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CANADIAN ARCHITECT AND BUILDER.

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CANADIAN ARCHITECT AND BUILDER,

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(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

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The Cost of Remodelling Old Buildings.

AN experienced architect who recently remodelled an important public building, using a large quantity of the original cut stone and brick work, states that the ultimate cost of the work was several thousands of dollars in excess of what would have been required to put up an entirely new structure. It is safe to say that this statement would apply to a large proportion of the old buildings which have been remodelled. Nor have the results usually been satisfactory, because the architect was hampered by having to conform in large measure to the plan of the old building. Taking down, cleaning and replacing old stone and brickwork is a much more costly operation than owners of old buildings imagine it to be.

Students' Competition.

ATTENTION is specially called to the announcement appearing in the Students' Department of this number regarding a competition for students and draughtsmen. The sole object of this competition is to encourage and benefit Canadian students of architecture. It has been remarked that the students of the present day in Canada do not display as great ambition or put forth as much effort to achieve success as did the students of eight or ten years ago. Our own experience in connection with recent students' competitions seems to bear out this

view, the number of competitors having been considerably smaller of late than at a former period. The students have now a favorable opportunity, by entering with enthusiasm into the present competition, to show that they are prepared to take advantage of any means of self-improvement which may be afforded them. Architects are requested to bring the competition to the notice of their students and urge them to take part. If a satisfactory result is attained, other competitions will follow. Request will be made of the judges to give in connection with their report a detailed criticism of the plans, in order that the authors may learn the weak as well as the strong features of their work.

Competition for School Plans.

THE Department of Education of Ontario has advertised for competitive plans for public school buildings ranging in size from a single room to four rooms. The highest premium is $150 and the lowest $80. It is understood to be the intention of the department to appoint experts to decide upon the merits of the plans which may be submitted. It is to be regretted that the advertisement inviting the plans does not specify the manner in which the competition is to be decided.

An English Opinion of American Architecture.

IN the London Builder of October 7th is printed an article headed "Notes in New York," in which reference is made to the modern architecture of New York. As might naturally be expected, special mention is made of the tall buildings which in recent years have sprung up so rapidly in the business thoroughfares of that city. With regard to these the writer says: "It is all very well for passers-by to say that buildings of such size are monstrosities, but seeing that utility is the first object of every building, it has to be admitted that the people of New York have by their system of building policy obtained not only space, but actually buildings in comfort and convenience up to the highest standard." The belief is expressed that, whether agreeable to the taste of the people or not, the tall building—perhaps modified in form as compared with the New York examples—will become a necessity in the large cities of the old world. It is the opinion of this writer that the educated American sets a higher value on art than does the average Englishman, or indeed a citizen of any other country except France. "There can be no doubt," he says, "that it is beyond the Atlantic that we shall find the finest buildings of the future. Energy, wealth, and a desire to produce structures which shall be at once useful and beautiful—large spaces, so far as cities outside of New York are concerned—all these things make towards the creation of finer architectural works than can be erected in an older country. Architectural individuality in New York is moreover given a very large field, a scope which is noticeable especially in regard to private houses. This freedom, though it necessarily from time to time must result in eccentricity, yet affords opportunity for much larger artistic effect than can be obtained in the more formal and systematic streets of English and Continental towns. Sometimes, also, the contrast between the opposing styles of houses which are side by side, the conflict between different materials —a red brick, for instance, side by side with yellow stone—does not tend to general harmony of effect. On the other hand, the obvious and often successful endeavor to create an individual house, pleasing to look upon—not one portion, as in England, of a monotonous street—is remarkable."

The Future of the O. A. A.

THERE are indications that the present discussion regarding the future of the Ontario Association of Architects is likely to result in benefit to that organization, and that from the suggestions which are being offered may be evolved a plan of future action designed to enhance the prosperity and usefulness of the society and permanently advantage the cause of architecture in this province. That some changes are necessary is clearly apparent. What is required, therefore, is to decide what can and should be attempted to enable the Association to achieve in the future, in a larger degree than in the past, prosperity and usefulness. This end will not be attained by criticism alone of the conduct of those who have in hand the management of its affairs. This is especially true of what may be termed "destructive criticism," such as has been indulged by some who have given expression to their views on the subject. It requires but little ability to find fault in a general way with everything and everybody. On the contrary, what may be termed "helpful criticism," which points out in a kindly spirit the causes of past failure, and suggests methods of achieving future success, should be heartily welcomed.

To those who have stood by the Association from its inception until the present, and have given much time and effort to promote its welfare, is due the highest praise. One of the greatest obstacles in the way of their success has been the unworkable and valueless character of the charter of incorporation placed in their hands by the Ontario legislature. The defects in this charter were stated in our last issue and on many previous occasions. Those entrusted with the management of the Association hoped that it might be possible to secure from the government through the legislature a single amendment which would render the Ontario Architects' Act of value to the public and the profession, viz., a restriction of the use of the title "Architect" to properly qualified persons. Influenced by this hope, they deemed it advisable to direct their efforts principally to an endeavor to secure the passing of this amendment. Could they have foreseen the failure of this endeavor, doubtless they would long ago have turned into different channels their thought and effort for the building up of the Association and the advancement of architecture.

In the light of present experience, it would appear that greater things might have been accomplished if the efforts put forth during the last ten years had been in the direction of formulating and putting in operation a system of education for the students, who, to a large extent, must decide what shall be the future status of architecture in this province. The Association's recent proposal to endeavor to provide a fund sufficient to establish a travelling studentship seems like starting at the wrong end of the ladder. The students have not had the training which would qualify them to profit by such a studentship. The greatest requirement at present is means of educating the student; the travelling studentship would naturally follow. This is the work to which we believe the Association should now turn its attention. It is impossible not to regret the

loss of past opportunity, but regrets can serve no useful purpose beyond that of stimulating to further effort. The Association should profit by the example of the American Institute of Architects, which, in annual convention at Pittsburg the present month, decided to give greater attention than in the past to the subject of professional education; to endeavor to bring into affiliation with the Institute the students and draughtsmen, and after 1905 to make the passing of an examination a condition of membership in the Institute. We commend to the careful consideration of Canadian architects, both within and without the O.A.A., the thoughtful address of the retiring president of the American Institute, to be found on another page. His suggestions with regard to the necessity of enlisting the sympathy and assistance of the young men of the profession are especially noteworthy and valuable. Future success must depend upon the young men, hence the wisdom of securing their co-operation. A strong effort should be made by the O.A.A. to provide means of educating students, of encouraging them, and, where neccessary, of compelling them to pass a qualifying examination. For this purpose there should be a fixed term of studentship, and no student should be accepted who is not willing to pursue the prescribed course of study and pass the required examinations.

It is desirable that a number of the younger men comprising the Toronto Architectural Club, who are not now members of the O. A. A., should be induced to join. Any obstacles which may at present stand in the way of their admission could no doubt be removed. Their adhesion should strengthen the organizatiou. In order that the Association might receive the benefit of their enthusiasm, ideas and energy, they should be given something to do, and a fair share of the responsibilitv and honors. The social spirit should be cultivated to a greater extent than heretofore. For this object it would seem desirable that the Association should, if possible, have suitable and easily accessible rooms in the heart of the city, which would serve as a rendezvous for its members, and to which access should be afforded at stated times to students for study and recreation. The Association library should be placed there, and as fast as possible should be enlarged until it should become one of the most valued adjuncts of the society. As a means of promoting acquaintanceship and good fellowship among the members, and of bringing the Association, its purposes and work before public attention, means should, if possible, be devised to revive the annual dinner, which in former years was a prominent and enjoyable feature of the annual gatherings. The suggestion which has been made that the conventions should sometimes be held outside of Toronto, is also deserving of consideration. The American Institute of Architects at its last meeting decided that in future every alternate meeting should be held outside of Washington which is the headquarters of the society. It is by no means improbable that if conventions of the O. A. A. were occasionally to be held in Ottawa, Kingston, Hamilton and London, it would be the means of widening interest in the organization and its work, and of increasing and maintaining the membership.

The announcement is made that the manual training system in the public schools, provided for by the munificence of Sir W. C. McDonald, of Montreal, will be inaugurated about the February 1st.

WARM VENTILATION OF HOUSES.*

In the previous article upon this subject we found that in order to keep the air of an occupied room sufficiently pure for wholesome respiration it is necessary to introduce into it one cubic foot of fresh air per second per head, or 3600 cubic feet per hour. In the case of houses we can only treat the house as one compartment and see that it is supplied with fresh air in this quantity, that is to say, at the rate of 3600 cubic feet an hour for each inmate. The question is how to arrange that the supply shall be of about the quantity required.

To make a fair start in our calculations it is necessary to consider what we really mean when we say that heated air rises. The expression suggests independence of gravitation. To be perfectly accurate we should say that heated air is raised. It is the greater gravity of cold air that does the work. Being denser bulk for bulk than the warmer air, it is more forcibly attracted to the earth and flows in under the warmer air and shoves it up. In order to make warm air rise it is necessary to provide for the inflow of cold air under it; and if we have made this provision we have a system of ventilation. The ordinary furnace with a cold air duct supplying air from outside, which, when warmed, is driven by fresh supplies of cold air up into the house and out by the fire-place flues, is a system of ventilation. The complaint is often made that it is more a system of ventilation than it is of heating; and the householder gives up the attempt to warm fresh air, and tries only to make the air circulate by drawing the cool air supply to the furnace chamber from corners of the house. By thus containing as far as possible the movement of air within the house it is perhaps easier to regulate the circulation to all parts so that they may be warmed; but, as material for breathing, the air is apt to be hardly worth circulating. It is as possible to procure the proper circulation of warmed air when the supply to the heating chamber is drawn from outside the house; but this is a matter of planning. The present question is of the supply.

Air in its movements is very like water, and the law which governs the supply of cold air to a furnace is the law of spouting liquids. This law is that fluids pass through an opening in a partition at a rate equal to that with which a body would reach the earth after falling a height equal to the difference in height of the liquids on each side of the partition. Where there is also a difference in the temperature of the liquids, the pressure of density in the cooler liquid also represents height—a height equal to the difference in the volume of the liquid at its own temperature and at the temperature of the warmer liquid on the other side of the partition. The difference in temperature between the outside air and the warmed air in the house is therefore the measure of the speed with which cold air will pass through the cold air duct into the heating chamber of the furnace. Air expands $\frac{1}{491}$ of its volume for each degree Fahrenheit of heat; the difference in pressure of the column of air outside the house and the column of air inside the house, is therefore the same as if the outside column stood at a height greater than that of the inner column by as many times $\frac{1}{491}$ of its volume as there are degrees of temperature; or to state the matter generally, the difference in pressure is equal to $\frac{1}{491}$ of the height of the house multiplied by the difference

*Conclusion of article upon this subject in the September number.

in temperature. A body falls through space at a velocity per second about equal to 8 times the square root of the number of feet fallen. So that with the temperature inside a house at the standard of 70° and and the temperature outside at 20°, the house being 40 feet from bottom of furnace to top of the fire-place chimneys which form the outlets for air, the velocity with which air will pour into the cold air duct will be at a rate per second which is 8 times the square root of $\frac{70-20 \times 40}{491}$ that is to say about 8 times 2, or 16 feet a second. An allowance of 20 per cent. or more must be made for friction and other causes which detract from this theoretical rate ; so that we may take the rate of the inflowing air, when the temperature is 20° outside, as about 12 feet a second. By a similar process we can find that the velocity of inflow per second varies from about 15 feet when the temperature is zero to 10 feet when the temperature is 40°. It is then a simple matter to discover the range our cold air duct must have. As one cubic foot per head per second is the requirement, it is obvious that a duct one foot square will supply air for ten people when the temperature is 40° and need be only $\frac{10}{15}$ or $\frac{2}{3}$ of a foot for 10 people when the temperature is zero. In other words, the formula is area $= \frac{\text{quantity}}{\text{velocity}}$. In the average household of 6 persons —as we know that we require 6 cubic feet of air per second, and that air flows into the house from 10 to 15 feet per second, reckoning from 40°, beyond which we need not go, to zero, after which perhaps we may close the inlet—we can determine our inlet to have an area of from $\frac{6}{10}$ to $\frac{6}{15}$ of a foot ; that is to say, it should be 7″ x 12″ with a sliding door by means of which it can be reduced to about 4″ x 12″ or less. This is not a great affair and it becomes evident when the matter is worked out, that the householder's kick has been against a cold air duct about three times too big. For an inlet of this size the two or three fire-places that are usual in a small house will afford all the outlet necessary.

So far figures may be used with sufficient precision to serve as a guide to practice ; but when it comes to examining into the question of furnace dimension and consumption of coal there is a wide margin to be allowed for variation in the space allowed to each occupant ; that is to say, from our present point of view, in the amount of cooling surface to which the air delivered to him is exposed ; and for other varying circumstances of construction, exposure, etc. Experiment becomes the ultimate basis of practical calculations ; but it is always worth while to examine how common practice agrees with the results of calculation from the data of science.

Taking the average winter temperature as 20°, at which temperative air enters the heating chamber of our furnace for 6 persons at the rate of 6 cubic feet a second, 258,200 cubic feet will enter in 12 hours, i.e., during the time in which one charge of coal for the furnace is consumed. As dry air weighs 13 lbs. a cubic foot this means about 20,000 lbs. of air. One pound of coal as usually burned will heat 8,000 lbs. of air 4.2° Fahrenheit. We have to raise 20,000 lbs. of air to such a degree of heat as will, when distributed through the house, keep it at a temperature of about 70°. The temperature of the air issuing from the furnace chamber will need to be about 120°, in other words, it is necessary to raise the temperature of 20,000 lbs. of air 100°. This will require 60 lbs. or a cubic foot of coal in 12 hours. The fire-pot for this supply must have about twice that capacity in order to allow room also for the residuum of glowing coal for which the new charge is food. A pot 1′.0″ in diameter on top, 1′.4″ in diameter at the bottom, and 1′.0″ deep will hold the required amount ; and the consumption will be at the rate of half a ton a week in average winter weather of 20° Fahrenheit.

FIRE TESTS.

"The Builder," London, England, of October 21, 1899, publishes the following : The British Fire Prevention Committee started its winter session by arranging a private view of its testing station at Regent's Park and showing a series of experimental tests with a concrete floor, with an iron safe, and with some wooden doors. The floor was of steel girders with a concrete filling prepared on the lines recently required by the London county council. The fire was intended to be of two and a half hours duration at a temperature of 2000 degrees Fahr., but the floor collapsed in approximately an hour and a half, before that temperature had been quite reached. The testing operations were conducted by a sub-committee of the executive, comprising several district surveyors with Frederick Farrow, Mr. Max Clarke and Mr. Charles E. Goad.

TORONTO GUILD OF CIVIC ART.

The following gentlemen were elected at the annual meeting recently to form the advisory board for the ensuing year : Laymen, Messrs. G. W. Allan, James Bain, jr., Allan Cassels, Q.C., S. H. Janes, E. F. B, Johnston, Q.C., Jos. Loudon, Prof. James Mavor, Bernard McEvoy, E. E. L. Porteous, A. J. Somerville, B. E. Walker ; architects, Messrs. Frank Darling, W. A. Langton, A. F. Wickson ; artists, Messrs. E. W. Grier, L. R. O'Brien, G. A. Reid. Mr. E. B. Osler was elected president, Mr. B. E. Walker retiring. The other officers are : Messrs. Hon. G. W. Allan and E. F. B. Johnston, vice-presidents ; James Bain, jr., treasurer ; and W. A. Langton, secretary.

PERSONAL.

The death is announced at Victoria, B.C., of Mr. A. J. Smith, a pioneer contractor of that city, aged 60 years.

Mr. Joseph R. Roy, formerly of Montreal, now resident engineer of the Department of Public Works, New Westminster, B.C., was married recently to Miss Edna Harvey of that city.

Mr. Hercules Robertson, one of the oldest, best known, and most highly respected contractors of Toronto, died at his residence in that city a fortnight ago. The late Mr. Robertson was a native of Shetland, Scotland.

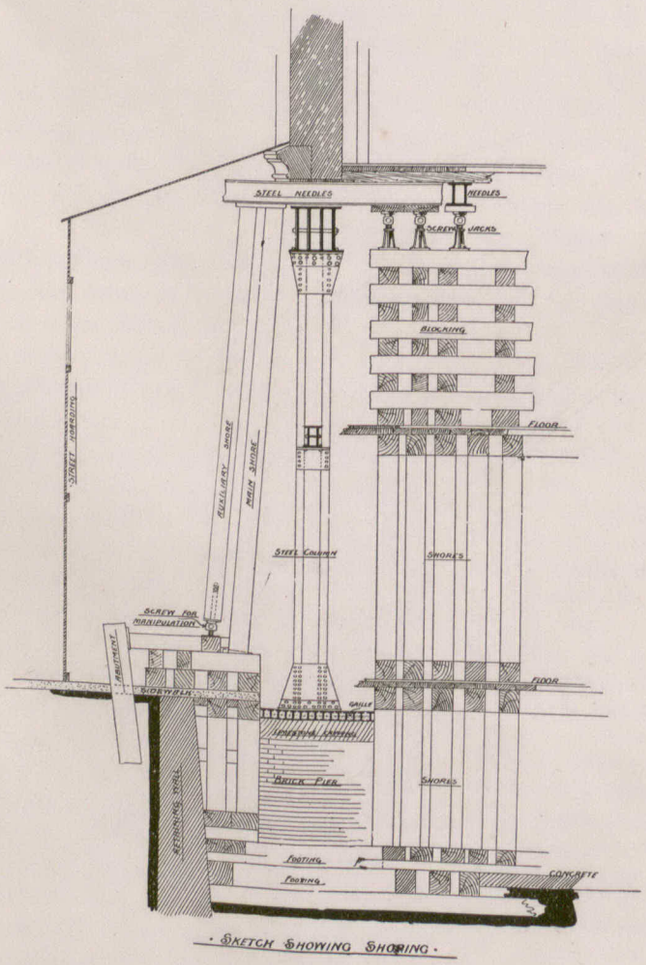
We record with regret the death of Mr. John Fletcher, contractor, of Toronto, from paralysis. The late Mr. Fletcher, who was sixty-five years of age, had for many years occupied a prominent place in the ranks of Toronto contractors, and was connected with the erection of many of the important buildings of that city, including the Temple building on Bay street.

During the last convention of the American Institute of Architects, held at Pittsburg, Pa., in November last, Mr. Alcide Chausse, architect, of Montreal, was elected a corresponding member of the above named association. Mr. Chausse is also corresponding member of the Societe Nationale des Architectes de France and of the Societe Centrale d'Architecture de Belgique, and member of the council of the province of Quebec Association of Architects.

The Elliott & Son Company, decorators, are preparing to remove on January 1st to new premises on King street west, Toronto.

