CANADIAN ARCHITECT AND BUILDER

Mechanical & Industrial Arts: Decoration · Furnishing · Construction · Sanitation · Engineering

VOL. VI.—NO. III. TORONTO AND MONTREAL, CANADA, MARCH, 1893. PRICE 20 CENTS $2.00 PER YEAR.

INDEX TO ADVERTISEMENTS

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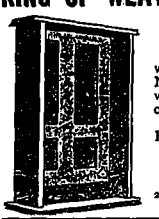

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CANADIAN ARCHITECT AND BUILDER.

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Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 15th day of the month, and changes of advertisements not later than the 5th day of the month.

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

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

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THE celebration of the two-hundred and fiftieth aniversary of the founding of the city of Montreal is to take place on June 24th and four following days. The inauguration of the National Monument Building on St. Lawrence Main street will take place on that occasion.

WE hope it will not be regarded as a reflection upon the work of Hamilton plasterers that the vibration caused by the running of the trolley cars through the streets is said to have caused the plaster to fall off the walls of the buildings of that city.

MR. T. C. Keefer, the celebrated engineer, who was the Canadian Commissioner at the Paris Exposition, thinks that a very striking exhibit of Canadian Engineering as manifested in the great public works of Canada, should be shown at the Columbian Exhibition at Chicago.

IN this age of keen competition it is refreshing to come across a trade that needs not to advertise, but is advertised for. Mr. George Johnson, Dominion statistician, of Ottawa, has received a letter from Georgetown, Demerara, asking for the names of firms able to supply ready-made houses. If any of our readers are able to fill such orders, they may, by communicating with Mr. Johnson, find an opening for doing business in this line.

THE designs submitted in the final competition for the proposed Government buildings at Victoria, B. C., have been forwarded to Montreal, where they were examined by the experts, Messrs. Curry and Taylor. Mr. Curry has gone to Victoria, taking with him the drawings. After conferring with the commissioner of Lands and Works, of British Columbia, the final decision of the competition will be made. We hope to be able to publish full particulars regarding the result in our April issue.

OUR New York contemporary, *Metal*, alludes to the deceptive practice of Canadian hardware dealers in branding their goods with fictitious names of United States manufacturers. Whatever cause for complaint Americans may find in this practice, Canadian manufacturers and Canadians generally should protest against it on the ground that it implies the inferiority of Canadian manufactured goods, and perpetuates the false notion, already too prevalent, that a foreign made article is necessarily superior to a domestic one.

MUCH interest has been awakened by the publication in the ARCHITECT AND BUILDER for February of the results of the series of tests of building stones conducted at the School of Science, Toronto, under the direction of the Ontario Association of Architects. The tests included samples of both native and foreign stones. The excellent showing made by the former should be a matter of satisfaction to the quarry owners, and to architects and builders desirous of assisting to develop Canadian resources by using native material whenever its quality can be shown to be equal to that of foreign productions.

OUR esteemed Indianapolis contemporary, *Stone*, discusses in a recent issue the subject of continental union, and reaches the conclusion that such a union would mean to the United States "a distinct commercial gain unequalled in the annals of the world." Following this comes the somewhat paradoxical statement that "it would be better that formal action be taken first by Canada, the country really most interested." In other words Canadians

are told that they should sue for the privilege of conferring upon the United States a distinct commercial gain which is declared to be unequalled in history. Canadians will appreciate our contemporary's humor.

THE architect for the new city and county buildings in Toronto, in which so much interest has centered since the disagreement with and dismissal of the contractor, has issued an advertisement inviting tenders for the completion of the contract. We are pleased to see this course taken in preference to an attempt to complete the work by day labor, for reasons previously stated, and we hope that the result will be a satisfactory arrangement under which this important undertaking may be brought with reasonable dispatch to perfect completion.

THE unsightly condition of Queen's Avenue, Toronto, has more than once been the subject of comment in these columns. It is gratifying to observe, that during the present year something is likely to be done towards its improvement. The Ontario Government propose to beautify the portion of Queen's Park in front of the new legislative buildings, which would serve to accentuate the unsightly appearance of the avenue leading thereto. The Government has been asked to join with the city in improving the avenue in a manner to harmonize with the portion of the park to which it leads. This the Government seems willing to do. We hope to see the natural beauties of the avenue supplemented to an extent which will make it a feature of pride to the citizens.

A BILL has passed the House of Representatives and the Senate of the United States, providing that in future the designing of Government buildings shall be done by private architects of recognized ability instead of under the direction of the supervising architect of the Government. The extent of this work is such that when attempted to be done in one office, it necessitates it being turned out at machine speed, and we might add, with the marks of machine manufacture upon it. Under such conditions there is no time for careful thought, with consequently the public architecture of the country, which should afford examples of the best architectural talent, is greatly inferior to the domestic work. Under the bill to which we have referred, the standard of such architecture will doubtless be greatly elevated, and with it the standard of public taste.

THE *Northwestern Architect* relates an amusing incident of an American architect who, having secured a commission from Canada, was coming into the Dominion via Suspension Bridge with the necessary plans for the carrying out of the work in his posession, when he fell into the hands of a confidence man in the form of a customs officer, who, after having extracted from him, under friendly guize, the necessary information as to the value of the drawings, etc., compelled him to pay one hundred dollars duty upon them. The architect in question was evidently what in western parlance would be termed a "tenderfoot," or in other words, one who is unfamiliar with the business of evading payment of customs duties. We would advise him to study the methods of certain architects in the eastern border cities, who, while taking out of Canada large sums in the form of commissions, have never been known to contribute a dollar in customs duties to Her Majesty's exchequer.

ADVICES from the principal cities and towns throughout Canada indicate that the volume of building operations during the season which is about to open, will probably be in excess of that of last year. In Montreal the indications point to a busy season, and in a modified sense the same can be said of Hamilton. The outlook in Toronto has considerably improved since the beginning of February, at which time it appeared exceedingly gloomy. While it is yet too early to speak with definiteness, there are prospects that a fair season's business will be forthcoming. There is great cause to hope that these prospects may be realized, as the condition of things in the city for many months past has been exceedingly trying to architects, builders and material dealers. The scarcity of work has had the effect of intensifying competition and further depressing prices which had previously reached far too low a standard.

THE interior of the Toronto public library building was recently remodelled, and is in consequence much better adapted than formerly for its purpose. In view of the expense which has been put upon the building for the purpose of increasing its attractiveness and usefulness, it is to be regretted that the means have not been discovered to prevent the public reading room from being used as a place of shelter in winter by persons of the dissipated class, whose presence in some cases is so offensive as to make the atmosphere unendurable beyond a short period. Rather than be brought in contact with persons of this class and be obliged to inhale the impure atmosphere due to their presence, the respectable reading public is forced to forego to a large extent the advantages to be derived from frequent visits to the public reading room. We can quite understand the difficulty which may be experienced in attempting to exclude the undesirable class of persons to whom we have referred, but it ought not to be an impossible task, and in the interests of the reading community it should be done.

THE importance of trifles in a contractor's business is not as fully realized as it should be, notwithstanding that if neglected they cause ruin, and if looked after will make a fortune. A brick merchant may not be particular about his bricks being one-eighth of an inch below the regular thickness, but to the builder this means he will want a considerable number more bricks to complete his job, for it will take 1125 bricks to fill the space usually occupied by 1000. Again what time can be lost by unpunctuality. A contractor employing 50 hands will lose fifteen hours per week by the loss of one minute each time of beginning work. In no trade is a good and accurate system of book-keeping so requisite as in that of building, on account of the various and multitudinous features of the business, the men and materials not unfrequently, being not under the employer's eye, and other minor matters. Whether it be a large or small business, every hour worked and all materials used should be charged to some account, and every sack, cask and package hired should be returned. The cost of every contract should be known to a fraction in order to see how the matter came out, and for guidance in future work. Attention to these matters together with great case in estimating for jobs, will prevent contractors much inconvenience and loss.

MUCH valuable information for architects and builders is contained in the paper which we publish in the present number entitled "Some Observations for Fireproof Building in New York," by Mr. J. C. B. Horwood. Canadian architects and builders have already been called upon to deal to some extent with the problems attendant upon this form of construction, and in the future may expect to be confronted with others of greater magnitude. The knowledge of this fact, is leading them to enquire extensively into the subject, and Mr. Horwood's timely contribution will be very much appreciated, more especially as it is known to be the result of the observation of one who has had exceptional opportunities for the acquirement of knowledge in this line, and who is known to be a painstaking student. In this connection it is said to be the intention of capitalists in Ottawa, Toronto and Montreal to erect iron frame structures approaching to some extent in height those in the large American cities. We regret to observe that it is declared to be the intention of the projectors of some of these buildings to employ American architects to design them and supervise their erection. Such action would be an unjust reflection upon the competency of Canadian architects, many of whom are undoubtedly as able to carry out work of this character to successful completion as any foreign architect who might be imported for the purpose.

THE recent accident at the Odd Fellows' Hall, Weston, is an instance of the foolishness of carrying out alterations to buildings without professional aid. About a year ago the members of the society decided, without the opinion of anybody who had any knowledge in such matters, to remove certain wooden posts from the room on the ground floor, which was 25×36. These posts supported two beams (10×10 each) which carried the ceiling joists, the beams being 25 feet long and resting on the posts (6×8 each) of the framed buildings by tenons only 2×8. As a substitute for the supports removed, a local blacksmith was

called in to fix a 1¼ inch iron rod under each beam, joined by nuts and washers to the posts on each side of the building. These rods supported two 2½ inch iron struts about 12 inches long, set at equal distances under the beams. On the evening of the accident it appears that the people present assembled altogether in one part of the room upstairs directly over one of these beams. The iron rod beneath snapped close to one of its washers at the side of the hall, and the whole floor gave way. There was no flaw in the iron as reported, but the weight on the rod was excessive. As the upper room was not half filled at the time, the accident was plainly the result of ignorance on the part of those who carried out the alterations in the building. Fortunately the results were not so serious as they might have been. We trust the accident will serve as a lesson to those who have to do with altering existing buildings or erecting new ones.

