From all sections of this country, North, South, East and West, we get orders—repeated orders—for Sargent's Easy Spring Locks and Artistic Hardware.

Because people everywhere appreciate the advantage of using locks that are well made, that stand the test of every-day use, that contain the famous Sargent Easy Spring, which lasts while the building stands.

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Return to your jobber at his expense any sheet, or part of a sheet, that has any defect of any sort whatever.

Apollo Iron and Steel Company, Pittsburgh, Pa.
LETTER FROM AUSTRALIA.

and, although the matter will probably be appealed to the

to the Mayor was shown or alleged to be expected from the stipu-

also be supplied, in addition to
to the United States, where they are taught there because they are not taught where they should be

It is this last part of the decision which is the most important, and which will probably occupy the largest share of the atten-

balances, and engineers can be supplied, in addition to
technical knowledge, with such command of their own language

One of these ways is by no means satis-

The defendants argued that the architects had, in any case,
a right, under the contract, to order the dismissal of work-

The American Architect and Building News.

DEPARTMENT OF STRUCTURES. — IX.

and referring to the authority under which this notice

is worth while to refer again to the interesting decision de-

ments of the contract, must be interpreted as reserving to the

ments, a practice which has been rampant for several years; and the

idea that it is illegal, that contracts embodying it are void, and

liability of officials in such cases from the fact that no advantage

of the privilege of

authority in law for any officer of the Government, State or

"the public welfare." The Court went so far as to say in

satisfaction of the contract, must be interpreted as reserving to the

defence was, of course, on the stipulation of the written con-

from doing so through no fault of their own, the stipulation

faithfully endeavored to comply with it, and were prevented

mechanics to the architect to require the dismissal of

such discrimination was the most important, and which will proba-

to proper workmen. It is only fair to the Mayor to say that his action in favoring union

members to do the work; and if his preference was embodied in the public con-

any advantage to the public to legalize such discrimination hereafter in Massachusetts.

T H E Engineering Record has started an interesting discus-

about the way in which graduates of technical schools and

amount of time and money in teaching branches which are

The defendants testified that he was very nearly, if not actually,

"authoritative in law for any officer of the Government, State or

regardless of their rights, needs, qualifications or merits, or

job of supplying them with this requisite is by no means satis-

elsewhere, and in the preparatory schools.

when construed in connection with the other provi-

ments, the provision for the performance of their work." As to Mr. Lynch's oral

the Court held without hesitation that, although the plaintiff

faithfully endeavored to comply with it, and were prevented from

from the Cloisters, looking Southeast.

From the Cloisters, looking Southeast.

widely interpreted, may be so much at variance with the public advantage when it

on the ground of their failure to employ union workmen.

in the performance of their work." As to Mr. Lynch's oral

means a new thing for public officials to restrict employment on

public work to members of trades-unions. In London, especi-

alleged exclusion of non-union citizens from employment. It is

liable for injury done to non-union men or others in conse-

of such discrimination, is a little startling. The Massa-

coerced to do the work; otherwise the union men might be expected to uri-

the performance of their work. A similar practice has been ral-

when the Mayor has good reason to believe that the workmen are unac-

The central question in this case is, whether it is lawful for

the job of supplying them with this requisite is by no means satis-


No. 1154.
It is to be remembered that students in engineering colleges are drawn, to a great extent, from new and small communities, particularly in the South and West, where schools, even the better class, are an inferior class, and, in consequence, if the candidates are properly prepared, in mathematics and physics, for the more strictly technical part of the work, it is for the best, to instruct them on account of a want of skill in writing English, which may be, and often is, rapidly acquired by the student, as soon as he finds himself surrounded by more favorable circumstances. This alone would tend to reduce the average of English attainment in such colleges, but other causes contribute to that end. In the first place, the standard of literary culture is not very high among the instructors in many engineering schools, and their pupils are, naturally, not very solicitors to show accomplishments in that respect superior to those of their teachers, while the latter, in such cases, are quite likely to entertain a contempt for the refinements that they do not themselves possess, which communicates itself more or less to those whom they teach; and, in the second place, very great numbers of every sort seem to contain a certain number of men whom no amount of instruction or exhortation can ever induce to spell their own language correctly, or to express themselves in it with propriety. Other singular persons are by no means confined to the technical schools; in fact, out of some thousands of examination papers, on technical subjects, which it has fallen to our lot to correct, the worst spelled, although not the worst in other respects, have been written, we believe, by graduates of Harvard College, Amherst College, and the College of New Jersey, to mention but a few. Prof. Randolph, of Virginia, who writes a very interesting letter to the Engineering Record, this orthographic obliquity is due to the environment of the subject, devoid as it is of any familiarity with the English language, or careless in its use; and he thinks that the only remedy is to provide the pupil, in such cases, with a new set of parents and relations; but in every grammar school there are children from illiterate families whose work compares favorably with that of others with better opportunities; and it is difficult to avoid the conclusion that the art of teaching in schools the correct use of the English language still affords opportunity for development.

