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A FOREWORD ABOUT VOLUME NUMBER TWO—ENGINEERING FEATURES TO BE ENLARGED UPON—MUNICIPAL DEPARTMENT TO BE ADDED.

“CONSTRUCTION” has entered upon its second year. The first number of our second volume, we believe, shows unparalleled progress in the development of a technical journal. This progress is demonstrative of three things: First, that there was a field for such a journal in Canada; secondly, that it is possible to successfully produce high class journals in Canada; and thirdly, that the trade has fully appreciated our efforts.

During the coming year, we shall develop the engineering features of our paper. A municipal department will be established, in which illustrated articles, dealing with municipal engineering, will be dealt with by the best experts in the country. A series of articles dealing with attractive, economically planned and constructed, moderate priced houses, has been arranged for, and will be illustrated with floor plans, elevations and details, together with complete data of proposed specifications.

A number of other very exceptional features have been arranged for and the second volume of “CONSTRUCTION” will, we believe, be found to be of wider interest and greater value to our readers than the first one has been.

BUILDING STATISTICS FOR OCTOBER—AVERAGE GAIN OVER SAME MONTH OF 1907—REPORTS FROM DIFFERENT POINTS ENCOURAGING.

BUILDING OPERATIONS for the month of October, as indicated by statistics compiled from the larger cities throughout the Dominion, continue to show very gratifying increases over the same period of 1907.

Of the ten cities, for which comparative figures were supplied “CONSTRUCTION,” only three show decreases, viz.: Calgary, Montreal, and Regina.

In the case of Calgary, this comparison is hardly a fair criterion of the conditions in that city, in so far as October of 1907 was an abnormally large month, owing to permits having been taken out for some very big work. During October of 1908, forty-four permits were issued for buildings to cost \$88,400; during the same month of 1907, forty-nine permits were issued for buildings, the aggregate cost of which was \$491,000. For the first ten months of last year, the aggregate cost of buildings for which permits were issued was \$1,574,820, so that it may be seen that, while there were only five more permits issued for October of 1907, as compared with 1908, the aggregate cost of the buildings represented about one-third of the value of buildings erected during the first ten months of 1907.

In Montreal, with a decrease of 61.32 per cent., very much the same conditions prevailed, for there were exactly the same number of permits (172) issued during October of 1908 as in 1907. The reason for the decrease is purely due to the fact that permits for two or three very large structures were taken out during the month of October, 1907, which month was an abnormally heavy one, as is demonstrated by the fact that the aggregate cost of buildings during this month was just about one-seventh of the total cost of buildings erected for the first ten months of 1907.

In the case of Regina, it should be noted that twenty-five permits were issued for the month of October of 1908, as against twenty for the corresponding month of 1907, although there is a decrease in the aggregate value of buildings for which permits were issued of 43.64 per cent.

In the face of these decreases, which can readily be accounted for by the fact that permits were not issued for any large buildings during October of 1908, there are a number of extraordinary increases in several of the cities. Winnipeg leads with an increase of 219.43 per cent.; Fort William has an increase of 163.55 per cent.; St. John, N.B., 176.50 per cent.; Toronto an increase of 31.02 per cent.; Edmonton, Vancouver, Victoria and Halifax also show substantial increases, while building in St. Thomas is 50 per cent ahead of what it was for the corresponding period of 1907.

Reports from the various cities show that future prospects for the remainder of the year are exceedingly bright. Winnipeg reports “fair”; Regina, “the outlook for the future is fairly good”; St. John, “fair”; Fort William, “quite bright”; Edmonton, “active, providing we have an open season”; Calgary, “no change for better this season. Everything looks bright for next spring”; Vancouver, B.C., “bright, even better than last year at this time”; Montreal, “fairly good”; and Toronto, “exceedingly bright.”

Statistics from Brandon, while not giving figures for

	Total Cost of Buildings for October, 1907	Total Cost of Buildings for October, 1908	Increase per cent.	Decrease per cent.
Calgary	\$ 491,100	\$ 88,400		81.99
Edmonton ...	77,125	98,735	28.	
Fort William	33,465	88,200	163.55	
Halifax	28,490	36,155	26.90	
London		59,700		
Montreal ...	1,091,344	422,080		61.32
Regina	103,390	58,270		43.64
St. John	26,600	73,550	176.50	
St. Thomas...		13,200		
Toronto	776,555	1,019,492	31.02	
Winnipeg	134,300	429,000	219.43	
Vancouver ...	325,570	414,810	27.34	
Victoria	83,875	99,750	17.73	

the month of October, show that for the first ten months of 1908, 116 permits have been issued for buildings, the aggregate cost of which is \$252,149, as compared with 240 permits with an aggregate value of \$536,911 for the corresponding period of 1907. The amount given for 1908 does not include the permit to be issued shortly for the proposed \$10,000 gas plant.

ARCHITECTURAL REGISTRATION THE PUBLIC'S ONLY POSSIBLE PROTECTION AGAINST THE INCOMPETENT OR DISHONEST PRACTITIONER—PROVINCIAL REGULATION REQUIRED.

THERE IS NO ELEMENT in our social and industrial development that is more important than building construction, and there is none about which the lay public knows less.

The average prospective builder who has money to invest, knows absolutely nothing of the "ware" he proposes to buy. He wants a building for a certain purpose, to be about so deep, so wide, and so high. He has a faint picture in his mind's eye as to how he would like the structure to appear when completed. He wants it to cost him about so much money, and in a vague way he has figured out about the interior arrangement he wants, to meet the demands of his purpose or his tastes.

But beyond these few ideas, that have been prompted and created by his knowledge of the purpose for which his building is to be constructed, he knows absolutely nothing of the essential details of design, plan or construction. He is not supposed to know—he leaves such matters to his architect, upon whose competency, judgment, ability and honesty he is forced to depend solely and absolutely.

What happens, if his confidence has been misplaced and in his selection he has employed an architect who is not an "architect"? What happens if he has placed the plan and erection of his building in the hands of a man entirely unequal to the task imposed upon him? What happens if he has commissioned a dishonest practitioner to spend his money in the erection of his building; one who operates and succeeds by the aid of "sharp practice," rather than through his competency?

The answer is simple and all too apparent, in object lessons that come before us every day. The inevitable results of the unfortunate plight of the client who has misplaced confidence in the man with whom he has entrusted the planning and erecting of his building, are evident by the so-called buildings—veritable shacks, fire traps, unsightly heaps of brick and stone, often erected in our smaller towns and cities and rural districts, for which owners have paid their good money.

The owner is to some extent protected in the larger cities, such as Toronto, Hamilton and London, in Ontario, where a building department exists that passes upon all plans before the erection of the building can be proceeded with, but even this protection is entirely inadequate, insofar as the building inspector demands only that the plans shall provide for a structure that will comply with the requirements of a law designed solely for the protection of the community at large, and in no way contemplates protection of the client against the incompetency, dishonesty or negligence of his architect. But in the smaller cities and towns, where there is no building department and no method of building inspection exists, neither the public nor the owner is protected and it is in these rural sections that the shrewd incompetent finds it easiest to operate.

It may be argued that if the owner is foolish enough to employ an incompetent, he must expect the inevitable. But how is the owner to judge in his selection of an architect? How can he, with his lack of knowledge of the essentials in the fitness of a capable architect, be able to choose between the capable and incapable man? What acknowledged standard of competency has he to guide him? To him the difference between one architect and another is confined simply to the individual tastes displayed in their

work. He does not realize the importance of what appears to him minor details, such as the strength and adaptability of materials, the suitability of appliances, mathematical details of plan and construction, merit of investment or supervision of erection. He does not look for a college diploma, for it is commonly known that there are possibly as many highly capable architects who have never had the advantage of a college course as there are among those who have had academic training.

The prospective builder in the Province of Ontario has absolutely no means whereby he may distinguish between the incapable imposter and the competent designer. His own knowledge of the "ware" he purposes to buy is so limited that his own better judgment often leads him astray, and there is no acknowledged standard of competence whereby he may measure the man whom he proposes to employ as his architect. He must trust to good fortune.

The conditions that have obtained under this rule of things certainly warrant a demand for a government standard of competence in the profession of architecture.

The practice of architecture in the Province of Ontario, and in fact throughout several provinces of the Dominion, has degenerated to a very low point, for the sole reason that anyone is free to declare himself an architect and start to practice without any previous training or proof of ability being required. For this reason, a great percentage of the practitioners are entirely unfitted to do the work which they have held themselves out to the public as being able to execute.

Important commissions in many cases are daily being entrusted to persons entirely unfitted to execute them, and the inevitable result is that many of the buildings erected throughout the Dominion are poorly designed and constructed, and, from a commercial standpoint, represent absolute failures.

The public does not stop to consider the basic reasons responsible for the low standard of building prevalent more or less in almost every section of the Dominion: the layman does not apprehend that much training and experience is necessary, in order to produce good buildings. He does not realize that the architect must be a thoroughly trained man. It therefore appears to us that a parental government should determine who should term himself an architect, and who should not be permitted to use the title. It has been declared that the Provincial Governments have complete and absolute jurisdiction over matters of this nature. It then rests with the progressive Ontario Government to work out this problem, for the benefit of the citizens of this province.

There is only one solution of this problem and that is "Architectural Registration."

By "Architectural Registration" we mean a system whereby the architect who desires to practice in the Province of Ontario is required by law to qualify before a government board of examiners, who shall determine his fitness to practice the profession and shall either deny him the privilege of the use of the title architect, or issue to him a certificate to practice architecture in the province.

PROVINCIAL BOARD OF EXAMINERS RESPONSIBLE ONLY TO THE GOVERNMENT THE CORRECT SOLUTION—PUBLIC PROTECTION COMES FIRST.

THE NEED FOR A LAW designed to create a government standard of competence in the practice of architecture has been officially recognized by the Ontario Association of Architects, which body has, for the past eight years, been endeavoring to secure legislation from the provincial government to provide some method or means whereby a man who desires to practice the profession in the Province of Ontario shall qualify before a competent board of examiners.

The unfortunate feature of the laws, as proposed by the O. A. A. was the fact that they would tend to make

this organization the officially recognized body of architects in the province, and placed with it certain powers in connection with the proposed examination. The bill presented at last year's legislature provided that the examination as conducted by the Government could be placed in the hands of the Toronto University, or some other independent body the Government might see fit to choose. But, unfortunately, after the examination was passed by the applicant the government ceased to have any direct connection with the officially qualified architect, who was obliged by the proposed law to pay his annual dues into the Ontario Association of Architects.

This law was strongly opposed by those architects who were not members of the O. A. A. They declared that they were perfectly willing to qualify before a government board of examiners, but did not see why they should be required by law to join and annually pay dues into any architectural association to be permitted to practice their profession in the Province of Ontario.

The result was that the bill was abandoned, in view of the strenuous opposition to it. While we might say that we are strongly opposed to any such bill favoring any private association in the matter of such legislation and granting powers such as will tend to place the control of the practice of so important a profession as architecture in the hands of any private organization, we have every reason to believe that the Ontario Association of Architects did not petition for such legislation with the view of obtaining arbitrary powers in the matter of controlling the practice of architecture within their association. It was purely a means to an end and the bill was drawn up by the association purely with a view of providing some means whereby some official standard of qualification could be established in this province, and we have every reason to believe that the O. A. A. would gladly endorse any other legislation (that would be satisfactory to the profession in the province generally, and that would conserve the interests of the public at large) designed to establish a government standard of qualification, and thus promote generally a better standard of building throughout the province.

The provinces of Quebec and Alberta have a law of the same nature as that proposed by the Ontario Association of Architects, but it is quite beyond all possibility to have such legislation passed by the Ontario Legislature. What is wanted in Ontario is an Architects' License law of the same type as that which has been in force in the State of Illinois and has operated so successfully during the past ten years. The states of California and New Jersey have adopted laws modelled after the Illinois law, and in each case they have worked out most satisfactorily, raising to a very appreciable extent as they have the standard of architecture and building. These laws have proven to be a great protection to the building public generally and have had a tendency of more clearly defining the responsibilities of the architect and the contractor, which fact has operated for the benefit of both the legitimate architect and contractor.

There is a bill now before the British Parliament known as the "Architects' Act," which provides for a very elaborate system of governmental examination and which, in general principles, is almost identical with the Illinois law, although somewhat more complicated and thorough. Indications are that the bill will be passed.

It is rapidly becoming a pretty generally recognized fact, the world over, that public safety and welfare demands that the practice of architecture should be under government control, and in a rapidly growing country like Canada, where there is such a vast amount of building, it appears to us that now is the time to solve this question, in so far as it will take thirty or forty years to reap the full benefit of such a law. The Province of Ontario, the largest in the Dominion, should, we believe, take the lead in this matter, and set an example for the rest of the Dominion.

The position of the architect in relation to the question of government control of the practice of the profession is stated very clearly in the report of the Committee on Registration of Architects made to the last convention of the American Institute of Architects.

"An architect's license law must necessarily be enacted under the police powers given to the legislatures of the several states by their constitutions, to regulate the acts of incompetent persons or even prevent incompetent persons from performing acts which might result in danger to the community. It is very clear that such laws should be enacted rather on the demand of those who need such protection than of those who are to be regulated by it. * * * No law which regulates the practice of architecture in the interests of architects should be or ever will be enacted. It is the people only who should be interested in their enactment."

It, therefore, may be seen that the interest manifested by architects in the passage of a law providing for the "Registration of Architects," is simply prompted by purely unselfish motives and they have become active in their support of such legislation only because of the fact that their knowledge of the importance of allowing only properly qualified men to become eligible for the practice of the profession. They ask the public to protect itself against the incompetent by forcing the architect to submit to a government examination only because they realize much more fully than does the layman the importance of the essential requirements of the architect.

*SUMMARY OF BUSINESS CONDITIONS
—REPORTS FROM MANUFACTURING
INTERESTS OF U. S. A. SHOW BIG IMPROVEMENT.*

EARLY LAST MONTH a circular letter was sent to every member of the National Association of Manufacturers of the United States, requesting definite information concerning present trade conditions and the percentage of increase or decrease in business during the last ten months. The association has 3,000 members, so that the correspondence and compilation of the reports have been onerous tasks. The information is summarized by Mr. Henry Harrison Lewis in "American Industries" of October 15, and shows clearly that the leading industries are slowly but surely recovering from the effect of the panic of a year ago and that immediate prospects of new business are gratifying as a rule.

The steel trade and the movement of pig iron are usually believed to form our most accurate barometer of trade conditions. It is distinctly encouraging, therefore, to read that 70 per cent. of the iron and steel plants in the Association's membership report conditions good, 78 per cent. have had an increase of business during the past ten months, and 85 per cent. have reason to believe that prospects for the immediate future are reassuring.

Machinery, by which is meant all classes of machinery in all parts of the country, shows present conditions 68 per cent. good, and that 76 per cent. of members dealing in machinery have had an increase in their trade since January 1, and 86 per cent. believing in future improvement.

The agricultural implement trade has the proud distinction of first place in prosperity. Every member of the Association interested in the manufacture of agricultural implements who replied to the circular letter reported present conditions good, and an increase of trade during the past ten months, and only one sounded a pessimistic note in connection with future possibilities.

The remaining sub-division in the metal trades, tools and hardware, shows 77 per cent. trade conditions good, 87 per cent. increase during the past ten months and 92 per cent. believing that possibilities for continued increase are good.—ENGINEERING RECORD.

THE BUSINESS OF ARCHITECTURE.---As a Profession It is Misunderstood.---As a Business It Begets Contempt.---Controlling Circumstances Are Created by Architects Themselves.---Less Commercialism and More Professionalism Required. ∴ By F. W. FITZPATRICK

STRANGE it is, indeed, how lowly a place the grandest, the mother of all arts, holds in public esteem, and how blessed little is known about it by even the better class of the masses. Why, little children today prattle learnedly about literature and its shining lights. The average man is surprisingly well read upon most subjects. He will entertain you with detailed accounts of the deeds of ancient and modern heroes, even the Spartan and the Gaul; he knows all about the great discoverers and historians; he does not balk overmuch at the names of famous painters, musicians, astronomers and travellers. Wonderfully erudite is he, our average man.

But most wonderfully ignorant is he of the names of the men who have contributed most to his and his ancestors' comfort, education, refinement—yes, his very civilization—the architects.

A beautiful poem always recalls the name of its author, a masterly oration, a grand literary success is never referred to without mentioning him who gave it to us; great battles glorify the contending generals, scant value is attached to a painting unsigned or unattributed to a master, but we see, we admire, we read of and think about and live in our great buildings, the beautiful structures of antiquity and of our own times, and never waste a thought about their designers, the men who created them and placed them as the most conspicuous and unerring milestones in the progress of our civilization.

DESIGNERS DISREGARDED AND UNKNOWN.

People go into ecstasies about the Parthenon. The very wise will tell you, perhaps, that Phidias designed it; that is, if any should deign to ask whose work it is; but that shows how little is known about it. Phidias did but the sculptural work, the embellishment. Ictinus was the architect. Not one out of a hundred thousand of you know it, either.

How many of you know that the Coliseum at Rome was designed by Rabirius and completed by Mustius?

Michael Angelo Buonarroti did manage to get himself handed down to posterity, the one man of them all who was saved from darkest oblivion. I wonder how he managed it. I believe that about one person out of every twenty thousand who visit St. Peter's at Rome learns that he had something to do with its design. But then, this spasm of knowledge is counterbalanced by the supreme indifference—concerning architects—with which we visit an equally imposing domed structure, the magnificent capitol at Washington. We praise its splendid outlines and step reverently through its sacred halls, but not one out of two hundred thousand who visit it give a snap of the finger for the men from whose brains it sprang. Who cares a rap about Hallet, or Hadfield, or Hoban, or Latrobe, or Walter?

For our indifference to the genius of past generations our text-books, schools and histories are to blame. It has become the fashion with those guides to public opinion to ignore our profession, while they rapturously extol the warriors, the poets, the travellers, the monks of old.

As a matter of fact, I am not quite sure whether it is that that public indifference has influenced those authorities to thus neglect the practitioners of the finest of fine arts, or that those authorities are really to blame primarily for that state of public opinion. Perhaps the fault may lie with the architects themselves.

Then, too, familiarity certainly does breed contempt, you know. Achievements in other lines are more noticed, talked about, because less is seen of them and their actual accomplishments, the mode of procedure. A great bridge is finished, it is something people do not see every day, its engineer is feasted and dined and glorified. You see his picture in the papers, much is made over him. A new opera is played, the composer is loudly called for, bouquets and speeches are thrown at him; he, too, is a great man, if only for a day. But do you ever hear of any fuss being made over an architect?

A great building is completed; we are accustomed to great buildings, be it ever so grand, however splendid an achievement of engineering skill and artistic perfection; the only thing you will hear about is a lot of grumbling because it was not finished in thirty days instead of the year it did take to build it. It is occupied in unseemly haste, while men are still working in it; everything is tumbled into it in undignified confusion; there may be an opening banquet given to the directors of the institution, who will pat each other on the back and swell up in righteous pride over *their* great accomplishment; a poor "half-tone" of the building, with all the names and pedigrees of the aforesaid directors, will appear in the next morning's papers. But who is the architect? Who designed the building, guided its infant steps, as it were, foresaw all the difficulties that would beset it, and finally completed it, ready for that opening banquet? Who knows, and, furthermore, who cares a continental?

I have seen of late an article or two in some magazine or other throwing wordy bouquets at the profession, describing in glowing terms the enormous fees we get, and the wondrous things we do. These articles were great surprises to me, for they actually indicated some public interest in us—or the editors would not have published them. But that sort of thing is on the milk-and-water order. More heroic treatment is necessary if we really desire to attain the place in public esteem that the accomplishments of some of our number would seem to entitle the profession to.

LACKS DIGNITY OF OTHER PROFESSIONS.

We should rank with the lawyers, the doctors, the ministers. That we do not is, I think, entirely our own fault. We have cheapened ourselves and brought the whole profession down to a low level of consideration indeed.

Let us glance at things as they really are.

Few doctors go about soliciting practice. You call those who do charlatans. A lawyer who would beg you to give him a case, or offer to prepare briefs until you found one to please you, you would put down as a small fry—a pettifogger of the lowest type. Now, we solicit business actually, or, at least, indirectly, by our everlasting willingness—the best of us, too—to compete for it.

Of course, there are those among us who are dignified, who have made enough of a name to insure some people coming to them direct anyway, or who have married well and cultivated their brothers-in-law and other relatives so assiduously that they have an assured practice; yet these, also, itch to get into competition occasionally. The others will sit about a man's doorstep whom they suspect of even dreaming of building a house, and they will plead and beg for that commission; they will turn the whole broadside of friends and politics and other "pulls" upon a committee in charge of a church or

other important work—not, mark you, to secure the “job,” but merely to get a chance to compete for it against Tom, Dick and Harry.

We are too blessedly cheap; that is all there is about it.

Many doctors and lawyers make their reputations, and then people with important cases wait around with their hats in their hands, pay exorbitant fees for mighty small services, and go away proclaiming the greatness of their advisors, who may have recommended but a drink of plain water to the sick and advised the litigiously inclined to go pay their bills.

How many architects dare charge a penny over the so-called legal five per cent., however difficult or responsible the work, and how many have prospective clients respectfully waiting around? Fewer still are they whose clients proclaim them great after passing through their hands.

A lot of men who will spend \$60,000 in competitive plans for a building committee that did not even take the trouble to look at those plans before “ordering” a new competition, involving a further outlay of \$40,000 to the competitors, and then decided not to build at all—those men, I say, need not wonder why the aforesaid committee did not even thank them for their trouble. This is not an isolated case, but one of many high-handed actions common to people who have buildings to erect. Are you surprised that such things occur? Is it not more to be wondered at, rather, that such a lowly and meek profession is not oftener made to serve the general purposes of a door-mat?

THE SCRAMBLE FOR PATRONAGE.

In our anxiety for business, for preferment, we have spoiled the public, made beggars, yes, often public nuisances of ourselves. There is more violent, cantankerous competition among us than there is in the dry goods or grocery business; fewer ethics observed, though we are long on can. about some alleged ethics, and occasionally hold brotherly pow-wows and feedings. But it is all sputter. We show it plainly, too; people know our ways pretty well; they are fully aware that nearly everyone of us carries a long knife—figuratively speaking—ever ready for our dear brother’s back. We have gotten people so that they feel they are doing us a favor in permitting us to scramble for their “patronage.” It amuses them. You have seen a lot of little darkies fighting and diving for nickels thrown them by some festive passenger at a boat landing? Well, as a profession we occupy about the same position in the esteem of the public as do those urchins.

If a doctor goes wrong, or if a lawyer should play both sides of the game, his client’s and the other fellow’s too, not only his confreres cut him out, but the public generally fight shy of him; he is unsavory and considered apart from the rest of the flock; the flock itself has not suffered; its whiteness is still unblemished. Not so with us. Some of us have sinned grievously. Architects have played double, they have taken fees from clients and “rake-offs” from contractors and material men; they have swelled the cost of buildings and divided the results with the builders; some have done all sorts of things they ought not to have done. But they are not set aside by the public as black sheep. Oh, no! Their sins are visited upon the profession as a whole. We are all under suspicion. People actually figure upon so much per cent. to be added to the cost of building to cover architectural “fleecings.” Some are surprised when told that co-partnerships between architects and builders are frowned upon by the profession, and others smile incredulously when we assure them it is *not* usual for us to get commissions from every contractor about a building.

That is really the meanest part about the whole thing. People do not discriminate. To them an architect is an architect. The individual’s experience, ability, integrity and everything else matter not; he is no better, no worse,

than Jim Jones, who may have been a horse doctor yesterday, but who styles himself “architect” to-day. We are all in the same class, a sort of unnecessary evil anyway, to be tolerated at times, but to be dispensed with whenever possible. And, as a matter of fact, the man, who does not feel perfectly confident he can be his own architect and deal directly with a builder, can be found, but one has to hunt for him.

PROFESSION WIDE OPEN.

And, after all, I repeat, can you be surprised at all this? The profession is wide open; there is no hedge about it as there is about the law or the medical practitioners; no examinations to pass, no license from State or school to be gotten. Any man who can afford a sign saying so is an architect legally, actually and beyond any question, whatever his training, his fitness, or however lacking he may be in both.

Supposing I have studied and travelled and delved for thirty years and built great structures and believe myself fully equipped to meet any demand; supposing, in fact, I should have gotten well up toward the top notch of my so-called profession. And, supposing a fellow takes an office next mine and also hangs out the magic word, “architect,” even though last week he was a plumber or a candlestick-maker. Well, what happens? People are as apt to employ him as me. He probably will skirmish around and talk big, and if he is shrewd enough to employ a clever draughtsman he will turn out some pretty catchy sketches; he will cut his rates, and the chances are he will have twice the business I have next year. Supposing he does get things all tangled up, and buildings cost more than they should, etc., his clients may congratulate themselves things are no worse; they feel sure there would have been as much trouble with any other architect. They are all the same, you know.

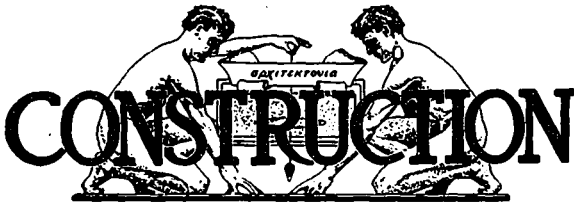
And why should he not be employed? True, he bears no brand, the State has not licensed him—it does its plumbers—there has been no imposition of hands or other ceremony; he just says he’s an architect, and there you are! But neither has the State licensed me. I have come in by the same road as he. We have all come in that way. That I have fasted and prayed and done a long novitiate, and am really thoroughly prepared for the work I am willing to undertake, seems to be no concern of the public’s. As a matter of fact, from the public’s standpoint, was I not a great dunce to go to so much trouble; am I not lacking in business shrewdness for not having taken as short a cut as he did?

ARCHITECTS MUST CULTIVATE SELF RESPECT.

That is not a lamentation, mark you. I am finding no fault with the dear public. I am simply telling you how things are. Perhaps you have given scant thought to the subject before. I know, indeed, that you have not thought about it at all. What good, then, can I hope for, what result do I aim at, in these few notes jotted down haphazard? What is their purpose?

Well, if you have a sore, a really bad sore, you do not slap a plaster over it and let it go—refuse to look at it, do you? That would be a good way to infect the entire system. You open it and dress it frequently. You look all about for pus, you inject disinfectants; you do not try to hide, but to get rid of it, and it is only by fussing with it that you will succeed, however unpleasant the operation may be. So it is with this question. I want to show it to you in all its phases, in its worst aspect, however unsightly that may be. Architects themselves realize how bad it is, and are at work with disinfectants, so to speak. They are trying to purify their ranks, to have the State place some bar to the indiscriminate practice of all the riff-raff that invades those ranks; they are cultivating self-respect before demanding your respect;

(Concluded on Page 36.)



A Journal for the Architectural, Engineering and Contracting Interests of Canada.

H. GAGNIER, LIMITED, PUBLISHERS
Saturday Night Building
TORONTO CANADA

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Address all correspondence to "CONSTRUCTION," Saturday Night Building, Toronto, Canada.

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Main 6641

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SUBSCRIPTIONS.—Canada and Great Britain, \$2.00 per annum. United States, the Continent and all Postal Union Countries, \$3.00 per annum in advance.

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. 2 November, 1908 No. 1

Current Topics

ARCHITECT W. A. LANGTON, Toronto, has removed his offices from 43 Victoria street to the Reliance Building, 82-88 King street west.

THE LEI... ..EN, the largest dredge in the world, was recently launched on the Mersey at Liverpool. It is capable of lifting 10,000 tons in fifty minutes.

IN ORDER TO PLACE READY FUNDS at the disposal of Three Rivers, with which to bring about the complete rehabilitation of the burned district, the Quebec Cabinet has decided to recommend a loan of \$400,000.

THE BUILDING CODE REVISION COMMITTEE, of New York, recently adopted a resolution restricting all buildings to 300 feet in height unless they face a park, square or plaza, when they may be built 350 feet high.

A PIECE OF ENGINEERING which is exciting general interest at Vancouver, is the sinking of the 16-foot caissons in connection with the construction of the substructure for the new bascule bridge which is to cross False creek at Westminster avenue. The piers will rest at a point about 26 feet below the water mark, and the men are at present working beneath the surface at depth which requires only about from 12 to 15 pounds pressure.

AN ACTION BROUGHT by Architect J. Erb, of Port Huron, against the Dresden Public School Board for \$700 as commission on a \$23,000 school building, for which the plaintiff had furnished plans, was recently dismissed by Mr. Justice MacMahon, following a decision by Mr. Justice Street, who ruled that a Public School Board has not authority to purchase grounds or to build a school without obtaining the sanction of the municipal council, or of the electors.

A MEETING OF THE COUNCIL of the Architectural Institute of Canada will be held at the Engineers' Club, 9 Beaver Hall Square, Montreal, on Tuesday, 8th December, 1908, at 2 o'clock p.m., for the consideration of applications for membership into the Institute and the transaction of any business that may arise.

BRIQUETTING IRON ORE, in order to increase the blast furnace output, is practised to some extent in England according to ENGINEERING. The briquettes are placed in a kiln for calcining or burning, the heat generally used being from the waste gases of the blast furnaces. After the moisture and volatile gases have been driven off in this kiln, the briquettes are fed into the blast furnace.

AN INTERESTING ENGINEERING TASK is now under way in London (Eng.), where the Imperial Theatre is being transplanted from its present site to a location twelve miles distant. The building is being taken down and removed in sections, and it is to be seen in about seven months' time, rebuilt along the exact lines as it stood at Westminster. It is said by the contractors that even in the United States a similar undertaking has never been attempted.

FIRE LIMIT "A" IN TORONTO, has been extended to take in the entire district from the waterfront north to College street, between Jarvis street on the east and Bathurst street on the west. This is a timely move on the part of the city to prevent the further ingress of dangerous structures in this section. Hereafter, all buildings erected within this territory must be of brick or similar construction. In the past this limit only comprised the district lying south of Queen street, between Jarvis and Bathurst streets.

WOODEN SHACKS and tar-papered domiciles have been tabooed by the City Council of West Toronto. In the future only brick, brick veneer, or like structures, will be permitted in residential districts. This action is taken preliminary to the enactment of a general building by-law now pending, which is designed to bring the construction of all classes of buildings up to a much higher standard.

A PETITION HAS BEEN PRESENTED to the Federal Government by the Montreal Board of Trade, asking that in the rebuilding of the Quebec bridge the height of the structure be made at least 190 feet, so as to permit of an unobstructed passage for modern high-masted liners in event of any of them desiring to come up to that port. While many of the new types of vessels dispense with masts altogether, nevertheless the question of height should be thoroughly gone into, so that no restriction will be placed on the importance of Montreal as a shipping point.

EXCLUSIVE RIGHTS TO INDIVIDUALITY in architectural design is denied owners of buildings in California, according to a recent ruling made by Judge Lennon, of the State Supreme Court. In an injunction suit instituted by F. V. Madison, an attorney of San Francisco, to restrain Architect Edgar Mathew, of that city, from executing a replica of an English domestic residence, which the latter had designed for him, for Armond de Courtieux, a local butcher, the court denied the application, on the ground that the architect has a certain personality which he expresses in the houses he builds, and to restrain this personality would mean to deprive him of his means of livelihood and stifle art.

THAT ROME WASN'T BUILT IN A DAY is a fact that has strongly impressed itself on the residents of Kingston. Following the destruction of the original dome on the city hall a somewhat protracted time was consumed in securing plans for a new one. One set of drawings was prepared and rejected; another set prepared and accepted. Then a further lapse occurred. Finally tenders were invited; some contractors were unable to get plans and friction arose. After estimates were submitted the figures were published, and then the tenders were thrown out. The contract has finally been let, and the city in general is rejoicing.

* * *

MICROSCOPIC EXAMINATION OF WOOD after it breaks in a testing apparatus has just been started by the office of wood utilization in the Forest Service of the United States. Every species of wood has several different kinds of cells, each of which has its own size and form. There is also a wide variation in the number and arrangement of the cells in different species. These differences in structure have their bearing on the strength of the wood. The application of microscopic work to tests recently conducted by the U. S. Forest Service is expected to give a better knowledge of the conditions on which the strength, stiffness and elasticity of wood depends, and how it may be used to best advantage in construction. Other problems connected with the structure of wood, such as the preparation of wood pulp and the treatment of wood with preservatives, will probably be aided by this new study.

* * *

REINFORCED CONCRETE BARGES and pontoons of considerable size have been in use for some time in Italy and have proved so satisfactory that the Italian Government has contracted for several large barges for use in harbor work. The first of these boats is of sufficient size and has been in use long enough to furnish a test of their utility. It is a double pontoon, built in 1897, 67 feet long and 27 feet out-to-out of the two parts on which is built a boat-house for the Rome Rowing Club. In 1905 the Italian Navy Department built the "Liguria," a reinforced concrete barge of 150 tons burden, 57 feet long and of 18 feet beam. This was first put upon the harbor work near Rome, but has since been towed to and from many of the ports of Italy. The Liguria was so successful that the Government built another 100-ton barge, on the model of which four others are now under contract. In several other places in the kingdom, notably across the River Po, near Pavia, pontoons of reinforced concrete are used to carry small or light bridges. Most of these constructions have been carried on by Messrs. Gabellini of Rome.

* * *

PAINTING CONCRETE can only be done successfully, according to an eminent concrete engineer, after the concrete has stood at least one summer. When the surface is thoroughly dry it must be washed with a 7 or 8 per cent. solution of muriatic acid, which should afterward be washed off with plenty of clean water. After the surface has been thoroughly dried, it should be given a priming coat containing so much turpentine that it is almost flat. It is considered best to use more turpentine and much less drier, as compared with ordinary painting, increasing the amount of oil for succeeding coats. Boiled linseed oil is considered preferable to raw oil. Each coat must be given time to dry thoroughly before the next is applied. For painting with water color or calcimine, the surface of the concrete should be washed with muriatic acid and clean water, as before stated. After it has dried thoroughly, it should be given a coat of alum size, or, still better, a coat of flat paint. When this is dry, the surface is ready for calcimining. One formula for size is one pound of acetic acid, one pound of alum and two gallons of water.

AN INTERESTING SERIES of experiments, says Engineering, an English publication, has been carried out at the National Physical Laboratory, at the instance of Sir John Brunner, to test the protective effect of cement concrete or steel; 8-inch specimens of mild steel bar, both turned and with scale left on, were embedded in blocks of good Portland cement concrete measuring 12 inches by 7½ inches by 7½ inches. The blocks were covered with water several times a week for a year, and for three months afterward were left in the open exposed to the weather. After 16 months one of the blocks has been broken up and the embedded specimens examined. No trace of any action of the cement could be detected, the scale on the rough specimen was undisturbed and the bright specimens showed no alteration on examination under the microscope. Further tests are to be carried out with the remaining blocks.

* * *

A SINGLE RAIL STREET CAR SERVICE is shortly to be introduced in New York City. Application has been made to the Public Service Commission by a syndicate who has recently acquired the Pelham Park and City Island Railroad, asking authority to change the motive power from horse to electricity, and to sanction the installation of the American monorail system. As soon as the legal formalities have been complied with, the construction work will be started by the Monoroad Construction Company, capitalized at \$1,500,000, which is to build and equip the road. It is expected that the road will be in operation three months after the work has been under way, and that it will be the first step in revolutionizing surface transportation throughout the city. The type of car to be used is fifty feet long and pointed at one end, running on four wheels placed under the car as in ordinary practice, but in tandem, two at each end, each wheel having double flanges, and being driven by two separate alternating motors. These wheels run on a single rail spiked to ties. Above the car at each end is a flexible arm, connected with an X-shaped truck, each truck containing four guide wheels, which run in two L-shaped overhead rails so arranged that the guide wheels cannot leave the rails without taking something apart. These guide rails, which are kept a uniform distance of thirty inches apart, conduct the electricity.

* * *

AN ELECTRO-MAGNETIC STREET CAR BRAKE, the invention of Mr. A. W. Maley, formerly assistant engineer of the Leeds Corporation Tramways, has recently been subjected to a series of important trials at Birmingham, England. It is generally believed that the problem of braking a runaway car on dangerous gradients has been solved. The contrivance is more elaborate than the present types of brakes, and adds about half a ton to the weight of the car. It is a combination of the principle of mechanical and electro-magnetic brakes, and among the many advantages claimed is the elimination of the danger of skidding, due to the fact that no braking is done on the wheels other than to drive the motors as generators, when descending a hill or making a stop. The current so generated is utilized for the track magnets, which in turn are attracted to the rail, and by their backward movement as the car goes forward throw into action mechanical rail shoes. There are three blocks on each rail, namely, a magnet and two slippers. While the brake action is thus extremely powerful, the blocks have a tendency to keep the rails clean. In addition to the electro-magnetic function the brake may be applied by hand from the driving platform, and for this purpose suitable levers and links are introduced. The magnets are excited either by the current taken from the motors acting as generators, or, by the operation of a special canopy switch, they may be energized direct from the trolley wire. The trials at Birmingham have been regarded as satisfactory.

WORK ON AN HYDRO-ELECTRIC SCHEME is about to be commenced in Simla. Nearly all of the details of this elaborate undertaking have been worked out, and great expectations are entertained by the inhabitants of the summer capital of India of comfort and convenience that will be derived from this new improvement.

* * *

HOT AIR HEATING by utilizing the waste heat of a gas engine is now practiced at a manufacturing establishment in Pennsylvania. The air heater for this purpose is novel in that both the exhaust gases and the jacket cooling water are utilized, the fresh air passing to the fan through large thin-walled metal tubes, around which the exhaust gases, and within which pass radiator tubes carrying the hot jacket water. While the jacket water ranges from but 120 to 150 deg. Fahr., as compared with the 600 to 800 deg. of the exhaust gases, it serves to compensate for the varying volume, and consequently heat, contained in the exhaust, and the installation is claimed to have proved successful.

* * *

THE NEW BUILDING BY-LAW which is projected in Ottawa, is to be a collaboration of the civic authorities, local architects and the Ottawa Builders' Exchange. It seems that their combined efforts should result in building regulations that would be ideal and consummate in every respect, that is, providing personal interest is made subservient to public welfare. Both the architects and the Exchange, it is said, are lending their earnest co-operation. The architects in particular are credited with having worked on the measure for the past several months, during which time they have carefully studied the building by-laws of Toronto, Buffalo, Vancouver, Montreal and Winnipeg.

* * *

MONTREAL'S MASTER BUILDERS are to have a new home. Owing to the rapidly increasing membership the association has outgrown its present quarters to such an extent that it was decided at a recent meeting of the Executive Board to lease the entire top floor of the Eastern Townships Bank building, which is now under construction at the corner of Victoria square and St. James street. Every provision will be made to insure the new Exchange being an ideal one, both in comfort and arrangement. In addition to a board room and general offices, there will be offices for the affiliated associations, a room for displaying samples of building materials and private rooms for members. The building is to be ready for occupancy next spring.