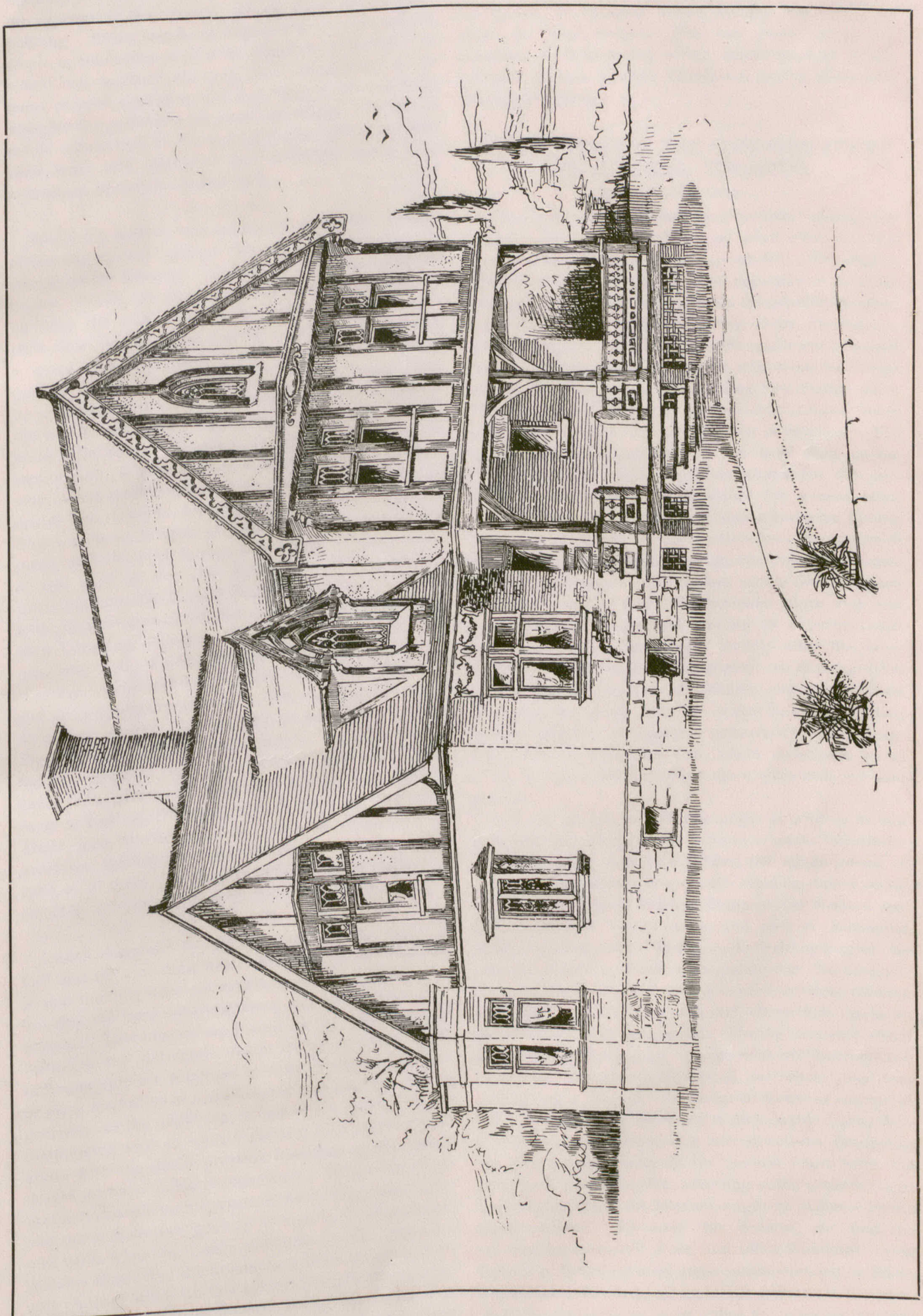
PERSPECTIVE VIEW BEFORE ALTERATION.

PERSPECTIVE VIEW AFTER ALTERATION.



KEY SKETCH.

ILLUSTRATIONS ACCOMPANYING PAPER IN THIS NUMBER BY MR. J. WILSON GRAY, ARCHITECT, DESCRIBING THE METHOD OF MAKING IMPORTANT ALTERATIONS TO THE CONFEDERATION LIFE BUILDING, TORONTO.



DESIGN FOR RESIDENCE AT HAMILTON, ONT.
W. W. LACHANCE, ARCHITECT.

BY THE WAY.

MESSRS. Bond & Smith, architects of the new Union Bank on Wellington street west, Toronto, have, with the approval of the owners, placed their name on the building. Other architects might well follow this example in connection with their important buildings. It would help to clarify the hazy ideas entertained by so many persons regarding the functions of an architect, and give the profession its proper standing. Further, it would induce care on the part of the architects to give their work such character that it would stand as a monument of their taste and skill.

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THERE are reasons why we should expect the builder of our day to rank among the most enterprising and worthy of our citizens. He has had a distinguished ancestry. Noah, the pioneer builder, spent 140 years in building the first house-boat. He may have been a trifle slow, but we know that he succeeded in making a good job. Pharoah knew a good deal about geometry, and without the aid of a steam winch piled up a mass of gigantic stones that is still the wonder of the world. Solomon, too, aided by Hiram, did a little building in his day, by which he greatly enhanced his reputation. A certain Chinese emperor comes to mind who built a retaining wall three thousand miles long to enable him to retain his kingdom against the Tartars. The wonderful temples of Greece and Rome and the great cathedrals of Europe still remain as monuments of the skill of the old builders, while in modern times we have the Crystal Palace of London, covering with glass an area of thirteen acres, the sky-scrapers of New York and Chicago, and last but not least, our own city hall, which, though it has involved a few "extras," is nevertheless a credit to a native architect and to Canadian craftsmen. The builder, like other men, has always had troubles of his own. In old Pharoah's day, labor-saving devices were unknown, but nevertheless we are told his workmen found cause for a strike, and the strike has been an event of more or less regular occurrence in the trade ever since. There have developed, also, other troubles such as lien-laws, workmen's compensation acts, etc., but in spite of all these, the builder maintains his reputation for skill, enterprise, honesty, and good humor.

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I HEAR complaint by the occupants of the new city hall that the automatic heat regulating system installed in that building does not satisfactorily perform its duty, but that the temperature goes up and down about as it pleases. Thermostats are placed on the walls and connected to the automatic steam valves attached to the radiators, and are supposed to be so sensitive as to open or close the valves at a variation of one degree. Owing probably to the difficulty, if not the impossibility, of maintaining an even adjustment of the air pressure from above with the steam pressure from below, the device is said to have failed in operation. When the steam pressure exceeds the air pressure the valve remains open, and the temperature goes up as high as it pleases, and vice versa when the steam pressure is weak, the valve remains closed and the atmosphere becomes uncomfortably chilly. While on this subject it might also be mentioned that the air used for ventilating the building is drawn by suction from the tower at a height of more than 200 feet above the ground level. It has been noticed that when an east wind prevails heavy clouds of smoke from the chimneys of the T. Eaton Company's steam plant strike the city hall tower at the point at which the fresh air supply is taken. When the wind is from the north the smoke from the chimneys of the electric station on Terauley street envelop the tower at about the same height. This has given rise to the question, to what extent is this waste product of the coal pile sucked into the ventilation system of the new municipal building.

ALTERATIONS TO THE CONFEDERATION LIFE BUILDING, TORONTO.

BY J. WILSON GRAY.

In the year 1892 the Confederation Life building was erected, not only for a home or head office for the company, but also as a revenue producer. The capital represented being large, it was necessary to consider well the best possible way to attain the greatest returns. The building was designed having three frontages—the east front on Victoria street, the south and principal front on Richmond street, and the west front on Yonge street. The design was divided into two distinct parts —an eastern section and a western—the central tower on Richmond street forming the point of division. The eastern section was set apart for the head office of the company, the first floor being designated for this purpose, and the remaining upper floors for general office purposes, with a large ball and supper room on the top flat. The elevations of this section bear the marks of this internal arrangement and are the most handsome of the two sections. The western section was designed for a warehouse or large departmental store and was consequently somewhat subordinate in exterior treatment to its eastern neighbor. Shortly after the erection of the building the departmental store proposition for the west section was abandoned, the ground floor converted into stores and the upper floors into offices, without altering the general appearance of the elevations, however advisable that might have been, so far as the Yonge street fronts for store purposes are concerned.

It is not the purpose of this paper to criticise or find fault with the design of the structure under consideration, but merely to point out what the advancement of the times has demanded since the building was erected, so far as the ground and first floors of the western section fronting on Yonge street and part of Richmond street are concerned. The immediate occupancy of the new sub-divisions of this west section was the best evidence of the wisdom of such a course, a larger revenue being derived from the stores and offices than could be got from any other enterprise. During the years which followed this occupancy, the general architecture and construction of store buildings all the world over was undergoing a change. In the great business centres of the world land was becoming more valuable day by day. The demand, therefore, was for structures occupying the least possible space on the ground floors with the structural materials, thus affording larger areas for light and display, while the heavens might be explored by the upper storeys. To meet this demand, we find the modern departmental store and office buildings being erected of fire-proof steel construction encased in brick, stone and terra cotta, all materials reduced to the minimum for strength, so as to utilize the greatest possible area for floors and windows. In some cases the lack of the fire-proof casing round the steel columns on the

street fronts is noticeable, so that every inch of space possible might be given to plate glass. To risk a whole superstructure for the sake of a few inches of plate glass may seem to be going beyond reason, but such is the case, and such is the demand of the commercial world to-day. What cannot be gained in area within a certain limit is gained in the height to which such structures are built, not ceasing to ascend till the twenty-second or twenty-fourth flat is reached—veritable sky-scrapers.

In the great commercial centres where new buildings could not be erected, the old ones are being speedily altered to meet the new conditions, and we find whole flats of heavy stonework being removed and giving place to the lighter steel construction, and what was for years a frontage of dismal stone piers, small windows, almost invisible doors, all badly lighted with gas, is transformed into large plate glass show windows, aglow with electricity, the points of support almost hidden from view with show cases and not invariably encased in mirrors. In this respect our own city of Toronto is abreast of the times. The steel construction in departmental stores has taken its place and is proving its value in remodelling old premises to meet the demand of the times. This advancement in store buildings was so rapid that the west section of the Confederation Life building fronting on Yonge street was soon left behind for store purposes, and with other new and altered structures all round, was considered out of date, and rightly so when one considers that in a total frontage in the best business section of the city of 68 feet 6 inches on Yonge street, 156 feet 6 inches on Richmond street, 104 feet 6 inches on Victoria street 57 feet were occupied with stone and lime, about three feet thick, with window reveals in some cases about two feet deep. A glance at the photograph of the building before the alteration will convince any one of the absurdity of this frontage being used for store purposes.

With a view to meet the advancement of the times and make the property more productive it was necessary to make such alterations as would bring it up to the standard of modern requirements. This necessitated the removal of the huge stone piers on both frontages, so that a prominent entrance might be made immediately on the corner to premises suitable for banking purposes, which would occupy the Richmond street front, and increase the plate glass area on Yonge street for store purposes, introducing, if possible, an additional store on that frontage. This could be done only by reducing the points of support to a minimum area by the use of steel columns with steel beams over upon which the superstructure might be carried.

In the fall of 1898 a commission to prepare plans and undertake to have the scheme carried out was placed in my hands. As soon as it became known that such an undertaking was about to be commenced speculation as to its success became rife amongst our city architects and contractors. The attempt was considered too daring to be successful, as nothing of the kind had been attempted in Canada before. Being confident however that the scheme was feasible, and satisfied that ample strength had been provided for in the construction, and that the building could be satisfactorily shored up, the contracts were awarded, not, however, without shouldering the responsibility for their successful completion upon the architect.

The problem of shoring up and holding in position such a mass of masonry and brickwork until the necessary steel columns and beams were inserted and tightly keyed up, at the same time keeping the tenants overhead safely in their offices and supplying steam heat to their premises as if nothing unusual was going on, was no easy task. The isolated construction of the building —that is to say, the weight of the superstructure being carried on isolated piers and foundations without any connection with each other except by large arches over the fifth floor—and the limited area on the two frontages allowed by the City Engineer for shoring purposes, and a retaining wall existing two feet apart from the foundation piers, were limitations which had to be contended with, and offered serious obstructions to the ordinary methods of shoring. By these limitations it became necessary to construct a system of shoring upon a very narrow base or foundation to come within the prescribed area, and also to be rigid enough to prevent any sway to the peculiar construction above.

A reference to the key sketch of shoring will explain this method and while there is only one set of shores shown in this diagram the other illustrations show how closely they were inserted in order to be efficient. The foundation necessarily had to be formed in the basement. Excavations were made to reach the solid clay upon which the first heavy timbers were laid. It was found impossible to form a sufficiently secure foundation on timbers alone because of the narrow area and limitations already referred to. It was determined at the outset to use the old foundation piers as foundations for the new steel columns, and these could not therefore be disturbed. Those foundation piers however had very heavy footings with large offsets at every course above the foundation clay. The offsets suggested their use as a means of forming part of the shoring foundation. With this end in view the foundation timbers were levelled up to the height of each footing course and overlapping them as the height was increased, so that by this means the old foundations were made to do duty in carrying the superstructure although entirely disconnected from it, the weight being equally divided as nearly as possible on each side of the foundation piers. The illustrations show how the different stages were constructed, so as to keep the concrete pavement in its position on the outside and the floors intact inside. This was done for the purpose of forming a strong bond between each stage of the shoring to prevent the whole system from swaying in any direction, an action which was very liable to occur because of the isolated construction of the building. Such a firm bond was secured by this method that it was impossible for any thrust outwards to occur without tearing out the flooring systems of three flats and all the anchorage of the heavy stack of vaults and iron beams inside. The outside shores were also well provided for. In addition to the main shores an auxiliary was inserted immediately behind each with a long heavy screw-jack inserted in the lower end for the purposes of manipulation in tightening up or slacking down. The outside shores were inclined inwards at the top at a sufficient angle to bear their proportions of the superimposed weight with safety, while the bottom was kept from sliding outwards partly by the heavy weight of the building itself and partly by heavy timber abutments sunk through the pavement deep into the ground and all firmly screwed and wedged. From the tops of the outside shores to the blocking inside, steel needles were inserted through the walls and upon those the building

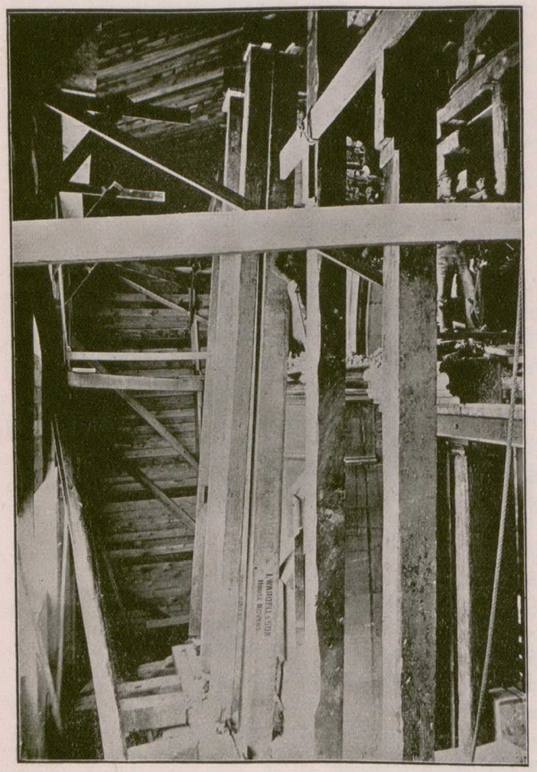


FIG. 3.

FIG. 4.

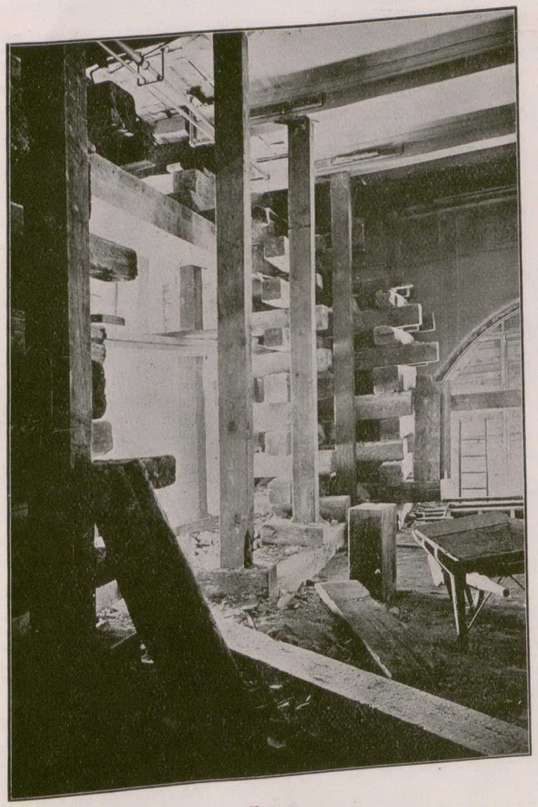


FIG. 5.

FIG. 6.

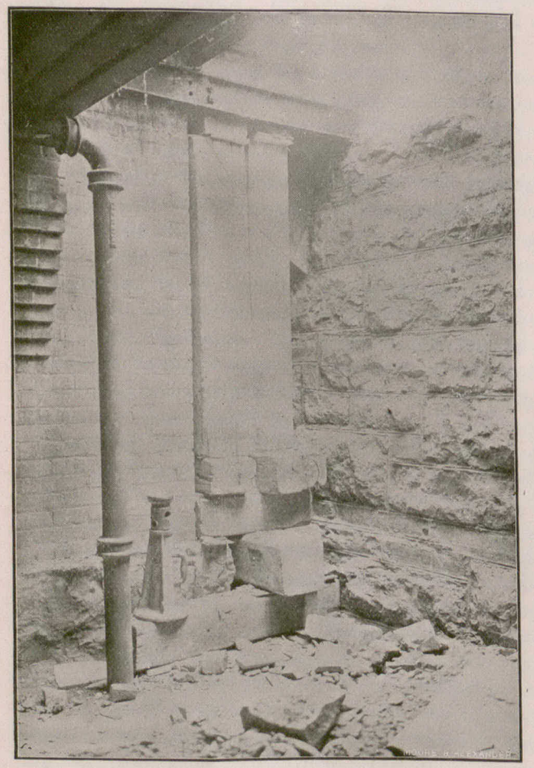


FIG. 1.

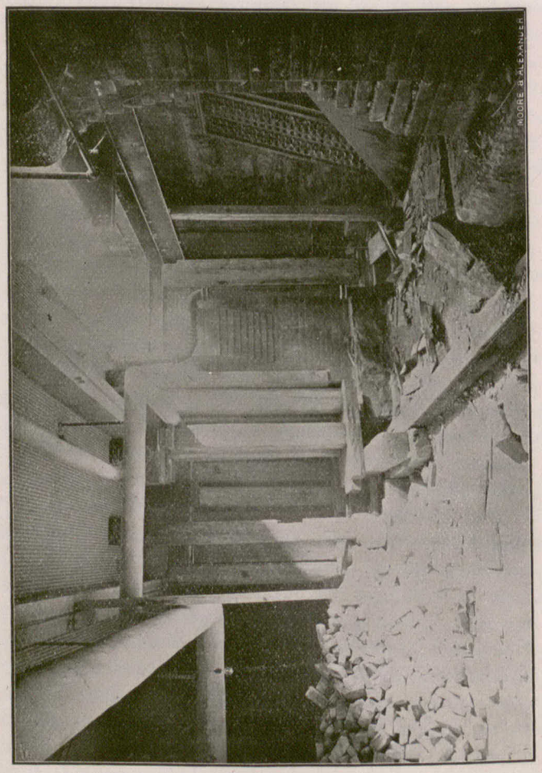


FIG 2.

