THE CANADIAN ARCHITECT AND BUILDER

VOL. XIV.- No. 12. DECEMBER, 1901 PRICE 25 CENTS $3.00 PER YEAR

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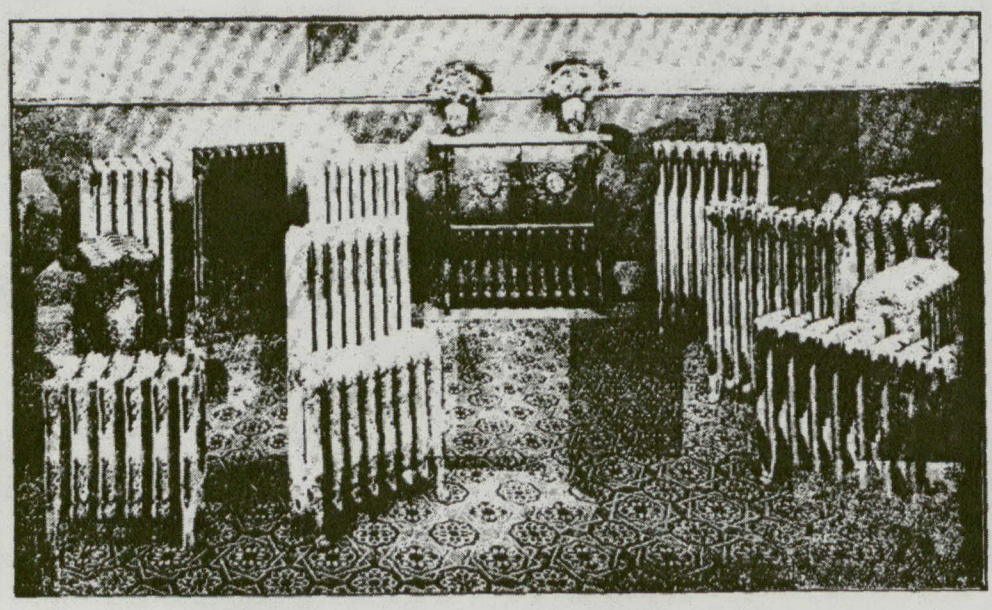
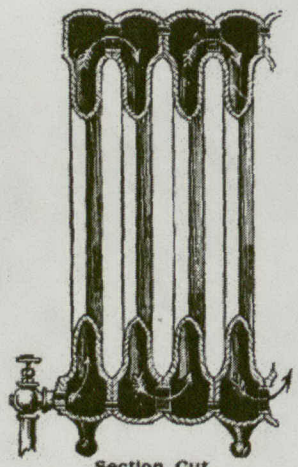
In the Later Gothic Style, the abacus becomes octagonal. The vigorous projection of the leaf ornaments very often give the capital the appearance of an inverted bell.

CANADA HOT WATER and STEAM RADIATORS





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THIS COMPANY have now one of the most complete radiator plants on this continent, and are prepared to supply radiators in large or small quantities on the shortest notice.

Their radiators are working satisfactorily in all parts of the Dominion. Send for catalogue and any further information desired.

THIS IS THE ONLY CAST IRON RADIATOR WITH PERFECT CIRCULATION.

CANADA RADIATOR COMPANY, LIMITED

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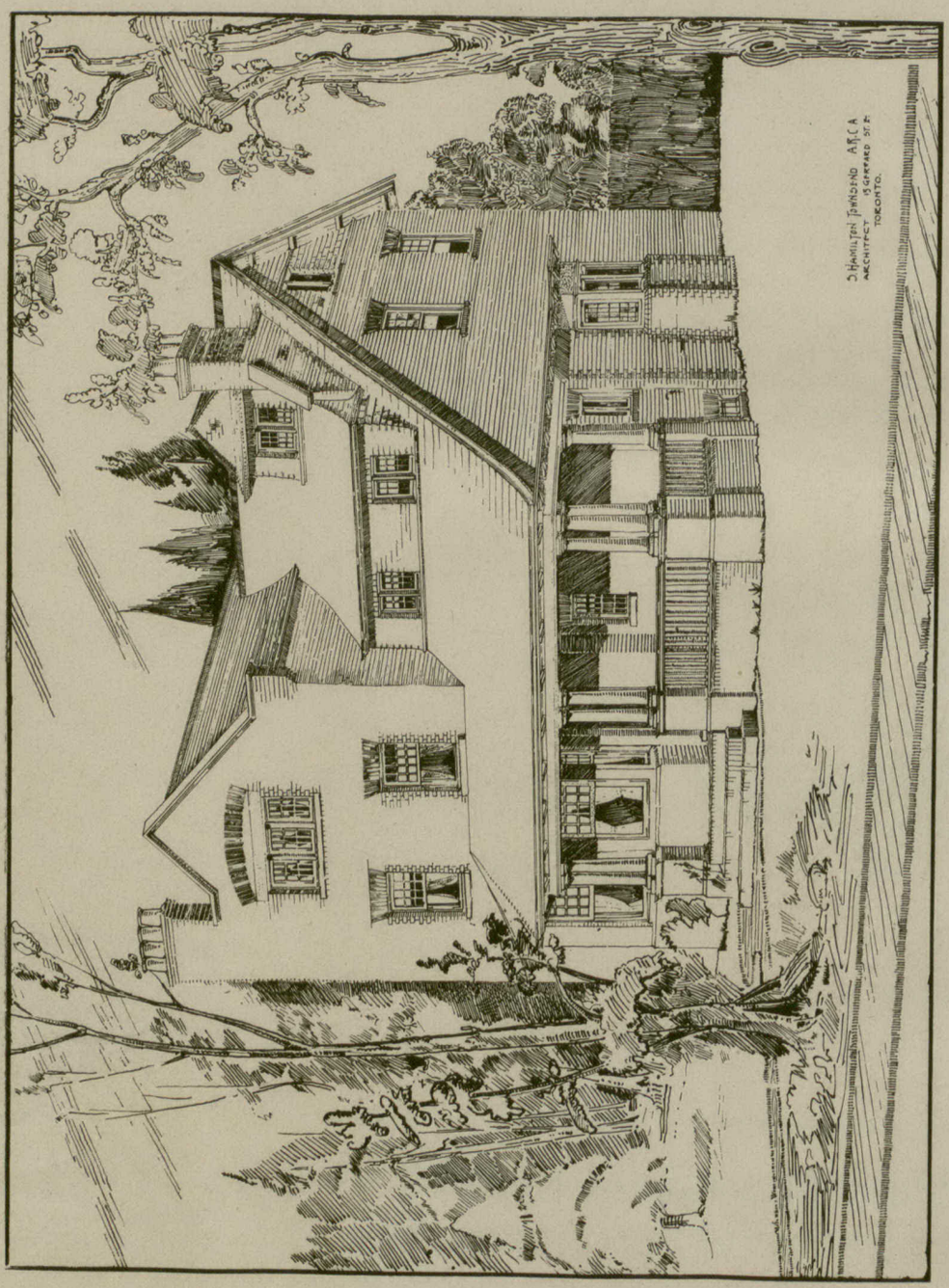
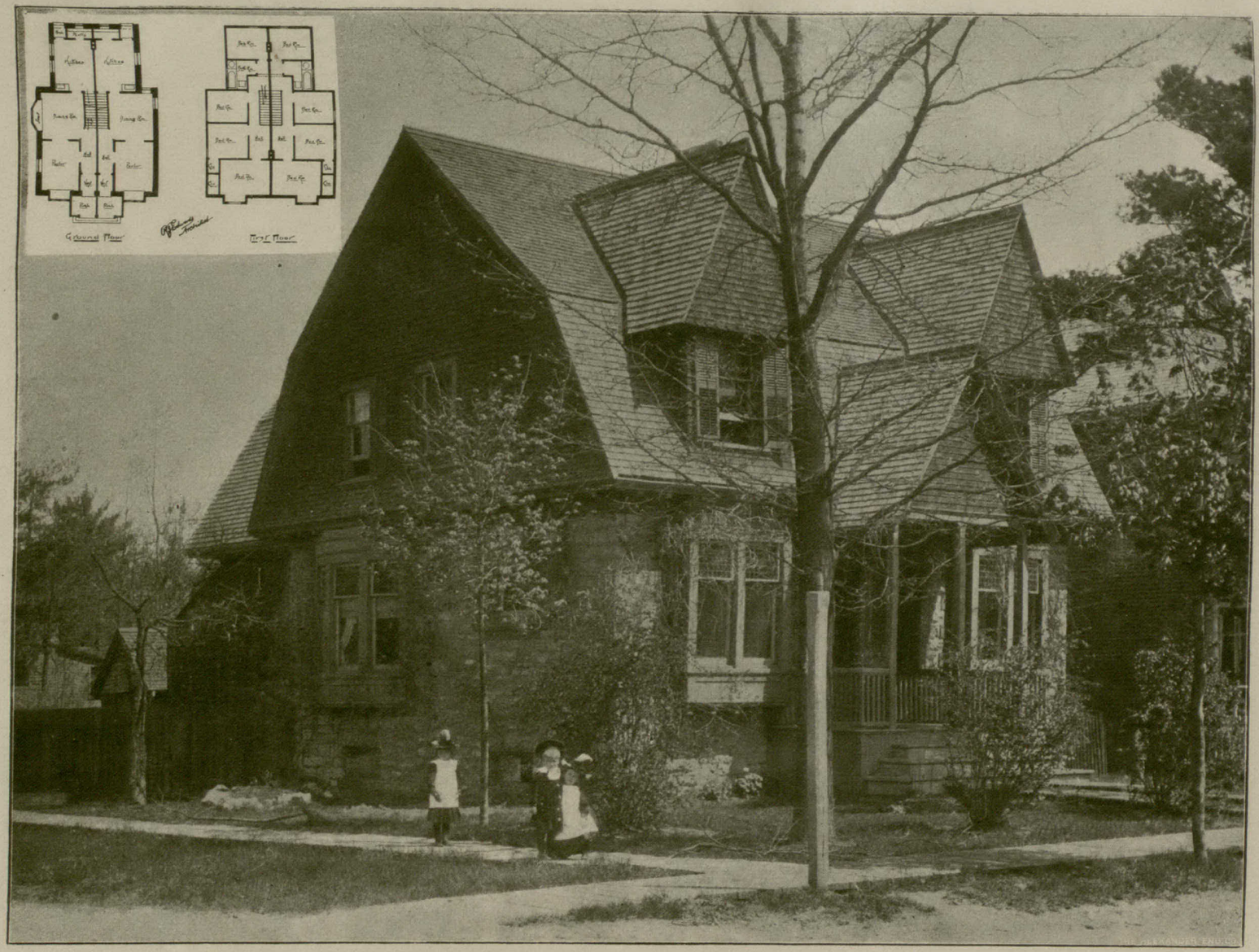


HOUSE, WALMER ROAD, TORONTO.

S. HAMILTON TOWNSEND, A.R.C.A., ARCHITECT.



PAIR OF COTTAGES IN EAST TORONTO—R. J. EDWARDS, ARCHITECT.

SUPPLEMENT TO
CANADIAN ARCHITECT AND BUILDER
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The Canadian Architect and Builder

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VOL. XIV.—No. 168.

ILLUSTRATIONS ON SHEETS.

Pair of cottages in East Toronto—R. J. Edwards, architect.
House Walmer Road, Toronto—S. H. Townsend, A.R.C.A., architect.

ADDITIONAL ILLUSTRATIONS IN ARCHITECTS' EDITION.

Two Photogravure Plates, Exterior and Interior Views of Bank of Commerce, Bathurst and Queen streets, Toronto—Darling & Pearson, architects.
Fire place—Symons & Rae, architects.
Montacute House, England—Sketched by S. A. Heward.