The second competition for the John Stewardson Memorial Scholarship in Architecture will be held at the School of Architecture of the University of Pennsylvania, in Philadelphia, beginning on Tuesday, March 1st. The preliminary examination will occupy three days, and will be devoted to Architectural History, Construction and French or Italian, and the candidates being allowed to offer either language, will be given practice in Free-hand Drawing. Those who receive a mark of not less than seventy-five per cent in Drawing, and sixty per cent in the other subjects, will be admitted to the final examination, beginning March 5th, when each candidate must make, at the school, a preliminary twelve-hour sketch. The completed drawings will also be made at the school, and must be handed in by ten o'clock, p. m., on March 26th. The award is made on the result of the final examination; but, in case of doubt on the part of the jury, the question will be decided by the relative merits of two designs, the marks or the preliminary examinations may be referred to. Only those are eligible who have studied or practised architecture for one year in the State of Pennsylvania and who are less than thirty years of age. Graduates of any of the recognized schools of architecture, as determined by the Managing Committee, and those who have already once passed the preliminary examination for the Scholarship, or for the Travelling Scholarship in Architecture of the University of Pennsylvania, are excepted from this preliminary examination, and may apply for the final examinations directly. The Scholarship is of the value of one thousand dollars, and the holder must spend a year in travel or observation in Europe under the direction of the Managing Committee. Further particulars may be obtained by addressing Prof. Warren P. Laird, School of Architecture, University of Pennsylvania, Philadelphia.

The engineers of the War Department have completed the project of surveying, and laying out, an imposing bridge, which is to cross the Potomac River from a point near the old Naval Observatory, in Washington, to the National Cemetery, at Arlington, on the Virginia side of the river. It is proposed to make this bridge an appropriate ornament to the new park, which is being made out of the neighboring "Potomac flats," and to dedicate it to the memory of Grant and Lincoln, probably arranging two towers on the bridge, to be called by the names of the two great Presidents. As the Potomac is a navigable river, it is intended to make the middle portion of the bridge as wide as the river, which will facilitate the passage of most of the vessels which ascend the Potomac beyond Washington. The Custom-house officers have a hard time with the question of art which are referred to them. Not long ago, an amateur in New York imported, through the house of Goupil & Co., a collection of miniatures on ivory, painted in the last century, and set as the pretty trinket, in lockets, rings, brooches and so on. When they arrived in New York, the Custom-house officers classed the whole collection as "jewelry," and demanded a duty of sixty per cent on the price which had been paid for them. As the owner, of course, had paid this price for the sake of the painting, and not for the setting, he claimed that he was "works of art," upon which a duty of twenty per cent only is payable. The case was heard a few days ago by the Board of General Appraisers, but decision was reserved. In another case, heard at the same time, the question turned upon the age of three Chinese vases. These were imported before the Dingley tariff went into operation, and the case was therefore under the previous tariff, which allowed "antiques" to be imported free. It will be remembered that the Wilson tariff did not specify the period at which "antiquity" stopped, and the Board of Appraisers, [vol. lix.—no. 1154.]

42 The American Architect and Building News.
The masonry arch is a structure composed of a number of wedge-shaped pieces or voussoirs, so arranged as to span an opening between two abutments, while sustaining its own weight and very often that of superimposed loads.

