THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. LXI. No. 1183.

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

AUGUST 27, 1898.

CONTENTS

OUR readers already know that it has been the expectation of the American Institute of Architects to establish its headquarters in the so-called "Octagon House," at Washington, and it is a satisfaction to know that a five-year lease of the odd little structure has at length been signed at a rental of about a dollar a day, the provisions of the lease providing on the one hand for renewal or for the eventual purchase of the property, and on the other hand for cancellation at stated times during the currency of the original term. In order to provide money for the rent and also for the repairs so old a building probably needs and for any alterations that may be needed to adapt the building to its new purposes, the Institute for the first time exercises its corporate powers and appears in the market as a borrower of money. As the bond issue is but five thousand dollars in all, the risk, even for so loosely knit an organization as is the Institute, is altogether a negligible quantity and the treasurer of the corporation will probably lose but little sleep over the matter between now and 1913. As this year's convention is to be held in Washington, those in attendance will have an opportunity to inspect the building, even if nothing is done to adapt it for this year's meetings. As the Octagon House, which is really a hexagon, was built about 1800, it is somewhat late in its development of the Colonial style. Moreover, as its owner, Colonel Tayloe, was one of the rich men of the day, a lover of horses and giver of lavish entertainments, it is only natural to infer that in his house, as in that of others of his kind, there should be found a greater regard for exuberant display than for the refinements of a chastened taste. If our readers care to turn to our issue for January 7, 1888, they will find measured drawings of some of the interior work in this house, which show, seemingly, that the general good taste of Doctor Thornton, who designed the building, was probably overruled by the requirements of the owner, who wished his new house to be as noted for its elaborateness as he himself was for his hospitality. In the same place will be found the plan of the building, which suggests that a fairly commodious hall can easily be arranged in an upper story.

AN accident, where the responsibility of the employer seems to be distinctly qualified and diminished by the acts of the fellow-servants of the unfortunate men who were its victims, occurred in Philadelphia last week, but just where the responsibility for a clearly avoidable occurrence will finally be placed cannot now be foreseen. The accident occurred on North Fifth Street, shortly after the noon-hour — and we cannot help feeling that but for the nooning some workman might have discovered the first signs of impending disaster and so given the needful life-saving warning — while two gangs of men were at work on scaffolds upon the face of a seven-story building having a frontage of forty feet on the street. The men on the upper scaffold were giving the finishing touches to the far oversailing terra-cotta cornice, when the entire cornice left its bearings and swept both gangs of workmen into the street below, killing four of them and wounding several others. The report of the official examination shows that the building was properly designed by the architect; that the workmanship throughout was thoroughly good, and that the disaster was simply due to one of those unaccountable oversights which, seemingly, overtake even foremen who are ordinarily efficient. Being of terra-cotta there was not, of course, the same chance to balance the cornice on the wall that is afforded in those cases where stone is used, and so more than ever dependence had to be placed on metal ties and braces, which were provided on the drawings in sufficient size and quantity to hold the work in place, during construction properly conducted, until the counterbalancing parapet-wall should have been built above the cornice. Apparently, however, the unconsidered presence of the iron lintel-beams over the windows caused a shortening at these places of some of the ties and by so much reduced the stability of the work, but this does not sufficiently account for the accident. The true cause appears to be found in the fact that, according to the testimony of the surviving workmen — who, now that the accident has happened, declare that they had always been afraid of the cornice and had worked with unwillingness on it or under it — the cornice had not, after the usual manner, been supported during the work of setting by any shores, running either from the window-sills below or from the erecting scaffold on which the men worked, and hence the cohesion due to the mortar used in setting, which, of course, amounted to nothing as the mortar was still green, was all that added to the security afforded by the metal anchors. The testimony appears to show that, with the mortar firmly set and the parapet-wall in place, the cornice would have been sufficiently stable and that the accident was due to the neglect on the part of the builder or his foreman to shore up his work in the ordinary way during the work of construction.

TO-DAY there will be organized in Philadelphia a body which should prove of great advantage to professional men engaged in the conduct of constructive processes of various kinds, since at that time will be perfected the rules for the governance of the American Section of the International Association for Testing Materials, of which branch Prof. Mansfield Merriman, well known to the architectural and engineering professions, has been appointed chairman. We believe we have already informed our readers that the International Association for Testing Materials itself is due to the initiative of Prof. J. Bauschinger and others, who formed a preliminary organization at Munich in 1882. Conferences, increasing in number of attendants, were held at Dresden in 1884, at Berlin in 1886, at Munich again in 1888, at Vienna in 1893, at Zurich in 1895 and at Stockholm in 1897. As these gatherings attracted increasing attention throughout the scientific world, the present international organization was perfected at the Zurich meeting in 1895. As might be expected, England as a disbeliever in the advantages of the metric system, which, of course, is the very fundament of the observations of such an association as this, has held aloof and taken no part in the meetings, but now, apparently seeing the writing on the wall, has changed her mind and proposes to take active interest in the work hereafter. That France also should not have been represented would be strange, but for the fact that in 1890 she appointed a commission to report on "Methods for Testing the Materials of Construction," and this commission for a while followed its own line of investigations. But in 1895 France joined the International Association at the Zurich convention, and now Turkey is the only European country that is not in membership. This country has been represented at these meetings in a somewhat informal way, the American Society of Mechanical Engineers leading the way in 1893, and later representatives of the Army and Navy were sent to the more recent gatherings. Now it is proposed to take a more active and formal part in the work and the organization of the American Section to-day is the outward token of the intention. Since July, 1896, the transactions of the International Association have been regularly published, in both German and French, in the *Baumaterialenkunde* (which can be had by sending $3.50 to Richard L. Humphrey, Secretary American Section, Testing Laboratory, City-hall, Philadelphia), but since the adhesion of England and this country it has been decided that they shall also be published in English, so it will be well worth while for every one to procure these reports and follow up the developments as they come along.

THERE is nothing that newspaper men and promoters of public enterprise like more to use than a good round number and the latest instance of the habit we have found is in connection with a projected monument in honor of Lafayette, which some one proposes shall, at the time of the Paris Exposition of 1900, be presented to Paris by the school children of this country. The argument is that it will be very easy to procure money for a fine and costly, if not artistic, monument, because there are "ten thousand schools in this country in which twenty million children are pupils" and that a contribution of only one cent from each would afford an ample building-fund. Probably the promoters have, as usual, overstated their case by one hundred per cent. Still, as the programme includes a proclamation by the President that the anniversary of the surrender at Yorktown, October 19, in which the French played some part, shall be duly observed this year as "Lafayette Day" by the public schools throughout the country, and an opportunity will thus be afforded to collect subscriptions from the children, very likely a sufficient fund may be secured to carry out the undertaking. Whose scheme it is and what sculptor with a pull hopes to secure the commission we cannot guess, but the whole matter looks not only factitious but even suspicious. Even the rage for "centennial" celebrations cannot be so wrested as to form a colorable pretext for the scheme, and there is surely nothing in the recent relations between France and this country, except its gift to us of a painting of the surrender at Yorktown, that calls for an exhibition of international amity expressed in bronze and stone. The only thing we can think of as accounting for this movement is a desire to get even with France for having imposed on us two very infelicitous statues of Lafayette, one by Bartholdi, in Union Square, New York, and the other by Mercié, in front of the White House, at Washington. Perhaps, as our customs, if not laws, do not allow the President to visit the potentates of the world and distribute, by way of gratuity, orders, snuff-boxes, Sèvres or Dresden dinner-services, photographs, paintings or what not as he takes his departure from each Court, the country, as a whole, in this very democratic way is going to take upon itself the duty of expressing its good-will to other peoples.

IF the late Dr. Evans, Napoleon's court dentist, were alive, we should suspect him of being at the bottom of the movement, for not only did he in 1876 offer to contribute ten thousand dollars toward the erection, in Paris, of a colossal statue in honor of America's amity toward France but he was particularly interested in Lafayette as a subject and had gathered a large collection of the "ana," material and immaterial, relating to that distinguished character. In fact it was his avowed purpose to erect, at his own expense, an equestrian statue of Lafayette in Paris, and he exhibited at the Exposition of 1889, the model for such a statue made at his suggestion by the young American sculptor, C. E. Dallin, but nothing came of it and it was generally believed that he was only cleverly seeking notoriety at little cost. We believe that in this bulky, if not valuable, interchange of courtesy the account stands at present against this country, since in return for Bartholdi's statue of "Liberty" and his statue of "Lafayette," and the group of "Washington and Lafayette," at Washington, we have only established on French soil a reduced copy of the statue of "Liberty," while a replica of the group, at Washington, has only been talked of. A good many years ago, too, there was talk of presenting a statue of Washington to the City of Paris, but we believe nothing came of it. If the present affair must be gone through with, we hope that the result may not do shame to the real capacity of our sculptors.

THE value of catalogues and records as evidence of ownership is attested just now by the care that is being taken to write up the records, fully descriptive and illustrated, of all the portable property which belongs to Victoria either as individual or as queen, so that there may be no difficulty in separating personal from crown property when the time comes. It is also attested by the steps that the Venetian authorities are taking in their endeavor to reclaim a large number of paintings of which their galleries have been deprived, and these endeavors do but add force to what we said the other day as to the uncivilized character of the suggestion that this country should levy on the Prado Gallery at Madrid, by way of laying hands on good security for a war indemnity. At this moment the Venetians are urging the Italian Government to take effective steps to bring about the return of some six thousand paintings which Bonaparte removed from various galleries and palaces at the time of his occupation of the city in 1806 to magnify the collections he was making for the glorification of Paris. These spoils were supposed to be properly distributed and returned to their original owners after the overthrow of the Emperor by the Allies, but, as we said, it has been well understood that a good deal of the plunder that left Paris on its homeward trip never reached its destination but remained in the hands of individuals or governments that had no title to them. Few, however, could have supposed that these secondary robberies included not less than six thousand canvasses stolen from a single city. Under the common law, perhaps under the Roman law, which is the basic germ of Continental legislation, an owner may reclaim his stolen goods wherever he may find them, without any compensation to the holder, who may have purchased them in good faith from the thief, and it would seem that if this were a good principle of law as between individuals, something of the same nature should obtain under international law as between nations. Besides the paintings stolen by the French, the Venetians seek to recover from the Vienna galleries one hundred and thirty-five paintings which were carried off in 1838, at a time when Venice was under Austrian domination and when, therefore, the Emperor Ferdinand had an apparent lawful right to have them carried from Venice to Vienna, if it seemed to him desirable to do so. If the Italian Government prefers a serious and formal request to its neighbors, it is possible that the return of some paintings may be secured; but if some why not all? Even in the case of the existence of an active international good-will the matter will probably turn on the perfection of the proof of original ownership that can be presented, and this must be in the guise of records and catalogues.

