PAGES

MISSING

CANADIAN ARCHITECT AND BUILDER.

VOL. XII.—No. 5. MAY, 1899 { PRICE 20 CENTS. $2.00 PER YEAR.

—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 2362.

Branch Office: NEW YORK 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 for $2.00 per year. The price to foreign subscribers is $2.50. 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.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

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.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publishers of any irregularity in delivery.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1899.

PRESIDENT	J. E. BELCHER, Peterborough.
1ST VICE-PRESIDENT	A. F. WICKSON, Toronto.
2ND VICE-PRESIDENT	ANDREW BELL, Almonte.
TREASURER	GRANT HELLIWELL, Toronto.

COUNCIL:

FRANK DARLING	Toronto.
D. B. DICK	Toronto.
S. H. TOWNSEND	Toronto.
FRED HENRY	London.
F. S. BAKER, A.R.I.B.A.	Toronto.

REGISTRAR AND LIBRARIAN:
W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1899.

PRESIDENT	A. RAZA, Montreal.
1ST VICE-PRESIDENT	S. H. CAPPER, Montreal.
2ND VICE-PRESIDENT	G. E. TANGUAY, Quebec.
SECRETARY	J. VENNE, Montreal.
TREASURER	W. E. DORAN, Montreal.

COUNCIL:

A. T. TAYLOR	Montreal.
J. S. ARCHBALD	Montreal.
G. A. MONETTE	Montreal.
J. F. PEACHY	Quebec.
M. PERRAULT	Montreal.
E. MAXWELL,	Montreal.

AUDITORS—J. A. CHAUSSE and J. C. A. HERIOT, Montreal.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

HENRY MARTIN, President.	JOSEPH RUSSELL.
THOS. CHRISTY 1st Vice-President.	JAS. CRANG.
JAS. B. THOMSON, 2nd Vice-President.	JOHN M. GANDER.
DAVID WILLIAMS, Treasurer.	R. CHALKLEY.
THOS. CANNON, Jr.,	JOHN VOKES.
GEORGE DUTHIE	DAVID WAGSTAFF.
THOS. PAINTER.	W. J. HYNES.

LONDON BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

THOS CANNON, JR., Toronto, Honorary President.	THOS. JONES.
WILLIAM JEFFERY, President.	JOSHUA GARRETT.
SCOTT MURRAY, 1st Vice-President.	HENRY STRATFOLD.
WILLIAM SMITH, 2nd Vice-President.	WILLIAM TYLTER
GEO. S GOULD, Secretary.	ERNEST FITZGERALD
JAMES LUNEY, Treasurer.	

MONTREAL BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

JAMES SIMPSON, President.	A. COWAN.
C. T. WILLIAMS, Vice-President.	J. MCLEAN.
G. J. SHEPPARD, Hon. Secretary-Treasurer.	F FOURNIER.
P. LYALL.	W. P. SCOTT.

HAMILTON BUILDERS' EXCHANGE.

BOARD OF DIRECTORS.

JOHN T. IRWIN, President.	G. POCOCK.
WILLIAM HANCOCK, Vice-President.	JOHN CLAPHAM.
J. H. SMITH, Secretary, King William Street.	F. A. CARPENTER.
W. J. REID, Treasurer.	J. ROSS.
	A. CLARKE.

Fire-Resisting Mortar.

THE discovery is reported that serpentine rock, when powdered and mixed with good lime, forms a mortar that will successfully withstand heat to 1,100° F., and will not crack if subjected when at this heat to contact with cold water. The new material, besides being in the highest degree fire-resisting, is also declared to be so elastic as not to crack when the building settles and permits of nails being driven into it. It is said to be one-third lighter than ordinary mortar, easy to handle, and capable of receiving decoration.

The Palace Hotel Project.

IT is gratifying to note that the project for the erection in Toronto of a first-class modern hotel appears to be making satisfactory progress. The promoters, among whom are many of the leading financiers of the city, have been granted incorporation under the name of the Toronto Hotel Company. A meeting for organization is being held as we go to press. The attempt to interest the two great railway companies has, it is understood, been successful, and the enterprise will be entered upon at an early date.

Steel Stirrups Condemned.

PROF. J. B. Johnson, of the Engineering Department of Washington University, St. Louis, Mo., says: "The recent fire tests of steel stirrups and brick walls, which were made under my supervision in this city, show very conclusively that unprotected stirrups are extremely dangerous. These stirrups become red hot in a few minutes, and then rapidly char and burn away the end of the beam, and also bend down, so that, in from twenty to thirty minutes after the fire reaches the stirrups, the beam is dropped right out of the twisted steel by the straightening out of this bend or twist." Another side of this question is that where beams are so securely anchored as to resist the action of fire for up-

wards of half an hour, they are almost certain to cause the walls to collapse and bring about the wreck of the entire structure.

Strengthening Effect of Metallic Cores in Mortar.

In the Comptes Rendus there was published recently the results of tests made by M. Considere to determine the value of metallic cores for adding to the strength of mortar and concrete. M. Considere states that the insertion of an iron core increases by twenty times the elongation of the mortar. Tests were made with various mortars and concretes, using prisms of square section 60 cm. long and 6 cm. in the side, in which were embedded rods or wires of iron. M. Considere is of opinion that injury to buildings by the settling of foundations, unequal expansions and shocks is much less liable to occur when cores are used, and finds that wrought iron and hard steel of the kind used for rails is capable of strengthening mortar and concrete to a much greater extent than is the iron usually employed for cores.

A Spoliation Scheme.

The management of the Toronto Street Railway are endeavoring to secure right of way for a car line up University street and through or beside Queen's Park to the northerly city limits. The proposal is one which the citizens should promptly and strongly oppose. By the expenditure of nearly $50,000 two or three years ago, the attractiveness of Queen's avenue and Queen's Park was greatly enhanced. There is now at the disposal of the citizens one central spot to which young and old may resort for pleasure and rest, undisturbed by the grinding of wheels and clanging of bells. Every effort should be made to preserve this condition. There is no wish or demand on the part of the citizens for additional street car lines in this locality, which is already well served by the belt line, Yonge street and Avenue road. The proposal has its origin in the greed of the street car company, who have never shown much regard for the comfort or even the rights of the citizens. The Toronto Guild of Civic Art, among whose members are gentlemen identified with Toronto University, the interests of which are affected by this proposal, should at once take decided action in opposition to the carrying out of the scheme.

Ill-Advised Legislation.

The legislature of British Columbia during its last session seems to have been largely under the influence of the leaders of organized labor. Reference was made in a previous number to an Act passed at this session, the object of which is to prevent contracts being made with workmen residing in the other provinces of the Dominion. This must be regarded as being legislation of a very narrow sort, and calculated to check free intercourse between the people of the different provinces, and the building up of a homogeneous nationality. Another measure was passed forbidding the employment of Japanese coolies in certain industries and upon public works, which has resulted in a strong protest from the Japanese authorities to the British government, which in turn has brought the matter before the Dominion government at Ottawa, where it is now being considered. The Japanese Ambassador to Great Britain, who passed through Canada recently en route to his native land, protested against the Japanese in British Columbia being placed on the same level with the Chinese—as the former spend their earnings in the locality where they reside and conform in their dress and habits to the customs of the country. It was intimated that the retention of the new law on the statute books of British Columbia would be likely to seriously disturb the international good feeling which at present prevails between the governments of Great Britain and Japan, and likewise restrict the development of the growing trade relations between that country and Canada.

Canada at the Paris Exposition.

Mr. J. A. Radford's suggestion that the Dominion government should institute a competition among Canadian architects for designs for the Canadian building to be erected at the Paris Exposition is an excellent one. We fear, however, that it comes too late, as plans for the building are said to have been already prepared. The Hon. Sidney Fisher, on his return from France last year, stated that while in England he had inspected and approved of plans for a Canadian building, prepared under the direction of the Executive of the Colonial Committee, of which Lord Strathcona is the chairman. It was proposed by these plans to erect a building which should cover the entire space allotted to Canada, which at that time was extremely limited, but which has since been increased by an allowance of 8,000 feet of the space allotted to Great Britain. This plan, on being submitted to the French Executive Committee, was rejected, and the Colonial Committee were informed that each colony was expected to erect a small kiosk-like building. To this regulation the Colonial Committee made urgent protest, on the ground that the erection of such buildings would tend further to reduce the already too limited space at the disposal of the colonies. We have not learned in what manner the difficulty was adjusted, but the recent announcement that the plans for the Canadian building had arrived at Ottawa would indicate that an understanding has been reached, and also that, in view of the difficulties which have been experienced, there is little prospect that the government can be induced at this late date to re-open the question of the design of the Canadian building. Notwithstanding, we could have wished with Mr. Radford that the design for this important structure had been thrown open to public competition, in order that the building might rightfully represent the product of the highest architectural skill of which Canada could boast.

Methods of Cooling Buildings.

A firm of heating contractors in Toronto recently received a letter from New Zealand inquiring whether any method had been devised of using Canadian radiators for cooling dwellings during hot weather. The writer was looking about for means whereby houses in New Zealand could be made comfortable in summer as well as in winter. He had become acquainted with the excellent heating apparatus manufactured in Canada, and which is rapidly finding its way into use in many foreign countries, and his thought naturally turned in this direction when seeking a method of cooling. Unfortunately, the desired information could not be given him, for the reason that Canadians have not yet solved the problem for themselves. By the use of fans or blowers located in the basement and operated by steam or electricity, large buildings are being successfully ventilated, heated and cooled, but the method, if possible of application, has not yet been put to practical use in ordinary dwell-

ings. The time has arrived when cooling methods applicable to buildings of this class are felt to be a necessity for those who are obliged to spend the heated term in the city. Electric fans can with some advantage be employed in houses where electric current is used for lighting, but the majority of houses are not lighted by electricity, so that the current to operate the fans is not generally available. What is required is a system by means of which cool air could be evenly diffused throughout the house in the same manner as warm air is now distributed in winter. The idea of utilizing the steam and hot water radiators for this purpose is an excellent one, and might, we believe, be found to be practicable. If we might rely upon the statement of the author of a recent article in Maclure's Magazine, regarding the wonderful expansive, cooling and other properties of liquid air, the solution of the problem would seem to be near at hand. Unfortunately, some of these statements are so directly opposed to well-known and tried physical laws that scientific minds have discounted largely the importance which the public at first attached to the writer's so-called wonderful discovery. We invite an expression of the views of architects, heating engineers, or indeed of any reader on this interesting subject of how to maintain in dwelling houses at sufficiently low cost a reduced temperature in summer.

BY THE WAY.

EXPERIENCE has shown that wire nails are not adapted for use in shingling, as in a short time they rust away and the heads drop off. A correspondent of the American Architect instances the case of a church shingled less than a year ago, where the wire nails have been destroyed by rust.

× × ×

SIR Wilfrid Lawson has thus put into jingle his view of the British Workmen's Compensation Act :

"If you fall thirty feet slap bang on the street,
You'll get cash if your head be split ;
But if, cutting it fine, you fall just twenty-nine,
In that case you won't get a bit.
So the moral is this—If I'm not far amiss ;
If you are a wise working man,
If you find you've a call to accomplish a fall,
Then tumble as far as you can."

× × ×

THE Canadian Club has decided to mark with memorial tablets historic land marks in and about Toronto. The Club would find their task a much easier one if the custom had prevailed among architects in the past of affixing to their principal buildings their names and the date of erection. Their failure to do so may have arisen from the modesty which is supposed to be an innate characteristic of the profession, or possibly they were over sensitive about what might be said about such a proceeding by the papers.

× × ×

GEORGE Lynch entered into a contract to build a new spire for the Wall street Methodist church in Louisville, Kentucky. The workmen disturbed a nest of hornets in the old spire. The hornets resented the intrusion by stinging the workmen so severely that some of them fell to the ground and narrowly escaped being killed. The attempt was made to eject the hornets by sulphur and fire, but it failed, while there was danger of destroying the building. The work is accordingly at a standstill, and the contractor is being threatened with a suit for damages by the church authorities for failure to complete his contract.

× × ×

THE danger which constantly threatens pedestrians on the public streets from the accumulation of snow on roofs in winter was sadly emphasized by the recent death of a little girl in Toronto as the result of a snowslide from a church roof. Witnesses testified at the enquiry that on several occasions they had narrowly escaped injury from the same cause while passing the building. It was further shown that the attention of the church authorities had been called to the matter, but no steps were taken to avert the danger. I understand that the city by-laws require the owners of buildings to keep the roofs clear of snow, but like many other ordinances, this one appears to find its fulfilment in the breach rather than in the observance. Let us hope that the sacrifice of the life of a little school girl will lead to more strict compliance with the law for the future.

× × ×

REFERENCE is made by a contemporary to the fact that the Jews were ever great builders and many of their ceremonies remind them of this art. The Passover is not allowed to pass without a reference to the brick-making bondage in Egypt. During the service the history of the Passover is related, being recounted in reply to a series of questions asked by the youngest person at table, who enquires the meaning of the unaccustomed things he sees about him. One quaint edible partaken of ceremonially is known as "Charouseth." It consists of a mixture of chopped apples, nuts, and spices, and forms a pleasant substitute for the mortar (of which it is supposed to be a reminder) used by the ancient Hebrews in building the cities of Pithom and Rameses, the two stone cities of the Pharaoh "who knew not Joseph."

× × ×

A NEW York contemporary, Fire and Water, has made the interesting discovery that Rome in the days of Cæsar Augustus, was ahead of Chicago, which has laid claim to being the mother and inventress of sky-scrapers. A reference to the building laws of the Eternal City shows that in the Augustan days the rage for running up excessively tall structures was so rampant that restrictive legislation had to be passed on the the subject, and the Senate enacted that their height should be limited for precisely the same reasons as are at present urged against them in New York to-day. It was proved that they darkened the streets, thereby rendering them unhealthy ; that their deterioration was also a source of danger ; and that they increased the already existing fire risks, since the growing population was hemmed in by the walls and had, therefore, to house itself in high buildings, which were overcrowded and, in case of fire, were likely to turn out deathtraps. The old Roman skyscrapers, however, were of a different type from those of Chicago or New York. Their rears towered over their fronts. The latter were 100 feet or more above the street level, while the former rose as high as from 120 to 130 feet, there being ten or fifteen stories, with a terrace-like appearance at the top. As these buildings were voted dangerous to the public safety, a law was passed fixing the minimum height of all new dwelling houses at sixty feet. The prophet knew whereof he spoke when he said that there is nothing new beneath the sun.

THE TECHNICAL SCHOOL QUESTION.

The question of Technical School education is beginning to receive the attention it deserves in this country. The question was taken up by a committee of the Ottawa Board of Trade some months ago and a report presented last March. Since then the Toronto Board of Trade has taken action in the matter and is to arrange an open meeting at Toronto next month, at which the Minister of Education for Ontario will speak. All this is as it should be and this meeting ought to be an important occasion. The whole system of production in enlightened countries is based upon the use of mechanical power and it is no longer possible to make progress without spreading the knowledge of the principles which underly its application. The question is in what way and to what extent.

There is already a Technical School in Toronto which has had a chance of exhibiting in what lines technical education should be carried on ; but after some years of existence it seems to have no other idea of its mission than to be a sort of night school with scientific leanings ; which seems to be attempting either too little or too much. It cannot provide all the scientific instruction which those should possess who are responsible for the conduct of important industrial undertakings, and it does not frankly profess to confine itself to teaching artisans the limited application of science in their own trades. If all knowledge of theory is not possible to those who use science in trade there must be a choice between total ignorance and partial knowledge, and there is no need to be afraid of the bugbear of superficiality. The carpenter who is instructed in descriptive geometry, for example, is none the worse if he can get the knowledge he wants without any accompaniment of chemistry. He is not even the worse if he stops in his own subject short of the point where the practical merges into the "pure." And he is certainly the better by a skill which we would call technical, and which may therefore properly be the product of a technical school.

It is difficult to speak in this matter with authority as the authorities seem to be divided. But it is difficult to regard the Board of the Toronto Technical School as authorities on the question of education. As a matter of fact their attention seems to be chiefly taken up with the question of getting themselves a suitable building. This is not only a good thing itself, but has the incidental advantage that they will by this means draw upon themselves the searchlight of investigation, for it will not become the City Council to spend $75,000 on a building for the School without satisfying itself that what is taught in the school justifies the expenditure.