Such an arch may be straight, semicircular, segmental, elliptical, or pointed, according to the manner in which the voussoirs are cut and arranged. Curved arches are usually convex above, though some occur which are concave above; the latter are called inverted arches. The outer curve of an arch is known as the extrados, and the inner the intrados.

167. In the case of beams we found that the loads they carried gave rise to strains, resisted by stresses, the amount and direction of which could be readily ascertained. The same is true of the arch. The weight of the several voussoirs, combined with that of the superimposed load, if there be any, calls forth pressures which traverse the arch from its crown to the abutments, where they are counteracted by the reactions. If the pressures acting at the several joints are combined into resultants—one for each joint—and these in turn into a continuous line extending from voussoir to voussoir, we get what is known as the line of pressure of the arch. Combining the stresses which resist these pressures into a similar line of resultants gives the line of resistance, which coincides with the line of pressure, but is opposed to it in sense. These terms are often, however, used indiscriminately.

168. The line of pressure is constructed as follows (Figs. 82, 82a):—

The weights \( P_1, P_2, \ldots, P_n \) of the several voussoirs, assumed as loads acting vertically through the centres of gravity of the voussoirs, are combined into a load-line, Figure 82a, a pole \( O \) assumed, and a cord-polygon \( \mathcal{V} - \mathcal{V} \) drawn. By means of this the resultant \( \Sigma P \) of the weights, as in \( P_1 \) is found according to the method described in § 57, Figure 18.

Now, 'the half-arch under consideration is held in place by the thrust \( H \), exerted at the crown by the other, right-hand, half-arch; and the reaction \( A \), exerted by the abutment at the centre of the impost or springing joint. The direction of \( A \) is determined by the requirement that it must pass through the intersection of \( H \) and \( \Sigma R \), for, if equilibrium is to exist, these three forces must pass through one point.

Drawing \( H \) and \( A \), in Figure 82a, parallel to \( H \) and \( A \) respectively, results in the force-triangle \( H' \); \( P_1 - P_2 \), from which the magnitude of \( H \) and \( A \) may be scaled.

169. Now, after assuming the intersection of \( H' \) and \( A' \) as a new pole, \( O' \), we draw the rays \( T, 8, 9, 10 \), and parallel to them the new cord-polygon \( \mathcal{V}', \mathcal{V}', \mathcal{V}', \mathcal{V}' \) in Figure 82b, beginning with \( P \) at the point of intersection of \( H' \) and \( P' \), and ending with the intersection of \( A' \) with \( P' \).

Ordinarily this cord-polygon \( H', T, 8, 9, 10 \), \( A' \) is called the line of pressure and serves all practical purposes as such; but the real line is that of which the cord-polygon is tangent.

The amount of the pressure at any point can evidently be found by referring to the rays \( T \ldots, 10 \) in Figure 82b. The pressure on joint \( J \), for instance, is equal to the resultant of \( H' \) and \( P_1 \), or \( 7 \); that on joint \( 11 \) to the resultant of \( H' \) and \( P_1 - P_2 + P_3 \); and so on; the horizontal component remaining constant, while the vertical component increases as the abutment is neared.

170. The stability of an arch depends on the position of its line of pressure, which must traverse within certain limits, in order that the compression may nowhere exceed the safe stress, or, what would be still more undesirable, that no joint be subjected to tension, which masonry is practically incapable of resisting.

Before these limits can be determined, it will be necessary to insert here a few remarks about the neutral axis and other properties of cross-sections in general.

171. The neutral axis of a cross-section, as we already know, is that line at which there exists no strain or stress whatever (§ 11). It may lie within or without the cross-section; if within, the stresses on either side of it are of opposite sign, as we found in the case of a beam subjected to transverse loading, in which the upper fibres were in compression, and the lower in tension and the lower in tension and the lower in tension. If without, the section is subjected to only one kind of strain over its entire area, as, for example, in the case of a column, pier or arch correctly proportioned.

The exact location of the neutral axis is dependent upon the position of the point of application of the resultant or resultants of the normal strains to which the cross-section is subjected. In other words, for every point of application there is a corresponding location of the neutral axis. A few examples will make this clearer.

