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—THE—

CANADIAN ARCHITECT AND BUILDER,

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

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

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Efflorescence on Brick.

AT the annual convention of the National Brick Manufacturers Association of the United States, held recently in Buffalo, the vexed question of how to prevent the appearance of efflorescence on the surface of brick, was discussed at considerable length. The consensus of opinion of the most experienced manufacturers was that the solution of the difficulty lies in slow firing and drying and in maintaining as large a flow of air as possible through the kiln until the water smoke shall have evaporated the moisture.

Warning to Architects.

ARCHITECTS need to exercise care in granting certificates to contractors to see that work has actually been done, at least to the amount of the value of the certificate. Mention has recently been made in the technical journals of instances in which damages were recovered from architects for sums for which certificates had been granted in excess of the work done. The English and Canadian courts have both decided that the architect should be held liable to pay the difference between the amount of his certificate and the value of the work done, in cases were it can be shown that the contractor has been overpaid.

Effect of Mining Speculation.

IN common with all who desire to witness the prosperous development of the Dominion, we rejoice at the recent evidences of mineral wealth in British Columbia, as well as in Northern and Eastern Ontario. We would like to indulge the hope that as these evidences become widely published population will rapidly come to us, affording the enlarged home market which is so necessary to our future progress. On the other hand, it is cause for regret that seemingly this cannot take place without the evils attendant upon mining speculation. Notwithstanding the fact that Eastern Canada in general and the city of Toronto in particular, have for several years been passing through a period of severe business depression, we see tens of thousands of dollars properly belonging to the business capital of the older provinces being sunk in mining stocks. A large percentage of this money will never be heard of again, and from stocks which may prove productive no returns are likely to be received in the near future. It will thus be seen that the large amount of money which is being withdrawn from the ordinary channels of trade for

investment in mining stocks, is being locked up, and will not be again available for business enterprises of a more legitimate character for at least a few years to come. This condition of things must certainly have an injurious effect upon business in the older provinces, tending to prolong the period of inactivity which it was hoped might shortly come to an end. Architects, builders and supply merchants have reason to deplore this phase of the situation. Mining speculation should be left to home and foreign capitalists, who can afford to risk large amounts of money without jeopardizing their business interests.

Tests for Mortar.

To ascertain whether mortar contains too large a percentage of sand, and whether the sand has the necessary quality of sharpness, the American Architect recommends that the hardened mortar should be rubbed between the fingers. If the mortar be good, the sand will be firmly held by the mortar. Other methods suggested by the London Builder are, to dissolve some of the mortar in hydrochloric acid, which will attack the lime, leaving the sand, or to examine a thin section of the hardened mortar by polarized light through a microscope, which will show the shape of the grains and their proportion to the mass. In this connection recent experiments in connection with the rebuilding of the Union Station at Columbus, Ohio, are said to have demonstrated that refuse brick ground in a crusher are superior to sand for use in mortar for color work.

British Columbia Legislative Buildings.

THE new Legislative Buildings at Victoria, B. C., are completed, and it is expected that in them the session of the legislature which will shortly be called will meet. It is estimated that the ultimate cost of these buildings will approach one million dollars. They are said to be handsome structures, forming the central architectural feature of the city and province. The citizens of Victoria are congratulating themselves that the erection of these costly buildings will destroy the possibility of the removal of the capital of British Columbia from Victoria to a more central point on the mainland. In view of recent developments there is a strong probability that, but for the circumstance mentioned, such a change would have taken place. The increase of population and business which must follow the development of the mines of the province will also remove the disproportion which at present seems to exist between the size and cost of the new legislative buildings and the requirements of a territory having a population of less than 100,000 people.

Qualifications of Architects.

STEPS are being taken in Wisconsin to establish a "State Board of Architects," to consist of five or seven of the most competent and trustworthy architects of the state. The duty of the board will be to examine into the qualifications of persons who may seek to practice architecture within the State. A similar movement is on foot in California. The method of procedure proposed by the Ontario Association of Architects for guarding the interests of the public and improving the status of the profession, seems preferable to the one mentioned. Our readers are familiar with the object which the Association is seeking to attain. It is proposed to restrict the use of the title Architect to persons who shall be known as practicing architects at the time of the passing of the Amendment to the Architects' Act, and to students who shall have given proof of their knowledge and ability by passing a satisfactory qualifying examination. Under this method, no hardship or injustice would be imposed on any one, while the status of the profession would, in the course of ten or fifteen years be, materially improved.

Protection of Public Buildings.

THE partial destruction by fire of one of the Departmental Buildings at Ottawa last month, revealed a disgraceful neglect of duty on the part of the persons charged with the responsibility of keeping the protective appliances within and without the buildings in serviceable condition. When needed these appliances were found to be useless—the hydrants being frozen and the hose so rotten as to be incapable of withstanding the water pressure. As a consequence of this condition of neglect, and of the fact that it has not been considered desirable in recent years to place any insurance upon these buildings, the public treasury must now be drawn upon to the extent of probably half a million dollars to pay the cost of repairing the damaged structure. The staff of officials at Ottawa is large enough and expensive enough to leave no excuse for the neglect to which is largely due the loss which this fire has imposed on the country. The wisdom of entirely discarding insurance seems open to question. Is it not false economy to leave the country constantly exposed to the danger of losing property valued at millions of dollars for the sake of saving a few thousand dollars per year in premiums? We are surprised to observe that the provincial authorities of Ontario are following the example of the Dominion government in this matter, and are relying upon their fire protective apparatus aud employees for the protection of the new legislative buildings. Incidental reference may fittingly be made to the fact, revealed by the Ottawa fire, that the Government Buildings are well constructed. The stone and brick work came through the ordeal intact, and if the building had been roofed with iron, in accordance with the plans and estimates presented by the architects at the time of its construction, the damage would have been trifling.

CHIPS.

The annual meeting of the Silica Barytic Stone Company was held at Guelph recently. The election of directors resulted as follows: Walter Mills, Ingersoll, president and general manager; A. C. Macdonald, Toronto, vice-president; Mr. Ewart, Ingersoll, secretary-treasurer; J. R. Stratton, M.P.P., Peterboro, and C. Kloeper, Guelph.

The Lake Medad Portland Cement Company is seeking incorporation, being composed chiefly of Hamilton capitalists. It is proposed to manufacture Portland and hydraulic cements, lime and builders' supplies at Lake Medad, a short distance north of Hamilton, and to erect mills for the purpose. The first directors will be: Ald. Dixon, Ald. Montague, S. D. Biggar, Lyman Lee, W. L. Cummer, M. Turnbull, W. A. Holton, A. Leitch, all of Hamilton, and Charles H. Holton, of Easton, Pa., president of the American Horseshoe Company.

On the 3rd of August, 1896, two men were killed by an accident while working in the Berri street drain in Montreal. The widow of one of the victims has since brought an action against the contractor, Mr. Jos. F. Houle, claiming $3,000 damages for the death of her husband. It is contended that the contractor neglected to employ the usual precautions to provide against accidents. She alleges that it is customary to put lime in a newly opened drain, to absorb any noxious gases, before any one goes down into the drain. This, it is claimed, was not done. The contractor claims, on the contrary, that he is not responsible for the accident.

SUNDAY SCHOOL PLANNING.*

By A. F. Wickson.

My paper this evening will not be so much an attempt to suggest the actual planning of school rooms as an effort to rapidly point out the requirements of these buildings, the working in of which will, of necessity, depend much on circumstances, such as size, shape of lot and the adjoining church premises, if there are any.

During the past few years the planning of Sunday school buildings, like that of almost everything else, has been undergoing the most radical changes. Although the one large square room, fiercely heated in the neighborhood of a tremendous box stove, and cold enough to paralyze one anywhere else, has long since been superseded by more comfortable rooms, properly warmed, it is only during comparatively recent times that any systematic arrangements for the separation of different divisions of the school have been seriously considered.

Now a well equipped Sunday school building is almost a more complete piece of planning than the church to which it belongs.

It is considered necessary to have both classes and departments divided, for several reasons, one being that as scholars grow older they have a disinclination to be in the same division, no matter how large it may be, with the smaller children, and another being that to get and keep the attention of the scholars it is desirable to prevent them having unlimited view of the whole room and the other classes; many a boy who would hesitate about pulling another's hair in the same class would be delighted to distract the attention from his teacher of some other boy in another class.

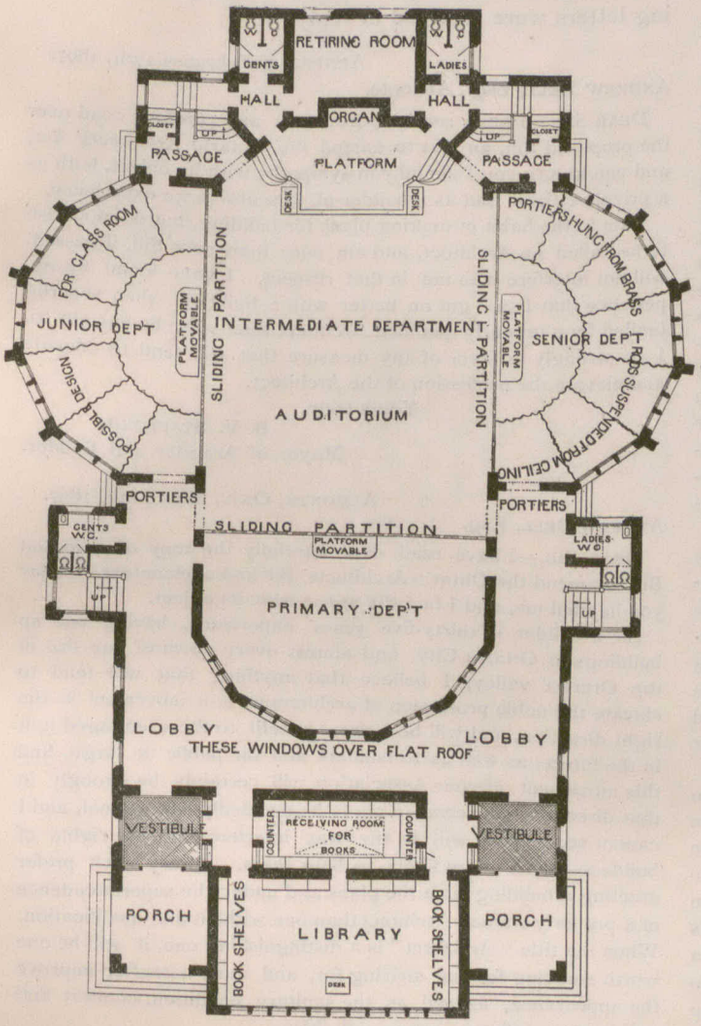
But there are many uses for a school room besides that of having classes on Sunday afternoon; there are open sessions of public reviews, and it is the place in which are held all the events connected not only with the Sunday school itself, but those also apart from strictly devotional services pertaining to the church; besides the usual mid-week prayer meeting, there are lectures, fastivals, concerts, socials, etc., and for all of these a room undivided is necessary.

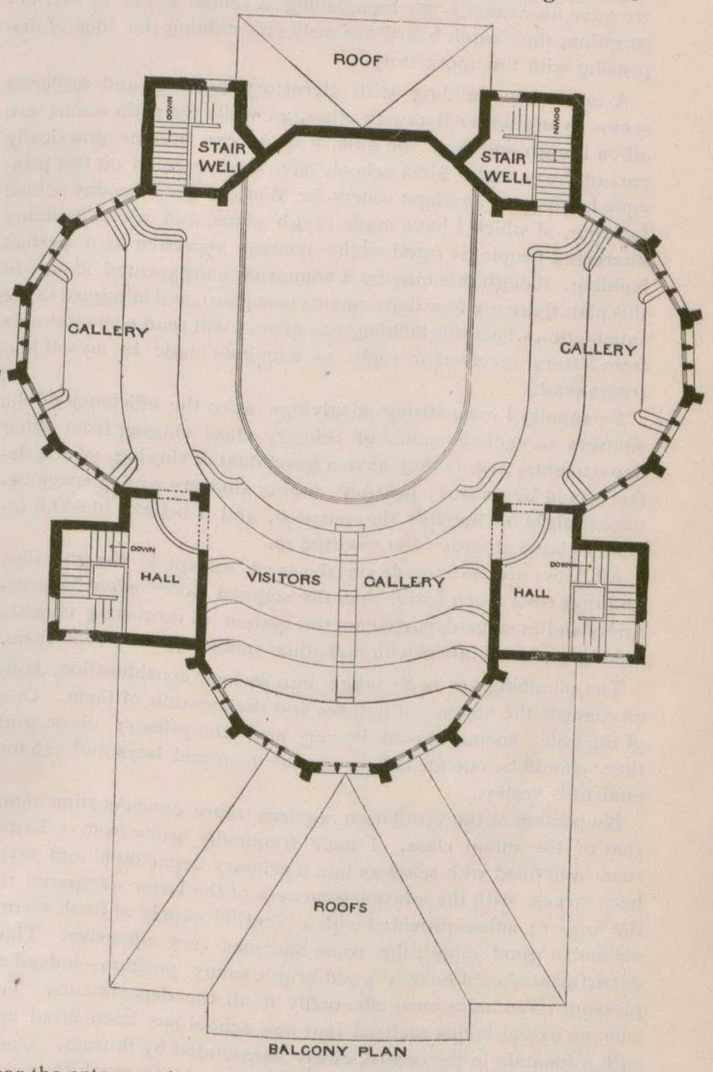
To plan a building to suit meetings of these different characters, the space must be divisible when necessary and be also entirely open when occasions call for it. To accomplish this double requisite many devices have been tried, apparently the most successful of them being a combination of rolling shutters, either vertical or horizontal, and curtains on poles—the former constituting divisions between compartments and the latter between classes.

In addition to the teaching and lecture room proper, there are many other features essential to the well appointed school to which I would draw attention. In so few cases is a school house erected separately from the church that one usually has to provide for rooms other than those solely required by the former.

There ought at least to be two cloak rooms—one for each sex—as without these the seats become very much crowded with clothing, thus interfering materially with the comfort of both scholars and teachers, and so long as overcoats are right beside them it is always a temptation to the boys to struggle into them during the closing prayer. These rooms also add much to the comfort of adults at church gatherings of any sort, as wraps otherwise so cumbersome can be thus dispensed with.

The library is an important, though comparatively small room, its location requiring more attention than its size; it ought to be near the entrance, but still so planned that pupils will not have to stand in a common thoroughfare and thus incommode others passing.





BALCONY PLAN

A very desirable addition is a retiring room at the side or rear of platform, and if the partition at back of platform be a removable one, this retiring room, if just behind it, could on occasions when the children themselves are performers at any entertainment, be used as a choir gallery by having removable stepped platforms.

The basement of a school house should be well fitted up and the heating, as far as possible, kept from interfering with the clear area of room, so that Boys' Brigade companies can be instructed in it without the necessity of disarranging the seating of the school itself. This room will also be extremely useful for festival teas, etc., and should have in connection with it a very respectable pantry, accoutrements, etc., and a sort of scullery where from a separate meter, in places where the gas is not all one price, a gas stove can be used. There should also be a literary room for the Boys' Brigade, and another for their room for accoutrements.

There must ordinarily be a minister's vestry, which should be

*Paper read before the Toronto Chapter of Architects.

so placed that besides being convenient to the pulpit entrance to the church should be easily accessible and in a pleasant location, as often a pastor spends much time in such a room.

Usually one or two good sized rooms are required for general purpose use, and are called parlors, but in the case of a building divided as above one compartment could be utilized as a parlor.

Some large and extensive churches have quite extensive auxiliary institutions in connection with their school, such as good baths, gymnasium and reading rooms; these are sometimes in a separate building and sometimes under the same roof as the school; such institutions are found very attractive in places that are deficient in that sort of thing outside of the churches. There are none like this in Toronto that I am aware of, but some day some wealthy church may want model school and auxiliary buildings, and it is well to remember that whatever one's private opinion may be in regard to the propriety of them there are these accessories.

Experience seems to prove that a two-story building is not satisfactory, for while it certainly gains much room it also causes inconvenience and a good deal of grumbling; it is not long since we gave an estimate for remodelling a school house of that description, the church board seriously entertaining the idea of dispensing with the upper story.

A one story building with clerestory lighting and galleries seems to suit better than any other, as while the main rooms are all on the ground floor the gallery space can become practically part of the school. Most schools have been erected on this principle lately, and amongst others the World's Fair Sunday school building, of which I have made rough plans, and which by many interested people is rated as the nearest approach to a perfect building, though this may be a somewhat exaggerated idea. In this plan there are four departments (see plan), and in regard to the satisfaction which this building has given I will read some extracts from letters received in reply to enquiries made by myself (extracts read.)

Personally I have strong misgivings as to the efficiency of the shutters to exclude sound of primary class singing from other departments, and as they have a good deal of singing, such a defect would be serious; possibly double shutters with a space between might accomplish the purpose, and I believe in some instances have already been resorted to.

All floors are now made on the level, except in the galleries, and that suits much better than the stepped floors even for primaries, and in some departments the system of furnishing consists in large or small tables with individual small chairs around them.

The plumbing has to be taken into serious consideration, both as regards the number of fixtures and the location of them. One of the toilet rooms should be very near the primary class, and there should be one for ladies, one for men and boys and one for minister's vestry.

