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CONSTRUCTION

A · JOURNAL · FOR · THE · ARCHITECTURAL ENGINEERING · AND · CONTRACTING INTERESTS · OF · CANADA

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An Especial Heating System Best Adapted to Each Individual Building

THE range of possibilities in the installation of highly efficient and economical heating systems, through the application of expert knowledge and practical experience, is as great as a range of unsuccessful and unsatisfactory installations made under "rule of thumb" methods.

Every type of building, from the *small residence* to *large public buildings* and *great factories*, comes within our scope of work.

We can save the *architect* and his *client* both money and annoyance through our method of installation.

In a *residence* we will install a system that may be readily controlled to give a uniform temperature in every room with a minimum consumption of fuel.

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In a *public building* we will install a system that will give uniformly, the desired temperature in the rooms and the corridors and adequately ventilate all parts of the building, without producing draughts.

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From the simplest to the most complicated systems, we can not only guarantee a most satisfactory result, but through our practical experience and theoretical knowledge as heating engineers, can design and install a system best suited to your building.

One installation under our method will demonstrate to your satisfaction the difference between "rule of thumb" installations, and scientifically and intelligently installed heating and ventilating systems.

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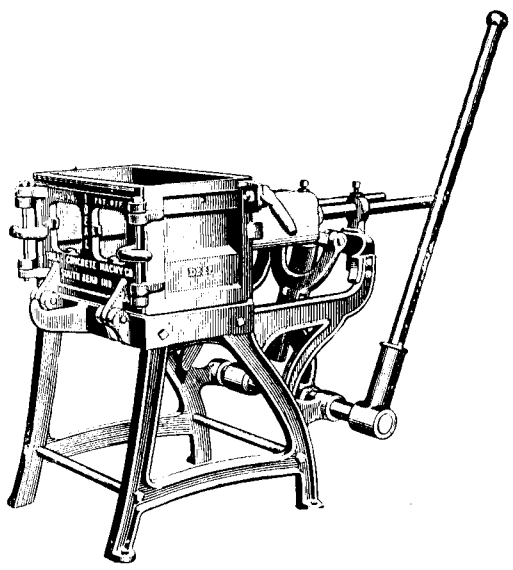

The Centre of Interest

at the great

Cement Show

AT CHICAGO

was the exhibit of the

IDEAL CONCRETE MACHINERY COMPANY

THE exhibit of our United States Company was declared to be the best and most attractive in the whole CEMENT SHOW. Judging from the manner in which their large section was continually crowded, and taking into consideration the fact that *they sold more machines than all other exhibitors of block machinery combined*, it was easily seen that Ideal Machines were the "hit" of the Show.

IDEAL MACHINES have been exhibited at every Cement Show held in America. 1903, 1904, 1905, 1906, 1907, 1908, 1909 and 1910 have seen us leaders in the manufacture of concrete block machinery, and in the promotion and upbuilding of the concrete block industry. At every cement exhibit it has been proven clearly that the merits of Ideal Machines appeal upon first sight not only to the block maker, but to the contractor, builder and architect. There were visitors from China, India, Austria, and most of the important nations of the world. In every country —in every form of construction—in every type of architecture — IDEAL Blocks represent the most artistic; the greatest service with the greatest measure of safety and economy. No one who is interested in concrete blocks, whether a prospective buyer, a dealer, a contractor or an architect, should think of taking up this subject without consulting the Ideal Concrete Machinery Company.

One of the most striking features of the Chicago Cement Show this year was the small number of concrete block machinery exhibitors. Less than half of those manufacturers who exhibited in previous years were on the Coliseum floor last week, in spite of the fact that the demand for concrete blocks and the progress of this form of construction is greater than ever before. This conclusively demonstrates the "survival of the fittest." It proves the necessity of purchasing concrete block machinery of substantial manufacturers, from whom you can always obtain new face-plates and other improved attachments. Where will the users of these now obsolete machines secure these accessories?

A display of a full line of our machinery will be made at the coming Second Annual Canadian Cement Show, to be held from March 29th to April 1st, 1910, at London, Ontario. Our factory being situated in London, will give intending purchasers a splendid opportunity of acquainting themselves with the great possibilities of Ideal equipment.

NOTICE

There is no question about our patent rights. The Ideal face down, horizontally movable core machine and our patents covering them were upheld by the High Court of Justice for Ontario on November 21st, 1906, the rulings enjoining infringing manufacturers from making, selling or using such types of machines. Buyers and prospective purchasers are cautioned against the purchase of this type of machine from infringing manufacturers.

Send for our new Catalogue and Illustrated Booklet, the most complete of its kind ever compiled.

Ideal Concrete Machinery Company, Limited

221 King Street **LONDON, ONTARIO**

Also South Bend, Ind., U.S.A.

Entrance of Second National Bank, Cincinnati, Ohio

Our Specialty is Furnishing Marble for Exterior Construction and Interior Decoration of

Government and Municipal Buildings, Court Houses, Librariaes, Office Buildings, Hotels, Clubs, Private Residences, Churches, Theatres and other high class structures, where marble is specified.

Missisquoi Marble

The demand for our material, not only in Canada, but in the United States as well, has grown so much faster than our most sanguine expectations permitted us to hope, that we are again obliged to make very large additions to our plant.

Contracts have been let for twelve additional gang saws, as well as larger engines, and increased boiler capacity. These additions should be complete by the middle of May, and we shall then be able to handle promptly a very much increased volume of business.

We appreciate the support we have had from a very large number of the leading Architectural offices, and we are using our utmost endeavors to merit it.

The Missisquoi Marble Co., Ltd.

PHILIPSBURG, QUEBEC **CORISTINE BLDG., MONTREAL**

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I am thoroughly convinced of the great need for fireproofing material in all structures; manufacturers are of one voice in desiring minimization of fire risks, with consequent insurance reduction, and a saving of investment value without a sacrifice of general safety.

To those contractors who still adhere to wooden lath because of having tried some imperfect metal lath, I want to say **PERFECT EXPANDED METAL LATH** has none of the imperfections of ordinary metal lathing. It rightfully supersedes wooden lathing because it insures a most permanent job, is easier to put up, does away with cracked walls and discolored plaster, and can be employed in a hundred places where wooden lathing cannot be used.

These virtues of **PERFECT EXPANDED METAL LATH,** meaning a decrease in labor and worry for the man who plans or supervises the construction work, must mean an increase in profits for you. Will you write my nearest branch for a sample?

G. A. Pedlar

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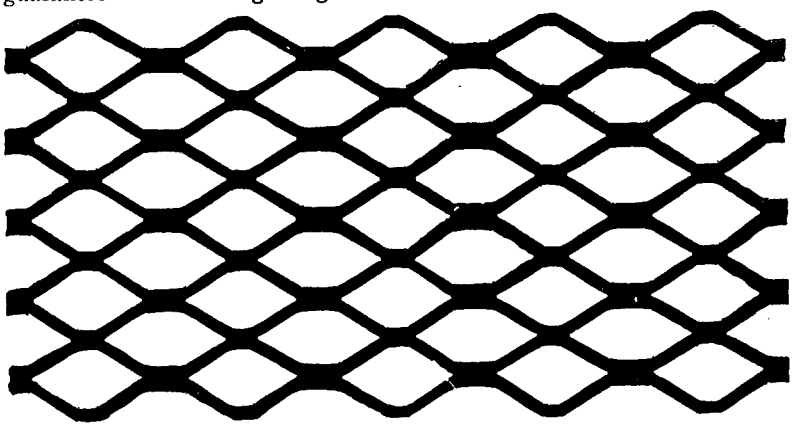
A Sure Base for Plastic Work

MADE BY A BETTER PROCESS

PERFECT EXPANDED METAL LATH is made by automatic machinery which splits and extends the mesh at a single stroke; only the highest grade of steel can stand this test, inferior grades would tear into shreds. That is why we select "perfect" grade sheet steel, and, by working it cold in the meshing process, get the utmost of elastic limit. The temper of the steel is unaffected so there is no need to re-anneal. Our process secures a rigid and flexible lathing—maximum resistance and minimum weight—a lathing that never kinks no matter how irregular the surface. We use nothing lighter than 26 gauge steel, and when galvanized, the galvanizing is done after the making. No lathing is sold by us unless it is either painted or galvanized—a guarantee of the lathing being non-corrosive.



Write for Sample and Free Booklet "FIRE-PROOF" No. 53

FAR EXCELS OTHER KINDS

PERFECT EXPANDED METAL LATH is designed for a multitude of uses—as a lathing in the construction of ceilings and partitions, and for general interior fire-proofing; as re-enforcing material for concrete floors and roofs; for stucco work; in the building of sewers, conduits, etc., etc.; in fact you cannot erect any office building, warehouse, church, school or house, etc., today, but one and all of them will be the better for having **PERFECT EXPANDED METAL LATH.** You see, our lathing is fire-proof, rust-proof, decay-proof. It can be put up easier and faster and with less labor than is required when wooden or other lathing is used. **PERFECT EXPANDED METAL LATH** sheets are 20¼ x 96 (26 and 24 gauge), each sheet covering 1½ sq. yards, or 18½ x 96 (23 gauge) covering 1⅓ sq. yards. To cover 1½ sq. yards, on 12 inch centres you only require 66 staples or nails—one pound of staples will apply ten yards of lath.

As to quantity of mortar used, actual practice shows that 100 sq. yards of the lathing can be thoroughly covered on both sides by 1½ yards of sand and 5 bushels of lime.

Walls and ceilings where **PERFECT EXPANDED METAL LATH** has been adopted are much more solid than common walls for the reason our lathing effects the greatest distribution of stresses, and the steel, over its entire area, is completely in tension.

PRICED RIGHT, TOO

PAINTED	GALVANIZED
10 cents per square yard for 26 gauge	16 cents per square yard for 24 gauge
13 cents per square yard for 24 gauge	17½ cents per square yard for 23 gauge
15 cents per square yard for 23 gauge	

Sample of lathing awaits you. Post card brings it

PEDLAR PERFECT EXPANDED METAL L=A=T=H

IT WAS CHOSEN FOR THESE CONSTRUCTIONS

These institutions selected **PERFECT EXPANDED METAL LATH** over all others.

Royal Victoria Museum, Ottawa; New Mint, Ottawa; Sir Wm. MacDonald's Agricultural College, Ste. Anne de Bellevue; Royal Victoria Hospital, Board of Trade Building, Merchants Bank Building, Coristine Building, Windsor Hotel, Bank of Montreal, M. A. A. A. Building, Royal Bank, Alexandra Hospital, Mark Fisher, Sons & Co., Mount Royal Club, Sherbrooke Apartments, New Harbor Sheds, Maternity Hospital, Henry Morgan & Co., all of Montreal.

Our galvanized lath was chosen, in competition, for McGill Medical Building, Montreal. Architects, Brown & Vallance. Contractors, Peter Lyall & Son.

We could name hundreds of other cases showing the accepted superiority of **PERFECT EXPANDED METAL LATH.** We'll gladly send such indisputable proof to you on request.

The PEDLAR PEOPLE of Oshawa — ESTABLISHED 1861

HALIFAX 16 Prince St.	ST. JOHN, N.B. 42-46 Prince William St.	QUEBEC 127 Rue du Pont	MONTREAL 321-3 Craig St.	OTTAWA 423 Sussex St.	TORONTO 111-113 Bay St.	LONDON 86 King St.	CHATHAM 200 King St.W.
PORT ARTHUR 45 Cumberland St.	WINNIPEG 76 Lombard St.	REGINA 1901 Railway St. South	CALGARY 1112 1st St. West		VANCOUVER 821 Powell St.	VICTORIA 434 Kingston St.	

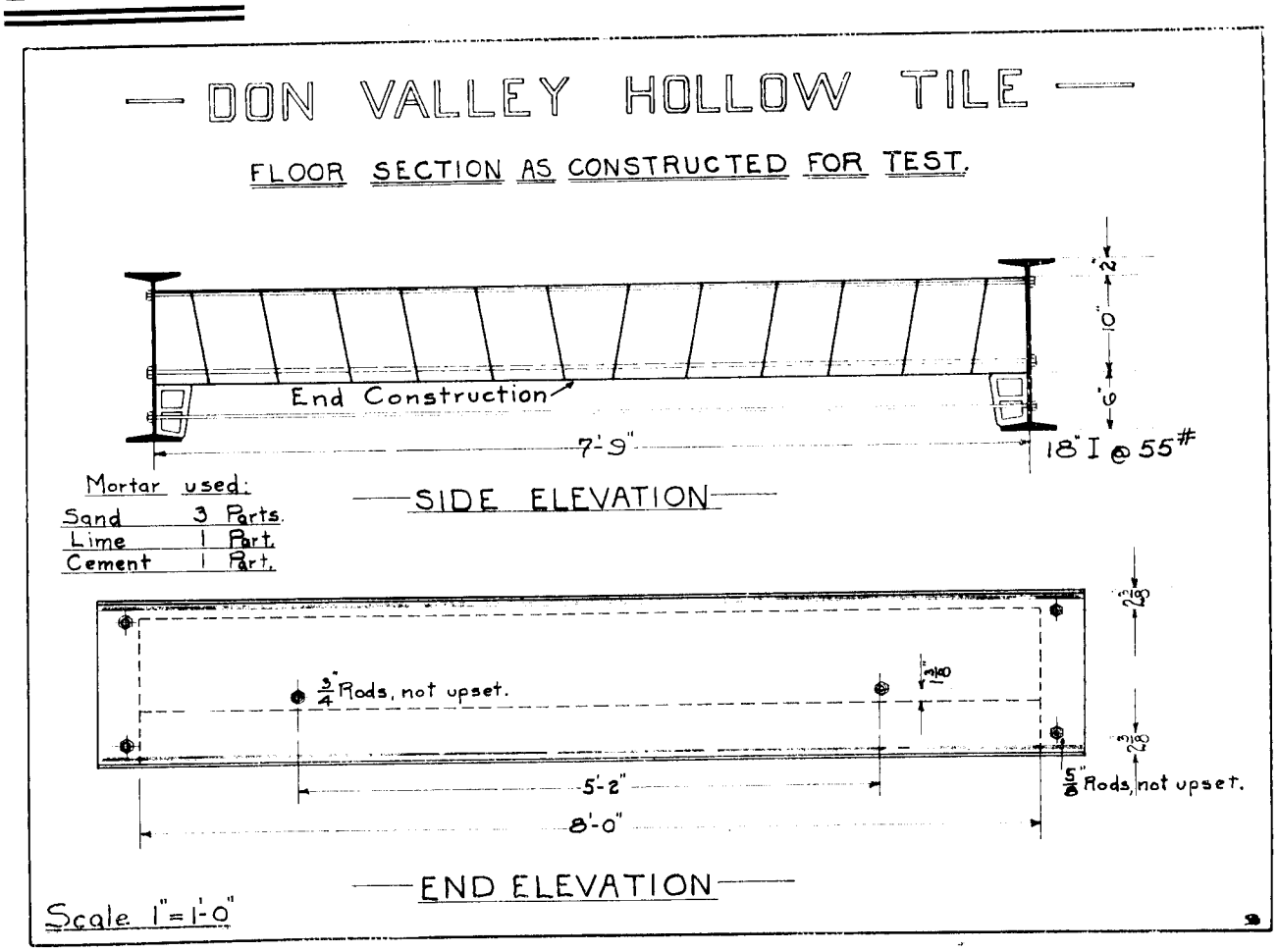
200 ADDRESS OUR NEAREST WAREHOUSE. WE WANT AGENTS IN SOME SECTIONS. WRITE FOR DETAILS. MENTION THIS PAPER.

AN EXTRAORDINARY TEST

OF

Loaded to the Roof without any signs of Destruction.

Don Valley Porous Terra Cotta Fireproofing by Prof. Peter Gillespie of the School of Practical Science, Toronto University



DETAILED DRAWING OF FLOOR PANEL ACCOMPANYING PROF. GILLESPIE'S OFFICIAL REPORT.

This test was made with the object of establishing Porous Terra Cotta Fireproofing as manufactured by the Don Valley Brick Works as the most efficient and economical method of fireproof construction. The test was conducted under the direction of Prof. Peter Gillespie, Lecturer on the Theory of Construction at Toronto University, and the result as shown in his official Report unquestionably establishes the pre-eminence of Don Valley Porous Terra Cotta Fireproofing.

The panel was an exceptionally large one, being 7 ft. 9 in. by 8 ft., and was designed to carry a load of 200 lbs. to the square foot. It was loaded with bags of cement and clay to the roof until it carried a weight of 516 lbs. to the square foot, at which point no signs of failure could be found. Further loading was made impossible by the roof of the building in which the test was made.

DON VALLEY BRICK WORKS

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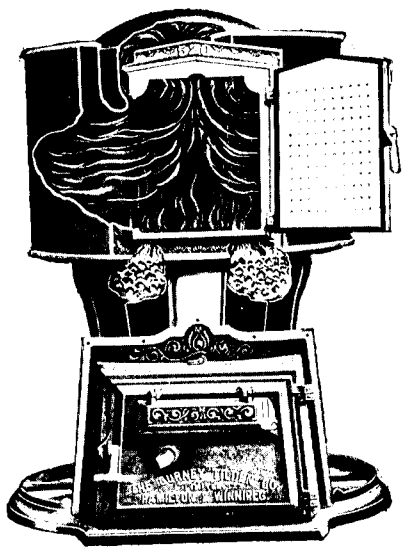
Grates Are Firmly Fastened— Yet Quickly Removed.



The New Idea Warm Air Furnace.

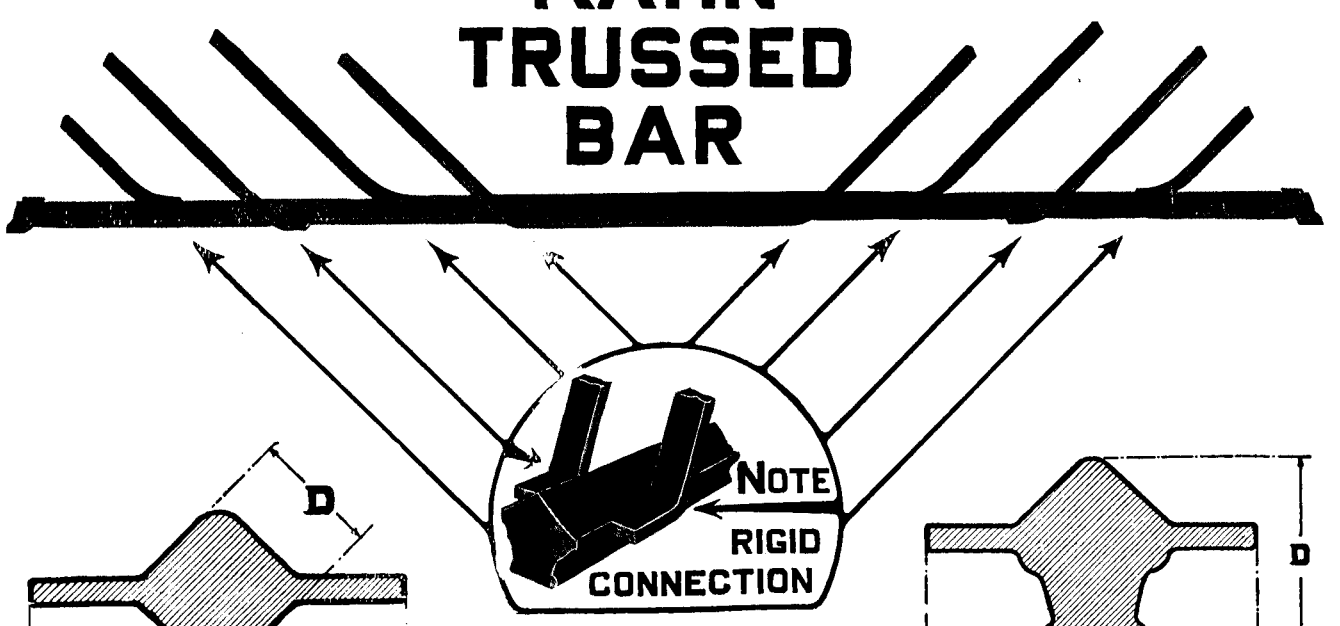
ORDINARILY cheap grates may be instantly detected by the method of fastening them in the furnace. *Fastenings that require or consist of small bolts, cotter pins, etc., are the earmarks of cheapness in furnace construction.* They not only require various kinds of tools, such as hammers, chisels, wrenches, screw-drivers, etc., but in nearly every case they *stick* and *bind* and are practically useless after the furnace has been in use a few weeks. Removing the grates from such a furnace is usually a case of loss of time and temper, ending up with breakages that cost money. It is different with the New Idea Grates. They are kept in position by a solid iron bar, 1¼ x ½ inches, and from eighteen to twenty-four inches long according to size of furnace. This bar drops easily into a deep strong slot at either end, from which it cannot possibly be displaced in any way except by lifting it out. To remove grate, simply lift this bar out, and the grate slides bodily out on tracks provided for that purpose. There isn't another construction made that is half as simple or half as strong as the New Idea.

The Gurney Tilden Company, Ltd.

MONTREAL HAMILTON VANCOUVER

Western Branch: Tilden, Gurney & Co., Limited, Winnipeg

KAHN TRUSSED BAR

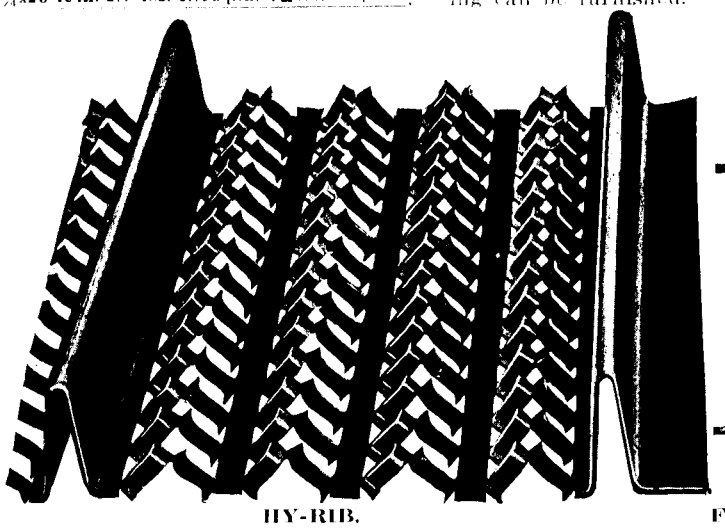


D. & B.	Weight per lineal foot	AREA	Length of Diagonals
½ x 1½ in.	1.4 lbs	0.41 sq.in.	6 in., 8 in., 12 in.
¾x2 3 16 in.	2.7 lbs.	0.79 sq.in.	12 in., 8 in., 18 in.

Rigid connection of diagonal shear members is the one essential requirement of reinforcing steel for concrete.

Kahn Trussed Bars are shipped cut to exact lengths—Bars up to 60 feet are carried in stock. Any desired length of diagonal or type of shearing can be furnished.

D. & B.	Weight per lineal foot	AREA	Length of Diagonals
1½x2¼ in	4.8 lbs.	1.41 sq. in	24, 18, 30, 36 inch
1¼x3¼ in	6.8 lbs.	2.00 sq. in	24, 18, 30, 36 inch
2 x3½ in	10.2 lbs.	3.00 sq. in	30, 24, 36, 48 inch



HY-RIB.

Self-centering reinforcement for concrete floors and roofs.

A unit of lath and studs for Walls, Partitions and Ceilings.

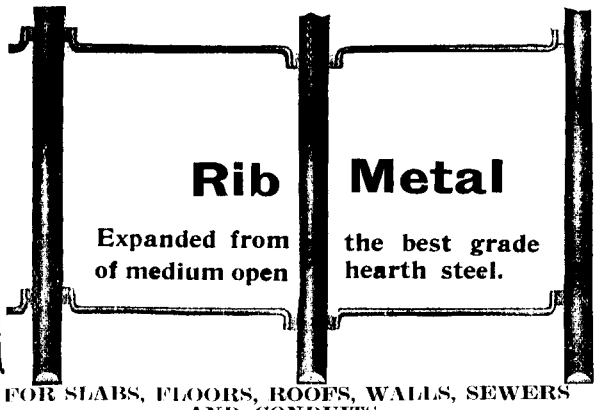
Width of **Hy-Rib** sheets, 10½ inches. Standard lengths, 6 ft., 8 ft., 10 ft., and 12 ft. Intermediate and shorter lengths as ordered.

Ribs of **Hy-Rib** are 13-16 inches high and 3½ inches apart.

Hy-Rib is furnished in either flat or curved sheets. The shop-bending assures absolute accuracy of curve.

Cross sectional areas of **Hy-Rib** per foot of width: 28 gauge, .165 sq. in.; 26 in. gauge, .198 sq. in.; 24 gauge, 264 sq. in.

Above gauges carried in stock. Other gauges can be supplied within a reasonable time.



FOR SLABS, FLOORS, ROOFS, WALLS, SEWERS AND CONDUITS.

A series of straight bars rigidly connected by cross ties formed from one sheet of steel. **Rib-Metal** provides maximum area of reinforcement in the direct line of strain. A rigid reinforcement that stays where it is placed. **Rib-Metal** is manufactured in seven sizes of mesh and in lengths up to 18 feet. **Rib-Metal** is furnished in either flat or curved sheets. The shop-bending assures absolute accuracy of curve.

Size No.	Width of Standard Sheet	Square Feet per Lineal Foot of Standard Sheet	Area per Foot of Width
2	16 in	1.33	.54 sq. in
3	24 "	2.00	.36 "
4	32 "	2.67	.27 "
5	40 "	3.33	.216 "
6	48 "	4.00	.18 "
7	56 "	4.67	.154 "
8	64 "	5.33	.135 "

Catalogues of **Kahn System** products—**Kahn Trussed Bars, Hy-Rib, Rib-Metal, Rib-Lath, Rib-Studs, Cup-Bars.** Also catalogues describing tests, structures of every kind, and "Kahn System Standards"—the best handbook on reinforced concrete design.

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Head Office and Works, Sales and Engineering Office, WALKERVILLE, CANADA.

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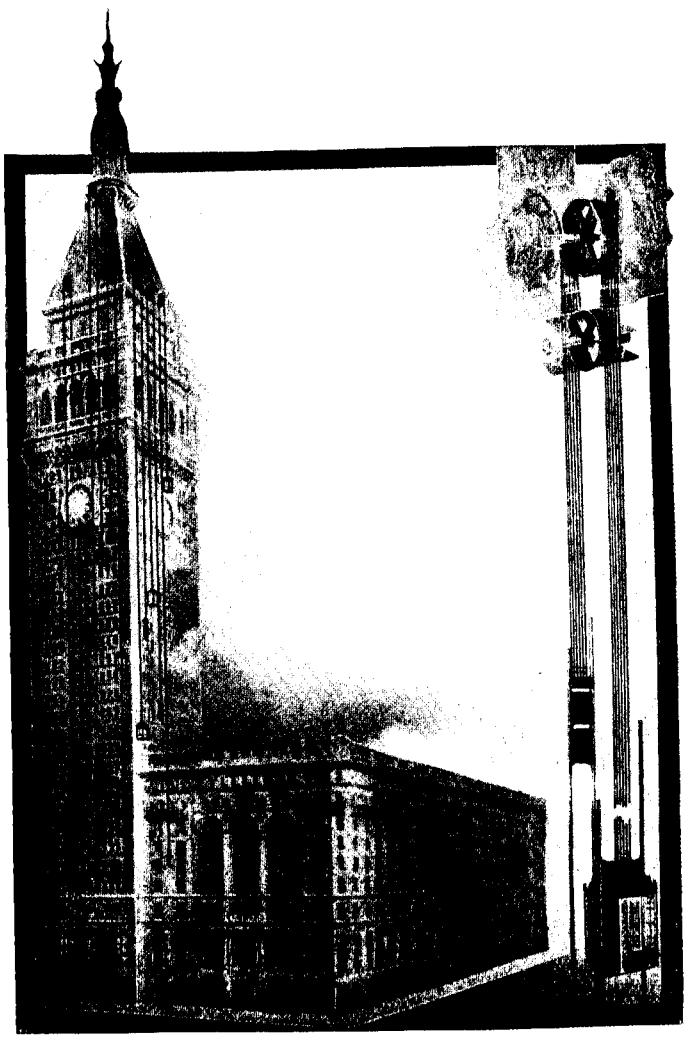


L. LeBrun & Sons, Architects.
The Metropolitan Life Insurance Building, New York City, N.Y.

Otis Traction Elevators

"The Elevator of Unlimited Capabilities."

have been installed in the Metropolitan Life Insurance Tower, which is the highest office building in the world. There are six elevators in all, five of which rise to the forty-first floor, and one to the forty-fourth, the latter having an actual travel of 585 feet 6½ inches.

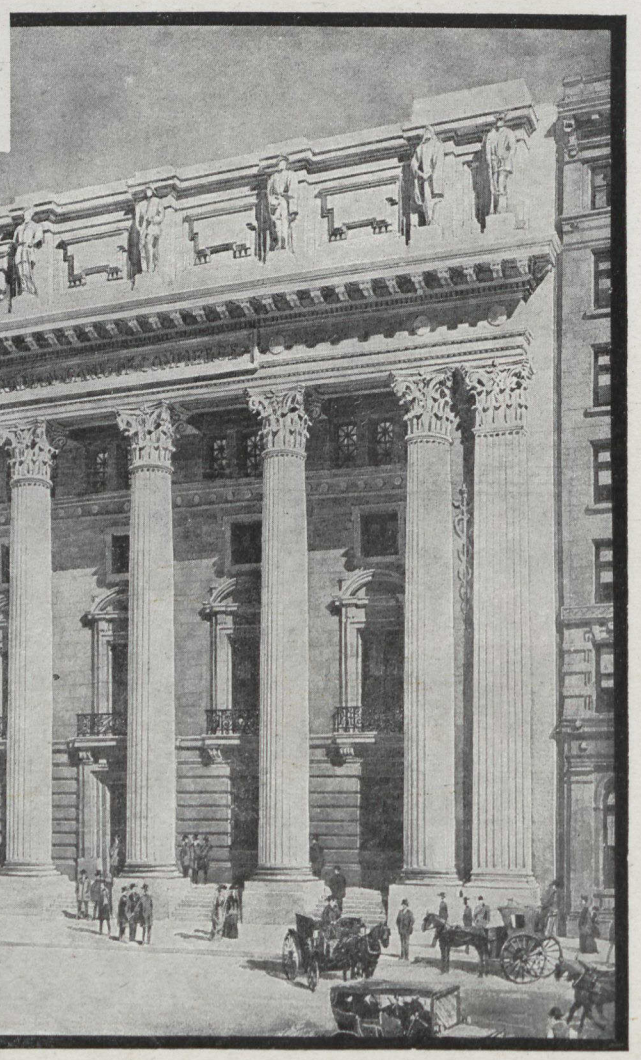
Manufactured and Installed in Canada by

OTIS-FENSOM ELEVATOR COMPANY, LIMITED

Head Office—Toronto **Works—Hamilton**

Montreal Light, Heat & Power Building

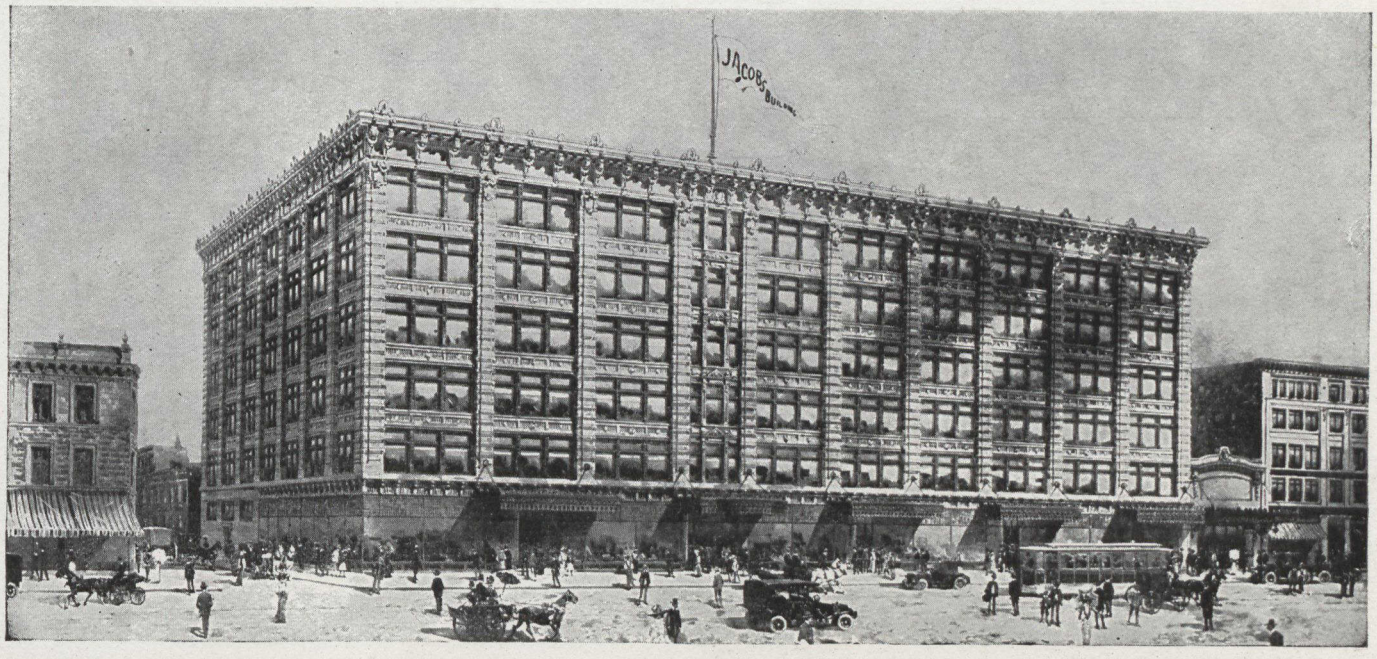
Kenneth G. Rea, Architect
Garth Co., - Plumbers



Bank of Commerce, Montreal

Darling & Pearson, Architects

W. J. McGuire, Plumber



Jacobs Building,
Montreal

Mitchell & Creighton,
Architects

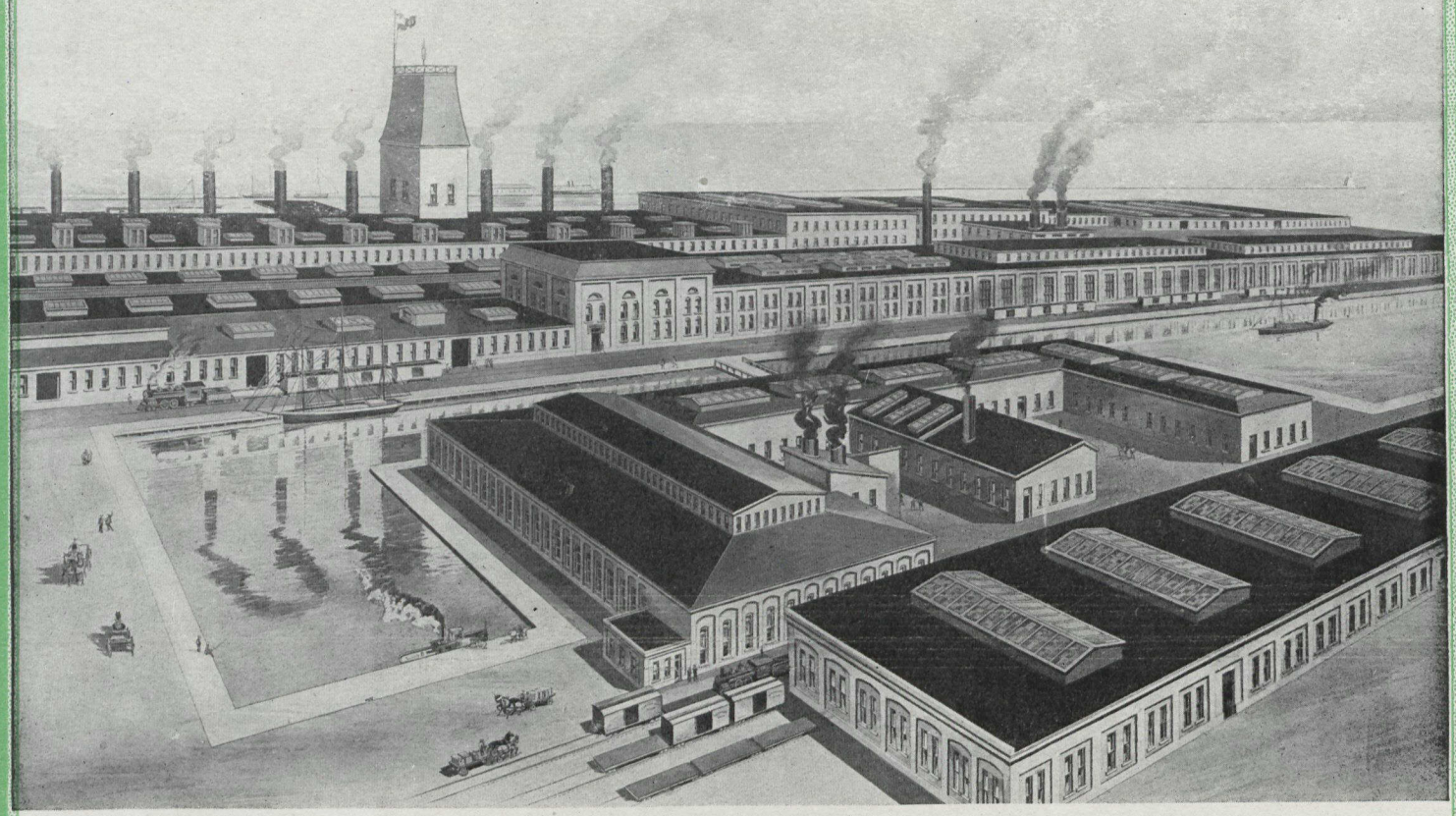
W. J. McGuire,
Plumber

Eastern Townships
Bank Building,
Montreal

Cox & Amos
Architects

James Ballantyne,
Plumber

ALEXANDRA WARE



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The Largest Exclusive Cast Iron Porcelain Enameling Works under the British Flag.

500 HANDS EMPLOYED. CAPACITY 110 TONS OF IRON MELTED DAILY.

The Standard Ideal Company Ltd.

MANUFACTURERS OF CAST IRON PORCELAIN ENAMELED SANITARY WARE

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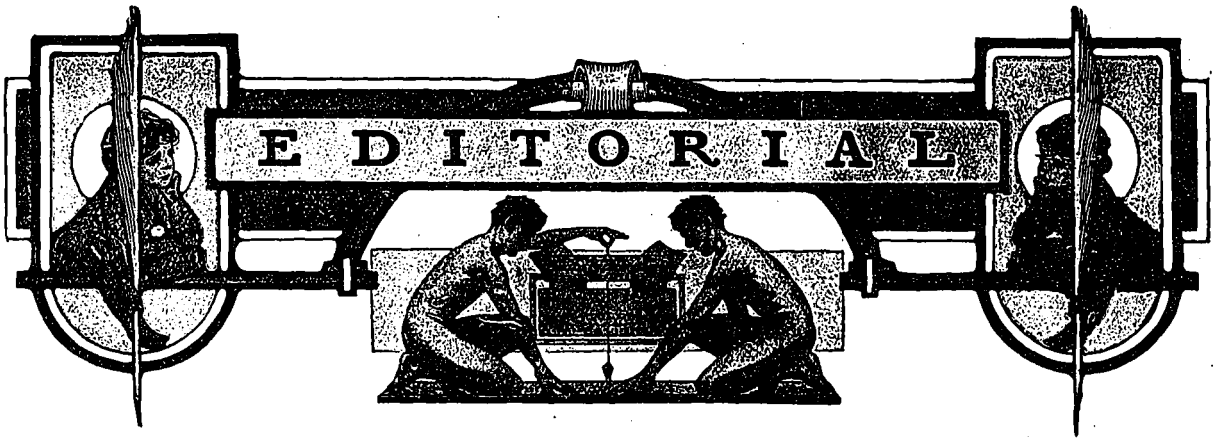
ALEXANDRA WARE



February's Building Returns.

BUILDING RETURNS for February, while not indicating as high a percentage gain as the preceding months, show the situation general to be most satisfactory. Despite the fact that there were more individual losses noted in the towns and cities reporting to CONSTRUCTION than at any previous time in the past two years, the month nevertheless registers an average gain of 7 per cent. over the corresponding period of 1909, which is indeed most gratifying to say the least, considering that the previous February was an abnormally active month in which a large number of projects matured that were laid over at the time of the money stringency. On the whole, there is nothing to indicate other than that the highly satisfactory and prosperous condition that has obtained for some time past will continue; in fact, the totals in a number of instances are such as to presage a greater activity in many localities than even the most ardent optimist has ventured to predict.

The fortunes of the month seem to have particularly favored the West. Aside from Fernie's loss of 90 per cent.—the biggest decrease noted—and Edmonton's decline of 74 per cent., the advance was both general and substantial. Saskatoon soared to the zenith in a most spectacular fashion, having by a gain of 1,955 per cent. registered the greatest increase noted. Regina rose to second position by an increase of 821 per cent.; while Vancouver, with a total of $880,795, and a gain of 115 per cent., records the largest volume of work undertaken, and thus secures the distinction for the month of being the premier city in the Dominion in this respect.

A strong forward movement was also manifest in Calgary, which annexed a gain of 117 per cent., and in Victoria, where the total for permits issued was 23 per cent. in excess of the aggregate amount for the same month last year. Again, Lethbridge's upturn of 41 per cent. bears evidence of a wholesome tendency, while Winnipeg's gain of 101 per cent., especially considering the amount of work undertaken and the enormous increase made in the preceding month, demonstrates plainly the gigantic strides which are being taken in the upbuilding of the Western metropolis.

It might be explained in the case of Fernie, that in the corresponding period of last year, the rebuilding of the fire-swept district was at its height, hence the remarkably large total, which could hardly be expected to be repeated under less extreme conditions.