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N.S.W. Industrial Arbitration Act

To the government of New South Wales belongs the credit of having departed from the beaten path in respect to legislation for the settlement of industrial disputes. The Industrial Arbitration Bill which has just become law, compels reference of all disputes between employers and employees to a competent court, with power to enforce its orders and awards, and makes a strike or a lock-out before or pending such reference a misdemeanor, punishable by fine or imprisonment. The court will be presided over by a Judge of the Supreme Court and will have most extensive powers, including the power to declare a standard wage, and to direct that, other things being equal, an employer shall give preference to unionist over non-unionist laborers. There is no appeal from its decisions. The result of the operation of this law will be watched with great interest, particularly by the great industrial nations.

Effect of Stock Speculation on Building.

THE American Architect states its belief that much of the indisposition manifested by small capitalists to invest in land and houses is due to speculation in stocks and the losses resulting therefrom. "Every one who takes note of the course of stocks," says our contemporary, "will remember shares which a few years ago were sold with the recommendation of bankers of the highest standing at fifty dollars, and after paying an assessment, could with difficulty now be disposed of at fifty cents, or a copper stock which has fallen within a few months from seventy-five to five dollars a share." There undoubtedly exists good foundation for the above opinion. Unfortunately Canada is following the lead of the United States in this matter. Our young men, especially business men of all ages and in every line—not excluding the professional man or even the preacher—are seeking wealth by a short and easy road. A few are succeeding, but the majority fail, and the community is poorer by the money lost in this way which should have gone into building improvements and other enterprises of a tangible character.

Importance of Proper Inspection of Building Work.

THE necessity for careful inspection of construction work on important buildings is exemplified in the case of an expensive city church, in the roof of which a number of leaks have developed. On investigation, it was found that the valleys extended only four inches instead of four feet under the slates, allowing water and ice to find access beneath the edges of the slates and destroy them. Two or three hundred dollars have already been spent on repairs and it is estimated that six hundred dollars more will be required to make the roof weather-proof. Another instance is that in which the authorities of a church are confronted with the necessity of lowering the furnaces in the basement in order

to make them comply with the insurance regulations, which provide that the tops of furnaces must be so many inches clear of the joists. The authorities must either lower the furnaces and piping at considerable expense, or run the risk of getting no insurance if fire should destroy the church. These buildings were constructed under the supervision of an experienced architect, who was probably too busy to watch the progress of the work in detail. Where such important interests are involved, however, the client has a right to demand that there should be careful inspection of the work if not by the architect, by his deputy or a clerk of the works.

Value of the Drop Test.

THE increased use of iron in construction has drawn attention to the necessity of using other methods in addition to the tension test for determining the soundness and strength of materials. The value of the drop test in this connection is becoming more generally recognized. The usefulness of this test and the best method of conducting it are treated of in a recent paper by M. Ch. Fremont, in the Bulletin de la Societe d'Encouragement pour l'Industrie Nationale. The writer shows that the results are very different if a test bar is broken by a number of moderate blows applied consecutively or by a single heavy blow. He therefore insists that a drop test should be made by a single blow producing rupture of the test piece, in contradistinction to the method which has prevailed of preparing a number of similar test pieces from the same metal and subjecting these to a series of drops of gradually increasing height, with but one drop to each piece, until one piece is broken. M. Fremont has devised a system for measuring the residual living force in the ram after the drop has injured the test piece, the difference then giving the resistance of the material. As the result of experiments on more than ten thousand specimens he has decided to use a standard test piece 10 millimetres wide, 8 millimetres thick and 30 millimetres long. These dimensions permit specimens to be readily cut from boiler and ship-building plates as well as of heavier parts. In view of the importance of the drop test as an auxiliary to the tension test, it is desirable that in future specifications should demand the application of such a test in addition to the tensile test.

The Toronto Technical School.

The Toronto Technical School has become an expensive institution. A building was recently provided for it at a cost of nearly $100,000, and the running expenses have become a heavy item. The general taxpayers who have to provide the necessary funds, should be interested in seeing that the school is properly managed. The impression prevails that considerable bungling has taken place owing in part to the preponderating influence of members of the Trades aud Labour Council on the Board of Management. A radical change was recently made in the method of management, the services of a principal being dispensed with and the general management being vested in a committee. Each department of the school was placed in charge of an instructor, who in turn was made responsible to the committee. Judging by the determination of the committee to appoint a new principal, this plan seems to have failed. Prof. McKay, of McMaster University, was chosen for the position, but after having accepted, reconsidered the matter and decided to remain in his present position. The selection of a qualified person to become the director of the school is attended with difficulties and fraught with important consequences. Having assumed heavy financial responsibilities in providing a building, equipment and teaching staff, a successful result must largely depend on the selection of a thoroughly qualified manager. In addition to being familiar with all that has been done and is being done in the line of technical education on this continent and in Europe, he should have knowledge of the special requirements of a Canadian school, and what is still more important should have power to organize and maintain in highest efficiency the various departments of the school. It was doubtless unavoidable that mistakes should have been made in the initial history of an institution designed to impart instruction on new lines, and for the organization of which there were few precedents. This experimental period should now be nearing its close, however, and from this time forward it should be possible to proceed on more clearly defined and certain lines, and to achieve results which should justify the large expenditure involved.

TESTS OF PORTLAND CEMENT.

The purposes for which Portland Cement is employed are increasing so rapidly and the manufacturing capacity is developing at such an astonishing rate that there is greater need than formerly for methods by which the quality of the material may be speedily and accurately determined. Much attention was given to this subject by the International Association for testing materials, at its third Congress, held in Budapest last September. Among various papers on cement and cement testing, presented by members of the Association, was one on "The Constancy of Volume of Cements," by Mr. Bertram Blount, cement chemist, of London, Eng. The author suggested the adoption in quantitative form of a hot test for Portland Cement which in its qualitative form has long been in use in the construction of harbors and other public works, viz. :—A bar of neat cement is exposed to the influence of water at 45° C, and the expansion observed by means of the Bauschinger apparatus. A good cement should remain absolutely free from cracks, and should expand not more than 2 per cent. attaining constancy of volume in seven days. The application of this test to sixty-eight specimens of cement produced by five leading English manufacturers, gave satisactory results in twenty-nine cases.

The president of the Association, Prof. Tetmajer, of Zurich, a high authority on the subject, stated that out of 127 specimens to which this test had been applied in his laboratory, only three had failed, and that the hot test for cement had already been adopted by the Swiss Federal government.

It is probable that a form of hot test will be included in the specifications for Portland Cement to be discussed at the next Congress which will take place in St. Petersburg in September, 1903.

After a lengthy discussion the Congress adopted a motion by Prof. Wm. Hawe of New York, for the appointment of an International Commission to collect so far as possible before the next Congress, material for establishing normal tests and specifications for Portland Cement, which may be used in international commerce.

THE AMENDED BUILDING BY-LAW OF TORONTO.

The Toronto Building By-law which has for so long a time been in retirement and understood to be in a constant state of revision has at length emerged from this lonely furrow and put itself at the service of the citizens of Toronto.

It is a remarkable by-law in respect that what there is not in it would make a fair-sized volume—and a very useful volume too. The law as it is given to us, deals chiefly with negations and even then it likes to be general. There is no doubt safety in generalities, to guard a position of power. For example, the opening clause of the by-law, the clause relating to the Inspector of Buildings, is admirable. It states simply that the duty of the Inspector of Buildings shall be "to see that the provisions of this By-law are carried out." This is simple, but comprehensive. It guards the power of the Inspector more effectually than the most elaborate definition of his rights. But, when we come to examine the provisions of the by-law, we find they are of the same nature—guarded rather than explicit. It is as if the authors of the by-law took the view that the municipal council is the natural enemy of building in Toronto, prepared only to swoop down upon it for offenses, instead of the view that the council are the city fathers, to lead intending builders in the way they should go to make the building of the city good.

One evil of a by-law full of generalities is the likelihood of conflict between builders and the Inspector, on the ground that where there are no definite directions the builder's opinion is as good as the Inspector's, and perhaps it may be. For example, under the head of Public Buildings, Sec. 31, it is provided that "no church, hospital, college, school, hall, theatre, or other building of a like nature used as a place of worship, or for public meetings of amusement or resort, shall be used or hereafter constructed unless the same contains such a number of doors, halls, stairs, stair railings or other means of egress "it is to be hoped this will not give colour to the idea that sliding down a handrail is permitted" of sufficient size and strength as in the opinion of the Inspector of Buildings shall afford ample facilities for free and rapid egress in case of fire, panic, or other cause." This is all very well, but public buildings are not erected by the "cut and try" method. An Inspector cannot come on the works of a public building in June and tell the architect that a passage-way he planned in January, must be a couple of feet wider. The plan is figured throughout to meet the existing dimensions, and the iron is all on the ground. The Inspector will either have no opinion upon that point, or if he has, and wishes to make it law, he must expect to find ample facilities afforded for his free and rapid egress from the building. This will not make for the authority of the law. It would be better if it was settled beforehand what is to be the standard in all cases where there can be the question of a standard. Then it will be known in advance what the opinion of the Inspector is going to be; and any dissent from it can be settled in advance, before the plans are made.

This would imply more work than the construction of the present by-law, but genius is not required; the process is one of compilation. If there ever was such a thing as a first by-law, no living human being has seen one. All bylawsare scompiled, and the process is commended to the city officials as a fascinating labor, in which perfection is attainable, and whereby they would learn a lot. Indeed it would not have been necessary to do so much work as might at first sight appear in order to fill in the deficiencies of this by-law, for the ground was well covered in a draft of by-laws, drawn up in 1895, with great care and many meetings, by a select committee of the Ontario Association of Architects, and placed in the hands of the City Engineer; among whose records it may doubtless still be found. That this draft was rejected by the revisers of the by-law argues that they aimed at something different, but it is difficult to see what they aimed at; it is difficult to grasp their purpose. If it is only a fire by-law, why enter into the question of the thickness of brick walls? If it is a building by-law, why not tell us some more? The thickness of a wall in proportion to its height is not the last word about building a wall. One of the notable building failures of New York was due to the quality of mortar used. There is not one word about mortar in this by-law. Nor is there anything said about the length a wall may run between cross walls or buttresses, for a given height; yet, even if this is merely a fire by-law, it is a consideration important for the safety of firemen that there should be some limit fixed in this.

The by-law should, in fact, declare the standard of sound building in all points. This sounds like a large order, but that it is possible is easily seen from the simple fact that it is done. The building by-laws of the great cities of the United States are compendiums of the art of building as locally practised. Indeed it is not necessary to go to the United States for example. The Montreal Building By-law is before us. It contains the usual precautions against fire, more complete than those of Toronto, where we have compared them. It contains also the rules for thicknessing walls, better stated than in the Toronto by-law because displayed in the form of tables, where the average sensual man can grasp them better than if, as in the Toronto by-law, he has to dig painfully for them in a six inch legal paragraph with one full stop. But it contains much more than this. There are full directions for building according to a standard of safety; and that is what we want in Toronto. The Montreal law takes hold of things from the very bottom by specifying the depth of the frost line; and from there up the builder has given him an authoritative decision upon every point, as to what constitutes good building. Footings, foundation walls, damp coursing, stone walls, brick walls, hearths and chimneys are all treated; and the different compositions of mortar are introduced in an intelligent manner as a condition affecting the loads permissible on walls. The strength of floors for buildings of every class, the strength of roofs of all pitch, are fully defined. To be

brief—for we write, not to praise the law of Montreal but to condemn that of Toronto—all questions of standard that arise in designing a building have in the building law of Montreal and other cities a minimum fixed by-law. The result is a sound handbook of building for these cities, and that is what we want in Toronto. For many men it will be the only handbook they recognize, and without it they have none.