IT is difficult to believe that the School of Drawing and Painting, under the guardianship of the Boston Museum of Fine Arts, has been pursuing its quiet but effective course for more than a score of years, but the receipt of the twenty-second annual report is proof of the fact and of the unnoted passage of time. Two or three things are to be observed in this report: first, that about thirty-four hundred dollars must be contributed by some friend of the School before July 16, 1899, to complete the ten thousand dollars which will secure the bequest to the School of thirty thousand, made by Mr. J. William Paige, for the foundation of an annual travelling-scholarship. The next noteworthy thing is the treasurer's statement of receipts and expenditures during the whole life of the School, and as many people have an idea that all such things in Boston are supported largely at the cost of liberal-minded contributors who have an interest in art and education, we believe the statement will surprise others than ourselves. During the twenty-two years the gross income has amounted to nearly two hundred and forty-five thousand dollars; and of this amount only some fifteen thousand dollars have been the gifts of friends in time of need, the balance representing the tuition-fees paid by the pupils. As the books show there is a reserve fund and cash balance of about seven thousand dollars, it appears that the School has within eight thousand dollars been a self-supporting institute for more than twenty years, and as the salaries now paid the instructors are fairly liberal the exhibit is rather astonishing and highly satisfactory to all concerned. The third point of interest lies in the fact that eighty per cent, at least, of the pupils are women and, therefore, it is to be supposed that only a small portion of the pupils are acquiring a training of which they hope to make professional use. Still, in twenty years many men and some women have in this school acquired a part, at least, of their professional training, and it would be interesting to know who they are and what they have done in the world of art since they left the nest in the basement of the Museum. The inquiry seems to us so well worth while that we hope that, when the twenty-fifth annual report appears, we shall find included in it the roster of former pupils who have actually pursued a professional career in one branch of art or another.

STATICS OF STRUCTURES. — THEORETICAL AND APPLIED.[1] — XII.

WALLS AND COLUMNS.

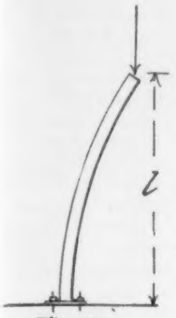


Fig. 116.

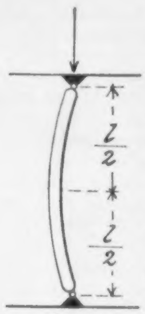


Fig. 117.

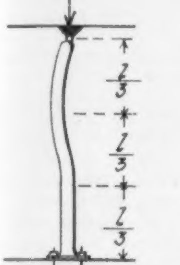


Fig. 118.

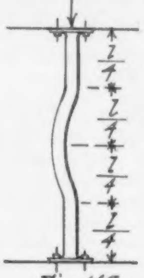


Fig. 119.

230. Two items of construction that demand the designer's attention as soon as his drawings begin to assume a more definite shape are the wall-thicknesses and the number and location of columns.

The method of determining the wall-thicknesses according to municipal building-laws has already been given (§§ 186–190). A simple rule, readily remembered, but only applicable to buildings with stories of the ordinary height, is to make *bearing*-walls (those supporting floors) 12″ thick for the uppermost 25′ of their height, and every division of 25′ below that 4″ thicker than the one next above it. This is practically the rule followed in connection with Figure 95, § 188.

Wherever possible, the main walls of a building should be supported or buttressed laterally by cross-walls. Very often heavy girders extending from wall to wall incidentally answer this purpose. According to the New York Building-law, main walls, whenever without cross-walls for a distance greater than 105′, should be increased 4″ in thickness.

231. When, however, unusual conditions are met with, as, for instance, in the case of large halls, churches, towers, or piers carrying domes, these building-law rules become inadequate. Under such circumstances the loads to be carried should be estimated, and the required size of the wall or pier computed by means of a suitable column formula. An example illustrating this method shall be given farther on.

The thickness of curtain-walls in skeleton buildings is of no importance structurally, as these walls are carried entirely by the ironwork, acting as a sort of heavy fireproofing for the latter. Were it not for architectural considerations, which demand that walls be built thicker at the bottom than at the top, curtain-walls could be made of the minimum thickness throughout, regardless of the height of the building.

While determining the thicknesses of the various walls it is necessary to continually bear the most likely arrangement of the floor-framing in mind, in order to ascertain which will be bearing and which simply partition walls. It is in this connection that the columns first make their appearance; they are required between walls which are so far apart that it would be impossible to frame a floor of ordinary thickness between them without intermediate supports.

232. The location of these columns depends to a great extent upon architectural considerations; although it is often possible, especially in the case of office-buildings, to arrange the plan so that the spacing of the columns will be an economical one. In general, it will be found that an arrangement resulting in fairly large bays, such as, say, 15′ × 20′, or 20′ × 20′, will be most advantageous. If they are spaced more closely together, the columns in the upper stories, if proportioned exactly to the loads to be carried by them, would have to be made smaller than desirable, as will be seen farther on.

The theory of the column is not as successfully established as that of the beam. This seems to be largely due to the fact that a great many factors affecting the strength of a column must of necessity be disregarded in deducing formulas sufficiently simple to admit of practical application.

Two of the oldest and best-known series of formulas are those of *Euler* and *Gordon*.

233. Euler's formulas, dating from the middle of the last century,[2] are based on the assumptions that a short column will fail entirely by direct crushing, and a long one purely by transverse bending; and that, for every material, there exists a definite ratio of length to diameter which marks the division between short and long columns in this sense. These assumptions are, of course, ideal, and cannot be verified by actual experiment.

Euler's short-column formula is exceedingly simple; it states that the load, or strength, varies directly with the cross-sectional area, or

$$P = c\,A \qquad (60)$$

in which P = ultimate load on column in pounds per square inch; c = ultimate compressive strength of material; A = cross-sectional area of column in square inches. If the safe load is desired, the result must be divided by the factor-of-safety; or, instead of c, must be taken c', the safe compressive strength of the material.

234. For the long-column formula Euler recognizes four cases: —

Figure 116: One end of column fixed and the other free.

Figure 117: Both ends free, but guided in the direction of the load.

Figure 118: One end fixed, and the other free, but guided in the direction of the load.

Figure 119: Both ends fixed.

In practice, an end planed off in a direction perpendicular to the axis of the column, so that it will press evenly against the surface supporting it, is considered a fixed end; and an end fastened by means of a pin, as, for example, the struts of a pin-jointed truss, is considered a free end guided in the direction of the load.

Figure 119 is, therefore, the case which occurs most frequently in practical work.

In deducing the formula, one end of the column is assumed as fixed, and the other free, as in Figure 116; and an equation analogous to the deflection formula for beams, involving the *moment-of-inertia* (§ 209) of the column-section and the *modulus of elasticity* of the material is applied; from which, finally, by means of the calculus, the following equation is evolved: —

$$P = \frac{\pi^2}{4}\,\frac{E\,I}{l^2} \qquad (61)$$

in which P = ultimate load on column in pounds; π = 3.1416; E, the modulus of elasticity of the material in pounds per square inch; I, the moment-of-inertia of the column cross-section in inches; l, the unbraced height of the column in inches.

235. Before proceeding, let us explain briefly the meaning of the term *modulus of elasticity*. The *elastic strength* or *limit* of any material is the minimum load required to produce a *permanent set*, or a lasting change in the shape of a piece of that material. When subjected to a load smaller than this limit, the material will only change its shape temporarily, and immediately regain its original form as soon as the load is removed.

The modulus of elasticity is the ratio

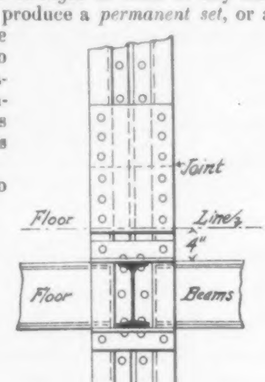


Fig. 122.

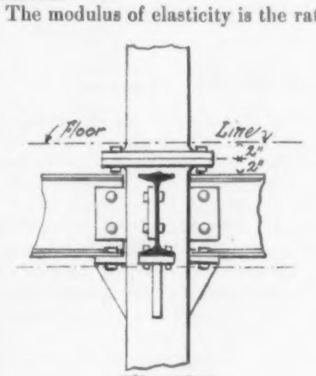


Fig. 120.

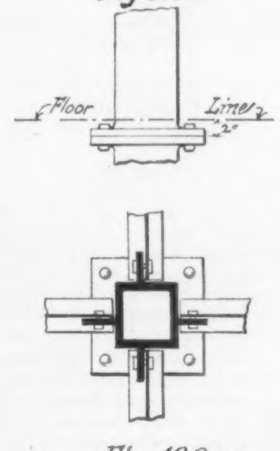


Fig. 120a.

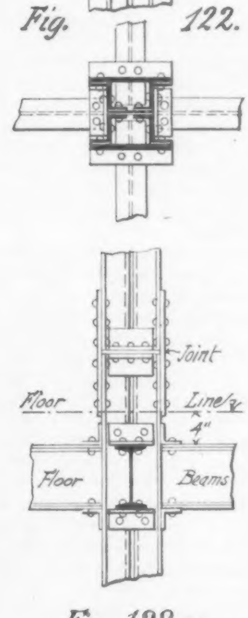


Fig. 122a.

of a load to the strain caused by it, if strain is taken to mean distortion of the material (§ 9).

Thus, if a load of p pounds per square inch causes a bar of the original length of l inches to elongate e inches, the strain s per inch of length will be $s = \frac{e}{l}$.

[1] Continued from No. 1171, Page 78.
[2] They were submitted to the Berlin Academy in 1759.

And the modulus of elasticity E of the material of which the bar is co in pounds per square inch, will be $E = \frac{p}{s}$.

For example: a tension of $p = 13{,}500$ pounds per square inch causes a wrought-iron bar 10″ long to elongate 0.005″. The strain s per inch of original length is, therefore, equal to $0.005 \div 10$, or

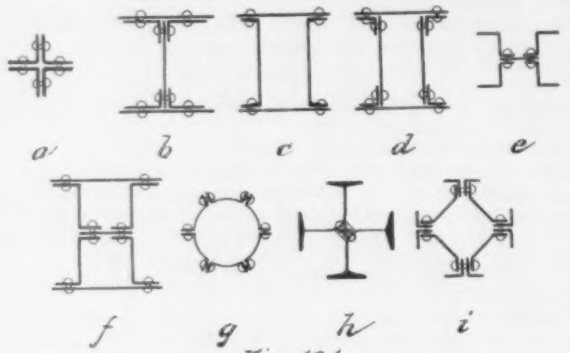


Fig. 121.

0.0005″; and $E = 13{,}500 \div 0.0005$, or 27,000,000 pounds per square inch, which is, therefore, the modulus of elasticity of wrought-iron. The modulus of steel is 29,000,000; that of cast-iron, 15,000,000; and that of wood, average, 1,000,000 pounds per square inch.

236. For the second case, Figure 117, Formula 61 becomes

$$P = \pi^2 \frac{E\,I}{l^2} \qquad (62)$$

For, in Figure 117, one-half of the column is analogous to the whole column in Figure 116: therefore, Equation 62 is derived by substituting $\frac{l}{2}$ for l in Equation 61.