FIG. 7.

FIG. 8.

ILLUSTRATIONS ACCOMPANYING PAPER IN THIS NUMBER BY MR J. WILSON GRAY, ARCHITECT, DESCRIBING METHOD OF MAKING IMPORTANT ALTERATIONS TO THE CONFEDERATION LIFE BUILDING, TORONTO.

rested while the lower portions were cut away. A few of the illustrations show this work in progress.

As soon as the useless walls were removed the old piers were prepared for the foundation of the steel columns by placing heavy limestone courses on top and then a grille of steel beams bolted together placed longitudinally and filled in solid with concrete. By this means the weight above was distributed from the narrow base of the columns to the old foundation area as nearly as possible.

The steel columns were formed of 15″ steel I beams rivetted together, with steel bases and plates and 15″ I beams on top, strongly reinforced at the points where the heavy crushing weights would prevail. The ends of the beams were cantilevered over the corner columns, securely rivetted together at the ends and secured on the top with a heavy steel plate cut to the radius of the corner. Upon this plate and system of cantilevers the round corner at Yonge and Richmond street is carried, and there now exists a band of steel beams securely rivetted together extending the full length of the Yonge street frontage, and a portion of Richmond street, which binds the whole together stronger than before. The columns and beams being set in their proper positions, the intervening space between the needles was built up with brick and cement and firmly wedged up with heavy slate wedges and allowed to set perfectly hard before any of the supports were drawn. Each set of beams was sufficiently secured to the existing iron beams by means of steel plates and tie rods with turnbuckles in the centre, so as to tie the old and new steel work together and make a complete connection between the two.

All exposed ironwork was fire-proofed by terra cotta casings and cement fire-proofing, the steel columns being encased in brick and cut-stone to harmonize with the other stone work of the building. The general treatment of the elevations is in harmony with the commercial requirements and restrictions, and do not materially affect the general architectural appearance of the building as a whole. The premises affected by the alterations are fitted up for general business purposes, with attractive fronts and entrances, and were all leased before the works were commenced, showing the monetary value of such an undertaking, and no doubt will continue to increase substantially the revenue of the company, as the location is becoming year by year the commercial centre of the city. I cannot close this brief description without referring to the intense interest taken in the work and the hearty support given me by the workmen on the building. Everyone seemed to realize how much was dependent on him individually. Messrs. Isaac Wardell & Son, who executed the shoring, and Mr. Alexander Marshall, the masons' foreman, were exceptionally careful and painstaking, and all employed entered heartily into the undertaking, determined to make it a success. To this care can be attributed the fact that the works were executed without a single accident of any kind. I mention these facts because it is so unusual to have such general co-operation by the workmen in such an undertaking, they invariably considering themselves wage earners only, having no further interest in the work than to fill in the time and look for pay day at the end of each week. I am glad to say this important undertaking has proven a happy exception to the rule.

The firm of Leitch & Turnbull, manufacturers of elevators, Hamilton, Ont., has undergone a change, Mr. Turnbull having retired and having been succeeded by Mr. C. H. Thompson, of Copetown.

ILLUSTRATIONS.

DESIGN FOR RESIDENCE AT HAMILTON, ONT.—W. W. LACHANCE, ARCHITECT.

ALTERATIONS TO CONFEDERATION LIFE BUILDING, TORONTO—J. WILSON GRAY, ARCHITECT.

NEW PREMISES FOR "THE STAR" NEWSPAPER, ST. JAMES STREET, MONTREAL, QUE.—R. A. DUNLOP, R.C.A., ARCHITECT.

THE ONTARIO ASSOCIATION OF ARCHITECTS' CONVENTION.

THE convention of the Ontario Association of Architects promises to have matter enough for discussion. A special committee has been at work considering in what ways that are feasible the Association can be made useful. A report from this committee will be presented to the convention, and it is hardly likely that the convention will pass without the enactment of something that will make a decided change in the present condition of affairs. The proposition to have a room down town, in association with another society, is likely to be made, in spite of the lukewarmness with which a similar proposition was met when advanced earlier in the year. The scheme is possible when combined with a proposal to make the registrarship an honorary office. The cost of maintaining a room will be met by the saving in the other department. There can be no doubt that the possession of a local habitation would foster the growth of all associated work; that meetings, the reading of papers, exhibitions of pictures, the use of a library, and students' classes and sketch clubs, all of which are the natural functions of a voluntary Association, will have a much better chance of thriving and developing. As a close corporation with power to force culture upon architects, or at any rate upon intending architects, the Association could do good work with a secretary, a board of examiners and a solicitor; but voluntary efforts require to be drawn out by opportunity and inducement, and the convenience of a room which would accumulate facilities for such efforts would be a great inducement to make them.

It is proposed to hold the convention down town instead of as formerly at the School of Practical Science. This experiment will show whether the convenience of meeting down town will be so great as to offset the privileges that have been enjoyed at the school. It ought to further a full attendance, for the Registrar's office, in which it is proposed to hold the meeting, is in a central position, near all architects' offices and also near the hotels.

All efforts of the Association to increase its effectiveness seem to be aimed at the cultivation of architecture. It's aim is always to do something for architecture; the architect is left to the operation of the law mhich makes him rise withe exaltation of his art. Yet it does seem as if a little attention paid to the commercial well being of architects would turn out to be as potent a stroke as can be made for the advancement of architecture. If a tariff of fees would give greater strength to the commercial position of architects, it would do the art of architecture a lot of good. To look at the matter from the other side: If it is true that the architect will rise with the improvement of architecture, it is equally true that architecture will decline with the debasement of the architect. It is to be hoped that, if there is in the report of the special committee no recommendation that there should be an authorized schedule of fees, the proposition will be made by somebody outside of the special committee.

BUILDING STONES AND STONE-CUTTING.*

By Alexander Marshall.

To the mason and stone-cutter a full and accurate knowledge of the materials he uses is most essential to enable him to estimate the advantages to be gained from their proper application for building purposes, so as to fill the conditions of economy, combined with utility and skilful workmanship. He should make himself acquainted with their positive and relative strength, the changes that take place from exposure to the atmosphere, moisture, heat and cold. Regard must also be had to the time and labor required in cutting them for building purposes. On the nature of the materials used in construction, the strength and durability of buildings wholly depend, and all the science we have ought to be applied to make the best selection from the materials within our reach. The most important properties of stone, as applied to building, is strength to resist compression, tension or other strains, its ability to withstand shocks and oppose friction, its unchangeable character when exposed to heat or cold—to the atmosphere or to the application of acids.

In making choice of building stone, when its qualities are unknown, it would be well to make a few simple tests to ascertain its qualities and defects. Sandstones that contain the greater proportion of silex in their composition, with a binding or cementing matter of a silicious nature, when compact and of fine grain, are the most durable, are very hard and most difficult to work, consequently very expensive where fine work is wanted, and not often used for mouldings or ornamental work. Sandstones whose component parts are silex and alumina, vary in strength and hardness, as the proportion of silex is greater or less. Alumina or pure clay is very adhesive, is incombustible, insoluble in water, but soluble in acids. It has a great attraction for metallic oxides, and thereby gives the shades of greys, reds and browns common to clays and sandstones.

When iron is to a great extent present in the cementing matter, and the stone coarse grained, disintegration soon takes place, more especially in large manufacturing cities, where it is more liable to the action of deleterious vapors and gases. The cementing matter being clay, with more or less iron incorporated, when exposed to the atmosphere the iron becomes oxidized, and is washed out by rain, leaving the surface of the stone porous and liable to absorb moisture in large quantities. When the surface of the stone is charged with water and becomes frozen, expansion takes place, the particles are forced apart, moulder away and fall off. Sandstones composed of silex, mica and alumina are generally of a more laminated nature, and being formed by the action of water, the mica in scales of greater of less size, is deposited on their flat sides. This kind of stone is much more easily split going with the bed or laminations, than at right angles to it. Great care should always be taken to have the stone placed in the wall on its natural bed. There are some sandstones so formed that it is very difficult to know the natural bed, even with the use of a lens; still, the mason or stone-cutter of experience can tell the difference when cutting the stone—it is harder and more difficult to break off across the grain than with it.

Stone, when laid on its natural bed, will resist decay from chemical and mechanical influences better, there being a smaller surface of cementing matter exposed; it will stand compression better, the layers being horizontal. There are some cases in which it is not practicable to have the stones placed on their natural bed, such as in the use of columns, pilasters, mullions and baluisters. Then great care should be taken to have the stone of the closest texture and as free from lamination as can be obtained.

Stones that are fine and regular in grain, close and dense in texture, of deep rich color, of the greatest specific gravity, are the strongest, if comparatively free from drys or cracks, clay or sand holes, metal ores, such as iron or sulphur spots. When these defects are present to any great degree the stone should be rejected, as they are liable to rapid decomposition. The iron, being often found from the size of small shot to one inch or more in diameter, becomes oxidized and runs over the surface, carrying decay in its progress and spoiling the appearance of the work. All quarries have various grades of rock, from coarse to finer, and often a considerable difference in color. When selecting stone for an expensive ornamental building, it is well to see the quarry the stone is to be got from. There are generally portions of the rock that have been exposed to the weather for many years, and the layer of rock that has withstood the exposure with least signs of decay should be the layer chosen. The hardest stone is not always the best to stand exposure to dryness and moisture, heat and cold. The composition of the rock is of the greatest importance.

In a climate such as we have here the materials used for residences and house building generally should be of a kind that are poor or imperfect conductors of heat, so that the house may be cool in summer and warm in winter. At the present time dwelling houses are not built to stand for hundreds of years—there has been a revolution in that class of building. Heating, lighting and hygiene have, and are being, vastly improved, calling for the removal of old structures and the raising up of new ones. Stones that are of a dry and porous nature are mostly imperfect conductors, easy to work, consequently not so costly as those of a hard and flinty nature that are better conductors of heat.

Common limestone as a building material is not much used where good sandstone can be obtained at reasonable cost. It is durable in construction, but difficult to cut. The expense of cutting mouldings or dressing it to a smooth surface causes it to be very little used in the exposed parts of buildings. Owing to its ability to resist compression, it is well adapted for footings and lower parts of walls, where great weights and strains are to be borne.

The oolite limestone is very much used in building. Some kinds are very easily cut, and take on a beautiful smooth finish, either off the chisel or rubbed. They have generally the property of becoming harder on the surface with exposure to the atmosphere. They are mostly of a light buff to cream color, which changes somewhat after being placed in the wall. Good examples of oolite are Portland, Bath, Caen, and Bedford, Indiana. Great care ought to be taken in selection, and a knowledge of their peculiar properties is necessary in making a choice, even from the same quarries; some coarse grain stones absorb little water, while others of finer grain suck in moisture readily, and are more liable to the action of frost, and soon decay.

Oolite limestone is much used in England. Portland stone, from Portland Island, has been most extensively used, and is hard and durable when carefully selected. Bath stone, from Gloucestershire, is soft and easily worked, getting harder on the surface when exposed, and can be obtained in great abundance. It is light, bears compression well, and of cream color. The Bible training school on College street has the trimmings of this stone. Caen stone, from Normandy, France, has much the same properties as Bath, about the same color, is finer in grain, lighter in weight, and will bear a greater strain than Bath stone, but is more costly, and the best qualities can only be obtained in small blocks. The stone work in the main stair, Osgoode Hall, is Caen stone. Bedford, Indiana, stone can be had in immense quantities, and in great variety as to quality, some hard and some dense, and can resist great compression and cross strains. Some of it is coarse in grain with the laminations easily seen; other kinds are close with uniform fine grain; the laminations can only be seen on very close inspection. With oolite as with sandstone, it is most important that the stone should be laid in the wall on its natural bed. The grain in oolite stone is globular in form, packed together like fish roe. The cementing material is of the same composition as the base, but is softer and more liable to the action of moisture, heat and cold.

Granite must take the first place in building materials, owing to its great strength, hardness and durability. Its ability to resist atmospheric influence puts it in the first rank. Its durability is proved by the remains of buildings erected thousands of years ago. Granite is to be had in abundance in nearly every country, and in blocks of any dimension that means can be provided to move. It is found in various shades of color and great variety of texture and composition. It is capable of taking on a high and permanent polish. A great amount of labor is required to cut and bring it to a high finish, and it is only used in building for special purposes. For monumental work it is unequalled, and for steps, bridge piers and dock work it is the best material known. In comparing the qualities of granites, the best is that in which the grains or particles are fine, uniform in size and equally distributed throughout the whole mass. If quartz is the principal component, and the grains large, the stone is hard and brittle, and consequently takes more time and labor to bring it to a smooth surface and polish. When feldspar or mica predominate, the stone is softer and easier to dress, but more liable to decay, especially if iron, its ores, and sulphur be present in great quantities.

The art of masonry may be divided into two parts—the rough dressing, and setting of shoddy and rubble stone is what is known as stone masonry. Bricks being of a definite size and regular in

* Paper read before the Toronto Chapter Ontario Association of Architects.

: MONTREAL STAR BUILDING :

A.F. DUNLOP . R.C.A.. ARCHITECT.

NEW PREMISES FOR THE "STAR" NEWSPAPER, ST. JAMES STREET, MONTREAL.

A. F. DUNLOP, R.C.A., ARCHITECT.

orm, the manner of setting and arrangement may be formed, and any workman, by practice and experience, may become able to build a good wall. It is quite different with the rubble stone used in common masonry. The workman has generally to deal with stones of various forms and sizes, and a constant exercise of judgment is required of him beyond the tact or skill gained by practice. The bonding of the work is the most essential part, and a skillful workman can make good strong work from rubble stones, though very irregular in shape. Coursed rubble and shoddy work is much easier to set; the stones being gauged to certain sizes and squared, the bonding does not require the exercise of judgment, as with common rubble.

The art of stonecutting is of very ancient origin. The tools used by the ancients must have been of the most primitive kind, consequently the labor must have been greater and much longer time taken to execute the vast works of the early ages. With the improvement in the tools used the quality of stone cutting has improved. Much larger stones are now placed in buildings, and the work is finished with more accuracy.

A stonecutter must have some knowledge of architecture, geometry and projection. His work is constantly changing from one style or order of architecture to another, corresponding with the difference in character of the buildings he may be employed on. He should be a man of taste and judgment, to give to his work the best finish in the shortest time. The mouldings and ornament in stonework are all cut out of solid materials, unlike carpenter, joiner, or plaster work, that is worked in sections and built together. Commencing with a rough block, he must define the exact size of the finished stone, make the templates and patterns required, and consider the manner of cutting the work to the best advantage and with the smallest amount of labor. There must be constant care exercised, as one careless blow may spoil the work when nearly finished, and so lose all his labor. A long and studious training is necessary to gain a sufficient knowledge to lay out and make templates and patterns for such work as arches, circular work, ramp and twist arches on a circular plan, niches, tracery, skew arches, domes, groined vaulting, etc., in an accurate and scientific manner.

The causes of decay in stone are partly chemical and partly mechanical, and may generally be traced to absorption of water; so that any contrivance that will check the admission of water will be most likely to succeed in arresting decay. Stone, when completely immersed in water, and not exposed to the air, will remain without any appearance of decay. It is when the pores become filled with water, then exposed to the air that chemical action takes place. When moist and frozen, mechanical action causes expansion of the cementing matter between the particles, then disintegration takes place. There have been many nostrums tried with more or less success to remedy decay in stone. Common drying oils, a mixture of linseed oil and sulphur, linseed oil and beeswax, solutions of various gums and resins. Oil has been used with considerable success when applied thin, when the stone is perfectly dry, or a solution of common soap dissolved in boiling water, allowed to dry and then apply a solution of alum dissolved in water. The lower mouldings and the under parts of cornices and strings are most liable to decay, owing to the water filtering through the stone. If the upper surface or wash is coated with oil it would prevent water from sinking into the stone, and obviate, to some extent, the decay of the lower parts.

AMERICAN INSTITUTE OF ARCHITECTS.*

It is my province and my privilege to welcome you to this Thirty-Third Annual Convention of the American Institute of Architects, to congratulate you on the national prosperity and progress which it is your high function to symbolize in works of architecture; to refer briefly to the main incidents in the history of American architecture during the past year; and more especially, to point out how the work which we are organized to perform may be more effectually carried out and how the beneficient influence of the Institute may be more widely extended.

If architecture during the past year has made a sufficiently definite advance in struciural ingenuity or artistic beauty and fitness to be noted in the official review which it is my duty to lay before you—if in this interval it has earned and is receiving from the public and the nation a more intelligent and appreciative recognition as a fine art, we may justly attribute these results to two causes: first, to the American Institute of Architects, through the cordial affiliations of its members and its organized and persistent efforts during more than fifty years of its existence; and, second, to the schools of architecture, which are now considered so essential to the generous culture of the youth of our country that they form a part of the systems of technical instruction in many of the principal institutions of learning in the United States. The splendid hospitality of Ecole des Beaux-Arts is no longer essential to the complete equipment of the American architects. During the past year the results of the special training obtained in our own schools have become very evident. The graduates are beginning to make good their place in the ranks of the profession, and the older members find that they are stimulated by a fine emulation of new blood and fresh inspiration. Almost daily new names become prominent, and new reputations are beginning to struggle with old for pre-eminence. The impulse of this new and healthy dispensation is already felt in the remotest parts of the country, and the vulgar architectural vernacular which has there prevailed is giving place to coherent and disciplined style.

The institute should take immediate measures to refresh itself from this influx of new and abounding life. It is most evident that these two powerful influences, the institute and the schools, which are thus working for the advancement of architecture, should work, not apart in rivalry, but together, in closer and more effective co-operation than heretofore.

To this end, I venture to suggest that, by a single amendment of the by-laws, the committee on education should include ex-officio, all these professors and instructors of the architectural schools who are members of the institute, and, if there are any who are not members, that they should be brought within our fold, so that this committee may act not only as a bond of union between the institute and the schools, but between the schools themselves; that the annual report of the committee should embrace a general statement of the work and methods of the schools, the number of pupils enrolled, and the names of those especially distinguished; and that the practical interest of the institute in the welfare of the students should be made evident to them by the establishment of a system of institute prizes, and, if possible, of one or more travelling-scholarships, open to the students of all the schools.

There are nearly five thousand persons practicing as architects in this country, and it cannot be denied that the professional practice and standing of this large body of men is made more secure, more honorable, more respected and more remunerative by the fact that one-tenth of their number is organized and united in a national institute, which for many years has labored successfully to promote the artistic, scientific and practical efficiency of the profession. It is true that the influence of the institute is in proportion rather to the wisdom than to the number of its members. It is no less true that the institute is organized for a far larger and far more widely distributed membership than it at present enjoys, and that, until it has such a national membership, it cannot have its full and proper effect as an instrument for the advancement of our profession, and adequately represent its dignity before the world.

