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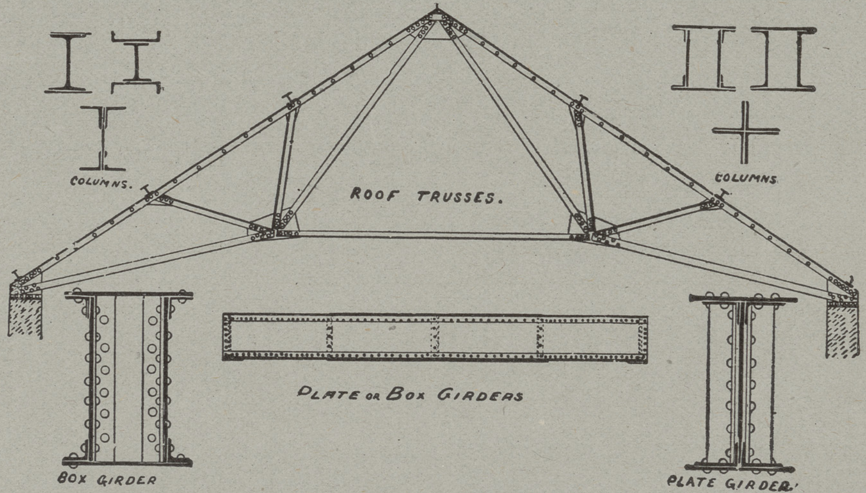

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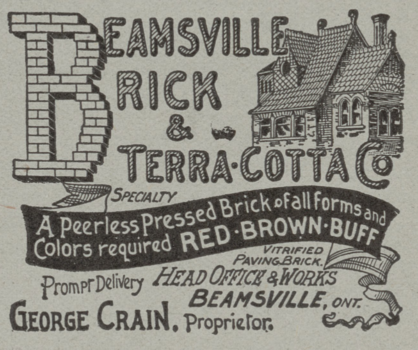

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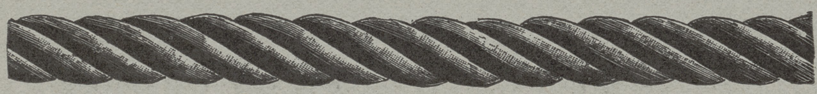

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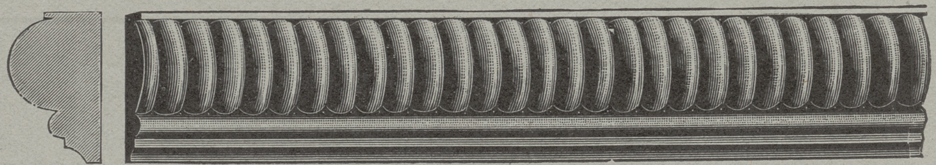

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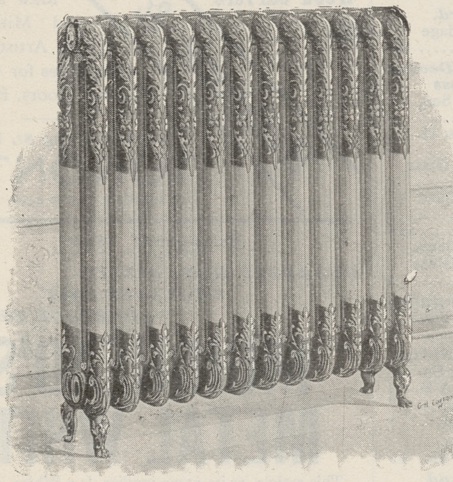

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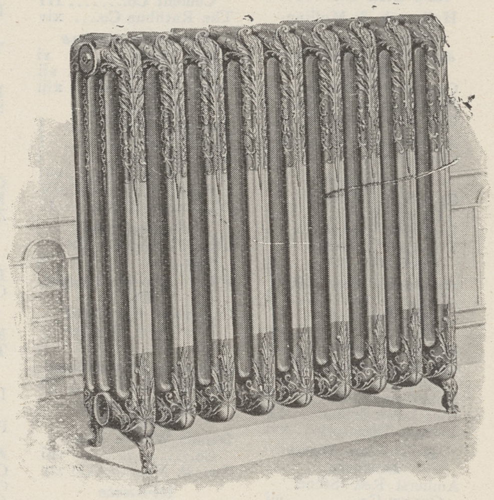

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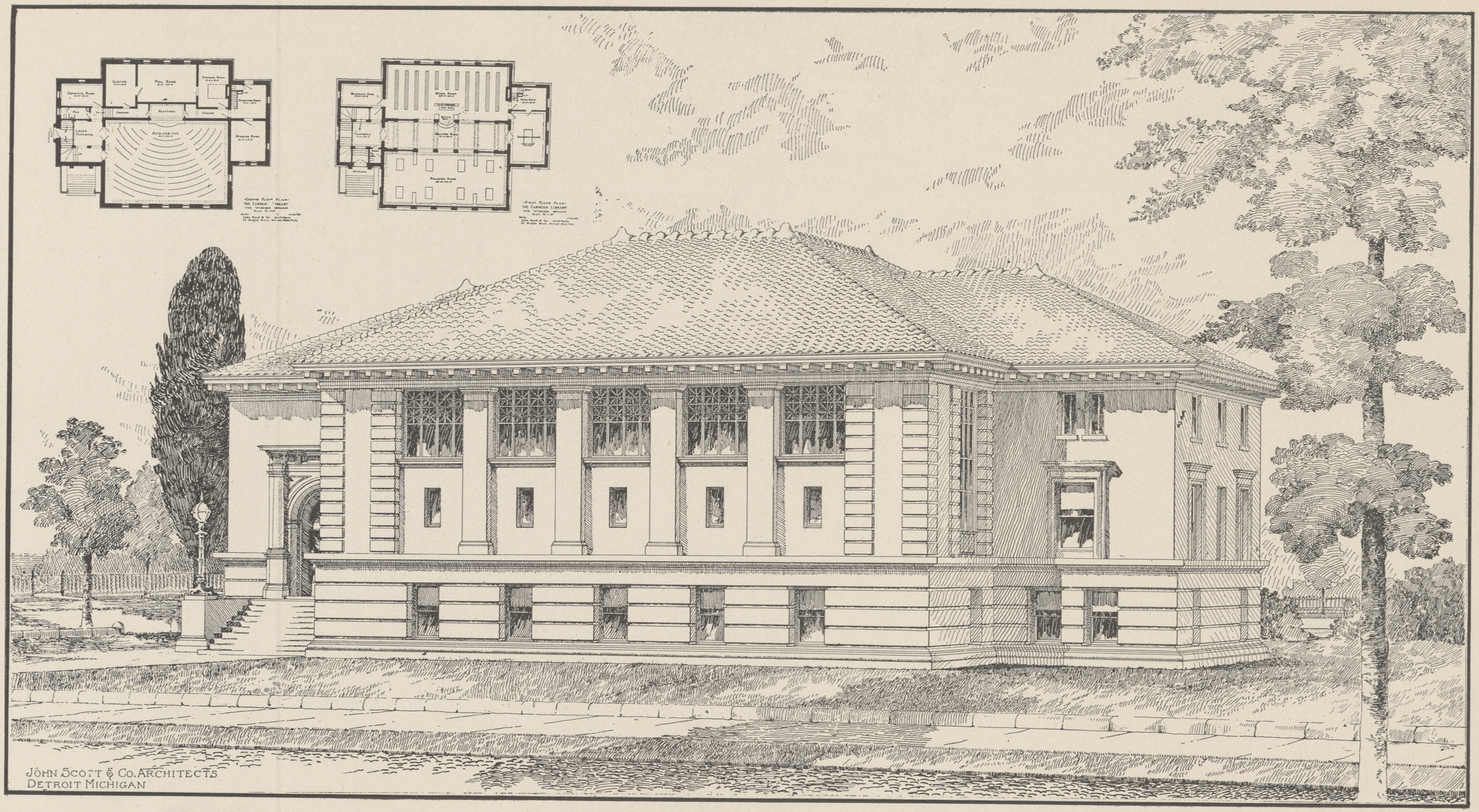

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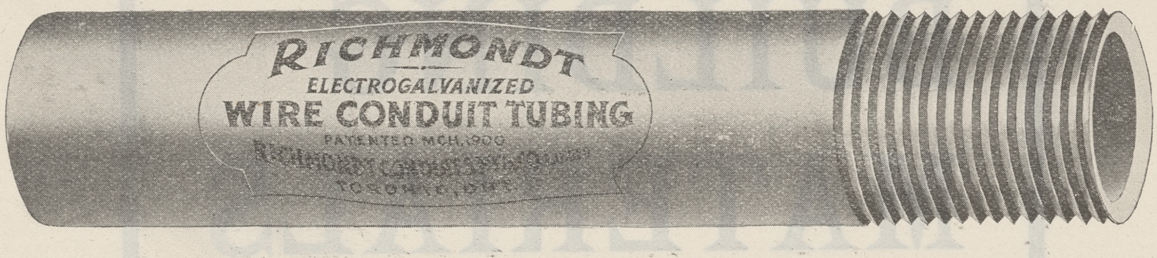

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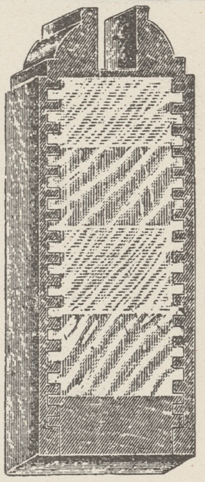

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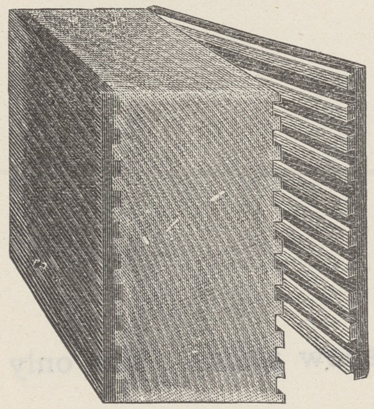

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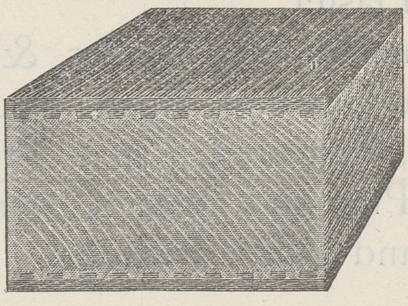

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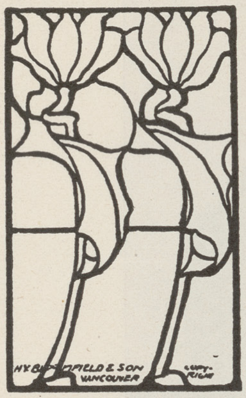

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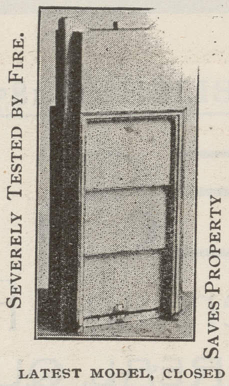

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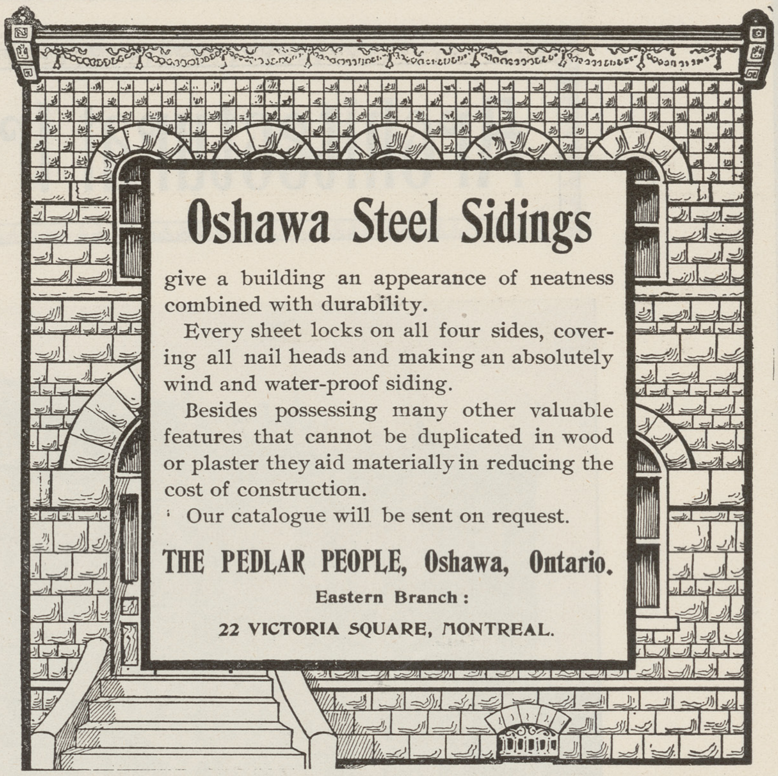

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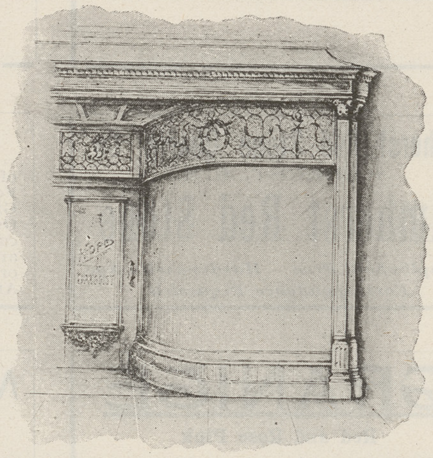

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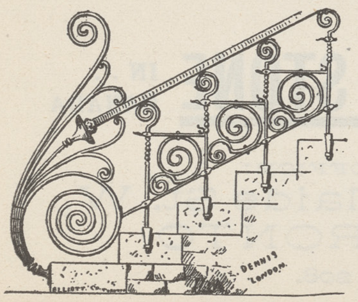

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" Edmund Burke, " "
" S. H. Townsend, " "
" Frederick G. Todd, Landscape Architect, Montreal.
" W. H. Elliott, Toronto.
" J. C. B. Horwood, Architect, Toronto.
" A. F. Dunlop, R.C.A., Architect, Montreal

Photographic Exhibition.

An exhibition of architectural photographs is a dull thing. The photograph is honourably matter of fact, no doubt, and tells no deliberate falsehoods; but it cannot be said, in the fullest sense, to tell the truth. In the first place, of course, the very important element of colour is left out; not only in the building, but in the surroundings which do so much to set it off. In the second place the point of view is limited and the effect from an imperfect point of view is less satisfactory seen through a limited lense than through an adjustable and reasoning eye. The complaint of painters, that people see things not as they appear to the eye but as they know them to be, is not on the whole a bad thing. We may be unperceiving sometimes of the pictorial effects of nature; but for practical purposes when a man is finding his way across the country, for instance, it is of less importance that he should enjoy the effect of a purple patch of shadow in the middle distance than that he should know it means a bridge. In the same way the eye is able to translate perspective back to the facts it represents, and see in an extremely sloping line the effect of a level cornice. But more than this the eye has a way, if it is an intelligent eye, of selecting the most interesting points and ignoring those which are unimportant. A man of taste before a well composed building sees it as it was meant to be seen, with his attention fixed upon the essentials; and if he were to draw it would bring out these essentials. A photographic lense on the other hand is just as particular about the non-essentials; when confronted with a family group, as amateur photographers well know, it seems to devote its best efforts to the wall paper and picture wires. This cannot be called an artistic representation. For artistic representation we want a statement that is like a good story—the points all in, the twaddle all out; and the photograph is too much like an old woman's tale—laying equal emphasis on major and minor points—to satisfy this requirement. As a study in design, a drawing which brings out a little more favourably than can be done in nature the points of the design, is perhaps more profitable than a photograph which tends to overwhelm the points with minor details more than would be the case in nature. An exhibition of drawings is certainly more interesting.

Correspondence Sch ols.

It is somewhat surprising to hear that the Architectural League had anything to say in favor of the Correspondence Schools. They have the merit of marking down a course of reading for the solitary student and giving him a stimulus to carry it out—in great part the stimulus of feeling that his course is costing a good deal of money and he must not throw it away. On the other hand they have the demerit of calling the course of reading a qualification, which it is not. They advertise in such a way that draughtsmen and builders' foremen think that this is the short road to become an architect. The result is an increase of the unskilled who do not know that they are unskilled, and a neglect of less attractive but more substantial means of training. Time will no doubt disprove the undue pretensions of these Schools, but at the cost of much loss and disappointment to students; and if any professional body speaks in praise of the system there should at the same time be strict recognition of its limitations. There can of course be no question of a Correspondence School as a substitute for the Scientific Schools of McGill and Toronto University, but students should be warned against thinking it a sufficient substitute for the course of study and examinations of the Associations of Architects.

Building Permits.

Just how numerous and glaring are the defects of the so-called Toronto Building By-law, is known only to those who like architects and builders have intimate relations with the Building Department. Let us take as example the unnecessary and vexatious regulations governing the issue of a building permit. The Building Inspector's Department will refuse to grant an architect a permit until a receipt is produced from the waterworks department showing that payment has been made for the water which will be required by the contractor in erecting the building. This means that the architect must either take his plans to the water department and wait while the officials figure up from them the probable quantity of water required by the builder, or leave them behind and go or send for them the next day. There is no good reason why architects should be put to all this trouble and delay. If the plans when submitted by the architect are found to conform to the by-law as interpreted by the Building Inspector, the permit should issue forthwith. Arrangements for the supply of water should lie with the water department and the contractor. Advance payment for the water could easily be insured by the city refusing to turn on the water except on production by the contractor of a certificate of payment from the water department.

Architects and Landscape Architects.

Mr. Pentecost's paper, read before the Architectural League, points clearly to a conclusion, which he forbore to press, that, when the site of a building is sufficiently important to require the intervention of a landscape architect, he is the paramount designer. Repton, as quoted in the paper, is less modest. "Repton's position," Mr. Pentecost says "is, that while the landscape architect should have no official voice in the actual designing of the house, the style and general arrangement, location and disposition of the house and grounds should be officially determined by the necessities of the landscape architect's general plan; for, as Repton says further, 'to my profession belongs chiefly the external part of architecture, or a knowledge of the effect of buildings on the surrounding landscape.'" All this is quite true. The site prescribes the character of the building; the building aims to be as it were a part of the site; and if the architect is obliged to call in a landscape architect to enable him to understand the possibilities of the site, it goes without saying that he must base his design upon the understanding thus received. This is all Mr. Pentecost spoke for—co-operation. But there is a dark hint lying in his statement that "the true solution of the problem rests with the progress and recognition of landscape architecture as a profession." He goes on to show that there has been hindrances to the development of of this profession—to its development that is to say, from landscape gardening, as it used to be called, to landscape architecture. When fully developed and recognized are we to expect that the landscape architect will rise from being employed by the architect to employing the architect? Will the co-operation, that Mr. Pentecost rests upon, change from an architect inviting the co-operation of a landscape gardener to the landscape architect inviting the co-operation of a house planner? It is the logical sequence. The major quantity fixes the condition for the minor. As the house (that is the architect) fixes the conditions for the supplementary arts of painting and sculpture, so the site (that is the landscape architect) should fix the conditions for the house. But logical consistency is an imperfect guide to life. The house is after all the principal thing. It is more impossible for the landscape architect to grasp the requirements of that problem than it is for the architect to seize upon the points of a site—and take advice from a landscape specialist.

The Education of Architects.

THERE is something most praiseworthy in the continual discussion by architects of means for the better education of students, but there is surely something that can be done by architects to educate themselves and each other. The absence of this element from the discussions of architects gives a strange air of unreality to their talk about education. It is of course useless to the cobwebs, and a surprising amount of good feeling talk of set studies, or problems, or prizes for busy architects, but Mr. Bispham Page spoke a bottom truth when he pointed out that an architect learns the best things he knows after he has begun practising; and the question is whether architects would not materially hasten each others' development by a systematic exchange of ideas. Meeting to study problems in the abstract is too laborious and it is school boy work any way; but the study of current problems, which constitutes this post graduate course, which Mr. Page speaks of, which architects are taking all their lives, could be made more profitable and much quicker in operation by meeting other architects systematically for mutual criticism and discussion. The old fashioned jealousy of architects for one another has almost disappeared, under the influence of greater culture; if indeed, in the matter of design, it has not altogether disappeared. There is no reason why it should exist. There is so much individuality in art that however much a man may give of his ideas he will never find that they are taken up by others in the same way he has taken them up. If every one pours freely into the the fund of common experience there will be a gain all round, without increase of conflict, for, though every man takes from it the same material, it will be found worked up into different products. He who contributes most to discussions of this kind will gain the most;

for, by the effort of explaining his ideas, he will clear them up as they never were before. Clear thinking is the fruit of expression, and one reason why it is so difficult to get contributors to professional paper reading and discussion is, that there is so little clear thinking and so much disinclination to the effort of thinking clearly. There ought therefore all the more be a prosperous career for a series of meetings to which members could bring, not their discoveries, but their doubts and difficulties. It is twice as easy to solve a problem in conversation as alone ; and it there is no solution, if the designer is up a blind alley, as so often happens in design, a light from outside is the quickest way to show him where he is. Architects could improve one another incalculably by regular meetings for mutual criticism.

The Durability of the Steel Frame.

THE rumour that the pulling down of a twelve year old steel frame building in Chicago has shown its lower columns to be half eaten through with rust contradicts the evidence of the gridiron foundations of the old post office which after a longer term of years, if we recollect rightly, were found to be in good order inside their cement casing. But if this rumour is true, (and doubt is cast upon the preservation of iron in cement), it will be a serious addition to the uncertainty which is felt as to the life of a steel frame building. This discussion has been revived in the American papers and reports of experts are so contradictory that the question may be said to rest in doubt. In the meantime steel frame buildings are being rushed up more than ever and we may be sure that carefulness does not increase with familiarity. Representations have been made of the danger of efflorescent brickwork in contact with the steel frame. If the corrosive salt is as freely efflorescent on the inside as it is on the outside, the wall can hardly be called a protective casing. Is any brickwork in fact sufficient protection to a metal which must be kept trom exposure, not to the weather merely, but to the carbonic acid convyeed in ordinary air. It is possible to blow a candle out through a brick wall, by placing the candle at the small end of a funnel held tightly against one side of a brick wall, while the mouth is applied to the small end of a funnel held tightly against the other side exactly opposite. There must therefore be a continual change of air between the inside and the outside of an ordinary brick wall. How much carbonic acid accompanies the change depends upon the amount detained by the mortar. The affinity of lime and cement for carbonic acid must be taxed by sudden changes of temperature or in a high wind when the change of air in the walls is rapid, and there must come a time of satiation when the mortar can no longer be relied upon to stop the passage of the gas. Brick and terra cotta surrounding a steel frame is supposed to be grouted so as to be impervious to air, but it is doubtful if it can be made so at the best, if we may trust the evidence of tests for the permeability of walls, and there is sure to be much laxity in practice.

On the whole there is not enough certainty about the protection of the steel frame buildings ; but they are being built in greater and greater numbers. It is said that twenty-four millions worth of office buildings have been begun in New York this season and steel frame construction is in progress for uptown buildings also. The centre of commerce has moved up a good deal ; and above that apartment houses grow taller and taller, in the effort to accomplish the end of making the same limited area hold an increasing population. About the time New York is solid with steel frame buildings the catastrophe to the earlier buildings of the kind—if there is going to be a catastrophe—will be due. In view of this state of affairs insurance companies are interested and the question of durability is going to be thoroughly tested by an Experiment Station, established by the efforts of Mr. Edward Atkinson, under the direction of a member of the staff of the Massachusetts Institute of Technology.

THE SECOND ANNUAL EXHIBITION OF THE TORONTO ARCHITECTURAL EIGHTEEN CLUB.

The Toronto Architectural Eighteen Club is to be heartily congratulated on the very successful nature of its Second Annual Exhibition which was held during the last week of May in the Galleries of the Ontario Society of Artists.

The exhibits consisted mainly of photographs, a few pen and ink drawings and some pastels and water colors. The subjects were of remarkable range and variety, for the Architectural League of America was well represented and some fine European photographs were loaned ; Montreal, Quebec and Vancouver all assisted to lend increased interest to the collection.

Some of the photos were chiefly remarkable as photographs, the subjects being scarcely entitled to such excellent reproduction; on the other hand, photography with its inherent defects of perspective, failed to do justice to many of the subjects.

As the exhibition was by no means confined to members of the Eighteen Club, it is to be regretted that so many of Toronto's architects were not represented. Such exhibitions can have none but a beneficial effect, by bringing architects together, brushing away and good fellowship is generated ; if it is good for one to mix with one's fellow men surely it must be still better to associate with fellow workers, to exchange ideas and broaden our views. Every architect to whom the advancement of art is more than a mere phrase should endeavor to be represented at this exhibition in the future.

The real live interest shown by our United States friends in this and similar exhibitions is instructive ; they send hundreds of beautifully framed and mounted photographs from many different points widely scattered over a continent to help out a numerically small Architectural Club in Canada ; their genuine interest in the welfare of architecture and their belief in the good derivable from such hearty co-operation is quite clearly demonstrated, and it is to be hoped that every Architectural Society in the Dominion will emulate this friendly example.

If I may venture to offer a suggestion, I think the interest in the exhibition could be greatly enhanced if small scale sketch plans more frequently accompanied the photos, more particularly of interiors. The soul of a design lies in the plan and if the true value of the design is to be appreciated its plan must be shown or at least indicated.

I cannot make mention of every interesting work as the catalogue, which by the by was rather late in making its bow, contained so much that was admirable. I can only make reference to some of those numbers which appealed most strongly to me: Messrs. Bailey & Truscott, Philadelphia, sent a fine collection of photos of executed work, a quaint "Colonial" Exterior, No 11, and a quiet gabled house with half timbered upper stories, No. 22, being particularly attractive.

It is difficult to judge sculpture from rather small photographs in which both scale and technique are almost lost, but the "Stitch" (in clay ?) of Commodore Bainbridge & Stewart, No. 124, seemed to give promise of much greater interest than the other work shown by H. K. Bush Brown (Newburg, N. Y.), though the group, "Indian Buffalo Hunt," No. 122, shows life and spirit.

Messrs. Cope & Stewartson, Philadelphia, contributed a round dozen of fine photos, every one representing work worthy of their reputation: No. 155, "Entrance to House at Edgehill," is simply exquisite, and No. 157, "Dormitories, University of Pennsylvania, from the Terrace," is a fine piece of transplanted English collegiate building.

Of Nicola D'Asanzo's decorative designs, No. 171, "Ball Room Decoration for W. W. Gibbs, Esq.," is a singularly fine composition. The remainder probably depend largely upon the scheme of co'or, which is of course lost in the photos. "Egypt Awakening," No. 190, F.F. Elwell, is in my opinion far ahead of all the other exhibits of sculpture.

No. 212, "Dining Room, Codmore, Hyland," (H. G. M. Gordon) and Nos. 55 and 56, "Dining Room" by A. H. Brokie, Philadelphia, are specially quiet and reserved.

Nos. 236 to 242 is a series of enlargements admirable in light and shade and peculiarly interesting as illustrative of the American Garden.

"Pantry Fittings," by Messrs. Kennedy & Kelsey, of Philadelphia, is a wonderful little bit of skillful contrivance, and the photo of a Mantel, probably in the same house as the Crystal Palace of a Pantry, is as refined as it is effective.

A good collection of photos of Port Sunlight, lent by Sproatt & Rolph, Toronto, indicate the happy result of several architects all working on similar lines and in sympathetic accord.

No. 295, "Bachelor Apartments," F.M. Mann, with an oak hall, kindly rendered by both architect and photographer.

Nos. 298 to 299, Mewman, Westman & Harris, Philadelphia, seemed to me to be the softest and most beautiful photos in the collection, the play of light and shade about the picturesque half timbered house in the trees being quite charming. For the furniture I can find little good to say. Nos. 317 to 320, C. Rholfs, Buffalo, appears to me to confound subtle simplicity and direct carpentry with sheer affectation and then smothers the unfortunate result with surface ornament, which is not bad in itself but so shockingly ill applied. Some designs of furniture seem to abhor a plain surface even of very beautiful material.

H. W. Weller, Montreal, sends Nos. 405 and 406, "Some Typical English Beauty Spots."

Judging from the bronze work, Nos. 411 to 417, by John Williams, New York, it would seem that funds are not doled out to the architect in the United States in the 10 cents at a time measure that is too commonly the case in Canada; but it is this very point which emphasizes the great difference between United States and Canadian Architecture. The Toronto architect has to exercise a degree of self restraint that his confrere across the border seems to wot not of. Rarely indeed can the Canadian architect let himself go because he has so commonly to solve problems involving the greatest possible return for the minimum outlay, and in Toronto the result is for the most part extremely gratifying, as may be seen by referring to the numerous exhibits of work by the President, which illustrates most aptly how a simple and dignified effect may be gained entirely by means of good lines, careful grouping and clever fenestration; all the detail being thought out and applied with a sparing and subtle hand.