172. Thus, let \( A B \) (Fig. 83) be a rectangular cross-section subjected to a strain \( P \) applied at its centre-of-gravity. The stresses resisting \( P \) (indicated by the small arrows) will all act in the same direction and be of the same intensity over the entire section. But we know that the stress at any point of a section varies with its distance from the neutral axis (§ 11); if, therefore, all the stresses are of equal intensity, all parts of the cross-section must be equidistant from the neutral axis. There is only one way in which this condition can be fulfilled: the neutral axis must lie infinitely far off, which consequently is the assumption made in this case.

Now, if \( P \) is shifted from the centre-of-gravity towards the edge \( A \), as in Figure 84, the stresses will no longer be of the same intensity throughout the entire section, but greatest at the edge \( A \), of average intensity at the centre-of-gravity, and least at the edge \( B \). Consequently the neutral axis must no longer lie infinitely far off, but has moved up to the point where \( P \) is brought still further towards \( A \); the neutral axis will come still closer, until, finally, when \( P \) is at \( \frac{1}{4} \) of the width of the cross-section from \( A \), and from \( B \)}
dividing it into two parts, with stresses of opposite sense. An example of the kind, with which the reader is already familiar, is given in Figure 87; it is that of a beam transversely loaded. Here $P$ is applied at two-thirds of the distance from the centre, with the result that the neutral axis passes through the latter, and the stresses above and below it are equal and opposite to each other.

175. Let us return to Figure 85, in which the line $A B$ is a side-view of the cross-section. If we now draw the plan, Figure 88, the point of application of $P$ with the neutral axis along $h$ would be at 1; at $f$ the width from $e c$. Similarly, with the neutral axis along $c d$, it would be at 2; along $o c$, at 3; and along $a h$, at 4. Joining these points results in a small square, which may be termed prolonged. It follows that we have only to ascertain the stresses at this case, be located at the point of intersection of $A B$ and $A' B$ of all the remaining stresses can be readily found by connecting the two extremities of a section to know all the rest.

176. The heart of rectangular sections, in ascertaining the magnitudes of the stresses which result at different points for varying locations of the cross-section; and is the section safe? (Fig. 93.) The section being rectangular, the graphical solution, Equations 31 and 32 will be found simpler which is also found to be the case in the figure. In Figures 89 and 89a $P$ is applied within the heart, which results in stresses of the same sense for the entire width of the section, as in Figure 89; it will also be noticed that $p$ and $p_1$ both lie below the line $A B$ in Figure 89c.

177. In applying Equations 28 and 29 to the case illustrated in Figure 89, it is assumed that the cross-section is capable of resisting strains of opposite sense, that is, compression and tension. If this assumption is not permissible, i.e., if the section can only take compression, as in the case of masonry, the force $P$ must either not leave the heart at all, or, if that cannot be avoided, the compressive stress at the extreme fibre must be found by a method different from that just given. This is the special case referred to above.

This formula results in a greater value of $p_1$ than that given by Equation 29, thus offsetting the effect of disregarding the tensile stress.$p_1 = \frac{P}{bh}$

178. If we denote the width of a rectangular cross-section by $b$, and its length by $h$, the value of $p$ (in Equations 28 and 29) will be $p = \frac{P}{bh}$ and $g_1$ and $g_2$ will both equal $\frac{P}{b}$. By inserting these values in Equation 28, the latter becomes

$$p_1 = \frac{P}{bh} \left(1 - \frac{y}{h}\right)$$

and, similarly, Equation 29:

$$p_2 = \frac{P}{bh} \left(1 + \frac{y}{h}\right)$$

179. Before going any further, let us apply the equations just given to an example. A cross-section of brickwork 30" x 12" subjected to only one kind of strain throughout. If, for any cross-section $A B$ (Fig. 89), the magnitudes of the stresses $p_1$ and $p_2$ at the extreme fibres are known, the magnitudes of all the remaining stresses can be readily found by connecting the ends of $p_1$ and $p_2$ by a straight line $A' B'$; which will contain the ends of all the other stresses, as indicated; since all stresses are proportional to their distance from the neutral axis, which would, in this case, be located at the point of intersection of $A B$ and $A' B'$ prolonged. It follows that we have only to ascertain the stresses at the heart of the section, to know all the rest.

