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THE new Pension Office in Washington, for which the ground has already been broken in Judiciary Square, is to be built under the very able direction of General M. C. Meigs, who, we need hardly say, has had great and varied experience as an architect. The Act authorizing the work limited the cost of the building to four hundred thousand dollars, at the same time directing that it should be made fire-proof; and these requirements General Meigs intends to comply with strictly. The structure is to be rectangular, four hundred feet long, and two hundred deep, and will contain a large central hall surrounded by three stories of lofty rooms, carrying the cornice to a height of seventy-five feet above the pavement. The exterior is to be of brick, with dressings of moulded brick and terra-cotta. The first story is plain, separated from those above by a rich band of terra-cotta; the second and third stories are ornamented with window-dressings in the same material, with portions in moulded brick; and terra-cotta string-courses will mark the stories and connect the various parts of the composition. The openings are large, and the Italian character of the fenestration is kept also in the deep "cornicione," of brick and terra-cotta, which crowns the walls. Inside, the building has the same sincere and durable character as on the outside. The galleries surrounding the central hall are of brick, resting on brick arcades, supported by two tiers of iron columns, of simple design. The roof is of iron, and the central cortile is lighted by vertical windows in the upper portion of its walls, which are carried up above the rest of the building for the purpose, as it seemed desirable to avoid admitting the vertical rays of the summer sun by sky-lights. With the same intention of keeping the rooms at a temperature as nearly uniform as possible, all the outer windows are to have double glazing, two sheets of glass being set in the same sash, separated by an air-space of an inch or more. The floors are to be of brick and iron, with an upper flooring of wood or similar material, for the greater comfort of the fifteen hundred clerks employed in the building. Taken altogether, the building bids fair to be one of the most interesting objects in Washington, and those of our younger readers who have the opportunity to visit the Capital within the next two years should not fail to go and see its construction. The sum for which it is to be built, amounting only to five dollars for every square foot of ground covered, is very small for a fire-proof building, but the lesson to be learned from it will be none the less useful, as showing the dignity which can be given to simple materials in the hands of one who knows how to use them.

A DREADFUL tragedy occurred last week at Halifax, Nova Scotia, where thirty-one people were burned to death in the city alms-house without any chance of escape. About midnight a smell of burning wood was observed in the building, which was traced to the bake-house in the basement, but the danger not seeming to be immediate, no steps were for a time taken to remove the inmates. The smoke spread through the various stories, but no flames were seen, and the officers of the establishment being engaged in pouring water into the basement, the doors were not even unlocked until a fireman broke down one of them with an axe, allowing most of the inmates to come out. Just at this moment, however, the fire creeping through the basement reached the foot of the elevator-shaft, and almost in an instant burst out with great fury in the roof. The upper story was used as a hospital, and contained about seventy patients. About half of these were brought safely down the long winding stairs before the fire rendered approach impossible, but when this retreat was cut off, nothing could be done but to look on and see the rest die in agony.

A DELAY of several weeks was caused in extending the service of the Edison Electric-Light Company in New York by an unforeseen and singular difficulty. The station from which the lights in the first district are operated is situated in Pearl Street, and the current is generated by means of immense dynamo-electric machines driven by steam-engines of two hundred horse-power each. Each dynamo-machine with its engine is capable of furnishing a current for fourteen hundred lights, and twelve of them will be needed for supplying the district. Of these six are in place, and the Company, by the rapid additions to the number of lamps which it was making, soon found it necessary to bring into service a second machine, besides the one which had supplied those first put in operation. Two were accordingly connected with the main conducting-wire, and set in motion, but with a result very different from that which was intended. Every one who has seen a dynamo-machine and an ordinary electric-motor will understand that under certain circumstances they may be convertible, the one into the other, and it was found that in case of any difference of speed between the two engines, this took place with the Edison machines, the one more rapidly driven taking all the work, and the other suddenly assuming the functions of an immense electro-motor, operated by the current derived from its more industrious companion. In this way first one engine, and then the other, would run at an excessive velocity, which could not be controlled, since it was the result of a reflex action of the current, and was quite independent of the steam power from the boiler. One of the engineers was much alarmed on first finding his engine running at lightning speed after the steam was shut off, and all natural agency apparently withdrawn, until the matter was explained to him. An automatic regulator by which all the engines could be run in perfect unison was, however, soon devised, and the difficulty is said to be completely overcome. Another alarm was caused to the men employed in the station by the instantaneous melting and evaporation of some six or eight pounds of copper on the doubling of the current by coupling the engines. The air of the room was filled with the vapor of the metal, nearly suffocating the inmates, who groped their way to the windows in terror.

THE holding of the Convention of the American Institute of Architects in Cincinnati seems to have stimulated the whole profession in that city to a zeal which is likely to have the best results. Already an association has been formed among the young men in the various offices, with a view to mutual improvement, and every Saturday afternoon some building in process of erection is to be selected for a visit under the guidance of one of the older architects. This excellent idea originated with the members of the Cincinnati Chapter of the Institute, and upon them will fall most of the self-sacrifice needed to carry it out successfully, but they are disposed to make the effort, and will find their reward, we hope, aside from the consciousness of good actions performed, in the increased intelligence and interest of their assistants.

A CORRESPONDENT sends us a copy of a circular to architects, inviting, or rather, graciously consenting to receive, competitive plans for a school-house, to cost thirty thousand dollars, upon the condition that "the plan finally adopted will be the only one for which any compensation will be given," and that "the successful competitor" shall furnish, in addition to his plan, detail drawings and specifications, for which "will be paid the sum of three hundred dollars." Our correspondent seems to think that there is something wrong, or injudicious, or ridiculous about such an offer, but in this we cannot at all agree with him. A buyer is not to be blamed for offering an unreasonably low price for anything that he wants; it is the seller who accepts it that makes himself ridiculous, and all the more if he tries, too late, to throw the blame of his own folly on the one who tempted him. As we have often said before in similar cases, the school-house in question must, sooner or later, be planned by some architect on his own terms, and the invitation of the committee, being addressed to the profession, simply puts the profession collectively in the place of an individual. If the profession believes that the plans and specifications called for are worth a thousand dollars instead of three hundred, it has only to wait until the thousand dollars is offered, as it surely will be if they cannot be had for less. At the present day the work of skilled architects cannot be done by any one else, and they need find fault with no one except themselves if they are not properly paid for it.

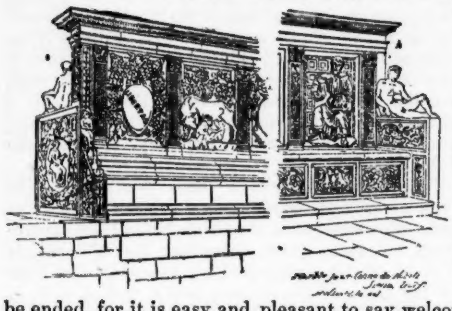
The New York elevated railroads seem likely to meet with complete defeat in their endeavors to show that they should not be obliged to pay damages to the owners of property which has plainly been injured by their construction. In the case of Mr. Story, whose claim for compensation for the privileges of air, light, and unencumbered passage along that part of Front Street adjacent to his estate of which the elevated railways had deprived him, was decided in his favor a few days ago, no further resistance is to be offered, and the railway company has petitioned the Supreme Court for the appointment of commissioners to fix the amount to be paid to Mr. Story for relinquishing his rights. In the suit of the heirs of Dr. Caro, who is said to have died of vexation at the delays in granting him compensation for the construction and operation of the road in Fifty-third Street, the General Term of the Superior Court has refused to modify its previous decision, which was unfavorable to the railway company, and the question is now to be submitted finally to the Court of Appeals. Even if the decision should be again adverse to the Company, as it probably will be, the aggregate amount which it will be obliged to pay, if all the aggrieved property-owners on the line should make claims, is not likely to be very large. In the wide avenues uptown the railways have as a rule increased the value of property near which they pass, and it is only in the narrow streets in the lower part of the city, where the obstruction of light and air is a serious matter, or in a few streets now occupied by dwelling-houses, that any material depreciation can be shown; and if the roads were permitted to assess the owners of property whose rental they have increased two or three fold, to offset the damages paid to those who are injured, their outlay would be reimbursed ten times over.

After three years of ineffectual endeavor to gain permission to build an elevated railroad in Boston, Captain Joe V. Meigs, the inventor of the single-rail elevated road which bears his name, intends, it is said, to obtain incorporation for a company to build and operate a line on his system elsewhere in Massachusetts. The principle of the Meigs road is simple enough, and there is no apparent reason why it should not answer an admirable purpose. Instead of a double line of posts, carrying lattice-girders, cross-ties and rails, the track is reduced to a single row of posts carrying one line of girders. Cross-ties are entirely dispensed with, and the track occupies in plan about one-tenth the space necessary for the elevated roadway of the usual form. The upper and lower chords of the girders are both utilized as rails, the main wheels of the cars being set like the letter V, with their tires meeting on the lower chord, while the upper chord forms the track for small wheels, with deep flanges, which prevent any lateral movement of the car. All the conditions of stability seem to be fulfilled in this arrangement, and it would be infinitely more difficult to throw such a car off the track than one of the ordinary kind. The locomotive designed to draw the cars has the peculiarity of being impelled by horizontal driving-wheels, which clasp the upper rail with a force which can be regulated at pleasure by the engineer, who is thus enabled to control his train in starting and stopping with a certainty impossible in the case of locomotives which depend on friction alone to hold their wheels to the track. The weakest point in the scheme seems to lie in the mode of switching trains from one track to another. Anything like the ordinary switch is of course impossible, and a substitute is found in hinging one girder so that its free end can be shifted in any direction. With ordinary trains, the distance to which it would be necessary to move the free end would be likely to make the angle between the switch-girder and the other portion of the track too great to be passed with safety, but the new plan is said to admit of sharper turns than any other. If the experiment should prove successful, the system may come into extensive use. The cost of a road so constructed, for equal strength, is much less than that of a surface railway, and the saving in expense of grading and bridging by the employment of posts would amount to a further large sum, while the outlay for maintenance, particularly in snowy regions, would certainly be no more than under the old system, and probably somewhat less.

A noble mansion of the century before the last is now in process of demolition in Paris, and has yielded an extraordinary amount of curious and valuable débris. At the first dismantling a hoard of three hundred thousand francs in ancient coins was discovered, and the modern finish has elsewhere proved to conceal works of art. Behind the panelling of one of the reception rooms were found some beautiful frescoes, in sufficiently good preservation to be readily removed. These are valued at twenty-five thousand francs, and some carved oak panels, discovered in a similar situation behind the wainscoting of another room, were sold on the spot for seventy-five thousand. The mantels and the staircase, which were all of marble, have been sold at high prices, and even the doors and other portions of the wood-work were eagerly bought up. The timber of the roof, which was of oak, seasoned by its centuries of exposure, was sold to carvers at a price much higher than that of new wood, while the lead covering of the roof brought ten thousand francs as old metal. The plates were so thick that special tools had to be sent for to cut them off the roof, and readers of Viollet-le-Duc will remember that the lead of old roofs, from which the silver has not been separated, is much less easily corroded, and is therefore more valuable, than the modern product. The total sum thus far obtained by the contractor for the old materials of the building is said to be one million, one hundred thousand francs, or two hundred and twenty thousand dollars; a result entirely due to the excellence of material and solidity of construction, as well as the artistic workmanship, of everything about it.

Some of the superior class of journals are now amusing themselves by sarcastic comments on the attempt which is reported to have been made in the Church of St. Denis, the burial-place of the kings of France, to discover the treasures supposed to have been hidden there, by means of the divining-rod. The implement used by Mme. Caillavat, the person who obtained permission to make the search, is said to be a wooden bar, containing a tube filled with a mysterious composition, which was bequeathed her by some wizard, but all her magic arts have so far proved insufficient to reveal any object of value. By some of the critics this poor old lady's wand is classed with the witch-hazel stick once so much used for tracing underground springs, as a curiosity of ancient and obsolete superstition. So far as the hazel-twig is concerned, the notion that the belief in its efficacy in finding water has passed away is quite erroneous. Many a professional well-digger still employs it as one of his regular tools, and it is by no means the oldest and least intelligent men in the business who have the most confidence in its practical value. As this particular superstition plays such an important part in a pursuit which is otherwise sufficiently prosaic, it seems as if a scientific investigation into the subject might possibly lead to interesting results. A theory which has been brought forward to explain the dipping of the forked twig toward subterranean water-courses is that such water-courses, forming the natural conductors of electrical currents in the ground, indicate their presence in the atmosphere above them by other electrical currents, perhaps caused by induction, and opposite in direction to the underground ones, or perhaps depending simply on the tendency of the atmospheric electricity to pass quietly into the earth by the shortest path. How the witch-hazel stick can feel and indicate these currents is another question; but if they exist they can certainly be detected and measured by the galvanometer, and the demonstration of their existence or non-existence would have some value. Another of the superstitions in regard to witch-hazel is that it will show the spot where lightning has struck, and this, if it has any foundation, may be connected with its other property, since lightning would usually find its way into the earth by the course offering the best and nearest conducting bodies.

ANNUAL ADDRESS BEFORE THE AMERICAN INSTITUTE OF ARCHITECTS.[1]



THE pleasant duty has been given me to deliver the opening address upon the occasion of your sixteenth annual meeting.

If, as a citizen of Cincinnati, it were simply to extend to you words of greeting, my office would soon be ended, for it is easy and pleasant to say welcome. As a layman, with no pretense of technical knowledge of the art and science of architecture, I might well approach its discussion with grave hesitation. As one of the fine arts, perhaps of all the fine arts, it has my profound admiration and respect, and I make bold to offer a few considerations which may be of interest to your honored Institute. Architecture, in its monumental, as well as in its inferior forms, more than the arts of sculpture and painting, has direct influence even upon the health, if not the pleasure of mankind, and far more than they is allied with and is inseparable from human industry. In truth, industry was born with primitive architecture. When man first felt the need of protection from the inclemency of the weather, he invented tools to assist his own weakness and overcome the difficulties of construction. The history of the race shows unceasing invention of implements and constant alliance between architecture and industry. It has also taught us that architecture is the first of the arts, for it was the first evidence of social organization, of permanency in place of a primitive nomadic existence. The hovel of mud took the place of the tent of skins. Following the hovel came the village and the city, with graceful palaces and majestic temples. The tribe has become a nation, and so the work of the architect tells the history of the civilized world, and more directly the history of industry, but most eloquently does it record the development of the law of the beautiful. In that masterpiece of incomparable value, the "Grammaire des Arts du Dessin," Charles Blanc says: "Deprived of its beauty, an edifice may be a work of industry; it is not a work of art. The definition of architecture enforces the law of being beautiful." Emerson somewhere says that "all construction without beauty is egotism." It will not be disputed that architecture in a certain sense stands higher than its auxiliary arts of painting and sculpture, yet painting and sculpture in their isolated and higher expression are more ideal; they give wider range to the imagination. In their lower and industrial forms as decorative and useful arts they sometimes dominate architecture, degrading it from its simplicity and dignity. Industry itself is debased by this intrusive intervention, while the arts of painting and sculpture descend from their high æsthetic plane. In our day, painting and sculpture enter but little into architectural construction. The industries governed by these arts are more largely engaged than ever before.

This is neither the time nor place, nor have I the inclination, to criticise or discuss at length the modern architecture and the decoration of public and private buildings. They present to us in all our towns and cities much that is good and beautiful, as well as frequent shocking incongruities, dire offenses against the laws of symmetry and harmonious color.

The taste and physical needs of modern society call upon all the industries to aid in building monumental structures as well as those for the home and for commerce. An architect who designs an edifice without taking into account the industrial element required to build it would meet with failure and disgrace. Of all the professions that of architecture demands the most general and exhaustive education. The architect must not only be an artist, but know how to be an artisan of all trades. In the annual gathering of your Institute many of the questions I have ventured barely to suggest have been the subject of learned and exhaustive discussion. You are striving to raise the standard of your profession by mutual labor, by criticism, by example. Some of you are engaged in the noble work of teaching. It seems to me the schools of architecture in Boston, New York, and at the Illinois University are among the most valuable of all your educational efforts. The schools of technology and of design in this country, directly and indirectly, assist in preparing the student for practical employment as an architect. The importance of this technical knowledge can not be over-estimated, yet I think the tendency of building in this country is to dominate the æsthetic by the industrial element. The definition of Charles Blanc, that architecture enforces the laws of the beautiful, is ignored. Oftentimes, it is to be feared, it is not known.

I know the difficulties the architect is obliged to overcome. Such as the stupidity and caprice of the owner, who has already drawn a plan of an impossible house, or, what is worse, the committee, whose every member has a pet scheme, while all of them are buzzing in the ears of the architect like a swarm of angry yellow-jackets. Sometimes the house-owner is a man of taste and knowledge, and committees are intelligent, having a general idea at heart of what they need. Every man ought to impress upon his home his own individuality. Often, however, he places himself unreservedly in the hands of the architect, the decorator, and upholsterer, and between the three there is incongruity. The brain that designs the structure should control its interior decoration.

