PAGES

MISSING

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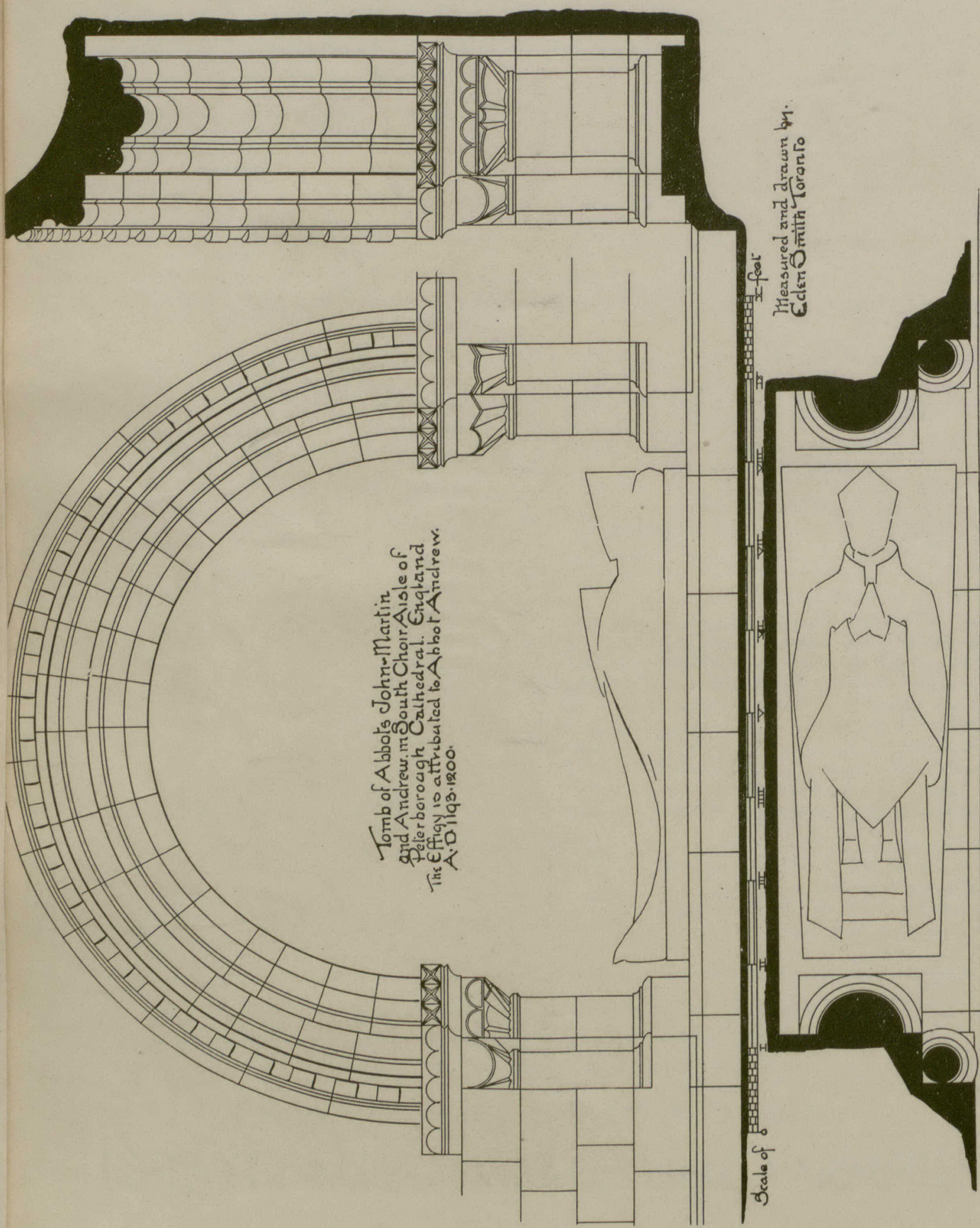
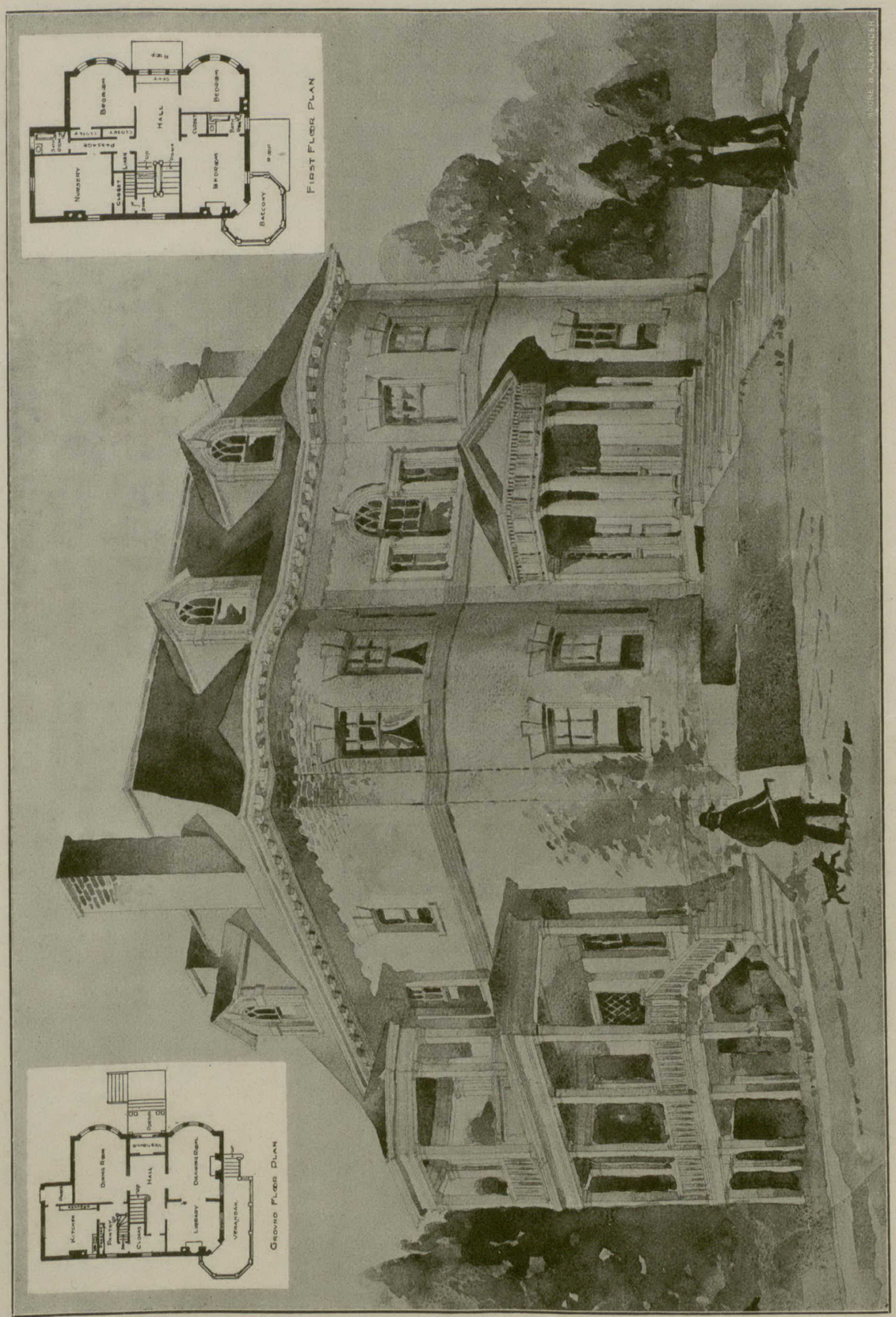
In the "Canadian Architect and Builder."



MEASURED AND DRAWN BY MR. EDEN SMITH.

SUPPLEMENT TO
CANADIAN ARCHITECT AND BUILDER
FEBRUARY, 1901.



RESIDENCE FOR MR. LEWIS SKAIFE, WESTMOUNT, MONTREAL.
MACVICAR & HERIOT, ARCHITECTS.

The Canadian Architect and Builder

VOL XIV—No 158 FFBRUARY, 1901

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Tomb of Abbots, John, Martin and Andrew in South Choir Aisle of Peterborough Cathedral, England. Measured and Drawn by Eden Smith.

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Portrait of Mr. Grant Helliwell, President Ontario Association of Architects.
" " F. S. Baker, F.R.I.B.A., 1st Vice-President Ontario Association of Architects.
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PROF. S. H. CAPPER, Department of Architecture, McGill University, Montreal.
MR. W. A. LANGTON, Architect, Toronto.
" EDMUND BURKE, " "
" S. H. TOWNSEND, " "
" FREDERICK G. TODD, Landscape Architect, Montreal.
" R. A. L. GRAY, Electrical Engineer, Toronto.
" W. H. ELLIOTT, of Messrs. Elliott & Son Co., Toronto.
" J. C. B. HORWOOD, Architect, Toronto.

IN COMMON WITH LOYAL SUBJECTS OF THE EMPIRE THROUGHOUT THE WORLD WE DEEPLY DEPLORE THE LOSS OF THE GRACIOUS SOVEREIGN WHOSE LONG AND GLORIOUS REIGN CAME TO A CLOSE AT OSBORNE PALACE ON JANUARY 22ND, 1901. "SHE WROUGHT HER PEOPLE LASTING GOOD."

The A.I.A.

THE next convention of the American Institute of Architects will be held at Buffalo, during the Pan-American Exhibition. The choice of a meeting place seems a wise one, for outside of its own attractiveness, the city of Buffalo will have a wealth of architectural features to show in its Exhibition.

The Toronto Architectural Eighteen Club.

THE Club are to be congratulated upon the success of the exhibition of architectural drawings held under their management in Toronto last month, an extended notice of which appears in another part of this issue. Several months of earnest effort were required to perfect the arrangements for this exhibition. The expenses were met by the revenue derived from advertisements in the exhibition catalogue, the compilation and publication of which also involved much labor. The number of visitors to the exhibition was large and would no doubt have been greater but for the death of the Queen. The public lecture by Mr. Albert Kelsey, of Philadelphia, on methods of beautifying towns and cities, brought together a good audience, and was much appreciated. The exhibition has undoubtedly proved a stimulus to local architects and directed public attention to the subject of architecture—results which in themselves are important.

How to Reduce the Fire Loss.

THE recent great fire in Montreal and the consequent heavy increase in insurance rates, should not only lead to the perfecting of fire brigades and equipment, but, on the principle that prevention is better than cure, should direct public attention to the value of fire resisting materials in building construction. The Japanese Government has recognized the wisdom of such action, by giving an order to a United States manufacturer for 80,000 feet of wire glass to be used as a fire-resistant in the Imperial Japanese navy buildings at Mai Juru. The value of properly constructed division walls as a means of preventing the spread of fire within a building was well illustrated at the recent fire in the store of Marshall Field & Co., in Chicago, where by such walls the fire was confined to one section and the loss was only $25,000.

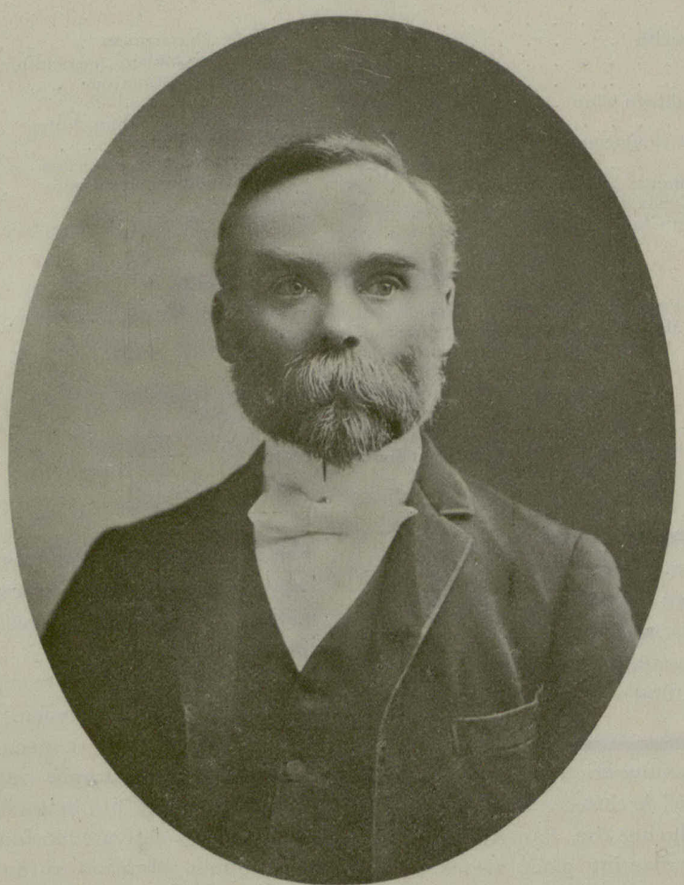
Tests of Fire Blinds.

THERE has recently come to hand a report of a test conducted last year by the British Fire Prevention Committee with fire-resisting curtains and blinds. The object of the test was to show the protection against fire afforded to a window and to a door of 20 superficial feet and 16 superficial feet area respectively, when screened from

the flames by rolling fire blinds which can be put into position in a few seconds. The test of the fire was within three feet of the face of the fire blinds, which were subjected to a temperature gradually increasing from 400° to 1600°. The blinds after 30 minutes test remained in position, the fire not having penetrated through the door or window. The test seems to show that by means of properly constructed and adjusted fire blinds the entrance of fire through windows and doors may be retarded for a time, thereby giving opportunity for the arrival of the firemen. A matter of much importance is the facilities for speedily placing the blinds in position under the most disadvantageous circumstances which could be induced by an attack of fire.

The O. A. A.

THE annual convention of the Ontario Association of Architects, held in Toronto last month, the proceedings of which are printed in this number, was one of the most interesting in the history of that organization, and likely to be productive of lasting results. It was decided to proceed at once to establish a system of instruction for students, based upon the course of study recommended in the report of the Committee on Education. The Association will memoralize the Dominion Government to throw open to competition among architects in private practice the designing of important public buildings, a system which was adopted several years ago by the United States Government, and which has worked out very satisfactorily. The adoption of the system in Canada would stimulate our architects to the exercise of their highest skill, and lead to the erection of public buildings throughout the country which would not only be carefully adapted to their requirements, but would stand as examples of refined architecture. The convention papers were of a high order of merit, and evoked interesting and instructive discussion.



MR. GRANT HELLIWELL,
President Ontario Association of Architects.

Effects of Sewer Gas Upon Health.

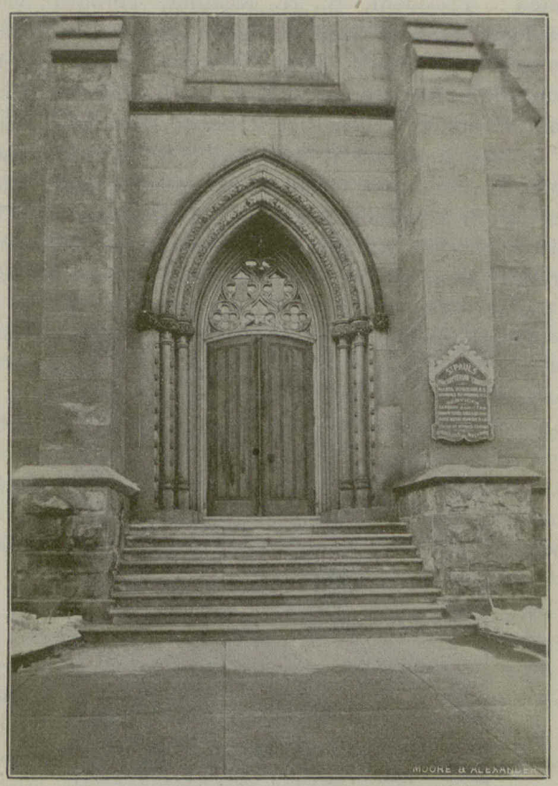
IT is gratifying to learn that the Medical Health Officer of Toronto is conducting an investigation to determine if possible what relation the out-flow of sewer gas from the ventilators at the street level has upon the spread of diphtheria. The noxious vapours arising from these ventilators, especially in winter when the atmosphere in the sewer is at a higher temperature than outside, have been the subject of much comment, and have been regarded by many citizens as a source of serious danger to health, and as being at least one of the causes of the prevalence of diphtheria among children. The evil is specially noticeable in the northern part of Toronto, where many of the sewers have dead ends. This section being at the highest altitude, the sewer gas from the lower districts of the city naturally rises to and finds an outlet there. The result of the investigation which is now being held will be looked for with much interest, and it is to be hoped will determine approximately at least the extent to which these ventilators are the cause of disease.

An Art Museum as a Memorial to Queen Victoria.

SINCE the death of Queen Victoria, the subject of a suitable memorial to her memory has been under discussion in Toronto. The Provincial Government has signified its intention to contribute at least $10,000 towards this object. The Premier has stated it as his opinion that the memorial sheuld take the form of an Art Museum. This opinion, we believe, will be shared by a large number of the citizens. Indeed, a movement having for its object the erection of a museum of this character was begun about a year ago by a number of public spirited citizens, and a considerable sum has already been raised by private subscription towards the carrying out of the project. It is gratifying to learn that the Government are in sympathy with the undertaking, and it is to be hoped that the proposed grant from the Legislature will be given to assist it. Queen Victoria's reign was marked by a wonderful advancement in the arts and sciences, to which advancement her liberal encouragement was at all times given. A memorial of the character referred to would therefore seem to be a particularly fitting one. Toronto has now reached a position where an institution of this kind should be established. There are few cities of equal importance, especially from an educational standpoint, in which a home of the arts does not exist. The Ontario Association of Architects, in convention assembled, passed a resolution approving of the views expressed by the Premier of Ontario with regard to this matter. Application is to be made for incorporation by an Association to be known as the "Art Museum of Toronto," and a public meeting of citizens is to be held at an early date to consider and promote its establishment. If it should be decided to give it the character of a memorial to our late Queen, public interest in behalf of the undertaking would no doubt be stimulated, and the probability of the success of the movement enhanced.