180. The heart, $H$, and centre-of-gravity $G$ of a cross-section are located as in Figure 91, where $H_1$, cutting off the values of $p_1$ and $p_2$ on $P$, as indicated.
0.180. The weight 6,830 pounds acts vertically through the centre-of-gravity of the whole mass. This centre-of-gravity is found by ascertaining the resultant of the weights of the two parts A B C D and E F G H. This can be done either graphically, by means of a semicircle, or analytically, by taking the moments of the two weights about the point F or any other convenient point. The area of the semicircle is the product of the two weights and the radius of the semicircle. The radius of the semicircle is the moment of the resultant of the two weights divided by the sum of the two weights. The centre-of-gravity is then found by dividing the resultant of the two weights by the sum of the two weights.

183. Having satisfied ourselves upon this point, we next proceed to construct a line of pressure through the pier, to ascertain whether the compression anywhere exceeds the limits of safety. By means of the joints C, E, G, I the pier is divided horizontally into blocks 3' high, and the weight of each computed. As it enters the pier, the thrust A is immediately acted upon by the combined weight of the blocks I, II and III; the resultant of A and this weight is therefore constructed; its intersection a with the joint G is the first point of the line of pressure. Similarly, the resultant of A and the combined weight of the blocks I, II, III and IV gives a second point of the line on the joint I; and finally the resultant of A and the weight of the entire pier gives a third point on the joint K. The line of pressure can now be drawn through these points. It illustrates clearly how the thrust A, entering the pier at an angle of about 45°, is gradually deflected downward as the weight of each successive part of the pier is brought to bear against it.

184. The construction of the line of pressure is shown on a larger scale in Figure 94a. The weights of the several blocks are all assumed as acting through the centre-of-gravity of the entire pier.
This assumption is slightly erroneous in the present case, but of
great advantage in simplifying the diagram. From the point of
intersection (1) of A with the vertical through the centre-of-gravity
the weights of the several blocks 1-3, 3-5, 5-7 are laid off. The
amount of A is then laid off from the point 3, in the proper direc-
tion, and again from the points 5 and 7. The sides 1-2, 1-4, 1-6 of
the three force-triangles are then the successive resultants of A and
1-3, 1-5, and 1-7. They locate the points a, b and c of the line of
pressure on the joints G, J and K, as already described.

If the line of pressure should happen to cut any joint at a lesser
angle than 30° the part above the joint would have a tendency to
shear or slide off. Such a case, however, rarely occurs; when it is
unavoidable dowels must be inserted between the blocks to keep
them in place.

185. The final pressure on joint K L is given by the length 1-6,
This can be resolved into a horizontal and a vertical component,
equal to 2,750 and 10,250 pounds respectively. The former is
counteracted by the friction and adhesion existing at the joint, and
may therefore be disregarded. The vertical component is applied
on the joint K L, at a distance of 12" from the edge. The joint
being 60° wide, its point of application therefore lies outside the
heart, giving rise to both compressive and tensile strains. As we
cannot count on a tensile resistance, we must apply Equation 50, and
find the extreme fibre stress at the edge K to be
\[ p = \frac{2 \times 10,250}{3 \times 12} = 47.5 \text{ lfs. per square inch;} \]
and the average stress for the stress area, which is 30° wide (§ 177).

\[ 10,250 \]
\[ = 33.7 \text{ lfs. per square inch.} \]

As both of these amounts are very much below the maximum safe
compression permissible for brickwork (200 pounds per square inch),
and since the pressure on the upper joints is even less, and more
favorably applied, we need not hesitate to pronounce the entire
construction safe.

(To be continued.)

O. F. Semscu.

ROMAN CATHOLIC AND ANGLICAN CATHEDRALS IN MELBOURNE AND SYDNEY.

SYDNEY, N. S. W., December 6, 1897.

