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THE Master Plumbers' Association of Toronto have petitioned the City Council to amend in several important particulars the plumbing by-law of the city. They ask that the license fee be reduced from $10 to $1 per year; that a qualifying examination must be passed by every person to whom a license is granted; that a permit to construct or reconstruct the drainage system of any building shall issue to the master plumber only. The City Engineer recommends the Council to refuse to reduce the license fee, to grant the petition for a qualifying examination, and in lieu of granting an exclusive permit to the plumber, to so amend the by-law as to prohibit the laying of tile drains under dwellings, and to substitute therefor iron pipes, to be put in and connected with the drains outside the house by the licensed plumbers only, which would enable the plumber's work to be inspected and a certificate issued independent of the drain layers, which, at present, is one of the difficulties of carrying out the existing plumbing by-law. It is hoped that the Council will see the wisdom of adopting these and other required amendments to the by-law. The master plumbers have suffered the injustice of being compelled to pay a license fee of $10 per year for the privilege of doing business in competition with carpenters, tinsmiths, and everybody else who might see fit to take out a plumber's license, as the by-law does not provide that applicants for license must undergo examination. The absence of such a provision has thrown a large amount of plumbing work which should properly belong to the qualified master plumber, into the hands of journeymen, apprentices and persons in other lines of business who saw a chance to make a profit above the cost of the license by tacking on plumbing as a side line to their legitimate business. The by-law should fix the lowest limit of weight of iron pipe at 12 or 13 pounds to the foot, as it is frequently the case with cast iron pipe that one side is much thinner than the other, and in pipe weighing but nine pounds to the foot, a very slight indentation is sometimes sufficient to puncture the metal on the thin side, while it is with difficulty that joints can be made tight without cracking the pipe. It is the opinion of persons who have followed closely developments in sanitary science that at least in the newer sections of the city, where the sewers are in good condition, the trap and breather which the present by-law specifies shall be attached to the house-drain between the building and the sewer should be abolished, and the soil pipes allowed to act as ventilators for the sewers. It is a well-known fact that for two or three months during a severe winter, such as we have just passed through, the street gratings, which are designed to act as ventilators for the sewers, become choked with snow and ice, and sewers and drains leading therefrom are charged with foul gases, which, were iron drains employed, and outside traps and breathers omitted, would be carried through the house-drains and discharged into the atmosphere above the roof. In recent amendments to the New York plumbing regulations, the use of the outside trap and breather is made optional, and in practice their employment is said to be declining.

THE Committee of the Ontario Association of Architects appointed to recommend to the City Council required amendments to the Toronto Building By-law, have completed their work. The Committee have given their most careful consideration to the subject, and have presented to the Council a draft by-law embodying what they believe to be necessary. The matter will shortly receive consideration at the hands of the Council. The O. A. A., as well as the Special Committee who have had the matter in hand, have rendered a valuable service which the Council and public should not fail to recognize.

WE regret to learn that the exhibition of architectural drawings under the exclusive direction of the O.A.A., which it was announced in our March issue would form a distinctive feature of the sixteenth annual exhibition of the Royal Canadian Academy, will have to be foregone. As the result, it is said, of representations on the part of some of its members, the Academy has seen fit to withdraw its permission to allow the architectural drawings to occupy a separate room at the Exhibition and to be hung under the direction of a special committee appointed by the O. A. A. This decision will to a large extent destroy the advantage which it was hoped might accrue to Canadian architects as the result of public attention being drawn to a carefully arranged exhibit of their work.

IN the preparations now in progress for the erection of new buildings to take the place of some of those destroyed in the recent Toronto fires, contractors have had their ingenuity exercised and been put to considerable expense in pulling down the brick walls, chimneys, etc., which stood their ground after the more combustible materials had been devoured by the flames. In this connection our attention has been drawn to the fact that when work of this character is required to be done in Great Britain, permission is asked by the authorities of the engineering schools to be allowed to perform it free of charge, as an object lesson for their students. The practice is one which might with advantage be adopted by Canadian engineering and technical schools. It would no doubt work to the benefit of both students and contractors.

THE Society of Architects of London, resolved at a general meeting held last October, that after the 1st of November next, applicants for membership in the Society be required to pass an examination to show proof of qualification. The subjects of the first examination are as follows :—Architectural History : The general principles of the various styles and periods of architecture ; their dates, mouldings and enrichments. Planning and design : The plan and design of some building, or portion of a building, with details to a larger scale. Construction : Constructional details in all trades. Materials : The properties, methods of working, manufacture, and the application of materials to building works. Specifications : Preparation of specifications, and the examination of builder's accounts. Contracts: The conditions pertaining to a building contract ; the relative position of architect, client and contractor ; and other questions of ordinary practice. Sanitary Science : To include water supply and drainage, ventilation, lighting and heating of buildings.

THE ONTARIO ARCHITECTS' BILL.

THE Act to amend the Ontario Architects' Act, prepared by the Council of the Ontario Association of Architects, and introduced at the recent session of the Ontario Legislature by Mr. O. A. Howland, M. P. P., has shared the lot of many other bills at the close of the session, in not having been reached for a second reading before the House prorogued. Good progress, however, has been made by the Registrar, Mr. W. A. Langton, and his associates, who were engaged in promoting the bill, and it is hardly anticipating too much to say, that it stands a reasonable chance of becoming law at the next session of the legislature.

Much of the doubt that surrounded the measure has disappeared. Having passed the first reading, Mr. Langton and his committee pursued the intelligent and convincing policy of bringing the principles of the bill before leading members of the House. The general impression had been that the bill was of an exclusive and monopolistic character, but a careful study of its main clauses sufficed to show, even leaders of the Patron Party, that there was nothing objectionable asked for in the bill. The important point aimed at is to make the degree of architect hold a parallel place with an M. A. or other educational degree.

There is nothing suggested that would bar out any person now practising architecture within the province from becoming a member of the Ontario Association of Architects were the new bill now law. On the contrary, it specially provides that any such person "by causing his name to be registered with the registrar of the Association within three months from the coming into force of this Act, and by paying to the registrar such fee as may be made payable in that behalf," becomes a registered architect under the proposed Act. The bill further provides, that in case any such person omits to be registered within the said period of three months through absence, illness or inadvertence, he is not necessarily prevented from qualifying under the Act, but at the discretion of the Council he may be admitted to enrollment.

The impression has prevailed, in some circles, that were the Act to become law builders and others would be prevented from undertaking the execution of plans for those who might prefer to place the work with them, rather than with a registered architect. This is not the case. If any person thinks that an architect's fees are too high, or for any other reason does not wish to engage his services to prepare plans for a building, the contractor who would construct the building can prepare the plans. This contractor may call himself by whatever name he likes, save that he does not announce himself as an architect. The thorough understanding of this clause by the members of the Legislature, and especially the Patrons, has done a good deal to remove objection to the bill. Some had thought that the farmer or other resident of a rural section, who might want a barn built, or farm house enlarged, would be compelled to engage the services of a registered architect, just as he would look to a barrister for a settlement of any point of litigation, or to a doctor to cure some of his bodily ailments.

Where objection has been taken to the bill in the past lest extortionate fees should be imposed by the Council of the Ontario Association of Architects, the bill as introduced by Mr. Howland leaves the fixing of the fees to the Lieutenant-Governor-in-Council, and shall be for the following purposes only :

A—For registration as a student.
B—For each assignment of articles.
C—For each examination.
D—For registration as an architect.
E—For the annual fees of members.

The qualification for registration is, that "the applicant shall be not less than twenty-one years of age and shall have served as a student not less than five years with a principal or principals entitled to registration under this Act or with any other principal or principals, whether resident or practising in Canada or elsewhere, approved by the Council and shall have passed such qualifying examinations as may be required by this Act." The concession is made that any person that has graduated from the Ontario School of Practical Science shall be required to serve only three years as a student, one of which three years may be served during the vacation of the school.

The Act, in fact, is an educational measure, pure and simple, designed to raise the standard of the architectural profession. Architects' bills have sometimes been referred to as legislation for architects, rather than legislation for architecture. The present bill is one in which this criticism has no application. It is legislation for architecture—the cause, not the individual. In an age when the disposition is towards scamp work, and a lack of thoroughness prevails to a large extent in all callings, architects and builders alike would, we fancy, welcome any measure that has for its purpose the raising of the standard of work done.

The local Board of Health of the city of Kingston urges the City Council to appoint an Inspector of Plumbing.

The Toronto Public Library has recently received through the Secretary of State, from H. H. the Maharajah of Jeypore, a set of seven volumes on Indian Architecture. The work will form a valuable addition to the already interesting collection of architectural books to be found in the Toronto library.

SAWING STONE BY WIND POWER.

MR. JOHN KLINE, jr., of Halifax, Nova Scotia, is the owner of a stone sawing mill which enjoys the unique distinction of being the only mill of the kind in America operated by wind power. Mr. Kline furnishes Stone with the following data :—

Mr. Kline's principal reason for adopting this kind of power was because fuel is quite expensive in Nova Scotia, notwithstanding it is a coal-producing country, and further, because with this power he could let his mill run windy nights with less attention—the wind in that region being of a more uniformly steady character than in the lower countries of the temperate zone. Thus a material saving is effected over steam power and a larger production is assured. The wheel adopted is 16 feet in diameter. It runs a gang of three blades in excellent shape under a light breeze. Mr. Kline figures out a positive saving over steam of three dollars a day, not counting his saving in labor, and the mill is yet an experimental one in the application of the most modern machinery for sawing stone. The mill is set to saw 1½ inches per hour, in granite, and it is doing the work splendidly. It is guaaunteed to furnish sufficient power under an ordinary wind, say one of five to eight miles an hour velocity, to cut three inches an hour in the hardest granite, using crushed steel for feed to the saws. The machine works true and is under regulation to any speed desired in any wind less than a tempest.

In connection with this brief allusion to a novel mill for sawing stone Mr. Kline writes interestingly of other matters relating to the trade in the Province. He says : "You will be surprised, no doubt, when you learn that of the boundless quantity of good granite and building stone, to be found in Nova Scotia, that so little of it is produced for use in building our towns and cities. The cost of working granite is so high that large contracts are rarely made. Being the largest producer and manufacturer in the Province, and the only one using steam power, I have been involved in the labor question more largely than others, and in efforts to popularize the use of granite have been at a disadvantage on that account. Some years ago I had the price of granite within the reach of any one disposed to use it, and had taken a large contract, when the cutters formed a union and advanced wages 50 per cent. and demanded that the granite be brought to Halifax in the rough and cut there, my quarries being about three miles away. The masons and bricklayers joined the cutters and boycotted my granite. I employed non-union cutters, but am debarred from handling any dressed stone for buildings in the city. In consequence the demand for the material has lessened, I am poorer in purse, the contractors get fewer contracts for granite and stone buildings, and a great many of the striking cutters have had to go to other places and work ten hours a day for 25 cents an hour. I pay two to three dollars a day of ten hours, according to the skill of the workman, and they have steady work the year round, but the jobs are not on Halifax buildings.

"We get between four and five dollars a ton for rough granite delivered in the city. The amount of fiianite handled in Halifax in one year is about 2,000 tons, mostly for street purposes. I export largely. You will wonder when I tell you that I have sent granite to Aberdeen, but it is true. I have an order from there for a large cargo of granite, samples of which I have sent to you, and which is taken from a quarry in Annapolis county. I get for a block containing 36 cubic feet $23 a ton in Aberdeen. For smaller blocks the price at that city is about 65 cents a cubic foot ; the average rate is fair, and much better than we get in Halifax.