For the third case, Figure 118,

$$P = \frac{9}{4}\pi^2 \frac{E\,I}{l^2}, \qquad (63)$$

derived by substituting $\frac{l}{3}$ for l in Equation 61; and for the fourth case, Figure 119,

$$P = 4\,\pi^2 \frac{E\,I}{l^2}, \qquad (64)$$

derived by substituting $\frac{l}{4}$ for l in Equation 61.

In all of these equations, 61 to 64, P is the ultimate or breaking load on the column; to get the safe load, it is, therefore, necessary to divide the results obtained through these equations by the factor-of-safety adopted for the material in question, as, for instance, 6 to 8 for cast-iron, 5 for wrought-iron, 3 for steel and 10 for wood.

237. Gordon's formulas, or, as they are often called, Rankine's, are based on the very reasonable assumption that all columns, whether short or long, fail by a combination of crushing and bending. Accordingly, the stress on the cross-section of the column taken half-way between the ends is composed of two kinds: one, a simple compressive stress uniformly distributed over the section, and the other, due to the cross-bending, a combined compressive and tensile stress, similar to that existing in beams. While the first involves only the area of the cross-section, the second involves also its moment-of-inertia, for which, to simplify the formula, the product of the square of the radius of gyration into the area (Equation 47) is substituted.

After a value for the deflection, derived from a proportion similar to that used for beams, but containing a constant, derived experimentally, is introduced, the following formula is obtained (for a column fixed at both ends, Fig. 119): —

$$P = \frac{C\,A}{1 + \frac{l^2}{n\,r^2}} \qquad (65)$$

in which P = ultimate load on column in pounds; C, ultimate compressive stress of material, in pounds per square inch; A, cross-sectional area, in square inches; l, length, in inches; n, a constant, as follows: 6,400 for cast-iron, 36,000 for wrought-iron, 50,000 for steel, 3,000 for dry timber, 500 for stonework, and 300 for brickwork; r radius of gyration of column section, in inches. If the safe load is desired, the result must be divided by the factor-of-safety, as given above, (§ 236), or the safe compressive stress C' must be substituted for C.

For the second case, Figure 117, Equation 65 becomes

$$P = \frac{C\,A}{1 + \frac{4\,l^2}{n\,r^2}} \qquad (66)$$

And for the third case, Figure 118,

$$P = \frac{C\,A}{1 + \frac{16\,l^2}{9\,n\,r^2}} \qquad (67)$$

These equations are obtained, as in the case of Euler's formulas, by the substitution for the original value of l its values as modified by the various end-conditions.

238. A series of formulas very much simpler than the above are the more recent ones of Johnson,[1] giving the ultimate load P in pounds per square inch, as folllows: —

For wrought-iron: —

Figure 117: $P = 42{,}000 - 157\,\frac{l}{r}$; (68)

Figure 119: $P = 42{,}000 - 128\,\frac{l}{r}$. (69)

For mild steel: —

Figure 117: $P = 52{,}500 - 220\,\frac{l}{r}$; (70)

Figure 119: $P = 52{,}500 - 179\,\frac{l}{r}$. (71)

In all of these $\frac{l}{r}$ is the ratio of the length to the least radius of gyration, both in inches.

To get equations giving the safe loads, divide all the constants by the factor-of-safety. Thus, with a factor of 3, Equation 71 would become

$$P' = 17{,}500 - 59\,\frac{l}{r}.$$

239. In practical designing column formulas are not used to a very great extent, as their application involves considerable calculating, which can be avoided by turning to the tables of safe loads given in numerous handbooks. Thus *Kidder* and *Trautwine* give values for nearly all of the various forms of columns, both cast-iron and steel; the "Carnegie" handbook, wood, cast-iron, and steel (Z-bar) columns; the "Pencoyd" handbook, latticed, round and square columns, both iron and steel; and the "Expanded Metal" handbook, round and square cast-iron, and steel angle and plate-girder columns, according to the requirements of the building-laws of Boston, New York and Chicago.

The values given by these tables are all amply safe under ordinary circumstances; for unusual conditions, as, for instance, eccentric loading, etc., extra allowances must be made.

240. Cast-iron columns are made hollow, with a thickness of shell varying from ¾″ to 2″; either round or rectangular in cross-section. According to the New York law their unbraced height should not be more than twenty times their diameter, or least lateral dimension. Thus, a column 12′ high would have to be not less than

$$\frac{12' \times 12''}{20} = 7.2''$$

in diameter, or $7.2'' \times 7.2''$, if square.

Figures 120 and 120*a* show the form generally adopted for cast-iron columns. It has a flat base and top, with brackets and lugs for the beams. Each column is *faced*, or planed off smoothly top and bottom, so that one will fit accurately on the other, making the entire line true and plumb. They are bolted together by means of four bolts at each joint. These joints are located over the floor-beams, so that the latter can be put in place as soon as one story of columns has been erected, thus holding them securely in position while the next story of columns is being set.

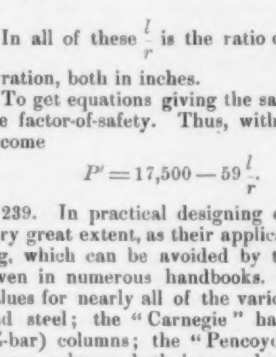


Fig. 123 and 123a.

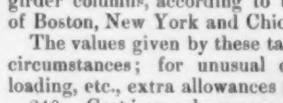


Fig. 124.

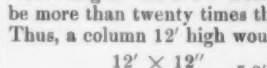


Fig. 125.

241. Steel columns are made by riveting together plates, angles and other suitable shapes into rectangular, circular, and a variety of other sections, as shown in Figures 121*a* — *i*. Of these the forms requiring the least number of rivets are generally the most economical to manufacture, as, for example, the Z-bar column, Figure 121*e*, requiring two rows; or the Larimer, Figure 121*h*, requiring only one row. Figure 121*d*, the box-girder form, would, in this respect, be the most expensive, requiring eight rows. Figures 121*a* — *d* are composed of ordinary structural shapes; while Figures 121*e* — *i* (Carnegie "Z-bar," "Phœnix," Jones & Laughlin's "Larimer," and the "Gray" column) are built up of patented shapes.

In the case of steel columns the joints are sometimes located at one-half the height of the floor-beams, but oftener, as in the cast columns, above them. The columns are butted together, and the joint covered with splice-plates (Fig. 122). Sometimes plates are

[1] Presented to the American Society of Civil Engineers in 1896.

interposed, bolted to the columns by means of angles (Fig. 122*a*). The beams are carried on brackets formed by angles riveted to the columns.

242. In determining the sizes of the columns for a large building it is customary to designate each line of columns by a letter (See Fig. 11, § 33). Each individual column is then known by its line-letter with the number of the story in which it is located affixed, as, for instance, "Column *A* 3," or "*D* 7," etc. A schedule is then prepared for each line of columns, consisting of seven divisions, the first of which contains the numbers of the stories; the second, the unbraced heights of the columns (generally equal to the story-heights); the third, the load on each successive column; the fourth and fifth, the adopted sizes of the columns; the sixth, the safe loads for these sizes (which must be equal to or greater than the corresponding amounts in the third column); and the seventh, remarks. As an illustration, we give here a schedule for column "*Q*" of our office-building,[1] assuming that circular cast-iron columns are to be used. The area supported by this column, per story, is equal to 16′ × 19.6′, or 314 square feet.

243. In New York it is prescribed by law that columns must be strong enough to support the entire dead and live loads on all the floors; this requirement is unnecessarily severe, as the chances of getting a full live-load simultaneously on every floor are, in an ordinary building, very slight indeed. For this reason a more economical method, and one quite as safe, is to calculate for the entire dead-load and only for from 50 to 80 per cent of the live-load. The first method practically amounts to increasing the factor-of-safety.

According to it, the load on our twelfth-story column, which carries the roof, would be 314 square feet × 130 pounds (80 pounds dead and 50 pounds live), or 40,800 pounds, or 20.4 tons. This amount we enter in the third division of our schedule. Proceeding, the load on the eleventh-story column, which carries the roof and the twelfth floor, will be equal to 20.4 tons plus 314 × 200 pounds (floor-load; dead, 100 pounds; live, 100 pounds) = 31.4 tons, or a total of 51.8 tons.

Similarly the load on the tenth-story column equals 20.4 + (2 × 31.4), or 83.2 tons; and so on, down to the basement-column, which carries everything above it, and for which the load is equal to 20.4 + (12 × 31.4), or 397.2 tons.

244. Now, taking one of our handbooks and turning to a table for hollow cylindrical cast-iron columns calculated by means of Gordon's formula, we find that the sizes corresponding most closely to our loads are those given in the next two columns, beginning with a 7″ column, ¾″ metal, safe load, 57 tons, in the twelfth story, and ending with a 16″ column, 1½″ metal, safe load, 402 tons, in the basement. It is necessary to commence with a 7″ column, although our load is only 20.4 tons, because a smaller column would exceed the 1 : 20 ratio of diameter to height, as above described.

It is for this reason that a close spacing of columns is uneconomical, as it results in very small loads for the upper stories. Even in our case, where the load-areas are quite large, the two upper columns are not taxed to their full capacity.

245. Schedule of column "*Q*" ("*R*" the same): —

Story.	Height.	Load in Tons.	Diameter of Column.	Thickness of Metal.	Safe Load in Tons.	Remarks.
12	12′	20.4	7″	¾″	57.	
11	"	51.8	"	"	"	
10	"	83.2	8″	⅞″	86.	
9	"	114.6	9″	1″	122.	
8	"	146.0	10″	"	149.	
7	"	177.4	"	1¼″	181.	
6	"	208.8	11″	"	214.	
5	"	240.2	12″	"	248.	
4	"	271.6	13″	"	282.	
3	"	303.0	"	1⅜″	307.	
2	14′	334.4	14″	1½″	347.	
1	16′	365.8	15″	1⅝″	388.	
Basem't.	16′	397.2	16″	1½″	402.	

246. The next schedule, column "*F*," is based on the assumption that steel Z-bar columns, Carnegie standard, are to be used. The load-area, in this case, is 19′ 7″ × 18′ 8″, or 366 square feet. The loads, beginning with 23.7 tons for the twelfth-story column, down to 462.9 tons for the basement column, were derived in the same way as for column "*Q*." The dimensions of the columns, together with their safe loads, were taken directly from the Carnegie handbook. Although, in the twelfth story, the smallest Z-bar column made is used, its strength is still considerably higher than the load. For steel columns the New York law requires a least ratio of diameter or side to length of 1 : 30. That is, a 12′ column would have to be at least 12 × 12 ÷ 30, or 4.8″ in diameter; or 4.8″ × 4.8,″ if rectangular in cross-section.

The lighter columns (twelfth to fifth stories) are composed of four bars and a plate (Fig. 121*e*); while the heavier ones (fourth to basement stories) have two additional plates, riveted to the outer flanges of the bars (Fig. 121*f*).