This self command is evident in much of the work of other exhibitors, and the English influence is also very marked in Messrs. Burke & Horwood's lovely little Bible Training School. And the garden front to "Castle Frank" and the Stables by the same gentlemen are delightful.

No. 368 to 376, "House in Queen's Park," by Messrs. Sproatt & Rolph, further illustrates the growing grip that the English influence is taking on Toronto; Messrs. Lever Bros. premises by the same authors emphasizes this fact very successfully.

Nos. 378 to 381 are exceptionally good pen and ink perspectives of Symons & Rae's new University Buildings at Kingston,.

No. 144 is perhaps the most pleasing example given of Chadwick & Beckett's work: E. J. Lennox is represented by some very fine enlargements of photos of his well-known work in the city.

No. 444, "An Artist's House," H. Payette, Montreal, is a pretty French villa such as one sees at Strasburg, for instance.

The impression received from this exhibition is that the influence of the French school is but little felt in Toronto, and that the so-called "Colonial" of the United States which has been so absolutely boiled to rags by ardent caricaturists in Canada as well as in the United States, has little hold upon Toronto. The influence of the modern English school on the other hand has rooted deeply in a congenial soil, and in so many able hands will doubtless greatly thrive in the near future. Toronto has a great architectural future and if the members of the profession will but work together the Queen City will probably give the note to the character of Canadian Architecture.

ROBERT M. FRIPP.

The modelling and carving of an immense frieze on the Stanford University memorial arch, in California, marks the completion of a colossal undertaking in sculpture. The arch is over 100 ft. high and is built of Sau Jose limestone; running around it at a height of 80 ft. is the frieze, illustrating American civilization. The total length of the frieze on the four sides of the structure is 232 ft.; its height is 12 ft. It contains 150 heroic figures in high relief.

INTERCOMMUNICATION.

[Communications sent to this department must be addressed to the editor with the name and address of the sender attached not necessarily for publication. The editor does not hold himself responsible for the expressions or opinions of correspondents, but will, nevertheless, endeavor to secure correct replies to queries sent in. We do not guarantee answers to all queries neither do we undertake to answer questions in issue following their appearance.]

From "Builder:" I have a difficult roof to put on a house which has five gables, and no two gables are of the same pitch. There are valleys, hips and common rafters. What I want is some rule by which I can lay out my rafters, so that the differences in pitch at the junction of the roofs will not make any "bad breaks" in the roof. Any information on the subject will be appreciated?

Ans.—In replying to this request, owing to not having before us a definite plan of the roof, we can only give a general rule for meeting the problems that will arise in the construction and joining of roofs having different pitches. The following diagrams and explanations cover the whole ground, and will, no doubt, suffice for the purposes of our inquirer. At Fig. 1 we show a plan having different pitches. Draw A B

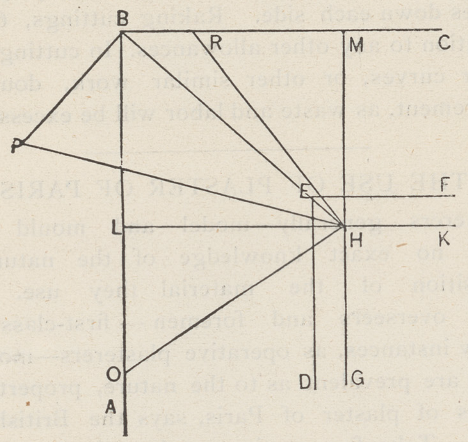


Fig. 1.

and B C, to represent the ridges of the roofs of the main building and wing. Draw E D and E F, representing the outside edge of the wall plate. Suppose E D to be 8 feet from B A, thus representing the half width of main building, and let E F be 7 feet from B C, or in other words, the half width of wing. Draw H C and H D, say 15 inches from E D and E F respectively, to represent the projection of the cornice. Draw H L, H B and H M, respectively the sides of main rafter, valley rafter and wing rafter. From these lines square off the rise, which we will suppose to be one-third pitch, on the main building, equal to 6 ft. 2 inches, as shown by L O, B P and M R. Joining the extremities of these lines with H we get the lengths and plumb cuts of the several rafters.

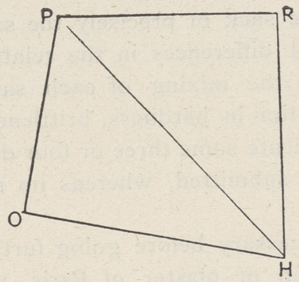


Fig. 2.

Fig. 2 shows the development of the surface. It shows the roof as it would appear if the jack rafter was hinged to the valley rafter and the whole flattened out.

Draw H O and H R, representing the lengths of main, valley and wing rafters, and P R and P O the seat of main and wing rafters, then the angles O P H and R P H give the horizontal cut for jack rafters on main and wing sides of valley respectively.

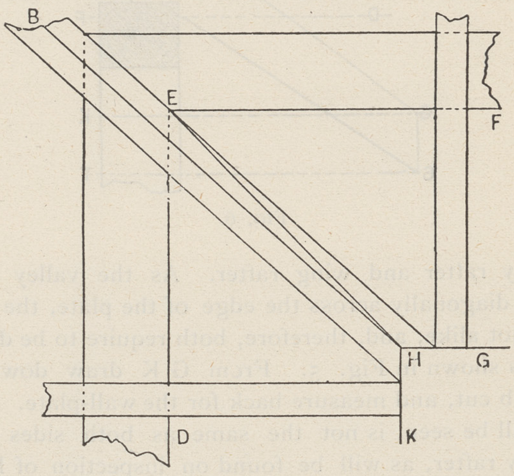


Fig. 3.

Fig. 3 shows the plan of a portion of the roof at foot of rafters on a larger scale. The letters in this figure correspond with those used in Fig. 1. On each side of the line B H draw a line parallel with it, and supposing the valley rafter to be 3 inches thick, make the distance between the lines 1½ inches. Join E H.

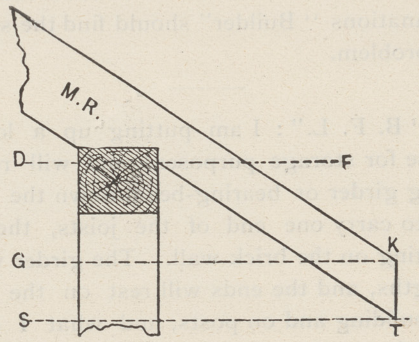


Fig 4.

It will be seen that the valley rafter does not fall directly over the corner of the plate. The joint in the soffit or planceer lies directly under the line E H; therefore in backing the underside of this rafter or triangular piece comes off of the wide side and a trapezoidal piece off the main side.

Referring to the construction of the roof, it is sup-

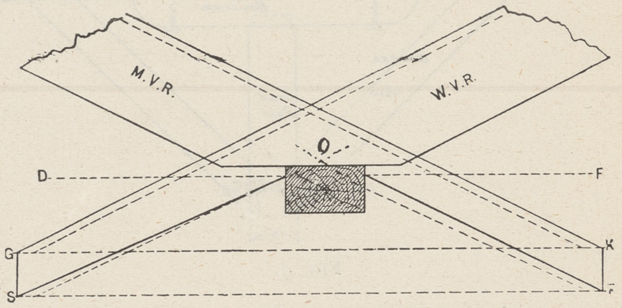


Fig. 5.

posed the valley rafter is three inches thick, or it may be made of two pieces 2 inches thick and spiked together, which would make a better job, and could be backed better.

Figs. 4, 5 and 6 show the side elevation of rafters, and corresponding letters in the several figures refer to the same parts. Draw the dotted line G K, see Figs. 1 and 3, which represents the line of upper edge of bottom end of rafters, and upon it, at the proper angles shown in Fig. 1, draw the line of main rafter,

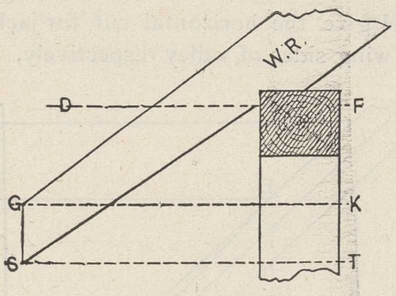


FIG. 6.

valley rafter and wing rafter. As the valley rafter runs diagonally across the edge of the plate, the sides are not alike, and, therefore, both require to be drawn; all as shown in Fig. 5. From G K draw down the plumb cut, and measure back for the wall-plate. This, it will be seen, is not the same as both sides of the valley rafter, as will be found on inspection of Fig 3. Size down the main rafter (see Fig. 4) as required, and through the intersection of the underside, with wall-plate and end cut, draw dotted lines D F and S T, by which corresponding points are to be located on the other rafters. The dotted lines shown in connection with the valley rafter in Fig. 5 shows the barking, and the barking of the underside lies in the intersection of the dotted lines K O and G O. From these diagrams and explanations "Builder" should find the solution of his roof problem.

From "B. F. L.": I am putting up a long brick warehouse for storage purposes, and will require to run a long girder or bearing-beam down the centre of building to carry one end of the joists, the end of joists resting on the brick wall. The girder will be in three lengths, and the ends will rest on the two end walls of building and on posts, and what I desire to know is of a good method to scarf the ends resting on the posts, the posts of corner to have faces on each side framed into the girders.

ANS.—If your timber is long enough to lap over and beyond the posts, a good method of scarfing is shown at Fig. 7. This is simple and not very expensive. A

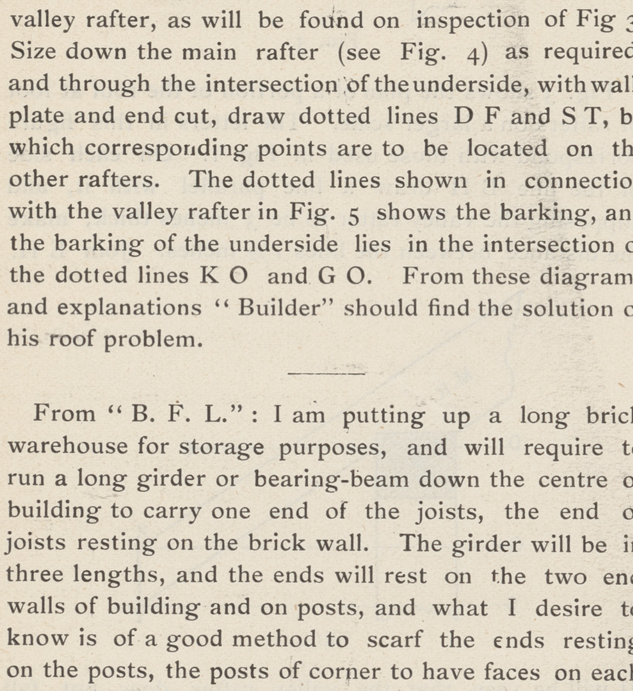


FIG. 7.

better method, indeed one of the very best methods of scarfing, is shown at Fig. 8. In this case the post is framed into a hardwood cap or bolster, the latter being equal in width to the girder and should be from five to six feet long and be fitted into girder as shown and bolted with ¾-inch bolts. This scarf may be depended upon to carry all the weight the girder can sustain.

From "Contractor": How is slating measured?

ANS.—Slating is measured by the square. Allowances are made as follows: Eaves for double crowns, half the length of the slate + 1 inch; above nail-holes,

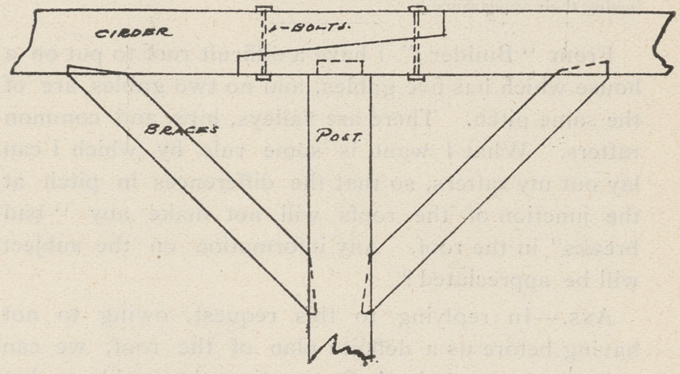


FIG. 8.

that is, for counters slate, 11 inches would be the width by which the dimension is squared (half 20 in. = 10 in. + 1 in. = 11 inches). Hips and valleys, 6 inches on each side, cutting around skylights, scuttles and chimneys or other like projections, 6 inches down each side. Raking cuttings, 6 inches in addition to any other allowances. In cutting around circular curves, or other similar work, double the measurement, as waste and labor will be excessive.

THE USE OF PLASTER OF PARIS.

Plasterers generally—model and mould makers—have no exact knowledge of the nature and composition of the material they use. Even among overseers and foremen — first-class men, in many instances, as operative plasterers—most hazy notions are prevalent as to the nature, properties and qualities of plaster of Paris, says the British Clayworker. Take five or six samples of plaster to the average foreman, leading man, or mould maker for his opinion, with reasons for same, on the respective qualities of each sample submitted. He will note the colour, the degree of fineness, together with the conditions and effects observed in the mixing and setting, and, finally, the degree of hardness—by scratching, and for brittleness—by snapping pieces off with thumb and finger from small test slabs or tiles run for the purpose. In some cases an attempt is made to get, roughly, at the expansion or contraction; in any case the operator will deduce his opinion of the respective qualities of each sample from observations turning on the methods given above. It is obvious that the observations from their very nature can be founded on no established physical or chemical fact. Indeed, under certain conditions the information afforded may be absolutely misleading. For instance, five or six samples may be taken from one sack of precisely the same quality all through; small differences in the relative qualities of water used in the mixing of each sample can give sufficient variation in hardness, brittleness, and expansion, as to indicate some three or four distinct qualities in the samples submitted, whereas no real differences should exist.

It will be necessary before going further to explain the composition of plaster of Paris, with attending chemical and physical facts, for the due understanding of the subject matter under discussion. Raw gypsum, or fully hydrated sulphate of lime, has the following formula $CaSO_4 2H_2O$. In other words, in 172 lbs. of this material there are 30 lbs. of water, or 20·9 per cent. water. This water may be driven off by heat, wholly or in part, in accordance with the temperature attained. In the manufacture of plaster of Paris it is the object of the manufacturer to drive off sufficient water from the raw gypsum to give the following formula: $2CaSO_4H_2O$. In other words, 290 lbs. of the manufactured plaster of Paris should contain but 18 lbs. of water, or 6·2 per cent. water. The lowest temperature at which gypsum may be burnt for its conversion into plaster of Paris is 80°C., but temperatures falling between 110° and 120° give the best results. At 200°C. gypsum loses all its water, becoming what is technically known as dead burnt, when it is useless for the work. It is thus seen that in converting crude gypsum (specific gravity 2·31) into plaster of Paris (specific gravity 2·7) practically three-fourths of the original water, which exists in some state of chemical combination, is driven off. And, conversely, this same amount of water is taken up when the plaster of Paris is mixed for running moulds, etc., at the plasterer's hands, on its reconversion into gypsum. But the query not unnaturally arises—why does plaster set? The answer is by no means generally known. It is because plaster, $2CaSO_4H_2O$, is soluble in water; but the additional water taken up gives rise to the insoluble hydrate $CaSO_4 2H_2$, which immediately crystallises out, the plaster when set being a vast network of thousands upon thousands of these crystals. In practice water is used in large excess in order to give the necessary fluidity to the plaster; but this makes no difference in the end, in so far as the amount actually taken up and used in the conversion of the plaster into the fully hydrated crystals is concerned; any water over and above this is simply evaporated in the drying.

Here, then, is a ready method at hand, which has the advantage of being based on exact scientific data, for getting at the true value of any sample submitted. This particularly in conjunction with the specific gravity, which presents no difficulty, since a neutral medium, in the way of a solution, of the specific gravity required, could be readily obtained at little cost from any wholesale chemist. In such a solution the plaster should neither float on the top nor sink to the bottom of the test glass or tube, but just remain suspended in the body of the liquid. This would confirm in many ways one's experiments and observations on the water test. Apart from any degree of fineness in size, plaster may be underburnt. In this case the extent of the damage would be shown by the lower percentage of water absorbed, and since the density would be inferior, the plaster would float on the top of a liquid standardized at 2·7. In the case of over-burnt plaster, we should get inferior absorption and superior gravity. The presence of lime would be indicated by a superior absorption, with corresponding differences in the specific gravity, while the presence of silicious matter would immediately place the combined water and the specific gravity respectively out of agreement. The superior absorption of water by plaster of Paris when lime is present—with evolution of heat, by the way—is explained by the fact that 56 lbs. of lime, CaO, combines with 18lbs. of water; H_2O giving 74lbs. of the slaked lime; $Ca(OH)_2$ a body containing 24·3 per cent. of water, 3·4 per cent. higher than gypsum. The following trials, conducted by the writer, will serve to show how constant is the combination:—

FINE PLASTER.

8 ozs. of plaster plus 5½ozs. of water. Weight after drying, 9¼ozs. full.

8 ozs. of plaster plus 6 ozs. of water. Weight after drying, 9¼ozs. full.

8 ozs, of plaster plus 6½ ozs. of water. Weight after drying, 9½ozs. bare.

Approximately the water taken up in each case was 14 per cent. Theory demands 14·7 per cent. Error 0·7 per cent. This was effected with slight expansion of the plaster.

COARSE PLASTER.

8 ozs. of plaster plus 7½ozs. of water. Weight after drying, 9¼ozs.

8 ozs. of plaster plus 8 ozs. of water. Weight after drying, 9¼ozs.

8 ozs. of plaster plus 8½ozs. of water. Weight after drying, 9¼ozs.

Water taken up and fixed 13·5 per cent., or 1·2 per cent. less than theory demands. The shrinkage in each case was ⅛ in 13 inches.

The three following trials were made with fine plaster, that which had been shown as being practically pure—taking up 14 per cent. of water, but with lime added in varying porportions:—

FINE PLASTER PLUS LIME.

A. 8 ozs. of fine pla ter plus ½oz. of lime and 6 ozs. of water.

B. 8 ozs. of fine plaster plus 1 oz. of lime and 7 ozs. of water.

C. 8 ozs. of fine plaster plus 1½ozs. of lime and 8 ozs. of water.

After mixing, setting, and thoroughly drying the samples were weighed. A had gained 1½ozs., B 1¾ ozs., and C 2¼ozs. In other words, the percentage gain in each case was:—

A = 15 per cent. B = 16·2 per cent. C = 19·1 per cent.

Some relation is thus seen between the amount of water fixed and the proportion of lime present in the plaster. It will be further noticed that the amount of water used in mixing does not affect the results after the plaster has thoroughly dried. But it does affect the plaster in other directions. A larger mass of plaster is obtained for a given weight of the material, when water is used in excess, than is obtained from the same weight of unmixed plaster if water be sparingly used in the mixing. But in the former case the resulting mass will be more open, as a body, and softer than when mixed under the latter circumstances, all other conditions being equal. An explanation of this fact is to be found in the rate or speed of setting. It is well known that the size of crystals, not the shape, is largely governed by the rate or speed of formation in the mother liquid, and since the setting of plaster consists solely of the formation and deposition of crystals in the manner indicated in the earlier part of this paper, the chances are that they are all governed by the same laws. In conclusion, it should be stated that the foregoing experiments were conducted in a workshop with ordinary balances and weights. The many nice adjustments and the absolute accuracy of the laboratory are not, under the circumstances, possible. However, the experiments are sufficiently accurate for all practical work.

WEATHER-TIGHT WINDOWS.*

By B. M. Ward.

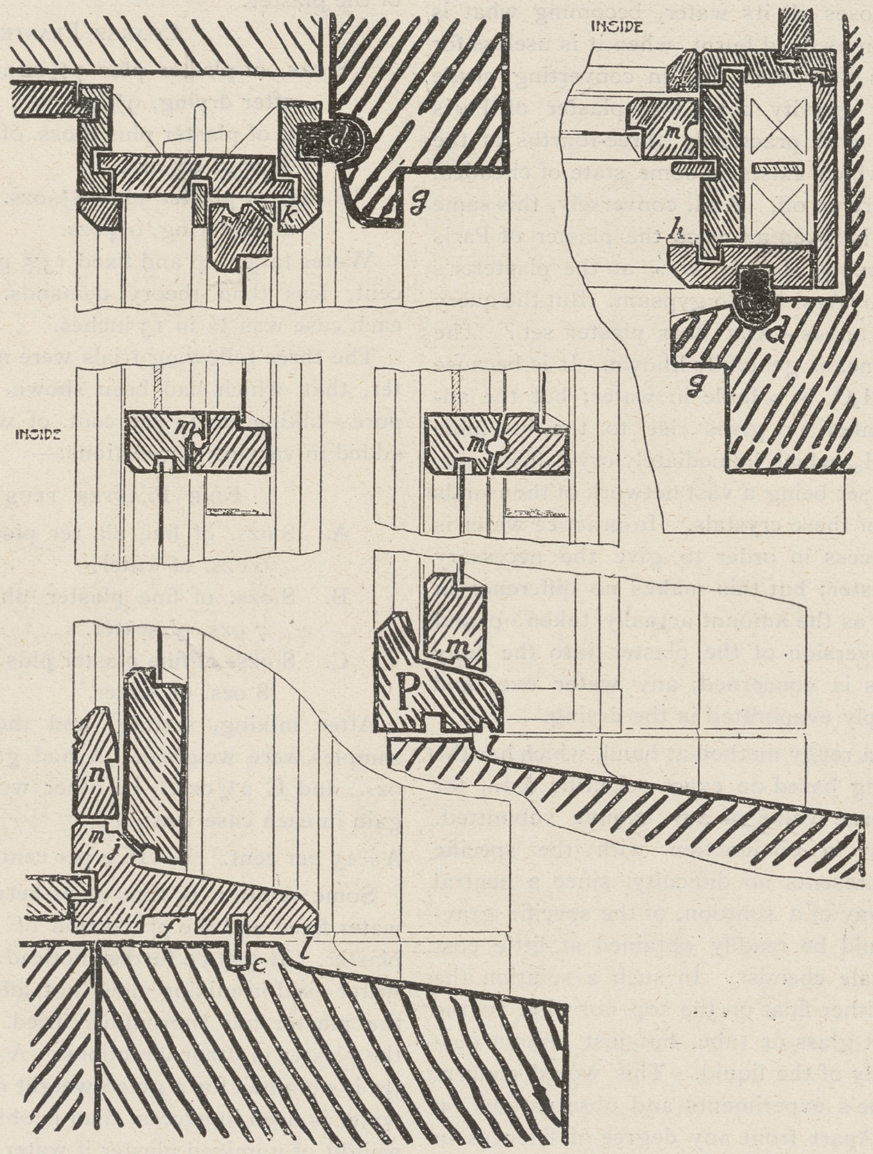
Which are the best methods of preventing windows leaking (water and air) under strong and prolonged pressure of wind and rain?

That is the subject of my paper, which is not meant to instruct you, but to draw out the ideas and opinions of those present. I want to know what is to be done to keep a window weather-tight under the most extraordinary conditions.

In the first place let us consider the junction of the frame and the brick or stonework at the jambs, head and sills. Bed the frame in hairmortar, you say. Is this sufficient, especially if the bedding is not very well built? It is very difficult to bed a frame really well. Moreover, under the varying temperatures, this bedding draws away either from the frame or from the brickwork (or stonework); little cracks occur; then in a big storm the wind, if prolonged, will force water through, and the trouble has begun.

Put a weather-bar between the sills (see e e e, sheets A, B, C)? Good: but what about the jambs, to say nothing of the head? Here crops up the question as to whether the window frame should be fixed in front of, or behind a reveal. In this there is plenty of food for discussion. I leave the meal to you.

I have not seen the idea exploited, but it seems to me that a metal tongue for stone, or a cement roll for brick, terra cotta or concrete, would be a good thing (d, d, d in sheets A, B and C). In my opinion the weather side or metal bar or cement roll would be better exposed to the weather and air (A and B; d), and I think the same would apply to the sill weather-bar (B and C); even if the bar or roll were omitted, the mere grooves would be helpful as "air hollows." This arrangement of the bar or roll would be of very little value if the frame were in front of a reveal. I have also shown a further groove in the solid frames (f f f, A, B and C), and this serves a double (or triple) purpose. It forms an emergency air-cushion, preventing the further ingress of forced air; it exposes more of the frame itself to the air and so lessens the chance of rotting; and thirdly, by its use less of the girth of the frame comes in contact with the bedding, itself an inducement to rotting; moreover in this connection the smaller the amount of contact between frame and bedding the better the chance of the bedding being made even and homogeneous.



Sash Windows--Sheet A.

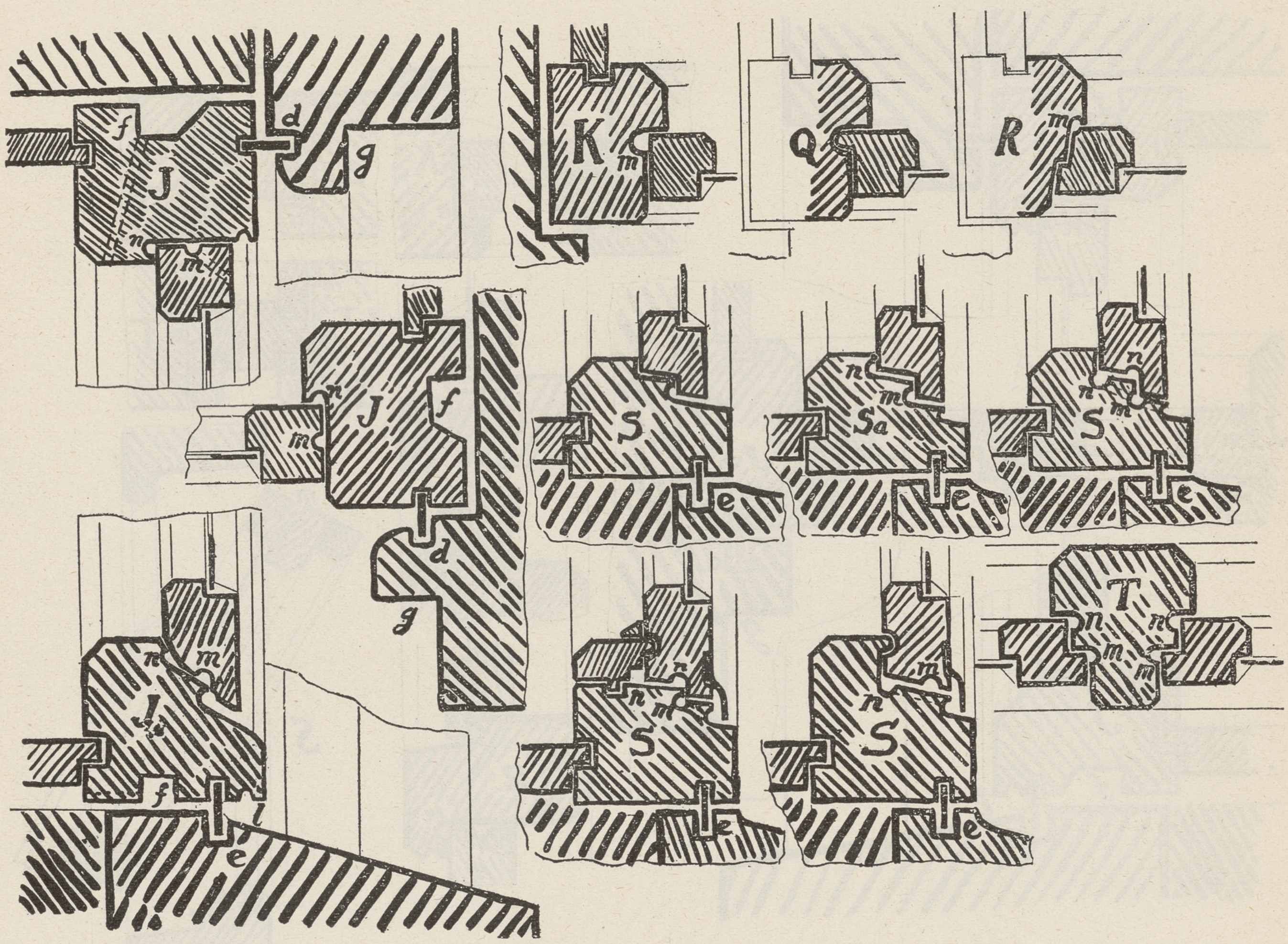
I have also shown (g g g, A, B and C) "the breakwater feature" of Mr. Campbell Douglas, advocated in an article of his on "Specification." I have slightly modified it. Mr. Douglas maintains that the fury of the storm will expend itself on this fillet, and only a

* A paper read before the Liverpool Architectural Society on March 3rd, 1902.

weak edition will be left to tackle the joint between frame and brickwork. Moreover, I have shown in most cases the frame-sill throated and projecting over the stone sill, the weathering of which is taken back behind that throat (l, l, l, A, B and C), another suggestion by Mr. Douglas.