No portion of the ventilation requires more consideration than that of the infant class. I have frequently gone from a large room well filled with scholars into a primary department and have been struck with the unwholesomeness of the latter compared to the former; unless provided with a plentiful supply of fresh warm air and a good outlet, the room becomes very offensive. This department should be in a good bright sunny position—indeed a pleasant room helps most effectually in all the departments. To such an extent is this realized that one school has been fitted up with a fountain in the centre, nicely surrounded by flowers. One can easily imagine that such an addition would do much to exercise a refining influence on the scholars. While the teaching is in progress the running water helps to mitigate the confusion of many talking at once, and when an address is being given from the platform the water is turned off. I could safely guarantee that this school would be the most popular in America if they would only turn on lemonade instead of water.

Unless the whole building is to be kept heated continuously all winter through, which few really are, it is necessary to arrange the heating apparatus so that one parlor, the minister's vestry and all the toilet rooms at least, will never be without heat, as some part of a well conducted institution is sure to be required nearly every night.

For large schools it is necessary to have separate entrances for boys and girls, and at least one of these should be so placed as to be prominently seen from the main street upon which it abuts, so that for week evening services there may be no difficulty in noticing the doorway. Sometimes they have been so arranged that the doorway being behind a transept or some other projection, or the front of the building occupied with minor rooms not lighted up, it is really difficult to know whether the place is open at all or not. A good example of a good entrance is the Presbyterian church school at the corner of College and Bathurst streets in this city.

Whatever may be the verdict in regard to the plans of the model building, the elevations certainly will not stand criticism. —the fourth prize man having by far the nearest approach to a good design.

BUILDERS AND THE PROPOSED AMENDMENT TO THE ONTARIO ARCHITECTS' ACT.

A MEMBER of the Council of the Ontario Association of Architects in order to test the feeling of builders with regard to the proposal to make the name Architect a title obtainable only by training and examination has submitted the bill to three prominent builders In his own neighborhood—the Ottawa Valley. The following letters were received in reply.

ARNPRIOR, February 17th, 1897.

ANDREW BELL, ESQ., Almonte.

DEAR SIR,—I have received from you and carefully read over the proposed Bill, an Act to amend the Ontario Architects' Act, and can assure you I am fully in sympathy with its object, both as a private citizen, and as a builder of 30 years' large experience.

I am in the habit ot making plans for building, but do not wish to be called an Architect, and am sure that your Bill, if passed, will not interfere with me in that respect. I have found by experience that I can get on better with a building when superintended by a properly qualified Architect than when by one not so. I am strongly in favor of any measure that will tend to educate and elevate the profession of the Architect.

Yours truly,

B. V. STAFFORD,
Mayor of Arnprior and Builder.

ALMONTE, ONT., March 6th, 1897.

ANDREW BELL, ESQ.

DEAR SIR,—I have read over carefully the copy of proposed Bill to amend the Ontario Architects' Bill and explanatory circular you handed me, and I heartily agree with its object.

As a builder of thirty-five years' experience, having put up buildings in Ottawa City, and almost every town of any size in the Ottawa valley, I believe that anything that will tend to elevate the noble profession of architecture is a movement in the right direction, and will be a great benefit to those engaged in it in the future, as well as to builders and the public at large, and this movement of your Association will certainly be strongly in that direction. It seems to me to be decidedly educational, and I cannot see how it will in any way interfere with the rights of builders—much more likely to help them. I very much prefer erecting a building from the plans and under the superintendence of a properly trained Architect than one without that qualification. When the title "Architect" is a distinguishing one, it will be one worth studying for and striving for, and must hereafter improve the appearance, as well as the sanitary condition, comfort and safety of our villages, towns and cities.

ROBERT CAMERON, Builder.

CARLETON PLACE. 12th March, 1897.

ANDREW BELL, ESQ., Almonte.

DEAR SIR,—In reply to your letter with copy of proposed Bill to amend the Ontario Architects' Act, and also Mr. Langton's circular explaining it, I have to say that as a builder and a citizen I fully approve of it, believing that it will be the means of educating in the future a higher class of Architects, and so tend to improve our public and private buildings, which is much needed in this province. I have had thirty years' experience as a builder, and I speak as I feel I should on this matter.

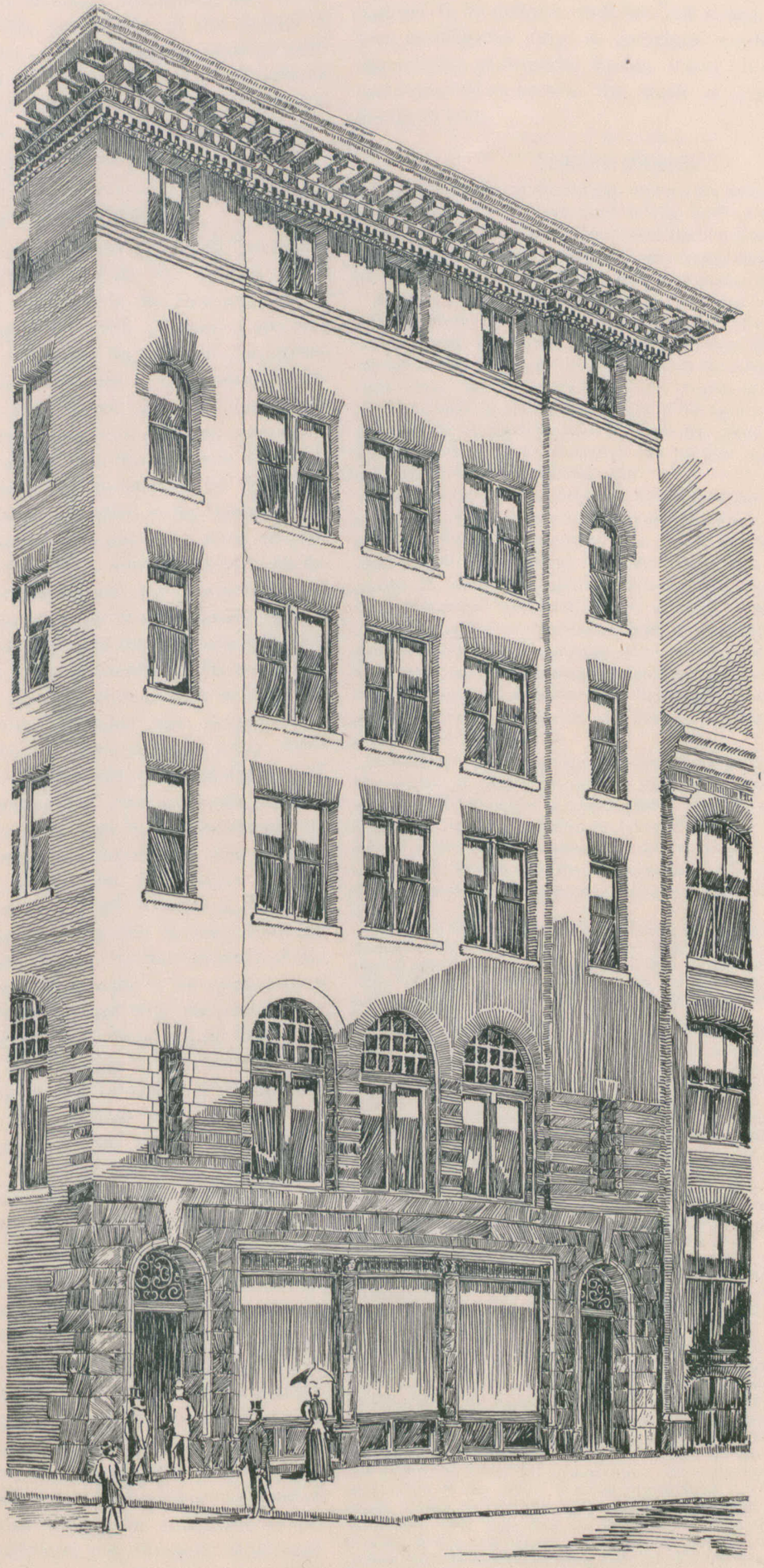
Yours,

W. PATTIE.
Builder and ex-Mayor of Carleton Place.
Ex-Warden of the County of Lanark, and now County Councillor.

These letters, from men of experience and judgment, seem to cover entirely the builder's point of view.

BUSINESS BLOCK, HALIFAX, NOVA SCOTIA.

W. T. WHITEWAY, ARCHITECT.



THE NORDHEIMER BUILDING, KING STREET, TORONTO.

S. FRANK BAKER AND J. W. SIDDALL, ARCHITECTS.

TORONTO CHAPTER OF ARCHITECTS.

THE regular meeting of the Toronto Chapter of Architects was held on Monday, March 8th, Mr. W. R. Gregg in the chair. Mr. Jos. Keele, of the School of Practical Science, gave an interesting stereopticon exhibition of architectural views, and Mr. G. F. Strickland read a paper entitled "Modern Methods of Electric Wiring." The three retiring officers of the Executive Committee were nominated for re-election.

MONASTIC INFLUENCE.

PROF. Capper recently delivered at McGill University his tenth lecture on Architecture, the subject being "Monastic Influence, as seen in the Development of Ecclesiastical Architecture." The Durham Cathedral was illustrated and described as one of the finest Romanesque churches in existence. The existing buildings attached thereto still showed the typical arrangement of a Benedictine monastery. These were compared with the much earlier plan (dating from the ninth century) still preserved of the monastery of St. Gall; some of the special points embodied in the famous Rule of St. Benedict, promulgated in 529 A.D., were touched upon to emphasize the work done by the monks on behalf of progress and civilization and the arts during the centuries when Europe was slowly raising herself from the barbarism that followed the northern invasions and the fall of Rome. The Benedictine Rule rapidly spread over Western Europe, though not to the total exclusion of other rules, notably the Augustinian. Architecturally considered, however, the rules were practically identical, and gave rise to a definite type of plan, in which a rectangular cloister, with certain definite buildings grouped around it, was invariably attached to the nave and one transept of the church. These buildings were, on the east the Chapter House, on the west the undercroft, usually containing the great cellar for stores, and, on the side furthest from the church and running parallel to it, the refectory of the monks. The dormitory was usually in an upper storey on the eastern side and connected with the transept by a stair, so that the monks, for whom matins began at midnight, might have ready access to the church. The cloister was the workroom of the monks. In it, against the wall of the nave, was situated the library of the monastery, the scriptorium, in which the literary work of monks was executed, being in the cloister alley next the church; the separate cells, or "carrels," were divided off by low partitions, usually of wood.

Several beautiful views of existing cloisters were given, all, however, save that of Le Puy, in France, as rebuilt at a later period.

The finest scriptorium that has come down to us is probably that of Gloucester, rebuilt in the fourteenth century, where the "carrels" are of stone and form a beautiful architectural composition. Some examples of illuminated MSS. were shown, and the lecturer took occasion to remark upon the excessive labor represented by such work, for which the world could not be too grateful to the scribes of these old cloisters, who must have toiled, often infinitely weary of their task. The Benedictines (to whom teaching was a duty of religious obligation) became inevitably a learned order, comprising within their ranks "some of the strongest and ablest men" of Christendom; but literary work was by no means their only form of labor. On the contrary, the great strength of St. Benedict's Rule was that it raised labor of all kinds, from the humblest to the highest, to be definite work for God, consecrated, therefore, as religious duty, a complete revulsion from the degradation of Imperial Rome, when all manual labor was regarded as servile, the work of slaves, unfit for free-born men.

LUXFER PRISMS.

THE wonder is that the simple, well-known power of refraction in a glass prism wae overlooked so long, and not utilized until the investigations of Mr. J. G. Pennycuick led him to make a practical use of the semi-prism to carry ordinary rays of sunlight, dispelling darkness and replacing objectionable gas or electric light.

By using a great number of small semi-prisms to cover a considerable surface of the window, the light from the sky, in passing through them, is refracted or diverted, and leaving the prisms, is carried along on a horizontal plane to the furthest limit of the room—hence the name "Luxfer" or "light carrying" prism. Through ordinary plate glass, a part of the light is reflected outside, and the remainder comes through the glass in a straight line, illuminating the floor close to the window and leaving the rest of the room comparatively dim.

About a year ago The Prismatic Glass Company, of Toronto, took up Mr. Pennycuick's invention and brought it before the public as an article of commerce. The result has more than exceeded their expectations. At the same time, the company spared no efforts to improve and perfect the original invention A laboratory has been fitted up and scientific experts employed to make a number of experiments and, by practical tests, to determine the exact size and angle of prisms required to attain the best results under the varying circumstances found in broad or narrow streets and in low or lofty buildings. The company can now undertake to supply "Luxfer Prisms" suitable to buildings of any size or location.

In addition to perfecting the prisms the Company has also adopted a new process of electrolytic glazing, which is a great improvement on the old method of lead or copper glazing. By this new process the small prism squares are united in sheets of any size, by a thin framework of copper, deposited between the squares by electricity, making a neat, strong, weather tight sheet of the prisms. This process also adds about 20% more effective refracting surface for the transmission of the light.

In stores a transom light of Luxfer Prisms will spread a diffused light throughout the darkest store. In office buildings the upper half of a window glazed with Luxfer Prisms will light up the dark corners of the office, leaving the lower half clear for other purposes. In private houses, dark halls or back rooms can be brightened up and made cheerful by a panel glazed with Luxfer Prisms.

Luxfer prisms are also used with the greatest success for lighting dark basements, through sidewalk or area lights. Basements that would be otherwise dark and damp can be filled with light and made suitable for business purposes, adding just that much valuable space to the earning capacity of a building.

Owners of old buildings as well as new ones can make their premises attractive to prospective tenants by offering them bright, well lighted stores and offices—and the renting value of property can be much increased by judicious use of this new invention.

For the purpose of demonstrating in a practical form the utility of this new method of lighting business premises, the Luxfer Prism Company have put in an exhibit at their new premises at 58 Yonge street, Toronto, showing the different methods of using Luxfer Prisms both for window and pavement lighting. They show a novelty in the form of a glass and iron pavement by which a basement can be brilliantly illuminated, without gas or electric light. Architects and builders are specially invited to inspect the various exhibits on view.

TO KEEP LIQUID PAINT IN GOOD WORKABLE CONDITION.—A good idea has occurred to an inventor to prevent liquid paint which, for convenience sake, is kept in small quantities and flat receptacles, from evaporating and drying. He gives the vessels such a shape that they can be placed one on top of the other without danger of falling over, and provides the under side with a porous mass, felt or very porous clay, etc., which, if moistened, will retain the water for a long time. Thus, in placing the dishes one on top of the other, a moist atmosphere is created around them, which will inhibit evaporation and drying of the paint. A similar idea is guiding the inventor in producing covers with a tight outside and porous inside, for the purpose of covering up, during intermission in the work, clay models and like objects which it is desired to keep soft. In order to avoid the formation of fungus growth on the constantly wet bottom, it may be saturated with non-volatile disinfectants, or with volatile ones if their vapors are calculated to act upon the objects kept underneath the cover. If the cover is used to cover up oil paints, it is moistened on the inside with volatile oil, such as oil of turpentine, oil of lavender, or with alcohol.

ANNUAL MEETING OF THE R. C. A.

THE eighteenth annual meeting of the Royal Canadian Academy of Arts was opened in Ottawa on the 9th inst., by Their Excellencies the Governor General and Countess of Aberdeen. In the unavoidable absence of the president, Mr. R. P. Harris, the chair was occupied by the vice-president, Mr. A. C. Hutchison, of Montreal, who referred in his address to the advance which had been made in art in Canada within the last few years. This progress was indicated by the many fine specimens which adorned the walls of the gallery. Mr. Hutchison introduced His Excellency, the Earl of Aberdeen, who expressed his appreciation of the artists' work and the good the Academy was doing.

The exhibit this year was much larger and of greater variety than that shown at the Exhibition in Ottawa three years ago, and consisted of 150 oils and 66 water colors. In addition, there were seven architectural sketches and paintings and one sculpture by Mr. Hamilton MacCarthy, of Toronto, consisting of a medallion terra cotta representation of the head of Rev. Henry Scadding.

The officers elected for the ensuing year are as follows: President, Mr. Robert Harris, Montreal; vice-president, Mr. A. C. Hutchison; secretary-treasurer, Mr. James Smith. Mr. Pinhey, of Hudson, was elected an associate member; Prof. Capper, of Montreal, associate architect; and Miss Lawrence Carlyle and Miss Howden, associate artists.

A REVOLVING PALACE.

ONE of the most wonder-exciting features yet proposed for the Paris Exposition of 1900, is an immense illuminated revolving tower. This tower will be hexagonal in form, constructed of steel, ornamented with nickel, aluminum, decorated with faience ware, crystal, mirrors, etc. It will reach a height of 115 meters. There are four grand divisions, each of which is subdivided into floors or galleries. The first and second parts will comprise five floors each, the third six, all accessible to the public. The upper portion will comprise eight galleries, of which the first three will be open to the public. Throughout the structure will be found cafes, restaurants, theatres, shows, etc., in extravagant profusion.

All of the ornaments, columns, capitals, statues, etc., are to be of colored glass, and comprise all the tints of the rainbow, the various pieces being strengthened and held by delicate iron framework. By day the effect will be marvelous, while at night the statues, the garlands and the transparent balconies will glow with the light of thousands of internal electric fires. The colossal system of illumination will comprise about 20,000 incandescent and 2,000 arc lamps which will outline all the borders of the decorative effects, and, aided by the crystal reflectors, perfectly show every design.

