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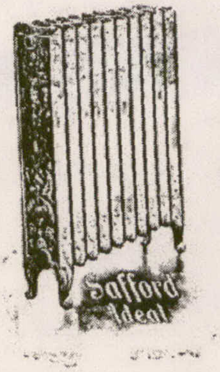

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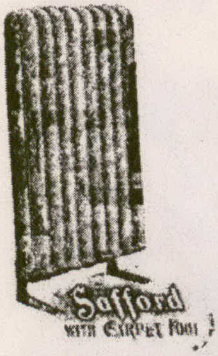

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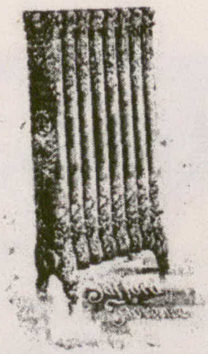

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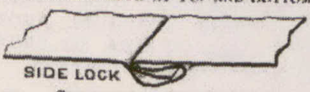

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CANADIAN ARCHITECT AND BUILDER.

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—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

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

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

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

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ADVERTISEMENTS.

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

EDITOR'S ANNOUNCEMENTS.

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

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

Compulsory Ventilation, Etc.

A BILL has recently passed the New York Senate which provides that every school house or other public building hereafter erected in cities or towns of more than 5,000 inhabitants shall be provided with proper means of ventilation. It is provided also that prior to the erection or alteration of any school building a detailed statement in writing of the specifications and a copy of the plans shall be submitted to the local school board, accompanied by a sworn statement regarding the provisions made for sanitation, ventilation and fire protection. The word school house is defined to mean any building in which public or private instruction is given to ten pupils at one time.

Proposed Greater Britain Exhibition.

ARRANGEMENTS are well under way for the holding of what is termed a Greater Britain Exhibition at Earl's Court, London, next year, lasting from May until October. The undertaking, which is under the direct management of the London Exhibitions, Limited, a company formed in 1894, and having a paid-up capital of £145,000, is receiving the approval and support of the Marquis of Lorne, Sir Charles Tupper, and other distinguished British and Colonial statesmen. The object, which is to bring together the products of the various parts of the British Empire, should commend itself to all who wish for a closer commercial relationship between Great Britain and her colonies. The Canadian government will be asked to grant an appropriation to cover the cost of a Canadian exhibit. Attention is called to the fact that exhibits intended for the Paris Exhibition of 1900 might with advantage and little additional cost be first shown at the London Exhibition. In view of the prevailing sentiment on both sides of the water in favor of closer trade relations, Canada should take advantage of every opportunity to make known her resources.

The Proposed Victoria Square.

AFTER having given careful investigation to the subject, Sir Oliver Mowat has declared that there is no ground for the contention that the city of Toronto is the owner of the square on King street west formerly occupied by Upper Canada College. In view of this decision, the correctness of which is not likely to be called in question, the City Council should give immediate attention to the project for establishing a public square at the south-east corner of Queen and Bay streets, opposite the new Municipal Buildings. A square in the heart of the business district is a conspicuous and attractive feature of most cities, and is no less a necessity in Toronto than in Montreal, Hamilton and Detroit. What would New York be without the series of squares adjoining Broadway at intervals between 14th street and Central Park? They are a source of untold pleasure and comfort to the citizens and to visitors. The present opportunity to secure at an extremely reasonable cost for the purpose of a central square what is beyond question the most desirable site in the city should not be allowed to pass. We hope the Council will take immediate and definite action to secure this much needed improvement.

Painters' Profits. THE complaint is heard that the competition of unskilled labor and departmental stores is ruining the business of painters and paper hangers. It is said that many men deprived by female labor of their occupation as clerks, office assistants, etc., have turned their attention to paper hanging as better suited to their tastes and acquirements than outdoor employment. The result is that prices for paper hanging have been reduced from 15 cents to 8 cents per roll. It is difficult to understand how work can be done by skilled labor at less than 12 cents per roll, and events will prove that those who give the preference to unskilled workmen because they offer their services cheaply, will in the end find that they have made a poor bargain. Painters who desire to be free from this unfair competition should seek to attain to a higher standard of artistic knowledge and skill, thereby placing themselves in a position to cater for a better class of work, such as no amateur would be allowed to undertake. The painter and decorator who follows this course will find that as he ascends the ladder of knowledge and ability his competitors will grow fewer in number—in other words that there is room at the top.

Building Conditions. THE columns of our weekly edition, the CONTRACT RECORD, afford evidence that the building industry is feeling the pulsations of steadily increasing activity at present distinguishing every branch of commercial enterprise in Canada. Building projects large and small are numerous in all parts of the country, and the coming season promises to be marked by an unusually large expenditure on construction account. Even in Toronto, where, owing to overbuilding arising out of the real estate boom, stagnation has been the prevailing condition for five or six years past, considerable work is in prospect. In sympathy with this improved condition of affairs has come a rise in price of several classes of building materials, notably bricks and cement. Brick manufacturers in the neighborhood of Toronto have allowed their works to stand idle for two or three years past, owing to lack of demand and consequent low prices. With the renewed activity in building operations comes the announcement that stocks are at a low ebb, and in consequence prices have already advanced to a point where it is claimed undertakings are likely to be checked by reason of the substantial increase in cost. It is to be hoped that this point has not and may not be reached, as the city is greatly in need of the stimulus which a season of activity in building would impart. Prices of cement have advanced considerably, and the prophecy is made that they may be expected to rise still higher. The reason given for this opinion is that the Canadian government has already invited tenders for a quantity greatly exceeding the total production of the Canadian factories, while the British supply will be largely reduced by the requirements of Imperial government works. The fact that on the first of July the advantages accorded to Germany under the preferential tariff will come to an end, is likely to lessen the supply from that quarter, and help to stiffen prices.

Professional Ethics. THE communication which we publish in this number from a young architect in the Northwest, following several of similar character addressed to us recently, indicate that many of the younger members of the profession are at variance with the policy of the Ontario Association of Architects, as well as with the individual conduct of gentlemen who occupy a prominent place in the Association and the profession. These criticisms in some respects appear to be well founded, in others the position assumed by the authors seems not to be capable of being successful defence. Honest criticism, whether well founded or otherwise, is calculated to accomplish good rather than harm. "To see oorsels as ithers see us" tends to rid us of our faults and induce us to strive after improvement. The remarks of our correspondent in the present issue anent the wide gulph separating the preaching and practice of some prominent architects on the ethics which should govern the practice of the profession, especially in relation to architectural competitions, are timely and deserving of consideration. Until prominent members of the profession hold aloof from improperly conducted competitions and in other respects conform to the principles which should govern honorable practice, it is quite useless to lecture the younger men on architectural ethics or expect them to uphold the dignity of the profession. There can be no improvement in this regard until those who are regarded as representative architects are willing to forego the chance of securing temporary financial benefit at the expense of the status of the profession. So long as greed of the almighty dollar continues to be the chief impelling motive, the status of the profession may be expected to sink lower and lower until it shall become entirely lost to public esteem. There must be a closer agreement between preaching and practice on the part of those who claim to constitute the respectable element if the profession is to regain the ground already lost and attain to a higher standard. If legislation could be secured similar to that which now obtains in Quebec, we might reasonably hope to see the standard of architectural practice in Ontario at least raised to a higher plane than at present. To secure this legislation seems to be the most important object to which the efforts of the Ontario Association of Architects can be directed.

The Safety of Building. WE commend the action of the property committee of the Kingston City Council in securing the advice of Mr. Power as to the safety of the public buildings of that city. With the recent disasters at London and Oshawa (which might have been avoided had those in charge of the public buildings in these towns acted in a similar manner) fresh in mind it behooves all who have the public safety in their keeping to look well into such matters, and the committee in question in engaging the leading architect of the city has perhaps taken the best course open to it. But what is reported to have taken place at a subsequent meeting of the Council emphasizes the folly of leaving the care of the public safety in matters of this sort to such bodies as city and town Councils, composed of men who, like Alderman Donnelly, (who claims to a "knowledge of the strength of timbers") think that any builder who has had a more or less varied experience in the erection of buildings, is a competent authority upon all matters connected with their safety. To arrive at a sound decision as to the safety of a public building requires an advanced scientific and mathematical education and a knowledge which can only be obtained by a comprehensive course of reading in purely technical and architectural subjects—for it is not only necessary to calculate strength and possible strains and loads upon walls, piers, beams, &c., but also to consider the effect of age and dilapidations, &c., upon the various materials of construction—the arrangement, plan, &c., and provision for egress in the event of sudden panic, the possibility of escape being cut off in the event of fire, and many other matters which would never enter the head of an ordinary layman. This knowledge is not possessed by every builder, or even by every person who calls himself an architect—and an inspection and report upon an unsafe building by an incompetent person is a distinct aggravation of the danger, as it tends to produce a fancied security which does not exist. What is needed is that all buildings in which the public assemble in numbers should be periodically inspected and reported upon by a qualified architect, and his report published, so that the public may know what buildings are safe and what are not. That the present system or want of system in looking after such buildings does not safeguard the public interest is plain from the fact that failures like those at London and Oshawa are continually occurring. This is due partly to the fact that those in charge of such buildings are not required by law to publish any statement of the condition they are in and that there is no legal standard whereby the competent architect can be distinguished from the incompetent—the first relieving those who are inclined to neglect their duty and the second tending to void the efforts of those who wish to do it and have the building in their charge kept in a safe condition. If the Ontario legislature will follow the example of Quebec and amend the "Architects' Act" so as to give the public an opportunity of distinguishing between competent and incompetent practitioners in architecture, a long step in advance will be made.

Mr. Chas. Dawson, formerly superintendent for the Central Bridge and Engineering Co., of Peterboro, has accepted the position of assistant superintendent for the Dominion Bridge Co., Montreal.

The second quarterly part of the Journal of the Royal Institute of British Architects, received at the library of the Ontario Association of Architects, is more than usually good, containing, among other matter, a review of "Modern Architecture" the last work of Mr. T. Heathcote Stratham, the editor of The Builder. A copy of this admirable book is in the Toronto public library. There is also an important and copiously illustrated paper by Mr. Edwin Sachs, on "The Housing of the Drama"; an illustrated historical paper on the "Mediaeval Campanile of Rome," by Mr. I. Tavenor Perry; a paper by Mr. G. D. Crace on "Heraldic Drawing and its Adaptation," and also a review by Mr. Gotch, whose name is also associated with this subject, of a recently published handbook of Decorative Heraldry by G. W. Eve.

BY THE WAY.

THE excellent specimens of terra cotta work from the Rathbun Works at Deseronto, which adorn the facade of the new building at the corner of King and Yonge streets, Toronto, serve to illustrate the progress which has taken place in this branch of manufacture in Canada in recent years. The material is now made in any desired shade, and the specimens referred to are as clean cut as though chiselled in stone.

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M. GIOT, of Ivry, who is a contractor for painting, has won the great prize in the lottery of the Paris Exhibition of 1900. It amounts to £20,000. An English contemporary naievly remarks that M. Giot, who is a Socialist, may be expected by his fellow-believers to divide with them the proceeds of his lucky venture, but, like the late William Morris, although he may talk by the hour about the necessity of collectivism, will think it his duty to acquire all he can for the mere enjoyment of wealth.

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THE City Council is being urged to add this that and the other expense to the cost of construction and equipment of the new municipal buildings at Toronto. The specious argument is employed that inasmuch as the original estimate of cost has already been so largely exceeded, the expenditure of a few more thousands would be a matter of no consequence, while it would be so nice, you know, to have a chime of bells and all the latest attractions. I infer that the people who talk in this strain are more likely to have stock in a bell foundry than a large interest in keeping the city taxes at a point which will induce people to regard the city as a desirable place in which to live and make investments. The new municipal buildings should be completed as speedily as possible and without a single dollar of extra expenditure that can be avoided.

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A WELL known architect with whom I chatted the other day remarked on the public disposition to regard the member of the profession who is known to possess the artistic quality as being necessarily unpractical and lacking in a knowledge of materials and methods of construction. For example, having consented at his client's request to ask the opinion of a brother architect on a certain point connected with the erection of an important public puilding, the gentleman of his choice was objected to on the ground that his artistic proclivities made it improbable that his opinion on a constructional point would have much value. "As a matter of fact," said my friend, "I know of no architect in Canada, or in America, who has a better knowledge of planning and construction." In this, as in other particulars, a man is apt to be judged by the company he keeps. The architect whose inclinations run in the line of the artistic will be likely to choose the association of artists and such like kindred spirits, and will be in danger of being regarded by the commercial world as an idealist, while the man who graduates from the ranks of the real estate or building speculator, will probably be credited with having a thorough knowledge of the practical side of the profession.

The firm of Curry, Baker & Co., architects, Toronto, has been dissolved. Mr. Curry retains the offices formerly occupied by the firm, while Mr. Baker has rented new offices in the same building.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

Among the few architects who contributed drawings to the recent R. C. A. exhibition at Toronto were Messrs. A. T. Taylor, F.R.I.B.A., and Prof. S. H. Capper, A.R.C.A., of this city. The former exhibited a pen and ink perspective of the Jubilee Nurses Home, Montreal General Hospital, and the latter four drawings, viz., a new Orphanage for Girls, Whitinch, Glasgow, with separate drawing of doorway ; Club House, Barnton ; St. Mark's Venice.

For some time past the financial difficulties of McGill University have been the subject of public comment. The endowment funds of the university have not kept pace with the increased expenses due to the new buildings erected and departments established in recent years with funds generously donated for the purpose. As a consequence, salaries have had to be fixed so low that but for the privilege given the instructors of engaging in outside pursuits they would not be able to maintain their positions. Such a condition of affairs is incompatible with the best interests of the students and the university. It is therefore gratifying to learn that there is a probability of the endowment funds being placed at an early date on a satisfactory footing through the munificence of Mr. W. C. McDonald and Lord Strathcona, to whom the institution is already under heavy obligations. In this connection I am pleased to record the recent gift by Mr. McDonald of $15,500 as an endowment fund to the Department of Architecture for the purchase of supplies and materials.

MEETING OF WHOLESALERS.

The Plumbers' Wholesale Supply Association of Toronto will hold their annual meeting in Montreal at the rooms of the Montreal Builders' Exchange on the 15th and 16th of this month.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

The last of the winter series of lectures under the auspices of the Province of Quebec Association of Architects was delivered by Prof. S. H. Capper, in the art gallery on March 29th. The subject of the lecture was "Ancient Rome." The lecture was illustrated by numerous lantern slides. The audience was large. Rev. J. Edgar Hall presided, and at the close moved a vote of thanks to Prof. Capper and the P. Q. A. A.

MONTREAL BUILDERS' EXCHANGE.

The membership of the Builders' Exchange is still increasing rapidly. The Exchange will shortly inaugurate a series of instructive lectures on different subjects relating to the building trades. Arrangements for these lectures which are to be given by the members once a month, are well under way. Messrs. Simpson, president, and Sheppard, secretary, have been requested to learn what dates would be most convenient. The secretary advises me that Mr. J. W. Hughes, the well known plumber, of this city, will give the first lecture of the series, his subject being "The Value of Organization." Every member should take advantage of the opportunity to hear these lectures, the inauguration of which is highly creditable to the management of the Exchange. Further particulars will be given from time to time in these columns.

MONTREAL ART ASSOCIATION.

The Spring Exhibition of the above Association is now being held in the art gallery, and is attracting considerable attention. There is a better display of architectural drawings than usual, although there is still room for a vast improvement in this particular. The architectural exhibit includes color drawings by Mr. Edward Maxwell of new C. P. R. depots at Vancouver, B. C., Moosejaw, N. W. T., and McAdam Junction, N. B. Messrs. Cox & Amos show drawings of the new tower and spire of St. Luke's church at Waterloo, Que., the new Montreal Hunt Club house and the Church of the Advent at Westmount. Messrs. Saxe & Archibald exhibit drawings of residences on Grosvener avenue, Westmount, and Mr. Arnold Findlay has some foreign sketches. In view of the fact that the annual meeting of the P. Q. A. A. will this year be held in Montreal, it is hoped that another architectural exhibition similar to that of 1896 may be undertaken.

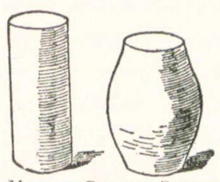
MOULDING MARBLE.

BRIEF mention was recently made in the CANADIAN ARCHITECT AND BUILDER of experiments conducted at McGill University by Professors Adams and Nicholson, which had resulted in the discovery that by means of pressure alone marble can be moulded into almost any desired form while retaining its strength. Further details of this wonderful discovery will no doubt be received with interest by your readers.

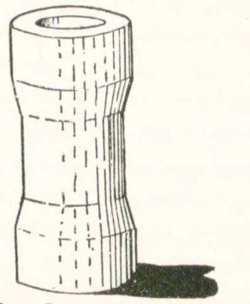
As before stated, the discovery at McGill shows that, however brittle a rock may seem to be, it is in reality a plastic substance, capable of flowing into new shapes as surely, if not as readily, as putty or dough is moulded.

The experiments so far conducted have been made chiefly with pure Carrara marble, and the process followed is thus described in detail by Prof. Adams : Columns of marble two centimeters and two and one-half in diameter and about four centimeters in length, are very accurately turned and polished. Heavy wrought iron tubes are then made, imitating the plan adopted in the construction of ordance, by rolling long strips of Swedish iron and welding the strips to the bar as they are rolled around it. When the welding process is completed, the core of soft iron, around which the Swedish iron has been wound, is drilled out, leaving a tube of welded Swedish iron six millimeters thick, and so constructed that the fibres of the iron run round the tube instead of being parallel to its length. The tube is then very accurately fitted on to a column of marble. This is accomplished by giving a very slight taper to both the column and the interior of the tube, and so arranging it that the marble will pass only half way into the tube when cold.

The tube is then expanded by heating so as to allow the marble to pass completely into it, and at the same time leave about three centimeters of the tube free at either end. On allowing the tube to cool, a perfect contact between the iron and the marble is obtained, and it is no longer possible to withdraw the latter. Any very slight failure to fit at any point, if such a failure exists in any case, is rendered harmless by the fact that under a comparatively low pressure, the limestone is found to be sufficiently elastic not only to fill up any such minute space, but even to stretch the tube, and, on the pressure being relieved, to contract again to its original form, so that it will drop out of the tube which has been thus enlarged.



MARBLE COLUMN BEFORE A D AFTER PRESSURE.



IRON COLUMN INCLOSING THE MARBLE READY FOR SQUEEZING.

