PAGES

MISSING

The Canadian Architect and Builder

C. H. Mortimer Publishing Company - - Publishers.
W. A. Langton - - - - - - - Editor.
Offices: Confederation Life Building, Toronto, Canada.

Vol. XVIII.—No. 211. July, 1905.

ILLUSTRATIONS ON SHEETS.

ADDITIONAL ILLUSTRATIONS IN ARCHITECTS' EDITION.

CONTENTS

Good School Design. It is worth while to call attention to the design for the Shepard school in St. Louis, of which plans and an elevation are shown in the extract from Mr. Ittner's report to the St. Louis Board of Education printed in this number. Here is an excellent example of good design which is simply the expression of the plan. The entrance, he says, is the only portion of these buildings which receives any effort in the way of ornamentation. This severity is entirely on the score of expense. There is no reason otherwise why every feature should not be made ornamental. But the design is not affected by this question. Whether plain or ornate it is the same and arises from a well disposed plan. We see so much in our school buildings of meaningless gables, towers that are expensive as well as meaningless, and windows displaced in the attempt to make an external arrangement with them, that it is satisfactory to find a set of schools which being eminently comfortable inside are made eminently satisfactory outside by simply walling and roofing in the interior arrangement. It is not to be supposed that there is no need for judgement and an eye for proportion in developing the exterior but, as every designer knows, things seem to fall in rightly together when one is on the right track.

Sand-blast Cleaning. It is the fashion just now to clean up smoke-blackened stone fronts by means of the sand-blast machine. There are those who speak gloomily of the cleaned straw hat and its accelerated decline into dinginess when the natural surface of the straw is disturbed; and they predict a similar fate for the stone front. Bnt the cases do not appear to be the same. The stone surface was never a natural surface. It was a worked surface when the front was new and the present operations merely make it resume that condition. In some kinds of stone a hardened surface is acquired by chemical change. That will form again as before, accompanied no doubt by a similar blackening. The struggle against soot is vain for long. It takes only two or three years to make a front look grimy, and either the nature of our smoke or the nature of our stone makes that grime spread evenly without the *chic* effect of black and white—white on the exposed surface of a column and black where it retreats, like a drawing washed in by a skilful draughtsman—that makes the characteristic smoke effect of London on its buildings of Portland stone. The cause, a chemical disintegration of the exposed surfaces, must wear away the stone in time and does, in fact, give a rather leprous appearance to some carved figures of Inigo

Jones; but that is a long time ago and the structural stone seems to be practically unimpaired.

Vitiated Air in Tall Buildings.

If overcrowding in lofty buildings is considered a menace to health, so much so that a speaker in New York has held the sky-scraper and the hospital for tuberculosis to be parallel institutions, what are we to say of the fate of those persons who spend their days in the top storeys of the sky-scrapers; whose air supply is the air that has already served its turn in the lower storeys. Anyone who has ever occupied a room on the top floor of one of these buildings will recognize that they are like flues for the passage of air from below to above. A visitor to the roof of one of them through a little door at the top will, if its communication with the main shaft of the building is direct, find it necessary to hold on to his hat to keep it from being blown away by the gust of air that passes out when the door is opened. Even in summer, when the balance of weight might, one would think, be in favor of the air within the building, it is impossible to open the windows in the top rooms of a tall building without annoyance from the draught, which flutters papers every time the door is opened, and has been known to flutter them out of the window. Here is something to be obviated in planning these buildings. The fresh air question does not always command respect in active life, but it is obvious that it is one with a question that does, viz., the fire question, or at any rate the question of suffocating smoke.

Overhead Signs and Telephone Poles.

The Toronto Board of Control has ordered the removal of signs which over-hang the street. The time limit for the change being set a year away, the support of public opinion may be necessary to prevent reversal of the decision. Merchants who have spent a good deal of money upon signs of this description protest that their signs are an ornament to the street. In a picturesque way there is perhaps something to be said for them, but, even if the question were one of beauty merely, rather than of safety, it must be said that this kind of adornment, which is said to enliven the streets of a Chinese town, is hardly the thing for a city like Toronto. A marshalling of lines in some way is necessary for the attainment of appropriate dignity. On this ground there is therefore an argument for getting rid of the higgledy-piggledy effect of projecting signs.

There is however not much use in talking about any dignity in streets that have overhead wires and are lined by telephone poles sticking up at every angle. If any preacher wants a comparison for the way in which evil fills the eye to the exclusion of the good let him refer to the telephone poles. Slight as they are and small in comparison with the buildings beside them it is extraordinary how the eye selects the drunken lines of the poles to the exclusion of the solid and abundant perpendicular of the buildings behind them. Indeed when there is a conflict of a single building and a single pole it is often the building that looks out of plumb, the eye giving all its confidence to the telephone company.

A Torontonian writing from Cape Town says he could not understand why the town, though smaller, is so much more pleasing and dignified than Toronto, until it struck him that it was the absence of telephone poles. There seems to be no town in Canada so small that it can do without the telephone, and we have to submit to the accompaniment of pine poles sticking up in our streets as they do in our forests. If there is anything in harmoniousness of character we have got it. Where nature flourishes (after the usual fire) the woods are topped by pine poles. And the habitations of man are similarly adorned.

New Building Laws and Old Buildings.

If the municipal attempt to have the staircase exit from the top floor of the Masonic Temple in Chicago increased, so as to make it sufficient for the uses to which the top floor has been put, is upheld, a precedent will have been created giving power to the municipality to regulate public safety to an extent so much beyond the usual bearing of a by-law that reflection upon it comes in alternate waves of satisfaction and doubt. The conditions of building in the United States are so like our own that a strong regulation must arouse our interest.

The facts are that the Masonic Temple, though built in compliance with the building law in force at the time of its construction, is now considered to be so flagrantly out of date in the matter of provision for the safety of its occupants, in case of fire or panic, that the city authorities have stepped in with demands for changes, and a lower court has ruled that they are within their rights in doing so. The case has been taken to the Appelate Court and further movement in the matter awaits this court's decision.

The present building law will allow no hall of 200 capacity higher than 45 feet above the sidewalk. It will allow a number of halls aggregating not more than a capacity of 500 if the halls are small and there are two sets of staircases provided for egress from them. In the Masonic Temple there are eleven halls with an aggregate capacity of 1,300; and the halls are all on the upper floors, said to be "hundreds of feet" above the maximum height allowed by law. What is required from the owner is to make two clear flights of stairs down to the bottom floor.

It is true, as one American journal says, that there are "owners who are eager to take as little precaution in the matter of public safety in public and semi-public buildings as they can get along with." If a building owner, who sees an expensive restriction coming, considers merely that he has done a good stroke of business if he gets his permit through and his building up before any one has a right to stop him, no freedom of action to deal with him, on the part of a municipality, will be beyond our sympathy. It is well that this sort of builder should know that he is not immune from interference because his building is built. For the other kind who keep genuinely up to current ideas, and only fall behind with time and the advance of experience, it is not such a hard case as may be supposed; for genuine thought is not likely to produce results that will be outclassed before they have served their turn with profit. The Masonic Temple, if it was originally designed for its present uses in the upper floor, never was safe; and that is why it suffers from municipal interference now.

CONCRETE BUILDING BLOCKS THAT DEFY DETECTION.

This is the seductive heading of a note in an American journal, which goes on to remark upon the uniform colour of ordinary concrete blocks "which detracts, in the eyes of some prospective purchasers, from their value as a material for making houses." Colouring matter unfortunately weakens the concrete, but "lately," our American contemporary announces "a new material has been found, which, when mixed with the concrete, will produce an almost perfect imitation of the stone that is used as a sample." Granite and Indiana limestones appear to be equally imitable by the use of this new material, and so perfectly that "at a few inches' distance even, the imitation cannot be detected from the original." It concludes therefore that "the time has come when persons of moderate means will be able to build imposing houses at less than one-sixth the cost of building them of real stone."

With the highest respect for our contemporary, and without ever having seen these imitations, it is still possible to affirm confidently that these imposing houses will impose on nobody as being built of either granite or Indiana limestone. One can stare by the hour at the marbles of St. Mark's, at Venice, and enjoy them the more for seeing them often, and yet one never turns the head to look at scagliola. There is no shock of surprise received at finding one of the marble columns in the Toronto City Hall with half its face off, showing its cementitious core? Nobody ever thought for an instant that they were marble. Yet if there is a good imitation of marble it is there. These imitations are in their way a wonder—only surpassed by the wonder that they should ever be made, for they have not the essential beauty of the substance they imitate, and so far from exalting the object they are intended to adorn they degrade it below the level it would assume if finished in its own humble material.

It is a common place now that every building material has its own character; that success in designing with it is to be met by letting that character appear, and not by trying to get the characteristics of another substance. What then is the matter with concrete that it is not pleasing in the mass. It is not its uniformity of colour. There is nothing unpleasing about the uniform colour of roughcast work or even whitewash. And we may feel sure that the prospective purchaser who found a uniform colour in concrete blocks detractive of its value as a material for making houses is the same man who is so powerfully attracted by the uniform colour of pressed brick. The quality of the natural colour of cement is unpleasing and that no doubt is the whole difficulty. If the colour can be made right we shall probably think little about its uniformity, or of requiring blocks of concrete to look like blocks of stone in order to be acceptable.

How to affect the colour of concrete without affecting the strength of the cement is the question. Colouring matters not otherwise suitable for the aggregate have an unsatisfactory effect upon the strength of the concrete, and perhaps it is as well they have. If every man could work his will on concrete in the way of colour, the thought of what might result is not without its terrors. Coloured aggregate would no doubt be sufficient if it could be seen through the bloom of cement that lies on the outside of the castings. This, being very thin, cannot endure forever, so that an old concrete building, like other old buildings, is likely to have a charm of age in the improved colour and greater interest its surface will acquire by the action of the weather in the course of years. If we do not want to wait for that, and must imitate something, we can imitate the action of time by scrubbing the bloom off with a steel brush, (in the case of blocks, by machinery), so exposing the aggregate and getting a characteristic surface with colour.

Concrete blocks of this kind will look even less like stone than those do which defy detection, but they will make a good concrete block wall.

THE LIFE OF A SKY-SCRAPER.

This very live question has been investigated by the *New York Herald* without positive results, but with a strong presumption in favor of a much longer life than is necessary in this day of constant change, where even a million dollar sky-scraper may be regarded as a temporary structure, likely in time not to be worthy of its site. However, this is reckoning for a period of some length of time, and it is generally conceded that, if a steel building is safe, it is safe for a very long time. But if it is not safe, who can tell how long—in fact, how short—the time may be before its collapse.

It is not a question of initial strength, but of subtle and secret disintegration. Danger from vibration, corrosion, and electrolysis do not announce themselves except by results, and if anyone responsible for a building of this kind is disposed to apprehension he is abundantly supplied with opportunity.

As a matter of fact there is not thought to be real danger from vibration in the ordinary condition of steel office buildings, and corrosion and electrolysis can both be met by sufficient insulation, and are so met in the care that is taken now-a-days in the erection of a sky-scraper. Every inch of steel is protected by paint or concrete. Even the interior of columns is filled in with concrete. The steel work itself is six times as strong as it need be. It is estimated that no wind that blows could lay it low, except as it does a tree, by tearing up its roots. And what wind could tear up the foundations of a building fitted into ground which is loaded on three sides with other buildings; fitted into the rock very often, thirty feet or more below the surface.

Yet of all the authorities consulted by the *Herald* not one ventures to give a positive assurance of safety without a qualifying "if." Safety depends not upon ordinary but upon extraordinary conditions of care; not, that is to say, upon sound calculation in the architect's office and good material upon the works, such as would, with ordinary workmanship, answer for the safety of a stone or brick building. Safety in in the hands of the workman. He has a responsibility such as he never had before, and the *if* upon which so much hangs refers to him. Will he rise to the occasion? Will he get above the idea of merely working between whistles and interest himself in his responsibilities? The skilled artisan of the day before machinery, whose supercession by machine feeders is the subject of so much regret, was supposed to take a personal interest in his work because of its dependence on his personal care. Here then in the personal care that the structure and protection of steel buildings require, is the way out of stupid toil and into personal interest in his work for the modern workman. In the army and navy, where there is a tradition of personal responsibility and heroism; in engine driving, locomotive and stationary; and in other situations, where the safety of many recognizably hangs upon the hands of one, there has never been any difficulty upon that score. The workman does rise to his responsibilities, and on their account enjoys the more his work and the title to respect which its importance gives him. Any increased responsibility which modern building gives to the modern workman will undoubtedly find him respond; and of steel buildings as a class we may dismiss the idea that, where a danger to their length of life is known and the precautions that must be taken against it are understood, there need be any anticipation of the life being shortened because the precautions are not properly carried out.

There is still the unknown to speculate upon, and this more than anything seems to make engineering authorities pause in assuring steel buildings of the life which they say is possible to their materials. "If," their reply is summed up, "the steel frames shall remain untouched by any destructive agency of which we are now ignorant, they will stand 5,000 years. But steel, unlike granite, brick and wood, is essentially an untried element in building construction, and we must wait for the years to demonstrate how well it is going to serve us."