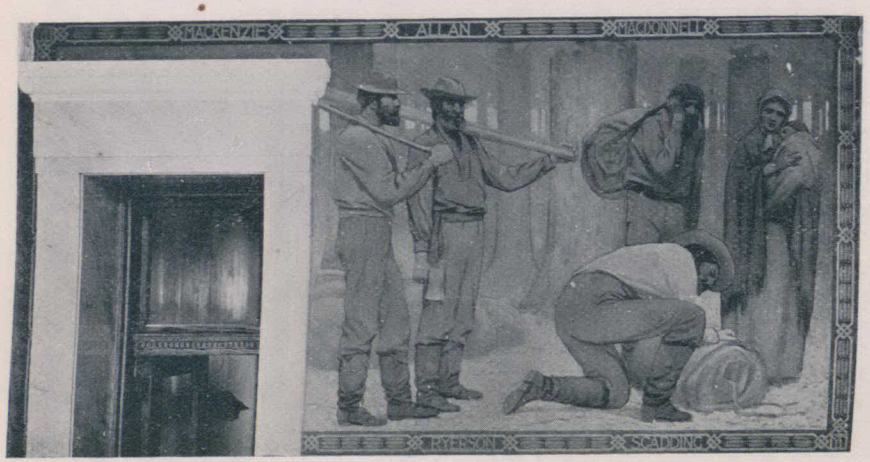
It is a time for revision of the curriculum of the school by a competent inspector. It is a time also for revision of the constitution of the board. Its personnel is somewhat peculiar. There are two educationists, which is well ; two architects and two stationary engineers, which is an incomplete contribution from scientific and mechanical callings ; five aldermen, which is well, but also five members of the Trades and Labour Council. We are familiar with the Trades and Labour Council as legislators but in an irresponsible field ; here in the character of educationists, they appear in overwhelming force, and from their constancy at meetings have the controlling power. The conduct of the school is virtually in their hands and, if report speaks truly, they appear to exercise the joy of management with very slight reference to the question of education.

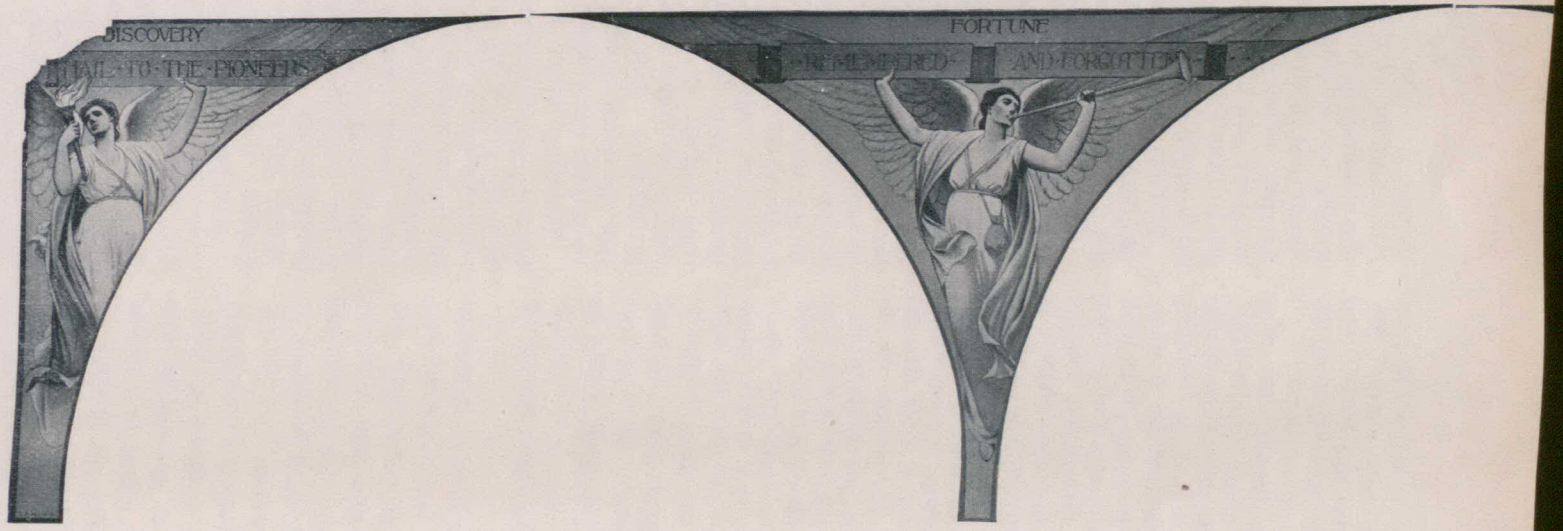
There are rumors of degeneracy in the teaching of the school and the falling off in attendance this year, which is attributed by the principal to the cold weather last winter and the prevalence of grippe, is attributed by a correspondent of the Mail and Empire, who signs himself "Old Student," to the belief on the part of students that the subjects they wish to learn are not properly taught ; and this correspondent says further, what is at least a proof of sincerity on the part of these students, that they have, at their own expense started classes, in connection with the Massey-Harris works, where they can learn what they want. Without admitting the principle that the taught are to dictate to their teachers what to teach them, there is in this statement at least an indication that the Technical School needs inspection. It is not difficult to find an inspector capable of judging whether the curriculum of the school is well taught, but the problem is greater than this, and is the problem which ought to be taken up by the meeting about Technical Schools which is promised for next month. What should be taught in a technical school which is intended for the instruction of young men and women intended for, or already engaged in the work of artisans? Is it their mental development that is to be aimed at, trusting that there will be results in the future ; or should the effort be to give them instruction bearing upon their daily work, so that they will acquire immediately intelligence and facility in their craft? In other words, are the classes to be arranged by grades or by trades? This is a question which means plenty of work and ought to mean a good deal of travelling for some one, and means therefore a liberal expenditure of money. But, it being granted that technical education is a necessity for the prosperity of the country, there is no wisdom in sparing expense either for the establishment of a sound system or for procuring a first rate staff of teachers. Trade returns are reckoned not by thousands but by millions and, as it is trade returns that are the ultimate aim, the soundest policy is to make sure of getting them—as sure as the outlay of thousands can make us.

Who is to provide the money is another question in debate. The Ottawa Board of Trade thinks it is a Dominion affair ; the Toronto Board of Trade thinks the provinces should take the matter up for themselves. If the province of Ontario should adopt the Toronto Technical School it would have to be so remodelled that it would cease to be the same school. There is, however, no reason why the Toronto Technical School should not continue to exist as the positive degree of an arrangement of which the Provincial Technical School and the School of Practical Science will be the comparative and superlative degrees.

Toronto's night Technical School, without fee, intended for the working class, will then fill without question the much needed place of a school to teach science for artizans. Not, as was before said, to teach chemistry or electrical science to carpenters, but to give them such science as they need ; a knowledge of graphical methods and better formulas than, "a two by ten is plenty for sixteen feet" etc. Every artizan wants some technical training, but it is the better for being limited to his needs. Free hand drawing is useful to most workmen, but not the study of light and shade. A tinsmith needs a knowledge of development that would puzzle a prime minister, but his science practically stops there. A painter should have some knowledge of chemistry but is blessed with freedom from mathematics. A plumber ought also to have some chemistry and should add hydraulics. It is more difficult, though we have made some exceptions, to set limits to a carpenter's scientific knowledge. He touches building at all points. If he would only know enough not to make original designs, a grateful country would exalt him high in its estimation.

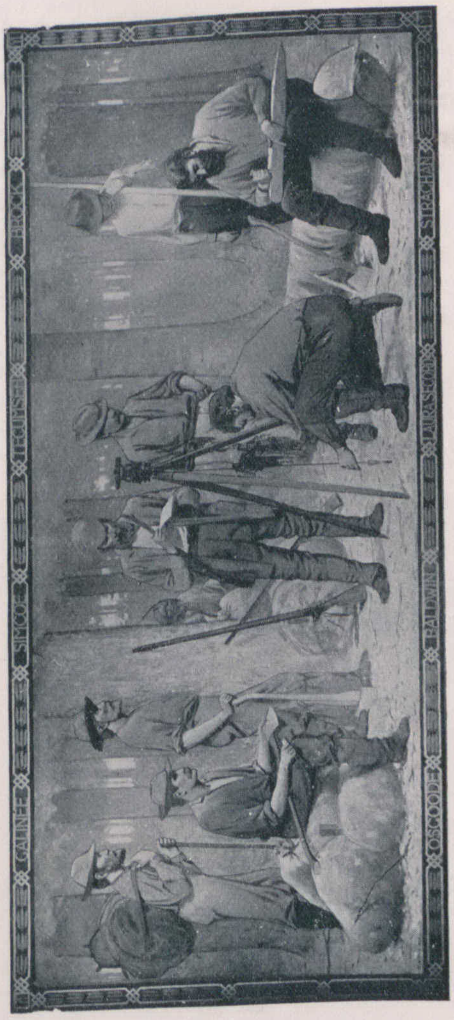
Outside of architecture and the building trades—in all productive work, it is through the hands of artizans the work is done, and there is incalculable gain in the workmen being prepared to understand fully the reason for their operations. Deliberate neglect of necessary precautions must be rare, but ignorance is common and though less blameworthy is as effective for evil ; for the law of nature like the law of the land makes no exception in favour of those who are ignorant of its provisions.

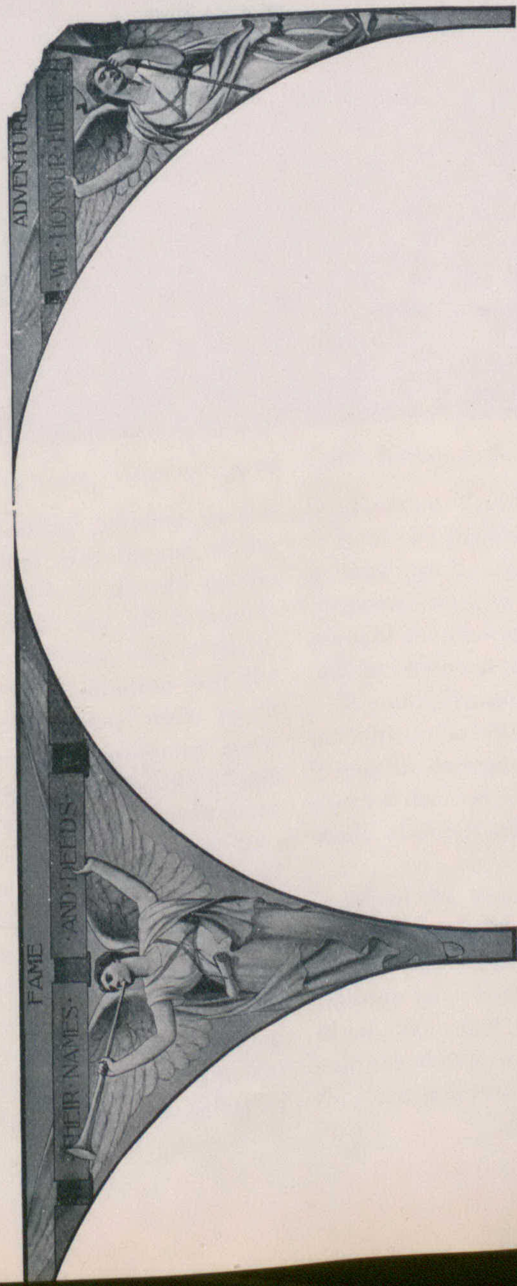




MURAL DECORATIONS IN THE NEW

PAINTED AND PRESENTED TO THE





ICIPAL BUILDINGS, TORONTO.

Y G. A. REID, R.C.A.

TORONTO BUILDING BY-LAWS.

THERE is urgent necessity for a thorough revision of the local building regulations of Toronto. Architects find it impossible to obtain from the Building Department printed copies of these regulations. When information is required as to what may or may not be done under the by-laws, it becomes necessary to make a personal visit to the City Hall. This condition of things is uncalled for, involving as it does waste of valuable time by the architect which, especially in a busy season like the present, he can ill afford to spare. The existing by-laws have been subjected within the past ten years to many amendments of a patchwork character, and in the absence of printed copies of the law as amended, it is impossible to know what its provisions are. This much is known, however, that the present regulations are by no means up-to-date, and require to be thoroughly overhauled, and made applicable to modern requirements. No provision exists for the proper regulation and inspection of steel constructed buildings, and the only guarantee that the public have that such buildings are properly constructed is the confidence which they repose in the architect who plans and supervises the work. The building inspectors go about their work in a manner to show that they know little or nothing about this method of construction. They pay particular attention to the thickness of the walls, while passing by with a glance steel supports on which the safety of the structure chiefly depends. The lack of knowledge which obtains on the part of aldermen and civic officials with regard to the use of iron in building construction is evidenced by the absurd regulation in the present law that all bressummers in buildings shall be of iron instead, as formerly, of wood. It is scarcely necessary to mention that the heavy wooden bressummers formerly used were much more capable of resisting fire than is unprotected iron. The Ontario Association of Architects took hold of this subject some four or five years ago, and submitted to the Council a well considered draft of a building by-law. The Council have, however, shown no appreciation of their work, and nothing has been done in the direction of adopting the suggestions made. With the present revival in building, action should be taken by the Council to bring the building regulations up to date. There should likewise be placed in charge of the Building Inspection Department an official possessed of sufficient scientific knowledge to be able to estimate the safety of buildings under construction. At present there appears to be no person connected with the department competent to calculate stresses of materials with any degree of accuracy, and inspections are made by the rule of thumb method.

CITY HALL, HAMILTON, ONT.—JAMES BALFOUR, ARCHITECT.

ONTARIO ASSOCIATION OF ARCHITECTS.

The Ontario Association of Architects, established by the Legislature of Ontario as an examining body to further the proper education of architectural students, and by this means to advance the art of architecture, have found that some inducement greater than they can now offer is necessary to make students prepare and present themselves for examination.

The Association have therefore decided to offer a medal to the student attaining to the first place in the final examination, and to make an appeal for the foundation of a Travelling Studentship. Fifty well known citizens of Toronto have been asked to subscribe the sum of $100 each, so that a fund of $5,000 may be raised from which to derive an income for the purpose of this studentship, which would be known as the Toronto Architectural Travelling Studentship.

The charge of the fund is to be with the Council of the Association. The investment of the fund by the Council is to be made to the satisfaction of a two-thirds majority of the subscribers.

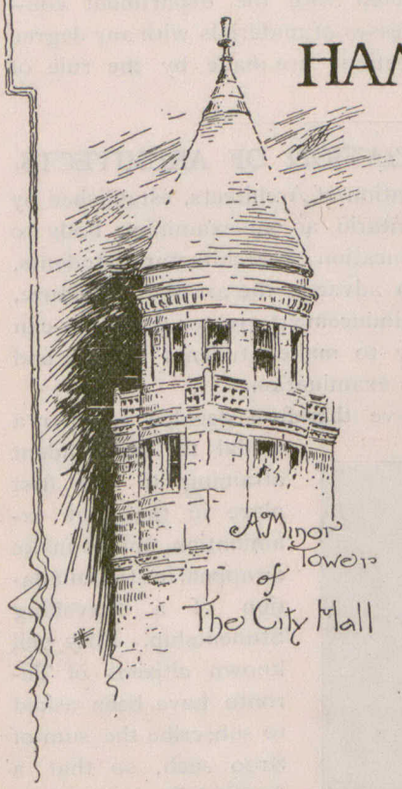
In the event of the medal not being awarded in any year, that year's income from the Studentship Fund will be added to the principal.

It will be provided that this fund, or the income from it, shall not be used for any other purpose than that proposed, and, in the event of anything occurring to prevent the continuance of the studentship, the money will be returned to the donors or their heirs.

We are pleased to chronicle the inception of this important undertaking by the Association, and trust that it may be carried to a successful conclusion, in which event a decided impetus will have been given to the study of architecture in this province.

When the thermometer was 3 degrees below zero measurements of the Brooklyn bridge were taken of the trusses and other parts to find out how much the contraction had been. In comparing these figures with those taken last July, when the thermometer was 30 degrees above, it was found that the difference was fourteen feet and a half.