The question how our strength and resources can be best enlarged is, therefore, of the first importance. The men whom the institute most needs are the men who most need the institute. A late earnest appeal to the chapters has in several localities been fruitful in securing many valuable members, as will be explained in the report of the board of directors. The Kansas city chapter has been rehabilitated and will be restored to full affiliation with the institute under the new by-laws. But the strengthening of the institute requires measures much more far-reaching. We need new chapters in every part of our wide domain, and within them, more members, and a much more active and efficient adjustment of their machinery to the needs of young men. No effort should be spared by the chapters to make their meetings so attractive and so essential to the younger men that the necessity for the existence of junior societies in their neighborhood should be less apparent, and there should be no occasion for rivalry. The institute should be especially hospitable to the graduates of the schools, and I am persuaded that, if the connection between the schools and the institute should be established on some such basis of mutual interest as has been outlined, the professors would prove the most effective recruiting agents, and that their pupils on graduation would be made to consider that junior membership in a chapter in the institute is essential to their proper and regular advancement in the profession and a necessary preliminary step in their career as architects. The institute should not only be the guardian of professional purity and dignity in practice, should not only advance the interests of our art and act as the fountain of professional honor, but should aim to secure a more effective unity of effort between old and young, so as to inspire our work with the strenuous spirit of our national life, and in this service to make our art distinctively stronger, truer, and more beautiful. Therefore the institute needs in its membership, not only the wisdom of age and experience, but the enthusiasm and zeal of youth if it would keep in closer touch with the most healthy aspiration of the profession and avoid becoming the slave of its own

*Annual address of the President, Mr. Henry Van Brunt, delivered at the Thirty-third Annual Convention, held at Pittsburg, Pa., November 14, 1899.

traditions. To this end the junior members of the chapters, recruited from draughtsmen and graduates of the schools, should be made to feel that they are wards of the institute and essential parts of its organization, and to anticipate their advancement in due time to the successive grades of associate membership and full fellowship as assurances of honorable professional positions before the world. It seems to me that the institute, under its present improved organization, would, by some such process as I have suggested, be brought into closer and more effective sympathy with the young men just entering the profession, and through such sympathy would receive at least as many benefits and advantages as it would confer.

I commend these propositions to your careful consideration, and would further propose that the Board of Directors be requested to examine into the work and methods of the most successful of the junior architectural societies or leagues with the object of formulating from their experience a scheme of exercises and duties to be recommended in a circular to the chapters, so that they may learn how to give greater interest and a more abundant life to their proceedings, and become more active and efficient agents in the practical work which this institute is organized to perform. Thus may be established a propaganda in the interests of a warmer comradeship, a purer practice, and a nobler art.

In considering what has been actually accomplished by our efforts during the past year, it is with especial pleasure that I refer to the fact that, under the operations of the Tarsney Act, public buildings at Norfolk, Va., Camden, N. J., and Ellis Island, New York city, are now erecting from the designs and under the care of private architects: that the new custom house in New York and the Judiciary building in Washington have, after fair competition, been assigned to architects capable of expressing the genius of the nation in monumental architecture; and that the Baltimore custom house and the National building at Cleveland, O., will probably soon be the subjects of competitive design. The work on buildings for the Naval Academy at Annapolis and on the Government building at Chicago is in the hands of private architects. It is probable that other public monuments, especially in the west, will be open to the profession as soon as the sites shall have been vested in the United States. The office of the Supervising Architect at Washington is thus gratefully relieved from a labor which no individual genius, however strong, and no official organization, however skilful, can be sufficient adequately to perform. But while the efforts of the institute have thus far succeeded in opening to fair and honorable competition the designing and building of the national monuments, and have made an encouraging beginning in rendering them more worthy to represent our higher civilization in terms of art, it must not be forgotten that these opportunities have been opened to us only through the intelligent sympathy of the present honorable secretary of treasury, operating under the provisions of the Tarsney Act; and that, without the accident of this intelligent and exceptional sympathy on the part of that official, the public buildings of our country would still be manufactured by the architectural machine in the treasury department, with its subdivided professional responsibilities, its baleful political affiliations, and its deliberate and extravagant methods of administration. Our attempt to formulate and obtain the enactment of a law sufficient to secure for us a truly national architecture fit to represent our highest standards in art, should not for a moment be relaxed, and our legislative committee on Government architecture should be continued, maintained, and encouraged to use every honorable means to bring about this result at the earliest possible day.

I am glad to bear witness to the fact that, in the conduct of competitions in general, the dignity and the highest interests of our profession have, during the past year, received more adequate and respectful consideration than heretofore. But it must be admitted that in many parts of our country, especially in those more remote from the great centres of activity and intelligence, the loose professional habits of many practitioners of our art still encourage the publication of "Invitation to Architects," while competitions in which the contestants are arbitrarily deprived of every proper safe-guard, and are asked to submit themselves to conditions insulting to their self-respect and devised to secure their service at the smallest possible cost, meet with ready and humiliating acceptance. Near every such locality the institute should maintain a missionary chapter to teach the primary principles of honorable practice, for the benefit not of the architects alone, but of the public.

Among the competitions of the year which have been managed in a manner creditable to the projectors, the contestants, and the judges, by far the most conspicuous and memorable is that for the laying out of the buildings and grounds of the University of California, under the "Phœbe Hearst Architectural Plan." Though the highest award in the international competition fell to a French architect, the brilliant part borne especially by some of the younger American contestants is a cause for congratulation. I should like to see this Institute, by formal resolution, recognize our indebtedness not only to the munificent and public-spirited woman through whom this important architectural event was made possible, but to the managing committee for furnishing an example so conspicuous of a fairly-conducted competition on a great scale, and for the courage and intelligence with which they have conceived a scheme of architecture which in extent and importance has not been exceeded, if it has been equalled, in modern times.

Another cause for congratulation resides in the cordial and effective alliance between painting, sculpture and architecture as exhibited in several works of monumental importance which have reached completion during the past year. It is only by such harmonious and fruitful co-operation that the highest civilization of our times may at length begin to receive competent expression in art. The public is beginning to understand that the highest and noblest expressions of art, not only in permanent monuments, but in public pageants of merely temporary significance, are possible only through such a concert of effort, and architecture is glad to restore to her sisters of the brush and chisel the field of high endeavor in which the old masters found their greatest opportunities. We especially recognize and admire the splendid service rendered by the sculptors in the decoration of the triumphal arch erected in New York in honor of the Navy and the victor of Manilla.

I have looked forward, gentlemen of the Institute, with especial solicitude and interest to this, your thirty-third convention, as it is the first in which, under our finally amended laws, the experiment of authorized delegations from the Chapters is to be tried; the first in which the remodelling of the Constitution and By-laws has not presented itself as the paramouut and absorbing topic of report and discussion; and practically the first in which the Institute has given to it the privilege and opportunity of considering at peace and without fear of interruption subjects related to the highest interests of the profession.

If, after those many years of experiment, we have at length reached an era of tranquil and prosperous development, let us realize that the best use we can make of this peace is to comprehend and to assume all the grave responsibilities which belong to the undisputed position of the Institute as the national representative and protector of a great profession and a greater art.

You may be sure that the civilized world will receive with peculiar interest all that we have to give forth in the elucidations of the strange and unprecedented conditions under which a rich and prosperous nation, unembarrassed by patriotic traditions of art, is developing style; that it will eagerly hear all that we may have to say on the practical applications of science to architecture, on the progress of invention in respect to building, on the discovery of new materials and new methods and their effect upon our art, and on the incidents of our unimaginable progress in the future. We alone are in position to influence the expression of the immense energies of our nation in architecture. Let us endeavor adequately to fulfil these duties.

I hope I may be permitted to close the address with a brief personal statement. When at the last convention you saw fit to make me president of the institute, I received the unexpected honor as an expression of consideration and respect for one whose connection with the Institute began at its first conception, forty-seven years ago. Recalling the brilliant services of my old friends and predecessors in this office, I undertook its responsibilities with doubt and severe misgivings. But as the culmination of a professional year is now, in the course of nature, drawing toward its close, and as a more precious testimonial of the good will and kindly feeling of my professional fellows, the honor was very grateful to me, and I now resign it with a deep appreciation of your generous confidence. If, possibly, it may be the purpose of my friends to propose my name for an election to a second term, as permitted by the by-laws and as customary in your practice, I must, with gratitude, decline the compliment, as I have in contemplation a long visit of study and observation in Europe.

I sincerely trust that in choosing my successor, you ma· ·e wisely guided and that he will receive the office with the conscious. that its responsibilities have increased, and are increasing with tin d that a merely perfunctory administration of it will delay the de. .. pment of the great future of the Institute.

TORONTO CHAPTER OF THE O. A. A.

The regular monthly meeting of the Toronto Chapter of the O. A. A. was held on Monday evening, 11th inst., in McConkey's dining parlors. Dinner was served to an appreciative ompany at 6.30, after which a paper was read by Mr. Alexander Marshall, on "Stone Work and Stone Cutting." The paper, which is printed in this issue, was very instructive and the discussions thereon proved very beneficial to those present. The representatives of the Chapter to the Technical School Board were instructed to prepare a report of the year's work and submit the same to a special meeting of the Chapter to be called this month. A special interest in the Technical School work is being manifested at present owing to the proposed changes by the city council.

An interesting new catalogue has been issued by the Expanded Metal and Fireproofing Co., Limited, of Toronto. By means of carefully prepared letter-press and sectional cuts drawn to large scale, the qualities and uses of expanded metal in architectural and engineering work are clearly explained. The material is made from No. 24 to 10 gauge steel and ¼ inch plate, and in various meshes ranging from ⅜ inch, suitable for lathing, to 3 or 4 inches, as adapted for flooring and heavy railway work. Reference is made to the results of scientific tests of materials conducted in England, Germany, etc., as a proof of its strength and value for fireproofing purposes. Other advantages claimed for it are that it is light and sanitary and occupies but little space.

STUDENTS' DEPARTMENT.

CANADIAN ARCHITECT AND BUILDER STUDENTS' COMPETITION.

THE publishers of the CANADIAN ARCHITECT AND BUILDER invite from architectural students and draughtsmen in Canada, competitive drawings for a Suburban Bicycle Club House. The building to be erected on a lot 60′ x 150′ in size, to have a southern exposure, and to cost not more than $6,000. It should contain bowling alley, billiard room for six tables, gymnasium, card rooms, reading and other rooms, necessary for a bicycle club. Provision must also be made for social entertainments, such as kitchen, etc.

Competitors are required to submit drawings to ⅛ scale showing south and east elevations of building, or it lieu thereof, a perspective from ¼ scale plan drawn at an angle of 30 degrees to the picture plane ; also plans to 1-16 scale of all floors, including basement, graphic scale to be indicated on each sheet. Competitors are also asked to state briefly the materials proposed to be employed in the construction of the building.

Drawings must be made with pen and PERFECTLY BLACK INK on white paper or cardboard. NO BRUSH OR COLOR WORK WILL BE ALLOWED. Drawings should be so arranged as to admit of photographic reproduction in the illustration pages of the CANADIAN ARCHITECT AND BUILDER. The size of each page is 7 x 10 inches. No set of drawings must occupy more than two pages.

Competitors must send in their drawings under motto, marked "Students Competition," and addressed to "The publishers of THE CANADIAN ARCHITECT AND BUILDER, Confederation Life Building, Toronto," prior to 5 o'clock p.m. on Monday, February 12th, 1900. Each set of drawings must be accompanied by a sealed envelope bearing on the outside the author's motto and enclosing a card giving his full name and address.

The merits of the designs which may be submitted in this competition will be judged by a committee of the Ontario Association of Architects and of the Province of Quebec Association of Architects, whose decision shall be final. For the benefit of competitors, the judges will be requested to give a detailed criticism of each plan.

Three prizes are offered, as follows : To the winner of 1st position, $10 ; to the winner of 2nd position, $5.00, and to the winner of 3rd position, one year's subscription to the CANADIAN ARCHITECT AND BUILDER.

The right is reserved to publish any or all of the drawings.

NOTE.—Competitors are required strictly to observe and comply with the above instructions and conditions.

CORRESPONDENCE.

THE FUTURE OF THE O. A. A.

TORONTO, Nov. 14th, 1899.

To the Editor of the CANADIAN ARCHITECT AND BUILDER :

I must beg humbly to apologize for what must appear discourteous delay in responding to your letter of the 2nd inst., which I know was prompted by zeal in the interests of the O.A.A. but of which such dilinquents as myself are unworthy.

Since the active members of our Association have failed to satisfy themselves, or others, after some years of honest effort, would it not seem wise to try and obtain an impartial view of ourselves from the outside, and to profit by any friendly hints that might be had for the asking ?

Our aims and intentions have probably been creditable and clear to ourselves, if not so well understood by others ; but possibly our methods have been too amateurish. We may have much to learn from other associations, and perhaps something to gain by taking outsiders more into our confidence as to the unselfishness of our objects and our desire to do good rather than obtain and retain all the advantages.

It seems to me desirable : First, to obtain full information regarding our sister association of Quebec, which though the younger, has apparently been made a success. This may perhaps be found in your own valuable files, or through the courtesy of the secretary at Montreal, or by sending a member to Montreal to investigate and report.

2nd. A paper dealing with the growth and methods of legal, medical and kindred associations in Ontario.

3rd. A representation from the Students' League now in operation here, stating why they find it necessary to work independently of the O. A. A. or its local chapter, and what would induce them to amalgamate and work with it.

4th. A full and free expression from Prof. Galbraith and Mr. Wright, of the S.P.S.

5th. A circular letter, or personal interview, might get valuable opinions or criticism from well known architects who have withdrawn or kept out of the Association.

It is well to be able to see ourselves as others see us, and with such new views, obtained in time, the coming annual meeting might become the turning point in the career of the O. A. A.

Possibly our former friend, the new Premier of Ontario, might be prevailed on to give us some pointers as to more successful methods for obtaining the legislation which has been one of our prominent objects heretofore.

Respectfully yours,

M. B. AYLSWORTH.

ARCHITECTS' FEES.

TORONTO, Dec. 12th, 1899.

To the Editor of the CANADIAN ARCHITECT AND BUILDER ;

DEAR SIR,—In your October issue appears an editorial on "Architects' Fees," which would lead many to believe that there is no standard of architects fees recognized by our courts, and infers that our judges are not acquainted with the regular rate of architectural charges, but base their judgment upon the testimony of alleged unprofessional men ; further, that there are architects who are so unprincipled that they appear in court and swear that they would do certain work for half and less than half of the regular fee, to the prejudice of their fellows. Your remarks seem to be founded upon a part of the proceedings of a recent and well known law suit to recover fees. My experience has been, and I believe it has been the experience of every architect who has found it necessary to sue for a fair claim, that our courts have given judgment in full, based upon our regular rate of fees. I have always found our judges fair, and well acquainted with our practices and charges, but I have never met nor heard of the unprincipled architectural witnesses you mention, and for this reason I do not believe they exist. I am so fully convinced of this that I doubt your ability to substantiate the statements you made, therefore there is the possibility, and the probability, that the gentleman who penned the article in question may find himself in the unpleasant predicament of apologizing to the profession. There is little doubt that one of the architects referred to will resist the unfair insinuations and presumptuous comments made against him with the vigor that the case demands.

Yours in sincerity,

J. FRANCIS BROWN.

MONTREAL

Branch Office of the CANADIAN ARCHITECT AND BUILDER,
New York Life Building, Montreal,

MONTREAL, December 15th, 1899.

COUNCIL OF ARTS AND MANUFACTURES.

The council have decided to establish a class for the purpose of giving instruction in steam and hot water fitting, including piping of houses, public buildings, and factories for hot water, high, low, and exhaust steam systems. The pupils will also be taught how to set and connect radiators, and make heating coils. The class was opened on the 18th inst., and will meet once a week.

ACCIDENTAL TEST OF TERRA COTTA FLOOR.

A terra cotta floor was recently built in Mr. Gatehouse's store on Dorchester st., in this city. The work was done by Mr. George Knott, Contractor, under the Supervision of Mr. C. B. Patterson architect. The floor had been in only a few days, and the centers only removed from underneath, when the workmen began to unload sand on this fresh-built floor, and before the contractor was aware of it, there was sand piled up until it is said to have represented a load of over 900 lbs. to the square foot. In spite of this heavy load the floor showed no sign of weakness and showed that it could stand over a thousand pounds to the square foot without any perceptible deflection. This test was only accidental and goes far to confirm the many previous reports as to the wonderful resistance of porous terra cotta fire-proofing.

MONTREAL BUILDERS' EXCHANGE.

There was a large attendance of the members of the above Exchange at the second annual meeting held on the 11th inst. The report of the directors presented by the honorary secretary-treasurer, Mr. George A. Sheppard, showed an increase of membership and a substantial surplus in the treasury. A cordial vote of thanks was tendered to the retiring board of directors and to the secretary-treasurer for the faithful discharge of their duties during the year. The following were elected as the new board of directors : Messrs. C. T. Williams, J. W. Hughes, C. W. Trenholme, N. T. Gagnon, H. R. Ives, John Wighton and T. Forde. At a subsequent meeting of the directors, Mr. C. T. Williams was elected president, Mr. J. W. Hughes, vice-president and honorary secretary-treasurer.

NOTES.

M. Benard, architect, of Paris, to whom was awarded the prize of $10,000 in the recent competition for designs for University of California, was a recent visitor to Montreal while en route to California. While here, M. Benard visited McGill and Laval Universities, and a number of the more important public buildings. Prior to leaving France, he was entertained at a banquet given in his honor in Paris by a number of French architects, and was presented by the Minister of Fine Arts with the Cross of the Legion of Honor.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Wood Cornices for Interiors.