As regards Ontario, the outcropping of decrease was a trifle more pronounced. Fort William suffered a reversal of 89 per cent.; London declined 71 per cent., and Kingston and Windsor fell back to the extent of 69 per cent., respectively. These setbacks, however, should in no way be regarded as alarming, as all these centres have excellent prospects immediately ahead, and will evidently show a steady expansion from now on. On the other hand, Hamilton made an excellent showing, registering an increase of 251 per cent.; Toronto slightly topped her figures for the corresponding month, and Brantford and Ottawa netted increases of 80 per cent. and 40 per cent. in order named.

Farther East, Montreal reports a gain of 16 per cent., and St. John, which lead the field in January, an advance of 225 per cent. Halifax and Sydney, however, are in the arrear to the extent of 34 per cent. and 44 per cent., respectively. Sydney's amount in either case is extremely small, and therefore, hardly material as indicating her progress. Both of these places are substantially ahead so far for the year's work.

	Permits for February, 1910.	Permits for February, 1909.	Increase, per cent.	Decrease, per cent.
Brantford, Ont. ...	2,800	1,550	80.64	.....
Calgary, Alta.	169,800	78,050	117.55	.....
Edmonton, Alta. ..	29,030	112,400	.....	74.17
Fernie, B.C.	35,000	370,000	.....	90.54
Fort William, Ont.	32,725	315,625	.....	89.63
Halifax, N.S.	14,525	22,070	.....	34.18
Hamilton, Ont. ...	37,650	10,700	251.86	.....
Kingston, Ont. ...	4,050	13,200	.....	69.31
Lethbridge, Alta. .	37,070	26,160	41.70	.....
London, Ont.	20,322	70,800	.....	71.29
Montreal, Que. ...	274,030	235,330	16.44	.....
Moose Jaw, Sask..	8,000	.....	.....	.....
Ottawa, Ont.	94,200	66,940	40.72	.....
Regina, Sask.	28,255	3,065	821.86	.....
St. John, N.B.	22,000	6,750	225.92	.....
Saskatoon, Sask. .	55,500	2,700	1,955.55	.....
Sydney, N.S.	1,775	3,200	.....	44.53
Toronto, Ont.	860,440	853,035	0	.....
Vancouver, B.C. .	880,795	409,655	115.00	.....
Victoria, B.C.	151,760	122,680	23.62	.....
Windsor, Ont.	5,200	17,075	.....	69.54
Winnipeg, Man. ..	318,600	158,500	101.00	.....
	3,075,527	2,899,485	6.07	.....

Toronto's Myopic School Board.

UNLESS THE UNEXPECTED OCCURS, Toronto's proposed $500,000 Technical School is to be erected after the plans prepared by Mr. C. H. Bishop, Public School Building Inspector of that city, with the aid of his staff of draughtsmen.

It is difficult to understand why "in the face of the many protests from Toronto citizens who are in a position to appreciate the danger of having a man so untrained in architectural design, erect so important a building," Toronto's School Board insists upon carrying out this determination to impose this task upon Mr. Bishop. To those who are in a position to intelligently look the affair squarely in the face, it appears that this body of men who expend annually vast sums of money on Toronto's new school buildings, are without the least conception of the extent of their responsibilities. They show conclusively that they have little appreciation for symmetry and beauty in architectural design, or the psychological effect of good architecture upon a community. A procedure of this nature might be excused if Toronto was still a country town, but the Queen City has grown

out of its swaddling clothes, and it seems only reasonable that its school officials should understand that they do not belong to a country school board.

At the time when the public is showing a greater appreciation of architectural design, a time when the Toronto Guild of Civic Art is making such earnest endeavors towards the beautifying of the city of Toronto, at a time when the city is spending large sums of money in parks and driveways, it seems almost incredible that a body of men responsible for the public school educational system of that city should show such an extraordinary lack of appreciation of architectural design as to make the unprecedented blunder of having so important a structure erected by an untrained man.

If the city gets value received for its expenditure, it will have one of the largest and best equipped technical schools on the continent. It will be by all odds the largest in Canada, and should be one that would stand as a model for other municipalities, many of which will erect structures to be used for a like purpose, within the next few years. This structure will be the largest individual educational building in the province of Ontario, and, therefore, should be one such as Torontonians could point to with justifiable pride. It will be the most mportant structure erected by the city of Toronto, with the exception of the General Hospital building, since the City Hall was completed.

The Technical School provides the most difficult task in designing and planning that has been presented in Toronto for many years, in that the designer has few successful precedents to follow. In other words, Toronto is spending in $500,000 a sufficient sum of money to erect a structure of which her citizens might rightfully be proud, a structure that should take precedent over all others, to be used in connection with the rapidly growing movement for the establishment of better facilities for technical education on this continent.

In view of these facts, it is obvious that the task of designing the Technical School is by no means a small one, even for our most thoroughly trained and best experienced architects. There is no architect in Canada who would undertake such a problem without first having given it long and careful study.

The Board of Education has evidently waived all these points as being of little importance, and are apparently under the impression that anything large enough, with four walls, a roof and the necessary partitions, is all that the people have a right to expect for their $500.000.

Mr. Bishop is admittedly not an architect. He has had neither the training nor practice to justify his being commissioned to design a $10,000 residence, let alone a $500,000 school building. His staff is inferior as compared with those in the better class of architects' offices, and cannot be expected to be equal to the task the Board of Education would impose upon them.

It is true some members of the Board of Education, together with Mr. Bishop, were sent to visit some more prominent technical schools in the United States, with a view to becoming acquainted with the usual requirements of such buildings, but you might just as well expect a sign painter, after having visited the art centres of Europe, to execute a Raphael, as to expect a man untrained in architectural design, to successfully design a $500,000 building after having viewed a few worthy structures.

Then, again, a private individual or corporation selects an architect to design a given building, only after having been satisfied by his (the architect's) former work, that he is equal to the commission. Every commission given to an architect is therefore justified, in the mind of his client, by the character of his former work. Can it be then, that in the minds of the members of the Board of Education, Mr. Bishop's public school structures in Toronto, justify his being commissioned to design this $500,000 building, a structure to be one of Toronto's most ambitious pieces of architecture? Surely not!

It is not our object here to discuss Toronto's public schools, but it is an undeniable fact that from the standpoint of either plan or design, Toronto's schools do not bear one mark of having been the work of a man trained in architectural design, merit of investment, knowledge of materials, or utility in planning. If the average architect had only such work to his credit, his chances for building a practice would be very small. But Mr. Bishop is to design Toronto's $500,000 Technical School.

Unless we are very much mistaken in the calibre of men we have on the Board of Education, it has not a member who would think of building a factory, a warehouse or a $10,000 residence, without the aid of an architect. One prominent member built not very long ago, a large storage warehouse. It was designed by a well-known firm of architects, and although the structure is simple, it bears evidence of good taste and shows a regard for the value of good materials, good proportions and the functions of the building. If private individuals find it expedient to employ trained men in such simple work as warehouses, factories or residences, how much more are the best of trained men required to design an educational building to cost $500,000?

The action of the Board of Education and Mr. Bishop's willingness to undertake a task he himself must know is so much beyond him, is without precedent. Never before in Canada, or the United States, has an untrained man been commissioned to design a structure of such proportions, a building so important, a work with so many problems. The outrage is without precedent.

The Board of Education has remained sullen and unresponsive to all the appeals that have been made to induce them to provide means whereby the city of Toronto would be given something for its $500,000 besides a meaningless unattractive structure with the necessary holes in the wall, a skylight or two in the roof for light, an elaborated entrance or two, and coping on the top to protect the walls from the elements.

The reason for this attitude seems inexplainable. Is it that the men to whom the citizens of Toronto have entrusted the conduct of all affairs pertaining to public education in the city are sufficiently lacking in culture and refinement to appreciate the educational importance of good design? Is it that they believe they are going to save money, or has Mr. Bishop actually convinced them that he, untrained as he is, is equal to the task of designing this great public structure?

It has been stated that an architecturally elaborate structure was not desired, but that a simple, dignified building, upon which no money was wasted on extravagant design, was to be preferred. This fact does not make the work one whit simpler; in fact, it renders it more difficult from the standpoint of good design. The popular belief that an architect's function is purely æsthetic, is entirely erroneous. The function of the architect is just as much utilitarian as it is æsthetic. Architectural training and practice is required to design a utilitarian structure, devoid of all ornament, just as much as it is required in designing monumental buildings of great cost. The trained architect will relieve the utilitarian building from monotony by the intelligent disposition of its parts to best express its function. He will produce a structure correct in detail and symmetrical in proportions, that betrays a strict regard for the value of good plain materials. It is the untrained man that belabors his building with a lot of cheap, meretricious ornament ill suited to the purposes of the building. A design that will give a rational expression to a utilitarian building, is what is required for the Technical School. To create such a design, is the work of a man trained in architectural design.

The argument that the Board would save the architect's commission by having Mr. Bishop undertake the work, is absolutely wrong. A good architect, if given a definite programme, by working economies in design and

construction, will more than save his commissions on any building, large or small. Apart from this, the superior class of work obtainable after the plans and under the supervision of a competent architect, warrants his employment. It is, therefore, quite clear that the Board of Education will make an unpardonable blunder if it persists in its present course and if the Technical School is built after the plans of Mr. Bishop, the city of Toronto will have erected a monument to the mismanagement and uncultured egotism of the Board of Education of 1910.

Toronto architects have filed their protest with the School Board, but it seems to have had little effect. The Board of Education appears to think that the architects' sole concern in the matter is prompted by their own professional interests. This is entirely erroneous. Architects should be given credit for having a public interest in such matters, unbiased by their own private interest. The architects of Toronto do not insist that a Toronto architect should design the building, but have asked that it be designed by a trained man. They were prompted in their protest against this ill-advised procedure, purely by their knowledge of the importance of such a problem, and the training that a man requires to successfully undertake such a work. The profession has not gone far enough. If it cannot get a fair hearing from the School Board, and a definite statement as to their position, a campaign should be organized whereby Toronto's citizens who have an intelligent interest in the city's welfare, would be made to see the horrible blunder that Toronto is about to make in connection with the erection of this important educational building.

The work is of sufficient magnitude to warrant a competition open to all architects in the province of Ontario, or the Dominion of Canada, while another plan would be to invite six or eight of Canada's foremost architects to prepare competitive plans. The programme could be drawn up by Mr. Bishop and his staff, and three or five eminent authorities could be brought from the United States to act as judges. I suggest from the United States, because Canada's more prominent architects would undoubtedly be competing.

In this way, it would be possible for the city to get the product of Canada's best trained architects, and the result would be somewhat different from what we might expect from one man, untrained in architectural design. A bad building once erected, is a mistake that cannot be rectified.

Architectural Services and Remuneration

FOR THE BENEFIT of the architects who have not as yet heard of this golden opportunity, we reproduce herewith an advertisement appearing under the heading of "general announcements" in one of the daily papers, believing that it will cause a general scramble for the draughting board as soon as the information contained therein has spread among the members of the profession.

TO ARCHITECTS.

The undersigned will receive competitive plans and specifications for an eight-room School House with basement, plans to provide for heating and ventilating, for Eganville Public School. Price of plans and specifications accepted to be seventy-five dollars.

It shall not be necessary for the Board to accept any plans submitted. The plans adopted to be the property of the Board. All others will be returned. Competitors to give approximate cost, exclusive of furnishings. Proposed cost of building from $10,000 to $12,000.

J. R. CAMPBELL,
Secretary, Eganville, Ont.

Seventy-five dollars for the accepted plans and specifications. Surely this is a recompense for service that borders on wanton prodigality. Would it have not been better to divide this sum into prizes, and to have had it so arranged that the first prize would include the fees of the successful architect. This would have at least given one or two others a chance "to get in on the money." Nothing is said in the advertisement about supervising the erection of the building, but from the munificent amount that the Board is willing to pay for the plans and specifications, it is only natural to assume, that this is to be expected.

Can anyone picture anything more preposterous or ridiculous than the terms of this announcement? Is it purely a case of gross ignorance as to value of architectural services; is it genuine parsimony, or an indirect appeal for charity? Possibly it is a combination of the three, but more likely it is the result of a niggardly policy which for genuine tight fistedness, surpasses anything that has heretofore come to our attention. The School Board desires a $10,000 or $12,000 school building and presumably one in which the plumbing, heating, ventilation, lighting of class rooms, and other sanitary features have been thoroughly considered, and in which adequate means of circulation and ingress and egress are provided. Tersely, it wants as good a structure as the money available will erect, and with this object in view it is willing to spend in one lump the sum of *seventy-five dollars* for the best ideas the architects may have to offer. Truly magnanimous, is it not? And yet, at that, there is no assurance that even this meagre stipend will be forthcoming, as the Board candidly stipulates that "it shall not be necessary to accept any plans submitted." The members must be fully satisfied that the design and plan of the building comes at least up to their expectations, aesthetically, constructively and economically, before any sordid designer can wrest the coveted amount from their hands.

There is a popular misconception on the part of many individuals that all an architect has to do is to submit sketches and plans of proposed structures for which he hasn't even a definite prospect of securing a commission; that the work of getting out such drawings is a mere trifle; and the outlay involved, simply nothing. They do not consider office rents, draughtsmen's salaries, the cost of workshop materials, and a number of other expenses which the architect has to meet. They merely regard him as a someone to whom they are absolutely indispensable, as one who must meet as many demands as they may make without any certain assurance of recompense.

The above case is quite typical in this respect. It invites the collective time and labor of as many architects as will compete for a picayunist consideration. In other words, the Board is willing to trade a seed for a watermelon, providing they cut and feast on it alone. But whatever may be advanced in the way of adverse criticism as regards the advertisement in question, it still possesses the virtue of open frankness. The facts are pertinently stated, and the architect knows just what he is up against.

Quite frequently we learn of library boards and other public committees who are guilty of unduly encroaching upon the architect's time, owing to gross irregularity in their mode of conducting competitions. We have had lately brought to our attention, a case of a Western Ontario town, where the library board, after keeping the competing architect in darkness for several months, finally rejected all designs submitted for a $25,000 building, and instituted a program on somewhat different lines for a second competition. The first competition provided that the author of the successful plans *would be requested* to furnish detailed plans and specifications, and that prizes of $50.00 and $25.00 respectively would be awarded for second and third choice. The second program, however, makes no stipulation of the kind; no award is promised, and there is nothing to indicate otherwise than that the competitors' efforts will again be in vain.

Taking these facts and conditions into consideration, it appears that the several architectural organizations would do their individual members and the profession in general a real material service by organizing bureaus that would keep the profession in touch with all competitions of this nature. Every competition should be carefully investigated the moment it is announced, and every member should receive notification from the secretary of the Association to which he belongs, stating whether such competition has secured the stamp of approval by the Association's committee, appointed for such purpose.

The popular conception that an architect's interest in his work, or his success in his profession, is measured, purely, by his ability to procure work and the collection of fees, is entirely erroneous. Every building designed by an architect, is an immovable evidence of either his skill or his incompetence, and in justice to himself, his client, and the profession generally, he must insist that the conditions under which he is employed, are such that will permit him to produce a finished structure such as he believes to do justice to his best ability. When the critical eye of the public passes over a building, it is judged as a finished work. Nobody ever inquires as to how much the owner paid the architect for professional services; nobody asks whether the architect received sufficient remuneration to permit him to erect a decent building; nobody asks whether the architect was responsible for the working drawings, nor whether the building was constructed as originally designed. The public simply looks upon the structure as the work of a certain architect, and criticizes it without any consideration for the conditions under which it was designed or built. For this reason, it is most important that every architect should take especial care that the conditions of his employment are such as to permit him to produce a finished structure, upon which he is willing to stake his professional reputation.

When an architect undertakes to do a given piece of work, at a price below that which his professional services are really worth, he undertakes to operate under conditions which do not permit him to carry out his work in a manner either creditable to himself or the profession. An architect should furthermore be very careful as to whose hands he permits his design and plans to go into, and in most cases should insist that the final working drawings should be prepared by himself, and that he be given the privilege to supervise the erection of the structure. Both he, the owner and the public would profit thereby.

To offer a nominal sum for a successful design with plans, and then carry out the erection of the building without the service of the author of the plans, may be termed an economy, but it is of the false variety. It is about the surest way to provide means for the squandering of money on a badly planned, poorly constructed and inadequately equipped mass of building materials.

It will be interesting to know just how many architects have prepared competitive plans for the Eganville school. We would like to give space to the three best designs, in "CONSTRUCTION." It would be interesting to see how much a man can get for $75.00 in the way of design for a $12,000 school. We doubt very much, however, as to whether the Board's inducement will prove sufficiently attractive to secure enough designs to provide for very much of a selection, unless it appeals to the "mail order architect," whom it might give an opportunity to job off one of his "hand-me-down" plans, with specifications, and working drawings thrown in to "cinch" the bargain. It is possible that the school board of Eganville, when they examine their competitive designs, will have a very poor opinion of the "Arch-e-teck's" ability to plan school buildings, and will possibly follow the usual course of village school boards, by giving the contract to a carpenter or mason to plan as well as build the schoolhouse, and Ontario will have added another to its long list of school building abortions for which it now enjoys a shameful distinction.

The "Big Stick" Measured.

AS WE GO TO PRESS a tariff war between Canada and the United States is imminent. The dictatorial, overbearing attitude of the American republic in demanding the same tariff concessions as Canada gave France under a reciprocal arrangement, with the threat of applying their maxmum tariff schedule against Canadian products, is perfectly in keeping with the egotistical trad epolicy of the myopic Yankee.

Before Canada came into her own, there was a time when she was in sore need of a market for her raw products. The United States seemed to be its logical and natural customer. We appealed to the American Government for a trade arrangement but our trade emissaries returned home empty handed—smarting under the almost discourteous treatment they received at the hands of the officials at the capitol, where the "big stick" is paraded.

Blaine told Canada plainly that she had to choose between two things—"secession from the Mother Country or commercial isolation as far as the United States was concerned." We chose the latter course and now that we have worked out our own destiny with the aid of the Motherland, in spite of the threatened commercial isolation, the commercial enemy of our youth comes to us with friendly representations and a "big stick" to attempt to cadjole us into the purchase of a highly polished "gold brick."

We are surprised that Uncle Sam, as crafty as he is, should have undertaken to awaken the "sleeping dog." Why he should attempt to disturb a condition that has been working so materially to his own advantage, is not quite clear, for by the application of the maximum tariff against Canadian goods, the United States will have done more to promote the policy of high protection than all the political agitators in Canada could ever hope to accomplish.

According to the report of the Department of Trade and Commerce, for nine months ending December, 1909, Canada imported $161,013,916 worth of merchandise from the United States, the greater portion of which was manufactured products. During the same period Canada's exports to that country amounted to $79,333,930 which was constituted almost wholly of raw materials. This gives the United States a trade balance in its favor of $81,680,033. During this period Canada's imports from all the other countries in the world, including Great Britain, amounted to only $110,783,437. In other words Canada bought, during the first nine months of the present fiscal year, $50,230,462 more from the United States than from Great Britain and all the other countries of the world combined.

More than this, we find during this same period that $75,025,145 worth of merchandise was admitted duty free from the United States, as against a total of $33,495,'88 of duty free merchandise from Great Britain and all the other countries combined. In the face of these facts, Washington maintains that the United States is being unduly discriminated against and threatens Canada with a sound tariff thrashing if additional concessions are not made. The "big stick" loses its terrors with the man who carries a stick of dynamite.

The majority of Canadians have for the past ten years realized that our tariff rates were inadequate. They have not been sufficiently high to prevent the dumping of surplus foreign manufactured products. As a result, our industrial equilibrum has often been disturbed and the trade against us has been too great to create a healthy condition of trade. But political policies and prejudices have set many obstacles in the way of

a sane solution of the difficulties with which a re-adjustment of our tariff laws is fraught.

Again, our forests are being demanded to keep the great paper mills of the United States, that employ thousands of hands ,in operation. Our asbestos mines are operated mostly by American capital and the raw product is being carried off to the United States to be manufactured by American labor, from whence it is brought back and sold to us in commercial forms. Our nickle mines—the richest in the world—give up their wealth to be carried off across the border where it is used in connection with the manufacture of inumerable articles that are brought back and sold to Canadians.

Our wheat is taken into Minnesota where it is mixed with an inferior grade and the flour thus manufactured is sold on the English market as No. 1 hard wheat flour, in competition with the product of uor own mills.

These are conditions that every thinking Canadian has deprecated, but the proper solution of them has never been quite clear. It has remained with Uncle Sam to point the way, and the tariff war he threatens to force upon Canada will operate directly in taking the last leg from under high tariff opponents, and will unite every Canadian, without regard to party politics, in the determination to correct the unhealthy conditions that have existed between the two countries. If the United States carries out its declared intention, the Canadian parliament will be forced to put an export duty upon raw products and a surtax upon imports from the United States. It will thus have a two-fold effect in promoting Canadian industry and enterprise.

The business man of the United States will not consent to have the Canadian market taken from him. If it becomes unprofitable to export goods to Canada, he will build a factory to supply his Canadian trade.

British capital will flow into the country, in the establishment of factories and warehouses and Canadian manufacturers will be adequately protected against the now ruinous dumping from the United States.

As regards building materials and equipment, we know of nothing that we import to-day that cannot either be produced in Canada or purchased in the English market. When such a condition has been brought about, Canada will keep to herself a very much larger percentage of the vast sums now being expended in building and engineering operations, than she does at present.

Canada, threfore, welcomes the tariff war that the United States seems determined to force upon her, as a solution of a perplexing trade problem.

EXAMPLES OF VENETIAN GOTHIC.—Ca d' Oro and Contarini Fasan Palaces.

ALTHOUGH ITALY cannot be said to have ever had a Gothic style, we can speak of a Gothic Age in Italy. The Italians never mastered or cared to master the principles underlying Gothic construction, but adopted at their good pleasure, and with modifications to suit their genius, a good proportion of Gothic forms. During the thirteenth and fourteenth centuries nearly all of Italy's architects were monks. Both the Dominicans and the Franciscans accepted the Gothic type and it is the churches of these two orders at Bologna (San Francisco San Domenico), Florence (Santa Maria Novella Santa Croce), Venice, Santi Giovanni e Paolo (Santa Maria, Sopra Minerva), etc., in which the type of Italian Gothic churches is developed.

It was in civil architecture, however, that the Italians excelled, and it is Venice that represents the full flower of the transition from the Byzantine ideals to the Renaissance through the Romanesque and the Gothic, in its numerous notable palaces and public edifices.

The pleasure palace of Venice, beginning as a Byzantine and Romanesque type, developed during the Gothic period into a beautiful creation, whose climax is the Ca d' Oro and the Doges Palace. The Venetian palaces are distinguished by their many loggie and colonnades, by their wealth of exterior decoration and colored surfaces; while their interiors are enriched by the brushes of the many superb Venetian colorists.

The celebrated Ca d' Oro is one of the many beautiful Venetian Gothic palaces on the Grand Canal, and is united with some three or four of these palaces of rather early date. It is difficult to secure a description of this palace, as it was originally built, owing to the fact that it was restored to render it fit for the occupation of Ma lle Taglioni, and much of the elaborate decoration, from which it originally derived its name, has perished or been destroyed. As it stands, however, it is still a very sumptuous example of the later Fourteenth Century Venetian Gothic. Its whole face is inlaid with squares of red and white marble, and a great amount of carving is spread over the entire surface around and between the windows. This is very flat, but good in its effect. The open arcade on the water story and the traceried arcade above, all open into recessed courts, an arrangement peculiar to this house, and so far similar in its purpose to the arcades in the Ducal Palace. Some of the balconies are considered exceptionally good, and the carving of the capitals and moulding of the window traceries are characteristic of Venetian Pointed.

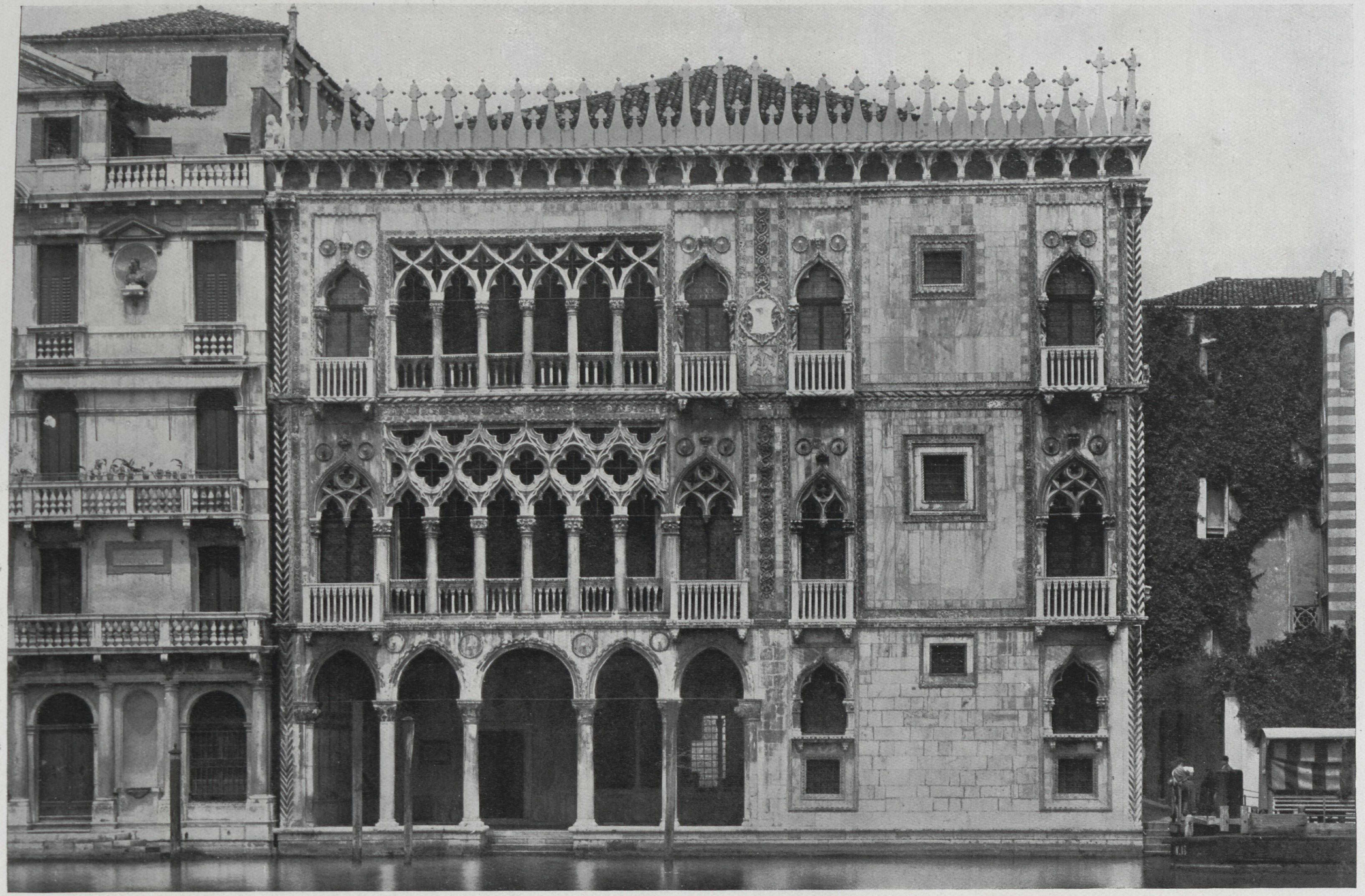
The whole design is criticized as being one-sided, thus giving the impression of a house to which an additional wing has been added. The water stage consists of an open arcade of five arches, the central arch round, and the remainder pointed. To one side of these are two windows and a continuous balcony. The second and third stages have above the five open arches, elaborate traceried windows of less than eight lights in width, filling almost the entire front, the outside lights having balconies while the others have balustrades. Over the two windows of the water stage, are single light windows in each stage. Throughout this front there are many medallions of dark marble, which let into a field of light marble and are most brilliant in effect.

The most remarkable features of the Ca d' Oro are, however, the triple and elaborately carved chamfroned angle shafts, which are nowhere else to be found, and the very singular parapet. The height of this is greater about the centre and at the two ends than elsewhere, but it appears to have been done rather with the intention of carrying up to the very top the noticeable division in the building itself, than for any other reason. A very small portion only of the parapet is perfect, but its general effect will be understood on reference to the illustrations. The small balls of marble affixed at the outer edge at the trifoils, are like those in the tracery of the Ducal Palace, and in the centre of the medallions of marble, everywhere throughout the city their effect is very piquant.

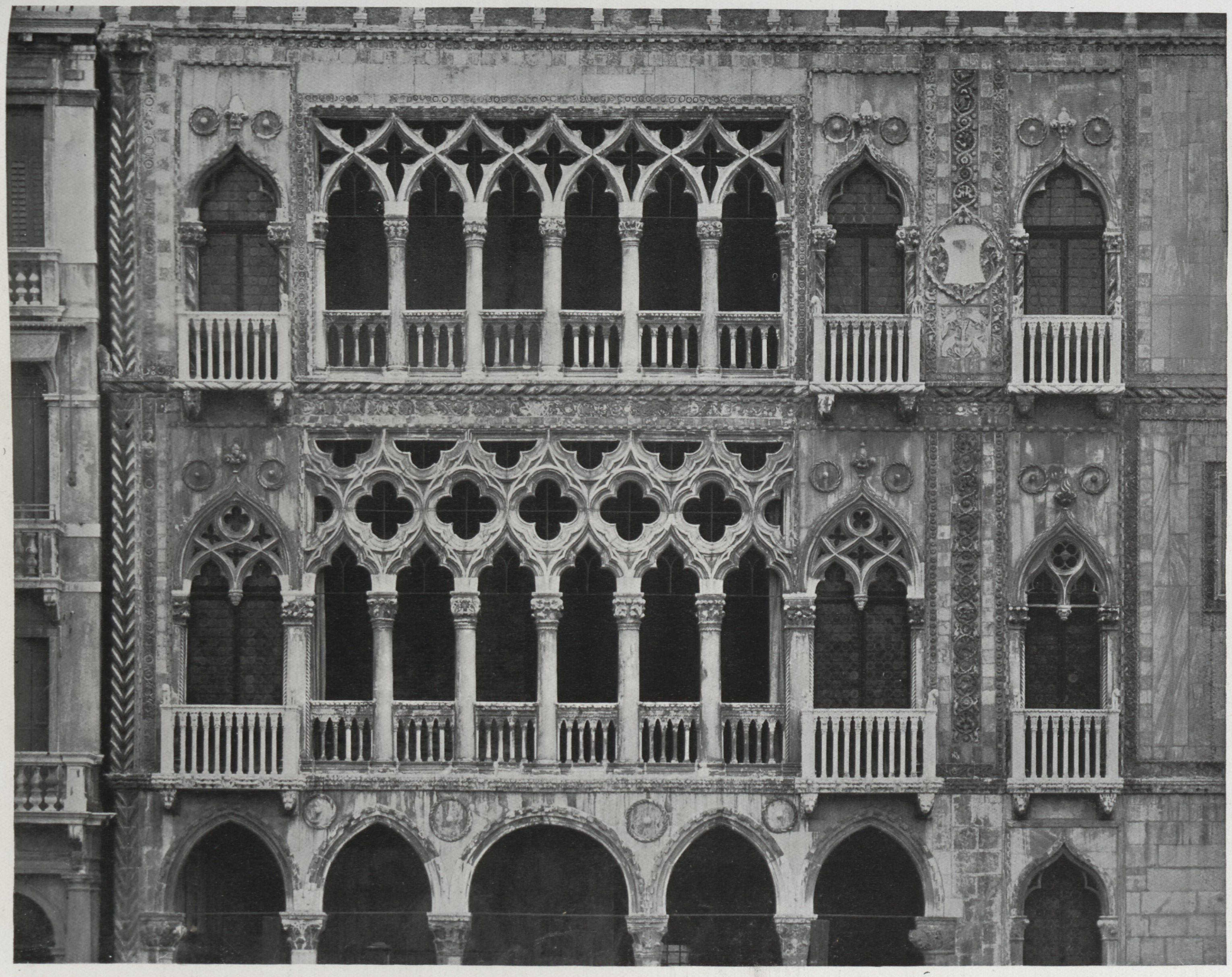
Palazzo Contarini Fasan.

The Palazzo Contarini Fasan, which is often shown as the house of Desdemona, is the most exquisite of small Gothic structures on the Grand Canal. It has corded edges and traceried balconies of surpassing richness supported on richly sculptured corbels. This house, which was built in the fourteenth century, is the only palace in Venice that has traceried balconies.

A GERMAN MACHINE MANUFACTURER in Magedeburg has devised a new means for power transmission in the shape of a wire belting. It is claimed for this invention which substitutes thin endless wires for leather belts, steel bands, chains, etc., that it equals other systems as regards efficiency and wearing qualities, and is considerably cheaper.



The Cà d'Oro Palace, Venice, erected during the Fourteenth century. This celebrated palace represents the beautiful creation in the Venetian palace, that was the climax of the transition from the Romanesque to the Gothic type. The most remarkable features of this structure are the triple and elaborately carved and chafroned angle shafts and the very singular parapet, together with the tracery of the loggie and the windows and the carved work around and between the windows.



Detail of first and second stages of the Cà d'Oro Palace, Venice. In this detail the exquisite carved work and beautiful medallions may be seen. The small balls of marble affixed to the outer edge of the trefoils are like those in the tracery of the Ducal palace, and the balls in the centre of the medallions of marble are like those seen everywhere throughout the city.

The Contarini-Fasan, Venice, built during the fourteenth centur y. This palace, which is often shown as the house of Desdemona, is one of the most exquisite of small Gothic structures in Venice, and is th e only structure in that city that has traceried balconies.

ARCHITECTURAL EDUCATION IN TORONTO.—Beaux Art System of Training Adopted by Aspiring Draughtsmen.—Classes Held Under Patronage of Local Architectural Society.—Work of Students and Life at Atelier Lyle.

WITHOUT ADEQUATE FACILITIES in our Canadian universities for instruction in architectural design, the responsibility of the proper training of the architect-to-be rests entirely with the practicing architect of to-day. It is true that the several architectural organizations in Canada are clamoring for the establishment of courses in architectural training in our colleges that will prove equal to the duties imposed upon them by a country that has yet to establish an architecture of its own. Their efforts in this direction have, however, met with little encouragement. The lay public in Canada does not seem to recognize the important position the architect occupies in our social, moral and industrial fabric. Canadians take pride in the facilities afforded in their universities for almost every other branch of learning, but we are not as yet sufficiently appreciative of design to have due consideration for the importance of architectural education.

Educators recognize—at least to some degree—the necessity for better facilities for architectural training, but the rapidly increasing demands in other branches of learning, together with the apathetic attitude of the lay public, precludes such action in this direction, that they personally might be inclined to take. It is not to be inferred from this that the laudable efforts of the several architectural bodies in Canada to induce our university authorities to give architecture as an art, the recognition that it deserves, will be of no avail. We are merely outlining a condition that has existed up to this time, and it is to be hoped that in the near future architecture will be placed on a par with the other courses of training now carried on in our universities.

In the meantime, the training of the student and the education of the lay public rests entirely with the architects of Canada, individually and collectively. By the quality of their own work, by training the young men in their offices, and by organizing classes in architectural design and practice, the architects of Canada will do much of a real material nature to elevate the standards of public taste and of the profession. In this way will a higher order of things be brought about that will place architecture in the important position it merits.

In Canada we have no museums, we have no notable monuments of architecture, our students cannot take a day's excursion to view the treasures of Rome and Italy, the picturesque monuments of Spain and Germany, the beautiful old cathedrals of England, or the architectural masterpieces of France. The student in Canada lives in a utilitarian atmosphere—as a people we have not found time to become artistic. Utility and cost are the predominating considerations in almost all our public enterprises. It is right that the student be impressed with the importance of the business phase of the profession, but not to the extent that it crushes out the vital spark of imagination, thus rendering symmetry and beauty, the least important of the factors in architectural design. These are some of the disadvantages and handicaps that the architect must meet before we can expect to elevate the standard of the profession in Canada to a point that will render a Canadian architecture possible. To this end several of the architectural bodies in Canada have established classes of instruction, and several members of the profession who have been fortunate in having had the opportunity of securing a superior training have and are giving up much of their time to this praiseworthy cause, under conditions that are trying, if not at times discouraging. To the instructions received in these classes, many architects practicing to-day owe at least their initial training. The success of such classes depends upon two things: the interest and diligent application of the student, and the patience, perseverance, unselfish sincerity and self-sacrificing devotion of the instructors.

In the absence of environment that promotes the appreciation for the aesthetic, many students become indifferent—they would like to take the short cut—"touch the high spots" as it were—and while it is this apathy on the part of the student that is most discouraging to the architect-instructor, it is here that heroic work has to be done. The students must be encouraged, goaded on—interest must be created and maintained. The most attractive and suitable conditions must be provided under which they work—they must be taught to take a mutual interest in each other's work. They must understand that they are all working for a common purpose toward a common end. Yet there must be a friendly rivalry and criticism to create an unwavering enthusiasm and determination to excel.

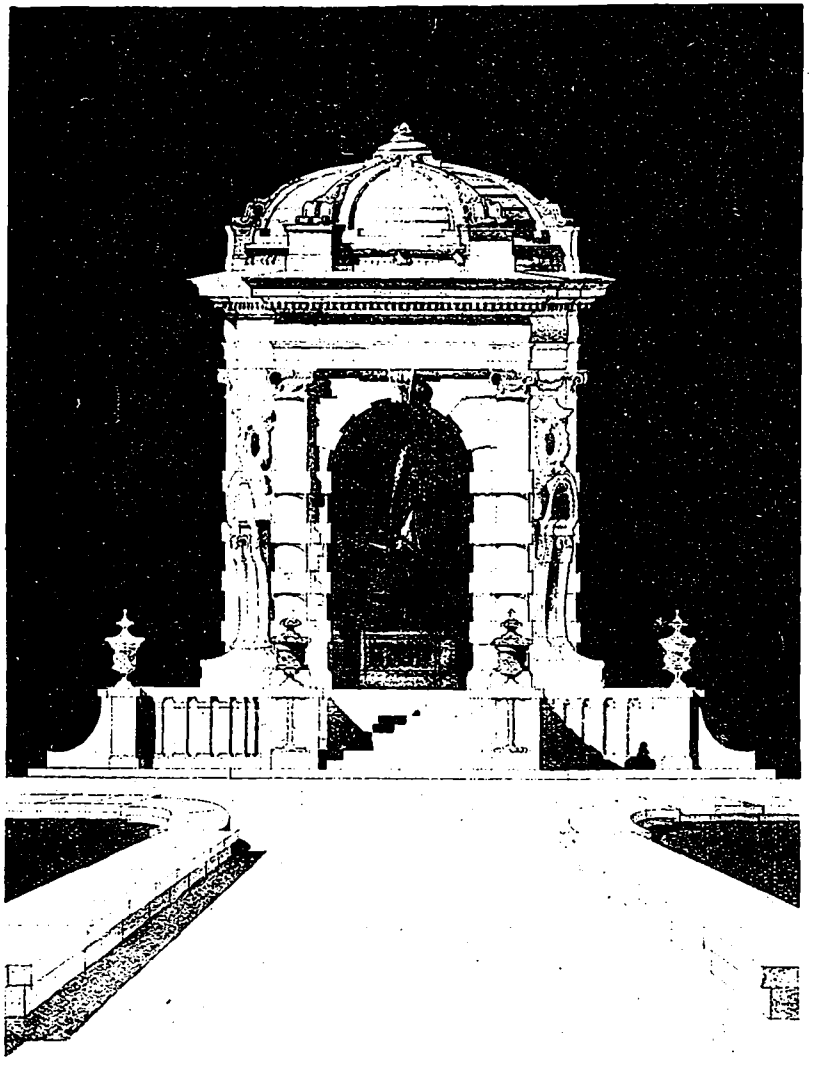
In the absence of the artistic atmosphere of Europe or the university courses such as are provided in the United States, it is only through the establishment and successful conduct of such night classes that students in Canada will be given an opportunity to secure systematic training in architectural design.

Before the establishment of architectural courses in the United States universities, the condition there was much worse than that which now obtains in Canada. About thirty years ago, after the civil war, there were few educated architects; the popular standards of design were almost grotesquely inartistic, and really fine architecture was nearly as impossible to execute as improbable to be appreciated. However, the appreciation of the beautiful in architecture was not entirely dead, and a few brave, earnest men strove by the excellence of their work, the training of their draftsmen, and the general interest they took in the advancement of the profession, to bring about just what Canadian architects are to-day striving for in Canada—better facilities for architectural education.