ST. PAUL'S CHURCH, HAMILTON, ONT.

The city of Hamilton possesses in St. Paul's a church which is well worth the study of architects. The present fine building is old, as the age of buildings goes in Ontario, but the parish is older still, its history reaching back to 1833 when Hamilton was a village with a population of less than a thousand. In 1833 a

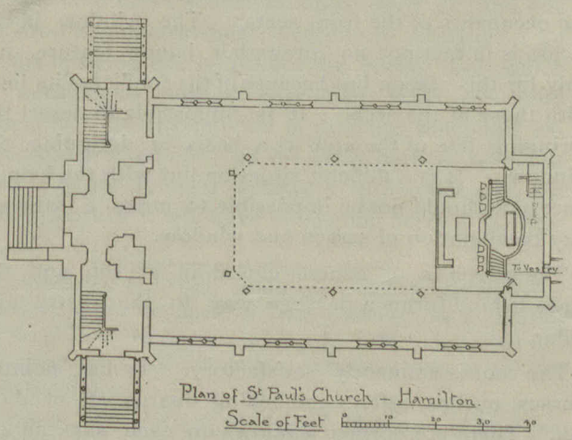


ENTRANCE TO ST. PAUL'S CHURCH, HAMILTON.

Presbyterian minister was first called to officiate regularly in Hamilton, and a small frame building on the site of the present church was built by his congregation and called St. Andrew's church. The founders of the parish lie in the churchyard, but they never saw the beautiful church which now protects their graves. Their headstones, inscribed in each case to the memory of a native of some county in Scotland, show that they went to their rest in the thirties and forties of the past century, whereas the present church was not built until 1857. But if the fathers of the church saw nothing of its present beauty they saw nothing also of the troubles that came upon the parish, beginning with the disruption of 1843 in Scotland which made its way to Canada in the following year. The congregation was first divided over this question, the minister leading off a portion to found a church representing the Free Church of Scotland. About ten years afterwards a second trouble began when the old church of St. Andrews was moved to another site in order to make room for a new building, which was begun in 1855 and opened for worship in 1857. Unfortunately for their peace, though fortunately for succeeding generations, the congregation overestimated their resources and undertook the erection of a more costly structure than they could finance. Though they raised the handsome sum of $30,000 there still remained a debt of about the same amount, and circumstances arose in connection with this heavy burden which led to the closing of the church for a time. Many members worshipped with neighboring congregations, while others built a brick church retaining the name of St. Andrew and the services of their minister. Thus it came about that when in 1876 there was an amalgamation of the divided congregation forming a body to resume worship in the new church it was found necessary to give up the name St. Andrew's to those who continued to worship in the brick church and to call the new church St. Paul's. But the bell which called the new congregation together for its first service was the old bell of St. Andrew's, the oldest bell in Hamilton, which still hangs in the tower of St. Paul's church.

The building was designed by William Thomas, of Toronto. It is of course a product of the Gothic revival and one of the better class of such products, in which an essential part of the aim was honest work. The construction is genuine; the spire is of stone throughout. As is often the case economy supervened when it came to the renewable appendages of porch and steps. These were originally all built of wood, but the front steps have been recently converted to stone and the porches will no doubt follow some day. This will be a great improvement, for not only is wood too mean a material for the entrances of so fine a church, but, as there was no attempt made to imitate the proportions of stone in the wooden porches, their slender design is somewhat too light for the substantial character of the main building.

The walls are of gray Hamilton stone backed by lake shore stone, which in the interior of the spire seems piled very high for such rough material. The details are well designed and well executed. The spire is truly elegant; the pinnacles which finish the tower have the appearance so common in this type of spire of needing unification, but they accomplish the purpose of enrichment for which they were intended. The crocketted gables over the belfry windows have an admirable effect of enrichment, and the spire is a model of well balanced ornament; with a band and dormers near the bottom to combine with tower and pinnacles, and just one well placed repetition of it near the top to give the eye a resting place which divides the spire in pleasant proportions into the beginning, middle and end which every composition should have. It is interesting to observe by blotting out this upper band with the finger how uncomposed the spire is without it and how impos-



sible it is to get the same effect of repose if the band is moved at all, either up or down.

It is a pity that the traceried window under the belfry is there at all. It does not look into the church as its size and ornate character would lead one to believe, but upon a passage way into the belfry. For this a very small window would have served and it would have

been better to have taken advantage of the facts so as to keep the wall plain at this point and increase both the size and richness of the entrance below which is now too small and too plain.

The gallery stairs give an opportunity for side gables to stop the slope of the roof which has usually such an unpleasant effect in combination with a spire.

The external defect of the church is want of length in the body, but an examination of the interior shows how this came to be. It is the gallery that provides lines for the interior proportion and on the inside proportion is satisfactory. There is no doubt the church would be a finer church without the side galleries, but if these galleries were to be taken down without at the same time lengthening the church the apparent width of the church in proportion to its length would probably be greater than the eye can guess in anticipation while under the influence of the present arrangement which is carefully composed. The pulpit is the centre of attention, and is given the importance which it should have and which it is so hard to give it when it stands alone, by placing it under the arch of a spacious recess. This arch spans the whole distance between the gallery fronts, with the effect of dividing the body of the church into a central portion with wings. Even above the galleries, although the roof is a clear span, to some extent the central portion governs the eye in estimating the proportions of the church, for the gallery fronts are a strong line running to the springing of the arch over the pulpit and meeting the top of the carved screen that backs up the pulpit and forms the tying line of the arch.

The treatment of the pulpit is admirable. The actual desk upon which the preacher rests his books is but a small point in the space at the end of the church, but the full spread of the steps which extend on either side has been utilized by enclosing them with a horizontal rail to increase the width of the pulpit and its platform to the utmost. What is lacking is made up by the screen behind which spreads across the whole width of the space under the arch, a distance of nearly 30 feet. The screen might well have been higher in the centre behind the minister in which case it would have served to blot out the lower part of the window behind and prevent the minister's head appearing en silhouette to the occupants of the front seats. The window in the recess is in fact not an altogether happy feature, not only for this reason but because of the conflict of its lines with those of the arch. It is impossible to desert the springing line of the arch as a basis in designing the window. It is a difficult situation but with the help of tracery it should not be impossible to make a satisfactory combination of screen and window.

The screen is of course closed in at top and the space behind forms a passage way to the vestry and cellar.

The roof is eminently satisfactory. It has pointed trusses, purlins, rafters and ceiling boards all of dark oak. There are dormer windows on each side, an addition to the original design, which, though they are rather poor in external detail have an excellent effect inside. The light shining in between the trusses increases the vigor while relieving the gloom of the roof and the dark colour of the roof matched by that of the seating below gives a fine breadth of effect in colour.

These are the main points that attract attention in a first visit to the church, but it has an attractiveness that increases with attention and forms a wholesome example in a country where there is more temptation to over freedom than to pedantry, of the merits of scholarly work.

CANADIAN SOCIETY OF CIVIL ENGINEERS.

The annual meeting of the Society was held in Montreal on Jan. 25th, when the following officers were elected: President, E. H. Keating, Toronto; vice-presidents, Messrs. G. H. Duggan and E. Marceau, Montreal; and C. H. Rust, Toronto; treasurer, H. Irwin, Montreal; secretary, Prof. C. H. McLeod, Montreal; librarian, W. H. Rice Roberts, Montreal; council, Messrs. J. Kennedy, Montreal; W. P. Anderson and G. H. Mountain, Ottawa; D. MacPherson, Montreal; P. S. Archibald, Moncton; H. J. Cambrie, Victoria, B.C.; W. R. Butler, Kingston; J. Galbraith, Toronto; James Ross, Montreal; H. S. Poole, Stellarton, N.S.; R. B. Rogers, Peterborough; R. Hering, New York; W. Chipman, Toronto; B. McConnell, Montreal; and C. B. Smith, Toronto.

MR. E. H. KEATING,
President Canadian Society Civil Engineers.

ILLUSTRATIONS.

RESIDENCE FOR MR. LEWIS SKAIFE AT WESTMOUNT, P. Q.—MACVICAR & HERIOT, ARCHITECTS.

The foundation walls are of limestone and the walls above base course are in red brick laid up with white mortar. The house is designed in "Old Colonial" style with woodwork of cornices, portico, and verandahs finished in white.

Entrance is obtained by wide flight of steps leading up to doric portico with columns on each side. The inner vestibule opens into a wide staircase hall with sliding doors giving access to drawingroom, diningroom and library. The broad staircase leading up to first floor will be finished in white and mahogany with oak treads and floors.

The kitchen is on ground floor with butler's pantry off dining room. A back staircase leads up to the first floor from pantry. The upper floors are arranged for bebrooms, nursery, large hall, sitting rooms, bath rooms, etc. The mantelpieces are designed in the Colonial style and the one in library is built of brick. The basement is utilized for workshop, heating apparatus laundry, etc. The heating is by hot water and the plumbing throughout is of the very latest style.

THE TORONTO ARCHITECTURAL EIGHTEEN CLUB EXHIBITION.

The exhibition of drawings belonging to the circuit of exhibitions of the Architectural League of America, which was obtained for Toronto by the association of the Toronto Architectural Eighteen Club with the League, has been an event in architectural circles in Toronto; and it is gratifying to learn that this is but the first of a series of such exhibitions.

We must however recognize that the exhibition was essentially an exhibition of drawing. It was the rendering that attracted attention principally, and was the principal field of effort on the part of the draughtsman. As such it was useful. Our own architects have not made a study of rendering as was evident from many of their exhibited works, and there is no doubt that this exhibition could give them some useful hints in the art of making attractive drawings. But it is well to enquire how far the art of making attractive drawings is helpful to the art of architecture. The real architectural drawing is of course the line drawing which marks the limit of surfaces only in order to define them for the purpose of measurement. Any other kind of drawing must be made either to help the architect to see his design in its perspective projection, or to represent to the owner the appearance of the executed work. The latter use has become a disease—a parasite that has fastened itself upon the profession, largely due to the profession's own eagerness to expose its wares. From the owner's point of view the practice is desirable, and in commercial ventures the profit in the new building often begins as soon as the design is made and a perspective can be furnished, for publication by lithography as an advertisement. The more realistic the representation and the more people going in and out of the door the better. But such drawings ought not to be called architectural drawings and there is no reason why they should be made by architects; indeed in the more lavish architectural circles they are done outside the office by specialists. The architects own work in the way of perspective and freehand drawing is done long before the design has reached the stage from which these finished drawings are made. The elevation is not the source of his studies but their product. By the time he has made up his mind enough to decide upon all points of his the elevation and completed the drawing of it his work on the drawing board is done; the rest is building.

For the purpose of this kind of tentative study the first essential is severe truthfulness. The motive of the drawing is the detection of faults; its purpose is not to show off the design but to show it up. Any kind of cooking, whether of the perspective or in the less bare-faced falsities of cloud shadows, improbable foliage, unrealizable beauty of colour, or a chic handling that is a ground of pleasure in itself is out of the question unless the designer wishes his studies to minister to self deception. On this ground Mr. Wilson Eyre, the genius of the exhibition, would be ruled out for the most part of his work. His drawings are works in themselves, and if the owner's right to the possession of drawings were to be established by the courts he would get in one of these preliminary sketches (if they are preliminary sketches) a possession for which the whole fee of one per cent. for preliminary drawings would sometimes be little enough. Mr. Eyre might, however, plead with justice that they are not architectural drawings but were made for his own gratification. They are in truth little pictorial creations founded upon his designs. Mr. Goodhue, Mr. D. A. Gregg and other skilful draughtsmen show their buildings by a drier light than Mr. Wilson Eyre does, but the excellence of the drawing too often consists in qualities of abstraction, colour and technique which would prove dangerous in a drawing intended for the scientific observation of a design by the designer. They are not therefore architectural drawings of the best type in spite of their excellences. A better model was the bird's eye view of the Pan-American exhibition sent by Messrs. Carriere and Hastings. This drawing had qualities of delicacy and clear modelling that gave it rank among the beauties of the exhibition, but its motive was a clear statement of the facts. This, the only motive that is reasonable in a purely architectural drawing, is not inconsistent with beauty, and as far as technical pleasure goes, to those who know the skill and knowledge required for its perfection, there is quite as much technical pleasure to be derived from its precise beauty as from the pictorial and decorative effects which a freer style accepts from accidents of material.

It may seem impertinent to speak of architectural drawing as a thing outside of the Beaux Arts rendering which is architectural rendering par excellence in the sense that the style is evolved from the theme and is exactly suitable for its expression. But herein lies its unsuitability for other themes, and all architecture has not the ideal conditions of that which is commissioned in the Beaux Arts schools and studios for a more splendid civilization in a better land than ours. That land of white marble colonnades with a backing of soft blue foliage is a land to dream of and to hope to go to when we die; but here, alas, white marble is not, and the trees are only green.

Yet it is from such a training as the students of the the University of Pennsylvania are receiving, who in this exhibition play like young Raphaels with the classic forms and make such beautiful drawings of their designs, that the best results may be expected not so soon however as would appear from the truly astounding skill they seem to display. Art is long. The law knows no change and respects no system, for art is not that which is planted in the mind but that which grows in it by the slow process of individual growth. But the result is all the greater for the enlargement of the mind in which the process of incubation is going on, and one great source of enlargement is facility in drawing. To have the drawing eye is to have the seeing eye which both consciously and unconsciously feeds the mind continually. If the interest in drawing which this exhibition has created does not die away without stimulating some of our younger architects to practice with the pencil and brush it will have done good service in Toronto.

Mr. Frederick G. Todd, landscape architect, of Montreal, whose office was in the Board of Trade building, lost a valuable collection of plans, books, etc., by the fire which destroyed that building last month. Mr. Todd has opened an office in the Bell Telephone building.

A book on "Bricklaying" by Owen B. McGinnis, of 810 West 128th street, New York, has just been published. It has been compiled from a series of articles on the subject contributed by the author to the professional and trade journals. The price of the book is not stated.

Mr. W. B. Hamilton, who for the past twenty-five years has been connected with the St. Lawrence Foundry (now the Canada Foundry), of Toronto, has severed his connection therewith, and has been appointed Western representative for Messrs. Drummond McCall Company, of Montreal. He is now located at 93 York street, Toronto.

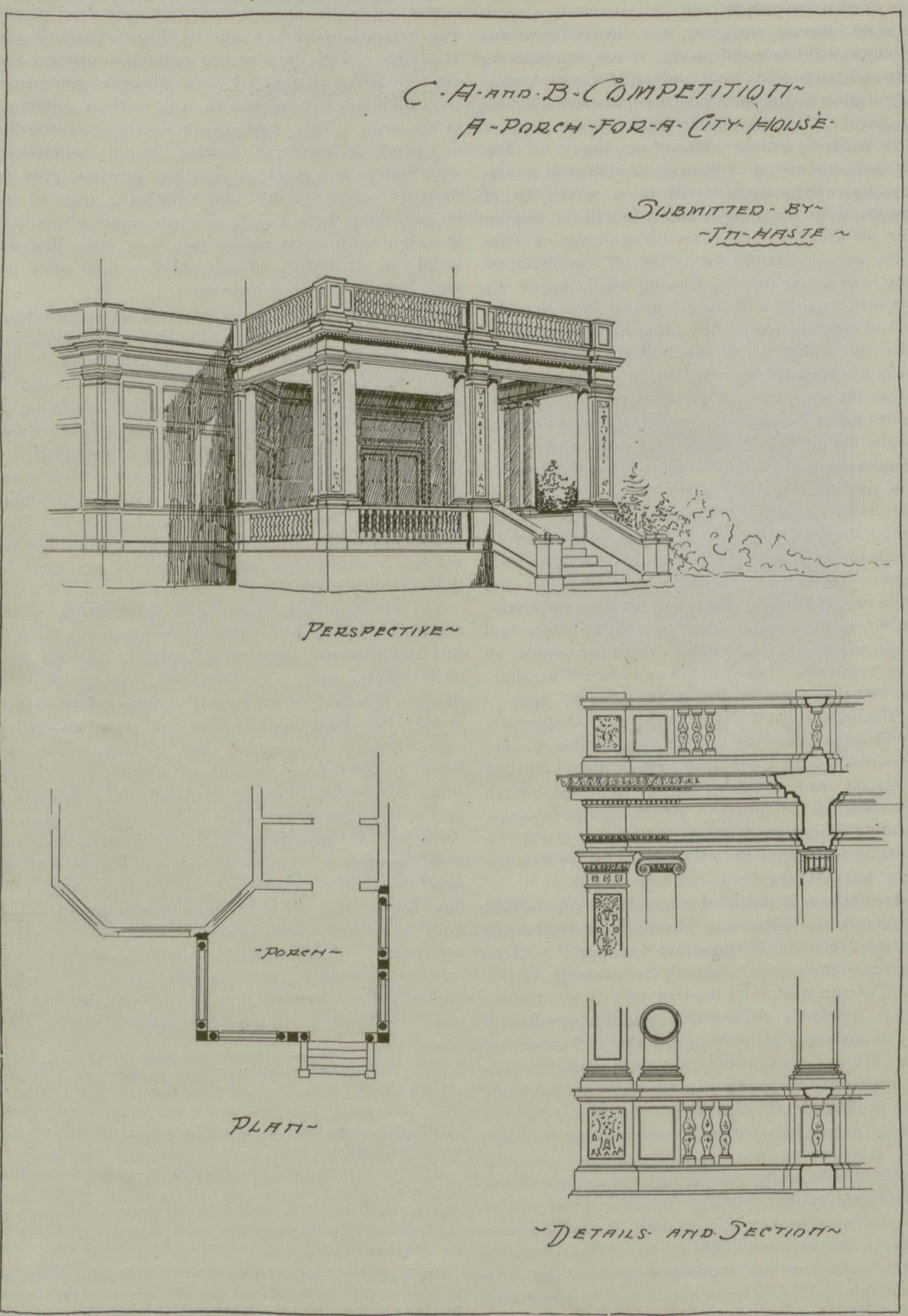
STUDENTS' DEPARTMENT.

