CANADIAN ARCHITECT & BUILDER

THE INDUSTRIAL ARTS
DECORATION FURNISHING
CONSTRUCTION SANITATION
ENGINEERING

VOL. XI.—NO. 12. DECEMBER, 1898 PRICE 20 CENTS $2.00 PER YEAR.

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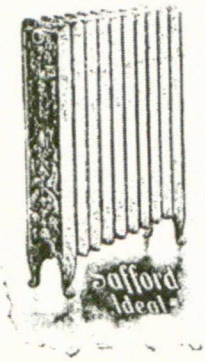

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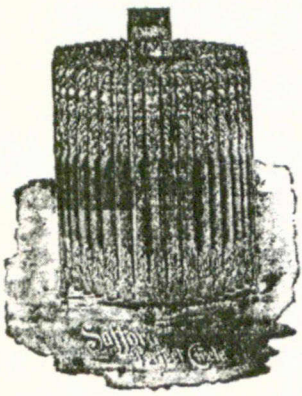

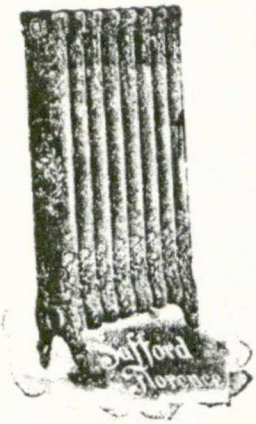

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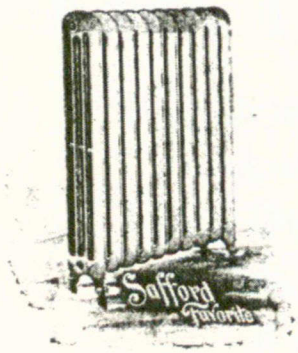

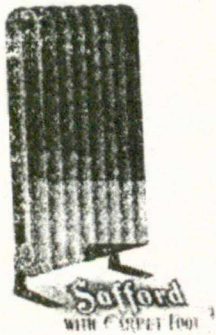

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—THE—

CANADIAN ARCHITECT AND BUILDER,

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

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

EDITOR'S ANNOUNCEMENTS.

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

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Errata.

IN an editorial paragraph in our last issue, it was inadvertently stated that radiators were selling in the United States as low as 12 cents per "pound." Our readers will kindly substitute the word "foot" for "pound."

Announcement.

THE special number of the CANADIAN ARCHITECT AND BUILDER which for several years past has been published at New Year's, will in future be issued late in March. In view of the fact that building operations in this country are at a stand-still in January and February, it is believed that our annual special number might more fittingly and advantageously be published so as to mark each year the approach to the building season. Preparations are already well under way for the publication in March of our special number for 1899, which it is hoped will fully maintain the standard of former years.

What are "Stock Bricks?"

THE Brighton County Court was recently called upon to determine the legal definition of the phrase "stock bricks," a claim having been preferred by a brickmaker at East Grinstead to recover the price of 16,000 bricks supplied to a firm of builders as "stock bricks," but which were rejected on the ground that owing to their inferior character they were not entitled to be classed as such. The plaintiff's witnesses held that stock bricks should be picked, while, on the other hand, it was contended that stock bricks meant bricks burned in a clamp or stock, and taken without picking. Judge Martineau said that in his opinion stock bricks meant picked bricks, which would be of a higher quality. Judgment was therefore given for the builders, and the counter claim was dismissed. Commenting upon the case, the Builders' Reporter remarks that picking may now be considered a sufficient ground for the promotion of place bricks to stocks. But in the early part of the century the difference between the two sorts was ad-

mitted to arise from the quality of the material, which could not be got over by any picking. Stocks were said to be "made of a good earth well wrought and with little mixture," place bricks being made of "the same earth, or worse, with a mixture of dirt and other coarse materials, and more carelessly put out of hand." It would be satisfactory if the standard were still materials and workmanship as formerly, rather than an indefinite process of picking, which allows of too much latitude.

The New Postage Stamp.

OUR new two-cent stamp is apparently intended to be a smart advertisement of the country. It does not reflect much credit upon us as designers nor as printers. If every country that gets a dab of red in printing this stamp became thereby a member of the British Empire, we should truly justify the vulgar motto at the bottom, "We hold a vaster empire than has been."

Architectural Standards in Ontario and Quebec.

THE Inland Architect is in error in stating that the Architectural Associations of Ontario and Quebec have each in turn secured the passage of an act compelling all practising architects to become members of the provincial association. Unfortunately the members of the profession in Ontario have not yet been given the legal status conferred upon their confreres in Quebec, but are still living in hope that the higher standard of practice instituted in Quebec will at an early day be sanctioned by the Legislature of Ontario.

An Opportunity for Canadian Manufacturers.

MR. H. Manizu, a Japanese architect, is at present in America for the purpose of obtaining information regarding modern materials and appliances, for an important building to be erected by the government of Japan. He invites information, catalogues, etc., from manufacturers of hardware, office furniture, wall and ceiling decorations, lighting, heating and ventilating apparatus, sanitary goods, dynamos, gas and hoisting engines, and modern building appliances of every description. These should be addressed to "Educational Department of Imperial Japanese Government." Canadian manufacturers should not forego this opportunity of bringing their goods to the attention of the government of Japan. Our goods in the above mentioned lines are strictly up-to-date, and are finding considerable sale in other foreign markets. With the advantage of direct shipping facilities, our manufacturers should certainly be able to secure a share of the Japanese trade.

Convention of the O.A.A.

THE annual convention of the Ontario Association of Architects will take place on the 17th and 18th of January. The programme indicates proceedings of the same nature as last year—the first afternoon devoted entirely to business (when it would be well for those to be present who have good advice to offer as to the conduct of the Association); the second day given over to reading of papers and the election of officers. The papers will include two by practical men. Mr. W. J. Hynes will talk about ornamental plastering work and Mr. M. J. Hynes about terra cotta. Mr. W. L. Symons will read a paper on "New Problems in Architecture," and Mr. J. W. Siddall on another architectural subject, not announced at the time of our going to press. The luncheon on the second day was last year more imposing than formerly, and will probably be similar this year, taking the character of a social gathering which formerly was relegated to a dinner in the evening.

A Stimulus to Architecture.

ARCHITECTS and other persons interested in the advancement of true architecture, will greet with satisfaction the recent action of the Municipal Council of Paris in offering prizes to the owners and architects of the most attractive houses erected in the French capital during 1898. It is stated that as a consequence of this action, unusual care has been shown in the design of facades. Particulars of the buildings submitted in competition were required to be placed in the hands of the city authorities between the 1st and 15th of December. The method of deciding the competition has not been learned. Presuming this to be satisfactory, the idea should be a popular one, and greatly assist in improving the architectural appearance of the city. The authorities of our Canadian cities should be urged to follow the commendable example of the Council of Paris. If a number of Canadian cities could be induced to do so, the result would be a friendly rivalry which would awaken a deeper public interest in architecture, and elevate the standard of work throughout the country. The subject is one which might fittingly be considered and dealt with by the architectural Associations of Ontario and Quebec.

Technical Instruction.

PUBLIC attention in Canada is at present directed to the subject of technical education. A public meeting held in Ottawa a few days ago put on record the opinion that a system of technical schools should be established so as to encourage the production of skilled labor, the growth of manufactures and the development of our great natural resources. The Board of Trade of that city has recently appointed a committee on Technical Education, and an effort will be made to have a technical school established at an early date. The Hon. G. W. Ross, Minister of Education for Ontario, in a speech delivered at the annual dinner of undergraduates of the School of Practical Science, referred to the need of a system of technical instruction on a lower plane than that afforded by the scientific schools. His opinion is that in each important city technical schools should be established at the cost of the municipality. Further than this, that the instruction should be adapted to the requirements of the artizan classes in each particular locality. With this view we are not in accord. On the contrary, we believe that the character of the instruction should be such as would be equally valuable to the student wherever his place of residence might be. As regards the manner in which schools of this kind should be established and supported, it would seem but fair that the Federal and Provincial governments as well as the municipalities should contribute, seeing that the country as a whole must benefit from the establishment of a higher standard of education and skill for the artizan classes. The success which is attending the Toronto Technical School and the classes under the direction of the Council of Arts and Manufactures in Quebec, has no doubt been the means of calling public attention to the desirability of extending the movement. It is to be hoped that by whatever means schools of this character are established and maintained, the controlling authorities will see to it that only the most approved systems of instruction and teachers of the highest efficiency shall be employed. If we undertake to provide technical instruction, let it be of the highest grade, so that our artizans may be the equals of the best in the world.

EVERY MAN HIS OWN BARBARIAN.

It has been said that the further advancement of architecture must wait for another irruption of barbarians to show us the way. This proposition has the evidence of history on its side ; but, inasmuch as the order of the world's movements has changed, and irruptions are now made not by the barbarians but upon them, it seems as if we may wait long and in vain for any chance of improvement to architecture in this way. What then must we do? Architecture must go forward or it will cease to live. It is clear then that the problem is to find the barbarians.

If we examine what the force was which the barbarians brought to bear upon building so as to cause it to assume new forms, we find it to be nothing but that practical logic which in matters not artistic has always appeared to be a characteristic of the English. Before art that nation of shopkeepers for a long time bowed with reverence as to something beyond the comprehension of ordinary men, and followed submissively any lead, until at last it became ridiculous even to itself, and out of its abjection is arising a horde of young men who have discovered that the common sense which the English have applied to other walks of life is applicable to art also. These are the barbarians who promise to make the English a regenerating force in architecture.

Let us not, however, wait for their developments. It was not the spread of the Goths' and Lombards' method of work that produced Gothic architecture, but of their method of thought.

What was there in their method of thought that made architecture revive in their hands? Primarily, we may say that it was ignorance of the Greeks. The conquering Roman was, in matters of art, subdued by the Greek he had conquered. He perceived the beauty of Greek work, and put himself in Greek hands to have his own building made beautiful. These German invaders knew nothing about the Greeks. They only knew what they wanted and found in the Roman buildings material ready to their hand for what they wanted to do. When it suited them they took details bodily ; when they wanted something different in form they regarded the Roman buildings simply as quarries of material and hewed what they wanted out of the choicest stones. There was no reverence for antiquity for its own sake ; these ancient moderns had not arrived at that development of modernism. Nor was there any religious feeling for the relics of an ancient worship ; though barbarians the Lombards were good Catholics, and they made rubble walls with the statues of the Roman gods. What their work was like there are some examples to show—barbarous enough in its ill-fitting detail those who have seen it say, but it has the starting of the character which was afterwards developed into what we call Lombard architecture, from which sprang the architecture of the middle ages. The Romans were in the line of progress to this result but missed it. We can see now how the developments of Gothic architecture proceeded from a basis of the constructive attainments of the Romans. What is before ourselves we cannot see and may perhaps never see (though movement is rapid in these days) ; but though we may see no result, at any rate no far result, the game is worth playing for its own sake. The barbarian's work was a man's work ; that of the Greeks who festooned the Roman buildings with architecture was not. The barbarians' method has always resulted in improvement, and in rapid improvement ; the method of the Romanized Greeks has always led to degeneration.

There is no talk of degeneration in Canada just yet, and fortunately the period of substantial buildings in this country is coming on at the same time as the forward movement in architecture. It is a time not only of a better understanding of the principles which underly good architecture but of such changes in the materials of construction that old models must fail as models and can supply only principles. There is no use in sneering at principles. To make light of the necessity for principle in design is only another form of the prejudice in favor of a "practical man" as opposed to a scientific architect. The practical man idea is now exploded. It is quite clear that architecture has got beyond him. It is not so generally recognized, but there can be little doubt that it soon will be recognized, that architecture is getting beyond the reach of imitative design. Indeed, there is much imitative design that we might already have dispensed with, and to begin now to do so would be the surest way to acquire that simple directness which is the mark alike of the barbarian and of the highest culture, and which is the only hope of any solution of our own great problem—how to make architecture of the birdcage building.

The time honoured shams which form so great a portion of our stock in trade are of this nature. Let us see from a couple of examples if they are really necessary to us. The tin cornice is a great unifier to a restless building, but there are more ways of making a cornice tell than by making it project. As a matter of fact, projections are awkward things to handle in a street front, and the tin cornice is often in difficulties which would be avoided if, instead of imitating the stone we cannot afford, we used stone in a way in which we can afford it, and were thus forced into the discovery that we may diminish the projection of a cornice if we increase its height. The barbarians were fond of an arcade to crown their buildings. It gave emphasis without much projection, of which latter they were perhaps afraid. Most business fronts have a flat roof sloping a long way back and requiring therefore a good deal of height in front above the ceiling. All conditions are therefore favorable for development here, and we venture to think that the adornment of this space is susceptible of as much beauty as and more variety than the tin cornice.

Another piece of imitative work which has the respectable countenance of the Colonial designers is the glued up wooden column designed in stone form. As a hindrance to thought this piece of imposture is entitled to a place in the very front rank. How many a building depends entirely for its effect upon its portico! No further effort is necessary. Without this effective but deceptive and in the long run debasing expedient there would have been more thought, less bastard grandeur, and more characteristic treatment of the simpler class of buildings. For buildings in which there is room for a fair amount of expenditure there is nothing prohibitive about the cost of sufficient stone columns. An upper structure of moulded stone would make a heavy bill, but there is no occasion for this. There are constant examples in Italy of beams and rafters laid on marble columns. The little cloister of San Gregorio in Venice, which appears in Mrs. Oliphant's "Makers of Venice" and other illustrated books about Venice, has its open corridor constructed in this way. It is, in fact, nothing but a verandah surrounding an interior court. It is not even necessary to have stone columns in order to produce an effect that satisfies both the eye and the mind. There are examples in our own work constructed with good square wooden posts and beams. Turning has been often abused, but it need not be so. The fatal modern defect of making everything like something else has given to turned wooden constructive posts the appearance of gigantic balusters, but this need not be so. A barbarian's "sure intent" would not fail to bring out the true feeling of a wooden post. To him and to all who follow in his footsteps each constructive feature has an expression inseparable from its use ; columns, arches, beams, cornices, labels, walls themselves, have logic and language. To study them, enjoy them for their own sake and work them out in design is good manly work, and in it is the only hope of architecture.

CANADIAN CITY ENGINEERS.

VIII.

Mr. John Galt, C.E. & M.E., the subject of our sketch, who has lately succeeded to the position of city engineer of Ottawa, the capital city of the Dominion, although well known in Toronto and Western Canada, is a native of Scotland, where he obtained all his early engineering training and experience.

His practical workshop and drawing office experience was first obtained at Kilmarnock, Scotland, and his scientific education at London and Glasgow, after which he was with large firms of consulting engineers and contractors as assistant engineer in many improvement works in the city of Glasgow and throughout Scotland.

His practical and scientific engineering attainments were considered of a high order, and crossing the Atlantic fully 20 years ago, he acted as engineer and draughtsman with the Baltimore Bridge Co., of the United States, and afterwards on railway construction.

Mr. Galt came to Canada about 16 years ago to take

Mr. John Galt.

the position of general manager of the Boiler Inspection and Insurance Co. of Canada, but after four years' time began his active private practice as consulting engineer and expert. Of late years his practice was confined chiefly to general municipal engineering work, covering mostly the design and construction of waterworks and sewerage systems.

In addition to being a civil, hydraulic and sanitary engineer, Mr. Galt is well known as a mechanical engineer, and at the time of his appointment had several large works on hand, aggregating about $1,000,000.

Mr. Galt is in the prime of life, being 40 years of age. He has a pleasing, genial disposition, with characteristic quiet firmness, exercising genuine good sound judgment and tact.

Backs of panelling, or any woodwork which has to be fixed against a wall, should have a thick coat of oil color before fixing. Before the next coat is applied the surface should be lightly rubbed down with glass paper, and the brad holes, open joints or cracks filled with hard stopping, and the dust removed.

STUDENTS' DEPARTMENT.