247. Schedule of column "*F*" ("*J*" and "*M*" the same): —

Story.	Height.	Load in Tons.	Dimensions of Columns.	Safe Load.	Remarks.
12	12′	23.7	6″ Z-bar, ¼″ metal.	55.9	
11	"	60.3	" " $\frac{5}{16}$″ "	70.3	
10	"	96.9	8″ " ⅜″ "	102 4	
9	"	133.5	10″ " $\frac{7}{16}$″ "	133.9	
8	"	170.1	12″ " ½″ "	172.6	
7	"	206.7	" " ⅝″ "	209.1	
6	"	243.3	" " $\frac{13}{16}$″ "	264 5	
5	"	279.9	" " ⅞″ "	286.1	
4	"	316.5	14″ " { 6″ × ¾″ bars. 14″ × $\frac{7}{16}$″ plates.	316.5	
3	"	353.1	" " { 6″ × ¾″ bars. 14″ × $\frac{11}{16}$″ plates.	358.5	
2	14′	389.7	" " { 6″ × ¾″ bars. 14″ × ⅞″ plates.	390.0	
1	16′	426.3	" " { 6⅛″ × ⅞″ bars. 14″ × ⅞″ plates.	433.1	
Basem't.	16′	462.9	16″ " { 6⅛″ × ⅞″ bars. 16″ × ⅞″ plates.	472.1	

248. Equation 65 can be readily used in calculating the strength of masonry piers of any shape, by considering them as columns fixed at both ends. It is only necessary to insert the values of C^{w} (200 pounds per square inch for brickwork, 500 pounds for cut stonework) and those of n (300 for brickwork, 500 for stonework), together with the square of the radius of gyration of the cross-section, which is usually rectangular.

As an example let us take a shed 50′ wide and 25′ high, its walls having arched openings 15′ wide and 20′ high (Figs. 123 and 123*a*). This arrangement results in piers 10′ wide. Each pier has to carry a roof-area equal to 25′ × 25′, the weight of a bay of brickwork amounting to 25′ × 25′, less the area of one opening, and the pressure of the wind, for which, unless it is separately calculated, a load of 15 pounds per square foot of superficial area is allowed.

Assuming the wall to be 28″ thick, the load on one pier would be as follows: —

Roof: $(25)^2 \times 70$ lbs. = ...	43,750 lbs.
Brickwork: (625′ — 275.85′) 280 lbs. =	97,800 "
Wind: $(25)^2 \times 15$ lbs. = ...	9,375 "
Total	150,925 "

The cross-sectional area of one pier equals 120″ × 28″, or 3,360 square inches. Its unbraced height is 25′; l^2, in inches, is therefore = 90,000″; r^2, the square of its least radius of gyration (Equation 55), is $\frac{(28)^2}{12}$, or 65.4″. The "least" radius of gyration is taken for the following reason: If the pier should fail by bending or buckling, this would take place in the direction of its least thickness; consequently its cross-section would rotate about the axis $M - N$ (§ 223), and its resistance would be measured by the moment-of-inertia taken about $M - N$, which is much smaller than that about the other axis, $M' - N'$. This applies to all columns or struts, for in failing they will naturally bend in the direction of the least resistance.

Inserting all these values in Equation 65, we get as the safe load on one pier

$$P = \frac{200 \times 3{,}360}{1 + \frac{90{,}000}{300 \times 65.4}} = 120{,}000 \text{ lbs.}$$

Since this is considerably less than the actual load, the piers are weak. We shall, therefore, increase their thickness to 36″. This adds somewhat to the weight of the brickwork, making it 126,000 pounds, and increasing the total weight to 179,125 pounds. The safe load on one pier will now be

$$P = \frac{200 \times 4{,}320}{1 + \frac{90{,}000}{300 \times 108}} = 228{,}000 \text{ lbs.},$$

or more than required.

249. By slightly changing its form, Equation 65 can be made to apply to continuous walls. For a strip one foot in width can be assumed as being cut from a wall and regarded as a column tending to fail by bending in the direction of its thickness t (Fig. 125); being confined on both sides, it could not bend in the other direction. Moreover, the assumed direction is that which would be taken by the entire wall, should it fail by bulging.

The square of the "least" radius of gyration in this case would therefore be $\frac{t^2}{12}$. The cross-sectional area of the strip will equal $t \times 12$. The height in inches involving too many figures, we shall substitute for it the height in feet, changing l^2 to $144\ L^2$. Inserting,

[1] See Figure 11, page 93, No. 1095; also Figure 46, page 44, No. 1115 and Figure 96, page 99, No. 1161.

further, for C', its value for brickwork of 200 pounds, and for n, 300, Equation 65 can be transformed into

$$P = \frac{2{,}400\,t}{1 + 5.76\frac{L^2}{t^2}} \qquad (69)$$

in which P = safe load in pounds per running foot on a brick wall, t, thickness of the wall in inches, L, its unbraced height in feet.

A similar equation can be derived for stone walls, by substituting the safe compressive stress on stonework, 500 pounds per square inch, for that on brickwork, and using 500 for the constant n (§ 237); or

$$P = \frac{6{,}000\,t}{1 + 3.45\frac{L^2}{t^2}} \qquad (70)$$

In which P = the safe load, in pounds per running foot, on a cut-stone wall, and t and L the same as under (69).

250. If we apply Equation 69 to the example given in §247 we shall find the safe load per running foot on the 36″ wall to be equal to

$$P = \frac{2{,}400 \times 36}{1 + 5.76\frac{625}{1{,}296}}, \text{ or } 22{,}800 \text{ lbs.}$$

Multiplying this by 10, the length of one pier, results in the same value as found by Equation 65.

We close this, our last chapter, with the hope that what has gone before may prove of some assistance to the reader, either in his practical work, or in pursuing a more advanced study of the subject.

O. F. Semsch.

[The end.]

BOOKS AND PAPERS

"To those who know nothing of stained-glass; to those who know something, and want to know more; to those who know all about it, and yet care to know what another may have to say upon the subject; — I dedicate this book."

THIS is the introduction to the most recent and comprehensive work upon the subject of stained-glass.[1] In the preface Mr. Day reminds the reader of his long experience, his thorough training in design, and adds that after a quarter of a century spent in hunting glass all Europe over, he feels that the windows have told him something and that he understood what they said. He treats the subject entirely from the standpoint of the artist student, with an absence of anything like dictum, which largely increases the value of the work by freeing it from the influence of any one school. The subject of stained-glass from beginning to end through the whole of the 400 and more pages is considered as a study of artistic facts and results rather than of theories. The book is very comprehensive, is well arranged, is presented in excellent form and is most profusely illustrated by reproductions of black-and-white drawings made from actual work in such manner that, though not giving the coloring of the originals, the relative color effects are quite fairly represented, and for purposes of study it is quite probable that one could learn more of the details of stained-glass from Mr. Day's pictures than would be possible from the glass itself. There are two peculiarly pertinent chapters, one on "How to see Windows," and another on "Windows Worth Seeing," both of which will be of aid to the artist in appreciating the quantity of excellent glass still remaining, in spite of the mediæval iconoclasts, the modern Philistines and the restorers. The subject of modern glass, that is, such as owes its creation to the past two centuries, is entirely eschewed, nor does the author attempt to prove any theories or fortify any personal bias by the lessons of the past, but he presents a thoroughly enjoyable, all-over-Europe study of this particular manifestation of art.

It is, perhaps, not going too far to say that stained-glass is one of the finer arts. It is also one of the most ancient. White glass, and that of extreme purity, would seem to have been known to the Chinese as long ago as 2300 B. C., for even then they were using astronomical instruments of which the lenses were presumably of glass. Long before this the Egyptians had learned the secret of producing colored glass. There are abundant examples of a species of work which might be called "ancient stained-glass" which is, even to-day, practised in the East, where from a very early date windows were built up of little pieces of colored glass, set in heavy frames of either iron or plaster. There are a number of specimens of this work in the Architectural Museum of Columbia University, and the same sort of work is frequently seen in modern Mohammedan countries. For that matter, even at an earlier time the Romans appear to have filled window-spaces with slabs of marble, framing discs of colored glass. It is more than probable that the Venetian glassworkers were familiar with the colored lattices of the East, and there is every reason to suppose that at first they did in lead what the Eastern artificer did in stone or plaster, and that the windows which, according to various vague accounts, adorned the Christian basilicas as early as the sixth century, bore strong likeness to Mohammedan glass Christianized, so to speak. Stained-glass, however, such as we find in the earlier existing mediæval windows, may possibly date back to the reign of Charlemagne, 800, but it may safely be said not to have occurred earlier than the Holy Roman Empire. It appears to be quite probable that Europe owes to the French the introduction of colored windows, a colony of Venetian glassworkers having settled at Limoges in the year 979. Of the very early glass very little remains. Fragments may still remain imbedded in windows of a later period, the material being too precious not to be very carefully preserved, but archæologists appear to agree that no complete window of the ninth or tenth century has been preserved, and that even of the eleventh there is nothing that can quite certainly be identified. The great mass of early Gothic glass belongs undoubtedly to the thirteenth century. The oldest French work to which definite date can be assigned is that of St. Denis, 1108, whose value, however, is almost nullified by expert restoration.

A rough general way of classifying the various kinds and, consequently, the various periods, of glasswork, is to say that in the early work the glass was regarded merely for its color, without any regard to design or workmanship; that in the middle period the glass was less brilliant in detail, but helped out a great deal more by the arrangement of leads; while in the later work the value of leading, as such, began to disappear, and painted work, as such, usurped the whole field. These are roughly the three stages through which the art of glasswork has passed. And, by the way, it is a good deal of a misnomer to designate this particular manifestation of art as stained-glass. Stain is assumed to be a coloration of the material so intimate that it becomes a part thereof without destroying its character. The early glass was almost without exception of uniform color throughout, — what would be called "pot-metal." In only one direction was staining, as such, used. It was discovered about the beginning of the fourteenth century that white glass painted with a solution of silver would take in the kiln a pure transparent stain of yellow, varying, according to its strength and the heat of the furnace, from palest lemon to deepest orange. This is practically the only staining, as such, which is known in glasswork. The first colored windows were intense in color, rich and even heavy. The note they struck was deep, satisfactory, suited to the Church and to the times. But from the twelfth to the seventeenth century there is little of what we call, rather loosely, "stained" and sometimes "painted" glass, in which there is not both staining and painting; that is to say stained-glass was used, and painting was applied to it. In the earlier work the painting is only used to help out the stained-glass, and in the later the stained-glass is used to help out the painting. In the very late Gothic and early Renaissance glasswork painting is everything, and the lines of architecture, the decorative sense which was unconsciously moulded into the earlier glass, disappear entirely.