To come, now, to the different types of windows. First, sash windows. These, as generally constructed, keep out the water fairly well, but for incessant rattling in a wind, just when you want to go to sleep, nothing can compete with a sash window. The sashes have shrunk in thickness, and there is now unnecessary space for them between parting slip and lining or bead. Slips of oak, or felt or leather (h h, sheet A) fixed in an existing window might stop the rattle. If they did, they would prevent the sashes being opened, so you

But all this means a window shut tight—an abomination at least in a bedroom. However, fairly large slots in the meeting-rails, which could be closed with little shutters, might be adopted. I have shown a great number of "water hollows" (as they are called ; "air hollows" would be a better word—m, m, m ; A, B and C). These help considerably in keeping out draught and the weather generally. Any wet that gets to them is carried down at once in the case of jambs, gets down as soon as it can in the case of sills, while in the heads it slips out of the holes drilled for that purpose. The greater object, however, of these hollows is the air-cushion which they form. This prevents forced air from making any progress. Those air hollows marked n, n, n on sheets A, B and C are emergency hollows, so that in case of bad fitting the winds that



CASEMENT WINDOWS OPENING OUT—SHEET B.

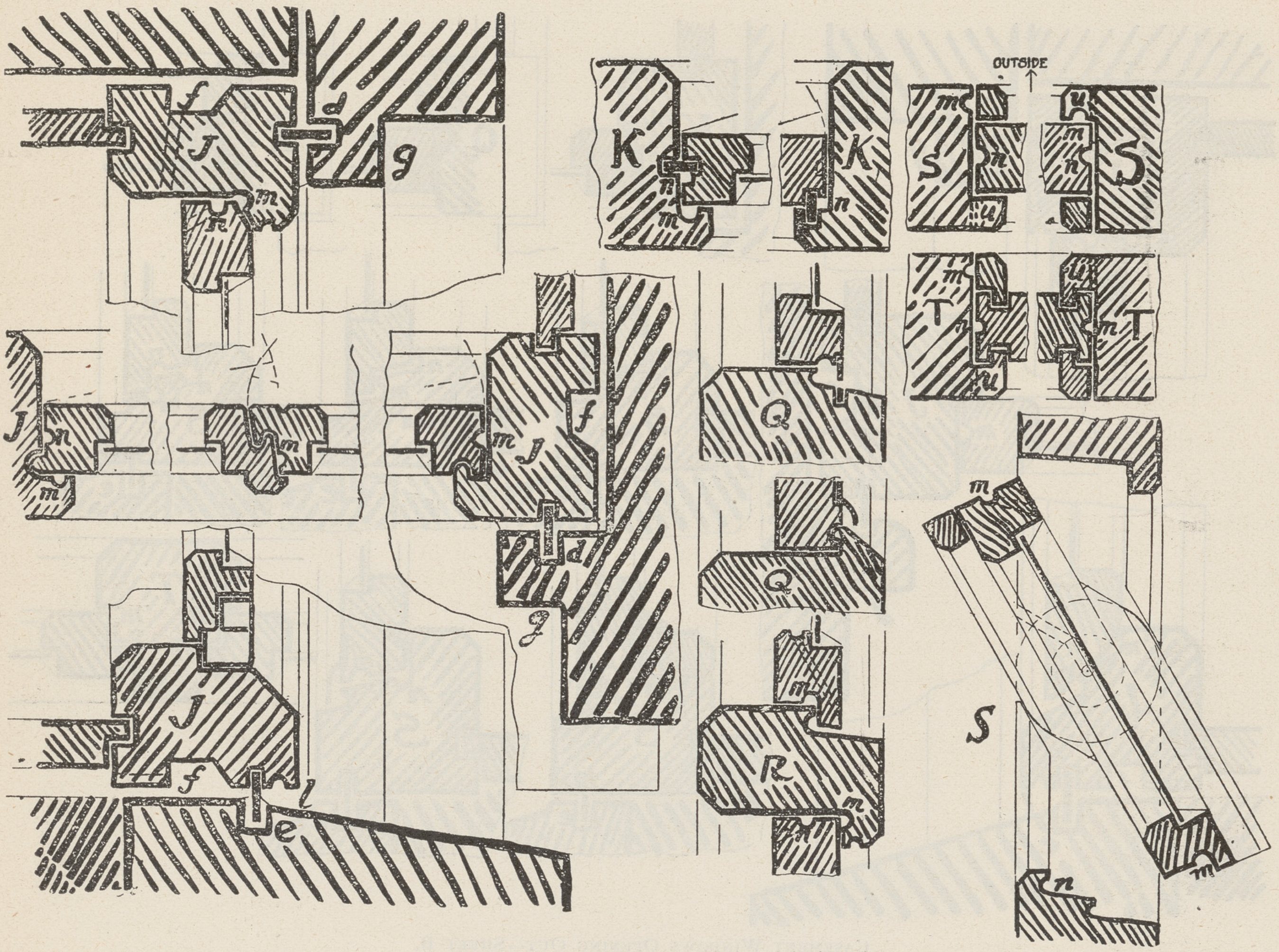
might as well screw the sashes up altogether. However carefully the sashes are made, however well-seasoned the wood may be of which they are made, either they will rattle or they will not slide (at least after rain). The great thing is to press both sashes tight against the parting slip. It struck me the other day that the slope of the sill would help the lower sash to hug the parting bead if the sash could be constantly pressed down, and the slope made steeper than usual (j, A) ; similarly a fillet (k, A) in the head would help the upper sash if constantly pressed up. All we want, now, is a wonderful fastener which will, at one and the same time, push down the lower sash, push up the upper sash and pull the meeting rails tight together. Whether these particular sections of bead and sill are valuable or absurd, the type of fastener I have described would be a useful addition to any existing window.

escape through "m" may be stopped by "n."

I have shown two different sections of sill in sheet A. That marked P is Mr. Campbell Douglas's section. He says the wide still, usually prescribed, is very liable to rot; will only allow a very gradual slope unless it is consideraby deepened; that the wet remains on this gradual slope in a wind, and blows up under the sash; that the wide bedded portion all unventilated is conducive to rot; that the weathering of the stone still under and behind a throat in the frame sill is a great improvement, and so on. He says, too, that he finds there is no need to stay the outer parts of the feet of the jamb-boxes. All this is very true, I think; but Mr. Douglas does not say how he stops the feet of the jamb-boxes, to prevent them rotting in their most susceptible part. I have shown a block under the feet, though I do not think it would answer very well; so I rather suggest the other sill which provides little more contract with the bedding. This would be better, to my mind, if the weather bar were exposed (as in b and c). The tall fascia in front of the bottom rail allows, of course, the bottom sash to be raised for ventilation through the meeting rails, without causing draught below. The shape of the fascia provides an emergency air-cushion at n, and lessens the risk of the fascia and bottom rail sticking together.

So much for sash windows. Of casement windows with the lights hung at the side and opening out, there have been suggested so many sections of the bottom rail and sill, and so many plans of jambs, most of which have their good points, that it is difficult to know which is the best. That marked j,j,j on sheet b seems to me to be good enough. There is little doubt that rebated in order to make a really satisfactory arrangement. Here I may mention that before writing this paper I thought it would be a good thing to get the opinions of some of of the local joiners and contractors on the whole subject of weather-tight windows. I therefore wrote to five or six prominent firms, but only received replies from two. One said they could give me no information; the other, Messrs. William Tomkinson & Sons, were good enough to send me a pamphlet on Elliott's fitting to wood casements opening in, saying that they had always found them satisfactory.

In the section of sill marked j (sheet c) I have shown Elliott's metal channels, for I cannot think of anything better. It would be unpleasant for anyone to lean the elbow on them if thinly clothed, but otherwise they would be very satisfactory. Between the jambs marked



Water-Tight Windows—Sheet C.

rails in a casement would be a great advantage if they could only be made quite certain of fitting well to the frame and yet without danger of sticking. In this case (jjj) there is always an emergency airhollow, n,n,n; k is a usual section; q can only be applied to the hinged side, of course; k would do for the other; r would be good if the fitting could be guaranteed—the splays lessen the chance of sticking; k,q and r are all copied, and so are the sills marked s, of which s a seems about the best. The mullion t is also copied, and looks satisfactory, though I personally should always feel afraid of the rebates. All these details (sheet b) would equally apply to a fanlight hung at the top, except that q could only be the head.

Wood casements hung at the side and opening in are more difficult to make weather-tight. It seems necessary to call in the use of metal in some shape or form j I have shown a plan of hooked meeting-rails; the right-hand jamb has obviously no connection with these meeting-rails.

K,K are plans of jamb for one window with metal bars. These would be very satifactory if well fitted. q,q are sections of sills often used, and here copied.

For fanlights hung at the bottom, the left-hand jamb (the hinged side) of j and k would not apply, but the other jambs and heads would; and for the bottom rail that on the transom r would, I think, do well enough.

Fanlights hung at the centre (horizontal centre) can, I suppose, never be made quite weather-tight, especially at the centre; s and t show ordinary method. It is better, if you must have a fanlight hung at the centre, to have it of iron, as there is then less unrebated portion at the centre.

In the plans of jambs, s and t, I have shown the beads n,n solid on the jambs; a joiner would much prefer these to be planted, but I think it is worth the extra expense to have them solid.

With regard to casements revolving at their vertical centre, Captain Chaddock has very kindly brought his model here. There ought to be the making of a really weather-tight window in this invention, though it is really intended for a bulkhead door in a ship. The window need not revolve on its exact centre at all; it can have the greater part to go out, or to come in, and also can be swung back into the room, the reverse side in, so as to be cleaned with safety.

With regard to iron casements, I only want to ask how long they will keep weather-tight. The manufacturers invite you to play a fire-hose on one of the windows and guarantee there shall not be a drop of moisture inside as a consequence. But this is with a newly-fitted window. I want to know how weather-tight they are after they have been slammed many hundreds of times and after they have been subjected to the extremes of temperature for say twenty years.

I have touched on most of the varieties of windows usually specified, and I am not going to speak of any other kinds.

The general arguments against nearly every section and plan I have advocated are complicatedness and expensiveness. With regard to the former, the golden rule that the simplest is the best seems not to apply here at all. Simple splays and simple joints will not do the work required when under the severest conditions.

With regard to expensiveness, I have purposely had no regard for expense. We want to know what is the best; we already know what is the cheapest. Still it does seem absurd that we should have to be always hacking out little air-hollows here, there and everywhere, and inserting little medal tongues and channels, and always we are fearful that the joiner will not make a perfect fit, or if the fit is perfect at first we know that the wood will shrink if it has not been well seasoned, or worse still, we know that if it has been well seasoned it will swell in wet weather.

Yet another point. I have so far spoken of "weather" either as wet or as draught. There is a third feature of weather—temperature. A window ought to keep out the cold and keep in the heat. Make your window never so water-tight, never so air tight, one thickness of glass will not keep in the heat or keep out the cold; not even plate glass ¼in. thick.

While preparing this paper I have come more and more to the conclusion I arrived at years ago, that this country of ours, with its "climate of samples," requires the almost universal adoption of double windows: double casements or sashes, with single or double frames. In Canada, I believe, they go further; they screw up their double windows inside and out during the winter, and provide for the ventilation (or perhaps they don't) by other means.

With double windows simple details will be quite good enough; the space between the sheets of glass is a splendid air-cushion, stopping wind coming through, and as for the heat and cold I suppose there is not a better non-conductor of heat than a mere layer of air. I am told that two sheets of glass with the air between them are as efficient as a 9in. brick wall, and that a single pane of glass has rarely 25 per cent. of that efficiency. As regards light two clean panes of glass stop less light than one dirty pane; though that is not meant for an argument. I ask you, finally, are not double windows the best of all; and if not, why not?

DAMPNESS IN WALLS.

A correspondent of Indian Engineering, in writing on this subject says : Wet subsoil and rain water are the two causes that account for dampness in walls. These two causes have been found to operate both conjointly and separately. They affect surface as well as the heart of walls. Dampness due to wet subsoil first affects the heart of walls, and working upwards afterwards manifests itself on the surface, but that due to rain water may be found either confined to the surface or in the core of the wall, or both.

Saltpetre on walls is the result of the action of damp on the salts that enter into the composition of the bricks and mortars forming the walls and that of dry air. During wet weather the salts in the bricks and mortar become dissolved and appear on walls in fine white crystalline powder during dry months. The action of saltpetre is not only to produce unsightly patches on the surface of walls, but it also disintegrates bricks and mortars, detaching them in fragments to their ultimate danger and damages properties and furniture in contract with them.

Having said what I know about the causes and effects of damp and saltpetre, I next proceed to impress upon the reader the importance of examining the walls with a view to trace out the source of the evil before suggesting remedies for it. It is very important to find out whether dampness is due to wet subsoil or beating of rain water or rain water from the roof finding its way into the body of the wall through leaks between parapet and roof, before hitting upon the proper remedy. For this purpose the wall should be stripped of the plaster where it is affected. If the look of the bricks is not indicative of damp, a nail should be inserted into the affected portion and watched for a week. If it shows saltpetre it is to be concluded that the heart of the wall has been penetrated by damp, and the bricks being free from sulphates and chlorides do not show signs of decay and that the plaster has been only attacked as the mortar (sand and lime) contains salts. In case damp is found to progress upwards from the plinth to the ceiling it is certain that it is caused by wet subsoil, and in exposed situations it is favoured by rain water beating against it and sometimes it enters the wall in the shape of rain water from the roof.

The principles that underlie the several inventions are (1) to render the walls impervious to rain water or damp; (2) to provide an outlet for damp in the wall and secure a thorough ventilation over the outlet; (3) to use materials that are free from salts. I should add that in case dampness is found due to wet subsoil, it can be best removed by providing an efficient drain for subsoil water if it is found economical and possible.

For new buildings under construction it is found very economical and effective to use damp-proof course over the sectional area of the wall on the plinth, where dampness is expected from wet subsoil. In new buildings caution is also exercised in the selection of bricks and mortar. But in old buildings, exposed to damp from underground, it is not advisable to cover the wall with imperious conposition. There are many petrifying compositions meant to render the walls impervious to damp, but they are of no use where dampness is due to wet subsoil. I am convinced that the second principle is applicable in such cases, i.e., to provide an outlet for damp and to secure a thorough ventilation over it. In new buildings under construction a course of perforated bricks over the plinth has been found to answer the purpose very satisfactorily. The application of this principle in case of old walls has been recently attempted by a gentleman, but I am not in a position to vouchsafe its thoroughness or its success.

The wall is stripped of its plaster into two lines, say 9 inches above the plinth and again 4 or 5 feet above the plinth. The area between these two exposed lines is first exposed to the action of the sun and afterwards plastered with Portland cement. The exposed portions are meant to act as outlets for damp and provided with ventilators. I doubt if this would stand any fair test.

Where dampness is due to rain beating against the wall I would remove all plaster and stone composition in thin coats. Where dampness is caused by the entrance of rain water into the body of a wall from the roof I would recommend repair of the leaks through which rain water finds its way into the wall and diversion of the drain of the roof, if possible and economical.

HOW TO HANG CANVAS WALL COVERING.

The New Art jute canvas wall hangings, or "burlaps," as they are sometimes called, for decorative purposes have reached such a state of perfection that they are destined to become as popular as any other medium used by decorators. After having gone through a period of many experiments by the decorators themselves—who for some years back have had to contend with the many imperfections of the raw material, in the coloring of the material as well as its application—a condition has been reached where the manufacturer has now placed on the market a specially prepared burlap that has not only an even texture and uniform dye, but it has also a coating of sizing on the back whereby it is practically as easy to apply burlaps to the wall as it is to apply the ordinary wallpaper. There is not the latitude, however, in the quality of workmanship when hanging burlaps as there is in hanging of wallpaper. There is only one way to put it up, says the London Decorators' and Painters' Magazine, and that is, of course, in a first class manner, and therefore the best class of workman only should be entrusted with the responsibility of applying this material. The foreman should select a man who is noted for his careful attention to the details of good measurement and cutting to advantage, as it will soon be discovered that it is not quite so simple a matter to cover up bad work in measuring, cutting or trimming, with a patch here and there, as it is with the ordinary patterned wallpaper.

Burlap for decorative use is now made in all widths under various brands, from 36-in. up to 108-in. It is put up in rolls of from thirty to fifty yards long. It can be obtained in a great variety of colors and finishes as well as textures. The most popular finish is the dyed colorings, which are especially adapted for all sorts of background purposes, and can be used to advantage in libraries, smoke-rooms, dining-rooms, dens, art galleries or halls. It is also to be obtained in painted, lacquered, illuminated or oil-stained. It can be used to very good advantage in the natural color of the burlaps, and has been very successfully used on walls of art galleries for the purposes of exhibiting etchings, photographs, water colors, Indian relics and oil paintings because of the plain ground from which all lines are eliminated that might clash with the lines of the picture.

For special effects or, for various reasons which we will take up and describe later, it is desirable to use the natural color or preferably the bleached which forms a better ground, and after material is in position, the frieze may be colored, stained or decorated. When properly handled burlap lends itself admirably to staining and decorating by either stencil or hand work, the fact is the introduction of burlaps has enabled the decorator to be somewhat independent of the print manufacturer, as it is possible by the use of the stencil process to produce designs and colorings specially appropriate to the apartment wherein they are to be placed, and notwithstanding the fact that it is so nearly perfect, burlaps as a decoration is yet in its infancy. Great things will yet be done on burlaps, that it will be impossible to produce upon any other surface. Not only has burlaps as a decoration made rapid strides in popular favor on its own individual merits, but its success in conjunction with other materials has been marked, especially when used in conjunction with old effects or other applique ornaments.

While it would be a great pleasure for the writer to take up space and time in the description of the various decorative possibilities, it is his wish to make the present article of as much practical value as it is in his power to do. He will therefore leave the fancy work for some future article, and devote the present entirely to a description of the "How to do it" part of the work.

The walls should be first prepared by the removal of all the old paper or distemper which may have been left on from some previous work. All large cracks should be properly cut out and filled in. All of the wall surface should then be rubbed down and properly sized. Reduce all protruding spots by rubbing with pumice-stone. The sizing consists of the ordinary glue used in the usual way by soaking first, and the melting and thinning as is the case with ordinary wallpaper, with the possibility of, in some cases, using a little black treacle, Venice turpentine or brown sugar to make the size more adhesive and less brittle. It is sometimes desirable but not absolutely necessary to line the walls with a good stout lining paper. The burlap manufacturer produces a lining fabric for this purpose, which is cheap and far superior to paper. Lining paper should be hung horizontally, or contrawise the hanging of the wall covering. This will prevent any shrinkage that is liable to occur with the best of materials. Aside from this precaution, it is sometimes desirable to run a strip of water color about 1½ in. in width from the ceiling to the floor wherever a joint is to be made. This takes a little more time but it pays in the end, because in the event of the workmen making a poor joint a slight opening might remain, if it is only the width of a hair-line it will show when the light shines directly on it. It can be specially noticed at night when the conditions are such that the artificial light is usually thrown directly upon the walls from a centre chandelier, which light is sure to discover any imperfections of this kind, while in the daytime the light coming from one end of the room, as it usually does, it gives only a side light which will cast shadows on the joint and therefore disguise any defect similar to the above description. There is a well-known brand of burlap on the market which is absolutely guaranteed not to shrink.

In the measuring and cutting of burlaps the method is no different than that employed in measuring and cutting wallpaper, the room being measured to ascertain how many lengths it will require, the same being cut about 3 in. longer than the actual measurement, to allow for difference in the height of the walls at different parts of the room. In hanging we recommend to use the lengths as they come off the roll, reversing every other length, so as to get the same edges together, thus preventing shading. With the prepared burlaps it is usual to trim the edges, which is done with straight edge and sharp knife. Be sure and keep the knife very sharp. It is pasted in the usual way by laying the burlap face downwards on the table and pasting the prepared side.

When placing the burlaps on the walls great care should be taken not to pull or stretch it in any way as it will yield very readily, as it will as readily shrink up again to its original position. If in accommodating any uneven condition of the wall it becomes necessary to stretch the burlaps even slightly, to obtain a perfect butt-joint, strike with the open hand some 6 in. or 8 in. back from the joint (while in the act of hanging) the stretch necessary takes place at a distance some 6 in. from joint and the adhesiveness of the intervening space prevents its returning.

In hanging the pieces over the doors and windows I would specially caution the careful workman not to hang these pieces horizontally, as it is very tempting to do to save time, as the difference in the direction of the weave of the material will cause it to appear as a different shade and will thus mar an otherwise good job. I find it advisable to do the door and window tops as I progress around the room instead of leaving them to do after all of the long lengths are put up, which is the invariable custom with the average workman.

FOUNDATIONS ON QUICKSAND.*

Meriden lies in a valley between high hills. In the valley, which is claimed by some to be the original bed of the Connecticut River, is a soil which consists of sandy loam, a little gravel and plenty of quicksand. Most of the buildings in this valley rest on the skin which is found at various depths below the surface, and here the Meriden Gas Light Company bought a 300 by 500-feet meadow lot adjoining its works on which to erect a new holder. Careful borings were made over a section 120 ft. wide by 250 ft. long to determine the thickness of the gravel, if any, and its distance below the surface. To the west of this section, and 25 feet distant, runs a shallow brook, 20 to 30 feet wide—shallow except in freshet time. About seventy-five tests were taken, and the result laid out and plotted into curves, so that the most desirable place for the site might be located. The top material was a sandy loam, evidently a silt deposited from the overflow of the brook when in past years it was not so confined; the next a good gravel, but very thin; below that a quicksand of unknown depth. At a few points the gravel was found as near as 2 feet from the surface and 2 feet thick, while at the others it was 8.5 deep and only 0.4 thick, shading off to nothing. The average depth, however, taken from the boring stations, was 5.5 ft. deep and 1.2 ft. thick. A boring of 50 feet taken in the centre of the site showed 42 feet of quicksand and still more below.

On such materials it was decided to construct the foundation and erect a steel tank-holder, to be 115 feet in diameter and 103 feet high; holding 700,000 feet of gas in three lifts. The weight of the holder to be 475 tons and the weight of the water to be 8,625 tons or a total of 9,100 tons.

As the work of excavating progressed and the gravel was exposed, there was found a clearly defined depression diagonally across the pit, as if at some time the brook had flowed that way; for logs and trunks of trees were found together with a quantity of brush. Through this depressiou the gravel was very thin, and in three places the quicksand was entirely exposed—the first, a space 10 by 15 feet; the second, a space 4 by 12 feet; the third, a space 3 by 15 feet.

Hardly had the whole of the loam been removed when a rain came, followed by a heavy freshet, overflowing the meadow and deluging the pit. When the water had subsided it was pumped out in 8 hours with a 4-inch centrifugal pump and a 7½ horse-power motor, though the water was ten feet deep in some places. The freshet convinced the company more than ever that in erecting a holder it would be advisable to make the top of the foundation above high-water mark, which in this case would mean a fill in some spots of 12 feet, with an average of 8 feet, and the steel tank would be 2.5 feet above the level of the meadow.

At this point a difficult problem was confronted. Meriden topographically is on high hills and in a sandy valley; good gravel is a very scarce article. Four miles away, on the line of the railroad, is a large, poor gravel bank, and two miles in another direction is a small, good bank; but with all the teams that could be procured it was not possible to haul the material as fast as it was needed; and it was expensive—one dollar per yard—delivered. It was evident that other and good material must be obtained in large quantities. On the line of the railroad three miles away is a large trap-rock quarry. Refuse in the shape of iron-stone, soft rock and some dirt is accumulated in large quantities. It was believed this stone would mix well with the material which was on hand and could be purchased after it had been passed through the crusher to a 1½-inch size, at 60 cents per yard delivered, and in quantities up to 150 yards per day. About 50 yards of gravel and 50 yards of clean, sharp sand could also be procured each day, and as much ashes from the works as there were teams to put on it.

The question of piling was considered, and by some might seem the only wise plan under the circumstances, but after consulting the leading local builder who had worked on this quicksand for thirty years and had erected some very heavy factory buildings on it, it was thought best to put in a combination filling of the above-named materials.

The quicksand is found hard packed and not easily dug, unless water is allowed to mix freely with it. Although the excavation was in places much below the level of the brook, little water was encountered, and quite as much came from the land as from the brook side. By keeping the bare spots well drained the men could work on the quicksand with a degree of ease without sinking in very deep; the less it was disturbed, however, the better off they were. Over these bare spots it was decided to lay plank close together lengthways of the holes, and upon these 8 by 10-inch timbers, 8 inches apart, crossways of the holes. The filling between the timbers was of pieces of bricks and old retorts broken up fine, that being the best material at hand just then. One of the bare spots being narrow and long, the surface was covered with large flat stones, the smaller spaces being filled in with fire-bricks and coarse ashes.

While working at this low level a pump was run night and day; also from these quicksand spots a 4-inch tile drain was laid to a central point to facilitate drainage and keep the mass from becoming spongy while the tamping was going on and each course of filling was laid.

Until the whole surface approached a level no roller could be used, but everything put in was thoroughly rammed and sprinkled. The layers were about 3 inches thick over the whole surface. When the valleys were evened up a two-horse 4,000 lbs. roller was put on, and as the thickness became greater this roller was increased in weight to 6,500 lbs., requiring four horses. When the level of filling had been raised above the natural water level the pumping was dispensed with over night, allowing the foundation to be saturated, but it was pumped out again in the morning.

Near the centre of the foundation a loose brick well was built up, into which the water ran as the foundation was successively wetted, and from which it was pumped to the brook. There were some high knolls of gravel not over 3 feet under the surface. It was thought at first that the 5-feet concrete side wall foundation might rest on these, but further consideration convinced the company that this was not advisable, as part of the foundation would rest on natural gravel, while most of it would be on filled ground, so the whole level was raised 1 foot to allow of the same kind of cushion underneath the whole structure before the 5-feet circle was started.

* From a paper by Mr. C. A. Learned, read before the New England Association of Gas Engineers.

The layers spread each day over a diameter of 125 feet were about as follows:—125 yards of quarry refuse, 40 yards of good gravel, 50 yards of works' ashes. Towards the end of the work the ashes were exhausted. Near by was a bank of 500 yards of sand, and from this was taken what was needed to make the top dressing under the concrete, spreading on the stone, washing it in and carefully rolling. Toward the end the roller worked night and day.

Near the edge where the wall of concrete was laid, there was a space that could not be rolled, but had to be filled and tamped to a depth of 4 feet. In order to make sure that this portion was as solid as the centre, a round tapering bar 5 feet long was driven into the main foundation several times. Seventy blows on the average were required to drive it 4·5 feet, and the outside ring was tamped until it equalled the above test.

The amount of material removed approximated 2,900 yards. The work of excavating and filling ready to begin concreting took twenty-two days, and six days more were required to fill in around the great circle after the concrete wall was 4 feet high. This, however, did not delay the concreters in their work. The filling was as per the following amounts:—Quarry stone refuse, 1,780 yards; gravel, 680 yards; sand, 310 yards; ashes, 1,100 yards; total, 3,870 yards.

On this foundation was laid 630 yards of Portland cement concrete, in the following proportions: 1 of cement, 2½ of sand and 5 of stone. The size of stone was 1¼ inch and smaller. A great circle of concrete 4 feet wide and 1 foot thick was laid 5 feet below the finished top. On this circle was laid a ring 3 feet wide at the bottom, tapering to 2 feet 9 inches wide at the top, and 3 feet high; resting on the ring was laid, over the whole diameter of 118 feet, a layer 1 foot thick, trued to prefect level and plastered smooth. This work was accomplished in eighteen days, and in a most satisfactory manner, a local engineer taking the job at 4.90 dols. per cubic yard laid. As soon as the foundation was ready the iron men were on the ground, and the holder was erected complete in a week less than the specified time of four months.

In order to prevent the action of the brook eating away the bank near the holder, a stone wall 7 feet high was built to the level of the holder foundation and 400 feet long, protecting also a new purifier building near the brook. City water was used to fill the tank, as the brook water contained acids. It took three and a half days to fill the tank, which holds a little over 2,000,000 gallons. Before the water was put in careful levels were taken on eight points of the foundations. After filling levels were again taken, and there was not the slightest settlement.

PAIR OF SEMI-DETACHED HOUSES ON A NARROW SITE, TORONTO.
F. F. SAUNDERS, ARCHITECT.