C. A. & B. STUDENTS' COMPETITION.

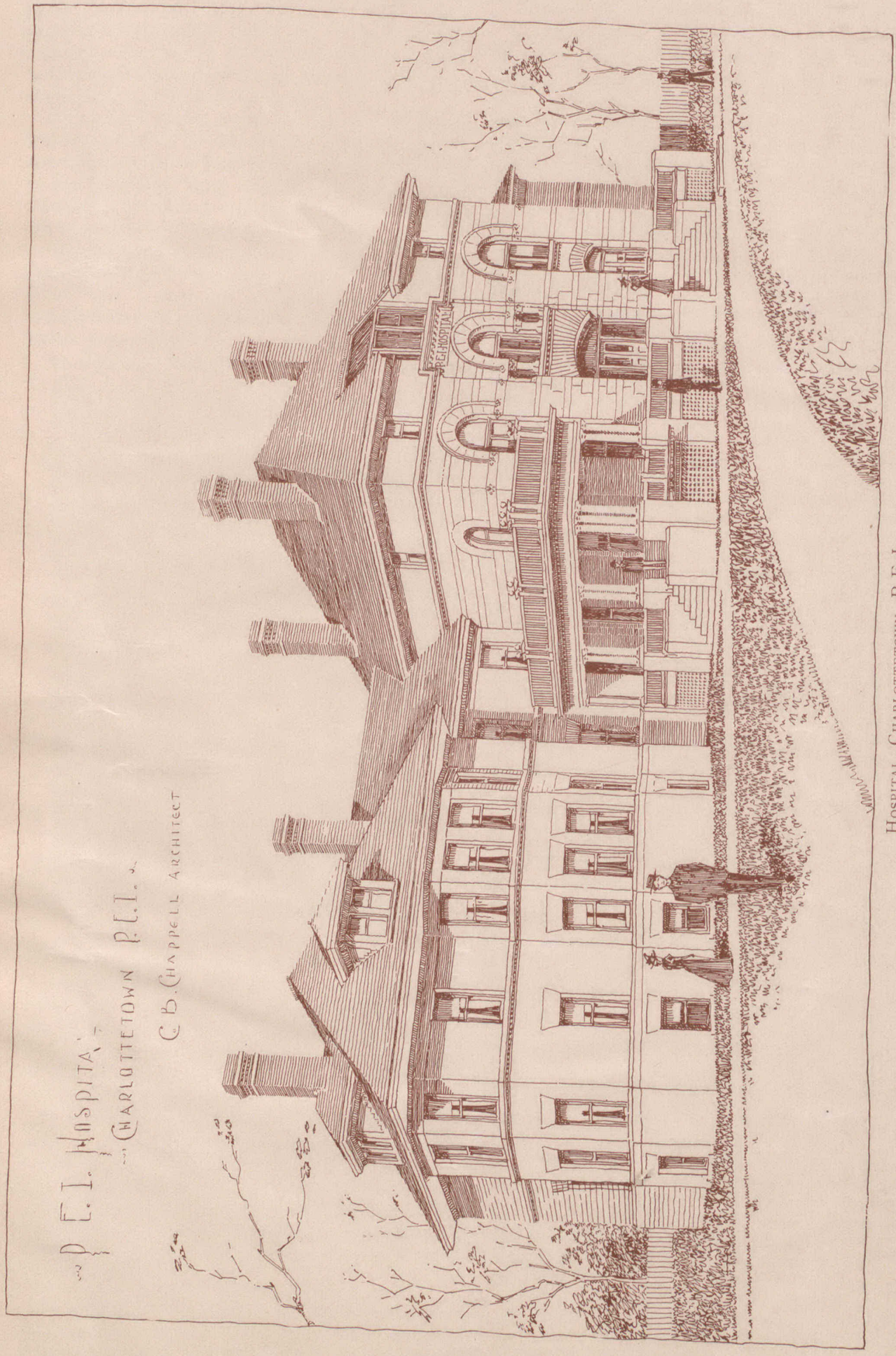
We had expected to be able to announce in this number the result of the Students' Competition for chimney designs. At the time of going to press, however, the report of the Committee of the Province of Quebec Association of Architects had not come to hand. We are therefore compelled to defer until our January issue publication of the decision of the joint committee, to whom were submitted the drawings in this competition.

DRAWING WITH LEAD PENCIL.

Lead pencil has the advantage over most black and white mediums in that it gives us a delicate grey and a rich black, a clear-cut outline and broad masses of dark; it is clean and convenient, writes Ernest Knaufft in the Art Amateur. Pencil may be used upon any kind of paper, but rough paper is most commonly used. A hard or soft pencil may be employed throughout, or both hard and soft pencils may be used. As a general rule a soft pencil (say an F or a B), if allowed to touch the paper but lightly, gives the prettiest results. All artists object to work where the pressure of a hard pencil makes an indentation. It takes a little practice to use a soft pencil satisfactorily at first, for it invariably makes a darker tone than was intended. The pencil may be kept sharp by rubbing it upon a piece of sand-paper. A sharp point allows one to obtain a clear outline, which is one of the most desirable things for a beginner, for though he may not use it in his final effect—that is to say, may not intend his drawing for an outline drawing—yet it permits him to separate one object from another in the beginning, which prevents slovenly drawing in the end. Let me explain: A shrub or a tree should be drawn in its entirety, and any drawing in which the final effect separates the branches to too great an extent, so that we cannot tell whether we are looking at one shrub or several shrubs, one tree or several trees, is, of course, a bad drawing; on the other hand, too, the drawing of a near-by tree which is so slovenly and indefinite that we cannot know whether it is meant for an elm or an apple, a peach or a chestnut-tree, is also bad drawing; and such indiscretion comes almost entirely from the student's failing to give a true delineation of the shadows among the branches and of the shape of the margin of the branches against the background. Now, to avoid this indefiniteness in your finished drawing, you should be most particular in your first sketch in mapping out the contour of shadows and margins in your preliminary sketch with a clear outline, no matter how much afterwards you may blur the shadows and margins in order to mass your foliage, that it may melt into the background. Then, wherever a shadow or contour should be brought out, you will be able to bring it out with exactitude if your preliminary outline is carefully done. There is here a mental attitude to be taken into consideration; the final effect of a shaded pencil drawing, if it be correct in values, depends upon the pressure of the pencil (if one pencil is used by which different degrees of dark are got). Now, it is no easy task, even after all your outlines are finished, to put in your shadows with a proper intensity. You have to be alert at every stroke of the pencil. If you do not press enough on the pencil your tone is too gray, if you press too much you have a worse result. If the tone is too dark and your rubber must be used you may smear the paper (though an expert with a rubber avoids smearing, for he cleans his rubber on the margin of the paper before using it).

Now, if the student, in finishing his drawing, has not only to worry about the intensity of his shading, but has also to worry about the shape of the shadow, why, his labor is increased twofold. Therefore, for this reason, endeavor, in your preliminary sketch to place all your principal shadows so that when you are making your final drawing your mind is occupied solely with the intensity of the tones.

From January 1, 1899, says a daily paper, the Vatican will be lighted throughout by electricity. Preparations for the installation have already been commenced. The motive power will be supplied by water flowing at a quick rate of speed from Lake Bracciano, which lies high up in the mountains twenty miles north of Rome. The Pope is declared to be taking great interest in the work.



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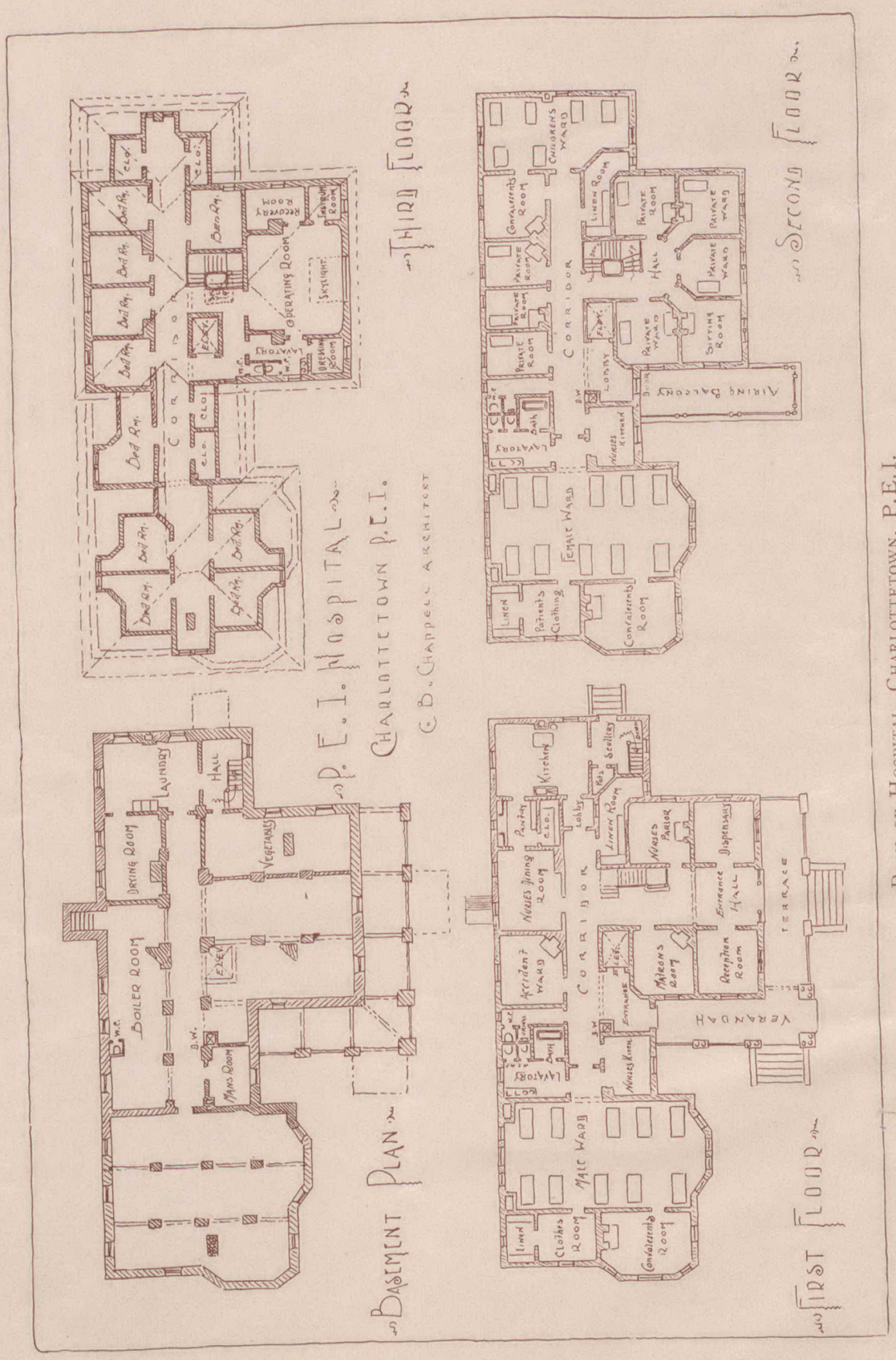
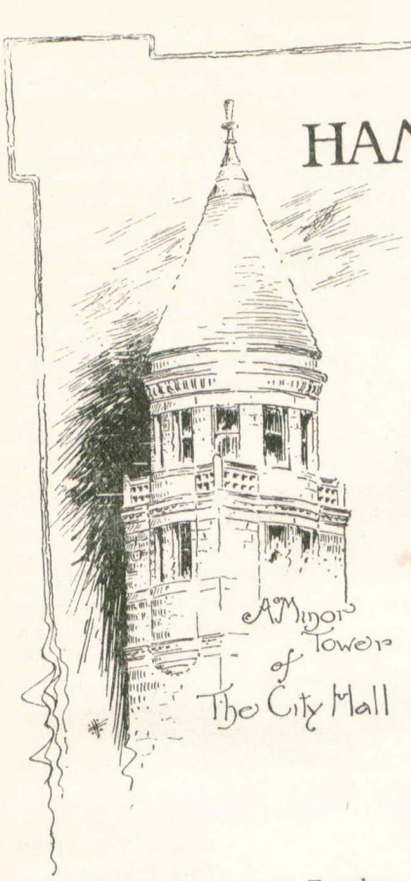


PLAN OF HOSPITAL, CHARLOTTETOWN, P.E.I.

C. B. CHAPPELL, ARCHITECT.



HAMILTON

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

PERHAPS the most interesting piece of news from this city for this month is the formation of a Builders' Exchange, the possibility of which was alluded to in my last letter. Two meetings were held, at the first of which the advisability of such an organization was fully discussed, and it was resolved that those present should form themselves into an association. Provisional committees were struck to draft by-laws, and look about for suitable rooms at which meetings could be held, and the meeting adjourned till Tuesday, 29th Nov. In the interval all who were not present were to be looked up and invited to attend the adjourned meeting that every trade might be fully represented.

On the evening of the adjourned meeting a large number of builders and contractors in all trades, with a sprinkling of material supply men and half a dozen architects, put in an appearance. Mr. John T. Irwin was asked to preside, and the provisional secretary, Mr. J. H. Smith, to act as secretary. A set of provisional by-laws was then read and agreed to so far as they went, and officers were elected as follows :

President, Mr. John T. Irwin.
Vice-President, Mr. William Hancock.
Secretary, Mr. J. H. Smith.
Treasurer, Mr. W. J. Reid.
Directors—Messrs. J. Ross, J. D. Pocock, F. A. Carpenter, A. Clark, G. Clapham.

The intention is to rent rooms at once suitable for the purposes of the Exchange, and get into working shape as soon as possible.

MR. JOHN T. IRWIN,
President Hamilton Builders' Exchange.

A meeting is to be called in a few days to consider the provisional by-laws, and get them amended and confirmed.

The Hamilton Builders' Exchange begins its existence on a broad basis that should ensure its success, not only as an association of contractors meeting together for their own good, but as a means of bringing together all men connected with building. It is to include in its membership all material supply men, manufacturers of builders' supplies and so on, and certain architects will be elected as honorary members. The president is a member of the firm of T. Irwin & Sons, slaters and roofers, and the secretary, Mr. J. H. Smith, of the J. H. Smith Iron Manufacturing Company. In the choice of the remaining members of the board of directors, representation has been given to as many trades as possible. Some thirty men signed the roll for membership, which will in a short time receive a large number of additional signatures. Of course, the CANADIAN ARCHITECT AND BUILDER will be the official paper of the Exchange. Mention was made of the paper at the meeting, and it was admitted that it would be a first rate means of communication between the Builders' Exchanges of the various cities.

MR. WM. HANCOCK,
Vice-President Hamilton Builders' Exchange.

R. W. GAMBIER-BOUSFIELD.

CORRESPONDENCE.

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

THE ONTARIO ASSOCIATION OF ARCHITECTS.

HAMILTON, December, 1898.

To the Editor of the CANADIAN ARCHITECT AND BUILDER :

DEAR SIR,—I am hesitating a good deal about writing you another letter for publication in this month's issue of the CANADIAN ARCHITECT AND BUILDER, but there is a matter that, in the advanced state of the season, will not admit of being held over another month. This matter is the Ontario Association of Architects. I have not kept up my membership for the past few years, but I have always taken a great interest in the Association, and have deeply regretted that it is apparently receding rather than advancing, and that very many members have lost heart at the repeated failures to obtain legislation. I wish very much that some of the old vigor and goodfellowship which characterized the inception of the Association were more in evidence to-day. It is time to ask what is to be the future of the O.A.A. I venture to offer a little criticism and to make a suggestion or two. Very great praise is due to the vigorous members of the Council for the zeal they have displayed in the attempt to secure legislation, in establishing examinations and placing the Association in the position of prosperity it once occupied. But, as I often stated, the policy of our Councils was wrong. Two matters of the utmost importance were neglected. The first was the failure to make the Association a real value to its members, and the second that it always kept itself in the background and aroused no interest in the public. From one convention to another its name was hardly ever to be seen in the daily press. Surely the first essential to the success of any association is that it shall make itself of value to its members. Legislation being the ultimate object of the O.A.A., it was right to keep that in view, but it was a mistake to make that the one and only object. Legislation being the object, the O.A.A. should have been kept prominently before the public, and such action taken by the Council as would have made the public recognize its value as an advisory board. I know that attempts were made to move in public matters, such as in forming building by-laws and so on, but it was done in a wrong spirit ; the Council was too dogmatic. Public lectures, a very few of which were

given, were poorly attended, because the public did not know what the O.A.A. was. The subjects were not such as would interest the public, and they were not held down-town. The lecturers were unaccustomed to lecturing. All such efforts were far too spasmodic.

If the Association is to be of any use, if it is to live, a radical change must be made. The O.A.A. has a charter and it must not be allowed to get mouldy. The next annual convention is drawing near, therefore now is the time for action, which must be immediate and decisive. Architects outside Toronto see no advantage in remaining members. Let the Council think out a plan by which the O.A.A. can be made attractive to them; something else than paying a subscription to help students. Put the idea of obtaining legislation into the background for a few years. Have no more "figure-head" presidents. Let us have new blood in the Council—active men who are not worn out with the failure of their efforts in the past. Let the programme of the conventions be really interesting—worth going to Toronto for. If there are lectures, don't let the lecturers say they have not had time to prepare, and don't give us extracts from text books by way of lectures. Suppose the Council set to work, issue an earnest appeal to all the architects of the province to come to the convention, whether they are members of the O.A.A. in good standing or not, for the purpose of discussing its future, and let them have a scheme to submit. When all the architects have learned that the O.A.A. is a necessity, and when the public have learned it is a good thing, then legislation may be asked for and will be easily obtained. A good many besides myself would be glad to rejoin the O.A.A. if the Council can give us good reason for doing so.

Yours truly,

R. W. GAMBIER-BOUSFIELD.

TORONTO, December 16th, 1898.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—I am obliged to you for sending me a proof of Mr. Bousfield's letter. I have no remarks to make upon it except that, if Mr. Bousfield can propose any definite plan for making the Association of more value to the profession, the Council will be very glad to hear from him. Indeed, I am instructed to ask him to read a paper upon the subject at the next convention.

Yours truly,

W. A. LANGTON, Registrar.

THE LYCH-GATE.

HAMILTON, Nov. 18, 1898.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—In defending some one whom we now know to be Mr. Gibson, for making use of a lych-gate, as it was supposed to be by the writer of your leader in October, it seems I have struck a snag. The lych-gate has developed a serious and alarming argument as to, in what the skill of an architect lies, while it remains itself in the field as a subject for discusssion as to the propriety of its use in these days. I feel inclined to get rid of the lych-gate first, as being the lesser subject, that I may have more room to deal with the other and larger question, so here goes. First, as to whether the lych-gate "has any real use." I would like to ask the writer of the leader if he has ever witnessed an old country scene, which, though I have nothing of the novelist about me, I will try shortly to describe. There has been a death in the village and there is to be a funeral in consequence. All the village takes a great interest in such an event, and crowds of rustics, male and female, old and young, collect—not at the house or cottage, for that would not be village etiquette, but respectfully at the church yard gate. As the time for the arrival of the funeral procession draws near, a lane is formed by the crowd along which the coffin bearers, on foot, followed by the mourners, may pass to the gate. The bearers reach the gate; here there is a delay, they must await the arrival of the clergyman, who will come to the gate to meet the procession; perhaps, too, it may be necessary to wait the arrival of other mourners from the country side. The bearers are not sorry to have the opportunity of taking a rest before proceeding with the coffin to the side of the grave. The gate is a lych-gate and forms a convenient place under which to rest the coffin, sheltered from sun or rain, and obviously it is more fitting to let down the coffin here than out in the open road. Here then is the use of the lych-gate. (Lych or corpse gate—from "lich," Anglo-Saxon for corpse). The lych-gate is an exceedingly picturesque feature and an adaptation of it for the purpose of an entrance to a garden park or anything else, I maintain is perfectly legitimate, and that the scathing criticism against such a procedure is absolutely uncalled for.