As a record of the decisions approved by the general experience in building matters, such a by-law is useful to architects as well as builders, not only to save labour but to save doubt and discussion ; to, in some measure, standardize processes which form so large a part of the investment of capital. The building laws of New York and Boston have before now been used in Toronto, as authorities for this purpose ; but a by-law of our own would be the proper authority.

In short the law is for instruction as well as reproof. If the whole object of the building law were to catch people tripping, it would be well to be as cautious and general as possible, and to give as little information as possible in order to catch the ignorant and unwary as well as the wicked ; but the object of the law ought to be to prevent people tripping ; to instruct the ignorant, warn the unwary, and leave the Inspector of Buildings to deal only with the wicked. That is his function and that is all.

To leave anything that can be settled beforehand, to be settled by the opinion of the Inspector of Buildings is nonsense. He is there to administer the law not to make it. The municipal council have power to make reasonable by-laws, but they have no right to delegate this power to anyone else. In making a by-law so general that it requires interpretation in detail, and in handing over the right of interpretation to the Inspector of Buildings they have in effect delegated to him the power of defining the requirements of the law. It is questionable whether this is a legal position ; it is certainly unpractical. The city of Toronto is still without a reasonable building by-law and something ought to be done to remedy this defect.

We want a precise and comprehensive by-law, printed in a convenient form, with tables, diagrams and cuts sufficient to make it plain, and an index. This is not much to ask for, but it would be a great thing to have.

EXPORT CONDITIONS AFFECTING HEATING APPARATUS.

A gentleman from Canada, intimately connected with the building business, visited the Glasgow Exhibition last summer, and on his return expressed disappointment with the character of many of the Canadian exhibits in manufactured goods. He instanced the case of radiators, in the manufacture of which Canada must be considered to be at the top of the ladder. The exhibit of these goods in the Canadian Building consisted of only a few radiators placed in an out of the way corner. The same gentleman made unfavorable comparison between our exhibits of stoves and those of British manufacturers, stoves being another line of manufacture which has reached great perfection in this country. He further stated that the American radiator manufacturers had captured the British market, and, to a large extent, driven out Canadian radiators.

In response to enquiries on the subject, we find that the small exhibit of radiators in the Canadian Section was placed there by request of the Canadian Commissioner, and that accommodation could not be given Canadian manufacturers in this building to make an adequate display of their goods. Another exhibit in this line was made in the British Section in the name of Messrs. T. B. Campbell & Sons, of Glasgow, who are agents for the Dominion Radiator Company. It is to be regretted that in lines of manufacture in which we admittedly excel, we should not have had proper representation. A manufacturer who visited the Exhibition informs us that the nations that had the fewest exhibits, such as Russia and India, appeared to have the most space, far more in fact than they required, while Canada, which is an important part of the British Empire, was not given room enough to fairly display her goods. Attention was recently called to the fact that a creditable display was not made in the Canadian Building at Buffalo, that Canadian exhibits were scattered about in the various buildings in such a way as to make it impossible for the visitor to receive a comprehensive idea of our development in various lines. The same objection seems to hold good in the case of the Exhibition at Glasgow. It is to be hoped that if Canada is to be represented at future Exhibitions of this kind, the Government will see to it that adequate space for the purpose is obtained, and that the exhibits are displayed to equal advantage with those of other countries.

As regards the competition of American manufacturers of radiators in the British market, we learn that a large share of the trade in this line is being secured by the United States. This is chiefly due to two causes, first, the advantage possessed by American manufucturers over those of Canada in carrying charges. By taking advantage of cheap transportation by canal from Buffalo to New York, and from thence chartering schooners to carry their goods at very low cost across the Atlantic, United States manufacturers are able to sell in the British market at lower figures than Canadians are willing to accept. To assist them in maintaining their advantage, these manufacturers are now bringing iron from the Dominion Iron & Steel Works, at Sydney, Nova Scotia to Boston, at a cost for freight of only 70 cents per ton. On this iron a duty is paid of $4.00 per ton, 99 per cent. of which is however, refunded, on the manufactured product of the iron when exported, so that the Boston manufacturer effects a saving of $3.00 per ton in freight charges by using Canadian instead of American iron.

The manufacture of radiators in the United States is in the hands of an immense trust whose aim is to keep in operation their extensive factories. For this purpose they have apparently determined to secure the trade in Great Britain at all costs. Extensive showrooms and warehouses have been opened in London where a large stock is constantly carried, from which orders can be filled instantly.

Notwithstanding Canadian manufacturers are getting a considerable amount of export business, and are at present favored by the fact that for the first time in many years iron is being sold in Canada at $2 per ton less than in the United States. The demands of the home trade have been so great as to keep factories here running at their highest capacity. Under these circumstances our manufacturers are not disposed to sell their goods in Great Britain without a profit.

INTERCOMMUNICATION.

[Communications sent to this department must be addres ed to the editor with the na ne and address of the sender attached not necessarily for pub ication. The editor does not hold himself responsible for the expressions or opinions of correspondents, but will, nevertheless, endeavor to secure c rrect replies to queries sent in. We do not guarantee answers to all queries, neither do we undertake to answer questions in the issue following their appearance.]

From R. T. :—In estimating builders' work such as pedestals, balustrades, square columns, and antæ caps, plinths, balusters, circular work, octagon and elliptical or similar work, how are the prices regulated?

ANS. :—These questions cover such a variety of conditions that it would require almost a volume to answer them correctly. However, we will try and answer them as briefly and satisfactorily as possible First get the estimated price of the work as though it was plain straight work ; then for pedestals in balustrading, where the plan is circular add one-third of estimated price of each pedestal, also same for each square column and antæ. Balusters 3 x 3 in., and not more than 16 in., long with pins turned on ends, set in place, may be charged 14 cents each ; if more than 16 inches long, charge ¾ of a cent extra for each inch extra in length. For each inch more in girth than 12 in., add 2 cents more. If carved or fluted, charge in accordance with the extra work. For hardwood add about 33 per cent. to whole estimate. For each storey above the first, add 1 per cent. to all work. In octagonal work, double the price, in circular work, make it three prices, and for elliptical work, make it four prices. Some judgment must be used in making these additional prices, as something will depend on the style of work and on position. Much further information on the subjects inquired of by R. T. can be found in the recently revised and enlarged edition of "The Contractors' Hand-Book," published in this office.

From "A Young Mason :" What is the proper method of measuring blocks of stone so as to obtain the correct contents, superficial or cubical?

ANS. :—The method generally adopted is what is termed cross multiplication, examples of which you will find in all good arithmetic books. Say for instance it is desired to know how many feet super there is in a slab of stone that measures 6 ft. 8 ins. x 3 ft., 4 in. you place the figures thus :

ft.	in.	
6	8	
3	4	
20	0	
2	2	8
22	2	8 the superficial contents.

In explanation, commence to multiply by the number of feet first, for feet multiplied into inches give inches, and also feet multiplied into feet give feet. Now, when you multiply inches into inches, these give what is termed parts, and in all measurements twelve parts are equal to one inch ; therefore, when you multiply 4x8 you get 32 parts, which is equal to 2 inches and 8 parts. Place these figures to the right as shown and multiply 4x6 ; this gives inches. Inches multiplied by feet give inches. You have then 26 inches, or 2 feet, 2 inches, which added up give the contents. To get the cubical contents, say if the slab is 1 ft. 2 in. thick for example, place the feet under feet and inches under inches, and proceed as in the first instance, using the superficial contents, 22 ft. 2 ins. 8 parts, which is to be multiplied by 1 ft. 2 inches.

From "St. Catharines" :—Is it possible to make doors true which have become very much out of "wind"? I have to fix up and make a lot of repairs in a house that was built some years ago, in which there are several 1¾ inch four panneled doors—pine—moulded on both sides, that are badly twisted, and I would like to know if they can be fixed up and made true again.

ANS. :—To answer this question properly, it will be necessary to know why the doors got out of "wind," or twisted. In many cases the twisting of a door is due to sagging of the head, thus preventing the top of the door closing, so that when the door is pressed home at the bottom in order to get the catch or hook to hold it, the top is forced out of the square, resulting in time in a twist. In many cases, if the door is eased out at the top, so as to allow it to enter the rebate freely, the doors will gradually assume their original condition. Another cause is that the mortices, which are now all, or nearly all made by machinery, are not accurate in alignment, and the rails when driven home are thus slightly out of square on their faces and in course of time the strain resulting forces the door out of "wind." Sagging itself adds to the trouble. The only way to make a good job of a door troubled with a twist, is to take it apart, turn the rails end for end. When this can be done, or frame new rails entirely, and easing the mortises a trifle, and re-wedging them all round. Often, however, it is more economical to get new doors altogether, for when doors gets twisted and set, it is a very difficult job to get them right. Often too, the spring or twisting of a stile or rail may result from some fault in the wood itself; if the grain of the wood is twisted, or curled, or the wood has been cut from the heart of the tree, or from the neighborhood of a large knot, it is likely to bend or twist, and when this is the case, no remedy is available.

From "Contractor" :—What is the proper pitch for window sills of stone or wood, for an ordinary dwelling house; also what should be the pitch for door sills?

ANS. :—The pitch for stone sills in windows should not be less than ¾ of an inch in 6 inches, and for wood sills the pitch should be a little more—say 1 inch in 6 inches. Door sills should have a pitch of about 1 to 12—that is, 1 inch to every 12 inches in width. In church work, the sills may have much more pitch for the windows, varying from 3 inches to the foot to 12 inches to the foot.

From "Subscriber" : A heavy brick building three stories high has a foundation resting on good footings about five feet from the surface—the whole resting on quick-sand, which in the spring and fall is under water two-thirds of its height ; the owner of the property adjoining one side has dug a cellar which runs down at least three feet below the footings mentioned, and without underpinning or otherwise protecting the foundation other than putting in a rough stone wall, with footings about three feet thick on which his own building is to be erected, which is to be a light building with walls only 9" thick and two stories high, which leaves the foundation of the larger building resting on a base of sand which has one of its sides

cut down on a line with the face of the wall three feet below the footings. Will the stone wall built against this sand, be sufficient to prevent the sand from shifting and injuring the foundation of the larger building;

ANS. :—With the data furnished, it will be somewhat difficult to give a correct answer, but we may say that as we understand the question, we think the work will be unsafe as the sand will gradually get pressed against the new wall, and may eventually force it outward unless it is well braced by buttresses or other devices, and thus cause injury to the building. Of course, the proper way and the most economical—would have been to underpin the large building, which would have made the work safe and complete. Another method, sometimes resorted to by architects, is to drive heavy sheet-piling along the whole side of the building and cut off the top of the piling above the footings, then run in concrete to level off footings, then wall against the piling and over at the top, making the foundation for the new building.

THE "NEWER" UNIONISM.

From the London Times, Nov. 18, 1901.