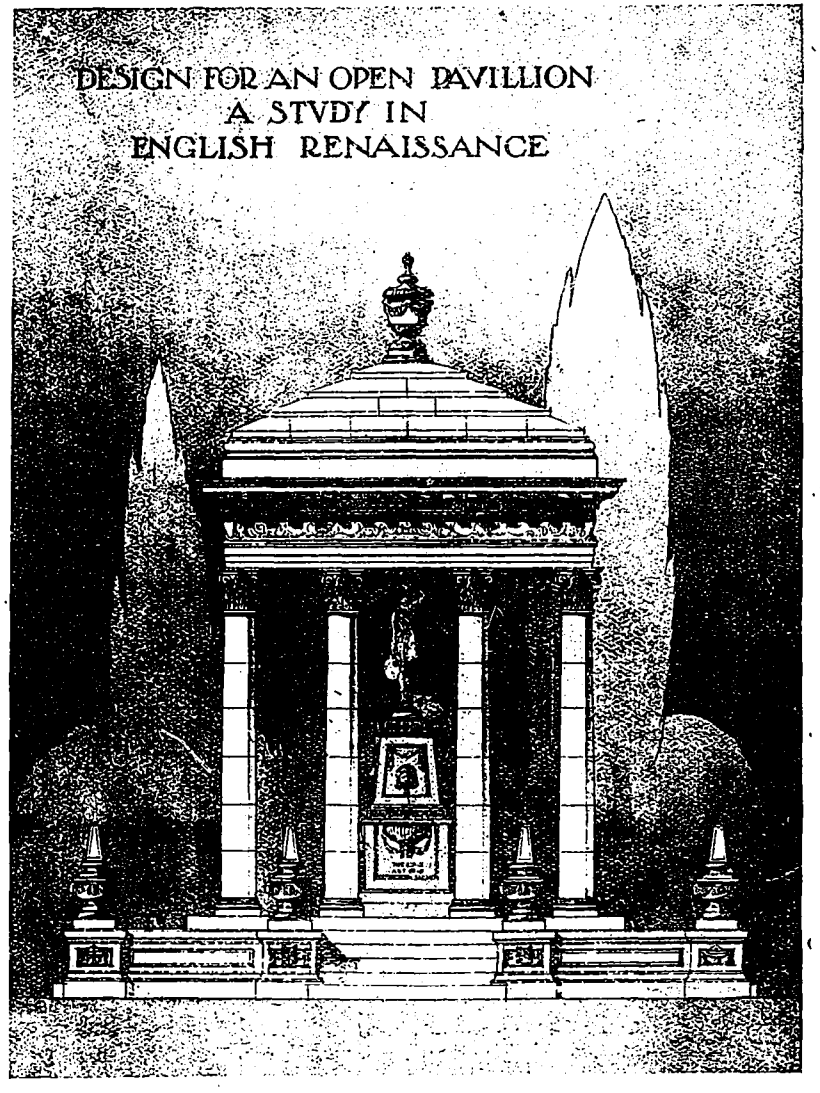
Professor Hamlin, executive head of the School of Architecture of Columbia University, places three names "foremost in this roll of honor," R. M. Hunt, H. H. Richardson, and W. R. Ware; Mr. Hunt and Mr. Richardson for the educational work carried on in their offices, as well as for their professional achievements in practice; Mr. Ware for the organization of the earliest United States School of Architecture in the Massachusetts Institutes of Technology in Boston. It was not, however, until 1876 that the herculean efforts commenced to bear fruit, when they became acknowledged leaders of a movement that eventually placed architecture in the United States on a higher plane. In 1880 the Columbia University established a Department of Architecture, and to-day there are four universities in the United States that conduct architectural courses that in almost every point of comparison are equal to those of the old world.

Canada is just now passing through this transitional stage, and it rests with the practising members of the profession to take care of the education of the student until such time as a condition may be created whereby public opinion and sheer necessity will demand the establishment of university courses in architectural instruction, such as will compare favorably with those of colleges in other countries.

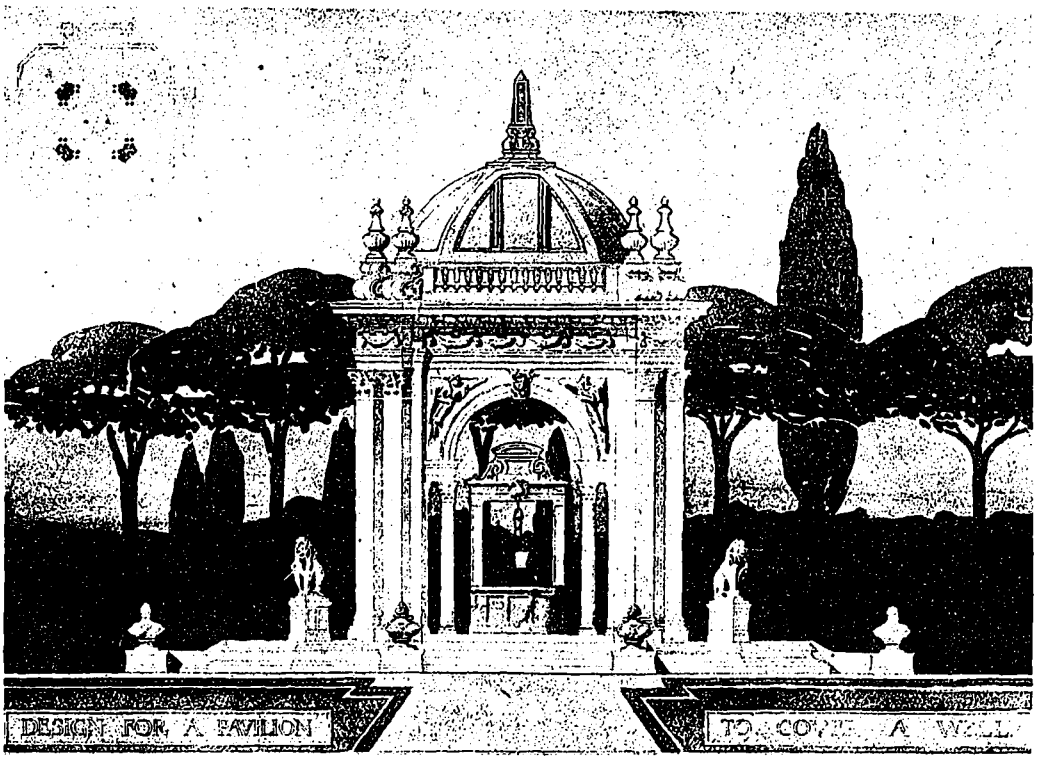
Among the several architectural organizations that have assumed their responsibilities in this direction is the Toronto Society of Architects, under whose auspices



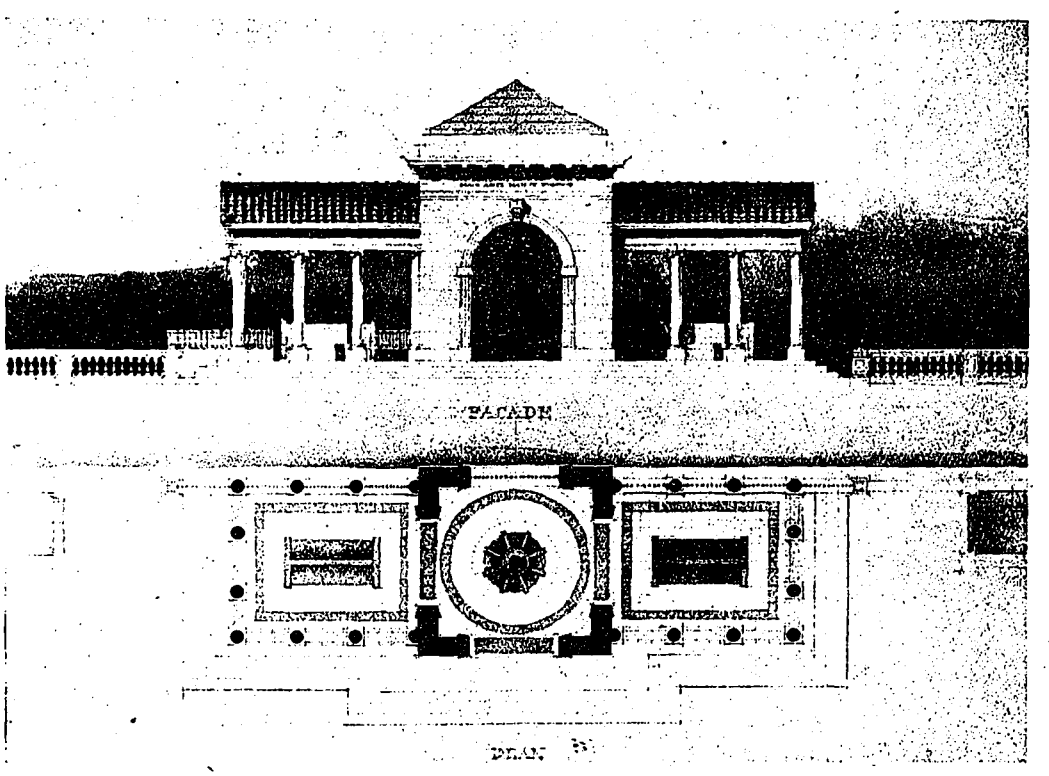
Design No. 1.—Open Pavilion—Toronto Beaux Art Society Competition—Second Mention—A. E. Martin, Atlier Lyle.



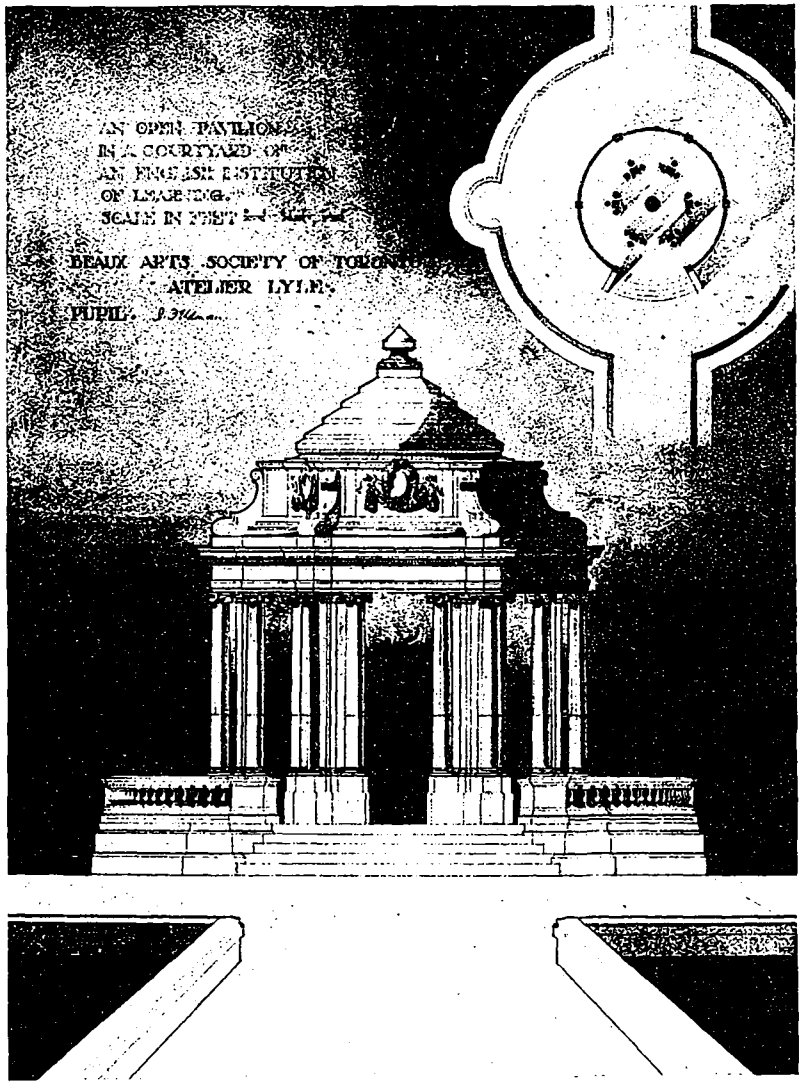
Design No. 2.—Open Pavilion—Toronto Beaux Art Society Competition—Second Mention—D. E. Kertland, Atelier Lyle.



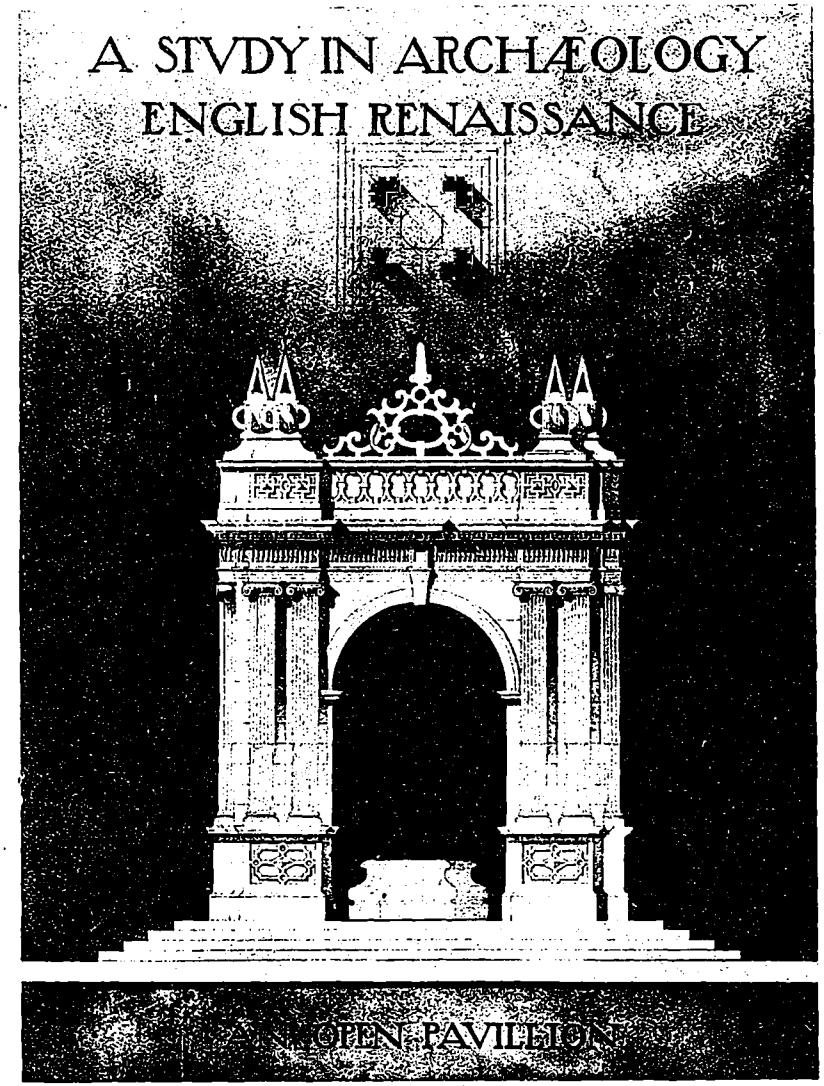
Design No. 3.—Open Pavilion—Toronto Beaux Art Society Competition—Second Mention—A. J. Everett, Atelier Lyle.



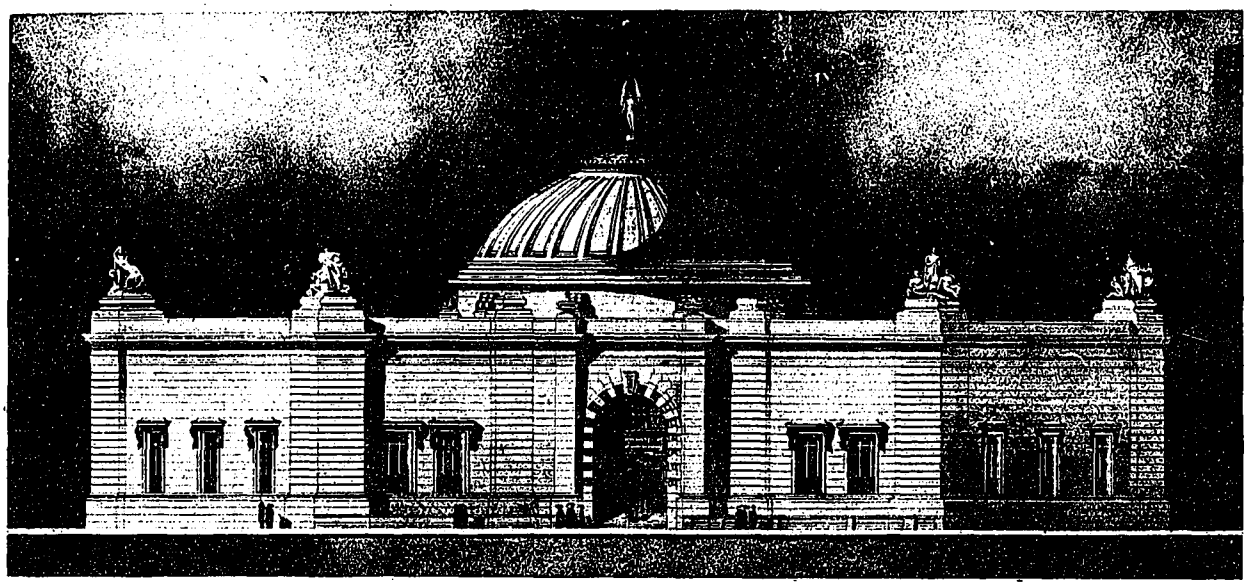
Design No. 4.—Open Pavilion—Toronto Beaux Art Society Competition—Mention—G. West, Atelier Lyle.



Design No. 5 —Open Pavilion—Toronto Beaux Art Society Competition—Mention I. Feldman, Atelier Lyle.



Design No 6.—Open Pavilion—Toronto Beaux Art Society Competition—A. E. Watson, Atelier Lyle.



Design No. 1.—Art Museum—Toronto Beaux Art Society Competition—A. E. Watson, Atelier Lyle.

"the Atelier Lyle" is conducted. The success of this class has been due almost entirely to the persistent efforts of Mr. John M. Lyle, who was invited by the students at its inauguration to become the *atelier patron* and *critic*, in which capacity he has acted for two years. The methods of instruction are similar to those in vogue at the celebrated Ecole des Beaux Arts of Paris, and we believe a short description of the *atelier* and its life would be of interest to the readers of CONSTRUCTION.

Mr. Lyle, who has had a "Beaux Arts" training, is well qualified to act as *patron* of this Beaux Arts class of Toronto. In the Paris school he was permitted to breathe an aesthetically exhilarating and illuminating atmosphere, and the influence of the material consideration imposed upon him in his practice since he returned has been toned down by the more highly artistic taste he developed when abroad.

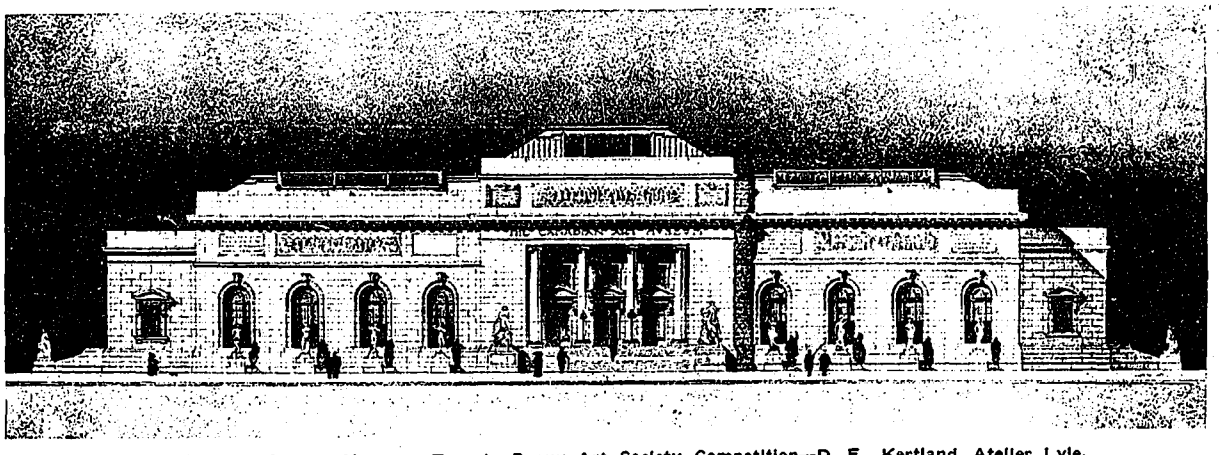
Despite the contentions of many architects that the Beaux Arts system is weak, in that it does not encourage the mechanical and utilitarian details, it is an incontestable fact that it opens the student's eyes to the artistic factors and possibilities of a problem. He is taught to think of a building as an artistic unit, as primarily and always a work of art, an object of artistic design in plan, composition and detail. The results of Mr. Lyle's educational work are shown by the illustrations of the several drawings by his students as published herewith. Generally speaking, the designs show intelligent thought, careful rendering and good composition.

The home of this youthful band of aspirants to the architectural honors of the future, is on the second storey of an old brick building of Georgian simplicity—situated on Bloor street near Yonge. The environment is of the humblest—the unkept condition of the rooms reminds one of the abode of an artist—everything that might tend to give the quarters a utilitarian atmosphere has been studiously avoided. A cabinetmaker occupies one of the lower storeys. A Chinese laundry is also located in this old building, and the whole Bohemian atmosphere is accentuated by the pungent odor peculiar to Oriental emporiums of this nature.

The *atelier* or workshop occupies a long room, the draughting room and smaller adjoining room—the library; neither one bears evidence of having imposed any undue responsibilities upon the class for their upkeep; they are unkept and in a state of chaos, as most workshops are. The rooms are full of plaster casts, drawings, sketches and at times much smoke and hilarity. The students are left free to do much as they please—there being no recognized code or rules of conduct.

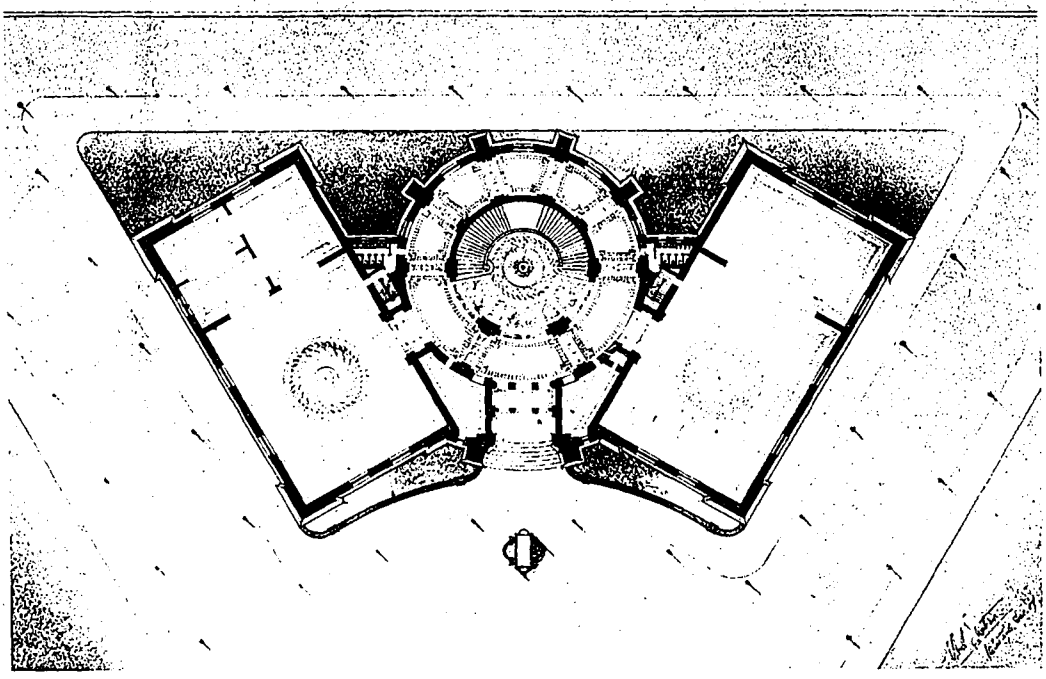
The *atelier* is managed by a board, composed of A. E. Watson, *massier;* D. E. Kertland, W. L. Somerville, G. West, I. Feldman, and A. N. Martin.

The *patron* has nothing to do with the actual management of the *atelier*—his function is to act as critic, guide and friend to the men. His duty is to set the programme, to criticize twice a week, and direct the efforts of his pupils. The programmes set are those used by The

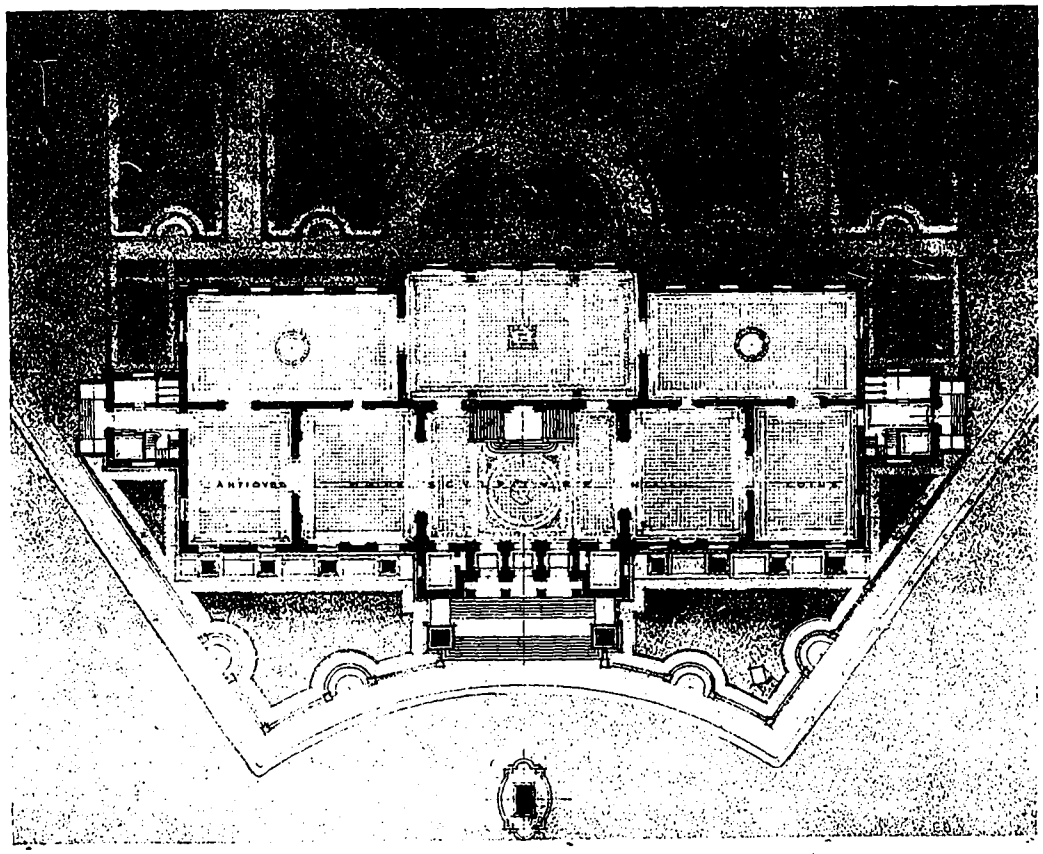


Design No. 2.—Art Museum—Toronto Beaux Art Society Competition—D. E Kertland, Atelier Lyle.

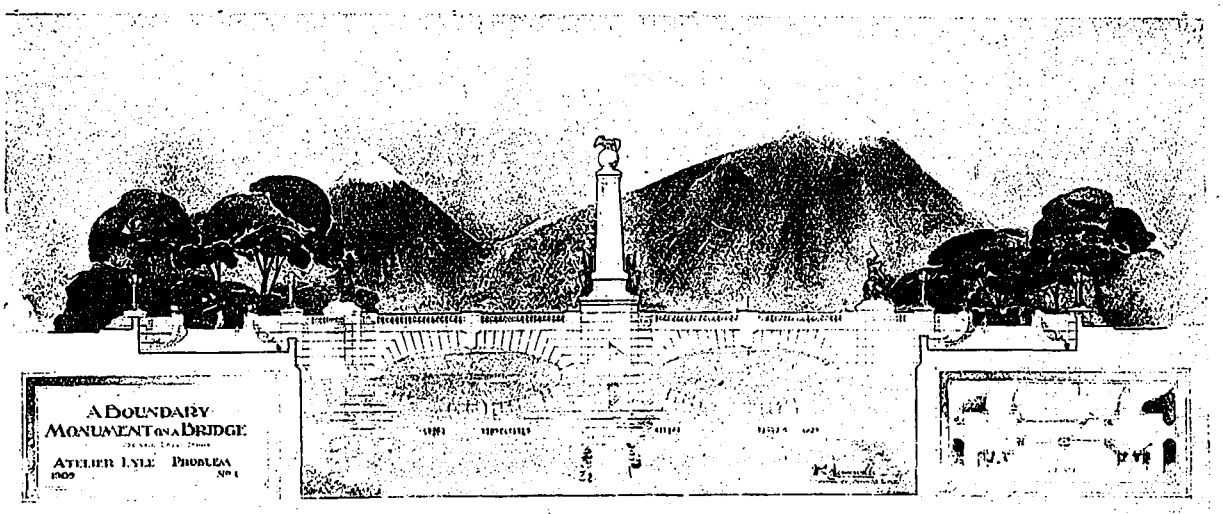
A DESIGN FOR AN ART MVSEVM



Ground floor plan, Design No. 1 for Art Museum, Toronto Beaux Art Society Competition—A. E Watson, Atelier Lyle.



Ground floor plan, Design No. 2 for Art Museum, Toronto Beaux Art Society Competition—D. E. Kertland, Atelier Lyle.



Design No. 1.—Boundary Monument on a Bridge—Toronto Beaux Art Society Competition—Second Mention—W. L. Somerville, Atelier Lyle.

Beaux Arts Society of New York, according to which the students are required to make a rough sketch in one evening; a copy of this sketch is kept and filed with the secretary. The student has a limited time within which to develop his scheme, and make his final drawings. The majority of the problems are short, requiring about three weeks' work. When the final drawing are completed, they are hung, together with the original sketch, for judgment.

The jury is composed of three practicing architects, together with the *patron;* the latter having no vote in awarding the mentions, but is present to explain and to defend his pupils' work. Each project is judged by a separate jury. If the jury think that the student has departed too much from his original sketch, they may withhold judgment on his drawings.

The *atelier* is divided into two classes—"A" and "B," or senior and junior. The drawings are marked as follows—"1st Mention, 2nd Mention, and Mention"—the former being the highest award and is rarely given—only in the case of exceptional ability.

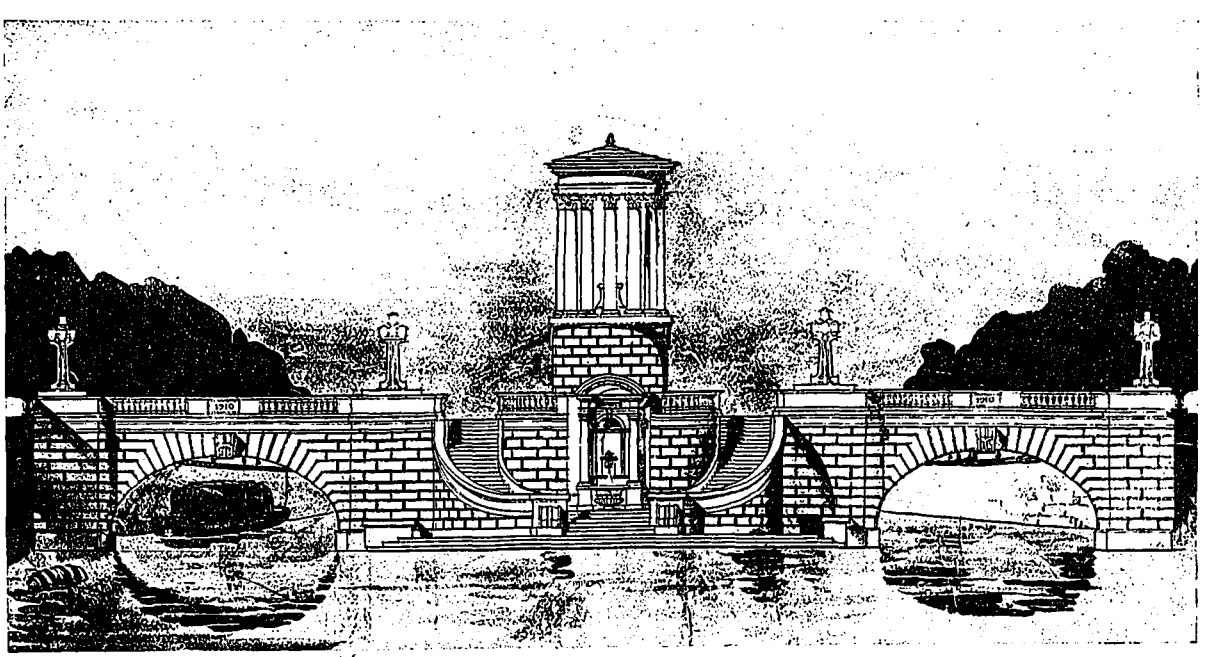
OPEN PAVILION.

The programme for the first competition we illustrate herewith provided for an archæological problem of an open pavilion covering a well or fountain situated in the gateway of an English institution of learning. It provided that the floor level of the fountain should be raised above the level of the yard. The structure itself was to be round or polygonal, and could not exceed 20 feet in diameter. The style to be followed was English Renaissance. The scale of the drawings used, to be ½-inch to the foot.

Criticism.

Design No. 1, by A. N. Martin, which received second mention, is subject to the following criticism: General character, very good; stony character, excellent; treatment of angles, very interesting; mass, very good, with exception of base, which is rather thin and out of character with the superstructure; detail, good; presentation, very good; drawing and rendering, both good.

The criticism of design No. 2, by D. E. Kertland, which received second mention, is as follows: General character, good; mass, good; detail, also good, except-



Design No. 2.—Boundary Monument on a Bridge—Toronto Beaux Art Society Competition—Second Mention—A. N. Martin, Atelier Lyle.

ing possibly the character of the foundation base, which does not quite harmonize with the general scheme; presentation, very good, excepting that the shade is wrongly cast.

Design No. 3 in this competition, by Mr. A. J. Everett, which received second mention, in general character might be considered good. The dome, which appears to be somewhat squashed down, might have been higher. The presentation is only fair, the drawing being too faint and undecided, not vigorous enough. The background is too strong, as compared with the subject, thus tending to kill the manument.

Design No. 4, by Mr. G. West, which was given mention, may be criticized as follows: General appearance, fairly good; central motive, somewhat out of character with side wings, thus detaching itself and marting the ensemble; presentation, fair.

Design No. 5, by I. Feldman, which received mention, in general character is fair but uninteresting. The mass is only fair, the upper portion being too heavy for the columns. The approach and balustrades are rather stiff and uninteresting. The detail is fair and the presentation good.

Design No. 6, by A. E. Watson, in general character is good, with the exception that the monument should not have been square. The mass is good, and the English Renaissance character of the detail is very good; presentation, drawing and rendering, very good.

ART MUSEUM.

The second competition we illustrate herewith is an Art Museum, on a lot fronting on a circle, which forms the termination of an avenue. It provided that on the ground floor should be found a vestibule, a monumental staircase, a great hall for architectural casts, galleries for sculpture, architectural fragments, remains showing the civilization of the various nations of antiquity, each one having its special gallery, varying in length. Small rooms were to be provided for a collection of coins, gems and small articles of virtu. Several secondary staircases and arrangements for checking coats, toilet rooms, etc., were to be arranged for. It was further provided that the second floor was to be reserved for picture galleries, some spacious ones for decorative canvases, some small for showing enamels and miniatures, and that one room in a central position was to be reserved for the *chef d'aeuvres* of the collection, as in the *Salon Caree* of the *Louvre*. For the *ecquisse*, one plan at 1-32nd inch scale and a facade of 1-16th inch scale were required. For the *rendu* the plan at 1-16th inch scale and the facade at ⅛th inch scale were required.

Criticism.

The general character of design No. 1, by A. E. Watson, was fairly good, though somewhat sombre and heavy in character. It is nevertheless interesting. The mass is fairly good, though the lower story is badly lit. The centre motive is rather weak and the angle treatment too massive. The details are good, and the presentation is good, though the rendering is rather hard.

The general character of design No. 2, by D. E. Kertland, is very good, and expresses the museum character. In mass it is very good, simple, stony and well composed, with the exception of the doubtful general form of the building, which does not carry out the intention of the programme. The details are good and of a simple character, and the presentation is very good.

A BOUNDARY MONUMENT ON A BRIDGE.

The third competition illustrated in this article provided for a monument indicating a demarkation between two states, to be built on the bridge's centre pier, in the middle of a small river. The monument was to be set to one side of the road on an extension of the pier, and to be provided with tablets for suitable inscriptions. The bridge itself was to be composed of a series of low arches, with the roadbed 16 feet above the water. Plan and section ⅛th inch to the foot, and elevation ¼ inch to the foot, were required.

Criticism.

Design No. 1, by Mr. W. L. Somerville, which received second mention, in general character, is fairly good. The mass is fair, but the span of the arches is too long and low. The centre pylon lacks interest, but the side approaches are good. Both detail and presentation are good as well.

Design No. 2, by A. N. Martin, which also received second mention, in general character is fair, the round type of monument being less suggestive of a boundary mark than the pylon type. The water approach is good and well treated. In mass it is fairly good, with the exception of the central motive, which is not well married to the lower base; detail is good; presentation only fair —the rendering being rather hard, and the trees in the background too wooden.

ANNUAL DINNER OF THE BEAUX ARTS CLUB OF TORONTO.

The annual banquet of The Beaux Arts Club of Toronto, in honor of its *patron*, Mr. John M. Lyle, was held at the St. Charles Hotel on February 8. About twenty-five men were present to enjoy the interesting speeches on various architectural subjects, and the numerous well rendered songs. The toast to the *patron* was proposed by D. E. Kertland. "The Profession" was proposed by F. Carney, and responded to by James Govan. Mr. Lyle gave a very interesting and instructive speech on present-day architectural conditions in Canada and the United States.

During the evening, Mr. A. E. Watson, secretary of the club, presented Mr. Lyle with a solid silver cigarette case, as a slight token of appreciation of his labors for the higher education of the students of architecture in Toronto.

The evening passed with unrestrained jollity, and the midnight hour had tolled before the guests made their departure. This, the first banquet of the *atelier*, terminated with much *eclat*, leaving a lasting impression on those *atelonians* who were present, and a singleness of mind, propitious to the greater development of the *atelier*, and the teaching of the art of architecture.

COST OF THE GREAT PYRAMID.

A PAINSTAKING COMPILER has written a paper, says the SLATE TRADE GAZETTE which gives the estimated cost of producing the Great Pyramid of Cheops. The author asumes that the material should be equally as good as that of the original, and that all the chambers and pasages should be reproduced. The length of the sides of the Pyramid are at present 746 ft., the height 454ft., and the area of the base 12¾ acres. To build it there would be required: 3,313,000 cubic yards of coarse limestone as backing stone, 140,000,000 cubic yards of fine limestone as facing stone, and 2,000 cubic yards of polished facing granite. The total cost of the above would be at least &£7,200,000 and the labor required would be 24,000,000 days' work, which is equivalent to the work of 40,000 men for a period of two years. Assuming that the labor required to re-produce Egypt's wonderful Pyramid would cost no more than an average of 6s. per day for each workman, this item would reach a total for the two years of £7,200,000, which would take the total for material and labor £14,400,000. To this figure must be added at least £600,000 for transportation and smaller items, and, practically, wherever built, the cost of a suitable foundation would also have to be considered. The Pyramid of Cheops stands on a foundation of solid rock 120 ft. deep, and if a foundation this depth were built, an additional 2,600,000 cubic yards of material would have to be used, bringing the total cost of the reproduction up to £20,000,000. The Pyramid of Cheops consumed the labor of 100,000 men for thirty years, which is about 900,000,000 days' work.

PROFESSIONAL STANDING OF THE ARCHITECT.—A United States Contemporary Makes a Strong Plea for Recognition of Architecture as a Profession by National Government.—Legislation Necessary to Place Architect in Proper Relation to His Client.

THERE CAN BE NO DOUBT that a more stable pecuniary relation between an architect and his clients, says the Architectural Record, is of signal importance to the building public, as well as to the profession. Neither can one doubt that the basis of remuneration upon which an architect renders his services is of equal account to the buildings he creates. But of greater moment to the successful prosecution of building operations is the professional standing which the architect has with his clients. And it will hardly be maintained by the most enthusiastic supporters of the architectural profession that this standing in America is anywhere near as high as it should be. There are, to-day, in this country, engaged in designing buildings, more individuals than ever who have a right to call themselves architects, that is, who have received training in an architectural school or in an office under the direction of a competent architect. And it may be added that the standard of requirements for architects has been raised fully as much as for the practice of medicine or law. While the standing of the doctors and lawyers has, in consequence, experienced a decided turn for the better, the architect has not been so favored, in spite of his more thorough preparation and the greater demands which have been made upon his ingenuity and talents.

The difficulty with which the architectural profession has always had and still has to contend is the possibility of extensive quackery and the popularity of ready-made methods which are alleged to be cheaper and more direct than the real services. The major part of the vast amount of building done annually in this country is, consequently, still carried on without its assistance—on the assumption that architectural services are merely a frill which increase the cost of building and are well enough for anyone who can afford to make an investment yielding no return. This is, of course, a great fallacy, as an architect has no more to do with increasing the expense of building than he has with the cheapening of it. That is not what he aims to accomplish. His object is rather to ascertain accurately his client's needs, and with the money put at his command, to secure his client the best value for his money. In securing the client his money's worth many things are involved: he must be thoroughly acquainted with the purpose which the building is to serve, and he must possess the ingenuity to so dispose the various parts as to most effectively and economically serve this purpose. Then, in addition to regarding his building strictly from the standpoint of utility, he must work with a trained artist's instinct of producing comeliness and harmony beween its many and diverse elements. His motto is to produce the most with what is available, whether the subject be space, efficiency or beauty. His chief concern is always of utility, even as regards the production of effect which is apt to be considered outside the province of the useful. The effectiveness of appearance possessed by a building as part and parcel of its value is second only to its rental income.

It is only recently that American architects have been allowed to demonstrate the use of architectural services in such important works of utility as our great stone and steel bridges, though, it must be admitted that the architects have done more to retard their professional standing by their tacit acquiescence in conditions than have outsiders by opposing their progress. The American architect has not succeeded in arousing the curiosity of a large part of those who might be his prospective clients. This he can hope to do only by having it perfectly understood what he stands for. The insinuation ascribed to Speaker Cannon, of U.S. Congress, a few years ago, on the subject of the architect's professional standing, still measures the extent of popular knowledge of what that profesion stands for.

If there is any profession which depends more than another for its efficiency upon its standing, it is that of the architect whose function requires his employer's complete confidence. The architect of a building must of necessity set himself up as the court of final resort on all matters in which the owner's interests are involved and his decisions must be consistent at the same time with his standing among his professional colleagues. Such a course he cannot sail successfully without his employer's entire assent, and failing in this, his position becomes one of vacillation towards him making efficient creative services impossible. Moreover, his direction of the contractors becomes feeble, and they are obliged to and do have recourse to the owner to settle their points of difficulty in the prosecution of their work. Of course, an architect who permits himself to be placed in such an awkward position is to be pitied, but unless he speedily changes his course deserves the contempt with which he is is sure to be treated by his colleagues, as well as by future clients.