Now for the "skill of an architect" and in what it consists. I do not want to be too severe as the author of the leader which has given rise to these letters is to me an "unknown quantity," but I feel like handling him without gloves. What does he mean by the sentence "On the whole there are few 'features' characteristic of former generations that remain in use in the present time, and can be imported bodily into modern work." He places the word features between commas, and perhaps he attaches a different meaning to it than that which is usually understood by the word. By the word features we understand windows, doorways, spires, towers, columns and a hundred other portions that go to make up a whole design, even including lych-gates, all of which remain in use at the present time, and I say that an architect shows his skill by adapting these features to present day requirements. But the leader writer, according to his argument, would consider that an architect who made use of the lancet form of window and adapted it for, say, a staircase hall, was glaringly ignorant of the first principles of his profession. Then let one ask him how did "Mediæval designers" "make features." If my clerk, with six months reading of elementary treatises on architecture made use of such an expression, and told me that Mediæval architects "made features" I should tell him he had better start and read his book again for that he had missed the whole principle of the development of the art. Did the "Mediæval designer" MAKE features out of the requirements of his time or out of anything else?

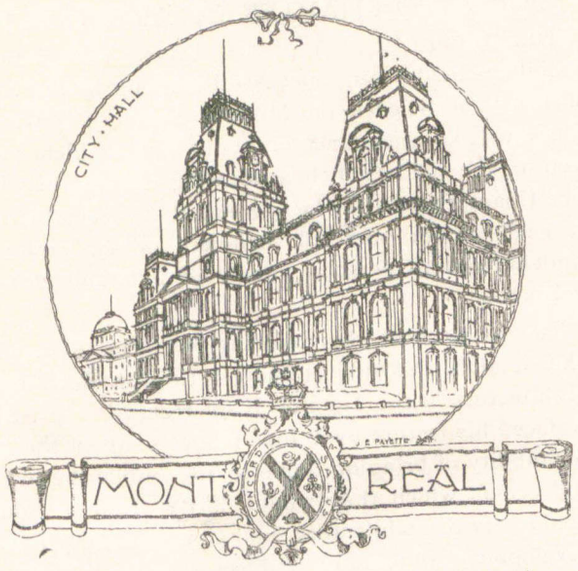
Our unknown quantity says that architecture is "a process" and he is right, and therefore he ought to know well enough that the "Mediæval designer" simply assisted in the process of development, he did not make features, he could not do it any more than we can now-a-days; he adapted—he made use of the work of centuries, the study of generations of his predecessors, and he adapted their work, and produced a further step in the gradual process of development. "Adapt" does not mean "slavishly copy," but rather to cut and shape, turn and twist, if need be, to make a general outline and even detail and make it suit a present day requirement. All architecture since the fifteenth century is classed as "imitative," and if the word "imitative" is a correct description of the work of the last three centuries, certainly the word "adapt" is appropriate. Our work therefore being "imitative," or "adapted," it is not produced by the same process by which "good architecture" was produced in olden times. The development of architecture was due entirely to structural necessities—a well known fact—to be observed in the work of all past ages. These structural necessities naturally differed in every climate, and were dependent upon the materials at hand. Nothing is more interesting than to trace the various steps of development from the earliest and rudest structures, first to the application of the arch, and then the various consecutive stages in the history of the arch, until the climax was attained in the pointed arch, which was, we may truly say, forced upon the "mediaeval designers" by the necessities of construction for a particular purpose.

But I am not now lecturing to a class of students; when next I do so I shall be glad to give your leader-writer a ticket of admission, as further remarks on the history of architecture would be more appropriate there than in your correspondence columns. I am sorry to have to inflict so long a letter upon you, but your leader is responsible for it.

Yours truly,

R. W. GAMBIER-BOUSFIELD.

[Mr. Bousfield's graphic description of the use to which the lych-gate still continues to be put in England accounts clearly for its invention as an adjunct to an English churchyard, but not for its application as the entrance gate of a gentleman's house, which was the point in question. As to the larger questions—what is a feature; did mediaeval designers make them; and why should we not adapt them to other purposes? We can only reply that we should call the lych-gate a feature; that the mediaeval designers certainly made it to meet requirements such as Mr. Bousfield describes; and we think its adaptation as a gateway to a gentleman's house is questionable, because it is formed to meet requirements which do not exist in a gentleman's house. That they do still exist in a cemetery is a reason not for but against its ornamental application elsewhere.—EDITOR C. A. & B.]



(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

MONTREAL'S NEEDS.

THE Insurance and Finance Chronicle of this city, which, by the way, is the property of ex-Mayor Wilson Smith, calls attention to the fact that Montreal requires a few important public buildings to place her in rank with other cities of like importance. The list of requirements includes a new city hall, a public library, a national museum, a public assembly hall, an art gallery, a custom house and post office and gaol. Regarding the first of these, it is recognized that the present city hall is too good to be sacrificed at present, but the gaol is declared to be "a disgrace to any government." It is urged that the cost of these improvements should be defrayed by private munificence and from the Federal and Provincial treasuries. Architects and builders would like to cherish the hope that some of these improvements will shortly be undertaken, but I must confess that the signs of the times do not appear to point in that direction.

INDUSTRIAL CLASSES.

The total attendance of pupils at the classes of the Council of Arts and Manufactures throughout the province is 1100. The number attending the classes in this city is 375. It is said to be the intention of the Council to open new classes next year. They have also announced their purpose to make awards in the form of medals and useful articles to the most deserving pupils.

UNIFORM HEIGHT OF BUILDINGS.

The Montreal Real Estate Owners' Association at a recent meeting resolved to petition the City Council to pass a by-law compelling the uniform height of buildings to be erected on new streets. The object is to prevent depreciation in the value of buildings of moderate height by reason of the placing of tall buildings alongside them. The suggestion is one that should receive the careful consideration of the Council. For many years in Paris regulations governing the height and character of buildings fronting on the public thoroughfares have been enforced. Within the last two or three years, since the injurious effects of the sky-scraper style of building have become manifest, regulations have been adopted in Boston and Chicago restricting the height to which buildings may be reared in the future. The Real Estate Owners' Association would appear therefore to be in line with the most advanced legislation on this subject.

A CRITICISM.

A correspondent of the Gazette, writing under the nom de plume of "Civis," criticizes the constructional methods employed in this city in terms following: "In fireproof buildings, girders sustaining concentrated loads or bays of I beams and masonry, arching should span, as well as be supported on steel stanchions fire protected. Also stone moulded window sills, cut in three pieces, while the stone ashlar appears but veneering with bed and butt joints conspicuously yawning, and misplaced. Such parsimony in stone may be observable in jerry structures, but absolutely insults the status of representative institutions."

WIND PRESSURES.

Mr. Chas. Baillarge, City Engineer of Quebec and ex-President of the Province of Quebec Association of Architects, writing to the Engineering Record on the subject of "Wind Pressures on Surfaces of Different Areas," says: "These differences may be accounted for on the assumption that a gale of wind presents areas of maximum pressure far in excess of the average pressure. For example, in a gale at Quebec the galvanized iron roof sheeting of four of the octagonal kiosks on Dufferin Terrace remained untorn, while a fifth kiosk, in the midst of the other four, had its sheeting bent, twisted and torn off, while the entire roof framing of cast and wrought iron, well bolted together, was wrenched from its eight supporting columns. The whole roof, weighing 2½ tons, was raised to a height of some 40 feet, and carried a distance of about 300 feet, where it was dropped in a broken condition on the glacis in the rear of the terrace. It is evident that in this case there was within the general stream of wind blowing up the St. Lawrence against the terrace an intensified current which struck the demoralized structure. I reduced the subject to figures at the time, some ten years ago, and found that while the anemometer indicated only 59 pounds' pressure, the stress on the roof of the kiosk which tore away and hurled it such a distance must have amounted to least 100 to 120 pounds to the square foot."

NOTES.

Mr. Archibald Spence, inventor of the "Daisy" hot water boiler, died in this city recently, after an illness of eleven years.

As a result of government inspection recently, the city hospital has been declared to be no longer habitable, so that its early replacement may be looked for.

The news comes from Paris of the death, at the early age of 29, of the famous sculptor, M. Lecardonnel, who in conjunction with Cherest designed the Champlain Monument at Quebec.

The President of the Royal Canadian Academy, Mr. Robt. Harris, recently resumed work in his studio, Phillips Square, after having spent seven months in visiting the art galleries of Europe.

Messrs. D. Norman MacVicar and J. C. A. Heriot have withdrawn from the firm of Brown, MacVicar and Heriot, architects, and have formed a partnership under the name of McVicar and Heriot, with offices in the Canada Life Building.

At the ball lately given by Mrs. Meighen, 140 Drummond street (formerly the residence of Lord Mount-Stephen), an unique effect of lighting the main staircase and hall was produced with reflectors placed outside of the stained glass windows and ornamental skylight. As the art glass was exceedingly handsome, and the lights not spared, the effect was excellent. The job appears to be in for all time, as the rubber lead encased wire is laid firmly outside the house on the limestone, and does not make an unsightly piece of work either, as the lead makes a fairly good match as regards color to the stone.

The Builders' Reporter and Engineering Times, of England, recently contained the following: The Canadians are showing loyalty by seeking professors of architecture and engineering in this country. The latest appointment is that of Mr. E. G. Coker as assistant professor of civil engineering in McGill University, Montreal. Mr. Coker is not only a graduate in engineering of Edinburgh University, but he has had an unusually extensive training in experimental engineering in the laboratories of the Universities of Cambridge and Edinburgh; Owens College, Manchester; University College, London; King's College, London; Finsbury Technical College, and the Heriot Watt College, Edinburgh. In 1896 he was offered the senior professorship of mechanical engineering in the Worcester Polytechnic Institute, but declined the appointment in order to pursue further studies at Cambridge. In Montreal Mr. Coker has plenty of scope to exercise his abilities.

SIR CHRISTOPHER WREN.

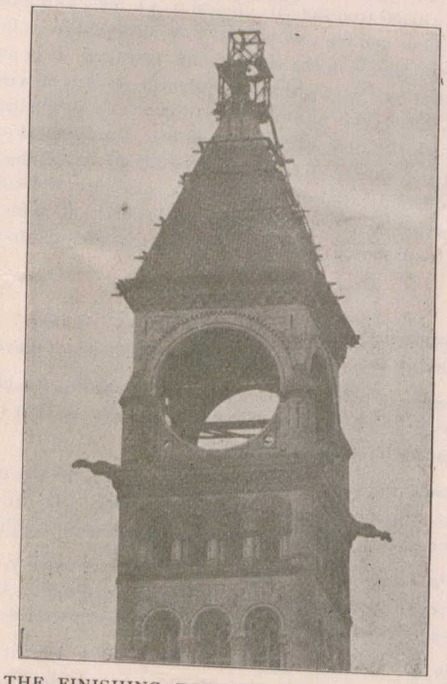
THIS renowned architect was born at East Knoyle, in Wiltshire, on October 28, 1632. His father, Dr. C. Wren, was Dean of Windsor, and young Wren was educated at Westminster School under the celebrated Dr. Busby, being afterwards entered, while yet only in his fourteenth year, as a gentleman-commoner of Wadham College, Oxford, where he distinguished himself in mathematics. In 1650 he took his degree of B. A. and in 1653 that of M.A. Evelyn spoke of him about this period as "that rare and early prodigy of universal science." In 1657 Wren left Oxford for London, where he became Gresham Professor of Astronomy, but four years afterwards he returned to Oxford as Savilian Professor of Astronomy. Before leaving London, he had, however, assisted in laying the foundation of the future Royal Society.

ILLUSTRATIONS.

A HOUSE IN ROSEDALE, TORONTO.—R. J. EDWARDS, ARCHITECT.

HOSPITAL, CHARLOTTETOWN, P.E.I.—C. B. CHAPPELL, ARCHITECT.

ALMSHOUSES, CHISLEHURST, ENG.—A. T. TAYLOR, F.R.I.B.A., ARCHITECT.



PUTTING THE FINISHING TOUCHES TO THE TOWER OF THE NEW MUNICIPAL BUILDINGS, TORONTO.

The accompanying illustration shows the roofers engaged in putting the finishing touches to the new municipal buildings, Toronto. The platform shown at the apex of the tower was erected for the purpose of putting in position a terra cotta finial 12 feet in height. When it is mentioned that this finial stands 300 feet above the ground level, it will be admitted that the job which is engaging the attention of the workmen is one requiring no small amount of skill and nerve. Messrs. Duthie & Sons, of Toronto, are the contractors for this work.

The total weight of this tower is upwards of 11,000 tons. It rests upon a foundation 72 feet in diameter. The tower itself is 32 feet square. The clock tower is 56 feet below the summit. The opening designed to show the clock dial is 20 feet in diameter, and from this point a magnificent view of the city is obtainable.

S. P. S. DINNER.

THE tenth annual dinner of the undergraduates of the School of Practical Science, Toronto, held on the 9th inst., was as usual a well attended and successful function. The chair was occupied by Mr. W. E. H. Carter. Among the invited guests, in addition to members of the Faculty, were the Minister of Education; Mr. S. H. Townsend, President of the Ontario Association of Architects; Prof. Mavor, Toronto University; Mr. A. W. Campbell, Provincial Road Instructor, and Mr. Archibald Blue, of the the Ontario Mining Bureau. The Minister of Education, referring to the development of the School of Science, stated that in 1883 there were only 11 students, as compared with 160 this year. He likewise made the gratifying statement that so far as he was concerned the school should want for nothing in the way of equipment necessary to its highest efficiency.

The credit for the success of the dinner is largely due to the efforts of the following gentlemen comprising the committee: Messrs. W. E. H. Carter, Chairman; T. Shanks, Vice-Chairman; Alex. H. Smith, Secretary; W. F. Thorold, Treasurer; W. H. Boyd, W. W. VanEvery, F. F. Clark, C. H. Boehmer, W. F. Grady, L. Yeates, J. B. Roaf, J. F. Wilkin. The menu was printed on white tracing paper, enclosed in a cover of white drawing paper, having as a front spiece an artistic pen and ink sketch, the work of Mr. W. H. Boyd.

TORONTO CHAPTER OF ARCHITECTS.

THE Toronto Chapter of the Ontario Association of Architects held a very successful meeting in the School of Practical Science on Monday evening, Nov. 14th. There was an attendance of about sixty, which augurs well for the success of these meetings during the winter. The Chapter meets on the evening of the second Monday in each month, and all members of the profession, students and all persons interested in architecture are welcomed.

The lecturer at this meeting was the Rev. C. H. Shortt, M.A., his subject being "English Ecclesiastical Architecture in the Time of King Henry." Mr. Shortt prefaced his lecture by a few remarks upon the great desirability of bringing home to the public the pleasure and benefit which they would derive from a study of the history of architecture, and showed clearly how the development of culture and good taste in the art depended not only upon the knowledge and experience of the architect, but also upon a a knowledge by the public of the difference between good and bad work. He urged the members of the association to become leaders in an organized crusade having that object in view. In his address on Perpendicular Gothic he dwelt upon the criticisms of the work of that period by Ruskin and others, suggesting that it was more severe than the faults of the work warranted, and making a strong plea for the right of recognition of many beautiful features of the architecture of the period. He conducted his audience through the transition from the early Norman work to the choir of Gloucester Cathedral and the veneering of the nave of Winchester, and showed how free from plagiarism was the work of that time, and how nowhere out of England could work of this character be seen. That was a period of monarchs whose orders were simply that a grand building should be erected, regardless of cost and conditions such as surround the architect of to-day. It was a period of wealth and prosperity in England. The lecturer referred to the introduction of colored glass in churches, and showed how it became a cause for the enormous windows of the period, divided into numerous panels by beautifully moulded mullions running to the top of the shield of the arch, and the probability that this led to the panelling of stone walls and the filling of the panels with paintings. After a brief discussion and a vote of thanks to Mr. Shortt, the meeting adjourned.

At the regular monthly meeting held in the School of Practical Science on Monday evening, December 12th, the chair was occupied by Mr. Helliwell. Mr. A. F. Wickson and Mr. W. A. Langton were unanimously re-elected to represent the Chapter on the Technical School Board. Mr. F. S. Baker read a paper giving an Englishman's impression of "Domestic Architecture in the Eastern States," which was discussed at length by the members present. The next meeting will be held on Monday evening, January 9th, when a paper will be read by Mr. J. Wilson Gray.

PERSONAL.

Mr. John H. Tilden, of the Gurney-Tilden Company, has decided to be a candidate for the mayorality of Hamilton.

The announcement is made in the public prints of the intended marriage at Flushing, Long Island, N. Y., on the 29th inst., of Mr. Vaux Chadwick, architect, of Toronto, to Miss Bessie Murray

ALMSHOUSES, CHISLEHURST, ENGLAND.
A. T. TAYLOR, F.R.I.B.A., ARCHITECT.

BY THE WAY.

THE report comes from England that a woman is to be admitted for the first time as an associate to the Royal Institute of British Architects. She is said to have passed with honors the entrance examination. We are not given the name of this clever pioneer in the ranks of the feminine architects.

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A NEW method of preserving an old brick building which showed signs of early collapse was recently adopted by the authorities of the South Dakota State Asylum. The structure was encased with a heavy coating of cement, which has rendered it impervious to the weather. An antique Tyrolese finish has been given to the cement coating, which is described as very pleasing. What the effects of frost and unequal expansion and contraction between the two materials will be remains to be told.