* * *

SLAG BRICK ARE MADE IN ENGLAND from blast furnace slag, according to *ENGINEERING*, by first running the slag in a molten condition into water, which granulates it. It is then passed between rolls, which remove the excess of water and crush any large particles. White, unslaked lime ground to an 8,000 mesh is stated to have proved most satisfactory for mixing with the slag. This lime must not contain more than half per cent. of magnesia. From 93 to 95 per cent. of slag and 7 to 5 per cent. of lime are placed in a steam-jacketed mixing machine, where the heat and the moisture of the slag start the reaction of the lime. The mixture is then put in presses which form the brick, and the latter are taken to steaming chambers. These bricks are stated to have a crushing strength of 2,500 to 3,000 lb. per square inch, and to withstand boiling and freezing tests fairly well. The labor cost of producing them is stated to be about \$1 per thousand, and their total cost at the work is given as about \$4.35 per thousand.

ACCORDING TO THE ANNUAL REPORT of the United States Geological Survey, there was a marked decrease in the production of asbestos in the United States in 1907, the output amounting to but 653 net tons (of 2,000 lbs.) valued at \$11,899, as compared with 1,695 net tons, valued at \$28,565, in 1906. The cause of this decline is found in the better quality and greater abundance and accessibility of the Canadian asbestos, which completely dominates the industry of the United States. The largest output in the history of the industry in the United States was in 1905, when the product amounted to 3,100 tons.

* * *

THE COMPARATIVE COST of "mill construction" and "reinforced concrete" is declared by a prominent New England contractor to favor the latter. This contractor, who has had much experience in concrete construction and who has carefully noted the cost of his building operations, has compiled some most interesting figures relative to the cost of these two types of construction.

In the case of six buildings on which he figured last year, both in mill construction and in reinforced concrete, there was a showing in every case in favor of reinforced concrete, varying from 4 to 11 per cent.

* * *

THE FIRST AND SECOND PRIZE in the competition for plans for the proposed provincial asylum, to be erected in Coquitlam, B. C., were awarded to J. C. M. Keith, of Victoria, and Edwin G. W. Sait, of New Westminster, respectively, while the plans of H. T. Griffith, of Victoria, received honorable mention. The competition was limited to architects of the province, and some twelve prominent members of the profession participated. A selection is to be made shortly from the three designs, as to the one which is best adapted to the special purposes for which the building is to be used. It is estimated that the completed structure will cost over a million dollars.

* * *

BETTER BUILDING LAWS are seemingly one of the immediate needs with which Winnipeg should deal. A deputation, including the city health officer, who recently held a conference with the fire, water and light committee, anent tenement house construction, declared that this class of buildings in Winnipeg was not only unsanitary, but that the conditions there were worse than in New York City. Apropos to this declaration is the observations of F. W. P. Rutter, of Toronto, general manager and secretary of the London and Lancashire Fire Insurance Company, who, in looking over the field, stated that the number of fireproof or fire-resisting structure there was by no means as large as it should be, adding that Toronto had been much more substantially built in that portion which was burned a few years ago, than Winnipeg is now. Winnipeg should profit from the experiences of other cities, and grapple, without delay, with the problem of improving the situation, both constructively and hygienically, by the enactment and enforcement of an effective building code.

BUSINESS OF ARCHITECTURE.—Continued from Page 33.

they insist upon competitions being justly and decently managed—many refuse to go into them at all; young men study more than they did a few years ago; our schools offer better training in that line; our work is of a higher order than it was a while ago; note even our Government buildings are vastly superior to what they were ten, yes, five years ago. The outlook is brightening well above the horizon.

I have shown you the sore, perhaps I have offended in making its unsightliness conspicuously apparent. Will you not aid in healing it? Give the devil his due; show some appreciation when it seems to be merited. Do not go out of your way to cast slurs upon us. At least do not place obstacles in the way of those who are doing the dressing.



PLATE I. PARLIAMENT BUILDINGS, OTTAWA, AS SEEN FROM NEPEAN POINT.

CANADA'S NATIONAL BUILDINGS.---Notable Group of Gothic Edifices that Form the Crowning Glory of a Magnificent Natural Site.---A Review of Their Construction, Arrangement, Relative Positions and Architectural Detail. By W. A. LANGTON, O.A.A.

In the Parliament Buildings at Ottawa, Canada as a British Colony, has much of which to be justly proud. While many Canadians have had the pleasure of viewing these buildings, there are few, even among architects, who are acquainted with their beauty of detail and architectural significance.

The article published herewith, dealing with these buildings, as written by W. A. Langton, O.A.A., should prove highly interesting and instructive to both architect and layman, as Mr. Langton is undoubtedly one of the best architectural critics in Canada.

In securing the necessary data and information for this subject, it was necessary to draw upon many sources, and among those to whom especial credit should be given for their collaboration, we wish to especially mention Mr. C. P. Meredith, of Ottawa, who provided a large amount of data relative to the history and construction of the buildings.—Editor.

IN planning public buildings, the first consideration is how to make the most of them. Legislative buildings, in particular, which stand as a representation of the national importance, must stand well apart from, and above the rank of private building. It is something, in this direction, to free the national building by giving it plenty of space, and to build it large and dignified, but the result is finest and most impressive when the advantage of site is a natural advantage, and the majesty of nature is contributory to the impression.

The site of the Parliament Buildings at Ottawa is a rare opportunity of this kind, and there is no doubt that the existence of such a site contributed much towards the choice of Ottawa for a Capital. "Having the world of Canada whence to choose," said Anthony Trollope, of Ottawa, in 1861, "the choosers have certainly chosen well." The expression "the world of Canada" has a larger sound now than it did then, when Canada consisted only of the united provinces of Upper and Lower Canada—now Ontario and Quebec. It was the difficulty of fixing a capital for these united provinces—disagreeing, as they did, profoundly, about their relative importance—which

made necessary the establishment of a new capital which would be neither Kingston, Montreal, Toronto or Quebec. Each of these places had been tried; the two latter in an alternating system, under which each became the seat of Government for four years at a time. No arrangement proving satisfactory, Parliament, in 1857, voted an address, praying that the Queen would select a seat of Government. This brought into action Sir Edmund Head, who, as Governor-General, guided the Queen's choice. He, no doubt heartily sick of sectional jealousies, favored a new departure, turning his back on the four big cities in which no peace had yet been found.

The choice of a new place was not such a wide speculation as it at first may seem. Ottawa had already become recognized as a place of some military significance. A military work was its origin—the Rideau Canal, which was constructed to enable gunboats to pass from Montreal to Kingston by an inland route not exposed, as the St. Lawrence would be, to an enemy's fire. There is a legend that the Duke of Wellington, with a view to selecting a defensible place for the seat of Government, had placed his finger upon the map at Bytown, as Ottawa was called in his time, and said, "That is the place." If this tale is true, the Duke's utterance must have been concerned with an earlier stage of the question of the Capital—which was always a live one—for the Duke had been dead for five years when the Queen was asked to intervene.

However, much previous suggestions, and the natural suggestiveness of the situation of Ottawa—straddling the boundary between the rival provinces—may have pressed the place upon the attention of Sir Edmund Head; it is likely that he, a man of cultivated taste, the author of an encyclopædia article on painting, and of two handbooks to the art galleries of Europe, perceived well the beauty of this promontory as a site for Government Buildings, and was influenced partly by this perception in advising the Queen as he did.

It is likely also that his influence was behind the really wonderful scheme of building that was soon put before architects for a competition of designs.

It must be remembered that the buildings, as we see

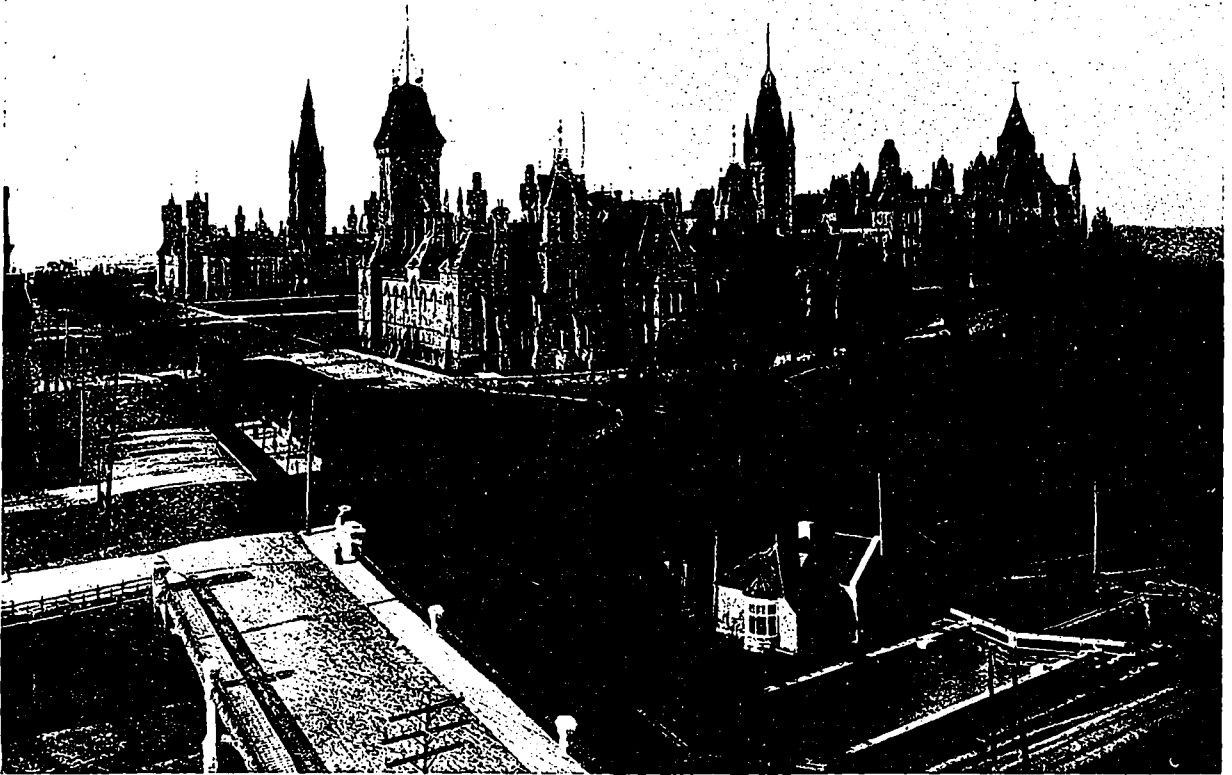


PLATE II. VIEW FROM EAST, SHOWING THE RELATION OF THE BUILDINGS TO ONE ANOTHER—HOW THEY FIT THEIR SITE—HOW THEY CROWN THE SURROUNDING LANDSCAPE.



PLATE III. VIEW ALONG THE FRONT OF THE SITE, SHOWING HOW IT IS ENCLOSED BY A FENCE IN CHARACTER WITH THE BUILDINGS.

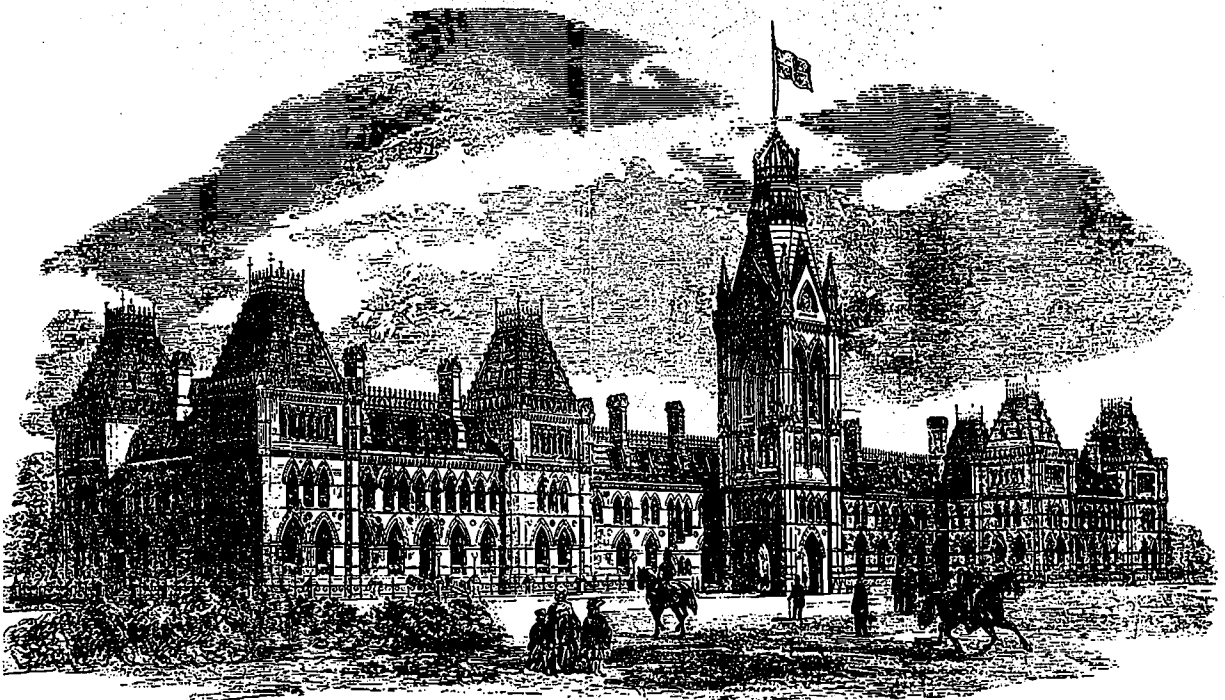


PLATE IV. MR. FULLER'S ORIGINAL PERSPECTIVE FOR THE CENTRAL BUILDING, AS REPRODUCED IN THE ILLUSTRATED LONDON NEWS, IN THEIR ISSUE OF NOVEMBER 15, 1859.

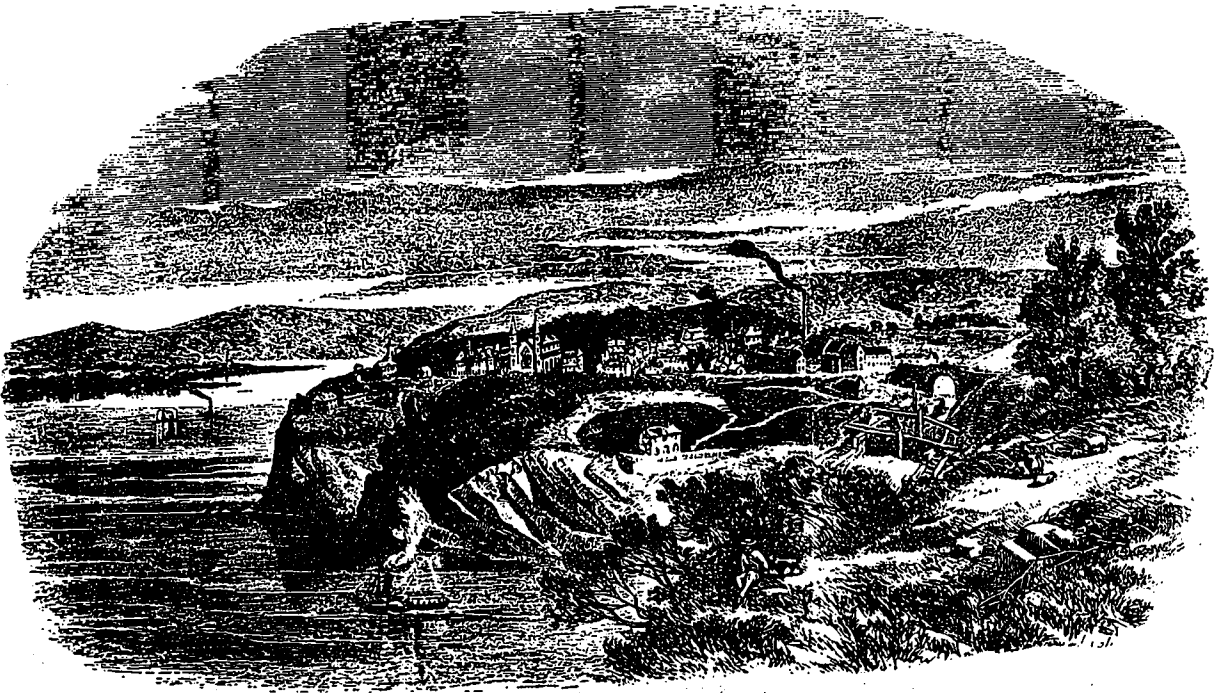


PLATE V. OTTAWA IN 1857, SHOWING THE ORIGINAL SITE OF THE PARLIAMENT BUILDINGS.

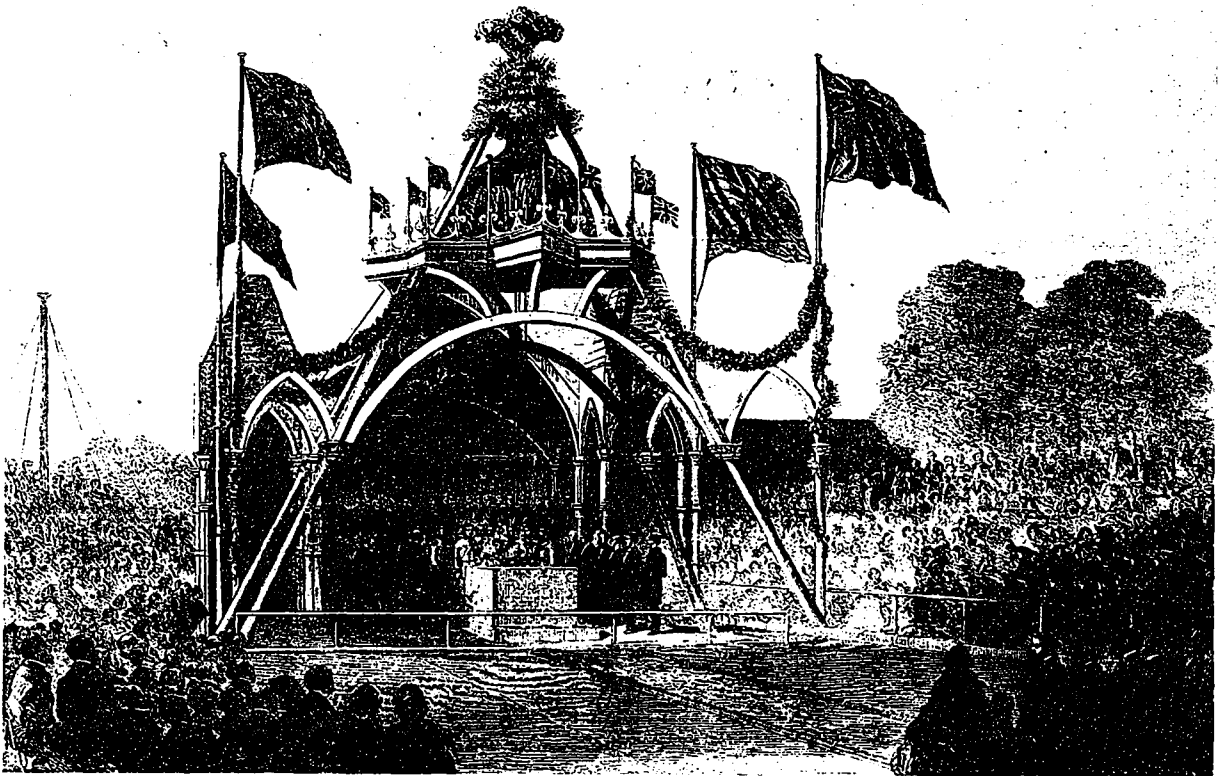
them now, were intended, not for the present Dominion of Canada, but for the old Province, which consisted only of Upper and Lower Canada, and had no high thoughts of its place among the nations.

The Legislative Assembly was disposed at first to reject the Queen's choice, when it was published in the summer of 1858, but in the session of 1859, her decision was affirmed by a small majority.

This was in February. In May the competition for the Government buildings was announced. The drawings were sent in on August the first. There were eighteen competitors in all, and seventeen of them were Canadians—so there were some architects in those days. Messrs. Fuller and (Chilian) Jones were awarded first prize for the Parliament Buildings. Their drawing, as engraved for the Illustrated London News, is reproduced in Plate IV. The prize was \$1,000. They got also the second prize for each of the Departmental Buildings. The first prize for these buildings (also \$1,000) was won by

was done, and the time was extended by four years for the Parliament Building and four and a half for the Departments. The Civil Service was moved to Ottawa in the fall of 1865, and took possession of the offices a year before the buildings were completed. The Legislative Chambers and their offices in the Parliament Building were so far completed in the spring of 1866 as to suffice for the last session of the Parliament of the old Province of Canada, which met on June the 8th.

The extra time taken requires, perhaps, no explanation. It is a law of nature that large buildings take longer to complete than their estimated time. But the addition to the cost is not so easily accounted for. The fact that, between the beginning and the completion of the work, Confederation had been conceived and established, may have something to do with it. The buildings intended for two provinces had now to do for four—with the prospect of further increase. But we should expect any expansion in the buildings, consequent upon a wider owner-



THE LAYING OF THE CORNER STONE OF THE CENTRAL BUILDING IN 1860, BY HIS MAJESTY, KING EDWARD VII., THEN THE PRINCE OF WALES. REPRODUCED FROM THE ILLUSTRATED LONDON NEWS.

Messrs. Stent & Laver. There appears to have been included, in the competition scheme, a Governor-General's residence, the prize for which was taken by Messrs. Cumberland & Storm.

It did not take long to get to work. Plans and specifications were ready by the 15th of October, and tendering occupied another month. Thomas McGreevy's tender for \$348,500 was accepted for the Parliament Building, and that of Messrs. Haycock & Clark for \$278,810 for the other two.

McGreevy's work was to have been completed on the 1st of July, 1862, and Haycock & Clark were given till the first of February in the same year. Operations were begun at once on all the buildings, and on the 1st of September in the following year, 1860, the corner stone of the Parliament Building was laid by King Edward, then the Prince of Wales.

The usual delay in finishing the work occurred, and also the usual increase in the cost. The original appropriation of \$900,000 became \$5,000,000 before the work

ship, to be an expansion of area; which does not seem to have taken place. It may have been a case of solidification, rather than of expansion. The interior construction is fireproof, in the best manner then known—the interior partitions are all of brick or stone, and the floors are of concrete on rolled iron beams—and, if this was not part of the original plans, it would account for a good deal of the extra cost. It is hard to understand how construction of this kind could have been included in the original contract prices. Indeed, it is hard to understand how the buildings, as we see them, terraced moreover and fenced, could be built for less than \$5,000,000 then, or for anything like it now. The people of Canada have got a bargain.

The dimensions of the buildings are considerable. The Central Block, as the Parliament Building is called, has a front 472 feet long; and a depth which must be 200 feet or more, to contain the Chambers with their appendages of lobby, with telegraph and other public offices in the front, and, corridor with the reading, smoking and other

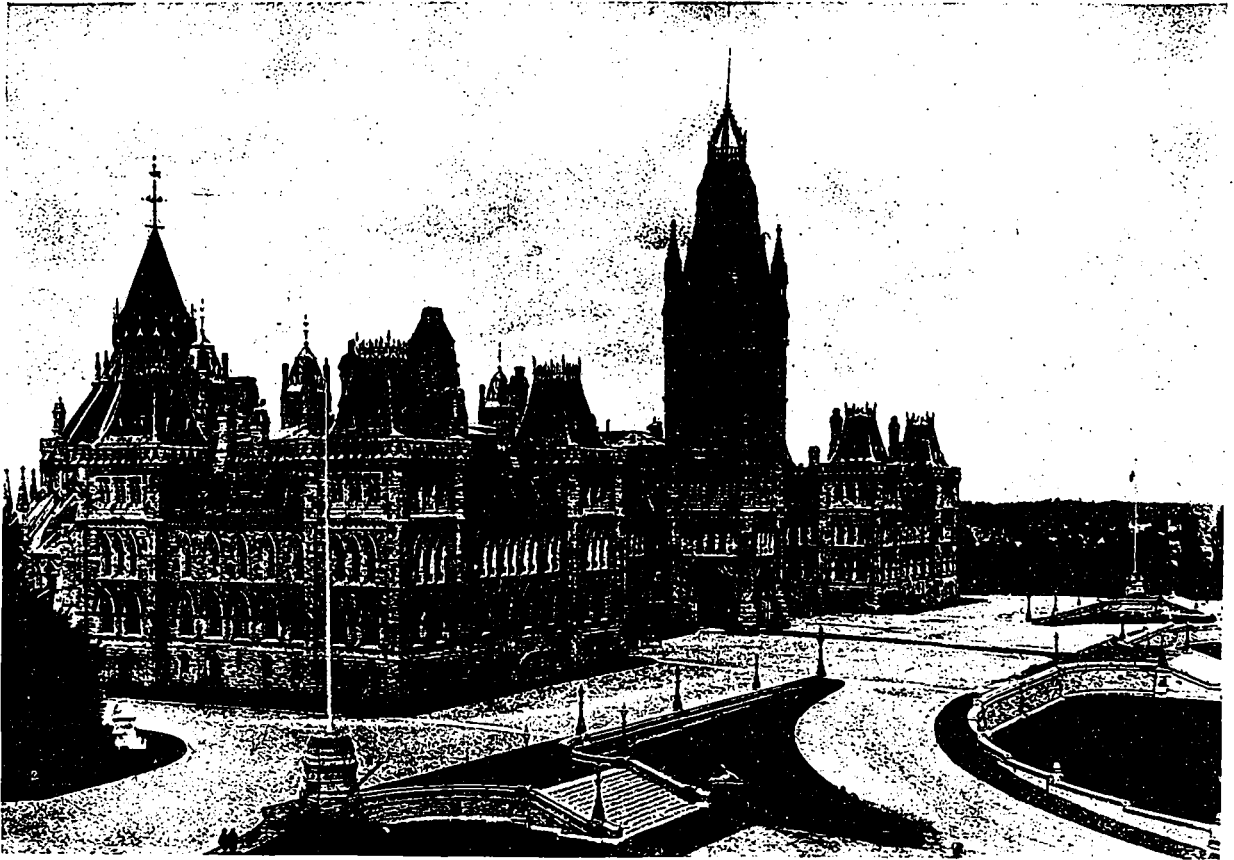


PLATE VI. THE CENTRAL OR PARLIAMENT BUILDING ON A WIDE TERRACE, SHOWING THE NUMEROUS, AND PARTLY CONTINUOUS, WINDOWS, WITH DEEP MOULDED JAMBS, AND EFFECT OF SOLID WALL WITH RICH HORIZONTAL DECORATION.

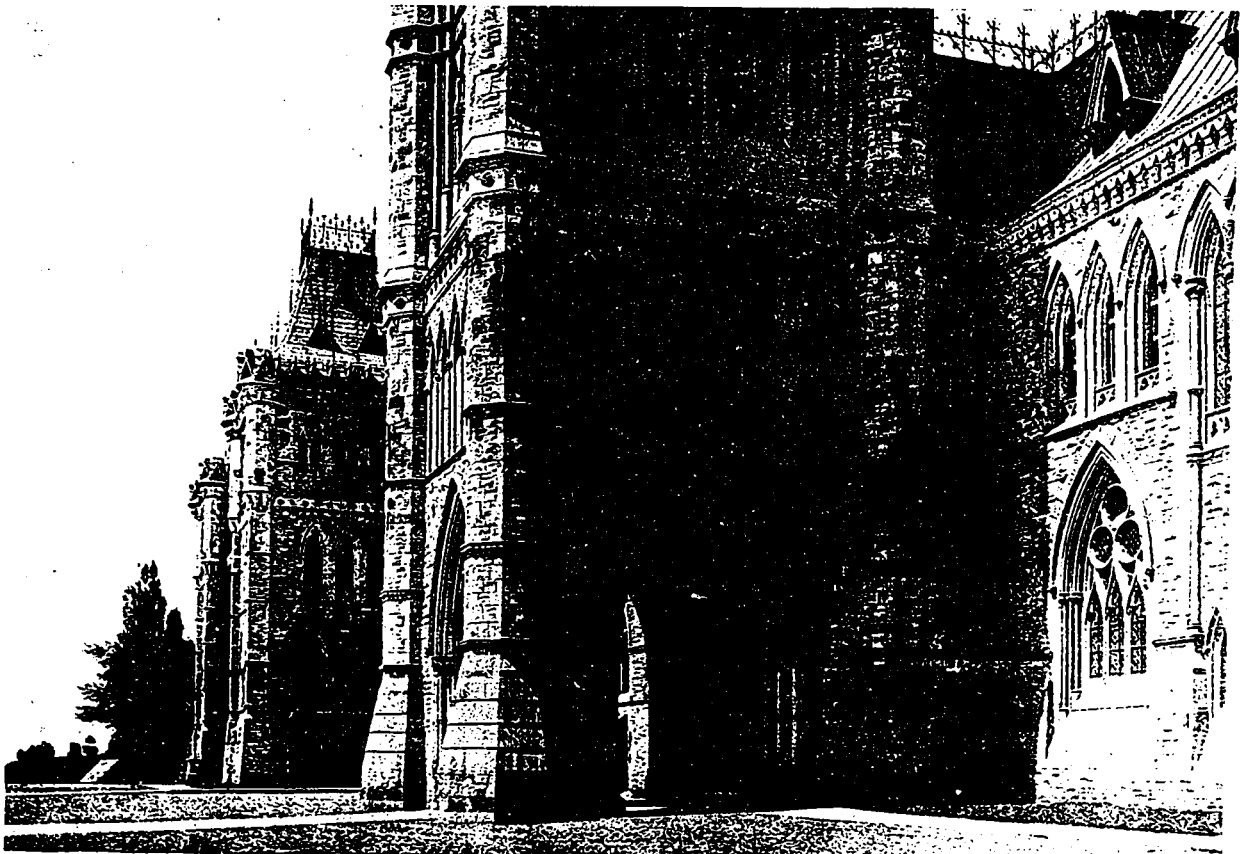


PLATE VII. BASE OF VICTORIA TOWER; GIVING ALSO A NEARER VIEW OF THE WINDOW FORMS AND DETAILS, AND OF THE RICH UPPER STOREY OF THE PAVILIONS WHICH BOUND THE END BLOCKS.

Construction, November, 1908.

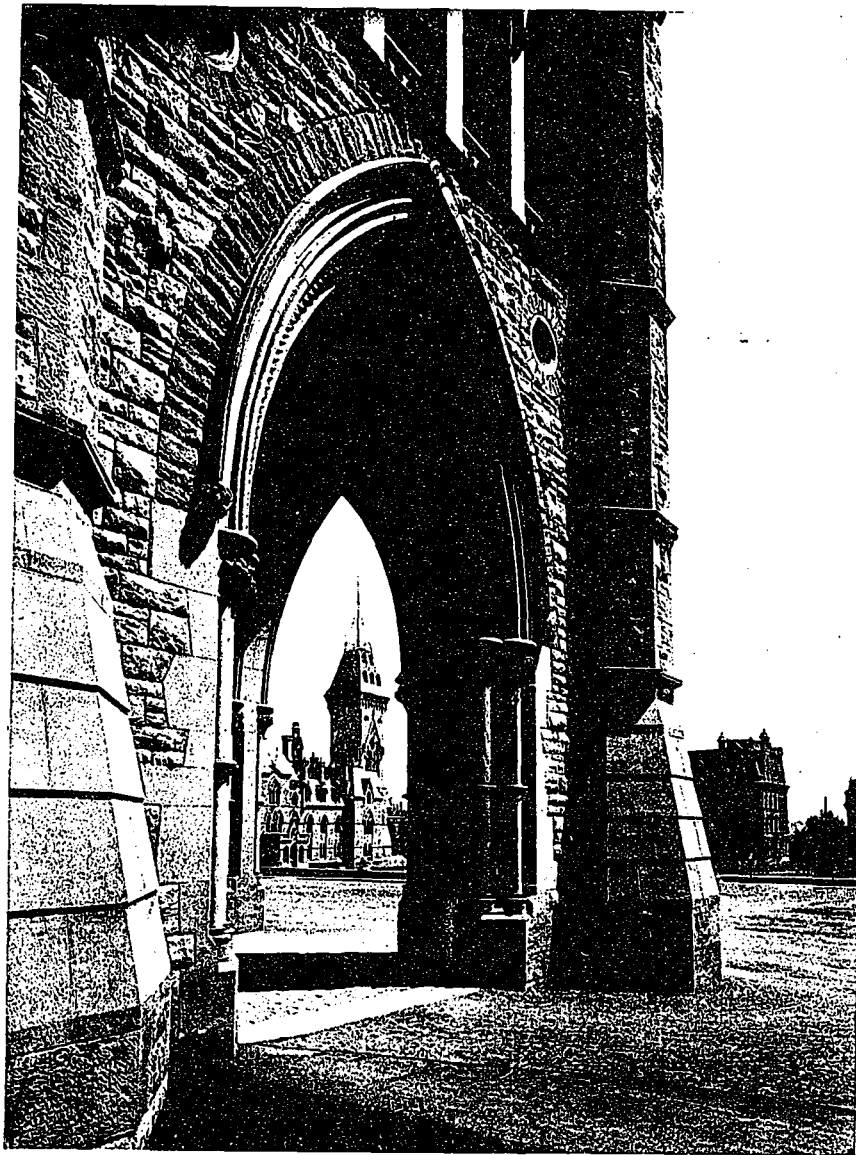


PLATE VIII. BASE OF VICTORIA TOWER, WITH THE EASTERN BLOCK SEEN THROUGH THE PORTE COCHERE UNDER IT. PATENT OFFICE IN THE DISTANCE; AN OUTSIDER TO THE SCHEME, AND, FORTUNATELY, OUTSIDE THE GROUNDS.

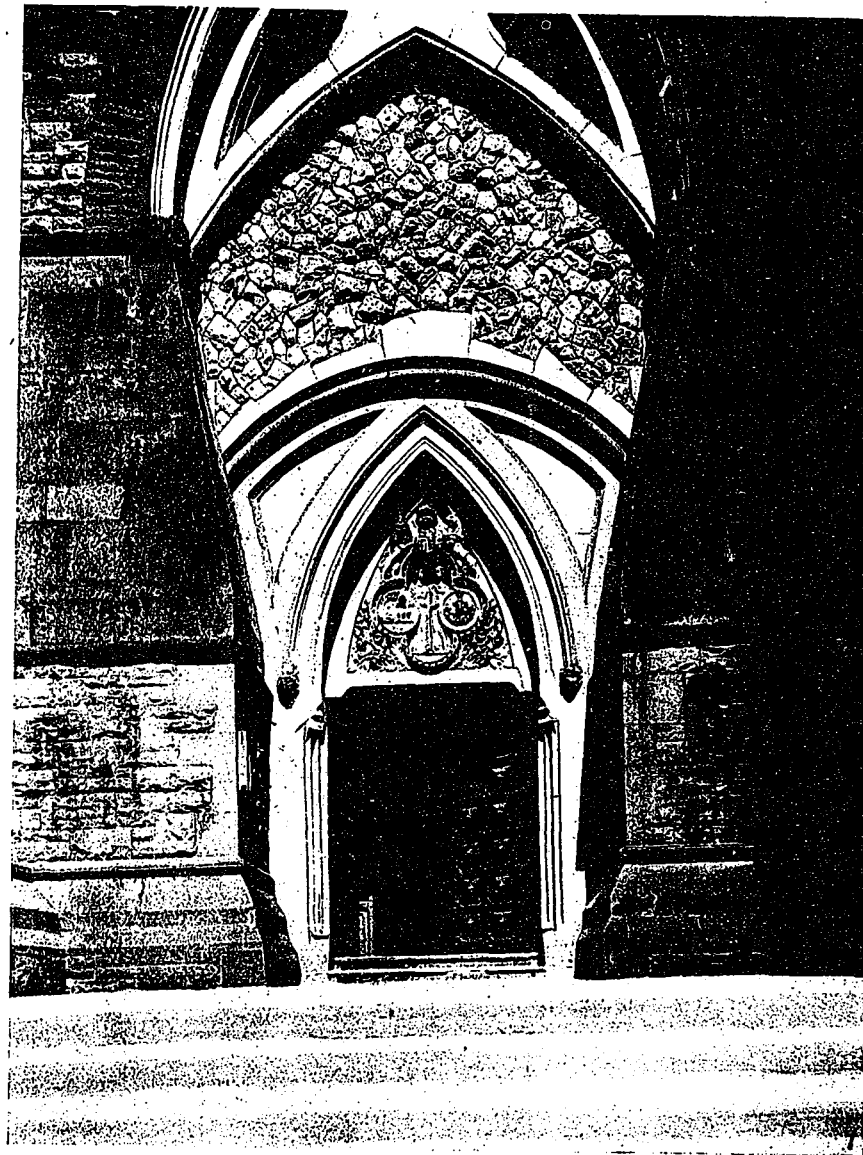


PLATE IX. EASTERN BLOCK ENTRANCE UNDER TOWER. DISCORDANT ARCH LINES HELP THE EXPRESSION OF STRENGTH AT THE BASE OF A LARGE FEATURED DESIGN. MEDLEY OF COLCOKED STONES IN THE SPANDEL.

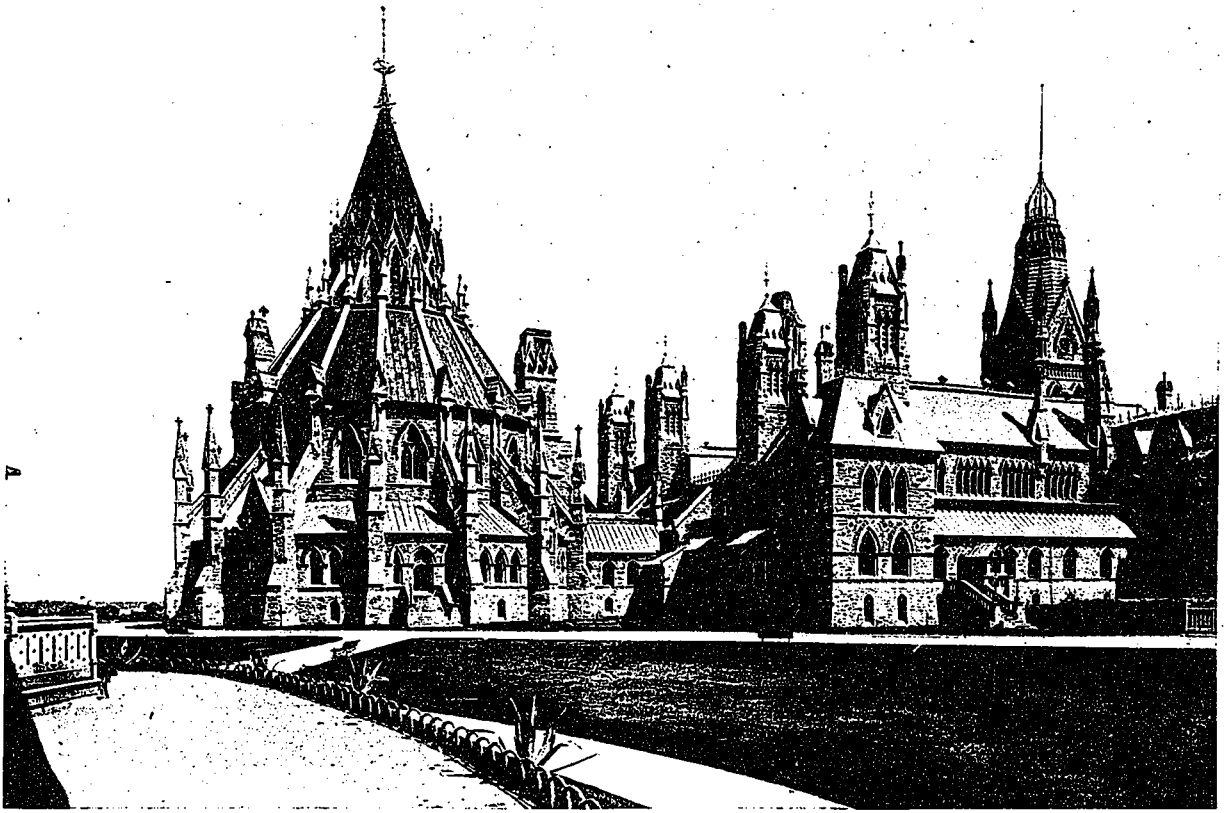


PLATE X. THE LIBRARY. THE VENTILATING TOWERS MARK THE CHAMBERS OF THE COMMONS (NEAR), AND THE SENATE (FAR). RESIDENCE OF SPEAKER OF COMMONS AT END OF WING ON THE RIGHT.

