CANADIAN ARCHITECT & BUILDER

Fine & Industrial Arts: Decoration, Furnishing: Construction, Sanitation: Engineering

Vol. XI.—No. 3. MARCH, 1898 PRICE 20 CENTS $2.00 PER YEAR.

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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, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

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A Hopeful Sign. FOR several years prior to the first of January last there was a decrease each month in number and value of real estate transactions, as shown by the Toronto Registry office records. It is reported, however, that the first two months of this year show an increase in the volume of transactions.

Building Materials. THE scarcity of timber in Great Britain is clearly shown by comparing the extent to which wood is there employed with the quantity used in the United States. The annual consumption in England is placed at only 18 cubic feet per capita, while in the States it is about 350 cubic feet. The introduction of iron and steel in building construction has, however, already greatly lessened the use of wood for this purpose in the large cities of the United States, and is destined to restrict its employment to a much greater extent in the future. The change is opportune, in view of the growing scarcity and costliness of white pine and other choice varieties of building timber.

Another Building Disaster. FOLLOWING close in the train of the recent building disaster at London, Ont., with its terrible consequences, comes the news of the collapse on Feb. 21st of the roof of a large music hall at Oshawa, Ont. The building is described as a three-story brick structure, with a large assembly hall on the upper floor. It was covered by a flat roof about 75 × 100 feet in size, which fell to the second floor, completely covering the seats in the music hall. The accident occurred at five o'clock in the morning. To this fortunate circumstance is due the fact that a number of lives were not sacrificed. On the preceding Saturday evening a large political meeting was held in the building, and on the evening of the day on which the accident took place an entertainment was to have been given at which it was estimated there would have been present 800 persons. How terrible, therefore, would have been the consequences had the accident been delayed but a few hours! Doubtless the immediate cause of the collapse was accumulation of snow on the roof, but the fact that the roof was a new one and that the building had recently undergone changes and repairs, at a cost of about $5,000, is sufficient proof of structural weakness. These accidents unmistakably affirm the necessity of a standard of qualification on the part of those who undertake to design and erect buildings—particularly those of a public character. If the title Architect was restricted to persons who had passed a qualifying examination, as is now the case in the province of Quebec and the State of Illinois, the public would at least be enabled to know who were qualified to put up safe structures, and could then govern themselves accordingly. Under present circumstances anybody is at liberty to call himself an architect and to design and erect buildings of every class. So long as this condition of things shall continue, accidents involving injury and loss of life will be the inevitable consequence.

The Sanford Mausoleum.

The New York Herald of the 16th of January prints an illustration and description of a mausoleum to be erected by Senator Sanford, of Hamilton, at a cost of $100,000. The design is that of a Grecian temple, 30 feet long and 18 feet wide, with heavy roof, supported on all sides by polished pillars. The structure, which will weigh 300 tons, was designed by Charles E. Tayntor & Co., of New York, and is to be constructed of Vermont granite. The interior will be finished in American marbles and mosaics, with massive bronze doors and lined with steel. While admitting that art is cosmopolitan, we fail to see anything in the design or materials of this structure the equal of which might not have been obtained in Canada. Several structures of this character, creditable alike in design and execution, have in recent years been erected in Toronto, London and elsewhere, with native materials, and at a cost by comparison greatly below that of the proposed Sanford Mausoleum. It is therefore to be regretted that Senator Sanford has not seen fit to encourage and aid art and industry in the country from which his wealth has been derived.

Equal Rights for Labor.

The courts at Massachusetts have lately decided that a municipal corporation has not the legal right to provide in its contracts for special privileges to union workmen. A firm of builders who had entered into a contract with the city of Boston for the construction of a bath house, were restrained by the Mayor from completing the work on the ground that they were not employing union workmen. The Mayor's action is said to have been dictated by the unions. The contractors thereupon applied to the courts for an injunction restraining the Mayor from interfering with the fulfilment of the contract. The injunction was granted, the court holding that "There is no authority in law for any officer of the government, state or municipal, to force a discrimination as was attempted in this case between workmen in respect to the privilege of labor on public work paid for by taxes levied upon all, for no reason except that some workmen belong to a certain party, society or class, and others do not; thus giving labor and the benefit of it to one class and denying it to another, regardless of their rights, needs, qualifications or merits, or the public welfare."

Sewer Ventilation.

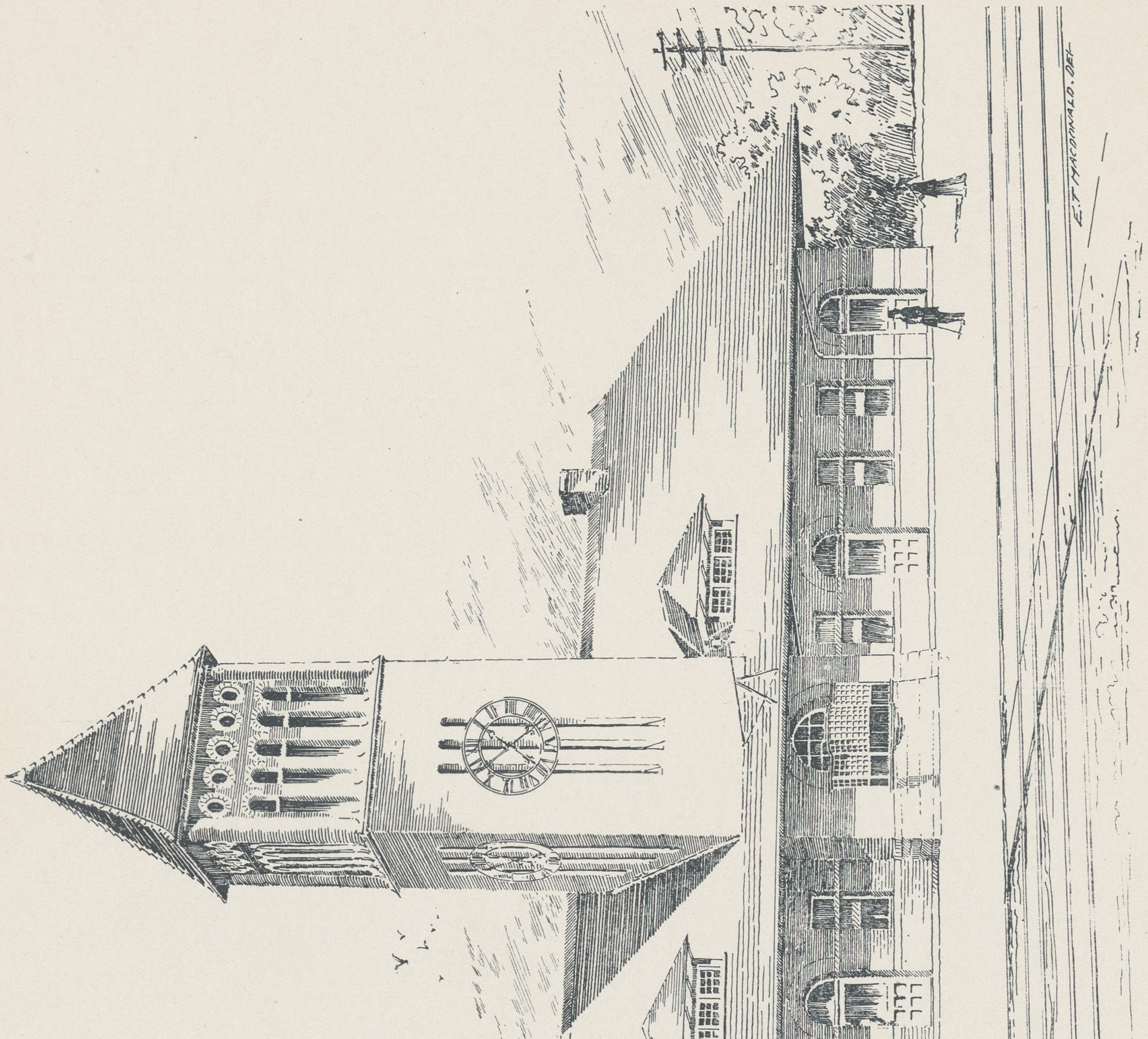
It is gratifying to observe that Alderman Denison, a well-known Toronto architect, has given notice of his intention to move in the City Council for a report from the City Engineer on the advisability of providing some adequate system of ventilating the sewers. The subject is a most important one, and as such will we trust be dealt with in a thorough manner at an early date. There is little room to doubt that the infectious diseases which have been so prevalent of late in what are supposed to be choice residential districts of the city originated in foul exhalations from the sewers. The precautions exercised by architects for the preservation of the health of the future occupants of the houses built under their direction are to a considerable degree nullified by the sewer gratings at the street levels, the foul odors from which assail the pedestrian, and in summer find their way into the houses through open windows. The public health demands that greater attention be paid to this subject, and that improved methods of sewer ventilation be adopted, especially in the northern part of the city, where in some cases the sewers have dead ends, and owing to the tendency of the gases to rise to the highest level, the evils to which we have referred exist in an aggravated form.

The Builders' Exchange Movement.

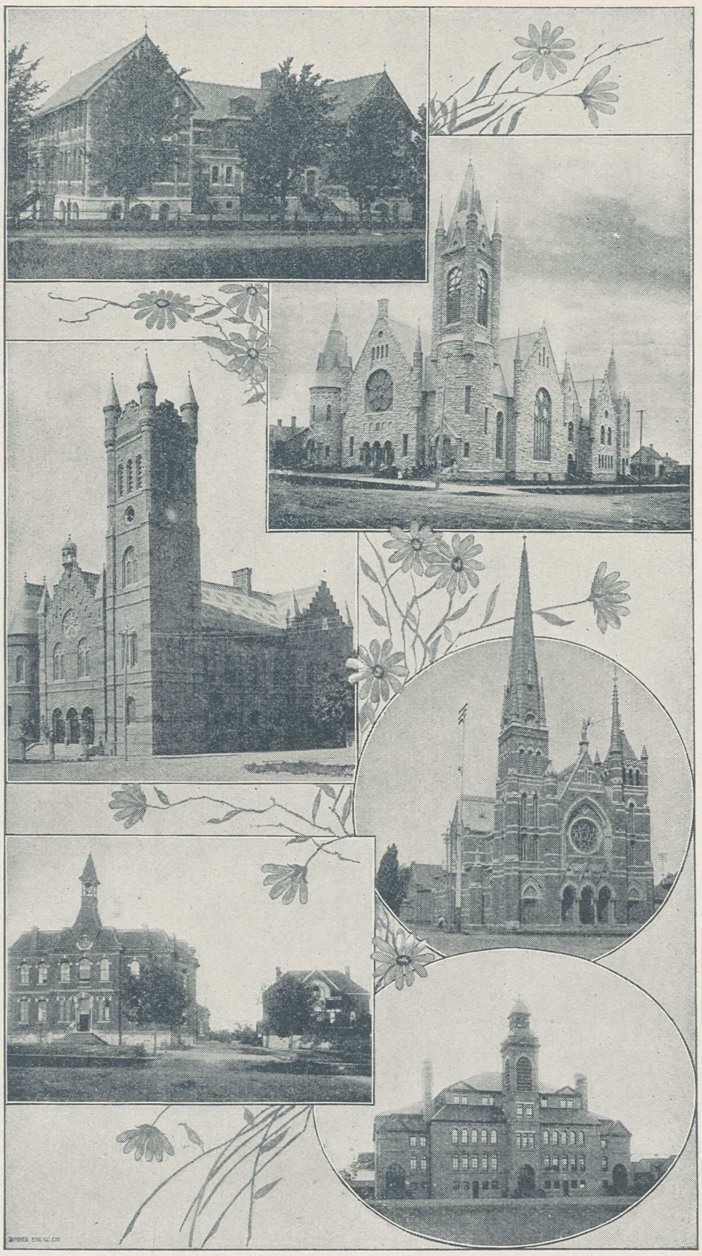
It is with satisfaction that we record the organization of a Builders' Exchange at London, Ont., particulars concerning which are printed in this number. The new Exchange appears to have started out under favorable auspices, being supported by the leading contractors of all trades. The promoters have announced their desire to work in affiliation with the Toronto organization, the officers of which rendered valuable assistance in connection with its formation. The purpose in view is to secure the formation of Builders' Exchanges in all the leading cities of the province, and it is hoped that from these may ultimately grow a provincial organization, such as the Canadian Architect and Builder endeavored some years ago to have formed. If well managed, these local Builders' Exchanges will be able greatly to improve building conditions in the localities where they exist. It is only reasonable to expect that the benefits which have followed co-operation of effort in other lines of business will accrue to the building trades also as the result of the adoption of a similar course of action. There are many abuses existing which will never be removed except as the result of concerted effort. This movement towards organization has therefore our best wishes for success.

Ashes in Mortar.

Col. Waring, Street Commissioner for the city of New York, is given as authority for the statement that ashes mixed with lime make a mortar superior in point of lightness and strength to mortar composed of lime and sand. By the substitution of ashes for sand the cost of the mortar would be reduced by more than one-third. The effort will probably be made to legalize under the building laws the use of ashes by the manufacturers of machine-mixed mortar, now almost universally used by New York builders. The discovery of the value of ashes as an ingredient in the manufacture of mortar is said to have resulted from experiments recently carried out by Mr. Joseph A. Shinn, of Pittsburgh, Pa. Mortar composed of nine parts of fine anthracite ash intimately mixed with one part of fresh lime and properly wet with water, when 30 days old, gave an average tensile strength of 65 pounds per square inch, as compared with 15 pounds per square inch in the case of mortar composed of lime and sand. The crushing strength



DESIGN FOR PASSENGER STATION.
E. T. MACDONALD. ARCHITECT.



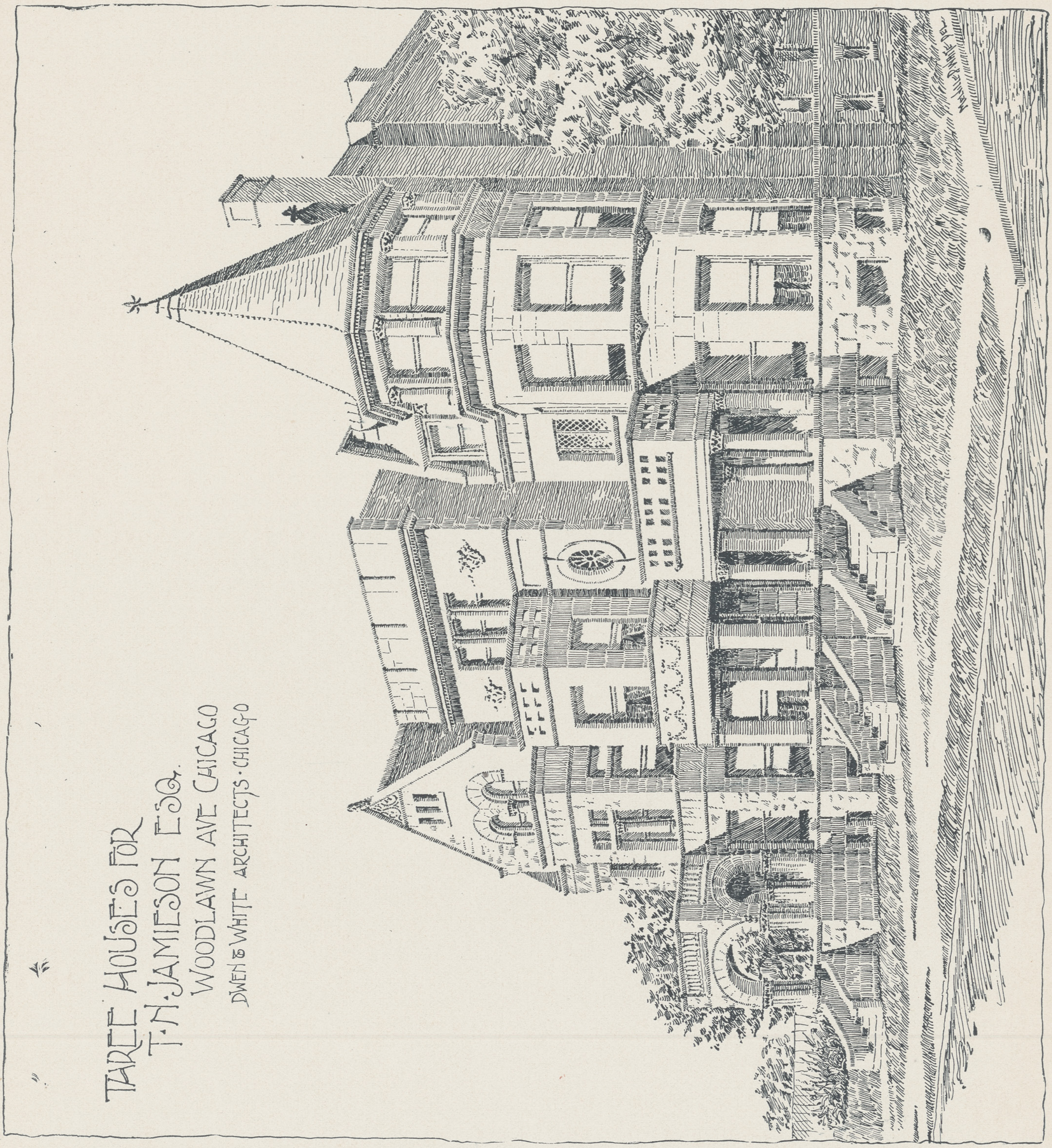
CHURCHES AND SCHOOLS, VICTORIA, B.C.

