VOL. 3. NO. 12. NOVEMBER, 1910 $3.00 per Year 35c. per Copy

CONSTRUCTION

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

OFFICE OF PUBLICATION
TORONTO
BRANCH OFFICES
MONTREAL - LONDON · ENG.

"MEDUSA"
Water-proof Compound

Makes Concrete Impervious to Water
Prevents Discoloration and Efflorescence

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.

"MEDUSA" GIVES ABSOLUTELY PERMANENT RESULTS, WILL NOT AFFECT STRENGTH, SETTING OR COLOR OF PORTLAND CEMENT.

Medusa White Portland Cement

A true Portland, perfectly White in color—Stainless—Guaranteed to Pass Standard Specifications.

Equal or Superior to any other White Portland Cement known. For Exterior and Interior Work where any High-Grade Portland is required.

A beautiful product adapted to Ornamental Artificial Stone Work of the Highest Grade.

REQUEST FREE SAMPLE, CIRCULAR AND PRICE.

Manufactured in Canada by

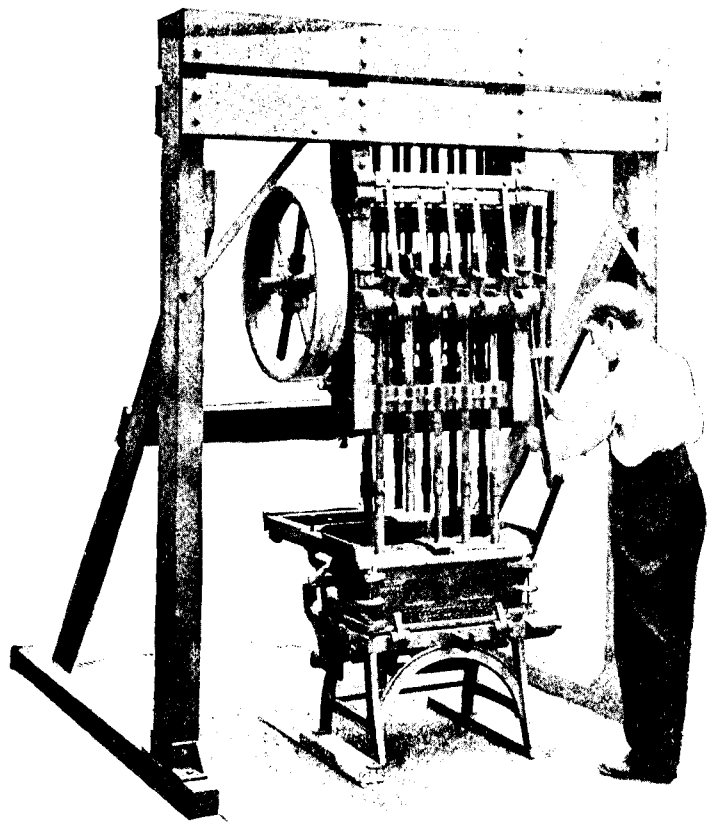
Stinson-Reeb Builders' Supply Co., Limited

9th Floor Eastern Townships Bank Building - - - MONTREAL, P. Q.

WE WANT AGENTS IN EVERY CITY AND TOWN TO HANDLE THIS MATERIAL

20th Century Methods of Doing Things

Speed, combined with labor-saving devices, are the greatest tendencies to success



THE IDEAL AUTOMATIC TAMPER

WHILE there are still countless numbers who manufacture Concrete Blocks in the same manner as has been the custom for years, the Automatic Tamper is now recognized to be a great advancement over the old way.

To the progressive business man, it is not so much the cost of equipment; it is effectiveness and speed results he wants. The buyer of Concrete Blocks, be he a Builder, Contractor, or Specifying Architect, is alert in recognizing the machine-made Concrete Block. They realize that each block is tamped alike, that the force of the blows of the Tamping Machine is greater than possible by human exertion, that machine blocks are more dense, consequently stronger, and by this process are made impervious to moisture.

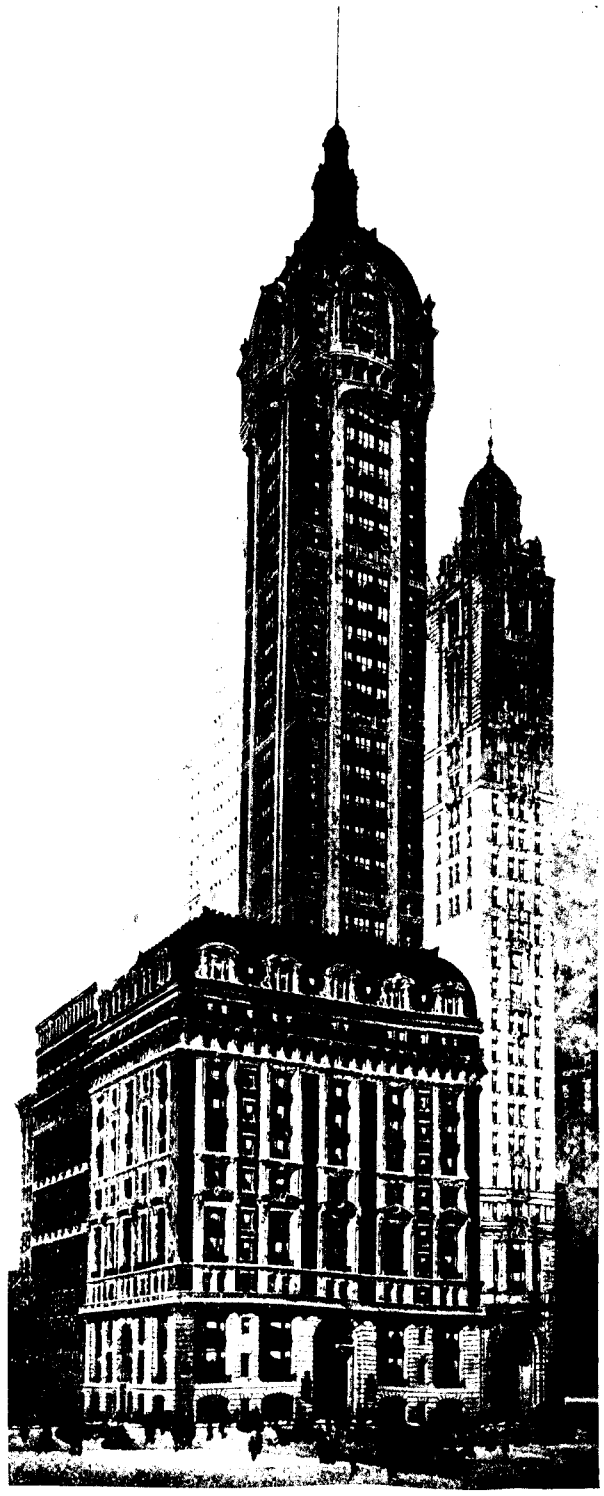
A word to the wise should be sufficient

IDEAL CONCRETE MACHINERY CO. Ltd.

DEPT. 221, 211 KING STREET, LONDON, ONTARIO

1600
Kinnear Radiators

With a superficial area of 66.234 square feet were installed in the "Singer Building," New York



Singer Building, New York. Ernest Flagg, Architect.

KINNEAR RADIATORS

are strong, efficient, light, compact, sanitary, durable and quick acting. Can heat a room in half the time it takes to heat with a cast heater. KINNEAR PRESSED RADIATORS will last a life time.

KINNEAR RADIATORS WEIGH 250 LBS., THE CAST 700 LBS., PER 100 FEET OF RADIATION.

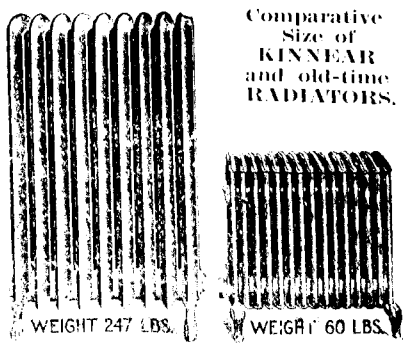
They are built on the plan of a sheet-iron stove, to get instantly hot on turn of the valve, and to get heat out into the room, where it heats you, not the Radiator.

You have absolute control of the heat, it will not burst with frost, have better circulation of water, and greater condensation power for steam.

Hold 40 per cent. less water than cast Radiator, consequently effecting a great saving in fuel, as it is much easier to heat 36 gallons of water than 60.

Why persist in heating up a ton or two of cast iron before you get any heat out of your Radiator for yourself?

KINNEAR RADIATORS are being specified by the leading architects on the American continent.



Comparative Size of KINNEAR and old-time RADIATORS.

A. WELCH & SON

SELLING AGENTS FOR ONTARIO

204 QUEEN ST. W. - TORONTO

OOUS TERRA COTTA
AIAN MATERIAL SPECIFIED BY
POMINENT ARCHITECTS

Don Valley

F REPROOFING used in modern
nstuction that has proven as
as practicable, and as efficacious
W POROUS TERRA COTTA,
LOW POROUS TERRA COTTA
nuactured in Canada or elsewhere
VALLEY Product. Our clay beds
in Canada. Our method of burn-
he hickness and weight of our pro-
ior to anything manufactured

odicts are of Canadian manufacture,
by Canada's best known Archi-
portant structures.

ll ine of the best quality of glazed,
nd common brick in all grades, and
ng first class services and prompt
n to every Architect in Canada.
PROOFING, get figures for DON
S TERRA COTTA.

The Lumsden Building, Yonge Street, Toronto. J. A. MacKenzie, Architect. This building was FIRE-PROOFED throughout with DON VALLEY POROUS TERRA COTTA.

BRICK WORKS

Montreal Agent:
DAVID McGILL,
83 Bleury Street, Montreal

Don Valley

GENERATING STATION, PLANT OF THE ELECTRIC DEVELOPMENT CO., NIAGARA FALLS, CANADA. E. J. LENNOX, ARCHITECT.

THIS, the largest and most elaborately equipped power house in Canada, on the Niagara River side, was built of ROMAN STONE. The Stone that is made of the purest materials ; the Stone that requires no waterproofing: the Stone that is of the same composition throughout; and the Stone that is made by the oldest established firm, and with the largest plant and equipment.

Roman Stone

(TRADE MARK REGISTERED)

NO FACING MATERIAL

ROMAN STONE has been used by Canada's most prominent architects in Bank Buildings, throughout the entire Dominion, of monumental construction; for stone trimmings in all classes of moderate-priced and high-class residential work ; office buildings ; and in fact for every type of high-class structure where stone may be used. ROMAN STONE is of the same quality throughout--no facing material being used--and has established itself as a standard product in Canada during the past decade.

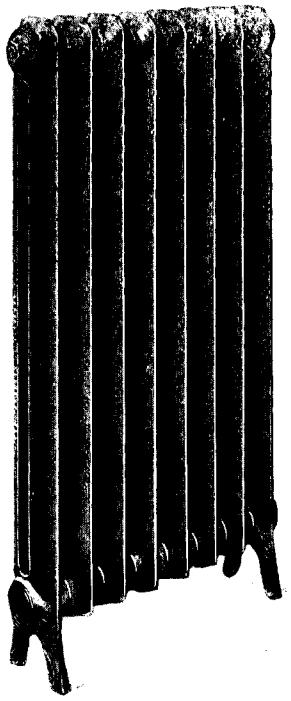
The Roman Stone Company, Limited

HEAD OFFICE—504-5 TEMPLE BUILDING

100 Marlborough Avenue
TORONTO

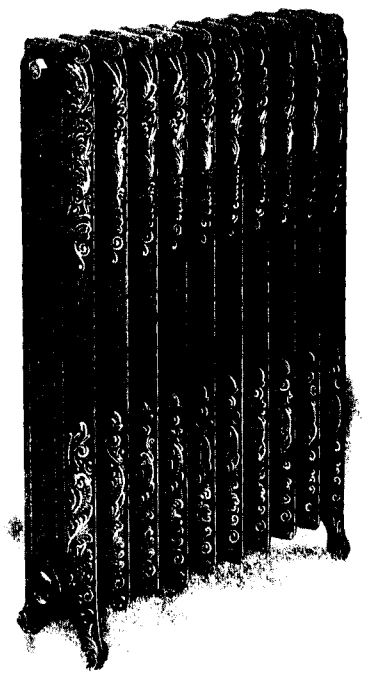
T. A. MORRISON & CO.
Selling Agents for Quebec
204 St. James St. - Montreal

SAFFORD RADIATORS



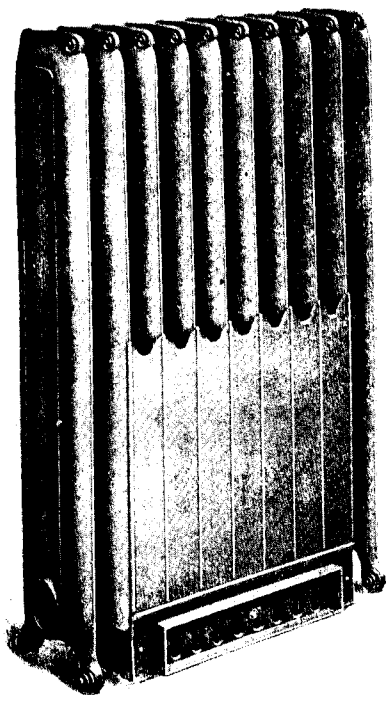
Zenda Plain Single Column.
The Narrowest Radiator Made.

The outstanding feature of the "Safford" line is the magnificent assortment of styles and patterns. There is no requirement in either heating or ventilating apparatus that cannot be fully satisfied by the installation of "Safford Radiators."



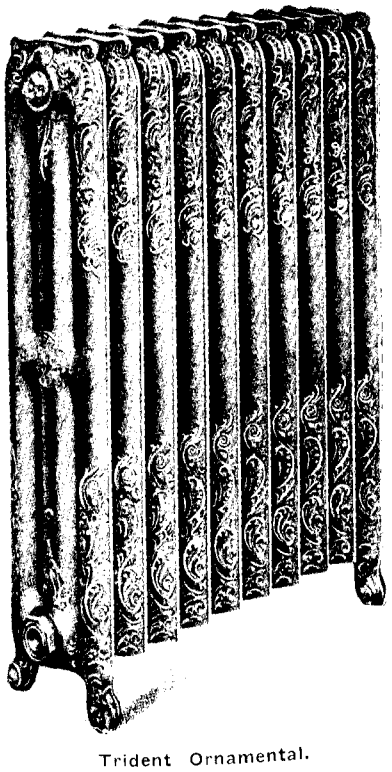
Regina Ornamental.
Two Column.

Not only in the perfect symmetry of outline, but in absolute mechanical accuracy, does the Safford excel.



The New Adjustable Box Base for ventilation work.

Safford Radiators emit a greater number of heat units, per square foot of catalogued radiating surface, than any Radiator manufactured.



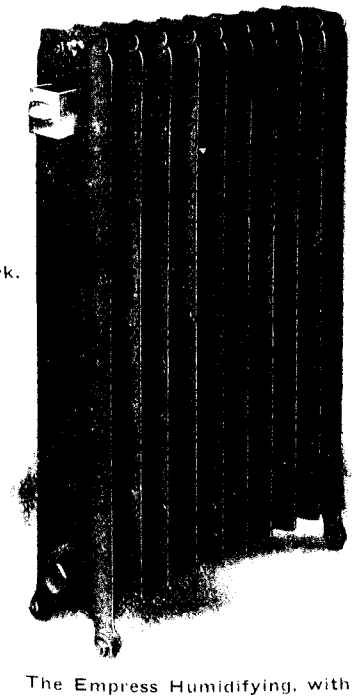
Trident Ornamental.
Three Column.

MANUFACTURED BY

THE DOMINION RADIATOR COMPANY LIMITED

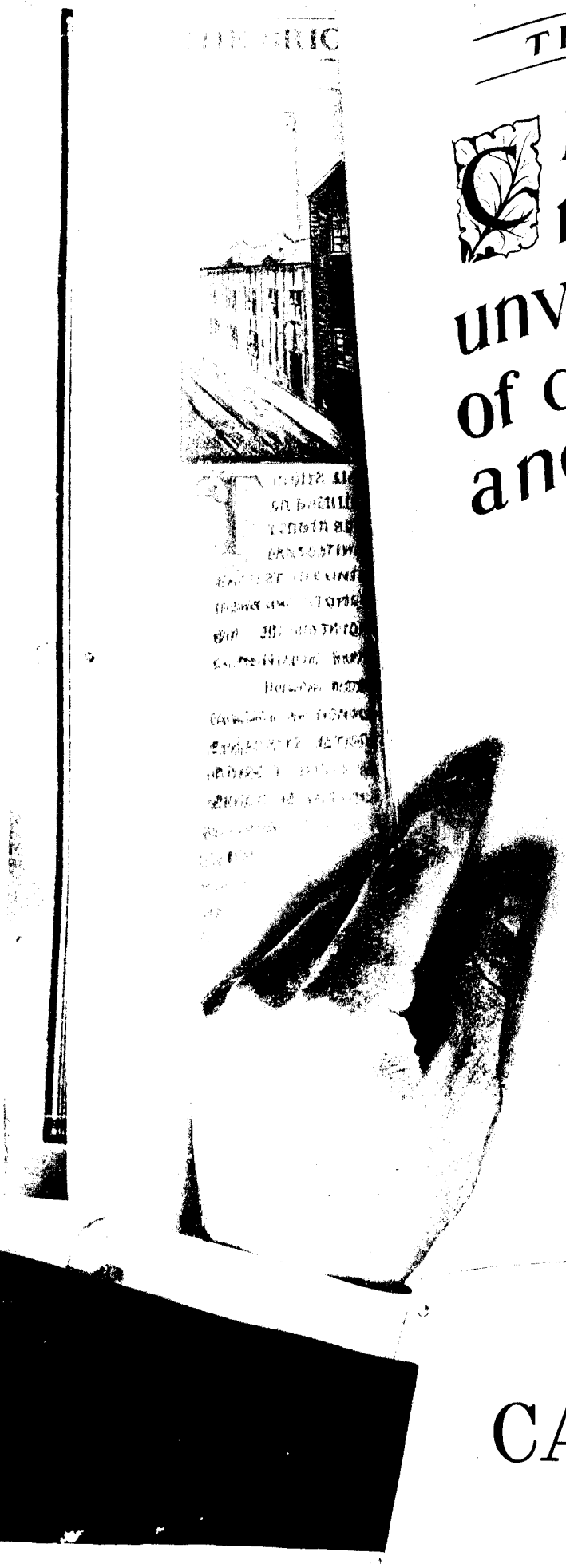
TORONTO

Branch Warehouses and Offices at Montreal, Winnipeg, Vancouver and St. John, N.B.



The Empress Humidifying, with Vapor Pan.

Progress turns over a new



THE CONCRETE AGE

CANADA Cement maintains an unvarying standard of quality purity and uniformity

See other page

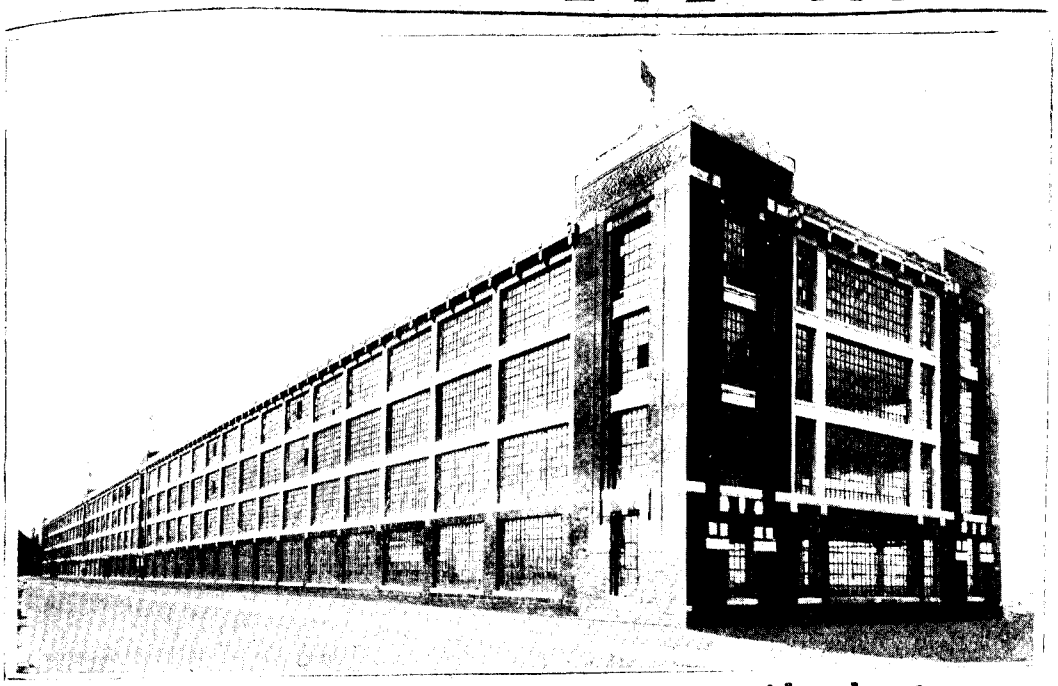
CANADA CEMENT COMPANY LIMITED
PORTLAND
CANADA
CEMENT
MONTREAL

CANADA CEMENT C

MONTREAL -

o leaf in factory construction

THE CONCRETE AGE



Considered from every viewpoint concrete provides the strongest, safest, most durable, and most economical material for factory construction.

Reinforced concrete has provided for the Manufacturer an entirely new building material. It has turned over a new leaf in the progress of business architecture. Indestructible, economical and fireproof, it offers features of advantage over: (1) *Wood frame construction,* (2) *Mill construction,* (3) *Steel construction.*

Since the advent of concrete, **wood frame construction** has gone out of date, principally because of its lack of durability and its fire risk. Board walls, narrow floor joists, wood floors and roofs, not only do not protect against fire, but in themselves afford fuel, even when the contents of a factory are not combustible.

Reinforced concrete, besides being as cheap, is superior to mill construction. Reinforced concrete is cheaper than steel construction, and, for factory buildings and warehouses, is superior in every point of comparison. Cheaper because it is lower in cost. It is vibration proof, fire proof, vermin proof, requires no repairs or renewals, and reduces insurance rates.

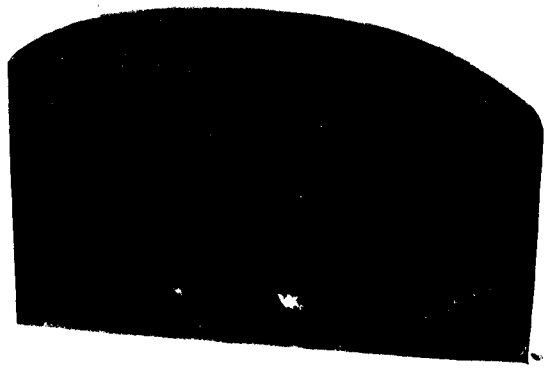
A special feature of reinforced concrete construction is the possibility of building practically the entire wall of glass, so as to afford a maximum amount of light, at the same time it is so rigid that even with the heaviest high speed machinery, the vibration is absolutely imperceptible.

The plastic nature of reinforced concrete permits of provision being made for pulley and shafting brackets and other permanent factory devices.

It is absolutely essential in the construction of reinforced concrete buildings, that the cement used be pure, uniform and of even strength. In every test to which **Canada Cement** has been subjected, it was found to give perfect satisfaction. The "Canadian Standard" associated with **Canada Cement** is not a meaningless phrase intended for effect. It represents a most vital and desirable quality. The standard which Canadian Architects and Engineers exact for building materials is notably high. We realize this, and in adopting this phrase as our trade-mark, we conscientiously accept all the conditions and obligations which its meaning implies. **Canada Cement** is always uniform in color, fineness and strength. Always **full weight,** 350 lbs. (gross). We promise deliveries when and wherever you want them sharply on the specified time. You will find our prices reasonable. May we not quote you on your next undertaking?

T COMPANY, Limited

- CANADA



Marble Exteriors

These have not become nearly so general in the Canadian cities, up to the present, as they are in Europe and the United States, partly because of the difficulty and delay in delivery.

These difficulties are, however, now entirely removed. Our beautiful light grey marble is being sold at a price which makes marble a material of general availability.

Our new plant, giving us a total equipment of 18 gang saws, besides circular saws, rubbing beds, planers, lathes, carborundum machine, pneumatic tools, electric cranes, etc., puts us in a position to finish 2,000 cubic feet of material every week.

The test of the material, made at McGill University, showed a resistance of 22,000 lbs. to the cubic inch, a strength equal to the best grades of Granite. The absorption test was very low.

We have put in several moderate sized exterior jobs, which have given the architects and owners entire satisfaction.

Our method is to furnish the material, all finished, ready for setting, f.o.b. car at any desired destination.

We are always pleased to make up prices.

The Missisquoi Marble Company, Limited

PHILIPSBURG, QUE. **CORISTINE BUILDING, MONTREAL**

85 SPARKS STREET, OTTAWA, ONT.

DISTRICT SALES AGENTS:

Eadie-Douglas, Limited, Toronto, Ont.
General Contractors Supply Co., Halifax, N.S. C. N. Barclay, Winnipeg, Man.
Bosse & Banks, Quebec, Que. Walker & Barnes, Edmonton, Alta.
James Robertson Co., St. John, N.B. Wm. N. O'Neil & Co., Vancouver, B.C.
G. R. Duncan, Fort William, Ont.

The magnificent Woodwork and Office Fittings, as shown in the above illustration of the Hydro-Electric Offices in the City Hall, Toronto, were designed and supplied by us. This Interior Woodwork job is considered one of the finest in Toronto, and is a fair sample of the work that we are prepared to turn out.

We are manufacturers of HIGH CLASS WOODWORK and INTERIOR HOUSE FINISH. We have the latest IMPROVED LUMBER DRY KILNS; newest and most UP-TO-DATE MACHINERY; GOOD MECHANICS under the best possible supervision.

This combination is absolutely essential to success in the manufacture of High Class INTERIOR HOUSE FINISH and FITTINGS.

Send us Blue Prints and Specification and let us quote you delivered prices.

We also manufacture **MIDLAND BRAND** HARDWOOD FLOORING in MAPLE, BEECH, and OAK, unexcelled in quality and workmanship.

GEORGIAN BAY SHOOK MILLS, Limited

MIDLAND, ONT.

ALEXANDRA WARE

Three Reasons
Why Architects Should Specify
"Alexandra" Ware

POINTS TO BE CONSIDERED

In specifying the bathroom fixtures, for the modern dwelling, the Architect must consider three important points: First, sanitation; Second, quality, finish and design; and, Third, cost.

SUPERIOR IN QUALITY

If Canadian architects, who have been specifying foreign-made bathroom fixtures, will compare "ALEXANDRA" WARE with that of any other made in the world, they will find that it stands head and shoulders above all others, in every point of comparison—quality, design, finish, construction and sanitary properties.

ELEGANT IN FINISH

"ALEXANDRA" WARE is porcelain enamelled both *inside* and *out*. It cannot craze or crack, and is made of specially prepared iron, with which is united a perfect *enamel of porcelain* in such a manner that the ratios of expansion and contraction are equal.

HYGIENICALLY UNEQUALLED

"ALEXANDRA" WARE is by far the most sanitary type of bathroom fixture on the market. *So-called Solid Porcelain* (porous fireclay products), when crazed, become *water-logged* and *unsanitary*, while "ALEXANDRA" WARE, made in two parts, provides a space of pure air, instead of unsanitary porous clay.

Our Cast Iron Enamelled Ware embraces every superior feature and improvement in design and manufacture of plumbing ware.

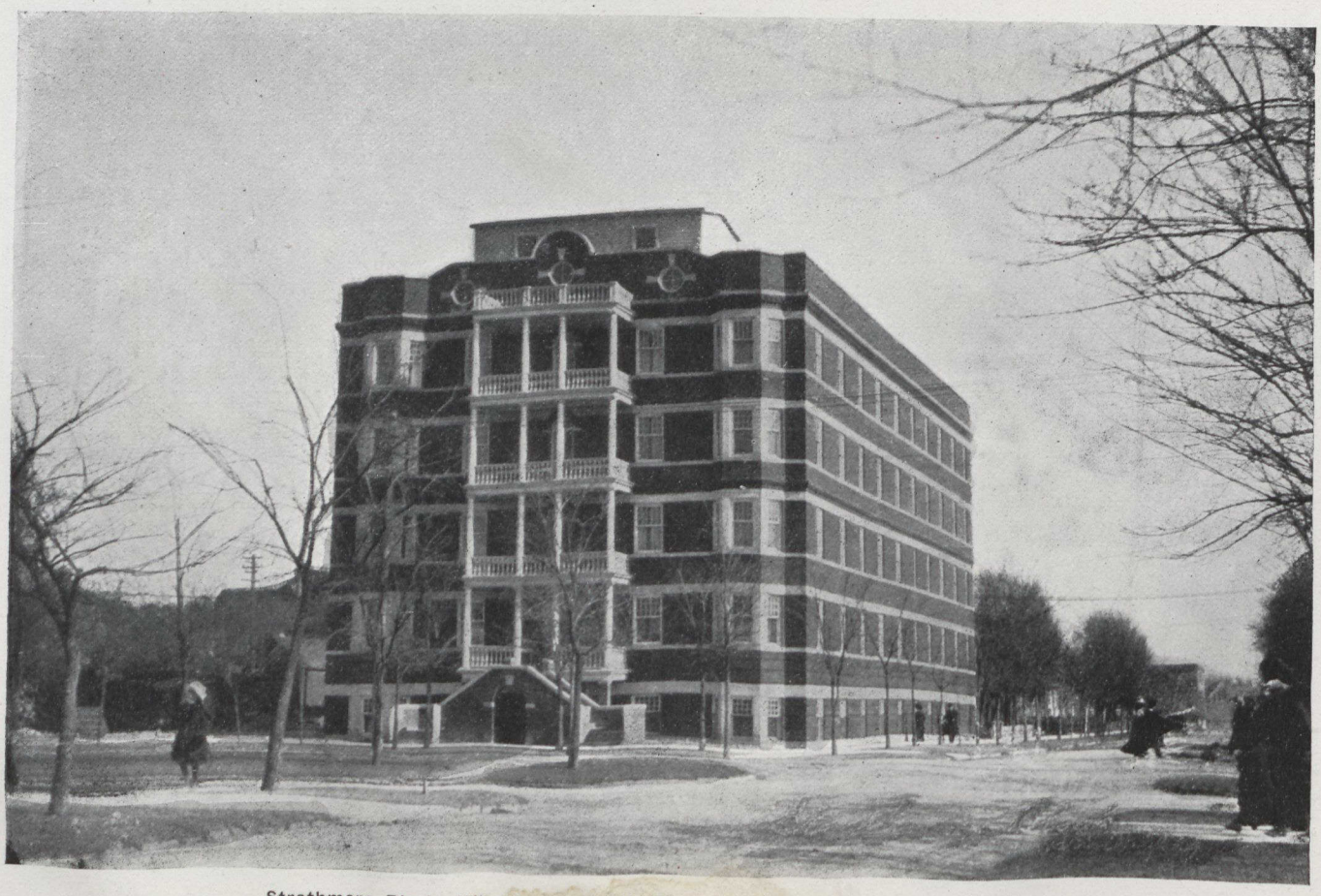
The Standard Ideal *Company Ltd.*

SALES OFFICES & SHOWROOMS:
TORONTO, MONTREAL, WINNIPEG.

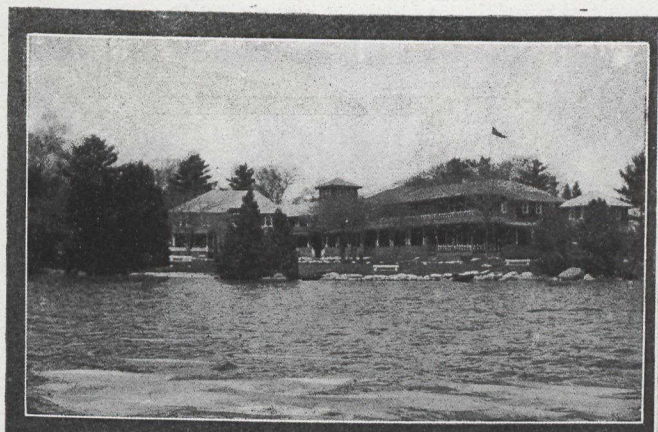
HEAD OFFICE & FACTORIES:
PORT HOPE, CANADA.

ALEXANDRA WARE

Quinte Hotel, Belleville, Ont. F. H. Herbert, Architect, Toronto. Eliott Bros., Plumbers, Kingston.



Strathmore Block, Winnipeg. W. W. Blair, Architect. R. H. Lear, Plumber.



The Plumbing Fixtures installed in these Buildings were Manufactured by the STANDARD IDEAL CO., Limited, at their plant in PORT HOPE, Canada.

Orchard Point Inn, near Orillia. W. H. Croker, Architect. Phillips & Co., Plumbers.

Men's Own Mission, Winnipeg. J. D. Atchison, Architect. Steam Power & Heating Co., Plumbers.

Madison Apartments, Toronto. Langley & Howland, Architects.

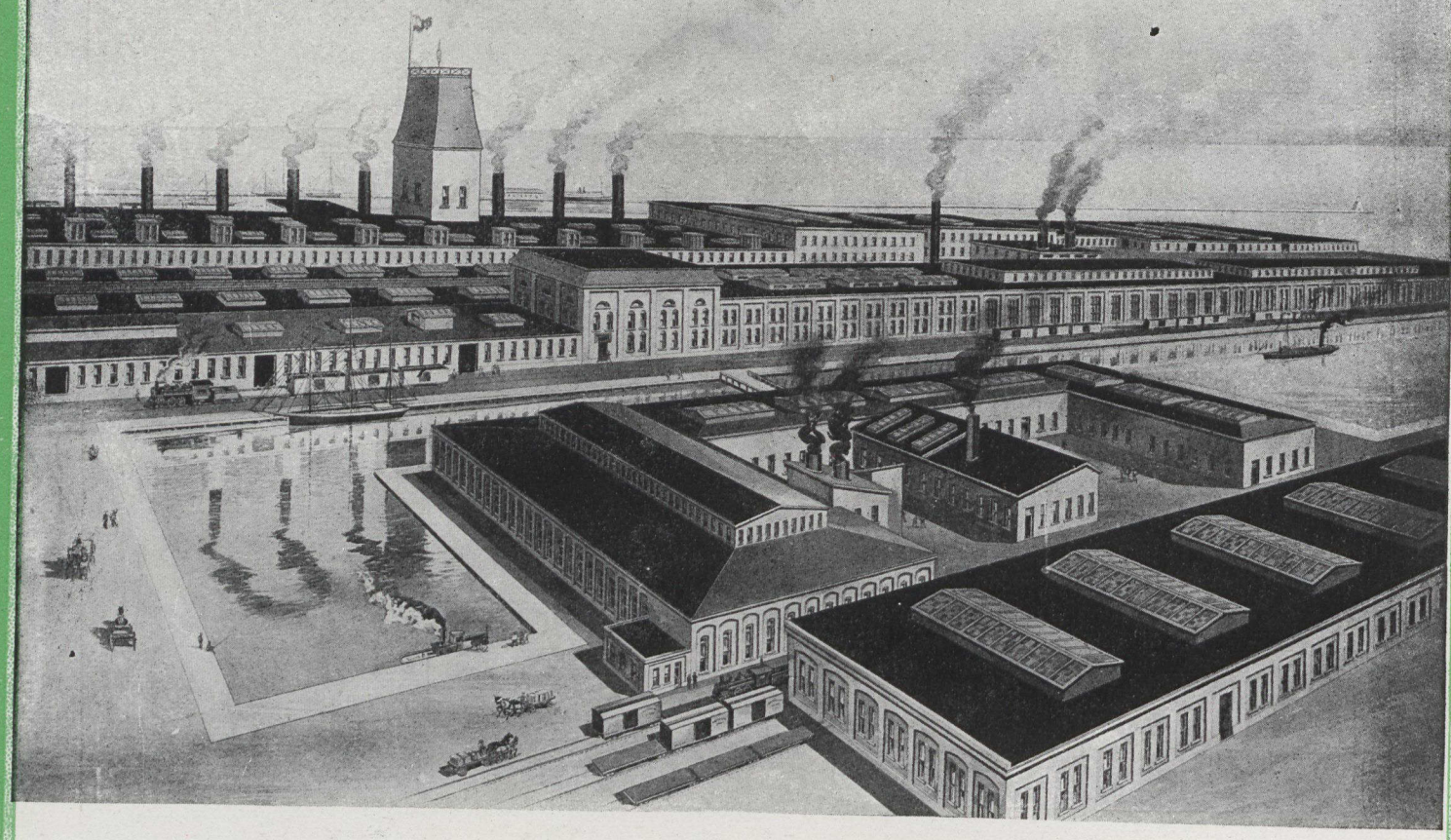
Wa Wa Hotel, Lake of Bays, Ontario. Ecclestone & Bates, Plumbers, Bracebridge, Ontario.