CANADIAN ARCHITECT AND BUILDER STUDENTS' COMPETITIONS.

The committee appointed, by the Ontario Association of Architects to judge the merits of the designs submitted in these competitions have reported as follows:—

COMPETITION FOR VESTIBULE

"Victor" is placed first. This is a very commendable design in Italian Renaissance. The disposition of the somewhat luxurious features of its design, the plan, heights of doors, impost mouldings, etc., are correctly worked out in their relation to each other. We think the author is to be commended for having taken good advantage of the fact that there was no limit of cost,

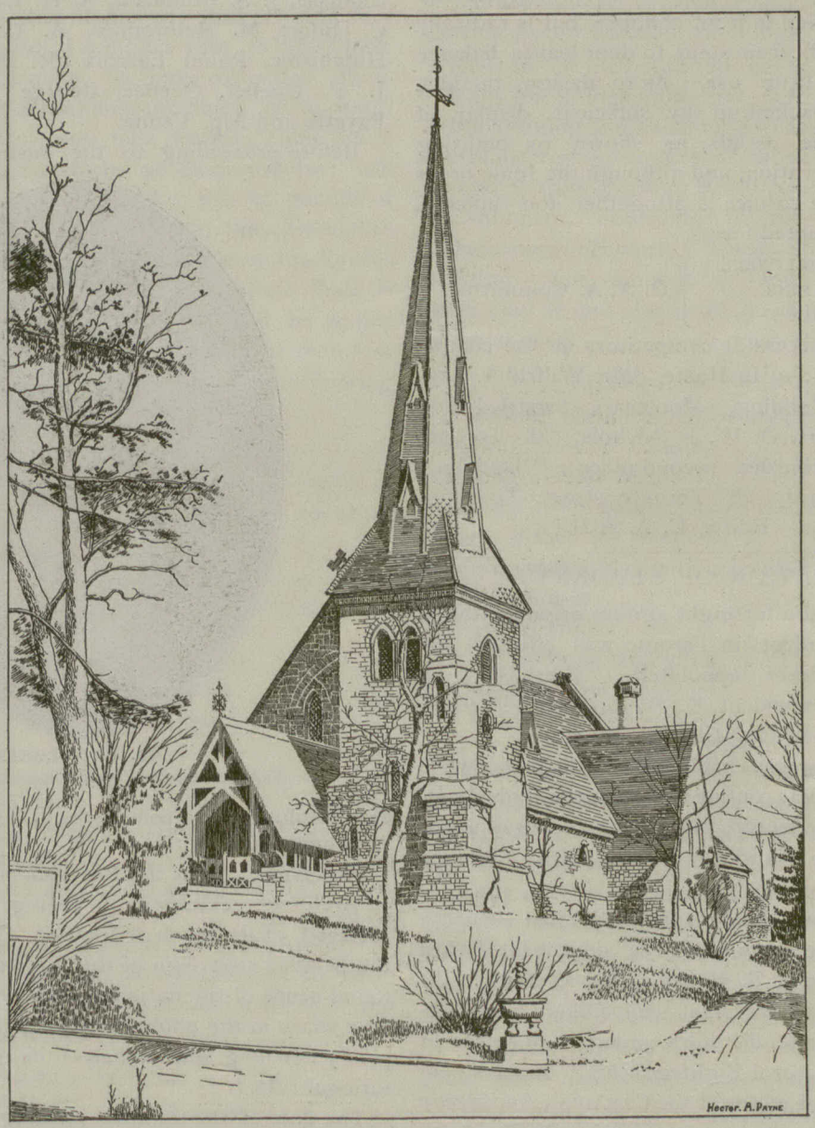


CANADIAN ARCHITECT AND BUILDER STUDENTS' COMPETITION FOR A PORCH FOR A CITY HOUSE—DESIGN BY "IN HASTE" (MR. WILLMOTT GAGNON, MONTREAL), AWARDED FIRST PLACE.

of having placed the problem on a high plane necessitating research and study, with corresponding benefit to himself. The rendering is clear, and displays good draughtsmanship throughout.

"Torch and Wreath" is placed second. This is a satisfactory, though not strikingly original "Old Colonial" doorway and vestibule. Its various details are of good type, though the lead work of fanlight of outer door is hardly in the spirit of the style. More light should certainly be provided in this vestibule, and this might be done by placing a window in one of the side walls. The rendering is good but a little shaky and uncertain in places.

"Drawing Pen".—We place the design marked by a drawing pen third, but must say, we had difficulty in deciding between it and "Jack," they being about equal in design and rendering, and having the same faults, a little too much elaboration, over panelling, etc. "Drawing Pen's" front door we consider better than "Jack's," the single panel in width being more suitable to such a door than the double one shown in the latter's design. The small window shown in section at line of capping of wainscotting would, we think, be better either larger or at least placed free from wainscotting, in which case the trim could be made as indicated in the elevation. Rendering is carefully done, and the sheet is nicely arranged, but we think it would be better if the author had taken the two pages permitted by the conditions to show his design.



CHAPEL ST. JAMES' CEMETERY, TORONTO.—(TORONTO ARCHITECTURAL EIGHTEEN CLUB JUNIOR COMPETITION IN RENDERING FROM PHOTO.)
FIRST PRIZE, HECTOR A. PAYNE, TORONTO.

"Jack."—This drawing, which we place fourth, is referred to above. Its general defect, both in design and rendering is "fussiness". The head-piece of interior door and window casings would be much better if higher, and so arranged that the picture mould would mitre with its cornice mould or at least stop against it.

"Check" and "Plus".—Of the two last designs, that signed "Check" is somewhat the better, but neither esigner seems to have taken the problem seriously, either from inexperience or lack of industry, and both have overlooked the fact that the competition was for a complete vestibule.

[The names of the successful competitors in the competition for vestibule are: "Victor," (Mr. Willford A. Gagnon, 590 Temple building, Montreal,) awarded first position; "Torch and Wreath," (Mr. George C. Egg, 24 Tupper Street, Montreal), awarded 2nd position; "Drawing Pen," (Mr. Wm. G. Murray, Albion Building, London, Ont.,) awarded third position.—EDITOR C. A. & B.]

COMPETITION FOR PORCH.

"In Haste."—This is evidently intended for a stone porch. For a porch of its pretensions, the foundation looks altogether inadequate, and should have had plinth and cap moulding. The balustrade over cornice is too heavy, the introduction of the panels flanking the posts increasing this defect. The parapets of steps lack grace, through want of proper ramps and want of thought in design of pedestals. The rendering of section shows some care, but the plan and perspective are evidently hurried work. The projection of the shadows in latter are incorrect and line work unsatisfactory. Although we place the design first, we think it is to be regretted that the author did not devote more time to its perfection.

"Gains" is placed second, as the design, while rather that of a verandah than that of a porch, shows a good knowledge, both of construction and design. The scheme of the heavy projecting eaves, and the general simplicity of outline and detail, are commendable. As the frieze would of necessity be "built up" the arched soffit would be unsatisfactory and would seem to be an attempt to get the effect of stone in a wood construction. The rendering has little character and indicates lack of practice, the tree and foreground being very scratchy.

"Dodeka," who is given third place, shows a plan which is original but hardly commendable. The jutting

of vestibule into porch is a serious defect, and takes away from the usefulness of the floor space. The general character of the design is simple and pleasing and shows an appreciation of the natural use of materials employed. It also has a domestic feeling, which is appropriate. The rendering, though somewhat rough and careless, is fairly effective.

"The Imp" shows a cleanly executed drawing, without exhibiting much knowledge of effective line work, particularly in the shadows under porch and the trees in the distance. The plan itself deserves special mention, being probably the best sent in, the steps directly opposite the doorway leaving the octagonal space available for use, without being interrupted by the traffic to the front door.

"Ajacks" (Ajax?)—This plan would be improved by giving more projection in front of house, but is radically defective in that traffic from steps to door leaves balance of floor space of little use. As to design, the idea is good, but not backed up by sufficient display of knowledge of classic details, as shown by omitting abacus of caps in elevation, and although the Ionic order seems intended, the cornice is altogether too radical a departure from accepted forms.

GRANT HELLIWELL
JOHN GEMMELL
A. H. GREGG
} O. A. A. Committee.

[The names of successful competitors in the competition for porch are :—"In Haste" (Mr. Wilfrid A. Gagnon, 509 Temple Building, Montreal), awarded first place ; "Gains," (Mr. D. W. F. Nichols, 28 Toronto street, Toronto), awarded second place ; "Dodeka," Mr. W. F. Sheppard, 28 Toronto street, Toronto), awarded third place.—Editor C. A. & B.]

ORGANIZATION OF STUDENTS.

AT a meeting held a fortnight ago an organization of the architectural students in Toronto was effected, and the following officers appointed : President, D. W. Nicholls ; vice-president, E. H. Russell ; secretary-treasurer, A. M. Weir, 225 Clinton street.

A second meeting was held on the 5th inst., when after disposing of some routine business, the students attended in a body the lecture given by Mr. Kelsey under the auspices of the Toronto Architectural Eighteen Club.

A third meeting was held on the 12th inst., when a small summer cottage was set as the subject for design by the members, Mr. J. P. Hynes acting as critic. At this meeting it was decided that the members would attend and support the studio work under the auspices of the Toronto Architectural Eighteen Club. It was also decided to request the editor of the CANADIAN ARCHITECT AND BUILDER to give greater attention to the Students Column in that publication, and that the club would support any competition for students which might from time to time be conducted by the CANADIAN ARCHITECT AND BUILDER.

A method of keeping track of the names of the colors in a tin color box is to paste upon the flap each of the labels. The colors and labels will bear a relative position to one another. When the case is used this idea is a good one but a better scheme is to paste the label to the pan, then the color tells its own name.

Draughtsmen experience an annoyance sometimes by having their Indian inks upset. This bother may be overcome by making a little wooden stand in which are bored a number of holes comparing with the number of colored inks used.

MR. F. S. BAKER.

Mr. F. S. Baker, first vice-president of the Ontario Association of Architects, has recently been elected a Fellow of the Royal Institute of British Architects. Mr. Baker is the first Canadian to receive this honor.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

A special general meeting of the Province of Quebec Association of Architects was held last month in the association's rooms, 112 Mansfield street, when several amendments to the by-laws were adopted. The chair was occupied by Mr. Jos. Venne, the vice-president. There were present: Prof. Capper, Messrs. Alcide Chausse, J. S. Archibald, A. H. Lapierre, L. A. Amos, C. Dufort, M. Helbronner, A. C. Hutchison, G. N. Hutchison, Raoul Lacroix, R. P. Lemay, Quebec, J. P. Ouellet, Quebec, George W. Wood, Eugene Payette and Alp. Venne.

Before proceeding to the business of the evening

MR. F. S. BAKER,
First Vice- President Ontario Association of Architects.

this resolution was passed, read by Prof. Capper, all members standing :

Resolved : That the Province of Quebec Association of Architects expresses its deep grief at the sad tidings received of the death of Victoria, Queen and Empress, the beloved sovereign of this Empire, recording its profound sense of the national loss that has befallen all who share in the noble heritage bequeathed to her people by her long and blameless life of beneficient constitutional rule."

The date of the annual meeting was changed from September to January, which was considered to be a more convenient date, as the books of the association are closed on December 31st. The council will meet twice a month, first and third Tuesdays, instead of once, as heretofore. Examinations will take place both in Montreal and Quebec, if there are candidates in each place.

The twenty second annual exhibition of the Royal Canadian Academy of Art will be held in the galleries of the Ontario Society of Architects, Toronto, on April 12th. An effort will be made to send a representative collection of Canadian art to the Pan American Exhibition at Buffalo.

Mr. Richard Dinnis, the well known builder, of Toronto, delivered a lecture on the 8th inst., in the Beverley Street Baptist church in that city, on "Rambles in Italy." The lecture, which was illustrated by stereopticon views, was highly interesting and greatly appreciated.

POINTERS FOR ESTIMATORS.

When making an estimate for amount of material required for laying a floor of given dimensions, it should be remembered that a thousand feet face measure of rough stuff, is reduced about 25 per cent. by planing and matching, and when bought at a factory, it is measured out as rough lumber, therefore, you pay for 1,000 feet and receive only 750 feet of actual covering. This is accounted for because of the fact that the mill owner—to make a reasonable profit—must sell out his lumber as he buys it in, and estimators usually make their estimates accordingly. If the flooring be narrow, 2 or 3 inches on the face, a larger percentage must be allowed. It is true, however, that at some mills flooring and other matched stuff is sold face measure, but is charged at a higher rate to cover loss. It is always better, however, to make estimates allowing 25 per cent. over actual measurements of flooring.

In laying a pine floor, one man working nine hours a day, will lay 625 feet, which, at $2.50 per day, will cost $4 per 1,000 feet. If we add to this 35 pounds of nails, which will be required for same, they, as well as cost of flooring must be added. In this case the figures cover 1,000 feet in actual face measure. If the floor is of hardwood and very narrow, 500 feet will be a fair days work for one man, and more nails will be required. There is generally more waste in hardwood flooring than in pine.

COST OF BALOON FRAMING.

The following figures are based on a day's work of nine hours, and at $2.50 per day, and not counting cost of materials or nails :

For framing and placing sills, per lineal foot	2
Double plates, framing and placing, per running foot	2
Girts, framing and placing per foot	1
Cutting and nailing in bridging per piece	½
Joists, 2x6 to 2x14, framing and placing per 1000 feet	3.50
Studding, 2x4 to 2x6, framing and placing, per 1,000 feet	6.25
Rafters, gable roofs, framing and putting in place, per 1,000 feet	8.25
Rafters in hip roofs, framing and putting in place, per 1,000 feet	10.00

Nails to the 1,000 feet, 10 penny common, 14 lbs.

Spikes to the 1,000 feet, 20 penny common, 10 lbs.

Ten per cent. to be be added to the labor for each and every storey over and above two.

FRAME COVERING.

Sawing and putting in place sheathing or sheeting, per 1,000 feet	2.50
Laying on paper, per roll, 500 square feet	25
Putting up 6″ x ½″ siding or ceiling boards, per 1,000 feet	6.25
To placing 4″x½″ siding or ceiling boards, per 1,000 feet	10.00
Putting on 1″x6″ drop siding, per 1,000 feet	5.00
To laying shingles, per square	1.10
Preparing and placing corner boards and base, from strips to size, per running foot	2

Nails for inch stuff, per 1,000 feet, 25 lbs.

Nails for ½ inch stuff, per 1,000 feet, 18 lbs.

If sheathing is nailed on studding diagonally, add 15 per cent. for extra labor, and 10 per cent. for waste.

ROOF AND CORNICE.

Sheeting roof, per 1000 feet	$ 3.00
Laying on paper, per roll	25
Spreading on mortar, per square	$ 30
Laying on shingles, per square	1.10
Boarding hip roof, per 1,000 feet	3.60
Shingling hip roof, per square	1.30
Putting ridge boards and rolls, per running foot	4
Ridges, etc., on hips, per running foot	5

To these prices add 10 per cent. for each and every story above two, and for very steep and broken roofs.

Nails for inch boards, each 1,000 feet, 25 lbs.

Nails for shingling, each 1,000 feet, 3½ lbs.

For plain cornice, consisting of planceer, facia and frieze, per running foot	$ 7
Cornice, with bed and crown moulding added	10
Cornice, with brackets at intervals, for each bracket	5
Cutting gutter bed and trimmings, per foot	3

Nails for ⅞ inch stuff, 8d, per 1,000 feet, 30 lbs.

Nails for ¼ inch stuff, 10d, per 1,000 feet, 40 lbs.

For framing and finishing porches complete, including shingling, railings and other work, the labor may be figured at from $1.00 to $3.00 per foot, as the longest measurement, according to the style of finish and elaboratness of work. These prices do not include painting. The amount of nails required for porch work may be put down at 30 lbs. per 1,000 feet of material used.

WINDOWS, DOORS AND FRAMES.

For making plain frames for weights	$ 85
Setting frames in building	20
Hanging outside blinds	25
Hanging inside blinds, 50c to $1.00	50
Fitting sashes for window	15
Hanging sash and trimmings with locks, lifts, etc.	30
Casing window	25
Putting in stops	17
Putting on band moulding	10
Fitting stool and apron	15
Total for each window	$ 2.82

When window frames are bought at the factory, and there are no blinds or band-mouldings to hang and plant, windows may be figured for setting, hanging and casing complete, each $1.00. About the average quantity of material required for one window frame in common homes, allowing for waste, on a basis of a two light window 24 in. by 36 in., and a door 2 ft. 8 in. by 6 ft. 8 in., will be about as follows :

Window jambs and heads, with drip on sill, per running foot	18 ft.
Door jambs and heads, per running foot	18 ft.
Outside casing, window, per running foot	18 ft.
Outside casing, door, per running foot	19 ft.
Inside casing, window, with apron, per running foot	20 ft.
Inside casing, door, for each side, per running foot	18 ft.

About the same quantity per running foot will be required for mouldings and stops for doors or windows.

Cost of making plain door frames, each	$ 65
Making plain frames for door, with transom, each	85
Setting frames, each	20
Hanging transoms, each	25
Casing one side, each	16
Casing two sides, each	32

Casing frames with transoms, side add 5 cents, two sides add 10 cents.

Putting on stops	$ 9
Band moulding, one side	10

Band moulding, two sides	21
Laying thresholds	10
Fitting and hanging common doors	25
Putting on rim lock	7
Putting on mortice lock	20
To make and set frame, hang and trim door with mortice lock, case two sides, with transom but no band moulding, each	2.25
If the frames are bought at a factory ready made, the doors may be figured for setting frame, hanging and casing complete, each	1.50
To hang a batten door and trim with latch	50
To make a batten door, with screwed cleats	75
To hang a pair of sliding doors, including all fitting, trimming and adjustments, from	$3.50 to $12.00

FLOORS, WALL TRIM AND STAIRS.

