PAGES

MISSING

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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Legal Decisions.

DECISIONS of the Canadian courts in cases of dispute between architects, builders, owners and supply firms, are of particular interest to the readers of this journal. A knowledge of precedents in cases of this description is likely to be the means of preventing waste of money and time in legal controversies. If each of our readers would contribute to our columns particulars of decisions in cases of this character with which he may have been connected or become acquainted, the information will be gladly published for the benefit of all.

Extended Privileges for Women.

AN impetus has been given to the ambition of female students of art by the recent decree of the French government granting women admission to the classes of the Ecole des Beaux Arts. The decree provides that sixty female students between the ages of eighteen and twenty-five shall be granted this privilege after having, by preliminary examination, given proof of artistic acquirement. The same course of study has been assigned to women as to men, and until the success or otherwise, of the new departure shall have been proven students of both sexes will pursue their studies together. Should a sufficient number of female students make application for admission to the school, however, special accommodation will be provided for them. Women have already distinguished themselves in the field of art. With the privileges for study now placed at their disposal, conjoined with their natural adaptability, they may be expected to achieve greater things in the future.

Reduced Cost of Building.

REFERENCE was made in these pages last month to the greatly reduced cost of building in Toronto at the present time as compared with a few years ago. While local circumstances have doubtless had something to do with changing the conditions in Toronto, a substantial decrease appears to have taken place in the cost of building throughout the United States as well as Canada. The American Architect, referring to this subject, states that in 1872 the cost of bricks laid in the wall was reckoned at $36 per thousand. To-day, with better materials, the cost is only $15 per thousand. It is stated that owing to the abnormally low price of materials at present prevailing, the cost of building is less on this continent than in Europe, notwithstanding the much lower scale of wages paid to workmen abroad. There is good reason to believe however, that prices of

materials have reached the lowest point, and that with a revival in business conditions will come a rise in prices.

The Duty on Cement.

THE Dominion government is said to have been impelled to substitute an ad valorem duty for the specific duty formerly imposed on imported cement, by the fact that foreign cement was being brought into the country in barrels 475 pounds in weight, with the object of materially reducing the duty of 40 cents per barrel. If such a practice existed under the old tariff, it cannot continue under the new. The present duty is 12½ cents per 100 pounds, which, taking a barrel of 350 pounds as the standard, is little greater than under the former tariff.

A Suggestion to Architects.

WE beg to suggest to the Toronto Chapter of Architects the desirability of organizing a bicycle sketch club. While the regular meetings of the Chapter have been called off during the summer, the interest of the members might be maintained and many pleasant and profitable outings enjoyed, if bicycle sketching parties were organized. No doubt interesting material for sketches and photographs could be found within a day's ride of Toronto. By this plan, the students would be given the opportunity of showing their ability with the pencil, and of collecting useful ideas; while the practising members of the profession could, as it were, live their youth over again, and afford assistance to those who in the future shall fill their places.

Legislation Affecting Buildings.

OUR readers will no doubt be interested in particulars of several important measures affecting the building interests which have lately been introduced in the legislature of the state of Massachusetts. One provides that 80 feet shall be the limit of height of buildings, other than public buildings, to be erected in Boston in the future. Another authorizes the use of concrete for all kinds of building construction, provided the quality has been tested and found satisfactory by the American Society of Civil Engineers. It is provided in another Bill that before permission is sought for the erection of stables, advertisements must be inserted in the newspapers and notices served on the owners and tenants of adjoining buildings. The erection of bay and oriel windows over any public road or square is prohibited, and it is proposed to repeal present legislation compelling annual registration by plumbers, the working of the regulation not having proved satisfactory.

Life of Brick Pavements.

REFERRING to letters of correspondents appearing in these pages regarding the relative advantages of various kinds of paving materials, the question is one which should only be decided in the light of local circumstances. The amount and character of the traffic to which the pavement will be subjected is a most important factor in deciding the choice of material. For residential streets vitrified brick appears to be in most favor in Toronto at the present time, while for business thoroughfares asphalt and granite setts hold first place. With a view to reducing the cost, the proposal has been made to lay the brick on a foundation of sand or gravel instead of concrete. There is reason to believe that work done in this manner would give satisfactory results for perhaps a period of eight or ten years in a city like Toronto, where the soil is dry sand, but under different conditions the experiment would be attended with risk.

Architectural Competitions.

THERE is something to be said in favor of architectural competitions for public buildings, when conducted under proper conditions. When, however, they are either devoid of conditions, or drawn with the deliberate purpose of placing the competitors wholly at the mercy of those for whose benefit the competition has been instituted, they are a source of great injury to architects and architecture. In Canada competitions have been rapidly degenerating, until they have reached a plane so low and unjust that no self-respecting architect should have anything to do with them. A somewhat similar condition appears to obtain in the United States, and some of the leading architects have wisely determined to make an effort to check the evil. With this object an agreement has been signed by the principal architects of New York and Boston, binding them not to take part in architectural competitions except on certain specified terms. It is to be hoped that this movement will spread until it shall embrace all the leading architects of the country, so that the public may know that a competition not based on proper conditions will be entered only by architects of second or third rate standing. Canadian architects are making a tremendous mistake by not grappling with this evil, instead of assisting to perpetuate it by entering, as many of them do, every competition regardless of terms. In the majority of instances, whether they win or lose, they reap nothing better than disappointment, and the feeling of having in a measure sacrificed their self-respect. Even in cases where some slight pecuniary advantage is derived, it is at the future expense of the architect and of the profession as a whole, the status of which is gradually being lowered in the eyes of the public. The architects have the remedy for the present condition of affairs in their own hands, if they choose to exercise it. It is for them collectively, but especially as individuals, to say whether this evil shall be allowed to go from bad to worse, or whether, by refusing to enter competitions except under fair terms, they will stamp it out.

Lessons of Recent Fires.

RECENT conflagrations in Toronto and elsewhere have drawn attention to the inadaptability to resist fire of the methods of construction employed in many of our modern store buildings. The statement has been made, so far as we know without contradiction, that in the case of the fire which recently destroyed one of the large departmental stores in Toronto, the walls of the building fell in within fifteen minutes after the sounding of the fire alarm. The building is said to have been originally intended for residence purposes. Three or four years ago it was extended in size and height and fitted up as a departmental store. Unfavorable comment was heard at the time regarding the constructional features of the building and doubts were freely expressed as to its safety. Whether or not these were well founded, the structure was certainly not adapted to withstand for even a reasonable time the action of fire. This brfngs us to consideration of the important question of the means to be employed to reduce the fire hazard in modern store buildings. As a first step in this direction the outer walls should be strongly built of hard burned bricks or other fire-resisting ma-

terials, thus preventing the lateral spread of fire to adjoining structures. The vertical and horizontal supports, elevator shafts, etc., should be enclosed within fireproof material. Large light wells extending through the several floors from bottom to top of building should be prohibited. Fireproof rolling partitions should be employed to divide the immense floor space at night into smaller areas. Until means are found to reduce the great floor area filled with highly combustible materials, in buildings of this character, they will fall a speedy prey to fire, and prove a source of great danger to property in the locality in which they are situated. Means must also be found for protecting the plate glass fronts of such buildings, otherwise it will be of little advantage to make fireproof the side and rear walls and inside of the structure. It is due to the rights of property owners on business thoroughfares where these large stores are located, that the civic authorities should impose restrictions which would tend to make them a less source of danger to life and property than they have hitherto been.

BY THE WAY.

THE Engineering Magazine for June contains an illustrated article by Mr. Allan Ross Davis, descriptive of the Trent Canal. The author concludes by expressing the opinion that the United States should unite with Canada to make the Trent Valley Canal route, the Erie Canal route, or best of all, the Welland and St. Lawrence Canal route, a highway adequate for the requirements of both countries.

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IT IS estimated that one-third of Paris is built over caverns formed by the quarrying of the fine building stone of which the city is constructed. Many thousands of piers have been built in these caverns to give the necessary support to the buildings erected above them. Numerous inspectors are likewise employed to patrol these subterranean galleries, with the view of avoiding accidents, such as the one which occurred in 1770, when several buildings sank into the cavities.

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The value of vitrified brick as a paving material has greatly broadened the field of the clay manufacturer. A still more recent discovery is the fact that hard-burned clay conduits are well adapted for the insulation of underground electric wires. Vitrified clay conduits are being used for this purpose by the Chicago Edison Co., of Chicago, and the Western Union and Bell Telephone companies of the United States. There is a hint here for our enterprising clay manufacturers.

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THE celebration of the Queen's jubilee has given a decided stimulus to many lines of business in Great Britain. The building trades in London have derived large advantage as the result of the many improvements which have been made to buildings on the leading thoroughfares. An army of workmen have been employed in the erection of scaffolding necessary to afford sightseers a view of the great procession, while painters and decorators find their services in demand as never before.

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THE Niagara Falls Paper Company's new brick chimney is receiving attention as an example of speedy construction. It is 160 feet in height, 16 feet square at the base and 13½ feet in outside diameter at the top, and is said to have been erected in 153 hours. An outside scaffold was employed for its construction, all the bricks and mortar being elevated by a double steam-operated elevator. If anything approaching or surpassing this feat of rapid workmanship has been accomplished in Canada, I would be pleased to have it brought to my notice.

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THE Pension office building at Washington is declared to be the largest brick building in the world. Its rectangular base is 400 x 200 feet. The exterior measurement is 316 x 116 on the inner court. The height from floor to glass roof is 89 feet. Each of the supporting columns is 25 feet in circumference at the base and contains 100,000 bricks. The first story walls are 3 feet thick and 2 feet 2 inches above. The interior of the building is divided by brick partitions into 170 rooms. The total number of bricks used in the construction of the building was 15,500,000.

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IN CONNECTION with the celebration of the Queen's Jubilee in London, a number of arches have been erected in the streets by the several colonies of the Empire. These arches are supposed to be characteristic in design of the countries which they represent. The Australasian memorial is to be a wide Gothic arch, stretching across the street and the footpaths. The upper portion is in the form of a gilt balustrade, surmounted by kangaroos. Below them is a frieze of mother-of-pearl shells, which will make a brilliant show when the arch is illuminated with electricity at night. Aptly signifying the movement for Australasian federation will be a royal shield charged witn the arms of the various colonies. The African arch, rich in its splendour of ivory and gold, is to be decked with the heads of springbok and koodoo, and waving ostrich plumes. We are told that the Canadian arch is ingenious. Spikes of ice surmount it, and coming downwards with the changes of the climate there will be snow-covered trophies, flowers and golden fruits, with fish in nets to indicate a native industry. The flowers, golden fruits and fish are right enough, but the spikes of ice and snow-covered trophies might with great advantage have been omitted. In view of such displays of stupidity on the part of persons entrusted with the duty of advertising Canada abroad, is it any wonder that Rudyard Kipling should feel himself inspired to write an ode to "Our Lady of the Snows?"

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NEW YORK boasts of the narrowest house of which I have heard as yet. It is situated at the corner of Lexington avenue and Eighty-second street, and occupies a lot 5 feet in width, by 104 feet in depth. The structure really includes two houses, each having an area of 5 x 52 feet. Architecture and Building prints the following description of these unique buildings: "The houses are of pressed brick, with white marble trimmings, and two walls of decorative tiles run up the front. The longitudinal walls are 8 inches thick, and the cross-walls, which sustain the girders, are 12 inches thick. While the houses are only 5 feet wide or deep, fully one-half of their length is increased to a width of 10 feet by bays, which project from the main wall nearly at right angles. These bays are three in number, the central bay being divided and affording an entrance to either house. The front doors of the houses are, therefore, close together. They are very narrow doors and lead to an interior hall, 8 feet 6 inches long, by 9 feet 8

inches deep. One-half of this hall is taken up by a semi-circular stairway, which runs to the top-floor. From the hall a passage-way 14 feet long and 3 feet 8 inches wide leads to the one room on each floor, which room about 18 feet long by 9 feet 8 inches wide, is formed by the expansion of the second bay. Beyond the room another apartment, 3 feet 8 inches wide and 7 feet long, is used, on the first floor, as a bath-room, and on each of the three upper floors as a closet. Thus there are in each house five fair-sized rooms, five large closets, five passageways and five halls. The passages and stairways occupy rather more than half the available space.

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I FIND in the Engineering News an interesting description of the methods employed to move 51 feet and raise 5 feet 6 inches the Emmanuel Baptist Church, of Chicago—a stone structure 93 x 161 feet, with two gables, each 100 feet high, and a tower, 225 feet high. Tests were first made to determine the loads the earth would bear without settling. Over the space to be traversed a floor of 12 by 12 timbers was laid. On this floor a superstructure of jack screws, timbers and I-beams was constructed. Altogether sixteen hundred rollers and 135 tons of rails were used. It was calculated that the ground and timber supports would settle as the load came on to them and an up-grade of two inches in thirty feet was given the track. Care was taken to have the rollers and steel of the same hardness as the track rails, so they would not flatten and wedge. To prevent the rollers from twisting out of line, the lining was so constructed in plates that after a foot or so of travel each roller was released, and could be put in again in exact line. To apply the power for moving the building a strong timber was fastened as an anchorage. From this anchorage chains extended back to hold the timbers which acted as a footing against which the jack-screws pushed. Altogether sixty jacks were used. They were so arranged as to distribute evenly the pressure along the side of the building. The average progress was nine feet per day. No damage was done either to the interior walls of the building or any other part, not even a crack being discovered from top to bottom.

MONTREAL.

[Correspondence of the CANADIAN ARCHITECT AND BUILDER.]

COUNCIL OF ARTS AND MANUFACTURES OF THE PROVINCE OF QUEBEC.

The Schools of the Council of Arts and Manufactures of the Province of Quebec are closed till November. The classes devoted to the building arts established in 1873 have steadily increased in numbers and interest, showing that the system of instruction has been appreciated in this and other cities where these schools are established. The work has been distributed for the best advantage of the country.

In visiting the annual exhibition held recently in the Lecture Hall, Monument National, I was much astonished and interested at witnessing the progress achieved by these classes, and cannot too highly recommend the system of instruction.