The injurious effect that trade unionism of the more aggressive or of the more insidious type may exercise on the trade of the country is a question of very grave importance at a time when there seem to be so many difficulties in the conduct of our industries, especially in regard to the cost of production and to foreign competition. There may have been a falling off recently in the number of labour conflicts of the more violent type, once comparatively common. But against this apparent improvement must be set the further considerations that there are industries still suffering from a loss of trade transferred to other countries as the result of trade-union action in the past; that there are employers of labour who, weary of stoppages of work, submit to the exactions of trade unions rather than fight against them, and pass the financial consequences on to the British public; and, most serious of all, perhaps, that the "new" unionism, with its resort to violence and intimidation, has in turn been succeeded by a "newer" unionism, which, although working along much quieter lines, is doing even more serious injury—by reason of the greater difficulty of coping with it—alike to trade, to industry, and to the individual worker. This "newer" unionism would pass among economists under the courtesy title of "restricting the output." Among trade unionists of the Socialist type, who have no regard for courtesy titles, it is better known as "Ca' canny," which means "Go easy, man, go easy." * * *

In no branch of industry, perhaps, has this principle of restricting the output been more generally adopted than in that represented by the building trades. There are other conditions existing in those trades which demand attention as well, but the "go easy" policy calls for first consideration. Not that the rules of the men's societies prescribe any such policy. For instance, there is no rule as to the precise number of bricks a man shall lay in the course of his day's labour; but there is a well-recognised unwritten law on the subject which a bricklayer will disregard at his peril. Twenty years ago a bricklayer would lay his 1,000 bricks a day when on ordinary work. Thirty years ago the bricklayers employed on railway tunnel work in London laid even 1,200 a day. But the unwritten law now in force declares that a bricklayer engaged even on ordinary work must "go easy," and not lay more than 400 in the day. What happens if he should exceed this quantity is shown by a story which is given on the authority of a master builder. At one of his jobs a new hand who possessed all the energy of youth was one day put on, and he showed himself so devoted to his work that the other bricklayers were dissatisfied, and counted up how many bricks he had laid in the course of the day. They found he was responsible for 724. Such zeal as that could not be tolerated, and they gave him to understand that he need not turn up on the morrow, as they would not have him working with them. The young man complained to the foreman, who replied that he was absolutely helpless in the matter, but would put him on another job. This was done, but as the young man started afresh at the same pace as before he had a repetition of his previous experience, and he had then to go away altogether. Such interference as this must be extremely galling to the large number of workmen who desire to do a good day's work for their wage; but for a bricklayer to attempt to fight against the unwritten law in question means that he will be subjected to constant annoyances, that his mates will be "chipping" at him all the time, that complaints will be trumped up against him and carried to the foreman, and that things generally will be made so unpleasant for him that he will be forced either to work no harder than the others do, or go elsewhere. To show how difficult the position of a foreman may be in such matters, the case may here be mentioned of a foreman in the north of London who, not very long ago, for having insisted on the bricklayers under him doing a fair day's work for their money, was repeatedly summoned before the lodge of his society, and fined 5s. on each occasion, for so-called "sweating."

The maximum of 400 bricks per day is the "recognised" limit for dwelling-houses, shops, and business premises built by a private contractor. In the case of public buildings, and especially London County Council and London School Board work, the limit is considerably less. It is to be feared that the London County Council, especially, with its direct employment of labour and its strong trade-union sympathies, must be held responsible in no small degree for the development of the "go easy" practices in the building trades generally, the standard set by its own employees being regarded as one which should be followed, not only on other public work, but to a certain extent, on private work also. Thus a firm of contractors had a job on hand in the East End of London, and complaint was made to some of the bricklayers—who were engaged on some straightforward work on which they could easily have laid from 600 to 700 bricks a day—that they were not doing enough. The reply they gave was: "The London County Council limit is 330 bricks the day. That is what they consider a fair day's work, and we are not going to do more for you or anyone else." But this 330 limit was somewhat generous for public work, if it be true, as affirmed by one authority, that in the case of a certain Board School in London the average number of bricks laid was only 200 per day. Even this figure, too, represents activity itself compared with still another school built for the London School Board. The builder thought he was paying an unconscionable amount for labour, and had his men watched for some days. He found that the work they did represented an average of 70 bricks per man per day!

Had there been any decrease of wages in the building trades there might have been some excuse for the adoption of "go easy" principles. But the contrary is the fact. The wages have gone up substantially of late years; but, as already shown, instead of more work being done for the extra money, there is less. The combined effect on the cost of labour has been such that, whereas a plain wall could have been put up ten years ago for from £12 to £14 per rod (272 ft.), such a wall would now cost from £20 to £22 per rod. Allowance must, of course, be made for the increased cost of bricks, though 10 per cent. of this increase is due to the fact that the brickmakers adopt similar tactics to the bricklayers; but the average cost of labour alone in brickwork (exclusive of pointing) has increased from £3 to £6 per rod in the last ten years, and even this figure is sometimes exceeded. One master builder in London, noticing how slowly the work on a particular job was proceeding, spoke about it to the foreman, and said he would like to find out how much the bricklaying was costing him per rod. The men had seen the two conversing, but had not actually heard what was said. They concluded, however, as they told the foreman, that "the guv'nor wasn't satisfied," and not one of them came back to work next day. The desired calculation was made, and it was found that the actual work of bricklaying was costing £9 per rod, or one halfpenny per brick.

As a combined illustration of lazy working, excessive cost of labour, and a resort to intimidation on the part of the men when the employer seeks to protect his own interests, no better, or rather no worse, example could well be given than that represented by an incident which occurred in connection with a certain East End job so recently as the middle of October. During the course of one particular week there were engaged on the job in question 24 bricklayers and 24 labourers each day. The wages paid to the bricklayers for their week's work amounted to £61 9s 4d, and those to the labourers £36 14s 10d, making a total of £98 4s 2d. The amount of work done for this sum was 43 cubic yards, representing a cost of nearly £20 per rod for bricklaying alone. Some of the men were discharged, but six or seven of them returned the following day, and finding that other men had been engaged in their place, they committed a savage assault upon the newcomers, one of whom was seriously injured. Two of the assailants were taken into custody by the police, and later in the day were convicted by a magistrate and committed to prison, one of them for seven days, and the other for one month. Up to the present the contractors in question have shown no partiality in the employment of non-union men, but they have caused it to be understood that, if the state of things suggested by the above incident should continue, they will take measures to protect themselves against such tyranny.

It is not against the bricklayers alone that complaints of "go easy" practices are brought. From the navvy who digs the foundations to the painter who puts on the last coat of varnish, all the men engaged in the building trades are declared to be "tarred with the same brush" in regard to doing less work for more money, especially where there is any lack of proper supervision. And, unfortunately, unless he makes up his mind to resort to exclusively non-union labour, the average master builder is practically at the mercy of his men. How they will leave a job if they even suspect him of complaining has already been shown, and other instances might be added. If he himself should turn off one man for "going easy" and put on another in his place, the chances are that the second man will be no better than the first. His opportunities, too, of finding relief in foreign competition are limited, though he makes use of those that present themselves. Thus an enormous trade has developed in ready-made doors from Sweden, for the simple reason that they can be brought here and sold at 9s 6d, while the same class of door made in England with similar machinery to that employed in Sweden would cost 13s 6d. When the Associated Society of Carpenters and Joiners found, some years ago, that the masters were availing themselves of foreign help to overcome the tactics of that union, it called a strike in order to compel the builders not to use Swedish doors; but the attempt failed. A substantial trade has also sprung up of late years in Swedish window sashes and frames, to the further detriment of our own carpentering trade, while architrave mouldings for doors and window frames are brought from Sweden and extensively sold here at one-third the cost of English mouldings. * * *

There is, on the whole, more toleration of non-union labour in the building trades than was formerly the case; but in many instances the non-unionist is still subjected to systematic annoyance, and even to persecution, at the hands of the unionists when they can resort to such practices without danger to themselves. Still another class of troubles is represented by an incident that occurred recently at Bath, where 100 masons and bricklayers left a job rather than work with five society men who had not paid certain penalties imposed on them, the strikers insisting that either the men should pay up or the firm should discharge them. The five would not pay, the firm would not discharge them, and so the 100 struck work and remained out until the local officials ordered them to return. As the outcome of all these disputes, rivalries and squabbles among the men themselves a further augmentation in the cost of production takes place, the figure eventually reached being far above that for which the building ought to have been erected. When possible the builder naturally seeks to recover the increased expenses from his patrons, or from what the operatives evidently regard as the bottomless purse of the British ratepayer; so that eventually it is the public who pay. Sometimes, however, a builder will find his calculations quite upset by the vagaries of the labour world, as in the case of one who had reckoned on a good profit from building a bank in London, his contract standing at a substantial figure, but who eventually found himself £1,500 to the bad. When the speculative builder feels that he must not exceed a certain outlay, he is under a strong inducement to guard against loss by building in the jerry-built style of which so much is heard, and here, again, it is the public who suffer. They suffer, too, in common with the building trade operatives themselves, through the increase of rents.

An effective remedy for the present state of things in the building trade will not be easy to find.

That trade includes so many small masters, repre sents so many different branches, each with its separate union among the men, and is so much subject to local influences, that the opportunities for the occurrence of troubles are exceptionally numerous. If the whole of the masters could show as much backbone as certain individuals among them do, and if, improving still further on their present combinations, they formed a solid and compact body through which individual losses sustained in the interests of the whole trade would be met out of a common fund, there would be a better chance of overcoming trade-union tactics, and the arbitrary powers of the unions would, as one man has put it, "tumble to pieces like a house of cards." On the other hand, it is feared that as long as municipal bodies like the London County Council remain what they are—their labour members returned by extremely active labor organizations, getting the controlling voice on labour questions, and playing into the hands of the trade-union workers, who fix a standard, as it were, which the employees of other public bodies, and of private contractors as well, are becoming more and more disposed to accept—so long will it be practically impossible to place the trade on a satisfactory footing.

HEATING AND PLUMBING IN GERMANY.

According to a report by the United States Consul in Brunswick on heating and plumbing arrangements in Germany, improved methods of steam or hot-water heating, sanitary plumbing and elevators have not been widely adopted in Central and North Germany. South Germany is said to be more advanced. In the city of Brunswick there are a large number of hotels, but as far as the Consul knows only one can boast of an elevator and steam-heaters. Last year steam-heating was introduced for the first time in four newly-built houses, and the apparatus was furnished by a firm in Geneva, N. Y. With a conservatism that is remarkable, the people adhere to the old system of heating by "Kachelofen," or stoves encased in tiles. These huge arrangements, standing in the corner of a room, look as if they would heat a whole house, but when their modest iron interior is examined one is convinced that they do not suffice to heat a room. There is no word in the German language for furnace, and this method of heating is known here as "central heizung" or central heating. Lately there has been introduced in a new flat a method of heating through steam or hot water, the apparatus standing in the hall or corridor of each storey. This system has not been tested yet. Most people in Germany live in flats, there are but few private residences. The difficulty in heating an apartment building from the basement has been the distribution of the expense, as each family must pay for its own fuel. This expense is not assumed by the landlord. As to plumbing, the kitchen ranges are without water backs, and when hot water is required tor a bath a fire must be made under a stove surmounted by a boiler in the bath-room. There is unquestionably, adds the Consul, a large field which has not been adequately worked for American enterprise. Manufacturers and dealers in elevators, heating apparatus and plumbing materials who desire to introduce their goods should have advertising matter in the German language. Probably the best way of introducing goods of these kinds is to establish an agency or store where the articles can be inspected.

EUROPEAN METHODS OF USING ROOFING TILE.

Roofing tiles in Greece and Rome were used as follows : Flat tiles with raised edges extended from rafter to rafter, the upper end of which had a rib which entered a groove formed on the other side of the tile placed above it. After these were laid the joints above the rafters were covered with other tiles, each formed like the half of a frustrum of a hollow cone, so that they were able to lap upon each other, their edges lying snugly to flat tiles on the roof. The end of these ridges was terminated with an ornament. Tiles, both flat and curved, were in great demand in Roman architecture. Roofs were covered with the flat and curved tiles alternating. Tiles two feet square, with a foot at each angle, were used to line the thermæ, so that an air space between them and the wall should prevent the absorption of water by the latter.

WATER STAINS AND THEIR PREPARATIONS.

While oil stains commend themselves in many ways, especially for staining soft porous woods, the use of water stains appears to be in the ascendant, writes Joseph Briggs, in the Decorators and Painters Magazine, and it is said that very few of the large wood-working factories of the country use oil stains to any extent, and apparently for very good reasons, chief among which is that water stains penetrate more deeply into the close grained woods, and therefore stained surfaces are not so liable to show accidental abrasions when water stains have been employed. Water stains properly made and judiciously used also bring out the grain effects more beautifully than is the case with oil stains. However, water stains have their defects also, inasmuch as they will raise the grain of the wood, making sandpapering an imperative necessity, and on white pine and woods of similar texture an even and uniform job of staining with water stain is next to impossible, unless the panel is short enough to be covered with one draw of the brush, because water stains connot be made to flow out like oil or varnish stains.

