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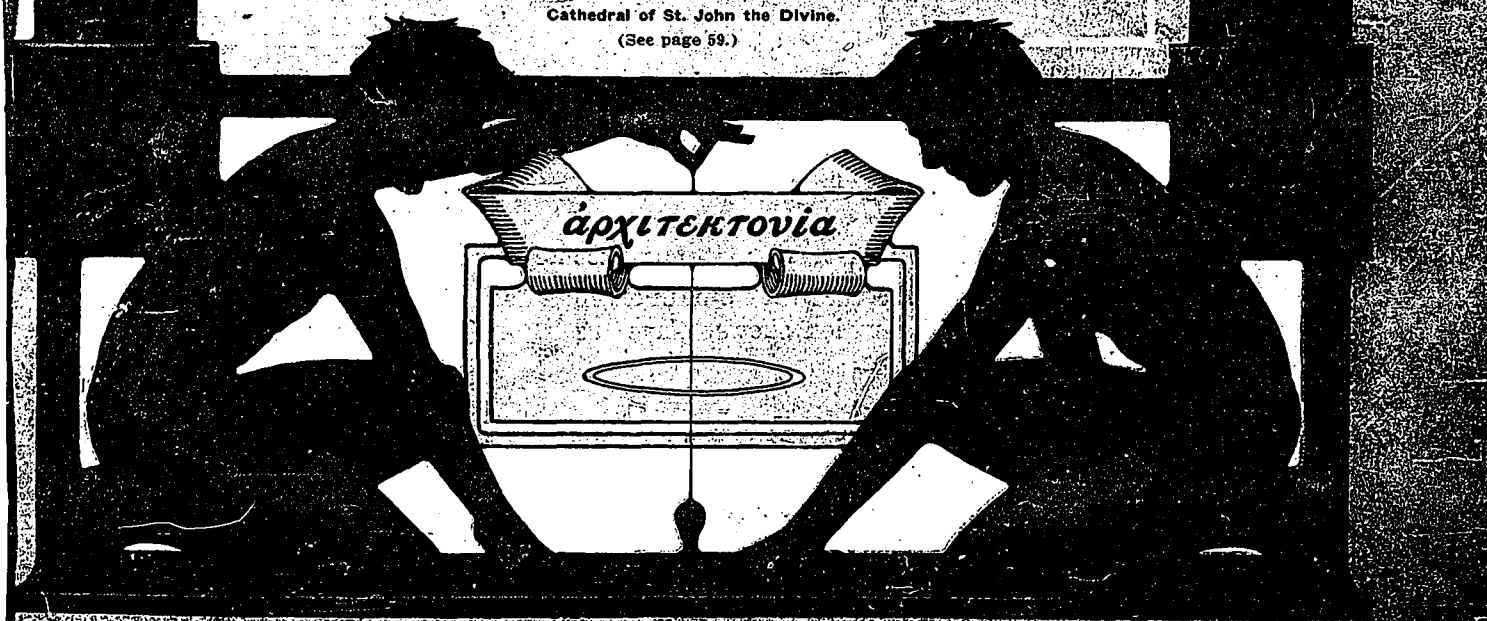
Cathedral of St. John the Divine.
(See page 59.)



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Customs Revenue.

JUBILATION almost akin to hysteria seizes our Canadian dailies, when the government announces that our import duties for a given month show an increase over those of the corresponding period of the preceding year. We are told that such a condition is an unmistakable sign of prosperity insofar as people cannot spend money that they haven't got, and if our people have money with which to buy foreign products, then it is a sign that we are prosperous.

When our official returns show that our government has collected a million and a half dollars more in custom duties during a certain month than the same month of a former year, it simply means that we have spent in the foreign markets of the world about eight and a half million dollars more during the month in question, than we did the corresponding period of the preceding year. These calculations are based upon the assumption that our average rate of import duties represent about 18 per cent. of the value of the imported product, and does not provide for the undervaluation of imports as is regularly practised by foreign shippers and Canadian importers of almost every important class of product brought into this country. So it is safe to say that when the custom revenue of the Dominion Government increases a million and a half, in a given month, it means that our already comparatively large expenditure in foreign markets have for that month been increased by at least Ten Million Dollars.

This, it appears to us, should give a rather weak excuse for exulation on the part of either our press, our manufacturer, the public, or the laborer. Canada is a great, undeveloped, producing country, and we surely cannot expect to build it up if we squander our money abroad in the purchase of the product of foreign labor.

What would we think of the business capabilities of a manufacturer who, upon securing his monthly statement of his receipts and expenditures, would become jubilant over the fact that his expenditures for that month had increased 20 per cent. over those for the same period of a former year, purely upon the basis of reasoning that it showed that he must have money or he could not spend it, and insofar as he had the money to spend, he is entitled to believe that his business is prosperous? If a manager of a business institution showed delight when presenting such a statement to his directors, it would be easy to foretell the consequences.

Canada is not a consuming country. At least its future, if it is to have one, is not based upon its ability to consume. It is essentially a producing country and its only hope for a future, depends upon its ability to sell its products to the world and bring back the gold with which to build up a nation industrially and financially sound. Canada is not a nation of holders of foreign dividend producing estates, industrial mining, railroad or bank stocks, that bring into the country annually vast sums that might tend to offset a balance on the wrong side of our trade ledger. We are a nation of producers, and every dollar of wealth that we may rightfully lay claim to as our own, must come from the consuming nations of the world who have a market for that which we can profitably produce.

But in the face of these indisputable facts, Canada's trade situation presents a most serious and yet ridiculous state of affairs, for our trade returns show that we actually buy more than $50,000,000 worth of foreign products more than we sell. At the present time this debit balance on our trade ledger is offset by the inflow of foreign capital for investment purposes, and the wealth brought into the country by the better class of well-to-do emigrants.

Our trade conditions present a situation very much like that of the inventor who has a good thing that it takes money to develop, and, after finding a good angel, he proceeds to spend his money on the development of his idea, without any attempt to place his business upon a commercially sound basis. He continues to spend more than he takes in, and each year has his deficit made up by additional cash from the good angel, until financial misfortune one day overtakes his moneyed friend and he finds himself without money with which to make up the deficit created by extravagant and improvident expenditures. He finally discovers, after much hardship, that a business, to be sound, must show a balance on the right side of his ledger.

This is truly our trade situation in Canada. We are safe as long as foreign capital is obtainable to offset our expenditures, in excess of our receipts, but when financial conditions in England or in the United States, abruptly cut short this source of money supply, what will then make up our minus balance? Under our present fiscal policy, we are solely at the mercy of foreign financial conditions, over which we have no control. Commercial or financial independence is impossible as long as we continue to buy more than we sell.

The very secret of the growth and wealth of the United States is in the fact that she sells annually over $500,000,000 more to the world than she buys. Canada buys more than twice as much from the United States as we sell her. Australia has an annual trade balance in her favor of over seventy millions. Is it not obvious that our trade conditions are unsound, and that, as an undeveloped producing country, our trade balance should be placed on the other side of the ledger?

The importance of this grave national problem will be all too evident when England or the United States is visited with either serious financial or national difficulties. We shall then be brought face to face with a situation that will force us to realize the false sense of security we have been laboring under, and our press will cease to be so jubilant over increases in our Customs revenue. The whole difficulty arises from our commercially unsound tariff laws. Our duties are just high enough to render this a separate market from that of the United

States, and thus encourage the dumping of surplus overproduction of foreign manufacturers, and just low enough to provide an effective adequate protection for the product of Canadian enterprise against the ruinous dumping of foreign surplus stocks and products of peasant labor.

National Status for the Profession.

A RESPONSIBILITY that cannot be measured at this time, rests with the Quebec and Ontario Associations, in the manner in which they deal with the question of federation with the Royal Architectural Institute of Canada, at their annual assemblies, to be held in the course of a few weeks. These are the two oldest, largest and most influential architectural bodies in Canada. Upon the action which they determine to take on this question, depends, to a great extent, the establishment of a national status for the architectural profession in Canada.

It is true that the provincial associations can handle best the local problems that confront the members of the profession, and it is also true that their right to deal with matters involving the interests of the profession in their respective provinces should not be interfered with, but it is equally true that there are many questions to be dealt with, that are of a national character. Problems and difficulties that are common to members of the profession in every province in Canada, should have the attention of a strong national body; an organization representative of, and backed up by all the provincial associations. As it is, the architect in Canada has no national status, and will never have such until all the architectural associations and clubs in the Dominion become federated under one charter, and agree upon a common basis of action.

This is surely a desired end toward which to work, and is a course deserving the earnest, unselfish co-operation of every self-respecting architect in Canada.

With this purpose in view, the R.A.I.C. was formed, a charter secured, and an affiliation effected with the R.I.B.A. As to whether the original methods adopted in the organization of this national body are now considered to be in due order or not, is a matter too late to discuss. As to whether the present policy of the R.A.I.C. is considered favorably or unfavorably, is a matter that has nothing to do with the importance of the work it has undertaken, nor the necessity for its existence. If it is believed by some that mistakes have been made, then it becomes the duty of these to attempt to have them rectified. But let the settlement of such differences of opinion as may exist between members of the different provincial bodies, be discussed and adjusted with that dignified spirit of common interest, that should temper the deliberations of men who belong to so ancient and honored a profession as architecture.

It would be the height of folly to undertake to establish two national architectural bodies in a country where there is such a limited number of practitioners. Such an attempt would be disastrous to the interests of the profession generally in Canada, and would make impossible for many years to come, the accomplishment of those things which a national organization should hope to secure to its members. If the profession divides against itself in dealing with such an important problem as federation, it is difficult to understand how they can expect the public they serve to be in sympathy with the cause of architecture.

The members of the Royal Architectural Institute of Canada realize that there are many differences to be adjusted before a complete federation can be effected, and are anxious to have these difficulties overcome in such a manner as will result in the common welfare of the profession. This will only be possible when the several associations will deal with the matter with that conciliatory attitude becoming earnest men. Quibbling over personal likes or dislikes, or ceremoniously standing on points of minor importance, must be made subservient to the one aim every provincial association must keep first and foremost before them, and that is the establishment of a truly national architectural organization.

Federations have been formed by men in almost every branch of human endeavor the world over, and it would seem incredible that architects should be unable to agree among themselves sufficiently to do that which has been possible by business men, doctors, lawyers and tradesmen.

It now, therefore, rests with the Ontario and Quebec associations to determine to a large extent, just what degree of the future success and usefulness of the R.A.I.C. they may rightfully be credited with. The cause is worthy of earnest thought and endeavor, and the inevitable results to be obtained, are worth the sacrifice of a few provincial ideals.

Toronto as Planned by Civic Art Guild.

WILL TORONTO ever elect a body of men to its city council who will sacrifice politics and self-interest to the extent of the appointment of a permanent board with power to carry out a systematic plan for the beautification of the city? Much has been done in this direction in other cities, but as yet Toronto has done nothing more than inspect and criticize plans, and appoint a committee for this purpose, which it has given no authority to either adopt a plan or carry out any scheme.

Despite the discouraging attitude of Toronto's city fathers, the Toronto Guild of Civic Art proceeds to work out its suggested plans with an enterprising courageousness that is to be highly commended. Most of the members of this club who have given much of their time to this apparently thankless work, can never hope to see their plans completed, even though the city accepted their suggestions and proceeded to put them into execution at once.

The most recent scheme as presented by the Toronto Guild of Civic Art, has just been issued in the form of a splendidly illustrated and printed brochure, accompanied by their report.

Accompanying the report is the plan of the proposed changes, showing by the use of colors what the Guild aims at.

In short, the plan shows two great diagonal thoroughfares from the centre of the city to the north-eastern and north-western suburbs. It is claimed that these, though costly, would more than pay for themselves. These roads are calculated for four lines of tracks. Every street north of Queen street would be crossed by one of these diagonals, which would be 125 feet wide, with broad roadways and sidewalks.

A radial road project is one part of the scheme of beautification, the other is the connecting of the various squares and parks by boulevards, driveways and parkways. The sea-wall project is a "cardinal and important section of the improvements."

The president of the Guild, Mr. John A. Ewan, says in the GLOBE: "It will be the feeling of all who give any thought to the matter that in Toronto we are at the parting of the ways with reference to what the future aspect of the city is to be. It does not need a prophet to predict that the next ten or fifteen years will see radical changes in streets and structures."

Instances and illustrations of what other cities have done are given at some length. The Kingsway, in London, cost $20,000,000, and at the date of opening the revenue derived from sales and leases was $15,000 a year in excess of what was required to carry the sinking fund.

Baltimore, after its fire, raised $30,000,000 for civic improvements. Toronto's similar opportunity was allowed to pass with the installation of a $300,000 high pressure

fire system. New York has $21,000,000 in cash over and above the outlay on establishing Central Park. Mexico is spending $100,000,000 on improvements, Buenos Ayres $70,000,000.

The park system proposes to link together the existing spaces along the waterfront to the Humber River, up the Humber valley to Lambton, thence easterly by drives in the ravines to the head of Avenue road, thence easterly to a park above Eglinton avenue, to the Don Valley, to Riverdale Park, easterly again to Scarboro' Cliffs, and back to the waterfront south of Ashbridge's Bay and on to the Island. Thirteen new parks would be included in this. Queen's Park is to be a point whence parkways run to connect it with the larger system. The establishing of twenty-eight new playgrounds in all the congested districts is no small part of the Guild's programme.

In carrying out its plans the Guild proposes the formation of a civic commission that would be a body with a continuous policy.

The report closes with an appeal to all citizens to interest themselves in the work.

Calgary's City Hall.

WHETHER TO GO on with the work and complete the new city hall, or to board it up and abandon it entirely, has been the subject of debate among the citizens of Calgary for some little time back. The city's plight as regards its "white elephant," as the unfinished municipal building has been "dubbed," is an unusual one. Not that it is an uncommon thing for a city to experience the pangs of "outrageous fortune," by being assured that a certain building, fully equipped, can be built for a specific sum, and then to find that when the structure reaches a certain stage, an excessive additional amount is required to complete the work; but because the ratepayers in this particular case stubbornly baulked when it came to approving of a further expenditure of over one-half the amount originally asked and authorized.

The practice, quite general among promoters of public buildings, of deceiving the ratepayers by underestimating the complete cost of a structure, in order to get the work under way, has a element of chicanery which is to be greatly deprecated. Originally, the city hall in question was to have cost $150,000, but now an additional sum of $80,000 is necessary to complete it. Had the proposition been put before the ratepayers clearly and frankly in the first place, the probability is that no interruption of the work would have occurred. A body of ratepayers, like an individual, is open to reason; they do not expect a better building than they are willing to pay for. Undoubtedly had matters been fully explained, and the $230,000 asked for at the outset, the amount would have been forthcoming in the same *corp d'esprit,* as the sum originally voted.

Usually in a case of this kind, a community forks out the extra sum, and regards such a procedure as a matter of maladministration or a species of graft. Graft, however, does not enter into such a deal as often as is supposed. Every dollar spent in the building in question, has been fully accounted for in the statement of expenditure filed with the city. It must be admitted, nevertheless, that there was a phase of trickery in the erection of the city hall, which places a stigma on those who were identified with its construction. This is, indeed, unfortunate, as the architect and promoters are the victims of self-created circumstances; circumstances over which they had absolute control. If a building of a certain type, equipped and furnished a certain way, cannot be built for a certain sum, then let the ratepayers be told so frankly.

The ratepayers of Calgary are not, we believe, at heart adverse to voting the sum required for the completion of the structure, but by turning the proposition down in a recent plebiscite, they showed their resentment at being "duped" at the time the erection of the buildings was first advanced. Such things have happened before, and will in all probability happen again, but never before, possibly, has a community showed its disapproval so strongly of this sort of procedure. Just so long as there is a tendency to underestimate the ultimate cost of a building, unnecessary interruptions and difficulties will arise, and those upon whom the work devolves will be charged with employing misrepresentation and shady methods at one stage or the other of its development.

Possibly the most logical way for a municipality to avoid the unpleasantness of an affair of this kind is to appoint a board of assessors, such as is demanded by the Royal Architectural Institute of Canada, to pass upon the plans and fix the complete cost of the building according to the market value of labor and the materials to be employed. The fees of such a board would be but a small consideration at the most, and the cost of the structure would—save possibly for a slight variance one way or the other—be definitely established to the satisfaction of all parties concerned.

Calgary will evidently be prepared to meet such a contingency when any like improvement comes up in future, and other municipalities will do well to profit by her present experience. As it is, the city hall stands to-day practically an abandoned project, and odium has been heaped upon the heads of those who were identified with its construction. One councilman at a recent meeting vented his spleen by suggesting that the building be turned over to the Alberta Government and converted into a Provincial Jail, but such an act was frowned upon as being wholly destitute of civic pride. Instead, there is a feeling manifest that the citizens are now in a more generous mood, and a petition will shortly be circulated among the business men and ratepayers requesting that the council and commissioners again submit the by-law at the next municipal election. It is quite possible that if sufficient signatures are obtained, the by-law this time will be adopted.

While there is nothing to show that the money originally voted has been in any way misapplied, nevertheless, the methods of carrying out the project, and the manner in which payments were made on the work, is being made the subject of a searching investigation.

One thing in connection with the whole affair, which is quite evident, is the fact that the practice of underestimating the ultimate cost of a building to be built of certain materials and according to certain specifications, results in no good. It not only operates against the interests of the architect employed, and his client, but also casts a reflection on the standing of architecture as a profession. Ignorance is no excuse, and wiles and guiles have no place in architecture. The policy of tricksters and artificers, is something to be greatly discouraged by practitioners in general.

Discrimination in Favor of U.S. Products

NEARLY A YEAR AGO Toronto's city officials did themselves "proud", in defying the Canadian Customs authorities in an attempt to bring into the country plans for the new filtration plant, without the payment of the rightful duties. Their attitude in this matter was anything but becoming civic officials of a city that boasts so loudly of its loyalty, and shouts so vociferously the "Made in Canada" slogan. The contention of the offending authorities, in the protection of their almost untenable position was that it was impossible to secure an engineer in Canada with sufficient knowledge and experience to design the plant, Toronto had voted to build, and, while this was no excuse for the violation of our Customs laws, it was accepted for what it was worth.

But we are now presented with a case where the city has actually discriminated against Canadian pro-

ducts in favor of those of United States manufacture: a flagrant violation of every principle of good business and fair play. In fact two cases have been brought to our notice recently, and we have no doubt that investigation would bring to light many more, where American goods were adopted by the city as standards in their specifications. J. L. Mott's plumbing ware was used as the standard in the specifications for Toronto's new lavatory, and enamelled ware of another American manufactory was named at the standard in the specifications for the plumbing work in the new Public Bath House. Every architect and plumber in Canada knows that this action on the part of the authorities of Toronto, is absolutely without justification. We have plumbing enamelled ware, manufactured in Canada, by purely Canadian institutions, that equals, if not excells, in every point of comparison, (design, quality, color and price), anything that is manufactured on the globe. If there is one line of goods which goes into a building that is made in Canada of as good or better quality, and that may be obtained under as good or better conditions, as compared with the products of foreign manufacturers, it is porcelain enamelled plumbing ware.

If Toronto officials will discriminate against Canadian manufacturers of enamelled ware, they will favor goods of foreign manufacture, whenever they so please, without the least consideration of the interests of the Canadian manufacturer or laborer, in view of the fact that Toronto is one of the largest, if not the largest manufacturing centres in the Dominion, this policy is at the least highly inconsistent.

We have one manufacturer of plumbing enamelled ware in Canada, well known to every architect, builder and plumber, whose goods are specified and used in some of the largest and best equipped buildings from coast to coast; whose goods are sold in competition with the largest manufacturers in the world, in France, Belgium and other continental countries of Europe; who has built up in a few years, an enormous industry in Canada, under the most trying conditions of foreign competition, and who to-day employs upwards of four hundred men.

Surely such Canadian manufacturers should at least be given an even chance with the United States firms. Canadian architects realize and appreciate the importance of the encouragement of the establishment of such institutions in this country, and they show it in their private work, but it is left with the public servants in Canada's greatest manufacturing center, to thus operate against the industrial welfare of our country, by adopting as standards, products of the United States manufacturers.

Great is the jubilation of Toronto over the prospect of the establishment of a new industry in the city, and yet they encourage the sending of its money for public improvements out of the country to strengthen our already formidable competitors. Where ever it is at all possible, every architect, every contractor, and every government (Municipal, County, Provincial or Dominion), should use Canadian standards and if competition of foreign manufacturers is desired, let the burden of satisfying the specifications fall upon them and not upon our own manufacturers. Let the foreign products be made to suit Canadian standards instead of Canadian products to suit foreign standards.

British Architectural Drawings for C.N.E.

WHENEVER the question of Architectural Education is discussed by members of the profession, without exception, one of the most deprecated of all conditions that militate against the advancement of this branch of Art and Science, is the lack of interest and appreciation, by the lay public, of the æsthetic in architecture. While there is no art with which the general public is more materially concerned, there is none about which the layman actually knows less.

It is the layman that every well-organized architectural association has sought, and is seeking to educate to appreciate the beautiful in architecture. This undertaking has proven a most arduous and thankless task, in the New World especially, and every accomplishment that furthers the efforts of the profession in this direction is heralded with much joy and satisfaction by every architect who loves his profession.

In this direction, the Ontario Association of Architects may rightfully claim credit for having been successful in bringing about one of the greatest victories for the cause of architecture in Canada, during the past decade. At the instigation of the Toronto branch of the O.A.A., the directors of the Canadian National, last fall, set aside a portion of the Applied Arts Building, for an architectural exhibit. Designs were submitted from almost every portion of the Dominion and the interest shown by the public in this exhibit, through the constant stream of visitors, convinced the Canadian Exhibition officials of the advisability of making this new departure a permanent annual affair. With the view of adding interest to next year's exhibit, Mr. Geo. W. Gouinlock, president of the O.A.A., suggested at one of the noon-day luncheons of the Toronto branch of the association, that an effort be made to secure a number of designs and studies from some of the more prominent architects abroad. He believed that such an exhibit would estimate interest in the architectural section of the Arts building; it would prove of educational value to the architect and the student and would cultivate a better appreciation of the art by the lay public, thereby ultimately resulting in a better style of architecture in Canada.

Mr. Gouinlock was earnest in his very commendable suggestion, and prevailed upon Dr. Orr, (manager of the Exhibition), to interview some of the more prominent architects in England, where he is at present on a trip, with the view of arranging for an exhibit of the work of well-known English designers. Mr. Gouinlock brought the matter before the Royal Architectural Institute of Canada at the annual banquet recently held in Toronto, and appealed for their co-operation and support.

As a result of Mr. Gouinlock's personal efforts with the co-operation of the O.A.A., Mr. Orr has succeeded in securing an exhibit from the British Society of Architects, which will undoubtedly include specimens of the work of such men as Sir Ashton Webb, F. C. Colcott, Belcher and other noted British architects.

To thus secure to the profession of Canada, permanent facilities for an annual exhibit at the greatest yearly exhibition in the world, for an exhibit of the work of Canadian architects from the Atlantic to the Pacific, supplemented by the designs and studies of the best architects of the Mother country, where they may be viewed by more than half a million visitors every year, we maintain to be the greatest achievement for the promotion of a better appreciation of the Art of Architecture of the last decade.

Building Operations in October.

PREDICTIONS VENTURED earlier in the season as regards fall building operations, are being fully borne out as the late months materialize. October was another period of activity in which the volume of new work undertaken greatly exceeded that of the corresponding month of last year, and as yet nothing has turned up to indicate otherwise than a continuance of this prosperous condition for some time to come. Two gains are noted to every loss, and the average in-

crease for the month, as based on comparative figures supplied CONSTRUCTION, was slightly in excess of 42 per cent.

Calgary again reports the biggest increase for the month, following her phenomenal advance of 399 per cent. in September, by another sweeping gain of 355 per cent. Sydney is second in the list, with 341 per cent. to the good, while Berlin again bobs up in the third highest place with a substantial increase of 173 per cent. to her credit.

Of the places to suffer a reversal—two of which are noted in the east, three in Ontario, and two in the west—St. John and London, which experienced a decline of 67 per cent. and 47 per cent. in order named, were hit the hardest. It may be mentioned, however, in the case of London, that the total value for permits issued up to date, is just double the amount expeded for new buildings during the entire year of 1908; and also that the outlook there at the present time is anything but discouraging.

Aside from the losses at Edmonton and Regina, which fell behind their last year's figures for the month, to the extent of 15 per cent. and 10 per cent. respectively, the West, in general, more than held its own. Vancouver registered an increase of 15 per cent.; Winipeg 10 per cent.; and Victoria 5 per cent.; while Lethbridge looms up with $190,270 for new work undertaken, which brings the total value of permits for the year well over the million mark for the first time in her history. In all these places, the immediate prospects are all that could be desired. Winnipeg is displaying an activity in the realty market seldom before witnessed at this time of the year, and, as for Vancouver and Victoria, the present indications are that both of these places are just beginning to grow.

In Ontario, besides the gain in Berlin, other advances recorded were:—Toronto 51 per cent.; Fort William, 39 per cent.; and, Hamilton 16 per cent. Windsor, which registers an amount of $19,500, can also be included in the list of gains, while as for Port Arthur, which had $271,000 to her credit last month, it might be explained that the small amount ($3,500), is not representative of the new work undertaken at that place, owing to the fact that there are no building regulations outside of fire limits, and hence no means of obtaining a complete record. The two set backs noted in addition to that of London's, mentioned above, are: Peterboro,, 43 per cent., and Stratford, 32 per cent. In both cases, however, the corresponding amounts for the month are relatively small, and the losses, therefore, can hardly be regarded as seriously affecting the general situation. Practically all the places mentioned are substantially ahead of 1908 in the season's work, while the amount already recorded in Toronto is greater than any previous yearly totad in the history of the city.

Farther east, Montreal again comes forward by noting an increase of 48 per cent. and as yet nothing has occurred to stay her progress. This is the tenth consecutive gain recorded, and in this respect, Montreal has perhaps showed the most consistent development throughout the year of any city in the Dominion. Halifax, however, once more lags behind her former figures, her less for the month being 25 per cent. It is quite probable, though, that a strong reaction will take place before very long, as the increasing importance of Halifax as a port entry, clearly indicates that the city has not, as yet, in any way approached the limit of its growth.

	Permits for October, 1909.	Permits for October, 1908.	Increase, per cent.	Decrease, per cent.
Berlin, Ont.	$26,550	$9,700	173.71	.....
Brandon, Man.	8,020	.....	.....	.....
Calgary, Alta.	403,050	88,400	355.93	.....
Edmonton, Alta.	83,535	98,735	.....	15.39
Fort William, Ont.	88,050	63,250	39.20	.....
Hamilton, Ont.	247,350	211,950	16.69	.....
Halifax, N.S.	34,200	46,160	.....	25.90
Lethbridge, Alta.	190,270	.....	.....	.....
London, Ont.	29,880	57,210	.....	47.77
Montreal, Que.	628,645	422,080	48.93	.....
Peterboro, Ont.	16,690	29,450	.....	43.32
Port Arthur, Ont.	3,500	.....	.....	.....
Regina, Sask.	52,080	58,270	.....	10.62
St. John, N.B.	23,800	73,550	.....	67.64
Stratford, Ont.	4,100	6,100	.....	32.78
Sydney, N.S.	22,050	5,000	341.00	.....
Toronto, Ont.	1,540,355	1,019,492	51.09	.....
Vancouver, B.C.	501,975	436,080	15.11	.....
Victoria, B.C.	104,840	99,755	5.09	.....
Windsor, Ont.	19,500	.....	.....	.....
Winnipeg, Man.	511,850	460,400	11.17	.....
	$4,540,290	$3,185,582	42.52	.....

C.C.C.A. Board Discuss Next Convention

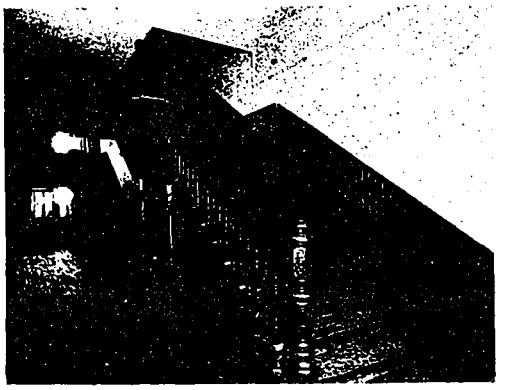
A DINNER was given recently at the St. Charles Hotel, by Mr. Peter Gillespie, lecturer of the Theory of Construction, Toronto University, to the members of the Executive of the Canadian Cement and Concrete Association, of which he is president.

The most important subject under discussion was the place at which the next convention and exhibition will be held, and the members present expressed in the strongest terms, their disapproval of the narrow policy of the Board of Control of the city of Toronto in charging $1,100.00 for St. Lawrence Market, which was neither heated, nor lighted, for the exhibition held last year. It was pointed out that it cost the Association, in addition to the rental, $650 to heat and light this building for one week.

This, it appears to us, is rather a short-sighted policy on the part of the officials of a city like Toronto, that is striving to establish itself as a manufacturing centre. When the National Association of Cement Users was organized in the United States, the various larger states in the middle West and the Eastern states vied with each other in offering the best inducements to bring the convention and exhibition of this newly organized Association to their cities, and in no case since the National Association of Cement Users was formed, have they ever been obliged to pay rental for convention or exhibition halls. In addition to this on several occasions have they been allowed a money grant to cover the expense of the entertainment of their visitors and members, by the cities which they had honored with their annual convention.

The convention of the Canadian Cement and Concrete Association not only brought to the city of Toronto last year in the neighborhood of 1,400 visitors, but it also served in bringing to Toronto three or four American manufacturers of cement products machinery, who have or will establish manufacturing plants in the city. After having had such an experience with the city fathers last year, the Association is not inclined to again leave themselves at the mercy of the whims of the members of the Board of Control, and, as a result, it has appointed committees of its members in Montreal, Ottawa, Hamilton, Quebec and London, to interview the business organizations of these cities, as well as the city officials, and learn what facilities could be provided in each one of these places for the next convention, to be held sometime the first of March during 1910.

There is no city in Canada that is better adapted to be the headquarters of manufacturers of cement products machinery than Toronto, and it is to be hoped that sufficient inducement may be offered to the Association to permit the next convention to take place in the Queen City.



A wood staircase in one of Toronto's schools. This view was taken shortly after the Collinwood disaster, and shows the condition generally prevalent in Toronto schools. Both stairways, it will be noted, come down to the main corridor toward the same door.

One of the "fireproof" basements in Toronto schools. It will be noted that it has not even metallic ceilings, and the furnace pipe runs directly under a wood beam above the doorway. The only protection being afforded is a piece of tin between the pipe and the beam. There is a can of oil under the table, which would contribute toward the "fireproofing" of this room.

The main corridor of the Ogden School, Toronto, showing the course taken by the children in their fire drill. "X" marks the location of the boilers under the main corridor.