When the marble has been firmly placed in position in the tube, an accurately fitting sliding steel plug is inserted in either end, and by means of these the marble is submitted to a pressure far above that which would be sufficient to crush it if not so enclosed. The machine employed in obtaining the pressure is so arranged that it (the pressure) might be maintained for weeks, or even months, if required. Under these circumstances the conditions of pressure to which the marble is subjected are those to be found in the "zone of flow" of the earth's crust.

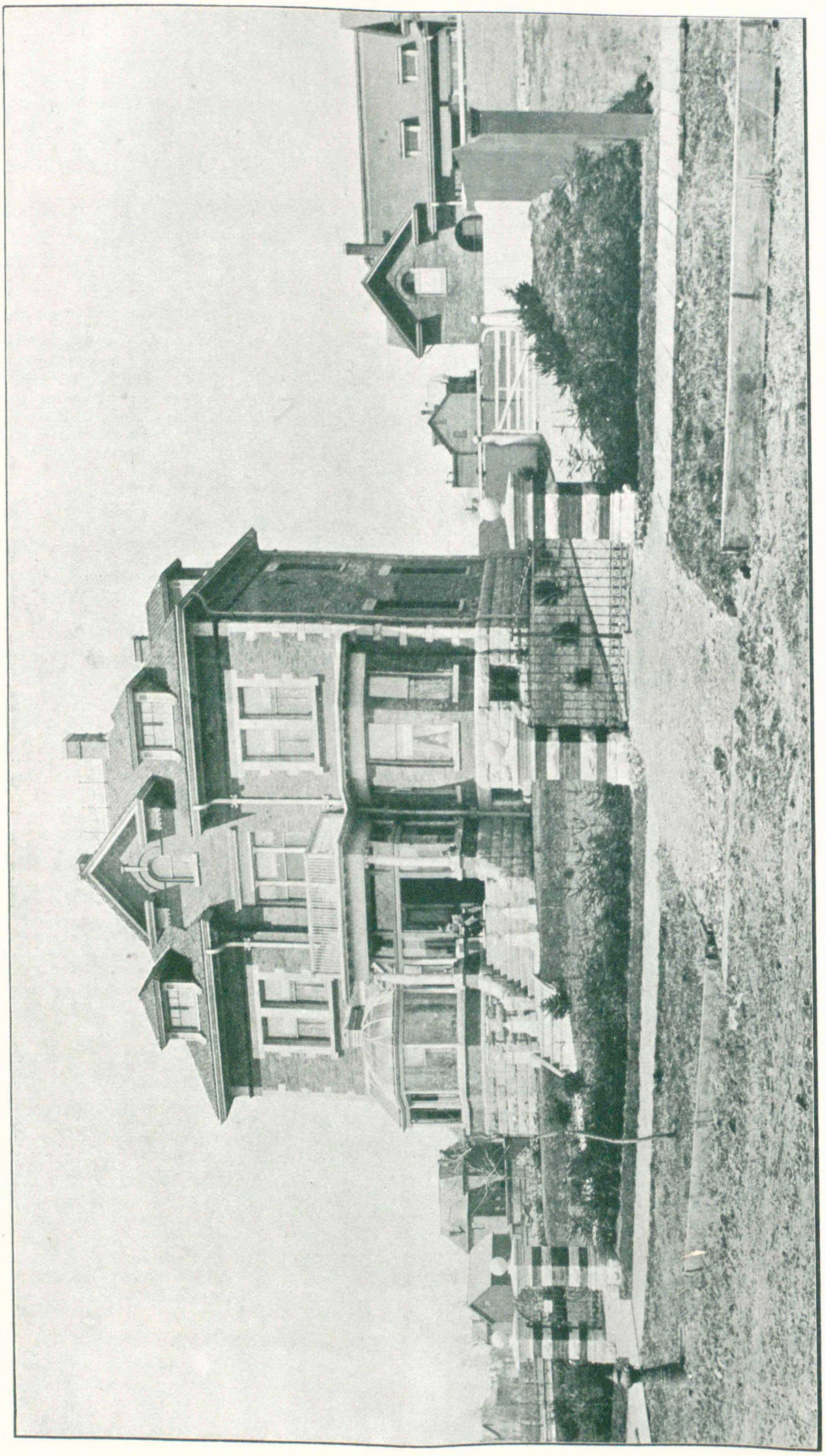
Under the pressure which is applied gradually, and in some cases continued for several weeks, the tube is found to slowly bulge until a very marked enlargement of the portion surrounding the marble takes place. The tube is then cut longitudinally, by means of a milling machine, along two lines opposite to one another.

When thus cut the marble within is found to be firm, so much so in fact that it holds the respective sides of the iron tube, separated as they are, so tightly together that it is impossible without mechanical aids to tear them apart. By the means of a wedge they can be separated, but the force of the blow frequently has the effect of splitting the marble through longitudinally.

In one experiment conducted by Professors Adams and Nicholson, the column of marble was reduced from 40 to 21 millimetres in height.

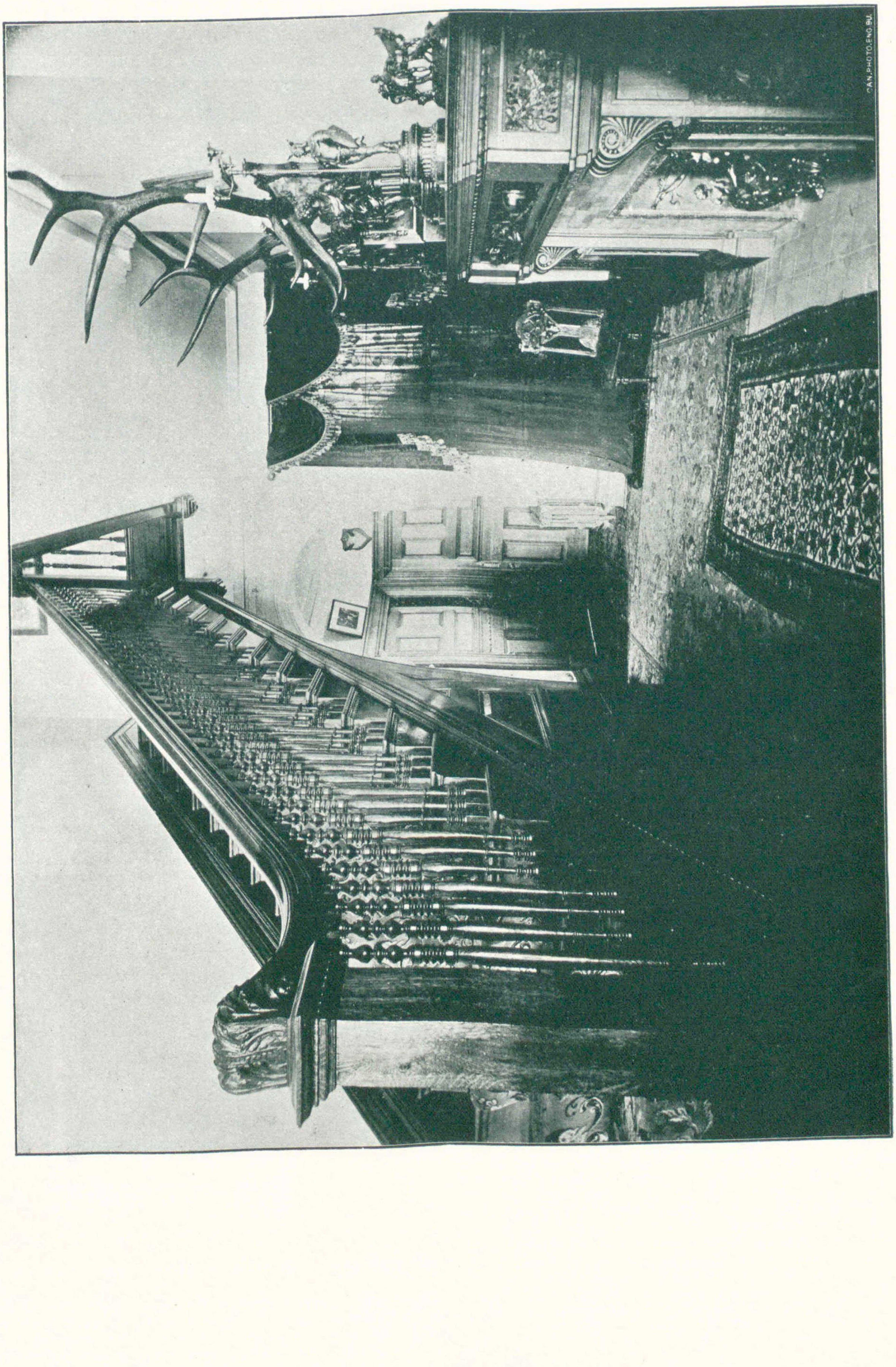
The deformed marble differs somewhat from the original rock in having a dead white color, the glistening cleavage faces of calcite being no longer visible. Although not so hard as the original rock, it is still firm and compact. especially so when its deformation has been carried out very slowly. No accurate measurements as to its strength have yet been made, but it will withstand a very sharp blow, and fragments of it weighing ten grams have been allowed to fall from a height of over eight feet onto a wooden platform from which they have rebounded without breaking. Thin sections of the deformed marble, when examined under the microscope, show that the calcite individuals composing the rock have, in many cases, been twisted and flattened, and in the majority of cases, a very fine polysynthetic pressure-twinning has been produced in them, with movement along gliding planes, as well as several other structures seen in nature in highly deformed rocks.

The experiments show that limestone and marble, even when dry and at ordinary temperatures, possess a certain degree of



RESIDENCE OF MR. DAVID KENNEDY, SOUTH PARKDALE, TORONTO.

A. R. DENISON, ARCHITECT.



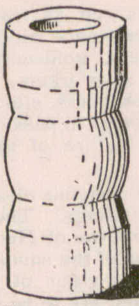
HALL IN RESIDENCE OF MR. DAVID KENNEDY, SOUTH PARKDALE, TORONTO.

A. R. DENISON, ARCHITECT.

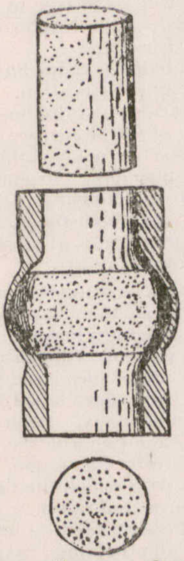
plasticity, and can be made to flow, the movements set up developing many structures characteristic of rocks which have been squeezed or folded in the deeper portions of the earth's crust.

It is now the intention of Professors Adams and Nicholson to reproduce more accurately, if possible, the deformation and cataclastic structures of the interior of the earth. For this purpose they have invented an apparatus capable of generating great heat. With this they propose to surround the iron tube, and, by means of steam and heat, obtain those conditions which surround the plastic marble in the bowels of the earth. It has been shown by geologists that marble and other stone formations become plastic in proportion to the depth they are found in mother earth. Thus, marble found five hundred feet below the surface of the ground is much less brittle than that found, say, at a depth of one hundred feet. The reason for these different degrees of plasticity consists in the fact that the former is subjected to far greater heat and moisture than the latter. By means of their new contrivance Professors Adams and Nicholson are confident that they can reproduce the conditions that prevail far beneath the surface of the earth, and they are awaiting with confidence the results of their future experiments.

The machinery used in all these experiments was designed and



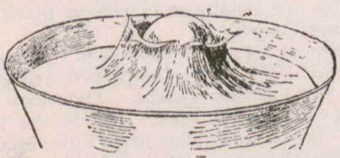
THE CYLINDER AFTER FIRST APPLICATION OF PRESSURE.



COLUMN BEFORE PRESSURE—CYLINDER IN WHICH COLUMN HAS BEEN REDUCED BY PRESSURE AND HAS BURST IRON SHEETING.

manufactured at McGill, and its counterpart does not exist elsewhere on this continent. It is largely the work of the students, who are thus trained in the principles underlying mechanics and hydraulics. The average pressure employed in moulding the marble is 80,000 pounds to the square inch. This is obtained by a number of hydraulic cylinders, which increases the natural pressure of the water mains—130 pounds to the square inch—to the above astounding proportions.

The opinion has been expressed that the experiments suggest a danger from the building of such sky-scrapers as are springing up in our cities. It has been said that if marble, one of the hardest of stones, yields to and becomes plastic under sufficient pressure, then clearly there must be a limit to the height to which one building stone can be heaped upon another in the erection of walls, without incurring the danger of such yielding of the stones of the bottom of the wall or building as will endanger the integrity of a building. For, short of the point at which the stone crumbles, there is apparently a point at which it may slowly



POOL OF WATER AT INSTANT WHEN BALL FALLS INTO IT.

ARMOR PLATE PENETRATED BY CANNON BALL.

change its shape under stress of heavy and long continued pressure.

In reference to this surmise Prof. Nicholson says: "The height of a uniformly thick brick wall required to crush brickwork is about one thousand feet, and that of a stone wall to crush either sandstone or limestone about five thousand feet. Long before these heights could be reached the building would have failed from lack of lateral stability under wind pressure, unless the width of base was of similar proportion to the height. Chimneys from five hundred to six hundred feet in height have, it is true, been built, and are still standing, but they have, of course, a regular batter all the way up, reducing the load very much. The crushing pressures assumed by me in my computations on this subject are 800 lbs. per square inch for brick work and 4,400 pounds per square inch for sandstone. There is not, therefore, nor can there be any sky-scraper a near approach to the moulding pressures, such as 70,000 to 80,000 pounds per square inch, employed in our experiments at McGill."

The experiments regarding the mobility of marble put quite a new complexion upon the question of glacial movement. For if it be proved that marble, a substance far harder than ice, and quite as brittle, can be molded by pressure alone into new shapes, it seems perfectly plausible that a much less degree of pressure might mold ice into new forms by causing its molecules to slide over one another without the intervention of melting. In this view ice and marble, and, of course, all other solids, are to be regarded as merely very stiff or viscid liquids. Gravitation alone does not suffice to make them flow, as it does more limpid liquids, but when additional force is applied their mobility becomes apparent.

This view, indeed, as applied to such solids as iron and other malleable metals is not new, for the mobility of such solids under pressure, as when hammered, is widely known. A curious experiment recently made by Professor Sinclair has illustrated this in a very vivid way. By means of an ingenious apparatus it has been possible to photograph the surface of a bowl of water at the moment a ball dropped from a height falls into it. The photograph being instantaneous, the water splashed up about the ball gives the impression of a solid crater. But the curious feature is, that exactly such crater as this is formed into a sheet of armor plate. About the mouth of the hole where the ball enters the iron is a bulging rim or crater of iron, which was manifestly splashed up exactly as the water splashes up about the miniature ball, making the observer feel that the iron and the water are really of one physical nature, one being merely a little harder than the other. The experiments at McGill make it clear that the same thing is true of marble also; that, in short, in a broader view, brittle solids are only very fragile liquids, just as malleable solids are very tenacious liquids.

THE ST. THOMAS CITY HALL COMPETITION.

As soon as possible after the announcement of the above competition the Council of the Ontario Association of Architects sent a communication to the committee intimating that the terms of the competition were not such as would be likely to secure designs from the best men in the profession.

A copy of the code approved by the Association was also sent in order to inform the committee as to the points wherein their conditions were lacking. The committee declined to alter the terms. The members of the Association were informed of the action of the council and later of the decision of the committee.

We must congratulate the Council for its promptness in this case, and it is a matter of regret that its efforts were unsuccessful.

It is to be hoped that the members of the Association will sustain the action of their representatives, and by the absence of designs prove to the committee their mistake in not issuing suitable terms.

The outcome of the late London competition is a proof of the unsatisfactory nature of such competitions when not safeguarded by proper conditions, and it is amazing how architects will, for the very hazy chance of a job, throw all caution and esprit de corps to the winds. So long as this is the case they will be the dupes and tools of committees, who, too often, have already selected their man. We regret to have to say that even men who claim high standing in the profession have erred in this respect—men who have accepted office and by that act are published as representative men. Such conduct is demoralizing and will tend to license on the part of others, especially the younger men and to the gradual lowering of professional standards.

A PROTEST.

TORONTO, April 15th, 1898.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

DEAR SIR,—I very heartily endorse the remarks contained in the letter of "A Young Architect," in the CONTRACT RECORD of the 16th ultimo.

It seems to me simply outrageous that, not merely plain every-day members of the Ontario Association of Architects, but members of the Council, should soil their professional skirts by countenancing such a competition as that for the London hospital—even though the rumor be true that a "pull" was the tempting bait which led them blindly on. I am of the opinion that to follow such standards, not to speak of pursuing architecture on a "comercial basis" is destined to work incaluable harm to the Association—and even to the men who follow such ideals. Why should the honorable men of the society passively submit to the ruination of the influence of their Association by the action of such men?

I think, Mr. Editor, it is quite time to bring this question to the front. Every member of the profession should follow the closing precept of Garbutt's Elements of Design: "SEEK NOT TO SEEM WHAT YOU WOULD BE, BUT BE WHAT YOU WOULD SEEM."

Yours very truly,

ANOTHER YOUNG ARCHITECT.

POMPEII—A CITY OF THE FIRST CENTURY.*

By Prof. Adams, McGill University.

(Conclusion.)

The House of the Faun is larger, occupying a whole insula or block, and although laid out in the same general plan, is more elaborate, and is always considered to be the principal house in Pompeii.

It has two atria, which is very unusual. The Tablinum, following the usual custom—but unlike that in the Tragic Poet's House—opens off the Atrium. The Peristyle is large and has a corresponding room opening off it—the Exhedra—used as a reception room—while behind the Peristyle, occupying the whole rear of the block, was a spacious garden also surrounded by a colonnade.

But what renders this house remarkable, even more than its size and beauty, is the richness of its decorations, but especially of its mosaics; of these may be especially mentioned the Nile Mosaic, which forms the threshold of the exhedra, and the Battle of Issus, which forms its pavement.

While the mosaics are numerous, the wall paintings are few in number. The house dates back to the time of the Republic in the 2nd century B.C., and impresses one with its air of elegant simplicity, being quite different in this respect to the more recent and much be-painted houses, which often, it must be confessed, have a tawdry appearance.

A few photographs will serve to give an idea of the house as it now stands.

Just inside the vestibule at threshold in mosaic is the word, "H.A.V.E." (Ave or Hail).

Vestibule rises by two steps and we enter the larger Atrium. On the little pedestal stood the wonderful bronze of the Dancing Faun, which gives its name to the house and which is now in the Museum at Naples.

When we walk into the Atrium we see the Impluvium and Tablinum, and further back the columns of the Peristyle.

Turning to the right and passing through a passage we enter the Peristyle. The roof of the covered walk around the columns has fallen in. The columns are all of brick and rubble work covered with a very fine stucco to imitate marble; this has in many places scaled off.

