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MISSING

CANADIAN ARCHITECT AND BUILDER.

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—THE—

CANADIAN ARCHITECT AND BUILDER,

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The St. John Fire.

ON a May 25th, the city of St. John, N.B., was again visited by fire, which destroyed some 200 buildings in the north end of the city known as Indiantown, and left one thousand persons homeless. The burned district consisted principally of wooden buildings occupied by workmen connected with the saw mills and other industries of the city. There was a stiff breeze blowing at the time, which carried the sparks in all directions, resulting in the fire spreading to such a degree as to make it impossible for the firemen to check its progress. It will be remembered that this is the second great conflagration which has visited this city within the last quarter of a century. The important lesson which this occurrence seems to emphasize is the necessity of abolishing wood construction in the central districts of cities. The question of cost enters into the matter to a considerable extent, but in these days of electric railways those who cannot afford to build or rent brick houses must be content to live in the less populous districts, even at the expense of a little inconvenience.

Adjustment of Wages.

AN agreement has been reached between the Toronto Builders' Exchange, representing the Master Builders, and the Journeymen Carpenters, under which an increase of about five cents per hour will be granted the workmen in this line. It is gratifying to observe that in this adjustment the union principle that there shall be a minimum standard of wages for all workmen, irrespective of their qualifications, has been disregarded. On the contrary, the truer principle is recognized that workmen differ widely in ability, and the remuneration for their services should therefore vary in like proportion. The new scale of wages will range from 22½ cents to 27½ cents per hour, according to the ability of the workman. The Exchange has now under consideration a request from the Journeyman Plasterers for a slight

increase in wages. The strike in the building trades at Winnipeg has happily been adjusted. An understanding has also been reached in the case of the moulders' strike. Conditions in the building trades may therefore be said to have reached a settled basis so far as prices for labor are concerned, and projectors of new enterprises now operate with certainty.

The Age of Combines.

COMBINATIONS of capital and labor are the order of the day. The object of both is to secure profits. The outcome of the movement is being watched with the greatest interest. In the consolidation idea some of the manufacturing companies think they see the remedy for over competition, with its attendant reduction of profits, as well as a means of reducing operating expenses. There is another side to the question, however, and that is the side of the buyers and consumers of the products of these factories. They are beginning to cry out against the prices at which the consolidated manufactories have listed their goods, and in at least one instance a counter combine has been formed by the consumers. The largest railroad and other contractors in the State of Indiana are said to have arrived at an agreement for the purpose of fighting the great trusts which control the manufacture of the products which enter into their business. This agreement binds them to buy all their material from dealers who are outside of the manufacturers' organization, and to provide security, without the aid of the manufacturer, for the carrying out of their contracts. If this counter movement on the part of the purchasing classes should become widespread, the purpose of consolidation by manufacturing concerns would be nullified, and resort must be had to some other method, which in turn would probably soon be confronted by difficulties equally formidable. The equitable adjustment of industrial and commercial conditions, in the present complex condition of affairs, is a problem of the greatest magnitude. Time must be an important factor in the solution—if a solution is ever reached.

The Teaching of Art and Design.

There was printed in our issue for May a lengthy resolution recently adopted by the Executive Committee of the Canadian Manufacturers' Association, referring to the need of schools in Canada for the teaching of industrial art. The resolution calls upon the government to assist in the establishment of such schools. In the present number will be found a communication from Mr. S. John Ireland, Principal of the Hamilton Art School, which points to the fact that schools of the character called for by the above mentioned resolution have been in existence for a number of years past in several important centers of population in Ontario, and asserts that these schools are being assisted by an annual grant from the Ontario government, and are doing efficient work. Mr. Ireland further states that the Hamilton school has received little or no encouragement from the manufacturers of that city. Other charges of an even more serious character against the manufacturers are contained in Mr. Ireland's letter. Our Hamilton correspondent after having visited and inspected this school, gives his approval to the work which is there being done. This subject is an important one, and we shall be pleased to allow reasonable space for its full discussion. The question of what methods should be adopted for the education of the artisan classes, is at present occupying public attention in Toronto, Ottawa and other Canadian cities. Closely identified therewith is the special phase of the subject now under discussion in our columns. The attempt should be made to discover and demonstrate to the public satisfaction whether the existing schools, known as the Ontario Government Art Schools, are equipped and managed to insure the teaching of industrial art in the most efficient and successful manner. This would seem to be the first point to be determined. If these schools are not fulfilling the requirements, let it be shown wherein they are defective and whether there is the possibility of effecting changes which will render them satisfactory. If they are found to be working on wrong lines and to be largely inefficient, it might be better to replace them with something entirely new. If, on the other hand, it should appear that up to the limit of the support accorded to them, they are performing meritorious work, means should be at once devised to place them on a proper financial footing.

MR. REID'S MURAL DECORATIONS.

A CORRESPONDENT writes: "It has been a source of speculation with not a few whether the mural decorations at the City Hall, Toronto, are satisfactory to the Guild of Civic Art, and if work of this quality will be accepted by them in the future. If the work presented by Mr. Reid to the city meets their requirements, then it becomes a question whether they are to be entrusted with the selection of further mural decorations.

While admitting the degree of success Mr. Reid has attained in a new field, it must be candidly stated that judged absolutely on its merits, his work falls very far short of what may reasonably be expected in monumental work of this kind. A more uninteresting grouping in any of the subjects would hardly have been seen in the most ordinary occurrence of the events portrayed. We are also told that the costumes are incorrect, and if the originals were more picturesque, as surely they must have been, the oversight is unpardonable. There is also a lack of modelling of the figure shown through the clothing, which, for example in Walter Crane's work, gives so much greater value to the drawing, and which one may see frequently enough in muscular humanity of the humblest walks of life.

The general scheme of color is good albeit rather tame—indeed this word applies to the whole work, in conception, composition, drawing and colouring.

And while we are on the subject we are rather curious to know just what Mr. Walker in his address meant to say when he referred to the decadence of the conventional in decorative art and the development of a modern school. Surely the greatest modern exponents of mural decoration are conventional to a degree in the treatment of their subjects. The greatest charm to us of to-day in the tapestries to which he referred, lies in the quaint conventional treatment of the subject."

We learn from the Orillia Times that: During its erection a few years ago, the immense brick chimney of Miller's tannery settled on its foundations, giving it a decided slant, and causing the workmen to leave the top unfinished. Mr. Ed. Webb, bricklayer, has recently completed the job of straightening it, cutting out the bulges and setting it upright. He has also added twenty feet to the height, making it eighty-five feet. The chimney now stands perfectly straight.

TECHNICAL EDUCATION.

The meeting to discuss technical education which was held in the Rotunda of the Toronto Board of Trade Building on June 7th brought out very clearly that the subject is one of far reaching importance.

Whatever may be the fate of the present Peace Conference it is not upon war that the mind of the nations is now set. The struggle for supremacy is a commercial struggle and the hero of this struggle, the skilled artizan, is an object of much attention in educational circles.

The national bill for technical training in England is $7,500,000 per annum besides the amounts paid by municipalities. Belgium pays even more highly in proportion to size and population, but as a consequence is able to support a population greater than that of all Canada in an area less than that of Lake Ontario. We on the contrary have already sent to the United States, because we have no work for them to do, a population sufficient for the settlement of a country of the size of Belgium; and this is not because we have not the raw material for manufactures, but because we cannot work it. It is not want of capital that hinders us, for capital is always on the lookout for opportunities. Nor is it a market that is wanting, for the world is now a market to those who have anything to offer it; and that we have, if we are prepared to employ the young men we now send away, in manufacturing the raw material we now export into the manufactured articles we now import. But there is one proviso—that our standard of excellence is the world's standard, the standard of the best markets. We must enter into the modern game of competition of products which involves high training for the workmen who produce.

This change that has come over the world, has brought about a change in the conception of education and its application. It is not long since education was confined to men of leisure and the professions. The education which consisted entirely in cultivating the imagination and the capacity for abstract thought, or as its advocates would have said, to fill the mind with "beautiful images" and give it "just ideas," was adapted to the purpose it served of cultivating the mind to perceive and understand. It was training with the idea of culture. The process of culture may be described as letting the mind examine what men have thought, and what they have done merely for the sake of knowing what interested them, not for the sake of devoting ourselves to the same subjects of thought; that the mind, from the habit of placing itself at the point of view of many men and of many generations of men, may acquire that flexibility which is necessary to enable it to take a sound view in the new circumstances of life which present themselves. The process of culture is long and, though the result is valuable, it is only in some walks of life, and when it has been highly developed that its value can be reckoned in money. For this reason education has with some justice been considered as making rather for the unsettling than for the real good of persons engaged in such pursuits as agriculture or the mechanical callings. Indeed the result has shown that the too exclusive study of literature has indisposed young men for active pursuits in the past; they have flocked from school, not back to the farms, but to the cities, to take up the professions or teaching, or at least some clerkship which will give them a berth in town away from the drudgery of the farm yard.

This is the natural effect of a system of education which pays almost exclusive attention to cultivating the ideal faculties to the exclusion of the practical, which arouses the imagination in a direction foreign to that which constitutes the daily effort of practical life. It is an old complaint that the young man, who is ready to walk a thousand miles in a thousand hours, faints at the sight of a wood pile. At the bottom of our hearts we know that our sympathies are with him. Feats of physical strength or endurance appeal to our imagination. We do not abhor the reduction of the wood pile because it is useful, but because it is stupid. If the young man were trained to apply mechanics to this and to other operations of the kind, to accomplish them by thought and the skilled use of his hands, instead of by day in and day out drudgery, the life on the farm, and other varieties of the "practical" life would form a field for the application of what has called out his mental powers and interests his mind. All students of our public schools are likely to be more useful and happier for some technical training, and it would be well if our public schools tended this way in the closing years of their course, both for positive training of those who want it and will have no other chance to get it, and also that any natural tendency to mechanics in a youth may have its chance to develop, instead of the literary side of education being pressed at this critical juncture until there is one more young man who finds himself fitted only for the professions. If the mechanical bent makes itself felt, there should be technical schools which will take, for such as feel this bent, the place of the High School or Collegiate Institute. Technical Schools will be of course well equipped government schools, designed to give the students such scientific and mathematical training, such knowledge of mechanical forces and of machinery, such manual dexterity and skill in drawing as the language of the mechanical arts, that they will be fitted to apply themselves as intelligent workmen, in whatever industrial operation they may find employment.

Here will be supplied one part of the necessary equipment for manufacturing our own raw material. Technical education will not alone start factories, but it is a necessary condition of their success and will contribute to their institution. There is much manufacturing to be done before this country can be said to be doing the best it can with its opportunities. But this is also a farming country and agriculture wants a hand. It is by giving such a turn as this to education, that it will get what it wants. Farming is a scientific and mechanical operation. In farming districts the technical part of the public school work may have a special bearing on agriculture, indeed the Education Department of Ontario has already prescribed such work as optional for country districts, and promises to make it compulsory. Here then is briefly described what, to judge from the discussion at the meeting in Toronto, will be the recommendations of the committee appointed on that occasion. It will deal with the education necessary for artizans and working people. Masters of skilled labor, engineers who direct it, will need the higher training which is to be obtained at the School of Practical Science in Toronto, but for the rank and file all that is needed and indeed all that can be accomplished, is the elements.

In thus giving an industrial cast to the education, and therefore to the thought of the country, not however to the entire exclusion of literary culture, we shall be simply falling in with the spirit of our generation. The field of thought in the early days of learning was chiefly philosophical, later it was artistic and literary, in the present century it has been scientific, and we are now reaping the results in an exaltation of the engineer, the man who applies science to industrial and commercial undertakings. He has hold of our imaginations. He is the artist of this age, and the constant theme of Rudyard Kipling, the writer of this generation. Whether Mr. Kipling's writings will live or not is being discussed, but there is no question about their being alive now. The writer who has found poetry in railroading, freight steamers, engineering operations and the like, is the poet of this age. We read with pleasure because the ideas are our own ideas, though we had not realized it before. The approval of our generation is bestowed most readily upon those who subdue the earth to our use, and service in that way is coming to be regarded as the most honourable service.

ILLUSTRATIONS.

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DESIGN FOR AN ANGLICAN CHURCH.—R. M. FRIPP, F.R.I.B.A., ARCHITECT.

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

Abbey Farm, near Yeovil, Somerset, as the name indicates, has not always been a farm house, but like many other similar buildings, fell into disuse as a religious house at the time of the suppression of the monasteries—happier than the fate of many, however, it still exists, or partly so.

Its religious life must have been a short one, for the period of its architecture is late Gothic. The sketches and details of two of its doorways are pleasing specimens.

THE DRIARD HOTEL, VICTORIA, B.C.—JOHN TEAGUE, ARCHITECT.

This building, which is one of the most conspicuous and imposing in Victoria, stands at the corner of View and Broad streets. It is six storeys in height, and has accommodation for upwards of three hundred guests. It was erected from the designs of Mr. John Teague, a local architect, by Messrs. Elford & Smith, contractors, of Victoria, at a cost of about $250,000. A special feature of the building is the plumbing, which is said to have cost about $30,000. From the main entrance on View street, a broad staircase, with rich carvings in dark oak, affords communication with the upper floors. There is also a commodious elevator, with entrance from the main hall, and a winding stairway constructed of open ironwork leading from the dining hall on ground floor to the cupolas at the top of the building. The building contains 225 bedrooms, every alternate room being furnished with bath and lavatory—each bathroom and lavatory having means of ventilation apart from the bedrooms. The woodwork throughout is polished oak and cedar, and the windows are all fitted with plate glass.

BY THE WAY.

THE Ontario Historical Society is raising a fund for the erection of a monument at Niagara, to the memory of Laura Secord, the Canadian heroine, who, after the battle of Stony Creek, escaped from Indian captors and walked twenty miles, ten of which were through the enemy's lines, to warn Lieut. Fitzgibbon of an intended midnight attack by the Americans.

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IN preparation for the international exhibition the Eiffel Tower is being repainted. The time required for giving one coat of paint to the structure is about three months, employing constantly on the work fifty painters. For each coat over fifty tons of paint are used. The second coat will not be laid until the beginning of next year.

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THE commendable proposal has been made that opportunity should be given for the public spirited citizens of Toronto to contribute works of art to the new municipal buildings. Mr. Wm. Davies is the first to take advantage of this opportunity by presenting a fine water color drawing, by Wadham, an ex-President of the Australian Society of Artists. Mr. Alex. Manning, ex-Mayor of the city, who is known to be the possessor of a valuable picture collection, has intimated his intention to become a contributor.

A CORRESPONDENT writes to the Toronto Globe in in criticism of Mr. G. A. Reid's mural paintings in the municipal buildings. He says the pioneer backwoodsman should have been depicted as wearing knee breeches and buckled shoes, which was the style of dress in vogue at the period of the first settlement of this country. The writer points out that the fashion of wearing trousers was not introduced until between 1830 and 1840. In reply to this, another authority states that the style of dress should properly conform to the early history of the city of which the building is the type. The author of the paintings has taken his departure for a season of rest in the Adirondacks, leaving the critics to settle the dispute as best they may.

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A correspondent of the Toronto Globe describes church building methods and architecture in Dawson City, as follows : "Dr. Grant, who is from Toronto, Canada, * * * * turned his attention to building the First Presbyterian Church, and never did I know of any person who could work as hard and so long as that same doctor ; and as there was no night at that season, the sun shining 22 hours, it seemed as though he worked all the time ; sawing logs, packing moss, etc., until the church was finished. It was built wholly of logs, with a thatched roof of the moss which grows everywhere in that country. The interior was of the same logs with the bark peeled off, making it light and airy. It had windows containing glass, which is a great luxury in the far north. The seats were benches, smooth and comfortable. A nice planed floor, a table for the altar and a large stove. It was lighted by coal oil lamps, which were almost impossible to obtain.