What this destructive agency is may yet be revealed by failure, or when a building of age sufficient for its development is pulled down. Hitherto no typical build- of sufficient age has been destroyed. When such an instance occurs it will be an event of so much public importance that the post-mortem examination ought to be in the hands of a Government commission of experts and every facility given for builders of sky-scrapers to personally inspect the operation.

ST. MARK'S, VENICE.

The warning given by the fall of the Campanile of St. Mark's at Venice, has so alarmed the authorities about the condition of the church itself that a careful survey of the building has been made and a report presented which suggests not only the insertion of new supports and stays for vaulting that is distorted, but the rebuilding of the vaults. This involves the removal and restoration of the mosaics which decorate the surface of the vaults. Mr. Reginald Blomfield has written to the *Times* to protest against this kind of restoration, which would amount to the destruction of a great part of St. Mark's as an historical monument. It is impossible to number mosaic tesserae and replace them as they were, as was done with the ashlar of Peterborough cathedral. The old material may be used, as far as it remains unbroken, and the old design followed; but as handiwork of the eleventh century it is not the same.

It is proposed also to restore the capitals of the gallery and to level the undulating floor which is understood to have been as it is for centuries. Against all this disturbance of surface Mr. Blomfield protests as unnecessary for security. The engineering proposals are sufficient with the addition of some visible stays which may offend the "unfortunate passion for neatness," as he calls it, of the Italians, but do not really interfere with either the beauty or the interest of the monument.

His protest has been taken up by the Society for the Protection of Ancient Buildings, who have issued the following memorial to be signed with influential signatures, and will then forward it to the Italian Minister of Public Works.

To His Excellency the Minister of Public Works of Italy.
St. Mark's, Venice.

We, the undersigned, having in view the inestimable value of St. Mark's Church at Venice as an historical monument of great beauty, submit to your Excellency that it is of vital importance that the building should be handed down to posterity intact, except for such works as are proved to be necessary to its preservation.

We feel confident that such works as underpinning, consolidation, and strengthening generally will be dealt with in a competent manner by the architect now in charge of St. Mark's, but we venture to submit that the substitution of modern reproductions for the old carving, the removal of the mosaics to the tribunes or piers supporting the central cupola, and more particularly the taking up and levelling of the old floor of the church, would not in any way whatever contribute to the security of the building, whereas such works would destroy what have been for centuries its characteristic features.

We submit that no modern reproductions, however exact, can have the same value as the original work; that, in the case of St. Mark's, the affection of educated people in all countries is concentrated on the stones and marbles themselves as they now are, and as they have ever been, and therefore that their disturbance and renewal would inflict irreparable injury on the historical value of St. Mark's, and would destroy the infinite attraction which it still has for those who care for the past.

We therefore appeal to your Excellency to direct that the proposals to interfere with the mosaics, the carving, and the floor shall be abandoned, and strictly to limit the works now being undertaken to what is proved beyond question to be necessary to the permanent stability of St. Mark's.

A few days later the following telegraphic news from Venice appeared in the *Times*:

The persons who are directing the work of restoration in the Basilica of St. Mark wish to have it known, especially in England, where criticisms have been passed on their undertaking, that, some restoration of the walls being not only indispensible but urgent, the mosaics covering them are carefully detached after an exact mould has been taken of them. After the restorations are made the mosaics are put back in their places with the greatest attention to the indications of the mould, so that not the least alteration will take place. It is, in other words, almost the same process as that for removing a fresco. A successful example of this was the removal of tne famous fresco discovered a few years ago behind Tintoretto's "Paradise" in the Doge's Palace. As to the floor of the Basilica, it is a question of saving it from ruin in some parts, which are in the most deplorable condition, but maintaining intact the original colour, form, and design, the only desire being to guarantee the stability of the famous monument. All works are proposed and executed under the constant surveillance of a special artistic commission.

We may hope that, as everybody seems to be alive to the desirability of as little disturbance as possible of the building as a document, the *juste milieu* will be followed.

The same telegram states that the piling for the Campanile is complete and the foundation wall is begun. The piling has been made solid, so that the foundation wall stands on a platform of piles. The wall is 10 feet thick at the base. This does not indicate a spread of footing more than about 2 feet on each side; for the hollow wall of the shaft, with an inclined pathway to the top, can hardly have been less than six feet in total thickness.

There is no complete drawing in existence of Sansovino's Loggetta which was built at the base of the Campanile. The design is being patiently reconstructed from fragments of detail found in the ruins.

OUR ILLUSTRATIONS.

THE DINING ROOM—NO. 500, WILBROD ST., OTTAWA, MR. J. W. H. WATTS, R. C. A., ARCHITECT.

This is the dining room of the house by Mr. Watts of which a view was given in the last number of this journal.

HOUSE ON JAMESON AVE., TORONTO — MR. R. J. EDWARDS, ARCHITECT.

The interest attaching to this house, besides its agreeable appearance, is the employment of Roman Stone (concrete) in place of the wood that has hitherto taken the place of stone for the columns, cornices and balustrades of old Colonial work. Both in durability and colour the artificial stone is better than the white-painted woodwork that we are accustomed to see in this kind of design.

OLD HOUSE IN ST. GABRIEL ST., MONTREAL—MEASURED DRAWING BY MR. C. S. BURGESS.

For comment see Montreal Notes.

WAREHOUSES, BAY STREET, TORONTO,

The rebuilding of the district destroyed in the Toronto Fire is going on rapidly. Our illustration shows a row of the smaller warehouses on Bay Street, most of which have been completed and occupied for some time.

INDOOR HUMIDITY.

Indoor humidity has again been discussed by a member of the medical profession, who takes the stand also that the excessively dry air of houses during the heating season is injurious to the human organization, because the dry air in passing over the membranes of the respiratory passages and the skin calls for an enormous output of the fluid elements of these tissues. This physician, Dr. Henry Mitchell Smith, of Brooklyn, N.Y., holds that this leads to glandular overactivity, and its consequent evils, but he does not offer the specific proofs which, it has been asserted, are lacking to show that direct deleterious effects are thus produced. In his contribution, which was made to the Brooklyn Medical Society, he mentions, however, some tests he had conducted with a radiator having an experimental moistening apparatus attached, and he obtained results which concur with general beliefs as to the relation of the humidity and temperature.

He found that with a relative humidity never below 50 per cent. nor above 70 per cent., 70° Fahr. was uncomfortably hot, 68° was warm and 65° comfortable. It was determined by repeated experiments that a temperature of 65° to 68° and a relative humidity of 60 per cent. produced the most comfortable conditions, which were in marked contrast to a temperature of 72°, with a relative humidity of 30 per cent. The former felt warm and balmy, he said, and the latter, notwithstanding the higher temperature, chilly and dry, and apt to leave the impression of draftiness. He did not describe the moistening apparatus, but said that the mechanism was such that the control of the temperature and of the moisture were independent.—*Engineering Record.*

PROF. WILLET G. MILLER'S REPORT.

In Ontario very little use has been made of the crystalline limestones which are adapted to decorative and monumental purposes. At the present time, so far as is known, only two quarries are worked for marble. The marble used in this country nearly all comes from the large quarries in the United States. Although there are in the Province native varities that are as good, trade prejudices favor the imported article. —*From Prof. Willet Q. Miller's Report to the Ontario Bureau of Mines.*

BY THE WAY.

Bank wrecking and house breaking have their respectable branches. The sign "W. Sykes (or another) Housebreaker" is frequently met with in London, looking down on an unperturbed policeman; and a small crowd of onlookers have daily countenanced the operations of the men who, as the newspapers say, have undertaken to wreck the Traders' Bank in Toronto in two weeks. There is a science in pulling down as well as in putting up and that a five storey building of substantial character, standing on the street line, should be taken down in that time without noise, without dust, and without danger is a piece of all Canadian work that Messrs. Carrère & Hastings, when it comes to their turn, are not likely to excel.

* * *

Careful experiments are going on in Boston, under the direction of R. Clipston Sturgis and Edmund Wheelwright, in order to get hold of certainties with regard to lighting, and especially top-lighting, for the new Museum of Fine Arts in Boston. A temporary structure has been erected on the site of the proposed building in order to determine the relative value of natural light from various polnts of the compass. This is no model in miniature—leaving room for doubt—but a full sized erection equal probably to one room of the gallery, for the skylight is 40 feet long and 22 feet wide, properly equipped with glass and weighing several tons. The model is not only of the full size of a room but can be raised up to the level it will occupy in the building. And here, mounted so that it can be moved about at various angles, all the peculiarites of the light will be observed for a period that may consist of months; indeed, if the varied lighting of the seasons is to be observed, the observations must take months. The report, based upon these experiments and upon a subsequent tour of inspection of the great museums of England and the continent, will form the basis later of a limited competition for the new museum building.

* * *

The wonderful Lake-on-the-Mountain at Glenora is likely to be used for the production of electric power. A company has been formed for the purpose of testing the capacity of the lake to see if the supply of water is likely to be sufficient for the purpose. The peculiarity of the lake is that no one knows where its supply of water comes from. Perched on the top of a bluff, 200 feet above the level of the Bay of Quinte and so near the edge of the rock that at one point it is not more than a hundred yards from the side. The little lake, 400 acres in extent seems designed by nature to be a reservoir for power. It has in fact been so used for the last hundred years, (since U. E. Loyalists settled in the neighbourhood), but on a small scale. A flour mill and a foundry at present lie at the base of the rock and are run by an outflow of about 1580 cub. ft. of water per minute. This apparently does not fail, and, when the mills are shut down and this draught on the lake is discontinued, the level of its water does not rise. Is it in a state of equilibrium with a source of supply at some distance off? And how great draughts can be made upon this source of supply?

SCHOOL BUILDING.

REPORT OF THE COMMISSIONER OF SCHOOL BUILDINGS, ST. LOUIS.

By the kindness of Mr. William B. Ittner, Commissioner of School Buildings of St. Louis, we have received a copy of his just published annual report to the Board of Education of the City of St. Louis. That portion of the report which relates to the new school buildings is of great interest as representing the latest developments and evidencing high perfection. We reprint it *in extenso.*

The prevailing and approved type of building in vogue previous to the present administration (1897) was three stories high. It contained 12 class rooms, four on each floor; a corridor ten feet wide passing through the center of the building, was lined with wardrobes on either side and terminated at the rear of the building in a corridor at right angle with the main axis of the building. This corridor was sixteen feet wide and contained two stairways, usually of iron stringers with wooden treads, risers and balustrades. Entrances were provided to the yards and basement with vestibules under the first landing of these stairways, as well as at the front of the building directly into the main corridor.

The class rooms were usually 28x30 feet with a clear storey height of about fourteen feet. They were lighted, as a rule, from two sides, the windows generally containing transoms.

The corridors were of fireproof construction, while the class room floors, attic floor and roof, were of ordinary joist construction, the roof being covered with slate.

Where more than twelve rooms were required, the main corridor was extended; and twelve rooms, duplicating in plan the main building, were erected, with one additional stairway closing the extreme end of the corridor.

The toilet rooms, as well as the heating and ventilating apparatus, were placed in the basement. The sanitaries were of an inferior make and were generally without proper ventilation.

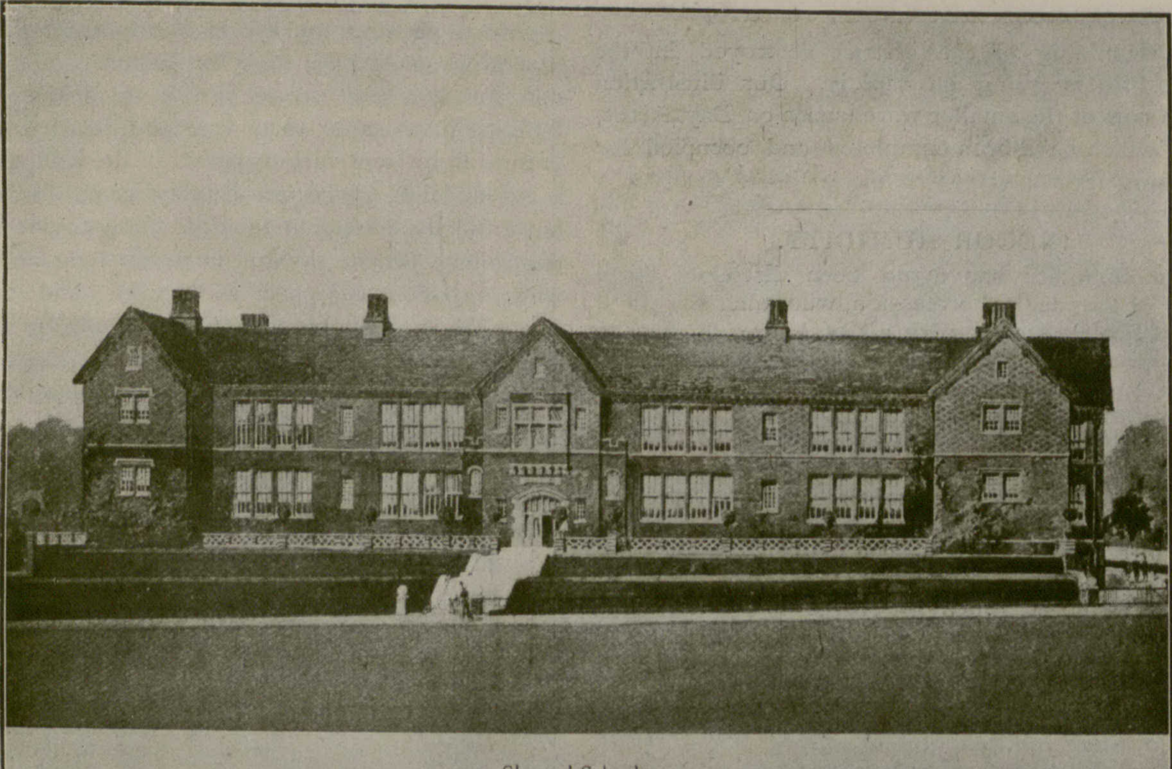
The heating and ventilation system was of the plenum type, with furnace or steam for heating the air. The furnaces were found to be totally inadequate for proper heating, and were in constant need of repair; this led finally to the abandonment of the furnace.