The wall at the back of the garden shows this well, for here the stucco is arranged to imitate panelling in marble, in buff colors. The stucco is still hard, smooth and polished. The little shrine, like that of the Tragic Poet's House, but simpler in design, is seen on the right.

The character of the wall beneath the stucco is seen at the other end of the garden, where the stucco has completely scaled off. Lumps of lava, held together by mortar, forms a coarse rubble work, forming the greater part of the wall. The arch over the doorway is made of travertine blocks, as is also the sides of the door, where, however, the travertine alternates with courses of flat Roman bricks.

The character of Roman brickwork is seen in this photograph of a brick wall; bricks longer and thinner than ours, like tiles—mortar lasts longer than brick. Such bricks are usually considered to be characteristic of Roman work, but precisely similar bricks are now in use in Naples.

About 700 skeletons have been found in the city so far, which would show that 1,200 to 1,500 persons must have perished. In some instances, where the victims, instead of being smothered in ashes, were overwhelmed by a fine mud which was ejected during part of the eruption, Fiorelli hit upon a most ingenious method of restoration.

The objects over which this mud flowed were enveloped in it as in a plaster mould, and where these objects happened to be human bodies, their decay left a cavity in which their forms were as accurately preserved and rendered as in the mould prepared for the casting of a bronze statue. Such cavities had often been observed. In some of them remnants of charred wood accompanied with bronze or other ornaments showed that the object enclosed had been a piece of furniture, while in others the remnants of bones and of articles of apparel evinced but too plainly that the hollow had been the living grave which enclosed some unfortunate human being. In a happy moment the idea occurred to Signor Fiorelli of filling up the cavities with liquid plaster, and thus obtaining a cast of the objects which had been inclosed in them.

Almost immediately behind the House of the Faun, Sig. Fiorelli has just finished the excavation of a house which rivals, if it does not surpass, any in Pompeii.

The walls are covered with fine painted stucco and the Peristyle contains many marble and smaller bronze statues. A fountain played in the centre, and a little marble runnel about the edge of the Peristyle carried off the water. The lead pipes which supplied water to the fountain are still in perfect order.

On the door handle are inscribed the words "Casa Vettiorum."

This photograph of the Peristyle, taken during the progress of the excavations, shows it as it appeared when freed from the ashes. The boys, with their baskets and trucks for carrying off the excavated material, are seen in the background.

In this house nothing has been removed, and those parts which have been burned or broken have been carefully restored, the garden of the Peristyle has been planted with flowers, and we now have this Roman house of the first century precisely as it appeared the day before the city was destroyed.

This photograph shows one of the little shops (they were all small in Pompeii) which occupy the ground floor front of all the large Pompeiian houses, and to which attention has already been drawn. This particular shop forms part of the front of the House of Sallust, and was probably occupied by a dealer in oil or wine. A broad counter, formed of irregular slabs of marble set in mortar, runs around two sides of it, and in this one were large holes, beneath which large earthenware vessels were set containing the goods for sale. The next slide shows one of these shop fronts with the woodwork restored from existing evidence of many kinds. "The arrangement was very simple; part of the front was hinged so that it could be let down to form a projecting counter, and at night pulled up to form a closed shutter. Every Roman shop, whether in Italy or in distant colonies, seems to have been arranged in this way. Moreover, all Roman shops appear to have been quite small, exactly as is still the case in the East. A rich dealer may have a large warehouse, but his actual shop is no larger than those of his poorer fellow-tradesmen."

These shops had no windows and no light except what entered from the open front; they were, in fact, nothing more than large "holes in the wall," differing, however, in no respect from many of the small shops in the older parts of Naples and elsewhere in southern Italy at the present day.

This photograph shows the front of a large block of buildings facing the wharves in Naples. Shops of this kind are seen on either side of an archway leading to fine apartments about the inner court. This building is of course much higher than the Pompeian buildings, which were scarcely ever over two stories high. It will also serve to give some idea of the class of rookeries whose existence in Naples makes that city one of the most congested in Europe.

Several bakers' shops have been found in Pompeii, all in a tolerable state of preservation.

From various inscriptions in Pompeii, as well as from the examination of the shops, we know of the existence within the city of workmen of many other trades—dyers, goldsmiths, pastry cooks, fruitsellers, carpenters, carters, saltworkers, fishermen, muleteers, coachmen, porters, fullers, booksellers, etc., and much might be said about these, but time obliges us to pass on, in order that we may get a glimpse of another feature of this ancient world—Pompeiian art.

The most characteristic and remarkable remains of ancient art in Pompeii are its mosaics and its wall paintings. The bronzes, however, although in general not equal to those of Herculaneum, deserve a passing word of notice. "Some of the smaller bronzes especially are unsurpassed for character and vigor of execution, and have been reproduced in thousands, and are to be seen in all modern collections. Such particularly is the statuette of the Dancing Faun found in the House of the Faun, and from which the house derives its name. Nothing can exceed the vigor and animation with which the figure is executed. It is bearded and has the horns and tail of a goat. An oaken garland with acorns—some of which seem to have fallen from their shells, encircles his head and proclaims his sylvan character. His attitude displays all the animated gestures of a drunken man; his widespread arms seem to accompany the movements of his feet, and he snaps his fingers for joy."

Another very graceful statue is the Narcissus, found in one of the smaller houses in Pompeii. His inclined head and earnest expression, as he listens for the voice of Echo, are admirably rendered, and it is considered one of the finest works yet discovered at Pompeii.

Perhaps the most celebrated bronze of all antiquity is the Mercury in Repose, discovered in Herculaneum. It is nearly life size. The messenger of the gods is seated and clearly reposing after rapid flight. The left foot and right hand both contribute toward bearing the weight of the body. The left holds a small piece of bronze rod, which perhaps originally formed part of the Caduceus—the only part of this beautiful figure which has been lost to us. The detail of the muscles and of the winged sandals is admirable, and every line of the composition is exquisite.

The mosaics of Pompeii, although in execution by no means equalling the best efforts of modern art, are remarkable for their excellence of design, and are so abundant that the dwellings of even this small and comparatively unimportant town have afforded many specimens good enough to be transferred to the palaces of Naples and ranked among their most precious ornaments. The Pompeiian mosaics are usually executed in black and white, but sometimes in colored marbles.

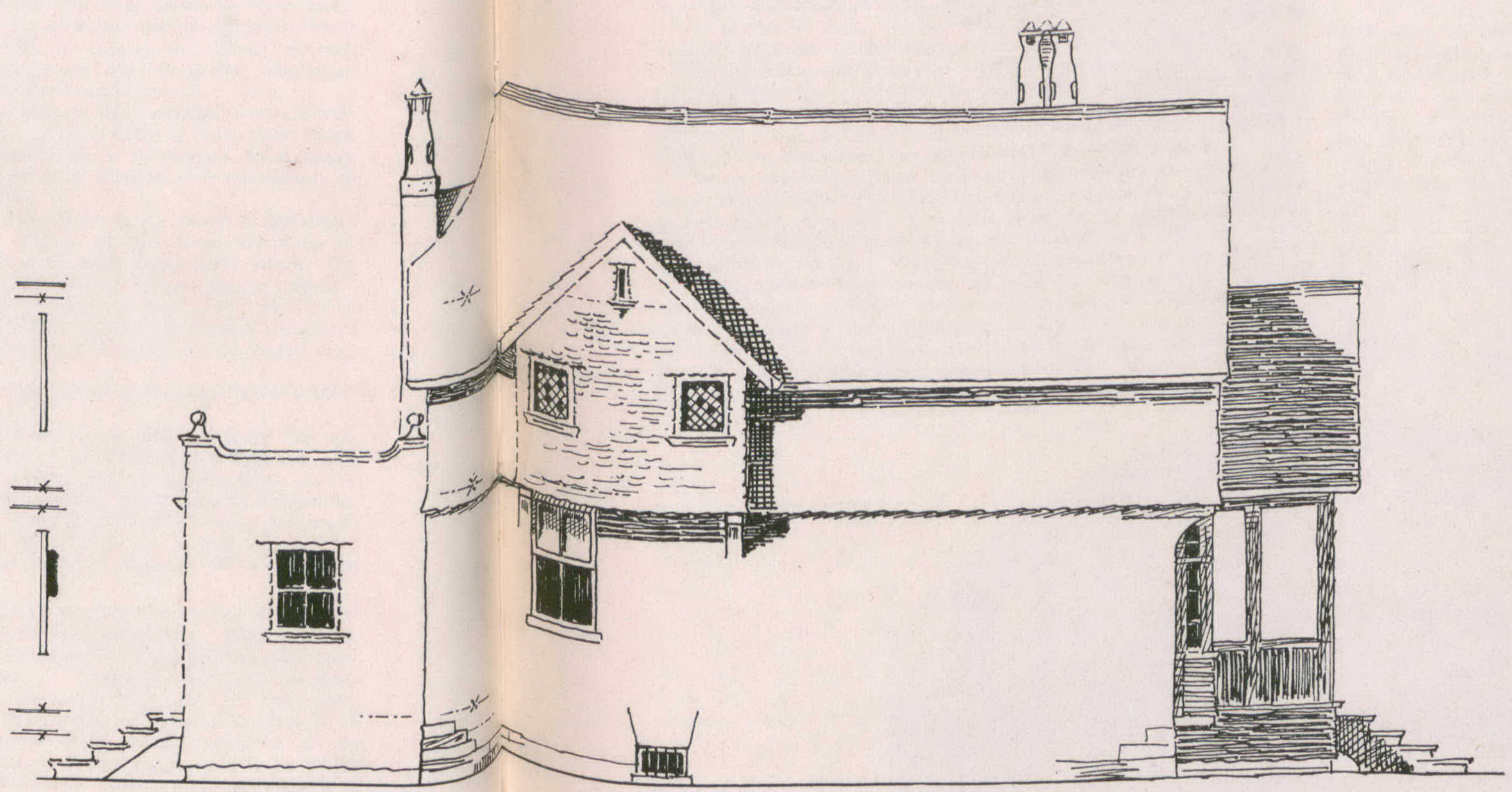
The walls of almost all the better class houses in Pompeii are elaborately painted. The colors employed are generally bright and seem to our taste rather gaudy. The deep red, known as Pompeiian red is very largely used. But in the half darkness of the houses when they were roofed in and provided with their curtains and hangings, the colors were probably sufficiently subdued.

The style of decoration adopted is remarkable and very striking. The wall surface is divided off into numerous compartments, usually set in an elaborate frame in imitation of architectural effects. Pilasters with architraves and cornices often festooned and elaborately decorated. Balconies, half open doors with figures advancing through them evidently suggested the scheme.

Within the framed compartments are represented urns, groups of statuary, etc., while the centre or chief compartment of each wall usually contains one of the pictures for which the city is so famous. This style of mural decoration is not peculiar to Pompeii, but is found in the other buried cities of the Campagna and also in Rome, in the few buildings of the same period which remain. It was derived from Alexandria where kings, great generals and statesmen loved to decorate their great halls of state with columns of priceless marbles, glorious statues and paintings by the great masters of the time. The ordinary citizen was obliged to content himself with a cheap reproduction of these glories; he had therefore false pilasters frescoed on his walls, framing false pictures and statues reproduced by the same process, and doubtless felt a pleasure like that of the kings and great lords when they walked in their

* Abstract of a lecture delivered before the resident members of the Province of Quebec Association of Architects at Montreal, January 29th, 1898. The lecture was illustrated by lantern slides.

East.



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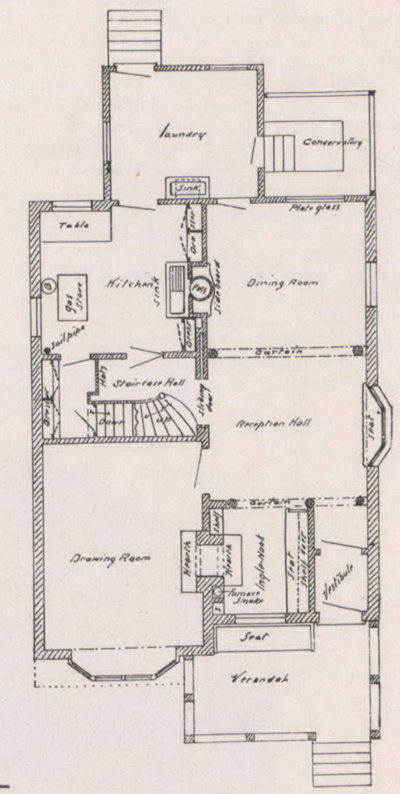
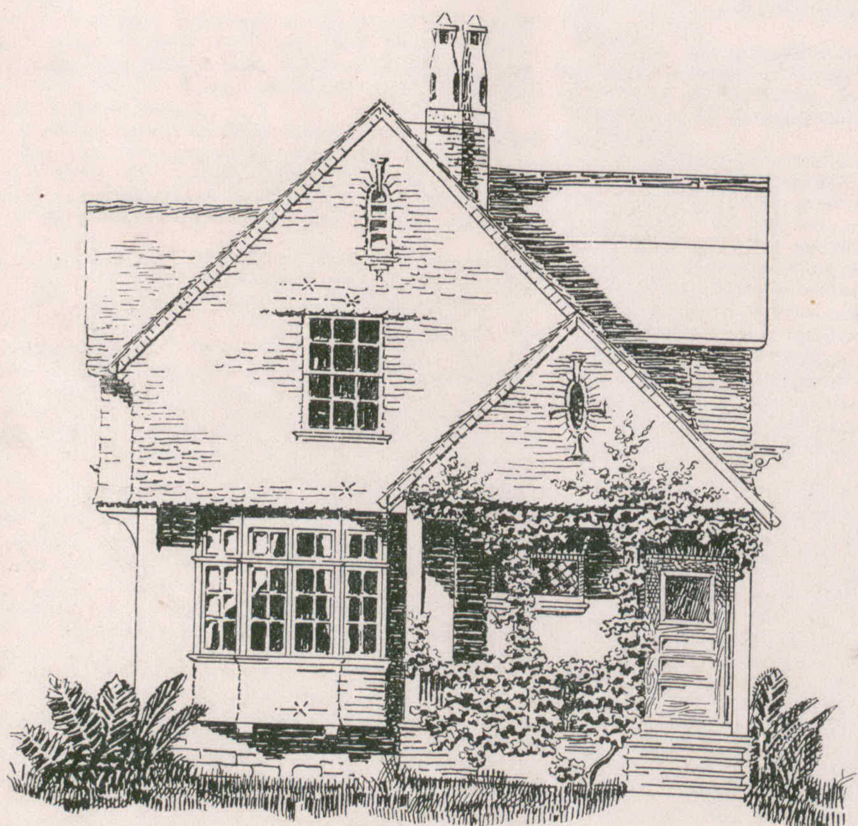
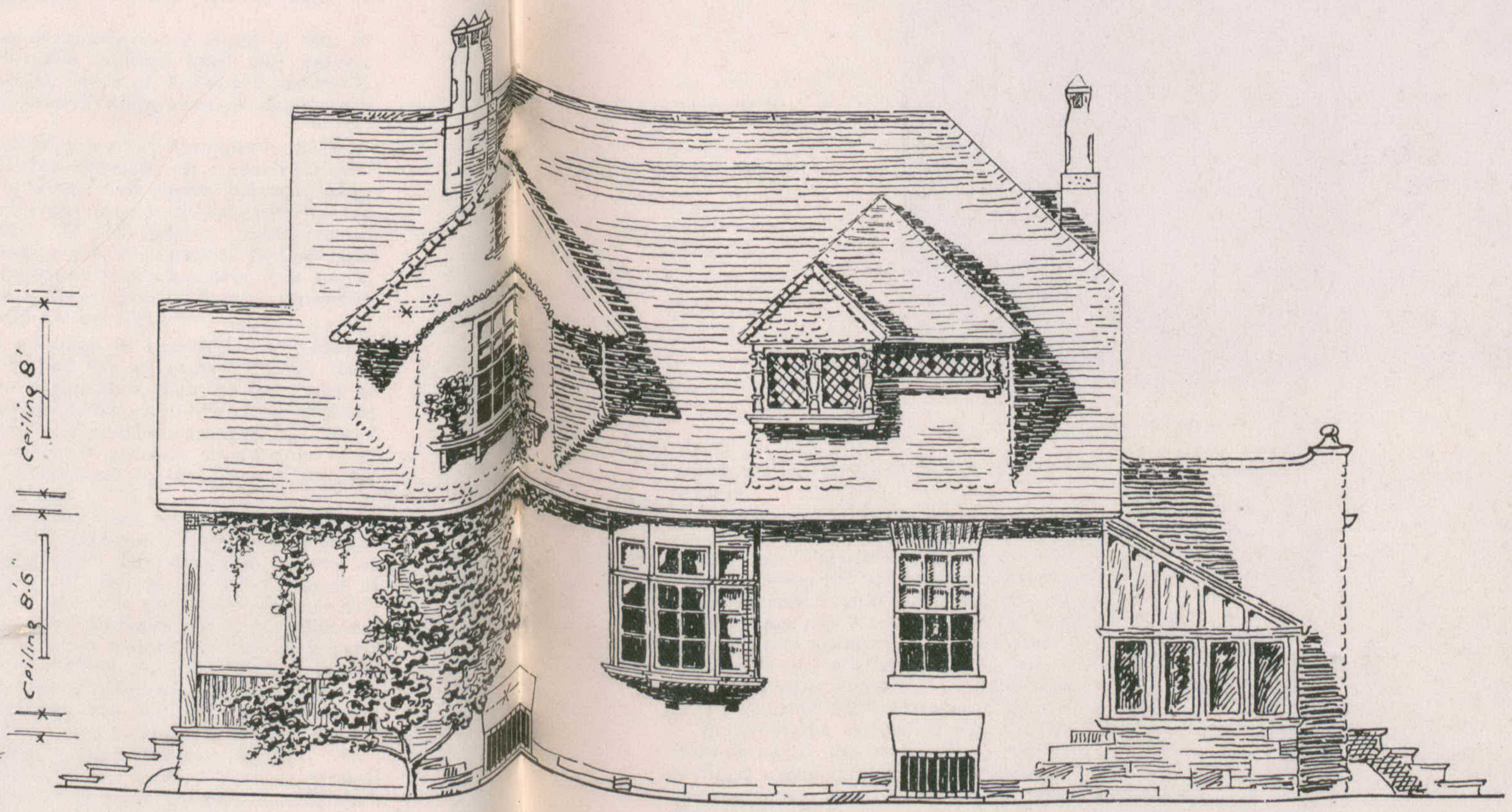
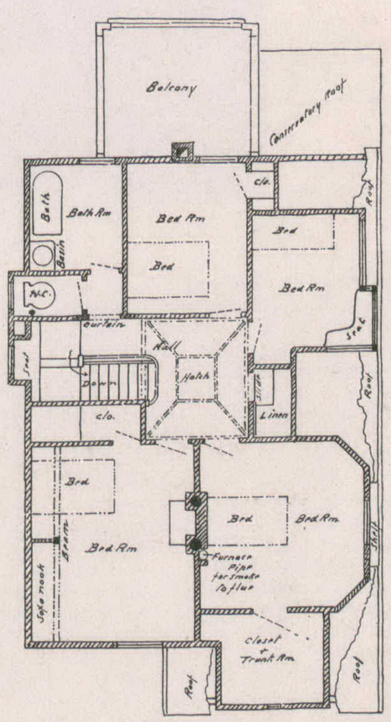




West



South



DESIGN FOR A SUBURBAN COTTAGE.