The architect must consult his principals, but by concessions to bad taste he too often sacrifices his self-respect. In monumental structures, such as churches, museums, and public buildings, where the laws of symmetry and grace exceed the requirements of use, the architect must not yield his convictions, but stand to his art. Is it not within the province of your Institute to go yet farther than this? When buildings are constructed by Government at the expense of the public, if they are gross violations of architectural law may you not express disapproval? We stand to-day under the shadow of a national edifice of this character, while its ungainly companions in other large cities offend the face of heaven. Cannot this learned and powerful body influence the national Government and save us from these inflictions?

A perusal of that admirable report by Prof. Ricker, made at your meeting a year ago, appears to confirm the impression that the course of instruction at the Illinois University, if not at Columbia College and at Boston, sacrifices the æsthetic to the industrial. Some years ago I read in the *Chronique des Arts* the report of a two days' discussion in a congress of architects at Paris, where it was finally decided that the student of architecture, before entering the atelier of the architect, or at least supplementing his labor there, should pass through a thorough study of drawing, and especially he should be able to draw the human figure. There is no doubt, of all things that exist the nude human figure best represents harmonious proportions and symmetry of form. How many students of architecture—indeed, how many professional architects—are there who can accurately depict what we are told was made after God's own image? The architect's atelier is usually utterly barren of objects of taste and beauty. It contains nothing to kindle the imagination and inspire the poetic sense. It ought to be filled with classic statuary, graceful vases, natural flowers, with their glowing harmonies of color, and a thousand objects of grace and beauty. If the architect desires to be something more than the carpenter, mason, or engineer, he must constantly cultivate, at least by his surroundings, the sense of the beautiful.

We have seen how intimate is the alliance between the arts of architecture, painting, and sculpture. If time permitted I would be glad to discuss the relations of music to architecture. Some one has entitled architecture as "frozen music," a figure of speech too far-fetched to be called even a poetic license. It may be said that a point of union exists between these arts in the science of numbers, the vehicle by which both are born, but there is a yet closer alliance in the fundamental laws of symmetry; the necessity for just and harmonious proportion of all the parts. These laws cannot be violated in architecture without harm. They are often disregarded in music by composers of unquestionable genius. Wagner, Liszt, Berlioz, and a host of smaller men indulge in frequent inconsistencies, sometimes building their temples of music upon the apex rather than upon the base; but the classical composers, such as Haydn, Mozart, and Beethoven, rarely violated the laws of symmetrical progression. With them the work of art is built out of the smallest parts, which grow in geometrical proportion up to a perfect whole. The smallest division of form in music is called a bar or measure. The symmetry of the composition of the masters of the classical period may be made comprehensible to the eye. In the diagram before you, which has been kindly furnished me by Prof. Singer, of the College of Music, is, you will find, a brief but complete example of this symmetrical construction. The smallest curves uniting two points indicate the single groups of two measures; the larger curves, groups of four; the yet larger comprise whole phrases of eight bars. The model which is here presented as an illustration of the laws of musical symmetry is a passage from Mozart's Symphony in G minor. I might easily multiply examples of exquisitely constructed architectural forms in music. Out of Beethoven's masterly Eroica Symphony could be built a Gothic temple of majestic proportions, with decorations of infinite beauty, but the limits of this hour force me to resist the fascinating temptation. In the suggestions I have made for the instruction of the student of architecture the study of music has not been named, and I have no doubt Professors Ware and Ricker would hesitate before including that art in the curriculum of their schools, yet that study may be earnestly commended to the architect, the painter, and the sculptor. Of all arts it is the most ideal; more than the others it excites the imagination, refines the taste, and elevates the soul. It is one, at least, of the paths which lead to that high æsthetic plane where every true artist should aspire to stand. The true artist is not an egotist. He works not only for to-day—his creations are for the ages.

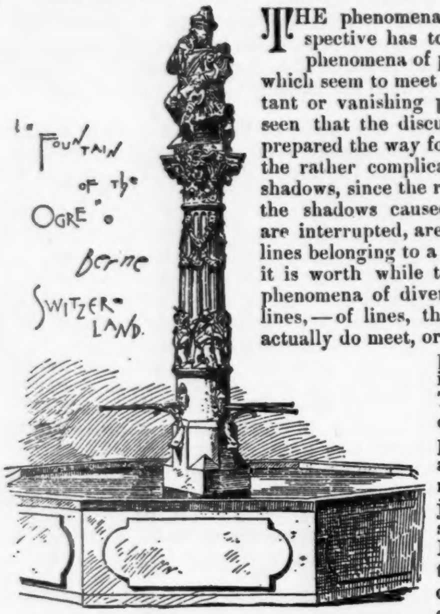
I think it was Montesquieu who said "Peaceful people have no history." In some degree this is true. Written history records the deeds of the conqueror. Wars are sternly fixed in the memories of the people and are perpetuated by the scribes, while generation after generation where peace and order reign are forgotten. But peace is the mother of art, and art is imperishable. When the bones of warriors and kings are but as the dust of the wayside, when the

[1] Delivered October 26, 1882, by Colonel George Ward Nichols, of Cincinnati, O.

glory of empire has gone with its broken sword and trailing banners, when civilization itself goes out in the darkness of a long night, art remains ever fresh and verdant. Above the sands of the desert, midst the wreck of effete peoples, the obelisk rises in its simple dignity; the Parthenon remains the type of stately majesty; the Antinous and Venus de Milo are as beautiful as when chiselled by the artist's hand, while the potter's vase emerges from the ashes of buried cities pure and perfect as when it received the proud inscription, "Egotinous made me—Clitias painted me." Art is its own historian. The warrior, statesman, and merchant live chiefly in the artist. The works of labor die—the work of art lives forever.

PAPERS ON PERSPECTIVE.—XV.

DIVERGENT AND CONVERGENT LINES.—REFLECTIONS.



THE phenomena with which perspective has to do are mainly the phenomena of parallel lines—lines which seem to meet at an infinitely distant or vanishing point, and we have seen that the discussion of such lines prepared the way for the elucidation of the rather complicated phenomena of shadows, since the rays of the sun, and the shadows caused when these rays are interrupted, are also parallel right lines belonging to a single system. But it is worth while to examine also the phenomena of divergent or convergent lines,—of lines, that is to say, which actually do meet, or tend to meet, at a point which is within a finite distance. These phenomena so closely simulate the phenomena of parallel lines that we may well inquire just how far the resemblance extends. Moreover, just as the sun and moon cast parallel shadows, every terrestrial source of light, being at a finite distance, casts divergent shadows, and it is a matter of practical importance to find out just how they go and what becomes of them.

296. Now just as parallel lines *seem* to converge, and look exactly as if they were radiating in every direction from some point not very far off, situated upon the line between the eye and the infinitely distant vanishing point, so lines that *do* radiate from a point more or less distant look exactly as if they were parallel lines going off to infinity. And as a perspective drawing has to do only with the appearances of things, it represents the two classes of phenomena in exactly the same way. All it can do in either case is to show a system of right lines, all meeting, or tending to meet, at the same point. The point which thus simulates a vanishing point we will call the *apex* of the converging lines.

297. This consideration leads at once to the solution of a question in itself somewhat puzzling. If the apex, or point in which the lines meet, is in front of the spectator, it is easy enough to draw the lines of the convergent system radiating from the perspective of the apex, like the spokes of a wheel. But what shall we do if the apex is behind us, the lines being divergent, passing, so to speak, over our head and around our shoulders, and, as they recede from us in front, separating from each other more and more. Such are the rays emitted by a candle set behind one's back, and the shadows cast by it. What becomes of these divergent beams? Where do they seem to go? How shall their perspectives be drawn—so much of them as extends beyond the plane of the picture—upon that plane?

298. The observation made just now as to the exact resemblance between the phenomena of divergent or convergent lines, and the phenomena of parallel lines, affords a hint of the answer to this question. Parallel lines have two vanishing points, 180° distant one from the other, upon a line passing through the station point. If the spectator, looking in the direction of the parallel lines of the system, sees one of these vanishing points directly before him, the other will be directly behind him, and on turning right-about-face he will see that instead. So with the rays of the sun: one vanishing point is in the sun itself; the other, as we have seen, is in exactly the opposite direction, namely, in the shadow of the spectator's head.

But as divergent lines exactly simulate these phenomena, and cannot in fact be distinguished in appearance from parallel lines, except by some extraneous indication, they too will seem to have a second point of convergence, opposite the apex, towards which they seem to tend, and when the spectator turns his back upon the apex and looks in exactly the opposite direction, he will see the position of this false apex directly before his eyes. So with rays of a candle or any source of artificial light: if he faces it, the rays converge upon it; if he turns his back upon it, they seem to be directed towards the point exactly opposite the candle. This point, as before, is to be found in the shadow of the spectator's head, in that part of the shadow, namely, that we may call the shadow of his eye. That lines diverging from a point behind the spectator must seem to converge towards a point in front of him is plain; for if we suppose a line to pass through the eye in any direction, all lines lying in planes that pass through this line will seem to be directed towards one or the other of its vanishing points; but the line drawn through the station point from the apex of these divergent lines is such a line passing through the eye, and the divergent lines are lines lying in such planes. They necessarily tend, either way, towards the vanishing points of the line

299. Figure 77, Plate XVII, illustrates these points and also brings into notice the curious phenomena that present themselves when the apex or point of convergence is neither behind the spectator nor in front of him, but, so to speak, alongside; that is to say, is just as far from the plane of the picture as he is himself. Let S be the station point, $p\,p$ the plane of the picture, and 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 the right lines lying in a horizontal plane somewhat below the level of the eye, one end of each touching the line $p\,p$ in plan, and the ground line $g\ l$, in the perspective view above. A simple inspection of the figure shows that the parallel lines 1, 2 and 5 have their vanishing point at V^L; 3, 4, 6, 8 and 9, which are perpendicular to the plane of the picture, have their vanishing point at C; while 7 and 10 have theirs at V^R. Moreover, the lines 1, 3, and 7, which converge upon A_1, behind the station point, and which accordingly appear to the spectator at S to be divergent, have their perspectives directed towards A'_1, the false apex, a point in space exactly opposite the apex itself, and as far above the horizon as the apex A_1, on the ground, is below it.

The lines 5, 6, and 7, which converge upon A_2 the apex in front of the spectator, are shown in perspective meeting at the perspective of A_2.

300. Finally, the lines 5, 8, and 10, which have their apex at A_3, a point just as far from the plane of the picture as the station point, have their perspectives *parallel*. The same is true of the lines 2, 4, and 7, which converge upon the horizontal projection of the station point at S. But these last lines are not only parallel but *vertical*.

301. It appears, then, that if converging lines have their apex, or point of meeting, in front of the spectator, their perspectives will converge upon the perspective of their apex; if it is behind the spectator, they will converge upon a point which we have called their false apex, situated exactly opposite the apex itself, and which is the vanishing point of a line drawn through the apex and the station point; if the apex is neither in front of the spectator nor behind him, but just as far from the picture as is the station point, the perspectives of the convergent lines will be parallel. Their position depends upon the height at which the apex lies, and is most easily determined by finding the perspective of that element of the convergent system that is perpendicular to the plane of the picture (such as line 8 in the figure), and making the rest parallel to that. Finally if the apex is directly above or below the station point, the perspectives of the convergent lines will be vertical. If it is on a level with his eye, they will be horizontal.

302. Figure 78, a sketch, somewhat reduced in scale from an old English print, illustrates this last point. It shows three streets converging upon the point occupied by the spectator. The axes of these streets are all drawn vertical and parallel.

A similar result would follow if one were to draw the spokes of a large wheel while standing upon the hub. They would all be vertical and parallel. So with the reflections of distant lamps which at night often seem to cross the water and converge below the feet of a spectator standing upon a bridge. In perspective they also would all be drawn vertical and parallel, continuing, indeed, the vertical line of the lamp-posts from which they emanate, as is seen in Figure 79.

303. Figure 80 shows that the position of the false apex may most conveniently be determined by finding the perspectives of two horizontal elements of the converging series, a and b, one perpendicular to the plane of the picture, and one passing beneath (or above) the station point. Let a' and b' (or a'' and b'') represent the points in which these lines pierce the plane of the picture, their distance from the horizon depending upon the position of the apex, A, below or above the eye, and the other element of their position being obtained from the orthographic plan. The perspective of the line a will begin at a' (or a''), and be directed towards its vanishing point, C; that of the line b will begin at b' (or b''), and be vertical, since it passes directly below (or above) the station point (301). The point A′ (or A″) where these perspectives would meet, if prolonged, is the position of the false apex.

The same result may be obtained by the methods of descriptive geometry, as may be seen in the same figure. The false apex is the vanishing point, as has just been seen (298), of that element of the converging system that passes through the eye. But the vanishing point of a line passing through the eye, and which is consequently seen endwise, is the point where it pierces the plane of the picture. Now b, in Figure 80, is the horizontal projection of such a line, and a' A′ (or a'' A″) its vertical projection. A′ then (or A″) is the point where it pierces the picture, its vanishing point, and the false apex in question.

304. Figure 77 furnishes other illustrations of the false apex besides those already mentioned. The points of convergence, A_5, A_6, and A_7, situated behind the spectator, have each a false apex, towards

which the perspectives of the converging lines are directed, as may be seen at A_5', A_6', and A_7'.

A_5, A_6, and A_7 are supposed to lie in the same plane as do A_1, A_2, A_3, and A_4, previously discussed. It will be observed that the most distant of them, A_6 and A_7, have the apex nearest the horizon, the nearer ones, A_1 and A_5, farther off, and those on a line with the spectator, A_3 and A_4, at an infinite distance, the perspectives of the converging lines being parallel.

If either apex were in a different horizontal plane, the vertical position of the false apex would change accordingly, that of A_7, for instance, appearing at A_7'', if the point of convergence were as far above the spectator's level as it has been supposed to be below it.

GIRDERS. — VI.

III. — APPLICATIONS TO PRACTICAL EXAMPLES.

EXAMPLE 1. Loading as in Case 1, Figure 1.

Required the dimensions of a girder of white-pine, 28 feet clear length, to support a centre load of 8 tons as in Figure 1.

Girder to be a single timber.

We have already found the maximum bending moment M to be 56 foot-tons, for this case. Shear is uniform and $= 4$ tons.

Let $f = 5 =$ factor of safety.

Let $r = .03 =$ maximum permissible deflection per foot.

For a rectangular section, $d' = d \div 2$.

For white-pine; $S = 1.24$; $E = 858.$; $B = .219$.

1. BREAKING.

Applying formula 4,

$$I = \frac{M f d'}{1.5\ B} = \frac{56 \times 5 \times d'}{1.5 \times .219} = 852.5\ d = 426.3\ d.$$

2. BENDING.

Applying formula 7,

$$I = 144\ \frac{M L}{E r} = \frac{144 \times 56 \times 28}{.858 \times .03} = 8775.$$

As the section is to be rectangular, substitute these values of I in formula 10.

$$426.3\ d = \frac{b\ d^3}{12}, \text{ for breaking.}$$

$$8775 = \frac{b\ d^3}{12}, \text{ for bending.}$$

Suppose that b be assumed to $= 16$ inches.

Solving the two equations for d, we obtain:

$d = 17.12$ inches for breaking.

$d = 18.74$ inches for bending.

Hence the last must be taken, because it is largest.

3. SHEARING.

Applying formula 9, $A = \frac{W' f}{S} = \frac{4 \times 5}{1.24} = 16.13$ square inches of section required to resist shearing. Hence $16.13 \div 16 = 1.01 =$ additional depth in inches required.

Therefore, $18.74 + 1.01 = 19.75 =$ total depth of girder. It should be made 16×20 inches, and of uniform section from end to end.

(N. B. For a girder of uniform section, with a load either concentrated at centre or uniformly distributed, the dimensions of section can be directly obtained by applying the following formulæ, without drawing the equilibrium polygon and finding M and I.

1. BREAKING. $$b\ d^2 = \frac{W f L}{B}. \quad (21.)$$

2. BENDING. $$b\ d^3 = 432\ \frac{W\ L^2}{E\ r}, \text{for concentrated load.} \quad (22.)$$

$$b\ d^3 = 270\ \frac{W\ L^2}{E\ r}, \text{ for uniform load.} \quad (23.)$$

If it be required to find the dimensions of sections at different points in the length of the girder, corresponding to the strains there acting, the following process may be employed.

Divide the length of the girder into any number of equal or unequal parts, for example, 8. Measure the corresponding intercepts at the points of division, multiply each by the pole distance, thus finding the moments acting at the points. The depth to resist the bending moments can then be found by applying the same formulæ as before. The additional depth for shearing is then found and added at each section as before.

This has been worked out for the example, and the results are shown in Figure 87, which is a side elevation of the girder, the required depth for resisting bending moment and shearing being indicated by the dotted lines. Figure 88 is the section.

Example 2. Loading arranged as in Case 2, Figure 2.