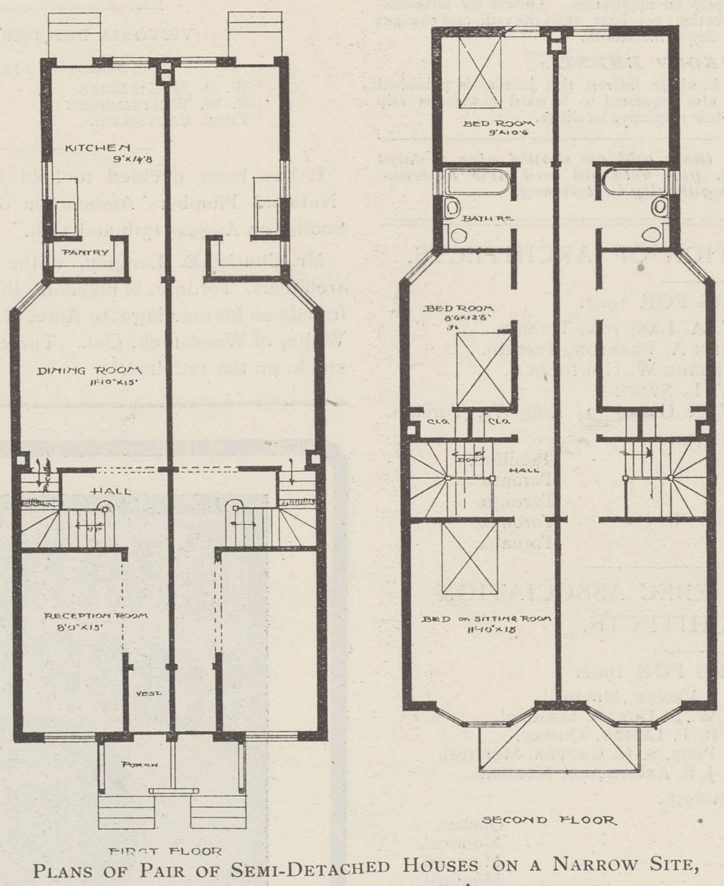
The Montreal Silicate Brick [illegible]mpany, has been incorporated,

BY THE WAY.

The present popularity of all kinds of athletic sports calls for the erection of tiers of seats for the accommodation of the enormous crowds of on-lookers. That great case should be exercised in their construction is evidenced by the accident which took place in Glasgow recently, when 21 persons were killed and 250 injured by the collapse of the "Grand Stand" during a foot-ball match.

× × ×

The Chinese have been demolishing walls outside the Summer Palace at Pekin, and selling the bricks to the various Legations where building is going on, the Ministers being in ignorance of where they were obtained from. But Nemesis sometimes overtakes even the "wily Chinee," says the British Clayworker, and investigation has led to the arrest and punishment of six of the offenders. The Legations ought now to be invulnerable, since sacred bricks have been employed in the'r fortification. When we come to reflect on the matter, however, the Ministers must be an extremely ignorant body not to know a new brick from an old one—perhaps they winked at Master John whilst the transference to their own abodes was taking place, bricks being particularly scarce in Pekin just now.



Plans of Pair of Semi-Detached Houses on a Narrow Site, Toronto.—F. F. Saunders, Architect.

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A verdict for £150 was recently given by an English jury against the proprietor of Her Majesty's Theatre in London in favor of a person named Davies who was injured by slipping from a 6 inch step while hurriedly making his exit from the building. The Builder points out that this should serve as a warning to architects not to plant a door on the top of a 6 inch step so that the fact of the existence of a step is only visible from one side of the door.

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Some twenty five years ago a friend of Mr. Aston Webb's wrote a little ditty which described the progress of a young man who started as office boy with a builder and passed through the various ranks until he became an architect. When he reached the position of clerk of works the ditty described him thus:—

When builder's work he found it tame,
So clerk of works he next became;
The work was less, the wages more,
And he liked to boss the contractor.
He wore a two-foot rule and suit of grey,
And now he is a F. R. I. B. A.

× × ×

The Monetary Times contributes the following to the long catalogue of unreasonable demands of the labor unions:—"We know of a case in an Ontario city last autumn where a block of brick buildings was in process of erection, and some bricks of peculiar wedge-shaped form had been ordered from a brick works to be ground to pattern by machinery. The architect was on the structure one day, and a delegate from a labor union came to inform him that these tapering bricks must be ground down by hand—the Union said so. "But," said the architect, "there are not enough bricklayers in the city to contruct before the snow comes the buildings already under contract; why do you want to delay by putting hand-work on these bricks?" There was no answer but the irrational one, that it was the Union's ultimatum. The architect, who is not a patient man, ordered the walking delegate off the works, using a Shakespearean phrase, and declining to be bullied. But, next day, not a man was at work on the block, bricklayer, carpenter, or plumber. The architect, consistent even in his wrath, went to look for non-union men to complete the walls and other work, when the owner of the building, himself a large employer of labor, interposed and accepted the Union's terms rather than have a strike in his own works.

× × ×

Much of the architectural terra-cotta of the day in the opinion of a writer in the British Clayworker, is decidedly over-finished. Apart from slovenly and careless work says the writer, two grades only of "finish" are possible — right finish, or the full rendering of the intended expression; high finish, or the rendering of vivid expression. These, and indeed all the best effects, are oftener got by rough than fine handling. Excellence in architectural terra-cotta, particularly in ornament, is not attained so much by the cutting of the form, it is rather in the ultimate effect of the mass. The correct finish is about that of a modelled piece, made in the same material employed in bulk on the building, after leaving the architectural modeller's hands, the presser or mould-maker's shop. After the mould is made, the presser or finisher, by the excessive use of sponge, leather, knife and busk, destroys all the life and spirit formerly existing in the work, to say nothing of the false surfaces, which readily flake, on the faces of the wares, worked up by excessive finishing. Look at a piece of direct work; work straight from the architectural modeller's hands, without the intervention of mould, presser, or finisher. Note this in a building, side by side with pressed-up wares; if the modeller is worth his salt there will be life and spirit in the work, attributes too often lacking in the doubtless more highly-finished samples of the moulder's art!

—THE—

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ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th, and charges of advertisements not later than the 5th day of the month.

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Contributions of value to the persons in whose interest this journal is published are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

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It has been decided to hold the annual convention of the National Plumbers' Association of Canada at Halifax, Nova Scotia, on August 13th and 14th.

Mr. Charles E. Langley, of the firm of Langley & Langley, architects, Toronto, is receiving the congratulations of numerous friends on his marriage to Anna M., second daughter of James White, of Woodstock, Ont. The ceremony took place at Woodstock, on the 12th inst.

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EXHIBITION OF ARCHITECTURAL PHOTOGRAPHS.

By the courtesy of the Toronto Architectural Eighteen Club, the Toronto Chapter of the Ontario Association of Architects has the Toronto photographs, which formed a portion of the A. L. A. Exhibition, now on exhibition in the rooms of the Association, 94 King St. West, where they will be hung for the next ten days. The Eighteen Club has also loaned the Interesting Catalogues of the Philadelphia T Square Club covering the past twelve years, which will also be on exhibition at the O.A.A. rooms.

NOTES.

Robert McCausland Limited, the well known manufacturers of stained glass have recently removed to new premises specially designed for their use, at No. 86 Wellington street, West, Toronto.

Frosting upon glass may easily be accomplished by mixing magnesium sulphate (Epsom salts) with beer. Apply by means of a sponge. Bind it upon the glass by running over it a wash made of gum arabic and water.

Putty may readily be softened by rubbing over it a strong solution of caustic soda, which should be applied by means of an old paint brush. Moistening the putty with spirits of salts will also rapidly turn it soft, when it may readily be removed.

Be sure you have figured accurately on a job, allowed yourself fair pay for honest work, counted the cost of all material used, and taken into consideration every expense incurred, before you name your price for the work.

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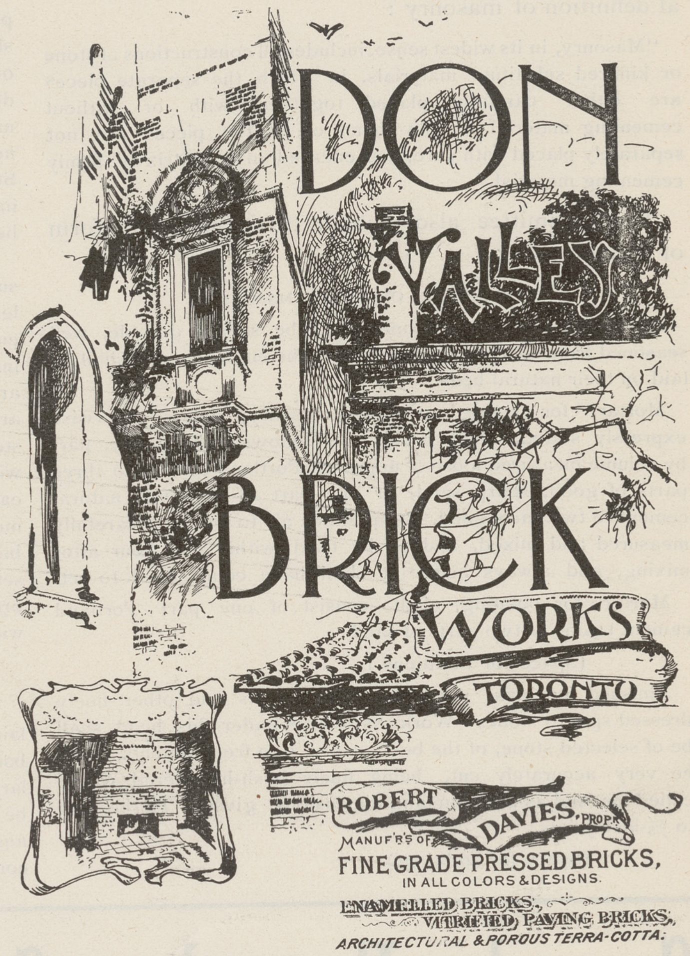
An excellent hard drying putty for exposed situations, as skylights and roofing work, may be prepared by mixing whiting with boiled linseed oil, adding about 1/6 of its weight of powdered litharge. Mix only sufficient for immediate use as it rapidly hardens.



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A MASONRY SPECIFICATION.

The Committee on Masonry of the American Railway Engineering and Maintenance of Way Association, in a recent report to that body, submit the following general definition of masonry :

"Masonry, in its widest sense, includes all constructions of stone or kindred substitute materials, in which the separate pieces are either carefully placed together, with or without cementing material to join them, or, if the pieces are not separately placed with care, are encased in a matrix of firmly cementing material."

The committee also submit the following form of specification :

DESCRIPTION OF STONE MASONRY.

All stones used for masonry shall be sound, durable, well seasoned from sources approved of by the engineer, and shall be laid on their natural beds.

Mortar, for laying up stone masonry, unless otherwise expressly stated, shall consist as follows: Either one part by volume measured loose of approved Portland cement to three parts of good, sharp sand, or one part of approved natural cement to two parts good, sharp sand, all to be very carefully measured and mixed, and to be used within one hour after mixing, and always before it shall have commenced to set.

Mortar, for pointing, shall consist of one part Portland cement to one or two parts of sand.

(Space for additions.)

Finished copings, parapets, bridge-seats and other finely dressed special stones—Work that comes under this head shall be of selected stone, of the best quality, free from defects, shall be very accurately cut, being finely bush-hammered where called for, and as per plan and dimensions given. To be laid to ⅜-inch joints.

(Space for additions).

FIRST-CLASS MASONRY.

First-class masonry will be laid in Portland cement mortar, in regular courses, each stone being carefully cleaned and dampened, if desirable, before setting. The face stones shall be rock faced, with edges pitched to a straight line, and no projections exceeeding 3 inches. A draft line, 2 inches wide, shall be cut at each angle in the masonry. The beds throughout and the joints for 12 inches back from the face shall be dressed to lay to ½-inch joints. No course shall be less than 12 or more than 30 inches in thickness except the coping, and the thickness of any course shall not exceed the course below it. Stretchers shall not be less than 3 feet long, and not less than 18 inches wide, nor in average width than 1¼ times their height, and at no single place less in width than height.

Headers must not be less than 4 feet long, where the wall is of sufficient thickness, and the majority shall exceed that length. Where the wall is not over 5 feet thick, they shall extend entirely through the wall. Headers will extend at least 20 inches beyond the width of the adjacent stretchers. The usual arrangement shall consist of headers and stretchers, alternately arranged, so as to thoroughly bond together the face stones and the backing ; for rare exceptions, two stretchers will be allowed to one header, by special permission, to cover each such case. The stones of each course of the face must break joints at least one foot with those of the course below. No hammering will be allowed on any stone after it is set. Each stone must be set upon a full bed of fresh mortar, the broadest bed down, and brought to a firm and level bearing without spalls or pinners.

BACKING.

The backing shall consist of large-size, well-shaped stones laid in full mortar beds and breaking joints so as to thoroughly bond the work together. The spaces between the larger stones shall not be over 6 inches in width and shall be thoroughly filled with small stones and spalls laid flat, and all spaces flushed with mortar or good cement grout. The courses shall correspond with the face stone, but may be

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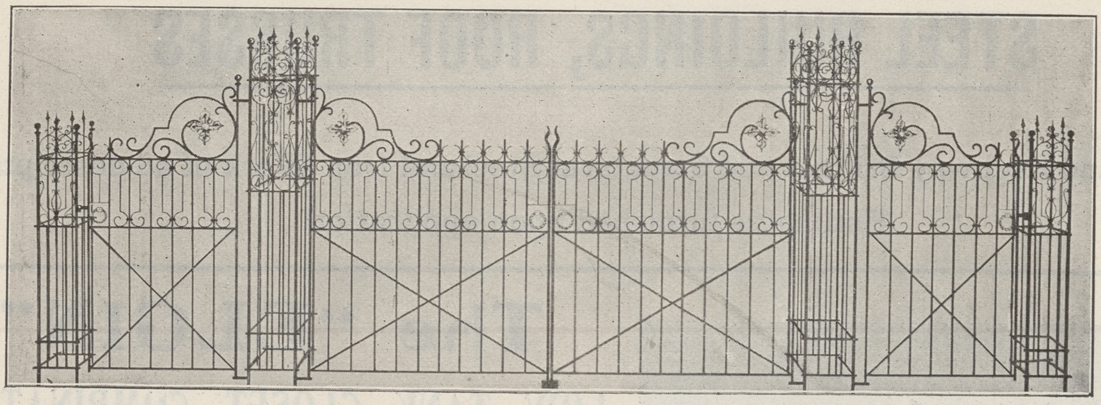

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made up in part by two thicknesses, providing no stone less than 8 inches thick be used. In cases approved by the engineer, satisfactory Portland cement concrete with large stones embedded in the concrete may be used for backing.

SECOND-CLASS MASONRY.—Second-class masonry shall be laid in cement mortar. The face stones shall be rock faced, no projections over 3 inches, edges pitched to a straight line, shall have parallel beds and rectangular joints. The beds and joints for 8 inches back from face shall be dressed to lay not over ¾-inch joint. The stones need not be laid up in regular course, but shall be laid level on their natural beds, shall be well bonded, having at least one header 3 feet 6 inches long to every three stretchers with joints well broken; no stone shall be less than 8 inches thick, and no stone shall measure in its least horizontal dimensions less than 12 inches nor less than its thickness.

BACKING.—The backing shall consist of well-shaped stones, not less than 6 inches thick, and of which at least one-half shall measure 3 cubic feet, to be laid in full mortar beds, with joints well broken, well bonded together and with the face stone. All spaces to be thoroughly filled with small stones and cement motar.

THIRD-CLASS MASONRY.—Third-class masonry shall be laid dry or in mortar, according to the direction of the engineer. It shall consist of good quarry stone, laid upon the natural beds, and roughly squared on joints, beds and faces, the stones breaking joints at least 6 inches; the wall shall be bound together by headers, occupying one-fifth of the area of the face of the wall front and rear, and extending through walls 3 feet or less in thickness; no stone shall be used in the face of the wall less than 6 inches thick or less than 12 inches on the least horizontal dimensions.

Messrs. Darling Bros., of Montreal, manufacturers for Canada of the Webster feed water heater and Webster system of steam heating, have just issued a new catalogue, a copy of which they will be pleased to furnish on request to anyone interested.

MISTAKES IN HIS NEW HOUSE.

O. M. Weand, a railroad contractor, of Reading, Pa., has just finished building a house for himself and to commenorate the event, has published an illustrated pamphlet of fifty or more pages containing the criticisms of leading citizens. The title of the book is "The Mistakes I Made in Building a House." Following are some of the criticisms of his friends:

"Of course, you are building the house, but if it were mine, I would run an open porch around the corner so as to connect the two porches."

"I would prefer one large window in the second-story front, instead of the double window."

"You'll make a mistake if you don't pebble dash the exterior".

"You better run the 13-inch walls all the way up. It gets pretty windy out here sometimes."

"I think the ceilings are two low."

"My!" How small the rooms are."

"You ought to be on the other side of the street."

"If it were my house, I would prefer to have the cornice several inches higher."

"By all means put a double line of boards on the first floor. It keeps the cellar dust from coming through."

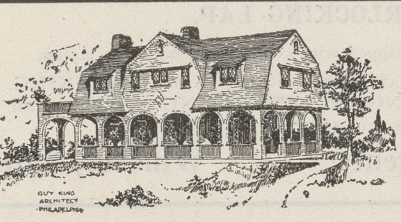
"Those chimney tops look like tomb-stones."

"The lawn steps should have been immediately in front of the main entrance."

"Why didn't you set the house in the middle of the lot?"

"Personally, I prefer steam heat to the hot water system."

The Toronto Master Painters' Association recently elected the following officers :—President, J. J. O'Hearn (re-elected) ; First Vice-President, J. W. Knott ; Second Vice-President, Charles Davies ; Secretary-Treasurer, Stewart N. Hughes ; Executive Committee, J. M. Faircloth, John Alexander, E. J. Livingston, James Casey and Charles Reeve.



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STONE AT THE ROYAL EXCHANGE, COLONIAL EXHIBITION.

The visitor interested in stone is struck by the fine display of Canadian building stones, says The Quarry, in an article referring to the above Exhibition, and then goes on to say :—"In New Brunswick freestone and sandstones suitable for grindstones are found in abundance in the carboniferous rocks. Grindstones and building stone are now quarried at Woodpoint Quarry, near Sackville, and at Cobourg Quarry, near Bay Verte, and work has been done in the parish of Dorchester. The industry has also attained considerable importance in the north, about Newcastle, in Northumberland County, and Stonehaven and Clifton, in the Bay of Chaleurs. From the French Fort Quarry, near Newcastle, much sandstone of a superior and durable quality has been taken. It has been used in the construction of the Langevin Block, at Ottawa, and in other works of importance. Some grades of it are admirably suited for the manufacture of stone for wood pulp grinding.

The freestones of Clifton and Stonehaven are said to be less suited for building.

Granite from Hampstead, Queen's County, known as Spoon Island granite, attracted early notice, although the quarrying industry has not become very extensive there. The red granites of St. George, Charlotte County, are better known, and the latter town has become the seat of somewhat important works. The stone has been used in many buildings, both public and private, and in bridge work. It is also excellently adapted to monumental work, and a considerable industry is carried on in cutting and polishing monuments, columns, &c., by water power.

Limestones are abundant throughout the province, but the remarkable purity of the deposits near St. John, with the facilities afforded for working them, have produced an important industry. Lime is sent to many adjacent ports.

Of building stones there is in Quebec a great variety. Fine granite, both of red and grey colors, is found at many places in the Eastern Townships, and is extensively worked in Stanstead county. Marbles occur in the crystalline series of the same district, especially about Stukely, in the Sutton mountain range, and also as a part of the Archæan of the Ottawa area ; while the limestones of the

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Extensive slate quarries are found in Eastern Quebec, at Melbourne and Danville.

Ontario abounds in building stones of many kinds and often of excellent quality. The old crystaline rocks of the Laurentian country yields granites and gneisses, generally red or reddish colors, as well as marbles like those of Arnprior and Barrie. Limestones and Sandstones are quarried in a great number of places in the southern and thickly inhabited parts of the province, chiefly for local use, but also for the supply of the larger cities and to a small extent for export. Clays and shales of different kinds largely employed in making bricks, drain-tiles, terra-cotta, &c. The manufacture of lime and hydraulic cement also constitute important industries, deposits of shell-marl ane being utilized to a considerable extent for the last named purpose, It will be observed that, taken together, materials applicable to purposes of construction represent a large proportion of the total mineral output of Ontario.

In concluding this article we cannot avoid commenting upon the somewhat unsatisfactory nature of the official catalogue of this exhibition, at least so far as the stone exhibits are concerned. Even the fine display of Canadian building stones, particulars of which have been given above, is dismissed in the catalogue in a few lines, and many of the other specimens are not even mentioned. As this is one of the few things for which a charge is made, it seems a pity that it should not form a more complete record of this most interesting exhibition.

An agreement has been reached with the structural iron workers by which the strike in Toronto is at an end. The new rate of wages is from 27½ cents per hour for first-class to 22½ cents per hour for inferior grades of workmen.

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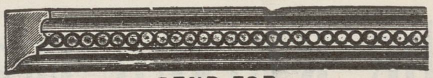

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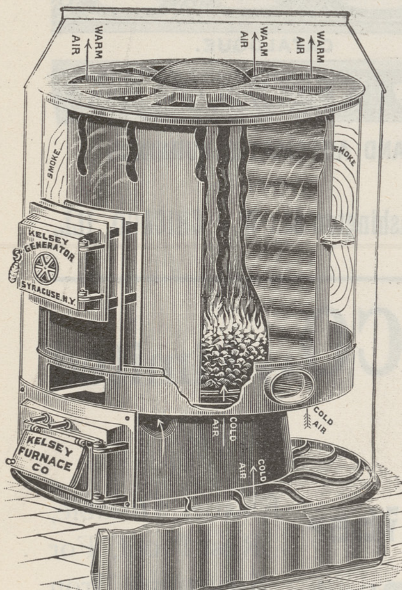

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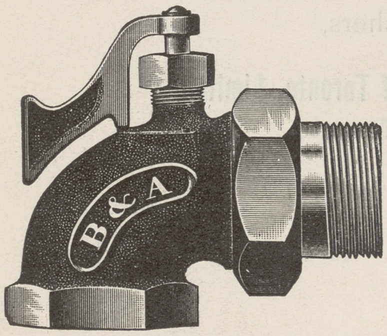

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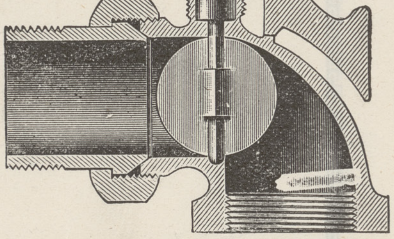

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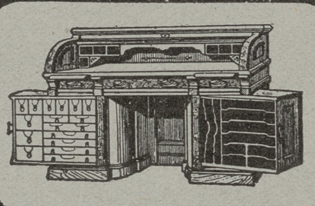

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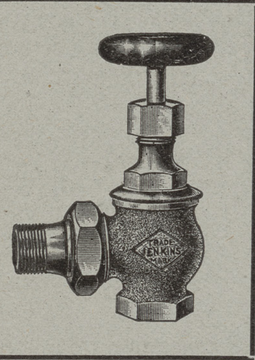

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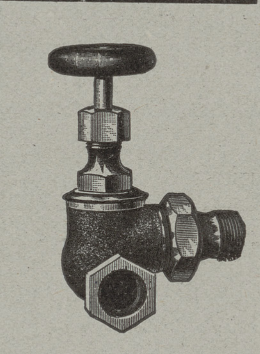

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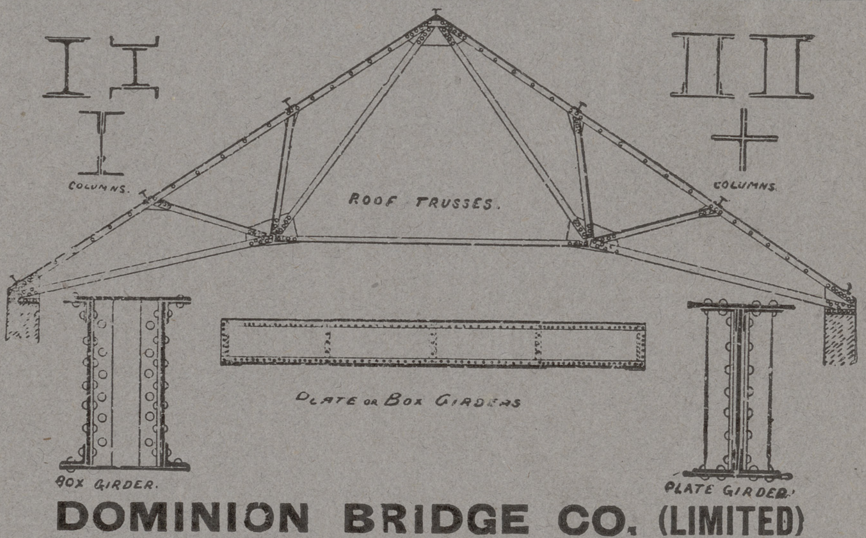

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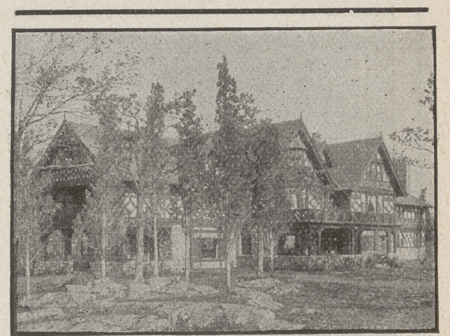

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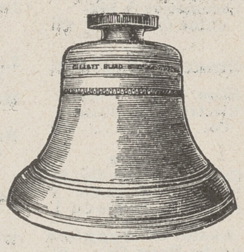

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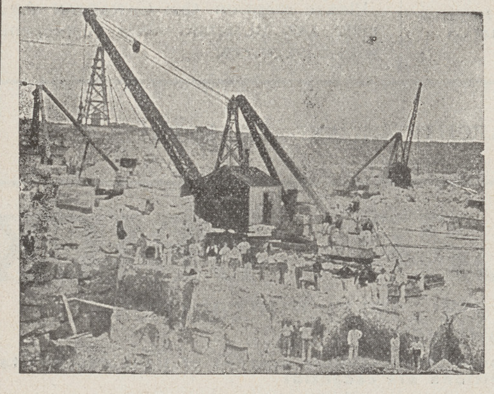

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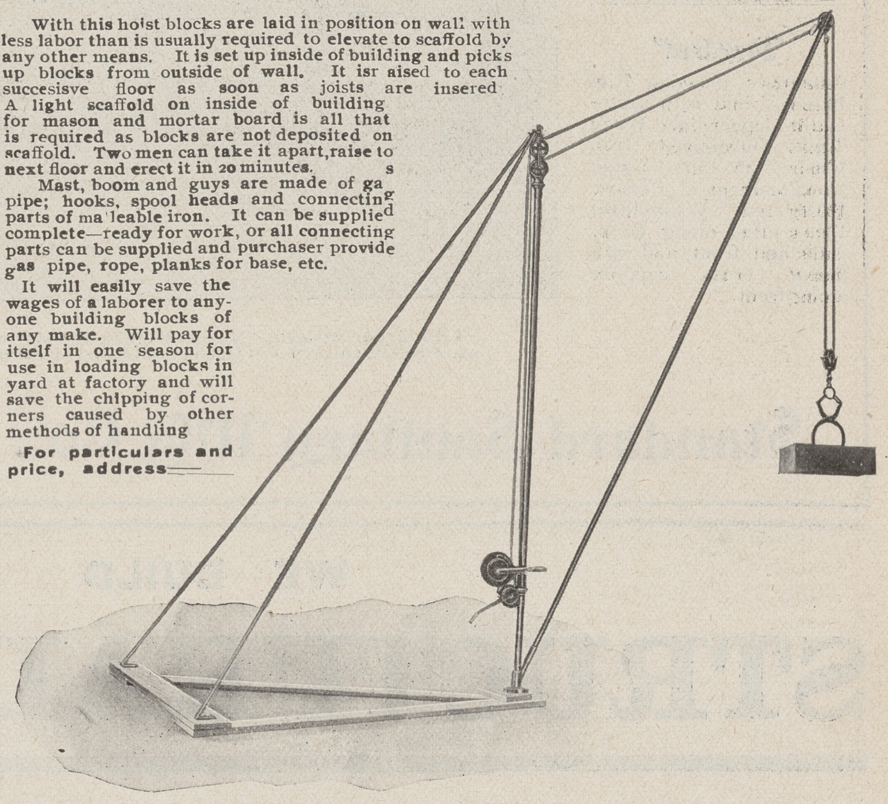