THE Canadian Society of Civil Engineers took a very important step at its last meeting in adopting a resolution moved by Mr. Alan Macdougall, asking for a committee to consider the present status of the profession. This points to an ultimate closer bond amongst the members, and the formation of what will be practically a close profession. From the tenor of Mr. Macdougall's remarks at the meeting, the intention seems to be to have one society for the whole Dominion rather than provincial societies such as now exist in our medical, legal and land surveyors' and other corporations in the several provinces. This subject will be found to be surrounded by many obstacles which will require the most careful attention and deliberation. The interests of practitioners who are not now members of that society, although belonging to English and American, must be carefully weighed. Provision must be made to acknowledge those who are now enjoying a well earned and honorable rest; and considerations granted in view of necessity arising for the consultation of engineers on special subjects who may not be residents of the Dominminion. The idea which prevails that this movement is aimed at making every engineer pass an examination, or to admit to practice only such men as now belong to the society, and as soon as they fall into arrears cut off their license, is we are confident, erroneous. We doubt not it will be to the advantage of employer and employed to have a code of professional ethics, and if the members will respond heartily to the circular which has been addressed to them, the object will likely be attained.

ILLUSTRATIONS.

SHOPS AND OFFICES, CHAPEL LANE, BRADFORD, ENG.; RESIDENCE AT BRADFORD, ENG.—F. M. RATTENBURY, ARCHITECT, VANCOUVER, B. C.

The large building is erected of fine warm buff sandstone, and is so designed that the fine detail of the whole building is observable from the street. The residence is built of stone and brick, with cement and half timber work introduced.

ILLUSTRATIONS ACCOMPANYING PAPER ON "SOME OBSERVATIONS ON FIREPROOF BUILDING IN NEW YORK," BY J. C. B. HORWOOD, IN THIS NUMBER.

ROAD AND CLUB HOUSE FOR THE HAMILTON JOCKEY CLUB.—JAS. BALFOUR, ARCHITECT, HAMILTON.

PORTRAITS OF OFFICERS OF THE TORONTO BUILDERS' EXCHANGE.

LEGAL DECISIONS.

It has been held in England that a barbed-wire fence next to the public way is a nuisance and the owner of same is liable for any damage happening to the public.

The master in ordinary at Toronto has given a judgment holding that where a mortgagee sells under power of sale subsequent lien holders are shut out.

An appeal has been dismissed against the judgment of Mr. Justice Rose, who held that a corporation was not liable for damages for injuries caused through a horse becoming frightened at a hammer of a pile driver used by their contractor on the highway.

It has been held in a recent lien case tried in the Toronto courts that if at the time of registration of the lien nothing is due to the contractor, there can be no lien, and that giving priority to a lien is not equivalent to enacting that the owner shall pay it whether the percentage has become payable or not.

CORRESPONDENCE.

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

DECORATION OF THE LEGISLATIVE CHAMBER AT TORONTO.

TORONTO, March 10, 1893.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—I have recently had an opportunity of inspecting one of the most ambitious pieces of decorative work yet attempted in Canada. I refer to the legislative chamber of the new Parliament Buildings in this city. While I cannot but admire the courage which prompted a departure from orthodox methods, it nevertheless appears to me that the idea of boldness of coloring has in this instance been carried a step too far. I would be pleased to know to what extent this opinion is shared by your readers.

STUDENT OF COLOR.

ORGANIZATION OF CANADIAN BUILDERS.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—The views expressed on the above subject by Mr. J. L. Phillips, Secretary of the Toronto Builders' Exchange, in the January number of your paper will, I think, be endorsed by all builders who have the interest and welfare of the craft at heart, the only wonder being that steps have not been taken, ere this, to bring about a closer relationship between the members of the several trades connected with, and incidental to building operations.

Canada is far behind in this matter. No doubt the unsettled state of the trade, and many of the inconveniences which builders are suffering from, would not exist if the several associations in the country relating to this line of business were brought more into touch one with the other and amalgamated under one National or Provincial Association.

Such a step would not only strengthen the trade as a body, but the experience of fellow craftsmen in all parts of the country could be obtained, which would be capable of actual individual application with good results.

The members of the building trades in Canada must be envious of their American friends meeting this month at the twelfth annual convention of the National Association of Builders, which promises so much good to all concerned. There is no doubt that such an Association in Canada, besides bringing about the improvements named by your correspondent would teach the several members of the trade the best methods of securing the establishment of equitable and profitable business conditions and would act as a strong security against unfair legislation and undesirable workmen, whether employers or employees.

It is hoped that now the subject is brought forward it will not be allowed to drop, but that the several Associations interested will come forward with their views and some steps be taken which will bring about a unity in this important department of business that will strengthen its position and place it on a more satisfactory and promising footing.

Yours truly,

AN INTERESTED BUILDER.

PUBLICATIONS.

The *Cosmopolitan* Magazine offers fifteen hundred dollars, in four prizes of one thousand dollars, three hundred dollars, two hundred dollars, and one hundred dollars, respectively, for the water colors which shall be chosen by a committee from such drawings as may be submitted by the artists of the United States or Europe on or before twelve o'clock on the first day of December, eighteen hundred and ninty-three. The subjects are to be selected from the life of Christ, taking those scenes which teach in the highest forms the lessons of love, patience, humility and forbearance, with fidelity, as far as may be, to the actual surroundings and conditions of the period. The treatment should be calculated for single page reproduction in the *Cosmopolitan*, in size five by eight inches. The subjects to be suitable, as far as possible, for use in stained glassfor church orcathedral. The originals for which prizes are awarded will become the property of The *Cosmopoliton*.

FIREPROOF PAINT.—Seventy pounds of zinc white, 39 lbs. of air slaked lime, 50 lbs. of white lead, 10 lbs of sulphate of zinc. Mix the zinc white and lime together and grind in elastic oil, then add one gallon 35° water glass, then the white lead and sulphate of zinc. Stir well. This will make white paint. If a shade is required add the necessary color.

SOME OBSERVATIONS ON FIREPROOF BUILDING IN NEW YORK.*

By John C. B. Horwood.

[The illustrations accompanying this paper may be found elsewhere in this paper upon a separate sheet.]

THE law in New York city requires all buildings to be fireproof when the top of the deck roof beams (half way up the rafter for pitch roof) are over 85 ft. above the pavement.

In all iron construction, as in slow-burning mill work, I find that the most straightforward and rational method of laying out the framing scheme is the best, avoiding trimming as much as possible, and keeping heavy weights from such position as necessitates carrying them in lateral directions to find their bearing on the continuous line of supports to the foundation.

Cast iron is the principal material used here for supports, except in very lofty buildings, such as the *World*, and the 12 storey Havemeyer office building now nearing completion: though the Columbia office building on Broadway, which has some 13 floors above the basement (3 of which are in a pitch roof) has cast-iron posts. Another building now going up, adjoining the Mutual Life building on Nassau street, has about 12 stories of frame in position, the posts being cast iron.

The *Herald* newspaper building being erected in an open plot of ground at the intersection of Broadway, 6th ave. and 34th st., is but two or three stories in height (similar in idea to the Bank of Montreal in Toronto) and has all the columns wrought and riveted (fig. 1) but this is the exception in such a low building.

In a very narrow, high building there will of necessity be a certain amount of play at the bolted connections of cast iron work, which is avoided in rivetted wrought columns.

If rolled sections only are intended to be used, the spans of girders and beams must be laid out to keep within the limits of the loads to be carried, whereas the spans may be greatly increased by substituting plate girders.

Whatever scheme of construction may be used for a fireproof building, the interior framing remains practically the same; so that it becomes merely a problem of treating the external wall in its relation to the adjoining floor. There are three ways of doing this, which are optional as far as the law is concerned: 1st. By making the masonry walls and piers of sufficient strength to carry their own weight plus that of the floors, roof and contents of the building. 2nd. By making the walls and piers of only sufficient strength to carry their own weight, and framing all the floors so that their weight shall be entirely carried by iron supports or columns extending from the foundation to the roof, the columns if necessary being somewhat recessed in the walls 3rd. By making a frame of columns and girders to completely carry the outer walls as well as the adjoining floor construction.

The first method was used in a 10 storey warehouse on Bleecker street erected about two years ago. I noticed, before it was finished, that a considerable quantity of the outer brick facing on the lower stories had been crushed by the great weight above, necessitating cutting out and replacing. The second scheme is the one most generally adopted. The last method is adopted where the utmost economy of floor space is desired; and of the three, I think it is the cheapest. A comparison of the relative cost may be easily estimated from rough sketches of each scheme, by taking (as we do) cast columns at 3½c. to 4c. per lb. and beams framed (and I presume wrought columns also) at 5c. per lb.

When the third method is adopted, the "curtain walls," if carried on girders at every story, may be 12" thick, but if on girders at every second storey, and the intermediate floor braced by metal ties, the wall must be 16" thick. The former method is the most usual—in fact, I have seen no case of the latter.

Before the building law was revised last year, the columns were allowed to project inside these walls without masonry protection (fig. 2) but now a 4" casing of brickwork is required (fig. 3).

The two following sketches (figs. 4 and 5) are copied from the Building Law, illustrating this method. Fig. 4 is the one usually adopted; I do not remember having seen No. 5 employed.

The flanges of the girders carrying the curtain walls are brought to within 2" of the outer face of the wall, the mason work being cut to fit them (fig. 6), making the masonry at the level of the girders a mere filling, resting partly upon the lower flanges of the girders, and partly upon the wall below. These girders may, of course, be of rolled sections instead of built as shown on sketch, though it is the latter that I have seen used for that purpose.

I heard the foreman of one of the largest iron firms say, that up to 20" it is just as cheap to use rolled sections—beyond that the built ones are more economical. The above sketch (fig. 6) of girders at floor level applies to all floors, as the girders over each other will be the same size unless in special cases where some extra load may necessitate greater depth and strength. The only variation is in the size of the columns at each storey, thus making the brackets and lugs larger as the sizes of the columns diminish.

The columns are usually footed as shown in fig. 7, the footing beneath being of sufficient spread to give about 4 tons weight to the superficial foot of soil. A building is being at present erected which has footings of an unusual character. The structure will evidently have an iron frame supporting the outer walls; upon the concrete bed are now being laid footings of rivetted plate girders. Immediately beneath the columns (which are of cast iron) there is a cast iron base plate the width of the column by about 4 ft. long in the direction of the girder footing. The latter is composed of two upright thicknesses of 1" metal (forming one web) about 30" deep and some 15 ft. long, with a top plate about 14" wide and a bottom one some 30" to 36" in width. These are connected to the web by angle irons and triangular-shaped stiffeners about ⅜" thick. The elevation and sections are somewhat as figs. 8 and 9. The whole of this built portion is coated with tar, and the last column, which is on the end of one of the footing plates is secured from sinking by having its footing girder rivetted to the adjoining one by means of a very thick plate about 6 ft. long on top of the upper plate (fig. 10). Method No. 2 is the most complicated one in dealing with footings, as the footings of the walls and columns usually overlap each other, making it difficult at times to get a good unified bearing beneath both—in a pier, for instance, six or eight feet long, where sometimes, of necessity the iron post is placed near one end.