Girder to be single, also of white-pine, breadth 16 inches.

Maximum bending moment M has been found $= 55.04$ foot-tons.

Maximum shear between left end and the load $= 4.57$ tons.

Applying the same formulæ as before, we obtain the following:

Depth required to resist bending moment $=$	18.64 inches
Depth required to resist shear $=$	1.15 inches.
Total minimum depth under the load $=$	19.79 inches.

The girder would be made 16″ x 20″ as in the last case.

This girder is shown in Figures 89 and 90.

Example 3. Loading as in Case 3, Figure 3.

Girder to be single, but to be of spruce.

As the loading more nearly approaches a uniformly distributed load, than one concentrated at centre, we apply formulæ 4 and 8.

Let $f = 5$; $r = .03$, as before.

For spruce; $S = 1.63$; $E = 783$; $B = .245$.

The maximum value of M has been found $= 47.92$.

Applying formulæ 4, 8, 9 and 10, as before, we find:

Depth required to resist bending moment $M =$	19.76 inches.
Depth for resisting shearing $=$	.46 inches.
Total minimum depth of girder $=$	20.21 inches.

As this is calculated for a uniform load, and the actual load is intermediate between a concentrated and uniform load, requiring smaller values of I and d than those found, a timber 16″ x 20″ would be sufficient. The shear which is here to be provided for, is not the maximum at left end $= 5.92$ tons, but is the larger shear found on either side and adjacent to the maximum intercept and bending moment. This is found to be here $= 2.42$ tons. The greater shear at ends of girder is more than sufficiently provided for by the extra depth of girder, above that required to resist bending moment at those points.

This girder is represented in Figures 91 and 92.

Example 4. Loading as in Case 3, Figure 3.

Flitch-plate girder, composed of two white-pine timbers, each 6 inches thick, and a wrought-iron plate 1 inch thick, between them.

Required, the depth of the timbers and plate.

The formulæ for flitch-plate girders may be found in the *American Architect*, Vol. 9, p. 93.

The formulæ there given for Case 3 are here applicable, and are as follows:

1. BREAKING.

$$M = \frac{d^2}{4 f}\ (B\ b + B'\ t). \quad (24.)$$

2. BENDING.

$$M = \frac{r\ d^3}{1728\ L}\ (E\ b + E'\ t) \text{ Concentrated load.} \quad (25)$$

$$M = \frac{r\ d^3}{2160\ L}\ (E\ b + E'\ t). \text{ Uniform load.} \quad (26.)$$

Let $b =$ total horizontal breadth of the two timbers, in inches.

Let $d =$ depth of timbers and plate, in inches.

Let $E' =$ coefficient for bending for wrought-iron.

Let $B' =$ coefficient for breaking for wrought-iron.

Let $f = 5$; $r = .03$.

Let $t =$ thickness of wrought-iron plate, in inches.

For white-pine: $S = 1.24$; $E = 858$; $B = .219$.

For average wrought-iron; $S = 22.5$; $E' = 12443$; $B' = 1.199$.

Length L of the girder to be 28 feet.

Substituting these values in formulæ 24 and 26, and reducing, we obtain the following:

$d = 15.82$ for breaking.

$d = 16.20$ for bending, uniform load.

The shear adjacent $= 2.42$ tons. One inch depth of girder will safely resist 7.48 tons shear. Therefore, 7.48 : 2.42 : : 1 : .32 inches $=$ additional depth of girder required to resist shear.

Then $16.20 + .32 = 16.52$ inches. The girder can either be made 17 inches in depth, or 16 inches deep and the thickness of the timbers increased to 7 inches each, which would be cheaper.

This girder is represented in Figures 93 and 94.

Example 5. Loading as in last case.

Flitch girder composed of two white-pine timbers and a wrought-iron I-beam, bolted together, as in Figure 17.

Since only certain stock sizes of I-beams can be readily obtained, it will be best to assume the section of I-beam and depth of timbers, then determine their thickness.

Let $I =$ the moment of inertia of the I-beam, and whose numerical value can be readily obtained from the pocket-books.

Evidently, for a wrought I-beam and plate of equal stiffness,

$$I = \frac{t\ d^3}{12}.$$

Substituting I for its value in formulæ 24, 25 and 26, for flitch-plate girders, we obtain the following formulæ, which are applicable to this form of flitch girder.

1. BREAKING.

$$M = \frac{B\ b\ d^2}{4 f} + 3\ \frac{B'}{d f}\ I. \quad (27.)$$

2. BENDING.

$$M = \frac{E\ b\ r\ d^3}{1728\ L} + \frac{E' r}{144\ L}\ I. \text{ Concentrated load.} \quad (28.)$$

$$M = \frac{E\ b\ r\ d^3}{2160\ L} + \frac{E'\ r}{180\ L}\ I. \text{ Uniform load.} \quad (29.)$$

Assuming a Carnegie Bros'. 15-inch 50-lb. beam, we find the corresponding value of $I = 530$.

For white-pine; $S = 1.24$; $E = 858.$; $B = .219$.

Let $f = 5$; $r = .03$; $L = 28$. Required b.

Substituting the values in formulæ 27 and 29, we obtain:

$b = 9.13$ inches for breaking.

$b = 6.03$ inches for bending, uniform load.

As the shear $= 2.42$ tons, this would require .38 inch additional breadth of the timbers.

Hence, $9.13 + .38 = 9.51$ = total breadth of the two timbers.
Two timbers would be used, each being 5 inches thick.
The girder is shown in Figures 95 and 96.
It is evident that this form of flitch girder would be more economical than the ordinary kind, since the timbers are smaller than in the last case, and the iron weighs $3\frac{1}{4}$ lbs. per foot less.
It would be about $8.75 cheaper in this case.
Example 6. Loading the same as in the two last examples.
Girder to be composed of a white-pine timber 16 inches deep, with top and bottom plates of wrought-iron $\frac{1}{2}$ inch thick, firmly fastened to it.
Required the breadth b of the timber and plates.
Let t = thickness of each plate; d = depth of timbers; other notation as before.
Then, by formula 15, for top and bottom plates alone,

$$I = b\left[\frac{(d+2t)^3 - d^3}{12}\right].$$

Substituting this value in place of I in the general formulæ 27, 28 and 29, we obtain the following general formulæ, applicable to this kind of girder, with top and bottom plates of wrought-iron.

1. Breaking.

$$M = \frac{b}{4f}\left[B\,d^2 + B'\frac{(d+2t)^3 - d^3}{d}\right] \qquad (30.)$$

2. Bending.

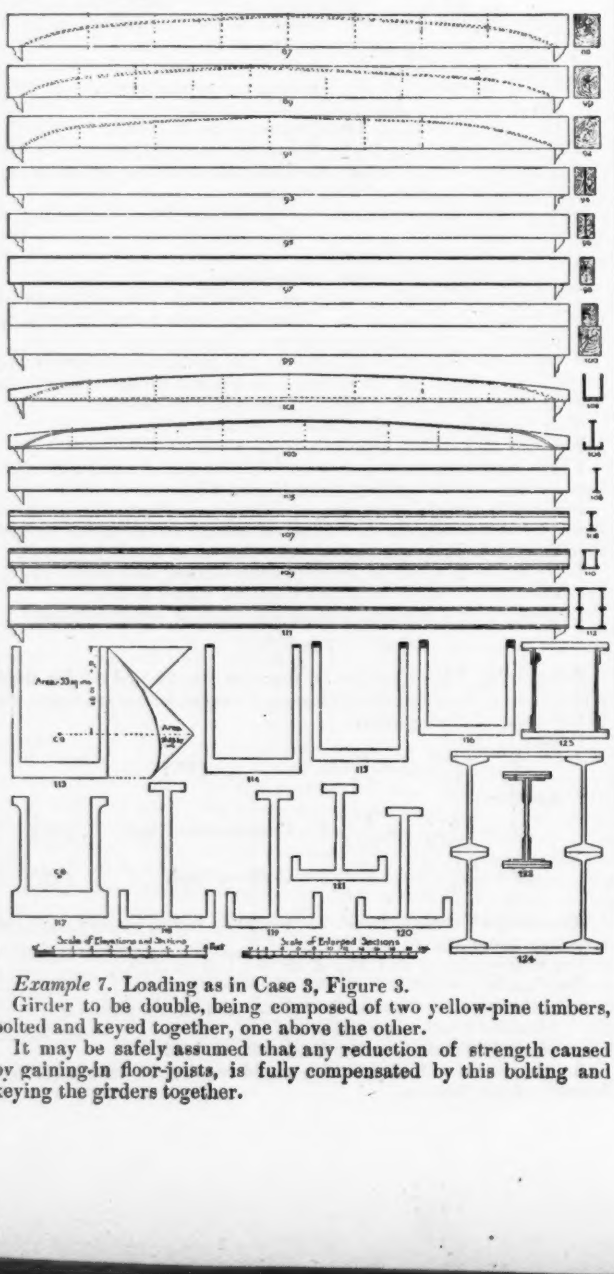
$$M = \frac{b\,r}{1728\,L}\left[E\,d^3 + E'\left((d+2t)^3 - d^3\right)\right] \qquad (31.)$$

Concentrated load.

$$M = \frac{b\,r}{2160\,L}\left[E\,d^3 + E'\left((d+2t)^3 - d^3\right)\right] \qquad (32.)$$

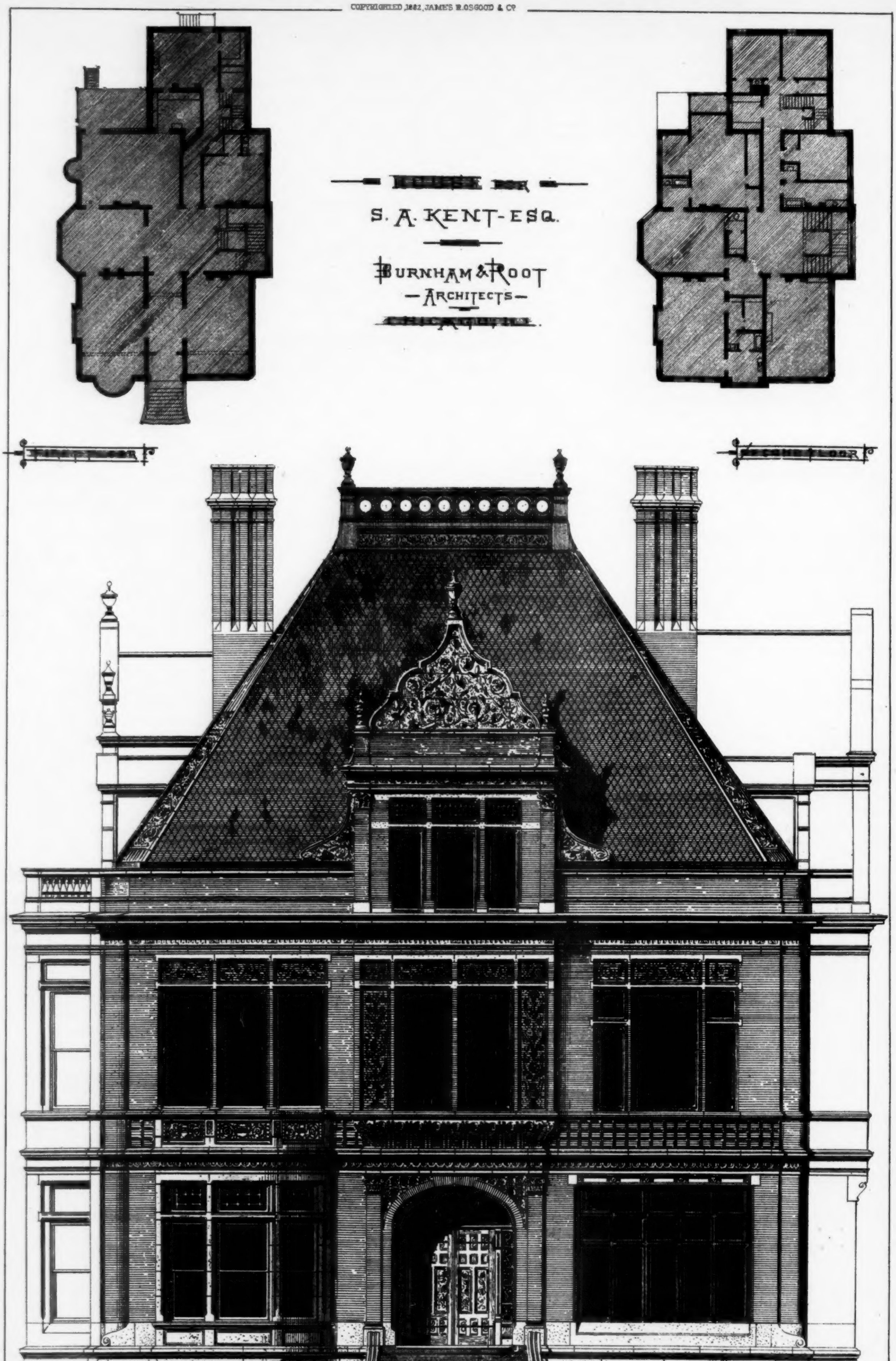
Uniform load.

Substituting the numerical values in these general formulæ, we find $b = 8.43$ inches for breaking, which is larger than either value for bending. For shearing, the additional breadth = .35 inch.
The girder may be composed of a timber 9″ x 16″, and two plates .5″ x 9″. This girder would be about $26 cheaper than the ordinary form, as in example 4.



Example 7. Loading as in Case 3, Figure 3.
Girder to be double, being composed of two yellow-pine timbers, bolted and keyed together, one above the other.
It may be safely assumed that any reduction of strength caused by gaining-in floor-joists, is fully compensated by this bolting and keying the girders together.

In this case M = 47.92 foot-tons.
Let $f = 5$; $r = .03$; $d' = .5\,d$, since section is rectangular.
For yellow-pine; $S = 2.17$; $E = 925$; $B = .250$.
The depth of the upper timber will be the same as of the joists: its width can be assumed, and the width of the lower timber should be 2 to 4 inches greater; the depth of the lower timber may then be found by calculation.
Suppose the upper timber to be 10″ wide x 14″ deep; lower timber 14 inches wide: required, its least safe depth.
Substituting the proper values for upper timber in formulæ 4 and 8, we find:
$M = 24.49$ foot-tons, for breaking.
$M = 12.43$ foot-tons, for bending, uniform load.
Hence, 12.43 foot-tons is the maximum bending moment that can be safely resisted by the upper timber alone, and $47.92 - 12.43 = 35.49$ foot-tons = bending moment to be resisted by the lower timber.
Substituting this value of M in formulæ 4 and 8, assuming the breadth = 14, and substituting the results in formula 10, we have:
$d = 14.24$ inches, for breaking.
$d = 17.68$ inches, for bending, uniform load.
The additional depth for shearing = .40 inch.
Hence, $17.68 + .40 = 18.08$ inches.
The girder may be composed of an upper timber 10″ x 14″, and a lower one 14″ x 18″. This girder would be considerably cheaper than any form of flitch girder.
If the girder be properly bolted and keyed, its actual strength will be considerably in excess of that required, but as its exact strength is not easily calculated, it will be found safest to solve the problem in the manner indicated here.
Example 8. Loading as in case 4, Figure 4.
Cast-iron box lintel to be used.
The load = 11.2 tons and is uniformly distributed. Maximum value of $M = 39.2$ foot-tons.
1. Suppose the Reuleaux section, as in Figure 86, to be used.
Its dimensions may be directly found by formula 20.
Let $f = 5$; $r = .03$; $L = 28$.
For average cast-iron; $S = 11.00$; $E = 7835$; $B = 1.037$.
Substituting these values in formulæ 4 and 8, obtaining the values of I, and substituting these in formula 20, we find:
$b = .994$ inch for breaking.
$b = .900$ inch for bending.
Hence the unit of proportion b should be made 1 inch, and the central section of the required girder would then be as in Figure 117.
In practice, it is usual to make the webs of cast-iron girders about half as high at their ends as at the centre, drawing a circular arc through the three points thus found, which forms the top of the girder. The thickness of metal is usually the same throughout, though that of the lower flange might be lessened towards the ends with economy, and still retain sufficient strength. As only the central section would have Reuleaux's standard proportions, the other sections could not be determined by his formula but might be by the indirect method.
2. Suppose a box lintel of ordinary form to be used. Fig. 20. Notation same as in last case.
Applying formulæ 4 and 8, we find;
$I = 126\,d'$, for breaking.
$I = 840.5$, for bending, uniform load.
The webs are here assumed to be 1 inch thick, bottom flange 2 inches at centre and diminishing to 1 inch at ends.
We first assume a section 16.5 inches in height. Fig. 113. Applying the graphical method, as indicated in the figure, we find:
Area of inertia figure = 26.83; of section = 53. Hence, $I = 26.83 \times 53. = 1422$.
According to the figure, $d' = 11.00''$. Hence I, for breaking, $= 126\,d' = 126 \times 11 = 1386$.
As the value of I for the assumed section is slightly larger than this, the section will be sufficient, especially as no allowance for shearing will need to be added to this section.
In the same way, we can determine the sections required at points 3.5 feet apart, exclusive of area for shearing, as follows:
At 3.5 and 24.5 feet from left end, section 11 inches high. Fig. 116.
At 7 and 21 feet from left end, section 14.25 inches high. Fig. 115.
At 10.5 and 17.5 feet from left end, section 15.75 inches high. Fig. 114.
Area for shearing is added as indicated by the shaded areas in Figures 114, 115 and 116.
The girder is shown in Figures 101 and 102.
If the end heights are made half the centre height, and a circular arc drawn through the three points as in the figure, it is evident that only the central section need be calculated.
Example 9. Modified Hodgkinson girder. Loading as in Case 5.
Maximum value of $M = 41.36$ foot-tons. Other notation as in last example.
Applying the same general formulæ as in the last case, the following results are obtained:
The largest section would be required at 14.86 feet from left end, and would be as in Figure 118. Height 18 inches; upper flange 1″ x 4.5″; lower flange 12 inches wide and 1.25 inches thick; edge webs 4.5″ high x 1″ thick.