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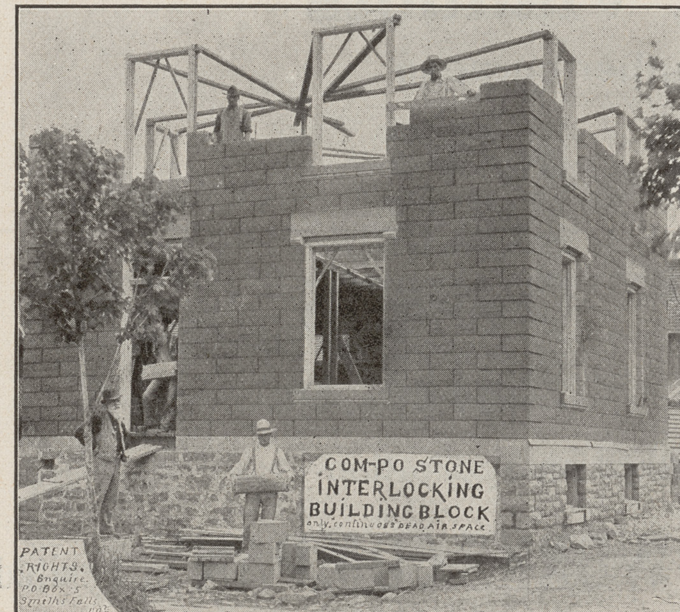

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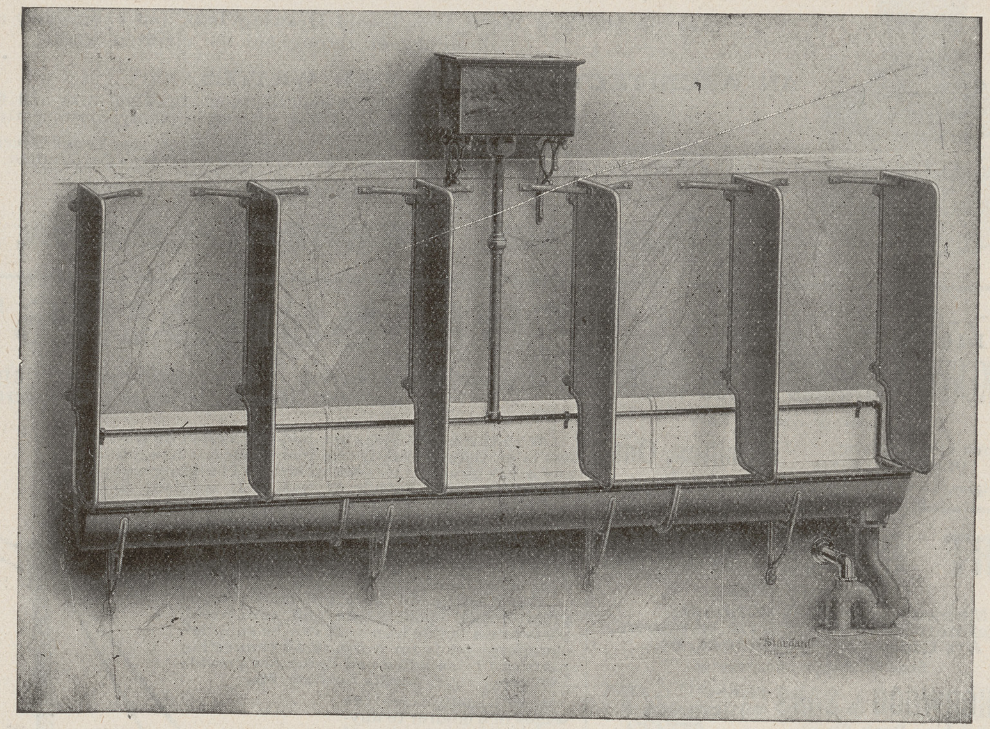

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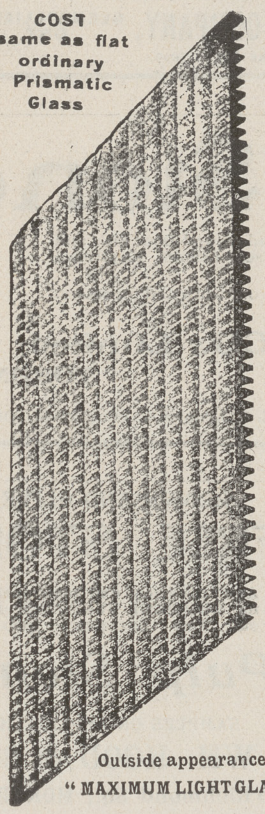

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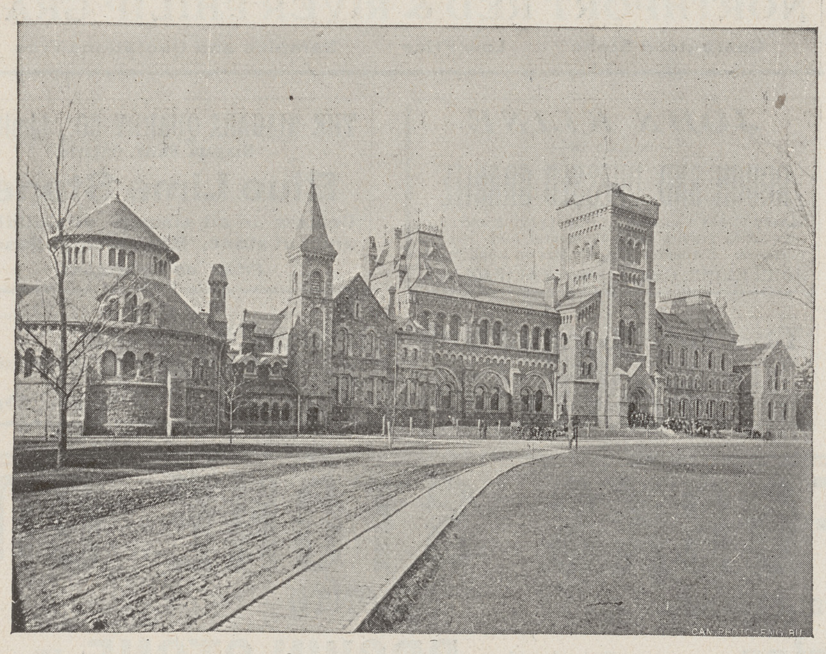

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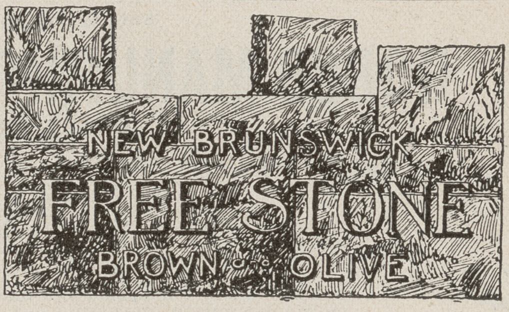

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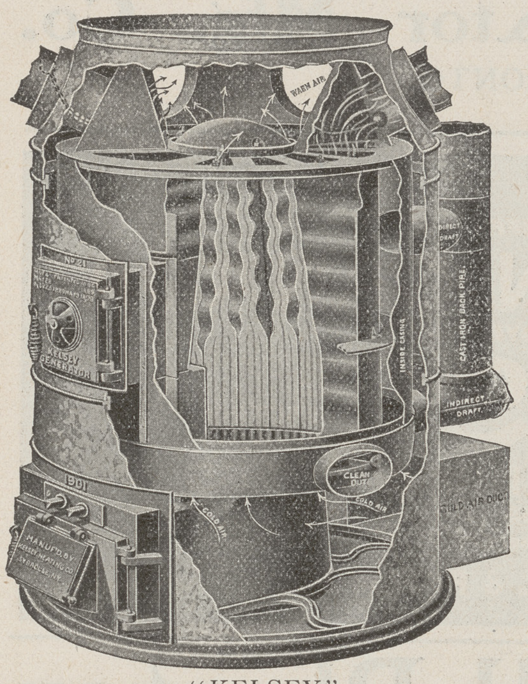

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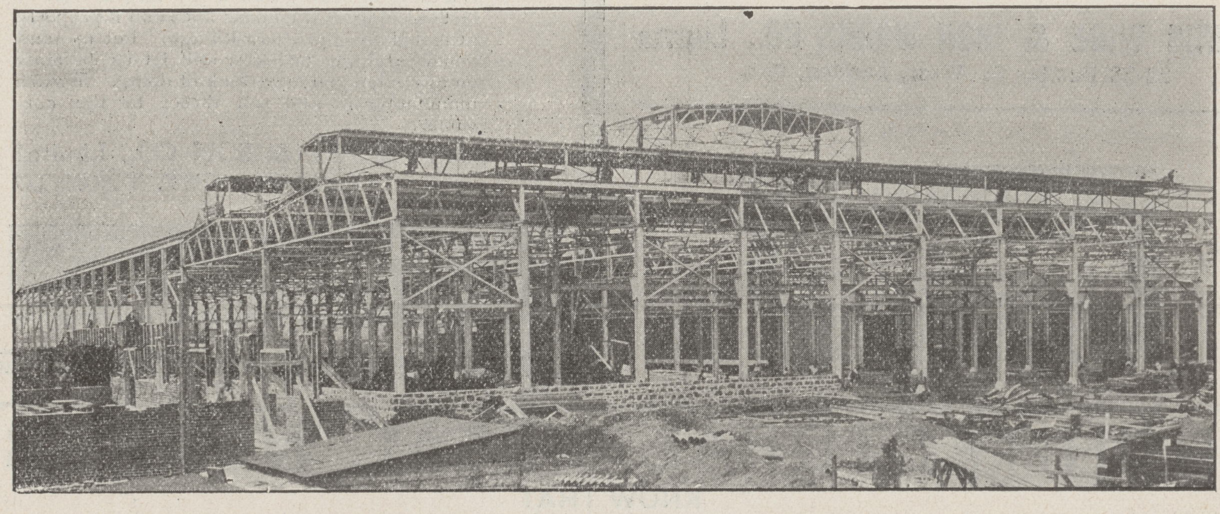

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Vol XIX.—No. 222. June, 1906.

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Government House, Victoria, B. C.—Mr. F. M. Rattenbury, Architect, Toronto.
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House of Small Cost in a Country Town; Canadian Architect and Builder Competition, Illustration IV; designed by Mr. S. Douglas Ritchie, Montreal.

CONTENTS

The Specialization of Architects.

A recent writer complains that amid all the specialization of present conditions of work the architect alone declines, as a rule, to specialize; and he argues that it is for this reason that the architect is ceasing to be an artist and has become a man of business. There is something to be said on this side. That is to say, it is the opportunity to make his work perfect that develops the artist, and it is only by exclusive devotion to one problem or one class of problems that an architect can give his mind to his problem enough to produce real design. Otherwise the stock materials of design, that have served so many purposes, must be tossed up again to put a decent face upon new problems which there is no time to think out. The new problems must, however, be taken up. There are no quiet eddies now in the stream of business. Could something be done by specialization in firms? It will mean larger firms and less profits, but more of a life—and we have only one life.

Smoke Abatement

We are going to be put to shame soon in this matter by cities in the United States. The journals have long been crying out about the non-exaction of the laws against over production of smoke and reforms are now following. That the reforms not only can be brought about but brought about suddenly, is shown by the action of the Mayor of Rochester who decreed that black smoke must cease on the first of June. It ceased on that day; and Rochester since then has been a bright city. An hour or so of black smoke is allowed early in the morning to get things started; but after that, if the watchers stationed on various high towers see any black smoke, there is trouble for the man who made it. That is the way it is done. There is nothing new or remarkable about it except that it is really done. Other towns have about the same laws and the same facilities for carrying them out. One demonstration of the feasibility of carrying out the law will no doubt produce a sequence of similar results.

Western Architects Organizing.

The Manitoba Association of Architects was organized on May 25th, about forty architects being present at Manitoba Hall, where the session was held. Only three or four outside architects were present, but the association will supply a long-felt want to correct the abuses and competition craze which has infested Winnipeg.

The following officers were elected: President, S. F. Peters; Vice-president, J. H. G. Russell; 2nd vice-president, C. H. Wheeler; Treasurer, L. O. Bristow; Secretary, Pery Over. Directors: Messrs. S. Hooper, J. Greenfield, J. Chisholm, Atchison and Elliott.

The constitution adopted was similar to that of the Eastern Associations as was also the schedule of fees. A set of rules governing competitions—to govern which is one of the first reasons for associating—was also adopted. The first rule, that $25,000 should be the minimum cost of work subject to competition in the ordinary way, shows how necessary it had become h at some agreement should be come to in this matter.

Among those present were Messrs. Rugh, Fineland, Chivers, Northwood, S. Hooper, J. Hooper, A. Melville, W. Melville, Paul Clemens, E S. Estlin, C. H. Wheeler, J. Chisholm, J. Greenfield, W. W. Blair, Eade Bros., Pratt, Howard, Jewitt, Horwood, Tuttle, Gould, R. E. Davies and a number of others.

With the organization of the Western Canada Architectural Association, which will be started in July, the western field will be covered fully. Both these new associations will fill two fields that needed such organizations.

Lessons from San Francisco.

Most of the talk about San Francisco is not edifying. One is reminded of the saying that "wheresoever the carcase is there will the vultures be gathered together." Nearly every 'expert' who rushes into print seems to do so in a spirit of conscientious hustling; to assert that the evidence is in favor of his material as the earthquake-resisting, fire-proof, covering for steel construction.

The situation is rather like that after the battle of Salamis, when the Greek generals decided by vote which of them was the bravest. Each general had two votes to cast. The result of the ballot, (every one receiving one vote while Themistoles got as many as the total number of generals,) showed that every one had voted for Themistocles as well as himself. It was considered therefore at Themistocles had been the bravest. Similarly we may consider it agreed that the number of testimonies in favour of the steel frame and ME tells at any rate in favour of the steel frame. But for a disinterested opinion which one can read with real profit we must wait for an official report, such as was made after the Baltimore fire by Captain Sewell of the Corps of Military Engineers at Washington.

In the mean time—just to show how different the point of view may be which will be taken by a disinterested observer, whose motive is purely scientific discovery—a Japanese investigation is reported, concluding that there would have been much less damage from the earthquake if there had been good mortar. As people who have overcome difficulties of their own with earthquakes the Japanese are entitled to respect, even if we had no other experience of their scientific exactness.

This opinion has the merit that it opposes no interest. No material is disqualified by the suggestion that it would stand shocks better if laid up in cement mortar—which appears to be the improvement in mortar that is suggested.

The aggregate elasticity of cement extending throughout the height and breadth of a structure is sufficient to take up the movement of a severe earthquake. But the cure must be not only in the use of cement but in its continuous extension. Cement mortar in the beds with vertical joints half empty can be no great improvement; but if all the joints are full, and the cement is continuous throughout the wall; the brick or other material embedded in it being merely a larger form of aggregate; it seems likely, even to ordinary perception, that a considerable movement can pass along the wall without dislocating its parts.

A TALK ON CEMENT.

FIRST PART.

In the Report of the Bureau of Mines for Ontario, Vol. XIV., Part 1, there is an admirable account by P. Gillespie of the Cement Industry of Ontario, which will be the basis of this article.

Mr. Gillespie goes at considerable length into the nature, sources of origin and process of manufacture of cement, and describes the plant, the process and the product of each of the nineteen factories in Ontario, of which fifteen are producers of Portland cement and four of natural cement.

The chemical composition of cement is somewhat complicated. It includes lime, magnesia, silica, alumina, oxide of iron, and sulphuric acid; and the exact nature of the processes involved in its hardening is (if we may judge from the fact that the Prussian Government and the German Society of Portland Cement Manufacturers have offered prizes for essays on the subject) not perfectly understood; but the essential ingredients of Portland cement are lime and clay. The marl, which in all but one of the Ontario Portland Cement Companies is the source of the lime, contains all the minor ingredients.

Portland cement, as is generally known, means nothing more than artificial cement. The name was given to it by the first maker, Joseph Aspdin, from its fancied resemblance when hardened to the limestone quarried on the island of Portland on the south coast of England and known as Portland stone.

Natural cement is produced by burning an impure limestone which contains lime, magnesia and clay. These ingredients vary in different parts of the quarry. Some parts are over-limed, some are over-clayed, so that when rock is brought together from different parts of the quarry, though the total result is sufficiently well proportioned, the difficulty in accomplishing a constant and intimate mixture of the ingredients when burned makes the natural cement less likely to develop the strength for which good Portland cement has acquired a reputation.

The difference in strength may be gathered from Mr. Gillespie's statement that a mortar which will develop, in three months, an ultimate tensile strength of 200 pounds to the square inch may be made with 1 of Portland cement to 5 of sand, while a natural cement mortar for the same specification would require to be mixed in about the ratio of 1 of cement to 2 of sand.

This, however, limits rather than bars the use of natural cement. If no great strength is required, natural cement has the advantage of Portland in respect of cheapness. The prices are about $0.90 a barrel for natural cement, and $2 50 for Portland. With these prices, and sand at $1.25 a cubic yard, it will be found that of two foundation walls, built, the one with Portland cement mortar and the other with natural cement mortar, according to the above specifications, that built with natural cement mortar would be the cheaper. A cubic yard of Portland cement mortar would cost $4.12, while a cubic yard of natural cement mortar would only cost $3.25.

Natural cement also sets more quickly than Portland cement. The former usually begins to set in five to forty minutes, and attains its permanent set in twenty minutes to two and a half hours. Portland on the other hand begins to set in three fourths of an hour to three hours, and attains its final set in two and a half to eight hours.

Therefore, if no great strength is required and a rapid setting mortar is desirable, Natural cement may be employed with advantage in the way of economy.

The Portland Cement plants of Ontario, mentioned in this Report are :—

The Bellville Portland Cement Co., Works, at Point Ann, Ont.; in prospect when the Report was written.

The Canadian Portland Cement Co., (an amalgamation of the Rathbun Company and the Beaver Cement Company). Works at Marlbank and Strathcona. Brand "Star."

The Colonial Portland Cement Co., Works at Wiarton, Ont.; in process construction when the Report was written.

The Grey and Bruce Portland Co., Works at Brookholm, Ont. Brand "Hercules."

Hanover Portland Cement Co., Works at Hanover, Ont. Brand "Saugeen."

The Imperial Portland Cement Co., Works at Owen Sound, Brand "Imperial."

The International Portland Cement Co., Works at Hull, Que.; in process of construction when the Report was written.

The Lakefield Portland Cement Co., Works at Lakefield, Ont. Brand "Monarch."

The National Portland Cement Co., Works, Durham, Ont. Brand "National."

The Ontario Portland Cement Co., Works at Blue Lake, Ont. Brand "Giant."

The Owen Sound Portland Cement Co., Works at Shallow Lake, Ont. Brand "Samson."

The Raven Lake Portland Cement Co., Works, Raven Lake, Ont. Brand "Raven."

The Sun Portland Cement Co., Works, Owen Sound, Ont. Brand "Sun."

The Superior Portland Cement Co., Works, Orangeville, Ont. Brand "Superior."

The Western Ontario Portland Cement Co., Works at Atwood, Ont.; in prospect when the Report was written.

The Natural Cement plants of Ontario, mentioned in the Report are :—

The Queenston Cement Works, near Queenston, Ont. producing "Queenston" cement.

The Estate of John Battle in Thorold, producing "Thorold" cement.

F. Schwendiman, township of Barton, four miles from Hamilton.

Toronto Lime Company, Limehouse, Ont. Brand "Ontario."

Coming to the uses of cement we may note in passing a special use mentioned in the Report, which is worth noting. As cement preserves steel, cement is sometimes used as a pigment to preserve from corrosion steel structures that are exposed to the gases of passing locomotives. A paste composed of red lead, cement and japan, is applied in a thickness of one quarter of an inch.

In general however our concern with cement is for construction purposes, either for mortar or concrete.

The use of cement for mortar is one point in which we have advanced beyond former generations in building. The lime mortar which for twenty centuries or more has been used with bricks is an unequal match for them in strength. The compressive strength of lime mortar is about 500 lb. to the square inch. Brick will resist a pressure ten times as great—about 5,000 lb. to the square inch. Portland cement mortar, which develops a compressive strength of about 4,000 lb. to the square inch, comes near to making, with common hard brick, a wall of strength equal throughout.

Neat cement is stronger than any mortar. The addition of sand weakens in proportion to the quantity added. The following table is given as representing the relative strengths in the average case.

Mixture.		Relative Strength.
Cement.	Sand.	
1	0	1
1	1	2/3
1	2	1/2
1	3	1/3
1	4	1/4

Lime paste is often added to cement mortar for the sake of cheapness, strength, imperviousness, and a desire to obtain a smoothness in working which is not possible with cement alone. Investigation seems to prove that an addition of lime paste not exceeding twenty per cent. of the mortar will not reduce the strength, and in some cases appears to increase it; and it gives the mortar a "body" much desired by the workmen. Beyond the limit given it is not wise to go if strength is the point desired.

The Owen Sound Portland Cement Company, in their brochure on the uses of cement suggest the following: "If it is desired to make water-tight mortar for cisterns and reservoirs, and where absolutely water-tight work is required, the following proportions are recommended.

Portland cement.	Sand.	Lime paste.
1 part	2 parts	½ part
1 part	3 parts	1 part"

Impervious mortar has been the subject of experiment in the State University, Columbus, Ohio. The following is a summary of the finding:

"The permeability cannot be materially reduced by the application of soap and alum solutions or by finely powdered loam used in the sand, but it can be reduced (1) by the application of one to five coats of cement grout, the reduction amounting to from seventy to ninety eight per cent. of the initial leakage; (2) by a coating of neat cement mortar one quarter of an inch thick; (3) by the mortar surface standing under a head of water containing suspended matter."

The following table is quoted, taken from a circular issued by the Buckeye Portland Cement Company of Harper, Ohio. It gives the amount of cement, sand and lime paste needed to lay one thousand bricks.

Mortar in all cases 6 : 1 : 1.

Joint.	Proportion of mortar to brick.	Bus. of sand.	Bbls. of cement.	Bus. of lime.
⅛ in.	1 to 9	3.8	.21	.64
¼ in.	1 to 4	9.6	.53	1.6
⅜ in.	3 to 10	12.5	.70	2.1
½ in.	1 to 3	15.2	.83	2.5

The second use of cement, viz. for concrete, and the question of tests and specification, it will be necessary to reserve for our next number.

THE P.Q.A.A. SKETCHING CLUB VISIT TO SAULT-AU-RECOLLET.

On Saturday, 19th May, the members of the Sketching Club visited Sault-au-Recollet where the old church is of considerable interest. The building itself belongs to the 18th century but the facade has been re-built and re-modelled about 1850. Both the older and the newer work are highly picturesque. There are some charming old cottages in the neighbourhood.

MCGILL STUDENTS UNION AND MOUNT ROYAL CLUB.

Members of the Sketching Club visited the Students Union and the new building of the Mount Royal Club on Saturday 9th June. This visit provided an exceedingly interesting object lesson in two different ideals in architecture. The Union by Professor Nobbs is typical of the English school of Architecture which finds an inspiration in the varied characters of its materials and in the methods of their application and processes of manipulation. By observing and giving values to these qualities the works and process of nature become the craftsman's standard. In the matter of proportion —purpose efficiently fulfilled is the fountain-head whose influence permeates all and whose stream must never be entirely drained by its surroundings which should only be those natural growths which it feeds. In decoration sentiment pertaining individually to the work is the *motif;* not introduced with rigid formality, empanelled and isolated, but cropping up on all occasions where the disposition to decorate is felt.

The Mount Royal Club is in its general lines at least, the design of Messrs. McKim, Mead and White, and, while not for a moment to be placed in comparison with their work at the Bank of Montreal, is characteristic of United States (and French) ideals. Severely classic throughout, the conventional forms of architecture—orders, columns, antae etc.,reignsupreme over all. Refinement of proportion, with an eye all the time on the masterpieces of the 'styles' as a standard, is the source relied on for beauty. An excellence, abstract and absolute is the ultimate aim. The desire as regards technique is for polish. The machine with its precision and regularity carries out the idea of the master, eliminating the tendency to err inherent in the craftsman's hand. Material is secondary, and a cornice in plaster, taking as it does the same form as one of wood, may legitimately be painted to appear as if it were actually part of the wood trim, for forms are used for their own sake as being equally beautiful in all materials. Ornament is conventional in character; and sentiment, if introduced at all, is of the guarded and formal sort which is elaborated in pediments and centralized over chimney-pieces. Law and Order are the watchwords of this school, as Liberty and Life are of the other.

The following prizes have been announced as open to the competition of all members of the Sketch Club.

SUMMER WORK PRIZES.

The work submitted in competition for these prizes is to be delivered to the Secretary not later than Wednesday 31st October, 1906.

All drawings to be the "bona fide" work of the student submitting them, aud drawings previously submitted are not eligible this year.

A prize of the value of $30 in books on Architecture is offered by the P. Q. A. A. for measured drawings of old local work.

A. Plans, Elevations and Section, preferably to the scale of ¼" to one foot, and not more than six drawings in all, of at least one old building—Farm House, Seigneurie, Civic Building, or Church in the local style of Quebec or the Maritime Provinces, with details of interesting features, internal or external, to a larger scale. Rough measuring sketches to be submitted.

B. Sketches of old furniture, fittings, etc., of artistic or historic interest.

Tracings or blueprints of the winner's principal drawings to be deposited with the Province of Quebec Association of Architects. On receipt and approval of these the prize will be presented.

BUILDINGS SUGGESTED AS SUBJECTS FOR MEASUREMENT.

The Inland Revenue Office, Place Royale, Montreal; Old Houses in Montreal, at Chateaguay, St. Geneviève, Varennes, Rosemère, etc.

Old Churches at Point-aux-Trembles, Sault-au-Recollet, St. Denis, St. Geneviève; Episcopal Cathedral at Quebec, etc.

2. A prize of the value of $10.00 in books on Architecture is offered by the P.Q.A.A. for perspective sketches illustrative of old buildings of local character. The sketches to be in any medium the competitor may prefer. The faithful representation of the building to be the first consideration. All competitors are expected to lend such of their drawings as may be asked for to the P.Q.A.A. for reproduction in the Year Book and elsewhere.

3. A prize of the value of $10.00 in books is offered by Mr. W. S. Maxwell for the best exhibit of 3 sketches done in water colour from nature, studio work not admitted, the subjects to be those in which some building or buildings occupy a place of some importance. Street Architecture or buildings with landscape surroundings are suggested as subjects.

The Committee to adjudicate upon the above competitions consists of Messrs. W. S. Maxwell, P. E. Nobbs, and J. O. Marchand.

SHOLTO SMITH, R. CHARBONNEAU,
Joint Secretaries.

5 Beaver Hall Square, Montreal, 1st May, 1906.

CORRESPONDENCE.

VANCOUVER, B. C., 16 May, 1906.

Editor "CANADAIN ARCHITECT AND BUILDER' Toronto, Ont.

DEAR SIR,—In your description of the Linton Apartment building in the April Number, page 53, you mention the cold storage closets in the pantries. I am curious to know something about the construction of these closets and the insulation of the pipes running to and from them. I, and I am sure, many others of your readers, would be interested to know more about this handsome building and the interior fixtures particularly in the pantries, kitchens and lavatories, and the electric fittings for lights etc.

Another topic of interest would be the percentage paid on Eastern cities upon buildings of different classes when same are built on a percentage basis. Recently I saw it stated that on much of the day work done in the East the builder in charge received 2½ cents per hour per man employed; this amount seems very small pay for management and the use of staging, plant office work, etc. Possibly it is supplimented by a small per centage on the cost of materials purchased for the work which would be only fair as a builder's experience in buying proper materials at right prices and securing their delivery just at the right time; neither too fast or too slow; is just as valuable as the proper management of men.

Another thing which the builder should be paid for is Employer's Liability Insurance (in case he carries it of course). This costs, in this province, from 2 to 3% on the wages paid, and is usually estimated on the annual pay roll. The rate on the coast here runs from 7 to 12 per cent. exclusive of the cost of insurance, according to the size and character of the building. The percentage basis is found very convenient for jobs such as the renovation and enlarging of old buildings where it is easier to plan the work as it progresses than before its commencement as would be necessary in case it was to be contracted for. Of course much depends upon the honesty and judgment of the builder when this method of building is adopted.

Hoping you will soon have some space to spare for the discussion of the above topics,

Yours truly,
BUILDER.

OUR ILLUSTRATIONS.

GOVERNMENT HOUSE, VICTORIA, B.C.; MR. F. W. RATTENBURY, ARCHITECT, VICTORIA.

We have been furnished with neither plan of this residence nor information concerning it. The point of special interest, (besides an evidently fine site), is the entrance. The suggestion of the castle at this one point is odd, but has been accomplished with taste. The centralization of the doorwav and bay window over, and the off-centre combination with this of the tower and gable, make an interesting and agreeable composition.

PUBLIC REFERENCE LIBRARY FOR TORONTO, MESSRS. WICKSON AND GREGG AND A. H. CHAPMAN, ASSOCIATED ARCHITECTS, TORONTO.

The problem in a library with reading rooms is, briefly—large and undisturbed areas which can be perpetually overlooked without requiring a special staff of attendants for the purpose. The key to the problem, in this case where there are two such areas, is an entrance near the corner. The entrance is at the outer angle between the two reading rooms, and the attendants' desk is in the inner angle. Thus the attendants are able to supervise the entrance and both rooms while discharging their ordinary duties.