With regard to interior framing, we usually make trial schemes in order to get the least amount of metal to accomplish the desired end, as this means a saving in cost as well as somewhat less weight upon the foundations. The deeper the beams and wider the span for filling gives the stiffest floor as well as the cheapest. The Pioneer Fireproof Construction Co., of Chicago, has a catalogue which gives some interesting information and experiments on this point.

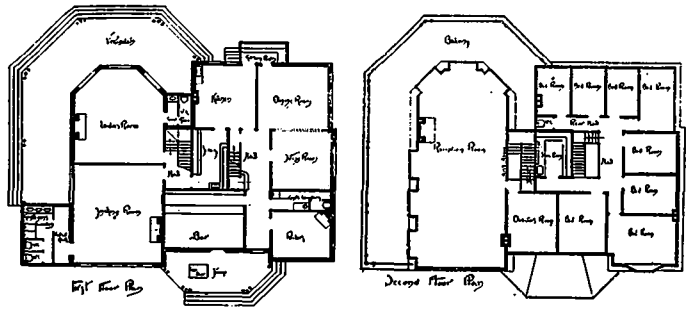
The heavy printing office building which is being erected near N.Y. City Hall is calculated for 400 lbs. per sq. ft. of floor space. The beams are about 5 ft. apart and 14' 6" long, resting upon plate girders 22 ft. between the bearing. The webs of the latter are 30" deep. The former are 10" beams. The general scheme is as per fig. 11. Where a beam is connected with a circular column it is the practice to mould the latter so as to allow the beam to butt against it with a square end (fig. 13). Fig. 12 is a section through the beams looking towards girders. Fig. 13 is a section through C. C. (fig. 12) looking towards beams, and the scored section indicates the bracket to which the double girders are bolted, and which is moulded to fit the shape of the girders. Fig. 14 is a section at A. A. fig. 12 looking down, and the plates (shown square) are sometimes made circular. Fig. 15 is a section at B B, fig. 13 looking down. The above four sketches are of instances where the bottom of the beams rest upon the top of the girders. Where a heavy girder is bolted to a square column, an interior web is cast to unite the two sides, so that the pull of the top connection or the pressure of the supporting brackets will not rupture the flat sides of the columns (figs. 16 and 17). Fig. 16 is a side elevation looking towards girder, and fig. 17 a horizontal section at level of girder.

Fig. 18 shows the manner in which the bracketings on the columns of the "Columbia" building were arranged, where the columns were about 18" square at the bottom, and connected with a wide lattice girder on the inside, which carried the floor beams. As the columns diminished in size towards the top, these supporting brackets were naturally made larger to suit the sizes of the girders which did not alter in size, as the weight they carried were the same at each floor. Fig. 18 is a section

* Paper read for the author by Mr. E. Burke at the third annual meeting of the Ontario Association of Architects.

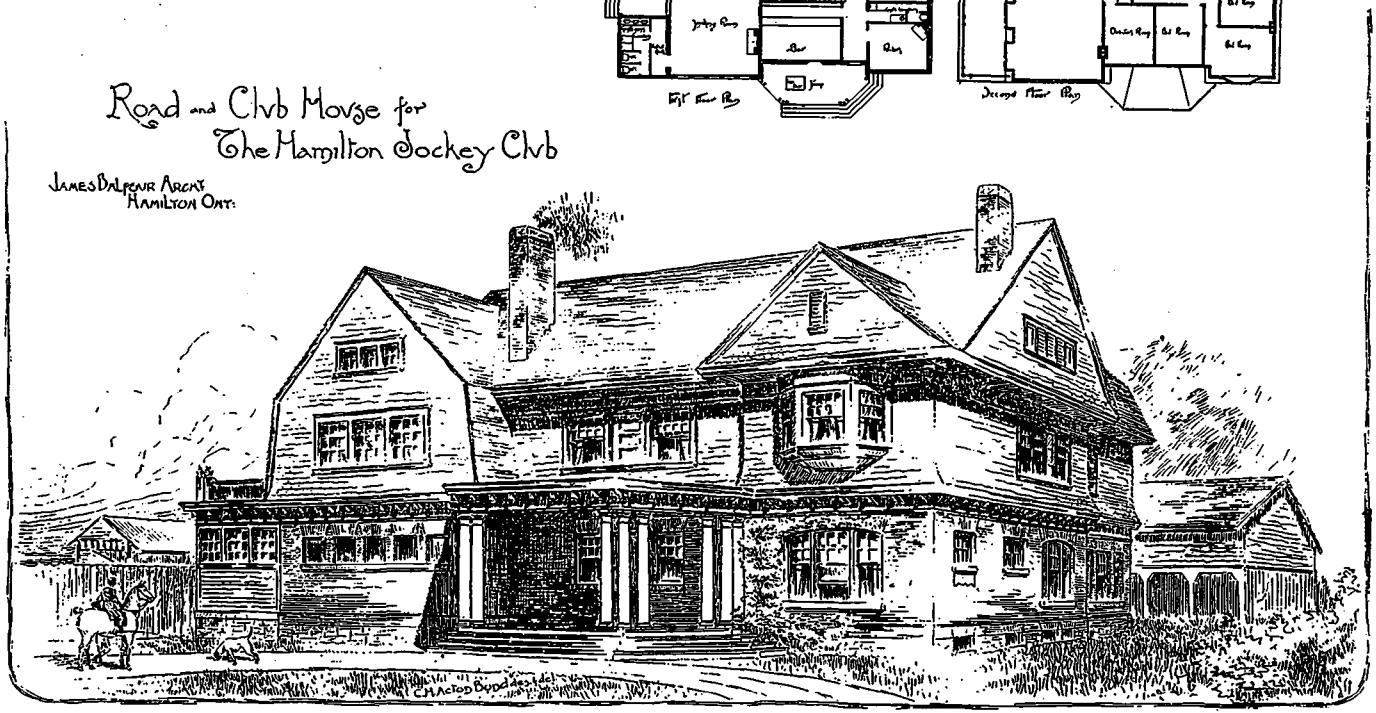
SHOPS AND OFFICES, CHAPEL LANE, BRADFORD, ENG.

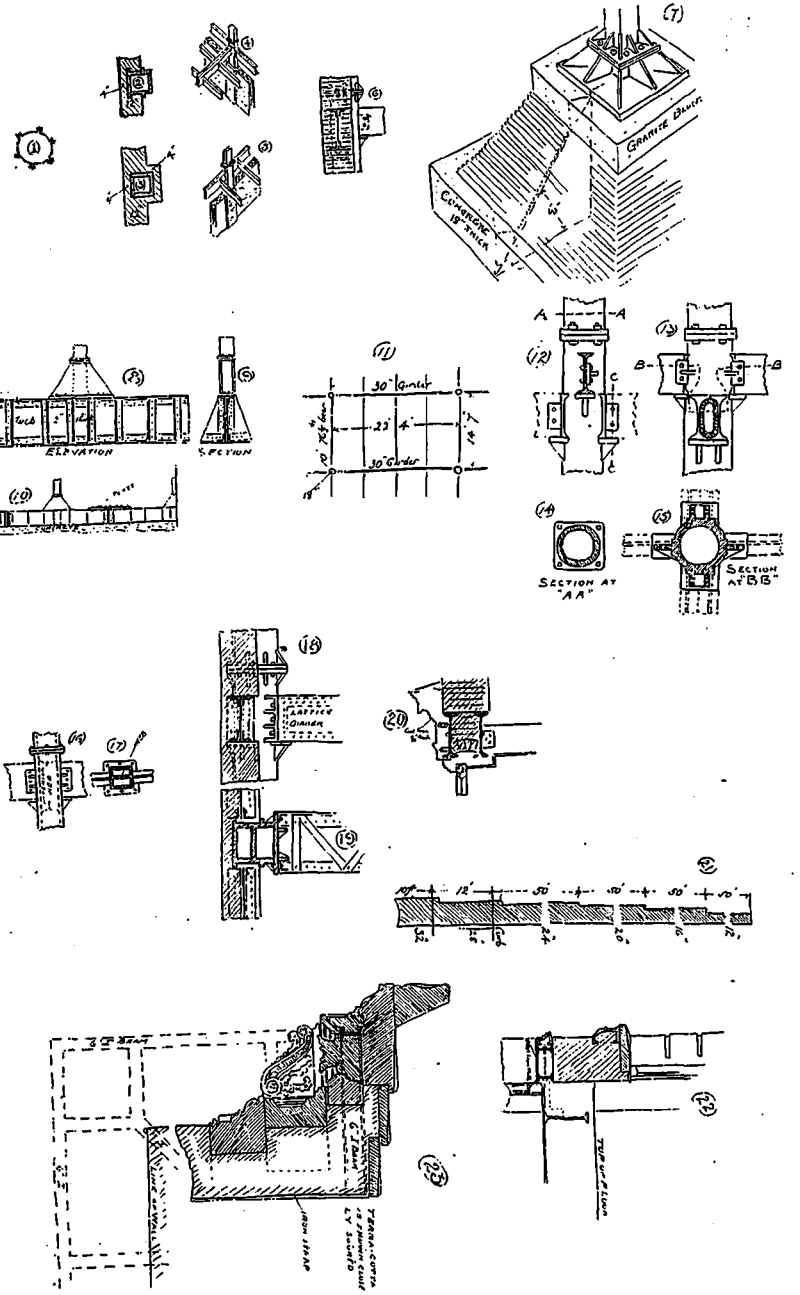
F. M. RATTENBURY, ARCHITECT, VANCOUVER, B.C.