One of the most frequent causes that help an architect to lose his professional standing with his clients is the cutting of his fees. We do not believe, however, that in every case where an architect agrees to accept a commission at a cut rate, such a concession necessarily implies a loss of professional standing with the owner. If it results so, one cannot but impute ulterior motives, to use no harsher phrase, to those architects who indulge in the practice. A recent communication from an architect in good standing cites circumstances in which it would be justifiable to cut the rate without doing an injustice to the profession or in any way neglecting his duties towards the man who employs him. He says, in part: "Among the 'special cases' referred to above, where I believe it may be allowable for an architect to reduce the rate of his commission and still receive adequate compensation for his services, is in the event of his receiving commissions to design a number of similar types of buildings in one locality, where the cost to the architect of superintendence, and of constructional details is obviously lessened. Also upon the receipt of the first commission for a type of building wholly different from the kind with which the architect has been familiar, it would seem to be his privilege to accept from the owner a lower commission than the expert would be entitled to charge and to receive. Again, in 'hard times,' and when one's necessary income may be seriously threatened from lack of business, a lower rate must often be accepted from sheer necessity." The last of these reasons is the one most frequently given by architects for rate-cutting, and where rate-cutting comes from this cause it is not infrequently accompanied by a loss of professional standing, making it exceedingly difficult for him to recover in another case the prestige which he has thereby lost. On the whole it is difficult to make an owner believe that his architect's services have more than the lowest value which he places on them, although it may, as our correspondent points out, be maintained with absolute honesty that the opposite is true.

It sometimes occurs that architects lose standing with clients from another cause. A client may possess an excellent sense of business values, better than his architect in fact. In such a case the architect's position is apt to be extremely difficult, regardless of his technical and practical knowledge of building affairs, and the more difficult in proportion to his high standing in the profession. The higher he is rated as a professional man, the more will be expected of him by his client in those matters of business detail which are inseparable from the complexity of present-day building operations. His ability as a practical designer and experienced builder can secure him no commutation of sentence if he fails to measure up to the business standards of such a client. Architects are realizing, more and more, that if they would improve their relations, pecuniary and professional, with their clients, they must lay in an always-ready store of commercial knowledge which is to the layman the most comprehensible evidence of an architect's fitness.

On the other side, it may be said that in order to allow an architect to render the most efficient services on which his fee should always be based, the client must be willing to meet him on the same common-sense basis on which he meets members of other learned professions. He must be willing to believe that just as the prescription which a doctor of medicine writes for him is only the result of his deliberations of the case, so also, are drawings, the evidences of work which the architect produces for the guidance of the contractor who combines the various materials and realizes the architect's intentions. The learned professions are alike in that whosoever would avail himself of their services must have faith in them, for there is no tangible guarantee beforehand of exactly what is to be produced. To the purchaser of professional services the only guarantee in any case lies in the record of the profession rendering them. An expert can, of course, produce concrete evidences of his fitness to perform the sort of services required by exhibiting the results of similar services rendered for others in the past. An architect is particularly fortunate in this respect, for he can always refer prospective clients to the buildings he has designed. But this advantage carries with it a notable disadvantage, for it requires, in the one who is so referred, the ability to appraise the evidence of fitness at its proper valuation, implying a degree of well-founded popular knowledge not at present existent. The possession of such knowledge means the ability to discriminate, in the case of the architect, between good building and the inferior article; it implies the ability to select the most competent architect to design a given class of structure which results show conclusively to be an unwarranted assumption. For the present, therefore, the architect cannot hope for much reward from the evidences of merit to which he can point in his buildings, as there is, at present, a very limited class capable of appreciating such merit. His greatest hope lies in his ability to arouse a livelier general interest in building. The sooner he can advance his position to the point at which his public will compare his work with that of his competitors who are engaged in designing similar buildings, the better it will be for the standing of the entire architectural profession and the sooner will spring up a public opinion, insecurely founded at first, perhaps, but an opinion, at any rate, instead of the placid indifference to architects and their work which now exists.

It is not at all necessary or even desirable that public notice should so much be directed to architecture as an art. There is enough useful every-day information contained in building and buildings without bringing into play the debatable questions of beauty and style the appreciation of which comes only after the most prolonged interest in and association with the best architecture that has been produced. There is an every-day side to architecture which brings into action, in some way, almost every activity of the day, and is, in fact, one of the truest records of our progress. Arouse that interest in our buildings and a truer and brighter light will, in time, be thrown upon the more serious aspects of architecture and upon those who create it.

While architects, as a class, have been very slow in putting forth their best efforts to stimulate such an interest in their work, another influence has been at work with a far less competent direction calculated to accomplish such an end. The method employed has been the publication during the past five years of a mass of photographs of buildings, especially of the less expensive suburban and country house type, in connection with glowing descriptions as to alleged style, construction and cost. Such information does not inform. On the contrary, it misleads the layman because he is not in position to test the accuracy of the statements which he is asked to take for granted. And it is not intended by this method to instruct the reader and make him think, but merely to attract his eye superficially, without giving him any real insight into an architect's work.

A source from which the layman, in limited numbers, has derived some measure of architectural appreciation, is foreign travel. Travel, no doubt, affords a cultural effect not to be despised, but its value to create for the layman the basis of an architectural judgment may be questioned. It probably does produce superficial likes and dislikes of buildings, but of a kind resulting in little material help to the traveller, unless directed by one who is professionally interested in the subject. As a rule, the traveler's mind, though more receptive, when he reaches home than when he left, is more astray than ever concerning the architect and his profession.

To improve the architect's standing, professionally, two very important steps are essential: government recognition of architecture as a profession, not merely recognition by several of the States individually; and a uniform system in the different States of the most rigid requirements for qualification to practice it. The first of these steps is, of course, the more important—official recognition by the national government of the fact that architecture is a profession which it is essential to place and keep on as high a level as medicine, and the law is sufficient notice to the public that an architect's services are valuable and that he is not to be trifled with in their discharge. Such recognition, backed up by proper legislation, would speedily eliminate from the field those who are merely quacks, and this would at once impose upon those properly qualified greatly increased responsibilities. Until these two very important steps are accomplished, the architect's standing will depend very largely upon the influence which he is able to exert by his personality upon his individual clients. The building public will continue to be incompetent to discriminate between good and bad architectural services, and its interest in the subject will be no keener until the architect is officially held up to its view and stamped with the seal of the government.

ST. ANDREW'S RAPIDS DAM.—Successful Movable Structure Built Across Red River to Increase Navigable Distance of Stream.—First Structure of Its Kind on Western Hemisphere.—Only Two Other Similarly Operated Dams in the World.—Its Construction and Engineering Features.

By H. P. BORDEN,* A.M. Can. Soc. C.E.

THE ST. ANDREWS RAPIDS are situated on the Red River, which flows north between the States of Dakota and Minnesota in the United States, through the Province of Manitoba in Canada, past the city of Winnipeg, finally emptying into Lake Winnipeg. In the summer months the Red River is a shallow river, having little value as a waterway, except for pleasure boats, and then, owing to rapids and other obstructions, only for short distances. For about twenty miles of its length, or from the mouth of the river to West Selkirk, a town about half-way between Winnipeg and the lake and directly below the St. Andrews Rapids, the river is navigable for the lake steamers during the season of low water. During the early spring, however, the river presents altogether a different aspect. The source of the river, springing as it does in the warmer provinces to the south, begins to receive the melted snow and rains of early spring at a time when the northern end of the river is still securely bound by ice. The result is that the river is filled to the top of its banks with a body of water, which if held too long by the ice barriers at its mouth, will overflow its banks and the surrounding low-lying country. What is known as the "Red River flood" of 1852, when there was eight feet of water in the streets of what is now the City of Winnipeg, is evidence of what may be expected under extraordinary conditions.

Lake Winnipeg is a very large body of water, having an area of between 8,000 and 9,000 square miles, and a shore line of nearly 800 miles. There are some thirty steamers plying on the Lake at the present time, and as their cargoes must in all cases be finally delivered at Winnipeg, it is evident that this business is very seriously interrupted by the shallow water in the river.

When the Department of Public Works at Ottawa took up the matter of providing a navigable river for the entire season from Lake Winnipeg, direct to the city of Winnipeg, they found that the characteristics of the river were such that all ordinary methods of overcoming similar difficulties would be entirely inadequate in view of the local conditions above referred to.

In order to give the depth of water required for safe navigation, the level of the river had to be raised about six feet at Winnipeg. This meant raising the level some 20 feet at the St. Andrews Rapids. The usual procedure under ordinary circumstances would be to erect a dam at this point, with a short section of canal and a lock at the side.

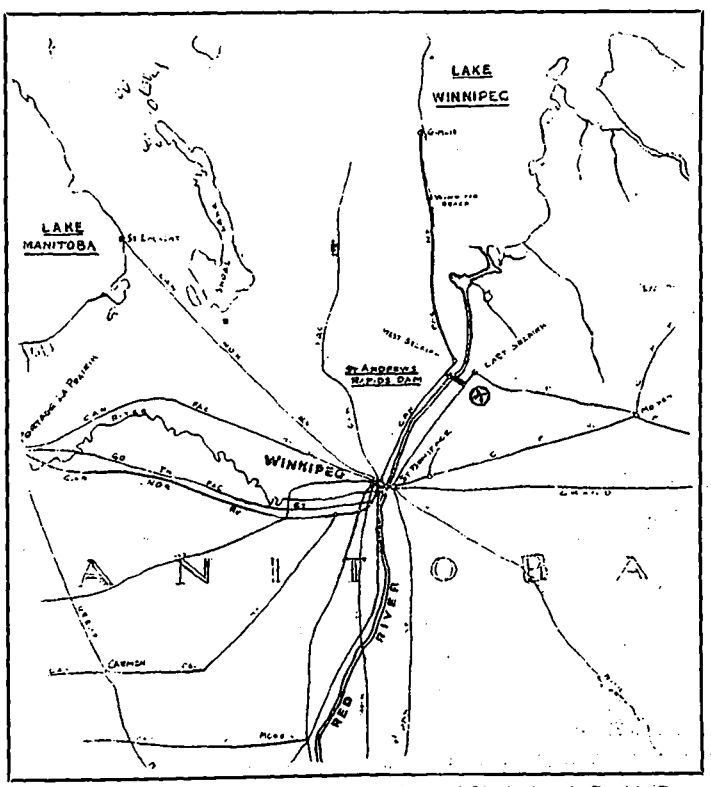
Under the conditions prevailing, however, a permanent obstruction in the river reducing the effective discharge area to any appreciable extent would be entirely out of the question. It was evident that the only way of raising the level of the water was by means of a dam of some kind that could be entirely removed during the period of flood. To design such a structure with stability sufficient to retain a head of water 21 feet in height and some 800 feet in length and yet be of such a nature that it could be put in place in the spring and removed in the fall without undue labor, cost, or loss of time was the problem that confronted the Government, and it is the solution of this problem that is just being worked out at the present time.

This dam is of the type known as a "Camere curtain dam," and is the first to be constructed on either of the American continents. While this type of dam has been more or less familiar to engineers for some years, yet there are only two in operation in the world; both having been constructed by the French Government on the river Seine in France. These dams have been in active operation for some twenty years and have given perfect satisfaction in every respect.

GENERAL DESCRIPTION.

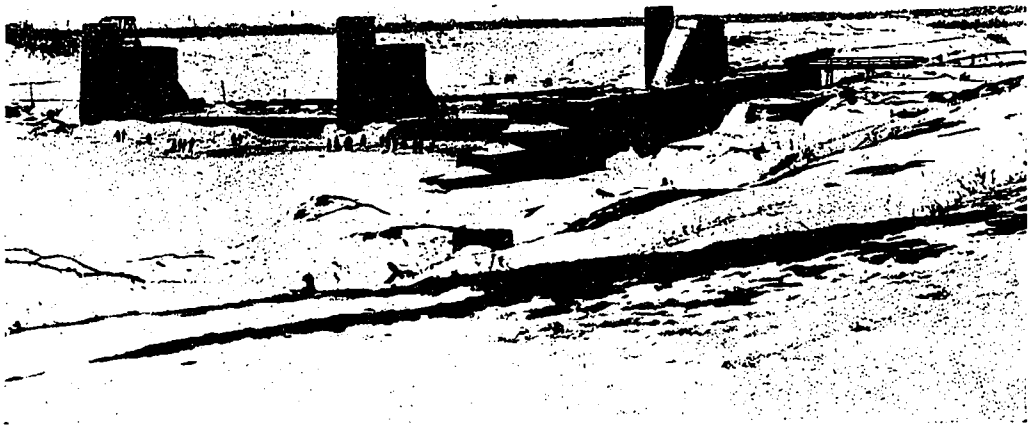
Plans Nos. 1 and 2 give a good idea of the dimensions, construction details and manner of operation. The river at this point is about 800 feet across. Heavy concrete piers have been placed in the bed of the river spaced 133 feet 8 inches centre to centre. Running between those piers and embodied with them is a heavy concrete submerged dam, extending 7 feet 6 inches above extreme low water, its top providing a seat for the castings carrying the foot of the curtain frame girders.

The supporting frame work of the dam consists of a series of steel truss bridges resting on these piers. Six of these bridges are composed of three heavy trusses, while the seventh span at the extreme east end is composed of two trusses only. Spans 1 to 6 inclusive, form the working portion of the structure, being over the water and the dam proper. Span 7 forms a

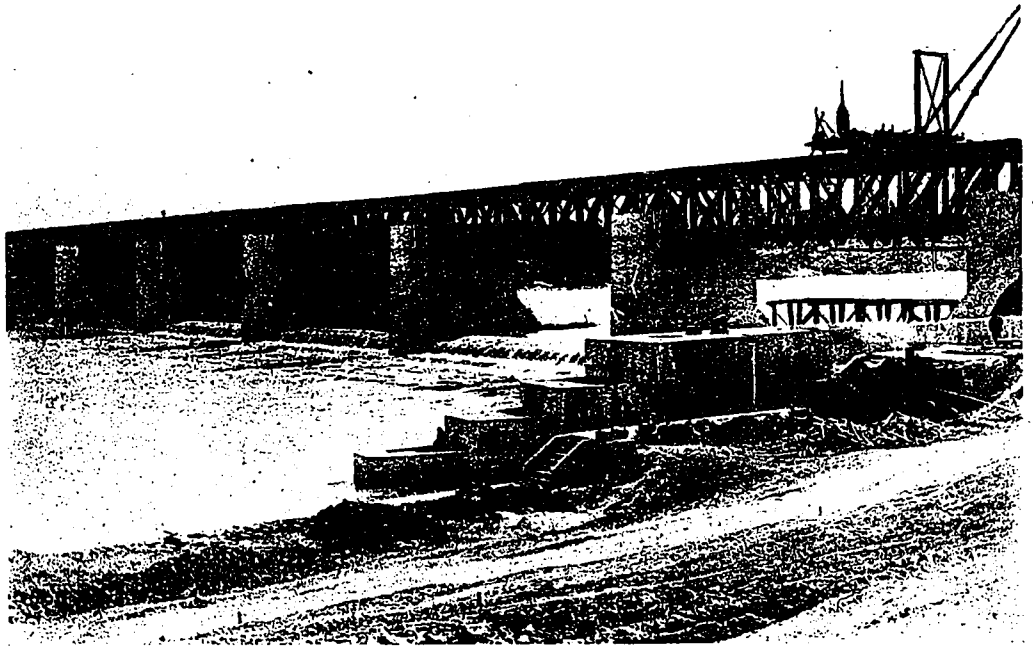


Map showing location of Red River and position of St. Andrew's Rapids Dam at point marked.

*Assistant Engineer, Board of Engineers, Quebec Bridge.



Progress view, St. Andrew's Rapids Dam, showing the stage to which the work had advanced in April, 1909. H. E. Vautelet, Consulting Engineer.



General view of St. Andrew's Rapids Dam, showing four sections of the curtain frames in place. H. E. Vautelet, Consulting Engineer.

part of the shore approach and is used as a means of communicating with the tracks underneath leading to the power house, machine and storage shops. The floor between the bottom chords of the two upstream trusses is known as the working floor and contains the machinery for handling the curtain frames and tracks and trucks for carrying the curtains from one point to another as well as tracks for the operating machines themselves. The roof or floor between the upper chords of the same trusses, is of solid reinforced concrete construction, so designed, with the idea in view that at some future date it may be used as a highway bridge should the roads be extended up to this point. No transverse bracing is used between these trusses, thus allowing an unobstructed runway for the electric cranes, hoists and tracks used for manipulating the curtains, frames, etc., suspended below.

The space between the two trusses on the downstream side is thoroughly braced in all directions. The bracing between the lower chords consists of a heavy truss taking the horizontal reaction from the upper end of the curtain frames. This reaction is also distributed, by means of horizontal shoes, to a portion of the pier which extends up beyond the level of that upon which the trusses rest. The floor between the bottom chords is known as the main floor and has a track running the whole length, which can be used in the transportation of any part of the mechanism at this point should repairs or the replacing of same be found necessary.

The normal position of the dam during the summer months is shown by the end elevation on plan No. 1. Each truss span supports 46 curtain frames and 15 sets of curtains. The frames are arranged in groups of twos and fours firmly braced together, enabling each group to act as a unit. Their upper end is attached to the main floor of the span by means of a hinge, allowing them to swing in a vertical plane. Their lower end rests against a casting imbedded in the top of the submerged dam. The curtain is unrolled against the upstream face of the frames and is held in place by two chains, one on either side attached to a hook on the frames. The position of these hooks can be adjusted by means of a nut, so that the bottom of the curtain can be made to rest exactly in its proper position.

At the end of the season of navigation, and before the ice forms, both curtains and frames must be removed. The first step is to lower the level of the water, which must be done gradually, since the sudden loosing of a body of water with a head of 15 or 20 feet might have disastrous results. The lowering of the water may be accomplished in either of two ways. First, by entirely rolling up an occasional curtain and allowing the water to escape through these openings, or, second, by rolling up all the curtains a short distance, making the flow uniform for the whole width of the dam. This latter method is preferable, as an extremely swift overflow is prevented at any one point, thus minimizing the chances of scour.

After the water has been lowered to the required elevation, the work of rolling the curtains can be proceeded with. This work is done by means of the machine working on the platform attached to the downstream face of the curtain frames. There are three of these machines, each doing the work for two spans.

In the act of rolling there is an upward motion of the chain marked "A" and a downward motion of chain marked "B," the speed of chain "B" being one-quarter that of "A." In some of the first designs experimented with in France an upward motion only was given to the chain, but it was found that the curtain could not be trusted to roll regularly, very often "bunching," thus causing considerable trouble and loss of time. By giving the chains this relative speed, however, it is found that all trouble of this nature is eliminated.

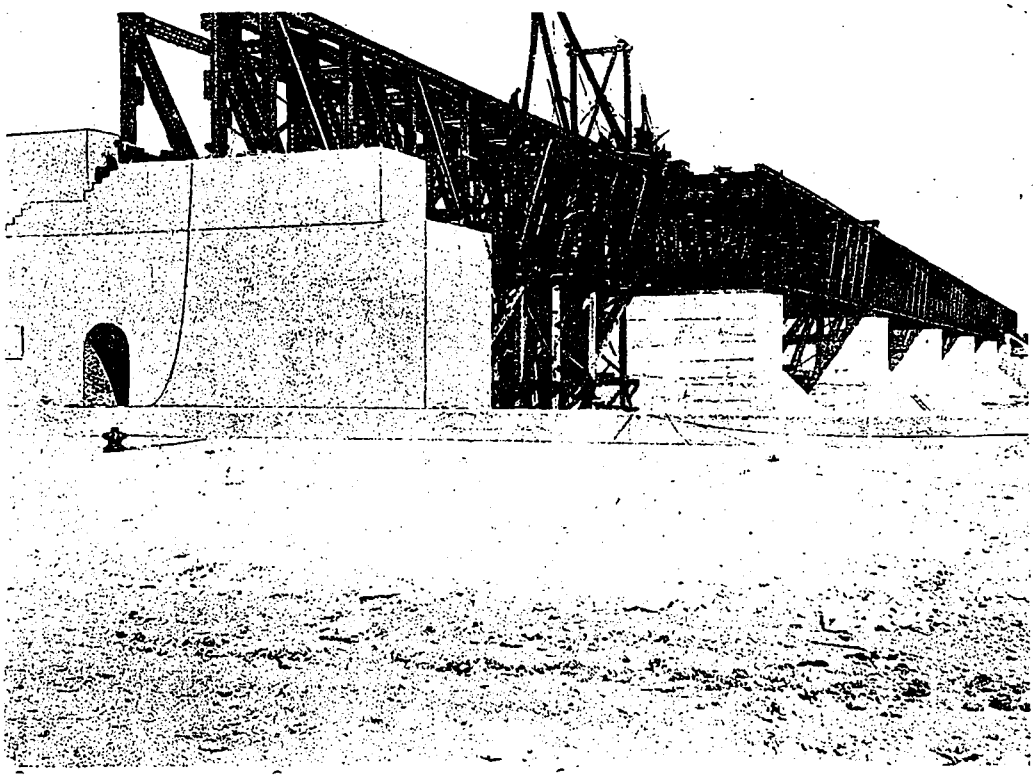
When the curtain has been entirely rolled, a short lever on the face of the frame is lowered. A lug on this lever passes through one of the links of the chain and engages the pulley wheel. The lever is then held in this position by a stay bolt, securely fixing the chain in the position desired. The chains passing over both pulleys are caught in this manner, thereby permitting the strain from the hoisting machine to be relieved and chains to be disengaged therefrom. The loose end of the chains is then led into a chain box built in between two of the frames and directly under the pulleys. The machine is then moved ahead on the tracks on which it rests, the section of this track and floor is folded up against and attached to the frame by means of a hook and link, and one section of the frames are ready to hoist.

The first step in lifting the frames is to lower chain "C" straight down some 15 or 20 feet. The chain passes through a looped strap containing a block and terminating in a hook at the end of chain "D." The other end of "D" after passing through a pulley block "P" is fastened to the floor. After chain "C" has been lowered, chain "D" is unhooked and allowed to drop, thus causing the block on the end of the chain "D" to engage chain "C," and by its own weight draw it over towards the curtain frames. Block "P," and with it chain "D," is then lifted vertically by means of the overhead travelling crane, thus giving chain "C" an upward and lateral motion until finally it is suspended directly below block "P" and in a position to be hooked to chain "E" attached to the frames. Experiment will determine the proper initial length that chain "C" should be lowered, in order that its end shall finally be in the correct position for making this connection. The frame can now be swung by means of the hoisting machine on the working floor until it finally reaches the horizontal position indicated by the dotted lines. The chain "E" is allowed to pass through a forked forging attached to the framework of the floor, and by means of a safety clutch is held securely in place. Chain "C" can then be disconnected and the machine moved ahead to the next group of frames. As the chain "C" is raised, chain "D" is slackened, and when the curtain frame reaches its final position, the chain is again hooked up in the position in which it was originally, as shown on plan No. 1. The front elevation on plan No. 1 shows various stages of the operation of lifting the curtain and the frames. If it is desired to inspect and repair the curtains, as will probably be necessary at the end of every season, it is picked up by an overhead hand crane, lifted through an opening in the floor and placed on a truck at the side and carried to another opening in the floor of span No. 7, through which it is lowered to a tramway on the ground, communicating with the repair shops.

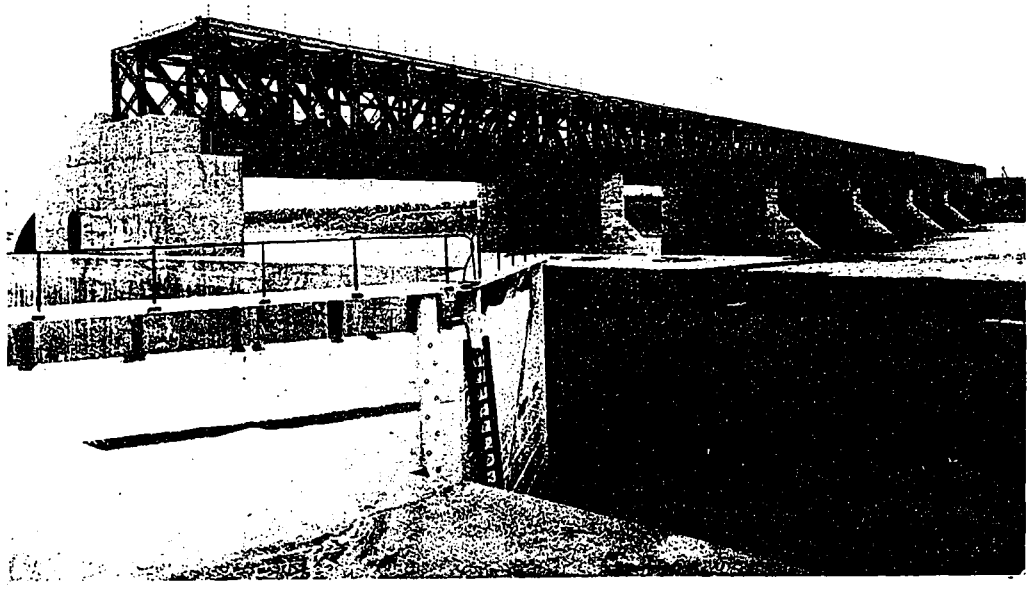
The operation is repeated for the entire length of the span. When the curtain on the last set of frames next the pier has been rolled up, the curtain crane is run ahead through a tunnel in the pier to the next span. In the centre of the pier and at right angles to the tunnel is another short tunnel into which, by means of a turntable on the runway, the curtain cranes can be housed when not in commission. The runway can then be used as a foot bridge by the employees, giving them free and unobstructed passage at this lower level to all parts of the dam, and for its entire length.

The operation of lowering the frames and curtains in place in the spring is very simple and is quickly performed; being simply the reverse of the operation for raising them.

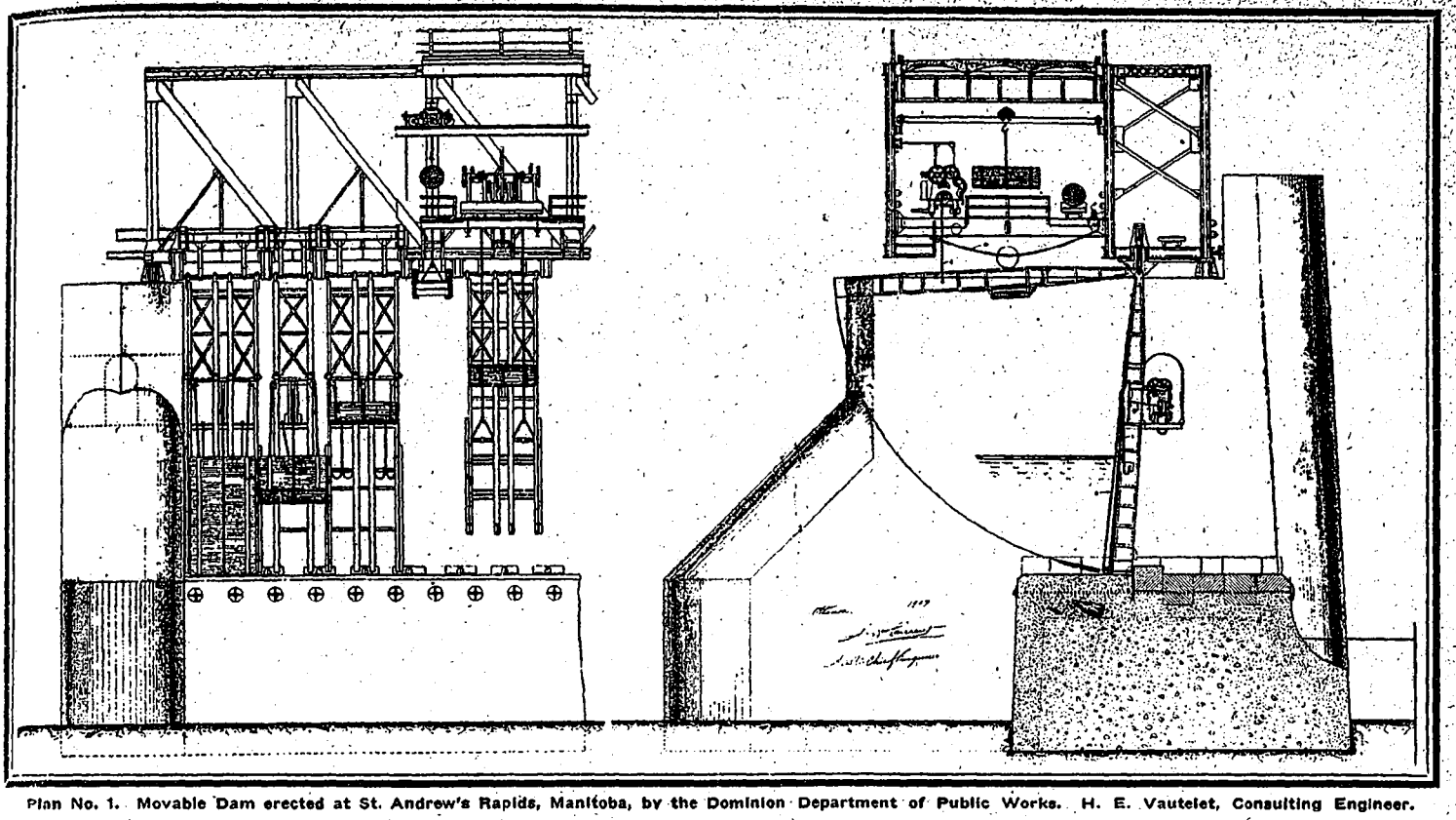
One might naturally suppose that the loss of water with such a dam would be of a very considerable amount. No difficulty has been found in this respect, however, in actual practice. When the curtains are first lowered there is more or less leakage through the joints, but as these joints are very small, they are soon filled with silt, etc., so that in a short time there is no appreciable waste in this way.



St. Andrew's Rapids Dam. View showing methods of erection, the trusses being assembled on narrow falsework, and then moved laterally into proper position on the piers. H. E. Vautelet, Consulting Engineer.



View of St. Andrew's Rapids Dam, showing the steel superstructure with curtain frames raised, as they will appear during the Winter and early Spring. The lock gates around the west end are shown in the foreground. H. E. Vautelet, Consulting Engineer.



Plan No. 1. Movable Dam erected at St. Andrew's Rapids, Manitoba, by the Dominion Department of Public Works. H. E. Vautelet, Consulting Engineer.

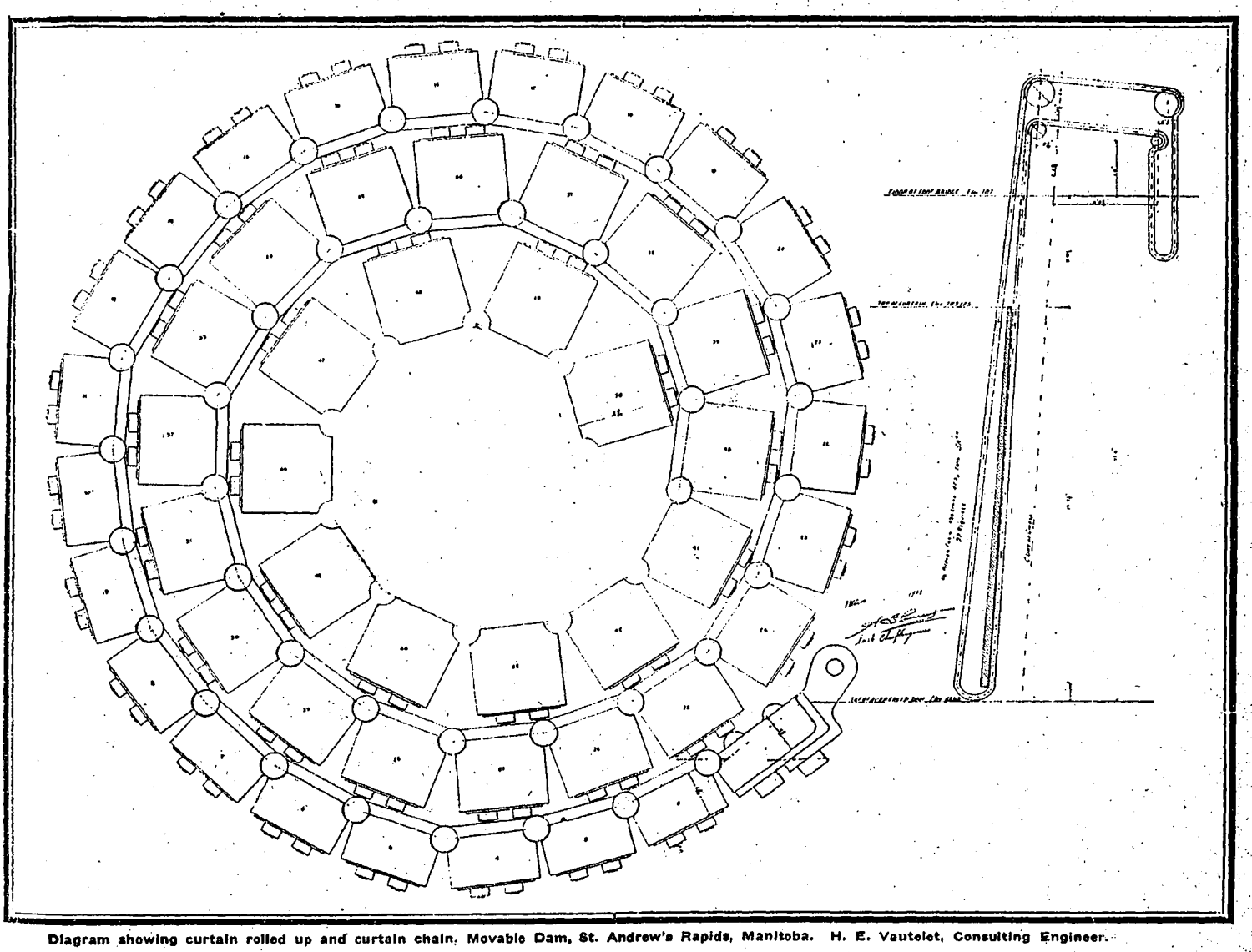
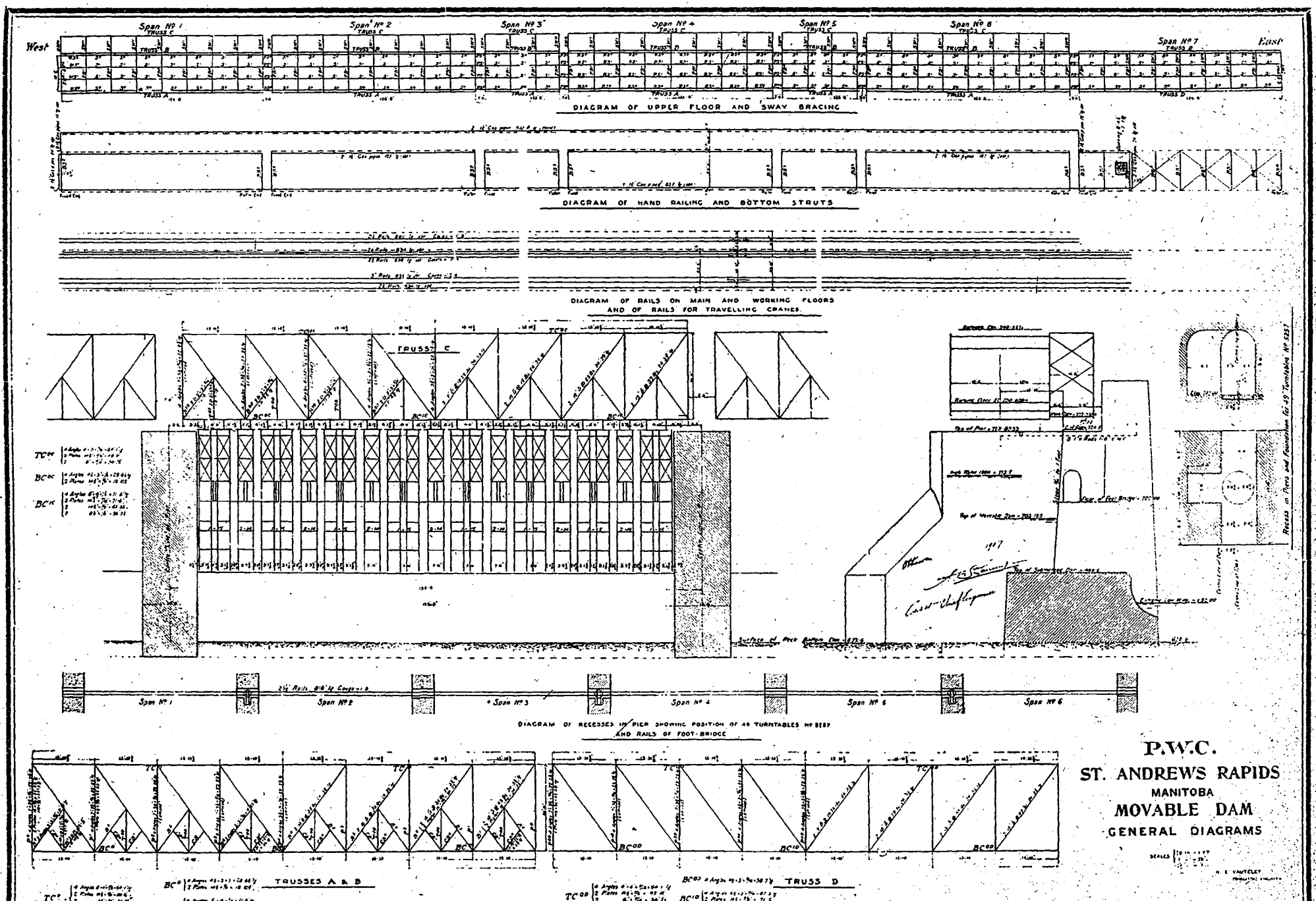


Diagram showing curtain rolled up and curtain chain, Movable Dam, St. Andrew's Rapids, Manitoba. H. E. Vautelet, Consulting Engineer.



Plan No. 2. General diagram of St. Andrew's Rapids Movable Dam, erected by the Dominion Department of Public Works. H. E. Vautelet, Consulting Engineer.

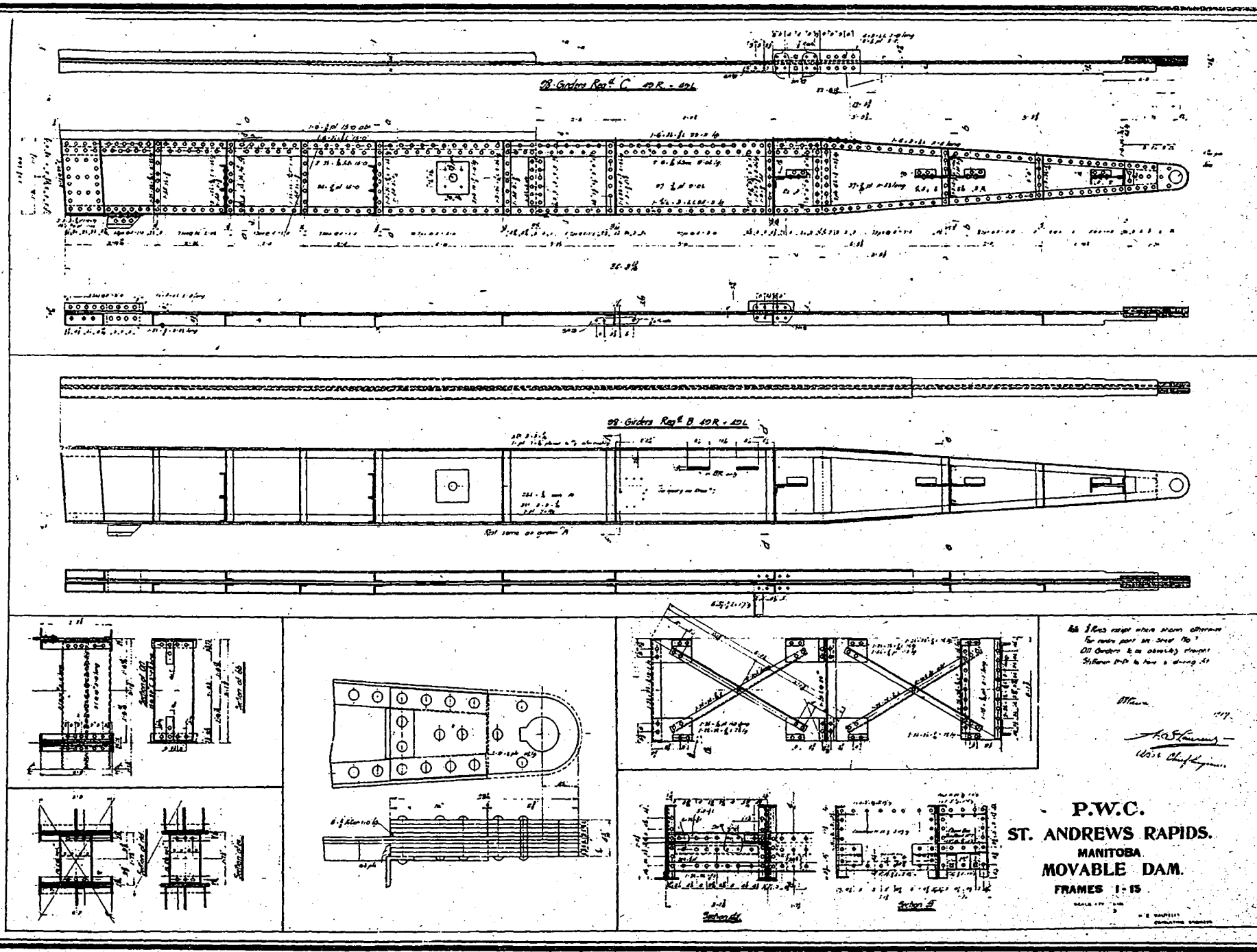


Diagram of Frames 1-15, St. Andrew's Rapids Movable Dam, erected by the Dominion Department of Public Works. H. E. Vautelet, Consulting Engineer.