All through the early and middle period of glass it was the custom to slightly cover the surface of the glass with a thin brown paint which was fired into the glass, without, however, forming a stain. Of richly jewelled Gothic glass all innocent of paint or obscuring of any sort, no single window remains to us. In later work this coating was used to give accent to the design, in some cases it even went so far as to simulate leads to avoid difficult glazing. At times, too, a diaper pattern would be picked out in this brown coating, letting the light shine through, and in some instances, instead of brown, a grayish tone was used as a means of producing effects *en grisaille*, a treatment applied to some of the most notable windows which have come down to us from mediæval periods, one of the most famous of which in England is the group of long lancets in the north transept in York Minster known by the name of the "Five Sisters."

In proportion as architecture seems to have been treated more as an archæological science the decorative arts suffer, and though a limited quantity of very excellent glass was produced all through the Renaissance period there is little of it which has the same intrinsic decorative qualities which marked the best period of the Gothic work. Stained-glass was preëminently a Gothic manifestation, and with all the wealth of ornament which the Renaissance period brought into the world the later class never was quite equal in decorative value to the best of the early. The tendency of development in all stained-glass was to the suppression of the decorative element and the magnifying of the pictorial element. If we can succeed in defining a picture as distinguished from a work of decorative art, and can then show how a stained-glass window, in attempting to conform to conditions which we have agreed to call pictorial, fails of its decorative function, it will then not be so difficult to see how, in proportion as glass aims at the pictorial, it falls short of making good windows. Success both as decoration and painting is possible, but the proportion as decorative stained-glass work aimed at pictorial effects it failed, or at any rate it is safe to say that since masters attempted it and failed, since the finest work in glass which aims at the pictorial and depends upon painting ends in being thin or opaque in effect, that the happy medium was not found.

The customary line between Gothic and Renaissance glass is drawn at about 1530 A. D. At the same time, if one considers the crudity of methods of Gothic glass and takes into account the gain in technique which the early Renaissance artists manifested, it is safe to say that an average between mere technicalities and artistic feeling with nothing but crude methods can be ascribed to some of

[1] "*Windows.*" A Book about Stained and Painted Glass. By Lewis F. Day, author of "*Nature in Ornament*" and other Text-books of Design. B. T. Batsford, 94 High Holborn, W. C., London. Imported by Charles Scribner's Sons, New York. 1897. Price $10.50.

the Renaissance work and the magnificent windows of Van Orley at St. Gudule, Brussels, mark in a sense the summit of design as well as of painting in stained-glass, showing the most advanced technique, and an ability to manipulate the medium which was lacking in the earlier, the cruder, but also, we must admit, the more artistic, glass.

Although the most monumental works in stained-glass are ascribed to the Gothic period and particularly to the French cathedrals, and notwithstanding the claim which is sometimes made that no nation ever was able to use glass as successfully as the French, it is a fact which is very strongly brought out in Mr. Day's work that just as the Italians were able to appreciate color effects in their architecture they were no less successful in a more limited way with stained-glass. The love of color, the appreciation for it, the ability to apply it in a decorative manner, are qualities which are peculiarly Italian.

In most of the Italian churches the walls were covered with paintings, and the necessity for strong light was so thoroughly appreciated by the Renaissance architects that the existence of the windows was not taken as an opportunity for filling them with colored glass. It is so evident that the Italian sense of color could find more adequate expression than ever in glass that it is to be expected that the Italian painters should found a school of glass-painting comparatively uninfluenced by the traditional Gothic types of design, while observing the very best conditions of glazier-like technique; and we find in Italy windows such as are nowhere else to be seen, windows which, at their best, are of the very best. And it is at Florence that the distinctive quality of Italian glass is best appreciated. There is a vast quantity of it, varying in date from the early part of the fifteenth to the latter part of the sixteenth century, but it is uniformly Italian, and, with a few exceptions, it is extremely good. Unquestionably the finest windows in Florence are the great lancets in the apse and south apsidal transept of the Duomo, finer than the three lights at the east end of Sta. Maria Novella, which are so much more often spoken of, possibly because they are seen to so much more advantage in the dark-walled Lady Chapel. Two of the illustrations taken from Mr. Day's book give some idea of the color qualities of these windows, which have been ascribed, probably without reason, to the hand of Ghiberti or Donatello. The reproduction of the single head even in the black and white strongly suggests the color. The face is brown, the hair and beard dark and bluish; against it the band around the head, which is ruby, tells light. The orange-yellow nimbus, rayed, is rather lighter still, the beaded fillet edging it bone-white. The drapery is of the brightest yellow diapered with occasional blue trefoils, each of which has in its centre a touch of red. The background is of very dark blue, the architecture nearest it bright green, beyond that it is dark red.

This short explanation will serve to indicate the key in which the color is pitched. The glass itself is as rich as French work of the twelfth century, as deep as German of the fourteenth, but more vivid than either; there are no low-toned greens or inky blues. The blue is sapphire, the green has the quality of an emerald. In this palette of pure color the artist revelled. Nowhere as in the Duomo at Florence is one so impressed with the feeling that the designer was dealing deliberately always with color. Plainly that, and no other, was his impulse: color — broad, large, beautiful, impressive, solemn color masses. Elsewhere, the story-teller speaks, or the draughtsman, here the colorist confesses himself. The grand scale of his figures allows him to treat his color largely, and its breadth is no less notable than its brilliancy. There is infinite variety in it; but the general impression is of great masses of red, blue, yellow, green, purple, brown, and so on, held together by the same colors distributed in smaller threads and spots, as in diapers on drapery. The broad mass of any one color is itself made up of many various tints of glass. The accidental fusion of color, as of red and blue into purple, is guarded against by framing, say, the blue with green, or the ruby with brownish-yellow. At other times neutral tones are deliberately produced by the combination of, for example, red and green lines.

At Arezzo there are some windows which are probably the finest glass pictures which have ever been painted; the work, nevertheless, of a Frenchman, William of Marseilles, who established himself at Arezzo, and painted, amongst other glass, five windows for the cathedral there, which go about as far as glass can go in the direction of picture. This man possibly did in glass much what *he* would have done on canvas; but he never could have got such pure, intense, and at the same time luminous, effects of color in anything but glass, and he knew it, never lost sight of it, and tried to get the most out of what it could best give him, that is to say, purity of color, and translucency and brilliancy of glass. These are not pictures done into glass, nor are they translations, but they are the creations of a glass painter, one who knew all about glass, and instinctively designed only what could be done in it, and best done.

A single final quotation from Mr. Day's own words will serve to show how fully he is in sympathy with the subject and how enthusiastically he has studied it: —

"A more delicate if not always so rich an effect is to be seen in the great monolithic slabs which fill the five square-headed windows in the apse of the upper church at S. Miniato. Effect, did I say? Nay, rather effects, for they change with every gradation in the light. You may see at first little more than flat surfaces of pleasantly mottled white and purple-gray, translucent, but comparatively dull and dead. Then, as the sun creeps round the corner, a strange life comes into them. The white and palest grays begin to glow, and turn by slow degrees to pearly-pink, which kindles into gold, and deepens in the duskier parts to copper-red. The stronger markings of the stone now show out in the unsuspected strength, and the lighter veins take on by contrast a greenish tint, so that the warm color is subtly shot with its cool counterpart. If, when you first see the windows, the sun illumines them, the effect is less magical; you get your strongest impression first; but in the course of an hour or so a great change may take place — when, for example, towards noon the light passes away; but for a long while the stone remains luminous. Your eyes are open now, and in the delicate ashen-gray you see — or is it that you feel it to be there? — a tint of rose."

The Illustrations

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

CENTRAL BAYS OF THE HOTEL WALDORF-ASTORIA, NEW YORK, N. Y. MR. H. J. HARDENBERGH, ARCHITECT, NEW YORK, N. Y.

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

KNOLLWOOD CEMETERY STATION AND ADMINISTRATION BUILDING, SHARON, MASS. MR. THOMAS M. JAMES, ARCHITECT, BOSTON, MASS.

"RESERVATION": HOUSE OF CHARLES A. KING, ESQ., MATTAPOISETT, MASS. MR. J. A. FOX, ARCHITECT, BOSTON, MASS.

MANTELS AND DETAILS DESIGNED BY MR. E. PRUSSIANO, BALTIMORE, MD.

These drawings show work done by a pupil in the Architectural Division of the Maryland Institute.

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

A FARM-HOUSE, LE MESNIL-MAUGER, FRANCE.

HAMILTON HOUSE, PHILADELPHIA, PA.

[Additional Illustrations in the International Edition.]

THE HOTEL WALDORF-ASTORIA, NEW YORK, N. Y. MR. H. J. HARDENBERGH, ARCHITECT, NEW YORK, N. Y.

[Gelatine Print.]

VILLA AT CANNES, FRANCE. MR. A. STOCKLEN, ARCHITECT.

ENTRANCE GALLERY: EXHIBITION OF NATIONAL SCULPTURE SOCIETY, NEW YORK, N. Y.

A VIEW IN THE "ITALIAN GARDEN," AT THE SAME EXHIBITION.

Notes and Clippings

Buried Forest unearthed. — Secretary Watson of the Lumbermen's Exchange reports that within the last months a vast forest of walnut has been unearthed in southeast Missouri. In 1811 an earthquake in that part of the State resulted in the sinking of large tracts of land. Since then there have been annual floods in that district, each year adding to the accretions. Less than two months ago two farmers, walking through a part of the district, noticed what to their eyes seemed to be the ends of walnut-trees sticking out of the sunken places and tipped over. Remembering that vast amounts of cedar-wood have been dug up in various places, the farmers reported their observations, and the ground was explored. It was found to be rich in trees of black walnut from 28 to 36 inches in diameter. Secretary Watson states that there are two parts to a walnut-tree: the centre consists of solid, black wood, and the rest of the tree is a soft, sappy growth, which is of little use for commercial purposes. In these new trees, just unearthed, the sap has all rotted off, leaving only the black heart or solid portion of the tree. This is found to be a fine specimen of walnut, with an unusual depth of color. — *St. Louis Globe-Democrat.*

The Cernuschi Museum, Paris. — It has, I hear, definitely been decided that the Cernuschi Museum is to be opened next October. The magnificent collection of Oriental objects of art bequeathed to the City of Paris by the late M. Henri Cernuschi is housed in the splendid mansion at the corner of the Avenue Velasquez and the Parc Monceau, which the donor had specially constructed for himself, and which the City of Paris also inherits. The history of the collection is curious. M. Cernuschi, in spite of his wealth, was a very advanced Radical; indeed, he was mixed up in the Commune, and it was the shock of seeing one of his best friends executed by the Versailles troops in 1871 that gave him a disgust for Europe, and determined him to undertake a voyage around the world. He chose as his companion M Théodore Duret, who guided him among the marvellous art treasures of China and Japan, and suggested to him the idea of forming a collection worthy of being subsequently bequeathed to France. M. Cernuschi was not at that time a Frenchman (he was born in Italy) but he subsequently became naturalized. His vast fortune enabled him to purchase whatever struck him as beautiful or curious, and at the end of his peregrinations he had become possessed of from 5,000 to 6,000 objects of Japanese and Chinese art, which constitute one of the most valuable and representative collections in the world. One of the choicest pieces in it is a full-sized bronze statue of a Chinese Emperor caressing a splendid beard with one hand, and resting the other on a halberd. The figure is dressed in the imperial costume of ceremony, all the details of which are produced with the usual accuracy and skill of the Chinese artist. Another *chef d'œuvre* is a colossal bronze statue of the Daibuts (the Grand Bhuddah) in the cross-legged posture with upraised hand. M. Cernuschi's collection was first exhibited in the Palais de l'Industrie during the exhibition of 1873. It has, however, been materially added to since then. — *Pall Mall Gazette.*