In the upper regions of the structure will be placed huge organs operated by air, steam or electricity, while a chime of 64 bells operated similarly will accompany the wind instruments.

TO REMOVE SCRATCHES ON PLATE GLASS.—To remove slight scratches on plate glass, first clean the surface with a pad of cotton wool, then cover the pad with cotton velvet charged with fine rouge. This will not only remove the scratches, but will also impart a great brilliancy to the glass, which should be the object whenever the cleaning process is pursued. Glass should be not only clear, but brilliant as well, and this comes of polishing.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

The Council of this Association have arranged a course of lectures for 1897, to be held, by the kind permission of the Art Association, in their galleries, Phillips Square, Montreal.

With a view to promote cordial relations and good fellowship amongst the members, the Council have also arranged for two dinners to be held during the session in the Queen's Hotel.

The first of the above-mentioned series of lectures was delivered by Prof. Capper on the 22nd of Jan., the subject being "The Egyptian Pyramids and Their Builders." By courtesy of the author, an abstract of this lecture was printed in the CANADIAN ARCHITECT AND BUILDER for February. Owing to inability on the part of Mr. A. C. Hutchison to deliver his lecture on "The Gothic of Northern Italy" according to arrangement, Prof. Peterson's lecture on "The Monuments of Athens" was substituted. Lectures by Mr. Hutchison on the subject named, and by Mr. A. T. Taylor, on "The Story of An Illustrious Abbey," will conclude this interesting series.

At the first of the dinners, held on the 26th of January last, there was a good attendance, and the occasion proved to be a pleasant and profitable one. Mr. A. T. Taylor, the president, occupied the chair.

Several toasts were proposed. Mr. A. T. Taylor in a most pleasing speech described the principal libraries of the United States, such as Boston, Columbia and Washington; and Prof. Capper, of McGill University, spoke of the necessity of having a School of Architecture, and hoped that in time McGill would be placed on the same footing with all other schools of this kind in the United States and foreign countries. He stated that he would probably make a visit to the principal university schools of architecture in the United States.

During the evening Messrs. Wright and Davis entertained the company with well rendered songs.

The evening was a most enjoyable one, and praise is due to the committee in charge, as well as to the presiding officer.

At a late hour the dinner was brought to a close.

PERSONAL.

Messrs. A. Hall & Son have commenced business as plumbers at Sherbrooke, Que.

Mr. John Guest, who formerly conducted a plumbing business in Toronto, died in New York last month.

Lieutenant Paul Weatherbee, of Halifax, has received the appointment from the Dominion government of architect of the Militia Department, to replace Lieutenant Fred. White. Mr. Weatherbee is a son of Judge Weatherbee and a graduate of the Royal Military College, Kingston.

Colors that are produced by heat will change under the influence of heat of a different character or temperature; they all generally deepen. Pigment colors produced by the dyeing process, fixed by a mordant upon some base, bleach out and expose the whitish base upon which the dye was applied. These are the reasons that some colors fade light and others fade darker.

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.]

UNFAIR COMPETITION.

VANCOUVER, B. C., March 4, 1897.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—Enclosed please find two dollars, my subscription to the CANADIAN ARCHITECT AND BUILDER. Things have been very bad in the building trade here. It is so hard to get hold of a few dollars even after one has earned them. A great deal of harm is being done by persons taking contracts who haven't a cent to lose, and who take the work so low that a bona fide contractor has no show to compete and pay wages. There are carpenters working here for $1.50 per day, and many of the so-called contractors don't make $1.00 per day. I think that you ought to censure our architects for assisting to make possible such a condition of things, for I think your paper does a great deal of good in this direction.

Yours truly,

S. G.

[It should scarcely be necessary for us to point out to architects the injustice of placing unskilled and financially disreputable contractors in competition with qualified and honest men, who in tendering try to make provision for the discharge of their honest liabilities. The evil results of such unfair competition must ultimately come back upon the architects themselves. The effect will be to drive reputable oontractors out of the city, thus leaving the business in the hands of the "Cheap-Johns," who have neither the knowledge nor the disposition to do a good piece of work, when such is required.—EDITOR C. A. & B.]

COST OF EXCAVATING.

CHATHAM, ONT., Feb. 25, 1897.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—Would you kindly furnish me with the approximate cost per cubic yard of removing material (clay and fine sand) from a pit about 800 feet long, 90 feet wide and about 8 feet in depth, with sloping sides about 1 in 1½, containing roughly about 20,000 cubic yards. About 11,000 cubic yards of the material excavated is to be banked on the sides to a height of about 6 feet and the balance of the excavated material is to be hauled to an average distance of 600 feet. The work is to be done by scraping the earth on to the embankment by horses and scraper, and the balance of the material to be excavated to be removed by waggons and wheel scrapers to an average distance of 600 feet. The wagons to be filled by men with shovels. The material is easy to dig and there is no water to contend with. The cost of teams per day, $3; cost of men, $1.25.

E. B. JONES,
Supt. Chatham Waterworks.

[In answer to our correspondent's enquiry we beg to submit the following:

Cost per cubic yard of loosening earth	2½	cents.
" " " loading in carts	5	"
" " " hauling 600 feet	8	"
Contractor's profit	2½	"
Total cost per cubic yard	18	cents.

If the embankment is to be carried up 6 feet above the natural level, as the enquiry suggests, then a portion of the earth will either require to be handled twice by shovellers or otherwise carted out of the cutting to the bank of the embankment. The cheaper way, of course, would be to cart the earth from the cutting to a platform, and again from this platform to the embankment. All the conditions are not given, but judging from what can be gleaned from the enquiry, we should think that 20 cents per yard would be the average cost of the work complete.—EDITOR C. A. & B.]

RECENT CANADIAN PATENTS.

HENRY Stauton, of Flushing, Ohio, has obtained a patent in Canada, No. 54,558, for a hot air furnace, having the combination of a grate, a brick fire-pot, and a perforated top over the fire-pot, a metal arch enclosing said fire-pot and top and arranged to direct the products of combustion downward, a cold air heating chamber enclosing said arch, and flues arranged to draw the products of combustion downwards between the fire-pot and arch and keep them separate from the air in the air chamber.

A patent, No. 54,569, has been granted to Lewis Skaife, of Montreal, for a sewer trap.

Mr. J. M. Gander, of Toronto, has taken out patents for a plaster board, comprising a composite material made in flat form with one underlying flange designed to be affixed to the joists, and overlapping flange fixed over the underlying flange of the abutting end of the adjacent board, with longitudinal tongue in one edge of board and a groove in the opposite edge, and a series of depressions or recesses formed in the back of the board. This board is designed to be fitted directly to the joists of ceilings and walls, and is formed of a composition of plaster of Paris, ground asbestos and grassy fibrous non-igniting material. Mr. Gander has also patented a fire-proof covering for steel beams.

A patent for a brick kiln has been granted to Edward M. Pike, of Chenoa, Illinois.

Albert B. Shantz, of Caledonia, Ont., has secured a patent, No. 54,664, for a ventilating apparatus.

A new roofing compound has been patented by T. Sparham and Jas. Thompson, of Lyndhurst, Ont. It is claimed to be a roofing having the felt or paper covering fastened by wires, secured by staples, and covered with a compound composed of blue clay and coal tar mixed together and spread while hot.

A water filter patent has been granted to James H. Blessing, of Albany, N. Y.

A CREDITABLE PUBLICATION.

MR. O. T. Springer, Burlington, Ont., writes: "I received your New Year number, and must congratulate you on your effort; it is very creditable to you when your somewhat limited constituency is taken into consideration."

CORRECTION.

IN our annual building review published last month it was stated that the Canada Life Building in Montreal was built in Ohio sandstone. This was an error, as the building is built in Oxford bluestone from Wyoming county, New York State.

Mr. Peter Brown, an Ottawa contractor, accidentally took a dose of carbolic acid, and at time of writing is in a precarious condition.

BY THE WAY.

I HAVE been wondering whether to luck or some more tangible cause is to be attributed the decrease of $447,725 in fire losses in Canada in 1896 as compared with 1895. It would be interesting to learn whether improved methods of building construction or more efficient fire protective devices had anything to do with this improved showing.

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AN individual bearing the scriptural name of Emanuel distinguished himself in Toronto recently by his altogether unique method of securing employment. Emanuel, surnamed Dunn, and by trade a stonecutter, was charged in the Toronto Police Court with having written a letter to a party in Rockland, Que., to which he signed the name of a well-known contractor, stating that there was any amount of work in Toronto. On the strength of this letter several stonecutters threw up their employment at Rockland and went to Toronto, only to find on arriving there that they had been deceived. Meanwhile, Emanuel is said to have betaken himself to Rockland and secured one of the vacancies which he had been the means of creating.

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THE California Architect points to a peculiar oversight in the bill now before the New York Legislature for limiting the height of buildings. The bill provides that no building shall be erected of greater height above the curb level than fifteen times the square width of the street, but neglects to say what denomination that width shall be taken in—whether feet, inches, yards or miles. The California journal aptly remarks that although the ordinary public would consider that feet are meant, there is no telling what the lawyers and judges would hold if the matter was brought into court by someone wishing to erect a building higher than implied in the act, for the ways of such are like the ways of Providence, past finding out.

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THE building inspector of the city of New York has made a new departure from the established custom of his predecessors, by making liberal use of the camera to secure pictures of defective work. Naturally enough contractors who have tried to increase their profits by doing their work in the flimsiest manner, without regard to the safety of human lives, are "down" on the new inspector. Our Canadian inspectors should lose no time in purchasing a kodak. It might also be possible by means of this little instrument for the Ontario Association of Architects to obtain some "horrible examples" of design and construction which would materially assist in bringing the Legislature to an appreciation of the reasonableness and necessity of amending the Ontario Architects' Act.

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MY attention has been called to the peculiar enterprise of a Montreal publisher. This gentleman recently issued the first number of a periodical for plumbers, the heading of which, if we except the one word "Canadian," is an exact fac simile of that of a New York publication in the same line. Anybody who imagines he is called upon to fill a long-felt want in the field of class journalism or any other branch of journalism, has a perfect right to make the attempt, but for the credit of the business and this Canada of ours, I protest that such persons should show that they have ideas of their own, and not purloin bodily the ideas of others either because of their lack of originality or because they desire by sailing under false colors to reap where others have sown.

THE COMPETITION EVIL.

AN architect forwards to us a copy of the document printed below, which he states is being sent out to architects both in Canada and the United States:

SAULT STE. MARIE, February 18th, 1897.

SIR,—You are hereby invited by the trustees of the Sault Ste. Marie Methodist Church to submit for their inspection plans and specifications for a church in said town, on the conditions that if your plans and specifications are accepted by the trustees, that you will be paid therefor the sum of one hundred dollars ($100); but should they not be accepted they will be returned to you at your own risk, and you will be entitled to no remuneration whatever.

The church to be built of stone which was blasted out of the lock-pit of the ship canal, and is consequently not uniform in size, as if it had been regularly quarried in the usual way. The outside course to be dressed and laid in the Broken Ashlar style on the front and two sides of church, the rear end to be built of hammered stone; church to have a seating capacity of at least 450 on the ground floor, exclusive of gallery or galleries in addition, and with basement underneath adapted and suitably arranged for Sunday School purposes.

The building with heating and seating complete not to cost more than $7,500, exclusive of stone and sand, which will be delivered by the trustees on building site outside of above amount. Full, ample and complete working details to be furnished with plans or specifications, or before the sum of one hundred dollars ($100) above mentioned is paid, and said sum of $100 is not in any event to be paid unless the trustees upon calling for tenders can secure a reliable contractor to undertake the building at the price named.

The church will be situated on the north-west angle of Spring and Albert streets, and will face towards south and also towards river, which runs east and west two or three blocks away; the natural depression of the lot and surrounding land is towards the south.

The plans, specifications and working details to be the absolute property of the trustees until the building is completed and all matters concerning same fully and finally settled and wound up, then to be returned to the party furnishing same at his own risk, but trustees not to be in any way responsible for loss or destruction of plans while in their possession. No plan necessarily accepted.

You are also requested to state, in case your plans are accepted, what amount you will take to superintend the erection of the building, and whether you would give same your personal supervision, and if not, what arrangement you would make therefor.

A similar communication to this is being sent to a limited number of architects, and you are requested to reply at once as to whether you intend to submit plans under above conditions, so that if you do not intend to submit plans the trustees can communicate with someone else in your place.

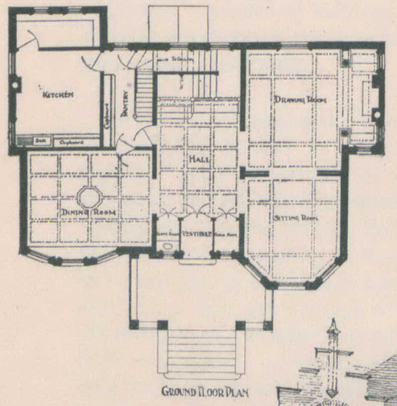
If you desire any further information the trustees will be pleased to furnish it.

W. H. HEARST, Sec. Com.

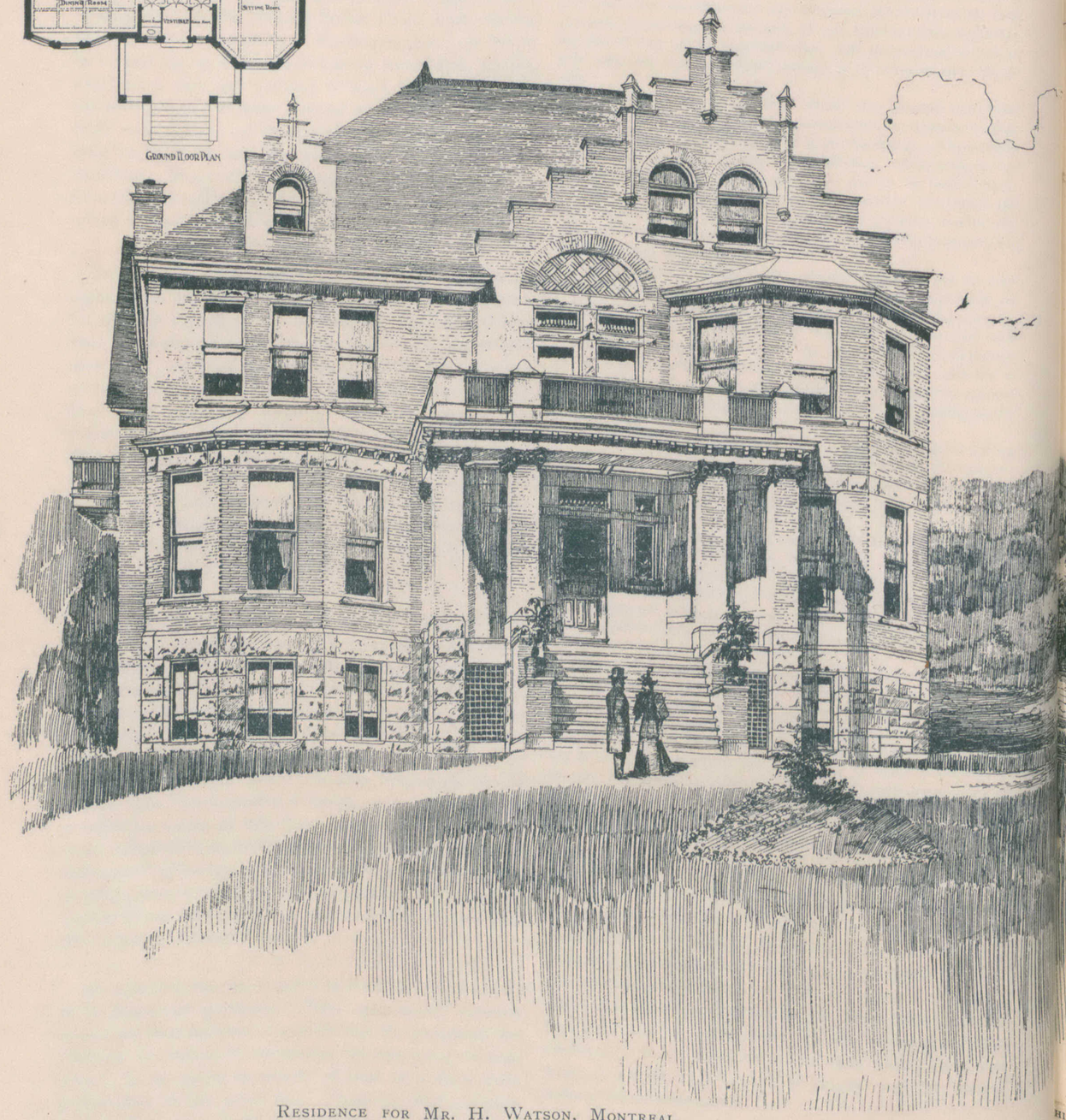
The gentleman who brings this document before our notice, writes: "I am not a member of the Ontario Association of Architects, and see no good reason for becoming such as long as prominent men in the Association residing in Toronto and other leading cities will allow themselves to be approached in such language and in such terms as are embodied in the enclosed. It has occurred to me that what I send you hints at a state of affairs that might well be placed before the Association."

Messrs. Smith Bros., of London, Ont., have removed to larger premises at 265 Dundas street.

The Asbestos & Asbestic Company, Limited, with a capital of £500,000, is being organized in London, Eng., for the purpose of developing property at Danville, Que.