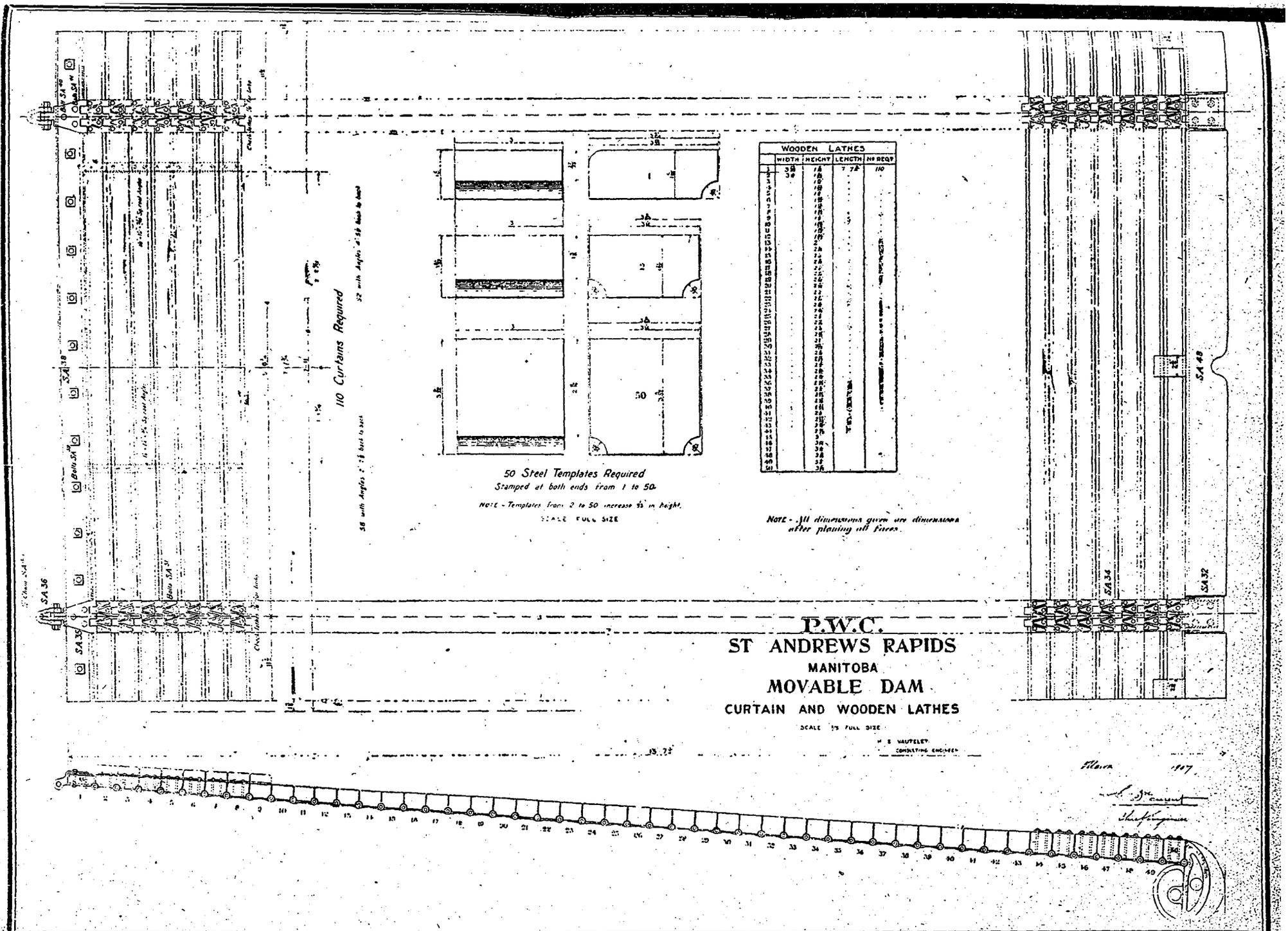
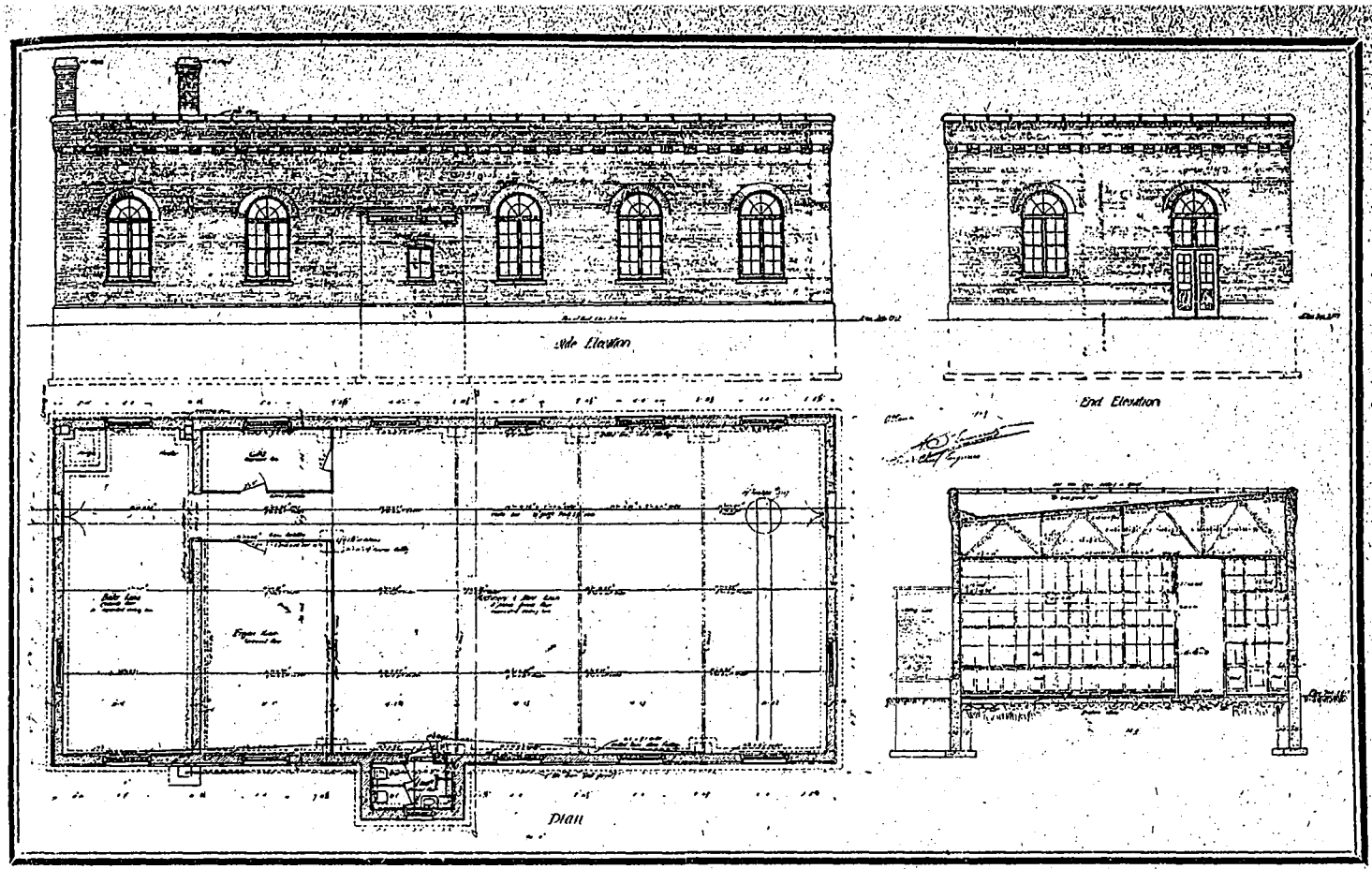


Diagram of Curtain and Wooden Lathes, Movable Dam, St. Andrew's Rapids, Manitoba. H. E. Vautelet, Consulting Engineer.



Elevations and floor plan, Workshop and Storehouse, St. Andrew's Rapids Movable Dam. H. E. Vautelet, Consulting Engineer.

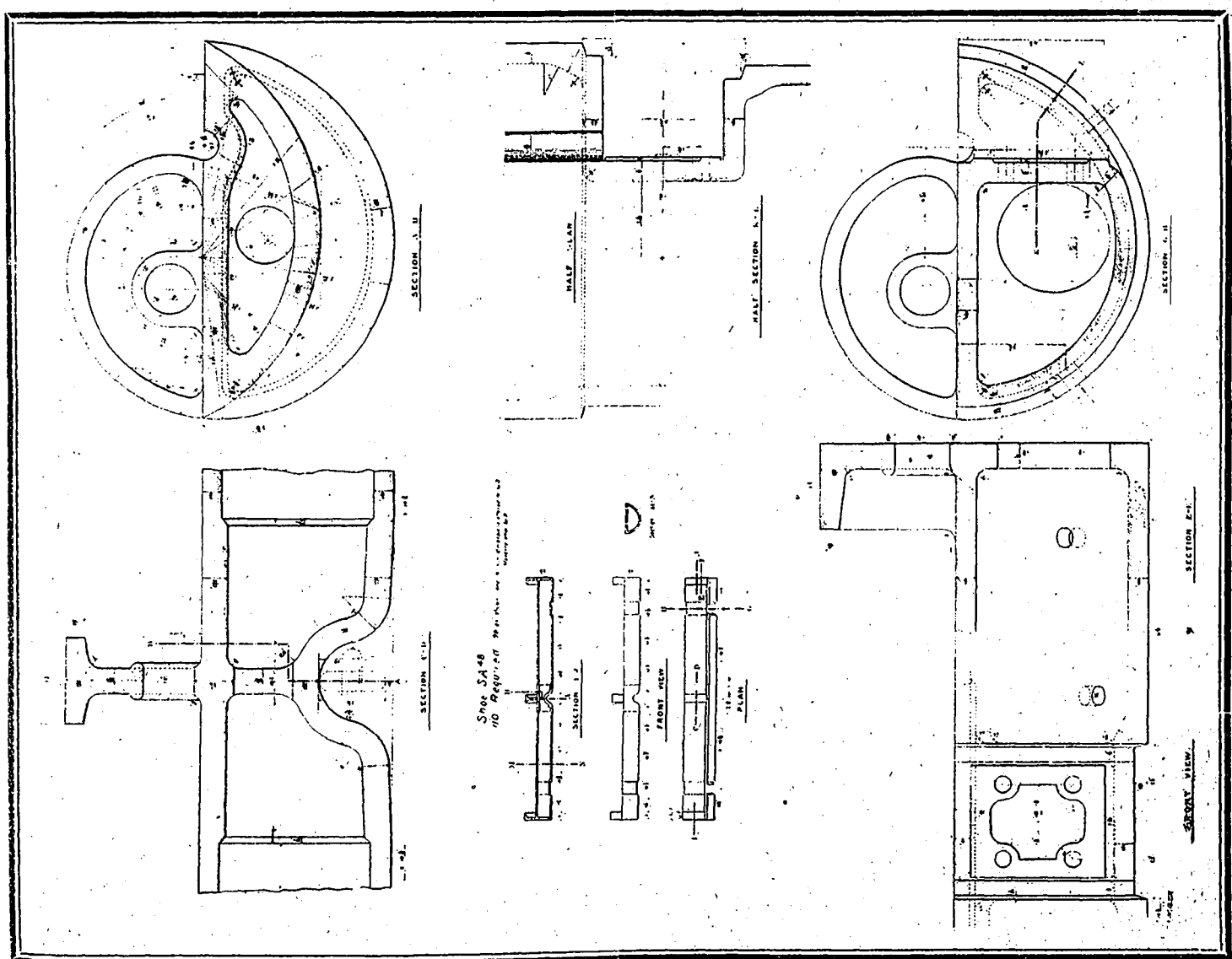
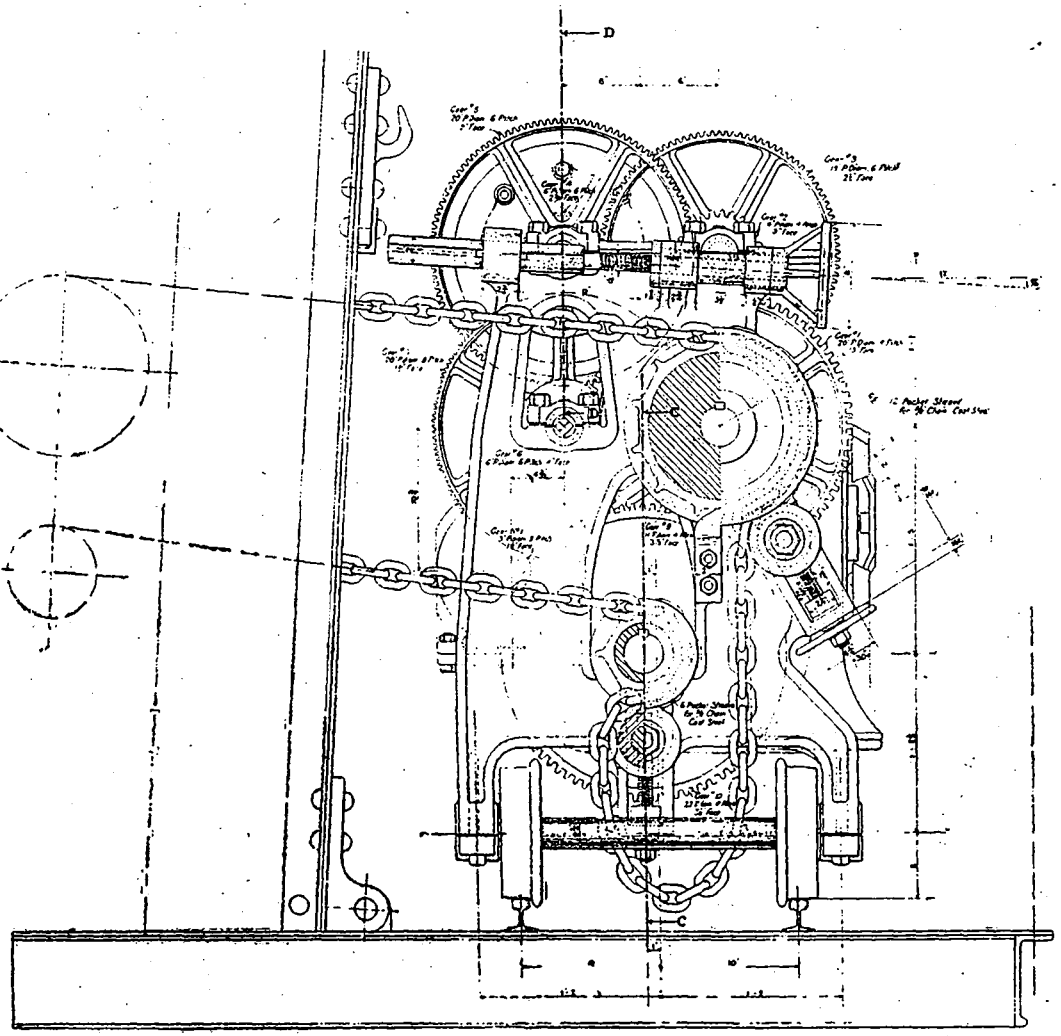
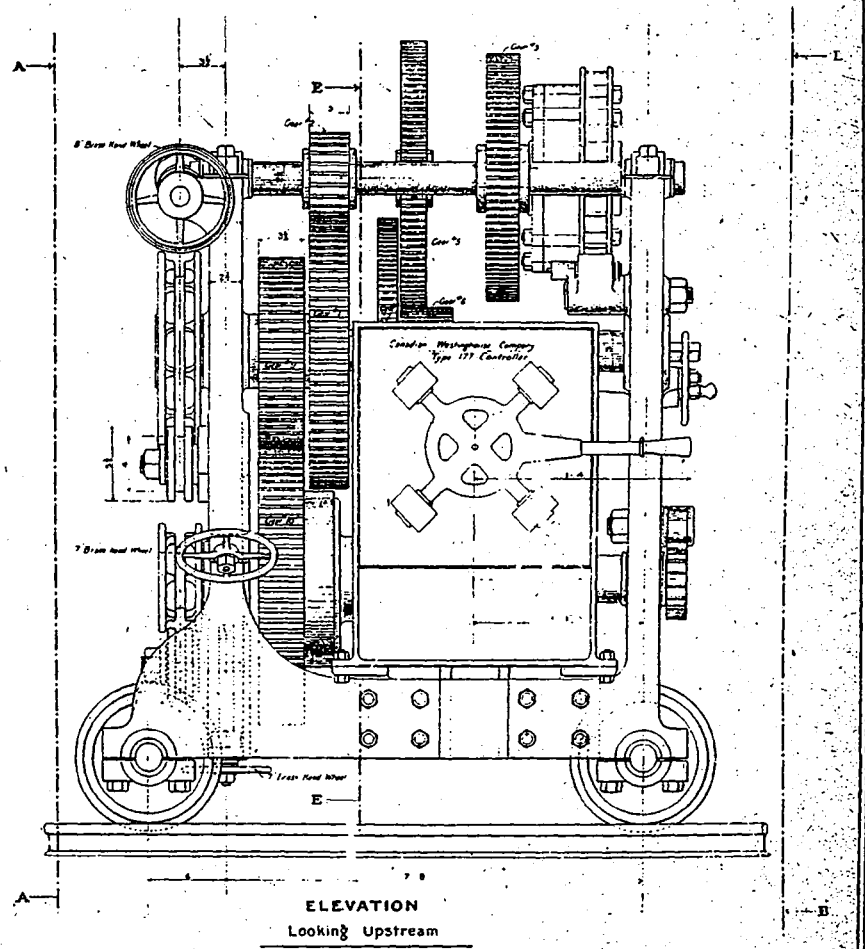


Diagram showing plan and sectional views of Cast Iron Shoe, St. Andrew's Rapids Movable Dam. H. E. Vautelet, Consulting Engineer.

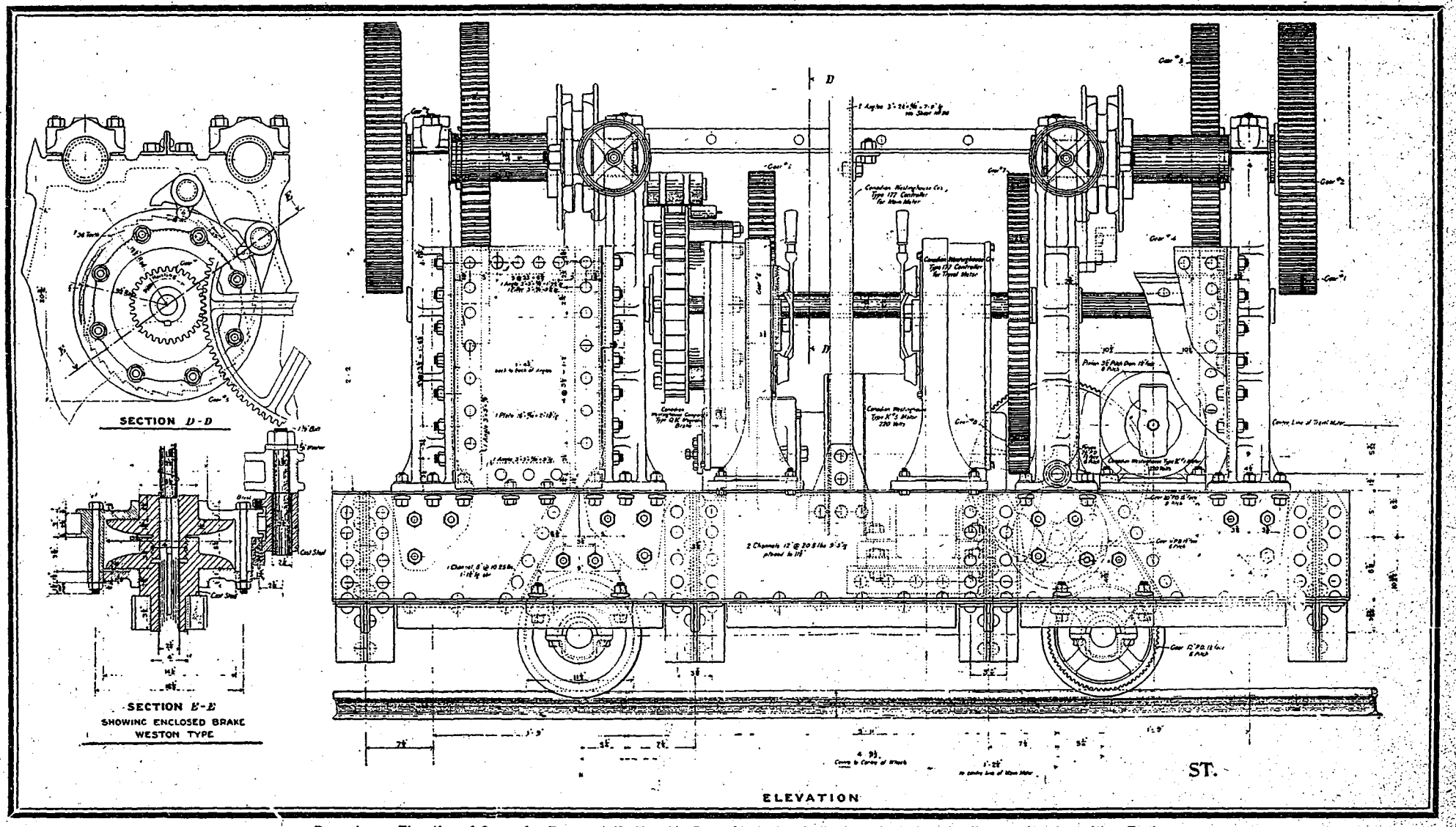


END ELEVATION A-A
Showing Half of Chain Sheaves in Section
(3 Cranes Required)

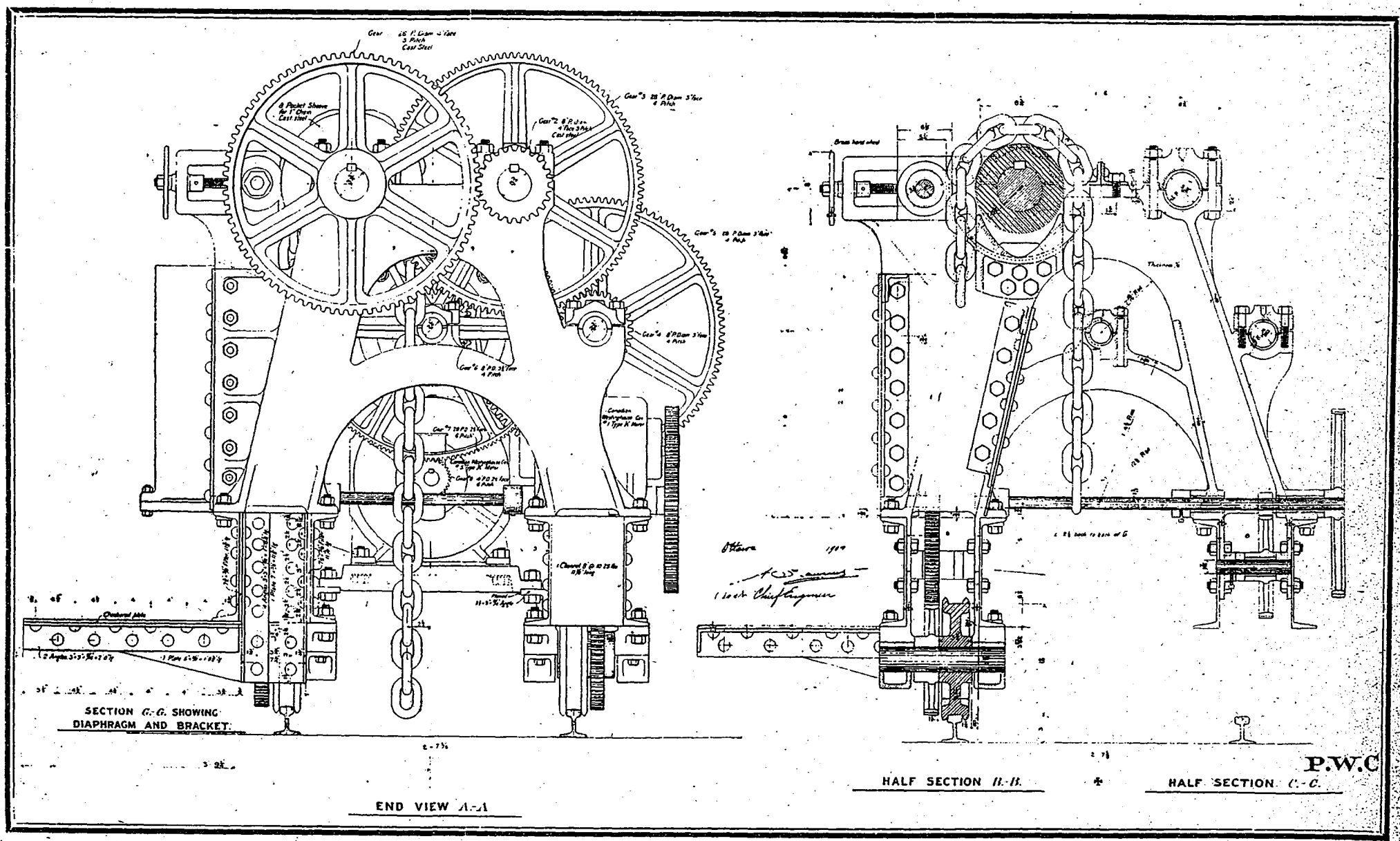


ELEVATION
Looking Upstream

Elevation and East End View of Crane for Curtains, Movable Dam, St. Andrew's Rapids, Manitoba. H. E. Vautelet, Consulting Engineer.



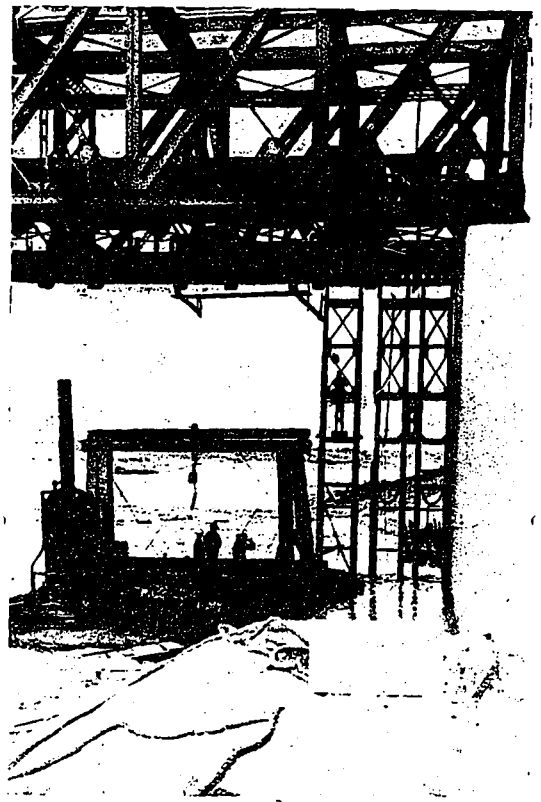
Downstream Elevation of Crane for Frames 1-15, Movable Dam, St. Andrew's Rapids, Manitoba. H. E. Vautelet, Consulting Engineer.



End View and Half Section, Crane for Frames 1-15, Movable Dam, St. Andrew's Rapids, Manitoba. H. E. Vautelet, Consulting Engineer.

DETAILS OF CONSTRUCTION.

Excavation.—The excavation for all masonry work, except foundations of workshop, was continued down to rock. This was encountered practically in the bed of the river. For the submerged dam, however, the rock bottom was trenched for a further depth of 3 feet 6 inches in order to provide against any horizontal movement of the masonry. The work of excavation did not present any



St. Andrew's Rapids Dam. View showing method of erecting girder frames. H. E. Vautelet, Consulting Engineer.

serious difficulties being performed during the summer months when the water was at its lowest stage.

Masonry.—The main piers are 14 feet wide and 55 feet long at the top, and 14 feet by 76 feet at the base, and are generally 50 feet in height. A section of the pier on the down stream side, some 11 feet 6 inches in length, extends up to a further height of 12 feet. This extension, as pointed out above, is intended to take up the horizontal reaction of the upper end of the curtain frames by the trusses. To guard against possible shearing of the concrete wall by the horizontal reaction, steel reinforcing is imbedded in the pier at this point. The reinforcing consists of seven 1¼-in. round rods, 15 feet 8 inches long, attached at each end to two 15-in. channels 12 feet long. The upstream face of the pier is provided with an ice-breaker extending some 21 feet beyond the face of the pier proper. For 21 feet the nose has an inclination of 45 deg., its face being curved to a semi-circle with a radius of 7 feet.

The downstream face of the pier is also curved to a radius of 7 feet, and has a vertical batter of 1 in 24.

A tunnel 9 feet high and 4 feet 6 inches wide passes through each pier at an elevation corresponding to that of the platform carrying the curtain cranes. As described above, this crane can be housed in an alcove in the side of this tunnel when the machine is not in use.

The sides of the pier within the working radius of the curtains and frames are so finished that they shall be absolutely plumb and smooth and the pier exactly 14 feet in thickness. This is important in order to prevent either binding of the curtains or leakage around them. The submerged dam is constructed between the main piers, its foot, however, being some 3 feet 6 inches below that of the piers and the general surface of the rock bottom, thus guarding against any possibility of a horizontal movement. The submerged dam is 38 feet wide and 20 feet in extreme height. Castings are imbedded in the top, against which the curtain frames rest, especial care being taken to have them placed so that their alignment will exactly coincide with that of the trusses overhead. It was the original intention to have the top of the dam and one course on the side of the pier faced with granite blocks. In construction, however, the granite was omitted, all faces being finished in concrete. In order to better distribute the shear from the reaction of the lower ends of the curtain frames acting against the castings, 2-in. rods, spaced 4 feet 6 inches centre to centre, are imbedded in the concrete, 2 feet from the top of the dam, with large cast iron washers at either end.

Both the piers and the submerged dam are of concrete masonry throughout. The concrete used was divided into two classes:

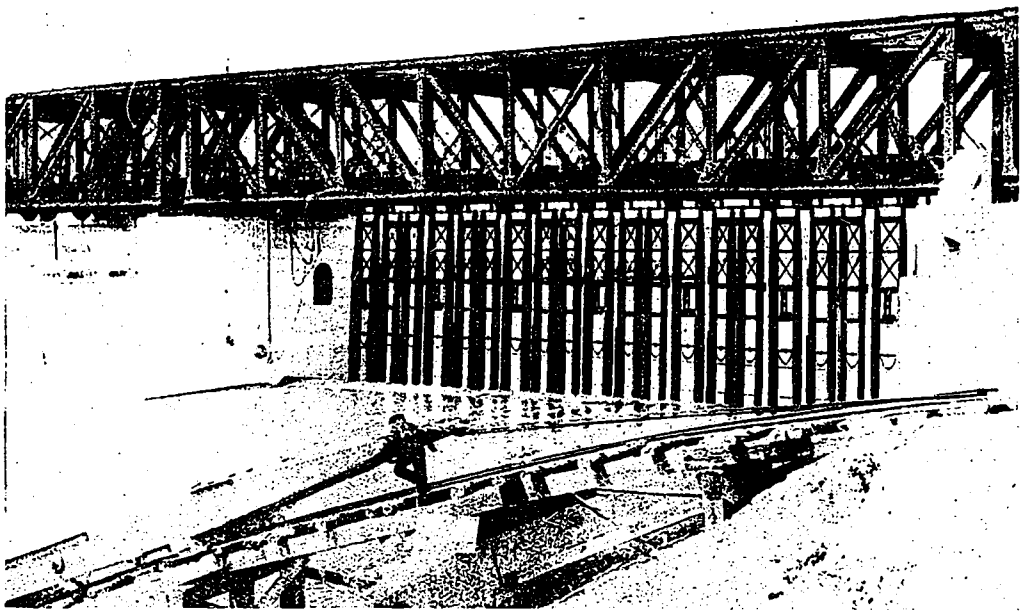
First class concrete was composed of one part of cement, two and one-half parts of sand, and five parts of good clean gravel.

Second class concrete was composed of one part of cement, two and one-half parts of sand, and five parts of broken stone. The broken stone was simply specified to be hard and durable and to pass through a ring two inches in diameter. "Displacers" or boulders containing over one

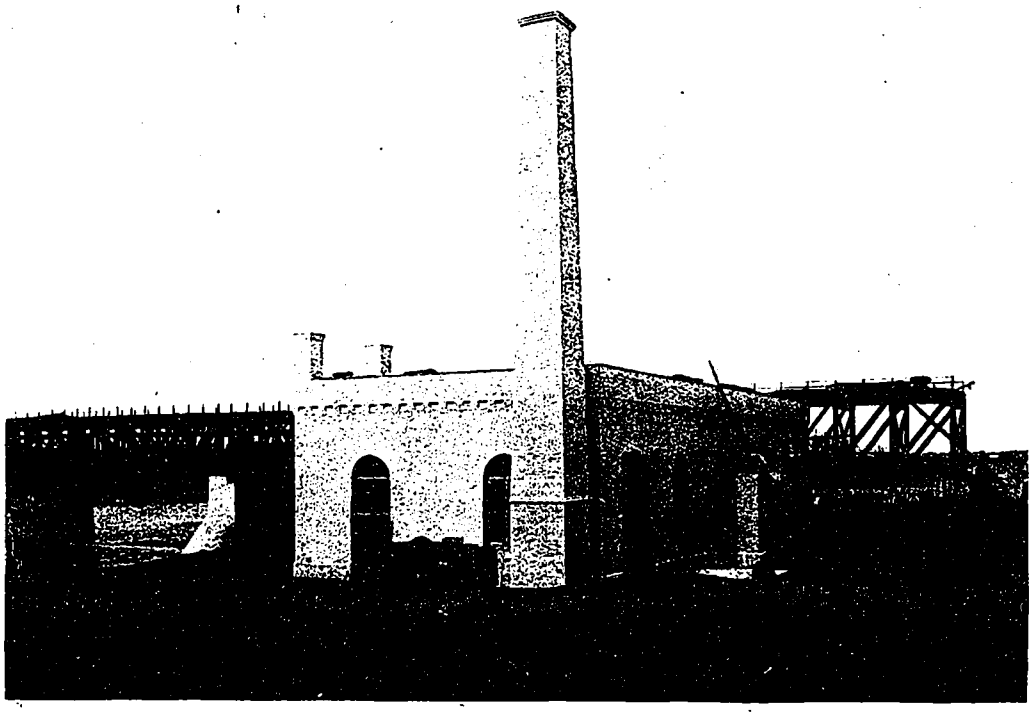
St. Andrew's Rapids Dam, showing the unobstructed working floor between trusses "A" and "B" and the highway floor beams overhead. H. E. Vautelet, Consulting Engineer.

cubic foot could be used in second class concrete, no stone to be closer than six inches to any other stone or any face.

First class concrete was used for the faces of all masonry and extending inward for a depth varying from 1 foot 6 inches to 3 feet, as indicated on the plans. Second class concrete was used in the interior of all piers, walls,



St. Andrew's Rapids Dam. View showing the superstructure completed with one section of the girder frames practically in place. H. E. Vautelet, Consulting Engineer.



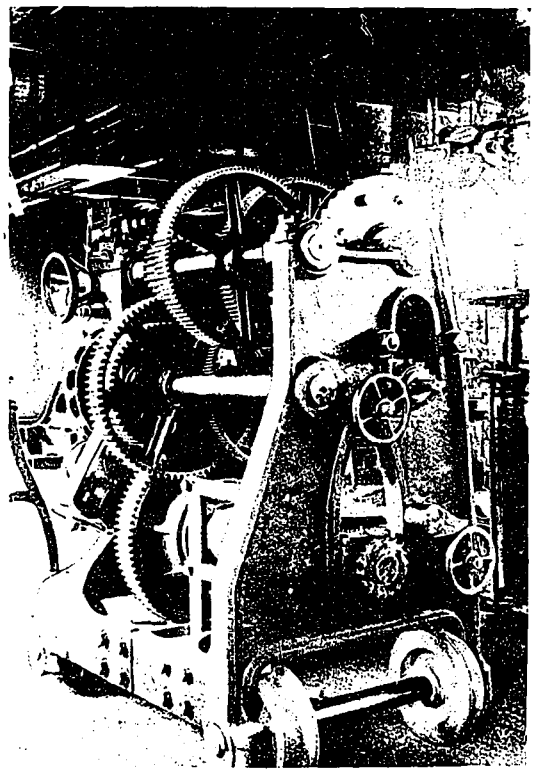
View of Power House, St. Andrew's Rapids Dam, in whi ch the power used for operating the dam is generated. H. E. Vautelet, Consulting Engineer.

etc., or in all places where first class concrete was not specified.

Lock.—The lock and approach channel is situated at the west side of the dam. The lock chamber itself is 215 feet long between hollow quoins 45 feet wide and with walls 34 feet in height above the lower sill. The walls have a total length of 290 feet, including wing walls.

At the upper end the lock is fitted with a pair of gates 28 feet long and 37 feet high from bottom of gate to floor of foot bridge. The lower gates are 28 feet long and 23 feet high from bottom of gate to floor of foot bridge. An extra set of each pair of gates were included in the contract in order to replace those in use at short notice in case of accident.

The lock itself is similar to all other works of this kind and provided with the usual culverts for filling and emptying the chamber, etc., and does not require further discussion. It is constructed entirely of concrete; the bottom being imbedded on solid rock.



St. Andrew's Rapids Dam. Small crane for rolling curtains. H. E. Vautelet, Consulting Engineer.

On the side of the lock provision has been made for a pier upon which a swing bridge can be supported should the dam be used as a highway at a later date.

Trusses.—Spans 1 to 6 inclusive are composed of three trusses 126 feet 8 inches long, and 21 feet deep, centre to centre. The upstream and centre trusses are designed to carry equal loads, and have their main members alike. The downstream trusses for these spans, while of a similar type, are considerably lighter in construction, having much less work to do. Span No. 7 is composed of two trusses of equal length and height to the other spans, but of still lighter construction. The material and layout of these trusses are clearly shown on plan No. 2, rendering it unnecessary to go more fully into details. The steel used is ordinary commercial O.H. medium steel, having an ultimate strength of not less than 58,000 lbs. per square inch and an elastic limit of not less than 33,000 lbs. per square inch.

All brackets and other details of these trusses, to which the working members of the bridge are attached, are put in place with the utmost care, the most rigid inspection being required to prevent any mistakes or careless shop work which might tend to prevent the easy and accurate movement of the parts so necessary for the success of the work.

Highway Floor.—The highway floor is carried on four rows of stringers spaced 7 feet 5 inches centre to centre, these in turn being carried on plate girder floor beams, attached to each post of the truss. The stringers are composed of one 15 inch I-beam at 42 lbs. per foot, and rest on a cast iron shoe attached to the top flange of the floor beam. The floor beam is 36 inches deep, back to back of angles, having each of its flanges composed of two angles 6 inches by 4 inches by ½-in. and a web plate 35½ inches by 5/16 inch. The web is stiffened by vertical angles 3 inches by 3 inches by 5/16 inch, every other one being directly under a stringer. Cross struts consisting of a 12-in. channel at 20½ lbs. separates the stringers over the floor beam and are connected to the ends of both stringers.

The floor itself consists of a series of arches of cinder concrete springing from the bottom flange of the stringers having a thickness of 2½ inches at the crown, the top surface being 3 inches above the top of the stringers. Over this is laid a layer of granite concrete 2 inches thick at the centre of the roadway tapering to nothing at the sides. Over this again is laid the wearing surface consisting of 1½ inches of asphalt. The cinder concrete has a proportion of 1:2½:6, the granite concrete being 1:2½:5.

The steel reinforcing consists of No. 22 four-warp wire cloth, stiffened with 9/16-in. steel rods woven into the cloth at intervals of 9 inches, and the whole placed between the stringers so as to take the form of the arch and act as centreing. The underpart of the arches are plastered with cement mortar so that all parts of the wire and rods are completely covered.

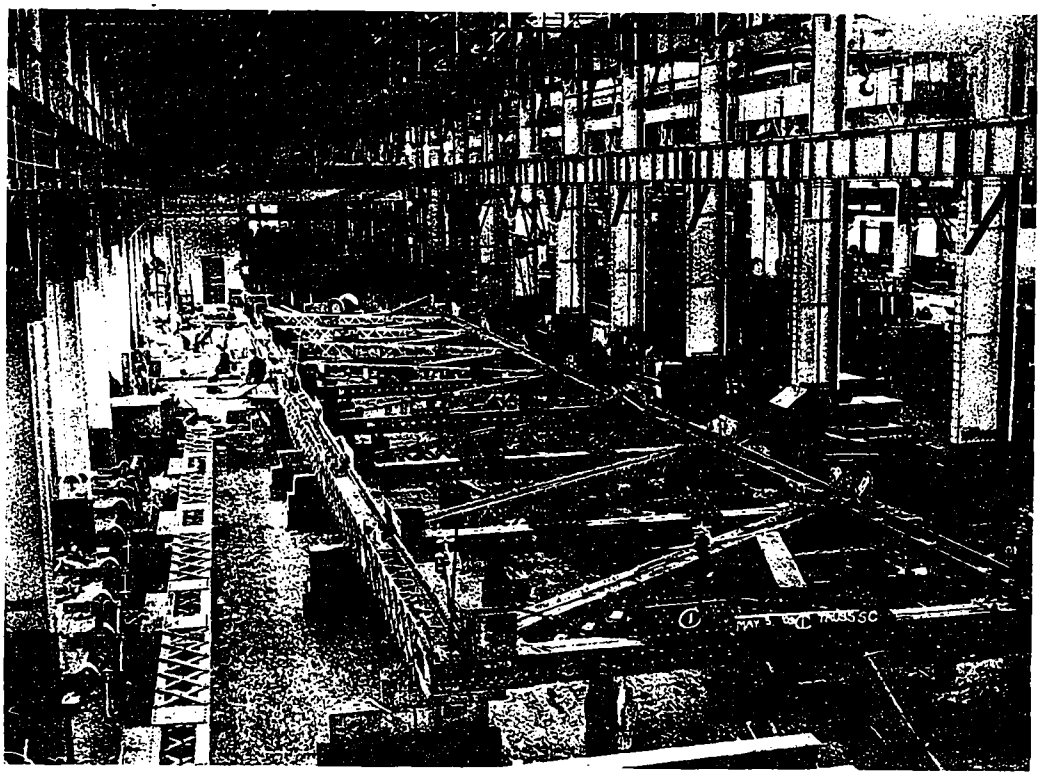
It was required that the floor of the roadway be able to stand the following tests:

1. A distributed load of 600 lbs. per square foot on the whole of a panel between two stringers.
2. A concentrated load of 3,000 lbs. per square foot over any 10 square feet.
3. A concentrated load of 10,000 lbs. on any square foot.