The only fire escape on a Toronto school building; a wooden affair that runs down from the third story of the York Street School to the roof of another building. This was erected about the time of the Collinwood disaster.

The system of outside stairways with which the Royal Alexandra Theatre is equipped. If theatre-goers are entitled to this fire protection, we ask why our school children should not receive some consideration.

Are Toronto's Schools Safe ?

Mr. C. H. Bishop,
Inspector of School Buildings, Toronto.

Dear Sir,—I am not at all surprised at the attitude assumed by yourself and Mr. Hughes, toward the charges made in an editorial "TORONTO'S SHAME," that appeared in last month's "CONSTRUCTION." The exposition of the ugly truth with regard to the real conditions of Toronto's public school buildings, does not make pleasant reading, and is not consistent with the false sense of security that yourself and Mr. Hughes have engendered in the citizens of Toronto, by your apparent confidence in the practicability of your antiquated school building methods and incongruous contentions with regard to the extent and character of the best protection to be employed against the loss of life in event of fire or panic. It is, therefore, not surprising to those who are acquainted with the real situation as well as with the tactics it is customary for you to employ in your defence whenever the structures for which you assume the responsibility, are attacked, that both yourself and Mr. Hughes should try to discredit the article in question by expressing your opinion that it was either paid for, inspired or written by a fire escape manufacturer.

Mr. Hughes is credited by a Toronto daily as having made the statement that his "detective instincts would lead him to inquire as to whether the article was paid for or not, and that trade journals would often publish such things so long as they are paid for." If Mr. Hughes had said what he thought, his statement would have read something like this: "My good sense prompts me to deem it more expedient to discredit this article, than to undertake to answer the charges contained therein." However, Mr. Hughes, whose position requires him to know but little of the details of building construction, is to be excused for this highly absurd and inconsistent attempt to question the integrity of the article in question, but for you, Mr. Bishop, who have had long experience in all the various branches of building construction, there is no excuse. I am surprised that a man in your position should, under any circumstances, make such an obviously ridiculous statement. For argument's sake, we will allow that "CONSTRUCTION'S" editorial columns are open to manufacturers who have an axe to grind or that paid matter would be accepted for publication in "CONSTRUCTION'S" columns, from manufacturers who desire to thus promote the sale of their products at so much per line. I would ask you what manufacturer of fire escapes, or combination of fire escape manufacturers would go to the trouble or expense to either pay for, or prepare such an article? There is no monopoly in the manufacture of fire escapes. Fire escapes are not patented, and there are one thousand iron workers, large and small, in Canada, who can make any fire escape required, from plans and specifications supplied them. It would, therefore be impossible for any manufacturer to expect to promote his individual business through the publication of such an article. It would be equally as reasonable to charge that every effort of the technical press in the promotion of a better type of building construction, and for the adoption of more improved equipment, was prejudiced by private interest.

A man of your experience knows better than this, Mr. Bishop, and I regret that your better judgment did not restrain you from attempting to avoid the real questions under discussion, by such an indiscreet ruse. The article in question was not written by a fire escape manufacturer, nor was it published in the interests of any private individual or corporation. It was written by the editor of "CONSTRUCTION," and was the result of a careful investigation of the conditions of Toronto's School buildings as compared with those of other large cities on the continent. I am in a position, however, to go further, and beg to inform you that "CONSTRUCTION" has never since its first issue, published a line in its reading columns, of what is usually termed "paid for matter," and in defence of the technical press "Trade Journals," I would say, as a rule it is much less subject to private monetary influence than are public officials, generally speaking.

While Mr. Hughes may give long interviews to the daily press, concurring with your represented views on the various phases of school building construction and equipment, with an effort to quiet the nerves of Toronto parents, it is you who are responsibe to the city for the safe and adequate housing of its school children. There is a law in the Province of Ontario that forces the attendance of all children under fourteen years of age, at school. Each municipality is obliged to provide adequate facilities for the education of those children. In Toronto, as in other Ontario cities, children are forced to attend the school provided for the district in which they live, it matters little whether the structure is a fire-trap or not. A store building, a theatre, a warehouse, or a church that may be considered unsafe, may be avoided by those who fear to enter them. But not so with school buildings. The same law that says the city must provide itself with schools, forces the attendance of the children of that city at those schools. Mr. Bishop, you are the School

Building Inspector of Toronto, where there are more than 30,000 school children attending schools under your inspection, and it is you and not Mr. Hughes who are legally, as well as morally, responsible for the safe condition of those schools. You have no right to shift the responsibility of avoiding loss of life, in case of fire or panic, upon the shoulders of the teachers and the pupils, by forcing them to depend upon a fire drill to get themselves safely out of a burning building. I cannot see what the practice of fire drills has to do with safe building construction. Do you work upon the principle that you can afford to take chances in an unsafe building, as long as another department will undertake to train children to be fire-proof and panic-proof. A fire drill cannot be considered as a substitute of safe building design and construction or adequate fire protection equipment.

In Toronto schools you pin your whole faith on this fire drill, the success of which depends upon the great unknown quantity, human nature. If this fails you, your children are lost.

A fire drill should be an additional precautionary measure, adopted for the increased safety of the children, whereby they are permitted to contribute to their own safety and comfort by marching orderly out of a burning building, in which every reasonable precaution has been taken advantage of, in its plan, construction and equipment to minimize the danger of fire or panic. The fire drill, as you know, Mr. Bishop, is practised with only this object in view, in every large city on the continent, with the exception of Toronto. Your responsibility is not in seeing that the fire drill is practised regularly, but in providing, primarily, safe buildings and equipping them to avoid loss of life, should the fire drill fail.

Lest you may have forgotten the horrible details of the Collinwood disaster, in which the lives of 165 children were sacrificed, I am going to quote a portion of the report of the holocaust as it appeared in the daily press, which should serve to impress upon every school architect or inspector, the extent of the responsibility that rests upon them, and the awful consequences that follow neglect of duty.

"In a frenzied rush for escape from the flames, the pupils were caught as if in a trap at the bottom of the rear stairway. Those who were alive after being trampled upon were burned to death. In the wedge of bodies that choked the exit forming a pile six feet high, children died before the eyes of mothers and fathers, fighting from without in utter helplessness to save them.

"Several parents succeeded in getting hold of the outstretched hands of their little ones, but they could not break the grip that held them from within. When the fire finally reached the prostrate mass there was nothing to do but to take one last look.

"The shrieks of the entrapped children, agonized, blood chilling cries, died away. There was a gurgle of sound—then quiet. For a few moments the rescuers were powerless to move, stunned into silence. Suddenly a grey-haired man dropped to his knees in the mud. "Oh, God, what have we done to deserve this?" he moaned, with arms outstretched toward heaven.

"Women, bareheaded and breathless, came running across the fields. They sought their children. They had not yet reached the building when they saw the old man kneeling. As if with one thought they threw themselves down in the mud and prayed to God to spare their little ones. As the words rose the dull sound of the fire engine came back as if to mock them and the hissing of the flames as if to sneer at their misery.

"The fire swept through the halls and stairways of the building like a whirlwind, laughing at fire drills and attempts at discipline. Ten minutes would have cleared the building of its population, but the ten minutes were lacking.

"Sweeping up under the front stairway the flames cut off that exit entirely, after one room full of children had passed out. This drove the great seething mass of frightened pupils into the back exit of the building.

"In that narrow stairway and vestibule, penned like rats in a great trap, poured the mob of children, fighting, screaming, pushing. Down on them poured others, jumping over the banisters, climbing over each other's heads in the last desperate attempt to reach the doorway. Into the seething death trap were drawn two of the teachers, martyrs to their attempt to pull the pupils back into the rooms of the first floor, where they could jump to safety.

"One second grade teacher, tall and strong, and nearly six feet in height, threw herself into the breach, trying to bring the pupils to their senses, but she was swept into the whirlpool of maddened children, many half grown boys and girls of the upper grades among them, and dragged down into the death pit at the door below. Another teacher in the second grade was swept into the vortex to her death. The larger boys of the sixth grades behind swept down like a tidal wave carrying teachers and pupils to death."

This is the story of a fire in a building that compared favorably with most of Toronto schools; a school in which no adequate provision was made for emergency exits to be used when the fire drill failed, and the awful holocaust that was the result, would not be only possible but probable under similar circumstances, in any one of the majority of Toronto schools. Here is what the press stated with regard to the fire drill:

"**The children were under good discipline, they had been practised frequently in the fire drill, their teachers without exception retained their self-possession,** showing great courage in the face of imminent death, and yet more than half of these little ones died horribly because of faulty building arrangements. The schoolhouse was two storeys and a half in height, the walls being of brick and concrete."

Mr. Hughes has stated that the great loss of life in the Collinwood fire was attributable not to the failure of the fire drill, but to the fact that the doors opened inward and that one of the entrances were locked. These statements are at variance with the facts of the case, for we find that the coroner's jury that investigated the horrible affair, found that the doors had been opened by the janitor before the children reached them, and, as for the doors opening inward, I beg to refer you to the following, which also tells how the children in their fire drills, had been accustomed to empty the school in one minute and thirty seconds:

"Miss Anna Moran, the principal of the school, **denies that the doors opened inward and insists that they were never locked during school hours.** She said: 'When the bell rang I, and I suppose other teachers, thought it was a regular fire drill. **Every child in the school has gone out over and over again from the second floor to the open air in one minute and thirty seconds.'** "

That the efficiency of even one poor fire-escape in saving life at a time of panic, was proven, is very plain in the following:

"Miss Laura Boddy, the only teacher on the third floor, formed her pupils in line and marched them down to the second floor, where, finding the flames rushing up the stairway, she turned them around and hurried them back again to the third floor. She here broke a window with a chair, and, getting on to the platform of the fire escape, lifted out her

pupils one by one and sent them down. ..Four or five children who broke from the line she had formed and ran down the stairway were killed."

In the face of these indisputable facts, why do you continue to talk about fire drills whenever the subject of the safety of Toronto's schools, comes up for discussion? Why do you not tell the parents of Toronto how you expect to get the children safely out of a burning school when the fire drill fails? Toronto children are no more panic proof than the children of any other city. They are human.

You express confidence in the present condition of your schools, because you have been sufficiently fortunate in your school fires thus far. But permit me to say that, the parents, of the children who escaped safely from these buildings, have not the Board of Education to thank but a kind Providence. Because there were no lives lost, you continue to pin your whole faith to the fire drill. I suppose if a hundred lives had been lost in one of these fires, you would have changed your policy. Then, are the citizens of Toronto to assume that to secure schools equipped with better fire protection, there must be a greater sacrifice of little lives? Surely not.

Mr. Hughes says he would never die happy if he ever recommended fire-escapes on Toronto schools. Perhaps he is right, but I am inclined to believe, with all due respect to the esteem in which he is held by his fellow citizens, that Toronto parents are somewhat more concerned about the safety of their children, than with the peace and happiness with which Mr. Hughes may be enabled to finish his life's work. However, it is my sincerest hope that fire-escapes will not be his last concern before he passes into "the great beyond."

I would say further, that it has for some time been rather a hobby with Mr. Hughes to oppose fire escapes, and it is not an easy matter for him, after he has indulged this eccentricity for so long, to do other than attempt to vindicate his position.

When Mr. Hughes was in Winnipeg he gave an interview to the daily papers there, telling them that their fire-escapes were no good. I am told by Mr. Mitchell, Commissioner of School Buildings of Winnipeg, that Mr. Hughes never saw one of these fire-escapes in operation, and I am further convinced of the authenticity of Mr. Mitchell's statement, by the extravagant remark recently made by Mr. Hughes to one of the Toronto evening papers, to the effect that the children would be crushed to death in them.

Before I go further, lest I be misrepresented, let me make it plain to you that I am not necessarily contending for outside fire-escapes. What I do maintain is that all of Toronto's three-story buildings should be equipped with adequate means of emergency exit. Inside fire stairs, cut off from the remainder of the building by fire walls and fire doors, and covered with wired glass, is the ideal type of fire-escape, but if the cost of equipping the older schools in Toronto with these would be too great the outside escape should be resorted to. The ideal school building is a two-story fireproof structure upon which fire-escapes are not required. The use of fire-escapes is purely a precautionary measure, used upon buildings where the plan and construction are faulty.

In defence of your position, you are perfectly aware of the fact that you cannot point to one authority in Canada or the United States, who will agree with you in stating that some measure of protection should not be provided, in the way of emergency exits, on such school buildings as Toronto has been building. There is not a city on the continent, of the size of the city of Toronto, that does not require on school buildings of non-fireproof construction of three stories or more in height, either an inside fireproof fire-escape, or an outside iron stairway, or what is known as the spiral slide, and, in some cases, especially in the State of Ohio, where they were visited with the holocaust in Collinwood, fire-escapes are required on non-fireproof school buildings of two stories or more in height.

I have written several building inspectors in the larger cities in Canada and the United States, asking their opinion with regard to fire-escapes or outside covered stairways on non-fireproof three-story schools, and, in not one instance have I received a reply giving the opinion that fire-escapes were unnecessary on such buildings. Some of those addressed gave their opinions on the matter, while others sent as an answer copies of their building codes covering the point.

The answers received from cities in the State of Ohio, where Collinwood is located, were most interesting. Surely you must be willing to admit that the searching investigation that followed the terrible experience, immediately in their midst, would result in the adoption of the best known system of fire protection. The following letter is from the building inspector of Cleveland. It tells its own story:

Editor "Construction,"
Toronto, Canada.

Dear Sir,—

"Immediately after the destruction of the school building at Collinwood, Ohio, a suburb of this city, which fire entailed a loss of one hundred and sixty-two (162) lives, the Board of Education of this city, together with the writer, designed a fire-escape which has since been erected on all non-fireproof public school buildings in the city, which allows the pupils to pass from the building without compelling them to pass through fire and smoke, and in my opinion is an almost ideal fire-escape for use on this class of construction.

"I am sending you herewith copy of the specifications for the construction of this escape, which is now required throughout the State of Ohio, our design having been used with the single exception that while we, in the case of Cleveland public schools, could construct the escapes so that the stairways were placed eight (8) feet from all openings in the walls of the building, it was found that this requirement could not be enforced throughout the State, for the reason that a number of the existing school buildings were so located as to preclude this arrangement; the State requirements were therefore made to compel placing of the escape two and one-half (2½) feet from the wall of the building. We were pe

ticularly fortunate in this respect in Cleveland, as the public school buildings in every instance had sufficient property beyond the building line to allow the escape to be placed eight (8) feet from the building. In every other respect the specifications adopted by the State are identical with those compiled at the instance of this Department and the Board of Education of this City.

"While I strongly advocate the erection of an adequate number of fire-escapes on every non-fireproof school building, I do not believe that a fire-escape or a number of fire-escapes should be expected to properly safeguard the pupils in the building. It is my opinion that all school buildings more than one (1) story in height should be constructed throughout of fireproof material; this requirement is made, both in our city ordinances and in the statutes of this State, so that we now design school buildings to be perfectly safe from fire from ordinary causes, and compel erection of the escape described in the enclosed specifications on all non-fireproof school buildings more than (1) story in height."

Yours very truly,

WM. S. LOUGEE,
Inspector of Buildings.

Another letter, received from the Dayton branch of the Ohio Inspection Bureau, which will interest you, reads as follows:

"As to construction of fire escapes, this matter is entirely in the hands of the State Shop Inspector, Columbus, Ohio. A letter addressed to him would probably bring you desired information. Our state law requires the Shop Inspector to make inspections of shops, factories, schoolhouses and other buildings, and see that the state law is complied with regarding fire escapes and other requirements. Experience has shown that in this and other states the matter of fire escapes on school houses and other buildings, is of vital importance, so much so that stringent laws have been passed requiring them, and we think it appeals to the reason of every man, that some method of escape is imperative in buildings where public gatherings are common on upper floors. The possibility of fires and panics is always present. The means of escape should be equally in evidence and it is the height of criminal negligence to wait for some awful calamity to demonstrate the above fact. This state, as well as others, has been guilty of just that kind of negligence, and it took the loss of nearly 200 innocent children's lives, in one single instance, to arouse the people to a sense of duty. The fire escape should be such not only in name but in fact. Not allowed to be constructed merely to comply with the law, but to serve as a real avenue of safety and not another fire trap in itself."

Yours truly,

A. W. FOSTER,
Inspector.

Still another letter was received from Toledo, Ohio, which demonstrates that this city has also taken advantage of Collinwood's awful lesson:

"We demand that all buildings used for school purposes, that are more than six feet from the grade line, must have fire escapes. The inspection of school buildings in this state is very rigid. The state department will no doubt furnish you with copy of state law on school building protection.

"Trusting this will be the information desired, we are,

Yours truly,

JOSEPH McMAHON,
Chief Inspector.

You undoubtedly know that the authorities of New York city do not concur with you in your views, as is to be inferred from the following letter:

"In reply to your inquiry, relative to fire escapes on school buildings, I would say that we require regular stairs with eight-inch risers and eight-and-one-half-inch treads."

Yours truly,

EDS. S. MURPHY,
Superintendent of Buildings.

The fire marshal of Troy, N.Y., takes a sane view of the proper use of fire-escapes and the manner in which the fire drill should be practised, as is evidenced by the following letter:

"I have your communication, and in reply I will quote my suggestions as given in my report of an inspection of the schools of this City in 1908, to the Board of Education of this City, which is as follows:—

"Every school building over two stories in height should have fire escapes erected on same and these fire escapes should have balconies at least five feet wide with suitable railings and a wide stairway with easy steps and risers leading from same, and the said balconies should extend the entire length or width of the buildings, and I believe that these fire escapes should be used by the pupils in their fire drills, so that they might get accustomed to the use of them."

Very respectfully yours,

CHARLES ROTH,
Fire Marshal.

"P.S.—I will further state that since the above report, all the school buildings in the city, where considered necessary, have been equipped as above suggested."

You will note from the following letter that Rochester, N.Y., takes advantage of every possible precaution in the erection and equipment of its schools; all schools have outside iron stairs protected with wire netting; they have fire drills once a week and no buildings are erected of over two stories of non-fireproof construction. Why should Toronto fail to protect its children to the same extent as Rochester?

Dear Sir,—

"Our building code does not allow school buildings to be erected more than two stories in height, unless of fire proof construction. We have iron stair fire escapes on all our school buildings, and for safety, have said fire escapes enclosed in wire netting. The principals of all schools have a fire drill at least once a week, which is an excellent practice, as it prevents a panic in case of fire. Fire escapes should be upon all school buildings, and the fire drill practised for the safety of the pupils."

Respectfully yours,

HERBERT W. PIERCE,
Assistant Fire Marshal.

The inspector of buildings of Minneapolis believes schools should not be more than two stories in height and that first floor should be of fireproof construction:

Dear Sir,—

"Our present ordinance gives me authority to demand fire escapes on all buildings three stories or more in height.

"In regard to the necessity for fire-escapes on school buildings, I should say that it would depend entirely on the height of the building, the number and width of stairways, the condition and location of the heating plant and the type of construction of the buildings.

"In my opinion, such buildings should be limited in height, if possible, to two stories. The first floor, at least, should be constructed of fireproof materials, and the building provided with wide, easy stairways in sufficient numbers."

Yours truly,

JAS. G. HOUGHTON,
Inspector of Buildings.

Salt Lake City has both fire-escapes and fire drills. The spiral escape referred to in the following letter is of the same type as is used in Winnipeg:

"In addition to fire escapes described in Section 100 of our building code, our Board of Education are using to a more or less degree the spiral fire escape, which you probably have knowledge of, being constructed circular in form, or iron, with a spiral incline plane inside. None of these have ever been used during a fire and panic, but the school teachers and principals of our schools give a practice drill with their scholars occasionally, and seem to think they are perfectly satisfactory. Whether they would be able to handle the scholars during the excitement of fire as successfully as they do during the drill, is yet to be proven."

A. B. HIRTH,
Inspector of Buildings.

Salt Lake City, Utah.

Des Moines, Iowa, as you will note in the following letter, gives the question of fire protection in its public schools the serious consideration it deserves:

"In view of the periodical disasters caused by fires, however incipient, in school buildings, one need not hesitate one moment to be convinced of the imperative need of the most practical fire-escape that can possibly be constructed. The disaster at Cleveland, Ohio, where several hundred school children were trampled to death is our more recent and awful example."

Respectfully,

De Moines, Iowa. JOHN MacVICAR,
Superintendent, Department of Streets and Public Improvements.

The following letter from Mr. Mitchell, Commissioner of School Buildings of Winnipeg, I wish to especially draw your attention to, in view of the fact that he, with Mr. McIntyre, Superintendent of Schools of Winnipeg, visited fourteen cities in the United States during 1907, with the purpose of becoming acquainted with the best methods there employed in school building design, construction and equipment, and his views on this important question are worthy of your earnest consideration:

Dear Sir,—

"I have carefully read the Editorial "TORONTO'S SHAME," which appeared in the October number of "CONSTRUCTION," and while I would not care to say one word which might appear to be a criticism of either the schools or the officials connected with the schools of Toronto, the question presents itself to me in this light.

"The general concensus of opinion on the American Continent is in favor of having fire escapes on all public buildings over two storeys in height, more especially since the fires which occurred at Hochelaga and Collinwood, with the resultant loss of life at each. With such a warning, why should any person or any community assume the tremendous responsibility of leaving undone anything in reason which may be the means of preventing the loss of even one life, should a fire occur, which is always a possibility.

"Under ordinary conditions, there is no doubt but that any of the schools in Toronto could, with the admirable system of fire drill which prevails, be emptied of all the children before there was a possibility of danger, and that rightly should inspire a certain degree of confidence among all concerned, but yet there is always the possibility, however remote the contingency may seem, that on some occasion the stairways would not be available either through fear of smoke which may be in lower halls, or the danger of a panic by the bringing together into the main halls, the classes from several rooms, the children of which being already in a very nervous and excitable state of mind, may then lose entirely the self government preserved while in the rooms, on account of the confidence which they feel in the teacher, to whom they are accustomed.

"The decision in Winnipeg was that it would be a wise expenditure of money to provide an alternative to the exit by the stairways, so that come what might the children could get out of the building one way or the other, and even if the fire escapes should never be needed, the confidence felt by the parents in the knowledge that an alternative had been provided, and the peace of mind due to that confidence, amply justified the expenditure made in that connection.

"To sum it up somewhat shortly:—What is a small amount of money in comparison to the life of even one child. I think this expresses all that need be said from the Winnipeg standpoint, and if these ideas are of any use, you are at liberty to make use of them."

Yours very truly,

Winnipeg, Nov. 11, 1909. J. B. MITCHELL,
Commissioner of School Buildings.

These, sir, are only a few of the many letters received, not one of which serves to bear out your contention. Does it not occur to you that should a fatal fire occur in one of the Toronto schools, in the face of these facts, you would have a difficult task in satisfying the Toronto public that all reasonable precaution against the possibility of such a calamity had been taken? Your position in such an event would not be an enviable one. You and Mr. Hughes stand alone on this question. In so far as every recognized authority on the continent disagrees with you, have we reason to believe you right, or have we a right to assume that you are wrong?

The fact that Toronto has been fortunate in not having had to record any fatalities as a result of any of its school fires, is no reason for assuming that all reasonable precaution should not be taken advantage of. Several fires were recorded in the United States about the time the Collinwood calamity occurred, but no lives were lost in any except this unfortunate suburb of Cleveland. New York averted a catastrophe from a fire in Public School 165, through marching the 2,500 occupants orderly out of the burning building. Twelve hundred pupils marched safely out of a burning school building at the signal for the fire drill, in Grand Rapids, on March the 5th, 1908. On March the 6th, of the same year, a panic was averted without loss of life, in a burning children's home in Kalamazoo. At Sturgeon Bay, Wisconsin, on March the 5th, 1908, we also learn that a $60,000 school building burned, but without loss of life. Again on the same date, a fire occurred in a school in Colorado Springs, Colo., from the explosion of coal gas in the furnace, and the pupils were marched safely out of the building. But though the fire drill served its purpose in all of these five fires, all of which occurred about the same time, it failed in Collinwood, with the resultant enormous death toll, which would have been avoided had the buliding been provided with reasonably adequate emergency exits.

With regard to the plan and construction of your more recent schools, you maintain that all buildings constructed or remodelled during the past few years, have fireproof basements, fireproof hallways and iron stairs. It is further claimed in your behalf, that all the school buildings are of "slow burning" construction, and that students of school architecture in the United States are now inclined to favor high and compact structures, rather than low-spread buildings.

While I am free to admit that most of the additions to your schools, since the Collinwood holocaust, have been provided with fireproof entrance halls and iron stairs, I have failed to find one school building in Toronto that has been so protected throughout. I would ask you about the Ogden School, the Queen Alexandra School, the King Edward School, and the Kent School. These are four of your largest schools, and all have been erected within the past few years. I have been unable to locate an iron stairway, a fireproof hall or a truly fireproof basement in one of them.

The Ogden School, which I am told accommodates 1,400 children, and is the largest public school in Canada, has wooden stairs, its halls are plastered on wood lath, on wood joists. The only

fireproofing I could find in the basement was corrugated ceilings nailed directly upon the wood joists, which at the best is only a make-shift. The front stairs from the basement come up directly under the stairways from the upper floors and the rear basement stairs lead directly out into the rear vestibules through which the children are bound to pass in leaving the building. The stairs from the upper floors all lead down into a central corridor, directly under which are your boilers. Should your boilers go wrong during school hours in this building, exit via all four stairs would be cut off and you would have a catastrophe worse than that which befell Collinwood. If this is the best type of building Toronto can afford, in the name of the parents whose children are forced to daily attend this school, I ask you why do you not provide it with emergency exists?

Your King Edward School is even worse than the Ogden. The entrance stairs and hallways are narrow. There are enough turns and twists in the wooden stairways to provide almost a dozen places in which a panic stricken mob of children might become blocked. The entrances are badly located and the basement has not even the "make-shift" of corrugated metal as a protection.

The Alexandra and Kent Schools are very much the same in both plan and construction. Neither has iron stairs or fireproof halls, nor are the stairs so located, wood as they are, that even a minimum of protection is provided. Both have have so many twists in the stairs that a stranger would almost require a plan of the buildings to conveniently get about in them.

You know the condition of these schools, as well as the older ones better than I do. It is useless for me to dwell upon their defects. After the Collinwood fire, you became nervous about the York Street school and you built your first fire escape on it. And a great affair it was, a wooden stairway leading down upon the roof of a lower building. If a fire escape was required, why did you not build something that would be of some service?

If schools that have not fireproof basements, fireproof hallways and iron stairs, are safe, why are you installing these expensive improvements in your new schools and additions? If they are necessary in one instance, they are required in all cases. If it required the death of one hundred and sixty-two innocents to demonstrate the necessity for fireproof corridors, and iron stairs in new buildings, what nature of disaster will have to occur before the older schools are made safe.

When the anxious parents of Parkdale, after inspecting the Queen Victoria school, accompanied with a representative of the Board of Fire Underwriters, who pointed out the many obvious unsafe features of the structure, appealed to the public press to take up an agitation for the better protection of their little ones, you aimed to discredit their observations by stating that the Board of Underwriters was biased because they wanted to improve their risks. Do you believe that you are the "soul of honor" and that all those who disagree with you on this question, are prompted in their motives by selfish interest?

With regard to the statement made in your behalf, that your buildings are of "slow-burning" construction, I would say that I am confident that such a statement never emanated from you, for as you know, there is not a "slow-burning" school in Toronto. They are of what is termed in the Toronto Building Code "ordinary construction." The only type of construction known to builders that is inferior, is known as "balloon frame construction," the type usually employed in the erection of barns.

As far as three story structures are concerned, there is not an authority, of whom I have ever heard, that would prefer "high and compact" rather than low spread structures. The almost universal tendency in the United States has been to limit the height of schools to two stories, and to adopt the best known type of fireproof construction in their erection.

To sum up the situation, I would call your attention to the fact that authorities on this continent agree upon the following:

1st—That schools should not be more than two stories in height; 2nd—that all schools should be of the best type of fireproof construction; 3rd—that all stairs should be wide and straight and as far as possible cut off from the remainder of the building; 4th—that all non-fireproof schools should have iron stairs, fireproofed basements and hallways; 5th—that all three story schools should be provided with some adequate means for emergency exit; 6th—that the fire drill should be practised weekly in schools and that children should be drilled in the use of fire escapes, as well as the natural means of exit.

What Toronto provides in its public school buildings may be summed up as follows: 1st—three story non-fireproof buildings; 2nd—buildings of a character inferior to warehouses, etc., which are usually at least "slow burning" construction; buildings that in their exterior appearance belie their interior construction; buildings of "ordinary construction"; 3rd—winding open stairways that lead directly down into the central or main corridors; 4th—with few exceptions, wooden stairs and unprotected hallways and basements; 5th—three story non-fireproof buildings without inside fire stairs, outside fire escapes, or any means whatever, for emergency exit; 6th—a fire drill that is confined to the training of the children to leave the building via the ordinary entrances, which, if

cut off by fire or smoke, or in event of panic would not only fail to get the children safely out of the building but would be worse than useless.

This is the situation, Mr. Bishop, and you are Inspector of School Buildings of Toronto. The fact that you cannot get sufficient money from the Board of Control to do those things which you must within yourself deem necessary, is no excuse. The people of the City of Toronto will vote money for a filtration plant, new exhibition buildings, a high pressure system, for the reclamation of Ashbridge's Marsh, and there is no expenditure that would meet with the hearty approval of the people more than that for the purpose of making her school buildings safe beyond all possible doubt.

Although I have in this letter, frequently referred to statements which have been reported, as having been made by Mr. Hughes, I have taken the liberty of addressing you, for the reason that you, and not Mr. Hughes, are Inspector of School buildings of Toronto. Let Mr. Hughes indulge himself in such of his hobbies as fire drills, boring holes in school floors (down which pupils may stick their pencils, waste paper, etc., and, incidentally be enabled to see the smoke when a fire takes place); or teaching children to read; instructions to teachers, or military training in schools. But your duty, Mr. Bishop, is to provide primarily, well planned, safely constructed and adequately equipped school buildings in the City of Toronto.

In closing, I beg to inform you that I have in my possession, the letters quoted herein, as well as copies of codes from almost every large city on the continent, which without exception, demand a far superior type of construction and a much more adequate fire protection equipment than obtains in Toronto Schools. These are open to inspection in my office.

Yours truly,

Editor of "CONSTRUCTION."

"THE TORONTO GLOBE" ON SCHOOL BUILDING CONSTRUCTION AND EQUIPMENT

WE reproduce herewith two editorials from "THE TORONTO GLOBE" on the subject of the condition and equipment of Toronto school buildings, which are remarkable for the expression of directly opposite views on this subject.

The first editorial appeared in "THE TORONTO GLOBE" of March 12, '08, while the Collinwood disaster was fresh in the minds of its readers. It will be noted in this editorial, that the "GLOBE" strongly contends for two-story buildings and fire-escapes, and expresses the opinion that the best drilled class might be thrown into an uncontrollable and fatal panic, in case of fire.