This ware is being specified by Canada's most prominent architects in all types of large residential structures, from the workmen's home—the modern apartment building—to the palatial hotel and exclusive Summer Resort.

We manufacture every type and character of plumbing fixture for every and any installation.

ALEXANDRA WARE

SUPERIORITY PURITY DURABILITY



OUR HEAD OFFICE AND FACTORIES AT PORT HOPE, CAN., WHERE "ALEXANDRA" WARE IS MADE.

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

HEAD OFFICE AND FACTORIES :

PORT HOPE, - - CANADA.

SALES OFFICES AND SAMPLE ROOMS

TORONTO. 115-121 King St. East

MONTREAL. 155 Notre Dame St. W.

WINNIPEG. 156 Lombard Street

ALEXANDRA WARE

CONSTRUCTION

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

Vol. 3 **TORONTO, NOVEMBER, 1910.** **No. 12**

CONTENTS

TERMS OF SUBSCRIPTION

Canada and Great Britain $3.00 per annum, single copies 35 cents. United States, the Continent and all Postal Union Countries, $4.00 per annum in advance. Entered as Second-Class Matter in the Post Office at Toronto, Canada.

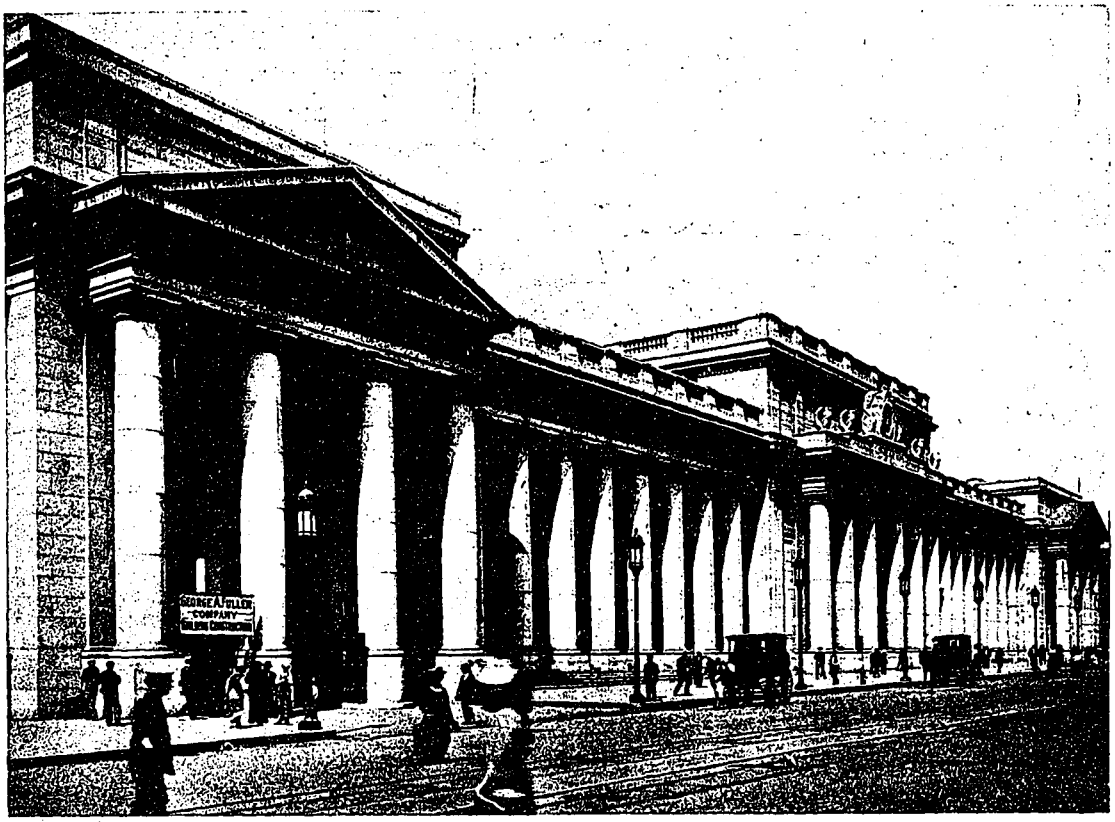
H. GAGNIER, Limited, Publishers

Saturday Night Building

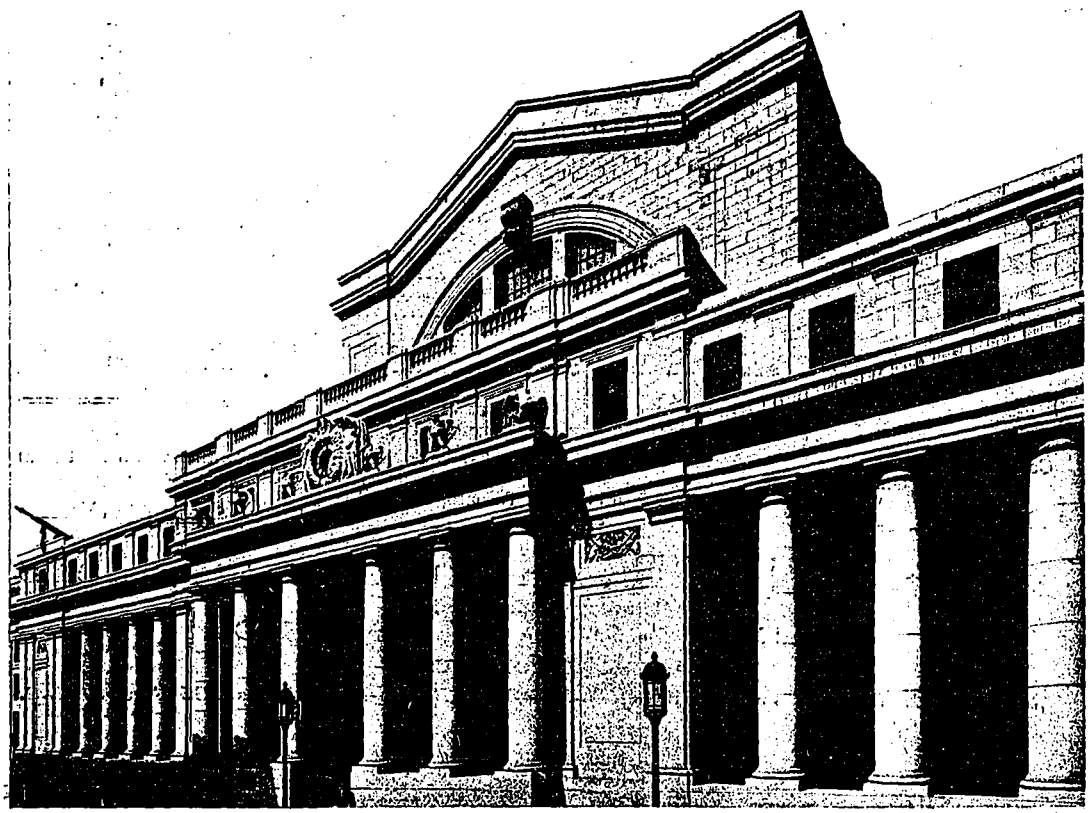
TORONTO - - - - - CANADA

BRANCH OFFICES

MONTREAL—Board of Trade Building. LONDON, ENG.—Byron House, 85 Fleet St. E.C.



Seventh Avenue Front, Main Façade, Pennsylvania Terminal. McKim, Mead and White, Architects.



Thirty-first Street Façade, Pennsylvania Terminal—Showing One of the Side Entrances. McKim, Mead and White, Architects. (See page 75.)

¶ Building Returns Show Country Active—September makes Substantial Increase over Same Month in 1909—Average Gain of 27 p.c. noted in twenty-two important centres.

ALTHOUGH THE TOTAL INVESTMENT as compared with the previous month is somewhat less pronounced, the building returns for September, submitted to CONSTRUCTION from twenty-two important centres, registers an average gain of 27 per cent. over the corresponding period of 1909. Taking into consideration the extraordinary strides that have been made throughout the spring and summer seasons, the advance noted is not only in itself satisfactory, but is a pretty good indication that nothing other than an active condition will obtain for the remainder of the year.

In the cities reporting, the aggregate total for permits issued amounted to $6,686,128, as compared with $5,254,291 for the same month last year, and in many cases the figures reflect a most prosperous condition of affairs. Of the five losses noted, three occurs in Ontario, viz., Ottawa, 6 per cent.; Peterborough, 52 per cent.; and Port Arthur, 84 per cent. Despite these reversals, however, the Province in general forged ahead substantially. Toronto's total of $1,332,525, representing a gain of 27 per cent., is by far the largest total registered in the Dominion, while Brantford's phenomenal advance of 403 per cent. is the second highest increase per cent. attained. London is also substantially ahead with a gain of 171, and an excellent showing was made at Hamilton and Fort William, which exceeded last year's figures for the month by 46 and 5 per cent. in order named. In all these cases the amounts noted are of gratifying proportions. Again, Windsor is ahead by a gain of 117 per cent. and Berlin comes to the fore with an advance of 75 per cent.; while Kingston, which does not send in comparative figures, reports activities to the extent of $17,576.

The largest proportionate growth for the month, however, was experienced in the Manitoba town of Brandon, whose mighty onward march reflects itself in a gain of 664 per cent. Work amounting to $437,675 was undertaken as against $57,200 in the same month in 1908. Winnipeg, of the same province, registers $804,400, and thus managed to slightly top its corresponding figures. Other Western increases are noted in the case of Prince Albert and Regina, which over-reach their last year total to the extent of 112 and 295 per cent. respectively. Calgary also witnessed a high state of development, and Victoria made a gain of 41 per cent. Calgary advance of 156 per cent. represent $439,635 more in new buildings than was undertaken in the previous September. Edmonton and Vancouver, however, were behind for the month, although Vancouver's loss is so infinitesmal as to practically amount to nothing, while Edmonton's decrease, which was 68 per cent., can be ascribed to the fact that improvements for the months were principally of a residential nature.

In the Eastern portion of the Dominion, Montreal, Sydney and St. John all turned the month to good account. Montreal's total of $993,386, representing a gain of 59 per cent., shows an investment that was only surpassed in one instance. Sydney and St. John increases are 37 and 8 per cent. in relative order.

Notwithstanding the lateness of the season, a large amount of prospective work is reported from many sections, and unless severe weather interferes with present plans, operations will be continued at a brisk pace up to the end of the year.

	Permits for September, 1910.	Permits for September, 1909.	Inc. Per Cent.	Dec. Per Cent.
Berlin, Ont.	$ 25,200	$ 14,350	75.60	.....
Brandon, Man.	437,675	57,250	664.49	.....
Brantford, Ont.	89,775	17,835	403.36	.....
Calgary, Alta.	720,372	280,737	156.60	.....
Edmonton, Alta.	159,763	505,199	.....	68.38
Fort William, Ont.	170,340	161,935	5.19	.....
Hamilton, Ont.	266,475	181,950	46.45	.....
Kingston, Ont.	17,576	.....	.....	.....
London, Ont.	148,950	54,890	171.36	.....
Montreal, Que.	993,386	620,955	59.97	.....
Ottawa, Ont.	160,950	172,100	.....	6.48
Peterborough, Ont.	21,865	46,485	.....	52.97
Port Arthur, Ont.	42,450	271,900	.....	84.39
Prince Albert, Sask.	63,665	30,000	112.18	.....
Regina, Sask.	209,750	53,000	295.75	.....
St. John, N.B.	17,200	15,800	8 86	.....
Sydney, N.S.	25,110	18,225	37.77	.....
Toronto, Ont.	1,332 525	1,046,065	27.38	.....
Vancouver, B.C.	740,715	744,530	.....	.52
Victoria, B.C.	199,686	140,935	41 68	.....
Windsor, Ont.	38,300	17,600	117.61	.....
Winnipeg, Man.	804,400	802,950	.14	.....
	$6,686,128	$5,254,691	27.24	....

¶ The Labor Question—Montreal Architect Advocates formation of Canadian Union—Thinks Profession should Aid in Solution of Difficult Problem.

THE LABOR QUESTION in the building trades has in the last few months, become a real live one, and it now looks as if we were at last going to have a Canadian Federation of Labor. For many years, our labor unions in Canada have been dominated by American officials, who are not and canot be in sympathy with conditions as they exist here. In the case of a coal strike in the West, Canada was subjected to the indignity of sending a Minister of the Crown to Indianapolis, Ind., to try to get Canadians to go back into the mines and provide the coal that should keep the West from freezing up. Recently a strike occurred (or a lock-out) in Winnipeg. The whole affair was conducted by men who are not citizens of our country and the situation was dominated by United States labor

officials. In Montreal there has been a strike in the carpenters' section of the builders' trades unions that was called and is conducted by American labor officials. This condition, which seems at this time to be fairly prevalent in Canada has caused employers to look about for some fair and reasonable solution of this unfortunate problem. That solution is evidently the formation of Canadian unions controlled, financed and operated by Canadians. President F. S. Baker, of the Royal Canadian Architectural Institute of Canada, made some very direct remarks along this line at the recent assembly in Winnipeg of the R. A. I. C., and in view of conditions, the following letter from Mr. Gardiner, of Montreal, is most interesting:

EDITOR CONSTRUCTION:

Dear Sir,—The Labor Question is undoubtedly one of the most important questions before the country at the present time, and if the Architects' Associations can do anything towards placing the building trades on a more satisfactory footing the whole community should be benefited thereby.

The architects certainly have a great deal to gain if labor can be placed on a more equitable and solid footing and in such a manner that there will be every inducement for the mechanic to work well and intelligently.

The question, then, for the architects to consider is the best method by which this can be procured. If the Provincial Associations could all agree upon a definite plan then this plan could be placed before the Minister of Labor and possibly some outcome, that would be satisfactory to all parties, could be obtained.

As a preliminary suggestion it might be proposed that the first step would be to form the building trades into a Canadian union, then to have this union incorporated, then to form a body of say five men to act as arbitrators to settle all disputes between the union and the employers, each of the arbitrators to be satisfactory to both parties, and both sides binding themselves to abide by all decisions of the majority.

By this means the loss of time by the men while a dispute is being settled is obviated (as the men work during the time of arbitration) and the building trades are not stopped, as they are by the present method, to the detriment of all parties concerned.

It is also proposed that the men belonging to the union should be graded and given certificates according to their qualifications. Such qualifications being determined upon by a board of examiners approved by both parties.

This would surely give a stimulus to the men to work from a third class to a second class certificate, and from a second class to a first class certificate, as the men would be paid according to their certificate. It would make the men ambitious to do better work and not, as with the present system, tend to lead the good men down to the level of the man with the minimum wage.

If these four (4) things, viz.: A Canadian union of all trades, incorporation of the union, arbitration of all disputes, and the grading of the mechanics into three classes, to be paid according to the certificate held by each, could be procured, would not the labor question in regard to the building trades be on a much more equitable and sound basis for both sides than it is at present, and if the architects from Vancouver to Halifax consider it to be the right solution of a difficult problem, why not say so and get the Dominion Institute to place our case before the Minister of Labor and the various Builders' Exchanges and unions in the Dominion?

The above is merely placed before your readers as a suggestion, and it would be interesting to hear other sides of a many-sided problem.

Yours very truly,
J. RAWSON GARDINER.

Extraordinary Conditions of Ontario Government House Competition—Result Worked Out as Predicted—Whole Competition a Deplorable Farce.

THE RECENT COMPETITION for a new Government House for the Province of Ontario, which has just been concluded, is, to say the least, one of the most extraordinary architectural competitions ever held in the Dominion of Canada.

The conditions of the competition were severely criticized by prominent members of the profession, together with the president of the Royal Architectural Institute of Canada. Believing, however, in the face of these criticisms, that the Government of the Province of Ontario would be inclined to deal fairly with the profession, a number of architects (presumably about twelve) submitted plans in this competition.

We reproduce below a complete copy of the general conditions.

1. The Government of the Province of Ontario propose to erect a residence for the Lieutenant-Governor, a cottage for the Gardener, a cottage for the Steward, a stable and coach house, conservatories and greenhouses, upon lots 102-118 on the north side of Bloor street east, in the City of Toronto, extending to Rosedale Valley Road.

2. The cost of the whole of the buildings, and work upon the grounds, roads and walks is not to exceed the sum of two hundred and twenty-five thousand dollars ($225,000.00). The competing architects are to furnish estimates giving the cost of each building, first, if the outside walls are constructed of stone and brick, and, second, if faced with grey stone.

3. The competition to include the placing of the various buildings on the site and laying out of the walks and roads.

4. Only architects who have been resident in Canada for one year or more will be allowed to compete. Designs that may be submitted by others will not be considered.

5. The competitive designs will be limited to sketches in ink. All drawings of the buildings, including plans, elevations and sections to be made to a scale of one-eighth inch to one foot. Brush work in India ink will be allowed on the elevations. Color may be used on plans and sections to designate material. The plan of the grounds to be drawn to a scae of 16 ft. to 1 inch.

6. Perspective drawings will be furnished at the option of the architects, to be line drawings on the same scale as the elevations, shaded with India ink, and must be accompanied by a perspective diagram. A bird's eye or isometric view may also be submitted, showing the arrangement of the buildings, walks, roads and grounds. A descriptive memorandum in typewriting must be accompany the drawings.

7. No motto or distinctive device is to be attached to the drawings or memorandum.

8. Each competitor will send in his name in a sealed envelope without any distinctive mark. The judges will number the envelopes and drawings as the packages are opened.

9. Drawings are to be made on white paper, to be sent packed in folio, and to be shipped by express prepaid, addressed to the Hon. J. O. Reaume, Minister of Public Works, Toronto, Ontario. All designs must be in the hands of the Minister of Public Works on or before the fifteenth day of July next

10. Subject to the foregoing instructions, conditions and requirements, the following premiums are offered:

For the best design $1,000.00
For the second to the best design ..... 500..00

The two prize designs will become the absolute property of the Ontario Government. The drawings of the unsuccessful competitors will be returned to them within a reasonable time.

11. All designs submitted in the competition will, with the consent of the owners, be publicly exhibited after the award is made.

12. The following is a schedule of the dimensions required or suggested:

Residence—Basement: To provide for heating apparatus, coal vaults, wine cellar, store rooms and cold storage.

Ground Floor: Vestibule; cloak room; hall, containing about 1,400 ft. floor space, including space for staircase; reception room, floor space about 500 ft.; drawing room, floor space in all about 1,300 ft.; library, on either ground or first floor, floor space about 450 ft.; state dining room, floor space about 900 ft.; private dining room, floor space about 250 ft.; breakfast room, floor space about 250 ft.; Lieutenant-Governor's office, floor space about 300 ft.; secretary's office, floor space about 170 ft.; fireproof vault, floor space about 50 ft.; ball room, floor space about 3,500 ft.; kitchen, floor space about 550 ft.; scullery, floor space about 270 ft.; butler's pantry, serving pantry, refrigerator room, china room, butler's room, servants' dining room, servants' sitting room, boot room, store room, back stairs, conservatory and greenhouses.

First Floor: 12 bedrooms, 3 dressing rooms, 4 bath rooms, 4 w.c.'s, billiard room, 2 linen rooms, 1 sun room.

Second Floor: 12 bedrooms, 2 bath rooms, 2 w.c.'s, store room, sewing room, 12 servants' bedrooms, 2 servants' bath rooms, 2 servants' w.c.'s, elevator from ground floor to second floor.

Gardener's Cottage and Steward's Cottage—Separate buildings, to be in two stories, seven rooms in each building.

Coach House—To provide accommodation for two double and two single rigs, with space for cleaning; harness room, three living rooms and bath room for coachman.

Stable—To provide accommodation for four single stalls and two box stalls; loft to be used for hay and feed.

Garage—To provide accommodation for two large automobiles.

J. O. REAUME,
Minister of Public Works.

Department of Public Works, Ontario,
Toronto, May 12th, 1910.

The points objected to most strenuously by members of the profession are as follows:

1st. That no statement was made that would commit the Government to the acceptance of the plans awarded the first prize.

2nd. That no statement was made as to whom the assessors in the competition should be.

3rd. That no statement was made that would justify an architect in believing that the man who was to assess his plans was professionally or technically competent as an assessor.

The result has been very much as was anticipated by some of the more prominent members of the profession who refused to enter the competition. It is true that a first prize of $1,000 has been granted to one architect, the

second prize of $500 to another, and that all the plans have been sent back to their authors, but we are anxious to know who is going to design the new Government House. We also would like to know who were the assessors of the several plans submitted to the Government under this unfortunate programme. Again, we would like to know who the technical advisor of the Cabinet was who evidently recommended that the Provincial Government architect should proceed to design the Government House. It occurs to us that it is high time that Canadian architects get together and work out some arrangement whereby a committee on competitions may be created, that would advise the profession as to whether the various programmes for competitions are in accordance with accepted rules. It is extraordinary that twelve architectural firms should each go to the expense of $500 in the preparation of plans for an individual project for the Province of Ontario at the solicitation of the Government, and receive in payment $1,500 (in $1,000 first prize and $500 second prize). If the profession were assured that the prize winner would secure the commission to build the proposed structure it would be somewhat different, but here's a case where twelves architects compete one with the other at an expense to themselves of at least $500 each, for prizes amounting to $1,500, without any assurance that they would secure the commission to build the proposed building. This unfortunate condition exists only because Canadian architects are not sufficiently positive in asserting their rights as professional men, and conditions of this kind will re-occur just so long as architects see fit to enter into competitions, the conditions of which are unfair to themselves, to the profession and to the community generally.

We reproduce the complete conditions of the competition only to show how specifically the profession was instructed as to what the buildings should be and as to what they should contain. It would appear that in so far as the Government has seen fit to hold the architect down to a definite programme, it should have, reasonably, intended to accept the design given first prize. Under conditions of this kind, it is inconceivable that a doctor or a lawyer would submit to the treatment which has been tendered the architectural profession. One of the most pronounced weaknesses of architects is that of submitting to non-professional treatment, through the members of the profession being timid in asserting their individual and professional rights, for the reason that they might offend some of the individuals or interests which they have served or aimed to serve. If an outrage of this nature had been perpetrated upon the legal or medical professions they would have had no compunction about the proper assertion of their individual and professional rights. We say again that it is high time that architects (if they aim to be professional men) should demand professional recognition. This competition is a glaring instance of the architect's inability (or lack of inclination) to make his private interests subservient to the integrity and ethics of his profession.

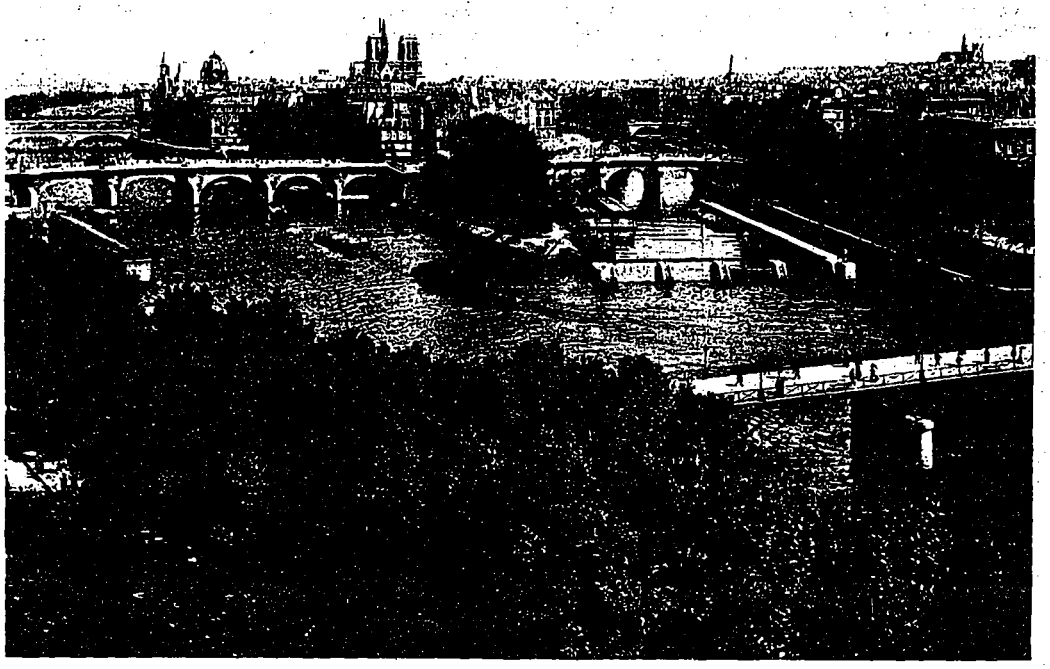
¶ The British Columbia Association of Architects—Provincial Organization now in Process of Formation—Will seek "Registration," and Affiliation with R.A.I.C.

THE EFFORT which is now being made to effect an organization of British Columbia architects constitutes the welding of the final link in a complete chain of provincial associations. Following as it does the recent step of Saskatoon in this direction, the move is not only a timely one, but one that should effectually unite with the prevailing and growing spirit to conserve Canadian interests, and to place the profession of architecture in the Dominion on a more dignified and ethical basis.

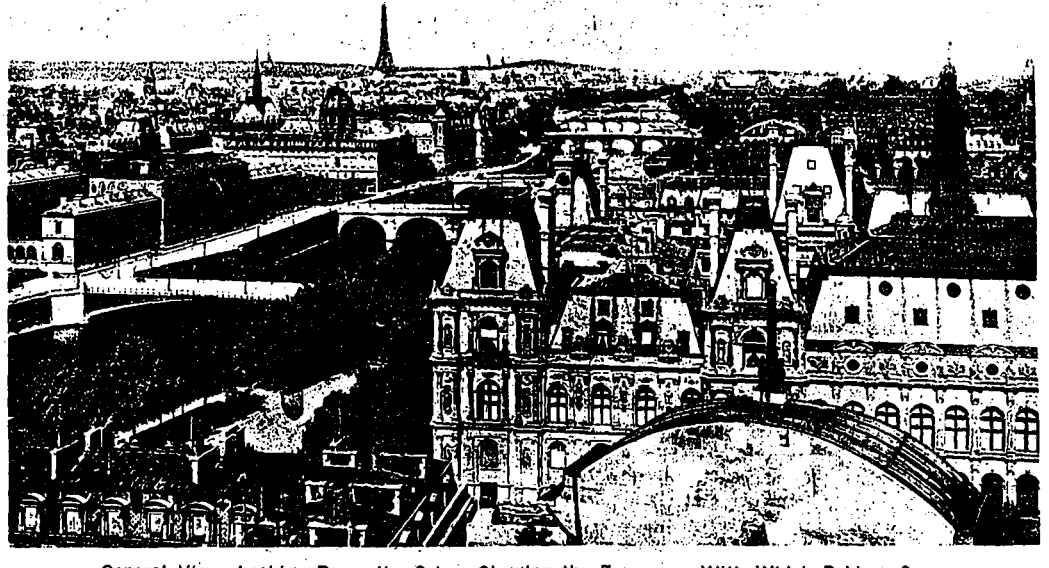
There is possibly no section of Canada that has been more seriously hampered and handicapped by outside influences than the Pacific Coast district; nor any part of the country where United States architects have more boldly usurped the rights of Canadian designers than in the particular province in question. Much of the blame for the condition that has existed, and also for certain other discrepancies which have crept into the practice of architecture, through the unprofessional conduct of some few designers, can be ascribed almost wholly to the lack of proper organization. The proximity of British Columbia to Seattle and other large western towns in the United States, especially under the existing state of affairs, makes it a most fertile field of exploitation for designers and contractors from across the line, and annually thousands upon thousands of dollars, which should remain in Canada, pass into the hands of our neighbor to the south. That an organization, such as is proposed in the British Columbia Association, will do much to remedy this condition, and work a vast amount of good in promoting the welfare of the profession and the contracting and commercial interests of the province, is all too obvious to require further comment here. The importance of the province geographically; its mild climate and wealth in natural and material resources, are a sufficient guarantee that it will prove to be for some years to come, one of the most active fields in architectural and constructive work on the American continent. For this reason, it is double essential that some effort should be made to organize the architecutral forces in that province so as to perpetuate the best traditions governing the conduct of the profession, and by a spirit of unity and cooperation reach the highest that is to attained in the pursuit of art, and that measure of protection that is neecssary for the best interest of things Canadian.

As we understand it ,the new association, which is to be known as the British Columbia Association of Architects, will seek the enactment of a registration or a licensing bill such as was recently passed in Manitoba, and also affiliation with the R.A.I.C., from which body the proposed membership of the new association is now awaiting a draft of the uniform constitution proposed at the Winnipeg Assembly. As is the case in the early experiences of all associations, the formation of the British Columbia body has been beset by certain indifferences that has made organization difficult; but this apathy, however, is being gradually overcome, and due to the self sacrificing efforts of the promoters, and especially Mr. S. M. Eveleigh, who is acting in the capacity of Hon. Secretary, what might come to be ultimately regarded as the key stone in the arch of architectural unity in Canada, is now in process of being shaped. It is to be sincerely hoped that the efforts of the organizers will be met in every way with the success they deserve, and that the new association will in the near future be an active and potent force in the architectural development of the important province whose interests it is destined to serve.

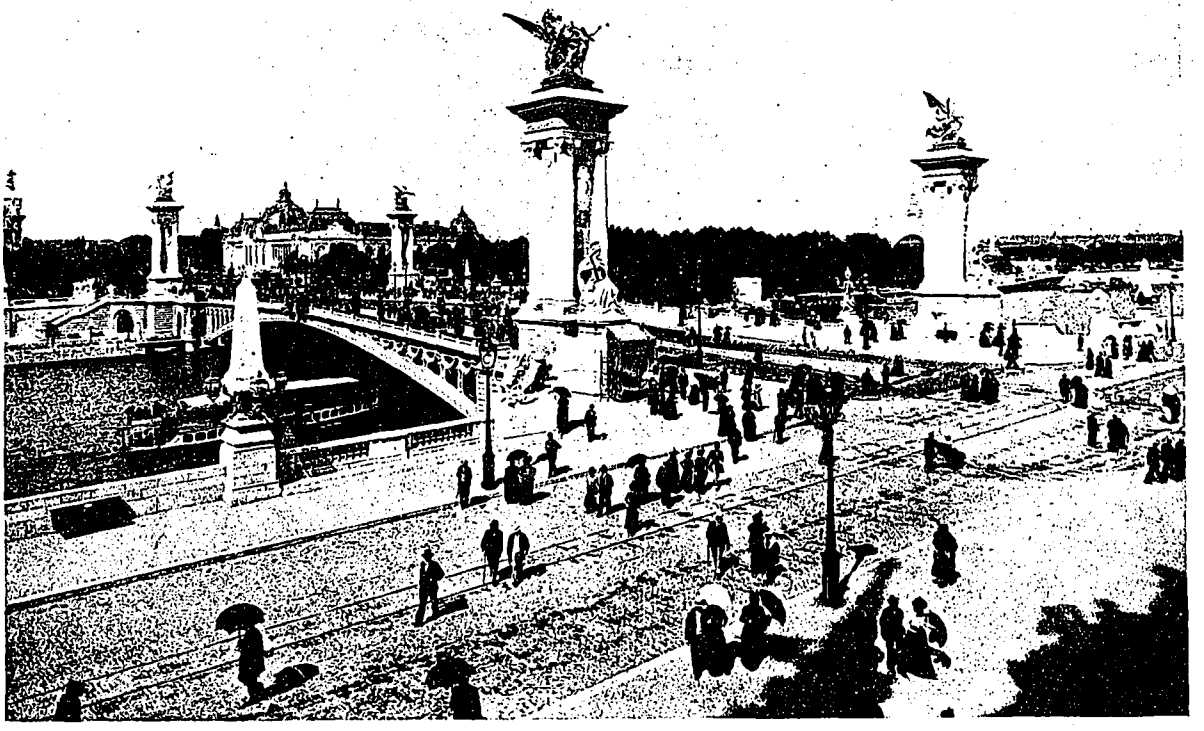
THE EDISON CONCRETE HOUSE, of which so much has already been said, will be seen for the first time at the cement show to be held in Madison Square Garden, New York, December 14-20, together with the complete set of molds to be used in its erection. Adding interest to the attraction is Mr. Edison's announcement that he will personally superintend the carrying out of the work. The house to be installed will be 25 x 30 feet, and is of the type that are to be for $1,200 in gross lots. The chief part of the invention is Mr. Edison's concrete mixture, which is reported to flow like water, holding the aggregates in suspension and securing a uniform distribution of the concrete throughout the molds. This apparent overcoming of the laws of gravity will be of unusual interest to concrete men all over the world. The completed house and the molds in which it has been cast will undoubtedly prove one of the big features of the show.



General View of the Older Portion of Paris on the Island Known as the Cite, Showing Pont Neuf, built 1578-1604, with a Portion of Pont des Arts in the Foreground, and Pont Au Change, Pont Arcole and Other Bridges in the Upper Left of Picture.



General View, Looking Down the Seine—Showing the Frequency With Which Bridges Occur.



Pont Alexander III.—Completed in 1900 by Resal and Abby, the Engineers, and Regarded as One of the Most Beautiful Bridges in the World.

THE MUNICIPAL BRIDGES OF PARIS

By R. E. W. HAGARTY, B.A.Sc.

A plea for the development on the American Continent of that Condition of Constructive Excellence which combines Art with Utility.

PARIS—the gay, beautiful, and historic capital of France—is geographically divided into two great parts by the river Seine. Popular parlance designates these divisions respectively as the "Right Bank" and the "Left Bank," although the city limits extend several miles in each direction from the river. The older portion of Paris is situated on a large island known as the Cité; but, in a general classification, may be included in the "left bank."

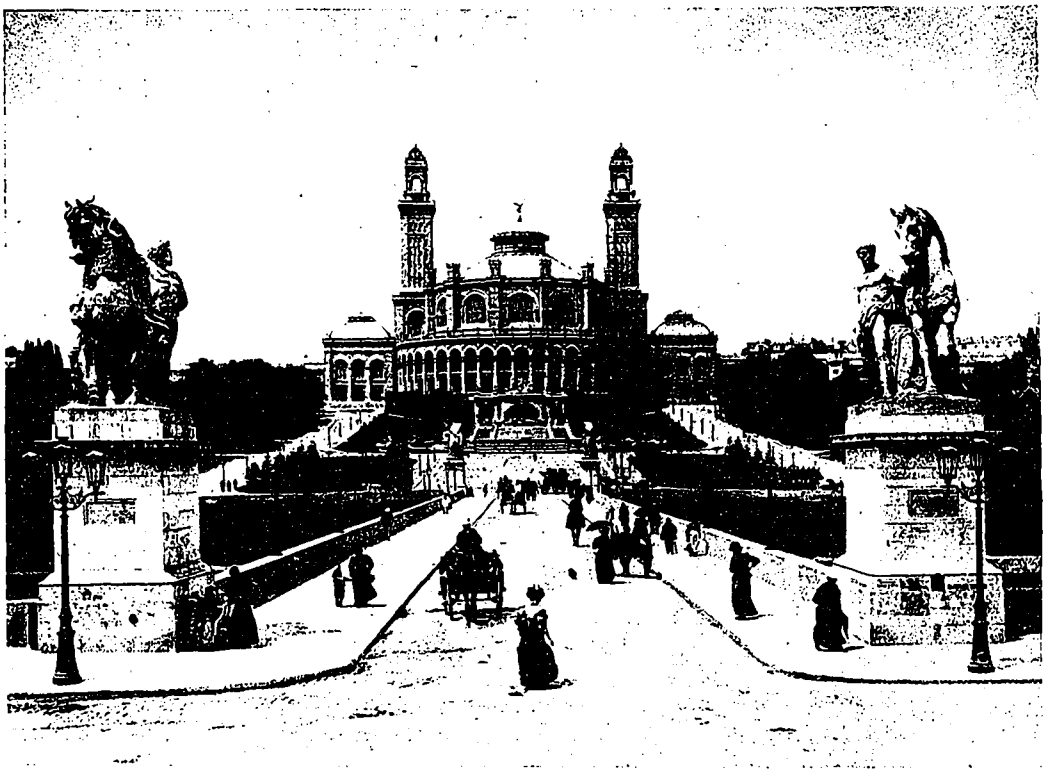
In the upbuilding of a large city, natural boundaries and dividing lines frequently have considerable influence in the distribution of the population, according to social, political and commercial distinctions; and such has been the case with the big French metropolis.