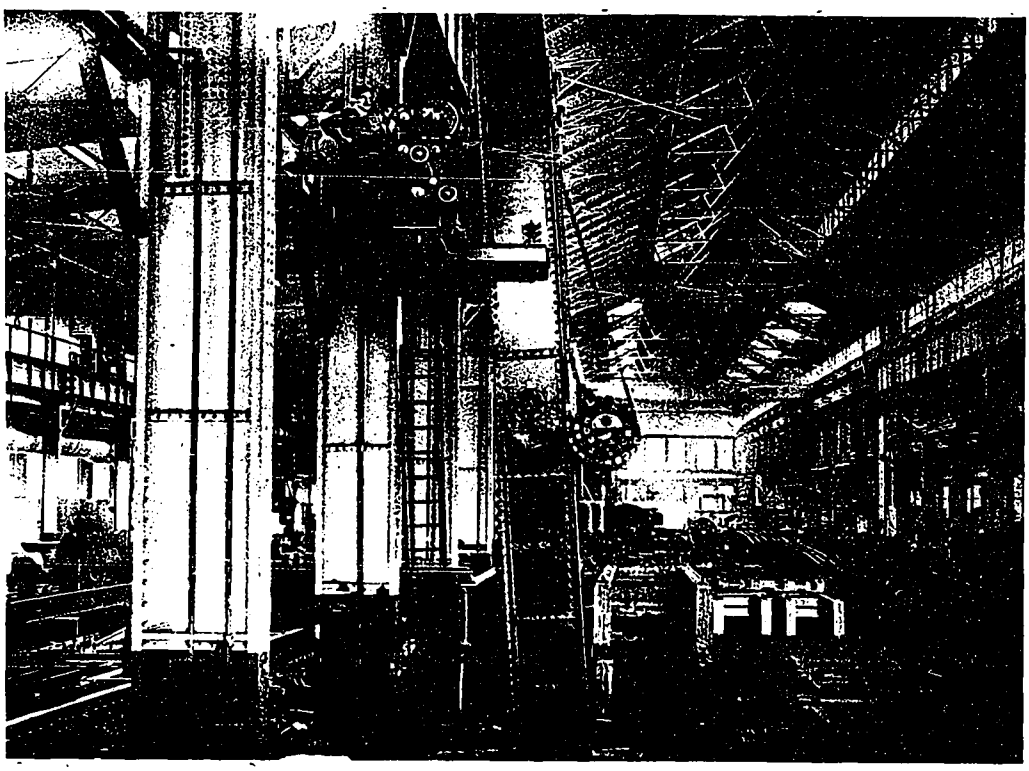
Working Floor.—The working floor is supported on floor beams composed of 24 inches at 80 lbs. I-beams spaced 7 feet 11 inches centre to centre. Two rows of longitudinal struts, composed of 12 channels at 20½ lbs. extend between these floor beams, forming a series of square openings down the centre through which the curtains can be hoisted. The remaining space between these longitudinal struts and the chords is filled with a horizontal cross bracing composed of two angles 3 inches by 3 inches by 5/16 inch to each panel. The floor, with the exception of the centre open space, is covered with steel checkered plate.

Main Floor.—This floor is supported by floor beams composed of 15 inches at 42 lbs. I-beams spaced 7 feet 11 inches centre to centre, alternating with those of the working floor. Two rows of stringers, each composed of one 15-in. channel at 33 lbs. spaced 2 feet 6 inches face to face, extend between the floor beams and carry castings carrying the hinged end of the curtain frames. Stiff horizontal bracing of the Warren type, composed of two angles 3 inches by 3 inches by 7/16 inches, latticed, connect with alternate ends of the floor beams and also the stringers, and transmit to the pier the horizontal reaction of the upper end of the curtain frame as explained above. This floor, unlike the working floor, has no covering.

Curtain Frames.—In studying the layout of the curtain frames it was found that the best results were obtained by arranging these girders in groups of two and four. By this means the ends of two adjacent sets of curtains rest against the outside girders of the larger group, by this means reducing the chance for leakage to a greater



St. Andrew's Rapids Dam. View showing method of assembling and reaming trusses in shop before shipment. H. E. Vautelet, Consulting Engineer.



St. Andrew's Rapids Dam. View showing method of assembling and operating curtains in the shops before shipment. H. E. Vautelet, Consulting Engineer.

extent than if the ends rested on two independent frames. There are, therefore, three different designs of girders, viz., the two in the smaller group of frames, marked "A," the two centre girders in the larger group, marked "B," and the two outside girders in the same group, marked "C."

The girders are 34 ft. 8 3/16 in. long from centre of pin hole at the upper end to the extreme lower end. They are of built-up girder construction, being 2 ft. 3 in. deep, back to back of angles at the lower end; the upper 11 ft. 0 in. tapering to 9 in. The flanges of girder "A" are each composed of 2 angles 3 in. x 3 in. x 3/8 in. for the full length, and one cover plate 7 in. x 7/16 in. x 8½ in. long, starting from the lower end. The web is a solid plate 26½ in. x 5/16 in. (tapering at the top as indicated above). The web is supported by stiffening angles 3½ in. x 3 in. x 3/8 in. with filler plates, spaced at irregular intervals to suit conditions.

Girder "B" is the same as girder "A," with the exception that the flanges are each of 2 angles 3 in. x 3 in. x 5/16 in. and cover plates 7 in. x 7/16 in.

Girder "C" has a somewhat different construction. The downstream flange is composed of one angle only, 4½ in. x 3 in. x ½ in, for the entire length. The flange of the upstream edge is one angle 6 in. x 3½ in. x 3/8 in. with the short leg outstanding, for the parallel portions of the girder, one angle 4 in. x 3 in. x ½ in. being used for the tapered end. For the lower 15 ft. 0 in., however, an extra flange angle 6 in. x 3½ in. x 3/8 in. is used and the web plate allowed to run through 3 in. between these angles. This 15 feet 0 in. length of flange angle is not required, however, as working material, but as a shelf against which the curtain may rest. When the curtains have been rolled up to their proper height this frame can swing to its horizontal position and clear with a comfortable margin the ends of the adjacent curtain.

The girders composing each group of frames are rigidly braced together, with two panels of cross bracing at the top, as well as with six rows of horizontal struts between them.

Curtains.—The curtains are composed of fifty wooden laths 7 ft. 7¾ in. long, 3 in. deep and varying from 1 21/32 in. in thickness for No. 2 to 3 5/32 in. for No. 50, each lath increasing 1/32 in. Lath No. 1 is 1 15-16 in. in thickness, being specially designed to accommodate the casting carrying the links and attachments for the supporting chains. The laths are made of long leaf Southern pine, classified as "clear timber," thoroughly seasoned and the best quality obtainable.

The links connecting the laths are of copper and are designed, cast and machined with the greatest possible care. The copper itself is composed of 88 parts of copper, 10 parts of tin and 2 parts of zinc. A finished link, tested to destruction is required to resist an ultimate strain of 20,000 lbs. per square inch at the point of rupture. The pins used to connect the links are phosphor bronze with an ultimate tensile strength of 140,000 lbs. per square inch. A series of assembled links are required to resist without deformation or alteration a tensile strain of 13,000 lbs. per square inch.

The spiral casting at the foot of the curtain is of cast iron and is cast and machined with great care in order to give the correct initial impulse to the curtain when it first starts to roll.

Before leaving the shop every curtain was required to be completely assembled and rolled a number of times to insure its perfect working condition. When suspended at its full length it was required that the upper edge of lath No. 1 and the lower edge of the spherical casting at the foot shall be exactly parallel and when entirely rolled up the ends of the laths at both edges of the curtain shall form an exact plane, shall be parallel to each other and at right angles to the upper edge of the lath No. 1. Unless a curtain could fulfill these requirements it was rejected. Such absolute requirements were necessary, to guarantee that when operated they would work exactly as intended and that there would be no danger of binding with the adjacent curtains.

One hundred and ten complete curtains in all are required for the dam, but to provide for contingencies the contractor was required to furnish twenty extra curtains with fittings complete, over and above the actual number required.

Travelling Cranes.—Four cranes are employed for hoisting the curtain frames. Two large ones with two sets of chain sprocket wheels for lifting the larger frames marked 1-15, and two smaller ones with one sprocket wheel for lifting the frames marked 2-14.

The large crane has the following electric equipment:

One Canadian General Electric type C.Q. 15, 20 H.P., 230 volt motor for operating the lifting machinery.

One C.G.E. type C.O. 2503, 2 H.P. motor, 220 volts, attached to the trucks.

Two C.G.E. controllers, conveniently placed to allow the operator to control the hoisting or travel of the crane with the greatest ease.

The crane is also fitted with a C.G.E. magnetic brake, attached to the hoisting motor.

Power for the motors is delivered by means of an overhead trolley bar and feed wires, leading from the power house.

The smaller girder frame is of the same general design, except that it is capable of lifting one chain only. It is equipped with a C.G.E. type C.O. 2505, 10 H.P. motor, 220 volts for hoisting, and has exactly similar controller and magnetic brake. This crane, however, has no driving motor, since it is comparatively light and can be readily moved by hand.

There are three cranes for handling the curtains, all exactly alike; each crane, as stated above, working two spans.

These cranes are equipped with a C.G.E. type C.O. 2503, 2 H.P. motor, 220 volts, and a C.G.E. controller. Provision is also made so that the lifting can be done by hand by means of a crank which, on account of the comparatively light load, renders it easy of operation. No propelling motors are used, the cranes being light enough to be readily moved by hand.

There are also six travelling overhead cranes; four 4-ton cranes over the working floor of the dam; one 2-ton crane in the repair shops; and one 2-ton crane in the dynamo room.

These cranes are of the ordinary type with I-beam bridge, hand chain drive and spur-geared sprocket chain hoist.

Repair Shop and Engine House.—This building embraces, properly, boiler room, engine room, machinery and store room, and office. It is a one-story brick building 90 feet x 40 feet, and thoroughly equipped for the purposes for which it is intended.

The merchanical equipment called for in the specifications is as follows:

Boiler Room.—One C.G.E. boiler, having 735 square feet of heating surface. One "Champion" forge, with half hood.

Engine Room.—One "Robb-Armstrong" engine, 10 in. side crank, left hand, direct connection with C.G.E. 40 K.W. direct current generator, 250 volts.

One C.G.E. motor generator set; motor 60 H.P. direct current generator 40 K.W. 2,080 volts.

One switchboard with three panels.

One 2-ton I-beam overhead crane as mentioned above.

Repair Shop.—One 2-ton overhead crane, as mentioned above.

One double cross-cut saw and counter shaft, especially designed to cut laths 7 feet 7¾ inches long and at the same operation cut two notches to fit links ⅛-in. deep, 4 11/32 inches wide, and 5 feet 8¾ inches centre to centre.

One No. 3 self feed rip-saw and counter shaft.

One 12-in. four-sided moulder, capable of planing in one operation the four sides and the quarter rounds of the laths of the curtains.

One wood-boring machine for 5/16-in. and ½-in. holes, 3½ inches deep.

One direct current C.G.E. motor of sufficient power to run the above machinery, with magnetic brake.

The machinery in the repair shop is so arranged that there is room left on side track off turntable for three curtain cranes and for skids to carry twenty spare curtains rolled up, one high, and for two curtains laid flat for repairs, allowing room also for working the overhead cranes.

Wire cupboards are also provided for the lath templates, spare tools, etc.

The building is lighted throughout by electricity.

Other than the works called for on the plans, the contractor was required to furnish the following material and equipment:

(1) Six sets of Manilla rope blocks, complete, to lift foot bridge.

(2) Six 15-ton Norton jacks, 9¾ inches high.

(3) All the electric wires and cables, their attachments and connections.

(4) Twelve round poles about 20 feet long to stop water between end curtains and piers.

(5) A telephone system, with seven boxes located as directed.

(6) Seven hundred lineal feet of track, 2½-in. rails, 20-in. gauge, with three switches and one turntable in the shop.

(7) Four platform cars and one coal car.

The work is being constructed by the Department of Public Works, Canada, of which Mr. Eugene D. Lafleur is Chief Engineer, the work, however, being under the direct supervision of Mr. A. St. Laurent, Assistant Deputy Minister of the Department. Mr. H. E. Vautelet was Consulting Engineer for the whole work, and designed all the special machinery, as well as prepared all plans and specifications in connection with the movable part of the dam and service bridge. The field work was in charge of Mr. A. R. Dufresne, Resident Engineer of the Department, who also prepared all the plans for the lock and masonry work, under the direction of Mr. A. St. Laurent. The plans for the lock gates and filling and emptying valves were executed by Mr. S. J. Chapleau. The mill, shop and field inspection was performed by the Canadian Inspection Company of Montreal.

POLYCHROME ARCHITECTURE.—As Viewed from the Standpoint of the Clayworker.—By H. C. Mueller.

POLYCHROME OR "many colored" architecture, should furnish a very interesting topic for the clayworker, for the simple reason that burned clay combines in itself all the necessary requirements for it. Burned clay is, in fact, the only known building material which will under all circumstances and conditions, retain its original color.

While the clayworker can only play a comparatively passive part in the selection of his product for building purposes, being subject to the directions and pleasures of the designer and architect, he may, nevertheless, take an active part by assisting the work in an experimental way, by suggesting color combinations, texture, etc., and by giving information about the limitations and possibilities of his materials.

Architects will, as a rule, be glad to co-operate with craftsmen who take an intelligent interest in their work, as the best results have always been obtained through the co-operation of the designer and conceiver of things and the man who had to do the work.

Polychrome architecture is almost "as old as the hills," and burned clay has played a most conspicuous part in it from the very beginning. The oriental nations with their love of color have given us the grandest examples in this direction, and it is owing to their wonderful material that we are so well acquainted with the classical examples of polychrome architecture.

While the claim has been made that the Greeks used to color and stain their marbles in rich colors, we must be satisfied with the written records, as nearly all traces of such coloring have disappeared, but we can study the original enameled terra cottas, bricks and tile of the Assyrian and Babylonian period without making any allowance for their age, as they look to-day as fresh and brilliant as when they left the potter's kiln, thousands of years ago. Some of these classical examples of the potter's art have been buried in the ground for centuries, some have been exposed to the rays of the sun and the weather, but no attack of the elements has dimmed or marred their beauty.

The Persians, the Arabs, the Moors have all attained a high degree of perfection in their polychrome architecture. The beautiful mosques, tombs and palaces of these nations are admirable in every respect. The detail of the clay work is marvelous and fascinating, and many a traveler who stood before such a building, or walked through its halls, has exclaimed: "Why do we not create something of this character?"

Our period has not been very productive in an artistic sense. We thought, perhaps, a little too much of labor-saving machinery, trying to gain our goal by producing a great quantity of certain staple articles at the minimum of cost. The engineer has held the stage for a long time and the artist was pushed aside.

It is hardly conceivable that this condition will continue very much longer. We find already a strong current in the direction of polychrome architecture, which may also be called the architecture of the painter, while monochrome architecture may be styled the architecture of the sculptor.

Europe, especially Germany, is making great strides in the application of color in buildings, constructed of terra cotta and brick, and lately great government buildings have been built of these materials. In the United States the government and most of the states have erected but few public buildings of other materials than granite and marble, and it seems that the idea prevails that the brick building lacks a certain monumental character. This is folly, as an examination of the wonderful brickwork of the Netherlands especially show.

Some experiments with colored bricks of terra cottas have not been successful, but the failure was, in every case, owing to the ignorance of the builder, who very frequently did not take into consideration that the porosity of some products would largely interfere with the stability of the color. It is positively necessary that the surface of burned clay be made impervious to moisture, especially if used in city houses, where the atmosphere is pregnant with smoke and soot, if colors are to be retained. The glazed or enameled surface will give the desired protection.

It is true that the bright glittering glaze does not produce a desirable effect, but the so-called matt or faience glazes should be acceptable in every respect. They are strong, deep and yet mellow and soft in appearance; they have a most desirable texture and the palette is practically without limits.—CLAY WORKER.

CONSTRUCTION

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CONTRIBUTIONS—The Editor will be glad to consider contributions dealing with matters of general interest to the readers of this Journal. When payment is desired, this fact should be stated. We are always glad to receive the loan of photographs and plans of interesting Canadian work The originals will be carefully preserved and duly returned.

Vol. 3 Toronto, April, 1910 No. 5

Current Items

A NEW CITY HALL is being considered in certain official quarters in Victoria. A statement recently made by Mayor Morley, tacitly put the necessity of the erection of such a building before the council. The city has outgrown the accommodations of the present structure, and the matter of erecting a modern municipal building will probably be submitted to the ratepayers within the present year.

* * *

ONE OF THE NOVEL FEATURES included in the splendid array of Japanese exhibits that will be seen this year at the White City, London (Eng.) famous exposition centre, will be an immense model of the entire city of Osaka, the Venice of Japan, which will contain the tiny reproductions of some 300,000 houses and hundreds of bridges, and a model of the beautiful temple in Shiba Park, Tokio.

* * *

A NEW GOVERNMENT HOUSE for the province of Ontario will be built on a site on East Bloor Street, Toronto, which was purchased for $90,000. The property was secured from the Board of Education, which bought the site two yeasr ago for the proposed technical school, but later decided the location to be unsuitable. The old Government House property on King Street will be sold to the Grand Trunk Railway, which it is understood, is buying up considerable land in the neighborhood with a view to carrying out some extensive improvements.

ONE OF THE FAMOUS 3,000 LB. BELLS of the far-famed chimes of Trinity church in New York is being recast for the purpose of improving its tonal quality. The whole apparatus, in fact, s beng overhauled, and a somewhat novel feature s being introduced in the installation of loud and soft pedals. This will admit of a modification in volume that will produce a melody in chime that is exceptionally rare and beautiful.

* * *

AT THE ANNUAL MEETING of the Alberta Association of Architects, recently held, the following were selected as officers for 1910: President, E. C. Hopkins, Edmonton; 1st vice-president, J. A. MacDonald, Lethbridge; 2nd vice-president, F. J. Lawson, Calgary; secretary, H. M. Whiddington, Strathcona; treasurer, C. L. Gibbs, Edmonton; councillors, R. Percy Barnes, James Henderson, H. D. Johnson, R. W. Lines, J. E. Wize, all of Edmonton, and G. Fordyce of Calgary.

* * *

A ONE HUNDRED AND FIFTY TON revolving shipbuilding crane, built in England a short time back, has a foundation conststing of four steel cylinders, one under each leg of the crane tower. In placing the sub-structure the cylinders were sunk by the pneumatic process to depths of 58 and 73 ft., and were then filled with concrete in which plates and long rods were embedded for anchoring the tower legs. Each cylinder was 10½ ft. in diameter, enlarged to 13½ ft. at the base.

* * *

MILL CONSTRUCTION OR BETTER, is now demanded by the city of Vancouver in the erection of all apartment houses over two stories high that have three or more suites on each floor. Although the new regulation has not been fully enacted, Building Inspector Jarrett has decided to enforce it on the ground that the building committee's recommendation in this respect is of such a character as to make its endorsement by the council only a matter of form.

* * *

A NEW BUILDING PRODUCT known as "Kellastone," the invention of Edward F. Kellie of Terra Hante, Indiana, displayed a crushing strength of over 6,000 lbs. to the square inch in a test recently made at the physical laboratory of Purdue University in that State. The material is being used to a considerable extent in Indiana in the construction of houses. It is of plastic composition, milk white in color, and is said to be cheap, durable, sanitary and fireproof.

* * *

THREE ENORMOUS GENERATORS are being built by the Canadian General Electric Company for the Electrical Development Company of Ontario, who are doubling the capacity of their plant at Niagara Falls. These will establish a new world's record as regards size of individual units, being 15,000 horsepower each. Other mammoth generators contracted for are three 12,500 horsepower units for the Ontario Power Company, and two of 10,000 horsepower each for the Western Canada Power Company of Vancouver.

* * *

OZOKERITE IS THE NAME of a waxy substance of different colors, mined in Germany, which is said to possess a peculiar virtue for the treatment of concrete surfaces. Spread on the surface to be coated, it is ironed in with hot irons,, and gives a smooth and durable surface that can be easily cleaned. Ink spilt on concrete floors can be wiped up with a rag and leaves no stain. The polish is to be tried on the hospitals in Manila, the surface being so smooth that it affords no holding for dust or germs.

WITH A VIEW TO BEAUTIFYING MONTREAL and environs, the Board of Control of that place has endorsed the proposal of the City Improvement League to apply to the Quebec Legislature for power to appoint an independent Commission of five members to formulate and carry out certain schemes tending to improve the appearance of the city. The new board, if constituted, will be known as the Metropolitan Park Commission and its duties will be to provide better means of street communication and transit, together with suitable park and recreaton grounds, under a concerted system of development.

* * *

A CONSPICUOUS FEATURE in proposed building work throughout the Dominion is the large number of important hotel structures projected. Particularly noteworthy is a fourteen story hostelry which will adjoin the Walker Theatre at Winnipeg, and also a fifteen story hotel to be built at Quebec City. The former structure will be erected by a company capitalized for the purposes at $1,250,000, while plans for the later, are now being prepared by Lorenzo Angiers, a Quebec architect. The Quebec hotel will cost a million dollars, and it is said, that it will be identified with the interests of the Grand Trunk Pacific, similar to the manner in which the Chateau Frontenac is to the C.P.R.

* * *

FOUR NATURAL BRIDGES, which were heretofore practically unknown, have recently been brought to light in the southwestern portion of the United States. The largest one of the four is between the Colorado river and the Navajo mountains, but a few miles north of the boundary line separating Utah and Arizona. It is of a hard sandstone formation. One end of the bridge juts out from the wall of the canyon floor, while on the other side the springing line is at the base of the cliff, so that the arch is not particularly symmetrical, though the curve is smooth and has scarcely a break, having a clear span of 274 feet, with its crown 301 feet above the bed of the small stream which flows beneath it.

* * *

IT IS THE UNANIMOUS OPINION of contractors, material men, and labor unions connected with the building trades in Winnipeg, that the city is just entering upon the greatest period of activity it has ever experienced. The estimate of the secretary of the Builders' Exchange, given out at the annual banquet of that organization recently held, places the total amount of work projected for the year considerable in excess of fifteen million dollars. Prominent builders and labor leaders are a unit in declaring that there will be no shortage in either skilled or unskilled mechanics and that the relationship between the employers and employees will be marked by a greater degree of harmony than has ever existd at any prvious period.

* * *

THE BIGGEST REAL ESTATE DEAL in the history of Toronto was recently consummated in the sale of the Janes Building at the northeast corner of Yonge and King streets, to parties whose names have not as yet been disclosed. The consideration named was $740,000. It is understood the property will form the site of a modern sixteen story office building. The corner, together with the abuting property on King st., was purchased for £400 in 1814 by John Dennis who erected a home upon it, which has long since disappeared. A comparison of the house and its trees and plum orchard, so interestingly described in "Robertson's Landmarks of Toronto," with the buildings in the vicinity that are seen to-day, show the wonderful transformation that has taken place, and the great strides which Toronto has made both commercially and industrially.

STEEL TIES are gaining in popularity in several of the European counties, and any new form or device to be used in connection therewith, is thoroughly examined and given a trial. In Germany, especially, this kind of fastener is taking a firm hold. Aside from the northern portion of the country where wooden ties are preferred on account of the soft moist condition of the ground on which the wooden ties are claimed to rest more firmly, particularly when the soil is frozen, steel ties have come pretty much in general use. It is reported that within the next few years this manner of sleeper will be quite universally adopted.

* * *

THE OLDEST TEMPLE IN THE WORLD, so far discovered, says the Slate Trade Gazette (Hull, Eng.) has been unearthed by excavators at Bisya, in central Babylonia. The walls of the tower were first uncovered and the summit cleared. The first inscription on the surface was on a brick stamped with the name Dungi, which goes back to 2750 B.C. A little lower appeared a crumbled piece of gold with the name Param Sim, who lived in 3770 B.C. Just below were large square bricks peculiar to the reign of Sargon, 3800 B.C., who was probably the first Semitic king of Babylon. A large platform was discovered 2½ yd. below the surface, which was constructed of peculiar convex bricks such as were used in building 4500 B.C.

* * *

THE OLD-WORLD EXCLUSIVENESS of Richmond, a spot close to London, is being disturbed by a party of American capitalists, who have had plans prepared for the erection of what Englishmen describe as a "towering pile of flats in one single edifice." The site selected is that of Ancaster House, a Georgian mansion of historic interest and an old-time hunting box of the Duke of Ancaster. The place was given to Sir Lionel Darell by George III., who was accustomed to make a stay there every week.. The projected flat building is to be several stories high, fitted with the most modern appliances for luxury and domestic economy, including the somewhat novel feature of a steam heating plant to contend against the damp of the English fogs.

* * *

AMONG THE LARGE NUMBER OF BILLS up for consideration during the present session of the Ontario Legislature, was a measure introduced by Mr. Hoyle (North Ontario) to amend the Municipal Act regarding the construction and control of bridges. The chief feature of the bill was that county councils should have control of all bridges more than 50 feet in length, should undertake their construction, and that the Provincial Public Works Department supply specifications and inspect the work. The township council was too small a unit to undertake the building of an important bridge. The bill also substituted the Ontario Railway and Muncipal Board instead of the courts in case of disputes between municipalities regarding bridges. The reduction in the minimum length from 300 ft. to 50 ft. was regarded by some of the other members as a somewhat radcal departure, and opposition developed in the shape of a protest against the centralization of control, entailed by the supervision of work by the Public Works Department. There was a question also, as to whether provincial inspection would not leave the province open to responsibility for accident. Dr. Reaume, Minister of Public Works said the bill had both merits and disadvantages, while Hon. Mr. Hanna expressed the opinion that while its passage would relieve rural municipalities of considerably outlay, it would greatly increase the contribution of county finances from urban centres, in addition to fixing on the Public Works Department a responsibility that was not desirable. The bill finally went to the Municipal Committee, which decided to let it stand for a year in order that county councils should consider it.

NEW YORK'S NEW THEATRE.—Beautifully Appointed Playhouse Erected Solely in the Interests of Dramatic Art.—Design and Plan of Building Depart from Usual American Idea.—Its Arrangement and Scheme of Decoration.

PRONOUNCED by some to be the most complete and beautifully appointed theatre in the English-speaking world, and conceded in general to be the finest play-house in America, the New Theatre, Central Park West and Sixty-second street, which was but recently opened to the public, has at least much in its design and construction to interest students of architecture.

As is already well known to the reading public, this magnificent structure was erected by thirty representative citizens wholly in the interests of dramatic art, and is intended to take the place of a National Theatre, such as the Comedie Francaise of Paris and the Hof-burg of Vienna.

In that the theatre is in no sense a commercial venture, considerable latitude was allowed Carrere & Hastings, the architects, in its construction, and it has therefore not been designed according to the usual interpretation of the American idea. Before drawing the plans, the architects visited and closely studied the representative theatres abroad, with a view of obtaining the best ideas available; and not only was beauty and the convenience of patrons fully considered, together with the acoustics, but particular attention was paid to sight lines, with the result that every seat in the house commands an excellent view of the stage.

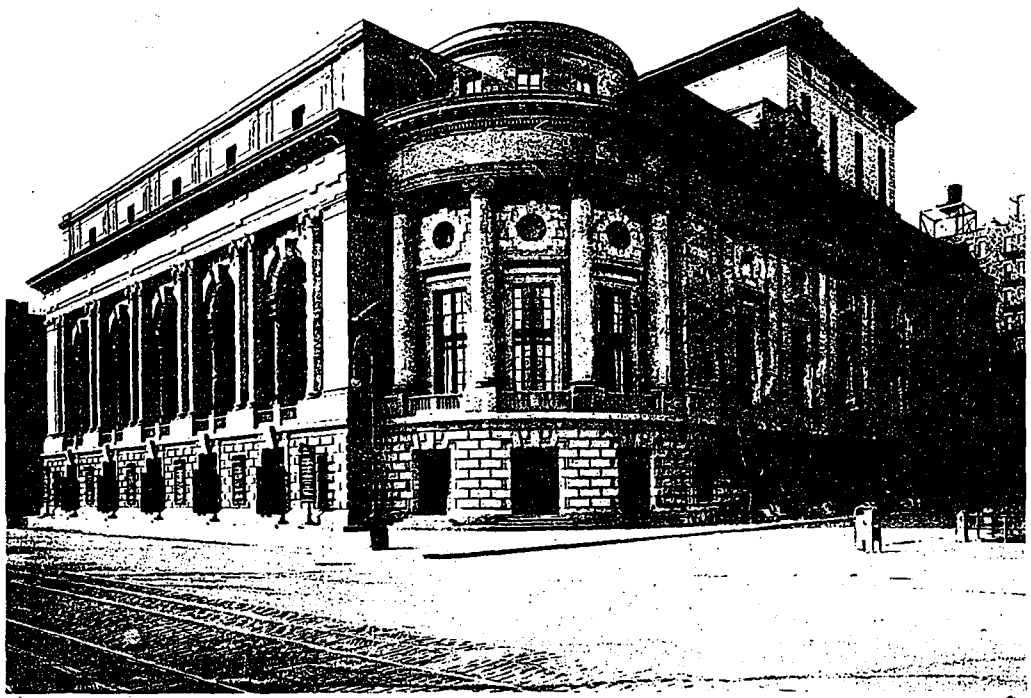
The entire building is not, as is usually the case, given over to the auditorium and the stage, thereby sacrificing the possibility of architectural effect, but instead, conforms more nearly to the Continental type in which the stage and audience room occupy but a moderate portion of the whole. Thus it has been possible to provide for a commodious foyer, two grand stair cases, retiring and smoking rooms, a tea room, restaurant, buffet, offices for the directorate and staff, scores of entrances and exits, numerous circulations and vestibules together with a Founders' room, green room and library.

Viewed from the approaches along Central Park West, the structure is both dignified and imposing. It is of clear gray Indiana limestone, occupying an entire block frontage between 62nd and 63rd streets, and architecturally, as well as in its location, suggests a civic, even a national institution. Although the theatre is modern in character, the treatment in general is somewhat in the spirit of the Italian Reniassance of the late sixteenth century, and reminds one in a degree of the Sansovino Library in the Piazza di San Marco, Venice. Every detail has been carefully considered, and every appointment has been designed and selected to be *enrapport* with the entire scheme.

The front entrances are on the park side while the carriage entrances are on 62nd and 63rd streets. This arrangement obviated crowding and confusion either before or after the play. Once within, the effect is simple, majestic and artistic, rather than gaudy and sumptuous. A trip through the building, taken for the first time, might lead the visitor to believe he was delving in the hidden recesses of some mystic labyrinth, but in reality the house is exceedingly simple and so planned that the auditorium and countless rooms can be emptied in three minutes. Fifty odd stairways lead to the streets or lobbies; exit doors without number can be opened by the pressure of a woman's hand, and the stage and dressing rooms above can be instantly flooded with water from automatic sprinklers should the necessity arise. In fact, no stone has been left unturned to make this structure of solid concrete absolutely safe as well as comfortable and artistic.

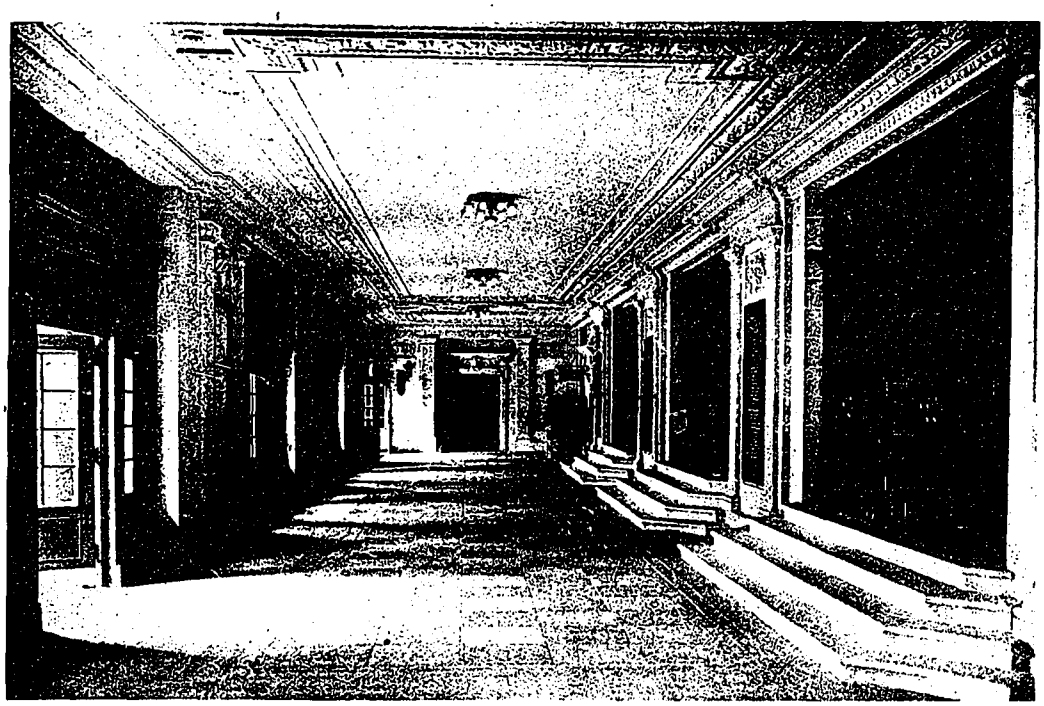
The ground floor, as in all latter-day playhouses, embodies the orchestra, or main auditorium, but here the similarity ceases. Not only have the sight-lines been studied with the idea of obtaining an exquisite, harmonious effect without imparing the conditions for seeing and hearing, but the orchestra and balconies have been surrounded with circulations calculated to contribute to the enjoyment and comfort of the playgoer. Standing on the stage the auditorium stretches away in an ellipse, the long axis of which is parallel to the proscenium arch. Under this arrangement, which follows the precedent of the Wagner Theatre at Bayreuth, the centre box is no further from the stage than the last seat in the orchestra in the usual theatre In other words the auditorium is the

Main Foyer, New Theatre, Central Park West, New York, showing famous Baudry paintings on ceiling. Messrs. Carrere and Hastings, Architects.



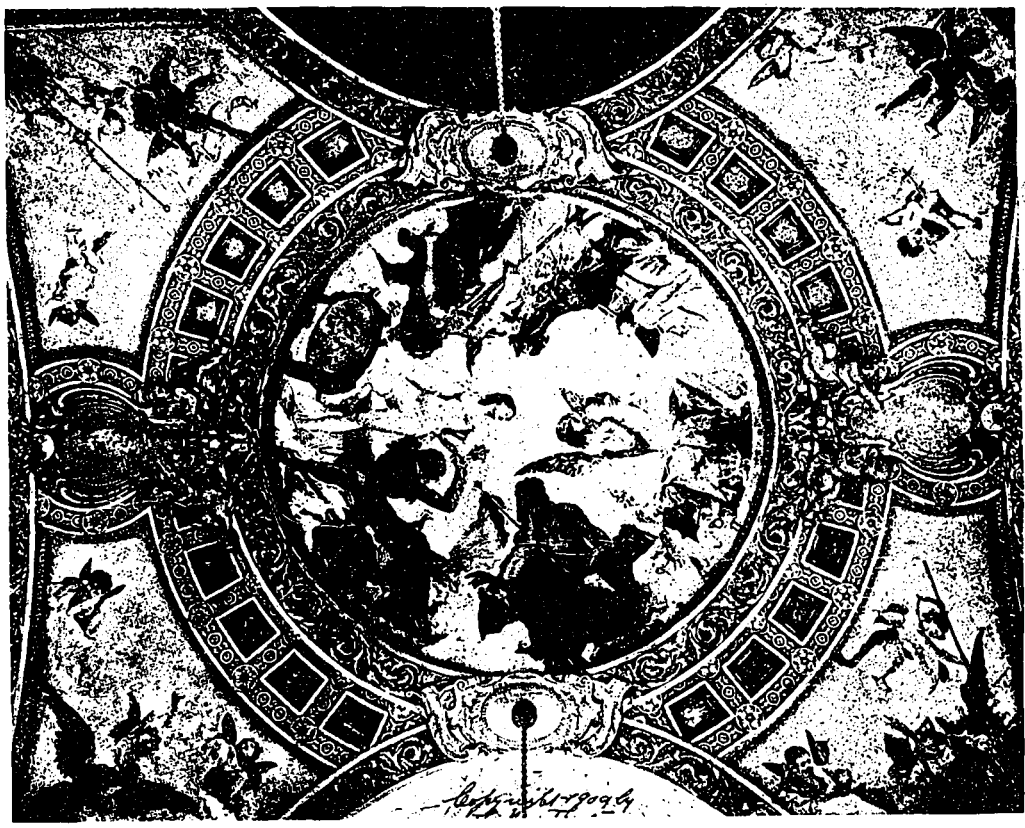
Copyright, 1909, by the New Théatre.

The New Theatre, Central Park West and 62nd street, New York City, a playhouse bu.lt solely in the interest of the dramatic art and the most magnificently appointed theatre building in America. Messrs. Carrere and Hastings, Architects.



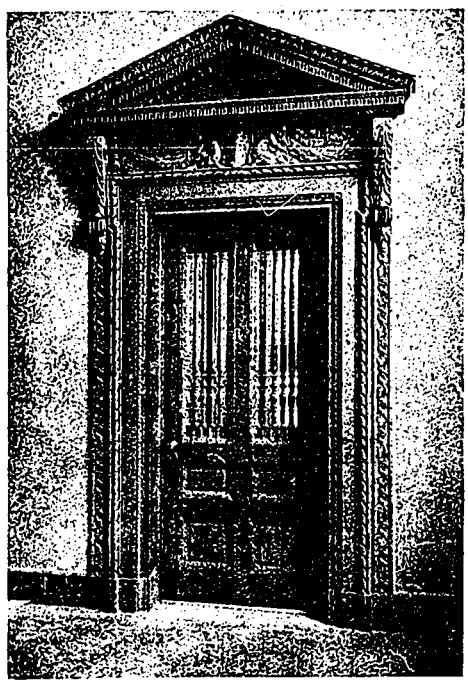
Copyright, 1909, by the New Theatre.

Main Entrance Lobby, New Theatre, Central Park West, New York. Messrs. Carrere and Hastings, Architects.

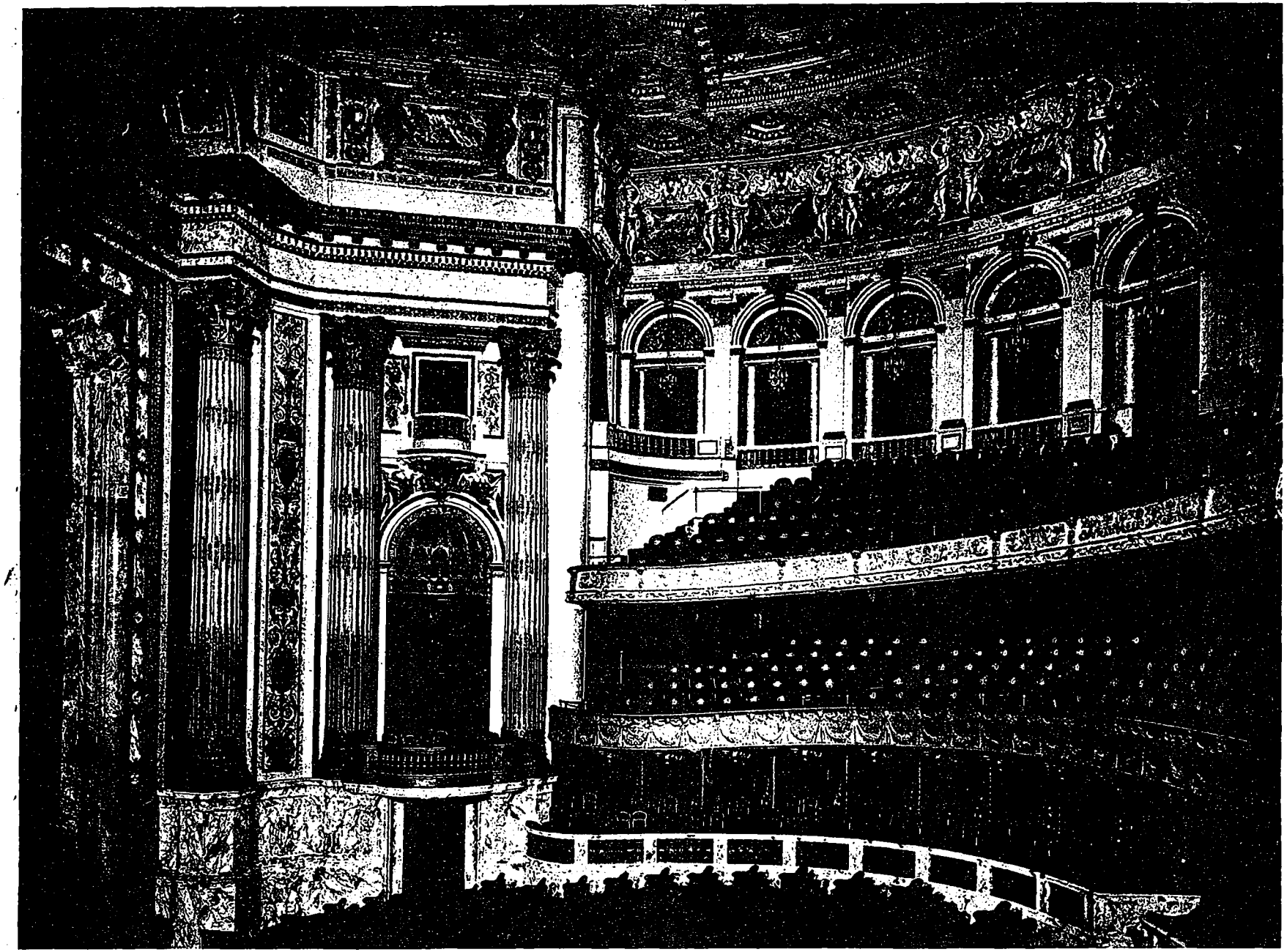


Famous Baudry Painting and detailed view of ceiling decoration in Main Foyer, New Theatre, Central Park West, New York city. Messrs. Carrere and Hastings, Architects.