R. J. EDWARDS, ARCHITECT.

palaces in the midst of their masterpieces. This economical process of fresco was invented in Egypt and we find certain of the latin writers expressing their contempt of the "Egyptian Invention" which they accuse of having ruined art, very much in the same terms as those applied to photography by many people of our own day.

All these mural decorations and paintings are, when uncovered, as bright and fresh as when first painted but when exposed to the action of the air fade considerably and if allowed to remain in Pompeii exposed to the weather are gradually destroyed.

The wall pictures above referred to fall into two groups. The first, to which by far the larger number of pictures belong, consists chiefly of scenes from Grecian mythology. The second class consists of representations of the ordinary scenes of every day Pompeiian life—scenes from the street, the tavern and the amphitheatre.

The execution is in both classes rather inferior, often very poor, but in the pictures of the first class the composition, arrangement and grouping is usually excellent, and points to the conception and execution of the pictures as the work of two different men of very different ability. Furthermore the pictures of this class are often represented by a number of copies in the several cities of the Campagna, so that it seems certain from these and other considerations that in these paintings of the first class we have reproductions by the comparatively inferior artists of the time, of certain celebrated Grecian paintings of the Alexandria school, the originals of which have in all cases been lost, but references to which are to be found in the works of certain of the classical writers.

The pictures of the second class, on the other hand, are inferior in conception and arrangement and are represented by single examples. They follow no ancient model but were in conception and execution the works of the contemporary Pompeiian painters. They represent local scenes and personages.

Whatever may be their merits or demerits as works of art, these pictures are certainly of transcendent interest in that they have served to throw a flood of light upon the manners and customs of the Romans, and are our sole informants, with regard to ancient style, coloring and treatment of light and shade.

In one of the rooms of the "new house" which was being excavated at the time of my visit to Pompeii, and of which I threw a photograph on the screen showing the men at work, I photographed a panel on the wall, which had just, the day before, been freed from ashes after having been concealed for nearly 2,000 years. The colors were as bright as the day on which it was painted.

In concluding, I would like to show you, in rapid succession, a few slides of photographs of certain cases in the Naples museum, containing the collections of domestic implements and appliances found in Pompeii. The collection of small bronze articles numbers some 14,600 specimens, and is a unique feature of the Naples museum. The museum is a mine of wealth to the antiquarian, representing, as it does, almost our only source of acquaintance with ancient domestic life, and containing as it does specimens of all the every-day articles of personal use and ornament which eighteen centuries ago were connected with the public and private life of the Roman citizen.

The difference between these Pompeiian artificers and those of our utilitarian age is especially noticeable in these rooms. All these articles are designed and executed wirh a wonderful artistic grace. The master hand of the artist is displayed in a simple but unaffected manner, whereas our household chattels, being made to a pattern and in vast numbers, though they answer their purposes admirably, may justly be said to testify rather to the skill of the artizan than to the taste of the artist.

"By the help of the innumerable objects contained in this unique collection, we can follow out all the hours of a Roman day, in their several duties and amusements. We sit, or rather recline, with the wealthy nobleman at his meals, and criticize his table furniture, and almost pronounce upon the flavor of his dishes, or the age of his wine. We peep into the dressing room of his wife, and see her toilet apparatus, her rouge, her mirrors, her ornaments—in short, all the weapons with which she fought off the approaches of time. We penetrate into the kitchen, see the charcoal lighted in the brazier, hear the water bubbling in the urn; we sit with the student in the library, go out into the fields with the farmer, visit the shops of mechanics and artizans, and accompany the surgeon in his professional calls; we go with the respectable to the theatre, and with the wild young man to the gaming table, and see him lose his money to a Greek blackleg." And what strange inconsistencies we meet with in Pompeiian life: "There the wealthy citizen, leaving a house in which Grecian art had surrounded him with an atmosphere of ideal beauty, went to the amphitheatre, where he sat for hours witnessing the most cruel and brutalizing of sports, men hacking each other to pieces, or fighting with wild beasts, till the sand of the arena became soaked with blood. The tasteful amateur of art, when we look upon him from the side of humanity and philanthropy, is not much above a New Fiji Zealand cannibal. Nor is this all. The discoveries of Pompeii and Herculaneum present a fearful weight of evidence, in addition to that which literature had previously furnished, that among the Romans the vice of cruelty was attended with its twin vice of licentiousness." If virtue, as Tacitus and Pliny tell us, was not to be found in Rome—it is certain that Pompeii was not the place to look for it. "The foulest epigrams of Martial, the grossest descriptions in Petrinius and Apulcius, are illustrated in the remains of those cities, in sculptures and pictorial representations which cannot be described, hardly alluded to. What must be the tone of conversation and sentiment, and the standard of morals in a community where such abominations were tolerated, not to say, favored? There is much in the character and history of the Roman people which we may justly admire—their energy, their perseverance, their constancy in adversity, their political wisdom and their executive and legal ability. But we are not called upon in so doing, to overlook the most obvious moral distinctions, and insist that the influences which formed their civilization were as efficacious in training the individual to excellence as in making the nation powerful."

BANK OF BRITISH NORTH AMERICA, VICTORIA, B. C.

Mr. Walter Grose, of Montreal has been appointed sales agent for Quebec and the Maritime Provinces for the Gurney, Tilden Co., of Hamilton.

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.]

CANADIAN VS. FOREIGN CEMENT.

To the Editor of the CANADIAN ARCHITECT AND BUILDER :

SIR,—I have read with interest the editorial articles published from time to time in your journal anent the opening which appears to exist for the extension of the Canadian Portland cement manufacturing industry, and the comparative quality of the home with the imported article. While I am free to admit that a great improvement has taken place in the quality of Canadian Portland cement, I am nevertheless not prepared to agree that it is equal in quality to the best English and German brands. One of the most important qualities in good English or German Portland cement is that its strength will steadily increase for a period of six months. Canadian cement compares favorably with foreign cement in this particular for about three months, but shows little or no increase in strength beyond that period. I am of the opinion that the trouble with the Canadian cement lies in the method of grinding—that it is overburned, so that in the grinding it is all reduced to an equal degree of fineness, leaving no residue, as is the practice of foreign manufacturers.

A USER OF CEMENT.

In answer to enquiries addressed to Canadian Portland cement manufacturers for information on the line of the charge of inferiority in strength of Canadian cement contained in our correspondent's letter, we have received the following communication:

SIR,—We are favored with yours of the 24th inst., in which you kindly call our attention to an argument which is being used by dealers in foreign cements in order to prejudice the sale of Canadian cements, based upon the allegation that the native article does not increase in strength for as long a period as the foreign, the contention, as you say, being on the part of these gentlemen that the foreign article continues to increase for a period of about six months, and that the Canadian attains its greatest strength in about half that time. Our answer to this is simply a denial.

The facts are not at all as stated, as actual experience has over and over again proven, and we defy the traducers of Canadian cements to prove their assertions.

Portland cement can only be made from carbonate of lime and clay. Our raw material has proved upon chemical analysis to be unsurpassed. We have adopted the latest English methods of manufacture, and we grind, in accordance with the requirements of Canadian engineers, very much finer than the average English manufacturer. The effect of this is to give us the best attained results, and results, as our testimonials show, in advance of the great majority of imported cements, and equal to the very best anywhere.

Our competitors have assumed without proof that because our cement in a thirty days' test so much surpassed that of most foreign cements, that foreign cements continue to increase in strength until they reach our standard or surpass it, an assumption easy to make, but which they have never proved, and which takes time and much trouble to disprove, and which is therefore made without fear.

Even if it were true that the imported cement requires six months to reach a degree which ours reaches in three, that by no means establishes its superiority, unless it could also be shown that the Canadian carried some elements of decay, which has never been contended.

We are aware that some persons, from qualities inherent in themselves, prefer goods that come from afar and which cost more money, and are always willing to discredit and disparage a home product in favor of the foreign. This phase of human character is a very old one and we think it answerable for any preference now shown to foreign over Canadian cements.

Actual tests and experience have demonstrated that there is nothing in their superiority. We will have pleasure in sending you our latest testimonials as soon as received from the printers. Again thanking you for your courtesy,

Yours very truly,
THE OWEN SOUND PORTLAND CEMENT CO., Limited.
Per Geo. S. Kilbourn.

A REPLY.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—You publish in your last issue a letter by Mr. Arthur E. Wells, entitled, "The Ontario Association of Architects and What It Should Do."

Mr. Wells' letter is so overloaded with sarcasm that it is difficult to keep track of his argument, but in conversation with him I find it to be this: The Association has devoted itself to the theory that by making a higher training for architects compulsory, calamities from the failure of buildings will be diminished; but, 1st, such failures "are due quite as often to carelessness or oversight as to incompetence," and, 2nd, granting carefulness as well as competency to members of the Association, there are still "the other fellows," who are not members, but have a right to build. Therefore, Mr. Wells concludes what the Association ought to do is to turn their attention in another direction, viz., to an agitation which would lead to the establishment in the cities of Ontario, "of effective building laws compiled by experts, and a Department of Buildings competent to secure their strict enforcement."

That is in its way a good suggestion, and indeed the Association has already been working in that way. A complete set of building and fire by-laws, the work of several sittings of the Building By-law Committee appointed in 1895, was submitted to the Toronto City Council when the Toronto building law was amended in that year (after the fires in which the Globe office and the Simpson building were destroyed), and all the cities of Ontario and some of the towns have been invited to make use of the services of this committee in amending or enlarging their building by-laws.

If Mr. Wells wants to do good by writing, let him turn his attention to the local newspapers of the Ontario cities, and urge them to press upon the attention of their municipal councils the advantages of this offer on the part of the Building Committee of the Association. It is the small end of the affair, but a good man devoted to the small end of the matter will be of the greatest possible service to the large end, which, I think, there can be no doubt, if I may say so when Mr. Wells has just expressed a doubt on the subject, is the elevation of the profession of architecture. It is surely unreasonaole to provide for the correction of errors rather than their prevention, yet this is the essence of Mr. Wells' proposal that legislation should be devoted, not to the qualification of architects but to building laws and building inspection. The herculean figure of the building inspector who would contain in himself all knowledge to detect and all power to arrest error, appeals to the imagination; but, as a matter of fact, he might fail to appear, and it is wiser in this as in other things to begin at the other end, and look out for the prevention of errors by fostering the growth of the architect, who is the fountain of everything.

There is something in what Mr. Wells says that "accidents in building operations are due quite as often to carelessness or oversight as to incompetence," but it is recognized as a matter of experience that the best designers are the most exact about their drawings, specifications and superintendence, and the surest way to prevent even errors of carelessness is to attend to the qualification and status of the architect. If as Mr. Wells very truly says what architects most want is "grace to see that they have embraced an art and profession which is rich in interest," one sure way of doing it is to make the title "architect" an attainment involving the possession of the knowledge and cultivation of mind, which alone give the power of being possessed by the interest of architecture. Without them the practice of architecture can only be the process known as "getting up a set of plans," a process which is bad for everybody—for the man who does it, for the man who owns the product, but perhaps most of all for the weary public.

Yours truly,
W. A. LANGTON.

QUALITIES OF FIRE-PROOFING MATERIALS.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—In Mr. Gagnon's interesting critique, in the March number of your journal, of my convention paper, he is evidently under some misapprehension, or has not read the paper as carefully as he might.

In no respect have I advocated the Maurer system in preference to terra cotta construction; I merely quoted the report of the test, and I must say I was mystified by the reputed failure of the terra cotta arch. Since my paper was presented, I have seen, however, the statement of Mr. Frank, explaining the very defective workmanship which was allowed, either by design or carelessness, in the construction of that arch, and which fully explains the cause of failure, which was inevitable under the circumstances.

Mr. Gagnon must have overlooked my summing up of the lessons of the Pittsburg fire, wherein I have placed porous terra cotta in the first place as a fire-resisting material, hard tile second, and concrete third. With regard to asbestic plastering as a fire-resisting material, I must say, as I said in my paper, that I would like to see it tested under as severe conditions as the New York tests. Till this is done architects will hesitate to adopt it in preference to present fire-proofing methods.

Yours truly,
EDMUND BURKE.

PREACHING VS. PRACTICE.

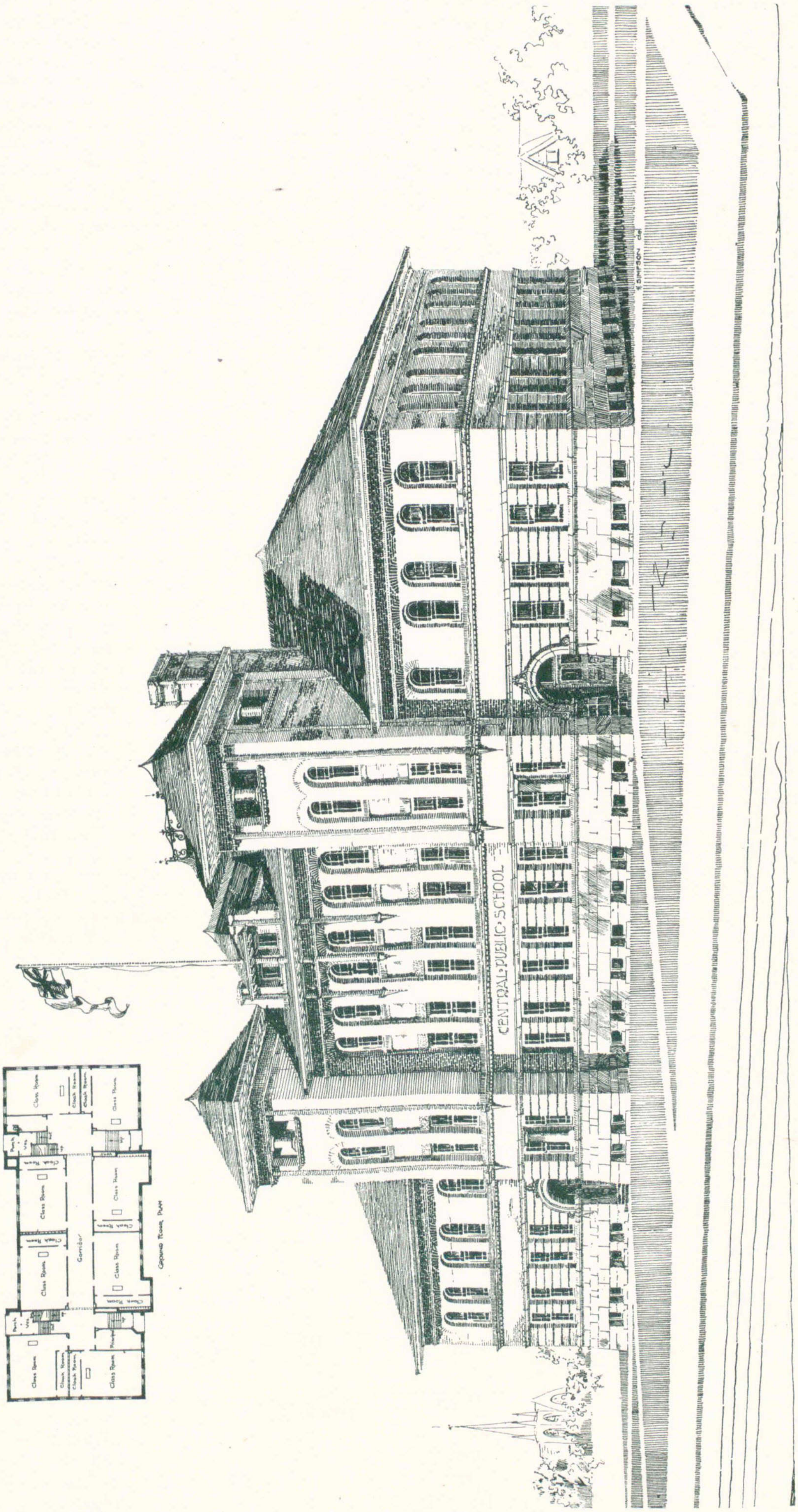
To the Editor of the CANADIAN ARCHITECT AND BUILDER :

SIR,—I have read with much interest a letter in the CONTRACT RECORD by "A Young Architect" re the stand taken by some architects in regard to competitions, ethics, etc., and I would like him to know that he is not alone in the opinions he expresses. I have very often been amused at the way some prominent members of the profession waste time and wind expressing themselves on these matters. As for "professional ethics," some of them should try and find out what it means or shut up. We out in the wild woolly west often hear reports of architects in the cities tumbling over each other, so to speak, to get work; of how they enter competitions that no thoroughly professional man would have anything to do with, and then we hear them in solemn conclave on competitions, ethics, fees, etc., etc.

Just a couple of instances that came under my own notice: A down east architect wrote out to the west offering to supply plans, specifications, etc., for a $25,000 building—not a warehouse either—for an amount equal to ⅜ of 1%. Another entered a competition for the same class of building, and after capturing the prize his plan was rejected when tenders were received. It was going to cost several thousand dollars more than his estimate. He was quite a prominent man, too.

And these are the men we young fellows are expected to sit at the feet of and learn! Trusting some of them will set us a better example or stop inflicting their precepts on us (perhaps you could eliminate the precepts from the CANADIAN ARCHITECT AND BUILDER.) Yours truly,

ANOTHER YOUNG ARCHITECT.



PERSPECTIVE VIEW

COMPETITIVE DESIGN FOR A CENTRAL PUBLIC SCHOOL AT ST. THOMAS, ONT.

SIMPSON & ELLIS, ARCHITECTS.

THE CITY GARDEN.

By W. A. Langton.