1. SOUTH WARD PRIMARY SCHOOL.—W. Ridgeway Wilson, Architect.
2. PANDORA STREET METHODIST CHURCH.—Thomas Hooper, Architect.
3. ST. ANDREW'S PRESBYTERIAN CHURCH.—The late L. Buttress Trimen, Architect.
4. R. C. CATHEDRAL (from plans of R. C. Cathedral, Longueuil, Que.)
5. CENTRAL AND HIGH SCHOOLS AND GYMNASIUM.—W. S. Gore, Architect.
6. NORTH WARD PRIMARY SCHOOL.—J. Soule, Architect.

HOUSE, UNIVERSITY GROUNDS, TORONTO.
CUMBERLAND & STORM, ARCHITECTS.

Bank of Montreal, Victoria, B.C.
F. M. Rattenburg, Architect.

Bank of British Columbia, Victoria, B.C.


THREE HOUSES FOR
T·H·JAMIESON ESQ.
WOODLAWN AVE CHICAGO
OWEN & WHITE ARCHITECTS·CHICAGO

was also seven times greater than that of ordinary mortar, being in some cases as high as 1,000 pounds. It also offered much greater resistance to the action of fire and water. There was, however, lack of uniformity of results—some samples giving evidence of much greater strength than others. In order to secure satisfactory results Mr. Shinn declares that the mortar must be thoroughly mixed by machinery.

Architecture at the O.S.A. Exhibition.

THE Ontario Society of Artists, whose annual exhibition will be held in Toronto in May, have expressed a desire to have an architectural section in the exhibition, and invite architects to send drawings of their work. Intending exhibitors must send in advance of their drawings, an application form, copies of which may be had from the Secretary of the association, Mr. R. F. Gagen, 90 Yonge street, Toronto, or Mr. W. A. Langton, Registrar of the Ontario Association of Architects. Drawings must be framed and must be delivered not later than April 30th at the gallery of the Ontario Society of Artists, King street west, Toronto. We presume that the usual rule holds—that the drawings contributed must be new, in the sense of not having been exhibited before at any exhibition in Ontario.

Question and Answer.

A QUESTION was propounded with reference to the architectural drawings exhibited at the Royal Canadian Academy Exhibition now in progress in Toronto—Should a perspective view of a building be exhibited under the name of the architect if it is not drawn by himself? The answer is obvious—that it is the design that is exhibited. If the drawing is well done, the design is favorably exhibited; if badly done, the design is poorly exhibited—that is all. The purpose of the drawing is to exhibit the building, and there is no room for the artists' contention that a drawing is not so much a matter of subject as of the handling of it. That is true of an artist's work. He makes nature the occasion to produce his own emotions in the mind of the person who views the picture ; but the business of the architectural draughtsman is to exhibit the building in the clearest and most suitable manner. To make a picture of it and above all to make a subjective picture, representing a mood of his own mind, is an impertinence. He obtains in his own sphere recognition and reputation, and is indeed often better known than the architect whose work he is illustrating, but the ground of his reputation will be his skill and taste in representing the character of the design, which, not his drawing, is the thing exhibited.

ILLUSTRATIONS.

BANK OF BRITISH COLUMBIA, VICTORIA, B. C.

DESIGN FOR PASSENGER STATION.—E. T. MACDONALD, ARCHITECT.

BANK OF MONTREAL, VICTORIA, B. C.—F. M. RATTENBURY, ARCHITECT.

HOUSE, UNIVERSITY GROUNDS, TORONTO.—CUMBERLAND & STORM, ARCHITECTS.

THREE HOUSES FOR MR. T. N. JAMIESON, WOODLAWN AVENUE, CHICAGO.—DWEN & WHITE, ARCHITECTS, CHICAGO.

CHURCHES AND SCHOOLS, VICTORIA, B. C.

1. South Ward Primary School ; W. Ridgeway Wilson, architect. 2. Pandora street Methodist church ; Thomas Hooper, architect. 3. St. Andrew's Presbyterian church ; the late L. Buttress-Trimen, architect. 4. R.C. cathedral (from plans of R. C. cathedral at Longueuil, Que.) 5. Central and High schools and gymnasium; W. S. Gore, architect. 6. North Ward Primary School ; J. Soule, architect.

BY THE WAY.

LYCH or Lich (to use the earlier spelling) is derived from the Anglo-Saxon word "lich," a corpse, hence corpse gate ; and lichway (corpse way) being the way to the burial place. They are roofed gates through which the body is carried to the grave—roofed to provide protection from the elements whilst the bearers rested with the bier and its doleful burden until the priest came forward to perform the last sad and solemn rites. Thus they served a useful office, whilst by their ancient character and picturesque beauty they add not a little to the peaceful solemnity of those quiet enclosures

Where heaves the turf in many a mouldering heap.

× × ×

THE philological editor of the Inland Printer has recently been looking into the origin of the word "hoarding," as applied to building, and finds that it was originally applied to the board structure, with roof, built on the top of the walls of the old mediæval fort or castle to protect the archer and give him a good opportunity to shoot or throw stones on the enemy. From the ruins of these old fastnesses the term got to be applied to any old decayed wooden building, and was used by Dickens in his novels. The transition from the old ruin or abandoned structure, so handy for the ubiquitous bill sticker, to the modern well-built billboard is as obvious as it is interesting.

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I AM heartily in accord with the suggestion of a writer in the London Plumber and Decorator that there would appear to be no reason why the spirit of humor should not be manifest in the decoration of certain apartments of a house or public building. Why not in, say, a billiard or smoking room? Think, for example, says the author of the idea, what might be done in this way by an artist like J. A. Shepherd, whose exceedingly clever and funny pictures of animals are so well known to readers of the Strand Magazine and other popular journals. He could certainly produce drawings that, if properly carried out on the walls of, say, a public billiard room, would prove of lasting enjoyment and probably of considerable financial benefit to the owner. The merely quaint has been used in interior decoration with success, why not then the humorous?

CRAYON FOR DRAWING.

Crayon may be used along with charcoal in a manner to gain the agreeable transparency and delicacy of tone of the latter along with the firmness and permanency of the former. One begins with a slight sketch, indicating the shadows and the principal values in crayon, but several shades lighter than they are ultimately intended to be. This work is gone over with the charcoal, bringing it up to nearly the full possible strength of color, and obtaining all the values by stumping, rubbing in with the fingers, and the other means known to the charcoal sketcher. Lastly, the outline is drawn in firmly, and the strongest darks are added with the crayon, and lights are given with white chalk, as Chinese white would take up the charcoal and become of a disagreeable grey. The preparation in crayon holds the charcoal, and fixes it to a certain degree ; still the drawing must be handled carefully, and should be preserved under glass.

BUILDING ACCIDENT AT OSHAWA.

THE illustration on this page gives a view of the music hall at Oshawa, the roof of which fell in recently. The roof, the span of which was 63 × 42 feet, was formerly carried by two beams, about 10″ × 12″. Beneath each of these beams were two brackets 8′ × 12″ × 10″. Supporting each beam and brackets were two oak posts 10″ square. In order to afford a better view of the stage the owner of the building removed one of these beams and its supports and replaced it with the truss appearing in the engraving, without apparently making any calculation as to its adaptibility to safely carry the imposed load The removal of this beam left 42 feet of roof to be carried by the remaining one. Placing the weight of roof at 60 lbs per foot, inclusive of 20 lbs. per foot for weight of snow, the total weight imposed on the beam would be about 30 tons.

TORONTO CHAPTER OF ARCHITECTS.

THE regular monthly meeting of the Toronto Chapter of the Ontario Association of Architects was held in the School of Practical Science on Feb. 14th, at which Mr. Wright, of the School of Practical Science, exhibited illustrations of crushed posts and beams, and gave a series of formulæ on the blackboard.

Mr. H. B. Gordon read a valuable paper on "Points in Wood Construction."

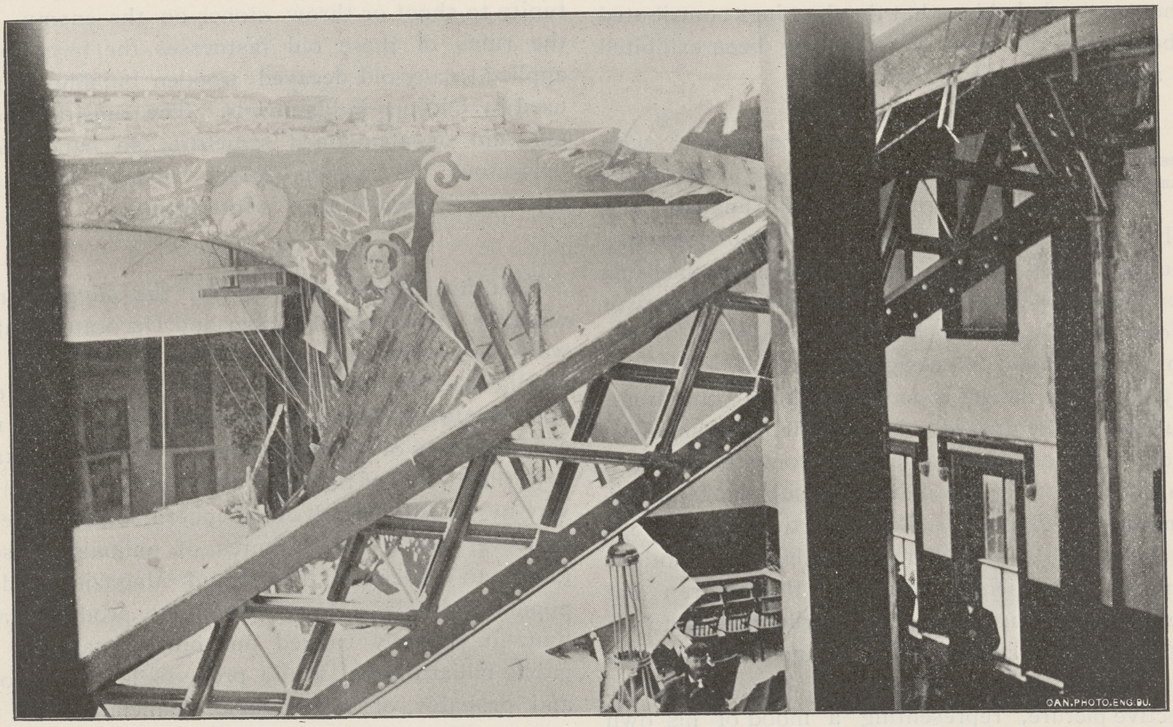
Mr. S. G. Beckett read an interesting paper on "Decoration," bringing out many important points governing the principles of decoration.

The meeting was considered by everyone present to have been most profitable. The attendance is gradually increasing, and it is hoped that before long every architect in the city will become a member of the Chapter.

For the artificial ventilation of a school by warmed air, Dr. Kerr says that 1,000 cubic feet per hour per child should be the lowest estimate, the accommodation being reckoned at 10 square feet per child, 8 square feet in infant departments. The temperature of the room should be maintained at 60 degs. Fahr.

TREATMENT OF DAMP WALLS.

WE have known of cases of dampness of walls successfully treated by coating with hard oil. Water glass, linseed oil and beeswax, paraffin wax in heavy coal tar, are also often successfully employed in overcoming dampness in walls. Probably what is widely known as Sylvester's solution is the best agent extant for the treatment of damp walls. The fame of this solution was firmly established when upon the application of four coats of it to the walls of the reservoir of the Croton Aqueduct in Central Park they were made proof against the further assertion of moisture. This solution consists of two divisions, if we may borrow a military phrase, intended for a first and second treatment. First take 1½ lbs. of castile soap and dissolve it in two gallons of hot water—soft water to be preferred, always. After cleaning the walls apply this solution hot, using a whitewash or other broad, flat brush. Avoid beating the solution into a foam or suds in applying it. Maintain a moderate degree of temperature in the apartment. The day following apply the second part of the solution, which is made by dissolving one pound of alum in eight gallons of water, having the water at a temperature of, say, 65 degrees F., and keeping the solution at about this temperature while applying it to the walls. The third application should be of the soap and water, and the fourth of the alum and water, the alternating coats forming, it is said, a chemical union absolutely impervious to moisture. This solution, when necessity compels, may be applied at the rate of two or more coats per day, but a space of twenty-four hours between coats will more reliably insure the proper hardening of the successive coats.—Painters' Magazine.



BUILDING ACCIDENT AT OSHAWA, ONT.

The best paint for floors is made of finely ground yellow ochre mixed with litharge, emery and boiled oil. The work should be primed with oil and ochre, mixed very thin and well brushed in, and then the paint be applied, allowing plenty of time between each coat. Two or three even coats should be given, finishing with a coat of elastic floor varnish.

MONTREAL.

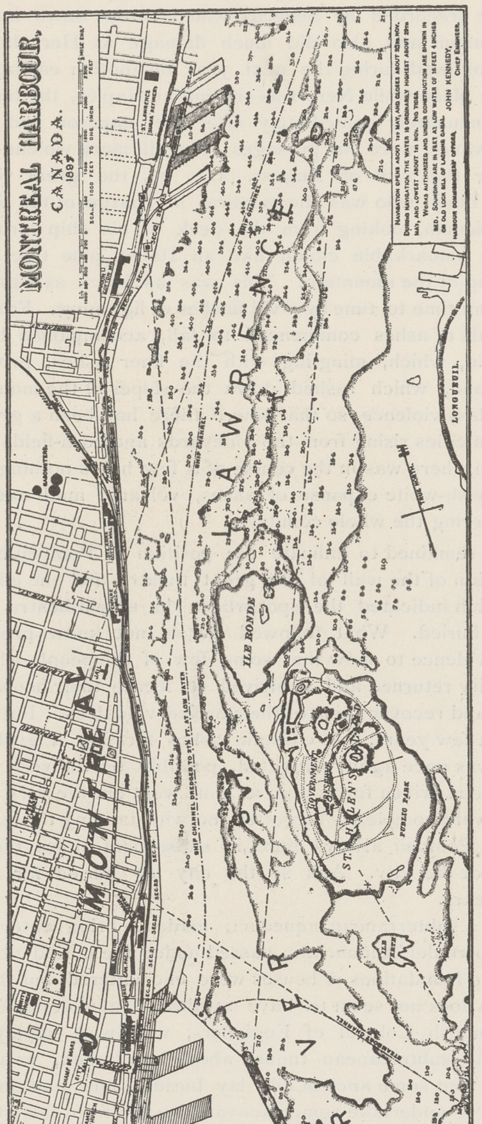
(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

LECTURE BEFORE THE ART ASSOCIATION.

ON the evening of Feb. 18th, Mr. Robert Harris, A.R.C.A., lectured to a large and appreciative audience at the Art Association rooms, on "Some Early Florentine Painters." The lecture was accompanied by a number of illuminated views illustrative of the work of the various artists.

MONTREAL HARBOR IMPROVEMENT.

The accompanying plan, known as plan No. 12 A, for which we are indebted to the courtesy of the Montreal Gazette, shows the improvements which are to be made to the Montreal Harbor.



GENERAL PLAN OF MONTREAL HARBOR SHOWING PROPOSED IMPROVEMENTS.

The Harbor Engineer, Mr. Kennedy, was unable to see eye to eye with the government regarding the character of these improvements, and the present scheme is a compromise as between conflicting opinions. It shows three piers, 300 feet wide, one being 850 feet, one 1,000 feet and the other 1,020 feet in length, on the centre line, designed to give 9,770 lineal feet of wharf front, and to afford accommodation for sixteen ocean steamers, 500 feet long. The cost of the improvement is to be entirely borne by the government.

DETERIORATION AS AFFECTING THE VALUE OF BUILDINGS.*

By S. G. CURRY.

THE reason I wish to have a discussion on this matter is because in arbitrations one finds such varying opinions on the part of professional men that it is somewhat astonishing, and it seems to me it would be well for the profession to discuss, as far as possible, these problems, in such a way that we may arrive, if we can, at some definite principle.

Depreciation may be divided into three classes. First there is the depreciation due entirely to wear and tear of the material, irrespective of any other deterioration; then there is the question of depreciation which must be looked at from the financial aspect, and in addition to these there is the depreciation which is the result of changed conditions. In the first place, then, we have the depreciation of material by reason of wear and tear, which simply means that if you erect a building, that building will be good for its purpose so long as the material in it will hold out, and, of course, that is merely the question of finding out what is the average life of the different materials used in the construction of a building. There are tables with regard to wear and tear, doubtful, of course, to some extent, but at the same time giving a fairly reasonable basis of calculation. I have not thought it worth while to bring any of these tables forward, because that, again, is very largely a question of the kind of material. You cannot say that all brick will last seventy years, because some bricks may be hard and some soft; it is a question of how long the particular brick in question will last, so after all there must be various opinions with regard to the life of the material itself.