The second editorial appeared in the same paper on October 23, 1909, and severely criticizes "CONSTRUCTION" for its charges in connection with the unsafe condition of Toronto schools. In this editorial, after the horrible details of the Collinwood affair had worn off, it favors three-story school buildings and criticizes fire-escapes. It further states that Toronto schools are of "slow burning" construction, which is absolutely untrue. It also states that all recent school buildings erected, or extensively remodelled during the past few years, are equipped with absolutely fireproof basements, iron stairways, and fire-proof hallways, which is also untrue.

We are inclined to ask the reason for these diverse views on this matter, and would like to know whether it would not be explained by the fact that one of the editorial writers of the "GLOBE" is at present on the Building Committee of the School Board.

If the daily press, in the discussion of this vitally important question, would adhere to facts, and not permit their views on the matter to be prejudiced by political influences, and would consent to make plain to the taxpayers of the city of Toronto the true condition of their public school buildings, there is no reason why the Queen City should not have school structures that would compare favorably with those of any city on the continent.

SAFEGUARDING PUPILS AGAINST FIRE.

The awful destruction of child life by the fire in a school near Cleveland has created a profound impression among those who are in any way responsible for the protection of the children in public educational institutions. In large cities like Chicago, New York, and London, the authorities are already investigating the conditions and finding them very unsatisfactory. Many buildings are little better than firetraps, and very few of them are as well provided as they ought to be with the means of escape, especially in the third stories, where these are in use. The Minister of Education in this Province has acted with commendable promptitude in calling attention to this matter, and especially to the necessity for providing fire escapes as a means of exit from upper floors when the stairs are by flame or smoke made unavailable for this purpose.

It is a fair question whether the Education Department should not forbid the erection of three-story schools, and the locating of assembly rooms on any other than the ground floor. The danger of loss of life by fire is more than doubled for third-story pupils. They have two stairs to descend, thus allowing more time for flames to make headway or smoke to become more dense. A still greater danger arises from the intensification of the nervous condition of the pupils during their long descent, and the exhaustion of their physical strength, which is tried with sufficient severity at ordinary times. There is no justification for adding third stories to school buildings except economy, and this will never commend itself to public opinion when a holocaust takes place.

As three-story schools are now in existence it becomes necessary to make them as safe as may be found practicable. The efficiency of various kinds of fire escapes is a matter to be determined by experts, but there can never be any doubt as to the necessity for wide corridors, broad and easy stairs, fireproof basements, and outward-opening doors. There should be fire drill of the ordinary sort, and also practice in the use of outside fire escapes. The law requires the doors of all public buildings to be made to open outward, but during school hours they should be left unlocked and unbolted. Not only should basements be themselves absolutely fireproof, but they should contain no combustible rubbish. Even a slight smoke from burning material might throw the best-drilled class into an uncontrollable and fatal panic.

FIRE-PROOF SCHOOLS AND FIRE ESCAPES.

There can be no two opinions about the importance, not to say the necessity, of safeguarding—short of criminal grossly to exaggerate the destruction by fire. It is quite legitimate to utter warnings against school buildings that are from this point of view really unsafe, but it is little short of criminal to grossly exaggerate the defects of buildings that are reasonably equipped with precautionary devices for the protection of the children who attend the public schools. The writer of a recent article in "Construction," a journal devoted to the interests of the building trade, is fairly chargeable with having done so.

One of the charges brought against the Toronto schools is that "there is not one in the whole city equipped with fire-proof stairways, fire-proof entrances, or fire escapes of any kind whatever." The fact is that all the schools either erected or extensively remodelled during the past few years are equipped with absolutely fire-proof basements, iron stairways, and fire-proof hallways. The process of fire-proofing the older basements has been going on for years, and with accelerated rapidity since the great fires at Cleveland and Montreal. All doors are made to swing outward, are left unfastened during school hours, and are so easily opened as to form no obstruction. There are no "fire-escapes," and it is not at all likely there will be any; they are treated with contempt by all disinterested students of school architecture. The only trustworthy fire-escapes are wide fire-proof halls with fire-proof stairways and numerous exits.

Fault is found with school buildings of three storeys. On this point there is room for differences of opinion, and the trend in the United States cities seems at present to be in favor of high and compact rather than low and wide-spread buildings. In the last resort it is probably a matter of expense. It is quite clear that if the people of Toronto wish to have two-storey school buildings they can have them by paying from one-third to one-half more for them than they do for buildings of three storeys. Whatever danger of fire may lie in the lower buildings, it is undoubtedly enhanced in the higher one; so far as fire is concerned, this is all that can be urged against the present practice.

The great danger in case of fire is from panic, and the best means of making pupils panic-proof is to accustom them to go out in a quiet and orderly march when a fire alarm is sounded. Any school building in Toronto may be emptied of pupils within two minutes, and as all buildings are now at the worst, "slow-burning," the danger from fire has been reduced almost to a minimum. There will be further improvements, no doubt, and reasonable discussion will hasten their progress, but exaggeration should be avoided.

DRAFTSMEN'S COMPETITION.

THE DECISION of the Standard Ideal Company, of Port Hope, to conduct a draftsman's competition for the purpose of securing a cover design for the new catalogue, illustrating "Alexandra Ware," is a most commendable one. Manufacturers of building materials and supplies, with which it is their aim to have architects and draftsmen familiar, expend considerable money in making their catalogues and literature attractive. This money, as a rule, goes into the hands of the artist employed by the engraver, and in no way contributes toward the promotion of any branch of the business in which these firms are interested.

The average architectural draftsman is more or less of an artist, and work of unusual merit, with a touch of originality, may be obtained through a competition such as the above mentioned firm is conducting. In this manner, not only can superior work be obtained, but the competition in itself, if properly conducted, through the co-operation of prominent members of the profession, tends to develop the practical side of art in the draftsman, and engenders in him an increased interest and love for the noble profession he is preparing himself for.

It is to be hoped that other Canadian institutions, whose goods are specified by Canadian architects, will follow this very commendable action on the part of the Standard Ideal Company. The conditions of the competition, together with the names of the assesors, are given in full in this issue on pages 34, 35, and 36.

RESTORATION OF ANCIENT TEMPLE.

THE TEMPLE OF KARNAK, the finest ancient temple in Egypt, is to be restored perfectly where it stands. This will be a new departure in Egyptian archaeology.

To discover new treasures in Egypt it is merely necessary to dig in the sand at any of a hundred different sites. The museums of the world have been filled with remains of early Egyptian civilization, until at last the Egyptian Government had to forbid the exporting of its monuments and collect all that were found in the great museum at Cairo.

This, however, seemed almost a desecration to those who really reverenced Egypt and wished to be able to behold it in all its pristine splendor. The scholars of England and France especially urged upon the Egyptian authorities the wisdom and necessity of keeping monumental treasures where they were discovered and reconstructing temples and statues in loco, wherever that was possible.

The Egypt Exploration Fund, has not only made some remarkable discoveries at the Temple of Deir-el-Bahri, at Thebes, but has begun the work of reconstructing the sacred structures there as completely as possible.

The greatest work of restoration; however, has been going on in the Temple of Amen, at Karnak, long admitted to be the most wonderful architectural monument in all Egypt. The reconstruction of this temple has been made absolutely necessary by the calamity of 1889, when as the result of an earthquake eleven of the great columns of this temple went crashing to the ground.

The great Hypostyle Hall, in which Seti I. and Rameses II. raised one hundred and thirty-four columns seventy feet high, was in imminent danger, for much of the foundation had been eaten away, and the arches between the columns having fallen there was nothing to keep them in position, so that at the least shock they crashed to earth, breaking the magnificent capitals to bits and often being broken into pieces themselves. Some were only leaning over like the famous "leaning column," forty feet tall, seven feet in diameter, and weighing 80,000 pounds, which was held in position by a broken base, as it leaned on an adjoining column. It was astonishing that it kept its place. When in 1889 eleven of the columns of this hall fell the scholars wondered that any remained standing. It appeared that one column in falling against another, and it in turn against the others, so that eleven were prostrated.

This catastrophe awakened the scientists to the danger of the utter destruction of the greatest ancient building in the world.

The task of the reconstructors was a most difficult one. Here were columns, capitals and architraves weighing from five to forty tons to be put back into place. M. George Legrain, who was in charge of the work, began in December, 1899, and in the first campaign took down five of the leaning columns, piece by piece. In the second campaign of 1901 he cleared the ground of the fragments of the eleven fallen columns and began the rebuilding. The defect of the foundation was remedied by making solid bases of masonry for each column, and then they were put back into place.

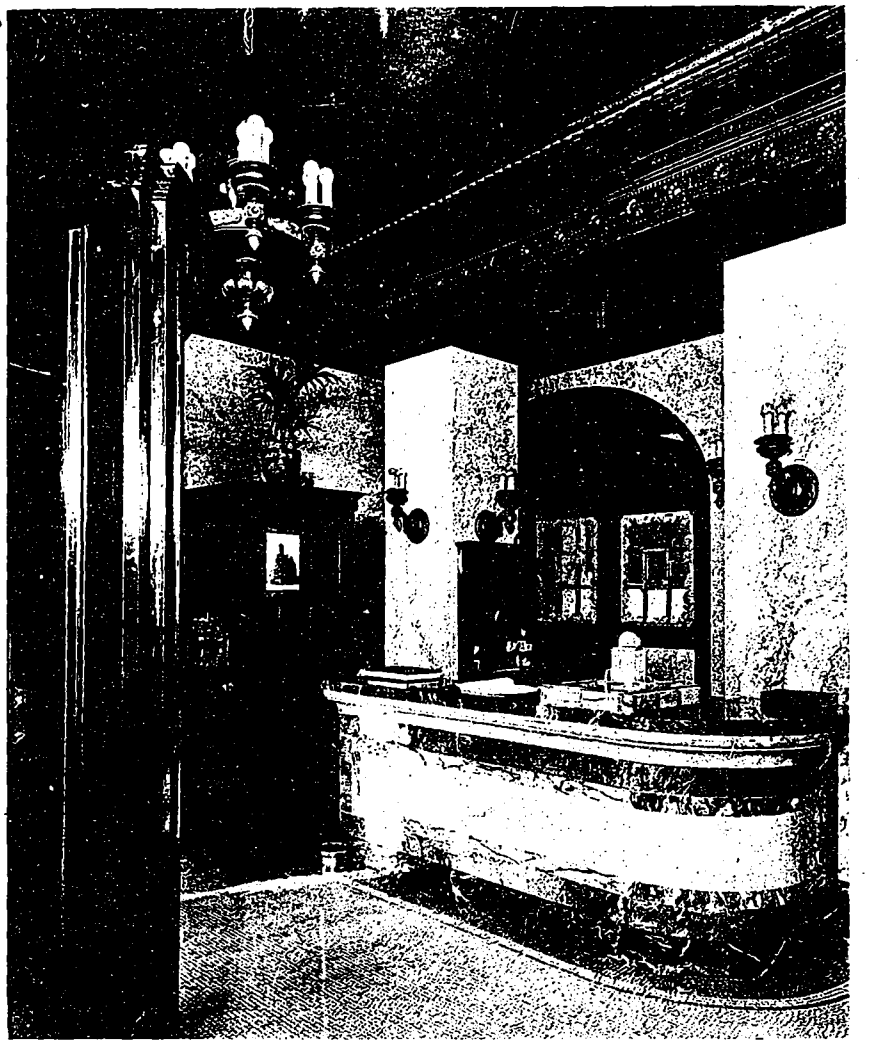
Each column was connected with the one next to it, and by 1903, after Lord Cromer had laid the first stones, the eleven columns had been raised again to the height of twenty feet.

The pieces were cemented into place, and all was as before the crash.

EXPERIMENTS CARRIED ON during the past four years at Glasgow (Scotland) with motor driven and motor operated fire apparatus, have resulted so satisfactorily from every point of view that it is the intention to gradually substitute vehicles of this character for the present equipment, so that ultimately horse and steam power will be entirely dispensed with. At the present time in the central fire district of Glasgow, there are three petrol engines, each having four cylinders and capable of developing 50 to 55 horse power. These with their full equipment and ten men each, easily maintain a speed of 30 miles an hour. The pumps are geared to the petrol motors by means of steel shafts running down the centers of the vehicles, having spur wheels engaging with steel pinions on the first motion shafts of the gear boxes. These pinions can be thrown in and out of gear by hand levers operated from the sides of the machines, enabling the pumps to be instantly put to work on arrival at a fire. The department has also in use a motor first-aid machine to carry an officer and twelve men, with 650 yards of 2½-inch canvas hose, 18 feet of scaling ladder, in two lengths, ambulance box on rear foot-board, and all necessary tools and gear; while another feature is a motor fire escape which carries an extension ladder of 85 feet on a turntable. When travelling the machine is 26 feet long, 10 feet high, weighs 6½ tons, and is driven by a 4-cylinder, 30 to 40 horse power petrol motor with battery and magneto ignition.

WORK ON THE GREAT WIRELESS STATION at Coltano, Italy, which is of the Marconi ultra potent type, and will be the greatest station of its kind yet attempted, is progressing rapidly. Already the 800 horsepower generating machines are in place, and the sixteen towers for the two radiators are ready for the final connections. When completed the station will communicate with Cape Cod in the United States, with Glace Bay in Canada, and with other similar stations which Italy has erected in the Erythrea colony, in Italian Somaliland, in the Argentine Republic, and another South American state.

Hotel Mossop, Toronto, which, both externally and internally, is of absolute fireprcof construction. It stands on a foundation of 18 concrete wells, carried down to bed-rock, the first foundation of its kind to be installed in Toronto. J. P. Hynes, Architect.



View of Office of Hotel Mossop, Toronto, as seen from the ladies' entrance showing the detail of marole counter and columns and rich ceiling cornice. J. P. Hynes, Architect.

TORONTO'S NEW FIREPROOF HOSTELRY.—An Interesting Eight Storey Structure in Which Every Measure for Safety Has Been Provided—Built on a Narrow Site and Supported by a Foundation of 18 Concrete Wells.—Its Plan and Interior Scheme.

HOTEL MOSSOP, Toronto's most recent addition to the city's system of hostelries, aside from being one of the most thoroughly constructed fireproof buildings in the Dominion, is noteworthy for two other reason: one, because it represents the successful solution of a most difficult problem, that of erecting a modern hotel building on an extremely narrow site; and the other, because in design, and in the materials employed, it is a structure which is mainly a Canadian product.

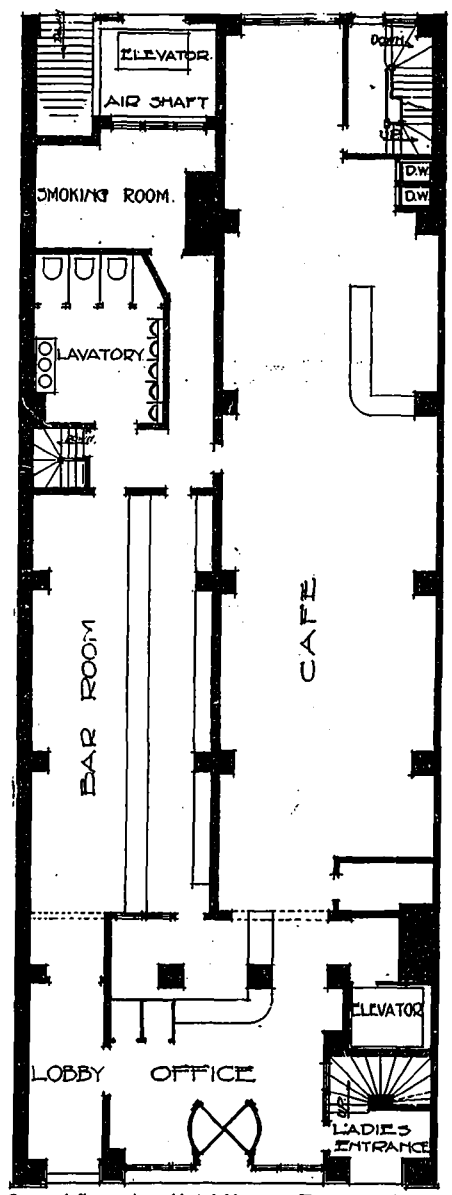
The building, which occupies a frontage of 40 feet by a depth of 112 feet, has been carried up to the height of eight stories, and is of steel frame construction with reinforced concrete and porous tile floors and porous tile partitions. It stands on a foundation of eighteen concrete wells running down to bed rock, the first foundation of its kind installed in Toronto. As a result of the thoroughness with which the building has been constructed from a fireproof standpoint, the owner has secured the lowest rate of insurance ever issued on a hotel building in Canada. All the steel work is fully protected at every point by non-combustible material; the stairways are of iron with slate treads; the elevators are enclosed in the most approved manner; and the doors and windows throughout are of metal and metal sash with extra heavy fireproof glass.

Externally, the architectural composition of the building derives its pleasing expression from simple, straight lines, rather than from any exuberance of decorative detail. The facade is of red pressed brick with cut stone piers and belt courses up to the third floor, and finished at the top story with arched opening which agreeably relieves the otherwise somewhat rigid and austere treatment of the windows. There are three distinct entrances leading from the street, the centre one of which, adorned by a wrought iron and opaque glass canopy, gives direct access to the hotel office and effects a complete separation of the ladies' entrance and the entrance used by the patrons of the bar.

While the narrowness of the lot, of necessity demanded a most compact plan in general, there is not, however, the slightest semblance of crowding of any character in the arrangement of the entire interior scheme. On the contrary, the space has been so advantageously utilized that the rooms in the main are of generous dimensions, and the character of the decorations and appointments are such as to render each interior particularly attractive and inviting.

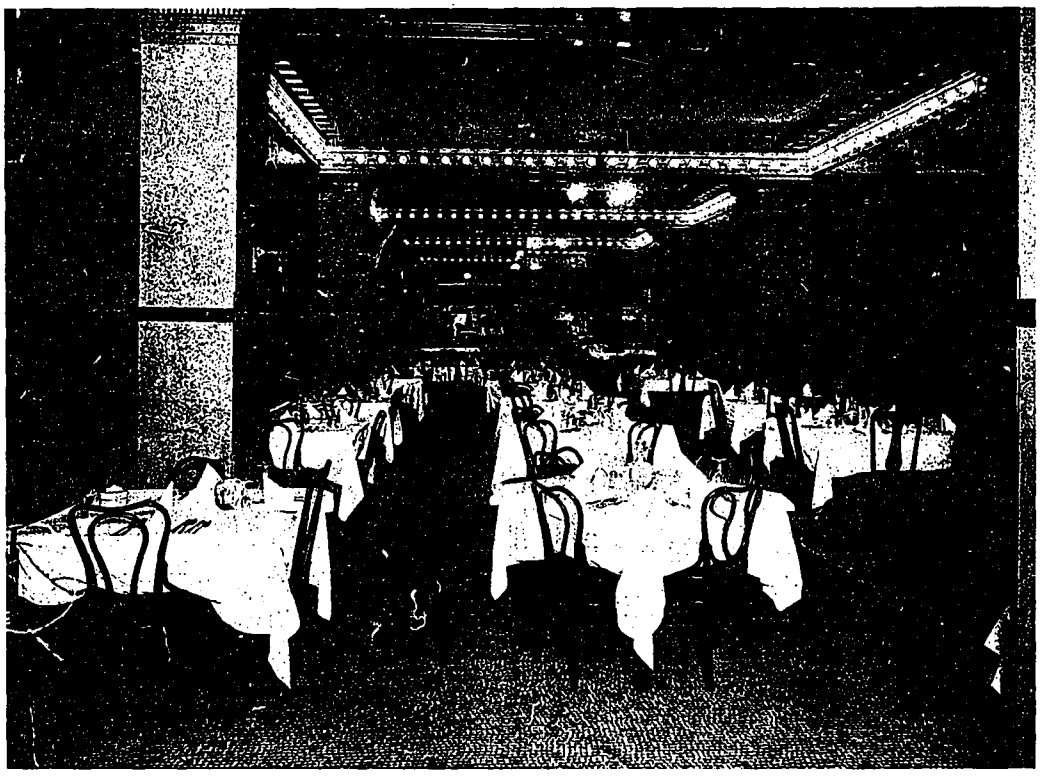
The office, although of limited area, is so compactly arranged as to provide for a liberal public space, and direct access to any part of the hotel. It is an extremely rich interior, with mosaic floor and walls and counter of beautifully veined Missisquoi and Tennesee marbles, affecting a warm contrast; while three large square marble columns, evenly spaced, rise to an enriched beam dividing the staff ceiling done in variegated bronze, which, together with the mahogany woodwork and the brass lighting fixtures, aid materially in giving a pleasing touch of color to the general effect. To the right of the office, on entering, are the ladies' entrance and guests' elevator, while immediately to the rear is the entrance leading to the grill room, a spacious room with mosaic floor and with walls and panelled ceilings decorated in simple tints in oils. The grill itself—a large modern range—is situated at the far end of the room, while directly behind it are the dumb waiters and a stairway connecting with the main kitchen in the basement.

The bar-room, to which access is obtained either from the street or through the lobby at the left of the office on entering, in its rich mahogany counter and back-bar, dadoed walls and columns of Italian marble, and staff decorations in brass and aluminum leaf, displays the same harmony of detail as is found in the office and entrances. Beyond the bar-room proper, the space is taken up with a modern lavatory, smoking room, and service stairway and elevator.



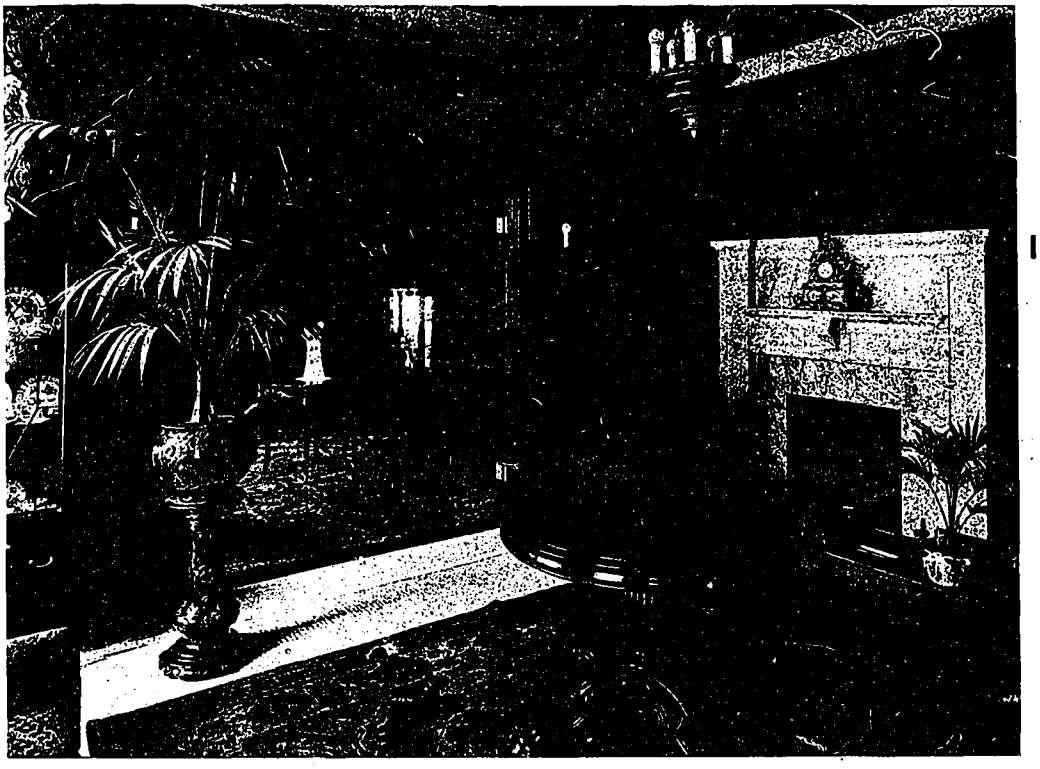
Ground floor plan, Hotel Mossop, Toronto. J. P. Hynes, Architect.

In addition to the elevator service from the office, the ladies' entrance, which is also finished in marble, has a private stairway leading to the first floor, where the parlor, reception room, and large and small dining rooms are located. All these rooms, which are appropriately



Grill Room, Hotel Mossop, Toronto. As seen from the Office. J. P. Hynes, Architect.

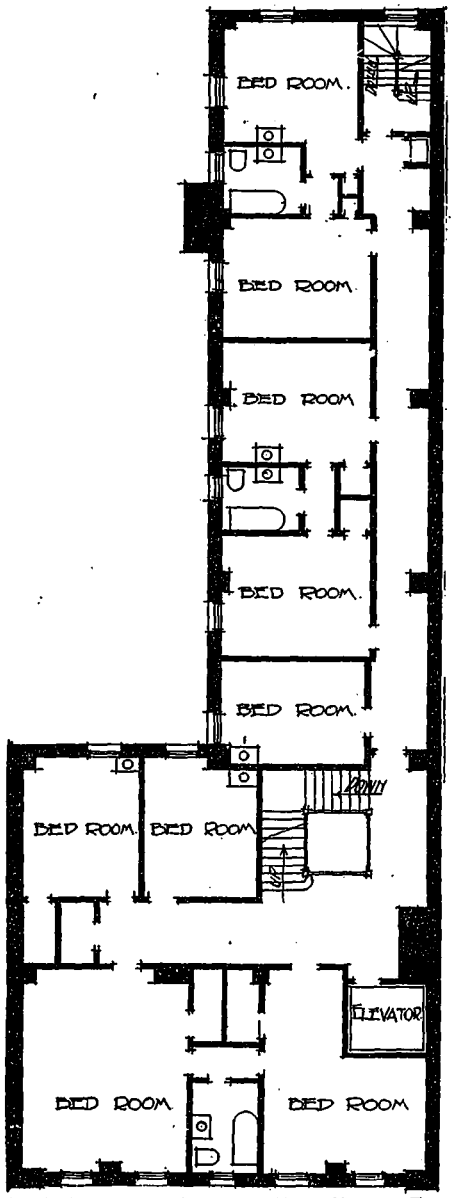
Main Dining Room, Hotel Mossop, Toronto. A rich interior with high panelled mahogany wainscotting, mosaic floor, and attractive ceiling scheme. J. P. Hynes, Architect.



Reception Rooms, Hotel Mossop, Toronto, showing the fireplace and general character of the decorations and furnishings. J. P. Hynes, Architect.

Interior of one of the bed-rooms, Hotel Mossop, Toronto, showing the pleasing wall scheme and the appropriateness of the furniture and hangings. J. P. Hynes, Architect.

furnished, have mosaic flooring and teko wall hanging, relieved by lightly colored staff decorations, with the exception of the main dining room, which has a high panelled mahogany wainscotting and electric ceiling lights enclosed in richly cut crystal pendants. Adjoining the dining rooms is a special kitchen for quick order, and also a serving room. The upper six floors of the building are entirely taken up by the bedrooms, the plan providing for nine rooms on each floor. The rooms adjoining the bathrooms are arranged in suites, and the other rooms have stationary basin with hot and cold water taps. In order to preclude the possibility of ad-



Typical bed-room floor plan, Hotel Mossop, Toronto. J. P. Hynes, Architect.

jacent buildings cutting off the outside light, the rooms, other than those placed at the front, are situated on a permanent court having an area approximately half as great as the width of the building. Each room is provided with individual telephone, which connect with the exchange in the hotel office, and the furnishings throughout are of a select character; the walls being decorated with imported papers, the ceiling tinted, and the carpets are laid on felt directly over the concrete floors.

The hardware throughout is in plain brass, the locks being of a special hotel corridor door type, inter-communicating doors and lavatory door locks, all master and grand master keyed.

The basement, in addition to the main kitchen, also contains the heating boilers, hot water heating apparatus, ice machine, laundry facilities, and also liquor and provision storage rooms.

The building, which cost $250,000, was designed and erected under the supervision of Architect J. P. Hynes, and the firms and contractors connected with the various branches of the work were: Brick and fireproof work, Jas. C. Claxton & Son; carpenter and wall work, Toronto Office and School Furniture Co.; ornamental iron work, Canadian Ornamental Iron Co.; hydraulic hoist, Parkin Eleveator Co.; elevators, Otis-Fensom Eleveator Co.; marble work, Hoidge Marble Co.; plastering, Hoidge & Son; tile work, Canada Glass, Mantels and Tiles, Ltd.; sheet metal work, roofing and ventilation, A. Matthews; refrigerators, John Hillock & Co.; bathroom fittings, Jas. Robertson Co.; coal chute, The John Inglis Co.; iron guards, Geo. B. Meadows Co.; safety treads, Mason Safety Treads Co.; carpet and furniture, John Kay Company, Ltd.; curtains and draperies, The Wm. A. Murray Company.

STEEL RAILWAY TIES are largely being substituted for those of wood in many of the leading industrial countries of the world. One reason for this is that their adoption is made imperative in certain localities to prevent the rapid destruction of forests. It is estimated that in Europe a mile of railway line requires about 2,500,000 cross-ties every 12 years, which means the cutting of an enormous quantity of forest trees. It is also estimated that the railways consume something like 40,000,000 ties per annum, and this consumption is said to be increasing at the rate of 3.000,000 a year. Another reason given for the utilization of steel ties is that investigation has shown that these ties when carefully constructed in order to meet the demands of modern railway traffic, are generally favored on account of their superior solidity and power of resistance. Nevertheless, their high price, certain defects in form, and the absence so far of a convenient and simple mode of attachment have prevented in a great measure their general adoption, although they are being more widely employed with each succeeding year. It is asserted, however, that the English manufacturers have on the market a tie "profile en rigole" (grooved section) that sells for $30 per ton, or less than the present cost of wooden ties. It is evident, therefore, that under these conditions the use of the steel tie would produce decided economical results for the railways. In the United States this type of tie is being subjected to a large number of experiments. The Pittsburg Gazette-Times states that the first test of steel ties by the traction lines of that city has led to a decision to place them on 1½ miles of track. If they are successful there, the entire system will be thus equipped. A steam railway operating into Pittsburg already has steel ties on five-eighths of its mileage and in a few years will have entirely replaced its wooden ties. The newspaper in question adds: The price of the steel ties is approximately $1.50 apiece, while wooden ties cost from 80 to 90 cents, but after treatment with creosote and the addition of heavy tie plates, the final cost of the wooden ties, it was explained, is nearer $1.25. And when they are worn out that is the end of them—they are burned up. But with the worn-out steel tie it is different. It can be sold as scrap and part of its original cost recovered. In the end, it is asserted, the steel tie is by far the cheaper. There is practically no wear out to it, while the wooden tie, if not treated with creosote, would last only a few years under heavy traffic conditions. In the olden days wooden ties were known to have lasted 20 years, but the conditions are very much changed now. There has been a demand all along for heavier ties to meet the increasing requirements in their use. The manufacturers naturally feel that the steel tie is the solution of the problem.

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ADVERTISEMENTS.—Changes of, or new, advertisements must reach the Head Office not later than the first of each month to ensure insertion. Advertising rates on application.

