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CONSTRUCTION

A · JOURNAL · FOR · THE · ARCHITECTURAL
ENGINEERING · AND · CONTRACTING
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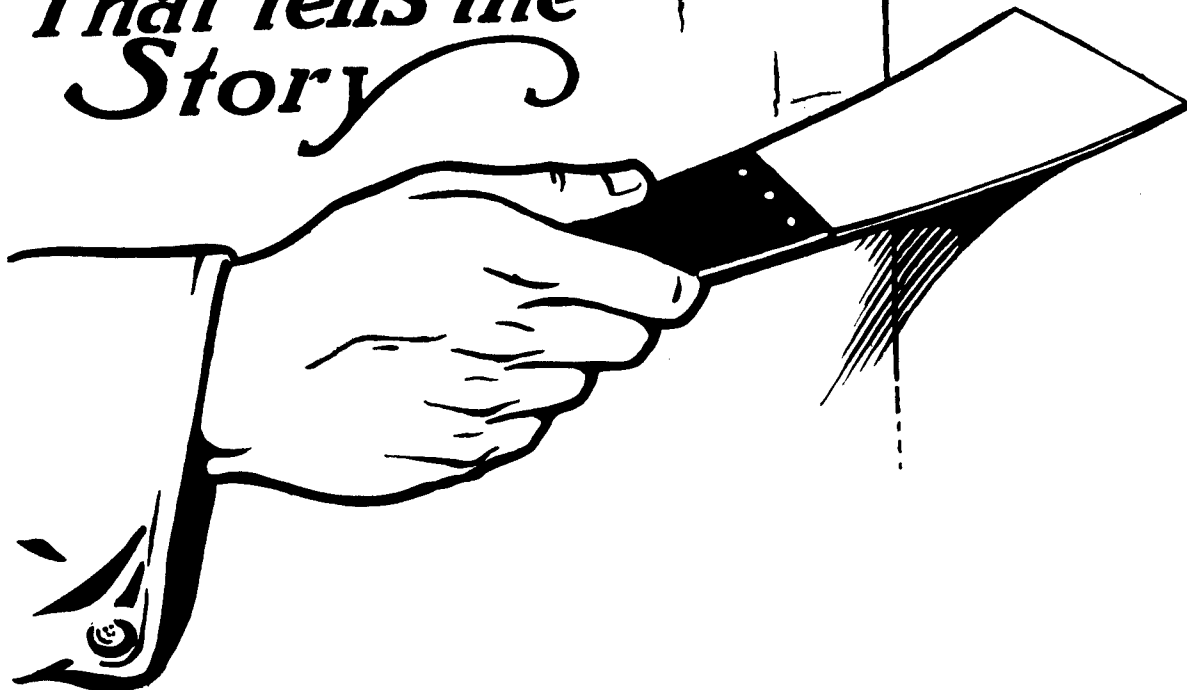
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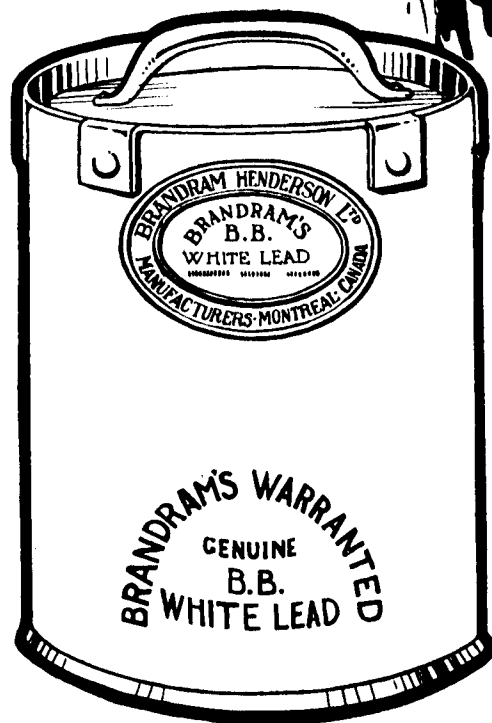
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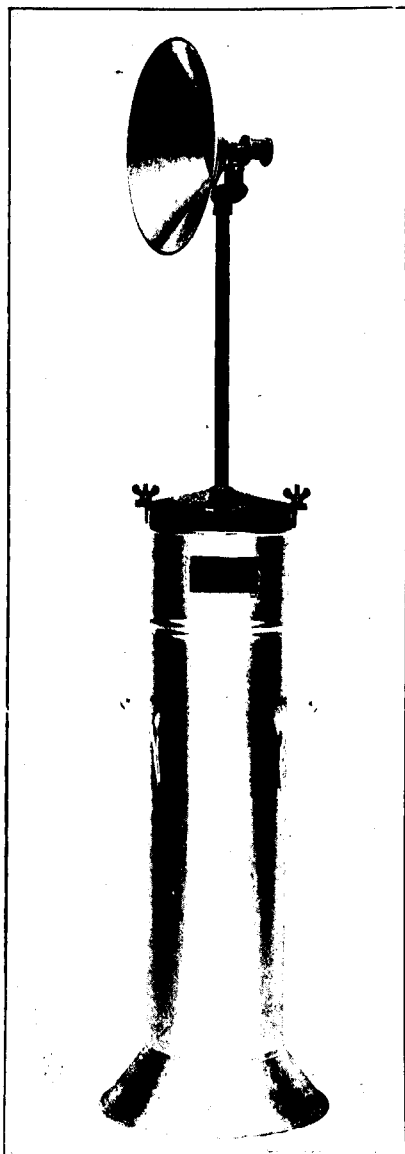
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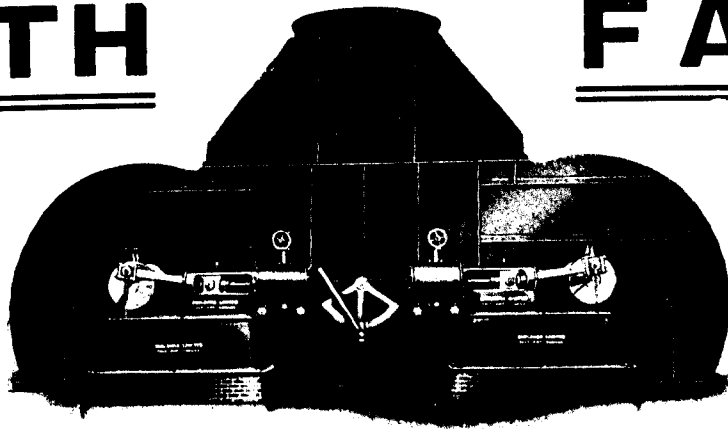
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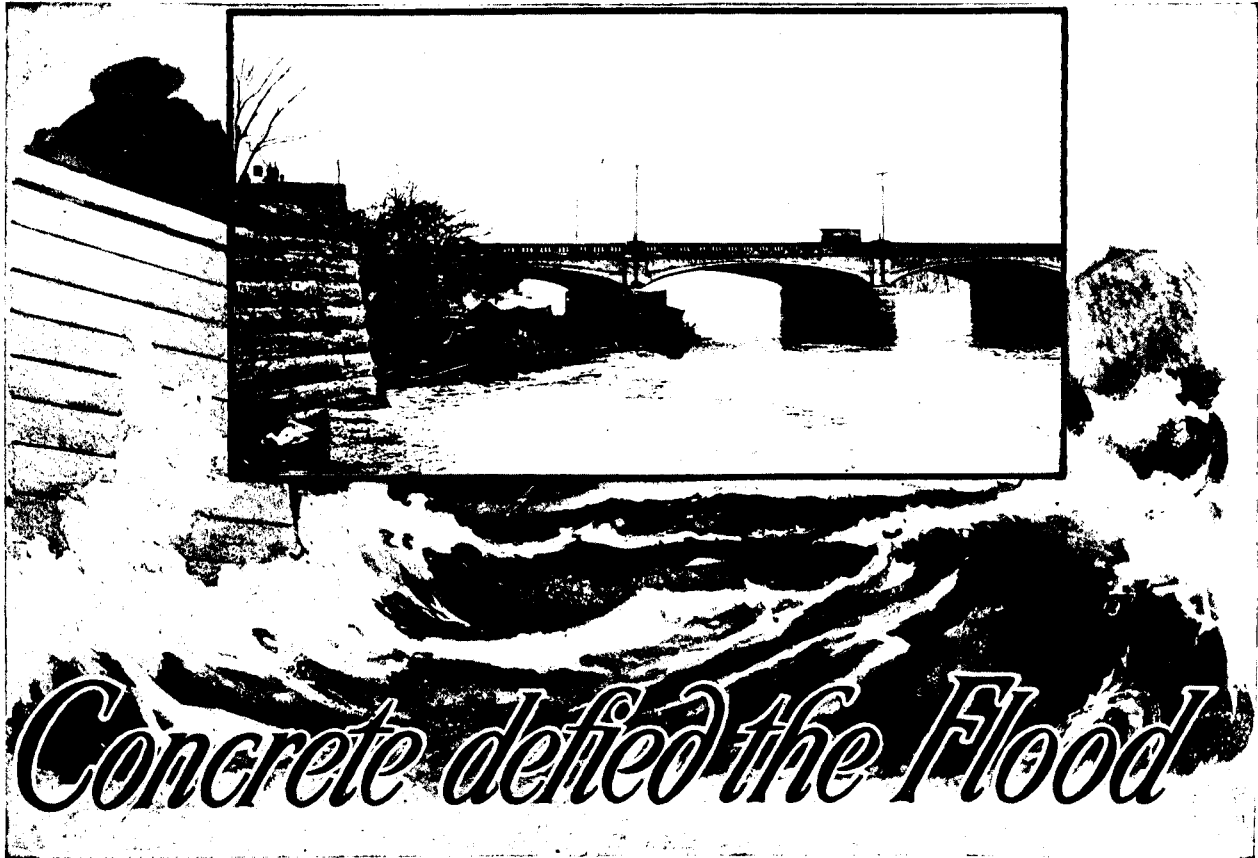
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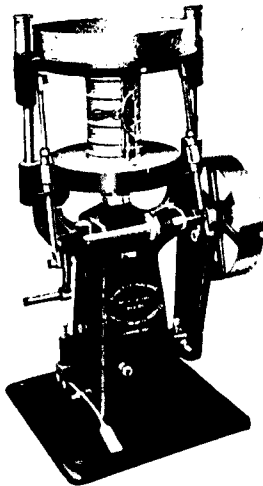


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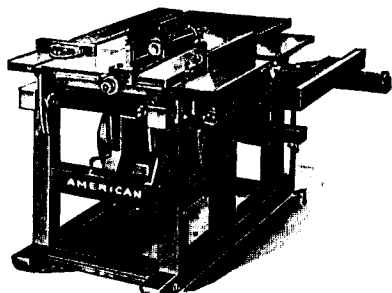
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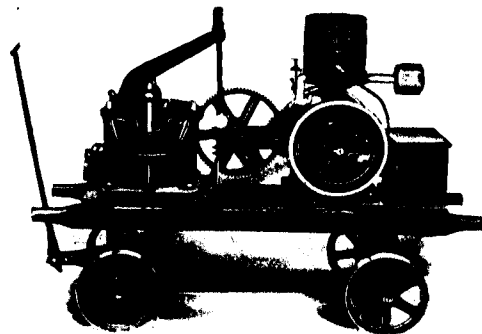
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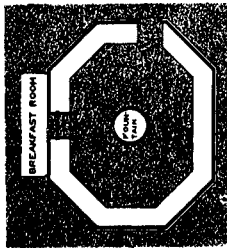
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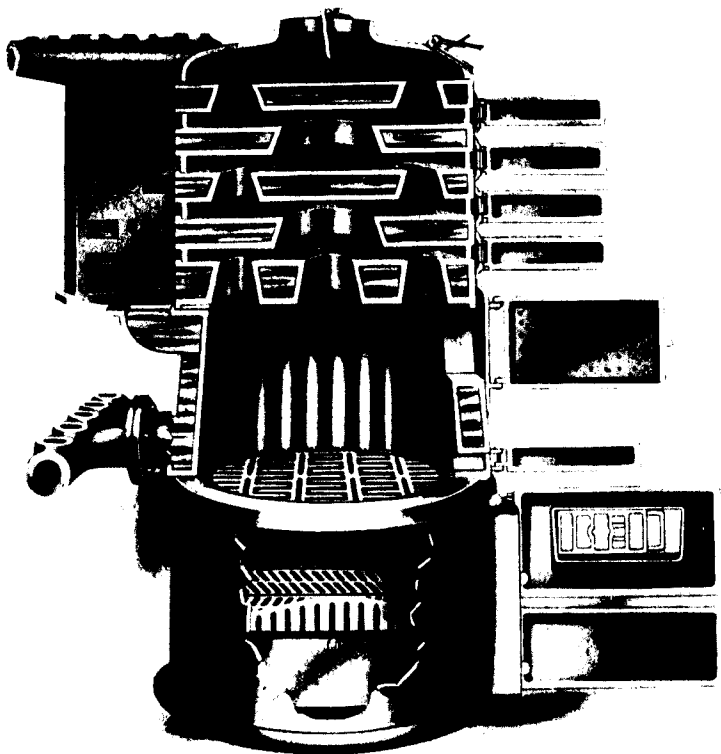
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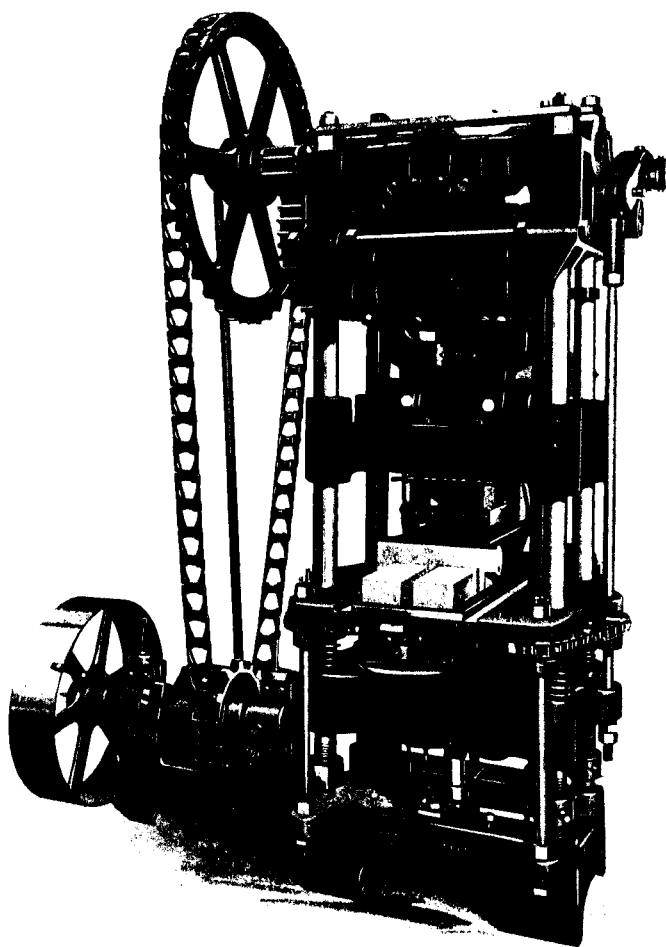
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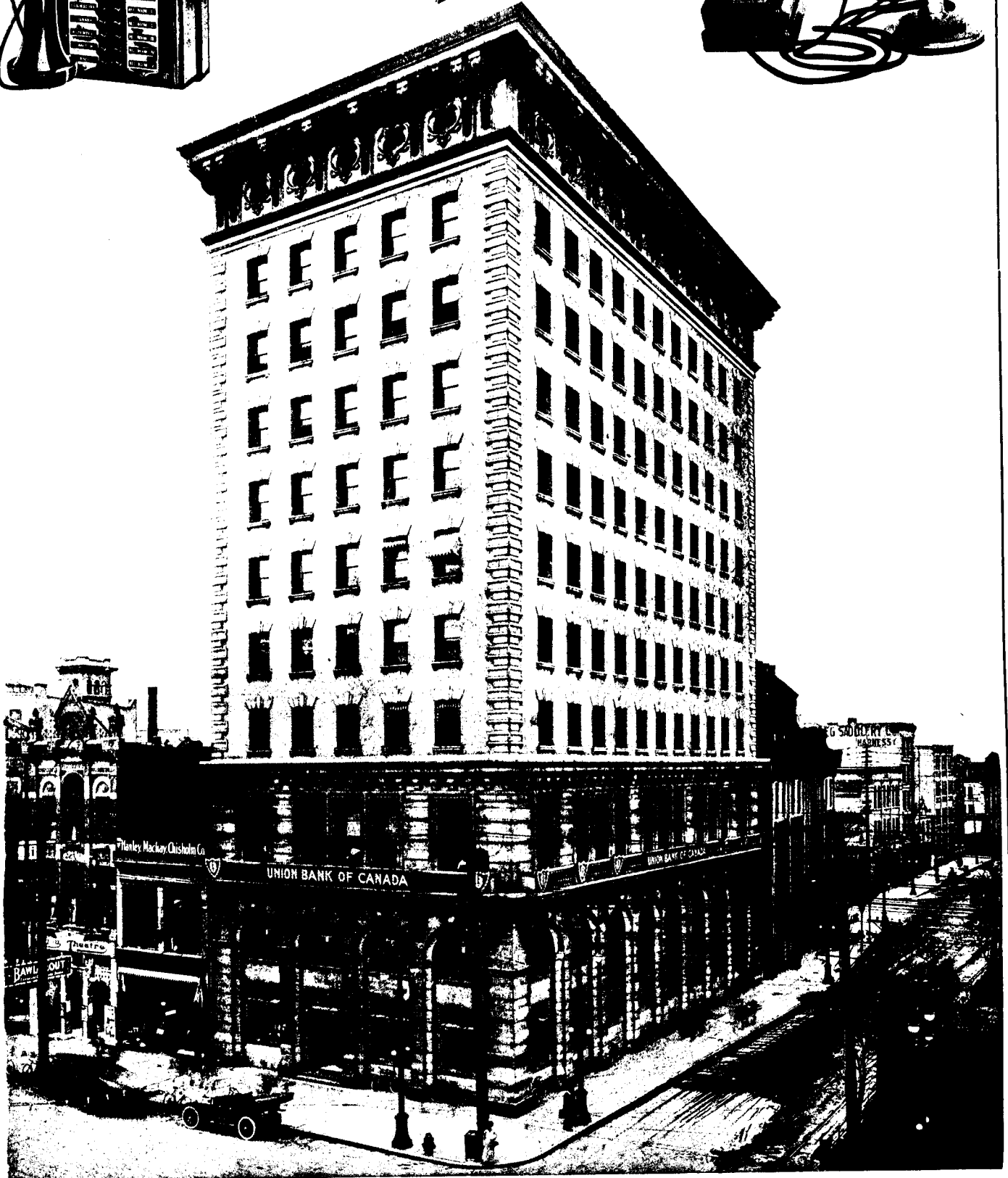
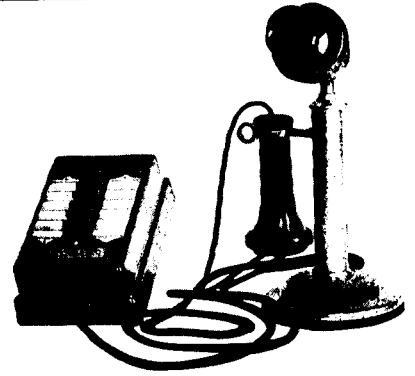
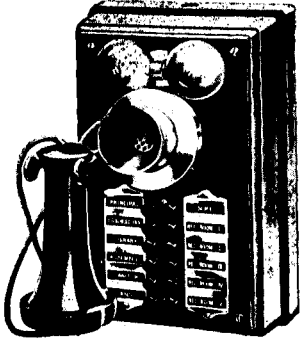
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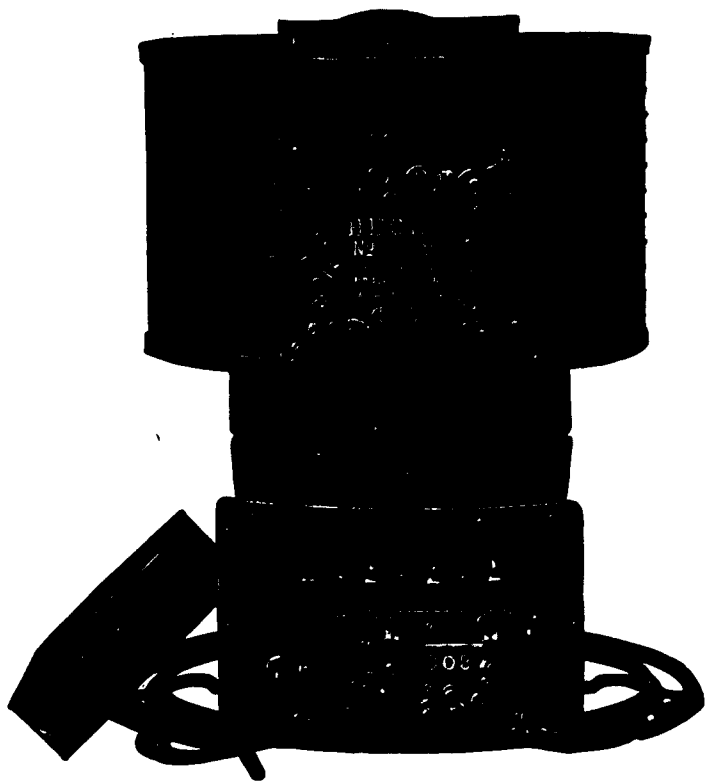
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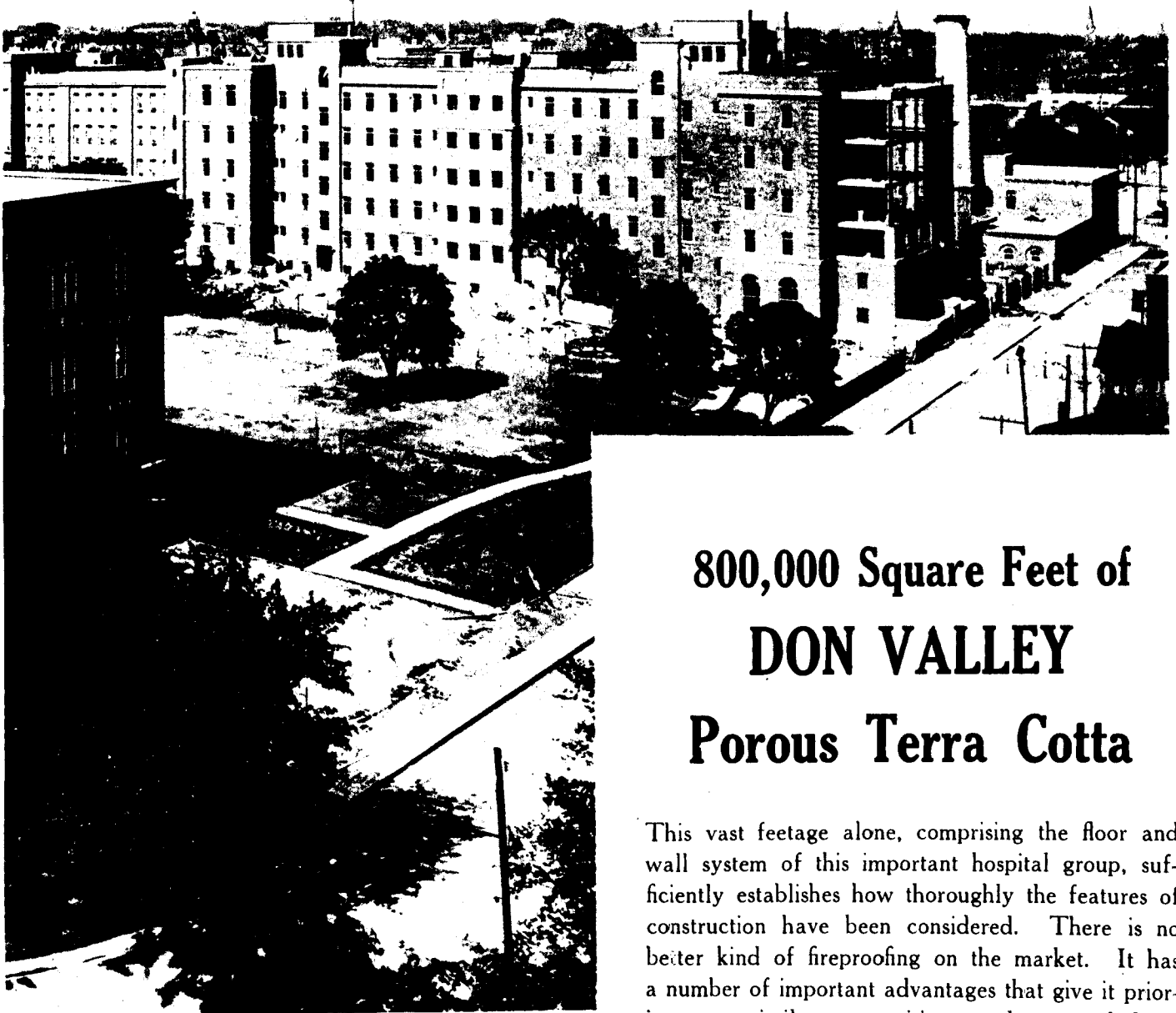
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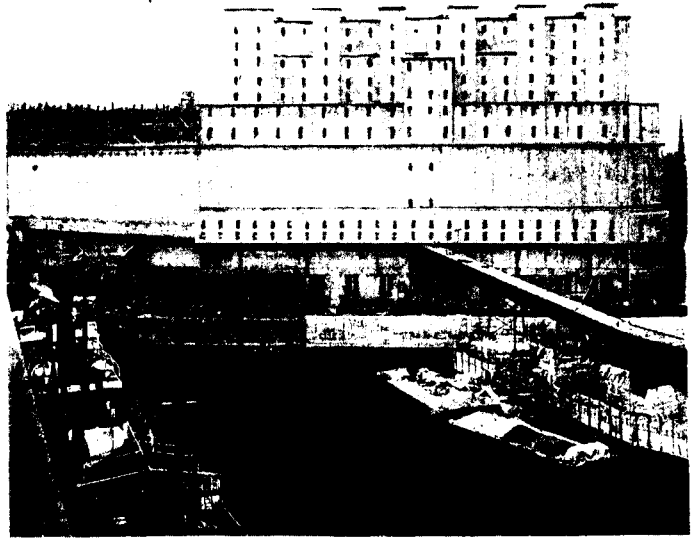
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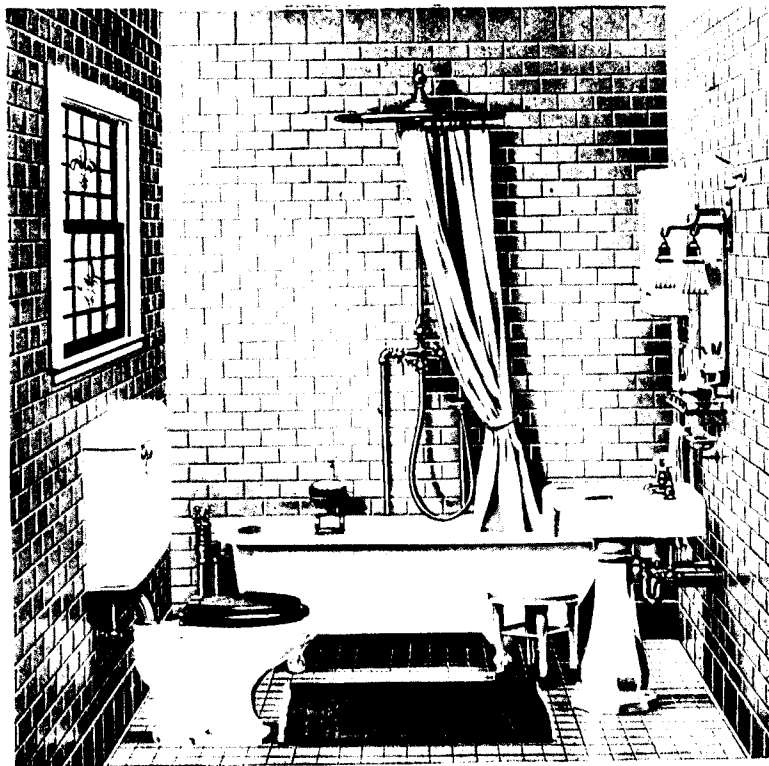
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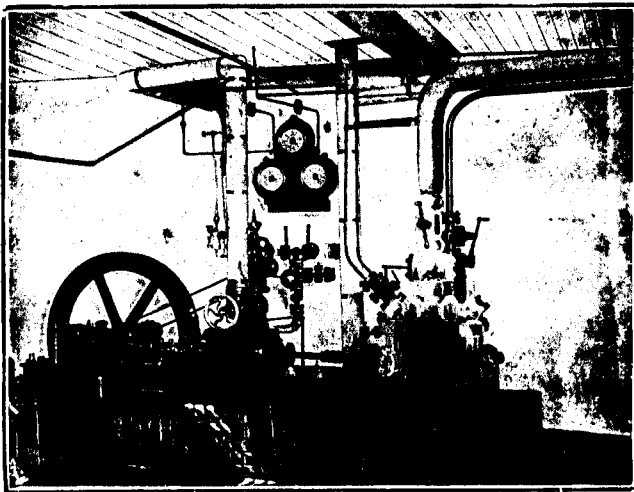
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Steel pontoons coated eighteen years ago still perfectly protected and good.