In years gone by, water stains were prepared mostly from earthy pigments, or from dyes of vegetable origin, but with the recent development of the coal-tar colour industry, material is handy to prepare them without the labour and trouble attendant upon their compounding by the old formulas, about which there was a great air of secrecy. We do not propose to give in the following formulas any of the complicated recipes where three or four different decoctions are to be used in so many different applications, but will endeavour to give such that may be prepared and set aside for future use and may be applied cold, only making it necessary, perhaps to give a second application, should the first one by any chance be too weak to produce the desired effect, or when too strong to wipe off the surplus before the stain has an opportunity to set hard.

We would further preface the formulas given by saying that because the strength of the materials naturally varies to a greater or less extent, the operator must, in preparing the stains, use his judgment and work out his own set formulas. Also that in the use of aniline

colours we cannot give commercial names, because the manufacturers have their own fancy name for each, and it is best to order simply aniline soluble in water, designating the colour wanted, as black, red, green, blue, violet, brown, yellow, &c. The stains so produced can be mixed to give the various effects for imitating natural wood or any fanciful effect desired, and by adding a small portion of vinegar may be kept from mould and also from fading too quickly.

BIRCH STAIN.

1. One ounce of bichromate of potash is dissolved in 1 pint of boiling water, allowed to cool, and, if too strong, diluted with more water.

2. One ounce alizarine yellow ground up in water to creamy consistency, then diluted with ½ pint of boiling water. Strain when cool, and add a tablespoonful of good vinegar. If too strong dilute with water.

CHERRY STAIN.

This can be made in various ways, and we give several different recipes as follows :—

1. Equal parts, say, ½ lb. each of burnt and raw Italian sienna of good rich transparency, ground very fine in water, mixed thoroughly with ½ gal. of water and 1 gill of vinegar.

2. One pound of good bright Venetian red ground in water and thinned with 3 pints of weak glue size will serve very well as a stain for cheap work. If the wood is very soft, add more glue size.

3. Boil in a brass or copper kettle 6 ozs. annotto in 1 gal. of water until the water shows a reddish colour, then add ½ oz. of potash or a similar quantity of concentrated lye, and keep the kettle on a slow fire for 15 minutes longer, set away to cool, when it is ready for use with a brush or sponge.

4. One ounce alizarine yellow and ½ oz. Eosine G dissolved in 1 pint of boiling water. When cold, add 2 tablespoonfuls of good vinegar. Before using try the stain, and, if too strong, dilute with water to obtain the desired effect. Should the effect be too red, mix enough aniline brown stain with it to suit fancy.

ASH STAIN.

Ash is so close to light oak that it can be imitated with the stains suggested for light oak, the bichromate of potash solution being best for the purpose.

ROSEWOOD STAIN.

1. Three-quarters of a pound of rose pink, ¼ lb. genuine ivory black, ground fine in water and thinned with ½ gal. of water and 1 gill of vinegar.

2. Boil 1 lb. of logwood chips in 1 gal. water for three hours and apply the stain warm.

3. One ounce Eosine G, ½ oz. aniline black (usually called nigrosine) dissolved in ½ gal. hot water, to which is added on cooling, 1 gill of vinegar.

BRITISH COLUMBIA.

A correspondent writes that a number of important buildings, including a new public library, warehouses and Methodist church are in progress in Vancouver at present. Many dwellings are in an unfinished condition owing to the rainy season having set in, yet others are being commenced. Our correspondent adds, however, that there is not enough work to keep the local contractors busy, consequently competition is very keen and prices little if any above the safety point.

PROPOSED PLUMBING BY-LAW FOR LONDON, ONT.

The City Council of London have given a proposed plumbing by-law its first reading, and it is expected to be finally passed and to be put into operation at an early date. The subject has been up for consideration several times during the last three years, but action thereon was deferred. The London Advertiser says

"When the city's sewage system was submitted to the Provincial Board of Health for approval, that approval was granted, subject to this condition—that the city should pass a proper plumbing by-law. In preparing this by-law the best features of the model by-law of the Provincial Board of Health, the New York by-law and a by-law prepared by the Ontario Plumbers' Association were combined. It was then revised by the city engineer, and the engineer of the waterworks, and ought to contain all the points that are essential. It was then submitted to the council by Dr. Campbell, but at the beginning of each year it was referred to committee and buried with other business that the aldermen did not wish to tackle.

"The reason has been that it was thought by some desirable to have a plumbing inspector to enforce the by-law ; and there were difficulties in the way of appointing such an officer.

"The regulations of the by-law are two-fold. They provide the material and method of construction, so as to produce the best sanitary results, and, at the same time,insure for the property-holder good material and work for his money. For example, it determines what kind of pipes shall be used for drains, and how they shall be laid, with the style of traps best suited ; the minimum size of soil pipes and material of which they are to be made ; character of water-closets in houses and how they should be ventilated ; the manner of making connections in plumbing ; the proper ratio of size to weight in different kinds of pipe used ; the manner of jointing pipes, and other particulars.

"In order to insure the enforcement of the by-law, it is provided that when a plumber has a job to do he shall apply to the city engineer for a permit, and shall submit the plans and specifications of his work. If they conform to the regulations, the permit is granted. The architect should see to it that the plans are carried out. Of course, if there is no architect, it might be said the property-owner would be at the mercy of the plumber, because there could be no official inspector. But the danger will not be great. Any plumber will be willing to live up to the regulations when he knows that they apply to everyone ; and, if he should not, he becomes subject to the penalties of the by-law as soon as his defects are discovered. It might be better to have an inspector, but, even without that official, it is well to have the rules laid down and the defaulting plumber made subject to law."

The following method of constructing a concrete tank, given by an English correspondent, may perhaps be of interest to some of our readers : A round hole is dug, say 6 feet in diameter and 10 feet deep, and the bare earth is rendered with cement, the only bricks used being in the crown. These tanks can be constructed cheaply, they rarely fail, and they are durable. Some have been in use for sixty years.

PRECAUTIONS TO BE OBSERVED IN INSTALLING HEATING APPARATUS.

Insurance Engineering prints the following suggestions for the installation of heating apparatus as a means of safeguarding the building from fire :

HOT AIR AND INDIRECT STEAM HEATING.

The furnace should be set upon a very solid foundation in order to prevent the sagging or cracking of its walls. The top or dome of its enveloping walls should not be less than 18 inches from unprotected woodwork or lath and plaster ceilings, and its smoke pipe or flue should be a like distance from combustibles. The ash pit should be sunken, or the floor in front of it be of brick, stone or concrete, not less than 36 inches wide. The enclosing walls of the furnace should be not less than 12 inches from all combustible material, and the inlet or cold air duct should be entirely of iron or other metal.

Hot air flues or conduits should be made of heavy, bright tin plates with well soldered lock seams, and be kept at least 10 inches from all wood-work or other combustibles. Where it is necessary to carry them through or into wooden or lath and plaster partitions, the flues should be double, i. e., one inside of the other, with an air space of not less than half an inch between the two, and be properly braced to insure rigid separation throughout. Where register boxes are set in floors or partitions, the woodwork should be framed around them to leave an air space of not less than 2½ inches, and be protected by flashings of bright tin extending from the outer edge of the register opening to and through the floor beams or partition. Each register should be set in a frame of soapstone not less than 2½ inches wide, and 1 inch thick, firmly and well set in cement or plaster of paris.

At least one of the registers of the system should be so arranged as to insure its being constantly open, either by the removal of the vanes of the valve, or by wiring the same open, so that closing would be impossible. Heater fire pots should be carefully examined before use each season, to discover and remedy defects due to the burning out of their walls, or the destruction of the luting at the joints of the same, whereby coals might fall into the surrounding air space and ignite dust or other combustibles which are liable to accumulate therein.

HOT WATER AND DIRECT STEAM HEATING.

The same general care in setting and arrangement should be followed as suggested under the item on hot air and indirect steam-heating devices, and in addition, all pipes used for the conveyance of hot water or steam should be kept free from contact with woodwork or other combustibles by the use of metal thimbles or sleeves, provided with interior lugs or radial points, to provide an air space where the pipes pass through floors or partitions. Fires from hot water systems occur from the high temperature reached by the water on account of obstructions or retardation of circulation in the pipe system, whereby the heat generated is sufficient to cause the ignition of the wood or other combustible material already partially carbonized by long continued high temperatures. Similar dangers attend the use of direct steam heat, and are augmented by the possibility of the superheating of the steam in the boiler owing to low power.

APPRENTICES IN THE BUILDING TRADES.

Mr. John Good of the Dublin Master Builders' Association read, not long ago, at a meeting of the architectural society of Ireland a paper on "Some Aspects of the Labor Question." Some of Mr. Good's conclusions are of interest to the builders and workmen of Canada. He laid down the principle that it was the duty first and most imperative of those responsible for trade or commerce to see that it was conducted on the most modern and best known lines, so as to defy competition. This end could not, however, be reached unless the unskilled learned their responsibility and felt that their best was necessary to the success of the whole. Customs in the old days of the building industry differed widely from those in use at present. The well establisded reputable firm of olden times had as much work as it could do and got it at its own price. To-day an evil reputation would not of course, assist, but a good one was of no avail unless the price was the lowest. The building trades, generally were, Mr. Good pointed out, recruited from apprentices and improvers, the condition of apprenticeship varying in the different trades. To keep the number of workmen in any trade at a uniform strength the number of apprentices should be 20 per cent. of the tradesmen. No person, should, he thought, take an apprentice or be allowed to do so unless he could give him his trade properly, by means of a constant employment with a variety of work. He quoted figures to show that the average number of apprentices in Dublin compared to tradesmen was but 17.75 per cent. Mr. Good concluded that: Manual training and courses in technical instruction in day or night schools are much to be commended for young men in America who desire to take up or have already taken up any of the the building trades. In this age of competition and specialization none but the fittest can survive. The fittest mechanic is he who has been trained as to head, hand and eye to conceive and achieve the best work.

"These figures showed that they were not training sufficient men to fill the gaps which the hand of time was making in their trades. So tradesmen came from elsewhere to fill their positions, while thousands of unskilled hands were to be found in all quarters of the land trying to get an existence on the wretched wages at which labor was valued. Hundreds more were forced to emigrate, who, if trained, would doubtless have done credit to themselves and their trade at home. It was evident that they wanted not alone an adequate supply of men, but also a supply of thoroughly trained and skilled hands, guided by a highly cultured brain. Employers knew that such men were very much the exception. Opportunity for training was absent in many trades in the city, and even were it available to-morrow many would not take advantage of it. In this lay their weakness. Theoretical instruction and practical training in apprenticeship were so interwoven and necessary, the one to the other, that they should be taken together, and be under one control.

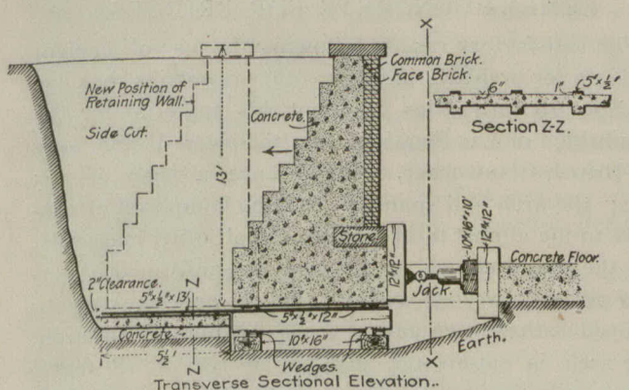
Lord Roberts is said to be promoting a plan for the extension of Cape Town Cathedral, to be participated in by the several portions of the empire, as a memorial to all who have fallen in the war.