It is hard to over-estimate the importance to a building of the treatment of its site. In fact, the buildings that occur to one as impressing the minds of travellers with their idea have all some characteristic advantage of site. St. Mark's of Venice would always be a wonderful study if one had to go up a lane to see it; but how much of the impression it has made upon the world is due to its beautiful site? Every traveller in search of impressions prefers the English cathedrals to the French, though no one doubts that the French cathedrals have greater architectural perfection. The French cathedrals stand on the street like warehouses, and there is nothing about them to tune the mind to harmony with the purpose of the building but "the reverend smell of incense" that sometimes greets one on entering; but, before entering an English cathedral, one turns out of the streets into the venerable Close, where, except at service time, when the place is full of the sound of bells, the church is surrounded by a solemn quiet. There is nothing in France so full of religious feeling as an English cathedral and its close. Indeed the actual buildings might, with such surroundings, be less noble than they are and still produce their effect. In the Inns of Court in London there is, except for the Temple Church and a hall or two which date from the time of the Templars, no architectural pretension whatever. What building has been done, since the district fell into the hands of the lawyers, is of an unrelieved plainness; built in the dullest period of architecture, of the commonplace and monotonous London brick, now dingy with age. Yet the Temple Courts have a charm because they are courts; they are a conception and have a place in literature. To turn out of Fleet street with its crowds—I will not say noise lest it might be thought to compare with the roar of the trolley car, beside which the London hum is velvety, like the sound of a city heard in a dream—but Fleet street is bustling, and to turn out of it into these quiet courts is to receive an impression which architecture might increase but which is there without it. These are large illustrations of the importance of site. For this reason they first attract attention to the question, but, when the lesson is learned, one sees abundant illustrations of it on a smaller scale; the village church in its churchyard is just as much a conception as the cathedral in its close, and the courtyard of an inn as the Inns of Court. The lesson appears to be that it is not unusual beauty in the site that emphasizes a building so much as harmonious character. When the site has great natural beauty it is necessary that the building should adorn it, and it is the character of the site that governs the character of the whole. Durham Cathedral, on the edge of a bluff overhanging a winding river, is beautiful and worthy of the situation; but a castle would have become the situation as well or better. The ideal cathedral, as a cathedral, is not Durham but Salisbury, set down upon a plain, with no natural distinction of site from any other building in the same county, but made so distinct by the environment made for it by its builders that it is cited as the ideal English cathedral. This is the kind of site that we have to consider under the head of gardening. This is the everyday problem, to create an environment, and it is a problem for the architect to include in his plan.

Because it is said that God made the country and man made the town it is sometimes supposed that towns should try to look like the country; but God made man too, and to the artist, the poet, to whom it is given to enjoy truth, pure country and pure town seem to be equally objects of delight. In villages, which are a sort of border-land between town and country, one admires a certain freedom that leaves it in doubt how much is due to nature and how much to man, but in towns there should be no such doubt; we want to feel the hand of man everywhere, and, of the two great divisions under which gardening is classed and about which there has been much controversy, whether landscape gardening is right or formal gardening right, there is no question but that formal gardening has a place in towns. To many people the term "formal gardening" brings only a vision of trees cut into the shape of cocked hats and teapots. It was formal gardeners who committed these follies but they are not an essential of the art. Landscape gardeners committed follies too. The judicious designer follows neither one nor the other exclusively but adopts the principle of each when it is suitable. In the parks of a city there is room for landscape gardening, but for the small amount of ground connected with private houses and for streets formality is the key. The picturesque is impossible for us because our work is new; we want a treatment that will give us beautiful streets at once, and the picturesque which delights cannot be fabricated. In all beauty there is an appeal to the mind as well as the eye, and the deviations from the regular which constitute the picturesque must, in order to please, be recognized as accidental. To be recognized as done "accidentally on purpose" is to weary instead of please. The picturesqueness that pleases us in older countries is, besides the mere charm of novelty, either the result of a freedom from regulation which is out of the question now-a-days, or of the adaptation of ancient arrangements to modern uses, and the resulting character in either case appeals to the mind in a way that no purely modern work can. But the appeal of formality is direct. What meets the eye is arranged to please the eye, and the intention is part of the pleasure. There may be some controversy as to whether, when trees are full grown, the approach to a house is more pleasing if winding through an accidental arrangement of trees or by an over-arched avenue of trees with tree trunks closing up in perspective; but there is no question that an approach winding among scattered saplings is nothing, while there is some effect of dignity in the formal arrangement of the youngest trees. It is the intention which is gratifying.

For a young country, then, formality is freedom. The hand of the designer, which must be apparent in modern work, can here appear freely. The mere effort, so long as it is properly directed, counts for something. But the proper direction is everything. The effort must be an effort to dignify some need which is recognizable. The adherents for formal gardening in England, when writing on the subject, occupy most of their space in quoting from ancient works on the subject and in referring to old examples still existing, and this not as illustrations of principles but as examples of what ought to be done now. The same mode of life in the main still goes on in England, substituting for ancient terms, such as the bowling green, modern terms such as the tennis lawn, so that no doubt these guides are reasonable; but to us who live in cities the whole arrangement of these gardens for country mansions is foreign. We are more likely to get direct examples of what we want from an English cottage, or a not too-French French garden. But the essential thing is to regard no example as an example of anything but the principle, and of methods in handling details.

The leading idea is bound up with the word "garden" in its original sense rather than in that which we usually attach to it—a place of trees and flowers or vegetables and fruit. The original form of the word is said to have been "garth," an enclosure, still in use to describe the space enclosed by cloisters; and the essence of the formal garden is the enclosure of a space about the house which is connected with the house rather than with what is beyond it, and partakes of the character of the house. For this reason, walls, gates, paving, steps and balustrades form as great a part of the consideration of gardening as do growing things.

A wall of some kind one might almost say is essential. This statement will stand for the present century. When the brotherhood of mankind, typified by the American elimination of boundaries, is accomplished, it may be necessary to modify it. At present we love one another as members of a grown-up family, who are better in separate apartments; and the American system serves chiefly to display as much as possible of one's own house and to make one's neighbor's lawn look as if it were our own—which is being artful rather than artistic.

A mere curb will answer the purpose of marking division, but there is a great deal to be done with a fence if it is made a feature. Wood is not sufficiently durable to form as it were part of the grounds. It is suitable only as a support for a hedge until it is fully grown. This does not take as long as is supposed. A privet hedge planted in the year 1887, and then a scanty row of slips about two feet high, has been for the last two or three years a complete screen from passers-by, although it has been kept clipped to an even outline. It is healthy and grows thick and evenly. It has still a small picket fence about two feet high to protect the roots from the street, and this, though perhaps unnecessary, has a good effect. If the fence were brick it would be better. A brick wall by itself, if of the full height of the gate, is rather unnecessarily forbidding, and will confine the view from the ground floor windows unless they are well up—as they ought to be in town. A better arrangement is a low brick wall with an upper part of wrought iron. The brick wall finishes at the entrance with gate piers, and the gate may be wrought iron. A wrought iron arch over the gate is in England a common survival of a practice when a light hung over the gate. At present it serves chiefly to carry a creeper which runs along the fence and over the gate. This creeper is in France also a common accompaniment of the wrought iron fence, and is always interesting; its festoons introducing into the regularity of the fence some spontaneous lines, or serving the purpose of contrast of line, like the swag in a cornice. But a better arrangement is to plant a hedge behind the fence. In this case we get all the the beauty and variety of the wrought iron topped fence and its advantage in strength, while making it perfect as a screen by a green background which is more beautiful as a finish on the inside than a brick wall would be. In this case, where the fence is a screen to the height of the gate, logic demands a solid gate also.

There are many shrubs, no doubt, besides privet that would make a good hedge in this country. There is a cedar hedge 15 feet high not far from Toronto, which is thick and healthy, and, when well trimmed, makes a good mate of the tall yew hedges of which one reads in descriptions of old English gardens. Barbary thrives also near Toronto in hedges about 6 feet high.

It is common in England to finish a yew hedge at corners and openings by allowing a tree to grow up at these points and trimming it to a regular shape. The teapot and cocked hat have done service in this position, but it is not necessary to pay them any tribute; a simple conical form with a projecting top is enough for emphasis and to appear as part of the hedge.

In a street of London, where there is more to be gained by screening one's self from the road than by securing a clear view of the road, there is an artist's house which has a low brick wall (acting as a retaining wall), a wrought iron fence above, with a hedge behind, and, in addition to this, a row of pollarded Lombardy poplars. The combination of all these parts is very interesting and remains in my memory, though I have quite forgotten what the house was like. The house was perfectly visible between the trees. The interruption made by the foliage of the trees came about the level of the bedroom windows and acted as some protection to them.

It is this kind of partial screen that one wants. Just so much screening as to make all parts of the houses not equally visible at the same time is both a gain to the beauty of the street and accomplishes for the houses all the protection from passers-by that is necessary. It is not necessary to wall in a house completely from all eyes, but only to place such partial obstructions in front of it that, as a spectator passes by, the view of any one portion is obstructed from time to time. It is possible to view the house as a whole while moving, but it is not possible to see the whole house without stopping for the purpose.

Poplars are also useful as a boundary between lots, because they have so little spread. The disadvantage of growing an elm or maple on a boundary is that the act is not a self-regarding act; the tree spreads as much over our neighbor's property as over our own, and our neighbor may not want it. The Lombardy poplar will give him only its shadow, and not much of that if we pollard it. There is much to be said for pollarded trees. They are manageable; one can confine them within prescribed limits, not only laterally but vertically. What we want from trees is a certain amount of screening from the sides and a certain amount of shadow; but not to keep the sun and air from us, nor to cast all below them in shadow; and the pollard answers these purposes. With them one can protect grounds from being overlooked without cutting off light, air and sunshine. As far as shade goes, a little maple 20 or 25 feet high will give shade enough for a family to sit under if they move their chairs according to the time of day.

For continuous shade, which is also desirable, the practice of pleaching is effective. In one of Miss Alcott's letters she writes: "Father would have enjoyed the pleached walks, for they are cut so that looking down on them is like a green floor, and looking up it is a thick green wall." On an ordinary scale such walks are described as 8 to 10 feet broad and 12 to 15 feet high, with trees 4 feet apart. It is necessary to have a rough frame of wood or iron to start the trees on the required lines. The boughs are then wreathed together and clipped. In France such walks are carried out on a large scale. Versailles is approached by miles of avenues with trees interlocking overhead, and in many other places the trees on the public promenades are treated in the same manner. The trees are spaced as widely as five paces on centres and brought to a flat top about 40 feet high. The arcading is sometimes done in a very perfect manner, forming pointed arches between the trees both longitudinally and transversely. The trunks and interval branches are kept entirely bare, so that there is in effect a continuous vaulting of bare limbs finished on top with a flat canopy of leaf-bearing twigs, which are also allowed to extend down the outer sides for some distance. The lines of the branches have of course sufficient wilfulness to prevent a monotonous regularity, but the hand of man is discernible both in the formality of the arrangement and in the character of the branches. These latter are gnarled or knotty with pruning. This description does not sound pleasing, but they are attractive to the artist's eye; there is an effectiveness about their lumpy, swollen ends which is comparable to that of the blob ended line that the artist himself affects.

There is an advantage in thus keeping trees within bounds on the streets as well as in private grounds. A street overarched with elms as in some old towns in the United States is not, as might be expected, cool in summer. The gain in shade is more than off-set by the check given to currents of air, which are the only real source of coolness on a hot day. Very tall trees are moreover not perfectly safe neighbors for houses. In open spaces trees may be properly allowed to grow to their full height, and in Canadian cities there are fortunately so many of such spaces that in stating objections to fully grown trees one need not feel that one is forbidding them the town.

There might doubtless be much more said, by an experienced gardener, in the way of suggestion about the materials for architectural gardening; but not many materials are required, and there is only space to say a few ungrateful words about our old friend the Virginia creeper. It grows rapidly and is beautifully colored in the autumn. It can also stand more severe exposure than the "Boston ivy." But it needs much training, and is dishevelled in appearance even when cared for. The Boston ivy only requires fostering at the first and can then take care of itself. It will follows the lines of a building so closely that it seems as if the stems had been cast to fit the variations of surface. It is an ideal architectural plant, and might be specified by architects like any other ornament.

It is not proposed to enter now into details of the treatment of the ordinary street front problem. It is not a difficult problem nor can it be so varied as are the possibilities of treatment of the private grounds on the other side of the house. One thing clearly ought to be more often done and that is to bring carriages up to the front door, instead of to the sidewalk 40 feet away. How to do this is not so difficult a problem as to tell why it is not oftener done. A greater difficulty consists in dispossessing the servants of the back of the house so as to utilize the extensive piece of ground that is so often wasted there. How to make both the front and back elegant and still find room for coal delivery, scavenger's withdrawals, drying clothes and other proceedings which neither the public nor the owner's friends are invited to view, is a difficult problem and for small houses perhaps impossible; but it has been done in fifty feet of frontage, and an enthusiastic planner surmounts the insurmountable so often that, if architects would give their minds to the grounds as much as to the house, we might see much more made of them than we do now, both as features on the street and as places for retirement out of doors.

STUDENTS' DEPARTMENT.

PROFESSIONAL INSTRUCTION.

THE irreducible minimum of knowledge necessary for those who practice architecture has been rather obscured by the attempts to raise the qualifications of its members. Instead of teaching a few things well, authorities on professional education have been tempted to put before the student a large number of subjects more or less allied to the calling of architects, for which only a superficial knowledge can be expected. This attempt to raise the qualifications of the architect has rather defeated itself by keeping a large number of students back from an ordeal they are not willing to undergo. Imagine an architect's pupil attempting to become proficient in such varied and opposite sciences as chemistry, mathematics, physics and geology, by a course of lectures, to be followed by another course treating of building construction, and the various trades and arts of which it is composed. No doubt an intelligent youth will acquire a general smattering of these subjects, but of what practical use or application is a question of doubt. If they are gone through before he enters an architect's office, it is ten chances to one that he will quickly forget all he has learned by the time his term expires, and that during his pupilage he will relieve his mind of all his school training. Is it at all probable that a pupil will trouble his head about the mathematical principles involved in a piece of construction he may be engaged on, or that he will be able to apply his mechanical learning to the stresses of a roof or the equilibrium of an arch, etc. It is very doubtful whether he retains in his memory the rules he learned respecting the composition and resolution of forces, and the application of those principles to practical building. Does he remember the principle of "moments" sufficiently to be able to put them to any account? How far, too, does his knowledge of geology come to his aid when he is visiting any building?—or his chemistry help him in his study of the solvent properties of acids on stone? It seems to us much of the practical value of this pre-pupilage training is almost lost, except, indeed, as a discipline, and all educational methods are valuable as disciplinary. In fact, school or college training can give all that is necessary in a general academical sense. Far better to postpone the professional course till the actual time of pupilage, and the second year of the term seems to be an appropriate time for the pupil to begin a course of instruction on these subjects, so that they may be carried on concurrently with his practical office work. If this could be managed agreeably to the master, and without overtaxing the pupil, what a gain it would be to the student, for the course of studies could be so arranged that it would help the student just when he is beginning to pick up his facts and experience. He wants to know, for instance, why walls of brick are made of certain thicknesses, generally by additions of half a brick; what bond is; why footings are formed as they are; how concrete and mortar are made. At that very time he would learn the rationale of the whole thing. Natural doubts as to the composition of brick, the varieties of stone, the qualities of timber, would speedily be set at rest by lectures on these subjects, which no master could afford to give himself. As he advances in his office experience, he wants to know why this and that is done? why roofs and partitions should be framed as they are? and a hundred other questions of a constructive kind will suggest themselves for solution. At this juncture the student will begin to feel a real interest in discovering the reasons why and wherefore. He will find his progress wonderfully assisted by the alternate aids of the drawing desk at office, and the class-room lecture or demonstration; by having to draw the construction to scale, and hearing the theory explained. Thus, theory and practice will go on hand in hand in hand, and the mathematical demonstrations will, having something practical associated, be more clearly understood and remembered than if given as a school subject months or years before the practical exemplification appears.

But, it may be asked, what ought the minimum attainments to be? We answer, just sufficient mathematics to enable the student to work out a formula, or to solve equations on structural questions; just enough mechanics to enable the student to determine the stresses of a structure of stone, timber or iron. Sufficient geological knowledge may be given to enable the pupil who has any curiosity to find for himself to what particular stratum or formation a particular stone belongs, and from what bed it has been obtained, and to know the varieties and properties of the great limestones and sandstones of his country, at least. To expect a young man who has a dozen or more very practical subjects to take up and become familiar with in a short period, to know more, is to expect him to do an impossible thing. Of what immediate use, for instance, would it be to question him on the specific gravity and chemical constituents of any of the Plutonic rocks or greenstones, or in what strata the serpentine rocks of Canada are to be met with, in what series, or in what group. It will be enough if he knows sufficient mineralogy or chemistry to enable him to describe the mineral character, the specific gravity, the percentage of silica, lime and other properties and durability of stones which are in use every day. In physics, ventilation, heating and sanitary science, he ought to know sufficient to understand all that is necessary to healthy habitation and construction; all beyond we should advise him to defer until after his term has expired, and he thinks of preparing for one of the professional examinations, when a more advanced and comprehensive course might be gone through at the option of the candidate. Till this period arrives, we think the pupil's attention and study should be limited to a few of the main scientific facts and principles of his art, and these should be learned thoroughly instead of being mixed up with a lot of irrelevant matter that may never be wanted, or, what is quite as stupid, their points of application to architecture and building obscured or lost sight of amid a vast number of distinctions and details. The courses of instruction given at Queen's College, University College, and at the technical school and colleges in London afford the pupil facilities for carrying out the arrangement we suggest.

In this connection we may mention a bill, the sections of which are before us, providing for the examination of architects and regulating the practice of the profession in the state of Illinois. The Ontario Association of Architects have already taken a similar course. The examination will have special reference to the construction of buildings, and will test the knowledge of the candidate in the strength of materials, and as to his ability to make practical application of such knowledge in the ordinary professional work of an architect, and in the duties of supervisor of mechanical work on buildings, especially in the laws of sanitation. The bill has passed the legislature, and is a proof that trans-Atlantic architects are beginning to see the advantages of a certificate of competence.—The Building News.

COLORS AND THEIR AFFINITIES.

Black upon white shows nothing lost.
White upon black gives a very bad cast.
Blue upon red is a purplish hue.
Red upon black brings a brownish stew.
Green upon blue is the color of bog.
Blue upon green shows the color of logs.
Brown upon black gives brown very dark.
Black upon brown is the color of larks.
Purple upon lake the lighter it takes.
Yellow upon white gives a very clear cast.
White upon yellow brings a much shorter last.
Brown upon yellow shows a bismarck tone.
White upon brown is as cold as the zones.
Red upon pink some use for the ground.
Pink upon red will not go down
Silver upon all colors used in cheapness lies.
Gold upon all colors will always harmonize.

FAMOUS DOMES.