Fresh water tanks coated ten years ago still perfectly protected and good.

It is also a wonderful preservative of wood whether above or below ground, preventing decay.

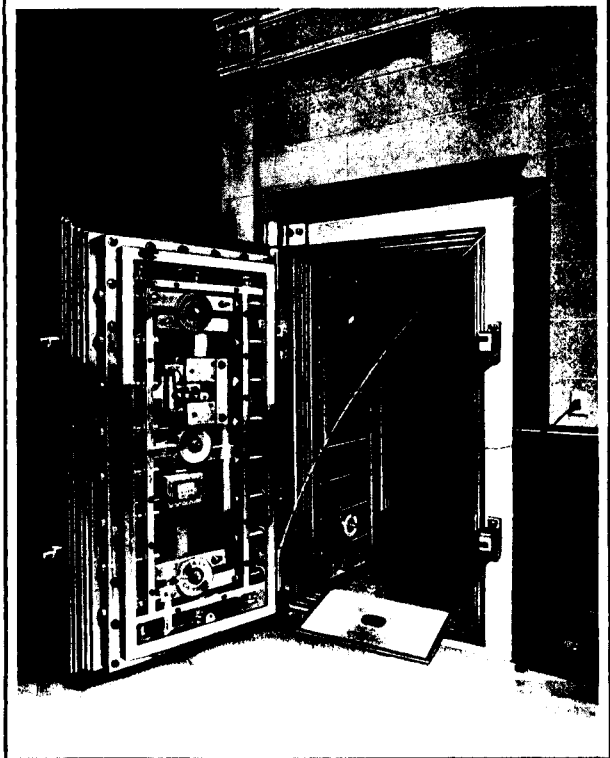
We guarantee it free from rosin and to have a flash point of not under 75° F.

Put up in packages from 1-gallon cans to barrels.

**The Ault & Wiborg
Co., of Canada, Limited**



Varnish Works
TORONTO
MONTREAL WINNIPEG
Cincinnati Philadelphia
New York Buffalo
Chicago Minneapolis
San Francisco London Paris



Showing Vault "with Outer and Inner Doors open" of The Dominion Bank at Vancouver, B.C., Designed, Built and Installed by us

35 Years Experience, Expert Mechanics & Best Material Obtainable

Are all combined in the construction of
G. & McC. Co. Safes and Vaults

OUR AIM HAS ALWAYS BEEN
To build Safes and Vaults as well as it was possible to build them, and it is owing to this care on our part that G. & McC. Co.

SAFES & VAULTS
have always stood the test.

OUR RECORD
35 YEARS WITHOUT A LOSS
is one of which we are justly proud.

Ask for our Catalogue and Book—
"Profitable Experience."

The
**Goldie & McCulloch Co.,
Limited**

Head Office and Works - GALT, ONT., CANADA
Branches or Agencies in TORONTO, MONTREAL, WINNIPEG,
VANCOUVER and ST. JOHN, N.B.



Architects:
Darling & Pearson, Toronto

The Toronto General Hospital

Contracting Painters:
Jos. Cousland & Son, Toronto

The finest hospital on the American Continent and one of the finest in the world. Sanitary to the minutest detail.

Floors are Finished with Over Four Hundred Gallons of "Liquid Granite"

"WHERE THE WEAR IS SEVERE IT HAS NO PEER."

THE MOST DURABLE VARNISH IN THE WORLD

Liquid Granite holds the record for long life and elasticity. Washing with soap and water does not affect it. It does not gather dirt like wax and is easily cleaned. Truly a sanitary floor covering.

There are fifty-five years of experience back of Berry Brothers' Varnishes. These are the labels you should know.

Luxeberry Wood Finish

Unequaled for general interior woodwork.

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Won't crack or peel, never turns white.

Hard Drying Church Oak

Especially suited for School and Church seats. Can be rubbed if desired.

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World's Largest Varnish Makers

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Window Guards

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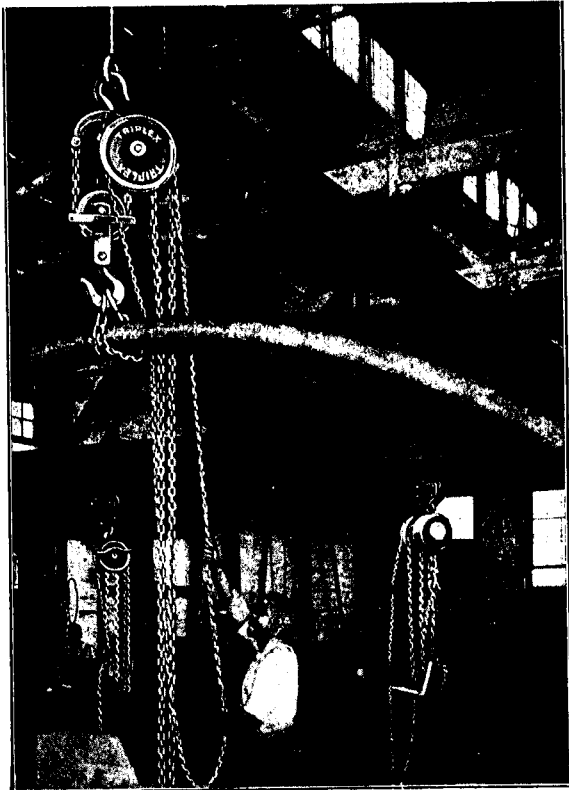
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A 4-ton Triplex Block used for handling girders in a steel structural shop in Brooklyn.

Why should weight of
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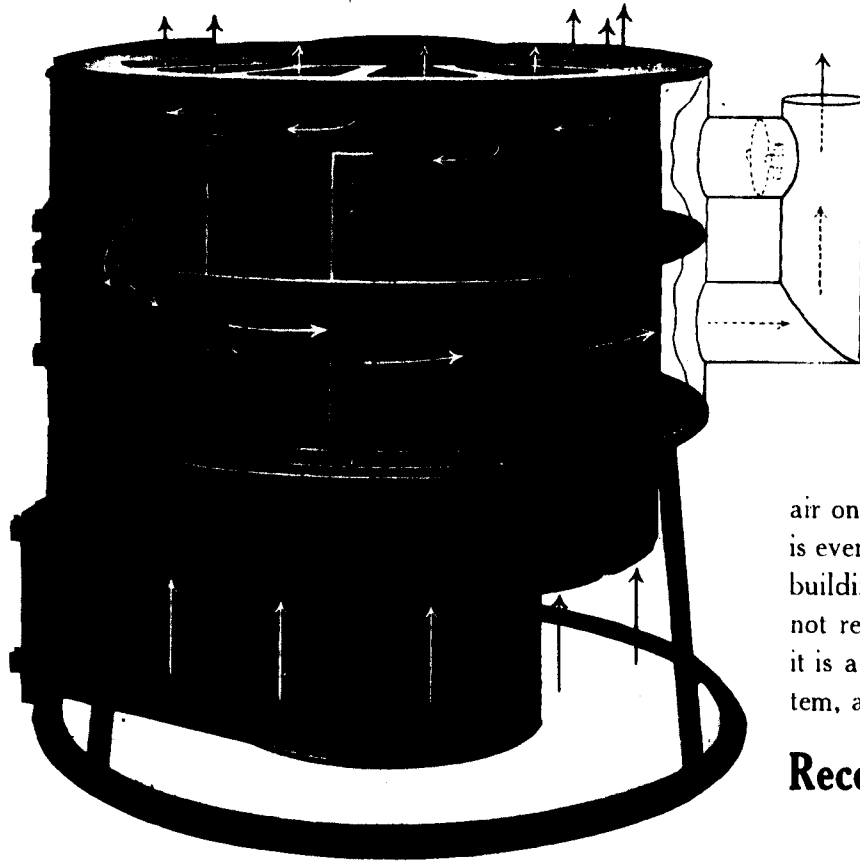
shows such plants in operation and gives tables of efficiency which will help to solve your manufacturing problems. Send for a copy to-day. To-morrow you may be too busy to think of it.

TRIPLEX 16 sizes: One-fourth of a ton to forty tons.
BLOCKS. 300 active stocks all over the United States and Canada.

Every Block Tested to 50% Overload.

The Canadian Fairbanks-Morse Co.
LIMITED

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Saskatoon Calgary Vancouver Victoria



Specify the **Calorific** Warm Air Furnace

The heating system is one of the features of a building which the owner can most fully appreciate if satisfactory. Your client is sure to be pleased with the Calorific. It produces a large volume of warm air on a low fuel consumption. The heat is evenly distributed to every section of the building. It is simple to operate and does not readily get out of order. Altogether it is a most thorough and economical system, and a safe one to specify.

**Record Foundry and Machine
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Montreal, P.Q. Moncton, N.B.
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Showing direct draft attachment applied to the "Calorific" from back of radiator, also course of fire travel around air heating columns to smoke stack.

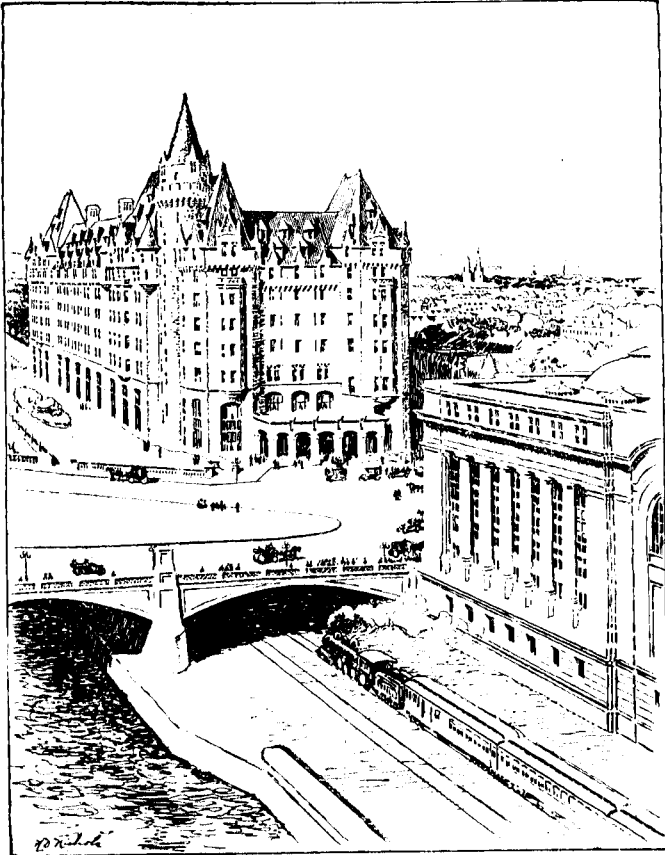


Iron Fence and Lamps, General Hospital, Toronto

Manufactured by

ARCHITECTURAL BRONZE AND IRON WORKS

Canadian Albis-Chalmers, Limited. Head Office: Toronto.



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WITH THE

IMPERIAL WIRE & CABLE COMPANY, LIMITED

TORONTO MONTREAL WINNIPEG

Second of a series of advertisements showing buildings of national importance which have been wired with Imperial Wire and Cable Company's, Limited, wires.

This picture shows

**Chateau Laurier & Grand Trunk Central Station
OTTAWA**

THESE BUILDINGS WERE WIRED THROUGHOUT
WITH "ADANAC" RUBBER INSULATED WIRE

Architects: Ross & McFarlane, Montreal.
Engineers: Westinghouse, Church, Kerr & Co., New York.
Electrical Contractors: Western Electric Co., New York.

Address our nearest office:

MONTREAL TORONTO WINNIPEG

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ALWAYS USE Hammer Brand Plaster of Paris

Manufactured for Half a
Century

The Standard of Excellence



TRY IT
and compare its surface
covering capacity with
other Brands

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Export Agents: THE IMPERIAL EXPORT CO., LIMITED

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Reduce Your Clients' Fuel Bills 25% to 35%

Actual tests and testimonials prove that from 25% to 35% more coal is required to heat a building when the walls are *lined* with ordinary sheathing paper, than when they are *insulated* against heat, and cold, with

KEYSTONE HAIR INSULATOR

Keystone effects this saving through its cushion-like construction, which contains the greatest amount of dead air (the most efficient insulator known). It *absorbs* heat, cold and sound waves *instead of transmitting* them, as in the case of sheathing paper, and a corresponding saving in fuel is effected.

Keystone Hair Insulator is made of a thick layer of thoroughly cleansed and sterilized cattle hair, securely fastened between two sheets of strong, non-porous insulating paper. It will not settle or pack down, dry out, rot or attract moisture. Is an effective fire retardant, as it will not carry flame. Is in-odorous and vermin-proof and will last as long as the building.

Other advantageous features are described in our Catalogue No. 102.

Write nearest Branch for a copy and samples.

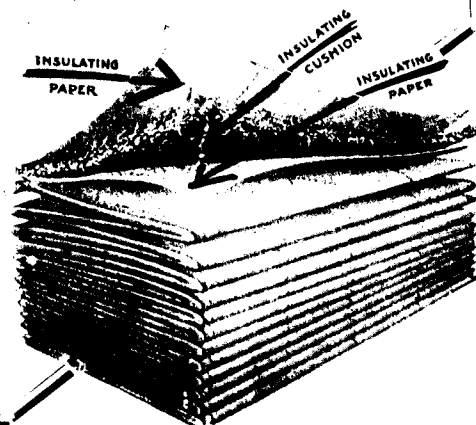
**THE CANADIAN
H. W. JOHNS-MANVILLE CO., LIMITED**

Manufacturers of
Asbestos and Magnesia
Products

ASBESTOS

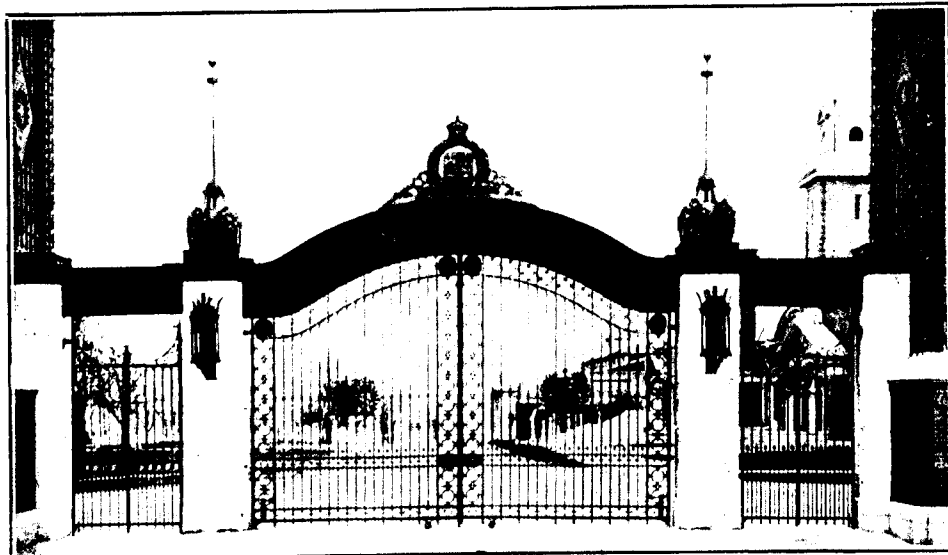
Asbestos Roofings,
Packings, Electrical
Supplies, Etc.

TORONTO MONTREAL WINNIPEG VANCOUVER 1739



Canadian Ornamental Iron Co., Limited

E. J. LEA, Manager.



Dufferin Memorial Gates. Entrance to Toronto Exhibition Grounds

Modern Method
Stairs and
High Class
Ornamental
Iron, Bronze
and Brass Work

86 & 88 RIVER ST., - TORONTO, ONT.

Ormsby-Lupton-Steel-Sash

Rolled Steel—Low Carbon Members
 All Sections—Solid—One Piece
 Accuracy in Glass Sizes Guaranteed
 Muntins Locked Making Joints Inseparable

Ormsby-Steel-Partitions Pond Continuous Sash

MINIMUM COST—MAXIMUM STRENGTH AND LIGHT

The A. B. Ormsby Company, Ltd.

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Associated with

WINNIPEG

THE METAL SHINGLE AND SIDING COMPANY, LIMITED

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 Regina, Robson Supply Co.
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Quebec, J. A. Bernard.
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24 GAUGE EXPANDED STEEL LATH

"Galt" Lath is becoming more and more popular. Plasterers are finding out that it takes less mortar, has a better key and is more reasonable in price than any other kind.

WRITE FOR PARTICULARS.

THE GALT ART METAL CO., Limited

(DEPT. "A")

GALT, - ONT.

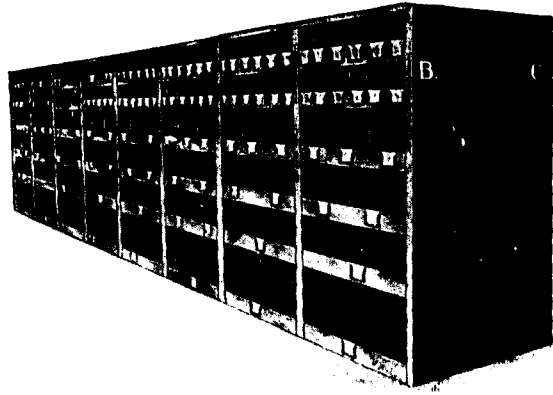
Dennisteel Lockers

are sanitary—safe—economical in cost and space—convenient to install and to rearrange if so desired.

The partitions are solid steel sheets, a much more sanitary method of separating the clothing in adjoining lockers than the ordinary wire or expanded metal. It is also a more durable construction.



The doors may be had in either perforated sheet steel or expanded metal. Each one has three hinges and a *three-way locking device*, with key or combination locks.



Dennisteel Shelving

Is much stronger, and takes much less room than wood. It is adjustable, and sections can be added as requirements expand. Shelves can be converted into bins by using steel bin shelf attachments. All compartments are furnished with label-holders.

SPECIFY DENNISTEEL LOCKERS AND SHELVING.

Dennis Wire & Iron Works Co., Limited

General Office and Works :

120-130 DUNDAS ST. - - LONDON, ONTARIO

Built of "AMERICAN" Enameled Brick
IT STOOD THE TEST



A Coney Island Beef Roaster

That withstood the severe fire which destroyed Dreamland Park in May, 1911.

The "American" Enameled Brick

are thoroughly sanitary and, burned at a temperature of 2,300 degrees Fahrenheit in the process of manufacture, insure absolute protection against any possible fire damage to the building.

WRITE FOR SAMPLES, miniature or full size in the standard colors, also "Fifth Edition" Catalog. Prompt attention given formal requests.

American Enameled Brick and Tile Company,
1182 Broadway, New York City.

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52 Elgin Street,
Hamilton, Ont., Canada. |
| The Ottawa Fireproof Supply Co.,
514 Sussex St.,
Ottawa, Canada. | Scott, Hammond & Pratt, Ltd.,
65-67 Victoria Street,
Toronto, Canada. |
| The Waite-Fullerton Co., Ltd.
402 Builders' Exchange,
Winnipeg, Man., Canada. | Cadwell Sand & Gravel Co.
Windsor, Ontario, Canada. |

THE
**LINDE BRITISH
REFRIGERATION
COMPANY LIMITED**

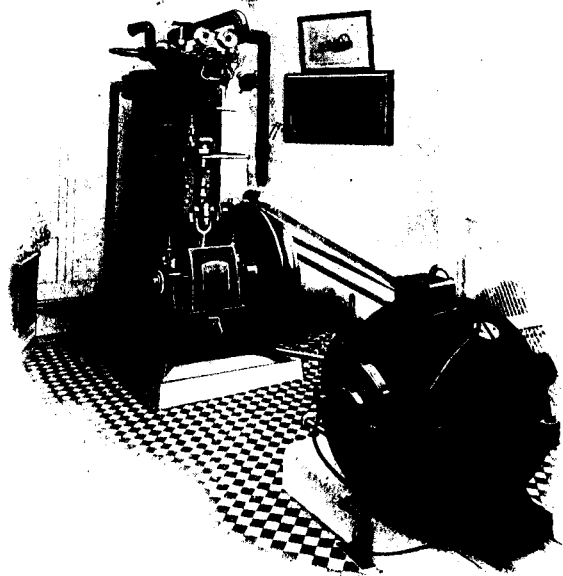
**Carbonic Acid Compression
"The Modern Method"**

Temperatures as desired.
Ice-making if required.
Need only unskilled attention and
small floor space.
Clean and absolutely safe.
Always available.
Delivery of most sizes from Montreal stock.

The illustration shows the Linde British Carbonic
Acid Refrigerating Plant as installed in

Hotels	Apartment Houses	Club Houses
Flats	Residences	Hospitals
Butcher Shops	Grocery Stores	
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ESTABLISHED
In Great Britain 27 years - In Canada 18 years
*Has the largest output in the world
of refrigerating machinery*



CANADIAN OFFICES:
**CORISTINE BLDG
MONTREAL**

Modern Architects

Specify SEBCO Expansion Bolts and Screw Anchors

THEY are TIME, LABOR and MONEY SAVERS. One can, in a very few minutes, fasten any kind of fixture to walls, floors and ceilings of brick, stone, concrete, tile or any hard substance in which a hole can be drilled. The fixture becomes part of the wall itself, never to come down unless purposely removed.

**Screw
Anchors**

SEBCO

**Expansion
Bolts**



SebcO Screw Anchors for fastening light bathroom and electrical fixtures, elevator indicators, signal lights, chandeliers, mail boxes, sprinkler systems and for work around marble or tile where it is imperative that no rust stains shall appear. Made of a non-rusting composition metal for use with any ordinary wood screw.

More Than 107,000

SebcO Bolts were used in the Singer, Metropolitan and Woolworth Buildings.

We Will Send Free

Upon request, catalogue and sample of Bolt and Anchor.



SebcO Expansion Bolts are used for heavy work such as fastening machinery, metal doors, gratings, heavy pipes, etc. Made of malleable iron for use with either lag screws or machine bolts.

377 St. Paul St., Montreal
28 Toronto St., Toronto
425 Henry Av., Winnipeg

STAR EXPANSION BOLTS

J. EDWARD OGDEN
Canadian Distributor

The Shadowless Office Light



An office requires a clear, soft light, evenly distributed to every part of the room, and free from shadows.

In the head office of the Canada Life Assurance Company, and in many other large offices, the light problem has been satisfactorily solved by installing

Alexalite

It does not cast a shadow and there is no glare. The lamps are concealed, giving an indirect reflected light, very grateful to the eyes. By insuring more comfortable working conditions, it increases the efficiency of all employees.

Alexalite is not expensive to operate. In fact it usually effects a saving of from 25 to 40 per cent. over other systems.

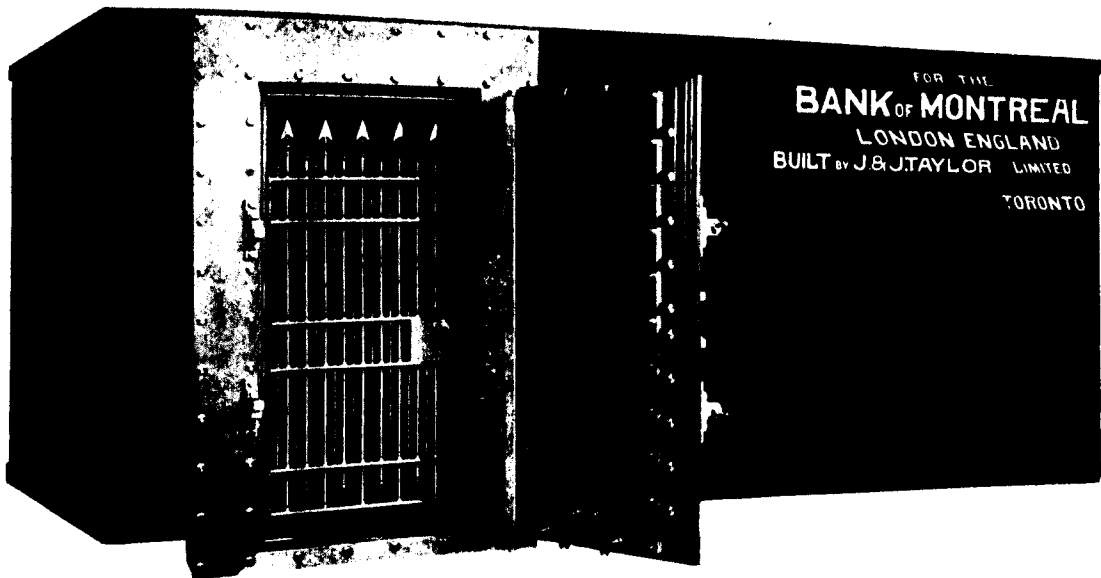
It is the ideal light, not only for offices, but for stores, warehouses and in every place where "more light and better light" is required.

Actuary Dept., Head Office, Canada Life Assurance Company. Photograph taken at night, with no other illuminant but Alexalite.