"Our excellent granites could be produced and exported at a reasonable profit if capitalists would become interested in developing them. I have an arrangement with shippers here to take any quantity from five to a hundred tons at a time, so there is no necessity for me yarding stock for shipment."

Mr. Kline intends to equip his wind power mill with the latest improved machinery, and to test the full capacity of the windmill as a prime mover in the manufacture of stone.

THE officers elect of the Contractors' and Builders' Association of Ottawa, are as follows : President, John E. Askworth ; first vice-presi- John McKinley ; second vice-president, Joseph Gravelle ; recording secretary; James Bennett; assistant recording secretary, H. Burgess; treasurer, E. B. Butterworth.

PERSONAL.

Mr. W. P. Witton has commenced the practice of architecture at No. 24 James Street South, Hamilton, Ont.

Mr. Thomas Tompkins, contractor, of Brockville, Ont., has recently returned from an extended trip to Australia and New Zealand.

Mr. S. G. Curry, ex-President of the Ontario Association of Architects, has resumed the practice of his profession in Toronto, having opened an office at No. 70 Victoria Street.

Mr. George Browne, architect, of Winnipeg, who spent the greater part of the winter in Ontario, has returned to the Northwest ; but expresses his intention to remove to New York City at the close of the present year.

Mr. H. C. McBride, of London, Ont., was in the city a few days ago. He will superintend the erection of the new Queen's Avenue Methodist Church, the plans for which are being prepared by Mr. Edmund Burke. Mr. McBride reports a fair outlook for building operations in the Forest City, this season.

VENTILATION A FEATURE.

THE builder of houses a few years ago was expected to introduce a warming plant only, with ventilation a thing unheard of practically ; to-day he must not only warm the house, but must successfully ventilate it, and the same is true in buildings of all kinds. Ventilation is now bought and sold as much as the warming plant, and the manufacturer of furnaces and warming plants who cannot demonstrate his ability to ventilate well must expect to lose all contracts.

The business of house-heating has developed wonderfully with the ideas of ventilation. Where a few years ago there were a few furnaces made, there are now a hundred, and all have been improved to a point that late comers in the field must expect to exercise the greatest ingenuity in order to get a foothold under the strong competition that exists. When a general idea is secured there are many who can go ahead with it and improve it. There are few persons who could devise the hot air method of heating at the outset, but once given the idea, there are hundreds who can go ahead and improve the original idea. This is true of anything, says the Hardware Trade.

Mr. Wm. Lockman, a veteran builder of Hamilton, Ont., who is now in his 86th year, is at present engaged in the erection of a residence for himself, and is preparing with his own hands all the woodwork for the building.

The officers of the Bras d'Or Marble Co., Limited, for the current year, are : President, Rod. McDonald, Halifax ; directors, Messrs. G. E. Franklyn, R. Uniacke, H. Saunders, S. Mosher, and G. Hattie, of the same city.

A preliminary meeting of the master plumbers of St. John, N. B., was recently held to consider a basis of organization for an association of plumbers throughout New Brunswick and Nova Scotia. A meeting for organization will be held in a few days.

A bill was recently introduced in the British Columbia Legislature, to prohibit the employment of other than British subjects on provincial or municipal works to be paid for out of taxation, and to establish eight hours as the legal working day. The Speaker ruled the bill out of order on the ground that the matter was one which belonged to the jurisdiction of the Dominion Parliament.

Application has been made for the incorporation of the National Sculpture Society, the object of which is to establish a school of sculpture in Montreal. The proposed capital is $50,000, divided into 500 shares. The petitioners for incorporation are:—Messrs. Henri Lemaire, notary ; Arthur Fiset, notary ; Pierre Catelli, manufacturer ; Edouard Pambrun, gentleman, and Charles Auguste Rocher, advocate, all of Montreal.

Mr. H. Gillen, architect, Kingston, Ont., agreed with the proprietors of the hotel Quinte at Belleville, to do the necessary architectural work on their new building, which was to cost $25,000. The building actually cost $36,000, and Mr. Gillen in rendering his account increased the amount of his fees in proportion to the increased cost of the building, and upon payment of the account being refused, brought action in the courts to recover his charges. The Judge decided that the hotel company were entitled to pay the increased amount.

POPULAR IMPRESSIONS vs. FACT.

AVERAGE human nature has a strong affinity for that which partakes of the mysterious. The superstitious is bred in the bone of most men. They like to speculate on that of which they know little or nothing. This, at least, would seem to be a generous way of accounting for many of the absurd opinions given out regarding the recent great fires in Toronto. Experts have shown how far off were those wise ones, who would have connected the Simpson fire with that subtle force electricity. In a previous number of the ARCHITECT AND BUILDER, it was shown that those who talked of the Simpson building as fire-proof, and would berate all and sundry who had anything to do

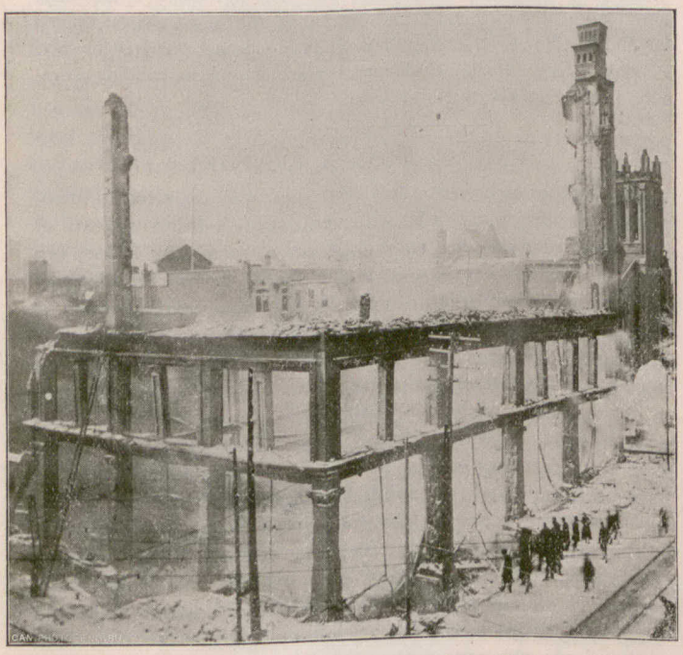


ILLUSTRATION SHOWING HOW PROTECTED IRON COLUMNS WITHSTOOD FIRE IN THE SIMPSON BUILDING, TORONTO.

with its construction, were simply talking of something they knew nothing about. Considerable notion seems, also, to have existed, and to some extent where better views ought to have prevailed, that had some other method been adopted in the placing of the large iron columns and beams that formed an important factor in the Simpson building, they would not have been so completely damaged by fire, as was manifest to everyone the morning after this unfortunate event.

The ARCHITECT AND BUILDER has taken some trouble to investigate this matter. Let us examine into the facts. It ought to be understood by this time that the Simpson building was not designed to be fire-proof. The internal columns and beams were of rolled steel and had to be of this material, as the spans were too long for wooden beams. The clear unobstructed space was a *sine qua non* necessitating as few columns as possible. In the case of buildings erected for office purposes, though of great height, and on the same plan, this condition does not apply to the same extent. But in large stores and warehouses great open space is a necessity. It was for this reason that the joists were of southern pine, the span and load being too great for the strength of the ordinary native pine. Objection has been taken to the use of southern pine in large buildings, because it is more inflammable than the white pine, but so far as the present case is concerned, with a fire of so great intensity, such a condition was neither here nor there, any more fire-proof substance must have succumbed. The plastering throughout the building was of acme cement, the columns being also plastered with it on metal lath. This protection would have successfully resisted an ordinary fire in the new building, but was powerless, of course, to resist the intense heat developed in the old adjoining buildings, which were directly connected with the new, without the interposition of any wall.

It has been said of the Simpson building that the steel columns, which extended from the ground line to the top of the second storey were inadequate to carry the weight of the building, and that the large masonry columns were partly used to give strength to the steel work.

The ARCHITECT AND BUILDER has made careful enquiry on this point, as it is one of importance, particularly from a structural point of view. Our information shows that the outer walls were carried from the third storey entirely on the steel columns, which extended from the ground lines to the top of the second storey. These columns were encased afterwards with cut stone, brick and terra-cotta. The protection of these columns and the beams which they carried was so thorough, that paper signs which had been pasted on them were intact when the brick work was taken down. The stone and terra-cotta of the two lower stories in no way supported the building, and were only a casing or ornamental and protective feature. All the columns and beams were calculated with the usual factor of safety and no settlement or structural defect of any kind, we have reason to believe, had shown itself up to the day of the fire, although the building had been rushed through in an unprecedentedly short time and under many adverse conditions.

Had it been intended to make the building fire-proof, the iron beams, which, as our illustration shows, became so terribly twisted, would have been encased in fire-proof material, such as porous terra-cotta. But this was not done. Profiting by the experience of the late fire, we are glad to learn, for the general safety of the city, that the new building that will be erected for Mr. Simpson, by the same architect, will almost certainly be made fire-proof.

We have heard comparisons made between the methods of construction adopted in the erection of such buildings as those of Simpson's and McKinnon's and some of the high buildings of New York and Chicago. It does not appear, in these larger cities where this plan of building is so much followed, that very much better methods of fire protection and construction are adopted than in Toronto, where the experience has not been nearly so great. The fact is in a composite building like either of those named, where wood, steel, and masonry work go into the structure, no better guarantee can be given in one place than another that a conflagration, when it gets headway, will not destroy it, providing, of course, proper fire equipment is possessed by the municipalities. The writer discussed this matter with a well-known local architect, who had, at one time practised in New York, and he cited the case of the destruction of a large warehouse there, built on somewhat similar lines to that of Mr. Simpson's, and where the result was just as disastrous.