HERE is a list of the principal domes of the world and their dimensions, showing the importance of that of Mosta:

St. Peter's, Rome, is 333 feet in height, with an interior diameter of 137 feet.

The Pantheon, Rome, is only 146 feet high, but it has a diameter of 142 feet inside.

St. Maria, Florence: Height, 275 feet; diameter, 137 feet.

St. Paul's, London: Height, 220 feet: diameter, 108 feet.

Santa Sophia, Constantinople: Height, 182 feet; diameter, 107 feet.

The dome of Mosta is 200 feet high and 124 feet in diameter, sixteen feet larger than the great dome of St. Paul's.

One of the largest domes in India, the land of domes, is that of Gol Gomuz at Beejapore, which is 175 feet high and 124 feet in diameter, ranking like that of Mosta, between St. Peter's and St. Paul's. The exterior height is 198 feet. This dome covers the tomb of Mohammed Shah, the sixth king of the Moslem dynasty in Beejapore, who died in 1689, so that the building is nearly contemporary with St. Paul's. The name signifies the "Rose Dome." The Sultan is buried under it with the simple inscription, "Sultan Mohammed, a dweller in Paradise."

The first bas-relief in terra cotta is said to have been made by the King of Sicyon, his daughter having traced on the wall the outline of the face of her lover who was about to leave her. It was then filled with clay by the king, and afterwards baked in the furnace with the tiles.

We learn from Indian Engineering that the grand ancient mosque near Masti Gate—the only relic in Lahore of the Pathan period—is undergoing repairs. A local paper has condemned the bad taste that has prompted the replastering and lime-washing of the outer walls. It is said that some of the best preserved specimens of fresco painting, of what we may call the Pathan school at its best, is to be found in this Musjid. Unfortunately, the repairing masons have descrated the work of the old masters by laying on big blotches of flaming, flaring colors.

THE BUILDER

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

Built-up Timbers. THE recent accident in London, Ont., should remain an object lesson to all builders who may be called upon to form long timbers by "building-up." A proper disposition of the butt joints should be insisted upon, and the character and quality of the timber should be subject to the closest scrutiny in order that sound and suitable joists may be selected for the purpose. While it does not always follow that a clear joist is always the strongest or best to select, it is an absolute certainty that a joist having a knot in it is not so strong as one devoid of knots, other things being equal. Many a clear joist has been so cut at the mill that the line of grain may "cross" the width of the joist at distances varying from twelve to four feet. Now, it must be evident to any one having a knowledge of the strength of timber, that a joist having the grain of the wood running at an angle from its edges cannot in the nature of things be as strong in resisting a transverse strain as one having the fibres running parallel with the edges and sides of the joist. Here, then, is a pointer worth knowing, for many a fine piece of timber, suited perhaps, for the finest of joiner's work, may be totally unfitted to become a part of a laminated beam that may have to bear a heavy transverse strain. Again, a joist being "curly" in the grain should be discarded on sight. A curly piece of stuff is the most deceptive of all—it may look well, but is generally short in the grain. A "brashey" joist, as well as one showing any signs of doze, should not be used, neither should a joist having sap or wane on either edge be permitted to form part of the beam. Perhaps the worst Canadian timber that might be employed in laminated beams, is hemlock; it is "brashey," short in the grain, and not strong transversely; indeed, it ought not to be employed in any position or in any form, when it may be subjected to heavy transverse pressure. While being a very useful wood in many places, it should be avoided in beams. Norway or Southern pine, of the softer woods, seem to be the best adapted for beams that have to undergo much stress, and they have the quality of resisting fire about as long as most woods and are not subject to injury or degeneracy because of being constantly under strain, like most other woods. It is not good construction to bolt laminated beams; it is better to spike them or to clamp them together, as bolting requires removal of timber, thereby weakening it, and renders it impossible for each lamination to do its own share of the work, as it may be hung on the bolt at some point, and make its neighbors carry a share of its burthen and thereby cause a rupture which may lead to serious consequences. Too much care cannot be exercised in building up beams.

Some Working Hints. THE framing square in general use among mechanics may often be used as a calculating machine if the one using it is thoroughly acquainted with its capabilities. The long arm of the square is called the blade, the short arm the tongue. On the side shown in Fig. 1 there is a diagonal scale on the tongue. This is for measuring off hundredths of an inch. The lengths of lines between the diagonal d e and the perpendicular e f are marked in the latter. To take off 3-10ths and 4-100ths of an inch, place the compasses on the dots on the fourth line. 7-10ths and 3-100ths of an inch is formed on line 3. 1 inch, 8-10ths, 5-100ths is the distance shown on line

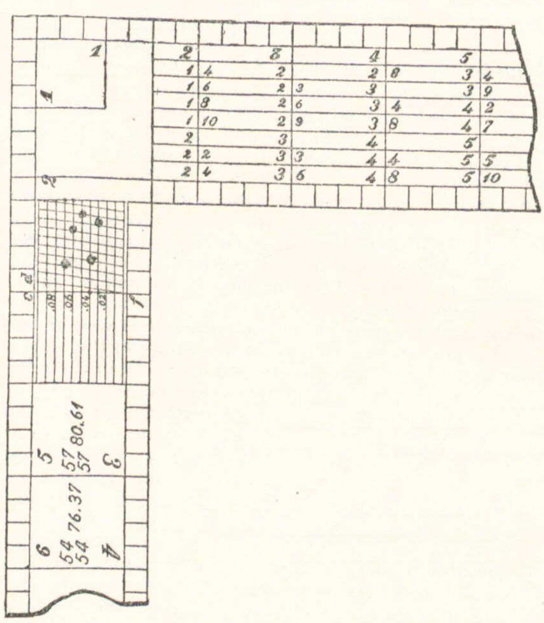
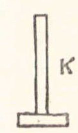


FIG. 1.



5. The brace scale or rule is always on the tongue. This rule is easily understood; the figures on the left of the line represent the "run" or the length of two sides of a right angle, while the figures on the right represent the exact length of the third side of a right-angled triangle, in inches, tenths and hundredths. The exact length of a brace with a run of 57 inches in the post and the same distance in a beam, would be 80-61 inches; this is the length between shoulders. The vertical rows of figures on the blade constitute what is known as the "board measure." The superficial contents of a board are found thus: Suppose the board to be 13 feet long and 15 inches wide. Look for 13 under the 12-inch mark on the inch scale; follow the line this 13 occupies till under the 15-inch mark, the answer, 16 ft. 3 in., is found. A useful addition to the steel square in solving mechanical problems is what may be termed a "fence." This may be made of any hardwood as follows: Dress a piece of wood to 2″ wide,

1⅝" thick, and about 2' 10" long; run a gauge line down the centre of both edges; this done, cut a saw kerf along the gauge lines, leaving a solid piece about 10 inches in the centre; this, of course, necessitates the kerf to begin at each end of the stick. The square is then inserted in the kerf, the blade on one side of the solid centre and the tongue on the other, the fence itself forming the third side of a right-angled triangle, the blade and the tongue of the square forming the other two sides. The next step is to make some provision for holding the fence tight to the square. This is best done by putting No. 10 1¼" screws in each end of the fence close to the blade and tongue. The next thing will be to apply the square in its present condition for the purpose of obtaining the lengths and bevels of braces and rafters. Adjust the square and fence as shown at Fig. 2, and place it on the prepared stuff as shown in

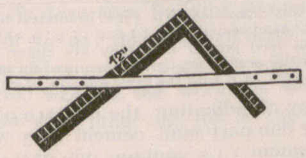


Fig. 2.

Fig. 3, in such a manner that the mark 12 on both blade and tongue coincide exactly with the gauge line 0, 0, 0, 0. Hold the square firmly in the position now obtained until the screws are tightened over it. We are now ready to lay out a brace. The gauge line 0,0,0,0, over which the figures 12, 12 stand, is ⅜ of an inch from the edge of the stuff, and is intended to admit of a flat or bearing point on the end of the brace called "the toe of the brace," as shown in the diagram. Slide the square to the left as shown by the dotted lines at X, mark with a scribe or fine pencil on the outside edges of the square, cutting the gauge line. Slide the square to the right until the 12-inch mark on the tongue stands over the knife mark on the gauge line. Mark the right-

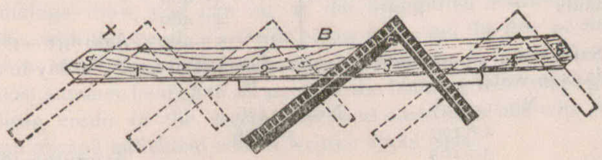


Fig. 3.

hand side of the square, cutting the gauge line as before; repeat the process four times, marking the extreme ends to cut off, and we have the length and exact bevels of a brace for a four-feet run. Square over, with a try-square, at each end from the gauge line, and we have the toe of the brace. The lines S S shown at the end of the brace represent the tenons that are to be left in the braces when such are necessary. Where a number of braces are to be cut, as is often the case in heavy timbered buildings, such as barns, workshops, saw mills, etc., it is always best to make a pattern out of a piece of thin pine or other suitable wood for each "run," and nail a strip or fence on the working edge of it as shown at K. The pattern can then be used from either side, and being the exact length and the bevels being correct, one man can lay out braces faster than six men can cut. In order to show the principle on which this rule is based, the brace is shown in place at Fig. 4; the dotted lines show the position the square was in when the pattern was laid out. It may be necessary to state that the square as now arranged will lay out a brace pattern for any length if the angle is right and the run equal. Should the brace be of great length, however, additional care must be taken in the adjustment of the square and its application, for should there be any departure from truth, that departure will be repeated every time the square is moved, and where it would not affect a short run it might materially affect a long one. Let us lay out a brace for an angle when the run in the beam is three feet and the run down the post four; proceed as follows: Prepare a fence of thin stuff for a pattern same as before; run a gauge line on it; lay the square on the left-hand side; keep the 12-inch mark on the blade over the gauge line; place the 9-inch mark on the tongue on the gauge line, so that the gauge line forms the third side of a right-angled triangle, the other sides of which are nine and twelve inches respectively. Proceed as on the former occasion, and as shown at Fig. 5, taking care to mark the bevels

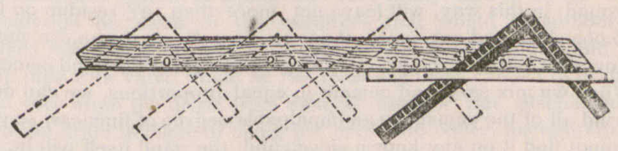


Fig. 5.

at the extreme ends. The dotted lines show the positions of the square as the pattern is being laid out. Braces for any unequal runs, if the angle is right, may be obtained by taking proportional figures on the square as gauge points, to suit the conditions. Fig. 6 shows an unequal brace in position, the dotted lines showing

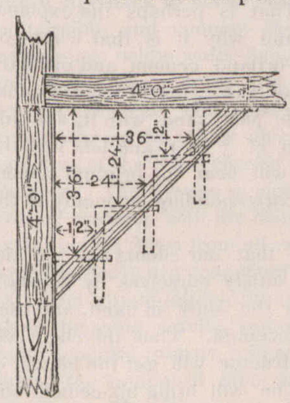


Fig. 4.

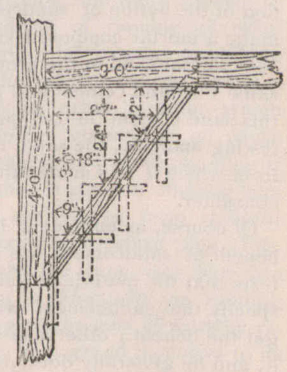


Fig. 6.

where the square was placed when the pattern was forming. There are many other things, equally important to laying out braces, that can readily be performed by the use of the steel square, and in future issues attempts will be made to describe some of them.

SILICA PORTLAND CEMENTS.*

By M. J. Butler, O.L.S., M. Inst. C.E., M. Am. Soc. C.E., M. Can. Soc. C.E. Deseronto, Ont.

Mr. Chairman and Gentlemen: If it be true that the man who makes two blades of grass to grow where one formerly grew is a public benefactor, then in that case F. L. Smidth & Co. should be considered public benefactors, for they have discovered a means by which it is possible to take one barrel of cement and make two of it with increased strength at the same time.

The first thing to bear in mind is this, that in the grinding of ordinary Portland cement it is practically impossible to reduce it to such a degree that less than 10% residue will be left on a sieve of 10,000 holes to a square inch; that when tested on the 40,000 mesh sieve, not more than 75% of it will pass that sieve, leaving 25% residue; that the residium on any sieve, however fine, has no cementitious property whatever. This is the fundamental principle which underlies sand-cement; that is to say, the unground portion of Portland cement is sand to all intents and purposes.

Now taking advantage of this fact, F. L. Smidth & Co., of Copenhagen, Denmark, who are the inventors and discoverers of the process, substitute for that unground portion of the Portland cement pure sand; it must be silicious sand, free from mica or earthy matter and feldspar and other soft or friable substances.

It is important that the cement itself be of the very highest

* Paper read before Ontario Land Surveyors' Association March, 1898.

grade—absolutely important. It is as important that the cement be good as in the Mannesman tube rolling process the steel be of the highest class to make a success of the actual working of the plant.

So, too, the sand should be clean; it must be pure Silica. Taking all the known methods of grinding up to the time of Smidth & Co.'s discovery, and it was impossible to grind by any known means to such a degree as is requisite for the successful making of sandcement. They invented the tube mill, and in order to give a proper understanding of it, I will briefly describe same:

It is a cylinder 25 ft. long, 48 in. to 50 in. in diameter, lined with cast iron plates, revolving at the rate of about 60 revolutions a minute. The tube itself is filled half full of flint pebbles. The pebbles are brought from Norway and delivered in Canada, and in all parts of the world where they are working under these patents.

The clinker is fed at a uniform rate into the tube mill. As it passes through the length of the mill revolving, it hammers itself together, the clinker and the balls revolving and pounding it, until they are ground to such a degree that the Portland cement ground, in this way, will leave not more than 10% residue on the 10,000 sieve and not more than 20 to 25% on the 40,000 sieve. Now that is about the practice required to grind Portland cement. When we mix sand and cement in equal proportions, we can now grind all of the cement to an impalpable degree of fineness, so you cannot find it on any known sieve, and the sand itself will be reduced to such a degree that not more than 4% residue will be left on a 10,000 sieve, and not more than 8 to 10% residue will be left on a 40,000 sieve. Consequently we now have every particle of active cement material in the cement acting upon a sharp, finely ground portion of silica.

In itself that minute particle of silica is stronger than any corresponding minute particle of Portland cement. The cement flour rubs around that particle of silica and has something to grip to, a sharp fine particle of silica. That is perhaps the explanation of the action of sandcement, and why it is that when you make a mortar composed say of Portland cement and ordinary commercial sand in the proportion of 3 to 1, that if you take that same Portland cement and grind one part sand with it, and mix this sand cement in the proportion of 3 to 1, and test it in the testing machine, the sand cement will beat the original cement from which it was made, and with corresponding economy to the consumer.

Of course, as engineers, in order that our clients may get the benefit of sandcement, we should satisfy ourselves by standard tests that the material is suitable for the work in hand, and then specify that sandcement will be accepted. Thus the client will get the benefit; otherwise the contractor will get the benefit of it, and he generally does, because he will bring his cement and place it before the engineer, who will test it and get the best results, and of course that is all he has to do with it, and the contractor is pocketing the profit.

On this continent probably the largest consumption of sand cement has been by the firm controlled by General William Sooysmith. On one contract 10,000 bbls. in the great cathedral of St. John the Divine, in the city of New York, was used.

I will read a test made by Prof. H. T. Bovey, at McGill University, Montreal:

Testing Laboratories, McGILL UNIVERSITY, MONTREAL.

Report of tests of "Ensign" Silica Portland cement—for the Rathbun Company, Deseronto, Ont.

1. "Ensign" Silica Portland, composed of Rathbun "Star" Portland and sand, ground together in the proportion of 1 to 1:

This Silica cement was mixed with standard sand in the proportion of 1 to 3:

(a) With rammed briquettes and the addition of 10% by weight of water, the tensile strength after 6 days = 189 lbs. per sq. in.
" " " " 13 " = 201 " " " "

(b) With rammed briquettes and the addition of 12% by weight of water, the tensile strength after 6 days = 178 lbs. per sq. in.
" " " " 13 " = 183 " " " "

2. Blowing test: The pats were mixed in the ratio of 16 of cement to 4 of water, by weight—the pats were subjected to hot vapor at 120° F. for 24 hours and were then submerged in boiling water for about the same time. The results were most satisfactory, showing no trace of free lime.

3. Fineness: Residue on No. 120 sieve = 7%
" " " 100 " = 6%
" " " 80 " = 0%
" " " 50 " = 0%

May 27th, 1897. (Signed) HENRY T. BOVEY.

To satisfy himself upon this matter, Mr. Henry C. Bamber, F.I.C., of London, England, selected a sample of English Portland cement without revealing its identity, and packed it in barrels sealed and sent to the Sand Cement Works at Denmark, of Homan Smith & Co. The seals were then broken in the presence of Mr. Bamber.

ABSTRACT QUOTED NEARLY VERBATIM FROM BAMBER'S REPORT.

The English cement was sifted in
200 sieve, 40,000 sq. inch. Residue, 39 p.c.
76 " 5,776 " " " 8.7 p.c.
Sand was sifted through 20 sieve, 400 per sq. in.
remaining on 30 " 900 " " for comparative standard tests, using only what remained on the 30 sieve.

The sand cement was made from usual clean sea sand. All the sandcement left about 3 p.c. residue on 200 sieve 40,000 sq. in. The proportions of sand, cement and water were taken by weight. The water used was chilled rain water.

Experiment.	Mixture by weight. Sand. Cement.			The mixture contains.		Tensile strain lbs. per sq. in			Gauged with p.c. of water.
	Cement.	Sand.	Sand not Ground.	Cement.	Sand.	7 days.	28 days	3 mos.	
No 1	1		3	1	3	113	178	255	11
" 2	1	2	2	1	8	164	248	332	9
" 3*	1	3	2	1	11	111	197	280	9
" 4	1	3	3	1	15	84.5	135	182	7
" 5	1	12	2	1	38	35	75	124	8
" 6	1		11	1	11		57	90	4
" 7	1		15	1	15		35	66	3.5

* With reference to this experiment No. 3 it is of interest to note that the countless experiments made with sand cement 1 : 3 : 2 and 1 : 2 : 3 which both contain 11 parts of sand to one cement have proved that they are almost identical in respect of strength. Acordingly the sand cement 1 : 2 when used for mortar with 3 parts sand is superior to Neat cement used with the same amount of sand.