An Owner's Box.
The New Theatre, Central Park West, New York.

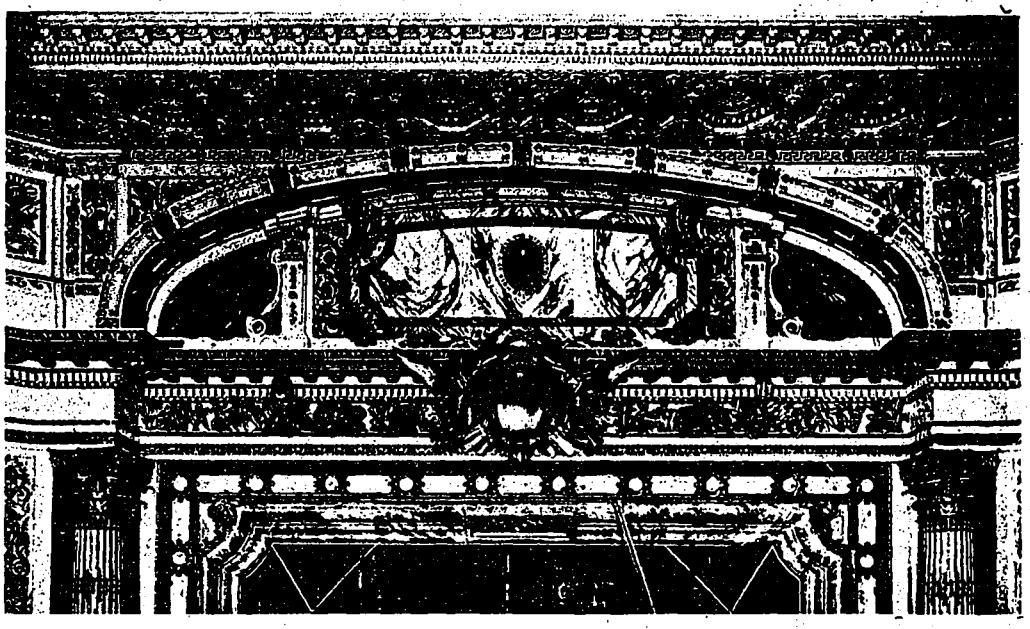


Door in Foyer.
Messrs. Carrere and Hastings, Architects.



View of Auditorium, New Theatre, Central Park West, New York, showing detail of decorative scheme and arrangement of Foyer stalls. Messrs. Carrere and Hastings, Architects

shape of half an egg with the proscenium arch in the centre of the straight line. Along the curved line rise the Founders' boxes, the foyer stalls and first and second balconies in a receding field of driftwood gray and dull

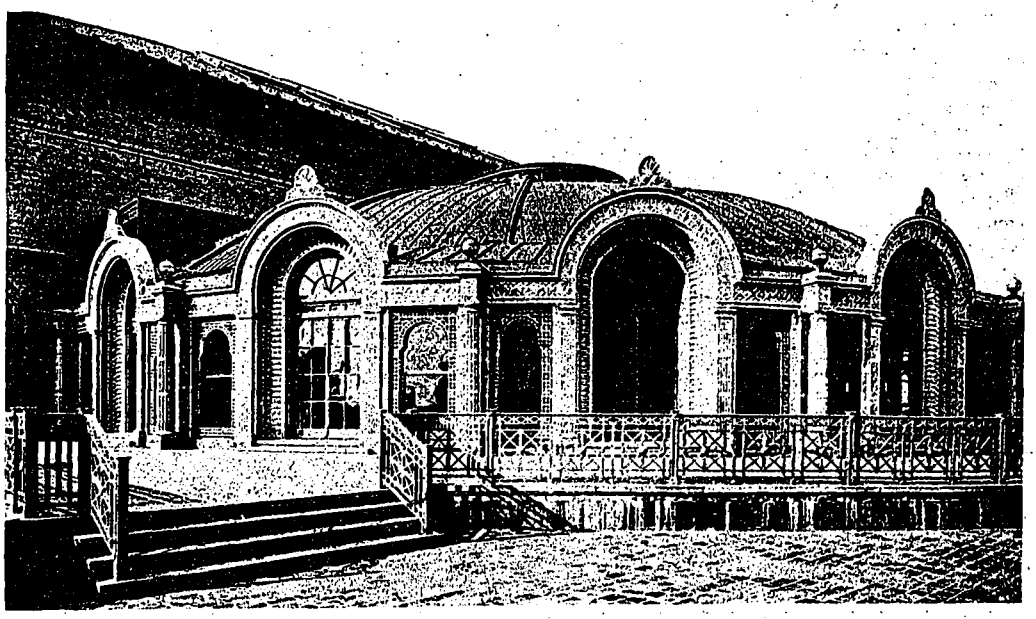


Copyright, 1909, by the New Theatre.

Detail of Proscenium Arch, New Theatre, Central Park West, New York. Messrs. Carrere and Hastings, Architects.

Roman gold, the predominating color notes in the decorations.

The floor pitches at a moderate angle toward the stage, so it has not been necessary to raise the boxes greatly. They are, in fact, but four feet above the level of the orchestra floor, making it quite possible for one to chat with the occupants from the floor during intermission. The boxes are twenty-three in number and correspond to the "Golden Horseshoe" at the Metropolitan Opera House, but instead of a second tier above them as was originally planned, there are six rows of foyer stalls. The boxes accommodate six persons each and are divided by tapestries from the tiny parlors in the rear. These parlors, in turn, open into a private hall from which short flights of stone steps lead either to the main foyer and circulation on the mezzanine floor, or to the corridor on the ground floor. The hangings of boxes and parlors are in a rich cerise and the balustrades of a royal gold bronze elevated on a Broche violette marble base with marble dies. The foyer stalls are also done in cerise. Above the stalls are the first balcony seats and over them the chairs of the second balcony. In the arrangement of all the seats, whether in the orchestra or in the balconies, great care has been taken to provide ample space for comfort. The aisles are of unusual width and the chairs are placed on enough of a pitch to



Copyright, 1909, by the New Theatre.

Roof Garden, New Theatre, Central Park West, New York. Messrs. Carrere and Hastings, Architects.

insure every playgoer seeing the entire stage without interference from the person occupying the seat immediate in front.

As regards the decorations, the tonal effects of the interior are most pleasing no matter from which point of the house they may be viewed.

The color scheme of driftwood gray and gold is quiet in the extreme and not only suggests dignified simplicity but a due regard for tradition. Moreover, the relief has been studied to interpret the architectural design, so that the gray is sometimes seen on a heavy gold background, and again the gold predominates on a background of gray. To further the effect the carpets are in cerise and the proscenium arch is framed in greenish-tinged Conemara marble. Over the arch is the theatre's crest, two masks with a looking glass in the centre bearing the motto, "To Hold as 'twere the Mirror up to Nature." Conemara tablets along the walls and under the dome are inscribed with the names of fourteen great dramatists.

The auditorium is surrounded on each floor by a broad corridor, which forms a circulation to be used between acts as well as in entering and leaving the playhouse. On the ground floor access is obtained to this through a number of vestibules and entrances, some of which lead directly to the corridor and others to the boxes, stairways and balconies, or to other parts of the house. At the corners are two monumental, spiral staircases of great beauty. Each is double, one flight being directly over the other and makes the ascent without meeting.

As the boxes are raised four feet from the orchestra floor they are reached from the main corridor by ascending a half flight of stone steps. This brings one to the private hall, which in turn, leads to the small parlor in the rear of the box. From the top of this half flight of steps the main foyer is reached by ascending another flight of equal length. It is this foyer, by the way, which will contain the majority of the art works to be exhibited from time to time; and it is here where the three famous Baudry paintings from the ceiling of W. K. Vanderbilt's ball-room, form a conspicuous feature of an elaborate decorative scheme, in which rich Sienna marble and gold are the principle elements of composition. At either end of the foyer, cut off by arches, is an orchestra platform which will be used by the orchestra during intermissions whenever dramatic performances are given.

At one end of the circulation on the same floor as the foyer is a tea room daintily done in wedgwood effect, the predominant colors being pale green and white. Here tea will be served to those who so desire during the *entr'actes*. At the other end of the circulation is the women's retiring room pleasantly decorated in a similar manner. The windows upon this floor front on Central Part West and as the park is but a few feet away plenty of fresh air may be had without recourse to the enormous plant which automatically supplies the theatre with fresh hot and cooled air as occasion requires.

The circulations in the rear of the first and second balconies are commodious and intended to be used as promenades during intermissions. On one floor is the Founders' room splendidly equipped, and on the other, the library. The library for the players, which adjoins the dressing rooms, is a model of its kind and has oak book cases rising from the floor to the ceiling. The books will include standard works on drama, books of reference and volumes devoted to art.

The top floor of the building in part is devoted to a picturesque roof garden, which at the present time is used for rehearsals. This garden, designed to delight the eye of all lovers of the beautiful, sets back a bit from the terrace overlooking Central Park and is partly roofed with glass. The doors, all of glass, lead to the walled terrace which will be decorated with potted plants and vari-colored lanterns when the garden is opened to the public. In all probability a stage will be erected here for concerts or performances of one kind and another.

Back of the gardens are smaller rehearsal rooms, two circular in shape; comfortably furnished rooms for chorusmen and women and model make-up rooms for supernumeraries, etc. They are all airy and illuminated during the daytime by skylights. In reality they have every appearance of modern studios and could be used as such. This floor, like others, is reached by large elevators so that neither the actors nor the public visiting the garden will be forced to climb lengthy flights of stairs.

The green room, in disuse since the days of the late Augustine Daly, has been revived. It is located on the ground floor just off the stage on the 63rd street side and is adjacent to two extra dressing rooms to be occupied only when quick changes are necessary. The room will be handsomely furnished, hung with pictures in keeping with tradition and, as of old, will be used exclusively by the players for social intercourse. The dressing rooms rise tier upon tier from the stage floor up on this side of the theatre. Each is fitted with a double wardrobe containing interior electric lights, a marble-topped make-up table with vari-colored lights that the effects of paint, powder and wigs may be determined; comfortable lounging and other chairs and hot and cold water. On each floor are tub and shower baths and many other luxuries and conveniences for the use of the players which other theatres have failed to provide. The offices of the directorate and executive staff are on the third, fourth and fifth floors. Of course the house is fitted with the latest appliances for quick communication, fire apparatus, etc.

A description of the stage requires an article by itself, so complete is its equipment. Suffice it to say, therefore, that as regards mechanism and equipment it embodies features that will attract the attention of mechanical engineers the world over. It is 100 feet wide and has a proscenium opening of 42 feet wide by 40 feet high. The height from the stage floor to the gridiron is 112 feet and the depth from the stage to the bottom of the pit beneath, 42 feet.

A SCHEME DESIGNATED "Roadtown," which is unique in theory at least, has been devised by a New York inventor, to be adopted in connection with the development of suburban property. It is a combination of connected dwellings, with a system of rapid transit and forming in a way a projection of the city into the country. The idea of the inventor is to have the continuous house two or thre stories in height and extending over a considerable area in one direction. On the top is to be a promenade and at the sides, gardens or grass plots, while at stated intervals streets and thoroughfares will pass through the first story. The continuous house will provide its tenants with water, heat, light, power and transportation, but for the latter a noiseless railroad will take the place of an elevator. The idea is to make use of the monorail as well as a moving sidewalk, and to provide for mechanical deliveries of all packages and parcels as well as for the transportation of passengers and food. The inventor, with the architects and engineers associated with him, in working out the estimates of cost state that the saving in construction and maintenance will make it possible for a man to live in the country at the rent now paid for second-rate city apartments and at the same time enjoy all the advantages and conveniences to be found in connection with high-priced elevator apartment houses.

IN THE CONSTRUCTION of the Christian Science church at Pasendena, Cal., which is of monolithic type, the concrete was deposited almost entirely through an 8 in. pipe leading from the bottom of a hopper erected on a high tower. The pipe was hung from a trussed boom and had a swivel joint in it so as to allow the discharge end to be manipulated easily.

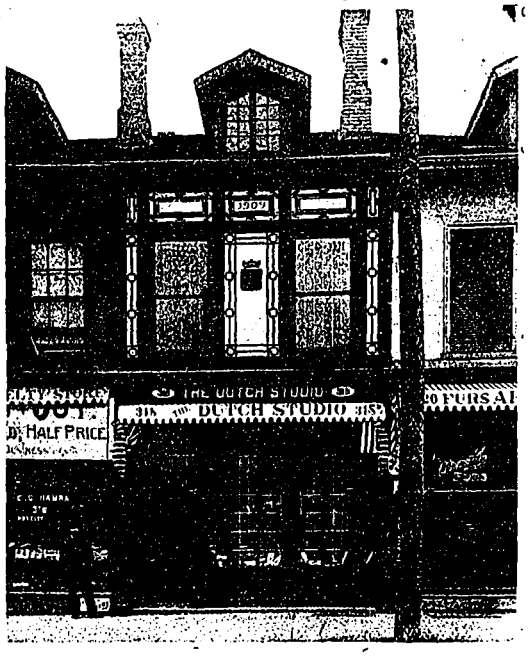
SGRAFFITO WORK.—A Method of External and Internal Plastic Decoration Much in Favor in 16th and 17th Centuries.—Modern Examples of Its Use in England.—A Recent Application of Sgraffito in Toronto.

By W. J. HYNES

THE ILLUSTRATION of this small store front shows the upper wall surface between the half-timbered work executed in Sgraffito or colored plaster work. In this instance a frame building was metal lathed, scratch-coated with cement mortar, straightened with cement mortar mixed with black mortar color and surfaced with white Portland (Blanc) cement. The half-timbered work was left from the saw and stained a dark brown. The background is black, the facing white with some bright red used in the Coat of Arms in the centre panel.

George P. Bankhart, in his recent work, "The Art of the Plasterer," gives some interesting data, historical and technical, on Italian Sgraffito. Sgraffito, the Italian for "scratch," is a fitting name for this work, results being obtained by scratching away the outer coating and thus exposing the undercoating of another color.

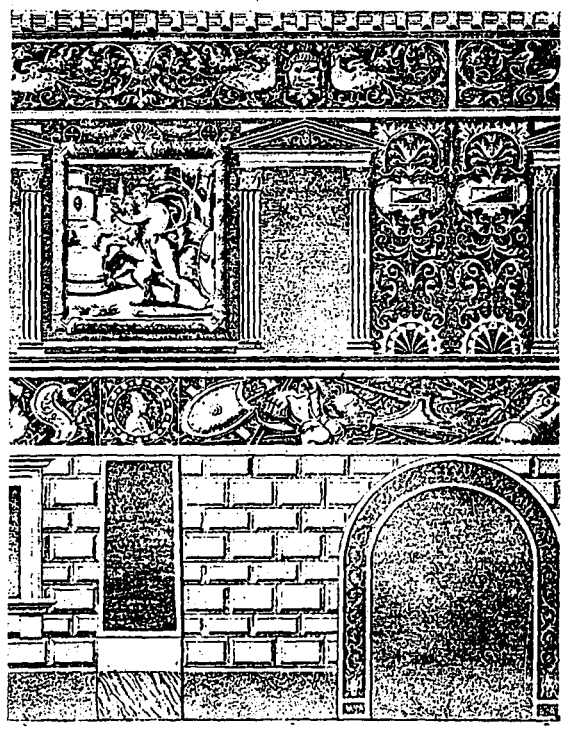
This system of plastic decoration was re-discovered at the exhumations of the Baths of Titus and was much in favor for external and internal decorations in the 16th and 17th centuries. With the contemporary art of modelling in Stucco Duro, or white stucco, its use spread throughout Europe and reached England in the reign of Henry VIII, much of it being used in the King's palace, "Nonesuch," at Hampton Court executed in the common parge of the native workman.



The Dutch Studio, Yonge Street, Toronto, showing the interesting use of Sgraffito.

The method of execution is to prepare a carefully studied and colored detail, deciding upon the base or background color or colors, and the facing or highlight color. Upon a suitable base or scratch-coating the first color is applied using a carefully prepared mortar, free from large stones or coarse gravel which would impede the free use of the graving iron. Upon this the finish coat of another color is applied as thinly as possible and before the undercoating has become hard or set. Only as much surface must be covered as can be completed while work is soft. The cartoon or design is now stamped or sketched upon the finish coat and the facing coat is scratched or etched away, exposing the undercoating and giving the design.

Most modern work is executed in two colors, generally a black ground and a white surface, and many very good effects are obtained by using simple outlines like the Greek fret; plain lines of different widths and shaded drawings of the astragal, egg and dart, dentil, shields, cartouches, etc. In England, Heywood Sumner, G. T. Robinson, Geo. P. Bankhart and other English architects



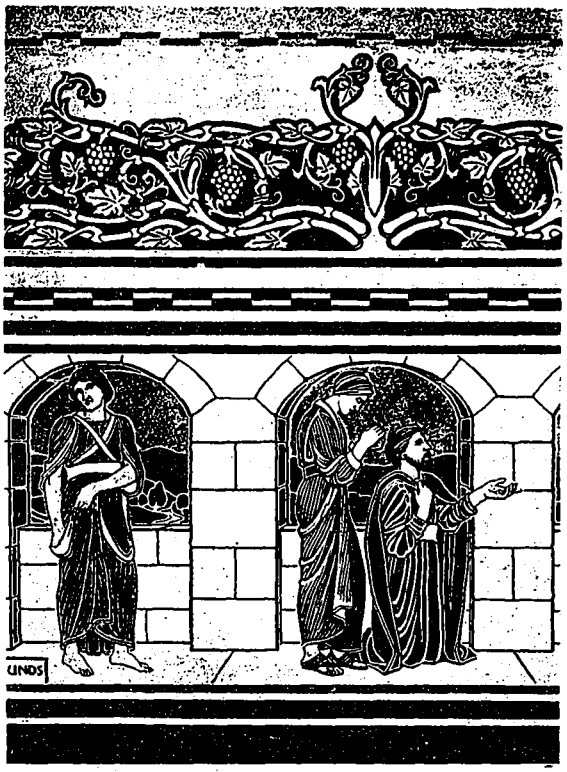
An Example of Sgraffito in Via S. Matteo in Merulana, Rome.

have executed some remarkably successful work by this method.

The earlier sgraffito work of the 16th and 17th centuries, executed in the days when the artists worked for fame and the dollars were not so much in evidence, is a different type. While the methods were the same, the work shows in line and color that the artist was on the job using his graving iron in much the same manner as he would his colored crayons. Occasionally the thumb or forefinger would be used to blend colors or to emphasize the design. Six or eight colors were employed in many instances; figures, animals, scrolls—there seemed to be no limitations and while the results are somewhat florid there is a wonderful ability displayed in their execution.

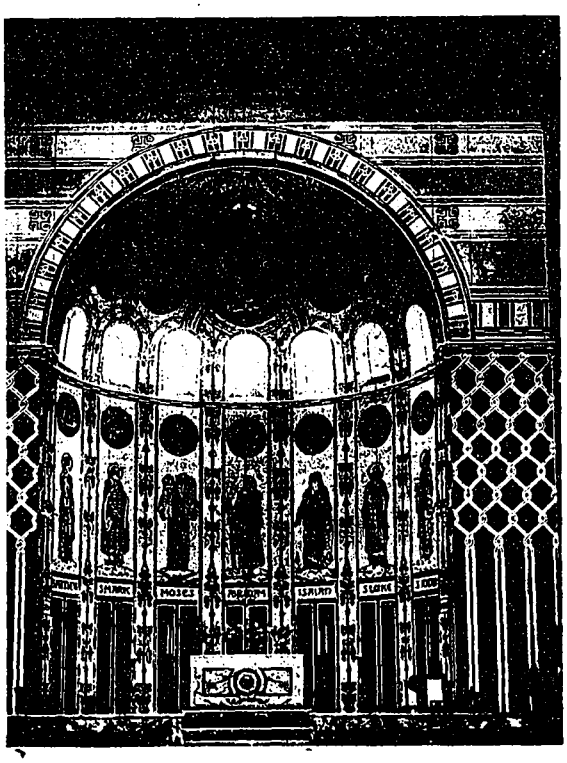
The present condition of the old, as well as more recent sgraffito, is such as to leave no doubt of its lasting qualities. Modern methods and materials can assure successful results and the possibilities should be most interesting to the architect who will readily appreciate the immense decorative value of color in design.

In monolithic concrete structures, color can be made to emphasize the structural lines and the heavy masses



Sgraffito Work in north wall of Chancel of St. Paul's Church, Winche.ter.

of walling lightened and embellished with sgraffito. Old painted or tuck pointed brickwork, always an eyesore



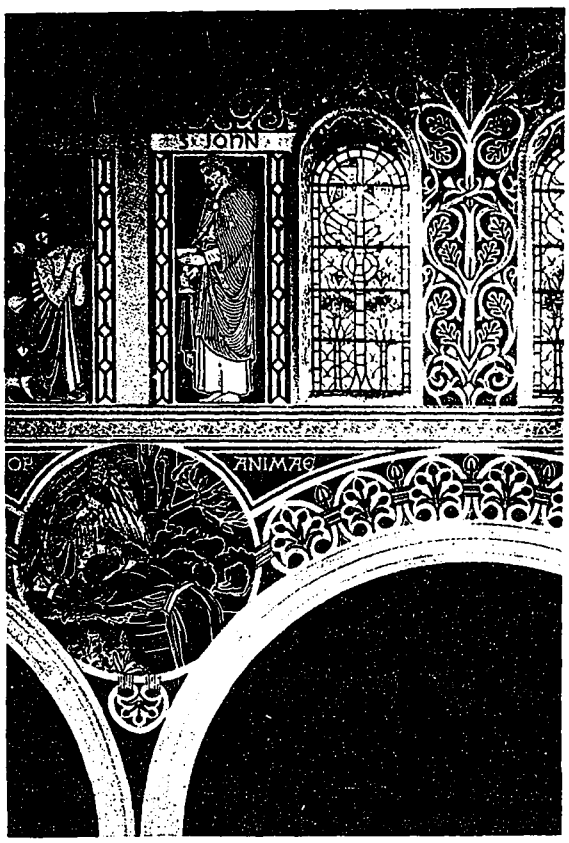
Beautiful decorations in Sgraffito, as seen in the Apse of St. Agatha's Church, Portsmouth.

but more objectionable when new work is added, can be covered by this method and will give pleasing and truthful effects successful in proportion to the care and study devoted to the design.

Heywood Sumner's work gives an idea of its possibilities in church interior decoration. A study of his work in St. Paul's church, Winchester; All Saints, Ennismore Gardens, London: St. Agatha's, Portsmouth and especially St. John's, Miles Platting, Manchester, shows a masterly handling of surface in color which can be secured only by means of sgraffito. The careful student who goes into this subject will see that strong effects for auditoriums and dainty results for house or studio are all within the compass of this material and method.

In half-timbered work, cartouches, borders, diapers and other forms of decoration in color will present themselves to the mind of the designer.

Further enlargements on the uses of this work could be made, but sufficient has been noted to enable the ar-



South Wall of All Saints' Church, Ennismore Gardens, London, showing the further possibilities of Sgraffito.

chitect to investigate and follow the opportunity for color in design, a matter too much neglected at present.

THE PEOPLE OF the United States waste in the course of a year $33,000,000 worth of gas, says the AMERICAN CARPENTER AND BUILDER. Gas is wasted by having wall coverings that absorb the light. Colors differ immensely in their power of reflection. The reflective power of yellow paper, for instance, is 40 per cent., while that of emerald green is only 18 per cent. Dark brown paper reflects 13 per cent., and orange as much as 50 per cent. Having the chandelier too high throws the gas where it isn't needed, and so wastes it. Some people try to secure what they call a cheerful effect by having bright spots of gilding, polished bric-a-brac and inconsequent mirrors to catch the light. This is a mistake; it smply wearies the eyes. Light should be thrown where it is needed, and reflected from broad surfaces.

ECCLESIASTICAL WOOD CARVING.*—Ancient and Modern Examples.—Significance of Work in the Mediaeval Church.—Splendid Carvings of Modern Craftsmen.

By HENRY WALKER

IT IS A REMARKABLE FACT that in a large proportion of the cathedrals and churches in England there are many grotesque and other curious carvings, some of which are profane, some obscene, and others that have apparently little or no connection with sacred art. The majority of these carvings date back to mediæval times, when the art of carving received more attention than it has subsequently done. In those days the workers in wood and stone were allowed greater latitude in the choice and execution of their subjects than is the case nowadays. Many of the examples of grotesque birds and beasts were undoubtedly copied from the ancient "Bestiaries," or Books of Beasts, whilst others were obtained from the decorations to be found in ancient illuminated service books and Bibles. In some cases the carvings have a symbolical meaning, and often beneath a crude and rugged exterior bore a wealth of significance to the unlettered mind of the period. One of the best examples of this character is the carving of the pelican feeding its young. At the time this symbol was first used it was erroneously believed that the pelican succoured its young with its own blood; the error arising from the fact that this bird has a red mark upon its bill, and as it preened the feathers upon its breast it was thought that it was drawing its blood in order to feed its young: "The Pelicane, whose sons are nursed with Bloude, stabbeth deep her breast, self murtheresse through fondnesse to her broode."

Tideswell Church, Derbyshire.

It is a remarkable fact that Shakespeare fell into the same error, and in "Hamlet" he says:

"To his good friends thus wide I'll ope my arms,
And like the kind life-rending pelican,
Refresh them with my blood."

Tideswell Church, Derbyshire.

In later times this theory has been exploded, but the symbol of the loving sacrifice of Christ is none the less beautiful.

In the parish church at Ufford in Northamptonshire, the bench ends are carved with a variety of grotesque faces. Four of these appear as illustrations to this note. One of them is two-faced, an admirable representation of hypocrisy, and a perennial warning to the villagers to be honest and straightforward in all their dealings. Another represents the horrible disfigurement consequent upon the indulgence in hatred and malice.

Manchester Cathedral.

Of the other illustrations attention must be drawn to the excellent examples of modern carving from the Choir Stalls in Tideswell church in Derbyshire. These are the work of Mr. Tooley of Bury St. Edmunds, and date back to the year 1878. The whole of the carved work at Tideswell will repay careful study. On the south side the figures are connected with St. John the Baptist, the patron Saint of the Church, and on the north they are mostly symbolical and denote purity, victory over sin, etc. A close examination of the illustrations will reveal a charming little "annunciation" and a bird feeding its young.

In the Nave of the same church, there are some remarkable carvings by Mr. Advent Hunstone, a local man, whose work is in great repute in Derbyshire.

Parish Church, Rochdale.

Rochdale Parish Church is also rich in ancient ecclesiastical carvings, and they are of great interest to the student. The example illustrated shows a knight in full armour, holding a shield upon which appear heraldic devices.

Manchester Cathedral also contains some excellent carvings of the fifteenth century, many of which are mutilated. The example shown reveals a notable piece of heraldic treatment which has happily escaped the rough treatment extended to many other carvings in this cathedral. The arms are those of De la Warre, and special attention is drawn to the excellent way in which the dragon and the poppy head have been carved.

The study and search for these old carvings is intensely interesting, and the quest may be heartily commended to architectural students. Many of them have unfortunately been

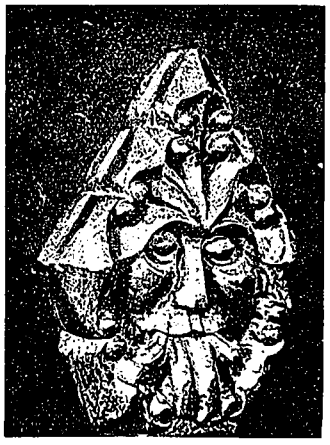
*From the Journal of the Society of Architects, London.

mutilated, and, as is too often the case, the damage has been attributed to Cromwell and his Ironsides. This, however, is far from being true, for many of them are known to have been in a damaged condition long before the Protector's time. In modern times the destruction is too frequently completed by the "restorer," but, happily we are waking up to the fact that these relics of a past age are worthy of the most careful preservation.

Economic Advantage of Well-Built Structures.

THE ECONOMIC advantages, both to individual owners and municipalities, of well built structures, is interestingly pointed out in the recent issue of a contemporary journal, which comments on the desirability of better building regulations, especially in the large cities on the Continent.

Hundreds of cities are now revising their building regulations, or



Ufford Church, Northants.

writing new ones, or have just put amended ones into force. It shows that the great fires of the past few years have not been wholly unfruitful lessons. People are awakened to a realization that something must be done. They are tired of having their lives and property constantly in peril, the while paying out nearly $300,000,000 a year for fire protection and $200,000,000 a year to the insurance companies in premiums, while over $215,000,000 of property goes up in smoke every year.

Perfect building is absolute economy, good building is sensible, and shoddy construction is positive extravagance. A city full of good buildings means lessened maintenance cost for each owner, fewer repairs, a longer life for the buildings (and in consequence lower rents would obtain), much less expense for fire departments and water protection, and the very minimum of insurance rates and premiums, safety of life and property. It would mean millions upon millions of dollars saved and a great municipal problem solved.

A first-class city can only be an aggregation of first-class buildings. Therefore in at least the congested districts only perfect construction can

Ufford Church, Northants.

be tolerated, the complete and total elimination of the combustible in building materials.

All buildings, new and old, of a public or semi-public nature should be conspicuously and officially labeled, just what classes they belong to, "First Class," "Second Class," "Dangerous," etc. That will keep the building department alert in properly classifying the buildings and will keep owners from falsely claiming that their inferior and dangerous buildings are "fireproof."

Then the department should make every effort to have the tax system so amended that there will be a scale of

Ufford Church, Northants.

rates rather than a flat rate. The owner of a first-class building requiring the minimum of fire protection and expense on the part of the city should pay a lower rate of taxes than the owner of the fire trap for whose benefit and protection and the protection of the neighboring property he endangers, the expensive fire departments have to be maintained. That man should pay the minimum rate of tax. Further, the building departments should try to influence the insurance companies to create the "neighboring risk" that exists in most European cities, whereby the individual becomes amenable for the damage done to other than his property through his neglect or carelessness.

In other words, if fire extends beyond a man's own premises, he would get but part of his insurance. In Europe this works a charm, people become most careful where they deposit ashes and waste paper and cotton waste, and all these fire-breeding things are kept in fireproof receptacles. Many people clamor for as few restricted fire limits as possible; the building departments should clamor for as wide limits as possible. It is only a question of a few years when the existing fire limits of any city have to be extended. Then they

Ufford Church, Northants.

take in all the second class buildings permitted under the old regulations, these old ones endanger the new buildings and the latter have to be superlatively well built to withstand the adjacent fires that are sure to rage in the old buildings. We must all realize that with as rapidly growing a population the town of to-day is the city of to-morrow. Every one of our cities is now suffering from an inheritance of fire traps handed down by previous generations. The city that would make its fire limits comprehend all of its corporate extent would indeed be a sensible city, a really first-class city.

MR. J. T. FORIN has been appointed to the office of Building Inspector of Cobalt to fill the vacancy caused by the resignation of his precedecessor. Mr. Forin was formerly Inspector of Public Works at Hull, Que., and goes to Cobalt well recommended for his new position.

GERMANY'S POWER PLANTS.—Manner in Which the Exploitation of Hydraulic Energy is Conducted and Governed.—Provisions and Charges for Use of Power.—Compulsory Membership in Associations of Persons Whose Property is Benefitted by Water Supply

GERMANY as an industrial nation, from the standpoint of organization and the efficient, economical utilization of her national resources, stands at the head of the nations of the world. At this time, therefore, while the several provinces of the Dominion are battling with the problem of determining the best course to pursue to get the most out of the water power value in their streams and rivers, a review of the development, control and use of water power in Germany will prove of interest to Canadian municipal officials and engineers.

We have gone a trifle further than the staid, thrifty German, in the establishment of provincial power plants for the development of energy for commercial purposes, for we find that, although some municipalities have their own electric development plants, none of the several states have as yet gone as far in this direction as have the Provinces of Ontario and Manitoba.

THE LAWS RELATING TO THE DEVELOPMENT AND USE OF WATER POWER.

Water rights in Germany are not regulated by Imperial legislation; neither do the use and development of water power come within the scope of the Imperial Government. At the formation of the German Empire the right of eminent domain over the public water was reserved exclusively to the sovereign States joining the Empire and now composing the same.

The laws governing water rights enacted by the several States and the various governmental decrees, rules and ordinances which were the law of the land at the time the Empire was founded remained in full force and effect and subject only to changes and amendments by the several States themselves.

In the contemplation of the German law, from time immemorial the public waters—that is, the rivers navigable by nature, the seashores, and the sea ports—are the property of the State, as a part of its sovereignty for common use. The right of usage of these waters may be acquired by private persons, communities, or municipalities from the State government for certain purposes, subject to governmental supervision and control.

The uniform policy of the German States heretofore has been not to exercise governmental control or ownership by reason of eminent domain over the public waters, so as to make them a source of fiscal revenue, as, for instance, by the erection and management of water works for the supply of water, or by the construction of works for the development and use of the water power, etc.

On the adoption of the new civil code for Germany in 1900, establishing a uniform private law in all the German States, the existing laws relating to the water rights in the various States were left unchanged, and legislation regarding water rights and the use of public waters was again specifically reserved to the several States.

Articles 65 and 66 of the Introduction Law (Einfuhrungs-Gesetz) to the Civil Code provide that: "The provisions of the several State laws governing the water rights, inclusive of the mill rights, accesses to the banks of rivers, rafting, the promotion of irrigation and drainage of real property, right of landing places, the formation of islands in the rivers, the river beds, dams, and embankments shall remain unaffected."

OWNERSHIP AND CONTROL.

Up to the present time, with a few exceptions, the governments of the several German States do not develop the water power under government ownership, nor do they control and rent and sell the power for the use of manufacturers, millers, etc., neither is the power all developed by private capital and the power rented and sold exclusively for the benefit of private owners.

Only during the past twenty years has the utilization of the water power of Germany by the several States under government ownership been taken into consideration. The question is also being agitated by private parties so as to bring about a co-operation between them and the public authorities.

In Prussia at the present time, government ownership of waterworks for power and other purposes is being seriously considered. An exhaustive report presenting the ways of utilizing the public waters as a means of fiscal revenue has been prepared by the ministry of public works, the department of the government which has supervision over all matters pertaining to the public and private waters, and recommending that proper legislation to that end be enacted by the Prussian Parliament. Action, however, on this project is being deferred.

The Bavarian Government proposes to take up the matter of governmental ownership of the waters in the province of Upper Bavaria. A bill for the purpose has been drafted and it is thought that legislation to that effect will soon be enacted. The purpose in view is to establish water power for the generation of electricity from which to furnish the energy to run the railroads in South Bavaria.

Baden has taken the lead in exercising governmental ownership of water power by the erection and management under governmental control of the small electric water-power works at the port of Kehl, on the Rhine, to supply the railroad stations and the navigation works of the said port with electricity.

The waterworks of the city of Nordhausen, in the Harz Mountains, are an illustration of municipal ownership of water-power works.

PROVISIONS FOR THE USE OF WATER.

The system hitherto universally prevailing in the German States for the use of the water is that the erection and management of waterworks are carried out by the water associations known by the German name of "Wasser-Genossenschaften." These are quasi public corporations, organized under the special laws mentioned above, under the enumeration of the laws of Prussia relating to water rights and water power.

These semi-official corporations are organized either entirely by private owners of land who are being directly or remotely benefitted by the use of the waters, or municipalities, or by a combination of both municipality and private individuals.

It is a special feature of the laws governing water associations that the membership of all persons is legally made compulsory whose real property is held to be benefitted by the purposes and the object of the associations, whether it be by the reason of a supply of drinking water or of furnishing power or of drainage or irrigation or of other ameliorations.

The right of appropriation of private property on the assessment of damages is also an essential feature of the said laws.

These associations being corporations for profit, are also being organized under the general German law of the "Code of Commerce" governing companies with a limited liability.

A leading illustration of these latter corporations is one in which the city of Aix la Chapelle is the principal stockholder. This company is called the "Ruhrthal Sper-

rengesellschaft G. m. b. H."—a limited liability company. It is named after the river Ruhr, near which the city is situated. It was organized on March 20, 1890, with seven incorporators, composed of the mayor of the city of Aix la Chapelle as the representative of the city by virtue of a resolution passed by the city council, a commissioner (landrat) of the county of Aix la Chapelle (landkreis of Aachen), empowered by resolution of the county commissioners and of five commissioners representing and empowered by five other adjoining counties or "landkreise."

This company, the title of which, "Ruhrthal Sperrengesellschaft," means company for the storage of the waters of the river Ruhr, was organized with a capital of 5,000,000 marks ($1,190,000), to which the city of Aix la Chapelle, the county of Aix la Chapelle, and two other counties subscribed 1,000,000 marks ($238,000) each, two counties subscribed 320,000 marks ($76,160) each, and one county 360,000 marks ($85,680).

The object of the company, as stated in the article of corporation, is as follows: The erection and maintenance of reservoirs (sammelbecken) for the river Ruhr and its tributaries for the purpose of improving the condition of the said river courses, and to better utilize the water and the water power by the erection of aqueducts, by drainage and irrigation, and also by the construction of electricity works, water motors, pumping works, and the transmission of power for farming, for the industries and for small trades, in a manner so as to be of common benefit.

It is one of the duties of the said company to offer the power produced to the parties in interest, especially to the city of Aix la Chapelle, at rates in proportion to the amount of the capital invested by fixing the prices upon an equitable basis.

CHARGES FOR USE OF POWER.

The above-mentioned Ruhrthal Sperrengesellschaft charges its four membership customers: (1) City of Aix la Chapelle; (2) County of Aix la Chapelle; (3) County of Duren, for electric light 4.1 pfennig (0.976 cents), and (4) the County of Schleide 3.7 pfennig (0.88 cents) for the kilowatt hour, and a further reduction of 10 per cent. if the dividend of the company exceeds 5 per cent.; but it is a condition that an annual consumption of between 2.3 and 8.5 million kilowatt hours must be guaranteed and paid for.

These membership customers are restricted in their sales to others to a tariff, imposed by the management of the company, by which a charge of between 25 and 40 pfennig (5.95 to 9.52 cents) for the kilowatt hour is made.

Electricity for power purposes is sold: (1) At low pressure from 8 to 35 pfennig (1.9 to 8.33 cents); (2) at high pressure (5,000 volts) at 4½ to 25 pfennig (1.07 to 5.95 cents) according to annual consumption.

A more uniform consumption is given a better rate; for instance, a consumer using 10 horse power in twenty-four hours is given a better rate than one using 24 horse power in ten hours.

The Valley Storage Waterpower Works of the city of Solingen, built in 1903, charges for light 45 pfennig (10.71 cents) per kilowatt hour, on a consumption up to 350 hours a year; above that, 25 pfennig (5.95 cents) a kilowatt hour; for power, 18 pfennig (4.28 cents) per kilowatt hour, on a consumption of 750 hours a year; exceeding 750 hours, 8 pfennig (1.9 cents) per kilowatt hour.

These works have a capacity of 450 kilowatt hours. In the spring of 1900 one year after construction, they were connected with 140 motors with a consumption of 209 kilowatts and had a lighting capacity of about 6,550 incandescent lamps of 16 candle light each. During the year 1904 the total output for light and power amounted to 278,000 kilowatt hours and in 1905 to 388,800 kilowatt hours, an increase in one year equal to 40 per cent.

In the spring of 1906 they were connected with more than 500 small motors.

The charge of the Ennepethalsperre for electrical energy is 20 pfennig (4.76 cents) for the kilowatt hour for power, and 35 pfennig (8.33 cents) for light, much lower than the rates of the largest cities of the neighborhood. This plant was put into operation in 1905 and has a yearly capacity of 1.9 millions of horse-power hours.

According to the statutes of the company the proportion of the general expenses which each member using the power has to bear is determined in the following manner: For each horse-power of the motor a rate of 30 marks ($7.14) is charged yearly for the daily use of the motor, in addition to which a gross sum is paid yearly, according to the size of the motors, as follows:

Horse-power.	Marks.	Dollars.
Up to 5	30	7.14
From 5 to 10	40	9.52
From 10 to 15	50	11.90
From 15 to 20	60	14.28
From 20 to 30	80	19.04
From 30 to 50	100	23.80
Above 50	120	28.56

HORSE AND STEAM POWER COMPARED.

On April 1, 1905, Germany had 375 public electricity works with an aggregate capacity of about 107,800 horse-power, the greater part of which was generated by water power.

According to the industrial census of 1895, the aggregate capacity of all motors in use in the industries was 3,428,000 horse-power. Of this, 79.4 per cent was furnished by steam power and 18.4 per cent. or 629,000 horse-power, by water; both together were 97.8 per cent. of all the power used by the factories in Germany.

In Prussia in the year 1898 there were in operation 19,567 water-power works with a total capacity of 219,500 horse-power, the average capacity being 11.2 horse-power.

According to the statistics, the capacity of all steam engines in use in Prussia April 1, 1905, with the exception of railway locomotives and engines used by the army and navy, was 5,440,000 horse-power.

USES TO WHICH THE WATER POWER IS APPLIED.

Water power in Germany is mostly applied to the generation of electricity for lighting and industrial purposes. It is also used for pumping water into reservoirs for supplying cities with water and for irrigation and for drainage. As an illustration of the uses of water power for the generation of electricity for industrial purposes, the following statement relating to the waterworks of the Wupperthal Sperren Genossenschaft, erected in the region of the source of the river Wupper, emptying into the Rhine, may be of interest:

Electric power is furnished by the company to the following plants, viz., 5 powder mills with 16 motors, 1 bone mill with 1 motor, 9 grain mills with 10 motors, 15 cloth factories with 14 motors, 7 spinning works with 5 motors, 3 hammer works with 13 motors, 6 electricity plants with 7 motors, 64 printing works, dyeing works, bleaching works, weaving works, etc., with 9 motors, 4 wire-thread works with 2 motors, 1 flat-iron factory with 1 motor, 4 paper factories with 6 motors, 19 grinding works with 27 motors, 1 felt factory with 2 motors, 1 woodenware factory with 2 motors, 1 waterworks and electric works with 3 motors, 2 hinge and metal screw factories with 6 motors.

THE ART OF BUILDING.*—Possibilities and Limitations as Regards Factors of Composition.—Knowledge of Character and Quality of Materials Necessary to Best Results.—Simple and Earnest Forms of Expression the Most Beautiful.