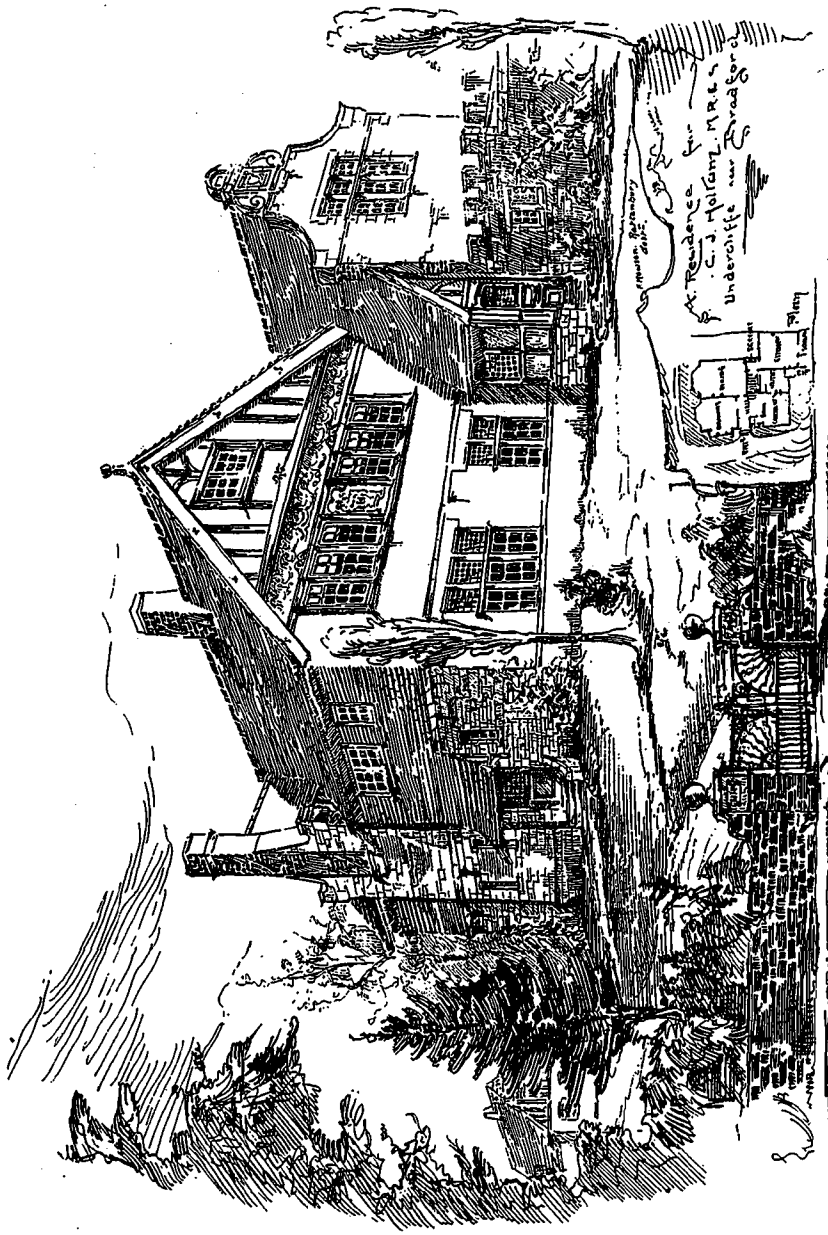
Road and Club House for
The Hamilton Jockey Club

James Balfour Archt
Hamilton Ont.





ILLUSTRATIONS ACCOMPANYING PAPER ON "SOME OBSERVATIONS ON FIREPROOF BUILDING IN NEW YORK," BY J. C. B. HORWOOD, IN THIS NUMBER.



RESIDENCE FOR C. J. HOLTANZ, M.R.C.S., UNDERCLIFFE, NEAR BRADFORD, ENG.

F. M. RATTENBURY, ARCHITECT, VANCOUVER, B.C.

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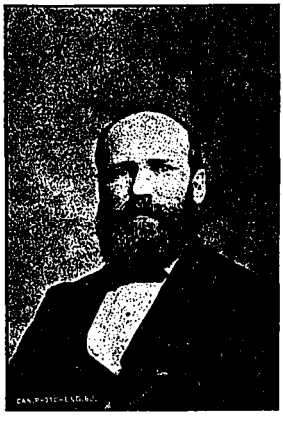


DAVID WILLIAMS, TREASURER

OFFICERS OF THE TORONTO BUILDERS' EXCHANGE, 1893.

through the outer wall at level of supporting girders, and fig. 19 a horizontal section at level of lattice girder carrying floor beams.

The following extracts are from the N. Y. Building Law, and may be of interest:

"Every building used as a store, factory, warehouse, or any other manufacturing or commercial purpose, shall be of sufficient strength in all its parts to bear safely upon every superficial foot of its surface one hundred and fifty pounds in addition to the weight of the materials composing the said floor.

Good, solid, natural earth shall be deemed to safely sustain a load of 4 tons to the superficial foot, or as otherwise determined by the superintendent of buildings. The width of the footing courses shall be at least sufficient to meet this requirement.

The safe bearing load to apply to good brick work shall be taken at:—Eight tons per superficial foot when good lime mortar is used; eleven and one-half tons per superficial foot when good lime and cement mortar mixed is used; fifteen tons per superficial foot when cement mortar is used.

All cast iron, wrought iron or rolled steel columns shall be made true and smooth at both ends, and shall rest on iron or steel bed plates, and have iron or steel cap plates, which shall also be made true. All iron or steel trimmer beams, headers and tail beams, shall be suitably framed together, and the iron girders, columns, beams, trusses, and all other iron work of all floors and roofs shall be strapped, bolted, anchored and connected together and to the walls, in a strong and substantial manner. Where beams are framed into headers, the angle irons which are bolted to the tail beams, shall have at least two bolts for all beams over 7" in depth, and three bolts for all beams 12" and over in depth, and these bolts shall not be less than ¾" in diameter. Each one of such angles or knees, when bolted to girders, shall have the same number of bolts as stated for the other leg. The angle iron in no case shall be less in thickness than the header or trimmer to which it is bolted; and the width of the angle in no case shall be less than ⅓ the depth of beam, excepting that no angle knee shall be less than 2½" wide, nor required to be more than 6" wide.

All wrought iron or rolled steel beams 8" deep and under shall have bearings equal to their depth if resting on a wall; 9" to 12" beams shall have a bearing 10", and all beams more than 12" in depth shall have bearings of not less than 12" if resting on a wall. Where beams rest on iron supports, and are properly tied to the same, no greater bearings shall be required than ⅓ the depth of the beams.

Iron or steel floor beams shall be so arranged as to spacing and length of beams that the load to be supported by them, together with the weights of the materials used in the construction of the said floor, shall not cause a deflection of the said floor beams of more than one-thirtieth of an inch per linear foot of span; and they shall be tied together at intervals of not more than 8 times the depth of the beams.

Under the end of all iron or steel beams where they rest on the walls, a stone or cast-iron template shall be built into walls. Said templates shall be 8" wide in 12" walls, and in all walls of greater thickness, said template shall be 12" wide, and such template, if of stone, shall not be in any case less than 2½" in thickness (the thickness of a brick—J.C.B.H.) and no template shall be less than 12" long.

All brick or stone arches placed between iron or steel floor beams shall be at least 4" thick and have a rise of at least 1¼" to each foot of span between the beams. Arches over 5 ft. span shall be properly increased in thickness as required by the Superintendent of buildings; or the space between the beams may be filled in with sectional hollow brick of hard burned clay, porous terra cotta, or some equally good fireproof material, having a depth of not less than 1¼" to each foot of span, a variable distance being allowed of not over 6" in the span between the beams. The said brick arches shall be laid to a line on centres, with close joints, and the bricks shall be wet, and the joints filled with cement mortar, in proportions of not more than two of sand to one of cement by measure. The arches shall be well grouted and pinned, or chinked with slate and keyed.

The bottom flanges of all wrought-iron or rolled-steel floor beams, and all exposed portions of such beams below the abutments of the floor arches, shall be entirely encased with hard burnt clay or porous terra-cotta; or with wire or metal lath properly secured and plastered on the underside.

The exposed sides and bottom plates or flanges of wrought-iron or rolled-steel girders supporting iron steel or wooden floor beams, or supporting floor arches or floors, shall be entirely encased in the same manner."

Staircases must be of uninflammable material. They are usually made with slate or marble treads in good buildings, and cast iron in the cheaper ones. The strings are often of cast iron, and sometimes wrought iron with cast-iron brackets bolted on to make a bearing for the treads.

Shop front frames are made of cast iron, and over the breast-summer is often placed a protection of cast iron, fig. 20: attached to it by means of lugs screwed to both the covering and the girders.

Fig. 22 is a section through the first storey opening of a large building which has sills and strings of terra cotta. The soffit is formed with a wrought-iron plate bolted to the two small beams and painted. This method is quite common here, but if so desired these beams and plate may be kept up to make room for a soffit of terra cotta slabs suspended from the wrought-iron plate which supports the terra cotta architrave on the face of the walls. The frame of the opening is of cast iron, also the sash.

In referring to the new law regarding "skeleton structures," I omitted to say that no floor beams may rest upon the walls if 16" or less in thickness. The law reads thus:—"Curtain walls built of brick, built in between iron or steel columns and supported wholly or in part on iron or steel girders shall not be less than 12" thick for 50 ft. of the uppermost height thereof (fig. 21), or to the nearest tier of beams to that measurement, in every building so constructed, and every lower section of 50 ft. or to the nearest tier of beams to such vertical measurement or part thereof, shall have a thickness of 4" more than is required for the section next above it down to the tier of beams nearest to the curb level; and then downwardly the thickness of walls shall increase in the ratio prescribed for other foundation walls. When the curtain walls are *20" or more* in thickness and rest directly on the foundation walls, the ends of the floor beams may be placed directly thereon, but at or near the floor line of each storey ties of iron or steel, encased in brick work, shall rigidly connect the columns together."

Fig. 23 is a section of the terra cotta cornice of the St. Bartholomew Mission Building, 42nd street, N. Y. Few cornices are more elaborate. The I beams resting upon the wall are placed over each console. The terra-cotta facia and outer edge of moulded soffit are hung upon the flanges of the beams running parallel to the walls. The projecting beams are anchored well down the back of wall, sufficient to give at least 33% of weight of brickwork in excess of the weight of the overhanging cornice.

[NOTE.—It is but fair to MR. HORWOOD to state that the foregoing remarks were not prepared for public reading or publication, but were sent in the shape of a letter to a friend. He kindly consented to their being read at the convention to fill a gap caused by the failure of a member to present a promised paper.—E. BURKE.]