Photography without the Aid of Nitrate of Silver. — H. N. Toply, of the Department of the Interior, in Ottawa, Canada, who discovered recently a method of developing negatives without the use of a dark-room, has discovered that the printing of photographs is not dependent on nitrate of silver. Heretofore the nitrate has had to be used in all prints, but Mr. Toply says that the juices of certain fruits are equally good, if not better than the nitrate, for photographic printing purposes. By means of this discovery a photograph can be printed upon anything — wood, pulp and paper — which can absorb these juices. The juice is not used just as it comes from the fruit, but it is subjected to a process which Mr. Toply, of course, desires to keep to himself at present. He has been engaged in the development of the process for five years. His attention was at first directed to the possibility of "herbaceous photograpy," as he calls it, by the withering of the white pine, which becomes a very dark gray under sunlight. A piece of planed pine was placed under the negative and exposed to sunlight without treatment and a permanent print on wood was obtained. Mr. Toply followed up this discovery by a series of experiments with the juices of fruits, which he found could not only turn dark gray, but would become jet black in sunlight. The process is so simple that, were it brought into general use, the price of photographs would be reduced to a minimum. —*Scientific American.*

Art in Paris Streets. — A few weeks ago it was announced that the Paris authorities had decided to make a change in the blue enamelled plates on which the names of Parisian streets are inscribed. These plates have been voted too plain, and they are to be replaced with something more artistic. An entire series of innovations in the same direction is now promised. The initiative in the matter is due to M. de Selves, the Prefect of the Seine, who is planning the creation of a special commission to be charged with promoting art in the streets. Competitions are to be instituted and prizes offered with a view to providing Paris with gas-lamps, fire-alarms, pillar-boxes, advertisement columns, and other necessities of a like order that shall be things of beauty and joys forever. The spirit in which the measure is conceived, says the *Morning Post's* correspondent, is doubtless wholly laudable, but the authorities have not always been happy of late in their efforts toward artistic improvement. For instance, the new copper and silver coins which they have issued are generally held to be far from a success, so far as the designs are concerned. In connection with this subject it may be mentioned that M. Chaplain has finally completed the model of the new gold coin, a first specimen of which was struck recently at the mint.

Chronicle Fire-Tables. — The unabridged edition of the *Chronicle* fire-tables for 1898 contains a record of the fire-loss in the United States by States and Territories for 1897, with exhibits of the monthly, annual, and aggregate fire-losses in the United States for the twenty-three years ending with 1897. A comparative statement of fire-losses for the last five years in round figures is as follows: 1893, $168,000,000; 1894, $140,000,000; 1895, $142,000,000; 1896, $118.000,000; 1897, $116,000,000. The aggregate loss by fire during 1897 amounted to $116,354,575, and the insurance-loss was $66,722,145. The number of risks burned was 74,740, and the number of fires was 55,779. It is significant that, while the property-loss for 1897 was less than that for 1896 by $2,382,845, the insurance-loss was smaller by $7,181,655.

Papyristite. — According to the United States consul at Zurich, a new artificial stone or moss has recently made its appearance on the builders' technical market, called papyristite, on account of the ingredients entering into its composition, principal among which is purified paper-pulp obtained from waste paper. The material is the invention of F. Gehre, a civil engineer of Zurich. It can be used in various ways, but is specially intended to serve as a solid, impermeable and jointless roof or floor, which, when once laid, will present a smooth surface, as if made in one continuous layer. This new material, it is said, is a non-conductor of heat, cold or sound, and, although as hard as stone, has a soft, linoleum-like feeling to the foot, and is noiseless. — *Boston Transcript.*

Receipts of the Salon of 1898. — The Paris *Salon* of 1898 has closed its doors, and the artists have removed their exhibits from the Galérie des Machines The final accounts of the exhibition have been made up. The total amount paid in entrance money was 348,000 francs, or not quite $69,800. On some Sundays in June the number of persons who visited the exhibition exceeded 30,000, while during the whole of the exhibition 315,000 free entrances were accorded. — *Exchange.*

The New Keeper of the Royal Academy. — Ernest Crofts, R. A., whose appointment as keeper of the Royal Academy, in succession to the late Philip Calderon, R. A., was recently announced, was born at Leeds in 1847. He was educated at Rugby and Berlin, afterward studying art in London as a pupil of A. B. Clay, and later at Düsseldorf under Professor Hünten. His first picture was hung at Burlington House in 1874, and four years later he was elected an Associate of the Royal Academy, becoming a full Academician in 1896. — *N. Y. Tribune.*

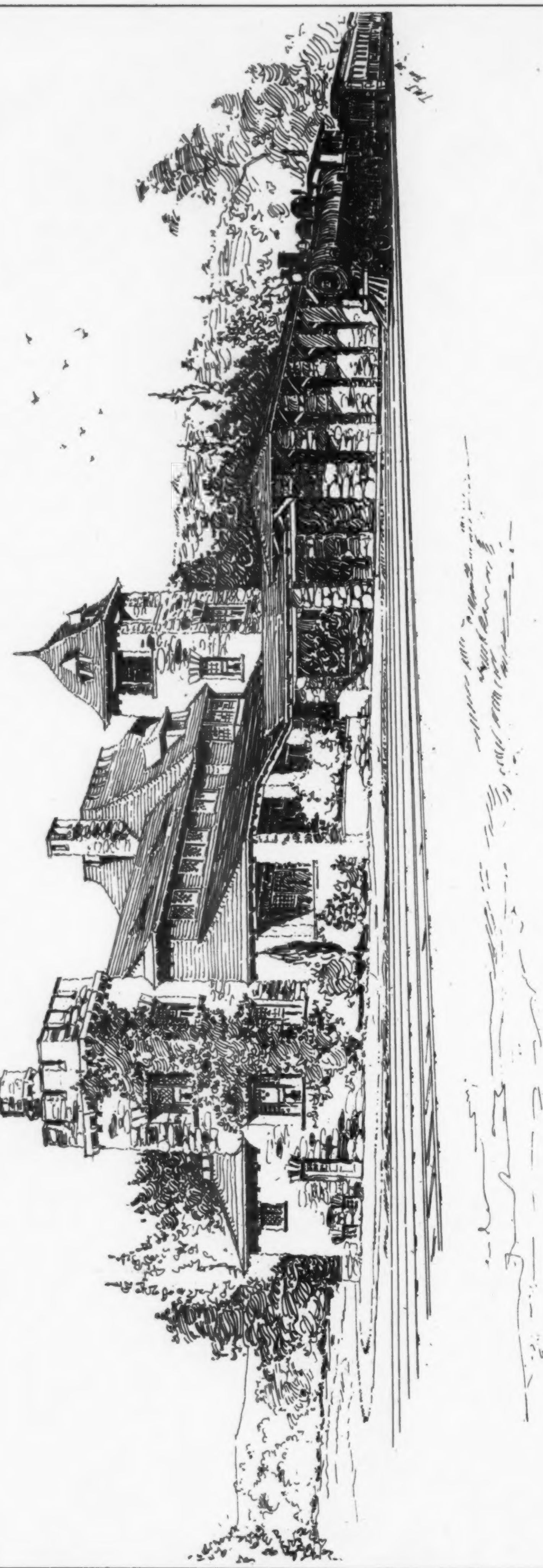
The British Museum vs. Barabbas. — The propriety of claiming four copies of every publication for the British Museum has elicited a strenuous protest from John Lane of the Bodley Head, who denounces the custom as a hardship on authors and publishers. Since works of fiction are withheld from readers in the library for twelve months after publication, Mr. Lane says it is difficult to see what service the Museum renders to their producers in exchange for this arbitrary toll, unless it be in giving a proof of publication. In the case of very elaborate, expensive and numerically small editions, a tax of four copies is decidedly onerous. "The nation buys its pictures," says a well-known London *Review*, "and every other kind of specimen for its museums. Why should it only be a Barabbas of books?" — *N. Y. Times.*

Sale of Mazas Prison Doors. — Two doors from Mazas prison to which a particular interest attaches have just been keenly bid for, although the sale of the building by public auction closed two days ago. These belonged to the cells where Monseigneur Darboy, Archbishop of Paris, and the Abbé Deguerry, Incumbent of the Madeleine, were confined as hostages during the Commune previous to their being transferred to the Roquette prison, where they were afterwards shot. Cardinal Richard desired to purchase both doors and preserve them in memory of the two victims of the Commune. Only one, however — that belonged to the cell occupied by the Curé of the Madeleine — has become the property of the Cardinal, the other having been bought already by the authorities of the Gerson school at Passy.—*Paris Correspondence London Telegraph.*

A Novel Railway Accident. — A passenger-train and a goods-train collided near Ponte Decimo, evening of August 20. Nine dead bodies have been extricated from the *débris*, seven of the victims being railway employés. Forty persons have been injured, many seriously. Details regarding the accident show that the goods-train was an exceptionally heavy one, and as the Giori Tunnel gradient is very steep three engines were attached. After the train had got well into the tunnel, however, it was found that the engines were not sufficiently powerful, and the train gradually slowed down, and finally came almost to a standstill. The tunnel is ill ventilated, and the coal used was of bad quality. The result was that the sulphurous fumes given off from the three engines rapidly became so dense that the engine drivers and stokers were all asphyxiated. After this the train, which was still on the up grade, slipped back and dashed with increasing speed down the steep incline, finally crashing with terrible force into the passenger-train at the bottom. Both trains were completely wrecked. Two more of the injured have succumbed, bringing the number of dead up to eleven, nine of whom were railway employés. The other two are a Mme. Asteng and her son. The condition of some of the injured is becoming worse. — *London Standard.*