By M. H. BAILLIE SCOTT

WHENEVER one sees an artist sketching in some old world village, one realizes afresh how modern art is divorced from the realities of life. No artist in the old days ever contented himself with producing merely shadows of reality. He was busy creating the very stuff of the world, weaving a garment of the gods to adorn the earth. His canvas was flung wide over the country side, and all his pictures were painted in the real. When he had done his work in the valley, the valley was a more beautiful valley than before. He adorned the hills with castles, and set the plains with many a jewel—in moated grange, manor, and farmhouse. In the walled town, too, he was still a creator of beauty in the real The mother art was the essential thing—nothing was or ever could be so important.

Stonework.

Let us now briefly consider then the materials we may use in building: and first let us take stone.

We have in many districts stone of various kinds for building; and in most of these districts we have object lessons in old buildings, showing how stone may be beautifully used. It is unfortunate, however, that the modern mason seems quite unable to profit by such examples: he always wants to improve on them. The art of masonry may often be made a kind of rude mosaic, in which stones of various shapes and sizes and tints can be combined and arranged. In old cottages in Surrey you may find the irregular spaces between the stones adorned with scraps of flint, iron stone, and broken red pottery, with excellent effect. Another instance of the same mosaic in masonry may be found in the old castle at Peel, in the Isle of Man, where the wide scale of tints in the local stone from various shades of red to grey and yellow is taken full advantage of. Is it necessary to add that in the local modern buildings of the same stone, the material has been reduced to an absolute regularity of tint and surface? When the modern mason does descend to rough walling he lets us know it, and can only give us an exaggerated excrescence in the centre of each stone—a confection known as rock-faced. And he seldom knows how to deal with the mortar joint, which in good old work makes such a beautiful reticulated pattern of varying shades of grey.

If only, instead of ignoring the qualities of materials and forcing them into these meaningless forms, we were to begin at the other end, what a new world of art would be disclosed to us. A visit to the site of our building may disclose, perhaps, the fact that flints are the essential local materials for walling. What a palette is there for the artist, of tones of pearly grey; what a variety of textures can be obtained too. ere the soft rounded outlines of the uncut stones, and here, to mark some special feature, the cut flints. The surfaces of the walling enriched, perhaps, with the shivers of the broken flints set in the joints, or notes of red brick or brown stone. And all this you won't find anything about in books, or learn anything about in offices, or art schools. It is a kind of rude natural mosaic, and if rightly done implies the use of materials in the right way, inasmuch as it develops to the utmost their possibilities, instead of obliterating their character by forcing them into preconceived academic formulas. It seems that we are too apt to put the cart before the horse in these matters, and instead of letting the materials influence us and suggest the design, we let them have no voice in the matter at all, but simply shape them into the arbitrary forms we have learnt at school.

Brickwork.

Passing on to consider bricks and brickwork, I suppose every architect has in his office one of those perfect bricks that is the manufacturer's pride and joy, absolutely regular in form and uniform in tint, and which is just everything that a brick should not be—from the point of view of the artist in building. A brick is after all a piece of baked clay, and its beauty consists of its character. It should have the characteristic surface and texture of mother earth. It should be of the earth earthy. In this connection, I remember a great collector of Japanese pottery once showing me a little rude earthen pot. It had no elegance of shape, and would have been scorned by the average buyer of vases. And yet in Japan it was held a perfect thing; and its chief claim to beauty rested in the fact that its form implied the expression of the character of its material. The object of the artist in making it had been to express its inherent clayeyness: subordinating all his own personal aspirations about form, he had sympathetically divined the character of his material. And a nation of artists understood his aims, and appreciated his efforts. And so our bricks first of all express the true inwardness of the stuff they are made of.

Then as to their color, a tint which is subtly varied must necessarily be more beautiful than a uniform shade, and more in harmony with natural surroundings. The mortar joint should not be a succession of mechanically ruled lines, and should be neither too light nor too dark in tone, but introduce into the color scheme a tone of neutral grey, which is always so useful in the general effect of the work—helping to give it that kind of bloom, that indescribable quality of tone, which we find in old brickwork, such as that at Cambridge, for instance.

Roofing Materials..

Then in the matter of roofing materials: the most important quality here is texture, and so tiles should be thick, and if their new color, as is generally the case, is too even in tint to be good, they must have such a texture as will weather and vegetate quickly. It is most important also that the tiles should have those slight irregularities of form and surface which give such interest and charm to old roofs. Nothing is so fatal to the beauty of a roof as tiles which are absolutely regular—giving the effect of a surface ruled with absolutely rigid horizontal lines. You might just as well cover your building with galvanized iron at once. There are at present perhaps no entirely satisfactory tiles made from the point of view of the building artist. The best of them will strike a jarring note of red in the country, and the darker ones are too even in tone to be good. If it is impossible to get old tiles, one is bound to accept a tile which is very crude in its effect for the first few years. Perhaps some day tile makers will weather and mature our tiles for us.

Probably you will agree with me that the finest kind of roof is one of stone—such as the Colley Weston. It is one of the few materials for roofs which is beautiful when new and grows in grace with age.

Slates have the defect that they do not readily yield to nature's inimitable coloring. The rougher and thicker they are, the better the artist in building will like them; and except in their own special locality he will, perhaps, prefer a good grey tone to the more fashionable green.

*Full text of lecture delivered at Carpenter's Hall, London, England.

There is a kind of harshness about slates which makes them specially at home in bleak and barren uplands, or in windswept open spaces by the sea; while the kindly warmth of tiles makes them more adapted in wooded and sheltered places.

It is unfortunate that thatch is not more widely used for small buildings. If it is treated with some preparation to make it fireproof, the main objection to it is removed. It affords far the best protection against outside conditions either of heat or cold, and so is well adapted for small buildings where the bedrooms are in the roof.

The Treatment of Timber.

In the use of timber for building many opportunities and possibilities are lost in the initial preparation of the material, as well as in its subsequent treatment in the workshop. In dealing with materials generally, and perhaps timber in particular, there are two main ideals which may be followed. In the case of timber which has no great hidden beauties to bring to light by high finish, it is wise to aim at securing some suggestion of those natural graces which belong to its living existence as a tree. In the case of other special timbers we may give up this natural beauty for those qualities which can only be educed by a high degree of finish. The great thing to avoid is to halt between these two ideals, and so spoil our horn without achieving a spoon.

I cannot help but note here how strangely these general principles apply to all departments of life. You may remember how this was illustrated in one of those charming early novels by Bernard Shaw, where the hero, merely from being a master of the art of prize-fighting, gained in a degree an insight into the principles which should govern all arts. That is perhaps an extreme case. But the point I specially want to note here is, that in writing an essay on the treatment of material and in showing how they may be educated, I find the same remarks apply exactly to the whole question of education; and the same defects occur in educating human beings as in educating planks of wood. In both cases we so often spoil our horns without making spoons, and so often try to make silk purses out of sow's ears. But while the human problem is an immensely difficult one, involving a sympathetic insight into the nature of the pupil and his possibilities, in the education of materials in the workshop it is relatively simple; and by the use of hand tools, at any rate for finishing the work, we cannot go very far wrong.

It is better in most cases to finish such timber as oak with the adze instead of the plane. Let me add a few words as to the higher education of such materials as mahogany, rosewood, and the like.

Even here I don't want an absolute level surface or straightness of line; but just such subtle undulations as a sculptor might make in highly finished marble. The surface must just so far be alive as that. And then not glassy French polish with its disconcerting stare that is like that excess in glossiness and shininess in boots and hat which we associate with a certain type of city gentleman. Instead of that, let us have the quiet, unobtrusive sheen which a wax polish gives.

In the development of design from the suggestions of the material, a very good instance is that kind of inlay work which consists of a landscape in which the markings of the timber, which so often suggest landscapes, are taken as the basis of a design. Another example is in the use of cross sections of laburnum wood. This material, as you are probably aware, has the annular rings extremely well marked, and these cross sections were often used in old work in hexagons, or in what I think is called the oyster-shell pattern, with very fine effect. The grain of wood, as well as its natural color, will give the best basis of design for inlay; and unless the designer is in close touch with his material here as elsewhere, he will lose all his opportunities. In this mosaic of wood, which we call inlay, I believe that the best results may be gained by slight variations of plane in the surface.

In wood carving what suggestions has the material to offer? We must respect its limitations and possibilities, and our wood carving must be primarily just another means of educing the woodenness of the wood. That is the main characteristic which strikes us in old work. The woodwork is essentially wooden; there is a kind of blunt knobbiness about it. The material has been educated, and its hidden characteristics brought to the surface. When the Renaissance came that ideal was lost, and the material was used merely as an unregarded medium for expressing the conceptions of the designer.

Let us take the case of that famous carver Grinling Gibbons, and let us begin by paying a proper tribute to that almost miraculous skill which places his work almost beyond criticism. He is such a master of his tools that we find he has fallen into the too common fault of ignoring and overriding all the true inwardness of his timber. He is not interested in it at all, but only in his own designs, and merely wants a nice obedient and accommodating material, and so he carves in soft wood. He will then give us a lobster, perhaps, or a bunch of pheasants, rendered with marvellous imitative exactitude. We may wonder, as we do wonder, at these Renaissance triumphs, just as we wonder at fireworks. But art should move us to something more than that. If we want to look at lobsters we can see them in any fishmonger's shop. This imitative rivalry with Nature is the stupidest kind of ideal. And so the work of Grinling Gibbons, wonderful as it is, seldom becomes more than a kind of curiosity of art—a triumph of mechanical skill.

Tiles.

It is a difficult matter for the building artist to find a modern glazed tile which he can use. The manufacturers have all aimed at a mechanical regularity of shape, uniformity of pattern and staring glassiness of glaze, which make practically all modern tiles impossible. There are, of course, or rather there were, the de Morgan tiles, which, excellent in color and design, were still somewhat glassy in their effect; and certain modern makers have produced dull tiles which err on the other side, and have a dead lack lustre aspect. Where then is the perfect glazed tile to be found? Probably only nowadays in the old Dutch tiles. In these the glaze has a thick and creamy quality of subtly varied tones, and in form, texture, and patterning they are full of individual character. It is the same story over again, and beauty has been achieved by sympathetic treatment of material and expression of its qualities. The drawings on these tiles would probably be a matter of scorn to any modern draughtsman, and yet they are perfect in their way, because they speak eloquently of material and process of manufacture. Is it too much to hope that some of our modern makers can learn this simple art, and give us tiles which do not fix us with a glassy stare? In the meantime, the building artist must do without tiles altogether, or use the old Dutch tiles.

Plasterwork.

No one has done more than Mr. Bankart to revive the possibilities of the use of plasterwork, and in his work you cannot find a better example of design in close association with workmanship—design which evolves and emphasizes the qualities of the material. There are two points in regard to plasterwork which I should like to bring before you. One is texture. Mechanical ideals in this, as in other materials, have led to absolutely smooth rigidity of finish, which obliterates all the character of the material, and those suggestions of methods of workmanship which lend such interest to the work. Do not then necessarily finish your plaster with fine stuff, but preserve the texture which the sand gives, and finish from the float with subtile variations in plane. In the arrises, such as those which occur at the sides of a dormer window, do

not work to a rigid line such as is given by a cement or wooden bead, but let the line of the arris take the characteristic line which results from deviations in plane of the surface of the plaster, and let this slight waviness of line occur in your plaster cornices as vague and soft in its outlines as waves of the sea. Let the finished plaster still retain some hint that it was soft and yielding when used; let it flow round the woodwork perhaps engulphing it partially, as if it had risen like a flood which had been frozen. You will find many examples of these qualities of plaster in old work, and but few in modern times. Then as to color, the natural tint given by the sand will often be found to be a good one, and in such cases the plaster may be left untinted. If, however, the plastering is tinted, let it be for choice some tint which is germane to the material—an earthy color, such as ochre, and not Nile green, peacock blue, or any of those shades dear to the art decorator.

Glass.

The use of glass in building is generally wisely confined to the windows. Here, again, we building artists want it to be made and used in the old way—in comparatively small planes, with those slight variations of surface which give our windows a friendly twinkle, instead of a glassy stare. Glass is a material to be used with caution in a building. The less we have of it the better, unless its surface is very much broken up, as in glass mosaic, for instance. Glass tiles are harsh and glaring in their effect. Glass shades so much in vogue in the Victorian era have now been happily banished to the garden.

Metals.

In considering the metals used in building, I have to weary you with the same demand for the evolution of character. In wrought iron, for instance, the particular form you may fancy for the hinges or latches of your doors gains its chief value as design, according to the extent to which it expresses the qualities of the material. In wrought iron we have a substance which, rigid when cold, becomes in the heat of the fire a soft and ductile thing, and the expression of that gentler mood of the iron is the most charming thing we can express about it. It can be shown by outlines which seem to be the resultant of surface pressure—by the swelling of the soft metal round the stamp of the die, as in old coins and in many other ways. In simple ironwork the filing of the cold iron may be combined with the hammering of the hot metal. In finishing such work do not obliterate all the varied tints of the surface with black paint, but finish with linseed oil instead, so that you retain the brighter notes of the file work with the grey tones of the forged iron. In cast-iron work we have plenty of fine examples in the old firebacks that used to be made in Sussex, and many more examples in modern work of inferior work which has made the very name of cast-iron a reproach. The same suggestion and somewhat vague modelling that expresses the qualities of plaster is equally right here, and these qualities in the mould will save the work from that forbidding precision and rigidity which we associate with the term cast-iron.

Reinforced Concrete.

In this brief review of materials, considered from the standpoint of the building artist, a word may be said as to that extremely revolutionary and radical material, ferro-concrete. There is something necessarily illogical in the use of this in connection with those architectural forms which have been evolved as vital and essentially structural features in the buildings of the past. If we are going to use ferro-concrete let us be logical about it, and recognizing its revolutionary character, let us have here, if nowhere else, a new style. Let the adornment of the structure within and without be admittedly superficial in character, with no sham features about it.

In Venice the greatest painters of the time used to adorn the external walls of their buildings with paintings. That would hardly serve in London to-day; but nothing could be better than mosaic and tiles, and such like washable materials used in decorative ways. And in the country this surface mosaic may take a local flavor, which, by the use of pebbles in the form of rough-cast or flints, as already referred to, may bring the building into harmony with nature. If we consider our function as adorners of the earth's crust, we must make our adornments out of the same materials as that crust—just as a pastrycook adorns his pies with pie-crust. Stone, brick and timber are all sound materials to expose to view in the building, but not iron.

Now I daresay there are some of you here who may think that all this talk about art in connection with building, is not very practical. But what does art mean to the worker? It means pleasure in his work. It means the gilding of dull necessary tasks with delight. More and more in the modern world it has become to be the custom to consider work as merely a means of making money to buy our pleasures with; and we lose sight of the fact that the best of all the pleasures that the world has to offer is in the production of work which we believe to be good. If we are going to spend the greater part of our lives in some pursuit, is it not well to see that we get all the delight out of it we can? That would seem a selfish kind of argument were it not happily true that pleasure in the worker begets pleasure in the beholder too. Is there no room in the modern world for the craftsman? Kipling pictures—

> Who lest all thought of Eden fade
> Brings Eden to the craftsman's brain,
> To Godlike muse o'er his own trade,
> And manlike stand with God again.

Let us hope that the artist of the future will find both his work and his pleasure in the creation of the world in which we live—the world of building. Instead of arranging colors on a canvas, let him arrange brick, stone, and wood on hill and dale, in such simple and noble forms that the very spirit of the country will be explained and rendered articulate by his work. Instead of communities of little artistic villas, smugly conscious of their prettiness, let us try to achieve in our smallest buildings those qualities of realities and earnestness which will alone make them seem at home with the creations of nature. And in conjunction with the house builder let us have the garden maker confirming his efforts, not merely in the grooming of suburban villa plots, but in making the wilderness to blossom as the rose. We do not want the dilletante pedantries of architectural art. Let Roman art be for the Romans, and Grecian for the Greek. Here in our Northern clime let us evolve our own art as our fathers did, from our natural conditions of climate and of race.

C.C.C.A. CONVENTION AND EXHIBITION.—Final Arrangement Completed for Gathering of Cement Interests at London.

FINAL ARRANGEMENTS for the second annual Convention and Exhibition of the Canadian Cement and Concrete Association held at London, Ont., March 29, 30, 31, and April 1st, have practically been completed and every indication points to an event that will far surpass in every way the initial meeting held in Toronto last year. An unusually attractive programme has been prepared, covering as it does a wide and varied range of subject matter of vital interest to the industry, and introducing some of the most prominent authorities on cement and concrete in Canada and the United States. Many of the papers and lectures present will be illustrated with stereoptican views, and among those who will address the Convention will be Richard L. Hum-

phreys, president of the National Ass'n of Cement Users in the United States, and Director of the Government Structural Material Laboratory at Pittsburg; Phillip L. Wormely, of the Department of Agriculture, Washington, D.C.; Percy H. Wilson, Secretary of the Association of American Portland Cement Manufacturers, Philadelphia, Pa.; and F. S. Baker, President of the Royal Architectural Institute of Canada.

The official programme is as follows:—

PROGRAMME

Tuesday, March 29th

2.30 O'CLOCK P.M.

Annual Address by the President—Peter Gillespie, Lecurer in Theory of Construction, University of Toronto.

Concrete Construction—Cecil B. Smith, of Smith, Kerry & Chace, Consulting Engineers, Toronto, Winnipeg and Calgary.

The Use of Concrete in Dwelling-House Architecture—Ernest Wilby, Architect, Detroit, Mich. (Paper to be read by Secretary.)

Waterproofing of Concrete—R. A. Plumb,, Chemist, Detroit, Mich.

8.00 O'CLOCK P.M.

The Use of Cement in Architecture—F. S. Baker, President Royal Architectural Institute of Canada.

What Concrete Means to the Farmer—Percy H. Wilson, Secretary of the Association of American Portland Cement Manufacturers, Philadelphia, Pa.

Inexpensive Homes of Concrete—Milton Dana Morrill, Architect, Washington, D.C. (Paper to be read by the Secretary.)

Wednesday, March 30th

10.30 O'CLOCK A..M

Discussion of Proposed Standard Specifications.

2.30 O'CLOCK P.M.

Concrete Bridges—A. W. Connor, of Bowman N Connor, Consulting Engineers, Toronto.

An Analysis of Concrete Bridge Failures—C. R. Young, of Barber & Young, Bridge and Structural Engineers, Toronto.

Concrete Roadway Construction—C. W. Boynton, Chief Inspecting Engineer, Universal Portland Cement Co., Chicago, Ill.

Concrete—James Bell, of Bell & McCubbin, Civil Engineers, St. Thomas, Ont.

8.00 O'CLOCK P.M.

The Engineer and the Finished Work—A. W. Campbell, Deputy Minister of Railways and Canals, Ottawa.

The Construction of Concrete Highway Bridges—Chas. Talbot, County Engineer for County of Middlesex, London, Ont.

Concrete Pavements—James Pearson, President The Constructing and Paving Co., Toronto.

Thursday, March 31st

10.30 O'CLOCK A..M

Election of Officers.

2.30 O'CLOCK P.M.

Concrete in Europe—Richard L. Humphrey, President National Association of Cement Users and Director of United States Structural Materials Testing Laboratories, Pittsburg, Pa.

Some Experiments with Cement Tile—W. H. Day, Professor of Physics, Ontario Agricultural College, Guelph.

The Uses of Concrete on the Farm—Philip L. Wormeley, Testing Engineer, Office of Public Roads, United States Department of Agriculture, Washington, D.C.

The Hardening of Portland Cement—A. G. Larson, Chemist, The Grey and Bruce Portland Cement Co., Owen Sound, Ont.

8.00 O'CLOCK P.M.

The Annual Dinner of the Association, at the Tecumseh House.

Friday, April 1st

2.30 O'CLOCK P.M.

Government Testing Laboratories—Richard L. Humphrey, President National Association of Cement Users and Director of United States Structural Materials Testing Laboratories, Pittsburg, Pa.

The Commercial Aspect of Reinforced Concrete in Canada—Gustave Kahn, General Sales Manager, Trussed Concrete Steel Company of Canada, Toronto, Ont.

What the Concrete Block Means to Canada—J. Augustine Smith, Secretary and Sales Manager, Ideal Concrete Machinery Co., South Bend, Indiana, U.S.A.

Concrete from the Contractor's Standpoint—D. C. Raymond, Vice-President, Bishop Construction Co., Montreal and Toronto.

The exhibit feature of the Convention will be held in the Princess Rink, which offers excellent accommodations for display purposes; and the array of concrete machinery and appliances will be complete in every respect. Included in the list of exhibitors are a number of firms from the United States, and several of the splendid exhibits seen at the Chicago show will be in evidence. The Eastern Passenger Association has granted reduced fares ond the certificate plan to delegates attending the Convention. Delegates will purchase, at their home station one-way tickets to London, obtaining at the same time from their local agents, receipts on a standard form for the money so paid. These receipts, when validated by the secretary of the Canadian Cemen tand Concrete Association, will entitle the holders thereof to return tickets free of charge.

SEVERE TEST FOR TERRA COTTA.

A MOST EXTRAORDINARY TEST of the structural possibilities of flat arch terra cotta construction, was conducted by Prof. Peter Gillespie, lecturer on the "Theory of Construction," of Toronto University, recently at the works of the Don Valley Brick Company. The result of the test proved beyond question the feasibility of floor construction in panels much larger than are usually used.

The panel constructed for the test was 7 ft., 9 in. by 8 ft. in dimensions, and was built entirely on the end construction plan, between two 18 inch steel eye-beams weighing 55 lbs. per foot. It will thus be noted that this panel is of much larger dimensions than the ordinary terra cotta floor panel, and for this reason the test was considered a most severe one. The panel was designed to carry a load of 200 lbs. per square foot. The loading consisted of sacks of cement and clay piled in tiers of 28 bags in such a way as to approximate as nearly as possible a uniformily distributed load.

After fourteen tiers of sacks had been placed on the panel, producing a load of 546 lbs. per square foot, without giving the least evidence of failure, it was found impossible to load the panel to destruction, for the reason that the roof of the building did not permit of adding any additional tiers without great inconvenience. It might be stated, further, that the load remained on the panel for several days, without producing a deflection in excess of that which occurred at the time the load was originally placed on the panel, which was 11-32 of an inch.

The Don Valley Company has every reason to feel highly gratified over the result of this exceedingly severe test to which their product was subjected.

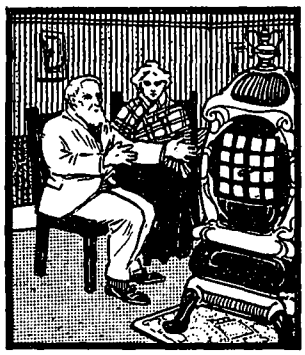
ATTRACTIVE EXTERIOR OF JACOB'S BUILDING.

ONE OF THE MOST ATTRACTIVE features of the new Jacob's Building, now under course of erection in Montreal, and described in the March number of CONSTRUCTION, will be its exceptionally handsome appearance, produced by the use of Burmontofts semi-glazed, cream Marmora terra cotta, for the entire exterior of the building. This material is being extensively used in all parts of Canada, for the exterior finish of some of the largest and most attractive business and bank buildings.

Teranno flooring as well as stair treads, well known to Canadian architects, is being used in the St. Regis Cafe which is to be located in the Jacob's Building. Both of these materials are supplied in Canada by Messrs. Eadie-Douglas, Ltd., of Montreal.

CONCRETE BLOCKS.

IN MANY SECTIONS throughout the country, the lack of suitable materials and facilities for the manufacture of clay building products, makes concrete blocks a most desirable and economic material for the construction of practically every type of building. Good sand and gravel are to be found in large qpantities in almost every community, and as these are basic elements in the manufacture of concrete blocks, their production, therefore, is brought within a moderate cost. From a sanitary standpoint, there is much to commend this character of



The Heating System That Heats in the Modern Way

There is no more important feature of a building than its heating apparatus.

It's a question that architects are paying special attention to nowadays.

In a climate such as ours, where six to eight months of the year our buildings require artificial heat, the comfort of the home depends to a large extent on its heating system.

If you would be certain that the houses you design are to give the utmost satisfaction to builder and occupant, get acquainted with the special merits of

Daisy Hot Water Boiler & King Radiators

We want you to make a careful, critical examination of the Daisy Hot Water Boiler. We want you to go into every detail of its construction and get full information about its exclusive features and the tests it has stood.

We know, that, when you have the facts before you, you will realize why seventy per cent. of the boilers in use in Canada, to-day, for hot water heating systems, are Daisy Boilers.

Daisy Hot Water Boilers are made in the largest and most modernly equipped plant in the country. The very highest grade of materials and expert workmanship are employed.

But the strongest feature of the Daisy Boiler is its design. It is so constructed that it makes use of all the heat generated in the fire chamber —none of the heat is wasted up the chimney or radiated into the cellar. It is under perfect control, so that every part of the house is evenly warmed and held at any desired temperature. It gives plenty of heat for the coldest days in winter and comfortable warmth without overheating during the chilly nights of early summer.

We are ready to give you every opportunity to thoroughly investigate the merits of the Daisy Hot Water Boiler.

King Radiators are designed to give a perfectly free circulation to the water from the boiler and offer the largest radiating surface.

King Radiators are cast from a special selection of iron that insures perfectly smooth castings and will stand our extremely high pressure test.

Though no radiator in operation is subjected to a higher pressure than ten pounds, we test each separate section and each assembled King Radiator to a pressure of one hundred pounds. The slightest imperfection or sign of weakness sends the radiator to the scrap heap. This test is most rigidly adhered to.

The design of the King Radiator is compact and neat in appearance, lending itself readily to any scheme of decoration.

The highest standard of efficiency in house or store heating is found in the combination of Daisy Hot Water Boilers and King Radiators. Write for our booklet "Comfortable Homes." It tells a story of interest to anyone with a house or building to heat. We'll gladly send the Booklet free.

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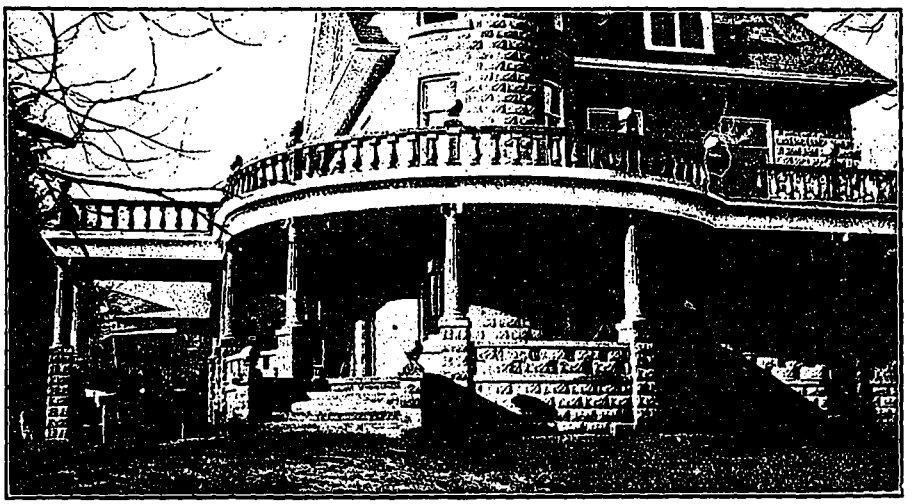
product while as regards its artistic possibilities, sufficient has been done to demonstrate satisfactorily that very excellent results can be obtained.

The residence of Mr. F. A. Fraser, Bowmanville, Ont., constructed entirely of concrete blocks, is seen in the accompanying illustration. This structure is built



Residence of F. A. Fraser, Bowmanville, Ont., built entirely of concrete blocks.

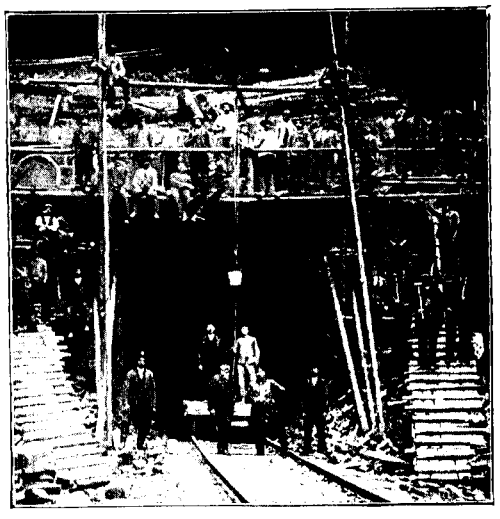
of 12 inch blocks for the foundations and 10 inch and 8 inch blocks for the second and third storey, respectively the core opening of the blocks varying from 3½ inches in the basement walls to 2½ inches in the superstructure. It will be noted that the size of the core openings are smaller than is generally the case. This reduction in size is due to the fact that the owner is of the same opinion as a large number of contractors who have come to believe that too much in the past has been expected from concrete blocks in the way of crushing strength. It is contended in many cases that walls of this character are too light, owing to large openings ,and that this is invariably the cause of the unsightly cracks that develope in a wall. A greater bedding surface and a smaller opening, if generally adopted, it is maintained, would do much to advance the interests of the industry. The blocks used in the walls of this particular house were made on the London Concrete Machinery Company's "Face-down Adjustable Block Machine," while the sills, steps, window heads, porch columns, etc., were made on moulds manufactured by the same company.

This company will have a large exhibit at the C. C. C. A. Cement Show to be held in London the last of this month, where those in attendance will find much interest.

CORRECTION.—We beg to call our readers' attention to an error in our Western Number, which we herewith desire to correct. Through some manner or other, the new Edmonton High School, designed by Architect Roland W. Lines, was included in the illustrations and text relating to Calgary and hence designated as a structure of that city. This building, which is one in which the School Board of Edmonton has evinced a liberal spirit, is now under course of construction. It will have thirteen class rooms, chemical and physical laboratories, lecture rooms, a large library and a manual training and domestic science departments. Further than this, it will be provided with a two story auditorium having a gallery, and also a large gymnasium equipped with shower baths, dressing rooms, locker room, etc. The building will be ventilated by the "Forced draft system," and in plan and character will be one of the most complete school structures in the Canadian West.

STEEL EXPOSED to the action of sea-water and the weather is said to corrode at the rate of an inch in 82 years and that an inch of iron under the same conditions corrodes in 200 years. For the combined action of fresh water and weather the respective periods are 170 years for steel and 630 for iron.

AN ENGLISH trade journal states that oil stains on concrete floors may be removed by using a mixture of one ponud of oxalic acid in three gallons of water, with enough wheat flour added to make a paste that can be applied with a brush. Allow this to remain on the stains for two days and then remove with clear water and a scrubbing brush. A second application will be found to remove the most stubborn case.



Ruppertsberg Tunnel, 1 mile long, constructed by the German Government, waterproofed with Ceresit. (This is only one of the many tunnels which have been waterproofed with our material.)

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is a milky paste which is simply added to the water used in mixing concrete and mortar. With the water Ceresit penetrates to all parts of the concrete and mortar and assures a permanent water- and damp-proof job.

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CERESIT is not an experiment, but has been used with complete success on hundreds of tanks, pits, foundations, dams and bridges. It has been employed by practically all Governments in the civilized world. MORE THAN 5,000,000 CUBIC FEET of concrete and mortar have been waterproofed with CERESIT in 1909. The use of Ceresit is complete insurance against the penetration of moisture or dampness, even under a pressure of more than 70 pounds per square inch.

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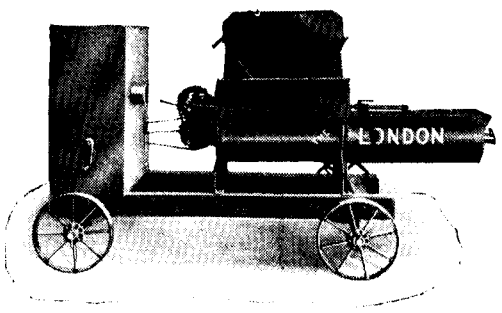
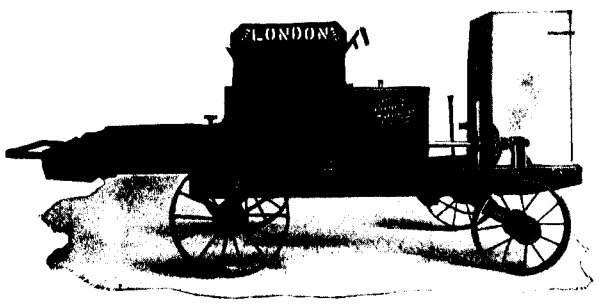
London Automatic Batch Concrete Mixers



London Automotic Batch Concrete Mixer, No. 1.
Capacity 50 yds. per day.
Price, without power, $160.00.
Complete, as shown in illustration, $290.00.

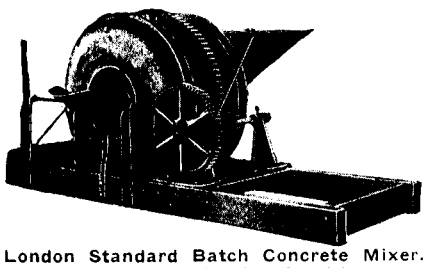
With these machines you can defy competition. WHY DOES IT SAVE YOU MONEY? Simply because the materials ONLY HAVE TO BE HANDLED ONCE. NO EXTRA SHOVELLING, NO WHEELING, NO MEASURING. Just KEEP THE HOPPERS FULL AND THE MACHINE WILL DO THE REST. Will give any DESIRED PROPORTION, WILL MIX ANY KIND OF MATERIAL with any consistency of moisture.



London Automatic Batch Concrete Mixer, No. 2.
Price, complete as shown, $390.00.
With three hoppers, $405.00.
Capacity with two hoppers 75 yds. per day; with three hoppers, 150 yds. per day.

MEASUREMENTS ABSOLUTELY PERFECT. This machine is selling AS FAST AS WE CAN MAKE IT. Only eleven months on the market; over One Hundred and Twenty have already been sold locally. LET US SEND YOU A LIST OF OUR CUSTOMERS.

We also manufacture a STANDARD DRUM BATCH MIXER in four sizes, namely, 7 ft., 10 ft., 20 ft., and 30 ft per batch. When writing for catalogue of mixer always state capacity desired. We also manufacture Face-Down Concrete Block Machines, Cement Brick Machines, Power Cement Drain Tile Machines, Sill Step and Window-Cap Molds, Concrete Fence Post Molds, Concrete Sewer Pipe Molds, Concrete Block and Brick Cars, Wheelbarrows and Carts, Ornamental Pier Block and Porch Column Molds, Baluster Molds, Lawn Vase Molds, Hitching Post Molds, Mortar Screens, Mortar Hoes, Sidewalk Tools, and a full line of Cement Working Tools. Our large catalogue mailed on request.



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Gurney, Tilden & Co., Ltd.

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Georgian Bay Shook Mills.
Page Wire Fence Co.
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Siemon Bros.
Wilson Bros.

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O'Connell, M. M.

Hoisting Machinery.
Otis-Fensom Elevator Co., Limited.
Mussens, Limited.

Hydrants.
Kerr Engine Co.

Iron Doors and Shutters.
J. & J. Taylor.

Iron Stairs.
Canada Foundry Co.
Dennis Wire & Iron Works Co.
Meadows, Geo. B. Co., Ltd.

Iron Supplies.
Kerr Engine Co.

Insulation.
Kent Company, Limited.

Interior Woodwork.
Canada Office & School Furniture Co.
Georgian Bay Shook Mills.
Seaman Kent & Co.
Siemon Bros.
Wilson Bros.

Jail Cells and Gates.
Canada Wire Goods Mfg. Co.
Dennis Wire & Iron Works Co., Limited.
J. & J. Taylor.

Joist Hangers.
David McGill.
Taylor-Forbes Co.
Trussed Concrete Steel Co.

Lamp Standards.
Canada Foundry Co., Ltd.
Dennis Wire & Iron Works Co., Limited.

Lath (Metal).
Heath, W. D. & Son.
Canada Wire Goods Mfg. Co.
Clarence W. Noble.
Expanded Metal & Fireproofing Co.
Galt Art Metal Co.
B. Greening Wire Co., Ltd.
Metal Shingle & Siding Co.
Metallic Roofing Co. of Canada.
Page Wire Fence Co.
The Pedlar People.
Stinson-Reeb Builders' Supply Co.
Trussed Concrete Steel Co.

Leaded Glass.
Hobbs Mfg. Co.
McGill, David.
Pilkington Brothers, Ltd.

Locomotive Supplies.
Mussens, Limited.

Lodge Furniture.
Canadian Office & School Furniture Co.

Mantels.
T. Eaton Company.
John Kay Co.

Marble.
E. F. Dartnell.
Missisquoi Marble Company.
Smith Marble & Construction Co., Limited.

Metallic Sash.
Expanded Metal Co.
Hobbs Mfg. Co.
Stewart, Wm. & Co.

Metal Shingles.
Galt Art Metal Co.
Metal Shingle & Siding Co.
The Pedlar People.

Metal Store Fronts.
Hobbs Mfg. Co.

Metal Walls and Ceilings.
Galt Art Metal Co.
Metal Shingle & Siding Co.
C. W. Noble.
A. B. Ormsby, Limited.
The Pedlar People.

Municipal Supplies.
Mussens, Limited.

Opera Chairs.
Canadian Office & School Furniture Co.

Ornamental Iron Work.
Canada Wire Goods Mfg. Co.
Canada Foundry Co., Ltd.
Dennis Wire & Iron Co., Limited.
Meadows, Geo. B., Ltd.

Packing.
Dunlop Tire & Rubber Co., Limited.
Gutta Percha & Rubber Mfg. Co.

Paints and Stains.
International Varnish Co.
Randall Bros.

Pipe Covering.
Canadian Johns-Manville Co.
Kent Company, Limited.

Plasterers.
W. J. Hynes.

Plaster Corner Beads.
The Pedlar People.

Plate and Window Glass.
Hobbs Mfg. Co.
Pilkington Brothers, Limited.

Plumbers' Brass Goods.
Standard Ideal Co., Ltd.
General Brass Co.
Jas. Robertson Co., Limited.

Plumbing Fixtures.
Standard Ideal Co., Limited.
Jas. Robertson Co.,Limited.

Pneumatic Tools.
Mussens, Limited.

Porcelain Enamel Baths.
Standard Ideal Co., Limited.
Jas. Robertson Co., Limited.

Radiators.
General Brass Co.
King Radiator Co.
Gurney, Tilden Co., Ltd.
Taylor-Forbes Co., Limited.

Radiator Valves.
Kerr Engine Co.

Refrigerating Machinery.
Kent Company, Limited.
Linde British Refrigeration Co., Ltd.

Refrigerator Insulation.
Kent Company, Limited.

Reinforced Concrete.
Beath, W. D., & Son.
Expanded Metal & Fireproofing Co.
McGill, David.
Noble, Clarence W.
Page Wire Fence Co.
The Pedlar People.
Trussed Concrete Steel Co., Limited.

Relief Decoration.
W. J. Hynes.

Roofing Paper.
Alex. McArthur & Co.
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Roofing (Slate).
A. B. Ormsby, Limited.

Roofing Tile.
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David McGill.
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Rubber Tiling.
Dunlop Tire & Rubber Co.
Gutta Percha & Rubber Mfg. Co., Limited.

Safes, Vaults and Vault Doors.
J. & J. Taylor.
Goldie & McCulloch Co., Limited.

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B. Greening Wire Co., Limited.

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Jas. Robertson Co.

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Canadian Office & School Furniture Co.

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Shingle Stains.
International Varnish Co.
Sturgeon, F.
Randall Bros.

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Sidewalk Lifts.
Otis-Fensom Elevator Co., Limited.
Parkin Elevator Company.

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Hobbs Mfg. Co.

Sign Letters.
Richardson, J. E. & Co.

Slate.
Vallango Slate & Marble Co.

Stable Fittings.
Canada Wire Goods Mfg. Co.
Dennis Wire & Iron Works Co., Ltd.

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W. J. Hynes.

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Sheldons Limited.
Kerr Engine Co.
Taylor-Forbes Co.

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Armstrong, Fred, Co., Ltd.
King Radiator Co., Ltd.
Warden King, Limited.
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Dominion Radiator Co., Limited.
Taylor-Forbes Co., Limited.

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David McGill.

Steel Concrete Construction.
Beath, W. D., & Son.
Expanded Metal & Fireproofing Co.
Noble, Clarence W.
The Pedlar People.
Trussed Concrete Steel Co.

Steel Doors.
Canada Wire Goods Mfg. Co.
A. B. Ormsby, Limited.
The Pedlar People.

Structural Iron Contractors.
Dominion Bridge Co.
Stratford Bridge & Iron Co.
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Hamilton Bridge Co.
Reid & Brown.

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Hamilton Bridge Co.
Dominion Bridge Co.
Reid & Brown.
Dennis Wire and Iron Works Co., Limited.
Stratford Bridge Co.

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Canadian Office & School Furniture Co.

Terra Cotta Fireproofing.
Eadie-Douglas Co.
Don Valley Brick Works.
E. F. Dartnell.
David McGill.

Tile (Floor and Wall).
David McGill.
Smith Marble & Construction Co.
E. F. Dartnell.

Varnishes.
International Varnish Co.
Randall Bros.

Valves.
Kerr Engine Co.
Taylor-Forbes Co.
Dominion Radiator Company.

Ventilators.
Sheldons, Limited.
Stewart, Wm., & Co.

Wall Hangers.
Taylor-Forbes Co.

Wall Hangings.
T. Eaton & Co.
John Kay Co.
W. A. Murray & Co., Ltd.

Waterproofing.
Cresit Waterproofing Co.
Eadie-Douglas, Limited.
Grose & Walker
Stinson-Reeb Builders' Supply Co.

Waterworks Supplies.
Standard Ideal Company, Limited.
Kerr Engine Co.
Mussens, Limited.

Wheelbarrows.
Mussens, Limited.

Window Guards.
Canada Wire Goods Mfg. Co.
B. Greening Wire Co., Limited.
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Wire Rope and Fittings.
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Makes Concrete Impervious to Water
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It is a dry powder, to be thoroughly mixed with dry cement before sand and water are added, thus becoming an inseparable part of the concrete.

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