To lay 1″ x 6″ pine floor and blind nail to each joist, per 1,000 feet	$4.00
To lay 1″ x 4″, per 1,000 feet	5.00
To lay bottom floor of shiplap or other wide stock, per 1,000 feet	1.50
To lay paper between, per roll	25
To lay paper between, per roll	35
To lay porch or verandah floors, with joints white-leaded, per 1,000 feet	5.50
To fit and place plain or moulded base, consisting of one member, per running foot	1
For base with two members	2
Two members with cap	3

Base angle blocks to be used in each case to avoid coping.

To lay carpet strip or to put up picture frame mould, per 100 feet	40
To put up ceiling boards overhead, if 4″ wide, per 1,000 feet	8.00
To make and set up cellar steps, open housed into string, per step	12
To make and place cellar steps with risers, housed strings, per step	25
To make and place boxed stairs between walls, housed and moulded, per step	40
To make and place same with windows well fitted, per step	60
To make and set up in place open stairs, treads 1¼ in. thick, 3 ft. 6 in. or less in width, 7 in. rise, 10½ in. tread, with nosing and cove cut square against the string and all nailed, per step	65
Same, with risers united to string	72
Same, housed into string	90
Same, mitred riser, blocked and glued	1.10
Same, mitred riser, blocked and glued, nosing returned, per step	1.20
Same, with scroll brackets	1.40

If windows are required in a flight of stairs, charge extra, according to number of windows, at the rate of from 35 to 45 cents each. If stairs have a quarter turn circular the cost will be very much increased, as the strings must be made circular to suit the stairs, cost per step, $1.75. This price is for both flyers and windows, or all the steps in the flight. Stairs having landings must be figured out differently. Each short flight must be charged up according to schedule given, and the landings figured by themselves, allowing for extra nosing, cove or other mouldings.

Neither stair rail, newels or balusters are considered in the foregoing. Newels are worth from $1.25 to $25.00 each, and balusters run all the way from 8 cents to $1.50, according to the material used in making them, and the amount of work laid out on them. Hand railing is worth from 10 cents to 45 cents per running foot. To frame and set up a newel post with wedges and keys under floor, is worth from $1.50 to $2.00. To cut in balusters, dovetail ends for ends of treads, bore rail, and glue in baluster is worth: For 2 in. bal. 18 cents, 2½ in. bal., 20 cents, 3 in. bal., 21 cents, and for larger sizes in proportion.

In putting up shelving, nailing on cleats and otherwise preparing for 12 inch shelving, charge per running foot	04
For wardrobe hooks and strips all put in place, charge for each hook	03
To make 4 drawers and fit up properly in closet or bath room	2.50
To case and fit sink with drip board and splasher	1.00
To make and place batten doors for cupboard, 2 x 4 feet, complete	1.00
To case an ordinary bath tub with matched pine.	1.00
To panel bath tub in hardwood	4.00

BY OTHER METHODS.

The following schedule of prices is sometimes used by experienced estimators for obtaining the cost of labor on wooden buildings. It is a sort of bulk method of arriving at the cost, and may do very well in experienced hands, but we warn the young contractor that it is somewhat unreliable, and had better not be employed unless experience warrants it.

For framing and placing dimension stuff in building, per 1,000 feet, b. m	7.00
Sheathing sides per square, measured in the building in each case	30
Roof, per square	35
Roof hipped, per square	45
Roof very steep, per square	50
Siding, 6 in. x ½ in. per square	60
" 4 in. x ½ in., "	85
" drop, 1 in. x 6 in., per square	50
Shingles, per square	1.00
Floors, 1 in. x 6 in., per square	25 to 50
" 1 in. x 4 in., per square	30 to 60
Ceiling, outside, per square	75
Ceiling, overhead, per square	85
Wainscotting, per square	1.75 to 2.25
Openings, to put up jambs, hang and case a door, two sides	1.50
To hang and trim a door	50 to 75
To hang, fit and trim sash	50 to 75
To case window, fit stool and apron	1.00
To hang outside blinds, per pair	75
To hang inside blinds, per pair	75 to 1.00
Plain cornice of 3 members, per rnnning foot	08
Painting, 1 coat of shellac, material included, per square	50
1 coat lead and oil, material included, per square.	75
2 coats " " " "	1.50
3 " " " " "	2.50
Sanding one coat, material included "	75
Graining " " " "	2.50
Calsomining 1 coat, material included, "	60 to 75

Plastering of course is always counted by the yard, plaster cornices by the running foot, chimneys for wood buildings are also reckoned by the foot in length (see table stone foundations by the cord.

SYDNEY, N. S., BUILDING NOTES.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

Each week gives further reason to believe that Sydney will increase continuously and rapidly for some years to come.

Messrs. Rhodes, Curry & Co., Limited, of Amherst, have one of their most important branches now in Sydney and have been doing an enormous amount of work. The manager here is Mr. A. S. Curry and he has about him a very large staff of clerks and workmen. The factory is large and well equipped, though most of the machinery came down from Amherst. The difficulties in transit and slowness of delivery render the necessity of keeping a large stock imperative. The firm acts as large suppliers and dealers in lumber and all sorts of building materials. About 200 men of all classes are employed in Cape Breton by this firm in this vicinity. Next summer there will be over 300 needed. A contract for construction at Glace Bay of three hundred double houses, making 600 tenements for the Dominion Iron & Steel Co. is now being filled. These are to be completed by the end of this year. All are identically alike, being of a storey and a half, size 24 x 40 and they will cost in vicinity of $300,000, the cost of each being therefore about $1,000. The houses are to be clapboarded, with cedar shingle roof, spruce kiln dried floors, plastered, with base and chair rail, two grates in each. They stand upon cedar posts and have no cellar. They are to be painted with red body and green trimmings. A previous contract for 70 of the same houses was completed some months ago. These had concrete foundations costing slightly more. Ten shacks were also built 26 x 120 clapboarded with shingle roof. Among other contracts in the vicinity are :

The town building, size main 52 x 48, hall 42 x 36 of brick with slate roof, cost $14,000, to be completed this month ; round house, I.C.R., six stalls, built of brick, cost $15,000,00, contract secured last fall, to be started in spring ; car shop for D. I. & S. Co. at Glace Bay, size 150 x 70, of wood, cost $5,000 ; store, Glace Bay, for McCarel Bros., size 30 x 100, three stories, of wood, cost $8,000, just completed. This store is of oak finished interior, hot water heating and lighted with its own electric plant ; residence Edgar Morely, of wood, cost $5,000, with heating, to be completed in spring. Others constructed by them were the Commercial Bank of Windsor, Ross block and Browse block of brick, and the Thompson building, Record building, and stores and tenements for Norman McDonald, and many others of wood. The firm expresses confidence that Sydney is but beginning operations.

Among the best known contracting and building firms in Sydney as well as in Nova Scotia or the Maritime Provinces is that of James Reid & Sons who are now completing the handsome Bank of Montreal building here.

Messrs. Schurman, Lefurgey, Clark & Co., which firm is a Prince Edward Island concern with a big record for business in that province, have developed a large business in the past year in Cape Breton, and are now doing most of their trade from Sydney. The firm is well known, and is a popular one in the growing town. They have offices and buildings on Water street. The Sydney Academy is being erected by them. It is of brick with eight foot Wallace greystone basement, cost $25,000. They recently completed the Sydney Club House at a cost of $10,000. This is a handsome building designed by Mr. Sturgies, a Boston architect, who presented the club with the plans. They carry a full line of building materials, manufactured and rough. This firm bring doors in carload lots from the factories of the Rathbun Co., Deseronto, Ont., a distance of over 1200 miles, and find them a cheaper and much better article than can be obtained nearer. The freight amounts to only about 10 cents a door.

John Morley is one of the builders who grew up with old Sydney. He has done a large amount of work, including some 30 residences ranging from $1,000 to $4,000. He built Mr. H. C. Harrington's residence at a cost of $6,000. He thinks trade prospects are excellent for the coming year.

Messrs. Stevenson & Farlinger have been in Sydney about a year and have good business. They have been handling a number of contracts during the winter, among which was Mr. Burns' double residence costing about $7,000. Mr. Stevenson is a son of Robt. Stevenson, contractor in St. Stephen, N. B.

Andrews Bros. & Boutillier have done a large amount of building and put up nine dwellings and business blocks in the past year.

The contracting firm of Wood & McBeth have on hand for winter work some 40 jobs, including mostly plaster and mason work in all their branches. The firm does not handle wood work. They have plastered about 200 houses. They did the Bank of Montreal, which is the most important job in this line particularly in the town. The firm came here a year ago from Amherst.

Spurr & Isreal do largely brick work and plastering. They came here from Boston during the past year. They have found business good and have many orders for spring. Winter work has been pushed forward in spite of severe weather.

The Sydney Mfg. Co., Limited, opened up about a year ago, having bought out the stand of E. W. Johnston. They opened up a full plant for sash, door and frame manufacture, as also all kinds of mouldings, etc. Though they have been contracting and building they expect to stop this and devote their attention to manufacturing. Over 20 hands are employed in and about the mill.

Chappell Bros. have just changed the name of the firm to Chappell Bros. & Co., Ltd., R. R. Chappell being manager. The new firm is now erecting a new wood-working factory for doing a full line of work. The building is about 60x100, and of three stories. This firm has done a large amount of building of late years in Windsor, where they have a factory. Much of the machinery will be brought here from it. They have been employing about 80 men in building construction, and have put up a large number of residences and buildings. They built 40 or 50 buildings in Windsor after the fire.

Shaw & Beairsto is one of the best known firms of plumbers and contractors for heating in Sydney. They employ about 20 men at all times. Their headquarters are on Prince Edward Island, and they employ about 15 men in their shop at Charlottetown. They came here last summer, and opened up at once a heavy trade. Among their best contracts is the plumbing of the Moxham residence. In this building a large amount of the fittings from Mr. Moxham's old house in the United States have been used, so that the plumbing contract is not so large as might be expected. They have also done the plumbing in the Cape Breton Club House, and in a large number of houses and residences here. In Charlottetown they are filling a $3,000 contract for plumbing of the addition to the asylum. They did the work on the Prince of Wales College there and several important buildings recently.

C. Estano, the well-known plumber, came here from Moncton about a year ago and has opened up a good stand, in which he does a good business. The Ross block was done by Mr. Estano, the heating being by hot water, using a Robb boiler with twin connections. He is doing the new civic buildings, which are being heated with hot water, a Gurney Bright Idea boiler being used. Mr. Estano has been using the Gurney-Massey radiators altogether. He has done a large number of residences and expects the coming spring work to be heavy.

The firm of Bayer & Company came here from Halifax and opened up about a year ago in the plumbing business, now doing general heating and plumbing. They carry a full line of equipment.

A. C. Thompson & Company do a large business in all lines of heating and plumbing in North Sydney and Glace Bay.

The Wallace Greystone Company Limited have been doing a large business during the past year from their quarries in Wallace, N.S. The stone turned out from these quarries has a wide reputation and has been used all over the eastern part of the continent. Huge shipments have in the past been sent to Montreal and Toronto, and to Boston, New York and other New England points. The quarries are about a quarter of a mile to the rear of the little village and upon a high knoll, in such a position that when once raised from the pits it is very easy to transport the stone to the wharves below, the stone practically slipping down the hill to the wharf. A large number of powerful derricks are in use and steam engines furnish the required power. Not only in quarrying and removing but in shipping are the facilities excellent. The harbor is a very safe one and no tugs are required for the vessels. The sandstone is of a blue grey color of very even shade and will retain its color. It splits very evenly and smoothly, being specially famed on this account for flagstone use, engineering and dimension work in general. Much has been shipped from here to the island, the cathedral in Charlottetown being one of the many buildings over there in which it was used. Large quantities have gone to Sydney in the past year. The new residence for Mr. Moxham, the manager of the Dominion Iron & Steel Co., is constructed of it.

An addition to St. Francois Xavier college, Antigonish, which cost $16,000, was completed in the latter part of last year. It consisted of a brick and stone ell to the main building of about 92x49 feet in size and of three stories.

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 w ll, 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 the issue following their appearance.]

A Quebec subscriber wishes to know "why we can see the ceiling battens through the plaster, or the centering of a coved ceiling or church vault, through either plaster or ⅞" boarding?"

ANSWER: The lines of lath showing through a plastered ceiling is due in a great measure to the plastering being too thin, or because it may be only two-coat work. The dark lines are caused by dust penetrating through the mortar and discoloring it. This dust or dirt gathers in the space between the flooring or other covering and the lathing and plastering, settling on the latter, thus discoloring it. The lines of lathing seldom show through on vertical walls. With regard to the "ribs" of a vault, or groin, showing through ⅞" ceiling boards, we cannot well account for this. If the boards are well "matched" and well fastened in place, we see no reason why the "lines of the ribs" should show through, under ordinary conditions. We have not, to our knowledge, ever met with a case of this kind. However, if the boarding is finished in a natural state and simply varnished, the spaces between the "ribs" may darken because of the absorption of dust, the same as the plastered ceiling.

Mr. Chas. Baillarge, architect and engineer, of Quebec, offers the following suggestions with regard to this subject:

"I had long wondered at this phenomenon without a serious endeavour to attempt to explain it. On now looking into the thing I seem to incline to one of some three different theories.

"My first idea was that the plastering overlying the battens or centreing must, by having its moisture sucked from it by capillarity, dry quicker than that over the intervening spaces, while the latter remaining wet for a longer time would cause dust and smoke to adhere to it more easily, sink to a certain depth into it as the grime of the atmosphere does into stone and marble and especially under the fog and smoke-laden air of London or Liverpool, requiring not merely washing to get rid of it but the removal of a certain film or thickness of the surface by refacing to get to the bottom of it; but this theory can hardly be made to apply to wood which is generally made very dry before it is used for ceiling or lining purposes.

"Again, if not due to mere adherence by moisture, there is the theory that the ether which permeates all space may in passing through the plastering and woodwork between the battens or where there is least resistance, carry with it the finest particles of dust and smoke depositing them on their way through and thus darkening and blackening the medium; while where the mortar or wood work overlies the battens and centreing the flow of ether is more impeded. Or may it be if the action of the ether be waived, that the air, though it cannot actually blow or be blown through the medium, may nevertheless slowly filtrate through it, leaving its dust or micro organisms on the way, as water does in filtering through sand; and here again the greater resistance of the supposed air filtration through the wood or plaster where backed by other wood would explain the less tendency of these portions of the vault or ceiling to become dark or black.

"There is again another or a third mode of conceiving the phenomenon, that of translucency or diaphaneity. Lay strips of paper on a dark ground separating them as if battens or cove centreings. Put a sheet of paper over these representative of the coat of plaster or wooden lining and the dark under surface can be plainly seen between the underlying strips or battens. Light can be seen through veneering woods, through cardboard, strips of bone or ivory, through chinaware and the like, and I am inclined to think that this may be the true explanation of the phenomenon; or may there not emanate from our system more piercing rays of light than those which are subject to reflection: rays of light analogous to the invisible and actinic ones beyond the solar spectrum, rays more pene trating; or who knows but what the electricity in our system may generate X or roentgen rays which penetrating the plastering or wood lining may reach into the darkness beyond and make it visible, while where there are centreing and battens the depth to be gone through to reach the darkness and render it visible is too great to allow of an equal amount of visibility.

"I am no pure scientist, physicist or chemist, but I am sure, Mr. Editor, that it cannot but be interesting and instructive not only to the architect himself or builder, but to the world in general to learn the why or wherefore of this apparently anomalous idea of seeing through wood and mortar, and that we shall all feel indebted, myself the first, to anyone who can satisfactorily solve this problem, bordering as it does so to say on the mysterious or at least on the parodoxical.

"Or may not each of the three theories or hypotheses or any two of them act or work together in producing the phenomenon, since neither of them in this case excludes the other.

"The explanation is moreover complicated by the fact that this visibility of the darkness is in no way sensibly diminished by one or two or more coats of paint which should not only render the medium seen through less translucent but by sealing or closing the pores of the plastering or wood work act as a bar or impediment to the dust and grime being sucked into them."

A Northwest subscriber asks: Will you kindly advise me as to what is considered the net contents of a barrel of Portland cement, also which brand you think is best for foundation footing?

ANSWER: The net contents of a barrel of Portland cement is 350 lbs. There ts no special brand of cement which is particularly adapted to foundations. All good quality Portland cement is suitable for this purpose.

ANS. TO T.V.: Perhaps the trouble with your red oak is because of its being dried too rapidly. It is a coarse, open-grained wood, shrinks a great deal, and when dried too quickly and in a dry heat, tears the fibres apart and causes honeycombing. The best way to season woods of this kind is to steam them and "sweat" all the sap out of them, then they should be gradually dried. If dried in a kiln, it should not be heated higher than from 110 to 120 degrees at first, but, when the lumber is nearly dry, the heat may be increased to 150 degrees, but never higher, or the stuff will be case-hardened, and, to some extent, spoiled.—OLD DEALER.

ANS. TO W. D.: Books on Gothic architecture are many, and ought to be easily obtained. I daresay the editor of the CANADIAN ARCHITECT AND BUILDER could procure you any quantity of them. Among the best, I would

reccmmend: "Details of Gothic Architecture," measured and drawn by J. K. Colling; "Gwilt's Encyclopedia of Architecture"; "History of Gothic Art in England," by E. S. Proir, M. A.; "Gothic Architecture," by H. E. Corroyer; "Pugin's Architecture," and "Parker's Gothic Glossary."—ARCHITECT.

ANS. TO JAS. N.: Instead of nailing the guard of your "pitch-board" on the edge of the "run," leave "pitch-board" wide enough to screw guards in each side, then when you want to change the "pitch," unscrew the guards and place wherever desired. For proportioning steps of stairs, see article on "Treads and Risers" in February number of CANADIAN ARCHITECT AND BUILDER for 1900.—CARPENTER.