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MESSRS. Fraser & Chalmers, of Chicago, who are extensive manufacturers of iron pipe, are credited with saying that "Foreigners have sent many orders here for machinery, steel rails, water pipe, ship plates, pig iron and other things, because they could not get them in Europe. Down in Australia it was proposed to establish some extensive waterworks, which would require 70,000 tons of iron pipe. That is an enormous order. The colonial authorities took it to England, but found they could not get bidders for more than 6,000 tons, and, as a consequence, the remainder of 64,000 tons was bought in this country." The question to which this statement gives rise in my mind is, why did not Canadian manufactories, of which there are several of large capacity, get a chance to tender for the supply of this large quantity of pipe for Australia? Presuming that the British manufacturers know something about our facilities in this line, it would seem to have been their duty to have directed this order to Canada when they found it impossible to fill it themselves.

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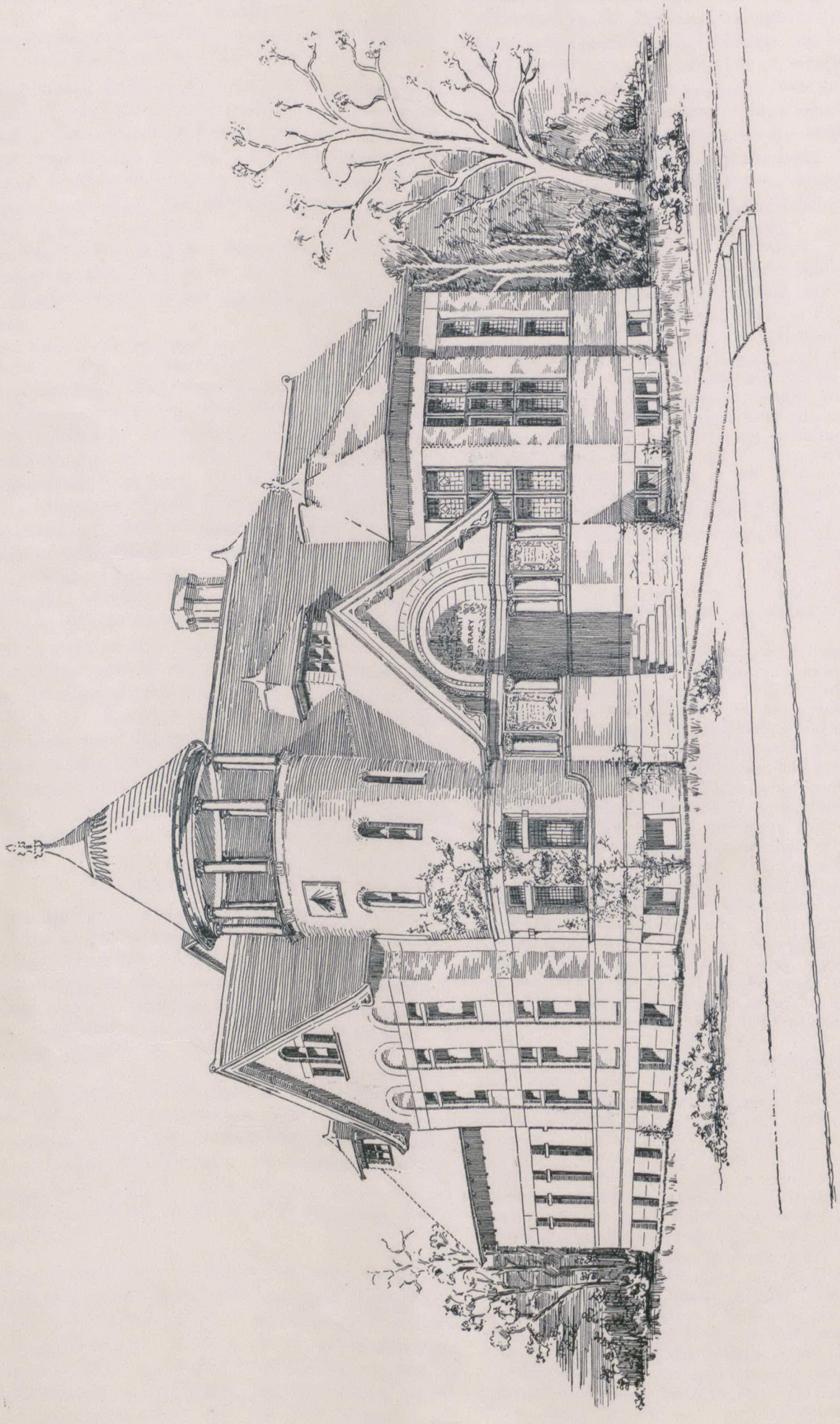
THERE are some interesting peculiarities about the architecture of the island of Manilla, the scene at present of guerilla warfare between the United States troops and the native soldiery. One of the most dsitinctive features of the houses on this island are the windows. The better class of houses have window frames which slide in grooves, so as to be opened or closed as desired, and in these are set the couchas, which soften the bright tropical sun rays. As a further protection against light and heat, blinds are used which run in the grooves with the windows. Oyster shells take the place of window glass. The shell is nearly round, about 4 inches in diameter, compressed, and so thin that it is nearly transparent. In appearance the interior of the shell resembles isinglass, with opalescent tints, the exterior being slightly rough. The animal is so exceedingly flat that when the valves are closed they apparently touch. This is probably the same species of mollusk which is known in China as the Chinese window oyster and which is used for windows, lanterns and similar purposes. These ingenious people also powder the shell, which they use for silver in their water colors



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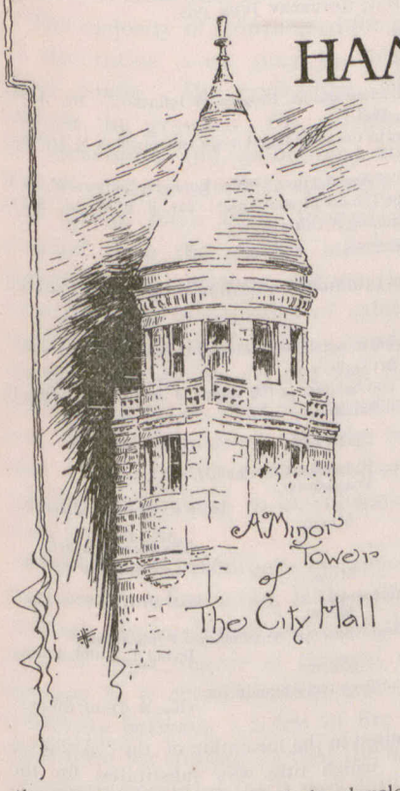


(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

THE article in the last issue of the CANADIAN ARCHITECT AND BUILDER, entitled "The Teaching of Art and Design," containing a resolution adopted by the Executive Committee of the Canadian Manufacturers' Association would certainly have the effect of causing anyone interested in the Schools of Art of the country to open his eyes. We have been accustomed to think that these Schools were properly equipped for the very purposes desired by the manufacturers, the instruction in the principles of design and the development of talent that will lead to a supply of practical designers in every branch of trade that has occasion to employ designers. And yet the resolution tells us "There are no existing schools constructed or equipped to meet the necessities herein alluded to."

In consequence of this sweeping assertion I paid a visit to the School of Art here with the object of finding out for what purpose it existed, if the Manufacturers statement is true, for certainly no school could have a right to its government grant if it were merely a "drawing" school, without any better object than the simplest instruction in drawing, which is what the resolution would make one think is all that these schools can give.

My first impression as a result of this visit, is that the Manufacturers do not know what is going on under their eyes; at any rate they do not know the Hamilton School of Art; of other schools I cannot speak from personal knowledge. But here I find students engaged in the study of design for wall papers, floor-cloth, brass-work, furniture, wood-carving and ornament for all purposes, from the manufacture of iron stoves to delicate stained glasswork. There are classes for modelling in clay, for the study of architecture, classes for sculpture, machinery drawing and all the usual work of the various grades. The text books used are those in use in the Art Schools in England and the Principal of the school, Mr. S. John Ireland, is a man of very many years experience in the art schools in England, a man who for years, ever since he has been in this country, has held the position of examiner for at least two great English Schools, who have thought it to their advantage to send out the students' work to him year after year for examination.

Of course "the proof of the pudding is in the eating," and no matter how highly a teacher may be recommended, if he cannot produce the results required of him in his position, he is no good. We have only to look at the work of the pupils and ascertain the results achieved by them to learn the truth in this particular. Several students of this school have obtained medals in acknowledgement of the excellence of their work. Prizes have been awarded in exhibitions far and wide. To mention one case in particular, a design for wall paper that was sent to the Worlds Fair at Chicago not only obtained a silver medal, but was the means of bringing a student all the way from Chicago to study in Hamilton under Mr. Ireland.

I saw several designs for ornamental brasswork, stained glass, lace, wall paper and carving of a very high degree of excellence, and yet the manufacturers to whom these designs have been submitted, while acknowledging their quality and expressing surprise that such work could be done here, did not care to make any use of them or their authors.

It is self-evident then, that for some reason or other, the manufacturers here consider the school a failure as far as their interests are concerned, and it would certainly be to the interest of the public as well as to them personally that they should speak out and say where the difficulty lies. I have not had the opportunity of hearing from the manufacturers, but I have no doubt many will be ready to take up the subject when it is brought to their notice in the columns of this paper.

Another point in connection with the Art School that has been agitating a good many people here lately, has been the earnest desire of the members of the Y. W. C. A. and Technical Institute to have their Technical Institute amalgamated with the Art School. Mrs. John Hoodless, President of the Y. W. C. A. has been working with strenuous efforts to bring this about. The matter has however been decided against her by the Directors of the Art School on very good practical grounds. The idea is acknowledged as a good one, but the first consideration would be a new building capable of holding both establishments and there are no funds available, nor is there any likelihood that any could be raised. The Art School does not see the advisability of saddling itself with the responsibilities of the Technical Institute, but at the same time the Directors would like to see a Municipal Technical School established.

A meeting of citizens of Hamilton was held recently in the Mayors' office, when it was decided to form the Hamilton Improvement Society based on the lines of the New York City Improvement Society for the beautification of the city. A Committee was appointed to draft a memorandum embodying the scope of the Society.

R. W. GAMBIER-BOUSFIELD.

PERSONAL.

Mr. Harry Edwards, son of Mr. W. A. Edwards, architect, of Hamilton, has recently gone to New York for the purpose of studying architecture.

Messrs Geo. W. Gouinlock and F. S. Baker, two well-known architects of Toronto, have recently formed a partnership, under the title of Gouinlock & Baker, with offices at No. 714 Temple Building.

Mr. J. A. Sheedy, Master of Bridges and Buildings of the Grand Trunk Railway, has resigned and accepted a position in Philadelphia. The members of his staff presented him, as a token of esteem, with a silver tea service.

Mr. William Burke, who was for many years a dealer in builders' supplies on Richmond street West, Toronto, and who represented St. Andrews Ward in the City Council in 1877, died at his residence a few days ago, aged 77 years.

The death is announced at Ottawa of Mr. James Strachan, a well-known contractor of that city. Among the buildings which he erected may be mentioned, the Macleod street Methodist Church and an addition to St. Andrews Church. The late Mr. Strachan was a native of Scotland, and was 73 years of age.

Herbert E. Gates, architect, of 58 Bedford Row, Halifax N. S., was married in England some time ago to Miss Sillery, daughter of the late Staff Captain Sillery, formerly of H. M. Ceylon Regiment, and niece of the late Major General Sillery, commanding the 12th (the Suffolk) Regiment.

Mr. W. J. Holland, architect, died at the General Hospital in Collingwood last month from consumption, at the age of 51 years. The deceased had for some time practised his profession in Collingwood. Prior to taking up his residence in that town, he lived in Barrie and Toronto. Among the prominent buildings which he designed are the Cyclorama Building on Front street, Toronto, and the stores of Messrs T. Long & Bro. Collingwood. He also prepared the first plans for the Market Building in Collingwood.

PUBLICATIONS.

The June number of the Review of Reviews has an illustrated article on summer reading, giving a rapid survey of the important books just issued from the various publishing houses.

Among the papers and brochures at the recent meeting of the Royal Society were three by Mr. Chas. Baillarge, of Quebec, entitled respectively "L'Antiquite de la Terre et de L'Homme," "La Vie—L'Evolution—Le Materialisme," "Le Grec—Le Latin—Leur utilite pour apprecier la signification des mots actuels de la langue, et dans la composition de nouveaux mots motives par les progres des sciences, arts et manufactures. Leur enseignement dans nos colleges." Mr. Baillarge is widely known as a versatile and prolific writer upon scientific subjects.

ARCHITECTURAL CLUBS.

ARCHITECTURAL societies naturally, owing to the different fields of usefulness in which they operate, have divided into two classes—those that look after the professional interests of their members and those whose members look after the interest of architecture as an art. True, some of the former have endeavored to do both, but never to the satisfaction of those who espouse the cause of the latter; in fact, it was this dissatisfaction which led to the establishment of the latter. Now, however, clubs that look after architecture as an art hold an acknowledged position with the loyal support of the clubs that look after the professional interests of their members, and find that their interests in no way conflict, but rather supplement and assist one another.

Architectural clubs that look after the interest of architecture as an art are not so long nor so systematically organized as those that guard the professional interests of their members, and consequently have objects and aims that are not widely understood, while their own work has an educational influence which keeps constantly extending their usefulness. Their object is the promotion of good designing and draughting, with a practical knowledge of the many subjects with which an architect is called upon to deal; to bring together the architect, sculptor, painter and art worker that they may learn of one another, harmonize their points of view, and work together on the opportunities that occur and may be made to occur by being brought under each other's influence. An unexpected, but very far reaching—on might almost say—duty, has devolved upon them, the performing of which is sometimes resented, sometimes looked upon with suspicion and sometimes accepted with thanks, but will no doubt yet be sought when its aim is thoroughly understood and appreciated. This is their influence in municipal affairs where opportunities and money are invariably not only wasted, but used to blemish our cities, of which we are all proud. Why should not schools be structures of good taste and refining influence? Would it not be part of the education? It does not mean more money but more thought of the proper kind; likewise the beautifying of parks, the grouping where possible of public buildings and the decorating of same already built or building. Again, opportunities of beautifying cities are often lost by it being no one's business to advocate them or point them out; this architectural clubs make their's, and watch all opportunities with the object of suggesting and assisting when possible. In a word, to the outside citizen the architectural club is a body whose members are by training and occupation, in a position to speak and be listened to on matters of civic improvements. With these views, and with some, these experiences, more than one hundred members of architectural clubs met in Cleveland, Ohio, on June 2nd and 3rd last, representing thirteen clubs having had one visiting delegate as follows:

Boston Architectural Club.	Irving T. Guild.
Architectural League of New York.	Julius F. Harder.
Society of Beaux-Arts Architects, New York.	John E. Howe.
Pittsburg Architectural Club.	John Comes.
Pittsburg Chapter, A.I.A.	W. J. East.
Detroit Architectural Sketch Club.	J. W. Case.
Chicago Architectural Club.	Joseph C. Llewellyn.
St. Louis Architectural Club.	William B. Ittner.
Cleveland Chapter, A.I.A.	Charles W. Hopkinsen.
Cleveland Architectural Club.	Herbert B. Briggs.
Toronto (Canada) Architectural Club.	J. P. Hynes.
T-Square Club of Philadelphia.	Adin B. Lacey.
Illinois Chapter, A.I.A.	P. B. Wight.

The programme was as follows:

FIRST DAY, FRIDAY JUNE 2ND.