The cost of these buildings was $0.12 per cubic ft. or $94.50 per pupil.

The objection to this type of building, aside from its defects as a good substantial structure, was the dark corridor lined with wardrobes which were without ventilation; the cramped and inadequate exits; and the size of the class rooms which were much too wide for perfect lighting; this, together with the passage of the new building laws (approved April 7th, 1897) requiring school buildings to be fireproof, demanded a radical departure from the prevailing methods.

Before plans for any new buildings were attempted, a careful study of the school house problem was begun, through all obtainable publications upon the subject, as well as through a visit to all cities in the country offering anything in the line of modern school house planning. The result of this study led to the adoption of the present plan, as one meeting local conditions in all respects. Its success has been such as to fix, for the present at least, the plan for our city, as well as to influence in a large measure the school architecture of the country.

The effort has been to develop a plan in line with the best thought and most thorough study of school architecture; one that would insure improved hygienic condition, and consequently preserve the health and morals, as well as promote the intellectual progress of the pupils; and at the same time invest the buildings with that measure of architectural fitness now recognized as essential in training the minds of the pupils to the perception of the beautiful, during the most receptive period of life.



Shepard School.

Briefly summarized, the general requirements that have influenced the plan, design and construction of the schools may be stated as follows:

SIZE OF CLASS ROOMS.

The adoption of the almost universal rule advanced by experienced educators, that a class room should accommodate not more than fifty pupils, forms the keynote to and has largely governed the planning. Authorities agree that each pupil in the grammar grade requires a floor space of about sixteen square feet, and two hundred cubic feet of air space; it follows that a room approximating 24 or 25 feet wide by 32 feet long by 13 feet six inches or 14 feet high, will give the required accommodation, admit of adequate lighting and enable the teacher easily to control the room. With such a room as a unit, it follows that the rooms should be so disposed as to receive light in sufficient quantity and render them easily accessible from stairways and corridors wide enough to permit rapid circulation of classes, and egress.

CORRIDORS.

Another consideration that has influenced the plan was the endeavor to depart not only from the conventional type of school building, wherein the central corridor lined with rooms on each side, was necessarily dark, but to introduce, if possible, outside light into the main corridor throughout its entire length, thus insuring the penetration of sunlight to all parts of the building during some part of the day. This naturally led to a plan grouping the class rooms on three sides of the corridor only; the remaining side being open almost its whole length to the light.

WINDOWS.

Since the success of a school building depends upon the adequate lighting of its class rooms, it naturally follows that the width, height and location of the windows dominate the exterior design. In no case is the window surface less than one-fifth of the floor area.

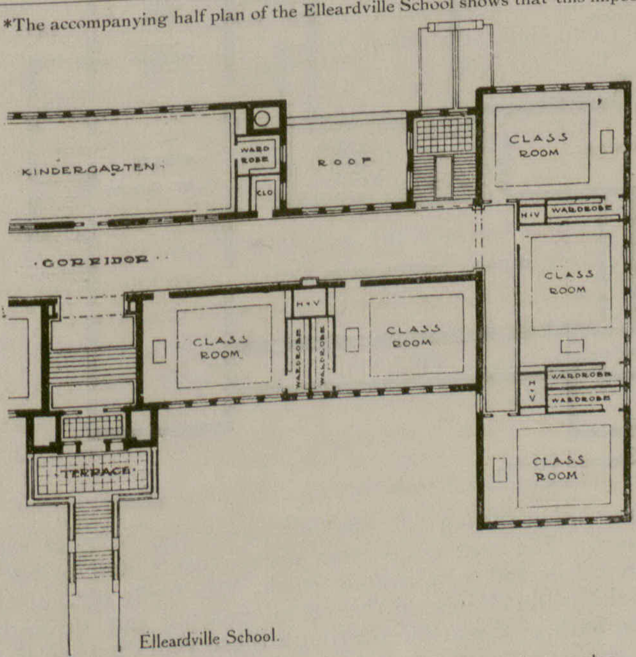
It is conceded that the maximum, if not all, of the light should come from the left of the pupil, and preferably from one side only, in order to avoid cross lights. Windows set 3 feet 6 inches, above the floor and extending to within 6 inches of the ceiling, are located to diffuse the light. This fenestration is possible except in corner rooms, where small windows are introduced on one other side of the room, in order that the design should receive fitting architectural treatment; it being manifestly impossible to locate desks in all rooms so that pupils will receive light from the left only, without enclosing the facade side of the room with a blank wall.*

GENERAL GROUND FLOOR.

The general plan developed by these rigid requirements is necessarily more or less similar in all of the schools approximating in form the letter E, except where kindergarten rooms are incorporated in the plan. In all cases the sites have been wisely selected to permit ample space surrounding the building, affording generous playgrounds, as well as good light and air.

The basements average 15 feet in height (or a clear height of 12 feet under heating ducts) and have been planned with the view of supplying separate playrooms for boys and girls for use in inclement weather, and rooms for physical culture, as well as affording space for the installation of the heating and ventilating plant, the storage of coal, and the general toilet rooms for both sexes. On the floor above the basement, corridors 18 to 20 feet wide afford direct communication to class

*The accompanying half plan of the Elleardville School shows that this impossibility has been met. The perspective of this school is quite satisfactory also.



Elleardville School.

rooms averaging 25x32 feet 6 inches in size, with ceiling 13 feet 6 inches to 14 feet in height. Wardrobes or coat rooms lead from class rooms only (a radical departure from the usual custom of opening them upon the corridor as well as into the room), an arrangement that not only gives the teacher full control over the class room and wardrobe, but permits ventilation of the room through the wardrobe; the constant passage of air carrying with it the vitiated air from the room, as well as odors arising from damp clothing in the wardrobes, thus entirely eliminating the disagreeable odor usually prevalent in schools.

Staircases are located at each end of the corridor on the open side, thus permitting rapid egress. In no case has the height of the buildings exceeded three stories; the tendency in the later buildings being two stories, with basement entirely above the ground.

HEATING AND VENTILATION.

The buildings have all been planned for a mechanical system, using low pressure steam and a fan for forcing the air, This method insures (regardless of the state of the weather, or the humidity of the air) a positive flow of pure warm air at a uniform temperature into each room, and a consequent outflow of a like quantity of vitated air through the wardrobe vents.

The system has been designed on the basis of supplying each pupil with 30 cubic feet of air per minute, this amount being exceeded somewhat under actual working conditions. This delivers to each room 1,800 cubic feet of air per minute and changes the entire volume of air in the room about every seven minutes. This is accomplished with a steam pressure of from 5 to 15 pounds upon the boiler. The system is arranged so that the building can be warmed in mild weather by the exhaust steam from the engine that propels the fan. Experience proves that this is possible in our climate for about one-third of the heating season, thus effecting a material reduction in the consumption of fuel.

Fresh air is drawn into the fans in the basement, usually from an elevation of about 30 feet above the ground, first passing through the tempering coils, where the temperature of the air is raised to about 65 or 70 degrees Fahrenheit. It then passes through the fan to the heating coils, where the temperature can be raised to any required degree. It is then driven through ducts from the hot chamber to the various rooms and corridors.

The heating coils are arranged with a system of by-passes and double dampers so that the air may be taken from the hot chamber, or may be mixed with the cooler air passing beneath the heating coils, and so tempered to any desired degree. The system is therefore very flexible and capable of many combinations at the will of the operator.

The warm air is introduced into the rooms about eight feet above the floor, the heat inlets being placed at or near the same end of the room as the outlet.

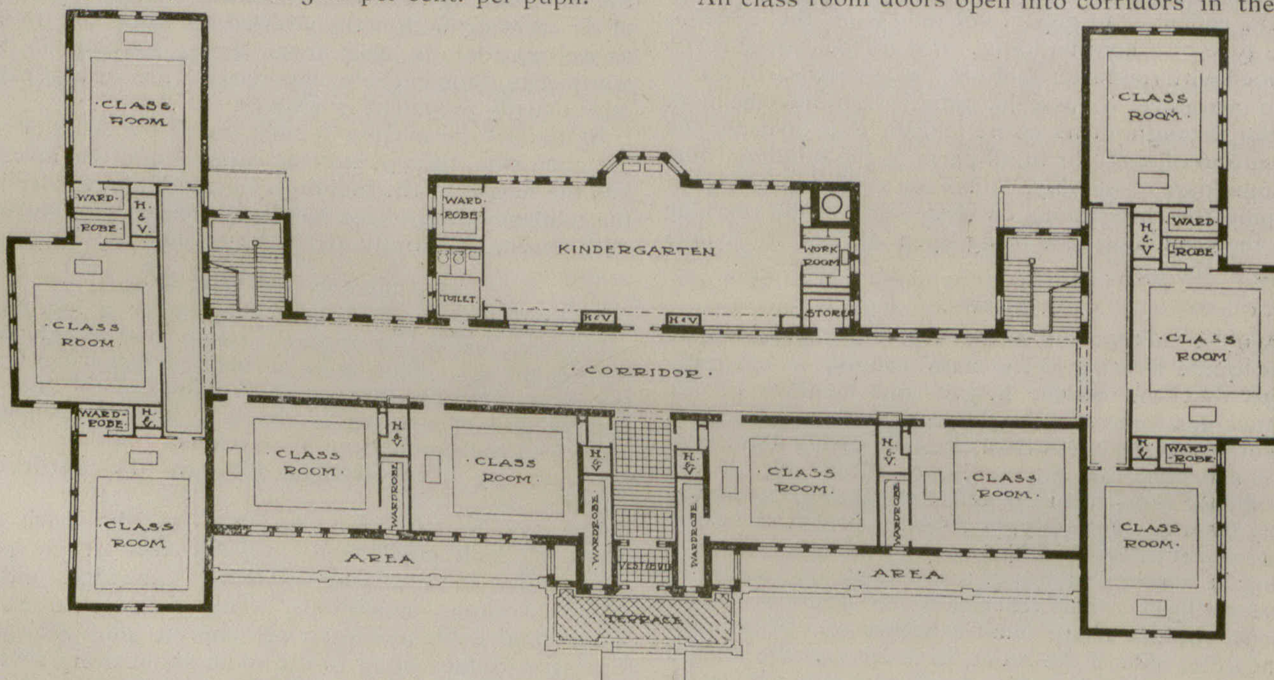
The air enters the class room at a velocity of about 300 feet per minute, and by means of deflecting blades at the inlet is evenly distributed throughout the entire room. The air is thus compelled to make a circuit of the room before passing out through the wardrobe vent.

The thermostat device to regulate the temperature is placed at or near the opening leading from the class room to the wardrobe ; and when set at the temperature desired, maintains it within a variation of one degree during the entire winter.

For the schools in the down town, or particularly smoky districts, an air washing device is being installed. This device will also be used during the summer mouths and the rooms rendered comfortable from the constant flow of cool air.

In order to heat the building rapidly in the morning the system is arranged to by-pass at the fresh air inlet, the fan drawing the air from the rooms and corridors, thus converting it into what might be termed a direct system for a sufficient length of time to thoroughly heat the building before the fresh air inlets are opened and the breathing process of the building is begun. All toilet rooms are separately ventilated to a stack that is kept heated at all times.

The average cost for heating and ventilation by this method for the last two firing seasons, with soft coal at $1.88 per ton, has been 36.1 per cent. per pupil.



First Floor Plan, Shepard School.