From JNO. W., Hamilton, Ont.: What is the distinction between the terms "dead load" and "live wall," when applied to the construction of floors?

ANS.: The term "dead load," as employed in mechanics, means a steady, quiescent load, as the weight of the material itself employed in constructing the floor, or a load of stone or other similar immovable body. A "live load" means a moving body or a moving load, as a crowd of persons, animals, boxes, bands or other articles liable to frequent moving. It has been found by experience that the effect of a live load on a beam or other piece of material, is twice as severe as that of a dead load of the same weight, and hence a piece of material designed to carry a live load should have a factor of safety twice as large as one designed to carry a dead load.—H. F.

From B. J. F., North Bay: I have a turned wooden bridge to throw across a creek, some 72 feet of a span, the ends resting on piers built on each side of the creek. I would deem it a great favor if anyone of your many readers would publish a design of a truss suitable for the position? The bridge is for road traffic, stands over a deep ravine and will be wide enough to admit teams to pass one another—say 14 feet wide. The deck will be planked over with 1½ inch plank. The timber used for construction is specified to be all of Norway pine, with exception of the planking, which may or may not be of the same material.

In reply to an Ottawa correspondent who asked for information regarding closets in public schools the following is submitted: "The closets must not be less than 2 feet 3 inches clear in width nor more than 3 feet; should be well lighted and ventilated and properly screened or divided. More than one seat in each closet should not be allowed. The table given beneath shows the number as near at possible of seats required for a given number of children. For boys, of course, there must be urinals provided in proportion.

	For Girls.	For Boys.	For Infants
Under 30 Children	2	1	2
" 50 "	3	2	3
" 70 "	4	2	3
" 100 "	5	3	4
" 150 "	6	3	5
" 200 "	7	4	6
" 300 "	8	5	7
" 400 "	9	6	8
" 500 "	10	8	10

There should be separate closets for teachers."

INSPECTOR.

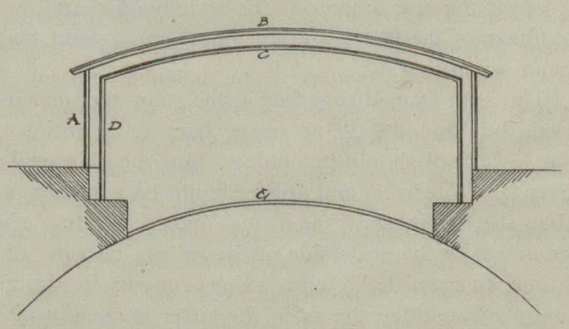
To W. R. G.: According to Millar artificial cements are Portland cement, Elay, Robinson's and other similar cements made or compounded from various substances. Natural cements are those which are made direct from a mineral by burning and grinding, and without the addition of other materials, similar to the Thorold cement. The usual tests for Portland cement are color, weight, fineness, tensile and transverse strengths. There are other tests made sometimes by manufacturers for their own satisfaction before sending the cement to market. Silver sand is used with Portland cement to give the finishing coat a close and uniform texture, also to impart a white or a silver-gray color to the finished surface.

M. B.

To T. W. R.: A full description of "secret nailing" with illustrations was published in this journsl some time in 1899, but the following may answer T. W. R.'s purpose: Secret nailing is sometimes called "blind nailing," also "chip nailing" and "sliver nailing," and is the art of finishing work in such a manner that no mark, of nail holes or screw heads are exposed, which under the ordinary method of doing work would require to be covered with putty before the painter or varnisher could apply the finish. The process is very simple and can be accomplished by any mechanic of ordinary ability. Take a very thin chisel—a paring chisel—⅜ to ½ inch wide and raise a chip with it wherever a nail or screw is intended to be driven. A sharp knife should be used to make two cuts with the grain of the wood, the width of the chisel apart, to keep the sides of the chip rom splitting. The chisel should be set at a steep angle at first till the proper depth is reached, and then made to turn out a piece of the wood of even thickness and not more than a sixteenth of an inch in thickness, and long enough to admit of driving the nail or screw. Care must be taken in raising the chip not to give it too sharp a curve or too great a thickness, as it is liable to break off while being straightened out again. After the nail or screw is driven in place, the chip must be glued in its place and held down firmly until it is dry and solid, when the work may be finished.

CARPENTER.

X X, Montreal, writes: A skylight has been built as per sketch. The outside A-B being built with T and L irons and rolled plate glass, ¼ inch thick. The inside C-D of wood (ordinary sashes) with puttied glass. The bottom E forming apex of a ceiling is also of wood



aud glass puttied. The inside sash has been built to prevent condensation, but is not effective. Could you not give some information in your valuable paper to cure that evil and oblige?

ANS.—Replying to the foregoing query we may say, the proper way is to have an inside gutter running all

round the skylight at the angle O, to which should be attached a small tin or iron pipe, which must lead to some place where the water will pass away. Better inside the building, if possible. All the glass at E should be removed—it is worse than useless. If there are cross bars in the skylight they should be made with gutters in them, and so arranged as to drop the water into the main gutter. The condensation cannot be prevented, but its inconvenience may be minimized by using inside gutters.

We reproduce by permission from Part II of Kidder's Building Construction, the following information on this subject :

"Large skylights, and those having a gable or hipped roof, can be made much better of galvanized iron or copper than of wood, but small skylights or glazed scuttles, when necessary for lighting an attic room, may be constructed of the latter material when not within the fire district. Such skylights usually consists of a glazed sash through which light is admitted, and the frame on which the sash rests, and to which it is usually hinged. When on a pitched roof the skylight or sash is usually placed parallel with and about eight inches above the roof. The proper method of constructing such a skylight is shown in section in Fig. 167. An

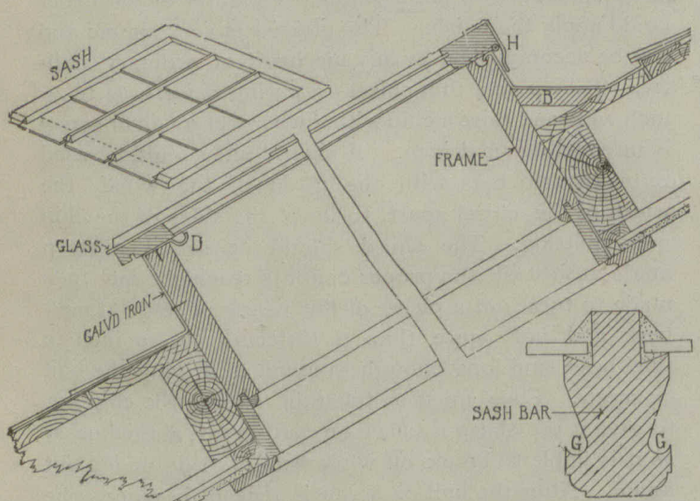


Fig. 167.

opening is first framed in the roof by means of header and trimmer rafters and the frame spiked to the inside of the opening. This frame should be made of 2 inch or 2½ inch plank, 11½ inches wide. Quite often the frame is made of 6 inch or 8 inch rough plank, nailed on top of the roof, the inside flush with the rough opening, and the opening and frame cased with finished boards or ceiling. This method, however, is not as good as the one shown, as the wide planks add to the stiffness of the frame and opening, and prevent the two from separating.

The sash framed together in the same way as window sash, but should have no cross bars or muntins, and the lower rail should be made so that the glass will pass over it. The rails and stiles should be 2 inches wider than the thickness of the frame, and a ⅞ strip should be nailed to the underside of the stiles, outside of the frame, to protect the joint. For economy in the glass, and also to stiffen the sash, the latter is usually divided into lights about 12 inches wide, by longitudinal muntins or sash bars, as shown in the isometric view. The glass is usually set in putty at the top and sides, but at the bottom the top of the glass is left free to shed water. If the length of the shaft is not more than 36 inches each light should be of one piece of glass. When it is greater than this the lights may be glazed with two or more pieces lapped over each other (about 1½ inches), as shown in the section." **** "The most important items in connection with a skylight of the kind shown are the flashing and provision for taking care of the condensation that always forms on the underside of the glass if the room below is warmed or occupied. Behind the top of the frame a gutter should be formed as shown, the board B being cut so as to be the highest at the middle and falling to each side. The lining of this gutter should extend well up on the roof, and should be turned over the edge of the frame into a groove which should be graded to drain off the water at the sides. If the sash is to open it should be hinged at the top and a strip of lead nailed to the top rail, as shown at H, to form a counter flashing. If the sash is stationary a simple fillet may be nailed to the underside of the sash above the frame. The sides of the frame should be flashed with tin (or zinc) shingles, the same as around a chimney, the flashing being carried to the top of the frame.

At the bottom of the frame it is better to use a wide piece of galvanized iron for the flashing, as shown at D. As the water forms on the glass it runs down until it strikes the lower rail and then drops into the gutter. For a small skylight the water in the gutter will evaporate so that it will not overflow, but in large skylights provision should be made for draining off the water by means of a small pipe carried through the frame. On large skylights, also, if made of wood, the sash bars should have a cross section like that shown by the enlarged section, gutters being formed at G to receive water that may run down on the sides of the bars. These gutters should empty into the gutter under the lower rail. Unless some such provision is made for receiving the condensation much trouble will be experienced by water dripping on the floor. The sash is usually fastened by a flat iron bar, provided with holes to slip over a pin, so as to both secure the window and to hold it open at certain distances. The frame and sash should be made of clear well-seasoned cypress, white pine or redwood. When a skylight of the style described above is placed on a flat roof it may be made in the same way, only making the frame higher at one end than at the

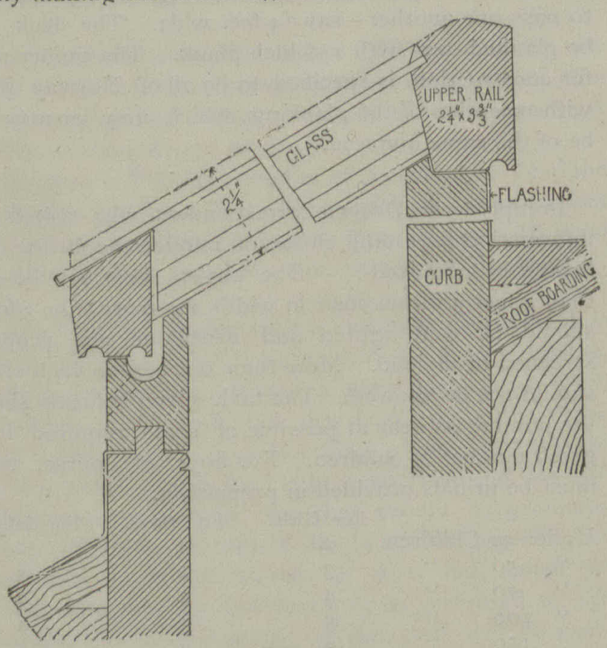


Fig. 167a.

other, so that the sash will have an inclination of about 2 inches to the foot. In flat roofs the frame or curb may be set on top of the roof. Fig 167a shows another detail, which is in some respects superior for large skylights."

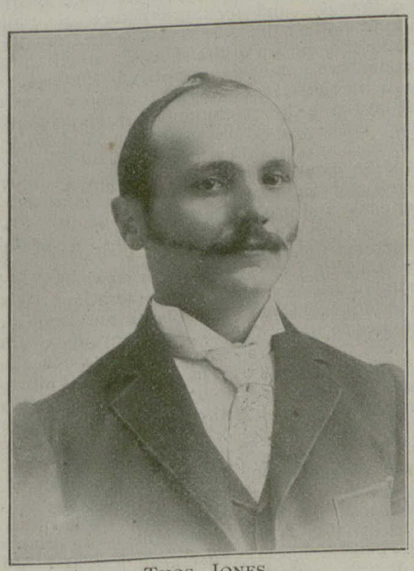
LONDON BUILDERS' EXCHANGE.

THE third annual meeting of the above Exchange was held on Jan. 21st.

The board of directors presented in their report a resume of the business transacted during the year, and offered some suggestions for the welfare of the Exchange, which were approved and adopted. Their report concluded with an expression of sorrow at the sudden prostration of Queen Victoria and the hope for her speedy recovery. The valor of the Canadian volunteers who went to South Africa in defence of the Empire was also referred to, and approval expressed of the proposal to erect a suitable memorial to the memory of those who died while on the expedition.

Subsequently, having approved of these sentiments, the Exchange referred to the incoming board the question of setting apart a sum from the funds of the Exchange towards the erection of a soldiers' memorial.

The following are the officers elect for the present year : Thos. Jones (of Messrs. Jones Bros.,) president ; John Nutkins, vice-president ; Geo. Howe, 2nd vice-president ; Geo. S. Gould, secretary-treasurer. Directors : Wm. Tytler, E. Fitzgerald, Ed. Martyn, John Whittaker, Wm. Jeffery.



THOS. JONES,
President, London Builders' Exchange.

THE NEW PRESIDENT.

Mr. Thos. Jones, who has been chosen as president of the Exchange for 1901, is one of the most successful contractors in the city, and is well qualified to advance the prosperity of the organization over whose affairs he has been called to preside.

Mr. Jones came to London from the old country when a young man. After working at his trade of carpenter and joiner for a few years, he in conjunction with his brother John, commenced business about 20 years ago as contractors and builders. Under their good management the business rapidly developed until to-day they stand second to none in this line.

Having large interests at stake, Mr. Jones was induced to serve as alderman for some years, and while in the couneil looked after the interests of the ratepayers so faithfully that he was repeatedly requested to become a candidate for Mayor. Up to the present the requirements of his business have prevented him from complying with this request. Undoubtedly however, in the near future he will be the worthy occupant of the Mayor's chair.

TORONTO BUILDERS' EXCHANGE.

The annual meeting of the Builders' Exchange of Toronto was held on Monday, January 21st, in their new quarters, Yonge street arcade.

The following members were present : J. B. Thomson, Geo. Gore, R. Hewitt & Son, Edwd. Gearing, Wm. Forbes, Geo. Henry, J. C. Gilchrist, C. Reeve, A. P. Steward, J. H. Morrison, Mr. Macdonell, J. F. Lyon, F. Saunders, Jos. Russell, R. Chalkley, Thos. Cannon, jr.; Robert Harrison, Fred. Beharriell, F. E. Phillips, Chas. Davies, J. M. Faircloth, Jas. Bather, Geo. Morley, D. Robertson, Jno. Maloney, W. D. Hutson, Ben. Brick, Wm. Holbrook, Wm. Booth, Jas. Crang, J. B. Vick, S. Hughes, R. G. Kirby, Thos. Robinson, J. C. Russell, Jno. M. Gander, H. W. Johnston, Mr. Hoidge, Geo. Duthie, Thos. Murray, W. F. Payne, J. C. Bayliss, Jno. Lucas, Jas. Wickett.

The 2nd vice-president, Mr. J. B. Thompson, occupied the chair.

The treasurer's report showed the finances to be in good shape.

The directors' report showed that the Exchange had increased in membership during the past three years, and fully warranted the renting of more extensive quarters.

The election of officers for 1901 resulted as follows : President, Thos. Christie ; 1st Vice-President, Jas. B. Thomson ; 2nd Vice-President, Joseph Russell ; Treasurer, David Williams. Directors, R. G. Kirby, J. M. Faircloth, Jas. Crang, John Logan, Geo. Duthie, W. J. Hynes, Ben. Brick, John Vokes, Wm. Pears. Auditors, Geo. Clay, Frederick Holmes. Representative on Board of Industrial Exhibition, H. Martin.

A vote of thanks to the retiring officers was unanimously adopted.

USEFUL HINTS.

The manufacture of asphalte paper pipe is outlined in a recent patent issued to Mr. Albert S. Dixon, of Los Angeles, C. J. A continuous strip of paper is run through a bath of maltha, then through a bath of asphalte, and finally spirally on a mandrel, wire being wound between the convolution of the paper at the same time.

REMOVING RUST AND GREASE SPOTS FROM MARBLE.—Rust spots on marble, says the Painters' Magazine, are usually produced when articles of iron are laid upon the wet marble or allowed to rest upon marble in a humid atmosphere. These spots penetrate rather deeply, as marble is very porous, and can be removed only by rubbing the marble deep enough to obliterate the spots and then repolish the surface. As even the weakest acids will destroy marble, such radical treatment cannot be thought of, or oxalic acid would be the proper remedy. Grease spots from paint, oil, or from touching with dirty hands can be removed by applying to the surface a stout batter made from equal parts of slaked lime and white pipe-clay mixed with water, or calcined magnesia and white pipe-clay will also serve the purpose. This batter is applied in a thick layer all over the surface and allowed to remain for two days, during which time it must be frequently moistened with water and only allowed to dry after the two days are over, when it is removed by wiping it off with a soft cloth. Then the surface is polished with a piece of soft leather and the finest bolted whiting. Artificial marble, however, cannot be treated in this way, as this article will not stand it.

DESIGN IN MODERN ARCHITECTURE.*

By C. H. C. Wright.

My excuse for taking up this subject at the present time, if any excuse is necessary, is the remark made frequently from the platform and through the press, that we are without any architecture, and that everything of to-day is copied. It is also a subject which I believe will provoke discussion and prove useful on that account.

In part then the object of this paper is to bring forth of itself and by discussion ideas which shall not only be profitable to us as members of this Association, but may also cause the general public to think somewhat differently of our work.

First, then, let me state a number of points, which you are all familiar with, but which under the circumstances will bear repetition.

All building is not architecture, any more than all writing or anguage is literature, and it is quite as logical to condemn this latter art because there is so much trash printed, as to condemn architecture because the greater majority of the buildings on King street do not display any art. The same may be said of any of the arts, and yet these carping critics will in the face of all that is bad admit that we have modern gems of music, of painting, of sculpture, and of literature, and admit further that they may have to travel to hear and see them. But because they cannot from their own windows view the beauties of architecture everywhere, they raise the cry that all types of buildings of to-day are copies and that the two characteristics of modern architecture are. 1st, variety of style, and 2nd, lack of originality. Many aspiring architects have evidently this same deplorable view, for I have been requested on many an occasion to name a good book of architectural recipes. The demand is for something new, some new architectural invention. They say when looking at buildings where the openings are spanned by beams, i.e. are rectangular, why that is Classic, if round, that is Romanesque ; if pointed that is Gothic, etc.