On the basis that materials have a definite life according to quality and position certain individuals have worked out tables which they support, on the principle that the first year there is no wear and tear, the second year ¼ per cent., with an increasing percentage each year until 100 per cent is reached in sixty, seventy or a hundred years, as the case may be, based entirely on the wear and tear of the material. Then there is the other side of the matter, the financial question. If you put $5,000 into a building you must figure on receiving sufficient return on the money invested to return you a fair interest and the principal money before the substance in which you have placed it disappears, because, after all, a building must dissappear in time. You must get such a rental as will give you not only fair interest on your investment, but return you the principal before the value of the building has gone. The question is, what amount is that per year? Some figure the wear and tear the first year as nothing, and only ask for a return to cover interest, but I think the first year is the very year in which a building should give the best returns, and pay forth the greatest proportions per year of the principal money. If you figure out the financial result on the basis that the wear and tear is light in the earlier years you are going to have a building when dilapidated making better returns in the form of rent at the end than at the beginning, which it certainly will not do. So that in any case you must first figure the interest you require, and then add to that sufficient to cover the loss of the principal, and that must be made during the earlier years, because during the later period you will find some difficulty in doing it.

Then there is the third question, of changing locations. You may erect a building in a certain part of the city today in which it at present serves its purpose perfectly well, but after a time, owing to changed conditions, it becomes practically valueless; it may be in ten years, fifteen years, twenty years or fifty years, and then you get no return for either interest or principal. The fact of the removal of the Courthouse and city buildings from where they are now to another site will affect the value of the property down near the City Hall, and what was at one time worth $10,000 you may not after a time be able to get a purchaser for at $2,000 or even $1,000, so that these things all work through the value of a building. Now, I think these are all matters that should be considered in arriving at the value of a building, or in ascertaining the deterioration in value of buildings.

Mr. Cecil B. Smith has resigned his position as assistant professor in Civil Engineering at McGill University, to join the engineering staff of the C. P. Railway.

* Introductory paper read at the annual convention of the O.A.A., January, 1898.

POMPEII—A CITY OF THE FIRST CENTURY.*

By Prof. Adams, McGill University.

You will, I think, agree with me that Italy is the most beautiful country in Europe, but on the extended coast line of that beautiful country one sweep there is of transcendent beauty—the Bay of Naples—by the shore of which is situated the city of that name. And if we were to-day steaming into the Bay of Naples on any of the great trans-Atlantic liners—and let us suppose the hour to be somewhat earlier, that some remnant of the bright Italian day-light might still remain—we should have before us one of the most lovely views in the world, and we should at the same time be on the threshold of a district every foot of which is of classical or mediæval interest. The waters of the bay—deep blue, like all the rest of the Mediterranean—would encircle us in a vast horse-shoe. On our left would be the promotory of Misenum, with the islands of Ischia and Procida, beneath the former of which the giant Typhon, overcome of the gods, lies buried; and as in the narrow house of his captivity he turns, restlessly straining his bonds, the walls of his prison-house tremble and are sometimes rent asunder; while on our right the island of Capri, with the twelve palaces of Tiberias Cæsar, towers up in snowy whiteness. From such a sea you might well believe that Aphrodite rose to take empire of the earth.

To the north-west of the bay is the broken, irregular, hilly country known to the ancients as the Phlegrean Fields, for this was the battle-ground of the gods and giants. Here is also Lake Avernus, and the cave of the Cumean Sibyl sung by Virgil, and here also Virgil's tomb.

To the north-east this broken country is succeeded by an extensive plain, known to the ancients, from its fertility and beauty, as the Campania Felix. The plains and slopes are everywhere clad with verdure, farms and vineyards, interspersed with groves of myrtle, lemon and orange trees, stretching as far as the eye can reach—with farm-houses and villas, and here and there a ruined temple.

At this point lies the city of Naples, built on the flank of a range of hills, and crowned by the fortress of St. Elmo—the largest city in Italy, which, with its suburbs, Posilippo, Portici and Resina, stretches for several miles along the bay.

But to every observer one object will seem to dominate the landscape. Rising from the plain behind Naples is an isolated mountain of peculiar and striking form, resembling two inter-penetrating cones, and on the summit of the eastern cone, the observer sees a remarkable phenomenon—"A cloud by day and a pillar of fire by night"—and at once recognizes the mountain before him as one of the class of so-called burning mountains or volcanoes; perhaps the most celebrated of them all—the volcano Vesuvius.

Now could we have visited this district in the time of our Lord, the landscape would have appeared different in certain of its features. Vesuvius would have been larger, but lower, and would have shown no signs of activity. Strabo (died A.D. 25) an observer of remarkable acuteness, saw it about this time, and describes the mountain as being clothed with farms and vine-yards to its very summit, where, however, there was a flat barren stretch, on which the rocks were fused and slaggy, bearing the marks of fire, which led him to conjecture that the mountain had at one time been a volcano. No eruption, however, had taken place in historic times.

About the foot of the mountain, in addition to Neapolis, were several small cities, the chief of these being Herculaneum, Pompeii and Stabiae, all Greek towns, which passed successively under the dominion of the Etruscans, the Samnites, and finally of the Romans. To the student of architecture these cities have an unique importance, for while we have remains of Roman temples and other public buildings, dating back to this time, which afford a thorough insight into their plan and construction, were it not for the excavations at Pompeii it would be utterly impossible for us to form any adequate idea of the domestic architecture of the Romans.

In the whole city of Rome the remains of but one private house have been unearthed, that of Germanicus, found in 1869 in excavating the Palatine. Elsewhere, as in Britain at Silchester, the remains of a few houses more or less aberrant in type have been discovered, but in Pompeii hundreds of Roman houses, great and small, elaborate and simple, and of various dates and styles of construction, are to be seen, which, with their appointments, reveal to us in the most striking manner the everyday life of the Roman world nearly 2,000 years ago.

Now any knowledge which we can obtain concerning these cities at this time is of especial interest: 1st. Because they were examples of the smaller Roman cities during the most civilized and the haughtiest age of the Roman Empire, when Rome was at the highest eminence of its luxury and power. 2nd. Because it was at this time that Christianity was being first preached and was making its way through all parts of the empire. It was in such cities as these and among such scenes as these present, that St. Paul and his co-workers found themselves, and sought converts to the new faith.

And here in these cities of the plain they ate and drank, they bought and sold, they married and were given in marriage, till on the 5th of February, A. D. 63, there came an earthquake (recorded by Seneca) which threw down a great part of Pompeii and also did much damage at Herculaneum. This was followed during the next year by another earthquake, which took place while Nero was singing at Naples, the building falling unfortunately immediately after the emperor had left it. These, however, were but presages of a still more violent catastrophe, for the 24th of August, A. D. 79, the great Roman naturalist, Pliny, who was the admiral in charge of the Roman fleet at Misenum, looking from the deck of his ship across the bay, saw a remarkable cloud, like an Italian pine tree, rising from the top of the mountain. This was as black as night, but pierced from time to time by vivid flashes of lightning. From this dense clouds of ashes commenced to fall, accompanied by torrents of rain, which, mingling with the finer ashes, produced rivers of mud, which rushed down the slopes of the mountains with resistless violence, so that where there had been a group of picturesque cities rising from the vineyards and corn-fields of the fertile plain, there was in the course of a few hours nothing but a great greyish-white expanse of ashes, volcanic mud and lava blocks covering the whole country.

Nothing remained to indicate the position of Pompeii but the upper portion of the wall of the great theatre and the elliptical outline which indicated the spot where the amphitheatre of the town lay buried. What followed we do not know precisely. There is evidence to show that some few of the people who fled from the city returned and contrived to locate their houses and dig down and recover some of their buried valuables. But in the course of a few years, the volcanic ashes forming a fertile soil, the plain was once again cultivated, possibly by the very people who had been driven forth, and, as time went on. the very site of the cities were completely forgotten, notwithstanding the fact that the site of Pompeii always bore in subsequent times the title "Civita," or the city. And so the city lay buried for fifteen hundred years.

In 1595, a subterranean aqueduct, made to bring water to the town of Torre dell'Annunciata, passed under the buried city, and some of the foundations of houses were encountered, but this circumstance does not seem to have awakened any curiosity. In 1748, a Spanish Colonel of Engineers, who was employed to examine the subterranean tunnel above mentioned, was led to conjecture that some ancient city lay buried there, and obtained permission to undertake some excavations, and from this time onward these were continued in an irregular manner and on a limited scale, with varying success. Any doubt, however, which may have been entertained as to the identity of the city, was removed by the discovery, in 1763, of an inscription recording the restoration to the municipality of the Pompeiians, by Vespasian, of all the public ground occupied by private persons.

The workmen employed in these excavations were generally condemned felons, who worked chained in pairs, and Mahommedan slaves, taken from the Barbary pirates.

The object of the excavations was simply plunder. The marbles were removed, the mosaics broken up; all objects of value were sold for what they would bring. Even the interesting water pipes were melted down for old lead, and it was not until 1860, when the Neapolitan provinces became a part of united Italy, that the government took the matter in hand and instituted a regular plan of excavation, placing Prof. Fiorelli in charge of the work. Now, careful records are kept of every foot of ground turned over, and all that is valuable, but would be destroyed if left in situ, is transferred to the great National Museum at Naples, where it is safely housed and excellently displayed for study.

It is estimated that in about fifty years the excavations will be completed, and the whole city laid open, though this, of course, depends upon the amount of subsidy granted by the government.

* 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.

It is, however, to be regretted that, owing to financial difficulties, the grant has been considerably reduced in recent years.

Through Signor Fiorelli's labor we can now for the first time picture to ourselves the appearance of a Roman town. This map will serve to show the outline of the city, and the proportion of it—about one-half—which has already been excavated. The walls are seen throughout almost their entire extent. The city is an irregular oval, its extreme length within the walls being about three-quarters of a mile, and the greatest breadth not quite one-half mile.

The population is estimated at 12,000, and an allowance of 8,000 more for the suburbs is probably a liberal one—20,000 in all.

The main streets are at right angles to one another, thus dividing the city into insulæ, or blocks, and it will be noticed that these insulæ or blocks are solid masses of buildings, not cut up or traversed by lanes or alleys. The insulæ have been named or numbered for convenience of reference, but in Roman times there was no such designation, or at least none such was posted. The reason for this will probably be that the streets of all Roman towns were known by a regular series of names, the principal street running north and south being called Cardo, and that running east and west being called Decumanus. The streets now as excavated have names assigned to them derived from something characteristic in their position or something significant to be found in them. It has been conjectured that the street now called the street of Stabia was the Cardo of Pompeii, while the Decumanus Major was the present Street of Nola, and the Decumanus Minor, the Street of Abundance.

I will ask you, this evening, to take a stroll with me through this ancient city.

We enter the city, as all visitors do, through the Porta della Marina, or Sea Gate, and passing along the Strada della Marina, enter the Forum, then, crossing the Forum, down the Street of Abundance and up the Street of the Theatre, past the Temple of Isis to the Greater and Lesser Theatres ; then, by the Gladiatorial Barracks, to the Amphitheatre, and back by the walls and the Street of Nola to the western part of the city, visiting two private residences situated on the Street of Fortune, the House of the Tragic Poet and the House of the Fawn, which I would select as samples of Pompeiian houses of wealth and refinement, for the western part of the city must have been the portion in which the well-to-do and fashionable people lived, no houses of the poorer element having been as yet unearthed. They probably lived down toward the Amphitheatre.

There was then a west end in the first century as there is in the nineteenth.

A more accurate idea of the appearance of the city than can be obtained from the map is afforded by this photograph of a portion of a large and very accurate model of the city which is exhibited in the Museum at Naples.

The Street of Stabia, the Cardo of Pompeii—we come down the Street of Abundance from the Forum, up the Street of the Theatre to the smaller Temple of Isis, the two theatres, the Gladiators' Barracks, and then off to the Amphitheatre on the right.

The compact manner in which the city is built, as well as the fact that the roofs, being made of wood covered with tiles, burned and fell in, will be noticed. All the debris has been removed from the city, however, and it therefore presents a clean and neat appearance, as well shown in this photograph.

Leaving Naples, then, by any of the half-dozen trains which daily start for the south, passing by the city of Herculaneum, and cutting across several lava streams which at various times have found their way into the waters of the bay, and skirting the Bay of Naples, in somewhat less than an hour, having gone some 17 miles, we hear the guard call out "Pompeii!" Alighting, we pass up a picturesque lane crowded with beggars in various stages of disintegration, to a gate leading into a garden. Here, purchasing our tickets, a guide is assigned to us and we pass on through the garden a few steps further and reach the wall of the ancient city, then up a rather steep archway and we enter the Sea Gate.

Continuing straight across we pass down the Strada della Marina and through to the Strada della Abundanzia, the Street of Abundance. The scene before us is a street corner in Pompeii. The Street of Abundance here meets the little side street or lane of Venus and Mars.

The street, it will be noticed, is paved with large, irregular, polygonal blocks of lava, fitted together after the manner of the Etruscans. This method of paving the Romans learned from the Etruscans, and it is thus that the Roman forum is paved. A narrow, raised sidewalk bounds the road on either side. The road is worn into deep ruts by the wheels of the carts which passed over it two thousand years ago.

Only a part of the town seems to have been furnished with sewers, hence the streets were waterways and must have been impassable in heavy rains. Stepping stones were accordingly placed across them at frequent intervals, as now in Baltimore.

In the front of the picture is a fountain and drinking trough, made of marble, and which is surmounted by a figure symbolical of Abundance, crowned with a vine, and bearing a horn of plenty. From this the street derives its name of the Street of Abundance.

The materials used in the construction of the city are here well seen. The house on the right is built of blocks of travertine, accurately cut and laid together without mortar. Such houses, however, are not common. They occur here and there in the city, and are in all cases very old houses, dating back at least to the 3rd century B. C. This style of masonry was called by the Romans, Opus Quadratum, and in Rome, where it is also found, is the most primitive among the existing methods of building. The early date of these houses in Pompeii is also shown by a primitive arrangement of the rooms, a peculiar simplicity of mural decoration, as well as the absence of a second story to the structure.

The houses of later date, and most of the houses in Pompeii belong to this class, are built of a sort of concrete or rubble work, faced with what the Romans called Opus Incertum, or with flat tile like bricks. This was formed by studding the face of the concrete wall with irregular shaped pieces of volcanic tufa, 3 to 4 inches across, each having its outer face worked smooth and the inner part roughly pointed. An example of this is seen in the building on the left. The brick faced concrete and the use of bricks in the arches is also seen. This house was built A.D. 14-24.

Still later another style of facing came into use, the so-called Opus Reticulatum (from its resemblance to the meshes of a net). This is similar to Opus Incertum except that the stones are carefully cut so as to present a square or lozenge shaped end, and are fitted closely together. A concrete wall thus faced with Opus Reticulatum and brick is here shown (taken from the work of Middleton, who is our great authority on these subjects). This style of work is everywhere in the Roman dominions, a sign of construction of the Imperial age. An example of it will be presented later on.

As a general rule this masonry or brickwork is covered with a hard and very fine white stucco, worked to resemble marble, of which it is an excellent imitation. There is stucco everywhere in the city, both within and without the houses, just as in Naples at the present day.

The building on the left, to which I have asked your attention, is a portion of an exchange of Eumachia, which must have been a very handsome building in its day. It was erected, as we learn from an inscription, by a priestess of the name of Eumachia, at her own expense, and dedicated to Concordia Augusta. It will be remembered that the temple of Janus, in Rome, was always open in time of war, and that Augustus closed in in token of the universal peace of the Roman empire, in the very year in which our Saviour was born. Horace mentions the facts in his Odes, thus showing that it had a hold upon the popular feelings of his day, and this building in Pompeii was no doubt dedicated to commemorate this famous universal peace.

It was probably used for a stock exchange ; the small chamber was for the doorkeeper ; the steps ascended to the upper floor ; the walls on either side were painted in black panels, divided by red pilasters ; a statue of the foundress stood in a niche opposite the entrance. This, which is a view down the streets of Stabiae, shows the ruts better.

Passing down the street, and turning up the corner to the right, we pass the Temple of Isis (whose worship seems to have been the fashionable cult in Pompeii, having been brought from Alexandria, with which city Pompeii, being a seaport, had a large maritime trade), and reach the two theatres, the greater having been used for the presentation of tragedy, and the smaller, as its construction indicates, for the production of comedy.

This is the view of the greater, the Tragic Theatre, which, as will be seen, is in a state of tolerable preservation, although the ashes have not been completely removed from the seats. It is semi-circular and was open to the sky and adorned in every part with white marble. The seats faced south, so that the audience, while watching the progress of the play, had at the same time a magnificent view over the plain of the Sarno as far as the mountains of the Stabiae.