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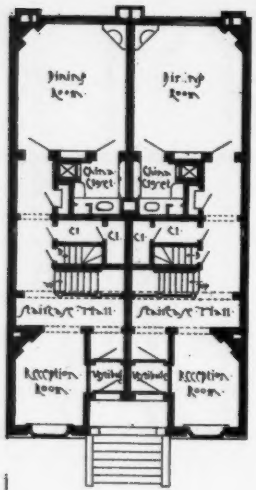
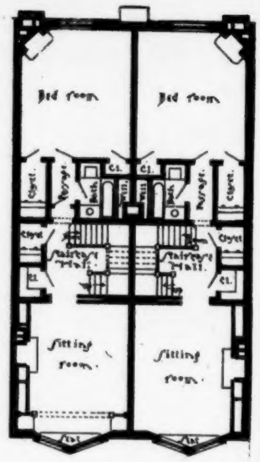
No. 360 American Architect and Building News, Nov. 18, 1882.





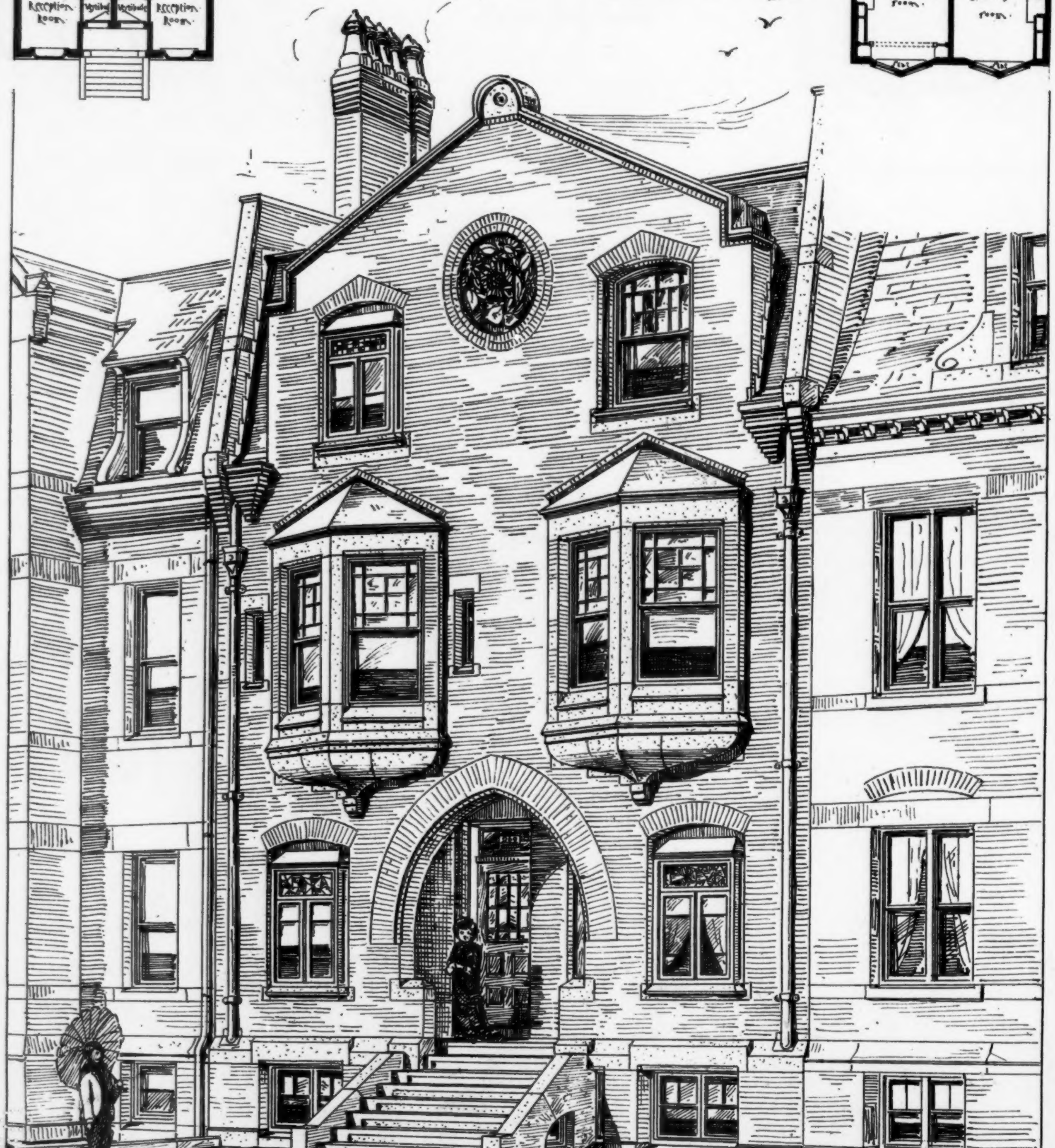


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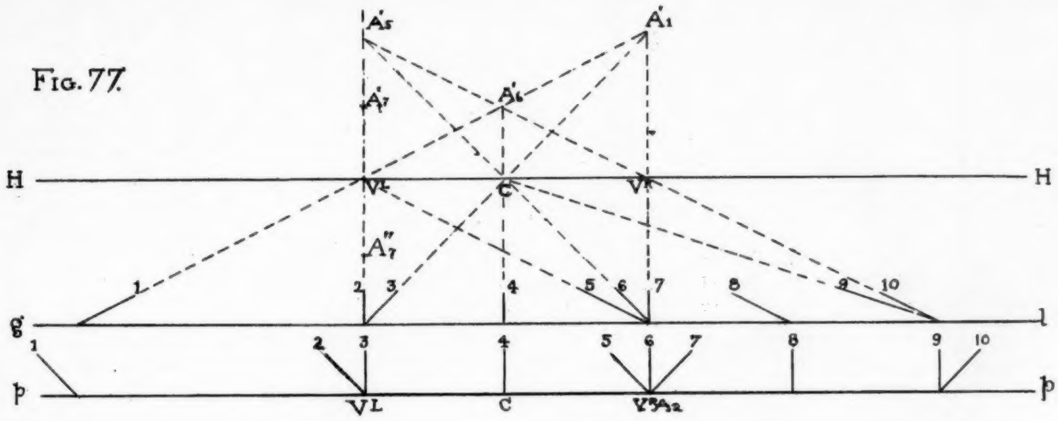
PLATE XVII. CONVERGING LINES.

Fig. 77.



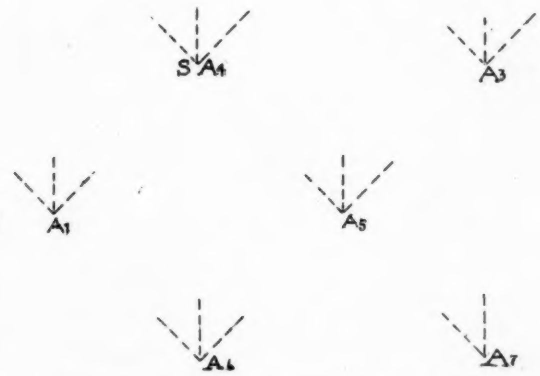


Fig. 80.

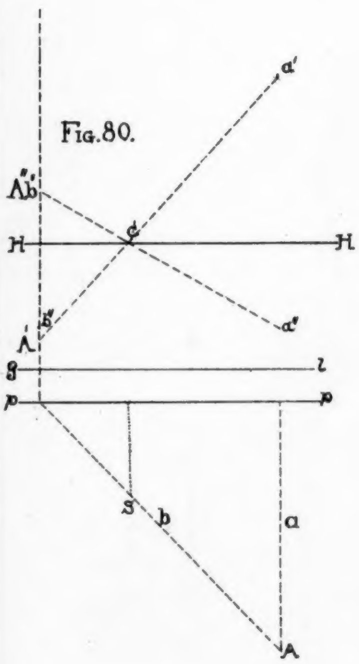


Fig. 79

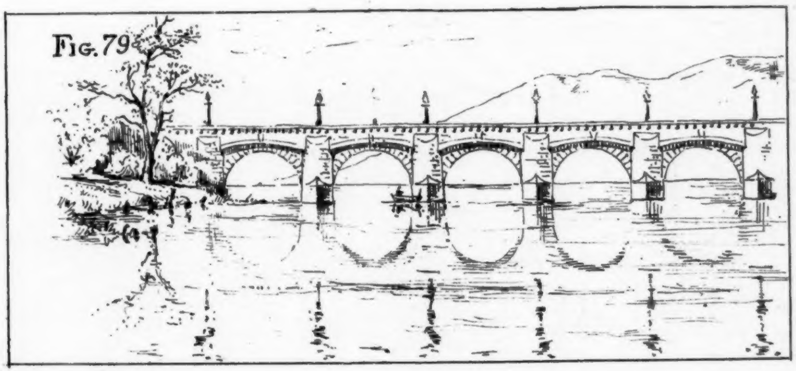
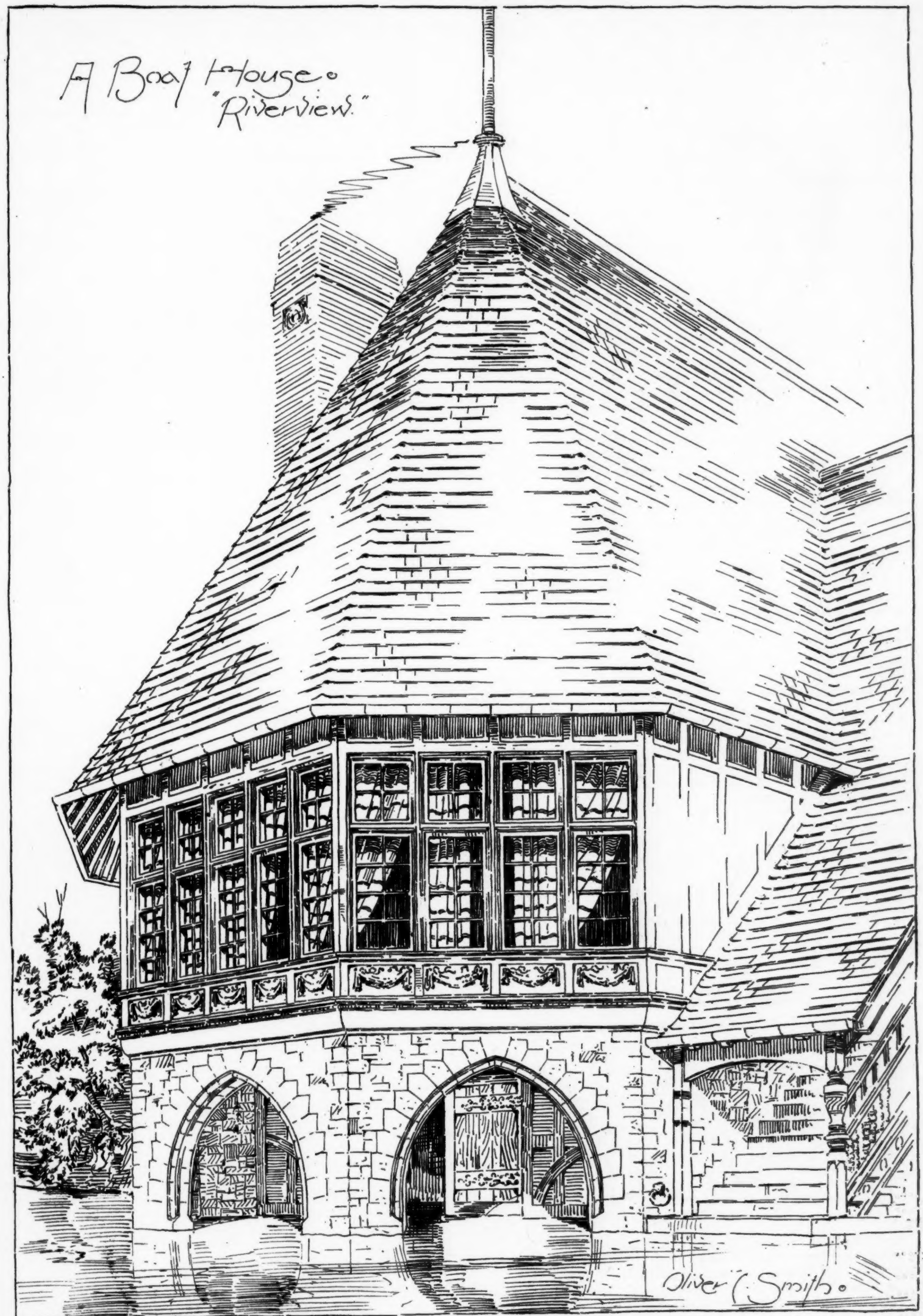


Fig 78.



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Sections at 10.5 and 19.23 feet are 17 inches high. Fig. 119.
Sections at 7.0 and 21.87 feet are 15 inches high. Fig. 120.
Sections at 2.56 and 25.7 feet are 12 inches high. Fig. 121.

The additional area for shear is best added to the height of the three webs.

In order to determine exactly the points at which a given section may be suitable, in this case, we must apply a reverse process.

Assuming the section, find its value of I and d'; substitute these in the general formulæ for breaking and bending (4, 7, and 8), and determine the values of M corresponding, selecting from these the *safest* value.

Divide this value of M by the pole distance, and obtain the corresponding length of the intercept. If this value of the intercept be then laid off downwards from the closing line, on any vertical, and a line drawn through its lower end parallel to the closing line, this will cut the equilibrium polygon or curve, immediately under the two required points. Draw verticals through the intersections and measure their distances from the end of the girder, which will be the required distances.

The height of web may also be found approximately by drawing a circular arc, as already explained.

Example 10. Wrought-iron I-girder. Fig.27.

Loading as in Case 6, Figure 6. Maximum value of $M = 32.96$ foot-tons.

For average wrought-iron; $S = 22.5$; $E = 12443$; $B = 1.199$.

Other notations as before.

Applying formulæ 4 and 8:

$I = 45.82\ d'$, for breaking.

$I = 445.3$, for bending, uniform load.

If a 15-inch Carnegie Bros.' beam be used, $d' = 7.5$ inches.

Then for breaking, $I = 45.82 \times 7.5 = 343.7$, against 445.3 required to resist bending.

Hence a 15-inch 50-lb. beam should be used, for which $I = 530$. This would be considerably cheaper than to use two beams of less depth, as two 12-inch 42-lb. beams might be used, but which would weigh 84 lbs., against 50 lbs. for the 15-inch beams. This girder is shown in Figures 105 and 106.

Example 11. Wrought-iron built I-girder. Fig. 32.

Loading as in Case 7, Figure 7. $M = 30$ foot-tons.

Applying the general formulæ, we find:

$I = 41.71\ d'$, for breaking.

$I = 405.19$, for bending, uniform load.

Maximum bending moment occurs at 13 feet from left end, and the corresponding section is found to be as in Figure 122.

The girder is shown in Figures 107 and 108.

The top and bottom are composed of two plates $\frac{3}{8}'' \times 6,'$; web is $\frac{3}{8}$ inch thick; girder 12 inches deep, with 4 angle-irons $2'' \times 3'' \times \frac{1}{4}''$. Between the left end and 4.85 feet from it, also from 22.2 feet to the right end, the extreme top and bottom plates of flanges can be omitted, not being required, though this is not usually done.

Example 12. Wrought-iron box girder. Fig. 33.

Loading as in Case 8, Fig. 8. $M = 47.68$ foot-tons.

Applying general formulæ:

$I = 66.29\ d'$ for breaking.

$I = 646.9$, for bending, uniform load.

The girder is found to be as shown in Figures 109 and 110, the enlarged section being Figure 123. It is composed of top and bottom plates, $\frac{3}{4}'' \times 11''$, is 12 inches high; webs are $\frac{1}{4}''$ thick, and has four angle-irons $1\frac{5}{8}'' \times 2 \times \frac{1}{4}''$.