9 A.M.—Registration of delegates, rooms of the Cleveland Architectural Club.

10 A.M—Meeting opened by President of Cleveland Architectural Club, Mr. Albert E. Skeel. Mr. J. C. Llewellyn, President of the Chicago Architectural Club was then elected chairman of convention, and Mr N. Max Dunning, Sec. of Chicago Arch. Club, secretary. The chairman then outlined the object of the convention.

Roll call.

Appointment of press committee.

1. (a) "Club Organization and Management." Adlin S. Lacey, T. Sq. Club.
   (b) Resume of club work. Outline from each delegate giving short history and concise statement of his club's work and organization. (Remarks limited to three minues each)
   Discussion.
2. (a) "The Annual Exhibition." Mr. Henry W. Tomlinson, Ex. Comm. C. A. A.
   Discussion.
   (b) Appointment (on motion) of committee to arrange schedule and circuit for exhibitions for 1900. Also to make arrangements for judges, packing, shipping, etc.
   (c) Appointment of National Exhibition Committee (by nomination) to solicit foreign exhibits.
3. Paper: "Code Governing Competitions." Mr. J. F. Harder, Archt. League, N.Y.
   Discussions.
4. General discussions (and references to committees) of such subjects as may develop at the convention.

8 P.M. — "The Grouping of Public Buildings." Mr. H. K. Bush-Brown, Archt. League, N.Y.

SECOND DAY, SATURDAY JUNE 3RD.

10 A.M.—Meeting called to order.

Roll call.

Reports of committees.

1. (a) "The Architectural Society and its Progressive Influence." Mr. Albert Kelsey, T Sq. Club, Phil.
   (b) Letters from schools as to the educational scope and province of Architectural clubs.
2. "The Modern Phase of Architecture." Mr. Louis H. Sullivan, C. A. A.
3. "The Ope ation of the Illinois License Law" Mr. P. B. Wight, Sec'y. State Board of Examining Architects.
4. Open for general discussions.

The programme of entertainment as outlined by the Cleveland Club was as follows:

Friday afternoon, a Tally Ho ride to points of architectural interest in Cleveland.

Saturday, a visit to the Olney Art Gallery.

Saturday evening, a reception and banquet at the rooms of the Century Club, on the 15th floor of the New England building.

TOASTS.

Herbert B. Briggs, Cleveland, Toastmaster.

Welcome - - - - - Benj. S. Hubbell, Cleveland.

MUSIC.

Response - - - - - - The New President. Albert Kelsey, Philadelphia.

MUSIC.

"What We Gain by Concerted Movement," - Wm. B. Ittner, St. Louis.

MUSIC.

"Reciprocity between Architectural Clubs and Architectural Publications," Irving T. Guild, Boston.

MUSIC.

"The Architectural School from an Architect's Standpoint," Geo. R. Dean, Chicago.

These deliberations resulted in the formation of the "Architectural League of America," which title was substituted for the National Architectural League owing to Toronto being represented at the convention.

The proceedings of the convention will be published, and as it will be interesting reading later, I will not anticipate here. The delegates might be generally described as young men and practicing architects, with a noticeable capacity for hard work, as may be instanced by the committee sitting up till three in the morning and again at work by six in order to report to the convention, which, unfortunately, only sat two days. It was also an evidence of their enthusiasm for their profession, which, like the "one touch of nature which makes the whole world kin," gave the delegates common ground on which to meet, and by the time the first session was over it was hard to realize that few of these men had ever met before. So much at home were they with each other that one felt more as if at a college reunion than at a first convention of an association representing ten cities.

The discussions that occurred during the sessions were interesting and animated, especially when it turned on precedent, which might be described as the debating ground of architecture in America to-day. The earnestness on both sides was evident, but the confidence of being right and the strength of argument seemed ever with the anti-precedents.

The local Entertainment Committee sent each delegate away heavily indebted to them for the place of meeting, the rooms of the Associated Technical Clubs (one of which is the Cleveland Architectural Club), for their tally-ho drive and their banquet, but most of all for their personal attention, the value of which to a stranger in a strange city can only be appreciated by being experienced, and not described.

Returning from the Convention, Mr. Adin B. Lacey, President of the T Square Club of Philadelphia, together with his wife, accompanied Mr. J. P. Hynes, the Toronto delegate to Cleveland, to Toronto for a short visit. On Tuesday the sixth of this month, the Architectural Club entertained Mr. Lacey at a lunch served at Webbs, and the members present were priviliged to hear from the lips of the President an outline of the T Square Club's very interesting history. That this club has won no small fame, is due to the untiring efforts of its officers and members. From small beginnings, working consistently for improvement of the architect as a designer, and for the enlightenment of a public blind to real merit in the architect's work, the T Square Club has become a power for good in the Quaker City.

If that latent enthusiasm for their art, which it is hoped Toronto architects possess, might germinate and find in some sort of organization, existing already, or new opportunity, to do for Toronto a tithe of what the T Square Club has done for Philadelphia, Mr. Lacey's visit will not have been in vain.

J. P. HYNES.

THE CLASSIFICATION OF BUILDING STONE.

The majority of stones used for any form of structural or decorative work may be roughly classified under three heads. The crystalline, siliceous rocks, which include the granites; the calcareous rocks, including all limestones and dolomites; and the plastic rocks, including the sandstones and clay slates. Those of the first group have been formed from molten matter, erupted from the earth's interior or from the metamorphism of siliceous sediments; the origin of the second group is deposits of calcareous mud from the breaking up of shells, corals, and the remains of other marine animals on an old sea bottom; those of the third group result from the breaking up of older rocks, and the accumulation on the bottom of lakes and seas of the resultant sand, clay, or mud, in beds of varying thicknesses, to be subsequently gradually hardened into stone.

The essential difference between a marble and a compact common limestone, is that the first has undergone, through the combined action of the heat and pressure, just the right degree of change, or metamorphism, to develop in it crystallization and color. The essential difference between a brick of fire clay, and a cleavable slate used for roofing, is that the first named still retains its plastic condition as it was laid down in the form of fine silt on a sea bottom, while the slate has, by geological agencies, and by actual movements of the earth's crust, been so squeezed and compressed as to lose all resemblance to its former self, and to become the cleavable article of commerce we now find it.

Since these processes of change are dependent very largely upon the actual movements, warpings and foldings, as may be said, of the earth's crust, and the heat and chemical action which is thereby generated, and since these movements only take place with extreme slowness, whole geologic ages being occupied in their conception and completion, it follows, as a matter of course, that metamorphic rocks, like granites, marbles and slates, are found only among the older rocks, and only in those portions of the country where this crust has been wrapped, compressed, and folded, as in the process of mountain making. In other words these rocks are to be expected in their best development only in places bordering along more or less extensive mountain ranges.

ENGINEERS' CLUB.

During the last three months several meetings of civil engineers, architects and surveyors, resident in the city of Toronto, have been held for the purpose of organizing an engineers' club, on the same basis as similar organizations in Detroit, Cleveland, St. Paul, Denver, Rochester and many other cities in the United States.

The organization has been completed by the election of the following officers for the current year: President, Kivas Tully; vice-president, C. J. Crowley; secretary, Willis Chipman; treasurer, T. B. Speight; directors, C. H. Rust, E. B. Temple and A. L. Hertzberg.

Regular meetings will be held on the first Tuesday in each month except the months of July and August, and the annual meeting on the first Tuesday in February.

All classes of engineers, civil, mechanical, sanitary, electrical hydraulic, mining and military, professors in engineering and architecture, architects and land surveyors are eligible for membership.

The Club starts with but forty members. It is proposed to arrange for a down town club room next year.

It is not the intention to permit the Club to usurp the functions of any of the existing professional or technical societies, the principal object being of a social character.

CORRESPONDENCE.

THE NEW YORK FIREPROOFING SCANDAL.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—I have before me several copies of the New York Tribune, containing a full report of the investigation now taking place before a committee appointed by the State Legislature to inquire into Tammany's transactions with reference to fireproof construction and other matters of civic interest, which apparently lays bare a system of corruption almost beyond conception.

Before the advent of Tammany into power, public tests of different systems of fireproof construction had been made under the direction of Mr. Stevenson Constable—at that time Superintendent of the Department of Buildings, New York—and as the result of those tests Mr. Constable prohibited the use of concrete and metallic systems in the construction of fireproof buildings of the first class in that city. That his reasons for prohibiting such systems were sound, the following report taken from the Engineering Record, Sept. 25th, 1896, No. 359, will show:

"A Roebling concrete arch, which we are justified in presuming represented the standard construction of that company, loaded with 150 lbs. per sq. foot, was subjected to firing for five hours. Upon re-opening the doors before putting water on, it was seen that all the plaster and metal lathing had burned off, except in the extreme corners." Maximum temperature. 2,300 deg.; maximum deflection, 4.485 in.

"Mr. Constable was restrained from further interference"! Why?

Mr. Constable was sustained in his action by the department and an ordinance was passed by which the use of concrete systems was prohibited in buildings of the first class, which were specified to be of fireproof construction.

Whether the superintendent was justified in the stand he took, is a question every unbiassed student can answer for himself.

But with the coming of "Tammany" into power a change took place. Previous ordinances were either abolished or amended, and concrete and metallic lath systems are not only given precedence to porous terra cotta and hard tile constructions, but have been practically granted a monopoly of civic work. Why the change? The evidence of Mr. Himmelwright, of the Roebling Company; Mr. Watson, of the Expanded Metal Company; Mr. Wright of the Columbian Fireproofing Company; Messrs. Tostevin and Hayes and others with similar concrete systems clearly tells us. Mr. Croker jun. received $17,000 in stock, which he says he paid for, and $2,500 per annum from one company to LEARN THE BUSINESS; Mr. McCann, (a nephew of Mr. Croker, sen.,) $5,000 cash and a prospect of $10,000 more for his influence; nor are Con. Daly, Mr. Hinckley and Senator Grady,—ward politicians—forgotten, as it appears each had been seen on the subject.

Will architects endorse Mr. Constable's decision? A great responsibility rests with them, and it is plainly their duty—not only to read, but to analyze every statement placed before them, and to use that only which is good and trustworthy.

Let them study Constable Stevenson's tests; the Denver tests of 1892; the Pittsburg conflagration of 1897—one of the severest tests that modern fireproofing has been subjected to; The Home Life and Postal Telegraph Buildings fire, 1899 (Mr. Burke, architect, of Toronto, in a paper read before the Association of Architects of Ontario, sums up the results of the Pittsburg confiagration as follows: Porous terra cotta, 1st; hard tile, 2nd; concrete, 3rd); the Ottawa Parliament Buildings fire, 1898; the experiments of Professor Dobie, Toronto School of Technology—and Professor Webster, of London, England—on the behaviour of concrete under the action of fire and water, and I am convinced they will use great caution before adopting systems which may, and probably will, lead to disappointment and disaster.

Many patents for concrete systems have been issued in Great Britain since the year 1811, but I have yet to learn that any one of them proved a success; or successfully stood the brunt of a serious conflagration.

I am, yours truly,

N. T. GAGNON.

The Central Ontario School of Art and Industrial Design Toronto, has petitioned the city council, to appoint one of its members a director of the school. At the recent annual meeting the following gentlemen were elected as the officers of the school for the current year: R. Y. Ellis, president; W. A. Langton, vice-president; B. McEvoy, James A. Smith, S. G. Curry, R. McCausland, S. M. Jones, F. S. Challener, directors; Geo. C. Downes, secretary.

THE TEACHING OF ART AND DESIGN.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—The article on the above subject in your May issue calls for some comment. I for one feel delighted that you are able to state "It is gratifying to observe that in Canada this subject is attracting attention," and I fully endorse your opinion "as to the importance of the relation which should subsist between the teaching of art and design and the development of a nation." But surely some of the clauses in the comprehensive resolution adopted by the executive committee of the Canadian Manufacturers' Association on 28th April last must have been adopted either in ignorance or purposely to pervert facts with a view perhaps to induce the government to pay the entire cost of educating apprentices.

The first six paragraphs contain the well worn platitudes of after dinner speakers, only that an important omission occurs, viz., that the tide has turned back on France, which 50 years ago sent designers to England to such an extent that nearly all the chief positions were then filled by Frenchmen, while to-day scores of English (South Kensington system men) are filling positions as designers in France and in their chief industry too, viz., that of silk manufacture.

The report goes on to state, in par. 7, "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."

I must take issue with this report. 1st, there has been a fairly strong effort made by the Ontario government to supply this need, as art schools have been established in Toronto, Hamilton, Ottawa, London, St. Thomas, Kingston and Brockville; but it is the Ontario manufacturers themselves, with but few exceptions, who have done so little to aid these schools financially, or to give employment or encouragement to the students who have been trained in them. Taking Hamilton art school as an example, situated as it is in a manufacturing centre, the government gives a grant of $400 and about $150 more for certificates taken. This is not bad, but when compared to a similarly situated school in England having about 200 students (the number annually enrolled in Hamilton), the English government would grant about as many pounds sterling and pay the expenses also of the Principal while visiting the metropolitan museums and industrial art exhibitions, and sometimes in foreign countries as well. The government there pay also 50 per cent. of the cost of buildings and equipment, the manufacturers subscribing the bulk of the remaining 50 per cent. besides liberal donations towards annual expenses and local prize funds—and no doubt the government here will do the same when the manufacturers take the initiative.

In Hamilton I am sorry to say the names of manufacturers are almost conspicuous by their absence from any list of subscribers. Even when this school was started in 1886 and forty citizens subscribed $50 each, only six manufacturers' names appear, two of whom make soap, and one, factory-made clothing; these have little use for design in their business, leaving only three others who could use designs—but even these three do not employ a designer between them; they get their "patterns" from the States. There is the same lack of support to our annual expense fund, for we get a sum not exceeding $10 from manufacturers, while other citizens subscribe more liberally.

In paragraph 8 of report, it stated: "It requires years to develop acknowledged lines of design in art," etc. True, and if fairly dealt with it will take time to regain confidence. I have heard many sad accounts from other Canadian cities, but must take them as heresay; I do know, however, that out of hundreds of students in this city, scarcely any have been able to earn a livelihood in Canada—in fact they might graciously give their services to Canadian masters—but had to go to the United States to earn an adequate salary. Let me quote a few instances of those who have secured employment here. The manager of a large factory has been antagonistic to this school for ten years because he has to pay $1000 a year to each of two employees, who improved themselves by studying with me, and he has bemoaned that prior to the advent of the art school he got these hands for about half that sum. When asked if he would dismiss them, he replied, "They are good help, and maybe I should have to pay more if I got Englishmen or Americans to do the work they are doing." Another firm employing a man to work a machine, hearing that he was attending classes at the art school gave him at first a little drawing to do, then more and more, and when the man asked for a slight increase in pay he was sharply told "No! we can fill your place many times over in half an hour." He having a family, had to accept the old rate of wages or leave the city to get other work. Another firm on hearing that an apprentice was attending the evening class, brought work from other departments for this apprentice to do, besides his usual work, but not one cent was paid for it, and worse still, for three months in the winter when work was slack this apprentice was paid off and might starve for all the firm cared.

Paragraphs 11 and 12 state: "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." These schools are already in existence. They have been getting some help from the government for many years. We need more, and possibly would get it if the manufacturers seemed disposed to bear their share of the burden. Now sir, let me state, that it is a most difficult thing for a young designer to get a Canadian manufacturer to purchase a design, no matter how good it may be, as the custom has been for years to reproduce only articles designed in other countries—pirating the design—and is it any wonder we hear grumbling on all sides that Canadian made wares do not find foreign purchasers when they have no distinctly Canadian characteristics of either novelty or beauty? Allow me also to draw attention to another reprehensible practice, viz., when a designer offers his designs for sale he is frequently asked to "leave them, as the 'manager,' or 'gentleman,' who attends to this is out at present but the designs will be shown him when he returns; call again, please." This time the designer is informed the firm regrets being unable to purchase the designs at present—they are good practicable, saleable things, and there should be no difficulty in disposing of them; but the firm do not inform him that they have taken either photographs or tracings of them, or even put them in execution with slight modifications during the twenty-four hours of possession, or will do so in a year or so. To check this dishonesty the government should grant greater facilities for copyrighting designs, and then make it as much a penal offence to steal the product of brains as objects of material value.