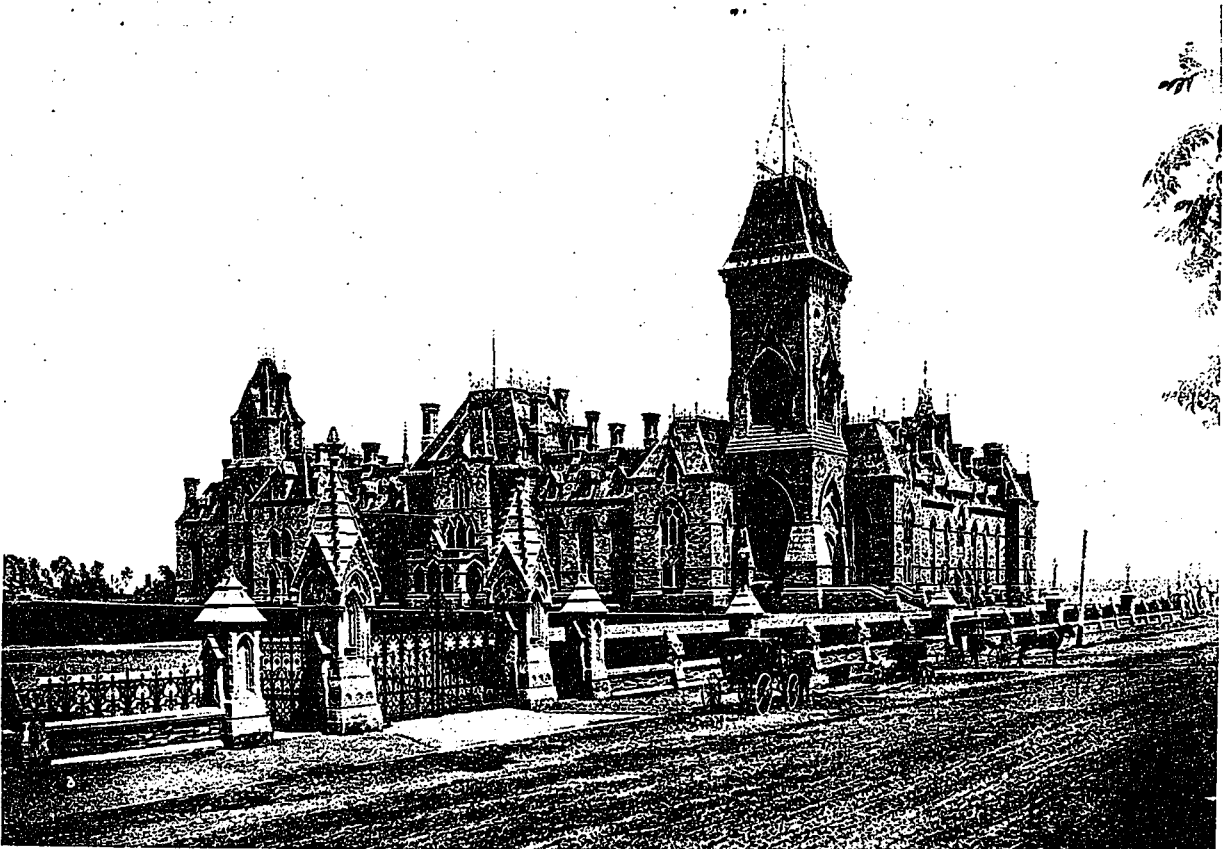


PLATE XI. THE EASTERN BLOCK, FROM NEAR THE CENTRAL GATE. THE BOTTOM OF THE FLIGHT OF STEPS AT THE EAST END OF THE CENTRAL BLOCK TERRACE IS JUST SEEN ON THE LEFT.

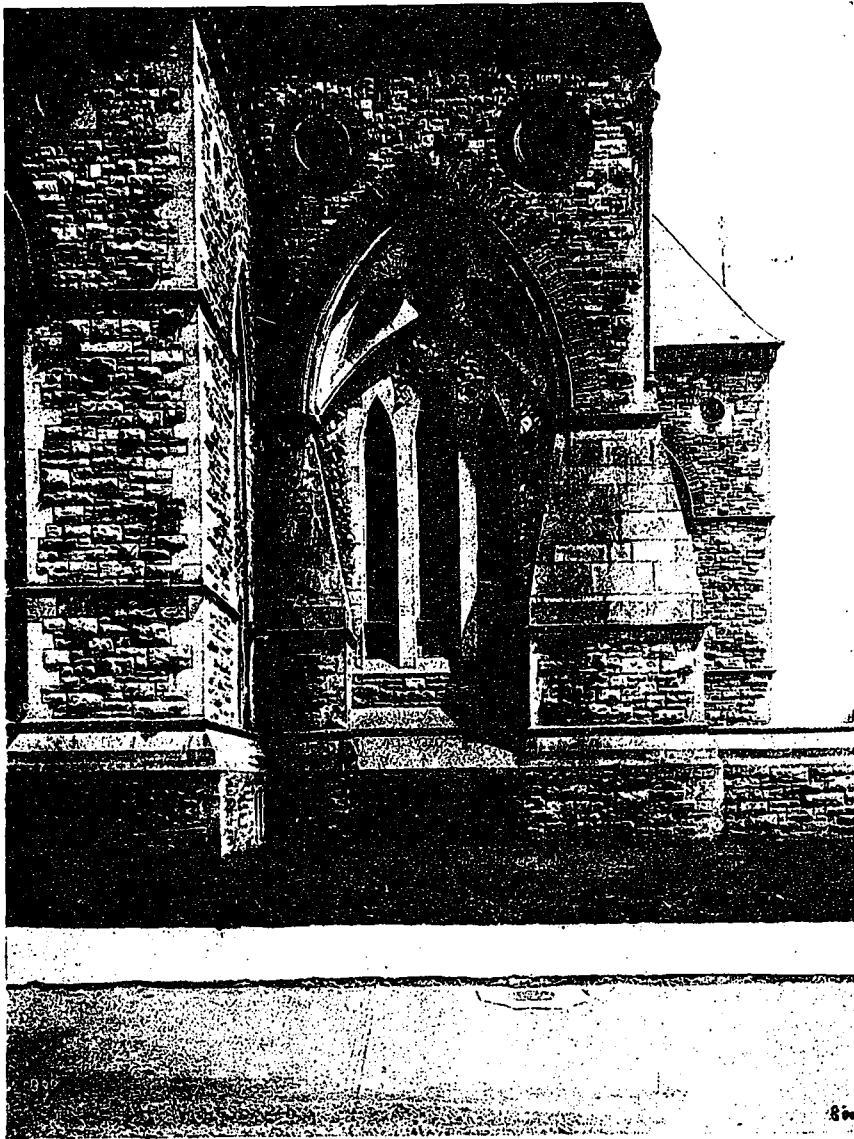


PLATE XII. EASTERN BLOCK, WINDOWS OF VESTIBULE UNDER TOWER. ANOTHER EXAMPLE OF FORCIBLE ARCHING INTRODUCED TO EXPRESS STRENGTH. THE SPRINGING FROM THE SLOPING LINES OF THE BUTTRESSES IS NECESSARY FOR THE EFFECT.

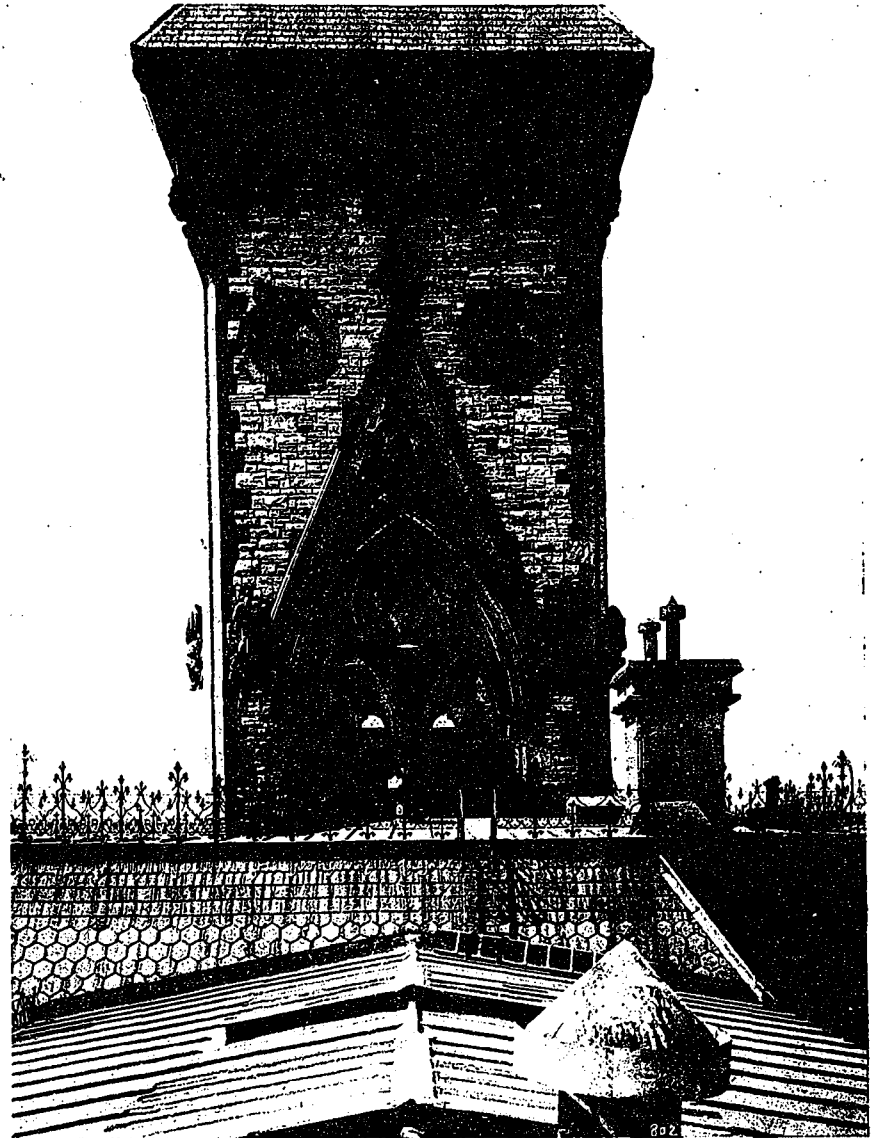


PLATE XIII. EASTERN BLOCK; UPPER FEATURES OF TOWER. STILL LARGE AND VIGOROUS BUT MORE FLOWING AND VERTICAL IN LINE. GREAT VALUE TO GENERAL EFFECT FROM LARGE SCALE OF STOPS TO PEDIMENT LABEL.

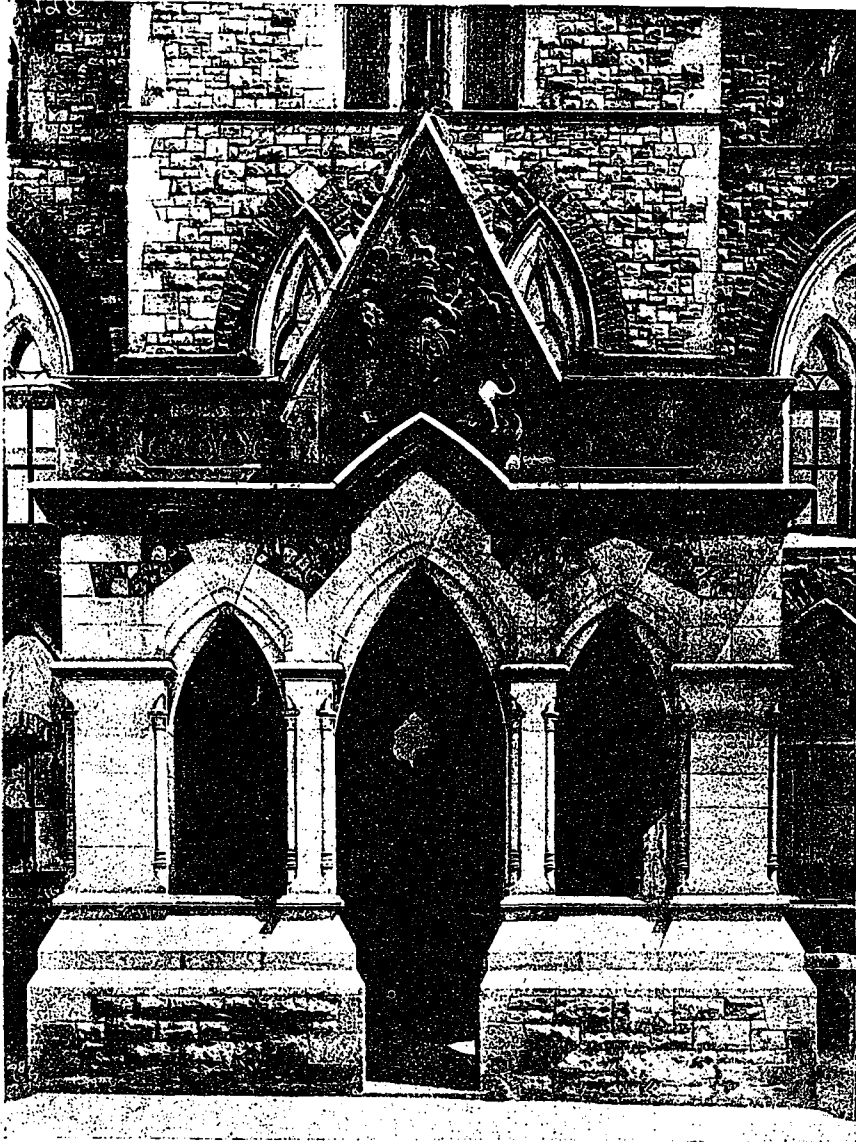


PLATE XIV. EASTERN BLOCK, GOVERNOR-GENERAL'S ENTRANCE. THE VIEW OF THE BLOCK SHOWS THAT THE RESTLESS LINES OF THIS COMPOSITION COMBINE REFINEMENT WITH STRENGTH SUFFICIENT TO FORM A BASE FOR ITS PAVILION.

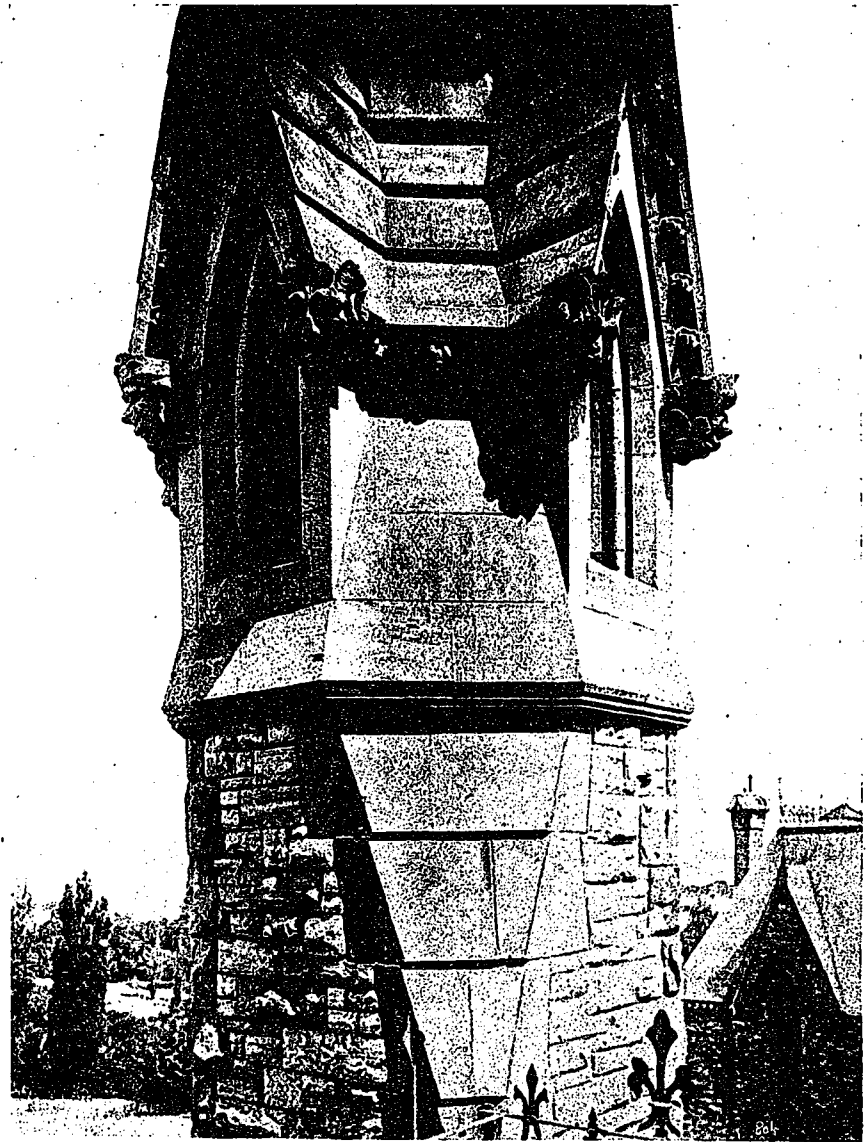


PLATE XV. EASTERN BLOCK, TOP OF A VENTILATING TOWER. A FINE PIECE OF STONWORK AND CARVING, WHICH MIGHT FORM PART OF A BUILDING IN THE BEST PERIODS OF GOTHIC ARCHITECTURE.

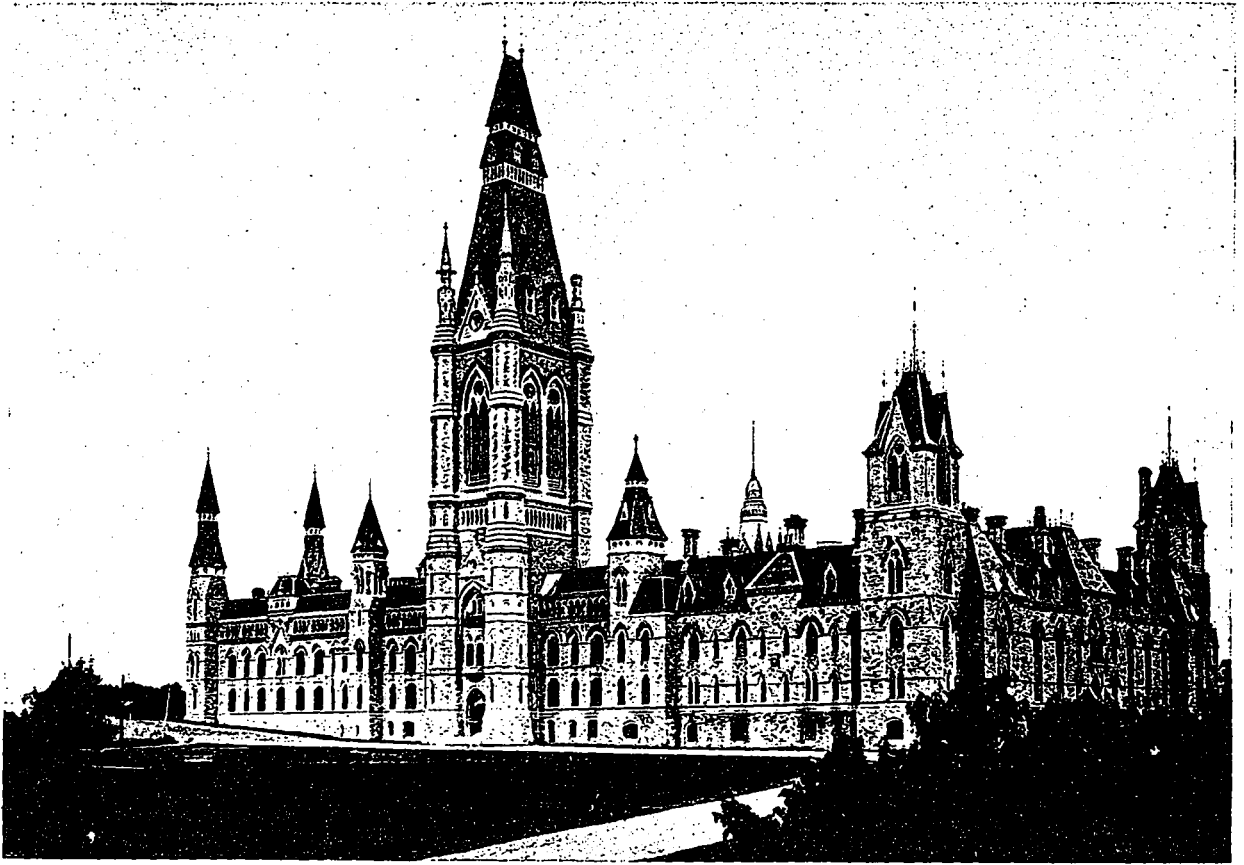


PLATE XVI. WESTERN BLOCK WITH ADDITION BY THE MACKENZIE GOVERNMENT. BETTER LIGHTED THAN OLD PART; BUT ROW OF SMALL WINDOWS IN ATTIC NOT SCALED SUCCESSFULLY WITH STOREYS BELOW. ALL DETAIL POORER.

private rooms for members at the back. The arrangement is as follows: The Chambers, each of which is 47 feet by 88, are set with the long dimension running from front to back. They are two storeys high. The upper storey is a very graceful arcade, of clustered marble shafts and pointed arches, carrying a skylighted ceiling. Behind the arcade is a gallery all the way round, subdivided for the various classes of auditors, including the press, who are seated in the gallery behind the Speaker. These galleries are represented on the ground floor by a corridor surrounding the Chamber. At the front of the Chamber, that is on the side towards the facade, the corridor is extra wide because it includes the width of both the gallery above and the passage which is between the gallery and the offices along the facade. On the ground floor this double width corridor makes the public lobby, and the offices along the facade open off it, and are occupied by the telegraph and other offices to which the general public have access. The corridor-ends which abut on the lobby are closed with doors, and all beyond is sacred to members: who have thus an undisturbed promenade on each side of the Chamber (originally no doubt intended for division lobbies after the manner of the English House of Commons), and at the back a passage, off which open the reading, smoking and other retiring rooms for members. This passage is the main thoroughfare for all the privileged part of the House. At opposite ends of it—speaking in general terms—are the residences of the two Speakers, overlooking the river; the Speaker of the Senate in the northeast corner, the Speaker of the Commons in the northwest corner; and by way of this private thoroughfare they reach their much-enduring chairs, and return to breathe domestic peace when their House has happily gone into a committee of the whole. This private thoroughfare is also the means of communication between

the two Chambers, and of access to the library, which lies behind, at the end of a one storey corridor.

All this arrangement is represented on the front, shown in Plate VI. The length between the tower and the nearest pavilion on each side represents the width (100 feet), devoted to each Chamber and its appendages. The pavilioned blocks on the two ends contain the offices of the permanent staff connected with Parliament; and these offices extend along the upper storeys of the central part. On each side of the tower are to be seen the raking windows which represent a staircase. This is the external manifestation of a two or two-and-a-half storeyed entrance hall, with a great stone stair ascending on each side; on the right hand to the Senate and on the left hand to the Commons. These stairs land at the lobbies of the respective Houses. People having business there no doubt enter by the small doors, at the flight of steps on each side of the Victorian tower, and ascend by an elevator. The grand entrance hall and stairs are for more ceremonious occasions. It is by this way the Governor-General approaches the Senate Chamber when he opens or closes Parliament. The main entrance is under the tower, which is, in fact, a *porte cochere*. To this His Excellency drives up in state, four-in-hand with a military guard, and enters the great hall on the ground level. The usher of the Black Rod meets him at the door, with all the respectful welcome that bowing can express, and conducts him up the stone stair to the Senate lobby, and along the centre of the Senate Chamber, through rows of waiting Senators on each side, to the upper end of the Chamber, where he bows him on to the throne.

We have described fully the Parliament Building, because of the interest of its plan.

The Eastern and Western Blocks are arranged more monotonously in plan for more monotonous portions of the public work. The Eastern Block has the distinction of

containing the office of the Governor-General, and the Privy Council Chamber, where cabinet councils are held. It is for this reason, no doubt, that it was distinguished from the Western block (as originally designed by the architect of both these buildings), by a more imposing tower. The Governor-General does not, however, enter at the tower, but under the *porte cochere* at the side, being the only civil servant who comes to his office in a carriage.

The Western Block was in fact, as first designed, a little too tame to make a good mate for the Eastern block. Mackenzie Tower (Plate XVI.), forms part. It is difficult, this defect was remedied by the addition of which the to understand why the Mackenzie Tower, which is 272 feet high, was made higher than the Victoria Tower, which is only 255 feet—to adopt the greatest height given, among conflicting authorities. The terrace upon which the Victoria Tower stands must be taken into account in estimating its advantage; and, partly from this reason, but mainly because the Mackenzie Tower is on the far side of its building, there is no conflict between it and the Victoria Tower in the front view of the buildings. There is a Laurier Tower now making its appearance, which we may hope has the good manners of the statesman it will commemorate.

The harmony of the original buildings is wonderful, considering that they were the work of two architects, and were designed in competition—that is to say, without opportunity of consultation. The style of the buildings was, no doubt, decreed, and was the fruit of the Gothic Revival in England, and Sir Charles Barry's success with the Palace of Westminster, which was then nearly completed. The uniform and distinctive material used throughout, has, perhaps most to do with the harmonious appearance of the whole,

but the manner of using it is rather remarkably assimilated in the different buildings. There is some evidence of one influence in this, and the influence may have been that of Thomas Fuller who, as soon as his firm was given the commission to execute the Central building, moved to Ottawa and lived with the work until its completion.

The rubble walling is of sandstone from the Nepean quarries, close at hand. Its general tone is buff, varied with brighter tints. The cutstone work is Ohio sandstone, and the relieving arches over cutstone openings are of red Potsdam sandstone from St. Lawrence County, New York. Spandrels are filled with bright colored pieces, fitted together in a patchwork mosaic, as may

be seen in Plates XII. and XIV. This occurs most, or altogether, in the work of Messrs. Stent and Laver, and accords well with the general vigor of their design.

There is no church-window gothic about the work of either of the designers. They worked freely in the style. Mr. Fuller, we at any rate know, had studied and practised in England, when the Gothic Revival was in its full tide of enthusiastic hope, and his career began by winning the competition for the cathedral at Antigua. The English church architects' models had, however, little influence upon this building, which, if it is indebted to old work at all, got its inspiration from the gothic civic buildings of Italy and the Netherlands, where a feeling for the horizontal is the conspicuous characteristic of the design. The windows of the principal floor, in Plate VI., have a peculiarity, in the low springing line, about

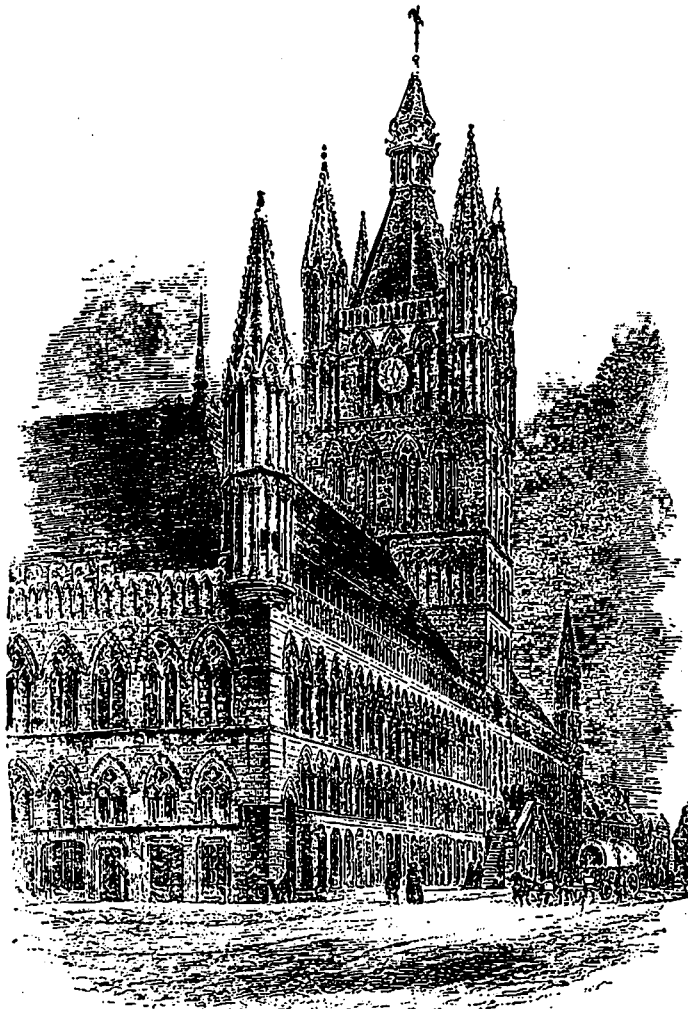
the middle of the total window height, which materially helps this horizontal effect. In a general way all the buildings are remarkable, in spite of their numerous windows, and their coupling and tracery, for an effect of solid wall which, particularly in view of the interesting character of the stone employed, seems most appropriate.

The strong picturesque quality of the Eastern Block generally receives the most admiration. How strong the work is that has produced this picturesque quality may be seen by referring to Plates IX. and XII. The segmental and obtuse pointed arches, in these bottom features of the tower, are rather startling, seen by themselves; but in the general view of the building, in Plate X. they are seen to be not more forcible than is necessary at the base of so strong a tower. Plates IX., XII., and XIII. show nearly all details of the tower, which is interesting as a study of strong and original modern gothic.

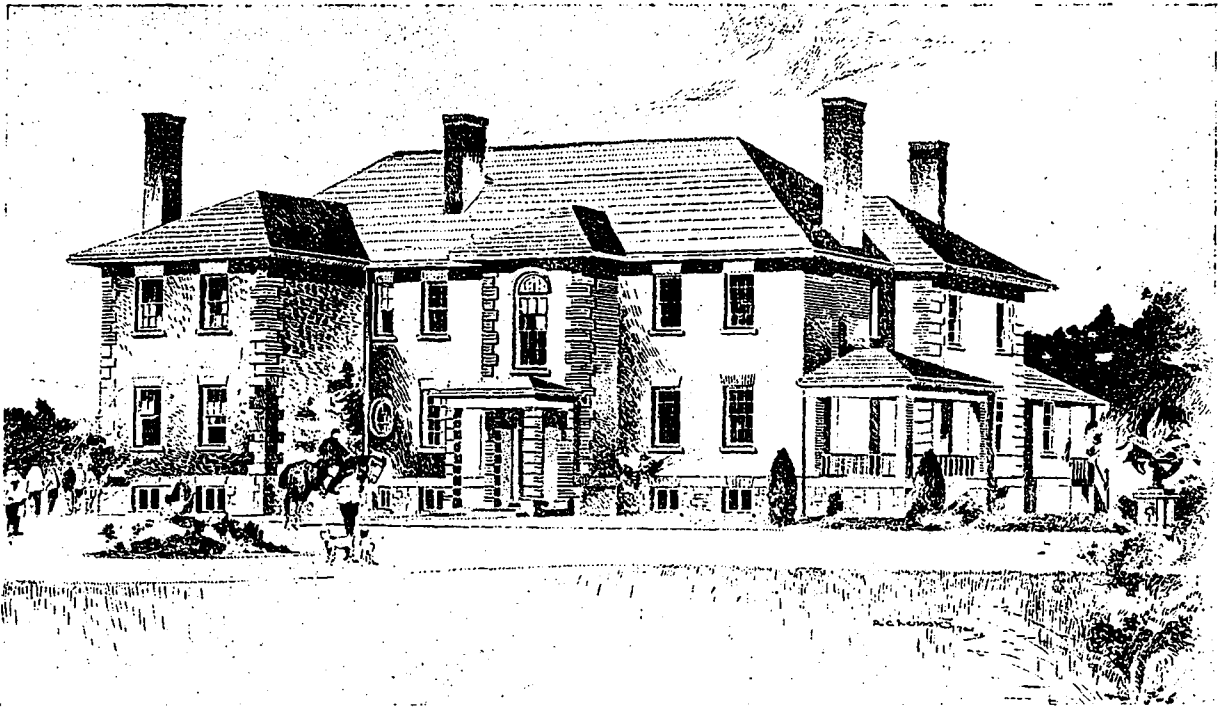
The central building may be all formal dig-

nity in front; but at the back, looking over the river it is as picturesque as any of them. The library, supported by the four ventilating towers of the two chambers, is in the prominent position, crowning the cliff. At any distance the buildings and towers all group together, and, as has been remarked, bear some resemblance in mass to the groups of pines which crown the heights on the same river in another part of its course.

The Parliament Buildings are to be seen rising high above all the houses from every distant view. The choosers of a site for the Public Buildings of the Province of Canada did certainly choose well; and the builders builded well; and the Dominion has done well to adhere to the same style, in adding to the group.



CLOTH HALL AT YPRES; AN EXAMPLE OF FLEMISH GOTHIC, SHOWING THE STRONG HORIZONTAL FEELING WHICH IS CHARACTERISTIC OF THE PARLIAMENT BUILDINGS AT OTTAWA.



PERSPECTIVE VIEW OF RESIDENTIAL SCHOOL FOR BOYS TO BE ERECTED AT BOBCAYGEON, ONT. MR. W. A. LANGTON, ARCHITECT.

HILL CROFT, BOBCAYGEON,---A Country Residential School for Boys.---To be Situated on a Delightful Site.---Building Provides for Family, Servants and Boys Departments.---Description of Building and Surroundings.

THE site of this building is a small plateau, forming an intermediate level on a slope of land, rising continually, in a broken manner, from the shores of Sturgeon Lake to a higher level of farming land.

The building faces south and west, and the ground rises northwards, sheltering the school by its general slope, and by a shoulder which rises abruptly close behind the house, overlooking the boys' quarters and offering a fine slope for tobogganing in winter.

A country road passes along the southerly side of the grounds; with a garden before the house and the boys' vamps up from the highway, at the end where the house is placed, and slopes gradually for some 300 feet to a private road, which comes over the hill and connects with the high road at this end of the school grounds.

The house has, therefore, an outlook over its own grounds, with a garden before the house and the boys' tennis lawn beyond; and the view beyond takes in the hill on the right, the high road, as a central object in the middle distance, climbing over a slope, and, towards the left, the lower level of the land along the lake, and its distant shores, which are high.

The house is designed to be a residential school for young boys, who will be members of the family, in the modified sense that is desirable for both parties.

The essence of the problem—as in all dwelling house problems—is an arrangement which will give contact between the different divisions of the household, at the proper points, and at none other. The difference between this household and one of an ordinary kind is that in most households there are but two divisions, viz.: the family and the servants; in this household there will be three, viz.: the family, the servants, and the boys.

The outlook over the highroad seemed most appro-

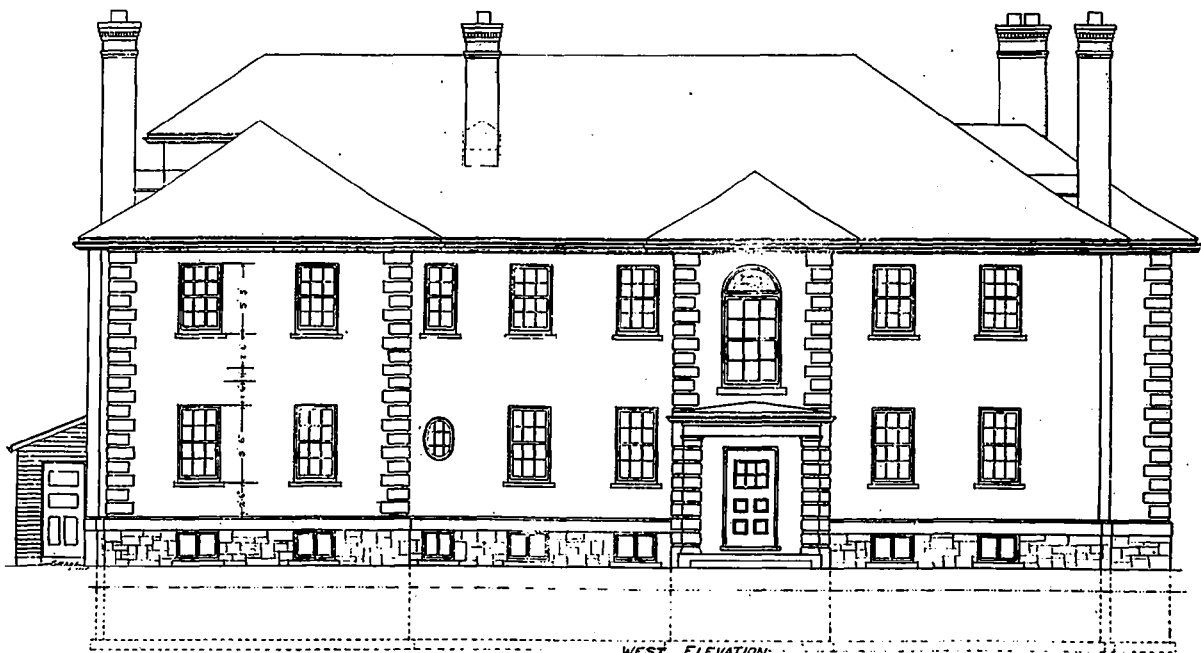
priate for the servants' quarters—to keep them cheerful. It is also convenient to connect the kitchen closely with the road; that vehicles of supply may touch its entry without entering the space behind the house, which is reserved for the purposes of a yard and drying ground.

The secluded interior of the lot is the natural place for the boys' quarters; and the proper position for the family rooms is between the other two departments, in contact with each and adjacent to the road, though not looking over it.

There is no reason why the service department should touch the boys' quarters directly. It is better that these two divisions should be kept apart as far as possible, except in so far as the dining-room may be considered as a room concerned with the boys. The dining-room as a common meeting ground for the three divisions of the household, must be in contact with all three; but not in such a way as to bring the boys to it by the same approach as the family. This is managed simply enough, because the dining-room, like the kitchen, should have the eastern aspect. Thus the two extend along the whole eastern side of the house, leaving the front of the house, with the western and south-western aspect, for the family rooms.