Whether it is wise to encourage the erection of buildings, constructed on what is familiarly termed the skeleton plan, is a

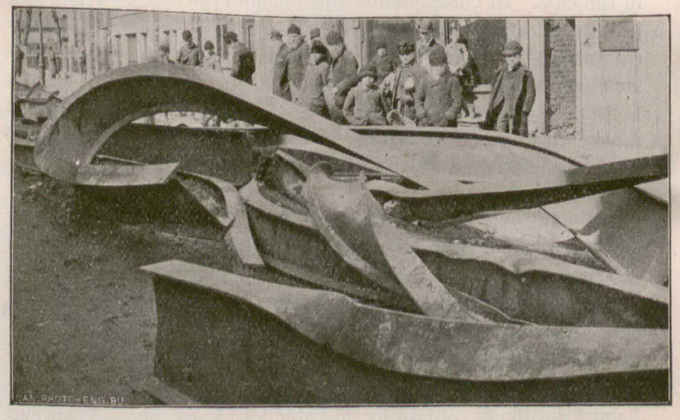
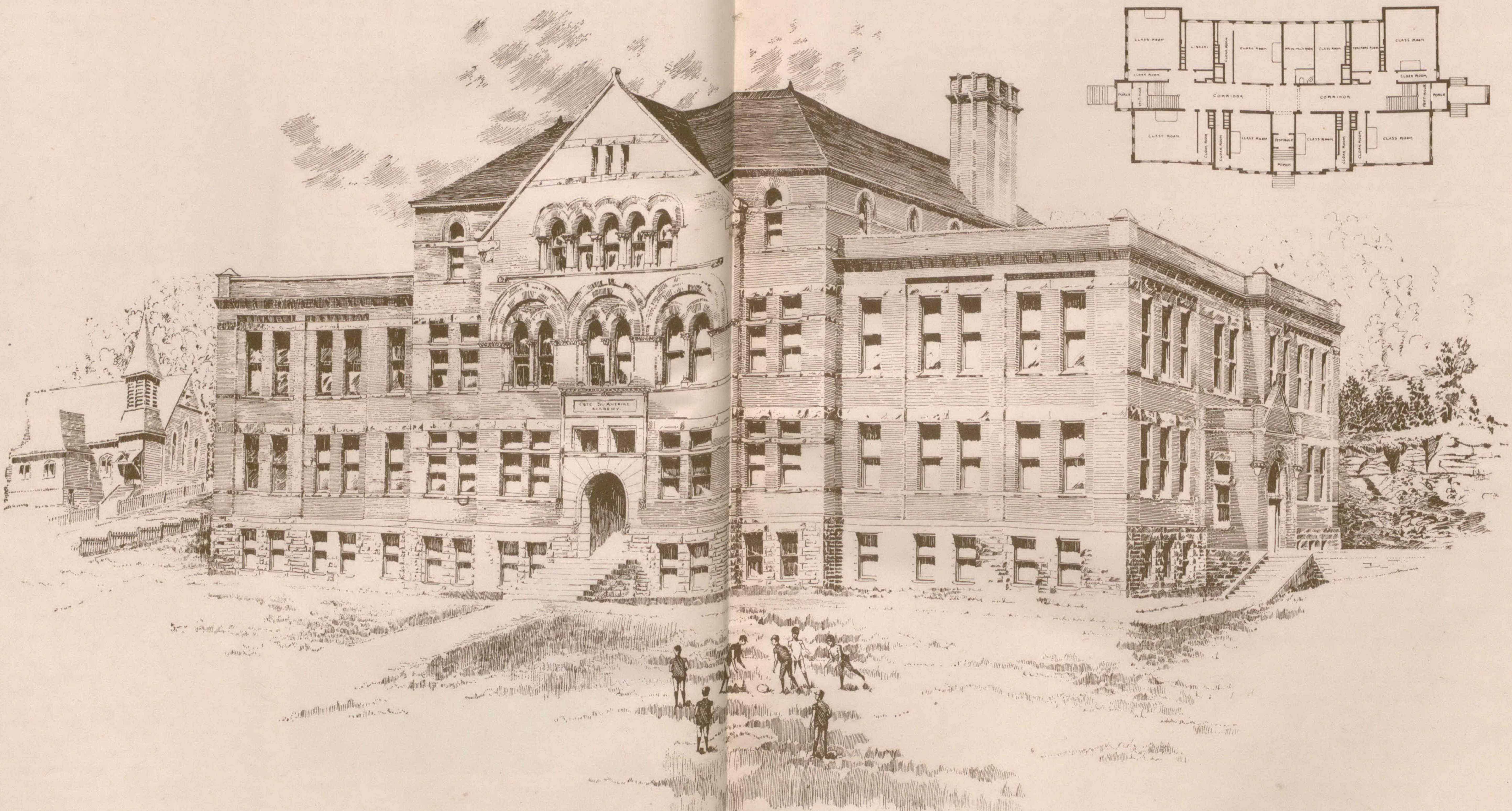


ILLUSTRATION SHOWING THE EFFECT OF HEAT ON UNPROTECTED IRON GIRDERS IN THE SIMPSON BUILDING, TORONTO.

point on which architects and practical men will differ. Perhaps the greater safety lies in the adoption of a happy medium, where steel and iron will be mainly used, and yet, where, as we understand is the case in New York, masonry work is not discarded to nearly the same extent as in Chicago. There is just this about it, that where masonry work is employed, the openness and light aimed at, especially by owners of large stores, has to be sacrificed. And wisely or not, in this intensely practical age, utility more frequently predominates in settling these matters than any other influence.

Mr. Andrew Taylor, R. C. A., recently delivered a lecture before the Woman's Art Association at Montreal, on "The Importance of Form in Art."



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ALEX. C. HUTCHISON, R.C.A., ARCHITECT, - - - MONTREAL.

ELECTRIC LIGHTING FOR LARGE BUILDINGS.

By Geo. White Fraser, E. E., Toronto.

THERE have, until recently, been but two general methods employed for the electric lighting of large buildings. 1. The renting of the current from the electric company operating a central station; and 2. The installation in the building itself, of a private generating plant. There can be no rules laid down, of general application, pointing to the adoption of either method preferentially to the other; every case must be considered on its merits. Such consideration will reduce the question to its lowest terms, viz., a comparison of the costs of lighting by the rival methods. The variable quantities that will enter into this reduction as governing factors are: The price of current supplied from the central station per lamp hour, or per kilowatt hour on the one hand, and on the other, the cost of generating the current required in the building, using a private generating plant. This latter cost will be the total of such items as coal and water, etc., engineer's salary, little repairs, depreciation of plant and interest on capital expended in purchase of machinery, etc.

It is evident that local data will greatly influence the selection of method. For instance, a building full of dingy offices, and employing already an engineer and using quantities of steam, for heating, might very reasonably be expected to effect an economy in lighting by using a private engine or dynamo; while a church using a number of lights periodically, would not. These are, of course, extreme cases, illustrations merely, of the general principle, but it is a great mistake to assume in all cases, that because there is a central station operating, it must be better and cheaper to rent current instead of generating it.

The object of this article is to introduce to the owners and designers of large buildings a modification of each of the two general methods described above, that have the merit of presenting very interesting features from an engineering point of view, and of promising well from that of the owner.

The first modification is the use of a gas engine instead of a steam engine, to run a dynamo in a private installation. This plan presents many very advantageous features. No boiler is required, with its coal dust, dirt, and chance of explosion. Less ground space is taken up. Gas engines are very largely used in Europe, and in the States for working dynamos, and many of them are absolutely guaranteed to use only 15 cubic feet of gas per horse power per hour. In connection with this, there is a very interesting and suggestive calculation easily made. Thus:—One thousand cubic feet of gas in Toronto costs the consumer $1.10, for lighting purposes, and 90c. for power and heating purposes. If burnt in a 5 foot burner, this thousand feet will give 3200 candle power hours. If consumed in a gas engine requiring 25 feet per horse power per hour, this 1,000 feet will give 40 horse power hours. These 40 H. P. H., if used to run a dynamo, assuming 75% electrical efficiency and 4 watt lamps, will give 5584 candle power hours. The Toronto Incandescent Light Co. sells current at the net rate of 6 cents per 160 candle power hours, barring special arrangements.

Reducing these prices down to their equivalents per 1,000 candle power hours, gives:

Gas in burner.....	costs,	34.375	cents	per	1,000	c. p.	h.
Gas Engine and Dynamo	"	16.177	"	"	"	"	"
Tor. Inc. Co.	"	37.500	"	"	"	"	"

Now, one 16 candle power incandescent lamp burning for 62½ hours is equivalent to 1,000 c. p. h., so it can be seen how, in a large building requiring extensive illumination, it may very easily be actually less expensive to run a private dynamo, operated by a gas engine, than to rent either gas or current. So far, there is a difference, in favor of the gas engine, of over 100 per cent., but no account has yet been taken of two considerable items, salary of attendant, and interest and depreciation. These will of course greatly increase the cost as calculated above, but to what extent depends entirely on the size of the installation; there seems to be, however, a considerable margin to come and go on.

The second modification is the use of a storage battery located in the building, and kept constantly charged by wire from the central station. I am aware that the advantages of this plan are open to criticism, and would have to be the result of special arrangements with the central station. I am also aware that "Central Station Management" as understood in most Canadian stations, except the really large ones, is not the science that it has become in the States and Europe, and that as a fact, so little attention has been given to its study, that managers do actually not know those conditions of operation which are productive of best financial results to themselves. At the same time I am convinced that a little persevering effort on the part of interested persons would bring about a state of affairs favorable to the economical operation of the modification I have just suggested.

The position may be briefly and clearly described thus:—The best and most paying load for a central station is a *constant* one, one that doesn't jump from 0 at 5 o'clock p.m. to 500 H. P. at 8 p. m., but that remains fairly steady all the time. This is just the very kind of load that a storage battery gives, and moreover, it presents another very attractive feature to the central station as follows: A building is wired for say 500 lights; it will use these 500 lights all at the same time two or three times a year, but the machinery in the central station has got to have this 500 light capacity consuming interest and suffering depreciation all the year round, although it earns money only three or four times a year. A storage battery, however, that can be charged at the rate of 20 amperes continuously, will give out when required the whole current for the 500 lights, and keep them going for four or five hours. Thus the central station will only have to provide generating machinery sufficient for 20 amperes, which will be earning money all the time, instead of sufficient for 500 amperes which will be idle most of the time. Consequently it is to the obvious interest of the central station to encourage the use of the battery, and in order to do so it will lower price of current. A very well known authority on electric matters, has stated that it would pay central stations to sell current (for use with storage battery) at 4 cents per kilowatt hour in order to get the constant load that is so advantageous. This figure is equivalent to 16 cents per 1000 candle power hours, and to this must again be added interest of and depreciation on accumulators. Here again particular conditions will affect the total per 1000 c. p. h., but as in the former modification a considerable margin is left. I have no doubt, that central stations would see the advantage of lowering their rates on such loads, if the case were properly presented, and advantage to both parties would result.

There being no particular installation to study, it is impossible to be other than general in this article; it was intended merely to point out to parties having large buildings to light, or to supply elevators for, that there are several ways of doing it, each of which is best only under certain favorable conditions, while under different conditions it should give place to some more efficient method, the actually best method being determined only after due consideration of the peculiar conditions.

BRIBES TO ARCHITECTS.

THE Southern Chapter of Architects, at its last convention, adopted the following resolutions:—

WHEREAS, The architect is in effect the trustee or agent of his client, and in that capacity shall endeavor to serve the client to the best of his ability, and to secure for him (the client) the full value received of the work under his charge; and

WHEREAS, It has been suggested to this convention that some material men have been tendering to architects commissions to secure the sale of their materials, the acceptance of which is contrary to our code of professional ethics; therefore, be it

Resolved, That we, the Southern Chapter of Architects, condemn such methods as dishonorable and to be discouraged by all legal and honorable means.

We further consider all material men, and others, resorting to such methods, as unworthy to hold business relations with members of this Chapter.

Resolved, That after the board of directors shall have received sufficient proof of such practices, or attempts, it shall notify the secretary, giving him the names of the parties transgressing, which names the secretary shall thereupon transmit to each member of this Chapter. Be it further

Resolved, That these resolutions be published, printed and distributed for the general information of material men, architects and the public at large.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

MONTREAL MASTER PLUMBERS' ASSOCIATION.