Canadian Alexalite

166 Bay Street

Toronto



ANOTHER CANADIAN TRIUMPH.

In London, England, the "hub of the universe," we have just installed the heavy vault doors and lining illustrated above. Similar installations have been made by us in Shanghai, China, and Hamilton, Bermuda.

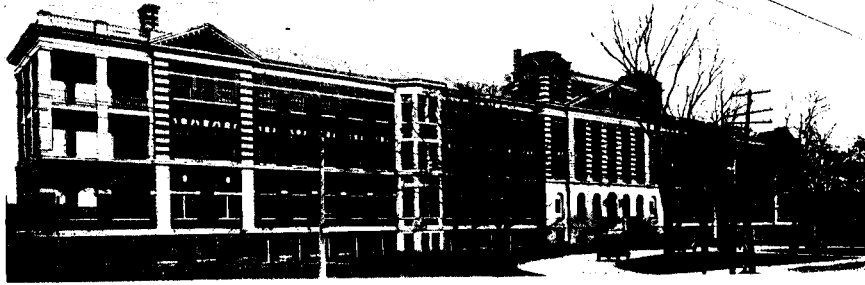
Branches :

MONTREAL
WINNIPEG
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J. & J. Taylor, Limited

Toronto Safe Works : TORONTO, Canada

Port Credit Brick



The Western Hospital

Construction made use of Port Credit Brick. This brick is full size, stands high compression tests, and has a notably low absorption. This makes Port Credit Brick highly desirable for facades and elaborate structures, subject to the grime of city conditions. The Port Credit Pressed Brick is graded No. 1, No. 2, and No. 3.

This Brick is made from Canada's best bed of shale. The output is 1,000,000 a week. Prompt deliveries may always be had at building centres.

For Specifications or Deliveries, telephone, call or write

Port Credit Brick Company, Limited

PORT CREDIT

Toronto Office: McKinnon Building

(12)

"Made of Canada's Finest Shale."



The Constructor Says —

"IT is as hard for the key of the mortar to fall off the back of Herringbone Lath as it is for a hod carrier to fall off a ladder. Every rib is a rung. Each does its share in sustaining the clinch. In a poorly lathed job, half the plasterer's profit may easily drop off the back of the lath and be lost between the studs. I take no chances with my profit.

"I USE HERRINGBONE LATH"

CLARENCE W. NOBLE

GENERAL SALES AGENT

TORONTO

MONTREAL

WINNIPEG

The Metal Shingle & Siding Co., Manufacturers

"OTIS-FENSOM"

The Symbol of Satisfaction and Unfailing Service

THE installation of an Otis-Fensom Elevator System is an assurance of speed, safety and uninterrupted traffic.

The name "Otis-Fensom" has come to be synonymous with *Efficiency*.

Office buildings equipped with Otis-Fensom Passenger Elevators seldom remain long with unoccupied floor space. High class tenants appreciate their convenience and reliability.

Factory buildings equipped with Otis-Fensom Freight Elevators are housing the most prominent and successful businesses in Canada.

Otis-Fensom engineers and designers are continually solving such problems as confront the Architect when planning the placing of elevator installations.

We invite correspondence from Architects and Engineers engaged upon the plans for buildings of any type of construction which make necessary the use of an elevator.

OTIS-FENSOM ELEVATOR COMPANY LIMITED

Head Office:
TORONTO, ONT.

Works:
HAMILTON, ONT

Ideal Drinking Fountains

are made in designs and sizes for every use. They are constructed to withstand the abuse that a public fixture usually encounters and their snowy enameled surfaces will last a lifetime. We manufacture the most complete line of Drinking Fountains ever offered to the trade and they are fully described and illustrated in a NEW CATALOG which will be sent upon request

MADE IN 167 DESIGNS AND SIZES

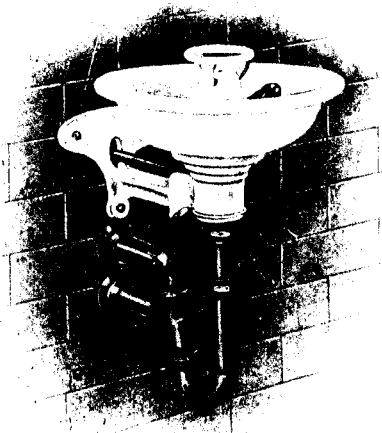


Plate F 3342

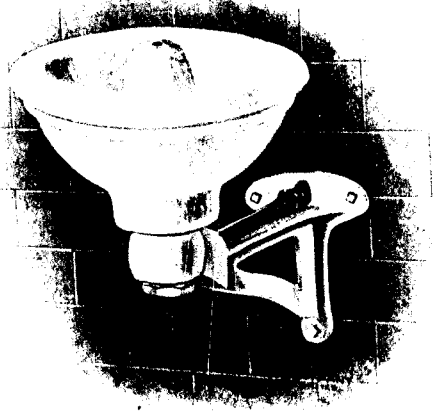


Plate F 3305



Plate F 3013



Plate F 3025



Plate F 3055

The Standard Ideal Company Ltd

General Offices and Factories:
PORT HOPE, CANADA

Branch Offices and Showrooms: Montreal, Toronto, Winnipeg, Vancouver

CONSTRUCTION

VOL. VI

NO. 11

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H. GAGNIER, Limited, Publishers
GRAPHIC ARTS BUILDING, TORONTO, CANADA

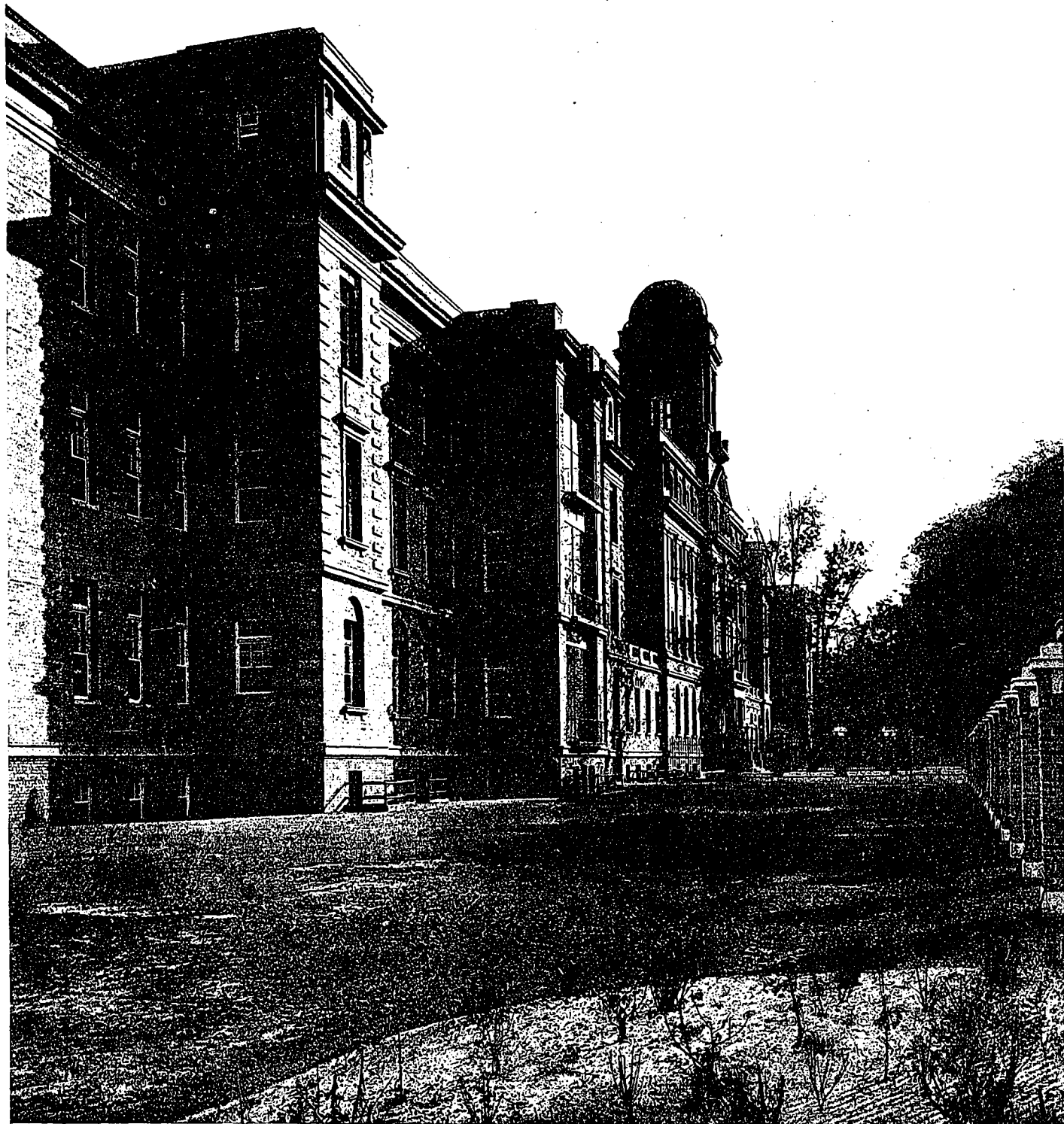
BRANCH OFFICES :

MONTREAL

WINNIPEG

CHICAGO

NEW YORK



DETAIL OF
MAIN FACADE.

TORONTO GENERAL HOSPITAL.

DARLING & PEARSON,
ARCHITECTS.



Canada's Thanksgiving—A cause for general gratitude over the progress of the present year and the future promise.

SURVEYING the conditions of the past year, the great question arose on Thanksgiving day whether or no, as individuals and as a united people, the times warranted the optimistic opinions offered by the various prominent men throughout the Dominion of Canada. To be sure, our pessimistic friend was ever present. He could see nothing but portending disaster ahead. Is it not evidenced, he asked, in the scarcity of money, the large number of unemployed, the moneyed institutions' refusal to advance loans on real estate, the drop in all phases of commercial activity, the building slump, etc., etc. We have meditated over his statements and after a conscientious endeavor to sift the various arguments to the very bottom, we are convinced more than ever that the clouds are breaking and that we have great reason to be thankful. In the messages from the Premiers of the Provinces we note a sentiment of confidence which must express the feelings of the millions under their jurisdiction. Sir Lomer Gouin of Quebec congratulates the Dominion on her present prosperity and prays that the industry and skill of the people, the productiveness of the agricultural and dairy lands, the commerce, the industries, the output of its forests and mines, all will continue in their present state of activity. The acting Premier of British Columbia cites the year as one of substantial gain in commerce and general development. He believes they are on the eve of a new era, a condition emanating from the successful operations at the Isthmus of Panama which is focusing upon the western coast the attention of the world. From Saskatchewan the Premier greets us with the statement that in no previous year has there been harvested a more satisfactory and bountiful crop. The Premier of New Brunswick claims the season has been one of the finest in many years; the harvest has been bountiful; prevailing prices in most lines satisfactory; demand for labor good and the remuneration fully up to if not in ad-

vance of previous years. Such optimism is true and wholesome. The real cause for our uneasiness is a failure to grasp the helm firmly, but rather be contented with a shaky and dangerous existence. Let the world cry hard times and we have it, but let each individual weigh the points carefully, consider the cause and effect, and he will soon feel his pulse tingling with new life. For some time the building trades took a slump—a slump not from the standpoint of a good successful period, but measured from the phenomenal record of 1912. When it is appreciated that in some cities the total for this year will exceed that of last and that in most of the remaining places the amount is gradually encroaching on the total for the preceding twelve months, then it is advisable at least for the hard-times look to disappear. All the more so when you realize that this has been true during a period of general depression when external causes have kept the world in a state of fear and anxiety. Our general tendency is to exaggerate the existing impressions by ignorantly quoting false conditions elsewhere. What a large amount of wasted sympathy has been expended on the Western people. The poor people, with their heavy crops, their gains in commercial life, their remarkable industrial growth. No, we feel that Postmaster-General Samuel, of London, in commenting on his recent extended visit to the Dominion, spoke correctly when he said: "The impression I received of the working classes throughout my tour was that on the whole they are prosperous. The sole unemployment existed in the West on account of the recent financial stringency. These conditions were, however, passing away in consequence of a very bountiful harvest, which has done much to restore the financial equilibrium."

The little lesson of economy as well as the bridling of real estate speculators during the past season has made a profound impression on us all. We have grown cautious once more and as a result the wheels of progress have been set in motion towards a future prosperity unparalleled in our history. And if we can only prove ourselves masters of this new era there can be nothing to hinder our advancement in the direction of unsoiled dignity and power.

Toronto General Hospital—*The high conception evolved from the first of making the institution practical and modern in every respect.*

THE FINISHED product of a large undertaking creates enthused admiration from the people at large, and yet how many of us stop to appreciate the intricate problems met during its erection. The new General Hospital illustrated in this issue stands as one of the best types in modern hospital work. It is cited by authorities in the various countries as having an exceptional plan, and an equipment of unusual merit. It reflects the æsthetic ability of our local architects and the practical modern methods employed by our hospital boards. The committee in charge started the undertaking with a comprehensive view of what the present and future needs demanded. Their chief aim was to erect a hospital complete in every phase of the work, with a prominent location, practical arrangement, modern equipment, a stable organization, proper co-ordination of efforts in every department, staffs of efficiency and the best facilities possible for student education. As a result of their untiring efforts the architectural firm of Darling & Pearson was selected to prepare the plans. Their task involved a considerable amount of preliminary work. The site was solidly built, cut through by numerous streets and of an unsanitary state. After the removal of over two hundred houses the complete area was specially treated and made thoroughly sanitary in every respect. On Tuesday, April 11th, 1911, the Governor-General of Canada, Earl Grey, laid the corner stone of the Administration building. The magnitude of the institution was impressively expressed at that time and assurance was given that the completed work would be second to none—a fact fully demonstrated by the present group of buildings. How the new institution was started is set forth by C. K. Clarke, M.D., LL.D., Superintendent Toronto General Hospital, in his treatise on the historical phases of the work. Dr. Clarke states that two years ago the Board felt the urgent need for a change of policy in the whole conception of the institution, including buildings, equipment, maintenance and administration. Conditions had changed and the marked advance in knowledge as to what constituted adequate hospital facilities necessitated an adjustment. The Board decided to make no further expenditure in patching up old buildings, but that provision should be made for new structures and equipment suitable for the modern and scientific treatment of the sick, and at the same time furnish facilities for educational work in conjunction with the University.

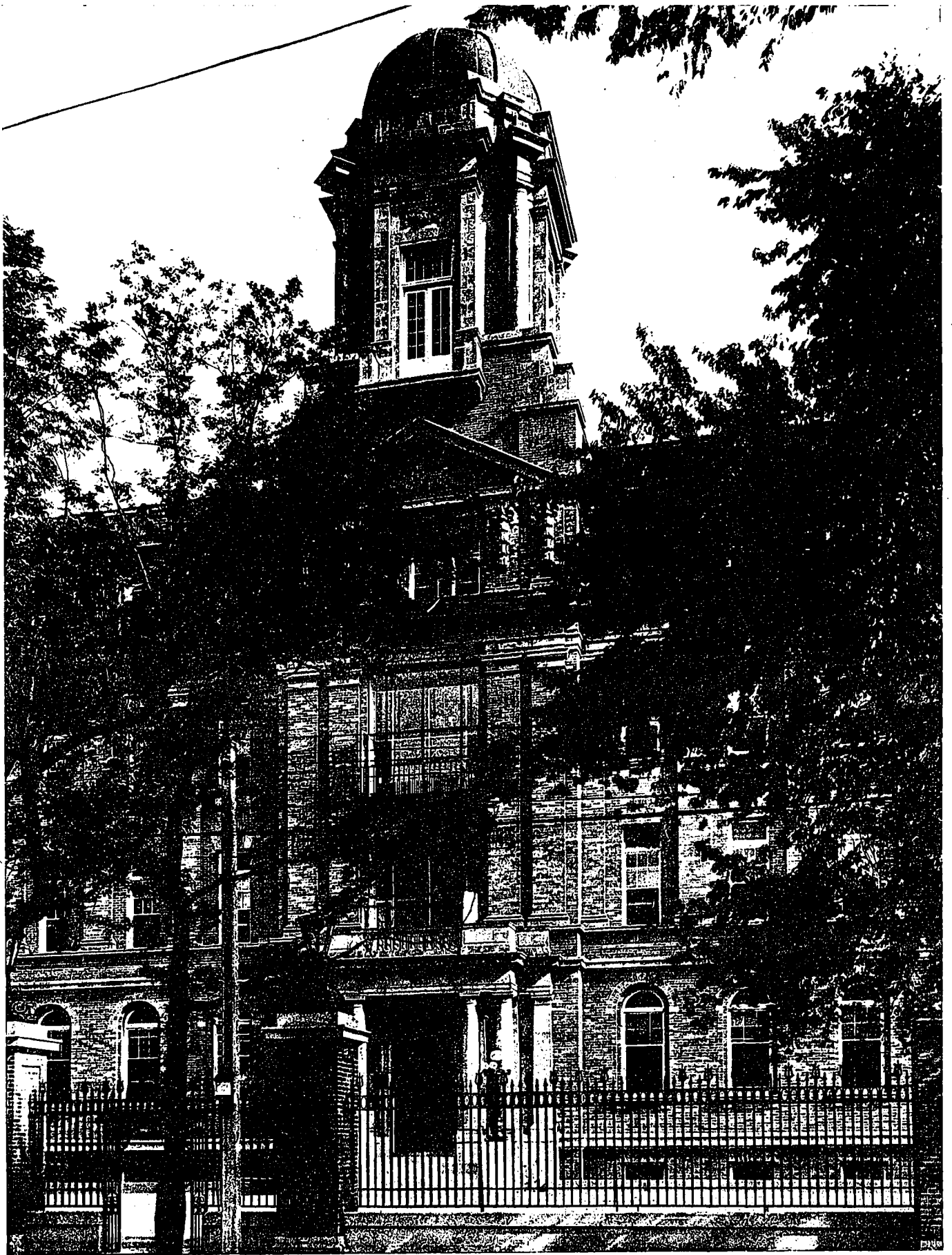
Steps were taken at once to secure the co-operation of every one interested in the creation of a new hospital. Among the donations were \$250,000 from the Government; \$200,000 from the city of Toronto; \$50,000 from the University of Toronto; \$100,000 from Cawthra Mulock for the out-patient department; \$100,000 from Hon. Mr. Cox for a memorial building; \$100,000 from the Massey estate, and \$330,000 from J. C. Eaton for the erec-

tion of a surgical wing and memorial. Generous and spontaneous contributions came from every source and are still giving evidence of the great interest which this humanitarian project has awakened among the people.

The hospital, which provides beds for approximately seven hundred patients, occupies nine acres of land in the heart of Toronto within easy access to every part of the city. It is a source of pride to the Torontonians, as it reflects the progressive spirit of our present area. It is worthy of note that while the work has been carried to completion in a mercenary age where the bare necessities sometimes obliterate all else, still here the æsthetic and practical are so happily united as to produce a dignified and artistic institution endowed with the very highest conception of structural ingenuity.

The main argument in favor of sacrificing parts of our public parks—*Intolerable conditions should be eliminated, not concealed.*

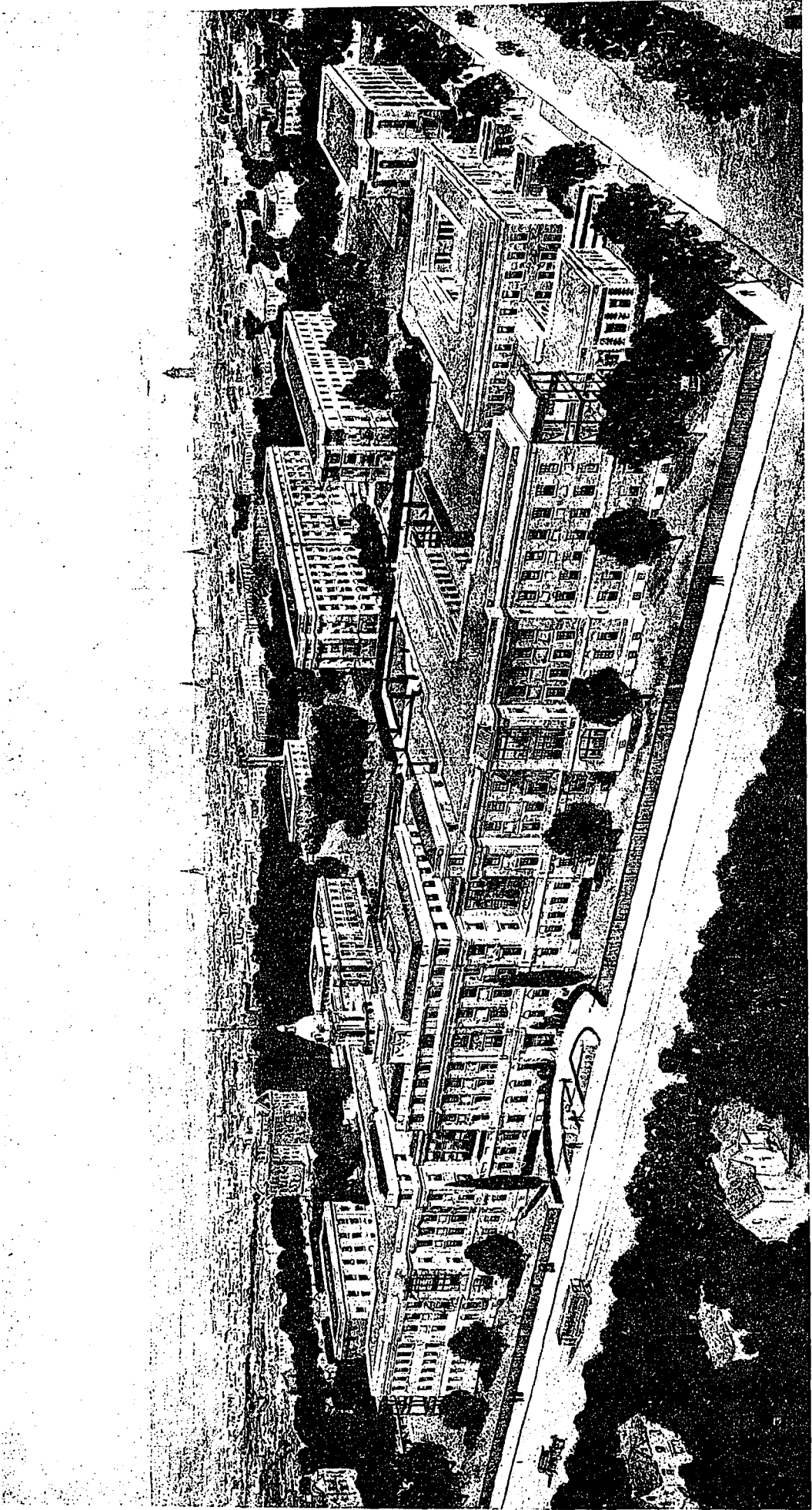
IN THE OCTOBER issue of CONSTRUCTION a criticism was offered against the scheme before the Toronto City Council of converting certain sections of the various parks into homes for the working people. Our attention has been called to the fact that the press in commenting on same failed to express the one important reason for such drastic action by the committee, viz., an endeavor to conceal conditions intolerable to the people who enjoy the parks. It is claimed that in certain places the rear yards and surroundings are of such a nature that the ground adjoining is never used—and in order to obviate this condition the happy solution offers itself of building artistic workmen's homes, the front of which will lend an attraction to the park, while the rear will hide from the public the filthy and unsightly features already existing. Surely the press has been the greatest help to the exponents of the act in their failure not only to mention but to dwell upon this point. Two reasons present themselves of the injustice of such a change. First, the present need of more park area. The argument to sell strips from our existing public spaces and purchase new land farther out is wholly out of the question. The city should and will create parks in new sections as the increase in population warrants, but she must not take from us what little we have in the crowded districts. Second, if conditions are unbearable in certain sections then we must eliminate these unwholesome places and not conceal them. Would it benefit the poor man to have an attractive home and be compelled to suffer at his very door a situation that is repulsive enough to prevent the parks from being used at the present time? What the people need and what the people must have is more opportunity to feel the magic power of nature. To take one foot of our parkage system is a crime towards the poor and must not be allowed. To counteract the unsightly views let the City Council purchase the parts which are objectionable and turn them into inviting lawns or athletic fields which will be a godsend to the people.



TORONTO GENERAL
HOSPITAL, TORONTO.

MAIN ENTRANCE OF ADMINISTRATION BUILDING.

DARLING & PEARSON,
ARCHITECTS.



DARLING & PEARSON,
ARCHITECTS.

THE TORONTO GENERAL HOSPITAL, TORONTO.

PERSPECTIVE FROM
COLLEGE STREET.

The Toronto General Hospital, Toronto

HERBERT HORNER

THE HOSPITAL, which represents the result of years of consistent work upon the part of the Trustees, is a living monument to their untiring energy and enthusiasm. Accommodating seven hundred patients and occupying nine acres of territory, it marks a decided advancement in the hospital growth of the Dominion. The site cost \$600,000, while the total expenditure for buildings approximates \$3,000,000. Towards this amount is the munificent grant of \$600,000 from the University, authorized by the Government and Legislature, \$400,000 from the municipality of the city of Toronto, and \$1,000,000 from private citizens.

The block plan shown on this page pictures the condition of the property when purchased by the hospital. In order to complete the present areas Christopher street was extended to Elizabeth, at which thoroughfare Hayter was stopped. In return for this new portion of land the hospital authorities presented the city with narrow strips extending along Christopher and Elizabeth streets. This exchange not only enabled the hospital to build on a rectangular piece of ground, but also permitted of an ample widening of the two streets mentioned above. The bill permitting the Board of Trustees to expropriate the property for hospital purposes gave a clear title to the parts of Chestnut, Centre, and College streets lying within the present boundaries.

As the work of wrecking the old buildings on the hospital site and the cleaning up of the debris progressed, it was found necessary in order to put the ground in a thorough sanitary condition to plough the whole, using hundreds of bushels of disinfectants. The tree doctor was called in and all trees to be left standing and requiring treatment were thoroughly attended to.

To-day the north façade facing College street is of free Renaissance treatment, which is rendered the more dignified and impressive by the well executed iron fence, the main gateways being accentuated by brick piers of unusual dimensions, surmounted by iron lanterns. Another impressive feature is the brick paved court surrounded as it is by the iron fence and

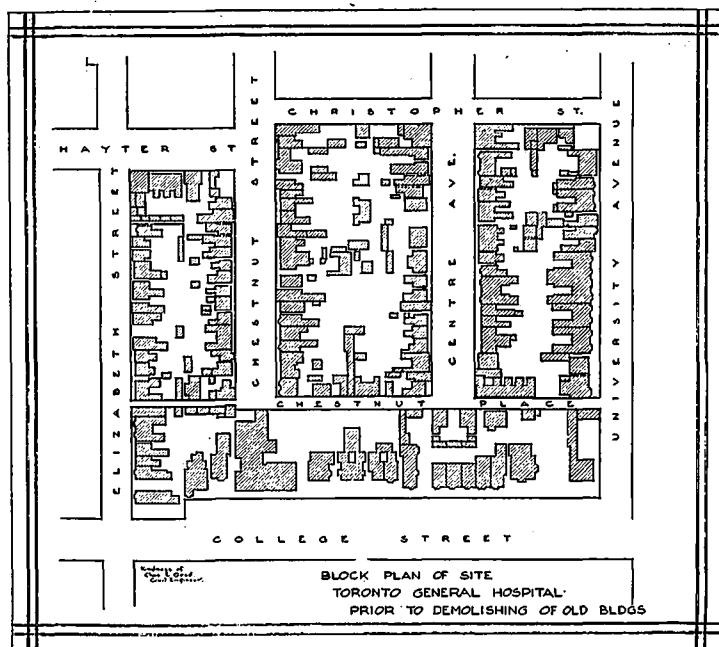
having for its central point, the main entrance to the hospital buildings.