The cities represented are Montreal (where the exhibitions are held), Quebec, Levis, Sherbrooke, St. Hyacinthe, Sorel and Three Rivers.

The Free-hand Drawing class had a complete collection of free-hand drawings well studied and rendered. This class comprises 130 pupils, under the supervision of Mr. E. Dyonnet, A.R.C.A.

The Architectural Drawing department is under the charge of Messrs. H. J. Peters and G. A. Monette, architects, who teach geometry and projections, plans and elevation of buildings, etc., to 45 pupils. This class exhibited some finely executed drawings.

The Mechanical Class is conducted by J. V. Graham, and has contributed a fine collection of drawings. The attendance comprises 43 students.

The Modelling Class is very creditable to the instructors, Messrs. L. P. Hebert and Jos. Gratton. Mr. J. Piche exhibited a "Chimere," a very nice piece of work; M. J. Leprohon, "A Female Bust" and M. E. Soucy, a "Venus de Milo," in which was displayed artistic and creditable modelling.

M. J. Peard is the Professor of the Plumbing Class. Very creditable work done during the last season was exhibited. The attendance at this class number 48 pupils.

The Lithographing department was well represented by creditable examples. The attendance during the last session was 18 pupils, having at their head Mr. J. A. Harris. I have had the privilege of seeing the diploma which the Council of Arts and Manufactures are to give in the future to the pupils who will attend regularly the courses. This diploma has been executed by the lithographing class.

I may further mention the exhibit of the Pattern Making Class for boots and shoes, of which Mr. C. A. Payfer is Professor. In the Stair Building and Building Construction Class, conducted by Mr. S. H. Blouden, and composed of 18 pupils, the work of Messrs. L. H. Tremblay and E. Desormeau are worthy of mention. The results of the last session, as shown by the character of the exhibits, have been very satisfactory to teacher and pupils. Every young man and workman should take advantage of the opportunity offered by these classes to qualify themselves to become intelligent and skilled artizans.

PROVINCE of QUEBEC ASSOCIATION OF ARCHITECTS.

The above illustration is a half size reproduction of the successful drawing in the recent P.Q.A.A. competition for an Association Seal.

The Committee of the province of Quebec Association of Architects to consider designs submitted on different occasions is composed this year as follows: A. T. Taylor, president; J. F. Peachy, 1st vice-president; A. Raza, 2nd vice-president; Jos. Venne, secretary.

The Association have recently presented to the Mayor and City Council of Montreal a petition to appoint an Art Standing Committee. Few will be inclined to question the beneficial results that should follow the appointment of such a committee. Employment of artistic thought for the beautifying and embellishment of a city ought to be represented in the erection of monuments, statues, etc. Unfortunately, at present there is no special committee of this kind. I hope the petition will meet with approval. The appointments will be purely honorary and with no emoluments attached. This petition has received the hearty approval of prominent citizens, and their signatures should be a guarantee of success.

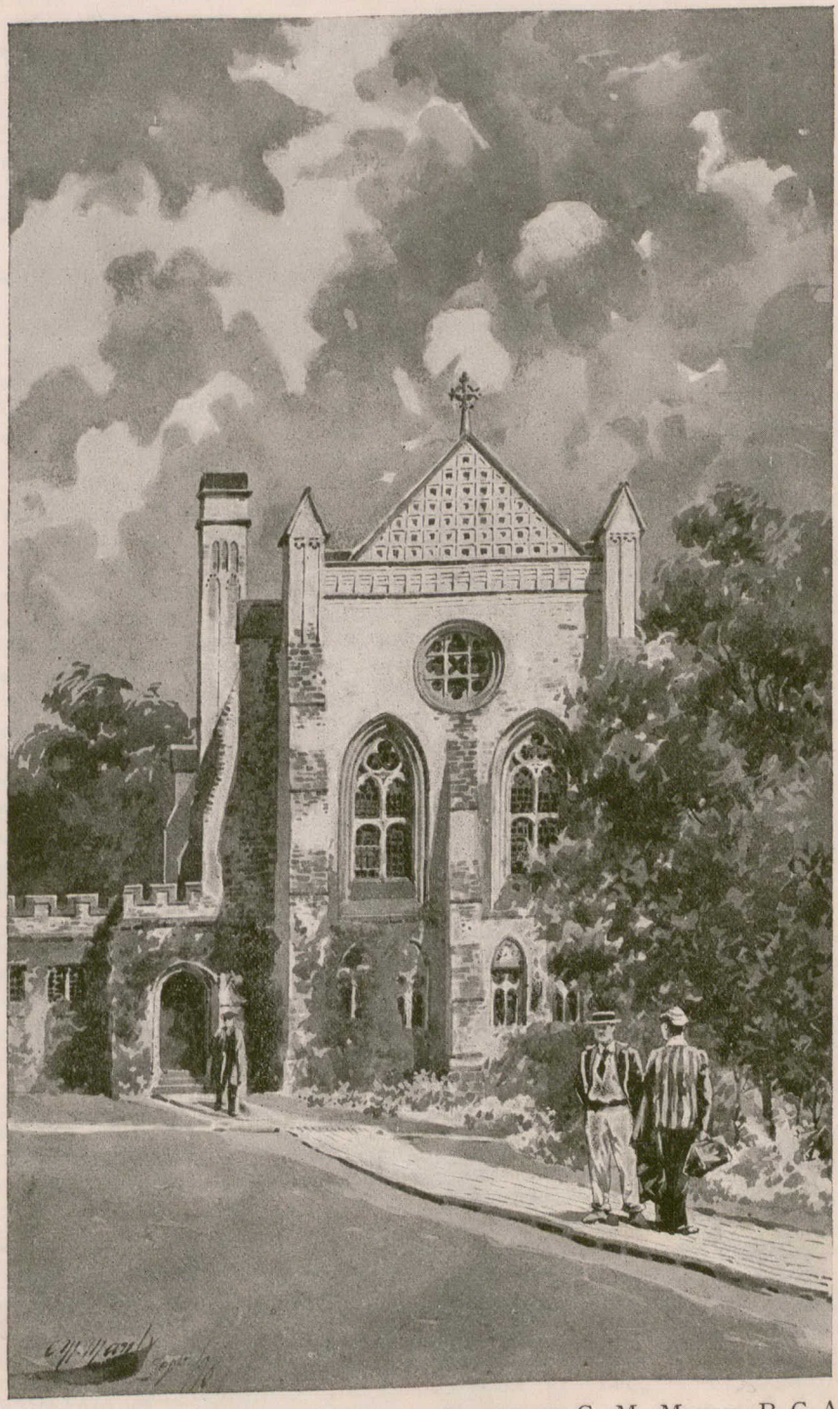
Messrs. Albert Guesnard and Theo. Daoust, architects, have formed a partnership with office in Montreal.

The City Council have again under consideration the paving question. During ten years the expenditure for pavements alone has amounted to $2,651,740. In 1896 the Road Department expenditures were $251,435. It is to be hoped that if further expenditures in this direction are undertaken, past experience will lead the Council to secure a guarantee from the contractors of the durability of the work.

Mr. C. H. Acton Bond, a promising young architect who served a large portion of his studentship in Toronto, has entered into partnership with Mr. Sandford Fleming Smith. The new firm will have offices at 185 St. James street, Montreal.

TRINITY COLLEGE, TORONTO—FROM A SKETCH BY C. M. MANLY, R. C. A.

MR. KIVAS TULLY, ARCHITECT OF ORIGINAL BUILDING; MR. FRANK DARLING, ARCHITECT OF EAST AND WEST WINGS, CONVOCATION HALL AND GYMNASIUM.



TRINITY COLLEGE CHAPEL—FROM A SKETCH BY C. M. MANLY, R.C.A.

MR. FRANK DARLING, ARCHITECT.

CORRESPONDENCE.

[Letters are invited for this department on subjects relating to the building interests. To secure insertion, communications must be accompanied by the name and address of the author, but not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

GRANITE AS A BUILDING AND PAVING MATERIAL.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR:—I was interested in reading an article with the above heading from the pen of "Experience." Everyone can agree with "Experience" that no building looks as substantial or wears as well as a granite one. That granite lends a solid appearance to a building, and that it is the best that money can buy, is equally true, but, when the same statements are made concerning granite blocks, for paving purposes, there is not the same reason for agreeing with your correspondent.

The average citizen considers that granite blocks will last for a lifetime, but statistics taken in New York show that the life of the best quality of granite pavement laid on concrete foundation is only from 12 to 15 years, and it costs $4.50 per square yard, while Trinidad asphalt is laid there with a 15 year guarantee for $3.50, a saving of almost 30%.

The statement of "Experience" that "In America, from New York to Denver, asphalt is giving way before the more enduring stone," can hardly be accounted for except on the ground that "Experience" does not know as much about this subject as his cognomen would indicate, as quite the contrary result is taking place, from New York to Denver. I need but mention the case of New York city itself to prove my contention. During the last five years New York has taken up over 100 different streets that were paved with granite blocks, some of them in fairly good condition, and has used the blocks for a foundation for asphalt. New York had five years ago more granite paved streets than any two cities in America, but they are getting rid of them with all possible speed. This year alone they are putting down about 30 miles of asphalt pavement, about one half of which will be put down on top of granite blocks. Fifth Avenue was paved with granite 12 years ago, and a contract was let last fall to replace it with asphalt, as the blocks were worn into cobble stones. The asphalt is laid under a 15 year guarantee, and as this is probably the heaviest travelled street in America, it looks as if good asphalt is enduring enough for most people.

Col. E. P. North, the Chief Engineer of New York, says that the difference between the price of granite blocks and asphalt is altogether in favor of asphalt, as with a 15 year guarantee it is much cheaper, and, in his opinion, a much better road than granite as it does away with a great deal of the noise which is such a serious factor in Gotham.

Experience with asphalt in Toronto should teach us that for track construction, such as we have, asphalt is not a success on account of the slight foundation under the ties; the heavy cars shake the pavement loose, causing it to break up and disentegrate.

The tracks should, in the writer's opinion, be repaved with granite blocks between the rails, and, if sides of street are not asphalted, brick should be put in the devil strip, where there is no travel, to accommodate the bicycle traffic, which must now be considered.

Time will show that brick is a fad similar to cedar block, with the exception that brick will not rot, and will last until it is worn out, while the blocks rot as quickly without travel as with it. Brick at the end of three or four years is as noisy as a granite block pavement, and under heavy travel, such as on Yonge street, would not last five years.

Why does "Experience" go away off to Berlin to try to show asphalt paving inferior to granite. It smacks of the brick men referring to what bricks did for Egypt. These cities are both a long way off! Right at home we have Bay street, laid with asphalt nine years ago, and right off it on Wellington is a piece of stone pavement for comparison. Jarvis and Sherbourne streets have been asphalted eight years, and the writer has seen no reports of officers being stuck in their deceitful crusts, but then there are asphalt pavements, and asphalt pavements here, as well as in Berlin.

W. G. MACKENDRICK.

Toronto, June 10th, 1897.

The Globe Furniture Co., of Walkerville, report good business prospects, having several large contracts for church and school seats and desks.

THE ROYAL CANADIAN ACADEMY.

A BRIEF outline of the history of the Royal Canadian Academy of Arts, of which a number of Canadian architects are members, will doubtless be of interest to our readers.

The Society was founded by the Marquis of Lorne in 1879, and held its first meeting in Ottawa on the 6th of March, 1880. The first exhibition was on the same date, opened by His Excellency the Governor-General. The title "Royal Canadian" was conferred by Her Majesty, 22nd June, 1880.

The objects of the Academy are: 1st, the institution of a National Gallery at Ottawa; 2nd, the holding of exhibitions in the principal cities of the Dominion; 3rd, the establishment of a School of Art and Design.

The first president was Mr. L. R. O'Brien, of Toronto. Since the formation of the Academy 18 exhibitions have been held—one in Halifax, one in St. John, and the others alternately in Ottawa, Montreal and Toronto. The Academy has contributed the paintings and sculpture in the National Gallery, Ottawa, and donates $500 annually for the support of drawing classes from the living model in Toronto, Montreal and Ottawa.

Her Royal Highness the Princess Louise took a lively interest in the formation of this society.

CONDITIONS OF ARCHITECTURAL COMPETITIONS.

A MAJORITY of the leading architects of New York have agreed that they will only take part in architectural competitions on the following conditions:—

That in any case the undersigned shall be paid at least a sufficient sum to reimburse them for their cash outlay in preparing their competition drawings.

That in case of limited competition the number of the competitors shall be definitely named and that the number shall not be increased without the consent of all competitors.

That it shall be definitely understood that the ordinary fees as published by the American Institute of Architects shall be paid as compensation for his professional services to the successful competitor.

That in work of any serious importance a professional advisor or advisors shall be appointed to act with the party instituting the competition in the preparation of a proper programme, which shall be definite in its statement of the drawings required, and their character, and of the various rules which shall govern the competition.

In the opinion of the undersigned it is very desirable that the professional advisor or advisors should be practicing architects; and the undersigned suggest that the best result can be gained by first appointing the architects to compete and by inviting them to meet with the party instituting the competition, for the purpose of consultation with regard to the preparation of the programme of competition, and to nominate the professional advisor or advisors.

It shall be the duty of the professional advisor or advisors to examine all drawings submitted by the competitors, and to place out of competition any competitor who has not submitted his designs at the date fixed for their reception, or who presents details or models which are not called for, or whose drawings do not conform exactly in number and character with the requirements of the programme, and that if placed out of competition his plans shall receive no further consideration by the party instituting the competition.

Inasmuch as the object of a competition is to adopt the general motif of a design to be further elaborated, and to select an architect for the work rather than secure plans perfectly studied in all of their details, the undersigned will enter upon no competition unless it shall be agreed that an award shall be made and that an architect shall be appointed on the consideration of the relative merits of the several schemes as shown by the drawings submitted, and that no demand shall be made for additional drawings or for a new competition.

The undersigned are of the opinion that all designs should be signed by their authors, and also that it is desirable that each competitor who has qualified by having his designs accepted by the professional advisor or advisors as complying with the terms of the competition, shall have an opportunity to personally explain his design to the party instituting the competition, in the presence of the professional advisor or advisors.