Owing to the great height of the outer wall, the upper portion of it always remained above ground, although no one seems to hnve suspected that it was the wall of an ancient theatre of a buried city. The benches are spaced off and numbered as in a modern theatre, the space allowed each person being fifteen and one-half inches, the theatre accommodating 5,000 persons. There was no confusion on entering the theatre, for around it was a series of doors, each leading to a set of steps, the door which should be entered being stated on the tickets of admission. The men of rank sat in the orchestra, on chairs of state carried thither by their slaves ; others, on the upper rows of marble benches, usually on cushions which they brought with them. Above was the women's gallery, partitioned off into compartments like the boxes in English or Continental theatres. Above, great projecting blocks of stone pierced with holes served to support masts which upheld the awnings spread to protect the spectators from the sun or rain.

The stage is wide and very shallow, but few persons being upon it at any one time. In the absence of a roof, the voices of the performers would have been lost on a deep stage. The scene was immovable, and built of brick or marble, representing the facade of a royal palace, and was pierced by three doors, handsomely decorated, the central door being used by the principal personages, the door on the right wing by inferior personages, and that on the left wing by foreigners, or persons coming from abroad. Along the front of the stage is the opening through which the curtain was lowered. The musicians sat in the niches in the front of the stage. The chorus moved in the semi-circular space in front of the stage, passing on to the stage at the completion of the play by the steps.

Note the opus reticulatum, a masonry of diamond pattern, everywhere in the Roman dominions, as has been mentioned, a sign of construction of the Imperial age.

The Comic Theatre is smaller and of inferior construction, a fact probably accounted for by an inscription which informs us that it was erected by contract. The stone steps on the left led down to the gladiator's barracks or fencing school, which consists of a square of exercising ground surrounded by a block of stuccoed Doric pillars, above which were sleeping rooms. The paintings on the walls of one of the large rooms were very fine, representing triumphs of gladiatorial arms. It also contained a collection of very fine bronze helmets, shields and gladiatorial arms of various kinds. The inscriptions on the walls leave no doubt as to the use of the building, as they consist of programmes of entertainments in the amphitheatre, eulogies of persons who caused them to be held, and a vow by a gladiator to Venus if his arms proved successful. Many skeletons were found in the building, probably the remains of gladiators who were wounded and unable to escape. Here, also, were the stocks, now at Naples, in which were the skeletons of four men who were undergoing this particularly unpleasant form of punishment at the time of the destruction of the city, and were evidently forgotten.

The gladiatorial school accommodated about 132 men, and may have supplied gladiators to the very large number of amphitheatres which were found within a short distance of Naples, although we learned from the inscription that 60 or 70 gladiators were often engaged in a single show at the Pompeiian amphitheatre, nearly one-half of whom were probably killed at each entertainment.

The amphitheatre is not nearly so fine as the Coliseum at Rome, or even as the smaller building at Pozzuoli or the one at Verona. It is, nevertheless, a fine and well preserved building of the class, and is calculated to have held 20,000 persons.

The Amphitheatre differs from the Theatre in that the tiers of seats run completely around the oval arena, instead of having simply a semi-circular form (the first amphitheatre having consisted of two movable theatres, placed face to face). The construction resembles that of the theatre, and need not be further described. The several classes of seats were reserved for corresponding classes in the community. A great velarium shielded the audience from the sun.

This photograph shows excellently the level of the surrounding country, from which the Amphitheatre has been excavated.

In these amphitheatres the cruel and revolting exhibitions, developed by the degraded tastes of the Romans from the innocent, athletic contests of the Greeks, were held—shows which seem to have reached the climax of their splendor in the first century of our era, or about the time when Pompeii was destroyed. Their subsequent suppression was one of the great triumphs of Christianity ; the last of these contests being that in which the monk, Telemachus, sprang into the arena and separated the contestants. Although he was in consequence stoned to death on the spot by the infuriated mob, his action made such an impression on the growing conscience of the world that the Emperor Honorius was led to issue an order forbidding such performances, and the gladiator became a thing of the past.

The spectacles of the Amphitheatre were of three kinds : First, the contest between gladiators, who fought singly or in bands. In connection with the celebration of the victory of Trajan over the Daci, as many as 10,000 men fought and butchered one another in the arena, surrounded by a vast and excited throng of bloodthirsty spectators. The fascination which these contests had for the Roman populace seems to us now almost incredible. There is a fine passage in that wonderful book of St. Augustine, his "Confessions," which relates how one day one of his most intimate friends was, by some of his boon companions, haled with familiar violence to the amphitheatre, but, closing his eyes, determined not to look upon the unhallowed spectacle. Hearing, however, a great shout go up from the populace as one of the contestants fell, overcome by curiosity, he looked into the arena and became so possessed by the spirit of cruelty, and intoxicated by the desire for blood, that he returned again and again to the amphitheatre, and even seduced others to accompany him.

Second, there were the sea fights, when the arena was flooded and boats laden with armed men were rowed in from opposite sides, their crews hacking each other to pieces until the arena was a lake of blood. The Pompeiian Amphitheatre was not arranged for such contests, but the neighboring one at Pozzuoli was, the channels for the entrance of the water to flood the arena being still distinctly seen. This style of contest was eventually put down, not on account of any humanitarian sentiment, but on account of the great waste of slaves occasioned by it.

Third, then there were contests between gladiators and wild beasts. In such contests he must have appeared who "fought with wild beasts at Ephesus." But, as a general rule, the Christians refused to fight for the amusement of the populace, and were accordingly thrown into the arena to be devoured. In these contests all manner of rare and curious beasts were brought from remote parts of the earth to fight with one another and with the gladiators. Lions, tigers, bears, elephants, hippopotami, rhinoceri, crocodiles, and even gigantic snakes.

This slide is a photograph of an old picture, giving an ideal representation of one these contests. Note the velarium, the Emperor, the vestals, and the incense or perfume being burned.

The paintings at Pompeii frequently represented groups ; from these "venationes," or hunting scenes, and advertisements written up in various parts of Pompeii, make it clear that this was here a favorite form of amusement. The following is a translation of one of the most important of these advertisements :

Twenty pairs of gladiators paid by Decimus Lucretius Satrius Valens, priest, in the time of Nero, the son of Cæsar Augustus ; and ten pairs of gladiators, paid by Decimus Lucretius, the son of Decimus Valens, will fight at Pompeii on the 11th, 13th and 14th of April. There will be a proper hunting scene, and the awnings will be spread.—Written by Celer Emilius Celer, writer of inscriptions, who wrote this by moonlight.

Returning then to the western part of the city by the circuit of the walls, and through the street of Nola and the street of Fortune, we find ourselves in a district of narrow streets flanked by fine residences. Two of these may be taken as representative of the whole, and will serve as examples of Roman houses of the 1st century. The first of these is known as the House of the Tragic Poet, from a picture on its walls representing a poet reading ; and the second is called the House of the Faun, from the exquisite bronze, known as the Dancing Faun, which was found within it.

The House of the Tragic Poet is at once one of the smallest and simplest, and yet one of the most ornate and best finished, of all the private houses of Pompeii. "It would," says Lord Lytton, who represents it as the House of Glaucurs in his Last Days of Pompeii, "be a model at this day for the house of a "single man in Mayfair." Its position in the insula, one-half of which is here represented, will be seen upon the screen. Entering through the door, the visitor would find himself in a long and narrow vestibule, and would be startled by the figure of a large fierce dog in the act of springing at him, worked in mosaic in the floor, beside which is written in large characters, "Cave Canem," (Beware the Dog). Here the slave who attended the door would sit, and his constant presence was often ensured, especially in earlier times, by his being chained to his place. It was not, therefore, necessary to ring more than once in Pompeii to gain admittance. The rooms on either side of the vestibule were rented as shops, and were, so certain of the classical writers tell us, one of the best kinds of property in which one could invest his money. Passing through the vestibule we reach the Atrium, a court roofed in about its margin but open to the sky in the centre. Beneath this open space was a shallow reservoir to collect the rain water coming in from the roof, and known as the Impluvium. In this Atrium the clients and visitors of inferior rank were received and business was transacted. It was in fact the public part of the house, and in the houses of the more "respectable" an "atriensis," or slave peculiarly devoted to this hall, was retained, whose rank among his fellow-slaves was high and important.

Off this Atrium opened several smaller rooms, and its walls were richly ornamented with fine paintings of classical subjects; one of the Parting of Achilles and Briscis is especially celebrated. The floor was paved with mosaic. A narrow passage would lead us through to the private apartments, which are situated about the Peristyle, a second court like the Atrium but surrounded by columns. In the open central space was a charming little garden. Opening off the peristyle was the tablium, where the family records were kept, and which probably was used as a drawing room; and the triclinium, or dining room—in this house, often called the Chamber of Leda, from a painting on one of the walls representing Leda presenting her children to her husband Tyndareus —and two small bed-rooms. The bed-rooms are in fact always small in these ancient houses—mere cupboards in which people spent as little time as possible. At the left of this garden is a beautiful little fane, dedicated to the Penates, and resembling one of those little shrines placed by the roadside in Roman Catholic countries. On the wall to the right of the columns of the Peristyle is the celebrated painting of the Sacrifice of Iphigenia to be mentioned later on.

This is the photograph of a model of the House of the Tragic Poet as it would appear if restored, in the museum in Naples, and will perhaps give you a clearer idea of the appearance of the whole. Note the vestibule, with its peculiar style of Pompeiian panelling; the Atrium, in two stories, with balcony and rooms for slaves; the painting of Achilles and Briscis; the passage to the Peristyle; the Tablinum; the Triclinium; the little shrine and the painting Iphigenia. Note also the roof of wooden rafters covered with tiles.

The picture now on the screen represents a restoration of the interior of the house as it must have originally appeared. It is correct in almost every detail, as owing to the perfect state in which the building was found, but little need be left to the imagination. Probably the entrance to the Tablinum was closed by a door or curtains. These have been represented as with drawn, and, as will be observed, it is possible from the street to see through the house from end to end, the little shrine at the back of the peristyle being plainly visible. This total want of privacy in such a house is repugnant to our notions of comfort, but it can hardly be denied that there is an air of splendor in the extensive and richly decorated suite of rooms which is scarcely equalled with us in houses of a similar class. It shows the shrine and fine smooth white marble-like stucco, with which the whole interior of the house was covered, and which must have given it a very fresh and bright appearance.

Such then is the plan of the typical Roman house. In primitive times the Atrium, with the few rooms opening off it, constituted the whole house. It was the original Roman house; in fact the house was called Atrium, and we have in Rome the remains of certain very early buildings, which always retained this name, e.g., Atrium Vestæ, the house of the Vestal Virgins and others.

The house took this form partly on account of climatic conditions, which enabled one to live much in the open air, and partly because glass had not been discovered, and light and air could thus only be obtained through the large front door or through the opening in the roof. This Atrium, which was in the earlier times the general meeting-place for the family, was characteristic of the Roman house as compared with the Greek, in which latter there was a separation of the apartments of the men from those of the women. In later times, as the demand for larger and more luxurious houses arose, the Peristyle, with its accompanying rooms, were added, a feature which both in name and position indicates its Grecian origin.

(To be Continued.)

The Gurney Foundry Co., of Toronto, have issued a handsome calendar, with the new Temple Building as the central feature. The calendar calls attention to the fact that this building is fitted up with the company's Oxford radiators.

CORRESPONDENCE.

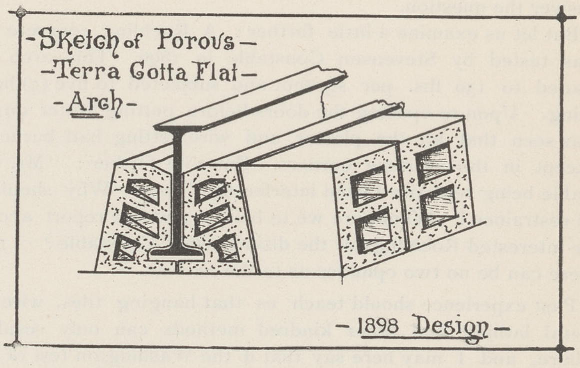
[Letters are invited for this department on subjects relating to the building interests. To secure insertion, communications must be accompanied by the name and address of the author, but not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

QUALITIES OF FIREPROOFING MATERIALS.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—Being deeply interested in the question of fireproof construction I have carefully studied the paper prepared by Mr. Burke, "Two Questions in Connection with Steel Construction in Buildings," read at the annual convention of the Ontario Association of Architects. This paper, as stated, was written to open a discussion as to the merits, or de-merits of the different methods in use, and before proceeding to criticize it—and the statements of those who took part in the subsequent discussion—I wish to congratulate him on the skill with which he handled his subject, so far as he carried it—a subject interesting not only to the members of the Ontario Association of Architects, but to all who practice the profession of architecture.

Mr. Burke has apparently taken as his text examples, "Stevenson Constable experiments; Roebling's so-called tests; and the Engineering Record's report of the Pittsburg fire—all useful in their own way—but it is to be regretted that he neglected to emphasize the changes which have been introduced in porous terra cotta flat arch construction within the past eight years, and either must have overlooked or been ignorant of them. Flat arch end construction has superseded all other forms where porous terra cotta is used, and I think supplies the wants of both Mr. Burke and Mr. Curry. They give a level ceiling throughout, the tile being 1¼" thick with an air space of nearly one inch between it and the lower flange of the iron beam, thus:



This form of flat arch was designed and introduced by Mr. Thos. A. Lee, of Denver, Col., and so far back as 1892 proved itself superior to all rivals and competitors, vide the report of the competition test made at Denver, Col., December, 1890. These tests it may be noted were made independently of the competitors by Messrs. Andrews, Jaques, and Rantoul, architects of the Denver Equitable Building Company, the porous terra cotta flat arch defeating all competitors decisively.

Stevenson Constable's experiments (New York, 1896), so far as they went, and even the Pittsburg conflagration, again conclusively proved the superiority of porous terra cotta, the "Engineering News" placing it first. Even H. Maurer & Son, for years the advocates of hard tile, now admit its superiority over all other materials—vide page 24 of their new catalogue, which says, "profiting by that experience (the Denver tests) we have since made all our hollow tile more or less porous." Surely this should convince the most skeptical, providing always he is seeking after the truth.

I would here sound a note of warning! Architects should be careful to note the difference between "hard tile," which is placed on the market under the name of "terra cotta," and "porous terra cotta." More than one manufacturer of the former article now advertises it in such a way as to practically mislead the public, and to make it appear as if they were manufacturing the latter article.

Surely Mr. Burke cannot be in earnest when he advocates a modified form of the "Roebling arch." Many segmental arches have been designed, but so far none of them have found favor with the profession. The latest is probably the "Maurer & Son's arch," vide page 50 of their catalogue. All such arches have been used in combination with concrete (the haunches being levelled up with that material), a practice much to be condemned.

I was under the impression there could be no two opinions as to the use of concrete arches, either flat or segmental, but from remarks passed by members of the Ontario Association of Architects I find I was mistaken. Evidently—in Toronto if not elsewhere—"a prophet hath no honor in his own country," else the exhaustive experiments made by Mr. J. S. Dobie, grad. S.P.S., could hardly have passed unnoticed by Mr. Burke or some other member of the Association. Read his conclusions and ponder on the same. They are as follows:

"While there is no doubt that a covering of Portland cement concrete will afford some protection to a metal column or girder, still there appears to be no doubt that the concrete itself will be ruined by the action of the fire and will have to be removed as soon as the fire is subdued. The concrete covering may remain upon the ironwork during a fire, but the heat will damage it to such an extent that it will disintegrate afterwards," etc.

"A number of cement briquettes were heated and rapidly cooled by immersion in cold water, after being heated for different lengths of time at different temperatures. In every case the briquette cracked when immersed, and if they were red hot before immersion, they completely disintegrated, in most cases being reduced to a heap of soft mud. Sand and cement acted precisely similarly to the neat ones, and it appears conclusive that if cement or concrete is allowed to become red hot, and is then immersed in cold water, the effect would be ruinous in the extreme.'

Mr. Burke dwells very much on the Roebling test of the Maurer system. Why mention a test conducted by a rival firm? Are such to be accepted? I cannot think any intelligent man would unhesitatingly accept it under such conditions. Is it not strange the Maurer arch only stood the fire test for three (3) hours, when Stevenson Constable reports them as standing during his experiments for six (6) hours uninjured. Nearly twenty days afterwards he loaded this arch up to 1960 lbs. per sq. foot, and it still declined to fall. Why the difference? Roeblings may be able to answer the question.

But let us examine a little further: A Roebling concrete arch was tested by Stevenson Constable in 1896. This arch was loaded to 150 lbs. per sq. foot and subjected to five (5) hours' firing. Upon re-opening the doors before putting water on it, it was seen that all the plaster and wire netting had burned off except in the extreme corners. But note further: "Mr. Constable being restrained from interference," etc. Why should he be restrained? Whom are we to believe; whose report accept; the interested Roeblings or the disinterested Constable? I think there can be no two opinions as to the answer.