Example 13. Wrought-iron U. S. girder. Fig. 31.

The girder to be 28 feet long in clear, and to safely support a uniformly-distributed load of fifty tons.

$M = \frac{1}{8}\ W\ L = .125 \times 50 \times 28 = 175$ foot-tons.

Shear at ends = 25 tons, uniformly diminishing to zero at the centre.

Applying formulæ 4 and 8:

$I = 486.5\ d'$, for breaking.

$I = 2363$, for bending, uniform load.

The section may be found by the indirect and graphical method, being assumed, drawn, and the corresponding values of I and d' determined, in the manner already employed for the same form of section in Figure 73.

Or it may be found by calculation as follows.

Assuming that four Carnegie Bros.' 12-inch 42-lb. I-beams are to be used with top and bottom plates $\frac{5}{8}$ inch thick, the width of the plates may then be found.

The tabular value of I for this I-beam = 275, taken about a horizontal axis passing through its centre of gravity. But in this case its moment is required about the centre of gravity of the entire section, which is 6 inches from the former.

Hence, by formula 21, the true value of $I = 275 + (12.5 \times 36) = 725$. (Area of section being = 12.5 square inches.)

For the four I-beams, $I = 725 \times 4 = 2900$.

The total depth of section = 25.25 inches; $d' = 12.675$ inches.

Hence, I for breaking $= 486.5 \times 12.675 = 6166$. (Maximum.)

The required value of I for plates only $= 6166 - 2900 = 3266$.

By formula 15, for plates only, substituting value of I and reducing for b, we find $b = 17.23$ inches.

The plates would therefore require to be 17.25 inches wide, or 19 inches, if allowance be made for rivet-holes, as should be done.

This girder is shown in Figures 111 and 112; an enlarged section is given in Figure 124.

N. CLIFFORD RICKER.

THE ILLUSTRATIONS.

HOUSE FOR S. A. KENT, ESQ., CHICAGO, ILL. MESSRS. BURNHAM & ROOT, ARCHITECTS, CHICAGO, ILL.

THE fronts are entirely of plain and moulded Philadelphia bricks, the carved panels, string-courses, etc., being red terra-cotta, made of the same clay as the bricks. The roof is of dark red slate.

TWO HOUSES ON NEWBURY ST., BOSTON, MASS. MR. W. W. LEWIS, ARCHITECT, BOSTON, MASS.

Each house is of brick and brownstone, 16 feet wide, finished in pine and white-wood, stained or painted. Hard-wood floors, first story; soft wood, stained, elsewhere.

DESIGN FOR A BOAT-HOUSE. MR. O. C. SMITH, ARCHITECT, PITTSBURGH, PA.

PERSPECTIVE PLATE XVII. CONVERGENT AND DIVERGENT LINES.

AMERICAN ARCHITECT COMPETITIONS.

THE jury of award have accorded the five equal prizes in the competition for designs for cast and wrought iron-work to the authors of the following designs: —

"*Cross Keys.*" Mr. J. W. H. Watts, Ottawa, Can.
"*Art Lover.*" Mr. J. W. Northrop, Hartford, Conn.
"*Two A. M.*" Mr. B. M. Lincoln, Hartford, Conn.
"*Ferrum.*" Mr. W. C. Hazlitt, New York, N. Y.
"*Vulcano.*" Mr. C. H. Rau, Rochester, N. Y.

We find it most convenient to delay the publication of these drawings until December 2.

THE subject of the next competition is one which is of the widest possible interest — a cheap dwelling; and we trust that more than the usual number of designs will be submitted in competition.

PROGRAMME.

The house is intended for a clerk, who has a salary of only $1,500, but whose social position is unexceptionable, and he consequently hopes to be able to build for the $3,000, which economy has placed at his command, a house in harmony with the tastes and habits formed during bachelorhood. He is now married, and has two children who must be provided for in the planning, as also the maid-of-all-work.

The material of the building, size, number, and distribution of the rooms are left to the competitors to determine, who are to be guided solely by the cost, which must approximate $3,000.

Required: — Plans of each floor, a perspective sketch, and an elevation of one of the sides not shown in the sketch, also all necessary details to a larger scale, and at least one sketch of some feature of interior arrangement.

Also, a skeleton specification of the briefest possible dimensions, enough merely to give a clue to the character and quality of the work. Also a bill of quantities giving the actual number of yards of excavation, perch of stone-work, MM of brick, laths and shingles, feet of lumber, window-sashes, doors, nails, hardware fittings, special fixtures, labor, etc., giving the present market price for the locality on each item, and reckoning-in the proper amounts for waste and allowances of all kinds, including the builder's profit, and the architect's commission. Those who can secure actual estimates from reliable builders are urged to do so.

The specification and bill of quantities are to be submitted on paper of the size of legal cap, and the drawings upon two sheets, each measuring 14" x 22" within the framing line.

All drawings must be received at the office of the "*American Architect*" on or before Saturday, January 13, 1883.

For each of the three designs of highest merit a prize of seventy-five dollars will be paid.

STONE BAS-RELIEF · COLLECTION OF COUNT PASSALACQUA-MILAN · FROM L'ART.

ON THE PREVENTION OF FIRES IN THEATRES. — II.[1]

IT is too much to ask a man to stand and fight fire when he knows that there is a tinder-box between himself and safety, and that at any moment a drifting spark may cut off his only chance of escape. Sometimes such heroes do exist, who pay for their bravery with their lives, but these are only warning examples to others not to risk their own in similar efforts.

[1] Concluding extracts from a paper read by C. John Hexamer, at the Stated Meeting of the Franklin Institute, held June 21, 1882, and published in the *Journal of the Franklin Institute.* See *American Architect* for August 12, 1882.

In this case we must again take our resort to automatic means, and for this purpose automatic sprinklers, which have been in use in mills for some time, would be of great value.

As a plentiful supply of water is not always at hand, and as steam-pumps frequently get out of order, large reservoirs should be placed on top of theatres. These should be placed on top of the auditorium and not in the rigging-loft. The stage, as the most inflammable part, being generally ignited first, would (if the reservoirs were placed on it) deprive the remainder of the building of water.

In order to keep the water in these tanks from freezing, the exhaust-steam pipe of the engine should be made to pass through it, or, as this is not always convenient, it should be mixed with salt (salt water having a lower freezing-point than pure water). The addition of salt would also have the wholesome effect of preventing the formation of algæ (the green slime found on ponds and other still water), which are obnoxious by their smell and by the tendency they have of closing the pipes.

Every theatre should have a fire-brigade consisting of at least five men; these should be present at all performances, and should be perfectly familiar with the theatre and all its fire appliances.

At Carlsruhe (the seat of the famous polytechnic school) the authorities, after the great fire of the "Hof-theater," organized a fire-patrol of students. These are stationed all over the theatre, know all appliances, and, as a corps of gentlemen, must be much superior to ignorant men, both in case of fire and in quieting a panic.

Watchmen should be constantly on the premises, and, to control them, watch-clocks should be fixed in different parts of the building.

Automatic fire-alarms, placed in various parts of the stage, would be of great use, as the fire-department is generally notified too late.

We now arrive at the most important question: *the safety of audiences.*

From the numerous accounts of theatre fires which the author has collected he finds that loss of life is caused by (1) suffocation by smoke; and (2) the crushing and trampling of the panic-stricken masses.

Experience shows that death is mostly caused by suffocation, and that the burning of bodies is a subsequent occurrence, taking place after life has already become extinct. This was again clearly illustrated by the late Vienna fire.

We must, therefore, get rid of the smoke in the quickest and best manner possible. This question has been solved by the ingenious device of Hofman, which acts in conjunction with his automatic drop-curtain, and by Mr. Louis Sues of Chicago.

The intense smoke in the auditorium, during a fire on the stage, is caused by a draught of hot air from all parts of the house towards the open doors and ventilator. The latter is usually situated above the main chandelier in the centre of the auditorium ceiling. This draught may frequently be noticed by the sail-like outward bulging of curtains. We must therefore form a counter draught, which in case of fire would be strong enough to overcome the combined action of the doors and ventilator. This could best be accomplished by a chimney or flue on the top of the stage which would take off all smoke and cinders. Or, as before stated, *making a perfect shaving-vault of the stage.*

We will now describe the different solutions advanced for this problem, beginning with the simplest.

A good idea was suggested a short time ago by one of the inspecting chiefs of the New York Fire-Department. It was, to make the roof over the stage a vast skylight, the glass of which could be broken in case of fire, and a draught thus created which would carry the flames upward and prevent them spreading to the auditorium.

Next in order comes Mr. Sues' smoke-flue, the description of which I quote from his patent specification.

"The object of my inventions is to construct theatres so that this difficulty will be obviated to a great extent, and it consists in a large outlet in the roof over the stage for the passage of smoke in case of fire, so that a current of air will be induced from the auditorium to the stage, instead of from the stage to the auditorium, and combining with such outlet a ceiling over the stage portion of the building which will for a considerable time resist the action of fire, thus giving the audience time to escape.

"In the drawings, *A* indicates the auditorium; *B* that portion of the building devoted to the stage; *C*, the stage; *D*, opening between the stage and the auditorium; *E* is the ceiling over the stage. This ceiling I make practically fire-proof, either by making it wholly of metal, or by the use of metal joists with wire or wire-cloth for lathing, and usual plastering, or in other suitable manner. *F* is a large passage to be made of fire-proof material. It passes through the roof *G*. Its lower end is properly secured in the ceiling and is open, except when closed by the valve *a*. *b* is a chain by means of which the valve *a* can be opened. *c* is a weight which holds the valve in position when closed. The operation is as follows: if a fire breaks out upon the stage, the valve *a* is to be immediately opened. The ascending heat and smoke will rise to the ceiling, and escape through *F*, thereby producing a current from the auditorium to the stage, instead of the reverse, thus keeping the smoke and flames from the audience-room while the audience is escaping. In cases where a fire-proof drop-curtain is used, suitable openings may be somewhere provided to admit air to the stage. In theatres of the usual size the passage *F* should be about six feet in diameter. It may be carried some distance above the roof, which will increase the draught. Two or more of these passages *F* may be used. The opening at the top of the passage *F* may be protected from storms by caps."

This is an excellent device, the only objection to it is that it is not automatic; its usefulness in case of fire being, therefore, dependent on the coolness of the men having it in charge.

The ingenious device of Hofman combines an automatic wire drop-curtain, automatic smoke-flue, and an automatic fire-alarm. This device will act without the aid of a single hand, being entirely automatic.

It consists of a safety-rope, which runs on pulleys over the principal and most dangerous parts of the stage. This rope is prepared so as to be the most combustible substance on the stage. In case of fire, it will, therefore, ignite and burn off almost instantly. Has this moment arrived, a heavy weight, held by the safety-rope, falls. This weight being connected with the machinery of the curtain by a lever, the lever is raised, the machinery set in motion, and the curtain lowered. Not, however, with a sudden fall which might damage it, but steadily.

The falling of the heavy weight at the same time opens the valve of the large smoke-flue contained in the roof of the stage, whereby the smoke and heat of the fire is kept on the stage and taken out through the flue; thus giving the audience time to leave the theatre quietly and in order, without being threatened by smoke or heat. The same moment the above takes place, the fall of the weight sets a fire-alarm in motion and the fire-department is notified.

We have now seen the different devices for getting rid of that greatest danger to audiences — smoke — and can now compare their relative values. The first would be very simple, but in the time required for the firemen to arrive and break in the glass of the skylight, the audience might be suffocated.

The second is an excellent patent, its only objection being as before stated, its want of automatism.

The third, to the author, seems undoubtedly the best, for if in case of fire, the men having it in charge should neglect to open the valve, it would act automatically; not to speak of the immense value of the automatic wire drop-curtain and fire-alarm.

The writer has frequently noticed the time required by audiences to vacate theatres, and out of numerous experiments finds it takes from $3\frac{1}{2}$ to 11 minutes for a theatre to be entirely emptied. But this time is protracted indefinitely in case of a panic. It has been found that in cases where audiences had ample time to vacate theatres many were killed, although not prevented from escaping by the smoke.

This is explained by the jamming of crowds in corridors. A mass of people may best be compared with a number of logs floating down a stream, which at some point, by their mutual pressure, form arches across it, thus becoming wedged fast. In the same manner persons form arches across corridors which are sometimes broken only to be formed again. This, the cause of many deaths, may be remedied by making the walls of corridors inclined towards each other, being narrowest in the theatre and widening towards the exit-doors, as it is impossible for logs to jam in a widening water-course.

There should be outlets from each gallery or floor separate and distinct from every other outlet, so that a crowd from one gallery cannot precipitate itself upon a crowd from another floor that is struggling to get out.

A matter still sometimes neglected is, that all doors should open outwards. The people of the fourth gallery at the recent Vienna fire, for example, were hindered from flight by the doors opening inwards.

Most theatres have a sufficient number of exits, but in order to save door-keepers most of them are locked; some not being satisfied with locking them, even nail and bolt them shut.

Corridors are also frequently too narrow; these should never be less than eight feet broad, which would allow at most but five persons abreast.

Another outrage to humanity are high galleries. In American theatres there are never more than three, but in Europe they have as many as five. Law should forbid the erection of more than two galleries, *i. e.*, a "balcony" and "family circle."

The horrors of theatre fires are always increased by the total darkness which envelopes audiences a short time after commencement of the fire. This is frequently caused by the explosion of gas on the stage. To obviate this, all theatres should separate the system of lighting the auditorium from that of lighting the stage. After years of hard work, the authorities of Vienna succeeded in compelling managers to have oil-lamps in corridors. The order was complied with, but as was seen by the late catastrophe, these were never lighted. It has frequently been urged, especially by "insurance men," that the risk from fire would only be increased by the use of coal-oil in these lamps. But it is not necessarily said that petroleum must be used, for any of the heavy oils (used long before coal-oil was known) might be employed with advantage. If these should be objected to, let it be remembered that festivals which outrival everything in history by their splendor, and that the plays of a Corneille and a Moliere were first produced before the eyes of the then most powerful king of Europe, by the light of *candles.* Why should these then not satisfy us in the humble position of safety corridor-lights?

Particular attention should be paid to the calamity at Carlsruhe in 1847. By the inattention of one of the servants in lighting the gas the drapings of the Grand-Ducal box caught fire. All parts of the house were crowded, over 2000 persons being present. The flames instantly spread to the balcony; every one tried to escape in the greatest hurry. The audience of the parquet, as well as that of the balcony, saved themselves, but the greatest confusion ensued in the higher galleries, which were in a short time filled with smoke. Of the four exits, but the one under which the fire broke out was open. Every one rushed to this exit and very soon it was jammed shut. The scenes following were indescribable: a few climbed or jumped from the galleries; others threw themselves out of the windows; many were crushed to death, and most were suffocated by the hot smoke. In the narrow corridors people were lying in heaps. To this was added that immediately after the breaking out of the fire the gas was turned off from the street, and the building thrown into total darkness. The situation of the people, jammed fast in corridors, without light, enveloped in smoke, was frightful. This catastrophe cost the lives of sixty-three persons, and over two hundred were terribly wounded. As before mentioned, the theatre had four exits, but to save the expense of extra door-keepers three of these had been closed for years, and not only locked but nailed and boarded shut, and but few knew the existence of these extra exits.

One cause saved the lives of many — gas had not long ago been introduced and on this account many oil-lamps had been retained to do duty in corridors. These lamps, which had been the objects of wit and sarcasm, saved the lives of hundreds.

We had at Vienna the counterpart of Carlsruhe, only in this case the lamps were not lighted or hundreds of unfortunate victims would have been saved.

It can, from this, be seen how necessary oil-lamps are, and that in the deciding moment this precaution will save many lives.

Before concluding my remarks it may be well for me to give an example of a theatre which was managed in the correct manner, which had many of the modern improvements, and which at the same time is the first case on record in which *the entire* audience of a burning theatre escaped in safety. On the 16th of April, of this year, during a performance of the farce "Robert and Bertram," at the "Hof-theater," of Schwerin, the cry of fire was suddenly heard from one of the galleries. As no flames or smoke were perceived the audience remained seated, until the news came from the outside that the roof was burning. The Grand Duke, who was present, immediately addressed a few words to the audience and ordered the musicians to continue. The stage-manager also assured the audience that there was no danger. But soon the wire curtain had to be lowered, and now the audience left the theatre in the greatest order, especially the densely-packed galleries were rapidly cleared, the audience escaping through the numerous exits, *which were all open*. For some time previous to the occurrence audiences had been instructed — by means of large placards hung in the corridors — how to act in case of fire. The *oil-lamps were all lighted*, and the wire curtain was in *good working order*, thus for the first time practically illustrating its use. On account of these excellent arrangements it was possible for the whole audience to save itself, although many ladies and children were present. Here we then have an example to show how, with proper precautions, faithful employés — especially the man who let down the wire curtain — and cool, collected conduct, an audience may be spared the dangers of a theatre-fire. The beautiful theatre burned down, also the large Concert-Hall attached to it. But the only life lost in the event was that of a fireman who was buried under a falling wall, this occurring a considerable time after the audience had escaped.