The boys' bedrooms are connected with the upper floor for purposes of service, but they have no right of entry to the house that way. They can enter the house only on the ground floor; and can, of their own initiation, go no further than into the side passage leading to the front hall. This passage, which is their means of communicating with the only two rooms in the house that they will have any cause to enter uninvited—the dining-room and the Head's study—is cut off, by a second door, from the front hall.

The boys' rooms are all contained in the wing; and



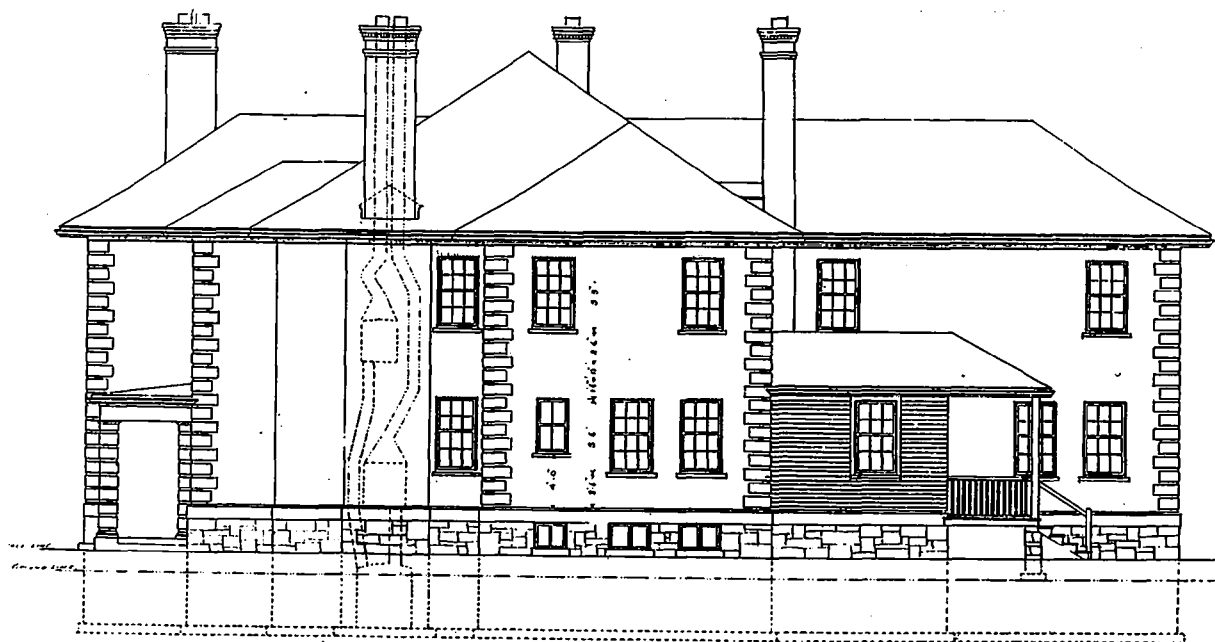
WEST ELEVATION.
A RESIDENTIAL SCHOOL FOR BOYS TO BE ERRECTED AT BOBCAYGEON, ONT. MR. W. A. LANGTON, ARCHITECT.

the plumbing room, which opens off their wing, makes it also self contained for the purposes of housemaids' service. Their bedrooms and bathroom are on the first floor; their class rooms and common sitting room on the ground floor; and, in a high basement storey, are the locker rooms for their sporting things, a gymnasium, and a room for carpentering.

Their entry on the far side of the wing keeps them, in their coming and going, from the front of the house. A path along the upper side of the grounds takes them to their tennis lawn at the lower end, and to the private road outside, which leads to their playing field, down on the flats near the lake.

During the holidays, when the boys' wing is empty, there will be no perceptible change in the rest of the house, which is much what the family would ordinarily have had if there had been no school; except that the dining-room is larger.

Externally, the building is of white brick, because the white brick is better than the red in that neighborhood. To vary the excessive whiteness—which the clean country air has left unchanged, in old houses in the neighborhood which have been built of the same kind of brick—a dark red mortar has been used, and the green and pink tinged bricks have been selected for the face work. In addition to this the arches over openings have been built



SOUTH ELEVATION.
A RESIDENTIAL SCHOOL FOR BOYS TO BE ERRECTED AT BOBCAYGEON, ONT. MR. W. A. LANGTON, ARCHITECT.

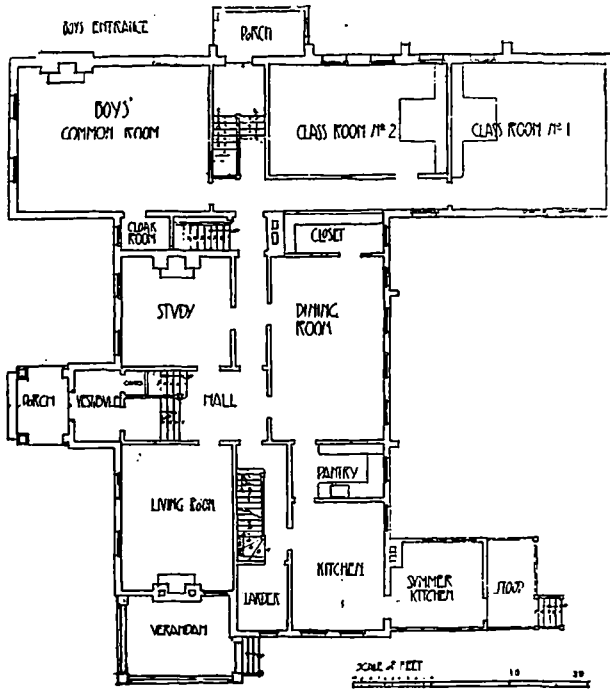
of unusually colored specimens, burned dark or fire flashed; and the heading courses are laid with arch brick, which are selected from both red and white kilns, and have ends with every kind of indefinable color of a tertiary character.

TORONTO'S NEW ASPHALT PLANT.---
 Will Enable City to Carry Out All Repair Work Promptly.

AN ASPHALT PLANT, with a capacity of 1,500 sq. yd. per 9-hr. day, has recently been completed for the city of Toronto, at a contract price of \$28,575. Its purpose is to enable the city to carry out all repair work promptly and probably lay a few small pavements each year. Complaints have been frequent in the past that openings in asphalt pavements were not promptly

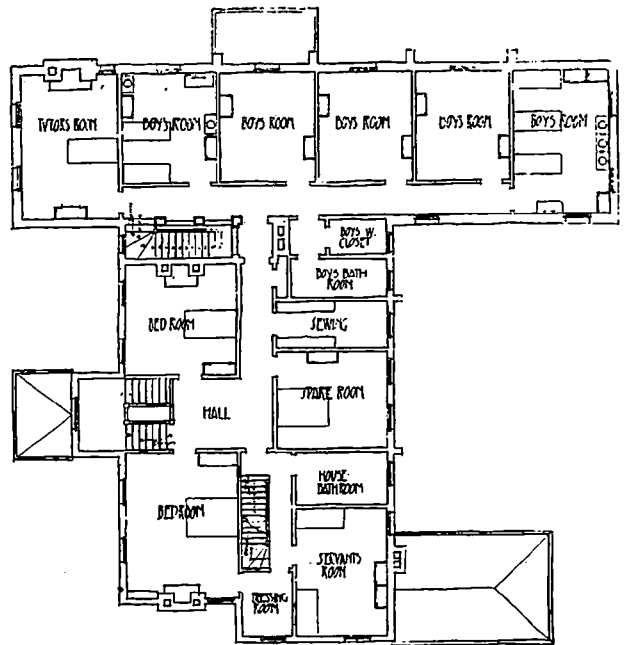
a capacity of 2,000 imp. gals. each. The asphalt cement is elevated by air pressure to the asphalt weighing bucket, running on an overhead trolley to the mixer. The storage tank for flux has a capacity of 10,000 imp. gals. The flux is blown from it to the weighing tank on the first floor and drawn by gravity into the kettles.

The asphalt barrels are hoisted to the charging floor by a barrel elevator. Power to the main portion of the plant is supplied by a 10 x 12-in. engine, and to the agitating tanks and barrel elevator by a 5 x 5-in. engine. Compressed air for forcing the asphalt cement out of the tanks and other purposes is furnished by a 6 x 8 x 12-in. Knowles direct-acting air compressor. Steam is supplied to these engines by a 60-h.-p. Star water tube boiler. Street and plant tools, including 8-ton and 5-ton steam asphalt rollers, five wagons, hand rollers, pitch kettles, etc., and twelve asphalt dump wagons, complete the equipment.



GROUND FLOOR PLAN.

A RESIDENTIAL SCHOOL FOR BOYS TO BE ERRECTED AT HURCAYGEON, ONT. MR. W. A. LANGTON, ARCHITECT.



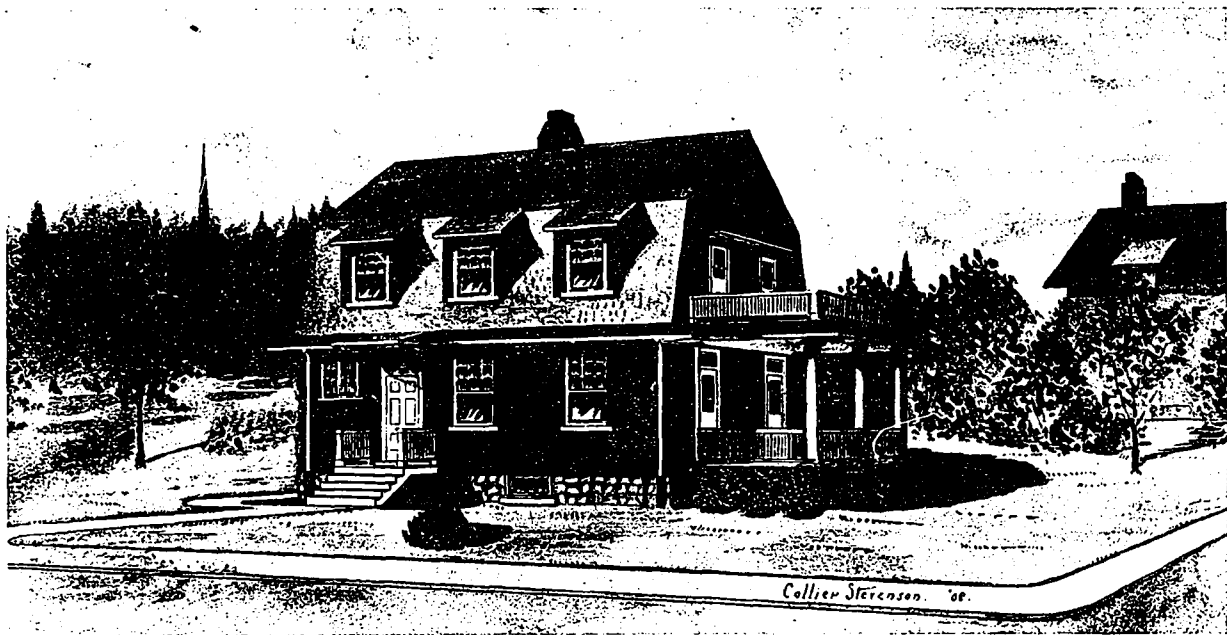
FIRST FLOOR PLAN.

ly repaired, and it is expected that no unreasonable delay will arise hereafter in executing such work. The buildings have steel frames, galvanized roofs and sides, and reinforced concrete floors. The machinery was recently described in a report by City Engineer C. H. Rust as follows:

There are two self-contained rotary driers, the revolving cylinders being 40 in. diameter and 19 ft. 6 in. long. Draft is supplied by a 50-in. exhaust fan which discharges into a Cyclone dust collector. The driers are fed by two chain elevators, and the hot sand or stone is discharged into an enclosed elevator and conveyed to steel storage bins holding 10 cu. yd. each, situated on the second floor, the stone bin being fitted with a rotary screen. There is also a storage bin for limestone dust provided on the second floor, having a capacity of 4 cu. yd. and fed by a dust elevator. The hot material and the dust are drawn by gravity into their respective weighing boxes which discharge into the mixer; the mixer has a capacity of 1,100 lb. of topping mixture.

The asphalt cement is prepared in three enclosed melting tanks provided with mechanical agitation and having

THE RECENT ACTION of the City Council of Vancouver, in ordering the demolition of condemned buildings, has aroused a bellicose spirit on the part of certain owners whom the mandate is destined to directly affect. A number of the places scheduled to go are occupied by business firms, who claim to have leases which entitle them to occupancy, and in many cases the owners and tenants are in collusion to defeat the city in its efforts to remove these dangerous structures, by "sitting tight," and, if necessary, force the civic workmen to pull down the buildings over their heads. Threats of procuring injunctions against the city have also been made by some owners, but, despite this opposition, the Council is evidently determined not to be swerved from its purpose. Already a gang of workmen, under the direction of the City Engineer, has started to raze a number of unoccupied buildings included in the list, and as soon as these are out of the way, the others are to follow. It now remains for the authorities to see that the work is carried out in a consistent manner, without fear or favor, and thus prove that building by-laws and other expedient measures are active rather than passive, and that the interest of the community is to be considered ahead of that of the individual.



SMALL HOUSE OF DUTCH COLONIAL COTTAGE TYPE DESIGNED BY ARCHITECT COLLIER STEVENSON.

DWELLING OF DUTCH COLONIAL COTTAGE TYPE.---A Moderate Priced Residence Designed to Meet the Requirements of a Small Family.---Plans Provide for Many Built-in Features.---A Model of Compactness and Convenience.

THAT small residence construction has shown a wonderful improvement in recent years is without question.

Not only is this fact noticeable in the larger cities, but also in the country towns and villages. The moderate size home of to-day has more of an architectural significance, more individuality of design, is better planned, provides to a greater degree for the comfort of the occupants, and is more practicable and livable in every way than the average home of twenty years ago. People are gradually being educated up to higher ideals as regards habitation; they are becoming more exacting in their domestic requirements; a more refining influence is making itself felt; while, on the other hand, architects have found a wonderful stimulus in this general tendency, and

are exerting their best efforts to produce a better type of residence structure.

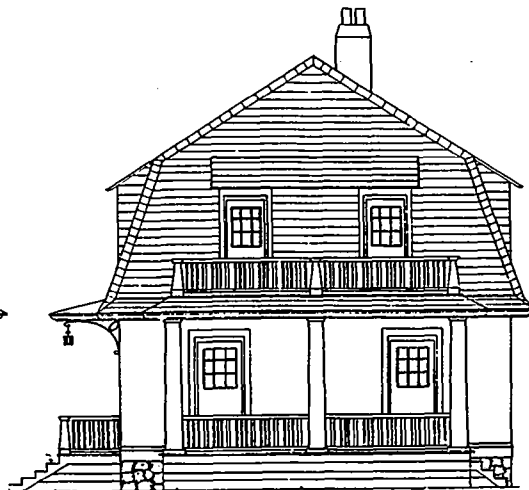
Not only is this seen in design and arrangement, but in the principles of constructive economy which are being adopted, and whatever may be said to the contrary, it seems quite clear that, considering the design, arrangement, construction, equipment and finish of modern homes, as compared with those of the past, the cost to-day, if anything, is not proportionately greater.

A particularly attractive small house of recent design is shown in the accompanying illustrations. It is an adaptation of the Dutch Colonial cottage type, by Architect Collier Stevenson, of Hamilton, at which place it is to be erected next spring.

On the outside the building is pleasingly striking and



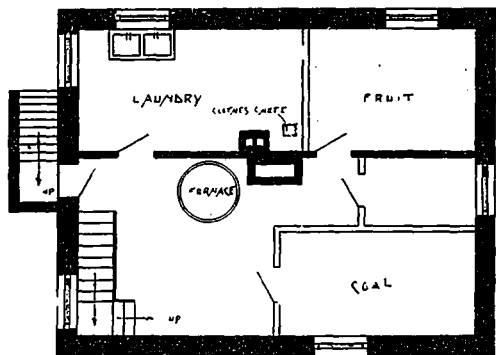
FRONT ELEVATION.



SIDE ELEVATION.

C O N S T R U C T I O N

homelike in appearance. Over the foundation of broken coursed ashlar, the walls of the first story are of red brick, having white joints, while the upper portion is covered with moss-green shingles, with the exception of



BASEMENT PLAN, SMALL HOUSE OF DUTCH COLONIAL TYPE. ARCHITECT COLLIER STEVENSON, DESIGNER.

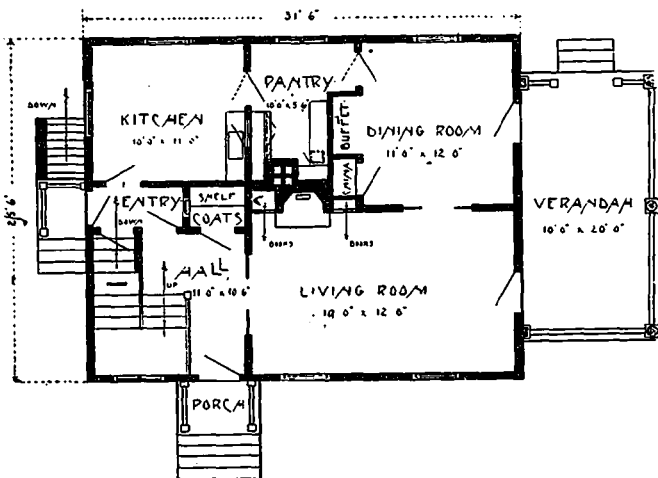
the side walls, which are stained a dark brown, all tones harmonizing well and contrasting cheerfully with the white woodwork of the verandah and porch.

Inside, the arrangement as for compactness, convenience and direct communication of the various rooms, leaves little or nothing to be desired.

The first floor provides for an entrance hall, large living-room, dining-room, kitchen and pantry, all admirably located. In the entire scheme there is not the least indication of waste space, all nooks and corners have been made to serve a utilitarian purpose. The woodwork is of Georgia pine, without moulding, stained a warm dark brown, while the hall, living-room and dining-room have dull green finished walls, with coved ceiling of rough plaster in warm buff.

Both the living-room, which has a large buff brick mantel, with built-in bookcases on either side, and the dining-room opens onto a spacious verandah at the side.

The dining-room, although somewhat small, affords ample room for the necessary furniture, as the niche takes the buffet out of the main part, being placed in the centre of a well-balanced wall arrangement, with a door



FIRST FLOOR PLAN, SMALL HOUSE OF DUTCH COLONIAL COTTAGE TYPE. ARCHITECT COLLIER STEVENSON, DESIGNER.

on either side, leading to the china closet and to the pantry, the latter being well situated between the dining-room and kitchen, and providing a direct connection between the two.

Over the sink in the kitchen is a small glass door, giving access to the built-in cupboard in the pantry, thus saving many steps in the washing and putting away of dishes.

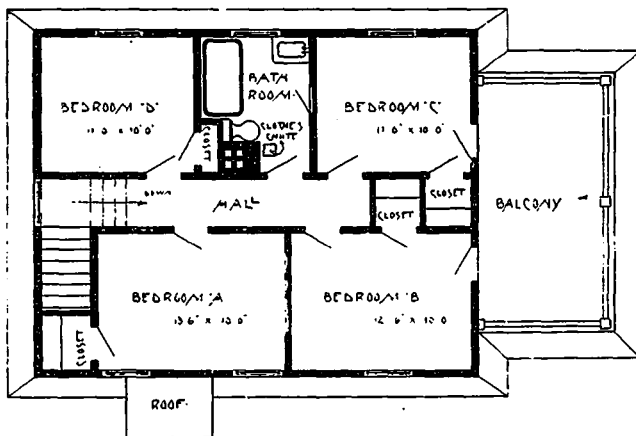
Upstairs there are four bedrooms, each having a separate clothes closet. No unnecessary space has been devoted to useless halls, and the bathroom is so arranged as to be convenient to each room, and yet present no unsightly vista from without, even with the door wide open.

All the woodwork on this floor is painted white, with the exception of the doors, which are mahogany-stained. A clothes chute, having door to same from pantry through which it passes, extends from the bathroom to laundry in basement, which is equally easy to reach from out of doors as from the kitchen.

Economy in construction has been effected in locating the chimney, so as to make it suffice for the entire house, and also in the plumbing by placing the laundry, kitchen and bathroom one over the other.

The cost of the building complete will vary from \$2,500 to \$3,000, according to location and interior finish.

GOVERNMENT CHARGES for Hydro-Electric Developments are arousing so much controversy in this country that some information concerning a project in Nor-



SECOND FLOOR PLAN, SMALL HOUSE OF DUTCH COLONIAL COTTAGE TYPE. ARCHITECT COLLIER STEVENSON, DESIGNER.

way, supplied by Consul-General Henry Bordewich, stationed at Christiania, is rather timely. He reports that two Government bills were recently laid before the Storting to give permission to a German company manufacturing chemical products to acquire the Tyin and Matre water courses in Bergenstift, West Norway, for the purpose of developing 60,000 to 70,000 h.-p. Among the conditions, the company is to pay yearly to the State 26.8 cents per horse-power beyond the 10,000 h.-p. which the watercourse is supposed to supply in its natural state while undeveloped. The company is not allowed to raise the price of electric energy within the kingdom and is bound to supply 500 h.-p. for public use at a yearly rate of \$13.40. The work of development shall be commenced within five years and completed within 12 years; for the former period the company is permitted to employ foreign engineers and workmen to such extent as they deem necessary, although the ordinary conditions as to Norwegian employees and Norwegian material are laid down as the essential rule. After the expiration of 75 years both plants shall revert to the State.—ENGINEERING RECORD.

CANADIAN-MADE CEMENT exhibited by the Western Canada Cement and Coal Company, of Exshaw, Alta., was awarded a diploma at the Spokane Interstate Fair, in competition with leading American and German brands.

PNEUMATIC CAISSONS.---Various Designs and Methods of Construction.---How They Are Sunk and Sealed to Form the Foundations of Large Buildings and Bridges.---Difficulties and Dangers Encountered.---Some Practical Illustrations. By T. KENNARD THOMSON

Mr. T. Kennard Thomson, whose article on "Pneumatic Caissons" is published herewith, was one of the early students at the School of Practical Science, Toronto University, from which he was graduated at the head of his class in 1886, with the degree of C. E. He is the son of the late William Alexander Thomson, who formerly represented the constituency of Welland in the Dominion House, and who was also the originator and builder of the Canadian Southern Railroad.

After spending three seasons in practical construction work on the Canadian Pacific Railway in the Rocky Mountains of British Columbia, Mr. Thomson was employed for two years by the Dominion Bridge Company at Lachine, and for a similar period by the Pencond Bridge Company at Philadelphia, which position he left to become bridge engineer for the Ohio extension of the Norfolk and Western Railway, having charge of the design and construction of 129 bridges, including the large Ohio River Bridge at Kenova, W. Va.

Since severing his connection with the latter company, Mr. Thomson has held various positions of responsibility in the engineering field. He was for eight years chief engineer for a prominent firm of foundations contractors, and also chief engineer for a well-known bridge company, besides being engaged on numerous occasions as a consultant on other work.

Mr. Thomson is the recognized authority on pneumatic caissons. He has designed and built pneumatic caissons for bridges over the Ohio, Monongahela, Susquehanna, Missouri and Harlem Rivers, and for the famous Hartford Stone Bridge over the Connecticut River, in addition to being retained on over twelve New York skyscrapers.

During his experience he has underpinned buildings as high as 18 storeys, putting in new foundations with the slightest settlement, although sometimes the new foundations were 60 feet below the old. In carrying out these various works, Mr. Thomson has been in the air chamber of the caissons about 3,000 times.

He has also taken out a number of patents on improvements, and is a valuable contributor to engineering literature, among his subjects being "The Canadian Pacific Railway," "Bridge Building in America," "Notes on Cement," "Bridge Specifications," "Foundations for a Twenty Storey Building," "The Mutual Life Foundations," "Notes on Caissons," and others.

The publishing rights for this article in Canada have been acquired by special arrangement with the Railroad Age Gazette of New York City, and we believe that we are particularly fortunate in procuring for the benefit of our readers so comprehensive and instructive a treatise on one of the most interesting problems in present day engineering.



T. KENNARD THOMSON.
M. AM. SOC. C.E.
M. CAN. SOC. C.E.
M. AM. SOC. M.E.

CAISSONS, under the name of Plenum Pneumatic Process, were first used in America in 1852 for a drawbridge over the Harlem river at Third avenue, where a number of cast-iron cylinders about 4 ft. in diameter were sunk to support each pier.

As the French have made some progress in this line, the contractors of the Third avenue bridge brought a French engineer over at a high salary per diem, but after about a week, having learned all he could teach them, they let him go home, much to his disgust. This bridge was rebuilt by the city of New York some 43 years later, using a modern large caisson instead of a number of small ones, and the old cylinders, on being removed, were found to be in a very good condition.

The word "caisson" is taken from the French caisson, from caisse, meaning a box or chest, and is also used for an ammunition carriage. It is often used to describe either open cofferdam work or pneumatic work, the first more by architects than engineers. Open cofferdam work, as the name would imply, is simply an excavation with supporting sides to prevent the surrounding material from caving in, while pneumatic work requires in addition a roof or floor some 6 or 7 ft. above the cutting edge or bottom of the excavation. The roof can be a temporary

one and removed after the cutting edge has reached bottom, or it can be left in place. While the roof has been put on top of the sides after they have been driven as far as they are to go, it very rarely is; one of the few cases being the Harlem river tunnel.

The usual method, however, is to build the caisson first, with the roof or deck about 6 or 7 ft. from the cutting edge—the side having first been excavated to the water level—work in the open by cheap labor, of course, being cheaper than excavation in the air chamber by high-priced sand hogs, with the cost of the compressor, plant, etc., in addition.

OBJECT OF AIR PRESSURE.

By working very quickly and steadily, caissons have been sunk through New York quicksand some 16 to 18 ft. before air was applied, but the material becomes soggy very quickly, and it is more advisable to apply the compressed air from the start, generally beginning with 3 or 4 lbs., on account of operating the doors, etc., although theoretically the pressure should start at zero, for as the only object of the compressed air is to keep the water from flowing in, the pressure of the air should just balance the pressure of the water. The weight of fresh water is about 62.1-2 lbs. per cubic foot, or 434 lbs. per square inch on the bottom, so if the water is 10 ft. deep the pressure will be 4.34 lbs. per square inch, and if the depth is 100 ft. the gauge will show 43.4 lbs. per square inch, which is about the limit of pressure in which men have been able to work.

It would naturally be expected that caissons being sunk in a field or city might not have as great a water pressure at the same depth as a caisson being sunk in the middle of the river, but, as a rule, the actual pressure required in both cases will not be found to vary much from the pressure calculated from the hydrostatic head of water. It is as dangerous to have too high pressure as it is to have too little pressure, for if it is too high a blow-out will occur, suddenly reducing the pressure in the working chamber and allowing the outside material to rush in before the pressure can be raised again.

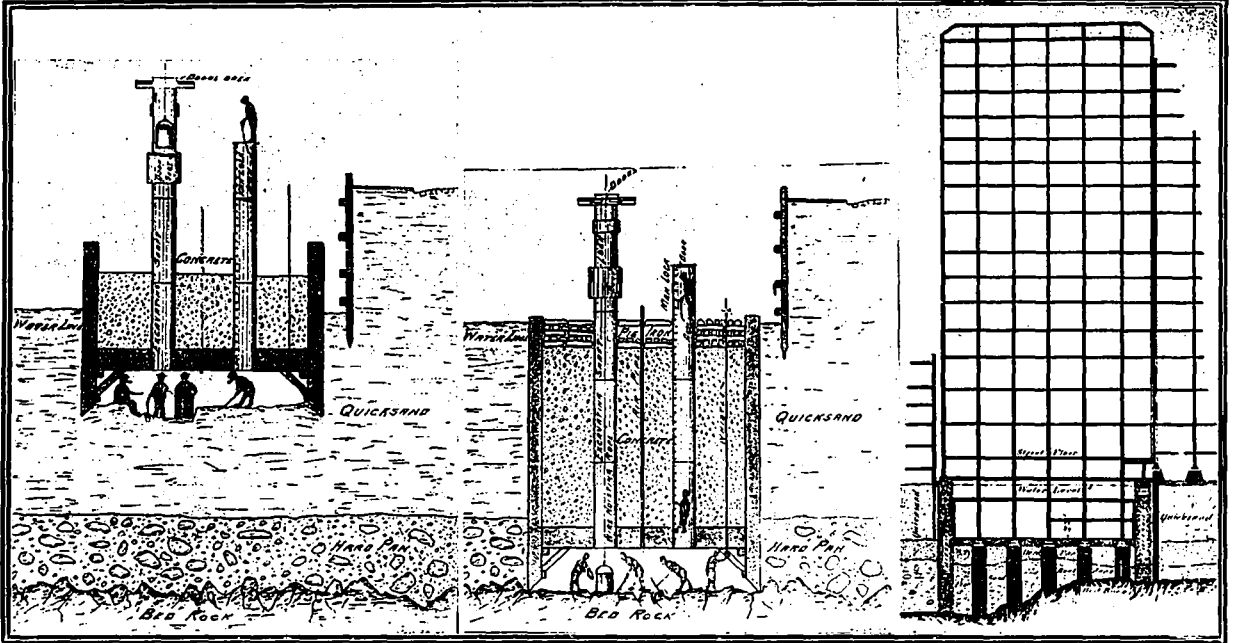
In the Rapid Transit tunnel under the Harlem river;

which I have referred to, the sides were driven first and the roof was sunk from the surface on to the solid side walls of 12 in. x 12 in. sheeting so as to leave 25 ft. of water above the roof at low tide, this being the Government requirement. Instead of driving the 12 in. x 12 in. sheeting one at a time, the contractor bolted three of them together, and by spiking two 3 x 4 in. timbers on in such

half of the tunnel. This was not only much cheaper than the first plan, but also much safer, and was first suggested by the writer.

VARIATION IN DESIGN AND CONSTRUCTION.

For ordinary caissons, great variation has existed, and still exists, in the design and construction, some engineers



SECTIONAL DIAGRAMS OF THE METHOD EMPLOYED IN CONSTRUCTING FOUNDATION FOR A LARGE BUILDING, SHOWING THE SAND HOGS AT WORK UNDER THE ROOF OR DECK OF THE CAISSON. IN THE FIRST DRAWING THE CAISSON IS FAIRLY STARTED, WHILE IN THE SECOND IT HAS REACHED BED-ROCK AND IS ABOUT READY FOR CONCRETE IN THE AIR CHAMBER. THE THIRD DIAGRAM SHOWS THE COMPLETED FOUNDATIONS OF THE MUTUAL LIFE BUILDING, NEW YORK CITY.

a way that one 3 x 4 in. piece on the adjoining three 12 x 12 would fit into it, forming a sort of tongue and grooved joint, which has proved very effective.

In this case the contractor did not wish to go to the expense of putting enough weight on the roof to withstand the entire air pressure which would be required to keep the water out of the air chamber; so he split the difference and used half the air pressure, theoretically required; that is, from 10 to 12 lbs. per square inch, and relied on the pumps to keep the water down. The pumps could not have handled the work without the assistance of the air pressure. This compromise plan proved successful, although the water broke in several times, giving the men a pretty good scare.

The success was undoubtedly due to the nature of the soil; clay, to a large extent, for this scheme would be too risky in a silty sand or gravel.

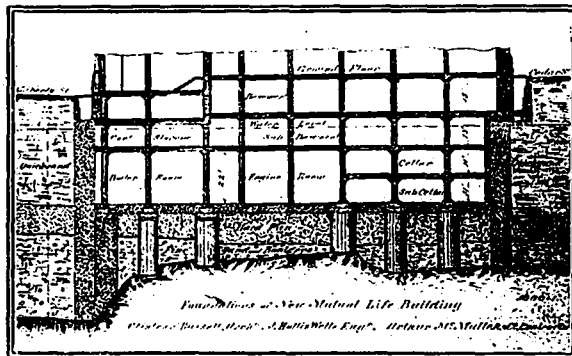
The first section to be sunk had a temporary roof under which the permanent roof was built after the material had been excavated, but the removal of this temporary roof, a solid wooden platform 3 ft. thick was found to be so expensive and tedious that the next section to be sunk had the permanent roof of cast-iron lining inside of the concrete with half the sides (that is, the entire upper half of the tunnel) built on floats so that when it was sunk in place all that remained to do was to complete the lower

using very thick timber side walls with a timber roof or deck 10 or 12 ft. thick, others reducing the thickness of the timber roof to 3 ft., while others again use plain concrete or reinforced concrete, and employ timber only for forms, while a few build the whole caisson and cofferdam of steel and cast iron. A good example of steel caissons was the Mutual Life building, where the sizes ran from 3 ft. diam. for under-pinning cast iron caissons, to 8 x 22 ft. for the main caissons.

Several contractors in New York have recently tried sinking caissons of concrete only, using timber for forms and removing the forms as soon as possible. Theoretically, this method is the cheapest of all, but practically it has been found that it paid to leave an outside shell of timber on to permit the sinking to proceed continuously, which is not possible when removable forms are used, necessitating a cessation of sinking for a day or so, sometimes several times for each caisson, to permit the concrete to harden before being

subjected to the friction of the ground. The removal of the forms required considerable labor, sometimes high-priced, as in the case where iron angles were used and the forms were held together by means of steel bolts, which gave the iron unions a chance to insist upon the bolts being put in and taken out by iron erectors.

Concrete also causes slightly greater friction than planed boards, especially where the latter are greased.



FOUNDATION OF MUTUAL LIFE BUILDING.

Most people seem to object to grease on the concrete itself.

In New York, as in many other places, the least friction is obtained by gradual but continual sinking, for allowing the caisson to take a quick drop of several feet and then perforce allowing it to stand for some time, gives the quicksand and other material a chance to adhere to the sides of the caisson, causing a very considerable increase in the amount of friction which must be overcome before the caisson can start again. Using forms instead of permanent sides, of course, prevents continual sinking.

FRICION DIFFICULT TO ESTIMATE.

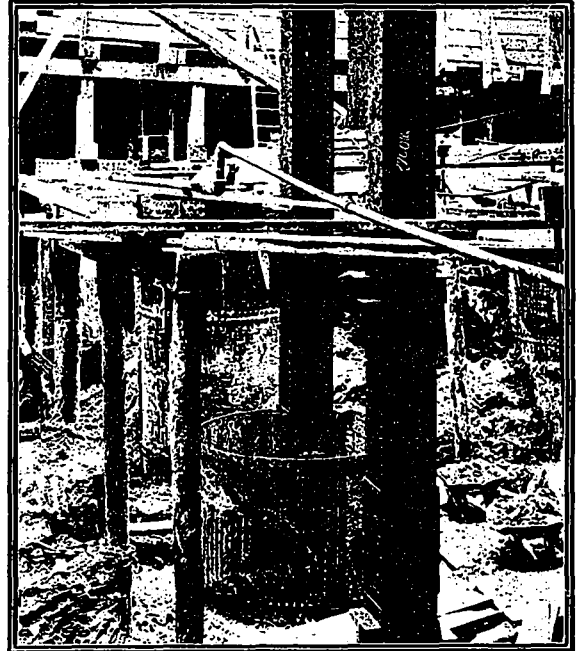
Friction is a very hard item to estimate, as it depends not only on the nature of the material, but also on the method of sinking, and on one job in New York City where very careful records were kept it was found that the friction varied from 150 to 650 lbs. per square foot of exposed surface, the material passed through being what is called New York quicksand.

In order to reduce the friction on the sides, nearly all beginners want to make the bottom of the caisson of larger cross-section than the top, thinking that as the hole excavated will thus be larger than the caisson above the cutting edge, that they will thus obtain very little or no friction, but this has been repeatedly found to be a mistake, for in most cases it results in the surrounding material "caving in" and jamming against the sides, increasing the friction enormously.

At the Hawkesbury bridge, in Australia, where cylindrical open steel caissons, or cofferdams, were used which tapered from the bottom to the top, the material was excavated by dredging, and instead of the surrounding material flowing against the sides and causing a jam, as is the usual case, the reverse happened, and a water space

to allow the earth, etc., to pack around the caissons, after which sinking was resumed, successfully.

To give an example of the opposite result in this country, an engineer once divided his caisson into two piers



VIEW OF CONSTRUCTION WORK ON THE FOUNDATIONS OF THE MUTUAL LIFE BUILDING, SHOWING STEEL COLUMNS IN PLACE BEFORE CELLAR WAS DUG, THE STEEL COFFER DAM BEING REMOVED AS THE EXCAVATION PROCEEDED.

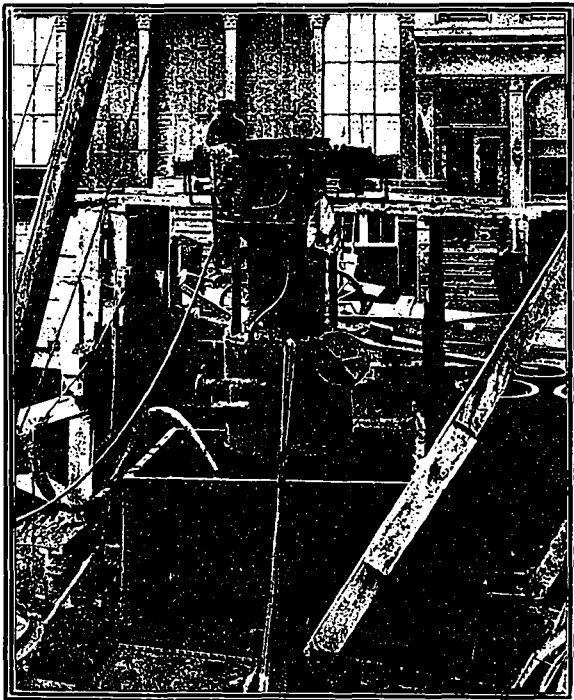
above the deck, leaving an open space of some 20 ft. between the two piers, and in addition the sides were battered, with the result that the boulders, etc., caved in and jammed so firmly that some 1,200 extra tons of pig iron were required to overcome the friction—a very expensive experience for the contractors. As these contractors had to sink a second caisson of similar design, they profited by their experience and built a cofferdam on each side between the two piers and filled the space with earth, etc. They also built the sides vertical. While the railroad saved a few yards of concrete by dividing the caisson into two parts above the deck, and similar economies, it had to pay fully fifty per cent. more per cubic yard for the next bridge it built immediately following, which shows that the mere cutting down of dimensions does not always mean economy.

Another favorite expedient, and an equally costly one, is trying to overcome friction by jetting, thus saving the purchase and handling of pig iron, which always consumes a great deal of time and money.

It is, of course, very easy to shove a jet pipe, of 3-4 in. diameter or so, down the side of the caisson, and to pump water through the pipe at high pressure, at the same time moving the pipe around the caisson, overcoming the friction by forming a sort of water jacket around the sides, which allows the caisson to sink, or rather, drop several feet at a time. This can often be repeated several times to advantage, but it disturbs the surrounding ground to such an extent that, in many cases, the material cakes against the sides, making each succeeding operation harder than the one before.

DANGER OF OVERWEIGHT.