The resolution leads one to think this committee consider there is not a school or an art master in Canada. I will speak for myself and leave others to do the same for themselves. Without egotism I wish to inform them that there are few English art masters who have had better training in all branches of technical design than myself, having devoted 30 years to this work, studying at South Kensington during seven years of this time, and I have visited France, Belgium, Holland, Switzerland and Germany on various occasions to gain knowledge on this subject. In regard to this school, I must inform them that the premises of the Hamilton art school were specially built and equipped for this work. In it will be found thousands of copies of the best examples of industrial art. The manufacturers may have been influenced by some of their employees who discredited the work which is being done. As an instance, some time ago two of my students sent some designs for sale to a large manufacturing concern. The reply came that the company were surprised that designs as good as those submitted could be made in Canada, but their buyer decided it was still necessary to go to France twice a year for designs. Of course any one could see this man's semi-annual trip would be stopped if Canadian designs were used. I have some of these designs by me, and the letter received in reply, which I will show to the Editor of the CANADIAN ARCHITECT AND BUILDER should my statement be discredited. I will also give him in confidence the names of the firms and employees referred to in this letter. Apologizing for taking so much of your space, I remain sir,

Your obedient servant,

S. JOHN IRELAND,
Principal Hamilton Art School.

LEGAL.

Alexander McFarren, a ratepayer of the city of Toronto, recently brought action against the Public School Board charging them with having violated the plumbing by-law in connection with the sanitary system in use in the Church street school. At the first hearing of the action before Magistrate Kingsford, the case was dismissed. The prosecutors appealed to the County Judge, who gave the following as his decision: "I am of the opinion that any brick pit built within a building without connection with the drains, and used, or intended to be used, as a privy, the construction of which allows the deposit of filth to accumulate and remain in the said pit, and attached even to a ventilating system, which, under conditions likely to arise, creating back draughts, allows the contaminated air or gas to escape therefrom into the building, is prohibited by the by-law. * * * No one is at liberty to construct a privy pit such as is in use in the Church street school." The appeal was, therefore, allowed, and His Honor ordered the defendants to pay $5 and all costs of the action, including the costs of the appeal. The case has now been carried to a higher court.

TRADITION AND MATERIAL IN ARCHITECTURE.*

THAT material is essentially a part of architecture at once marks out that art from others, sculpture in nearest degree resembling it; but painting, music and poetry are almost free of the practical limitations that the use of material implies Architecture is not so ethereal an art as any of these; like these it appeals to the mind of man, but in addition it supplies a bodily want, and this is a dual service attempted by no other. The architect's cognate worker is the clothier whose service to man is the same in kind, differing in degree for use and beauty; architectural style is pretty much fashion writ large.

That mere mass of material should be of account at all in an artistic appreciation of architecture is repugnant to some, still the fact is unquestionable that bulk produces a sense of awe. The Parthenon is now surpassed in size by many a factory, yet even its influence in the expression of majesty was not a little owing to substantial size; in its day it was amongst the biggest of contemporary buildings. True art will recognize this common instinct, and will with least material give the sense of greatest extent. If it be argued that it is not possible to magnify appearances, then, negatively, an artistic aim will be to prevent the belittling that results when features are measured that by association have a certain magnitude attached to them—St. Peter's, for example.

I would direct attention to some of the materials used in building, with the object of showing that, though an essential constituent of architecture, material shares place with another influence, tradition, that is yet more powerful. Mind has influenced matter by a greater degree than some are disposed to admit. If on the one hand we must differentiate architecture from sculpture and painting, by whose canons of criticism it is so often mistakenly judged, on the other hand we must avoid excess in our materialistic belief in the potency of materials recently or yet to be discovered and applied in buildings.

We may well surmise that at the beginning the materials of a country or locality strongly influenced its architecture; but it is not so easy to get direct evidence of the fact, and the day has passed for the calm assumption of certainty as of the methods, not to say motives of the men of old; to gratituously assume, as not so long ago was the custom, that primeval man took Nature in the fields and woods as his tutor in columnar construction, is unwarranted. The resemblance between trunk and column all may see, but not everyone may settle how much is coincidence and how much conscious imitation.

However interesting ethnographically may be the study of man as cave-dweller or erector of tent and hut, for practical purposes we may date the beginning of architecture from when we see evidently that, coincidently with provision for material wants, an elementary desire for beauty has been met in a traditional treatment or style. The earliest of Greek and Indian remains that we have are far removed from the beginning of things architectural, and notwithstanding what evidence may yet come to light, it is hardly probable that we shall ever get much nearer the beginning; but rightly directed research may enable us to predicate with some measure of certainty as to what that beginning was. Though the earliest remains are of stone, they show forms that have such a resemblance to wood construction that from the masonic evidence alone we should be justified in affirming the fact, even without the confirmation of pottery aud painted and carved decoration. I do not suppose there can be any room for doubt that many features in Indian work are clearly limitative or reminiscent of wood construction; the trellis work of stone beams, the corner bracket from columns like a fork of a bough, mortises and tenons, etc. But is it equally clear that the Greek Order is also an immediate survival of previous timber construction? Many are of opinion that it is otherwise—Viollet-le-Duc in his lectures, for example—and maintain the Order to be specifically designed for stone. They bid us note that the Doric abacus is of a size not easy to get in wood; while the derivation of triglyph and mutule from ceiling beam and rafter respectively is negatived by their appearance at the gable ends, where in their alleged prototype they could not have been. Even the shaft, they argue, does not appear to come at first hand from the tree trunk, for the further back we go the stumpier they are and the least like trees; while it is noted that a square prism of stone is most naturally taken from the quarry with its four corners cut off, and these again chamfered give the sixteen-sided column of the earliest Greek type. All this notwithstanding, I thing the Classic order does show a reminiscence of prehistoric wood construction. In the case of the abacus, the timber prototype has entirely been departed from, and it now shows the qualities proper to stone, but in other parts this influence of material on design is absent. Tradition has been more powerful than logical consistency, and wood forms are perpetuated in stone.

It is obvious that big stones are required for lintels; smaller will do for arches. So in Greece the abundance of Pentelic marble has permitted of, if it did not suggest, a trabeated style; but Egypt also employed the lintel, though with the greatest difficulty. She had to hew the hardest of granite and transport it long distances. Why, we wonder, did not the excellent bricks suffice for arches that would have proved hardly less enduring than the granite beam? And in the lintel an arch form has here and there been found, proving, apparently, that a religious sentiment led to the use of the material conceived to be most lasting, while an architectural motive, gratified at the expense of logical treatment, led to the arch form in a lintel. Let three thousand years pass, and in, perhaps, the oldest type of building we have in Scotland—the Round Tower at Brechin, for example—we have large masonry generally, and a large lintel with the arch cut out of it. Opinions may differ as to the origin of the prototype, but there the arch is a notable instance of tradition being more influential than material. Early Romanesque work has generally larger sized masonry than Gothic, yet the same quarries were drawn upon at the different periods, hewing implements and mechanical means of transport all improved, but the later builders' inclination did not go out to Cyclopean work, when it might quite easily have been gratified. Hence, throughout the whole Mediæval period in Britain I question if a stone has been built exceeding a couple of tons in weight. About Oxford I have noticed in places a soft stone in large sizes, but singularly enough the forms cut are plainly those traditionally in vogue when smaller stones were used. Late arch-labels in the

*An abridgement by the author, Mr. Alexander M'Gibbon, of a paper read by him before the Perth Architectural Association, on Friday, November 4, 1898, republished from The Builder.

same way generally keep the traditional section, but are cut out of larger stone than was the earlier practice; they have no joint, that is, at the extrados. We find Gothic at Mont St. Michael, and Classic at Aberdeen, both of granite, but it does not appear that in either case the material had anything to do with the choice of the style.

Wrought-iron in the form of tie-rods influenced the Gothic of Italy. Arches were desired springing from single columns at porches and elsewhere, but the thrust was met not by counteracting flying buttress or inertia of wall, but by tension of metal. This was a novel use of a material till then in construction neglected, but now legitimately, if not quite happily, turned to account, and one might have expected the new mode to have spread and become more general than it did ; but after all it takes its place only as a useful aid alike for arches and roofs. Gothic architecture was not revolutionized ; the old methods have not been displaced ; for one arch to be seen, even to-day, whose thrust is met by tension, a dozen are found sustained by either counter arch or buttress. The eye is apparently better pleased to have it so ; old world practice is in its favour, hence the mode endures.

Cast-iron columns and rolled beams in our own day are developments that have undoubtedly influenced architecture. To believe some, indeed, one would think we are now quite emancipated from all past canons of art ; but we note that, although most happily we have it in our power nowadays to do much that was hitherto impracticable, still, after all, a substantial proportion of the world's work is done in the old way. No disparagement to the new methods ; for architects, whose conservative sympathies incline to stone construction, often best appreciate the existence of metal so used, and it is they, and not engineers, who should give all due regard to the novel material, and who regret to see it masked behind masonry—as, for example, at the Tower Bridge.

Lead is a material that as a covering might have influenced the Gothic roof, and so necessarily the gable—the characteristic Gothic feature, says Ruskin—in a way that it did not. If in Norman times lead was in small plates, in Gothic times, just when roofs were steepest, it was used in strips and rolls. On a pitch of forty-five to sixty degrees slates and tiles hang well, but the "crawl" of lead is excessive ; the material calls for a rake anywhere under thirty degrees ; called, I may say in vain, for over a couple of centuries, until in the Perpendicular period this sensible pitch of roof was given ; in this, as in some other things, the style showing a truthfulness to utilitarian principles and logical construction not met with in the perfected Gothic of France, so unweariedly eulogised for this very quality. Of course, I am not arguing that the pitch of the roof ought to be lowered to suit cast-lead ; architecture overrides such fitness. I only cite as a historical fact that it was not, although the practical logic of the material pointed that way ; traditional motive was superior to the material in influence, and Gothic as gloriously inconsistent as ever Classic was.

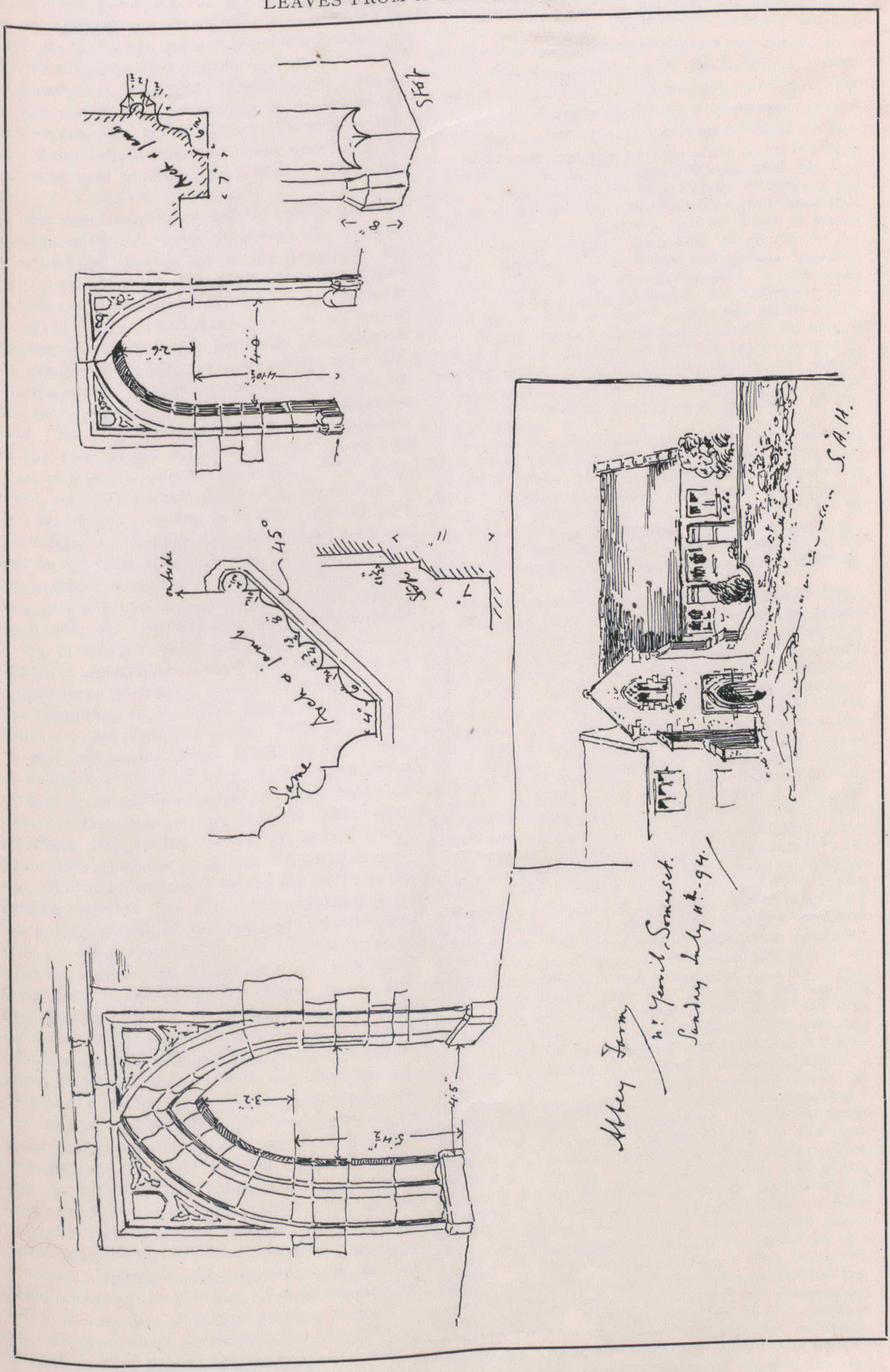
Timber, I think, we might have expected to have influenced our Scottish buildings more than it has. Of suitable woods we have abundance, and the climate is not inimical. Statistics of the comparative rainfall in Lancashire and our west coast prove this ; yet in Lancashire there are noble half-timber manor houses ; with us none at all. Why is it that north of the Tweed we have not a single timber church porch, and a timber spire is rare, though these may have existed? Simply, we must believe, I think, that the timber-work did not appeal to the Scottish taste, though material in abundance was to be had, in spite of what Dr. Johnson was pleased to believe to the contrary. Zinc and sheet-iron have been employed in America for cornices, a a development on European practice (chiefly French) confined hitherto to large and elaborate hip rolls on roofs, mansard especially. This direct imitation of stone features is alarming, but perhaps only at first. A little reflection will reassure us ; it is no new thing in the course of architectural development for an old form to be copied in a new material. We have seen wood copied in stone ; stone imitated in sheet iron is not more strange. As in the former case, it will be an affair of time, if ever, before detail is designed appropriate to the new material ; but even with its nature and capabilities recognized there will remain a reminiscence of that other material from which it was derived. It is in the noting of such like derivations that much of the interest of archæology consists.