The author hopes to have shown how theatres can be built, although not fire-proof, yet in a manner so as to give safety to audiences.

Theatres *could* and *should* be built so that the largest audiences could escape in safety.

THE VALUE OF COAL-TAR. — Before the year 1856, the value of coal-tar in London was hardly one cent per gallon, and in most of the English country towns gas-makers were glad to give it away. Up to that time but small quantities of benzine, naphtha and creosote oils had been distilled. In 1856 the discovery of the mauve or aniline purple gave a great impetus to the coal-tar trade. At the present time the color-trade industry practically uses all the benzine and most of the naphtha, all the anthracine and a portion of the naphthaline, resulting from the distillation of coal-tar. It is estimated that the value of the coloring matter so produced is upward of $16,000,000 in England alone. Over 1,000,000 tons of ammoniacal liquor and 95,000 tons of sulphate of ammonia are made, which is worth over $100 per ton. It is said that the by-products of the English gas-works exceed the value of the coal used by $15,000,000. It is to this wonderful economy in the utilization of the waste products that the English cheap gas is due. A gas engineer from this country a few years ago spoke of English gas works as being works for the production of coal-tar, ammonia liquor, etc., which sold their gas as a by-product at little more than the cost of producing it. Anxious as the gas-makers are to increase the consumption in order to make more profitable portions of the business larger, it seems strange that they have not more generally taken measures for encouraging consumption. In many places the application of gas for heating purposes is difficult, in consequence of the reduced pressure on the mains during the day-time In fact, this pressure is so low as to barely prevent the indraft of atmospheric air into the pipes. — *The Metal-Worker.*

AMERICAN WOOD-ENGRAVING.[1]

I HAVE brought with me to-night a number of specimens of these modern American wood-engravings. You are, perhaps, aware that its processes have been assailed with some asperity by representatives of the more conventional school. A fierce controversy has been going on between these artists and that veteran engraver, Mr. Linton, to whom they, in turn, doubtless owe much of their instruction. Mr. Linton has no faith in the new movement, he denounces the liberty which many of the younger men allow themselves, and he regrets the recent attempts that have been made to reproduce varied effects of tone and color, and to imitate the different modes of execution in pen, brush, or charcoal, as a waste of time and a wanton perversion of skill and labor. It would take too long to follow Mr. Linton in all the details of criticism, nor is it necessary for our purposes to do so; the point which he seems to miss is that wood-engraving in its modern acceptation is of a wider scope than he would seem disposed to allow. It is idle, at this time of day, to attempt to confine wood-engraving within the limits of an original art. A process which offers such facilities in regard to reproduction must, of necessity, be employed in a vast variety of ways, and there seems to us to be no reason in the nature of things why one school of workmen should not take the course which the American engravers have followed. An experiment of this sort must be measured by its success; nor can it be gainsaid that these younger engravers of America have in this respect more than justified their departure from the accepted rule. So closely does the work accord with the original it has undertaken to imitate, that I have often heard it asserted, even by artists, that these American wood-blocks are in fact not wood-blocks at all, but are mechanical reproductions of drawings or paintings. Of these mechanical reproductions I shall speak more at length in my next lecture, but although these American illustrations are genuine works of wood-engraving, there would seem to be little doubt but that the efforts of their authors have been largely stimulated by the success with which various mechanical processes have lately been developed.

That a wood-engraver, who has faith in his art as a dignified means of original expression, should regard with dislike the kind of dexterity which this younger school has acquired, is conceivable enough, but the truth is that these pretensions which Mr. Linton and others are now making, are of quite recent origin. In all its past history, wood-engraving has been a recognized method for reproducing original work. When the propriety of *fac-simile* engraving is once admitted — and *fac-simile* engraving, it may be remembered, is the very earliest and worthiest form of the art — the accusations brought against the younger school will be found to lose half their force.

Their practice is nothing more than a development of a principle that has been tacitly acknowledged since the craft has been in existence, and as the earlier workmen strove to reproduce faithfully the simple lines of the design, so they now endeavor, by greater variety of method, to copy exactly the effect and color of the original drawing. The degree of success which they have attained can only be judged by reference to particular examples; but their efforts would certainly have missed success if they had allowed themselves to be hampered by the rules which Mr. Linton, and those who think with him, now seek to impose upon the art. The principle that may be said to characterize all the work of the school springs out of a single desire to preserve the character and appearance of the work chosen for reproduction; and with this work steadily in view, the engraver permits himself to make use of devices which are often in conflict with the conventional kind of execution hitherto employed. That these devices are, in many cases, experimental, is frankly acknowledged; but no one who studies these blocks attentively can fail to perceive that such experiments have been the means of enriching the resources of the art. Now and then their endeavor to do justice to the original artist may result in a failure; but this failure is more than counterbalanced by many successes, and by the strong impress of personal and individual style which the experiment has gradually developed. The engraver, it will be seen, begins to acquire and to practice a system of his own, by which he is enabled to infuse into his work a new sense of variety, and to claim for it a kind of attention and interest such as could never be allotted to the strictest adherence to a rigid rule of procedure; and it may be said, further, that in the hands of the most gifted of these American engravers, a sense of style is gradually asserting its control over the newly acquired methods.

[1] Extract from a "Cantor" lecture, by Mr. J. Comyns Carr, published in the *Journal of the Society of Arts*.

I may point, in particular, to the work of Mr. Cole, as it is shown in the pages of *Scribner's Monthly Magazine*. The block, for instance, in which he has reproduced the noble picture of "The Sower," is executed in a manner that has nothing discordant with the principle that Bewick established. Where the simple line can be used, as, for example, in the treatment of the sky, the artist has shown his willingness to adopt that mode of treatment; and although the whole effect of the block is delicate and refined, there is an admirable economy of method in the way in which the dark, sombre figure is relieved against the dark hill-side.

These essays of American engravers present, as I have said, nothing that is antagonistic in principle to the practice of Bewick. Their method is founded, like his, rather upon the rendering of mass than upon severe definition of line, and the differences between the two are differences of detail. And yet these differences, it must be allowed, are not unimportant. Though Bewick, in his admirable cuts of British birds, did not insist upon outline, he always adopted a regular and uniform system of execution. He worked with line even while he was endeavoring to secure effect of tint; and it will be seen that although he makes use of the black surface of the block where he can give the sense of dark color, yet the lighter tints are always produced by delicately-cut lines which have a rhythmical and regular direction. The majority of the American engravers do not confine themselves to this method. If they want to relieve or lighten a dark surface, they as often as not pick out the lights in small irregular holes. They stipple, so to speak, with the point of the graver, and their work has, for this reason, more of the appearance of accident and less of the method of art. And it must be said further that they are greatly assisted by the mechanical appliances of printing which were not within Bewick's reach. The printing of wood-blocks in America is itself an art, and much of the beauty of the wood-engravings depends upon its exercise.

ARCHITECTURAL SCHOOLS.

Streator, Ill., October 16.

To the Editors of the American Architect:—

Dear Sirs,—Will you kindly inform me through the columns of the *American Architect* what architectural school you consider the best in Europe. Also give me some information regarding the one at Paris, the cost of tuition, etc., with address of corresponding secretary of same, and oblige,

Yours very truly, F. S. Allen.

[The best architectural school in Europe, to our mind, is the Architectural Department of the Ecole des Beaux-Arts in Paris, in which tuition is free. Application for admission must be made through the United States Minister, to the French Minister of Fine Arts. There is no such officer as a corresponding secretary of the school.—Eds. American Architect.]

TO DEVELOP A NATIONAL STYLE.

Atlanta, Ga., November 6, 1882.

To the Editors of the American Architect:—

Dear Sirs,—In your notice of the convention at Cincinnati it appears you did not get the true inwardness of the motion for each one of us, Fellows and Associates, to make a design for the next convention. I made the motion, and the idea was this: in view of the fact that as America has no marked style of architecture of her own, as other countries have, it behooves the A. I. A. to put their shoulders to the wheel and make a systematic and united effort in that direction, and that the Trustees give out a problem, and each one of us solve it as he thinks best, avoiding at the same time the beaten tracks. By this method it is hoped a national style will be formed in time, especially if we have your valuable aid in agitating the matter from time to time, of which I feel perfectly sure.

Very respectfully yours, John Moser.

NOTES AND CLIPPINGS.

A Big Well.—The largest well in California is now rapidly nearing completion in Wilmington, in this county. It is the enterprise of General Phineas Banning, one of the most energetic citizens of Los Angeles County, who has made this well his hobby and pride for several months past. It is twenty-five feet in diameter, and has reached a level some forty feet below the surface of the earth. In the interior of this circular hole a huge wooden tank, hooped together with iron bands, and each stave twelve inches square, has been built. The inside of this tank, which is bottomless, is hooped with bands of railroad iron, and formed so that the bottom flares outward and is wider than the top. As the earth is removed from the bottom of the well, this mammoth bottomless tub, one foot thick, sinks downward, thus forming a watertight wall. On top of this wooden structure a brick wall is being built as the hole becomes deeper. The water enters the well at the bottom in large volumes, but it is kept almost dry by the operation of a large steam-pump, which runs night and day. There is room for twenty-five or thirty-men to work upon the bottom of this well. When it is completed the water will be pumped into a gigantic tank, which, being elevated above the ground upon scaffolding, will give sufficient gravity to send water in any direction for miles. With the completion of this well Wilmington and San Pedro will have an assured supply of water for all time. Pipes are laid to the wharf at San Pedro, so that vessels can take water with greater ease and without trouble. The cost of this monster well will not be less than $8,000 or $10,000.—*Los Angeles (Cal.) Telegram.*

The Tulpehocken Town-Clock.—The Tulpehocken town-clock is interesting to study as a piece of rather phenomenal machinery. One of its characteristics is its variety. It has four faces, a face upon each side of the tower, and persons who are not satisfied with its alleged record of time upon one face can obtain another and wholly different record by looking at another face. The four sets of hands never, excepting by accident, tell the same story. It will be quarter past two on the north dial when it is twenty minutes of nine on the south dial, and at the same moment the east and west dials will range from half-past six to five minutes of eleven. This would be perplexing to a stranger who wished to catch a train at the station, but the town folks are used to it. Generally they regard the clock simply as an original kind of curiosity, not depending upon it in any manner for accuracy; but it has been discovered that a reasonable approximation to the correct time may be obtained usually by adding together the records of the four dials and striking a general average. The clock has what may be called idiosyncrasies. On the south dial the minute-hand every now and then changes off with the hour-hand, and each performs for a time the functions of the other, with the effect to fill with complete bewilderment the mind of the oldest inhabitant who has made a practice of looking at that dial alone. The east dial works differently. Now and then the hands come to a complete stop, say at 8 minutes past 12. After a few moments of repose, apparently to gather strength for a forward movement, both hands will suddenly whiz around and will slow up and begin regularly again at quarter to four. One who looks at the east dial just before and immediately after the operation gains an impressive notion of the rapidity of the flight of time. Now and then the hands on the north dial become interlocked, and for a day or two they revolve together, so that the meaning of their record is not very distinct, and it is difficult to make a fair average of the four dials. The hands on the west dial went backward every day for three weeks last summer, adding much to the interest with which the clock is regarded, and suggesting entertaining reflections as to the possibility of a machine which might take up the spent moments and wind us gradually back into the eighteenth century. The clock has a striking apparatus, but like the rest of the machinery it is peculiar. It has rarely been known to strike the hour when any of the minute hands touched the 12 spot. Thus far no one has been able to detect any exact system in the striking, but some careful observers hold that when 12 is struck it is fair to presume that one or the other of the dials marks 10 minutes after 2. This, however, is not yet verified. Occasionally the clock will not strike at all for several days, and then it will suddenly start up and strike 237 with such rapidity that the strokes can hardly be counted. The proposition is that it gets in at one time or another the proper number of strikes for each year, so that nothing is really lost. It is held by some that it would be better to have the clock begin on the first of January and strike up ahead for the whole ensuing year, so as to get that much work out of the way; but the clock will never be prevailed on to do anything so systematic and regular as that. The name of the maker is not known. It is thought he is dead, and there are those who urge that he overstrained and killed himself inventing and putting together such an extraordinary piece of mechanism. I often feel when I hear this clock strike 34 at a quarter to seven that I should like to have known that man; I should like to have a competent phrenologist examine his cranial development.—*Max Adeler in the Century.*

Value of the Public Buildings in Washington.—From the figures of the official assessment it appears that the Capitol building is assessed at $15,699,556, and the grounds at $7,907,595; the White House at $753,-590, and the Executive stables at $28,500; the Treasury Department building and grounds at $7,008,454; the State, War and Navy Department building, $6,211,161; the Agricultural Department building, $331,-825, and the grounds, $689,086; the Smithsonian, $492,651, and National Museum, $250,000, and the grounds, $2,553,378; the National Monument grounds, $1,815,781, and the Washington Monument, $300,000; the National Observatory grounds, $125,861, and the building, $255,284; the Patent-Office building and grounds, $3,754,883; the Arsenal buildings, $233,324, and grounds, $1,221,607; the Marine Barracks ground, $31,-235, and buildings, $329,637; the Naval Hospital, $7,198,128; Bureau of Engraving and Printing, grounds, $27,612, building, $327,537; Winders building, used by Engineers' Bureau of the Army, $214.367; United States Medical Museum, $96,280; General Post-Office, ground, $312,495, building, $2,124,500; Government Printing Office, $230,000; Judiciary Square and City Hall, $1,399,713; United States Jail, $525,550; United States Navy-Yard, ground, $1,413,500, buildings and wharves, $3,615,-808; Botanical Gardens, grounds, $1,462,251, buildings, $556,676, hot-houses, $58,598. The aqueduct is valued at $3,847,547, and water-pipes and plugs, $172,276. The intersections of streets, circles and spaces are put down at $4,682,942; the Department of Justice, ground, $150,000, and building, $150,000; the Government Insane Asylum, $1,349,775; the Reform School, $221,056; the Soldiers' Home, grounds $333,947, buildings, $350,000; Naval Magazine, $95,000; the Georgetown Post-Office and Custom-House, $63,767.

Proposed Tunnel Under the Elbe.—Under the river Elbe, at Hamburg, it has been proposed to build a tunnel to connect that city with an island a third of a mile distant. The great Hanseatic city, which has hitherto been a free port, is shortly to lose that privilege, and to be included in the Zollverein or German Customs-Union. It is intended however, to make an exception in favor of the island in question, which bears the name of Steinwarder, and to permit it to retain the privileges of the free port. Large bonded warehouses will be built there for the accommodation of merchandise before paying duty, and in order to bring the island into closer connection with the city, the above-mentioned scheme for a tunnel under the river has been started. The tunnel would be 500 metres or nearly a third of a mile in length. This will be upwards of 300 feet longer than the Thames Tunnel. The cost of the Elbe Tunnel is estimated at about £900,000.—*Van Nostrand's Magazine.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

266,963. OPERATING TANK-VALVES. — James E. Boyle, Brooklyn, N. Y.

266,979. RADIATOR.—Thomas Davis, St. Paul, Minn.

266,989. AUTOMATIC FIRE-EXTINGUISHER.—Frederick Grinnell, Providence, R. I.

266,998. FIRE-ESCAPE.—John R. Judd, New York, N. Y.

267,019. FIRE-ESCAPE.—James Roberts, New York, N. Y., and Newton W. Palmer, Boston, Mass.

267,031. FIRE-ESCAPE LADDER.—Patrick H. Spelman, New York, N. Y.

267,035. ADJUSTABLE DOOR-SECURER. — James Streeter, Rochester, N. Y.

267,055. CLAMP FOR ADJUSTING DOOR-KNOB ROSES.—George V. Blackman, Oakland, Cal.

267,060. TOOL-HANDLE. — Edgar Buell, Clinton, Conn.

267,102. VENTILATING APPARATUS. — Emil H. C. Oehlmann, Berlin, Germany.

267,103. FAUCET.—Edwin F. Pierce, Milwaukee, Wis.

267,105. MANUFACTURE OF METALLIC DOOR-KNOBS.—Charles Puddefoot, Detroit, Mich.

267,109. PORTABLE HOUSE.—James Reilly, Sherbrooke, Quebec, Can.

267,114. APPARATUS FOR COOLING AIR.—John P. L. Simon, and Charles Abele, New York, N. Y.

267,128. HOT-AIR REGISTER. — James S. Bailey, Brooklyn, N. Y.

267,139. COMBINED LOCK AND LATCH. — Eugene Bourquin, St. Louis, Mo.

267,156. OVER-FLOW VALVE FOR WASH-BASINS.—William S. Cooper, Philadelphia, Pa.

267,168. SHUTTER-FASTENER.—Russell G. Dudley, Jersey City, N. J.

267,176. COMPOUND FOR CLEANING PAINTED AND VARNISHED SURFACES.—Albert Ford, Atlanta, Ga.