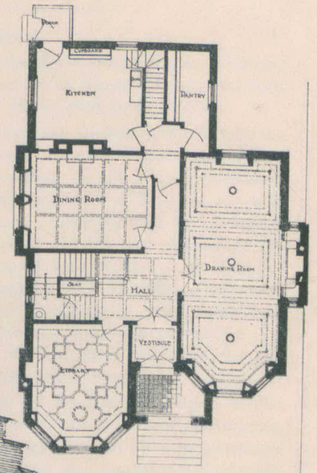


GROUND FLOOR PLAN



RESIDENCE FOR MR. H. WATSON, MONTREAL.

A. C. HUTCHISON, ARCHITECT.



GROUND FLOOR PLAN

RESIDENCE FOR MR. ROBERT MITCHELL, MONTREAL.

WORDS OF ENCOURAGEMENT.

In addition to the complimentary references by subscribers to the ARCHITECT AND BUILDER, which were printed in our February number, we have since received the following :

"The CANADIAN ARCHITECT AND BUILDER is a credit to the proprietor, being both artistic and very useful to all architects and builders. We wish you every success for the future."—MOORE & HENRY, Architects, London, Ont.

"I am pleased to say something in favor of the CANADIAN ARCHITECT AND BUILDER. I have been a subscriber for a number of years and have carefully marked its progress, which I consider has been in excess of my expectations. I find it very useful generally, and think that if all the materials going into a building were advertised in the paper it would still further enlarge its usefulness."—JOS. VENNE, Architect, Montreal.

"I consider your journal, the CANADIAN ARCHITECT AND BUILDER, a very useful medium amongst architects and builders for the exchange of ideas, practices and methods, &c., conducing greatly to the knowledge required by both architects and builders in every day work. The New Year number is good and excellently illustrated, and should be in the hands of every Canadian architect, builder and artisan. I understand somewhat the difficulties of the last ten years in introducing your journal, and have noticed the gradual education of the public in matters architectural, due in a great measure to the influence of your paper, and heartily wish you success in the coming years."—CORNELIUS J. SOULE, Architect, Victoria, B. C.

"I take it that, in addition to the illustrations, the interchange of ideas, theoretical and practical, between members of the profession, the object of a journal devoted to Architecture is to afford its readers some information as to where the appliances most needed in the building trades can be obtained. I consider this feature of primary importance, and if manufacturers only knew how the pages of trade journals are scanned by architects and builders living in out-of-the-way places, there would be a considerable increase in the number of their advertisements. The CANADIAN ARCHITECT AND BUILDER is doing a good work, and its influence should be spread to a greater extent than now obtains. This can easily be done if every architect and builder in Canada will send their subscription of two dollars each for the current year. The January number is an interesting one, and well worth perusal. It will bear comparison also in its make-up with any other architectural and building journal published in America. You have my best wishes."—CHAS. H. WHEELER, Architect Winnipeg, Man.

WORKS OF CONSTRUCTION.

A new hotel, known as the Arlington, has been completed at Tavistock, Ont., from the plans of Mr. D. G. Baxter, architect, of Stratford. The building is 47×44 feet, three stories high, with basement, of Romanesque design, and built of white brick with stone trimmings. The ground floor contains bar, dining-rooms, sample rooms, etc., well lighted and arranged. On the upper floors are eighteen large bedrooms and a ball room, and throughout the building is finished in polished hardwood. Safford hot water radiators are used for heating. The contractors were Messrs. Wilker and Wolfe & Quehl, of Tavistock. The interior furnishings were supplied by Messrs. Kalbfleisch & Krug, of Tavistock, and J. A. Duggan, of Stratford. The cost was in the neighborhood of $14,500.

THE new wing of the General Hospital, at Guelph, was formally opened last month. The addition was constructed from the plans of Curry, Baker & Co., of Toronto, and is a white brick structure, three stories high, with a frontage of 63 feet and extending back 83 feet. The cost, including interior fittings and permanent furnishings, was $20,000, and accommodation is provided for 30 additional patients. Adjoining a large solarium is a semi-public ward, and in the north end of the first floor are two private rooms which have been furnished for the exclusive use of the nurses. Besides these there are five private wards, pantry, kitchen lavatory, baths, etc., while opposite the pantry is the electrical room, where apparatus is kept for medicinal purposes. The basement contains the heating and ventilating system. Two large boilers are used, one for direct and the other for indirect heating, the former being done by steam and the latter by hot air. A small boiler is also used for the heating of water for the baths and other purposes. In the basement are also four private rooms. On the second flat are several wards, and solarium, with a large maternity ward in rear. The feature of the third floor is the operating room, 18×26 feet, located in the north-east corner. Corrugated glass in the roof, and 88 incandescent lights provide ample light at all times. The nurse's private quarters are also on this flat.

LEGAL.

Joseph Ferry, contractor for the Giles avenue sewer, Windsor, served a writ on the city in an action for $3,000 damages for cancelling his contract. The case will be tried at the assizes.

Judgment has been given in the case of Henry Macfarlane vs. Chas. N. Armstrong, of Montreal. This case arose out of contracts in connection with the building of the Baie des Chaleurs railway. The plaintiff claimed the sum of $417,142.29, with interest thereon at eight per cent., alleging that by a contract entered into in June, 1886, between himself and defendant, the latter undertook the construction of that portion of the Baie des Chaleurs railway between Metapedia and Paspebiac, under the direction of the railway company's engineers. After completing some 40 miles of the route defendant suspended operations for want of funds. Mr. Justice Mathieu gave judgment for the plaintiff for $168,964.10, with costs and interest.

Judgment was recently given by Mr. Justice Walkem at Victoria, B. C., in the action brought by Mr. McDonald, contractor, against the trustees of the Pandora Methodist Church, to recover certain moneys alleged to be due him in connection with his contract. The plaintiff claimed a balance of $1,245 for excavating and completing the basement of the church, damages to the amount of $3,000 for alleged failure of the defendants to furnish him with suitable plans, drawings and specifications and delays on the part of the defendant in paying him as the work progressed, and $3,624.10 for alleged extras. In respect of the first claim the jury and judge found in favor of the defendants on the ground that there was no contract with the plaintiff for the work. Regarding the second claim, it was shown that defendants had originally made a contract with another contractor to construct both basement and superstructure of the church in brick, but subsequently decided to have the superstructure done in stone. Thereupon the name of the plaintiff in this action was substituted in the contract for the superstructure for that of the original contractor. The Court held that the plaintiff having thus assumed the contract, had consented to and was bound by its provisions. On this ground the jury and the Court found against the plaintiff's claim for damages for delays in furnishing necessary plans, etc. With regard to the plaintiff's claim for extras, the jury recommended the allowance of a number of items. On this point the judge remarked : "Building contracts, like all other contracts, have, according to a well known rule, to be construed by the Court ; and as plans and specifications, when referred to in the contract, form a part of it, they are, of course, included in this rule. Hence the question of what are and are not extras in the present case, depends on the contract and the specifications, and is a question for me to determine ; and even had I left it to the jury, their opinion, however sound, would have been inoperative. My object was to get their valuation of the work charged for, so that if the plaintiff should be entitled, according to the construction of the contract, to the benefit of any item so valued, I would be enabled to give it to him. Before dealing with each of these items, as I propose to do in their order, it may be useful to quote the first paragraph of the contract, which speaks for itself, viz.: 'The specifications and drawings are intended to co-operate, so that any works exhibited in the drawings, and not mentioned in specifications, or vice versa, are to be executed the same as if mentioned in the specifications and set forth in the drawings.'" The Court refused to allow a number of the allowances recommended by the jury on the ground that the work was specified either in the drawings or the specifications, and therefore came within the contract. In deciding the action the judge gave judgment for the plaintiff for $130 and for the defendants on counterclaim for $300. A portion of the costs were allowed to the defendants, as to the remainder each party to bear his own.

Mr. George C. Morrison, of Hamilton, Ont., has patented a hot water boiler. The claim is for a vertical boiler constructed with one tubular piece having threaded or screwed ends, and faced in combination with heads having inner true face to engage with ends of said boiler when screwed in position, with water inlet and circulating tube or pipe and water heating reservoir connected by means of pipes.

REPORT OF TESTS ON VENTILATION.

By the courtesy of the Chairman, Dr. J. J. Cassidy, of Toronto, we are enabled to publish the following valuable report of the Committee on Ventilation presented recently to the Ontario Provincial Board of Health. Embodied in the Report are the results of recent tests of ventilation in a number of public buildings in Toronto. In view of the importance of the subject we print the Report in full as follows :—

REPORT OF THE COMMITTEE ON VENTILATION.

It is a source of satisfaction to learn that in the State of Massachusetts the ventilation of public buildings and school-houses has passed beyond the theoretical stage. In that State statutes were passed in the year 1894 regulating the construction, ventilation and sanitary conditions of buildings, and it is the special business of the Department of the Inspection of Factories, Workshops and Public Buildings to see that the regulations imposed by those statutes are promptly carried out.

In a Massachusetts statute, entitled chapter 508, the following regulations are made :

"Section 40.—Every public building and every school-house shall be kept in a cleanly state and free from effluvia arising from any drain, privy or other nuisance, and shall be provided with a sufficient number of water closets, earth closets or privies for the reasonable use of the persons admitted to such public building or of the pupils attending such school-house.

"Section 41.—Every public building and every school-house shall be ventilated in such a proper manner that the air shall not become so exhausted as to be injurious to the health of the persons present therein. The provisions of this section and the preceding section shall be enforced by the inspection department of the district police.

"Section 42.—Whenever it appears to an inspector of factories and public buildings that further or different sanitary provisions or means of ventilation are required in any public building or school-house in order to conform to the reqirements of this Act, and that the same can be provided without incurring unreasonable expense, such inspector may issue a written order to the proper person or authority, directing such sanitary provisions or means of ventilation to be provided, and they shall thereupon be provided in accordance with such order by the public authority, corporation, or person having charge of, leasing, or owning such public building or school-house."

On printed form No. 83 the following requirements are called for in the heating and ventilation of school buildings in Massachusetts :

1. "That the apparatus will, with proper management, heat all the rooms, including the corridors, to 70° F. in any weather.

2. "That, with the rooms at 70° F. and a difference of not less than 40° F. between the temperature of the outside air and that of the air entering the room at the warm-air inlet, the apparatus will supply at least 30 feet of air per minute for eaeh scholar accommodated in the room.

3. "That such supply of air will so circulate in the rooms that no uncomfortable draughts will be felt, and the difference in temperature between any two points on the same breathing plane, in the occupied portion of a room, will not exceed 3°.

4. "That vitiated air, in amount equal to the supply from the inlets, will be removed through the ventiducts.

5. "That the sanitary appliances will be so ventilated that no odors therefrom will be perceived in any portion of the building.

"To secure approval by the department of plans, showing methods or systems of heating and ventilation, the above requirements must be guaranteed in the specifications accompanying the plans."

Fully recognizing the wisdom of the above mentioned statutes and the propriety of the regulations founded on them, your committee, in order to ascertain whether the conditions of heating and ventilation in Toronto are conformable to the legal standard required in Massachusetts, examined the ventilation of three public school-houses, two Sunday school-rooms and the city police court. The following is the report of the work done :

REPORT ON THE VENTILATION OF TWO ROOMS IN THE CHURCH STREET SCHOOL-HOUSE, CORNER OF ALEXANDER AND CHURCH STREETS, TORONTO.

Date of inspection Dec. 17th, 1896. Weather overcast and mild. Wind south-east. Temperature 33.8 F. Humidity 61%. Barometer 29.85. This building is heated and ventilated by the Smead-Dowd apparatus. It is a twelve-room school, three stories in height, and there are four furnaces, one for each corner of the building, each furnace heating and ventilating three rooms.

Room No. 2, ground floor, s. w. side ; seating capacity 63 ; present 61 ; net air space 11,368.67 cubic feet ; air space per head 186.37 cubic feet ; temperature at teacher's desk 68 F.; humidity 49% ; difference in temperature in different parts of the room at the breathing line 5° F.; air supply at inlet 1,630 cubic feet ; air removed at outlet per minute (estimate) 1,630 cubic feet ; amount of air supplied to each pupil per minute 26.72 cubic feet ; air changed completely in 6.96 minutes ; carbonic acid parts in 1,000 of air 0.537 ; time of test 2.55 p.m.

Room No. 4, ground floor, n. e. side ; seating capacity 64 ; persons present 50 ; net air space 11,738.17 cubic feet ; air space per head 235.66 cubic feet ; temperature at teacher's desk 67° F.; humidity 55% ; difference in temperature in different parts of the room at the breathing line 3° F.; temperature of the air at the inlet 71° F.; air supply per minute 1,650 cubic feet ; air supply at outlet per minute (estimate) 1,650 cubic feet ; amount of air supplied each pupil per minute 30.8 cubic feet ; air changed in 7.14 minutes ; carbonic acid in parts of 1,000 of air 0.537 ; time of test 3.20 p.m. The fires were getting low, and the results obtained would probably show the average of all kinds of weather.

REPORT ON THE VENTILATION OF TWO ROOMS IN THE LOUISA STREET SCHOOL, TORONTO.

Date of inspection Dec. 18th, 1896; weather generally clouded; wind south ; temperature 36.9 ; humidity 92%; barometer 29,389. This building is heated by box stoves in which wood is consumed. There is a fresh air inlet in connection with each stove, but the supply of fresh air is merely nominal, the ventilation being accomplished by open fanlights in the windows.

Room No. 1, ground floor, on the s. e. side ; seating capacity 45 ; persons present 40 ; net air space 11,636.25 cubic feet ; air space per head 290.90 cubic feet ; temperature at the teacher's desk 61° F.; humidity 60% ; difference in temperature at different parts of the room at the breathing line 13° F.; temperature of the air at the inlet (fanlight) 42° F. The fresh air inlets were two open fanlights, having an area of 6.72 square feet. The wind was blowing towards them, but as there was no definite inlet or outlet, I did not ascertain the amount of air supplied per minute or the amount removed. Carbonic acid in parts of 1,000 of air 0.806 ; time of test 11 a.m. It had begun to rain when the next room was tested.

Room No. 2, ground floor, on the n. w. side ; seating capacity 64 ; persons present 58 ; net air space 10,365.42 cubic feet ; air space per head 178.71 cubic feet ; temperature at the teacher's desk 59° F.; humidity 71% ; difference in temperature in different parts of the room 5° F.; temperature of air at inlet 42° F.; fresh air inlets, five open fanlights, representing 16.75 square feet ; carbonic acid in parts of 1,000 of air 0.615. As the fanlights were all open and the room was filled with fresh air, this cannot be considered a test of the ventilation of this room.

REPORT ON THE VENTILATION OF THE SHERBOURNE STREET METHODIST SABBATH-SCHOOL, TORONTO.

Date of inspection Dec. 20, 1896 ; weather very cloudy ; wind south ; temperature 30.9 ; humidity 59.0 ; barometer 29.561. This is a large room with galleries, formerly used as a church ; seating capacity 350 ; persons present 250 ; area 65,920 cubic feet ; area per capita 263 feet ; temperature at the desk 64° F.; carbonic acid in parts of 1,000 of air 0.806 at the first test ; at a second test I found 0.537 ; time of test 3.30 p.m. This room is heated by a Smead-Dowd furnace. Fresh air is propelled through the furnace by a 48-inch fan, which is driven by an electric motor. The fresh air enters by eight inlets high up on the walls, and is extracted at the level of the floor, brought to a gathering chamber, and expelled by a 48-inch extraction fan. The extracting fan was said to be making about 200 revolutions per minute when I obtained 0.806 carbonic acid. It was said to be making 400 revolutions per minute when I obtained 0.537 carbonic acid. January 26th, 10.45 a.m., I tested the ventilation of the Sherbourne street Sunday-school, only two persons being present. Temperature at desk 70° F.; difference in temperature in different parts of the room at the breathing line 4° F.; temperature of air at inlet 100° F.; temperature of air at outlet 66° F.; area of combined fresh air inlets 8.50 square feet ; revolutions of propelling fan 160 per minute ; revolutions of extracting fan 160 per minute ; air propelled through inlets per minute average 520 linear feet. This multiplied by the area of the inlets, 8.50 square feet, equals 4,420 cubic feet per minute, or 17.68 cubic feet per head per minute for 250 persons. Air removed at outlets, 530 linear feet per minute, equalling 270,-

300 cubic feet removed per hour. This last sum, divided by the total area, 65,920 cubic feet, shows that the air of the room was being changed at the rate of 4.1 times per hour. Assuming that 30 cubic feet of fresh air ought to be supplied per head per minute, and that 250 persons were present in this room, we find that instead of receiving 7,500 cubic feet of air they would get 4,420 or 58% of the proper quantity. This probably accounts for the large amount of carbonic acid present in the air on December 20th. If the propelling and extracting fans were made to work more actively there would be no difficulty in introducing the proper amount of fresh air, although, in cold weather, it would take more fuel to heat the room.

REPORT ON THE VENTILATION OF THE CENTRAL METHODIST SUNDAY-SCHOOL, CORNER OF BLOOR STREET EAST AND PARK ROAD, TORONTO, DECEMBER 26TH, 1896.