DISCUSSION.

Mr. Paull said the Association was much indebted to Mr. Horwood for sending such a very interesting paper to be read at the Convention, and he had much pleasure in moving that a vote of thanks be accorded to that gentleman. After expressing a hope that the paper and accompanying drawings would be reproduced in the CANADIAN ARCHITECT AND BUILDER, Mr. Paull pointed out as a difficulty in regard to these very high buildings, which did not seem fully explained, that, although there might be no trouble about the foundation for its support so long as you were not cramped for room, if a building 100 feet square were erected closely adjoining another property where you could not go beyond the limit of your own ground, it would not be possible to to get that proper support for the angles which could be secured when there was a large area of ground surrounding it, and the base could be extended to a considerable distance. Regarding the craze for lofty buildings which was characteristic of American cities, notably Chicago, he thought it had about reached its limit, as regulations were now being enacted to prevent the erection of structures beyond a certain height. He pointed out the danger that existed in these large and lofty buildings, even in themselves fireproof, from the burning of furniture, etc., or being surrounded by other buildings, owing to the difficulty of getting out the large number of occupants who would necessarily be within it. These, he thought, were matters worthy of consideration by architects. He then referred to the developments of recent years in the manufacture of iron for structural purposes, some illustrations of which, by the courtesy of Prof. Galbraith, they had witnessed in the experiments that had taken place this morning, by which it had been shown that inch iron was capable of sustaining a strain of 50,000 lbs.

Mr. Burke said, in regard to the supporting beam, that it was to him a surprise; it seemed to be a very weak method of carrying a column that had no support beyond it. It seemed to him that owing to the joint which was there, everything was dependent upon the plate in the top.

Mr. Belcher thought if the plates and girders were reinforced it was very much stronger than work carried through continuously, because the angle irons at the joint were double.

At the request of the President, Prof. Galbraith then explained, pointing out on the drawings some features of the construction.

Mr. Aylesworth was interested in knowing what was thought

of this combination of construction by other than American architects, as it was purely an American system. He could not but think there were weak points about it, owing to the combination of vertical iron work and masonry, of which the one would settle more or less, and the other would not. Then, in regard to the curtain walls, he noticed there was a twelve inch wall, (brick and a half) carried on a beam, about 15 feet square of masonry; he thought the support for that wall at the beam was insufficient, and did not see what was to prevent it tumbling out. It might be tied more or less, but it seemed to him a weak method of construction; either iron or masonry alone might be all right in themselves, but he did not see that they would always hold together. He had always found weakness in that kind of construction.

Mr. Paull thought the expansion and contraction of the iron under varying temperatures would affect the walls in some degree, and necessarily weaken them.

Mr. Belcher instanced the erection, with which he was connected, of a fireproof building in Liverpool some fifty years ago. It had been thought the effects of the expansion and contraction would be prejudicial, and very careful notes were made. The building had outer walls of cut stone, and brick and cement internally. The walls were supported by eight sectional cast-iron columns, and were five stories in height. The girders were cast iron, trussed with wrought iron, and brick filling springing from the flanges of the girders. The observations did not reveal the slightest appearance of crack due to contraction or expansion. Of course there were not in England the extremes of temperature to be found in this climate.

Mr. Paull said that whereas the variation in temperature in England was not more than 50 degrees, here it would be as much as 120, which must be considered in making any such comparison as Mr. Belcher had instituted.

The Registrar said that from what he had read of iron construction in the United States the objection had been found to exist there, and that iron and brick were not built together now, but the construction was a skeleton of iron entirely.

Mr. Darling said he noticed in the Canada Life building, the walls of which were quite equal to carrying the building unaided, a number of upright iron columns were built into them.

Mr. Burke said the Freehold Loan building was constructed in the same way, and also a new building at the corner of the market (Branch Bank of Commerce).

Mr. Darling questioned the utility of such a practice, and condemned it as bad construction. He thought it distinctly a loss.

Mr. Burke thought it a waste of material.

Mr. Power thought it might be as a horizontal tie.

Mr. Burke said of course that was not the difficulty in the paper under discussion, which gave the different systems. In that case there would be no contraction or expansion in the columns, the carrying power of that would be so slight as to be scarcely appreciable in the joint it would form in the brick work. In the other way, where it was carried independently altogether, then the walls were increased so that they carry their weight; practically there would be no shrinkage in that, but moving up and down inside, there might be a question about that.

Mr. Aylesworth thought the variation in a building 100 feet high would be considerable.

The President said, that as Mr. Burke had stated, what had been read was not a regularly prepared paper, but a letter written to Mr. Burke regarding this system of construction. The system was the outcome of special requirements in American cities, and could not well be compared with work done in Canada or the old country. The growth of American cities rendered necessary the erection of these enormously high buildings, and as a result this steel construction with curtain walls had been developed in New York and Chicago; especially the latter, where, despite its great area, the business centre was somewhat congested. When the development began, it was soon found more economical to run up 13, 14 or 20 storeys. A building which consisted of seven or eight storeys was built, which was found not to pay as large interest as it ought, and it was taken down and replaced by one ten or twelve storeys in height. The first building was a steel construction, with nothing more or less than a 4½ inch casing of pressed brick outside, and a curtain wall of some other brick inside. He remembered seeing those bricks being fastened at intervals with copper wire to upright angle irons, to stay this wall. With regard to the question of temperature affecting iron or steel construction, he did not think that entered into consideration at all, because, in a building the iron work is subject to practically the same temperature all the year round, and there is very little of it exposed to the extremes of heat and cold, as it is nearly all covered. In regard to shrinkage, between the two systems there must be some shrinkage, but it was reduced very considerably by the use of cement instead of the ordinary mortar. He understood there was a shrinkage of ⅜ inch in twelve feet of first-class brick wall; after the building had been up and settled to a limited extent there would be that skrinkage in the course of time. Of course that was considerable, but he was inclined to attribute it entirely to the use of ordinary mortar, and believed where the brick was laid in cement there was practically very little shrinkage. It was evident that whatever shrinkage there was must accommodate itself in some way or other, because the important fact remained that the buildings had not developed any serious defects; and theorizing was of little benefit so long as the practical outcome showed the plan of construction to be serviceable. There had been a great deal of discussion in papers devoted to such matters on this subject, but he could not tell just where to lay his hand on the information at present. The architectural appearance of a building, of course, was another question, but that, as a rule, was not considered in this class of buildings to any great extent; they were required for a certain purpose, and it was incumbent upon the architect to do the best he could under limitations. After all, the buildings were to all intents and purposes, in a sense, the works of engineers rather than architects.

FRENCH DECORATIVE ART.

By W. H. Elliott.

It is interesting to study the different periods of French art in connection with, and as they reflect the scenes and characters intimately associated with them. One might construct a partial history of the time from a careful analysis of the adornments of the palaces and mansions of the chief actors in the stirring scenes of last century in French political life. Passing over the earlier periods of Henri Deux, Francois Premier and Louis Freize, we come to that of Louis Quatorze, a man who united a real desire to revive true art feeling with a debased and voluptuous mind. Progressing with the rise and degradation of his court, one is struck with the gradual development of the renaissance to a high pitch of perfection, and a gradual descent to a florid and meretricious travesty upon it. The reigning beauty in many cases exerted a marked influence on the work executed during her *regime*, and her original station in life might very easily be guessed from the decorations she indulged in. What is remarkable, however, is the originality and attractive character of most of the work. The delicacy of the decorations during the reign of Louis Quinze tells us of advance in refinement and a gradual abandonment of the virile renaissance in favour of the lighter and effeminate Italian styles. There is not apparent the same love of art for art's sake, but instead the gratification of the whims and fancies of a court that existed for the bubble pleasures of the hour. This period of dilletantism gave place to the pure and unaffected family life of Louis Seize, a bright spot of sunshine in French history, around which was hovering the storm of popular frenzy that had been brewed by Louis' profligate predecessors. The decoration shows itself in garlands of flowers, rustic scenes and other pastoral touches, especially in La Petit Trianon, the miniature palace of the unhappy Marie Antoinette. At the fall of the curtain on this tragic period, and following the accession of the great Napoleon, a remarkable change is seen in the houses of the nobility. Military rule produces severity in art as in other things, and we find the style of the First Empire beautiful, chaste, pure—but always severe. To-day there is a great revival of all these periods, and we have the fortunate advantage of choosing the best from each of them.

In working with copper pipe a difficulty is often met where lengths must be jointed to valves or fittings by means of flanges, because the joint between the cast flange and the rolled pipe cannot be made perfect. A device to mitigate this evil recently forms the flange casting with projecting lugs which comes up around the outside of the pipe, and thus increases the surface for the adhension of the brazing material.

ONTARIO ASSOCIATION OF ARCHITECTS.

Mr. N. B. Dick, the late treasurer of the Association, who was elected to the Presidency of the Association during his absence in Europe and in spite of his expressed wish to be allowed to retire from office altogether for a time, has, since his return recently, written to the Registrar accepting the responsibilities of the position. The proposal to Mr. Dick came from the Council, by whom the constitution of the Association requires the election to be made, but during the discussion which took place in the Convention as to the feasibility of the election of the President being by vote of the convention, Mr. Dick's name was by general consent used in connection with the proposition.

* * *

The second annual examination of students was conducted at the School of Practical Science from Tuesday to Saturday, March 7th to 11th. The time of holding examinations was changed from April, in which the examinations were held last year, to March, as being more convenient to students who wish also to come up for examinations at the School of Practical Science later in the year. Before notice of the examination results is sent to the students who were examined it is necessary that the Board of Examiners report to the Council of the Association, in whom is vested the control of the examinations. The meeting of the council will be held as early in April as possible.

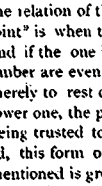
* * *

The Library of the Association has received a valuable addition in a set of *The Brickbuilder* for 1892 which has been presented by the publisher. The volume has been bound and is ready for lending. It is recommended by the Librarian as a practical aid to those who are aiming at good design in brick. The photographic reproductions are all of good subjects and there are many working drawings of standard examples in Europe and of work by the late H. H. Richardson and by well known American architects.

JOINTS IN CARPENTRY.