SIX years ago a movement was started by leading master plumbers of Montreal, such as Messrs. John Date, F. Hortan, Jos. Lamarche, J. W. Hughes, W. A. Stephenson, J. C. Jacotel and A. Champagne, to form an Association of their own in connection with the Montreal Contractors' Association and as a section of the same, but unfortunately the efforts of these gentlemen ended fruitless with a banquet held two years after at the Richelieu Hotel. They and others having the welfare of their profession at heart were, however, not discouraged by their past experience, and new efforts were again made last summer to successfully carry out the scheme. A general meeting of all the master plumbers of the city and suburbs was consequently called last July to discuss the advisability of organizing the proposed Association, which was responded to enthusiastically by nearly all the plumbers of the city and suburbs. A committee was entrusted with the task of preparing a constitution and by-laws, and at a general meeting of the craft held for the purpose on Aug. 3rd these were discussed and adopted, and at the last session of the Provincial Legislature the Association secured its charter through Mr. C. Beausoleil, M.P.P.

MR. J. LAMARCHE.
President Montreal Master Plumbers' Association.

Since then, although a very short time has elapsed, the Association has been very active, and has more than once proved its utility. The new plumbing by-law of the city, passed last June, has been studied, and although admitted to be a great improvement on the previous state of affairs, suggestions were drawn up and sent to the Health Committee of the City Government, which they have now under consideration. Not only has this Association been established with the view of an interchange of professional knowledge and ideas amongst its members, which would be beneficial to them alone, but its field extends far beyond that, its object being also to instruct the general public in matters pertaining to hygiene and plumbing, by means of popular lectures given free at regular intervals by prominent hygienists and physicians, of which two have been recently given—the first by Dr. Lapthorn Smith, and the other by Dr. E. P. Lachapelle—which were a marked success, both in respect to attendance and instructiveness.

The Association has not forgotten either the important matter of giving proper instruction to apprentices. As a step toward this, the Department of Plumbing at the School of Art and Manufactures, now one of the most important at the school, has been placed under its control, and a committee has been appointed to look after its welfare and regulate its instruction. A reorganization of the Department is contemplated at the next session. The Association meets every second and fourth Thursday of each month at St. Joseph's Hall, corner St. Catherine and St. Elizabeth streets. A standard price list is now under consideration for adoption by the manufacturers of and dealers in plumbing materials, so as to put a stop to selling to private individuals at the same prices as to the trade, a practice which has been indulged in for some time to the injury of the trade.

The Association opened a branch on the 8th instant in Quebec, and propose also to establish similar branches in all the principal cities of the Province, and at St. John, N.B. Negotiations are now pending to amalgamate this Association with the Toronto Master Plumbers' Association, so as to make it a Dominion Association, and before the close of another twelve-month it is said that it will form part of the National Master Plumbers' Association of the United States.

The Executive Committee of the Association for the ensuing year is composed of Messrs. J. Lamarche, President, whose portrait accompanies this article; John Date, 1st Vice-President; A. Champagne, 2nd Vice-President; Henry Padden, 3rd Vice-President; W. M. Briggs, Secretary; J. W. Hughes, English Corresponding Secretary; Joseph Gibeau, French Corresponding Secretary; J. C. Jacotel, Financial Secretary; W. A. Stephenson, Treasurer.

On the refusal of the trustees of the French Baptist Church, corner St. Catharine & Cadieux streets, to take down the building which was recently condemned, on the ground of its being built contrary to the regulations of the building by-laws, and being a menace to the safety of pedestrians, the Building Inspector commenced to tear down the building on the 9th instant. All the exterior of the building was about completed, and the roof was being put on. It is understood that the building has been taken out of the hands of the architect, Mr. G. Mann, and given to another city architect to rebuild.

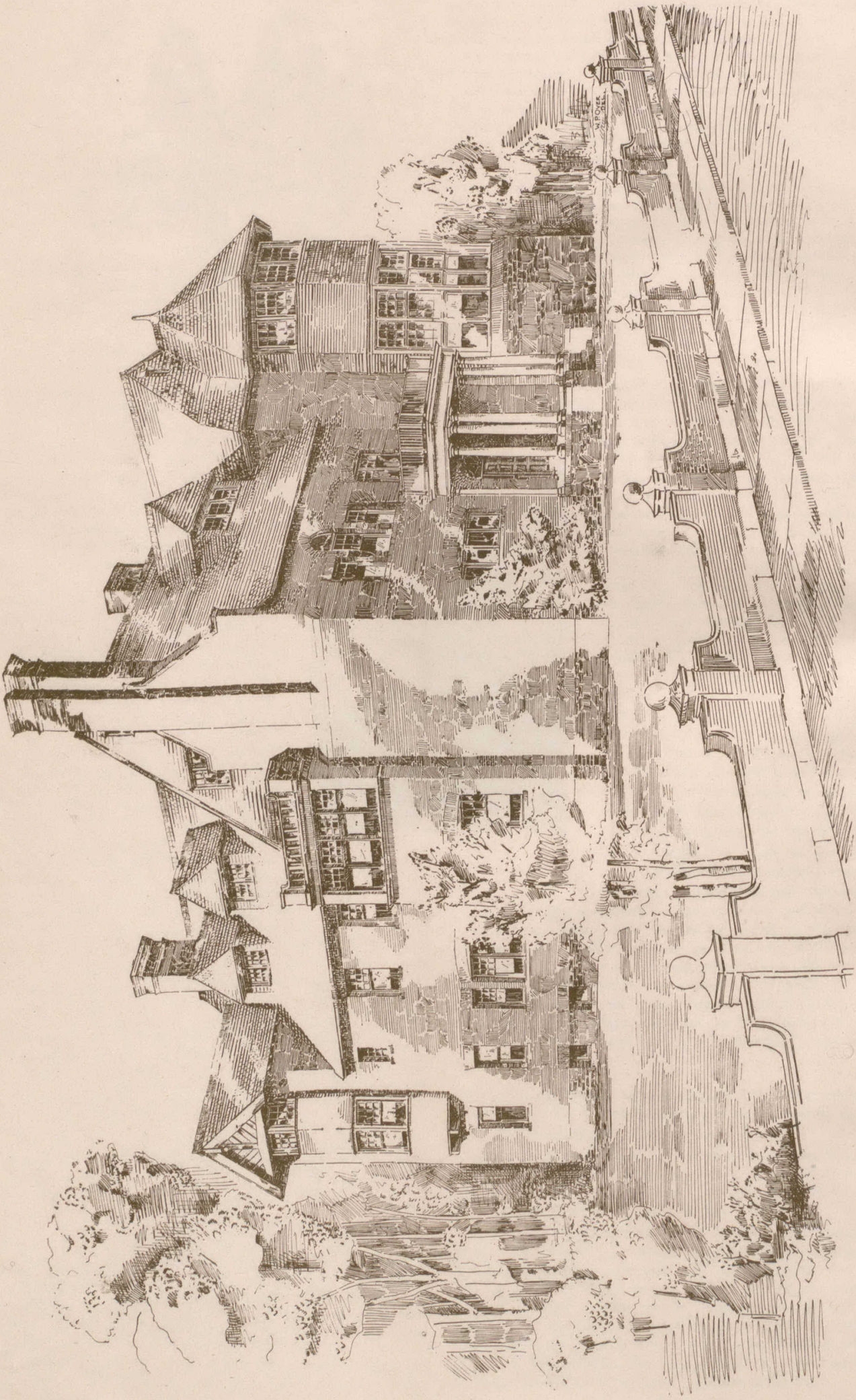
WATERPROOFING BRICKS.

AT a recent meeting of the Australian Association for the Advancement of Science, Professor Liversidge read a paper on the "Waterproofing of Bricks and Sandstones with Oils." These experiments were made with the view of ascertaining the length of time that bricks and sandstone are rendered waterproof or protected by oiling. The oils used were the three commonest and most readily obtainable for such purposes, viz., linseed oil, boiled linseed and the crude mineral oil known as "blue oil," used for preserving timber. The weatherings were made upon a flat portion of the laboratory roof exposed to the sun and weather. Good sound machine made bricks were experimented on. The amount of oil and water taken up by the sandstone was very much less than that absorbed by the bricks, although the area of the sandstone cubes was much greater than that exposed by the bricks. Equal amounts of the raw and boiled oils were absorbed; the blue oil, however was taken up in much greater quantity by both bricks and sandstone, but by the end of twelve months the whole of the 13½ ounces of blue oil had apparently evaporated away, and the brick had returned to its original weight, but those treated with raw and boiled oils remained unchanged. After the second oiling in November, 1890, and exposure for nearly four years and two months, they had practically retained all their oil, inasmuch as they had not lost weight and were practically impervious to water. It was noticeable that the sandstone cubes treated with raw and boiled oils returned to their original weights, but do not appear to have lost the beneficial effects of the oils, being practically impervious to water.

The March number of the Indianapolis Clayworker contains illustrations of the Beamsville Brick Company's works, and of specimens of the material produced therefrom.

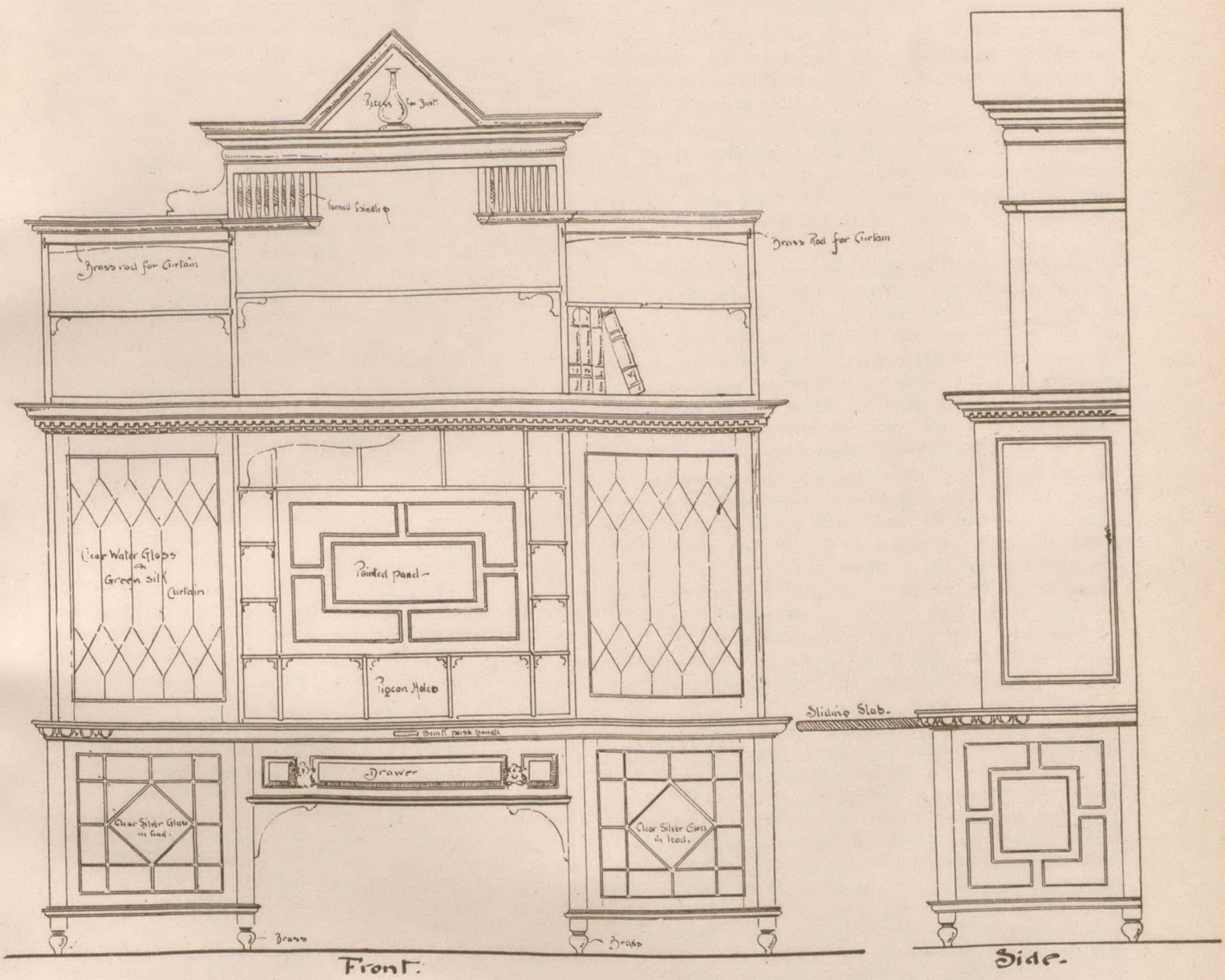
Reports from Windsor, N. S., state that the plaster business for which that locality is celebrated, will be developed to an unusual extent during the present year. One company alone will, it is said, ship about 100,000 tons to New York.