Weather cloudy; wind south-west; temperature 30.2; humidity 71%; barometer 29.945. The room is situated on the first floor and has a gallery; area 70,000 cubic feet; persons present 500; area per capita 140 cubic feet; temperature at the desk 61° F. Two warm air furnaces supply the heating, and there are ten warm air inlets in the room, most of which discharge at the floor; net inlets 7.81 square feet; two outlets on the wall and two in front of the stage; net area 1.51 square feet; 650 ½-inch holes in perforated boards, placed in ceiling and connected with two outlet tubes, which escape through the roof; net area 1.42 square feet. The ceiling ventilators were closed. No estimate of amount of air supplied; carbonic acid in parts of 1,000 of air 0.806 at the floor; in the gallery 1.61; time of test 3 p.m. The room was crowded, the doors were closed and the windows closed and darkened, as a magic lantern exhibition of scriptural subjects was being given at the time the test was made. On February 9th, 1897, I estimated the amount of fresh air which entered this room, the conditions as to heating and amount of outlet being similar to those obtained December 26th. The supply amounted to 70,260 cubic feet of fresh air per hour, or about one change of air in an hour.

REPORT OF THE VENTILATION OF THE TORONTO CITY POLICE COURT, COURT STREET, DECEMBER 28TH, 1896.

Weather cloudy and hazy; wind south-east; temperature 23° F.; humidity 99%; barometer 30.259.

First floor, north side; area 20,240 cubic feet; persons present 165; area per head 122.50 cubic feet; temperature at the desk 67° F. The room is warmed in cold weather by four steam radiators. Four circular pipes 6 inches in diameter enter the room about 13 feet from the floor. They are intended to act as fresh air inlets. There were two large outlets, each having an area of 256 square inches, one grate-flue having an area of 21 sq. inches, and another of a similar size which was bricked up. Two small windows near the ceiling were open. Three doors were open—two of them double doors opening on the main corridor near the head of the staircase, which starts near the street door. The third door opened into the magistrate's room. There was also in the centre of the room an open staircase leading from the ground floor, through which the prisoners ascended. The available area was thus very much larger than the figures given—20,240 cubic feet—would indicate. Carbonic acid in parts of 1,000 of air, first test, 0.537; after the three doors had been closed for fifteen minutes, the two windows and central staircase remaining open, carbonic acid in parts of 1,000 of air 0.806. February 6th, 12.30 p.m., I estimated the natural ventilation of the police court, the doors, windows, and the trap-door over the staircase being closed. Only two persons were present.

The discharge of air by the outlets was as follows:—

By 1 outlet	30,798.00	c. ft.	per hour.
" 1 "	24,426.00	"	"
" 1 grate-flue	1,828.26	"	"
" 1 bricked-up flue			
" 2 cold-air inlets which acted as outlets	5,771.28	"	"
Total air discharged	62,823.54	"	"

The indraught of air was as follows:—

By 2 cold-air inlets	5,771.28	c. ft.	per hour.
" loosely fitting doors and trap-door, and the spaces beneath the doors and around the windows (estimate)	57,052.26	"	"
Total air introduced	62,823.54	"	"

The amount of air introduced in an hour, 62,823.54 cubic feet, divided by the area of the room, 20,240 cubic feet, would show that the air was changed 3.1 times in an hour. Allowing 30 cubic feet per minute or 1,800 cubic feet of air per hour to each person present, such an area, doors and windows being closed, would properly accommodate 34 persons, each of whom would then have an area of 600 cubic feet.

REPORT ON THE VENTILATION OF A ROOM IN THE DUFFERIN SCHOOL, BERKELEY STREET, TORONTO, JANUARY 7TH, 1897.

Weather cloudy; wind south; temperature 27° F.; humidity 67%; barometer 29.891; room 8, 3rd floor, east side; seating capacity 58; persons present 49; net air space 12,163.83 cubic feet; air space per head 284.24 cubic feet; temperature at the teacher's desk 69° F.; difference in temperature at the breathing line over the greater portion of the room 1° F.; temperature of the air at the warm air inlet 128° F. Two window sashes were lowered at the top, one 8 inches, the other 5 inches. There was a large foul air duct in one corner of the room, the shaft of which was heated by steam coils. The available area of its opening in the room was 4.27 square feet. When the door and windows were closed 320.25 cubic feet per minute were removed through this opening, or 19,215 cubic feet per hour. Fresh air supply at the inlet, 600 cubic feet per minute or 36,000 cubic feet per hour; amount of pure warm air supplied per minute per head, 12.24 cubic feet; amount of foul air removed per head per minute through the ventiduct 6.53 cubic feet. When the windows were opened there was no current in the foul air outlet. The open windows acted both as inlets and outlets, but the amount of air introduced and extracted by them was not estimated, as the supply was irregular and capricious. Carbonic acid in parts of 1,000 of air 0.806; time of test 3.15 p.m. Remarks.—The warm air supplied was insufficient in quantity and of too high a temperature, so that cold air had to be introduced in an irregular fashion to supply the deficiencies under both these heads. Even with the open windows the supply of fresh air was small, as was proved by the amount of carbonic acid in the air. The high temperature of the warm air at the inlet, ranging from 120 to 150° F., made it difficult for pupils to occupy the corner where the register was situated. As the air of the schoolroom became superheated, the windows had to be opened, allowing a considerable waste of heat. This room is heated but cannot be ventilated unless the windows are opened.

Dufferin school is an 18-room school-house. Sixteen of the rooms are heated by steam pipes, direct and indirect. The indirect heating consists of pure air, warmed by passing over steam coils in a shaft situated in the basement, and introduced into the room by a register. In very cold weather direct steam coil heating is superadded. In each of these sixteen rooms is a foul air outlet, heated by steam coils; net area of opening 4.27 square feet. In two rooms there are no warm air inlets, the heating being effected by direct steam coils. These latter rooms are provided with skylights, which may also be used as outlets for air. The combined outlets of the north wing of the building discharge through a large covered outlet about four feet above the roof of the north portion of the building. Similarly the combined outlets of the south wing discharge above the roof of the south side. Tested at the roof these outlets seemed to discharge a considerable amount of foul air; but the test made in room 8, which is circumstanced in a manner similar to the other fifteen rooms, shows that these outlets remove only a small percentage of the foul air.

Your committee submit, that of the six buildings examined, the only one which could be considered as satisfactory in the matter of ventilation was the Church street school. In room 2 of this building there was slight overcrowding, and the amount of air supplied each pupil per minute, viz., 26.72 cubic feet, was below the standard. The difference in temperature in different parts of the room at the breathing line, viz., 5° F., was too great, but some of the thermometers were placed near windows. In room 4 the conditions were all quite satisfactory, the amount of air supplied per head per minute being 30.8 cubic feet, and the difference in temperature in different parts of the room at the breathing line 3° F.

At Dufferin school the heating was sufficient, if anything rather too high, but the supply of pure air at the inlet was defective, and was supplemented by the liberal use of windows.

At the Louisa street school-house, in room 1, the difference in temperature between different parts of the room was excessive, viz., 13°, and the ventilation, depending on the open fanlights, was draughty.

At the Sherbourne street Sunday-school the heating was good, but the supply of pure air was not sufficient. This defect could be easily remedied by making the fans work more briskly.

At the Central Methodist Sabbath school the heating was suffi-

cient, but the fresh air supply insufficient. The room was also overcrowded. Increased inlets and outlets, with the use of fans, would produce good ventilation in this room, but the heating would require to be changed to suit the new conditions.

The ventilation of the Police Court, with several doors and windows open, cannot be seriously considered. If doors and windows were closed, the room would be altogether too small for the large number of persons who assemble there every day when business is transacted.

For services rendered during the preparation of this report your committee desire to express grateful acknowledgements to Mr. W. F. Rutley, secretary of the Smead-Dowd Warming and Ventilating Co.; Mr. R. F. Stupart, Meterological Observatory, and Mr. C. H. Bishop, Superintendent of Buildings, all of Toronto, and also to Mr. John F. White, State Inspector of Public Buildings, Boston, Massachusetts.

Respectfully submitted,

J. J. CASSIDY,
P. H. BRYCE.

MANUFACTURES AND MATERIALS

STAINED AND PAINTED GLASS.

A LECTURE was delivered before the Women's Art Association of Montreal by Rev. Canon Norman on "Stained and Painted Glass." The two terms were not synonymous, he explained, though as a fact most windows were the result of a combination of both practises. White and colored glass was made by the ancient Egyptians at least 3,000 years ago. The Greeks and Romans also excelled in the manufacture of glass vessels, but do not seem to have known anything of glass windows. St. Jerome, in the 4th century, seems to have been the first known author who alludes to glass windows. Colored glass windows were apparently used in the 6th century. It is believed that glass painting took its origin in Limoges, and that the first artists were Venetians. The mosaic character of the very old glass suggests that it was modelled on the style of glass mosaics. The art was generally known as early as the 10th century, and the exact process of manufacture has not undergone material change since the 12th century. The lecturer described the tests for determining the date of any old painted window. He went through the history of the art in England from the 13th century to the recent revival. In the early days there was no attempt at perspective, the designs were conventional, but the colors were very rich. Much of this early glass was manufactured in Germany. France is very rich in examples of early glass. As time went on, the drawing of the design was much improved, and the same may be said of borders and canopies. But the quality of the glass began to deteriorate. The Renaissance period witnessed the golden age of painted glass, so far as mechanical execution went, but there was a marked falling off in reverence and devotional feeling. In England, soon after the Reformation, the demand for stained glass greatly diminished, and enamel coloring, discovered about that time, was freely introduced, and impaired the transparency of the glass. Deficient knowledge in the chemical combination of colors tended to produce failures in effect, and lack of permanence. The art in fact nearly died throughout Europe, until within the last 40 years. The revival on the continent owed its existence to the energetic skill of a French gentleman at Serves, and the revival in England synchronizes with the introduction of Gothic art. The lecturer next described the process of manufacture, which he illustrated by specimens, kindly furnished by Messrs. Spence Bros. He recommended, in the selection of a window for any church, that the aspect of the window should be taken into consideration, and the architectural details of the church, and he urged the beauty of stained glass as a decorative adjunct for churches and domestic dwellings. The artists of the present day far excel those of ancient days in their drawing, although they may not surpass them in their treatment of color.

THE DUTY ON CALCINED PLASTER.

THE Albert Manufacturing Company, of Hillsborough, N.B., have submitted the following points to the Tariff Commissioners in opposition to a reduction of the present duty on calcined plaster :

"That the average price at mill, now obtainable for sales throughout Canada, is 86 cents per barrel of 300 pounds, from which has to be deducted back charges and interest where credit is given. Calcined plaster cannot be manufactured for less than 80 cents per barrel unless in far larger quantities than the present demand of the Canadian market represents. It is quite impossible to increase the present price owing to competition from the manufacturers of plaster in the states of Michigan and Ohio. A reduction in the duty on plaster from 45 to 40 cents, made at the last revision of the tariff, necessitated a corresponding reduction in price to points in most parts in western Canada. Further reduction would make the business unprofitable. The average cost to the consumer at this time is at least 35 cents per barrel less than before the imposition of protective duties, and the price obtainable is at least 25 cents per barrel less for the manufacturer. We would cheerfully welcome reciprocity in this article, and in conclusion submit that if any change be made it should be in the direction of increase rather than decrease in the present rate, no satisfactory reason having yet been given for the reduction above referred to. The manufacture of this article is important in the locality in which it is made, i. e., in the parish of Hillsborough, county of Albert, N. B. It also affords considerable freight for the Intercolonial Railway, total shipments over this road for the year 1896 amounting to 23,144 barrels, and if not discouraged would in time become a very important contributor in the way of freight to this railway."

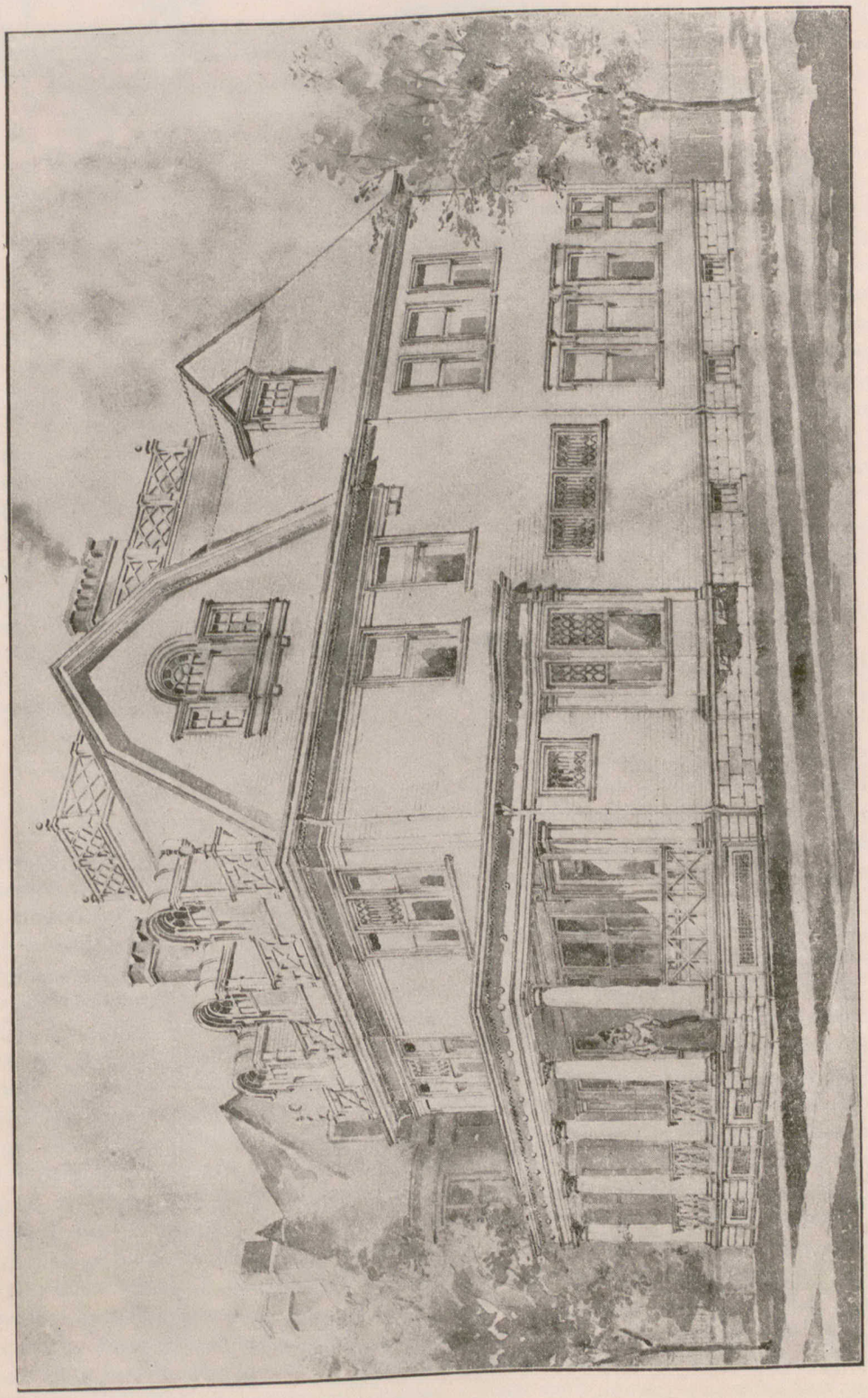
The present sales of the company in Canada were shown to be 23,000 barrels. Last year 60,000 tons of plaster rock were shipped to the United States, and each ton of rock makes about eight barrels of plaster.

The McIntosh Granite and Marble Company, Ltd., is applying for incorporation, to acquire the business of D. McIntosh & Sons, Toronto.

Messrs. J. C. Spence & Sons, of Montreal, have executed a handsome stained glass window, for the chapel of St. George's Cathedral, Kingston. The window is being erected in memory of the late Wm. H. K. Macauley.

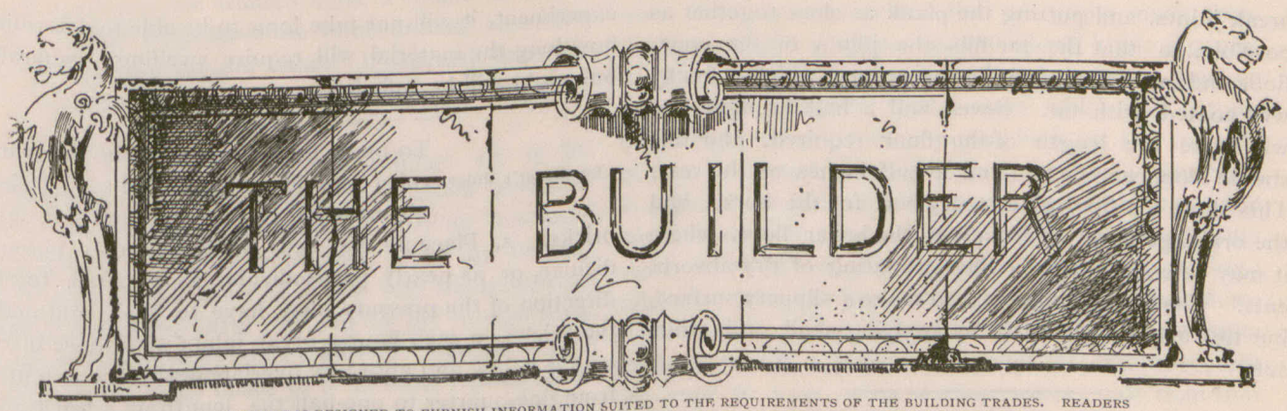
The Dominion Electric Heating and Supply Company, are applying for incorporation, to manufacture electric heaters and other electrical appliances. The capital stock is $100,000, and among the promoters are Thomas Askwith, contractor, and J. A. Trudeau, electrician, both of Ottawa.