Portland Cement in Ontario. — A grade of Portland cement, claimed to be fully equal in point of excellence to the English, German, or even Belgian product, is, according to a recent report of Mr. L. S. Hunt, one of the United States consuls, made of the natural deposit obtained from the bed of Shallow Lake, in the township of Keppell, Gray County, Ontario, nine miles west of Owen Sound. Its manufacture was begun in 1889, by the Owen Sound Portland Cement Company, and was attended with very great difficulties at first, owing to the fact that but little was known about the processes of its manufacture, and suitable machinery was not readily obtainable. The lake floods every spring and autumn to a depth of several feet, the water leaving, through fissures in the bottom and rock-bound shores, usually about the month of June. Men and teams are then employed to remove a few inches of the waste surface, beneath which the marl lies to a depth of about three feet. Under the marl is found the clay which forms the other ingredient and which is removed with the aid of a derrick, loaded on wagons, and carried to the factory on the shore of the lake. A large number of men and horses are usually employed for from six weeks to two months, in order to obtain sufficient material for manufacture during the ensuing autumn, winter, and spring. The quality of the cement has been conclusively tested in the construction of the canal of Sault Ste. Marie and other waterways, as well as in buildings throughout the Dominion. The supply of ingredients is said to be practically inexhaustible, the lake covering about 600 acres. The daily capacity of the factory is at present 125 barrels, which is to be increased to 300 at an early date. The company was originally formed at Owen Sound, where the principal office is now located. Although the entire plant was destroyed by fire in 1895, the erection of the present extensive factory was immediately begun, and it is expected to cost, when finished, £25,000. Excellent railway facilities, with sidings to storehouses and coke-sheds, are furnished by the Grand Trunk Railway Company. About seven car loads of coke per week are consumed in the manufacture of the cement.—*Journal of the Society of Arts.*

S. J. Parkhill & Co., Printers, Boston U. S. A.

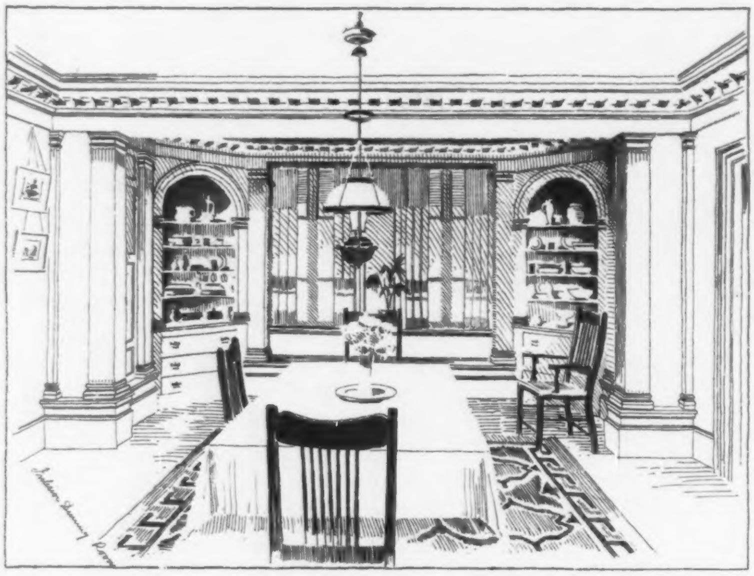


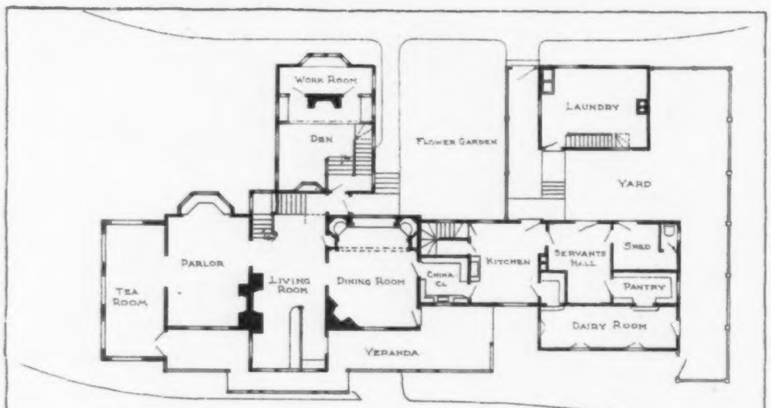
Thomas M. James
Architect
27 School St. Boston.

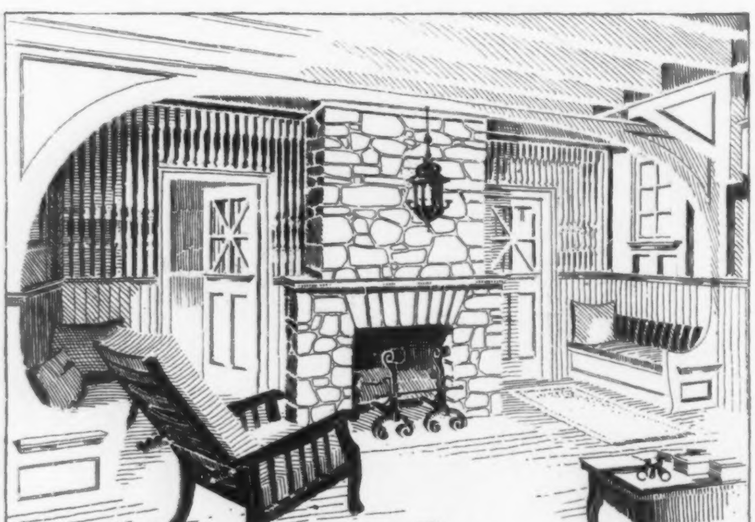
Knollwood Cemetery
Station & Administration Building.
Sharon Mass.

HELIOTYPE PRINTING CO. BOSTON

·Sketches·at·Mattapoisett·



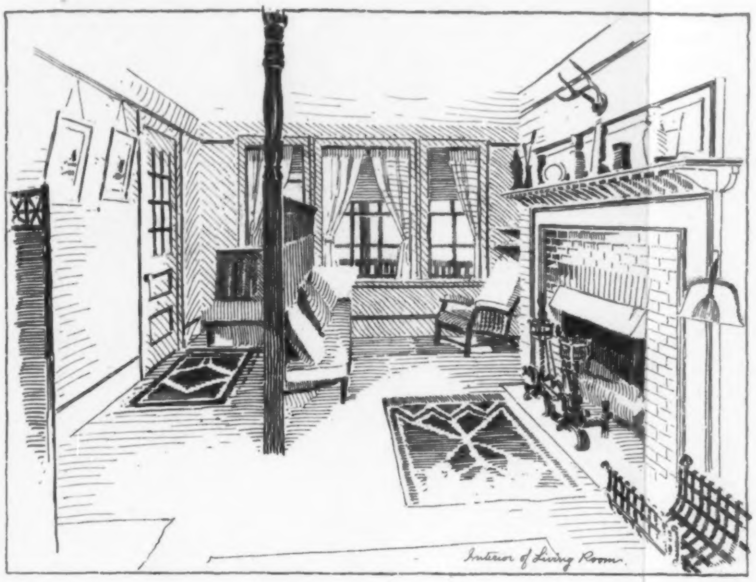




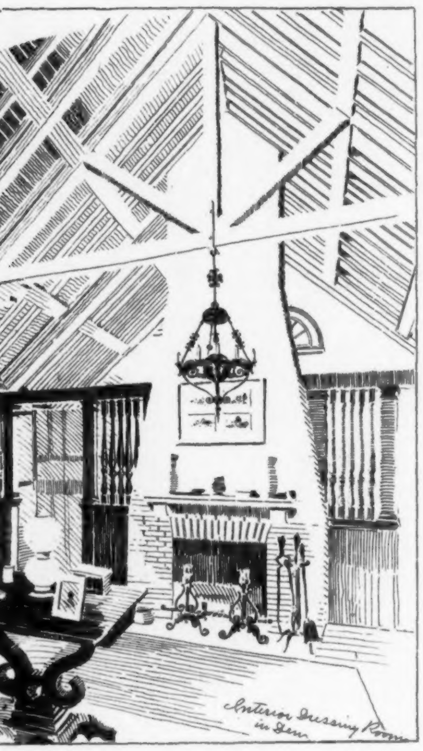
·Cottage·of·Charles·A·King·Esq·

· of · the "Reservation"