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A WELL known tea company have inquired of the Mayor of Toronto if they might rent for advertising purposes the clock tower of the new Municipal Buildings, pending the arrival of the clock. They offer to pay a reasonable sum for the privilege. Doubtless the citizens would like to hit on a plan to make a revenue out of these buildings, in which a couple of millions of their hard cash have been invested, but it is just possible that they would consider the above-mentioned method as being rather infra dig.

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THE Philadelphia Record purports to describe the origin of the elevator, which is to-day so necessary an adjunct of all important buildings. The earliest mention of the elevator, which is said to have been invented in Central Europe, is declared to have been made in a letter of Napoleon I., addressed to his wife, the Archduchess Maria Louise. He writes to her that, when in Schoenbrunn, then the summer residence of the Austrian Emperor, near Vienna, he used the "chaise volante" (flying chair) in the castle, which had been constructed for Empress Maria Theresa to save her the annoyance of climbing up the long flight of stairs. It consisted of a small square room, sumptuously furnished with hangings of red silk, and suspended by strong ropes, with counterweights, so that it could be pulled up or let down with great ease in a shaft built for the purpose about 1760. The great Corsican mentions that when he first entered the "flying chair" he was asked for his weight and that of his two companions, probably in order to employ the proper counterweights, since it was difficult for the operators to stop at the right point unless weights were about even. A similar elevator was built in the castle of Duke Charles of Lorraine about the same time, but this one was simpler, consisting only of a chair on a platform.

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LIGHTNING rods seem to a large extent to have passed out of favor of late. No doubt this is in a measure due to the sharp practices of the lightning rod vendor, who after securing the order cared but little whether the rod was put up in a proper manner or not. Mr. Thomas A. Edison, writing to the Popular Science News recently on this subject, says: "There is no doubt whatever that the lightning rods are a source of great protection when buildings are properly equipped with them. In doing this it is necessary to have good metal conductivity and a perfect connection with the earth at the bottom of the rod. If you refer to a book published by Sir William Snow Harris, who first introduced lightning rods into the British Navy and mercantile marine, you will find this subject discussed at length. Before the introduction of lightning rods in the British Navy, disasters were quite frequent, and the subject of protecting their ships from this element of danger presented itself in a very serious light to British naval officers. When Harris proposed equipping these ships with lightning rods, he was almost alone in the belief that they would afford such protection as was desired. After a great deal of trouble he succeeded in having them adopted, since which I do not think there has been a single serious disaster from lightning in the British Navy, which is conclusive that Harris's theory was correct. The same applies to buildings of inflammable nature erected on land, and when these are properly supplied with a sufficient number of lightning rods, dependent upon their size and the extent of ground covered by them, I believe they are absolutely safe from all danger." It is worthy of note that in New York City the electric wires and the metal so largely employed in the construction of large buildings, serve to attract and as it were absorb the electricity in the atmosphere, so that it has become almost an unheard of occurrence for a building in that city to be damaged by lightning. It is adduced in support of this theory that it is no unusual thing for the shipping in the harbor to be damaged by lightning.

METHODS OF PREPARING SPECIFICATIONS.

BY D. A. HEWITT.

MUCH has been said and experienced in the length of time it requires to draw a thorough and comprehensive description of the several things that go to make a complete specification. The drudgery could be lightened somewhat and delegated to a junior clerk who writes a good hand or can operate a typewriter, by a system of cataloging or cypher code alluding to the architect's private collection of choice architectural phrases.

In taking instructions from a client it is well to have a sheet on which to note the various and minor requirements which really enter into and form a very important part of the specification. By a judicious arrangement of the "Wants," this list may form a part of the specification skeleton, from which a concise and well arranged description is obtained for drawing the final specification. From the numerous pamphlets and books published on this subject, a good many clauses suited to the particular phraseology of the architect can be had, and from which he may make his book. The numerous clippings are most conveniently sorted into an "invoice" book, the pages of which are numbered, and an index of contents in the back aids a rapid search.

Each paragraph usually refers to but one item of the work, as "Strapping," "Casings," "Hardware," "Lathing," "First Coat of Plaster," or other things, according to the special department of work. The intention is to number the different paragraphs in each trade, as—25, "Strapping," 58, "Casings," and so on consecutively. A "skeleton list" of the aforesaid specification, giving the number and name of each paragraph, would assist the memory of the specification writer and be a check on the items that it should contain. When the architect is desirous of getting up a

specification for a new piece of work, he takes from his model specification a list of numbers (without names), and where special or altered clauses eventuate, he drafts them on separate slips of paper and makes a note of it on the list of numbers. The routine or stereotype of the matter can thus be obtained for the stenographer by the use of a string of numbers ; the intention is not to use the skeleton numbers in the finished document.

Interlining of old specifications has its advantages, but so seldom is it that two jobs are similar that it entails considerable drafting of slips to apply in this case. The suggestion of model clauses or slips is better.

Another feature is noted in specification writing, that which might be called the "Construction Method." As the several items come on the works and are used, in the same order should they appear in the written document, and thereby save many omissions or the makeshift of an addenda.

In the carpenters' work, four subdivisions might be made, and classified as "rough work," "exterior work," "interior work" and "trimmings, with hardware." Some architects draw a carpenter's specification as a whole, without making any different headings or marginal references. This involves time and patience in hunting out any one item, unless the person looking for it is familiar with the make-up. Mechanics having to refer for guidance, experience difficulty in locating the desired information from the vague way the clauses are designated, and the length of paragraphs, covering several items.

On completion of the whole specification a frontal index page should give the contents of the several pages, thus :

Page 1—Excavate, grade, etc.
Page 2—Drains, weepers, filling.

For single items of reference, the alphabetical index of contents to the printed forms is easy of access, but does not always assist the architect so well as a list prepared on the construction method.

Each trade should have a slight reference clause drawing attention to one general set of conditions and time schedule, giving date of completion for each contractor, preceding the main specification. Thus, such features of the "Builders' Revised Contract" as do not coincide with the wishes of the writer can be straightened out as he may desire.

Frequent changes could be made from time to time in a model specification or system similar to the manner in which a filing cabinet can be used. The arrangement should consist of cards of tag board, 3 inches high × the width of foolscap, on which each paragraph is pasted. The numbers must assist in maintaining order. When it is found absolutely necessary to elongate a clause, or introduce a new one, and space is not to be had on a card, let such additional card bear the number of the paragraph or insertion, and be distinguished by letters, as No. 76A. or No. 76B.

In "setting up" for a specification, one would only require to pick out the clauses and add such changes by written slips, to convey to the stenographer the matter. Letter files or a desk drawer will easily contain this system, and be kept in order by the office boy after each piece of work has been written.

Cobalt green is fast to light and weather, and does not re-act with other pigments. Dilute acids do not affect it, but strong ones dissolve it, forming a blue solution. Alkalies have no action upon it.

MARBLE WORK.

By George H. Blagrove.

Statuary, carved ornament, mouldings and surfaces—such are the principal uses to which marble can be applied in relation to architecture. There can be no doubt that the happy union between the natural and the ideal which was attained by Greek sculptors, and which rendered their creations at once so god-like and so human, owed much of its impressiveness to the pure white marble in which they worked. We have only to compare any single specimen of marble statuary with its plaster counterfeit to be convinced of this. Plaster being relatively opaque, it can give us nothing but reflected lights ; whereas the more enduring material derives a flesh-like aspect from its translucence, combining the effects of reflection and refraction. The former material is death-like, the latter life-like ; and when the milk-like surface of Carrara has been softened and mellowed by time, it has acquired a warmth assimilating it more closely to living flesh. There is no other material that can so well afford to be toned down as marble. Even when yellow with age, its surface is alive with minute scintillations of light. This is true in a greater or less degree with respect to many of our building stones, but it is pre-eminently so with white marble. These are the principal reasons why marble is so well suited for the highest purpose of the sculptor—the representation of the human figure.

In reference to statuary marble—the technical name is happily suggestive of its noblest use—the important question arises, should sculpture be polished? The public who are afforded opportunities of inspecting ancient marble sculpture in museums, and modern work of a corresponding kind at the Royal Academy and elsewhere, have been educated into thinking of figure sculpture generally as unpolished. Modern specimens of polished work are to be met with occasionally ; polished figure sculpture dating back some two hundred years or more, is more plentiful, and there are isolated examples of Greek and Roman production which retain their original polish almost unimpaired. But with these exceptions, it may be asserted that the best sculpture which the British public ordinarily obtain opportunities of seeing has either never been polished, or has so far parted with the polish it originally had, that it cannot now be said to possess any. Yet it is an established fact that not only the Greek and Roman sculptors of antiquity, but those of the mediæval period also, gave a very high polish to the nude portions of their statues. The same practice was followed in the Renaissance period, and Michel Angelo even went so far as to polish some portions of a statue more highly than others, so as to obtain high lights just where he wanted them. Yet modern sculptors are practically unanimous in discarding polish, rejecting in this respect, as we have seen, the traditions of their best predecessors in the art. Which is right, the practice of the moderns, whose art is but a thing of yesterday, or that which was undeviatingly followed in the best as well as the worst periods of art within the cognizance of history? The question is, as we have designated it, an important one ; for the practice deemed right for adoption in relation to figure sculpture ought to furnish us with some principle for our guidance in dealing with architectural carvings generally. It behoves us, therefore, as architects, to determine which practice we intend to encourage, as occasions present themselves calling for our decision.

Professor J. H. Middleton, who contributes a learned

and thoughtful paper on "Sculpture" to the latest edition of the "Encyclopædia Britannica," is strongly in favor of the ancient practice, which, he declares, "really suggests the somewhat glossy surface of the human skin very much better than the dull, loaf-sugar-like surface which is left on the marble by modern sculptors. Here we have an assumption combined with an assertion. It is assumed that we are justified in seeking to produce a realistic resemblance to the human skin, and it is asserted that polished marble goes nearer to produce this effect than if it was left unpolished. Accepting the doctrine that the aim of the sculptor should be to produce a resemblance to human skin, which we may well do without carrying realism too far, we may seriously ask ourselves, "is the skin glossy in its normally healthy condition?" We feel bound to confess that it is not so —certainly not more so than ancient sculpture whose polish has been dulled by time. The healthy skin presents a slightly-glazed surface only when it is tightly stretched over a bony protrusion, such as a raised shoulder or bent knee, and then its glossiness is softened by the minute down with which the skin is covered. The skin of a figure emaciated by famine or disease is often glazed, especially where it forms the only covering to the bones; but the dry skin of the healthy subject presents, on the whole a dull texture. One property, already noticed, which living flesh possesses in common with statuary marble, is translucence; but this property is largely nullified by polish. In so far as we increase the reflecting power of marble by polishing the surface, we reduce its absorbing and refracting powers, which constitute its translucence. Light, striking upon a highly polished surface, rarely penetrates beneath it, but is thrown off at once. Human flesh is soft, and how can the lights and shadows which fall upon polished surfaces present the same soft gradations of tone as those which rest upon smooth but unpolished surfaces? According to Professor Middleton, it is "much to be desired that modern sculptors should, to some extent at least, adopt the classical practice, and by a slight but uniform polish, remove the disagreeable crystalline grain from all nude parts of the marble." But we contend that, unless the marble is to be placed very close to the eye it is just the lustre of this crystalline grain which is so helpful in softening the abruptness of strong shadows.

If the absence of polish produces the effect of softness, its presence must suggest the contrary idea; and the hardness and closeness of surface produced by polish are surely associated in the mind with corresponding qualities in the mass of the material. This essential difference between the effect of a polished and an unpolished surface, places it in our power to produce striking contrasts of surface without the aid of color, some portions of a composition being polished, while others remain unpolished, there ought, however, to be no doubt in the mind of the artist as to when or where polish should or should not be employed.

If the reasons adduced against the polishing of nude statuary are held to be of sufficient weight, we are furnished with the outline of a principle which may serve for our guidance in the treatment of carved ornament generally. If it be the legitimate aim of the sculptor to follow nature as closely as possible in the counterfeit presentment of human flesh, then the surface of the marble should, in other cases, be made to resemble the surface of the object represented. Thus, while we should not apply polish to the nude figure nor to drapery, we might at once mark the distinctive surface-character of weapons, armour, or other metallic objects represented. Foliated ornament we should never polish; and indeed it is scarcely conceivable that any representation of an organic form should be so treated. We shall probably not go far wrong if we agree that polish may only be applied to representations of artificial forms, and not invariably then. If we adopt Mr. Ruskin's view, as expressed in the "Stones of Venice," that representations of artificial objects should be subordinated in sculpture to those of natural forms, it will necessarily follow, that in bas-reliefs or groups of carved ornament, the proportion of unpolished surface will always be in excess of that which is polished; and we contend that the best effect is produced when this excess is large. When we compare the soft gradations of shadow and light which become possible upon an unpolished sculptured surface, with the sharp and restless contrasts in which polished surfaces abound, it seems evident that the latter should occur only exceptionally. Its startling brilliancy will afford occasional relief to the softer masses of the unpolished work. But the principle of repetition should never be forgotten. As the painter repeats his colors, the musician his cadences, and the architect his forms, so should the sculptor or carver repeat his areas of polished surface, that none may appear isolated or singular.

There is a practical objection to be urged against applying polish to delicately carved work, whatever it may represent, which will commend itself to every architect. It is clear that we cannot rub the surface of marble without effecting a slight, if imperceptible, reduction of its bulk. What may become perceptible in the process is a modification of form, unless the polisher possesses equal skill with the artist who originally carved the ornament. We are informed by a foreign firm of marble decorators who have assisted in the production of works of the highest class, that they never undertake to polish a piece of carving after it has left the sculptor's hands, notwithstanding that they have a staff of highly-skilled art-workmen at their disposal.

Reference has been made to Mr. Ruskin's views upon the subordination of the artificial to the natural in sculptured representations. That such subordination is appropriate, and, indeed, essential in all sculpture which has a story to tell, is we think undeniable. But Mr. Ruskin surely goes too far in asserting "that all ornament is base which takes for its subject human work." There is no doubt that sculptured trophies which relate to obsolete rites and customs appear ridiculous when reproduced upon modern buildings. But this is only because they have no significance for us. Let the trophies bear a close relation to the aims or requirements of modern life, and their appropriateness will at once be recognized, provided that their forms are agreeable to the eye.

To treat exhaustively of the uses of colored marbles, in their application to architecture, would seem an endless task. It is easy, however, to define broadly the limits within which their uses should be confined. It is well for us to recognize that variety and brilliancy of color cannot successfully be combined with elaboration of form. Mr. Ruskin has somewhere given expression to this doctrine, illustrating it by a comparison between the swan and the humming-bird—the first exhibiting perfection of form, and the second perfection of color. The more we reflect upon the principle inculcated, the

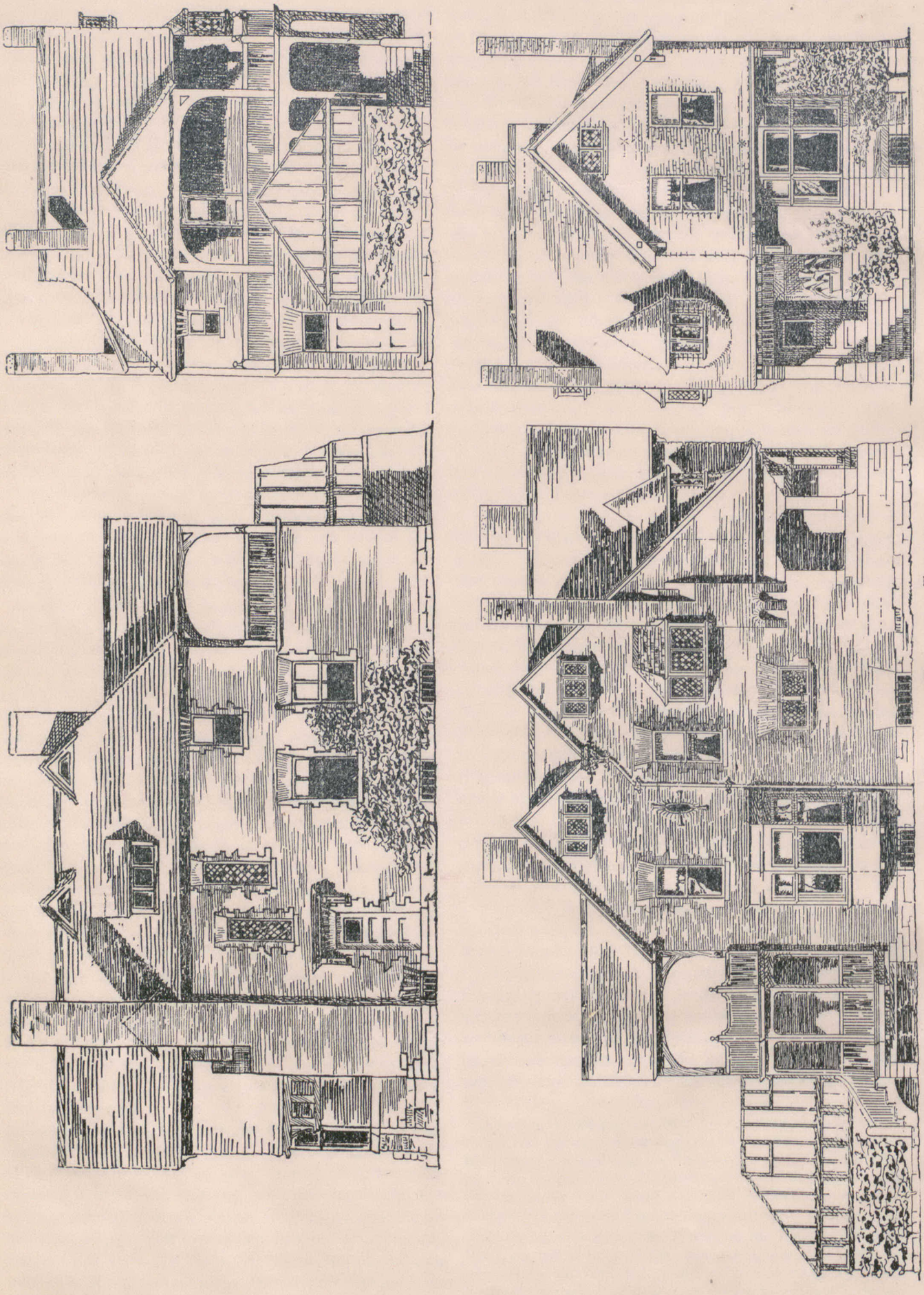
more we are convinced of its truth. It is evident that the full appreciation of form depends upon contrast. It may be a contrast of light and shade upon one material, as in the case of a bas-relief, or a band of carved ornament; or it may be a contrast between the colors of two different materials, as in the case of a statue enshrined in a niche; but in either case there are only two colors or shades to be broadly contrasted—the introduction of a third would weaken the effect. The sharpest accentuation of form is obtained by projecting white against black, or black against white; and this can be exemplified in reference to marble inlay or mosaic. The most feeble presentation of poses which are intended to be strikingly effective, may be seen in the "tortuous attitudinising" of harlequin in his variegated costume, the brilliantly contrasted colors in which quite distract attention from the form which it covers. If the man were arrayed in one color, we should distinguish his figure clearly against a suitable background. It follows that if the forms of architectural details are to be shown to advantage, they must be executed in uni-colored marbles. No cornice or other group of mouldings can exhibit its lines in their full meaning when their contiguity is traversed by the irregular markings of a variegated pattern. It is safer to reserve the variegated marbles generally for use in large masses of plain surface only, where there is no form to be impressed upon the eye except that of the outline. Even veined marbles should be employed with caution for architectural features. It was the opinion of Sir William Chambers that marble columns should not be fluted; and this was due to the feeling that the breadth of a veined surface ought not to be interrupted with sharp vertical lines.