To the left of the entrance is the corner stone, which was laid by the Governor-General, Earl Grey, on April 11th, 1911. This entrance admits to the Administration building, the centre of the whole College street front. The Administration building is four stories high, or a story higher than the wings, and is surmounted by a tower executed in terra cotta and finished with a copper dome, thus giving greater prominence to the central feature.

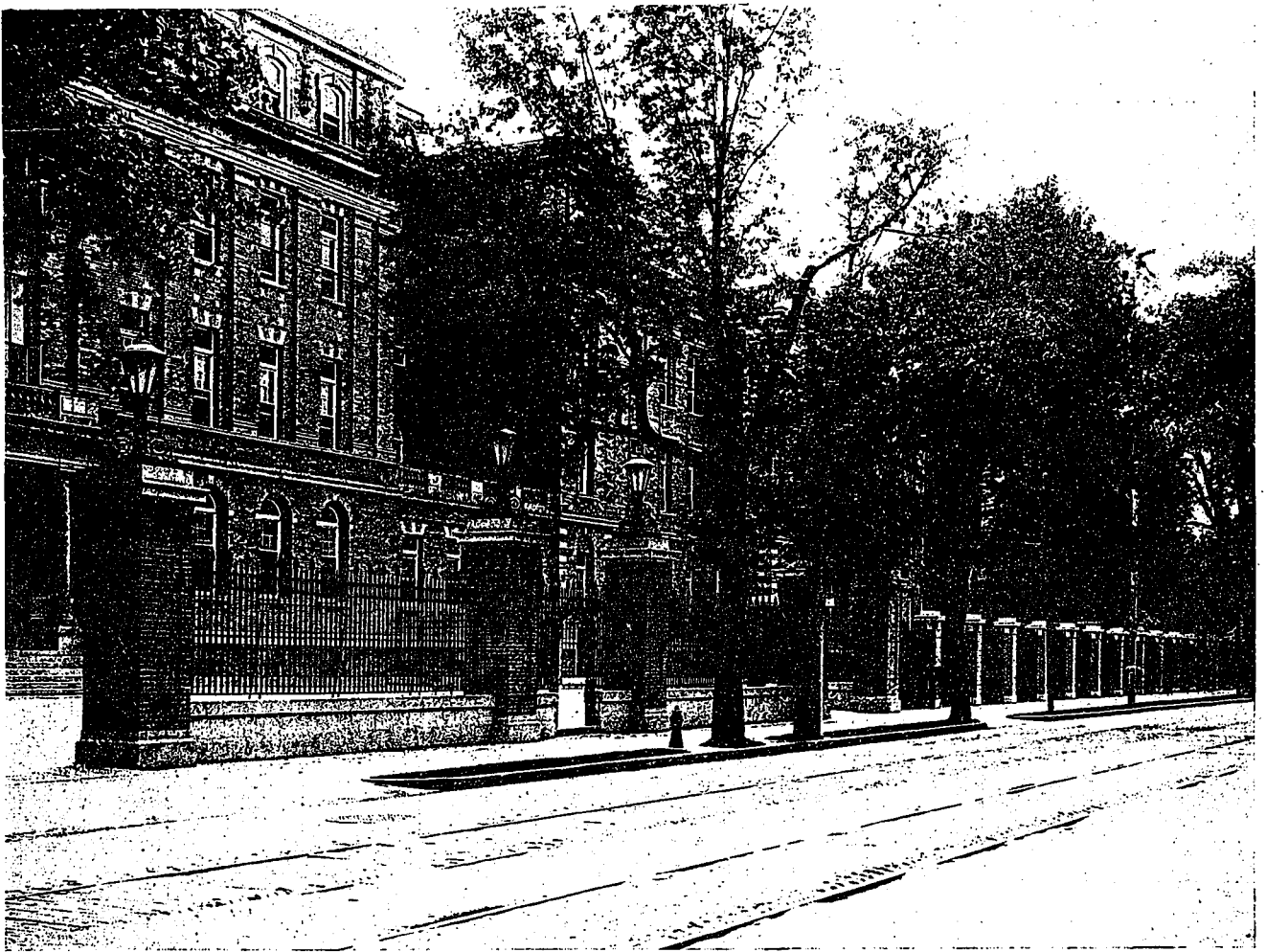
The walls are faced with a specially manufactured brick and relieved with trimmings of British made terra cotta, while the whole is further relieved by the interesting spacing of windows, and the sub-division of the windows themselves. In the rear the buildings are grouped from a wide open quadrangle, commanding abundance of fresh air and sunlight, some of the windows being finished with green shutters, which not only form a pleasing contrast to the walls, but also

suggest on a hot day a delightfully cool and shady effect within. This great quadrangle is smoothly sodded, providing abundance of lawn space for convalescing patients and is beautified by shrubberies, walks and flower beds. The court being almost entirely surrounded by buildings, privacy and quiet prevail, and yet abundance of fresh air and sunlight is admitted, partly owing to the fact that the connecting corridors are but one story high.

The buildings throughout are fire-proof, the outer walls being of solid brick, the floors of concrete and the inner dividing walls of hollow terra cotta tiles with metal lath used throughout. The outer walls are faced with a specially manufactured brick obtained by the careful mixing of different clays and requiring more than ordinary skill in firing to obtain the variety of color. These bricks are one and one-half times as long as the length of the ordinary brick. 800,000 square feet of porous terra cotta were used in partitions. Most of the floors are of a cement finish with red Scotch battleship linoleum, laid directly on the cement, which gives a firm and even wearing surface that is



BLOCK PLAN OF PROPERTY WHEN PURCHASED, REVEALING THE CONGESTED AREA OF THE NEW HOSPITAL SITE.



VIEW SHOWING MAIN ENTRANCE GATEWAYS.

not only noiseless, but easy to walk upon, an inef-
fable boon to the nurses who will have to traverse it
almost unceasingly for hours both day and night.

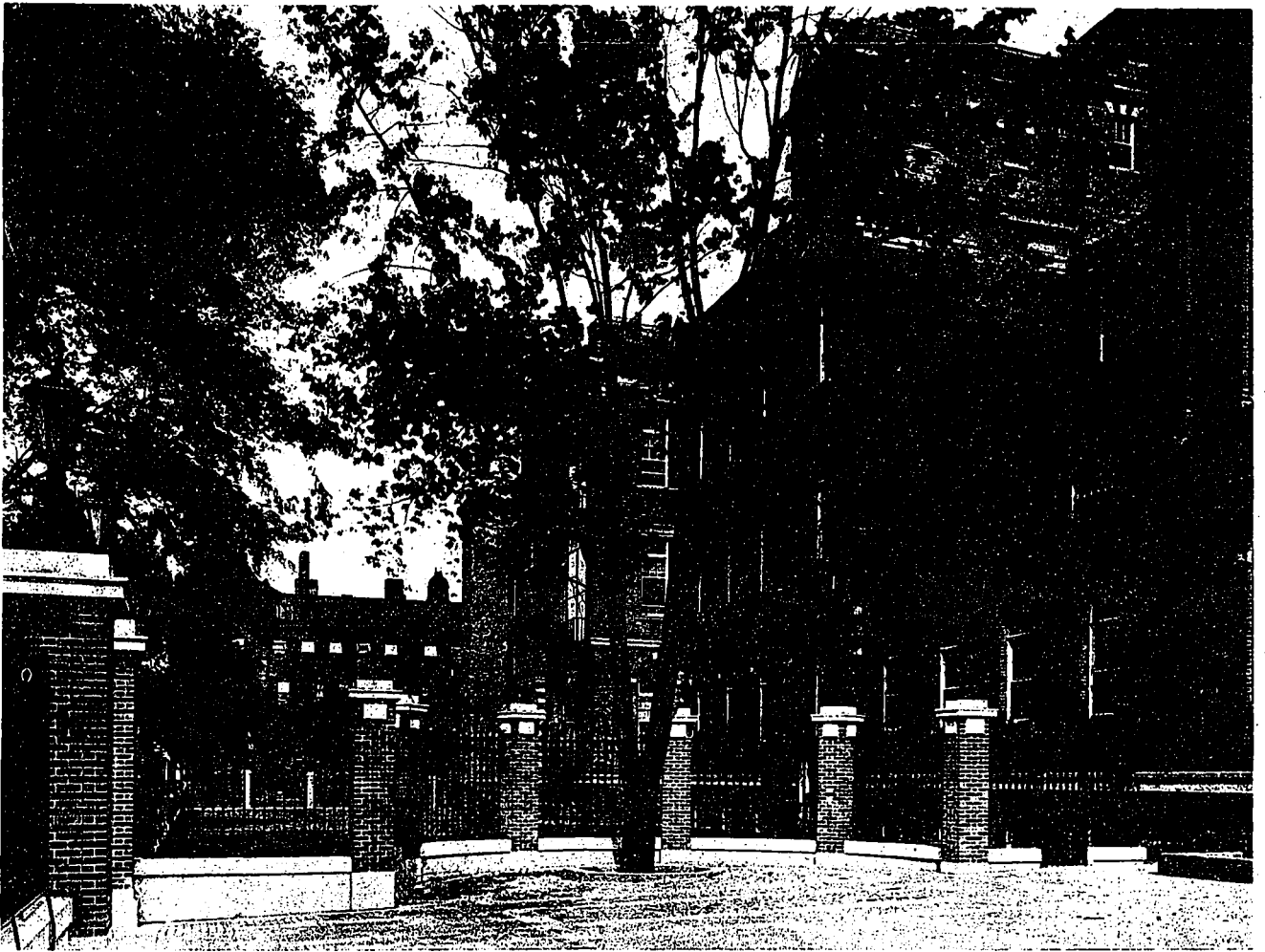
The walls are finished at the floor line with a
smooth and jointless base of terrazzo composition of
marble chips and cement. Some of the most notice-
able features of the interior are that all moulding and
projections have been omitted wherever possible,
all internal and external angles coved or rounded as
the case may be, and all doors made perfectly plain
and without panelling. For all interior painting an
enamel specially prepared for hospital use has been
employed, all wearing surfaces having a glossy finish
which is as readily washed as marble.

Visitors to the hospital, or those having business
to transact, will enter by the main entrance off Col-
lege street, which opens directly into the main rotunda
and waiting room. This hall, the floor of which is
of marble, is lighted by the stained glass windows,
which coloring offers a pleasing contrast to the walls
finished in a soft and restful gray. On the left is the
general office; on the right the information bureau.
Here also is located the telephone exchange which
will be in direct communication with all parts of the
buildings. In close proximity are the offices of the
medical superintendent, superintendent of nurses,
secretary, and steward, also the board room. Upon
entering the latter room one is impressed by the

thoroughly business like and quiet treatment of the
interior. Handsome bookcases extend across either
end and the balance of the wall space is panelled in
oak to the height of the doors, above which point the
walls are of a dark olive green. The furniture is of
fumed oak and the window draperies of rich dark
material combine to put the finishing touch to a most
quiet and harmonious interior.

The public wards throughout the building are
equipped with all that is most modern and up to date
in the way of hospital furniture. The beds are the
best that money can buy and are furnished with large
ball bearing casters of rubber, thus greatly facilitat-
ing the moving of patients from place to place when
necessary. Beside each is a sanitary bedside table
of enamelled steel and a particularly comfortable
arm chair constructed on a special slant. At the
head of the bed is an electric bracket of white enamel
provided with a specially made glass shade and a
fixture for the attachment of the physician's exami-
nation lamp. The artificial lighting of the wards is
all on the indirect system, which gives a soft, pleasing
and shadowless light and can be regulated at will in
three different intensities. Close to each bed is a large
window, the transoms having ventilators specially
arranged to avoid draughts.

All through the building is the silent nurse-call
system installed. Each ward bed is provided with



VIEW OF COURT AT MAIN ENTRANCE.

a cord bell push which lights a bull's-eye on the indicator board in the head nurse's table, showing from which patient the call comes. Should the nurse be temporarily absent from the ward, her attention is attracted by a red light over the ward door which lights up simultaneously with the bull's-eye. As the nurse answers the call she touches a button at the bed which extinguishes both bull's-eye and red light.

Each group of private and semi-private wards has its own indicator on the nurse's table in the hall outside and every door has its own red light. This system also facilitates inspection, as a supervisor making rounds from the corridor can see at a glance if any of the patients in either public or private wards are requiring attention.

The whole building is thoroughly ventilated with fresh air in quantities sufficient to change the entire air in the wards every ten minutes and in bathrooms, lavatories and operating rooms every six minutes.

Spacious and airy verandahs are provided on each floor, laid with tiles and in direct communication with outside stairs to be used in case of fire or other emergency. These verandahs are a priceless factor in the welfare and recovery of patients and even those confined to bed may be wheeled into the fresh air with perfect ease and comfort, owing to large rubber casters on the bedsteads before mentioned.

All bathrooms, lavatories and nurses' wash-up

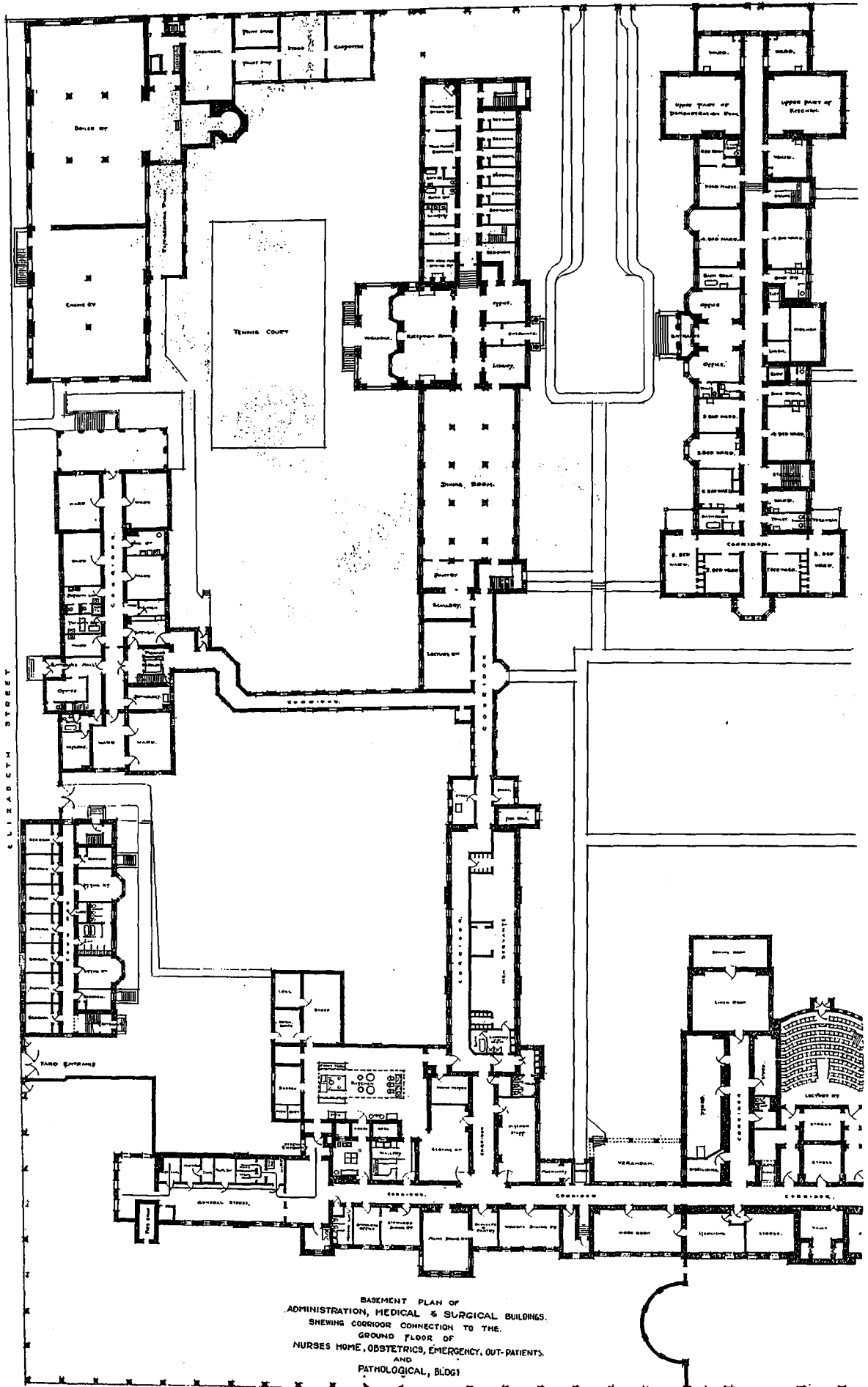
rooms are supplied with up-to-date sanitary fixtures, mostly of vitreous ware, many of which have been specially designed and made to order. The floors and trimmings of these rooms are of grey Tennessee marble, and the glossy enamel used on the walls reduces the labor of the inevitable sanitary cleaning to a minimum.

The operating rooms are eleven in number and are found in the main building and almost every other building of the group. Most of these are lighted from the north, the windows running nearly the whole height and width of that side of the room. The floors, and in most cases the walls, are of specially imported tiles. Each suite, consisting of operating room, anesthetizing room, sterilizing room and doctors' wash-up, has its own special system of ventilation. The equipment generally is of a very high order of merit and has been brought to such a pitch of perfection that already it is being adopted as a standard for comparison, and purchased by other institutions. A very useful adjunct is found in the copper hoppers with a grating at the bottom, designed for the reception of both waste water and soiled dressings.

The sterilizing rooms are fitted up with sterilizers for hot and cold water, utensil and instrument sterilizers and autoclaves for the sterilization of dressings. The proper use of this outfit means that nothing is

CHRISTOPHER.

PART OF
BASEMENT
PLAN,
TORONTO
GENERAL
HOSPITAL,
TORONTO.



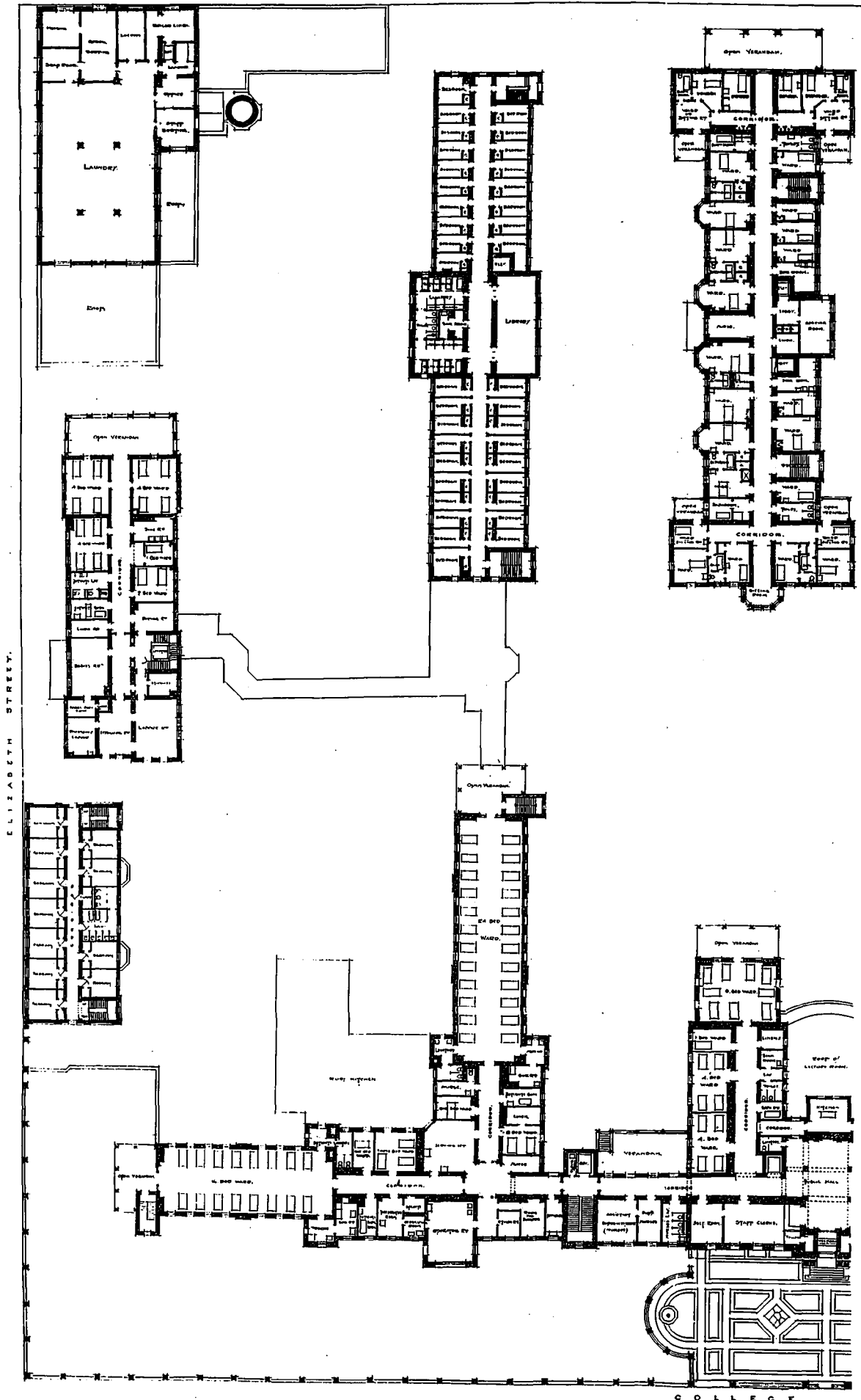
DARLING &
PEARSON,
ARCHITECTS.

BASMENT PLAN OF
ADMINISTRATION, MEDICAL & SURGICAL BUILDINGS.
SHOWING CORRIDOR CONNECTION TO THE
GROUND FLOOR OF
NURSES HOME, OBSTETRICS, EMERGENCY, OUT-PATIENTS,
AND
PATHOLOGICAL, BLDG 1

COLLEGE

CHRISTOPHER

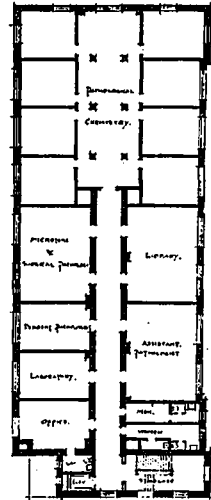
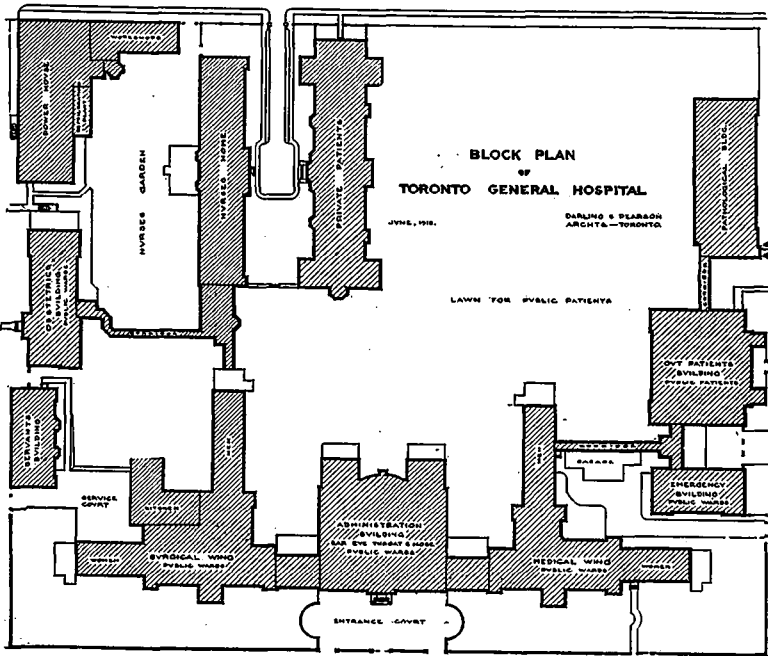
PART OF
GROUND
FLOOR
PLAN,
TORONTO
GENERAL
HOSPITAL,
TORONTO.



DARLING &
PEARSON,
ARCHITECTS.