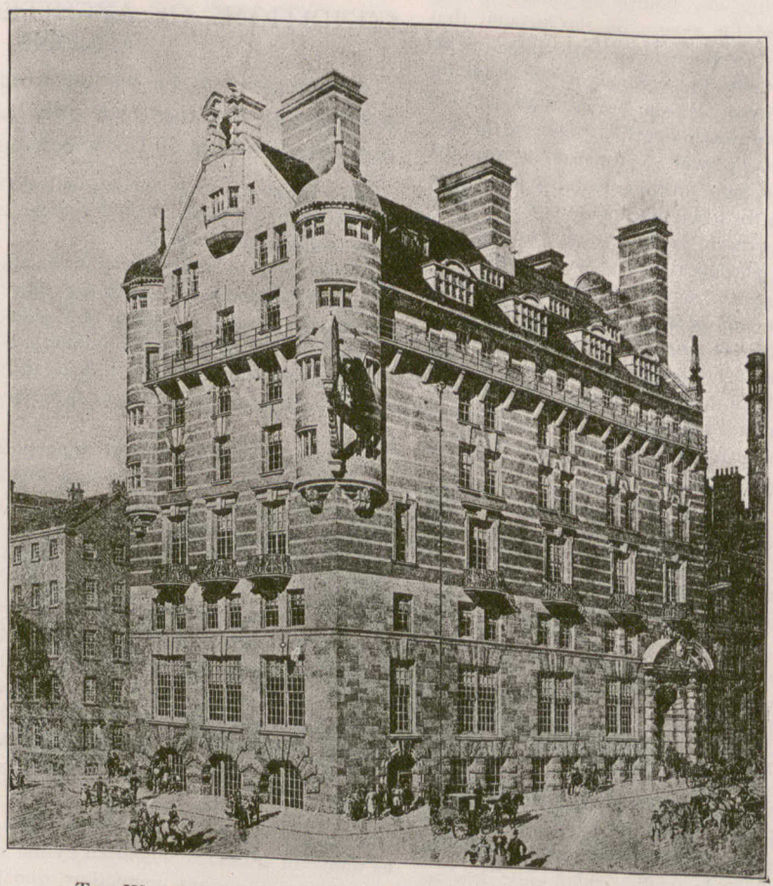
MANUFACTURES AND MATERIALS

CANADIAN HEATING APPARATUS IN EUROPE.

REFERENCE was made recently in these columns to the perfection to which heating apparatus and methods have been brought in Canada of late years. It is gratifying to Canadians to know that the good qualities of Canadian manufactured goods in this line are finding appreciation abroad as well as at home. In this connection we print on this page an illustration of the White Star Steamship Company's new office building in Liverpool, which is heated with Oxford Duet radiators manufactured by the Gurney Foundry Co., Toronto.

ASBESTOS AND ASBESTIC.

AT a recent meeting of the society of Arts, of London, Eng., a paper was read by Mr. R. H. Jones entitled "Asbestos and Asbestic," in which allusion was made to the recent discovery of asbestic at Danville, Quebec. Mr. Jones defined for his hearers the difference between the two materials. The name "asbestic" is applied to a purely fibrous material which forms the residue after the richer veins of asbestos have been extracted from the serpentine rock. It is used for a variety of purposes in the building trades, being capable of being pulverized and being converted into fire-proof cement or plaster. This material is a non-conductor of heat and sound, and being elastic will adhere to metal or glass. Asbestic paper, which is another product of this material, will in future be a competitor of paper made from wood and straw pulp for building purposes.



THE WHITE STAR S. S. CO.'S NEW BUILDING, LIVERPOOL, ENG.

AN IMPORTANT CHANGE.

AN important change has occurred in the old firm of Jos. McCausland & Son, stained glass workers and decorators, Toronto. Mr. Robert McCausland, who for many years conducted the memorial and art glass departments of the business, has withdrawn from the firm and will continue these branches at 87 King St. West, under the name of The Robert McCausland Stained Glass Company, Limited. The office, showrooms and works are uncommonly well arranged. Mr. McCausland, who is an experienced designer for glass, has equipped the new firm with improved materials and appliances to aid in producing the best possible results. The company has already been favored with several important commissions, among them the following: Memorial window, Chapel of St. John the Divine, Toronto; numerous windows for the Foresters' Temple; large classic figure window for the Department of Education, Toronto; memorial window, First Congregational Church, Kingston; decorative glass, Bank of Montreal, Newfoundland; three-light memorial window for St. Patrick's Church, Hamilton; memorial windows for St. Paul's Church, Charlottetown, P. E. I., and Yarmouth, N. S., besides several minor works.

CRUSHING STRENGTH OF WHITE PINE.*

BY A. H. HARKNESS, Grad. S. P. S.

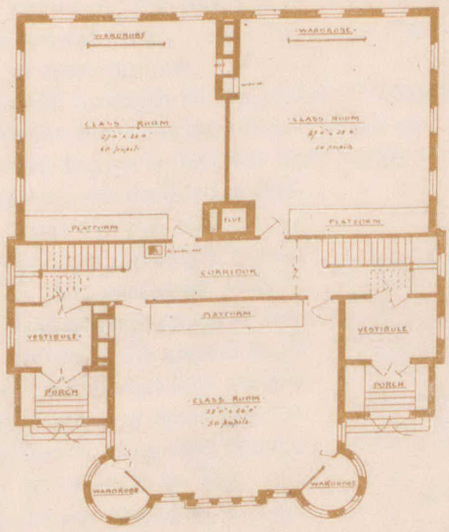
THE tests, the results of which are given in the following tables, though not extensive enough to permit of any very definite conclusions being drawn, may prove of interest as serving to show the relative crushing strength of pine transversely and longitudinally placed, that is, with the load applied to the sides of the fibres, and with the load applied to the ends; also the the effects of moisture on the longitudinal crushing strength.

The specimens used in the tests were cut from pieces of white pine about three and three-quarter inches square, and are from the heart wood of small trees. Although they were not all cut from the one piece, the material in them was so similar in quality that the different tests will admit of comparison.

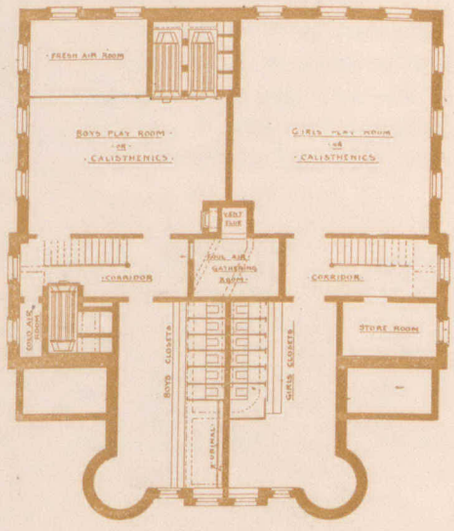
The pieces from which the specimens were taken were purchased from a city lumber firm 21st October, 1896, and represent fairly well the average quality of pine from which 4 x 4 inch pine is cut. They were stored in the laboratory of the school of Practical Science, until the tests were made.

The first table gives the transverse crushing strength tested on March 17th, 1897. The specimens were all cut in four-inch lengths from one piece, the specific gravity of which was 37.25, and which contained 12.2 per cent. of moisture calculated on the weight after being dried. This is about the normal amount of water contained in thoroughly seasoned wood protected from the weather. The loads required to produce a compression of three per cent. and of fifteen per cent. respectively, are given in table No. 1 in the fourth and fifth columns. The second column gives the thickness of the block, and the third the dimensions of the area subjected to pressure. Figs. (a), (b) and (c) show the

* Paper read before the Engineering Society of the School of Practical Science, Toronto, and reprinted from the copyrighted report by permission of the Society.



PLAN OF GROUND FLOOR



PLAN OF BASEMENT FLOOR

PROPOSED PUBLIC SCHOOL BUILDING AT NEWMARKET LARGE SCALE PERSPECTIVE VIEW.

J. Wilson Gray. Architect. Toronto.

COMPETITIVE DESIGN FOR A PUBLIC SCHOOL AT NEWMARKET, ONT.

J. WILSON GRAY, ARCHITECT, TORONTO.

different ways in which the blocks were placed in the machine in regard to the position of the heart of the wood and the annual rings. The letters in the sixth column refer to these figures.

The maximum strength of the wood is sometimes reached before the block is compressed fifteen per cent. In fact the load begins to increase very slowly shortly after the three per cent. limit is reached, at perhaps about five per cent. compression. When the pieces are placed as in Fig. (a) the maximum load is always reached at a compression of less than fifteen per cent., the annual rings seeming to act somewhat like curved plates, the rings splitting apart and the side towards which they are convex bulging out, as shown in Fig. (d). When the blocks are placed as in Fig. (b), the rings simply become pressed closer together, and the load will continue to increase indefinitely. Failure is accompanied by splitting above the heart, which seems to act as a wedge, as shown in Fig (d.) When the heart is near the centre failure is accompanied by both splitting above and below the heart, and bulging out at the sides as in Fig. (f).

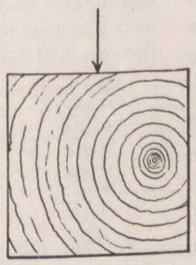


Fig a

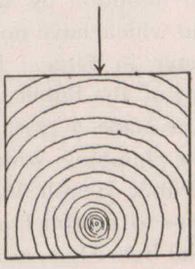


Fig. b

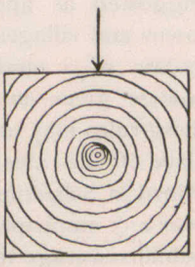


Fig. c.

Fig. d

Fig. e

Fig. f

TABLE NO. 1.

No. of Test.	Thickness in inches	Breadth in in. by Length in in.	Load at 3% Compression in lbs. per sq. in.	Load at 15% Compression in lbs. per sq. in.	Manner of placing block.	Remarks.
1	3.73	3.75 x 3.97	435	524	A	
2	3.73	3.75 x 4.00	475	478	A	
3	3.73	3.75 x 4.00	556	579	A	
4	3.72	3.73 x 4.00	468	576	B	
5	3.73	3.70 x 4.00	537	645	C	
6	3.73	3.73 x 4.00	483	576	C	
7	3.74	3.74 x 3.98	455	551	A	Knotty and splintery.
8	3.73	3.73 x 3.98	499	613	C	
9	3.73	3.74 x 4.00	408	482	C	A pitch ring about heart.
10	3.72	3.72 x 4.02	516	618	C	
11	3.72	3.73 x 4.02	493	593	C	Large season crack.
12	3.73	3.75 x 4.03	458	510	C	Knotty and pitchy.
13	3.74	3.71 x 4.02	505	584	C	
14	3.73	3.74 x 4.00	406	475	B	Pitch ring.
15	3.75	3.75 x 4.05	486	486	A	Knot at each end.
16	3.74	3.77 x 4.02	538	638	C	Season cracks.
17	3.73	3.70 x 3.96	420	542	C	
18	3.73	3.72 x 4.00	435	555	A	
19	3.72	3.73 x 4.06	542	621	C	
20	3.73	3.73 x 4.02	413	413	B	
21	3.73	3.71 x 3.95	534	551	C	Gummy.
22	3.74	3.74 x 4.00	441	541	A	Gummy and shaky.
23	3.73	3.75 x 4.00	437	513	C	Pitch ring.
24	3.72	3.72 x 4.02	543	597	B	An enclosed knot.
25	3.72	3.74 x 4.02	440	563	C	
26	3.74	3.70 x 4.00	550	596	C	
27	3.73	3.70 x 6.00	489	600	C	
		Average	480	560		

TABLE NO. 2.

No.	Crushing strength per square inch.			
	A	B	C	D
1	5,110	3,641	3,598	3,513
2	4,746	3,982	3,562	2,948
3	4,848	4,391	4,078	3,043
4	5,317	4,096*	3,740*	3,332
5	4,934	3,883*	3,826*	3,947
6	5,050	4,426*		3,115
Average	5,001	4,069	3,761	3,316

Table No 2. shows the longitudinal crushing strength. The specimens were cut in eight inch lengths with the exception of the five marked with asterisks, which were each four inches long.

Those of which the crushing strengths are given in column A, were cut from the same stick as the four-inch pieces tested transversely, and were tested at the same time, March 17th, 1897. Those given in columns B, C and D were tested on December 21st, 1896, and were cut from the ends of three different sticks, which had been tested as long posts on December 16th, on which date the specific gravities and percentages of moisture were as given in the following table. As the pieces would have lost some moisture in the five intervening days, the values given for B, C and D are higher than the actual.

	A	B	C	D
Specific gravities.....	37.25	51	46	53
Percentage of moisture	12. 2	23		22.5

The percentage of moisture in C was not determined, but was probably about the same as in B and D.

A comparison of the results given in table No. 1 with those in column A, table No. 2, both sets of tests being made on specimens from the same piece of timber, shows that for well seasoned pine the longitudinal crushing strength is about ten times as great as the transverse strength to resist a compression of three per cent. Hence it is quite evident that in the case of a wooden column in order to develop its total crushing strength, it is necessary to have a capital to receive any wooden beams resting on it. The area of the top of the capital should be about ten times the area of the column, or the top of the capital should be over three times the diameter of the column on which it rests. The same thing applies to the cases of columns supported by timber placed horizontally. Of course in the case of long posts in which the full crushing strength of the cross section is not reached, the ratio between the area of the capital and the column need not be so great.

A comparison of column A in table No. 2 with the columns B, C and D, shows the very decided effect which the quantity of moisture in timber has on its crushing strength.

The Master Plumbers' Association of St. John, N. B., at their last meeting appointed delegates to attend the Toronto convention.

Mr. W. B. Lait, formerly with Mr. George Browne, architect, Winnipeg, has commenced the practice of his profession in that city on his own account.

Mr. George H. Proctor, of Sarnia, Ont., in renewing his subscription to the ARCHITECT AND BUILDER states that he is much pleased with the improvement recently made in the paper.

MODEL PLUMBING BY-LAW.