CORRESPONDENCE.—The Editor will be pleased to receive communications upon subjects of interest to the readers of this journal.

Vol. 3 Toronto, November, 1909 No. 1

Current Topics

A GIGANTIC EXPENDITURE, aggregating $133,000,000, for municipal improvements in Paris, has been proposed by the Prefect of the Seine to the Municipal Council. Of this sum it is proposed to spend $23,600,000 on water and sanitary works, and $6,600,000 on streets and parks.

* * *

OWING TO THE TRADE CRISIS which Berlin is undergoing at the present time, Germany's Capital offers but little in the way of encouragement to her architects and builders. A writer in a recent article states that the city is suffering from a glut of vacant buildings. It is estimated that 19,000 buildings are unoccupied. These include over 1,000 shops and 18,000 dwelling houses.

* * *

THE EXECUTIVE BOARD of the Architectural League of America announces that the Convention of that organization this year will be held at the Willard Hotel, Washington, D.C., December 11, 13, and 14, 1909. Further information can be obtained from the President, 1103 Union Trust Building, Detroit, Mich., or from the office of the Permanent Secretary, 729 15th Street, Washington, D.C.

* * *

A SUM OF $100,000 PER ANNUM, for a period of ten years, making a million in all, is to be granted from the federal funds to the civic commissioners of Ottawa, for the purpose of promoting improvements tending to beautify the city. The Government heretofore only allowed an annual grant of $10,000 for such work. With this additional appropriation, the commissioners will be enabled to carry out a number of projects which will greatly enhance Ottawa's reputation as one of the finest cities on the American continent.

THE TWO TUNNELS at Kicking Horse River, forming a part of the Canadian Pacific Railway right of way, near Field, B.C., are built on 10-deg. curves, and 1.6 per cent. grades. Together, they measure over a mile in length, and are part of an 8¼-mile cut-off, containing two loops, which allows a reduction of maximum grade from 4.4 to 2.2 per cent.

* * *

THE DISMANTLING OF FARADAY HALL at Cobourg, (Ont.) within the past couple of weeks, marks the passing away of another famous landmark to disappears in the on march of Canadian progress. The building was erected some thirty years ago as a science hall and museum in connection with the old Victoria University, and at one time was a noted seat of intellectual life.

* * *

PETERBORO'S GROWTH from a residential standpoint this year, has been most marked. It is estimated that no less than 125 new homes have so far been erected, and that the amounts expended in this respect will total $200,000 or over. A residential growth of this kind, means also a commercial and industrial growth; and if the increase in population is keeping pace with the development of new houses, the next census returns should indeed be gratifying.

* * *

A DELEGATION OF OFFICERS representing the Canadian Federation of Labor, recently visited Ottawa and laid before Sir Wilfrid Laurier, Hon. L. P. Brodeur and Hon. Mackenzie King, the resolution adopted at the annual meeting of the Federation, asking that the provisions of the Lemieux Act be extended. In addressing the delegation the Minister of Labor said that the widening of the scope of the Act should be brought about gradually and that it first might be made to apply to the building trade. The demand, however, would have to come from the trade itself. If such a request were made, he would be willing to recommend the extension of the act to his colleagues.

* * *

THE BUILDING REPORT OF HAMILTON for the year ending Oct. 31, 1909, as submitted by Inspector Anderson, shows that 730 permits entailing an expenditure of $1,547,425, were issued in the past twelve months, as compared with 623 permits totaling in value $1,531,182 in the preceding year. One of the important features of the report was the Inspector's recommendation that a special committee be appointed to revise the building by-law, so that the regulations would more adequately safeguard the interests of the city. The report also advised the inspection of a plumbing inspector whose duty will be to see that all work of this character is properly installed. It is expected that the new building code will provide most stringent regulations as regard plumbing and sanitary equipment for buildings.

* * *

CANADIAN CAPITALISTS from Toronto and Montreal, who have already expended many millions in electric railway enterprises in Mexico, says a recent press report, are preparing for the construction of a great dam across the Conclos River for the purpose of forming a reservoir which will give initial power for a 25,000 H.P. hydro-electric plant which they propose to install. In addition, the company will build a railroad 20 miles long connecting with the Mexican Central line and Santa Rosalia. We might add that it seems a long way from home for Canadians to invest their "shekels," particularly when the Dominion offers such a wealth of opportunities for industrial development and gives every assurance of the highest returns on every dollar thus expended. The investor in Canada at the present time, cannot help but become a modern day *Midas;* and outside capitalists are fast recognizing the great possibilities this country has before it.

UNUSUALLY RAPID EROSION has created a new 5-mile channel for the Sittang River, India. A ditch 6 ft. wide was dug in 1903 to drain land on a neck in a bend of the river. The tide and floods frequently overflowed the ditch and in receding rivulets toward it. In two years the ditch widened to 300 ft. The flood waters then found their way into the ditch from above and created a waterfall of 5 ft., which receded 1,000 ft. in a year, working finally into the upper river.

* * *

THE LOCATION OF THE FIRST SECTION of the Alberta and Great Waterway Railway has been completed and if favorable weather conditions continue it is expected to accomplish considerable construction work yet this year. The entire right of way to Fort McMurray will be cleared between now and spring, and a party of surveyors will be kept continually in the field until the location of the entire line is completed. Contracts for the ties and rails will be let shortly, so that they can be distributed along the road bed during the winter months.

* * *

WITH THE OFFICIAL OPENING of the new railroad thoroughfare over the River Sioule by the French Minister of Public Works, M. Viviani, the completion of the highest viaduct ever built, is brought to the attention of the engineering world. The viaduct is situated at Fades on the Orleans railway system in the Pay-de-Dome department, between the stations of Lepeyrouse and Volvic. It is 144¾ yards above the stream, and was built at a cost of $800,000, eight years being taken up with its construction. Previously the highest bridge over which a railroad passed was the Chokteik viaduct in Birmania, 139¾ yards high.

* * *

RATHER AN INTERESTING BRIDGE, said to have been built by Indians, is situated about 200 miles east of Prince Rupert, B.C., near the proposed line of the Grand Trunk Railway. It is built of round poles, fastened together with telegraph wire and wooden pins, the floor being the only part where nails are used to any extent. No two joints of the structure are made alike, but it seems, nevertheless, to do the work required of it, that of providing means of travel for pack trains to cross Bulkley River. Looking at it from a distance, it seems to be nothing but a conglomeration of poles and wire stuck together, with no particular reason for its not falling; the floor is very uneven, and the joints of the different members are made by lapping and binding them with wire. But a closer inspection show that the party who built it had a pretty good idea of engineering, for the bridge is an ingenious combination of cantilever and suspension construction.

* * *

NEW YORK'S MILLIONAIRE PLAYHOUSE, as the gorgeously appointed "New Theatre" just completed at Central Park west and 62nd street is known, was opened to the public on the night of November 8. From the outside it looks more like a Greek temple or an art museum than the particular style one is accustomed to see in structures of this kind. On the interior the color scheme throughout is driftwood and gold, relieved by a touch of cerise in tapestry and hangings, while in the panels forming the ceiling of the foyer are two magnificent oil paintings, presented by Wm. K. Vanderbilt, and taken from his own ballroom walls. The playhouse is intended to promote and elevate the legitimate drama, and its erection was made possible by a fund subscribed to by wealthy New Yorkers. E. H. Sothern and Julia Marlowe, at the head of a notable array of stars, presenting Shakespeare's "Anthony and Cleopatra," had the honor of being the first to appear before the footlights. The theatre is the finest and most costly playhouse in America.

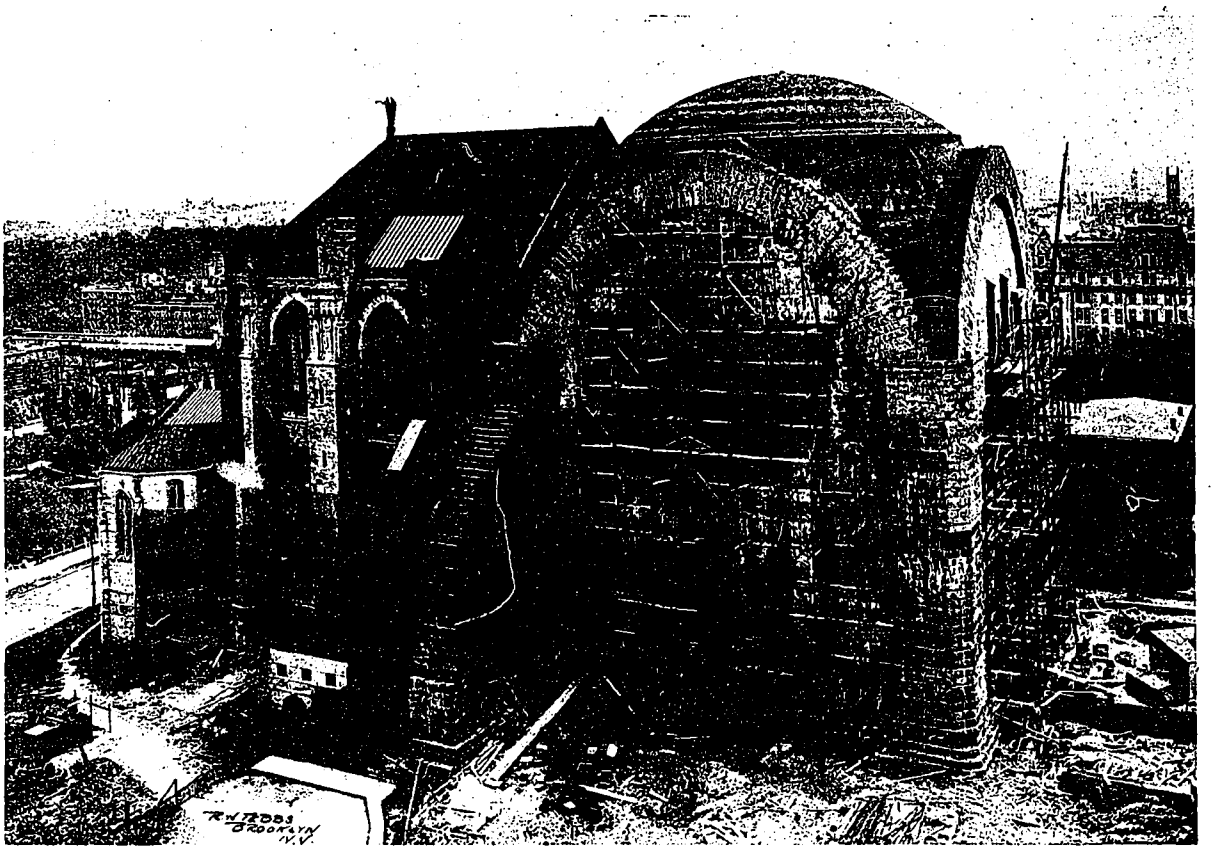
MACHINERY IMPORTED into the Transvaal during the first quarter of 1909 amounted in value to $1,820,000, an increase of $344,648 when compared with the amount for the corresponding period of 1908. Evidently a good market in this respect will be found there for some time to come, especially in view of the fact that the government has made the first survey and completed preliminary arrangements for the extension of the railway from Pietersburg to the copper fields at Mesina, 200 miles to the north, with an ultimate continuation across the Limpopo into Rhodesia. The whole district through which the railway will run is rich in mineral resources and agricultural possibilities, and the construction of the line, which is to be proceeded with forthwith, will mark an important epoch in Transvaal development.

* * *

A STEP CONDUCIVE TO PUBLIC SAFETY has been taken at Toronto in the form of an edict issued by the Police Department prohibiting the sale of standing room tickets at any of the local theatres. That the authorities intend to apply stringent measures to suppress the practice of crowding the aisles and the space back of the seats, is evidenced in the fact that two theatre managers were, subsequent to the time when the notice was served, fined for violating the order. Other cities in Canada where a similar evil exists should follow Toronto's example. It will be recalled that the great campaign of investigations throughout the country which followed the fatal Iroquois Theatre fire in Chicago a few years ago, pointed out that just such a condition was one of the greatest dangers which confronted most municipalities as regards their playhouse. A review of the existing conditions in a large number of Canadian cities shows that the drastic measures then adopted for the safety of the public, have been but feebly carried out. Another idea, suggested by Controller Geary, in connection with the new order of things in Toronto, which should be approved of by theatre managers and enforced by the authorities, is the throwing open of fire exits after each performance, and the encouraging of the public to use these openings, so that theatregoers may familiarize themselves with their location and the point of the street to which they lead.

* * *

COINCIDENT WITH THE WIDENING of the Richelieu River Channel at the port of St. John's, Quebec, other harbor improvements, including the construction of concrete wharves and the erection of a railway bridge, are being carried out in a vigorous manner. The river channel, according to the present plans, is to have a width of 300 feet, and a depth of 14 feet; but it will require several years to complete the dredging, the object being to extend the work 3 miles to St. Theresa Island, in which event 7 miles of the Chambly Canal, through which all the vessels plying the Richelieu River have to be towed, will no longer be used. This will be of great benefit to the commerce of the river, as it will materially reduce the cost of towage, only 5 miles of the present 12-mile canal then being required for navigation purposes. The immediate benefits to be derived from the work in its present state will be a considerable reduction of the annual spring inundation of farm lands bordering the banks of the river between this port and Lake Champlain. In addition to this work, the construction of concrete wharves is at present under way, and the Canadian Pacific Railway is replacing its old bridge, built on piles, with a modern one of concrete piers and steel superstructure, at an estimated cost of $200,000. The piers will be of sufficient width to accommodate a double track, the present bridge being single tracked.



Cathedral of St. John the Divine, now in course of construction, on Morningside Heights, New York City. An idea of its great size may be obtained by comparing it with the buildings in the immediate background. Work on the Cathedral was started fifteen years ago, and, when completed, it will accommodate ten thousand worshippers.

DOME OF ST. JOHN THE DIVINE.—Construction of Immense Vault Over Partially Completed New York Cathedral Wholly Without Precedent.—Built Without Falsework or Scaffolding 200 Ft. Above the Ground.—An Edifice Which Will Accommodate 10,000 Worshippers.

IF NOT THE ARCHITECTURE of the building itself, nor the vastness of its magnificent dimensions, then the construction of its immense dome alone serves to render the Cathedral of St. John the Divine, now in process of erection on Morningside Heights, New York City, a structure of absorbing general interest. It is the first great dome in the world built without either falsework or scaffolding, and its completion marks the successful carrying out of a stupendous and daring work, which in method of construction has upset all existing theories in engineering of this kind, and excited the wonder of the architectural and engineering fraternities and the lay public alike.

This mighty vault, which rises above the centre of the structure at a distance of 200 feet from the cathedral floor, was built bit by bit over an area of absolute space. When Rafael Guastivino, Jr., began preparations for the work, builders called the undertaking visionary and foolhardy, wholly without precedent, and impossible of accomplishment. Experts were extremely dubious as to its outcome, and it was predicted that the dome was sure to collapse, carrying death and disaster in its wake, for not only would it have to support the weight of the workmen as the work progressed, but the heavy material required each day. Mr. La Farge, the architect, and Mr. Parson, the engineer of the building, alone showed their faith in Mr. Guastivino's ability to erect the massive structure without the aid of supports of any kind.

The entire dome consists of ordinary thin, flat terra cotta tile, 6 x 12 inches, and an inch thick, laid according to a method of construction involving the cantilever principle. These tiles in size and shape are much like the bricks of the ancient Romans still to be seen in the walls of the little church near Canterbury. Beginning at the bottom course, the first six or seven rows of tile were laid one over the other breaking joints, in a special cement of plaster of paris. The next course, laid in Portland cement, was held in place by overlapping the tile below, and this process was repeated until the great dome was finished.

This particular method of dome building was invented by the elder Mr. Guastivino and has been extensively employed in public and monumental building in various parts of the country. It saves thousands of dollars by dispensing with costly false work and heavy staging for domes of such magnitude. But his son's startling audacity marks a new departure in this branch of industry, as never before has this method of construction been attempted on such a gigantic scale.

The dome springs from the four massive skeleton arches 62 feet square, of solid granite, rising 145 feet above the street, with a clear span of 85 feet. These arches will eventually carry the huge tower and spire, weighing millions of pounds, shooting above the dome and church 425 feet from the pavement.

The Cathedral itself, which when finished will cost ten

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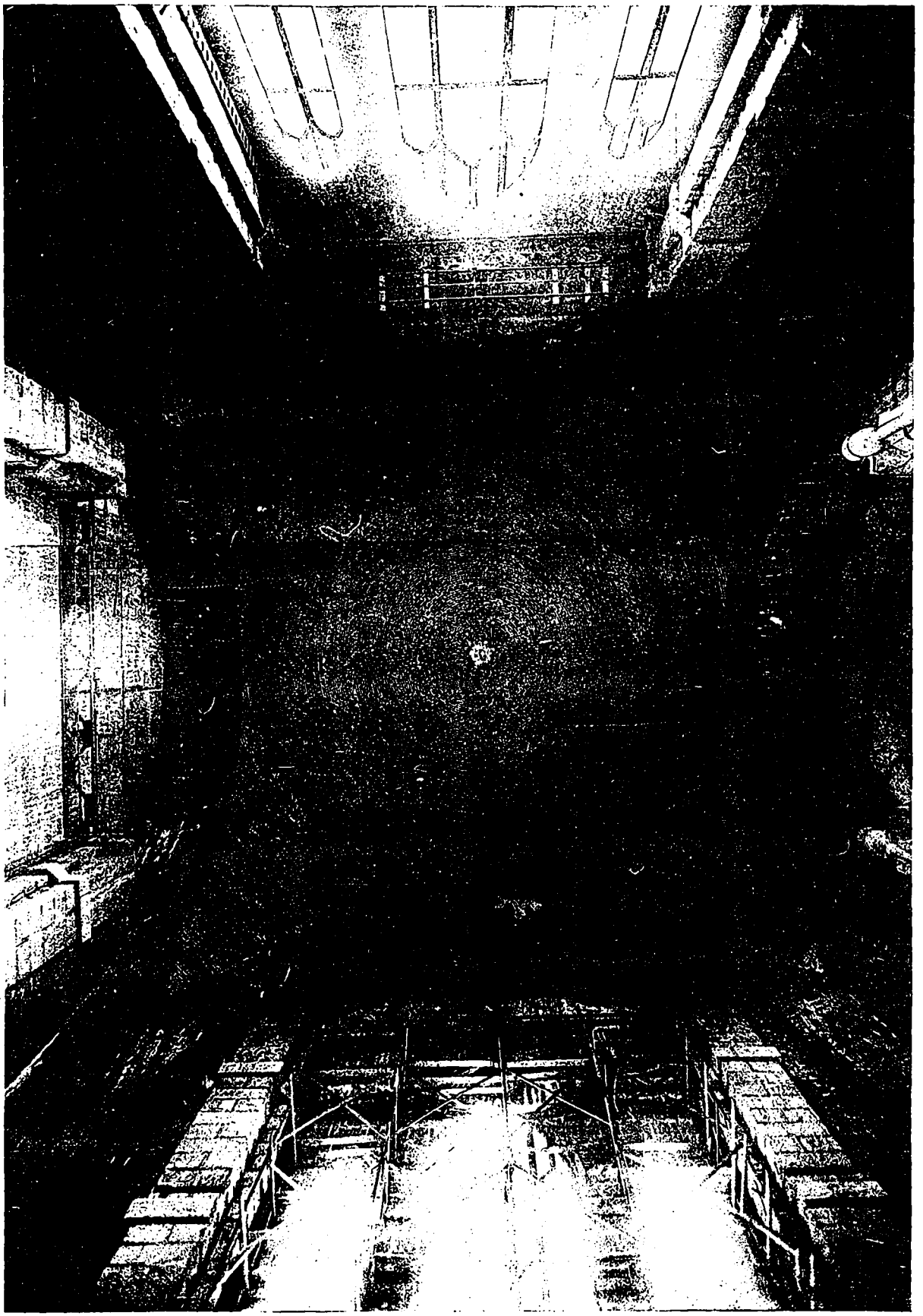
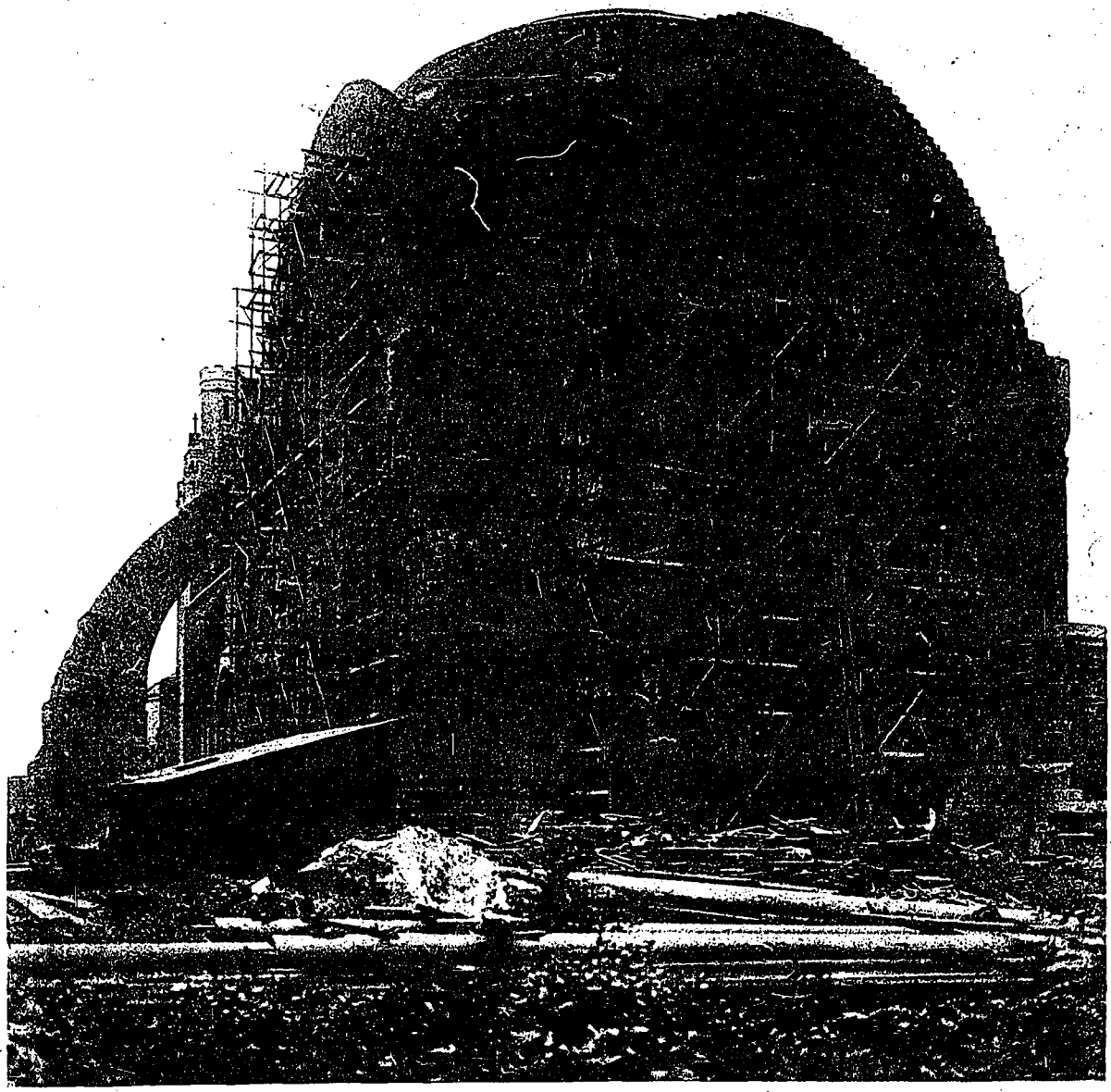


Looking up into the immense dome, Cathedral of St. John the Divine, New York City, the construction of which, being carried out in defiance to all accepted theories of engineering of this kind, is entirely without precedent. It was built without either false work or scaffolding, and is the third largest dome in the world, being 135 feet in diameter, or 7 feet less than the dome of the Pantheon in Rome.

million dollars, has the extreme dimensions of 520 x 280 feet. Work on its construction was begun first fifteen years ago, and it is estimated that twenty years more will fully elapse before it is entirely finished. At present the walls and arches of the great tower, the choir and sanctuary have been completed. The four great arches form a square of about one hundred feet exactly under the dome, which rises from its four corners, already making a vast cathedral chamber to open into the two

Florence, about the same. The Mosque of St. Sophia is about 115 feet, while the famous dome of St. Paul, in London, is only about 112 feet.

The most impressive feature of its construction is the extreme thinness of the dome shell, and its wonderful sustaining strength. Above the base of the dome, which will eventually bear a large share of the weight of the lofty spire, the thickness of the dome does not exceed seven and a half inches. and from that point upward



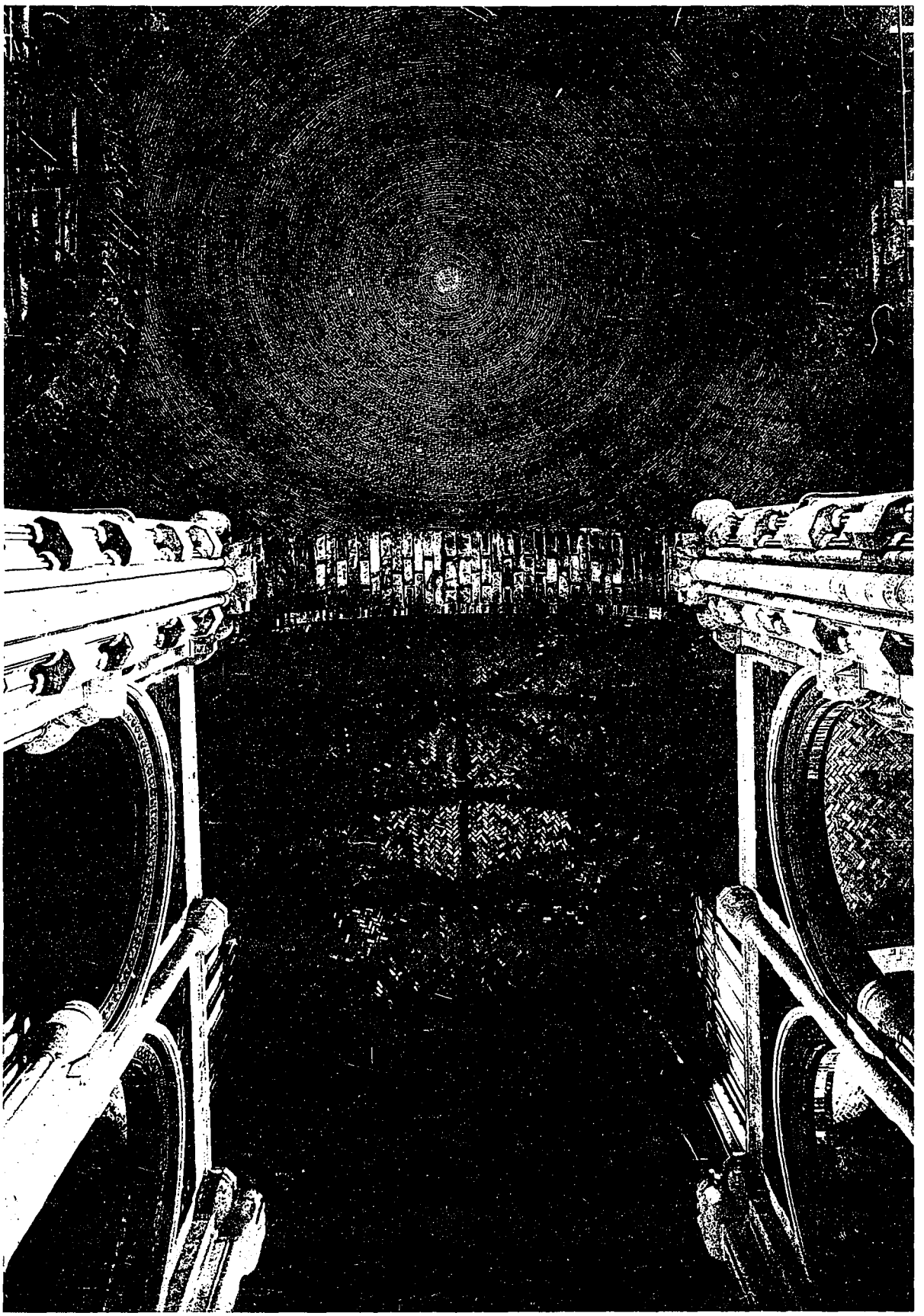
Cathedral of St. John the Divine, New York City. View showing one of the huge buttresses, the massive arches, and the great dome which rises above the centre of the structure at a distance of 200 feet from the Cathedral floor.

hundred foot long nave and north and south transepts.

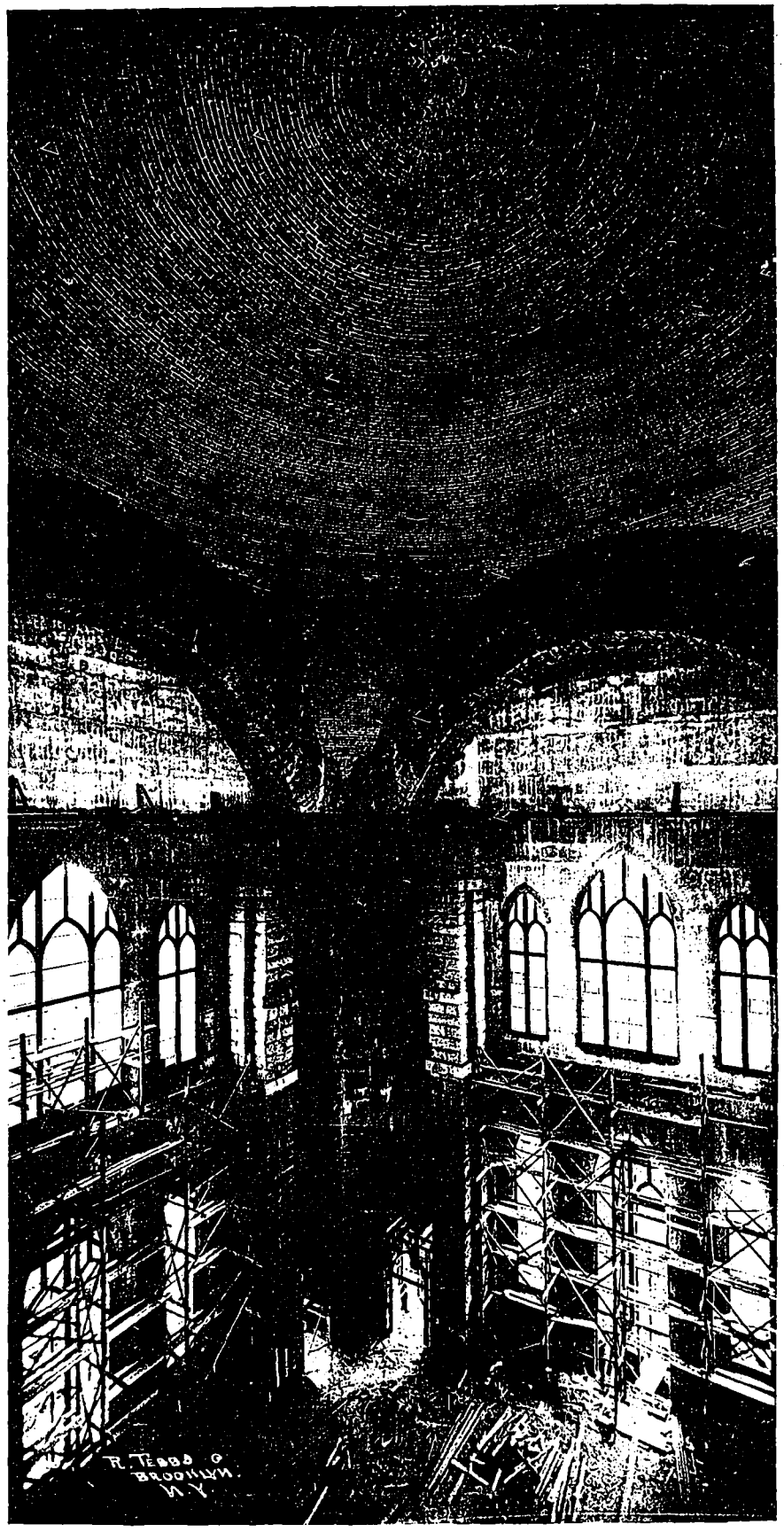
Like most cathedrals, St. John the Divine is in the form of a cross, and the dome which is 135 feet in diameter, is one of the four great domes of the world constructed of masonry. The Pantheon, in Rome, the largest, is 142 feet across; St. Peter's, 139, and the Duomo, at

toward the top it diminishes gradually to three and a half inches, which seems incredible when compared with the massiveness of the other masonry of the building. Compared with the ponderous walls of the Cathedral it seems but an eggshell.