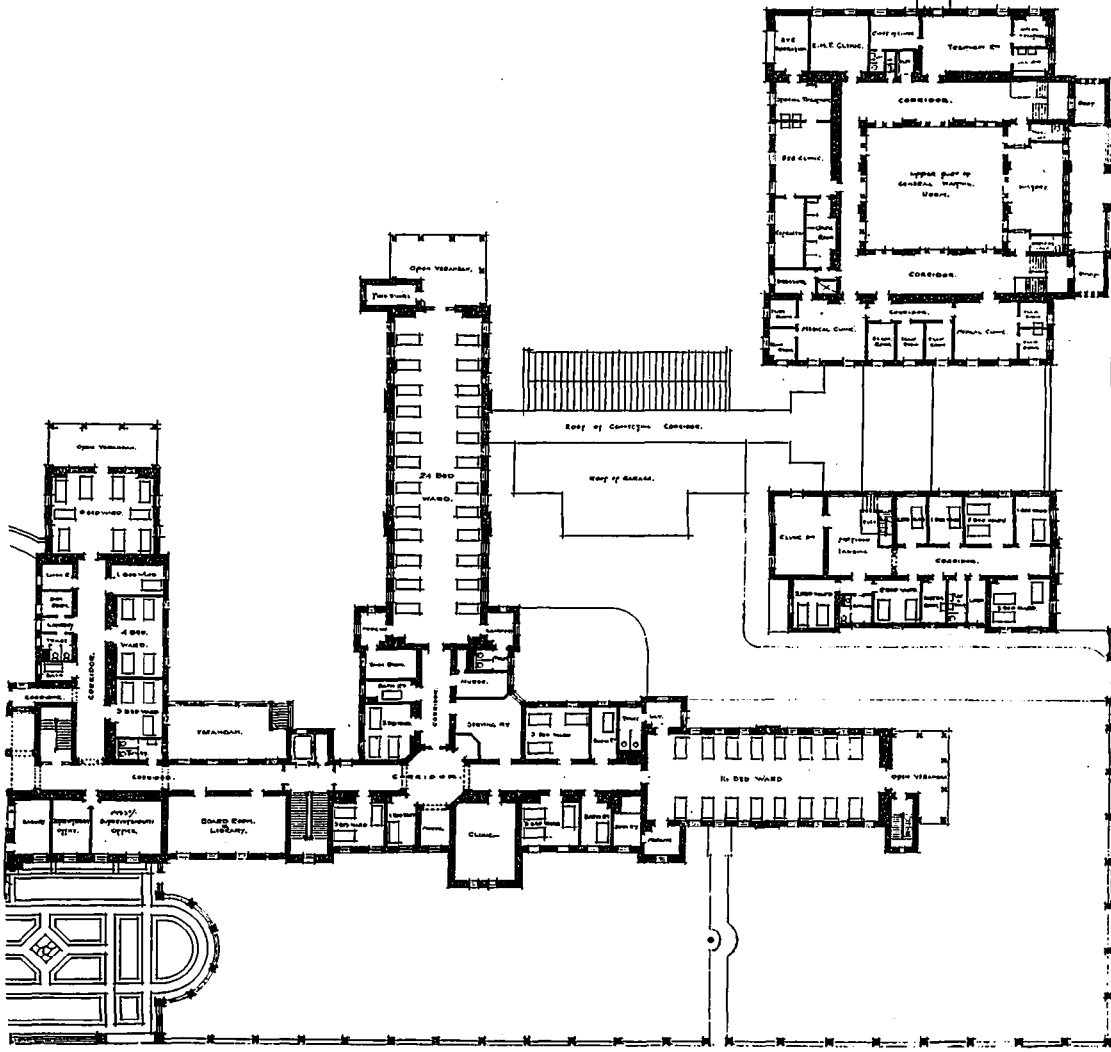
COLLEGE

STREET



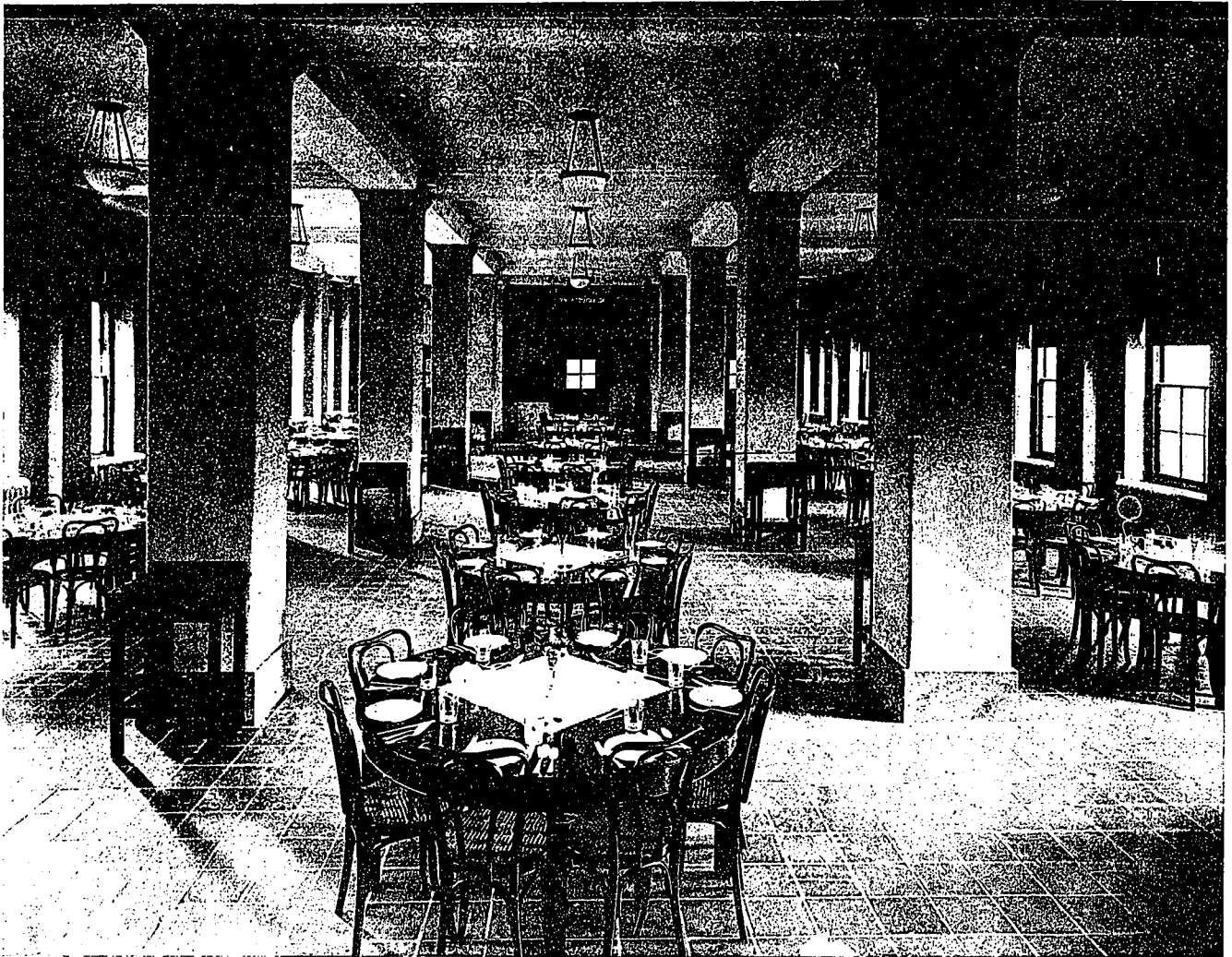
PART OF GROUND FLOOR PLAN, TORONTO GENERAL HOSPITAL, TORONTO.

UNIVERSITY AVENUE



DARLING & PEARSON, ARCHITECTS.

STREET



DINING ROOM, NURSES HOME.

permitted to come in contact with the operating field which is not absolutely sterile.

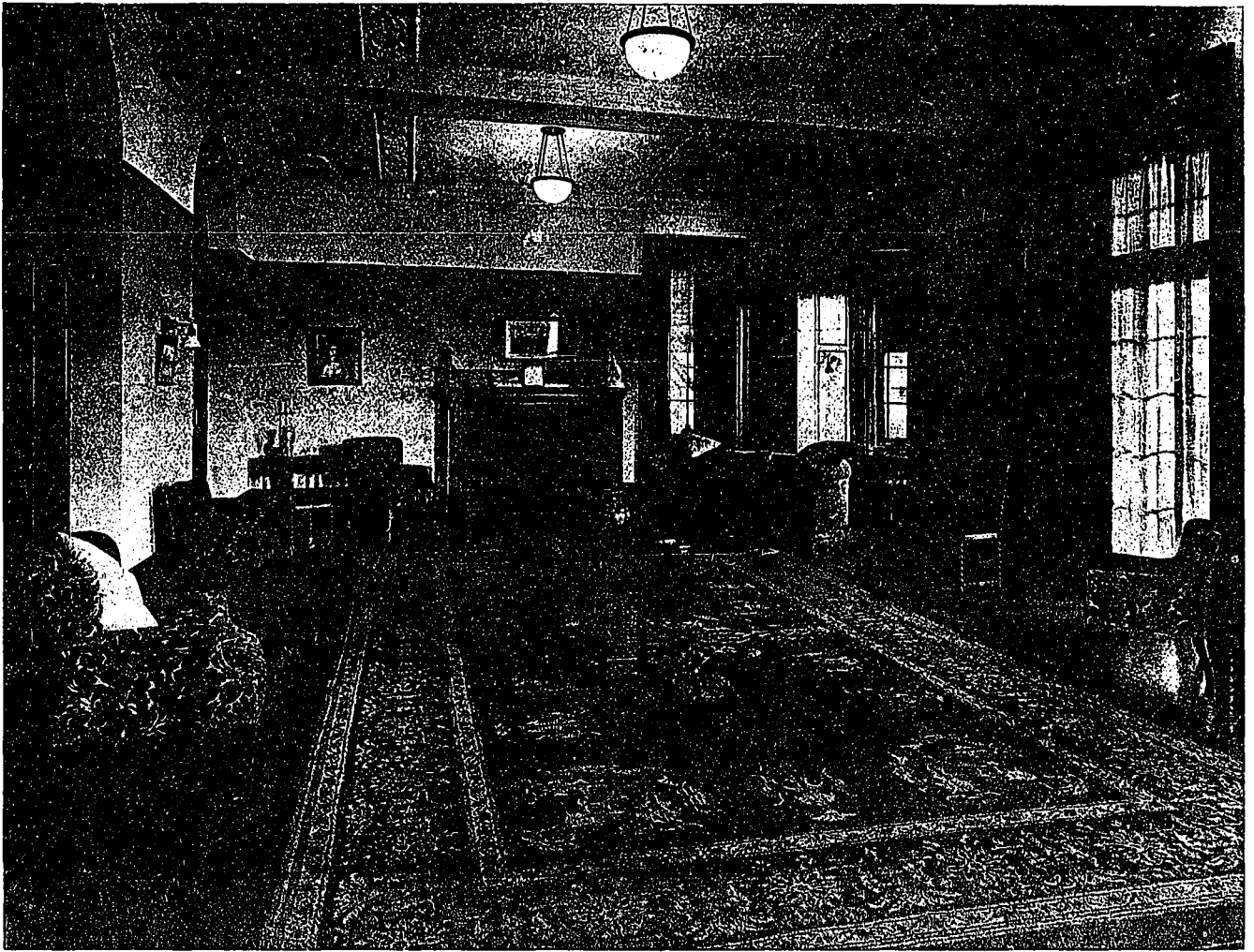
The ether room holds everything possible for the administration of one of the greatest of all blessings—the anesthetic, and the apparatus of all kinds is as complete as it is possible to be. No pains have been spared in equipping the doctors' wash-up and dressing rooms with everything to promote their comfort and welfare. In two or three instances shower baths are found. These will be thoroughly appreciated by weary men who have been standing perhaps for hours.

The diet kitchens are conveniently situated adjacent to the wards and private rooms on the different floors and are thoroughly equipped with the newest and best appliances. Each kitchen has its gas range, steam table, dish sterilizing sink, refrigerator, and cupboards. From these diet kitchens the individual trays are served, most of the food being brought cooked in bulk from the main kitchen. The main kitchen, which is located in the Timothy Eaton wing, the dimensions being fifty-four by thirty-two feet, is lighted by three large skylights. The floors are of terrazzo and the walls are lined with tile to the height of six feet. By the system of ventilation employed, the air of this room will be changed every six minutes, rendering it impossible for the odors of

the cooking to penetrate other parts of the building. This is doubly assured by the fact that the vents of all steam cookers are carried through above the roof.

Too much praise cannot be accorded to the equipment, which is in many ways the only thing of its kind in Canada. There are four coal ranges for the fine roasting, two dry steam roasters capable of holding one hundred and fifty pounds each, for the heavier work. The broiling is done by charcoal and three fifty-gallon steam kettles will be used for the heavy boiling of vegetables and meats. In the two steam vegetable cookers may be seen the latest thing in kitchen apparatus, the prepared vegetables being enclosed in heavy steel compartments into which high pressure steam is admitted and brought into direct contact with the vegetables with incomparable results. Two twenty-five-gallon cereal cookers, two seventy-gallon urns—one for coffee and one for tea—warming tables, working tables and coffee roasters complete the stationary equipment.

Opening out of the kitchen is the bakery, furnished with two ovens each having capacity for 140 loaves. Connecting the kitchen with the corridor is the serving pantry, in which are steam tables, egg boilers, plate warmers, and hot food trolleys, designed for the transportation of hot food to the diet kitchens. These latter are the only ones of the kind



RECEPTION ROOM, NURSES HOME.

in Canada and are equipped with a storage battery which is connected with heating plates in the sides of the wagon. The food may thus be kept at any desired temperature. Close to the serving pantry is the ice cream room, containing two twenty-five quart ice cream freezers and also ice crushers. This room also accommodates the machinery for peeling vegetables. Near to the kitchen is the entrance by which all food supplies are received into the building, and close at hand is a line of refrigerators which are cooled by brine pumped from the power house and consisting of a range of cold storage rooms kept at a temperature varying from slightly above freezing to ten degrees below zero.

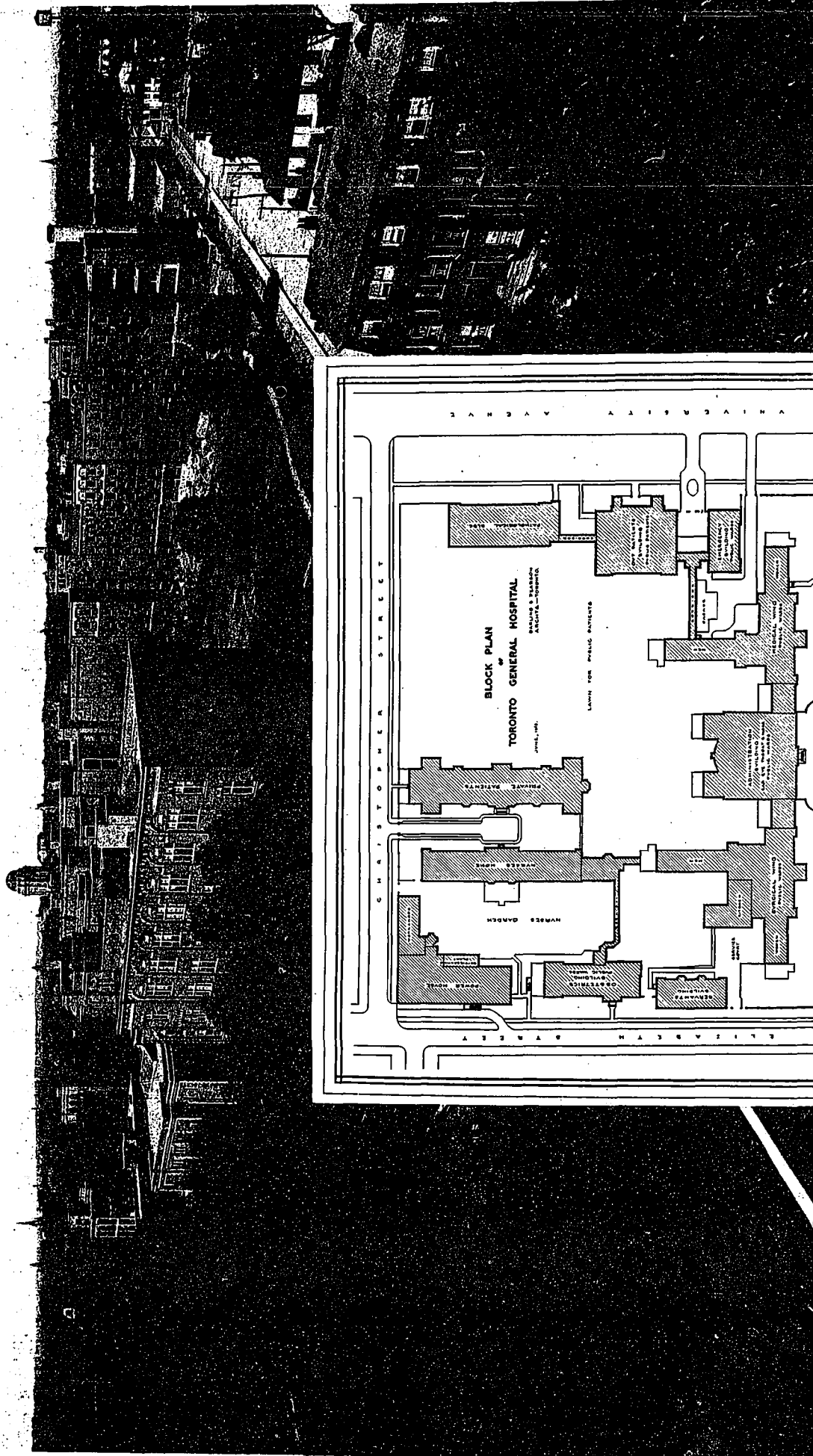
The first building on University avenue south of College street is the Shields emergency, the gift of Misses Agnes and Jane Shields in memory of their brother. Connecting this building to the south with the main group is the receiving lobby, opening directly on to the large partially-covered ambulance court, which is suitably screened from the street by a brick wall with two gates.

On admission the patient is taken to one of the two accident wards where all minor injuries are treated, from where, should an operation be necessary, the preparations are made. The anesthetic is given in an adjoining room, after which the patient is taken directly into the operating room. Two more rooms

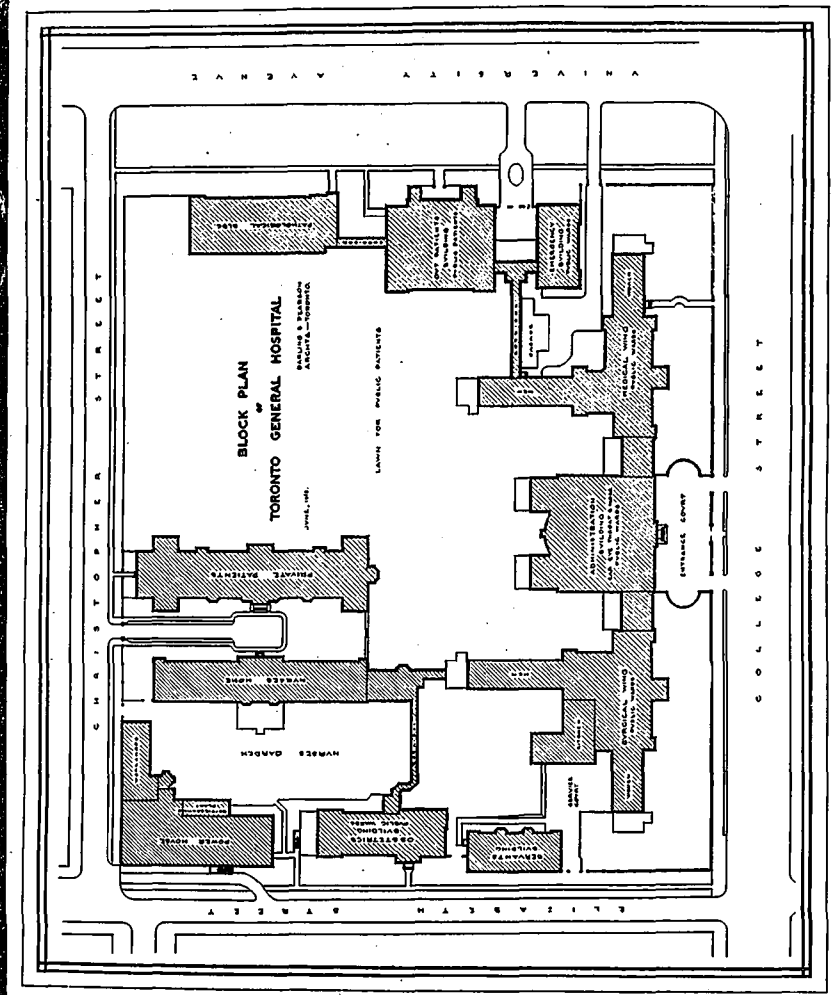
complete the suite, the surgeon's room and the sterilizing department. Here, as in the main building, the standard equipment prevails. A specialty of this operating room is the artificial lighting, which is accomplished by a battery of powerful electric lights, focused on the field of operation. Thus the table is flooded with light, insuring the absence of shadow on any part of the operation field—a system which is the only one of its kind in Canada. One observation stand is provided for visiting surgeons or students, for whom sterilized gowns will be provided.

In this building are ten wards, public, private and semi-private, containing in all twenty-one beds. These afford temporary accommodation as recovery rooms for operative cases or for very serious accidents. True to its name, the emergency operating room will be in readiness day or night. Completing the equipment of this department the same donors have given two of the finest automobile ambulances procurable, machines fitted with two pneumatic stretchers, and a cabinet containing all appliances possible for first aid. The garage which belongs to the main hospital group has a capacity for three ambulances, and is fitted with small machine shop for minor repairs.

It should be mentioned here that it was the original intention of the donors to erect this building independent of the General Hospital, but to Dr. Powell

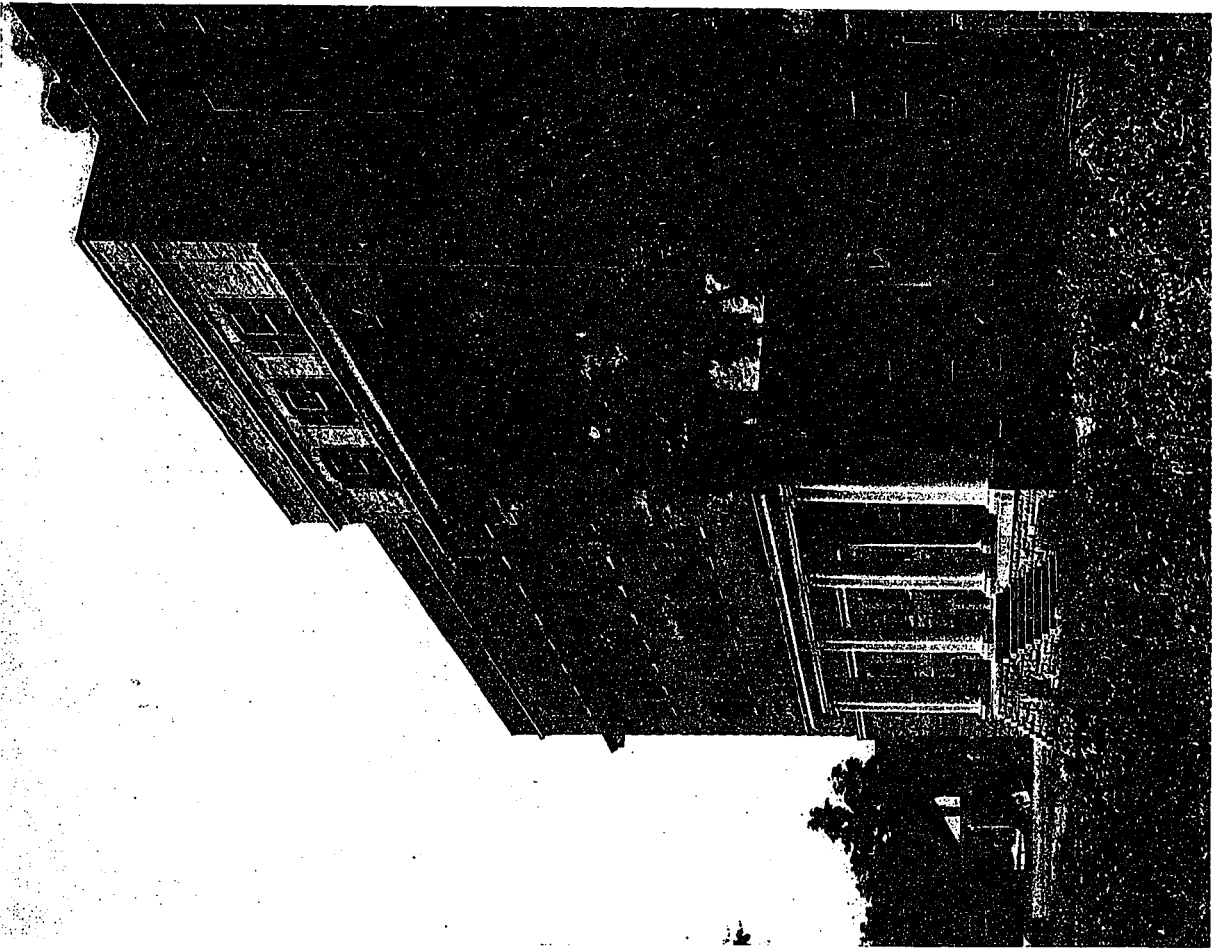


GENERAL VIEW FROM CORNER
UNIVERSITY AVENUE AND
CHRISTOPHER STREET.

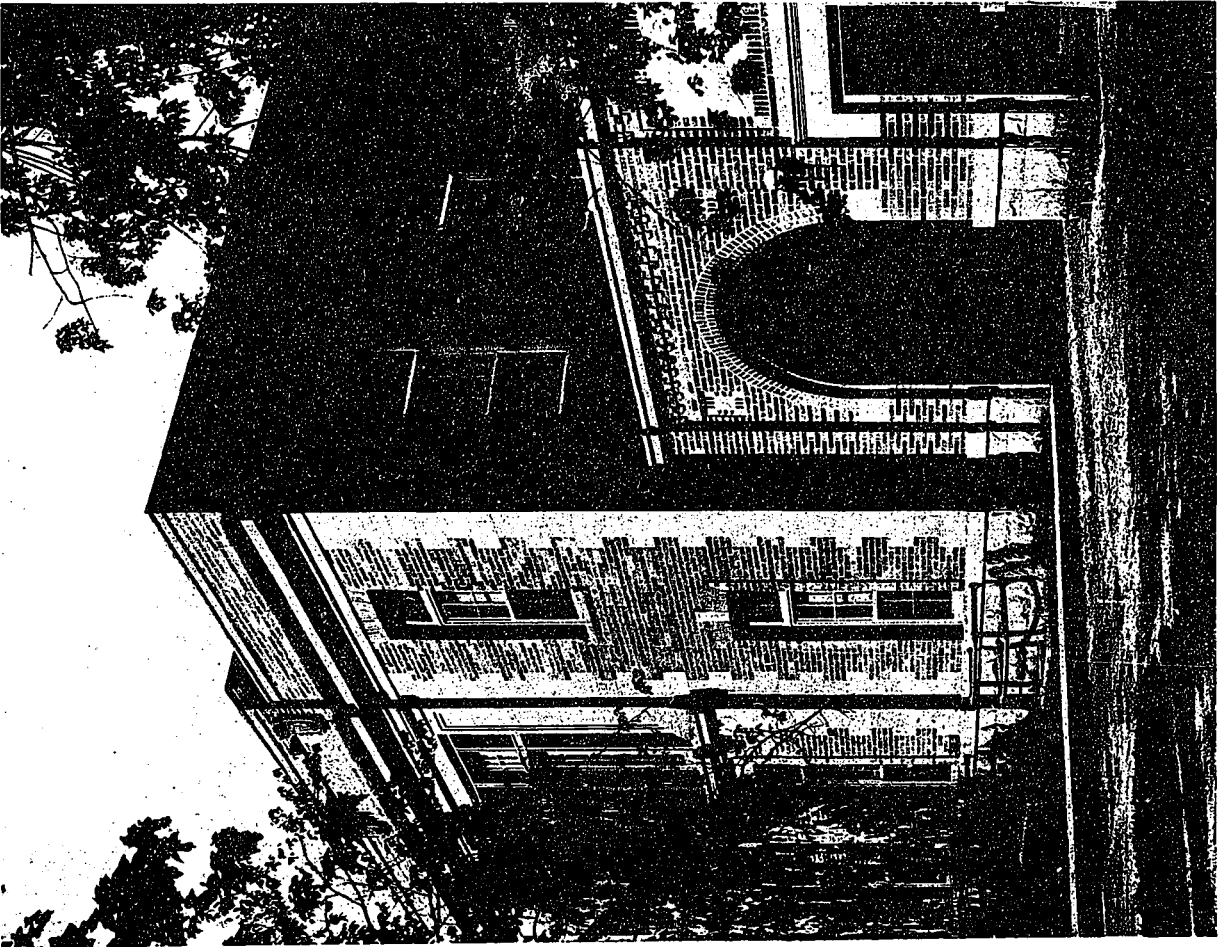


DARLING & PEARSON,
ARCHITECTS.

THE TORONTO GENERAL HOSPITAL, TORONTO.