On the right bank may be found modern business and fashionable districts of the city, which include the principal boulevards, handsome streets and squares, most luxuricus hotels, cafés and restaurants, the best theatres and the most attractive stores, etc. Here, also, are situated the Louvre, the celebrated gallery of art; the Champs Elysées, the Hotel de Ville, the Trocadéro, l'Opéra, Palais-Royal, Bibliotheque Nationale, the Bourse, Banque de France, and other financial buildings and numerous other places of interest.

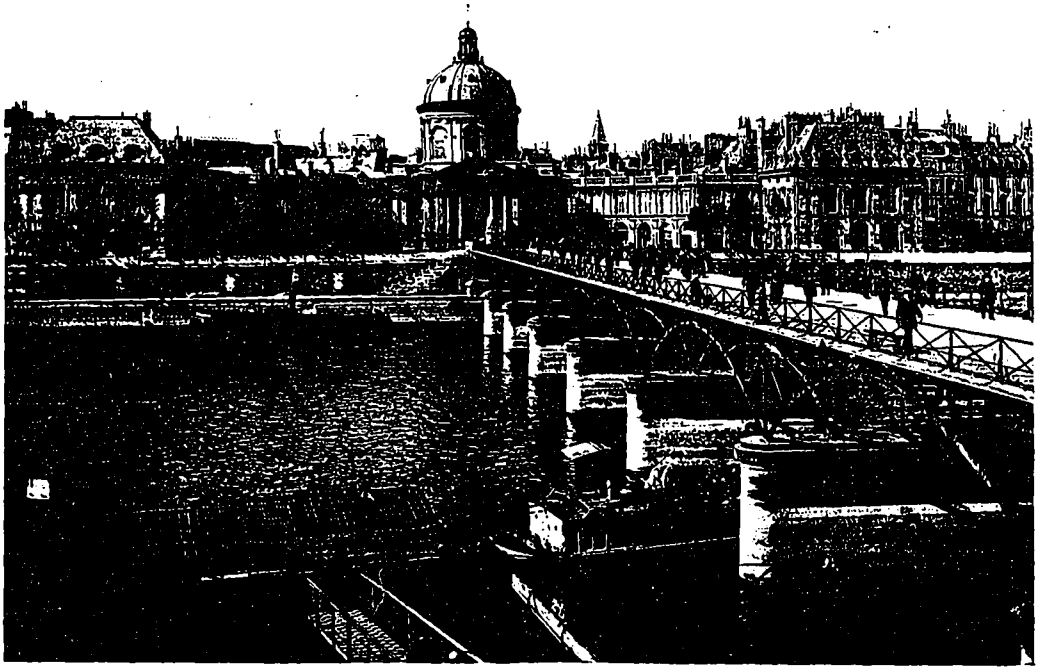
On the left bank and in the Cité are located those sections varying from the slums, the Latin Quarter, and the lower grade hotel districts to the middle class boarding houses, etc.; although, at the west-end are several ministries, embassies, and a number of large military establishments. Also, on the left bank one may find the famous Panthéon (Napoleon's tomb), the Jardin des Plantes and the Hotel des Invalides.

Strange to say, however, in spite of the fact that the river Seine intercepts nearly equal portions of the city, yet the traffic conditions from one bank to the other are noticeably different from those of certain other centres of population similarly situated as regards the presence of one or more large rivers.

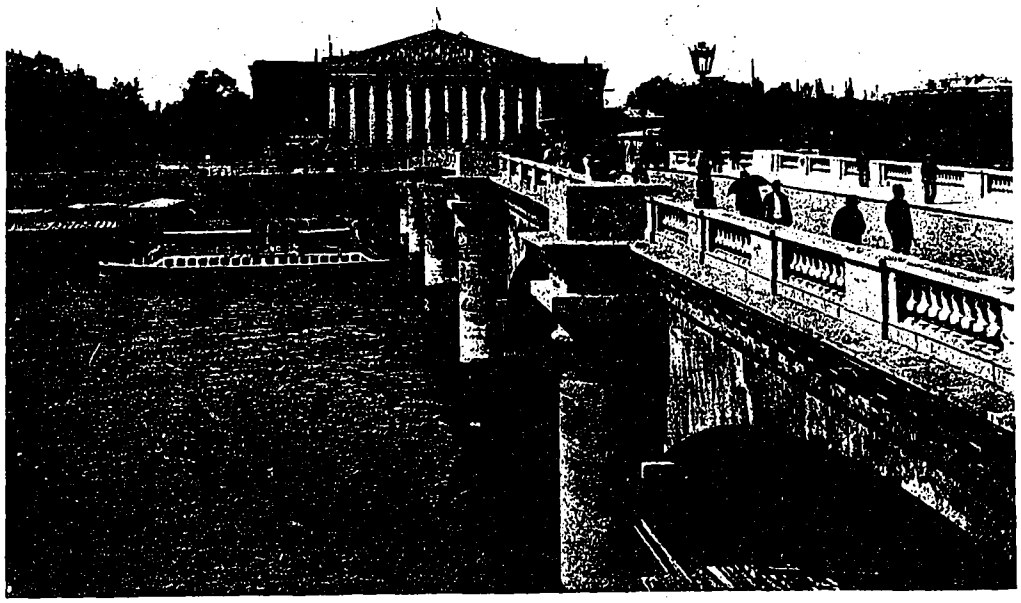
For example, New York's millions find three or four main arteries sufficient to accommodate the intercourse with Brooklyn, while the same condition exists to a less marked degree in London; but, in Paris, one finds that a bridge is seemingly the necessary adjunct to every street heading toward the river. In a distance of less than ten miles one is surprised to find some twenty-six bridges. It is obvious, therefore, that the traffic conditions in Paris are amply provided for, although the number of bridges is by no means in excess of the requirements.



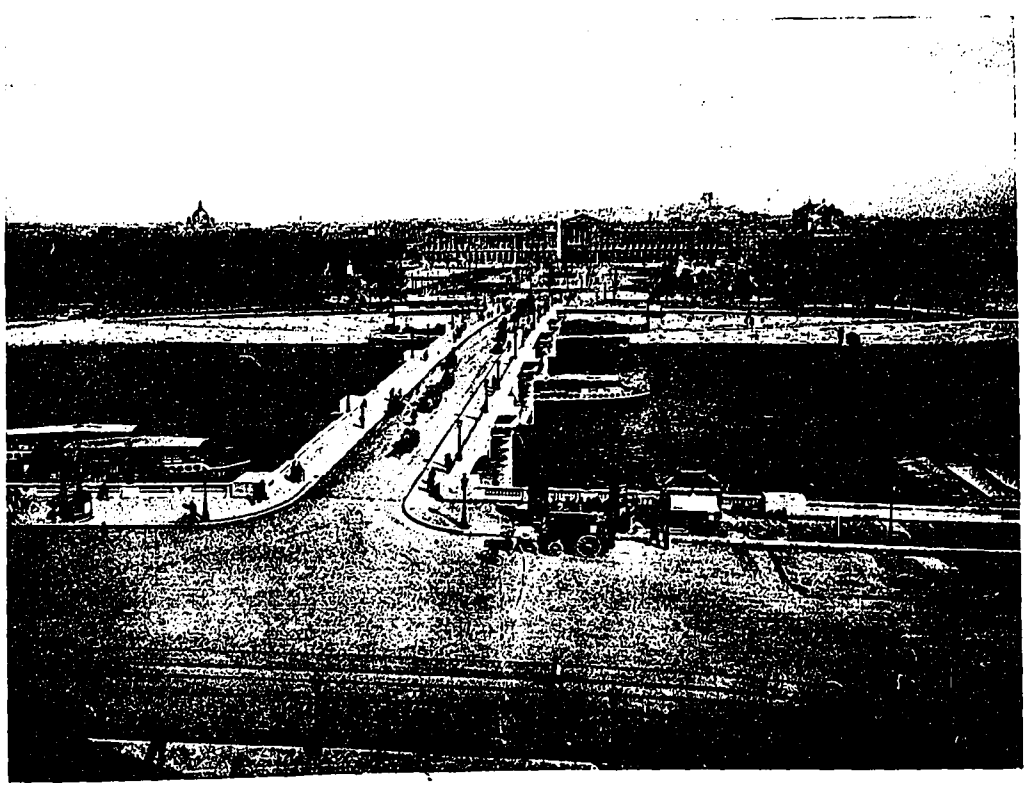
Pont d'Iena—Showing the Continuous Roadway Effect, Which is a Prominent Feature of Parisian Bridges.



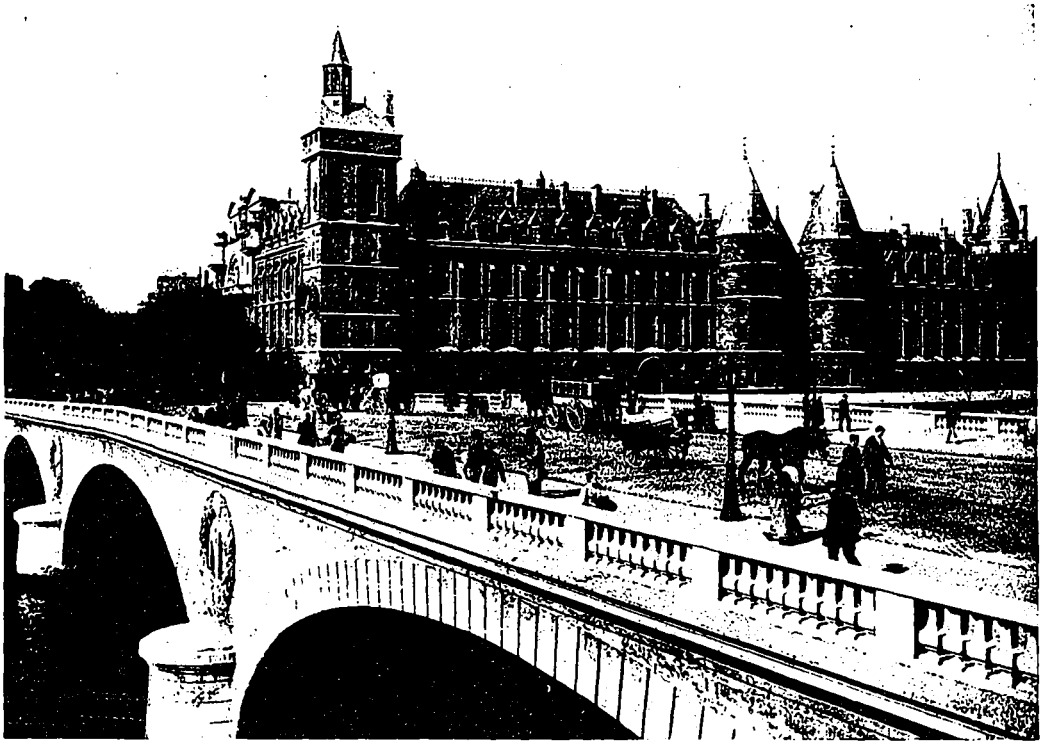
Pont des Arts—Built in 1802-04. This Bridge is Built of Cast Iron and is Used by Pedestrians Only.



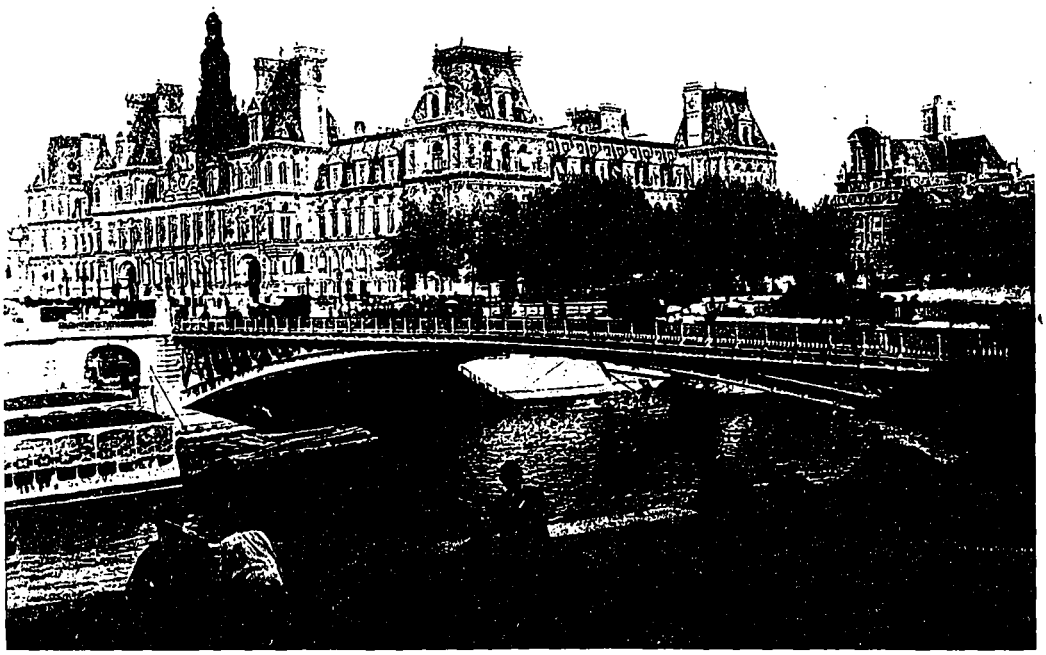
Pont de la Concorde—Built 1787-1790, the Upper Portion Being Constructed from Stones Taken from the Bastille.



View Along Same Bridge, Showing the Magnificent Approach to the Place de la Concorde.



Pont Au Change—Although One of the Most Ancient Bridges in Paris, It was Entirely Rebuilt in 1858-59.



Font d'Arcole, As It Appears Looking from the Cite Toward the Hotel de Ville.

There are several other features worthy of notice in considering the various phases of "Parisian bridges." Among these is the historical importance which is attached to certain of the older structures. The native Parisian tells with considerable pride of the wonderful and interesting deeds committed in the vicinity of certain bridges, or of certain other bridges which commemorate the valiant acts of bygone heroes. Thus the fact is evinced that the average citizen regards "the bridge" as something beyond a mere commercially necessary evil, a tax-raiser or a political gratuity.

This spirit of public interest is further exemplified by the marked presence of art and architecture. Artistic design is so skilfully combined with engineering accuracy as to supersede entirely the crude apparency of the latter.

The mere mention of this feature is undoubtedly sufficient in itself except to say that the same marvellous aesthetic development is probably the greatest object lesson the bridges of Paris have to teach the architects and engineers of our own continent.

Referring to the engineering features of bridge construction along the Seine, there are certain points worthy of notice.

When a Canadian or American engineer visits Europe he is surely impressed with the prevalence of the arch in all types of construction. "Les Ponts de Paris" are practically all of this kind, from the massive gray stone circular arch of the sixteenth century to the cast iron bridge of recent years and the neat appearing steel parabolic structure of the present day.

One hesitates to give specific reasons for this condition; but, it might be proper to infer that the inborn sense of beauty and early schooling in classic works of art of the average European might be in some way accountable for the general adoption of the arch type for artistic municipal bridges.

Another striking feature which is especially noticeable in the more recently constructed bridges, is the clever effect successfully attained in designing the structure so as to give the entire bridge-crossing an appearance exactly continuous with that of the adjoining boulevard.

To illustrate: A tourist motoring in Paris is alleged to have asked of his chauffeur:

"Est-ce que nous avons traversé la Seine?"

And the latter replies:

"Eh, Mon Dieu! vous avez passé le Pont d'Iéna depuis cinq minutes, Monsieur."

Investigating further, one might notice that although the more elaborate structures are built of cast iron or steel, yet, when the engineer views the austere, cemented stone arches which have withstood the wear of the water for several centuries, it is evident that the longevity of the masonry bridge must not be neglected as a factor in modern bridge designing.

Although a complete description of the architectural and engineering features of Parisian bridges is not within the scope of the present article, yet the foregoing remarks may perhaps be enhanced somewhat by a few facts concerning the more important of the structures.

Pont de la Concorde.

We might refer first to the Pont de la Concorde, which crosses the Seine from the Place de la Concorde to the Chambre des Députés. This bridge was built by Perronet in 1787-1790. The upper portion of the bridge was constructed with stones originally taken from the Bastille. The piers, which take the form of half columns, were adorned with a number of statues, which have been removed to Versailles.

Pont Alexandre Trois.

At the end of the Avenue Alexandre-Trois, and leading to the Esplanade des Invalides, is situated the Pont Alexandre Trois.

Not only is this bridge the largest and handsomest bridge in Paris, but it is generally conceded to rank as one of the most beautiful bridges in the world. The foundation stone was laid by Czar Nicholas II. in 1896, and the bridge was completed in 1900 by Résal & Alby, the engineers, and Cassien-Bernard & Cousin, the architects. The bridge consists of a low rise steel arch 352 feet in length by 130 feet in width. At each end is a massive pylon 75 feet in height, surmounted by gilded groups of Pegasi led by Fame, by Frémiet (right bank) and Granet and Steiner (left bank); these are flanked by groups representing France at different epochs of history, by Lenoir and Michel (right bank), Coutan and Marqueste (left bank), and by lions led by children (Gardet, right bank; Dalou, left bank). The allegorical groups in the centre of the arch are by Récipon; on the downstream side are the arms of Paris; on the other those of St. Petersburg.

Pont des Invalides.

Farther on is the Pont des Invalides, originally built in 1827-29, and rebuilt in 1854-5. This bridge is adorned with Victories by Diéboldt and Villain.

Pont de l'Alma.

Another structure of considerable importance is known as Pont de l'Alma, which was built in 1856 and named in memory of the Crimean War. The buttresses are embellished with handsome figures of a zouave and a private of the line by Diéboldt, and an artilleryman and a chasseur by Arnaud.

The recent flood of the river Seine, of which the world's newspapers gave vivid accounts, did not have the damaging effect depicted by certain journals. The only bridge that was seriously affected by the high water was the Pont de l'Alma. The level of the water assumed a higher elevation than the crown of the arch of this bridge. Hence the structure was temporarily converted into a dam with all the consequent stresses for which the bridge was probably not designed.

Pont d'Iéna.

Somewhat below the middle of the Parc du Trocadéro one finds Pont d'Iéna, constructed 1809-13 by Lamandé, to commemorate the victory after which the bridge is named (1806). The bridge was widened by 33 feet in 1900. The principal decorative features of the bridge are a series of figures of eagles. There are also four colossal horse-tamers, a Roman, a Greek, an Arab and a Gaul. The surface of this bridge is a notable example of the through-street effect which is a prominent feature of these bridges.

Pont de Passy.

The Pont de Passy crosses the river at the upper end of the Allée des Cygnes. It was built in 1903-6 in place of the old Passerelle de Passy. The bridge has two decks, the upper one being used by the Metropolitan Railway of Paris (the underground). One may find on the bridge several large statues and reliefs; also four splendid groups (by Michel) representing the "Blacksmiths of Industrial France" and the "Boatmen of the Seine."

Pont-Viaduc d'Auteuil.

Situated at Auteuil, one of the suburban districts of Paris, is a large bridge and viaduct known as the Pont-Viaduc d'Auteuil. The bridge consists of 234 arches, and upon it is situated the immense viaduct of the Chemin de Fer de Ceinture (underground belt-line of Paris). The bridge is constructed of masonry throughout.

Pont Neuf.

At the west end of the Cité is a bridge 1,080 feet long and 75 feet wide, crossing both arms of the Seine, known as the Pont Neuf. In spite of the remarkably good condition of the masonry in this structure, one is surprised to find it the oldest bridge in Paris. It was constructed in 1578-1604, although it was remodelled in 1852, and the end next the left bank was restored in 1886. The masks supporting the cornice on the outside are copies of those originally executed by Cercaux. On the island halfway across the bridge is the fine equestrian statue of Henri IV. by Lemot, erected in 1818 to replace one which had stood there from 1635 to 1792. In the latter year it

was melted down and made into a cannon. Louis XVIII. retaliated by causing the statue of Napoleon on the Vendome Column and another of the Emperor intended for the column at Boulogne-sur-Mer to be melted down in order to provide material for the new statue. On the back of the monument is an exact copy of the original Latin inscription, and at the sides are two bronze reliefs representing Henry IV. distributing bread among the besieged Parisians and causing peace to be proclaimed by the Archbishop of Paris at Notre Dame. From this bridge one may obtain a splendid view of the Louvre, the famous Parisian art gallery and museum.

"In the seventeenth and eighteenth centuries, the Pont Neuf was the favorite rendezvous of newsvendors, jugglers, showmen, loungers and thieves. To this motley crowd Tabarin, the famous satirist, used to spout his witicisms from a platform which he set up between Nos. 13 and 15 in the Place du Pont Neuf."

"One of the first hydraulic pumps, the 'Samaratine,' was erected on this bridge."

Pont au Change.

Leading from the Place du Chatelet to the Cité is situated a bridge known as the Pont au Change, which is one of the most ancient in Paris, and is almost as celebrated as Pont Neuf. The structure takes its name from the shops of money changers and goldsmiths located in the neighborhood. It was entirely rebuilt in 1858-59.

Pont des Arts.

At the eastern limit of the Quartier Saint Germain, one finds the Pont des Arts. This bridge is built of cast iron and is used for pedestrians only. It was constructed in 1802-4. It received its name from the Palais des Arts, as the Louvre was once called.

Pont du Carrousel.

The west portion of the Quartier Saint Germain is connected with the right bank by a series of handsome bridges. One known as the Pont du Carrousel, formerly called Pont des Saints-Peres, was erected by Palonceau in 1832-34. It was embellished by four large statues by Petitot, representing Plenty and Industry on the right bank, and the Seine and the City of Paris on the left bank.

Pont Royal.

Another of this series is known as Pont Royal, built in 1685. The bridge consists of five stone arches which span the river opposite the Pavillon de Flore.

Pont de Solférino.

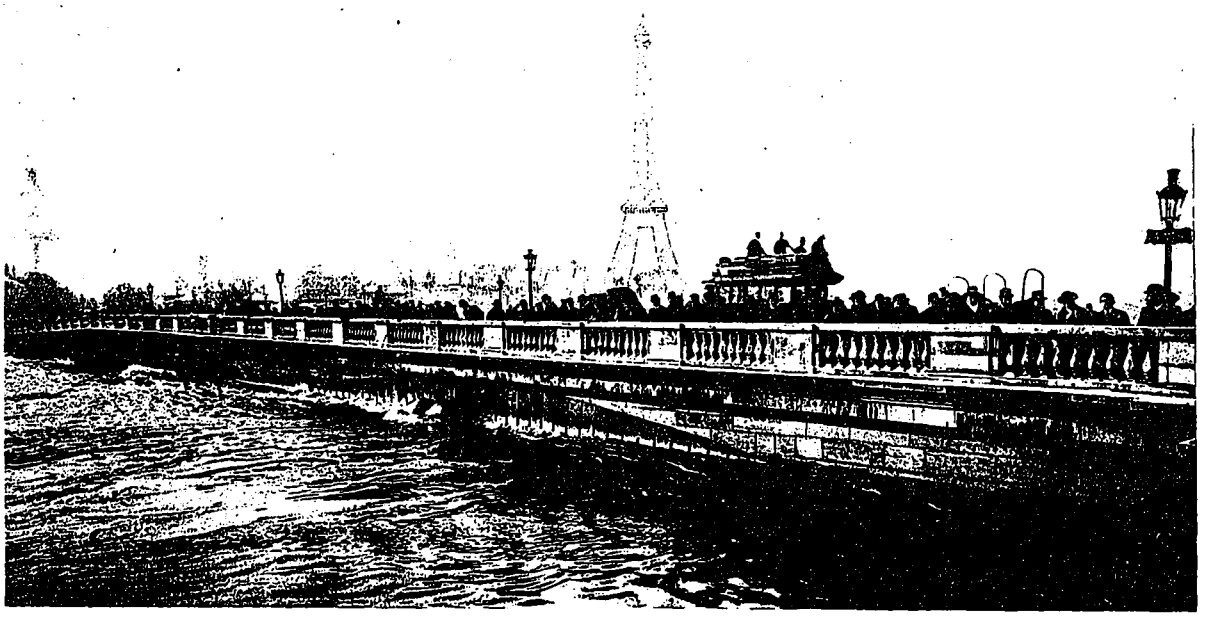
Near Pont Royal is situated the Pont de Solférino. It consists of three cast iron arches erected in 1858-59.

Pont d'Austerlitz.

Pont d'Austerlitz was erected in 1802-7, and was rebuilt in 1855, and enlarged in 1884-5. The bridge owes its name to General Valhubert, who was killed at the battle of Austerlitz in 1805.

The foregoing synopsis will probably be sufficient for a partial understanding of the part which bridges have to play in the history, art, architecture and civic development of Paris. However, in concluding, it might be noticed that the conditions which affect European bridge building are not quite analagous to those prevailing in our own municipalities. On this continent the lives of persons famous in history are usually commemorated by costly monuments, tombs or mausoleums. We have not yet fully attained that degree of constructive excellence which combines art with utility. There are, nevertheless, indications of progress in this direction, notably the handsome series of small bridges in Belle Isle Park, Detroit. New York, Boston, St. Louis, Toronto, and other places are beginning to undertake ventures of this kind, and it has been the purpose of this article to stimulate, if possible, this meritorious tendency. Further, it may be reasonably supposed that along with the perfecting of structural concrete arches, the artistic and historical factors of American municipal bridge building will receive the increasing attention they well deserve.

AN ANNOUNCEMENT is out making known the partnership of Mr. Percy E. Nobbs, M.A., F.R.I.B.A., A.R.C.A., and Mr. George T. Hyde, B.Sc., B.S., who have opened an architectural office at 157 St. James street, Montreal, under the firm name of Nobbs & Hyde. Neither of these gentlemen require an introduction in architectural circles, especially Mr. Nobbs, who as Professor of Architecture at McGill University for several years back, and as a contributor to architectural literature, has done much to assist the advancement of the profession in Canada. CONSTRUCTION desires to join the many friends and acquaintances in extending felicitations and in wishing the new firm every possible success.



Pont de l'Alma—Built in 1856 in Memory of the Crimean War. This Structure was the Bridge Most Endangered by the Flood of January, 1910.

ARCHITECTURAL QUALITIES AS RELATED TO CHURCH AND STATE

Factors and Influences in Early, Mediaeval and Modern Work, as Manifested in the Architectural Character of Ecclesiastical and Public Buildings.

THE ATTITUDE OF THE ANCIENT GREEKS towards religion, art, dialect and rhetoric is worthy of consideration. Their Pantheon, says Viator, in The Architect of September 17th, was peopled by a mythological crew of demonic divinities, who were actuated by human passions and were willing, in consideration of bribes, to divert the otherwise proposed course of events. Originally these divinities merely symbolized various forces and propensities of Nature, but after a lapse of time they received an accretion of individual and divine power. The Greeks treated their gods and goddesses with a cool aloofness of passion that has in it an amusing element; there was no religious ardour such as is now understood, and characters like Socrates were not numerous enough to affect the general racial characteristics, the latter including many interesting and even fine qualities, though amongst these we do not find religiosity. This being so, what wonder is it that the Classic temples, however much we may admire them as works of art, do not appeal to our religious sense? They leave us sensuously cold and uninspired and conscious of the insincere religion that accompanied their production. Insincere! That is a most suitable adjective to use, for as it well defines the Grecian attitude towards ethical matters, so was the opposite quality—sincerity—the potent factor in all that concerned their art; and it is directly due to this unaffected bias towards the fine arts that the Greeks produced buildings which cause beholders to forget purpose and fitness in the rapt artistic admiration engendered by the other essential qualities of good design.

Examining further we may note the Athenian love for academic debates, their rigorous adhesion to and devotion for good laws, their virile belief in the *mens sano in corpore sano;* and thus we learn to realize the fact that in these matters their art aided the sense of fitness instead of opposing it. For though the academic qualities of their religious buildings served to express in the main their own attitude towards religion, we hold that such is not the natural or rational attitude. On the other hand, the dignified sedateness and the restrained beauty of their secular public buildings were more worthily and suitably decked in Classic garb than they would have been in any other known to the children of men, Renaissance alone excepted.

Though Roman as compared with Grecian art was somewhat debased, yet it possessed the same elemental features and a similar aspect in regard to religion up to the days of Constantine the Great. But the Romans developed a love of luxury unknown to the Athenians in their palmy days, and this taste acted adversely respecting the architectural design of many of their public buildings, though bathing establishments and places of entertainment would benefit; and in this connection the Pantheon at Rome, regarded as a hall attached to public baths has indisputable claim to admiration, whilst viewed as a temple it is unsatisfactory.

Following upon those remarks that child of Classic architecture known under the name of Renaissance is similarly less fitted for the expression of religious ideals than are those styles which bear the stamp of indigenous religious fervour. And it is to be observed generally that people are more soulfully impressed in places of worship designed in one of the Gothic styles, even if at times they are more intellectually moved by Renaissance churches.

Before, however, adverting to Gothic art, a few remarks may be accorded to early Christian and some other styles, and to the position they hold in regard to inherent suitability for Church or State architecture. Respecting early Christian populations there cannot be two opinions as to the sincerity of their religious tenets, a sincerity not necessarily reflected in their ecclesiastical buildings for reasons now to be stated. Where persecution of the believers was not actively exercised, it was nearly always to be anticipated; consequently religious enthusiasm expended itself in acts of devotion and martyrdom, though it was at the same time recognized as impolitic and unchristian to invite the imposition of that thorny crown by any show of luxury such as might provide a lever wherewith the persecutors could raise a specious case against the followers of the new faith. Not, indeed, that there was much chance of being luxurious, as the early Christians were for the most part poorly endowed with the world's goods, and were thus deprived of the means of gratifying a natural desire to honor their Master by the presentation of choice gifts. Policy and poverty thus combined to prevent the early Christian churches from being places of grandeur. As a result the buildings erected were mere *aulæ* or *basilicæ,* the plan being that of the old heathen Hall of Justice and not infrequently structurally decorated with portions of the old heathen disused temples; of necessity the result was nearly as cold and formal as Classic art itself, and it could in no way interpret the mysticism attaching to Christian tenets.

But (it may be remarked) Oriental art is not cold and formal; Chinese, Japanese, Byzantine, Indian—these are not cold and formal, nor actuated in regard to expressing religious sentiment by any such restrictions as just detailed. To dispose of the first-named it is well known that the Celestials have been conservative in art as in religion and everything else from the early days of their very ancient empire; any reforms and progress observable in their territories have been forced upon them by external pressure. Though a very ancient civilization—or, perhaps, because of its antiquity—it is one that other nations regard as childish in many respects; with childhood, crude ideas as to form and color go hand in hand. The religion of Confucius is one apart from all other known creeds and is, perhaps, justly given effect to by the fantastic designs of Chinese art. In fact, this nation is adapted (and possibly better adapted than others) to express garden architecture and similar work, but it cannot do justice to Church or State buildings.

Any nation, also, whose taste for luxurious display pervades all its actions at home and abroad, a nation that regards the Ruling Power as supremely sensuous and the future state of existence as a life of voluptuous pleasures, any such nation is but ill-adapted to express religious or State architecture in a manner that would adequately realize their respective claims; and consequently, under the ban of unsuitability, we must include Oriental styles generally.

Byzantine architecture gives evidence of the co-operation of true religious feeling and expression, though for the full development of this we must seek the Gothic styles. In the eastern empire of Constantine, buildings were erected whose planning was no less serviceable for the proper exercise of worship than that of the early Christian buildings, and whose architectural treatment, unshackled by considerations either of prudent seclusion or of economy, yet evinced an artistic avoidance of exuberance combined with a justifiable use of color and of structural design.

It is, however, only when the period of the later Romanesque work is reached that a distinctly expressed ecclesiasticism is observable. Perhaps the main factor responsible for this is the religious ardour arising after the close of the tenth century of our era, when people were relieved from the fear that the world would end

with the close of the year 1000. The bar safely crossed, the nations put out to sea full of hope and thankfulness, and being more simple-minded and direct than those of to-day they were not afraid to express their love and gratitude in buildings devoted to their religious worship.

It must be evident that where the idea of a God is of an exalted Being inhabiting space and far removed from the pettinesses of mortals, this will best find expression where no cramped effects are to be seen; and as the curious notion has ever been prevalent that heaven is above us, not around us, this would again be best expressed by a lofty building.

But there is another point to bear in mind as probably influencing the adoption of loftier church interiors, and this is the introduction of the organ fairly contemporaneously with the advent of the eleventh century. To give due effect to the tones of this majestic instrument a spacious building is required.

At the same time also (or perhaps somewhat earlier) there arose from whatsoever cause a general disuse of Autolycan trifles from ancient heathen edifices such as had formerly been introduced mosaic-wise into Christian churches. A certain "feeling" of Classicism in the ornament was to be expected, but progressively this gave place to other forms not intrinsically better by any means, but as having no resemblance to what had preceded they kept the mind of the observer free from any suggestions of heathen work. Anything in the nature of affectation in this matter of suitable mouldings and ornament is to be deprecated; the bowtell, dog tooth, cat's head, roll moulding, diaper, etc., are no more expressive of religious feeling than are the echinus, scotia, egg-and-dart, honeysuckle or acanthus. Where the difference arises is in the workmanship, mediæval art showing an individuality, a freedom from undue restraint, a lack of cold formality, altogether opposed to the practice of Classic art.

The desire to obtain increased proportionate height prepared the way for the use of the pointed arch; and here, once again, is apparent an added interpretation of religious ideals. With the semicircular arch the eye is held within a confined space travelling from one springing point to the other almost unconsciously; with the pointed arch the effect is just the reverse, the eye tending to continue the course of flight upwards. Quite unconscious interpretation we may believe this use of the pointed arch to be, but none the less effective. The idea that pointed architecture had its origin either in leafy avenues or in intertwining round arches may be set aside as being more plausible than probable.

A reference was made earlier to the mysticism attaching to Christian tenets; this may be contrasted with what may be termed the "mystery" connected with some of the more remote faiths wherein the prevalent idea was that the gloom of the temple interior should be in direct ratio to its sanctity. This effect of gloom and mystery was obtained by two methods, if not three; the ancient temple consisted of a congeries of rooms progressively narrower, lower and more shut off from the light of day as the innermost sanctuary was approached. This could not but result in a tendency to making a terror of religion, and the heirarchy enhanced this impression on the lower orders by calling to its aid the use of scientific tricks and mechanical subtleties.

How different to the more modern ideal of concentrating the resources of art and shedding a brilliant light upon the central point of attraction in a place of worship as most effectively seen in the chancel of a church. The soul of religion is not wrapped in mysterious veilings, and the faith of worshippers is invited to satisfy its cravings intelligently, not blindly. The accidental mysticism arising from what has been termed "dim, religious light" has been, perhaps, unduly insisted upon, as the feeling is probably the result of environment.

The fitness of pointed architecture for ecclesiastical buildings having been analysed in brief, what may be said about its suitabilities for State edifices? Firstly, it is evident that the more elevated the purpose of the building the more should it express dignity, formality, reserve, stateliness and continuity. It would be unpardonable to suggest that in most Governmental methods there is any continuity of policy in the generally accepted sense, and yet, on the principle that "under all circumstances the King's Government must be carried on," there is an underlying idea of continuity that should find expression in the "frozen music" of architecture. In Gothic art there is a lightness of touch, a certain irresponsibility and other qualities mentioned earlier, that militate against its fitness for the expression of State architecture; and whilst these qualities may recommend it for private and for certain public buildings, yet it is conceivable that other qualities may prove adverse to its free use even for these purposes.

The English Houses of Parliament are well adapted to point a moral, though they do not adorn the tale of nineteenth century progress. Who does not recall Carlyle's denunciation of them ("Latter-Day Pamphlets"), written as the time of their completion approached? "A wilderness of stone pepper-boxes with tin flags atop . . . if this is ideal beauty, except for sugarwork and the more elaborate kinds of gingerbread, what is real ugliness? Can any earnest soul pass them without mentally exclaiming 'Apage!' and striking a pious cross in the air?" So far Carlyle. Dignity (that is, the expression of it) is at a discount, and where the whole surface is cut up into restless elaboration the expression of continuity is impossible; and with the absence of these is also to be noted the absence of formality (though not of stiffness by any means), reserve and stateliness.

When our eyes are turned to the English Law Courts in the Strand we see another phase of Gothic, also unsuitable. The Palace of St. Stephen's (criticised in the preceding paragraph) is Classic clothed in Gothic garb; the Law Courts renounce Classicism altogether and presents to passers-by a confused jumble of buildings that quite fail to typify the orderly process of law.

But when we regard the various blocks of Government offices within sight of St. Stephen's, their fitness is at once apparent, and we are in a position then to establish the justice of our adverse criticisms above and to absolve ourselves from any charge of jaundiced views.