PLASTER cornices for interior work are expensive, and are often out of the question when a new house of the ordinary kind is being erected, owing to the limited purse of the owner. This is particularly true of farm houses and houses erected in our villages and small towns. While no sort of a cornice is more appropriate for a parlor than one formed of plaster by the expert plasterer, yet, as before stated, its heavy cost precludes the ordinary house-owner from indulging in such a luxury. A cornice made of wood, properly fitted in place and proportioned correctly, when nicely painted or stained, is, in many cases, just as appropriate and effective as one formed of plaster, and is less costly and within the range of the ordinary carpenter. Besides, a wood cornice can be put in any room and at any time after the room is finished without disturbing furniture or other things in the room. Fig. 1 shows a simple

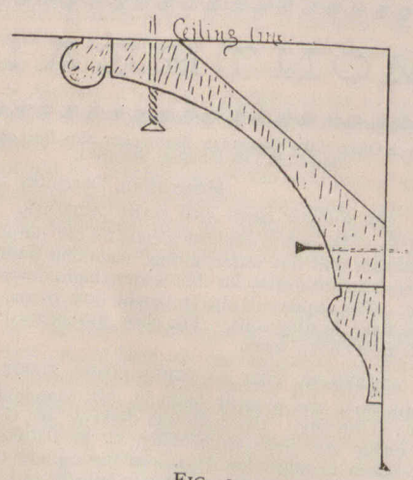


FIG. 1.

design for a cornice that may be constructed at very little cost. The cove may be made from 1½ inch plank with the hollow wrought as shown, and the top and bottom lines worked off to suit wall, ceiling and mouldings. The return bead and the O G moulding can be obtained from any wood-working factory for a cent or two per foot running measure, and in some factories large coves for crown or bed mouldings are kept in stock which might be made available for the cornice. If not, the moulding can easily be worked out by hand. When desirable, several other members may be added to the cornice, such as dentils, drops, rosettes and running mouldings. Indeed, there is no limit to the enrichments of a wood cornice, and when properly finished in harmony with finish of room, it becomes "a thing of beauty and a joy forever." Wood cornices for interior work are becoming quite popular in many places because of their adaptability to surrounding conditions. In putting up a cornice of this kind when the room has been plastered, some care must be taken by the carpenter in nailing the work to the walls and ceiling. If the building is of brick the outside walls will be strapped or furred, the straps being nailed to the wall in spaces of 16 inches from centre, and it is on these straps the wall nailing must be done. The inside walls will be of studding, placed 16 inches from centre to centre, and on these studs the nailing must be done. After finding one stud or one strap the finding of all the others on that side of the room is an easy matter, as 16 inches measured either way will locate the next strap or stud. The same rule applies to the ceiling on two sides, but on the other two sides it is very likely only the lath can be found to carry the cornice, and in such case thin long screws should be employed to attach the mouldings to the ceiling. There should be no mitreing of any internal angles, these should all be coped, then shrinkage will not expose joints or show bad workmanship. External angles around chimney breasts or other projections must necessarily be mitred, and the work must be done well as these projecting mitres are always in exposed positions. In splicing the members of a cornice never lap the joints, always make them butt; the results are better. Use the finest wire nails for the purpose. It is always best to start on the wall to put up the stuff, and a correct starting point should be obtained, and then a line struck which should be the guide throughout. Care should be taken in every case not to break the wall.

Estimating Items.

THE following estimate rules are employed by some builders in western Canada on a basis of $2.00 per day wage. The estimates are for labor only and by the square :

	Per Square.
For putting in drop siding	50 cents
" " " lap siding	62 "
" " " sheathing	20 "
" " " " if papered	30 "
" " " surface boards	26 "
" " " roof-boards—plain	25 "
" " " hip roofs	45 "
" " " very steep roofs	50 "
" " " shingles	95 cents to $1.00
" " " pine floor, 1 × 6	25 to 50 cents
" " " " " 1 × 4	28 to 60 "
" " " " " 1 × 3	60 to 95 "
" " " outside wall ceiling	78 "
" " " soffit ceiling	85 "
" " " wainscotting	$1.90 to $2.15
" " " dressing off pine floor	50 to 65 cents

In laying the tin work in valleys, a man will put down from one to one and a quarter squares per day. A good man will carry up and lay on a roof from 1,600 to 2,400 shingles per day. Two men will put on 2,000 feet of felt paper per day. Two men will lay 500 to 600 feet of

outside beaded ceiling per day, or say, $7.25 per 1,000 feet. A man will put down 100 feet of plain base in a day. A man will fit and nail 400 pieces of bridging per day, at one-half cent each. Two good carpenters will lay out and frame 50 pieces of 2 × 10 joists 16 feet long in a day, or about 1,350 feet; or they will frame 100 pieces of 2 × 6 studding 12 feet long in a day, or 1,200 feet; or they will frame 70 pieces of 2 × 6, 16 feet long, for rafters, in a day, or 1,120 feet; or they will frame 14 pieces of 8 x 8 sills, 16 feet long, or 1190 feet in a day. From these figures a pretty safe estimate of the cost of labor may be obtained for the working of the items named. These figures are the result of actual experience of average day's work.

Making a Frame House Warm.

In this Canada of ours, particularly in country towns and villages, all the studding, joists, rafters and other timbers used are just from the mill, and are, therefore, consequently, in an unseasoned condition, and will be sure to shrink more or less, and if the building is finished while the timbers are in this condition, settlements and ruptures in the plastering will be sure to take place, and much trouble and annoyance will follow. The old-fashioned plan of putting up a frame building—or a brick one for that matter—putting on the roof and enclosing, leaving windows and doors out, during the month of May, and letting it stand in this state until the early days in September, is to be commended, inasmuch as this will give time for joists, studding and other timbers to become fairly dry, and but little shrinkage will ensue, and it is much better to have the bulk of the shrinkage done before the inside finish is put in place. Floors in all cases should be double. A layer of sheathing paper should be laid between them. The first floor need not be made of good quality of stuff, so long as it is sound and driven well and tight together. The second or finishing floor should not be laid until all the plastering work is done. This is imperative where the top floor is of hardwood. Wherever possible, the span between the joists on the walls should be filled in with coarse mortar or grout for at least five or six inches above the floor. This will prevent rats, mice or other vermin from working their way into the house, and will cut off all cold drafts from the outside. The outside studding should be boarded on both sides, and should be covered with building paper before being sided or lathed and plastered. If siding is employed for outside finishing, it should be well lapped and as well nailed. If honestly put on, a sided house may be made very warm, but, if appearances do not count against warmth, the owner will do much better by having his house rough-casted, as this latter is warmer, and its use lessens the danger from fire. Roof boards should be laid tight, and heavy felt paper—well lapped—laid on the boards before the shingles are laid. The felt paper, being a non-conductor of both heat and cold, tends to keep the house cooler in summer and warmer in winter. Strong building paper should be well wrapped around the studding at window and door openings before the frames are put in place, then strips of the same paper should be well tacked about the frames, in order to cut off any chance for wind to force its way into the house from the outside. Have a spare flue in each chimney, to be used for ventilation, make openings into the flue at the baseboard and cover with an appropriate register, and with proper management of doors and windows, perfectly pure air can be secured in every room. If the building is to be heated by a hot-air furnace, or by steam or hot-water, be sure to get the heater large enough. This should be at least one or two sizes larger than the heater man says will answer. It is always well to have reserve power in your heaters; it saves fuel and never fails you when called upon to do extra work. In plastering, do not use a "brown coat" of mortar. Two coats, when well done, are as good as a dozen poorly wrought. Put the finish coat directly on the "smooth coat." Time and money will be saved, and the work will be better, harder, and more durable. Do not make the ceilings too high. Ten feet is high enough for an ordinary house in the main storey, and nine feet makes a high enough storey for bedrooms, and if there should be a third storey, eight feet six inches will make a good height for that storey. It costs quite a little sum of money to heat space overhead that is not required. Doors and windows should in all cases be fitted snugly, and yet should work freely. Attention paid to these matters will convey for all time to the householder warmth, comfort, economy and happiness.

Some Odd Mitres.

Often the builder will find himself confronted with some odd problem in mitreing he has not met with before, and for a brief time be somewhat puzzled as to the proper way to go about the solution. In order to aid him in getting out of difficulties of this kind the annexed

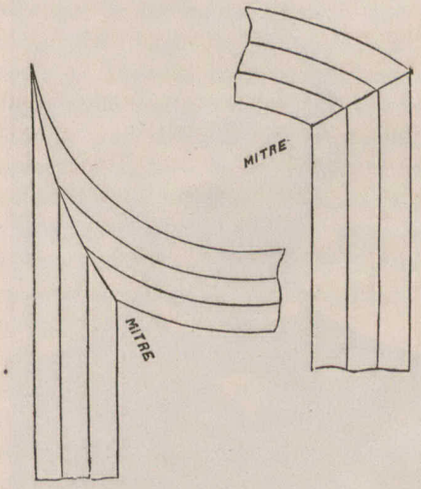


Fig. 2.

problems and solutions are presented. When a straight moulding is mitred with a curved one the line of mitre is sometimes straight and sometimes curved, as shown in Fig. 2, and when the mouldings are all curved the mitres are also straight and curved, as in Fig. 3. All

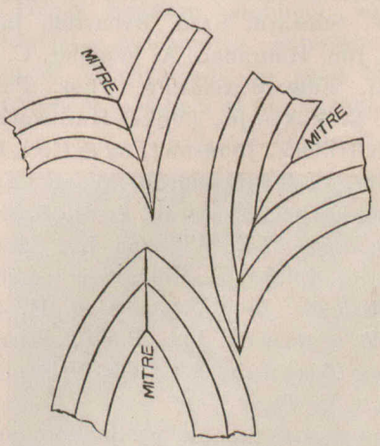


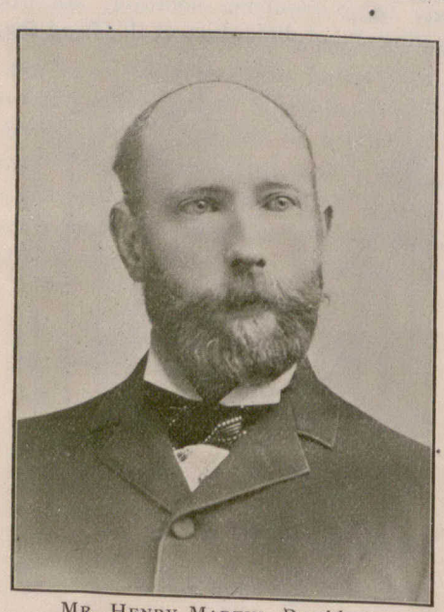
Fig. 3.

such work should first be laid out on a board as shown, and the lines correctly drawn, when the lines for the mitres can be pricked off and transferred to the mouldings. The diagrams are self-explanatory and should be readily understood.

TORONTO BUILDERS EXCHANGE.

THE annual dinner of the Toronto Builders' Exchange was held on the evening of the 12th inst., and was largely attended and in every respect a gratifying success. The President, Mr. Henry Martin, whose portrait accompanies this article, presided. The vice-chairs were occupied by the following gentlemen: Jos. Russell, Thos. Christie and Jas. B. Thomson.

Among the invited guests and members were His Worship the Mayor, Mr. E. F. Clarke, M.P., Mr. Thos. Crawford, M.P.P., Mr. J. E. Belcher, of Peterboro', President, Mr. A. F. Wickson, Vice-President, of the Outario Association of Architects, C. H. Mortimer (CANADIAN ARCHITECT AND BUILDER), J. Hoops, A. Young, Britnell & Son, D. H. Hutson, Thos. W. Self, Richard Dancy, Arch. Orr, Robert J. Orr, Alex. Orr, Geo. Orr, Jno. R. Lyon, Geo. Henry, Jno. Wickett, Jas. Wickett, Eli Wickett, Jno. R. Marshall, Wm. Forbes, Geo. Moir, Patterson, E. Dinsmore, Geo. Duthie, W. R. Payne, T. Cannon (sr.), T. Cannon (jr.), Isaac Price, Jno. Maloney, Jas. Crang, David Williams, Ben Brick, Thos. Robinson, R. G. Kirby, F. W. Robarts, J. H. Morrison, C. J. W. Neale, W. J. Bailey, Thos. Gander, Jas.



MR. HENRY MARTIN, President.

Larkin, Jno. B. Vick, Jno. Gander, T. Thomson, W. F. Thomson, R. Robson & Son, McGregor & McIntyre, Wm. Clarke, A. Y. Young, J. B. Reid, Richard Chalkley, Wm. Rennie, Holtby Bros., A. Weller, A. P. Steward, A. W. Steward, Fred. Beharriel, Jas. Muldoon, Jas. Pears, Jno. Hanrahan, A. Whellar, C. C. Witchall, A. Gardner, Edward Gearing, Thos. Painter, Wm. Prowse, F. L. Vokes, jr., (Vokes Hardware Co.), Neil Burton, Jno. Hillock, Johnson (Fox & Co.), R. Harrison, Alf. Maguire, Walter Davidson, W. F. Tasker, Ransome (Pease Furnace Co.), M. Scott (Scott & Cross), Schoulen & Bain, C. E. Williams, Jas. Morrison, Pritchard (World), Elliott, F. Holmes (jr.), Bell Bros., Jno. Price, H. Tucker, Jno. Logan, Geo. H. Orr, Wakefield, A. E. Cameron, Jas. Purse, Harry Simpson, Alex. Young (Aikenhead & Co.) A. Nelson, Jno. Vokes, McConnell, Geo. Clay.

The menu was an unique production, and attracted much attention. It was headed "Specification," and was as follows:

SPECIFICATION.

SPECIFICATIONS OF MATERIALS TO BE SUPPLIED AND LABOR TO BE FURNISHED AT THE ANNUAL BANQUET OF THE BUILDERS' EXCHANGE, TUESDAY EVENING, DECEMBER 12TH, 1899.

FOUNDATIONS—Oysters, malpecques, on the half-shell. To be bedded on an undisturbed stomach.

GROUTING—Soup. Consomme a la Macedoine. To be well mixed in proper proportion, and ladled into position.

COURSING—Fish, Lake Superior Salmon, Pommes Duchesse. To be of a rich portage entry color.

BOND TIMBERS—Supreme of Sweetbreads in cases.

JOISTING—Bread and Butter Rolls. To be laid on bond timbers and properly bridged, and to be covered diagonally with Butter (nut), knots less than $1\frac{1}{2}$ inch allowed. Hair joints will not be required in this flooring.

JOINTS—Roast Young Turkey. Properly trussed and braced and strapped at angles with $\frac{1}{2}$ x 3 inch Cranberry Sauce straps.

Beef Sirloin. To be laid up and neatly pointed with Horse-radish, with not more than 6 joints in 12 inches.

Lamb (Mary had one). This material to be well soaked with Mint Sauce; to be white struck joint and tied with French Peas.

NOTE.—Carving to be executed by experienced workmen, and to detail.

PLASTERING—Mashed Potatoes. Best 3-coat work, corners to be neatly rounded.

CELLAR FLOOR—Plum Pudding. Concrete foundation to be 12 inches deep, with broken Suet, Raisins, Currants, Peel, Flour and Eggs in proper proportions, well mixed and pounded, adding Brandy Sauce. Top 5 inches to have Celery, Cheese and Biscuits added to above and troweled to a smooth hard finish.

DESSERT.

TRIM—Unless where otherwise specified, to be clear pine, spoon cleaned, and principal rooms to be for enamel finish (Neapolitan Ice Cream) a nice cream.

HEARTHS—To be of assorted Cakes and Wafers with a border Bon-Bons and Chocolates.

HARDWARE—Except bolts (Nuts and Raisins) to be supplied by proprietor, but put in place by contractor.

DECORATIONS—The dining room to be frescoed with Apples, Oranges and Bananas.

GLAZING—To be best cut glass lemon (ade) color. Any glass of other than this color brought on the job will be entirely at contractor's risk.

TILING—To be best brown glazed Spanish (T and Coffee) make of tiles, finishing at ridge with tooth pick ridge-roll to special detail.

EXTRAS—Are to be paid for when ordered.

NOTE—This work must be strictly carried out according to details, which will be supplied by architect after the completion of work.

TOASTS.

"The Queen," "Our Country," "The City of Toronto," "The City's Industries," "The Ontario Association of Architects," "Sister Exchanges," "The Press," "The Ladies."

After an hour had been given to considering this specification, the Chairman rose to propose the toast to Her Majesty The Queen. In doing so, he remarked that, contrary to usual custom, the builders this evening were acting as the party of the second part of the contract, there being no party of the first part on this occasion. He did not think that the party of the first part would be disposed to accuse the party of the second part of not fulfilling their obligations. He heartlly welcomed the visiting guests.

After the singing of "The National Anthem," Mr. Christie rose to propose the second toast, that of "Our Country," coupling therewith the names of the local representatives in parliament, Messrs. Clarke and Crawford. Mr. Christie in proposing the toast, referred to the fact that Canada had at last taken her proper position in relation to the Empire by sending a contingent of her soldiers to South Africa. This position Canada should have taken long ago. The Dominion was destined to be the strong right arm of the Empire.

Following Mr. Christie's remarks, the Canadian national anthem, "The Maple Leaf," was heartily sung by the company. Owing to the non-arrival of Mr. Clarke, Mr. Crawford first responded to the toast, and in doing so referred to the wealth possessed by Canada in the form of mines, fisheries, and forests. Her possessions of this character were greater than those of any other country of the same population. Canadians could boast also of their connection with the great British Empire. He referred to our excellent system of government which is so planned as to work out to the best advantage of the people. He trusted that the growth of the Builders' Exchange would keep pace with the "growing time."

Mr. Blight sang with good effect, "Soldiers of the Queen," after which Mr. Alf. McGuire proposed the third toast, "Our City," coupling therewith the name of Mayor Shaw. After a song by Mr. Young of the Aikenhead Hardware Company, the Mayor, in reply to the toast, said that he was born in Toronto and had lived there all his life, and it was by the merest accident that he was not a member of the Builders' Exchange, his father having been a builder and he himself having been in his earlier days an apprentice to the trade. Just here a voice from the company remarked: "You've get a better job, John." The Mayor disagreed with the speaker on this point and said that, while he had attained a prominent position, he believed he would have been better off financially had he followed in the footsteps of his father who was a successful builder. He declared that the city government of Toronto was recognized to be a good one, and he believed that good government would continue to prevail. Toronto was never more prosperous than at the present time. New buildings and industries were springing up on every hand which he took to be an evidence of confidence in the city government. He predicted a great future for the city, and in concluding his remarks wished the Builders' Exchange the greatest possible success.

Mr. Neil Burton gave a couple of recitations in excellent style.

Mr. E. F. Clarke, who had in the meantime arrived, then responded to the toast with which his name was identified. He regarded the large attendance at the dinner as an evidence that harmony and good feeling prevailed among those connected with the building industries of the city. He was happy to know that after a period of dull times, this important branch of industry was now sharing in the return of prosperity. Referring to the toast he said that Canada belonged to an Empire of free men, and that for quality and character Canadians are the peers of any people. They had received from the motherland educational and political institutions of the highest order, and in this country there was a chance for every man to obtain a prominent position. As proof of this he referred to the fact that Mr. Alexander Mackenzie, who was by trade a mason, had risen to the position of premier of the Dominion. The fathers of Confederation had the utmost confidence in the future of Canada, "and shall we," said the speaker, "who have witnessed the larger possibilities of the country have less confidence?" With such resources it would be our own fault if we did not work out the destiny which God had in store for us. The speaker reminded his heroes that this destiny could best be achieved by each individual doing the duty which lay nearest to his hand, and dealing honestly man with man."

Mr. John Hanrahan, chairman of the carpenters' section, proposed the next toast, "The City's Industries." In doing so he said that Toronto was one of the finest cities of the world, and, according to post-office and other statistics, stood first as a business city in the Dominion. He coupled with the toast the name of Mr. J. J. Withrow, one of the oldest builders of the city and President of the Industrial Exhibition Association.