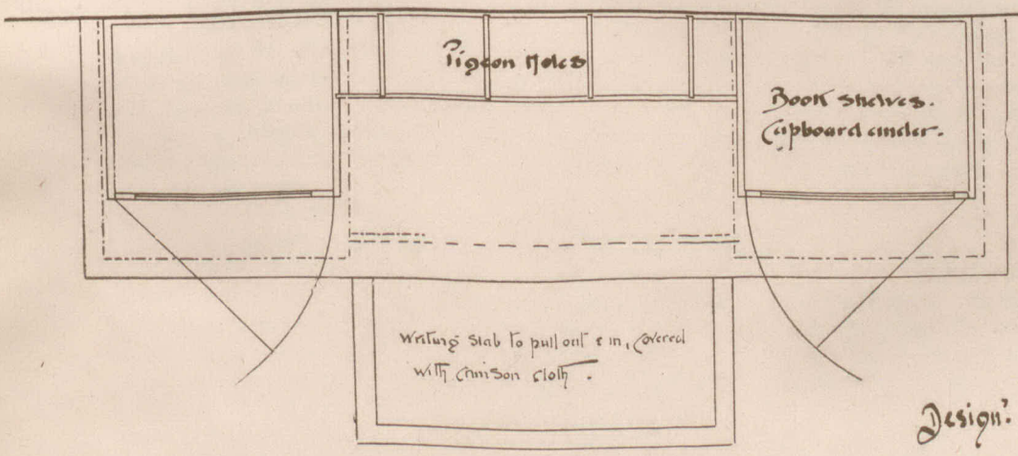
The Master Plumbers of the city of Quebec held a meeting on the 19th of March, to consider steps for the organization of a Plumbers' Association for that city. A committee was appointed to appoint officers and a second meeting to complete organization will be held shortly. The Association will endeavor to prohibit journeymen and apprentices from competing with master plumbers, and supply houses from selling to any but the legitimate trade. The City Council of Quebec are taking steps to improve the sanitary condition of the city.



SKETCH FOR PROPOSED HOUSE FOR MR. A. DICKSON PATTERSON, TORONTO.

DARLING, SPROATT [& PEARSON, ARCHITECTS.





Book Case & Writing Table in Smoking Room, made in Rimu, Mottled Kauri, Rewa Rewa, & Mangeo, New Zealand woods for Cuyler A. Holland Esqre

Design. by R. MacGregor Fripp. F.R.I.B.A.
Vancouver B.C.

STUDENTS' DEPARTMENT.

AN AUSTRALIAN EXAMINATION PAPER.

THE following papers were set for the last associateship examination of the Royal Victorian Institute of Architects :—

STYLES OF ARCHITECTURE.

1. Name the five orders of Classical Architecture, and give their principal proportions and leading features, and illustrate the descriptions with sketches.

2. Explain and illustrate by sketches the meaning of the following terms : Billet, cortile, flèche, loggia, carona, telamones, systile, sgraffito.

3. Give briefly the leading characteristics as to plan, construction and ornament of the Greek, Roman, Romanesque and Gothic periods, and give rough sketches.

4. Write a brief description of two of the following buildings, giving the style and dates and names of their architects : Church of St. Vitale at Ravenna, Cathedral of Pisa, Cathedral at Florence, Library of St. Mark's at Venice.

5. Write a short description of one only of the following buildings : Salisbury Cathedral, Henry VII. Chapel, Westminster.

6. Sketch the differences in plan and section between the Basilican form of churches and the Gothic cathedrals of the late twelfth century.

7. Give a short account of some building designed by Palladio, Inigo Jones and Philibert De Lorme.

8. Name a typical Romanesque church in Germany or France, its date and particular features.

9. Name some representative French cathedral and describe it.

10. As to the accompanying ten photographs, give in each case (*a*) the style, (*b*) the county or locality, (*c*) the order, period or century, (*d*) explain upon what details of feeling you base your opinion, (*e*) if you recognize the building, give what particulars you can in addition.

MOULDINGS, FEATURES AND ORNAMENT.

1. Drawn to a scale of ½in. to 1ft., a Greek Ionic column showing cap and base, lower diameter to be 3ft.

2. Drawn to a scale of 1½in. to 1ft., the entablature carried by column above, and write against the various portions thereof the name each bears.

3. Describe the use of the human figure as a decorative feature in Greek buildings, and name the parts of a building in which such decoration was usually put.

4. What are the leading characteristics of Romanesque mouldings, and from what sources are they derived? Illustrate with sketches to large scale.

5. Describe and illustrate by sketches to large scale the following terms : Gargoyle, fléche, battlement, dormer, finial, sedilia, machicolation, peristyle, crochet and ballflower.

6. A doorway is to be formed in a stone wall 3ft. thick, the opening to be 10ft. wide, drawn to scale of 1in. to 1ft., the archmould and plan of jamb (*a*) in the thirteenth-century Gothic style, (*b*) in the fifteenth-century Gothic style.

7. Sketch a Gothic buttress, also a flying buttress, and describe the origin and use of the latter. State the period which your sketches represent.

SHORING AND SANITARY SCIENCE.

1. It is proposed to convert the front of the warehouse, shown in drawings A, into a shop, and to put a cellar extending back 24ft. and the full width of the building and 10ft. high from floor to ceiling. Describe in order each operation necessary to carry out this work, and illustrate by pencil sketches to scale.

2. When rain-water from the roofs has to be conveyed to the sewers, what precautions must be taken to prevent egress of drain air from the down pipes in very dry weather?

3. As to water-closets. Describe and sketch some of the best types, and state their relative advantages and disadvantages.

4. How are automatic flushes produced? Describe and sketch some of the apparatus, and state under what circumstances their employment is necessary or advisable.

5. What is meant by the term "seal"? What should be the amount? How is it liable to be diminished? How can the latter be avoided? Give rough sketches.

6. Fig. 6 shows a plan of a building with stables at rear, and the w.c's., sinks, bath, &c., are marked. Sketch on the plan the various drains, waste-traps, &c., you would adopt, and describe and sketch the various fittings, connections, &c.

7. As to underground tanks, what special precautions must be taken in their construction and in the arrangements of supplies and overflows to avoid pollution of the water.

USEFUL HINTS.

It takes 813½ cubic feet of air to weigh as much as one cubic foot of water. If 813½ cubic feet were compressed into the space of one cubic foot, its weight would be about the same as an equal volume of water.

Radiant heat passes through moderate thicknesses of air and gas without suffering an appreciable loss or heating them. When a polished surface receives a ray of heat, it absorbs a portion of it and reflects the rest. The quantity of heat absorbed by the body from its surface is the measure of its reflecting power.

Admirable results may be obtained in interior decoration by confining the colors to creamy browns and relieving the color with gold. For instance :—Ceiling, white with a touch of cream ; paper, rich cream ground and open floral design with gold ; as bold a frieze as the height of the room permits ; and woodwork also in creams, with the styles and rails, of course, much darker than the panels. A room decorated in this way presents a warm and charming effect that would be admired by nineteen out of twenty people of good taste.

In estimating temperatures under conditions where the thermometer is not suitable, such as in the uptake, of breeching, of a boiler, says the Master Steam Fitter, the following list of melting points of metals may be of assistance : Plumber's solder, two parts lead, one part tin, melts at 440 degrees ; tin melts at 428 degrees ; lead melts at 612 degrees ; zinc at 793 degrees. It will be noticed that the addition of tin has a peculiar effect in reducing the melting point of the alloy below the temperature at which either of the component metals melt. With fine solder, which is one part lead and one part tin, melts at 370 degrees.

The manner in which mosaics are now made for decorative purposes is quite different from the elaborate system used by the ancients, which consisted in fixing the tesserae one by one on the cement previously applied on the wall. The modern method of the Venetian school consists in executing the mosaics in the workshop, by having the tesserae fixed with common paste on the section of the cartoon assigned to each workman. When all the parts of the mosaic are complete, they are put together on the floor or on a special wooden frame. The mosaic, which is then a perfect representation of the original cartoon, is again divided into sections on the reverse side, marked with a progressive number and carefully packed to be sent off to the place for which it is intended. The surface of the wall where the mosaic is to be fixed is then covered with cement, into which the sections of the mosaic are uniformly pressed, according to their numbers and the key-plan supplied to the fixers. When the cement has hardened, the paper on which the tesserae have been pasted is gently taken off, and the faithful copy of the original cartoon is again exhibited on the right side.

A GLASS ERA.

GLASS is a material whose astonishing possibilities we are only beginning to realize. Great progress in its manufacture has been made in the last ten or twelve years, blowing by compressed air having greatly increased the quantity and variety of the work that can be produced, while improved methods of moulding have made possible castings of large size. Large glass pipe, unaffected by the soil and having the strength of cast iron, is now turned out in considerable quantities. The material can also be made into plain and ornamental bricks, chimneys, furniture, and even tapestries and complete houses. M. Henrivaux, an enthusiastic French manufacturer, proposes to exhibit a glass house of novel design at the Paris Exposition of 1900. An iron skeleton will be erected, on which will be placed slabs of glass in such a manner as to form a double wall, in the interior of which hot air will be circulated in winter, and compressed air—which will cool the walls—in summer.

ILLUSTRATIONS.

SKETCH FOR PROPOSED HOUSE FOR A. DICKSON PATTERSON, TORONTO.—DARLING, SPROATT & PEARSON, ARCHITECTS.

COTE ST. ANTOINE ACADEMY, MONTREAL.—ALEX. C. HUTCHISON, ARCHITECT.

BOOK CASE AND WRITING TABLE FOR CUYLER A. HALLAND, —DESIGN BY R. MACKAY FRIPP, F.R.I.B.A., VANCOUVER, B. C.

RIEVAULX ABBEY, YORKSHIRE.