Largely because of the use of a metal frame-work in buildings, terra cotta has come into vogue. It is, of course, nothing more than brickwork of a superior kind, which, instead of being moulded into plain solid blocks, takes the form of pottery ; solidity, if required, being given by concrete filled in when building. One obvious possibility about this material is that, coming from a mould, elaborate ornament can be repeated easily and inexpensively. We must, then, in judging it, use another standard than that applicable to carved stone-work. Vermiculation and diaper laboriously cut by the mason often offend by vaunting labour of execution over design ; but as turned out from a mould our criticism must alter, and we may welcome abundance of ornament that need not disturb the contour of features, and may give a texture of surface of almost as much value as colour itself. This, of course, should be our treatment of the material ; but whether it gets it or whether it will be treated just as stone, time alone can show. It has been noted that in the modelling of terra-cotta, as raised ornament is applied by the fingers to a surface rather than left by cutting from it, as with stone, so the treatment should express itself in the case, say, of a panel, by the ornament projecting. This is, perhaps, carrying the principle to an extreme of nicety, for the material being plastic, the modeller can at will dig out or apply ; but I think it very just that in stone cutting this truth in working should be more recognized, for it is always regettable, as misapplied labour, to see small portions of raised work left at the expense of sinking a large surface.

Besides the inherent quality of materials that should condition their employment, there are others imposed by process of manufacture, such as size in bricks, or commercial usage, as the stock sizes of timber and stone, carrying with it variation in prices that cannot be disregarded. These intrinsic conditions may, to a slight extent, modify architecture, though, if motive is assertive enough, these will be overridden ; but I can see no particular merit in disregarding such subordinate influences. In one of Dublin's cathedrals are to be seen, I believe, Purbeck shafts that, just as shipped across channel in stock lengths, are built, with bands at intervals, decided not by an architect's designs, but by quarrymen's practice. It is a trivial matter, but I do not think architecture in the grand sense suffers

THE DRIARD HOTEL, VICTORIA, B.C.
JOHN TEAGUE, ARCHITECT.

LEAVES FROM A SKETCH BOOK.—II.



from it, and to those who know there is an added piquancy. We know that in our ordinary practice stones are delivered at a job of approximate fitness in size for the particular parts they are intended for, so there is considerable affectation in the studied excess of irregularity in door and window quoins sometimes seen; weak in construction, it disregards the workman's practice. It will give a craftsman's interest without the architect's influence in any way being impaired, to let local practice assert itself in things immaterial.

Let this, then, suffice to answer the query. Has the architecture of the past been influenced most by material or tradition—the motive of the designer? Assuredly by the latter. And that said, are we prepared to go further and forecast in the future, say, which of these will be the potential influence in days to come? A question not strictly within the limits of a practical paper, yet not wholly idle; for as we realize the greatness of the future so shall we be inclined to see the dignity of the present, out of which that future must proceed. To me it seems that only in the experience of the past have we any assurance for the future, and if we are inclined to think of the maxim, "The thing that hath been is that which shall be," as derogatory to present day life and progress, let us reflect that the part of architecture is something very noble, of an antiquity greater far than that of music and painting, the popular arts of to-day. Hence our data, gathered from a wide source, permit of an augury that one might not attempt in these arts. "Forty centuries look down on us from the Pyramids," while music, which in much is analogous to architecture, and has been delighted in by man since its creation as an art with formulated canon, is of comparatively recent date. Seven centuries ago harmony as now understood was not, while the best of the musical instruments are the inventions of the last two. Landscape painting, with its developments of perspective aerial and linear, of recent date. Sculpture resembles architecture, not only in mass, but in age; its principles and practice are as old as civilization. The same may be said of poetry; so it is not to be wondered at that these, with architecture, fail to show the modern development that music and painting exhibit.

This antiquity, then, of architectural practice gives data for a forecast of its future. Of course, architecture has not been a thing of evolution and broadening precedent only. An intelligent review shows that besides logical advance, with increasing utilitarian needs and variety of materials there has never ceased to exist a sentimental influence, impalpable but potential, viz., traditional motive—which very often has expressed itself in tenacious retention of old forms for the sake of associations connected with them, material or religious. And hence have arisen all these delightful inconsistencies in the use of materials that we have discussed; the prejudices that influence a national choice of lintel or arch style, Classic or Gothic, that no one can suppose ever came out because of the architect class decreeing the superior merit of one or the other, even had the architects themselves been quite beyond the influence of the current taste. And so architecture is seen to be a history of human progress written in stone. Surely national peculiarities are worth preserving, even provincialism in due measure; it is a spurious altruism that would replace these by a lifeless cosmopolitanism. Timber, as we have seen, is quite available in Scotland, but just because of the historical fact that heretofore it has not obtained favor, perhaps we do well to preserve the character of our architecture as we find it. We do not condemn half timber work if we elect to use stone, for there is a difference between our retention of old forms and that of former times; this, namely, that our conservatism is self-conscious. Then it was that, knowing no other way and convinced that their father's methods were best, a traditional method was followed; while we, not even by implication, affirm that other forms are less worthy, where we retain those indigenous to our land, or specially associated with our race. Vandalism was the characteristic evidence of life in all previous periods; nowadays we rightly taboo that spirit, for we can exercise the right of liberty in choice of our models without destroying those we do not follow. Employing past forms and archaic materials does not imply that we are wilfully blind to the excellence of modern; it but indicates the cultivation of a sentiment that adds poetry to our too matter-of-fact day. Modern needs, comforts and conveniences may be depended on to demand and get full attention, but a fostering care is required for the beauty that should accompany these, and this will often take the form of ingeniously preserving the historical continuity of traditional forms.

The phonetic power of architecture is very limited; beyond the expression of majesty, richness and beauty, I know of none a building is capable of. The first is effected by actual bulk, the second by repetition of parts, the third by refinement of form. Beyond these it is by association of ideas merely that certain styles are popularly apportioned to certain types of building, to the church, the theatre, the town hall, the family dwelling, &c.

Now, these three emotions are excited independently of particular materials. Thus, much of the Italian Renaissance is of brick covered with stucco, simulating stone construction; and, regret as we may the unsubstantiality of the meaner materials, the architectural form is there and gives us pleasure; that pleasure would, of course, be heightened by the presence of the real rather than the make-believe. Still, intellectually, it is better to have, say, Palladio in stucco than not at all. Whether granite or stucco, in mass there is produced an emotion of awe. Repetition of parts expresses richness; its equivalent in poetry is rhyme. That may be allied with doggerel, but is none the less a component part of noblest verse. So in a structure the repeated feature may be poor, though not necessarily, but simply because with its repetition a sense of richness results. This principle is best exemplified in Indian work, but a colonnade or arcade are cases in point; and to come to details, note the dentil course in a cornice or a balustrade. Of the Greek triglyph, you remember Ruskin has asked if any one ever found pleasure in it; but even if unlovely in itself, repeated, it fulfils a purpose. Repetition of parts and symmetry are methods by which an architectural effect is produced, and that quite irrespective of materials. And clearly, abstract beauty of form is in no degree dependent on material.

So we may confidently predict of all coming architecture that whatever be the material employed, not merely the principles of the past, but as these were practised—the actual form—will be retained. Novel materials may emerge, but in the main the old will be preferred. There will be cycles of fashion in revivals of past styles, but withal there will result an accretion of real worth, so that it will not be possible for future cognoscenti to be misled in distinguishing the chronology of these successive revivals, for each will have acquired insensibly a character peculiarly its own. Color indeed may perhaps be more considered than it has been, for chemistry or commerce may bring to us colored material hitherto denied us; but this will never revolutionize architecture. The best correction of the mistaken notion that the coming years will see new materials, and hence a new architecture, is a reference to history; can any one conceive of greater social changes than the past has shown, or wider variety in material than timber, stone metal and slate?

STUDENTS' DEPARTMENT.

STUDENTS' AND DRAUGHTSMEN'S COMPETITION.

We regret to announce that only one photograph was submitted in the Students' and Draughtsmen's Competition for photographs of residences, announced in this column recently. Under these circumstances we feel justified in not awarding the prizes.

The students and draughtsmen of to-day appear to lack the enthusiasm which characterized the young men of the profession in Canada five or six years ago. We would be gratified if some of them would tell us the reason for this seeming lack of interest in matters which might be expected to arouse the attention of ambitious students.

If the terms of our recent competitions have in any way been unsatisfactory, we shall be pleased to be informed in what respect they failed to meet the requirements. We, in common with many of the leading architects, are at a loss to account for the apparent apathy of Canadian architectural students with regard to matters in which students of other countries evince the most active interest. Will some spokesman arise from the ranks of the students and draughtsmen and tell us what is the matter?

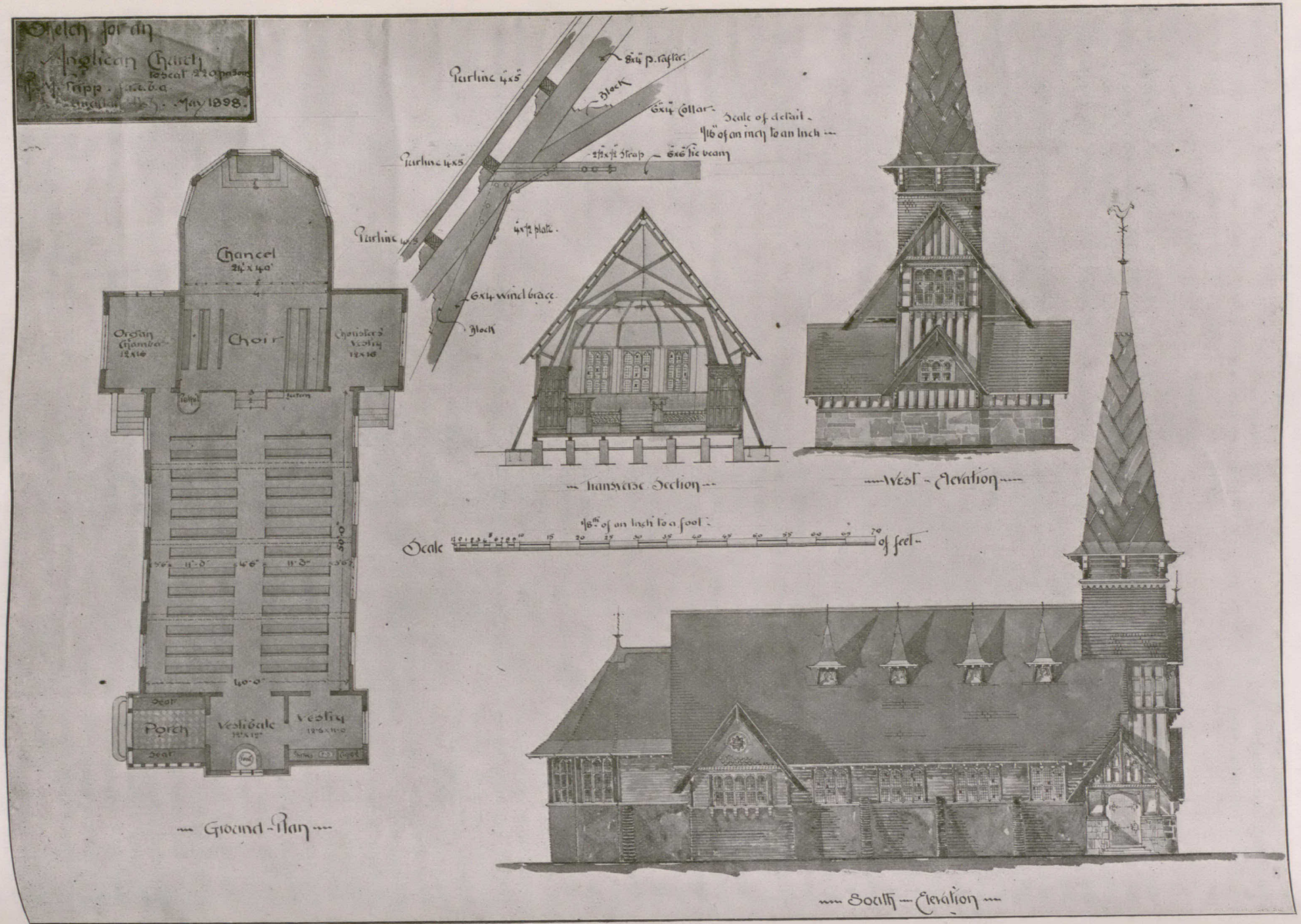
THE PARTHENON.

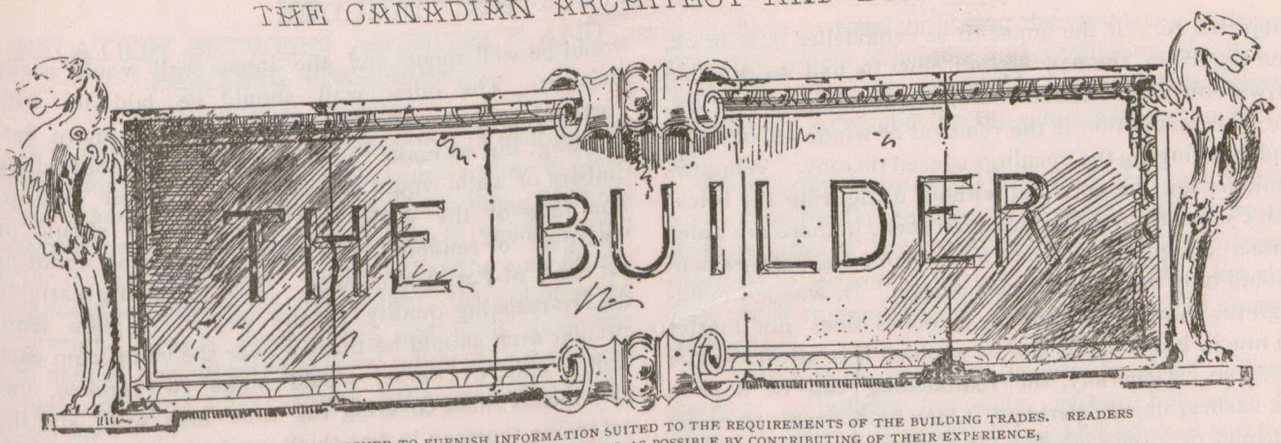
The Parthenon has gathered unto itself all the best points of Greek architecture; it has studied harmony of proportions, delicacy of feeling in optical corrections, exquisite taste in selection of mouldings, colored ornaments and unrivalled sculpture. Take away the sculpture and some accidental grace was gone; but the building in all its transcendent beauty would remain as single and specious as a statue. Take away the sculpture and its air of sublimity would remain in the sheer weight and vigor of its masses and in the colossal scale of its architectural forms; its air of grace would remain in the modulated harmony and exquisite perfectness of its related parts; its air of intellectuality would remain in the austere majesty of its conception; its air of religious awe would remain in the mystery and poetry that its author communicated to his work by means that he knew so well how to wield. Think of the expressiveness of the structure as the broad rays of rising or setting sun beat aslant the clerestory in the roof upon massive columns or undivided weight of solid wall, and threw the unlit parts into gloomy shade. Think of the small scale of the sculptures—the noble frieze, for instance, is but 3 feet 4 inches deep—and compare this with the impressiveness of mighty mouldings whose abacus is 6 feet 5 inches square and diameter 5 feet at the top. It is the glory of a great building that it is one grand indivisible whole; take away the sculpture and some accidental grace is gone, some emphasis of parts is lost; but the primary quality, the central sweetness of the thing, remains. On the other hand, if a structure retains its expression, even though you remove its accessory of figure sculpture, it is different with the sculpture that is removed. The figures formed part of the very masonry of the structure. They emphasized its parts. The glory that they had was a communicated glory. The music that they made was only a part of a grand chorus, a share in the pervading harmony of the fabric that the master musician had blended with the melody and rhythm of the rest of the related parts. The music was not theirs, for it would go on still in the fabric, and with little perceptible difference, when the figures were gone. But removal makes all the difference to the figures; their inherent loveliness remains, but they become in a manner dumb, and remove them from the pediment or pedestal or niche to which they are allied and they wear an orphaned appearance like poor casuals without a home.

AUGUSTUS PUGIN THE ELDER.