Mr. W. W. LaChance, of Hamilton, has recently given up practice as an architect, and engaged in business as a dealer in building supplies. He has secured the agencies for a number of American and Canadian companies.

MOVING A LONG BRICK WALL.

The following description and illustrations of the methods employed to move a long brick retaining wall in New York, taken from the Engineering Record, of that city, should prove interesting and instructive to Canadian contractors who may some day find themselves confronted by a problem of this kind :—

The first portion of the New York Rapid Transit Railway structure which was completed ready for the track rails was a section a few hundred feet long on Broadway, north of West 135th street, section 13. It was

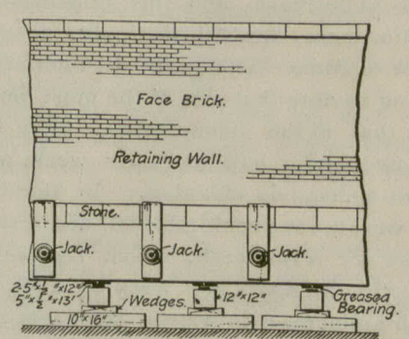


METHOD OF MOVING RETAINING WALLS ON NEW YORK RAPID TRANSIT SUBWAY.

built by L. B. McCabe & Brother, sub-contractors for sections 12 and 14, and was finished nearly a year ago. It was constructed of the standard dimensions and design for two tracks, but as recent developments have made it desirable to have three tracks at this point for operation of the railway, the Rapid Transit Commission authorized the contractors to change it to a three-track structure, and this work is now in progress. At about One Hundred and Thirty-fifth street the tracks begin to decend northwardly from the surface of the ground to enter the underground section, and there is an inclined entrance in open cut to the beam-construction subway. The bottom of the cut has a solid concrete floor, continuous with the footings of the retaining walls on each side. It was decided to cut through this floor parallel, and adjacent to, the face of each wall, and to move each wall backward parallel to its original position 5½ feet farther away from the centre line, to permanently seat them in their new positions, and to restore and extend the concrete floor between them, so as to secure the wider structure without destroying the original masonry.

The retaining walls are about 196 feet long, from 4 feet high at the south end to 13 feet high at the north end and 3 feet thick on the top, battering with irregular offsets on the rear to a maximum bottom thickness of 8 feet. They are faced with 9 inches of brickwork, built with one course of pressed brick and one of red brick, and have a line of footing stones built into the concrete base under the brickwork at floor-level. After removing the concrete floor close to the wall, and making, on the opposite side, an excavation about 6 feet wide at the bottom, small holes were worked through the earth under the footing and 12x12-inch transverse timbers, about 8 feet long, were set in them from 3 to 5 feet apart, according to the height of the wall. A 5x½-inch steel track-plate, 13 feet long, was laid on top of each timber, and 5x½-inch sliding pieces, 12 inches long, were laid across them longitudinally, under the front and rear edges of the footing. A 10x16-inch longitudinal sill was laid flat under each end of the transverse timber, and the latter was given bearing on them by driving a pair of thin oak wedges side by side on top of each sill. The sills were so long that their ends nearly touched in the middles of the spaces between the transverse timbers, and practically formed two continuous bearings, each 16 inches wide, under the wall. Back of the wall a concrete footing, 5½ feet wide and 6 inches in minimum thickness, was laid with deeper transverse ribs on the centre line of track-plates, which were 1 inch above its upper surface, and bedded in cement mortar. The oak wedges were driven until the wall was slightly raised, and after the concrete footings had set a week or more, jack screws were placed horizontally from 3 to 6 feet apart against bearing pieces on the foot of the wall and on the edge of the concrete floor, and, being simultaneously operated, in a few hours pushed the whole length of the wall 5½ feet traversely to bearing above the new footing.

The screws were turned at given signals, and great care was taken to keep the wall lined in, so that no transverse strains or distortions were developed. A transit was set up and a sight taken parallel to the axis of the wall, a few inches from the required position of its face, and offsets were taken from it to make sure



METHOD OF MOVING RETAINING WALLS ON NEW YORK RAPID TRANSIT SUBWAY.

that the wall should not be moved too far and to check its position. At the end of the moving the wall was found to be less than 1-16 inch out of line or level, and no cracks or injuries could be discovered. Where the wall was highest the blocking had settled a little and given the sliding plates a slight upward inclination, and the face of the wall had to be raised slightly to plumb it. The space was about 1½ inches between the top of the new concrete footing and the bottom of the old wall, which was left between the sliding plates for clearance of the irregularities of the concrete, was grouted, the timber removed, the steel track plates cut off flush with the face of the wall, the excavation backfilled, and concrete put in to restore and extend the floor. The estimated weight of the wall was about 200 tons, and the preparatory work and moving was accomplished in ten days by twenty men under the direction of the Terry & Tench Construction Company.

A cement to resist white heat is made as follows: Pulverized clay, 4 parts ; plumbago, 2 ; iron filings, free from oxide, 2 ; peroxide of maganese, 1 : borax, ½ ; sea salt, ½. Mix with water to a thick paste, use immediately, and heat gradually to a white heat.

THE MARBLE INDUSTRY OF GREECE.

The famous Dippotin marble quarries in the Island of Euboen are now being restarted by an English company. These quarries supplied green marble, and had not been worked for 2,000 years. The marble quarries near Pentelikon are also exploited by an English company, but, so far, not quite successfully. It has already expended considerable sums on improvements, and hopes to start work in the new quarries by the end of the present year. 1,000 cub. metres of Pentelikon marble have already been contracted for in connection with the Stadian at Achon. Several American orders have also been secured, and a gigantic block is shortly to be despatched to Berlin.

WAGES AND WORKING HOURS IN ENGLAND.

According to the last annual report of the Board of Trade (London) for the year 1900, "the year 1900 was the culminating point of the upward movement of wages which began in 1896, and that the general level of wages stood higher at the end of 1900 than in any other year for which statistics exist. In other words in the last year of the nineteenth century the artisan was in a more flourishing condition than at any other time in the history of this country. But the same report also states the fact that from the end of 1900 wages began to decrease, and this downward movement is certain, there can be little doubt, to continue for some time to come. As regards the hours of labor, it is interesting to note that one of the most important changes was that in the cabinet trade, there being a reduction of two and a half hours per week, affecting 8,000 cabinet-makers in London. In the building trades there were 9,111 people affected, and a reduction of 8,016 hours for a full week, which represented an average reduction in hours per week of 0.88. Thus, together with an increase in wages, there was a reduction in the hours of labor, all tending to show how much the condition of the working classes has been improved in the century which is now at an end."

UNFAIR WORK.

It is one thing to order and get good bricks, and another thing to see what the contractor does with them when the order is faithfully fulfilled. We recently saw says the British Clayworker an enormous piece of brickwork, not ten miles from Charing Cross as the crow flies, in which tenth-rate red bricks are being employed for the interior, and a rather substantial bluish brindle for the exterior of both sides of a wide wall. The wall may, perhaps, be from 4 ft. to 4 ft. 6 in. in thickness, and is remarkably well built. But—what will happen when it has been up a few years? There is an awful example of what might almost be called an answer to this question close by, where a very thick wall of somewhat similar character is cracked practically from top to bottom (about 25 feet). That wall has been patched up from time to time as the face clearly shows. Yet, so far as we can see, the builders of the new wall have not profited by the example exhibited to them near by. The fact is, that for brickwork having to bear a great strain, and especially a moving one with stress in addition, it does not do so to sandwich inferior bricks between thin walls of good ones—even when the brickwork in itself is excellently done. The outside bricks, after a time are called upon to bear an undue strain owing to their more elastic nature as compared with that of the porous red bricks within. On the other hand, when the damp course is impaired, or non-existent, the inside bricks suffer to some extent, and strain is set up between them and their outside neighbors. If the wall does not buckle it will tend to crack. This is an unfair use of bricks, detrimental to them and to the maker; though no one could say that in the case mentioned the work is that of a jerry builder.

CEMENT CONCRETE FOR BRIDGES.

The satisfactory results following the use of cement concrete for arched bridges in other countries, has led the Spanish authorities to adopt this material for the new bridge of Las Segahas over the river Ualon, says the British Clayworker. It will have a span of 165 feet; the arch and spandrels will be composed of concrete to the almost total exclusion of all other materials, and the spandrels will be of open design formed of vertical pillars carrying arches. Pivots or hinges are to be used at the crown and at the springings of the arch. The arch is segmental, and has a rise of 18 feet 9 inches from the centre of the pivot at the springing to the centre of that at the crown. At these two points the depth of the arch is the same, and measures 3 feet 2 inches, but at the centre of the half arch the depth is increased to 4 feet 8 inches. Between the open cast-iron parapets, which are 4 feet high, the width of roadway is 17 feet, but no provision is made for footpaths. The main arch is to be faced with brickwork. The spandrel arches are 5 feet span. The composition of the concrete to be used in this work is as follows, the proportions being by volume:—Cement 1, sand 2.5, and broken stone 5.

PRACTICAL HINTS.

A French authority says a good cement to form the joints of stones round water reservoirs consists of: Litharge in fine powder, 5 parts; minium, 4 parts; sifted road dust, 100 parts; oil, 9 to 10 parts. This cement is said to become gradually white, and in a few months to acquire the colour of quarry stone.

SHRINKING WALL PAPER.—To remedy this defect the wall should only be rubbed down with pumice stone and cleaned, as the size and whiting have a tendency to crack and give, in fact, it has the same effect on a painted wall as gum. The paste required for sanitary paper is: After mixing the flour well in cold water, put a gallon of hot water, or rather boiling water, to every pound of flour. Mix well, strain through a sieve, and put in a piece of alum about the size of a walnut. After putting the paper on roll the joints well.

During the past ten years or so, many experienced and observing painters have pointed out the effects of priming with yellow ochre alone, and have recommended that when ochre is to be used for priming it should be mixed with from 50 to 70 per cent. of pure white lead and thinned with pure raw linseed oil only, or at most with the minimum quantity of dryer. Ochre, consisting for the most part of silica or sand, is at best a brittle pigment and cannot hold its own with white lead as a priming. When covered with an elastic white lead paint, it will remain fixed longer than when a more brittle paint is used over it, but sooner or later it will "split," throwing off the top coats of paint. If this has happened in your case, you can determine by examining the back of the peeled off strips of paint, as well as the bared wood, both of which would show a yellow color. We believe that the lead and zinc paint obtained a direct hold on the ochre priming, which had also lost its adhesion to the lumber, and there not being oil enough for all, caused the cracking and subsequent peeling or scaling. The only other cause that the trouble could be attributed to would be a damp surface on painting.

NORTHWEST CORRESPONDENCE.

WINNIPEG, December 5, 1901.

For some time past the question of erecting a large apartment building in the city has been before the public. The proposal has now taken definite shape and is being promoted by Hunter, Cooper & Co., financial agents, of this city. The intention is to erect the building on Ellice avenue, close to Knox Church. This is a good location and not far from the main portion of the city. The frontage will be 200 feet and depth 120 feet. Mr. E. Kennedy, of Minneapolis, U. S., is the name of the architect which appears on the sketch plans.

It is intended to put up a modern and thoroughly equipped building in all points, and first-class both in construction and fihish. The outline plans show a structure in the form of the letter E. The main entrance is from an open court in the centre between the two arms of the letter, and is carried up to the second story, the doorways being flanked on either side by massive columns and pilasters of stone supporting a stone entablature. The building is seven stories in height above the basement, with an eighth story over the centre portion. The facade is to be of red pressed brick with diagonal work of a darker colored brick for the first two stories, Bedford sand stone dressing to windows and other openings, with a generous treatment of carved and ornamented work.