We use this way of indicating the mixture of a mortar as e. g. 1 : 3 : 2, meaning one part sand cement 1 : 3 with 2 parts coarse sand; as sand cement 1 : 3 contains one part cement + 3 of sand ground together 1 : 3 : 2 mortar will to each part cement have 3 of ground sand and 8 of coarse sand or 11 parts of sand altogether.

This shows the investigation of an eminent English Chemist who has been giving the question of cement considerable study and is associated with the firm known as K. B. & S. English Portland Cement.

There is also a record taken at the School of Practical Science, Toronto, which shows as follows:

SCHOOL OF PRACTICAL SCIENCE,
TORONTO, April 17th, 1897.

Partial record of test of a sample of "Ensign brand" cement.

Neat cement: 2 days in water, 1 day in air:

Briquettes were gauged with 20% of water cement rammed into moulds — No. 1 = 375, 2 = 335, 3 = 340, 4 = 355, 5 = 365. Average = 354

6 days in water, 1 day in air:

Briquettes were gauged with 20% of water rammed into moulds — No. 1 = 475, 2 = 540, 3 = 460, 4 = 480, 5 = 455. Average = 482

Sand test: 1 part cement, 3 parts standard sand; 1 day in air, 6 days in water:

No. 1 = 137 No. 4 = 176
2 = 177 5 = 176
3 = 165
Average = 166

Hot test: Pats of the neat cement placed in hot water for 48 hours (2 days) turned out perfectly sound.

C. H. C. WRIGHT.

DISCUSSION.

Mr. Walker: I would like to ask the cost of that, what the price of it is?

Mr. Butler: I think it is about 10 cents to 15 cents per barrel less than that of Portland cement. The cost of grinding is just in the ratio of 5 to 12, so that the other items are reduced practically to nearly the same proportion. You see adding on the cost of grinding this comes on in the proportion which the cost of sand would bear to cement clinker.

Mr. Walker: The grinding costs less?

Mr. Butler: The grinding costs more, in the ratio of 5 to 12. Sand is worth 60 cents a cubic yard, and cement worth a good many dollars a cubic yard, but the grinding being slightly more expensive it reduces the cost about 10%.

Chairman: What facility does this give for adulterating cement? Does it give a better chance?

Mr. Butler: No.

Mr. Vanbuskirk: What portion of sand is in the cement in Canada?

Mr. Butler: One and one by weight—that is to say the sand cement itself is made up of 100 lbs of Portland cement and 100 lbs. of dried sand.

Mr. Vanbuskirk: I had some sand cement tenders the other day, but I would not accept any because that was not plain.

Mr. Butler: We are putting the cement in such shape that you are getting more use out of what cement is there, and when you realize that every barrel is practically 25% of sand anyway—if you realize that fact, that question does not arise.

Chairman: I suppose the strength consists in this—instead of having the real Portland cement in your sand, you have silica cement in place of that, and the real Portland cement itself is ground to an impalpable powder; that is where the strength comes.

SYSTEMS OF PIPING IN STEAM HEATING.*

By Wm. Mansell.

I have been asked by your Secretary on different occasions if I would write a paper on steam-heating. I will be as explicit and plain as possible in my remarks, and hope they will be understood. They are only a few practical observations that I have gathered during my career as a steam fitter. Being entirely of a practical nature, some of my remarks may possibly clash with the theoretical views of some of your members; and here at the beginning I might say that we find some of the theoretical ideas very impracticable, and also many things which, though practicable, are very unsightly. That being the case, the remark which is often made that anything practical is not unsightly is more true than pleasing.

We in the steam-heating line find we have to keep up with the times in the construction of our work. The advanced and still advancing changes in the construction of buildings has caused an entire revolution in the construction of steam heating plants in the last few years. I don't think I am far astray in saying that in no one of the building trades have the changes been so great or inventions more numerous than those connected with the steam-heating problem. I remember, as a boy at the trade, when the British American Life Assurance Building was under construction, it was the wonder of the day that a 4-inch main steam pipe was being used, and having occasion to go down there one day to get a piece of pipe of that size cut, the workmen were very excited and anxious to know what other big job in the city was using 4-inch pipe.

That building at that time was the pride of the neighborhood, and the job of steam heating was the pride of the city; but step by step the size and height of buildings have increased so that heating engineers have been kept on the hustle right along to keep up with the strides the architects were making to keep pace with the demands of the public and their requirements in the larger cities in the northern part of this continent.

One requirement most necessary to the comfort of the public has been the proper heating of the buildings and the installation of systems most suitable to the construction of the buildings. When you look back, not many years ago, to the time when the open fireplace, with its roaring wood fire, was the only means of warming the dwelling and office; and when the weather got so cold that the mercury got ashamed of being seen and crawled down out of sight; when the folks used to snuggle up to the fire so close that their faces used to almost blister, and their backs felt as though the marrow of their back-bone was turning into an icicle; and then turn to the present and compare the surroundings—how you can sit at the draughting boards in your office, with the weather outside below zero, and the fire perhaps half a block from you, with the temperature in your office at almost summer heat, and all parts of the building the same—give a little credit to the steam-fitter, and don't class him with that much abused individual who is written about thus:

Who is that man, so rightly abused,
Who charges for stuff that is never used,
And when he dies don't get excused?
The Plumber.

Who round my house at night doth sneak,
With my big servant girl to speak,
And tell her "Make the steam pipes leak?
The Plumber.

This man was, perhaps, the same that went to the house to make repairs, and the mistress of the house, seeing him coming, called down to the servant, "Lock the pantry; here comes the plumber." But changes in the mode of heating necessitated changes in the men. A few years ago the same workman used to do the plumbing and the steam fitting as well; but that practice has been done away with, not because the same man cannot do both kinds of work, but because a man must become more proficient if kept working continually on the one class of work, and it has been found that more work and a better class of work was being done at either branch if the same man was kept to plumbing, or to steam fitting, as the case might be, and at the present time it is almost universal to find men being made specialists.

This, perhaps, has helped as much as anything to solve the steam-heating problem. Then it depends a great deal on the place that a workman in the steam fitting trade has been taught his trade—what systems he is best acquainted with—because there is steam fitting and steam fitting, and there are steam fitters and steam fitters, just as there are architects and architects.

In some of our cities the same systems of piping are being employed to-day that were used in the same place and by the same men twenty years age. Here is that system (Fig. 1) and several jobs of this description have lately been remodelled in our city. In this system the steam main would rise from boiler and run up hill all the way to radiators, so that any condensation forming would have to drip back to boiler in the steam main, or be lifted up and forced through the heater, before returning back to boiler, making a great amount of noise throughout the whole building; the sound being conveyed to all parts by means of the lines of piping. The sound would be most noticeable while steam was being raised in the morning, or in case the pressure got down and then got up again quickly.

As a rule, with this system, when the engineer started to get up steam he would shut a valve on the main return entering boiler, and open a valve on a drip pipe which was connected from the return header to the drain. This would blow all of the cold condensation into the sewer and get up a circulation through the system quickly; then when all the radiators were hot he would close the drip valve and turn the condensation into boiler. This old-fashioned system of piping was very faulty, and to better the circulation on some of the radiators that would be stubborn, valves would be placed on each return pipe at the boiler, and a drip pipe with valve would be run from each and carried to drain, and very often the drips from several heaters was discharging into the drain in place of being put back into boiler, necessitating additional water to be turned into the boiler every hour, when steam was up.

A new idea was then conceived, which did away with a lot of noise as well as a lot of pipe. This was to grade the steam main from the point over boiler and run the pipe down hill (Fig. 2), and at the bottom end of all rising steam pipes, and at the end of all long horizontal runs in basement, to insert a relief pipe, drop this pipe down below the water line, and in place of bringing every return pipe back to boiler before dropping down, to drop as direct as possible and connect them in groups, and there connect to main return below water line. The object of running all relief and return pipes down and submerging the junction point is to prevent the steam which has passed through the nearest radiator from rising up the return pipe from some other radiator, which would meet the other current and stop the circulation, or cause bucking. This system of piping is general now in all two-pipe or gravity systems, with the distinction that in place of running separate returns down from all radiators, the returns from radiator on upper floors are connected to the same riser return pipe (Fig. 3). This way of joining the returns with the same riser pipe has given the same results, and works as satisfactorily as running down separate returns, and as it cheapens the cost of work by reducing the amount of pipe and labor, is a grand incentive to its adoption. This system is, I think, the most general, both in Canada and the Eastern States. It has been superseded and has been almost crowded out of existence in the Western States by the circuit main and single pipe riser system, and which has been extensively adopted in this city by some of our architects. (Fig. 4.)

This system of piping has many advantages in its favor in a certain class of buildings over any of those already mentioned. It can be installed in any building having no basement, providing there is room to work below the ground floor joist. Still, it must be understood that the boiler has to be put low enough, to provide the proper distance for steam main above the water line; and again, if there is no space below ground floor joist, the circuit can be carried around on the ground floor near the ceiling, and the branches to ground floor heaters to drop down to them, but as this requires a return main for collecting the dregs from ground floor heaters, it is seldom used.

The circuit system is by far the cheapest to install, as the cost is lessened in several ways: 1st. As you have one main, which acts both as a steam main and also a return. With the main the highest part is directly above the boiler, and from this point it descends with a slight fall until it comes back to the boiler again, when it drops and is connected at bottom. All branches are taken off the top of this main, and rise from that point. This is done for two reasons: First, that all condensation will drop back into main and be carried to boiler, and also to provide for expansion, which is a necessity in all jobs of steam piping, but more especially with this system. The reason of this is that the main is usually carried around about four feet from outside walls, so as to make the horizontal branches as short as possible, which method is found to give the best results.

The rising pipes in this system are, as a rule, from one to two sizes larger in diameter than the two pipe jobs, on account of

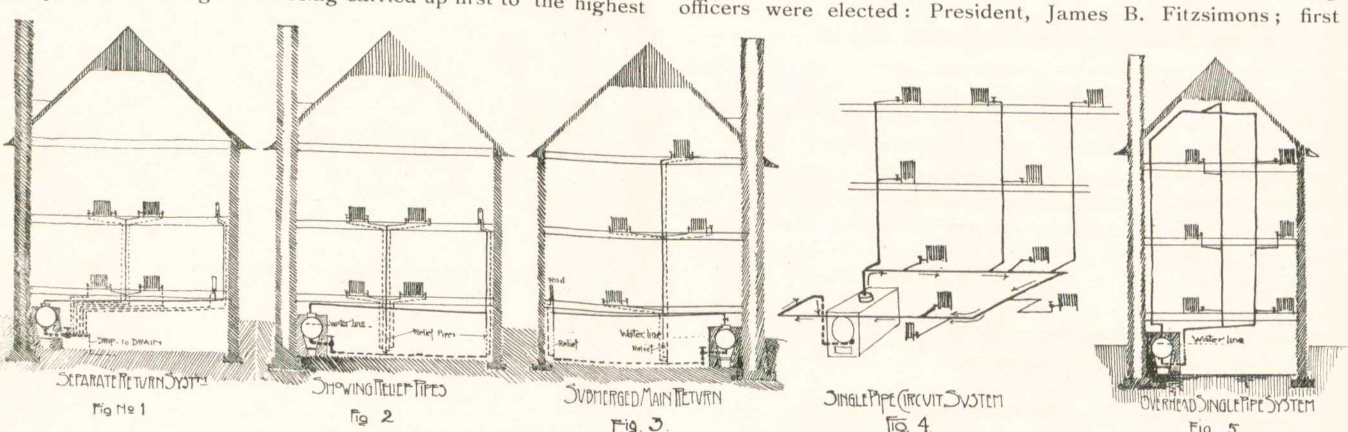
* Paper read before the Toronto Chapter of Architects

having to act the same as the main, both for steam and return pipe. The branches to radiators are also, on that account, made larger, and are exposed either above the floor or below the ceiling, to the connection of radiators. The idea of doing this is a good one, as it prevents the notching of joists and the shrinking of floors necessary in two-pipe work.

Another thing in favor of this one-pipe system is that only one valve is necessary to each radiator. That is a boon to the engineer, as it is the custom with most people who don't understand the difference, when they want to lower the temperature in an office or apartment, to close down one valve on the heater, and if that one happens to be the return valve the heater fills with water and then becomes noisy, or perhaps begins to throw water from the air vent; the same thing will happen if the steam valve is closed and the return valve left open. If the pressure of steam is high enough on the boiler, it will back the water up from the returns and fill the heater, but with the single pipe system the one valve prevents this trouble.

The time saved in installing this system is another item in its favor, and still the greatest saving feature in favor of the circuit system is the temperature at which the condensation is returned back to the boiler, whereby a great saving is made in regenerating steam and in fuel compared with the two-pipe system.

There is still another system of piping which is being extensively used, and which is most favorable to the higher class of buildings, and that is the overhead steam main system (Fig. 5). The main in this work is, as a rule, taken up to the roof space, sometimes to the ceiling of the floor below the upper one, making the upper floor work the same as from a circuit system, and the rest of building from the drop riser system. The overhead system of piping is very similar in its construction to the circuit, with the exception of its rising steam being carried up first to the highest point before distributing, and then the circuit is made with the different branches connected to the drop riser. The size of pipes is about the same, but their diameters diminish as they come down in proportion to the number of radiators that are connected. This overhead system has the additional expense attached to it of having a collecting drip return, which gathers the lower ends of all the drop pipes and carries the condensation back to boiler. This is usually suspended from basement ceiling, and when basement heaters are used it is lowered down to suit.



NOTE.—Solid lines of pipe indicate steam pipe; broken lines of plpe indicate return pipe.

In some of the very high buildings these two systems are amalgamated together, the lower twelve to fifteen floors being worked on the down hill riser system and the twelve to fourteen upper floors worked from a circuit system, sometimes each system having a separate rising main, and in others the one large riser supplying both systems. In either of these systems it is usual to valve all rising pipes, so that any part of system is under independent control. Many of the larger buildings of to-day have their own power plants, either for generating electrical or hydraulic power for elevators and other purposes. Where this is the case the steam for the heating plant is taken from the high pressure boilers and passed through a reducing valve. This valve on one side has the boiler pressure of perhaps one hundred pounds, and this is reduced down with the aid of the reducing valve, which can be regulated or set to give one, two, or as many pounds as may be required in the heating system. The condensation from the heating system is gathered by the collecting drip main, and this is run to a return tank, from which it is drawn and forced back into the boilers with a steam pump. In connection with this system the exhaust steam from the engines and pumps is passed through an invention that extracts the grease from the steam, and the steam is then thrown into the heating system. In some cases this exhaust steam is found sufficient to warm the whole building, except in very cold weather, when a little live steam is passed through the reducing valve.

This, I think, is a fair explanation of the systems of piping used in steam heating. There is another so-called system of steam heating in which the heating is in reality done with hot air. This is called the Plenum or hot blast system. With this you have large heaters constructed with thousands of feet of piping, through which the steam is passed. Either live or exhaust steam can be used. This large heater is housed in with an iron casing, with a large blower fan attached to one end of the housing. This fan draws cold air from outside and forces it through amongst the piping, and at the other side is taken a large sheet metal pipe, sometimes ten feet in diameter, with branches to all parts of building where required, and the air which is heated by being in contact with the steam pipes is discharged all over the building. This system is only practised in certain classes of buildings, such as auditoriums, churches, school buildings and factories. This system is sometimes combined on a small scale with other systems for the purpose of ventilation, and is assisted by extraction fans, which are arranged to draw the foul air out of the building. This system, when used with live steam only, is more expensive on fuel, on account of condensing more steam than in other systems, and having either an engine or electric motor for driving the blower fan.

There is also the system of exhaust steam heating, the piping, which is similar to that in the overhead one-pipe work, but, as the hour is late, I will have to leave that for another occasion, and will now close by thanking you for your kind attention this evening.

TORONTO MASTER PLUMBERS' ASSOCIATION.

At a recent meeting of the above association the following officers were elected: President, James B. Fitzsimons; first vice-president, James H. Wilson; second vice-president, A. S. Bates; secretary, W. G. Ritchie; treasurer, D. Fiddes; sergeant at arms, J. R. Seager. The affairs of the association are reported to be in a flourishing condition, and the meetings are marked by spirit of good fellowship and a purpose to make the organization fulfil a useful purpose in behalf of the trade.

The Sash Balance & Lock Co., of Woodstock, N. B., is seeking incorporation.

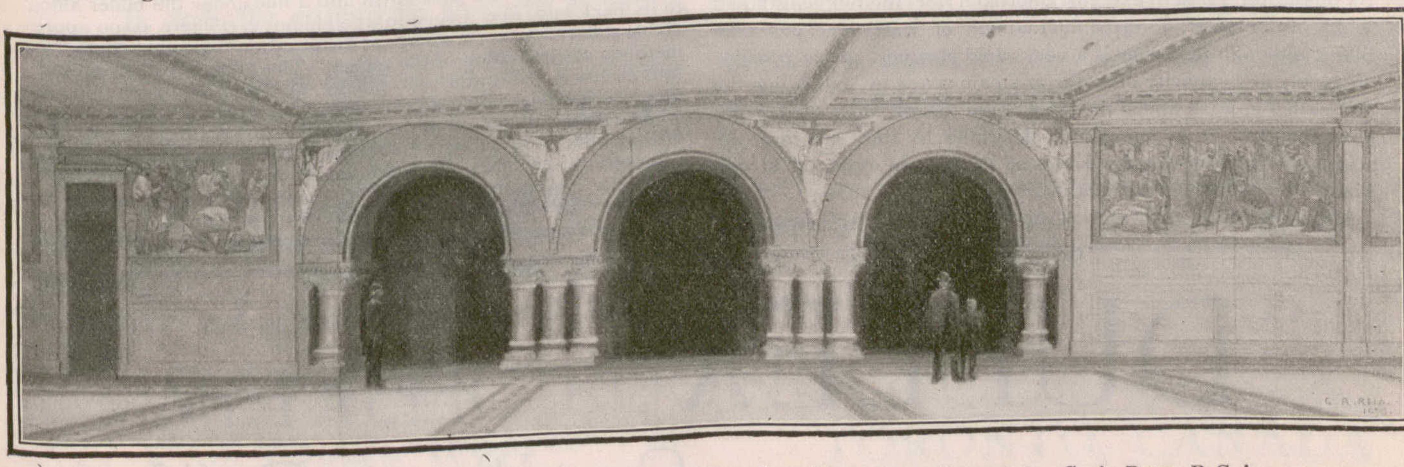
The death is reported at Lancaster, Ont., of Mr. John Ross, who is said to have built more miles of railway than any contractor in America. Mr. Ross was 78 years of age.