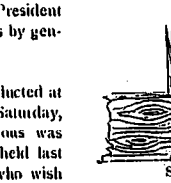
A MOST important feature of the manipulative or handicraft part of carpentry is the "joints" to be used in the work, and an accurate and practical knowledge of the principles relating to these is most essential. It is therefore proposed in this article to deal with some of the matters relating to this branch of the ancient calling, treating the subject generally without going into the extensive question of special joints used in framing partitions or roofs. There are several kinds of joints used, according to the relation of the pieces of timber to each other. The "square joint" is when the pieces are at right angles with one another, and if the one is lying on the ground and the surfaces of the timber are even, a simple way of effecting a junction would be merely to rest or butt the end of the vertical piece upon the lower one, the pressure of material supported by the upper piece being trusted to keep the two together. Although often adopted, this form of joint cannot be relied on unless the pressure mentioned is great, and in a vertical position, that is, parallel to an imaginary line called "the axis" passing through the centre of the vertical piece.

The better method of making a "square joint" is by passing one piece of timber into another by means of a rectangular or square hole; this is well known as "the mortice or tenon joint," of which we give a sketch showing the junction in section. A denotes the piece of timber with an aperture 1234 called the "mortice" to receive the piece X called the "tenon," made in the timber B. This is a very common and useful joint, and in making same it should be remembered that the thickness of the tenon X should be well proportioned and about one-third of the width of the piece to which it belongs, in order that it may have sufficient strength. The depth of the tenon is generally equal to the depth of the piece to which it is joined. The mortice should be of the shape and dimensions of the tenon, smaller if anything, in order that no space be left when the tenon is inserted, and it should never exceed three-quarters of the thickness of the piece out of which it is cut, nor lose more wood than is necessary. When the tenon is sunk, or driven into the mortice the pieces are fastened by means of one or two wooden pins. This adds nothing to its solidity, but helps to keep the joint well together.



SKETCH 1.

In order to prevent the possibility of these joints not fitting tightly, several improvements have been made on the simple method described above, as when the tenon is not made rectangular or square, but as shown in sketch 2, which is known as a "dovetail cut." Such mortices are very often not carried right through the entire depth of the timber, which is a good form of a joint to use when the strength of the timber will not allow much cutting away for a mortice. Another way to make a joint of this class is to carry the tenon through the mortice so as to have a piece projecting on the under side sufficient for a hole to be bored and a pin drawn tightly through it, thus keeping the tenon in the mortice without the aid of the pins as mentioned. A very satisfactory and reliable method is to combine the rectangular tenon and the dovetail mortice together, which is done by inserting the tenon and driving up wedges to fill in sides of the dovetail mortice.


SKETCH 2.

Having thus far dealt with the "square joint," we will now consider what is known as the "vertical joint," that is, when two pieces of timber are joined, both of which are in the same vertical line. In most cases the joints under this head are practicable for joints between the timbers which are in a horizontal line, except for spanning; these methods not being calculated to be placed under such severe strains. As these joints are chiefly used for lengthening a vertical piece of timber by joining it to another, the principal point to be gained is to keep the jointed ends of the timbers from sliding or being pressed out. The pressure of the upper on the lower piece might be found sufficient to keep them together in a line, but it must be borne in mind that if the lower timber has no good foundation an unequal settlement will be brought about, and the line thrown out of the plumb; therefore vertical joints are very seldom made with merely even surfaces where they join, unless bound together with plates of iron, or bound round with iron hoop and straps securely fastened. A simple form of a vertical joint is made by cutting a groove in the centre of the end of each timber where they join, and a wooden or iron wedge inserted therein which will make it impossible for the lower timber to swerve from the plumb line, if it is securely fixed at its foundation.

It will be found, however, that there are other directions of possible pressure, and in order to provide against these, it is best to cut two grooves at right angles to each other at the end of the lower timber, and make two tenons on the end of the upper piece to join tightly into the grooves. This last form is by far the best, and although more labor is necessary, yet the safety that is secured is worth the extra work.

To join a horizontal to a vertical piece of timber at its extreme end, a good method is found by cutting a tenon in the upper piece and fixing it tightly into a mortice made in the lower piece, but by far the neatest and securest joint for this class of work is what is known as the "mitre joint." This is formed by cutting one piece of timber at an angle of 45° leaving a tenon in the middle, and cutting the other piece of timber at the end to the same angle making a mortice on the angular side to receive tightly the tenon of the other piece. If this work is done correctly it will be seen that the corner made by the two pieces will be at right angles.

The next class of joint it is proposed to refer to is the "horizontal joint," which is used in connecting pieces of timber crossing or meeting at right angles, and the method used is to lay one piece of timber upon the other and secure the two by means of wooden screw nails, but this form should not be used where there is much strain. A more satisfactory way is found by making a groove in the lower timber cut right across the width, and should be a little less in thickness than the section of the upper timber, that this can be tightly driven in. An improvement on this method is made by cutting a groove across the the lower edge of the upper piece and making a mortice to receive the upper piece, leaving a projection to fit into the groove made in the timber inserted. If this system is adopted it is impossible for the timbers to move even in their own directions.

When pieces of timber cross at an angle the method generally used to join same is by cutting a part out of the upper face of the lower piece large enough to receive tightly the upper timber, and these can be further secured by nails or pegs.

THE PLACE OF ARCHITECTURE IN NATIONAL HISTORY.

By G. F. Stalker.

Much greater rapidity marks the progress of history-making events, and greater minuteness and accuracy in chronicling the same, in our own time, than in any previous age. We have constantly "a chiel amang us takin' notes." It would seem as if the minute hand of the modern clock was provided with a fountain pen attachment, and that a faithful record of everything that transpired was most carefully registered for future reference. The daily and weekly newspapers, the monthly and quarterly magazines, the system of conducting the business of cities and countries, provide for the modern historian an abundance of material that is almost appalling. The situation in this respect, to-day, is a complete reversal of the state of things before the invention of printing; or even later than that, before the use of electricity. Old-time historians had a hard task of it, when, from the scanty material at their command, and the slow process of locomotion and intercommunication, they set about collecting and collating the events of their time. Add to this the laborious method of transcribing their tomes, the limited circle who could have access to them, and the most certain feeling that what they had been at so much pains to record would never benefit their own age, and it must be conceded that their occupation had at least none of the outward and visible signs of cheerfulness. And if their reward in their own time was, at the best, the most meagre, it has not, in all cases, been made up to them in the shape of unstinted posthumous fame and honour; for as we have waded through their works at school and college, the probability is we have bestowed upon them more maledictions than benedictions as our recompense for their hard and disinterested labors.

But if there is a law of compensation applicable, as some believe, to all things mundane, it is to this law that we are indebted for the durability of the materials on which the books of the ancients were written. The only perfect code of morals was written on tables of stone. Particular events in the lives of individuals, tribes and nations have been marked by cairns, pillars, obelisks and other memorial erections. Astronomical, mathematical and other discoveries, and historical facts have been cut in everlasting granite, while such writings as required more lengthened space were inscribed with indelible ink on parchments and papyrus prepared to run a race with time. (It is rather a singular coincidence in this connection, that Napier, the inventor of logarithms, worked out his problems on the garden wall of Merchiston Castle, near Edinburgh). And as the world advanced in age, these records became the subjects of study in the school, and were translated and transcribed indefinitely with more or less care. Naturally enough these translations were not free from errors; and the originals being almost inaccessible, and in some cases lost, it has been with great difficulty or altogether impossible that a thorough and accurate revision could be made of them. To this extent, therefore, the world has been a loser; for though nothing that is really good can be altogether lost, it may be shorn of much of its influence and beauty when we possess only a hazy idea of it.

Add to all this the fact that no historian ever yet wrote or could write without a certain bias, and the works of the ancient writers are subject to a considerable discount.

As regards the collection of materials the modern historian is infinitely better circumstanced than his old-time brother. The important occurrences in almost any part of the world may be said to be served up at the breakfast table of every household in civilized countries; and if we confine ourselves to any particular country, the difficulty that confronts the chronicler is not the paucity but the superabundance of matter. No need for him to scour the country in order to obtain data and information from every conceivable and inconceivable source. He has more need for the threshing machine than the reaper. So rapidly do events succeed one another, and so continually is the map of the world being remodelled, that it is no easy matter for the modern historian to keep pace with the times, and to separate the chaff from the wheat, so that what he records will be a faithful delineation of the events which really constitute the life of a nation. This, however, has never been accomplished; neither has it ever been attempted. The impossibility of the thing must be apparent to everyone on the slightest reflection.

To obtain anything like a comprehensive idea of a country we must have recourse to many channels of information. Its political life as a rule is recorded with greater minuteness than any other phase of its existence. And it is right that this should be so; for in those chambers where the nation's business is conducted, its laws are framed, and the multitude of interests affecting its internal and external affairs are brought forward and dealt with; so that, from the manner in which these things are done, we can form a very fair conception of the general character of a people. But though in the political arena there is, or there should be, nothing untouched which properly belongs to a nation's vitality, or which indicates its progress or retrogression, it would be absurd in the extreme to imagine that, within the limits of this one expression of national existence we have a full and complete portrait of the nation itself. The industries of the people, whose name is legion, can only be guessed at or catalogued by the laws which are made affecting them. But their extent, their application, and the manner in which they are conducted, all, in fact, that really constitutes the industries themselves, can only be understood or appreciated by reference to sources outside the political sphere altogether. And it is quite clear that written descriptions of the industries, amusements, and the general pursuits and occupations of a people must, in most cases, be inadequate; and to a stranger to the country, or even to the future generations of the country, such descriptions will inevitably be, to a great extent, cloudy or incomprehensible.

We have proof of this when we call to mind such points in the history of ancient peoples as have only come down to us in the works of contemporary writers. In connection with these we find the savants of our own time in a chronic state of disagreement with one another; and as time goes on the old writings are subjected to a process of re-translation, or the translations of a former age to a process of revision. Albeit, the one desire which animates all the scholars, is to obtain, in modern language, an exact account of the events which took place, and the circumstances connected with them, in ancient times.

In cases, however, where buildings were erected for any specific purpose, we are not dependent upon descriptions. The language of architecture is a universal language, and needs no such translations as are necessary in written documents. The accounts which they record are true and unbiassed, and can, therefore, be in all cases relied upon. This, of itself, is of immense importance, which is greatly enhanced when we keep in view the fact that, in ancient times, special training was prescribed for such as shewed that they had natural endowments or qualifications for making architecture or any of the arts their profession in life. The practice of art was, by the Egyptians particularly, considered as one of the highest religious avocations in which man could be engaged, and without this special training, which consisted chiefly of the study of music and form, no one was allowed to practice it lest they should be guilty of profanity or sacrilege. But even when such a rigorous system was not adopted to ensure its purity and development, architecture has, in all ages, found men of the highest attainments and the purest thoughts and aspirations to devote their lives to its study and practice.