From the main hall, entrance is obtained to two large electric elevators, one on each side of the entrance, running from basement to top flat. The main or public corridors branch off on either side of this entrance, and at the turn or arms of the letter E the main stairs are located, one flight at each arm between brick walls. This arrangement is followed out on each floor. Private halls lead off the public corridors into the various suites of rooms. Each suite of rooms or household apartments contain dining room, parlor, library, kitchen, three chambers and bath room. All these rooms--in fact, all the rooms in the building—ore lighted from the outside, the use of light wells being done away with. Some portions of the floors are to be laid off in smaller suites, such as bachelor apartments, doctors' or dentists' offices and artists' studios, the whole building having about 500 rooms.

Each suite of rooms as may be required will be provided with spacious cupboards, linen closets, store rooms and pantries, with cold storage section to be operated by an ammonia process located in the basement. Dust chutes when necessary from the rooms and floors descend to the basement and these will be of the most approved pattern.

The floors will be of fireproof construction throughout, overlaid in private halls and rooms with hardwood flooring, and the corridors will be paved with mosaic.

The bath rooms will be provided with enamelled baths, Syphon jet closets and marble wash basins, having hot and cold water, the sanitary arrangements being complete in all details.

The lighting, heating and ventilation will be of the latest description. Electrical heating is under consideration, as electricity will be supplied in the near future by the water power at Spruce Falls, sixty miles from Winnipeg and at a very reasonable rate.

The eighth story over the centre portion of the building is to be arranged for a restaurant, having general and private dining rooms with all the modern conveniences attached to same.

The basement is laid out for lockers, store rooms, bicycle rooms, etc.

The estimated cost of the completed building is $175,000, and if the plan is carried out as outlined it will be an enterprise of no mean order as well as an ornament to our city and will largely take the place of first-class hotel accommodation which is at present very deficient.

The past season has been one of substantial progress and activity in the building trade. Many large and handsome structures have either been begun or completed, and we find our city is so much the richer, not only in bricks and mortar, but also in architectural adornment. Building permits covering buildings completed or uncompleted have during the past year been issued to the amount of about $1,500,000.

At the south east corner of Main and Lombard streets, the Merchants' Bank of Canada are erecting a massive and handsome structure to be used for their banking business and for general commercial offices. The walls are up to the roof line and it is proposed to close the building in for the winter and complete next year. The structure is seven stories in height above the basement. The base for about five feet above the pavemeut is of grey granite and above this to the height of the banking floor the two fronts are of white sandstone. From this point to cornice line red pressed brick has been used with a liberal proportion of white sandstone in ornamental and constructional work designed and detailed in the Renaissance style. The columnar effect just below the main cornice is very striking. The Roebling system of fire-proof construction is to be used for floors, etc. It is by far the highest building here and when completed will form one of the most attractive architectural features of this progressive metropolis of the West.

Other banking corporations have not been behind in providing adequate and attractive buildings for their headquarters. During the year the Bank of Commerce, Dominion Bank and Bank of Hamilton have each shown their faith in the present and future prosperity of this land of promise by expending large sums of money in the completion of beautiful and stately edifices. The Bank of Commerce building is designed after the Corinthian style, constructed of light sandstone. Carefully designed and well executed details mark this structure as one of classic outline both as to elevation and internal arrangement. The banking room is lofty and a circular treatment has been adopted for the banking counter.

The Dominion Bank is modelled after the Renaissance style in red sandstone and terra cotta and is situated at the south-west corner of Main street and McDermot avenue. The general elevation is not as pleasing in outline as we could have wished and for a corner building is in our judgment, not high enough. The banking room is very lofty, but has somewhat of a cramped appearance. Excellent taste has been displayed in the elaborate finish of the entrance corridor.

The Bank of Hamilton building has been extended this year, doubling the size. The facade is of white brick painted, ornamented with red sand-stone trimmings in bold detail, making an imposing structure at the south-east corner of Main street and McDermot avenue. The internal finish, which is quartered oak, is to be completed this winter.

The Lake of the Woods Milling Co. have erected on McDermot avenue, in the rear of the Dominion Bank, a solid and commodious office building 2 stories in height, designed and executed in brown and red sandstone and pressed brick. The walls are lined and the partitions formed of hollow terra-cotta brick. The floors are fire-proof. The internal finish is to be of the best.

A local syndicate has erected at the corner of Albert street and McDermot avenue an apartment block called "The Alexander." The lower portion is divided into stores with plate glass fronts. The super-structure is of solid brick veneered with dark red pressed brick ornamented with buff stone trimmings. The two stories above the store fronts are almost entirely carried on steel beams supported by iron columns. The face wall above the window openings is carried by steel lintels, so that there is a continuous line of brick without arches. The two upper flats have been arranged for small suites of rooms, such as bachelor apartments. These are well planned and fitted with all necessary sanitary improvements.

The School Board have erected in Nena street, at the head of Notre Dame avenue, a large and handsome solid brick school of 12 rooms, with pressed steel ceilings. The building is complete in all sanitary and other appointments.

The Toronto Crematory Co. have just completed for the city a large crematory, having 3 furnaces with water grates. The chimney for carrying off the gases is 80-feet high. Tests are just now being made as to the efficiency of the furnaces to completly destroy garbage and other like material.

Winnipeg has grown and is still growing. The foregoing is but a glance at a part of what has been done.

Space would not permit to give a detailed list of the many wholesale warehouses, stores, commercial buildings and dwelling houses which have been erected during the year; suffice it to say that the expansion of trade and general financial advancement of the city fully warrant the outlay, and we look forward to the coming year as one of still greater expansion.

The premature cracking of varnish is due, more often than not, to iuquality of elasticity—to oily or improperly adjusted undercoats. Apply color that dries quick enough to become hard before varnishing over it, and so far as that color is concerned there will be no shrinkage sufficient to disrupt the varnish.

STUDENTS' DEPARTMENT.

THE TRUE AIM OF THE ARCHITECT.

There was much sound advice expressed in admirable style in a recent address, "To the Younger Generation," which Mr. Heathcote Statham delivered before the London Architectural Association School of Design. At the outset he exhorted his hearers not to accept the pessimistic views of those who maintain that all architecture is a sham and a worked out thing now, and that nothing but an entirely new beginning on a new basis can revive it. Architecture is no worse off now than it has been at any time since the Renaissance, as far at least as its higher possibilities are concerned. It is true that it is on a radically different basis since the Renaissance ; but we cannot help that. The Renaissance theory of architecture is not so contemptible after all. It might even be argued that it is the higher theory ; that we have exchanged the pursuit of architecture as a craft for its pursuit as an intellectual problem and we have developed in these latter days much more power of invention and much more sense of character in decorative detail than the men of the Renaissance possessed.

The lamentations made by what may be called the socialist school of critics over the supposed death of architecture are to my mind as unreal as their remedies are unreal. Architecture is not a dead art unless you choose to make it so. The more earnest and enthusiastic of the younger generation have had it so preached to them that architecture is dead, and that copyism has killed it, that they are all on the qui vive to do something original, as they think ; something picturesque ; something out of the common. Hence all kinds of vagaries—short stumpy columns, windows in unexpected places, immense rustications enclosing half the shaft of a column and leaving the other half bare, and so on. These devices do impart what is called "character" to a building, no doubt, as long as they are novel ; but one very soon gets tired of them. It is possible to be picturesque, no doubt, without being eccentric ; but it is a question whether the picturesque is the true object of architectural design. The picturesque, really and truly, will only come unsought ; a sought-out and carefully contrived picturesque defeats its designer's ends. A good deal of the work which an architect is called on to do in practice has not, unfortunately, much relation to art in its higher or intellectual sense. The whole thing is mixed up with practical requirements, sometimes of a very prosaic order. But when we can get the opportunity to contemplate and treat a building, large or small, as a whole ; a building the uses of which are associated with some of the higher objects of our lives—with the repose and sanctity of life, as in the house—the aspiration to higher life, as in the church—the dignity of corporate life (or, shall we say ? the dignity which it should have) as in a municipal building ; in such cases it is the part of the architect to make of his building an embodied idea—a conception which should be whole and complete in itself ; a leading idea, pervading first the plan and expressed with the same completeness in the design. This is where I think that architecture is or can be still a living art. It is all very well for the pessimists to accuse modern architecture of being only a copied architecture, making use of the detail of preceding styles ; it is not within the power of man to avoid that, except to a very limited extent. Even before the Renaissance made such a radical change in the situation, the detail in each generation or in even fifty years, depended largely on that of the preceding fifty years.

It is in this matter of unity and completeness of idea in architecture that I think we get a valuable lesson from some of the Renaissance architects. What strikes one in the works of Inigo Jones and Wren especially, as compared with most modern work, is the manner in which they grasped the conception of a building as a whole, and subordinated everything else to a central idea. Every church of Wren's, for instance, is a distinct conception with a dominant idea of its own. The details they used were to a great extent borrowed (though Jones put some originality into his), and the decorative details, in Wren's buildings at all events, are often not good, and perhaps he was not much responsible for them; but their general conception of a building was nearly always fine and always complete and consistent with itself ; an architectural whole. The pessimist critics deny that architecture is anything but building, and are always dinning into us that drawing is not architecture. It is not ; but it is a means of showing and putting on record an architectural conception. An idea in architecture is an idea, whether carried into execution or not. As to the use of the detail of a past style, probably the wiser course, and the one that is most in accordance with the actual tendency of architecture in the past, is not to throw overboard the historical detail, but to regard it as a basis for gradual development and modification, little by little, as we find opportunity ; which is the way in which all the changes of style in the pre-Renaissance period really came about. They were not the result of sharp and sudden and wilful change, but of gradual modification.

Coming to another point, not to scruple to find fault with an old building because it is old, Mr. Statham said there is a weak tendency among modern architects to admire everything in an old building, instead of considering it on its merits as they would a modern building. Then the next thing to this blind admiration is blind imitation. The designers of old buildings were subject to human error like ourselves ; and a study of them critically, considering what are their merits and what are their mistakes, is far more useful to our minds than accepting everything as right because it is old. Two other reflections were added in concluding, first not to be sure that you are right in architecture and everybody else is wrong. There is a tendency to this among our young architects, partly arising, perhaps, from the fact that our aims at present are rather uncertain and conflicting.

The other observation is to make perfection in architecture for its own sake an object, and not for what you can get out of it. If those who make the love of the art rather than the desire of gain their first object—if they must be content to see others richer than themselves in bankers' balances they have the compensation of keeping their youthfulness of spirit and their appreciation of the beauty of life.

The demand for paints and varnishes is said to be greatly increasing in Japan. Formerly, stains were principally used for all timbers used in the construction of buildings, but of late the application of oil paints is coming more and more into favor.

AMERICAN AND CONTINENTAL HEATING PRACTICES AND APPLIANCES.

A writer who signs himself a member of the Royal Institution contributes the following on this subject to the London Plumber and Decorator :

We are apt to look to America for improvements and go-aheadness in heating, and we do not look in vain by any means; but how few know, or even think, that on the Continent, in France and Belgium, and only a few hours from London, steam heating systems are erected in business premises and in private residences in a more advanced and perfect manner than America can boast of. In these countries so near home the valves to steam radiators can be worked to control the supply of steam and regulate the heat to the greatest nicety, whereas, in adopting American methods, the radiator valve has to be full open or quite shut; regulation of steam supply and heat is not possible. These remarks refer to the ordinary methods practiced in each country. England, it must be said with regret, is, in a general sense, behind both.

America is the home of the radiator, and it may even have originated there. Certainly the practical and pretty designs came to England from that country, and two or three (no more) English makers were stimulated to set to work and improve on what had served our purpose in the past. They have succeeded in this, but radiators of American manufacture still sell in this country by the thousand feet for every hundred feet of the home made article. The lesson to be learned from this is that more can be done by our manufacturers, but it needs funds, skill and smartness all on a liberal scale.