To the California Architect belongs the responsibility for the following story: An architect and builder who was very proud of his efforts in designing a house which he had just planned and built, met a well known architect in front of the said house. The architect and builder could not resist the impulse to show the architect his creation, and asked him to step in and have a look round and tell him what he thought of his effort. This happened only just lately and the architect had nothing to do that morning so he obliged the architect and builder by viewing the house. "Well, what do you think of it, pretty good, isn't it?" said the A and B, when they had got outside and were looking up at the ig sawed front. "Yes," said the architect, "but it seems to me you have got too many rooms." "How can that be?" replied the A and B, "there is the parlor, kitchen, dining-room and three bedrooms; I can't for the life of me see where any of these could be left out." "How about that large room for improvement?" said the architect, leaving the A and B scratching his head and trying to locate that room.

PLASTERERS' PRICES.

At the last meeting of the Toronto Chapter of Architects, Mr. J. M. Gander, in the absence through illness of Mr. W. J. Hynes, submitted, on behalf of the Master Plasterers' Association, the following as a desirable schedule of charges to govern on extra work :

Metal lathing	35 cts. per yard.
Lathing ordinary	7 "
" 1" lath	8 "
" 5 nails to 4 ft.—add	1 "
One coat mortar on lath	14 "
Two coat work hard white finish	18 "
Three " " " " "	24 "
Gauged work additional	15 "
Dubbing out to be charged where plastering exceeds 1" in thickness.	
Floated stucco sand finish	24 "
Jointing additional.	
Trowelled stucco	35 "
Portland cement plastering ......80 cts. to $1.00	"
Governed by quantity and quality.	
Keene's eement finish on Portland—	
On brick walls	$1.00 "
On metal lathing	$1.25 "
Lime whiting	4 "
Rendering before strapping	5 "
Pugging 1½" thick	12 "
Moulded cornices one cent per inch in girth but not less than 15 cts. per foot run.	
Material not to exceed 1½" in any place.	
All mitres over 4 in a room each to count as one foot by the girth.	
Angle beads and chamfers, per foot run	15
Metal angles " " "	15



STUDY FOR MURAL DECORATION, ENTRANCE HALL, NEW CITY BUILDINGS, TORONTO.—G. A. REID, R.C.A.

From R.C.A. Exhibition.

Window and door jambs 8" deep and under	10 cts. per yard.
Center flowers, ordinary stock—	
24" diameter or under put up, each	$2.00
Enriched members, not over 2" ordinary stock	10 cts. per foot.
Larger or special centre flowers or enrichments governed by character and selection	
All work modelled to be charged extra.	
Allowance for hoisting charges to be made for all work over 2 storeys in height.	
All work to be measured superficial openings half deducted.	
Plasterers to be charged	35 cts. per hour.
Lathers to be charged	30 "
Laborers to be charged	25 "
All overtime to be charged time and a half.	
Lath per M in yard	$2.50
" " 100 "	25
Lath nails per lb	6
Sand per yard delivered	$1.50
Barrel or barrow in yard	30

Mortar—			
Per load double team,	$5.00;	delivered	$6.00
" " single "	3.00	"	3.50
" ½ " " "	1.50	"	2.00
" ¼ " " "	75	"	1.25
" brl. or barrow	75		
" hod or keg	20		
" pail, not less	10		
" load shingling mortar		"	3.00
Putty—Per barrel in yard	$2.50 ;	"	50 cts. extra.
" pail "	25		
Plaster—Per barrel "	2.50	"	50 "
" keg "	75		
" pail "	40		
Patent plasters—per bag with sand			50 cts.
" pail			35 "
Portland cement—Per pail			50 "

TORONTO GUILD OF CIVIC ART.

THE Toronto Guild of Civic Art, which aims at fulfilling for Toronto the functions of the Municipal Art Commission of New York, has been introducing itself to the Toronto public by an exhibition of photographic prints of wall decorations kindly lent by the publishers, Messrs. Curtis & Cameron, of Boston.

The subject of mural decoration is at present chiefly before the Guild, as its only official function just now is to represent the city as a supervising body, to work with Mr. G. A. Reid in preparing his design for the decoration of the entrance to the new city hall. It is probable that there will be more work of the same kind for the Guild to do in the near future, for since the introduction of canvas as a ground for wall painting, the art has become so much more feasible that it is rapidly growing, and even commercial buildings have their wall paintings, while a great public building in the United States, such as the Boston public library or the Congressional library, is not considered complete until the walls are painted.

But the functions proposed by the Guild embrace all branches of municipal art. The members are not themselves professed experts, though there is naturally a strong representation in it of the friends and patrons of art, and one-third of the advisory board will always be composed of an equal number of artists and architects. The function of the body is rather to provide a disinterested body of public spirited men who are interested only in seeing that if the city decides to spend money on art, it shall be spent so as to get art. In New York this body is established by law, and all expenditure of money upon art, and all gifts to the city of objects of art, must be approved by the Art Commission. In Toronto the Guild of Art was recognized by the last city council in a resolution to "avail itself of the services of the Guild as occasions arise."

It is desirable that architects should belong to a body of this kind—at least those architects whose interest in art is large enough to induce them to take a hand in a public work at the cost of but little more than their moral support and annual subscription of a dollar for expenses. The occasional meeting with other persons interested in fostering good art will also be a duty of membership, but ought to be counted as a compensating privilege rather than a burden.

The various manufacturers of sanitary ware at St. Johns, Que., have recently combined their interests under the name of the Potters' Manufacturing Association with the object of controlling prices. Mr. Edwin Plant, of Montreal, has been appointed selling agent for the association. Prices have been advanced from 25 to 75 per cent.

KINGSLEY WATER TUBE BOILERS.

THE Kingsley patent water tube boilers, for which Mr. E. A. Wallberg, C. E., of Montreal, has been appointed agent for Canada, are constructed with two shells, an outer and an inner. The outer shell has vertical parallel sides and semi-circular top and bottom. The inner shell is fixed parallel to the sides and bottom of the outer shell by means of two flanged heads and numerous stay bolts, leaving a uniform space about four inches wide between the two shells, extending the full length of the boiler. The crown sheet is horizontal, and extends continually the full length ef the boiler. It is flanged down three inches along each side for its entire length, and forms the top of the inner shell by being rivetted to it along each side.

The tubes are threaded at their upper ends with standard pipe threads, and are screwed into the crown sheet. The bottom ends of the tubes are plugged with ¼ inch iron and are then welded solid. The tubes are made of standard 2 inch iron lap-welded pipe. They are short enough in the fire box to leave an ample combustion chamber, and are longer behind the bridge wall. Any tubes can be readily screwed in or out of the crown sheet without touching any other tubes.

The crown sheet is strongly stayed by stay-bolts screwed simultaneously, at various angles, into the semi-cylindrical top of the outer shell and into the crown sheet. These stay-bolts and those connecting the two shells are headed on each end. The parts of the two flanged heads forming the ends of the steam chamber are likewise stayed by rods screwed simultaneously into each, these rods being headed at each end or fitted with nuts.

The water is contained in the tubes and in the space between the shells and extends up a few inches over the crown sheet. As this water service extends unbroken for the full length and width of the boiler, no rapid fluctuations of water level can take place, although the boiler is a very rapid steamer. It is possible to supply any capacity of water or steam space by extending the outer shell upward above the level of the crown sheet to any desired height. It is sometimes desirable to thus increase the steam space where large volumes of steam are required at one time, which occurs in various industries.

Regarding the construction and efficiency of this boiler the manufacturers say: No steam drum is used on these boilers. This is claimed to be an advantage over most water tube boilers, as well as many other types, as a steam drum elevated far above and away from the hottest fire can of itself act only as a condenser, as it is the tendency of steam to cool and condense immediately on leaving the direct action of the fire. In the Kingsley boiler the tubes, being vertical and short, liberate steam very freely, and without friction or impediment, which in all water tube boilers with inclined tubes causes a large percentage of water to be carried up with the steam. This is also one reason why this boiler produces dry steam even under the heaviest forcing.

The feed water, entering at the front of the boiler, between the shells, below the level of the grate-bars, in passing up becomes intensely heated before reaching the crown sheet. It is well known that water, heated to a few degrees above the boiling point, parts with most of its impurities, as mud and carbonates of lime; and at a temperature of about 300 degrees Fahrenheit, equal to 52 lbs. steam pressure, it can no longer retain in solution the sulphates of lime, magnesia, etc., which form the much-dreaded scale in boilers. In this boiler these impurities, being separated by the intense heat, precipitate into the space between the cells, at the bottom of the boiler, where the heat is not sufficient to bake them into scale, and whence they can be washed out occasionally through the hand holes. This boiler is, therefore, by its construction, a perfect feed-water purifier, and no sediment or scale can gather in the drop tubes, because only purified water reaches the crown sheet from which the tubes are supplied.

The boiler, being internally fired, has the fire-box entirely surrounded with a water-jacket. The incandescent gases from the fuel, passing up among the short tubes in the fire-box, are drawn backward among the long tubes to the end of the boiler, whence they divide and return, half on each side, between the outer shell and the brick casing towards the front of the boiler. From this point the now nearly exhausted gases can either be carried by means of a saddle over the front of the boiler direct to the chimney, or they can pass down into a flue under the boiler along to its back end, and thence to the chimney. There is no appreciable difference in economy of evaporation between these two methods of circulation of the gases. The tubes are "staggered" in the crown sheet and are placed at such distances that the gases which pass zig-zag and strike each tube at right angles, while being confined on all four sides by the waterjacketed shell of the boiler, lose nearly all their available heat before they are returned on the sides. For this reason this boiler can be operated also as a locomotive boiler. The gases are passed out of the chimney only sufficiently hot to secure a good draft.

This boiler requires the same size of chimney as any other type of boiler. For hot water heating for buildings there is no change in the construction of the boiler, the steam space being simply filled to the top with water. The fuel economy is the same as for steam purposes. The circulation of the water is the most direct that can be desired, as there is a continual uninterrupted rise from bottom to top of the boiler.

It requires only 6½ feet in height. The brick casing is used only for the return gases, and hence never requires renewing. As there is no fire-brick furnace to renew periodically, the repairs are reduced to an absolute minimum.

It is not necessary to refer to the exceptionally high evaporative economy of this boiler, as this could be readily predicted from its construction. The advertisement of this boiler will be found on another page.

BUILDERS' ACCOUNTS.*

A PROPER set of accounts to the business man, in whatever line of industry or trade he is engaged, is in effect the chart and compass by which he sails the ship of his business undertakings. It is just as necessary for the builder to know where he stands with respect to resources and liabilities, and in regard to profits and losses, as it is for the merchant. It is just as important for him to know the actual profit in each of the structures he puts up as it is for the merchant to know the profitableness of each of the several departments of his business.

Builders, it has always seemed to me, are especially prone to neglect their accounts. Sometimes this is due to a lack of acquaintance with accounting methods, and sometimes it is due to a willful disregard of what men in other lines of business have learned to profoundly respect. Account keeping, properly considered, is one of the simplest things to which the builder's mind can be directed. Many who neglect their accounts do so from a misapprehension of the requirements of the case. They seem to argue that account keeping is mysterious, and then conclude that they have no time for mysteries, and must necessarily devote themselves to the practical work of their calling in order to accomplish results. If account keeping could be made as simple to them as are the mechanical operations of building, they would undoubtedly give just as much care to the supervision of their accounts as they now give to the mechanical construction of their buildings.

I have been requested by Secretary Sayward to prepare for publication in these columns a short series of articles of a character to help builders in their struggles with account keeping. In responding to his request, I do so with the hope that I shall be able to show builders that the principles of account keeping are no more beyond the comprehension and reach of the busiest builder than are the various mechanical operations with which he is brought into contact day by day. I hope before I am through to point out methods so simple in their application that the builder who prefers to keep all his accounts in a pocket memorandum book may do so and still proceed upon an adequate and scientific plan. At the same time other builders who prefer a complete and detailed set of books, presided over by a salaried bookkeeper, shall also have at their command a system that they will understand, and which shall be in its results in such a condensed form as ever to give them the information that they require for planning their operations.

Before entering upon a discussion of the principles and methods of account keeping for builders, let me direct attention to the difference between what I shall call accounting in these articles and what I would designate as book-keeping. There is far more book-keeping in use in builders' offices and far more of good book-keeping available to the builder than there is of accounting. It is the latter that is particularly lacking. Accounting means the plans and specification, while book-keeping means the mechanical work or the placing of materials in the positions demanded by the plans and specifications.

My effort in the present articles will be along the same lines, to show the builder, and the builder's bookkeeper, where he has one, how to arrange the accounts in a way to show day by day, and more particularly at the completion of every operation, just where he stands financially.

At the first of a year, and particularly in a season when, of necessity, building operations are retarded or are abandoned altogether, it is very natural for the builder to use his leisure to look about him for the purpose of estimating his financial condition. He accomplishes this end by putting into one list all the articles of property which he owns, including cash on hand, materials, equipment, accounts that are owing to him, his interest in incompleted work, etc., at their actual value. In another list he puts down what he is owing—so much to each of several people for supplies furnished that have not been fully paid for, so much to each of several sub-contractors who have not been fully paid for the work that they have done, and including notes outstanding and all accounts with creditors.

However he may make out these two lists, the builder will attempt to do the work correctly, for he will realize that the accounting he is thereby doing is with himself alone and not with anyone else. Accordingly, if any mistake is made in the estimates, either making the amount too much or too little on either side, it will be against himself and by no construction to his own advantage. Therefore he will desire to value things correctly, and neither to over-estimate the amounts that are due him nor to under-estimate the amounts that he is owing to others.

* Abstract of an article by A. O. Kittredge, F.L.A., in The Bulletin.

When the two lists have been made out, the first, which the accountant would call Resources, will be the larger, and the other, called Liabilities, the smaller, provided he is solvent. He will subtract the latter from the former, thereby showing his net capital or present worth.

The first thing to do in opening the books of any business is to make out lists in this way; in other words, to construct a balance sheet of the business.

The builder's balance sheet, preliminary to opening his books for the new year, will be something as follows:

RESOURCES.

Cash in hand..

Cash in bank..

Notes receivable..

Accounts receivable.....................................

Work in process...

(Under this head list the different operations in progress, setting opposite each the amount that is due at each time.)

Materials on hand.......................................

(Under this head list the different lots of materials on hand, extending opposite each its actual cash value.)

Equipment...

(Under this head list the different items of equipment, such as engines, derricks and machinery in general, scaffolding, benching, tools, horses, wagons, etc., putting opposite each its cash value.)

Other property..

(Under this head put a list of all other property in the business, whether used specifically in building operations, or simply as a basis of credit. This would embrace real estate, including residence and all outside investments, like stocks, bonds, etc.)

LIABILITIES.

Notes payable...

Accounts payable..

Net worth or present investment in business.............

(This is the difference between the two classes of amounts above issued.)

The two lists to which I referred in the early part of this article are here combined in one great statement. They are arranged in such a way that by including the builder's net worth their respective footings balance. The difference between the two classes of items, as previously explained, is the builder's net worth or real investment in the business at this time, and this is filled in in the second column along with the liabilities.

ILLUSTRATIONS.

RESIDENCE OF MR. DAVID KENNEDY, SOUTH PARKDALE, TORONTO.—A. R. DENISON, ARCHITECT.

COMPETITIVE DESIGN FOR A CENTRAL PUBLIC SCHOOL AT ST. THOMAS, ONT.—SIMPSON & ELLIS, ARCHITECT.

STAIRCASE HALL, RESIDENCE OF MR. DAVID KENNEDY, SOUTH PARKDALE, TORONTO.—A. R. DENISON, ARCHITECT.

DESIGN FOR A SUBURBAN COTTAGE.—R. J. EDWARDS, ARCHITECT.

The noticeable features of Mr. Edwards' plan are the manner in which the stairs are cut off from the reception and dining rooms, rendering a back stairway unnecessary and at the same time making the rooms positively free from drafts in winter; also the ingle nook off these living rooms, with its hearth and upholstered seat, above and below which shelves and drawers may be arranged for books, papers, etc.—a matter of some convenience in a house too small to have a library. Attention may also be drawn to the manner in which the built-in side-board and "pass" are arranged, in relation to the kitchen sink and dressers. The "pass" is arranged to turn on a central pivot and would be somewhat like a small barrel with bottom, top, one shelf, and an opening on one side to give access. It can be turned to an opening in the kitchen wall at will. The whole would be arranged by means of rubber strips to make a tight fit, so that no odors can pass out from the kitchen. It may be worth while to note the manner in which the smoke pipe from the furnace is made to do something towards warming two of the rooms. It passes up through a tin-lined groove in the brickwork of the fire-place, and the groove is covered with light iron gratings to screen the pipe but allow the air to flow in at the floor and out at or near the ceiling. The other features of the plan are sufficiently explained by the illustrations.

ST. JOHN'S CATHEDRAL, NEWFOUNDLAND.

THE Evening Herald (Newfoundland) gives a description of the reopening of this portion of the cathedral dedicated to St. John the Baptist on June 29. It will be remembered the building was almost entirely destroyed by fire in 1892. Triumphal arches were erected on the occasion of the reconsecration in the thoroughfares leading to the sacred edifice. The work generally has been carried out under the personal direction of Mr. Wills, who acted as clerk of works of the original building, and from the designs of Messrs. George Gilbert Scott, M.A., F.S.A., and John Oldrid Scott, F.S.A., architects, of Springardens, London. Most of the internal fittings are special gifts. The oak eagle lectern is a reproduction of the burnt one. The carved oak Bishop's throne, sedilia, and stalls which, like the lectern, are entrusted to Messrs. Hems and Sons to carry out—have not yet arrived. There is a handsome new pulpit and altar. The Lord Bishop of Newfoundland was followed into the choir by the rector, rural dean, and a large number of surpliced clergymen. His lordship pronounced the benediction at the altar, font, lectern, and pulpit, and solemnly dedicated the new building and furniture generally.

The Star Iron Co., Limited, of Montreal, has recently been incorporated under a Dominion charter, to manufacture heating apparatus.

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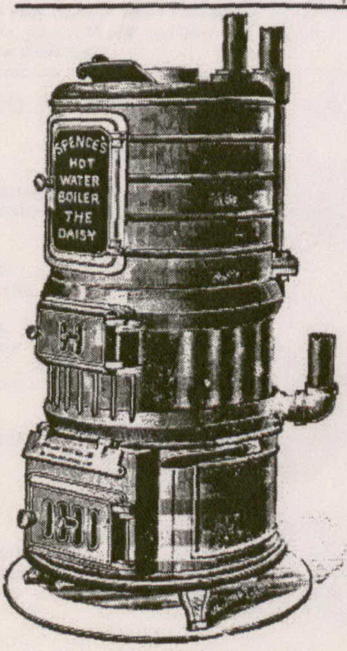

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