The only economical method of sinking is to have just sufficient weight so that the caisson will continue to move downward as fast as the cutting edge is undermined. Too



LOCK WITH TWO TOP HORIZONTAL SLIDING DOORS, MUTUAL LIFE BUILDING.

or water-filled cavity was left around the sides, with the result that it was impossible to hold the caisson plumb. This gave so much trouble that material was dumped around the sides and then work was suspended for a year

much weight is obviously dangerous, as in soft material there is a risk of the cutting edge penetrating the material until the air chamber is filled with earth and water, and even if the men have all had time to escape it is expensive work digging in from the shaft to make room for the men and buckets.

The usual method, after a caisson has fairly started on its downward course, is to dig about a foot below the cutting edge except just around the cutting edge itself, then removing the material directly under the cutting edge itself, and by slightly reducing the air pressure for a very short interval the net weight of the caisson and its load is increased enough to overcome the friction, and to allow the cutting edge to reach the bottom of the excavation water level below the cutting edge, in which case it is not usual to excavate below the cutting edge.

When passing through hard material, such as hardpan, boulders or rock, it is important to see that the excavation is made wide enough, or the caisson will surely become jammed. In fact, I have seen a 3-ft. diameter cylindrical cast-iron underpinning caisson become so jammed that four hydraulic jacks aggregating 320 tons would not budge it, and as the jacks were acting against the wall of a building it was not considered safe to jack any more for fear of injuring the building that we were underpinning.

Much difference of opinion exists as to the proper form of cutting the edge, which, as might be inferred, is the bottom of the caisson, the idea being that it cuts its way into the underlying material, though, as we have seen it is often necessary to excavate under the cutting edge itself. Many strive to obtain a knife edge (for the cutting edge) by means of steel plates and angles; while I have in many cases contented myself with an 8-in. channel laid flat. The knife edge is, of course, ideal, but is very expensive, and where it is really needed is almost sure to become bent and distorted, in which case it is far worse than no cutting edge at all.

The cutting edge and sides should, of course, be designed with the object of giving the maximum room to work at or under the cutting edge, for, at the best, removing the material at the cutting edge is very much more expensive than removing the rest of the material.

While it is possible to analyze the strains in most structures, and it is possible to do so with a pneumatic caisson, still there is such a large element of personal judgment required that it is dangerous to lay down rules for others. Theoretically, if the air pressure just equals the outside pressure, it might be argued that there are no strains on the sides or roof of the air chamber, but we know, as a matter of fact, that sometimes these strains are enormous and irresistible, especially when the caisson gets out of plumb, or encounters harder material on one side than the other. Every experienced "sand hog" or caisson man has seen the roof badly deflected and the sides twisted out of shape. So it is essential for the designer to use his eyes and his judgment. He should also be familiar with the methods of the contractor who will use his plans—for a design that would be quite safe for one contractor would not be at all safe for another.

CAISSON CONSTRUCTION.

All wooden caissons should have an outside tongued and grooved sheeting of 2 in. or 3-in. plank laid vertically to avoid friction on long horizontal joints. Most contractors, however, use plank with a calking edge instead of tongued and grooved, and then calk with oakum.

For small caissons, say from 5 ft. to 12 ft. square, there should be a horizontal wall of 8-in. or 10-in. timbers from the cutting edge to the roof instead of the plank sheeting, properly braced at the corners, and inside of this there should be a 12-in. x 12-in. belt course under the roof. One solid course of 12-in. x 12-in. timbers is ample for the roof or the deck, and if concrete is placed on the deck as fast as the caisson is sunk, the plank sheeting will

be sufficient for the side walls above the deck, with light horizontal waling pieces, spaced about 5 ft. apart vertically.

For large boxes, up to 30 ft. wide, I have used, successfully, 27-in. sides, below the deck; that is, 3-in. plank against 12 x 12 horizontals, inside of which I placed a wall of 12 x 12 posts, about half of which extended from the cutting edge to the roof and the rest projected from 2 to 6 ft. above the deck, while the corner posts and an intermediate about every 15 ft. apart were extended to the top of the cofferdam, properly spliced at the joints.

Above the deck, horizontal 12 x 12-in. walings spaced from 3 to 5 ft. apart vertically were placed outside of the posts, the sheeting being spiked to the walings.

If the concrete were placed in the cofferdam on top of the caisson as fast as the caisson was sunk, all the bracing above the deck could be removed as the concrete reached the bottom of the brace, or omitted altogether in some places, but it is often necessary to keep the concrete 20 to 30 ft. lower than the surface of the water in order to prevent the caisson from becoming too heavy, when very heavy cofferdam bracing will be required to withstand the hydrostatic head. This is especially so when the water is deep, say, over 30 ft., and bottom of the river consists of fine silt. Sixty feet of water is the deepest in which I have started a caisson.

For deep water work it is necessary to so design the caisson and plant that there will be no danger of turning turtle, lack of which provision has resulted in several accidents.

Reference has been made to the advisability of having a shell of timber or steel, even where the concrete is always above the ground while being deposited, in order to save time and expense, and it is also necessary to prevent new or green concrete from being parted by the friction of the ground.

In sinking the first caisson for a New York City skyscraper, the Manhattan Life building, steel caissons were used, on top of which brick work was built, but it was found that the friction broke the new mortar, thus pulling the brick work away from the caisson. In any case, the cofferdam should be very securely attached to the caisson, the necessity of which was proved in a river caisson where the clay was taken out of the air chamber and dumped over the side of the cofferdam to which it adhered, and broke the whole cofferdam, 106 ft. long, away from the caisson.

Many small New York caissons have been built with wooden sides and a 2-in. plank "form" under the roof, on which 2 ft. of concrete has been laid and allowed to set for a couple of days, after which the form was removed and the concrete continued. At first, forms were also used instead of cofferdams for the sides above the roof, but after this scheme had been used for three or four buildings it was abandoned as not economical in practice.

In these caissons, sometimes the steel shafts were left in, and in other cases collapsible steel shafts or wooden forms for the shafts were used and then removed. Removing or leaving out the steel shaft in a small caisson is very risky and has been attended by accidents where the caisson has broken in two owing to greater pressure on one side of the cutting edge than the other.

Steel caissons have been used a great deal in the past, but are not used in New York much now, except, perhaps, for circular caissons, especially where of very small diameter. The advantage of using steel for round caissons up to 10 or 12 ft. in diameter, consists in the rapidity in which the light sections of cofferdam can be bolted on and filled with concrete, the time saved often being enough to pay for the extra cost of material. Another advantage is the ease with which they can be made watertight.

Small caissons for underpinning purposes are made from 30 to 36 in. diameter, of cast-iron or built-up steel

plates. A good plan is to use steel cutting edge sections and make the upper sections of cast-iron, using 1 1/2 to 2-in. metal. In underpinning the adjoining buildings to the extension of the Mutual Life building, in 1900, we used 26 of the small caissons from 60 to 80 ft. deep.

Twenty-seven inches inside diameter is the smallest pneumatic caisson we have worked men in, but they were cramped for room, and 33-in. inside diameter or 36-in. outside has been found to be a much better size.

For the main caissons of a new building, anything under 6-ft. in diameter is unsatisfactory, as there is not sufficient room for the men and bucket, and besides it is hard to keep small caissons plumb and in line.

In the above only those caissons in which the roof is left in place have been considered, but there are many places where it is desired to sink the caisson shell with a temporary roof, and, of course, a temporary weight; where, for instance, the base of the column must be set below the surface of the ground before the main part of the cellar is excavated. This has been done in a number of cases in New York in recent years, where there are from three to four floors below the street level, both for the purpose of saving time by allowing the erection of the steel work to commence before the cellar is excavated, and also in order that the steel work and concrete floors may be used, as the cellar excavation proceeds, to obtain sufficient bracing for the side caissons, which are usually only 6 or 8 ft. wide, forming a wall around the buildings sometimes 60 to 70 ft. below the street line, and are entirely too light to withstand the enormous water and earth pressure without the horizontal bracing afforded by the floors.

CALCULATING STRAINS.

It is necessary to use considerable common sense and experience in attempting to calculate the strains in a caisson. As regards the deck, for example, it is very easy to calculate the weight to be carried by the deck and the strains that would result therefrom, and we know that the air pressure acting up against the roof will counterbalance a great deal of this weight, making it, in fact, something like a pontoon floating in the water. But, on the

other hand, the air pressure is often slacked down to almost nothing in order to overcome the friction and is raised again before much water has time to enter the working chamber; and sometimes an accident to the air plant will suddenly cut off the supply of air, throwing a tremendous strain on the roof. If the principal weight on the roof is concrete it will in many cases be self-sustaining unless too fresh.

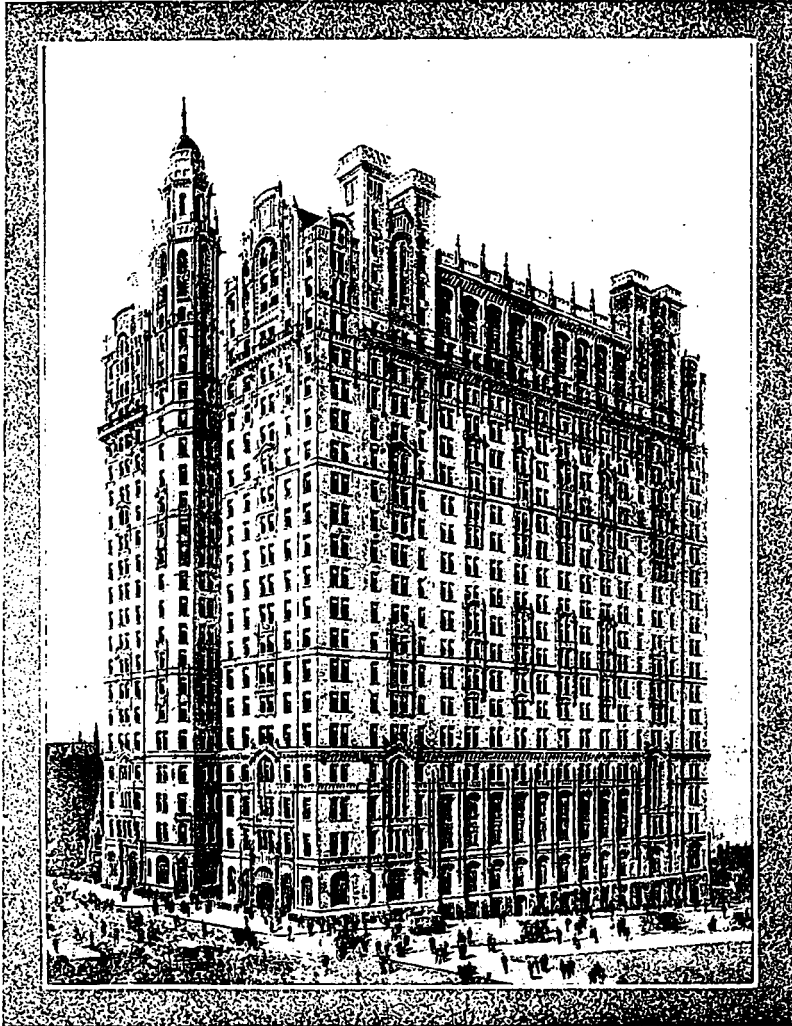
The same with the sides. If the material were absolutely homogeneous all around and the caisson were sunk absolutely plumb, which almost never happens, and the air pressure were kept just equal to the outside pressure, then we would have practically no strain on the sides—but all practical caisson men have seen the sides of caissons collapse, and some very strongly built ones at that. A very much more frequent cause of accident than loss of air pressure is to strike some obstruction on one side, deflecting the cutting edge, and thus throwing much of the weight of the caisson on the weakened side, making bad worse.

A caisson 8 ft. wide has had its sides so distorted and compressed that there was not room left for a 29-in. bucket to enter the working chamber from the shaft. In this case the working chamber was made much too tight to start with, and collapses occurred in the working chamber, and a couple broke in two above the deck and had to be stopped where they were in the quicksand, some 20 ft. above hardpan, and the excavation continued under the cutting edge by lining the sides, as in the case of a vertical

tunnel—a very risky proceeding, but successfully accomplished.

Some caissons have been sunk as much as 5 ft. out of plumb, an inexcusable state of affairs for a small caisson, for while we have said that very few caissons are absolutely plumb, still there is no excuse for their being more than a few inches out.

Large concrete steel caissons have been sunk, and in one case it was claimed that by using reinforced concrete the company had saved \$100,000, as compared with the cost of the steel caisson they had contemplated; but I have built an equally large caisson, 46 x 130 ft., of wood, the total cost of which was only about \$25,000. So if the



TRINITY AND U. S. REALTY BUILDINGS, NEW YORK CITY, WHERE THE WORLD'S RECORD FOR CAISSON SPEED WAS MADE. EIGHTY-SEVEN CAISSONS WERE SUNK AND SEALED IN 60 DAYS, THE LAST 57 OF WHICH TAKING BUT 30 DAYS.

cost of the reinforced concrete caisson were compared with a wooden caisson it would be rather difficult to show a saving of \$100,000.

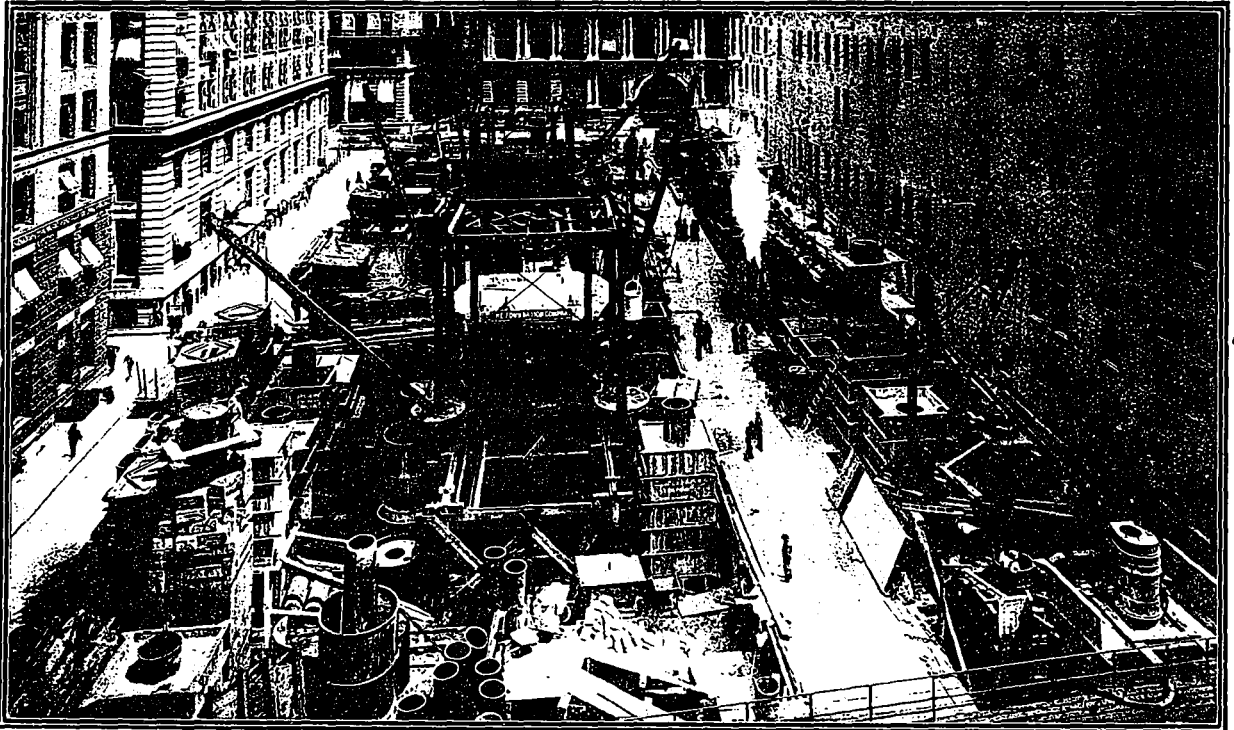
In building wooden caissons I very seldom halve the timbers or use dovetailed joints, preferring to use butt joints as much as possible with plenty of drift bolts. The trouble with butt joints, however, is that while a carpenter will make a dovetail or halve-joint fit he will probably leave an inch or so play in a butt joint.

The deck timbers, as well as those in the sides, should be planed on one side and one edge, for the sizes would otherwise vary too much to get a good job, while the planking for the outside and inside of the air chamber should be either tongue and groove, or the sides should be planed for a calking joint. The plank should, of course, have its faces also planed.

It is very important, and difficult, to keep the water out of the cofferdam, and it requires great care with the

about the worst position that could have been selected, for if the caisson became too heavy there would be danger of smashing the lock, and then the lock had to be taken to pieces and taken out before the shaft could be filled. The reason for putting the lock in such an awkward position was probably to permit adding to the shaft and cofferdam without removing the lock, before the idea of having an additional door at the bottom of the shaft in the air chamber occurred to caisson men. This door at the bottom of the shaft is now used when it is desired to lift the lock off temporarily to place more shafting, so as not to permit the air to escape from the working chamber during the operation. The door is also useful in case of emergency or accident.

It probably did not take long for the advantages of placing the lock on top of the shaft to become apparent. But at first the hoisting mechanism was placed inside of the lock—so the bucket would be lifted from the working



FOUNDATION WORK IN PROGRESS, NORTH TRINITY AND U. S. REALTY BUILDINGS. EVERYTHING SHOWN IN THIS PICTURE DISAPPEARED BEFORE THE IRON WORK WAS ERECTED.

calking, for sometimes a joint under the cutting edge is not completely calked, with the result that the water finds its way up through the sides and into the roof or deck and thence through the concrete, forming a very bad leak which it is impossible to stop, as its location cannot be discovered. This often necessitates continual pumping in the cofferdam while new concrete is being deposited, which is, to say the least, of no benefit to the concrete.

One of the most important contrivances on a pneumatic caisson is the air lock, without which the work cannot be carried on.

EARLY AND MODERN AIR LOCKS.

A lock is essentially an air chamber having two doors, one opening to the atmosphere and one into the working chamber or shaft. In the early caissons the lock was placed below the shaft in the working chamber, and when the material was placed in the bucket in the lock, the lower door was shut and the air allowed to escape from the lock, when the upper door was opened, allowing the material to be hoisted out. This was an inconvenient and unsafe position for the lock; in fact, it seems to be

chamber up into the lock, after which the bottom door would be closed and the material dumped through a side door or lifted up through a top door. Cumbersome and slow as such a method is, requiring the material to be handled twice instead of once, it is still used in Europe, but very seldom in this country.

It was long, however, before this lock was superseded by the modern locks which permit the bucket to be lowered into the air chamber, filled, taken out, emptied and returned to the working chamber without detaching it (if desired) from the cable of the hoisting engine. The first lock to accomplish this time and money-saving result had the top door in two horizontal halves, meeting over the centre of the shaft, having a hole for a stuffing box about 3 or 4 in. diameter at the centre of the joint between the two halves. This stuffing box was so arranged with packing, etc., that the steel cable could pass through it freely without allowing much air to escape. The stuffing box, of course, remained on the cable near the bale of the bucket, when the bucket was taken out of the lock.

It has now been almost entirely discarded, as it has been found by experiment that it is only necessary to

allow a hole on the door or doors sufficiently large for the cable to pass through, and that the resulting loss of air is not sufficient to make a stuffing box (patented) necessary. As there is no object in the cable passing through the bottom door of the lock when the bottom door is shut, the best form for the lower door is a single round door slightly larger than the opening, hinged on one side, and known as a flap door, as it swings up against its door seat and is held there by air pressure. A rubber gasket is usually attached to the door to prevent the air escaping between the door and its seat. The gasket is usually 1-2-in. thick and from 3 to 4 in. wide, in the shape of a ring, about the diameter of the opening.

Thus, in present practice, the derrick lowers the bucket into the lock when the upper doors close against the cable, and after the lock has been filled with air the bottom door is allowed to drop open of its own weight, when there is nothing in the way to prevent the bucket being lowered to the working chamber, filled with material and hoisted into the lock again. Then the lower door is swung up by levers from the outside, the air in the lock allowed to escape, permitting the top doors to be opened, etc., and the entire cycle of filling, emptying and returning a half-yard bucket is performed twenty times an hour; a vast improvement on the old system. Numerous patents have been taken out to get around the original patent. One has a circular flap door for the top as well as bottom, the top door having a slot from the side to the centre, permitting the door to shut while the bucket is suspended in the lock, an additional contrivance being required to then close or cover the slot.

Another lock, much more used, has a circular top door, so placed that the edge of the door is directly over the centre of the shaft, permitting the hole for the cable to be put in the side of the door instead of the centre. This requires the lock tender to give the bucket or cable a slight push as the bucket enters and leaves the lock, which he easily accomplishes.

It would seem that every conceivable useful form of lock has been patented, and though there are numerous lawsuits pending, none have been settled.

All the locks described so far have doors which open in, so that when they are shut the air pressure tends to hold them shut, which is the only safe way, for the greater the air pressure the tighter the door will be shut. But to get around the original patents, locks have been built with upper doors which are held on from the outside by means of screws, etc., and when the bucket is taken out of the lock the door remains on the cable with the stuffing box, over the bale of the door. This patent was at once bought up, and as its only use would be to get around other patents, very few of the locks were ever manufactured.

REMOVING MATERIAL BY BLOW PIPES.

In city work the material excavated from the caissons is nearly always removed by buckets through the air locks, but in big river caissons it is usually much cheaper to use "blow pipes." A "blow pipe" is simply an iron pipe, usually 5 in. diameter, from the deck of the air chamber to the surface. At the top is an elbow to deflect the material, and in the air chamber is a flexible pipe connected to the iron pipe; at the lower end of the flexible pipe is a valve. The sand or other material is shovelled up against the valve and when the valve is opened everything in front of it, even good-sized pebbles, is blown out, sometimes 100 ft. or more beyond the end of the pipe. The material can be blown out so much quicker than it can be shovelled against the bottom of the pipe that the valve is necessarily kept closed much of the time.

The blow pipe is operated by simply allowing the compressed air in the working chamber to escape, carrying the material with it, the air pressure, of course, not being increased beyond the pressure required to keep the water

out of the working chamber. But as a rule "blowing" is not resorted to until the pressure is about 8 or 10 lbs. per square inch. The men have to be careful not to let their hands get caught, as they would have a good chance of losing them; in fact, the force is so terrific that the very hardest material is required for the upper elbows, and I have seen cast-iron elbows with metal two inches thick worn clean through in a couple of hours, and less. Sometimes big blocks of oak are cut to fit over the elbow and roped on until a new elbow can be obtained.

The contractor for the first caisson for a New York skyscraper attempted to blow out the quicksand—blowing it out very wet and allowing the water with a good deal of sand to escape into the sewers. This was a very economical arrangement at first, until the sewers got "plugged" and the city put a stop to the operation.

METHOD OF CONCRETING WORKING CHAMBER.

Bucket locks are much used for concreting the working chamber as well as for excavating small caissons; but for the large caissons or where there are two shafts, a special concrete lock is used. This is usually an ordinary 3-ft. shaft, with a door in the bottom and a cone above the lower door. The lock is placed on top of the shaft and has a hopper arranged over it. As soon as a yard or so of concrete has been dumped into the lock, the top door is shut and the bottom door is opened, allowing the mass to fall down the shaft into the working chamber. The concrete can thus be taken in about as fast as the men below signal that they are ready for it.

Concrete should be made very wet, wherever possible, but the men in the air chamber do not like it wet at all, and they are always asking for dryer concrete. As long as the concrete is spread in approximately horizontal layers it cannot be too wet, but when it is necessary to bench it around the sides and under the roof it is impossible to use wet concrete. It is customary to fill the air chamber in horizontal layers to within about 3 ft. of the roof and then bench the concrete around the sides and under the deck until there is only a space under the shaft left. The men, of course, prefer, where they can, to keep a working space about 5 ft. high. The concrete is usually carried to within 3 or 4 in. of the roof, and the remaining space is then filled with mortar, packed in place with a wooden rammer about 3 x 1 by 3 ft. long, driven or pounded with an 8-lb. hammer—which gives a very good job, but is, of course, very slow.

Sometimes the concrete is carried up horizontally to within 18 in. of the deck and allowed to set hard, at least 12 hours being necessary, when the air is taken off and wet concrete is dumped down the shaft. The trouble with this method is to be sure that all the spaces under the roof get filled, for no one who has not tried it would believe that the water in the concrete would disappear so completely. I have seen a caisson with two 3-ft. shafts about 6 ft. centre to centre, where the concrete was dumped down one shaft in an absolutely "sloppy" condition, and yet when we suspended work to examine the concrete we found that the concrete was filling the shaft it was dumped in without filling the space under the deck to the adjoining shaft. I have seen concrete dumped into a shaft so wet that one would expect to see a couple of feet of water on top of the concrete, and yet when the work was stopped the concrete looked almost dry.

If mortar is made watertight the proportion should never be poorer than one volume of cement to two volumes sand, to insure filling all the voids in the sand. For the same reason the proportion of cement and sand should be the same for concrete where as much stone can be used as can be covered, depending on the smallness of the stone or gravel and the wetness of the mass; much more stone can be used if the stones are small and the mass wet. I have made caissons watertight against a head of 80 ft. of water by concreting to about 6 in. above the cut-

ting edge and then placing a layer of mortar about 2 in. thick and covering this at once with good wet concrete, 1—2—4. And yet many say that it is impossible to make concrete hold water—which, however, is certainly true as far as “dry” concrete is concerned, that is, concrete that requires ramming to bring the moisture to the surface.

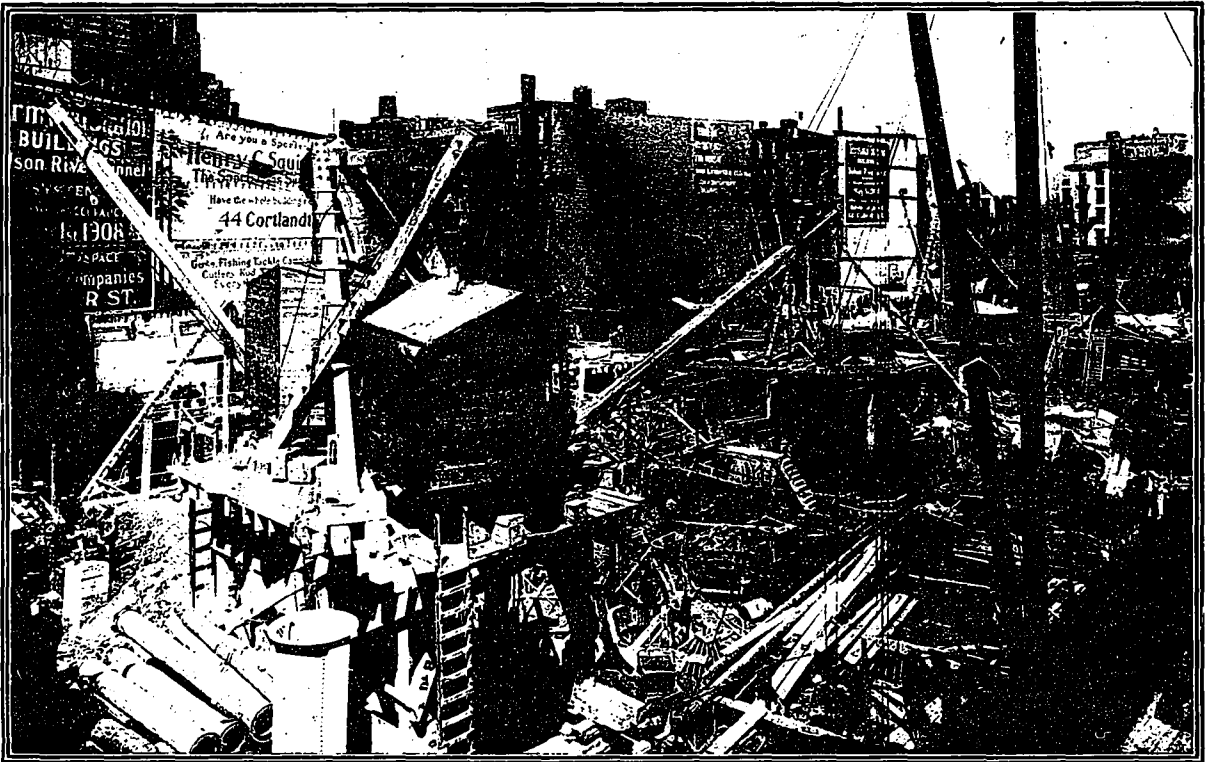
The concrete in the cofferdam above the deck should also be put in very wet, and though it is very customary to use a 1—3—5 concrete for this purpose, I would much prefer a 1—2—4 mixture, though the amount of stone could be increased as stated above if judgment is used.

Great care should always be exercised when pumping is necessary to avoid pumping the cement out of the concrete and thus ruining the mass. I have heard a contractor brag of using eight big pumps, with 6 in., 8 in. and 10 in. discharge pipes, on an open cofferdam 30 x 50 ft., while concreting. Small wonder he had not much confidence in concrete after such abuse.

The amount of concrete placed on the deck of the caisson while sinking often depends on the amount of

built on a pontoon, made of two or more parts bolted together. A pontoon is usually made by spacing 12 x 12 in. timbers about 3 or 4 ft. apart and spiking 3-in. plank on the bottom and then building side walls of 3-in. plank about 6 ft. high, the bottom and sides being well calked with oakum, giving a dry platform to build and calk the caisson on. We usually build the sides of the caisson about 14 ft. high above the cutting edge, when we expect the caisson to draw 8 or 9 ft. of water after the pontoon has been removed. But before this is done it is necessary to attach the bottom sections of the excavating and main shafts as well as all air and blow pipes, and gas pipes for electric wires and whistles.

The method usually adopted for removing the pontoon from under the caisson is to weight the center of the pontoon with gravel or stones and remove the bolts which connect the two halves together, and then flood the pontoon by opening a valve or two, which allows the caisson to float and removes the weight of the caisson from the pontoon. The pontoon then acts up against the caisson according to the displacement of the pontoon



EXCAVATION OF SITE AND CONSTRUCTION OF FOUNDATION FOR THE MC'ADOO TERMINAL BUILDING, NEW YORK CITY, SHOWING THE LARGE ELECTRICAL DERRICK USED IN CARRYING OUT THE WORK.

weight required for the penetration. On shore, for instance, the friction on the sides starts at the surface and the concrete on the deck has to be kept above the surface of the ground until all the concrete is in that will be required for the finished structure, when pig iron or other temporary weight has to be added. But in river work, where the water is often from 20 to 60 ft. deep to start with, the caisson would be too heavy if the concrete were kept up to the surface of the water; in fact, sometimes the level of the concrete in the cofferdam of the caisson is as much as 30 ft. lower than the surface of the water, which requires very heavy cofferdam bracing and makes any leak in the cofferdam or deck of the caisson very troublesome and dangerous on account of the great head.

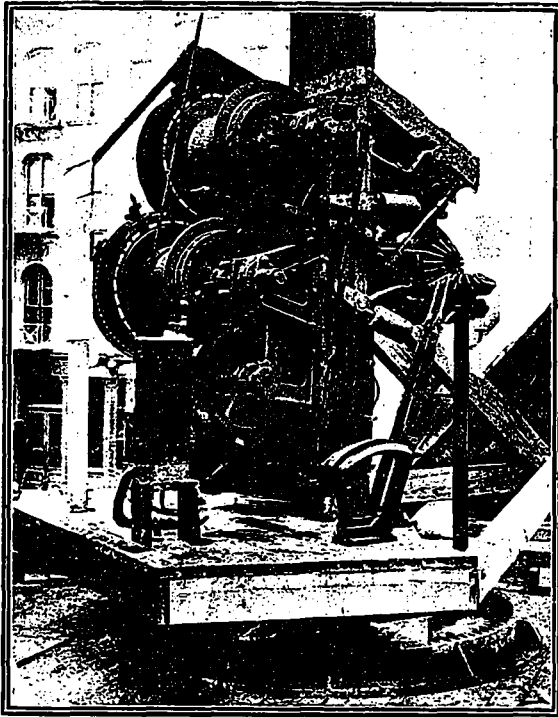
CAISSONS FOR RIVER WORK.

River caissons are usually built either on the shore and skidded or launched into the river, or else they are

when submerged, itself, instead of according to the much greater displacement of the caisson. If sufficient weight has been placed on the pontoon, each half will often shoot from under the caisson as it sinks. At other times it is necessary to attach tugs to pull the pontoon sections away, or to rig up a few struts with block and tackle connected to a hoisting so arranged as to force the parts of the pontoon under the caisson down and out. While this is generally the operation of a few minutes, it is often bungled, and it once took several weeks, first because a green man tried to pull the pontoon away without sinking—thus pulling against the entire weight of the caisson, and second, because he allowed enough water to get in to freeze the caisson to the pontoon, and then sank them frozen together—a very expensive lesson.

The pontoon can, of course, be used over and over again, in fact, as often as there are caissons on the job,

unless time is an object, when it will often pay to build two pontoons. Caissons from 60 to 100 ft. long will often take three or four weeks to build, if built by an expert,



ELECTRICAL HOIST FOR MAST USED ON THE FOUNDATION WORK OF THE MC'ADOO TERMINAL BUILDING.

before they are ready to launch, which is a serious amount of time if 10 or 12 caissons are to be sunk in one season.

Caisson work in winter always costs more than if done in the summer, owing to the extra consumption of coal, trouble of packing air pipes to prevent freezing, to say nothing of the danger of ice and floods. Sometimes in silty rivers where, if a channel was dredged to float the caisson it would fill up at once with silt, it is necessary to build the caisson on a platform supported by piles at the site where it is to be sunk and to attach a dozen or so rods about 2 or 3 in. diameter to the cutting edge. The rods being threaded for most of their length and pass through plates held on frames around the caisson in such a way that when the caisson is completed it can be hung from these rods. By turning the nuts on the rods simultaneously the caisson can be lowered until it floats or until the resistance under the cutting edge is sufficient to support the caisson while the cofferdam is being placed on top. The rods are so arranged that as soon as the caisson is landed they can be disconnected and used over again for the next caisson. A caisson can usually be lowered in less than a day by this means, so the expense is not very serious.

It is very important to see that the site for the caisson is level before putting the caisson in position, and if it is not it should be dredged as nearly level as possible, otherwise the caisson will be thrown out of plumb and probably warped at the outset, and then will cause trouble all the way down.

PROPER START IMPORTANT.

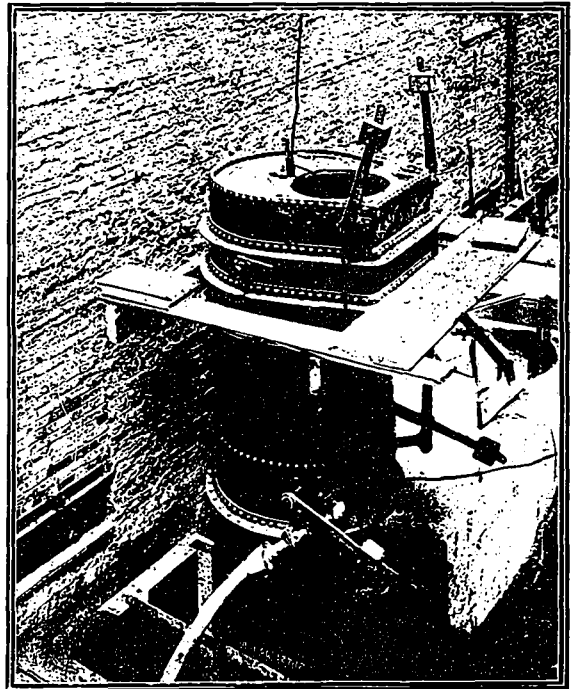
The expedient of dumping material in the low shots to level up is a very poor one, as the dumped material will not give nearly as much resistance to the cutting edge as the original surface, and distortion will probably occur. It is an exceedingly difficult matter to handle a warped caisson, and once a caisson is warped it is almost

impossible to level it up again. As a caisson which does not start right in this respect seldom finishes right, half the battle is in the start.

Caissons sunk on land are held in place by shoring against any available structure until the cutting edge has penetrated sufficiently far to prevent loss of control. In a recent New York city job the concrete caisson standing 20 ft. in the air was insufficiently shored up, with the result that it fell over—a total wreck—costing the contractors several thousand dollars.

In river caissons clusters of piles are usually driven, when possible, near the four corners about 5 ft. or so away from the caisson, and a guide frame is placed between these piles and the caisson. These piles also serve to attach the sand hog boat house, the derrick boats, as well as scows of sand, stone and cement—making quite a cluster of necessary boats. The derrick boat often carries a 2-cu. yd. concrete mixer with hoppers or bins above to hold the sand, stone and cement, and should have at least two booms, one for unloading the material from the scows, using a clam-shell bucket for the sand and stone; and one to handle the concrete bucket, and when necessary the cofferdam material.

In many cases where the material is "blown out" it can be excavated faster than the cofferdam can be built and calked, so it would sometimes pay to have a separate derrick for building the cofferdam. This rapidity of sinking could not be obtained if the material were excavated by means of buckets, and if the material is to be so handled it would be economy to have a shaft for every 25 lineal feet of caisson length, and even if the material is to be blown out it would pay to have frequent shafts for economy in handling the concrete. But contractors will not as a rule put in so many shafts, for even if the caisson is 130 ft. long, they will probably not use more than two excavating shafts and one main shaft—the latter also being used at the end for concreting the working chamber.



PNEUMATIC LOCK USED ON THE SINGER BUILDING, NEW YORK CITY.

The pipes for supplying the compressed air are generally 4 in. diameter, and there should be at least two from the deck to the top to facilitate changing the con-

nection, etc., as the cofferdam is added to. One 4-in. line is sufficient from the caisson to the compression plant, with smaller pipes for high pressure to operate the locks. In winter it is necessary to place these in a box filled with manure, for I do not know of anything that will freeze quicker than a compressed air pipe.

The compressor plant with electric lighting and pumping plants is sometimes compactly arranged on a big float, though it often pays to place the entire plant on shore alongside of a railroad track on account of coal, etc.

In many cases we find an existing bridge parallel to the bridge under construction where the pipes find plenty of points of support, and in other places a light trestle is built or the piles can be laid directly on the bottom of the river, which, however, is not so desirable.

It is impossible to lay down any cast-iron rule for the size of the plant required, for it will depend not only on the number of caissons to be sunk at the same time, but also on the time of year or climatic conditions. It always pays, however, to have plenty of boiler capacity, say, for a fair-sized bridge, two boilers of 150 h.p. capacity each, or four of 80 h.p. each, while there should always be at least one more compressor than is actually required for the work, to allow for repairs, etc., which are sure to be needed. A work of this magnitude would probably require three or four compressors aggregating from 2,500 to 3,000 cu. ft. of free air per minute.