Another point to be observed in connection with marble work is that all delicate mouldings, and sunk or raised enrichments, should be executed in marble of light color, if not white. Slight shadows and subtle gradations of light are overwhelmed by a depth of strong color. Dark-colored marbles require very bold treatment to give any appreciable emphasis to high lights and depths of shadow. Those who have been accustomed only to designing ornament in white marble, freestone, wood or plaster, will find themselves at fault unless they adopt a fundamentally different method in dealing with such a material as Ashford, or the dark green serpentine of Letterfrack, which, though not strictly a marble, is used and regarded as such by marble decorators. The mouldings and enrichments most effectively executed in dark-colored marbles are those of abrupt contour, which admit of sharp, concentrated high lights, and depths of shadow undiluted by reflection. Polish intensifies the depth of color when not exposed to direct light, while it increases the brilliancy of high lights. This is why polish should be applied, by preference, to dark-colored rather than to light-colored marbles. It is upon plain surfaces, however, that polish comes most into requisition, as in wall-linings and dadoes, and the boxed enclosures to iron construction, to which marble is most extensively applied in modern work. It may, and indeed has been objected against the practice of veneering with thin slabs of marble, that the result is only to produce an elaborate sham. But everything depends upon how the veneering is done. If slabs of marble are affixed to a wall in such a a manner as to break joint, the joints at the external angles being concealed in mitres or in quirks of beds; if steps are formed with treads, risers and spandril ends of the same material, the very veins and patterns of the marble being so arranged that they shall run in unbroken continuity from one slab to another; if, in short, every effort be made to deceive the spectator into imagining that the thin slabs are really solid blocks of marble, then the whole composition is a sham, and is utterly offensive to good taste. But if, on the other hand, the designer simply sets himself to produce pleasing decoration, instead of trying to imitate construction which does not exist, he will boldly confess that his decoration is only a casing, and does not pretend to be anything more, and his wall-linings will not be confined to the tiresome regularity of equal-sized slabs, breaking joint; but he will consider himself free to use panels of forms which bear no relationship to solid masonry, being merely beautiful in themselves; and his external angles may be treated with mouldings in a different material from the wall-linings, which they could not be if the whole were required to be an imitation of solid work. He will case up a girder with panelled soffit, side architraves, and moulded string courses above, all in marbles of different colors, because he does not wish to counterfeit a solid marble beam carried over an impossible bearing; and he will follow a similar principle in enclosing an iron stanchion. The Venetian architects of the Romanesque period treated the art of marble veneer upon sound principles, honestly exposing the edges of the slabs, which they often decorated with simple nail-head enrichments.

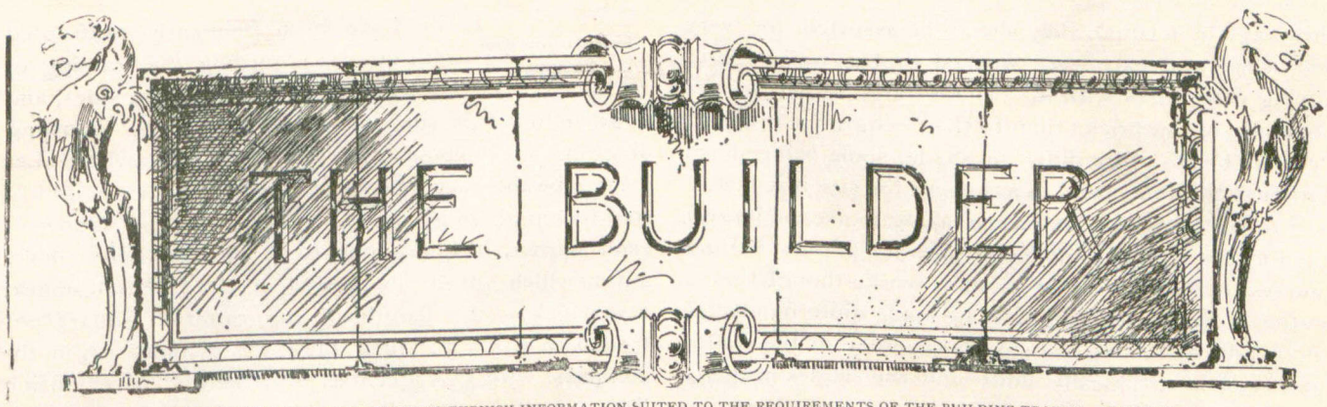
There is one caution to be observed in the use of colored marbles, and that is not to employ too many colors. Of course this applies to every kind of decoration into which color finds admittance, but in dealing with marble the temptation is too often to revel in a variety of stones. Brecciatted marbles of large pattern find their place only in panels of proportionate size, in which the beauty of the material is fully exhibited, suitably framed. An adjacent panel, if smaller, may often be filled with the same breccia, taken from another part of the bed which is found to furnish the same pattern on a smaller scale. Thus may a frequently recurring difficulty be surmounted without the necessity of resorting to different marbles for small panels. With uni-colored marbles, perhaps the richest combinations may be formed with crimson griotte, jaune Lamartine, dark green porphyry, Cardiglio, and the pale green campan, with the addition of black and white. We can scarcely indicate any that are uni-colored within the strictest acceptance of the term, but in those that are ordinarily so styled, the markings are so small and subdued, that they do but serve slightly to tone down the prevailing color. Hence it is that absolutely pure primary colors are not obtainable in marble decoration, and hence arises the importance of preserving clearly defined contrasts between the stones selected, avoiding any two between which a modified resemblance subsists.

In putting the plate glass front in the new Thomson block at Vancouver, the usual supporting post at the corner was dispensed with, and the ground edges of the glass clamped together. The front was designed by J. W. Mitchell, and the work executed by the Vancouver Plate Glass Co. This method has also been adopted in a new store front on King street west, Toronto.

Mr. Ryan, of Smith's Falls, contractor for the Carleton Place town hall, has brought suit for damages against one of the sub-contractors, Mr. Wm. Willoughby, of Carleton Place, who, being a member of the town council, was obliged to relinquish his contract owing to the refusal of the council to accept his resignation as a member of that body.



HOUSE IN ROSEDALE, TORONTO.
R. J. EDWARDS, ARCHITECT.



[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.]

Height of Ceilings.

In this northern climate, where the air is full of oxygen, ozone and other life-giving qualities, high ceilings are not so necessary for the maintenance of good health as the climates of more southern countries. The matter of heating our domestic buildings is one of considerable importance to every householder, and if economy, and health, and comfort can be procured without a violent sacrifice of good taste, he will generally embrace the opportunity of acquiring them. To heat a room of any given size, having a ceiling fourteen feet high costs considerably more than to heat one having a ceiling only ten feet high, and the air in the latter room will be as pure and as health-giving as that in the former; indeed, it is claimed by some scientific men in England that a low ceiling is the healthier of the two and is advocated as really affording better ventilation throughout, in preventing the formation of upper strata of all but immovable foul air, and tending to prevent draft. From an artistic point of view, low ceilings have an important value, as the furniture placed in them is not dwarfed by the height of the apartment, and they possess a cosiness which in a high ceilinged room is sacrificed to emptiness. In the reign of Good Queen Bess low ceilings and wainscoted rooms were the rule, and comfortable interiors, rather than imposing exteriors were the qualities sought for by the middle classes.

Pressed Brick In Fronts.

There is no branch of the bricklayer's art which requires more attention, and to be thoroughly understood, than that of pressed brick face work, which is becoming more and more in demand in this country. The many forms of pressed bricks, or terra cotta, that may now be obtained from the yards of our Canadian makers, enable our architects and designers to produce very effective work in brick. There is no beauty of detail or of design on a small scale that may not be obtained by the use of moulded bricks, and they are in themselves far more durable, and, if carefully burned, retain their sharpness of outline longer than most kinds of stone. The bricklayer of to-day, if he desires to be considered a proficient workman, should study and cultivate a taste for ornamental brickwork, and when an occasion is opportune for him to practice this branch of his art, he should do so with a knowledge of ornamental effect, and of the nature of the materials he makes use of; and he should perform his work in a skillful and careful manner. It takes time to lay pressed bricks properly, and those for whom the work is done should understand that to rush pressed brickwork is to spoil it. The effect of pressed brick fronts depends to a considerable extent on the color of the mortar used and its distribution, the best effects resulting from the use of mortar colored the same as the bricks. This is particularly true of a buff front, where colored mortar, red, black or brown, makes too much of a contrast to be pleasing to a refined taste. A buff front with light brown mortar and light stone trimmings form a fairly pleasing combination, but a much better effect is obtained with buff or white mortar and light grey stone trimmings. Dark red or terra cotta bricks may be laid in red, black, or grey mortar with nearly equal effect, but, as a rule, red or black are preferable, with red or blue stone trimmings. Mortar joints should be uniform in thickness, and should never exceed a thickness of three-sixteenths of an inch. The bond on the face should be perfect, the headers, stretchers and closers placed in regular order, and the face kept flush and plumb in every direction and well tied to the backing wall.

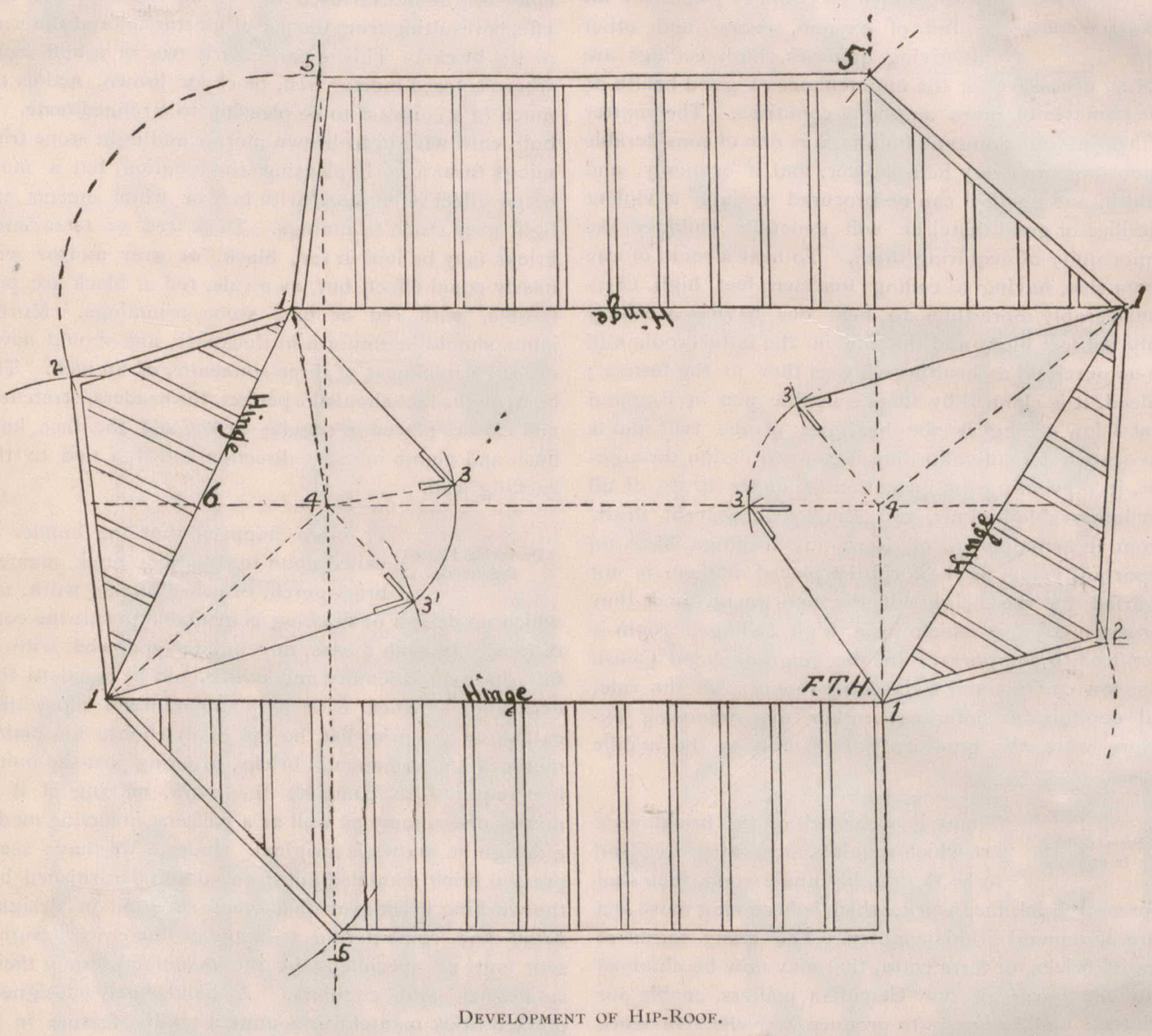
Designing Pressed Brickwork.

It often happens that the builder is called upon to design a brick mantel, brick porch, or other similar work, for which no design or drawing is available to suit the conditions. In such a case, any builder endowed with a fair share of ingenuity and skill should be equal to the occasion. Armed with a manufacturer's illustrated catalogue and price list, he can easily choose his plain, moulded and ornamental bricks, ordering just the number required to complete the work, making of it a matter of economy as well as a pleasure in having made a design he knows is original. Indeed, we have seen pressed brick mantels built from designs furnished by the working bricklayer that were superior in design, detail and combination to many of the crack designs sent out as specimens by the manufacturers in their catalogues and circulars. A handsomely designed pressed brick mantel forms quite a taking feature in a dining room, hall or billiard room, aud gives an appearance of cheerfulness to one, cosiness to another, and a pleasing welcome to the third. Frequently a few glazed or enamelled bricks can be introduced into a design with good results, in panels, or in relieving courses under moulded bricks, but their use must not be of too generous a nature, or the work will drift into gaudy vulgarity. There is a difference between "glazed" bricks and bricks that are "enamelled." The first is made by covering the raw brick with a "slip" and afterwards applying a coat of transparent glaze resembling glass, while the true enamel is made by fusing into the clay without an immediate coating, and the enamel is opaque in itself. These bricks may be obtained in almost any primary or secondary colors. Pressed bricks are more uniform in size than common bricks, but, as the

shrinkage is unequal, they should be assorted for very fine work and each size worked in the wall without mixing other sizes with it. This relates rather to the thickness of the bricks than to their length or breadth. Pressed bricks also differ in shade, some being much darker than others, and in assorting for size it is just as well to sort for color, and when laying to use the largest pile for face wall and the lesser piles for plinths, belting courses, corbels or other similar work, though, as a matter of fact, a building may be made quite handsome and bright by mixing the shades together in the wall if the work is artistically done and the shades properly grouped; but this implies a knowledge of color harmony not usually possessed by the ordinary bricklayer. Under no circumstances should pressed bricks be laid dry, as the mortar joint is so thin that the moment a dry brick touches it the moisture is absorbed and the mortar rendered inert. In hot weather it is impossible to get the bricks too wet, but in freezing weather less wetting will answer, but the bricks should be made warm before laying. It is much better not to lay bricks in freezing weather when it can be well avoided, but when it is imperative the wall should be covered every night with straw and boards, or better, with heavy horse blankets, and it is well to add about one-third in bulk of Portland cement to the mortar, which will make it quick-setting and prevent damage from frost. It is necessary that the surface of the bricks be free from ice and snow and perfectly clean when laid, as dirt or a frozen surface will prevent the mortar from adhering to the bricks, leaving the wall weak and unstable.

Irregular Hip-Roof Framing.