We had radiators in England before America invaded our trade, and the same radiators are still made and sold, but they had simply to subside into the rear when the others came, and there they remain. The demand for radiators in this country is worthy of a big effort, for it is an established demand and must grow greater. Radiators must be of a style or character which will serve to make them pleasing, or, at least, not unsightly in nice rooms. It is in this that our rivals have succeeded chiefly.

The coming of the American radiator has been a blessing in disguise, quite apart from its stimulating our manufacturers. What it has done is to greatly stimulate the calling of the heating engineer. Residence work is now quite common and to be readily obtained, compared to what it was previously. The radiator has made this mode of affording warmth more acceptable, and, not least important, it has made it cheaper for given results.

Not only has America sent us its radiators, but the valves and fittings, the "trimmings," as they call them, have come also. They brought us the angle-valve and the union-elbow, two details to be grateful for, allowing, as they do, for very neat and unconspicuous connections at the radiators. They also brought us the floor plates and many little details which are gradually melting the average woman's opposition to a hot water heating plant in a house. It will not do to make the appliances and the work savour so strongly of the engineer's shop and the foundry. This has been a blight, dwarfing the growth of the industry ever since it originated. The Americans undoubtedly cured this.

It was America that we had first to thank and then to hate for the malleable fittings. They are pretty, strong, businesslike and of admirable shape. In the latter respect they are very superior to our wrought fittings. They tap them with a thread that stands up clear of the body metal, and this thread is tapped taper. It would be difficult to make a bad joint. In addition to ordinary shapes they gave us the 45 degs. branch, the bushing, the eccentric reducing socket, and ditto bushing, the close and open return bend, the male and female elbow and other things. What they have not given us is a guarantee that the fittings shall be water-tight. It is simply distressing.

An English firm has remedied this, and are now making a very high quality malleable fitting which is reliably waterproof always, but, how strange it is! they have actually copied the two faults that wrought fittings have, and are obliged to have, and they have made the price the same as wrought fittings. The three things making malleable fittings desirable are therefore absent, and it is reasonable to ask what is to be gained by using them compared to wrought? Simply nothing. Some unnatural people would say this was just like English manufacturers.

Like the radiator, the American boiler has stimulated our manufacturers, for we were sadly behind in getting a large area of heating surface in a moderate compass. A cast iron structure can have corrugated surfaces, heat absorbing pins, complicated flue-ways, and every conceivable means of catching the heat to an extent that is impossible with wrought iron. In the past our boilers were wonderfully plain, and reliance was placed in carrying the flame up and down their sides, which were made as long as possible.

—THE—

CANADIAN ARCHITECT AND BUILDER

A Monthly Journal of Modern Constructive Methods,

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

PUBLISHED ON THE THIRD WEDNESDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

The C. H. MORTIMER PUBLISHING CO. of Toronto, Limited.

Publishers,

Confederation Life Building, - TORONTO, CANADA.

Telephone Main, 2362.

Branch Office: IMPERIAL LIFE INSURANCE BUILDING, MONTREAL.

Bell Telephone 2299.

SUBSCRIPTIONS.

THE CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States on the following terms: Architects' Edition, $3.00 per year; Regular Edition, $2.00 per year. The price to foreign subscribers is: Architects' Edition, 16 shillings; Regular Edition, 12 shillings. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

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

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The Fire and Light Committee of the Montreal City Council have recommended that the salary of the City Building Inspector be $1,500 per annum, that an assistant Inspector be appointed at a salary of $1,000 per annum; also an elevator inspector and a wire inspector, each at a salary of $1,000.

It is suggesed in Nature that great advantage would accrue from the use of magnetic iron ore as a material for the manufacture of concrete blocks. If magnetite is used instead of ordinary rock broken into fragments, and magnetic sand, or ilmenite sand instead of ordinary sea sand, concrete blocks can be obtained which have all the strength of the ordinary concrete blocks, and which weigh, when immersed in water, twice as much as the ordinary blocks. The great advantage of this additional weight as regards resistance to the waves is obvious.

The Contractors' Liberal Club of Montreal have elected the following officers:—Honorary presidents, Sir Wilfrid Laurier and Hon. S. N. Parent; patrons, Hon. J. I. Tarte, Hon. L. Gouin, and Mr. R. Prefontaine; president, Mr. Elix Sauvageau; vice-president, Mr. J. Grattan; second vice-president, Mr. Jos. Brunet; secretary, Mr. G. T. Gagnon; assisstant secretary, Mr. G. I. Leveile; treasurer, ex-alderman P. Leclaire; committee on rules, Messrs. J. Lamarche, J. Beland, H. Contant, J. B. Brouillette, D. Martineau, Cezairc, Lemay and J. Amesse. Arbitration committee, Messrs. A. C. St. Amour, J. Beland, F. Lemoyne, J. G. Doquette, and P. Lellaire, jr.

DECAY IN TIMBER.

Discussing the causes of decay in timber and their remedy, Indian Engineering states that those organisms which actually cause the decay of timber directly—whether in the living tree or after it is felled—are funguses of one kind or another. The fungus has its roots, the hyphx—slender threads which penetrate and spread throughout whatever it is feeding on—but these themselves secrete a solvent or digestive substance which both enables them to penetrate the hardest wood and to abstract from it what portion forms their food. Some air, some moisture and some warmth are necessary to the growth of fungus. Free ventilation keeping dry prevents all rot—immersed in water always and thus kept from air, wood will not rot in any ordinary way, and with attention to these facts much can be done towards preserving timber. But in the great majority of cases some dampness in confined positions must exist and naturally we seek for specifics which can render wood unpalatable to the enemy.

Untainted timber treated on the outside is protected greatly, and undoubtedly the best antiseptic we know is common creosote oil. This is very cheap—it is absorbed with great avidity by dry wood especially does the sapwood drink it greedily—and sapwood most requires protection. Moreover creosote can be used alike either for a thorough impregnation under pressure or cheaply as a surface painting, and also it protects from weathe ing as well as does a coat of common tar—though not as tar and pitch combined. It can be used, too, where tar cannot; because it simply stains the wood a pleasing brown.

The carving on the Liverpool Exchange building, burned a few days ago, was done under the direction of Mr. Thos. Mowbray, now of Toronto, and occupied a period of seven years.

THE WINDOW GLASS MONOPOLY.

One of the most complete specimens of a labor monopoly pushed to its extreme limit is to be found in the window glass manufacture in this country, says the American Architect. Not long ago the American Window Glass Company, a powerful trust, conceived the idea of driving the independent concerns out of business by interfering with their men; and, in the pursuit of this benevolent purpose, it made friends with the head of the Glass Blower's Union, who, by a series of judicious strikes, succeeded in closing, if we are not mistaken, every window glass manufactory outside of the trust. In return for this favor the American Window Glass Company is said to have distributed five thousand shares of its stock among members of the Glass Blowers' Union, in what proportion is not stated, and to have assisted it in establishing a monopoly of the trade unequalled, perhaps, since the middle ages. The number of "pots" operated by the American Window Glass Company is, in round numbers, twenty-eight hundred, while the Glass Blowers' Union has only twenty-two hundred members, so that the demand for men is greater than the supply, and, in order to perpetuate this condition, admission to the union can only be obtained with great difficulty. Most of the members are said to be Belgians, and, as a special favor, a Belgian who wishes to join may, if he is acceptable to the members, be received on payment of an initiation fee of five-hundred dollars. Except under such circumstances no new members are admitted except blood relations of the present members. It need hardly be observed that under these conditions, both the monopolies, that of the masters and that of the men, are, for the present, flourishing. How long the prosperity will last is another question. So far as the men are concerned, they seem to be pursuing in this country the tactics by which the same men have already destroyed the window-glass trade in their own land; and the American Window Glass Company, which, a few months ago, was threatened with serious competition, is not likely to keep the business to itself indefinitely.

STONE WORKING IN ATHENS.

It appears that the Athenians worked the marble to an even, but not very smooth face, with a toothed chisel before they placed the blocks in the work, and that they afterwards went over the whole exposed surface and finished it to the greatest smoothness and nicety, but without polish, taking off in this operation about one-fifth inch, and this has been the practice on the horizontal as well as on the upright surfaces, for the columns of Propylæa are sunk in to about that depth below the general level. The place intended for their reception was sunk before the lower cylinders were placed, and lest any inconvenience should arise from the wet remaining there before the building was completed, a small channel has been cut from the recess to carry off the water. In the steps the adjoining faces are carefully finished at the internal angles, by which means the accidents and wear which take place during the execution would rarely be of any consequence.

Put a little saffron, or a little dragon's blood with the size, when gilding, as it improves the colour of the gold.

The St. Louis Exposition management proposes to make the principal feature of its show a duplication in steel and staff of the greatest of the Egyptian pyramids. It will be the exact size of the original, will cover forty acres, and contain the largest assembly hall in the world. It will also be as large, comparatively, as the deficit the St. Louis people will have to face if the proposed plans for the exhibition are carried out. Montreal Gazette.

MONTREAL BUILDERS' EXCHANGE.

At the annual meeting of the Montreal Builders' Exchange which took place on the 9th inst., there was a large attendance of the members.

The annual report presented by the directors together with the financial statement was considered very satisfactory and a resolution adopting same was unanimously passed.

The election of directors for the ensuing year resulted in favor of Messrs. J. H. Hutchison; James Paton; N. T. Gagnon; J. Wightou; John Quinlan; E. S. Mattice and H. R. Hussey.

A vote of thanks was passed to the retiring board of which C. T. Williams was the president and Mr. J. W. Hughes vice-president, and also a vote of thanks to the hon.-secretary-treasurer for past services rendered in the interests of the Exchange.

The meeting freely discussed the future building interests in the city and a consensus of opinion was that a much more hopeful outlook was in prospect.

A feeling of regret was expressed that some of the leading institutions should have placed contracts for important buildings in the hands of outside contractors, in view of the fact that Montreal contains some of the most substantial buildings to be found anywhere on this continent, which have been erected by local contractors and builders.

At a subsequent meeting of the newly elected board, Mr. J. H. Hutchison was elected president, and Mr. James Paton vice-president, and Mr. George J. Sheppard hon.-secretary-treasurer for the ensuing year.

The committee on admissions to be composed of the following members: J. Ballantyne; Felix Sauvageau; A. F. Bury Austin; John Gray; John Roberts; E. T. Houghton and J. W. Harris.

The rooms committee are Messrs. N. T. Gagnon; E. S. Mattice and Mr. George J. Sheppard.

A STONE BAROMETER.

A curious use for stone is that made by the inhabitants of Northern Finland. They quarry a somewhat peculiar stone, somewhat common in that country, which serves as a barometer. The stone turns black, or blackish gray, when bad weather is approaching. Fine weather has the effect of turning it almost white. The Finns regard the stone with superstitous reverence, but men of science say that its changes in color are due to certain salts contained in its composition.

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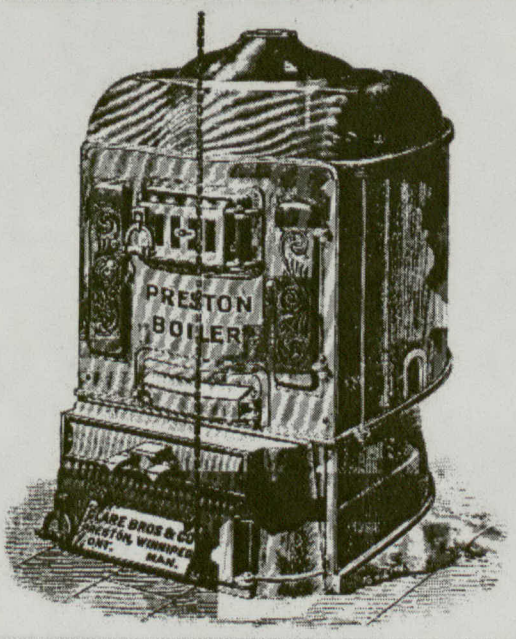

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