Past experience should teach us that hanging tiles, wire and metal lathing and other kindred methods can only result in failure, and I may here say that if the Washington test of "asbestic plaster" was conducted on the same principle as that in Montreal, it is utterly unreliable—that in the latter city being a perfect farce in so far as testing the material went. I question if any architect would take the responsibility of using metal lath, hanging tiles, or even asbestic plaster as the only protection were he constructing a fireproof building.

For nearly twelve years I have studied and experimented with different materials for fireproofing. I have had unusual facilities and opportunities for posting myself on the different systems—past and present—used in Europe and America, but have yet to find a material which has the fire-resisting qualities of porous terra cotta, My own opinion, gained from a large experience, is that no concrete, or all-plaster system is safe, and I heartily endorse the action of the Board of Examiners of New York in their condemnation of concrete. It was well founded, and unless adhered to, may sooner or later lead to disastrous results.

Yours very truly,

N. T. GAGNON.

THE ONTARIO ASSOCIATION OF ARCHITECTS AND WHAT IT SHOULD DO.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—The proceedings of the tenth convention of the Ontario Association of Architects as reported in the CANADIAN ARCHITECT AND BUILDER seem to show that organization to be suffering from nervous prostration in an aggravated form. This association, called into existence with the avowed intention of seeking legislation to enable it to restrict the practice of architecture, has made a long and manful fight of it. Relinquishing one point or another in the proposed Bill as the years passed, it has been consistent to the last in seeking for its members legal recognition and a status denied to outsiders.

That the promoters of this idea of seeking legislation were acting in what they believed to be the best interests of the profession, there is no doubt. They felt at the outset that public opinion was not ripe for the passing through the Legislature of such a measure as was desired; and so the "campaign of education," which has been carried on for years, was begun with high hopes. In this campaign the architects in their wisdom sought to disguise the real object of the Bill—which was, of course, the advancement of the profession—and to make it appear that the prime motive of its authors was the protection of the public. This was not quite sincere; and unfortunately such arguments as can be adduced to show that such legislation as was proposed would afford real protection to a suffering public, are not quite conclusive. For instance, let me quote from the CANADIAN ARCHITECT AND BUILDER for February, 1898:

"Even the terrible calamity at London has not taught the average man common sense. From the papers we find that in several instances the advice of incompetent parties has been asked as to the safety of public buildings. Every man who calls himself a builder or an architect is not a safe or reliable authority upon construction. The Ontario Association of Architects have been doing their utmost to obtain from the Ontario Legislature such changes in their Act as would to some extent protect the public against the possibility of such accidents as the London disaster."

Now, permit me to ask, to what extent would such legislation as the association has been seeking furnish safeguards against the occurrence of catastrophes such as that at London? If the Ontario Architects' Act had been amended as the architects desired, it would now be illegal for anyone beginning practice to style himself an "architect" unless he had passed a prescribed examination. Let it be granted that this examination be such that no one could pass it without proper knowledge. Let it also be assumed that the incompetents already in practice, and on that account, not to be forbidden the use of the word "architect," have died or gone to the United States. Most architects know that in building operations accidents, slight or serious, are due quite as often to carelessness or oversight as to incompetence. That an architect has had at some time in his life, or even that he still has, a proper knowledge of construction, is very far from being a guarantee that no accidents can happen in connection with work with which he has to do. And, even suppose the association could guarantee its members to be architects who are not only competent, but careful, conscientious, never overworked, nor fond of modes of construction too economical to be quite safe—in short, guarantee them to be infallible—what of the other fellows who are not "architects," but who would still have a right to build and might find occasion? Their structures, of course, might be placarded "Unlicensed and Irregular," and the public thus warned when to dodge. But, seriously, is it any wonder that the "average man" is suspicious of legislation which seems so ill-adapted to the ends professed to be had in view; or, that by advancing such arguments, the association has signally failed to create a sentiment in favor of its demands?

The truth is, this whole movement for legislation has been rather petty in its aim and not too farsighted. The proper sphere of action for an architects' society lies along other lines. In the purchase of a library, and in the institution of examinations, the association has done work much to its credit, work that has been of real value to junior members of the profession. What the architects of Ontario need is not legislation to protect them or the public, but grace to see that they have embraced an art and profession which is rich in interest, which has fields for study that are very broad, and in the practice of which, even at this time and place, it is possible to preserve some germs of what really is "Architecture."

So much for the profession; and, if the association really wants to do a public service, here's a "tip":

Toronto either has no proper building laws, or they are not enforced. Because the amended Ontario Architects' Act would afford the public no adequate protection against dangers from panics, fires, or falling buildings, it does not follow that the public should not be protected. There is in Toronto at least one theatre—and that a much frequented one—in which the size and arrangement of exits is such that its use is a constant menace to public safety. And I believe this theatre is not much worse in this regard than are some other buildings in Toronto where crowds assemble from day to day. Such an organization as the Ontario Association of Architects has it in its power to create such an agitation as would lead to the establishment in Toronto—and what is said of Toronto of course applies to other cities in Ontario—of effective building laws compiled by experts, and a Department of Buildings competent to secure their strict enforcement. Such a Building Department as New York City has, Toronto should have—if on a smaller scale.

Let the Ontario Association of Architects urge the adoption of such practical means for securing the public safety as have been found effective in New York and elsewhere, and it will prove itself worthy of all support. Let it wait for another London disaster to occur in Toronto or somewhere else, and then through its convention, or its organ, prate about a Bill to restrict the use of the word "architect," and it will not command the respect of

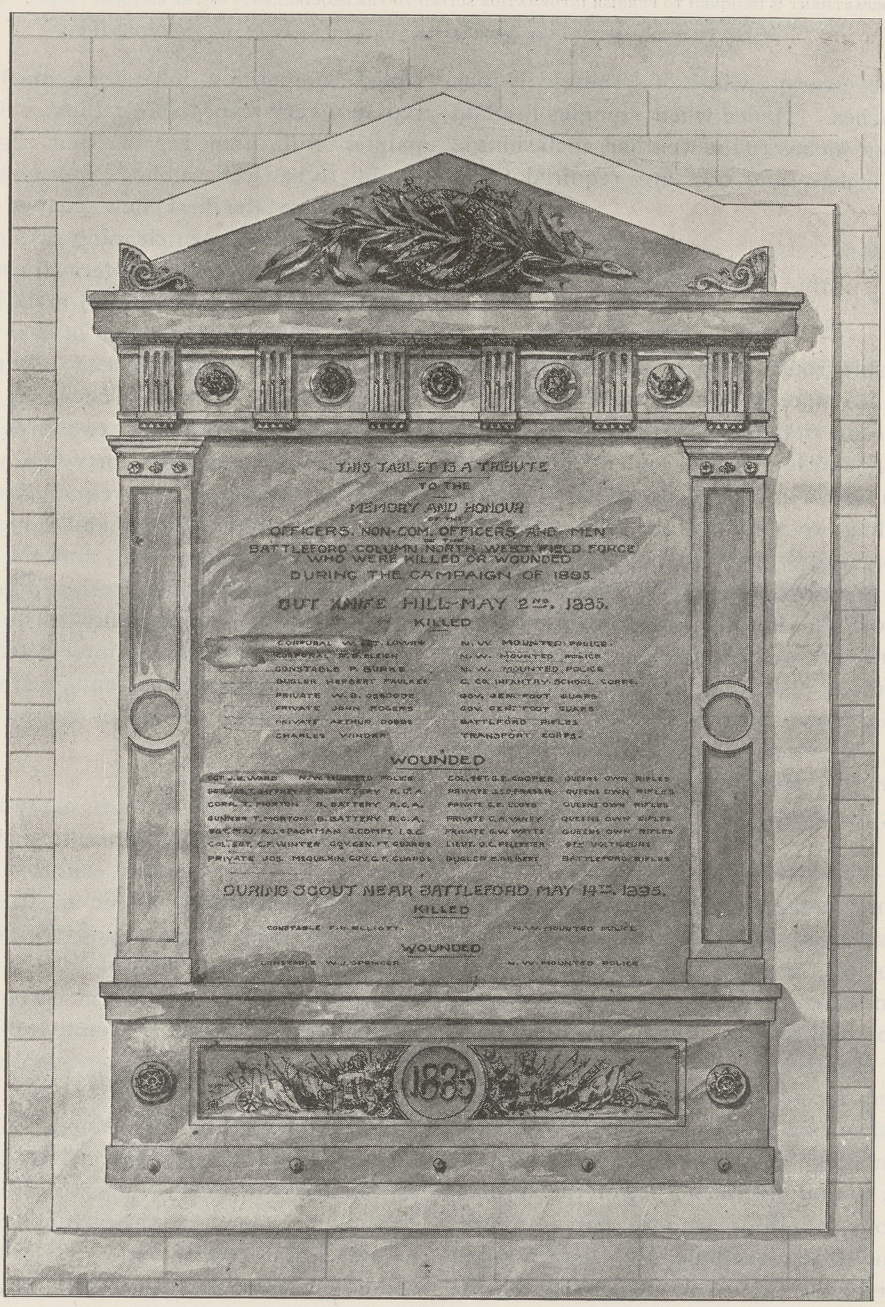
Yours truly,

ARTHUR E. WELLS.

BATTLEFORD MEMORIAL TABLET.

WE reproduce on this page the design for a memorial tablet to be erected in the Toronto armories by the Battle Column Association, in honor of their comrades who were killed or wounded during the campaign of 1885. The design is the work of Mr. C. D. Lennox.

The tablet will be about three feet wide by 5 feet high, cast in bronze, out of a bronze field piece donated for the purpose by the militia department, backed by a large marble slab, and having in addition to the names of the killed and wounded, medallions showing the regimental badge or inscription of the various corps comprising the Battleford column. The estimated cost is about $200.



SANITARY MATTERS ON THE COAST.

MR. Geo. Watson, plumbing and sewer inspector, of Victoria, B. C., in his annual report to the city engineer, for the year 1897, suggests that the provisions of the by-law be made more definite in order that the occupants of the Chinese quarter may be compelled to observe the sanitary regulations. It is also recommended that provision be made for an examination of all journeymen plumbers. The report states that under present conditions the inspector is at times obliged to issue permits for plumbing to persons who are known to be incapable of doing the work properly.

THE TORONTO GUILD OF CIVIC ART.

THE charter granted by the Province of Ontario to the Toronto Guild of Civic Art states that it is the purpose of the Guild to act as a purely supervising, consulting and advisory body to promote and encourage civic art, including mural painting and decoration, sculptures, fountains and other structures or works of art or of an artistic character; and to arrange for the execution of works of art by competent artists, to be chosen by competition or otherwise; and to hold exhibitions from time to time of works of art more especially connected with mural decoration, architectural and stained glass designs, sculpture and kindred subjects; and for the said purpose to appoint an advisory board to carry out the objects of the Guild, with powers to be declared by by-law, provided that in all matters the services of the advisory board shall be without remuneration; under the name of "The Toronto Guild of Civic Art."

Mr. B. E. Walker, manager of the Canadian Bank of Commerce, is the president, and Mr. W. A. Langton, Registrar of the O. A. A., secretary of the Guild, from whom any desired particulars may be obtained.

The Guelph Foundry Co. has been formed to manufacture hot blast furnaces, etc., for which purpose the company are fitting up with improved machinery the Gowdy foundry.

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.]

Estimating For Shingles.

THE average width of a shingle is four inches. Hence when shingles are laid four inches to the weather, each shingle averages sixteen inches, and 900 are required for a square of roofing.

If laid 4½ inches............800 per square.
" " 5 " ....720 " "
" " 5½ " ....655 " "
" " 6 " ....600 " "

This is for plain gable roofs. In hip and valley roofs when the shingles are more or less cut to meet the conditions, add 5 per cent. to the foregoing figures. A carpenter will carry up and lay in the roof from 1,500 to 2,000 shingles in a day of 10 hours, or 1½ to 2 squares of plain gable roofing, so that the art of shingling at the present rate of wages may be put down at $1.00 per square, exclusive of cost of material, scaffolding and nails. To lay down roof boards and carry to roof is worth about 25 cents per square, and to cut and place rafters is worth about the same, i. e., 25 cents per square. This would make the total cost for labor $1.50 per square. This, of course, is calculated for buildings up to 2½ stories high. Buildings more than that will cost for roofing, 5 per cent. more per square for each additional story.

Hints For Painters.

FEW painters know, with anything like exactness, the amount of paint required to cover a given surface, and this lack of knowledge often leads to disastrous results in estimating. It may be well to give a few facts that have been arrived at by experience. A gallon of well mixed paint will cover from 450 to 630 superficial feet of wood. On a well prepared surface or iron the gallon will cover 720 feet. In estimating painting over old work, the first thing to do is to find out the nature of the surface, whether it is porous, rough or smooth, hard or soft. The surface of stucco, for example, will take a great deal more paint than wood, much depending on the circumstances—whether it has been painted and what state the surface is in. A correct estimate of repainting woodwork CANNOT be made from the quantities only; a personal examination ought to be made in every case where there is much work to be done. Trusting to quantities or measurements alone will only tend to lead the contractor into a trap; there are so many unforeseen conditions cropping up all the time that the painter should see the locality and the work to be painted, when such is possible, before he gives in his figures for the work. There is painting and painting; it can be done well and it can be done indifferently, and no other trade will admit of greater scamping, and, unfortunately, in this country, low prices, bad estimating and unprincipled competition, have done much to bring into disrepute a very respectable calling. A slovenly inartistic painter will often repaint and regrain on work that ought to be well rubbed with pumice stone or sand paper before the first new coat is laid, but the work goes on without even cleaning or stopping, and the result is a bad name for painters all round. In three coat work the following amount of materials will be required to cover 100 superficial feet of new woodwork: Paint, eight pounds; boiled linseed oil, three pints; spirits of turpentine, one pint. The work, to do it as it should be done, will require over two days for one man. According to an authority forty-five yards of first coat, including stopping, will require five pounds of white lead, five pounds of putty, and one quart of linseed oil. Painting, when done well, and the best materials are employed, should remain fresh and good for seven years, but the most done now-a-days does not last over four. It pays both owner and painter better to have the work done well at a good price, and good materials employed, as the work lasts so much longer and is much more satisfactory.

Proportion of Doors.

As a rule, everything being equal, single doors for dwellings should be as 2 is to 5, and to entrance doors for buildings intended for public use they should be as 1 to 2. If the width is given and the height required of a door for a dwelling, multiply the width by 5 and divide the product by 2; but if the height is given and the width required divide by 5 and multiply by 2. When two or more doors of different widths show in the same room, it is well to proportion the dimensions of the more important by the above rule, and make the narrower doors of the same height as the wider ones, as all the doors in a suit of apartments, except the folding or sliding doors, have the best appearance when of one height. The proportions for folding or sliding doors should be such that the width may be equal to four-fifths of the height, yet this rule needs some qualification, for if the width of the opening be greater than one-half the width of the room, there will not be sufficient space left for opening the doors, also the height should be about one-tenth greater than that of the adjacent single doors. Where doors have but two panels in width the stiles and muntins should be one-seventh the width, or whatever number of panels there may be, the united width of the stiles and muntins should occupy three-sevenths of the width of the door. Thus, in a door thirty-five inches wide, containing two panels in width, the stiles should be five inches wide, and in a door three feet six inches wide the stiles should be six inches wide. If a door three feet six inches wide is to have three panels in width the stiles and muntins should be 4½ inches wide, each panel being eight inches wide. The bottom rail and the lock rail ought to be equal in width to one-tenth of the height of the door, and the top rail, and all other rails, of the same width as the stiles. The mouldings in the panels should be one-quarter the width of the stile. Doors made of these proportions are always well balanced, and whether ornamental or not always have a graceful appearance. Doors should always be hung so as to open into the principal rooms, and, in general, no door should be hung to open into a hall or passage. As to the proper edge of the door on which to affix the hinges, that will depend altogether on conditions, as some doors may be finished on one side with mouldings in the same style as the finish in the room, while the other side may be finished in some other style, or be devoid of mouldings altogether, and again, something depends on which side of the frame and on which jamb the door must be hung on. These conditions render it impossible to lay down any fixed rule defining the edge of door on which the hinges must be affixed.

Scribing. THE operation of scribing, to be done properly requires some skill and care. Its object is to bring the edge of one piece of wood to fit close up to an irregular surface. Thus, in putting down base boards round a room, not only when first down, but often after the shrinkage of the joists and the floor, or sagging of the timbers, when gaps will be left between the lower edge of the base board and the floor, the work of laying base may have to be done a second time, when scribing will be necessary to fit the base close to the floor. The operation of scribing is as follows: The base board having been placed in position with its upper edge to a true line, a pair of suitable compasses is taken and opened to the greatest distance that the lower edge of the base board is anywhere from the floor. One point of the compass is often drawn along the floor, keeping the joint of the compass as near to a given angle with the floor as possible, whilst the other point is made to scratch a line on the face of the base board, which line will, of course, be exactly parallel with the floor line, and to this line made on the base board, must the work be done. The superfluous wood may be removed either by ripping with a saw or by use of the draw-knife.