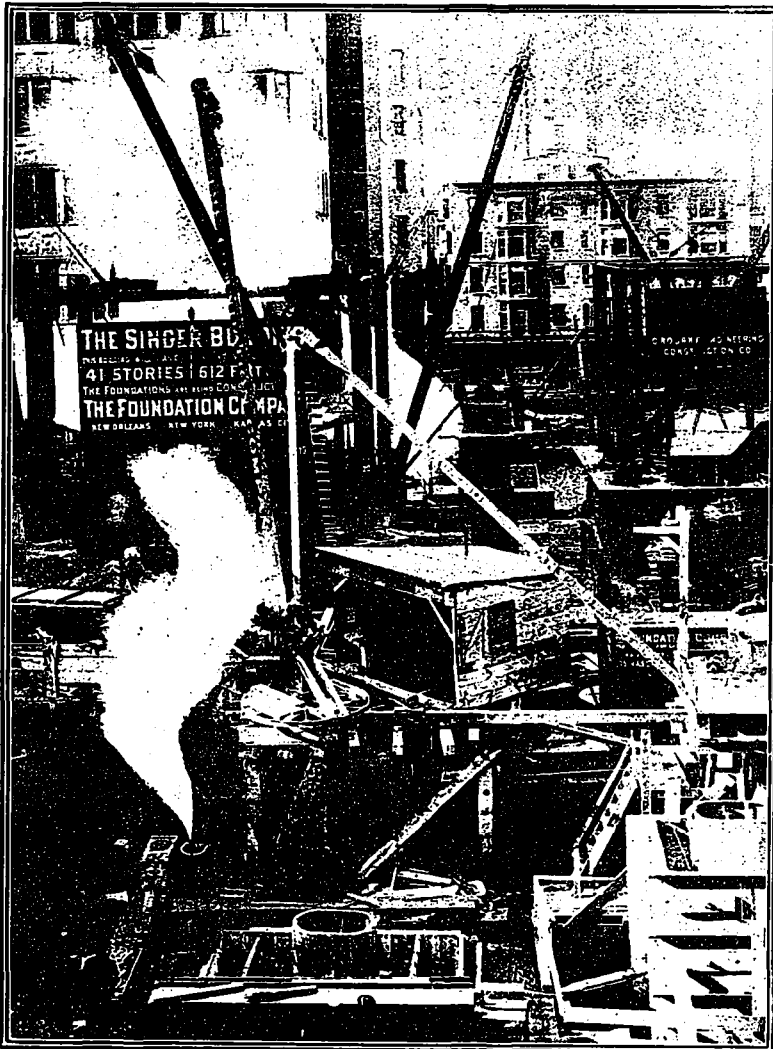
Nothing is so expensive on contract work as delay.

DIFFICULT TO ESTIMATE COST.

Reference has been made to the effect of the weather and locality on the cost of caisson work as regards coal, etc., and I may give two examples, in both of which the work took about one year, winter and summer. The first case was in the East, where there were some 20 medium-sized river caissons using 5,000 tons of coal at \$3, making the total cost of coal about \$15,000. The second was in the West, and though there were only about one-half as many caissons and the total cubic yards of caisson

work was only about one-half in the western bridge than in the eastern one, the amount of coal, owing to the severe weather, was the same, while the price was \$8 a ton, making the total cost of coal \$40,000, which made the coal in the second bridge cost over five times as much per cubic yard of caisson work for the western bridge as it did for the eastern one, although both were handled by the same contractor, with the same plant and same staff. This is one of the reasons why it is so hard to figure the cost of pneumatic work in advance.

Ed. Note--The second and concluding installment of this article will appear in the December issue.



FOUNDATIONS OF THE SINGER BUILDING AND THE CITY INVESTING BUILDING, NEW YORK CITY, ON WHICH THREE TORONTO GRADUATES WERE ENGAGED IN THE PERSONS OF L. L. BROWN, SUPERINTENDENT ON THE SINGER BUILDING; E. W. STEM, CONSULTING ENGINEER ON THE CITY INVESTING BUILDING, AND T. KENNARD THOMSON, CONSULTING ENGINEER ON BOTH JOBS.

ARTIFICIAL PAVING STONE. --- New German Combination of Rock Refuse and Cement.

A GERMAN firm at Wurzburg has recently placed on the market a patented artificial stone, called Vulkanol, for which much is claimed as a paving material. The stone, as described by U.S. Consul H. W. Harris at Nuremberg, is composed of crushed basalt or other similar rocks collected in part as refuse from quarries and mixed with a small percentage of cement. The mixture is subjected to heavy hydraulic pressure and formed into blocks of convenient size for paving. These blocks are then subjected to a process of burning under high temperature in specially prepared furnaces, which process continues for about twelve days. The blocks are then permitted to cool

as slowly as possible. This process of manufacture, resembling somewhat remotely nature's process in the formation of volcanic rocks, furnishes the name Vulkanol.

The blocks are of a brown chocolate color, and show on a broken edge a similar color intermixed with white grains and small fragments of feldspar. The blocks are tough in structure and, it is claimed, withstand all the ordinary tests as to crushing, frost, disintegration, and so forth, that they do not become smooth or slippery by use, and are as durable as natural granite. For much-travelled streets, where heavily loaded waggons are in use, a 6-in. concrete foundation is recommended.

PROSPECTIVE CONSTRUCTION

The following information is obtained from our correspondents, from architects, and from local papers. These items appear in our Daily Advance Reports and are herein compiled for the use of subscribers to the monthly issue of "CONSTRUCTION." Should any of our readers desire this information oftener than once a month, upon receipt of request we will be pleased to submit prices for our Daily Service.

Mills and Factories

Toronto.—Joseph Price, 152 Lee Ave., has taken out a permit for the erection of a two-storey brick factory on the north side of Queen street, east, near Ashdale Ave., at cost of \$5,000. R. W. S. Chadney is the architect.

Toronto.—Messrs. Stockwell & Henderson, 103 King street west, have taken out a permit for the erection of a three-storey brick store and dye-house at 78-80 King street west, near Bay street, in accordance to plans prepared by architect J. Francis Brown, Board of Trade Building. The building will cost \$20,000.

Port Perry, Ont.—The Weber Gas Engine Company, James Building, Toronto, will erect a 1-2 storey foundry at this place. The building will be of fireproof construction, with brick walls, concrete foundation, concrete floors, expanded metal partitions, steel and iron roof, electric lighting, factory plumbing, producer gas heating, and will cost \$50,000. The structure will be equipped with skylights, vaults, and fireproof doors and windows. Architect F. H. Herbert, 65 Adelaide street east, Toronto, prepared the plans.

Alton, Ont.—The Beaver Woollen Mills of this place, owned by Wm. Algis, have been almost totally destroyed by fire. Loss estimated at \$20,000, with insurance of \$10,000.

Hamilton, Ont.—The People's Brewing Company of this place, have taken out a permit for the erection of a new brewery at an estimated cost of \$131,000.

Summerstown, Ont.—The Royal Cheese Factory at this place has been totally destroyed by fire. Loss not stated. The building was owned by Mr. H. McLaren.

Winger, Ont.—The evaporators of the Erie Evaporator Company, at Winger, Ont., owned by Mr. W. J. Alkens, of Dunnville, have been totally destroyed by fire. Loss estimated at \$80,000, covered by insurance.

Latchford, Ont.—The Empire Lumber Company's plant at this place has been damaged by fire to the extent of \$30,000.

Sarnia, Ont.—Contracts have been awarded as follows for the rebuilding of the Standard Chain Company's building, which was recently destroyed by a wind storm. Mason work, John Forkin; carpenter work, Thos. Grace. A. Crockett, of Pittsburg, manager of the company, will superintend the construction of the buildings.

Montreal, Que.—The contract for the erection of a factory at 161 McCord street, for the General Fire Extinguisher Company, 620 St. Paul street, has been awarded to Chas. Thackeray, 242 St. James street. Plans for the building were prepared by Architect Robt. Findlay, 10 Phillips Place. The structure will cost \$17,500. The carpenter work has been submitted to Shearer, Brown & Willis, 225 St. Patrick street.

Quebec, Que.—The planing and sawmills of Onesime Chalibur, at the corner of Princes Edward and Laliberte streets,

Quebec, have been damaged by fire to the extent of about \$3,000.

Causapsal, Que.—Among the recently incorporated companies is the Matapedia Lumber Company, capitalized at \$140,000, with headquarters at Causapsal, County of Matane, Quebec. The incorporators are: Jean Baptiste Napoleon Piche, Odilon Napoleon Piche, Joseph Napoleon Piche, and Joseph Lurger Piche, all of Causapsal, Que., and Ernest E. Piche, Campbellton, N.B. The company is empowered to erect and operate sawmills, pulp and paper mills, and carry on a business of manufacturing woodwork.

New Glasgow, N.S.—Plans have been prepared for a new steel building, 135x50 ft., to replace the factory of the Humphrey Glass Company, which was recently destroyed by fire.

Glenwood, N.B.—Two large lumber mills at this place, owned by the Newfoundland Timber Estates, have been destroyed by fire. Loss estimated at approximately \$100,000.

Hunter River, P.E.I.—The Starch Factory at this place has been completely destroyed by fire, entailing a loss of about \$8,000, half of which is covered by insurance.

Vancouver, B.C.—A joint stock company will be organized by John Hanbury, Brandon, for the purpose of erecting a large sawmill on False Creek, near the south end of the new Granville street bridge, at this place. Mr. Hanbury is president of the Hanbury Manufacturing Company which owns mills in Brandon and the Kootenays.

Port Moody, B.C.—The British Columbia Refining Company has secured a site of eight and a half acres, with water frontage of 1,500 feet, at this place, on which they will erect an oil refinery, with an annual capacity of 72,000 barrels. Work on the plant, which it is estimated will cost \$150,000 will be commenced shortly, and it is expected that the structure will be completed by March next. The enterprise is being promoted by Mr. Leon Melnikov of Vancouver. The officers of the company are: Messrs. Robert Kelly, T. F. Neelands, A. M. Tyson, Hugh McLean, Major J. Duff Stuart, and Colonel Tracy of Vancouver; Mayor Keary of New Westminster; and Fred L. King, President of the Keystone Oil Company, Ltd., of Seattle.

Gas Plants, Elevators and Warehouses

Toronto.—A. Campbell has been awarded the contract for alterations to warehouse on Don Esplanade, near Blevin Place, for H. B. Johnson, 137 River street. The improvements will cost \$14,000.

Toronto.—Messrs. Wilson & Warden, 174 King street east, have awarded the contract for a two-storey and basement brick office and warehouse to be built at 60 Duchess street, near George street, at cost of \$12,000, to Dancy Bros., 340 Palmerston Boulevard. Plans for the structure were prepared by Architect Geo. R. Harper.

Toronto.—The contract for a two-storey brick storage warehouse to be erected on College street, near Bellome Ave., at cost of \$10,500, has been let to Self Bros., 78 Howard street. Wickson and Gregg are the architects.

Hamilton, Ont.—The Domestic Specialty Company's warehouse at this place, which was recently damaged by fire to the extent of \$5,000, will be rebuilt at once.

Fort William, Ont.—The contract for the new Grand Trunk terminal elevator to be erected here, has been awarded to Messrs. James Stewart & Co. The eleva-

tor will have a capacity of 4,000,000 bushels, and will be absolutely fireproof.

Fort William, Ont.—Mr. W. J. Ross, of this place, has taken out a permit for the erection of a warehouse to cost \$4,000.

Wyoming, Ont.—Mr. A. Laing's grain warehouse at Wyoming, Ont., has been destroyed by fire. Loss not stated.

London, Ont.—The Hobbs Manufacturing Company have taken out a permit for the erection of a one-storey frame storage building on Ridout street.

Montreal, Que.—Architects Mitchell & Creighton, Inglis Building, have awarded to Thos. O'Connor, 183 Ottawa street, the contract for plumbing and heating system to be installed in the new Lyman warehouse.

Montreal, Que.—Damage in the neighborhood of \$50,000 was done by fire to one of the warehouses of the Montreal Cotton and Wool Waste Company, Ltd., 34 Duke st., Montreal, the loss amounting to about \$12,000. S. E. Linchtenheim, managing director, states that the company will rebuild immediately.

Winnipeg, Man.—The Scottish Co-operative Society has decided to at once erect six elevators in Manitoba, along the Grand Trunk Pacific. Others will be built next year. The company has a representative in the Grain Exchange at Winnipeg.

Victoria, B.C.—Tenders were recently opened for a cold storage warehouse to be erected at a cost of \$300,000, for the B. Wilson Company, Limited. The building, which will be erected on Herald st., will be three storeys and basement in height, and will be equipped with a modern elevator service, tile floors in office, and other modern features. The power and machinery equipment includes two large boilers and an electric generator. Hooper & Watkins, of Victoria, are the architects.

Electrical Construction

Glencoe, Ont.—A by-law will be submitted to the local ratepayers on November 16, for the purpose of authorizing the expenditure of \$11,000 for the establishment of a municipal electric light plant.

Montreal, Que.—Mr. Cowie, Engineer of the Harbor Commission, is preparing plans for an electric plant to be erected at a central point on the harbor front, for the production and distribution of power required for every purpose along the harbor.

Vancouver, B.C.—Revised plans for extensive improvements to be made by the British Columbia Electric Railway, in the way of developing the hydraulic and generating equipment of its plant at Lake Buntzen, have been prepared. According to the new plans the hydraulic equipment will be so changed as to have a capacity of 52,000 horse-power, and the electrical units to be installed will be equal to this amount. The work also involves extensive tunnel improvements and the construction of a massive dam at the outlet of Lake Coquitlam.

Bridges, Wharves and Subways

Toronto.—City Engineer Rust estimates the cost of constructing the proposed viaduct from Niagara and Wellington sts., over the railway tracks to Garrison Commons, at \$165,000.

Toronto.—Plans are being prepared for the construction of a new bridge to cross the Don at the foot of Winchester street. The estimated cost of the structure, \$15,000.

Hamilton, Ont.—It is reported that a new steel bridge will be built over the C.P.R. and T.H. & B. tracks at Garth street.

Michipicoten River, Ont.—Tenders will be received up to 4.30, November 27, for the construction of a wharf at the mouth of the Michipicoten River, District of West Algoma, Lake Superior, Ont., according to plans and specifications on file at the office of J. G. Sing, Resident Engineer, Confederation Life Building, Toronto; E. B. Temple, Resident Engineer, Port Arthur; Postmaster at Michipicoten River, Ont.; and at the Department of Public Works, Ottawa.

Pelee Island, Ont.—Tenders will be received up to 4.30 p.m., November 23, for the construction of an extension to the west wharf at Pelee Island, Essex County, Ontario, according to plans and specifications on file at the offices of J. G. Sing, Resident Engineer, Confederation Life Building, Toronto; H. J. Lamb, Resident Engineer, London; Postmaster at Pelee Island; and at the Department of Public Works, Ottawa.

Peterboro, Ont.—A by-law will be submitted to the local ratepayers in January next, for the purpose of authorizing the construction of a new bridge at Smith street.

Port Hope, Ont.—At a meeting of the Town Council it was decided to accept the tender of W. G. Gibson for the construction of the new bridge on Walton street, subject to plans and specifications to be prepared by the solicitor and Street and Bridge Committee. The bridge will cost \$3,095.

Providence Bay, Ont.—Tenders will be received up to 4.30 p.m., November 16, for the construction of an extension to the wharf at Providence Bay, Township of Carnarvon, Manitoulin Island, Algoma, Ont., according to plans and specifications on file at the offices of J. G. Sing, Resident Engineer, Confederation Life Building, Toronto; H. J. Lamb, Resident Engineer, London Ont.; the Postmaster at Providence Bay, Ont., and at the Department of Public Works, Ottawa. Nap. Tessier, Secretary, Department of Public Works.

Missanable, Ont.—The C.P.R. bridge near Missanable, Ont., has been destroyed by fire. The structure will be rebuilt.

Stratford, Ont.—At a meeting of the City Council it was decided to accept the offer of the Grand Trunk Railway Company to build a new steel bridge at this place.

Montreal, Que.—Mr. Cowie, Engineer of the Harbor Commission, is preparing plans for the construction of a new dry dock to be equipped with all the latest devices.

Montreal, Que.—The Harbor Commissioners are arranging for the construction of a cement wall or case along the piers, to protect the piles from decay. This work will be carried on as soon as the necessary funds are available.

Lake St. John, Que.—The bridge spanning the Assoumouchouan River, Lake St. John district, has been destroyed by fire. The bridge, which was of wood, was constructed by the Provincial Government at cost of \$20,000. It will probably be replaced by a more substantial structure.

St. Andre, Que.—Tenders will be received up to 4.30 p.m., November 23rd, for the construction of an extension to wharf at St. Andre, Kamouraska County, Province of Quebec, according to plans and specifications on file at the office of J. L. Michaud, Resident Engineer, Merchants Bank Building, Montreal, P.Q.; A. R. Decary, Resident Engineer, Post Office Quebec, P.Q.; the Postmaster at St. Andre de Kamouraska, P.Q.; and at the Department of Public Works, Ottawa.

Three Rivers, Que.—Tenders will be received up to 4.30 p.m., November 27, for the construction of a timber dock and ice breaker at Three Rivers, according to plans and specifications on file at the offices of A. Decary, Resident Engineer, Post Office, Quebec; Chas. Desjardins, Clerk of Works, Post Office, Montreal; F. X. Berlinger, Resident Engineer, Three Rivers; and at the Department of Public Works, Ottawa. Nap. Tessier, Secretary, Department of Public Works, Ottawa.

Devil's Island, N.S.—Tenders will be received up to 4.30 p.m., November 19, for the construction of an extension to the breakwater at Devil's Island, Halifax County, N.S., according to plans and specifications on file at the offices of C. E. W. Dodwell, Resident Engineer, Hal-

fax, N.S.; E. G. Millidge, Resident Engineer, Antigonish, N.S.; the Postmaster at Eastern Passage, N.S.; and at the Department of Public Works, Ottawa. Nap. Tessier, Secretary, Department of Public Works, Ottawa.

Minasville, N.S.—Tenders will be received up to November 19, for the construction of a breakwater at Minasville, Hants County, N.S., according to plans and specifications on file at the offices of C. E. W. Dodwell, Resident Engineer, Halifax, N.S.; E. G. Millidge, Resident Engineer, Antigonish, N.S.; the Postmaster at Minasville, N.S.; and at the Department of Public Works, Ottawa. Nap. Tessier, Secretary, Department of Public Works, Ottawa.

Lower Caraquez, N.B.—Tenders will be received up to 4.30 p.m., November 16, for the construction of a wharf at Lower Caraquez, Gloucester County, N.B., according to plans and specifications on file at the offices of E. T. P. Shewen, Resident Engineer, St. John, N.B.; Geoffrey Stead, Resident Engineer, Chatham, N.B.; the Postmaster at Lower Caraquez, N.B.; and at the Department of Public Works, Ottawa.

Fredericton, N.B.—The City has laid a request before the Hon. Dr. Pugsley, Minister of Public Works, for an appropriation of at least \$20,000 for the construction of new wharves at this place.

St. John, N.B.—Tenders will be received up to 4.30 p.m., Nov. 20, for the construction of a wharf at Partridge Island, St. John Harbor, St. John County, N.B., as per plans and specifications on file at the offices of E. T. P. Shewen, Resident Engineer, St. John, N.B.; Geoffrey Stead, Resident Engineer, Chatham, N.B.; and at the Department of Public Works, Ottawa. Nap. Tessier, Department of Public Works, Ottawa.

Harvey Bank, N.B.—Tenders will be received up to 4.30 p.m., Nov. 20, for the construction of an extension to Dow's Wharf at Harvey Bank, Albert County, N.B., according to plans and specifications on file at the offices of E. T. P. Shewen, Resident Engineer, St. John, N.B.; Geoffrey Stead, Resident Engineer, Chatham, N.B.; the Postmaster at Harvey, N.B., and at the Department of Public Works, Ottawa. Nap. Tessier, Secretary, Department of Public Works, Ottawa.

Winnipeg, Man.—The Transcontinental Railway engineers have submitted to the special committee of the City Council for approval, plans for the proposed bridge across the Red River, from Lombard street to the St. Boniface side. The plans provide for two separate superstructures on the same abutments, one for the G.T.P. and the other for street cars, roadway and footpath. Estimates will be submitted on approval of the plans.

Waterworks, Sewers and Canals

Hamilton, Ont.—The Fire and Water Committee has awarded to the John Montgomery Company, of Toronto, the contract for a system to pump water to the mountain top. Contract price, \$6,500. The contract calls for a compressor, motor, four tanks and two water elevators.

Hamilton, Ont.—Contracts have been awarded as follows for the Hamilton Waterworks system, viz.: Pumps, John McDougall Co., contract price, \$7,220; motors, Canadian Westinghouse Company, Hamilton, contract price, \$12,928. The latter company also secured the contract for the installation of the new pumps and motors for the Beach pumping house. Their tender was \$20,148.

Burlington, Ont.—A by-law will be submitted to the local ratepayers for the purpose of authorizing the installation of a waterworks system at this place.

Owen Sound, Ont.—At a meeting of the City Council it was decided that a by-law be submitted to the ratepayers in January for the purpose of authorizing the expenditure of \$100,000 for an extension of the local waterworks system.

Trent Canal.—Tenders will be received at this office up to 4 p.m., Nov. 17, for the works connected with the construction of the Lindsay section of the canal. Plans and specifications can be seen, and forms of tender obtained at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the

office of the Superintending Engineer, Trent Canal, Peterboro. L. K. Jones, Secretary, Department of Railways and Canals, Ottawa.

Vancouver, B.C.—The following contracts have been awarded in connection with the extensions to the Waterworks System at Vancouver, B.C., viz.: Steel mains, Thomas Piggott, of Glasgow, per W. Beverly Robinson, contract price \$53,939; cast iron pipe, A. J. Forsyth, Vancouver, contract price, \$29,491; pipe for main at Second Narrows, Evans, Coleman & Evans, Vancouver, contract price, \$44 per ton; 100 Ludlow hydrants, Robertson-Godson Company, Vancouver, contract price, \$40.50 each.

Saskatoon, Sask.—The by-laws to authorize the raising of \$30,610 for the extension of the sewerage system and \$26,000 for the extension of the waterworks system, Saskatoon, Sask., have been given their second reading.

Saskatoon, Sask.—Messrs. McVean & Craig, Prince Albert, Sask., have been awarded the contract for the construction of the extensions of the sewers and waterworks systems at this place to the new City Hospital and Alexandra School.

Railway Construction

Toronto.—At a meeting of the City Council it was decided to construct an independent street car line from the centre of the city, along Adelaide St., to the north-west section of the city.

Hyde Park, Ont.—The Grand Trunk Railway is negotiating for a site at Hyde Park, five miles from London, on which to erect a new station. A new siding will also be built.

Ottawa.—The Canadian Western Railway Co. will make application at the next session of Parliament for articles of incorporation for the purpose of constructing, equipping, maintaining and operating a railway system in the Western portion of Canada.

Fort William, Ont.—Tenders were recently opened by J. Oakley, Chairman of Street Railway Committee for the construction of the street railway car barn and machine shop for the city of Fort William. The buildings will be of brick and reinforced concrete, with steel roof trusses, and will cost \$30,000. H. S. Hancock, City Engineer, is the architect.

The Grand Trunk Pacific Railway has decided to at once erect ten station buildings at various points along the line where depots have not as yet been provided. Tenders for these buildings will be called for in the near future.

Montreal.—The Grand Trunk Railway is contemplating the installation of a block system on the main line from Montreal to Sarnia, and also from Sarnia to Chicago. It is believed that the work will be started in the spring, and will cost about \$1,350,000 for the 900 miles of track.

Montreal.—It is reported that Chief Engineer R. G. Kelly is at work on a new terminal scheme for Montreal, which will involve a cost of several millions of dollars. The plans in contemplation include the construction of an air line from the Victoria Bridge to Bonaventure station, where it is proposed to locate the terminal structure.

Montreal.—The new Grand Trunk Railway ticket offices, at the corner of St. James and St. Francois Xavier Sts., have been badly damaged by fire. Loss not stated.

Winnipeg, Man.—The contract for the construction of new carshops, etc., for the Winnipeg terminals of the National Transcontinental Railway, has been awarded to Messrs. Thomas Kelly & Sons, of this city. The work, which calls for the expenditure of about \$500,000, will be commenced at once.

Winnipeg, Man.—J. H. Tremblay, St. Boniface, Man., has been awarded the contract for the two large freight sheds to be erected near the Union Depot, in the C.N.R. yards, for the joint use of the Grand Trunk Pacific and the Canadian Northern, at a contract price of \$92,749. The buildings, which will be of structural steel, will be 500 feet long, one being 40 and the other 40 feet wide.

Winnipeg, Man.—The Grand Trunk Pacific Railway has awarded to the Carter, Halls, Aldinger Company, of this city, the contract for the erection of three sta-

tion buildings at the following places, viz.: Wainwright, Biggar and Waterous, Sask. The total cost of the structures will be approximately \$40,000.

Victoria, B.C.—Chas. M. Hayes, general manager of the Grand Trunk Pacific Railway, announces that tenders will be called for in the immediate future for the construction of an additional 200 miles of railway west of Wolfe River, extending well into British Columbia.

Saskatoon, Sask.—The Canadian Northern Railway will, in all probability, let the contract this fall for the erection of a new station building at this place.

Saskatoon, Sask.—The Canadian Northern Railway will immediately start the erection of new freight sheds on First avenue, between Twentieth and Twenty-first streets. The plans call for a building 240 feet long by 40 feet wide, of metal clad construction, with hardwood floors.

Business Buildings

Toronto.—Architects Ellis & Connery, Manning Chambers, are preparing plans for a large department store building to be erected upon the circle now occupied by Knox College, for the British-Canadian Departmental Stores, Limited, London. The building will be 368 feet square in ground dimensions, and twelve stories in height, having granite and marble for the three lower stories, above which will be glazed terra-cotta. The frame of the building will be of steel and concrete construction. The elevator service will include 21 passenger and eight hydraulic plunge elevators. A large glass canopy, arching into domes at the entrances, which will have revolving doors, will extend around the building over the first story. A complete power and machinery plant will be installed for the purpose of providing light, heat and ventilation. It is estimated that the building will cost \$1,250,000.

Toronto.—Architect P. H. Finney, 43 Victoria street, has prepared plans for five stores and dwellings to be erected at the north-west corner of Bloor street and Brunswick avenue for Geo. Phillips, 536 Huron street, at an estimated cost of \$25,000. The building will be three stories in height, of pressed brick construction, with stone foundation, slate roof, maple floors, pine interior finish, open plumbing, combination lighting, steam heating, plate glass display windows, electric bells. The owner will purchase the necessary materials for the mason and carpenter work, which he will do himself; contracts for the other branches of the work will be sub-let.

Hamilton, Ont.—The McLaughlin Carriage Company has purchased a property on King street, near the corner of Bay street, on which they will erect a new \$15,000 building.

Fort William, Ont.—W. J. Pierson, contractor, has been awarded the contract for the erection of the Enzer block on Simpson street.

London, Ont.—Tenders have just been opened for the construction of two stores etc., adjoining the Oddfellow's building, for the London Loan Company. Plans and specifications for the building were prepared by W. G. Murray, architect, Masonic Temple.

Glencoe, Ont.—Messrs. R. F. Howard & Son have purchased the site adjoining their present building, on which they will erect a new structure, two stories in height, 44 by 90 feet.

Montreal.—J. C. Cusson, 96 Agnes St., has taken out a permit for the erection of three buildings, containing three stores and five dwellings, on St. James street, at cost of \$13,000.

Montreal.—Architects Mitchell, Creighton & Creighton, Inglis Building, have awarded to Geo. Heavins, 46 Bleury St., the general contract for the building to be erected on Lorne Crescent avenue for Messrs. Fraser Bros.

Montreal.—The Castle Blend Tea Co., Limited, have taken out a permit for the erection of two store buildings at 382 St. James street, Montreal, at cost of \$7,000. Architects Saxe & Archibald, 59 Beaver Hall mill, prepared the plans.

Montreal.—Contracts have been awarded as follows for alterations to residence, to be changed into stores, on St. Denis street, near St. Catherine street, for Mr. J. Beaudry, viz.: Steel, Dominion Bridge

Company; plumbing and roofing, John Date; carpentry, Jos. Marcotte; masonry, and brick, M. Huberdeau, all of Montreal, Montreal.—The establishment of O. Poirier, dealers in leather, etc., on St. Paul street, has been damaged by fire to the extent of \$8,000.

Montreal.—The Provost Estate Property, which has a frontage on St. Catherine street of 128 feet and 271 feet on Mountain street, has been purchased by J. Stephenson Brown, real estate agent, Guardian Building. It is quite probable that a large building will be erected on this property, of which information will be given later.

Three Rivers, P.Q.—The Bell Telephone Company have awarded the general contract for the erection of its new Exchange Building, to be built here, to C. E. Deakin, 11 St. Sacrament street, Montreal. J. W. Carmichael, also of that city, is the architect.

Minitonas, Man.—Messrs. Foley & Larson's general store, at this place, has been destroyed by fire. Loss estimated at \$16,000, partly covered by insurance.

Brandon, Man.—Messrs. Nation & Maybee, have taken out a permit for the erection of a brick store building on the corner of Ninth street and Pacific avenue, at a cost of \$5,000.

Edmonton, Alta.—The floors of the wholesale building of Foley, Lock & Larson, at this place, have collapsed. The building, which is practically new, is three stories in height, of solid brick construction. The damage is estimated at over \$100,000.

Edmonton, Alta.—C. L. Carsley has taken out a permit for the erection of a store and office building on first street, at an estimated cost of \$9,500.

Public Buildings

Toronto.—The Parks Committee has again sent on to Council the recommendation that the proposed palm house in Allan Gardens be built. The matter has been referred back to allow of avatories and a boiler house being added to the plan, but the committee made no change. The building will cost \$30,000. City Architect McCallum is the designer.

Toronto.—The Property Committee has forwarded to the City Council the report of Commissioner Harris, recommending the erection of a new registry office on a property near the City Hall.

Toronto.—Messrs. Keith & Fitzsimons, 111 King street west, have been awarded the contract for installing the electric wiring and fixtures in the circulation department of the new Carnegie Library on College street.

Collingwood, Ont.—The Main Exhibition building, at this place, has been destroyed by fire. Loss estimated at approximately \$5,000. It is proposed to erect a one-story building to replace same.

Kingston, Ont.—R. N. F. McFarlane has been awarded the construction of the city hall dome at a contract price of \$12,135. It will be of wood construction.

Niagara-on-the-Lake, Ont.—Messrs. Baker & Jordhal, Manning Chambers, Toronto, have been awarded the contract for the Rifle Range to be constructed at Niagara-on-the-Lake for the Dominion Government.

Montreal.—The City Morgue has been damaged by fire to the extent of \$15,000.

Montreal.—Estimates are being prepared on fire escapes for the City Hall. It is proposed to ask the Finance Committee for the necessary funds, which is approximated at \$6,000.

St. John, N.B.—The Executive of the Exhibition Association is contemplating the erection of new exhibition buildings at this place.

Vancouver, B.C.—The Board of Park Commissioners have decided to ask the City Council to submit a by-law to the ratepayers for the purpose of authorizing the expenditure of the sum of \$35,000 for new improvements. Of this sum \$25,000 will be required for the proposed new bath house at First Beach, the remaining \$10,000 to be used in providing athletic grounds, etc. Plans prepared by Architect C. E. Blackmore for the proposed bath house, have been approved. The plans provide for a building of white concrete, with tile floor, eight shower baths, etc.

Vernon, B.C.—Tenders, addressed to the undersigned, will be received up to 4.30 p.m., Nov. 20, for the construction of a public building at Vernon. Plans and specifications can be seen and forms of tender obtained at this Department and on application to the Postmaster at Vernon, B.C. Nap. Tessier, Secretary, Department of Public Works, Ottawa.

Banks

Revelstoke, B.C.—Architect A. F. Dunlop, Lindsay Building, Montreal, has prepared plans for a branch bank building to be erected here for the Moisons Bank.

Clubs and Societies

Toronto.—The Lakeview Curling Club, 146 Harrison street, Toronto, has taken out a permit for the erection of a one-story brick curling club building at the above address. Architects Denison & Stephenson, 20 King street west, are the designers of the building.

London, Ont.—St. John's Athletic Club has taken out a permit for the erection of a club house at the corner of Oxford and Waterloo streets.

Ottawa, Ont.—The Board of Management of the King's Daughters have purchased the property known as Berwick Hall, No. 219 Laurier avenue west, and will, either make extensive alterations and additions to the building or erect an entirely new structure on this site.

Walkerville, Ont.—The Tecumseh Boat Club has decided to erect a new clubhouse on a site adjoining the Pratt farm. The property has a frontage of 138 feet. Plans for the proposed building have been prepared by Messrs. Porter and Kerrigan, of the Canadian Bridge Company, and are at present in the hands of Architects Watt & Crane, who will make the required alterations, and who will superintend the construction of the building. The structure, which will be of frame and plaster cast construction, will cost in the neighborhood of \$6,000, exclusive of plumbing, heating and lighting.

Montreal.—Architects Saxe & Archibald, 51 Beaver Hall Hill, have awarded the contract for alterations and interior decorating in the Masonic Temple on Dorchester street to Thomas Wand, 326 Laval avenue.

Nelson, B.C.—Tenders have recently been called for the new block to be erected on Baker street by the Fraternal Order of Eagles. The building will be two stories and basement in height, of brick and stone construction; the first floor and basement to be used for stores and the second floor for lodge purposes. The main hall will be 34 by 65 feet, and will have a parquet flooring.

Asylums and Hospitals

Toronto.—The site for the new General Hospital, to be erected on College street, has been purchased. The property acquired is bounded on the north and south by College and Hayter streets, and on the east and west by Elizabeth street and University avenue, and has a frontage of about 725 feet, with depth of 620 feet. Architects Darling & Pearson, 2 Leader Lane, are preparing new plans for the building, which, it is estimated, will cost about \$1,112,000. The president of the General Hospital Board is J. W. Flavell.

Ottawa, Ont.—The sum of \$30,000 has been subscribed so far for the new hospital building to be erected at Bayswater, by the Anti-Tuberculosis Society of Ottawa. Of this sum, \$10,000 will be contributed by the Daughters of the Empire.

Kingston, Ont.—At a meeting of the City Council it was decided to erect an isolation hospital, to accommodate twenty patients, on the smelter site. Estimated cost of building, \$2,500.

Hamilton, Ont.—At a meeting of the Hospital Board it was decided to ask the City Council to submit a by-law to the ratepayers next January for the purpose of authorizing the expenditure of \$25,000 to complete the Fever Hospital, and to further equip the Nurses' Home.

Montreal.—The Montreal League for the Prevention of Tuberculosis has accepted Lt.-Col. Burland's offer of \$50,000 for a tuberculosis dispensary and institute, providing they would give an ad-

ditional \$50,000 as an endowment fund. Co. Burland has purchased a building, on Belmont Park, at a cost of \$30,000, and is having plans prepared for its conversion into a combined hospital and dispensary, at an additional cost of \$20,000. It is expected that the building will be completed by May 1st next.

Regina, Sask.—Ald. Thompson states that the excavation work for the new Municipal Hospital to be erected at this place will be commenced in the near future, and the foundations will, in all probability, be completed this fall. Tenders will be called for as soon as the plans are completed.

Residences and Flats

Toronto.—Architects Ellis & Connery, Manning Chambers, have prepared plans for an eighteen suite apartment building to be erected on Carlton street, near Parliament street, for J. Curry. The building will be of solid brick construction, with stone trimmings, tar and gravel roof, marble and tile work in entrance, hardwood interior finish, gas and electric lighting, open plumbing and steam heating.

Toronto.—Architect W. G. Hunt, 255 Westmoreland avenue, has prepared plans for two semi-detached two and one-half story dwellings to be erected at 252 Westmoreland avenue for J. Bulger, Bartlett and Van Horne streets, at cost of \$7,600. The building will be of brick construction, with stone foundation, shingle roof, pine floors, pine interior finish, open plumbing, hot air heating, combination lighting, plate and art glass and electric bells.

Toronto.—Architect W. G. Hunt, 255 Westmoreland avenue, has prepared plans for a two and one-half story brick residence to be erected at 184 Howland avenue, for Mr. Condes, at cost of \$4,000. The building will have stone foundation, shingle roof, oak floors, pine interior finish, open plumbing, hot water heating, combination lighting, plate glass, electric bells and one mantel. The general contract for the building has been awarded to M. Wallace, 489 Church street.

Toronto.—J. W. Devitt, 92 Albany avenue, has taken out a permit for the erection of three pairs of two-story and attic semi-detached brick dwellings on the east side of Palmerston avenue, near London street, at cost of \$15,000. The building will be erected by the owner.

Toronto.—The contract for the erection of a two-story and attic brick dwelling on the west side of Poplar Plains Road, near St. Clair avenue, for C. E. Potter, of the City Dairy Company, has been let to J. W. Ham, 490 Givens street. Plans for the building, which will cost \$9,000, were prepared by Architect J. H. Stanford.

Toronto.—Architect E. G. Wilson, 77 Victoria street, has prepared plans for a two story residence to be erected on Castle Frank avenue, for D. C. Smith, 33 Rose avenue, at an estimated cost of \$4,500. The building will be of brick construction, with brick foundation, shingle roof, oak floors, oak and pine interior finish, open plumbing, combination heating, hot water heating, one dumb waiter, art glass, electric bells and four mantels. The building will be erected by the owner, and the first story will be faced with cement stucco.

Toronto.—Mr. Geo. Phillips, 556 Huron street, has purchased the property at the north-west corner of Bloor street and Brunswick avenue, on which he will erect a block of stores, with apartments above, at cost of approximately \$75,000. The site has a frontage of about 77 feet on Bloor street, with depth of about 110 feet.

Toronto.—The Keltz Building Company, care of Architect W. G. Hunt, 255 Westmoreland avenue, who designed the structure, has taken out a permit for the erection of six pairs of brick veneer front and roughcast dwellings on the west side of Gladstone avenue, near Halla street, at cost of \$18,000.

Toronto.—L. J. Bland, 18 Vermont avenue, has taken out a permit for the erection of three pairs of two-story semi-detached brick dwellings on the south side of Dupont street, near Christie street at cost of \$12,000.

Toronto.—Architect J. H. Stanford, Yonge Street Arcade, has prepared plans

for the erection of a residence at 657 Palmerston avenue for J. W. Devitt, 92 Albany avenue, at cost of \$4,000. The building will be of brick construction, with stone foundation, slate and gravel roof, pine floors, pine interior finish, open plumbing, combination lighting, hot air heating. The contract for the mason work has been awarded to F. W. Weale, 35 Linusay avenue.

Toronto.—R. C. Vaughan, 639 Huron street, has taken out a permit for the erection of five pairs of two-story, semi-detached brick dwellings on the south-east corner of Dupont street and Howland Road, at cost of \$20,000.

Toronto.—Messrs. Love Bros., Limited, 1000 Gerrard street east, have taken out a permit for the erection of three pairs of two-story semi-detached brick veneer front and roughcast dwellings on the east side of Logan avenue, near Gerrard street, at cost of \$10,800. Architect, R. H. Finney, 43 Victoria street. The owners will do the construction work.

St. Catharines, Ont.—Contracts have been awarded as follows for a two-storey 30 by 44 feet frame residence to be erected for Miss F. Richardson: Masonry, cement work and plastering, W. Bennett; carpentry work, Williams & Nesler; heating, plumbing and sheet metal work, John Peart. Architect A. E. Nicholson prepared the plans.