Mr. Samuel Cabot, of Boston, has issued a handsome half-tone plate of the "Old Pierce House," at Dorchester, Mass., built in 1635. Mr. Cabot uses this old house as an illustration of the durability and value of eel grass as a preservative material, the walls of this old structure having been found to have been stuffed with this grass. This grass is employed by Mr. Cabot as an insulating material in his sheathing and deafening quilt.



DESIGN FOR A RESIDENCE.

STRONG & WILBY, ARCHITECTS, BUFFALO, N.Y.



[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.]

Finishing Pine.

If a room is to be finished in pine, and the wood to be left in its natural state —which is decidedly the best way to finish pine—care should be taken that no oil, or grease of any sort, animal or vegetable, should touch it, nor should any of the so-called fillers be used, as they stain the wood, and so far as pine is concerned, do no good. The pristine freshness and beauty of pine can only be preserved by first finishing the woodwork with a plane very finely set, and avoiding all plane marks or other blemishes, and when the wood has been properly prepared and cleaned, done without using sand or glass paper, it should receive a coat of pure white shellac varnish, which, after drying, and being properly rubbed down, should be coated with two or more coats of transparent varnish, and rubbed down with hair-cloth to polish desired. Pine finished in this manner gives to either furniture or interior trimmings a handsome and desirable finish, that will preserve the grain and lustre of pine in all its mellow golden lightness.

Concrete.

A concrete is used in France for building purposes that possesses the necessary qualities of solidity and hardness. It is composed of 8 parts of sand, gravel and pebbles ; 1 part of common earth, burned and powdered ; 1 part of powdered cinders and 1½ parts of unslaked hydraulic lime. These materials must be thoroughly beaten up together ; their mixture, when properly moistened, gives a concrete which sets almost immediately, and becomes in a few days extremely hard and solid, properties which may be still further increased by the addition of a small quantity—say 1 part—of Portland cement. It is stated that many large buildings have been constructed of this material in France—in one case a house three stories in height, 65 × 45 feet, standing on a terrace, having a retaining wall built perpendicular 20 feet high and 200 feet in length. Every part of this structure was made of hard concrete, including foundations, vaults of cellars, retaining wall, and all walls exterior and interior, as well as the cornice work, mouldings, string courses, parapets and balustrades, and the building has no band iron in the quoins or other plan to bind it together. All lintels over doors and windows, and all sills, are composed of the same materials, being cast in moulds.

Windows and Doors.

One of the most important features in an interior arrangement is the actual and relative height and width of doors and windows. The question is whether the apparent proportions of apartments cannot be greatly modified by the treatment of the necessary openings. A window in the center of one side of a room gives more light than if at one side of the center, but it has the effect of shortening the length of that side. The same is true of doors in similar positions. The higher a window is the more light it will give, but the lower a room will appear. In doors, nothing is gained by increasing the height beyond the regular proportion ; sometimes, however, it may be necessary to keep a narrow door the same height as other doors in the same room in order to prevent an uniform appearance. Their relative height to that of the windows is a nice question of balance that can only be determined by the height of ceiling and size of room. Wall space to suit furniture often has to be considered, and when conditions will admit, it is often advisable to place two narrow windows in a wall, with the required space between them, than to put a large window in the center of the room. In the disposition of doors much can be done in the way of providing wall space by arranging closets and openings so that the desired results may be attained.

Stable Floors.

For reasons that are obvious, a stable floor should be durable, not too hard or unyielding, impervious to moisture or vermin, adherent to the feet and not slippery, smooth and a non-conductor of heat. Wood is the most common material in use, and its cheapness, ease of working, and non-conducting qualities, go a great way to make up its want of durability. But there are several kinds of wood, and some are better than others for this purpose. The hardest woods are not the most durable, nor the most desirable. Three-inch basswood plank has made a more durable floor than one of three-inch white oak plank, and it was warmer, softer, and gave a much better footing because it wore shreddy instead of smoothly, as the harder wood did. This timber has many useful points about it, as it will stand rough usage and wear, and as we have plenty of it in Canada, it might be used more frequently for barn and stable floors than it is. Hemlock and spruce come next in this respect. But a plank floor is an absorbent of the urine, and soon becomes rank with ammoniacal odors. Then some process is required to make the planks water proof, this may be done by saturating the planks with hot gas tar, when the floor becomes a most desirable one for such stables as can not have a ground floor. For a plank floor of the best kind, it is best to lay the planking double, that is, the first floor of soft three-inch plank, which must be thoroughly soaked with coal tar, filling the joints well ; then, while the tar is hot and soft, lay a two inch plank floor over, taking care to

break joints, and putting the plank as close together as possible, so that the tar fills the joints of the upper floor and overflows upon the top surface, which is finally well coated with tar. Seven and a half or eight feet will make the length of the floor required, and this should slope about two and a half inches to the rear. This short top floor gives a dry bed for the horse, and the drainage flows off from it to the lower floor, where it may be collected by a liberal coating of dry absorbents. The tar coating is apt to make a slippery surface, but this may be prevented by applying sand on it while soft.

Estimating Lath.

LATHING and plastering are usually estimated by the square yard. Local customs govern the allowance to be made for openings, closets, etc. In some localities it is the custom to deduct all openings, such as doors and windows. In other places half of the openings are deducted, while the custom in still other sections is to measure on all openings and figure them in. Closets presses, etc., would be figured in one place at their actual contents, while in another section of the country the surfaces would be doubled. To find the number of lath required to cover a square yard is a very simple matter. A standard lath is 1½ inches wide and four feet long, and consequently contains one-half of a square foot. It would therefore take eighteen laths to lay a square yard of surface if the laths were laid close together. As a rule, however, the laths fall short in width, enough to allow for the spaces which are left between them. Each bundle should contain 500 feet, or 100 laths. As some bundles fall short of this, and as there is more or less waste in cutting, it is necessary to make due allowance for this falling off, and to meet it, it is the just thing to allow when estimating twenty-one laths for every square yard to be covered. Experience has proved that this figure is the nearest possible to being correct.

Veneering.

IN these days, when native hardwoods are coming into general use for inside finish, it is necessary that the workman shall have some knowledge of the art of veneering, for such a thing as solid hardwood doors or sashes should not be permitted in a well finished house. Those workmen who have had any experience in veneering, are aware of the irritating difficulties that beset the new beginner when attempting to prevent the veneering side from going hollow as the glue sets; in fact, to prevent this is a very difficult job unless the workman is well up in his art. Many methods to avert the "hollowing up" have been devised, such as joining ends in several places, veneering on both sides, the one to counteract the other, and fixing before and after veneering. A good method, which has the two advantages of being simple and inexpensive, as regards material and time, is as follows: Prepare the heart side of the stuff to be veneered, then swell the other side by placing a layer of damp sawdust on it over night; it will then be in the morning quite hollow on the face side. Then size the face side, keeping the back damp until the size is sufficiently dry for the caul and veneer, when it will be found to be slightly round on the veneering side, and it may be kept so by placing the veneered sides of two piers face to face and clamping them up, and allowing them to dry gradually. Of course, after trying this experiment, it will not take long to be able to determine how long the material will require swelling; generally one night will be sufficient.

Bricklayer's Rules.

TO make good brickwork the following rules should be observed: 1. Reject all mis-shaped, broken and unsound bricks. 2. Place all the beds of the courses perpendicular, or as nearly perpendicular as possible, to the direction of the pressure they have to bear, and make the bricks on each course break joints with those of the course below and above by overlapping to the extent of from one-quarter to one-half the length of a brick. 3. Cleanse the surface of each brick and wet it thoroughly before laying it, in order that it may not absorb the moisture of the mortar too rapidly. 4. Fill every joint thoroughly with mortar, taking care at the same time that the thickness of mortar shall not exceed one-quarter of an inch. In order to prevent the use of too great a thickness of mortar, it is usual in specifications to prescribe a certain depth which a certain number of bricks shall not exceed. For example, if the bricks are 2¾ of an inch thick, it may be specified that four courses of bricks, when built in the wall, shall not measure more than one foot in height, a condition that implies the average thickness of mortar in the joints shall be not more than one-quarter of an inch. 5. Use no bats or pieces of bricks except when absolutely necessary in order to make a "closure," that is, to finish end or corner of a wall, or the side of an opening, and even then no piece less than half a brick should be used.

Ground Floors.

GROUND floors for stables may be made in a variety of ways. The best are, no doubt, made of concrete, or of gravel and hot tar mixed, and laid down hot, or of Portland cement and sand, or of wood blocks laid down on end and saturated with hot tar. The first, second and third make exceedingly durable and solid floors, non-absorbent, non-conducting of heat, and are therefore warm for the animals, cool for the feet and wholly impenetrable by rats. The manner of laying down these floors is very simple, and with the exception of the tar floor, should be laid down the same as a cellar floor, with coarse gravel, broken bricks and broken stones as a first tier, three or four inches thick, well pounded down; on this a layer of regular concrete or cement should be laid, of sufficient thickness to meet requirements. The tar floor should first have a foundation of gravel, broken stones or bricks, laid down and well pounded to give it a solid start, on this should be poured grout, made of common lime cement, sand and fine gravel. When set hard and dry coat over with about an inch of coal tar sand and fine gravel, which must be spread evenly over the whole work. Whatever gutters or drains are required should be moulded in the floors as the work progresses, or a piece of timber, wrought to the shape required, may be laid down, and the floor built around it, and which may be taken up as soon as the work is done, and such repairs made to make the drain complete as may be apparent. For making a floor of blocks on end the earth should be removed to a sufficient depth, and a proper bottom prepared of broken stones, gravel or plank, the former being preferred. The blocks should be soaked in hot tar and laid as close together as circumstances will permit. When the whole surface is covered and the blocks

where the gutters are wanted sunk a couple of inches lower than their neighbors, the whole should be coated with a layer of hot tar and sand. If properly done the floor will last a lifetime, and remain sweet and clean.

Plaster for Mouldings.

When walls and ceilings are to be heavily moulded some extra provision should be made for carrying the additional weight. This is sometimes done by driving spikes in the wood-work in a line with the projecting mouldings, allowing them to stand out far enough from the wall to carry the weight of all the "coarse stuff" and yet permit their heads to be covered entirely with the "fine stuff." Besides taking this precaution, some decorators use a "fibrous" plaster, with the object of securing greater firmness and tenacity. Longer hair is employed in making this mortar than is ordinarily used in making common mortar. In England and France, and to a limited extent in Germany, plasterers sometimes apply a coat of coarse mortar where the mouldings are to project, then let it dry; then lay over this a fine wire netting, which is secured to the wall or ceiling with nails or other appliances; then the work is finished over this. In some first-class residences the picture-frame moulding is formed of plaster, and when properly done such a moulding is superior in many ways to the gilded or finished wood moulding. The rough mortar used as a foundation for moulded work should be superior to that used on the wall or ceiling for straight plastering, and to insure this it should be well mixed and re-mixed, for it is impossible to mix mortar too much. A good proportion is to use one portion of lime and two and a half of clean, sharp sand and a proper quantity of hair, to which sufficient water should be added to make it workable. The mass should stand at least ten days before being used. It is better, if time will permit, to allow the mass to stand fourteen days before applying to the walls. The cracking of plaster, when not attributable to settlement or shrinkage, is often due to the fact that the mortar has not been properly mixed or has been applied in too "green" a state.

Hints to Paper-Hangers.

In hanging paper where the room has been occupied for some time it is essential, if good work is desired, that the room be cleaned out, floor washed, and the walls washed down or well brushed; not a fly-speck should be left to be covered by the paper. The old adage: "Clean out the sides and corners, and the middle will take care of itself," holds good in the matter of preparing walls for papering. Perhaps in the whole art of decoration there is no department where cleanliness is so imperative as in hanging paper, and when work is commenced the workman should have at hand pumice-stone, a basin of clean water, a clean towel and a sponge, all of which should be in a position where they may be used whenever required. The best paper-hangers use a large round paste-brush, and eschew the flat brush used by men who are not well up in the business. It is claimed —and justly, too—that the round brush takes up the paste much more cleanly than the flat one, and that it can be turned by the hand when spreading the paste and thus prevent the paste from soiling the printed side of the paper. It also has other advantages, as it can be used in any shape it may be taken up, and can be worked dryer than the flat brush. It is conceded by all paper-hangers that all attempts to make paste from anything but the best wheat flour have resulted in failure; but it does not follow that all paste made from the best of flour is alike or adapted to all kinds of paper-hanging. A good paste for general purposes may be prepared as follows: For a room which will require about eight or nine rolls of paper, beat up four pounds of flour with cold water, but no more water at first than is sufficient to make a stiff batter; beat it a little, and small knots will not be formed; then add more cold water to bring it to pudding batter as used in cooking; add from one to two ounces of well-pounded alum. This amount of material, when mixed, will make paste enough to fill a patent pail about three-quarters full. Be sure to have more boiling water ready than that measure. Take it boiling hot from the fire and pour it gently but quickly over the batter, stirring it at the same time; and when it is observed to swell, and the white color of the batter is changed, no more water is required. This method, if closely followed, will give a paste that will be fine and smooth and very adhesive. For heavy embossed paper the paste should be made a trifle stronger by putting in it a little more flour, according to the weight of the paper to be hung. For cheap light paper of inferior grades a thinner paste may be used, though we would not recommend the use of inferior paste even if inferior paper is employed. If the walls to be papered are broken or uneven, the cracks or uneven spots can be made in the same plane as the walls by applying plaster of Paris to the defective places. Sometimes the projections, if not too prominent, may be rubbed down with the pumice-stone the paper-hanger always has on hand.

Fire Doors and Shutters.

The best door to resist fire is the simplest. It should be made of pine and should be made of two or more thicknesses of matched stuff nailed across each other at right angles or at an angle of forty-five degrees. If the doorway be more than seven feet by four feet, it would be better to use three thicknesses of stuff; in other words, the door should be a thickness proportional to its area. Such a door should always be made to shut into a rebate, or made flush with the wall when practicable; or if it is a sliding door, then it should be made to shut into or behind a jamb, which should press it closely to the wall. The door and its jambs, if of wood, should then be sheathed with tin, the plates being locked at the joints and securely nailed under the locking with nails at least one inch long. No air spaces should be left in a door of this kind by paneling or otherwise, as the door will resist fire best that has the most solid material in it. In most situations it is much better to fit the door upon metal slides rather than upon hinges. This sort of a door may be fitted with automatic appliances, so that it will close of itself when subjected to the heat of a fire, but these appliances need not interfere with the ordinary methods of opening and shutting the door. They only constitute a safeguard against negligence. The construction of shutters varies from that of doors only in the use of thinner wood. All the other conditions are the same. Doors and shutters built after the manner described resist fire a dozen times better than the ordinary iron door, whether sheet, plate, cast or rolled, single, double or hollow, plain or corrugated. The wooden door covered with tin only serves its purpose when the wood is fully encased in tin, put on in such a way that no air, or a minimum of air, can

reach the wood when it is exposed to the heat of a fire. Under these conditions the surface of the wood is converted into charcoal; and charcoal being a non-conductor of heat, itself tends to retard the further combustion of the wood. But if air penetrates the tin casing in any manner, the charcoal first made, and then the wood itself, are both consumed, and the door is destroyed. In like manner, if a door is tinned only on one side—as we have seen some—as soon as the heat suffices to convert the surface of the wood under the tin and next to the fire into charcoal, the oxygen reaches it from the outside, and the door is of little more value than a thin door of iron or a plain wooden door.

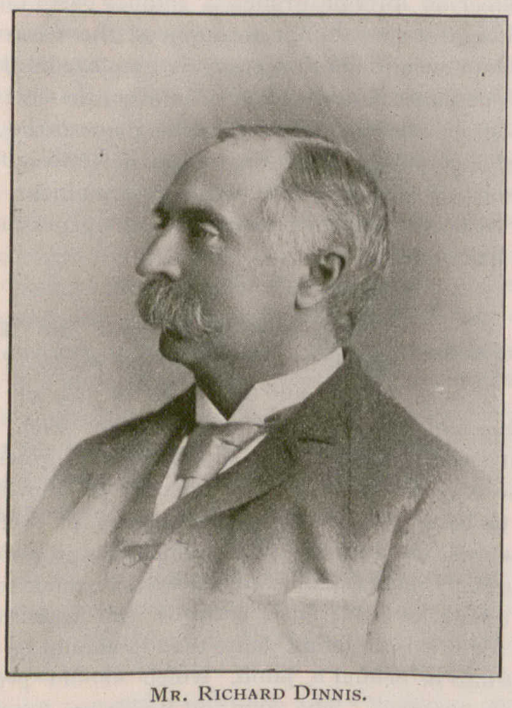
PROMINENT CANADIAN CONTRACTORS.

I.

MR. RICHARD DINNIS.

We have pleasure in presenting to our readers as the first of a proposed series of sketches of prominent Canadian contractors, the accompanying portrait and particulars of Mr. Richard Dinnis, senior member of the firm of Richard Dinnis & Sons, Toronto.

Mr. Dinnis was born in Cornwall, England, Sept.



MR. RICHARD DINNIS.

18th, 1834. After leaving school he was apprenticed to Messrs. Oliver & Son, the largest contractors in Cornwall, from whom he received his indenture papers, which he now has. After receiving his papers he became head clerk and manager for the firm.