In view of the advances which have been made in the art of plumbing during the past ten years, due to the increased knowledge of the physical and mechanical principles underlying the construction of sewers, house drains and house plumbing, the Provincial Board of Health has drawn up the following rules, which are suggested as applicable for adoption by those cities, towns and villages in Ontario which have not already a by-law of a similar character in force. Under the powers given in section 113 of the Public Health Act these rules may at any time be made a town by-law in place of the rules relating to plumbing which are contained in Schedule A of the Public Health Act. Whenever any municipality purposes to establish a system of public sewerage the Provincial Board has, as a condition of the approval of such system, adopted the rule of requiring that a plumbing by-law of a character similar to the following be adopted by the town council as a part of such sewerage system :

I.—1. No house drain or sewer shall be constructed or extended to connect with any private, common or public sewer ; nor shall any house plumbing be placed within any house until the plans and details of construction, and the qualities of materials used shall have been approved of by the Local Board of Health or such municipal officer or officers to whom said work is delegated by the Board.

2. The owner, or his agent, shall, before the commencement of construction of the drainage or plumbing of any house or building within the municipality, have sent for filing to the clerk of the municipality the plans and details of construction thereof, together with the necessary specifications of information as set forth in this by-law for examination and approval. Such plans shall be submitted to the town engineer and medical health officer, or to such officer of the municipality as may with their approval be delegated by the Local Board of Health for the purpose. The plans, when satisfactory, shall be approved of and a permit granted under the hand of the officer designated by the Local Board of Health, when the following conditions have been fulfilled :—

II. The plans and specifications submitted shall show :—

1. The location, depth and size of the house drain or sewer, and position of traps, cleaning screws and pipes, if such exist thereon.

2*. The location of soil pipe, and of all pipes within the walls of the house ; also their size, weight and kind, also the position and size of all traps and vents, and the location and kind of all closets sinks, baths or other fixtures connected therewith.

3. That the house drain must not in any case be less than 4 inches in diameter, and may in no instance exceed 6 inches, except by special permission of the properly constituted official or officials.

4. That the soil-pipe, drain or sewer within the house be of a minimum diameter of 4 inches, and the pipes connected directly therewith shall in every case be constructed of iron, either cast or wrought iron, or steel, and such as shall be approved of by the proper official as suitable for the work, and such soil-pipe shall extend to a point at least three feet outside the wall of the building, and there be properly connected with the house drain or sewer by proper bedding and jointing in Portland cement.

5. That any cast-iron pipe used shall have the specified minimum weights as below, and all fittings thereof shall correspond in weight and quality.

If 2 inches in diameter	.....	5½ lbs.	per lineal foot.
" 3 " "	.....	9¾ "	"
" 4 " "	.....	13 "	"
" 5 " "	.....	17 "	"
" 6 " "	.....	20 "	"
" 7 " "	.....	27 "	"
" 8 " "	.....	33½ "	"

6. If wrought iron pipes be used the following shall be standard weights :—

WEIGHTS OF WROUGHT IRON PIPE.

1 inch	.....	1.67 lbs.	per lineal foot.
1¼ "	.....	2.24 "	"
1½ "	.....	2.68 "	"
2 "	.....	3.61 "	"
2½ inch	.....	5.74 lbs.	per lineal foot.
3 "	.....	7.54 "	"
3½ "	.....	9.00 "	"
4 "	.....	10.66 "	"
4½ "	.....	12.34 "	"
5 "	.....	14.50 "	"
6 "	.....	18.76 "	"
7 "	.....	23.27 "	"
8 "	.....	28.18 "	"

7. That the vent pipes and other attachments of the soil pipe and fixtures may, if under 2 inches in diameter, be of lead, but if over 2 inches, they must be of iron. Such lead pipes shall have the specified minimum weights of—

If 1 inch in diameter	.....	2 lbs.	per lineal foot
" 1¼ " "	.....	2½ "	"
" 1½ " "	.....	2¾ "	"
" 2 " "	.....	3½ "	"
" 2½ " "	.....	5⅓ "	"
" 3 " "	.....	7¼ "	"
" 4 " "	.....	8 "	"

8. That the wrought iron pipes shall have screwed cast iron fittings ; that all joints in cast iron pipes shall be caulked with tow and molten lead, properly bedded and hammered ; that joints between iron and lead pipes be made with brass thimbles or ferrules of same size as lead pipe, and properly wiped and soldered to it, and properly gasketed, loaded and caulked to said pipe.

9. That sinks, wash-trays and closets are designated as to quality ; wooden or other absorbent materials for fixtures must not be used inside of houses, and approved strainers and grease traps must be provided for in those fixtures requiring them, or on such as the proper official may direct.

10. That the plans show location and arrangement of all pipes which must be as direct and as accessible as possible, and on inner walls when danger from frost exists.

11. That the soil pipe and attachments have a minimum fall of one inch in every four feet towards the outlet ; shall open freely above the house without a hood, and be one inch larger in diameter above the roof than inside.

12. That all vent pipes passing through the roof, have a minimum diameter of 3 inches, and are in no part of the system less than 1¼ inches internal diameter.

13. That every waste pipe from any fixture be shown connecting with the main soil pipe, and in no case with the trap of a water-closet or any other fixture, and must in no case be less than 2 inches in diameter.

14. That every water-closet, urinal, bath, sink, wash tray and tub or set of tubs, be shown separately trapped as near the fixture as possible ; and that overflow pipes from any fixture, connect with the fixture pipe, on the proximal or fixture side of the trap.

15. That every trap or fixture be shown to have its vent pipe to prevent siphonage, except where some anti-siphon attachment, approved of by the proper official, be shown. The vent pipes from several fixtures may be shown connected with one outlet vent pipe of proportionately larger size, or with the soil-pipe above the highest fixture.

16. That the overflow pipe from the water-closet supply tank be led into the water-closet basin, bath-tub or sink, but in no case be connected with the soil-pipe.

17. That the plans locate water-closets in rooms where light and ventilation are provided for ; and that no water-closet be located in a cellar, except where specially permitted by the proper official with special provision for lighting and ventilation.

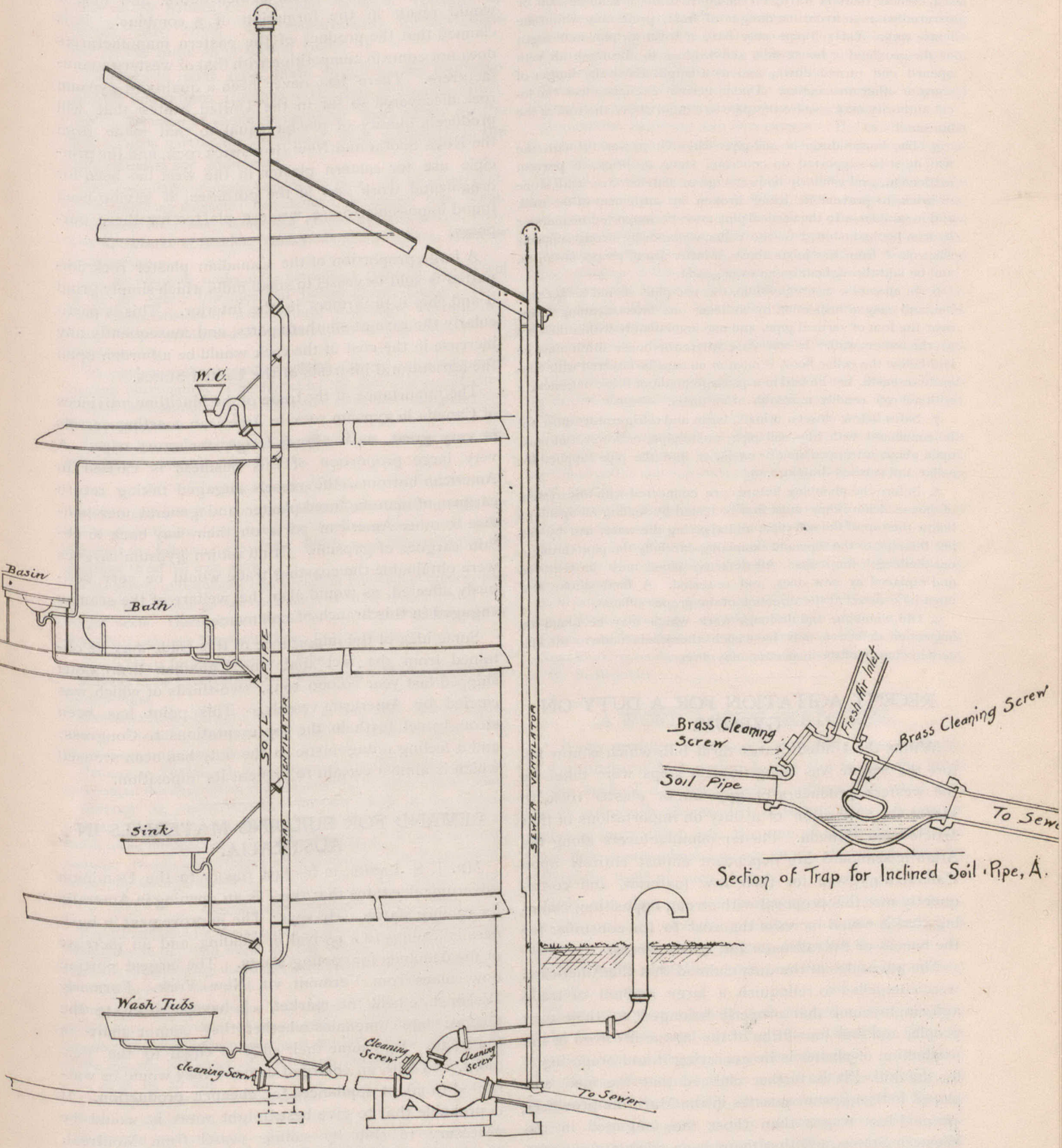
III. The following rules shall be the guide for contractors and inspectors :—

1. The house-drain or sewer must be laid on an even grade and in straight lines from the house to the street connection ; and where soil is newly made or of a loose character, the drain must be laid on well rammed clay, concrete or board bottom, and must have a grade not less than one inch in four feet, and so that the inner suface shall be left smooth, clean and of even grade through its entire length. All joints in the house-drain must be cemented with Portland cement.

2. The walls of houses must, wherever possible, be drained by field tiles, not less than two inches in diameter, laid around and outside the foundation walls, at a depth of at least 6 inches below the same, and on a grade of at least one inch in eight feet. Such tiles must be led directly to a system of tiles laid alongside the house drain and street sewer for sub-soil and cellar drainage, and if not then must connect with the house sewer with provision made for trapping the same, and keeping trap sealed automatically with water.

3. Where no special provision is made for ventilating street

*NOTE.—The vertical portion of the soil pipe should not be hung or fastened to any floor or wall, but should rest on a stone foundation at its foot, as any settlement or heaving of the floor or house is liable to pull joints apart.



Section of Trap for Inclined Soil Pipe, A.

SECTION SHEWING GENERAL ARRANGEMENT OF HOUSE PLUMBING AND DRAINAGE

sewers, and unless the town system provides for no traps on house sewers, the house sewer, if trapped outside the house wall, should be provided with a separate cast or wrought iron ventilating pipe of quality to be approved of by the proper official, of not less than (4″) four inches in diameter, carried to a point above the roof of the house and subject to the conditions as to height the same as the soil-pipe and other vent pipes.

4. Where there is a trap on the house drain, it shall be laid or covered so as to avoid the danger of frost, preferably within the house wall. The soil-pipe may have a fresh air pipe entering it on the proximal or house side, and leading to the fresh air with opened end turned down, and at a height above the danger of snow or other obstruction. Under certain circumstances the local authority may require this pipe to extend above the roof of the house.

5. The house drain or soil-pipe where it passes through the wall must be supported on concrete, stone or brick, to prevent settlement, and similarly be protected or linteled over with stone or brick, to prevent its being broken by settlement of the wall, and in its course to the vertical pipe must be supported on piers or by iron hooks fastened to the cellar walls, or by strong supports suspended from the joists above, if latter are of proper strength, and be laid throughout on an even grade.

6. In all cases, where possible, the soil-pipe should be accessible, and easy of inspection by at least one brass cleaning screw near the foot of vertical pipe, and one immediately within the trap at the outer wall. In any case where the house drain must be laid below the cellar floor, it must in no case be covered with concrete or earth, but be laid in a passage made of brick or concrete with a cover readily moveable at all times.

7. Safes below closets, urinals, basin and refrigerators must not be connected with any soil pipe, waste pipe, or sewer, but must open above a trapped sink or basin, or into the pipe supplied for cellar and sub-soil drainage.

8. Before the plumbing fixtures are connected with any system of house drains they must first be tested by sealing all openings below the top of the soil-pipe, and applying the water test by filling the pipe to the top; and examining carefully the pipe throughout the length for leaks. All defective pipes must be removed and replaced by new ones, and re-tested. A final smoke test must be ordered at the direction of the proper official.

9. Old plumbing and drainage work which may be found on inspection defective, must have such alterations made as the officers in charge of the inspection may direct.

RECENT AGITATION FOR A DUTY ON GYPSUM.

While the United States tariff bill, which is now before the Senate was being framed, steps were taken by the western producers of gypsum, or plaster rock, to secure the imposition of a duty on importations of that article from Canada. Plaster manufacturers along the Atlantic seaboard are dependent almost entirely upon Canadian gypsum for their raw material, and consequently met this proposal with strong opposition, claiming that it would increase the cost to the consumer for the benefit of the railroads and mine owners.

The advocates of the duty claimed that the Americans were compelled to relinquish a large amount of trade and employment that properly belonged to their own people, and that four-fifths of the labour involved in the production of plaster is in quarrying it and preparing it for the mill. It is further claimed that the men employed in the gypsum quarries in the Maritime provinces are paid less wages than those thus engaged in the Western States, and that there is an adequate quantity of gypsum in the Unites States to supply all the demands of that country for many years to come. The output during 1895 was 265,000 short tons. It was asked that a duty of at least $2 per short ton be placed on the crude rock, $2.50 on ground gypsum and $3 on calcined plaster, or plaster of paris.