The public come in contact with the attendants, or the librarian or the board room, at the point of entering the building, and need not enter the reading rooms at all until they have done all business requiring conversation and are prepared to take a seat and read.

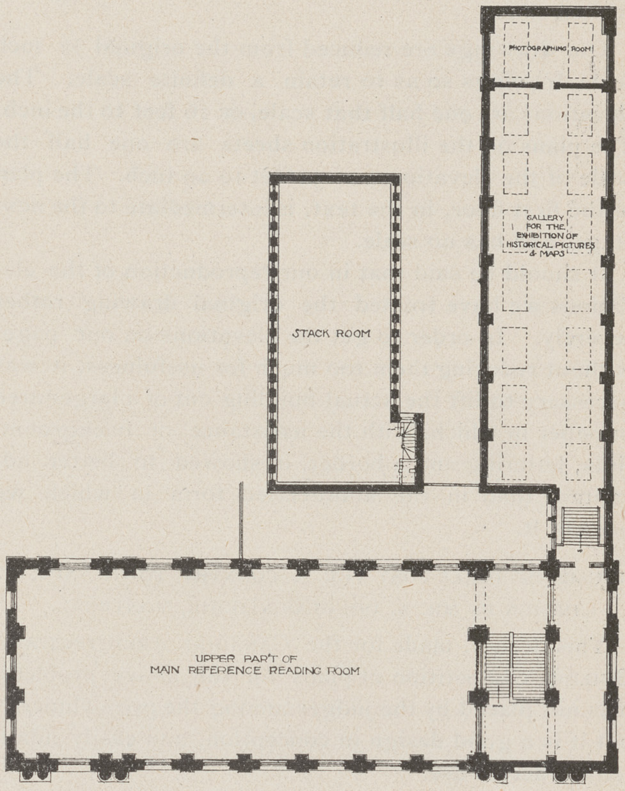
The Secretary's office, where business is done not ending in the use of the reading rooms, has a separate entrance from S. George St. on another floor, with sufficient office room to be contained entirely in that part of the building.

The Secretary's entrance is the entrance also for employees, whose cloak room, sitting room, dining room etc. are on this floor, in the rear. Their work is done (apart from the stackroom) in the two pairs of rooms that stand over and under one another in the angle with a private stair of communication.

The books are brought in by the rear entrance at the unpacking room. Here they are checked by the invoices, entered in the accession books and labelled. The bindery next receives them to stamp the library mark in gold upon the back. Then they go upstairs to be checked again and receive the blind stamp on pages and plates. Finally, in the cataloguing room, the books are classified, catalogued and marked with the shelf number.

All this takes place in little groups of rooms between the stack room and the public rooms. It is not even necessary for the cataloguers to go outside the barrier to make their additions to the card catalogue. This will be contained in double ended drawers which can be pulled in to the cataloguing room or out to the reading room as is required.

It will thus be seen that this plan has the distinguishing mark of a good working plan—that the lines of traffic do not cross one another. It would appear from the plan before us that there is one exception in this respect. The rooms in the basement set apart for special study have no approach shown but by the private stair from the delivery room. This, which might in itself be a matter for little objection, would have in the basement the greater disadvantage that there is a quiet way out close at hand. In execution all this is being changed. The first part of the stair to the men's lavotory is being enlarged so as to be an approach to the study rooms. These will then be cut off from the lower hall so as to have no other means of access but by this stair. Thus all persons using the study rooms must, (like other readers), pass the delivery desk in coming and going.



PLAN OF UPPER FLOOR.

A reference library is essentially a place for work and the floating population of a circulating library, and the magazine and newspaper readers, are well kept outside of any access to it. The circulating library is a mere branch, and, with the periodical and children's tables, is kept apart in the basement, with an entrance of its own from the street, and with no communication with the rest of the building except that there is a private door for the attendants, connecting the circulating library with the attendants' quarters.

The newspaper room which occupies part of the St. George street wing is not a room for exposing current newspapers, but the place where files of old newspapers are preserved for reference. These, which take their place as historical documents along with maps, drawings, engravings, etc., are among the most valuable records of a country. For the safety of these documents from fire the main dependence is upon the site chosen, away from the crowded part of the city, now-a-days known as the "fire zone". The building itself will have little combustible material in its construction. In a conflagration it might suffer, but apart from that—being apart that is to say, from the region where such a thing might happen—it is expected to be safe in this respect,

The stack room is made as fireproof as possible; with a protected roof, wire-glass windows, metal fittings and a single entrance with a fireproof door. Its sheltered position is also a great advantage.

On the outside we have a facade which has a full measure of the dignity which is the merit of the Renaissance. It has also, of course, the classical characteristic of being to some extent an abstraction; a form independent of the essential construction, and capable of being rendered in more materials than one. The architects consider that their means will allow of a stone basement, brick walls and a terra cotta cornice. These—though not the white cut stone which alone seems to realize the classical idea—are reasonable and durable building materials that we shall not regard with shame.

Our drawings are reduced from the original ⅛ inch scale drawings so as to retain a definite scale. The elevations are one half that scale, or 16 feet to the inch. The plans on the illustration sheets are one half the scale of the elevations, or 32 feet to an inch. The plan of the first floor, in the text, is intermediate to the next stage, and has no scale.

It should be said that in our reproduction of the elevations we have treated the original drawing rather severely. In order to get the elevations on our page, without reducing them too much for usefulness, it was necessary to lift the actual building out of a larger area of paper in which, with the assistance of background tints, lettering and a border, it showed to better advantage than in the abbreviated form in which we present it.

HOUSES OF SMALL COST FOR A COUNTRY TOWN—NO. IV.

DESIGN BY MR. S. DOUGLAS RITCHIE, MONTREAL.

This design, made for the CANADIAN ARCHITECT AND BUILDER competition of plans for the above problem, was not placed by the judges among the prizewinners; but it is a good design in conception, and easily adapted for actual use.

The leading idea—a large living room extending across the house in one direction—is a good one. So is the simplicity of the general form of the plan. The aspect, facing the east, and a narrow lot which would preclude side windows of importance, were part of the conditions of the competition, benevolently intended to give trouble and let the competitors have an opportunity of showing their good judgement. If, however, there is an opportunity of placing this design upon a lot with sufficient freedom to the south, the living room and the bedrooms above should have south windows. It cannot be too often remarked that in this country all rooms should have south windows, when the site allows it; and all rooms should, if possible, have windows on two walls. South windows, in the winter, make the house warm; and, in summer, they make it cool. But to make the coolness perfect there should be also a window in an adjacent wall, the east or the west; or, where a room runs through the house as this living room, in both east and west walls. Rooms such as one meets with in the country—with one window which will only open at the bottom, and must be propped with a stick, and has but a six inch stick provided, and is so guarded by paper shades and lace curtains nailed across it that there is great difficulty in getting the sash up further, after the host has withdrawn, by inserting the back of the bedroom chair—these bedrooms, as a national production in architecture, are a tribute to our economy and endurance but not to our architectural sense.

Some internal changes are desirable in this plan. The larder, in the middle of the west side, is in about the worst place in the house for summer. The trouble connected with its position might be moderated by making the window small and covering it with an awning. But, if the larder is out of place on the west wall, the pantry would do there very well, and is not in a good place where it is. So it might be a good thing to move the pantry to the west, increasing its size, (which will always be a gain), so as to leave towards the east only space enough for a coat closet, opening at the foot of the stair. (Fig. 1.)

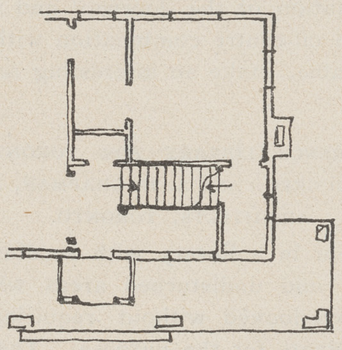


FIG. 1.

It is now necessary to spoil Mr. Ritchie's very nice hall plan by squeezing up his stair so as to get more room under the landing. The steps are evidently 7″ x 10″, which is handsome. Unfortunately 7½″ x 9″, which is much less handsome, makes a very comfortable stair; and by its help we could get a larder under the landing which, if the way to the cellar opened out of it—which would be quite in the cottage style—would be roomy enough for the purposes of housekeeping on this scale; and with a north window, it would be not badly placed. The way to the cellar from the hall is of course is gone, but that is not a first essential in a no-servant family where the master of the house not only *may* seek the society of the cook but *must*.

Another way would be to block up the rather doubtful archway to the living room by a partition, making an ordinary door in it near the east wall, and starting the stair with winders against the partition. The handsomeness of the hall would then be transferred to the landing; and there would be room under it for a sufficient larder, with the kitchen descent to the cellar separate from it, and a coat closet on the hall side of the larder.

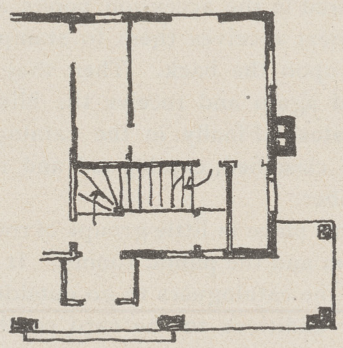


FIG. 2.

All this is more or less murder; and it is a pity to lose the front way down to the furnace, for this would make a very good house for a small family with one servant.

It would perhaps be best to leave the hall alone, except for filling up the archway and having a door instead—placed opposite the stair so as get away from the front door.

Let us, however, still pursue the search for a north-east larder and a pantry with a window in the outer wall. One begins to tremble before the classic inviolability of this plan; but there is one point in which it is perhaps a little too classic for the kind of house. The verandah need not return at each end in the same manner, and we may project our larder to form a solid end on the north, under an extension of the verandah roof. In this way we leave the hall and cellar passage intact. The spare space at the east end of the pantry would make a cupboard—a most useful adjunct—for the living room.

The verandah is undoubtedly a great feature in the design, but it is not likely to be built with brick arches, as drawn. It is worth noting therefore, as a question, whether the roof is not really the essential element in the effect, and whether the oblong brick piers do not show up in the perspective as being, if not too heavy for the house, at any rate unnecessarily heavy. It is partly a matter of the narrowness of the verandah, (which ought to be wider), and partly a consequence of the severe training to which we have been subjected all our lives, in the matter of skimpy building, which has accustomed our eyes to the smaller diameter of wooden posts in a verandah. Fourteen inch brick piers in this case, with a plate consisting of a pair of joists set apart on the outer edges of the posts, would be substantial beyond the ordinary.

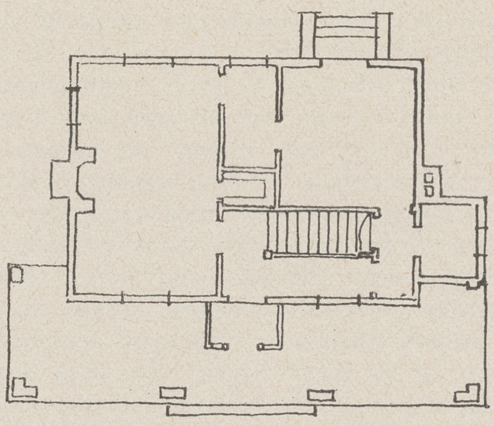


FIG. 3.

One thing the perspective does show:—that the eaves of the house would bear lifting. The attic would be better for it; for, as drawn, there appears to be no more than 4 ft. vertical wall height, inside, at the plate. Another two feet inserted below the attic window sills, which do not appear to be more than 18 in. above the floor, would both help the attic and make a wider verandah roof possible. Even though the relation between the eaves and the apex of the verandah roof were unchanged the eye would acknowledge the extra altitude of the wall, and the building would probably get more of the snap of the elevation. But a verandah half as wide again would not, with the same pitch, rise more than a foot higher on the wall.

The St. Johns Brick Company, Limited, has recently been granted incorporation to purchase and acquire the business of St, Johns Brick Company, manufacturers and dealers in brick, St. Johns, Que. The headquarters of the company will be St. Johns, and the capital $75,000. Among the promoters are Messrs. Joseph Simard, Ulric Normandin and Alfred Simard.

The expansion of building operations in all parts of the country has so increased the business of W. H. C. Mussen & Company, dealers in railway and contractors' supplies, Montreal, that they have been compelled to extend their premises. They have purchased the large warehouse situated at Nos. 21 and 23 Colborne street, Montreal. This will give them excellent facilities for handling their goods, as the new warehouse faces the canal, and has railway sidings within 100 feet of the goods entrance.

ILLUMINATION.

By ERNEST C. WHITE, Member Illuminating Engineering Society.*

In commencing a series of articles on Illumination, it is not the writer's intention to indulge in rhetorical generalities on the universal importance of light. A clear, and, it is hoped, an instructive description of a lighting problem and its solution will be presented in each paper, and it is only as an aid to the more thorough appreciation of these problems that an outline classification of the more important considerations in illuminating work is given below.

It is realized that, to the Architect, the problem of lighting design easily resolves itself into the architecture of fixtures and their supports, plus—some estimate regarding the light sources needed to produce the desired (more often *a desirable*) illuminating effect. Various rules have been employed to arrive at the number and size of lights; and judgment, good and bad, has been exercised in the disposition of these sources. But judgment is haphazard unless based upon accurate information, and a simple examination will prove the foundation of most "rules" of lighting to be somewhat less reliable than shifting sand.

What is meant by a "16 candle power" lamp? The ordinary incandescent lamp of this rating gives less than 7 candle power in the direction of the tip. The lamp is rated at its maximum candle power, which is in a horizontal direction, the lamp being pendant. Some manufacturer makes a lamp giving about the same total flux of light and equips it regularly with an accurately designed reflector. This is rated as a unit at the maximum candle power in any direction. The direction may be in line with the tip and the candle power may be 50, and a result more suitable to the particular need might be obtained with the ordinary incandescent lamp fitted with the proper accessories. In each case the rating means less than nothing, for it is misleading.

What is a "110 volt" lamp, and where should it be used? If properly made and labeled by the manufacturer, it is a lamp that will give its rated candle power horizontally on a certain consumption of current for about a certain number of hours across a 110 volt circuit. If this lamp is put on a 104 volt circuit it will give only 11.5 candle power and will consume 24% more watts per candle power. The voltage varies in nearly every installation and where the lighting companies do not supply renewals, the dealers stock lamps for the nominal voltage of the circuit. The customer can get nothing else and pays, in many cases, 25% too much for the light produced. I would say "for the light used", but the production and utilization of light are two very different things.

What becomes, then, of the rule that specifies so many lamps of a certain candle power for a room of given dimensions? The discrepancies resulting from unscientific lighting become much more apparent, however, when we begin to investigate the different effects produced by the use of various reflectors, globes, etc., with the same lamp. It is a very common error to suppose that a given quantity of light will produce approximately the same average illumination in a given space, no matter how distributed. This is not true even though the pigment and color of walls and surroundings be the same. The

*Engineering of Illumination, Aikins Building, Winnipeg.

efficiency of the best ceiling reflection is very much below that produced by reflectors that give a predeterminable distribution. The benefits accruing from the skilful use of accurately made accessories will be illustrated in the succeeding articles of this series.

The above remarks have touched only one form of electric lighting, but like considerations obtain in the use of any illuminant. It is necessary to know the quality and pressure of gas in the mains and to insure known conditions at the outlets. Inverted gas burners have entered the field, with many imperfections it is true, but offering a wealth of possibilities when properly used. Various forms of gasoline vapor and acetylene lighting must be considered in their place. Vacuum tube lighting and Nernst lamps have their peculiar characteristics and efficiencies. The luminous arc has appeared as a formidable competitor with the enclosed arc for some purposes only. Is the architect to take a centractor's advice in such a field as this, or, on the other hand, to protect himself by putting in an abundance of light sources? Is he really alive to the fact that the efficiency of lighting equipment must be measured in its operation.?

In order that succeeding examples may be perfectly understood a few remarks on the physiological side of illumination will not be out of place. It is very commonly considered that incandescent lamps are hard on the eyes, and probably no other illuminant has suffered so bad a reputation in this respect. But neither has any other form of lamp been so easy to hang in front of the eyes and in positions impossible for a gas or oil lamp. The bare filament of a 16 candle power incandescent lamp has an intrinsic brilliancy of some 50 candle power per square centimeter, and should never be allowed in the line of direct vision. Not the least among the economies of good lighting, is that obtained by keeping the eye of the observer sensitive to the actual illumination through the avoidance of eye strain, and this is said without reference to the tremendous human economy in eyesight itself.

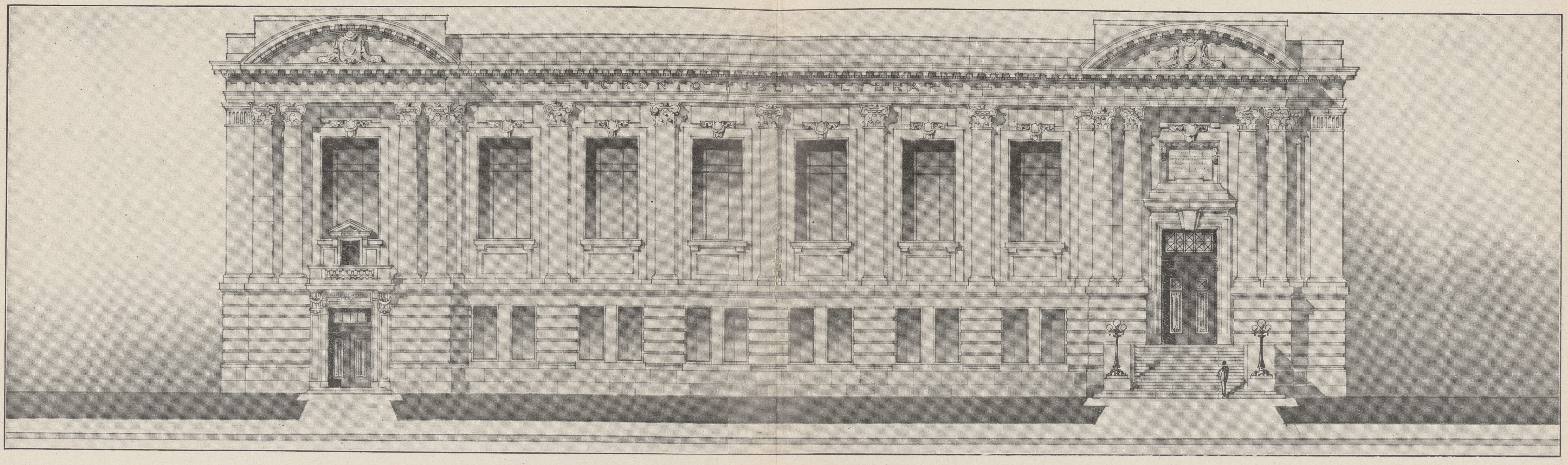
If the foregoing shall have created any impression that economy in lighting must be obtained at a sacrifice of decorative requirements, this should be corrected. True art may at least conform to essential mechanical requirements, and the limitations imposed by these are not so narrow as might be supposed. In view of this the eminence of some mistakes is remarkable. I will quote the words of Dr. Louis Bell before the Illuminating Engineering Society:

"One does not have far to go to see some horrible examples of inartistic and thoroughly bad illumination. Sometimes this is noticed and remedied; sometimes it is not. The delivery room in the public library in the city of Boston in its early stages was perhaps the most shining example of the malapplication of light that I have seen. In that room the mural paintings are sunk into deep panels, the reason for which I have been unable to discover. That room was originally lighted by two gigantic chandeliers which came down one-third of the way to the floor, and were dotted with incandescents, entirely defeating any object of lighting up the mural paintings and in fact preventing anybody from seeing them. That was finally remedied, but even when it was done, it was not done well. If you will go there to-night you will find that the lights intended to illuminate the paintings are not so directed that they do it to the best advantage, for the very simple reason that the scheme of decoration which had been adopted for the room, utterly irrespective of the possibility of having paintings there which anybody might want to see, was such that it did not seem wise to put the lights where they would do any particular good. It is that sort of thing which ought to be given a great deal of careful attention. We want to know not only how to get good light for general illumination, but how to use it for particular illumination, as in a case of that kind, with the best benefits possible."

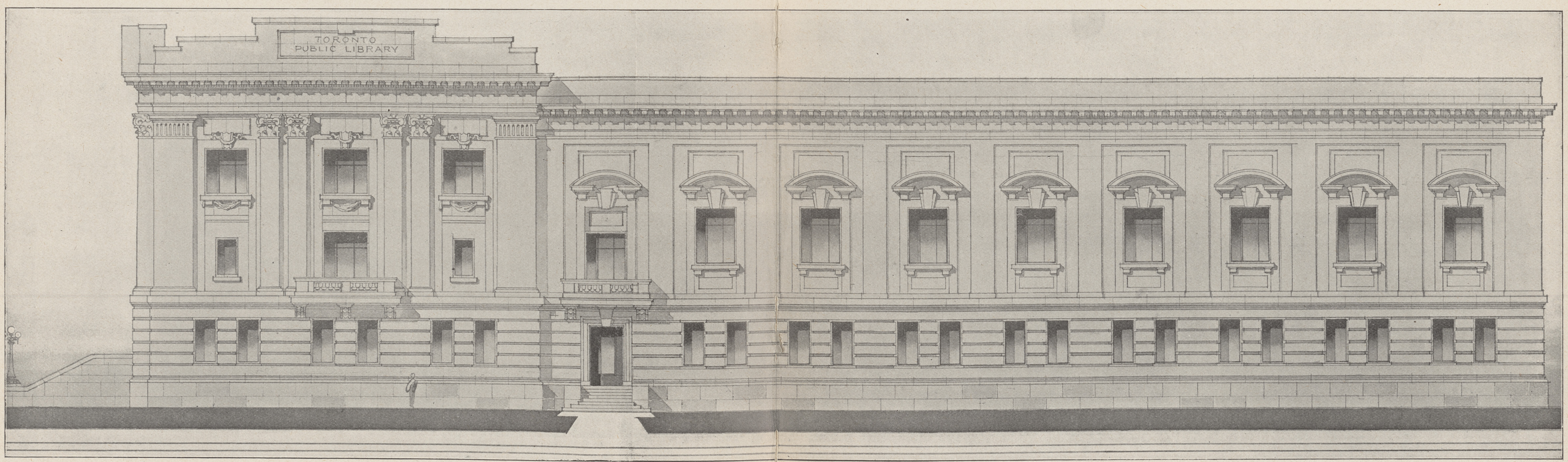
It is true that many artistic features have been "designed", which seem in every way beautiful until their utter uselessness as a support for light sources is understood. But these things are passing. Some day the fixture designer will judge the beauty of his appliance by its purpose, to the same extent that an Architect feels intuitively as well as intelligently the relation between the shape of a beautiful arch or column and its ability to support a load.

MONTREAL NOTES.

The special committee of the Province of Quebec Association of Architects which has been appointed to deal with civic improvements has prepared a sketch plan embodying a number of suggestions the general aims of which are, first, a better communication for heavy traffic between the up-town and down-town sections of the city and, second, the formation of a number of fine avenues forming uninterrupted circuits and connecting the principal parks and open spaces. This plan is a tentative scheme prepared with a view to inviting a more thorough and general discussion and consideration of the question. When the details of the projects which meet with most acceptance and are felt to be most urgent have been discussed, the Civic authorities will be invited to take action. It is the purpose of the Committee to increase its influence by adding to its members, as associate members, such influential citizens as they can find desirous of furthering their aims. With a view to extending interest in the subject a meeting was held, on Friday, 1st of June, at the Beaver Hall Square rooms, at which Prof. Nobbs presided, and to which were invited members of the Board of Trade and a number of other influential citizens. Amongst those present were Messrs. H. V. Meredith, John Dougall, L. J. A. Surveyer, H. Godin, J. O. Labrecque and Fortunat Bourbonéire, Professor Cox and ex-alderman Robertson. In its present form the most expensive item of the scheme is the suggested formation of two diagonal roads from about Victoria Square to St. Catharine Street in such a manner that the one going to the right hand and the other to the left they could form a means of arriving at the up-town section without the necessity of climbing the very abrupt and difficult Beaver Hall Hill. It is claimed that such roads could be formed almost entirely through districts consisting of the poorest sort of property, and that the enhanced value they would give to the property traversed would speedly repay their construction. A good prima facie case can be made out for the scheme, and, if any one thinks he can make out a better, now is the time for him to make his suggestions.



FRONT ELEVATION ON COLLEGE STREET



ELEVATION ON ST. GEORGE STREET.

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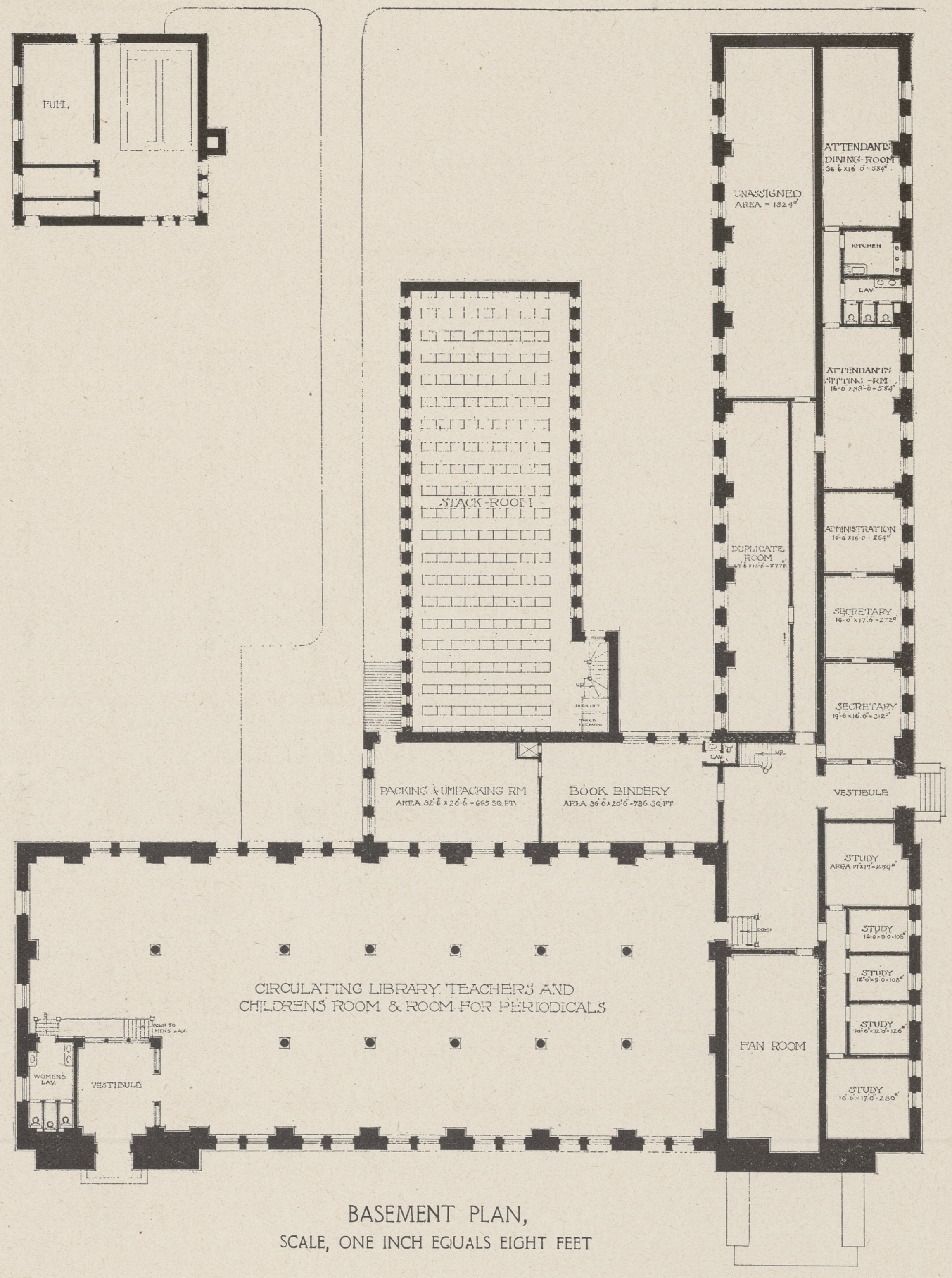
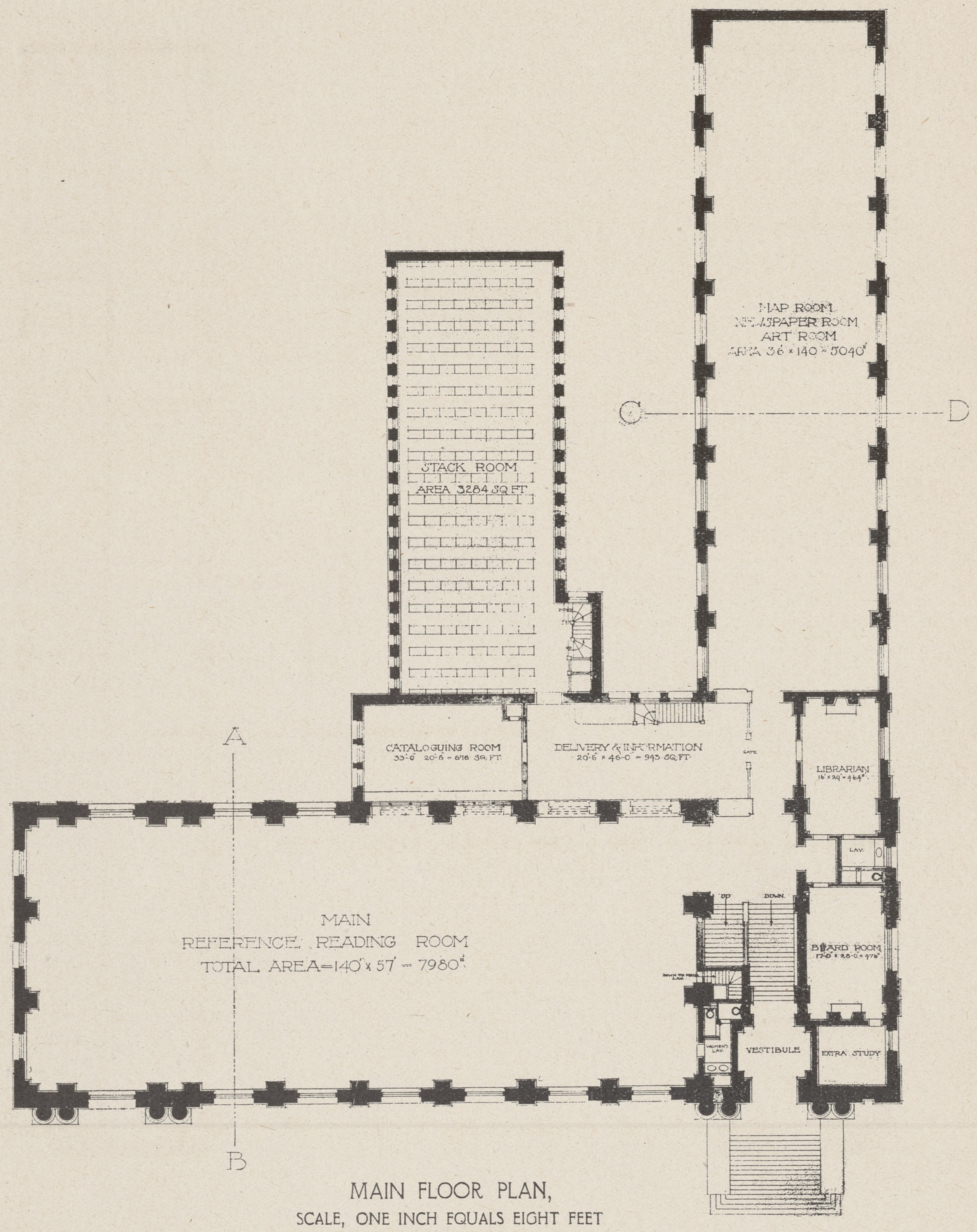
SUPPLEMENT TO
CANADIAN ARCHITECT AND BUILDER
JUNE, 1906.