In 1856 he came to Toronto and entered the employ, as bookkeeper and assistant, of Mr. Pim, a well known builder of that time. He afterwards became general manager for Messrs. Worthington Bros., contractors, and with them in 1865 went to Ohio, U. S., to execute some large railroad contracts.

In 1866 he returned to Toronto and commenced on his own account the extensive business of which he is still the head. For many years Mr. Dinnis did a large business for the city in the construction of street roadways, wharves, etc., and during his long career in Toronto as a contractor has performed in a highly creditable and satisfactory manner the carpenter work in many of the best residences, warehouses and public buildings of that city. As the contractor for the large buildings for the Toronto Industrial Exhibition Association, he made an enviable record for speedy workmanship—the Main building having been completed in ninety days, the large Annex in forty days and the Grand Stand, 650 feet in length, in forty-two days. The firm have the contract for the carpenter work in connection with the new city buildings now nearing completion in Toronto. As an evidence of their excellent reputation, the fact may be mentioned that when in 1888 the Toronto City Council decided to invite new tenders for these buildings, the carpenter work was excepted, on the ground that the original tender of Messrs. Richard Dinnis & Son was "an exceptionally good one."

The subject of this sketch is a member of the Toronto Board of Trade and from his large experience is in frequent request as a valuator. In the midst of onerous business duties he has also distinguished himself in other fields, having taken an active part as a volunteer and held a lieutenant's commission in the 10th Royals, being likewise a prominent Freemason, last year having been elected District Deputy Grand Master of the Toronto district.

Mr. Dinnis is yet in body and mind a vigorous man, and it is hoped that for many years to come his active and useful life may be prolonged.

A MAIN TRAP AND ITS APPLICATION.

By R. F. Elliott, Kingston.

While we have various forms and styles of sanitary traps, they are all made on the same general principle. As we understand a trap it is a sag, bend or partitioned chamber in a drain, soil pipe or sewer, arranged so that the liquid contents of same act as a seal to prevent the passage of back air or gases, but at the same time permitting the free discharge of liquids, solids and all waste matter. Where there is a connection between the sewer and the plumbing fixtures inside of any building, the most important feature with such connection is to prevent the entrance into the building of sewer gas. This can only be done effectually by placing what is termed the main trap at the foot of soil pipe before entering the main drain on the outside of building. This trap can be placed either outside or inside of cellar wall, but as close to said wall as possible, with proper provisions against the action of frost, and arrangements made for easy access for examination and cleaning out same should occasion require.

In this part of the country, on account of our severe winter, I have always advocated the placing of it inside the cellar wall. Thus I claim prevention before cure. Property owners have sufficient putrid matter as a factor of foul air from years' secretion on the internal surface of their waste pipes with the mechanical agencies applied, to prevent their passage through the fixtures in the form of traps, ventilators, etc., thus preventing the turning of private property into ventilating shafts for the public sewers, with all the attendant evils liable to enter the building through defects taking place in piping, fixtures, etc. Such defects are only too well known to the trade in general. Therefore, the main trap in question is the only safe sentinel always on guard to prevent any entrance of foul odors from the sewer into the building. It may be advanced that by placing a trap in the main drain we prevent the free ventilation of the public sewers by cutting off the free passage of air from the sewer and not allowing it to pass up through the main pipe for ventilation of the fixtures in the building. I would say in reply to this, that the sewers are public property, and any ventilating required should be carried on at the public expense, and not thrust upon private property owners. Again, when the occupants of buildings have discharged the decomposed refuse of organic or vegetable matter, it would be most detrimental to receive it back again in the form of disease, infected with sewer air and all its accompanying disease-spreading germs.

The only objection I have ever heard against this main house trap is its liability of being stopped up with particles of refuse which would otherwise pass away clear of any obstruction to the sewer. We must not forget that what might stop in the trap is just as liable to stop in the drain beyond, where means for its removal is more difficult than if it were retained in the trap. Not that alone, but the direct passage for waste matter to the sewer acts also as a conductor for the foul odors from the sewer through the house pipes, which greatly overbalances the benefits to be

derived from the much-claimed-for direct passage of waste matter to the sewer. The system of ventilation that some people advocate, having an unimpeded course from the sewer through the house vents to the outside air, should be ignored and condemned without any hesitation either in practice or theory.

The only proper system of ventilation for the soil, waste and drain pipes of any building is on the fresh air inlet system on the house side of the main drain trap, as circulation of air creates ventilation under any conditions where ventilation is required. The air cannot be too pure to effect such purposes. The best means I know of that can be applied, is to admit the outside air from a point, say about two feet above the ground, carried down to the foot of the soil pipe, and entering on the house side of the trap. The superior gravity of the outside air forces the confined air in pipes to circulate out of the orifice at the top of the main vent pipe, there to diffuse itself in the atmosphere, becoming harmless in its effects. The chances of stoppage in fixture traps are ten to one in the main trap, the reason for such being that as a rule water closets have, at the most, only ten to fourteen inches fall before reaching the trap seal, which is claimed in the main trap to be an obstruction. On the other hand, we have in sixty to seventy cases out of one hundred, from five to seven feet fall before reaching the main trap. In most instances the chances for cleaning out stoppage in fixture traps are more difficult than in the main trap. Over-flows in fixture traps are liable to do ten times more damage on upper floors of a building than an over-flow through the fresh air inlet at its base, which is the true indicator that the main trap in question calls for immediate attention. This is not the case with fixture traps until the damage is done, provided there are fixtures in the basement. Over-flows in basements are not fraught with such dangerous or annoying results as if happening on upper floors. They act as direct indicators to stopped-up drainage, which should be attended to at once.

Where can you place a better fixture to remedy the evil more quickly than by having the main trap to begin investigation after examining fixture traps? If they are found to be all right, there is no other fixture so useful for any purpose as this much misrepresented main trap. I can see great benefits to be derived from this system of house drainage, and the only grievance seems to be that plumbing or sanitary work, with its plumbing inspectors and sanitary laws, rules and regulations, should be condemned, and be, instead of a progressive element in our midst, a thing of the past. After many years of practice and theory, are we to wait until the thinking lawyer and householder, who in early days would see to it that he had a cement or other trap fixed in in his house drain to prevent the foul odors permeating his dwelling, commences over again to see that it is to be done, or are we expected to know of these requirements, and to recede from our plain duty by ignoring that which we know is a prime necessity. In connection with our imperfect drain and sewer systems, I believe we should not recede from that which is right; the task is before us in all branches of business, in all mechanical callings, and we must endeavor to advance with rigid rules determined to protect the health and lives of the community who place their confidence in us.

From many years of practical experience with main traps, I have yet to meet with any difficulty or serious complaint sufficient to call for anything but the highest praise for this—the most perfect system of sanitary plumbing known at the present time. Nor do I know of an instance where once this system was properly introduced, and its principles explained, that it has ever been removed. Ventilation, or the thorough circulation of air under various conditions, is what creates or conducts in direct connection with the sewer, and, run out above roof of building, causes a removal of the pipe air only under some favorable conditions. The forcing of the confined air to ascend occurs only when the sewer air is colder and of greater gravity than the pipe air, and the external atmospheric conditions at and above the earth's surface are favorable to assist the confined pipe air to discharge at the orifice of the main vent pipe above the roof. The condition above stated, as a general rule, is present to assist the upward motion only during the heated term of the year. In winter weather, when the sewer air is much warmer than either the outside air or confined air in house pipes, the reverse or descending motion takes place. If sufficient heat is generated in the sewer to put in motion the air confined in the conducts or vent pipes, the only favorable time for downward motion is when there is a heavy atmosphere prevailing at and above the earth's surface. Being subjected to various changes on account of wind, rainstorms, etc., in place of a direct circulation taking place, the air in pipes becomes dormant and stagnant and moves in neither direction, only being distributed a little when a large quantity of water sufficient to fill the pipes is discharged suddenly into the fixtures. We must apply as an agent some remedy to destroy or set in motion this stagnant air in house pipes and remove it, if possible, from the building, with all its dangerous elements always at hand to enter the dwellings of our people through any defects which may happen to exist. As sanitarians it is our duty to prevent, not to cure. The physician's duty is to cure if he can, and he must take and be content with second place.

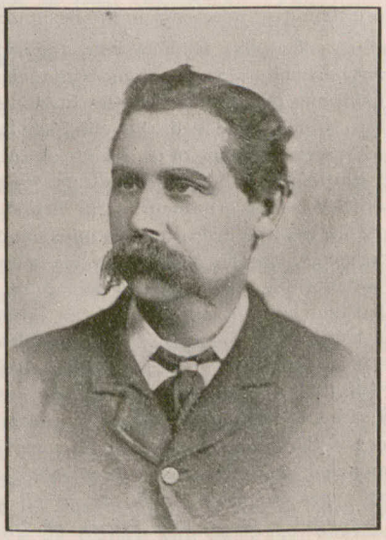
In conclusion let me point out that the most important feature in connection with the system which I have tried to place before you is the fact that we admit fresh air into the soil pipe which causes circulation to constantly take place, morning noon and night, and removes foul odors from all house drains and connections.

PRESIDENTS OF CANADIAN PLUMBERS' ASSOCIATIONS.

MR. THOMAS CAMPBELL.

THE Master Plumbers' Association of St. John, N. B., was organized about two years ago, and now includes on its membership roll every plumber in the city. The present officers are Thos. Campbell, president; J. H. Doody, vice-president; Peter Campbell, secretary. It is our privilege to present on this page a portrait and brief sketch of Mr. Campbell, who has so ably occupied the president's chair.

Mr. Campbell is a native of St. John. He was



MR. THOMAS CAMPBELL.
President St. John Master Plumbers' Association.

apprenticed at an early age to learn the plumber's trade in that city, completing his instruction in Boston, where he spent some years. He commenced business in St. John some twenty-five years ago, and at all times has kept up with modern improvements in steam-fitting, hot water heating and plumbing. He is now engaged in fitting up the new High School building, now under construction, with the Sturtevant blast system of steam, driven by fans through galvanized iron piping. He has also just completed the heating apparatus in the new Vanwart block on Duke street.

Mr. Campbell was asked a few weeks ago by the Queen's Jubilee Committee to take part in the coming celebration as one of the very few survivors of the old volunteer fire department, of which he was one of the first and most prominent members, having been foreman and engineer of No. 4 company between the years 1850 and 1860, when the foremost men in the city were enrolled as fire-fighters, and when a fire department maintained at city expense was unknown.

As president of the Association for the past two years, Mr. Campbell has proven himself to be well qualified for the position, and has always shown a disposition to advance in every way possible the calling in which he is engaged. He claims that plumbing and its attendant branches have taken great strides in scientific improvement in New Brunswick of late years, that St. John architects are very particular as to specifications, and in no part of Canada, not even in its largest cities, can be found a higher standard of work.

DECORATIVE PLASTER WORK.*

AMONG the subsidiary arts with which the architect has to deal there are few of more general application or importance than that of the plasterer. So much of our construction nowadays is of necessity concealed, and plaster is so handy a means of concealment, and indeed, when rightly used, so excellent a one, that its use in the interior of buildings is inevitable.

It is a material so sympathetic and lending itself so easily to decorative treatment and the repetition of ornamental design, that a vast amount of decorative plaster-work—good, bad and indifferent, and I fear the last two adjectives are fully entitled to qualify two-thirds of the work—is being daily done. There is no one of us can well escape its use even if he wishes to do so. It therefore behooves all of us who have to do with building and decorating to consider and to learn what can and should, or what cannot and should not, be done with plaster-work, and it is much more with a desire to direct the attention of the younger members of my audience to some of its uses and abuses, than with any hope or intention of giving technical instruction, that I venture to appear before you.

One of the first considerations that borders the subject of plaster-work is that of its fatal facility—which constitutes a great decorative danger. Its comparative cheapness, its possibilities of rapid workmanship, and the endless and easy opportunities of reproduction that it affords—in a word, its immunity from the natural and powerful restraints that cost and structural necessities impose in most other building materials—seem to me in the case of plaster-work to render self-imposed restraint and careful discrimination more than ever necessary in the designer.

We are all of us, unhappily, familiar with the incontinent cornices of amazing horticultural suggestions, with their basket-work and lattices, their vines and passion-flowers insecurely supported by internal wires, which bedecked the chief chambers of our fathers. We all know, and none of us, I hope, love, the weirdly confectioned "centre flower" with dependent "gasalier" that formed the cherished ceiling ornament of the British householder in the fifties, the sixties, and even the seventies, and dropped, in intermittent fragments, into his tea-cup or his soup-tureen. So fearfully and wonderfully made, so all-pervading were these adornments, that they begot a natural nauseau in time, a nausea that—as often happens in such cases—communicated itself in mental connection to the innocent material that they vulgarized, causing sober folk to forswear ornament of any kind in plaster-work, to find a safe and wholesome refuge in absolute negation, absolute plainness. This was, of course, only a partial revulsion, and was accompanied or followed by "revivals," as they are called, of many types in plaster-work, as in all architectural design. The beautiful ceilings and friezes of the seventeenth century, which made our country famous for its plaster-work, were studied to good purpose by the very few, to evil by the very many, and "Elizabethan" and "Jacobean" travesties became nearly as rife and rampant as the exuberance of the centre-flower period. "Revivals" of Italian, French, Saracenic—indeed, of all and every bygone manner, have been practised, and there are many eminent plaster-shops where you can buy a "reach-me-down" design in imitation, superficially correct, of any style you please at so much—the term is apt—"per superficial foot." These things have had a great vogue with the uninstructed. They please because they offer a romantic suggestion of a possibly romantic original or of the manorial or seigneurial appurtenances of romantic fiction; a suggestion only, for even as copies they are poor, with their dead, level floated grounds, their railway line rigidity of "run" mouldings, their sharp arrises and mechanical "repeats." What a contrast they offer to the originals they travesty. Anyone who examines, with the eye of discernment, a good seventeenth-century English ceiling, will see that, beautiful as the plan of design and forms of ornament may be in themselves, they only count for a portion of the total sum of beauty. The hand of time and recurrent coats of whitewash have often done much in contribution of effect, but the intrinsic, ineffable, underlying charm of handiwork, of human pleasure and interest, of "handling" is there.

The plain surfaces are not hard and level, they are full of slight undulations, the ribs or "strap-work" have no mechanical rigidity, they are by no means accurate at their intersections, they are softly and pleasantly moulded, and usually undulate somewhat with the uneven surface of the ceiling.

The ornamental foliations, bosses, roses and the like—when they repeat, do not do so with regimental exactitude; awkward corners caused by irregular wall lines, chimney-breasts, etc., are lightly and nonchalantly dealt with; there is no strained attempt at fit, begotten of the drawing-board; the design is curtailed, expanded, chopped off or twisted to meet the emergency in a manner that would look queer on a smart office drawing, but is delightful in reality.

Experts differ very much as to the methods of preparing the plaster used for these old ceilings, and as to the way in which they were put up. It is, of course, well known that some were rendered in lathing, some on rough withies and some on reeds or rushes. It is obvious that casting was employed in many instances for the ornamental foliations and bosses, and it is stated that a sort of stamp or pressing-mould was employed for repeating ornaments of small size, such as the roses in the beautiful ceiling at Chastleton, one or two of which I was able to examine closely, as they had fallen down. They certainly seemed to me to have been squeezed into a mould. There are many indications that a good deal of the rib-work was formed by pressing into the plaster ceiling, while still damp, lengths of rib in a similar damp condition. One finds awkward joins and curious failures to fit to a centre, in the case of radiating ribs, which warrant that idea.

If you examine a fallen bit of plaster from one of these old ceilings, you will generally find it very thick and coarse, often very earthy, and sometimes full of little bits of gravel, etc., the kind of stuff the conscientious architect would have to condemn. But its very coarseness helped the effect of the plain surfaces by giving them texture—a quality we so often miss nowadays. How the elaborate and complicated ceilings were designed and set out we do not know with certainty, but there was probably a rough plan, which was all that a well-skilled workman needed—he had his tools, his models and his traditions. That he had models of ornaments for ceilings and friezes we know, as we find exact repetition not only in different rooms of the same house but in different houses. And you will often find ornamental designs, obviously intended for a ceiling, formed into a frieze or used to decorate the spandrels left between the horizontal frieze and the end of a vaulted ceiling, as in the library at Merton College, Oxford. It is probable, however, that much if not most of the decorative design was modelled in situ on the ceiling itself, partly with tools, partly with fingers.

When fingers were used upon the actual plaster it is obvious, as any plasterer will tell you, that the lime used cannot have been as sharp as that we use now—it must have been old or deadened, or no man's fingers would stand it.