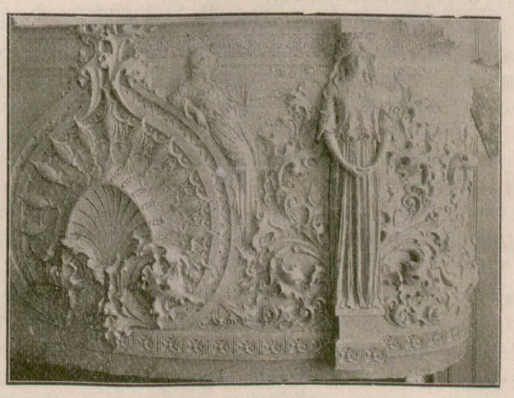
Mr. Withrow, in responding said, that if time would permit he would be inclined to become reminiscent, as he, like the Mayor, was a native of Toronto, and had witnessed its wonderful growth. He had had the honor of being, for many years, the secretary and afterwards the President of the Builders' Association, which preceded the present Builders' Exchange. At that time the industries of the city were, to a large extent, combined with building. Other industries, like that of the Massey Harris Company are now taking their place. While there would yet be done a considerable amount of building each year, it must be remembered that the city was now, to a large extent, built up, and therefore the building industry could not afford employment to so great an extent as in former years. It should therefore be the purpose of the aldermen to endeavor to encourage the location of industries in the city, and thus provide employment for the people. In conclusion, the speaker referred to the "specification" on the table, and remarked that he never saw a specification so well lived up to. The plan also seemed to have been carefully prepared. He hoped the Builders' Exchange would live on through the years of plenty and also through the years of famine.

Mr. Kirby sang "The Death of Nelson" in a manner which called forth hearty applause, after which the President proposed a toast to the "Ontario Association of Architects," coupling with it the names of Mr. Belcher and Mr. Wickson. He referred to the fact that Mr. Belcher had come all the way from Peterboro' in order to be present on this occasion.

In reply, Mr. Belcher said that exactly twenty-nine years ago he arrived in Canada, and in the following spring first came to Toronto. At that time, the Dominion Bank Building at the corner of Yonge and King streets was in course of construction. He had visited the city on many occasions since, and had marked with pleasure its wonderful progress. To-day for the first time he had entered the new City Hall, a building which reflected the greatest credit on the architect, Mr. Lennox. Osgoode Hall he described as a work of art, and made reference to some other important buildings.

Mr. Wickson followed in a humorous vein. He remarked that he was pleased to have at last found a bill of extras which he could go over without feeling that he was liable to have his innocence taken advantage of by the contractor. He reminded them that contractors, especially masons, were given to "chiselling." He noticed a growing respect on the part of builders for architects, and a disposition, when something good was required, to go to the architects for the designs and plans in preference to undertaking the preparation of them themselves, as was formerly the custom.

Mr. Henry Simpson, architect, whose ability as a ventriloquist is well known, entertained the company, and got off excellent hits on some of the public men and prominent members of the Exchange.



Staff Over Mantel—W. D. Matthews' Residence, Toronto.
G. M. Miller, Architect. By Wm. J. Hynes, 16 Gould Street.

"THE MONTREAL BUILDING BY-LAW OF 1899."

(Continued from November issue)

FIRST CLASS BUILDINGS, HOW CONSTRUCTED.

SECTION 103.—In all buildings of the first class hereafter erected, the external party or partition walls shall be made of stone, brick or terra cotta, in conformity with the provisions of this by-law; the beams of floors, roof, etc., and all supports other than brick or stone walls, shall be of iron or steel, of such size and so arranged that the maximum fibre strain shall not exceed 12,000 lbs. per square inch for iron, and 16,000 lbs. for steel. The beams forming the floors and roof, shall be filled in between, with porous terra cotta, hollow tiles or burnt clay, brick, cement, concrete, or other incombustible material, which is also a slow heat conductor, and such terra cotta, tiles, brick, or concrete shall completely invest the beams in such manner that in no part shall there be less than two inches of such covering on the iron or steel.

The beams supporting the terra cotta, hollow tiles, brick, or concrete, shall not be spaced further apart than 6 feet. All beams, lintels, supports or other metallic structure shall be protected against the effects of fire by a covering of incombustible material, which is also a slow heat conductor; these materials shall be applied to the metal with cement in such manner that every part of the metal is invested by not less than two inches in thickness of said material.

All cast iron, wrought iron, or steel columns shall be made true and smooth at both ends, and shall rest on steel or iron bed plates, and have iron or steel cap plates, which shall also be made true.

All iron or steel beams, of whatever kind, shall be suitably framed and connected together; and iron or steel girders, columns, beams, trusses, and all other iron or steel work of the floors and roof shall be strapped, bolted, anchored, and connected together, and to the walls, in a strong and substantial manner, and such connections, shall be made in the manner recommended in steel or iron construction.

Iron or steel floor, or roof beams shall be so arranged as to spacing and length of beams that the load to be supported by them, together with the weight of the materials used in the construction of said floors or roof, shall not cause a deflection in the said beams of more than one-fiftieth of an inch per lineal foot, and they shall be so tied together as to prevent lateral deflection.

Under the ends of all iron and steel beams where they rest on the walls, stone or iron templates shall be built into the walls; said templates, if of stone, shall not be less than twenty inches long, by twelve inches wide, and eight inches thick; if of iron or steel, they shall be not less than twelve inches long, by eight inches wide, and one inch thick.

In all first class buildings the stairs, elevator, enclosures, cars, guides, supports of machinery, etc., shall be made entirely of incombustible materials; no wood-work or other inflammable material shall be used in any of the partitions, furrings, or ceilings, excepting, however, that the doors and windows and their frames, the trimmings, the casings, and the interior finish and the floors may be of wood, provided that they are filled solid at the back with fire-proof material.

SECTION 104.—In all first class buildings constructed on the skeleton principle, wherein all external and internal loads and all strains, are transmitted to the foundations by a frame work or skeleton of metal, such frame work or skeleton shall be so constructed in all its parts that the maximum fibre stress shall not exceed 16,000 lbs. per square inch, for steel, or 12,000 lbs. per square inch for iron. All the supports, beams, girders, etc., shall be joined by riveted connections, in such manner as to rigidly connect all parts of the frame together.

If buildings of skeleton construction are designed so that their enclosing walls do not carry the weight of the floors and roofs, then their walls may be reduced in thickness less than herein before provided for, excepting that no wall shall be less than twelve inches in thickness, and provided also that such enclosing walls shall be thoroughly anchored to the metal frame or skeleton, and provided also that wherever the weight of the said walls rests upon beams or pillars, such beams or pillars must be made strong enough in each storey to carry the weight of the wall resting upon them without reliance upon the walls below them.

The floor and roof beams in such buildings shall be filled in between with incombustible and similar material, and all parts of the metal thoroughly protected from the fire with slow heat conducting material, and the framing of iron or steel, strength of beams, bearing of post, columns, and beams, construction of stairs, and elevators, and the use of wood for interior finish shall be governed by the provisions of the preceding section.

THEATRES AND OPERA HOUSES.

SECTION 105.—Every building hereafter built or altered to be used as a theatre for dramatic, operatic or other similar purposes, involving the use of a stage with movable or shifting scenery, curtain and machinery, shall be a first class building, and the highest part of main floor of auditorium shall not be over seven feet above the level of the street or pavement on which the doors of exit are located.

Every theatre referred to in the preceding paragraph shall have the front in which the main exits are placed, made as wide as the auditorium, including the passages or stairways leading to the galleries, and said frontage for the whole height of the building shall be upon a street or square. Should another building intervene between the said front in which the main exits are placed, and a street or square, then the said front shall be upon a court or passage way not less than thirty feet wide, and open to the sky, and said court shall communicate with a street or square by a passage way also open to the sky, and not less in width than thirty feet; should the exit from said court to a street or square be through another building, the said exit or passage way shall not be less than thirty feet wide, and unobstructed, and should it be ceiled over, the ceiling and the walls supporting the ceiling shall be constructed of substantial fire proof material.

There shall be at least two independent exits from each division, compartment, or gallery in such theatre; every such exit shall shall have a width of at least 18" for each one hundred persons which the division, compartment, or gallery to which it leads, is capable of containing; three or more exits may be substituted for the two exits above required, provided they are of the same aggregate width; no exit shall be less than five feet in width, and the doors of such exits shall all open outwards only. In addition to the exits before mentioned there shall be provided where practicable, direct exits from the main floor or auditorium to a street, square, lane, or court, and such exits shall be provided with suitable light doors or sashes opening outwards, and secured on the inside only in such manner as will admit of their being readily opened in case of fire or a panic.

Should a room intervene between the doors from the auditorium above described, and the street or square, which would prevent or impede the egress of an audience in case of fire or panic, a distinct corridor shall continue from the said doors to the street or square, and should the street end of said corridors be fitted with doors they shall open outwards, and be fitted with fastenings on the inside only; all exits from such buildings shall be opened for the use of departing audiences and shall have fastenings on the inside only. Plans showing the exits and stairways shall be printed on every programme or play bill. There shall also be posted in some conspicuous place on each gallery or floor, and also on the stage along with the regulations referred to in this section, a diagram, showing the stairways and exits. Rooms in theatres for the use of persons employed therein shall have at least two independent exits; all exits here described shall have the word "Exit" in letters at least 6 inches long painted on the auditorium or stage side of such exit.

Each gallery in such building shall have at least two independent staircases located as far apart as possible and extending from the gallery to a street or square, or to a court or lane, having open communication with a street or square.

All such stairs shall be of incombustible materials, except the treads, which may be hardwood, and shall be of ample strength to sustain the load to be carried, the cut of the strings for such stairs shall not exceed 6½ inches rise, nor be less than 12½ inches on the tread. No winding steps shall be used.

No stair shall be less than 4 feet 6 inches wide in the clear, no platforms less than four feet; there shall be no flights of more than fifteen nor less than three steps between landings.

All stairs and landings shall have a substantial hand rail on each side; stairways of twelve feet or over in width shall have one, and stairs sixteen feet or over, two intermediate hand rails firmly secured to the steps.

All corridors, passage ways, aisles, etc., in such theatre shall be of ample and uniform width, and, if possible, widening towards the exits, to afford easy exit from the building, and shall be kept during performances free of all obstructions of whatsoever kind. No temporary seats, and no person shall be allowed to remain in any aisle or passage way during a performance.

All passage ways and aisles on the respective floors in the auditorium having seats on both sides of same, shall not be less than 3 feet wide where they begin, and shall be increased in width towards the exit in the ratio of 1½ inches to every 5 lineal feet. Aisles having seats on one side only shall not be less than 2 feet

wide at their beginning, and increase in width the same as aisles having seats on both sides.

The stage of every theatre shall be separated from the auditorium by a brick wall not less than sixteen inches thick, which wall shall extend the whole width and height of the building, and two feet above the roof. There shall be no openings through this wall except the curtain opening at or below the level of the stage. These latter openings shall not exceed twenty-one superficial feet each, and shall have bright tinned wood self-closing doors, securely hung to rabbeted iron frames or iron rabbets in the brickwork, or wood frames covered with bright tin.

The finish or decorative features around the curtain and wood work of the stage shall be covered, and if practicable saturated with fire resisting material.

No fixed portion of the stage except the floor shall be of wood.

The framing of the floor of the stage shall be steel or iron. The framing and floors of fly galleries and rigging lofts, and all rails, with the supports and stanchions of the same, also all sheeves and pulleys and their supports, shall also be of steel or iron.

The proscenium or curtain opening of every theatre shall have a curtain of incombustible material approved by the Building Inspector, sliding at each end within iron grooves securely fastened to brick wall and extending into such grooves not less than six inches on each side. That curtain shall be raised at the commencement of each performance and lowered at the close of same and operated by approved machinery.

There shall be over the stage of every theatre one or more ventilators constructed of incombustible material; the area of said ventilators shall equal one-thirtieth of the total area of such stage; every such ventilator shall have a damper or valve so arranged and counter-balanced as to open automatically, and shall be kept closed when not in use by a cord reaching to the prompter's desk; such cord shall be of incombustible material, and so arranged that if it is severed the ventilator will open automatically.

STORE ROOMS AND WORKSHOPS.

All scene docks, carpenter, or property shops, and wardrobes of every theatre hereafter built, shall be separated from the stage, auditorium, or dressing rooms, by brick walls not less than twelve inches thick. There shall be no openings in these walls to the auditorium, or dressing rooms, and all openings to the stage shall have tinned wood doors securely hung to iron frames, or to iron rabbets in the brickwork.

All rooms in any theatre for the use or occupancy of persons employed therein shall be located as remote from the stage as practicable, and shall have at least two independent exits to a street, lane, or court; the partitions, floors, walls, etc., of such rooms shall be constructed of incombustible materials.

There shall be at least two four inches stand pipes on the stage of every theatre, with ample provision of hoze and nozzle, attached to the stand pipe at each level of the stage on each side, and the water shall be kept turned on said stand pipes during the occupation of the building by an audience. Over the whole area of the stage there shall be a complete system of sprinkler pipes, with automatic sprinklers approved of by the inspector, the size of said pipes and spacing of sprinklers shall be according to the rules of the Mutual Mill Fire Insurance Coys. and shall be supplied by mains connected with the city water pipes. The proscenium opening shall be provided with sprinkler pipes and sprinklers, so constructed that when in operation there shall be a complete water curtain for the entire width of the proscenium opening.

There shall be on the stage of every theatre in addition to the stand and sprinkler pipes before mentioned, four casks full of water with two buckets to each cask, the said casks and buckets shall be painted red and marked "For Fire Use Only" there shall also be not less than four portable Babcock or other automatic fire extinguishers approved of by the inspector, said extinguishers shall be placed in some conspicuous position and within easy reach.

In some conspicuous place on each gallery and floor the regulations for the protection of the public against fire or accident shall be posted.

Every theatre shall be illuminated entirely by electric light; the lights in the entrance halls, corridors, and stairways shall be independent of the lights in the auditorium and stage, and shall be kept lighted during a performance and until such time as the audience has left the building. There shall be a light opposite each exit, and at the top and bottom of each stairway, and all such lights shall have glass globes colored red.

All gas and electric lights in the halls, corridors, lobby or any other part of said building used by the audience, except the auditorium, must be controlled by a separate shut off located in the lobby, and controlled only in that particular place.

In cases where electric light is not obtainable, o when the electric apparatus is out of order, gas light may be used.

Gas mains supplying the building shall have independent connections for the auditorium and the stage, and provision shall be made for shutting off the gas from the outside of the building. Where interior gas lights are not lighted by electricity other suitable appliances to be approved by the inspector, shall be provided.

All suspended or bracket lights surrounded by glass in the auditorium or in any part of the building devoted to the public, shall be provided with proper wire netting underneath.

No gas or electric light shall be inserted in the wall woodwork, ceiling or any part of the building unless protected by fireproof material.

All lights in passages or corridors in said building and wherever deemed necessary by the inspector, shall be protected with proper wire network.

The footlights in addition to the wire network shall be protected with a strong wire guard not less than 2 feet distant from said footlights, and the trough containing said footlights shall be formed of and surrounded by fire proof materials.

All border lights shall be constructed according to the best known methods, and subject to the approval of the building inspector, and shall be suspended for ten feet by wire rope.

All ducts or shafts used for conducting heated air from the main chandelier or from any other light or lights, shall be constructed of metal, and made double with an air space between.

All stage lights shall have strong metal wire guards or screens not less than 10 inches in diameter, so constructed that any material in contact therewith shall be out of reach of the flames of said stage lights, and must be soldered to the fixture in all cases.

The stand pipes, gas pipes, electric wires, hose, foot lights, and all apparatus for the extinguishing of fire or guarding against the same, as in this section specified, shall be under the control of the inspector of buildings, and he is hereby directed to see that the arrangements in respect thereto are carried out and enforced.

No boiler, furnace engine or heating apparatus shall be located under the auditorium, nor under any passage, stairway, or exit of any public building.

SECTION 106.—No theatre hereafter erected, or altered to comply with the foregoing provisions, shall be opened to the public until the same has been examined by the inspector and approved by him as conforming to the requirements of this by-law. It shall be the duty of the inspector to visit every such theatre at least once every two months, to ascertain if the provisions of this by-law are observed, and to bring to justice any person in contravention thereof.

CONCERT AND ASSEMBLY HALLS, CHURCHES, HOTELS, ETC.

SECTION 107.—No public assembly or concert hall or church (with the exception of halls in school buildings) which are capable of seating 400 or more persons shall be placed in any second class building at a greater height above the pavement or street than twenty feet to the level of the main floor of said hall or church.

Every such hall or church shall have at least two stairways leading to a street or square, or to a court or lane communicating directly with a street or square, the said stairs shall not be less than five feet in width in the clear, and shall increase six inches in width for every additional fifty persons which the said hall or church can contain over four hundred, the said stairs shall be constructed of incombusible materials except the treads which may be of hard wood, and shall be of ample strength to safely bear the loads which may be imposed on them; in no case shall there be windows in such stairs without the consent of the inspector, nor shall there be more than fifteen, nor less than three steps between platforms or landings, the cut of the string for such stair shall not exceed 6½ inches rise nor be less than 11½ inches on the treads; no winding steps shall be used.

All such staircases shall be enclosed on at least three sides with solid brick or stone walls.

In all assembly and concert halls, churches, and all buildings of a public character to be hereafter built, such as hotels, restaurants, railroad depots, or other buildings where 200 or more persons may assemble, the stairways, halls, corridors, and exits shall be of ample size, and so arranged as to afford easy egress in case of fire or accident, to the persons therein assembled, and so as to afford requisite and proper safeguards for the public protection.

The exits from such buildings shal be made to open outwards and in conformity with the provisions of this by-law.

All aisles and passage ways in assembly or concert halls, or theatres, shall be kept free from temporary seats, or other obstructions that might interfere with egress, and no person shall be allowed to occupy any of the aisles or passageways during any performance, lecture, service, exhibition, concert, ball or other public assemblage. The width of the passage ways and aisles to be similar to that required in section 105 for theatres, etc., excepting that for churches, minimum width must be 4 feet wide when seats are on both sides, and 3 ft. wide when seats are on one side only, and the sides of same may be parallel.

The stairways and exits from any hall or main corridor in such buildings, also the stairways and corridors in any lodging, tenement, or apartment house, or hotel, or other similar building, in which 30 or more persons lodge at night, and where the exits from the same to the street are in common to all the occupants, shall be indicated at night by a gas, or electric light, enclosed in a glass globe, colored red.

In halls, churches, or other such buildings which are temporarily occupied at night, the said lights shall be kept well lighted during the term of any lecture, service, exhibition, ball, or other public assembly, until the audience or assembly has departed from the building.

In hotels, lodging, tenement or apartment houses, or other buildings of similar character, occupied during the night by 30 or more persons, the said lights shall be kept lighted from dusk to dawn, and said building shall also have one or more gongs so placed, and of such size and number, as to give an alarm throughout the house in case of fire, and in every sleeping room there shall be conspicuously posted directions for escape in case of fire. In all hotels, where deemed necessary by the inspector, there shall in addition be one or more competent watchmen on duty during the night.

The inspector may make further requirements for prevention and escape from fire as may be reasonably necessary.

SECTION 108.—It shall be the duty of the inspector, as soon after the passing of this by-law as possible, to visit and inspect every existing theatre or public building, and if any be found in any important respect to be contrary to the provisions of this by-law he shall immediately give to the owner of the building, notice in writing, requesting him within a reasonable delay to do anything required to be done as far as practicable, to bring said building in conformity with the requirements of this by-law.