Wickson & Gregg
A.H. Chapman } Associated Architects.



BASEMENT PLAN,
SCALE, ONE INCH EQUALS EIGHT FEET



MAIN FLOOR PLAN,
SCALE, ONE INCH EQUALS EIGHT FEET

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SUPPLEMENT TO
CANADIAN ARCHITECT AND BUILDER
JUNE, 1906.

There is a considerable inclination just now to experiment with reinforced concrete construction on a large scale. This is of course partly due to the present high rate for fire insurance, which can in this manner be minimised. Contractors who make a specialty of this material are also apt to tempt clients with promises of comparatively small intial cost, which are probably not always fulfilled when contracts are drawn up in black and white. Contracts have however been signed by the Dominion Engineering and Construction Co., of Montreal, to erect of re-enforced concrete a set of buildings for the American Tobacco Co., Ltd. of Canada, on the ground between St. Antoine, Bourgette and Anne streets. Completion in five months is called for.

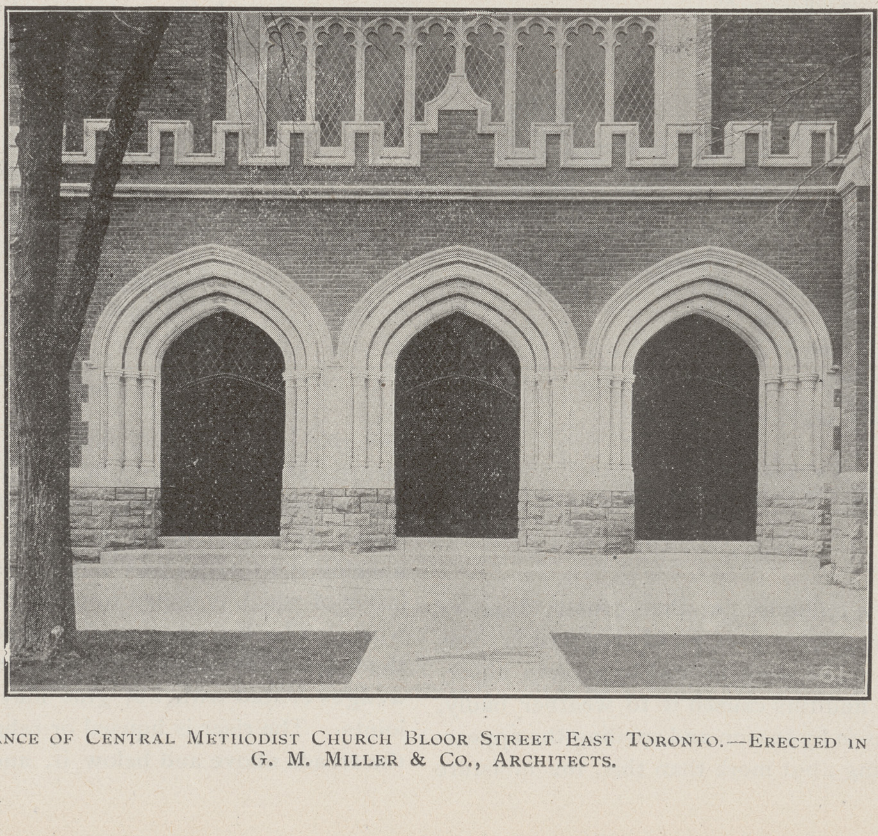
The contract for the new seven storey building for the Montreal Light Heat & Power Co., at the corner of Craig St. & St. Urban St. has been let to John Quinlan & Co., of Montreal. The facework is to be of Indiana limestone with a base of Standard granite. The fourth, fifth and sixth storeys will be let as offices, the others will be occupied by the company.

The Year Book for 1906 of the Province of Quebec Association of Architects has now been issued. It includes as last year an account of the constitution, membership and proceedings of the Association, the Library Catalogue, Code for Conduct of Competitions, Statement of the Professional Duties of an Architect. Of these the Code for the Conduct of Competitions is indexed under the surely rather broad title of "Code ot Ethics" which would more properly apply to the Statement of the 'Professional Duties of an Architect.' Both these statements, by the way, are well worthy the perusal of all architects and of those who employ them, The new matter contained in this the second issue of the Year Book comprises the Reports of the Quebec section of the Association, the regulations for examinations and the questions set, presumably during 1905, with recommendations as to the books suited for study in Connection therewith, a paper on Reinforced Concrete read before the Association by A. Loignon in Nov. 1905, an account of the Sketching Club of the Province of Quebec Association of Architects, list of Student Associates, and a statement regarding the forthcoming International Congress. Under this last heading is included an account of the Royal Institute of British Architects not separately classified in the index. This should be of special interest to students of architecture as it includes particulars of the Colonial examinations to qualify for Candidature as Associate R. I. B. A., and also gives information regarding the various medals and studentships in the gift of the Royal Institute which are open for the competition of all British subjects. The reproduction in this Year Book of a number of illustrations of old buildings of the Province of Quebec prepared by members of the Sketching Club is an interesting feature. Whilst this volume is a distinct advance on its predecessor, it might be still further improved by the introduced of more papers read before the Association, such as that of Mr. Loignon's, and by increasing the number of the illustrations.

NOVEL SASH BALANCE.

A novel device for balancing the weight of window sashes has appeared in the hardware trade. It is a spring roller held in brackets at the highest point of the sash slide. Two screw-eyes are placed in the top of the sash, to which are connected belts from either end of the roller. The screw.eyes can be raised or lowered to equalize the belts on each side. If a different tension is desired, one belt at a time can be taken off and either wound or unwound on the roller. These belts are attached to the eyes by means of hooks fastened to the ends of small brass straps, the belting being connected to the roller by means of other brass straps locked in grooves.

The Mira Brick Company have decided to make extensive improvements to their plant. A new kiln, costing about $5,000, is to be installed, giving the company an output of 20,000 bricks per day, or about one million five hundred thousond bricks per season.



DETAIL AT ENTRANCE OF CENTRAL METHODIST CHURCH BLOOR STREET EAST TORONTO.—ERECTED IN ROMAN STONE.—G. M. MILLER & CO., ARCHITECTS.

INTERCOMMUNICATION.

[Communications sent to this department must be addressed to the editor with the name and address of the sender attached not necessarily for publication. The editor does not hold himself responsible for the expressions or opinions of correspondents, but will, nevertheless, endeavor to secure correct replies to queries sent in. We do not guarantee answers to all queries neither do we undertake to answer questions in issue following their appearance.]

From "Builder": In the building of small church—Episcopal—in a country village, would you advise me to build in stone (sample sent) or in brick? The stone can be obtained close by the work, and there are no bricks to be had within a radius of 25 miles, so that the cost will be about the same in either case. Please advise me through your journal, also give me your idea

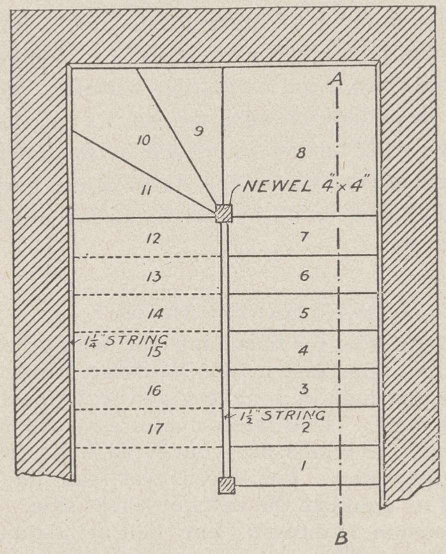


FIG. 1.

as to the wearing qualities of the stone, sample sent you?

ANS.—The choice of a suitable stone is of very great importance to all who are interested in building work, and careful attention should always be given to the subject. We have seen a comparatively new and

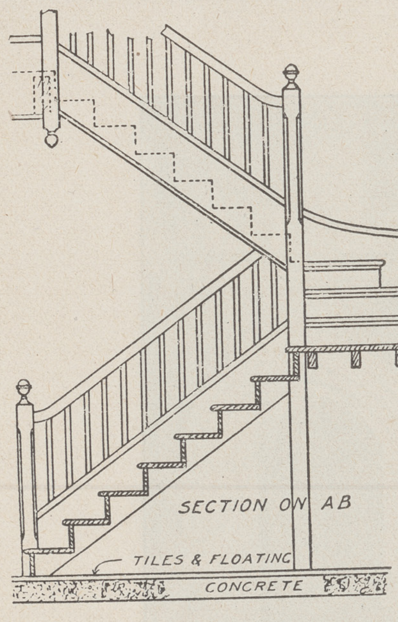


FIG. 2.

exceedingly costly building, in the construction of which stone from a quarry of good reputation was extensively used. The stone proved to be very absorbent of moisture, and this caused it to weather badly, losing its face season by season and spoiling the appearance of the building; but more than this, the moisture was conducted quite through the walls, and rotted the ends of the timbers which they supported, letting down floors and ceiling, and destroying cornices, and so necessitating extensive repairs in addition to the substitution of sounder stone. Not only do stones from different localities exhibit very different weathering qualities, but apparently similar stones from different beds in the same quarry exhibit differences equally great. The experience gathered by constantly noting the behaviour of different stones and of the same stone

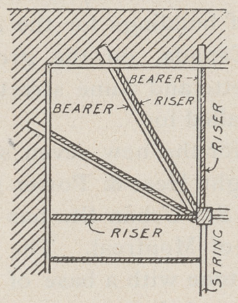


FIG. 3.

under varying conditions is the only sure guide. The sample of stone sent is rather a poor example of sand stone, and is very absorbent. We do not think this stone will weather well as both wet and frost will cut on it and finally destroy it. If, as you say, the cost will be about the same, we would advise you to use good hard bricks with trimmings of Port Credit stone.

From "Young Carpenter". Will you kindly show how a dog-legged stair to go between two walls six feet apart should be constructed, giving such details and explanations as you may think necessary?

ANS.—The term Dog-Legged implies that the second flight returns in a direction contrary to the first, without leaving any space between them; Figs. 1, 2 and 3 are plans and sections of such a stair.

The treads are horizontal boards on which the foot is placed. The risers are the vertical boards between treads. The nosing is the projection of the tread at its intersection with the riser. A flight is the whole series of steps between two landings. The going is the horizontal distance between the fronts of two consecutive risers, and should not be less than 9 inches.

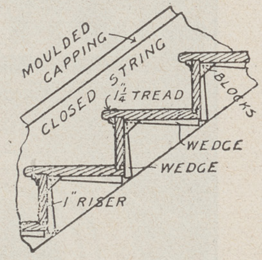


FIG. 4.

The rise is the vertical distance between two consecutive steps or treads, and should never be more than 7½ inches. The pitch is the angle at which a flight rises. In Figs. 2 and 4 the stairs are constructed by housing the treads and risers into an outer string, the latter of which is nailed to plugs driven into the brickwork. The housings in the strings are made wider than the thickness of the tread and risers, so that wedges coated with hot glue may be driven into the joints. The riser is housed or rebated and grooved to the treads above and below it, and the upper joint is strengthened with glued blacks, Fig. 2. A closed string has its upper and lower edge parallel, and is usually finished with a moulded capping grooved and tongued on ; the capping to the outer string carries the balusters which support the handrail. A cut string is shown in Fig. 5. The treads then line on the horizontal part of the cutting, and the risers are mitred to the vertical part. The nosing to the tread is returned along the end of the tread, and often has beneath it a bracket planted on ; the bracket serves no purpose beyond that of ornament. When stairs are over 3 feet in width, a "rough string" or "carriage" is used to

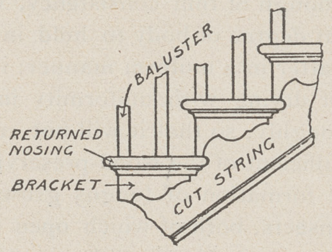


FIG. 5.

support the middle of the tread and risers; and rough brackets, as in Fig. 6, are nailed to the carriage for this purpose; apron linings may then be needed to conceal the carriage ; the creaking of stairs often is owing to the absence of a rough string. Where winders are used "rough bearers" take the place of carriages in supporting the risers, and in Fig. 3; they rest in the wall, and are framed to the newel. To economize space in small houses, it is not uncommon for stairs to rise in one flight between walls, with winders at the head or foot; both strings are then plugged to walls. This description and diagram covers all ordinary stairs.

From "Mason" : Please explain what is meant by "Coursed Header Work" in stone masonry, and the manner in which it is constructed and oblige ?

ANS.—"Coursed Header Work" consists in having the stones all properly squared and the headers run the entire depth of the course as shown in Fig. 7. Perhaps the following remarks by Professor Rankine, along with the diagram, will explain the matter much

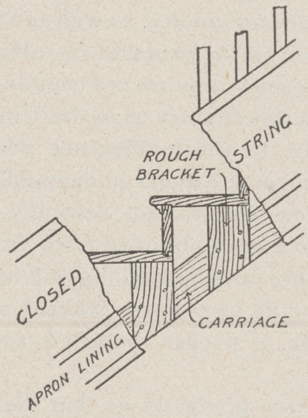


FIG. 6.

better than we can. The professor says : "One-fourth part at least of the face in each course should consist of bond stones or headers; each header to be of the entire depth of the course, of a breadth ranging from one and a half times to double that depth, and of a length extending into the building to from three to five times that depth, as in ashlar. These headers should be roughly squared with the hammer, and their beds hammer dressed to approximate planes ; and care should be taken not to place the headers of successive courses above each other, for that arrangement would cause a deficiency of bond in the intermediate parts of the course. Between the headers each course is to be built of smaller stones of which there may be one, two or more in the depth of the course. These are sometimes roughly squared, so as to have vertical side joints ; sometimes the stones are taken as they come, so that the side joints are irregular ; but no side joints should form an angle sharper than 60 degress. Care should be taken not only that each stone shall rest upon its natural bed, but that the sides parallel to that natural bed shall be the largest, so that the stone may be flat, and not be set on edge or on end. Howsoever small and irregular the stones may be, care should be taken to make the courses break joint. Hollows between larger stones should be carefully filled with smaller stones completely imbedded in mortar."

From "Builder."—I desire to finish a large room with a dado in cement. Dado to be of a warm red

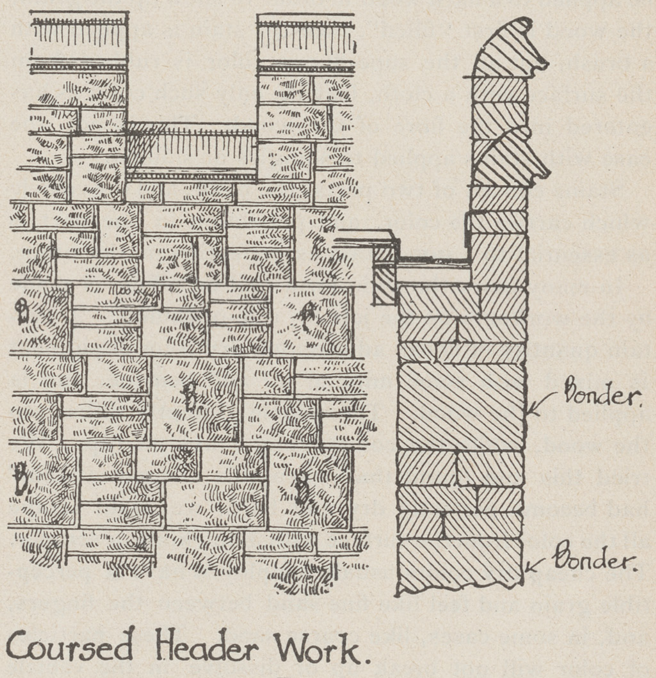


FIG. 7.

color when finished, but the walls are not to be painted. Please describe a good method for executing this kind of work ?

ANS.—If a granular surface is required, first coat the walls with portland cement and sand, and when set float with colored Portland cement and sand, 2½ to 1, working to a uniform face with a felt covered or cross-grained float. For a smooth or polished Portland finish, float the work, keying the surface well by using a coarse broom, and finally finishing with lime putty 2 parts, Portland cement 1 part, mixed with colored water made by dissolving 1 stone of red oxide in a large pail of water. For a Keene, Parian or chromolith finish float the surface like the last, finishing by using three cements gauged with the colored water. The two latter processes when laid are gently scoured with a cross-grained float, filling in any slack places, until brought to a true surface ; then polish with the laying trowel, and finally polish with felt or flannel. Fresh air-slaked cements must be used, so that the setting property of the cement may not be destroyed by the coloring matter ; also the different gauges of material and color must be noted and maintained throughout to the completion of the work. A uniform colored surface may be ensured by keeping a test piece.

SHINGLE STAINS.

It sometimes happens that a well planned house is spoiled in the making by some oversight or makeshift, or an artistic exterior spoiled by the color placed on it, for the reason that the architect may not have specified just what was wanted or has allowed the contractor to use something "just as good", or both architect and builder have been unable to obtain the material wanted.

We have been doing some investigating to see why the colors on so many roofs and gables seem to go to a frazzle and become old before their time. Sometimes a single winter takes the life out of a stained roof and leaves plain, bare wood in spots. Then somebody is blamed because the roof is an eyesore.

A stain should not be paint, the difference being that a a stain enters into the material to which it is applied, while a paint remains on the surface. Stains are applied to undressed wood which has not been treated in any way and which presents what might be called a raw surface, while paints are applied to a wood which has been primed or filled, so as to prevent the paint from sinking in. In fine wood finishing when a stain is to be applied to a hard wood in order to show up the grain, the wood is first "filled", then the stain is applied with a brush, but all the superfluous color is rubbed from the surface with a cloth, leaving only such color as has entered into the fibre of the wood. This is not the case with stains applied to shingles or sidings.

Stains consist of two parts, the color, and the vehicle which carries the color, and perfection in one part is as essential to a good stain as perfection in the other.

In many cases the stain for a roof or siding is made by the workman on the job by rule-of-thumb. A certain quantity of cheap adulterated dry color or pigment is mixed with some mineral oil and benzine, and is applied to the wood. The vehicle promptly sinks into the wood, while the coarse color stays on top. We tried this and found that when this alleged "stain" had become perfectly dry and hard, we could scrape all the color from the surface with a dull knife or scraper. The cheap dry colors usually employed have a perceptible grain and feel like fine sand between the fingers, and, in some cases, like coarse sand. These particles of color will not break up or dissolve in the vehicle without grinding, excepting to a very slight degree, and as these particles are of a larger size than the pores of the wood, they have, of necessity, to remain on top while the liquid part only goes into the fibre. It is the old story of a two inch plug not going into a one inch hole, no matter how much lubricant is used.

Therefore, colors for stains must be ground even finer than for paints, and as a stain must not cover up the effect of a wooden surface but simply give it color, the color used must be absolutely pure and without adulteration. Any color adulterant used would simply fill up the fibre of the wood without staining it, and would, to just that extent, destroy the character of the finished surface. Therefore, the purest, strongest colors make the best stains, because the stronger the color the less the quantity required to produce the result.

The fading or the unfading property of a color is by no means a small factor in the making of stains, particularly those to be applied to exposed surfaces, such as roofs or gables. Certain kinds of reds, greens and other colors will be affected by light to an almost imperceptible degree as compared to those which may have the same general appearance, the difference being in the chemical composition of the color. The color or pigment for a shingle stain must, therefore, be one showing the maximum resistance to sunlight.

Stain for roofs, gables and sidings are used as beautifiers, and it follows that all colors, shades and tones should be soft and harmonious, and that all harsh, heavy and severe effects should be avoided.

As the pigment used in the stain is for the purpose of filling and giving an artistic color effect to the wood, it necessarily follows that the remaining value of a shingle stain is in the vehicle. This vehicle must be thin enough in its consistency to enter readily into the wood fibre; although of thin consistency, it must still have a sufficient degree of body to hold in suspension the coloring matter in a uniform manner; it must have the property of drying with uniformity in the right time, and thoroughly, so that it will not run or bleed; it must have sufficient of the wood-preserving property to prevent the formation of fungus growths and the burrowing of insects, both of which open the way for the entrance of water and ice, and the consequent cracking, warping and final destruction of the wood ; and it must have binding property to thoroughly unite and bind together all the elements of vehicle and color in order to produce a homogeneous mixture and a resulting satisfactory product.

The absence of any one of these properties is practically fatal to the life of the stain and of the wood, and, furthermore, a stain might contain all these properties and yet be lacking in value, due to the percentage of some one or two of the ingredients being too high or too low. It is impossible in this article to go into the details of percentages and materials necessary for the production of a thoroughly practical and effective shingle stain, for even with these details, the mechanical and practical knowledge of method in producing the combination cannot be transmitted, and, furthermore, the chemical properties of the various colors used make it necessary to vary the percentages of the vehicle.

While great care is taken in the selection of a proper paint for a building, both interior and exterior, the selection or making of a stain for the roof and gable, where the exposure is greatest, is often left to the carpenter. The obtaining of a stain with the requisite penetrating and preserving quality, as well as the selection of the colors, is second in importance to no other work about a house. The reason stains are not used in relatively as great quantity in this country as in the United States is owing, primarily, to the indifference which has been shown by the property owners in demanding an article possessed of proper merit, and, secondly, to the poor results which have been obtained from the methods in vogue. Much more outside staining will be done than at present if the results of properly stained and protected wood by the use of proper materials are more frequently seen.

Our investigation proves to us that the making of a high grade stain is a scientific piece of work, that its admixture must be in the hands of thoroughly practical men, that cheap materials make cheap products, and that the off-hand rule-of-thumb substitute is an expensive expedient in the long run.

A gothic roof of reinforced concrete has been built for a church in Belgium under the direction of Messrs. Aronstein and Luder of Brussels. It has a central span of 23 ft. and side spans of 11½ ft. The concrete is covered with mortar and plaster moldings.

BUILDING IN HAMILTON.

Thus far the building season of 1906 has been one of great activity in Hamilton. Whilst it may not be ahead of last year in the number of buildings being erected, yet the work of this year is of a superior character, and it is thought that the cost will total an amount equal to, if not greater than that of 1905. There is considerable increase in the cost of building this year, and this has had a tendency to lessen the amount of work done. Still contractors report that they are kept very busy.

Solid brick is the popular style of construction for dwellings, there being very few brick veneer or cement houses erected.

The majority of dwelling houses range in price from $2,500 to $5,000, which seems to meet the requirements of persons of moderate means. A pair of semi-detached, two and a half story dwellings, on Main street, built by Mr. George J. White, contractor, afford a fair specimen of this style of house. Each contains nine rooms and all modern conveniences. They are neatly finished th o ughout and possess all the requirements for cozy homes.

Of residences of a more expensive nature, a fair type s one being built on Ravenscliffe avenue, of which Mr. Stewart McPhie is the architect. This consists of two stories and attic, and is constructed of brick with stucco finish. Mr. E. B. Patterson, who has designed many dwellings this season, gives another good example of this style of building in a modern brick residience being erected on Barton street. Mr. McPhie has also planned a fine residence for Hannah street to cost about $15,000. It will be constructed of pressed brick with cut stone trimmings. The Vineyard Hotel, a modern three story brick structure, on Main street, was also planned by the same architect.

Besides the great number of dwellings, there are many stores, office buildings, warehouses and public buildings being erected, also many buildings undergoing extensive alterations. The Twentieth Century Club, on Locke street, has just been completed. It was designed by Messrs. F. J. Rastrick & Sons. It is a two story building, 73 feet in length by 40 feet wide with flat roof, pressed brick front, stone trimmings and galvanized iron cornices. The lower story contains two stories and in the second story are the club rooms.

Several new churches are included in the list of buildings this year. A small church in the east end park, of which Mr. Rastrick is architect has been completed recently. It is a neat building, of Gothic architecture, constructed of brick. St. Andrew's Presbyterian church, whose corner stone was laid a few weeks ago was planned by Messrs. Stewart & Witton. It will be of Gothic architecture and constructed of brick and stone. The site is at the corner of Smith and Barton streets. The first installment of fine church buildings for the Barton street Methodist congregation is the new Sunday school now in course of erection. It was planned by Mr. W. A. Edwards. It will be built of brick at a cost of $12,000. It is to be followed later by the main church building. One of the finest examples of cement concrete work to be seen in the province is St. Anne's Roman Catholic church on Sherman avenue. It was designed by Mr. Robert Clohecy. He is also the archi-

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tect for St. Patrick's Presbytery building, at the corner of Main street and Victoria avenue. The material for its construction is Bedford Indiana stone. It will cost about $18,000. The Gospel Tabernacle is of Grecian architecture, constructed of brick with stone trimmings. The interior arrangement is of amphitheatre style. The galleries are carried on plate girders, which are hidden from view. Mr. Charles Mills is the architect.

The new theatre being built on Merrick street was designed by Messrs. Stewart & Witton. It is of Modern French architecture, 128 feet long by 52 feet wide. The lower story is built of stone and the upper portion of brick and stone.

The Wentworth street school building and the patrol station are also being built from plans by these architects. The latter building will be located on May street and will be constructed of brick and stone. The school bullding will consist of a brick addition comprising eight rooms and will cost $30,000.

There are some good examples of warehouses and factory buildings in course of erection. A large warehouse on Vine street for Mr. G. Hill was planned by Messrs. Rastrick & Sons. Originally it was intended to have a four storey building, but latter it was decided to make it eight stories. It will be construted of cement blocks. A three story brick building for the Jackson Visible Typewriter Company has been designed by Messrs. Stewart & Witton. Mr. A. W. Peene is the architect for the Coppley, Noyes and Randall warehouse. It will consist of four stories and basement. Pressed brick is the material. The Otis Fensom Elevator Company have had large additions made to their building at a cost of $35,000. These consist of a two story machine shop, a wood-working shop and a fire-proof pattern vault of re-inforced concrete. The Sawyer and Massey Company are also enlarging their premises by the addition of a two-story fire-proof building of re-inforced concrete. Mr. Edwards is the architect. The Eagle Spinning Mills to be erected at the corner of Wilson and Sherman streets were planned by Mr. Charles Mills. These buildings will be of concrete construction throughout and will consist of a three story building, 135 feet long by 106 feet wide, and a warehouse 125 feet by 35 feet.