Against these arguments the plaster manufacturers in the Eastern States pointed out that only about one-fifth of the cost of producing plaster could be charged to quarrying, that the eastern mills using Canadian rock were subjected to heavy freight charges, most of which is paid out to American seamen and vessel owners engaged in the coast wise trade, while the western producers had the raw material at their doors, and that it would result in the formation of a combine. It is claimed that the product of the eastern manufacturers does not come in competition with that of western manufacturers. There has never been a quality of gypsum rock discovered so far in the United States that will produce a quality of plaster equal to that made from the Nova Scotia and New Brunswick rock, and the principle use for eastern plaster in the west has been for ornamental work and in the potteries, it having been found impossible to use western plaster for these purposes.

A large proportion of the Canadian plaster rock imported is sold ex vessel to small mills which simply grind it and ship it to farmers in the interior. This is particularly the case at southern ports, and consequently any increase in the cost of the rock would be a burden upon the agricultural interests of the United States.

The importance of the trade of the Maritime provinces of Canada in gypsum rock to American coasting vessels is very great, as it affords freight for return trips. A very large proportion of this business is carried in American bottoms, the vessels engaged taking return cargoes of manufactured plaster and general merchandise to other American ports on their way back to obtain cargoes of gypsum. If no return gypsum cargoes were obtainable the coasting trade would be very seriously affected, as would also the welfare of the seamen engaged in this branch of commerce.

Some idea of the importance of this trade may be obtained from the fact that one Canadian firm alone shipped last year 60,000 tons, two-thirds of which was carried by American vessels. This point has been strongly set forth in the representations to Congress, and a feeling antagonistic to the duty has been aroused which is almost certain to prevent its imposition.

DEMAND FOR BUILDING MATERIALS IN AUSTRALIA.

Mr. J. S. Larke, in his last report to the Dominion government, states that there is an opening in Australia for roofing slates. He says: The improvement in business is leading to a revival in building and an increase in the demands for roofing slates. The largest portion now comes from Vermont via New York. Formerly Welsh slate held the market. I have written to the Quebec slate companies whether they cannot share in the trade. I presume their slate is equal to the Vermont, and with an enlarged demand they would be warranted to adopt appliances for cheaper production. It is probable that to give best freight rates it would be necessary to ship by sailing vessel from Montreal. There is a very fine slate quarry, well fitted for exportation, in British Columbia. It ought to be in a position to command this trade, but unfortunately it is not being worked, so I am informed. The demand here would warrant the working of a quarry on an extensive scale. Plaster of Paris is another building material for which there is a better demand. The trade is now supplied from New York and Maine, but Nova Scotia and New Brunswick should be able to take part in it.

STUDENTS' DEPARTMENT.

O. A. A. EXAMINATIONS.

THE examinations of the Ontario Association of Architects, for the year 1898, are announced to take place at the School of Practical Science, Toronto, on March 14th, 1898. The requirements for admission will be the same as in former years.

Candidates must send their names to the Registrar at least one month previous to the date of examinations, and in the case of those presenting themselves for the first time, a certificate of status with reference to the requirements for admission.

The percentage of marks required to pass will be 45 per cent. for the following subjects: Foundations, Structural Iron Work, Strength of Materials, Nature and Properties of Materials, Practical Knowledge of Building Trades, Sanitary Science, Elements of Construction.

For the following subjects the percentage required to pass will be 30 per cent.:—Architectural Jurisprudence, Design, Technical Terms, History of Architecture, Mouldings, Features and Ornaments, Heating and Ventilation, Euclid, Algebra, Statics, Trigonometry.

No supplemental examination will be allowed to candidates for the final examination. Candidates for the first and second intermediate examinations will be allowed a supplemental examination in one subject.

The fee for each examination is ten dollars, and for each supplemental examination two dollars.

FIRST EXAMINATION.

Each candidate for the first examination must, at least one week prior to the date fixed for the examination, send to the registrar the following drawings, which must be certified by his principal to be his own work:

Five sheets of drawings, one of each of the Roman orders; one sheet of the mouldings and ornaments of these orders drawn to a larger scale. (Each sheet to be of the size of a half sheet of Whatman's Double Elephant Paper, i.e., 20 in. by 26 in.)

The subjects for examination will be:

ELEMENTS OF CONSTRUCTION.—Text book: Mitchell's Building Construction.

MATHEMATICS.—Euclid: Books I, II and III. Plane Trigonometry: Including the solution of plane triangles. Algebra: Including quadratic equations.

TECHNICAL TERMS.—A knowledge of the terms necessary to understand the description of a monumental building and its parts.

HISTORY OF ARCHITECTURE.—To the close of the Roman period. Books recommended: Stevenson's House Architecture Vol I, as an introduction; Banister Fletcher's History of Architecture; Fergusson's History of Architecture; Statham's Architecture for General Readers.

SECOND EXAMINATION.

Every candidate for the second examination must, at least one week prior to the date fixed for the examination, send to the registrar the following drawings, which must be certified by his principal to be his own work:

One sheet of Romanesque architecture; two sheets of Gothic architecture; one sheet of drawings measured from existing examples; one sheet of constructional details. (Each sheet to be of the size of a half sheet of Whatman's Double Elephant Paper, i. e., 20 in. by 26 in.)

The subjects for examination will be:

STATICS, GRAPHICAL AND ANALYTICAL.

STRENGTH OF MATERIALS.—Textbook for both the above neads: Lessons in Applied Mechanics, by Cotterill & Slade; Part II.

PRACTICAL KNOWLEDGE OF BUILDING TRADES.—Masonry (excluding cut stone work), Brickwork and Plaster. Text books: Kidder's Building Construction and Superintendence. Clark's Building Superintendence.

STRUCTURAL IRON WORK.—The candidate will be required to draw details of the forms of iron construction in use in ordinary practice, viz.: the construction of columns and girders, and the framing of beams and trusses. Text books: Mitchell's Building Construction. Advanced course. Kidder's Architects' and Builder's Pocket Book.

HISTORY OF ARCHITECTURE.—From the close of the Roman period to the present time. Texts books recommended: Fergusson's History of Architecture; Banister Fletcher's History of Architecture; Parker's Introduction to Gothic Architecture; Statham's Architecture for General Readers.

FINAL EXAMINATION.

Every candidate must, at least one week prior to the date fixed for the examination, send to the Registrar a perspective drawing which must be certified to be his own work. Drawings to be on a sheet of paper, 20 in. by 26 in., and not mounted on cardboard.

The subjects for final examinations will be:

HISTORY OF ARCHITECTURE.—The candidate will be expected to know the history of the development of Architecture.

MOULDINGS, FEATURES AND ORNAMENTS.—The candidate must be able to draw the characteristic mouldings, features and ornaments of any style.

DESIGN.—As illustrated by drawings for a building of moderate dimensions, or a portion of a building, from particulars given, with details of construction and ornament. In addition to the study of architectural style, which will be necessary for this examination, Osborne's House Planning should be read. (The aspect compass in this book is incorrectly subdivided.)

NATURE AND PROPERTIES OF MATERIALS.—Limes, cements, stones, bricks, timber. Text book: South Kensington Notes on Building Construction.

FOUNDATIONS.—Text book: Kidder's Building Construction and Superintendence.

ARCHITECTURAL JURISPRUDENCE.—Text book: The Law Relating to Civil Engineers, Architects and Contractors, by Macassey & Strahan.

PRACTICAL KNOWLEDGE OF BUILDING TRADES.—Sufficient for the purposes of ordinary building. Text books: Kidder's Building Construction and Superintendence; Building Superintendence, by T. M. Clark.

STRENGTH OF MATERIALS.—Designing structures of an ordinary kind from data, with computation of the strains involved.

HEATING AND VENTILATION.—Text books: Ventilation and Heating, by John S. Billings; Steam Heating for Buildings, by Wm. J. Baldwin.

SANITARY SCIENCE.—Text books: Gerhard's House Drainage; Bayles' House Drainage and Water Supply.

STEEL AND IRON CONSTRUCTION AND PROTECTION IN BUILDINGS.—Text book recommended: Skeleton Construction in Buildings, by W. H. Birkmire.

A WORD ABOUT SKETCHING.

"If any apology is needed," says Mr. John A. Begg, in Architectural Association Notes, "for laying the birch on the back of a much-thrashed subject (but what subject is not much thrashed?), it is but this. A change seems to have crept into the way of students, and the time has come when a word about sketching may be said in the light of such change.

It is not that we are sketching much more or less, not that we are sketching better or worse (though I think we are sketching better), but that there is a tendency to split sketchers, elder as well as younger, into opposite camps.

These camps are pretty well defined, and it is plain to be seen they are opposing camps, having little in common, for seldom is a member of the one a member also of the other; and when a man changes camps—as does happen—he usually renounces entirely his former ways. The two are plainly at cross purposes—they appear to do their sketching for different reasons, and from different principles that seem to lie at the root of their whole conception of the architect's function.

Look at them. On the one hand, there are those to whom our improved—or should I say cheapened?—methods of reproduction are a banner to rally round, and on the other, those who go forth to war armed with a two-foot rule and accoutred with a big note-book—or rather who go a-hunting (pot-hunting is it called?) with

the rule for their gun and the note-book for their game-bag.

We believe (say the first) in training hand and eye, and in sketching as the best means to that end. In the study of mass, effect, essentials and in schooling ourselves to take a large view of things. We believe, moreover, in precedent, in so far only as it stimulates but does not fetter us in the designing of original work.

We believe (say the second) in drawing only as a means of study. In exact and careful study of details first and through these afterwards of mass. In drawing what will be most useful to us in our practice, and that in such a form as will be most handy for reference. We believe in upholding tradition, that new tradition may have legitimate birth.

Each of these seems so reasonable that one is inclined to ask, "Why all this pother? What is there in either that is antagonistic to the other? Why not mingle banners and join forces, and so march shoulder to shoulder? Why, indeed! Yet the points of difference are quickly shown by what each think of the others.

The first hold that the trained eye will ever guide the trained hand aright in the tracing of true proportions and fitting forms, even down to the minutest details in original design, and cry out upon the second for a slavish adherence to traditional detail, taunting them with utter helplessness when away from their note-books. The second retort that their rivals' method of study get them no knowledge of architecture, but only of drawing, and hold up their own well-filled note-books as but a type of their well-stored minds. Put mind into your work, say the first—beauty, say the second.

To an unprejudiced eye (that is one which looks for faults in each), broadly, the first school oftenest seems to fail in beauty of detail—just as you might expect—and the second in largeness of idea. It would not do to quote instances, nor is it necessary, for they are easy to recognize and will readily suggest themselves. It is true that we must all have our failings, but should we not try to counteract them?—and there would be nothing to be said if our men of large ideas were found sketching a little more than they do for the sake of detail; and vice versa our cunning inventors of beautiful detail sketching more for the sake of receiving impressions.

The latter, on the whole, have just now, I think, the louder voice and the larger following. The louder voice because matured generally by years, and settled into a commanding basso that rings of authority and circumstance; and it might ring and welcome but that it is apt to find too ready an echo from voices that have not lost their youthful treble.

It is surely impossible for a man who claims to have a sense of justice to argue himself to a conclusion in favor of either of these two methods. There is so much to say for each. It is just conceivable that those who have begun life in one camp may find that as years have grown on them with gray hairs and light-and-air cases they have gradually moved over to the opposite camp—there perhaps to stop. But from which and to which camp this migration is likely to have taken place I pray to be excused from saying. It would be hard to tell, and the more the question were looked at so the more it would be hard to tell.

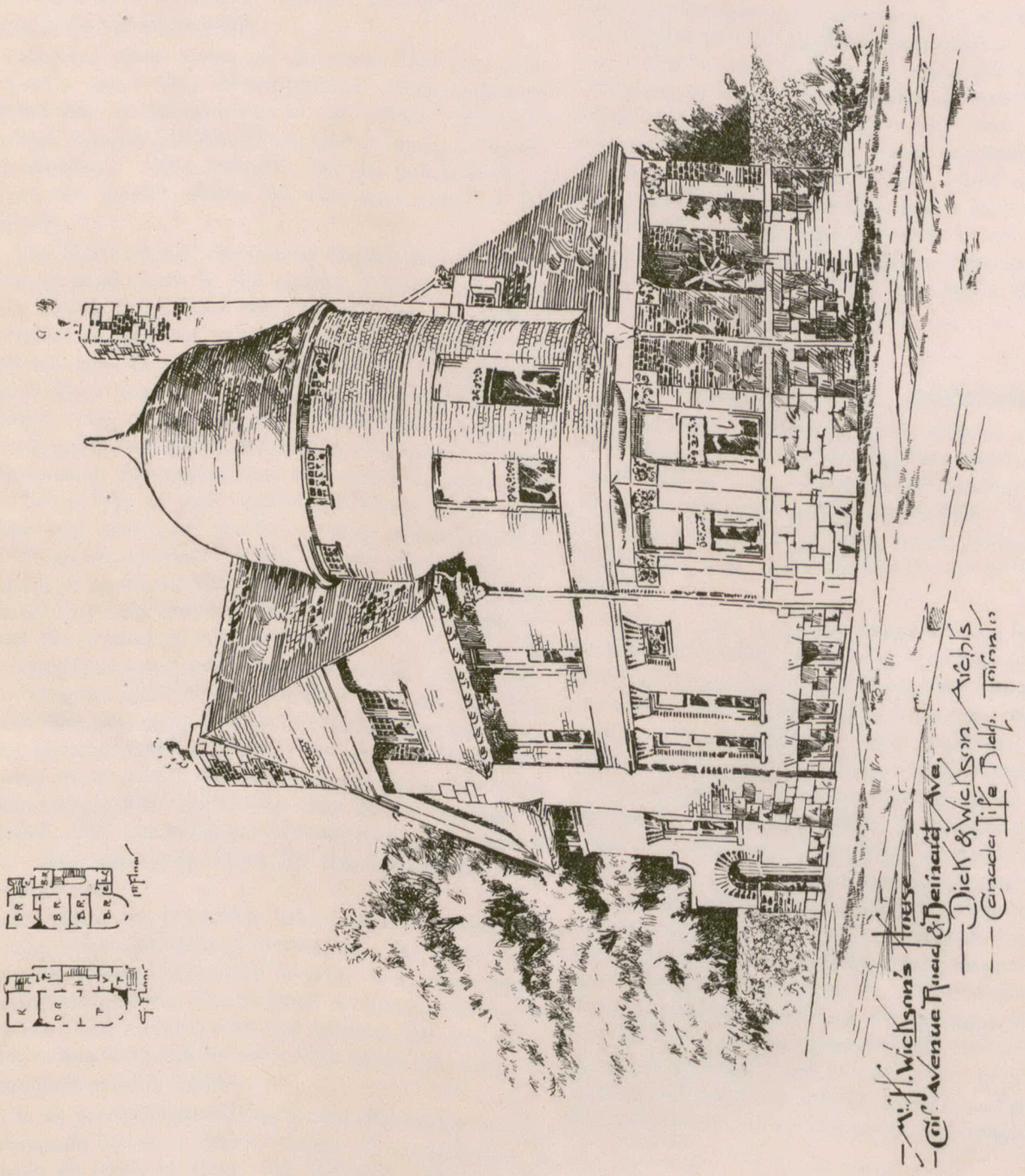
It is just as likely, but for the fleeting fashion of the time, to have been the one as the other. Now, who of us old men are ever really ashamed of the follies of our youth? Or who of us young men but could (did we stop to think) look forward with some complacency to a total change of ideals when age shall have come upon us? If one camp may have been associated with our earlier and the other with our later years, who is to say which was wrong and which right? That one may have come last as a development from the other is surely no more an argument in favor of that one than that it may have come first, when the mind was pure, fresh and receptive, is an argument for the other.