Slag bricks are now being made in many parts of Germany by a method recently described by Herr Lurman. Briefly, the molten slag is discharged direct from the furnace into a tank of water. The slag here crumbles to pieces, and part of the siliceous acid it contains is dissolved in water. To this mass there is added a portion of finely ground slag and about 10 per cent of slaked lime. About six or eight days are required for the mixture to harden, and this it is left to do in moulds of suitable shape, under pressure applied either with a hand or steam-worked toggle-joint lever. The strength of the bricks produced is about the same as that of ordinary burnt-clay bricks. For flue and chimney building they are specially adapted by reason of their heat-resisting qualities.

Remember, it is advertising ink that makes the public read and think, and turns the buyers' feet and face directly towards your business place. Therefore, if you have anything to sell, in advertising ink display it well.

PROMINENT CANADIAN CONTRACTORS.

VIII.

THE LATE MR. SYLVESTER NEELON.

WE present herewith a portrait, with some particulars, of the late Mr. Sylvester Neelon, of St. Catharines, contractor for the masonry of the new municipal buildings, Toronto, whose death was recently recorded in these columns.

The late Mr. Neelon was born at Sackett's Harbor, State of New York, in 1825, and while very young removed with his parents to Port Dalhousie, at the lower end of the Welland canal, where he attended the village school. As a lad his first employment was found on board a timber vessel. In a short period he had attained the rank of mate, then of captain, in which capacity he sailed the lakes for many years. He afterwards formed a partnership with the late James Norris. The firm engaged in building and buying boats and in freight transportation on the upper lakes and Welland canal to lower lake ports and Montreal. They were the first to adopt the towing of vessels by tug or steamer on the lakes. In these enterprises they amassed a large amount of money and property. The firm dissolved in 1869.

THE LATE MR. SYLVESTER NEELON.

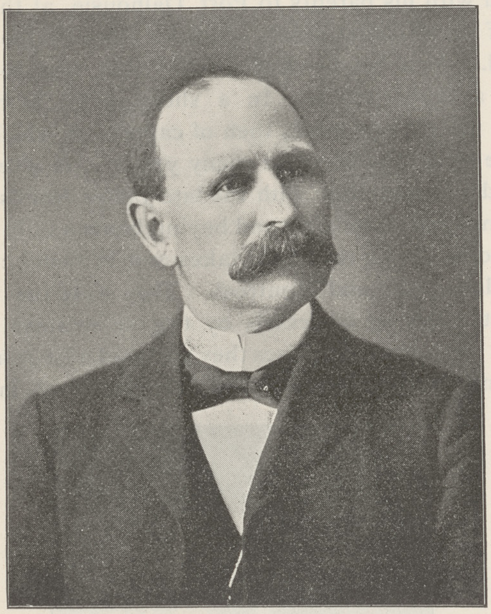
Mr. Neelon was afterwards extensively engaged in the grain and flour milling, shipping and ship-building, and other lines of trade.

In the year 1885 Mr. Neelon went into contracting, building a number of sections of railway. He was the principal agent in the construction of the Niagara Central railway, into which he put a large amount of money. He was associated in large contracts both in the United States and Canada, and in connection with the late John Elliott, took the contract for the masonry in connection with the erection of the new municipal buildings at Toronto. Mr. Elliott's death occurred in the early stages of the work. Afterwards there arose the dispute between Mr. Neelon and the architect regarding the quality of the stone, resulting in the dismissal of the contractor and the assumption of the work by the city under the direction of the architect, with the particulars of which our readers are already familiar. This and other business complications in which he became involved, filled with trials the later years of his life.

Notwithstanding the extent of his private business enterprises, Mr. Neelon evinced a deep interest in the welfare of the city in which he lived. For many years he was a member of the city council, and also represented the county two terms in the provincial legislature.

ORGANIZATION OF THE LONDON BUILDERS' EXCHANGE.

THE builders and contractors of London, Ont., met in the Knights of Pythias Hall on Thursday, Feb. 17th, for the purpose of organizing a Builders' Exchange. Representatives of about fifty firms were present, and the chairman, Mr. Scott Murray, called the meeting to order. After a few preliminary proceedings, the chairman called upon Mr. Thomas Cannon, Jr., president of the Toronto Exchange, who had kindly visited London



MR. WILLIAM JEFFERY,
President London Builders' Exchange.

for the purpose, to address the meeting on the principles of a Builders' Exchange.

Mr. Cannon outlined the groundwork of a successful Exchange, and gave those present the benefit of the experience of the Toronto organization. In a very interesting talk, he fully demonstrated the fact that a Builders' Exchange, established on a proper basis, and rightly managed, would be of incalculable benefit to every member. At the conclusion of his address, he was tendered a hearty vote of thanks for the valuable information imparted.

The London Builders' Exchange was then organized, the following officers being elected for the ensuing year:

Honorary President, Mr. Thos. Cannon, Jr., Toronto.
President, Mr. William Jeffrey.
1st Vice-President, Mr. Scott Murray.
2nd Vice-President, Mr. John G. Pritchett.
Secretary, Mr. Geo. S. Gould.
Treasurer, Mr. James Luney.
Directors, Messrs. Thos. Jones, Joshua Garrett, Henry Stratfold, Charles Colerick, William Smith, Arthur C. Nobbs.

The following resolution was unanimously adopted; Resolved, "that it is in the best interests of the Builders' Exchange of London that we become federated with the Exchange of Toronto, and that we request Mr. Thos. Cannon to present our desires to the Toronto Exchange and seek their co-operation to accomplish that end."

The directors have since secured commodious rooms on the second floor of the Ontario Loan & Debenture Company's Building on Market lane. The rooms are very pleasant, easily accessible, and centrally located. The officers hope to have 100 members on the roll of the Exchange by the 1st of April.

Our readers will no doubt be interested in the accompanying portraits and particulars of the principal officers of this new organization :—

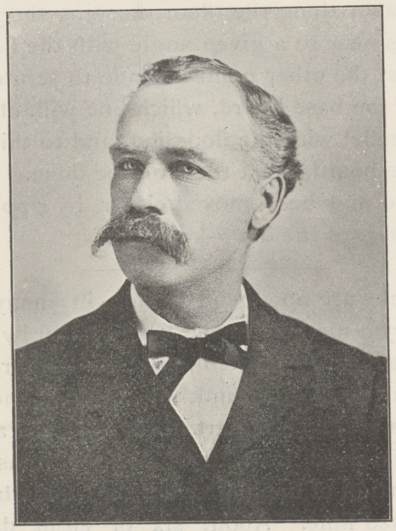
MR. WILLIAM JEFFERY.

The President of the London Builders' Exchange, is one of London's prominent young contractors, and was born 39 years ago in that city. After passing through the educational institutions of the city with credit to both himself and them, he devoted his attention to learning the carpenter's and joiner's trade, and in due time became master of all its details. Fifteen years ago, in conjunction with his brother James, he started contracting under the name of Jeffery Bros. This partnership existed for 9 years, at the end of which time his brother withdrew. The business has since been carried on by Wm. Jeffery alone.

Added to his efficient workmanship, Mr. Jeffery has displayed in all his business transactions those sterling qualities of fair dealing, and a watchful care over all the details of his business. By the practice of these principles, he has earned for himself a reputation that any contractor might be proud of. He is very enthusiastic in Excange matters. With such a pilot at the helm, the London Builders' Exchange will soon reach the point where mutual goodwill and perfect confidence will characterize all transactions between its members.

MR. SCOTT MURRAY.

Mr. Scott Murray, 1st Vice-President of the London Builders' Exchange, is a native of Ontario, having been born in Woodstock. He has resided in London for the last 30 years. He is by trade a bricklayer, and is a member of the firm of Simpson & Murray. This firm are widely known for the excellence of their work, and for their ability to execute a contract with dispatch. They are both men of large experience, especially in sewer work and the higher class of ornamental work. Mr. Murray is universally liked for



MR. SCOTT MURRAY,
1st Vice-President London Builders' Exchange.

his quiet unassuming manner and generous disposition. He is one of the promoters of the Exchange, and takes great interest in its success.

MR. JOHN G. PRITCHETT.

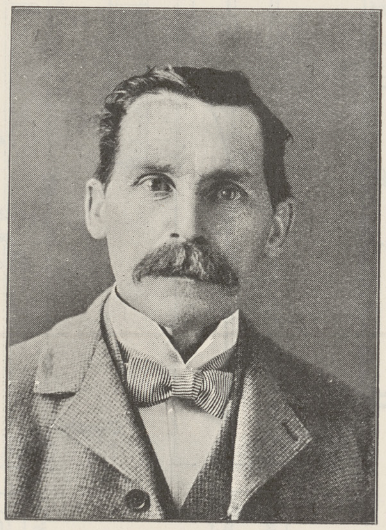
Mr. John G. Pritchett, 2nd Vice-President of the London Builders' Exchange, is senior member of the firm of Pritchett & Calhoun, plastering contractors. He is a native of London, born in the year 1851, of Scotch parents. After serving an apprenticeship in his own city, he removed to the neighboring Republic to gain further experience in the trade. Since returning to Canada he has been very successful, and a few years ago joined his business interests with those of Mr. James Calhoun, also a plastering contractor. Mr. Pritchett takes more than a passing interest in municipal affairs. He has filled the

MR. JOHN G. PRITCHETT,
2nd Vice-President London Builders' Exchange.

position of Reeve of the Township of Westminister, and is also an ex-alderman of the city of London.

MR. GEO. S. GOULD.

Mr. Geo. S. Gould, Secretary of the London Builders' Exchange, is engaged in the plastering trade. Mr. Gould is of English birth, but as his parents removed from London, England, to London, Ont., when he was only a boy, he received his education and early business training in that city. Mr. Gould's father was a contracting plasterer of large experience, and upon his retiring from the business in 1870 he was succeeded by his son, who carried it on for five years, after which he returned to his native land and spent 3 years in acquiring a larger experience in different branches of his



MR. GEO. S. GOULD,
Secretary London Builders' Exchange.

business than could be obtained here. Upon his return to London Mr. Gould associated with himself Mr. Henry Stratfold (also a native of England), and from then to the present time they have always enjoyed the reputation of standing in the front rank in their line of business in Western Ontario. Among the many prominent buildings they have finished may be mentioned St. Paul's and St. Peter's Cathedrals and the military buildings in London and the Church of Our Lady, Guelph. Mr. Gould has always been interested in Association work, and has sought to advance Exchange principles whenever an opportunity occurred. He possesses the qualifications necessary for the arduous and responsible duties of the position to which he has been elected.

MR. JAMES S. LUNEY.

Mr. James S. Luney, Treasurer of the London Builders' Exchange, is a native of Cornwall, England, and came to this country in the year 1871 when 22 years of age. Mr. Luney is by trade a bricklayer, and, in connection with Mr. E. Parsons, started a contracting business in the year 1873. This partnership existed 14 years, Mr. Parsons then retiring. Mr. Luney, by his untiring energy and careful business methods has achieved success, and owns and occupies one of the prettiest residences on Grand Avenue, South London. Among some of the important buildings that stand as a credit to his skill can be named the Granite Block, Waterloo Block, Kingsmill's Terrace, Knox Presbyterian Church, Colborne Street Methodist

MR. JAMES S. LUNEY,
Treasurer London Builders' Exchange.

and other large churches in the city. Mr. Luney has always taken a deep interest in municipal affairs, was a member of the School Board for a number of years, and is also an ex-alderman of the city of London.

The City Council of Kingston have appointed Mr. Joseph W. Power, architect, to make an inspection of the city buildings to ascertain whether they are in a safe condition. The appointment of a competent plumbing inspector for the city is being urged. The statement is made that plumbing work is being put in by boys, while competent workmen are unable to find employment.

The Beamsville Pressed Brick Works have been sold to Mr. Geo. Crain, an enterprising business man of Brockville, Ont. It is the intention of the purchaser to remodel and refit the works, and about the first of April commence the manufacture of high grade pressed brick. It is understood that the works will be under the management of Mr. W. F. Tallman.

Messrs. D. B. Brown, T. M. Rowan, R. H. Gillespie and J. M. Rowan have acquired 500 acres of land in the township of Caledon, within three miles of Orangeville, 400 acres of which contain a solid bed of marl, varying in depth from eight to twenty-one feet, with an average of thirteen, underlying which there is said to be an extensive deposit of yellow ochre, while on top of the marl lies three feet of peat. The owners have not decided whether to sell or work the property. The marl is pronounced by leading chemists to be particularly good and suitable for making Portland cement, putty, whiting and Paris white (which answers the same purpose as Paris green). The quality of the marl can scarcely be excelled, as has been proved by comparison with different Canadian and American deposits of a similar nature.

TESTS OF CAST-IRON COLUMNS BY THE DEPARTMENT OF BUILDINGS OF NEW YORK CITY.*

WE present herewith a report of the tests of full-sized cast iron columns recently conducted by the Department of Buildings of New York city at the works of the Phoenix Bridge Co., Phoenixville, Pa., under the direction of Mr. W. W. Ewing, of the Department. The tests began on Dec. 15 at 1 p.m., and were finished on Dec. 21. The machine used was the well-known hydraulic testing machine, at the Phoenix works. It is the most powerful testing machine in the world. To ensure the accuracy of the tests, the Building Department arranged a comparison of

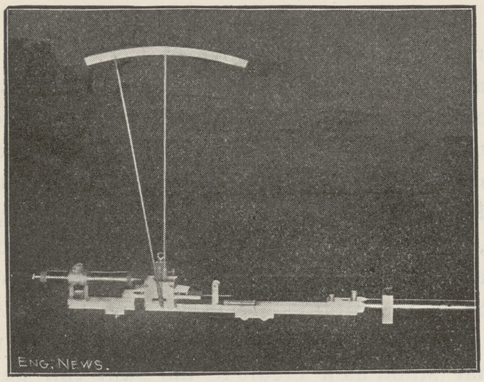


FIG. 1.—READING END OF THE ROLLER EXTENSOMETER EMPLOYED IN THE CALIBRATION WORK.

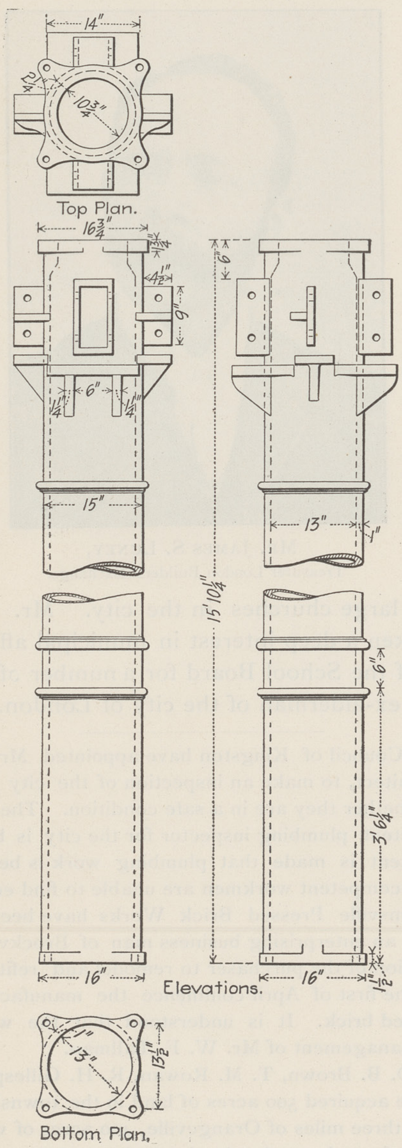


FIG. 3.—DETAILS OF THE 15 IN. COLUMN.

the Phoenix machine with the famous Emery machine in the U. S. Arsenal, at Watertown, Mass. On Dec. 30-31, 1896, a series of compression tests was made at Watertown upon a soft steel Phoenix column built by the Phoenix Iron Co., especially for these tests. It was made of eight segments riveted together, forming a round column 21 ft. long, inside diam. 14⅝ ins., thickness of metal 1⅛ ins., area of section 75.3 sq. ins., total weight of 5,485 lbs. The calculated safe load was 530 tons. The column was shipped to Watertown Arsenal and carefully tested in the government machine shops at that place. Marks were made 26 ins. from the ends, that is, 200 ins. between marks, and a form of roller extensometer (Fig. 1), reading to 1-10,000 in., was employed, to take all measurements. In applying the load constant increments were used. Certain additional loads were applied, corresponding with those to be applied later in the Phoenix machine. The column was then returned to Phoenixville, and the tests repeated in the Phoenix machine. The conditions were reproduced as nearly as possible; the same series of readings were taken, using the same extensometer. The results of the two tests are shown in Tables I. and II.