Hamilton, Ont.—Alanson Moote has taken out a permit for the erection of three brick dwellings at the corner of Stinson and Ontario avenue, at cost of \$3,400. A permit was also granted to M. M. Webb for the erection of six brick dwellings on McNeil street, east of Queen street, at estimated cost of \$12,000.

Brantford, Ont.—Chas. Silks has been awarded the contract for the erection of two houses on Egerton street for Henry Pierce.

London, Ont.—A. Templar has taken out a permit for the erection of a two-storey brick residence on Beaconsfield ave. Other permits recently issued include a one-storey brick veneer dwelling on Dean street for H. Paisley; a brick veneer dwelling at the corner of Maitland and Victoria streets for F. W. Radcliff; a two-storey brick building on Dundas street for H. G. Abbott, and a two-storey brick building on Talbot street for Fleming and Houghtby.

Montreal.—Joseph Levy, 56 Laval avenue, has taken out a permit for the erection of a house containing five dwellings, at 246 St. Hubert street, at estimated cost of \$16,500. Architects, J. E. Vanier & W. McGregor, 6 Beaver Hall Square.

Montreal.—Architect J. Rawson Gardner, New York Life Building, has awarded the following contracts in connection with the residence to be erected on Bellevue avenue, Westmount for Arthur Fry, care of Munderloh & Co., 51 Victoria Square: Concrete work, Swan, Church & Co., 40 Hospital street; brick work, P & J. O. Brunet; plumbing, H. Bailie, 294 Mountain street; carpenter work, N. Panze & Fils, Notre Dame street west and Greene avenue.

Montreal.—The contract for the electrical work for a residence at 922 Park avenue Annex, for Mr. Thos. Wand, general contractor, has been awarded to C. Lapierre, Lindsay Building.

Montreal.—Architect Jas. E. Adamson, Coristine Building, has prepared plans for a residence to be erected on Crescent street for Chas. Skelton.

Montreal.—Mrs. B. Robinson, 230 Laval avenue, has taken out a permit for the erection of a house, containing three dwellings, on Mance street, at cost of \$11,000. A permit has also been granted to J. P. Howard, 271 Sherbrooke street west, for the erection of a residence at 740 Pine avenue, at cost of \$7,000.

Montreal.—Architect Jas. E. Adamson, Coristine Building, has completed plans for a pair of semi-detached villas to be erected on Grosvenor avenue, Westmount, for Rupert M. Sharp.

Montreal.—Architect Alphonse Piche, 54 Victoria Square, has awarded the following contracts for the erection of two houses on St. Antoine street for Mr. Als. H. Martin: Masonry, Corbell & Frere, 192 Clarke street Annex; brick, J. A. Legault, 198 Ferdinand street, St. Henri; plumbing and heating, Hickey & Anbut, 324 St. Antoine street; steel, Structural Steel Company.

Montreal.—Theo. Lefebvre, 1384 St. Andre street, has taken out a permit for the erection of four houses, containing twelve dwellings, at the corner of Caze-luis and Walnut streets, at cost of \$15,000. A permit has also been issued to F. Larrogere, 1388 St. Hubert street, for the erection of two houses, containing four dwellings, on Drolet street, at cost of \$6,000.

Montreal.—Architects Peden & McLaren, 20 St. Alexis street, have awarded to Messrs. Sparrow & McNeil, Coristine Building, the general contract for the erection of a residence on Grosvenor avenue, Westmount, for Mr. Thom.

Montreal.—Architects E. & W. S. Maxwell, 6 Beaver Hall Square, have completed plans for two houses to be built on Pine avenue for Mr. E. M. Renouf and Mr. W. S. Maxwell.

Montreal.—Mrs. Marie Papineau, 182 St. Denis street, has taken out a permit for alterations to house, at estimated cost of \$10,000.

Verdun, Que.—Architect Alphonse Piche, 54 Victoria Square, Montreal, has prepared plans for a house to be erected for Z. Charland.

Montreal.—Architect Jas. E. Adamson, Coristine Building has prepared plans for a residence to be erected on Grosvenor avenue, Westmount, for Thos. M. Barrington.

Outremont, Que.—Architect W. F. Doran, 180 St. James street, Montreal, has prepared plans for a residence to be erected here for F. H. Carlin.

Outremont, Que.—Architects Ross & Macfarlane, 1 Belmont street, Montreal, have awarded to James Young, 7 McCulloch avenue, of this place, the contract for the excavation, masonry and brick work for two residences for Mr. Gammell to be erected here.

Winnipeg, Man.—Gibbons & Company have been awarded the general contract for an apartment building to be erected for A. Monkman. The building will be of brick construction, four stories in height, and will cost \$20,000. Architects James Chisholm & Son, are the designers.

Edmonton, Alta.—E. J. Taylor has taken out a permit for the erection of a residence on Thirteenth street at an estimated cost of \$3,200.

Vancouver, B.C.—Peter Agren has taken out a permit for the erection of two frame houses on Beach avenue at cost of \$6,000.

Hotels

Toronto.—Architect F. H. Herbert, 65 Adelaide street east, has prepared plans for the rebuilding of the Nurse Hotel at the Humber, which was badly damaged by fire some time ago.

Norway, Ont.—Mr. Chas. F. Lavender, of the old Woodruff House, Kingston Road, near Woodbine avenue, will erect a new three-storey hotel building on the present site of the Norway Hotel.

Portsmouth, Ont.—The hotel building of James Short, at this place, has been damaged by fire to the extent of over \$3,000.

Fire Stations and Jails

Montreal.—Tenders were recently opened for the construction of a police station in St. Jean Baptiste Ward, according to plans and specifications prepared by Architect Jos. Art. Godin, 120a Park LaFontaine. L. O. David, City Clerk, City Hall.

Brandon, Man.—The contract for the erection of the new South Ward Fire Hall has been awarded to John Forbes at contract price of \$4,370. The contract includes both heating and plumbing.

Vancouver, B.C.—The Fire and Police Committee have awarded to Messrs. Campbell, Burke & McLay the contract for the erection of a fire hall in Grandview, according to the competitive plans submitted by Mr. L. B. Watson. Amount of tender, \$6,920, complete with heating, wiring, lighting, plumbing, etc.

Vancouver, B.C.—It is understood that a by-law will be submitted to the rate-payers next January for the purpose of authorizing the erection of additional jail quarters. It is proposed to provide a separate building for convicts.

Opera Houses and Rinks

Toronto.—Mr. Shea, of the Shea Theatre, on Yonge street, has applied for a permit to erect a new playhouse on the south-east corner of Victoria and Richmond streets. The building will have a frontage of 82 feet, a depth of 107 feet, and height of 70 feet. It will be fire-proof throughout, and will be built of brick, stone, steel and concrete. There will be two galleries and an abundance of exits.

Toronto.—Plans have been prepared and approved for the erection of a new building for the Lakeview Club to replace the one recently destroyed by fire. The following are officers of the club: President, Geo. C. Loveys; vice-president, T. A. Drummond; secretary, Hugh Spence.

Fort William, Ont.—The Executive of the Curling Club have had plans prepared for the erection of a \$10,000 curling rink to replace the one recently destroyed by fire. E. S. Rutledge, Fort William, can be addressed.

St. Mary's, Ont.—The St. Mary's Curling Club is contemplating building a rink at this place.

Cobalt, Ont.—Messrs. H. B. Dunbar & Bro., Halleybury, Ont., have been awarded the contract for the new skating and curling rink to be erected here. The building will be 50 feet in height, and will have corrugated iron roof. Estimated cost, \$6,000. W. R. Graham, of this place, is the architect.

Winnipeg, Man.—A permit has been issued to the Grand Opera Company for the erection of a brick theatre building on the west side of Main street, between Jarvis avenue and Dufferin avenue. Among the members of the company are the following, all of Winnipeg: W. E. Aisip, Douglas Bros., and A. & W. Melville. The building will cost \$35,000. Architects A. & W. Melville, Union Bank Building, prepared the plans for the structure.

Winnipeg, Man.—A new curling rink is to be erected here for the Strathcona Curling Club. The building will be of frame construction, with shingle roof, and will cost \$3,500. Plans for the building have been prepared by Architects James Chisholm & Son.

Lethbridge, Alta.—Mr. Sam. Griffiths, of Sweet Grass, Mont., has purchased four lots here at the corner of Crabb and Bompas streets, on which he will erect a large opera house.

Churches

Toronto.—The congregation of Our Lady of Lourdes Church, Sherbourne street, will erect a new church in the rear of the present building next summer. The new building will accommodate 1,000 people. Rev. Father Cruise is pastor of the church.

Brantford, Ont.—Plans for the new Lutheran Chapel at the corner of West and Nelson streets have been submitted to the contractor and it is expected that the work will start shortly. Plans for the new church have also been completed.

Montreal.—Architect J. A. Karch, 17 Place d'Armes Hill, has awarded to Messrs. Sparrow & McNeil, Coristine Building, the contract for the erection of St. Thomas D'Aquinas Church, on St. Antoine street. The building will be of pressed brick construction, with stone trimmings.

Montreal.—Architect R. Montgomery Rodden, 8 Beaver Hill Square, has awarded to W. J. Graham, 35 Cathcart street, Montreal, the contract for plumbing to be installed in the new Presbyterian Church to be erected at Maison-neuve. The general contractors of the building are Laird, Paton & Son, Limited, 455 St. James street.

Ste. Angele, Que.—Architects Oullet & Levesque, 115 St. John street, Quebec, received tenders up to Nov. 14 for the new church building to be erected at St. Angele, Que., for the Roman Catholic congregation. The building will be of stone construction, with stone foundation and galvanized iron roof. Estimated cost, \$30,000.

Three Rivers, P.Q.—Architects Daoust & Lafont have awarded the general contract for the erection of church and pres-

bytery for the parish of Ste. Phillippe to Mr. Roy of Quebec.

Preston, Ont.—The Roman Catholic congregation of this place is contemplating the erection of a new church building.

Schools and Colleges

Toronto.—The Property Committee of the Board of Education have awarded contracts as follows for improvements and enlargements to the Morse street school: Masonry, H. Lucas & Son, 141 Havelock street, \$7,427; carpentry, F. Armstrong & Co., \$5,194; plastering, T. Blackburn & Son, 208 Broadview avenue, \$1,033; painting, R. G. Johnston, 80 Gerard street, east, \$345; roofing and tin-smithing, Robert Rennie & Sons, 378 Berkeley street, \$1,127; heating and ventilating, W. F. Rutley Company, 36 Toronto street, \$272; structural steel, Reid & Brown, 63 Esplanade East, \$798.

Toronto.—The Government has approved the application of the Board of Governors of Toronto University, to be permitted to raise funds on the security of their property, for the erection of a public and high school building in connection with the new Department of Pedagogy. A site on the south side of Bloor street, between Spadina avenue and Huron street, has been procured for the Department of Education. The building will cost \$150,000.

Toronto.—The Property Committee of the Board of Education have awarded contracts as follows for improvements and enlargements to the Queen Alexandra School, viz.: Masonry, Charles Bulley, 18 Withrow avenue, \$3,750; carpentry, W. Williamson, 133 Woodbine avenue, \$2,156; plastering, T. Gander & Son, 38 Marian street, \$338; roofing and tin-smithing, R. Rennie & Son, 373 Berkeley street, \$342; heating and ventilating, Frank Armstrong & Co., \$1,296; heating registers, Nash Thermostat Company, \$299; structural steel, Reid & Brown, 63 Esplanade east, \$184; painting, J. Phinmore & Son, 10 Gerrard street east, \$333.

Toronto.—The Property Committee of the Board of Education have awarded contracts as follows for improvements and enlargements to the Howard School: Masonry, H. Lucas & Sons, 141 Havelock street, \$6,664; carpentry, Frank Armstrong & Company, \$4,229; plastering, T. Blackburn & Son, 208 Broadview avenue, \$610; painting, J. R. Robinson, \$350; roofing and tin-smithing, Webb & Dunlop, 15 Kensington avenue, \$660; heating and ventilating, W. F. Rutley Company, 36 Toronto street, \$845; structural steel work, Trussed Concrete Steel Company, 23 Jordan street, \$600.

East Toronto, Ont.—The Board of Management of the Alexandra School for Girls has decided to petition the Government for a grant of \$20,000 for the erection of an addition to the present building, and for the laying of a two-inch water pipe for a distance of 3,000 feet.

Eglinton, Ont.—Contracts have been awarded as follows for the enlargement of the public school at this place: Masonry, Harry Jennings, 105 Cottingham street, Toronto; carpentry work, Messrs. Fisher & Ramsay.

Ottawa, Ont.—At a meeting of the Public School Board plans were submitted by the Building Superintendent for the converting of the Kent Street School into a commercial and technical school. The plans provide for a four-room addition to the north and south ends of the present building; the interior of the building would also be remodelled.

Candeboyne, Ont.—The trustees of Union S.S. No. 12, Biddulph and No. 4 McGillivray, have decided to build a new school building next summer, for which a site, immediately east of Cunningham's hotel on the road to Lucan, has been selected.

Woodstock, Ont.—At a meeting of the City Council by-laws were given their third reading and passed, providing for the issue of \$10,000 in debentures for col-Company, Limited, 706 Mark Fisher Building, has been awarded the contract for laying 42,000 square feet of "Dolomment" in the Salaberry School.

Montreal.—The Montreal Dolomment Company, Limited, 706 Mark Fisher Building, has been awarded the contract

for laying 42,000 square feet of "Dolomment" in the Salaberry School.

Richbucto, N.B.—The Grammar School Building, at this place, has been destroyed by fire. Loss estimated at \$4,000.

Oak River, Man.—The four-room brick public school building, at this place, has been destroyed by fire.

Calgary, Alta.—The Management Committee of the School Board has recommended the establishment of a high school in the east end of the city and the purchase of two school sites in the south-west section of the city.

Fernie, B.C.—The Fernie Construction Company has been awarded the contract for the erection of the new public school building at the corner of Victoria avenue and Thompson street.

Civic Improvements

Toronto.—The City Council has decided to carry out extensive local improvements, including sewers, concrete curbs, pavements, concrete sidewalks and plank sidewalks, on certain described streets.

Toronto.—The City Engineer has recommended the paving of the following streets, viz.: Asphalt pavement, on Galle Ave., from Roncesvalles Ave. to Sunnyside Ave., on King street, from west side of Berkeley street to St. Lawrence street, on Dufferin street from Lindsay Ave. to Bloor street; asphalt block pavement on North Markham street from Olive Ave. to Vermont street; vitrified brick block pavement on King street from west side of St. Lawrence street to Queen street.

Toronto.—City Engineer Rust has recommended the construction of the following pavements: Margueretta street from College street to Bloor street, asphalt, \$15,387; Beaumont Road, from Glen Road, 600 feet east, asphalt, \$3,620; Silver Ave., from Golden Ave. to Morrow Ave., brick, \$2,879; Pearson Ave., from Roncesvalles Ave. to Sunnyside Ave., brick, \$3,497; Shaw street, from Bloor street to Burnfield Ave., vitrified block, \$24,943; Huntley, from Bloor street to the bridge, macadam, \$3,016; Lane, first west of Jarvis, from Shuter to south end, concrete, \$2,039.

Brantford, Ont.—At a meeting of the Collegiate Institute Board plans were submitted for the new Collegiate Institute to be erected at this place. A by-law will be submitted to the ratepayers in January for the purpose of authorizing the expenditure of \$50,000 for this improvement. The plans call for a building three storeys in height, with an annex in the rear for advanced technical school work. Architects Chapman & McGriffin, 59 Yonge street, Toronto, prepared the plans for the building.

Brampton, Ont.—The contract for the construction of the wall and sidewalk on Main street has been awarded to D. W. Mitchell at a contract price of \$3,910.

Fergus, Ont.—A by-law will be submitted to the ratepayers for the purpose of authorizing the expenditure of \$12,000 for the laying of new cement walks.

Golden, B.C.—The Trustees of the Golden School District have been instructed to carry out their plans with respect to the erection of the new school building at this place. The estimated cost of the building is \$9,000, towards which the Provincial Government has made a grant of \$5,000.

Miscellaneous

Toronto.—A company to be known as the Georgina Houses, Incorporated, has been organized for the purpose of providing homes for working women throughout Canada. Among those belonging to the corporation are: Canon Welch, Provost Macklem, Mr. D. W. Saunders, K.C., and others all of Toronto.

Toronto.—City Engineer Rust has recommended the purchase of a new hydraulic dredge, at a cost of about \$76,000.

Windsor, Ont.—Detroit capitalists have organized a mining company, to be known as the Lady of the Lake Mining Co., Ltd., with head office at Windsor. The company is capitalized at \$1,000,000.

Pembroke, Ont.—Many of the best buildings of the town of Pembroke, Ont.,

have been destroyed by fire, entailing a loss of approximately \$500,000. The chief losers are: The National Manufacturing Co., \$140,000, insurance \$90,000; Mrs. J. W. Munro, \$75,000, fully insured; J. P. Millar, \$20,000, partially insured; A. Millar & Son, \$25,000, partly insured; Moffat estate, \$10,000; Pembroke Milling Co., \$40,000, insured; Mrs. W. W. Dickson, \$12,000; Branch Bank of Ottawa, Royal Bank of Canada, Bell Telephone Co.'s office, Leland Hotel, Brash's Hotel, the Public Library, and several residences.

Klock, Ont.—Among the recently incorporated companies is the Algonquin Lumber Company, Limited, capitalized at \$48,000, with headquarters in the village of Klock, Township of Cameron, Nipissing District, Ont. The incorporators are: John Henry Maybee, lumber merchant; Milo Edgar Woodcock, lumber merchant; and William Sylvester Woodcock, lumber merchant; all of the village of Edwards, County of St. Lawrence, New York State; and Frederick Dennis Sullivan, lumber merchant, and William Andrew Sullivan, lumber merchant, both of Watertown, N.Y.

Port Arthur, Ont.—The ratepayers have passed a by-law authorizing the expenditure of \$25,000 for an addition to the telephone system at this place.

Matheson, Ont.—The new town of Matheson, on the T. & N. O. Railway, originally called McDougall's Chutes, has been literally wiped out by fire. Among the buildings destroyed are: Messrs. Revillon Bros., fur and general merchants' store; Messrs. Rothschild Bros., dry good store; Taylor's hardware store; John Clark's general store; R. A. Douglas' drug store, the post office, and the Syrian colony. The T. & N. O. Railway station was not damaged. Loss estimated at approximately \$75,000, with no insurance.

Montreal, Que.—Among the recently incorporated companies is the Asbestos Lapping and Insulator Company of Canada, Limited, capitalized at \$10,000, with headquarters at this place. The incorporators are: Philippe Durocher, advocate; Alexander Campbell Calder, manager; Caliste T. Jette, bailiff; Oscar Gagnon, student; and Edgar Reginald Parkins, advocate, all of Montreal.

Ste. Emelie, Que.—Tenders, addressed to the undersigned will be received up to 4.30 p.m., November 23rd, for the construction of a roadway and enlargement of block at Ste. Emelie (Leclercville) Lotbiniere County, Province of Quebec, according to plans and specifications on file at the offices of A. Decary, Resident Engineer, Post Office, Quebec, P.Q.; on application to the Postmaster at Leclercville, Lotbiniere County, Que.; and at the Department of Public Works, Ottawa. Nap. Tessier, Department of Public Works, Ottawa, Ont.

St. John's, N.F.—A wharf and the Blair, Gordon & Company's block at 117-135 Water street, have been destroyed by fire entailing a heavy loss partly covered by insurance. The block was occupied by the owners and a number of other mercantile houses.

St. John, N.B.—The Maritime Dredging and Construction Company of this place has been awarded the contract for dredging in the local harbor.

Victoria, B.C.—Tenders will be received up to 4 p.m., November 30th, for the supplying of lead pipe and brass goods, as per specifications, copy of which may be obtained on application to W. W. Northcott, Purchasing Agent, City Hall.

Penticton, B.C.—The following buildings at this place have been destroyed by fire, viz.: Pomeroy's fruit and tobacco store, Kent & Son's harness store, and Weatherby's barber shop. Loss estimated at \$30,000.

Calgary, Alta.—A company, to be known as the Calgary Paving Company, has applied for letters of incorporation. The company purpose operating in the West, and will make Calgary their headquarters. The directors will be Messrs. W. H. Warwick, S. McNeill, Contractor McNeill, and J. E. Warwick, of Calgary.

Toronto.—Contracts have been awarded as follows for a \$5,000 residence to be erected on Indian road, for Mr. Thomas McIlwain, 147 Jamieson avenue, viz.:

Brick, stone and excavating, Hall & Son, 32 Boustead street; heating and plumbing, Mr. Wray, 247 Delaware avenue; plastering, T. Lyons, 109 Westmoreland avenue; electric wiring, Reeder Electrical Mfg. Co., 1526 Queen street west. The building will be 2½ storeys in height, of brick construction, with stone foundation, slate roof, maple floors, pine and hardwood interior finish, open plumbing, hot water heating, electric lighting, cement cellar and walks. Architects, Simpson & Young, 17 Toronto street.

Toronto.—The City Engineer has recommended the laying of the following pavements, viz.: asphalt, Brock avenue, from Bloor street to 1,000 feet south, \$6,215; asphalt, Barton avenue, from Brunswick avenue to Howland avenue, \$1,501; asphalt, Dufferin street, from Gordon street to Subway, \$5,913; asphalt, Marguerita street, from Bloor street to 583 feet north, \$5,893; asphalt, Marguerita street, from Dundas to Bloor street, \$18,572; bitulithic, Oriole road, from St. Clair avenue to Lonsdale avenue, \$11,533; vitrified block, Dufferin street, from south side of Gordon street to Dundas street, \$9,608; asphalt, Berkeley street, from King street to Duke street, \$2,264.

Toronto.—Tenders will be received after November 18, for all trades required in the erection of a \$5,000 apartment house on King street west, Parkdale, for Mr. W. Alderson, 38 Cowan avenue. The building will be three storeys in height, of brick construction, with stone foundation, felt and gravel roof, pine floors, pine interior finish, open plumbing, hot water heating, combination lighting, dumb waiters, plate glass, art glass and electric bells. Architect, J. H. Galloway, 77 Victoria street. Tenders will be received by owner.

Quebec.—The general contract for the work to be done on the Matane and Gaspé Railway, has been awarded to the H. J. Beemer Company, of New York. Work has already been commenced, and the first two miles of track, and the sub-structures for the bridge over Metis River will be completed this fall. The total length of the railway will be 240 miles.

Toronto.—The general contract for a store and dwelling to be erected at 178 Queen street west, for Mr. S. Hallis, 233 Queen street west, has been awarded to Mr. P. Anderson, 45 Hazelton avenue, who will purchase all necessary materials and do the entire work. The building will be two storeys in height, of brick construction, with stone foundation, gravel roof, maple and pine floors, oak and pine interior finish, floor and walls of tile in store, open plumbing, combination lighting, hot water heating. Specifications include one dumb waiter, three skylights, ornamental columns, plastic relief work, plate glass, electric bells, refrigerator. The front of the building will be of enamelled brick, buff brick and Indiana sandstone. Estimated cost, \$5,000.

Toronto.—Architect P. H. Finney has prepared plans for the erection of an addition to the E. H. Harcourt & Co.'s factory at 255 Wellington street west. The building will be of brick construction, with brick foundation, felt and gravel roof, pine floors, cement floor in basement, combination lighting. Specifications include structural iron, metal ceilings, fireproof doors and windows, plate glass, electric bells. Work on the building, which will cost \$5,000, will be commenced this fall, or early next spring.

Toronto.—Architect Leonard Foulds, 43 Victoria st. has prepared plans for a 2½ storey residence to be erected on DeLisle street, Deer Park, for Mr. V. B. Marle, Adelaide street east; estimated cost, \$5,000. The building will be of brick construction, with brick foundation, shingle roof, concrete cellar and walks, oak floors, pine and hardwood interior finish, open plumbing, hot water heating, combination lighting. Specifications include tile, plastic relief work, plate glass, art glass, electric bells, three mantels. Size of building, 27 by 37 ft.

Toronto.—The Ontario Asphalt Block Company of Windsor, will in all probability establish a plant on the water front at this place. A site of three acres will be required, and, in the event of the company locating here, they will erect a substantial structure, and employ a large number of men. Vice-President of the

Company, C. W. Cadwell, Windsor; Local Agent, T. B. Goodman.

Toronto.—Architect Leonard Foulds, 43 Victoria street, has prepared plans for a \$3,000 residence to be erected on Avenue Road, north of Bloor street, for Mr. Geo. Griffin, North street. The building will be of brick construction, with brick foundation, slate shingle, felt and gravel roof, oak floors, Georgia pine interior finish, combination lighting, open plumbing, hot air heating, ornamental columns, plastic relief work, plate glass, electric bells and two mantels.

Toronto.—Mrs. I. Standish, 18 Toronto street, has taken out a permit for the erection of a 2½ storey brick dwelling on Warren Road, near Clarendon Avenue, at cost of \$9,000. Architect, W. R. Gregg, Bank of Commerce Building. Builders, Orr Bros., 35 Queen street east.

Toronto.—Architect Leonard Foulds, 43 Victoria street, has completed plans for two 2½ storey dwellings to be erected on Avenue Road, north of Bloor street, for Mr. Geo. Griffin, North street. The buildings will be of brick construction, with brick foundation, slate shingle, felt and gravel roof, oak floors, Georgia pine interior finish, combination lighting, open plumbing, hot air heating. Specifications include ornamental columns, plastic relief work, plate glass, electric bells, two mantels. Estimated cost, \$5,000.

Toronto.—W. Fountain, 30 Adelaide st. west, has taken out a permit for the erection of a two-storey brick stable and carriage house at 8-10-12 anauley st, near Queen street, at cost of \$3,500. Architect, Jas. Thompson, 43 Victoria street.

Toronto.—Architects Eden Smith & Son, 199 Yonge st, have awarded the following contracts for the erection of a \$12,000 residence on Oriole Road, north of St. Clair avenue, for Mrs. T. J. Brough, 199 Yonge street, viz.: Mason work, T. Fussell, 53 Poplar Plains Road; carpenter work, Robinson & Wilson, 1123 Dufferin street; plastering, R. C. Dancy, 171 Spadina avenue; plumbing, J. T. Aggett, 880 Yonge street; heating, J. Harrison, 608 Yonge street; tinsmithing, Geo. M. Bryan, 524 Yonge street. The building will be of brick construction, with brick foundation, shingle roof, oak and pine interior finish, oak and pine floors, cement floor in basement, cement walks.

Toronto.—The Canada Bowling Club, which holds a lease on the Avenue Road grounds, with an option of purchase, is contemplating the erection of a \$10,000 modern club house.

Toronto.—The congregation of Woodgreen Tabernacle, Queen street east, will next spring erect a new school room in connection with their church, for which the sum of \$5,100 has already been contributed. The Rev. S. W. Fallis is pastor of the church.

Toronto.—The congregation of St. James Cathedral is contemplating the erection of a new parish house, to cost approximately \$60,000, for which a general canvass will be made. The Rev. Canon Welch is rector of the church.

Montreal, Que.—Messrs. Doig & Barnes, who have been awarded the general contract for a pair of semi-detached houses to be erected on Durocher street, for Mr. A. R. Tourgis, have sub-let the following contracts: Plumbing and heating, Findleton & Russell, roofing, Richardson, Simard & Co.

Montreal, Que.—Israel Reeves, 1482 St. Dominique street, has taken out a permit for the erection of three houses, containing nine dwellings, on St. Urban St., at cost of \$9,000.

Montreal, Que.—Francis Villeneuve, 1785 St. Lawrence Boulevard, has taken out a permit for erection of a house, containing three dwellings, on Esplanade avenue, at cost of \$6,000.

Montreal, Que.—Architects Ross & MacFarlane, 1 Belmont street, have awarded the following contracts for the erection of two houses in Outremont, for Mr. B. Gannell: Plumbing and heating, D. A. Bethune; plastering, Frank Charles; painting and glazing, W. J. Chapman; carpentry, D. M. Long; roofing, Richardson, Simard & Co.

Montreal, Que.—O. Beault, 914 Esplanade avenue, and B. Marcel, 524 Gifford street, have taken out a permit for the erection of three houses, containing nine dwellings, on Esplanade avenue at an estimated cost of \$11,000.

COMPETITIVE CONTRACTS.—Present Method of Estimating Uncertain and Costly.—New System Proposed.

IN view of the recent discussion among architects and contractors in both England and America upon the merits and demerits of the present system of competitive tendering, the following editorial from a recent issue of the *ENGINEERING RECORD* will prove of interest to our readers.

The general custom of letting building contracts after receiving competitive bids based on plans and specifications prepared by an engineer or architect has never been regarded with favor by many leading representatives of these interests, but it was not until recently that any serious attempt to suggest a substitute for this system was made. Last May, however, a committee of the Illinois Chapter of the American Institute of Architects prepared a report criticizing the present method of securing competitive bids and suggesting another system of contracting, which report has aroused considerable interest and is deserving of careful consideration; it should be stated at the outset, however, that *The Engineering Record* is not prepared to accept the arguments for the new method, although agreeing in the main with the criticism of the present practice. The fundamental objection to the method of awarding contracts after securing competitive bids is the great expense incurred in preparing bids, and the committee has done some good work in ascertaining definitely what this expense amounts to.

Five representative contractors furnished the committee with statements of the time and money spent by them in one year in making competitive bids for buildings, which would cost from \$100,000 to \$150,000 as a rule. The average number of contracts estimated by each builder during the year was 72 and the average number which he obtained was 10. The average value of the time spent by the office force of each firm on each estimate was \$125 and the average expense on each estimate incurred in addition by the numerous sub-contractors and material men was \$378, making a total of \$503 spent by each builder, his sub-contractors and material men on each building. In addition to these expenses the head of each contracting firm spent 21 per cent. of the total time given to his business in estimating or overseeing the work of estimating. As there are usually at least six bids taken for each building, their cost would be about \$3,018, or from 2 to 3 per cent. of the cost of the building. Each builder estimated on 72 structures, so that the expenses for the five contractors for this work was \$180,583. Deducting one-third of this for sub-contractors' bids used in common by the general builders, leaves approximately \$120,000. As only ten contracts were secured by each bidder, or 50 for all, the expense of the bids from which work was actually secured was \$25,150, so that the expense incurred for estimating other contracts which they did not get was \$95,000, which sum was a dead loss to the five contractors, sub-contractors and material men in one year. As some one must make up the loss to them it is charged on the books as estimating and office expenses and the owners from whom buildings are obtained must pay for it. There were taken out in Chicago in 1906 building permits for structures estimated at \$63,000,000, which means, according to the above figures, an expense of \$1,260,000 for estimating, of which only \$210,000 resulted in securing work. In this one city, therefore, this enormous sum of about \$1,000,000 was spent fruitlessly in one year, assuming that the reports received by the committee from the five builders were correct. A loss which is also quite serious from the viewpoint of good construction was the time given by the heads of the firms to making or overseeing estimates. The committee reports that the time spent by contractors on estimating and securing contracts is undoubt-

edly a great detriment and loss to every building erected.

A strong argument is also made by the committee to the effect that competitive bidding does not necessarily establish a true and proper basis on which to make a building contract. It is pointed out that all court rulings involving building contracts have been made on the principle that the consideration in a contract must be commensurate with the obligation assumed, while under the system of competitive bidding, builders will sometimes not only hazard their legitimate profits but also run the risk of serious loss in order to secure a contract. It is often asserted concerning this contention that the builder has as many chances for making very large profit as he runs risks for loss, but such a consideration is contrary to the spirit of the law regarding contracts, just mentioned. A contract should neither be a speculation nor a hold-up. It should provide with certainty a reasonable profit for the builder who carries it out efficiently. The great desideratum is some form of contract by which the skill of the builder in directing the execution of work may be properly compensated without forcing him to obtain his profit by skinning the cost of the work down to the minimum possible without violating the terms of the contract. What is desired is real co-operation and sympathetic service, which is not likely to be attained, according to the committee, under the present system of competitive bids except where the competition is restricted to firms which will only do good work. Unfortunately in most cases the owner of the building has friends who induce him to allow less responsible bidders to estimate, and it often happens that these bidders receive the contracts at a low figure and proceed to make as much profit as they can by doing as little and as poor work and supplying as cheap material as the terms of the contracts will permit.

The practice of securing competitive bids is a very old one and at the time it first became firmly established the work was in most cases of such a nature that the cost of it could be estimated fairly closely by experienced builders. The modern structure is so complicated, however, that it is not an easy matter to make such estimates, as is very well shown by the wide difference between the bids of thoroughly responsible builders for the same work. In some cases the complications are so great that a percentage or cost-plus-fixed-profit contract seems to be the fairest method of carrying on construction, although it is generally acknowledged that they are not at all desirable for most classes of work.

Although lump-sum contracts have these disadvantages it has been possible to substitute for them anything better for most work, and accordingly the proposal of the committee of the Illinois Chapter is very interesting. This proposal is, in substance, to do away with all the expense, or most of it, incurred by contractors in estimating, by employing a professional estimator to make a complete estimate of all labor and material in the proposed building. He would be paid by the owner, would be absolutely independent in his position and his success in business would depend solely on the accuracy of his estimates. His reputation would suffer just as much if he made them too high as if he made them too low, according to the committee, which believes that the nature of his position would enable him to secure better prices for the great mass of the material for the building by eliminating middlemen's profit and reducing the opportunity for combinations. The owner would go over the plans and specifications of the building and the estimator's report of its construction, and if the cost was satisfactory to him, the papers would be turned over to a contractor whom the architect and owner considered thoroughly responsible. If the contractor was satisfied with the amount of the estimate, he would be given the contract to build the structure for the estimated amount plus a fee depending upon the character of the structure

and its magnitude. At the completion of the work if the building cost less than the estimate, the committee suggests that the amount so saved would be divided equally between the contractor and the owner, while if the cost of the structure ran over the amount of the estimate, the loss would be divided equally. It is the committee's belief that in this way the interest of the owner and contractor would be the same, for whatever would be for the contractor's gain and profit would also benefit the owner. Their relations would, therefore, be harmonious instead of being just the opposite, as they are now.

The basic idea, it will be seen, is the introduction of a new factor in contracting, the independent estimator. Some of the readers of this journal will doubtless recall that a few years ago a firm in a New England city undertook such work as a business speculation. They took off quantities from architects' plans and specifications, and estimated them closely, and then sold this information to contractors. The business did not develop to any extent, which is a pretty good indication that it was not found desirable by contractors. The Engineering Record calls attention to the committee's suggestion of a modification of this former venture as a matter of interest, but it would point out that the proposed plan depends solely on the high character and independence of the professional estimator. Every architect having much experience with large buildings where the expense of estimating is at all serious, will doubtless agree that a client would be perfectly justified in awarding the contract for such a structure on a percentage basis to a few builders whose reputation for square dealing is universally recognized. The trouble lies in the fact that very few business men are sufficiently acquainted with building operations to know these contractors; few parties put up more than one or two buildings and it is but natural that they should see greater economy in the system of competitive bidding than in awarding the work without competition to a builder named by the architect. It is safe to say that, as a practical proposition, no matter whether an independent estimator figures the cost of a structure or not, the average owner, who is the man who really settles the matter, will insist upon shopping around among builders whose names are suggested by his architects and also among those to whom his friends urge him to give a chance. It should not be forgotten that while the architect and builder are carrying on construction work all the time, the average owner knows nothing about such work and will insist on having things done in what may be termed the average business way, that of securing competitive bids.

FIRE RESISTING RESIDENCES.—Would Add Much to the Permanent Architecture of the Country. —Radical Reform Needed.

AT THE PRESENT TIME the problem of building is a very grave one after one gets outside the suitable range of ordinary steel construction such as is employed in large city buildings. For all small structures there has been until recently the same old choice that has been available for 5,000 years: wood, brick, and stone, alone or in suitable combination. The more slightly civilized people have generally used wood as nearest to the hand and easiest to work, and those of larger experience and powers have gone on to brick and stone. Here in America our civilization is still too crude and the country is too new to have gotten fairly beyond the timber stage. We are not so many generations yet past the log cabin, in spite of the fact that our material progress has taken on the outward form of orderliness and even complexity. This, however, seems really to be only skin deep when one judges it not as a Chauvinist, but as a man of affairs. It is not a civilization of great stability and depth that looks coolly at the casualty list of

nearly a hundred thousand killed and wounded annually on the railroads and contemptuously figures the probable cost of safety appliances per victim. The same superficial quality still appears in our building. It would be hard to imagine a country better capable in skill and resources of fine permanent architecture, and it would be quite impossible to find one in which fine permanent architecture has been until quite recently a smaller proportion of the whole.

As a nation we build for to-morrow or next week and lay bets at rather small odds with the insurance companies that our structures will burn before they rot or tumble down. A large proportion of the buildings erected in some parts of this country are apparently of the flimsiest timber construction compatible with their holding together until they are sold, and in consequence the losses annually by fire rise to an amount that is simply appalling. Insurance with all its benefit to the individual in case of disaster cannot make up to the community as a whole the losses thus incurred. Somehow, in the long run, the losses get back to the public in every case, and when, as in the San Francisco disaster, the insurance companies have suddenly to settle enormous losses the reflected effect upon general business may be serious in its results. It is time, therefore, to make radical rules for reform in building, time in particular for structural engineers to urge the building of relatively fireproof structures. The present scarcity and high price of timber should serve as an active stimulus to this good work. Is it not practicable, for instance, to take at least some features of modern steel construction with reasonable economy into some classes of buildings now generally of timber? The frame apartment house fortunately is getting scarce under the pressure of building regulations, but it ought to be as extinct as the dodo. Apartments have, in fact, been worked toward steel fireproof construction, but there are still left many that are little better than timber boxes with a brick exterior casing.

Another line of improvement is opened by concrete construction, in its several types of monolithic, hollow-block and tile-concrete. When the concrete industry gets fully under way and architects learn to use the material in less expensive ways, it ought to be possible to build a house or a shop almost as cheaply of concrete as of timber, although the time has hardly yet arrived. Why should one not have some combination of concrete and steel as the normal material for residences, structures that would neither burn up or rot down. The ordinary frame dwelling of the present day has a limited life and requires large and frequent repairs. The mere item of painting it, capitalized at any reasonable rate, would justify the use of material that does not require painting. The chief depreciation in a frame house is in the exterior shell, which is exposed to the elements, and if one reckoned only the interior, repairs would be few. Given a concrete exterior and the repair bills would be small. There is occasional objection to concrete on aesthetic grounds, yet are not these due rather to its present unfamiliarity than to any intrinsic faults? It is hard to see why a well-designed building should be reckoned as inartistic merely because its exterior is of one material rather than another. It is to be hoped that architects will take up more generally the possibilities of the new material in some form other than stucco, the present craze, and see what can be done with it from the artistic standpoint. It should not be difficult to manage, and as a matter of fact there are already not a few capital concrete dwellings in existence. Timber structures are essentially archaic in type, belonging to a period of small means and meager resources, from which our country ought ere this to have emerged permanently, and if nothing else can hurry it into improvement the terrific and needless losses chargeable to fire and fire protection ought certainly to do so.—ENGINEERING RECORD.