The sentiment which at first induced men to commemorate events by the erection of cairns and pillars prevails to-day, only in a somewhat more pretentious form. It may be said that such erections are not now so monumental as utilitarian. In most cases this is a great advantage. Our memorial halls, institutes, hospitals, fountains and the like, may serve a very useful purpose, while they carry out the same feeling which has from the first animated our race. There is an inseparable, although it may be an indefinable, connection between an intangible historic event and an edifice to commemorate it; so that the milestones of history are being constantly raised all the world over, marking indisputably the progress or the decadence of nations.

But it is not merely works of a monumental character that give to architecture an historical importance. The ordinary everyday life, the business occupations and the amusements of the people are as clearly marked down in the domestic and civic buildings. In these, until we come to the time of the Romans, we have so few remains, that our knowledge is, of necessity, obained from such writings as have come down to us; and to whatever written source we may turn for our information we have to confess that the result is disappointing; whereas, from the Roman era until now, apart from any written descriptions, we are at no loss to understand the manners and customs and the occupations of civilized countries from the buildings which were then erected and are still extant. Our poets have peopled those old and ruined cities with the same old-fashioned, slow-going folk that used to inhabit them; have set them to work at their old occupations and household duties; have put their armies in motion against one another, and given detailed accounts of their methods of attack and defence, and with such minuteness of description that we might as well be reading an account of contemporary events. Even the distinctive racial characteristics are so strongly marked in their buildings that it is not difficult for the student of architecture merely to fix the date of the erection of a building, but also the race of people who erected it. So that the history of architecture is in reality a history of the world, and when compared with the sciences which treat of national or racial affinities, dealing, as it does, with the thoughts and feelings of men in all ages, its sphere is wider and more comprehensive, and its utterances more reliable and conclusive, than those of any other science yet known. To the historian, therefore, a knowledge of architecture is of the utmost importance; and on the other hand, to the architect a large acquaintance with history is almost indispensable. In the one case many of the leading points in history about which contemporary writers may give different and contradictory accounts, can be tested and set at rest, by reference to the inflexible testimony of brick and stone. In the other case the purpose for many features and details of buildings can be explained by hints or more lengthy descriptions of usages and customs which have long since become obsolete.

And as future generations will judge of the position which nations in the present day occupy in the civilization of the world by their architectural achievements, as much as, if not more than any other evidence, a most important responsibility is laid upon the shoulders of every architect. Unfortunately the same spirit which animated the architects in those times when the art was at its best does not seem to exercise dominion in the minds of those of our time. Neither are we influenced by surrounding circumstances to the same extent. We are too much inclined to imitate and reproduce what has already been done before, and that too, unhappily, without any very nice discrimination between what was good and what was bad in old examples. We are sometimes, also, inclined to forget that the design for a building for any particular purpose should have a very close relationship to that purpose and give unmistakeable indications of it. In this respect we are placed at a great disadvantage as compared with the ancients. There is practically no limit to the purposes for which buildings are required; and as in most cases these objects are peculiar to our time, and were never dreamt of in bygone ages, an opportunity is here afforded which should be kept in view.

It is frequently said by men who ought to know better, as they look at

the magnificent cathedrals of the middle ages or the temples of a much earlier date, that the architects of to-day could not produce such work. Under present financial circumstances, certainly they could not. People are aghast at the wasteful expenditure of money if a large modern church should cost $50,000 dollars. But this amount has to be multiplied by one hundred before we get into cathedral figures at all. The same holds good in other classes of buildings. And we are not poorer, but much richer than they were, only they did not seem to think there was so much honor in having a long string of figures dangling after their names, as in spending their money for the public good. And the same penuriousness is observable in works of national character, and which are paid for out of the public purse; so that while architects have now a much larger scope for the exercise of their abilities, they are restrained and hampered by the very limited funds usually placed at their disposal.

The outlook, however, is much brighter to-day than it was a quarter of a century ago. There is a tendency among architects to break away from the old lines and to give to their general design and detail a character more in consonance with our own time. The fact also that architects are now expected to erect a very large building for a very small sum of money may not be without its beneficial results. If it forces upon us the observance of simplicity in everything connected with a building, it will have taught us one of the most essential qualities of true art.

SHAVINGS.

Messrs. T. E. Waller and H. G. Downer, plumbers, of Victoria, B. C. have assigned.

The Public Library Board of Toronto abolished the office of consulting architect at their last meeting.

Mr. Samuel Riding has been appointed sanitary-plumbing inspector for the town of Toronto Junction.

The corner stone of the extensive additions to the Collegiate Institute at London was laid on the 7th inst.

The Standard Drain Pipe Co., of St. Johns, Que., are increasing their capital to $500,000, and the new shares are being rapidly taken up.

The Imperial Portland Cement Co., of Montreal, is in liquidation, with liabilities about $70,000, and a poor lookout for the shareholders and creditors.

Large quarries of fine dark free stone exist in the immediate neighbourhood of Calgary. The stone is said to be easy to quarry and hardens by exposure.

Mr. Thomas J. Drummond, of Drummond, McCall & Co., Montreal, has been elected to represent the iron and hardware interests on the Montreal Board of Trade.

A clause providing that eight hours shall constitute a day's labour on all provincial and municipal works was voted down in the British Columbia Legislature recently.

Buildings to the value of $95,450 were erected last year in Berlin, which exceeds the amount of the previous year by $17,012, but in 1890 the sum expended was $103,825.

Mr. T. Hill, builder and contractor, of Truro, Nova Scotia, has taken into partnership Messrs. R. O. McCurdy and N. T. Wilson. The firm will be known as McCurdy, Wilson & Hill.

Messrs. Elliott & Son, of Toronto, have just completed a handsome stained glass window for the Central Presbyterian church, corner of Grosvenor and St. Vincent streets, Toronto.

Perfect cylindrical cores of rock formations overlaid by over 100 feet of water have recently been discovered in obtaining data for the new tunnel between P. E. Island and New Brunswick.

The new court house of Oxford county at Woodstock, cost $109,949. Mr. A. J. Brown, of Toronto, was the contractor, and there is a dispute over his bill of extras, which amount to $16,360.

A company known as the "Pacific Portland Cement Co." has been formed to operate the Portland cement industry near Victoria. Messrs. Travis & Co. are the agents, with A. S. Dumbleton as solicitor.

Messrs. Denis O'Brien & Son, contractors, of Montreal, have assigned, with liabilities amounting to about $17,000. The assets consist of plant and claims against Dominion Government and others for about $3,118.75.

In spite of the strong efforts put forward by Messrs. L. H. Davis, L. L. Beer and Benj. Heartz to obtain money sufficient to build a very necessary hotel on the island of Prince Edward, the scheme has fallen through.

During some boring operations of the piers in connection with some railway works at Brantford recently a valuable strata of marble was struck. A company is to be formed to start a quarry if investigations prove satisfactory.

Among the pictures to be exhibited at the World's Fair by the Canadian Royal Academy the one of Miss Mabel Cawthra, painted by Mr. Greer, and which was on view at the Royal Academy, England, is given the place of honor.

Contractor Webb, of Hamilton, is negotiating with the Board of Works of that city to purchase the quarry at the brow of the mountain. The city engineer and the street commissioner have reported against selling the property.

Mr. Ewart, the superintending architect in the erection of the Canadian building at the World's Fair, has received instructions to carry out the work of designing the enclosures and decorations for the Canadian Courts at the Exposition.

The captain of ships which carry brick have to be very careful. An ordinary brick is capable of absorbing a pint of water. So with a cargo of bricks in the hold, a serious leak may well go undetected, for the water that enters is sucked up as fast as it gets in.—*Clay Record.*

For more than 2000 years, a dressed stone containing 12,9 2 cubic feet—being 71 by 13 feet in size—has rested on pillars in a quarry at Baalbac, in Syria. It was intended for the foundations of the temple of the sun, a mile or more distant, to which four stones nearly as large were actually transported.

At the annual meeting of the Metallic Roofing Company, of Canada, Limited, held on January 26th last, Mr. E. Samuel was re-elected president, Mr. A. D. Benjamin, vice-president, Mr. J. O. Thorn, secretary-treasurer. The company are making arrangements to start a branch factory in Montreal.

A plan, with full information regarding the competition for the proposed memorial to the late Sir John A. Macdonald to be erected at Montreal, has been sent to Toronto for exhibition. Among the Toronto architects who propose taking part in the competition are Messrs. S. Hamilton Townsend, J. Wilson Siddall, Frank Baker and George R. Harper.

The Royal Academy of Arts, Montreal, have elected the following officers:—President, Robert Harris, Montreal; vice-president, A. C. Hutchison, Montreal; secretary-treasurer, James Smith, Toronto; academician painter, John Hammond, St. John; academician architect, David B. Dick, Toronto.

A new company, with a capital of $10,000, has been organized in Hamilton to manufacture brick by a new process. Mr. W. A. Freeman, of that city, is said to have secured control of the product of nearly all the local brickmakers. The price of brick is now $6 as against $5 and $5.50 per thousand last season.

A company with a capital stock of $50,000, has been formed in Montreal named the "Bostwick Metal Lath Co.," for the manufacture and sale of laths composed of metal and plaster and other building materials. The company is composed of Mr. W. W. Bostwick, of New York, with Messrs. J. W. Allison, T. A. Morrison, J. H. Kendall and R. A. Mainwaring, of Montreal.

Mr. P. W. St. George, City Surveyor of Montreal, when reporting to his Board on the advisability of allowing steam to be injected into the sewers, stated that this was most injurious to health, for the steam displaced the sewer gases and forced them into the private houses. As there are no doubt connections of this kind existing in Montreal, it is hoped that speedy steps will be taken to remedy the evil.

Mr. J. P. M. LeCourt, architect, of the Department of Public Works at Ottawa, has recently had a romantic wedding in his family. His daughter was married to Mr. J. H. Stranger, of St. Anne de Manitoba. The couple met eleven years ago and never saw each other again until their wedding day, the engagement having been made by letter. The bridegroom's godmother stood in the same capacity to the bride thirty-six years ago.