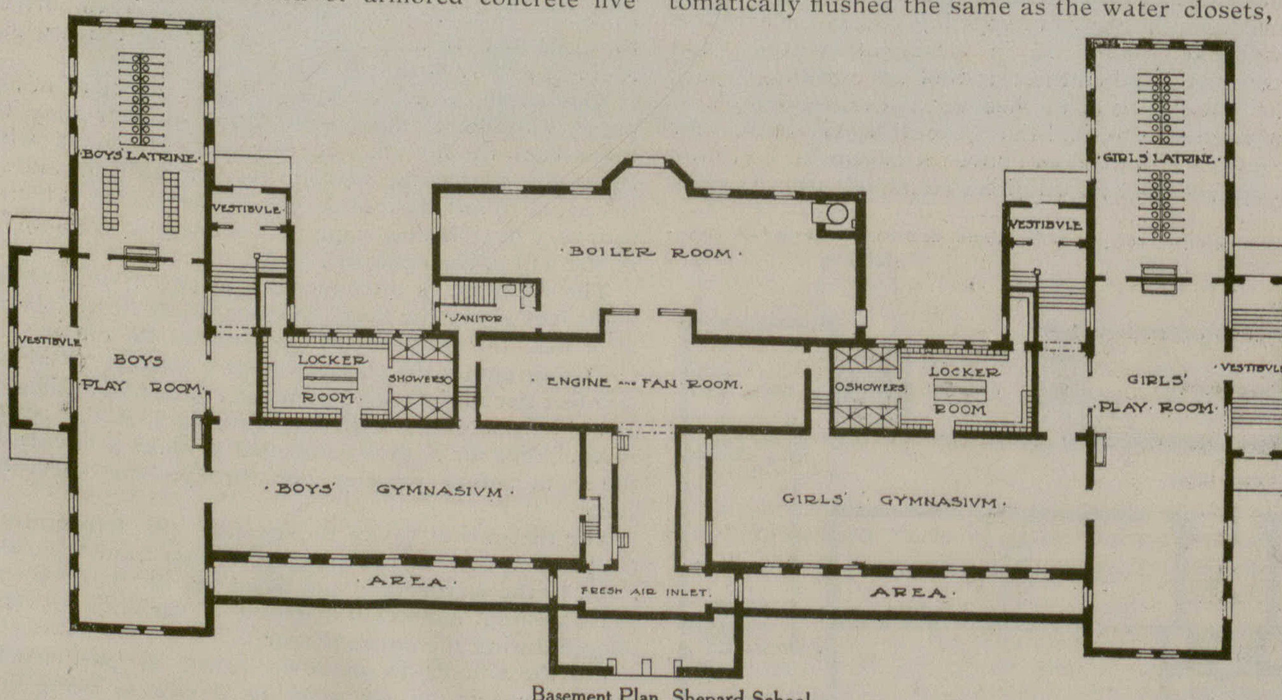
CONSTRUCTION.

All outer and interior bearing walls are of hard brick laid in Portland cement mortar. Interior non-bearing partition walls are of hollow tile, and the buildings are plastered with cement or hard plaster. The interior framing is of steel girders and floor beams, the spans varying from 10 feet to 12 feet. Floors are constructed with a system of concrete and metal. Some of the later buildings have floors constructed entirely of armored concrete.

All stairways are of iron or armored concrete five feet wide; the wearing surface of the treads are covered with asphaltum, which renders them noiseless and non-slipping. The roofs, where pitched, are covered with slate or tile, cemented and nailed to concrete or sheathing. Flat roofs are cemented and covered with composition roofing. Gutters are lined with vitreous tile bedded in asphaltum, or are of copper, copper being also used for the downspouts. Corridors are paved with granitic mosaic, with six-inch borders and bases of marble, or are of narrow maple flooring closely laid.

Basement floors are of granitoid or cement, with an asphalt finish in toilet rooms. Class rooms are floored with closely laid maple flooring. Such woodwork as is used is of quartered oak and simple in design.

All class room doors open into corridors in the line of direct travel to the exits, and are leather-covered and equipped with floor hinges.



Basement Plan, Shepard School.

The plumbing is of the most approved sanitary type, and is installed like the balance of the work, under a system of rigid inspection. The water closets are installed in a series of automatic flushing ranges, the frequency of the flush being regulated by the flow of water into the flush tank. Each closet is vented at the closet seat through a 1-inch by 6-inch vent opening.

The urinals have marble partitioned stalls; are automatically flushed the same as the water closets, and are vented through an opening along the base at the floor. The vent ducts from water closets and urinals are connected to a heated stack, the fresh air, after making the circuit of the room, passing out through the fixtures themselves through these vent ducts to the stack.

EQUIPMENT.

Class rooms are equipped with natural slate black boards set 1 foot 9 inches above floor for lower, and 2 feet 6 inches for higher grades, and extending around the three inner walls of the rooms. The desks are of the single adjustable type, with aisles 18 inches wide between desks. A bookcase, shelf and wardrobe are provided for the teacher, and cases are placed in the library, kindergarten and storerooms for books and supplies.

Drinking fountains are installed in corridors, as well as in yards and basements. Class rooms are painted in lead and oil, the colors being carefully selected with respect to the location of each room and its relation to the point of the compass ; in general soft tints of green are selected for the south rooms, while yellow and red tones are used in the rooms having north or cold exposures. All rooms have a stenciled frieze and picture moulding. The corridors are also treated in the same manner, and serve for exhibition of photographs and class work. Kindergartens are sometimes decorated with mural paintings, typifying the life of childhood.

Each room has a self-winding electrical clock, regulated from a master clock in the principal's office.

Artificial light is furnished by gas or electricity.

SCHOOL GROUNDS.

Believing that a large well-located site is a wise investment, the Board of Education has purchased generous sites for all new buildings. This, aside from the desirability on the score of light and air, has enabled the department not only to provide ample playgrounds, but has given opportunity in a modest way for making our school grounds object lessons of refined civic taste in the art of landscape gardening.

Each school ground can thus be made to present to the juvenile mind some distinct instructive feature, awakening an interest in the knowledge of decorative plants and their use in the embellishment of home and city at large.

Thus the school grounds through a modest beginning may be made an important factor in the educational system of our city, and it is hoped that this feature will be made a permanent part of every school.

DESIGN.

In exterior design the effort has been made to avoid the use of extravagant material and ornamentation and the straining for effect not justified by the function expressed in the plan.

In most instances the buildings are faced with ordinary hard and red brick mixed as to color and laid up with a large bed joint in garden wall or flemish bond. Stone is used sparingly, and no attempt is made to accent any part of the building except the main entrance, which is generally dignified by fitting architectural treatment.

The attempt has been made to invest each building with some degree of individuality in the belief that this, together with simplicity in design and material, will more clearly express the tendency of the times, and that buildings so expressed will more nearly fulfill their purpose as part of our great system of education

---

Here follows a list of the schools (19 in number) built since June, 1897. In this list, the Shepard School, which we have chosen for our illustration (out of three given) is scheduled as fireproof, with 24 rooms, 1,200 fixed seats, and costing $154,254, which is 16½ cents per cub. ft. and $128.54 per pupil. As a means of comparing this with the cost of our own schools the next section is useful.

It will be seen that the cost of our buildings has increased from 11 and 12 cents per cubic foot in 1898 to 16 and 17 cents per cubic foot in 1904-05. This is accounted for by the steadily increasing wage scale since that time, and a corresponding increase in the price of all building materials. It may be fairly assumed, however, that the highwater mark in the price of materials and labor has been reached, and although there has been no decline in these items since the close of the Louisiana Purchase Exposition, the change, if any, will reduce rather than increase our present costs.

The following tables will illustrate the change which has taken place in the price of labor and material during the period :

WAGES PER HOUR

	1898	1899	1900	1901	1902	1903	1904	Jan. 1 1905
Carpenters......	$0.35	$0.35	$0.35	$0.45	$0.45	$0.55	$0.55	$0.55
Stone Masons...	.50	.50	.55	.55	.55	.60	.60	.60
Bricklayers......	.40	.50	.55	.55	.60	.65	.65	.65
Plasterers.......	.57½	.57½	.62½	.62½	.62½	.75	.75	.75
Tinners	.30	.35	.40	.40	.45	.50	.50	.50
Iron Workers...	.35	.35	.40	.45	.50	.55	.55	.55
Slaters..	.45	.45	.45	.45	.45	.40	.55	.62½
Comp't'n Roof'rs	.35	.35	.40	.50	.50	.00	.50	.50
Painters........	.31¼	.31¼	.37½	.37½	.42½	.50	.45	.45
Plumbers........	.43¾	.43¾	.50	.50	.50	.62½	.62½	.62½
Steam Fitters..	.50	.50	.57½	.57½	.62½	.62½	.67	.67½
Electrician......	.37½	.37½	.37½	.37½	.50	.62½	.62½	.62½

To illustrate more clearly, an hour's labor of all mechanics employed upon the schools in 1898 cost the Board $4.90. An hour's labor by the same mechanics in 1904-05 cost the Board $7.10, an increase of 45 per cent.

The rise in the price of building materials has been just as marked :

	1898	1899	1900	1901	1902	1903	1904	Jan. 1 1905
Brick per M........	$ 4 50	$ 5 65	$ 7 00	$ 7 50	$ 7 75	$ 8 00	$ 7 50	$ 8 00
Steel per ton........	24 00	38 00	38 00	32 00	40 00	32 00	31 00	32 00
Lumber per M.....	16 50	16 50	18 00	19 00	20 00	20 00	20 00	20 00
*Plumbing Supplies	.....	......	......	......	.....	......	......	... ..
*Electrical Supplies	......	......	......	......	......	......	......	......
*Steam Supplies ..	.....	......	......	......	.....	....		......
Hardware...... ..	39 35	40 50	41 65	43 00	44 40	46 20	49 35	56 95

* The advance in these items has been from 25 to 65 per cent.

It is only fair to state that in 1898-99 both the building material and labor market were recovering from the panicky prices of 1893-94.

The report continues with an account of reconstructions, repairs, etc., which, except as showing that these are in the direction of fireproofing, wardrobes, better lighting and modern heating and ventilation, are of less interest to us. But the summary of cost, with which the report concludes, is interesting. This summary states that the expenditures through the Department of School Buildings and contracts let from June 30, 1897, to January 1, 1905, have been $5,377,-157.22, and the cost of the Department in salaries, etc., for the same period has been $149,977.10, or 2.78 per cent.

A NOVEL BALANCED DOOR.

A Belgian inventor, Mr. Joseph Henri Dierickx, has recently produced a door which is a radical departure. It consists of two leaves, which are so pivoted that they will swing into partitions as the door opens, leaving an entirely clear passageway. Thus, the new doors partake of the advantages of both the hinged type and the sliding type, while avoiding their objectionable features. The common hinged door has heretofore been considered the most satisfactory type where space allows of its use, because of the ease with which it can be swung open. The sliding door, while it overcomes space objections, is nevertheless not perfect. The rollers on which it travels are too apt to slip off the track, causing the doors to stick and jam.

Mr. Dierickx's door is formed of two triangular leaves, which, when the door is closed, meet on a diagonal line of junction. The leaf, which is largest at the top, is pivoted at the lower corner, and the other leaf is swung from a pivot above the centre of the doorway. A rod connects the two leaves in such manner that when either one is swung in a certain direction, the other will swing in the opposite direction. Thus, in opening the door, it is not necessary to seize both leaves and move them, for if either leaf is moved into or out of its pocket, the other will automatically move in harmony with it. The two leaves are also so connected that they counterbalance each other, and they are controlled in their movements by suitably grooved guides, in which they travel with a minimum of friction. No rollers are necessary. The peculiar shape of the door is apt to strike one as awkward at first; but this is due mainly to the fact that we have always been accustomed to rectangular doors.—*Building News.*

*CONCRETE CONSTRUCTION AND CONSISTENCY IN REINFORCEMENT.

The subject of concrete and its general use is so large a one that the writer feels his inability to treat it properly, even if time and space permitted. The uses to which concrete has been put and the possibilities still open to it, are almost numberless.

Only within the last couple of years a new field has been opened to it in the shape of the concrete building block. Two years ago its use in moulded blocks as a substitute for stone was a mere rumor. To-day there is in the neighborhood of two hundred companies in the United States, whose business is the manufacture of machines for the moulding of concrete blocks.

Blocks can be made in an infinite number of forms appropriate to the material, or in imitation of stone.

In connection with this particular point, it seems sad that there should be so much imitation and so little attempt to produce an article which would not proclaim all over its face the fact that it is supposed to be something else. Great quanties of so-called "rock faced ashlar" concrete blocks are being manufactured and used in the construction of foundations or for the facing of buildings. The rock-face is clearly intended to have the appearance of stone, but the deception is an utter failure.

Why should this be? Why should not blocks be treated like the concrete from which they are made? For instance, if a concrete contained, as an aggregate, crushed granite, or marble, possibly varied in colors, or if gravel of various types were used, a surface having all the rustic advantages of rock face but at the same time, the characteristics of the material used, would be produced by the brushing out of the mortar slightly on the surface and leaving exposed the pieces ot broken stone, gravel or sea-shells as the case might be. Concrete blocks using this feature or some other method of treatment appropriate to the material would be far more popular than those now produced, and at the same time no more expensive.

The subject of reinforced concrete is one of specialty and is well worth careful study. The range of possibilities in reinforced concrete is simply limitless.