HAMILTON



(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The somewhat serious fire that occurred on the night of the 4th May here seems to substantiate my remarks in my last letter as to the risks this city runs from the inflammable nature of many buildings within its limits. The building destroyed that night was a wooden factory of considerable size, standing in the centre of a block, in a populous district, almost surrounded by timber and other frame buildings, and all that was needed to assist the spread of the fire to a very alarming extent was the wind, which happily was absent. It required the efforts of the whole brigade to confine the fire to the factory building itself. It was just at this time last year that the old Spectator building in the heart of the city was burned down while it was undergoing remodelling.

It was reported in some local paper and from thence found its way into the CANADIAN ARCHITECT AND BUILDER, that the architects of Hamilton were making a complaint that the heads of departments in municipal affairs were in the habit of carrying out small works that required the service of a builder, obtaining tenders them and so on, and not consulting members of the profession or permitting them to superintend the works or prepare necessary plans. So far as I can find out there is an error here, and a question asked in reference to the authority of the building inspector to advertise for tenders, by a private individual, was construed with the wonderful ingenuity of a daily paper reporter to be the "registering of a kick" by the architects. I do not think the architects of Hamilton as a rule are quite so hungry that they would take the trouble to find out why the building inspector does not employ one or more of them to superintend the laying of a few thousands of bricks here and there. At any rate they would naturally resent such an insinuation.

There is a good deal of building going on this season, principally, however, of a commercial character, factories, warehouses and such things. Existing buildings are being enlarged and some new ones added. The Hamilton Stockyards Company will have in a few months one of the best equipped stockyards in the country; with a $10,000 hotel of its own. Senator Sanford is making a large addition to his clothing factory, and altogether the building record for the year is far ahead of last year. There is, however, very little architecture, nothing in which the artistic portion of the architect can revel—bricks and mortar, columns and girders of the most utilitarian pattern being the only requisites. The extensive alterations that have been going on for several months at the new Royal Hotel under Mr. W, P. Wetton, as architect, are approaching completion, and it is only fair to say that he deserves great credit for his work. The whole building has beeen remodelled and a great deal of marble introduced in the main hall with plate glass panels. The details are all very good and carefully worked out. The new Royal is certainly, although smaller than some, the most beautiful hotel in its interior of any in the province. The proprietors have understood the value of having good work done and there is nothing cheap or tawdry in the result.

The plumbers of the city have formed themselves into an association under the presidency of A. Clark, and with George Stevenson as secretary. The membership includes all the master plumbers in the place, and numbers thirteen. The principal object in view is to keep as much as possible to a uniform price for work. Such associations would I think gain far more for themselves, if they existed as sections of the Builders' Exchange. As separate bodies they incur expenses without the advantages of the rooms of the Exchange and the general meetings, and as a rule it is to the advantage of each man to belong to the Exchange, so that two subscriptions are paid instead of one. As a part of the Exchange they can still have their own meetings, with their president and other officers duly elected, and be as separate as they like so far as their own trade is concerned, but there are many objects to be gained by affiliation with the Exchange, and they would do well to connect.

The space between The Gore, (a view of which appears on another page) and the Macdonald Monument, on King street east, is being transformed into a public flower garden. The change is one which will add much to the appearance of our most important thoroughfare.

R. W. GAMBIER BOUSFIELD.

UTILIZING WASTE HEAT.

IN discussing the topic "Simple, Inexpensive Schemes for Warming and Ventilating Small Buildings, Dwellings, etc.," at the annual meeting of the American Society of Heating and Ventilating Engineers, Prof. R. C. Carpenter described the attachments made to a hot air furnace which was burning enough coal to heat the building in which it was placed without doing it. The attachments were made with a view of increasing the heating capacity of the furnace and reducing the fuel consumption.

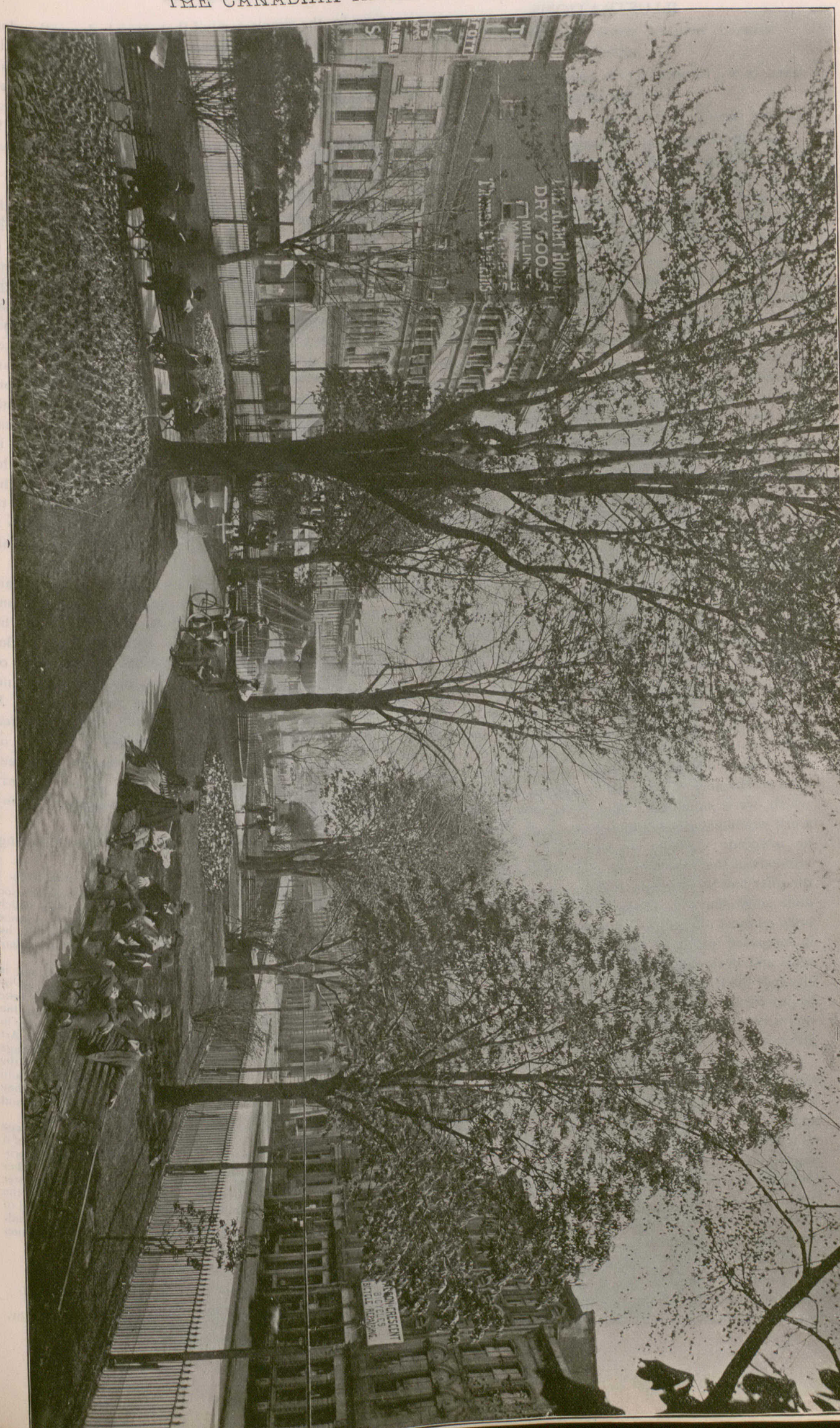
The first attachment was a water heater placed in the fire and combustion chamber for heating water to be circulated through radiators placed in rooms that were not satisfactorily warmed. This addition enabled the furnace to heat the building, but did not reduce the waste of heat in the chimney or reduce the coal consumption sufficiently. The temperature of the gases at the point where they entered the chimney was very high and the draft very rapid. The velocity of a draft increases with the temperature very rapidly up to 250 degrees, but much slower as it reaches the maximum at 550 to 600 degrees.

In order to utilize the heat of the gases so that a smaller amount of the fuel would do the work a section of a recently introduced cast iron wall radiator was incased in a galvanized sheet iron box aud connected with the return pipe from the radiators. This box was made to fit close, so that it would bring the hot gases into contact with the radiator. The smoke pipe from the furnace was connected with one end of the box and the hot gases allowed to pass over the surfaces of the radiator section and then dive under a partition at the opposite end before escaping to the chimney pipe.

This method of utilizing the heat that had previously gone to waste was adopted in preference to creating an air heating chamber by jacketing the smoke pipe, owing to water absorbing heat much more freely than air. This attachment had a double effect; it heated the return water without interfering with the circulation, and practically nullified the waste of heat in the chimney as far as was desirable by reducing the temperature of the escaping gases to 150 degrees. It also reduced the work to be done by the water heater in the fire chamber. The introduction of the water heater and radiators reduced the amount of air to be heated by the furnace, and utilized the heat of the gases in heating the water so as to enable less fuel to do the heating. A comparison of the amount of fuel previously consumed and the amount of heating done with the work now done and fuel now consumed shows a saving of about 50 per cent.

CHOIR SCREENS.

These originated from the stone balustrade or railings which separated the presbyterium from the other parts of the ancient basilica. They were afterwards retained to separate the space devoted to the clergy from that portion allotted to the congre gation. Choir screens were frequently of the most elaborate design and were adorned with statues and traceried openings or panels. On the Continent, many magnificent examples are to be found. The screen of the minster at Basle, that at Havelburg Cathedral, Munster, Germany, and the Magdelene Church, Troyes, France, are splendid instances of choir screens. In England we may name Long Sutton, Kingsbury, Barnwell, Newark, Stanton Harcourt, and Chester Cathedral, in which churches the screen or rood-loft appears to have been used. The parclose screens at Fyfield (Berks), Ingham (Norfolk), Lavenham, Long Melford, Southwold, and Spalding, are good examples of wooden screens of the Perpendicular period.



GORE PARK, LOOKING EASTERLY FROM JAMES STREET, HAMILTON.

ILLUSTRATIONS.

STREVEL TERRACE, WINNIPEG.—GEORGE BROWNE, ARCHITECT.

HALL IN W. FLUMMERFELT'S HOUSE, VICTORIA, B. C.—S. MACLURE, ARCHITECT.

LEAVES FROM A SKETCH BOOK.—BY STEPHEN A. HEWARD.

The church tower at Wraxall, Wils, is very simple and pleasing, and it has a peculiarity in the construction of its roof—no wood at all being used. Large stone slabs, which weather on each other, are supported by arched stone ribs inside, one rib being under each longitudinal joint, of which there are five.

Wiltshire is a "stone" country, and in a stone country good architecture is usually to be found, because the builders of the period used the material that was at hand and learnt its nature and capabilities.

From this use of local material the external effect is usually happy and good, and to this is attributable the beautiful harmony of nature with buildings so noticeable in English country and villages. The stone walls and roof of a building—for the roof in this country is always of stone, too—weathered and aged exactly as the stones in the fields, being the same, and so became a natural part of the landscape.

MURAL DECORATIONS IN THE NEW MUNICIPAL BUILDINGS, TORONTO.—BY G. A. REID, R.C.A.

On the afternoon of Tuesday, the 16th inst., these mural paintings were formally presented as a free will offering of the artist, to the city of Toronto, by Mr. B. E. Walker, President of the Toronto Guild of Civic Art. In making the presentation Mr. Walker recalled the circumstances attending this generous gift on the part of Mr. Reid, as follows :

"In 1897 when the city hall was nearing completion certain artists, Mr. Reid among the number, who had been studying together the most advanced methods of wall painting, and especially the methods of Paul de Chavannas, offered to decorate several panels in the Council chamber with certain subjects, the designs of which were submitted. The price suggested for the work would clearly not have remunerated the artists in an adequate manner, the offer being made in the interests of the development of art in this country. If the offer had been accepted the work was to have been done under the supervision of the Guild of Civic Art, a body as most of you know, the advisory board of which is composed partly of laymen, partly of artists, architects and designers. In view of the great cost of the city hall the Council did not feel that they could afford to pay for the decorations at that time, although there was a very strong feeling on the part of many of the aldermen in favor of encouraging such a good work.

"The project for decorating some of the panels of the Council chamber having failed for the moment, Mr. Reid generously offered to decorate two panels and the spandrels of the arches constituting the main entrance as a gift to the city, the work to be done under the supervision of the Guild of Civic Art. It seemed desirable that at the very commencement of the use of this noble building there should be in constant evidence some touch-stones of modern wall decoration, so that we may be saved from mere commercial decoration such as we have heretofore had in Canada, and also from wall paintings conceived in a proper enough spirit, but executed without regard to the true principles of decoration. It also seemed desirable that it should be made clear to the simplest mind that mural decoration does not involve, as it seemed to at one time, an entire departure from the ordinary facts of life. It is true that these facts must be dealt with in a manner entirely different from that adopted by the painter in easel pictures. Such realism and dramatic action as may be necessary to tell the story must be subordinated to certain principles of line and color which are vital in decoration.

"The projection on walls or other flat spaces by the painting or sculpturing of scenes commemorating historical events, or by other designs of general interest to man, is one of the oldest means of decoration of which we have knowledge. Such painted or sculptured designs have always attracted the great mass of humanity, and it must be because of our intensely utilitarian habits that thus far in Canada this phase of art has been neglected and some great buildings have been allowed to remain for years with all the ugliness of bare walls and without even a serious protest from the public. We have only to look at this beautiful hall, however, to realize that this is a fitting time and place to begin a new era in Canada for this particular art, and let us hope that the good seed sown by Mr. Reid will so root itself in the minds of the people that other artists will be able to project their ideas upon these and other walls until a great national school of wall painting has been developed.

"To speak more directly, we hope that year by year, not too rapidly, the various spaces in this magnificent building—and there must be hundreds of them—will be filled with histories and allegories bearing upon the development of Canada, and especially of this part of Canada. * * * * You will notice that at the top and bottom of the panels thirteen spaces are arranged. A committee of the Canadian Historical Society were asked to suggest names to fill these spaces and as a matter of record I will now read the names selected : Galinee, Simcoe, Tecumseh, Brock, Osgoode, Laura Secord, Baldwin, Strachan, William Lyon Mackenzie, Allan, Macdonell, Ryerson, Scadding."

With the paintings there was presented the following document :

TORONTO, May 16th, 1899.

This document is to record the presentation to the corporation of the City of Toronto of the series of mural paintings which occupy the panels immediately on either side of the main entrance of the new City Hall, and the spandrels between the arches, by George Agnew Reid, painter, member of the Royal Canadian Academy.

These paintings are a gift to the city from the artist, and in accordance with his wish, their execution has been supervised by the Toronto Guild of Civic Art. The members of the Guild take this opportunity of recognizing with the deepest appreciation the generosity of Mr. Reid in thus giving of his best to the city in which he lives. On his behalf the Toronto Guild of Civic Art hereby hand over to the corporation of this city these paintings which commemorate and illustrate the heroic life and work of the pioneer settlers of this country, in the hope that while they add to the completeness of the building in which they are placed, they may also help in the creation and maintenance of a refined and artistic taste in those who from time to time look at them.

In tendering this gift, the Guild take leave to express the hope that these fine decorations may prove to be but the first of a series of historical memorials of this nature illustrating the progress of our country, which may be placed in this and other buildings. They beg to record their conviction that no better investment can be made than the expenditure of money in the proper decoration of such buildings, which thus not only add to the attractiveness and interest of the city in which they stand, but are calculated to be a valuable means of artistic education and an inspiration of true patriotism.

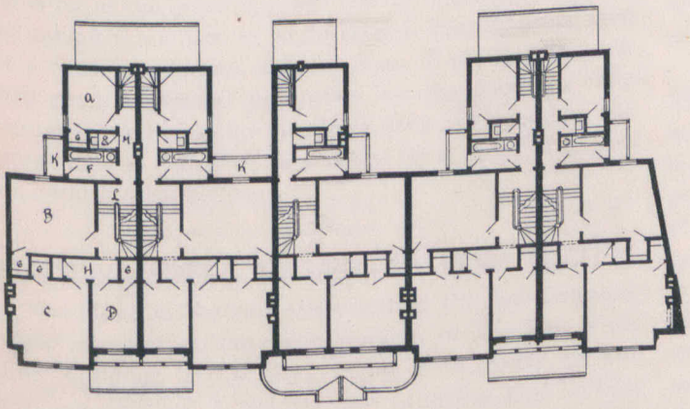
Signed on behalf of the Guild,

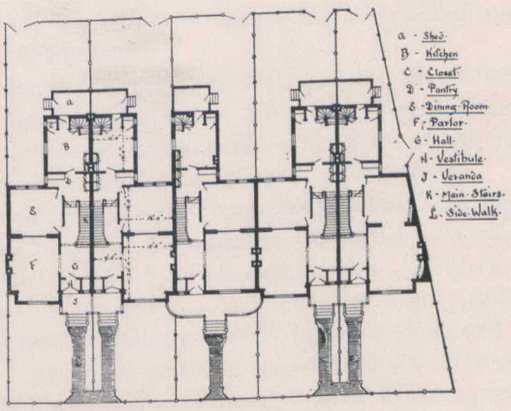
B. E. WALKER, President.
W. A. LANGTON, Secretary.