If then the openings in our modern work, in order to satisfy their desire for inventions, cannot assume any of these shapes we are limited to no openings, no entrance, no exit, no admission of light, etc. What do these people expect? Is is not safe to say that this is but an illustration of the old proverb, "a little knowledge, etc.," or rather, perhaps, a want of consideration on their part. Would not many of these same people give favorable descriptions of many of our modern buildings? Would not most of them find fault with many features of much if not all of the early work? I certainly think that we would get from them as favorable a criticism of a modern building that we might name as of any one building of the early periods chosen by themselves, and for that matter of any dozen or hundred buildings. Again it might be pointed out that we have records of but very few of the buildings of these early periods.

Let us stop this form of discussion and ask ourselves what are we doing and why are we not doing otherwise. We are not living in an age where the church, the state or the monarch (in any form) is all powerful, and can on that account divert unlimited wealth or resources in the line of architecture thus resulting in the erection of cathedrals, temples, palaces or castles. But on the contrary we are living in a commercial age—a period in which our art productions in architecture must be considered as investments and reduced to profit and loss in cold coinage.

Our admiration for a building to-day (and we have such admiration for many) depends upon the thought expressed in it, or, in other words, upon the thought expended in its design, and the greater the power of the mind of the architect who has created or developed the design, the deeper the thought expressed, and consequently the greater the lasting qualities in the beauty of the creation.

In the first place he must produce a plan that is perfectly suitable for the work intended. This may require a knowledge of the business and business methods of any of our commercial enterprises whose success in this economical age depends upon an almost innumerable number of small arrangements—or conveniences—or facilities for the transaction of such business, knowledge which the architect must obtain by experience not only of himself but from close and careful study, as well as from all the different clients for whom he has done or is doing work. Not only must he provide for this present service, but also for a growth of the enterprise, the rapidity of which is entirely problematical. Thus when an entrance is or may become necessary he provides for one—where light is necessary he admits it boldly, and where light is not wanted he leaves the wall surface whole. The result of this thought is an expression on the exterior, on the facades, of the interior requirements of the business, or of the purpose for which the building was erected. The building may from its exterior appearance alone declare it to be an armoury, a school, a court house, a church, etc. This classification is, however, very superficial, but the more masterly the subject has been treated the more minute does the classification become and the greater the range of thought expressed. But with this, as with any other art, the refinement in the production requires an equal refinement in the observer in order to be appreciated. In architecture we cannot hope to proceed much faster than we can educate the public to appreciate. It is therefore with feelings of regret that I read in the Canadian Architect and Builder of December the following: "The Toronto Industrial Exhibition Association have sent out a circular inviting architects to submit competitive designs for a new main building and several subsidiary buildings. The cost of the main building is estimated at $106,000, and of the lesser buildings from $5,000 to $15,000 each. To the author of the accepted design for the main building a prize of $250 is offered, and to the author of the accepted designs for the smaller buildings prizes of $40 and $50. Architects are required to submit plans, elevations, perspective and brief specifications."

This sounds like throwing a morsel to a pack of hungry wolves.

Have the Industrial Association stopped to think over the above offer, or have they been led to believe in some manner that the above course was all that was necessary? Have these men, who are supposed to be shrewd business men, considered how long they might expect to employ the services of one respectable set of brains for the chances of the prize offered, viz., $250? Have they thought of the mere labor involved in the production of plans, elevations, perspective and brief specifications?

There is one ray of light however which should be encouraged, and that is their handing the appointment of judges over to the Ontario Association of Architects. For the sake of themselves, for the sake of the city, and for architecture generally it is a great pity that in making the provisions for the competition they did not also take the opinion of the O.A.A., which in matters of this kind is undoubtedly the best authority in Ontario.

Returning to our subject we find that another reason for the beauty in design lies in the careful study of the proportions of the various parts. These proportions cannot be set down in a column like the multiplication table; they are not mathematical but artistic, and are so interdependent that every problem must be studied by itself and the proportions adopted must be such as to give a proper scale and produce a harmony of the whole, a harmony which can only be made complete by a careful arrangement or grouping of these various parts.

In addition to all this, the material out of which the building is to be erected must receive careful consideration. We have on account of the long continued use of brick and stone masonry become accustomed to thick walls, to deep reveals at the windows and doors. And the time was when this was a necessity, the eye required it. This however is passing if not already passed. Steel is in such common use to-day that the mind is fully convinced of the stability of the thin wall, of the narrow reveal. Does it not see in the brick or terra cotta a thin fire-proofing shell? Does it not appreciate that within this shell lies the bone and sinew, the strength of the building in the form of steel construction? Again, good architecture of to-day is often spoiled by its surroundings, due to our economical ideas; land is too valuable, and occasionally to lack of thought or design, incongruous objects called buildings are crowded around what would otherwise have given delight. Observe the cathedrals of England how beautifully they nestle among the trees or rear their spires heavenward from the lowlands or again how imposing and boldly they stand on the tops of elevations of more hilly ground. On the other hand the cathedrals of France command attention because of their proportions; they dwarf their surroundings into insignificance.

The success of the building scheme of the World's Fair at Chicago was largely due, if not entirely so, to the design of the whole in harmony.

These were Classical buildings, but could they have been copied from a book? Were they mere copies? Certainly not, but rather did they display wonderful thought, power of design (inventive power if you will). The Classical idea and the harmony might have been attained if all of the buildings had been erected from the one design (copied from the one page of Classical receipts). But their beauty was won because of their fitness for their work, because of the thought expressed in the design of each, because of the harmony in the design of the whole, and last, but by no means least, by the design of their surroundings. These latter were as carefully planned, studied and executed as were the buildings themselves. The extent and form of the grassy lawn, the water ponds with their alder banks, their reflections of the blue heavens and marble buildings, even to the ducks swimming on the surface, all was studied to produce an effect which displayed forethought and power of design that has seldom if ever been excelled, and which won from all sides the loudest of praise. Why is it that after this example so near home our Industrial Association did not profit by the lesson? Perhaps it is because the scheme at Chicago was so large. This, however, is no reason why we should not work in a modest way, but ever in the right direction. I have no right to speak except as an individual member of this Association, but I feel sure that we are willing to lend this or any other organization a hand with suggestions as to methods which will produce the best architectural results.

I have spoken of buildings as expressing thought and design when the ideas used may have been derived from a variety of sources, a statement which perhaps would be the better of an illustration. An individual may be a good mathematician and

*Paper read before the Ontario Association of Architects at the annual convention held in Toronto on January 29th and 30th, 1901.

display thought even though he is using the fundamental rules of arithmetic or the laws of Newton. An artist may display thought though working with a simple palette he paints the same sky, sea and landscape as have been painted for centuries and yet their productions are classed as works of art, even though copied from such a universal book of art receipts. In the same manner an architect may design a building and display thought, etc., using ideas derived from the past.

Why do we admire the main building of the University of Toronto? Why is it that after passing that building day after day, year after year, we still admire it? Because it is more than a mere copy, more than a mere page out of our receipt book of Norman architecture. Is it not because it is a design, because it displays thought? It is a work of art and a lasting monument to one of our number who has gone to his rest. Here we have in the midst of our busy city a secluded quiet spot and in its centre stands a building, which seems to say to the noisy rabble and buzz of traffic—keep still! stand off! quietness is what is required for university life. As we stand viewing the building, resting on its grassy terrace from across the wide lawn, we observe its restfulness, grace and dignity. The entrance is well marked and inviting. Look at it where you will and the repellant and military feeling of the old Norman work have disappeared and in their places stand the thought, the design of the architect.

Look at the variety of the work, so varied in fact that every day seems to reveal something new. Observe the grouping of the windows how they mark the large halls, the smaller subdivisions of classrooms, etc. Now look at the round feature at the extreme west and see how well suited it is for the protection of valuable apparatus. The whole building unites to form a group, a unit of design, a picture which is indelibly stamped on the heart of every graduate as well as producing a lasting impression on every visitor too ur fair city of Toronto.

Mr. Paull: Mr. Wright's paper contains many valuable points. He names the University of Toronto as being a building which would attract our attention and bring forth our admiration. The University of Toronto has one advantage which other buildings in Toronto have not. It is in a position of isolation. Its beautiful form has plenty of room to show itself, and you can go and view the perspective of it from many points, and at every point you can see some new beauty. It is a great pity in my opinion that there are a great number of very fine buildings in Toronto lacking those conditions, and if there were more room surrounding them they would look very much better. Very many buildings built by the architects of the city of Toronto are cramped up and cannot be seen to advantage. For instance the Sick Children's Hospital, on College street, a fine building, but not having room enough to be seen to advantage. Now suppose that $100,000 was the cost of that building, and suppose that $20,000 were expended in taking down the buildings around it so that the building could be seen to advantage, would it not add very considerably to the advantage of the building, and to the utility of the work, and create as it were an importance to the city of Toronto itself? Many other buildings might be mentioned that are so situated. Even our own City Hall has not sufficient ground around it to see it to advantage. If you go to Buffalo you will see that their City Hall is well arranged as to site and has plenty of ground around it.

Mr. Aylsworth: In regard to the Exhibition Building Competition, it strikes me as strange that this Association in some way had not been consulted by the managers before issuing the advertisement. It seems that the Association is not well known to the citizens. I don't know if there is any way that it could be made better known, but that is an instance showing the necessity for it. It seems to me that the members of the Association ought to have been more in touch with the Exhibition managers. It might be worth our while to appoint a committee to look after that sort of thing. If we had had such a committee something else could have been done. Perhaps it might be thought worth while yet to appoint one. The Exhibition Board I don't think should be permitted to go on and disfigure the city; they represent the city in some way, and the citizens should have some hold on them, and the architects should be sufficiently strong to guide the citizens. Just what shape that might take I cannot say. It seems strange that such a large number of architects should not have sufficient influence to have some weight with all such corporations.

Mr. Burke: Perhaps Mr. Aylsworth is not aware that the President called together some others of the Association, among whom were Mr. Eden Smith and myself, who went down and saw the officials of the association. I was not able to remain for the interview, but I understand that about all that could be accomplished was to gain consent to appoint experts to be selected from the Association membership. While Mr. Wright was reading his paper, I could not help noticing how the Americans went about the inauguration of their exhibition, putting it into the hands of competent architects and landscape architects. I do not know whether it is too late now to do anything towards guiding the Exhibition management into proper line.

Mr. A. H. Gregg: There are two instances brought before the Association, the Exhibition and the University buildings, where there has been a number of buildings erected one after the other. At the University the library was built in a splendid position, but with that exception hardly any of the other buildings have been placed with any regard to artistic grouping, and the Exhibition buildings have been managed in the same way. When our University was burned down, some landscape gardener might have laid out the grounds and allowed for coming buildings, and much better results would have surely been obtained.

Mr. Baker: Mr. Wright has referred in the early part of his paper to the difficulty of obtaining originality in our designs and the great danger and tendency there is towards plagiarism. I think if we look over the buildings of the United States it will appear to us that there is very little original work; that most of the large buildings have been designed along the lines of magnificent examples of architecture which have been erected in earlier periods. Are we in Canada really wise to attempt the original, or would we do better to adapt what we know to be good? It is a question which has been before us at all times, but is difficult to decide. Take the architects in the United States, and of course we have to turn to them, as they have always so much work at their disposal. Those who have tried to work along original lines have not succeeded; they have given it up and gone back to precedent. For example, some of the finest buildings recently erected in the United States are admittedly adapted from important European examples—Madison Square Garden Tower in New York, the library at Boston, the New York Herald building, and many others. I mention these without hesitation as they have even been published side by side with the Eurpean examples in a comparative way. I think architects should work together when designing and erecting adjoining or even adjacent buildings of all kinds. Petty jealousies often prevent good architectural effect. Last night we had a view of several New York buildings. I noticed in passing over the view one building which was perhaps an eighteen story building erected beside a twelve story building; evidently the taller building had been erected since the other, but the cornice line on the smaller building had been carried artfully around the taller building improving the appearance of both. Many examples could be named proving the advantage of consultation in the public interest, and I hope the influence of our Association will improve matters in this direction. With regard to the Exhibition we must not forget the state of architectural embryo the whole of it is in. The fact that Mr. Wickson and other members of the Association were asked to confer with the association and succeeded in having the conditions made as nearly satisfactory as possible should not be overlooked. It is true that the prizes are very small and look as Mr. Wright said, like "a bone thrown to a pack of wolves," But Mr. Wickson if he were here would explain to you that he admitted a certain amount of reason in this. It was thought the architects of the city of Toronto would be patriotic enough to enter into the competition and help on the city's welfare. It is true that designs are asked for individual buildings without any regard to the placing or grouping of them, and it is evident from this that the Exhibition Association has overlooked this, from an architectural standpoint, vital point. All of us who have given the subject any thought will realize what a splendid opportunity there is of grouping the buildings, spaces and courts, and even of introduc-

ing the delightful element so desirable at exhibitions, water, the vast stretches of which through the Chicago Fair gave the White City the delightful transparency and lightness, and the absence of which with the absence of music was the cause of the heavy, serious business-like appearance of the marvellous exposition recently held in Paris. Consequently I think it is to be regretted that this matter was not considered from that point of view. The large sum of money which it is proposed the citizens should expend there, ought to be well expended indeed if the placing of the buildings be properly handled.

Mr. Baker moved a vote of thanks to Mr. Wright which was seconded by Mr. Belcher and carried.

Mr. Aylsworth : It is clear to us all as Mr. Baker says that a splendid opportunity still exists for a thorough replanning of our exhibition grounds ; not that great changes need be carried out at any one time, but that when money is to be expended whatever is done may be as part of a complete whole to be realized in the course of time. There is no body of men more competent to outline such a scheme than this Association ; but in this business age something more than planning must be done. We must not only have an artistic and feasible arrangement to present, but it must be so placed before the executive body that there shall be no chance left open for its rejection. As our time is now perhaps too limited to fully handle the problem I propose that it be made the principal subject at our monthly meetings during the balance of this winter, first to develop such a scheme as the citizens cannot but be proud of, and then appoint such a strong and permanent committee to see it gradually worked out that the City Council Exhibition Association can never shake them off.

Mr. Wright : As the grouping of the University buildings has been referred to I should like to ask Mr. Dick what opportunities have been offered him in this respect. A difficulty in the way of a comprehensive scheme is the fact that there is continual progress in the aims of the University, and ideas which were accepted a few years ago are now in the process of change.

Mr. Dick : Regarding the University buildings a particular building was proposed and a particular site selected for it, and of course one would have liked to have carried out all the buildings in the same style as the University itself, but unfortunately this is a very expensive style, and the library is the only one that could be made to harmonise with the main building. It would have been a very excellent thing to have had a landscape gardener to lay out the whole buildings, but as Mr. Wright has pointed out, ideas have changed so considerably, that the ideas would have had to be modified as the buildings were erected.

Mr. Gordon : It might be interesting to note that the public are gradually getting educated on this question of grouping of buildings. The process is slow, but the college authorities are beginning to realise that the general effect of their buildings depends so largely upon their grouping, and I might mention that last summer I was asked to go to Kingston with just that object in view, to give an opinion as to what would be the best method of grouping the buildings, in view of the lack of effect from the McGill buildings, and to some extent the lack of effect of the Toronto buildings. The authorities recognized that although they were doing things in a modest way they might be planned ahead to get the best grouping of buildings, and that the whole would have the best possible effect, and it is a pleasure to see that college authorities are beginning to realise the importance of grouping.

Mr. Burke : Would it not be well to memoralise the Toronto Exhibition Association, and point out the pains the Pan American Exhibition people have gone to in the grouping of buildings, landscape architecture, etc.

Mr. Hall : You would have to send it to the city, Mr. Burke.

Mr. Burke: To the proper authorities, also give it to the papers, so that the public would see what was suggested.

Mr. Gray : I think Mr. President that would be a good idea. The existence of the Association is kept too much from the general public. There have in the past been cases right in our midst where the Association has been looked for by the public. Recently with regard to the St. Lawrence market buildings the public have looked round about aud said "Where is your Association, what are you doing?" "Where is the Ontario Association of Architects?" I think that the Association has been asleep during this last year and has lost opportunities and kept in the background when it could have been doing useful work. I feel that it is too bad that the public should have to look round about for the Association when these things occur. When this exhibition matter was brought up, too, we find the public asking "where are the Ontario Association of Architects, what are they doing?" and we have simply to shut our mouths.

Mr. Baker : Well, somebody ought to get up p.etty quick. I would like to ask this Convention whether it was the Association or Mr. Gray that was asleep during the past year. Nearly every morning when I look at the paper, I see that the Association of Architects has done so and so. Certainly 10 or 20 times during the last year I have noticed this. We cannot hang a banner across the street from the doorway down stairs stating that the Association is to be found here. I would rather th .t the recent Kingston University competition were discussed than the exhibition. Perhaps, after all, the worst we can say about this exhibition competition is the prizes offered. If they do not see fit to offer a larger premium, we can appreciate that it is because they are tied up in every direction. Regarding the Kingston College buildings : Anything which has ever been placed before a body of professional men which would equal that in absolute lack of knowledge of decency in the procedure of engaging professional assistance, I do not think I have ever seen. If any action is to be taken to-day, I think it ought to be taken against that kind of competition. I think several of our members felt this very keenly. This is an instance demanding an explanation, but in the other I think we should rather do what we can to show our appreciation of what they have tried to do for us.

Mr. Gray : With all due respect to Mr. Baker's reference to the publicity of the Association in the daily papers, the Association is not known as it should be to the general public. Now I do not care what Mr. Baker says, it is a fact that the Association is not known as it should be to-day.