"If the present dome were built by the usual method,"



View of dome and vaulting over retrochroir, Cathedral of St. John the Divine, showing the detail of Columns, arching and groin work.



The great arches and dome, as seen from the interior of St. John the Divine's Cathedral, New York City.

said Mr. Guastivino, "a ponderous scaffold and false work would have to be erected 160 feet high, which would entail great risk and expense in building, saying nothing for the subsequent work of removing it."

Viewing the four great arches, visible for miles around, the question naturally arises as to how it was possible to start the dome at the corners formed by this juncture of the arches and carry it up so as to form a hemisphere the base of which is some one hundred and ten feet above the ground, and this so exactly built that there would not be the variation of a fraction of an inch in any part of the dome out of the true sphere. It is evident that no human eye, however trained, could outline a circle of such magnitude in imaginary curves and preserve more perfectly the lateral and upward curvature until finished at the crown.

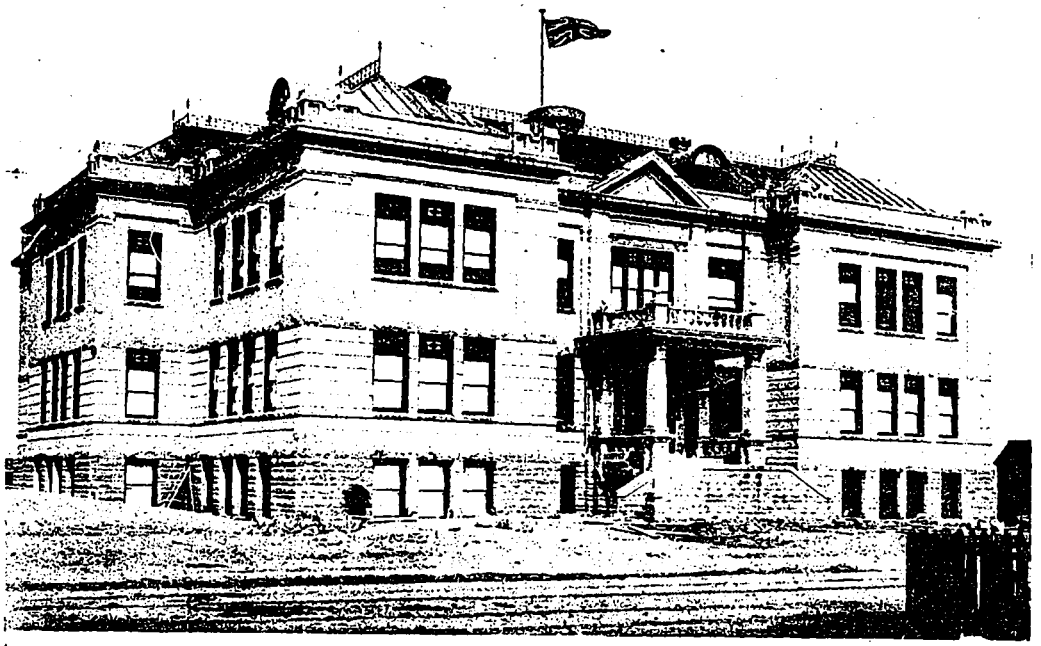
To insure a smooth and perfect curvature at all points it was necessary at the beginning to establish a centre point from which to work, which would coincide exactly with the focal spot 'up in the blue sky,' as some of the engineers expressed it.

Anchors composed of steel pins were driven in the central point of the top of each of the four great arches and a quarter inch steel cable was thrown from each pin and fastened to a steel plate below, this plate being four inches square, with a hole drilled in each corner. This plate had in its centre a hook with turn-buckle adjustment, to which a fifth cable was attached acting as a guy to hold the point rigid.

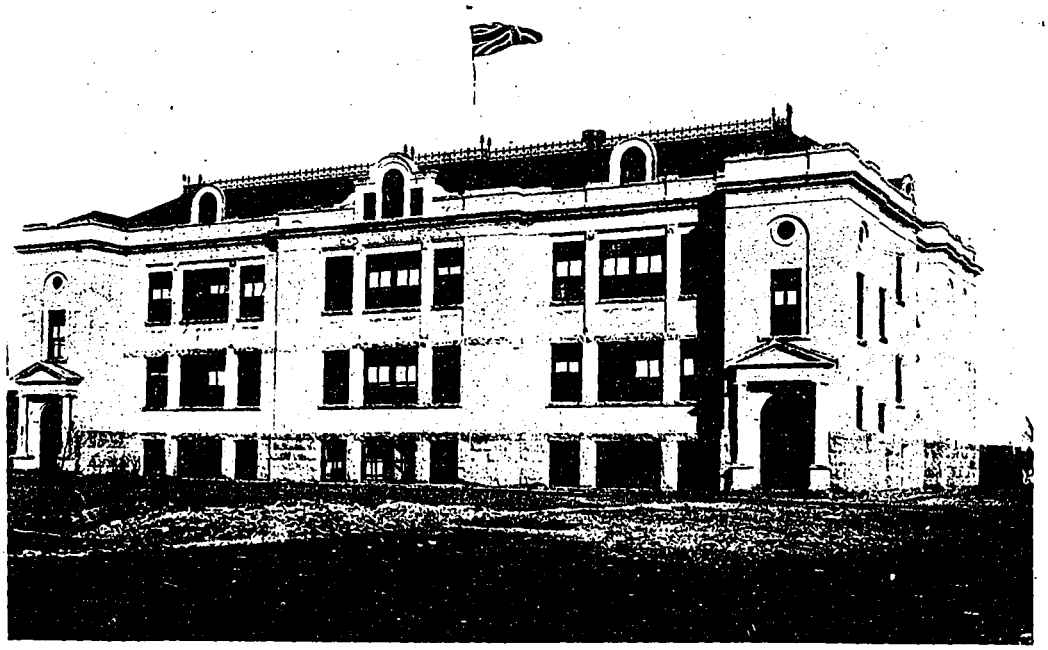
When all was ready the men on top of the arches hoisted up the plate to the level of the imaginary centre of the great dome to be built. This imaginary centre was accurately determined by the engineer with instruments, which established the true centre of the dome. A lead of 800 pounds was fastened to the lower end of the fifth cable, suspended from the centre of the plate, hanging like a plumb line to the centre of the floor of the Cathedral, a hundred feet below, to maintain it in true position.

The eye of the hook extending through the plate constituted the centre of the dome. By stretching heavy steel tapes, marking half of the diameter of the dome,

(Continued on page 70.)



King Edward School, Winnipeg, erected in 1908, at a cost of $63,000. One of the first structures to be built in accordance with the comprehensive scheme outlined in 1907, to the Board of Education, by Commissioner of School Buildings, Mr. J. B. Mitchell, to provide adequate accommodations for educational work, and to bring the school buildings in general up to a standard of sound and safe construction.



Lord Selkirk School. Another of Winnipeg's new school buildings. This structure was built simultaneously to the King Edward School, and cost $53,000. The walls of both buildings are lined with hollow tile, to which the plaster is directly applied.

WINNIPEG'S SCHOOL BUILDING.—Commendable Enterprise of Western Metropolis in Providing Modernly Equipped Structures for Educational Work.—Expenditures in 1908 Alone Total $333,802. —Several New Buildings Now in Process of Erection.

Mr. J. B. Mitchell, Commissioner of School Buildings, Winnipeg.

THERE IS NO CITY on the American continent that has shown a more liberal spirit in its diligent efforts to provide the best possible accommodation in public school training, and we are safe in saying that there is no city in Canada which has been as free in its expenditures to provide modern courses of training, competent teachers, safe and comfortable school buildings and and the best modern equipment, as has Winnipeg.

On the other hand, the problem of elementary education, as represented in the West, is one of a much more difficult solution than that with which our Eastern cities are confronted. The vast influx of settlers from Europe has rendered Winnipeg a city of many languages. These new citizens invariably have large families, and the West that is to be will, to a great extent, be influenced in its development by the character of men the West makes from these little urchins, most of whom, when they enter the public school, cannot speak the English language. Some extent of the difficulties to be encountered by the Winnipeg school authorities, may be realized from the fact that there are from fifteen to twenty nationalities represented in some schools. They are bright little folk, eager and quick to learn. The West prizes every one, and it rests with the school authorities to make stout, useful Canadian citizens of them all.

There is no race suicide in Winnipeg. Most of the people who have gone West are young. They have large families, and there is a strong prevailing sentiment that nothing is too good for the youngsters, it matters not what the cost. This most commendable attitude toward expenditures for the building and maintenance of their public schools, is directly the opposite of that assumed by the taxpayers of most of our Eastern cities, who quibble over every detail of expenditure called for in public school estimates. Property owners and their representatives in most of the Ontario cities and towns, have so brow beaten those in whose charge the erection and equipment of public school buildings has been placed, that, although the condition of many of the Ontario schools are far below what might be termed a reasonably decent standard, is well known to them, they have become too timid to ask for even those improvements that are essential to the safety and comfort of the children.

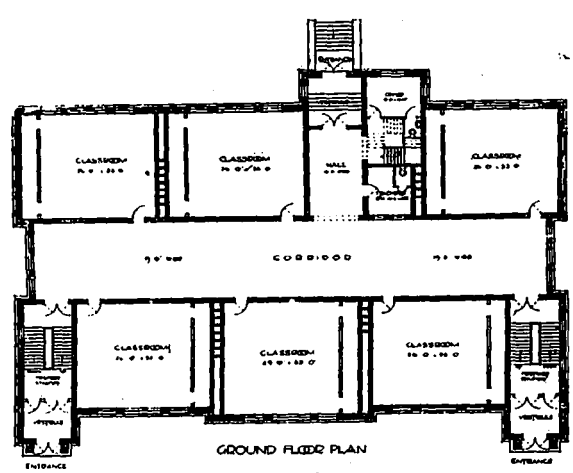
The citizens of Winnipeg have shouldered their responsibilities with that true Western spirit, and, despite the extremely high prices they are forced to pay for materials and equipment, they have to-day, generally speaking, the best constructed and the best equipped school buildings of any large city in Canada.

The fact that Winnipeg, during 1908, spent $333,802.48 in the erection of new buildings and additions and improvements of old structures, gives some idea of the extent to which the city is going, in its attempt to provide first-class buildings in its public schools. This is a fairly liberal expenditure on school buildings for a city of 100,000 population.

In order that Winnipeg schools should be abreast of the times in every particular, the School Board sent Mr. D. McIntyre, Superintendent of Schools, and Mr. J. B. Mitchell, commissioner of School Buildings, to study conditions under which every phase of school work was being carried on in the East and South. After having visited fifteen cities, in each of which they inspected an average of four schools, they came back full of ideas which the school authorities immediately proceeded to put into practice, with the result that their expenditures during 1908, for buildings, amounted to almost three hundred and fifty thousand dollars.

Mr. Mitchell, in his report, outlined generally what they had seen in the cities visited and went into the details as regards design, construction, fire protection, lighting and heating and ventilation quite thoroughly.

The portion of his report, however, that characterizes most truthfully the attitude of Winnipeg toward public school expenditures, were the opening and closing paragraphs. In opening, he gave briefly his general impression of what he had seen in the United States. He said:

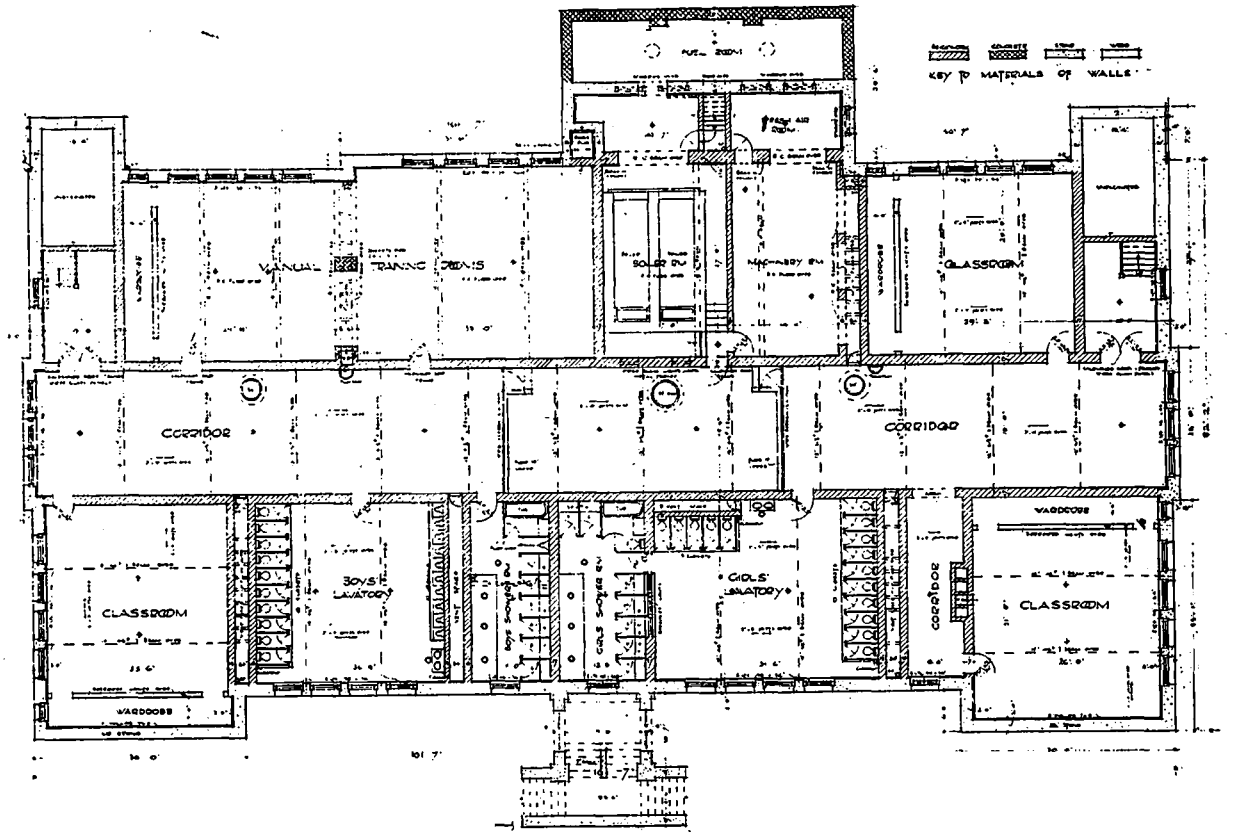


Ground floor plan, Lord Selkirk School, Winnipeg.

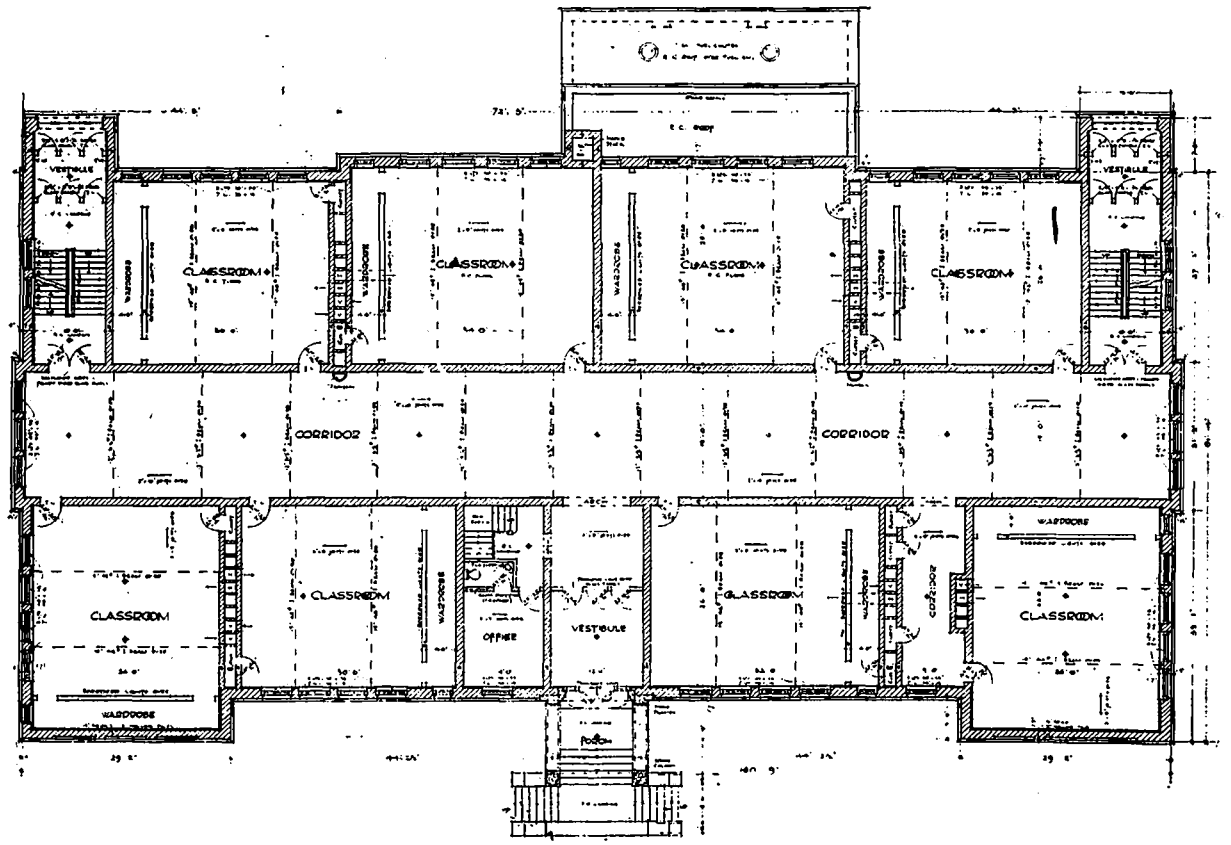
"The first impression irresistibly borne in upon my "mind is the evident pride which the average American "feels with regard to the schools, and the prominent, "the outstanding position which the public schools occupy "in the thought and life of the nation.

"The schools are viewed as a medium through which "those who in a few years are to guide the destiny and "shape the future of their country, will be trained even "to a higher degree than those who preceded them, to "use the best advantage, the physical, mental, and moral "gifts with which Providence has endowed them.

"These views lead to a cheerful and willing expendi- "ture for school purposes which, otherwise, might be



Basement plan, Greenway School, Winnipeg, a feature of which is the large floor space devoted to manual training room. The arrangement of the lavatory, providing absolute private compartments, is also noteworthy.



Ground floor plan, Greenway School, Winnipeg, showing the large class rooms and wide corridors. It will be noted that the steps leading to the grade line are placed outside of the building.

"objected to, and the result is seen in every department "of school work; buildings, first-class in every par- "ticular; style, character, appearance and conveni- "ence; every provision made for the proper heating "and ventilation of the rooms; the closet accommoda- "tion provided of the most sanitary type known; and a "liberal equipment for class rooms, manual training, and "technical work.

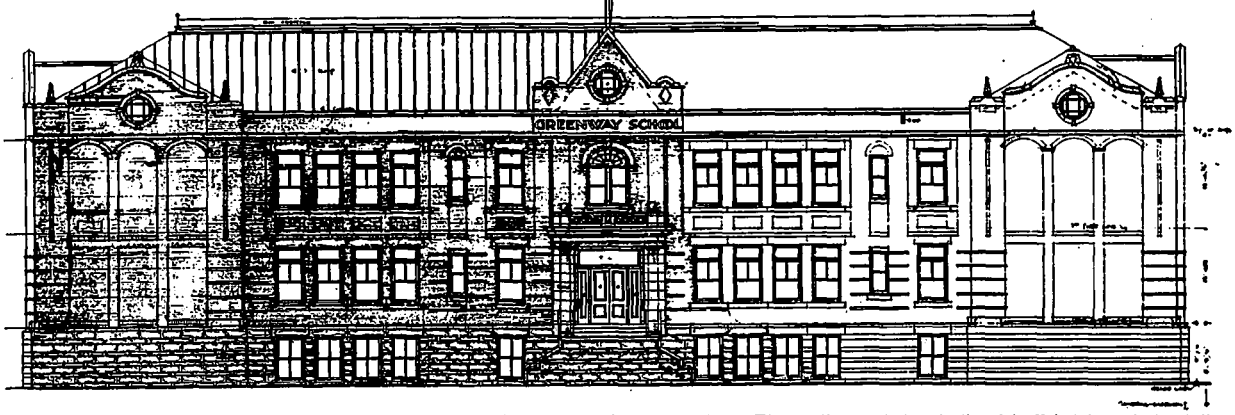
"A report from a committee from Cincinnati which "recently visited thirteen cities between the Mississippi "and Atlantic Coast, states that one-third of the funds "raised by taxation in those cities is devoted to educa- "tion, and no public money that is expended for other purposes gives such an adequate return."

It is the closing paragraphs, however, that are most interesting, in that they express in few words, the spirit that has been responsible for Winnipeg's superior school buildings. It is further interesting in that it expresses a sentiment, tempered with common sense and national pride, that should govern the work of every school board in Canada. The portion above referred to, was as follows:

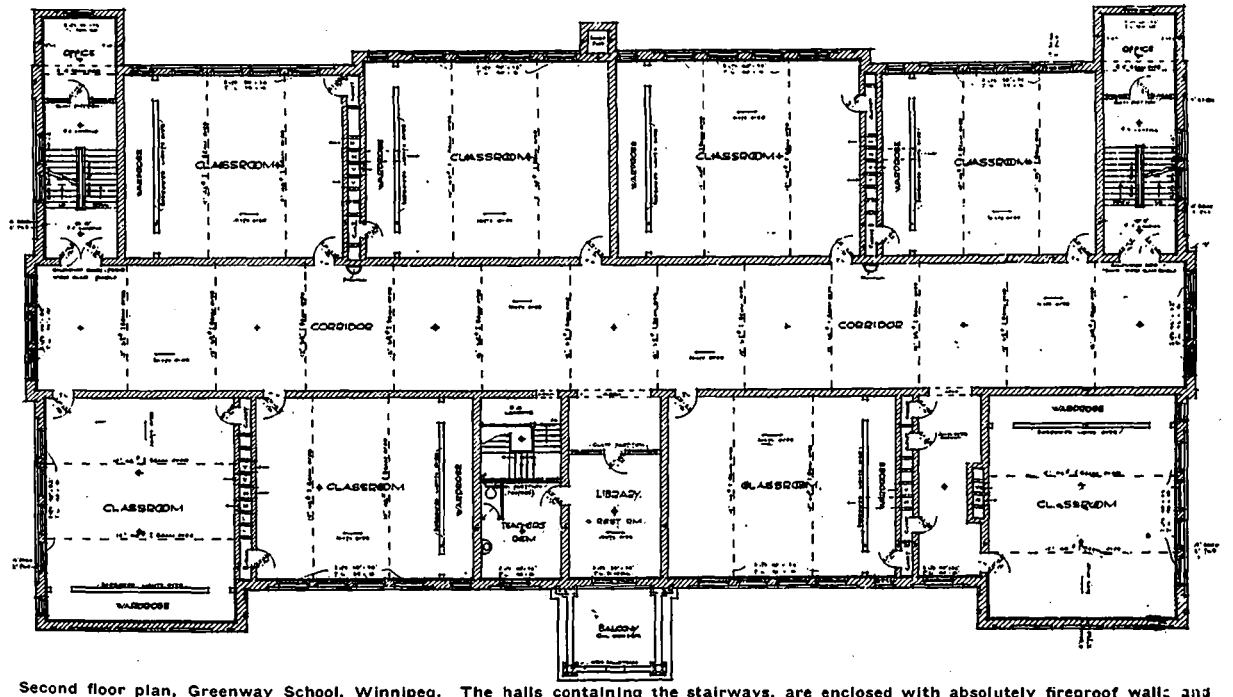
"In concluding this report, I wish to express the "thought with which I became impressed as a result "of the conditions observed.

"That Canadian boys and girls may be able to hold "their own against the world, it is only necessary that "they be given equal advantages to those which are en- "joyed by the children of any other nation, and that "they be allowed to study and do the work they are call- "ed upon to do while in school, under conditions as fav- "orable as those with whom in after life they may have "to compete.

"In keen competition, every advantage counts for "much, and remembering the efforts which are being "made throughout the United States to give the children "every facility which it is possible to do, it would seem "that the idea which should prevail in the minds of every "trustee on the school boards throughout Canada should "be: There is nothing too good for the children, and it "should be known, appreciated, and remembered by every "parent in this Dominion that education is more im- "portant than good streets, roads or sidewalks, and more "public money should be spent to thoroughly equip the "children for the battle of life, than is now being de- "voted for that purpose."

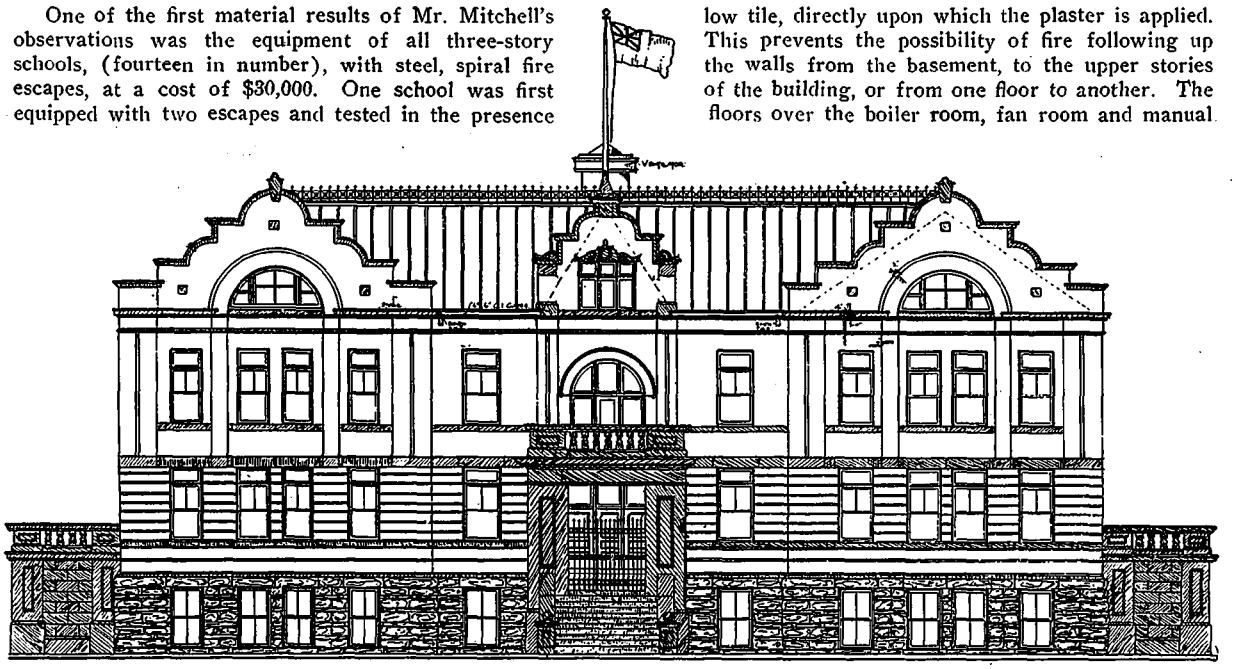


Front elevation, Greenway School, Winnipeg, now under course of construction. The walls are being built of buff brick and Tyndall stone, a combination of materials used in the exterior of all Winnipeg schools.



Second floor plan, Greenway School, Winnipeg. The halls containing the stairways, are enclosed with absolutely fireproof walls and doors, and are placed so as to assure egress in the event of any emergency.