267,179. FIRE-ESCAPE. — Kasson Freeman, Grand Rapids, Mich.

267,190. WATER-CLOSET. — Stephen Goldner, Baden, Germany.

267,201. WINDOW-SASH.—William Heaps, Walden, N. Y.

267,217. ARTIFICIAL STONE, MARBLE, ETC.—Raphael Josia, Florence, Italy.

267,224. COMBINED SASH-FASTENER AND BURGLAR-ALARM.—Theodore E. King, Westport, Conn.

267,248. HOD-ELEVATOR. — Franklin Pierce, New York, N. Y.

267,256. VENTILATOR.—De Garmo Robbins, Rochester, N. Y.

267,260. T-SQUARE. — Joseph W. Rowe, Austin, Tex.

267,264. FUNNEL-TRAP FOR SINKS.—John G. Schill, Hoboken, N. J.

267,286. FIRE-ESCAPE. — Abraham Van Wagner, New York, N. Y.

267,290. CALIPERS. — Oliver D. Warfield, Springfield, Mass.

267,306. WATER-TRAP CLEANER. — John S. Gall, Rochester, N. Y.

SUMMARY OF THE WEEK.

Baltimore.

WAREHOUSE. — Wm. Ferguson & Bro., architects and builders, are rebuilding the warehouse at the northeast corner of Howard and German Sts., for Alex. Rieman, 22' x 66', five-story and basement; cost, $11,000. First-story front, iron; balance, brick.

BUILDING PERMITS. — Since our last report nineteen permits have been granted, the more important of which are the following: —

Lawrence Turnbull, 6 two-st'y and basement brick buildings, e s Chester St., commencing s e cor. Chester and Keyser Sts.

Mrs. Jane M. Kelso, 3 three-st'y brick buildings, n s Baltimore St, w of Central Ave.

Western Maryland R. R. Co., two-sty brick building, n e cor. High and Hillen Sts.

F. C. Fossett, 2 three-st'y brick buildings, Belair Ave., between Hoffman and Washington Sts.

W. L. Stork, 8 three-st'y brick buildings, Madison Ave., between Prestman and Bloom Sts.

John Boyce, three-st'y brick building, Patterson Ave., between Cary St. and Stockton Alley.

Wm. G. Scarlett, 7 three-st'y brick buildings, e s Druid-Hill Ave., commencing s e cor. Laurens St.

Richard C. Wills, two-st'y brick building, Franklin St., between Brune and Fremont Sts.

Boston.

BUILDING PERMITS. — *Brick.* — *Boylston St.*, cor. Clarendon and Newbury Sts., Ward 11, for Massachusetts Institute of Technology, four-st'y flat building for college purposes, 90' x 155'; James Fagin, builder.

Beacon St., No. 344, Ward 11, for Lucien Carr, four-st'y mansard dwell., 25' x 70'; L. P. Soule, builder.

Marlborough St., No. 244, Ward 11, for Henry Whitewell, three-st'y mansard dwell., 25' x 55'; Joseph E. Keening, builder.

Wood. — *Call St.*, near Everett St. and Carolina Ave., Ward 23, for R. C. Billings and Geo. Faulkner, 2 two-st'y flat dwells., 21' x 31'; John D. Wester, builder.

Call St., near Everett St. and Carolina Ave., Ward 23, for R. C. Billings and Geo. Faulkner, 2 two-st'y flat dwells., 21' and 33' x 31'; John D. Wester, builder.

Bellevue St. near Trull St., Ward 1, for J. Homer Pierce and others, trustees, one-st'y mansard stable, 30' x 40'.

L St., near East Broadway, Ward 14, for Freeborn Adams, Jr., 2 two-st'y pitch dwells., 20' x 29'; J. H. Sears, builder.

Perkins St., near Prince St., Ward 23, for Daniel C. Shea, two-st'y pitch dwell., 23' x 25' 4"; ell' 13' x 14'; Thomas O. Cangley, builder.

M St., No. 127, Ward 14, rear of, for H. C. Bowen, 4 two-st'y flat dwells., 19' x 28'; Wm. T. Eaton, builder.

West Seventh St., No. 55, Ward 13, for Edward Devin, three-st'y flat dwell., 23' x 26'; John Mulholland, builder.

Brooklyn.

CLUB-HOUSE. — The Hamilton Club, of Brooklyn, intend erecting a building, to cost $150,000.

BUILDING PERMITS. — *Columbia Heights, No.* 146, w s, between Wall and Fulton Ferries, four-st'y brick dwell., tin roof; cost, $25,000; owner, Isaac Henderson, 47 Seventh Ave.; architect, Thos. Stent; mason, R. L. Darragh.

Waverly Ave., w s, 250' from De Kalb Ave., two-st'y brick stable, tin roof; cost, $4,500; owner, A. G. Jennings, Park Ave., cor. Hall St.; architect, G. L. Morse; builders, O. Nolan and Morris & Selover.

Flushing Ave., s s, 146' e Garden Ave., three-st'y frame dwell., tin roof; cost, $4,600; owner, D. G. Shultz, North Eighth St., cor. Union Ave.; architect, Frank Holmberg; builders, H. Grasman and Jno. Rueger.

Jefferson St., n w cor. Central Ave., three-st'y frame tenement, tin roof; cost, $4,200; owner, A. Dudenpansen, 72 Central Ave.; architect, Geo. Hillenbrand; builders, W. Beir and M. Metzen.

Suydam St., No. 38, s s, 380' e Broadway, two-st'y frame dwell., tin roof; cost, $3,000; owner, Fred. Friedlein, Hopkins St.; architect, Th. Engelhardt; builder, Jno. Rueger.

Boerum St., n w cor. Old Bushwick Ave., three-st'y frame tenement, tin roof; cost, $6,000; owner, Mrs. Koebler, on premises; architect, Th. Engelhardt; builders, John Heilmann and P. Kunzweiler.

Twentieth St., No. 347, n s, e of Third Ave., 2 three-st'y frame tenements, felt roof; cost, each, $2,500; owner and carpenter, John R. Greene, 230 Twentieth St.; architect, W. H. Wirth.

Putnam Ave., s s, 90' e Marcy Ave., 17 two-st'y brownstone dwells., tin roof; cost, each, about $4,500; owner and builder, F. C. Vrooman, 444 Gates Ave.; architect, F. De W. Vrooman.

Forrest St., n s, cor. Evergreen Ave., two and three st'y brick wash and machine house, gravel roof; cost, each, $9,500; owners, S. Liebmann's Sons, Forrest St., cor. Bremen St.; architect, Th. Engelhardt; builder, G. Lehrian.

Baltic St., n s, 75' e Nevins St., three-st'y frame tenement, tin roof: cost, $3,000; owner, John Cline, 499 Baltic St.; architect, J. Freeman; builders, J. Haney & Co.

Eighth Ave., n e cor. Berkeley Pl., 4 four-st'y brownstone dwells., tin roof; owners, architects and builders, J. Doherty & Son.

Fourth Ave., cor. Flatbush and Atlantic Aves., gore lot, three-st'y brick store and office, mansard, slate and tin roof; cost, about $5,000; owner and builder, Thos. H. Brush, 704 Fourth Ave.; architect, F. E. Lockwood.

Cumberland St., Nos. 10, 12, 14 *and* 16, five-st'y brick factory, gravel roof; cost, $8,000; owner and architect, Daniel S. Hammond, 132 Willoughby St.

Chicago.

The unmistakable signs of approaching winter have had the usual effect of causing a marked diminution in the number of applications for permits for erection of the better class of dwellings. Contractors and builders are making all haste to enclose and roof those already under way, and not many more will be started now before the spring-time.

BUILDING PERMITS.—J. E. Pritchard, two-st'y brick flats, 22' x 51', 137 Clybourn Ave.; cost, $3,000.

Chas. Skeer, three-st'y and basement brick dwell., 62' x 75', 351 to 357 La Salle Ave.; cost, $20,000.

P. Sullivan, three-st'y and basement brick store and dwell., 22' x 60', 504 Indiana St.; cost, $10,000.

N. K. Fairbank, three-st'y and basement brick factory, 72' x 100', 219 to 223 Eighteenth St.; cost, $13,000.

E. G. Russell, two-st'y brick dwell., 25' x 56', 245 Robey St.; cost, $7,000.

F. R. Otis, five-st'y and basement brick stores, damaged by fire, cor. State and Jackson Sts.; cost, $10,000.

H. Wollner, two-st'y brick store and dwell., 25' x 70', 3364 South Halsted St.; cost, $5,000.

Wm. Busby, 3 two-st'y and basement brick dwells., 40' x 50', 3204 Forest Ave.; cost, $6,500.

S. H. Curtis, two-st'y brick dwell, 20' x 40', 2500 Indiana Ave.; cost, $4,000.

J. H. Loveday, 3 two-st'y basement brick dwells., 50' x 54', Hoyne Ave., near Harrison St.; cost, $12,000.

C. W. Shonk, two-st'y and cellar brick dwell., 22' x 56' 188 Winchester Ave.; cost, $5,000.

E. T. Ewing, 3 two-st'y brick dwells., 33' x 66', 3737 to 3741 Ellis Ave.; cost, $12,000.

Vaclav Horace R., two-st'y brick store and dwell., 20' x 50', Allport and Nineteenth Sts.; cost, $4,000.

Robert McMahon & Co., four-st'y and basement brick factory, 98' x 100', s w cor. Monroe and Clinton Sts.; cost, $15,000.

John McCarthy, three-st'y and basement brick store and dwell., 638 Centre Ave.; cost, $6,500.

Patrick Ahern, three-st'y and basement brick store and dwell., 1245 Milwaukee Ave.; cost, $6,000.

Bohemian Turner Society, brick basement, 48' x 90', 106 and 108 De Koven St.; cost, $8,000.

Mrs. A. Jedlicka, two-st'y and basement brick dwell., 21' x 44', 268 Taylor St.; cost, $3,500.

D. Donegan, three-st'y and basement brick flats, 69' x 80', 545 to 549 La Salle Ave.; cost, $20,000.

J. L. Stewart, two-st'y brick dwell., 20' x 50', 286 Leavitt St.; cost, $3,500.

J. H. Dole, three-st'y and basement brick dwell., 50' x 50', Elm St., near State St.; cost, $14,000.

H. W. Leman, three-st'y and basement brick dwell., Elm St., e of State St.; cost, $5,000.

Violet Gray, three-st'y and basement brick dwell., Elm St., e of State St.; cost, $5,000.

M. Mercer, two-st'y and basement brick dwell., 26' x 60', Honore St., near Jackson; cost, $7,000.

D. Burns, two-st'y and basement brick flats, 44' x 53', 583 and 585 Sedgwick St.; cost, $5,000.

P. McNamara, two-st'y and basement brick dwell., 33' x 48', 3443 and 3445 Indiana Ave.; cost, $6,700.

M. McDermott, two-st'y and basement brick store and dwell., 24' x 80', Halsted St., s of Twenty-sixth St.; cost, $6,000.

Thomas Cullerton, two-st'y brick store and dwell., 29' x 59' 9 Whitney St.; cost, $3,000.

J. Jerusalem, three-st'y brick store and dwell., 30' x 60', 562 and 567 North Halsted St.; cost $7,000.

D. Casey, two-st'y and basement brick dwell., 22' x 52', 2536 South Halsted St.; cost, $4,000.

Casey, Ogden & Parker, four-st'y and basement brick paint factory, Eighteenth and Brown Sts.; cost, $20,000.

O. Vider, two-st'y and basement brick dwell., 36' x 42', 525 Garfield Ave.; cost, $5,000.

Goss & Phillips Manufacturing Co., addition and repair building damaged by fire, Fisk and Twenty-second St.; cost, $12,000.

Marshall M. Kirkman, 3 two-st'y and basement brick dwells., 44' x 60', 726 to 630 Washington Ave. Boulevard; cost, $27,000.

S. Rothschild, two-st'y and basement brick dwell., 23' x 43' 662 West Adams St.; cost, $6,300.

P. T. Dodge, 2 three-st'y and attic brick store and dwells., 42' x 52', 501 to 507 Ogden Ave.; cost, $10,500.

Cincinnati.

BUILDING PERMITS. — Henry Myer, two-st'y brick dwell., Jefferson St., near Corry St.; cost, $4,000.

L. Schreiber & Sons, one-st'y brick dwell., 525 Walnut St.; cost, $2,500.

R. Atkinson, three-st'y brick dwell., Hopkins St., near Dalton Ave.; cost, $4,300.

Alex. McDonald, repair three-st'y brick store, Pearl St., near Walnut St.; cost, $3,500.

Six permits for repairs; cost, $3,500.

Los Angeles, Cal.

BUILDING PERMITS.—The Naudeau building is to be brick, three-st'y, and will cost about $125,000.

Rose's brick building will be three-st'y, and will cost $25,000.

The Laronde block is two-st'y, and will cost $14,000.

Mr. Luitweiler's extension to his building will cost $5,000.

Susskind's brick building, two-st'y, on Los Angeles St., near Requena, will cost $5,000.

Additions to the building occupied by the *Herald* and the *Express*, will cost $14,000.

Improvements on the Allen block will cost $11,000.

The Alexander building, only one-st'y, will cost $6,000.

The Bernard block will be two-st'y, and will cost $10,000.

P. Lalande is erecting a brick building, to cost $4,000.

Lewis Lichtenberger is erecting a two-st'y block, to cost $12,000.

New York.

RESIDENCES. — Mr. Maher is to have seven houses, of brick, with brownstone finish, four-st'y, built for him, on the cor. of One Hundred and Twenty-sixth St. and Fifth Ave., from designs of Mr. Jno. G. Prague. They will vary in size, having frontages of from 17' to 25'.

Mr. C. D. Thompson will have a house, 22' x 55' with 12' extension, built on One Hundred and Fourth St., 250' e of Ninth Ave. It will be of brownstone, three-st'y, and occupy a lot 50' x 111'; Mr. G. M. Huss is the architect; and Mr. J. Coar the contractor.

ALTERATIONS. — The old Armory Building on Twenty-third St., is to be altered into a theatre, at an expense of about $20,000, for Mr. Morse, from designs of Mr. H. Edwards Ficken. Work has already commenced.

The Hotel "Branting," Nos. 608 to 614 Madison Ave., is to receive extensive improvements. The building, which is now six stories high, is to be built up one, and in places two stories. The owner is Mrs. Sarah E. L. Taylor. The cost of the alteration will be about $135,000.

BUILDING PERMITS. — *Roosevelt St., No* 12, five-st'y brick tenement, tin and iron roof; cost, about $19,000; owner, Estate Eleonora R. Conkling, H. Conkling, executor, 27 East Tenth St., office, 3 Mercer St.; architect, B. McGurk; builder, John Fitzpatrick.

East Fifty-ninth St., Nos. 430 *and* 432, five-st'y brick factory, metal roof; owners, Heyman Bros. & Lowenstein, 182 Chatham St.; architect, J. B. Snook; builders, List & Lennon.

One Hundred and Nineteenth St., s s, 165' e Fourth Ave.; 2 five-st'y brick tenements, tin roofs; cost, each, $13,000; owner, Patrick Dempsey, 5 East One Hundred and Thirty-second St.; architects, Cleverdon & Putzel.

One Hundred and Forty-second St., n s, 72' w Eighth Ave., three-st'y frame dwell., tin roof; cost, $7,000; owner, Christian Brand, 1 West One Hundred and Twenty-fourth St.; architect, A. Spence.

Washington Pl., s s, 100' e Monroe Ave., two-st'y frame dwell., shingle roof; cost, $3,500; owner, Jacob Paulsen, One Hundred and Seventy-seventh St., cor. Railroad Ave.; architect, A. Arctander.

One Hundred and Forty-sixth St., n s, 60' e Morris Ave., 5 three-st'y brick dwells., tin roof; cost, each, $10,000; owner, Robert Huson, 218 East Fifteenth St.; architect, J. W. Marshall; mason, R. Huson.

ALTERATIONS. — *West Twenty-third St., No.* 116, one-st'y brick extension, interior alterations and front altered; cost, $5,000; owner, Geo. C. Schleier, Metropolitan Hotel; architects, D. & J. Jardine.

East Sixth St., Nos. 303 *and* 305, hay-loft altered for flat, etc ; cost, $3,500; owner, Matilda Jantzen, 104 Second Ave.: architect, J. M. Forster; builders, G. Staiger and W. T. Roylance.

West Seventeenth St., Nos. 104 and 106, three-st'y brick extension, etc.; cost, $5,000; owner, Thomas Kelly, 345 West Fifty fifth St.; architect, J. M. Dunn; builders, N. & H. Andruss.

Philadelphia.

Building Permits.—*Greenwich St., No. 238*, three-st'y dwell., 18' x 44'; Geo. Roth, owner.

Canal St., cor. St. John St., third-st'y addition to factory, 16' x 39'; Thos. McCarty, contractor.

Miller St., s s, e of Wistar St., two-st'y warehouse, 35' x 60'; J. & B. Allen, owners.