THE site selected for the Abbey was on the sloping bank of the Rie. The Valley of the Rie is so tortuous that, looking from the Abbey, it seems to stand in a magnificent amphitheatre, surrounded on all sides by hills clothed with trees rising to the level of the moors above. From its situation it obtains the name of "Rievale" or "Rivaulx," and is called in the neighborhood "Rieval" and "Rivers." It was founded by Sir Walter d'Espec, who endowed his foundation with the manor of Hamelac, with wood and pannages for their hogs in his forest and four carncates of land (a carncate being as much as one team could plough in a year). Its first Abbot was William, a monk of Clairvaux (1131–1146),—"a man of great virtue and excellent memory"—the last, Richard or Rowland Blyton, who, with 23 monks, signed the surrender. The history of Rievaulx is meagre and uneventful, sheltered as it is in its secluded valley—the highroad to and from nowhere. The brethren appear to have commenced building a small stone church in the prevalent Norman style immediately after their settlement, of which nothing remains except the lower portion of the transept, which was incorporated with the new church built by Archbishop Abred, in the pointed Gothic which was then becoming fashionable with the Cistercian order. The choir, although roofless, is in a tolerable state of preservation, although portions of the outer walls of the aisles are gone. The aisles were separated from the centre by ranges of clustered columns, with bandings instead of capitals, from which spring richly moulded pointed arches. Above the triforium the centre spandril, ornamented with quatre foils in sunk circles. At the east end are six lancet lights—three and three—the upper tier with clustered shafts and lozenge mouldings, and flanking these at the end of the aisles are two smaller lights, all richly moulded. The turret staircases to the triforium were placed at the angles, but only one now remains. The clerestory windows are also lancet—fourteen on each side—in pairs under an arch outside. Each pair is flanked by a smaller blank lancet. The refectory is a noble apartment 100 feet by 30 feet, situated on the west side of the Quad.

The ruins were at one time much overgrown with ivy, which has been removed. At the dissolution the commissioners caused the lead to be stripped from the roofs of the church, the Abbot's house and other buildings, nearly all of which remain sufficiently to trace out the whole plan, and it is remarkable that the mouldings are as sharp and clear to-day as when they left the builder's hands.

Many abbeys have sprung from Rievaulx—notably Melrose, Revesly and Rufford—and its influence spread to York and Fountain, many of them passing under the Cistercian rule. The Abbey of Byland is within a few miles, and the whole district is rich in antiquities. Rievaulx is owned by the Duncombe family, whose seat is at Hembley, the nearest town.

A POMPEIIAN BATHROOM.

A VERY interesting discovery recently made near the old site of Pompeii is described in the European journals. A large building was unearthed on the property of a Signor de Prosco, containing several rooms, among them three bathrooms, furnished with large sculptured marble basins, heating apparatus, lead plumbing work, with bronze faucets, and tiled floors and walls. The three rooms correspond in their arrangements with the usual hot, tepid and cold baths usually found in the old dwellings of the wealthy classes. This is, however, said to be the most complete, richest and best bathing installation so far found. It has been so well preserved on account of the roof not having caved in during the great eruption of Vesuvius which buried the city of Pompeii in the year 79. Most of the houses were entirely destroyed at that time, only a few vaulted structures resisting the immense pressure of the lava and ashes. This roof is nearly 45 feet in length.

THE APPLICATION OF COLOUR TO ARCHITECTURE.

By G. F. STALKER.

FOR a very long period the idea prevailed among architects, and the public, generally, that the application of colour to buildings, in any way whatever, was a sign of effeminacy or pedantry, or a lack of taste. It was considered that anything which interfered with the tameness of tone in the material of which a building was constructed, interfered with, if it did not altogether destroy, the purity of the style in which it was designed. Whether this was the result of a most unhappy misconception, or a want of knowledge of the laws of colour and how to apply them, it is difficult to say. Probably it was a little of both. But whatever the cause may have been, the result was, that for many generations, architecture and colour were divorced. Precedent, that fickle and uncertain mistress, was dragged from Egypt, Greece and Rome to prove that colour was shunned by the ancient architects in their work, and that they depended entirely upon the proportion of their buildings, and the elegance of their detail and ornament for the matchless beauty which they possessed.

Still the eyes of men looked for something more than form, (however perfect) and light and shade, (however well disposed), and some restless spirits examined and analyzed the ancient precedents until they discovered and established beyond a doubt, that colour was applied, and that extensively, to architecture, by all the nations of antiquity. The anti colourists had omitted to reckon with Father Time, who, though he had not altogether destroyed the buildings of the ancients, had almost wholly obliterated the colour with which they had adorned them. Further investigation has shown that the combination of form and colour was well understood and practiced by every ancient people who have made their mark upon the world by the excellence of their architecture. And this is the more remarkable particularly in regard to the three nations mentioned, when we consider the care which they must have bestowed upon every detail of their structures. For we cannot but be impressed with their exquisite beauty if we see them only in photograph or in drawings in black and white. Add to this the colouring which architects of such perfect taste would apply to their buildings, and if from the meagre basis which time has left us, we can re-animate them, we should have before us the most perfect examples of architecture.

Following the ancient and natural lines, the Byzantian and Rennaisance architects gave great prominence to color in their work. In many instances (particularly in Italy) they sacrificed architecture to such an extent that it became a sort of framework for mural painting and decoration. But, on the whole, their work was done in such good taste, that the defects in architectural detail were atoned for in the beauty of the colortng, and so, philosophically, it has been allowed to pass. Such an apology, however, would not hold good at the present day. There were thousands of excuses which could be given for the delinquencies of that time, which cannot, in fairness, be put forward now. We accept what they did, in good faith, based on the knowledge they possessed. Future ages will expect the same of us. We have all their work before us as examples to follow or shun, and we shall act foolishly if we do not profit by them.

In mediæval times the architects followed in the same lines as their predecessors. It is true, (all honor to them for it) they returned to the ancient practice of giving prominence to form. But they did not neglect the application of colour. They applied it to their columns and roofs, to their wall spaces and to their windows. Crude in many cases, no doubt, broken necked and out of joint are many of their figures. But the effort was there, and the aspiration which in such case covers a multitude of sins.

It is since the middle ages that the unfortunate divorce of colour from architecture has taken place. Various attempts have been made of late years to effect a reconciliation. In view of the fact that they were formerly wedded, and that they have never separated of their own desire, and that there is still, as there always has been, a strong affinity between them, it is surely the duty of all architects to bring them together again to live in harmony with each other. There are many reasons why this should be done in Canada, and many opportunities for doing it. One reason may be sufficient. In the sunny countries of Italy and Greece they enhanced the beauty of their otherwise beautiful

"Rievaulx Abbey"
E. Swales dr 189

buildings by the application of colour to them. The sun shines on these countries from January to December, giving them changes of natural raiment only varied in beauty from one season to another. One would imagine that buildings devoid of colour would be suitable in such places. But the luxurient colouring of nature has created in them a demand for colour everywhere. Then the supply is provided for the demand. The clays and marbles of Italy are ready to hand, and by skillful application, their structures lose all their strength or purpose but gain much in their appearance and grace.

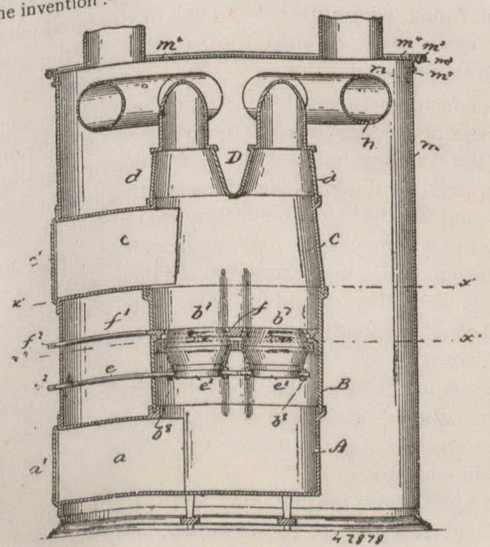
We cannot speak of our country as Sunny Canada, but we can hazard an opinion that there are few countries in the world of such varied colouring as our own. It is true we have not continual summer. But when summer is here it is brilliant; and our fall is so rich in colour, that it seems as if nature would provide us then with beauty enough to last us through our long, cold and colourless winter.

If the people in the sunny southern climes find pleasure in colouring their buildings, is it likely that the people of the frozen north will take less pleasure in the relief which colour will afford them? This is not likely. But the people will never take the initiative. It is for architects to do that. It is true that something has been done in this direction of late years, but it has been in such a hesitating, imbecile way that ii is scarcely noticeable

In applying colour to our buildings, however, it is necessary to say that, externally at least, the colony should be constructive. And, so far as this is concerned, we are happily circumstanced in Canada. We have within our Dominion almost every variety of granite, marble, stone and clay to provide us with the means of applying colour to our buildings in the most artistic and, at the same time, constructive manner. It may be, however, that our architects have not given this matter that amount of study which the subject merits. Appearances have that look about them. If, however, architects would consider that colour is one of the essential details of their profession a very few years would make a wondrous change in the tone and character of our buildings.

RECENT CANADIAN PATENTS.

No 47,878, for a heating apparatus, to Henry Ransom Luther, Cambridge, Mass. The accompanying illustration and statement of claim will serve to explain the invention :—

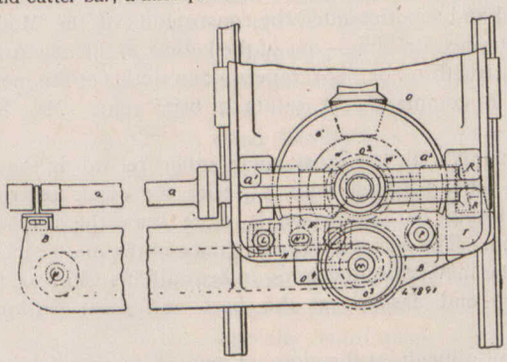


HEATING APPARATUS.

In a heating apparatus, a fire pot, an upper grate surface supported therein, means to shake said upper grate surface in sections, a series of independent pockets depending from said upper grate surface, a pocket support, a series of lower grate surfaces in the said pockets, and a common axis connecting said lower grate surfaces in series, whereby they may be rocked. In a grate of the class described, the combination with upper and lower grate surfaces, of pockets depending from the former and inclosing the latter, the upwardly and outwardly inclined, baffle surfaces on the sides of the said pockets to deflect the air or gases rising between the same away from the side walls of the pockets at the tops of the latter.

No. 47,891, for a machine for cutting coal, stone, etc., to Thomas Heppell, Leafield House, Chesterle street, William Patterson and John George Patterson, of Hardwicke Terrace, Gateshead, Durham, Eng. The following illustration and statement of claim will serve to explain the invention :—

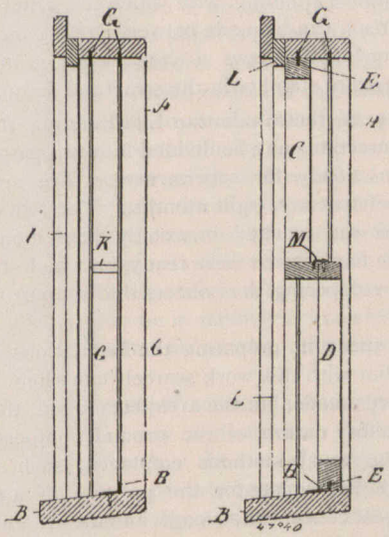
In a machine for cutting coal, stone and similar hard substances, the combination with a backstay B, pivoted to a suitable trolley, the means for locking the said backstay in its working position, of the cutter-bar A, mounted in bearings A1 and A2, on the inner end of the backstay, and a sliding bearing K, at the outer end of the backstay, cams R, R1, on the inner end of the said cutter-bar, a fixed pin S1, on the said backstay engaging the



MACHINE FOR CUTTING COAL, STONE, ETC.

said cams, a convey or chain or debris-removing apparatus carried on wheels journalled in the said backstay at M, M, and means for revolving the said cutter-bar and wheels carrying the said debris-removing apparatus.