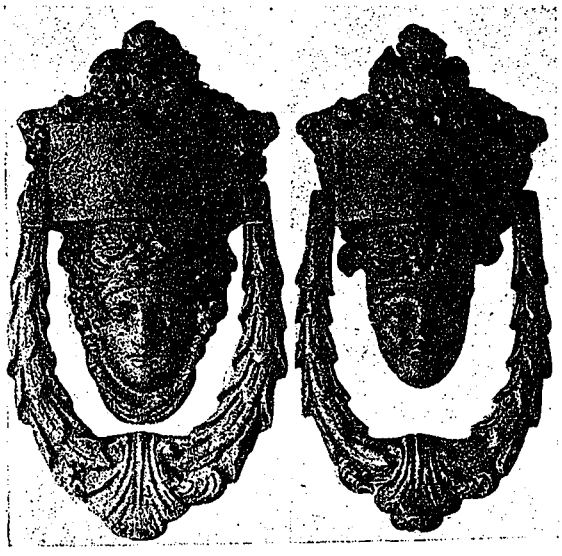
In State architecture it is proper to include Royal palaces, where the predominating influence may indeed be traced to their public character, though the privacy attaching to a home must also find due expression. We may exemplify three Royal palaces here—one at Madrid (not the Escurial), one at Vienna, and one in England; all three are Renaissance in style. The Spanish palace exhibits a dignity, formality and symmetrical disposition that relegate it in appearance to the rank of a worthy Parliament House, for it bears no impress of domesticity. The Vienna palace, though less formal, shows just as few signs of the domestic character. Hampton Court Palace, however (we refer to Sir Christopher Wren's work there), by its greater freedom of treatment (and more particularly in the use of cheerful red brickwork as an integral portion of the design) acquires an air of combined stateliness and homeliness which in conjunction with its noble proportions and fair surroundings at once sets the palatial seal upon it and inspires in the beholder a sense of its absolute fitness. Gothic art in one or other of its phases may serve for private palaces, but with domestic architecture in general this article is not concerned.

SAND FACE BRICKS of a type used in the monasteries of the Middle Ages, are again being adopted to quite an extent in Continental Europe. This style of brick, which is 11 x 3 x 3 inches, promise to have considerable vogue and to vie strongly for popularity with the thin Roman brick which became fashionable a few years back.

DOOR KNOCKERS— EARLY SANCTUARY AND DOMESTIC TYPES

Custom of Ancient in announcing their presence and early adoption of time honored device. Some Knockers of 16th and 18th Century designs.

THE QUESTION as to whether the old fashioned knocker has any longer a legitimate place as a doorway requisite, is something which every now and again obtrudes itself for quiet discussion in certain corners of architectural circles. Where adopted at the present time, its lack of utility is usually indicated by an electric bell set in the frame of the door, but even for some years before the advent of this particular device, the door-knocker had been rendered archaic by a non-observance of its primary function on the part of visitors generally who deemed it less disturbing and more polite to announce their presence by means of the more gentle rap of the hand. There are, however, a large number of both designers and laymen who respect its tradition as an index of privacy, and as a simple decorative feature which greatly adds to the character of the



Iron Knocker of the 18th Century.

Brass Knocker of the 18th Century.

entrance; and there are many who think that with a few modifications, it could be made to serve advantageously as a sort of a push plate in connection with an electric call, and thereby again be reinstated in an utilitarian capacity.

As to when knockers first came into use, says Henry Walker, in the Journal of the Society of Architects (London) it is difficult to determine. In the houses of the Greeks and Romans the doorway contained two doors folding together, and these were fastened by means of bolts pushed into sockets in the sill. At night the front door of the house was further secured by means of a wooden or iron bar placed across it, and inserted into sockets on each side of the doorway. It was considered improper to enter a house without giving notice to the inmates. The Spartans gave this notice by shouting, the Athenians by using the knocker, where it was provided, but more commonly by rapping with the knuckles or with a stick. In the house of the rich a porter was always in attendance to open the door. He was generally a eunuch or slave, and was chained to his post. To assist him in guarding the entrance a dog was kept near, and the warning "cave canem" was sometimes written near the door. It will be readily appreciated that the attendant at the door would frequently weary of his vigil, and tumble off to sleep. Hence the necessity of finding some means of awakening him, and this necessity probably suggests the invention of the door knocker.

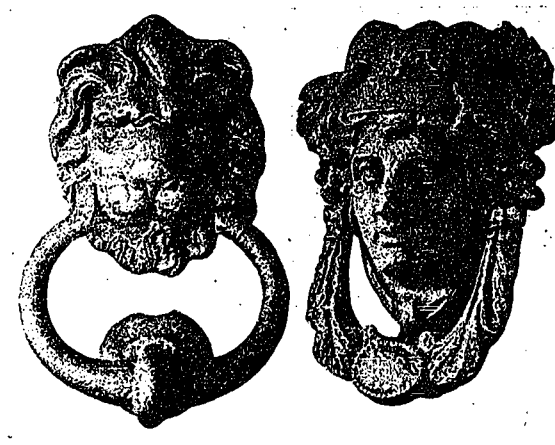
Laquered Brass of the 18th Century—Taken from the Birthplace of Philip James Barley Poet, of Nottingham.

Italian Bronze of the 16th Century—Formerly on the Door of Nottingham Castle.

The earliest knockers appear to have been plain rings without any attempt at ornamentation.

Sanctuary Knockers.

In England, the oldest remaining examples are those known as "Sanctuary Knockers," of which that on the north door of Durham Cathedral is typical. Some of the cathedrals and parish churches in this country were, at one time, sanctuaries or harbours of refuge for criminals and others. If the pursued could reach the sanctuary before being captured they were safe, and were housed, fed, and protected for a period not exceeding thirty-seven days. This provision necessitated a constant attendant, night and day, at the gate, and a knocker had to be provided in order to arouse him. Many of these sanctuary knockers are grotesque, others symbolical, and



Cast Iron Knocker of the 18th Century.

all worthy of the closest attention by students of architectural detail.

Domestic Knockers.

In domestic architecture the knocker was first of all crude in design and workmanship, but from the 15th to the 18th century knockers of excellent design, in bronze, brass, and iron, were produced, many of which remain

(*Concluded on page* 63.)

Reception Hall, Residence of Mr. E. R. Wood, Toronto—An Interior Characterized by a Dignified Simplicity in Treatment, and Finished in White Enamel with a Soft Yellow Tinted Ceiling. Sproatt & Rolph, Architects.

Drawing Room, Residence of Mr. E. R. Wood, Toronto. With the Hallway, this Room is in Georgian Character. The Color Scheme is in White and Fawn, with Delicate Touches of Green and Red in the Draperies and Carpets. Sproatt and Rolph, Architects.

Residence of Mr. E. R. Wood, Toronto. An Interesting Example of Modernized Elizabethan Architecture in English Domestic Design. Sproatt & Rolph, Architects.

AN ATTRACTIVE TORONTO HOME IN ELIZABETHAN DESIGN

Residence of Mr. E. R. Wood. An excellently planned and beautifully appointed House, which in design and construction is exceptionally well adapted to its environments.

A VERY SHORT DISTANCE south of the Bloor street stone gates to Queen's Park, Toronto, on the west side, setting behind two beautiful old elms, with a low cut English hedge in front, is one of the best examples of modernized Elizabethan architecture in domestic work to be found in Toronto. It is the home of Mr. E. R. Wood, and was designed by Messrs. Sproatt & Rolph. Although the exterior is simple, in general effect it is rich in the extreme. The absence of heavy pilasters, broken with quoins and bands, that had a tendency to render the architecture of the Elizabethan period gorgeous rather than elegant, together with the simple breaking of the gables and the excellent square treatment of the windows gives the building all that is desirable in the architecture of this period in domestic design, and produces an effect that is elegant, graceful and comfortable, rather than one that is rich and gorgeous.

The exterior color scheme is well suited to the environment; the brick is of the dark red common variety, with one-half inch grey mortar joints; the trimmings are of grey cut limestone, while the roof is of green slate.

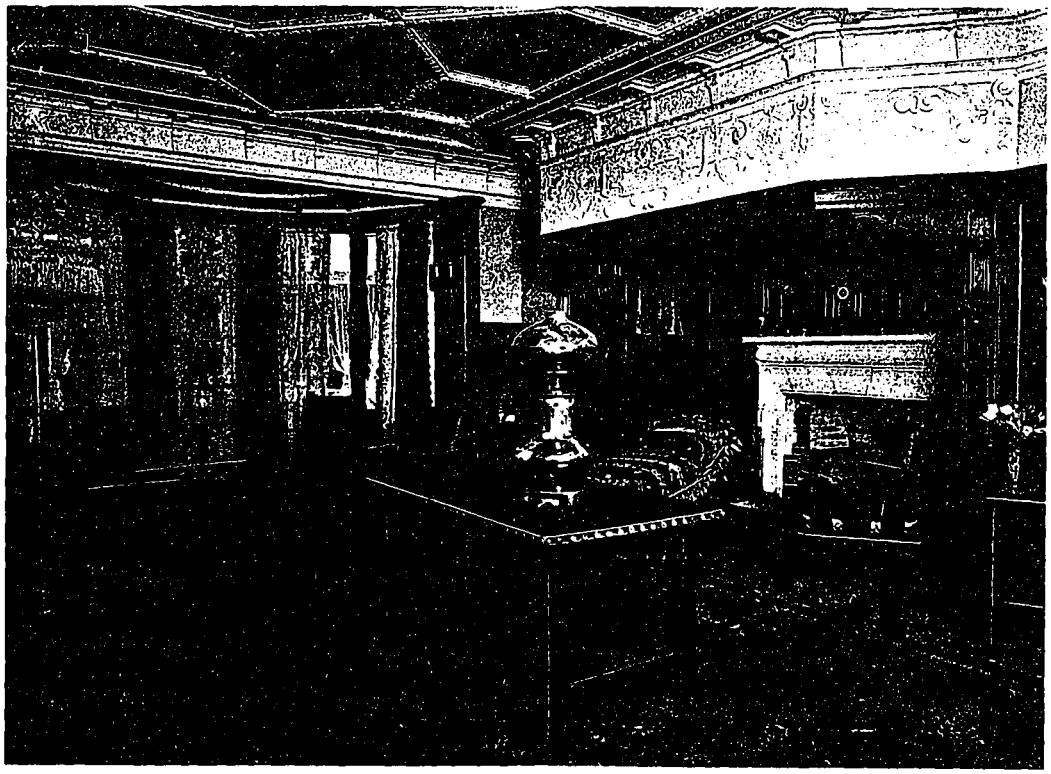
The general lay-out of the house has been planned with a view to comfort and convenience, rather than display and grandeur. The ground floor contains reception hall, drawing room, living room, library, dining room, palm room, billiard room and kitchen service.

The front entrance opens into a spacious reception hall, with beamed ceiling and heavy pilasters. The wood work is white enameled, and the panelling in the ceiling is of a delicate tone of yellow. The drawing room to the right is decorated in white and fawn, relieved with a touch of delicate tones of green and red in the draperies, silk wall hangings and carpet. This room, as well as the reception room, in both decoration and furnishings, have a strong feeling of Georgian.

To the right of the hall are the living and dining rooms. The woodwork and the mission furniture in the living room are of oak, finished in an Early English tone. A large Elizabethan recessed fireplace lends an air of comfort to this large well appointed room.

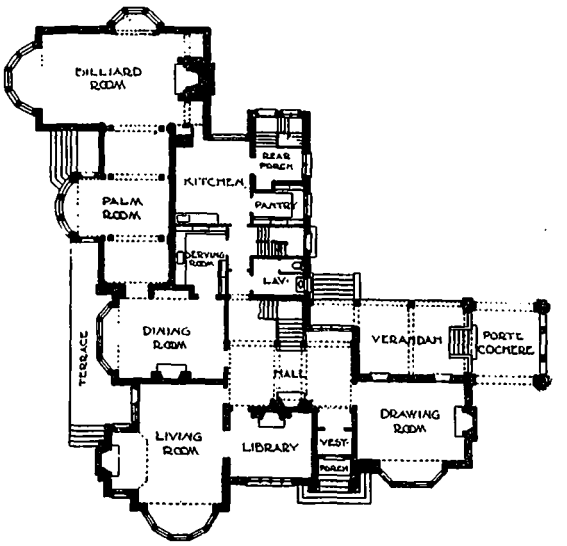
The most unique, and at the same time, the coziest room in the house, is the library, which is at the left of

Library, Residence of Mr. E. R. Wood, Toronto. Here the Woodwork is Enamelled a Sea Green, and the Freize and Ceiling Decorated with Naturalized Mural Designs in Subdued Tones. Sproatt and Rolph, Architects.



Living Room, Residence of Mr. E. R. Wood, Toronto—Finished in Early English Oak. The Large Elizabethan Recessed Fireplace is Especially Noteworthy. Sproatt & Rolph, Architects.

the living room. The woodwork is enameled a sea green and the walls above woodwork, with the ceiling, are decorated with mural work of naturalized ornament in sub-



Ground Floor Plan, Residence of Mr. E. R. Wood, Toronto. Sprott & Rolph, Architects.

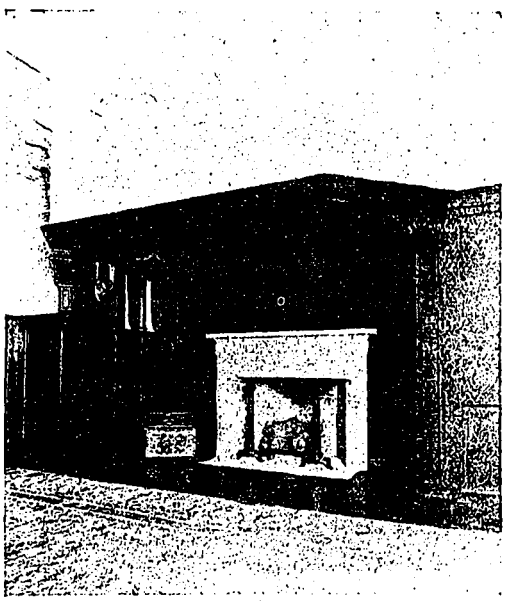
dued tones. The furniture is of the heavy mission style, with Early English finish, and has dark red leather cushions. The color combination, although unusual for a library, is harmoniously worked out.

The dining room, which has a large bay, with southern exposure, is finished in mahogany. The wall panelling

Detail of Entrance, Residence of Mr. E. R. Wood, Toronto. Sproatt & Rolph, Architects.

runs up to within three feet of the beamed ceiling. The walls above the panelling are finished in a grey tone with a greenish tint, relieved with a narrow gold stripe. The ceiling panels are painted a delicate yellow, with borders of blue and a narrow stripe of gold. This room, with the living room, in decorative detail, is purely modernized Elizabethan, although they lack the cumbersome, heavy ornaments that characterized the work of the early designers of this period. The carved mantel and built-in sideboard are among the best pieces of modern Elizabethan decoration we have ever seen.

The palm room, which leads from the dining room back to the billiard room, is decorated and furnished in Georgian style. The woodwork is white enameled, and the walls are hung with a silk of a delicate sea green. The furniture is upholstered with silk of the same texture and color. This, is a very bright room, and in addition to a large bay on the south, has a skylight of slightly ornamented glass. The billiard room is panelled with selected circassian walnut to the coved ceiling, which is

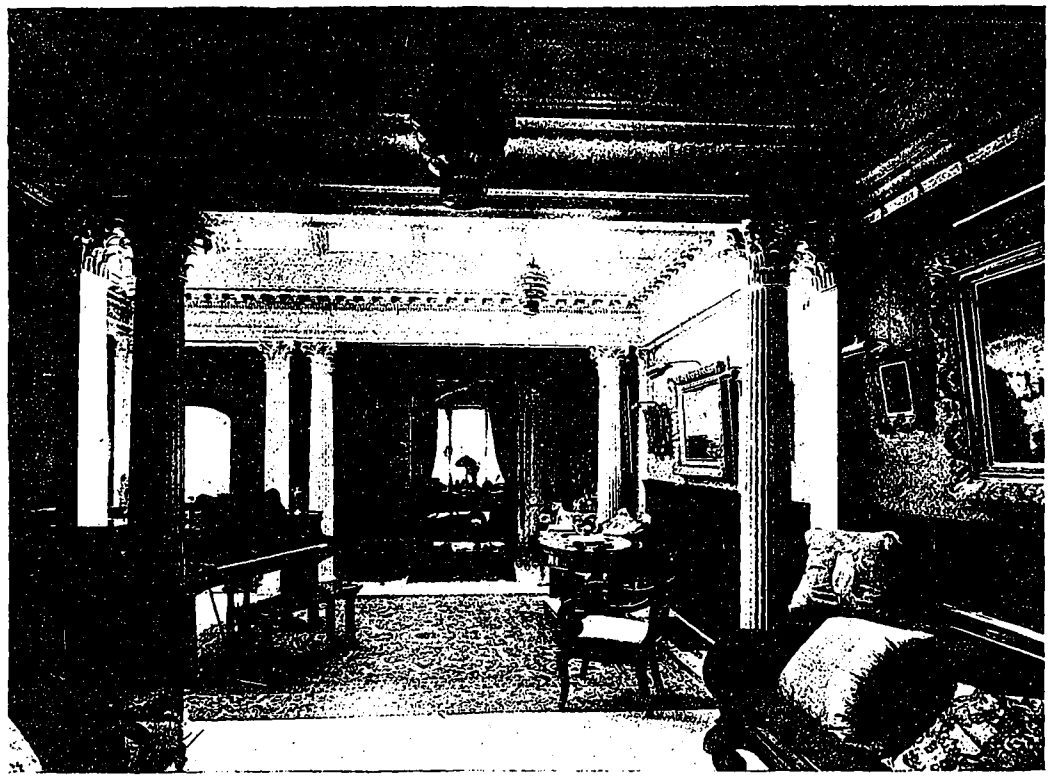


Detail of Fireplace in Living Room, Residence of Mr. E. R. Wood, Toronto. Sproatt & Rolph, Architects.

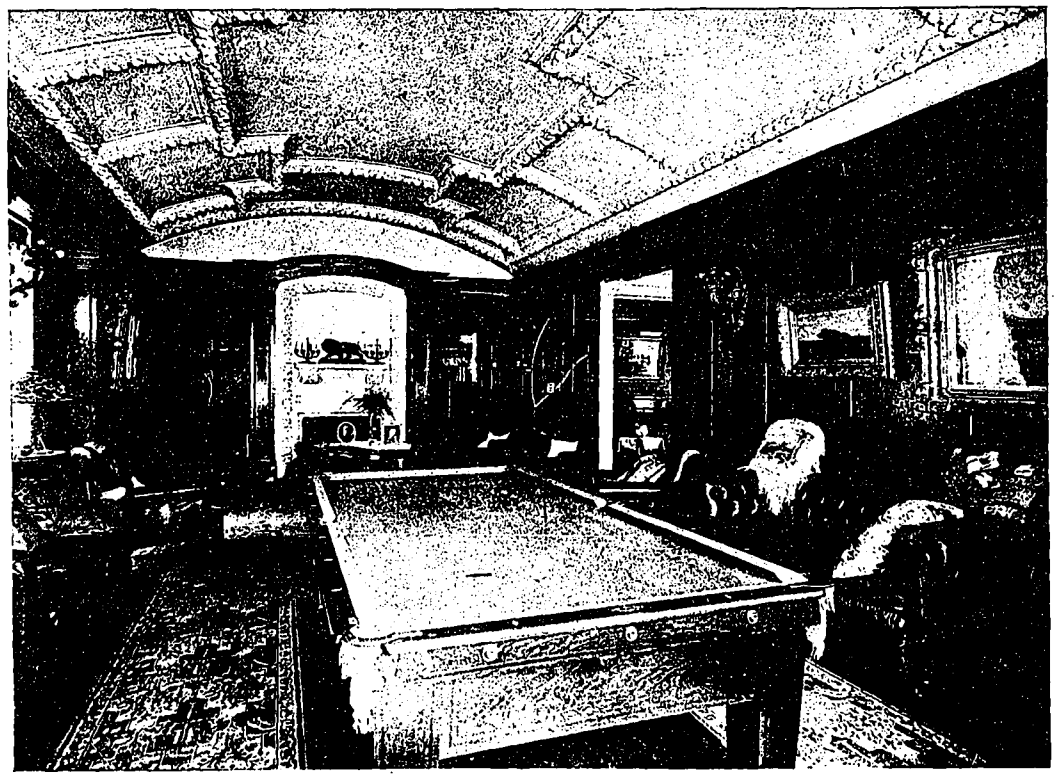
richly decorated in white plastic relief work. It has two large bay windows, one in the south wall, and one in the west wall. At the north end of the room is a high, richly carved mantel.

The arrangement of the kitchen service is ideal. The pantries and kitchen are so located as to provide the maximum degree of convenience, with the least possible domestic labor.

Fireplace in Dining Room, Residence of Mr. E. R. Wood, Toronto. Sproatt & Rolph, Architects.



Palm Room, Residence of Mr. E. R. Wood, Toronto, Looking Toward the Living Room. The Woodwork is Stained a Rich Brown, with the Columns and Pilasters Enamelled White, and the Walls finished in a Silk of Delicate Sea Green. Sproatt and Rolph, Architects.



Billiard Room, Residence of Mr. E. R. Wood, Toronto, Showing the High, Richly Carved Mantel. The Walls are Panelled with Select Circassian Walnut, and the Ceiling is Finished in a Soft Grey Tone. Sproatt and Rolph, Architects.

The main stairway leads to a large hall sitting room on the first floor. To the left is the owner's bedroom, which is tastily decorated in white and old rose, with mahogany furniture of Early English design. The guests' room, located at the southwest corner of the house, is decorated in white and pale green. A feature of this room is a fireplace nook on the south, with windows and seats on each side of the mantel.

All the bedrooms and the first floor hall sitting room have white enameled woodwork, and the same general style of simplicity of decoration prevails throughout. In all, the house has about a dozen bedrooms, and five large, well appointed, tiled bathrooms. The servants' quarters are finished in white enamel, and are cut off from the main portion of the house.

Built-in Sideboard in Dining Room, Residence of Mr. E. R. Wood, Toronto. Note the Exquisite Hand Carving. Sproatt & Rolph, Architects.

In short, this Elizabethan home may be termed a well designed, tastily decorated, appropriately furnished English house, in which there has been no lavish expenditure in meaningless ornament, vulgar decoration, or costly, cumbersome furniture. It is a home made elegant and graceful by the architect in his design, and beautiful and comfortable by the owner in his tasty decoration and appropriate furnishings.

GLASS BRICKS IN GERMANY.

THE DEMAND FOR GLASS BRICKS in Germany has increased somewhat in recent years, and a number of concerns are producing them, says U.S. Consul Robert P. Skinner. There are no statistics available, and it is extremely difficult to estimate the product of the German factories, especially as they are produced in connection with other lines of glass goods. It is certain, however, that the business has attained large proportions within comparatively recent years.

Three types of glass bricks are well known to the builders and architects in this country. One, the Falconnier hollow brick, of a singular and irregular shape; another, a hollow, rectangular brick similar in shape to a common brick; and, finally, a pressed-glass brick molded into the form of a thick letter U.

Glass bricks can never be more than special-purpose building materials, particularly useful where walls instead of windows are essential, while at the same time light must be provided.

Limitations of Use.

The chief obstacle to their more extensive use is their inability to support more than their own weight, or even this when the wall exceeds 15 feet in height. Consequently girders must be provided or ordinary window openings made in such manner that the walls of glass sustain no pressure. Perhaps in the United States, where steel buildings are constructed so extensively, and where brick and stone walls carry little load, builders might find opportunities for a more extensive use of glass bricks than in this country.

When these bricks are carefully handled they seldom crack or break, but as they are sensitive to changes in temperature, builders must use them with considerable discretion. They are delivered to contractors loosely packed in straw and are shipped in the same manner in carload lots from the factories. The mortar used in laying them should be composed of one part of fine sand to four parts of cement, the latter to include 50 to 75 per cent. Roman cement.

The rectangular, hollow, blown glass bricks have become of late the most popular form among German builders. They are thicker than the Falconnier bricks, and are therefore more valuable for fireproofing purposes, although a little more expensive than the Falconnier. These bricks cost an average of 13 cents each in dimensions of 125 by 250 millimeters (4.9212 by 9.8425 inches), or half that price for half bricks, 125 by 120 millimeters (4.9212 by 4.7244 inches). Brickwork of this kind costs about $4.20 per 10 square feet.

Cheapest Not Popular—Porcelain Not Common.

The pressed glass bricks made in the form of a thick letter U are the cheapest, but are also the least popular, as changes of temperature facilitate the passage of moisture and dust through the mortar, and as the latter lodges on the inner surface of the bricks they eventually lose their transparency.

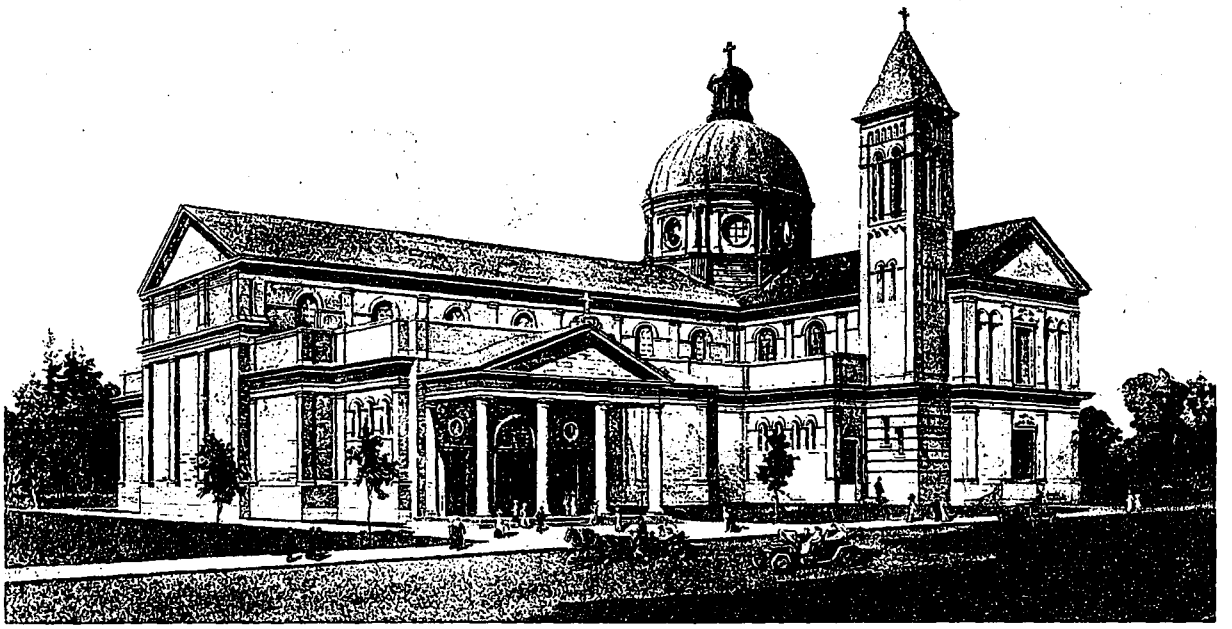
It is not understood that any of these forms are protected by patents. A large Hamburg building contractor estimates that to erect a first-class plant for making glass bricks as a specialty would cost $178,500 to $238,000. However, it appears that many German manufacturers of glass produce bricks as one of numerous lines whenever market conditions make it profitable.

DOOR KNOCKERS.—Continued from Page 57.

to this day. A walk round any old town in search of these interesting old knockers seldom goes unrewarded, and occasionally a rare example may be met with. It is remarkable how often the lion's head appears on the older knockers. Ruskin has a tilt at this. "The lion," he says, "is the power of death on earth, conquered by Heracles, and becoming thenceforward both his helmet and ægis. All ordinary architectural lion sculpture is derived from the Heraclean. The Christian lions are the Lion of the tribe of Judah, the Lion of St. Mark, the Lion of St. Jerome, and the Lion of the Zodiac. These four will give you, broadly, interpretation of nearly all Lion symbolism in great art. How they degenerate into the British door knocker I leave you to determine for yourselves."

The examples which illustrate this note are from dwellings in Nottingham. They are now in the City Museum, where they will be carefully preserved. It is a regrettable fact that these old knockers are fast disappearing. Dealers in antiques are beginning to search for them. With the advent of the electric bell their practical use is almost gone, but it will be deplorable if they are removed from the doors they have graced so long.

EXTENSION TO CHURCH OF
OUR LADY OF LOURDES. TORONTO.
J.P.HYNES ARCHITECT.



Church of our Lady of Lourdes, Corner of Sherbourne and Earl Streets, Toronto—As It Will Appear When the Extensive Enlargement and Alterations Now Under Way are Completed. J. P. Hynes, Architect.

REMODELING OF OUR LADY OF LOURDES CHURCH, TORONTO

Brief description of new addition and improvements now being made to edifice ere ted twenty-five years ago.

THE CHURCH of Our Lady of Lourdes, corner Sherbourne and Earl streets, Toronto, as it will appear when the present addition and alterations now underway are completed, is shown in the accompanying illustrations. The half-tone view shows the exterior in perspective from a south-east point on Sherbourne street, and makes obvious how the new extension is being carried out to form a consistent and co-ordinate development entirely in harmony with the existing structure.

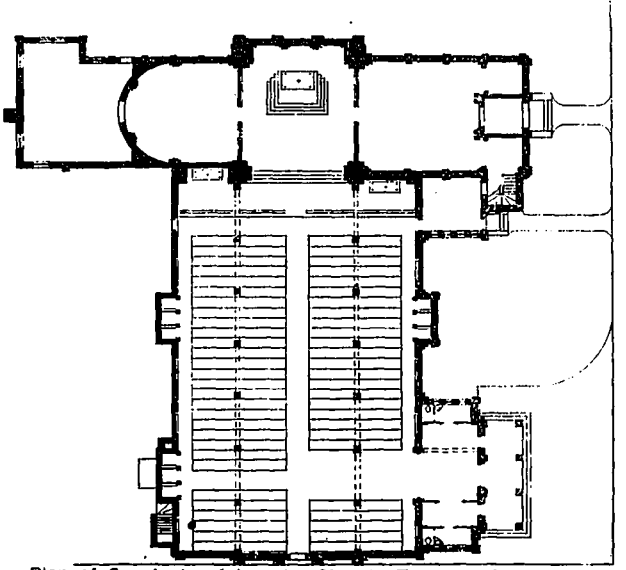
The original church was erected in 1886, Mr. F. C. Law, R.X., being the architect. It was built as a memorial chapel with a seating capacity of less than three hundred, but was subsequently converted into a parish church, with the result that the accommodations for the congregation have gradually become more and more inadequate.

At the time the improvement was suggested, several propositions were put forth for enlarging the seating capacity, even to the building of another church adjoining the present one; but as a harmonious and adequate extension was shown to be practical, the latter scheme was adopted. According to the plan decided upon, the altar is placed under the dome of the original edifice, the existing sanctuary is used for the choir, and the portion east of the dome is retained to supplement the seating accommodations.

The new extension, which is entirely for the use of the congregation, will give the structure in all a seating capacity of eight hundred. It is built to the south at right angle to the axis of the original church, thus making the remodelled structure similar in outline to a T shape, or restricted cruciform plan.

The portico of the present entrance will be removed, and the main entrance (as shown in illustration) will be made from Sherbourne street at the south end of the new extension, through a portico and vestibule. The central portion of the extension is a replica of the present church, having a semi-circular coffered vault, intersected by lunnettes, in which are placed the windows. This vault is supported by an arcade on either side, which

(*Concluded on page 66.*)



Plan of Our Lady of Lourdes Church, Toronto. Showing the New South Extension, and the Original Structure, which now Forms the Transverse Section. J. P. Hynes, Architect.

CONSTRUCTION

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

Ivan S. Macdonald, Editor and Manager

H. GAGNIER, LIMITED, PUBLISHERS
Saturday Night Building
Toronto, - - Canada

BRANCH OFFICES
Montreal London, Eng.

CORRESPONDENCE—All correspondence should be addressed to "CONSTRUCTION," Saturday Night Building, Toronto, Canada.
SUBSCRIPTIONS—Canada and Great Britain, $3.00 per annum. United States, the Continent and all Postal Union countries, $4.00 per annum, in advance. Single copies, 35c.
ADVERTISEMENTS—Changes of, or new advertisements must reach the Head Office not later than the fifth of the month preceding publication, to ensure insertion. Advertising rates on application.
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, November, 1910 No. 12

CURRENT TOPICS

IT IS REPORTED that an English syndicate will construct an immense cement plant to be operated entirely by electricity, on the Chilliwack River, near New Westminster, B.C. A site having lime rock to a depth of from 100 to 500 feet and two miles in length is said to have recently been staked off by Mr. C. D. McRae, who is acting in an engineering capacity for the parties interested.

* * *

COMPETITIVE DESIGNS are now being received by the Cuban Government or a new Presidential Palace to be erected on the Villenueva Station plot in the City of Habana The competition is an open one, with prize offerings of $10,000 and $5,000 respectively for the two best designs. A circular setting forth the programme to be followed has been issued by the commission in charge of the erection of the building, and plans will be received by the Department of Public Works up to 2 p.m., April 15th, 1911.

* * *

A MONTREAL CONTRACTOR of considerable prominence and affluence, has offered the Board of Control of that city, sufficient land for a boulevard four miles long and 125 feet wide. To the man on the curb this seems to be "the long lane without a turn," or a re-turn to speak more correctly, as the donor seeks nothing for his property, or imposes no stipulation other than the city bear the expense of the survey, and carry out the work of running the boulevard through. The proposition looks good on the whole, and if accepted, it should do much to start Montreal on the right road towards establishing a system of driveways that would be both a credit and an advantage to so important a centre.

WHAT IS SAID to be a new method of concrete fireproof construction for small buildings, consists of a frame work of steel tubing filled with concrete and a net work of wire strung to a tension of 1,000 pounds, for the basis of walls, floors and roof. It is difficult to see, however, where this method has any commercial or structural advantage over the present metal stud and metal lath systems now on the market.

* * *

THERE HAS RECENTLY BEEN COMPLETED at Rotterdam, one of the largest reinforced viaducts in the world. It is over a mile in length and carries a two-track heavy electric railway line. The structure comprises two sections, one built within and the other extending beyond the city limits. The former has sixty-three normal spans and a length of 2,300 ft., while the remaining portion is 3,150 feet long and includes seventy-nine normal spans.

* * *

CEMENT BLOCKS 50 YEARS OLD, were recently examined at Bridgeport, (Conn.), and found to be in an excellent state of preservation. They were taken from a pioneer house of this type of construction, which has just been razed on a site at the south side of the east approach to the Congress street bridge. According to the "Times,' published in that city, the blocks are not only free from any signs of disintegration, but are in a better condition now than the day they were placed.

* * *

INSTEAD OF SELECTING varieties and grades of wood entirely according to external appearance as formerly, it is now examined by means of the compound microscope. This instrument is used to determine the commercial value and proper industrial use to which the wood may be put, by viewing the longitudinal and transverse section of the sample. Fine grain and thick walled cells assure the solidity and resistance which are required in carpentry while other characteristics in turn fit the wood for other purposes.

* * *

STATISTICS BROUGHT FORWARD by M. Ziffer, of Vienna, at the recent International Tramway Congress held at Brussels, show that wooden sleepers "treated" by approved methods have a life as long as metallic sleepers, the comparatively slight use of which indicates that they have not entirely fulfilled expectations. Among the new types being brought forward for trial, concrete sleepers have in several cases been adopted on a large scale, and with a certain measure of success. Such sleepers, it was pointed out, deserve to be kept in mind, though it is not yet possible to pronounce a definite opinion concerning them.

* * *

THE WORLD'S LARGEST GAS TANK, which is being built at Toronto for the Consumers' Gas Company, has approached that stage in its construction where it is possible to judge somewhat definitely as to what will be the magnitude of its ultimate dimensions. Already the framework of its huge bulk lifts itself many feet above the site on which it stands, and the constructors are employing one hundred skilled workmen in order to have the entire work completed December 31st. This mammoth receptable is being built in four telescope sections, each 40 feet high. It will have a capacity of 5,000,000 cubic feet of gas, and when completely filled will be over 200 feet high. Some idea as to vastness of the work may be gathered from the fact that it requires 3,500 tons of steel, while 12,000 rivets are used in the base alone. The diameter of the tank is 218 feet, and the entire framework will be enclosed with 1¼-inch steel plates. The work is being carried out by C. & W. Walker, Ltd., an English firm, at a contract price of $1,000,000.