Bridges of astonishing grace and strength have been built of it in every portion of the civilized world. Buildings in part, and as a whole, from the reinforced piles to the cornice, have been and are being built in reinforced concrete. Commercial buildings, flat buildings, warehouses and hotels have been built, ranging in size from the one-storey affair to the sixteen-storey sky-scraper and consisting throughout the construction of their columns, beams, girders, floor slabs and walls of reinforced concrete. Roundhouses for the storage of locomotives are being built with the greatest success of concrete, reinforcement being used in every portion, from the foundation to the roof. Grain elevators and storage tanks, in which the loads and pressures become enormous, are now as easily designed and built in the reinforced concrete as are the far more expensive and less fireproof steel structures.

There have, however, been some bad errors made in getting the experience necessary to properly accomplish the results above referred to, and it is our purpose to set forth here in brief a few of the principles which the engineer, architect and owner should observe when they are called upon to exercise judgment in regard to the reinforcement of concrete. No matter whether the reinforcement lies in a beam or slab or truss, the general principles are the same. No matter whether the slab be used as a light floor in a flat building, or in the roof a roundhouse, or whether it be standing on edge and resisting the horizontal pressure of grain in a deep bin, the strains are there just the same and they must be resisted in the same consistent manner. In order to make the matter perfectly clear perhaps it would be best to start at the beginning.

To define what reinforced concrete is, a comparison will be made to a familiar object, a railroad bridge of the Pratt type.

We all understand, in a general way, the action of the various members in the trusses of a bridge of simple plan. The top chord is in compression, and the bottom chord is resisting a corresponding amount of tension, the end posts and intermediate posts are in compression, while the diagonal members of the web are carrying a tensile load.

Concrete we know to be strong in compression. Is it not easily conceivable that if the steel truss assumed were entirely imbedded in concrete, the steel compression members might be removed and the concrete would supply the required resistance to compression? This would be entirely feasible and the result would be nothing more or less than a reinforced concrete truss. In brief, reinforced concrete means the placing of steel within the concrete in such a way that a truss will be formed by the combination of the materials, in which the steel carries all tensile loads, and the concrete does the work of compression.

Suppose that in the truss the size or capacity of the top chord were fixed, and it were required to increase the capacity of the truss, the immediate conclusion would be that the distance from the top to the bottom chord must be greater, in other words, the effeetive depth must be increased so that the stresses in the chords will have a greater advantage, and the required strength be attained. This is the exact case in concrete-steel construction. A slab, being a solid body of concrete, has a definite capacity to take compression and if additional strength is required, it must be by thickening the slab until the proper effective depth is reached. It will be seen that depth is a requirement in reinforced concrete as well as in any other material.

A short time ago, the writer, in discussing the construction of round houses of reinforced concrete, with a railroad official, was confronted with the remark, that if a concrete slab were used for the roof, the present form of expensive steel trusses might be entirely omitted, a remark which if it had been considered on a scientific basis, would have been found entirely inconsistent. Depth is essential to any form of construction and it can always be depended upon that the strains required to be resisted, will always be inversely proportional to the depth.

To illustrate the inconsistency of most designs in concrete steel, we refer again to the previous example. Suppose that in a railroad bridge one of the diagonal web members should become disconnected at the upper chord, what would be the result? There would be a collapse as disastrous to the structure and to its load, as if the chords had failed to do their duty. In other words the web members, required to take care of the shear in the structure, are as essential to its stability as are its chords.

Now, why should not reinforced concrete be treated with the same consistency. Is it simply because the friction in the concrete is sufficient to care for part of this shear, and buildings are standing in which no other provision is made? That is not sufficient reason why we should throw away what we know to be correct construction and continue to trust to something which a settlement of the building or a bad spot in the concrete may destroy. There are fireproofing companies placing their goods upon the market to-day, who make no pretenses at provision against shear until compelled to by the building departments. There are many more companies who place the shear members in such a way as to be equivalent to the pin-connected truss without the pins in place, in other words, the members are there, but there is no means provided to make the connection to the concrete and consequently, no possibility of developing the strength of the member. With these features lacking, how is the load on the floor slab going to be carried on to the beam; what will prevent its shearing off and precipitating the load into the floor below? Worse yet, how will the beam with its accumulated load ever resist the shear at the girder, if the steel shear members are not securely fastened to both?

*A paper read before the Northwest Railway Club, by Louis F. Brayton, of The Brayton Engineering Co, of St. Paul.

Then again, how can the girder, with its load of beams and their loads, transmit its load to the column, when the shear members imbedded in it are depending upon the adhesion of the concrete to the steel, to resist the enormous shearing strains at the end of fhe girder. These points are brought out merely to emphasize the necessity of consistency in the design of reinforced concrete.

The chords must be of sufficient strength, and they must be properly secured, or they will not do their duty. The web or shear members must also be of sufficient strength, and they must be properly fastened to the chords, or they will be a menace to the structure, from the fact that they give a false sense of security.

The use of reinforced concrete has progressed so rapidly that except among technical men who have devoted special study to the subject, there is a lack of knowledge decidedly to the advantage of the material. Even among architects, the men who have to specify its use and who must determine the relative values of the various systems, there is so little real knowledge of the subject, that they are inclined to waive all responsibility and try to make the construction stand up by placing the contractor under a bond.

It is needless to say that the less real knowledge a fire-proofing company may have of the subject, the more willing it will be to sign a guarantee, imbuing its system with supernatural powers, and blinding the eyes of the owner, with a money security, to the possibility of a collapse which may send him and his associates into eternity. What good will a bond do them? It may replace the building. It surely will not replace the loss of life due to incompetent design. Why should an owner consent to place himself and his associates under the shadow of a reckless design? It is for two reasons, the love of the almighty dollar and the lack of appreciation of the risk being taken.

Two fireproofers may be asked in a general way, "What does your system of fireproofing cost per square foot?" The answers, because of the variation, are a surprise to the owner. One man quotes a standard price. He uses the same construction regardless of span or capacity, and offers to give a bond that his floor will have the required strength. The other takes more time to consider, fignres out accurately the quantities of materials required to do the work in a scientific manner and quotes a price consistent with the design. The work is awarded to the first, he being the lower bidder, and the owner moves his business into quarters which are a continual menace to public safety. He is simply letting apples be shot off his head and feeling that he will not be hit because the marksman has had pretty fair success picking apples heretofore, and he has put up a bond to shoot straight this time.

In talking to an architect a few days ago, the writer dropped a few remarks about the probabilities of a collapse in concrete-steel construction and the desperate chances some people are taking. "Well," said the architect, "you are the last person on earth I expected to hear talking that way," and he spoke the truth. He has had concrete-steel men pumping concrete impossibilities his way until he expects them all to be prevaricators of the rankest nature.

Concrete is subject to all of the faults of building materials and a few more. Every ingredient must be perfect. Mixing and placing must be perfect. It must have the proper time to acquire its strength. Any one of these points failing it is no better than so much mud. The question arises, if a material, hazardous in itself, must be used, should not the reinforcement be placed in such a way as to reduce to a minimum the possibility of a collapse? There can be but one answer; do the reasonable thing; supply in steel what is lacking in the concrete, and do it consistently throughout the design from the centre of the slab to the base plate.

Concrete-steel is like all other good things. It is common sense from the beginning to the end. If reason calls for a certain thickness of slab then it should be used, for to cut down in so essential a feature is taking a responsibility for the lives of others. If common sense says, place reinforcement here or there, then it should be so placed in spite of the cost in excess of that design neglecting it. A prominent engineer once said to the writer, "If your design does not look to you symmetrical, common sense, logical, consistent, then keep on until you get it." Every word was true and it has been the greatest aid in the design of structures, to feel when the conditions were attained, a kind of self-satisfied confldence that the design would fulfill the conditions of those words.

In consideration of the conditions outlined, what is the owner to do in regard to the fireproofing of his building? In the first place he is to realize that the fireproofing is the most important part of the construction, without exception, upon which it is his lot to pass.

In the second place he, in conjunction with the architect, should settle beyond a doubt the exact form of construction which he proposes to pay for.

Far too often is a general contract signed in which no provision is made in regard to the fireproofing to be used other than that it should fulfill certain tests, when with proper attention the best might be had without additional cost. The result is, that the contractor not being bound to any particular system, is free to take such bids as he sees fit. The well-designed system, upon which he may have originally based his bid, is unable to meet the price of reckless competition and it is crowded out to give its place to one deficient in thicknesss of slab, or quantity and correct design of reinforcement.

The reputation of the architect and his own personal interests demand in every way, that only such a system be used as is fully consistent with the requirements imposed upon it and above all things, when an owner buys fireproofing, he ought to get what he wants, for it is his head it is going to hang over.

Summing up, the following points may be noted as worthy of thought:

A chain is no stronger than its weakest link. No matter how strong the longitudinal reinforcement is, the shear member may prove the weak link causing the wreck of the whole. Be consistent from the load to the support.

A bond will not contribute to the strength of the design, nor will the fact that one panel has stood a strenuous test be any criterion that the next will do the same, if the design is not logical and consistent throughout.

The man who wants the best must select it for himself when he pays the price, or he will get a substitute, carrying with it a continual menace to business and human life.

The importance of the reinforced concrete work as a part of the entire structure has been considered. The architect and owner may fully realize the necessity of good designing in reinforced concrete as well as in other materials, but the question arises in their minds, "If this work is to be done by companies designing under patented systems, and is to be entirely a work of specialty, how are we to get the desired results?"

The first thing of importance for the architect to consider, is the specification. It lies within his power to lay down certain rules, which designers, in submitting their schemes, must adhere to. In order to make consistent specifications, however, something of a knowledge of the subject is absolutely necessary. Requirements should be made in such a general way as not to exclude good systems of construction in favor of any particular one, but they should not be so general as to allow the indiscriminate figuring of those companies known to submit habitually designs inconsistent with engineering principles.

One of the first matters for consideration should be that the concrete-steel designer will have the liberty of designing the reinforced concrete portions of the work in such a way as is most consistent wfth his system. He shall submit details sufficient to illustrate his method of construction and furnish a specification clearly setting forth the thickness of the slabs and the depth of the beams, and stating the proposed arrangement of the steel reinforcement therein.

His specification should state the ingredients which he proposes to use in his concrete together with their proportions, but in no case should the designer use a concrete less rich in cement than in the proportion of one part Portland cement to three parts of sand to four parts of gravel or crushed stone. In no case should the use of cinders in any structural portions of the reinforced concrete be considered. The reason for stating the proportions as above is evident. It is a simple way of stating that the architect and owner will not be satified to consider a leaner mixture than that specified, but if the fireproofer wishes to use a richer concrete he is at perfect liberty to do so.

The architect who specifies a definite proposition for concrete takes a certain responsibility for its strength, but if he says, "not less than," he is relieving himself of this responsibility.

The same question arises in regard to placing of the reinforcement. If an architect chooses to design the reinforced concrete for the structure, then he should be absolutely responsible for its stability, for he is asking general contractors to bid upon the work who have made no particular study of reinforced concrete and do not claim to know whether the steel reinforcement, as called for in the architect's plans, is of sufficient strength or not. It would be unreasonable under the circumstances to ask the contractor to guarantee that the floors would stand a load of any definite amount under test, except in so far as the architect is willing to take the responsibility for the correctness of his design.

The writer had occasion to figure some fireproofing a short time ago in which the architect specified the requirement which would be used, at the same time he required the general contractors to guarantee that the floor would stand up under a test load of 1,000 pounds per sqnare foot without sign of failure. There are two very inconsistent propositions in this specification. In the first place, the reinforcement, as the architect designed it, had nothing like the capacity which he asked the contractor to guarantee. In the second place, the idea that a reinforced concrete construction should stand up to its utmost capacity without signs of failure is inconsistent, for what is it expected that the concrete will be doing while the steel is stretched up to and far beyond its elastic limit? Under the specification any cracks occuring in the concrete would be considered a sign of failure, and yet we know that the very nature of the materials used will necessitate a stsetching of the steel under a load and that the concrete must necessarily show more or less cracks on the tension chord as a result.

A NOVELTY IN LAYING CONCRETE.