One of the first material results of Mr. Mitchell's observations was the equipment of all three-story schools, (fourteen in number), with steel, spiral fire escapes, at a cost of $30,000. One school was first equipped with two escapes and tested in the presence



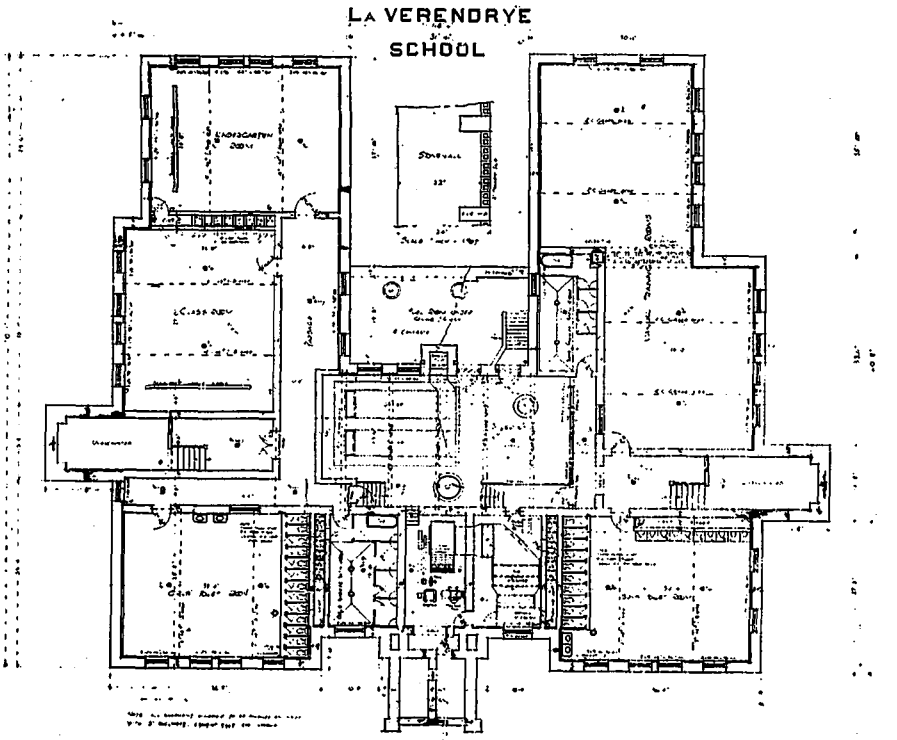
Front elevation, LaVerendrye School. Another Winnipeg structure now in process of erection, which demonstrated how thoroughly the campaign of providing the city with modern school buildings is being carried out.

of the members and officials of the school board; Fire Chief Buchannan; Building Inspector Rogers; Provincial Fire Inspectors Lindback and O'Connor, and several interested citizens. The test was unanimously agreed to be successful, and it was decided to equip all schools with two escapes each. Thus having provided their three-story schools with reasonably adequate means of protection against fire or panic, it was decided to limit the height of all schools to be erected, thereafter, to two stories, and to adopt in their construction to a greater extent than before, the use of fireproof materials.

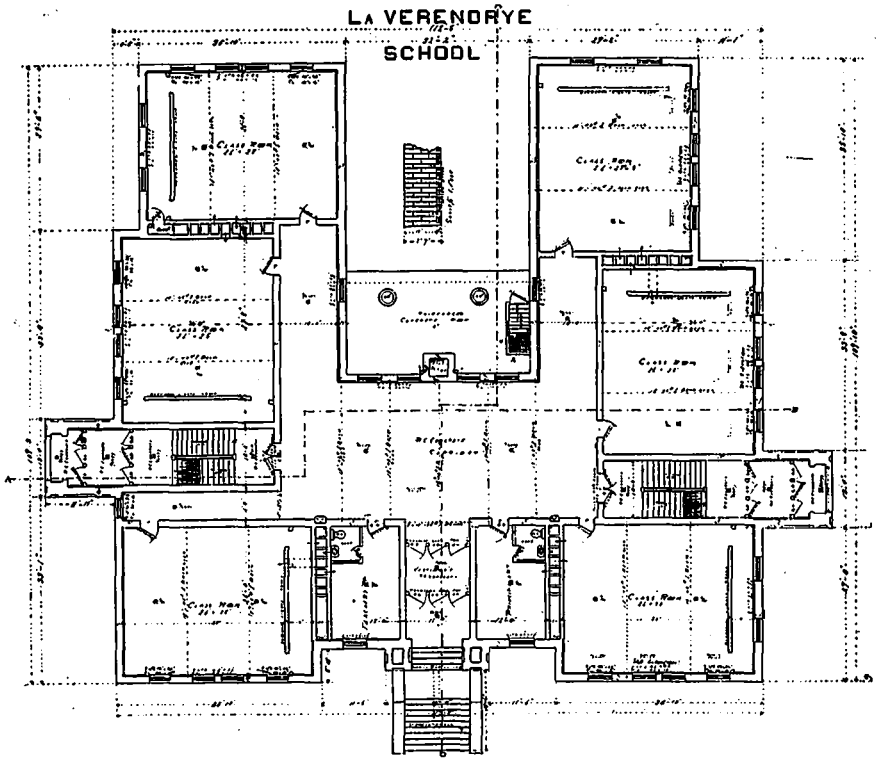
The Lord Selkirk and King Edward schools were built in 1908, at a cost, exclusive of heating and ventilating, of $59,000 and $63,300. These two structures were the first to be built after Mr. Mitchell's report had been given consideration by the school board, and they marked a distinct era in schoolhouse architecture in that city, and the features of their construction and their equipment clearly indicate the determination of the school authorities to utilize the latest ideas gathered from the experience of other cities with regard to protection against the consequences of fire or panic.

These structures are two stories in height, solidly constructed on concrete foundations, with Tyndall stone above the grade to the ground floor line, with brick walls above. A very commendable feature that serves as a very excellent fire protection, is the lining of the brick walls with hollow tile, directly upon which the plaster is applied. This prevents the possibility of fire following up the walls from the basement, to the upper stories of the building, or from one floor to another. The floors over the boiler room, fan room and manual training rooms, all of which are in the basement, are of reinforced concrete. The floors and stairways and landings throughout, are of reinforced concrete with iron stairs. Electric wires are laid in conduits and the roof covered with galvanized iron. Every precaution which experience might suggest, has been taken to lessen the danger of fire and make the schools as safe as possible.

In connection with each lavatory in the basement, the floors are tiled, shower baths were installed for the convenience of the pupils, a European idea which is fast gaining ground in America, as a recognized necessity.



Basement plan, LaVerendrye School, Winnipeg.



Ground floor plan, LaVerendrye School, Winnipeg.

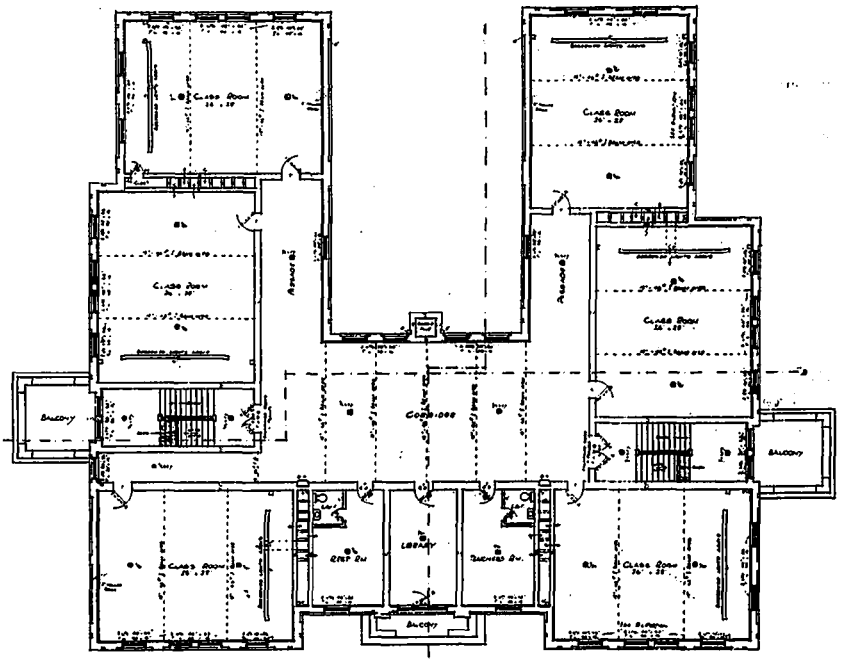
The heating and ventilating systems in these buildings are low pressure steam, supplied by two boilers with direct radiation in rooms and halls, supplemented by mechanical ventilation, fresh air passing through tempering and re-heating coils in basement and supplied to rooms by a fan driven by an electric motor, the heat being controlled by automatic temperature regulators.

While it will be seen that, architecturally, the designs of these buildings are very simple and unpretentious, the idea having been to eliminate everything in the way of useless and meaningless expenditure in superfluous decorative effects, but to give to the structure a quiet, simple dignity with an impressive appearance of massiveness and solidity. The plan of the Lord Selkirk school, which is shown herewith, gives a fair idea of the general lay-out of the two schools. It will be noted that the portion of the structure in which the fireproof stairs are located is entirely cut off from the main hall, as well as the rear entrance hall. The main corridor is 19 feet wide and the entrance halls and vestibules are 13 feet wide.

We also reproduce elevators and floor plans of two of the most recent schools, which, by the way, are at present under course of erection. They are known as the La Verendrye and Greenway schools, the former being erected in Crescentwood, and the latter at the corner of Livinice and Brunnell streets. The construction of these two buildings is very much the same as the King Edward and Lord Selkirk schools above described. The class rooms on the ground floor have a ⅞ in. maple covering, laid. The reinforced concrete floor and the iron and concrete stairways have asphaltum treads.

Another fire protection which was recommended by the Board of Fire Underwriters, and which will gradually be installed in all the school buildings in Winnipeg, is the cutting off of the halls from the main building by Kalimined doors. These are fitted with door checks and springs. In all schools now erected in Winnipeg, metal ceilings are used throughout. Another innovation carried out in these last two schools, is the May-Ordway Fire Alarm System, which will ring the fire alarm at any time the temperature in any portion of the building rises above five degrees beyond what may be considered a normal temperature. This is, without question, one of the greatest advances towards protection against fire that has yet been made in school buildings. It is also the policy of the board, in connection with the city council, to have all large school buildings connected direct with the fire station, so that, when this automatic fire alarm rings, it will not only notify the teachers, but will also, at the same time, automatically give the alarm at the nearest fire station.

Some idea of the importance at present given to manual training, will be gained from a glance at the basement plans of these two school buildings. It will be



Second floor plan, LaVerendrye School, Winnipeg.

seen that a very large portion of the floor area, has been set aside for manual training classes.

In the La Verendrye school, it will be noted that all entrances lead directly to a central corridor. It will also be noticed that the manner in which the stairways are entirely cut off from this central hall, by fire walls, is a worthy feature. There are no great winding, massive wooden staircases leading down directly into the main corridor, up which the flames can shoot, and thus cut off safe exit from the building. It will be seen that there are no steps in the entrance halls, leading down from the ground floor to the grade line. These halls take the pupils directly out to the open, all steps to grade level being on the outside of the building.

The plan of the Greenway school is noteworthy for the features above mentioned in connection with the La Verendrye school, in addition to the very excellent arrangement of the entrance halls and vestibules. The corridors are wide, and the rooms are large and airy.

Architecturally, the buildings are very much better than what we usually find in the East. The combination of Tyndall stone and buff brick, which is used in the construction of all the schools in Winnipeg, produces a very excellent effect. In the La Verendrye school, Tyndall stone is used up to the ground floor line for the belt courses, and the entrance; and limestone is used from the ground floor line to the first floor line, the walls above which are constructed of local buff brick.

Mr. Mitchell, who is responsible for Winnipeg schools has been Commissioner of School Buildings in that city for sixteen years, and has, in that time, either made additions to, remodelled, or built, every school now in use in Winnipeg. Mr. J. B. Mitchell was born in Gananoque, Ont., in 1852, and was educated in both the Ontario public and high schools. He went West in 1874, after having studied drafting in Montreal, and was, for some time, connected with the North-west Mounted Police, after which he became engaged in the contracting business in Winnipeg. He was chairman of the building school committee for six years, and in 1893 was appointed to his present position.

Mr. Mitchell is a man very much interested in his work, and appears to be untiring in his efforts to provide Winnipeg with the best possible school buildings. There is no official in Winnipeg who holds, to a greater extent, the esteem and confidence of the taxpayers, than does Mr. Mitchell.

Apart from his official position, Mr. Mitchell is very prominent and popular in both the commercial and social circles of Winnipeg. He is at present president of the Canadian Club of Winnipeg, and is vice-president of the Associated Canadian Clubs, which was organized recently at a meeting in Montreal. Mr. Mitchell is a true, patriotic Canadian, who fully appreciates the responsibilities that rest upon the shoulders of our present day public officials, and he is one of the many men you find in the West, who will stoutly put their shoulder to the wheel, in shaping the destiny of the "West that is to be."

DOME OF ST. JOHN THE DIVINE.—Continued from Page 63.

the exact position where every tile should be laid was instantly shown. A piece of board, shaped exactly as a segment of the great circle, attached to these tapes enables the masons to place each tile exactly where it should go, and thus the dome progresses symmetrically and mathematically exact. No wonder in gazing at this impressive work that one becomes conscious of Emerson's words that, "The hand that rounded Peter's dome wrought in sad sincerity."

One great obstacle encountered by the men working aloft was the heavy wind prevalent on the exposed heights of Morningside Park when the work was under way. More than once it seemed as if everything, men, mortar and tiles, would be swept from the roof.

One almost regrets, standing under that impressive vault high in the heavens, to learn that the central portion is to be removed when the great spire, rising from another dome a hundred feet above the present one, is finished. Those who have stood under the dome of the Capitol at Washington may recall that above the turn of the first arch rises a series of columns forming a sort of circular portico or colonnade, and high above all is the dome proper. A somewhat similar effect is to be carried out in the Cathedral.

The present dome, however, while built for the time being only, serves a double purpose—first, it encloses the great space a hundred feet square under the dome, so that services can soon be held in the Cathedral, and practically it will serve for every church purpose, and the work of putting in the upper columns or piers between the two domes and building the spire itself will proceed without interfering with worship or imperilling the life of any one in the Cathedral below.

When all is finished about half of the present dome will be removed and a cornice put on, projecting out a little under the base of the pillars supporting the lofty dome—the true dome—under the great spire more than four hundred feet above the street. Then will appear a beautiful colonnaded space, probably with open galleries around, like the vaulted whispering gallery of St. Paul's. When completed the great structure will extend nearly to the street in front, with room for ten thousand worshippers.

THE EFFECT OF WIND ON VENTILATION and heating formed the subject of a highly interesting paper read by Mr. H. W. Whitten, before the summer meeting of the American Society of Heating and Ventilating Engineers. The most apparent effect, Mr. Whitten states is the inleakage of air through crevices while the least apparent, but nevertheless important effect, is the outflow of warmed air through crevices in the sheltered side of the building, caused by an area of low pressure in the lee of the building, which acts as a partial vacuum. As the pressure of the inside warm air is naturally outward, the combination of this pressure with the partial vacuum outside produces a greater loss than is sustained on account of inleakage, assuming the aggregate amount of crevices on each side to be equal. The author then describes a few typical tests made by him and others in this connection, some of which are given here. A room situated on the east side of a rectangular school building, with a northwest wind blowing 14.5 to 15 m.p.h. and an outside temperature of 33 deg., showed an average rate of supply velocity of 817 ft. per minute and a vent velocity of 340 ft. per minute, giving a loss of 477 ft. per minute. The inlet was 8 ft. above the floor and the outlet at the floor, both being of equal size and on side of the room opposite the windows. An air test showed 10 parts of carbon dioxide in 10,000. A test of another school building with wind at 18 m.p.h. and outside temperature of 30 deg., the building being heated and ventilated by the gravity indirect system, showed an average loss of 20 per cent. from the supply ducts and an addition of 60 per cent. to the vent velocity in rooms on the windward side. Rooms on the leeward side of the building showed an addition of 30 per cent. to the supply velocity and a reduction of 62 per cent. of the vent velocity. Another test was performed in a high-school building. After shutting down the fan the supply ducts were closed in the rooms on the exposed side of the building and, with all doors and windows closed, it was found that as much air was being removed from the vent ducts as the fan system was supposed to supply. During this test the outside wind was of moderate velocity.

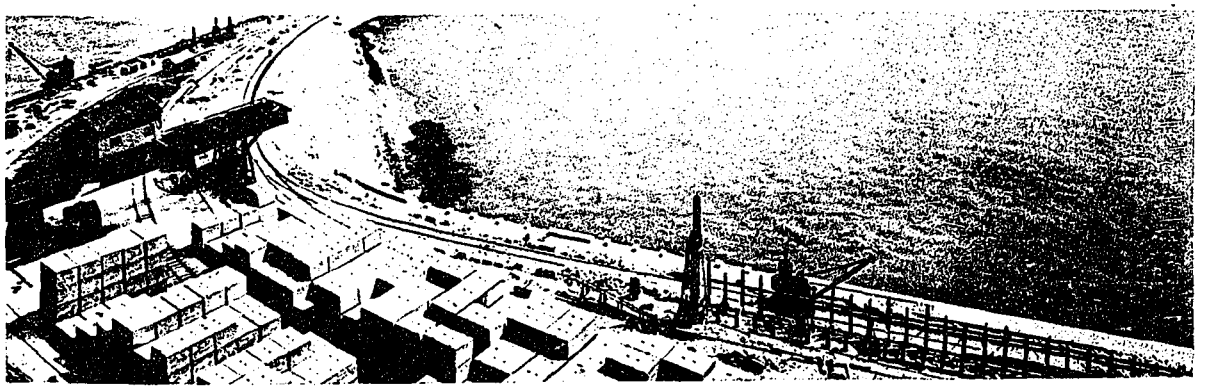
The new Harbor at Dover, as seen from the English Channel, the greatest artificial enclosure for war vessels and merchantmen over constructed. Some idea of the magnitude of the undertaking may be gathered from the fact that the outer masonry walls alone measure 2½ miles in length, and necessitated in their construction over a quarter of a million barrels of Portland cement.

GREAT ADMIRALTY HARBOUR AT DOVER COMPLETED.—World's Largest Artificial Enclosure for Vessels Formally Opened by Prince of Wales.—A Stupendous Undertaking Presenting Many Engineering Difficulties Which Took Eleven Years to Build.—Outer Sea-walls Alone Measure Two-and-a-half Miles in Length. ∴ ∴

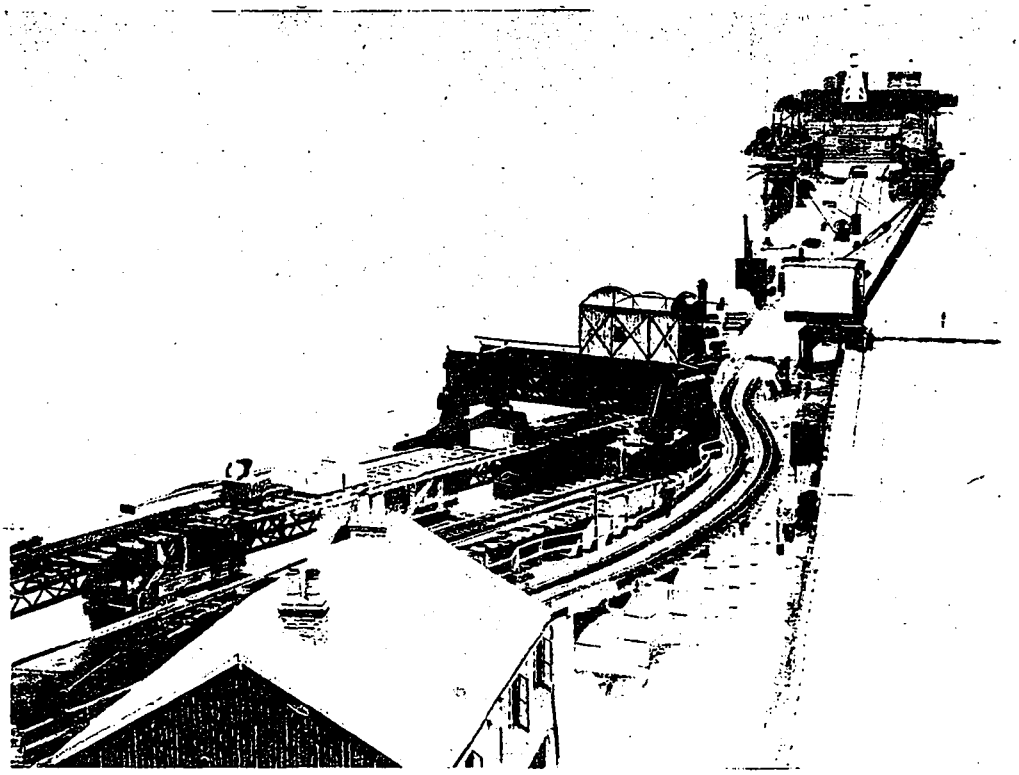
THE OPENING of the new Admiralty Harbor at Dover, England, on October 15, by the Prince of Wales, brings to the attention of the world the completion of one of the most gigantic engineering undertakings of modern times. This great artificial enclosure comprises a national harbor with a low water tide of 610 acres, together with a commercial harbor, boasting of a water area at low tide of 75 acres. In the former there is ample accommodation for a fleet of twenty-five first-class battleships, with the attendant smaller craft such as gunboats and destroyers.

Built in the roughest part of the English Channel, and under conditions fraught with seemingly unsurmountable difficulties, the carrying out of the great project stands without a parallel in the annals of harbor construction. In order to accomplish the work, which involved a period of eleven years, it was necessary to bring huge piles, measuring 100 ft. in length and 20 in. square, from a distance of 13,000 miles. These piles were used to support the ponderous wooden staging, temporarily built, for the laying of the great concrete monoliths, which were placed only after thousands upon thousands of cubic yards of lime and chalk had been removed from the bottom of the channel, by giant grabs having a double row of formidable teeth, and the bed of the harbor leveled by men working in the largest diving balls ever used.

Some idea as to the immensity of this undertaking may be had from the fact that 66,000 massive concrete blocks, averaging in weight 35 tons each, together with 200,000 tons of granite, were required in the construction of the Admiralty Harbor alone. This masonry in itself is equal to nearly one-half the weight of the great Pyramid of Cheops, which is estimated at 6,316,000 tons. Compared with other monumental works, it would form two mammoth slabs 72½ feet wide, 400 feet high, and 600 feet deep, with an additional slab of equal dimensions across the top, which would rise above and enclose on either side, the great cathedral of St. Paul's, London; while five of the 40 ton blocks up-ended and placed one on top of the other, would come up to the height of Cleopatra's Needle, and outweigh it by 22 tons. London's largest public grounds, Hyde Park, comprising 400 acres, would

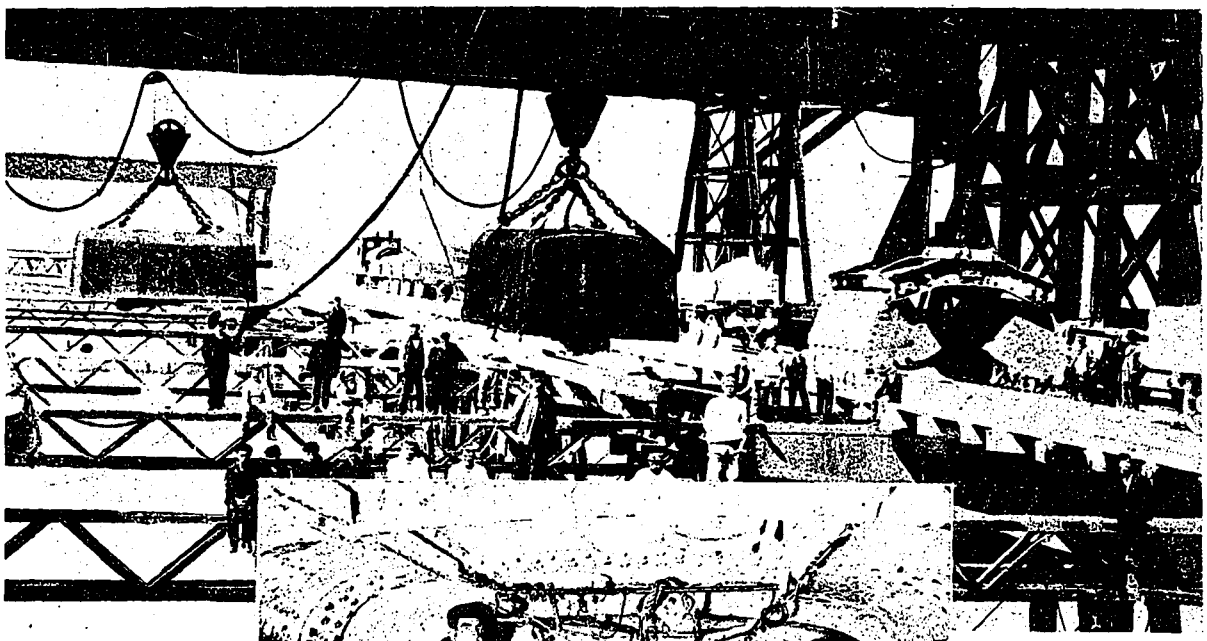


High concrete monoliths, as they were assembled prior to being placed in the walls forming the arms of the great Dover Harbor. Sixty-five thousand blocks in all were used, averaging in weight 35 tons apiece. If placed end to end, they would extend 150 miles in length, and their total weight, together with the 200,000 tons of granite used, is equal to nearly one-half of the estimated weight of the great Pyramid of Cheops.

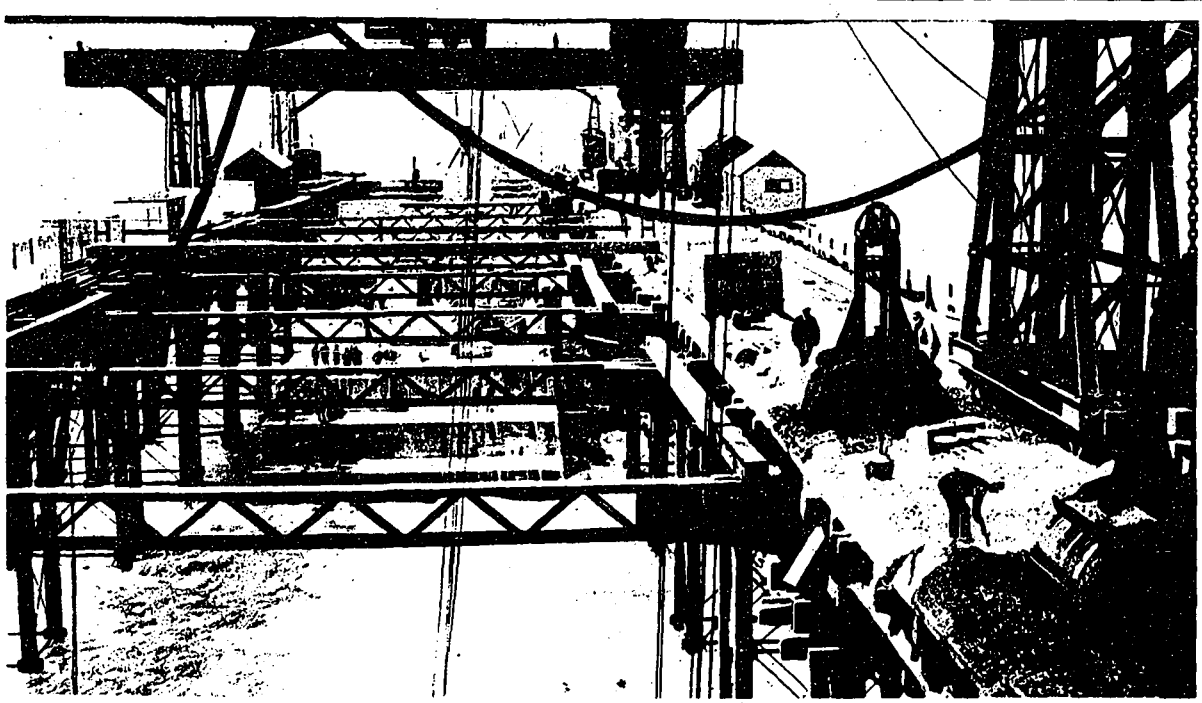


Admiralty Pier Extension of Dover Harbor, as it appeared in course of construction. The work on this extension consisted in carrying the old Admiralty Pier, which was 1,000 feet long, some 2,000 feet further out into the sea. It is the shortest of the three outer walls, the south breakwater, or centre wall, being 4,200 feet, and the east arm 3,320 feet.

One of the many difficulties contended with in building Dover Naval Harbor. The point at which the work was carried out is one of the roughest spots of water between England and France, being exposed to all seas from east to west. In order to place the massive concrete blocks, it was necessary to erect for temporary use a ponderous wooden staging, on huge piles of a special wood brought a distance of 13,000 miles.



Views showing the contrivances and equipment used for securing the foundations in the construction of the great Dover Harbor. On the extreme right is one of the giant grabs. This, when lowered into the sea, closed its teeth into the chalky bottom and brought to the surface a sufficient amount of material to completely fill one of the waiting cars. In this way the upper crust of the harbor bed was removed. Divers then descended in the huge diving bells, two of which are shown, and leveled the sea bed ready to receive the blocks. These bells weighed 35 tons and were 17 feet long and 10 feet wide. They were lighted by electricity. The blocks were placed in position by dress divers. The lower view shows the interior of one of the bells. The quantity of water required to fill the harbor is equal to a fall surface 66 times greater than that of the Horseshoe Fall at Niagara, estimating the latter as salt water.



Construction work on walls of the Admiralty Pier Extension of Dover Harbor, showing the masonry through frame work, as it rises above the surface. So accurately were the blocks set below the water that when the walls appeared above the surface, they were even and regularly laid. Below the water, the blocks were not cemented, but "joggled," that is, the cylindrical cavities left between them were filled in with concrete in bags, so as to prevent the possibility of any slight lateral movement under the shock of heavy storm waves. Above the surface, the blocks were joined together in the ordinary way.

fit nicely into the harbor and then admit of a channel large enough for a squadron of vessels on all four sides; while the quantity of water required to fill this great enclosure is estimated at 17 million tons, equal to a fall [illegible] 6 times greater than that of the Horseshoe Falls [illegible] Niagara.

From time immemorial Dover has been an important strategic point, both naval and military. To say when it first became a fortified place would be difficult. It was certainly a stronghold in the days of the Saxons, for William the Conqueror hastened to possess it after he had consummated his victory at Hastings. The old fortress has been besieged over and over again, sometimes falling into the hands of the enemy and at others gallantly keeping them at bay. It fell to Stephen after a staunch resistance through treachery, but made a successful defence against French attack in 1216.

In the days of Queen Elizabeth, Sir Walter Raleigh called attention to the unique position of Dover, declaring that "no promontory, town, or haven in Christendom is so placed by nature and situation, both to gratify friends and annoy enemies, as this town of Dover. . . . Nor is there in the whole circuit of this famous isle any port, either in respect of security or of defence, or of traffic and intercourse, or rather of necessity, to be regarded than this town of Dover."

After reading this epistle Queen Elizabeth, we are told, with commendable enterprise, decided to restore and improve the harbor. The channel, which had previously been only 4 ft. deep, was extensively dredged and deepened. Successive sovereigns also gave their attention to Dover, and so things continued until it became desirable to transfer the balance of British naval strength from the Mediterranean to home waters and the North Sea. To put it bluntly, it was found expedient that the British fleet should lie near to its greatest rival in strength, Germany.