FIRST CANADIAN CEMENT CONVENTION. --- Canadian Cement and Concrete Association to Hold Their Initial Convention and Exhibition in St. Lawrence Arena, Toronto, the First Week in March.

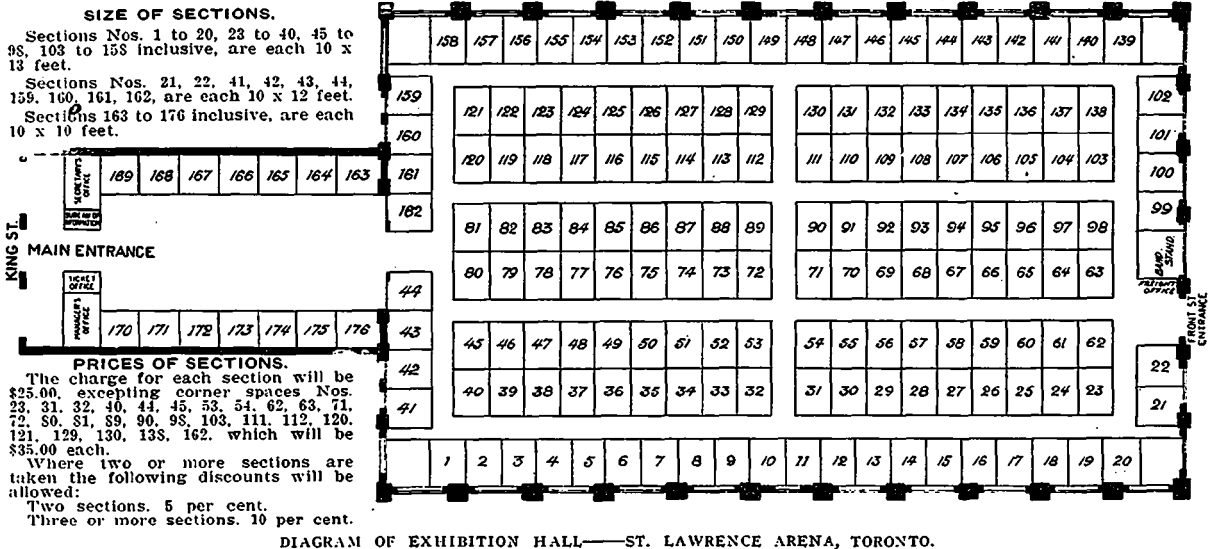
DEFINITE arrangements have been completed for the first annual convention and exhibition to be held by the Canadian Cement and Concrete Association, and from March 1 to 6, 1909, Toronto will be the mecca for delegates and visitors from every section of the Dominion, who are interested in the growing industry, whose allied branches the association has been formed to promote.

This gathering will be the result of a movement started several months ago, to bring together all those who are in any way engaged in the production of cement, the manufacture of cement machinery and appliances, or the use of this material in various forms of construction.

Announcement of the time and place of the convention have been sent broadcast throughout the country, and if the encouraging responses which have been received to

cities monolithic structures of this material are rapidly multiplying in factories, warehouses and business buildings, while in the suburbs and in the smaller municipalities, where suitable clay is not to be found, cement blocks are being adopted as a most desirable material for residences and other types of buildings.

Another reason why Toronto is admirably located for the first convention and exhibition of the Canadian Cement and Concrete Association, is the fact that possibly no other province in the Dominion has done so much for the promotion of the use of cement for municipal work, and in the construction of highway bridges, culverts and roadway work, than has Ontario. The Provincial Government has for some time past carried on a campaign of education in the use of cement in municipal and county highway work, and has done much to greatly encourage



(date can be taken as an indication, the convention will be in every way an unqualified success.

The event is to take place in the St. Lawrence Arena, which is ideal for an occasion of the kind, as the building is of ample size to provide quarters for both business sessions and exhibition, so that the two can be conducted simultaneously, apart from and without conflict with one another. The large floor area which has been reserved for the exhibits, as seen in the accompanying diagram, makes quite evident how important will be this feature alone. In arrangement it affords the greatest opportunity to the exhibitor and public for display and inspection; and, judging from the many subscriptions for space that have so far been received, every available section will be well occupied at the appointed time.

Toronto, as a place for this convention, could not be improved upon. Being centrally located and within a reasonable distance from Chicago, Detroit, Cleveland, Buffalo and other points, it will enable manufacturers of block machines and concrete appliances on the other side, who are desirous of entering the Canadian field, an excellent opportunity of showing their products and of arranging for their manufacture and sale in this country. The gigantic strides that concrete construction is making in the Dominion is to be seen on every side. In the

use of cement by municipalities and counties throughout Ontario. The engineers in these municipalities, who have had charge of this work, have not only shown their willingness to attend this convention, but have also consented to lend it their active co-operation, believing that the information to be gleaned from the convention and the exhibit of cement and concrete machinery and appliances will prove most valuable to them in solving the local problems with which they have to deal.

Manufacturers and dealers desiring space for exhibition purposes can procure application forms, plan of building, rules, regulations, and all necessary information upon application to Mr. R. M. Jaffray, manager of the exhibition, 1 Wellington street west, Toronto.

THE QUEBEC BRIDGE will be constructed under the supervision of the Dominion Government, which will, on December 1, take over the assets and liabilities of the Quebec Bridge Company. The work of construction will commence as soon as possible after the engineers entrusted with the work have finished their work, and the plans have been properly approved. These plans are being prepared to provide much heavier members in the superstructure than was used in the former structure.

THE CLAY OF THE DON BANKS.

IN ANCIENT DAYS the people of the earth worked in materials that were convenient to them. In the Stone Age they fashioned their implements and constructed their abodes of the stone that was native to their particular vicinity. Later, when the art of using wood was accomplished, we find those places with neighboring forests using this material to good effect.

This ancient law has obtained down through the ages, until to-day, when we find our different localities and cities characteristic of the materials at hand, Quebec building in the granite peculiar to its vicinity, Montreal grey and sombre in the grey stone from the Laurentian Mountains, Kingston with its lime stone, Ottawa and the Northern towns worked out in wood, and in Toronto and surrounding country, the clay of the Don banks stands out prominently in hundreds of buildings. This product has been moulded and fashioned in many ways, by many hands, for many years, and is seen throughout this district in every shape from the lowly cottage to the mighty skyscraper.

The art of best utilizing this excellent natural material has been applied by the manufacturers of Don Valley Brick, and their product has won a place of high esteem with the architect and builder. The Don Valley Brick Company has been established for over twenty-five years. Their plant is one of the largest on the continent. Its machinery, equipment and shipping facilities are unsurpassed.

During these years the company's products have always been of a first-class quality. To-day they are better than ever. This is attested to in an eloquent manner by the way in which they are being universally specified.

TERRANO STAIR TREADS.

SOMETHING new in stair work that is commending itself to architects and builders, is stair treads, made from Terrano. While Terrano stair treads have only recently been introduced to the building public, they have already been adopted for a number of important structures.

The eminent satisfaction this material is giving as a jointless flooring, is, perhaps, the best assurance of how well it will serve in this new departure. These treads can be furnished in any color and with any style of nosing and from a standpoint of economy, durability and appearance they are claimed to be the best stair treads on the market.

Aside from being of a hard, impervious nature, and absolutely fireproof, they are half the weight of other hard materials used for stair treads, and equally as strong. They assure a firm foothold, and where required a special non-slipping safety tread can be supplied.

Furthermore, they can be cut with an ordinary hacksaw and chisel without breaking or chipping, and in event of a tread in any manner being broken after it is in position, it can promptly be replaced. As Terrano stair treads are made in Canada they can be furnished promptly and without delay to the contractor in charge of the work. They are molded at the factory to fit the iron stair frames according to requirements, and are delivered at the building ready to be put in place.

The number of important contracts already secured

for this new feature, includes the Y.M.C.A. Building, Ottawa; Technical School, Toronto, and Bell Telephone Building, Montreal.

For ordinary requirements, the average thickness of treads of this character is 1 1/4 inches, and when necessary for extra heavy service, or spans of large dimensions, the treads are reinforced so as to withstand the most severe strains and usage.

Risers of this material can also be supplied, and when combined with Terrano treads make an exceptionally attractive staircase. Where concrete stairs are built, Terrano is especially recommended as a finish. The material in this case being trowelled into a continuous sheet over the concrete from top to bottom, making a jointless, dustless stairway of fine appearance.

All Terrano work is guaranteed to be free from imperfections and satisfactory in every way. Over two hundred floors of this material—including the floor of the Art Gallery, Toronto Exhibition, which was given a first award and medal—have been laid up-to-date, and it is now being used and specified by all the leading architects in Eastern Canada.

Write to the Eadie-Douglas Company, general sales agents, 22 St. John street, Montreal, and 77 Victoria street, Toronto, for a list of buildings in which it is being used, and attests as to the satisfaction it is giving. Prices, samples, and full information will be furnished upon request.

ARCHITECTURAL RELIEF WORK.

AN EXCEPTIONALLY splendid edition—something which will be found to be practically indispensable to the architect—is the new catalogue issued by W. J. Hynes, 16 Gould St., Toronto. This catalogue is devoted entirely to architectural relief decoration, and it is published for the purpose of assisting the architect in the selection of designs in carrying out work of this character.

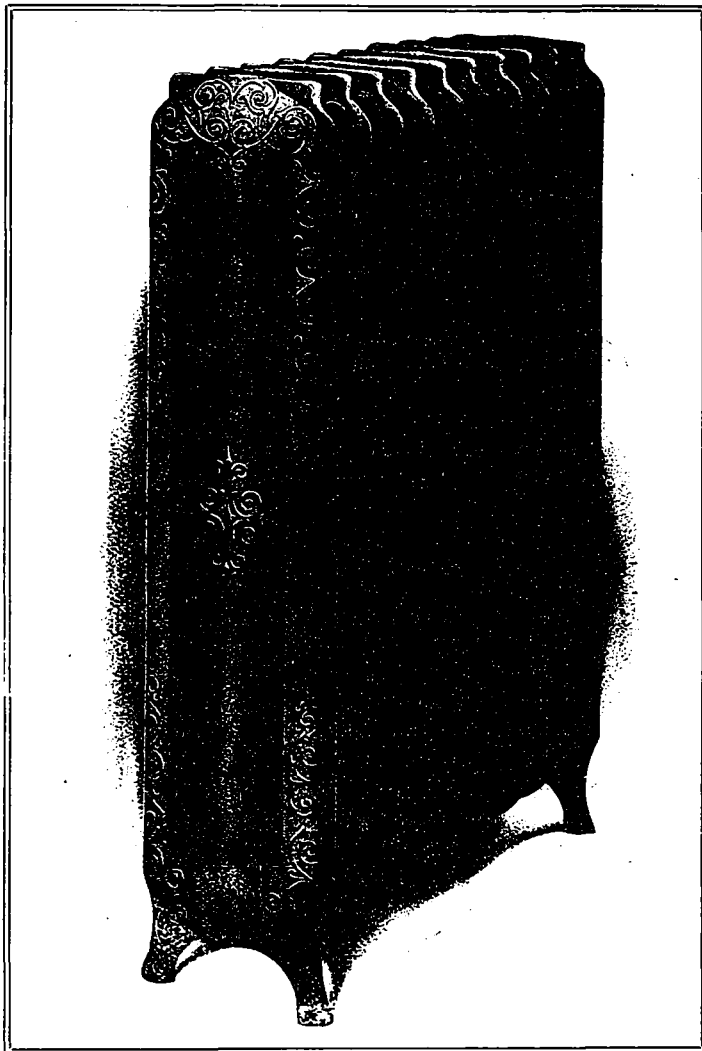
The great extent to which plastic relief work is being employed in Canada, is seen in the many fine public, business and residential buildings which have been erected in the past few years. It is but another indication of the refined taste which people are cultivating in their surroundings. A room decorated in relief work has its character stamped upon it for all time. It gives that permanence and dignity to architectural lines which have been fully appreciated by architects in all ages and countries.

Modern methods of manufacture and application has made it possible to meet the building requirements in this line to-day, at a cost that is very much less than heretofore; and with careful study and design, one is able to perfect any desired scheme of decoration from the simplest to the most ornate, from stock or special models as required.

Throughout the catalogue are a large number of plants showing the different lines of plastic relief work carried in stock by this firm. Centres, cornices, capitals for columns and pilasters, friezes, brackets, consoles, bosses, corbels, architraves, wall and ceiling panels, enriched moulding, etc., etc., in a great variety of designs, are illustrated on a black background which brings out their every detail in an effective manner. Opposite each

KING RADIATORS

are HONEST RADIATORS in BUILD, RATING and DESIGN



The same style of ornamentation reigns supreme, so that in every installation, whether comprised of 2, 3, 4 Column, or Wall Radiators, the ornamentation will be found to be absolutely consistent throughout. This is a distinguishing feature of the KING.

The Ornamentation is Raised (not sunk)

Materially Reducing Cost of Decorating

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LOMBARD STREET

TORONTO

Selling Agents for WARDEN-KING, Limited

plate is a page giving the corresponding number, description and price of each design shown.

In addition there are a series of designs of ceiling plans for different size rooms, with the approximate cost of the ceilings fixed in position; diagrams showing the proper location of wooden grounds for nailing purposes in cornice and beam work; sectional drawings of column and pilaster work, etc., all of which the architect will find of inestimable value.

While the catalogue gives an excellent idea of the range and general character of this firm's work, it does not by any means place a limitation on the numerous designs carried in stock. It simply enables one to judge the firm's capabilities and the vast possibilities of their materials in decorative work.

The basis of all staff castings listed in the catalogue is calcined plaster strengthened and reinforced with different fibres, canvas, scrim cloth, etc., as the occasion demands. Casting in finer interior cements such as Keene's, Parian, Caen Stone, etc., are not carried in stock, but made only to order. The firm, however, can make any of their designs in these cements. Models which are made specially from designs and details, if requested, are not put into stock, but are either destroyed or surrendered upon completion of the work. By this means the best results can be secured, as it guarantees that the work will not be reproduced.

A design which is particularly worthy of mention is shown in Plate A. It is a plastic reproduction of the British Coat of Arms, executed for the entrance of the Bank of Montreal. Those who have seen this splendid casting speak in the highest terms of its beauty of detail and excellent workmanship.

The catalogue also contains several interior views of work done by this firm, besides a partial list of well known buildings throughout Canada in which their work appears. An inspection of any of these buildings is perhaps the best proof of what they are capable of doing along these lines.

Architects will find this catalogue of frequent use, and of immeasurable worth in specifying work of this nature.

The firm is admirably equipped to carry out architects' special designs in a careful and accurate manner. In connection with staff decorative work, they are also prepared to execute any and all kinds of plain interior or exterior plastering, including all required metal or wood furring, lathing, etc., thus enabling them to handle any architectural problem from start to finish with the greatest facility.

The catalogue may be had upon request to W. J. Hynes, 16 Gould St., Toronto.

ALEXANDRA WARE.

CATALOGUE F. of the Standard Ideal Company, Limited, of Port Hope, Ont., is the finest, most complete and useful volume of its kind that has ever been published. This is the consensus of opinion among the architects in whose hands it has recently been placed, and a glance through its pages demonstrates fully that the architects are not amiss in their conclusion.

From cover to cover, it is a veritable masterpiece of the engraving and printing art in catalogue work, and in every feature it reveals that high standard of quality, workmanship and care in production, which so characterizes the goods to which it relates.

It is printed on heavy gloss coated paper and profusely illustrated with the best quality of vignettes, showing the extensive line of plumbing fixtures and appurtenances which the company manufactures. The catalogue, being of loose-leaf style, is capable of being added to and revised, with new plates of designs and price lists, as the occasion demands.

In composition, arrangement, general detail and char-

acter of make-up, there is nothing more elaborate that has ever been seen in Canada. And it may be well, in this connection, to mention the fact that this splendid production is an all-Canadian accomplishment, even to the stock on which it is printed. It is a tribute to the high degree of excellence to which commercial printing in this country has attained—a degree in fact which enables the Canadian publisher in this line, to take rank with the best producers of other countries. Furthermore, the cordial manner in which this book has been received shows quite plainly that it is to the interest of manufacturers and supply dealers, when publishing a catalogue, to see that it has the stamp of quality, even if a little additional expense is necessary.

The arrangement of the Standard Ideal Company's catalogue is indeed commendable. Following a bird's-eye view of the company's plant, at Port Hope, Ont., and a brief Introductory, regarding the quality of Alexandra Ware (both in rich-toned three-colored plate work) the entire book is taken up with the various fixtures and appliances manufactured, including complete bathroom sets, separate bath-tubs, wash-stands, drinking fountains, laundry trays, kitchen sinks, factory sinks, bath-room and brass fittings, etc. All are arranged in classified order and



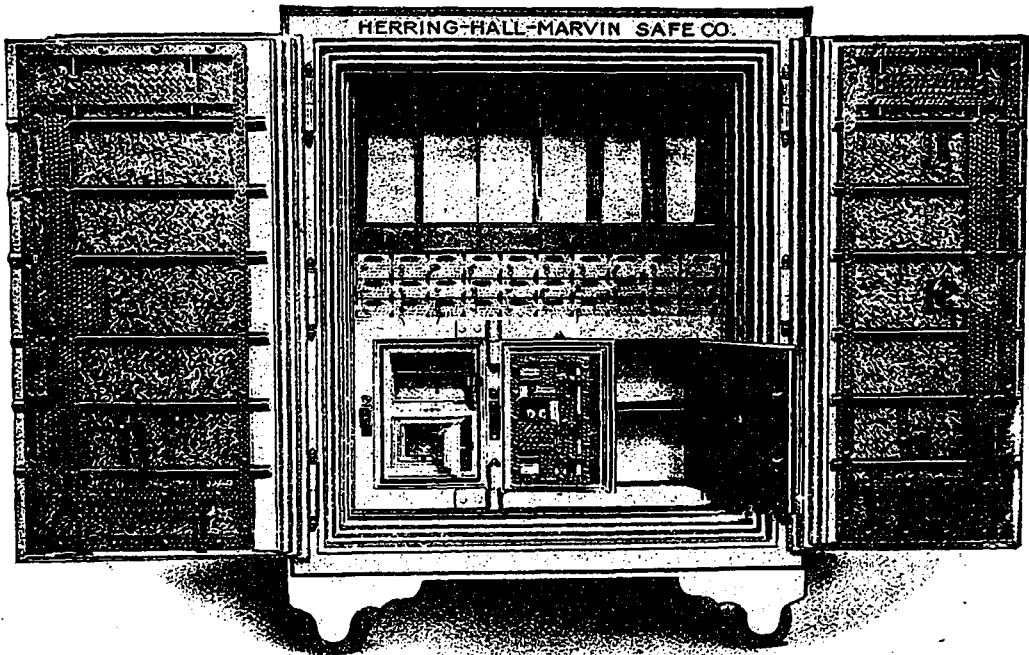
STANDARD IDEAL COMPANY'S NEW CATALOGUE.

indicated by linen index tags, on which is printed the names of the various class of goods to which they individually refer. The series of plates illustrating the styles and arrangements for complete bath-room equipment are particularly worthy of note, as is also the splendid array of separate bath, lavatories, etc., of "Alexandra Ware."

Alexandra Ware is not to be confounded with fire clay products (erroneously named and marketed as solid porcelain ware) as the latter are covered with a thin glazed coating upon the interior, which is usually crazed or cracked, permitting the water to seep through in time into the pores of the clay, and thereby causing it to become water-logged and unsanitary. The "Alexandra Ware" has been constructed with a view of obviating the defects which are found in fire clay products. It has heavy porcelain enamel both on the exterior and interior and each bath and lavatory has a "pure air space," instead of the porous clay body. Being made in two parts, it is more convenient to handle and install than the other variety, which, owing to its very nature, is extremely heavy and cumbersome. While massive in appearance, "Alexandra Ware" is simple and practical in construction. In quality, finish,

THE CANADIAN SPECIAL THE NEW COMMERCIAL SAFE

GIVES THE GREATEST POSSIBLE PROTECTION



Herring - Hall - Marvin Safes and Vaults

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**THE BEST FIRE AND BURGLAR PROOF PROTECTION -IN-
THE WORLD**

SOME INSTALLATION :

MOLSON'S BANK, MONTREAL (St. Catherine St. Branch)

is equipped with a large Herring-Hall-Marvin Safety Deposit Vault.

THE DOMINION BANK OF HAMILTON

is now being equipped with a large Herring-Hall-Marvin Safety Deposit Vault.

THE BANK OF NEW BRUNSWICK

is equipped with Herring-Hall-Marvin Steel Burglar Proof Bankers' Safes.

CANADIAN SELLING AGENTS :

THE CANADIAN FAIRBANKS CO., LIMITED

MONTREAL TORONTO ST. JOHN, N.B. WINNIPEG CALGARY VANCOUVER

and design, it leaves nothing to be desired, either from a sanitary or an artistic point of view.

Prices and more detailed information regarding these excellent products, will be furnished by the Standard Ideal Company, upon request. The company has branches at Toronto, Montreal and Winnipeg.

MOTOR DAGO.

ASIDE from adding to the appearance of the interior of a building, marble mosaic and terrazo floors owing to their non-combustible nature, are regarded to-day as forming an important part in fire-proof construction. The greatest difficulty architects and builders have experienced in the past with these floorings, has been in the lack of experienced contractors and workmen skilled in this work.

It will, therefore, be a matter of interest to those engaged in the design and construction of buildings to learn that the delays, inconvenience and expense heretofore oc-

curring in laying floors of this kind, have been overcome by an ingenious device, illustrated herewith, which is accomplishing great result, as it enables the mosaic or terrazo contractor to execute his work in one-half of the time formerly required, and in a more efficient manner. Furthermore, it makes possible for the contractor, to carry out a job at a distant point without the expense or difficulty of assembling a great number of workmen.

Estimates, prices, and descriptive matter on mosaic and terrazo flooring will be furnished by the Calkin Tile and Mosaic Company, Ltd., 458 Bleury street, Montreal, upon request.

A HANDY REFERENCE BOOK.

A HAND-BOOK of practical calculation and application of reinforced concrete, published by the Trussed Concrete Steel Company, of Toronto, will be found of especial interest to architects and engineers who have occasion to design reinforced concrete structures.

After a brief history and review of the method of reinforcing concrete, and a few pages descriptive of the



MOTOR DAGO RUBBING A FLOOR IN NEW PRINCESS THEATRE, MONTREAL.

casioned in laying floors of this kind, have been overcome by an ingenious device, illustrated herewith, which is accomplishing great result, as it enables the mosaic or terrazo contractor to execute his work in one-half of the time formerly required, and in a more efficient manner. Furthermore, it makes possible for the contractor, to carry out a job at a distant point without the expense or difficulty of assembling a great number of workmen.

This machine, known as the "Motor Dago" or rubbing machine, is the property of the Calkin Tile and Mosaic Company, of Montreal, designers and contractors in this particular line. Its development has been largely due to the initiative of Mr. Calkins, president of the company, whose twenty-five years' experience in tile and mosaic work, has made him thoroughly conversant with the business from one end to the other. The illustration shows the machine rubbing a floor in the new Princess Theater, Montreal, where 3,000 square feet of mosaic was laid and entirely completed by three men in 42 hours. It is simple in construction, having six rubbing wheels, and so geared that it may be moved in any desired direction at an average speed of twenty feet per minute. It is equipped with

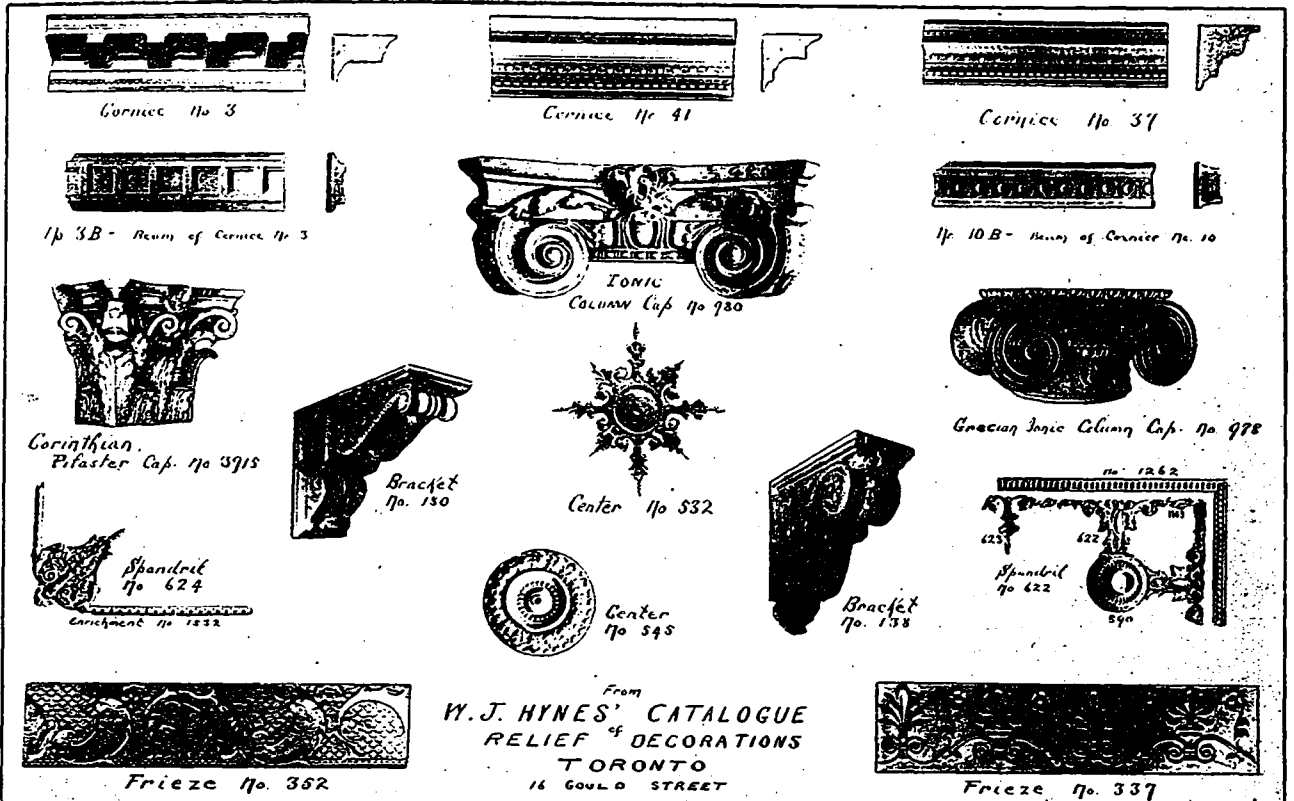
Kahn system, the book takes up the theory of design, explaining the process of deriving the formulas mathematically from the elementary principles.

This is supplemented by tables showing the reinforcing required for beams and slabs of various spans, depths and loadings, together with tables for columns and footings.

The tables regarding the pressure of coal, earth and grain against the sides of bins, are of exceptional value, as are also the carefully compiled figures showing the relative amount of cement, sand and stone required for concrete of various proportions.

In addition, there is a complete set of tables of coefficients for the design of arches—by use of which the labor incident to design of this character may be considerably lessened—as well as a series of standard designs for both arch and girder bridges and culverts.

Altogether the book is a handy, compact little volume, which should prove a valuable adjunct to the reference library of any architect or engineer. It is comprehen-



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CENTER FLOWERS **CAPITALS**
BRACKETS **CORBELS** **FRIEZES**
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RUNNING ENRICHMENT of all descriptions

Write for a copy with sizes and prices complete.
 Modeling to Architect's details or instructions

W. J. HYNES
 16 Gould St. **TORONTO** Phone M 1609

sively written, splendidly illustrated, and substantially bound in a linen surfaced pressed board cover.

Besides containing the information outlined above, it is replete with hints and examples on centering, water-proofing and other points of interest.

INTERIOR FURNISHINGS.

SPECIALLY designed furniture in specially planned buildings is not an uncommon thing to-day. In fact, "Made-to-Order" furniture is essentially a part of any interior where refined taste is manifest. No matter how elaborate in detail are the walls, ceilings and floors, without furniture that will harmonize with the general scheme, the effect is lacking.

An excellent example of the rich tone which the right kind of furniture gives to an interior, is seen in the Royal Bank, Toronto, which was illustrated in the last number of CONSTRUCTION. All the furniture in the building is of special design, and, with the exception of the chairs in the Board Room, was made by the Canadian Office and School Furniture Company, of Preston, Ont. The counter desk and movable furniture in the banking office, as well as the desk, cabinets, tables, etc., throughout, are made of selected mahogany; and the workmanship and finish has been executed in the most creditable and satisfactory manner.

The pavelling in the Board Room is another well-executed piece of work, which was done by this company. These panels are of East India Mahogany, and in size are approximately 9 ft. wide and 13 ft. high, each. The company employes a competent staff, who are prepared to carry out architect's specifications in regard to specially designed furniture. They specialize in bank, office, hotel, drug and jewelry store and courthouse fittings.

MODEL SAND LIME BRICK PLANT.

THE following is an extract from a letter written by Dr. Ernest Horstmann, a well known authority on sand-lime brick, relative to the importance of adopting the proper process in the manufacture of products of this kind.

Among the sand-lime brick plants of the entire west coast, that of the Monterey Brick and Stone Company, at Seaside, near Monterey, Cal., takes a special place: not by the exceptional greatness of its output, which is merely 18,000 brick daily, and is, therefore, a proportionately small one, but by the steady demand occasioned owing to the superior quality of its product.

This fact serves to be all the more pronounced, as no matter how favorably sand-lime brick plants are installed, manufacturers, in their endeavor to place first-class products on the market, have suffered from detriments, due less to unscrupulous outside influences than to products of a low standard of other sand-lime plants working in the same districts.

At the present time indications point to a prosperous turn and a rapid development of the sand-lime brick industry, that is, providing the products come up to modern standards of sand-lime brick technique, and thus conform to the requirements of the builders.

This, and not more or less, is to be expected of a first-class sand-lime brick, if they are to compare favorably and compete successfully with first-class bricks of other materials.

The fact that a good sand-lime brick in every particular can successfully hold its own with the first-class brick of other varieties is just as well established as the fact that an inferior brick of other varieties is not better than an inferior sand-lime brick.

The reason that the product of the Monterey Brick

and Stone Company is recognized as being first-class, is based alone on the absolute fulfilment of all conditions to be taken into account in the manufacture of a good product. These are: Good raw materials and best character of machinery.

The manufacture of the sand-lime brick is carried on by means of the Schwarz System, which achieved in Germany a very high position on account of its merits and economy. The three conditions to be fulfilled in the manufacture of a first-class product, besides the matter of good raw materials, are unquestionably fulfilled in Monterey, being: Uniformity in the absolute perfection of slaking the calcined lime into hydrated lime, uniformity as to the moisture of the prepared sand-lime mixture to be pressed, uniformity in the percentage of sand and lime.

Of the qualities of the brick produced by the Monterey plant, merely one may be mentioned, aside from the durability, uniformity, sharp edges and corners, namely: the high crushing strength, which is on the average of 3,000 pounds per square inch.

Besides face and common brick of the natural color the Monterey plant produces colored bricks of most beautiful tints, also moulded bricks and blocks of all designs, by the use of special hand presses.

Any information desired on sand-lime brick will be freely given by The Scientific System Brick Company, 79 Adelaide street east, Toronto.



RECREATION ROOM, ELK'S CLUB, TORONTO—DECORATED BY DECKER AND CARLYLE—CHAS. P. BAND, ARCHITECT.

AWARDED TWO CONTRACTS.

TWO GOOD-SIZED contracts for cement have recently been awarded by the Department of Railways and Canals to the Wm. G. Hartranft Cement Company, Limited, Montreal. One calls for 10,000 barrels and the other for double that number, making 30,000 barrels in all. This cement, which is known as the Vulcan Brand, is to be used by the Government in carrying out construction work on the Lachine Canal. It is made from the best of raw materials, and is especially adapted to meet the most exacting requirement in Government, municipal, railroad and private work.

Vulcan cement is the product of a splendidly equipped plant, operated by an experienced staff of engineers, and the company is adequately prepared to execute orders for their product promptly and satisfactorily.

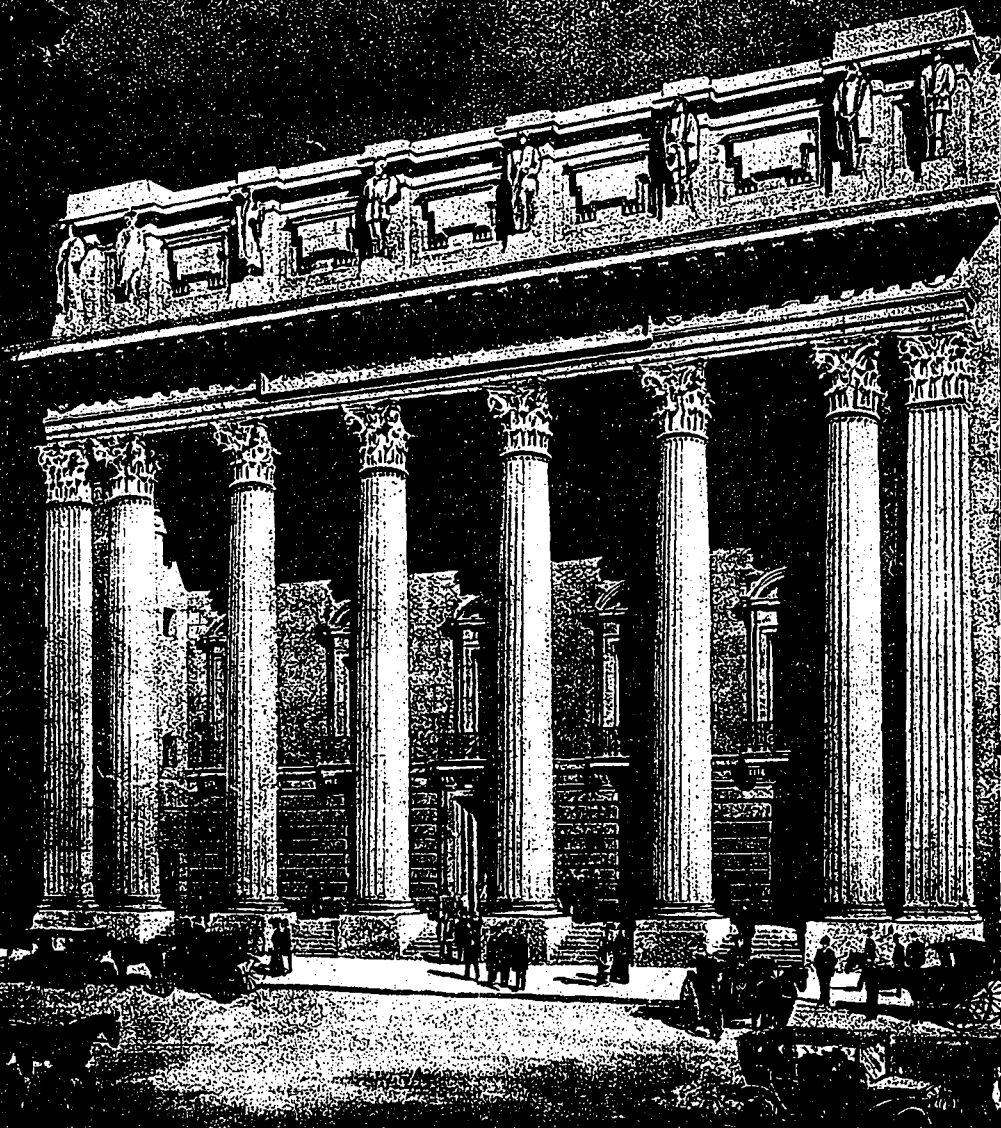
For samples, prices, etc., apply, either in person or by letter, to Wm. Hartranft Cement Company, Bank of Ottawa Building, Montreal.

EXPANDED METAL REINFORCEMENT

was used throughout in the Concrete Work in the Building—one of the finest examples of Modern Fireproof Construction in Bank Building in America.

This Building was also Plastered Throughout on
EXPANDED METAL LATH

Expanded Metal Fireproofing Co., LIMITED
100 KING STREET WEST, TORONTO



New Canadian Bank of Commerce Building, Montreal—Darling & Pearson, Architects.

THE MODERN STORE.

MODERNISM along architectural lines is finding greater expression in store fronts and interior fittings of exclusive retail establishments, than in any other form. This is indeed an age when the progressive retailer is seeking the stamp of individuality in



UNIQUE DISPLAY FRONT OF A. E. REA AND COMPANY'S STORE, TORONTO.

his place of business, and the great transformation which has taken place in the shopping districts during the past ten years has carried us through a number of successive changes.

Stock fixtures and fittings of antiquated pattern are being superseded by those of special design, and the old style store with its sash windows and plain interior is fast becoming but a memory. To-day the display windows are more attractive, more alluring in every way, while the interior is far richer in its general tone and more inviting in appearance. In the accompanying illustrations, showing exterior and interior views of the new store of A. E. Rea & Company, Yonge street, Toronto, can be seen the character of the work designers are at the present time accomplishing in this line.

While the attractive front, with its unique display windows and overhanging canopy, stand out in striking contrast with other stores in the shopping district, it does not in any way transcend the splendid character of the interior with its modernly equipped appointments. Here the wall cases and silent salesmen, together with the trying-on cabinets at the rear, show that discrimination and care in detail and arrangement which gives the whole an individual and yet an extremely refined appearance. All the woodwork is of mahogany, highly polished, while the heavy glass of the silent salesmen and

wall cases is of the very best quality. In design, detail and workmanship, these fixtures are of the very highest type.

The entire contract for this interior was executed by the Toronto Show Case Company, 5-21 Defries street, Toronto, and the despatch and thoroughness with which this firm carried out the work, is certainly a credit to Canadian enterprise and ability. The manner in which the old store of Wanless & Company was converted into this modern establishment, seemed to have an element of the magic of fairyland. At no time has Toronto seen work of this kind carried out in a quicker or more thorough manner, nor has it anything more attractive in general interior appointments. The Toronto Show Case Company's splendid organization makes it possible for them to execute and instal interior fittings and fixtures according to architects' details and specifications, on short notice. Their workshops are excellently equipped and they employ only the best skilled labor.

BAKER & JORDAHL.

MESSRS. BAKER AND JORDAHL, general contractors, Manning Chambers, Toronto, are evidently securing a fair portion of the season's business. They have recently been awarded several contracts for Government improvements, including the construction of a magazine at Toronto, and a rifle range to be built at Niagara-on-the-Lake. While making a specialty of fireproof building construction for factories, mills and warehouses, and also the designing and erection of reinforced concrete buildings and structural steel work, this firm is equipped to carry on general building construction in the full meaning of the term. At the present time they are, in addition to executing other work, making the foundation test pits for the proposed new building which is to be erected in Toronto, for the Bell Telephone Company.

Another contract which has lately been awarded them, is for a residence to be built at Niagara-on-the-Lake for Mr. W. P. Chapman.



INTERIOR OF A. E. REA AND COMPANY'S STORE, TORONTO, SHOWING THE MODERN STORE FIXTURES INSTALLED BY THE TORONTO SHOW CASE COMPANY.