Augustus Pugin was an emigre—one of those virtuous, blameless, painstaking Frenchmen whom the revolution drove into England, and who, taking kindly to the sober land of his adoption, like so many of his countrymen, pursued thereafter a life of diligent and worthy industry, in utter contrast to the hideous tumult which had cast him forth. It would be an interesting inquiry to discover how many such, so utterly unpolitical that the fact of their having been driven to these shores by such a whirlwind of social agitation is almost unbelievable, have stimulated and afforded new developments to English industry and laboriousness. Pugin, by dint of a faculty of drawing not much cultivated or remarkable, fell in his penniless and friendless estate into the employment of Nash, the architect, and by degrees became himself a theoretical architect of much eminence and influence, laying the foundation in his careful practical works and in the thorough training of his pupils for all that has been since accomplished in Gothic architecture. It was the age of the Brighton Pavilion and other such monstrous follies in which with souvenirs of Normandy in his heart the quick-eyed Frenchman, with his lively pencil and perception of awakening public interest, took up the vanguard in the new movement. He made the noble remains of former ages familiar to the eye and clear to the mind of the nation, which stirred by many influences, and in the flush of a new outbust of national genius and splendor, began to be doubtful of its own tame mediocrity in point of art. When public taste has come to the length of bursting out into insane bulbs and pinnacles by way of relief from the dead flat of former dulness, such an oracle close at hand is invaluable. The French draughtsman who loved his work, and had no other object in life than its accomplishment, filled his office with pupils to whom he opened a new and fascinating world. Cathedrals and castles, not of stucco, all noble, real, solemn, rose out of the darkness around the fortunate lads who were to reproduce and emulate what they saw. Their master himself reproduced only upon paper, in books that stimulated the general curiosity and helped to mend the vitiated taste which had exhausted itself upon pediments and cornices. They went into France and over England, sketching everywhere, making "examples" of the half-mouldering fragments which otherwise would have been lost to the world, and learning by what simple, splendid constructive art edifices which look like creations grew into being. Within the household where the Frenchman trained his pupils into all the individualities of Christian architecture a kind of Protestant conventual rule existed under his strong-minded English wife.

Not infrequently the final cleaning up of painting involves the scrubbing of bare woodwork. In such a case use borax freely, adding it to clean water. In acts as a disinfectant, assists the actual cleaning operations, and prevents the breeding of insects.


Design for an
Anglican Church
Tripp, R.C.A.
May 1898.
Purline 4x5
8x4 P. rafter
Block
6x4 Collar
Scale of detail
1/16 of an inch to an inch
2½x½ Strap
6x6 tie beam
4x½ plate
6x4 wind brace
Chancel
24'x40'
Choir
Organ Chamber
Chorister's Vestry
Porch
Vestibule
Vestry
40-0"
Ground-Plan
Transverse Section
West - Elevation
1/16th of an inch to a foot
Scale
of feet
South - Elevation



[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.]

On Slate Roofs.

If slates are laid on a boarded roof the boards should be covered with a waterproof bitumenized felting, overlapping on the incline of the roof. If when slats or battens, a sheet wire netting might be stretched from slat to slat in order to keep the felt from sagging, and the slates laid with the proper tilt to make the tails lie close. To keep out draughts, as well as a special precaution against leakage occurring on exposed sites from driving rain or melting snow, the slates are often pointed with hair mortar on the inside, or "torched" as it is termed, or they may be shouldered or bedded for about two inches at their heads in hair mortar, generally mixed with coal ashes, which have been sifted and washed, to give a good slate color, and this method is more effectual than mere pointing, as it does not get loose nor drop out, while it tends to keep the tails or feet of the slates down tight. Sometimes the slates are rendered on the undersides with good hair mortar, both to keep out the weather and maintain a more equable temperature within. If the slates are already laid and the roof leaks, pointing must be resorted to as suggested, but there is a cement for pointing which has been in successful operation in this country and England for a long time, and it is superior to hair mortar. It is made as follows: Take equal parts of whiting and dry sand, add 25 per cent. of litharge, make into the consistency of putty with linseed oil. Use just enough sifted and washed coal ashes, in addition, to give the mixture a good slate color. Apply where required while soft. It will not crack when cold, nor melt like coal tar and asphalt with the heat of the sun. Slate makes a superior roof, but is heavy and costly, and requires great care in laying on the roof, but when once done, it is good for several generations.

Builders' Exchanges.

Workmen by their united action, often accomplish many things favorable to themselves, that never could have been done without organization. The occasional misuse of the power attained by organization does not alter the fact that through unity of purpose the greatest good for the greatest number can often be accomplished, and in this sense, when employers of skilful and other labor in the building trades are associated together they can do much, by combined effort on reasonable lines, towards warding off the labor disturbances that seem particularly to afflict the building trades. Under existing circumstances, labor organizations have no headquarters to which to submit their grievances, and the individual contractor does not, as a rule, feel justified in conceding to his dissatisfied workman, something he imagines would be unjust to himself and fellow contractors. If there was a recognized authority—a Builder's Exchange—in any city or town where dissatisfaction existed between the employers and employed the two parties could easily be brought together, and by talking their differences over and "reasoning together," a rupture might be avoided "and peace with honor" secured by both parties. The peculiar condition of the building trades from a business point of view is that nearly all contracts are secured by competition, and this makes united action on the part of employers difficult to obtain, for the reason that there are always certain builders who will not identify themselves with any movement they may fancy will place their business in temporary jeopardy. As a rule, however, the majority of contractors associate themselves with an Exchange when once it is established, knowing that to become members benefits of many kinds are sure to result, but they do not care to take an active part in its establishment, partly from modesty and partly because they imagine it will make serious inroads on their time—and their purses. As a matter of fact, it need take but little of either if proper methods are employed.

Remodelling Old Buildings.

It is quite a difficult undertaking to re-model and modernize an old building, particularly if it is expected that much of the old building is to be left untouched. Heroic measures are generally the best to adopt in work of this kind, and designing the new building to a large extent regardless of the old one, keeping just a few things in view only. If the old building is large enough on the plan to cover the requirements, the task is generally more difficult, as additions can always be rendered so that defects in old structure may nearly always be hidden, and windows and doors and gables may be so distributed in the new part as to subordinate a great portion of the old work to it. If the floors and floor timbers are sound, and the building is not to be raised on its foundations, the task will be made much easier than if new floors were required, or if the building had to be raised. If a new lay-out of rooms is necessary, this will be governed largely by the position of the stairways and well-holes, and by the position of the partition or partitions that support the inner ends of the floor joists. Moving or disturbing the partitions that carry one end of the joists should be avoided if possible, and the new lay-out should be so designed that the old well-hole remains undisturbed. Where this latter cannot be avoided, there should be new joists inserted, and the short joists and trimmers forming the well should be taken out. This is important, as carrying short joists from trimmer to wall is inadmissable, as it would leave the floor too weak to resist every strain it might be

subjected to. If the house to be remodelled is of brick, due regard in the new lay-out must be had to position of windows and outside doors, as one of the worst features of renovation is the removal of windows or doors and bricking-up the openings caused thereby. Windows or doors may be enlarged without disfiguring the brickwork if done carefully, but even then, if there are stone lintels or gauged niches over them, the enlargement should only be made in their length. In wooden buildings the moving of windows or doors does not matter so much, but when it can be avoided it is always better to do so. Generally, the remodelling can be done in the sashes, unless, perhaps, it may be desirable to insert a triplet or a twin window where only a single window was before. In a frame building this will be easy enough, but in a brick building it will be necessary to take into consideration the effect the change will have on the wall above. Perhaps the most troublesome part of the whole work will be in dealing with the roof. If the whole is to be new there will not be much trouble, put if additions are to be put to it, or dormers or skylights put in it to light up the attic, the practical builder may find some difficulty in arranging them so as to accomplish the practical purpose and at the same time add to the appearance of the building. When a building is to be remodelled, no work should be commenced until everything has been considered and the scheme for the renovation has been completed in every particular. Of course, no hard and fast rules for this kind of work can be formulated, as each particular building to be remodelled will require a treatment peculiar to itself Architects generally agree that it taxes their skill and ingenuity much more to remodel a house and give satisfaction than it does to design and build a new house out of whole cloth, so to speak.

Safety Vaults.

A WELL-BUILT vault with a good safe of modern make may be considered fairly safe so far as ordinary fires are concerned. Late occurrences go to show that the best constructed safes and vaults afford but little protection against the raids of scientific burglars. However, as a place to deposit valuables and to reasonably protect them against the ravages of fire, the modern vault with its usual accessories seems to be the best device yet invented. The construction of a thorough fireproof vault entails a considerable amount of care and expense, and experience has proven that the only material that can be relied on to resist the heat of a burning building is well burned brick laid on a solid foundation of honest concrete and stone, the latter to be below the ground line. All vault walls should be double, with an air space of from three to six inches between the walls, and the two walls should be bonded or tied together at close intervals with fire-clay, brick tiles or with copper strips one-fourth of an inch thick and from one to one and one-half inches wide. If neither of these can be obtained, iron strips may be substituted for binders, though iron is not the best material to use in a vault. The walls should not be less than nine inches thick, but it is much better to have the inner wall nine inches and the outer wall fourteen inches thick. The object of having the outer wall the thickest is because in case of fire, the thicker wall would resist the longest, and its greater strength would prevent its being broken through by falling debris, and before a fire could make its way through fourteen inches of solid brick, its force would be well spent and the inner wall would easily resist it. The outer wall should be laid up with Portland cement mortar—not to make it more fire-resisting, but to make the wall stronger so that falling timbers or walls would not destroy it in their descent. The face of the walls in the air spaces should be "parged" or rendered with mortar containing about 25 per cent. of Portland cement. This will add greatly to the fire-resisting quality of the walls. A plain semi-circular arch should be thrown over the vault from each wall. This, of course, would make two arches, one nine inches thick covering the nine inch wall, and the outer one fourteen inches thick, springing from the face of the outside wall. These arches should be carefully constructed and laid up with cement mortar, and all the joints well filled in. The inside arch should be turned over a centre, and when completed the outer or top arch may be turned over a sand bed laid on the lower arch to the thickness of the air space. When the arch is completed, the sand may be removed, though this may not be essential. The tympanum, or end of the arches, may be built up after the arches are turned, but they should not be connected with the arches in such a manner as to preclude any shrinkage of the arches, as that would cause some displacement that might prove dangerous. The whole of the brickwork in the vault should be left exposed for at least thirty days, and then a careful "pointing" process should be gone over, stopping up every joint or crack. The inside of the vault—and the outside too, for that matter—should be rendered on the brick walls, and the mortar used for the first coat should contain a fair proportion of Portland cement. A well built vault with semicircular arches should require no binding rods to support it, as it will be able to stand, without damage, any ordinary stress that it may be subjected to. However, as a matter of precaution, it may be as well to tie the walls together by iron rods, just below the spring of the arches. These rods may be from one to one and one-half inches in diameter, but in no case should they go through the outer walls. Four rods are usually sufficient for ordinary-sized vaults, two on each side, crossing at right angles to each other. They should be laid in the wall as the work progresses and should have large flat washers on their ends to hug the outside face of the wall. After the brickwork is up to the spring of the arch, the rods may be tightened up so that the washers hug the wall tight. Provision must be made for ventilating the vault, and this should be so devised that neither the inlet or outlet should be so exposed that fire could creep in if the building was in flames. When it can be done, the cold air should be drawn from the outside and from a point some distance from the vault. This could be managed by the use of metal pipes or drain tile, so laid as to carry the air from the outside of the building to the vault, where it might be admitted on a line with the lower courses of the brickwork, or through the concrete or other floor. The outlet should be well up in the vault, and if possible should lead to flue in one of the chimneys. If there is no chimney near at hand, and the building is in course of construction, a flue might be built in the wall purposely for the outlet. If this cannot be done, a system of piping, either through the floors or exposed, should be devised leading to the outside, so that a clear current of air may circulate in the vault at all times. It is not wise to have the inlet or the outlet for air inside the building in which the vault is situated.

RELATION BETWEEN ARCHITECT AND HEATING ENGINEER.*

By T. N. Thomson.

It is unfortunate for the advancement of heating and ventilating interests that so little consideration is given to the scheme of installation while the building is in the embryonic condition. There is so much "hurly-burly" in the current methods of business that the bulk of our wisdom is included in the "backsight" instead of in the "foresight" lens of discernment, and until clear and well defined lines of procedure are adopted in the offices of both architects and engineers, little progress can be hoped for.

Example.—Broker Martineau calls on architect "Sector" with the information that he has purchased a lot and wants him to get out the drawings for a four-storey residence right away; in fact, a friend of his is ready to start excavating as soon as the cellar plan is out, which must be within ten days.

The architect naturally maintains that it is poor policy to talk of building cellar walls before he has thoroughly studied the requirements of the building and had sufficient time to complete the structural plans in detail, but his client feels that immediate progress must be made, and will listen to no explanations. As a persuader, he hints that architect Todhunter is very anxious to do the work, and unless Mr. Sector can see his way to go right ahead he will have to see the other fellow. The client's patronage is valuable, and he must be humored, so the result is that Mr. Sector immediately commences preliminary studies and submits them to his chief draughtsman with instructions to push them along, as Mr. Martineau will call in three days to examine them. Before the broker and his wife, however, have made up their minds as to the many details of arrangement which they wish incorporated in their residence, it is found that thirty days have elapsed and the architect is still goaded by his impatient client to make a start. The office force is set to work preparing the working drawings, and the chief draughtsman, having decided on the structural requirements of the design, now turns his attention to the location and size of the smoke and heating flues, etc., provision for which must be made in the walls. He therefore consults with his superior on the proposed system of heating, but finds that the owner has not yet decided upon a system. The work must be pushed, however, and the very important matters of heating and ventilation are entirely neglected until the building is under cover. Up to this time the only provision that has been made for the heating system is a chimney flue located somewhere—generally anywhere—and it will be a miracle if this flue is not too small.

The reason why this state of affairs exists, possibly, is that the owner does not know what kind of a heating system he wants, and consequently, his architect has been working in the dark; it is more probable, however, that the energies of the architectural force have been concentrated on the construction of the building, and the heating system has, therefore, been overlooked. The owner is now notified by the architect that a decision must be made on the system of heating and the contract must be let and the work started immediately, otherwise the plastering will be delayed. After many consultations between architect and owner, the latter decides that, as the design of his residence has attracted so much attention and has been so favorably commented upon, he is justified in having the very latest and most approved system of heating and ventilation installed in the building, and Mr. Sector is instructed to submit schemes for accomplishing the same, with estimates of cost.

The architect immediately calls in a few expert heating and ventilating engineers and explains to them the characteristies of the structure and certain conditions which he is desirous of having complied with. He also gives each engineer a set of blue prints and general instructions.

Of course each engineer decides upon an indirect steam or an indirect hot water system, but when he takes a general survey of the now half-finished building the difficulties to be surmounted are so pronounced, and the expense of such an installation is so great, that he reluctantly feels like recommending the old direct-radiation method all over. It is just the old story—no provision made for anything but the chimney.

After an enormous amount of worry and scheming each engineer submits two sets of plans and specifications—one set is for direct radiation and the other for indirect radiation with the necessary outlet or vent flues and probably an aspirating stack.

The indirect plans are submitted first, and the architect is simply stunned. His practiced eye sees at a glance that this vent stack and that flue boxing, along with many other projecting monstrosities, will ruin the internal effect of the structure. The basement will be like a factory, and, in fact, the entire building will become a "hotch-potch" of pipes, flues and boxings. Something must be done so that a reasonable degree of character and style will remain in the internal treatment. Engineer and architect now consult and decide upon a "give-and-take" plan. The architect is willing to cut out here and build up a little there in order to conceal certain flues. He changes the plans somewhat to get in a central vent stack, and puts in a few more open fireplaces for the sake of ventilation. He also agrees to build an underground duct, and brick in the indirects, etc., all for appearance and general utility's sake. The engineer, on the other hand, cuts out some indirects and replaces them with direct radiation, because it would weaken walls or beams too much if the proposed flues were all run through, and so the thing goes until a fairly good arrangement is mapped out on the "trestle board." But see what it will cost to make the changes in the building; compare it with the very simple, economical and unobtrusive system that could have been devised if architect and engineer had but worked together on the first lay-out of the plans, before the construction was commenced.