DETAIL OF ENTRANCE,
NURSES' HOME



DETAIL OF ACCIDENT AND
EMERGENCY DEPARTMENTS.

THE TORONTO GENERAL HOSPITAL, TORONTO.
DARLING & PEARSON, ARCHITECTS.

belongs the credit of having it incorporated in the same scheme as now executed. To the south of the Shields emergency, connected with it by the receiving lobby, is the out-patients' department, the gift of Mr. Cawthra Mulock. The main entrance to this building is off University avenue, where patients are admitted at certain times and receive medical and surgical treatment free of charge, if unable to pay a nominal fee. This building, which has a forecourt tile paved with a shelter at either end, is able to treat upwards of 600 patients per day. The door opens directly into the large waiting room, which is exceptionally fine. It is square in plan and surrounded on three sides by a cloister having a vaulted ceiling, from which open the various rooms for the reception of gynecological and surgical patients. Here also is the dispensary where prescriptions are filled. The plan is repeated on the second floor, leaving the main

covered corridor, where they are received by the physician in charge, who makes his examination and diagnosis and personally admits the patient. Small observation wards are provided, where cases of suspected contagious diseases are kept until the diagnosis is determined. In close proximity are found fumigating rooms so that patients and their clothing may be cared for specially before going to the wards if occasion requires.

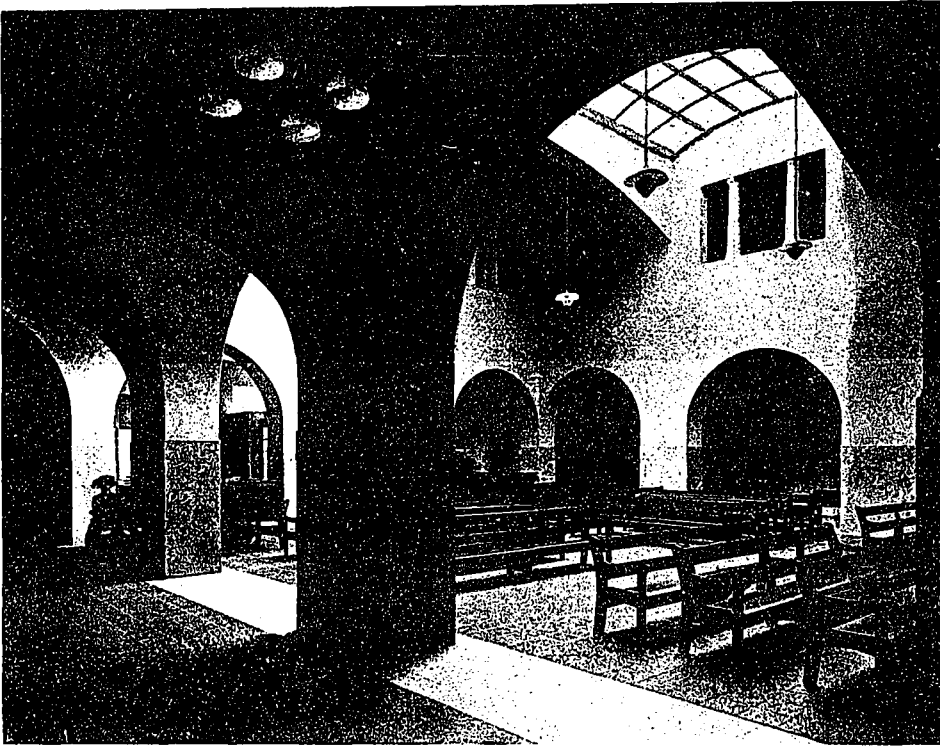
The Medical wing is the building to the extreme west of the College street group. Here are six wards containing in all one hundred and twenty beds, in addition to which there are smaller wards containing thirty-six beds for purposes of classification. In this building is a large hall to be used as demonstration and class room, as well as a recreation room for the nurses.

All the X-ray work of the hospital, emergency

hospital and out patients' department is to be done in a special department, which is located in the basement of this wing. There are five X-ray machines and every accessory for exact scientific work, such as X-ray treatment, locating bullets and other foreign bodies, taking exact heart measurements, studying bone diseases, the setting of fractures, etc. The orthodiarscope completes the equipment, this instrument, the only one of its kind in Canada, having been designed and specially made for this Hospital. This machine projects a parallel beam of X-ray; the operation through which the ray passes may be, as in the camera, increased or diminished in size at the will of the operator, and the whole moved in any direction in

the vertical plane; by this means the movements of the heart or digestive organs can be outlined on the photographic plate. Adjoining this department is the photographic laboratory, where X-ray plates will be developed and photography, microphotography and even cinematography will be carried on. The arrangement for filing and classifying the thousands of X-ray plates is a very complete one.

Across the corridor from the X-ray treatment room is located the Hydrotherapeutics department. Here the equipment is as modern and complete as it is possible to make it. For severe burns, acute and alcoholic delirium, there are continuous baths provided in which running water is kept at a constant temperature; in severe cases patients are immersed for days at a time. The Nauheim baths are provided for those suffering from heart and other diseases; in



GENERAL WAITING ROOM, OUT-PATIENTS' BUILDING.

hall open to the roof, through which it derives most of its light. Off the gallery over the cloister open rooms for the treatment of medical, eye, ear, nose and throat patients in addition to the history room, where the out-patients' records are kept. The accommodation and equipment in this building are extremely good and the department includes two operating rooms, one on each floor, where minor operations are performed. This building is connected by a closed corridor with the pathological building, which is a University as well as a Hospital department.

All cases are admitted to the hospital by the receiving lobby, the only exception being the private patients, who are taken immediately to their own building. From the receiving lobby the patients pass directly to the medical wing basement by way of a

these baths the water is impregnated with gases of various kinds. In the electric baths the water acts as a resistant between the two terminals; when the patient, who is in all probability suffering from some nervous disease, is immersed in the water a proportion of the current passes through the body. Vapor, hot air, and electric light cabinets are provided for special treatments. The shower, needle and spray baths, together with all douches and hip baths, are controlled by a system of levers from a station in the centre of the room.

Access to this and the X-ray Department is from College street; a special entrance is provided for the purpose. A general waiting room, history room and offices complete the suite.

Next in order is the Administration building. In the basement is located a large lecture room for the use of University students, also for the giving of clinics to the practitioners throughout the city. On the ground floor are thirty-six beds for semi-public patients of all classes; on the second floor are public wards containing forty-four beds. This floor is for the treatment of the eye, ear, nose, throat, and has two operating rooms to one suite. On the third floor are public wards containing forty beds with ample provision for the treatment of gynecological cases. On the top floor of this building are the internes' quarters, with accommodation for twenty-seven doctors, although the number employed by the hospital will be in the neighborhood of forty. Everything here is exceptionally comfortable. Large, airy sitting and dining rooms, pleasant, well furnished bedrooms, all combine to make a delightful home, while the verandah to the south forms a noteworthy feature. Easy access is also provided to the roof, which will be used extensively.

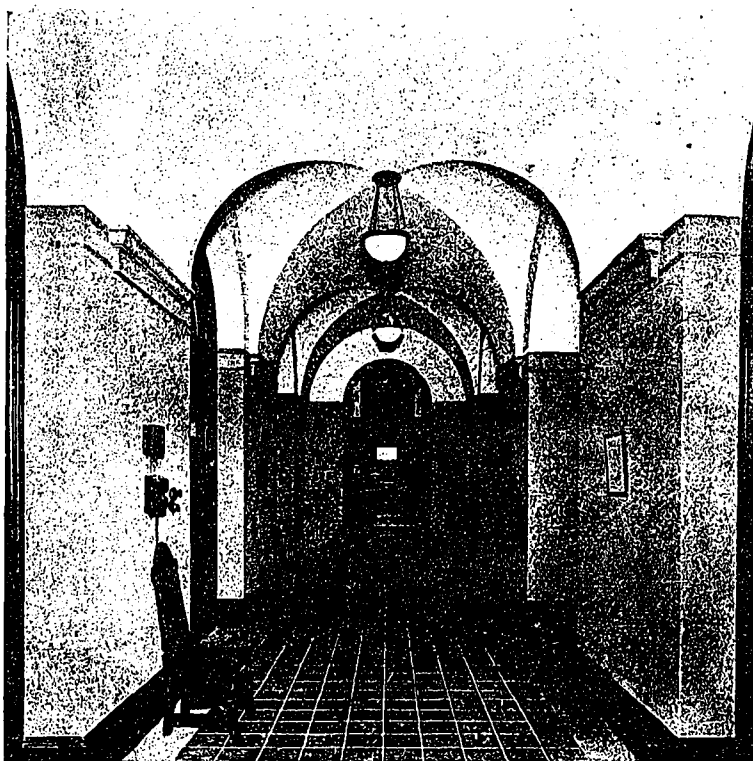
The Surgical wing, occupying the eastern end of the College street group, was donated by J. C. Eaton in memory of his father. In an extension to this building are the main kitchen as described before, the orderlies' quarters and the servants' dining rooms; on the first, second and third floors are found six wards containing one hundred and twenty beds, besides which are smaller wards having twenty-one beds. Each floor has its own suite of operating rooms, all of which are of ample size and well lighted. In this building, as in the medical wing, the roofs are devoted to the use of the convalescing patients. The push-button elevators running to these roofs are fitted with every modern safety appliance and are long enough to admit any hospital bed or stretcher. One great advantage of the push-button elevator is that it can be operated by anybody with perfect safety, it being impossible to start the car until all



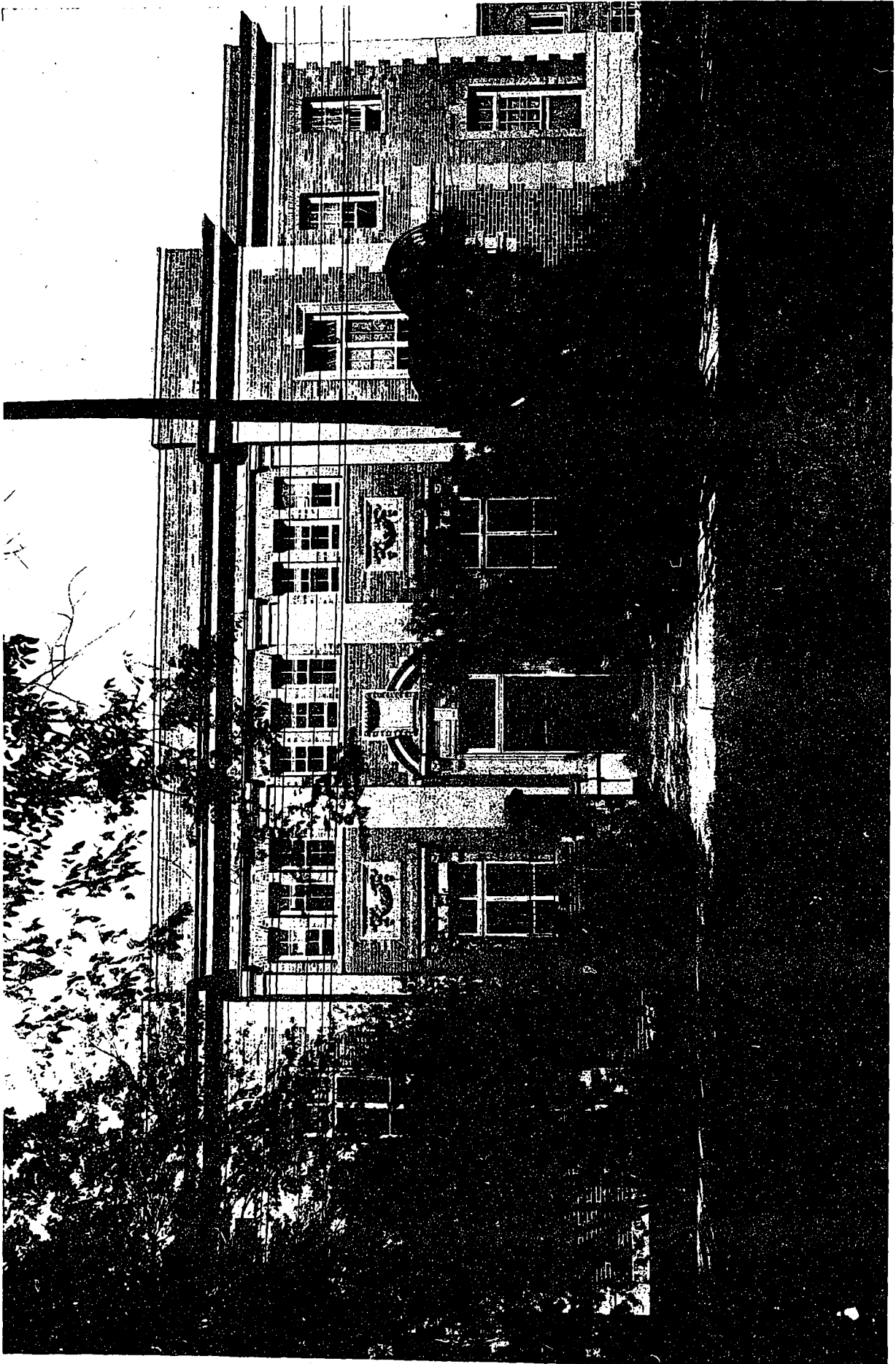
REST ROOM.

hatch doors and the doors on the car itself are closed.

The Nurses' Home is situated to the south of the Surgical Wing, with which it has direct communication by a covered corridor. Neither pains nor expense have been spared in the effort to render this beautiful building an ideal home for nurses and to surround them with every comfort possible. The home is five stories high and basement. On the ground floor are the dining room and reception room.



HALLWAY.



THE TORONTO GENERAL
HOSPITAL, TORONTO.

THE OUT-PATIENT DEPARTMENT BUILDING.

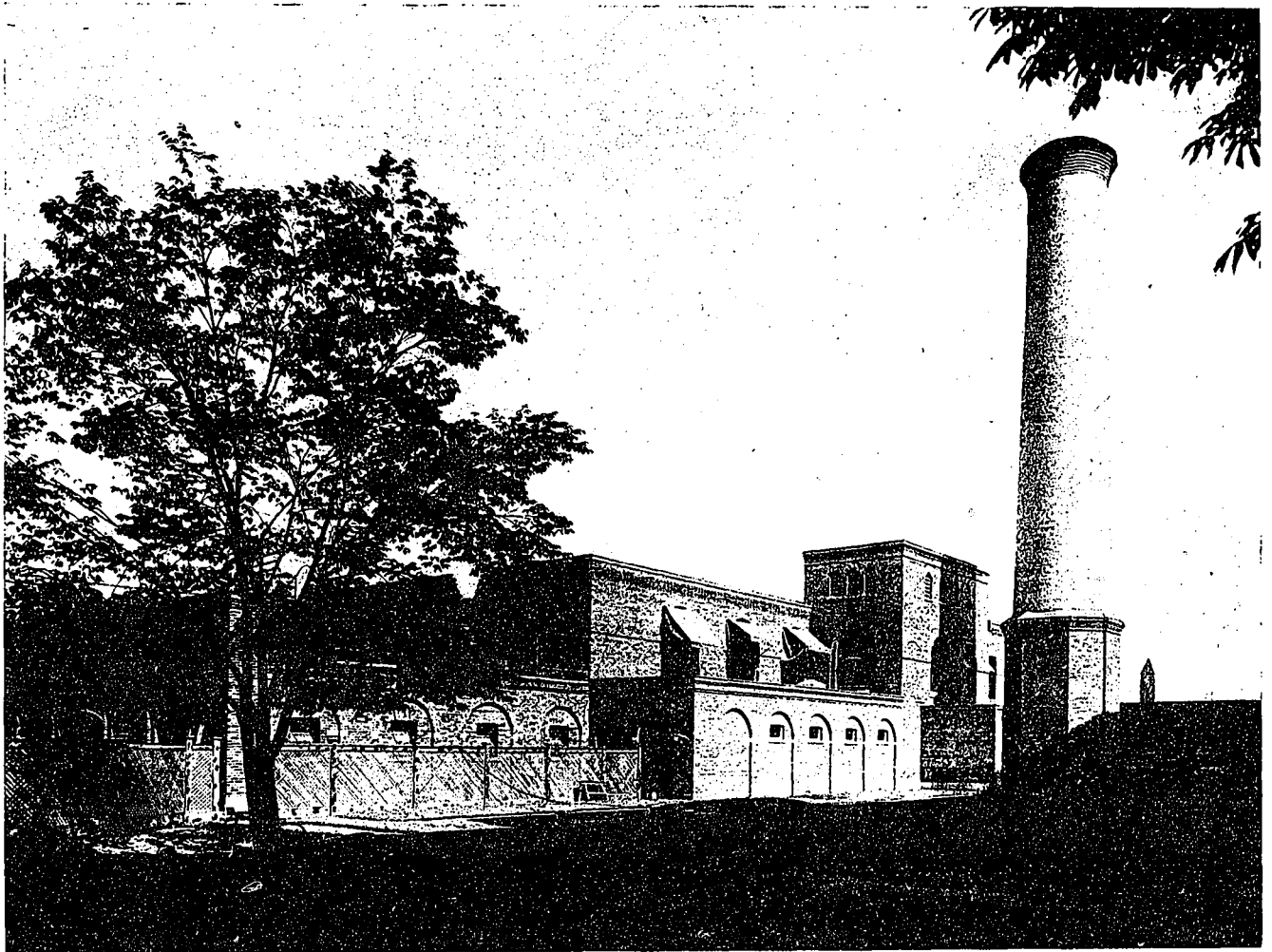
DARLING & PEARSON,
ARCHITECTS.

Of the latter special mention may be made, as it is unusually spacious, with two fine bay windows finished in oak panelling. There is a fireplace at either end, and the walls are finished in soft green; the barrelled ceiling is relieved with plaster ornament. This room opens on to a large verandah, which overlooks the nurses' tennis courts and flower gardens. The entrance proper is by way of the large court to the west. On this same floor, but remote from the general quarters, are the rooms devoted to the Superintendent of Nurses and her assistants.

The upper floors are given over to bedrooms and lavatories, each nurse having her own room. These rooms are tastefully furnished, there being a pleasing

variety of decoration employed throughout. The lavatories are exceptionally well arranged with a view to comfort and privacy, each bath and basin having its own cubicle. Here also the nurses have the advantage of the push-button elevator.

The private patients' building lies to the west of the nurses' home, and stands in a commanding position, overlooking the major portion of the hospital grounds. The approach to this building is from Christopher street, where a fine gateway marks the entrance to a large court on which the building faces. This building is of the same general construction and design as the remainder of the group. It is five stories high, with basement, and has accommodation for one hundred and fifty patients. Here the general equipment is of the same high standard as that employed throughout the institution. The main kitchen has been arranged for gas and steam cooking only, while all apparatus is of Russia iron with nickel trimmings. The stocks and soups are made in copper steam-jacketed kettles lined with a coating of pure block tin three-sixteenths of an inch thick. The service tables are of polished steel, while scullery and kitchen sinks are of cold rolled copper. This, with a full equipment of vegetable cookers, ranges, broilers, vegetable peelers, etc., go to make up a most complete installation. The demonstration room,



POWER HOUSE.

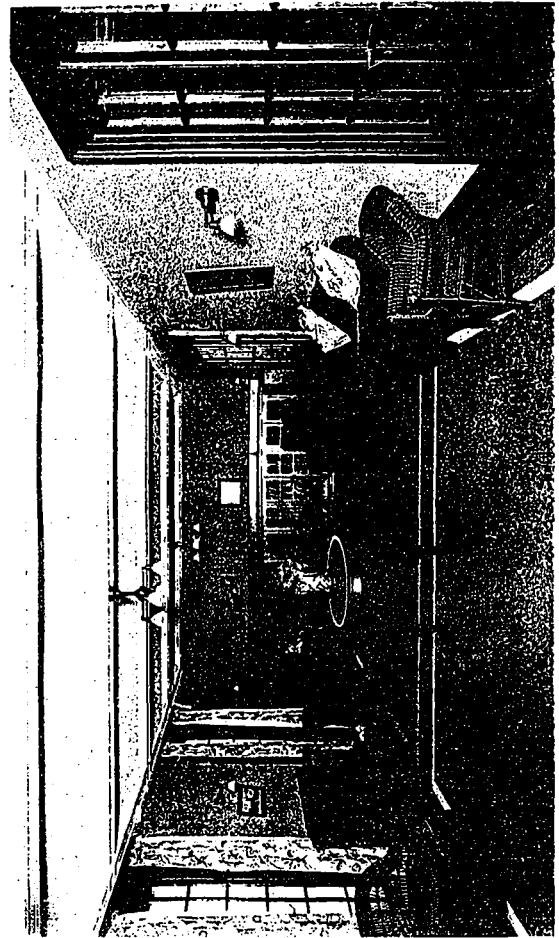
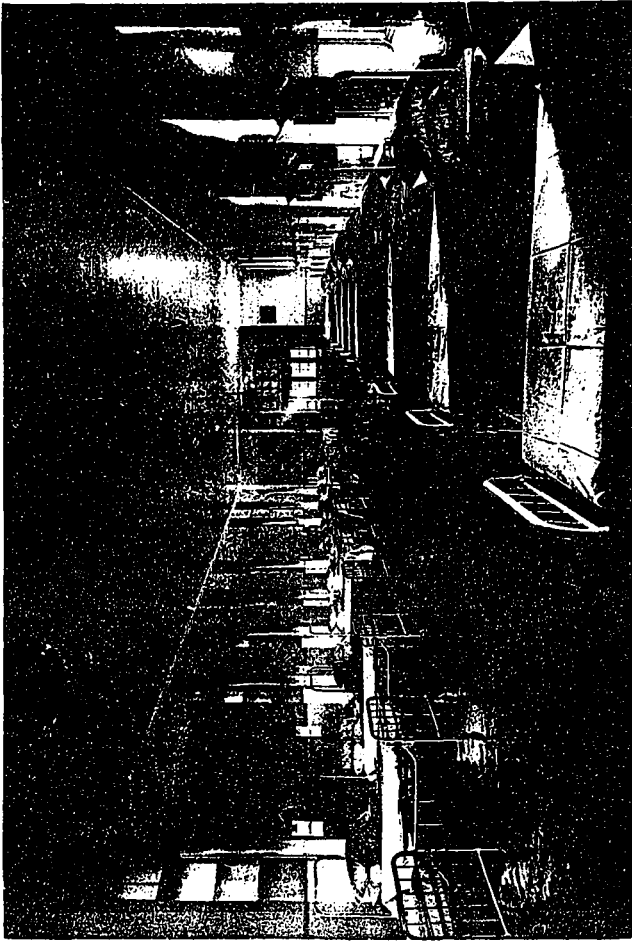
which is across the corridor from the kitchen, is for the purpose of teaching the nurses the art of dietary cooking. Here the equipment is a duplicate of the kitchen, only on a smaller scale. There are in addition, however, twenty-five small gas stoves which are used for the purpose of individual instruction. These two rooms are exceptionally high and well lighted, the floors and walls to the height of six feet being of white tile. The refrigerators are conveniently located, and together with the diet kitchen refrigerators are cooled by brine pumped from the power house. The equipment of the diet kitchen, consists of steam tables, ranges, etc.

variety of decoration employed throughout. The lavatories are exceptionally well arranged with a view to comfort and privacy, each bath and basin having its own cubicle. Here also the nurses have the advantage of the push-button elevator.

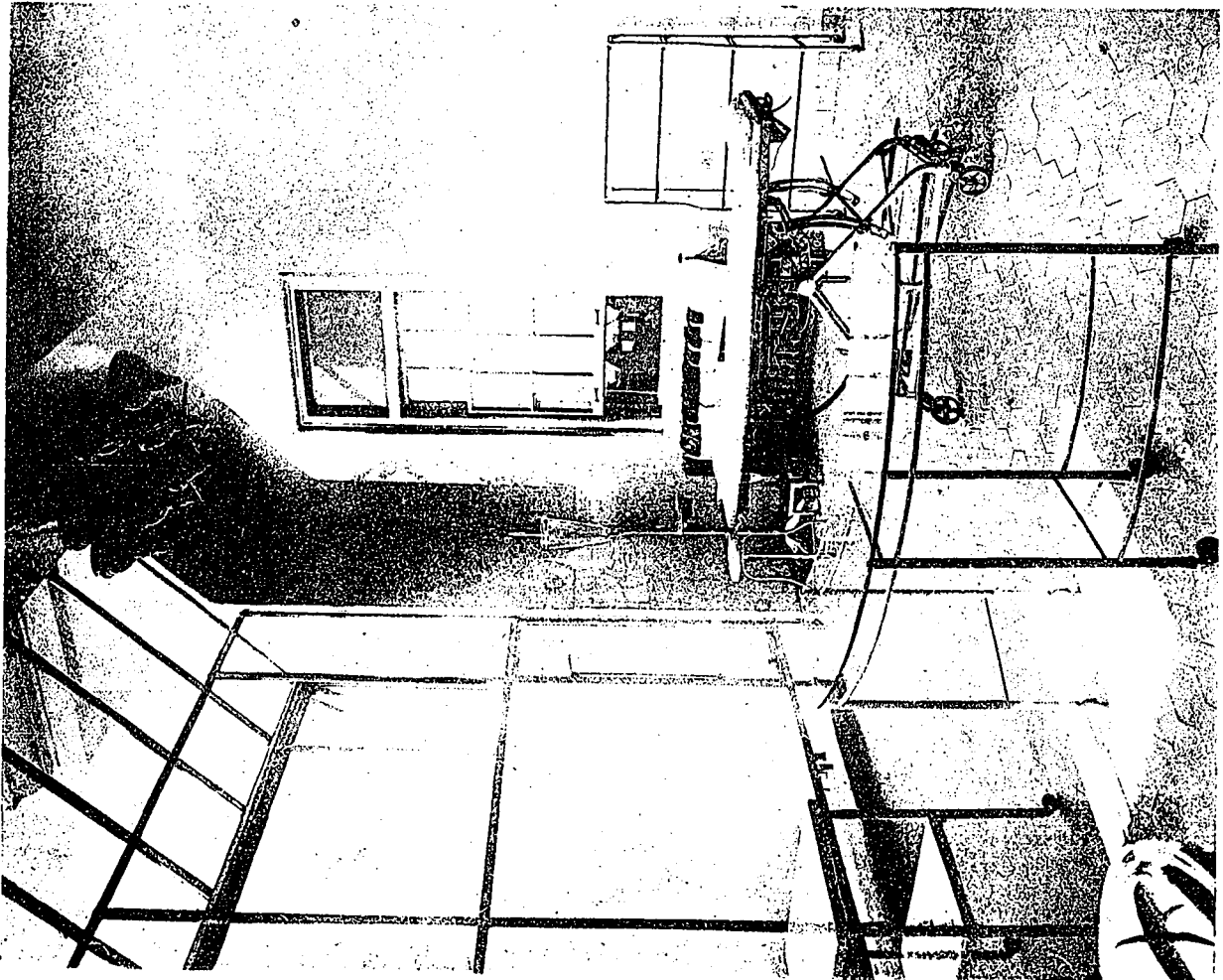
The private patients' building lies to the west of the nurses' home, and stands in a commanding position, overlooking the major portion of the hospital grounds. The approach to this building is from Christopher street, where a fine gateway marks the entrance to a large court on which the building faces. This building is of the same general construction and design as the remainder of the group. It is five

stories high, with basement, and has accommodation for one hundred and fifty patients. Here the general equipment is of the same high standard as that employed throughout the institution. The main kitchen has been arranged for gas and steam cooking only, while all apparatus is of Russia iron with nickel trimmings. The stocks and soups are made in copper steam-jacketed kettles lined with a coating of pure block tin three-sixteenths of an inch thick. The service tables are of polished steel, while scullery and kitchen sinks are of cold rolled copper. This, with a full equipment of vegetable cookers, ranges, broilers, vegetable peelers, etc., go to make up a most complete installation. The demonstration room,

CONSTRUCTION



TYPICAL WARD,
MUSIC AND LIBRARY.