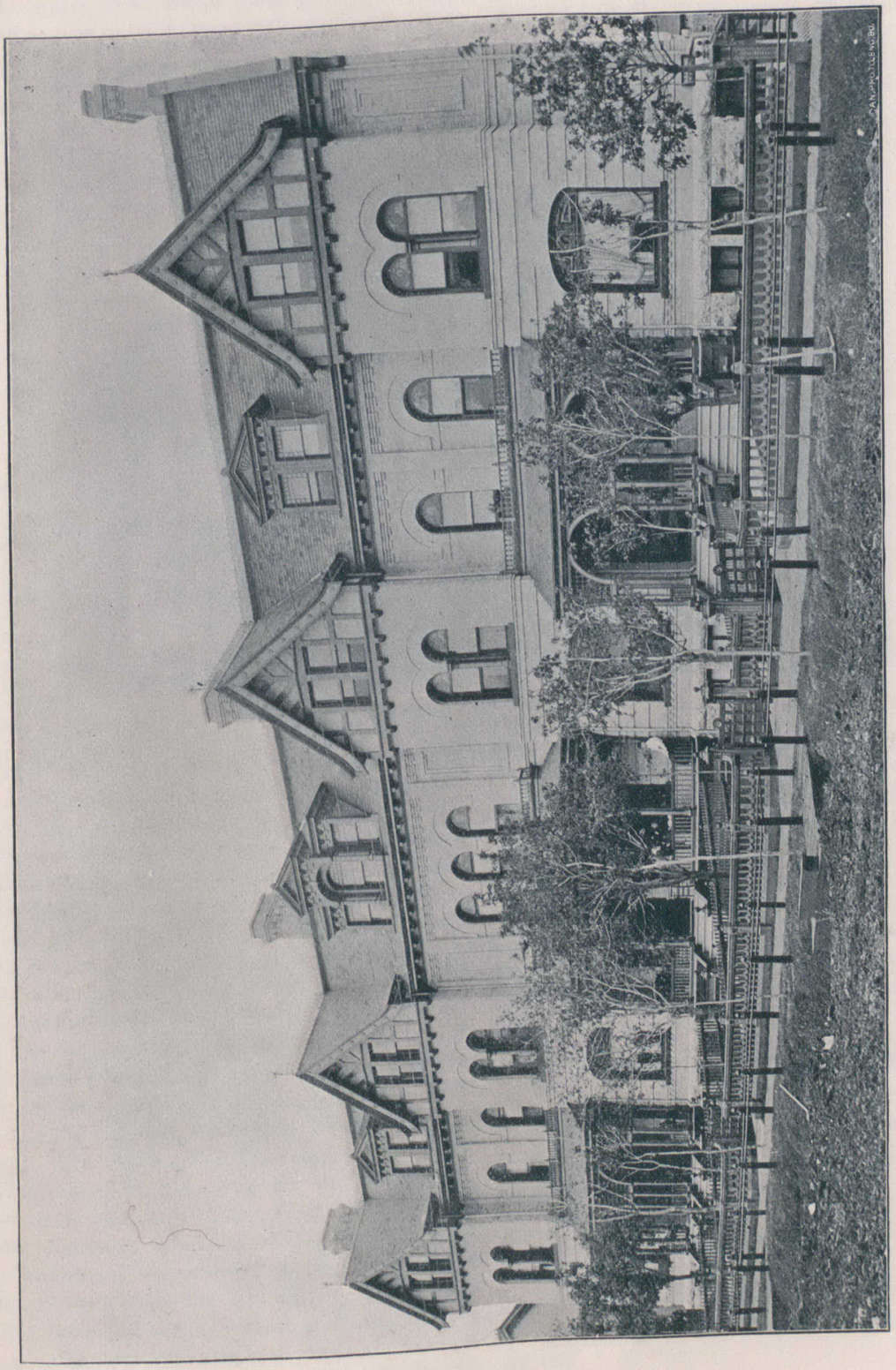
B. E. WALKER.
PROF. CLARK.

SUPERVISING COMMITTEE.

JAMES MAVOR.
FRANK DARLING.
E. WYLY GRIER.
BERNARD MCEVOY.
L. R. O'BRIEN.







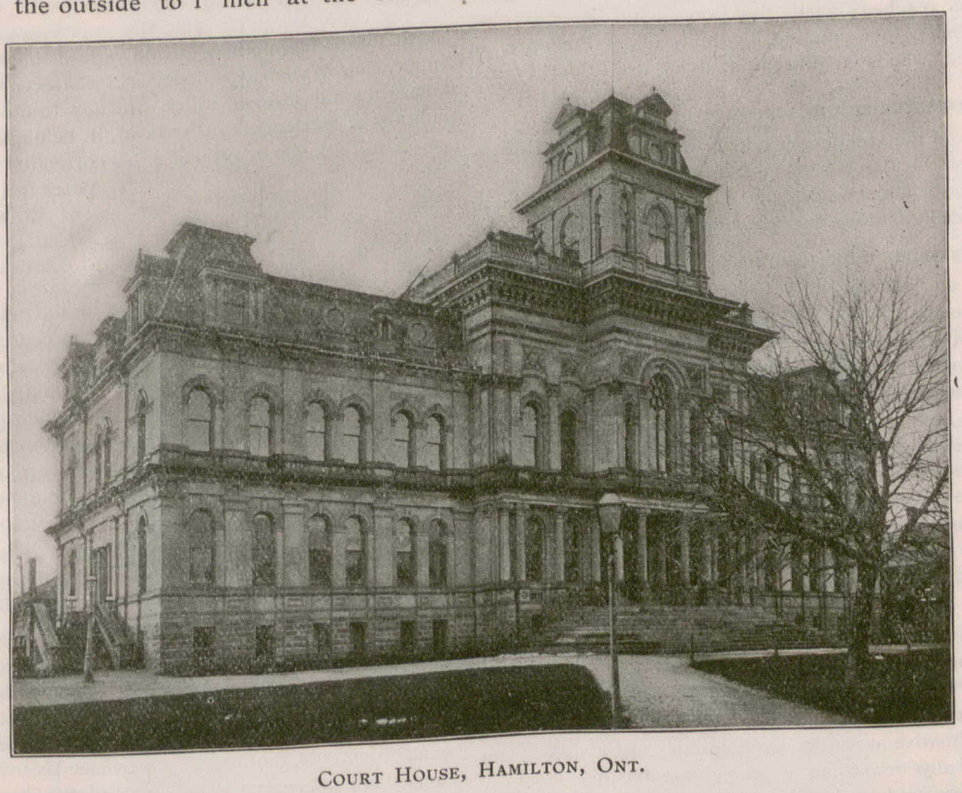
STREVEL TERRACE, WINNIPEG, MAN.
GEORGE BROWNE, ARCHITECT.

ARCHITECT'S CLUB.

The weekly meetings of the social club recently organized by some of the younger architects of Toronto, have proved both interesting and instructive. The practice thus far at the meetings has been for one of the members to submit a number of architectural photographs, and in a brief talk discuss their merits. Following the talk has come a general discussion by the members. On resuming their regular meetings after the vacation, the purpose is to endeavor to arrange for a series of papers on architectural subjects.

CUTTING STEEL GIRDERS BY ELECTRICITY.

The Moulton Starratt Contracting Co., of Chicago, while engaged on the reconstruction of the New York Life Building, in that city, found it necessary to cut through six steel I beams, each 15 inches high with a ½ inch webb and 6 inch flange varying in thickness from ¼ inch at the outside to 1 inch at the center.



COURT HOUSE, HAMILTON, ONT.

The point at which the cut was to be made was located in such a position that it would be necessary to have special saws made, and as three I-beams of this size, side by side, would not cut very easily, it was estimated that in addition to the time required to make the special saws it would take two men at least two weeks at $3.50 a day to saw them off. This loss of time in finishing the job and the expense involved were important considerations, and when it was suggested to Ralph Starrett, superintendent of the contracting company, that inasmuch as a smooth cut was not necessary, it might be feasible to get the girders burned off with the electric arc, he placed the matter in the hands of Clyde J. Coleman of the Coleman Laboratory of Experimental Engineering. Mr. Coleman has done considerable work in the line of electric arc burning for the purposes of getting into safes and vaults with broken locks, and for cutting new doorways in vaults already in place, and also as an interesting experiment to demonstrate the possibilities of safe burglary by this method. Mr. Coleman pronounced the plan of burning off the I-beams perfectly feasible and undertook the task. The time actually required for electrically burning off the six girders was about twelve hours, and from four to five hours more were spent on mechanical work, such as removing girders to get at the remainder. The electric arc therefore, did in two working days what would have required from two to three weeks by the usual method, resulting in a great gain of time for completing the remainder of the job.

The plan of operation, as described by the Western Electrician, is very simple. Current was applied at 110 volts from one of the dynamos in the plant of the building. The current used was about 350 amperes. The positive side of the circuit was grounded on the structure of the building and the negative connected to a carbon holder containing a 1½-inch round carbon. The carbon holder had a wooden handle. The operator struck an arc between the spot on the iron to be melted and the carbon. The light and heat were intense, and the effect was very disastrous to the eyes where proper precautions had not been taken. The arc is usually covered over with a muffle, consisting of an asbestos lined iron box, with a hole in the back just large enough to admit the carbon used. The box is placed against the iron to be burned and the carbon thrust through the hole and the arc drawn. In places where there is not room for the box the carbon is simply thrust through a shield consisting of a sheet of heavy asbestos board. Some resistance has to be placed in the circuit, as is the case with any arc working on a constant potential circuit. The resistance used in this case was simply a few turns of German silver wire placed in a pail of water under a faucet, from which it was constantly replenished.

QUESTIONS AND ANSWERS.

IN answer to the query of a subscriber, "Could you give me a receipt for filling up small cracks in plastered walls before having them kalsomined or painted?" we beg to submit the following: Mix up plaster of Paris to the consistency of soft putty; press the mixture into the cracks with a trowel or with a painter's putty knife; smooth off the wall before the plaster sets, and if not smooth enough, rub down lightly with No. 0 sand-paper. The plaster expands as it dries and remains firm in the crack.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.

HONOR TO A CANADIAN ARTIST.

The news has reached Canada that a place has been granted in the Paris Salon to a painting by Miss Mary Pomeroy, of Crompton, Que., who is at present studying art in the French capital.

THE MONASTERIES AND ABBEYS OF OLD ENGLAND.

Prof. Capper, of the architectural department of McGill University, lectured on the above subject before the members of the Women's Art Association at Ottawa recently. The lecture was illustrated by limelight views and was highly appreciated.

AN ACT TO DETERMINE THE LENGTH OF A WORKING DAY FOR WORKMEN AND LABOURERS.

A bill with the above title has been introduced into the Dominion parliament by Major Beattie. It provides: "1. That eight hours shall be the length of the working day for all workmen and labourers employed, either permanently or temporarily, by any person or by any contractor or sub-contractor under him. 2. That every such person, contractor or sub-contractor who has under him or who employs workmen or labourers, and who wilfully violates the provisions of this Act, is guilty of an indictable offence, and liable to a penalty not exceeding $1,000, or to imprisonment for a term not exceeding six months, or to both penalty and imprisonment, in the discretion of the court."

REQUIREMENTS OF NATIVE ART.

In behalf of the Royal Canadian Academy of Arts the government has been memoralized to make provision for an adequate representation of Canadian art at the Paris Exposition and to grant such assistance as will enable the Royal Society to make an annual exhibit of native art in the leading cities of Canada. The government are also requested to amend the existing law in a manner to suppress art lotteries in the province of Quebec. The petition on this subject sets forth that the act under which art unions are conducted has been seriously perverted, and that the plan which was originally intended as a means of encouragIng art, has become a mere cloak for gambling and financial gain, and that as at present conducted such lotteries are a detriment to the cause of art.

INTELLECTUAL FREE TRADE.

The majority of your readers, like myself, will probably sympathize with the views expressed by Principal Peterson of McGill University at a recent graduates' dinner in Ottawa, when he pleaded for intellectual free trade between the provinces of Canada. "At present," he said, "each province surrounds many professions with such limitations that a man trained in one province cannot practice in another, except after going to much trouble and inconvenience in passing examinations or in putting in a probationary term." Whatever barriers we may consider advisable to raise against other countries—and we can scarcely be charged with having been too strict in this respect—there should certainly be the greatest possible uniformity of practice and liberty accorded to members of the professions residing in any part of Canada.

PERSONAL.

J. Rawson Gardiner, architect, has removed his office to the Temple building. He worked conjointly with the late Alex. G. Fowler (who was one of the oldest and most respected architects in Montreal) for the past five years, and will now carry on the practice in his own name.

CORRECTION.

OTTAWA, April 26th, 1899.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—In your March issue of the CANADIAN ARCHITECT AND BUILDER is an illustration of the interior fit-up of the library of parliament at Ottawa. You credit the authorship of design therefor to Messrs. Fuller & Jones, Stent & Laver and Thos. Fuller.

I am quite satisfied that were these gentlemen now living they would be the last to covet credit for another person's work, and as no one else has thought it necessary to correct your mistake, I will do so.

The architects named by you designed the structural part of the library, exclusive of all interior fit-up of the book shelving, etc., and which latter work forms the subject of your illustration.

During the tenure of office of the former chief architect—Mr. Thos. S. Scott—I was acting as assistant to the chief architect, and at his request I designed and superintended the construction of the interior fit-up of the library, and on leaving the service I received from Mr. Scott a letter dated 11th June, 1877, accrediting the authorship to me. I may add that the clerks' desks immediately surrounding the Queen's statue were designed by Mr. J. W. H. Watts, then in the service.

So, while Mr. Scott officially was responsible for the work, actually he had nothing to do with it boyond authorizing and approving of what was done. So whatever the public estimate of merit, or the reverse, which attaches to the interior fit-up of the library of parliament at Ottawa, it belongs to me, and I shall esteem it a favor if you make this correction in your next issue.

Yours truly,

FRED. J. ALEXANDER.

LEGAL.

A compromise has been reached in the action brought against the city of Toronto and A. M. Brown, contractor, by Pilkington Bros., glass manufacturers, of St. Helens, England. Mr. Brown, who received the contract for painting and glazing the new municipal buildings, gave an order to the Pilkingtons for 15,000 feet of glass, which the specifications provided should be of the very best quality of extra fine British polished plate glass, one quarter of an inch thick. After a large quantity of the glass had been delivered the architect rejected it on the ground that it did not fulfil the terms of the specifications as to quality. Then followed a suit by the manufacturers for $4,721. After a prolonged legal fight a compromise was reached under which it said the claimants will receive $1,400, or 20 cents per foot for the glass in dispute, the glass to be retained by the contractor.

SHERWOOD V. BALCH.—This action was brought by sub-contractors against the contractors for the construction of the New York and Ottawa railway line. The plaintiffs' contract was for excavation, and contained a provision that the work should be done "in conformity to the plans and directions, and to the satisfaction and acceptance of the chief engineer." It was also provided that in case of disputes and differences the matter should be referred to the engineer, "who shall consider and decide the same, and his decision shall be final between the parties." The plaintiffs were paid the amount of a final estimate of the engineer, but contended that by custom they were entitled for work measured in embankment, instead of excavation, to a price 10 per cent. in advance of the price paid by the engineer. It was held in the High Court of Justice for Ontario that although the engineer had publicly and privately expressed himself to the effect that no such usage existed; yet as he swore he would, nevertheless, give the plaintiffs' contention fair consideration should the matter come before him as arbitrator, action must be stayed until arbitration. By the 19th section of the Arbitration Act, 1889, a method is given contractors, if they feel aggrieved, to obtain the opinion of the court upon the true construction of the contract.