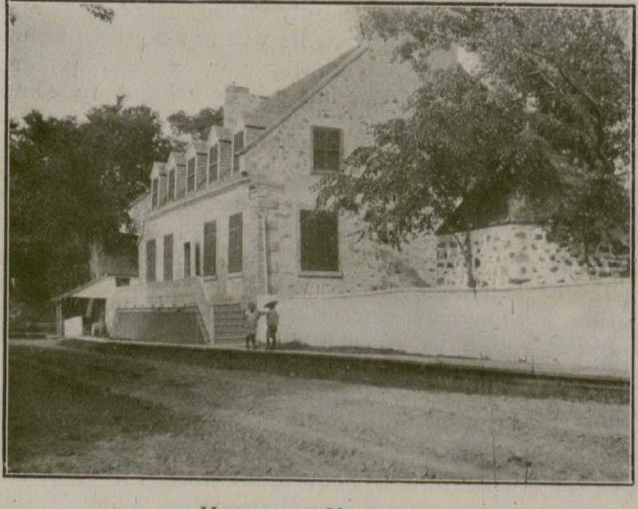
A rather novel method of laying concrete has recently been adopted by J. F. Lyman, of Modesto, Cal., in the construction of a concrete wall, according to the Stone Trades Journal. Between the framing forming the outer and inner faces of the wall collapsible hollow cylinders somewhat less in diameter than the thickness of the wall were placed vertically at intervals, the cylinders having previously been perforated with several holes. The object of this was to drain the water from the fresh concrete as the latter was placed round the cylinders. The concrete having been filled in round the cylinders, it was allowed to set during the night, and the water which had collected in the cylinders was then pumped out and the cylinders were withdrawn, the space which they occupied being filled with concrete. It is stated that the hollow cylinders contained from 2 in. to 6 in. of clear water at the end of from ten to twelve hours, the water having drained from the concrete. The object in providing this extra drainage was to procure a more uniform set throughout the mass of the concrete. It is also stated that concrete laid by this method is unusually free from cracks and very uniform in strength.—The Improvement Bulletin.

MONTREAL NOTES.

The Domestic Architecture of Montreal has a history worthy of being written and illustrated at length and in detail. Even the primitive wood buildings in this Province have architectural qualities.

THE BEGINNING OF THINGS.

The illustration of a little log house shows the roof carried far out on the ceiling joists to shade the house-front and its little platform. The shingling as it works from the steeper roof to the flatter tilt of the eaves develops a strikingly beautiful curve. In an hour's walk just outside Montreal one might see a hundred examples of this most natural economical and excellent arrangement. But it is a virtue which seems to blossom only in humility, for wherever the first sympton of pretentiousness show themselves one looks and finds that this peculiar grace is gone. Many of the buildings existing in the older part of the city date from the seventeenth century and for the most part these pioneers of civilization put to shame in the matter of solidity of construction the majority of their more modern confrères. Their obvious efficiency in warding off the elements, their cosy look and air of substantial well being, give them as pure architecture a similar superiority to most of the more recent work that with frantic and pitiful pretentiousness endeavours to make itself up with makeshift features and exasperating garniture of tin. If in the beginning of things the house of Montreal were of wood this stage cannot have lasted, and everybody who was anybody must soon have had a house of stone.



HOUSES AT VARFNNES.

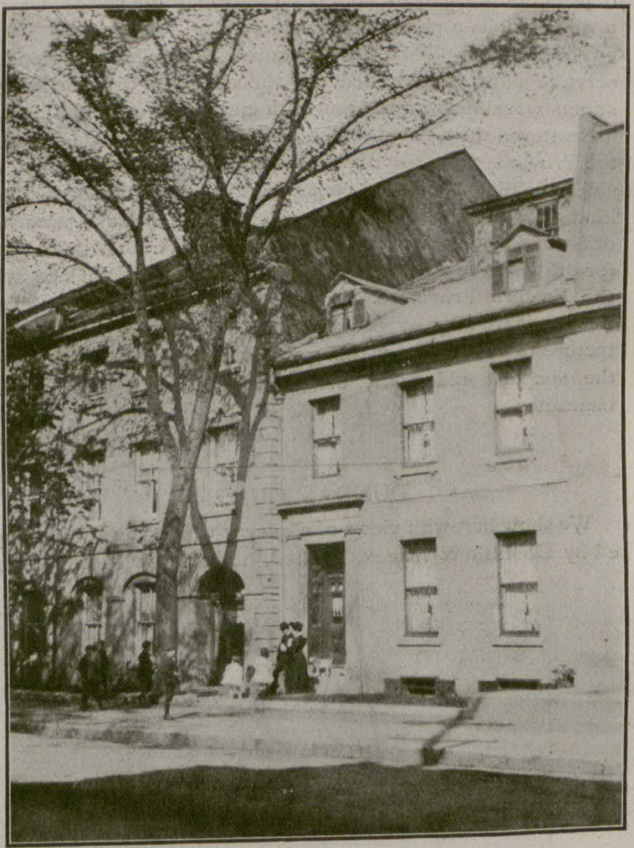
The old house at Varennes is a good type of the simpler eighteenth century dwelling of the province. The front is in this case of ashlar work, the gables random rubble carried well above the roof. In many cases these gable skews are the full thickness of the walls, or about 2'.0" broad and are shingled like the roof. In this house at Varennes may be noticed the almost invariable and picturesque form of footstone to the skew with its large projection to cover the overhang of the eaves of the roof, which is in this case more moderate than usual. The chimneys are here too of the favorite form—double with a lower stretch of horizontal wall across the apex of the roof. The object of the great spread given to the gable, by its projecting footstones, high skew and broad chimney stacks, was apparently to give all the shelter possible not only to the house but also to the roof itself. The projecting quoins make good the connection between the ashlar of the front and the rubble work of the gable. The balustrade to the platform along the front of the house still has the old molded balusters. The square outbuilding with its pyramidal roof is a very usual adjunct to these old residences.

OLD HOUSE, ST. URBAN STREET.

The houses in St. Urban street, Montreal, show the same type of architecture as applied to the more crowded streets of the city. The masonry here is of a rough irregular ashlar. The footstones of the skews have the same molding as those on the Varennes house. The windows are very commonly constructed with a small projecting keystone over their centre. This custom evidently was suggested by the difficulty in handling or obtaining large stones and justifies itself as a constructive expedient by giving a certain elasticity to the structure preventing the unsightly cracking of lintels, difficult to avoid on treacherous soils. The rough ashlar house in Sherbrooke street may be

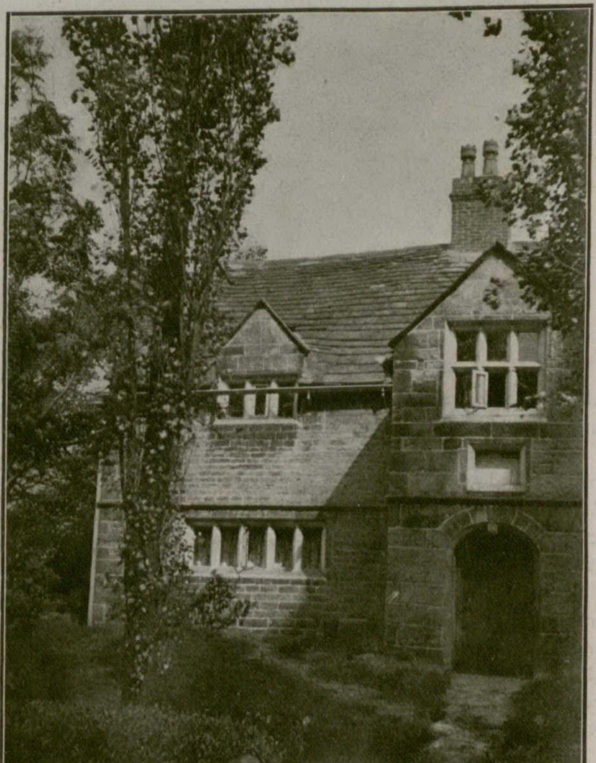
OLD HOUSE IN SHERBROOKE STREET.

more modern in date but follows closely the same type. Still later in date come houses of dressed and evenly coursed ashlar of which some here illustrated (No. 5) are also in Sherbrooke street. Houses of this class have a very considerable charm not readily exhibited by a photograph. They suffer from the fault common to most late Georgian and Adams work of being over restrained. They speak of a time when people set such store on refinement that from fear of expressing themselves with any appearance of vulgarity they hardly expressed themselves as individuals at all, and their architecture has an air of uniformity and conventionality. To a considerable degree of refinement it has, however, fair claim, and in Montreal it is happy in the use of the beautiful local limestone. The builders of this period handled this excellent material with a true instinct. Their delicate little mouldings, broad plain surfaces, and slightly projecting pilasters and bands exhibit the delightful grey tone of this material to perfection. The stone is so hard as to be somewhat refractory but this difficulty is overcome by the method of dressing locally known as fine boucharding i.e., picking with a very heavy hammer the square face of which is furnished with rows of sharp teeth. It is worth observing that in the building which Messrs. McKim, Mead & White are now erecting, for the Mount Royal Club in Sherbrooke Street, the Montreal limestone is being used and the style of the building strongly recalls that of the period now being noticed.



OLD HOUSE IN SHERBROOKE STREET.

The old house on St. Gabriel Street, of which a measure



COTTAGE IN LANCASHIRE ENGLAND.

drawing appears in the present issue, is a variant on this extremely restrained type of work. Here may be observed employment of the small key block over the centre of the openings. The use of a kind of triglyph treatment with a Corinthian order of pilasters is a naïveté not characteristic of the period, which as a rule exhibits a passion for correctnes.

The photograph of a little cottage in Lancashire, England may serve to show how kindred are the effects of true building instincts working far apart and with much difference of detail.

Scattered throughout the cities of Montreal and Quebec and in the Province there are many old buildings some of them of considerable dimensions and containing features of a more elaborate kind of interest than those here cited: A prize is now being offered in connection with the the Sketching Club of the P.Q.A.A. for drawings recording the old work in Quebec Province and in the Eastern Provinces. If the students interest themselves in this work we may expect much valuable and charming architecture to be brought within general knowledge. Most of even the simplest old work being stamped with a truly native character.

CONCORDIA SALUS.

DUNDAS QUARRY.

We show herewith views of a quarry which has just been opened by Doolittle & Wilcox, Limited, mmediately east of Dundas station on the main line of the Grand Trunk, which is interesting in both location and equipment.

The workings are on top of the cliff 250 feet above the R. R. tracks, and 500 feet above Lake level. The top layer, 16 to 18 feet thick is an exceptionally pure hard dolomite, carrying Silica .28%, carbonate of Lime, 53.78%, carbonate of Magnesia 42.00% Iron and Alumina 1.22%.

This stone is used for metalurgical work and as a flux, and contracts have been closed for supplying it to the Hamilton Steel & Iron Co. and the Lackawanna Steel Co., of Buffalo, to whom shipments will be made twelve months in the year, it is a fine concrete or macadam stone but is too valuable to be used for this work.

The next layer of stone 15 feet in thickness is harder but not so pure, carrying about 1.50% of silica, this stone is more suitable for concrete and macadam work, but cannot be used as a flux.

As hardness is an important quality in stone used in concrete work, the stone from this quarry was tested last spring by Mr. McPhail, Assistant City Engineer, of Toronto, with the following results:

Two blocks about 8½ in. x 4 in. x 4 in.—Original weight, 27lbs. 3 oz.; weight after 1,000 revs. 26lbs. 6 oz., 3 per cent. loss; weight after 2,000 revs. 25lbs. 14½ oz., 4.7 per cent. loss.

The crusher which is placed just below the second layer of rock, in the building on the brow of the cliff shown in illustration No. 1, is a No. 7½ Austin gyratory, with a capacity of 1000 tons per day of 10 hours. It is belted direct to a 100 h. p. Westinghouse alternating current motor which gives ample power to develope the full capacity of the crusher.

From the crusher the broken stone is delivered through the chute to a revolving screen located in the building on the hillside. This screen is 48 inches in diameter and 20 feet long, and is provided with a dust jacket 60 inches in diameter and 10 feet long. The screen is geared direct to a 15 h. p. motor and is large enough to handle the full output of the crusher.

The bottom of the screen building contains bins 25 feet deep, 43 feet long and 32 feet wide, divided into five compartments, giving a storage capacity of 2,000 tons.

From these bins five chutes lead to a central chute. which delivers stone into cars standing on a track scale as shown in plate No. 2 sothatany combination of sizes required can be loaded at will.

VIEW OF CRUSHER AT DOOLITTLE & WILCOX QUARRY, DUNDAS ONT.

The perforations of the screen and size of stone made are as follows: 1st. Smallest hole ⅜ in., material passing through this is known as dust; 2nd. stone passing over ⅜ in. and through ¾ in. known as ½ in. stone; 3rd. passing over ¾ in. and through 1¼ in. hole known as 1 in. stone; 4th. passing over 1¼ in. and through 2¼ in. hole known as 2 in. stone; 5th. passing over 2¼ in. and through 3¼ in. known as 3 in. stone; 6th. passing over 3¼ in. known as 4 in. stone.