The gage used to calibrate the Phoenix machine was a mercury

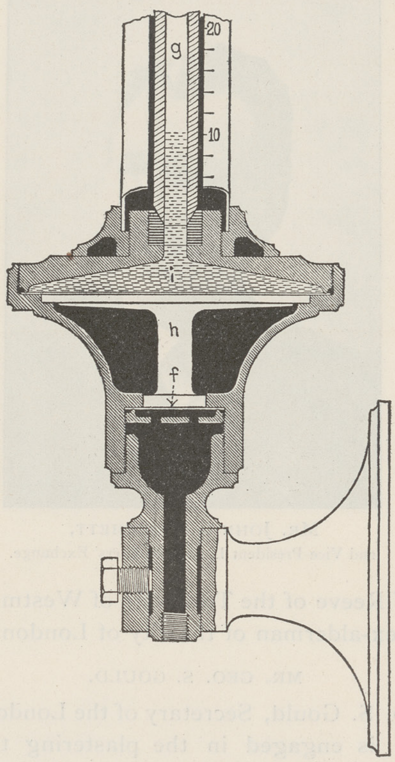


FIG. 2.—SECTIONAL VIEW OF THE SHAW MERCURY GAUGE USED AT PHŒNIXVILLE.

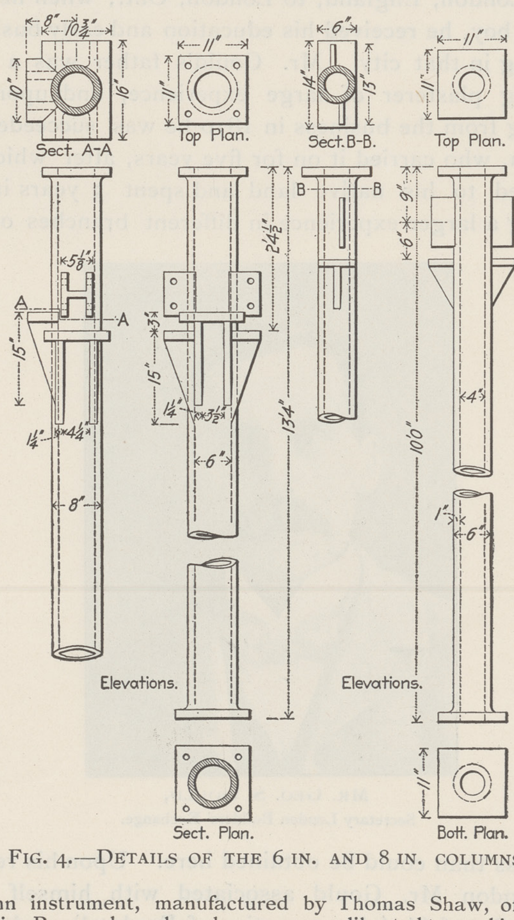


FIG. 4.—DETAILS OF THE 6 IN. AND 8 IN. COLUMNS.

column instrument, manufactured by Thomas Shaw, of Philadelphia, Pa., and numbered 5447, was calibrated to read in pounds per sq. in., and ranged from 0 to 220 lbs. Fig. 2 is a sectional view of the lower portion of the gage. The pressure used in the cylinder of the hydraulic testing machine is received on a diaphragm (f) and transmitted to the lower end of the double-headed piston (h), whose upper end, of much greater diameter, is surmounted by another diaphragm, above which is a reservoir of mercury (i), and a mercury column of small bore (g). The actual

*Reprinted from Engineering News, New York.

tests were made with a higher reading mercury column, which was compared with instrument No. 5447 at the time of the tests, and afterwards by the maker of both instruments. The values in Tables I. and II. have been corrected in accordance with the result of the calibrations.

From the figures given in Tables I. and II. the following computation of the calibration of the Phoenix testing machine was made and included in Mr. Ewing's report :

Let P = unit load in Watertown machine.
I = compression in ins. due to P.
P′ = unit load in Phoenix machine.
I′ = compression in ins. due P′.
P = 1 lb., I = .0000000891, and I′ = .0002432916.
If P : P′ = I : I′,

$$\text{then } \frac{P}{P'} = \frac{I}{I'} \text{ and } P' = \frac{P\,I'}{I}.$$

$$P' = \frac{.0002432916}{.0000000891} = 2{,}730.54 \text{ lbs.}$$

This figure indicates that each unit on the gage must be multiplied by 2,730 to obtain the pressure exerted in lbs.

We would call especial attention to the importance and value of he above test as furnishing for the first time, so far as we are aware, an active calibration of the Phoenix hydraulic machine.

According to the illustration of the Phoenix machine in our issue of Jan. 10, 1891, the hydraulic cylinder is bored to a diameter of 64.1 inches. This is equivalent to an area of 3,227 sq. inches. If there were no friction in the machine and no error in the Shaw mercury column gage, then 1 lb. pressure per sq. in. indicated on the gage would represent a load of 3,227 lbs. on the testing machine, instead of 2,730 lbs., the figure given by Mr. Ewing. The difference, 497 lbs., is 15.4% of 3,227, which may be taken as the average friction of the machine plus the error, if any, of the gage.

In the tests made at Watertown (Table 1) there were 36 readings taken, in nine different tests, in which the increment of load was uniformly 80,675 lbs. The corresponding compressions ranged only from .0070 to .0074, a variation of .0004. An inspection of the figures seems to indicate that this variation was that of the measuring instrument and of the personal equation of the observer, rather than an error in the recording of the load by the testing machine, or a variability in the action of the column being tested. The differences in the recorded compressions due to the first applied load, 161,150 lbs., in the nine tests, ranging from .0057 to .0091 inch, is probably an error in the setting or in the zero reading of the measuring instrument, which error remained practically conscious during each one of the tests, and does not affect the increments of loads after the first load.

In the calibration of the Phoenix machine the compressions due to increments of 25 units on the gage (or 25 × 2,730 = 68,250 lbs.), range from .0054 to .0065 inch, a difference of .0011, which is nearly three times the range shown in the Watertown tests for an increment of load 80,675 lbs. If we assume that the whole range of difference found in the Watertown tests, .0004 in., is the error

TABLE I.—Tests of Phoenix Column in Watertown Machine, Dec. 30—31, 1896.

No.	Total load, lbs.	Compressions in ins. No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.	No. 9.
1.	161,150	0.0091	0.0088	0.0084	0.0081	0.0085	0.0068	0.0057	0.0058	0.0057
2.	322,700	.0233	.0229	.0226	.0221	.0220	.0207	.0200	.0199	.0200
3.	403,375	.0304	.0302	.0298	.0292	.0292	.0278	.0272	.0272	.0271
4.	484,050	.0375	.0372	.0370	.0365	.0364	.0349	.0345	.0345	.0345
5.	564,725	.0446	.0444	.0441	.0437	.0435	.0420	.0418	.0417	.0418
6.	645,400	.0519	.0518	.0515	.0510	.0506	.0493	.0490	.0490	.0490
7	763,720	.0626	.0625	.0622	.0617	.0613	.0600	.0597	.0597	.0597

Differences.

Nos.	Loads, in lbs.	Compressions in ins.								
1—0.	161,150	0.0091	0.0088	0.0084	0.0081	0.0085	0.0068	0.0057	0.0058	0.0057
2—1.	161,550	.0142	.0141	.0142	.0141	.0135	.0139	.0143	.0141	.0143
3—2.	80,675	.0071	.0073	.0072	.0071	.0072	.0071	.0072	.0073	.0071
4—3.	80,675	.0071	.0070	.0072	.0073	.0072	.0071	.0073	.0073	.0074
5—4.	80,675	.0071	.0072	.0071	.0072	.0071	.0071	.0073	.0072	.0073
6—5.	80,675	.0073	.0074	.0074	.0073	.0071	.0073	.0072	.0073	.0072
7—6.	118,320	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107

Average differences.

Nos.	Loads, lbs.	Compressions, ins.	Compression in ins. per lb.
2—1.	161,550	0.014,066,66	0.000,000,087,0
3—2.	80,675	.007,177,77	.000,000,088,9
4—3.	80,675	.007,211,11	.000,000,089,3
5—4.	80,675	.007,177,77	.000,000,088,9
6—5.	80,675	.007,277,77	.000,000,090,2
7—6.	118,320	.010,700,00	.000,000,090,4

Average compression in ins. per lb. of load, 0.000,000,089,1.

TABLE II.—Tests of Same Phoenix Column in Phoenixville Machine, Dec. 15—16, 1897.

No.	Loads, gage read'g.	Compressions in ins. No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.
1.	60	—0.0095	—0.0091	—0.0097	—0.0090	—0.0096	—0.0089	—0.0096	—0.0089
2.	100	.0003	.0004	.0002	.0005	.0003	.0005	.0002	.0007
3.	125	.0059	.0061	.0059	.0062	.0057	.0062	.0060	.0063
4.	150	.0118	.0122	.0118	.0123	.0117	.0122	.0117	.0122
5.	175	.0181	.0186	.0179	.0187	.0180	.0187	.0182	.0188
6.	200	.0235	.0247	.0237	.0248	.0238	.0247	.0240	.0247
7.	220	.0292	.0303	.0288	.....	.0289	.....	.0289	.....

Differences.

Nos.	Loads, scale divisions.	Compressions in ins.							
1—0.	60	0.0095	0.0091	0.0097	0.0090	0.0096	0.0089	0.0096	0.0089
2—1.	40	.0098	.0095	.0099	.0095	.0099	.0094	.0098	.0096
3—2.	25	.0056	.0057	.0057	.0057	.0054	.0057	.0058	.0056
4—3.	25	.0059	.0061	.0059	.0061	.0060	.0060	.0057	.0059
5—4.	25	.0063	.0064	.0061	.0064	.0063	.0065	.0065	.0066
6—5.	25	.0054	.0061	.0058	.0061	.0058	.0060	.0058	.0059
7—6.	20	.0057	.0056	.0051	.....	.0051	.....	.0049	.....

Average differences.

Nos.	Loads, scale divsn.	Compressions, ins.	Compression in ins. per unit of gage rdg.
2—1.	40	0.00967	0.000,241,75
3—2.	25	.00565	.000,226,00
4—3.	25	.00595	.000,238,00
5—4.	25	.00639	.000,255,6
6—5.	25	.00586	.000,234,4
7—6.	20	.00528	.000,264,0

Average compression in ins. per unit of gage reading, 0.000,243,291,6.

TABLE III.—RESULTS OF BREAKING TESTS OF CAST-IRON COLUMNS.

Column No.	Length.	Outside Diameter.	Thickness. Maximum.	Least.	Average.	Location of break	Breaking load lbs.	Compression.	Character of metal at fracture.	Remarks.	Sectional area, sq. in.	Breaking load per sq. in. of area, lbs.
I.	190¼ ins.	15 ins.	1	1	1	About 3 ft. 4 ins. from bottom.	1,356,000	....	Medium grain; blowholes and dirt.	One place foundry dirt extended half way through; another pla e foundry dirt and honeycomb between inner and outer surface.	43.98	30,830
II.	190¼ ins.	15 ins.	1 5-16	1	1⅛	Bet. 1 and 5 ins. from bottom.	1,330,000	....	Medium grain; fairly uniform, spots of dry dirt.	At a pressure of 1,302,000 a slip of some kind occurred, which dropped the pressure to 1,275,000; again run up until break occurred. Upper portion sprung ½-in. in 9 ft. 4 ins.	48.03	27,700
B 2.	190¼ ins.	15 ins.	1¼	1	1⅛	Bet. 3¾ ft. from bot'm and 6½ ft. from top.	1,198,000	2½ in., bet. 150,000 and 1,108,000.	Coarse, but uniform; a few flaws.	At 1,108,000 column sprung badly, Fig. C; movement recorded under compression	48.03	24,900
B 4.	190¼ ins.	15⅛ ins.	1 7-32	1	1⅛	Bet. bot'm and one-third up from bottom.	1,246,000	2¼ in., bet. 150,000 and 1,246,000.	Coarse in centre; finer on outside; cinders and slag.	Bad spots, cinder pockets and blowholes near middle of column; small cracks in necking near top; column given a permanent set.	49.48	25,200
5.	190¼ ins.	15 ins.	1 11-16	1	1 11-64	At bottom flange.	1,632,000	2 5-16 in. in 8 ft. 3 in.	Fine grain and uniform where no flaws occurred.	Flaws and foundry dirt at point of break; load was carried as high as 1,804,000. The dummy head against which column rested was found broken after the test; this may have had something to do with character of break.	50.84	32,100
6.	190¼ ins.	15 ins.	1¼	1⅛	1 3-16	No break; permanent set of 1 3-16 ins. in 8 ft.	Over 2,082,000	⅜ in. bet. 232,000 and 1,108,000.	No break.	Pressure run up to 1,108,000 and released. It was again run up to 2,082 000, released and run up to 2,033,000. Column could not be broken; capacity machine reached.	51.52	Over 40,400
XVI.	160 ins.	Bet. 8¼ and 7¾ ins.	1¼	⅝	1	Where chaplet was placed at middle, and at ends.	651,000	....	Metal g'd; medium grain.	At time of breaking, column had a vertical deflection of 3 9-16 ins. and a horizontal deflection of 1⅛ ins.; fracture seemed due to flexture.	21.99	31,900
XVII.	160 ins.	8 ins.	1 3-32	1	1 3-64	At middle and ends.	612,800	....	Fine grain, uniform and free from flaws.	Vertical deflection 4¼ ins.; horizontal, 7-32 in.	22.87	26,800
7.	120 ins.	6 1-16 ins.	1 5-32	1⅛	1 9-64	At middle and each end.	400,000	....	Good even gr'n, no flaws.	Vertical deflection, 3¼ ins.; horizontal deflection, 1 11-32 ins.	17.64	22,700
8.	120 ins.	6 3-32 ins.	1⅛	1 1-16	1 7-64	At middle and each end.	455,200	....	Fine grain, uniform and free from flaws.	Vertical deflection, 3 ins.; horizontal deflection, ⅞ in.	17.37	26,300

TABLE IV.—COMPRESSION TESTS OF CAST-IRON COLUMNS MADE FOR THE DEPARTMENT OF BUILDINGS, NEW YORK CITY, IN 1896, BY GUS. C. HENNING, M. AM. SOC. M. E.

No.	Length.	Outside Diameter, Ins.	Thickness. Maximum.	Minimum.	Average.	Breaking Load, Actual Gauge-Reading, Lbs.	Sectional Area, Sq. Ins.	Breaking Load, per Sq. In., Lbs.	*Corrected Breaking Load per Sq. In.
1	147¾ ins.	8	13-16	⅝	¾	520,000	17.08	30,400	25,840
2	150 "	9	1⅛	¾	1	630,000	25.14	25,100	21,340
3	162 "	12	1	1	1	1,250,000	34.55	36,200	30,770
4	159¾ "	14	1⅛	¾	1	1,226,000	39.84	30,700	26,100

* The figures in this column are obtained by deducting 15% from those in the preceding column, for friction of the machine.

of the measuring instrument and the personal equation in reading it, and subtract it from .0011 in., the difference, .0007 in., seems to be due to a variable error, due to variable friction, in the Phoenix machine. Taking the compressions due to an increase of the load from 100 to 200 on the gage (Table II), or 273,000 lbs. in 10,000ths of an inch, we find that in the eight tests they were,

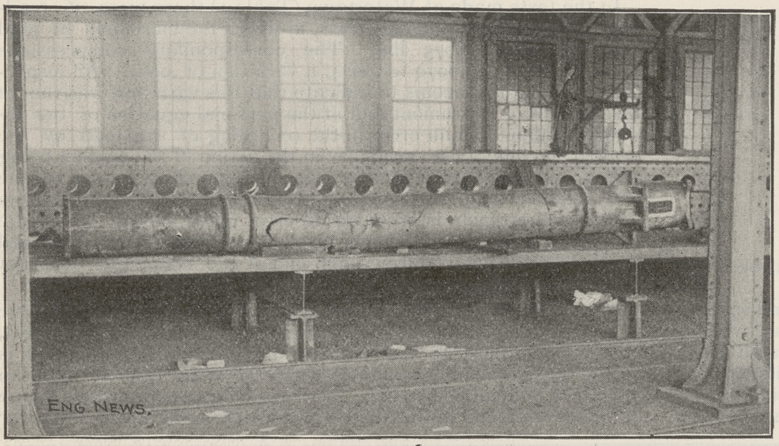


FIG. 5.—COLUMN B 4. SHOWING FRACTURE NEAR CENTRE.

respectively, 232,243, 235,243, 235,242, 238,240, averaging .02385 in.; the lowest figure (232) being .00065 in., or nearly 3% below, and the highest (243), .00045, or 2% above the average. The figure .02385 ÷ 100 = .0002385 in., seems to us to be a more correct figure for the average value of the compression due to the unit gage reading, than the figure .000243 given in the report, and this figure gives 2,675 lbs. instead of 2,730 lbs. as the load corresponding to a 1 lb. pressure per sq. in. per division recorded on the gage. Comparing this value with the area of the cylinder of the testing machine 3,227 sq. ins., gives an average friction of 17.1%, instead of 15.4%, as computed above. According to the calibrations the friction may vary from the average as much as 3% in the case of loads of 273,000 lbs., the variable percentage being greater the smaller the load. The figure of 2,730 lbs. given in the Building Department report, may be accepted as being probably the highest value of the actual load corresponding to 1 lb. per sq. in. indicated on the gage, the actual load in some instances being probably 5% less than that computed from the gage reading, in the case of the lighter loads, and, say, 3% less in the case of the heavier loads.