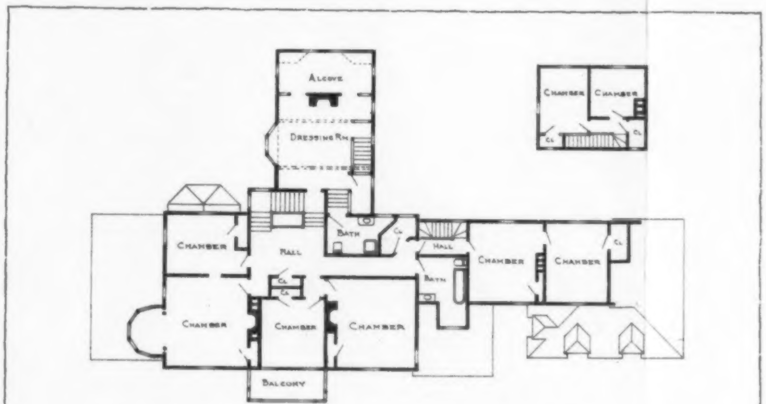
Sketch of Water front



Interior of Living Room

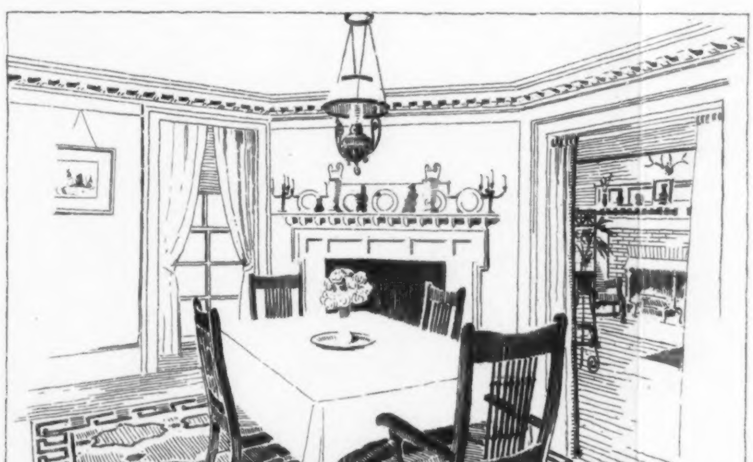


Interior Dressing Room in Den



Scale 1/16 inch to 1 foot

Second Floor Plan

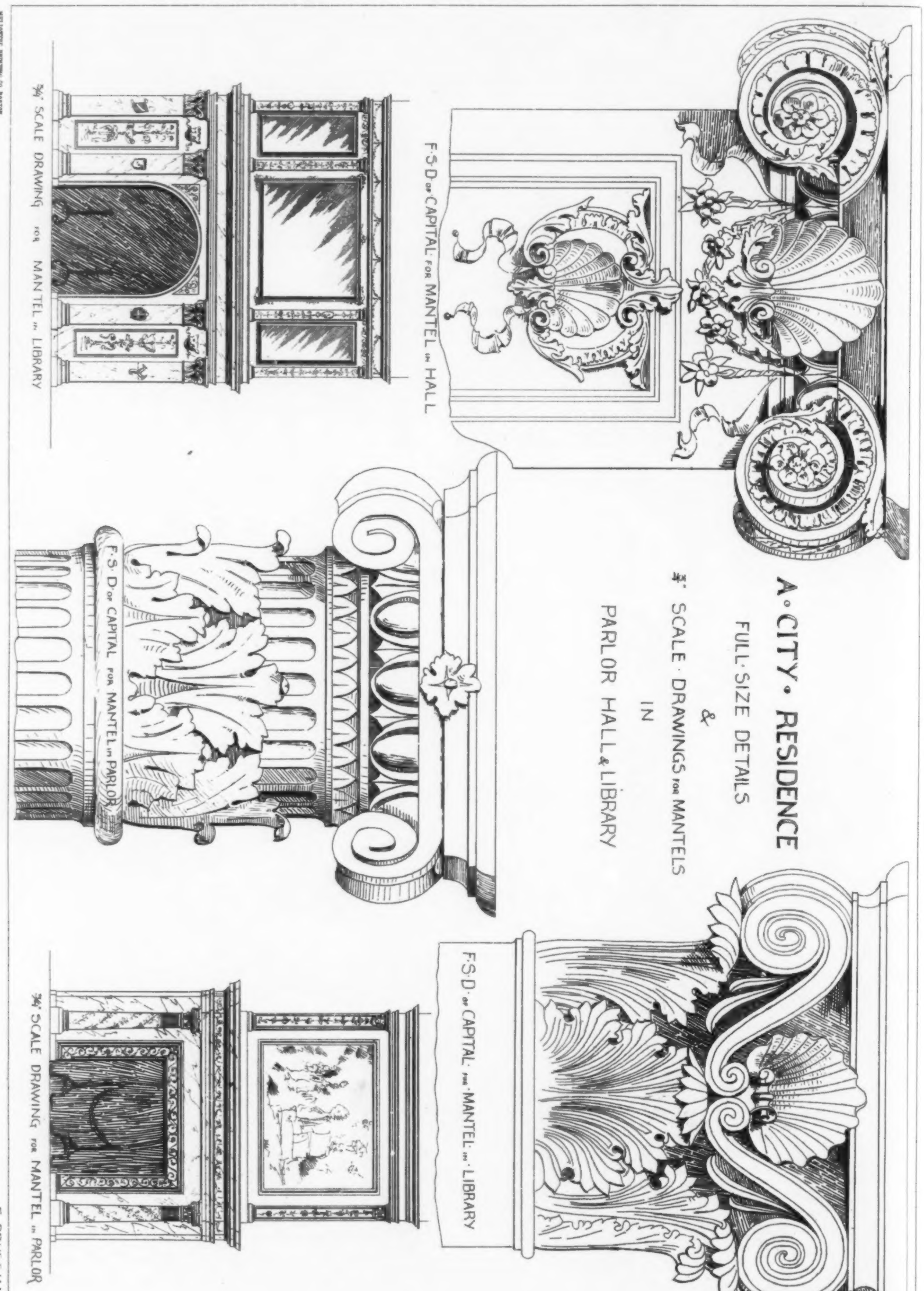


Interior Dining Room

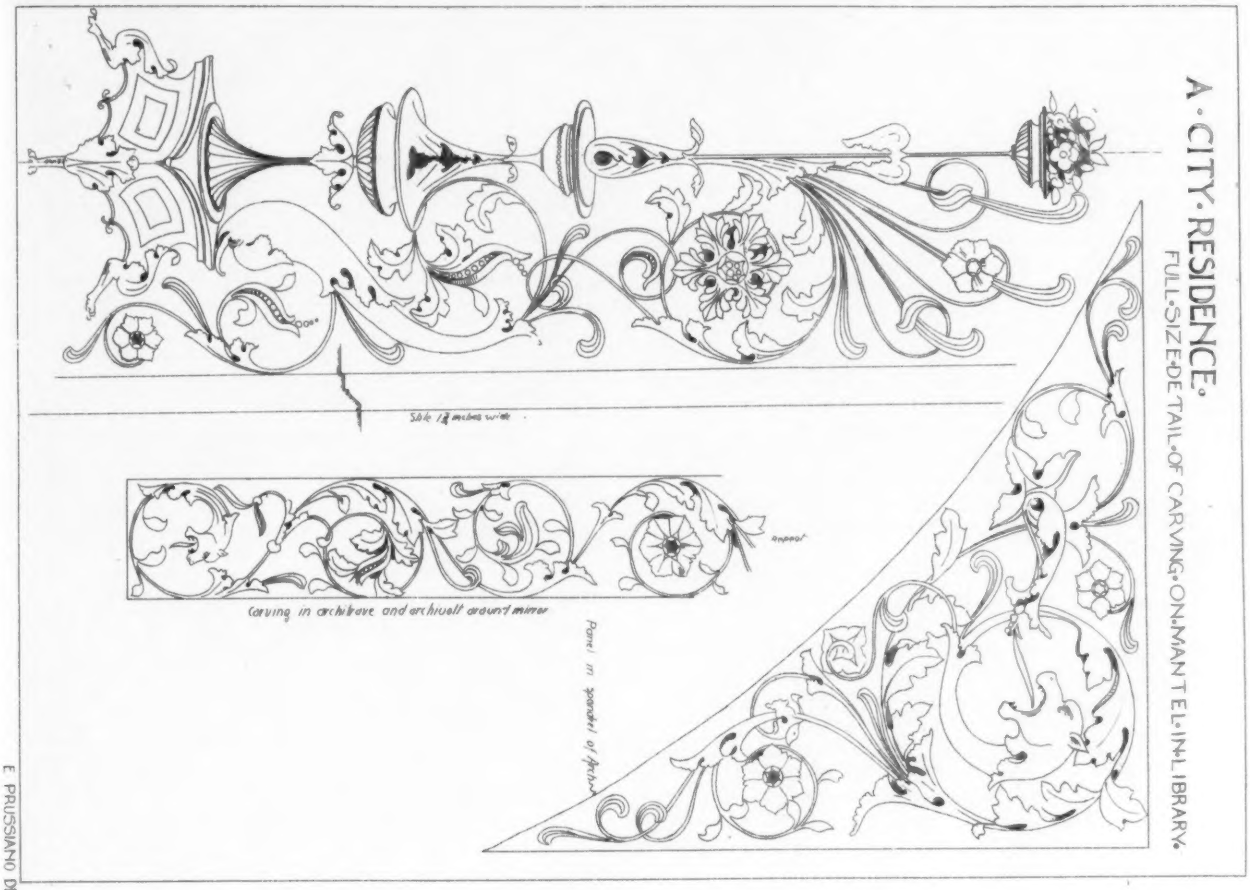
Rear View of Cottage

· John · A · Fox – Architect – 120 · Tremont · St ·
· Boston · Mass ·

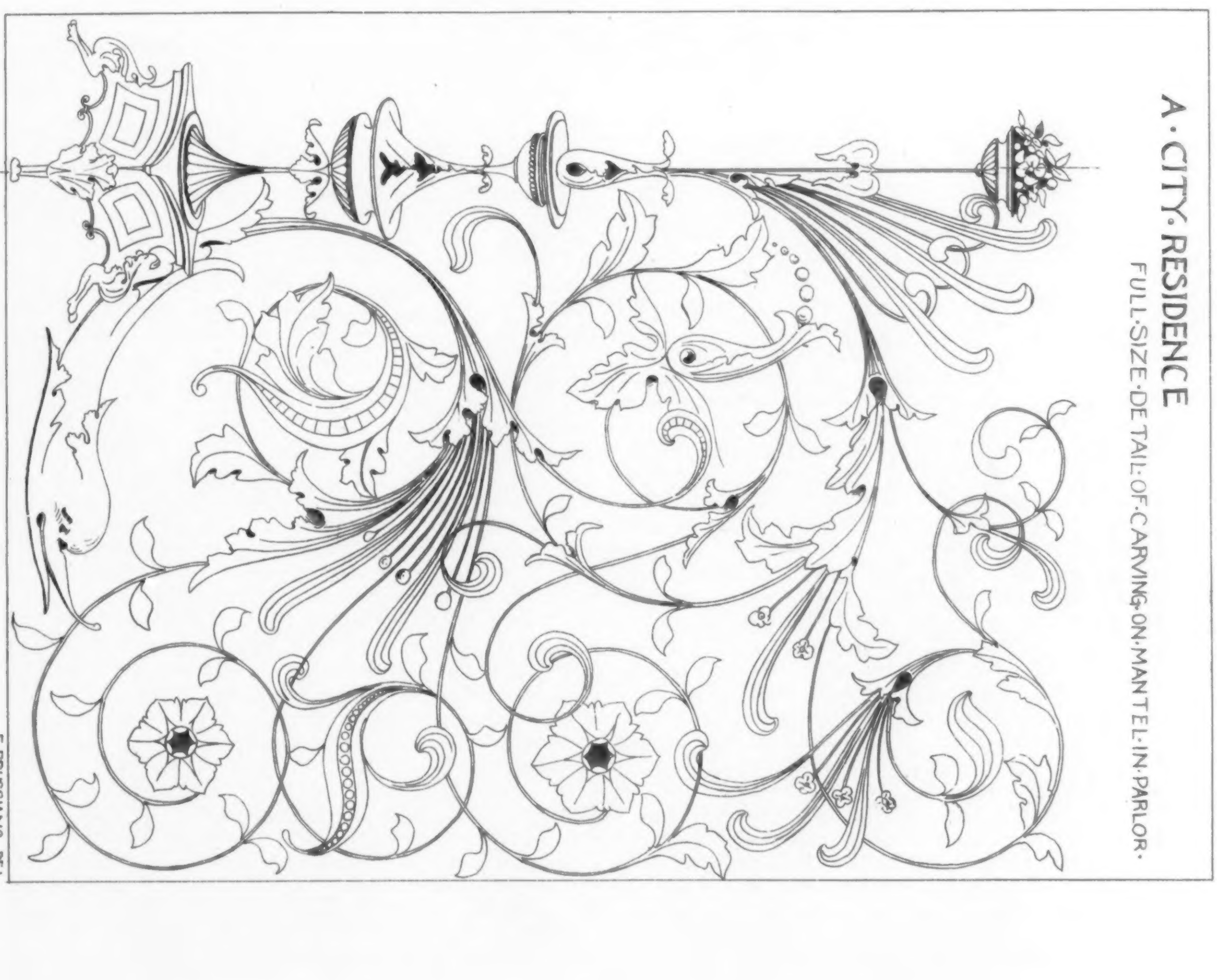
Heliotype Printing Co. Boston


A·CITY·RESIDENCE
FULL·SIZE DETAILS
&
¾" SCALE·DRAWINGS FOR MANTELS
IN
PARLOR HALL & LIBRARY
F·S·D· OF CAPITAL FOR MANTEL IN HALL
¾" SCALE DRAWING FOR MANTEL IN LIBRARY
F·S·D· OF CAPITAL FOR MANTEL IN PARLOR
F·S·D· OF CAPITAL FOR MANTEL IN LIBRARY
¾" SCALE DRAWING FOR MANTEL IN PARLOR
E. PRUSSIANO DEL.

AMERICAN ARCHITECT AND BUILDING NEWS, AUG. 27, 1898. No. 1183



E PRUSSIANO DEL



E PRUSSIANO DEL