PROMINENT BUSINESS INTERESTS in Montreal, according to a recent news item, are back of a scheme which is at the present time promoting a Canadian-Franco-British-American Exposition to be held next year. So far, it is stated, $500,000 has been pledged towards the exhibit, by local parties, while additional capital is promised from outside sources. The Exhibition will include manufactured products, a pure food display, arts and craft department, women's section, electrical devices and appliances, automobiles, self-culture hall, and other features which have not as yet been fully decided upon. That the event bids fair to materialize, is indicated by the fact that a site has already been secured, and that the erection of the necessary buildings, is to be proceeded with shortly. The headquarters of the affair, are in the Bank National building, and, it is said, that a definite announcement as to the opening date, will be made within the next two weeks.

* * *

IN TWO PARTICULARS the Shoshone dam, recently completed by the United States Reclamation Service is unique among other structures of its kind in the world. It is the highest and the only one in existence in which the height is the greatest dimension. Built in the famous Big Horn Basin of Wyoming, this important structure forms a mighty reservoir capable of empounding approximately 149,000,000,000 gallons, an almost inconceivable number. It is built entirely of concrete, and is the controlling feature of an irrigating system which is designed to convert 150,000 acres of barren waste into a tract of rich, productive, arable land. The dam has a maximum height of 328.4 feet, making it the highest in the world. The maximum thickness in portion below the river bed is 108 feet, and the length 60 feet. At the top the dam is 10 feet thick and 220 feet long, the radius of its curvature being 150 feet. This rather pronounced curvature imparts great resisting powers to the structure, else its upper part must needs have been made much thicker. The comparatively small gravity action is atoned for by the arch action. The location was peculiarly adapted to this form of construction and offered great advantages to the engineers. The upstream face of the dam falters 15 per cent. from the vertical and the downstream face 25 per cent. The dam, spillway and tunnels in all cost the U.S. Government about $1,000,000.

* * *

CONSIDERABLE EFFORT is being made in England to meet the conditions in roadmaking imposed by motor and trolley traffic. As a definite step in this direction a new and direct roadway is proposed between West Hartlepool and Middlesborough, near Newcastle, in the County of Northumberland, a direct line of 7¾ miles. In designing the roadway the engineer in charge has given attention to the possible development in both heavy, slow, and fast vehicular and motor traffic, each of which demands separate consideration, and possibly different methods of road-surface treatment. The plan accordingly provides for a centre footpath 9 feet in width; on the east side of the footpath a road for motor and light fast traffic 24 feet in width; and on the west side of the footpath, a road for heavy, slow traffic 22 ft. in width. This gives a width for highway purposes of 55 feet. The plan further shows on the westernmost side of the footpath a width of 14 feet reserved for light railway or trolley purposes, making a total width of land to be acquired of 69 feet. A scheme similar to this will doubtless control future road making in England, and existing roads may be reconstructed on a corresponding plan. One of the chief advantages in separating the several kinds of traffic would be in permitting different methods of surfacing to be used, and those best suited to the traffic adopted. Another adavantage would be the lessening of the chances of accidents. A third advantage would be the greater speed permissible to fast travelling.

SAN DIEGO, CAL., has attracted national attention in the United States by the recent feat of raising $2,000,000 for an Exposition to be held in 1915, simultaneous with the one for which San Francisco is now preparing. As a city of 50,000 population, this means a per capita subscription of forty dollars—an amount that may well set the tongue of civic pride and enterprise advocates "awag." Winnipeg is asking the Dominion Government to contribute a like sum ($2,000,000) towards the proposed Selkirk Centennial. With commendable enterprise the business interests of that city have already subscribed large amounts in order to assure the undertaking, and it seems that the Government could do much worse than to endorse by a financial grant, an event which promises to at least assume semi national importance.

* * *

THE NETHERMOST EXTREME so far reached in the size of modern commercial structures, finds expression in a diminutive reinforced concrete building which stands at the gore of Montgomery Avenue and Jackson Street, in the Californian city of San Francisco. This structural "lilliput," which is the outgrowth of a peculiar clause in the City's charter preventing the sale of municipal land, is in all likelihood, the smallest cass "A," or strictly fireproof commercial building on the American continent. It occupies a triangular site, having one frontage of 12 feet and ⅜ inches; another of 7 feet and ⅞ inches; and a base of 9 feet and 3 inches; while in total height the structure itself does not exceed 12 feet. Notwithstanding its limitation as to size, the building has been dignified by the architectural effort of Mr. Wm. Mosher, one of the city's foremost designers. The land is leased by the city for a sum of nine dollars a month, and the building which is occupied by a retail tobacconist, net a revenue in rentals which insures the owner a very satisfactory interest on his investment.

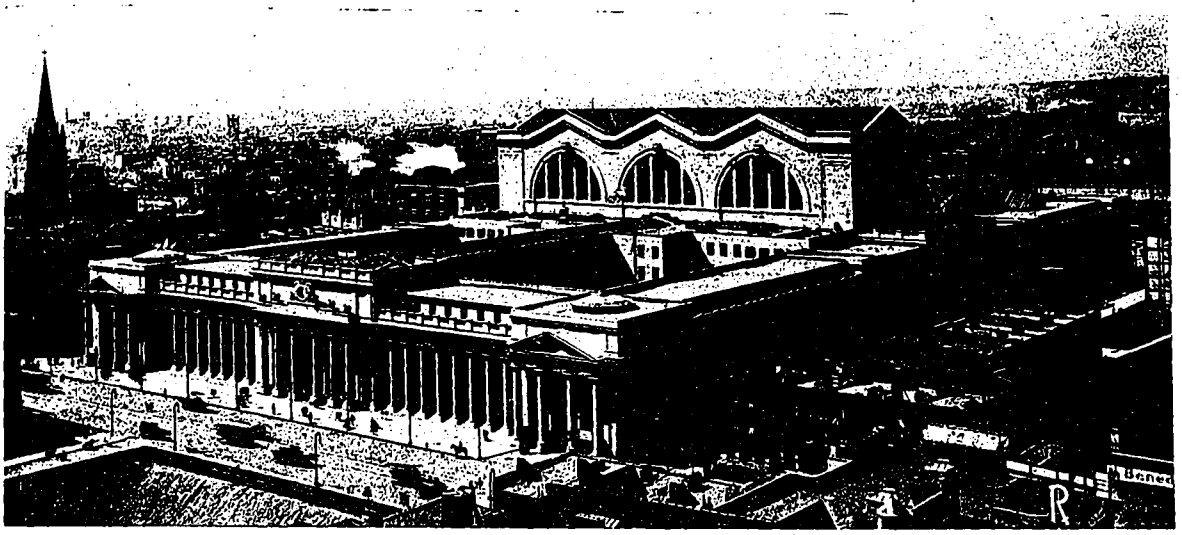
* * *

THE UNDERGROUND POSTAL RAILWAY, which has been under contemplation for several years past at Berlin (Germany), now seems likely to be carried out. A contemporary remarks, that a line built for experimental purposes is now under trial, and that this will serve as a model for the final construction. The present section consists of a 1,300 ft. subway, having double tracks, with a 1 ft. 5 in. gauge, on which is operated an electric locomotive working upon three phase current at 200 volts, coming from an overhead trolley line. The locomotive is about 5 ft in length and 1 ft. 6 in. high, and it is designed to run automatically with four small cars, each carrying a sack of mail, at a speed of 25 miles an hour. As to the actual subway which is planned, the project has not as yet been fully decided upon. It is designed to have a width of 6 ft. 6 in., and a height of 2 ft. 8in., with a trench between the two tracks to allow employees to circulate within the tunnel. One source of heavy outlay in building the line lies in the fact that it must pass under the Spree in two different places.

REMODELING OF OUR LADY OF LOURDES CHURCH.—Continued from Page 64.

separates the central portion of the church from the aisles, the ceilings being formed in a succession of small domes having central lantern lights, dispensing entirely with windows in the aisle walls. The arcade and dadoes are worked in Caen stone cement, and the communion rail is in marble, extending the full width of the church, with brass gates in the centre. Marble is also used for the sanctuary floors and steps, as well as for lining the large pier which rises to the cornice under the dome.

The new addition and alterations are being made from designs by Architect J. P. Hynes, Toronto; and the remodelled edifice, which is now nearing completion, is interesting as a structure which effectually combines the efforts of two designers laboring twenty-five years apart.



Bird's-Eye View of the New Pennsylvania Terminal, New York City, Which Occupies the Entire Ground Space Between Seventh Avenue on the East, Ninth Avenue on the West, Thirty-first Street on the South, and Thirty-third Street on the North, a Tract Comprising Twelve City Blocks, or an Area Equivalent to Twenty-eight Acres. This View Shows the Colonnade of the Seventh Avenue Façade and the Elevation Along Thirty-first Street. Together with its Site and Entrance Facilities into New York, this Terminal will cost in all $150,000,000. McKim, Mead and White, Architects.

THE NEW PENNSYLVANIA TERMINUS

Magnificent Station and elaborate track system built at enormous outlay to give Manhattan Island direct terminal service. The largest and most costly building ever erected by a private corporation.

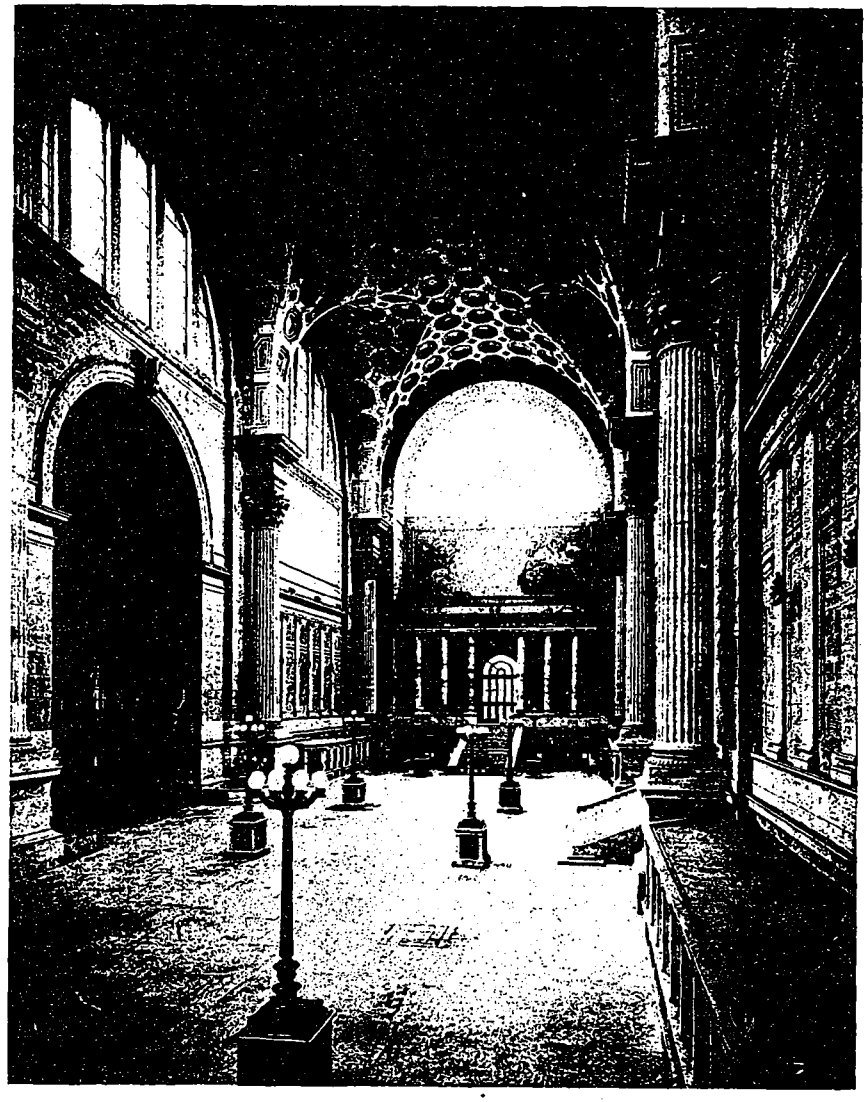
THE NEW TERMINUS of the Pennsylvania Railroad in New York City represents the greatest architectural and engineering undertaking of modern times. Architecturally, it is noteworthy because of its being a reproduction of a Roman Temple in "Cæsar's time," and from an engineering standpoint, it provides every convenience and accommodation known to modern building science that could be contrived in the most aggressive and second largest city in the world.

This magnificent monument to American wealth was built to bring New Yorkers three miles closer to the great system of the Pennsylvania Railroad. To give this service to Manhattan it cost the company $150,000,000—more money than was originally invested to establish a transcontinental railroad in Canada in the form of the Canadian Pacific system.

The completion of the Pennsylvania Terminus in itself, indicates the fact that railroad stations are more or less public buildings. By an expenditure of $150,000,000, a railroad in the United States has seen fit to provide for conveniences and accommodations that have never been dreamed of in England, or in Canada. Without one cent in the shape of a bonus or a subsidy, there has been planted in apparently the most remote portion of Manhattan Island the largest and most stupendous structure ever erected by a private corporation. While the Pennsylvania Railroad has been criticized to some extent for not having erected their new terminus closer to the usual avenues of traffic in New York, the location of the station, involving such an enormous expenditure has been well advised. New York, as most of the other large cities on this continent, has been prone to give too much importance to the avenues made popular by shopkeepers and office buildings. In other words, the Pennsylvania Railroad, in the erection of this great granite terminus, in what might be called the slums of New York, has done much to divert the traffic from 6th avenue and Broadway, and to rehabilitate a portion of the city that, unfortunately, has proven to be nothing else than a degraded tenement district.

The railway station problem, to Canadians generally, is not one of easy solution. Our railroads seem to have the impression that in the building of a structure of even mediocre design and construction they have done the community a favor. Very often the municipality in Canada is asked to go as far as to grant a bonus to have a railroad run through it. Our railroads in Canada have preyed upon every section of our Governmental system from the Federal Government down to the village council. To what extent our Canadian railroads in this connection have been able to pull the wool over our eyes is best shown by the fact that a great railroad on this continent finds it expedient to spend $150,000,000 to place their terminus three miles closer to the seat of the population that they aim to serve. The expenditure made in the Pennsylvania terminus, in the tunnels and structure, are greater than have ever before been incurred by a private corporation in a single undertaking. The building itself covers more territory than any other building ever constructed at one time in the history of the world. The Vatican, the Tuileries, the St. Petersburg Winter Palace, are larger buildings, but it took centuries to build them. The Pennsylvania Station is unique, covering as it does with tracks twenty-eight acres of ground, with

Approach to Arcade, Pennsylvania Terminal. In the Niche to Right is the Statue of the Late Alexander Johnston Cassatt, President of the Company, 1899-1906, "Whose Foresight, Courage and Ability Achieved the Extension of the Pennsylvania System into New York City." McKim, Mead and White, Architects.



Main Waiting Room, Pennsylvania Terminal, Showing the Dignified Severity Which Characterizes the Treatment of the Structure Throughout. The Vastness of This Interior Can be Better Appreciated From the Fact that the Height is 150 Feet. McKim, Mead and White, Architects.

exterior walls extending approximately one-half of a mile, all told, and having been erected in less than six years.

The main waiting room is patterned after the great halls and basilicas of Rome, such as the baths of Caracalla, Titus and Diocletian, and the basilica of Constantine, which are perhaps the greatest examples in history of large roofed in areas treated in a monumental style.

The interiors of the waiting room and arcade are built of Roman travertin stone from the quarries in the Roman Campagna near Tivoli, Italy; this being its first importation into the United States.

The main entrance to the station facing 7th avenue leads through an arcade, 225 feet long, 45 feet wide, to the main waiting room, which, with its width of 103 feet and length of 277 feet, and clear height of 150 feet, ranks as the largest in the world. Opening out from this room are two smaller waiting rooms each 58 feet by 100 feet, which are provided with the usual retiring rooms. On the same level also, is the main baggage room, 450 feet in length. The baggage is brought in and carried away through a special subway, and is delivered to the track below by motor trucks and elevators. Passing through the main waiting room, the traveller will find himself on a vast concourse 210 feet wide, which extends the full width of the station, and parallel with the large waiting room. The concourse stairs lead down to the train platforms on the track level, which is 40 feet below the street service. The concourse, which 340 feet long, is covered by a lofty glass roof supported by light steel columns and arches. Between the concourse and the tracks is a subconcourse 60 feet in width, which will be used for outgoing passengers only.

Commenting upon the completion of this, the world's greatest terminal, the *Scientific American* says as follows:

"The main facade on Seventh avenue is composed of a Roman Doric colonnade, with columns four feet six inches in diameter and thirty-five feet high. Allowing for its much greater scale, the main entrance is comparable to the Brandenburg Gate in Berlin. The main body of the building is about the same height as the Bourse of Paris, reaching, as it does, seventy six feet above the street level. The main entrance on Thirty second street is at the centre of this facade, and at each corner is a sixty three foot wide carriage drive, fronted by double columns and pediments. Midway along the Thirty-first and Thirty-third street sides of the building are similar columns and entrances to that on Seventh avenue.

"The passenger station building, which is 784 feet long by 430 feet wide, covers some eight acres of ground, and the construction of the exterior walls, which are nearly half a mile in length, required nearly half a million cubic yeards of pink granite. This and other stone work in the building ran up to a total of 47,000 tons, and to transport it from Milford, Mass., called for the service of 1,140 freight cars. Into the construction of the building there has also entered 27,000 tons of steel and 48,000 tons of brick.

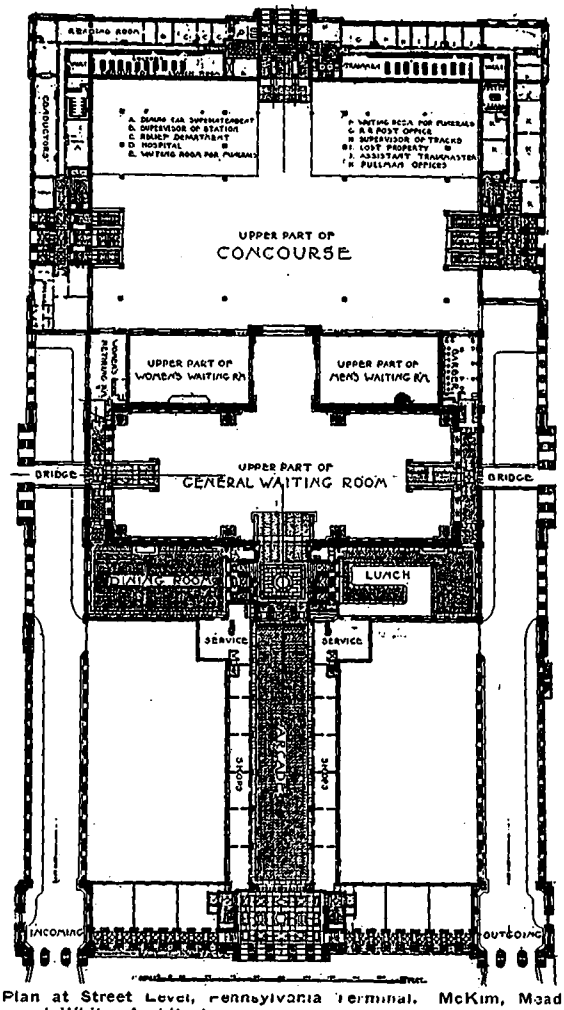
"The statistics of dimensions and quantities of materials are of such interest that we present the following from among these supplied by the railway company:

Area (10th avenue to normal tunnel section east of 7th avenue), 28 acres.

Length of trackage, 16 miles.

Number of standing tracks at station, 21.

Number of passenger platforms, 11.



Plan at Street Level, Pennsylvania Terminal. McKim, Mead and White, Architects.

Total excavation required, 3,000,000 cubic yards.

Length of retaining walls, 7,800 feet.

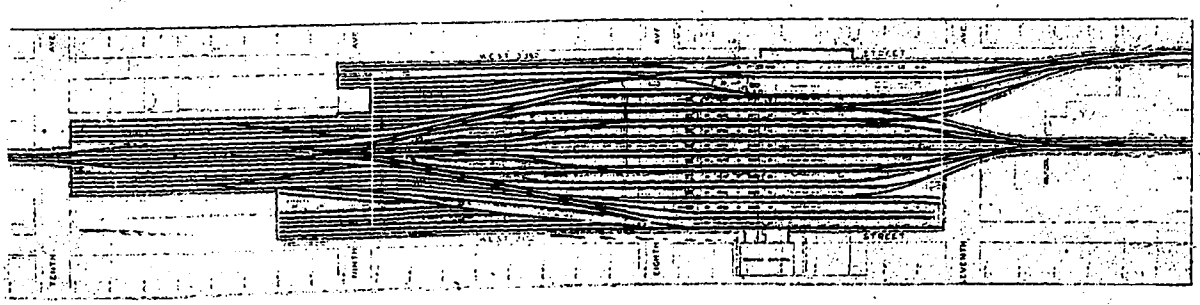
Number of lineal feet of streets and avenues carried on bridging, 4,400, or an area of about 8 acres.

Concrete required for retaining walls, foundations, street bridging and substructures, 160,000 cubic yards.

Number of columns supporting station building, 650.

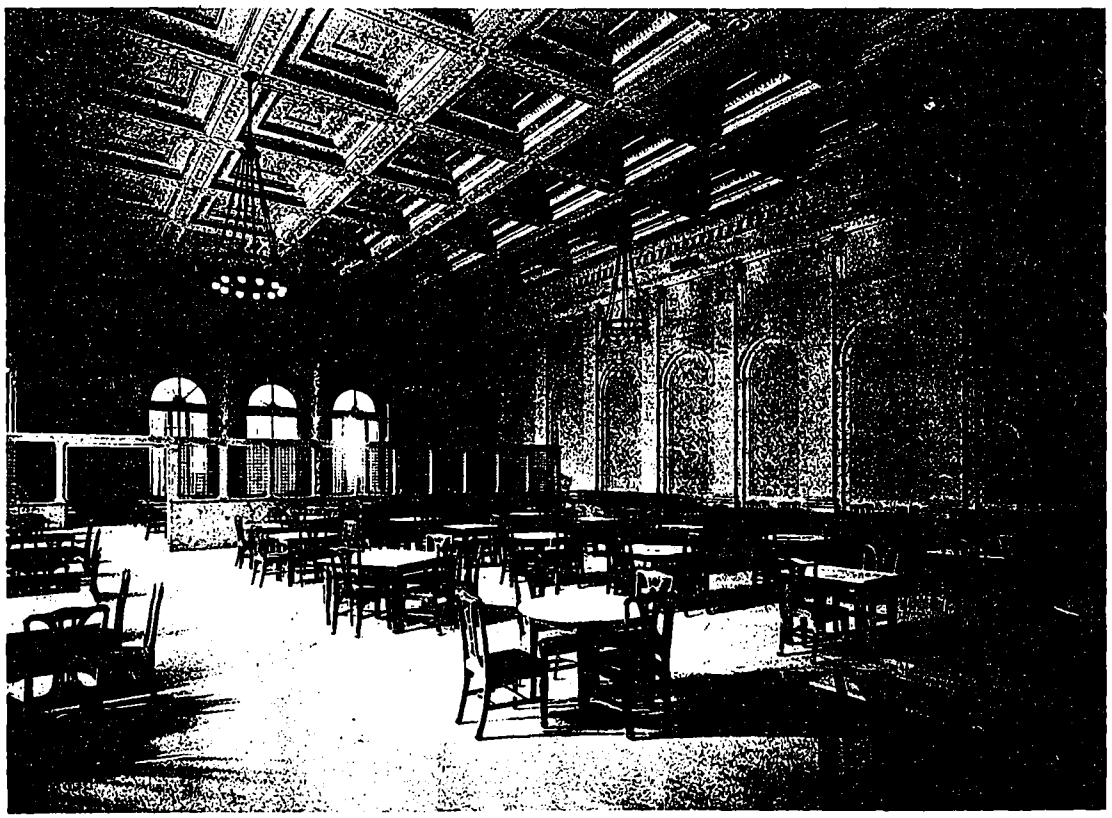
Greatest weight on one column, 1,658 tons.

Number of buildings removed on terminal area, about 500.

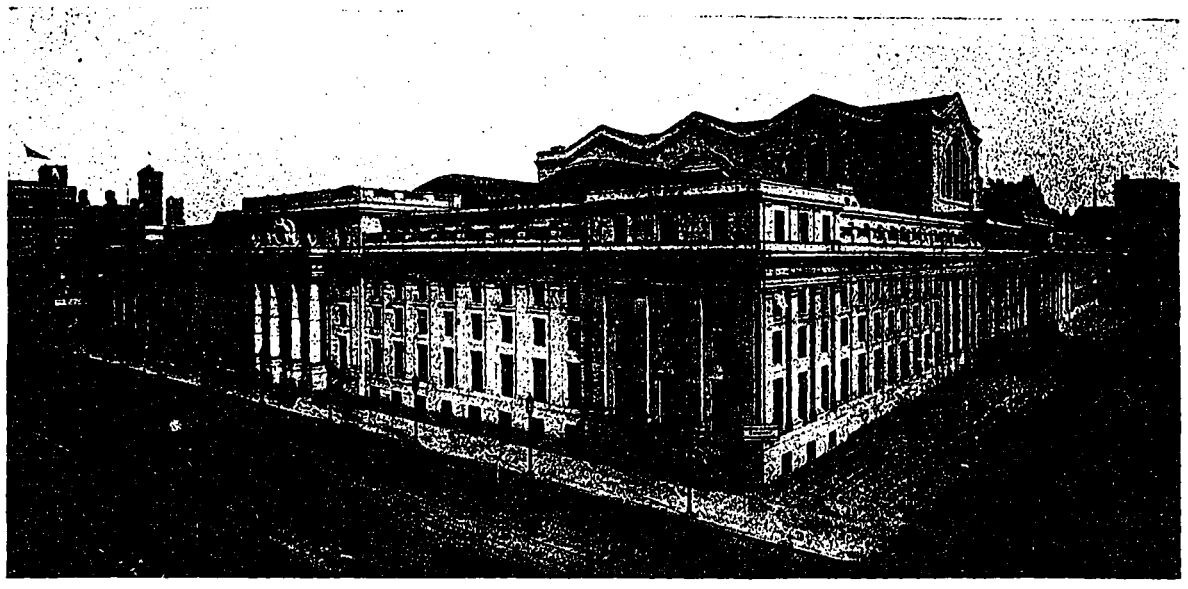


Plan of Huge Sub-Surface Yards of the Pennsylvania Terminus on Manhattan Island, Which Comprises in all Sixteen Miles of Track and Provides Accommodations for 386 Passenger Cars. The Whole of the Area, Which Includes Over Five Large City Blocks, Was Excavated to an Average Depth of 50 Feet Below the Street Level.

View of Arcade, Pennsylvania Terminal—Looking Towards Main Waiting Room, and Showing the Arrangement of Shop Space on Either Side. McKim, Mead and White, Architects.



Dining Room, Pennsylvania Terminal, Showing the Dignified Simplicity of the Wall and Ceiling Scheme. McKim, Mead and White, Architects.



The New Pennsylvania Terminal, as it is Seen from the Corner of Tenth Avenue and Thirty-third Street. McKim, Mead and White, Architects.

Boiler capacity of service power plant, ultimate, 5,000 horse power.

Total length of tunnel (2-track), Jersey to Long Island, 5.3 miles.

"After passing under the East River the four tubes reach Sunnyside Yard, the terminus of the Long Island tunnel extension, which covers some 153 acres of land. It contains 73 miles of track, and has a capacity of 1,550 cars. From the Sunnyside yard there are tracks leading to the New York connecting railroad, which will form a junction with the New Haven Railroad at Port Morris.

"An important feature of the New York tunnel extension is its relation to the Long Island Railroad, which is subsidiary to the Pennsylvania system. It is estimated that forty minutes will be saved between Long Island points and New York city by the operation of trains through the East River tunnels to the Pennsylvania station at Thirty-third street.

"The tubes under the Hudson River were driven by a special shield designed by Charles M. Jacobs, who is also well known as the chief engineer of the four Hudson River tubes which were simultaneously being driven for the Hudson Company's system of rapid transit tunnels. Contract for the North River tunnels was let to the O'Rourke Engineering and Construction Company. The shields were thrust forward by twenty-four rams capable of exerting a pressure of 3,400 tons. At first, the silt and other materials were removed through the doors in the front of the shield; latterly, however, the shields were pushed bodily through the material, and only about one-third of it was removed through the tunnel, being admitted through the doors in its lower face. The cast-iron lining of the tunnel is twenty-three feet interior diameter. The interior is lined with two feet of concrete, making the finished interior diameter of the tunnel nineteen feet. The weight of the cast-iron lining, with bolts, is from 9,609 to 12,127 pounds per lineal foot of tunnel. The weight of the finished tunnel with the heavier lining, when concreted up and equipped, is 31,469 pounds per lineal foot. The weight of the silt displaced, per lineal foot of tunnel, is 41,548 pounds. The weight of the tunnel with the maximum train load is 41,869 pounds per lineal foot.

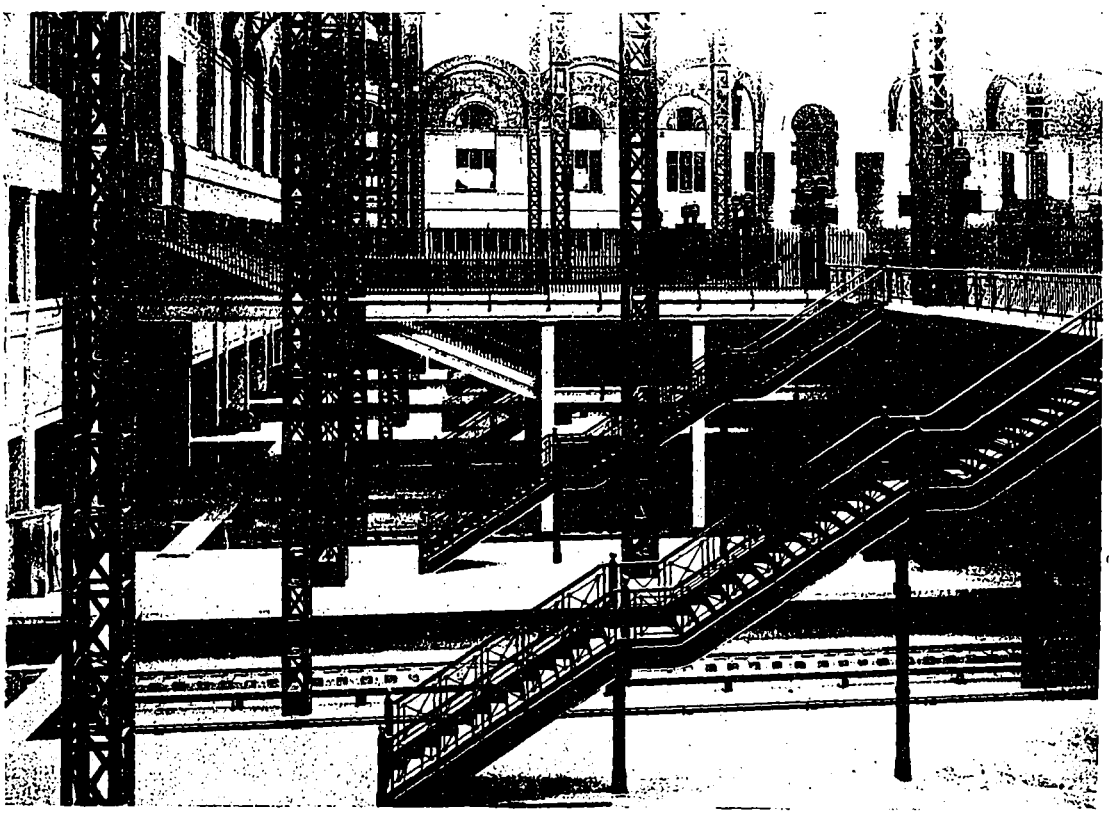
"Thanks to the very able and efficient engineering staff, the excellence of the contractors' equipment, and the harmony with which all concerned entered into the task of driving these tunnels, the work was carried through practically without a hitch, and considerably faster than the most sanguine expectations. The driving of the tunnels beneath the East River, which was in charge of Alfred Noble, past president of the American Society of Civil Engineers, was done by S. Pearson & Son, the contractors, of London, England. Because of the great variety and difficult nature of the material through which the tubes passed, much trouble was experienced at various times with blowouts; but ultimately these difficulties were mastered, and the tubes pushed through to successful completion.

"In computing the population of New York and vicinity within a circle of nineteen miles, drawn from the City Hall in Manhattan as a centre, there was in 1890, 3,326,998; in 1900 it had increased to 4,612,153, and in 1905 it had grown to 5,404,638. It is estimated that by 1913 the population of this territory will be about 6,000,000 people, and in 1920, 8,000,000. The railroads that have their termini on the western bank of the Hudson River carried nearly 59,000,000 people in 1886. In 1890 they carried over 72,000,000; in 1896 more than 94,000,000, and in 1906 they carried about 140,000,000 people. The significance of these figures was fully considered by the Pennsylvania Railroad, and the vast works they have undertaken are thought to be fully justified by the present and prospective growth of travel within the areas affected."

In its issue of September 10, the same publication makes the following remarks in connection with the opening of this station:

"The station itself is a magnificent structure (certainly the finest in New York city), and worthy to rank as one of the notable buildings of the world. It has a frontage on the streets of 788 feet, and of 432 feet on the avenues. In designing the exterior of the building Messrs. McKim, Meade & White, the architects, endeavored to embody two ideas: To express not only the exterior design of a great railway station in the generally accepted form, but also to give to the building the character of a modern gateway and entrance to a great metropolis. Keeping these two objects in view, the plan of the station was so drawn as to give the greatest number of lines of circulation for the passenger traffic possible. The structure has been described as a monumental bridge over the tracks, with entrances to the streets and the main avenues, and on all four sides, thus affording a maximum of entrance and exit facilities. The imposing Seventh avenue facade symbolizes in the most impressive manner a monumental gateway. It is composed principally of a Roman Doric colonnade, each of whose columns is 4 feet 6 inches in diameter and 35 feet high. From this entrance an arcade

Upper Portion of Concourse, Pennsylvania Terminal, Showing the Steel Framework and Overhead Glass Enclosure. McKim, Mead and White, Architects.



Track Level in Concourse, Pennsylvania Terminal. McKim, Mead and White, Architects.

45 feet wide by 225 feet long leads to the main waiting room, entrance to which is made by a grand stairway 40 feet wide, at the head of which is a striking statue of Alexander John Cassatt, the moving spirit, during his later life, of the great work which has just been thrown open to the public.

"Apart from its long reaches of imposing facades, the distinctive feature of the station is the waiting room, which is 314 feet 4 inches in length by 108 feet 8 inches in width, and whose stupendous vault spans the great interior at a height of 150 feet above the floor.

"This magnificent hall, dignified with massive, classic columns, and enriched by the warm soft tones of its clothing of travertine stone, is one of the most impressive interiors in the world. In clear height it is matched only by the nave of the Cologne Cathedral.

"Parallel to the main waiting room, and of equal length, and 200 feet in width, is a concourse from which access is had to the platforms below by stairways.

"It should be mentioned that the storage tracks of the station will accommodate 386 cars, and that there at the station some four miles of standing tracks. The station contains eleven passenger platforms, with 25 baggage and express elevators. The maximum capacity in trains per hour of all the tunnels is 144, and the initial daily service will consist of about 600 Long Island trains, and 400 trains to and from the Pennsylvania system to the West.

"Not the least important of the improvements has been the electrification of the Long Island system, which, now that the new station is open, is placed in close relation with the heart of Manhattan Island. The service will be operated by multiple-unit trains, running under short headway. As evidence of the valuable character of this improvement, it may be mentioned that Jamaica (L.I.) is now brought within 18 minutes of Manhattan, and that similar reductions have been made in the schedule to other Long Island towns.

"While the service to Long Island will be worked by multiple-unit trains, that to the West, consisting mainly of through express trains, will be operated by the huge locomotives, each of which has a capacity of 4,000 horsepower, exerting a drawbar pull of 60,000 pounds, and weighing complete 166 tons."

The *Architectural Record* of New York has published the following architectural criticism of the structure proper, which is interesting:

"The excavations and the edifications of the new Pennsylvania Terminal have been made in a neglected quarter of Manhattan which not one Manhattanite in a thousand has occasion to visit from year's end to year's end. That, in fact, from a civic point of view, is one of the interesting points about the undertaking, that it is a project of reclamation as well as of "reclame." One of our chief civic needs is that of multiplying and scattering "centres." To establish a new centre which shall serve to divert traffic from the old ones and relieve their congestion, which shall create or enhance values in a neglected and derelict neighborhood is a civic benefaction, even though the enterprise was entirely selfish on the part of its promoters. The successful establishment of a new centre pays for itself very speedily, in so great and growing a city as New York, in the "unearned increment" of the value of the surrounding land. The success of this establishment may be already assumed. The terminal and the post office together insure the creation of what may fairly be called a new city on the shore of the North River.