THE TORONTO GENERAL HOSPITAL, TORONTO.

OPERATING ROOM.

A notable feature of the whole institution is the doctors' call system, which consists of twenty-nine stations, each station consisting generally of four series of five different colored lights, the whole contained in a rectangular white enamel casing and suspended from the ceiling usually at the intersection of the corridors. These lights are controlled from the telephone switch-board in the main building, where the operator, by pressing a button, flashes a signal simultaneously to all stations. The doctor upon seeing his signal is expected to telephone the operator.

The main entrance leads into a reception room, which is panelled in oak and burlap to the height of about six feet. The walls above the panelling are tastefully decorated, while the barrelled ceiling is freely ornamented in plaster.

The general office, at which all enquiries are made, is conveniently located to this room. A pair of oak doors open into the main corridor, which is in direct communication with the two staircases, the two push-button elevators and ambulance entrance. The bedrooms are entered from this corridor, this plan, except for the ambulance entrance, being repeated on the upper floors.

All the bedrooms in this building have oak floors, with wood base, and the plaster walls are painted with a special egg shell finish enamel to the height of the picture moulding, the ceilings being done in a soft cream white. The general lighting is by the indirect method, a bracket being supplied over each bed. In each room is installed a standing basin, and in the majority of cases there is a bathroom to each pair of rooms. There is direct telephone communication between each room and the office. The chintz hangings are careful reproductions of fabrics from either the Adam or early periods in England. There is a soft harmony of colors which give a pleasing and restful effect. A number of the best rooms are furnished throughout in the Adam style; some few are of an old ivory finish, while the balance are in cream. The furniture includes bed, dressing table, cheval glass, somnoe, easy chair, and a chaise lounge (the two latter having covers to match the hangings), a large central rug completes the set.

On the top floor are located the two operating rooms, with their dependencies, the balance of the floor being reserved for obstetrical cases.

In the southern half of the basement is located the main kitchen, demonstration kitchen, storerooms, refrigerators, elevator machinery, etc., while the north end is given over to the help. Nice bedrooms and sitting rooms are here provided.

The servants' building, the first building south of College street on Elizabeth street, lies directly to the south of the goods and servants' entrance. It is separated from the main kitchen only by a paved delivery yard. This building is three stories high with basement and has accommodation for sixteen female servants and twenty-two male servants. On the first floor are two nicely furnished sitting rooms. The building is comfortably arranged and, as in the nurses' home, all bedrooms have outside shutters.

The Obstetrics building, which is three stories in height with basement, is entered from Elizabeth street and is also connected to the main group by a covered corridor. This building, in construction, design, and equipment is up to the same Toronto General Hospital standard. The out-patients' department is located in the basement and entered by a separate entrance at the south end, while the upper floor gives accommodation for fifty-nine patients.

The vital centre, the heart of this great system—the power house—is situated on the northwest corner of Christopher and Elizabeth Streets. Under this roof we have the source of all heat, light and power used in the institution. The pipes and electric wires are carried to the various buildings through considerably more than a third of a mile of tunnels. These tunnels connecting the different buildings are of concrete and carried underground. Otherwise they follow the line of the corridors.

The power house is divided into three sections,—the boiler room, the engine room and the laundry. The two former are approximately on the same level, or about 16 feet below the sidewalk, while the latter is the height of an ordinary story above the sidewalk. It will be seen from the foregoing that the boiler and engine rooms, extending as they do above the street level, afford good opportunity for abundance of light and ventilation.

The boiler room contains four Babcock & Wilcox boilers in two batteries and having a total capacity of 1,800 horsepower; they are equipped with the most modern automatic smoke consuming stokers, the fuel being supplied to the stokers by an electrical overhead crane and dump bucket.

In the engine room are located four 125 k.w. steam turbine generators, delivering current at 125-250 volt, three wire system. These machines, besides supplying all electricity required for light, furnish power for elevators, for the 39 large ventilating fans, for the air washers, the nurse call system, the electro-therapeutics, the laundry, and all minor electrical apparatus. For emergency service there has been installed a 150 k.w. motor generator set. The power for the motor, coming from an outside source, is 550 volts, 25 cycle, 3 phase. The generator side of the machine is the same voltage as the steam generators.

The entire apparatus is controlled from the main switch-board; for each machine there is mounted the standard equipment of ammeters, volt meters, circuit breakers, controlling switches, etc. From this board separate feeders are carried to each of the various buildings, all lighting being operated on the 125-250 volt circuit and all power on the 250 volt circuit, which is taken from the two outside lines. Full records of current consumption are kept on record—the total voltage for each machine being recorded, while a graphic recording watt meter indicates the total load for any period during operation.

The buildings are heated by a system of forced circulation of hot water, direct radiation being employed throughout; the radiators are of a special

hospital type, sections far apart and perfectly plain. The water so circulated is heated by the exhaust steam from the generators. The steam turbo-driven impellers, which are in duplicate, ensure a positive circulation of water, no matter at what temperature it may be.

There is also a pump and receiver for condensation returned from the live steam lines which supply heat for the steam tables, cooking apparatus, sterilizers, etc., together with the indirect heating coils employed for warming the air which by the various fans is forced into the different parts of the buildings. It should be mentioned here that air washers are installed wherever air is drawn from the outside and used for purposes of ventilation. These washers consist of a series of water sprays, through which the air is drawn. This method insures a positive cleansing of all air used for purposes of ventilation.

The usual installation of boiler feed pumps, feed water heater, sump pumps, etc., complete the installation of the power plant proper, the exhaust from these latter pumps going direct to the feed water heater.

The upper floor is occupied by the laundry. Here there is a plant which is as complete as is possible to make it. The most noticeable machine is the compound flat ironer, capable of forty thousand pieces a week. In addition to this there are four body ironers, one shirt ironer, two extractors, four washing machines, which with the metal dry room, rotary tumbler dryer, blueing and soap tanks complete the equipment.

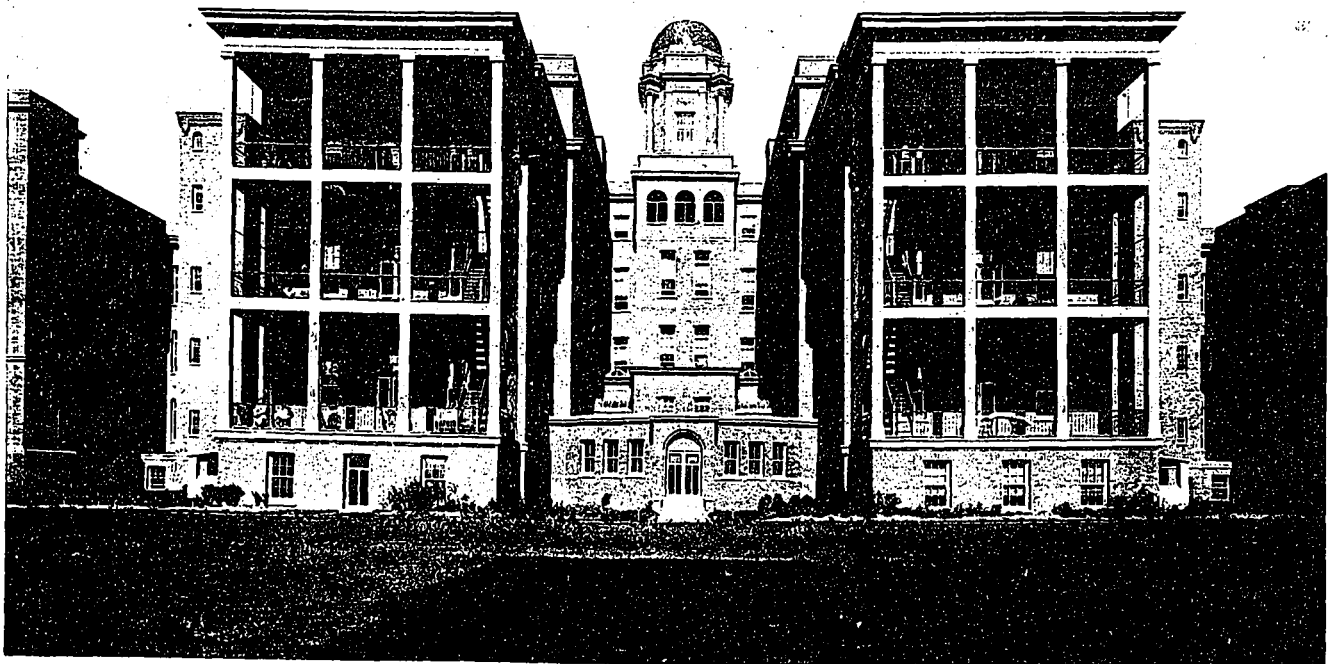
The soiled linen, entering the building at a separate entrance, follows one continuous circuit during the various processes of cleansing, until it reaches the sorting room. From here it is delivered to the different departments. In this way the clean work never comes in contact with the soiled.

Adjoining the power house is an addition containing the refrigeration plant. The brine pumps and ice tanks are located here, while the ammonia compressor is in the engine room. The plant has a capacity of two tons of ice and eight tons of refrigeration per day, the ice being used throughout the institution, while the refrigeration is for the refrigerators located in the surgical wing and private patients' building.

In close proximity are located the workshops, the machine shop having the usual equipment of lathe, drill press, forge, work benches, etc., while the carpenter and paint shops are conveniently arranged.

A large greenhouse is also provided for the care of many flowers which make the gardens attractive.

The completed work affords a solid unit comprising all the departments essential to the ideal institution of the present time. Nothing interfered in the endeavors of the board to make the final result efficient in every phase of hospital work and accordingly to give Toronto one of the finest of its kind in the new world. How successfully this has been accomplished is judged by the enthusiastic and unstinted praise of foreign critics, who are unanimous in their favorable comment in respect to the plan as well as the equipment.



REAR VIEW, ADMINISTRATION BUILDING.

The Ontario Association of Architects

TO ATTEND the ordinary annual meeting or convention of an association is one thing; to attend such an annual meeting as that held this year by the Ontario Association of Architects is quite another thing. It was so filled with diversity of places and of interests that the charm of the gathering seemed to grow rather than to lessen as it progressed. Let us begin at the beginning. Most of those in attendance left Toronto by the C.P.R. train at 9.30 on the morning of Wednesday, October 15th. The time in the train went so quickly, thanks to cheery badinage, that the hour appeared to have fewer than the normal number of minutes in its make-up. At the Hamilton station the incoming members were met by local members who formed a sort of small body guard to escort the arrivals to "The Wentworth Arms." Here the professional interest of the members was at once aroused, for was not the old Lovering House being transformed, under the able hands of an architect, into a comfortable modern hostelry in which happily there was to be found something of the quiet spaciousness of inns of olden days! A meeting of the dying Council was held in a cozy quarter of the hotel, and, after that, the welcome sound of the luncheon gong was heard. The members of the architectural profession then demonstrated that amongst their capacities they included the art of demolition. In other words, full justice was done to the excellent fare provided.

Luncheon over, the annual meeting was called to order by the President of the Association, Mr. C. P. Meredith, and under his gracious chairmanship the members showed the most admirable spirit, no matter how keenly at variance they may have been upon any point under discussion for the time being. The main topic for consideration was the revision of the by-laws, and for that purpose, as well as for many others during the deliberations from day to day, recourse was had to the services of Mr. A. Monro Grier, K.C., the Solicitor and Counsel of the Association. His methods were such that it seemed almost as if he belonged to some profession whose aim in life was to bring men together and exhibit their several good points rather than to keep them apart by

exploiting their failings. His reading of the by-laws was of such a quality that it seemed almost heretical to suggest that there were any flaws in them. The gaiety of the occasion was considerably heightened when a member who had moved an amendment was asked, after some discussion had taken place upon it, if he wished to take a vote upon it, and replied that he would like to, if he knew it would carry! During the session at Hamilton an exceedingly interesting event took place in the birth of the Hamilton Chapter of the Association. It was welcomed most heartily and long life and prosperity were wished for it.

At 5.10 the members took a special car on the Hamilton, Grimsby and Beamsville electric line for the "Village Inn," Grimsby, where the annual banquet was to be held that night. When the members trooped into the spacious, comfortable dining-room for the banquet the scene was grateful to the eye and appetizing to the palate. The feast was enjoyed by all, and it was not only a material feast, as food for the mind and soul, some substantial, some lighter, was provided by the speakers. The list of toasts was not long. Amongst the members who spoke were the following: Mr. Meredith, who of course presided; Mr. Wickson, Mr. Acton Bond, Mr. Fennings Taylor, Mr. F. S. Baker, Mr. Ellis, Mr. A. H. Gregg. "Our Country" was responded to by Mr. A. Monro Grier in a splendid burst of oratory, and a fine fighting speech was delivered by Rev. Dr. Lyle in defence and praise of the

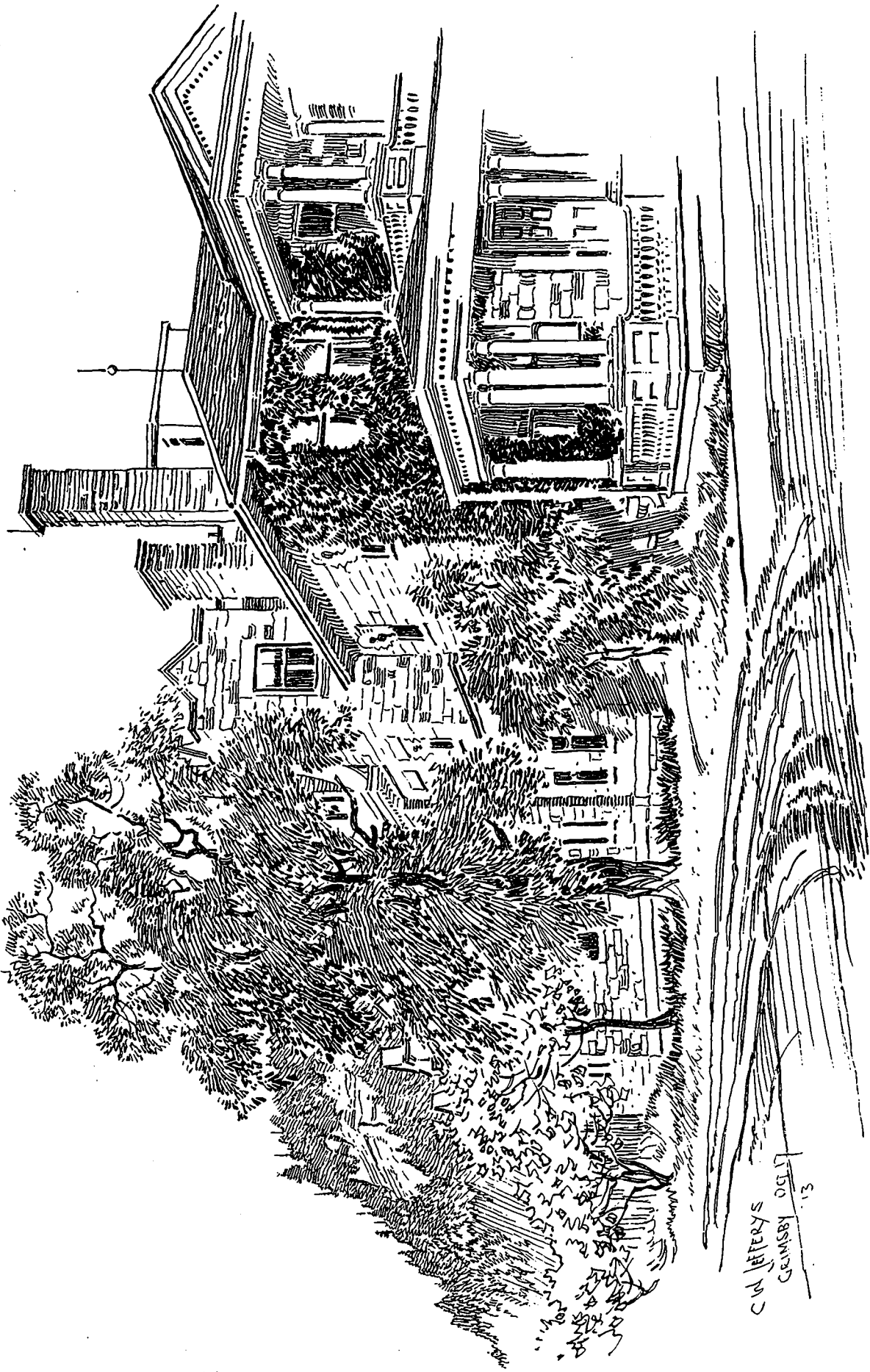


ACTON BOND.

Newly Elected
President, O.A.A.

Drama. Mr. C. W. Jefferys spoke as President of the Ontario Society of Artists; Mr. W. B. Wolsey on behalf of the Engineers' Club; Mr. Reed responded in fitting and sympathetic terms for the Press. The proceedings wound up with "Auld Lang Syne" and "God Save the King."

The deliberations of the Association were continued the next morning, Thursday, October 16th, in the "Village Inn," amongst the morning's proceedings being the election of new members of Council to take the place of those retiring. The following is the Council for 1913-14: President, C. H. Acton Bond, Toronto; First Vice-president, Herbert E.



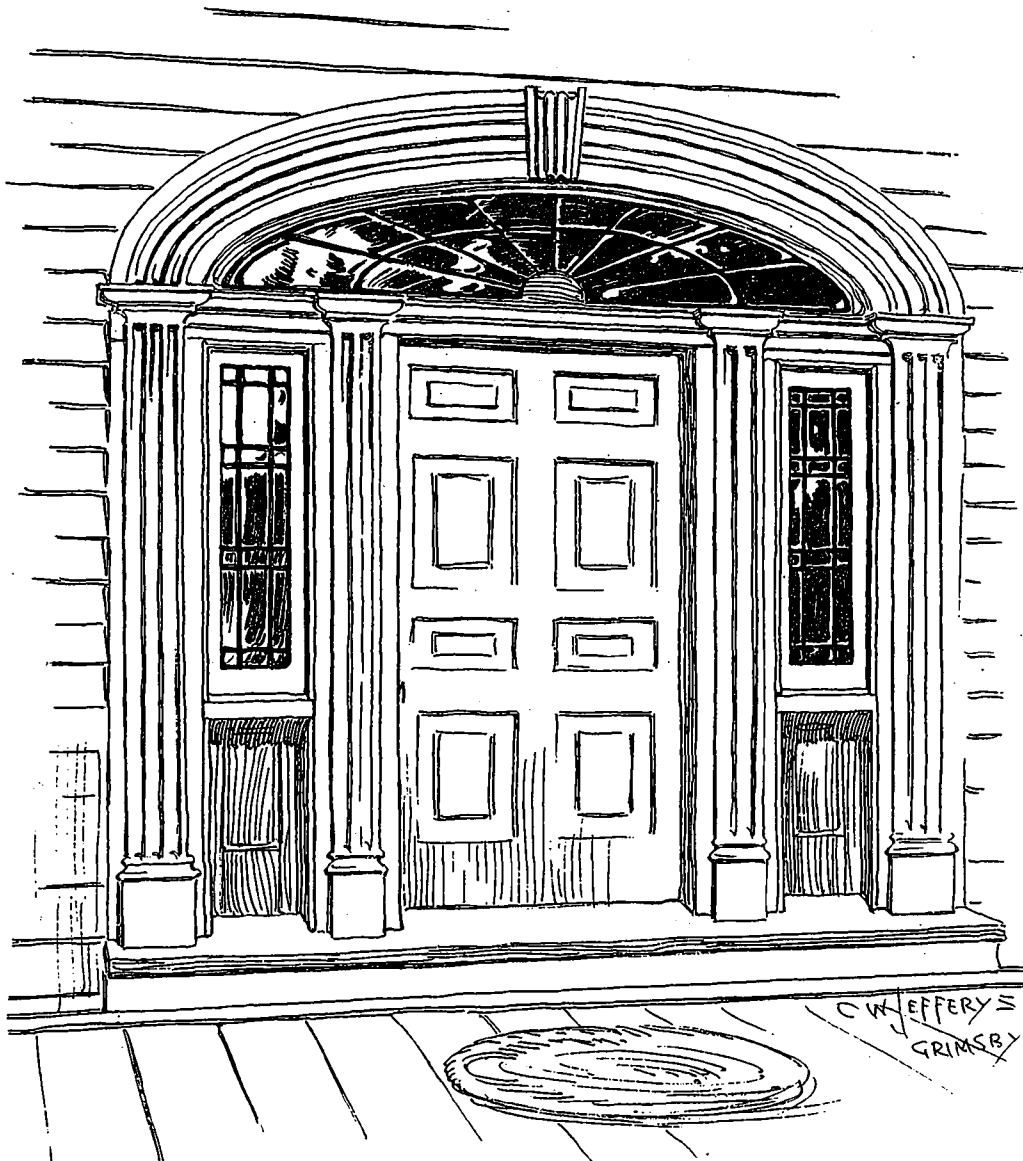
"THE VILLAGE INN," GRIMSBY, ONT.
SKETCHED BY C. W. JEFFERYS.

Moore, Toronto; Second Vice-president, L. Fenning Taylor, Ottawa; Treasurer, J. P. Hynes, Toronto; Registrar, Franklin E. Belfry, Toronto; Councillors, Colborne P. Meredith, Ottawa; J. W. Powers, Kingston; W. R. Gregg, Toronto; W. W. Stewart, Hamilton; Chas. E. Langley, Toronto.

That morning the members imposed upon the good nature of Mr. C. W. Jefferys. It was thought desirable that the record of the annual meeting should be enhanced with sketches of the "Village Inn," and

tages near by, where genius, in the shape of old porches and old mantel pieces were to be seen. The occupants of the dwellings were politeness itself in allowing the visitors to wander through their rooms, and the members noted these visits as amongst the most interesting items of the outing.

The concluding note of the occasion was a visit to Grimsby Beach, which included not only an opportunity to see the natural beauties of that spot, but also the chance to walk through a neighboring vine-



COLONIAL
DOORWAY AT
GRIMSBY, ONT.

SKETCH BY
C. W. JEFFERYS.

of an old doorway in the main street of the village, and it was calmly suggested to Mr. Jefferys that he supply the sketches. Behold, therefore, whilst the members do nothing but argue and discuss in meeting assembled, the President of the Ontario Society of Artists, seated on a verandah opposite, his back propped up against the wall, drawing the "Village Inn." How faithfully he lived up to his own high standard of work can be seen by any and all who examine his sketches which enrich this article.

After lunch, visits were paid to houses and cot-

yard and pluck and devour bunches of luscious grapes at the gatherer's own sweet will. The task of gathering was greatly lightened by the efficient help of the two children of the newly elected President, who, with their happy laughter, also made the scene more joyous.

Let us close our reminiscence here, with the memory of the quiet of that autumn shore, beautiful with the pines and poplars a decorative foreground to the uprising hills beyond; beautiful with the sunset glory of the waters of Lake Ontario.

CONSTRUCTION

A JOURNAL FOR THE ARCHITECTURAL
ENGINEERING AND CONTRACTING
INTERESTS OF CANADA



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CURRENT TOPICS

THE PRELIMINARY MEETING of the Ottawa-Hull Town Planning Commission was held in Ottawa, October 2nd. The following members, which constitute the Commission, were present: H. S. Holt, chairman, and Sir Alexander Lacoste of Montreal; Frank Darling and R. Home Smith of Toronto; Hon. W. T. White and Mayor Ellis of Ottawa, and Mayor Dupuis of Hull. The meeting was given up to a general discussion of the lines along which the Commission's work should proceed. The members wished two points clearly stated, viz., that there would be no conflict between the new Commission and the Ottawa Improvement Commission; that in outlining a plan for the development of the capital an endeavor would be made to lay down a scheme for a distinctly Canadian city. The Commission will take some time for studying conditions before getting down to the detailed work.

THE ORDINARY method of using open stoves, burning coke, to heat and dry buildings in course of construction, has been forbidden by the German Government. The vitiation of the air caused by escaping gases is considered detrimental to the health of workmen; and a new law requires that all such stoves be connected by pipes to chimneys or to some point outside of the building.

* * *

THE ANNUAL CONVENTION of the Saskatchewan Association of Architects was held in Saskatoon on October 25th. Some forty members were present to enjoy the hospitable reception offered by the city and enter into the important matters brought before the Assembly. One of the problems taken up by the Association was the question of technical schools for the building trades. These schools were thoroughly endorsed by the Association. In order that boys intending to enter the building trades could receive a liberal education along the line of their chosen work, it was thought advisable that technical schools should be established in connection with the collegiate schools. The secretary was finally instructed to take the matter up with the Provincial Government.

In a brief address F. C. Clemesha of Regina, president of the Association, expressed the appreciation of the members of the architectural profession in Saskatchewan for the arrangements that had been made for them by the local chapter. He referred also to the hospitality of the Saskatoon club, which had made the visitors honorary members for the day, and also to the kindness of the University authorities in placing an auditorium at their disposal. He spoke feelingly of the recent death of Mr. John Storey, of Regina, who was a prominent member of the profession.

A very enjoyable banquet was held in the dining room of the Saskatoon Club, at which function sixty architects felt the great bond which brought them together in hearty fellowship. The hall was profusely decorated with red, white and blue, which formed an admirable setting for this impressive gathering. A feature of the banquet was the menu. By each plate was laid a roll of blue prints, on which appeared the menu, the toast list and some clever sketches, besides a number of conundrums on technical subjects. Among those who proposed and answered the various toasts were the newly elected president, W. G. Van Egmond, Mayor Harrison, F. A. Fevell, Dr. Murray, Denis Shannon, R. S. Byers, Professor Grieg, Commissioner Yorath, R. M. Thompson and F. C. Clemesha.

During the afternoon session the officers of the Association for the ensuing year were elected as follows: President, W. G. Van Egmond, Regina; Secretary-Treasurer, F. C. Clemesha, Regina; Vice-presidents, R. G. Bunyard, Moose Jaw, and A. G. Creighton, Prince Albert; Council, A. R. Greig, Saskatoon; D. W. Webster, Saskatoon; A.

L. Favell, North Battleford. Moose Jaw was the unanimous choice of the convention as the next place of meeting.

* * *

THE FOLLOWING Scheme of Competition for the Scholarship in Decorative Painting at the British School at Rome, has been offered by the Commissioners for the Exhibition of 1851. The Scholarship will be of the value of two hundred pounds per annum, and will be ordinarily tenable for three years. Candidates must be British subjects, and less than thirty years of age on 1st July, 1914. The Competition, which will be conducted by the Faculty of Painting of the British School at Rome, will be in two stages:—A. An open examination; B. A final competition, open to not more than four candidates selected from those competing in the open examination.