ST. PATRICK’S Cathedral, Melbourne, undoubtedly the most important ecclesi-
astical edifice in Australia, was opened
last month with much pomp and ceremony by the Cardinal-Archbishop of Sydney, assisted
by a host of lesser dignitaries. The building has been in course of
erction for many years, and has cost over £200,000 without the
spires. The Cathedral is very happily situated, and commands a
central position, overlooking the City of Melbourne, and, next to St.
Mary’s Cathedral in Sydney, is the finest example of Decorated
Gothic south of the equator. It is of the usual cruciform shape,
with a central tower and spire at the place of intersection, and the
smaller towers and spires flanking the nave at the western end.
The dimensions are as follows: nave, sanctuary, and Lady Chapel,
clear internal length, 200 feet. Nave and aisles, and transepts and
aisles, internal width, each 76 feet. Transepts, internal length, 162
feet. Height of main roofs to ridges, 68 feet. Height of western
towers and spires to be 260 feet. Height of central tower and spires
to be 260 feet. These measurements are only slightly smaller than

those of St. Patrick's Cathedral, New York, which was begun in the same
year. Exeter Cathedral is almost the same in area as St.
Patrick's, namely, 35,000 square feet, while such historic Cathedrals
as those of Lichfield, Hereford, Rochester, and Gloucester, and half

St. Patrick's Cathedral, Melbourne, Victoria.
a score of others in England and Scotland are smaller in area. When the central spire is erected there will be only four higher in England. The bluestone of which the Cathedral is built— the dressings alone being of the lighter freestone—gives to the exterior a sombre and even gloomy aspect. The pinnacles are richly carved, and infinite pains have been bestowed upon the tracery of the fine windows, and the embellishments of the numerous entrances. The doors are deeply recessed, and the arches are beautifully carved and moulded. All the carving is in freestone. The architect is Mr. W. W. Wardell, F. R. I. B. A., now of Sydney.

The Roman Catholic Cathedral in Sydney is also the work of the same architect, and though only half built, promises to be when completed a far finer building than St. Patrick's. The material used in its construction is a brown freestone of a warm tone, and this alone lends it a charm which is altogether lacking in the gloomy, and almost repellent, exterior of the Metropolitan Catholic Church of Melbourne. A contract has just been entered into for the completion of the transepts and the central tower of the Sydney Cathe-

dral, at a cost of £26,000. About six times this amount has already been expended, and the greater portion of the nave, and the western towers and spires have still to be erected. Neither the Anglican Cathedral of St. Andrew in Sydney, nor that of St. Paul, Melbourne, can compare with the Catholic cathedrals in those cities either in point of size or architectural effect.

At the first general meeting of the Institute of Architects of New South Wales, held on November 17th last, the following gentlemen were appointed officers for the session 1897-98: President, Mr. J. B. Barlow; Vice-President, Mr. H. A. Wilshire; Honorary Treasurer, Mr. W. Pritchard; Honorary Secretary, Mr. G. Sydney Jones, A. R. I. B. A.; Council: Messrs. Thomas Rowe, F. R. I. B. A., C. Backhouse, T. Kirkpatrick, J. A. Kothel. Messrs. M. C. Day and Halloran were appointed Honorary Auditors.

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

[Additional Illustrations in the International Edition.]
made no such deductions. My picture of the portion of Rome and Hadrian's villa was drawn, in order to illustrate the practical view — combined with taste — the Romans took of weather protection, — protection against the almost suffocating blasts of hot summer.

It is hardly worth while to correct the inaccurate reports of the press, but having had in past times very friendly, as well as professional, relations with your journal, you will do me the favor to print this communication.

Frederic Crounshields.

THE PIEBEE A. HEARST ARCHITETURAL PLAN.

New York, N. Y., January 29, 1898.

To the Editors of the American Architect:

Dear Sirs,—For the information of your readers, especially architects and engineers, and around Brooklyn, N. Y., I desire to state that any map of the ground, plaster model showing contour of ground, and programme of competition for the University of California, "The Phebe A. Hearst Architectural Plan," are now on exhibition in the Art Buildings, Montague Street, Brooklyn, N. Y., where any one may examine them, and, if they desire to compete, can obtain a programme and map. Very truly yours,

A. G. Thomson, Secretary.

"FIREPROOF BUILDINGS: THE BURNLEY FIRE."