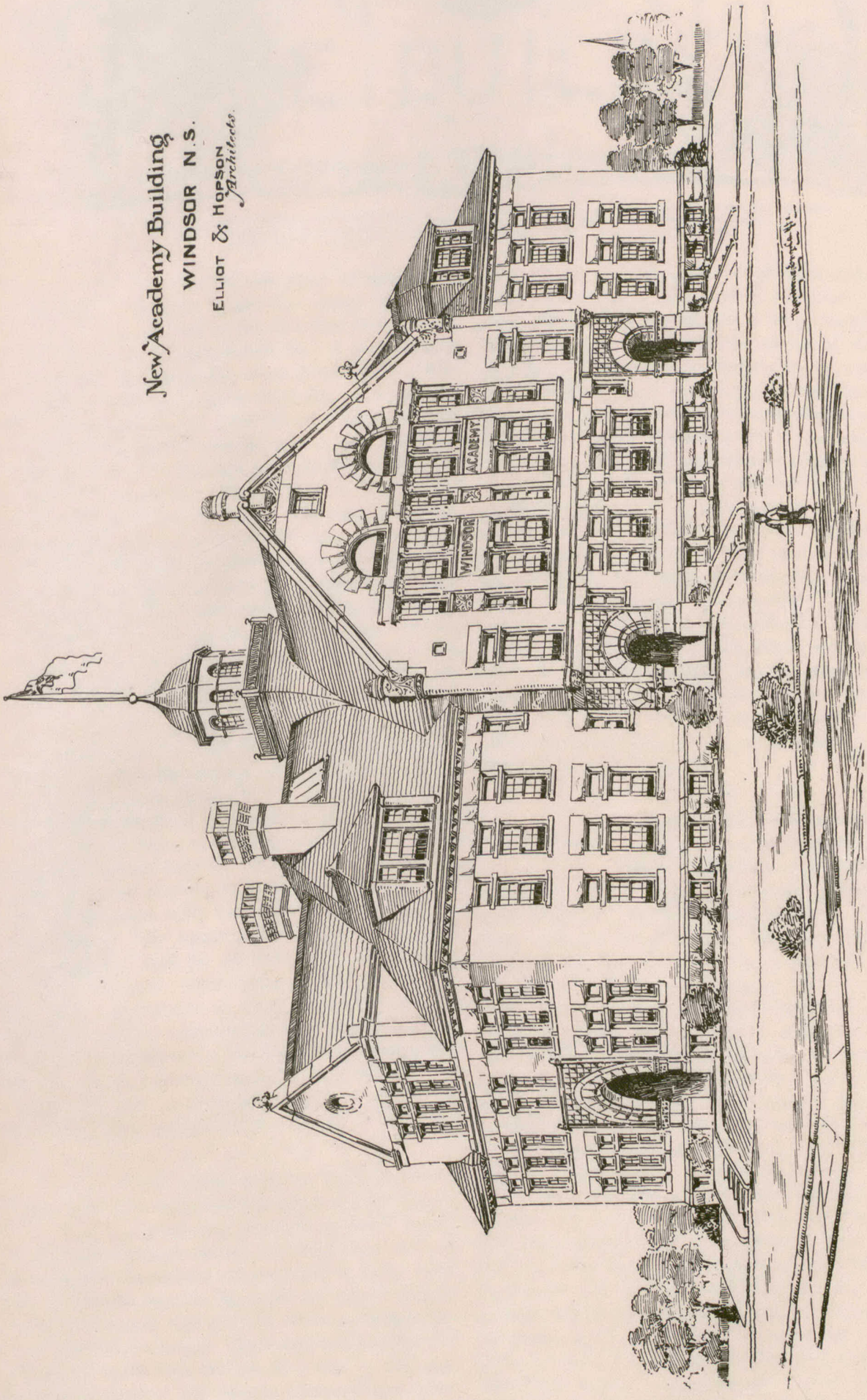
Did we stop to think, that hits it, for old and young alike, for sketchers and measurers, for perspective men and collectors of detail, for impressionists and academics. Did we stop to think we might use the time we waste and the energy in inveighing against the opposite camp, to further the interests of our own. For both are serving under the same queen, and there is no reason why an exchange of civilities might not take the place of an exchange of invectives. A day's hunting as guest to one camp would come amiss to no member of the other. In golf, when you have become "stale" in the use of your "driver," you play for a day or two with your "cleek."

QUESTIONS AND ANSWERS.

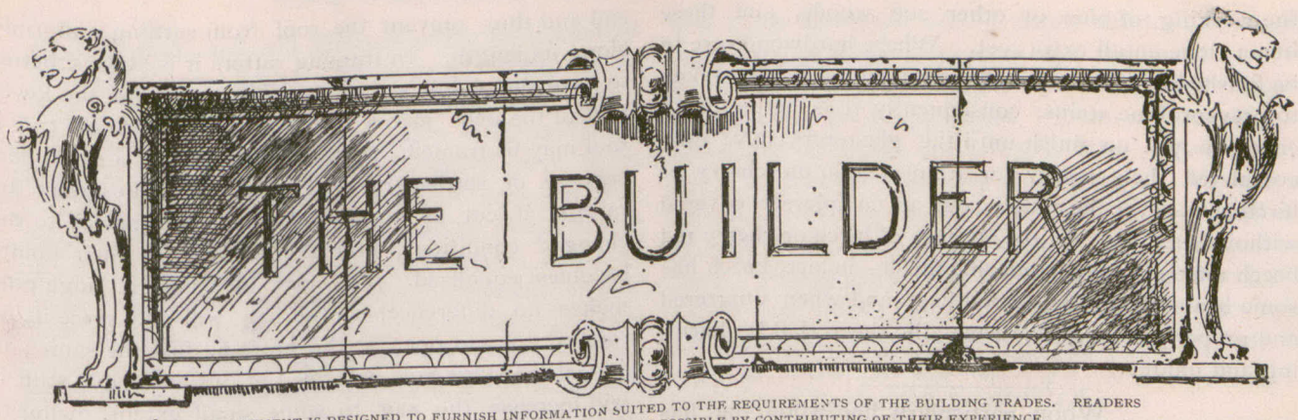
A SUBSCIBER at Chatham, Ont., writes: "Please inform me to whom should belong the responsibility for the care of stone after it is put in the building—the party who furnishes the stone, or the bricklayer. In the event of the stone getting chipped by bricks falling on it, or being splashed with mortar, who should be held responsible?"

ANSWER.—The question of responsibility for the care of materials placed in a building is usually covered by a clause in the contracts, and in case the question arises as to where the responsibility for damage belongs, the matter is usually decided by the architect. Where a person enters into a contract to supply stone or any other material for a building, which is to be placed in position by other contractors, his responsibility ends when the material is laid down in good condition at the building. In case the contractor agrees to furnish the material and place it in position in the building, he is held responsible for its protection from damage until the completion of the building, and is expected to take all reasonable precautions to guard it from damage. If, after such precautions have been taken, it should be damaged through the negligence of a contractor for one of the other trades, we imagine that there can be no question that the person guilty of such negligence would be held accountable for whatever injury might result.


W. J. Wickson's House
Cor. Avenue Road & Belmont Ave.
Dick & Wickson Architects
Canada Life Bldg. Toronto



NEW ACADEMY BUILDING, WINDSOR, NOVA SCOTIA.
ELLIOT & HOPSON, ARCHITECTS, HALIFAX, N.S.



[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.]

Tin Roofs.

TIN roofs do not prove as satisfactory as they might do, owing in a great measure to the fact that they are not as honestly put on as they should be. A roof properly covered with the best quality of tin should make a first-class one for such buildings as have flat, or nearly flat roofs. Two styles of tin roofs are used, one is known as the "flat lock seam" and the other as the "standing double lock seam." The first is generally employed on roofs that are nearly flat. This is done by locking the sheets together on all four sides alike and soldering, thus making one sheet of the whole roof. In no case, however, should tin be put down in one unbroken flat; there should be cleats or buttons running lengthways under every seam that runs down the incline of the roof; this will provide for contraction and expansion. Where a flat roof has a fall of three-fourths of an inch to the foot or more, the standing double lock seam will make much the better roof. This style of seam may be made in several ways, but the better way is to lock the cross seams together in the workshop and properly solder them before rolling the sections up in rolls to convey to the roof. Use cleats about $1\frac{1}{2}'' \times 1\frac{1}{2}''$ and place same along every longitudinal joint, and lap the joint over in the centre of the cleat; nail with tinned nails and solder the joint its entire length. To make the roof more lasting it is good practice to paint the underside of it before laying down, with two coats of good oxide or graphite paint. The upper side of a tin roof should never be painted until the second year it has been in use. The tinsmiths, when laying on the tin, should wear rubber soled shoes, or shoes with some sort of soft soles, as leather soles having nails or pegs in them are sure to cause injury to the tin, either by crushing holes through, or making indentations that will hold wet or snow, and cause corrosion to take place at a much earlier period than would otherwise occur.

Air Space in Stables.

IT is stated on good authority that a horse or cow has six times the breathing capacity of a man, and it is known that the latter averages twenty inspirations a minute, each inspiration being of a volume equal to forty cubic inches, so that he requires 800 cubic inches of fresh air per minute to supply him with the necessary health-giving pabulum for his lungs. Each expiration unfits for breathing twice the bulk of fresh air; that is, the 800 cubic inches expired per minute contaminates 1,600 inches of fresh air, or nearly one cubic foot. In round figures then, a man requires one cubic foot of fresh air for every minute of his existence, or 60 cubic feet per hour. A cow or a horse will require 360 cubic feet of air per hour, or 3,600 cubic feet of space in the stable in order to keep the air in a healthy condition. A stable then, with stalls 6′ 6″ wide and 9′ long, ten feet between floors, and a passage behind the animal of six feet, will provide ample air space for each horse or cow. There are many methods of ventilating stables, but the one that seems the most reasonable and effective is the ridge louvre or ventilator extending the whole length of the roof. This method of ventilation is adopted by military men in the construction of stables for artillery and cavalry horses. It is a good plan to leave vent holes near the eaves of the building, about 4 x 4 inches, sloping outwards with the line of the roof in order to keep the rush of air from going downwards. A small hole, about 2 x 2 inches, just above the stable floor, will allow enough air to satisfy each stall and aid in ventilating the stable. There should also be a small window to each stall—on the swing principle, and the glass should be of such a kind as will not let in the bright sun rays, as such would tend to injure the animal's eyesight. These conditions, properly followed, will produce a healthful stable for cow or horse.

Hardwood Finish.

COUNTRY builders who have always been accustomed to finishing their houses with pine or other soft woods, experience some difficulty in getting a proper estimate of the extra labor required to finish in hardwoods. It is safe to say that the cost of labor in finishing off a room in cherry, black birch or white ash, is about double what it would be if finished in white pine. Black ash or elm finish takes about 50 per cent more time to put in proper shape than pine, and oak, red or white, costs a trifle more to finish than cherry or black birch. Lumber cut from the butt logs of the black birch is one of our handsomest woods, and is strong and durable and will take a polish as high as the best cherry or mahogany. For newels, hand-rails and balusters, it is superior to walnut, and much stronger, works better in the lathe and is less apt to chip or sliver under the carver's tools. If not quartered when sawn, it has the fault of warping, and will be affected more or less by atmospheric changes, but on fixed work this may easily be prevented by proper fastenings, and in free work, such as doors, sashes, venetian blinds, etc., quartered stuff should be used, or the doors and sashes should be "built up" with the grain reversed, which will prevent warping and twisting. This latter method is expensive, but insures lasting and satisfactory work, but when economy is the rule, quartered stuff worked solid answers very well. The working of hardwood of any kind requires more skill, a better class of tools and more exact workmanship than

the working of pine or other soft woods, and these items alone entail extra cost. Where hardwoods are to be finished in a natural state great care should be taken to prevent lime stains, consequently it is better in all cases to put no finish until the plasterers have fully completed their work, for a lime stain on cherry or birch can never be taken out or completely covered without staining. In the absence of birch or cherry red beech makes a very handsome finish—in fact, beech has some beauties no other wood has, and when quartered and properly finished has a metallic sheen that is charming and unique.

Wood Warping.