Broad St., w s, s of Ellsworth St., 5 three-st'y dwells., 22' x 70'; H. R. Shoch, owner.

Green Lane, n w cor. Mitchell St., three-st'y store and bake-house, 25' x 25'; H. Waukin, owner, Roxboro.

Fowler St., s s, w of Jefferson St., 2 two-st'y dwells., 13' x 30'; Jas. Kenworthy, owner.

Kensington Ave., n w cor. Lehigh Ave., three-st'y dwell., 15' x 28'; Jno. Torpy, owner.

Wayne Junction, cor. P. & R. Rd., engine and boiler-house and shed, 50' x 90' and 80' x 218'; A. B. Rorke, contractor.

St. John St., e s, n of Willow St., four-st'y factory, 18' x 68'; Stacey Reeves & Co., contractors.

Dickerson St., Nos. 210 and 212, two-st'y stable, 32' x 35'; Benj. Hunt, owner.

Passyunk Road, s w cor. Tasker St., three-st'y store and dwell., 31' x 56'; J. Bevlin, owner.

Twenty-sixth St., s e cor. Washington Ave., two-st'y office-building, 16' x 30'; J. S. McHenry, owner.

Sansom St., n s, w of Twenty-first St., two-st'y stable, 21' x 32'; R. W. Strode, contractor.

Wildley St., n s, bet. Fourth and Fifth Sts., four-st'y warehouse and office, 40' x 40'; A. M. Greene, contractor.

Wharton St., s s, bet. Huhn and Jarden Sts., one-st'y car-shed, 96' x 252'; Union Pass. R.R. Co., owner.

Cumberland St., cor. Twenty-sixth St., two-st'y dwell., 18' x 31'; Chas. W. Hawes, owner.

Reed St., Nos. 1816, 1818, and 1820, 3 three-st'y dwells., 16' x 42'; Jos. Stuckey, owner.

Fairhill St., Nos. 2841 and 2843, 2 two-st'y dwells., 12' x 28'; Conrad Arnold, owner.

Hale St., No. 1749, two-st'y dwell., 15' x 27'; Jno. Zoelle, contractor.

Glenwood Ave., n w cor. Twenty-first St., one-st'y stable, 32' x 38'; J. Sims Wilson, contractor.

Barker St., n s, w of Seventeenth St., one-st'y storehouse, 18' x 65'; Hinch & Hutchinson.

Twentieth St., e s, s of Kater St., two-st'y storehouse, 17' x 47'; M. McConnell.

Bethlehem Pike, n of Chestnut Ave., alteration and addition to dwell., 40' x 127'; W. C. Mackie, contractor.

Thirty-third St., n e cor Walnut St., one-st'y addition to building, 40' x 60'; L. Havens, contractor.

Queen St., n s, bet. Wayne and Knox Sts., 2 three-st'y dwells., 16' x 47'; Wm. Garvin, contractor.

Mehan St., s s, e of Muskgrove St., 2 two-st'y dwells., 12' x 40'; Wm. Garvin, contractor.

Levering Ave., s s, bet. Ridge Ave. and Mitchell St., 2 two-st'y dwells., 16' x 41'; Wm. Eddleman, contractor.

Marshall St., w s, s of Norris St., 3 two-st'y dwells., 15' x 45'; H. M. Martin, contractor.

Kensington Ave., e s, n of Adams St., two-st'y dwell., 16' x 37'; L. L. Yates, contractor.

Fairhill St., e s, bet. Lehigh Ave. and Somerset St., three-st'y dwell., 17' x 29'; E. Schmidt, contractor.

Otsego St., n e cor. Mifflin St., one-st'y factory; E. W. Rowley.

Brooklyn St., w s, n of Hamilton St., 2 two-st'y dwells., 16' x 50'; H. Grau, contractor.

Twenty-sixth St., e s, s of Jefferson St., one-st'y chapel, 32' x 52'; Jas. H. Young, contractor.

Brandywine St., No. 1506, three-st'y stable, 20' x 62'; C. G. McMullen.

St. Louis.

Building Permits.—Those worth $2,500 and over are as follows: —

Gus. Sporleder, two-st'y brick dwell.; cost, $5,000; Schaper, architect; H. Heitmann, contractor.

A. Moll, two-st'y brick store; cost, $6,000; F. W. Bruggeman, contractor.

Joachine Storjohann, two-st'y brick store; cost, $5,600; Pipers, architect; Chas. Wehking, contractor.

J. M. Schnaider, two-st'y brick dwell.; cost, $8,000; E. Jungenfeld, architect; Chas. Wehking, contractor.

J. S. Zimmerer, three-st'y brick dwell.; cost, $10,000; A. Beinke, architect; sub-let.

F. G. Gildringhaus, two-st'y brick stable; cost, $4,000; A. Beinke, architect.

T. Bolz, two-st'y brick dwell; cost, $3,500; C. F. May, architect; H. Drees, contractor.

H. C. Christopher, two-st'y brick dwell.; cost, $6,000; Cledus, architect; F. C. Bonsack, Jr., contractor.

B. Dierkes, two-st'y brick dwell.; cost, $4,500; J. A. Conlon, contractor.

General Notes.

Athol, Mass.—A Roman Catholic Church and parsonage are to be built here.

Atlanta, Ga.—Store building, brick, five-st'y, 30' x 105', for C. P. M. Barker; Messrs. Bruce & Morgan, architects, Atlanta.

Store building, brick, five-st'y, for W. W. Anstell; Bruce & Morgan, architects.

Remodelling stores for W. W. Anstell; Bruce & Morgan, architects.

Granite mausoleum for the Anstell family; cost, $16,000; Muldoon & Co., of Louisville, Ky., are the contractors, and the structure is to be erected under the supervision of Bruce & Morgan, architects, Atlanta, Ga.

Baltimore County, Md. — Frame dwelling for Robert Magruder; cost, $8,000. Frank E. Davis, of Baltimore, architect.

Columbus, Ga.—Frame residence for Soule Redd, 30' x 50'; Bruce & Morgan, architects.

Easton, Mass.—The Congregational Society has received about $7,000 toward rebuilding the church edifice recently burned. It is proposed to erect a $10,000 church.

Fort Wayne, Ind.—J. M. Coombs is now completing a block, of three buildings, 75' x 80' of brick stone finish, n w cor. of Berry St. and Broadway; cost, $25,000.

Also Mrs. B. Ocomner a brick house, stone finish, 40' x 60', on West Wayne St.; cost, $10,000.

Also the estate of Mrs. H. Merdlinger, a block of four store buildings, one st'y, 70' x 73'; cost, $3,500; J. F. Wing & Co., architects.

N. Y. C. & St. Louis R. R. is building a fine station-house, freight-house and round house.

Milton N. Webber is building a brick residence on West Washington St.; cost, $4,500.

Frankford, Pa. — William A. Drown & Co. are building a three-st'y factory, 120' x 200', on Gillingham, Jefferson and Tackawanna Sts.

Irvington-on-the-Hudson, N. Y. — Extensive alterations and interior decorations to the residence of Mr. C. C. Worthington have been designed by Mr. W. A. Bates, of New York.

Jackson, N. H. — A large addition, which includes a new dining-hall, is to be made to the Thorn Mountain House, at a cost of about $12,000, from designs of Mr. W. A. Bates, of New York.

Louisville, Ky. — Of the building permits issued since last report, the following are those of $2,000 and over:—

I. D. Vaughan, brick dwell.; cost, $8,500; M. I. Wilson, architect.

W. T. Grant, brick dwell.; cost, $3,500.

W. Aikin, brick dwell.; cost, $7,000; M. I. Wilson, architect.

R. Lechlieter, brick store; cost, $3,000.

Blatz, Krebs & Co., brick dwell.; cost, $2,800.

McCoy, Oregon. — Mr. Lomer is building a residence for Mr. Frizzele: cost, $3,000.

Munroe, Ga. — Brick and stone court-house, 65' x 85'; Bruce & Morgan, architects.

Montreal, Can.—The Canadian Pacific directors and a committee of the Montreal Corporation have come to an arrangement recently for the erection by the former of a monster depot, costing $2,000,000, in the east end of Montreal. The Council will contribute $200,000 cash, in addition to 225,000 square feet of valuable city property as subsidy.

Muskegon, Mich. — Hon. W. M. Harford is building a wooden dwelling costing $5,000; D. S. Hopkins, architect, Grand Rapids, Mich.

Nashville, Tenn. — A stone mansion, 60' x 100', is to be built for Col. E. W. Cole, from designs of Messrs. D. & J. Jardine, of New York. It will be in the Tudor style, two-st'y and attic.

New Britain, Conn. — Large frame house for Thos. S. Hall; Robt. W. Hill, architect, Waterbury, Conn.

Dwelling for Chas. Church; Robt. W. Hill, architect, Waterbury, Conn.

Newman, Ga. — Brick residence for Capt. A. B. Berry; Bruce & Morgan, architects.

Newport, N. H. — The Roman Catholics of this place are erecting a church of Gothic style, with open timbered roof and spire 75' high; cost, $5,000; builder, H. R. Beckwith, Claremont, N. H.

Newport, R. I.—Mr. W. G. Weld of Boston, is about to pull down the De Rham cottage on Bellevue Ave. and erect a costly villa on the same site.

Newton Centre, Mass. — Mr. F. A. Gardner is the owner of a semi-detached frame house, now being built from plans of Mr. O. F. Smith, architect. Size, 36' x 42'. Two stories; Mr. Geo. L. Esterbrook, contractor.

New Rochelle, N. Y. — Work is to be commenced forthwith on the new school-house, the contracts having been awarded. Messrs. D. & J. Jardine, of New York, are the architects.

Northampton, Mass.—P. R. Whitcomb will build at once two more cottages on the new Bright St.; F. F. Pratt is already making the plans.

A fire-engine house is to be built at a cost of $4,000.

North Long Branch, N. J.—Frame cottage is to be built for Mr. Sam'l. Harris; from designs of Messrs. Lamb & Rich, of New York.

Ocean Beach, N. J. — Eben C. Jayne, Esq., of Philadelphia, is about to build two cottages, 40' x 60'; Benj. Linfoot, architect, Philadelphia.

House and stable for Thos. Bolles, Esq., of New York; Benj. Linfoot, architect.

Peekskill, N. Y. — Two-st'y cottage for N. G. Foshay; cost, $3,000; Palliser, Palliser & Co., architects, Bridgeport, Conn.

Pittsburgh, Pa. — A house and stable are to be built for I. C. Schwartz, of brick and terra-cotta, from designs of Mr. C. W. Romeyn, of New York, to cost about $40,000.

Point La Belle, Conn. — H. W. Collender, Esq., 768 Broadway, New York City, is building two cottages here; cost, $14,000; Palliser, Palliser & Co., architects, Bridgeport, Conn.

Raymond, Me. — A union chapel is to be built here.

Reading, Pa. — The Equitable Building and Loan Association have begun to build a series of twin dwells., 28' x 50'; J. J. Deery, architect, Phila.

Geo. M. Ermentrout, Esq., is building a house, 17' x 30' and 31' x 44'; from plans by J. J. Deery, architect, Phila.

Roanoke, Va. — For the Shenandoah Valley, R. R. Co., a four-st'y office building, to be of stone and brick, with tile roof; Geo. T. Pearson, architect, Philadelphia.

Chapel building, 40' x 48'; Geo. T. Pearson, architect, Philadelphia.

A block of four-st'y stores and offices, 50' x 238', to be built by the Roanoke and Land Improvement Co.; Geo. T. Pearson, architect, Philadelphia.

Rochester, N. Y. — A large brick building on North St. Paul St., to be used as a dormitory for the Western New York Institution for Deaf Mutes; to cost $10,000; J. G. Cutler, architect.

School-building on North St. Paul St., for Western New York Institute for Deaf Mutes; to cost $8,000; J. G. Cutler, architect.

The new depot for the N. Y. C. & H. R. R. Co., on Atwater Street, is nearly ready for roof. The work of tearing down old depot will be commenced on the 1st, as trains will be run on new elevated tracks by the 8th of October.

Rye, N. H. — J. C. Philbrick & Son have commenced building the new "Farragut House" on the site of the hotel of the same name destroyed by fire last April. It is to be 288 feet long, and will contain, beside its public apartments, one hundred and four rooms. The cost will be about $50,000. Mr. S. J. F. Thayer, architect, of Boston; M. C. Foster & Son, contractors.

Salem, Oregon. — J. Sherwin, of Portland, Oregon, has prepared plans for a brick bank building three stories high; cost, about $25,000.

San Antonio, Texas. — A cottage is to be built for Mr. I. S. Rockwood, to cost about $5,000; also a similar priced one for Mr. Leonard Jacob, both from designs of Messrs. Price & Freeman, of New York.

Seabright, N. J.—Mr. W. Sheppen, Jr., is building another cottage from designs of H. Edwards-Ficken, of New York.

Southington, Conn. — The Second National Bank just organized, together with the Savings Bank will immediately erect a bank building of stone, brick, and terra-cotta, 25' x 55'; Palliser, Palliser & Co., architects, Bridgeport, Conn.

Spring Lake, N. J.—House, 48' x 50', for B. H. Yard, postmaster; plans by Palliser, Palliser & Co., architects, Bridgeport, Conn.

Presbyterian Church, to be of stone, frame, and tile, 40' x 60'; seat 600; Benj. Linfoot, architect, Philadelphia.

Stockbridge, Mass. — The foundation is being laid for a new Methodist Episcopal church.

Washington, D. C. — Church, St. Mark's Episcopal, cor. Third and A Sts., stone; style, Gothic; seating capacity, 600; cost, $30,000; C. E. Cassell, architect, Baltimore.

Waterloo, Ia. — Residence for J. L. Girton; cost, $4,000; D. S. Hopkins, architect, Grand Rapids, Mich.

COMPETITION.

BATTLE MONUMENT. **[At Monmouth, N. J.]**

Designs and specifications for a monument to commemorate the Battle of Monmouth are invited by the Committee on Designs, to be submitted in accordance with the terms of a Circular of Information as to purpose, location, material, cost, competition and award, including premiums for accepted designs; copies of which circular may be had by addressing

360 JOHN B. CONOVER, Treasurer,
Freehold, N. J. P. O. Box 33

PROPOSALS.

SUPPLIES. **[At San Antonio, Tex.]**

San Antonio Arsenal,
San Antonio, Tex., October 25, 1882.

Sealed proposals, in triplicate, upon the blank forms furnished from this Arsenal only, will be received by the undersigned **until 12 o'clock, M., on Saturday, November 25, 1882**, for furnishing the supplies, in such quantities and at such times during the fiscal year ending June 30, 1883, as the Commanding Officer of this Arsenal may require, viz.: Thread, cotton cloth, iron, lumber, leather, cement, sand, lime, paints, oils, bricks, stone, etc.

A preference will be given to articles of domestic production. Catalogues, giving the estimated quantities and articles required, can be had on application at this Arsenal. Also, full information as to the manner of bidding, conditions to be observed by bidders, and terms of contracts and payments.

The Government reserves the right to reject any or all bids. JOHN A. KRESS,
360 Captain of Ordnance, Commanding.

SCHOOL-HOUSE. **[At Chicago, Ill.]**

Chicago, November 12, 1882.

Sealed proposals will be received at the office of the Board of Education, No. 85 Fifth Ave., **up to 12 o'clock, noon, of Monday, 27th inst.**, for the carpenter, cut-stone, and sewer work and materials required in the erection of a school-house, on the corner of Wabash Ave. and Twenty-sixth St., in accordance with the plans and specifications prepared by James R. Willett, Architect and Superintendent of Construction of the Board, to be seen at the office of said architect, Merchants' Building, corner La Salle and Washington Sts.

Proposals to be made on printed forms to be obtained at the office of the architect. Persons making proposals for the above work will be required to deposit with the clerk of the Board a sum in cash equal to two and a half per cent. of the amount of their bid, to be refunded to each bidder whose bid is not accepted, immediately after the action of the Board upon such proposals, and to each bidder whose bid is accepted, as soon as satisfactory bonds for the fulfillment of his contract are filed with the Clerk of the Board.

Proposals to be addressed to the Chairman of the Committee on Buildings and Grounds, indorsed "Proposals for Mason-work."

The Committee reserve the right to reject any or all proposals received, at their discretion.

J. W. GARVEY,
WILLIAM FLOTO,
M. J. DUNNE,
360 Committee on Buildings and Grounds.

GLASS. **[At Philadelphia, Pa.]**

Office of Supervising Architect,
Treasury Department,
Washington, D. C., November 14, 1882.

Sealed proposals will be received at this office **until 12 M., on the 2d day of December, 1882**, for furnishing and delivering, ready for fixing in place, all the plate, double thick sheet and double-thick ground glass required for the Court-House and Post-Office at Philadelphia, Pa., in accordance with specification, schedule and diagrams, copies of which and any additional information may be had on application at this office, or the office of the Superintendent.

361 JAS. G. HILL, Supervising Architect.