In the American Monthly Review of Reviews, which publishes a frontispiece portrait of Rear-Admiral Kautz, the Samoan difficulty is reviewed by the editor in the department of "The Progress of the World."

Dr. Thomas Oliver, of England, who has been investigating the cause of the "compressed air disease" which so frequently affects workers in caissons, has come to the conclusion that it is due to the increased solution in the blood of the gases met with in compressed air, and the liberation of these gases after the person escapes from the compressed atmosphere.

THE TEACHING OF ART AND DESIGN.

THE importance of the relation which should subsist between the teaching of art and design and the industrial development of a nation, has long been recognized in European countries, and of late in the United States. It is gratifying to observe that in Canada also the subject is attracting attention. The Executive Committee of the Canadian Manufacturers' Association, held on April 28th, adopted the following comprehensive resolution :

Whereas;—fully appreciating the merits of all that may be said relative to the necessity of technical schools being established by those in authority to whom attaches the responsibility for the life and growth of our commercial enterprises, it is expedient to direct attention to the teaching of art and design which is an important part of the education which should be imparted to the young people of the country who propose to give their after years to labor in industrial pursuits.

Technique is all important in building a boiler, loom or other machine which gives the power or means to produce a finished article. This branch is important, but it is only a very small part of the result to be attained.

The product, whether it be of metal, wool, cotton or wood, is only of value in the commerce of the country according to its utility and appearance.

Designing in all branches is so wrapped up in the values of a manufactured article that all countries are vieing with each other to excel therein.

In designs the taste of the British manufacturer at the great exhibition of 1851 was so crude as to shock the taste of the world, the result being that the Prince Consort, at the request of Jones, Redgrave, Playfair and others, established the Kensington School of Art and Design. This example was quickly followed by the establishment of many similar schools throughout the country, a notable result being that in 1867 Great Britain was awarded the palm in decorative art.

POST OFFICE, HAMILTON, ONT.

It was the art schools of France that made that nation the leader of the world for many years in the production of the finest chef d'oeuvres ; but with the British, German and American nations all working for the highest excellence of design and color in their manufactures, the commerce of France soon found competitors of equal strength.

In Canada no strong effort has yet been made to develop, in our schools, the art needed in our manufactures. While our industrial establishments are giving every sign of extensive development and expansion, every facility should be afforded by our government to supply competent designers to them ; and in no way can this be so well done as by equipping and supporting industrial art schools, where art and technique work hand in hand.

It requires years to develop acknowledged lines of design in art and many countries and periods have become known in the commercial world by the peculiarities of their designs. This may be instanced in the following in design class, as Persian, Turkish, Grecian, Byzantine, Renaissance, Empire, etc.

It is by going into the value of a design that appreciation of an article is forced upon us. Mr. Leslie Jones in an able paper says : " By going deeper into the study of a design we get down to examining and analyzing the forces and undercurrents of power that lie in a great piece of work. We appreciate that there is something more than mere existence of form and color, even if it is arranged according to the laws of ornament which defy all errors. Take for instance two designs precisely the same in character executed by two different persons. Both works might be termed excellent, both true to the character of form and the laws of ornament. Yet one may have something the other has not. There seems to be a touch of life in one that speaks a gentle and thrilling message which the other does not do. Surely, then, there must be more of the soul of the designer that finds its way to affect us in this mysterious manner than of the other which affects us not. All the knowledge we have from the ancients to the present day amounts to little when compared with this creative genius which flows from the inner soul."

This emphasizes the fact that it would be in the interest of the whole country that the government should establish and equip industrial art schools in all the leading manufacturing centres of the Dominion to the end that our manufacturers might be supplied with designers possessed of artistic abilities.

Whereas;—there are no existing schools constructed or equipped to meet the necessities herein alluded to ;

Resolved, that this Association use its efforts to induce the proper authorities to establish, or contribute to the support of schools of art and design in the manufacturing centres of the country that will promote the growth and development of our industrial institutions.

FIRES IN ROOFS.

ASTONISHMENT is frequently expressed at the rapid spreading of fires which occur in the roof spars. The flames distinctly break out in the one gable, then appear at the other, and suddenly the whole roof is on fire. We are inclined in such cases to believe in several sources of the fire, and to harbor a suspicion of incendiarism. According to Sendtner, a fire brigade officer of Munich, that suspicion may be quite unjustified. He saw that one of the rafters at the end of a hall had caught fire. The hall became filled with smoke, but he distinctly observed that little blue flames began to creep along the beams ; they reached the other gable, found more convenient ground there, and all at once the whole roof was ablaze. The observation suggested to him that the fire spreads with the aid of a kind of dry distillation in the wood. Experiments confirm this view. We read in the "Gesundheits-Ingenieur" that he rigged up roof models of spars and sheet iron without any intermediate wooden parts, and set fire to the lower end of a spar in the one gable. The hot gases travelled along the ridge, the other gable caught fire, and soon all the spars burned as if each had been set fire to.

The duration of slate roofs is variously placed, but is usually given as sixty years. A resident of Bangor, Me., informs a contemporary, however, that in 1863, when he was living in England, he assisted in removing the slate from the roof of a building of the Plymouth dockyards that was known to have stood over 300 years. After the old building had been torn down a new structure was erected on the same site, and the slates, after being redressed, were placed on the new roof, and at last accounts were still there.

STUDENTS' DEPARTMENT.

STUDENTS' AND DRAUGHTSMEN'S COMPETITION.

THE publishers of the CANADIAN ARCHITECT AND BUILDER invite architectural students and draughtsmen in Canada to enter a competition for architectural photographs. The subject is a constructed residence costing $10,000 or under. Photographs must show a perspective view of the entire building. They must not be less than 4 × 5 inches in size, and must be accompanied by a brief memorandum descriptive of the location, site and aspect of the building and the material and coloring, together with the name of the architect, if obtainable. The photographs will be judged from an architectural standpoint as exhibiting specimens of good design—the object being to test the student's or draughtsman's knowledge of design. Photographs must be suitable for reproduction. Competitors are not restricted as to the number of photographs which they may submit.

Photographs for this competition should be sent under nom de plume, all charges prepaid, marked "Competition," addressed to the "Publishers of the CANADIAN ARCHITECT AND BUILDER, Confederation Life Building, Toronto," and must reach this office not later than 5 p.m. on Thursday, May 25th next. They must be accompanied by a separate sealed envelope containing the nom de plume and full name and address of the competitor.

The merits of the photographs submitted in this competition will be judged by a committee of the Ontario Association of Architects and the Province of Quebec Association of Architects, whose decision will be final.

The publishers of the CANADIAN ARCHITECT AND BUILDER reserve the right to publish any of the photographs submitted, and to withhold the prizes if in the opinion of the judges, a reasonable response is not made on the part of the students and draughtsmen to this invitation.

The first prize will consist of architectural books to the value of Ten Dollars and the second prize of architectural books to the value of Five Dollars. The persons to whom the prizes may be awarded will have the right to select such books as they may desire within the above mentioned limits of cost.

CONVENTION OF ARCHITECTURAL CLUBS.

The secretary of the Chicago Architectural Club, with the sanction and support of the T. Square Club, of Philadelphia, and the St. Louis Architectural Club, and the informal approval of the Boston and Cleveland Clubs, has called a convention of delegates representing the architectural clubs of the United States (no mention is made of Canada), to be held at Cleveland, Ohio, June 2nd and 3rd next. The Cleveland Architectural Club have tendered the use of their rooms, for the convention. The subjects proposed for discussion are: "Club Work," "Methods for acquiring and holding the interest of members," "Management of Exhibitions," "Establishing an Exhibition Schedule and Circuit for 1900," "Establishing a National Exhibition Committee whose Duty shall be to Solicit Foreign Exhibits in the Interest of all Clubs of the congress;" Discussion of the "Code Governing Competitions" as adopted by the T. Square Club, The Architectural League of New York, The Chicago Architectural Club and other similar organizations. Papers on questions pertinent to the profession, and such discussions and new business as may develop later. Any further information regarding this convention can be obtained from Mr. N. Max Dunning, secretary Chicago Architectural Club, Art Institute, Chicago.

TORONTO TECHNICAL SCHOOL EXAMINATIONS.

Following are the names of the pupils who were successful in architectural subjects:

MODELLING IN CLAY.—Modelling from the "flat" in Relief. Elementary—Miss L. M. Phillips, Miss M. Baigent, Mrs. Whett, R. Quigley, A. Willoby, Chas. Baker. Advanced—Walter S. Boyce. Modelling from the "flat" in the round. Elementary—Miss L. M. Phillips, R. Quigley, David Ross (Romanesque), H. G. Muntz (Norman capital). Advanced—Walter S. Boyce.

BUILDING CONSTRUCTION, ADVANCED.—Class II—E. M. Meshaw.

ARCHITECTURAL DRAWING, PRACTICAL.—Elementary—Class I—Frank Belfry, George Barber. Pass—David Hood, Alex. McClements.

ARCHITECTURAL WORK, PRACTICAL.—Advanced—Class II—E. M. Meshaw.

SHEET METAL PATTERN WORK.—Class II—H. Park. Pass—W. J. Cook.

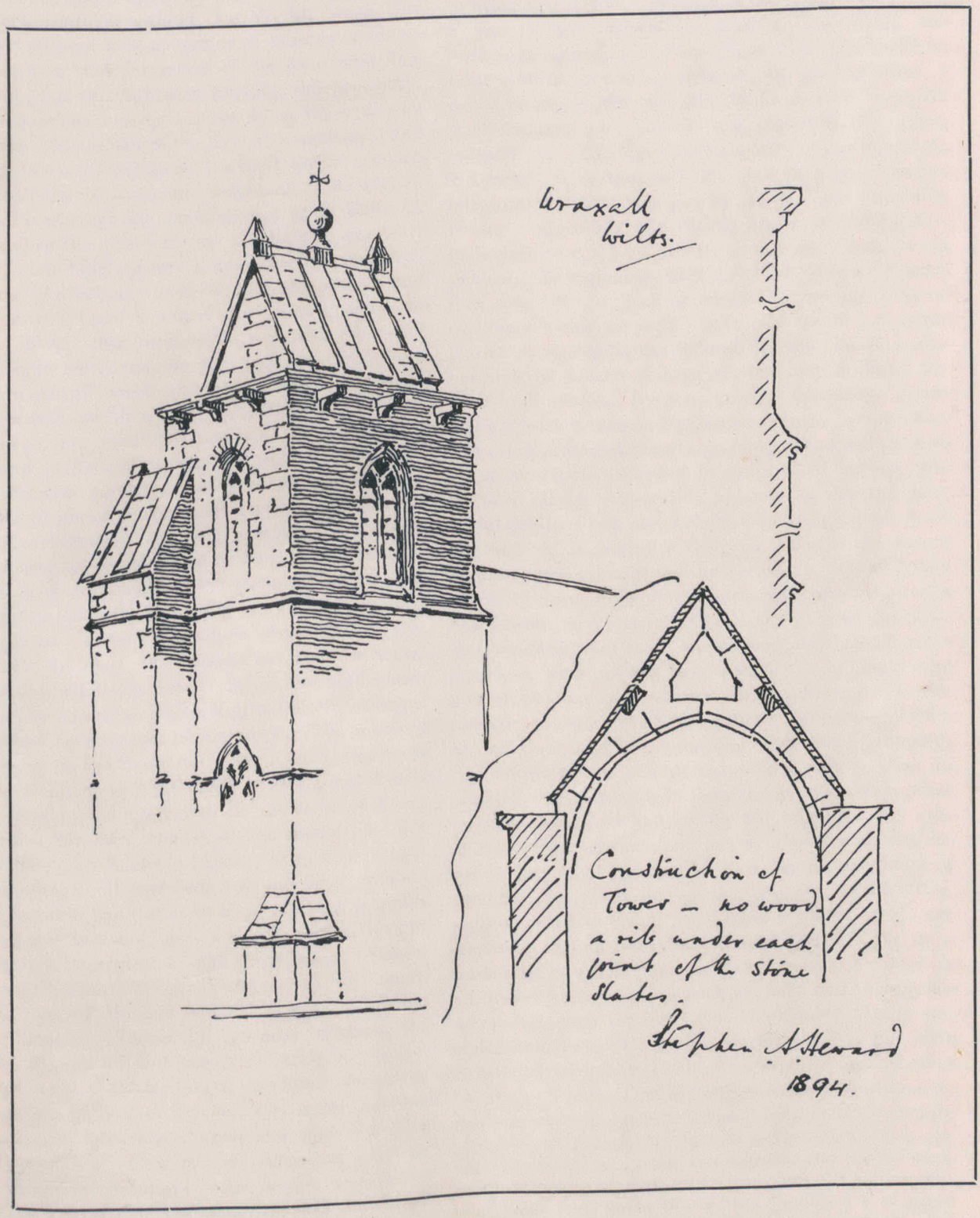
BUILDING CONSTRUCTION.—Carpenter and joiner work—Class I—Frank E. Balfrey, George Barber. Class II—D. A. Key, R. Bruce.—Brick work—Class I—George Barber, Frank E. Balfrey. Class II—T. Sullivan. Pass—D. A. Kay.

ARCHITECTURAL DRAWING.—Class I—Frank E. Balfrey, George Barber, R. Bruce. Class II—D. A. Kay. Pass—T. Sullivan.

ARCHITECTURAL THEORIES AND PRACTICE.

Mr Reginald T. Blomfield, M.A., F.R.I.BA., concludes a paper before the London Architectural Association, on "Certain Reflections on the English Renaissance," by saying: "Now, how do we stand at this moment in regard to the theory of architecture? I do not mean abstract theory as to its philosophical basis, but our own attitude to the art. What are the sources to which we look for inspiration? What are the ideals at which we aim in actual design? I fear that the answer to this question can hardly be satisfactory. We are, here at the end of the 19th century, in a condition of greater uncertainty, and more complete absence of conviction than, I should say, at any previous period of history. You have merely to look back upon the last 100 years. We began the century with the remains of the Classical tradition, but Adam had already "improved" it, as he thought; Stuart and Revitt had done their work and the Greek fashion was well in the ascendant. Then came Pugin, ardent, fanatical, full of energy and narrow ideas, a very iconoclast in regard to the old tradition; and after him Ruskin, who thought he had found the key to architecture in his personal preferences and the morality of Exeter Hall. Then came the rush for Gothic, Early English, early French, early Italian, with a vehemence that threatened to sweep the board clear of everything but a heterogeneous collection of details from every country. Every man has been for himself and meantime architecture has gone to the wall. The serious study of architecture, not only as an art, but also as an expression of the intelligence which is not

LEAVES FROM A SKETCH BOOK.