If any such owner to whom notice has been given as aforesaid, makes default in complying with the directions therein contained within the time specified, he shall be liable to the penalty in section 209 of this by-law, and until he has complied with such directions, no assemblage, representation or performance whatsoever shall be held in such theatre, hall or building, and the inspector is hereby empowered to placard on the outside of the building near the entrance in a conspicuous position, that this building is dangerous.

SCHOOL BUILDINGS.

SECTION 109.—No second class building hereafter erected, or which may be altered to be used as a school, shall exceed three storeys in height above the pavement.

Any school building hereafter erected exceeding three storeys in height above the pavement shall be a first class building.

Every second class building used as a school, which is more than one storey in height, and which is capable of containing 400 or more pupils, shall have at least two stairways placed as far apart as practicable, such stairs shall not be less than five feet wide in the clear, and shall increase six inches in width for every fifty pupils which the school building is capable of containing over 400.

In school buildings which are three storeys in height, the stairs shall be constructed of incombustible materials, except the treads, which may be of hard wood. The said stairs, whether in a building of two or three storeys in height, shall be enclosed on at least three sides with solid brick or stone walls.

An assembly hall may be made in the second or third storey of such school building, provided that such hall is used exclusively for school purposes.

VENTILATION.

SECTION 110.—All school buildings, churches, concert or assembly halls, or public buildings, where a number of persons may assemble, also all factories or workshops where a number of persons are employed, shall have an efficient system of ventilation, and such system shall be shown and indicated upon the plans of the building when they are submitted to the inspector for approval, as provided for in section 22.

INSPECTOR OR HEALTH OFFICER MAY ORDER BUILDINGS UNFIT FOR HABITATION TO BE VACATED.

SECTION 111.—Whenever it shall appear to the satisfaction of the inspector that any building or part thereof is unfit for human habitation, by reason of its being so infected with disease as to be likely to cause sickness among the occupants, or by reason of its want of repair has become dangerous to life, he may issue an order, and cause the same to be conspicuously affixed to the building or part thereof; the said order shall also be personally served upon the owner, agent or lessee, if they can be found, in the city or district, requiring all persons therein to vacate such building for the reasons to be stated therein aforesaid.

Such building or part thereof shall, within ten days thereafter, be vacated; or within such shorter time not less than twenty-four hours, as in said notice may be specified.

But said inspector, if he shall become satisfied that the danger from the said house, or part thereof, has ceased to exist, may revoke such order, and it shall thenceforth be inoperative.

TENEMENT HOUSES.

SECTION 112.—No building for a tenement or lodging shall be erected on any lot where there is another building, unless a space as hereafter mentioned is maintained between the said buildings; if one of the buildings is one storey high the space shall not be less than ten feet; if both buildings are two storeys high the space shall not be less than twenty feet; if both buildings are three storeys high, or if one of them is three storeys and the other two storeys, the distance shall not be less than thirty feet; if the buildings are over three storeys high the distance shall not be less than thirty-five feet.

Between the rear of any building, erected or converted to the purposes of tenement, or lodging house, which is not over two storeys high and the rear line of a lot, there shall be a distance of not less than ten feet, unless the rear line of said lot is a lane of not less than fifteen feet wide; if the said building is three storeys or over in height the distance from the rear line shall not be less than fifteen feet, unless the rear line of said lot is a lane, in which case the building may be within eight feet of the lane.

Such open spaces may be modified or lessened in special cases, with the consent of the inspector, and may be dispensed with on a corner lot with the permission of the inspector.

In every such tenement or lodging house, every habitable room except rooms in an attic storey, shall be in every part not less than eight feet in height from the floor to the ceiling; and every habitable room in the attic of any such building shall be at least eight feet in height from the floor to the ceiling throughout not less than one-half the area of such room.

Every habitable room in such tenement and lodging house, and every habitable room in any other building, shall have at least one window connecting with the external air, either on a street, square, lane or court, or into a light shaft, the dimensions and position of which shall be approved by the inspector.

The total area of window or windows in every such room communicating with the external air or with a light shaft, shall be at least one-tenth of the superficial area of every such room; and the top of one, at least, of such windows shall not be less than seven feet and six inches above the floor, and the upper half, at least, shall be made to open the full width when the windows of said rooms are fitted with double or winter sashes; the said sashes shall have ventilating openings of not less than 24 square inches in each sash.

A habitable room in any building lighted by a sky light placed in the ceiling, and having a shaft not over six feet in depth between the ceiling and the external air, shall be considered as equal to a room with a window opening to the external air or to a light shaft, as described in the preceding paragraph, provided that the said skylight is fitted with a metal ventilator of a pattern approved of by the inspector, and being not less than eight inches diameter in the tube, and that the opening in the ceiling below the skylight, if fitted with a sash or sashes, shall have said sash arranged to open. Every room used as a sleeping room shall have a fanlight over the door made to open.

No tenement or lodging house, or any portion thereof, shall be used as a place of storage for any combustible article, or any article dangerous to life or detrimental to health, nor shall any horse, cow, calf, pig, sheep, or goat be kept in said house.

ELEVATORS FOR STORAGE OF GRAIN OR COAL.

SECTION 113.—Elevator buildings (which term shall be interpreted as including all buildings intended solely for the receipt, storage and delivery of grain or coal, in bulk) shall only be erected on a site approved of by the city council. Said elevator may be constructed with bin walls, made entirely of wood, pro-

vided such walls are made solid and without cellular open spaces within them.

The external bin walls shall have a covering of brick, slate, metal or other incombustible materials. If brick is used for casing, it shall not be less than eight inches thick, and securely fastened to the woodwork by iron anchors. If the weight of the bins is independently carried on a skeleton construction of wood, steel or iron, and does not rest upon the enclosing walls, the enclosing walls as high as the bottom of the bins shall be made of brick not less than twenty inches thick, or stone not less than thirty inches thick.

The walls and roof of the copula, and the roof on the bins on such buildings, shall be covered with incombustible materials, also the road ways and the ground floor, together with the supporting timbers when detached. All the external openings in he copula shall be covered with wire netting made of No. 14 wire, with mesh not over ½ × ½ inch.

The engine and boiler used in connection with any such elevator shall be enclosed with solid brick walls, and the roof over the same shall be fireproof. Any opening between the engine room or boiler house and the elevator shall be fitted with fireproof doors as before described in this by-law.

Any elevator building lighted by gas shall have all the lights protected by a wire basket or cage.

Every such elevator building shall have two four inch stand pipes connected with the water mains, and carried up to the copulas, the lower end of each pipe to be fitted with a valve, and the end in the copula with a valve, and not less than 100 feet of hose and branch pipe, attached to same.

STABLES.

SECTION 114.—Stables for private use may be erected, provided that said building is not more than two storeys in height, and may be third class buildings provided that the walls of said buildings are built upon or about upon the line dividing two properties shall be made of solid brick not less than eight inches thick, and that said wall shall be carried above the roof to the height mentioned for party walls in this by-law.

SECTION 115.—No person shall hereafter erect or alter an existing building to be used as stable, having stall accommodation for more than eight horses, nor shall any person erect or use such building for the keeping of horses and carriages or other vehicles, commonly known as a livery stable, or for the board and treatment of horses commonly known as veterinary stables, without having complied with the following conditions, and obtained a permit from the inspector and the sanction of the council.

An applicant for such permit shall give at least ten days public notice of his or her intention to apply for the same to the council, in the newspapers in which the notices of the said council usually appear, which notice, stating the dimensions and purposes for which said proposed buildings are to be used, shall be placarded in legible type, the letters of which shall not be less than ½ inch in height, on the lot on which said building is to be erected, or on the building proposed to be used for said purposes, so that neighboring proprietors, residents and others interested may have an opportunity of opposing the granting of said application. and no such application shall be entertained by the council unless notice has been given as herein provided.

Upon the receipt of such application, the council shall refer it to the Fire and Health Committees, and the inspector shall examine the premises where such building is proposed to be erected, or the building proposed to be used for such purpose, and shall hear the interested parties, and report to the Fire Committee. Should the council sanction the erection or alteration of said building the inspector shall issue a permit therefor as provided in this by-law.

VAULTS UNDER PAVEMENTS.

SECTIONS 116.—Any person wishing to use the space under a sidewalk shall first make application for permission to do so to the City Surveyor, submitting proper plans of same, and if said application is granted, pay the fees for such privilage as determined by the Road Department.

Any person utilizing the space below the sidewalk shall enclose said space with stone or brick walls, of sufficent thickness and strength as to retain the roadway, and resist all lateral pressure, the roof of said vaults shall be constructed of incombustible material supported on steel or iron beams, or brick or stone arches.

The surface of said roof shall be finished with stone, asphalt, cement or other covering prescribed by and made under the direction of the City Surveyor.

Openings in the roofs of said vaults for the admission of light or coal shall be covered with lights of glass in iron frames with raised points, or with iron covers having a rough surface, and made flush with the sidewalk; such lights or covers must be approved of by the City Surveyor.

FLOORS OVER AREAS.

SECTION 117.—Any area of space in a yard or elsewhere, which is covered over, and on which there is to be traffic by pedestrians or wheeled vehicles, shall be covered with iron, iron and glass combined, or stone or other incombustible materials, and the beams or arch and supports of the same shall be of sufficent strength to safely carry the loads imposed thereon.

STRENGTH OF MATERIALS.

SECTION 118.—The dimensions of each piece or combination of pieces of materials required for a column of vertical support, shall be ascertained by computation according to rules given by "Haswell", "Troutwine", "Kidder" or other recognised authorities.

The strength of all columns and posts shall be computed according to Gordon's formulæ, and the crushing weights in pounds to the square inch of section, for the following materials shall be taken as the co-efficients in the said formulæ, namely:

Cast iron	80,000 pounds.
Rolled steel	48,000 "
Wrought or rolled iron	40,000 "
White oak	6,000 "
British Columbia Douglas fir	5,000 "
White pine and spruce	3,500 "

The breaking strength of wooden beams and girders shall be computed according to the formulæ in which the constants for transverse strains for central loads shall be as follows, namely:

Hemlock	400 pounds.
White pine	450 "
Spruce	450 "
Douglas fir, B. C	500 "
White oak	550 "

For wooden beams and girders carrying a uniformly distributed load, the constants should be doubled.

The factors of safety for all beams, girders and other pieces, subject to a transverse strain, when made of steel or iron shall be as one to four.

As one to four, for all posts, columns, and other vertical supports, when made of iron or steel.

As one to six for tie rods, tie beams and other pieces subject to a tensile strain, when made of steel or iron.

As one to five for other materials subject to a compression or transverse strain.

The following are the maximum loads to be imposed upon the after mentioned materials in tons of two thousand pounds per square foot:

First quality masonry, with squared beds and joints and laid in cement mortar.

Granite	60 tons.
Limestone on natural bed	40 "
Limestone where used on edge for columns and piers	20 "
Limestone rubble work in good lime mortar	15 "
Sandstone, Scotch or New Brunswick	40 "

Other stones one fourth of the crushing weight, as determined by satisfactory and recognized tests.

LOAD ON BRICKWORK.

First class brick work, of hard burned bricks, and including piers in which the height does not exceed six times the least dimensions if laid in the following manner:

One part cement, two or three parts sharp river sand	15 tons.
One part lime and three or four parts sharp river sand, and strengthened with one part of good approved cement.	12 "
Lime mortar, in the proportion of one part of lime and three or four parts of sharp river sand	8 "

Brick piers of hard burnt bricks, in which the height is from six to twelve times the least dimension:

One part cement, two or three parts sharp river sand	13 tons
One part lime, three parts or four parts sharp river sand, strengthened by one part good cement	10 "
Lime mortar, in the proportion of one part lime and three or four parts sharp river sand	7 "

Stresses for material and formulæ for calculating the same, not herein mentioned, shall be determined by the best modern authorities.

PRECAUTIONS AGAINST FIRE.

SECTION 121.—In all public buildings, every storey above the ground storey shall be supplied with means of extinguishing fire, such as pails of waters or other portable apparatus, or of hose attached to a suitable water supply all as approved by the inspector, and such apparatus must be kept at all times in good condition and ready for use.

SECTION 122.—Any person owning or occupying a workshop or other building, or building in course of erection, or premises in which shavings or other like combustible materials are made, shall keep the said shop, building, or premises, as free from accumulation of such shavings, or other like materials as practicable, and shall remove all such materials at least every two days from the said shop or building, or premises. No stove shall be used in a carpenter shop, or other shop or building, used for similar purposes, unless the same shall be surrounded with fire proof material and that the pipe from the same shall be set in conformity with the provisions of this by-law.

No building of which any part is used for storage or sale of hay, straw, hemp, flax, shavings, inflammable liquid or highly combustible substances other than as permitted by section 121 of this by-law, shall be occupied in any part as a dwelling, tenement or lodging house, except that rooms for coachman or groom may be allowed in connection with private stables authorized by this by-law, by permission of inspector.

No person shall store ashes on a wooden floor, or in close proximity to any wood partition, or to any woodwork whatever. Where ashes are stored in any building, it shall only be in enclosures or receptacles made of incombustible materials.

No person shall keep, sell or explode any fire crackers within the city, nor shall any person manufacture or keep for sale any fireworks without having applied for and obtained a license or permit from the council.

No person shall set fire to any fireworks in any square or street without having obtained permission from the inspector to do so,

nor shall any person set fire to any fireworks on private property nearer to any building than forty yards.

SMOKE HOUSES AND KILNS.

SECTION 123.—No person shall use any smoke house or kiln for curing hams or for the drying of wood, or other materials, until the same shall have been inspected and approved by the inspector.

LUMBER YARDS.

SECTION 124.—No person shall use or occupy any yard or lot for the storage or sale of timber without having first applied to the council and obtained a permit to do so, as provided for in section 122 of this by-law.

FIRE ESCAPES.

SECTION 126.—Every dwelling house occupied by three or more families above the first storey, and every building already erected more than three storeys in height, occupied and used as an hotel or lodging house, and every boarding house having more than fifteen sleeping rooms above the first storey, and every factory, mill, manufactory or work shop, hospital, asylum, or institution for the care or treatment of individuals, and every building in whole or in part occupied or used as a school, or place of instruction or assembly, and every office building not of fireproof construction of four stories or more in height, shall be provided with such good and sufficient outside fire escapes, stairway or other means of egress in case of fire, as may be approved of or directed by the inspector.

Such fire escapes shall consist of an iron stairway with a suitable railing, and shall be connected with the interior of the building by doors and windows, and shall have suitable landings at every storey above the first, including the attic, if the attic is used as a work-room ; and they must be kept in good order and free from any encumbrance or obstruction whatever.

The inspector shall have full and exclusive power and authority within the said city to direct fire escapes and other means of egress to be provided upon and within aforesaid buildings, in addition to any provision heretofore made.

The owner or owners of any building upon which a fire escape is erected shall keep the same in good repair and properly painted, and the occupant of such building shall keep it free from encumbrance of any kind whatsoever.

SECTION 127.—In case of the falling of any building or part of a building, where persons are known or believed to be buried under the ruins, it shall be the duty of the building inspector, immediately after being notified thereof, to engage men to search for and recover the bodies of the killed or injured, and the city treasurer is hereby authorized to defray the expense incurred by the building inspector for that purpose, and all expenses incurred in so doing shall be recovered from the owner of such building, in any court having jurisdiction in the matter.

PLUMBING WORK.

I.

SECTION 129.—No person, firm or corporation shall engage in or work at the business of plumbing, either as a master or employing plumber, unless such person, firm or corporation, has received a license or certificate therefor in accordance with the provisions of this by-law relating to these, as hereinafter contained.

II.

The word "Master Plumber" as used in these regulations, shall be deemed to mean one who employs practical plumbers or journeyman plumbers, and who keeps a shop or place of business for which he pays a business tax to the city.

III.

Any person engaged in or working at the business of plumbing, prior to the passing of this by-law, and desiring to engage in or work at said business, either as a master or employing plumber in the city of Montreal, shall apply to the board of examiners hereinafter provided for, to be examined as to his qualifications for such business.

IV.

In case of a firm or corporation, the examining and licensing of and granting a certificate to any one member of the firm or the manager of the corporation, shall satisfy the requirements of this by-law.

V.

There shall be a board of examiners of plumbers, consisting of the building inspector or his assistant, the sanitary engineer (who shall be ex-officio), and a master plumber of at least ten years' practical experience, to be appointed by the city council, on the recommendation of the Master Plumbers' Association of Montreal, for the term of two years at a time. Said third member to receive as compensation for his services a sum not exceeding five dollars a day for actual service.

VI.

The said board of examiners shall then appoint a chairman, and designate the time and place for the examination of all applicants desiring to engage in the business of plumbing within the city of Montreal. Said board shall examine said applicants as to their practical knowledge of plumbing, house drainage, and plumbing ventilation and shall submit the applicant to some form of practical tests, and if satisfied of the competency of the applicant, shall so certify and issue a license, authorizing him to engage in the business of plumbing in Montreal, either as a master or employing plumber.

VII.

The fee for a license shall be two dollars for a master or employing plumber, and said license shall be renewed yearly, on the payment of one dollar for master or employing plumbers.

PLUMBING, DRAINAGE, AND VENTILATION OF BUILDINGS.

SECTION 130.—Every licensed master plumber, or drain builder, or drain layer, shall be required to register his name and place of business at the office of the Board of Health, and to give notice at the said office in case of the removal of his place of business.

An official list of such plumbers, and drain builders, or drain layers recognized by the Board of Health, shall be published once a year during the month of May.

It shall be unlawful for any person to carry on the trade of plumbing or drain making in the city of Montreal, unless licensed or registered as above.

SECTION 131.—All plumbing and house drainage and ventilation in the city shall be made and constructed in accordance with the following rules, which shall be binding on all parties concerned.

No drains shall be made or plumbing work done in any building until a permit to do so has been obtained from the sanitary engineer, as provided for in section 22 of this by-law.

No alteration of drains or plumbing work in any building affecting its sanitary condition shall be undertaken before giving notice to the sanitary engineer. Forms of application and specification for the drains and plumbing work of a new building and for a new building and for alteration of the same in old buildings, will be supplied by the Health Department.

Pipes, drains and plumbing work shall not be covered or concealed from view until approved by the inspector, who shall examine the same within two working days after notice that they are ready for inspection.

The material used shall be of good quality and free from defects, and the work shall be executed in a thorough and workmanlike manner.

SECTION 132.—The arrangement of the soil, waste and ventilation pipes shall be as perpendicular and direct as possible.

The soil, drain, waste and drain ventilation pipes shall, as far as practicable, be exposed to view, ready for inspection and for convenience in repairing.

When necessarily placed within partitions or recesses of walls, soil, drain, waste or ventilation pipes shall be covered with woodwork, so fastened with hinges or round headed screws, as to be readily uncovered.