This is no fable—it is an every-day occurrence, and almost every engineer can testify to it. Why is it that some of the very finest and most costly buildings in the country to-day are defaced internally by steam pipes running here, there and everywhere? it is simply because no provision was made for a better arrangement in the working drawings, and before the building was commenced.

Why is it that the basements of most large buildings look like factories? Just because the engineer came on the scene too late to have it otherwise.

Why is it that the basement of a building is not usually finished in a half-decent manner? Just because there is a general impression among architects and owners that this part of the building, at least, must be sacrificed to the several engineering contrivances now in use in all modern buildings.

Architects are not blind to this fact, and nobody knows that better than we do; they all prefer consultation with the engineers before the working drawings are made, because they know how much can be saved and how superior the results will be when all installations are carefully considered in detail and accurately mapped out before the cellar walls are built. But this treatment of a building is seldom resorted to except by a few of the leading architects.

* Abstract of paper read before the Society of Heating and Ventilating Engineers, New York.

FACE-BONDING.

Clarence A. Martin, in the American Architect, gives some highly valuable pointers to masons and builders on the face-bonding of broken ashlar work. He says :

If one may judge anything from architects' drawings and from illustrations published in some of our best text-books on the subject of masonry construction, there is much need for observation on the part of those called upon to make or accept such drawings. The word " observation " is used advisedly, for certainly few architects would ever allow face-walls to be bonded as many allow them to be shown on drawings ; and it would be an ignorant inspector indeed who would pass such work as is used to illustrate the bonding of broken or random ashlar in many of our best works on masonry construction. That we have so much really good rubble and ashlar work in this country is more to the credit of the workmen and the superintendents than to that of the men that make the drawing. However, the purpose of this article is not so much to find fault as to offer a few suggestions that may be of use in drawing, building and inspecting certain kinds of stone walls.

In speaking of bonding here, reference is made only to the bonding of the face-stones with one another and not to the bond in the thickness of the wall, though the latter, of course, is not to be neglected a sa measure of good construction. The bonding of a rubble wall offers few difficulties ordinarily, the principal requirements being to keep beds as nearly horizontal as possible and to see that vertical joints are well broken and not too long. In coursed work the bonding is so simple as practically to care for itself ; but it is with broken or random ashlar that the difficulty occurs, and the following suggestions, which have been gradually formulated from a considerable experience as a superintendent, from hints dropped by workmen, and from careful observation of executed work, both good and bad, are offered as a guide for the proper face-bonding of this kind of masonry.

First.—All stones should be perfectly rectangular, no re-entrant angles being allowed, as such re-entrant angles are never cut except to save a stone that has been damaged by having a corner knocked off and are, therefore, prima facie evidence of patchwork.

Second.—The horizontal dimension of a stone should always be greater than the vertical dimension, except in the case of quoins, where it is sometimes, though not always, permissible to make the short end less than the vertical height.

Third.—No stone should be superimposed directly upon another stone of exactly the same length, thus bringing the end joints of both in the same vertical lines, except in the case of comparatively narrow piers, where this may be necessary to avoid the appearance of coursed work.

Fourth.—Stones should not be so laid that four corners come together at a single point.

Fifth.—The number of stones abutting upon a single vertical joint (counting stones on both sides of the joint) should usually be three or four and should never exceed five ; and the number of stones abutting upon a single horizontal joint should never exceed seven.

Broken range ashlar is exactly the same as broken (or random) ashlar, except that it is laid with numerous long horizontal joints. Aside from this it should be governed by the same rules that govern the laying of broken ashlar.

MORTAR IN MASONRY.

Mortar plays a very important part in all except dry masonry and especially in concrete and the inferior forms of stonework, says Mr. Geo. S. Morrison in a paper on this subject. The simplest form of mortar is a well worked clay, such as adobes are laid up in, and with which the brick chimneys of many of the older farm-houses in our country were formerly built ; but the use of clay has practically gone by except in furnaces and ovens where the heat-resisting capacity of fire clay is more important than the superior strength of a good mortar.

Mortars are generally formed of lime or cement and sand. A lime mortar does not set but hardens slowly. A cement mortar sets quickly and then continues to harden. The hardening of the lime mortar is a slow chemical action between the lime and other elements ; the best results are obtained by mixing the mortar some weeks before it is used and not subjecting it to any great strain till a considerable time after it is laid. The action of cement is different ; the cement itself contains all the elements necessary to the setting and hardening ; a briquette of pure cement will set harder and be stronger than a briquette containing even a small portion of sand. The function of sand in a cement mortar is simply that of a dilutant and is precisely similar to that of broken stone or coarse gravel in concrete. In a cement mortar there should be enough cement to fill all voids between the grains of sand, which implies a coating of the entire surface of every grain, and enough more than this to provide for the contingency of imperfect mixing. The more perfect the mixture the less the amount of cement that will be required, and the finer the cement is ground the less cement it will take to coat every particle of sand.

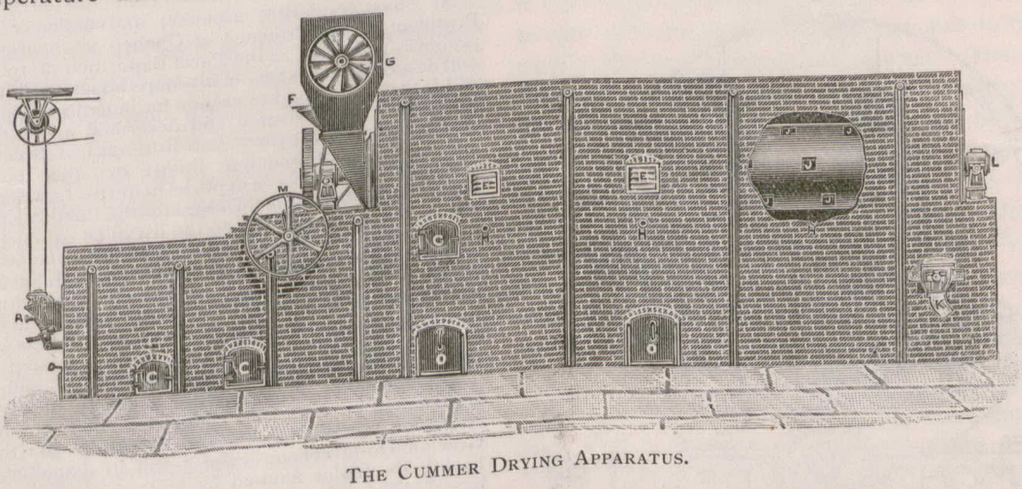
In both lime mortar and cement mortar the best results are due to work ; the more complete the incorporation of the ingredients the better the mortar will be. In lime mortar, which hardens slowly, time need not be considered, and this incorporation can be done slowly. In cement mortar where a set takes place early it is important that too much time should not be spent in mixing. In the alluvial deposits of the Ganges is found a kind of limestone of irregular shape known as kunker ; the Hindoos make a mortar of kunker, lime and brick dust which becomes as hard as Portland cement ; the piers of the great bridge across the Ganges at Benares are laid in this ; its excellence is due to work. A similar excellence is found in all their mortars ; when the lime has been slacked they grind it in a hand mill, then they grind the sand in a similar mill and then they grind the lime and sand together, all of this work being done by women ; the mixture is then wet and ground in a mortar mill with bullocks and when it is used it is pounded for hours. They will take this mortar, plaster a wall, pound it and rub it down and the final result of their patient work is a plastered wall, with a polished surface as smooth as that of procelain, which will stand the weather of their frostless climate for more than a century. The secret of good mortar is work ; in India, where labor is hardly worth 5 cents a day, this can be done by hand ; in this country we cannot afford it ; it is cheaper to use the most costly cements, but even cement mortars are better if thoroughly worked, and I hope to see the time when machine mortar mixers are as common on masonry walls as power riveters are now in bridge shops.

MANUFACTURES AND MATERIALS

THE CUMMER DRYING APPARATUS.

The F. D. Cummer & Son Co., of Cleveland, Ohio, has made the subject of mechanically drying different materials its sole study for ten years. The Cummer Company manufactures two styles of rotary dryers, and each style in eight different sizes. Each dryer is sold accompanied by a guarantee.

The accompanying cut shows a side elevation of the Cummer style 'F' dryer. The machine is used for drying materials that will not support high temperatures. This dryer (which consists of a revolving cylinder of special design, through which the material being dried passes) is arranged so that direct heat is employed, mingled with large volumes of pure air. Absolute control is had over the temperatures to which the material being dried is subjected, in its different stages of dryness. No steam is used, and the drying is all done mechanically. The dry product is delivered at a low temperature and without injury. With this



THE CUMMER DRYING APPARATUS.

dryer, as high as twelve pounds of water are being evaporated per pound of combustible consumed. Soft black coal is the fuel used, and perfect combustion is obtained. The firing is all done mechanically. The whitest of materials are being dried by the Cummer dryers without any discoloration or injury.

The style 'Salamander' dryer resembles the style 'F', but is designed for drying materials that are not easily injured, such as clay, rock, phosphate, sand, marl, infusorial earth, *etc. (*Ores of all kinds.)

The Cummer Direct Heat Tunnel System is most efficient for drying brick, terra cotta, cement briquettes and similar products. Like the other dryers made by this company, it is a great economizer of space, fuel and labor. No steam pipes or boilers are required in connection with this system.

The F. D. Cummer & Son Co. have dryers in operation in all parts of the world (many in Canada), drying different materials, and will, upon application at its Cleveland office, 413 The Arcade, be glad to arrange for any one interested to see a dryer working.

The National Brick Manufacturers Association of the United States at their recent convention recommended the adoption of standard sizes for brick. The size adopted for common brick was 8¼ x 2¼ inches, and for pressed brick, 8⅜ x 4 x 2⅜ inches. The association also adopted, as a standard size of Roman brick, 12 x 4 x 1½ inches, and for a Roman brick, 12 x 4 x 2⅜ inches.

SLATE IN CANADA.

The slate quarried in Canada comes chiefly from the Cambrian rocks in Quebec, although agillites of various colours are known to exist in other parts of the Dominion. British Columbia has had two companies operating quarries by horse and hand power in recent years; one at Nanaimo, in Vancouver, and one at New Westminster. In Quebec at one time there were three concerns working quarries in Richmond County; one at New Rockland and two at Richmond, which produced principally roofing slates. In recent years, however, only one large concern has supported the industry, says the Engineering and Mining Journal.

One of the reasons why Canadian production has been small is because slate can be imported very cheaply from the Vermont region in the United States, notwithstanding the duty.

During the years 1894 to 1898, the total production of slate in Canada was $271,411; the imports, $119,366; the exports, $13,097, and the approximate consumption $377,680.

To encourage the home industry the Canadian government has imposed a duty of 25 per cent. on all importations of roofing slate (not exceeding 75c. per square), school slates and pencils, and 30 per cent. on mantels and other manufactures of slate. Notwithstanding this tariff, however, the domestic output has diminished 46 per cent. during the past five years and the consumption has fallen off nearly as much. On the other hand, a small export trade was built up, but in the last two years little or nothing has been done in this line.

The total production of slate in Quebec in 1898 was 3432 short tons, valued at $37,374, as against 5208 tons, valued at $37,600 in 1897. The New Rockland Slate Company is the only one working slate quarries in Quebec. The company opened its property 35 years ago, and in 1898 it employed 85 men regularly; 50 in the quarry and 35 in the shops for preparing the slate for market. The average yearly output of roofing slate is used in Ontario. The National Slate Company, a small concern, abandoned its quarry in 1898, leaving the New Rockland Slate Company the only one in the field.

Of the total imports into Canada in 1898 the United States furnished $21,762, or 87 per cent.; Germany, $2,573, or 10 per cent.; Great Britain, $362, or 2 per cent., and China and France the balance. The United States shipments consisted of 1150 squares of roofing slate, valued at $3475, or $2.30 per square; 302,744 pieces of school slates, worth $10,334; mantels, valued

at $544 ; pencils, $447, and all other manufactures of slate, $6952. In comparison with previous years, the imports from the United States show wide fluctuations, more particularly in roofing slate. In 1894 the total imports were 3067 squares of roofing slate, valued at $12,568 ; in 1895 they dropped to 1470 squares, valued $5276, but in 1896 the imports rose to 2891 squares, valued at $9948. On the other hand, the imports of school slates have grown from 140,139 pieces, valued at $4307, in 1894, to 302,744 pieces, valued at $10,334, in 1898.

The small imports from Germany in 1898 included no roofing slate, but a small quantity of school slates. Little or no roofing slate has been imported from Great Britain for a number of years past.

The imports from China in 1898 were 30 squares of roofing slate, valued at $102—noticeable only as coming from an unusual source.

The roofing slate imported went mostly to Ontario and Quebec ; the school slates to the same provinces ; the mantels to Nova Scotia, Manitoba and New Brunswick ; pencils to Ontario and Quebec, and other manufactures of slate principally to the same provinces.

Branch Office of the CANADIAN ARCHITECT AND BUILDER, New York Life Building, Montreal.

JUNE 15, 1889.

OTTAWA CONTRACTORS' ASSOCIATION.

An understanding is reported to have been reached between the members of the Ottawa contractors' association and the architects of that city, under which the latter consent to invite tenders only from members of the local guild of contractors.

BUILDING REGULATIONS.

The city Surveyor is directing the attention of contractors to section 20 of By-law 48, which provides: No person shall, without having first obtained a written permission from the City Surveyor, dig, remove or carry away (or cause the same to be done), any sod, stone, earth, sand or gravel from any street, alley or public ground in this city, under the penalty hereinafter provided.

THE RENAISSANCE CLUB.

The water color class have their meeting every Saturday night. These meetings will be continued until the 24th inst., when they will cease until the end of September. About a dozen of the members recently took a trip to Lachine and further up the Lake, taking sketches on the way. Although the meetings and lectures will end in two weeks, the members will find the club rooms open as usual.

COUNCIL OF ARTS AND MANUFACTURES.

The announcement of results of the examinations and the distribution of prizes in connection witn the classes of the above association, took place on Thursday last at the Monument National ; but lack of space prevents more than brief mention in this number.

The officers elected for the ensuing year are:— President, Thos. Gauthier; Vice President, Cyrille Duquette, Quebec ; Secretary, S. Sylvestre, Quebec ; Assistant Secretary, Mr. L. P. Berube.

The winners of the first prizes in the several departments are as follows : Mechanical Work, Geo. Hartley ; Stair Building, A. Charpentier ; Lithography, A. Jackson ; Freehand Drawing, T. Grimsdale ; Architecture, Wm. Dowling ; Modelling, Jules Leprohon ; Mechanical Drawing, Clement Johnson ; Decorative Painting, A. Bourgeois ; Plumbing, Geo. Delaney.

THE NEW GRAND TRUNK OFFICE BUILDING.

Through the influence of the Labor organizations, a clause was inserted in the agreement between the city and the Grand Trunk Railway Company, which provides that in the construction of the Company's new office building, for which the city granted a free site, only local labor shall be employed. It is unfortunate for Canadian manufacturers, that the agreement contains no similar clause relating to materials, and if the architect follows his usual practice, the most of these materials will be purchased abroad. The question of where the stone shall come from is understood to be now under consideration. There is an abundance of excellent stone in the province of Nova Scotia, which we hope will find employment.