Wood, particularly hardwood, that has not been properly sawn, is almost sure to warp or twist to some extent in the seasoning, and this is a matter that every contractor should see to when getting in a stock of lumber to be worked up. A board cut from the side of a log has the grain rings of the wood lying in circles having a greater length on one side of the board than on the other, and it is quite natural that these rings will endeavor to close as their circumferences get shorter by seasoning, and in closing they bend the board over, or, in other words, warp it. If the rings at one end of a board are out of line with the rings at the other end, which is frequently the case where the log was originally crooked, then the board will both warp and twist, as the rings do not shrink uniformly. Much can be done to prevent warping and twisting, in the piling of the stuff. The boards should be laid on their flat side with the side down that shows the concave or hollow curve of the rings; battens or weather strips should be laid across the pile at regular intervals, and always directly over the corresponding battens below; then another tier of boards on these again, and so on, until the pile is completed. The pile should have an inclination to carry off the rain, and should be topped off with rough boards enough to keep the pile dry. It is not best to pile the lumber where it will get too much sun or drying winds, as lumber seasoned too rapidly is apt to crack and check. Of course the best boards, boards that will not warp or twist, are "quarter sawn." It makes no difference what the lumber may be, whether it is pine, oak or ash, if it is quarter sawn it will not warp in drying nor yield so readily to changes of the weather. It has the disadvantage of being more expensive, as in sawing each quarter a narrow board is first taken, then one a little wider, and so on until the whole quarter is cut. Quartered oak, of which we hear so much now-a-days, never changes its shape after it is worked, "it stays where it is put," as the carpenters say, a quality that is very valuable. Another advantage of "quartering" is that you get all the beauties of the grain shown up to better advantage than if the boards were just "sliced" from the round log.

Sagging of Roofs.

The practice of cutting rafters so that their points in the plumb cut are close, while the lower part of the joints are left open, is bad, and not in accordance with good construction. When the points come together at the top and a small gap is left at the bottom, the roof is sure to drop as the weight of boards, shingles or slates is laid on it, and it will continue to drop until the joint in the rafter finds a solid bearing; this causes the ridge to sag in the centre and throw an uneven outward thrust on the walls. The gables support the ridge at each end and thus prevent the roof from settling uniformly along its length. In framing rafters it is always better to have the plumb cut at its point, proud at the lower part of the joint just a trifle, for no matter how true a roof may be framed, there will always be a small percentage of settlement, and when this takes place the rafters, if cut as suggested, adapt themselves to the changed conditions, and the bearing at their points becomes equalized. The fact of using a ridge pole makes no difference, as the sag will take place if the rafters are cut open at the bottom, just the same; in fact, if the ridge pole is formed of unseasonable stuff it will increase the sag to some small extent, owing to shrinkage. Rafters should be of sufficient section to sustain the regular load, including wet snow and rain, to which should be added 100 pounds to the square foot for cyclonic wind pressure. Light rafters may be very much strengthened by a generous supply of collar beams and braces. It is a prevailing fault with Canadian builders to frame their roofs with too light materials, and this is the cause of many a leaky and saggy roof in country places. There is quite a difference between the roofs of America and those of Europe. Here a few light timbers and a few pounds of spikes with a minimum of labor are about all that are employed on most of our domestic roofs. There, heavy timbers framed together with mortise and tenon, bolted with heavy iron bolts and tied with iron straps, is the manner which obtains. Their roofs last a half dozen centuries, here they are old and weary at 25 years, but if proper attention was given, and honest construction prevailed, there is no reason why roofs built on our present methods should not live twice the years they do now.

Figuring on a Contract.

Omission of items in figuring contracts is probably the most common cause of disaster prevalent in building contracting, and many a man who has intended well enough has been brought to grief because of having left out some things in his bill of estimates that ought to have been figured on. As we have before stated in these columns, every man who intends to become a contractor should prepare a minute schedule of all the items that could possibly be included in any manner of building construction. These should be classified and arranged under sub-headings, according to the different building industries or trades, and prices, when possible, should be added. It may take some time before a schedule of this kind can be completed; in fact, it may never be completed, for the continual changes that take place in styles and character of work, hardware and colors, will make it necessary to always keep the columns of the schedule open for additions. By having a schedule as suggested, and consulting it closely when making an estimate, the possibility of an omission will be reduced to a minimum. All successful contractors follow some such system as this in estimating, but the careless and unsuccessful contractor fails to see just where it would be to his interest to follow a rule of this sort, as the loss of time in preparing and consulting a schedule for every little thing would be a waste of time and loss greater than any benefits that would be derived. Every time a contract is taken below its actual worth every contractor in the neighborhood is injured thereby, as well as the man who does the work. If a man gets a house built for $5,000 that is actually worth $6,000 to erect, every man in the neighborhood will expect his work to be executed in the

same proportion, and will object if tenders are submitted based on the larger figure. So, after all, it is to the interests of all contractors that even a rival should get a good living price for work done, and a contractor's ignorance or mistakes are a thousand times more to be feared in a bidding competition than an accurate competency in making estimates. In country places and in our towns and villages there are very seldom works of such magnitude that the local builder cannot encompass, but he should not forget that even in buildings of similar size, and built of similar materials, the style of finish may vary so much that he will be treading on dangerous ground if he adopts the method of estimating by "comparisons," for that system is delusive and will surely lead its adopter into trouble. Figure everything—leave not a nail or a screw unthought of, for it is just such small things that make all the difference between profit and loss. A contractor seldom makes mistakes in the larger things in a building. His figures for the walls, roofs, floors, stairs and other costly adjuncts are generally correct ; and when a leak does take place, it will be found that it has its existence among the smaller matters in the contract ; hence the necessity of having a reminder of all these little things at your elbow when making up an estimate. It may be a little troublesome to be obliged to refer to a schedule every time an item is to be figured on, but it should be remembered that money is not earned without trouble, and that it is much more satisfactory to know you are safe and sure, even if you have to work for it, than to take a contract at hap-hazard, and be sorry afterward.

Carpenters' Repairs.

We have always thought that charging an ordinary day's wages with a percentage of profit to the boss or contractor was not doing justice to the workman who may be sent to perform the work. Repairs, generally, are of such a nature that the workman is compelled to use tools or material he would not be called upon to work up if he remained in the shop, thus destroying or seriously injuring costly tools for which he receives no recompense. Repairs, too, are much more destructive on the workman's clothes, a matter of considerable importance to him, and a matter that ought in justice to be considered. Workmen as a rule do not like repairing, partly for the reasons mentioned, and partly because repairing about old houses is too often a very disagreeable service and seldom satisfactory to anyone. After much experience and observation in the matter of repairs, the writer has came to the conclusion that at least 25 per cent. should be added to the present scale of charges for this work, and that this extra percentage should be equally divided between the master-builder and the workman. In contracting for repairs, enough extra should be provided to pay the workman employed upon them, at least ten per cent. extra, for undue wear and tear of tools and breakages.

BUILDERS' SUPERSTITIONS.

"You would be surprised how superstitious some men employed in the building trade are," said an elderly builder's foreman representative. "For instance, it's considered by some a most unlucky thing to lay the top brick at the north side of a building. I've known men do all sorts of things to escape this duty. They will undertake some harder work, sham dizziness, or even lose half a day's work. To brick-up in the recess of a wall a cast horseshoe with a penny tied to it is usually recognized as a sure forerunner of a season when work is plentiful. Another belief, that by substituting a sovereign for the penny a man will never meet with an accident or be out of work, is very often talked about ; but I have never heard of a man trying it. All sorts of things are bricked up in walls, 'just for fun,' and not because they have any charm or good omen about them. Newspapers, old boots, bottles, and such-like things are served in this way, and a favorite way of playing a joke on a 'mate' is for a man to conceal his beer can in the wall, and then build it in."

PROMINENT CANADIAN CONTRACTORS.

IV.

MR. F. T. HARDING.

Although only thirty-five years of age, Mr. F. T. Harding, who forms the subject of this sketch, has already attained a prominent position in the contracting field, being senior member in the firm of Harding & Leathorn, of London, Ont. He was born in Cornwall, England on April 12th, 1862, and after leaving school

Mr. F. T. Harding.

resolved to seek his fortune in America, arriving in New York in the year 1880, where he remained for only a short time. For two years he was engaged in contracting work for the Pennsylvania Mining Company at Iron Mountain, Michigan, leaving there in 1883 for London, Ont., where he commenced business as a general contractor. In 1885 he became associated with Mr. Christopher Leathorn, when the partnership now existing was formed.

Mr. Harding is endowed with unflagging energy, to which can be attributed much of the success which he has attained. He is recognized as a reliable and conscientious business man, and enjoys the full confidence of all who have business transactions with him. He is a member of the Masonic Society, an advanced thinker on social problems, and a constant reader, by which he is kept in touch with the many improvements affecting his business.

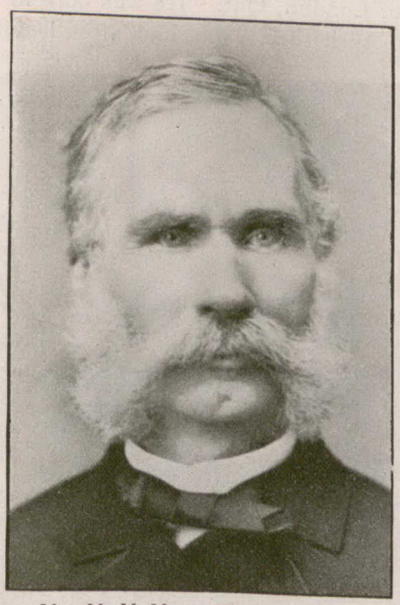
The firm of Harding & Leathorn have constructed a number of important works, among which are the Petrolia trunk sewer, the waterworks systems at Wiarton and Goderich, and a number of contracts in connection with the London waterworks, being now engaged in building sections "P" and "F" of the new London sewerage system, a work which requires skilful workmanship and careful management.

PLUMBING, OLD AND NEW.

We are pleased to be able to present to readers of the Canadian Architect and Builder the accompanying portrait of one of the oldest plumbers on this continent, Mr. N. McNeil, of Kingston, Ont., together with some particulars from his pen of the changes which he has witnessed during his long connection with the trade. Mr. McNeil, who is still in business in Kingston, and recognized as being fully abreast of the times, writes as follows :—

Although I have very little time at my disposal, at your request I will give you a hurried sketch of what the plumber trade was as I knew it nearly sixty years since. I commenced my seven years' apprenticeship to the trade in 1839; the indentures, fully and honorably discharged, with the signatures of the interested parties, lie before me.

Plumbers in those days were true to name—from "plumbum, plumber, a worker in lead." Lead, nothing but lead ! We made our sheet lead, for which purpose



Mr. N. McNeil, Kingston, Ont.,
A Veteran Canadian Plumber.

we had two casting frames, a large and a smaller one. We made lead pipe from 2-inch upwards—2½, 3-inch, etc., for pumps of steam engines, etc.; the seams were wiped. In the case of pipe of the above sizes for chemical works, we burned the seams. The pipe was filled with sand; one man poured lead in the seam from his ladel, another man or boy with a small stick as he poured felt for the smooth sand inside. Small sizes of lead pipe as we now know it, also sheet lead, were made in Liverpool under a patent. There was no lead pipe nor sheet lead as we see it made in Scotland—both were brought from Liverpool. Two or three years after this Messrs. Newton, Yeats & Co. started to draw lead pipe and sheet lead in Glasgow.

The art of working sheet lead is comparatively unknown to the plumber in America, as there is no roofing done here. We do not now make our soil pipe bends ; at that time we made lead soil pipe, waste pipe, bends, traps, etc.

At the time I speak of the D trap was the trap in use everywhere for closets, sinks, etc. I saw several lots of D traps made as shop work. The S trap was just introduced as a new thing, and as we knew he was a good hand who could make a neat 4-inch S trap, by and by we got to make them off a solid block. Our old friend the Dan closet was in general use, and long anterior to this date. At this time there sprung up a rival in Brama's patent valve closet ; it was expensive, and its action uncertain ; the ship closet of the present day is a modification of it. The Brama closet soon died out, and left the Dan closet, with all its faults, the general favorite. When speaking of this closet I may remark that my former apprentice, William Smith, of San Francisco, made some improvements in the manufacture of the Dan closet, which he patented. Presently he had to fight in the law courts for the protection of his patent with a wealthy New York firm. Smith afterwards invented the syphon jet closet, and before he could reap the reward of his labors he was again drawn into litigation, which left him without a dollar. On the completion of his apprenticeship in my shop in Kingston, he wrought at the trade in Chicago, then went to San Francisco and commenced manufacturing, and thus became identified with that city. When I revisited Glasgow in 1883 I saw Shanks' syphon tank used as a wash-out. Some time after my return I fitted up the first wash-out or National closet, and we are now elaborating that principle.

To return to my younger days again, when a comparatively young apprentice I was sent to the Highland Society's School to repair a water closet. This closet was fitted up in a small space under the pitch of a stair, with little or no head room. The tank, with ball cock, etc., was on a level with the closet. I was so taken up with the odd affair that I made a rough sketch of it, which I retain till this day. Zane's sanitary closet is, as it were, an exact copy of it, the only improvement being that it is made portable. About the same time I repaired a closet at a way station on the Wisha & Coltness Railway, now a part of the Caledonian Railway system. That closet had a standpipe at the back which served the purpose of a tank to wash out the closet. The Felly self-acting closet, or Malcolm's closet tank, are on the same principle. Now, while it is quite likely that the idea was new to the party who got up the Zane closet, and likewise new to those who got up the Felly tank, nevertheless new ideas in plumbing work have been introduced in America which were very old and in general use in the Mother Country. As an illustration, the Unique bath, or basin waste, was old and in general use when I entered the trade. The valve and valve pipe, with overflow on same, with valve pull and plate on top, made the finish with the lever of hot and cold cock on either side. Those supplies were soldered on to the sides of the valve pipe. I fitted up baths on that principle in the Commercial Bank, Kingston, and in the Commercial Bank, Belleville, early in the fifties.

With the introduction of brass pipe at a reasonable price, those fixtures have been got up in a portable form. How slow we are in introducing new schemes after all, and with all our activity ! I conveyed out to and fitted up in the Gartnaval Lunatic Asylum, Glasgow, one of the first, if not the very first, needle bath. It was made of copper pipe in the shape of a cone, perforated with fine holes towards the inside. The pipes were fixed in a vertical position, bent in towards the top. That was in 1844 or 1845.

But this must suffice. Although the plumber of today may have lost much of the cunning or art of working lead, he has to contend against a hidden law of nature that did not appear to trouble those of a former generation. The architect and the plumber, as practical

sanitarians, are working hand-in-hand trying to overcome an almost insurmountable difficulty—sewer gas. But this is too large a field for me to enter upon now.