The Bank of Hamilton building is being extensively remodelled according to plans prepared by Mr. Mills. When completed, it will be practically a new structure. The plans call for a nine-storey, fireproof building in the Italian Renaissance style. The two lower stories will be constructed of stone. For the next five, New York hydraulic pressed brick with stone trimmings will be used. The eighth and ninth stories will be of carved stone. The estimated cost is about $300,000. The Federal Life Assurance building was described in our last issue and requires no further reference.

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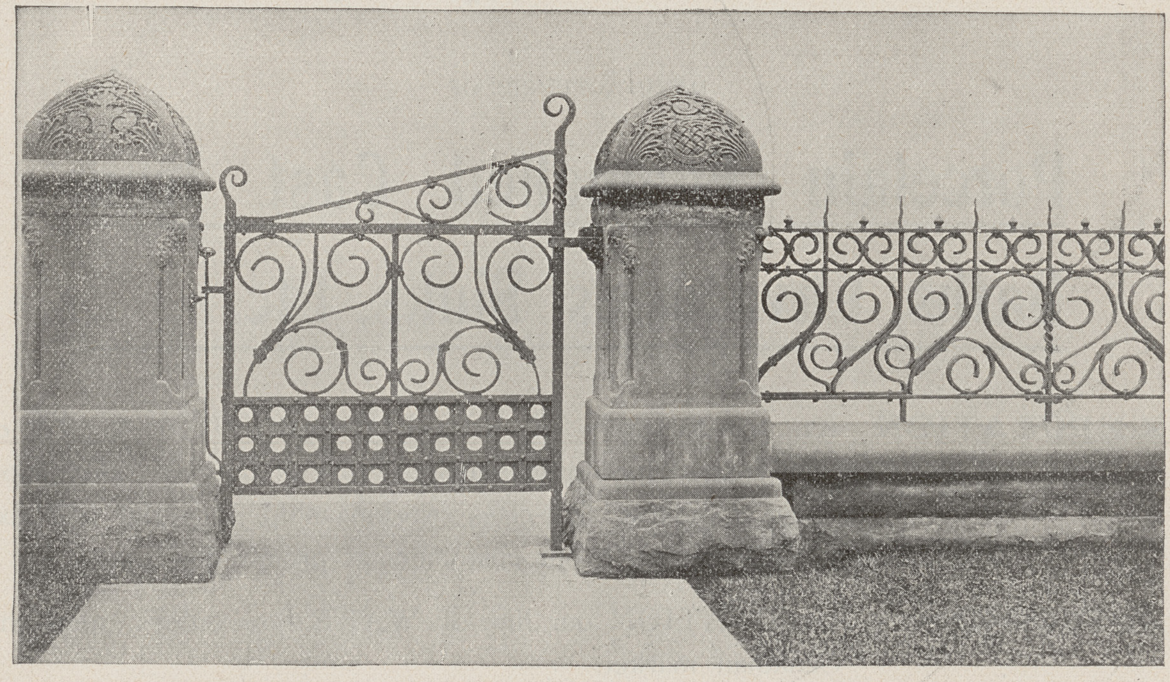

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STANDARD SANITARY MANUFACTURING COMPANY, TO ERECT A PLANT IN THE EAST.

The interesting announcement is made that the Standard Sanitary Manufacturing Company, Pittsburg, Pa., manufacturers of the celebrated "Standard" porcelain enameled baths and sanitary goods, will this year erect a large modern plant for the manufacture of these goods in the East. Land has been acquired at East Camden, N. J., directly across the Delaware River from Philadelphia, and a factory, designed upon the same elaborate scale as the great plants at Allegheny, Pa., New Brighton, Pa., and Louisville, Ky., will be constructed. The new works will be completed this year, and will employ in the various departments about 1,000 hands. The cost of the plant will be approximately $500,000.

The most thorough and elaborate mechanical equipment will be installed in the new factory, in order to facilitate the various processes of manufacture, and produce goods of such noted quality as has long been indicated by the name "Standard" as well as to ensure the prompt execution of contracts. A full line will be manufactured including the various types of bath tubs in all sizes, lavatories in the different designs and sizes, sinks and laundry trays, closet bowls and tanks, urinals, drinking fountains, wash sinks and other articles used in plumbing and sanitary installation.

The erection of a factory in the East was found to be an imperative necessity, owing to the enormous trade which has developed by the company in the large cities of New York, Philadelphia, Boston, Baltimore and other centers. The company's export trade also has grown to such large dimensions that it was found by locating a plant near the seaboard, great savings could be effected in freights as well as raw materials, and deliveries could be made more promptly and satisfactorily. The new plant will therefore be a great convenience to the Eastern trade, as when the factory begins operations the goods can be secured quickly, and delays unavoidable in the case of long shipments will be obviated.

The company was the first concern in the world to successfully attempt the enameling of cast iron sanitary articles with a powder (known as the "Dry Process") instead of applying the preparation in liquid form by the "wet process". Indeed the Standard Sanitary Manufacturing Company was the first concern in America to manufacture enameled baths and sanitary goods successfully at all, and prior to the advent of this company in the field, the public had no faith in the porcelain enameled bath and wash stand. Other manufacturers had attempted to produce these goods, but the enamel would crack and craze, the casting was rough and clumsy in appearance and invariably any enameled goods sent out would be returned. Along in the 70's the Standard Sanitary Manufacturing Company began a series of experiments to learn the secret of the manufacture of perfect porcelain enameled ware, and by persistent efforts, succeeded in devising means and methods of manufacture that have never been equaled.

While the plant at East Camden will not of course be able to supply the company's eastern trade, the output, will relieve the other factories, and will enable a more satisfactory distribution of the products. So large a business has been developed in the Western States and on the Pacific Coast that at the present time a considerable proportion of the output of the three big factories is sent to that point.

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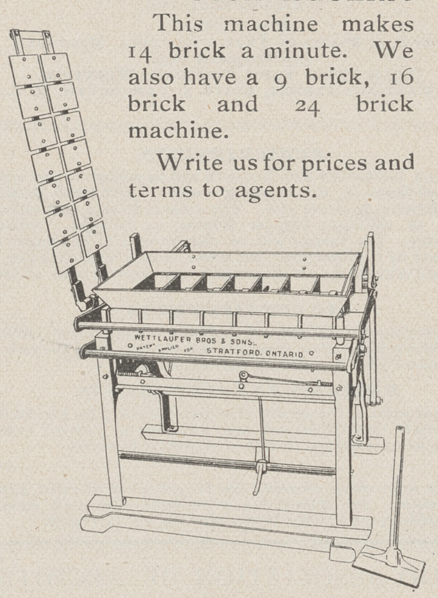

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There are few building concerns in Canada at present that pretend to make a specialty of speed in construction, though the demand for rapidity is daily becoming more and more of a requisite among engineers, architects and owners in letting contracts for important works. A company which aims at speed, and what is more guarantees to accomplish it and to work likewise with efficiency and economy, is the Dominion Engineering and Construction Company, Limited, recently organized in Montreal. Its directorate contains some of the best known names in the Canadian building world. Randolph Macdonald, the president, has had a wide experience in large undertakings all over the country, Henry Holgate, the vice-president, stands in the front rank as a hydraulic engineer, Frank B. Gilbreth, the second vice-president, is well known as a handler of large construction works, Robert A. Ross, the secretary and treasurer, is one of the foremost electrical and mechanical engineers in Canada, and John A. Aylmer has been identified with railway and canal building.

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The Dominion Engineering and Construction Company has just closed a contract on the Gilbreth System with the Canadian Copper Company, which is erecting an extensive plant and buildings at Copper Cliff incident to the opening of new mines. The Copper Company's first demand was speed in construction and the Engineering Company regards its selection to do the work as a distinct triumph for progressive Canadian methods.

It is rumored that a large cement works is likely to spring up in Edrans, Man., owing to a vein of clay ten feet deep having been found on the farm of T. Seamans. A sample is now in the hands of experts, being tested.

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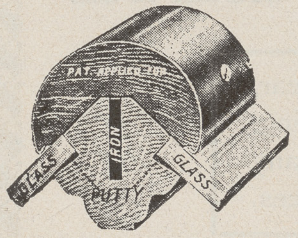

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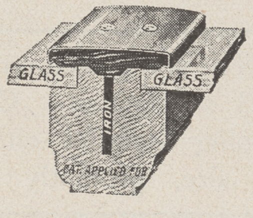

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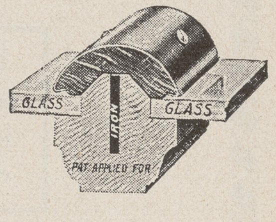

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CONCERNING DRY ROT.

Mr. Harry Hems, of Exeter, who writes on this subject in *The Builders' Journal*, in answer to a request for information as to a preventive, mentions that infection with the dry-rot fungus sometimes takes place in the forest, when felled timber remains stored there for some time. The first evidence of such infection is indicated by the presence of red stripes in the sawn wood. If such wood is thoroughly seasoned the mycelium present in the red stripes is killed. If the seasoning is neglected or imperfectly done, the mycelium, which possesses the power of remaining in a latent condition for some time, commences active growth when the wood is used in any part of a building where it is exposed to dampness, and this in some cases is unavoidable, as when the ends of joists are built into a wall. Under such circumstances, dry-rot eventually appears. On the other hand, the fungus is by no means rare on old beams and boards stored in wood yards, etc., and it is mainly from such sources that spores or portions of the spreading mycelium are introduced into buildings by new wood which has become infected.

Again, when a house that has suffered from dry-rot is being repaired, sufficient care is not exercised in the immediate destruction, by burning of all diseased wood, and portions that are not too much decayed are often stored for repairing purposes. In consequence the air in towns always contains spores of the dry-rot fungus. During the building of a house, the danger arising from the presence of dry-rot may be reduced to a minimum by taking proper precautions. A thorough system of ventilation and the avoidance of damp, stuffy places is of primary importance. The endeavour to exclude dry-rot by hermetically closing all communications with the outer air in the spaces between flooring-boards and joists and similar places, has been practically demonstrated to be an utter failure. In the case of a recently-constructed mansion the expenditure of many thousands of pounds was entailed in rectifying the consequences of such a proceeding. Perhaps the greatest source of danger arises where the ends of joists are built into a wall near the basement of a house, and this is more especially true where there is evidence of red stripe in the wood. As a precaution, the ends of joists should always be treated with creosote.

Coal tar is not recommended, as its power of penetrating into the wood is very limited, and by forming a waterproof coating it prevents the wood from drying. A frequent cause of trouble is the use of damp, deadening material, or pugging and covering it over with boards before all the moisture has evaporated. Such material should be used as dry as possible, coarse sand being the best for the purpose. The surface of boards coming in contact with deadening material

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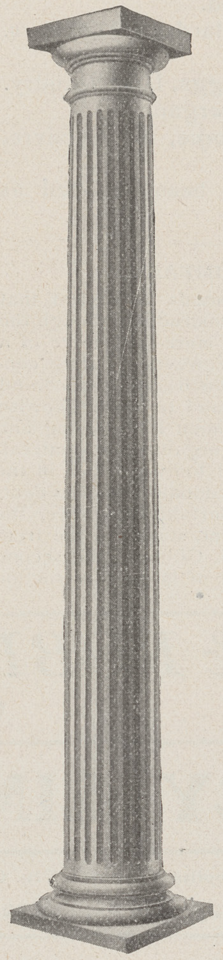
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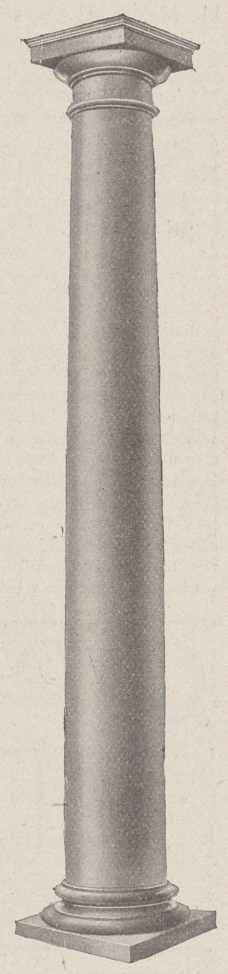
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should first be painted over with methylated spirit containing corrosive sublimate in solution 6 ozs. to 1 gallon. The spirit evaporates, leaving a coating of corrosive sublimate on the boards, which completely destroys any mycelium coming into contact with it. It has been proved that the spores of dry-rot can only germinate in moisture containing some alkali in solution, hence coal-dust, cinders or any kind of humus should never be used for deadening or packing.—*The Architects' Magazine.*

The journeymen plumbers, of London, Ont., who threatened to strike for an increase of five cents an hour, have compromised on the basis of two and a half cents advance, making the minimum per hour 37½ cents and maximum 47½.

The Standard Paint Company of Canada, Limited, have recently been incorporated with a capital stock of $150,000. The chief place of business will be Montreal, Que. The promoters include Messrs. Ralph L. Shainwald, New York, Louis C. Rugen, Bound Brook, N.J., and D. W. Lockberby, of Montreal.

The contracts for supplies of cement for the city of Hamilton have been secured for the past few years by American manufacturers and the Hamilton rate has been made the basis of contracts with other Canadian cities. Last year, the price delivered in Hamilton, free, was $1.55½ per barrel of 350 pounds. The consumption by the city was 4,000 tons, and a large additional amount was sold to private parties at the same rate. The duty is 12 cents per hundred weight on cement and 20 per cent. ad valorem on sacks.

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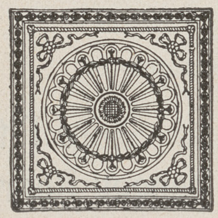

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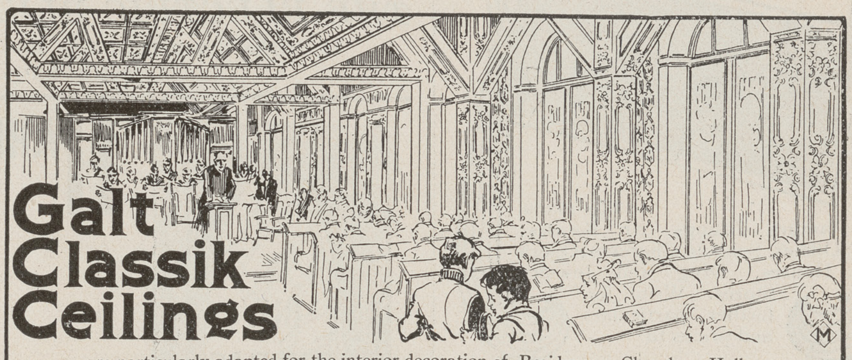

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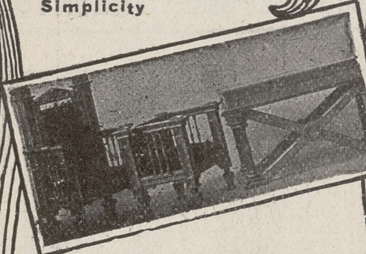

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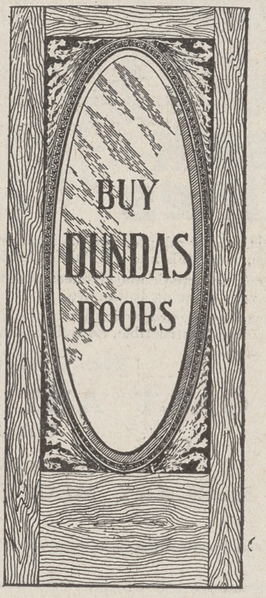

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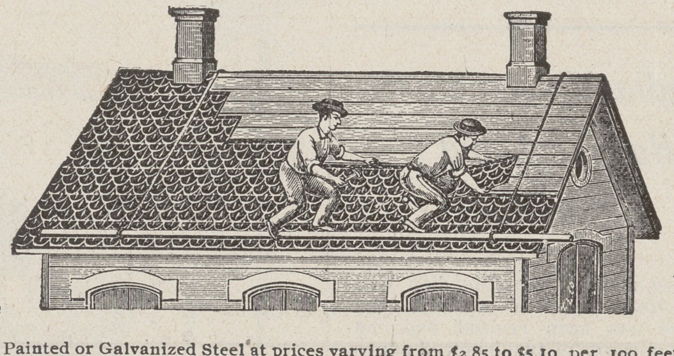

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NOTES.

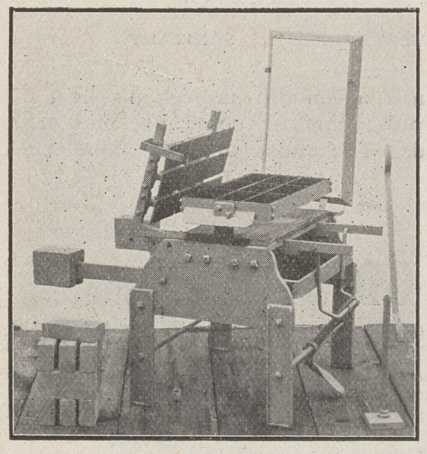
The Standard granite quarries are now running full blast again, the places of the striking granite cutters having been filled with non-union men.

Hooper, Houkes Company, Limited, Winnipeg, are applying for change of firm name to Hooper Marble & Granite Company, Limited.

New machinery has been installed at the works of the Sydney Cement Company, Sydney, N.S., increasing the present capacity of the works to an output of 500 barrels in twenty-four hours.

Mr. William Hayman, of Wm. Hayman & Son, builders, London, Ont., is retiring from the business, which will in future be carried on by his son under the name of H. Hayman.

The Cement Brick Company, of Parry Sound, Ont., have purchased a half of the Bryson property and are erecting necessary buildings for the extension of their plant. A brick machine, with capacity of 20,000 cement bricks per day, is being installed.



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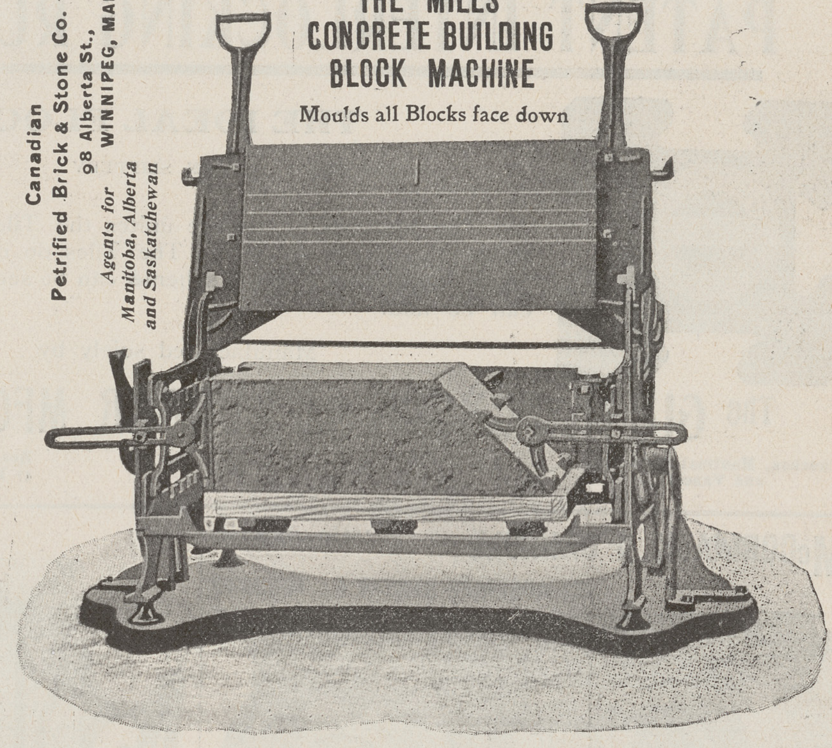

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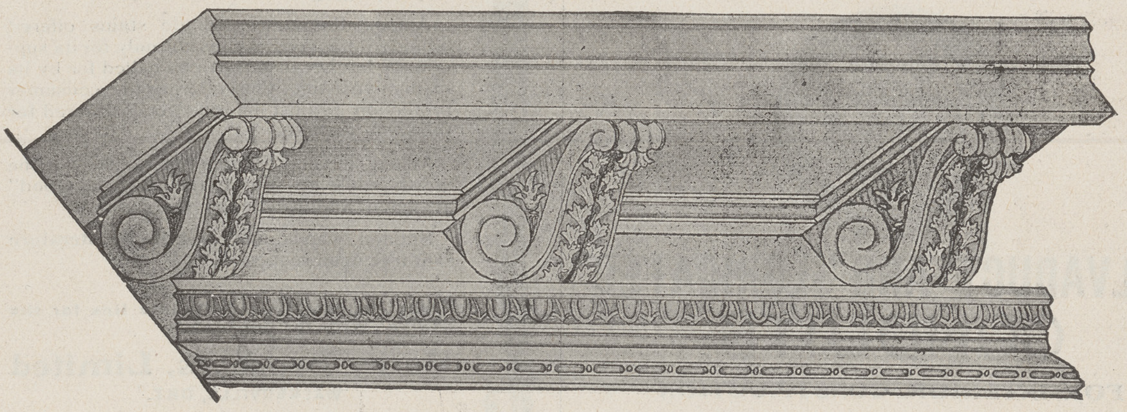

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The following students were successful in passing the recent examinations in Architecture at the School of Practical Science, Toronto: First year—Honors—J. P. Molesworth. Pass—W. C. Collett. Second year—Pass—C. B. Jackson, G.N. Molesworth. Third year—Honors—A.W. McConnell. Pass—A.G. Creighton, W. N. Daniels.

The Welland Concrete Company has been organized and will engage in the manufacture of cement brick, etc. The company is capitalized at $20,000, and will have its plant near the T. H. & B. spur at Ridgeville, Ont. The following officers have been appointed: President, Geo. Arnold; vice-president, Col. Raymond; secretary, B. J. McCormick; treasurer, Col. Raymond.

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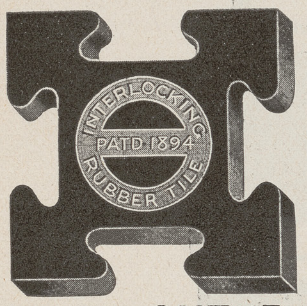

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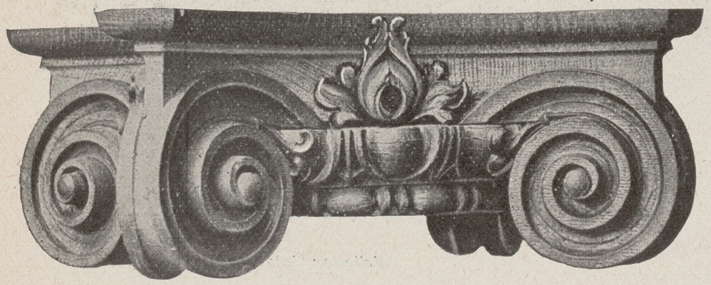

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PERSONAL.

Mr. E. N. Storey, architect, formerly of Kingston, Ont., has opened up architectural offices in Regina, Sask.

Mr. John Britnell, cut stone contractor, 93 Summerhill avenue, Toronto, and his son Albert, have left for a two months' visit in Europe.

Mr. Barrett, a prominent member of the Toronto Architectural Eighteen Club, has gone to Regina and commenced a practice in that city.

Mr. Jacob Wright, a well known builder and contractor of Toronto, died at the home of his son-in-law, Mr. T. Joliffe, 19 Rusholme road, Toronto, early in June. He had reached the age of eighty-five years.

CALGARY LABOR TROUBLES.

The two strikes, those of stonemasons and bricklayers, which have been troubling Calgary for several weeks have been settled. The former were asking an increase from 55 cents to 60 cents an hour and the latter 55 cents to 65 cents. A compromise has been effected. The stonemasons get what they asked, and the bricklayers get 62 1-2 cents. The agreements have been signed for three years. An arrangement has also been made for a conciliation board in case of difficulties.

NOTES.

The Western Iron Works, Limited, successors to the Myres Iron Fence Company, Limited, Winnipeg, have just opened a new factory in Elmwood, Man. Some of the lines to be manufactured are architectural and ornamental iron work, wire work and iron fencing.

Another active manufacturing plant has begun operations in Hamilton. It is the Diamond Flint Glass Company, at James and Picton streets. The company, which is controlled by head offices at Montreal, is occupying the old plant of the Hamilton Glass Company. Every portion of the new plant has been constructed in the most improved manner. Considerable labor-saving machinery has been installed. The new furnace installed has a capacity of 100 tons. At first about 20 tons of composition will be treated daily. The new machinery has a capacity of about twelve hundred dozen bottles per day. At first only bottles will be manufactured, while at a later date glassware of every description will be turned out. To prevent the closing of the plant in case natural gas might possibly give out, the company have constructed three gas generating tanks, which can be put into operation within a moment's notice.

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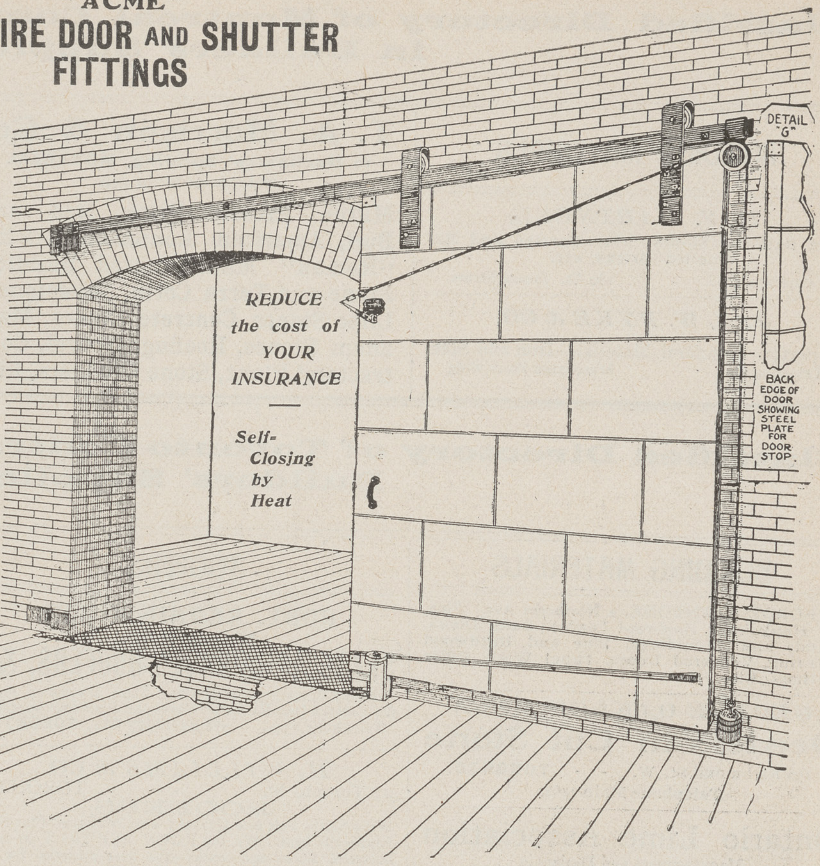

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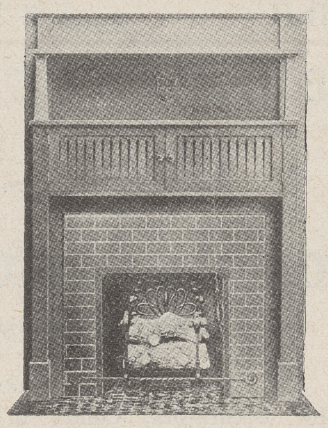

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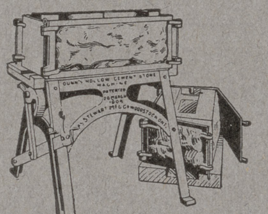

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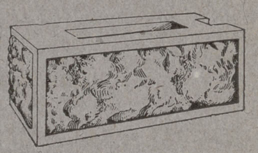

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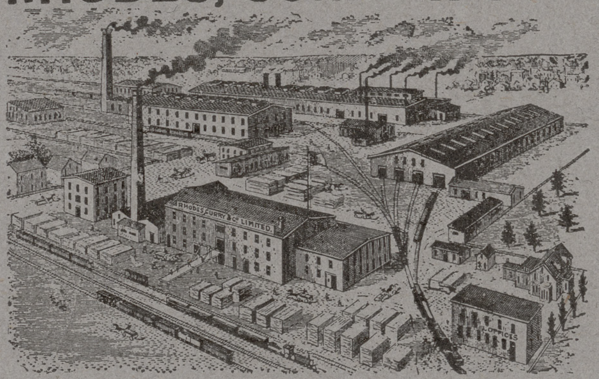
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