"Doubtless this aspect of the improvement has been or will be dwelt upon sufficiently by the Pennsylvania's Press Bureau. It is only the strictly architectural aspects of the project that invite and indeed compel illustration and comment from an "Architectural Record." Probably no larger and costlier building than the station has been under construction concurrently with it. Certainly no larger. There are other buildings of greater cubical contents contemporaneous with this, notably the Metropolitan Life in New York, and very many superior in altitude have been going on at the same time. In fact it is the lowest big building of recent years, only the New York Public Library, of buildings in the same city, having so little height in proportion to its area. But the area of the station is enormous. The frontage, from Seventh to Eighth avenue, is almost exactly the same as that of the Capitol of the United States, including the wings. There is nothing in New York anywhere near as long, excepting the front of the Museum of Natural History, which one supposes to be about the same. The Metropolitan Life, indeed, occupies a block front each way. But the block from Madison to Fourth is, of course, only half a "long block," half the distance from Fourth to Fifth avenues, the other half being occupied by Madison square, whereas the new station occupies the whole space from Seventh avenue to Eighth. And the other dimension is equally exceptional. The closing of Thirty-second street west of Seventh avenue gives the shorter fronts the unequalled length of 430 feet. The area is thus not far from 300,000 square feet, half as much again as that of St. Peter's, nearly three times that of Milan. Doubtless we are dealing with a "big thing." To find an American building of as great area as the new station, we should have to recur to the temporary and occasional architecture of the fairs of Chicago and St. Louis.

"The lowness is, of course, an architectural advantage in the sense and in the degree that it emphasises the horizontal extent of these walls. Excepting the emergence of the roof of the great concourse at the centre in what is virtually a sort of transept, though it is not carried out to the street fronts, the enormous spread of the structure has a height of only three moderate stories and a moderate attic. The level line of the cornice, unbroken except by the moderate projection of the portico at the centre of each front, stretches away interminably to an undeniably impressive effect which might, it seems, have been enhanced by a more pronounced and emphatic base-moulding. Everything, indeed, concurred to enable the architects to emphasize this "horizontal extension" which, according to Freeman, is the character of "classic" as vertical extension is of Gothic, and as "rest," or immobility, is of Romanesque. No doubt the classic effect is attained, especially in the most elaborated and "important" front, the Eastern, which contains the main entrance, and carries a colonnade along its whole extent—

> As where, from Pluto's garden Palatine
> Mulciber's columns gleam in far piazzian line.

Another adventitious advantage, especially for a strictly classic treatment, the architects had in the comparative blankness of the walls, at least of the most conspicuous walls. An American architect in the days of the old Greek revival incurred just enough ridicule by saying that modern architecture would not be so difficult if it were not for the windows. In other words, if men would be content to live and do business behind blank walls, their claims would not conflict with those of the buildings which they foolishly imagined to be meant for their accommodation, holding that architecture was made for man, not man for architecture. Of course the retort upon the foolish architect was obvious that if classic architecture did not allow for the admission of necessary light, it was his business to find or make some architecture that did. All the same, the foolish man was right enough from his point of view. In the Greek and Greco-Roman templar architecture, the portico, the colonnade, which is to say the architecture, was relieved against the absolutely blank wall of the cella, and doubtless it was much more effective with that relief than with any form of opening whatsoever in the intercolumniations. When the Romans undertook "miscere utile dulci," to unite the practically necessary with the architecturally agreeable, they used the order which was the entire construction of the temple as a kind of trellis to overlay a construction of arches, so that the Roman building involved a contradiction which was never reconciled until what Freeman calls "the classical or transitional Roman" had ceased for some centuries to be built,

Even now, an architect who starts out to make his architecture out of the "orders" is very lucky if he can ignore the openings and produce a building

> Where the blank windows blind the wall
> From pedestal to pedestal.

That good luck has befallen the architects of the Pennsylvania station in unusual measure. It results from the lowness, the prospective shows, that the interiors can almost all, or almost all on the conspicuous and "architecturesque" fronts, be lighted from above, or from courts, and that the walls can be treated as mere backgrounds or foils for the colonnade. That is conspicuously the case on the principal or eastern front. And nearly half way down the side, or until you come to the central portico of the entrance, the order, here subdued from columns to pilasters, is relieved against a wall virtually blank, to the great enhancement of the architectural effect. The western front is apparently the "business end" of the structure. It accordingly contains four tiers of practicable windows. The architects have hardly attempted to bestow more abundant comeliness upon these more uncomely parts. They have simply carried through the order, in the form of pilasters, and make the openings mere rectangular holes, not "treated" architecturally at all, but recognized perforce as an ugly necessity. This, you will observe, is precisely the method adopted in the public architecture of Washington, in the Treasury and the Patent Office, by the Greek revivalists of half a century ago. It is hard to see what better could be done, given the primary commitment to strictly classic architecture. It is true that one cannot exactly see a Greek architect resorting to such a confession of impotency. But still less can one see a Greek architect resorting to the hybrid construction of the Imperial Romans. If not what a Greek architect would have done, it is exactly what Isaiah Rogers and Thomas U. Walter and Robert Mills and Amni B. Young would have done, if they had had all this money to spend and all these dimensions over which to spread themselves. It is what they would have done for it, it is what they did. In fact, the exterior of the Pennsylvania station, with one notable exception, is what would have been done in this country seventy years ago. It has no trace of the later inculcations of the beaux-arts. There is no more taint of "modernism" about it than about a Papal allocution. This must not be taken as dispraise of the architecture. Quite the contrary. Given Greek architecture, the absence of anything "smart" or modish, or modern, is an advantage as an adherence to the type that has "pleased many and pleased long."

"Doubtless the structure has the defects of its qualities, and also of its conditions. The lowness, the massiveness, the solidity and the blankness make for g'oom as well as for dignity. The poet may be right in saying that

> Stone walls do not a prison make.

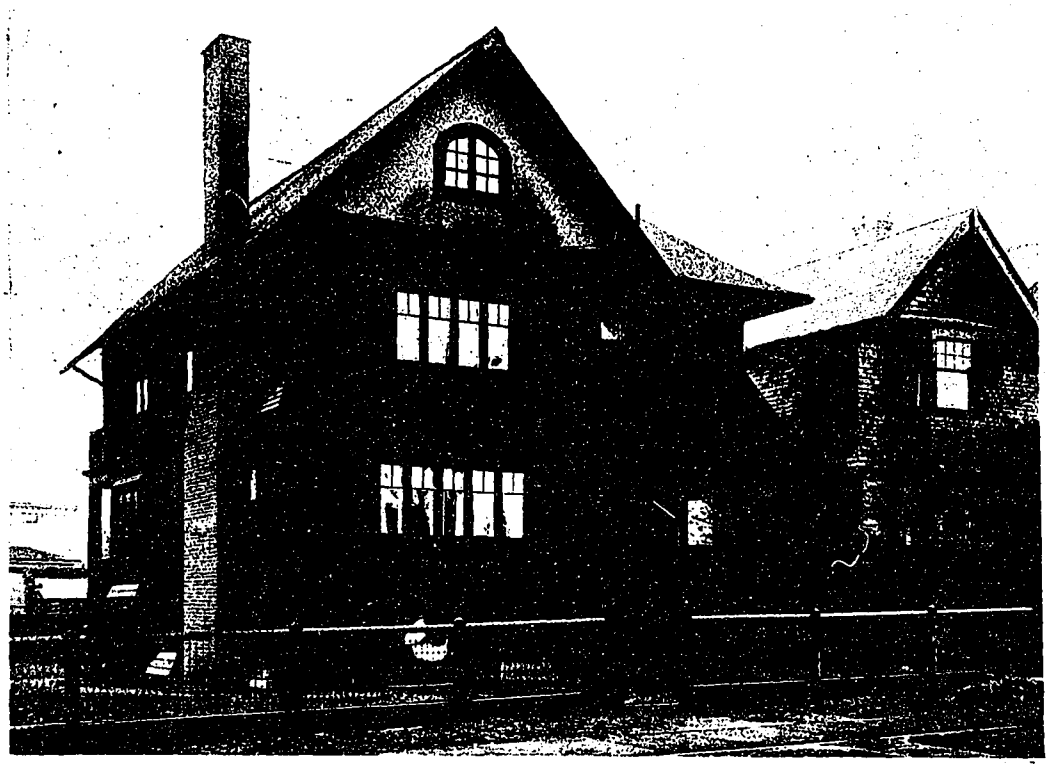
But these stone walls do. A stranger set down before this Seventh avenue front, out of sight of the emerging mass at the centre, and told to guess what it was all about, would be apt to guess it a good substantial jail, a place of dentention and punishment of which the inmate were not intended to have a good time. The simplicity of arrangement and detail furthers this impression. The plain unfluted Roman Doric of the order, of which this is an impressive example, is the most "serious" of the orders, as serious as the Greek Doric in the modern, not the Greek use, in which it is not relieved and enlivened by sculpture or by color, and more so than the sprightly Corinthian, or even than the Ionic, of which the voluted capital has an interest in itself to which the Roman derivative Doric does not pretend. The carving of the porticoes, excellent as it is in adjustment in scale and in execution, by no means suffices to relieve the sadness of the interminable fronts. The architecture raises one or two questions which it does not answer. Why should the central intercolumniations of the porticoes be wider than the others? And particularly why should the otherwise unbroken horizontality of the design be subjected to the single exception of the projected pediments of the terminal pavilions on the Seventh avenue front, when the pediment does not reappear at the centre, nor on the sides of the same pavilions, nor anywhere else throughout the vast structure? It has undoubtedly an anomalous air. If it be meant to denote and signalize the corridor to which the portals under the pediment give access, it is manifest that this purpose would be equally secured by a reduced reproduction of the central portico, in the same plane with it, and like it crowned with a pedestal instead of a pediment, relieved against the flat attic. If it be an attempt to enliven the architecture, and to relieve it of monotony, the attempt has plainly miscarried. And in fact, the monotony of the building, the interminable sequence of "magnitude, uniformity and succession" is not only connected with its artistic quality, but is its artistic quality. It seems a mistake to have disturbed it, most of all to have disturbed it in one solitary instance. For the impressiveness of the building is very great. Whatever abatements and qualifications we may be moved to make, it is securely one of our public possessions, and liberal owners and sensitive and skilful designers are entitled to the public gratitude for so great and grave an example of classic architecture.

"Much of the interior work is of the same grave and simple character as the exterior, and here we may perhaps expect that, in the fulness of time, the gravity and simplicity will be relieved without being disturbed, by mural decoration. The tympana in the loggia of the entrance seem to have been reserved expressly for such an enrichment. One may walk for long distances in the interior, as he may inspect the entire exterior, without once being reminded that "we live intimes unknown to the ancients." The most emphatic recognition of that fact is in the treatment of the great hall, or "concourse," both inside and out. "Modernism" and Gallicism are unmistakably indicated from the outside by the emerging mass of the transverse roof, with the three heavily mullioned arches, each decorated with a protruding keystone, and covered with its own low gable. Within, an enormous and lofty shed of iron and glass is an architectural feature for which no classic precedent exists, since no Greek architect or Roman engineer ever had occasion to treat such a construction. Originality, or at least modernism, is here enforced. The architectural treatment is constructional and straightforward, with as much, perhaps, as the case admits, of the gravity and simplicity of the abundantly precedented design of the exterior, but with necessarily much less of the impressiveness of massiveness, and of the monotony which the massiveness here entails. But of the design, classic or modern, in masonry or metal, one has to own that its dignity everywhere escapes frivolity. In the language of Mr. Edmund Sparkler, there is no nonsense about it."

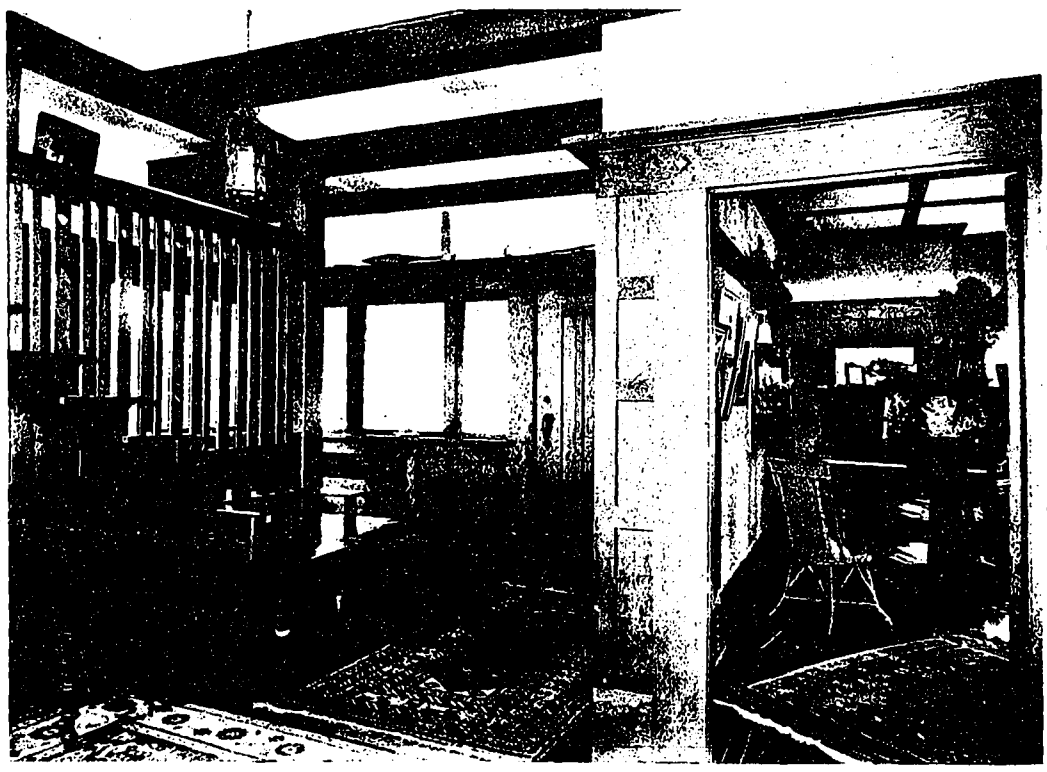
"KITCHENETTE APARTMENTS," consisting of suites of two rooms, one of which, as the name indicates, is a kitchen on a decidedly small scale, are growing in popularity in New York City. Generally speaking, the kitchenette is equipped with a sink with running water, an ice box, a one or two hole gas cooking appliance, a small dish closet and a dumb-waiter or some other means of receiving supplies. In short, the up-to-date kitchenette may be said to consist of a miniature kitchen minus laundry tubs, gas range and perhaps an outside window. It occupies a comparatively little space, is easily looked after and yet is equipped so that the tenant may prepare a simple hot meal for one or two persons without the necessity of resorting to that Mecca of the furnished-roomer —the delicatessen store. The demand for this type of kitchenette has grown to such an extent that many builders in putting up apartment houses now provide from six to eight kitchenette two-room apartments, and even some former furnished room houses have lately been altered so as to provide the same convenience.

Bungalow of H. J. Simmons, Vancouver, B.C.—The Low, Broad Lines and Massiveness of the Design, make the Heavy Timber Effect and External Construction of this Dwelling Eminently Suitable. E. Stanley Mitton, Architect.

Ingle Nook, Residence of H. J. Simmons—An Inviting Corner Forming a Feature of the Living Room, and Carried Out Entirely in British Columbia Fir. The Small High-Placed Windows in Art Design, are Both Novel in Character and Appropriate to the Particular Treatment Employed. E. Stanley Mitton, Architect.

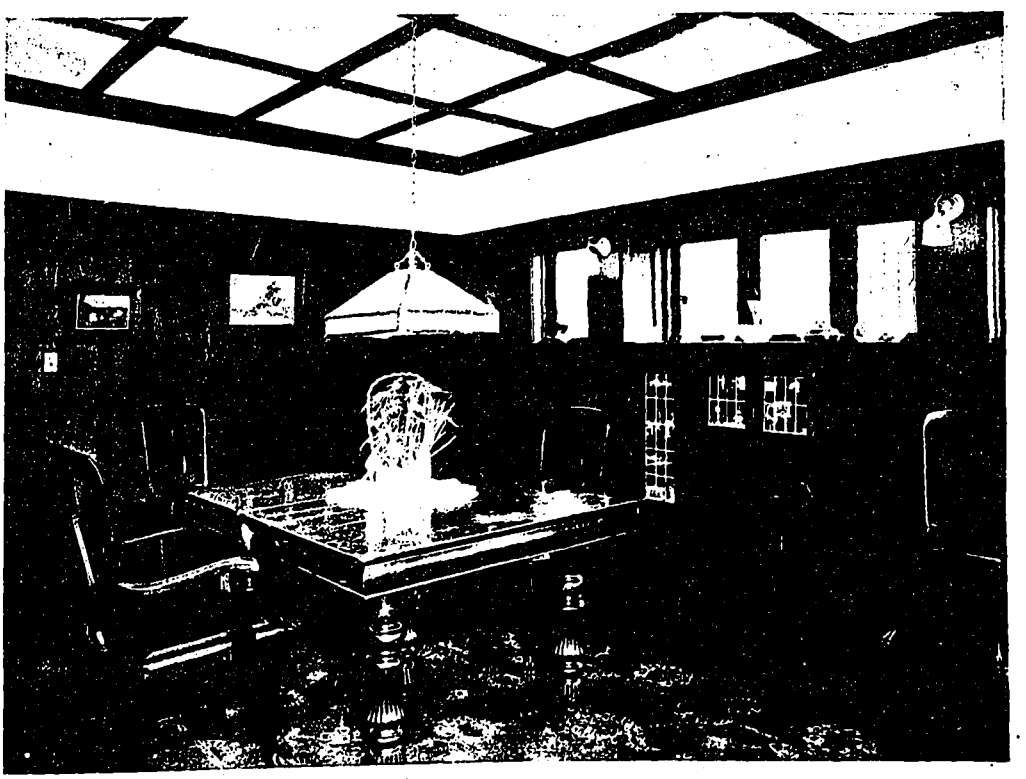


Residence of H. D. Hulme, Vancouver—A Clapboard and Shingle House, which Typifies the Construction Usually Prevalent in British Columbia for Small Moderate Priced Dwelling Structures. E. Stanley Mitton, Architect.

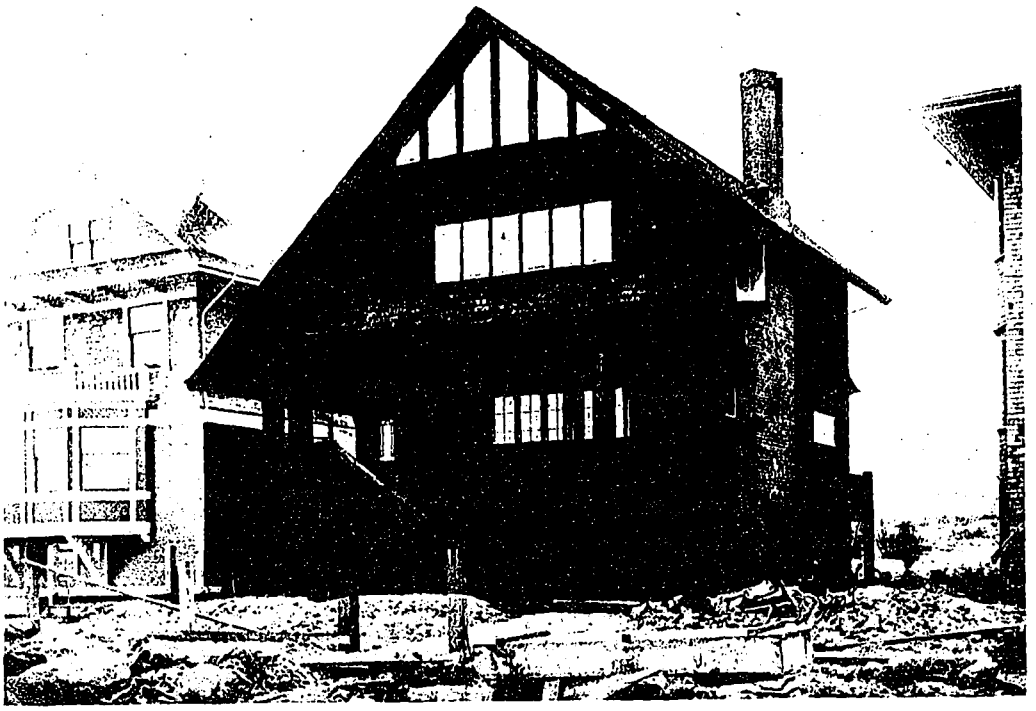


Hallway, Residence of H. D. Hulme—Looking Toward the Entrance and Living Room, and Denoting in its Treatment an Interior that is Both Comfortable and in Good Taste. E. Stanley Mitton, Architect.

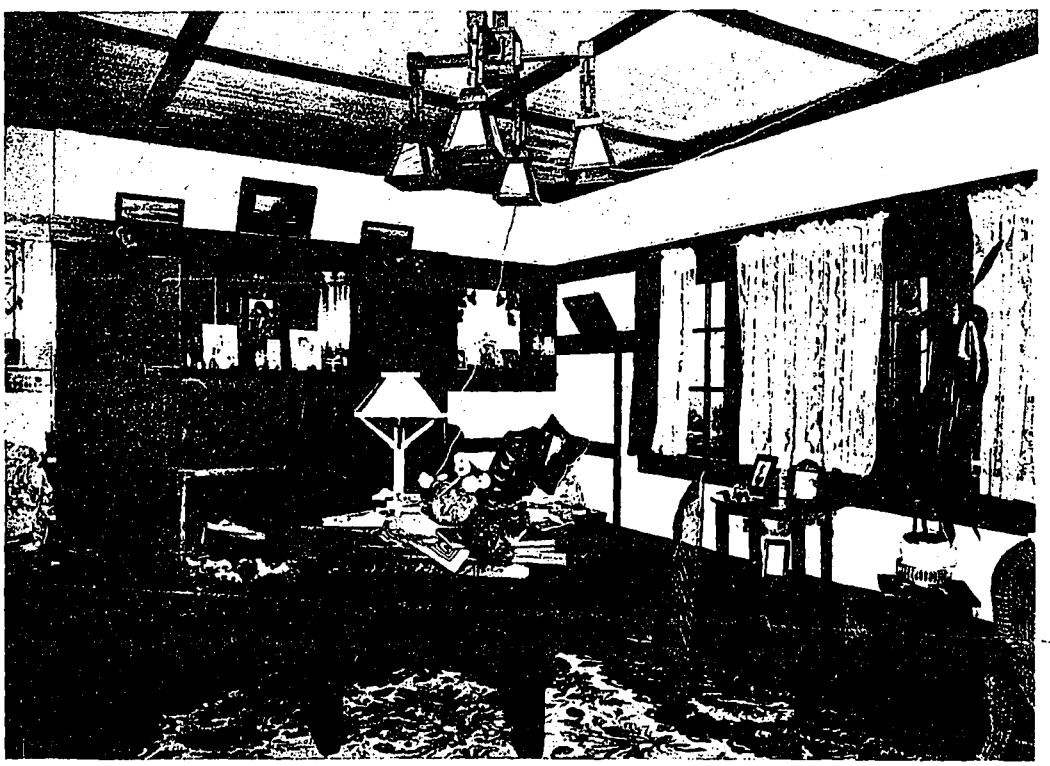
Living Room, Residence of H. D. Hulme—Note the Cross Strapping of Ceiling, and the Attractiveness of the Scheme in General. E. Stanley Mitton, Architect.



Dining Room, Residence of H. D. Hulme—In Keeping W ith the Architectural Character of the Living Room. The Sideboard with Windows Above is a Noteworthy Feature. E. Stanley Mitton, Architect.



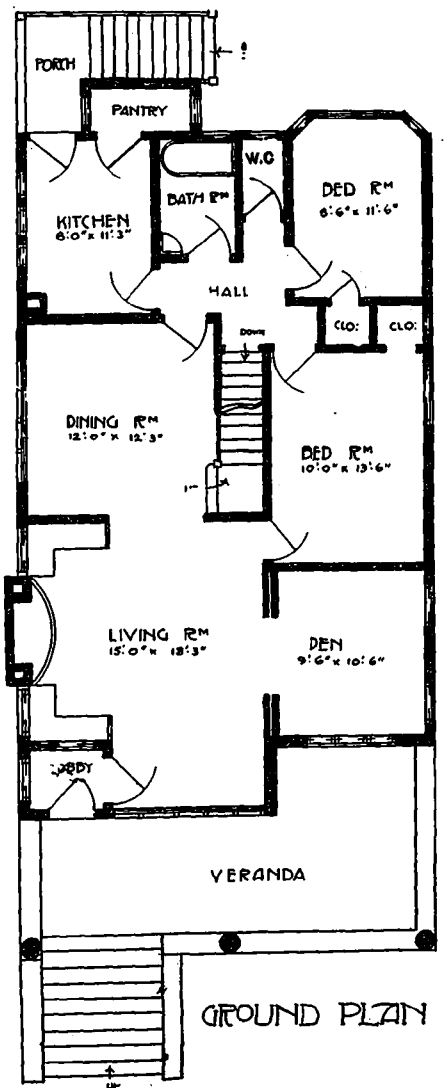
Residence of A. P. Watkins, Vancouver—A Small House Which is Made Interesting by Sheltering Roof Lines and Effective Window Grouping. E. Stanley Mitton, Architect.



Living Room, Residence of A. P. Watkins—Showing the Tile Fireplace and Simple Wall Treatment. E. Stanley Mitton, Architect.

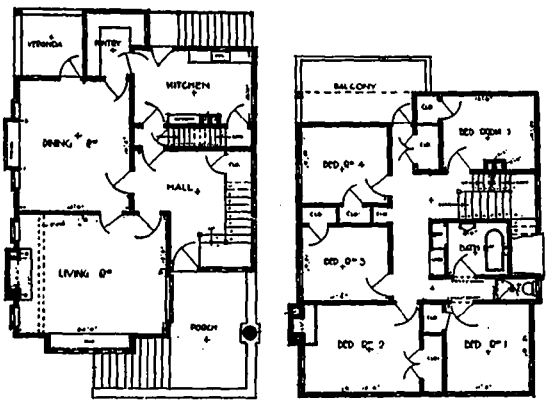
WESTERN BUNGALOWS.

FOR LOW PRICED, moderate sized dwellings, it is doubtful if any particular style in domestic work, admits of greater opportunities for individuality of design and inviting homelike interiors than that of the bungalow. By adopting such characteristic features as may be considered representative, and studying the



Floor Plan, Bungalow of H. J. Simmons, Vancouver, B.C. E. Stanley Mitton, Architect.

small house from the most logical standpoint, it is not only possible to produce a dwelling structure that is artistic, convenient and modern in its entirety, but one that is in itself unnecessarily expensive. As regards Canada, the bungalow type of residence occurs with general frequency in the Pacific Coast district, and even a large number of good examples are to be seen as far east as Edmonton, but more this side little has been done in this particular style of design. Several exterior and interior views of Vancouver bungalows are illustrated on the accompanying pages. These typify to an extent the character of comfortable and inexpensive homes that are being erected in that city. It might be said in this connection, that the architects of British Columbia have, in a large number of cases, succeeded in producing most excellent results, and the true, simple, homelike effects as seen in some of their better designed bungalows, is something which the eastern designer can study to advantage. As a rule, only simple element of composition are employed, and mainly the results are obtained from well-poised and well- restrained lines, simple window grouping, low, sheltering roofs, convenience of plan, and effective ex-



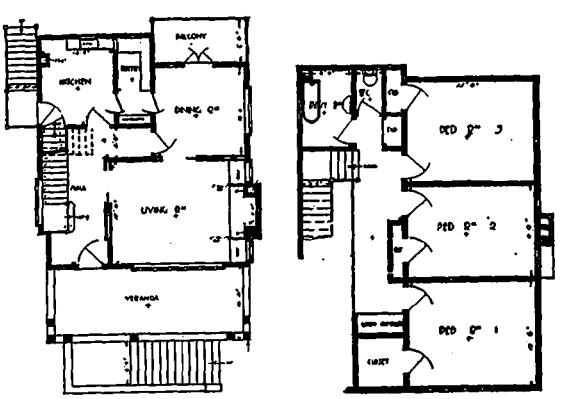
Ground and First Floor Plan, Residence of H. D. Hulme, Haro Street, Vancouver, B.C. E. Stanley Mitton, Architect.

terior and interior stains. Of course, British Columbia fir, owing to its availability, is material usually employed for both external and internal work; and while this wood in its rich grain, and splendid staining surfaces gives opportunity for certain effects, yet this in itself is purely a secondary advantage as the design and architectural scheme could be equally as well reproduced in the materials common to other vicinities.

HE USE OF WOOD BLOCK PAVING IN GERMANY

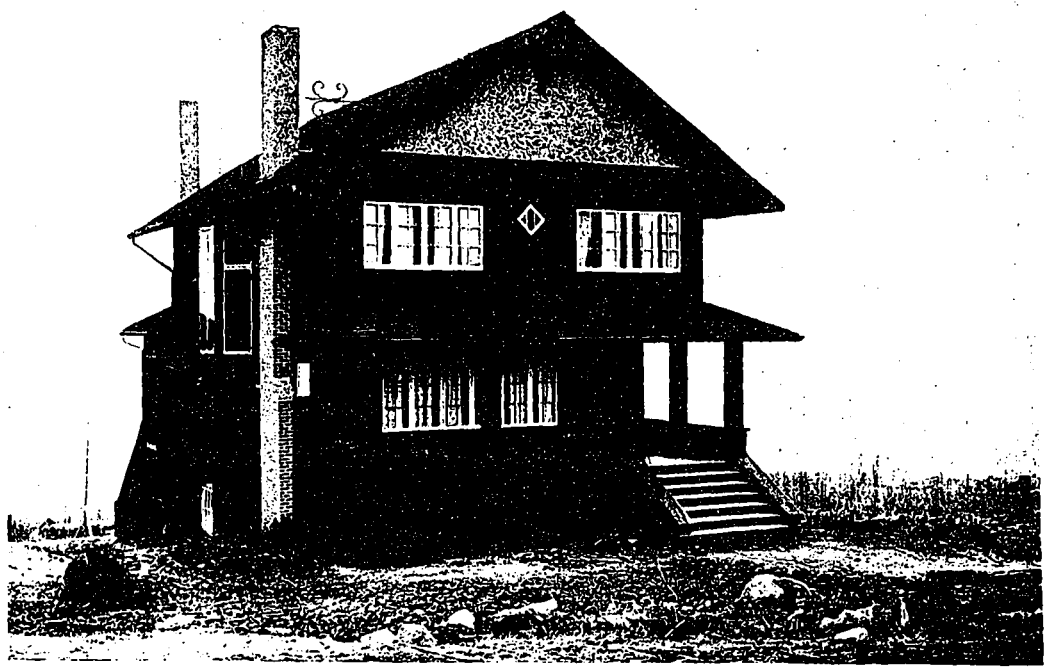
Varieties of wood employed, method of impregnation, foundation work and manner in which blocks are laid.

ACCORDING to the latest statistics issued by the authorities at Berlin, Germany, less than 2 per cent. of the street pavement of that city consists of wood blocks. The varieties of wood blocks most used are Swedish pine, and, to a more limited extent, the Australian hard-wood varieties, tallow-wood and black-butt.



Ground and First Floor Plan, Bungalow of A. P. Watkins, Fourteenth Avenue, Vancouver, B.C. E. Stanley Mitton, Architect.

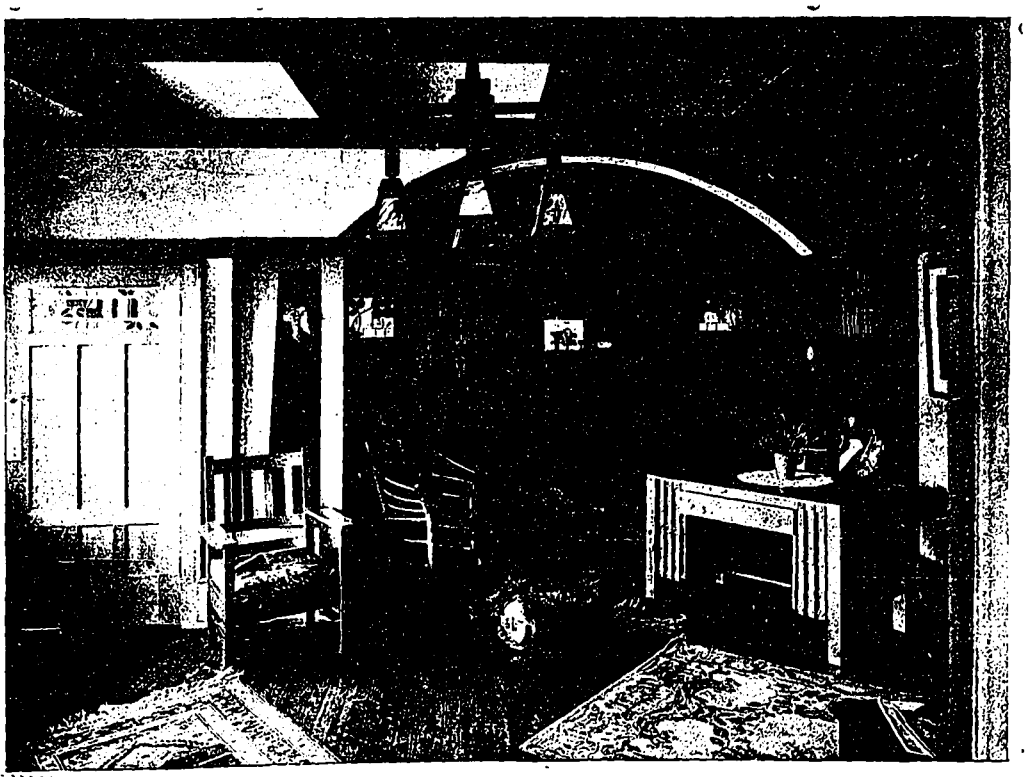
The native pine and beech varieties are, however, also used in Germany, as are also the American cypress and yellow and pitch pine. The wood used is carefully selected and free from knots and cracks. It is considered unwise to use in the same section of pavement, woods



Residence of Fred J. Calvert, Vancouver, B.C.—A Shingle Clad Dwelling of Moderate Size, Designed to Admit of a Well Arranged and Convenient Interior. E. Stanley Mitton, Architect.

Hallway, Residence of Fred J. Calvert—With its Built-in Window Seat and High Wall Panelling, a Similar Wall Scheme Being Seen in the Dining Room Through the Opening on the Left. E. Stanley Mitton, Architect.

Residence of W. O. Webster, Vancouver, B.C.—While Characteristic of the Bungalow in Design, this House is Placed on a High Foundation, in Order to Take Full Advantage of the View Which its Site Commands. E. Stanley Mitton, Architect.



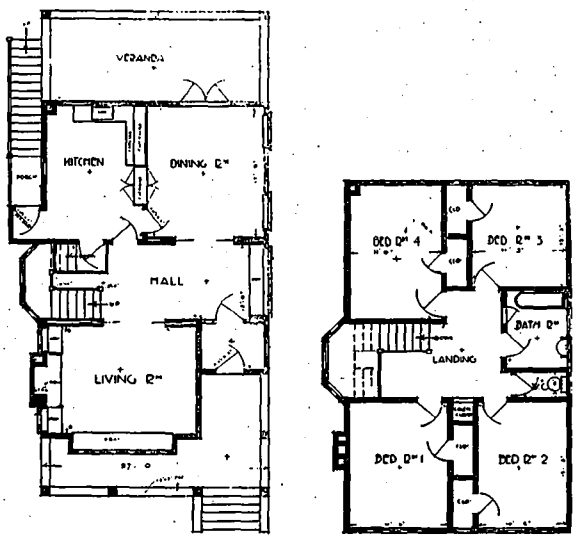
Ingle Nook, Residence of W. O. Webster—Note the Treatment of the Architectural Scheme, and the Simple Design of the Fixtures and Furniture. E. Stanley Mitton, Architect.

from different countries, wood gathered at different altitudes, or wood of different species.

The dimensions of the paving blocks vary, the width ranging from 7 to 10 centimeters (2.75 to 3.94 inches), the length from 18 to 30 centimeters (7.09 to 11.81 inches), and the height from 12 to 18 centimeters (4.72 to 7.09 inches). The so-called Paris standard dimensions are 7.5 by 22.5 by 15 centimeters (2.96 by 8.86 by 5.9 inches).