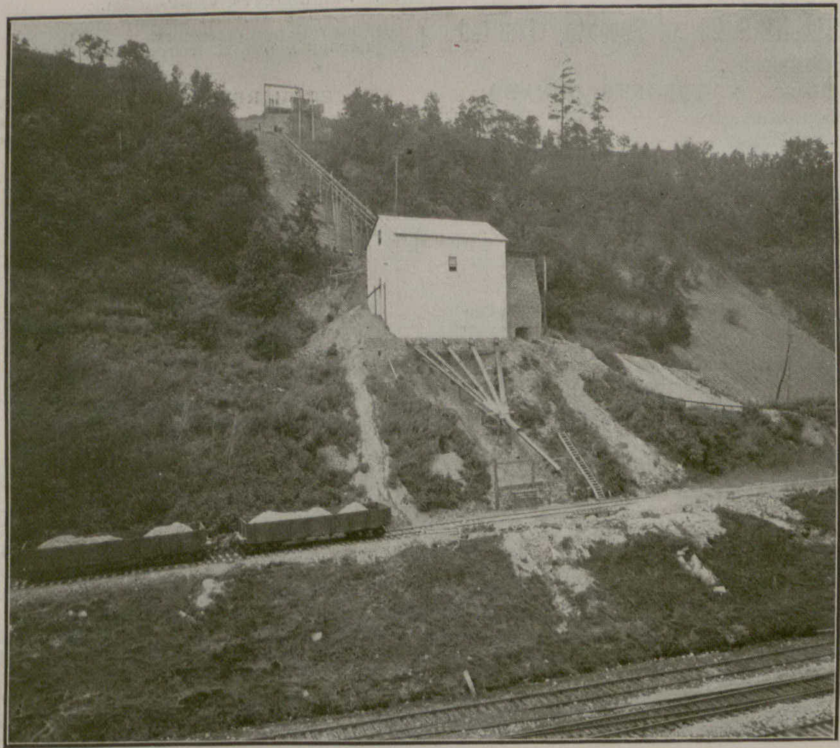
As soon as sufficient space is cleared at top, the carts shown in plate 3 will be replaced by dump cars running on rails which will deliver direct from quarry face to the crusher. This track will be circular and loaded cars will be drawn from one end of the working face to the crusher, and when dumped will be placed empty at the other end of the working face to be filled.

It is also expected that electric drills will be installed to replace the steam drill shown, and in this case the quarry will be operated entirely by electric power, making it so far as we know the only one so operated on this continent.

Those familiar with quarry work will appreciate the advantages of this plant in simplicity of machinery, and freedom from flooding or snow blockades; also in its avoidance of the troubles entailed in operating a steam plant at a distance from coal or water.

The Rogers Supply Co. will handle this stone in Toronto and will stock it at the various yards of the Rogers Coal Co. throughout the city.

Doolittle & Wilcox, Limited, also own and operate the Rymal Quarry, with a capacity of 250 tons and a slag plant at the

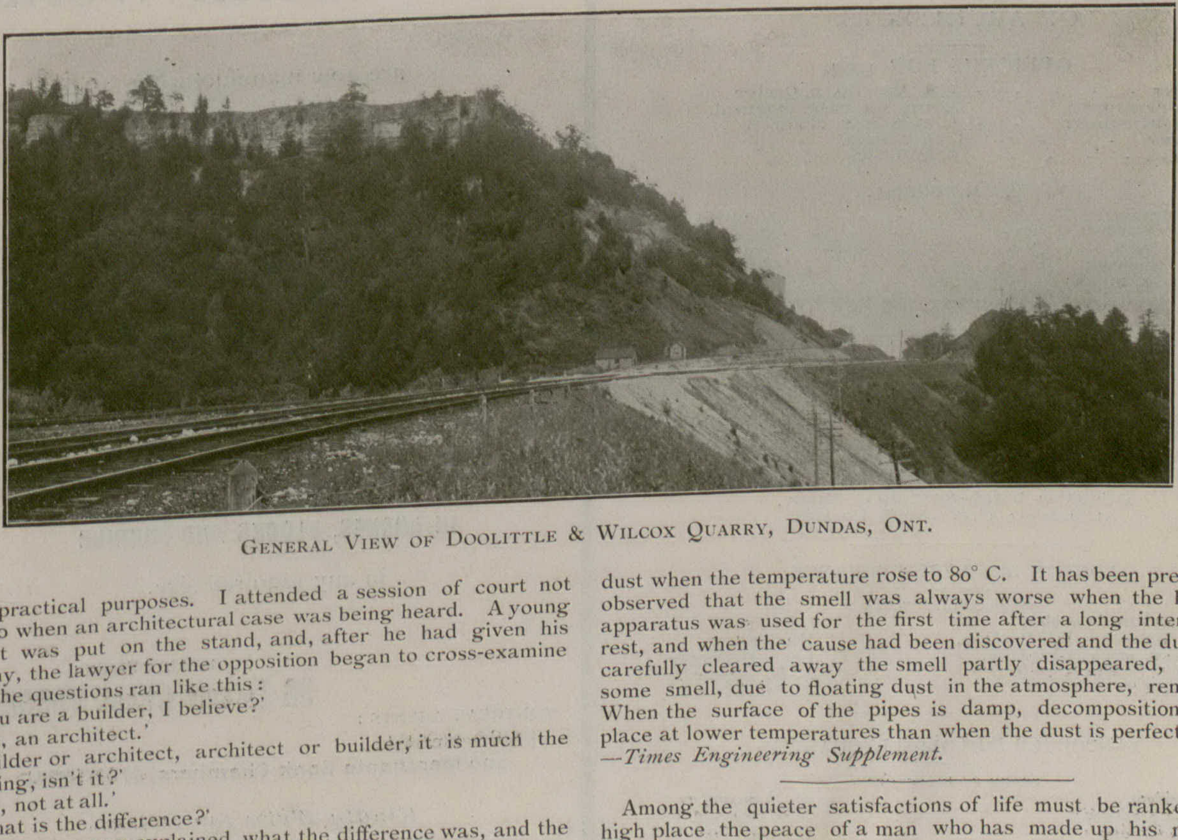


SCREEN BUILDING—DOOLITTLE & WILCOX QUARRY, DUNDAS, ONT.

blast furnace in Hamilton with a daily capacity of 500 tons. The Dundas Quarry being as stated, on the main line of the Grand Trunk Railway, with three way trains daily between Dundas and Toronto, the Company's shipping facilities are of the very best.

EXPLAINS CONFUSION AT BABEL.

"Among ignorant persons," said Frank E. Wallis, secretary of the Architectural League of New York, "there is a belief that architects are useless—that a builder is enough of an architect



GENERAL VIEW OF DOOLITTLE & WILCOX QUARRY, DUNDAS, ONT.

for all practical purposes. I attended a session of court not long ago when an architectural case was being heard. A young architect was put on the stand, and, after he had given his testimony, the lawyer for the opposition began to cross-examine him. The questions ran like this:

" 'You are a builder, I believe?'

" 'No, an architect.'

" 'Builder or architect, architect or builder, it is much the same thing, isn't it?'

" 'No, not at all.'

" 'What is the difference?'

" 'The young man explained what the difference was, and the lawyer, with a sneer, said:

" 'Oh, very well. That will do. And now, after your very ingenious distinction without a difference perhaps you can inform the court who was the architect of the Tower of Babel?'

" ' There was none,' he answered, 'and hence the confusion.' "

HEATING APPARATUS AND BAD ODOURS.

In consequence of complaints respecting smells arising from the use of hot pipes for heating purposes, Professor Nussbaum has, according to the Gesundheits-Ingenieur of June 10, been let to carry out a series of observations extending over several years into the character of the dust deposited on the pipes used for the distribution of hot water or steam and into the products of decomposition of such dust. He has found that when the temperature reaches 70° C. this dust begins to become decomposed and that between 75° and 80° C., such action goes forward with great rapidity. The smell complained of resembled that of a stable and is due to the chemical action of the particle of organic matter which forms a large portion of the dust deposited in dwellings and public buildings. In the course of certain experiments here described, ammonia was freely evolved from the dust when the temperature rose to 80° C. It has been previously observed that the smell was always worse when the heating apparatus was used for the first time after a long interval of rest, and when the cause had been discovered and the dust was carefully cleared away the smell partly disappeared, though some smell, due to floating dust in the atmosphere, remained. When the surface of the pipes is damp, decomposition takes place at lower temperatures than when the dust is perfectly dry. —*Times Engineering Supplement.*

Among the quieter satisfactions of life must be ranked in a high place the peace of a man who has made up his mind.—Anthony Hope.

—THE—

Canadian Architect and Builder

Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The Canadian Contract Record).

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

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

The C. H. MORTIMER PUBLISHING CO. of Toronto, Limited

Publishers,

Confederation Life Building, - TORONTO, CANADA.

Telephone Main, 2362.

Branch Offices:

38 Alliance Building, Montreal.

Bell Telephone 2299.

720-721 Union Bank Building, Winnipeg.

536 Hastings Street, Suite 3, Vancouver, B. C.

22 Great St. Helens, London, E.C.

SUBSCRIPTIONS.

The Canadian Architect and Builder will be mailed to any address in Canada or the United States on the following terms: Architects' Edition, $3.00 per year; Regular Edition, $2.00 per year. The price to foreign subscribers is: Architects' Edition, 16 shillings; Regular Edition, 12 shillings. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

ADVERTISEMENTS.

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

EDITOR'S ANNOUNCEMENTS.

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

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

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1905.

President	Edmund Burke, Toronto
1st Vice-President	S. G. Curry, ,,
2nd Vice-President	W. A. Langton, ,,
Treasurer	Henry Simpson, ,,
Registrar	W. R. Gregg, 96 King St., Toronto

COUNCIL:

J. W. Siddall	Toronto
John Gemmell	,,
J. Wilson Gray	,,
John E. Belcher	Peterborough

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1905.

President	J. S. Archibald, Quebec.
1st Vice-President	Alcide Chausse, Montreal.
2nd Vice-President	R. P. Lemay, Montreal
Secretary	J. E. Vanier.
Treasurer	D. R. Brown.

P.Q.A.A. COUNCIL.

Jos. Venne	Montreal.
H. W. Davies	Montreal.
L. A. Amos	Montreal.
J. Z. Resther	Montreal.
J. R. Gardiner	Montreal.

Auditors—L. Lemieux and P. E. Nobbs.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

John Hoidge, President.
George Duthie, 1st Vice-President.
John Maloney, 2nd Vice-President.
Jas. Crang, Treasurer.

T. Martin.
Cannon, Jr.
R. G. Kirby.
A. Marshall.
Geo. Gander.

Exhibition Board—Richard G. Kirby.
Auditors—G. Clay and F. Holmes.

LONDON BUILDERS' EXCHANGE

BOARD OF DIRECTORS:

Henry Stratfold, President.
George C. Young, 1st Vice-President.
Jas. S. Luney, 2nd Vice-President.
Geo. S. Gould, Secretary-Treasurer.
478 English St.

J. Jones.
Ed. Martyn
Jno. Whittaker.
L. H. Martyn.
A. Nobbs.

VANCOUVER BUILDERS' EXCHANGE.

BOARD OF DIRECTORS

E. Cook, President.
E. A. Carter, Secretary.
H.A. Bell, Treasurer.
T. Bradery.

C. P. Shindler
K. M Fraser
E. G. Bayne
D. Sault

WINNIPEG BUILDERS' EXCHANGE.

BOARD OF DIRECTORS

G. W. Murray, President. A. E. Porter, Secretary.
A.T. Davidson, 1st Vice-President. T.D. Robinson, Treasurer.
G Burgeault, 2nd Vice-President. Alexander Irwin, Sergeant-at-Arms.
Directors: T. G. Latimer, E. Cass, F. Powell, M. B. Martinson, D. Cameron, V. L. Bouche, Wm. Alsip, C. H. Simpson, Jas. A. Payne, T. W. Morley, Thos. Cotter, T. A. Giroin.

MONTREAL BUILDERS' EXCHANGE.

BOARD OF DIRECTORS

N. T. Gagnon, President.
Edward M. Roberts, Vice-President.
Phillip Lahee, Hon. Treasurer.
J. Herbert Lauer, Secretary.
Jas. Simpson and J. H. Hutchison.

John Duthie
Jos. O. Deslauriers
John Gray,
Geo. H. Hood.
Past Presidents

CHAMBRE SYNDICATE DE LA CONSTRUCTION.

(French Builders' Exchange.)
8¸ St. James Street, Montreal.

BOARD OF DIRECTORS.

J. B. Gratton, President.
G. Menard, 1st Vice-President.
T. Charpentier, Jr., 2nd Vice-President.
Alcide Chaus e Treasurer.
N. T. Gagnon, Secretary.

Felix Saurageau.
L. Z. Mathieu.
H. Contant.
E z Cote.
Louis Payette.

VICTORIA BUILDERS' EXCHANGE, VICTORIA, B. C.

BOARD OF DIRECTORS:

W. D. McKillican	Chairman
E. W. Whittington	Secretary
Thos. Catterall	Treasurer

THE T. EATON & CO'S. STORE AT WINNIPEG.

The new departmental store at Winnipeg was opened on July 16th, ten days less than a year from the first sod was turned for its excavation. The day for its opening was fixed from the start and the time was kept.

The building has a 266 feet frontage with space in the block to double that length when needed. The building is five storeys in height but the foundations and steel framework are said to be calculated for double this height.

The type of design is perfectly utilitarian; vertical and horizontal framing with protection, and the remaining surface all glass. There are nevertheless 1,000,000 bricks and 7,000 barrels of cement included in the structure.