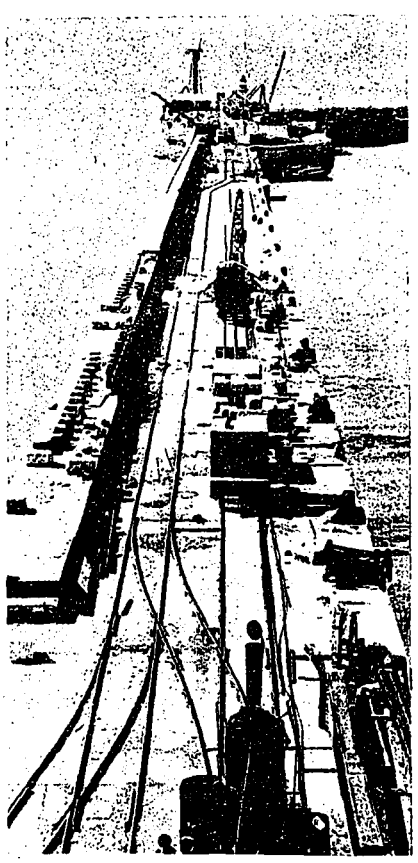
Hence it was desirable to erect a strong naval base in the English Channel at a point from which it could easily strike out into the North Sea. It was decided, therefore, to erect at Dover a great national harbor which would enclose at low tide a water area affording ample accommodation for a powerful naval fleet, and providing facilities and anchorage in the way of an inner harbor for merchantment and other vessels of high seas.

Operations were actively commenced in the summer of 1898, and after eleven years' work the great undertaking has been brought to a successful completion. The entire work was carried out by the famous firm of contractors, Messrs. S. Pearson & Sons, from the designs of the Admiralty engineers, Messrs. Coode, Son & Matthews. The harbor has been formed by the building of three huge arms or walls. The old Admiralty Pier, which boasted of a length of about 1,000 ft., has been extended some 2,000 ft., which forms the westward arm of the harbor. Then from the base of the tall cliffs, immediately below the old convict prison, a wall 3,320 ft. in length and known as the East Arm has been constructed. The third wall is the breakwater, 4,200 ft. in length, which has been erected some three-quarters of a mile from the shore and almost parallel with it.

One of the first things the builders did was to reclaim 21 acres of land to the east of the town, just below the cliffs, and convert this space into a huge brickyard and workshop, where the huge concrete blocks composing the sea walls were made. Before a single stone could be laid on the ocean-bed strong staging had to be built out into the water. This staging stood far above high-water mark and measured over 100 ft. from top to bottom, being higher, in fact, than an ordinary eight-story structure. Some of the huge piles which carried the wooden staging were 100 ft. long, 20 in. square, and weighed about 10

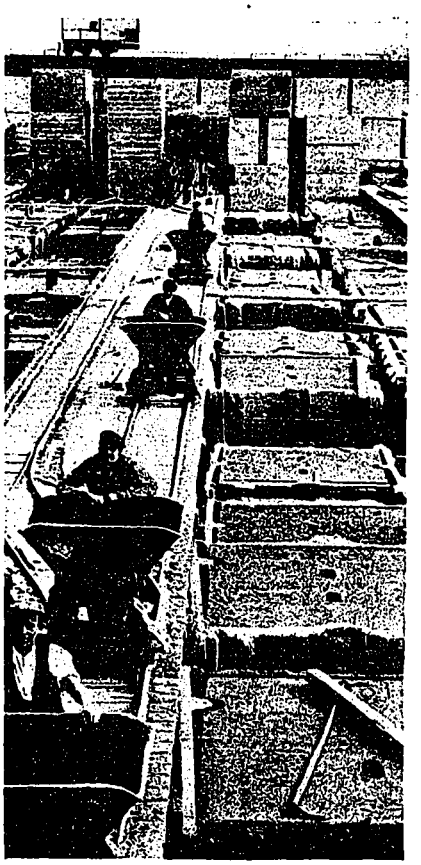
(*Concluded on Page* 84).

View showing three stages of the work in the construction of Dover Harbor. The carrying out of this stupendous undertaking necessitated a most thorough working organization and a vastly greater array of machinery equipment than had ever before been assembled in the execution of any similar project. The view showing the construction of the Admiralty Pier, which in itself is 3,000 feet long, gives some idea of the miles of trackage alone that was required. Preparation of the site for making the concrete blocks is seen in the centre view.

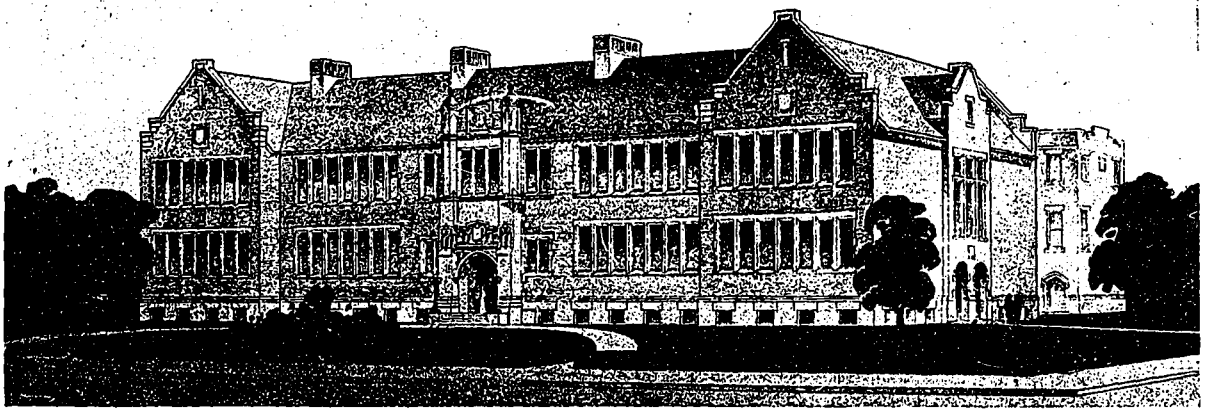


BUILDING THE ADMIRALTY PIER.

INITIAL WORK UNDER THE CHALK CLIFFS.



BLOCKS WAITING TO BE PLACED IN POSITION.



New Collegiate Institute which is now being built at Brantford, Ont., at a cost of $85,000. Chapman and McGiffin, Architects.

BRANTFORD NEW COLLEGIATE INSTITUTE.—School Building Now Under Construction Designed Along Model Lines.—Plan Provides for Large Assembly Hall, Gymnasium, and Accommodations for 500 Pupils.—All Corridors Fireproof, and Entrances So Placed as to Assure Safe Exit.

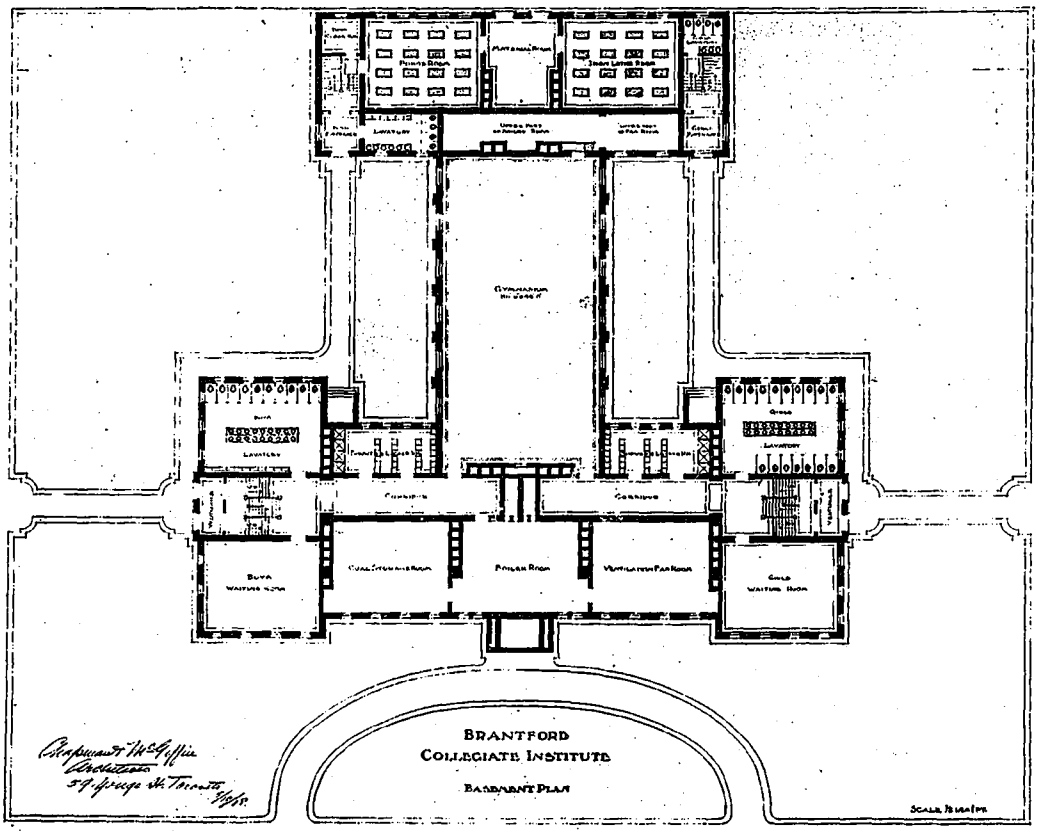
ALTHOUGH A CITY of only 20,000, Brantford considers the necessity of providing well constructed, comfortable, safe and sanitary school buildings a matter of vital importance. In the new Collegiate Institute now in process of erection at that place, the authorities have shown a broad spirit as regards their schools, and a strong desire to possess a building embodying the best methods of construction and the most modern equipment that the extent of their finances will permit.

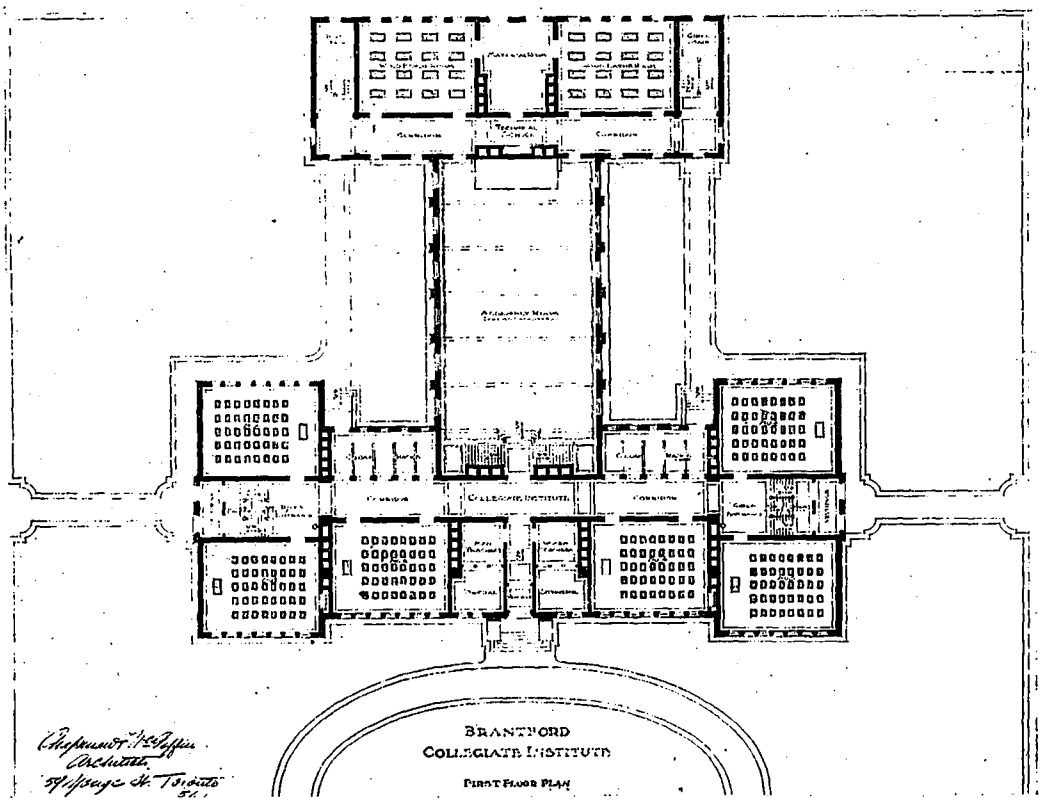
The Institute, which is wisely restricted in height to two stories, is estimated to cost $85,000, and will accommodate 500 pupils in high school and manual training classes. It is a much different type of building than box-like, joist constructed, brick enclosed schools which Mr. Bishops has provided for the city of Toronto. There is no labyrinth of winding stairways, no unnecessary turns, no narrow or unprotected corridors; but an intelligently considered, safely planned building that would fittingly dignify the school system of any city, and which convincingly demonstrates that the task of designing modern educational buildings is the work of the architect and not the mechanic.

An examination of the accompanying plans, which are those chosen by the Board from among a number of other plans submitted in a limited competition, shows an ideal arrangement, with well placed class-rooms, broad fireproofed corridors, and staircases and entrances so located at the centre and each end of the building as to practically insure safe exit from any point in case of emergency. The building that is now being erected differs in one or two minor respects from the preliminary plans; the main point of difference being the omission of the manual training department at the rear of the gymnasium. Provision for this department will be made in the northern wing of the main building.

Care has also been exercised in the selection of the site. The lot chosen is on Brant Avenue and has about 300 feet frontage. There are a number of splendid old trees along the street line and dotted over the grounds which are level for a distance from the street of about 250 feet, from which point there is a slope down to a level of 50 feet below the grade line of the building, thus forming a splendid natural amphitheatre for the exhibition of athletic games. The building will be set about 100 feet back from the street, and will be seen through the trees, the greater number of which will be left standing. The style of architecture, which is an adaptation of English Collegiate, has been chosen partly for its associations with the Universities of Great Britain, and partly because it lends itself better than any other style to the grouping of the large number of windows required. These large window areas, so necessary to the lighting and hygienic condition of the modern ideal school, are often the destructive element in the composition of school exteriors; the scale of these exteriors is necessarily rather large, owing to the height of the ceilings and the size of the windows. The composition, as seen in the perspective view shown herewith, depends mainly for its effect upon the grouping of the windows and the relation between the gable ends and the central feature. It is at this latter point where the interest has been concentrated and where the only elaboration, beyond substantial construction, has been indulged in. This centre is the pivot of the composition and the formal entrance to the building. The entrances at each end, one for boys and one for girls, are more capacious than the central entrance, but by being simpler and broader than the latter are intended to suggest the relation between the general circulation and that used on special occasions by a more limited number of people. The materials used throughout the exterior are dark red pressed brick, with a white joint and a light grey terra cotta for trimming and for the central feature. The roof will be of light green slate.

In the interior the lighting of the class rooms and corridors, the easy and simple circulation of the pupils, both for every day exercises and in case of the emergency of fire, have been the main controlling features in the arrangement of the plan. This, as seen in the ac-





Basement and first floor plan, Brantford Collegiate Institute, showing the gymnasium, assembly hall and general arrangement of lavatories, shower baths, and class-rooms. The location of the stairways and entrances at the centre and both ends of the building is particularly worthy of note. Chapman and McGiffin, Architects.

companying plans, resolved itself into a centre corridor with staircases at either end, and the entrances to the assembly hall and gynasium in the centre equally accessible to all.

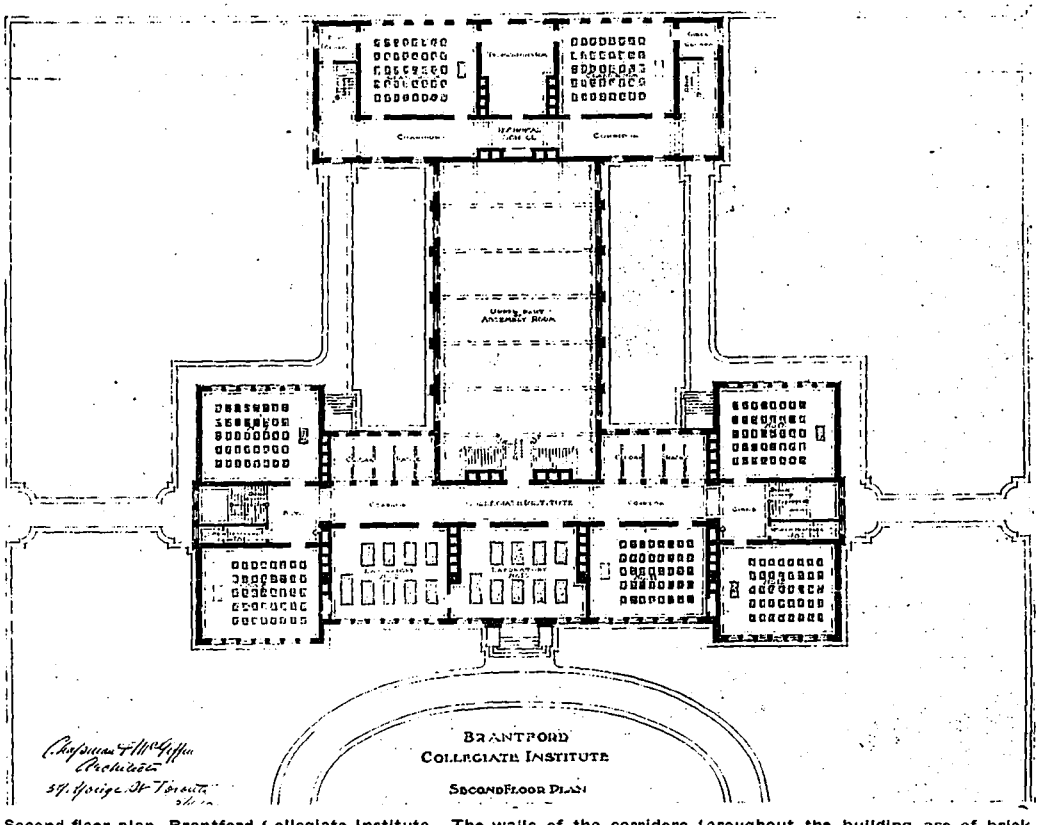
The gymnasium is the larger size required by the standard school regulations. It has the best arrangement of light for gymnasium work, and with its brick lined walls, wooden floor and ceiling and other arrangements, has been designed specially for the purpose for which it is to serve. The assembly room above the gymnasium has stucco plaster walls, exposed timber truss stained dark brown, and has been planned to seat five hundred people. It might be remarked here that arrangements have been made to extend any of the three wings to accommodate extra classes or to accommodate an increased number in the gymnasium or assembly room in case of need at any future time. This has been done in such a manner as to make the extension a natural development of the plan rather than an added excrescence, as so often happens in this rapidly developing country.

The walls of the corridors are of brick, arranged in decorative patterns in two colors, and the flooring is of composition material in colors and patterns to harmonize with the brickwork. The windows in the halls, as well as the windows in the assembly hall wing, have metal frames. The above materials have been used to give the building as solid, durable and sanitary a character as is possible in a building with the limited appropriation for buildings devoted to our schools in Canada. The thorough lighting of all parts, including the corridors, has received the most careful consideration, the latter are lighted by large windows at each end of the corridor, and by windows at each side of the assembly hall wing.

The building is ventilated throughout by mechanical draught, the fresh air being forced through a large duct formed by furring down the basement corridor, from this central duct it enters the various flues leading to the class rooms.

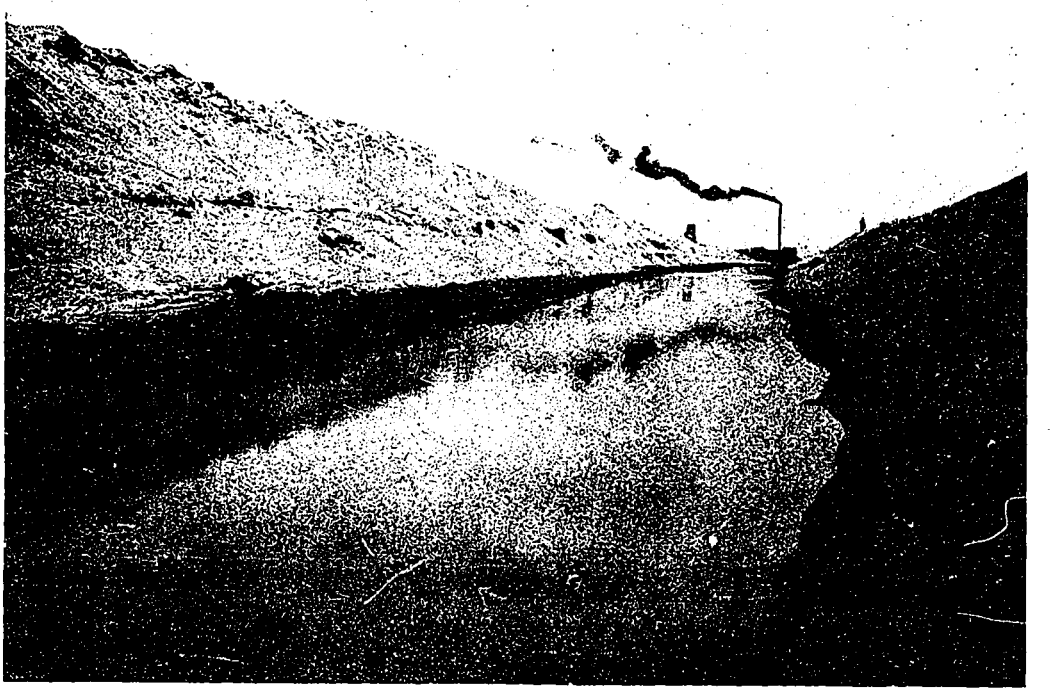
The ventilation of the assembly hall wing is affected by ducts under the floor of the gymnasium which distributes the air into the vertical flues leading to the gymnasium and assembly hall. The pressure caused by the large fresh air fan will force the vitiated air through registers near the floor of the class rooms into the flues provided for taking the air into the roof space from whence it escapes through a large ventilator. The only mechanical power used for the exhaust is a small fan in the roof space, which is connected to ducts exhausting the air from the lavatories and science laboratories.

The wood trim throughout is composed of ash, in order to obtain the maximum amount of durability at the minimum cost, and for the same reason maple was chosen for the flooring where composition flooring was not used.



Second floor plan, Brantford Collegiate Institute. The walls of the corridors throughout the building are of brick, arranged in decorative patterns in two colors, and the flooring is of composition material in colors and pattern to harmonize with the brick work. Chapman and McGiffin, Architects.

FRENCH SCIENTISTS and the Belgian Society of Geology, Palæontology and Hydrology have recently conducted a series of experiments with a new instrument called the "acoustele," which is designed for detecting, by means of concentrated sound, the presence of subterranean streams of waters. From the most reliable information to be obtained as to results, the acoustele has proved quite successful in certain kinds of ground—a chalky, calcareous formation being found most favorable for its use. The conditions which are most essential to its success seem to be the existence of subterranean veins or channels of water, flowing with sufficient velocity to create a rumbling or gurgling sound by their flow or fall, and a surrounding geological formation of a resonant character capable of transmitting the sound thus created to the surface of the ground, where it is detected by the delicate auditory receptivity of the instrument.



View looking along the canal with which it was necessary to surround the site of the Filtration Works so as to lower the ground water level to a point which would not interfere with the putting in of the concrete. At the head of the canal is to be seen the building housing the centrifugal pumps, which discharge 4,000 gallons of water per minute into the bay.

View showing sections of the huge concrete pipes which will form the conduits through which the raw and filtered water will flow. The manner of laying and locking the joints of these pipes will be one of the most interesting processes of the work.

TORONTO'S FILTRATION PLANT.—Interesting Engineering Undertaking Now in Process of Installation at Centre Island.—Feature of Its Design and Construction.—General Plan Admits of Further Extensions as Growth of City Might Demand.

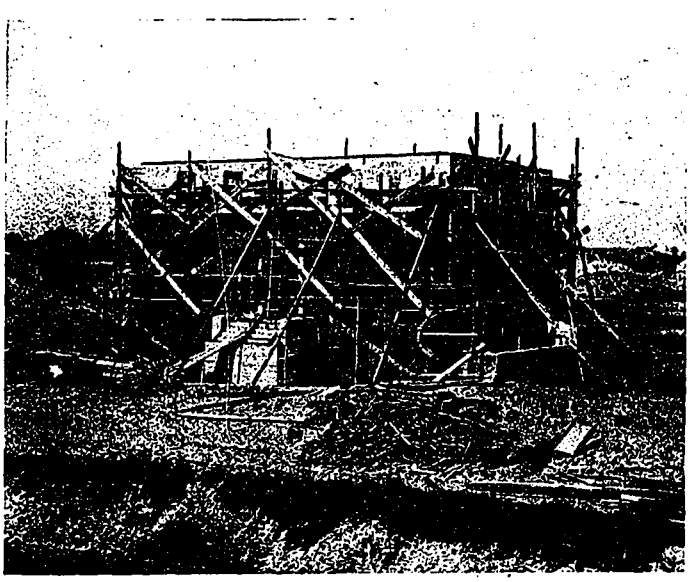
WHEN THE FILTRATION PLANT now under construction, at a cost of $750,000, is placed in operation in the spring of 1911, Toronto will have one of the most modern and thoroughly built water purification works on the American continent. Aside from being an undertaking of considerable magnitude, the fact that it is the first filtration plant of any great size to be established in the Dominion, attaches an importance to the work which renders it of especial interest to Canadian engineers, and Canadian municipalities in general.

So far, the progress of the work has been eminently satisfactory. Since operations were begun in the latter part of June, by the contractors, Messrs. Dill, Russell & Chamber, Toronto, a large force of men have been steadily employed, and the number is to be materially increased as the work progresses. Already one of the two great sections of area comprising the site of the filter beds, has been excavated and levelled preparatory to putting in the concrete work, and a portion of the 24-inch cast iron pipes to be located beneath the regulator houses between the two groups of filters, have also been set in place. The installation of the concrete foundation for the low lifting pumping station is another part of the work nearing completion; while the three-story structure, built entirely of concrete, which is to house the offices, chemical and bacteriological laboratories and provide living quarters for the employes of the plant during the winter months, is now ready for the putting on of the roof.

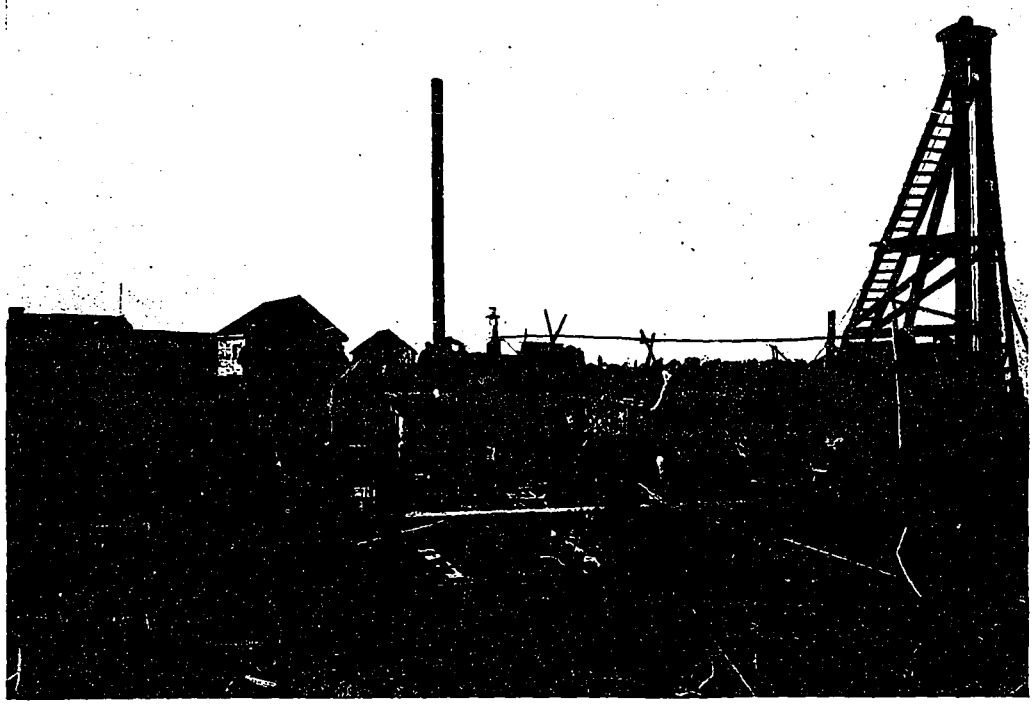
The plant is located at Centre Island, a little more than a mile across the bay from the city's present main pumping station, to which it will eventually connect, and the work is being carried out in accordance with the plans prepared under the supervision of Mr. Allen Hazen, whom the city has retained as consulting engineer to City Engineer, Mr. C. H. Rust. In design, the filters themselves, in that they are to be of the closed type, will differ materially from the open sand filters recommended in 1894 by the late John Mensergh, of London, England, who was retained at that time to investigate existing conditions and to report as to the most feasible means of providing the city with a pure water supply. The closed type of filter is more representative of the advancement which has taken place in the science of water purification within recent years, and is especially required in a climate where severe winters are experienced.

The plan of the works, which is shown in an accompanying illustration, provides for twelve filter beds, each 117 by 312 feet in dimensions, aligned in equal number on either side of a court containing the regulation house and sand bins. Adjoining these filters is a pure water reservoir, 312 feet square. The water will pass through the filter at the rate of 9 feet per hour, and the arrangement of the beds is such as to readily permit of further extensions as the growth of the city might demand. Owing to the fact that most of the foundations for the works are being placed below the level of the lake, it was necessary at the outset to surround the entire site with a drainage canal, so as to lower the ground water level to a point which would not interfere with the putting in of the concrete. This canal was made by a huge lake dredge which worked its way through the sandy soil, cutting a channel with a minimum depth of 7 feet below zero level of the lake and a bottom width of no less than 10 feet; and it is drained by centrifugal pumps discharging 4,000 gallons of water per minute into the bay.