A novel system of fire protection is in use in Cleveland, Ohio. Four 6 in. mains are laid from Cuyahoga River to the business streets of the city, covering a distance of 700 to 1,000 ft. The mains are provided at intervals with ordinary fire hydrants, and being laid with a fall towards the river they are normally empty. In case of a fire the city fire boat is run to the river end of the main with which one of its nozzles are connected. The pumping engines in the boat are capable of putting on a pressure of 200 lbs. to 250 lbs. per square inch, so a good pressure is available at the hydrants on the mains.

PERSONAL.

Mr. C. H. Rust, assistant city engineer of Toronto, has recently arrived home from a trip to England.

Mr. D. T. McIntosh, for many years with Messrs. Elliott & Son, Toronto, has resigned his position to enter into partnership with his father and brother in the firm of D. McIntosh & Sons, dealers and workers in marble.

The architectural firm of Darling, Curry & Co., Toronto, has been dissolved by mutual consent. Mr. Curry retires. The business will continue to be carried on by Mr. Frank Darling, under the style of Darling, Sproatt & Pearson, at the offices in the *Mail* Building.

We regret to announce the death during the past fortnight of Mr. Charles Gurney of the E. & C. Gurney Co., Hamilton and Toronto. The deceased, who was about 74 years of age, commenced business in a small way with his brother in Hamilton about 50 years ago. By perseverance the business was raised to the high position it now holds. He was a prominent and greatly respected citizen of Hamilton, and his large funeral on the 6th inst. in that city, bore evidence of the high esteem in which he was held among his fellow citizens, and large circle of business and private friends.

A good plan of preventing tools from rusting is the simple preparation employed by Professor Olmstead, of Yale College, for the preservation of scientific apparatus, and which he long ago published for the general good, declining to have it patented. It is made by the slow melting together of six or eight parts of lard to one of resin, stirring till cool. This remains semi-fluid, ready for use, the resin preventing rancidity and supplying an air-tight film. Rubbed on a bright surface ever so thinly it protects and preserves the polish effectually, and it can be wiped off nearly clean, if ever desired, as from a knife blade; or it may be thinned with coal oil or benzine.

QUESTIONS AND ANSWERS.

(Readers are invited to ask through this department for any information which they may require on lines consistent with the objects of the paper. The effort will be made to furnish satisfactory answers to all such enquiries. Readers are requested to supply information which would assist us in our replies. The names and addresses of correspondents must accompany their communications, but not necessarily for publication.)

W. T. B.:—Can you inform me which is the oldest architectural building of note in Canada?

Ans.—We would like to hear the opinion of some of our readers on this subject.

"CHIP":—What do you consider the best means of joining a principal rafter with a tie-beam?

Ans.—Provide the principal with a butting joint, made at right angles to the line of the principal and let into a notch cut on the edge of the tie-beam.

"OUTSIDER":—How can an architect join the Ontario Association of Architects? Where can I get full information as to cost, etc.?

Ans.—Write to W. A. Langton, Registrar O. A. A., Canada Life Building, Toronto.

C. D.:—What should be the scantlings of a roof covering a span of 54 feet, to be covered with slate?

Ans.—Tie-beam 12×7, queen posts 7×6¼, small queens 6×2¼, principal rafters 6½×7, straining beam 9×6, braces 4¾×2¾, purlins 8¾×5¼ and common rafters 4½×2. The pitch should be 27°, and trusses 10 feet apart.

The firm of Parkes, Reekie & Co., Montreal, mantels, tiles and other building materials, has been succeeded by that of Webster Bros. & Parkes.

OFFICERS OF TORONTO BUILDERS' EXCHANGE.

WE publish in this number, portraits of the officers of the Toronto Builders' Exchange, to the success of which we have referred on several previous occasions. These gentlemen were elected to office for the current year, at the annual meeting of the Exchange, held on the 16th of January last.

The President, Mr. W. Pears, is also Mayor of the town of Toronto Junction, and is connected with the Davisville and Carlton Brick Mfg. Co. He is well and favorably known, having lived the greater part of his life in the vicinity of this city.

Mr. Geo. Moir, the first vice-president, is senior partner in the firm of Moir & McCaul, carpenters and builders. He has for many years been identified with the building interests of Toronto, and is regarded as one of the most capable and reliable men in the ranks of the builders.

Mr. Geo. Oakley, second vice-president, represents the building stone interest, being a member of the firm of Oakley & Holmes, and president of the Master Stone Cutters' Association.

Mr. David Williams, the treasurer, who has been elected a second time to this office, is one of the oldest builders in the city, and a charter member of the Exchange.

The secretary, Mr. John L. Phillips, has served the interests of the Exchange for about a year in this capacity, previous to which time he was engaged in matters connected with the building trades. He has performed the duties of the office with singular courtesy and ability.

We have no doubt that under the capable management of these gentlemen, the Builders' Exchange of Toronto will continue to advance, and render valuable service on behalf of the building interests of the city.

Overhead piping for exhaust steam heating is largely in use now for factories and machine shops. The radiant heat of the larger exposed surface by this system seems to make a heat energy felt in all directions, that does not take place from pipes partly hidden by benches and machinery; placing the coils flat overhead at an average height of 8 or 9 feet, or as far below the ceiling as circumstances will allow, facilitates the convection of heat by free circulation of air through the spaces between the pipes. This is considered the best system, wherever it can be properly applied. It is better to commence feeding the coils as near the engine as possible, as it makes less back pressure than to carry the exhaust to the top and feed downward. A proper lay-out of the plan should give all the coils an equal share of the steam. The best size of pipe for small factories is 1¼ inch, with each coil fed from the main exhaust, and of a size that all the coil connections shall have an aggregate area equal to or greater than the main exhaust. The drips should be gathered and led direct to an open tank to separate the oil before being pumped back to the boiler. The water from exhaust steam should not be trapped back to the boiler. The coils for heating should be made with branch trees to lessen the length of circulation,—*Scientific American.*

A new idea has occurred to a New Westminister, B. C., roofer, for measuring roofs of buildings, which he thinks of importance to those who estimate quantities, and which may prove of interest to many others engaged in the same line. It is this: Find the whole horizontal area of the roof by dividing it into quantities or sections. To these quantities add the fractions thereof necessary to raise them to the required quantity, which is in a roof of square pitch, 5.12; in a roof of 9 inches rise to the foot ¼; and so on according to the varying pitches. This is equal to raising the quantity representing one of the sides from 12 to 17, or 12 to 15, as in the pitches mentioned respectively. This will apply only to a roof in which all the pitches are equal, but can be made approximately correct by taking a mean between, or it may be made correct by considering the portions separately.

USEFUL HINTS.

Cement to unite brass and glass melted together—one-fourth pound resin, one-fourth pound of beeswax, one-fourth pound of red ochre and one-half tablespoonful of gypsum.

"A good finish cannot be obtained when starch, earth and many other substances of like nature are used for filling," said a well-known foreman finisher. "Starch is soft, easily applied, and work can be rushed by using it, but a satisfactory finish is never obtained. Starch will not hold up the varnish, and the placing of three or four coats over goods filled with starch does not help them much. It is not used so much as formerly. Silex, when properly mixed, makes the best filler. It can be pushed into the grain, where it forms a solid, reliable basis of varnish. A coat or two upon a silex filler, makes the work shine like a piano. My method of testing fillers is to spread a little over a piece of glass. If after the lapse of a certain time, it is found hard, firm and unyielding, it is fit for use. It will furnish the basis desired."—*Furniture News.*

An improved system of ventilation was recently introduced in the great hall of new Sorbonne, in Paris, the principle resorted to being that of maintaining the walls at a higher temperature than that of the air which they enclose. In order to accomplish this, a mixing chamber is located beneath the auditorium and hot and cold air are mixed to the temperature desired; the air is forced into the auditorium through a great number of small holes in the floor and in front of the seats, the openings being covered by a wire netting. Before the entrance of an audience the walls are thoroughly warmed by forcing air heated to 200 degs., into a conduit which delivers the air into a space behind the moulding and close to the floor. The wall is thus heated to a temperature of 100 degs.— a temperature which by radiation, will keep the audience comfortable, at the same time ventilating the hall with air at 60 degs., derived from the mixing chamber. All downward cold draughts are thus prevented, the currents of air all being upward, owing to the heated surface.

DURABILITY OF INDIA-RUBBER HOT WATER PIPES.—With reference to the durability of india-rubber hot water pipes, it may be mentioned that on the Grand Central Railroad of Belgium an ingenious system of hot-water circulation for warming the cars was introduced in 1882, and careful observation were made to ascertain the average duration of the most destructible elements of the system, the india-rubber coupling pipes connecting the train pipe between the cars. M. E. Ballaroche, in writing of these experiments in the *Revue Universelle des Mines*, gives a table of the life of coupling upon that section of the road where they were first introduced, showing that no loss was experienced on the original number installed for four years. In the fifth year about one-fifth of them failed, but half of the original number survived the sixth year, and they were entirely gone before the end of the ninth year. The second lot installed showed failures in the fourth year, and failed rather more rapidly than did the first set. The mean age of the tubes in service at the end of 1891 was three years and a half. The total number of tubes worn out during the peroid under review was 88 and as their service had amounted to 466 tube-years, an average duration of 53 years is assumed.

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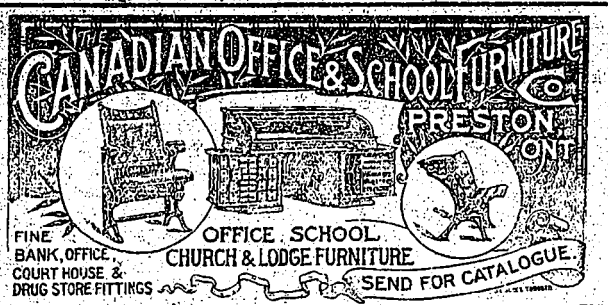

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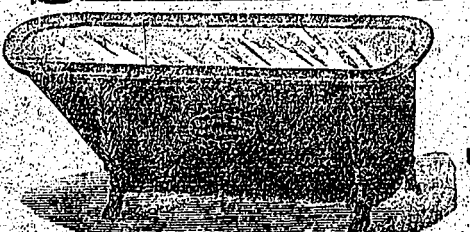

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