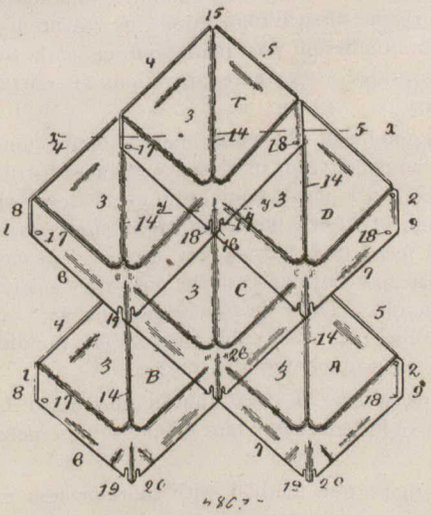
No. 47,940, for a window frame and sash, to Charles Day Morson, Park Hill, Ont. The accompanying illustration and statement of claim will serve to explain the invention :—



WINDOW FRAME AND SASH.

1st. The combination with the window frame, having parallel tongues G, at the sides, and a tongue at the top and sill, of the upper and lower sliding sashes C, D, having grooves at the side edges and at the top and bottom, and receiving said tongues. 2nd. The combination of the upper and lower sliding sashes, the meeting rail of the upper sash provided with a metal strip or tongue M, fitted into a groove in the meeting-rail of the lower sash. 3rd. The caskets K, secured to the window frame intervening the parallel tongues E, and opposite to the ends of the meeting rails of the sashes.

No. 48,037, for metallic roofing tile, to Ephraim Benj. Repp. Washington, Col. The accompanying illustration and statement of claim serve to explain the invention :—



METALLIC ROOFING TILE.

An approximately rectangular roofing tile having cut away sides 1 and 2, and provided with a rib 9, at one side 2, and an upward projecting flange 8, at its side 1, having holes 17 and 18 at the lower ends of the cut-away sides 1 and 2, and provided with points 19 and 20, at its central lower end, having a nail-hole 24, at the apex of a rib running along one side of the tile, and a raised portion 26, to accommodate the head of nail passed through a similarly situated nail-hole, of an under tile, having ribs 10 and 11, and flanges on the upper sides 4 and 5, said ribs and flanges meeting each other at their outer extremities.

METHODS OF RAPID CONSTRUCTION.

IN the Engineering Magazine for February there is an article by Mr. Francis H. Kimball, who, with Mr. G. K. Thompson, designed and superintended the construction of the Manhattan Life Insurance Building—one of the loftiest of the new American class of structures, or sky-scrapers—descriptive of the mode employed in completing it within a brief time. Mr. Kimball writes :—

The temptation to excel some other record in the quick-building line, together with a desire for quick returns from rentals, losing but one season, is more than the investor can withstand. The architect has no choice in the matter ; he must accept the inevitable, and bring to bear all his skill to accomplish the end desired in the best and most workmanlike manner.

It is not difficult, at the close of one of these quick-building operations, to trace the reasons which led to so successful a termination.

The most recent example in point of the actual time consumed in erection and in finishing the great bulk of the building —which has not been equalled up to the present time, pound for pound of iron and brick for brick of masonry—is the Manhattan Life Insurance Building, with which the writer is identified.

No comparison can be made between New York and Chicago records, as our building laws are more rigid, in that they exact a greater degree of stability in the structural features.

In the case of the Manhattan Life Building, the time consumed in its erection may be divided into two parts, as follows : —Foundations ready for superstructure, five and two-thirds months ; superstructure, eight months.. The roof or eighteenth tier of beams was reached in exactly three months from the time when the foundations were ready, on which to set the first piece of steel composing the bolsters that support the cantilever system.

The time spent in preparing the foundations may seem to those unfamiliar with this work scarcely consistent with the progress afterwards made, but the architects found that, in view of the unsatisfactory nature of the ground composed largely of quicksand, the usual methods employed, such as piling of masonry, were inadequate for the purpose of a foundation to sustain the great concentrated loads, and they thereupon decided to reach bed-rock, 57 feet below Broadway, by some unprecedented means. They finally concluded to introduce the pneumatic process used in sinking bridge piers to rock.

Sinking the piers to bed-rock rendered the building independent of any outside operations, either building foundations or tunnels. The fact that they were the pioneers in this undertaking, so far as the application of this principle to building work is concerned, led to much carefulness on the part of the engineers, Messrs. Sooysmith & Co., in respect to the probable effect on the foundations of adjacent buildings, and that there might be no disturbance of such foundations, by reason of going so far below them, no attempt was made to force work to the degree attained in bridge-work where operations are carried on in an open country.

The magnitude of the work may be better understood by reducing it to cubic yards of masonry. This substructure, which starts on bed-rock and continues up to the level of the cellar floor, consists of fifteen piers, varying in size from 9 feet in diameter to 21 feet 6 inches by 25 feet square. The caissons made of steel corresponded in size to the piers they sustain, and were 11 feet in height. These caissons were filled with concrete, and contained altogether 1,260 cubic yards. The number of bricks used in the piers amounted to 1,500,000.

From this it may be seen that a good-sized building was sunk out of sight before any part of the superstructure could be begun.

The fact that a new method, with more or less experimental work attending its adoption, had to be devised, and the really large mass of masonry forming the piers, are sufficient excuses for the length of time consumed in this feature of the building. It was a work which in olden times might have taken twelve months. Even the progress attained was due to the fact that three relays, or gangs, of men were employed in sinking the caissons, thus giving the work the benefit of the full twenty-four hours in one day for the entire period of five and two-thirds months, except in the case of the masons, who worked only regular hours.

Suffice it to say that in three months about 5,800 tons of steel were raised into position. This was not accomplished, however, without night work. When the foundation work was prolonged to September 1, the prospect of completing the building on May 1 was not promising. A council was held—attended by the building committee, architects and builders—the purpose of which was to incite the builders to greater activity and also to settle upon a plan for beginning and continuing night work until the roof was reached.

This meeting resulted in the institution of day and night gangs of men for the erection of the steel frame ; and by reason of the time which, in consequence of the delay in the foundations, the contractors for this branch of work obtained for the making of the wrought material and the delivering of the same within a short haul of the building, coupled with the fact that great care was taken at the rolling mills in laying out the various members to templates, so that when they were assembled at the building no fitting was required, the work of erection went on without interruption from the beginning to the end. Recalling the incidents of these three months' work, and the system employed to produce the quickest results, it seems that no mistakes were made and that every moment was counted.

To better illustrate the magnitude of the skeleton, I may say that there were girders weighing 40 tons, many columns of 10 and 12 tons each, and cantilevers of 80 tons (in four sections of 20 tons each), the length being 67 feet.

All of these heavy members required special means of transportation ; the heaviest girder had to be rolled from the dock to the building by night, the task requiring three nights. It took just twenty minutes to raise it from the street to its position on the second floor.

On account of the great risks where material must be raised 300 feet in the air, and the haste with which the work must be done, the setters of iron and stonework should be picked men with certain qualities, the most prominent of which must be good judgment and steady nerves. It is rarely that serious accidents and even deaths are not recorded against buildings of even less magnitude than the Manhattan Life Building, but, strange to say, in this case there was no loss of life, and but few accidents worth mentioning. The work was greatly facilitated by the use of a travelling frame, with a derrick at each angle, by which material could be easily disposed of as it was raised from the street and placed in its proper position.

It was considered advisable to begin the brick masonry when four storeys of the steel frame had been set in position. This enabled the frame-setters to keep in advance of the other trades. As far as possible this plan was pursued throughout, but inasmuch as bad weather has no effect on iron and steel, while with masonry the contrary is the case, at times it was necessary to lay off the masons while the others pursued their work. When high winds prevailed all work had to cease. But with good weather, when all could work advantageously, the masons could hardly hold their own.

There seemed to be a friendly rivalry between the two trades as to which should outstrip the other, and the greater the exertion the brighter was the prospect of closing in the building before cold weather set in.

Rough piping both for plumbing and steam began when the masons had reached the fourth storey, and continued without interruption until all the lines, vertical and horizontal, with all their branches, were in position. In the meantime the masons had begun setting the fireproof blocks forming the partitions, and as far as practicable this was carried along with the advancement of the outside walls.

When the partitions of a storey had been set, the electrician ran his wires, enclosed in conduits, to the various fixture outlets. One can hardly realize now that this "roughing," as it is called by the workmen, is concealed from view—that more than five and a half miles of gas, water, waste and vent-pipes, five miles of steam pipes and thirty-five miles of electric wires were required to perfect the respective systems. The facing of the front on Broadway contains about 30,000 cubic feet of stone, which was cut and set in position in eighty days.

It was not at first the idea to undertake to finish more than ten storeys by the first day of May, as the plastering could not

be commenced until the winter was well advanced, and the outlook for enclosing the roof seemed distant and discouraging. When the twelfth storey was reached a temporary roof was deemed necessary for the protection from rain and snow of all the storeys below; and such roof was constructed, and was of great help in removing all fear of damage to the finer grades of interior fittings.

Immediately thereafter plastering was begun, temporary heat was supplied, windows enclosed, and a general advancement made towards the completion of the storeys below. There was no cessation, however, in building above this temporary roof. Fortunately the weather was propitious, causing but little delay. The building was permanently enclosed by the time severe weather set in. Then all the forces that could be brought to bear were employed in the supreme effort of getting the entire building in such condition that tenants could occupy on the first of May any rooms that they might choose. It was successful. It proved a good investment for the company, as the greater proportion of the offices rented were above the sixth storey.

To follow all the different trades and describe the various methods employed to force the work almost beyond the limit of human endurance would be an interesting story. Suffice it to say that to the layman there can be no realization of the vastness of the undertaking.

Take the laying-out of the engineer's department—the boiler and engine, the electric and elevator plants, the plumbing and heating systems contained in a building of this magnitude, the decorative treatment of the interior, employing the carpenter and cabinet-maker, plasterer, marble-worker and metal-worker (on stairs and elevator fronts), the mosaic and tile flooring, gas and electric fixtures for lighting, to say nothing of a more or less ornamental exterior—and it seems hardly less than a miracle that all these different interests, all large because the building is large, could have worked harmoniously together, and achieved such satisfactory results in the period of eight months.

It might be asked, have manufacturers of building material kept up with the rapid advance in methods of handling, producing articles that will set more quickly, and reducing to the minimum the danger of destruction, such as that from dampness proceeding from brick, plastering and concreting?

If the "drying out" of a building could be reduced to a few weeks instead of months, the length of time required for its erection would not be so much a matter of uncertainty. Some thought has been given to the mixing and manufacture of plaster, the application of which is made more simple than formerly by certain quick-setting qualities which make it practicable to put on the wood trimming within a few days after a room is white-coated.