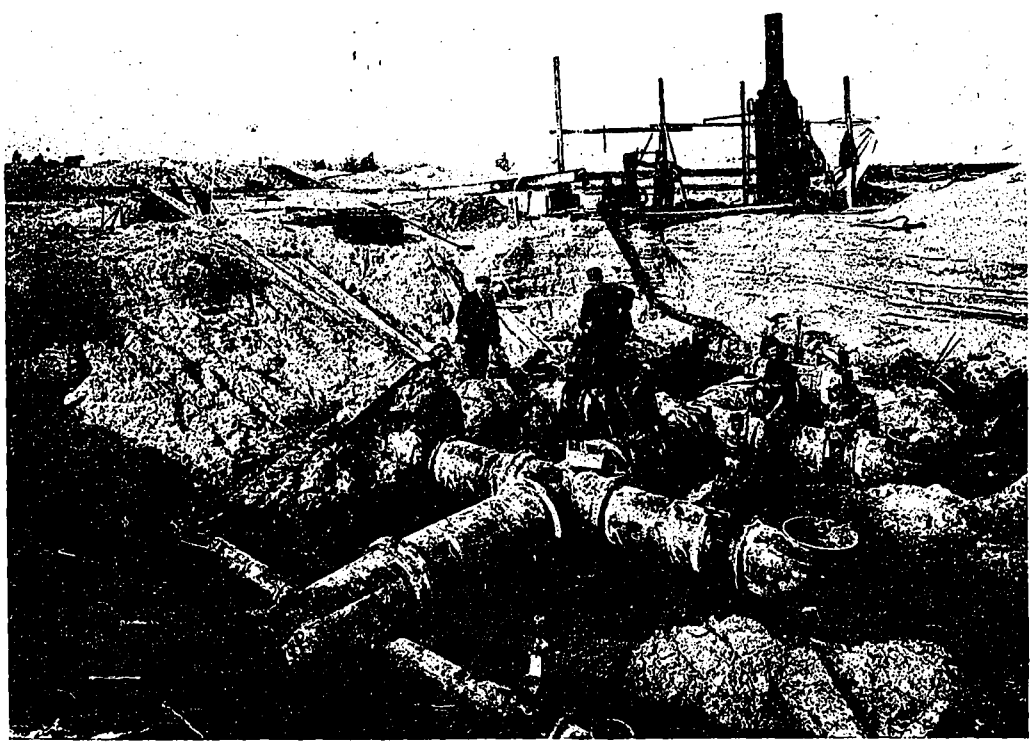
From the low-lifting pumping station, which is seen in the general plan, the water will flow through a 72-inch reinforced concrete pipe, from which 36-inch reinforced concrete pipes are taken off at right angles to the inlet chambers under each filter entrance. Similar pipes will also be used to convey the filtered water to the reservoir, and all manholes on each line and the Venturi meters will also be likewise constructed. The contract for these pipes was completed within the past week, and they are to be placed in position during the winter months. With the exception of a very limited number of smaller sections, the pipe was cast in 4 ft. lengths in cylindrical vertical moulds, the concrete used being of a proportion of one barrel of cement, 7 cu. ft. of sand and 10 cu. ft. of ballast, the latter ranging from ¼ to 1 inch in size. The sections are made in three diameters, 36, 54 and 72 inches, and in addition to the triangle mesh reinforcement, they are further reinforced by ¼ inch steel bands, spaced four inches apart, which are firmly secured to the mesh. The method of making the joints of the adjacent lengths in laying this pipe, is particularly interesting. The end of one pipe has a projecting ring which fits into a socket on the end of the other pipe. The inner form of this socket differs somewhat from the ring entering it, so that after the two parts are in place there is an annular groove on the inside of the pipe line, having a dove-tail cross-section. The operation of making the joints is conducted in two stages, first to make an exterior joint and then to complete the work from inside the pipe. The two lengths of pipe are first brought into position and the joints filled with oakum. The outer surface of the ends are then smeared with hot tar and covered with strong building paper, which is in turn smeared with tar. A second layer of paper is applied and covered with tar, and a strip



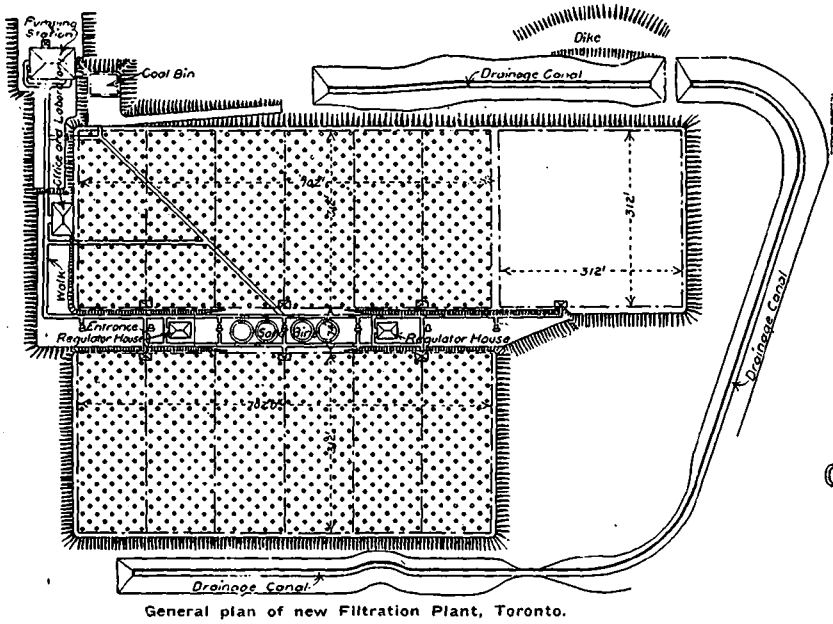
Construction work on three-storey Office and Laboratory Building at Filtration Plant, Toronto.



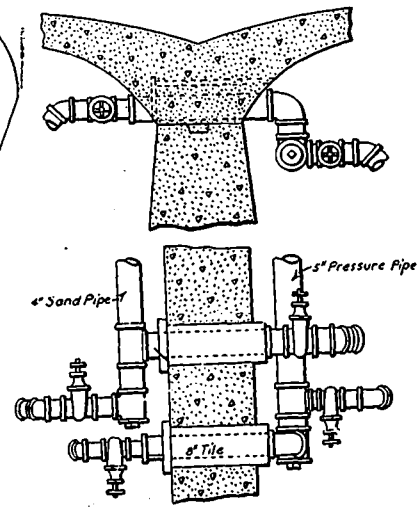
View showing construction of foundation for Low-lifting Pumping Station of Filtration Plant, now in process of installation at Centre Island, Toronto.



Laying the 24-inch cast iron for the Regulator Houses of Filtration Plant at Centre Island, Toronto, on either side of which are to be aligned six filter beds.



General plan of new Filtration Plant, Toronto.

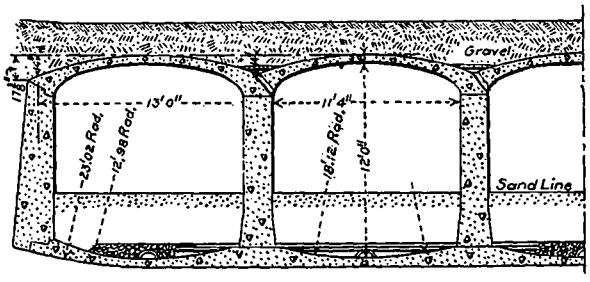


Location of sand and pressure pipes.

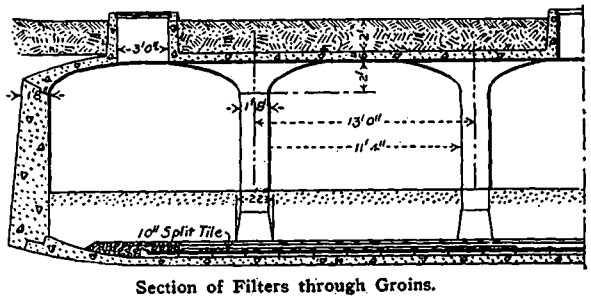
of coarse cloth is then wound around the paper and fastened with two wires.

This manner of locking the joints differs somewhat from the method usually employed in connecting sections of pipe of this kind. As a rule, the union is made by a cement grout forced into the seams by a force pump, and compressed into place by steel bands fastened at the outside and inside of the joint, which are removed when the cement is set. In the case of the Toronto plant, however, the method to be adopted in sealing the joints is deemed the most expedient, as it will enable the contractors to fully take up any spreading movement which might occur through any settling, and thus insure a perfect connection. After the joint is made sand will be placed under the pipe and on the lower quarters very carefully before the back-filling of the trench is begun. Since the steel reinforcement of the pipe is at a different part of the cross-section at the top than at the bottom, the separate lengths of pipe are marked, so that the top of each can be recognized and the inspector will be able to know that each length is in the proper position. Following the pipe laying, water will be pumped through them into the filters and maintained at the full level in the latter for at least a week. The pipes will then be pumped dry and the joints grouted from the inside under pressure.

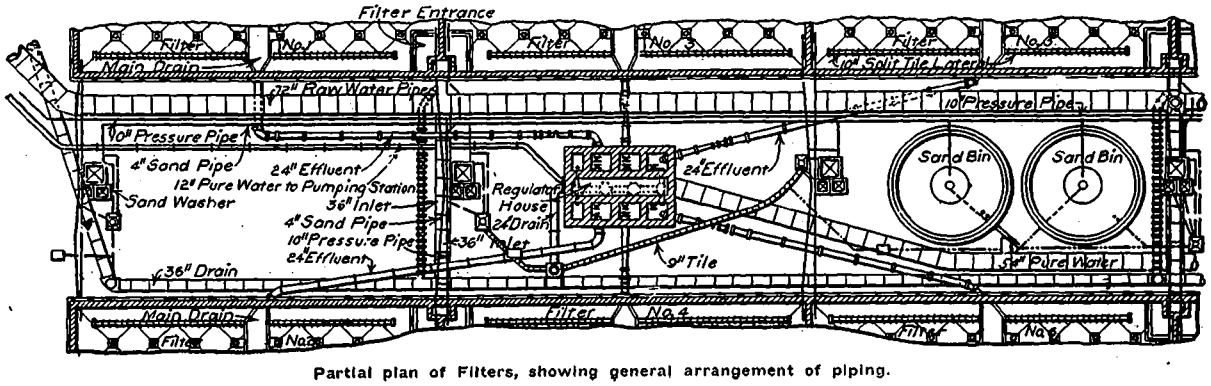
One of the interesting processes in the manufacture of these huge pipes is the manner in which they are lifted from their vertical position and placed on their side. Formerly they were simply tilted over, but this practice, owing to the fact that this part of the work is done before the pipe is fully seasoned, quite often resulted in the concrete being fractured at the end, forming the point of fulcrum. In order to overcome this danger the Lock Joint Pipe Company, in accordance with whose patent, and under whose supervision the pipes were made, now employs a derrick from which is



Section of Filters through Piers.

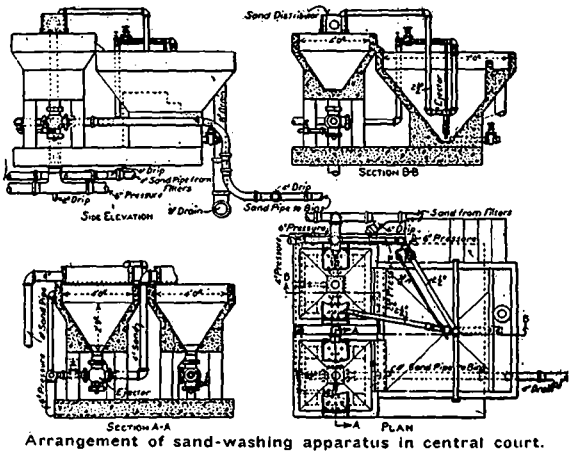


Section of Filters through Groins.



Partial plan of Filters, showing general arrangement of piping.

suspended a cross-piece that is placed athwart the top of the pipe. A rope passes at each end of the cross-piece to pulleys on either side of a steel belt, consisting of two sections, which is fastened at the centre of the pipe with turnbuckles. From the pulleys the, rope is brought down and fastened around the base of the pipe. When everything is adjusted the pipe is raised, and by the weight of two men swung into a horizontal position It is then lowered a few inches from the ground where the rope is kicked off, and the pipe placed safely on its



Arrangement of sand-washing apparatus in central court.

side. When required, the sections of the pipe will simply be rolled to the point of the trench at which they are to be lowered.

The thoroughness with which the work is to be carried out in general, is manifest in the way the filters are to be built. These are to have inverted groined arched floors, square concrete piers 13 ft. apart on centers, outside and cross walls of concrete, which will be built in sections 13 ft. long, and groined concrete roofs. The concrete will be mixed in a proportion of 1 barrel of Portland cement, 9 cu. ft. of sand and 16 cu. ft. of ballast. The contractor is required to provide centers for at least two complete filters, and no center may be struck without the express consent of the engineer. Owing to the importance of the matter of keeping the centers of such work in place, the specifications provide that: "No centers under the cylindrical vaulting near the wall shall be struck until the walls are thoroughly secured. Outside walls shall be considered as secured when the embankment is completed and compacted against them to the springing line. Cross walls shall be considered as secured when there are two rows of vaulting on the other side in place and set, whether supported by centers or not. The other arches in the roof shall be considered as secured when sufficient work is done beyond them to prevent the possibility of spreading and movement when the centers are struck, the amount of work depending somewhat upon the amount of fill already placed upon the adjoining vaulting."

The main drain which will be run down the center of each filter is to be a trough formed by depressing the concrete along this line. It will be 6 ft. 3 in. wide and covered with a reinforced concrete slab. The tile underdrains which will extend from it at intervals of 13 ft. are to be 10 in. split or channel pipes. The bottom of the filter bed will be covered with about 1 ft. of gravel or broken stone, on which the filter sand will have an average depth of 3½ ft. The sand is to have an effective size of 0.25 to 0.35 mm. and a uniformity coefficient of not more than 3.0. Not more than 1 per cent. of it may be finer than 0.13 mm., and no particles shall be above 5 mm. in diameter. The sand will be removed from the filters by portable ejector hoppers delivering it through wrought-iron pipes to sand washers. After being washed it will be delivered by ejectors to sand bins 34 ft. in diameter and 17½ ft. deep at the walls, the bottom being of a conical shape.

Provision is made for allowing the water above the sand to overflow at five elevations.

It will be impossible to use the ejectors and sand washers during the coldest winter weather. At such times the lake water is invariably clear, and the filters will clog but slowly, even though operated at the comparatively high rate that is proposed. Under these conditions it is not expected that it will be necessary to scrape the filters but once, or at most twice, during the winter. The sand taken off at such scrapings is to be piled in the filters, thrown out, together with that of the next scraping, at the time of the first cleaning, when it is warm enough to use the ejectors and washers. This procedure will reduce slightly the effective area of the filters during the winter weather, but it was found much cheaper to add an equal area to the filters than to protect the sand handling and washing apparatus so as to make it capable of use during winter weather.

The filtered water is to be delivered by the main drains of each bed through a 24 in. cast iron effluent pipe running through one of the regulating houses. Each pipe is provided with a reinforced concrete Venturi meter. The various pipes necessary for observing the head at different points on the filtration plant are to run to the regulating house, where they will be provided with the standard gauges and indicators. From the regulating house the filtered water will be delivered to a 72-in. reinforced concrete pure water pipe, which runs to the pure water reservoir constructed like the filter beds. A 72-in. outlet conduit constructed of reinforced concrete will connect the reservoir with the tunnel, through which the supply is delivered to the main pumping station of the city.

The connection of the outlet conduit with the mains laid across the bay to the city will be one of the greatest difficulties the engineers will have to contend with. How this will be accomplished has not as yet been definitely decided upon, but those in charge of the work are confident that it will be done in a remarkably short time, and without cutting off the city's water supply for more than a few hours.

After the filtration works have been completely installed, it is said that the city intend to convert the top of the filter area and the entire grounds of the plant into a public park for the residents of the Island and the many visitors who spend a great portion of their holidays during the summer months across the bay.

The engineer in direct charge of the work is Mr. F. F. Longley, and his assistant, Mr. W. Storrie,, both of whom have had a broad experience in undertakings of this character. The contract for the concrete pipes was carried out by the Lock Joint Company, under the supervision of Mr. John A. Hall, the "triangular mesh" reinforcement used in their construction being furnished by W. D. Beath & Co., Toronto.

AMONG THE EXHIBITS at the Industrial and Agricultural Exhibition, Lahore, there will be a working model of a grain elevator suitable for use in the Punjab. It is to be substituted for a full sized plant which a number of outside firms had intended to install, but abandoned owing to the time being too short for the purpose. The model, the construction of which is to be supervised by Capt. G. P. F. Osborne, R.E., manager of the Eastern Bengal State Railway, is to be about 5 feet long, 5 feet high, and show satisfactorily the working of an elevator. It is intended to show the manner in which grain can actually be handled, cleaned, put into bins, and taken out. It will be worked by electricity.

WATER POWER IN NEW YORK.—Initial Step in Great Scheme to Develop Energy for Gotham's Manufacturing and Industrial Plants.—Natural Motive Force to be Only Means of Operation Fifty Years Hence.

WATER POWER for the electrification of New York City, forms the subject of a most interesting article in a recent issue of one of the great newspapers in that city. The writer of the article in question draws a most vivid picture of the American metropolis fifty years hence when coal, as a fuel, will have vanished or at least when it will have become so scarce that its use as a fuel will be impracticable because of its almost prohibitive cost. He further declares that not only New York, but all the other large commercial and industrial centres in the American Union, in the next half century, will be forced to harness their streams for the development of power, light and heat.

Few Canadians realize, fully, what this forced development of the science of the transmission of the force of gravitation into industrial power, heat and light in these great centres, means to Canada. Other countries with their great coal deposits and wealth of petroleum, under the existing methods employed in the development of power, may have an advantage over Canada, but, with our unequalled wealth of streams, lakes and waterfalls, when the new order of things takes place, we shall be enabled to develop power, heat and light more cheaply and expeditiously than any other nation on the globe.

Sheer necessity will force the greater industrial centres of the world to encourage and aid engineering and invention in the solution of the many problems involved in the economical development of water power and every engineering accomplishment, as well as every creation of inventive genius that brings to a higher state of perfection the transmission of power from our streams and waterfalls, to a state where it represents commercial value, places Canada a notch higher, industrially, among the producing nations of the world.

When coal and petroleum cease to be available for industrial purposes, and when the industrial wealth of a nation will be dependent upon the extent of power it can develop from its streams and rivers, then will Canada be the richest spot on the globe.

Nations may burn their coal and consume their petroleum but, with reasonable care and scientifically sound engineering, our streams will run on forever.

The following is, in part, Mr. Rene Bache's article, above referred to, and is highly interesting, not only because of the importance of the subject with which it treats, but because of the graphic manner in which he describes the application of this new power and how it will serve to solve the many heating, lighting and motive problems with which, even now, this great metropolis, New York, is confronted.

The City of New York is to be run before long by water power wholly. The plans are already being made, under authority given by the Legislature of the State, and the work may be said to have fairly begun.

The metropolis as a whole may be likened to a gigantic machine, to run which requires a number of horse-power well-nigh fabulous. All of this vast aggregate of power is produced by steam, but when the work already undertaken has been carried out, practically all of it will be water power.

This water power will be transmitted in the form of electricity from distant sources. The New York of that day will be run by cataracts, mostly artificial, located on suitable rivers, in many cases hundreds of miles away. Not only New York, but Boston, Chicago, and other large cities will be run by water power half a century from now.

The work for New York City has begun with the building—by the Water Supply Commission—of great dams on the Sacandaga, the Genesee and the Racquette Rivers, for the utilization of the power of those streams. One of these, at Hadley, on the Sacandaga, about 200 miles north of New York City, is to be the greatest power dam in the world. It will be 230 feet high, and 800 feet long, and will store enough water to yield 30,000 horse-power at the dam site.

Most of the power required for running the city will come from the upper Hudson and the streams that drain the Adirondack regions. But much of it, doubtless, will be derived from dams along the Wallkill, Housatonic, Catskill, Hoosick and Susquehanna rivers, and from the Passaic Basin.

The revolution of affairs in respect to the power that runs the metropolis is destined to be brought about through the development of the possibilities of transmitting water power over wires in the form of electricity. New York is the centre of a magnificent circuit of such power, which may readily be converted into electricity; but the sources of it are so far away that no attempt has yet been made to carry it to Manhattan Island and its vicinity.

The reason why this has not been done before is that the cost of transmitting electricity over long distances has been too great. But the efficiency of transmission is being steadily and rapidly increased, and the cost is being proportionately reduced. From this time on it will continue to go lower and lower—and within a very few years it will be practicable to fetch electricity in unlimited quantities to New York from rivers 200 miles and more distant.

When this comes about, the complete electrification of New York will be undertaken. Fifty years from now, or possibly sooner, Manhattan Island and its environs will not be run by steam, as it is to-day, but by water power from dams on the Sacandaga, the Genesee, the Upper Hudson, the Racquette, the Esopus, the Wallkill, the Housatonic and other streams.

A large part of the electricity will be used for driving machinery in the factories of New York. Another considerable factor of the "fluid" will be required for traction—for running the surface, elevated and subway roads.

Gas for illumination will be entirely replaced by electricity. Already the increase in the use of power for the electric lighting of New York is very rapid, owing in part to the growth of the number of dark rooms. This is a matter which most people do not seem to notice. It is a phenomenon incidental to the development of contiguous "sky-scraper" construction.

Almost every tall building has many dark rooms, and, as the city grows, the number of such dark rooms is multiplied. Every tall building that is put up makes the city darker. A tall building on one side of a street shuts out part of the light from a shorter building on the other side.

The development of "skyscraper" construction represents a struggle not only for altitude, but for light. It is interesting to go through some of the tall buildings on lower Broadway, and to notice how many thousands of electric lights are kept burning in them all day long. Then there are the stories below ground, dug and occupied to economize precious space, which must be artificially lighted even in the day-time; and the subway tunnels and the tubes that run under the rivers require electric illumination throughout the twenty-four hours.

All of this illumination consumes a vast amount of power, demand for which is steadily and rapidly increasing. Doubtless, one of the first uses to which the electricity derived from the dams is put will be to supply this power—not only for the lighting of office buildings, subways, theatres and restaurants, but also for the dwellings of the metropolis.

In the electrified city—whether it be New York, Chicago, Boston, or other large centre of population—there will be many incidental employments for the currents from the power dams, the running of thousands of elevators in office buildings and apartment houses being not least important. But one of their principal uses will be

for heating. Fifty years from now New York City will be warmed, as well as lighted, by water power.

When that time arrives, and the power is fetched over wires from distant dam sites on suitable rivers, the furnaces and steam heating apparatus in the dwellings and office buildings of New York, Chicago, Boston and other cities will be replaced with electrical contrivances. All the heat required for the warming of a house will be brought into it by a wire, and distributed by suitable connections to the various rooms.

Then there is the matter of cooking. It will be done fifty years from now, and probably very much sooner, by water power conveyed in the shape of electricity, over wires. In fact, the same current that is used for heating the house will be employed by the housewife for all of her culinary purposes. She will not be obliged to bother with a range—that clumsy piece of ironmongery being entirely done away with. Instead, her kitchen will be provided with an ordinary table, on which a few simple pieces of apparatus will stand—the requisite current for boiling, frying or any other kind of cooking, being turned on with a switch.

The discovery of the possibilities of electrical transmission over wires has called attention to what may be done with water power. When it was necessary to use such power—if employed at all—at the waterfall, the factory had to be put on the spot, whether the situation was desirable or not for commercial reasons. Thus the great Massachusetts cities of Lowell and Lawrence have literally grown up around the falls of the Merrimac; and the same may be said of many other towns, such as Holyoke on the Connecticut, and Paterson on the Passaic.

Now, however, that it has become practicable to pick up the power from a cataract and carry it on a wire over great distances there is a complete change in the problem. A waterfall is no longer a mere local interest, but a public utility. It is easily possible to establish a generating station in one spot, and from it to supply the whole of a great region. This, in fact, is the idea on which the Water Supply Commission of New York State is now busy.

The power generated and converted into electricity at dam sites on rivers will be carried to the city—whether it be New York or any other centre of population—by wires and delivered at sub-stations. For this purpose special buildings will be erected, each sub-station taking a certain amount of current off the wire, and supplying a given arena with just what it needs for lighting, heating, running machinery and other purposes.

Before very long the problem of transmitting electricity economically over 200 miles or more of wire will have been solved. But a considerable time will be required to build the dams and construct the plants for generating and transmitting the current. Also, the replacement of steam by electricity will be necessarily gradual. It is not to be expected that owners of expensive steam power machinery will hasten to throw it away the minute that wires are run into a city. Hence the estimate of fifty years as the approximate period likely to elapse before the electrification of New York will have become a fully accomplished fact.

The problem where New York is concerned is especially interesting for the reason that the metropolis—including Manhattan Island—is to-day the greatest power-utilization centre in the world. As above stated, all the power employed is now produced by steam.

But the price of coal is destined to go steadily higher and higher, and electricity, when furnished by water power, will be very much cheaper. Thus there must come a time, and that before very long, when currents from the rivers will displace steam on the island of Manhattan and its neighborhood. The burning of fuel for the production of energy will be entirely abandoned, and all the machinery of the metropolis will be driven by the flow of distant streams.

GREAT ADMIRALTY HARBOR AT DOVER COMPLETED.—Continued from Page 74.

tons. These piles were brought from Dover in Tasmania, a distance of 13,000 miles. This timber is one of the heaviest of woods, and when cast adrift sinks like a stone of account of its great density.

At intervals of every 50 ft. two sets of six piles were driven firmly into the ocean-bed opposite one another; across the piers so formed strong iron girders were placed, and in this way the temporary staging was carried seawards. Although all this work was purely temporary, it had to withstand the full force of the storms and tidal currents as well as hundreds of tons of heavy machinery. Some of the cranes upon it turned the scale at 400 tons apiece.

In the sea between these piers great blocks weighing from 26 tons to 42 tons apiece, which form the seawalls, were laid. Before they could be laid, however, it was necessary to remove the loose debris from the Channel bed. A giant grab, a jawlike contrivance with a double row of formidable teeth, descended to the bottom of the sea with open mouth. There it worked its way into the chalky bed, fastened its teeth into it, and came up with a dripping mouthful of flint and chalk that filled a railway truck. By this means the upper crust was eaten away until the solid bed was reached. Divers were then sent down in bells, whose duty it was to level the bed ready for the blocks. These bells were the largest ever used. In all seven were employed. These measured seventeen feet long and ten feet wide each. They were lighted by electricity, and fifty feet below the surface their interiors were as bright as day. As the huge blocks were lowered into the sea they were guided and placed in position by the dress-divers who worked from small boats. The walls of the National Harbor alone has cost £4,000,000, and the sum expended upon the commercial harbor amount to £1,250,000.

A NEW TEST FOR CONCRETE.

A VERY INTERESTING METHOD for the testing of concrete and materials composing the same was presented recently by Mr. J. S. Owens, Assoc. M. Institute of Civil Engineers, before the Society of Engineers in London.

Mr. Owens' methods, which are described very fully in his paper, and which are summarized here, present a new way of arriving at the various percentages of materials used in concrete and to enable the engineer to determine whether too much sand, or too much stone, has been used to the proportion of the cement required. The test may be briefly summarized as follows:

The methods which have been tried in the past to achieve this result are: (1) inspection; (2) making briquettes, breaking when set, and noting if of uniform strength; and (3) mixing pigment with the concrete, making briquettes, breaking when set, and examining fracture for even distribution of pigment. The author criticized these methods, and showed their lack of value for the purpose. He stated that it had been ascertained experimentally that inspection alone could not detect the difference between concrete having 1 part of cement to 2 of ballast, and that having 1 to 3. The following definition of properly mixed concrete was then given: "Concrete in which the various ingredients are as uniformly distributed as the size of the particles composing them will admit." He went on to say: "The question, therefore, is how to determine when this uniformity of distribution has been attained." The principle on which the author's test is based was thus described: "If we take a few small samples from different parts of the heap of concrete, and if we can tell in some simple way whether all the samples contain the same relative proportions of

stone, sand and cement, we have a means of telling whether the concrete is properly mixed or not." The author's method of comparing the samples is simply to place each in a tall glass cylinder nearly filled with water, shake them up, and allow them to settle. The rate of settlement of the cement in water was shown to be about thirty times as slow as that of the sand, which, in turn, was slower than that of the larger particles of stone; this caused the stone, sand and cement to settle on the bottom in distinct layers. It was shown that the depth of these layers was proportioned to the amount of the material present in the sample, and that in this way it was possible to tell whether each sample had the same amount of cement, sand and stone.

The precautions to be observed in making a test are as follows: "Two or three test glasses of sufficient diameter should be used, one for each sample. The same glass must not be used for each sample, as the time of exposure to water and the temperature of the water might be different in each test. A column of water, at least four times the height of the layer of sand and cement, should be used to eliminate the error due to entanglement of cement in the sand. The samples taken should be as small as is consistent with fairly accurate measurement. They should be taken from parts in the heap of concrete as far removed from each other as possible, or where a difference in appearance is noticeable. When the first test gives a positive result it should be repeated before deciding that mixing is complete. The test is very simple, and can be applied, with a little practice, by any engineer. Each test occupies about fifteen minutes, and the apparatus costs only a few shillings. Hence it may be regarded as a works test, which can be used wherever concrete is being mixed."—CEMENT AGE.

STRENGTH AND WEATHERING QUALITIES OF CANADIAN MARBLE.

THERE ARE TWO ELEMENTS to be considered in specifying marble work in addition to richness of texture,, viz., its compressive strength and its weathering qualities. If the lustrous surface is to endure, and the marble itself is to permanently serve either a structural or aesthetic purpose, both indeed are essential. There is a difference in marbles, just the same as there is in bricks, stone, and other building materials. Some are more dense, more compact, and less susceptible to disintegration than others; and nature is as varying in her handiwork as is man in the quality of the products which he invents.

Although Canadian marble was first employed in building construction as far back as a quarter of a century ago, it remained until recent years more or less of an unknown quantity. Architects and builders, as a rule, looked to foreign markets in order to meet their requirements in this respect, little realizing that their own country offered a richly veined, durable, high grade marble. That was before the day when Canada came into its own, and before the resources of the country were exploited in the manner in which they are being exploited at the present time. To-day the order of things have changed, and not only is Canadian marble to be seen in many of our splendid modern buildings, but its rare qualities are being recognized abroad, and it has been specified in several important buildings in the United States within the past few years.

An interesting test of marble from the quarries of the Missisquoi Marble Company,, at Philipburg, Que., was recently conducted by the Department of Civil Engineering and Applied Mechanics of the McGill University, Montreal. The results showed convincingly the great density and strength which is possessed by the products of this company, and how well it is suited to meet every structural requirement in architectural work. Four samples, consisting of 2-inch cubes, were submitted, two of "Windsor Gray" and two of "Eureka," and these were subjected to both compression and absorption tests. The compression tests were made in a Wicksteed Testing Machine. Sample No. 1, "Windsor Gray,," with an area of cross section 3.98 sq. inches, sustained a maximum load of 85.100 lbs., equivalent to 21,380 lbs. per sq. inch: and sample No. 2 of "Windsor Gray," with an area of cross section of 4.04 sq. inches, a maximum load of 86,000 lbs., or 21,280 lbs. to the sq. inch. With the samples of "Eureka," equally as high or better results were manifest, the two samples of relative area of cross section as the samples of "Windsor Gray" showing a compression strength of 21,600 lbs. and 22,900 lbs. per sq. inch respectively.

Following the compressive test, the two roughly broken samples, which, after having been thoroughly dried, were immersed in water for 48 hours, showed an extremely low absorption, the amount of moisture in each instance being but 0.072 per cent. and 0.076 per cent.

Both the compressive strength of this marble, which is extremely high, and compares favorably with the best grade of granite, and its excellent weathering qualities, which is demonstrated by the low percentage of moisture which it absorbs, makes the product of the Missisquoi Company one of the most desirable materials where marble work is specified, and it should demand the first consideration of Canadian architects and builders in the erection of their more important buildings.

ONE OF THE INTERESTING FEATURES of the Kowloon-Canton Railway, China, is the Beacon Hill tunnel, which was holed through last May. It is 7,212 ft. long, is entirely in hard granite, and will have a completed cross-section of 17 x 21 ft. It was driven with 9 x 10-ft. headings.