Mr. Baker : How should it be made known ?

Mr. Gray : I think one of the methods is in using it in our own daily experience ; using it from time to time ; let the people know about it. I maintain with all due respect to Mr. Baker that it has not been brought sufficiently before the eyes of the public.

Mr. Aylsworth : Mr. President, I am glad to see a little discussion on the lines I intended to evoke, and I do not think this might be confined to exhibition or university matters. It seems to me that we might prepare for the press a little more extended notice of this Convention than has been done heretofore, and announce that a standing committee had been appointed, so that the public might know that the Association is prepared to consult with any such bodies at any time in future.

Mr. Gray : Allow me to give you an idea of that matter which I spoke of. When the St. Lawrence Market was brought before the Board, that Board turned round and stated that they did not really know of an Association such as the Ontario Association of Architects.

Mr. Gemmell : I don't know whether this discussion is on Mr. Wright's paper or not. The only suggestion which I see that would arise out of Mr. Wright's paper (laughter)—excuse me saying only, but I mean the only PRACTICAL one would be : I think that a proposed competition that the Exhibition could bring forward would be for a landscape garden plan, comprising the whole laying out and construction of the Exhibition, when, if they wanted to erect a new building, it could be laid down in a position making it a fitting part of a well digested plan to utilize the ideal site that would not ignore the effects to be got from that beautiful stretch of water, Humber Bay. I therefore think that what the exhibition wants most is a scheme for a whole. Their buildings now are not expensive. They should not be considered as opposing one grand scheme at all.

They could be torn down or removed. Perhaps the Association would move in this direction of bringing forth a competition for laying out a scheme for the whole Exhibition, if properly brought before them.

Mr. Langton: I am always opposed to puffing the Association simply for the sake of puffing it. As a matter of fact the Association has been very weak for a few years for lack of support, but it has not been idle in matters where it could help the city. We have drawn up a complete and perfect set of building by-laws (which were ignored), intervened in the case of the Market Buildings, and have done everything we could do. If the City Council did not know of the Association it is certainly strange, especially in connection with the market competition, for both the Mayor and the City Engineer received letters upon the subject and had an opportunity of perusing a copy of our conditions of competition. On a certain occasion in the days of the old Guild—of blessed memory (laughter), we had a meeting over laying out the old Upper Canada Grounds, and had several schemes for laying them out. Why could not some of the monthly meetings be devoted to laying out the Exhibition Buildings in the grand style; and Mr. Wickson has already denoted to the Association that the city is willing to do something in the direction of assisting the Association in carrying out the buildings.

WEDNESDAY AFTERNOON SESSION.

The convention having re-assembled, Dr. P. H. Bryce, Provincial Health Officer, presented his paper on "Problems in Maintenance of Purity, Equability and Moisture of House Air."

PROBLEMS IN MAINTENANCE OF PURITY, EQUABILITY AND MOISTURE OF HOUSE AIR.

GENTLEMEN:—It was with some diffidence that I complied with the request of your Committee to read a paper before a society composed of gentlemen who are daily engaged in dealing with the practical details of house building, and I must appeal to your indulgence if in my remarks I betray an ignorance of practical details which are to you but the alphabet of your work. My excuse for attempting a paper at all has been due, however, to a conviction growing out of my observation, that we are, in matters of ventilation and heating, not living up to our knowledge. For instance, last summer the Ladies' Committee were arranging for the heating of a mission church, and I asked them what arrangements for ventilation were included with the furnace. They answered that they did not know, but supposed that the furnace dealer would see to everything. However, I was asked to find out, and learned from one of our prominent makers that no provision for fresh air was in the proposed tender, and that it was intended to draw the air off at the floor back to the heating chamber around the furnace. When I protested that surely they were not going to make the people rebreathe the air, I was told that not one furnace in five in the city nowadays provided for anything else. If such be the case, and if the term "economy" is to be applied to furnace heating performed after this fashion, then, indeed, it would seem high time that architects and sanitary officers place this matter in its true light before the public, and insist on the application of the true remedy.

The problem of how to heat economically and yet efficiently has been, and is, both a complicated and difficult one, owing to the many circumstances of latitude, exposure, nature of employment of inmates, number of occupants of dwelling, and so on, and yet there are some primary principles which must be fully understood if even a moderate degree of success is to be attained. I shall attempt to outline these in order of importance as they appeal to me.

Owing to the constant atmospheric movements of external air it must be remembered that the external air is, even in cities, infinitely purer than the best house air under ordinary conditions. For instance, Dr. Paul Regnard quotes a table from Miquel giving the bacteria per cubic metre in air as follows:

Air over the Atlantic	0.6
Air of Paris at summit of Pantheon	200
" " in Rue de Rivoli	3,480
" " in a new house	4,500
" " in the sewers	6,000
" " in an old house	36,000
" " in the hospital de la Pitie	79,000

Or as Regnard says, a patient in La Pitie inhales 790,000 bacteria daily.

As regards chemical constituents, Dr. Angus Smith, Saussiure, Muntz, and others, have found that the carbonic acid of the purest and most impure outer air does not vary more than between 2 and 4 parts in 10,000, whether on mountain top or in the slums of great cities. To illustrate further, Pasteur and Tyndall both found that sterilized solutions of beef bouillon, could not be exposed a moment in a room without danger of infection by some floating microbe, while on the mountains outer air was practically sterile. Clearly, then, our problem involves the introduction into houses or living rooms of a reasonable amount of outer air, if we believe that fresh air is necessary to health. Now it is quite apparent that we are at once confronted with the question of how to do it, and how to pay for it. After much consideration, I am convinced that it is possible, with reasonable economy, to keep house air fresh, but only by an appreciation of the several physical laws entering into the problem.

First, the construction of a warm building—this is our first point. But some one says, here again it is a matter of cost. Partly so, and only partly so. Practically we have three building materials, stone, brick and wood. Speaking of refrigerating machines, Leask remarks, that a large percentage of the actual work done is required to make up for the transfer of heat through the walls, floors and ceilings, occasioned by poor insulation, which amount may be measured experimentally. Tables are given as illustrating the varying conducting powers of substances. Prof. Shaw, of Cambridge, indeed gives a formula for estimating the amount of heat lost in one hour by conduction through an area of one foot square of different substances of one inch in thickness, with a difference on the two sides of from one per cent. upwards.

Copper conduits	3225.0	units.	Cork	0.90	units
Iron	477.0	"	Water	5.82	"
Stone	17.0	"	Air	0.16	"
Brick	4.3	"	Glass	6.66	"
Oak (across fibre)	1.70	"	Slag wool	0.314	"
Brick dust	1.00	"	Asbestos	same as above	
Coke	0.99	"	Paper	0.20	"

It is thus apparent that enormous differences exist in the conducting powers of our several building materials, and that very important facts regarding the conducting powers of other substances may become of practical service to us under many circumstances. Thus, Leask gives several examples, of which the following illustrates the successful arrangement for a refrigerator wall.

Outer wall, 14 " of brick.
Next inner wall, 4 " of pitch and ashes.
Next inner wall, 4 " of brick.
Next inner wall, 4 " of air space.
Next inner wall, 14 " of brick.

But assuming that we are to build an ordinary 14 " wall, we must see that two points are well attended to (a) that the mortar is laid so that the wall is not a seive, and (b) that its inner surface is grouted, and a good stripping is laid on tar paper, with an air space between this and the plaster, and thereby get at least some of the non-conducting conditions we are seeking.

But the question will be asked, what difference can the wall make if the air is to be frequently changed? An example will probably best illustrate the case. Assume a room with two outer walls of 30 ft. each by 16 ft. in height, and one ft. in thickness. This represents 900 square ft. of external radiating surface. Assume that one inch thick with one degree of difference between outer and inner air means in heat a loss of 4 heat units, one-twelfth of this is lost with a foot in thickness, or 300 heat units per hour. Let the difference in temperature be between 60° Fahr. and zero, and not only will there be a loss of sixty times as many units of heat, but the rate of loss of heat is directly proportional in rapidity to the difference between the internal and external temperature. But assuming that this most important matter of making a building warm, compatible with moderate first cost, is accomplished, we have still the problem of its heating. It is apparent that houses, essentially dwellings, must most concern us. Warehouses and similar large buildings, are usually filled with goods rather than people, but schools, workrooms and factories, as well as dwellings, must claim our attention.

It has always appeared to me that the large buildings with many inmates is our simplest problem, since the means applied may be mechanical and caretakers may be provided to supervise such. But I think it will be common experience when I say that the idea of introducing adequate air while installing our heating apparatus has hitherto been given relatively but little thought.

Take the heating of a school or church, for instance, and we have hot air furnaces, steam and hot water, to choose from. Suppose it be a hot air furnace which is chosen. Air is introduced into a school room at from 100 to 150° Fahrenheit at a single point, with its moisture reduced by expansion of the air to perhaps ten per cent. or less of relative humidity. It is delivered at one point often creating a draught, and a chimney register of a few square inches area is usually the only exit. Analysis shows the carbonic acid relatively in excess. Windows, if open, again subject the inmates to the danger from draught, and so are only occasionally opened. If the heating be steam we have heat alternately in excess and defect, while the likelihood of getting a fair amount of moisture into the room, and a fair degree of purity, is seemingly very slight. In the case of hot water heating, we have in the regulation of the degree of heat in the rooms many advantages, but in the matter of air purity the same problem of how to maintain a reasonable purity of air is quite as prominent as in the case of steam. In both cases it is not uncommon to have fireplaces in rooms, and in such instances a fair degree of purity is naturally maintained by the chimney shaft, greatly increased, of course, if a fire is kept in the grate, although the air near the floor is relatively cold in consequence of the draught from beneath doors leading to cold halls and the outer atmosphere.

The question, therefore, before us is: Can we, with the ordinary means at our command, improve the air conditions in the living rooms of public or private dwellings without an increased expense? I believe that we can, and I propose to deal with some of the methods and explain the reasons for my opinion.

Suppose that we have to deal with an ordinary school building. What methods should we pursue to effect the desired end? I shall assume that the walls have been made in a large degree non-conducting. In a school building of four rooms, each providing for

fifty pupils, and giving 240 cubic feet, or 4x4x15 feet to each, it is found that 2,000 cubic feet per pupil per hour will keep the carbonic acid at 6 parts per 10,000. In order to supply this, 100,000 cubic feet of air per hour must be passed into each room, whose cubic capacity is 12,000 feet. This means 8⅓ changes per hour. To supply this an inlet shaft 2x2½ feet is required, which delivers air at 6.94 feet per second. It is found that air coming into the room at this rate, at a point above the head, say 7 feet from the floor, with the mouth of the delivery duct at an angle of 45 degrees, will cause the air to distribute rapidly laterally, while the vis a tergo, or head, and the temperature at say 80 degrees Fahr. will cause the air to rise and be propelled across the room, where reaching outer walls it will be cooled and will descend and return at a rate not exceeding 2 feet per second along the floor towards an exit shaft, which should be at the floor near the inlet. To favor even distribution the windows should be double and the walls non-conducting as far as practicable. In order that this work be done, the air must be previously warmed, in the cold air room of the basement, and forced into the shaft by a fan or drawn in by heated extract shaft. The method provides a very important means of supplying outer air as it is warmed, with an opportunity of receiving moisture in the cold air room from broad and shallow evaporating pans supplied with water automatically by a ball-float and valve. To illustrate the importance of this point, some figures may be given. It will be remembered that as air expands with heat, its capacity for moisture increases. The percentages of moisture at different temperatures have been calculated. Thus at

0°	Fahrenheit	=	Moisture	= 0.09 per cent.
32°	"	=	"	= 0.37 of 1 per cent.
42°	"	=	"	= 0.56
52°	"	=	"	= 0.81
62°	"	=	"	= 1.17
72°	"	=	"	= 1.68
82°	"	=	"	= 2.36
92°	"	=	"	= 3.28
102°	"	=	"	= 4.54

Thus the relative humidity of air more than doubles with every twenty degrees, proportionately increasing with increasing temperature. Now, it will be further noted that air in motion practically never becomes saturated as it passes over moist surfaces, but takes up probably 75 per cent of saturation. Hence, outer air at 0 degrees going into a room, we shall say, at 90 degrees, will at 75 per cent of saturation have taken up ten grains of vapor, or it will hold thirty times as much moisture as that in outer air at zero. In other words, the 100,000 cubic feet of air hourly introduced into a school room should be supplied with 1,000,000 grains of water, as vapor, or it would actually take up through evaporation 13 gallons of water hourly. As however, the moisture from the breath of children yields a very notable amount of moisture, we may say ten gallons of water ought to be provided hourly. This amount seems enormous, and would seem to actually use up heat. But the heat is never lost, it is only latent, and the service rendered by the moisture is apparent. If the air goes into the room too dry, and I am informed by Mr. Stupart of the observatory, the air of the house heated by an ordinary hot air furnace, has a relative humidity of not more than 25 to 35 per cent even with a good evaporating pot, it is apparent that the air must, from every available source in the schoolroom, seek its moisture. This it gets from walls and furniture, but especially from the mucous membrane and skin of pupils. Now assume that this 100,000 feet of dry air becomes even partially saturated, and I have found it in a school room heated with Smead Dowd furnace, at 50 per cent of saturation, it is apparen that it will in an hour have removed a large amount of moisture from the bodies of the pupils. But to evaporate one pound of water requires nearly 1,000 units of heat, and hence it is apparent that even if two pounds of water were given off by the breath and bodies of fifty pupils per hour, 2,000 heat units would be utilized. But very much more is lost by insensible perspiration. Now the practical point is this, that since the body temperature is 98.4 degrees F., it is apparent that the air of a room does not warm the body, but only prevents the loss of heat aided by clothing, with too great rapidity and as evaporation produces cold, the lower the air is the more rapid the loss of heat by evaporation, and hence the constant experience that in rooms with dry air a temperature of 70 to 75 degrees is required to prevent a sensation of cold, whereas if the air held more vapor much less loss of heat would take place by evaporation and the sensation of cold at 60 degrees F. would not be as great as in the other case at 70 or 75 degrees. Indeed, we all know that in English text books a temperature of 60 degrees F. with the common fire-places of that country is set down as a normal house temperature, due to the moist air constantly brought into the room by the draft. I have dwelt upon this point at some length, because I am convinced that more injury is being caused by the abnormally dry atmosphere of our houses than from any other cause.

This matter of reducing the temperature of a living room further bears a very important influence upon the question of economy in heating. If we assume that outer air brought into a cold air chamber is at 15 degrees F., then it will require every hour in the school-room referred to, some 10,000 heat units to raise it to 70 degrees F. or 55 degrees ; or nearly 25 per cent. more fuel is required than is necessary to raise the air to 60 degrees, if the heat rendered latent by evaporation be not considered. As some 35 pounds of coal per hour with a loss of 20 per cent. by the chimney is theoretically required to heat a room up to 70 degrees under the conditions we have assumed, it is apparent that the matter is a most important one for consideration.

In this connection, it seems of importance to refer to the part played by radiant heat as an adjunct to room heating. All are aware of the effects of the heat from a grate, but we are not so conscious of the effects of the heat radiated from steam and hot water pipes. We speak of heat waves and are aware of how relatively different are different liquids, solids and gases, in their power to absorb rays of heat, and that amongst gases, the oxygen and nitrogen of the air are non-absorbers of heat, whereas, as Tyndall informs us, the absorption of heat waves by water vapor is the chief agent in preventing the earth from becoming barren from the loss of the heat absorbed by the earth during the day. Probably from 10 to 15 per cent. of the heat radiated from the earth is absorbed by the water vapor within 10 or 20 feet of the earth's surface. Such air, too, plays an important part in the absorption of heat in the air of a room when the air has its proper amount of moisture, while further the penetrating powers of the heat rays from radiators and grate fires by which the bodies of occupants are warmed, are well known. Another point of importance in this connection is the fact that a white wall reflects the heat to a much greater degree than dark walls, although not absorbing heat readily itself, and the black steam pipes are much better radiators than if painted white.

We have dealt with some of the physical laws entering into the conditions affecting the heating of the air of rooms, but I have frequently thought that the construction of our houses, which usually have open stairways on three storeys, might be dealt with in a much more economical manner than is usually practised. Most of us know that in a single room, say on the ground floor, the heat near the ceiling is 10 to 15 degrees higher than at the floor, and for the same reasons the air of the lower floors constantly ascends as by a funnel to the upper rooms. In such cases the remedy applied usually is to have a hot air register or a hot water radiator in each room.

Some of our economy hot air furnace manufacturers have, however, seized upon a familiar fact, namely, that by drawing off the air at the floor by a down draft shaft leading to the warm air chamber around the furnace, not only is the air led more equably in each room, but the warm air is kept near the floor of the room and they have with much success solved the problem of equal distribution of heat and economy in the use of fuel. The fatal defect in the system is, that they are re-heating the air already breathed and violating the very first principles of introducing pure air by a fresh air duct in the living rooms. Now, it appears to me that we may make use of the principle of maintaining an equable distribution of heat in the manner referred to, while at the same time utilizing the fresh air shaft by arranging floor ducts so as to lead the foul air from the room into the ashpit of the furnace, with a damper which will turn this foul air into the smoke flue as a cheque draft in mild weather. Indeed I have had this done with much success in the Mission church referred to, insuring a very good ventilation with an excellent distribution of heat in an oblong building.

With regard to the question of moisture, not only can a series of shallow pans in the heating chamber of a hot air furnace be supplied, but evaporating pans under each register may, with advantage, be utilized for still further supplying moisture to air which is abnormally dry.

But dealing with the problem as regards the most practical method of heating a private house and at the same time supplying fresh air there would seem to be no question but that the heating with hot water most completely supplies the several requirements. In the sleeping rooms radiators may be placed, while the window is drawn down, and a draft prevented by a drawn blind fulfills every requirement. For the living rooms each should be supplied with a radiator, while fresh air would be brought into a cold air room in which is a series of radiators over which shallow pans are placed with an automatic supply of water while there will be delivered by the indirect method an ample supply of fresh warm air with adequate moisture for maintaining the air of the room at a normal humidity.