We have been frequently confronted with queries regarding the framing of "hip-roofs" having irregular sides, and in order to satisfy some of these queries the following diagram and explanations are given herewith: Let 1 1 1 1 be the base lines or ground plan; 6 4 height of roof to top of ridge pole. Connect 1 4 as shown at each corner. Square out to 3 on each line; make 4 3 3, which gives the height of elevation. Connect 1 3, which is the length of hip rafters. Square out from 4 to 5, 5 5 5; then take the distance 1 3 in the compass, with 1 as a centre, describe the curve cutting line 5, and again take 1 3, which is the shorter hip, and with 1 as a centre describe the curve cutting line 5, and bisecting the curve 5 to 2. Connect 5 1 1 2 2 1, and 1 and 5, and the figure is complete so far. This gives length of hips in position. This applies to either or to both ends of the roof, each being of like shape and proportions. Place the jack rafters or cripples at the domed spaces and the work is done. To make model: Draw the figure on cardboard the exact shape of the roof as shown, to any convenient scale, then cut the board nearly through with a sharp knife on the lines marked "Hinge," which are the lines of the wall; stand up the wings, or sides of roof showing lines of jack-rafters, until all the angles come together, and the shape of the roof will be given complete. The lines at "Hinge" may be cut through, and a piece of thin cotton cloth pasted on will allow the wings to turn up easily and will protect the joints as well. The bends for the plumb cuts of the rafters are shown at 3 3 3 3.



Development of Hip-Roof.

Backing for hips may be obtained by any of the usual methods.

Chimneys.

In estimating the cost of chimneys, the size of flue and thickness of wall must be taken into consideration; but where these conditions are defined the cost may be easily determined, the total height being known. Suppose a chimney to have a flue 4 × 8 inches with one thickness of brick outside. This will require 25 bricks to the running foot in height, and at the present price of labor and material, will be worth 75 cents per foot to furnish materials and labor and erect. Thus, a chimney 25 feet high will cost for bricklayer's work, $18.75. This, of course, does not include foundation or necessary carpenters' work. Chimneys having flues 8 × 8 inches require 30 bricks to running foot, and are worth 85 cents per foot to build. When the flue is 8 × 12 inches, 35 bricks are required for each running foot and cost of building will be 90 cents per foot. Chimneys with flues 12 × 12 inches require 40 bricks per foot and cost $1.05 per foot. A two-flue chimney—one flue 8 × 8 inches, the other 8 × 12, requires 56 bricks to foot, is worth per foot to build, $1.40. Two flues 8 × 8 inches, 45 bricks to foot, is worth $1.30 per foot. Chimneys having three flues, 8 × 8, require 66 bricks per foot, and are worth $1.60 to build. A chimney with two flues 8 × 8 inches and one 8 × 12 inches requires 75 bricks per foot, and is worth to build, $1.90 per foot. The cost of chimneys with any number of flues may be found by using the above as a basis to work from. Chimney breasts require about 95 bricks per foot in height, and is worth about $2.10 per foot to build; but if the chimney is in a corner, and the breast runs diagonally, the cost for labor will be increased at least 25 cents per foot. If there is a fire-place, and a grate to set, and a throat to make to flue, the cost will increase to $2.50 or $2.75 per running foot. These prices, of course, are for common bricks; if pressed or ornamental bricks are introduced into the work, 25 per cent. over and above the extra cost of bricks must be added to the cost. If ornamental tops are added to chimneys, extras must be charged to cover extra labor and extra cost of materials. There is no provision made for scaffolding or for colored mortars in the figures presented. Where these are necessary, their cost must be added to the figures given.

MONTREAL BUILDERS' EXCHANGE.

The first annual meeting of the Montreal Builders' Exchange took place in the rooms of the Exchange, 204 St. James street, on Monday, December 12th. A large number of the members were in attendance. The directors presented their annual report, as follows:

Gentlemen,—In presenting to you our first annual report of this organization, we do so with a feeling of satisfaction at the progress and growth we have experienced and which, if not quite up to the expectations of some of the promoters, is on the whole most gratifying.

There are a number of our members who constantly make use of the rooms and its privileges, and they have done so because it has proved beneficial to their business interests,—the privileges afforded and the benefits derived have proved an ample return for the membership fee; on the other hand it is a source of regret that a number of our members have failed to take that active interest in furthering the objects of the exchange that they should do. We felt justified in starting the Builders' Exchange on a membership of 40. The roll has steadily increased and we have now 113 members in good standing.

Your board appointed a committee on admissions, composed of the following names: Messrs. J. W. Hughes, Thos. Forde, C. W. Trenholme, W. T. McLaurin, J. H. Hutchison, Jas. Paton, Jno. Wighton. These gentlemen have performed their duties to the entire satisfaction of the board.

Your board elected the following names as honorary members: Messrs. Danl. Wilson, Robt. Weir, Moise Martin, Hy. Bulmer.

In order to interest and instruct our members your board made an effort to get some of our members to read a paper on some subject and Mr. Hughes kindly consented to do so, and presented a most instructive paper on the value of organization, at which a number of our members were present.

Conforming with a resolution of the board a letter was sent by our secretary to all the prominent insurance companies, monied corporations and Montreal City Council, real estate owners, federal and provincial governments, etc., protesting against the importation or encouragement of alien contractors and labor.

A letter was also received from a firm of architects complaining of delay they experienced in contractors neglecting to send in tenders in proper time. A copy of the letter was sent by your secretary to all contracting firms who were members.

A letter has been written to the city clerk in regard to the new building by-law, asking for information and what progress was being made towards its adoption.

Your board has instructed its legal adviser to apply for our charter; as this has to be obtained through the council of the local legislature, and as this body has not met since the date of our organization, we have not been able to take any steps in regard to the matter until the present time. The notice of application appears in the papers this week.

Our reading table has been well patronized, and the matter supplied for mental improvement has been greatly appreciated.

Your board, in accordance with the by-laws, has had to post the names of eight firms for non-payment of dues.

It is our sad duty to record the death of two members, viz., W. M. Briggs and F. W. Horton.

In conclusion, your board would most strongly urge on the members the necessity of greater co-operation and to come forward and assist their incoming board in furthering the general interest of our exchange.

Messrs. Chas. Trenholme and James Robinson were appointed auditors. They have kindly gone through our secretary-treasurer's books and we will now have the financial report for the past year, certified by them.

STATEMENT OF RECEIPTS AND EXPENDITURE.—1898.

RECEIPTS.

105 annual subscriptions @ $15	$1,575 00	
2 semi-annual subscriptions @ $7.50	15 00	
Rent of drawers	27 00	
		$1,617 00

EXPENDITURE.

Expense account, 11 months	$378 75		
" " clerk, 11 months	180 00	558 75	
" " rent, "		366 63	
		925 38	
Furniture account		384 94	1,310 32
			306 68
Balance in bank			306 68

Stock account,
Furniture account.....$384 94

Dec. 9, 1898. Audited and found correct,

C. W. Trenholme
James Robinson } Auditors.

After hearing the directors' and secretary-treasurer's reports for the year, which were considered highly satisfactory, a motion was unanimously passed that the same Board of Directors remain in office for the ensuing year. A vote of thanks was also unanimously accorded to the board, the Committee on Admissions, the auditors, and to Mr. George J. Sheppard, the Hon. Secretary-Treasurer, for their efforts in the interest of the organization.

The board is composed of Messrs. James Simpson, President; C. T. Williams, Vice-President; Peter Lyall, Amos Cowen, John McLean, F. Fournier, W. P. Scott, Directors, and Geo. J. Sheppard, Hon. Secretary-Treasurer.

SANITATION, HEATING.

VENTILATION OF HOUSE DRAINS.

THE following is a report by Dr. Unna, the municipal engineer of Cologne, on experiments made upon the necessity of fixing secondary ventilating pipes for house drains, and the consequent circulation of water and air in the same :

At the meetings of the commission which has recently been considering the revision of the Cologne police regulations referring to house drainage, doubts were expressed as to the soundness of clause 9 of the old regulations. This clause was worded as follows : "Each fall pipe must be continued in the same width, and if possible without a bend, until it reaches right above the roof. The upper points of the siphon joint are to be connected with this pipe for the purpose of ventilation, etc., in order to avoid the failure of the water seal. If more than two floors are drained into one fall pipe, then a separate ventilating pipe of at least 1¼ in. diameter must be provided, and this must be connected with the highest points of each siphon."

Apart from the fact that simplicity of construction is the guiding principle in the execution of house drainage works, the use of secondary ventilating pipes becomes positively dangerous if the installation is at all badly executed, because these pipes are soldered at such a number of points, any of which may not be tight enough to prevent the escape of sewer air. Besides, the more the installation is simplified, the cheaper it becomes.

The general method in Cologne was to use zinc pipes of a diameter of 1¼ in. The diagonal and longitudinal seams of these were either soldered badly or, as frequently happened, they were not soldered at all. The connection with the highest points of the siphons was made by lead pipes having an inside width of 4 in. The latter were often soldered blind, so that at least a continuous escape of sewer air was avoided. A careful examination of these connecting pipes proved that they were quite stopped up with grease, coffee grounds and cobwebs, thus fully justifying the doubts expressed by the commission. A radical charge is required with regard to this point. Those who were in favor of the retention of the by-law quoted advocated the insertion of a clause stipulating that the secondary ventilating pipe, as well as the pipe connections with sewer, should be made of lead or iron of an inner width of at least 1¼ in. Others argued that ventilating pipes were not necessary at all, because the siphon could not be exhausted even without them. In consequence of the great importance of the question of house drainage, the police found the money for a series of exhaustive practical experiments dealing with this matter, and instructed Mr. Maniewski, a police architect, to make same.

It was of great interest to me to join Mr. Maniewski in these experiments, as I had already instituted similar enquiries which served me as a basis for a paper on the laying of house drains, with special consideration of the hygienic significance of sewer air in connection with the same. This paper appeared in the Gesundsheitsingenieur, Nos. 23-24, 1895. As the trials were confined to the laboratory only, I experimented with narrow glass tubes. Our joint experiments were to cover a larger field so as to decide not only the value or otherwise of secondary ventilating pipes, but also various open questions, as, for instance, the movement of air and water in the drains, and so forth. For this purpose we erected a wooden frame (Fig. 1), about 32 ft. 6 in. high and about 25 ft. wide, divided into three equal storeys of a height of 9 ft. 10 in. The fall pipes were fixed on the perpendicular wall with hoop-iron clasps. The trial conduit consisted of a level main pipe, into which a sliding valve was inserted behind the junction of the first vertical fall pipe. (For gradients of the main pipe see later on.) This first fall pipe was carried right above the frame, and three closet pans were connected with it. In the ground floor another flat-laying pipe branched off from this fall pipe. On to this fall pipe also three closet pans were connected, placed behind each other a distance of 3 ft. 3 in. apart. The main pipe ended in a similar vertical pipe, which was also continued upwards right above the structure. Glass tubes of the same diameter as the inner diameter of the fall and main pipes were inserted into these at each floor.

In order to investigate every possible combination of systems and dimensions which are met with in practical work, the following points had to be considered : (1) width of drains or main pipes ; (2) width of sewage pipes ; (3) width of siphon connection of closet pans ; (4) depth of water seal ; (5) diameter of sieves in the sinks or pans ; (6) distance of pans from pipes ; (7) fall of the flat-laying sidewards connections ; (8) effect of enlarging, narrowing or closing pipes at their upper ends ; (9) result of fixing or omitting a main intercepting trap ; (10) the working of the latter on pans when connected with a pipe which is subject to sudden and copious flows of water, such as from roof gutters, bathroom pipes, etc. ; (11) effect of w.c. siphons on a pipe.

Before treating with the results concerning experiments of the working of the siphon valves against emptying of the pans by suction, a few remarks may be made referring to the observation of the movement of the water and the air in pipes and drains. These movements could be observed very clearly through the glass tubes above mentioned. During my former experiments with narrow glass tubes I could always observe that whenever a pan was emptied into a pipe a solid column of water piston was formed, which had on the water seals above and below an effect similar to that of the piston of a pump, and consequently they were broken—i.e., emptied by suction. This now only took place when flat-laying pipes or pipes which were closed at the top were used. In pipes open at the top, the water coming from pans laying sidewards of the vertical pipe was distributed in the following manner : First, it fell against the opposite side of the pipe, then it dissolved itself into single threads, and finally descended along the sides of the pipe in spiral form (Fig. 2). The number of these threads increased in the same measure as the influx of water increased. This process went on working gradually towards the centre of the pipe, until finally the whole was filled with these water threads. This distribution of the water in the shape of single threads explains the large quantity of air which accompanied its fall, as some air particles were carried along on the surface of each thread. In order to gauge the volume of this air, we inserted into the top of the pipe an anemometer of the same diameter as the pipe. The air had to pass through this instrument. It was then seen that a bucket of water (3.3 gallons) carried with it from four to six times that quantity of air, according to the rapidity of the flow. When four buckets of water were thrown in in quick succession, the quantity of air drawn in equalled 110 gallons. If the water was thrown in vertically from above, then parallel vertical threads were formed. This experiment was made with a second pipe 4 inches in diameter, and in this pipe about 50 per cent. less air was carried down with the water. There appears, therefore, to be greater force of suction with narrower pipes, especially when the inflow comes from the side. There was no change noticeable if the pipe continued upwards in about the same width. If the added piece had only about half the diameter, the water threads thickened, and the water in the side connections commenced to oscillate strongly ; this movement increased until these connections were emptied by suction. When the top of the pipe was stopped up, no water threads formed at all.

Small quantites of water in a wide pipe simply ran down along the sides ; by larger quantities of water a water piston was formed, similar to those noticed by me formerly in the glass tubes, which emptied the connections (by suction). The water flowing in the main drain did not show a level surface—it was more like a

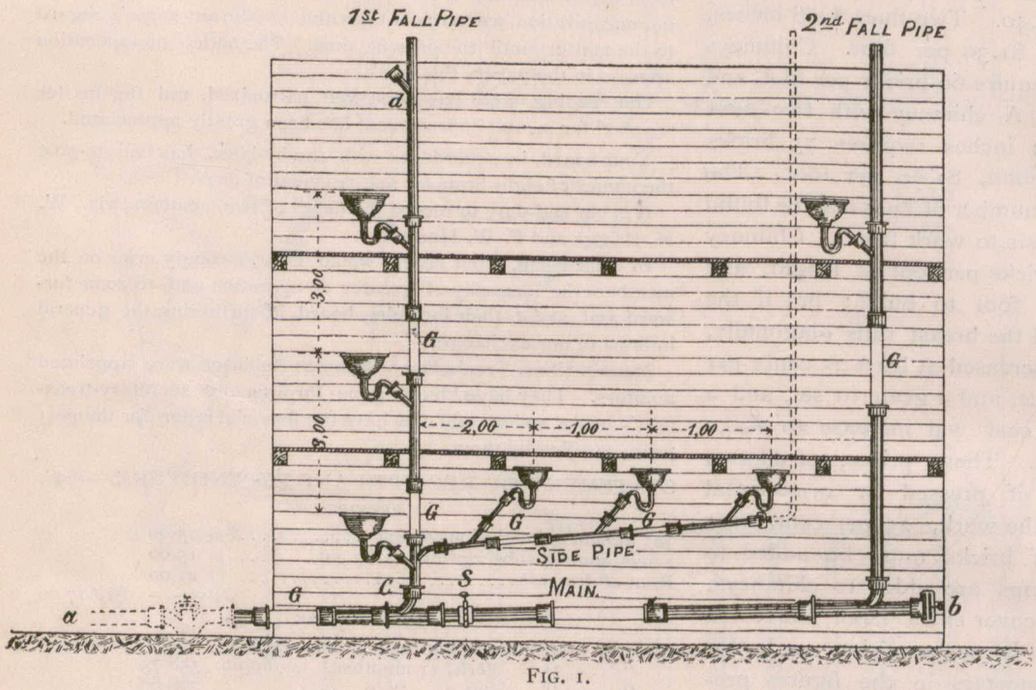


FIG. 1.

FIG. 2.

half moon (Fig. 3). This is accounted for by the friction of the water near the sides of pipe, which caused the particles of water nearest to move not so quickly as those in the centre. In the narrower side line (2 in.) the same observation was made, only with this difference, that the inflow of larger masses of water immediately caused the formation of a piston, and in consequence the emptying of the connections. The smaller pipe was cut open at the end and carried up vertically (Fig. 1). Here the same phenomena were observed. This pipe acts just like a main line of smaller dimensions.

No principal main interception trap was used in later experiments with syphons, since the use of the same is prohibited, and rightly so, by the new Cologne police regulations. Yet a few experiments were made on account of the great effect such a contrivance has upon the movement of both water and air in drains. When the trap was removed from the principal syphon, and a strong inflow of water equal to a medium rainfall was let into the second fall pipe, it was shown that the water rose in the principal syphon up to the top ridge, and a current of air ensued which could clearly be felt one yard above the open syphon, even when the first fall pipe was open at the top. When the main trap was closed, the current of air became strong enough to constantly break water seals which had a depth of 1½ in. It was even noticed that particles of falling water in the fall pipe were thrown up by this current. At any rate, these trials proved that the omission of the main trap facilitates the proper discharge of water in the house drains. Another question of the utmost importance in connection with the experiments described below was to ascertain the limit at which siphons were self-cleansing, as, though an increase in the water seal diminishes the danger of its being rendered useless by suction, experiments with siphons which are not self-cleansing are of no value. The maximum depth of the water seal depends upon the rinsing power sufficient to render the siphon self-cleansing. In order to ascertain this limit, experiments were made with siphons made of glass, of different widths and of different depths of water seal. The whole of the bends (see Fig. 4) was filled with slimy sand, after which water was let into the pan so as to give about 16 in. over-pressure. The diameter of the inflow on the sieve was taken equal to 50 per cent. of that of the siphon. What always happened was this: The water broke through at the upper part of the lower bend of the syphon, a, thus creating a strong current which carried away the rest of the sand. These experiments led to the following conclusion: Siphons of 1½ to 2 in. diameter proved self-cleansing up to 4¾ in. depth of water seal, siphons of 2½ in. diameter up to 2⅙ in. of water seal.