SECTION 133.—Every house or building shall be separately and independently connected with the street sewer, in front of such house or building, or with such other sewer as shall be designated by the board of health ; but in all cases of dwelling houses there shall be a special connection with the street sewer for each fifty feet frontage of said house, if there be only six dwellings in the said space ; and in case there shall be more than six dwellings in the said space of fifty feet, the special connection with the street shall be as directed by the board of health.

SECTION 134.—Interior house drains when above ground shall be of cast iron pipe ; when laid under ground may be of vitrified clay pipe with a fall of at least ¼ inch to the foot ; where water-closet discharge into them, the pipe shall be at least 4 and not more than 6 inches in diameter, and be laid in a straight line if possible. All changes in direction shall be laid with curved pipes and at least one clean-out length shall be provided. All drain pipes laid in the ground must have a solid foundation. When necessary, concrete made with cement, must be used.

Every such drain put in and covered, without due notice to the health department, shall be uncovered within 24 hours, for inspection by the sanitary engineer or his representative.

SECTION 135.—No brick, sheet metal, earthenware or chimney flue, shall be used as a sewer ventilator, or to ventilate any trap, drain, soil or waste pipes.

SECTION 136.—Soil pipes shall be of cast iron of the weights specified in section 144, and shall extend at least two feet above the highest part of the roof, or coping, undiminished in size, and in no case shall they be less than four inches in diameter ; where the soil ventilating pipes come within fifteen feet of any windows, open louvres, or other openings, they must be carried up 5 feet above top of such window or opening.

Soil, waste and vent pipes, in an extension, shall be carried above the roof of the main building when they are closer than 20 feet to the windows of the main building of adjoining houses.

SECTION 137.—All water closet traps must be amply back air ventilated with a pipe from 2 inches to 4 inches, or other approved device, or the pipes must be so arranged as to prevent syphoning.

SECTION 138.—Joints of sewers and soil pipes shall be gas and water tight.

SECTION 139.—When stacks of pipe are required for sinks only they shall be carried through the roof, and be not less than 2 inches for four sinks or 3 inches for over that number ; but the portion above the roof in all cases must be 1 inch greater diameter than that below the roof.

SECTION 140.—When lead pipes are used to connect fixtures with vertical soil or waste pipes, or to connect traps with vertical vent pipes, they shall not be lighter than six pounds sheet lead to the square foot.

SECTION 141.—There shall be no traps in connection with vertical soil or waste pipes.

SECTION 142.—All pipes shall be sound and free from holes or cracks.

SECTION 143.—The following weight per lineal foot or yard, for cast iron and lead pipes, are the minimum weights :

IRON PIPES.

FOR PLUMBING WORK.—2-inch, 4 pounds per lineal foot ; 3-inch, 6½ pounds ; 4-inch, 9 pounds ; 5-inch, 12½ pounds ; 6-inch, 17 pounds.

FOR DRAIN WORK.—4-inch, 13½ pounds per lineal foot ; 5-inch, 17 pounds ; 6-inch, 20 pounds.

LEAD PIPES.—1¼-inch, 1½ pounds per lineal foot; 1½-inch, 2 pounds; 2-inch, 2½ pounds; 2½-inch, 4½ pounds; 3-inch, 5½ pounds; 4-inch, 7 pounds.

FOR WASTE SINK PIPES.—2 inch, 10 pounds per lineal yard; 3 inch, 15 pounds per lineal yard.

Lead waste pipes, bonds or cess-pools, shall be equal to not less than 6 lbs. per square foot of sheet lead.

The fittings used in connection with such pipes shall correspond with them in weight and quality.

SECTION 144.—Plumbing work shall not be used unless the same has first been tested in the presence of the inspector, or his representative, with the water test, or if that is not practicable, with the peppermint, smoke or other reliable test, and if said test is satisfactory, he shall issue a certificate to that effect.

The Water Department, for the purpose of such test, shall temporarily turn on the water, and shall only permanently turn on the water when the certificate of the inspector is produced.

When defective pipes are discovered, they shall be removed and replaced by sound pipes; defective joints shall be made tight, and every part of the work in which defects are found shall be made to conform to the present rules.

SECTION 145.—Joints in iron drain, soil and waste pipes, shall be filled with oakum and lead, and hand caulked, so as to make them gas tight, and they shall not be painted, varnished, tarred or puttied over until after inspection, unless the inspector or his representative does not signify his approval or disapproval of the work within 36 hours after the department shall have been notified that the work is ready for inspection; the said joints may also be screw joints; should the work prove to be satisfactorily executed in the judgment of the inspector or his representative, he shall grant a certificate to that effect to the person concerned.

SECTION 146.—All connections of lead with iron pipes, shall be made with a brass or copper sleeve or ferrule of the same size as lead pipes, put in the hub of branch of the iron pipe and caulked with lead; and the lead pipe shall be attached to the ferrule by a wiped joint.

All connections of lead pipes shall be by wiped joints.

SECTION 147.—No tile pipe shall be connected with the soil or waste pipe, unless the same be provided with a flange to admit of a proper connection being made.

SECTION 148.—Every water-closet, urinal, sink, basin, wash tray, bath, and every tub shall be separately and effectively trapped. This rule shall apply to a set of tubs, but only one trap shall be required for the set.

Traps shall be placed as near the fixtures as practicable, and in no case shall they be distant more than two feet from the fixtures.

There shall be only one trap under the water-closet and that immediately beneath the same.

SECTION 149.—The connection between iron and tile pipes shall be made with best cement, or by any other means approved by the inspector.

SECTION 150.—All waste pipe fixtures other than water-closets shall be provided at the inlet of such fixtures, with strong metallic strainers to exclude from such waste pipes all substances likely to obstruct them.

SECTION 151.—In no case shall the waste pipe from a bath, tub or other fixture be connected with a water closet trap.

SECTION 152.—Overflow pipes from fixtures shall in every case be connected with the inlet side of the trap, and above the water.

Drip or overflow pipes from the safety pan under water closets and other fixtures, or refrigerators, or from tanks, other than those of water closets, shall be made to run into some place open to sight; and in no case shall any such pipe be connected directly with the drain, waste or soil pipe.

SECTION 153.—Each water-closet apartment shall be ventilated by means of a shaft or air duct extending 3 feet over the roof, and not less than 6 inches in diameter.

SECTION 154.—Every water-closet shall have a cistern supply, and in no case be supplied directly from the city reservoir supply pipes.

SECTION 155.—In houses containing one, or more than one family, there shall be a water closet for each family, and a separate cistern for each closet; in other buildings, however, a group of closets may be supplied from one tank, but not water-closets on different floors; and at least one water-closet to every 15 inmates.

In buildings where operatives of both sexes are employed, proper separate accommodation shall be furnished for men and women.

SECTION 156.—The overflow pipes from water-closet cisterns shall discharge into an open sink, or the basin of the water-closet or where its discharge will attract attention, and indicate whether waste of water is occurring, but not into the soil or waste pipe, or into the drain direct.

SECTION 157.—Valves must be so fitted and adjusted as to prevent wasting of water.

SECTION 158.—No privy vault or cesspool for sewage shall be permitted in any part of the city.

SECTION 159.—No steam exhaust blow off pipe shall connect with a sewer directly, or any house drain, soil pipe, or waste pipe; such pipe must first discharge into a tank or condenser.

SECTION 160.—Cellars shall not be connected with the house drain, unless absolutely necessary, and by special permission of the department, and according to plans approved of by the department.

SECTION 161.—A sub soil drain shall be provided when absolutely necessary, and shall be constructed and trapped to the satisfaction of the department.

SECTION 162.—No trap shall be permitted between the house drain and the public sewer, unless such trap shall have a hand hole for cleaning purposes, and a fresh inlet air pipe, the whole as may be decided upon by the department.

SECTION 163.—Drains in yards shall, in all cases, be trapped below frost, that is to say, four feet at least under ground.

SECTION 164.—In the case of a new house being built, or one already existing being repaired, wherever there is a public sewer in the street, a water closet shall be put in, to the exclusion of privy pits.

SECTION 165.—The inspection of drains within the line of street shall be under the exclusive control of the department.

SECTION 166.—Gas companies are obliged to place a stop cock to every main pipe.

SECTION 167.—Any person contravening any of the provisions of this by-law, from sections 131 to 168 inclusive, shall be liable to a fine, and in default of immediate payment of said fine, and costs, to an imprisonment; the amount of said fine, and the term of said imprisonment to be determined by the Recorder's Court, at its discretion; but the said fine shall not exceed forty dollars and the term of imprisonment shall not exceed two calendar months; the said imprisonment, however, to cease at any time before the expiration of the period fixed upon by the Recorder's Court, on payment of said fine and costs; and where the infraction is continuous, such infraction during each day shall constitute a separate offence.

RULES GOVERNING THE INSTALLATION OF ELECTRIC APPARATUS, ETC., FOR ELECTRIC LIGHT, POWER AND HEAT.

SECTION 168.—All the electrical apparatus, wires, etc., for the generation or supply service in any central station or isolated plant, and all wires, lamps, motors, etc., used for light, power or heat in any public or private building, shall be installed according to and in conformity with the rules and regulations of the Canadian Association of Fire Underwriters, and in order to secure conformity to said rules and regulations, all such installations shall be subject to inspection and issuance of a certificate to that effect from the electrical inspection department of the city of Montreal. In order that proper inspection may be made, due notice shall be given the building inspection office of any intention to install any such electrical wires or apparatus for the purposes herein mentioned, in order to allow of inspection of the installation as the work progresses, and before any portion of the work is covered or concealed, and no installation shall be considered complete and in conformity with said rules and regulations until a certificate shall issue from the inspection department to that effect. In all cases, the inspection department shall have power to decide and determine whether such work has been done in a safe and proper manner, and the issuance of a certificate therefor shall be in evidence thereof.

All materials, switches, wire or any other auxiliary apparatus or device pertaining to said installations shall be subject to the inspection department before being used for such purpose.

All wires of any description, either for telegraph, telephone, electric light, heat or power, on, or entering any building, public or private, shall be subject to the supervision of the inspection department, and with power on the part of said department to compel the placing of those wires in a proper and safe manner.

All theatres and all public halls for scenic display shall be subject to inspection at least once a year.

In case of any installation, already in operation, either of generating plant, motors, wires, or other electric apparatus located in any building or premises, becoming defective to such an extent as to threaten immediate danger to life or property, the inspection department, having notice thereof, shall have immediate power to suspend the operation of such pending the necessary repairs.

The said inspector shall, at proper hours, have the right to enter any building or premises where electric power or light is being used, to inspect all electrical wires or apparatus, in order to ascertain if the proper regulations have been complied with, and no person shall refuse to allow such inspection.

No alterations or change shall be made in the plan of wiring any building without notifying the building inspector and securing a permit therefor, and subjecting the plan of wiring to inspection as herein provided.

PENALTY.

SECTION 169.—Any person violating or contravening any of the provisions of this by-law, for which a penalty is not hereinbefore provided, or disobeying the orders of the said inspector, or refusing or neglecting to comply with such orders, or opposing or obstructing the same in any way whatever, or preventing the said inspector or assistant inspector from entering into any house, or on any premises, or assaulting him or them in the execution of the duties and powers imposed upon him and them, in and by the present by-law, shall for each offence be liable to a fine, and in default of immediate payment of the said fine and costs, to an imprisonment, the amount of said fine and the term of said imprisonment to be fixed by the Recorder's Court at its discretion, and any person who shall violate any of the provisions of this by-law shall be liable to the penalty mentioned in this section for each and every day that such violation or contravention shall last, which shall be held to be a distinct and separate offence for each and every day as aforesaid, provided that such fine shall not exceed forty dollars, and the imprisonment shall not be for a longer period than two calendar months, for each and every offence as aforesaid; the said imprisonment, however, to cease at any time before the expiration of the term fixed by the said Recorder's Court, upon payment of the said fine and costs.

REPEAL.

SECTION 170.—Any by-law or part of by-law contrary to, or inconsistent with any of the provisions of this by-law, is hereby repealed, except in cases wherein the city council has adopted, or may hereafter adopt resolutions regulating the buildings in certain streets.

MANUFACTURES AND MATERIALS

CANADIAN BUILDING MATERIALS.

FROM the Annual Report of the Ontario Bureau of Mines for 1899, recently published, has been extracted the following statistics showing the extent of the production of building materials in the province of Ontario:

SUMMARY OF PRODUCTION IN 1898.

Product.	Quantity.	Value.	Employes.	Wages.
Building stone, rubble, etc..		$750,000	1,250	$520,000
Cement, natural rock, brls...	91,528	74,222	85	23,784
Cement, Portland, brls.....	153,348	302,096	220	104,350
Lime, bushels.....	2,620,000	308,000	548	127,000
Drain tile, number.....	22,668,000	225,000	2,622	456,000
Common brick, number.....	170,000,000	914,000		
Pressed b'k & terra cotta, nbr.	8,969,868	100,344	126	42,580
Sewer Pipe.....		93,717	77	26,260
Pottery.....		155,000	164	61,000

Statistics of building materials were not collected for the year 1897, and for that year the comparative tables which follow for the period 1891-8 are incomplete. The years of depression had seriously affected the building trade, and production fell off steadily for some time. But with the revival there is a brisker demand for building materials, and it is noticeable also that there is a more generous response to the request for statistics.

The total number of men employed in the production of building materials last year was 4,611, the amount of wages paid for labor was $1,168,240, and the value of materials produced was $2,378,611. In these statistics cement is not included. This industry employed last year 305 men, with wage earnings of $128,134, while the value of the product of their labor was $376,318.

The following table gives the value of the products of stone quarries and the amount of wages paid for labor for each year of the period 1891-8, exclusive of 1897:

Year.	Value.	Wages.
1891.....	$1,000,000	$520,000
1892.....	880,000	730,000
1893.....	721,000	464.000
1894.....	554,000	336,700
1895.....	438,000	296,000
1896.....	394,000	273,000
1898.....	750,000	520,000

The number of men employed at the quarries last year was 1,250, or 480 more than in 1896.

Brick and tile works are correspondingly active, and the output of the yards is but little short of the best year in the decade. Following are the figures of production and value for the seven years, and the amount of wages paid for labor—the quantities of brick and tile being given in millions:

Year.	Brick M.	Value.	Tile M.	Value	Wages.
1891.....	160,000	$950,000	7,500	$ 90,000	$432,000
1892.....	175,000	980,000	10,000	100,000	445,000
1893.....	162,350	932,500	17,300	190,000	451,000
1894.....	131,500	690,000	25,000	280,000	388,000
1895.....	126,245	705,000	14,330	157,000	364,000
1896.....	105,000	577,000	13,200	144,000	306,000
1898.....	170,000	914,000	22,668	225,000	456,000

The number of workmen employed in brick and tile yards was 2,622, or nearly 800 more than in 1896.

Separate statistics are given for pressed brick and terra cotta, and as will be seen by the following table for the eight years 1891-8 there is little sign of revival in the production of these materials. Two or three of the works had been closed down owing to lack of demand for pressed brick, but work has been resumed at one or two of these and it is likely that the output of this year will show an increase.

Year.	No.	Va'ue.	Wages.
1891.....	13,617,909	$156,699	$58,000
1892.....	22,048,000	259,335	88,865
1893.....	21,634,000	217,373	80,886
1894.....	25,456,000	286,230	95,400
1895.....	17,940,867	184,550	69,442
1896.....	12,201,000	129,845	60,824
1897.....	8,043,908	99,277	40,084
1898.....	8,969,868	100,344	42,580

The number of men employed at the works last year was 114, being 29 less than in 1897.

The statistics of lime production show an increase in

proportion to those of other building materials, and very nearly approach the highest figures of the decade. They are as follows for seven years of the period :

Year.	Bushels.	Value.	Wages.
1891	2,350,000	$300,000	$116,000
1892	2,600,000	350,000	120,000
1893	2,700,000	364,000	122,000
1894	2,150,000	280,000	108,000
1895	2,090,000	280,000	104,000
1896	1,880,000	220,000	85,000
1898	2,620,000	308,000	127,000

The number of workmen employed last year was 548, or 118 more than in 1896.

The manufacture of sewer pipe last year gave employment to 77 men, whose aggregate wages were $26,260, as compared with 64 men and $19,600 for labor last year. The value of sewer pipe produced was $93,717, or $20,166 more than last year.

CEMENTS.

Very satisfactory progress continues to be made in the production of cement, but especially the Portland variety of it. There has been substantial improvement in the output of the natural rock cement works during the past four years, but values are not so well maintained as is the case with Portland cement, and the rate of increase is considerably lower in the number of workmen employed, in the amount of wages paid for labor and in the quantities produced. The following table gives the statistics of the industry for the last five years :

Schedule.	1894.	1895.	1896.	1897.	1898.
Natural rock cement					
Number of works	5	5	5	4	4
Number of workmen	63	45	56	79	85
Wages for labor	$13,020	14,166	15,200	21,500	23,784
Product	bbl. 55,323	55,219	60,705	84,670	91,528
Value of product	$48,774	45,145	44,100	76,123	74,222
Portland cement—					
Number of works	3	2	2	2	2
Number of workmen	105	129	120	161	220
Wages for labor	$31,858	46,000	48,400	67,560	104,350
Product	bbl. 30,580	58,699	77,760	96,825	153,348
Value of product	$61,060	114,332	138,230	170,302	302,096

The average rate of wages in natural rock cement works rose from $207 to $315 during the period and in Portland cement works from $303 to $451, while for both classes of works the aggregate of wages paid for labor grew from $44,878 in the first year to $128,134 in the last, being an increase of 185 per cent. The product of all cement works has grown from 85,903 barrels in 1894, valued at $109,834, to 244,876 barrels in 1898, valued at $376,318, being an increase of 173 per cent. in quantity and of 243 per cent. in value. There has been a slight fall in values per barrel, the average of natural rock being 88 cents in 1894 and 81 cents in 1898, while the average of Portland in 1894 was $2 and in 1898 $1.96. The statistics of Portland cement for 1898, it should be stated, includes 18,400 barrels of Silica Portland, valued at $32,200, which accounts for the apparent fall in value per barrel of Portland.

But although the production of cement in Ontario is steadily growing larger there is no falling off in the quantity of imports for all Canada. The following statistics show for the five years 1894-8 the values of imports entered for consumption from Great Britain, the United States and other countries :

Year.	G. B.	U. S.	O. C.	Totals.
1894	$182,974	$33,263	$68,234	$284,471
1895	135,693	21,103	95,130	251,926
1896	121,125	25,997	107,907	255,029
1897	111,551	45,200	104,081	260,842
1898	106,548	59,855	200,574	366,977

It will be noticed that the trade has undergone a marked change in this short period of four years, the imports from Great Britain having fallen off from 64 to 29 per cent. of the whole, while those from the United States have increased from 12 to 16 per cent., and from all other countries from 24 to 55 per cent. of the whole. Practically all imports except those from Great Britain and the United States come from Belgium and Germany, the former having last year supplied cement to the value of about $150,000 and the latter to the value of about $50,000. The amount of duty paid was $124,868.65, being $121,968.58 on Portland and $2,900.07 on all other kinds. The total quantity imported last year, including what was not entered for consumption, was 1,153,640 cwt. of Portland and 11,713 cwt. of other kinds.

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