There is yet room for improvement in the direction of freeing the process of plastering from dampness, and rendering it less objectionable from the standpoint of cleanliness to those who must follow the plasterers. But there is one feature of the mason's work to which much attention has been paid during the past ten years, but seemingly not in the right direction; for the difficulty remains although the material is harder. I refer to fireproof blocking used for partitions and flat arches between beams. The blocks designed for partitions are not of uniform size; therefore the surface of one side of the partition becomes very irregular, as the mason lays up one side to a line. The plasterer must even up with plaster, the thickness of which varies anywhere from half an inch to 1½ inch. It cannot be expected that the shrinkage of plaster will be uniform, to say nothing of the danger of freezing when the work is done in the winter months. Fireproofing of floors between beams consists usually of flat arches formed of terra-cotta blocks made hollow to secure lightness. These blocks do not make up a thickness equal to the depth of the beam, where the beam is more than 8 inches. They vary in depth according to the span between beams; and where the beam is more than 8 inches there is a space above the arch to be filled, in order to meet the material of which the finished floor is composed. This space may be 4 inches, possibly 6 inches—sometimes more, sometimes less, according to the depth of beam. The concrete is generally composed of ashes and cement, especially when saving in weight is important.

Such a foundation is not of the substance required where there is a direct action thereon—as in the case of tile or mosaic floors—proceeding from the heavy and constant traffic usual in business buildings. Consequently such floors show the natural impact of the spongy concrete by numerous cracks, which, in the case of mosaic floors, can never be properly repaired.

This defect is not the only one of importance. A large percentage of the dampness usual in masonwork proceeds from this source. As this concreting is usually done just before the laying of the floors, it is quickly covered in, and dampness must pass through the wood-flooring in the process of drying-out. It is natural to suppose that kiln-dried lumber will absorb much of the dampness, and swell in consequence, so that afterward, when heat is turned on, it will shrink and open at every joint. More thought should be paid to a remedy for this, which may properly be termed a defect. Arches could be made that would reduce the space referred to, thus removing an element which, although it may not materially retard quick building, causes much of the criticism on the defective work (so considered) now credited to rapid methods of building. Other features no doubt enter into this class of building to which attention might be directed with profit to the builder, but it is hardly possible to discuss them in detail here. The individual experiences of others would be interesting and profitable.

Without co-operation on the part of the builder, the architect's suggestions are of no advantage, and the work lags in consequence. It is important, therefore, that none but the most reliable men should be selected to do the work. The architect, moreover, should make the selection, for if he is to come in for his share of censure in case of delay, it is better that he and his own men should wholly deserve it than that he should suffer for mistakes over which he has had no control. Should the whole work pass into the control of one firm (usually masons), it should be an arrangement satisfactory to the architects.

The architects of the Manhattan Life Building, Messrs. Kimball & Thompson, were ably assisted throughout, and they take great pleasure in publicly acknowledging their indebtedness to the different firms who aided them to make so remarkable a record.

The secret of success always lies in constant, unremitting push in every department. Begin at the very beginning; an ounce of push at the start is worth a pound of push at the end. Start the trades whenever and wherever it is possible so to do, and keep up the tension; then satisfactory results cannot fail to follow.

MANUFACTURES AND MATERIALS

THE OLD MEN'S REFUGE AT KAMLOOPS, B. C.

Messrs. Knowles & Co., of Avondale, have purchased for $10,000 from Messrs. Dill Bros., the plaster quarry at St. Croix, N. S.

The Beamsville Pressed Brick Company have recently been experimenting with a new brick machine, the invention of Mr. Sims, of Toronto. The machine is said to be capable of turning out from forty to fifty thousand bricks per day.

S. A. Lazier & Sons, of Belleville, Ont., have secured the sole right for Canada to manufacture the Norwich Folded Paper Floor Deafener, which has been extensively used by architects in the United States for building purposes with the most satisfactory results.

Mr. H. J. Warsup, Superintendent of the C. P. R. Cement Works at Vancouver, has recently experimented with British Columbia clay for the manufacture of cement, fire and building brick, etc. The experiments are said to have proved that in British Columbia there is to be found china and pottery clay in considerable quantities, and the necessary materials for the manufacture of plaster paris, fire brick, building brick and cement.

The Montreal Quarry Co., Limited, which has recently been granted incorporation, propose to acquire certain quarries in St. Denis Ward, Montreal, and to carry on the business of quarrying and selling stone. The quarries are upwards of two million feet in extent, are already fully opened up and well-equipped with plant. From them has been taken a large amount of limestone used in the public and domestic buildings in the city of Montreal. The provisional Board of Directors of the new company consist of Alderman Peter Lyall, P. A. Peterson, C.E., D. G. McCaskill, W. G. Reid and George McDougall.

CODE OF ETHICS.

THE following code, which is in conformity with the best standards of practice, has been adopted by the Boston Society of Architects :

Section 1. No member should enter into partnership, in any form or degree, with any builder, contractor or manufacturer.

Section 2. A member having any ownership in any building material, device or invention, proposed to be used on work for which he is architect, should inform his employer of the fact of such ownership.

Section 3. No member should be a party to a building contract except as "owner."

Section 4. No member should guarantee an estimate or contract by personal bond.

Section 5. It is unprofessional to offer drawings or other services on approval and without adequate pecuniary compensation.

Section 6. It is unprofessional to advertise in any other way than by a notice giving name, address, profession and office hours, and special branch (if such) of practice.

Section 7. It is unprofessional to make alterations of a building designed by another architect, within ten years of its completion, without ascertaining that the owner refuses to employ the original designer, or, in event of the property having changed hands, without due notice to the said designer.

Section 8. It is unprofessional to attempt to supplant an architect after definite steps have been taken toward his employment.

Section 9. It is unprofessional for a member to criticise in the public prints the professional conduct or work of another architect, except over his own name or under the authority of a professional journal.

Section 10. It is unprofessional to furnish designs in competition for private work or for public work, unless for proper compensation, and unless a competent professional adviser is employed to draw up the "conditions" and assist in the award.

Section 11. No member should submit drawings except as an original contributor in any duly instituted competition, or to secure any work for which such a competition remains undecided.

Section 12. The A. I. A. "schedule of charges" represents minimum rates for full, faithful and competent service. It is the duty of every architect to charge higher rates whenever the demand for his services will justify the increase, rather than to accept work to which he cannot give proper personal attention.

Section 13. No member shall compete in amount of commission or offer to work for less than another, in order to secure the work.

Section 14. It is unprofessional to enter into competition with or to consult with an architect who has been dishonorably expelled from the "Institute" or "Society."

Section 15. The assumption of the title of "Architect" should be held to mean that the bearer has the professional knowledge and natural ability needed for the proper invention, illustration and supervision of all building operations which he may undertake.

Section 16. A member should so conduct his practice as to forward the cause of professional education and render all possible help to juniors, draughtsmen and students.

THE PLANNING OF SMALL HOUSES.*

By T. W. F. NEWTON.

IN planning a small house it should be our especial study to avoid waste of space, and yet insure general utility. There must be no long passages ; height must be kept down, and roofing as simple as possible. Breadth of effect must be studied rather than prettiness and ornament, as in this class of work there is no money to spare for either ; all must be simple. One can hardly do better than conceive one's design on the lines of the old cottages in the immediate neighbourhood, as they will invariably suggest much in the way of simple planning, detail, and construction. It cannot in this connection be too clearly laid down that passage must be reduced to a minimum ; this class of house cannot afford that 10 per cent. of its cost should be spent in passage. In large houses it is generally unavoidable but in small houses it can be so curtailed as to be practically *nil.*

The ground plan is the key to all the rest ; if that be bad, as a rule all is bad ; but it must be worked out by a careful consideration of the needs of the first floor. The front entrance should be fairly imposing, the door of ample width, with an inviting air about it. If it be a little lower than the usually given proportions, so much the better, as it will apparently increase the width. It is well either to have a porch or pent, or to recess the door, to afford shelter for anyone waiting to be admitted. Care should be taken that the front door be not too much raked by the principal windows. The door should open into a small lobby or outer porch, this in its turn should have a small cloak-room or recess for coats and hats. Three feet by three feet will hold a considerable quantity of these, and the general tidiness of the hall is thus preserved. Following this lobby an arched opening should give into a small hall of about 9 ft. by 12. This hall-sitting room, if carefully planned so that it may be shut off from the stairs and kitchens, will give quite a useful apartment. To secure this object it is advisable to have all the doors on one side, that the remainder may be free from traffic. An ingle-nook, if it can be arranged, or a corner fireplace will add to the picturesqueness of this cosy room. The ingle should always be low, never more than 6 ft. 6 in. or 7 ft., and a deep beam with a wide shelf over. An internal treatment of bricks gives a solid air of comfort, and wide benches at the sides add to this. The usual long passage hall is so much waste space, and quite useless as a room of any sort ; neither can it be warmed. With this and the well of the stairs a current of cold air is generated which is drawn into the rooms every time the door is opened. If the stairs be shut off by a swing-door or a curtained arch, and a good fireplace given to the hall, an air of warmth and comfort is secured and greater privacy gained to the house, as the inmates may pass up and down unobserved from the hall.

The dining-room, if possible, should have an eastern aspect, and if it can also have a south light so much the better. The morning sun is always valuable in the dining-room in a house of this type, as it serves also as the breakfast-room, and the dinner is usually in the evening when the lamps are lighted. The chief points to be considered in this room are width, which should not be less than 13 ft. and ease of service to the kitchen and pantries —a small serving hatch from the latter serves a good deal of needless traffic. The fireplace is best at one end and the door at the other, at right angles to the fire. A long, low window, with a seat recessed, and a simple beamed ceiling should make a comfortable and useful room.

The drawing room, being more for afternoon and evening use, should face south to west. Here, I think, a square room is to be preferred—say 14 ft. by 14 ft.—with bays and ingle, and a plain ribbed plaster ceiling. There is a tendency to make ingle-nooks long, narrow, and high ; this is out of character with the old traditions, as all old ones are just the reverse in every particular.

The kitchen should be of fair size, and the light preferably on the north or east side, so that the midday sun may not add to the heat. The windows should be at right angles to the fire, so that the light on the range may be unobstructed. The larder should have a similar aspect, and may open out of the scullery. The pantry is most useful near the dining room for easy service. The scullery should have sink and copper on the same side, under the window, and out of the draught of the door if possible ; there should be two rows of 6 in. white tiles round the sink. The trades entrance and yard should be well away from the front door, and the space for coal and wood should be under cover and enclosed from the back porch. W. c. and ashpit are best distinct from the porch, and the former should not, as is too often the case lead out of the scullery. A small tool-house is useful for tools, stores of potatoes, etc. A good height for downstair rooms is 9 ft.

The first floor is gained by a light, easy, and wide staircase, alike convenient for all parts of the house, and the space underneath may be utilised for pantry or way to small cellar. The staircase, both up and down should be well lighted, and the landing so planned as to give easy access to four or five bedrooms, bath-room, box-room and w. c. Of the bedrooms, two should be of good size, and two or three smaller. A large bath-room with hot closet for airing linen is a great convenience ; the shelves should be of open battens so that the heat may ascend. It is best to arrange the bath-rooms and w. c. over the scullery and outbuildings ; by this means the circulation from the kitchen boiler is kept short, and breakages, should they unfortunately occur, do not cause so much damage.

The bedrooms must be arranged with an idea as to the position of the bed, so that it may be shielded from the draught, and give a view of the fire to anyone in bed. Strong light opposite the bed is to be avoided. The roof can be started at 7 ft. and go off to 9 ft. in the centre.

* From a paper read before the Birmingham Architectural Association.

PAGES

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