Siphons made of glass were used in these experiments, as already mentioned. The usual lead or iron siphons have, of course, not such smooth interiors as these, and therefore a depth of 4 in. may be taken as the average limit.

A word might be said about experiments made to determine what time expires before an ordinary siphon lets sewer air into the rooms owing to evaporation of water contained in it. For this purpose four glass siphons of 1½ in. and 2 in. diameter, and 2 in. to 4 in. depth of water seal, were set up in a medium temperature of 68 deg. F. They all showed an average evaporation of 0.4 in. per week. Therefore it would take 10 weeks to break a water seal of 4 in. by evaporation. The evaporation was reduced to 0.6

FIG. 3.

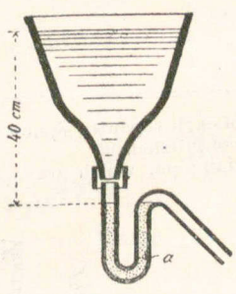


FIG. 4.

in. per week if a flannel cloth saturated with oil was inserted above the sieve opening of the pan. In this case a 4 in. seal would therefore be broken in about 16 weeks. A nearly similar result was obtained by pouring about a wineglass of oil into the pan. This shows that a house is quite safe in this respect during an ordinary holiday's absence. In order to be absolutely safe, it is only necessary to open the siphons and to fill them with glycerine.

We will now describe more minutely the siphon experiments on the vertical fall pipe at which the above-mentioned data were taken into consideration. The main drain, a b (Fig. 1), consisted of 5 in. pipes with a fall of 1 in 50. That was considered the lowest fall allowable. The first fall pipe, c d (Fig. 1), was 2 in. wide; afterwards one of 2½ in. width was used. The width of the siphon and siphon connections was 1½, 2 and 2½ inches, so that with the 2 in. fall pipe, 1½ in. and 2 in. siphons were used; while with the 2½ in. pipe, 2½ in. siphons were connected in addition to the former.

The 1½ in. siphons had water seals of 1½, 2⅓, 3¼ and 4 inches, while the depth was 2⅓, 3¼, 4 and 4¾ inches at the 2 in. and 2½ in. siphons. These combinations were tried with the various widths of pipes described above. One siphon of each size was made of glass.

In order to accurately observe the movement of the air—i.e., thickening or thinning—an opening was made at the highest point (see Fig. 5). This was corked, and an S-shaped 0.39 in. glass tube was inserted into it. This tube was 1 ft. high. Behind it was fixed a sheet of paper, ruled off to a scale, the zero point of which lay exactly in the middle of the tube. The tube was filled with water up to zero point.

In order to determine the diameter of the sieves, 0.2 in., 0.24 in., and 0.32 in. was fixed as width for the holes, and after measuring several samples current in the trade. The number of the holes varied very much, and their superficies was from 10 to 50 per cent. of the diameter of the opening. This appears at first sight impossible. The following table, however, explains it:

	Width of hole		
Diameter.	0.2 in.	0.24 in.	0.32 in.
1½ in.	63 holes	45 holes	25 holes.
2 in.	98 holes	70 holes	39 holes.
2½ in.	1,166 holes	118 holes	66 holes.

0.325 in. was used for the experiments as being the least favorable for the seals. According to the above table a 0.32 in. sieve would have, with an opening of 1½ in., 2 in., and 2½ in. diameter,

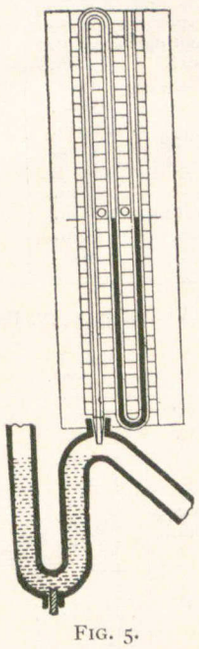


FIG. 5.

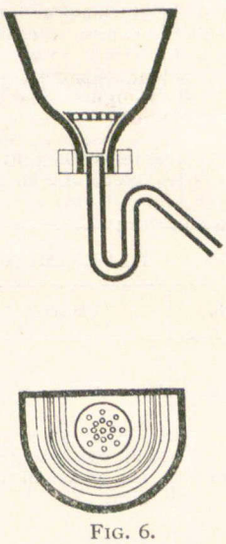


FIG. 6.

a 2¾ in., 3½ in., and 4¾ in. diameter, and 25, 39, and 66 holes respectively. These sieves were made of zinc and shaped like the rose of a watering pot, and were inserted as required into the lower part of the pans (see Fig 6). The opening which the latter were intended to close during the experiments was blocked with a piece of wood until the most favorable diameter was discovered.

In every experiment referring to the distance of pan from fall pipe the siphon was connected direct on the fall pipe branch by the insertion of a piece of the same diameter as the siphon, and also by a piece of the same diameter as the fall pipe by means of a reduction piece, so that in the latter case the distance from fall pipe to pan was 3 ft. 3 in. In order to ascertain what influence either the closing, widening or narrowing of the upper prolongation of the fall pipes had on the state of the water seal, every one of the above-described experiments was repeated, with the addition of a correspondingly wide top piece. All possible cases of inflow were tried by pouring the water into the upper, middle or lower pan, either singly or together, in every conceivable variation and by observing at the same time the action of every one of the three seals. From one to three or more buckets holding 3.3 gallons each were thrown in at one time (see later). At the last experiment of each series it was also determined in which way the widening or narrowing of the upper part of the fall pipe influenced the water seal of the siphon, and it was found that while a widening of the fall pipe had no effect upon the movement of the water contained in the siphon, on the other hand, a narrowing of the top piece gave unfavorable results. The principle of carrying every fall pipe in the same width right above roof must therefore be maintained. It is, however, preferable to make the top piece a little wider, so that an opening equal to the diameter of the original pipe still remains in the winter, when the same is liable to be partially stopped up by hoar frost settled along the rim.

If we now summarise the result of the experiments made with a vertical fall pipe, with three pans connected above each other, we arrive at the following conclusions:

If a secondary ventilation of the pan siphon is to be omitted, the following points must be observed: (1) The diameter of the fall pipe must always be greater than that of the water seal. A 1½ in. diameter of water seal corresponds with a 2 in. diameter of fall pipe (minimum); by 2 in. diameter of the former, 2½ in. minimum diameter of the latter is required, and so forth. (2) The water seal must be fixed immediately below the pan and connected either direct to the branch piece (which must be of the same width) without any connecting piece or with a branch piece of the same width as the fall pipe, and with a connecting piece of the next higher width of pipe of at least 2 in. diameter, fixed direct to the siphon. (3) The depth of the water seal must be 4 in. (4) The total of the openings in the pan sieves must not be more than 50 per cent. of the free diameter of the siphons underneath. (5) Every fall pipe is to be carried past the roof vertically, and, if possible, without a bend; but it is better starting, say, with a width of 2 in. below the roof, to add 2 in. of diameter from there, It should project at least 4 in. above the roof, and should

EXPERIMENT I.—VERTICAL 2 IN. FALL PIPE WITH PAN CONNECTIONS SPACED 9 FT. 10 IN. APART.

Branch.	Diameter of siphon.	Depth of water seal.	Emptied by suction.	Results.
(a) 1½ in.	1½ in. direct on the fall pipe.	1½ in.	At sieve diameter = $\frac{7}{25}$ of siphon diameter.	Can only be used by 4 in. depth of seal and ½ sieve diameter.
		2⅓ in.	" " = $\frac{10}{25}$ " "	
		3¼ in.	" " = $\frac{12}{25}$ " "	
		4 in.	" " = $\frac{25}{25}$ " "	
(b) 1½ in.	1½ in. and 3 ft. 3 in. connecting piece of 1½ in. diameter.	1½ in.	" " = $\frac{7}{25}$ " "	Must not be used without a separate ventilating pipe.
		2⅓ in.	" " = $\frac{9}{25}$ " "	
		3¼ in.	" " = $\frac{10}{25}$ " "	
		4 in.	" " = $\frac{15}{25}$ " "	
(c) 2 in.	1½ in. with small pipe of 2 in. to 1½ in. direct on fall pipe.	1½ in.	" " = $\frac{10}{25}$ " "	Can only be used with 3¼ in. depth of seal and ½ diameter of sieve, but preferably with 4 ft. depth of seal.
		2⅓ in.	" " = $\frac{15}{25}$ " "	
		3¼ in.	" " = $\frac{15}{25}$ " "	
		4 in.	" " = $\frac{25}{25}$* " "	
(d) 2 in.	1½ in. with 3 ft. connecting piece of 2 in. diameter.	1½ in.	" " = $\frac{10}{25}$ " "	As above.
		2⅓ in.	" " = $\frac{13}{25}$ " "	
		3¼ in.	" " = $\frac{16}{25}$ " "	
		4 in.	" " = $\frac{25}{25}$* " "	
(e) 2 in.	2 in. direct on the fall pipe	1½ in.	" " = $\frac{12}{39}$ " "	Only to be used by 4¾ in. depth of seal.
		2⅓ in.	" " = $\frac{15}{39}$ " "	
		3¼ in.	" " = $\frac{18}{39}$ " "	
		4 in.	" " = $\frac{25}{39}$ " "	
(f) 2 in.	2 in. with 3 ft. connecting piece of 2 in. diameter.	1½ in.	" " = $\frac{10}{39}$ " "	Must not be used at all.
		2⅓ in.	" " = $\frac{13}{39}$ " "	
		3¼ in.	" " = $\frac{18}{39}$ " "	
		4 in.	" " = $\frac{18}{39}$ " "	

EXPERIMENT II.—VERTICAL 2½ IN. FALL PIPE WITH PAN CONNECTIONS SPACED 9 FT. 10 IN. APART.

Branch.	Diameter of siphon.	Depth of water seal.	Emptied by suction.	Results.
(a) 1½ in.	½ in. direct on the fall pipe.	1½ in.	At sieve diameter = $\frac{8}{25}$ of siphon diameter.	Can only be used with 4 in. depth of water seal and ½ diameter of sieve.
		2⅓ in.	" " = $\frac{12}{25}$ " "	
		3¼ in.	" " = $\frac{15}{25}$ " "	
		4 in.	" " = $\frac{25}{25}$* " "	
(b) 1½ in.	1½ in. and 3 ft. 3 in. connecting piece of 1½ in. diameter.	1½ in.	" " = $\frac{7}{25}$ " "	Must not be used except with a special ventilating pipe.
		2⅓ in.	" " = $\frac{10}{25}$ " "	
		3¼ in.	" " = $\frac{12}{25}$ " "	
		4 in.	" " = $\frac{20}{25}$ " "	
(c) 2 in.	2 in. direct on fall pipe.	2⅓ in.	" " = $\frac{15}{39}$ " "	Can only be used with a depth of water seal of 4 in. and ½ diameter of sieve.
		3¼ in.	" " = $\frac{20}{39}$ " "	
		4 in.	" " = $\frac{25}{39}$ " "	
		4¾ in.	" " = $\frac{39}{39}$ " "	
(d) 2 in.	2 in. with 3 ft. 3 in. connecting piece of 2 in. diameter.	2⅓ in.	" " = $\frac{12}{39}$ " "	Can only be used with a depth of water seal of 4¾ in. and ½ diameter of sieve.
		3¼ in.	" " = $\frac{15}{39}$ " "	
		4 in.	" " = $\frac{20}{39}$ " "	
		4¾ in.	" " = $\frac{25}{39}$ " "	
(e) 2½ in.	2½ in. direct on fall pipe.	2⅓ in.	" " = $\frac{20}{66}$ " "	Must not be used at all.
		3¼ in.	" " = $\frac{24}{66}$ " "	
		4 in.	" " = $\frac{28}{66}$ " "	
		4¾ in.	" " = $\frac{32}{66}$ " "	
(f) 2½ in.	2½ in. with 3 ft. 3 in. connecting piece.	2⅓ in.	" " = $\frac{15}{66}$ " "	As above.
		3¼ in.	" " = $\frac{20}{66}$ " "	
		4 in.	" " = $\frac{26}{66}$ " "	
		4¾ in.	" " = $\frac{30}{66}$ " "	

* Emptying did not take place.

not end in a box, as hitherto used, but in a wire basket (Fig. 7) of a size at least equal to the free diameter of the fall pipe.

Now, follow the experiments made with a flat-laying drain of 2 in. diameter, which ran into the first fall pipe. Three pans also were connected with this drain. These were interchangeable, and we used 1½ in. siphons, with 1½, 2⅜, 3⅛, and 4 inches depth of water seal, and 2 in. siphons with 2⅜, 3, 4, and 4¾ inches depth of water seal. The distance of these pans from the fall pipe was 6 ft. 6 in., 9 ft. 9 in., and 13 ft. These were used either one at a time or simultaneously. In the former case the other two were closed up, so as to enable us to determine how the different distances between pan and fall pipe influenced the working of the arrangement.

As it was anticipated that the working of the siphons would somewhat depend upon the gradient of this drain, we placed it successively at 1:40, 1:20, 1:10, 1:5, 1:1. Since these trials only gave a negative result as far as the omission of secondary ventilation is concerned, it is unnecessary to give the details of the various trials, and we briefly summarize the result as follows:

The siphon of each single pan connected by such a drain to a fall pipe must always be ventilated if the pan is placed at a distance of more than 3 ft. 3 in. from the latter, unless the connecting piece is made at least ¼ in. wider, and the siphon constructed according to the rules, No. 3 and 4, laid down for vertical fall pipes. A single pan connected by a separate fall pipe with the main drain, if similarly constructed, requires no special ventilation, but in this case, as the one described above, a tap has to be provided in order to avoid the escape of sewer gas caused by evaporation of the water seal in case the pan is out of use for some months. Even in this case it is preferable to provide ventilation, and to omit it only when the structure of the building renders it too difficult of execution.

It is only necessary to place one ventilating shaft (of the same size as the side drain) at the farthest point from the fall pipe, provided that the former has a larger diameter than the siphons, and provided the siphons fulfil the conditions No. 3 and 4 above mentioned. In this case we must look upon these side drains as main drains, and these always require ventilating shafts. A secondary ventilation of each separate siphon is required if the above conditions are not fulfilled.

A second fall pipe, which was placed at the end of the main

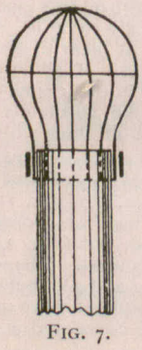


FIG. 7.

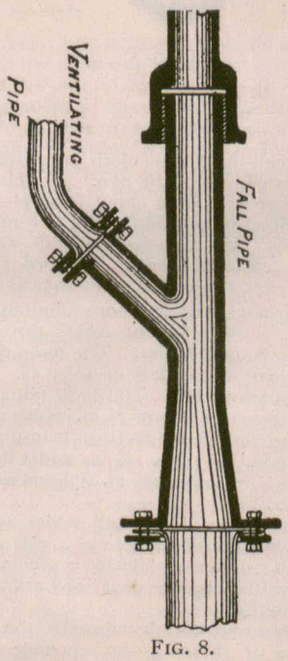


FIG. 8.

drain, was used to determine how water seals acted at a sudden influx of large quantities of water, such as occasioned by rain, baths, etc. Two of these pipes were erected consecutively. They

were of 2½ in. and 4 in. diameter respectively, and a pan having a 2 in. wide water seal was connected with them. The water was poured in through a hose fitted with a gauge cock, so that the quantity of water could be accurately regulated.

We allowed that, as a rule, 118.4 square yards of roof required a 2½ in. pipe, while for 236.8 square yards superficial a 4 in. pipe would be sufficient. The equivalent of a rainfall of ¼ in. on 118.4 square yards is equal to 0.0616 gallons per second, and that of double the size of roof is equal to exactly double that quantity of water passing through the pipe. We made the following experiments on the 2½ in. fall pipe: (a) 0.11, 0.22, 0.44 gallons per second, as corresponding to a rainfall of 2.79 in., 5.58 in. and 11.16 in. on 118.4 square yards of roof; (b) 0.22, 0.44 and 0.88 gallons per second, corresponding to the same amount of rain on double the size of roof. The result was as follows: The water seal of the siphon connected with the 2½ in. pipe was not weakened by an inflow of 0.11 gallon per second. It was emptied by the 0.22 gallon per second, and consequently (1) by an 8.8 gallon per second flow: (2) on the 4 in. fall pipe 0.22 gallon per second weakened and 0.44 gallon per second broke the seal. Therefore pans must not be connected with roof or bath-room drains. In any case a 4 in. deep water seal and special ventilation is required. In these experiments also we tested, by means of an anemometer, the volume of the air drawn down by the water. It appears superfluous to repeat here the various results, as they fully coincide with those made by the municipal architect of Posen, Mr. Grueder, and described in the Gesundheitsingenieur, 1896, No. 23.

In order to test the working of several w.c. siphons connected with one fall pipe, again the second pipe was used, first with a width of 4 in., then with one of 5¼ in. Three 4 in. branches were connected with the w.c. siphon by means of a connecting piece 3 ft. 3 in. long and 4 in. wide. Siphons with a depth of water seal of 1 in. and 2 in. and 3.3 gallon cistern were used. The result was as follows: (1) w.c. siphons with 1 in. water seal always required ventilation, even if the fall pipe was 5¼ in. wide; (2) w.c. siphons with 2 in. water seal always required ventilation if their diameter was equal to that of the fall pipe; ventilation was still necessary if they were more than 3 ft. 3 in. distant from the latter, even when their diameter was smaller than that of the fall pipe. Regulations therefore should always expressly demand siphons of at least 2 in. water seal, placed not further than 3 ft. 3 in. from a fall pipe of at least 5¼ in. diameter. Should the latter be narrower, then secondary ventilation must be provided. No experiments were made with w.c. siphons having deeper water seals, because they have not proved self-cleansing with the methods usually employed in Cologne—i.e., ordinary ring or centre rinsing. It is desirable that such trials should be made with closets worked by vacuum pressure or by lever. All the above described experiments refer to fall pipes continued upwards in the same diameter. The narrowing of a 5¼ in. fall pipe to 4 in. gave unfavorable results.