The question of steam heating for large buildings naturally must be considered, and in the matter of economy of installation leaves little to be desired. But except as a means of heating fresh air to be supplied by ducts with a fan, it presents all the difficulties of lack of ventilation and dryness of air which have been already referred to. When thus utilized with small radiators in rooms as supplementary heating in very cold weather, it probably is the most readily applicable of all methods, but the disadvantages of heating houses by radiators are numerous, and cannot be said to be a desirable method of heating, while defective in the total absence of adequate ventilation and supply of moisture. Equability of temperature is not possible, while the cracking due to condensed steam is most undesirable. Probably the ideal method of heating such large buildings is that where steam pipes are used for heating cold air to be delivered by fans with adequate exit shafts, while the steam is carried to coils placed in tanks of water at convenient points for each suite of rooms, from which hot water pipes are carried to the coils or radiators which heat the several rooms as a supplementary means of heating. I have, however, referred to some of the many difficulties no doubt experienced by all, and have touched upon some of the possible remedies. One, however, must recognize the difficulty of having remedies applied. In too many cases we have to take what is in the market, and as I witnessed last year, in some specifications for school buildings, the details were left so indefinite that it seemed likely to become a question of what furnace manufacturer could satisfy a trustee that he could get enough of heat into the building, and not whether they would be ventilated when heated. It does seem very essential that at any rate in public buildings not only should there be laws defining certain necessary conditions before school buildings, &c., could be constructed, but that, as in Massachusetts inspectors should be employed to examine the proposed methods of heating before they be installed.

The President, resuming the chair, spoke in appreciation of Dr. Bryce's paper, and said he hoped Dr. Bryce would tell the meeting in concluding the discussion, if there were any simple methods by which the quantity of moisture in air can be tested.

Mr. Burke : I am almost dumfounded at the amount of moisture necessary to keep a room in a satisfactory condition. I thought when my furnace was evaporating half a pail of water a day I was getting a splendid amount of moisture in the house. With regard to the practice of the hot air furnace men of drawing all the air from the house, instead of from outside, it is almost suicidal. Another arrangement I have in my house which I think is a good thing—I have exhaust registers in rooms where there are no fireplaces. They are set close to the floor and are carried to flues in the chimney stack which are warmed by the furnace and kitchen flues. I find they are acting in a very satisfactory way.

The President : I am glad to say I can go one better than Mr. Burke, I evaporate in my furnace one pail of water a day, but I confess that is one-fifth of what I ought to do.

Mr. Dick : In dealing with a question of this nature architects are generally confronted with the question "what is it going to cost?" I recently noticed an article in the American Architect with regard to the cost of ventilation, and I should like to read it. The article is a portion of a lecture delivered by G. A. Suter before the Engineering Society of Columbia University :

" The total cubical contents of this room are 30,000 cubic feet ; the total direct radiating surface in the room is 350 square feet, and the total steam consumption or proportionate boiler capacity required for the heating of this room in zero weather is 3½ horse powers. The moment, however, that you ventilate this room, renewing or replacing the air six times each hour, supplying 180,000 cubic feet of fresh air per hour, we require not less than 9 horse power of steam, when the outside temperature is at zero, to warm this quantity of air from zero to 70° F., or room temperature, and in addition thereto, 2½ horse-power for the mechanical effort required to move this quantity of air in and out of the room. Therefore, out of the total of 15 horse-power that are required for the heating and ventilating of this room, only 3½ horse power are required for heating while 11½ horse power are required for ventilation. Similarly, out of a total of 3,550 horse power required for warming and ventilating these buildings in zero weather only 560 horse power are required for the direct heating, while 2,990 horse power are needed for ventilation. When the outside temperature is higher these quantities are correspondingly less, except that the motor power, of course, remains constant. For example at 35° outside temperature, out of a total power of 2,017 horse power, the direct heating requires 280 horse power, the ventilation 1,102 horse power for heating the air, and 635 horse power for motive power, or 1,737 horse power for both. The proportionate amount of power for ventilation, as compared with the total power, increases as the outside temperature increases, and, as our average temperature during the heating season is not far from 35,° it is fair to conclude that the ventilation of these buildings costs about six times as much as the heating. This gives us a clear illustration of the cost of ventilation, and an explanation of why, even when the apparatus is provided, the ventilation is somewhat curtailed. We sometimes wonder why our public buildings are not better ventilated, but the explanation, when it is not due to ignorace or incapacity, is found in the expense of the apparatus and in the expense of operation."

In buildings in which the ordinary fan system is provided for exhausting the air, and having a certain amount of direct radiation in the rooms and a certain amount of indirect in the basement for the purpose of warming the fresh air, I have noticed that the whole system of ventilation is often allowed to fall into disuse. For instance, the manager of a bank once asked me if I could not make an opening into his room to get some fresh air into it. I said, " You have a fan ; do you use it ? " He said " I really do not know. I must see about that." There are some buildings in this city which have excellent systems of ventilation and in which the ventilation is notoriously bad, and I am told that the reason the ventilation is bad is that the apparatus is not used simply on account of the cost of the power for running the fans, and also of the increased amount of fuel necessary to warm the fresh air that must be taken in to replace the foul air taken out. In regard to actual temperatures, I have noticed that with a steam radiator in a room I feel much more comfortable with the temperature at 60° than if it is higher, but when there is no direct radiation in a room, without direct radiation one is apt to feel chilly even if the temperature is a good deal higher. The automatic water supply that Dr. Bryce recommends is an excellent idea, but I confess I had no idea of the large amount of water that is required to properly moisten the air in a room. There is one point I might mention with regard to this : I noticed in my own house that when the water was doubtful (as it has some times been in this city) there was a very objectionable odor in the house, but after awhile I discovered that it was caused by the gradual accumulation of filth from the water at the bottom of the evaporating pan, and a very objectionable odor was sent up into the rooms.

Mr. Edwards : I would like to mention here one thing that has come under my own observation. I once or twice went on a little exploring expedition a year or two ago after having seen a ventilating apparatus in successful operation, and found steam shut off from coils in ventilating stacks and fresh air inlets closed up, and on mentioning the matter to the owners have been told that it was a pity I had not looked around sooner, as they were not aware that the ventilating appliances were not in daily use. In these cases the caretakers had shut off the fresh air and closed up the ventilators simply to save themselves the extra labor in firing up. I believe this sort of thing is more common than one might suppose.

Mr. Langton : The reason why the hot air heaters object to the cold air duct is that to them a cold air duct is a cold air duct. A standard size does for houses of very different sizes and is usually too large for any house. As a matter of fact the cold air duct should be proportioned not so much to the house as to the number of people in it, and it takes a very small cold air duct to supply an average family of six with the 3600 cubic feet per head per hour that the tables of ventilation require, the law being that air enters through the aperture of a duct between outside air and inside air at a rate which is equal to that a body would attain in falling through a space equal to the difference in height of a column of the outside air and a column of the inside air if equalized in density, therefore in cold weather the air enters at a fast rate, and in mild weather at a slow rate, so that in cold weather a much smaller duct is required than in mild weather in order to supply the same quantity of air. I have calculated that for the average family of six a cold air inlet need only be 7″ x 12″ when the thermometer is 40° outside (accepting the inside standard of 70°), and may be reduced to 4″ x 12″ in zero weather. If our ducts were made of sizes carefully regulated according to need they would not be found to cool the house too much. There is something which Dr. Bryce said which I do not understand. The great point made, and a great part of the argument was, that if moist air surrounds our bodies, the radiation from the body is less, and therefore the body is more easily kept warm. How is it that in the North-West where it is so dry they say that 40° below zero is not felt as much as a much higher temperature is here ?

Mr. Kay : Mr. Chairman, it seems to me that this question of ventilation that has been discussed, goes beyond the limits of what is praotical. The idea of taking a cold air duct and putting it under the furnace ! What would be the consequences ? Why, the fire would be uncontrollable, you would be roasted out. The moisture in the air would be burned up. I think there is a great deal of common sense in the use of an interior cold face when it is placed near the front door. The air at that part is cold ; every time the front door opens there is a great deal of fresh air comes in which goes down the cold air pipe, so that there is plenty of fresh air supplied in the course of a day. I find by experience that warm air ducts must be on the inside, in some internal partition, in a brick partition ; if we have not a brick partition we must make them out of tin.

The President : In regard to that point of too large an amount oi supply of air to the furnace, you need not use all the air, but divert part of it into the smoke pipe.

Mr. Gordon : I don't know, Mr. Chairman, how long time you wish to devote to this discussion, and I think it is proper at this stage to very enthusiastically and heartily move a vote of thanks to Dr. Bryce for the very instructive and practical paper which he has given us. In common with a great many others here I have been thinking of my past sins and making promises that I am going to do better in the future, and that in itself is a good thing for the doctor to have secured. I am sure we will all remember the impetus he has given us. I am impressed with the large amount of moisture required. I have been trying for two or three winters in my own house a plan of supplementing the evaporating pan at the furnace, (which, by the way is nearly always placed too low down to render efficient service) by suspending ordinary two quart tin cans under the floor registers and having them filled each day. It is astonishing with four or five of these in a house, what a large amount of water you can evaporate. However, I was just thinking, in fact I was speaking to the doctor before coming in here of the way in which the present generation seems to be enfeebled and subject to disease more than our fathers and grandfathers used to be. We have our houses built so much better than they used to ; we fit our sash so much tighter ; we try to save fuel in that direction, and make our houses as hot as possible. We put in hot water heating apparatus, and in many cases without any indirect radiators and fresh air inlet. I have been insisting (even with small apparatus) on having at least one indirect radiator under the hall. I have been trying a plan of putting a pan over the indirect coil under the hall and a water pipe brought there, so that by turning the tap a little every day that pan could be kept full. But since I have been learning of the immense amount of water required, I have been considering if it would not be desirable to have upon that a ball cock, so as to keep the pan automatically filled.

Mr. Belcher seconded the vote of thanks. I am a friend of Dr. Bryce. I noticed that he spoke of the low rate of diphtheria in my native country. Possibly he may recollect that the winds are from the west and they blow from the Atlantic right over the country. Of course we get the moisture from the ocean saturated with salt, and that coupled with the fact that we have no furnaces, and there are no heating apparatus but the fire-places, may account for it. Where in every room there is a fire-place, and the fire is kept burning in every room, it is impossible to get heat without at the same time getting ventilation and an abundant supply of fresh air which in Ireland is moist.

Mr. Baker : In attempting to speak to this immense question, I find my mind in a most chaotic state indeed. The paper I think is the best paper we have ever had. It is practical from beginning to end. We cannot fail to understand it. It brought out, for my part, the points I have been trying to get at through reading, and has condensed for me a great many books. Taking the tables which have been put upon the blackboard by Dr. Bryce, in the first column we find that a person who is run down should take a sea trip as we see that the air in mid-ocean contains only .06 bacteria per cubic meter. Following that down I am staggered by the figures, when in the city of Paris 36,000 bacteria per cubic meter are given off by an old house. Now that should be advertised ; that is a point for us, sir. We have a reporter here, and he should devote a column to that. It makes it clear that we should not live in an old house, that we should have a new house ! Taking the next paragragh on the black-board it would appear that we ought to live in wooden houses if we are to live economically. I also would think that perhaps a wooden house would be more wholesome to live in. It is very interesting to note the different points brought out there of the different powers of conducting heat, of the several materials. Passing on to the question of moisture, we have another peculiar proposition, that is this : We find that in London since artificial means of heating rooms other than fire places have been introduced, the ratio of diphtheria cases has greatly increased owing to a sufficient amount of moisture not being supplied. Now it has been pointed out to us that the residents of Ireland who have only fire-places are all in old houses. The individual who lives in the old house has more moisture and more microbes, while the man who lives in a new house has less moisture and fewer microbes ; a choice of two evils with the benefit of the doubt in favor of the new house; henceforth we should see that he gets the necessary moisture. Dr. Bryce referred to painting of radiators. I think we all know that bare iron radiates heat more than that which is in any way finished outwardly. I remember on one occasion when I travelled up to the park to speak to Dr. Bryce on this question of heating and ventilation, he described an ingenious device which he had successfully used to equalize the temperature of the air throughout the room ; if he has time perhaps he will describe it to you now, as I am sure you would be interested.

The President : We have this motion before us. I know Dr. Bryce will recognize that although it is a formal motion, it is one that is sincerely made. I am

only afraid that when our municipal authorities learn the amount of water that is being used, they will raise the rates on us. You will please show your approval of this motion. Carried.

Dr. Bryce: Mr. President and Gentlemen: I know your time is limited, and I am sure you have had quite enough from me without discussing the points that have come up, yet there are several that need to be answered. The ventilation especially in the schools in the city of Toronto, attended by 35,000 children, is criminally neglected. Naturally one gets interested in the question. After all a health officer is not a health officer until he runs into actual contact with all the problems affecting the health and comfort of all the citizens, and that is what I have been trying to do for eighteen years, and in the question of ventilation, I may say that this generation in my judgment, is farther back than it was eighteen years ago. We recognized years ago that there ought to be an honest attempt to get outdoor air into rooms; to-day we have forgotten it, and we have been led into the idea that a hot air furnace may be allowed to give us the same air over and over again. I have pointed out in the table which Mr. Baker has referred to the relative purity of air outdoors and in, and if we have many diseases of a communicable character, that the number of germs in a house is an important factor. It is further true that an old house which has been accumulating dirt for a number of years must necessarily be a dirty house. Undoubtedly a hospital is a dangerous place to try and get well in. I recognize the point that Mr. Dick has brought up with regard to cost. No one can doubt that in this country. I am as convinced as I can be of anything that if we realized that the air which is up there at the ceiling is 15° warmer than it is here, that we would endeavor to economize by adopting means whereby it may be kept near the floor thereby economizing heat. Mr. Langton says that a person in Calgary is not supposed to feel the cold there as much as in Toronto. It is perfectly true, and if Mr. Langton will watch these figures for a moment he will see a partial explanation of the fact. We have got a loss of heat from the body. As we all know moist air conducts heat rapidly while dry is a non-conductor. Further, if it be remembered that the air of Calgary is usually dry and cold, capable of holding very little moisture, we will see why a man's body does not lose much by evaporation. If I have aroused an interest in what seems to me to be a very practical subject, I will feel myself compensated for any trouble I have had in preparing the paper. There is a practical question asked by Mr. Burke which I neglected to answer. He asked how we are to find out the humidity of rooms. You need only to arrange the ordinary dry and wet ball thermometer and with a set of tables may determine the relative humidity readily.

Mr. Burke: Can you introduce too much moisture in winter?

Dr. Bryce: If you get up beyond 75 or 80% you would probably have too much, because you are going to lose heat unduly by a damp air. The difficulty is the other way, because in all artificially heated houses we do not get the moisture.

Mr. President: I thlnk that it is a generally understood thing that we do not confine our members on the Council to the city. There is just one difficulty that if we get too many outside of the city we have a difficulty in getting a quorum. There have been generally two members of the Council who are not Toronto residents.

Mr. W. R. Gregg: Read letters from Mr. Dick and Mr. Gouinlock withdrawing their names from the list of nominations for Council and from Mr. Baker resigning from Council. Under pressure Mr. Baker withdrew his resignation.

The election of members of the Council was then proceeded with, resulting in the election of Messrs. Edmund Burke, Lawrence Munro, of Hamilton, and Eden Smith.

The convention then closed.

At a subsequent meeting of the Council the following officers were elected:—President, Grant Helliwell, Toronto; 1st Vice-President, F. S. Baker, F.R.I.B.A., Toronto; 2nd Vice-President, John A. Pearson, Toronto; Treasurer, W. A. Langton, Toronto; Registrar, W. R. Gregg, 94 King street west, Toronto. Council:—Fred Henry, London; A. H. Gregg, Toronto; Lawrence Munro, Hamilton; Edmund Burke, Toronto.

Colouring gives repose to the eye when hadings and shadows are, as in Nature, used in true contrast to the lights, and produces the rule of harmony. Examples of neglect of such harmony may frequently be seen in our modern domestic dwellings. For example, it will be found that rooms with north lights are often decorated with ornaments shaded in greys or cold colors, whereas warm shadings should be used, and vice versa, rooms with sunny aspects as a rule should be treated with cool shadings. The choice depends, however, considerably upon the source of the light in the room, whether from direct or reflected rays. The artist will at once see and adapt his color decoration to the peculiarity of the situation.

Brown ash woodwork may have old red walls, the frieze of old blue, the cornice of buff, and the ceiling of a lighter shade; whilst the upholsterings may be of old gold, red and blue, and the draperies of grey.

SEVEN NOTABLE BRIDGES.

London Bridge is constructed of granite, and is considered to be one of the finest specimens of bridge architecture. The present structure was commenced in 1824, and completed in seven years at a cost of £1,458,311. The Bridge of Sighs, at Venice, over which condemned prisoners were transported from the Judgment Hall to the place of their execution, was built in the Armada year, 1588. The Bridge of the Holy Trinity, at Florence, consists of three beautiful elliptical arches of white marble, and stands unrivalled as a work of art. It is 322 ft. long, and was completed in 1569. The Niagara Suspension Bridge was built in 1852-1855 at a cost of £80,000. It is 234 ft. above high water, 820 ft. long, and the strength is estimated at 1,200 tons. The Rialto, at Venice, is said to have been built from the designs of Michael Angelo. It consists of a single marble arch 98 ft. long, and was completed about 1592. Brooklyn Bridge was commenced, under the direction of Mr. Roebling, the designer of the Niagara Suspension Bridge, in 1870, and completed in thirteen years. It is 5,989 ft. long and 135 ft. high. The cost of building was little less than £3,000,000. The Lagong Bridge, built over an arm of the China Sea, is five milas long, with 300 arches of stone, 70 ft. high and 70 ft. broad, each pillar supporting a marble lion 21 ft. in length. The cost of the bridge is unknown.—Builders' Journal.

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