Impregnating the Blocks.

To prevent decay, the wood blocks are impregnated with a zinc chloride solution or with creosote oil. The zinc chloride solution (3° B.) contains 2 parts, by weight, of chloride of zinc ($ZnCl_2$) and 30 parts, by weight, of water. The creosote oil should contain not less than 5 per cent of creosote and not more than 15 per cent. of naphthalin, and is distilled at between 180° and 270° Cel. The specific weight of the oil is 1.07. The creosote oil impregnation is considered preferable because it also serves to forestall the subsequent swelling of the blocks by dampness, after they have been set, and the resulting bulging of the pavement. To impregnate



Ground and First Floor Plan, Residence of Fred. J. Calvert, First Avenue, Vancouver, B.C. E. Stanley Mitton, Architect.

with creosote oil, the blocks are dried out for three to four hours in a tank or boiler at a temperature of 100° to 140° Cel., when they are transferred to another tank and allowed to remain for an hour in a vacuum of one-tenth to one-fifth of an atmosphere, after which creosote oil, which has previously been heated to approximately 50° Cel., is pumped in and forced into the wood under a pressure of 6 to 8 atmospheres.

A combination of the creosote and zinc chloride impregnation is the so-called English system in which a mixture of crude carbolic acid or creosote and a water solution of zinc chloride is used. This method is that employed to a large extent in southern Germany and Austria, and is said by German authorities to give the best results from the point of view of the preservation of the wood blocks.

Still another impregnation method, which was first used in Paris, and is now employed considerably in Germany, consists in immersing the paving blocks in large tanks containing a mixture of gas tar and heavy oil, and allowing them to remain until thoroughly saturated. The time of immersion varies from a few minutes to three-quarters of an hour. In Paris this system has been altered by the omission of the tar. The paving blocks are packed in box-shaped wagons which are run under a pipe leading from the oil tank from which the wagons are filled. After the blocks have become saturated, the remaining oil is drawn off at the bottom of the wagons and pumped back into the tank. A variation of this method has been made in Germany, in that smaller boxes are used and so arranged that all the blocks to be impregnated may be put into the boxes and all taken out at the same time. This system has been proved equally successful with that used by the French, but from the German standpoint none of the last-mentioned systems are as efficient as the English method described, because the oil has not an opportunity to penetrate as deeply into the blocks.

Constructing Wood Pavements.

In constructing the wood pavement, the lower sides of the impregnated blocks are first dipped into hot tar or asphalt and then laid in a carefully prepared level layer of concrete, of from 15 to 20 centimeters thickness (5.9 to 7.87 inches). The blocks are set side by side close to each other, a space however, of from 2 to 5 millimeters (0.079 to 0.197 inch) being left at the ends between the rows. This space is filled with tar and in some instances with asphalt. When asphalt is used, the intervening space is twice as large as when tar is the binder. To gauge the space between the ends, wood battens of the proper thickness are used. The rows of blocks may be set either at right angles with or at an angle of 45° to the axis of the street.

After the pavement has been laid, the surface is covered with a thin layer of asphalt or tar, over which a layer of coarse sand or fine gravel is spread. This when pressed into the blocks forms a durable coating, which serves to prolong the life of the pavement. The sand or gravel is usually spread on the pavement once a month.

If the pavement is kept clean and if good materials have been used in construction, under ordinary conditions of traffic and of weather, the surface wears at the rate of about 0.5 centimeter (about 0.2 inch) annually. Wood block pavements on an average last from ten to fifteen years, but in damp places, not exposed to sunshine, the blocks will decay in half the time.

The approximate cost of block pavement in Berlin is 14 marks ($3.33) per square meter (1.196 square yards).

THE PLAYGROUND PROBLEM in overcrowded tenement districts is shortly to be solved in a novel manner at Cleveland, Ohio, where plans have been completed, and approved by the city authorities, for a building intended to provide better housing accommodations and sanitary advantages for the poorer class of workmen and their families. In order that the children of the occupants may have the advantage of recreation grounds, the building is to be built on pillars or stilts, leaving an open space of seven feet between the lower portion of the structure and the ground. This opening will also serve to ventilate six great air shafts, each 20 by 25 feet in size, which will extend up for the full three storeys, being entirely open at the bottom and top, so that the air can circulate freely. Of the three hundred rooms the tenement house is to contain, every one is to have an exposure either on the outside or in one of the spacious light courts. The whole structure will be strictly fireproof, and will be of reinforced concrete, with exterior walls of brick. The rooms are to be so arranged that they can be either rented separately, or in suites comprising any required number of interiors, the plan being such that the rooms conveniently and systematically open into each other. Communication to and from the ground will be by a series of iron staircases connecting with balconies at each respective floor line, both on the outside and in the inner courts. The sanitar devices throughout are to be modern, the heating will be produced by a steam system, and the lighting and cooking will be by gas. The cost of the structure complete is estimated at $75,000.

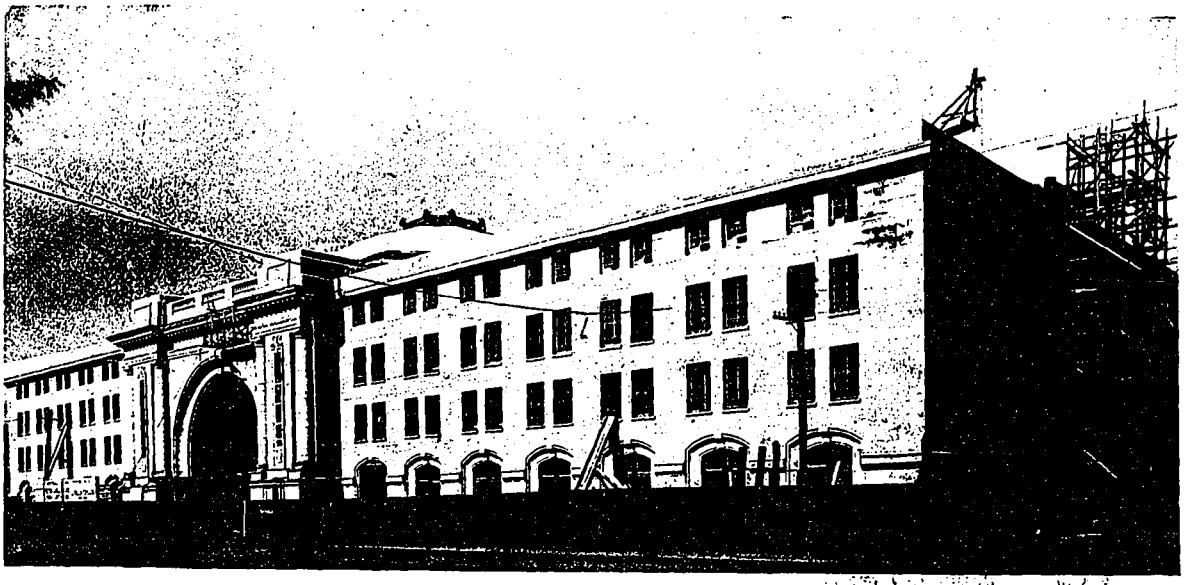
BRICKS

A·DEPARTMENT·DEALING WITH·THE·ARCHITECTURAL AND·CONSTRUCTIVE POSSIBILITIES·OF·BRICK

BRICK HINTS FOR THE ARCHITECT-BRICK
POINTERS FOR THE CONTRACTOR-BRICK
SUGGESTIONS FOR THE MANUFACTURER

Legg Bros., Toronto, Designers and Engravers.

Residence of E. R. Wood, Esq., Toronto. Sproatt & Rolph, Architects. A Good Example of Red Brick in Elizabethan Domestic Design.

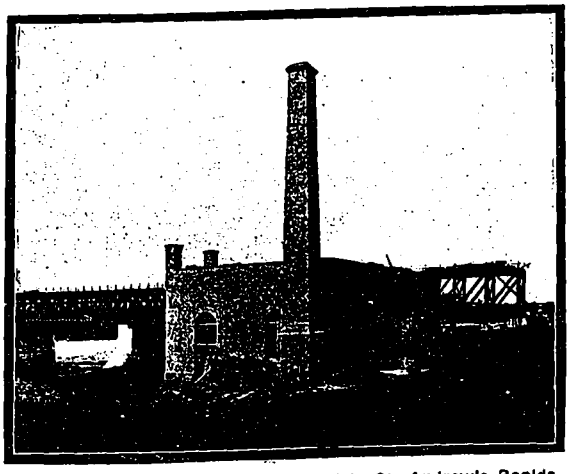


Fort Garry St..tion, Winnipeg—A $4,500,000 Terminal Building in Which the Only Bricks of the Vast Quantity Used, are of Sand-Lime Manufacture. Warren and Wetmore, Architects.

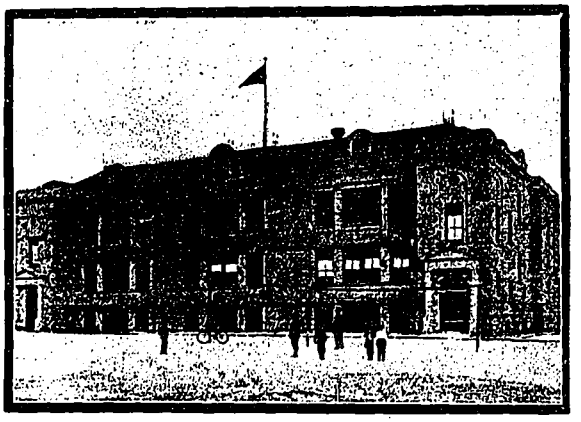
THE TEXTURE AND GENERAL QUALITIES OF SAND LIME BRICK

A brief treatise on the manufacture, color possibilities, structural character, and economic advantages of a product that is growing in favor in architectural and constructional work.

ONE OF THE MOST MODERN, most economical, and most practical of all bricks is the sand lime brick. We find buildings constructed of these bricks in almost every portion of the Dominion. Their pleasing, warm grey tone, resembles very closely Indiana limestone. Architects often complain that color schemes are impossible with sand lime bricks. This is not so, for by the aid of artificial coloring materials, an unlimited range of coloring shades can easily be produced. These colors are numerous and are proof against climatic changes. More than this, they are uniform, thus rendering it unnecessary to sort them in order to obtain a sufficient quantity of a particular shade. In this manner,



Power House, Built of Sand-Lime Brick, St. Andrew's Rapids Dam, Manitoba. H. E. Vautelet, Consulting Engineer.



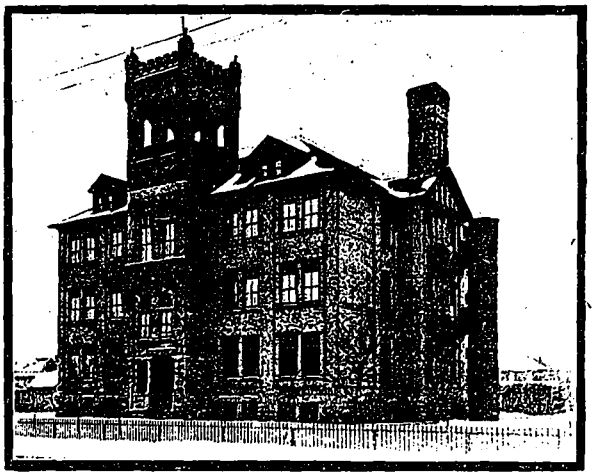
Lord Selkirk School—One of Winnipeg's Several Important Educational Buildings, in Which the Entire External Wall Construction is Executed in Sand-Lime Brick. Designed by Commissioner of School Buildings J. B. Mitchell.

architects are enabled to obtain color effects not possible with any other building material.

As the name denotes, sand lime brick is made from a mixture of sand and lime. This mixture was used in even the most remote ages for mortar. As a material for the production of an artificial stone, it, however, found very little use, although some contend that the Temple of Salamo in Jerusalem was built of sand lime brick.

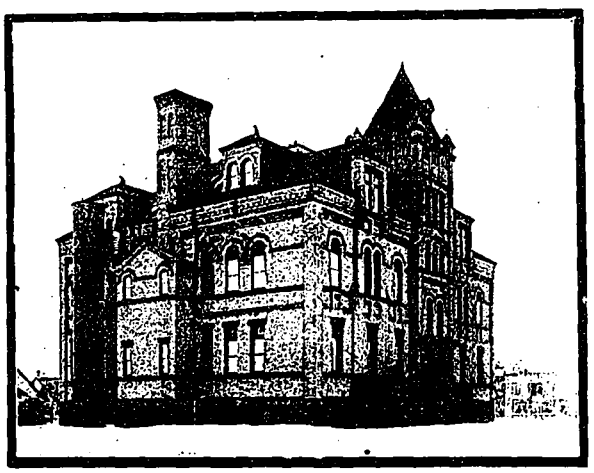
It was not, however, until the beginning of the nine-

teenth century that the town of Postum in Germany, which is surrounded by large sand hills, utilized sand with a mixture of lime in the production of bricks. These German bricks were made by moulding the mixture of sand and hydraulic lime. The green bricks were allowed to weather for a period of about six months, at the end of which time they were ready to be erected into walls. It was discovered by Dr. Michaelias, of Berlin, that at the time of curing it could be very much exhilarated by subjecting the fresh bricks to the action of steam. This experiment proved successful, and the number of sand lime



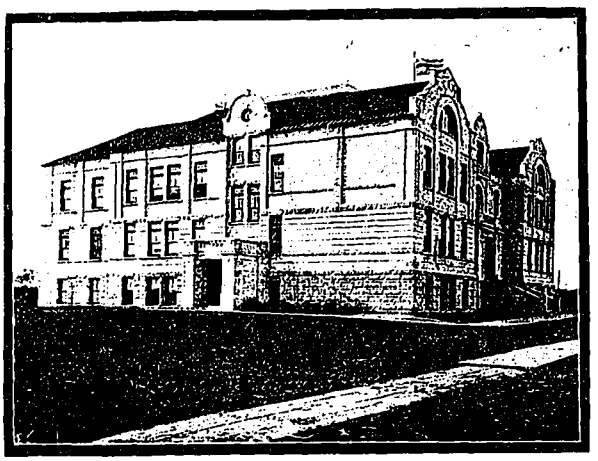
Somerset School—Another of Winnipeg's Sand-Lime Brick School Structures. Designed by Commissioner of School Buildings J. B. Mitchell.

brick plants in Germany increased with great rapidity. One of the oldest and yet the most enduring and dignified edifice built of sand lime brick or "mortar brick" was the Howard University at Washington, D.C., constructed by General Howard in 1867. When the crude method of manufacturing these bricks is considered, together with the permanency of the building which they composed, the admixture of sand and lime into a composite brick, especially under the advanced modern conditions by which it is produced, most assuredly justifies their adoption by pres-



Dufferin School, Which, Together with Other Buildings of Similar Character Illustrated on this Page, Shows the Extent to Which Sand-Lime Brick is used in Winnipeg Schools. Designed by Commissioner of School Buildings J. B. Marshall.

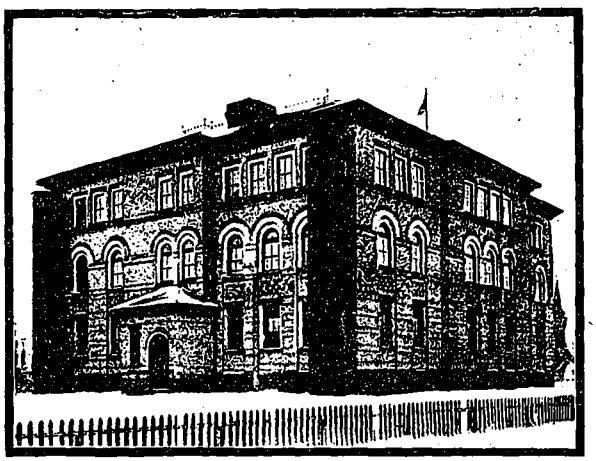
ent day architects. The steam hardening process under high pressure was introduced in America in 1910, but the lime at that time became an aggregate in a raw state, and was stored in silo or bin to slack with the sand. This did not prove satisfactory, but it was discovered that by hy-



La Verendrye School, Winnipeg, Most Recently Erected and Elaborately Equipped School Building, Built of Sand-Lime Brick. Designed by Commissioner of School Buildings J. B. Mitchell.

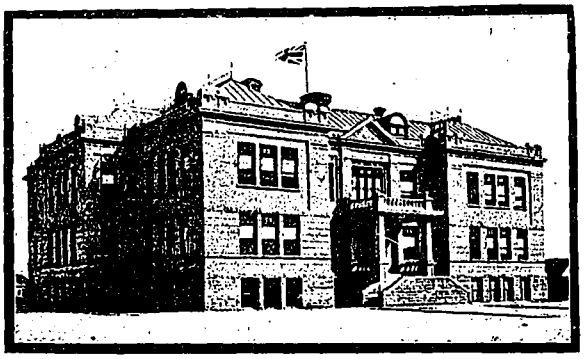
drating the lime through a steam process before mixing with the sand that the hydrate product is made possible, and that it has proven itself a commercial success.

Sand lime brick plants have been established in various portions of almost every province in the Dominion, and in some sections they have proven more successful than in



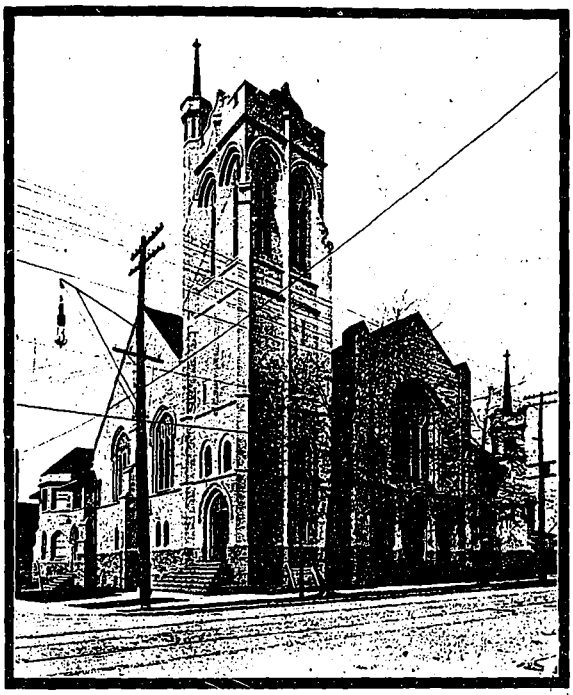
Norquay School, Winnipeg. Designed by Commissioner of School Buildings J. B. Mitchell.

others. In those communities where there is not to be found a good brick clay that can be burned at a reasonable cost, sand lime brick has done much to relieve the situation, but even in the city of Toronto, where we have in close proximity possibly the finest clay beds in Canada, we find residences, warehouses, and churches built of



King Edward School, Winnipeg. Designed by Commissioner of School Buildings J. B. Mitchell.

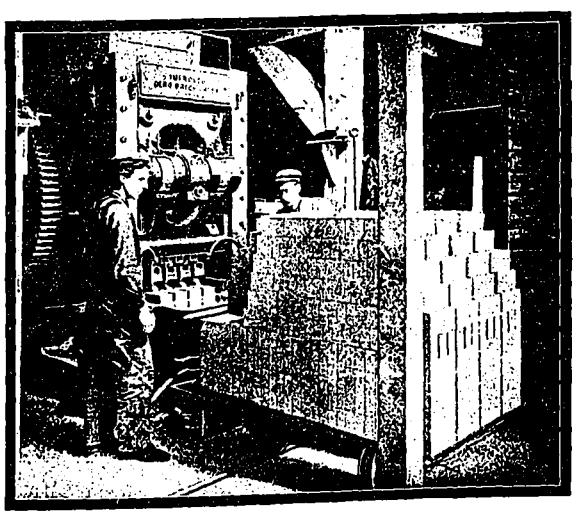
sand lime bricks. In the West where good common clay brick is very hard to obtain, we find sand lime brick very much in use. All of Winnipeg's recent school buildings have been built of this material, together with a large number of warehouses and residences in the same city. Port Arthur and Fort William also has a number of most



A Sand-Lime Ecclesiastical Edifice—High Park Presbyterian Church, Roncesvalles Avenue, Toronto. Smith and Gemmell, Architects.

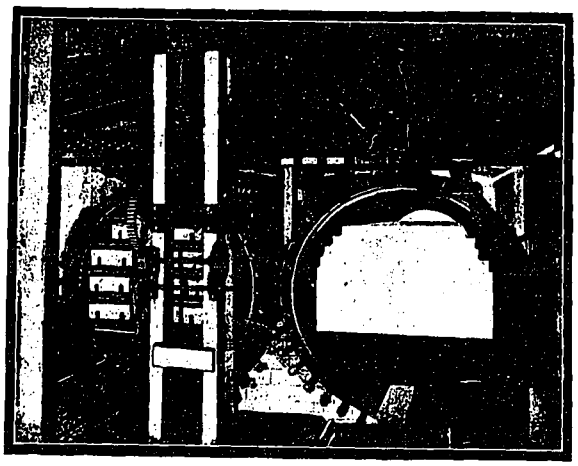
noteworthy structures constructed of this material. It should be of considerable interest to architects and contractors, as well as brick manufacturers, to know something about the process of manufacture, raw materials, the method of treatment, mixture, time and cost of manufacturing and the margin of profit in connection with the merits of this exceedingly important building material.

With regard to the process of manufacture of this particular brick, sand and lime constitute the raw ma-



Process View—Showing a Sand-Lime Brick Press with a Minimum Capacity of 20,000 Bricks per Day.

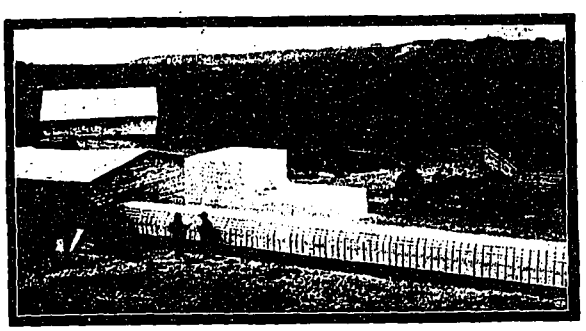
terial. The lime is hydrated; it is then mixed in the proper proportions with dry sand and the required amount of water is added. The mass is then thoroughly pressed into the form of bricks, and these bricks are hardened by the action of steam and high pressure. There are two



Process View—Showing Hardening Cylinder Filled with Sand-Lime Brick Ready to be Sealed for Hardening.

kinds of sand that may be used in the manufacture of sand lime brick; one kind inferior to the other. One occurs as fine round particles. The latter in the form of sharp and irregular grains. For the purpose of sand lime brick manufacturers, the latter kind is preferable, although the former kind of sand may be used to fair advantage. The presence of clay in sand is most injurious; it will not make a strong brick. The lime used in the manufacture of sand lime bricks must be a high calcium lime, and thoroughly hydrated. The mixture used for the manufacture of sand lime bricks is variable, and according to the quality of sand and lime the usual proportion is about six per cent. by weight of hydrated lime to ninety-four per cent. dry sand. Excess of lime is very injurious to the strength of brick.

Time and cost of the manufacture of any building material are very important features in connection with their production. It is maintained by the sand lime brick in-



Sand-Lime Brick Yard—Showing a Day's Run Taken from the Cylinder and Ready for the Market.

terests that their system of brick making produces a perfect product in very much less time than is possible in the manufacture of ordinary clay bricks. Another contention of these manufacturers is the cheapness of manufacture Raw materials are plentiful and cheap in most localities, and it is maintained that through this particular process of the manufacture of bricks that there is a great saving in time, labor and fuel. It is contended that high grade front brick, equal in appearance, weight, and quality to anything offered in face brick which can be made to be laid in the wall for about $3.50 per thousand. (Of course this is the contention of manufacturers). This is qualified, however, by a statement that this is under ordinary conditions where the plant to be located near the sand bank, and where the cost of labor and fuel are normal. It is further maintained that a standard sand lime brick

(*Concluded on page* 92).

ANCIENT BRICKS AND POTTERY

By HAROLD SLICER, M.S.A.

Some notes on the early manufacture and use of clay products. Biblical and Arabian Records. Color combinations and size of bricks employed in various countries.

THE WORDS OF SOLOMON applied to the making of many books of which, he said, there was no end, might with equal force be applied to bricks, and one has only to inspect the Patent Office records to be astonished at the ingenuity of man year by year in this respect.

Some Biblical Records.

A number of Biblical records of brickmaking are extant. About the year 2247 B.C. (Genesis xi. 3), we find the descendants of Noah travelling eastward and coming to a plain in the Land of Shinar, where they settled down and made bricks. These they used for stone, and slime for mortar. In connection with the building of the Tower of Babel, Josephus states that Nimrod, the grandson of Noah, incited the people to build a tower which was built of burnt brick cemented by bitumen that it would be impervious to water.

Then there is the reference to the refusal of Pharaoh to provide the Children of Israel with straw to make brick (Exodus v.), about the year 1491 B.C. There are, however, earlier records of brick construction in existence in Egypt, as for instance, the tomb of King Zer of the first dynasty, 5400 B.C., which contained brick partitions, while Egyptian pottery dates back to about 7000 B.C., and if the people of that day were capable of manufacturing pottery, red in color with a black top and ornamented with imitations of wicker or basket work, it is highly probable that they were also capable, at least, of making sun-dried bricks.

This would be the first kind of brick made and their manufacture probably arose from the use originally made of clay for filling in the interstices between the reeds or wattles of which their houses were constructed.

In Egypt, glazed tiles were extensively used for wall decoration before 5000 B.C., but glazed bricks were not used as the dry Egyptian climate rendered any preservative for the wall surface unnecessary, and the bricks were not burnt, but simply sun-dried.

The sizes of the bricks in prehistoric times and through the first and second dynasties were 9 to 10 inches long, half as wide, and about 3 inches thick, or about the same size as the modern brick, showing that the Egyptians had some considerable knowledge of the proper size of bricks for bonding to the best advantage. The bricks of the Ramesseum vaults are 14 inches by 7 inches by 2½ inches thick (Circa, 1330 B.C.).

Glazing was known to the Egyptians in the prehistoric age, but its use was then confined to beads and amulets.

Prehistoric Glazed Pottery.

The earliest known glazed pottery dates from the time of King Mena, and has his name inlaid in violet glaze on a green glazed body. Though glazed vases were used in the first and second dynasties they became rarer and their use was not revived until much later times. This art of glazing in two colors took a new form in the eighteenth dynasty, when large objects, 5 feet square, were covered with a single fusing of glaze, and inscriptions were executed in glaze inlaid in white stone walls. True glass was first manufactured in the time of Tahutmes III., in 1500 B.C., and was wrought pasty and not blown, the latter method belonging to the Roman age.

Arabian Records.

There are very few historical records in Mesopotamia before the time of Nabunasir, in 747 B.C. It is computed from the excavations which have been made in various mounds, such as the one at Susa, and at the north-eastern extremity of Parthia near Askabad, that pottery was made there at least 5000 B.C.

In Semitic times, brick making for building purposes was the main industry of the country, and the temples were erected on immense piles of bricks. For example, the brick Ziggierat or fine stepped pyramid at Nippur, was 190 feet by 128 feet and about 100 feet high.

The earliest baked bricks measured 8.7 inches by 5.6 inches by 2.2 inches, but were later enlarged to 12 inches by 7.8 inches by 1.9 inches and towards the close of the Sumerian age, square bricks were used. Sargon made baked bricks 18 inches square and 3½ inches thick (B.C. 772). From the time of Ur Engur (3200 B.C.) onwards, the baked bricks were about 12 inches square, and were used for facings and other important work, pavements and drains. The great majority of these bricks, however, were made of crude materials as in Egypt, being used for common work with baked bricks as facings, bitumen being often used as the cementing material.

There are evidences also of bitumen being used as a damp-proof lining to store rooms and tanks, the inside of the chamber being lined with this material; pottery also abounded as in all periods. Coming to the later Semitic age, wherein the Sumerians and Semitics were intermixed, we find large building operations going on.

Each town had its artificial hill of bricks built in stages to support the Temple of its god at the top, and every city had its enclosing walls of an immense thickness. Those of Babylon are said to have been 85 feet high and 340 feet thick, surrounded with a moat lined with burnt bricks laid in bitumen. The use of brick was necessary on account of the lack of stone, but the Assyrians became so used to its employment that, even where stone was plentiful, brick was used for palaces and temples. It is easily seen that the use of bricks to this enormous extent was a serious question. In building city walls, the excavations for the materials were made just outside the proposed area of the city, forming a boundary ditch, which, when filled with water, became the moat. Where houses and temples were concerned this caused a serious difficulty, the excavation becoming a stagnant pool or a perilous pit, a trap for the unwary.

Herodotus says, that in building the walls of Babylon, the clay dug out of the trenches, afterwards to form the moat, was made into bricks as soon as it was carried up, and burnt in kilns. When they had made a sufficient number, the bricks were cemented together with hot bitumen, and at every thirtieth row craters of reeds were inserted.

The bitumen was obtained from the River Is, a tributary of the Euphrates, and was brought to Babylon, lumps of bitumen being found in great abundance floating in the river.

In the alluvial plains of Assyria, both clay and bitumen were found, the bituminous cement bubbling out of the ground. It is collected by the Arabs at the present day.

The Babylonian bricks were more commonly burnt than those at Nineveh, for the latter people, like the Egyptians, mainly used sun-dried bricks.

The Babylonians used glazed bricks to a very large extent, and burnt bricks were usual, because, unlike the dry Egyptian climate, the Babylonians had changeable weather and a damp atmosphere to contend with. All the facings and main parts of their structures were composed of these indissoluble bricks, the interiors only being built of crude brickwork.

The use of glazed brickwork was, however, mainly developed in the ninth century B.C., and onwards, when it came to be used on the external face of the wall.

Previously used only for external decorative effect, its property of weather resistance or utility—for which reason it is nowadays so much employed externally—was now first realized.

The finest remaining example of this is the facade of colored glazed bricks in relief from Susa and of the Persian age, now in Paris, restored from the fragments, and representing the Royal Archers. Amongst other things baked jars of large size and coffins of the same materials were used, as also cylindrical drains large enough for a man to descend therein to perform repairs.

The walls of Nebuchadnezzar's palace were built of bricks of a pale yellow color and of excellent quality, laid in fine lime cement, and stamped with his name and titles.

The Warka Temple was built of bricks of various sizes and shapes, the cement being simply mud, and reeds were largely used in the construction. This temple, like the other Babylonian temples, was built of masses of brickwork in stages one upon the other, and its date is about 2500 B.C.

The Early Jerry Builder.

I might here mention the fate of the jerry builder at this early period. In 1901-2, De Morgan, in making excavations of the "Tell" or mound of the Acropolis at Susa, unearthed a huge block of black diorite, upon which is engraved the Laws of Hammurabi, depicting the social condition of Babylon, about 2200 B.C.

This code of laws was engraved upon the monolith in forty-nine long columns of writing, with introductory and concluding texts, forty-four columns of which are still preserved; the head of the stone being carved with sculptural representations of Hammurabi receiving the laws from the sun-god Shamash.

The laws dealt with the three classes into which the people of Babylon were divided, defining the penalties to be enforced when these were broken. These laws state that: slaves could acquire property and purchase their own freedom; marriage regulations thereto, rights of widows, the employment of agents for sale of goods, fees for water carriage of merchandise, the responsibility of unsound workmanship in boat building to rest upon the boat builder; repair of channels and dykes; agricultural regulations as between land owner and farmer; the protection of patients against carelessness or unskilfulness of doctors, and the protection of the public against carelessness on the part of builders.

In the latter two cases, if death resulted from bad workmanship, the law held that punishment in kind was merited.

In the case of the jerry builder, with whom even in these early days they seem to have had trouble, the penalties were most severe. If a builder erected a house which afterwards fell and killed the owner, the builder himself was put to death. If one or more slaves were killed, the builder had to restore to that owner slave for slave, and if the owner's son was killed by the house collapsing the builder's son was put to death. The builder had also to pay to the owner compensation for damage to his goods arising from such mishap, and he had further to rebuild the house or re-erect the parts that had fallen down.

To Babylonian influence and example, we can attribute the extension of the use of bricks to those surrounding countries where stone was to be had with little labor. Babylon had no stone, and therefore the buildings consisted wholly of brick. The perfection of this art was imitated at such places as Elam, Assyria, and even in Syria, where stone abounded. Further, the want of stone and timber led to the invention of the brick column, although this was seldom used.

At first timber was obtained from Amanus, and later from Lebanon, when the first source failed. Timber in the form of cedar trunks was obtained at great expense, but even these were not extensively used as columns. The Assyrians followed the Babylonians in this respect.

The ordinary brick was dried in the sun, whilst burnt bricks were used only for extra strength, and as a protecting coating to the sun-dried bricks. Abundance of asphalt was at hand for cementing the burnt bricks together, where they were used in foundations, for pavements, and as already stated, for strengthening the walls of unburnt bricks.

Near the end of the reign of Sargon, who died 705 B.C., the great palace bearing his name was built, restorations of which suggest a considerable use of the arch. It was built at Khorsabad, which lies to the north of Nineveh, upon an artificial eminence of brick and overlooking the city.

Some bricks enamelled with colors and showing figures representing the winged deities of the Assyrians have been found belonging to the arch of the palace gate. They were in four courses, the lower course—laid as stretchers—had a length of about three and a half times the depth, the second and third courses were laid radially to the centre, their narrow face being a quarter of the length of the brick, and the fourth course were laid like the first, i.e., as stretchers.

We also have from Sargon's Palace a favorite Assyrian decoration, glazed bricks depicting a lion, the whole being enclosed in a colored border. The panel is ten courses of bricks deep, the lion taking up nine courses, and in length from nose to tip of tail nearly five and a half bricks long, the bricks being about three and a half times as long as the depth, on face.

Layard found in the Tel of Arthur the Lieutenant of Nimrod about 2200 B.C.), remains of walls and a pavement of baked bricks. He says these bricks had evidently been taken from some other building, for upon them were traces of colored figures and patterns, of the same character and styles as those on the sculptured walls of the palaces. Their painted faces were placed downwards, as if purposely to conceal them, and the designs upon them were in most instances injured or destroyed. The colors had faded, but were probably once as bright as the enamels of Khorsabad. The outlines are white on a pale blue or olive green ground. The only other color used is a dull yellow. A few of these fragments are now in the British Museum. Layard says that these fragments can be attributed to the King Tiglath Pilesar.

The absence of other building materials than brick in Babylon is accounted for by the fact that there were no alabaster or limestone quarries in the district, such as existed at Nineveh. The city was built in the midst of an alluvial country far removed from the hills. The mighty rivers deposited the rich clay which formed the plains of Mesopotamia, and of which the Babylonians made such good use. The favorite material used by the Babylonians for their detached figures, namely, black basalt, came from the Kurdish mountains.

With this river deposit—which they combined with chopped straw—they made bricks, the cementing material being natural products found close at hand, as, for instance, bitumen in the rivers. That the process of glazing was also known we are aware, for they covered bricks with a rich enamel for use both internally and externally to their edifices. Layard says that their cement was of a very fine quality, equal to the best of his day, and from several passages in the Bible we learn that the walls of their temples and palaces were coated with plaster and mortar. As in Assyria the bricks were either simply baked in the sun or were burnt in the kiln. Of the kiln-burnt bricks there was more than one shape and quality, some were square, others were oblong. The usual dimensions of the Babylonian bricks were 12 inches by 12 inches by 3½ inches.

In color those from the Birs Nimroud (Palace of Nimroud, constructed of bricks called by the Arabs, Al-ajur, meaning kiln-burnt bricks), are generally of a dark red color, whilst those from the Mujelibe are mostly of a light yellow.

In the Mujelibe the 'overturned' or Kasr, the bricks —as mentioned—are of yellow color firmly bound together by a fine lime cement, and of a quality not exceeded by any found in Babylonia. Upon nearly every brick is stamped the name and titles of Nebuchadnezzar, the ascribed face being nearly always placed downwards. Many of these bricks are covered with a fine glaze of enamel, the colors having preserved their brightness and resisted the efforts of time, ornaments and parts of figures can be traced upon them. The principal colors are a brilliant blue, a deep yellow, black and white.

At Susa, the ruins of the Palace of Artaxerxes, was examined in 1885 by Mr. E. Disulafoy, wherein he discovered many fragments of painted and glazed tiles. When these were carefully pieced together they showed representations of striding lions, the coloring being: blue turquoise ground, lions (white, yellow and green), and inscriptions in white characters. The tile design below the frieze was grey and rose colored.

It is known that Dareious, the son of Hystaspes, the second successor of Kyros, had Susa rebuilt and ornamented, but it has been found that this was destroyed by fire and built over by his son Artaxerxes, the work being not inferior to the Babylonian models from which they were taken.