arbitrary, but determined by certain inevitable causes, has almost dropped out of sight, and I suppose that, in practice, the very worst work that has ever been done in England has been done in the last fifty years. I need hardly add that a few men of powerful and original mind have done admirable work, but the average of architecture has been left untouched, and it is by the average level that the state of architecture has to be gauged. We cannot look back with pride on the artistic attainments of the 19th century, judged from any standpoint, and it appears likely that we shall enter on the 20th century without having hit upon any certain way through this quagmire of modern architecture. It is here that the study of the past must help us. The days of the craftsman working independently, yet in unconscious unison, ceased when the choice of styles arose. He tasted of the tree of knowledge, and henceforth to his knowledge of his craft had to be added the responsibility of conscious judgment, if he was to undertake, I will not say architecture, as it might be thought to beg the question, but building of any sort. Because, in any building now-a-days, a man has to use one method of expression in preference to another, and implicitly in this there is raised the whole question of selection. Now, this responsibility proved too much for the simple craftsman, as you may see from the blunders in design which abound in more ambitious Jacobean works; and it was only a question of time how soon there should arise the man who had sufficient training and intellectual capacity to enable him to discriminate between good and bad, to enable him to grasp the logical coherence in expression which is an essential element of architecture. As soon as such a man arose, the matter was settled for good or bad. The architect ceased to be a craftsman in the technical sense, and what might be lost in craftmanship was assuredly gained in architecture. I think, therefore, that this critical function of an architect, this detachment from the actual details of craftsmanship, which chafes the enthusiasm of some of by no means the least gifted of our younger men, is of the very essence of his work. The more of craftsmanship he has the better ; but a man may be a very good architect without being a very good craftsman—I mean a good craftsman in the sense of being able to carve his own woodwork and model his own ceilings. His craftsmanship must be of a wider range. It must embrace full knowledge of the past ; it must rest on a constant habit of analysis of the best methods of expression in building, and a keenly critical insight into the abstract qualities of architecture, mass, balance, rhythm, and proportion. An architect, to my mind, should be like a fastidious man of letters, he should not be content to express his purpose anyhow, he should be anxious to find the exact inevitable phrase. It is in this sense, I think, that an architect should be an artist of the highest order, and this is the position that has, in fact, been forced upon him since the days of the Renaissance. Perhaps this reflection may be some consolation to those who would reluctantly abandon the idea that in craftsmanship lies the future of architecture. Nor, again, is this ideal less exacting than the other. To attain to this faculty of reasonable judgment it is clear that a man must possess knowledge of what has actually been done in architecture—the more the better, provided he is not over-burdened by it ; and this knowledge is not mere student's learning, but means a practical knowledge of buildings, gained by careful analysis and measurements, and by exact observations of materials and local circumstance. A lifetime of constant study is not too much for such a task. I would suggest to you, therefore, to those of you, that is, who are now beginning your career, that there is no short cut to architecture through pattern books, or even through the pleasant paths of detail craftsmanship ; but that, nowadays at any rate, you must have knowledge, and that now, as always in the history of architecture, you must seek that knowledge not only in books, but also in the builder's yard and on the scaffolding of buildings. I have still one more point to bring before you. Perhaps in this paper I may seem to you to have insisted too much on knowledge, too little on imagination, and the criticism has been made on some remarks of mine elsewhere. In the first place, I would point out that we seem to be face to face with some dangerous developments of originality, or, rather, eccentricity. To judge by the majority of our buildings, it appears to be thought that "knowledge hampers imagination," as it was put by the eminent Capability Brown. Certainly, the results are a very nightmare of architecture. Now, there is only one antidote to this sort of originality, and it is knowledge. I fancy that some of the more accomplished of our original designers would be rather surprised to find that the flattest of the ogees, the boldest of their amazing proportions, have been anticipated, not only in Italy, but even in England. Even a cursory knowledge of the work of such a man as Baldassare Peruzzi would show them that profound knowledge is not incompatible with the most complete freedom in design; and further, that the most daring imagination can co-exist with the most trivial detail. You may recollect the indignation of the old Sieur de Chambray at the pretensions of the men of his time, who thought that by turning a capital upside down, or something of the sort, they had invented a new architecture, "as if the Pantheon" (I quote the Sieur de Chambray) that same stupendous and incomparable structure, were not the invention of the architect who built it, because he has vary'd nothing from the Corinthian ordnance of which it is entirely composed." In the second place, and this is the gist of all that I have said, this knowledge is not an end, but a means. For an architect does not study in order to reproduce what other men have said once and for all, but to perfect his own mastery of expression ; and just as a poet does not invent a jargon of his own or write in the language of Chaucer, but takes the current language of his time, and compels it to his purpose, so an architect would not waste his time in a vain ambition of a new style, or a futile copy of an old one; but would master the best in all the architecture of his country, and find thereby an ample language for his own individuality. It is not styles, therefore, that we are concerned with, but style that indefinite quality of all good architecture, whether Greek or Roman, Gothic or Renaissance; indefinable, and ever varying, because it varies with the individuality of the artist, because it depends on the faculty that the man possesses of giving the simplest and yet the most complete expression of all his purpose. It is here that knowledge must come in, as the groundwork of good architecture. We want to know, as a part of our training in our art, how other men in the past have solved the difficulties that confront us now; and it is only by this long laborious study that we can learn to discriminate between good and bad, and to free our own method of expression from what is trivial and irrevelant. It is this way, and not along the pleasant paths of the amateur, there lies the best chance of the architecture of the future.

THE BUILDER

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

Bakers' Ovens.

In the building of bakers' ovens, a number of things must be taken into consideration. First, the size of the oven must be determined, then, whether coals or wood is to be used as fuel, and the situation must be decided upon. These things having been considered, it would be well to make a thorough examination of an oven that has given satisfaction, and with these matters settled, the work may be commenced. Let us suppose the oven is to be heated with coals, and the size of the base determined, this base should be carried up to the height of the furnace door, and the ashpit left according to the width of the door and the length of the furnace bars, allowing for the door being set 4½ inches from the brickwork. The frame and the door, should be about one foot square like the furnace door of a steam boiler, set in brick, and the bars should be about twenty inches long, and level with the bottom of the oven and of the door. The flues should be made sixteen inches square for the fire to shoot into the oven from the shoulder, where the furnace is straight across to the opposite angle of the oven, and the fire catching the crown in its course it will spread all round. A register should be fixed in the flue, and a "copper" five or six inches above the furnace, not so as to get too hot, for it is usually warm water only that is used in a bake shop. A register should be fixed within a little of where the flue enters the oven, and rise slanting;

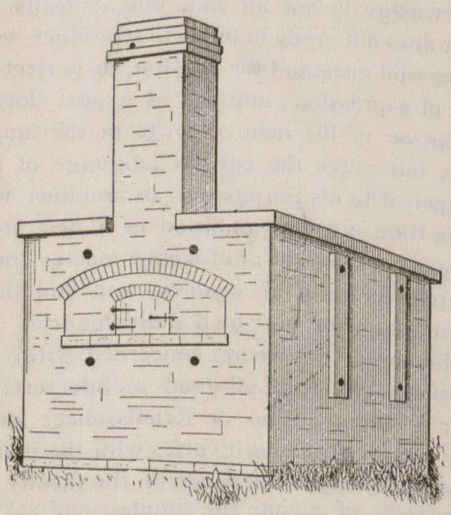


FIG. 1.—BAKE OVEN.

which being stopped when the oven is hot enough, leads to the chimney flue. The general rise of the crown above the flue is from 17 to 20 inches, the form of which is often made of sand which is removed after the brickwork has set. Sometimes an oven is constructed without a copper, and this is, perhaps the better plan, for it is certain the brick and copper will not expand uniformly under heat, though by the use of the copper, more economic results may be obtained as less fuel will be required to heat the oven. The side walls from which the crown of the oven springs, ought not to be less than 2½ bricks in thickness, and the crown spring, should be about nine inches above the

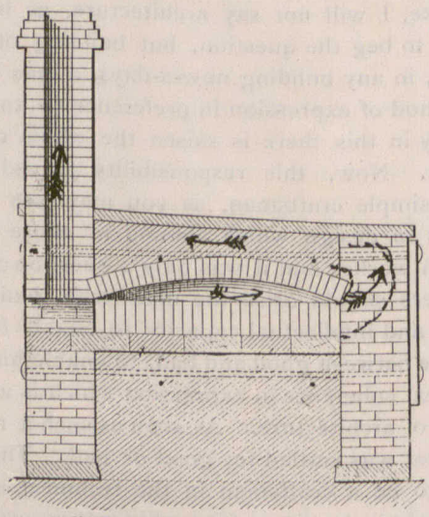


FIG. 2.—SECTIONAL VIEW.

floor of the oven. The angles should all intersect and all be laid with as close joints as possible. In first-class ovens the lining is all of fire-clay bricks, laid in fire-clay mortar. If the top is domed, instead of arched, as is sometimes the case, sand should be spread over the top so that when the work gets dry the sand will fill up any cracks that may result from shrinkage when drying. Fig. 1 shows a perspective view of a very good class of ovens. This is about five feet wide in front and six feet back. It may be made larger or smaller to suit conditions, but this proportion should always be maintained. Fig. 2 shows the longitudinal section and Fig. 3 the

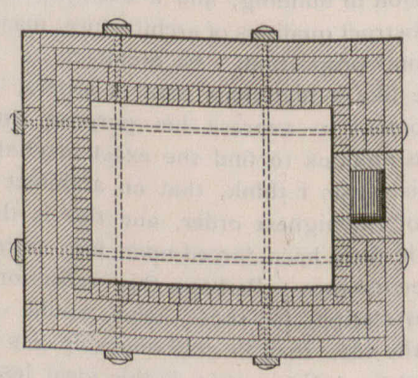
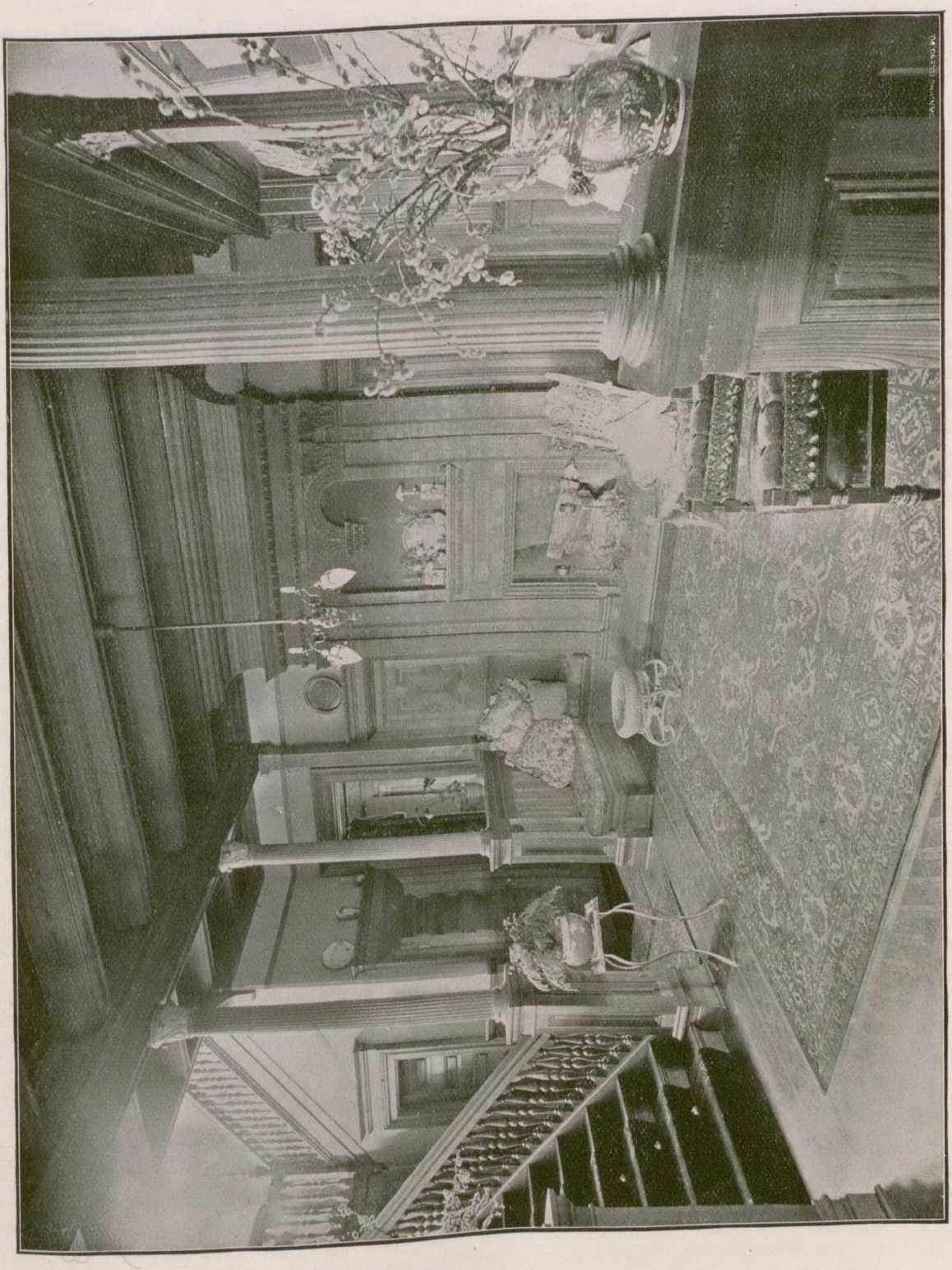


FIG. 3.—PLAN OF OVEN.

plan of the brickwork, showing the iron rods that pass through the oven to hold it firmly together. The manner of laying and binding the bricks is shown in the plan, and the construction is so plainly presented in the illustration that further explanations are unnecessary.



HALL IN W. FLUMMERFELT'S HOUSE, VICTORIA, B.C.
S. MACLURE, ARCHITECT.

Bricks. The sizes of bricks vary so much that it is impossible to construct any rules concerning them, that may be said to be correct for every locality in the Dominion, but this should not prevent a contractor from knowing exactly how many bricks it will require to perform a certain piece of brickwork situated in his own locality, if the bricks are manufactured in his neighborhood. The average size of a brick is 8¼ x 4 x 2¼ inches, and 23 of them will make a cubic foot of brickwork, and ten years ago, The National Traders' and Builders' Association of the United States, adopted this size as a standard for common bricks, and 8⅜ x 4⅛ x 2¼ inches for face bricks; but this standard has not yet been obtained. Seeing that bricks, before being burned may be all of one size and that after burning scarcely two bricks may be found in the pile of equal size, it would appear that a uniform size of bricks, is among the impossibilities, under the present method of manufacture. But suppose bricks were made all to one standard as regards size, it would not then be possible to make a mathematically correct estimate of amount of wall a given number of bricks would make in every case, as bricklayers in building walls, do not all make the same thickness of mortar joints; indeed joints vary in thickness from one quarter to three-quarters of an inch, depending somewhat on the character of the work, and this part would destroy the accuracy of any rule defining the dimensions a given number of bricks would make. There is one way, however, a builder may to some extent, overcome the difficulties of the situation, and that is to take a "ten-foot pole", and on one side lay-off bricks and mortar joints as they average in his neighborhood, taking stretchers on one side, headers on another side of the pole, and face-bricks in the wall on the third side, reserving the fourth side of the pole for a division of feet and inches. From this pole he may be enabled to determine the height and width of frames, thickness of sills, and number of bricks displaced by frames, as well as the number of bricks required to build a wall 10 x 10 feet surface, or any fraction thereof. The uses of a rod of this kind, in an office, may be amplified almost indefinitely.

Hot Air Heating. To determine the proper size of furnaces to use to efficiently heat a house with hot air, the locality in which the house is built or being built must be considered. It is colder in the region of Hudson Bay, than south of Lake Ontario, and a furnace that would be ample for the latter would be unfit for the former. When a person does not possess the experience with a particular furnace to determine this very important point, the best way is to send a description and plan of the building to some well known manufacturer or dealer in that particular make of furnace, who, from greater experience will be able at once to determine the proper size, and thus save the expense of purchasing the next size larger. With regard to sizes of registers and pipes for different sized rooms, the following rules, which have been prepared for the purpose by an expert may be followed: "In public halls or buildings where but a single register is required, take the hot air pipes from the top of the furnace and use register without valves. The sizes of pipes and registers requisite for the successful operation of any furnace is a matter requiring the best judgment, and should be determined by the size, position, and distance from the furnace, of the spaces to be heated, and cannot be governed by any fixed rule. The figures given herewith, however, have generally proved to be near the correct thing, and are prepared for a building supposed to have ceilings 12 and 10 feet high, respectively: Rooms on first floor, measuring 12 x 14, on plan, should have 8 inch pipe with 8 x 12 inch register; rooms on first floor, 12 x 18 feet, 9 inch pipes, 9 x 12 inch registers; rooms on first floor, 16 x 20 feet, 10 inch pipe and 10 x 14 inch register; rooms on second floor, 8 x 12 feet, should have 7 inch pipe, with 8 x 10 inch register; room on second floor, 10 x 16 feet, 8 inch pipe, 9 x 12 inch register; room on second floor, 16 x 12 feet, 9 inch pipe, 10 x 14 inch register; medium sized halls should have 10 inch pipe with 10 x 14 inch register; large sized halls should have 12 inch pipe with 12 x 15 inch register. All pipes in the foregoing are circular in section. When oval or flat pipes are built in the walls of an ordinary two or three storey house, the basement and parlor floor should have independent pipes; the second and third storeys can be warmed by a single line of pipes reduced in size over each register as follows: A house 18 or 20 x 45 or 50 feet plan, should have a separate pipe, 4 x 16 inches to basement; a house 18 or 20 x 45 or 50 feet, should have a separate pipe 4 x 16 inches to each parlor; a house 18 or 20 x 45 or 50 feet, should have one line of pipe 4 x 18 inches to second storey, reduced to 4 x 14 inches for third storey; a house 20 x 40 or 50 should have a line 4 x 17 inches to second storey, reduced to 4 x 10 inches for third storey. The above sizes to be varied according to the size of the house and the general division of the interior space. When pipes open in the wall directly, they should be sized as follows: A 4 x 24 inch pipe in the wall, should have a 12 inch pipe connected with the furnace; a 4 x 20 inch pipe in the wall should have a 10 inch pipe connected with the furnace; a 4 x 18 inch pipe in the wall should have a 10 inch pipe connected with the furnace; a 4 x 16 inch pipe in the wall should have a 9 inch pipe connected with the furnace; a 4 x 14 inch pipe in the wall should have an 8 inch pipe connected with the furnace; a 4 x 12 inch pipe in the wall should have an 8 inch pipe connected with the furnace; a 4 x 9 inch pipe in the

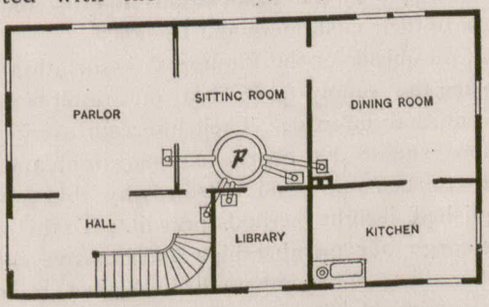


FIG. 4.—SHOWING POSITION OF HOT-AIR FURNACE.

wall should have a 7 inch pipe connected with the furnace; a 4 x 7 inch pipe in the wall should have a 6 inch pipe connected with the furnace." A furnace should be located in the most central position for all the rooms to be heated; for the quicker the heat flows into the rooms, the less friction and condensation occurs, and the better the results obtained. The higher temperature of the air reaching the rooms through the furnace pipes is the only thing that causes circulation. The plan shown at Fig. 4 gives a fair idea of the best position for the furnace to stand. The registers in this case open in the floor, and all are pretty close to the furnace. This subject may be reverted to again.