There are many lessons to be learned from the abundant examples to be found in almost every county of England of beautiful old plaster-work, while Scotland, Wales and Ireland have their characteristic examples, and one of them is the extreme importance of plain surfaces of texture. I am glad to know that within the last few years that lesson has been seriously taken to heart by one or two artists who have turned their attention to plaster-work. There were some striking instances of the fact in the work of Mr. Ernest Gimson at the last Arts and Crafts Exhibition—work full of charm and feeling and quiet originality, and delightful in uneven surfaces, roughish texture and broad unlabored modelling—work as different in spirit from the average mechanical plaster-work of to-day as was that of the Elizabethan or Jacobean plasterer. I believe that the first essential of success in plaster work of frieze or ceiling is the treatment of the ground. It will be difficult, but necessary if we are to succeed, to wrest from the modern workman his ideal of perfect, even-floated and set levels, innocent of the faintest undulation as fresh thin snow over a sheet of ice, and looking just as cold and hard. It is amazing with what skill a good and conscientious plasterer, armed with his float and straight-edge, will arrive at that result. It is neat, it is smart, it is difficult to do, and he is proud of his achievement, and I do not blame him; he does well what is expected of him, and satisfies his conscience, we will hope. When his ceiling is to be sub-divided by ribs, or decorated with ornament of any kind, he still appears to be ruled by the instinct for sharpness, hardness and rigidity. He starts with a billiard-table surface, the "ribs" are run with a zinc mould in situ, or are cast in a "run" reverse mould and put up subsequently, the ornaments are cast from sharp feelingless models, and the work reaches a wonderful perfection of mechanical accuracy, which, to the mind of an artist, is its glaring imperfection. The arrises are sharp as razors, the beads are round and smooth as glass tubes; a correspondence religiously exact is maintained on both sides of a centre line.

*Abstract of a paper read at the Architectural Association on January 15 by Mr. E. Prioleau Warren.

The cornices are run as accurately, as mathematically as the rest, and the drawings and details are faithfully observed. The result is naturally as unsympathetic as the method. I speak of the average. I am well aware that, fortunately, there are exceptions—I am happy in believing that they are many, and the number seems likely to increase rapidly as architects increasingly devote more time and thought to what is one of the most interesting and important crafts among the many that they rule. What we need, it seems to me, to fit us for a more competent control of plaster-work, as of so many crafts, is to draw less and model more. Fortunately, within the last few years, a good many sculptors of talent have turned their attention to decorative plaster-work, and beautiful ceilings, friezes, and panels in low relief stand to the credit of several men whose names are well known to you. There is an increasing demand for decorative work in plaster. People, even of moderate means, are no longer generally content with the blank white lids of the boxes they live in. This discontent is exemplified in many ways, one of them is that suburban joy, the patterned ceiling paper; other indications are the patent substitutes for modelled ceilings, whose illustrated catalogues, with their alluring titles, are lavished in the letter box and waste paper basket of every architect. A desire for decorative friezes is also prevalent, and is exemplified by precisely similar instances. If this discontent is responsible for many queer results and unlovely makeshifts, it is not in itself ignoble. It is our business to divert it into wholesome channels. The instinct to enrich the ceiling or the roof is, I think, a natural one—the roof is surely as worthy of adornment as the walls. In a church or a great hall it is, or should be, the crown and glory of the whole scheme. In domestic work, in the home of the average comfortable Briton, the cheap substitute for modelled plaster-work obtains a readier acceptance on account of the fact that we dwell—most of us—like hermit crabs, in other people's shells. The leasehold condition of our occupancy has begotten a lease-hold type of decoration. The householder wants something that will "last my time, don't you know"—or, at any rate, suffice for seven, fourteen or twenty-one years. So he not unnaturally shrinks from permanency, which implies cost, and he thinks the real thing costly; but, as a matter of fact, it is by no means necessarily so. With care and thought, and a little ingenuity, it is possible to get good decorative results in plaster at small cost. There are many ways, for instance, of redeeming the absolute bareness of a plain plaster ceiling, without much expenditure. You can have a well-moulded cornice, and divide your ceiling into plain panels by means of shallow ribs. At very little extra cost, if your design "repeats," you can put some simple little ornament into the panels. You can dispense with ribs, and have ornamental corner-pieces and a centre; or you can have the general field plain, and have an ornamental border next the cornice, and modelled in low, broad relief. Where your conditions make it possible, and, I should say, in a longish room or corridor, you can drop the cornice a little way down the wall, and form your ceiling to a shallow curve. This may be delightful in itself, even if quite unrelieved, or can be very effectively decorated with light ribs at intervals and simple flattish ornaments. There is really no end to the simple and effective possibilities of very slightly decorated ceilings. I have seen an old ceiling in a low room at Oxford which has four corner ornaments and a centre, very simply modelled in a highly conventionalized grape vine design—and it wants nothing more—but the plain surface is such as would horrify the skilled plasterer of to-day.

The ceiling under an ordinary collar-rafter roof frequently gives a pleasant opportunity for plaster decoration. You can accept the splayed side between ceiling and cornice and treat it as a sort of sloping frieze, ornamenting the flat under the collars more simply and sparsely, or you can fix out and form a curved or vaulted ceiling, as I have suggested before; and a vault is one of the most delightful fields for decoration.

When cost is not a closely restrictive consideration, the range of possibilities is wide—for ceiling, frieze, decorative panels on chimney-breasts, or such like positions, or for the treatment of the walls themselves. It is sometimes desirable—in a hall or a ball-room for instance—to treat the walls with a permanent architectural decoration that precludes further adornment by means of pictures, wall-papers or hangings, and this, if you use low relief and have a good protective base or dado, can well be done with plaster-work by means of pilasters, decorated panelling, reliefs, etc.

If pilasters are used, it is generally advisable to enclose the plaster relief in a wooden frame for preservation's sake. Whatever the field of your decoration, it is necessary, of course, to use restraint, to avoid overcrowding and fussiness, to aim at a broad decorative result, to remember that you will cheapen your devices by over-repetition and spoil your ornament by over-elaboration. The eye wants some unornamented spaces to rest upon. It seems to me in most cases wise to have rather plainly treated walls and a simple freize, for instance, where your ceiling is elaborate, and a simple ceiling where you want an elaborate frieze. It is hardly necessary to say that your plaster-work should be "plastering" in effect, round and soft, and should not imitate the treatment of any other material.

The ceiling, frieze, panels, or whatsoever form the plaster-work may take, should fall into the architectural scheme of the interior they contribute to; they must be in coherent relation to the rest. The scale must be preserved. And there are many considerations to be taken into account in designing a frieze or ceiling. The proportion of the room, of course, first. It is obvious that the same design would be inappropriate, in one instance, if applied to two rooms, one of which was 10 feet high and the other 20 feet, and that a long low room needs different ceiling treatment to a high square one. Then the lighting must be taken into account. Where the tops of the windows reach nearly to the ceiling, and especially where a longish room has such windows pretty evenly distributed along one side only, very delicate relief will tell at a considerable height. In the same room, if the windows are low, or so small as to give inadequate light, the relief will require to be bolder in order to tell. A room lit from two opposite sides, giving a strong cross light, is the most difficult to treat successfully. The cross light defeats the shadows and spoils the effect of relief; in such a room greater emphasis, greater sharpness of modelling, is advisable. All these remarks are intended to apply to daylight effects, but artificial lighting should be considered too. In great reception rooms, chiefly used at night, and in all rooms intended to be brilliantly lit—say by electric light—it is well to keep the relief rather softer and more delicate than in rooms of more ordinary character in illumination.

As a general rule, in an averagely lighted room, up to 13 feet or 14 feet in height, the relief of ceiling mouldings or ornaments does not require very great projection if the ceiling is left white or nearly white, as relief looks exaggerated. Ribs, I think, are but rather broad and shallow in form, and with a tendency to round members rather than sharp-arrised ones. Their size, of course, must depend upon the scale of the room, the heights at which they occur and the effect aimed at. Constructional beams dividing the length of a ceiling frequently help the design greatly, and are capable of very effective treatment in themselves. In many a splendid old ceiling the ornament was confined entirely to the beams and the cornice with which they intersected.

When there are no beams I am personally inclined to prefer detachment between the decorative design of the ceiling and the cornice. I like a margin left along the cornice. This helps you if you wish to leave the ceiling whitish and to color the cornice; and, generally speaking, the cornice must be regarded as the crown of the wall and not as the beginning of the ceiling.

However, that is, after all, a matter of design or circumstance; it is risky to generalize too freely. But it is safe to say that too much attention cannot be bestowed, first, on the ground surface—whether of ceiling, frieze or panel— and second, on the modelling of any ornament, whether simple rib or foliated or arabesque design. If you cannot be sure of getting good modelling have none at all, find safety in plainness. If you wish to avoid sharpness and hardness have ribs and cornices modelled, not run. Keep them simple and broad, not liney and wiry. Generally speaking, I believe that for ceilings a more or less geometric basis for the leading lines gives the happiest effect; the arrangement should, at any rate, be ordered, if not formal. But whatever the basis and whatever the treatment, the design should essentially be a ceiling design, the ornamentation of a flat surface—to be seen from below—and in a room where it is intended to be seen from all points it should "read," as it is called, in all direction equally well, though it may have a main longitudinal or lateral tendency. It is, perhaps, hardly necessary to counsel the avoidance of any obviously unsuitable type of design for a ceiling, such as swags and festoons—suitable, perhaps, on a vertical surface like a frieze, where the sense of vertical dependence is appropriate, but inappropriate and awkward in a ceiling. A frequently effective treatment for a tallish frieze is to have some form of ornament repeated at widish intervals, the interspace being either quite plain or filled with a plain moulded panel.

I have dealt so far with the consideration of plaster-work for

the interiors of private houses. Great mansions and great civic buildings differ in degree rather than in kind from these, and, as regards their internal plaster-work, the principles applicable to smaller buildings apply to them. Where deep-beamed and coffered ceilings are used greater structural support is needed for them, and bolder modelling and moulding, of course, to preserve their relation in scale to their architecture. They often, however, present the decorative problem of the treatment of domes, of which in a civic building I have not yet seen a strikingly original treatment in plaster-work. I have seen, you have all doubtless seen, dozens of domes treated with diminishing coffered panels, whose framework ascends on the converging radial lines. Wren left us many fine instances of these.

It has been reserved for the last few decades of this century, and the devotees of the "Gothic Revival," to find that plaster-work is inappropriate to the interior of a church. In the seventeenth and eighteenth centuries, and until near the end of the first half of the nineteenth, plaster ceilings were the rule and not the exception in churches.

A great many very charming ones have disappeared before the hand of the restorer, but several seventeenth and numberless eighteenth-century examples remain. I am glad to see that plaster-work is regaining its place in church interiors; it provides, at any rate, a pleasing variant to ceilings of stained or painted deal, or to open roofs with timbers or small scantling and wrought "die-square." For the enriched ceiling of sanctuary chancel or side chapel, I think it is a most excellent material; and the invention of fibrous plaster makes it possible, with little difficulty and comparatively small cost, to use enriched plaster-work, not only for ceilings, but for other decorative purposes in churches.

The slabs of plaster which bear portions of the design, or completely fill separate panels, are put up like woodwork and screwed to the rafters or firring pieces put to receive them. Each slab should be composed of thinnish plaster, embedding layers, usually two in number, I believe, of very wide-meshed canvas, the plaster being worked well through the meshes. They are stiffened with laths or battens and can be worked to any required angle or curve. If the relief is not great they are very light. Where a number of slabs have to be joined to form a ceiling without intermediate ribs, it is customary to pack damp canvas between their meeting edges, which not only protects them, but forms a stiff setting when it dries; the fissures are subsequently pointed in with plaster. Brass screws should be used for fixing and the screw holes, of course, must be stopped in. If steel screws are used, the heads require to be coated with Japan or paint to prevent the inevitable rust from staining the plaster.

The use of fibrous plaster enables one to escape the flatness and rigidity I have spoken of as due to floating surfaces and running mouldings. The casts bear the direct impression of the modeller's handling. The use of this material is not without its artistic dangers, the chief of which is that its modelling is not as a rule done upon the actual ceiling. It is possible, of course, to model in situ, and then cast from the models elsewhere, and that, I fancy, would be one of the safest ways in which to prepare the design of a fibrous ceiling, for nothing can quite come up to the actual position and the actual lighting of the building for which the work is destined. The next best method is to arrange your model in the workshop at as nearly as possible the height that the ultimate casting will occupy, approximating as far as possible the conditions of light and surroundings, and modelling the ceiling from below. If you can manage this, it is wise, at least, to get your model either conveyed to the site it is to occupy, or hoisted up in some similar position for your judgment of effect.

It is essential in case of a ceiling with a cornice and divided by plaster ribs to have cornice and ribs cast from models also, not run. In the case of ribs this can be efficiently done by casting a reverse from the first model and pressing the clay into it to form ribs for the model section of the ceiling. The laying of the moist clay ribs into the ground surface of the model insures the avoidance of rigidity. I have said that it is impracticable to mould with the fingers the actual plaster so as to avoid casting altogether, unless that plaster differs very much from what we generally use. But that difference is now obtained, as I am told, by the use of old or deadened lime and some special kind of sand, and ceilings and other decorative work are modelled in plaster and in position. That, it seems to me, must be the best plan possible when the object is to avoid repetition and when cost admits of it; further, where exact repetition can be avoided the better will be the result.

I have now only a few words to say as to the treatment to finished internal plaster-work. When the plaster—fibrous or otherwise—is perfectly dry, it can be treated with a thin coating of wax dissolved in turpentiue, wiped or rubbed here and there with a rag; this gives it a pleasant, soft, ivory like appearance that is more agreeable than the even tint of distemper. (At Groombridge I had the shields and emblems entirely gilded, and then glazed over partially with oil color, the whole of the remainder being waxed). If heraldry is employed the coats of arms must, of course, be colored, or the blazonry is incomplete There are some good instances of the effect of emblazoned coats occurring in a general field of toned white plaster in the cloisters of Corpus College, Oxford. It is a contrast of which I am fond, that of richly toned heraldry and toned white plaster-work. In church work it is likely that color over the whole surface of the work may be needed, and this presents no difficulties either in the case of oil color or distemper; in the latter case the suction of the plaster will probably need to be stopped with a coat of priming. I referred just now to the effects of a cross light. In my opinion a ceiling lit from both sides requires color, and perhaps gilding, more imperatively than one lit from one side or end only, when the relief gets its full value through shadows.

Plaster reliefs may, of course, be readily used for decorating wall spaces or arch spandrels in churches.

There is, in fact, no end to its decorative applicability.

Time, and your patience, would fail me if I endeavored to cover all the ground of my subject.

You will notice that I have omitted all consideration of sgraffito work and scagliola, which certainly come under the head of decorative plaster-work; I did so advisedly, for the former subject alone would readily fill the limits of a paper like this.

MONTREAL PLUMBERS' DINNER.

THE master plumbers of Montreal gathered together on Monday, the 1st inst., for their annual banquet, which was held at the Richelieu Hotel. Together with their friends, the company numbered over one hundred. The president of the Association, Mr. P. J. Carroll, presided, having on his right the Acting Mayor, Ald. Dupre, Ald. Beausoliel and Jacques, Messrs. T. Collins, of the Standard Manufacturing Company, F. Martineau, M.L.A., and A. A. DuMond; and on his left Mr. J. Lamarche, president of the National Association, Ald. Grothe, Messrs. Hy. McLareu, Colonel F. Massey and L. A. Mongenais.

After the bill of fare had received due attention, the toasts of Her Majesty and the Governor-General were acknowledged with the usual honors, and Mr. Carroll, in a pleasing speech, proposed the toast of "The National Association of Canada." Mr. Lamarche, in responding, spoke of the good the Association was doing, the benefits derived from being united for mutual protection, the necessity of maintaining the good feeling at present existing between the wholesale men and the plumbers, and the cultivation of a feeling among the journeymen that the interests of the master plumbers were theirs also. He referred to the relation of the plumber to the public, their calling being the one supplying the prevention and the profession of the doctor furnishing the cure to those that did not adopt the former; everbody knew the relative value of these, a case of sixteen to one.

"The Corporation of Montreal" was proposed by Mr. Jos. Thibault, and responded to by Acting-Mayor Dupre, Ald. Beausoleil, Jacques and Grothe.

"Our Guests" was proposed by Mr. W. A. Stevenson and responded to by Messrs. Hy. McLaren, of the Toronto Radiator Company; Col. Massey, of Gurney-Massey Company; Alex. A. Robertson, of the James Robertson Company; Wm. Robertson, of Warden King & Son; J. H. Wynne, of H. R. Ives & Co.; L. A. Mongenais, of the Star Iron Company, and A. A. DuMond. "Our Absent Friends" was proposed by Mr. W. M. Briggs in his usual happy manner, and Mr. E. C. Mount responded. "The Ladies," proposed by Mr. J. W. Harris, evoked a pleasant and witty response from Mr. John Watson.

During the evening Messrs. Briggs, Giroux and Wynne entertained with songs. The success of the banquet is largely due to the energetic work of the committee, of which Mr. Martin was chairman and Mr. Dennan secretary. Mr. Carroll proved an efficient presiding officer.

WINDSOR PLUMBERS ORGANIZE.

AN association of master plumbers has been organized at Windsor, Ont., through the efforts of Mr. Wm. Smith, of London, vice-president for Ontario. The first officers are: Geo. M. Christie, president; Robert Paddon, first vice-president; H. Meadows, second vice-president; Jas. Pennington, secretary-treasurer; James Purser, sergeant-at-arms; representative to master plumbers' convention, Mr. A. Brian. The firms who have entered the association include Messrs. Morton & Christie, Pennington & Brian, L'Hereux Bros., Robt. Paddon, M. B. Squire, H. Meadows, R. Purser & Son, all of Windsor, and Watt & Son, Chatham.

Messrs. W. J. Burroughes & Co., Toronto, have removed to more convenient premises at No. 13 Adelaide street West.

The plumbers of St. Catharines, Ont., have organized an association, with Mr. Albert Chatfield as presiding officer.

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