In this connection, the City Attorney has been asked by the council to give his opinion on a fine point of law. The Grand Trunk Railway Company have recently purchased a stone cutting machine which is to be employed to do the work on their new building, which the council expected would be done by local stone-cutters, and which, it is said, will deprive local workmen of wages to the amount of $20,000. The City Attorney has been asked to give his opinion as to whether the use of this stone-cutting machine will violate the clause in the company's agreement with the city which provides that the work on the building shall be done by workmen residing within the city.

EXHIBITS FOR THE PARIS EXPOSITION.

Mr Chas. Baillarge, architect and engineer of Quebec, ex-President of the Province of Quebec association of architects, proposes to exhibit at the Paris Exposition of 1900, plans, models and descriptions of some of his more important inventions. These will include a method of escape for inmates of public buildings in case of fire (as illustrated and described in previous numbers of the CANADIAN ARCHITECT AND BUILDER); a practical and economical system of founding bridge or other piers in rivers a hundred or more feet in depth as in the St. Lawrence opposite Quebec in 160 feet of water; Design for the London Eiffel tower as proposed in 1889, placed 5th on the list of 68 exhibits, contributed by the foremost engineers and architects of the world ; an electro chromatic revolving fountain ; the Victoria Jubilee Tower, as proposed in 1897 ; Photo-gravure of the St. Foy Monument, erected in 1860 to the memory of the brave soldiers under generals De Levis and Murray who fought the last battle between the French and the English on the occasion of the capitulation of Quebec on its cession to the English by Louis the 15th and La Pompadour. This monument erected after a design by Mr. Baillarge and surmounted by a statue in bronze of Bellona, the gift of prince Napoleon—is itself of cast and wrought iron : the shaft a fluted Grecian Doric column some 5 feet in diameter, on a pedestal having its angles flanked by buttresses, each of which is surmounted by a mortar throwing 12 inch shells, a row or chaplet of which surrounds the base of shaft.

An exhibit of building materials will be made by the city of Quebec, and will include specimens of granite, marble, limestone and crushed quartz from Frs. Parents Laurentian Quarries at Beauport, Que.

NOTES.

The Quebec Government has granted a charter of incorporation to the Montreal Builders' Exchange.

Messrs. Jack & Robertson have recently been appointed Canadian sales agents for the Spague Elevator Company of New York.

Four stained glass windows, each 23 feet in height, are about to be placed in St Patrick's church. In the centre of each window is a figure of one of the Evangelists.

Incorporation has recently been granted to the Diamond Light & Heat Company of this city, with a capital of $200,000, to manufacture burners, radiators, stoves, grates, etc.

The action brought by Mr. O. Martineau, builder of the church of the Immaculate Conception, this city, against the Jesuit Fathers to recover a balance of $7,464.67 claimed to be due him on his contract, has been dismissed by Mr. Justice Pagnuelo, on the ground that the plaintiff had not carried out his contract according to the specifications.

Mr. Stephen Jarvis, Nordheimer Building, has secured the right to manufacture in Canada an artificial stone, the invention of Mr. William Owen. The material is called Owen stone. The process is thus described : Quartzose sand, dug in the vicinity of the works, is first dried by being heated; it is then thoroughly mixed dry with hydraulic lime in the proportion of about 12 per cent. of the former. This mixture, still in a dry condition, is packed into very strong moulds of any desired shape, the filled moulds being subsequently built up in a steel frame or box. The latter is conveyed by tramway to an immense steam cylinder, inside of which it is placed, the cylinder now being closed and the door strongly bolted up. Water near the boiling point is then admitted until the cylinder is full, and an indicated pressure of from 60 lb. 70 lb. maintained. The water is kept in a highly heated condition by steam coils running along the length of the cyliuder inside, and this is a very essential part of the process. It is claimed for this material that it is fireproof, unaffected by frost, has great crushing strength and can be cheaply manufactured. Mr. Jarvis is endeavoring to organize a Company to manufacture.

HEATING GREENHOUSES BY HOT WATER AND STEAM*

For heating small ranges of greenhouses some of the cast-iron hot-water boilers, although they are comparatively high priced, will prove satisfactory and in the end economical, as they will be more durable than wrought-iron boilers, especially if the latter are made in the form of box coils from ordinary gas pipe. The joints of the latter being screwed together will expose more or less of the threads, and as a result may not last more than two or three years, although with heavy pipe the life of the pipe boiler may be seven or eight years, if care is taken not to have any of the threads exposed. For larger ranges where hot water is used, tubular boilers may be employed and will give good satisfaction, especially if the tubes are placed so as to fill the shell of the boiler. Although these boilers are made of wrought iron, the tubes are thicker than those commonly used for coil boilers and the tubes, being riveted rather than screwed into the boiler heads, will be quite durable. Although not to be recommended for very small ranges, a considerable saving in the amount of pipe required for radiating surface in the houses can be made if the system is placed under pressure. Although there is hardly any limit to the size of the plant in which hot water under pressure may be used, a majority of the greenhouse men prefer steam for ranges of the size that will make the use of a night fireman desirable. While it will require rather more careful attention than a hot-water system, steam as a means of heating greenhouses has some advantages.

For ranges of houses with less than 10,000 square feet of glass only one heater will be desirable, but if the amount of glass exceeds this, two or more should be employed. The heaters should be so arranged that either one can be cut out from the system in case of accident and for the purpose of making repairs. Having more than one heater, under such conditions, will oftentimes prevent serious loss. During the fall and spring months only one heater will be required, the other being held in reserve for use during the severe weather in winter.

PIPING.

For piping houses for hot water circulation there has been a marked change in the kind of pipe used in the last twenty years. Instead of the old fashioned four-inch cast iron pipes, wrought iron pipes from one and one-quarter to two inches in diameter are used for the coils. In some cases the coils include both the flow and return pipes, but more commonly the water is carried to the further end of the house in pipes of a somewhat larger size, which are there connected with the returns. Although larger pipes are occasionally used, the usual size for the flow pipes is either two or two and one-half inches, the former being used for coils containing about 200 square feet of radiation, while the latter will supply 350 feet. When the heater can be sunk so as to be below the level of the greenhouse floor, a fairly good circulation can be secured with all of the pipes under the benches ; but better results can be obtained when the flow pipes are carried as high as possible, and the use of overhead flows becomes almost necessary where it is not possible to lower the heater. One or two of the flow pipes can be carried upon each of the rows of purlin and ridge posts, and others, if necessary, upon the walls. The radiation supplied by the returns will be rather more effective when arranged in horizontal coils than when the pipes are placed one above the other, but from the fact that when the coils, in whole or in part, are carried upon the posts of the side walls they are out of the way, the vertical coil is often used. While good results will be secured whether the flow pipe is carried with an upward or a downward slope, the results, if anything, seem to favor a down-hill system. The slope should be merely enough to free the pipes of air, for which an outlet must be provided at the highest point. It is an excellent plan, especially when the closed system is used, to connect the highest point of each flow pipe, or the highest point of the common system, with the expansion tank. The returns should always be laid with a slight slope toward the boiler, but if the larger sized pipes are used and are properly supported, this need not be more than one inch in twenty feet, the object being to carry the pipes as high as possible, and at the same time have a sufficient slope to permit the air to escape.

HEATING BY STEAM.

The arrangement of the pipes where steam is employed is quite similar to that in the hot water system, the particular difference being that the size is considerably smaller for both the flow and returns. The return pipes need not be larger than one and one-quarter inches, and for small houses very good results can be secured with one-inch pipe. As a rule, a two-inch supply pipe will answer for an ordinary house 20 × 100 feet, except where high temperatures are desired. In the steam system there should be an automatic air valve at the lower end of each of the coils, and for controlling the heat valves are necessary upon both the supply and drip pipes, while in the hot water system only one valve is necessary, although two will be desirable in case there should be occasion at any time to cut off the coil in order to make repairs upon it. In the steam coils it is also well to have several of the pipes provided with valves in order that one or more of them may be cut off to control the heat. In estimating the amount of radiating surface that will be required, it is customary to consider that one square foot of surface will be sufficient for three of exposed glass, if the house is to be carried at 60 degrees, with hot water, and that it will answer for four or five if 50 or 40 degrees, respectively, is to be maintained. With steam heat one foot of radiation will be ample for five and one-half square feet of glass in houses to be heated to 60 degrees, for seven and one-half if 50 degrees is to be maintained, while only one foot of radiating surface to nine square feet of glass will be required in houses that are to be heated to 40 degrees. The above figures will be found substantially correct in sections where the usual winter temperature does not drop below zero, and where the houses are well built and with a comparatively small amount of wall surface.

*From a paper read by Professor L. R. Taft, of the Michigan Agricultural College, before the Missouri State Horticultural College.

NATIONAL ASSOCIATION OF MASTER PLUMBERS AND STEAMFITTERS OF CANADA.

At a meeting of the executive committee of the above association held in Toronto recently, it was decided that the annual convention should take place in Ottawa on June 30th and July 1st.

Arrangements for this convention are being pushed forward by the local committee of management, which consists of Messrs E. T. Butterworth, R. McCallum, H. Vornam, P. Racine, J. McKinley, F. G. Johnson and H. A. Knox, secretary.

The president of the Ottawa Plumbers' Association, Mr. J. Higman, is understood to be preparing an address for this convention on the conditions surrounding contract work. Mr. Higman will urge a higher standard of proficiency, of prices and of profits.

The delegates appointed to this convention by the Toronto Association are Messrs Wilson, Mansell, Meredith and Wright.

ALIEN LABOR LAWS.

Much discussion has taken place of late in and out of Parliament, regarding the non-enforcement of the Canadian Alien Labor Law, in view of the strict manner in which the American law is enforced at Buffalo. The Premier, in explanation, stated that an unwritten understanding exists between the government of Canada and the United States that, in the present interval between the sittings of the Joint High Commission appointed to adjust matters of difference between the two countries, these alien labor laws will not be put in strict operation. He points out that Buffalo is the only point on the border line where the American law is being put into effect, and instances, in support of this statement, the fact that no trouble exists at Detroit, where many of the residents of Windsor find daily employment. It is to be hoped that when the Commission reassembles, these laws may either be wiped off the statute books of both countries, or so modified as to prove a less cause of irritation than at present. In this connection we observe that the Dominion government, in compliance with the expressed wish of the Imperial authorities, have recently disallowed the act passed at the last session of the Legislature of British Columbia prohibiting the employment of Japanese and Chinese by tramway and similar companies.

A recent report from Vancouver states that the building contractors of that city are about to organize a Contractors' Exchange.

Model for Photo-Lithographing. J. L. Banks, Sculptor.

THE HISTORY OF PLASTERING.

Plastering is (says Mr. G. T. Robinson in his introductory chapter to Mr. Millar's standard work on the subject) one of the earliest instances of man's power of inductive reasoning, for when men built they plastered. At first, like the birds and the beavers, with mud, but they soon found out a more lasting and more comfortable method, and the earliest methods of civilization were directed, it is considered, to plastering, evidence being afforded that man had very early attained almost to perfection, in compounding material for the purpose and, in fact, some of the earliest plastering which has remained excels, we are told, in its scientific composition that which is used at the present day. The pyramids of Egypt contain plaster work executed at least four thousand years ago, and this to some extent still exists in perfection. Dr. Petrie in his "Pyramids and Temples of Gizeh," shows how serviceable and intelligent a co-operator with the painter, the sculptor, and the architect was the plasterer of those early days, and that to his care and skill we owe almost alf we know of the histry of those distant times and their art.

Very early in Greek architecture the use of plaster has been found consisting of a true lime stucco of most exquisite composition, and it is known to have existed in Greece about 500 years before the Christian era, the temples being covered with it externally and internally, and some of it remains in very preservation to this day.

During the Middle Ages plastering existed, Mr. Robinson continues, only as a craft, and its highest function was to prepare a surface to be painted on, nor was it until the commencement of the Renaissance in Italy that it showed any symptoms of revival.

Glancing back at what English plastering was before this period, mention is made of the fact that the ancient Britons used houses built of hurdles plastered inside and out with mud—the old "wattle and daub," in fact much of which is still done in the West of England. Evidence is also afforded ihat the Anglo-Saxons plastered many of their buildings inside ann out, as well as the Normans. All this was, of course, the ordinary lime stucco, for the use of plaster of paris or calcined gypsum was unknown in this country until the time of Henry II., who, on a visit to Paris in 1254, so admired the superior whiteness and fineness of the walls, that he introduced it here. But plaster or lime stucco was, as yet, in England only considered as a structural necessity and not as a decorative adjunct. That its fireproof qualities and sanitary influence were known is evidenced by the edict of King John, who, after the great fire which destroyed the timber-built London Bridge in 1212, issued an edict that "all shops on the Thames should be plastered and whitewashed within and without. All houses which till now are covered with reed or rush, let them be plastered within eight days, and let those which shall not be plastered within that time be demolished by the Aldermen and lawful men of the venue (overseers), and let all, houses in which brewing or baking is done be plastered within and without that they may be safe from fire."

A number of Ottawa contractors, who are supporters of Separate Schools, have recently petitioned the Separate School Board to restrict the erection of new school buildings to Ottawa architects and contractors.

HEAT RESISTING QUALITIES OF BUILDING STONES.—According to some experiments made by Dr. Cutting, the heat-resisting capacity of building stones, when water is not applied, stand in the following order: 1. marble; 2. ordinary limestone; 3. sandstone; 4. granite; 5. conglomerate. The limestones and marbles seldom crack from heat or water, but when the heat from the outside is excessive, they slightly crumble on the outside when water is thrown on them. When they are cooled without the application of water, the injury is much less. This is contrary to the generally conceived idea, which is that granite is a fire-resisting material, the fact being that marble is capable of resisting heat to a much greater extent.

"My wife," said the tall, lantern-jawed man, "is as womanly a woman as you could find, but she can hammer nails like lightning."

"Wonderful!" sang the chorous.

"Lightning," the tall lantern-jawed man continued, "seldom strikes twice in the same place."—Cincinnati Enquirer.

"And you assure me that it is an antique?"

"Why, madame, this rug is known to have been in the apartments of Catherine de Medici."

"What are those four little holes?"

"H'm—it is known, too, that the rug was in her sewing room, and that is where the sewing machine sat."—Judge.

An art patron one day came into Turner's studio when the artist was already famous. He looked at a picture and asked what was the price. The artist named the sum he had set upon it.

"What!" exclaimed the buyer, "all those golden sovereigns for so much paint?"

"Oh!" replied Turner, "it's paint you are buying? I thought it was pictures. Here," producing a half-used tube of color, "I'll let you have that cheap: make your own terms." And, turning his back on the astonished patron, he went on painting.

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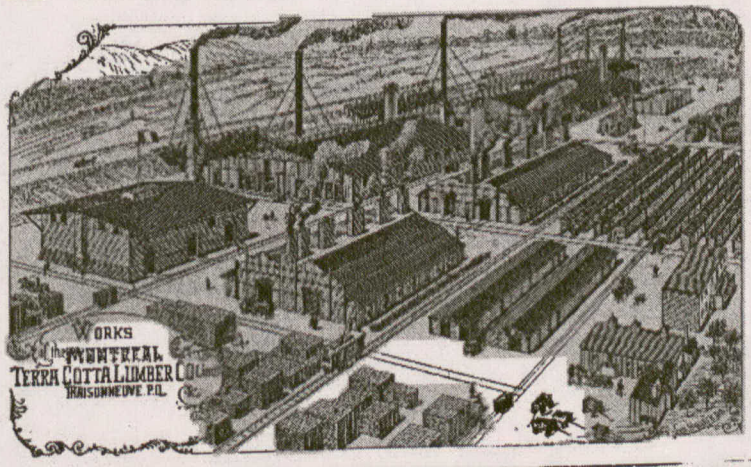

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