We come now to consider the results of the breaking tests of the cast-iron columns. Ten columns were tested, six of them (Fig. 3) being 15 ft. 10¼ ins. long, 15 ins. diameter, and from 1 to 1 3-16 in. thick; two (Fig. 4) were 13 ft. 4 ins. long, 8 ins. diam., and two were 10 ft. long and 6 ins. diameter. A condensed table of results, Table III, is given herewith, the last two columns of which are from our own calculations and are not given in the Building Department report, which gives only the actual data obtained without drawing any conclusions.

From the observations reported by Mr. Ewing we quote as follows:

Column 1.—Column suddenly broke under a total load of 1,356,000 lbs. into 10 pieces; the fractured surface began about 3 ft. 4 ins. (average) from the bottom.

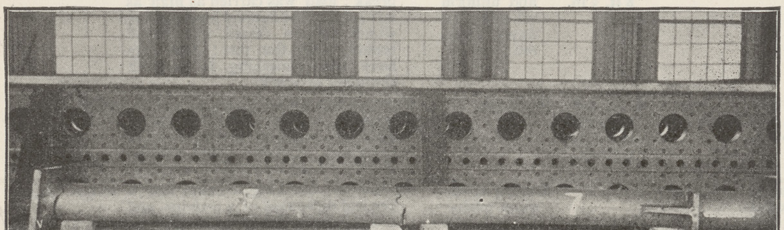


FIG. 7.—COLUMN NO. 7. SHOWING BREAK AT ENDS AND MIDDLE OF 6-IN. COLUMN.

The quality of metal was medium grain; foundry dirt and blowholes were quite numerous; in one place the foundry dirt extended half way through the metal; in another place there was a thin layer of foundry dirt and honeycomb midway between the inner and outer surfaces; between this layer and the two surfaces, the metal was perfectly sound; this layer of foundry dirt contributed to the weakness of the column as was evident from an inspection of the fractured surface.

The column sheared at an angle of about 30° with an element of the surface, and about 45° with a normal to the surface, inside of the layer of foundry dirt, above referred to only. This layer of foundry dirt extended about 6 ins. around (circumference) on column. At another fractured surface where no defects occurred, the metal sheared along a spiral course about 45° with an element of the surface, and at an angle of 45° with a normal to the surface; this surface was about 15 ins. long.

Column II.—The column crushed near the lower end, many of the pieces being quite small; the bottom flange was left intact, the fractured surface beginning at the top of the flange or 1¾ ins. from the faced end of the column and extending around the shaft in an irregular manner reaching 5 ins. away from bottom flange in one place.

The shaft of the column above the fractured portion was found to be permanently sprung ½ in. in a distance of 9 ft. 4 ins. along shaft. The quality of metal at bottom of column, where fracture occurred, was medium grain and quite uniform in grain. Considerable quantities of foundry dirt was found at fractured surfaces and where the column crushed into small pieces, the foundry dirt extended all the way through in many spots.

The shaft sheared in several places at an angle of about 45° to the elements of the surface of the column parallel with its axis, the fractured surface following a sort of spiral path around the shaft. The metal at the same time sheared through at an angle of from 30° to 45° with a normal to the surface of column.

Column B 2.—The fractured portion of column was below the center, beginning 3 ft. 9 ins. from bottom and 6 ft. 6 in. from top of column.

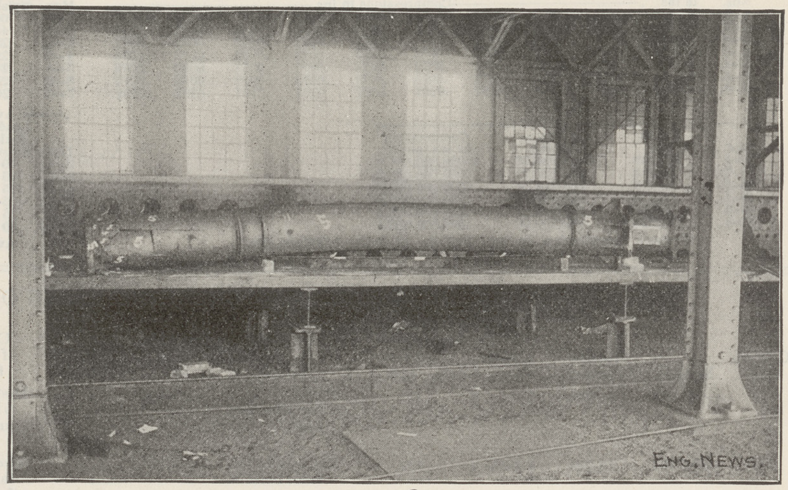


FIG. 6.—COLUMN NO. 5. SHOWING BREAK AT BOTTOM AND PERMANENT SET IN UNBROKEN POSITION.

Quality of metal, rather coarse, but quite uniform. Flaws occurred in spots, but not bad. There was evidence of shear at 45°, the same as in preceding columns.

Column B 4 (Fig 5).—The quality of metal was rather coarse in center of shell, and somewhat finer toward the surfaces. Cinders and slag in considerable quantity, two bad spots nearly opposite at bottom of column where metal was poor; one of these was 5 ins. long on outside (around column) and extending about half way through the metal. On the opposite side the defective portion was 4 ins. wide on inside, and extended for one-third to two-thirds the way through the metal. There were indications of shear at about 45°, similar to cases previously noted, at the bottom, where the column broke into small pieces.

The total number of pieces was 15.

The fractured surfaces revealed many cinder pockets and blowholes near middle of column. Small cracks were observed in the necking near top of column.

Column 5 (Fig. 6).—Column broke into 14 pieces; all fractures occurred below the lower necking on column and broke through the bottom flange. The permanent set in the shaft between the upper and lower necking was 2 5-16 ins. in 8 ft. 3 ins.; the upper part of the shaft above the necking remained perfectly straight after the test. Flaws were found in fractured surfaces near bottom, of foundry dirt. One bad flaw about 5 ins. wide and 4 ins. high (long) on outside extending three-fifths of the way through.

Quality of metal was rather fine grain and very uniform where no flaws occurred. Part of the shaft remained intact to end, and part of flange was left on. After the test, it was found that a dummy head against which the end of the column bore, was broken in such a way that the load on the column was eccentric after the head gave out; the nature of the fracture sustains this belief.

Column 6.—The test was discontinued when a load of 2,033,000 lbs. had been reached, the capacity of the machine having been reached. The permanent set of the column after it was removed from the testing machine was 13-16 in. in a length of 8 ft. 5 ins. The concave side, after the test, was about 90° from the joints of the flack, and undoubtedly was the top of the column as cast in the mold.

Column XVI.—One fracture occurred at a point where the chaplet for holding down the core was imbedded into the metal of the column. The metal outside of the chaplet was 7/8 in. thick, and the chaplet 3-16 in. metal. The cast metal did not adhere to the chaplet.

The column broke into 6 pieces (at middle and at each end). The fracture at the middle was nearly square off, and very near the exact middle point between the two ends. The fractures were about one foot from each end and irregular in outline.

The metal was good, of medium grain. Wires were attached to the shaft of the column, 6 ft. 6 ins. from bottom, and ran perpendicular to the axis of the column, one horizontally and one vertically. These were carried to the outside of the building in which the tests were being made, and the actual vertical and horizontal deflections of the column were observed in conjunction with the corresponding loads.

There was no evidence of shear at the fractured surfaces, as in the case of the larger columns. Failure seemed to result primarily from flexure.

Column XVII.—The column broke into 8 pieces, the fractured points being at the middle and near each end.

Quality of metal at fractured surfaces was fine grain, uniform and free from flaws.

Column 7 (Fig. 7) was broken into four pieces, the fractures being 3 ins. to one side of the middle of the column and near each end. The quality of the metal was good, even medium grain, with no flaws.

Column 8.—The quality of metal was fine grain, uniform and free from flaws. The column broke into four pieces, fractures being at middle and near ends; broke off nearly square at each point; no signs of shear in metal.

Two of the 15 in. columns tested, Nos. B 2 and B 4, were taken from the Ireland building, which, it will be remembered, collapsed Aug. 8, 1895 (Eng. News News Aug. 15, 22, 29, Sept. 5, Oct. 3, 1895). The four remaining 15 in. columns were made from drawings prepared by the Department of Buildings of New York city (Fig. 3), and were as nearly as possible duplicates of the Ireland columns.

The columns marked I and II were made by the Jackson Iron Works, 27th St. and East River, New York city, of their ordinary run of metal. They were cast while other columns were being cast, with no knowledge of their ultimate use. The two marked 5 and 6 were made by the Healy Iron Works, Brooklyn, N. Y., who were informed of what the columns were wanted for. The drawings for the 6 in. and 8 in. columns (Fig. 4) were also made by the Department.

All the columns broken were, we understand, fair samples of the average cast-iron column used in buildings in New York city, and regularly passed by the Building Department as coming within the provisions of the law.

The Building Law of the city of New York says:

The strength of all columns and posts shall be computed according to Gordon's formulæ, and the crushing weights in pounds, to the square inch in section, for the following materials, shall be taken as the coefficient in said formulæ, namely: Cast iron, 80,000. . . . The factors of safety shall be as one to four for all posts, columns and other vertical supports when of wrought iron or rolled steel, and as one to five for other materials, subject to a compressive strain.

Applying Gordon's formula* with the coefficient 80,000, as above required, in the numerator, and 400 (which is not given in the law, but is given in Haswell's Pocket Book, to which reference is made) in the denominator, we have

$$S = A\frac{80{,}000}{1+\dfrac{l_2}{400\,d^2}}$$

in which S is the breaking load, A = sectional area in sq. ins., l = length and d = diameter of the column in inches.

For the 15 in. columns we have l = 190 ins., d = 15 ins., S = 57,143 A. For the 8 in. columns l = 160 ins., d = 8 ins., S = 40,000 A. For the 6 in. columns, l = 120 ins., d = 6 ins., S = 40,000 A. That is, by the New York law, the 15 in. columns would be calculated to have a breaking strength of 57,143 lbs. per sq. in., while the actual tests show that their strength was only from 24,900 lbs. to something over 40,400 lbs. per sq. in. The 6 and 8 in. columns would be calculated to have a breaking strength of 40,000 lbs. per sq. in. while their actual breaking strength was only from 22,700 to 31,900 lbs. If such columns as these are loaded in buildings with the loads which the law allows, the factor of safety, instead of being 5, as required in the law, is actually in some cases little more than 2. This is also borne out by the results obtained during similar tests conducted about a year ago by the Department of Buildings with full sized cast iron columns. The dimensions and results of these tests are given in Table IV. The values given in the column headed "breaking load" are in round numbers, hence the breaking loads per sq. in. of area are correct to the hundreds as given.

* Mechanics' and Engineers' Pocket Book, Chas. H. Haswell, 1897, p 768.

Following his usual practice, Mr. Alex. Bremner, of Montreal, has issued a useful calendar for the current year.

Attention is called in the advertisement in this number of the James Smart Manufacturing Co., of Brockville, to the merits of the Kelsey corrugated warm air generator. This heat generator is said to be in satisfactory operation in every province of the Dominion.

A very neat catalogue has just been issued by the Luxfer Prism Co., of Toronto, explanatory of their prismatic glass and the methods of using it. It contains views of many prominent buildings throughout Canada in which prismatic glass is employed, and many excellent testimonials from the owners as to its value as a light diffusing agent. The fact has recently been discovered that prismatic glass possesses the additional and valuable quality of resisting the action of fire. Satisfactory evidence of this fact was given at a test conducted at Chicago recently in the presence of the Chief of the Fire Brigade and Underwriters of that city. After being heated to a very high temperature the glass was sprayed with cold water. The result was found to be that while the glass was cracked in all directions, it could not be dislodged from the metal framework. The company purpose making a similar test in Toronto at an early date.

COOLING ROOMS IN SUMMER.

An apparatus has been devised by Professor Elmer Gates of Washington for the ready cooling of rooms in summer, which he declares to be capable of being more cheaply operated in summer than a coal stove in winter. It is simply a tall cylinder of galvanized iron resting in a large basin or pan, and connecting at the top with the ordinary stovepipe, or with a tube leading out of the window. In the top of the cylinder's interior is a perforated tubular ring, and when a cock is turned on this ring an artificial shower is caused inside the cylinder. The water thus flowing down the sides takes a rapid spiral motion, which sucks the air down the cylinder at a rapid rate, a fine spray inside cooling the air thus entering, reducing its humidity to normal and taking out all dust and bad odors; the water collects in the basin below, from which it is drained off, the cool air escaping through openings just above the water surface of the basin. In some experiments exhibited with this contrivance, the temperature of the air on entering the cooling cylinder was observed to be about ninety-two degrees, while it was as low as sixty-eight on its coming out at the bottom. When the temperature of the laboratory is ninety-two degrees, the atmosphere inside can thus be cooled to about seventy within three hours, and the humidity at the same time may go down to from one hundred to about normal.

Mr. John H. Russell, architect, of Winnipeg, Man., was married on the 2nd inst., in Toronto, to Miss Aggie Campbell, daughter of Mr. Thos. Campbell, of that city.

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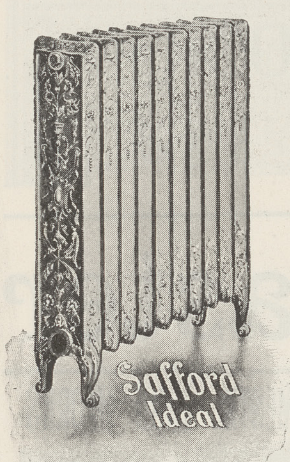

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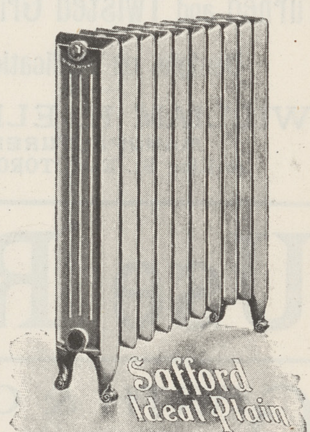

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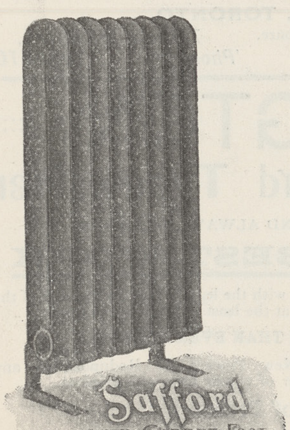

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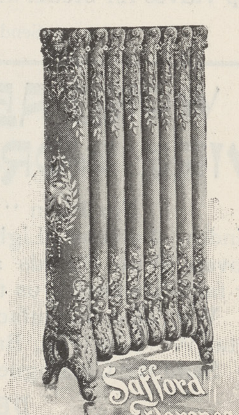

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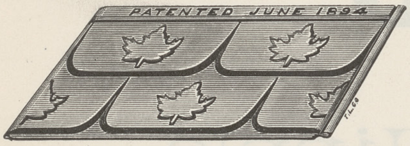

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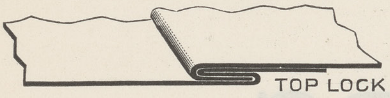

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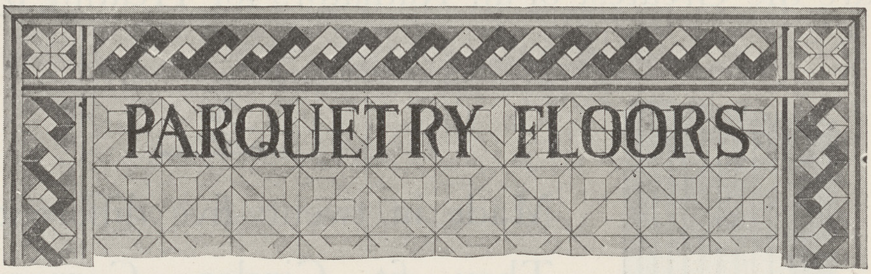

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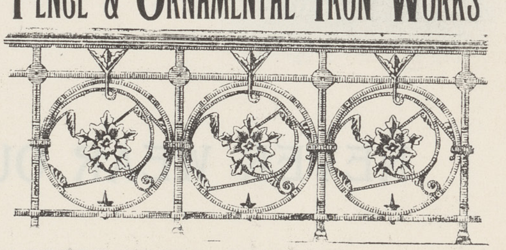

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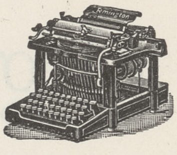

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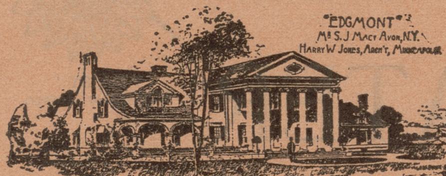

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