It does not appear to be absolutely necessary, where structural difficulties exist, to insist upon the continuation of the fall pipe in the case where only one single w.c. siphon is connected on to a 5¾ in. fall pipe, provided that the siphon is connected direct with the same, and has a 2 in. water seal, and that there is behind the first fall pipe another one which is ending in such a continuation. It is, however, desirable to do so under any circumstances.

This concludes the experiments concerning the desirability of secondary ventilation.

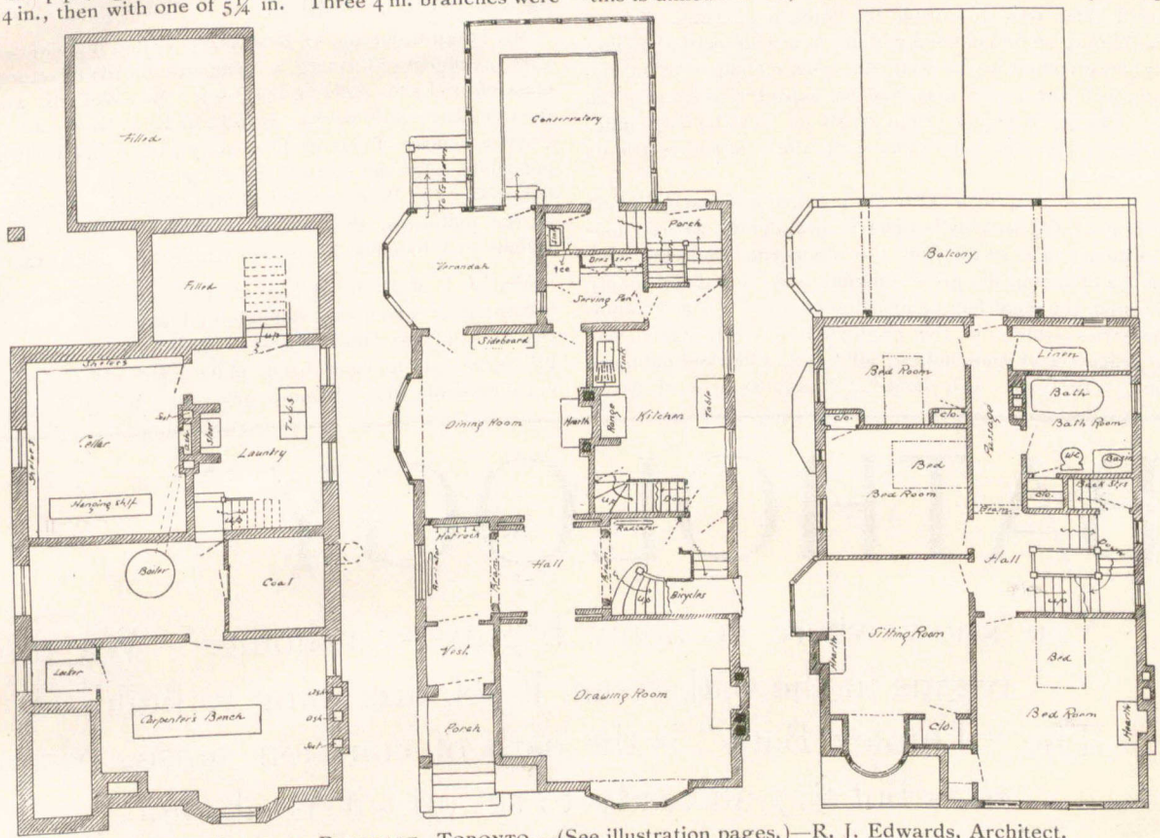
It now remains to determine the conditions under which it is necessary to demand the erection of secondary ventilating shafts. This has to be done in the following cases: (1) when the siphons of the pans have less than 4 in. and those of the w.c.'s less than 2 in. depth of water seal; (2) when the diameter of the fall pipe is not larger than that of the siphon; (3) when fall pipes through which large quantities of water have to pass, and to which pans are connected, are constructed with 4 in. diameter or less; (4) when the distance of the pans from the fall pipe exceeds 3 ft. 3 in.: (5) when more than one pan is connected with a horizontal line (for gradients see previously)—in this case, however, it is sufficient to carry up one ventilator at the end of this line furthest away from the fall pipe.

Although we may take it for granted that the method in which secondary ventilating lines are to be constructed is generally known, yet it may not be superfluous to indicate how this should be done when required, because we have come across many installations which were badly planned with regard to that point.

As we have already mentioned, narrow ventilating pipes, and principally branch pipes from the siphon to the vertical ventilating pipe or fall pipe, have the tendency to accumulate fat, coffee grounds and cobwebs. The minimum diameter for the upward part should be 2 in., and that for a branch connection only ¼ in. less than that of the siphon. Lead, iron or zinced gas-pipes only must be used, and they must be either soldered, screwed or packed with hemp (Mening's patent) and leaded. In the case of the siphon being ventilated direct into the fall pipe, which appears admissible where there are only one or two of the former, the connection must be made at a point higher than the upper rim of the pan. This must be done with a screw thread made of brass set in horizontally. It should never be soldered direct, because this is difficult to do, and is not done satisfactorily except in the rarest instances. Branch connections with a vertical ventilating pipe must be executed in an angle of 45 deg. The upper end of the ventilating pipe may then be continued above the roof, either direct by itself or from above the last connection on the fall pipe. In the latter case the connection is best made by a separate piece (Fig. 8) with a flanged joint, and the widened fall pipe set over the upper flange. In the other case, both the ventilating and the fall pipe must be widened, beginning with 2 in. below the level of the roof.

In conclusion, I beg leave to communicate the results of a few experiments on the diameter of the water supply required with various sized siphons, on account of the flooding which often occurs when the former is unproportionally large. These results are, of course, dependent upon the pressure on the mains, and refer especially to Cologne, where a pressure of 3.5 atmospheres is applied. They demonstrated: (1) the quantity of water supplied by a 1 in. low screw tap is too large for a 2 in. pipe; (2) a ¾ inch tap brings 21.78 gallons in 70 seconds—for this quantity a 2 in. pipe without sieve is sufficient; (3) a ½ in. tap brings the same quantity in 100 seconds—a 2 in. pipe with a sieve of 50 per cent. of the diameter is sufficient for this; (4) a ⅜ in. tap brings the same quantity in 300 seconds, requiring a 1½ pipe with a 50 per cent. sieve. Consequently the size of taps is ½ in. for 2 in. siphons and ⅜ in. for 1½ in. siphons.

I think that, although the above results repeat much which was already known, some useful hints may be taken from them. Technical men who have to plan house drains may also be glad to receive actual proofs of points which they knew previously. Furthermore, many points were elucidated and proved which were not at all clear before, as is shown by the divergence of the various by-laws and regulations in this matter.



PLANS OF HOUSE IN ROSEDALE, TORONTO.—(See illustration pages.)—R. J. Edwards, Architect.

MANUFACTURES AND MATERIALS

CANADIAN NATURAL CEMENT.

FOR the purpose of demonstrating the quality of their material, Messrs. Battle, of Thorold, propose to build at their own expense a stone wall near the Soulanges Canal, using the identical cement which was rejected by the government engineer, Mr. Munro. The manufacturers point to the piers of the old Victoria bridge at Montreal, which were constructed with this cement, as evidence of its enduring quality under the most severe conditions.

CHARACTERISTICS OF BUILDING STONES.

MR. H. F. Bain, in the annual report of the Iowa Geological Survey for 1897, referring to the use of stone in building, draws attention to the fact that architects and engineers of the present day have before them a more difficult problem than that faced by the Egyptians and other early workers in the matter of climate. Not only is our climate in itself more trying than that of the semi-tropical southern countries in which the early builders worked, but the great size of our country and the modern development of transportation facilities results in a given stone being far more widely used than was any from the ancient quarries. We no longer build from stone quarried within a few miles of our building site, and hence cannot argue that the rock having stood for untold centuries in the quarry may well be expected to stand in the building. Our stone may be shipped so far as to be used under totally different climatic conditions from those affecting it in its native exposures.

Again, modern conditions of life are producing a marked effect on our climate. Particularly is this true in our cities, where under present circumstances so much of the stone must be used. Our universal use of steam, the great amount and often poor quality of coal burned, the imperfect combustion obtained, the large number of industries which, in the production of their wares, use chemical processes of some nature, all exert a marked influence on the purity of the air. It is doubtful if any stone used by the older builders was ever called upon to stand the insidious influence of so tainted an atmosphere as that to which our stones are exposed as a result of purely artificial conditions alone. This, coupled with the many trying natural conditions of humidity, variation in temperature, wind action, and unequal settling, all make the wise selection of stone a matter requiring much thought and a wide range of information.

A granite quarry of excellent quality is reported to have been recently discovered near Nictaux, Annapolis County, N.S.

Messrs. Andrew S. Baldwin and O'Brien & Gilmour have recently purchased the granite quarries at St. George, N.B., formerly owned by Taylor Bros.

Mr. C. J. Lewis, formerly connected with the Burlington Pressed Brick Co., has recently leased the works of the Toronto Terra Cotta Company near Milton, Ont., and will put the same in operation again.

Messrs. R. M. Ramsay and C. M. Adams, of Chicago, and J. P. Wagner, of Buffalo, visited Toronto recently for the purpose of looking into the possibilities for the establishment of a factory for the manufacture of cast iron girders and other structural iron work. They are reported to have been favorably impressed with the conditions and prospects.

Mr. Hugh Cameron, of Brantford, visited Vancouver recently with the object of forming a company to manufacture a special class of bricks for building purposes. Mr. Warsap, manager of the C.P.R. cement works, is reported to have said that there exists a deposit of clay in the locality from which bricks of a deep chocolate color and capable of taking a fine glaze could be manufactured. Mr. Warsap states that, owing to the improper mixing of the materials, the bricks heretofore manufactured in the vicinity of Vancouver have been largely affected by the weather.

Mr. W. J. McBride, of Toronto Junction, is one of the leading promoters of a company which is said to have purchased twenty-two acres of clay land in East Toronto, from samples of which bricks are said to have been made upon which no impression could be made with a hammer or chisel. It is declared to be the

intention of the company to erect and operate a manufactory next year. It is presumed that the Toronto Street Railway Company will be large customers of the new concern, as this company at present purchase from Germany bricks of a somewhat similar character for use alongside their tracks.

A fine building stone of light color is being quarried on the islands on the Gulf of Georgia, and is being used in some of the important new buildings in course of erection in Vancouver, B.C. A stone of darker color from the quarries of Calgary is being used in the Molson's Bank Building. Some specimens of excellent marble have recently been brought to Vancouver from Mr. J. J. Palmer's quarries on Texada Island, and it is reported that if these are found to be satisfactory, the material will be employed in the construction of the new Bank of Commerce building on Hastings street.

The City Hall Building Committee—consisting of Mayor Wright, Ald. Meehan, Ald. Sanders, Ald. Wallis, Ald. Meek, Ald. Chant—went to London yesterday afternoon. The party went at the invitation of Mr. Robert Porterfield, representative of the Gurney-Tilden radiators and boilers. Architect Darrach accompanied the party. Mr. Porterfield was anxious to have the St. Thomas aldermen see the firm's "Buffalo" boilers, made by Ives & Co., Montreal, before they awarded the contract for the heating of the city hall. The committee was taken to the Wolsley barracks, where six "Buffalo" boilers are being erected. Major Winn, who is superintending the construction, thoroughly explained the advantages of the "Buffalo" boilers to the deputation, and the committee evidently thought they were the best, as they afterwards stipulated that Mr. Porterfield's firm's radiators and boilers must be used in the heating of the new city hall. Mr. Porterfield is certainly a hustler for his firm. There were about half a dozen other representatives here in the interests of their boilers, but Mr. Porterfield showed that his goods were right up-to-date, and the "Buffalo" will be the heating boiler in the new city hall. The committee unanimously decided to have the building heated by the Gurney-Tilden radiators and boilers, known as the "Buffalo" boiler, and made by Ives & Co., Montreal.—The Daily Times, St. Thomas, Nov. 15, 1898.

PERSONAL.

The firm of Head & Co., architects, Rat Portage, Ont., has recently been dissolved.

Messrs. Hewitt & McLaren, architects, Ottawa, Ont., have recently dissolved partnership. Mr. McLaren will continue the practice and Mr. Hewitt has returned to Toronto.

Mr. C. H. Acton Bond, of the firm of Bond & Smith, architects, Toronto, was married in All Saint's Church, Toronto, on November 17th, to Miss Newton, of that city. We join our congratulations to those of many friends of the principals in the happy event.

The officers and employees of the Smart Mfg. Co., Brockville, recently tendered a complimentary banquet to Mr. John M. Gill, president of the company, who, with his family, recently returned from a lengthened visit to Europe. Many kind things were said about Mr. Gill in the course of the evening.

Mr. A. J. Greenaway, who is a son of Mr. Greenaway, plumber, London, Ont., is at present travelling in Canada in the interests of the Ideal Mfg. Co., of Detroit, manufacturers of plumbers' supplies.

The Chronicle calls the attention of the citizens of Halifax to the serious penalties imposed for neglect to comply with the requirements of the plumbing by-law of the city. The fine in such cases is $50, and after the case once gets into court it matters not whether the work has been done in the meantime, as the defendant is still liable to the amount of the fine in addition to the cost of making the alterations.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS

NOTICE

The Semi-Annual Examinations for Admission to the Study of Architecture and for Registration will be held on WEDNESDAY, 25TH, and THURSDAY, 26TH, of JANUARY, 1899, in the office of the Association, City Hall, Quebec, at 10 o'clock in the forenoon of each day.

Intending candidates are required to give one month's notice to the undersigned, accompanied by the necessary fees.

For Admission to Study..... $10.00
For Registration..... 25.00

JOS. VENNE, Secretary.

17 Place d'Armes Hill, Montreal, Dec. 10, 1898.

A STANDARD SIZE EOR BRICKS.

THE Royal Institute of British Architects and the Institution of Civil Engineers are taking joint action with the object of securing the adoption of a standard size for bricks. Opinions of manufacturers and others interested are being invited regarding the following recommendations, which are the outcome of the deliberations of the above named societies :

1. The length of the brick should be double the width, plus the thickness of one vertical joint.

2. Brickwork should measure 4 courses of bricks and 4 joints to a foot.

Joints should be $\frac{1}{4}$ in. thick and an extra $\frac{1}{16}$ in., making $\frac{5}{16}$ in. for the bed joints to cover irregularities in the bricks. This gives a standard length of 9$\frac{1}{2}$ in. centre to centre of joints.

The bricks to be measured in the following manner :—

Eight stretchers laid square end and splay and in contact in a straight line to measure 72 in.

Eight leaders laid side by side frog upwards in a straight line to measure 35 in.

Eight bricks laid, the first brick frog downwards, and then alternately frog to frog and back to back, to measure 21$\frac{1}{2}$ in. This is to apply to all classes of walling bricks, both machine and hand made.

It is proposed, when all the replies have been received, to convene a meeting of all the institutions interested, with a view of arriving at an agreement on the standard size of bricks.

Coarse grained surfaces should not be stained at all, but if they are so treated a coat of paste filler should first be applied. This fills up the grain of the wood and prevents the stain from penetrating so deeply as to darken the wood more than is required.

TO MAKE A WOOD VARNISH TO STAND BOILING WATER.—Seven hundred and fifty parts of linseed oil are boiled in a strong copper pan in which is suspended a bag containing 150 parts of litharge and 92 parts of powdered minium. After the oil has been boiled so long that it becomes dark brown in color, the bag is withdrawn and replaced by another containing a clove or garlic (!), this operation being repeated several times with fresh portions of garlic. Meanwhile 500 parts of finely powdered amber have been melted by heat, along with 60 parts of linseed oil, raised to the boil and now stirred into the main bulk of boiling oil. After boiling a further two to three minutes the varnish is left to settle, the clarified portion being subsequently decanted and stored in well-corked recipients.—Oils, Colors and Drysatteries.

Dr. Carnelly, in his "Report on the Heating and Ventilation of Schools," wherein he supported the view that mechanical ventilation by propulsion is the best method in practice for ventilating schools, quoted quantities between 800 cubic feet and 1,400 cubic feet of air per head of accommodation as supplied by mechanical arrangements in good order at certain schools reported upon, so that 1,500 cubic feet per hour would seem to be a good allowance.

Woodwork intended for varnishing requires extra care bestowed upon it from the beginning to secure an absolutely smooth surface, and, after the fourth coat, should be applied one or more coats of French oil, varnish, or pale copal for delicate tints, being rubbed down between each coat with pumice stone powder and water, and a felt float to remove all inequalities. This can be repeated until the work has the finish of a coach panel or Japanese lacquer tray. Work of this kind is expensive, but very durable, and should be designed with this finish in view with very simple mouldings and large plain surfaces.

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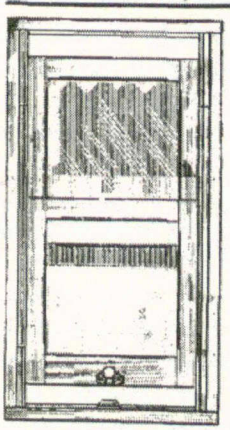

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