New York, N. Y., January 29, 1898.

To the Editors of the American Architect:

During the latter part of January both you published an article on the fire in the New Hall Spinning Mill Co., at Burnley, England, with illustrations of the subsequent wreck, as also of the manner of conducting the search for the bodies in relief in England with the assistance of the police. It was the seven years of fireproof construction, which has collapsed through the effects of internal fire. The illustrations show that not a single column, beam or girder was protected; is it not a misnomer to call a building so constructed "Fireproof?"

You say: "columns and beams were giving away before the steamers got to work and the fire had practically to be allowed to burn itself out." Considering that the only fuel was the wood-work of mules and the rovings and bobbins in creeds, with the finished yarns, it is incredible how the place became such a complete wreck, for the whole of the floors and roof were broken in."

In view of recent experiments on cast-iron columns, it would have been more incredible had anything but a total collapse resulted from such defective construction.

A careful study of the series of articles published in Engineering, by Mr. G. A. Roe, with illustrations, shows conclusively the small resistance offered by unprotected iron. The moment a fire has any force; but not many realize what slight development of heat can be fatal to a large structure; he cites the instance of the canvas in a panorama at Vienna catching alight and in the shortest space of time being reduced to ashes by the flames. Cast-iron columns when unprotected collapse at a temperature of about 1393 degrees Fahrenheit, and, if all spong in parts, will most probably fly into pieces through quenching, even though such a temperature be not reached; cast-iron beams may also be fractured with electric power on the bridge itself. The wires do not appear to have had any influence on the fire, but there is no doubt that the concrete itself will be ruined by the temperature, and the rest, trees over one hundred years old. The fire seems to suit the trees, as it opens the pipes and allows them to grow. In fifteen or twenty years the soil is covered with poplars, willow, etc., which shelter young fire and other trees. In fifty years the trees are probably sufficiently well insulated from the ground, plaster model showing contour of ground, and programme of competition for the University of California, "The Phebe A. Hearst Architectural Plan," are now on exhibition in the Art Buildings, Montague Street, Brooklyn, N. Y., where any one may examine them, and, if they desire to compete, can obtain a programme and map. Very truly yours,

A. G. Thomson, Secretary.

FOREST FIRES CAUSED BY LIGHTNING. — According to Dr. Bell, in The Scottish Geographical Magazine, the forest fires of Canada are generally caused by lightning. In the great forest between Alaska and the Straits of Belleisle the portions recently burned are easily recognized. The green of the foliage from the tree tops is seen to have been longer spared. The fire rushes along with the speed of a galloping horse, which is in the same time that fire breaks off the trees, and, after the severest wind, it catches alight and in the shortest space of time is extinguished. Your recommendation covering all iron with concrete as a protection to call a building so constructed "Fireproof?"

You recommend covering all iron with concrete as a protection. While there is no doubt that a covering of Portland cement concrete will afford some protection to a metal column or girder, still there appears to be no doubt that the concrete itself will be ruined by the action of the fire and when heated will not stand the subsequent application of water — a very important point when we consider the immense amount of material thrown out during a configuration. The concrete is then sure to break off, leaving the ironwork bare.

It may be worth while to point out that the language which our correspondent criticism is contained in not Mr. Atkinson's comments but in the report of the English experts. — Rev. American Architect.

The American Architect and Building News. [Vol LIX. — No. 1154.]

ELECTRICITY ON THE BRIDGE. — The opponents of the extension of the Brooklyn trolley system across the New York and Brooklyn Bridges have brought up a new and quite interesting argument concerning the possible danger of accidents caused by the electric current. It is claimed that the return-current will seek the bridge structure and return through the upper part of the Brooklyn Bridge, the latter being on its ground on its way to the powerhouse.

This argument is weak, however, and rests upon the assumption that the bridge proper is laid on the wooden flooring and are hence fairly well insulated, and still remains an uncertainty about the currents from the New York Electric Light Company by the ordinary pavement. Large currents will necessarily return from these tracks in the power-
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