Another frieze showed the Royal Archers of the Guard. The designs vary although the cut of the clothes is the same, clearly showing that the Archers belonged to different corps. Their hair is held by golden circles, they have gold bracelets on their wrists and jewels in their ears, whilst their spears have a silver ball at their lower ends.

The embattled stair parapet which led from the plain to the palace, having shallow and broad steps at so gentle a slope that they could have been mounted on horseback, was encased in enamelled brickwork, fragments of which were found.

Of color combinations, the following were most frequently used:

Ground: light blue, prevailing color, white with touches of green and pale yellow.

Ground: dark green, prevailing color, golden yellow with touches of blue and white.

Ground: black, prevailing color, golden yellow with touches of pale green and white.

The gateways were colored in a white and rose colored mosaic, above which stretched the grand lion procession.

The following table of the sizes of bricks is very instructive: compared with the present standard English brick which is 9 inches by 4.375 inches by 2.6875 inches, or a London brick, 8⅞ inches by 4¼ inches by 2⅝ inches.

	Length.	Breadth.	Thickness.
Egyptian (21st Dynasty, 100 B.C.)	18 in.	9 in.	5 in.
(Ramesseum Vaults, 1330 B.C.)	14 in.	7 in.	2½ in.
Syria (Earliest baked bricks)	8.7 in.	5.6 in	2.2 in.
Later baked bricks Sumerian Age)	12 in.	7.8 in.	1.9 in.
(Latter part of Sumerian Age. Large square bricks).			
Mesopotamia (King Ur-Enqur, 3200 B.C.) Baked bricks, 11 in. or 12 in. square.			
(King Sargon, 772 B.C.)	18 in	18 in	3½ in.
(City Walls Babylon 604-562 B.C.)	12 in.	12 in.	3 in.

Babylonian bricks vary 12 in. or 13 in. by 3 in. or 4 in. to the largest 19¾ in. square by 3½ in. thick.

Birs Nimroud, 13½ in. long, 4½ in. thick.

Roman large flat bricks, 1 in. to 11in. by 1 in. to 11 inch, by 1½ in. thick.

Saracen, 9th Century, 7½ in. by 2½ in. by 1¾ in. thick.

Of Roman bricks there were two kinds—Lateras—sun-dried; and Testae or tegulae—kiln-burnt.

These were made from clay carefully selected and exposed to the weather for two years before being made into bricks. The clay was thoroughly beaten and mixed with chopped straw, moulded into shape and finally put in the sun to dry. In some cases the length of time they were thus exposed before being used was very long, as for instance at Uttica where they were kept for five years.

The use of unburnt brick was discarded after the first century; unburnt bricks being mostly used in the reign of Augustus, but there are no examples left.

The sizes of Roman bricks varied considerably, one size called Lydium, being 18 inches by 12 inches was used in Rome. These were protected by Stucco to prevent weathering, the general practice of the Romans; but where the bricks are not thus protected the joints between the bricks are thinner and the bricks themselves are not so thick as in the covered work.

The size of the large square Roman bricks or tiles was in many cases the guiding factor in the thickness of their concrete walls, which were two Roman feet or a multiple thick (about 1 in. to 11½ in.), was the size of the tile, but burning caused shrinkage to about 1 ft. 11 in. square.

Tiles 12 in., 14 in., and 18 in. were also used, whilst smaller ones 8 in. or 9 in. square were employed for short pillars or to place over wooden entering into which concrete was poured.

Arch facings to concrete walls have nearly always the 6th or 7th brick one large through bonding tile (1 ft. 11 in. square), the others being half tiles broken for the purpose.

Bricks were also used of a triangular shape, equilateral triangles varying from 4 in. to 14 in. length of side, although 10 in. is perhaps the most common.

These were used to form the surface to concrete walls by laying them in horizontal courses with their apexes pointing into the wall, the courses being laid in a similar manner in elevation to courses of headers, thus breaking joint. These were used even in thin walls, 7 inches concrete walls being treated in this way. In the thicker walls the large tiles were used as bonding bricks passing right through the concrete wall, every 9th course or so being of these 2 feet tiles, the remainder of the wall face being of triangular bricks.

There were many kinds of clay used for these bricks; the colors, red, yellow, and sometimes brown, all of which are well burnt and sound.

Middleton gives the following table of the thicknesses of bricks and their mortar joints:—

	Date.	Average Thickness. Bricks.	Joints.
Rostra of Julius Cæsar	442 B.C.	1½"	¼"
Pantheon of Agrippa	27 B.C.	1½"	⅜" to ½"
Prætorian Camps of Tiberius	23 A.D.	1¼"×1¼"	½" to ½"
Aqueduct of Nero (Aqua Claudia)	c 62 A.D.	1"×1¼"	⅜" to ½"
Baths of Titus	80 A.D.	1½"	½"
Palace of Domitian	c 90 A.D.	——	——
Temple of Venus and Rome	c125 A.D.	1½"	1"
Palace of Severus	c200 A.D.	1"	¾"
Aurelians Walls of Rome	c271 A.D.	1¼" to 1¾"	1¼" to 1½"

These are common kinds of brickwork only.

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

MACHINERY AND TRADE

MANUFACTURING PLANT FOR SALE.

PURSUANT TO the winding-up order made in the matter of The Parkin Elevator Company, Limited, and wtih the approbation of the Local Master of the High Court of Justice at Berlin, sealed tenders addressed to The London and Western Trusts Company, Limited, London, Ontario, and marked "Tender for Parkin Plant" will be received up till 4 p.m. of the 5th day of November, A.D., 1910, for the purchase of the real estate, buildings, plant, machinery, stock-in-trade and assets belonging to The Parkin Elevator Company, Limited, and situate in the Town of Hespeler, Ontario, of which the following is an inventory:—

(a) Real Estate and Buildings	$14,936.00
(b) Plant Equipment	6,633.00
(c) Foundry Equipment	3,165.00
(d) Machinery	9,580.00
(e) Patterns	8,183.00
(f) Patents, Prints and Tracings ..	1,200.00
(g) Office Furniture	695.00
(h) Office Supplies	850.00
(i) Tools	875.00
(j) Stock-in-trade	17,731.66
	$63,848.66

The real estate and plant will be sold subject to an existing mortgage thereon bearing interest at 4½ per cent. per annum and payable in equal annual instalments.

The buildings are new and modern in every respect and the plant is up-to-date. The Town of Hespeler is admirably situate for manufacturing purposes, having both C.P.R. and G.T.R. connections. Switches adjoin the property. Several very large manufacturing industries are located there among others, R. Forbes Woollen Mills, Canada Machinery Company, Limited, Jardine Tool Works, Hespeler Furniture Company and W. A. Kribs large lumber and planing mill plant.

The following is a description of the real estate:—Lots numbers five and six on the north side of Sheffield Street, in the George D. Forbes survey.

The property will be offered subject to a reserved bid and subject to conditions of sale.

Terms:—A marked cheque for One Thousand Dollars payable to the order of the Liquidator shall accompany each tender and the balance shall be payable in cash within thirty days from the date of acceptance of tender without interest.

The Local Master will attend at his Chambers, King Street, Berlin, on the 11th day of November, A.D., 1910, at four o'clock in the afternoon to consider the tenders.

For further particulars, conditions of sale, form of tender, inspection of inventory or other information, apply to The London & Western Trusts Company, Limited, Liquidator, London, Ontario, on the factory premises at Hespeler, or to Melvin A. Secord, Galt, Ontario, Solicitor for the Liquidator.

J. J. A. WEIR,
Local Master at Berlin.

Dated 7th October, 1910.
MELVIN A. SECORD,
Galt, Ontario.
Solicitor for the Liquidator.

SEAMAN-KENT'S NEW FACTORY.

THE REAL MERITS of any commercial product can possibly best be measured by the growth of the concern which manufactures it. Quality and demand invariably go hand in hand, and where the one is recognized a constant increase in the other follows as a natural sequence. Although only a firm of eight years' existence, the Seaman-Kent Co. has, by progressive business methods and the production of a uniform high-grade hardwood flooring, won for itself a place in the foremost industrial ranks of Canada. During that time, the company has not only been under the necessity of enlarging its factory at Meaford, Ont., but within the past few months it has found it advisable to establish a large branch plant at Fort William in order to meet the demand and better serve the interests of its rapidly expanding western trade. The new plant occupies three acres of a twenty-acre tract, and is excellently situated, having 600 feet of dockage on the Mission River and direct transportation facilities to assure the prompt delivery of all orders. It comprises in all four buildings, viz., a 400 x 100 feet factory built of reinforced concrete and heavy timber construction, a power plant 65 x 100 feet, dry kilns 123 x 80 feet, and a two storey office building. The remaining portion of the site is utilized as storage yards for lumber. At the present time, the working staff of the new plants consist of eighty employees, but it is expected that the business will warrant the working of two hundred hands by the early part of next summer.

In addition to manufacturing "Beaver Brand" hardwood flooring, which has gained for the company a universal reputation throughout the Dominion, the new plant will manufacture quarter cut and plain cut oak flooring, together with birch and beech products and hardwood interior trim. During the winter, five million feet of lumber will be turned through the machines, but a much larger proportionate amount of material will be required when the plant is working to its full capacity.

The company in so thoroughly preparing to look after the needs of such an important and promising field as the West, take a most aggressive step, and the business sagacity and enterprise which it displays in this connection, is something upon which the members of the firm are to be highly complimented.

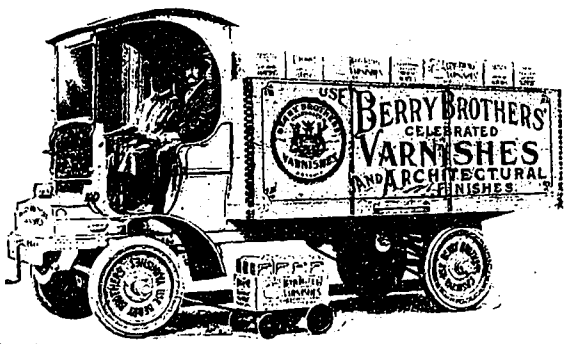
THORNE HOLD-FAST BAR SYSTEM.

STORE FRONT CONSTRUCTION is something which, owing to economic reasons, requires careful consideration. The unsightly wooden post, cornices, and bulky transom bars now in use have their decided drawback; and even the so-called all-glass construction is claimed to be unsatisfactory, principally because of the high rate of insurance and the fact that dust and water enter the show window through mitred or ground edges, and again because of the great delay in replacing broken glass. For these reasons the metal store front has come to be accepted as the most logical form of construction, and the growing popularity of this type attests to the fact that it has a number of individual advantages. What is regarded as one of the most perfect inventions of this character, is the Thorne Hold-Fast Patent Metal Bars. This system has been designed and made with the object of providing a method for holding the glass firmly together, so as to withstand wind pressure, and still cover

the smallest possible surface of the glass, thus assuring a store front with an attractive and finished appearance. This particular construction includes corner, transom, dividing, jam and drip sill bars; and its adoption brings an end to the rotting out of wooden members, besides furnishing a method of setting glass which is water tight, dust proof, and prevents steaming and frosting of show windows. In this country the Thorne Hold Fast Metal Bar system gives promise of being widely adopted, and already the Hobbs Manufacturing Company, Ltd., who are the Canadian selling agents, have made a large number of installations in various parts of the Dominion. Architects, owners and contractors who may be interested, can secure a complete set of samples and catalogue, with carriage prepaid, by notifying the nearest office of the company—London, Toronto, Montreal or Winnipeg.

"FAMOUS WAGON" ON OVERLAND TRIP

THE ACCOMPANYING ILLUSTRATION shows the new auto power wagon recently made by the Grabowsky Power Wagon Co. for Berry Brothers, Ltd., the well known varnish manufacturers of Walkerville and Detroit. This wagon is a replica of the now famous toy wagon introduced by this firm many years ago, and which has brought joy to the hearts of youngsters in every quarter of the globe. The body of the auto truck is constructed of handsome quartered oak, well finished with Berry Brothers' varnish, and has a capacity of two tons. The lettering on the truck and its general characteristics are in exact imitation of its small prototype, and the truck



Load of Varnish en route to New York in Auto Truck Modelled After Berry Brothers' "Toy Wagon."

excites much comment, especially from the young folks, who instantly recognize the giant cousin of their toy wagon. An interesting item in connection with Berry Brothers' toy wagon is the shipping of a load of varnish overland packed in toy wagons from Berry Brothers' factory to their New York warehouse at 262 Pearl street. The vehicle transporting this unique load is one of the new Grabowsky auto trucks, and the trip with its heavy load will practically demonstrate the good qualities of this particular power wagon. Upon request Messrs. Berry Brothers, Limited; Detroit, Mich., will send a card printed in colors showing their auto truck illustrated above.

AUTOMATIC CEMENT BLOCK TAMPER.

CATALOGUE NO. 13, the latest advertising effort of the Ideal Concrete Machinery Company, of London, Ont., and South Bend, Indiana, is a very handsome book, 9 x 12 inches in size, which fully describes and illustrates the Ideal Automatic Power Tamper and the Ideal Scraper and Finisher Attachment. The illustrations show a numbers of working views of this equipment used in conjunction with the Ideal Block Machine, and the text is full of interesting and useful facts concerning the practical and economical manufacture of concrete building blocks. Many reasons are advanced in support of the contention that machine tamped blocks are best and to prove that by the use of this particular equipment the manufacturing cost of hollow concrete blocks is reduced at least one half, while a much better, stronger, waterproof and more saleable block is produced. Any block maker who wishes to improve the quality of his output and increase his profits, will do well to secure and read this interesting catalogue.

In this connection it might be mentioned that the company will have an elaborate exhibit at the Cement Show to be held, December 14th to 20th inclusive, at Madison Square Garden, New York City. The extensive preparations that are being made for this important event are attracting widespread attention, and a large number of visitors from all parts of the continent are expected to be in attendance. To those who come from Canada, the Ideal Concrete Machinery Company will give special attention, and any one who may be interested in concrete machinery and appliances, together with the recent development of "Tycrete" stone products will be well compensated by paying a visit to this firm's exhibit.

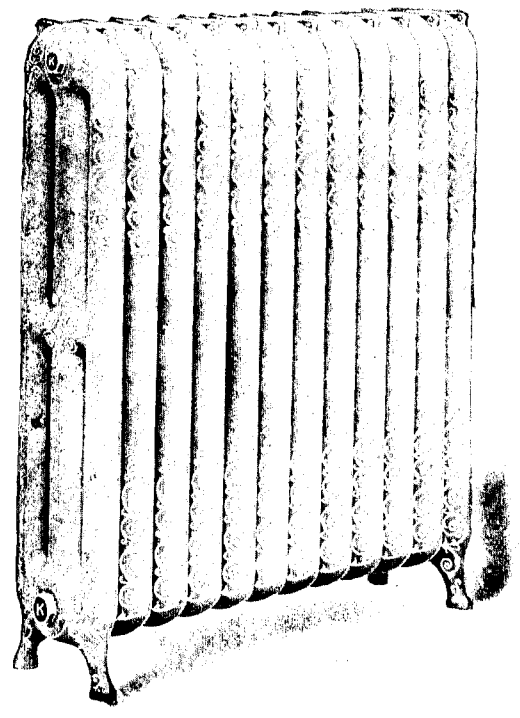
MONTREAL FIRM GETS BIG CONTRACT.

THE NEW TRANSPORTATION Building at the corner of St. James and St. Francois Xavier streets, Montreal, Messrs. Carrere & Hastings and Ross & MacFarlane associate architects, will be constructed of Marmo semi-glazed terra cotta. This contract, which is said to be the largest terra cotta contract ever placed in Canada, has been awarded to Eadie-Douglas, Limited, 12 University street, Montreal.

SAND-LIME BRICK—Continued from Page 87

plant will produce about 20,000 bricks a day at an average cost of $3.50 per thousand bricks. If these are sold for common bricks, they will bring from $8 to $10 a thousand, while those that are suitable for face brick will bring from $10 to $20 a thousand, according to color, and of course, demand. If these figures have been carefully calculated, it would appear that in communities in Canada where good clay is not obtainable, and where sand pits are sure to be found, an impervious strong and everlasting material may be obtained through the admixture of lime with sand. In connection with this article we reproduce a number of illustrations of buildings erected of sand lime bricks in the Eastern as well as Western Canada which should prove interesting to architects as well as contractors.

ALTHOUGH THE IRISH ROUND TOWERS are simple in form and construction, they present puzzles to the observer not only as regards their origin and purpose, but also as to the use of some of the parts, says the *Architect and Contract Reporter*. G. H. Orpen points out in the Journal of the Royal Society of Antiquaries of Ireland that although innumerable visitors have seen the round tower at Glendalough, near Dublin, one feature appears to have been unnoticed by them as well as by archæologists. Almost directly, he says, under the elevated doorway, about 15 in. above the slightly projecting base, is a rectangular hole about 8 x 6 in., pierced right through the wall. The two side stones of this hole are "thorough stones," and it is roofed by two stones. The wall is about 4 ft. thick, and the doorway about 10 ft. above the ground. What was the purpose of this hole? It was certainly an original feature, and was not a loophole for a missile. Mr. Orpen suggests that it was a spy-hole, to enable the occupants of the tower to ascertain, before opening the door, who was demanding admittance. Such a squint was not uncommon in after centuries beside the doorway of castles and even of ordinary houses.

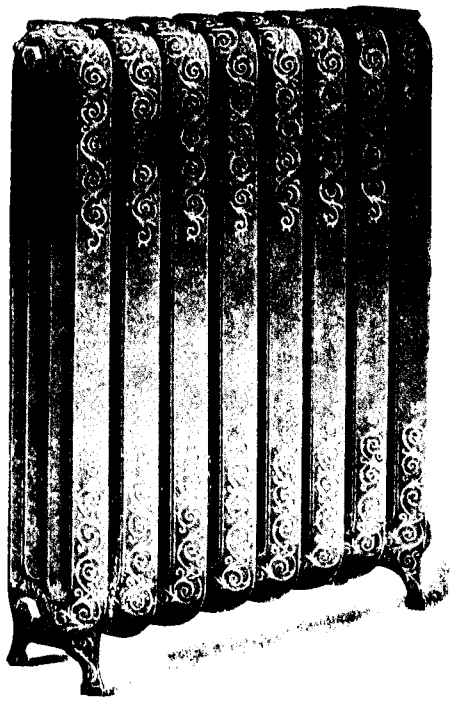


King Radiators are honest radiators in build, rating and design. They are made in the best and finest equipped radiator plant on the continent, which employs only the most skilled workmen.

The superior quality and smoothness in finish of the castings used, and the graceful and artistic lines in their construction, make

King Radiators

scientifically, practically and mechanically a masterpiece —the most perfect steam and hot water radiators on the Canadian market. The ornamentation is raised—not sunk. They are handsomely built, aesthetic in proportion, and the relief ornamentations are such as to adapt the **"King"** to various combinations in color decorations.



See them—then compare with others

THE KING RADIATOR CO., LIMITED

St. Helens Ave., near Bloor, TORONTO

·A· DIRECTORY ·FOR·

·ARCHITECTURAL·SPECIFICATIONS & CONTRACTORS'·SUPPLIES & MACHINERY

Adamant Plaster.
Stinson-Reeb Builders' Supply Co.

Antique Furniture.
B. M. & T. Jenkins.

Air Washers and Humidifers.
Sheldons, Limited.

Architectural Bronze and Brass Work.
Dennis Wire and Iron Works Co., Limited.
Meadows, Geo. B. Co.

Architectural Iron.
Canada Foundry Co., Ltd.
Canada Wire Goods Mfg. Co.
Dennis Wire and Iron Works Co.
Meadows, Geo. B. Co.
The Pedlar People.

Architectural Stucco Relief.
W. J. Hynes.

Artificial Stone.
The Canadian Art Stone Co., Limited.
The Roman Stone Co., Ltd.

Asbestos Products.
A. B. Ormsby, Limited.
Canadian Johns-Manville Co.

Awnings and Tents.
Bartlett & Son.

Bank and Office Fittings.
Canadian Office & School Furniture Co., Limited.
Globe Furniture Co.

Bank and Office Railings.
Canada Foundry Co.
Canada Wire Goods Mfg. Co.
Dennis Wire and Iron Works Co., Limited.
Meadows, Geo. B. Co.

Bank and Office Window Blinds.
Canada Wire Goods Mfg. Co.
B. Greening Wire Co., Ltd.
Dennis Wire & Iron Works Co. Limited.
Meadows, Geo. B. Co.

Bath Room Fittings.
General Brass Co., Limited.
James Robertson Co., Ltd.
Standard Ideal Co., Limited.

Belting.
Dunlop Tire and Rubber Co., Limited.
Gutta Percha & Rubber Mfg. Co., Limited.

Blowers.
Sheldons, Limited.

Blow and Vent Piping.
A. B. Ormsby, Limited.
The Pedlar People.

Boilers.
Clare Bros.
Dominion Radiator Co., Ltd., Toronto.
Berg Machinery Mfg. Co., Ltd.
Goldie & McCulloch Co., Ltd.
Gurney, Tilden & Co., Ltd.
King Radiator Co., Limited.
Pease Foundry Co., Ltd.
Taylor-Forbes.

Brass Works.
General Brass Co., Ltd.
James Robertson, Limited.
Kerr Engine Company.

Brick and Terra Cotta.
David McGill.
Don Valley Brick Works.
E. F. Dartnell.
Eadie-Douglas Co.
Port Credit Brick Co.
Stinson Reeb Builders' Supply Co., Ltd.

Builders.
C. W. Noble.
Fred Holmes & Sons.
Jas. C. Claxton & Son.

Building Paper and Felts.
Alex. McArthur & Co., Ltd.
The Pedlar People.

Building Supplies.
Christie, Henderson & Co., Limited.
David McGill.
Eadie-Douglas Co.
E. F. Dartnell.
Fred. Holmes & Sons.
Rogers Supply Co.
Sand & Supplies, Ltd.
Stinson-Reeb Building Supply Co., Limited.
The Pedlar People.

Brick Machinery.
Berg Machinery Mfg. Co., Ltd.

Caps for Columns and Pilasters.
The Pedlar People.
W. J. Hynes.

Cars (Factory and Dump).
Mussens, Ltd.
Sheldons, Limited.

Cast Iron Columns.
Canada Foundry Co.
Gaudry & Co., L. H.
The Pedlar People.

Cement.
Canada Portland Cement Co.
Dartnell, E. F.
McGill, David.
Rogers, Alfred.
Rogers Supply Co.
Stinson-Reeb Builders' Supply Co.
Sand & Supplies, Ltd.

Cement Block Machinery.
Ideal Concrete Machinery Co., Limited.
London Concrete Machinery Co.
Mussens, Limited

Cement Brick Machinery.
Ideal Concrete Machinery Co.
London Concrete Machinery Co.
Mussens, Limited.

Cement Machinery.
Berg Machinery Co., Ltd.
Ideal Concrete Machinery Co.
London Concrete Machinery Co.
Mussens, Limited.

Cement Tile Machinery.
Ideal Concrete Machinery Co.
London Concrete Machinery Co.

Chimney Construction.
Eadie-Douglas Co.

Church Furniture.
Canadian Office & School Furniture Co.
Globe Furniture Co.

Coal Chutes.
Down Draft Furnace Co.

Cold Storage & Refrigerator Insulation.
Kent Company, Limited.
Linde British Refrigerator Co.

Columns (Staved).
Batts, Ltd.

Concrete Contractors.
Leach Concrete Co.

Concrete Construction (Reinforced).
Canadian Siegwart Beam Co.
Expanded Metal & Fireproofing Co.
Jas. C. Claxton & Son.
The Pedlar People.
Trussed Concrete Steel Co.

Concrete Mixers.
Canada Foundry Co., Ltd.
E. F. Dartnell.
Goold, Shapley & Muir.
Ideal Concrete Machinery Co.
London Concrete Machinery Co.
Mussens, Limited.
Rogers Supply Co.

Concrete Steel.
B. Greening Wire Co., Ltd.
Clarence W. Noble.
Dennis Wire & Iron Co.
Expanded Metal & Fireproofing Co.
Page Wire Fence Co.
The Pedlar People.
Trussed Concrete Steel Co.
W. D. Beath & Son.

Conduits.
Conduits Co., Limited.
The Pedlar People.

Contractors' Machinery.
Mussens, Limited.

Contractors' Supplies.
Canada Wire Goods Mfg. Co.
Eadie-Douglas Co.
E. F. Dartnell.
David McGill.
Kent Company, Limited.
Miller Bros. & Toms.
Mussens, Limited.
Rogers Supply Co.
Stinson-Reeb Builders' Supply Co.

Cork Board.
Kent Company, Limited.
The Can. H. W. Johns-Manville Co., Ltd.

Corner Beads.
The Pedlar People.

Cranes.
Miller Bros. & Toms.

Crushed Stone.
Christie, Henderson & Co., Limited.
Contractors' Supply Co.
John Maloney & Co.
Rogers Supply Co.
Stinson-Reeb Builders' Supply Co.

Cut Stone Contractors.
Canadian Art Stone Co., Ltd.
Cement Products Company.
E. F. Dartnell.
Fred Holmes & Sons.
Roman Stone Co., Limited.

Decorators.
T. Eaton & Co.
W. A. Murray & Co.
Waring & Gillow.

Deposit Boxes.
J. & J. Taylor.

Doors.
Wilson Bros., Ltd.

Drawing Materials.
Eugene Dietzgen Co., Ltd.

Drills Brick and Stone).
Mussens, Limited.

Drying Appliances.
Sheldons, Limited.

Dumb Waiters.
Otis-Fensom Elevator Co., Limited.
Turnbull Elevator Co.

Electric Fixtures.
The Tungstolier Co. of Canada, Ltd.
Toronto Electric Light Co.

Electro-Plating.
Dennis Wire and Iron Works Co.

Electric Wire and Cables.
B. Greening Wire Co., Ltd.
Jas. Robertson Co., Limited.
Page Wire Fence Co.

Elevators (Passenger and Freight).
Otis-Fensom Elevator Co., Limited.
Turnbull Elevator Co.

Elevator Enclosures.
Canada Foundry Co.
Dennis Wire and Iron Works Co.
Meadows, Geo. B. Co., Ltd.
Otis-Fensom Elevator Co., Limited.

Enamels.
Benjamin Moore Co.
Berry Bros.
International Varnish Co.
Randall Bros.

Engines.
Berg Machinery Mfg. Co., Ltd.
Goldie & McCulloch Co., Ltd
Goold, Shapley & Muir.
Sheldons, Limited.

Engineers.
Bowman & Connor.
Canadian Domestic Engineering Co., Ltd.

Engineers' Supplies.
Kerr Engine Co.
Mussens, Limited.

Exhaust Fans.
Sheldons, Limited.

Engineers and Contractors
Bishop Construction Co.
Clark & Monds.

Expanded Metal.
Clarence W. Noble.
Expanded Metal & Fireproofing Co.
Galt Art Metal Co.
Metal Shingle & Siding Co.
Stinson-Reeb Builders' Supply Co.
The Pedlar People.
Trussed Concrete Steel Co.

Fire Brick.
David McGill.
E. F. Dartnell.
Stinson-Reeb Builders' Supply Co.
Alexander Gibb.
B. & S. H. Thompson & Co., Ltd.

Fire Sprinklers.
General Fire Equipment Co.
Vogel Co. of Canada, Ltd.

Fire Extinguishers.
General Fire Equipment Co., Ltd.

Fire Escapes.
Canada Foundry Co.
Dennis Wire and Iron Works Co., Limited.
Meadows, Geo. B.

Fire-Place Goods.
Canada Wire Goods Mfg. Co.
John Kay Co.
T. Eaton Co.

Fireproofing.
Beath, W. D. & Son.
Clarence W. Noble.
David McGill.
Don Valley Brick Works.
E. F. Dartnell.
Eadie-Douglas Co.
Expanded Metal & Fireproofing Co.
Page Wire Fence Co.
Port Credit Brick Co.
The Pedlar People.
Trussed Concrete Steel Co.

Fireproof Steel Doors.
A. B. Ormsby, Limited.
Stinson-Reeb Builders' Supply Co.
The Pedlar People.

Fireproof Windows.
A. B. Ormsby, Limited.
Galt Art Metal Co.
Hobbs Mfg. Co.
Metal Shingle & Siding Co.
Pilkington Brothers, Ltd.
Stinson-Reeb Builders' Supply Co.
The Pedlar People.

Flooring.
Chemical Floor & Tile Co.
Eadie-Douglas Co.
Georgian Bay Shook Mills.
Seaman Kent Co., Limited
Siemon Bros.
Toronto Flooring Co.
Wilson Bros.

Furnaces and Ranges.
Clare Brothers & Co.
Gurney, Tilden Co.
King Radiator Co., Ltd.
Pease Foundry Co., Ltd.
Record Foundry & Machine Co.
Taylor-Forbes Co., Limited.

Furniture.
John Kay Co.

Galvanized Iron Works.
A. B. Ormsby, Limited.
Galt Art Metal Co.
Metal Shingle & Siding Co.
Sheldons, Limited.
The Pedlar People.

Galvanized Iron.
A. C. Leslie & Co., Ltd.

Glass.
Pilkington Bros., Ltd.

General Contractors.
Jas. C. Claxton & Son.

Grille Work.
Canada Wire Goods Mfg. Co.
J. & J. Taylor.
Meadows, Geo. B.

Hardware.
Gurney, Tilden & Co., Ltd.
Taylor-Forbes Co.

Hardwood Flooring.
Georgian Bay Shook Mills.
Page Wire Fence Co.
Seaman Kent Co., Limited.
Siemon Bros.
Wilson Bros.

Heating Apparatus.
Clare Brothers.
Dominion Radiator Co., Ltd., Toronto.
Goldie & McCulloch Co., Ltd.
King Radiator Co., Limited.
Pease Foundry Co.
Record Foundry & Machine Co.
Sheldons, Limited.
Taylor-Forbes Co., Limited.

Heating Engineers and Contractors.
O'Connell, M. M.

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

Heating Engineers.
Canadian Domestic Engineering Co., Ltd.

Hinges.
Soss Invisible Hinge Co.

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.
The Can. H. W. Johns-Manville Co., Ltd.

Interior Woodwork.
Batts, Ltd.
Burton & Baldwin.
Canada Office & School Furniture Co.
Georgian Bay Shook Mills.
Globe Furniture Co.
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).
Beath, W. D. & Son.
B. Greening Wire Co., Ltd.
Canada Wire Goods Mfg. Co.
Clarence W. Noble.
Expanded Metal & Fireproofing Co.
Galt Art Metal Co.
Page Wire Fence Co.
Stinson-Reeb Builders' Supply Co.
The Pedlar People.
Trussed Concrete Steel Co.

Laundry Tubs.
H. C. Bedlington & Co.

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

Lodge Furniture.
Canadian Office & School Furniture Co.
Globe Furniture Co.

Mantels.
John Kay Co.
T. Eaton Company.

Marble.
B. & S. H. Thompson & Co., Ltd.
E. F. Dartnell.
Missisquoi Marble Company.
Smith Marble & Construction Co., Limited.
The Hoidge Marble Co., Ltd.

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.
A. B. Ormsby, Limited.
C. W. Noble.
Galt Art Metal Co.
Metal Shingle & Siding Co.
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.
Benjamin Moore Co.
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.
Consolidated Glass Co.
Hobbs Mfg. Co.
Pilkington Brothers, Limited.

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

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

Pneumatic Tools.
Mussens, Limited.

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

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

Radiator Valves.
Kerr Engine Co.

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

Refrigerator Insulation.
Kent Company, Limited.
The Can. H. W. Johns-Manville Co., Ltd.

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

Relief Decoration.
W. J. Hynes.

Roofing Paper.
Alex. McArthur & Co.
The Pedlar People.

Roofing (Slate).
A. B. Ormsby, Limited.

Roofing Tile.
David McGill.
E. F. Dartnell.
The Pedlar People.

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

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

Sand and Gravel Screens.
B. Greening Wire Co., Limited.
Canada Wire Goods Mfg. Co.

Sanitary Plumbing Appliances.
Jas. Robertson Co.
Standard Ideal Co., Limited.

School Furniture.
Canadian Office & School Furniture Co.
Globe Furniture Co.

Screens.
Watson, Smith Co.

Shafting Pulleys and Hangers.
Goldie & McCulloch Co., Limited.

Sheet Metal.
A. C. Leslie & Co.

Sheet Metal Workers.
A. B. Ormsby, Limited.
Galt Art Metal Co.
The Pedlar People.

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

Sidewalks, Doors and Grates.
Dennis Wire & Iron Works Co.

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

Sidewalk Prisms.
Hobbs Mfg. Co.

Slate.
Vallango Slate & Marble Co.

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

Staff and Stucco Work.
W. J. Hynes.

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

Steam and Hot Water Heating.
Dominion Radiator Co., Limited.
Gurney, Tilden Co., Limited.
King Radiator Co., Ltd.
Taylor-Forbes Co., Limited.
Warden King, Limited.

Steel Casements.
David McGill.
Wm. Stewart & Company.

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

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

Structural Iron Contractors.
Dominion Bridge Co.
Hamilton Bridge Co.
Jenks-Dresser Co., Ltd.
Reid & Brown.
Structural Steel Co., Ltd.
Stratford Bridge & Iron Co.

Structural Steel.
Dennis Wire and Iron Works Co., Limited.
Dominion Bridge Co.
Hamilton Bridge Co.
Jenks Dresser Co., Limited
Reid & Brown.
Stratford Bridge Co.
Structural Steel Co., Ltd.

Store Fixtures.
Canadian Office & School Furniture Co.

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

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

Varnishes.
Benjamin Moore Co.
International Varnish Co.
Randall Bros.

Valves.
Kerr Engine Co.
Taylor-Forbes Co.

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

Wall Finishes.
Benjamin Moore Co.
Berry Bros.
International Varnish Co.
Randall Bros.

Wall Hangers.
Taylor-Forbes Co.

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

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

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

Wheelbarrows.
Mussens, Limited.

Window Guards.
B. Greening Wire Co., Limited.
Canada Wire Goods Mfg. Co.
Page Wire Fence Co.

Window Shades.
Wm. Bartlett & Son.

Wire Rope and Fittings.
B. Greening Wire Co., Limited
Mussens, Limited.
Otis-Fensom Elevator Co., Limited.

An Index to the Advertisements

ART STONE

A Reproduced Sandstone in

Color Quality Texture

Made by applying the latest Scientific Ideas to the Oldest Approved Methods.

Freely Used by the Leading Architects.

BUY THE BEST

STRONG STAINLESS

Accurately Reinforced.
Promptly Delivered.

Canadian Art Stone Co.
LIMITED

Price Street - - - Toronto

Agents in the Principal Cities.

HOIDGE MARBLE

Architects who have had the experience of tearing out unsatisfactory Marble Work are not slow to show their appreciation of the advantages of employing "Hoidge Service" on their important work—which means a guarantee of absolute satisfaction to the architects on all contracts carried out by us.

We have to our credit the finest Marble Interiors and Exteriors in Canada, and will be glad at any time to give architects the benefit of our experience in this character of work.

The Hoidge Marble Co.
LIMITED

Office and Works: Phone N. 3299

34 Price Street - - - - TORONTO

THE ONLY WAY

To know whether each part of your business is profitable, and that some branches are not eating into the profits of others, is to have a system of estimating and cost accounting which keeps each department separate and yet works together as a harmonious whole. You can have such a system and yet reduce your office expenses. All you have to do is to introduce

The Builders' Auxiliary

into your business. This system is accurate, simple and complete. Every contract is kept as a separate unit. Labor and material are separated in every branch, and each is charged up in an extremely simple manner to its own part of the contract.

PRICE, $5.00 PER SET.

Just Out

HANDBOOK OF ESTIMATING DATA

Invaluable for Architects Contractors, Estimators, Carpenters, Masons Plumbers, Painters, and all others engaged in the Building Trade.
It is full of facts, not formulas, and is so simple that every item can be readily understood by anyone who can read. There is no useless padding to make the book look bigger. Every page is worth the price of the book.

PRICE, ONE DOLLAR.

The Builders' Auxiliary Co'y
SHERBROOKE, QUE.

E. F. Dartnell

(Established 1893)

Montreal

Building Supplies, &c.

Fine Face Brick. Dry Pressed and Plastic. All Colors and Patterns.

"Tapestry" Face Brick in Reds, Greys and Golden.

Enamelled Brick of the very highest grade made by Stanley Bros., Limited, Nuneaton, England.

Glass Brick

Terra Cotta Fireproofing

Glass Tiles **Hollow Brick**

Floor Quarries **Roofing Tiles**

&c., &c., &c.