PRESIDENTS OF CANADIAN PLUMBERS' ASSOCIATIONS.

MR. J. A. CASTLAKE.

In the city of Stratford, Ont., the master plumbers recently organized for the improvement of the trade, and elected as their president Mr. J. A. Castlake, whose countenance is portrayed on this page. Mr. Castlake was born on November 16, 1864, in the city in which he now resides. He was apprenticed to learn his trade with W. R. Anderson, of Collingwood, in 1883. After the completion of his apprenticeship he worked for Mr. J. C. Gilpin, of St. Marys, for a short time, and then with Mr. Climo, Jeffrey Bros. and E. Dunsmore & Son, of Stratford. The latter firm was changed to Dunsmore Bros., and upon the retirement of one of the partners, Mr. Castlake became a member of the firm, which partnership continued for two years. On the first of July, 1883, he started in business for himself, and by close attention to the details of his work has worked up a good trade. Mr. Castlake is enthusiastic

MR. J. A. CASTLAKE.

in association matters, and states that although all the plumbers in the city have not yet joined, they have started out with good prospects of success.

THE PLUMBERS' CONVENTION

Arrangements are now well completed for the second annual convention of the Dominion Master Plumbers' Association, which will be held in Toronto on July 1, 2 and 3 next. The programme, both from a business and social standpoint, is sufficiently interesting and varied to warrant a large attendance, and every member of the Association should endeavor to be present to assist in promoting the interests of the trade. A meeting of the Entertainment Committee was held last week, at which the following programme was outlined:

The Executive Committee will meet at the Palmer House on June 30th. The convention proper will open in the rooms of the Toronto Association, Pythian Hall, at 9.30 a.m. on Thursday, July 1st. Three sessions will be held that day, and probably a short session on the morning of the following day. On Friday afternoon an address of welcome will be belivered by the Mayor on behalf of the city, after which a tally-ho drive will be given the delegates. In the evening a banquet will be held in Webb's parlors, Yonge street. On Saturday an excursion to Niagara will take place, to which every master plumber in the Dominion is invited. Reaching Niagara Falls, dinner has been arranged for at the Dufferin Cafe', and the afternoon will be spent in viewing the beauty of the Falls and vicinity, returning to Toronto at eight o'clock.

Arrangements have been made with the railway companies to give a special rate of fare and a third for the round trip to members of the Association, good from the 30th of June to July 5th. The headquarters of the members will be the Palmer House, which has given a special rate of $1.50 per day.

The master plumbers of Toronto are sparing no effort to make the Convention a success, and no doubt a very large number of plumbers from different parts of the Dominion will avail themselves of the opportunity thus afforded to visit Toronto. Mr. J. B. Fitzsimmons is chairman of the Entertainment Committee.

CHIPS.

The McClary Manufacturing Co., of London, Ont., contemplate the establishment of a branch of their works in Montreal.

A return brought down in Parliament recently shows that the bounties paid on iron and steel manufactured from Canadian ore since February, 1896, is as follows: On pig iron, 42,404 tons, $84,809; iron puddled bars, 4,353 tons, $8,708; steel billets, 35,757 tons, $71,514.

Under the microscope, a surface painted with zinc oxide shows no porosity; in fact, it is almost a perfect enamel. Consequently, if damp wood be painted with zinc, there is no way for the moisture to escape except by forcing off the coating of enamel. A certain per cent. of silica added will, however, render it porous, so that any vapour or steam may pass through.

We regret to have to announce the recent failure of Messrs. Tallman & Son, proprietors of the Beamsville Pressed Brick Co. An assignment has been made to Mr. W. G. E. Boyd, assignee, Hamilton, Ont., for the benefit of creditors. The long-continued inactivity in building enterprise was a leading cause of the failure. The firm had an expensive plant, which it is hoped may shortly be put to use again.

A new cement, called petrifite, has been introduced in the market in England. The composition of the material is not known, but it resembles Portland cement in its general action. While it is employed chiefly in the manufacture of piping, slabs, tiles, conduits, etc., in conjunction with cement, yet, if powdered, it will bind together in a solid, stonelike mass a number of substances, such as wood, paper, pulp, earth material, sea sand and powdered slate.

"American Plumbing Practice" which has just come from the press, is a compilation of illustrated descriptions of plumbing installations in modern buildings of every character, together with Notes and Queries touching interesting points developed in practice, from articles which have appeared in the Engineering Record. The book is a well bound quarto of 259 pages, and contains over 500 illustrations. Published by the Engineering Record, 100 William street, New York.

A discovery of black granite is said to have been made at Welsford, N. B. The property has been acquired by a Bridgewater, Nova Scotia, firm, and they will commence the erection of polishing works. There is an excellent water power on the property for the working of hydraulic drills and polishers. The owners of the quarry have secured a contract for 2,000 tons of rough stone which will be shipped from St. John to Aberdeen, Scotland, during the summer and winter. The getting out of this stone and the opening up of the quarry will take most of the summer, and in the fall the polishing works will be built and equipped.

The Halifax Chronicle says that a new industry is soon to be started in Halifax county. Nearly two months ago an English syndicate sent an agent to Nova Scotia for the purpose of searching for a suitable material for the manufacture of terra cotta, and as the result of his research it is understood he has been instructed to purchase some property in Halifax county, build a factory and manufacture terra cotta. The output of the factory will be sold both in the United States and Canada. It is said that terra cotta made there can be sold cheaper in Boston and New York by this company than by the companies who are supplying those cities at the present time.

VENTILATING BY ELECTIRICTY.

How easily large halls can now be ventilated is seen in the recently installed plant for lighting and ventilating the house of representatives and the Senate Chamber in Washington. The system of ventilation which is already in operation in the Senate is illustrative of the best modern practice. The fans under the flooring are twelve feet in diameter, and are driven by electric motors of 18-horse power each. There is also a fan on the roof, which is connected to an eight-horse-power motor. The pure air is drawn from a stone tower, situated on the north-west section of the capitol grounds, and passed between steam piping before it is driven up through the double air-tight flooring and into the Senate Chamber. At the front of each of the numerous desks provided for the senators are a number of perforations, and through these holes the air passes inward. Each desk is provided with means of shutting off the supply of air, or regulating it. An ice plant is to be erected later, and in warm weather the air will be cooled before being forced into the chamber.

THE LOSS OF HEAD DUE TO ELBOWS IN PIPES.

In a series of articles describing the engineering department of the Yorkshire College, Leeds, Engineering has given some particulars of the results of experiments conducted in that institution to ascertain the effect of the friction of water in a pipe fitted with sockets, elbows, tees, bends and a sudden enlargement. The experimental pipe was half an inch in diameter, and the friction was measured by loss of head in the usual way. It is shown in works on hydraulics that the loss of head due to resistance of this nature to the free flow of water in a pipe may be expressed in terms of a length of plain pipe that will give the same loss of head due to friction. Experiments extending over several years show that the loss of head resulting from a socket is equal to that due to from 15 to 17 diameters of the plain pipe ; while that of easy right-angled bends may be from 10 to 15 diameters ; and that due to sharp right-angled elbows from 30 to 36 diameters. At one place the experimental pipe is suddenly enlarged to five times the regular diameter. The total loss due to this and the contraction should, by calculation, be equivalent to the friction of 1.92 feet of this half-inch pipe. Experimentally, however, the loss is only equivalent to the friction of a length of from 1.2 to 1.4 feet. The experiments show the detrimental effect of sharp elbows on the dischargiug capacity of a pipe system.

TESTING THE STRENGH OF SOIL FOR BUILDING.

There is very little to be found in technical literature on the weight that certain soils will support. The few tables extant generally do not indicate with sufficient clearness under what conditions they have been compiled. Rudolf Mayer describes, in the " Zeitschrift des Oesterreichischen Ingenieur und Architekter Vereins," an instrument specially devised for this purpose. It is certainly not complicated, and though it is hardly meant for the ordinary builder, it may prove useful in its present or an improved shape. There is a heavy piston screwed into a cylindrical guide block carrying a platform on its top, on which the weights, iron plates of about 20 lbs. weight, are to be placed. The piston and its guide slide in a strong cylinder, which forms one casting with the bed-plate. This bed should be wide. There are, further, three legs in the plane of the bed, with pins at their ends, by means of which the instrument is fixed in position. The guard carries a sidearm holding a micrometer screw dipping below into a mercury cup, from which a capillary tube branches off. The diameters of the cup and the indicator tube are such that the depression of the screw is marked tenfold. When the weights are applied the piston will sink more and more, fairly proportionally at first ; this would graphically give a straight line. When the line changes into a curve which becomes steeper and steeper, it is clear that the bearing limit of the soil has been reached.

PERSONAL.

Mr. John C. Burrows, a well-known contractor of Hamilton, died in that city last month.

On the 26th of May Mr. Alfred McInnes, of the firm of John McInnes & Co., contractors, Halifax, N. S., was married to Miss Conrod.

Messrs. W. T. Whiteway and W. T. Horton have formed a partnership as architects at Halifax, N. S., under the style of Whiteway & Horton.

Mr. Thos. M. Buley, painter and decorator, who had been in business in Toronto for 27 years, died at his residence on Denison avenue early this month.

The death is announced of Mr. John Drury, builder, of St. John, N. B. Mr. Drury was born in Sussex, but removed to St. John when very young. For thirty-five years he carried on a successful business, and erected many of the finest buildings in the city.

A prominent resident of Toronto passed away a couple of weeks ago in the person of Mr. William Hill, builder. Deceased had been a resident of that city for fifty-four years. He was born at Tadcaster, Yorkshire, England, in 1819, and came to Canada in the forties. He obtained his first employment in Toronto upon the Insane Asylum on Queen street, which was then in course of construction. In 1866 he sustained a double fracture of one leg and a broken ankle on the other by falling a distance of 65 feet, from which he was permanently lamed.

CHIPS.

The corner stone of a new public hospital building at Cornwall, Ont., was laid by the Hon. A. S. Hardy, Premier of Ontario, on the 14th inst. The building is being erected with funds donated for the purpose by the late Mr. John Purcell.

The brickmakers of Hamilton, Ont., have lately increased the price of bricks from $4.25 to $5.50. Some time ago, when there was competition among the brickmakers, brick was selling for $3.50 a thousand, but the price has been gradually increased to the figure named.

USEFUL HINTS.

LAC WATER VARNISH.—Shellac, 6oz. ; borax, 1½oz. ; water, 1 pint. Boil together until the lac is dissolved. If bleached lac is used a white varnish will be made ; if the orange shellac, the varnish will have a pale brown color. This varnish makes a fair vehicle for water colors. It is a good paper varnish, and dries with a fair lustre and with a hard coat, which is waterproof. By adding any of the soluble coal tar colors colored varnishes can be made.

GLUE VARNISH.—Dissolve 1lb. of good pale glue in two gallons of water. The color of this varnish depends very much on the quality of the glue used ; if the best gelatine, then a white varnish will be made ; if a brown glue, then a brown varnish. This varnish is not very good, because of the sticky coat it gives, which is not waterproof. By adding, just before using, a small quantity of bichromate of potassium (1oz. in two gallons), the coat becomes nearly waterproof. It is important that the bichromate be added just before use, as it would act on the varnish and cause it to set into a gelatinous, unworkable mass. This varnish forms the basis of some leather varnishes. A little thymol or borax may be added as a preservative.

NEW PUTTY FOR METALS.—A new putty for metals, says the "Gewerbe," is being offered for sale from Switzerland. It is a metallic alloy, which melts at about 250° C. (482° F.) like lead, and can be poured into the finest moulds on account of its easy fusibility. Another characteristic of this new putty, and one which recommends it especially for use is the great binding power which it shows in union with all kinds of materials, such as stone, masonry and metal. Owing to its great density, it is greatly adapted for repairing leaks in water and gas pipes, oil receptacles, etc. Its low specific gravity, which is about 1.5, as well as the circumstance that it expands in cooling, thus securing absolute tightness of the puttied fissures, have caused it to meet with a favourable reception. When the putty is to be used, break it into small pieces, and melt these in an iron kettle over a moderate fire, thus obtaining a highly fusible mass. For casting small objects, lime made of plaster of paris, loam or sand may be used.

USEFUL HINTS.

Olive green walls may have gold predominating in the frieze, woodwork and cornice antique oak, ceiling in vellum, the upholsterings of a pronounced red with bronze prevailing in the draperies.

The best method of making a whitewash for outside exposure is to slack half a bushel of lime in a barrel, add one pound of common salt, half-pound of sulphate of zinc, and a gallon of sweet milk.

Bottle-green walls should be accompanied by a frieze with Indian red prevailing, antique oak wood-work, deep sienna cornice, ecru ceiling with upholsterings brown and Indian red, and sharp Indian red draperies.

The following is an excellent paint for wirework :—Boil good linseed oil with as much litharge as will make it of the consistency to be laid on with the brush ; add lampblack at a rate of 1 part by weight, to every 10 parts of the litharge ; boil three hours over a gentle fire. The first coat should be thinner than the following coats.

The experiment made by Captain W. de W. Abney, C. B., in the Raphael Cartoon Gallery of the South Kensington Museum, London, of using colored glass to intercept the rays of light which act injuriously on pigments is said to be considered quite successful. The colored glass is hardly noticeable, and many people walk through the gallery without being aware of its existence. The system will probably be extended to the skylights of all the picture galleries in which water colors are hung.—Building News.

Mr. James Elliott, of St. Marys, Ont., is putting in a stone crushing plant in connection with his stone quarries.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS

NOTICE

The Semi-Annual Examinations for admission to study of Architecture and for registration will be held on Wednesday, the 28th, Thursday, the 29th, and Friday, the 30th July, 1897, in the rooms of the Province of Quebec Association of Architects, New York Life Building, Montreal, at 10 o'clock in the forenoon each day.

Intending candidates are required to give one month's notice to the undersigned accompanied by the necessary fee.

For Admission to Study..... $10.00
For Registration..... 25.00

JOS. VENNE, Secretary P.Q.A.A.
17 Place d'Arms Hill, Montreal

Montreal, June 8th, 1897.

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