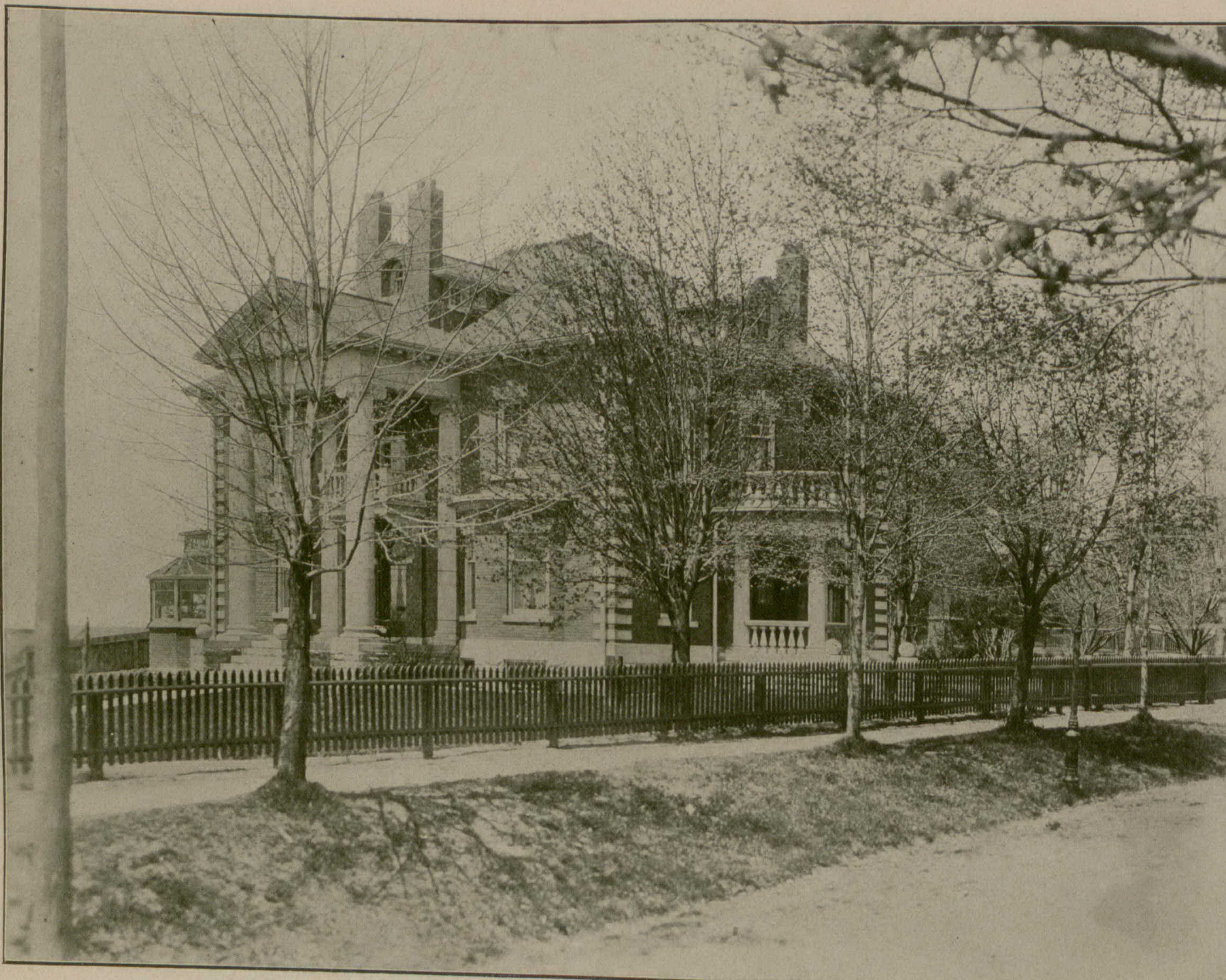
Automatic sprinklers are installed within the building and a water screen without. To feed these there is a private well and two pumps of a capacity of 3,000,000 gallons a day.

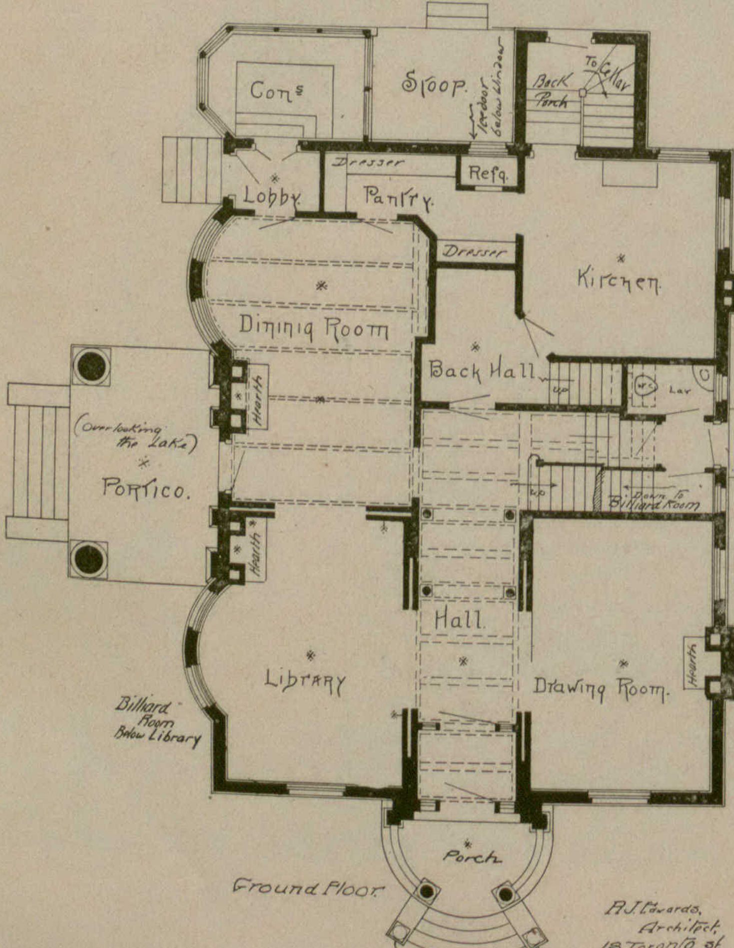
The most modern equipments are arranged inside: a rest room, fur-checking room, counting room, public telegraph and telephone stations, and a bureau of information regarding trains.

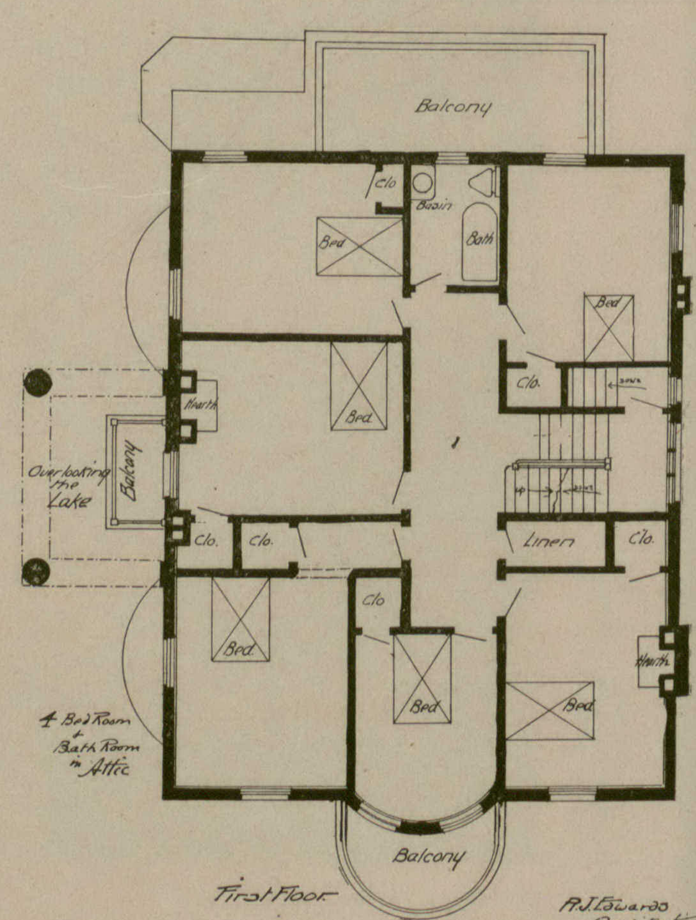
Dining Room in No. 500 Wilbrod Street, Ottawa.

Mr. J. W. H. Watts, R. C. A., Architect.

SUPPLEMENT TO
CANADIAN ARCHITECT AND BUILDER
JULY, 1905







SUPPLEMENT TO
CANADIAN ARCHITECT AND BUILDER
JULY, 1905

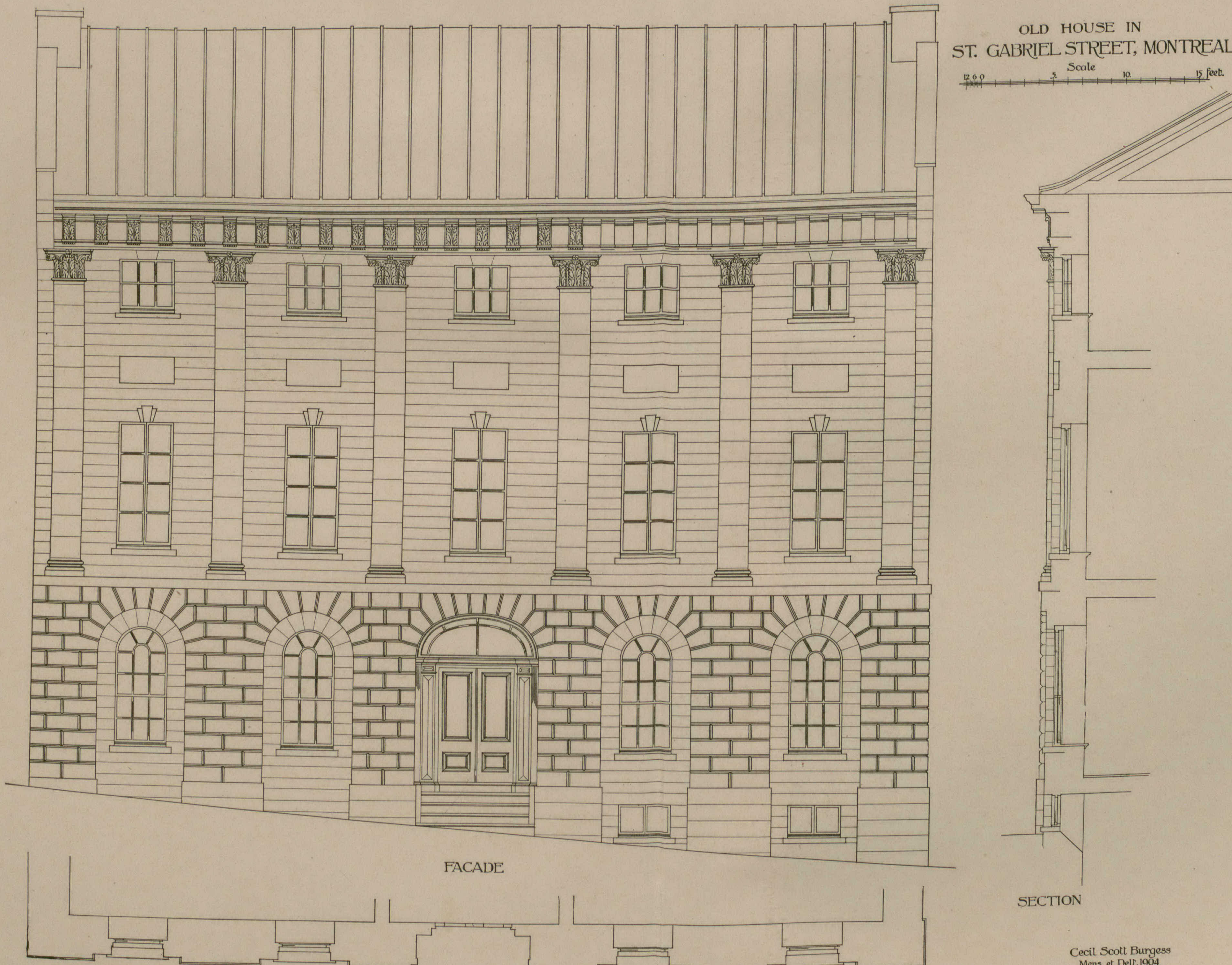
House in Jameson Avenue, Toronto

Mr. R. J. Edwards, Architect

REBUILDING THE BURNED DISTRICT IN TORONTO.
WAREHOUSES ON BAY STREET.

SUPPLEMENT TO
CANADIAN ARCHITECT AND BUILDER
JULY, 1905

OLD HOUSE IN
ST. GABRIEL STREET, MONTREAL.



Cecil Scott Burgess
Mens. et Delt. 1904

SUPPLEMENT TO
CANADIAN ARCHITECT AND BUILDER
JULY, 1905

HOUSE IN JAMESON AVENUE, TORONTO.
MR. R. J. EDWARDS, ARCHITECT.

SUPPLEMENT TO
CANADIAN ARCHITECT AND BUILDER
JULY, 1905

PAGES

MISSING