WHAT PURPOSE SHOULD A NATIONAL ASSOCIATION OF PLUMBERS SERVE?

ED. BRADEN, JR.

In response to a request received from the Chairman of the Essay Committee, I have selected the above-mentioned subject.

There can be no more important question before the national body than the purpose it should serve in its relation to its membership. With this question successfully answered, the duty of each individual member is plain.

When men decide to co-operate—when they agree to harmonize social or commercial interests, the very first thought is, what valid excuse have we to offer for such an association? Is the object or purpose praiseworthy? Is it necessary to better social relations or business interests, as the case may be? Is there a principle of right which we can use as a basis of organization, and which the great public at large must respect? These are the thoughts which must come to men who found organizations based upon principles of mutual interest, or social harmony.

I believe that the true purpose of an association of master plumbers should be as follows:

First, to advance the cause of scientific sanitation. Why? Because plumbing and house drainage are its most important departments.

Second, its special object should therefore be a sanitary law which would provide for the examination and registration of plumbing labour and honest inspection. To secure such law, public prejudice against, or ignorance of its necessity, must be overcome, and to do this there must be a plan formulated for the education of association members who need it, and the education of the people. To educate members the maintenance of pleasant association rooms in each city is the essential point. These rooms should be provided with maps, charts, and blackboards. The library should consist of the latest scientific works on sewer building, house drainage, ventilation, bacteriology, etc., and there should be kept on file at all times trade literature for ready reference. To educate the people to realize the necessity of a plumbing law, educational literature should be issued by the association and distributed by members to their customers and friends.

Third, an object of the Plumbers' Association should be to place the supply trade and the retail trade on a basis of mutual interest. Their interests are identical, and there should be hearty co-operation, and to my mind, there seems no good reason why this cannot be accomplished, if right methods prevail. To this end we must enlarge our memberships and improve the commercial credit of our members through open, honorable, and co-operative business methods.

When we build an association attractive enough to secure 95 per cent. of the purchasing power and reduce the risk of selling materials in our own ranks, we will command absolute trade protection without question, and what is more to be desired, with respect.

To overcome public suspicion and prejudice, we must by these methods improve the character of plumbing work. There is no surer way to win the respect and confidence of the American people than to reduce the death rate of cities and the expense of sickness, which are the result of flagrant, I might say, criminal, sanitary neglect.

An association of plumbers built upon, to my mind, the above lines would become speedily a powerful factor in the world's best progress. Following out such a purpose, our annual gathering would become the theater for scientific discussions and debates of great public import and interest.

Here, for instance, we are met in a city which seems to be upon the threshold of great sanitary reform. I am advised that the press and the people have been looking forward for months to this visit of the nation's plumbers, believing that the deliberations of this convention would bring to them valuable information, aid, and encouragement.

What a disappointment it would be should we, an association organized to serve the purposes enumerated, fail them. Ah, gentlemen, we make a sad mistake when we, as an association of master plumbers, refuse to interest ourselves in the great sanitary problems of the day.

The Southern League of Master Plumbers, an organized district of the National, has tried in a number of ways to show the advantages of an organization on the basis I have outlined. The results which have followed our efforts should convince every member of the association that such a plan meets with the approbation of the public, and as an earnest advocate for the betterment of the plumber, and the elevation of the business, I urge the National Association of Master Plumbers to adopt that plan.

A paper read at the Annual Convention of the National Association of Master Plumbers of the United States, New Orleans, March 8, 1898.

BUILDING MATTERS IN BRITISH COLUMBIA.

A correspondent of the ARCHITECT AND BUILDER writing from Vancouver, says:

"I am much pleased with your Spring Number, particularly with the article, "Builders' Exchange—Why?" Since its arrival the builders of our city met and organized, hoping to be able to do something towards upholding prices, and preventing the keen competition which has, up to the present time, whether the trade was dull or brisk, rendered our business precarious to say the least. I notice, however, by your editorial notes that in your city, where an exchange has been thoroughly organized for some years, the same conditions seem to prevail. The masons and bricklayers organized some four or five months ago, and formed a branch of the International Union. The contractors were notified at the first of the year that an increase of wages from 45 to 50 cents per hour would be asked for on April 1st. So far, although there is a large amount of work under way and coming out, the contractors have not consented to this increase; unless they do there will probably be a lock out to-morrow or next day. Most of the men have been getting the increased rate since the 1st of the month. This city seems to be the jumping off place for all comers from the east. This fact, in my opinion, accounts for the difficulty of maintaining an organization of either employers or employees. Much of the work now going on is in the hands of outsiders who have been here but a few months. The average number of bids for buildings let by tender and open for all comers is about fourteen."

The following is recommended as a good recipe for a black varnish for ironwork: Take ½ lb. of asphaltum and ¼ lb. resin, and dissolve in 1 pint of turpentine; rub 2 ozs. of lampblack with a little linseed oil to form a paste and stir this into the first mentioned ingredients.

TRADE DISPUTES.

As we are about to go to press, the pleasing information is received that a settlement has been reached between the master builders and the bricklayers who recently went on strike in Toronto. An agreement has been signed fixing the standard of wages at 37½ cents per hour, for one year from the first of the present month. The carpenters are demanding an increase of wages from 22½ cents to 25 cents per hour, and it is probable that some increase in wages will be granted to them. The recent strike of the brickmakers in the vicinity of Toronto has been settled, and operations have been resumed. The disturbance to building operations may therefore be considered to be at an end, and it is hoped that the temporary cessation of work may not seriously affect the prosperity of the present building season.

The strike inaugurated by the bricklayers was based upon a demand for only 1½ cents per hour above the wages which the employers offered to give. It was also declared in the face of an offer from the employers to submit the matter in dispute to the decision of the County Court Judge as arbitrator. When strikes involving serious disturbance of trade are instituted under circumstances like these, it becomes apparent that some means is urgently required of adjusting future differences between employers and employees in the building trades, and we trust that such means will be devised before the expiration of the agreement which has just been signed.

THE WASTE IN FURNACE HEAT.

S. Hampton Ripon.

I have been making a little calculation of the wasted heat due to leaving the leader pipes in furnace heating unprotected by covering material and I confess I am startled at the results disclosed. The waste un-checked, I am led to believe, is largely responsible for the dissatisfaction so often expressed at the magnitude of the coal bills and poor results therefrom.

Take as an illustration a furnace heating a small cottage ; four 10-in. pipes to the first floor and three 8-in. stacks to the second. Consider the average length of pipe in each line to be 10 ft. ; then we have 40 ft. of 10-in. pipe and 30 ft. of 8 in. leader in the basement.

Each 10-ft. length of 8-in. pipe contains 21 sq. ft. of surface, or 63 ft. in all. Each 10-ft. length of 10-in. pipe contains 26 sq. ft. of surface, or 104 sq. ft. in all, or a total of 167 sq. ft. in the basement leaders. Add, if you please, the casing of a 40-in furnace 48 in. high and, ignoring the top, we have 42 sq. ft. more. Now, under ordinary conditions it is safe to assume that the temperature of casing and pipes is at least 140 deg. We have here a total of 219 sq. ft. of surface radiating heat into a waste space with a surface temperature of 140 deg. Had we that number of square feet of radiation in a hot-water heating job we should consider it sufficient at that temperature to heat a room containing at least 4,200 cu. ft. of space, or, say, a room 15x28x10. Now, suppose the apparatus were to be wrapped first with a layer of asbestos paper and then with hair felt. I think all will agree that 25 per cent. of this waste heat would be rendered available. Probably most would claim a greater saving, but assume that for the sake of demonstration 25 per cent. of 4,200 cu. ft. is 1,050 cu. ft., or equivalent to a room 10 x 11½ x 9 warmed by waste heat. At an estimated cost of 10 cents per square foot, the entire bill for covering in this manner would be $21.90. The annual interest on this amount, allowing for gradual depreciation, etc., ought not to be 10 per cent., but we will assume that our householder values his money at that figure, so that the net annual cost would be $2.19.

Now, it needs no mathematical demonstration to prove to any one that $2.19 would be a small investment to warm a room containing 1,050 cu. ft. of space.

This then expresses a minimum saving ; the practical, actual saving, all will recognize as being much larger.

Now I am wondering whether, in view of what is here demonstrated, it is not possible for those whose ambition it is to do the best work to persuade their customers to invest a little more in their heating plants to cover the dealer's expenses, and profits, he to cover the pipes in a scientific and workmanlike manner ; not merely a single layer of asbestos paper, but a complete job as good or better than the one outlined here.

PERSONAL.

At the recent examination, Mr. W. F. Shepherd won first year honors in the Department of Architecture at the School of Practical Science, Toronto.

Messrs. Chadwick & Beckett, architects, have removed from their old quarters in the Saturday Night building into new offices in the Canada Permanent building on Toronto street, which has lately been completely remodelled, under the direction of Mr. R. J. Edwards, architect. Messrs. Chadwick & Beckett's offices now comprise one of the finest architectural suites in the city, being tastefully decorated and furnished.

The death is announced, on the 1st inst., at Thorold, Ont , of Mr. F. T. Walton, a well known contractor, in the 61st year of his age. The late Mr. Walton was a native of Hamilton, Ont. He resided for some years at Niagara Falls, during which time he erected the Niagara University, Loretto Convent, Spencer House and Brunswick House. He subsequently removed to Toronto, where he built the House of Providence, Loretto Abbey and St. Joseph's Convent. During the last eighteen years he resided at Thorold.

The Canadian Office and School Furniture Co., Preston, Ont., have found it necessary to build an addition, 36 x 38 feet, to their factory.

The Expanded Metal Co., Toronto, has been incorporated with a capital stock of $110,000 to manufacture expanded metal for fireproofing purposes.

Recently a marble block was taken out of the quarry of the Southern Marble Company in Pickens county that weighs over 100,000 pounds, and, so far as known, is the largest block of marble quarried in the world during modern times. The block of marble is almost pure white, and measures twenty-seven feet two inches long by four feet three inches wide, having in all the mass 500 cubic feet.

Mr. Raoul Aube, resident representative of the French syndicate which two or three years ago purchased the works of the Canada Stone Chinaware Co. at St. Johns, Que., has applied for an order of the courts to wind up the business. The business has been run in a very spasmodic way since the transfer, and the new proprietors appear to have had difficulty in getting all the stock taken up. Finally, friction developed between the Messrs. McDonald, the former owners, and the company, resulting in recent litigation.

Messrs. Darling Bros., of Montreal, have recently published a well printed and complete catalogue of the special appliances manufactured by them, and foreign devices for which they are the Canadian agents. Prominent among these may be mentioned the Webster vacuum feed water heater and purifier, which is largely employed in heating systems in large buildings, also passenger and freight elevators operated by hydraulic or electric power. A list of some of the buildings in which these appliances are in successful operation are included in the catalogue.

MANUFACTURES AND MATERIALS

LUXFER PRISMS.

Application has been made for a charter by a company which proposes to take over the business of the Luxfer Prism Company, of Toronto, and conduct the same on a more extensive scale. The new company which will have a capital of $400,000, have purchased a site for a new factory on King street west, and in addition to the manufacture of luxfer prisms will make artistic iron work and other building materials.

MARITIME CLAY WORKS.

The Maritime Clay Works, Limited, of which Mr. Robert Brownell, of Truro, is general manager, is the name of a new concern which is about to begin the manufacture of clay building materials at Pugwash, Nova Scotia, where the company control extensive deposits of the finest clay. The company's new works comprise a main building, 60 x 61 feet, dryers 60 x 100 feet filled with steam tunnels, 15 kilns, boiler and engine room. From sixty to one hundred men will be employed, including experienced clay workers from the United States. The class of goods manufactured, will embrace building and ornamental bricks, hollow building blocks, terra cotta, fire bricks, and tiling of all kinds.

FIREPROOF WINDOWS.

In our last issue appeared an article upon "Safety from Fire in Hotels," mention being made therein of the desirability of having the end of every passage open upon a balcony. "Over the door to the balcony," it was stated, "may be, framed in iron, heavy glass of the luxfer prism order, sufficient to illuminate the passage, but not likely to be soon injured by heat." Since this was written, more particulars about the fireproofing product of the Luxfer Prism Co. are to hand.

A brick test-house, assuming the nature of a furnace, was furnished with a large window made of 4-inch plate glass squares, glazed electrolytically in copper by the luxfer prism process. The test was witnessed last February by Fire Chiefs Bonner and Dale of Brooklyn, and Superintendent Anderson of the New York Board of Fire Underwriters, and a number of insurance experts, architects and builders. About one-fourth of a cord of pitch pine, mixed with resin, was piled on the grated floor. The match was applied and a few minutes later the great draft had raised the flames to such an extent that the plate glass was red hot. The rest of the story is from "The Insurance Press:"

"At that stage Chief Dale ordered his men to turn the water on, and the windows were cooled and the fire was damped. Then the doors of the structure were opened and the windows examined. They were found intact. The insurance experts then desired that the test be continued, and more resin and wood were piled in, and very quickly the terrific heat within made itself evident. The plate glass was cracked, but every square remained intact in its copper frame and did not even move before the full force of the hose when the fire was extinguished. Fire Chiefs Bonner and Dale, Mr. Anderson and Architect Le Brun expressed themselves as highly satisfied with the fire-resisting qualities of the Luxfer Prism Company's plate glass squares. The heat attained was more than 2,400 degrees Fahr." We may add that this and other similar experiments in New York and Chicago were made after the discovery that luxfer prisms successfully withstood the ravages of fire and water in buildings where disastrous conflagrations had occurred.

MANTELS AND GRATE FITTINGS.

In the show rooms of Messrs. Rogers & Son, Toronto, is a mantel of chase design, made of enamelled whitewood. The space immediately above the grate is filled in with glass and pearl mosaic set in white cement, the cement backing being held by an iron frame. A design in suitable colored glass serves to relieve the surface of the white glass mosaic. The top of the grate opening is bordered with brass, plated with gold, the andirons being of the same material. It is gratifying to know that the Toronto Ornamental Iron Co. have successfully made some wrought iron grate fixtures for the above firm, and that in future the attempt will be made to produce in Canada goods of this class which have always in the past been imported from abroad.

The craze for cheapness which prevails to so large an extent in this day is an obstacle in the way of firms who attempt to produce original and artistic goods in this and other lines. The masses appear to be satisfied with any kind of imitation, so long as it is cheap, and many manufacturers, with a keen eye for profits have planned to meet the demand by appropriating wherever they find opportunity, the designs of the better grade goods and by machine carving and other processes cheapening the cost of production to the required extent. To such a degree has this become the practice that the manufacturer of a well designed piece of furniture dare not give the same exhibition in a public window. Happily there is a more limited demand for all well designed and properly manufactured goods. Let us indulge the hope that with the increase of culture and wealth in this country will come public perception of merit and the distaste for shams.

THE COMPRESSIVE STRENGTH OF CONCRETE.*

AS DETERMINED BY TESTS MADE AT McGILL UNIVERSITY.

Concrete, especially in the construction of piers and foundations, is coming every year into more extensive use. It is therefore desirable to determine its strength, and more particularly the resistance to crushing, as it is to a compressive force that it is most often subjected. The results of very few tests with this end in view are given in any of the treatises on concrete or building materials, or in the engineering journals. A few results may be found, but they are scattered and very irregular, and little information can be obtained from them.

During the past three years a few tests have been carried on by the students of civil engineering at McGill University. The first series, two years ago, was to determine the effect of different percentages of water upon the strength, and the best percentage to use. This was found to be about 20 per cent. of the sand and cement. Last year tests were made comparing the strengths of concretes made respectively from an English Portland and a German one. This year tests

* From a paper by W. B. Anderson, Stud. Can. Soc. C.E., read Thursday, March 16th, 1899.

were made upon sand cement in order to compare it with the Portlands, and also to determine the best proportions in which to mix it in making concretes.

This cement was "Cathedral" brand sand cement, made by the St. Lawrence Portland Cement Co., of Montreal. It is made of equal parts of Portland cement and kiln-dried pump sand. These are run together into a revolving cylinder half full of flint pebbles, where they are thoroughly mixed and ground to an impalpable powder.

The conditions under which the tests were made this year were the same as those of the first series (published in paper No. 117, Trans. Can. Soc. C. E.), except that the blocks were made 9 x 9 x 12-in. instead of 12-in. cubes, as the cubes were found, in some cases, to be too strong for the testing machine to break. The blocks were tested with their long edges vertical, and rested on a steel plate which was on a ball and socket joint, the plate above the block being fixed. Sheets of rubber were inserted above and below the block to give a more uniform distribution of the load. The blocks were allowed to stand in the moulds for about two days, and were then removed and placed in water, where they were kept until the time of testing.

The results of all the tests made in 1898, and the more striking ones of other years, are here presented in tabular form :—

RESULTS OF EXPERIMENTS ON THE COMPRESSIVE STRENGTH OF CONCRETE.

No. of Test.	Date of Test.	Brand of Cement.	Mixture.			Percentage of Water.	Weight in lbs. per cu. ft.	Breaking load lbs. per sq. in.			Proportion of Mortar to Broken Stone.	Relative Amounts of Cement.	Relative Costs.	
			Cement.	Sand.	Broken Stone.			One week.	Four weeks.	Two months.			First Assumption.	Second Assumption.
1	1896	German Portland "Hemmoor" Brand.	1	2	4	20	139.5	746	626	507	6.0-8.0	157	174	126
2	"	"	1	2	5	"	....	....	703	....	-10.0	122	135	116
3	"	"	1	2	6	"	.....	....	728	....	-12.0	367	407	206
4	1897	"	1	1	1	22½	142.3	×	×	....	6.0-3.0	275	305	175
5	"	"	1	1	2	"	146.7	1037	×	....	-6.0	220	244	156
6	"	"	1	1	3	"	148.0	×	×	....	-9.0	183	204	144
7	"	"	1	1	4	"	153.3	×	×	....	- 20	157	174	135
8	"	"	1	1	5	"	151.2	×	×	....	-15.0	220	259	150
9	"	"	1	2	2	20	143.5	494	565	....	6.0-4.0	183	2 6	139
10	"	"	1	2	3	"	146.0	611	555	....	-6.0	157	185	131
11	"	"	1	2	4	"	148.5	819	613	....	-8.0	137	162	124
12	"	"	1	2	5	"	150.5	581	680	....	-10.0	122	143	120
13	"	"	1	2	6	"	150.0	500	698	....	-12.0	157	185	122
14	"	"	1	3	3	"	139.5	333	205	....	6.0-4.5	137	162	117
15	"	"	1	3	4	"	139.0	....	366	....	-6.0	122	143	113
16	"	"	1	3	5	"	145.0	....	386	....	-7.5	110	129	110
17	"	"	1	3	6	"	147.0	....	357	....	-9.0	122	122	104
18	1898	Sand Cement "Cathedral" Brand.	1	3	5	"	146.5	144	274	400	-7.5	110	110	102
19	"	"	1	3	6	"	146.4	110	182	218	-9.0	100	100	100
20	"	"	1	3	7	"	150.3	210	322	....	-10.5	157	157	119
21	"	"	1	3	4	"	150.6	316	441	....	6.0-8.0	137	137	114
22	"	"	1	2	5	22	148.5	275	477	494	-10.0	122	122	111
23	"	"	1	2	6	20	54.0	521	639	670	-12.0	200	200	134
24	"	"	1	1½	3	"	149.8	412	490	....	6.0-7.2	169	169	126
25	"	"	1	1½	4	"	151.5	446	679	....	-9.6	157	157	123
26	"	"	1	1½	4½	"	153.5	536	741	....	-10.8			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Blocks marked thus (×) remained unbroken under a load of 1,050 lbs. per square in.

Column 13 shows the relative quantities of cement in the different mixtures, and some attempt has been made to estimate the cost of the different mixtures on this basis. The relative costs are compared on the following two different assumptions :—

First assumption :—Column 14 shows the relative costs if it is assumed that the sand and stone can be secured on the spot and their cost ignored. The cost of different brands of cement is taken as below.

Second assumption :—Column 15 shows the relative costs of the different mixtures and brands on the following assumed costs per cubic foot of materials :

English Portland	53 cents.
German Portland	50 "
Sand cement	54 "
Broken stone	8 "
Sand	2 "

The cost of labour is not taken into account, as it will be the same in every case, and these costs can at best be only a rough approximation.

The main requisite for an economic and good concrete is to have just enough cement to completely surround every grain of sand, and just enough of this mortar to fill every interstice between stones. Column 12 gives the proportion of mortar to stone, and it will be seen that with each different mortar the strength increases as the proportion of stone increases, or as the volume of interstices between the stone decreases, because the mortar is not so strong as the stone. The strength also increases with the richness of the mortar in cement, so that the strongest concrete will be one with very little sand and a great deal of stone. Those with the 1-1 mixtures of mortar are very much stronger, though also more expensive than the others. The sand cements are found to be weaker than similar mixtures of Portlands by from 12 per cent. to 40 per cent. The manufacturers claim that with a mortar, such as a 1-10, with a great deal of sand, this cement is stronger than the Portland. This remains to be determined.

If the concrete is desired to have very great strength, a Portland cement and a rich mortar might be used, but if weight is the main consideration, with only moderate strength required, a concrete of sand cement will be much cheaper and quite efficient. Of course, much cheaper mixtures than the ones tested can be made, but they will be weaker accordingly after a certain limit is passed, which limit has not been reached in these experiments. One of the cheapest and a fairly strong concrete is No. 23. This mixture would seem to be the best one to use if excessive strength were not required.

The loads given in the table are the actual crushing loads. The blocks showed cracks or signs of failure before this load was reached, but it was thought better to make the comparison on this basis. For purposes of comparison it is best to take the results of the four-week tests, as the concretes then show more uniform results than at one week, and the two-month tests are not complete.

These tests are still very incomplete, and it might be profitable to make further tests with concretes containing more stone. The strongest of the sand cement mixtures is No. 26, and with this rich mortar it looks as if it would stand a good deal more stone, thus increasing both the strength and weight, and reducing the cost. Tests of this nature will likely be carried out at McGill University in future years.

CHARACTERISTICS OF GLASS.

Glass is bent in a kiln. Glass melts at 2,300° ; the heat employed in bending is 1,800°. No pyrometer would stand long in that heat ; it might last an hour, but it would not last a day, and so the heat of the kiln is judged from the color of the flame and other indications. By long experience and observation the expert glass bender is enabled to estimate the heat in this manner with accuracy. Smaller pieces of glass are put into the moulds in the kilns with forks made for the purpose. The great moulds used for bending large sheets of glass are mounted on cars, so that they can be rolled in and out of the kilns. The glass is laid upon the top of the mould over the cavity and is bent by its own weight. As it is softened by the heat it sinks into the mould and so is bent into forms. It may take an hour or two to bend the glass, which is then left in the kiln from twenty-four to thirty-six hours to anneal and cool. Glass to be bent, of whatever kind or size it may be, is put into the kilns in its finished state ; the great heat to which it is subjected does not disturb the polished surface. Despite the exercise of every precaution more or less glass is broken in bending it. Bent glass costs about 50 per cent. more than the flat.

POINTS ON HOT WATER HEATING.

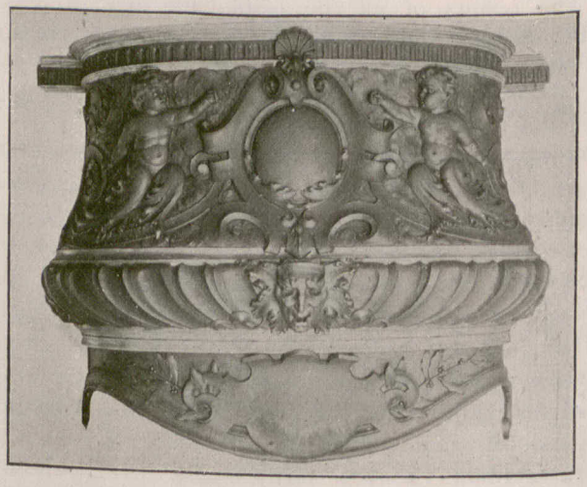
Mr. A. T. Hoyt, makes the following points in an article contributed to Heating and Ventilation, on the duties of a heating boiler : The circulation of water for heating purposes in radiators, box coils, or lines of piping, is a purely mechanical operation, and is controlled by mechanical laws. The fundamental law of mechanics is : what is gained in time is lost in power, and vice versa ; or in other words, something cannot be made from nothing. In order to create a motion or a force of any particular kind an equivalent force or motion of the same or some other kind is required. A heating boiler is governed by mechanical laws, as surely as is the lever ; it is simply a machine, and the circulation of water is its work. That which causes motion is called force, and that which stops motion is called resistance ; they work against each other. Motion is simple and compound, uniform, accelerated or retarded.

These principles of mechanics enter as factors into water circulation. A heating boiler is a machine, and its duties as a machine are the scope of this article. As water receives no heat after leaving the boiler, neither does it receive any motion ; its motion is really a retarded motion, from the time it leaves the outlet of the boiler until it reaches it again at the inlet. As the circumference of a circle, if revolved, can go no faster at any one point than at another, so the current of water in a heating pipe of uniform size cannot be fast and slow in any one line. It may be faster or slower in one line or part than another line or part ; but in individual lines, the motion is uniform. Although the motion of water in the individual radiator is a uniform motion, water circulation is of the retarded class of mechanical motion. Boiler duty is thereby increased, as it has to create a current of force in itself sufficient to overcome the resistance met with in the radiation, and the current at the return inlet will be the power of the boiler, minus the resistance. In other words, the volume (velocity and area) and temperature at inlet of boiler, are the measure of the power of the boiler. This will be governed by the style, manner of laying out the radiation and its amount, &c.; but it is not in the scope of this article to touch on these matters.

The force of the current is established in the boiler, as it receives no accelerated motion after leaving the boiler ; and as the heat is also given to it in the boiler, it is conclusive, therefore, that the boiler duty is virtually to cause and maintain a circulation of water, the temperature of which, as well as the velocity, is dependent upon another force, viz., heat. As the boiler is simply a machine, it can create no force, but is operated by a force, and as this force operates upon the boiler surface, its operative force will largely depend upon the construction of the boiler. As stated already, the water receives neither heat nor motion after leaving the outlet of the boiler ; therefore it must receive its heat and also its motion from the fire, and its velocity and temperature will consequently depend upon the force or heat from the fire.

Boiler duty, or the duty an individual boiler will economically perform in water heating will, outside of its size, depend upon its construction. Water absorbs or receives heat from a fire, and also motion ; and it may receive heat with little or no motion given to it from the fire ; but it cannot receive motion without absorbing heat. The duty, therefore, a boiler will be capable of performing, will depend upon the proper construction of its fire furnaces, which should be such that the water in it will receive the greatest possible motion, this will ensure an absorption of heat ; and the temperature, with the volume, velocity and area of outlet, will be the rating or power of the boiler.

There are three points to be considered in water circulation, and all devolve upon boiler construction. Fire is the primary cause of water circulation from a boiler through piping or radiation, back to the boiler again, and like a circle it has no end, as there is no point in the circulation where the flow ceases and the return commences. The terms flow and return, are only relative terms, designating the directional piping. Water is under the law of inertia, and if moved at all,



Box Front in Staff, Grand Opera House, Barrie.
By Wm. J. Hynes, Toronto. Eden Smith and Eustace Bird, Architects.

must be moved by a force outside of itself, and the circulation of water, either hot or cold, is a mechanical operation and governed by mechanical laws. Heat is the sole cause of water circulation in lines of piping or radiation, as from it alone are the velocity and temperature of circulation started and maintained.

As something cannot be obtained from nothing, neither can a circulation of water be increased either in velocity or heat after leaving the boiler from any cause in itself. As the current is started in the boiler, and by the construction of the boiler, and is through the boiler from bottom to top, as much water enters the boiler as is leaving it, and no more, whether the temperature entering is 40 degs. or 200 degs.

USEFUL HINTS.

PERCOLATION THROUGH BRICK AND STONE.—The results of some experiments to ascertain the most effective material for checking the percolation of water through brick or stone work are given by Mr. A. W. Hale in a recent number of the "Engineering and Mining Journal." The investigation was mainly carried out in connection with the new Croton aqueduct of New York, and the substances employed in the experiments were numerous and varied. It was found that Portland cement gave the best results, and that the hydro-carbons, which are commonly regarded as suitable materials for rendering brick or stone impervious to water, oxidized by exposure to air and gradually disappeared It was also found that a brick was rendered impervious to water by cement more rapidly when the cement was applied as a wash by means of a brush than when applied with a trowel in the usual manner. A brick which had been treated with four cement washes was found at the expiration of two months to be quite impervious to water, even under a pressure of 200 pounds per square inch.

A stain to show at its best must exhibit a tone of color which comes from a combination of the color of the wood and the pigment or stain used, on the same principle as glazing and graining. Hence the more transparent the color used, the better the stain.

Japan intends sending to the Paris Exhibition a huge house, hexagonal in shape, and composed entirely of porcelain. It measures several yards in circumference and its weight will not be less than seventy tons. From the artistic point-of-view, according to the several models already finished, it will exquisite. It is estimated that the cost of making it will be about £2,000.

CEMENT COATING FOR IRON WATER TANKS.—Every good oil paint and red lead coating will protect the water reservoir from rust, and when it is perfectly dry will not give the water any noticeable side taste. The only drawback is that the oil coating does not last long. For this reason a cement coating is considered superior to oil paint. Cement dries perfectly in a few hours, and if it is made right lasts at least as long as oil paint, while its cost is next to nothing. In the Experimental Brewery at Berlin (says the Nordd Bangew Anzeiger) the lime and warm water receptacles are painted with cement, and after four years' use the coating has not yet required renewal.

CURE FOR WORMS IN WOOD.—A writer suggests the following methods for treating wood which has been bored by worms: 1. Fumigate the wood with benzine. 2. Saturate the wood with a strong solution of corrosive sublimate. If used for carvings the color should be restored by ammonia and then by a weak solution of hydrochloric acid. The holes may be stopped with gum and gelatin, and a varnish of resin dissolved in spirits of wine should afterward be applied to the surface. 3. Whale oil and poisonous ointments have been found of service, the wood being carefully brushed before being operated upon. Still another plan is to dust the parts with pounded quicklime and then water them with ammoniacal liquor of gas works, when the ammonia will be instantly disengaged by the quicklime, and this is destructive to insect life.

PAGES

MISSING