A. The Open Examination: Competitors in this examination should submit the following works:—
1. Not less than four drawings of the nude figure from the life; 2. One painting of a head, and one painting of a figure from the life in oil or tempera; 3. Two figure compositions in color suitable for wall decoration (not larger than thirty inches by twenty-two inches); 4. Sketches of designs for decorative purposes, which should include some architectural studies.

Competitors should notify the Honorary General Secretary, British School at Rome, 54 Victoria Street, London, S.W., of their intention to compete in this examination as early as possible, and in any case not later than 24th January, 1914, and with such notification must enclose a certificate of birth, or a declaration as to age and nationality, duly attested by two responsible persons. The works submitted for the Open Examination should be addressed to the Honorary General Secretary, British School at Rome, care of Messrs. Chapman Bros., 241 King's Road, Chelsea, London, S.W., and delivered at that address not later than 31st January, 1914. The words "Scholarship in Decorative Painting" should be clearly marked on the outside of each package. The names and addresses of competitors must be clearly written on the back of each drawing, painting, etc. The works must be sent unframed and unglazed, and must be forwarded at the candidates' expense. The works will be returned to candidates at their own expense. The Faculty will undertake no responsibility in the case of any damage or loss.

B. The Final Competition: This competition will be held in London from 27th April to 20th June, 1914, and will be open to not more than four candidates selected from those competing in the Open Examination. The subject will consist of a design for a wall decoration to fill a given space for a given purpose, and to a given scale. Eight weeks will be allowed for the execution of the design, and during that time candidates will be provided with studio

accommodation, and given an allowance of two pounds per week for models. The successful candidate in this competition will be recommended for appointment to the Commissioners' Scholarship.

The Faculty reserve to themselves the right, at their absolute discretion, to alter any of the conditions, periods, dates or times herein specified, and to decline to hold the Final Competition, or to select any candidate for it, or to make any recommendation for the Scholarship. The Faculty also reserve to themselves the right to publish photographic reproductions of, or exhibit, any of the works submitted by competitors.

* * *

SIR LAURENCE GOMME, Clerk to the London County Council, London, England, contributes to "The Sphere" an account of a remarkable discovery recently made in the Corte Reale or Reggia at Mantua. "It is a thought worth bearing in mind," says Sir Laurence, "that foreign cities have, and have had, a better opinion of London than Londoners themselves. Somehow or another a Londoner is always a Little Londoner. There are many instances of foreign opinion in the past looking upon London as one of the great world cities, but no instance, perhaps, quite so interesting as the London County Council has just succeeded in recovering from Mantua. Mantua itself has all the romance of Italy associated with it—scenery that Dickens described as only Dickens could describe, a history which goes back to the wonderful Etruscan period which can appeal to us through the verses of Virgil, which came through the vicissitudes of the mediæval struggles following the fall of the Roman Empire, and which in the late fifteenth century made Mantua one of the great homes of European art. It was then ruled by the eighth member of the house of Gonzaga, Gian Francesco III. (1484-1519) whose wife was Isabella d'Este. On July 24, 1523, Isabella, in pursuance of her policy to embellish Mantua with all the best products of contemporary art, asked the Mantuan Ambassador at Venice to obtain drawings of notable cities as materials for frescoes in her loggia. One of the cities chosen under this instruction was London, and there can be little doubt that the scheme was carried out in its entirety. About ten years ago many town plans, including one of London in fresco, were discovered in what were known as Isabella's apartments in the Reggia, and through the kindness of the Director of the Reggio Archivio the London County Council obtained a photograph of the London plan, which by permission of the Council was exhibited at the annual meeting of the London Topographical Society. The outline of the city wall agrees closely with Norden's drawing of 1593, between which date and that of Isabella's request to her Ambassador there was practically no alteration in the city's exterior appearance. We can therefore on the whole accept this fresco as a representation of London in the early sixteenth century."

Testing of Cement and Concrete

PROFESSOR BRYDONE-JACK*

MR. PRESIDENT and members of the Royal Architectural Institute of Canada: It is not my intention to give you to-day anything in the form of a lecture, but I propose making a few rambling remarks upon the manufacture and tests of cement and concrete for use in building construction. It may be as well at the start to let you know that my remarks will be brief, as of course it would be impossible to go fully into the subject in the short space of time at my disposal. I propose outlining briefly: 1. The history of the discovery of cement; 2. The general process of manufacture; 3. The interpretation and meaning of results obtained by the standard tests of cement; 4. The effect of alkali on concrete; 5. The use of oil.

History.

The use of cement and concrete extends back to a period long before the Christian era. Lime must have been used by the Egyptians thousands of years before Christ, as the stones of the pyramids were apparently laid in mortar of common lime and sand, while it is thought by some that the Egyptians understood the principle of mixing lime and clay together to make a real cement. Concrete was made by the Romans several centuries before Christ, and they discovered that volcanic ash or puzzolan, when mixed with slaked lime, made a cement with hydraulic properties.

In the first century, Vitruvius describes a method of making concrete with lime, and gave the following formula: 12 parts of puzzolan, well pulverized; 6 parts of quartz, well washed; 9 parts of rich lime recently slaked; to which is added 6 parts of fragments of broken stone, porous and angular, when intended for a pise or a filling in.

From the downfall of the Roman Empire to the last half of the eighteenth century, little appears to have been done in the manufacture of cement, but the cement mortars and concretes of the early Romans were so hard that in the eighteenth century experimenters endeavored to discover the supposedly lost art.

In 1756 John Smeaton discovered that an argillaceous limestone produced a lime that would set and harden under water; but no immediate appreciation of this knowledge appears to have resulted.

Natural cement was first discovered by Parker in 1795, as a result of an attempt to equal or excel Roman cement, and in 1796 he took out an English patent. Natural cement was not produced in America, however, until 1818, when Canvass White discovered a rock suitable for the manufacture, and this was the principal cement used for a long time, the maximum yearly production being about ten million

barrels in 1899, which has decreased rapidly since then, due to the superior qualities of, and the reduction of cost in Portland cement.

The art of manufacturing Portland cement was discovered in 1824. The cement was called "Portland" on account of its resemblance to a building stone obtained from the Isle of Portland. It was not until 1855, however, that much progress was made in the manufacture of Portland cement in England.

In America, Portland cement was first manufactured in 1824, but it was not used to any great extent until 1880. Mr. D. O. Saylor is regarded as the founder of the Portland cement industry in America. He experimented on it from 1871 to 1875, and marketed the cement in 1875.

The manufacture of Portland cement now is approximately one hundred million barrels per year:

Manufacture.

Natural cement is the product resulting from the burning and subsequent pulverization of an argillaceous limestone or other suitable rock in its natural condition.

Portland cement is the product resulting from the process of grinding an intimate mixture of calcareous and argillaceous materials, calcining the mixture to incipient fusion and grinding the resulting clinker to a fine powder. It contains no materials added after calcination, other than small amounts of certain substances used to regulate its setting properties.

The distinguishing characteristics between Portland and natural cement are: 1. Portland cement is manufactured by the use of an artificial mixture, grinding before burning, and calcination to incipient fusion; 2. Natural cement is manufactured by the use of a single variety of material, unground, and burned at a low heat; 3. Portland cement is heavier, slower setting and has greater strength than natural cement. Portland cement, then, may be considered as a mixture of calcium carbonate and aluminum silicate, ground fine, calcined, and then re-ground, for commercial use.

The processes of manufacture differ with the natural state in which these materials are found, but the operation consists essentially of: 1. Pulverizing and mixing the two ingredients; 2. Heating to a temperature near the melting point; 3. Grinding this product to a fine powder.

There are two principal methods of manufacture, known as the wet and the dry processes. In the wet process the materials are mixed and ground in the wet condition and introduced into the kilns. In the dry process the materials are mixed dry and introduced into the kilns in a dry state. After the calcination in the kilns the clinker is ground in the same manner for both processes.

The exact proportions of ingredients for Portland

*Read before the R.A.I.C. Convention, September 15th, 1913.

cement are determined by their chemical composition, a usual ratio being seventy-five per cent. of calcium carbonate and twenty-five per cent. of aluminum silicate.

Due to the many forms of these substances as found in nature, there is a large range of choice for raw materials. Some of the combinations used are as follows: 1. Cement, rock and limestone; 2. Limestone and clay; 3. Limestone and shale; 4. Marl and clay; 5. Chalk and clay; 6. Limestone and slag.

Fine grinding before burning is one of the secrets of successful manufacture.

For calcining the mixture of finely ground material the rotary kiln is principally used. This consists of an inclined steel tube from sixty to two hundred feet long, the diameter usually being from six to twelve feet. The tube is lined with fire-brick, and is set on a slight slope in such a manner that it can be rotated on its axis. The fuel used for calcining is usually either powdered coal or petroleum, and is fed to the kiln at its lower end by piping. The ground materials for the cement are fed to the kiln at the upper end by a spiral conveyor enclosed in a water-jacketed pipe. The degree of calcination is governed by the supply of raw material, the speed of rotation of the kiln, and the quantity of fuel. The temperature for burning is between 2,700 and 3,000 deg. Fahr.

At a certain point in its descent the raw material becomes semi-vitrified, and forms into irregular balls or clinkers. These roll around and around, and finally fall out red hot at the lower end. They arrange in size from sand to one inch in diameter. This clinker is of a greenish black color with a faint glisten.

The output of a kiln varies with the length and diameter from one hundred and fifty to twelve hundred barrels per twenty-four hours. After coming from the kiln the clinker is first cooled and then crushed in rolls or some form of crusher. It is then ground fine by passing through ball and tube mills.

The rotary kiln has been used largely for the dry process of manufacture, but it is also used for the wet process even in cases where the slurry (or mixture of raw materials and water) contains as much as forty per cent. of water. For use of the rotary kiln in the wet process the slurry is pumped into the end of the rotary and dried by the same flame used for calcination, but considerably more fuel must be used. Before the introduction of the rotary kiln all cement was calcined in stationary kilns, which were either intermittent or continuous in action. The labor cost with stationary kilns is much higher than with rotary kilns.

Testing.

Cement is used to such an extent in engineering structures and in building construction, and the strength and stability of structures depend so much on the quality of the cement used that it is imperative to have all cement tested before using in any important work.

In selecting samples for testing purposes care

should be taken to get representative samples for each lot in a shipment. The sample for testing is generally taken in one of three ways: 1. An average sample from several packages; 2. Separate samples, each from a single package, tested separately; 3. One sample from a single bag. Obviously the test of a sample taken from one bag is unfair, and inaccurate, and should not be permitted. The separate testing of a number of samples each taken from a single bag involves a large amount of unnecessary work, though in some cases it may be necessary in order to test the uniformity. The average sample from several bags is usually the best method, and on large shipments approximately every bag in thirty or forty should be opened and sampled.

The cement taken from each bag should be the average of its entire contents, since the cement on its exterior is more liable to influences tending to change its properties than that on the interior. The bag should be sampled from surface to centre, using either a sampling auger or a long narrow scoop.

The tests which are regarded as the most suitable for the acceptance of cement are as follows:—1. Chemical analysis; 2. Specific gravity; 3. Fineness; 4. Activity, or time of setting; 5. Tensile strength of neat cement and mortar; 6. Soundness.

1. Chemical Analysis: The average analysis of a good Portland cement is as follows:—Silica, twenty-one to twenty-four per cent.; alumina, six to eight per cent.; iron oxide, two to four per cent.; lime, sixty to sixty-five per cent.; magnesia, one-half to two per cent.; sulphuric acid, one-half to one and one-half per cent.; carbonic acid and water, one to three per cent.

Significance of Chemical Analysis: Chemical analysis may render valuable service in the detection of adulteration of cement with considerable amounts of inert material, such as slag or ground limestone. It is of use, also, in determining whether certain constituents believed to be harmful when in excess of a certain percentage, as magnesia and sulphuric anhydride, are present in inadmissible properties.

The determination of the principal constituents of cement—silica, alumina, iron oxide and lime—is not conclusive as an indication of quality. Faulty character of cement results more frequently from imperfect preparation of the raw material or defective burning than from incorrect proportions of the constituents. Cement made from very finely ground material, and thoroughly burned, may contain much more lime than the amount usually present, and still be perfectly sound. On the other hand, cements low in lime may, on account of careless preparation of the raw material, be of dangerous character. Further, the ash of the fuel used in burning may so greatly modify the composition of the product as largely to destroy the significance of the results of analysis.

2. Specific Gravity: It is usually specified that the specific gravity for Portland cement should not be less than 3.1.

Significance: A lower specific gravity may indicate adulteration and hydration.

Fineness: Specifications for Portland cement usually state that a residue of not more than five per cent. by weight should be left over a No. 100 sieve after shaking, and not more than twenty-five per cent. on a No. 200 sieve. A No. 100 sieve contains 100 meshes per lineal inch and 10,000 meshes per square inch. A No. 200 sieve contains 200 meshes per lineal inch or 40,000 per square inch. The diameters of the wire are .0045 inch for No. 100, and .0024 inches for No. 200.

Significance: It is necessary for the cement to be very finely ground, as the coarse particles in cement are practically inert, and it is only the extremely fine powder that possesses adhesive and cementing qualities.

Time of Setting: It is usually specified that initial and final set for Portland cement should take place between the limits of thirty minutes and ten hours after mixing. The initial and final sets are determined by purely arbitrary standards.

The initial set is said to occur when a needle 1 mm. in diameter and weighing 300 grammes ceases to penetrate more than 35 mm. into a cake of neat cement 40 mm. thick. The final set is said to occur when the needle no longer penetrates the cement.

Significance: It is essential that initial set does not take place too rapidly except in special cases—as the process of crystallization, or hardening, is said to begin then, and a disturbance may produce a loss of strength.

Tensile Strength: The test of tensile strength consists in mixing cement and water, or cement, sand and water, into a paste, forming it into test-specimens, called briquettes, which are allowed to set, and harden, under definite conditions, and then determining the amount of force necessary to cause rupture in tension at the expiration of fixed intervals of time.

The object of the test is to obtain a measure of the strength of the material as used in actual work. In construction a concrete is often subjected to every conceivable form of stress, except possibly that of torsion, while the testing is confined almost exclusively to tension. This condition is the outcome of both theoretical and practical considerations. While it is impossible to formulate definite ratios between the ultimate strength of cement under different forms of stress, nevertheless the tensile is, more or less, a measure of the compressive, transverse, adhesive and shearing values, and furthermore investigations have apparently shown that the strength of cement in tension is more susceptible to any good or bad influences operating on the material, and hence furnishes a better criterion of its value than tests made in any other manner, the results of the tensile test thus giving the most reliable basis for computing the values of the strength under other forms of stress.

The practical considerations favouring the adoption of this form of strength test are the small and easily handled test-specimens, the lower stress, as

compared with compression tests, necessary to cause rupture, and also the fact that uniformity in the preparation of the specimens is only necessary in a small portion of the specimen, namely the breaking section, while accurate test-pieces for the other determinations must be homogenous and uniform throughout their entire mass.

Although in practice cement is invariably mixed with an aggregate, tests are usually made on both neat cement and sand mixture. The objection to the use of test pieces of neat cement is that they are not similar to the conditions of practice, while the reason that sand tests are of comparatively recent origin is that the sand introduces another variable in the influence exerted by its character.

For Portland cement the following strength should be found:—Neat: 24 hours' moist air, 150 to 200 pounds per square inch or over; 7 days' moist air, 450 to 550 pounds per square inch or over; 28 days' moist air, 550 to 650 pounds per square inch or over. 1 part cement, 3 parts sand: 7 days, 150 to 200 pounds per square inch or over; 28 days, 200 to 300 pounds per square inch or over.

Soundness: By soundness is meant that property which resists any force tending to cause disintegration or lack of permanency in the structure.

The test for soundness is one of the most important tests of cement and one of the hardest to interpret. A sample of cement may pass all the other tests with ease; but if it is unsound it will eventually disintegrate on the work. It is misleading as well as worthless, because the disintegration may not appear for a considerable period.

The main cause of disintegration in cement is an excess of lime, either free or loosely combined, which has not had an opportunity of becoming sufficiently hydrated. Unsoundness may also arise from an excess of magnesia, alkalies or sulphides.

The usual tests for soundness are as follows: Accelerated test—placing a pat of cement in boiling water for a definite period, or keeping pat in an atmosphere of steam for a definite period.

Normal Test: Keeping a pat of cement in air at normal temperature for at least twenty-eight days, or keeping pat in water at normal temperature for at least twenty-eight days.

In both cases the object is to find out if there is any tendency on the part of the pat to disintegrate. Evidently it is usually impossible to wait for the twenty-eight days before accepting the cement, and the accelerated tests are usually taken as at least a guide to the acceptance of the cement at the start.

Failure may be revealed in the pat by cracking, checking, swelling or disintegration; or by all of these combined. A cement remaining of constant volume without cracks, checks or swelling, may usually be accepted as a sound cement.

The above outline represents the usual commercial tests made, while there are a great many other special tests which may be made.

In the interpretation of all cement tests it must be borne in mind that the cement should be judged from

the results of all tests made, and not from the individual case.

It can be said that any failure in the normal pat tests, or any indication of normally low sand strength or neat strength is sufficient to warrant the rejection of the shipment without other evidences of poor quality.

There are two additional points to which I would like to call your attention briefly:—1. The action of alkalis on cement and concrete; 2. The use of oil mixed concrete.

This would seem appropriate in the first case, due to the great use of concrete in building work in Western Canada, in places where alkali is present in quantity, and may come in contact with foundation walls, etc.

In the second case, where we find damp foundations and cellars, oil mixed concrete may be used to advantage under small pressures and with very little additional expense to prevent moisture and dampness.

Effect of Alkali: It has been found in several localities that alkali water has affected concrete work, as instanced by the disintegration of the cement, mortar, and of the joists and coating of a sewer in Great Falls, Montana. This disintegration is supposed to be due to the action of alkali. Other instances have also occurred in various localities.

The matter was investigated by Professors Burke and Pinckney, of the Montana Agricultural College, the following conclusions being reached:—

"I. The disintegration of cement by alkali salts is principally due to reactions between these salts and the calcium hydroxide necessarily present in set cement.

"As a result of these reactions relatively insoluble new compounds are formed in the body of the cement structures.

"It has been shown that these new compounds have greater weight and require greater space than the calcium hydroxide replaced.

"In order to obtain the necessary space the new compounds force apart the particles of the cement, thus weakening or breaking the binding material.

"1. The compounds resulting from these reactions with the various destructive salts are as follows:—

"a. With sodium sulphate the resulting compounds are sodium hydroxide, which is soluble and therefore is removed by leaching, and gypsum, which is relatively insoluble, and therefore accumulates in place of the calcium hydroxide.

"b. With magnesium sulphate the resulting compounds are magnesium hydroxide and gypsum, both of which are insoluble and accumulate in place of the calcium hydroxide.

"c. With sodium carbonate the soluble sodium hydroxide and the insoluble calcium carbonate are formed. In this case there is little increase in the space required, but the silicates and aluminates are also attacked and dissolved. This solvent action is especially marked upon the silica. This loss of silica must weaken the cement, but there is little, if any, crumbling due to expansion.

"2. The additional material, requiring increased space, consists in part of dry matter and in part of combined water, which is taken up by the cement during its exposure to the alkali solutions.

"a. This increase in dry matter is brought about by the formation of the sulphates, magnesium hydroxide, and carbonates, as shown by the reactions given in paragraph 1, a., b. and c.

"b. Part of this increased amount of combined water is due to the fact that the new compounds, gypsum, magnesium hydroxide, etc., require more water for crystallization than did the calcium hydroxide which they replaced. This further assists in the disruption of the cement.

"c. A part of this increased amount of combined water is due merely to the continued action of water upon the incompletely hydrated cement. This amount should serve to set free more calcium hydroxide, and thus to a certain extent repair the damage due to loss of the binding material and to expansion.

"II. A certain weakening, not a disruption of the cement, is due to the loss of a portion of the binding material, crystallized calcium hydroxide, which is merely dissolved and removed in solution.

"III. In order for destructive action to become marked the alkali solutions must percolate through the cement work, or at least must penetrate beyond the surface.

"IV. When the action is strictly confined to the surface, as when briquettes of neat cement are immersed in a still solution, the tensile strength may be increased. In such cases the expansive action closes up the pores, making the surface more nearly impervious and preventing the alkali from penetrating further.

"V. When cracks are started by the expansive action due to alkali salts, wetting and drying, or freezing and thawing, will hasten the destruction of the cement by extending the cracks already started.

"VI. Any measures that hinder the penetration of the alkali solutions into the interior of the cement will delay the destructive action. For this purpose both soap and aluminum sulphate have been tried in laboratory tests and have been found to afford some protection. The soap, however, in itself had a slightly injurious effect on the tensile strength of the cement.

"The efficiency of these and other waterproofers is being further studied and results will be reported in a later bulletin." (Above quotation being found on pages 130 and 131, Bulletin No. 81, Montana Agricultural College.)

I might add, however, that the denser a concrete is made, the less it is subject to the attacks of the alkali, as the alkali cannot penetrate into the concrete, but closes up the outer pores, thus preventing further disintegration. Oil mixed concrete might also be advantageously employed to protect the concrete. In regard to oil mixed concrete, it has been found that five to ten per cent. of the clunch of petroleum residuum oil mixed with the concrete will render it impervious to moisture, and waterproof

under small heads. This can be made by mixing the cement mortar and adding oil, the oil being measured as a percentage of the cement.

The specifications for the residuum oil are as follows:—1. The oil shall have a specific gravity of not less than .930, nor more than .940 at 25 deg. C.; 2. It shall be soluble in carbon disulphide at air temperature to at least ninety-nine and nine-tenths per cent.; 3. It shall contain not less than one and one-half per cent., nor more than two and one-half per cent. of bitumen insoluble paraffine naphtha; 4. It

shall yield not less than two and one-half per cent. nor more than four per cent. of residual coke; 5. When twenty grammes of the material is heated for five hours in a cylindrical tin dish, two and one-half inches in diameter and one inch high, at a constant temperature of 163 deg. C., the loss in weight shall not exceed twenty per cent.; 6. The viscosity when heated to a temperature of 50 deg. C. and maintained at that temperature for three minutes, the viscosity shall not be less than forty nor more than forty-five degrees.



GROUP OF DELEGATES AND FRIENDS ATTENDING THE R.A.I.C. CONVENTION.

President's Address at Calgary

J. H. G. RUSSELL

MR. ACTING MAYOR and Gentlemen,—
On behalf of the Institute, I thank you heartily for your cordial welcome to Calgary. It is, I can assure you, a great pleasure for us to be here, to meet here in the westerly city of the federated bodies belonging to the Institute, and although we hope it will not be very long before we have the British Columbia architects to join in with us. We will be very glad when they will be in a position to join us, but I may say they have been trying hard to get the Act passed through, but they are experiencing some trouble, as Mr. Lines has told us, in getting together, to make it strong enough for the Legislature to do what is best to do.

I think it has been said that Calgary is one of the most progressive cities in Canada and no doubt in some respects you are. You have gone towards the town planning part of it so far, and in that respect you are further ahead than any other city, and taken such steps that it would be well for others to follow. When a city is in its making is the time when its

beautifying should be considered instead of leaving it until the place gets too old, like, for instance, the city of Winnipeg.

At our last meeting in Ottawa some person kindly said that he thought the Winnipeg convention of 1910 was the most enthusiastic we had had, but I am inclined to think that if he was here to-day he would think that Calgary was as enthusiastic as it was possible to be. I suppose it is due to the fact that you are further west and more up in the clouds and have a little more ozone to breathe than us further east. We will take that as the reason now. I would not want our eastern brethren to think we are egotistical at all, because we have a very high feeling for them and their work; but they must begin to realize very shortly, if not now, that the west are far ahead of the east. We are better organized than in the east, Quebec being the only province in which they have the Registration Act. Down in the Maritime Provinces the members of the profession are not strong enough to form a body, there being very few

in New Brunswick and Nova Scotia; so I am afraid it will be a long time, perhaps never, before they will have any registration that far east.

This last year, although really the sixth year of our Association, is in some respects the first year, since we had a new charter at the last meeting and it was at that meeting that we organized the federated societies of architects comprising the five Provinces—Quebec, Ontario, Manitoba, Saskatchewan and Alberta. I might say, owing to the difficulty of getting the lists of members together so that we could form committees, we did not get very much work done, so that it was really a kind of formative period this last year. That has been overcome now and we hope that the new Council will find something for everyone to do. That is the only way to make a success out of it—to find something for everyone to do, and let everyone become an enthusiastic member.

I might say, our by-laws require to be amended. Before we could really commence operations, at the meeting in June last held in Montreal, there was a draft made of these by-laws and I think a copy was sent to every architect who was a member of the Association, and you will be asked to take this question up to-morrow and I would like to impress upon every person that it is a very important thing to have a good set of by-laws, and I earnestly trust you will all give your best consideration to the matter.

Mr. Lines truly said, I think, when talking about the profession at large, the work they had to do and what an architect is supposed to know, and also Mr. Brocklebank when he said he thought we met here together to protect the public, I think the public are becoming better acquainted with our work and our aims.

Our assistance as an Institute has been sought different times during the past year. Even in British Columbia they asked us to name assessors for their recent competition for a hospital in Victoria, and they followed by selecting one of our members as assessor, and I understand through him that they had a very successful competition.

We have also been asked by the Dominion Government to assist them in drawing up a programme in selecting for the new Court House buildings in Ottawa, and I might add that this is one of the largest things the Government have undertaken for a long time, and we are hoping for a successful competition. The Government were ready to meet us at every point and showed a great deal of interest in the getting up of the programme.

There is one thing I might mention in connection with the work that they have done by Mr. White, that when he was selected by the Dominion Government he was only asked to lay out a plan of the new grounds and suggestions as to the way he would locate the buildings on those grounds, and he asked to be allowed to consult some architects in connection with the work, and he got in communication with Sir Aston Webbs and they got up the drawings which perhaps some of you have seen published. I might say to those going into the competition, please do not

take the elevation as shown as any criterion of what the Government requires. The design as submitted to the Government was classic in character, as classic as some people would like, but the present buildings are entirely Gothic and it will be left to the competitor as to what he thinks best to work out.

The Quebec Association have appointed Mr. Marchand of Montreal as one of the members of the new Council, and he was appointed by the Government, and as he had been appointed one of the assessors by the Government, we have now two members of the Council on the Board of Assessors, and Mr. Colcutt of London, England, was the third assessor appointed by the Royal Institute of British Architects.

A great honor was done Mr. Baker a short time ago. He was asked to go over and address the Institute of British Architects on Canadian Architecture in London, England. Perhaps most of you have seen the synopsis of the paper Mr. Baker gave there. He was very heartily welcomed in London last January and had a very pleasant time. I might say that during his visit to London that time he got into communication and saw Lord Strathcona in connection with a scholarship in architecture, and he got Lord Strathcona to promise to give \$12,500.00 if he would raise the other \$12,500.00, to provide a fund of \$25,000.00 to be invested and have a travelling scholarship on architecture each year. I may say we tried during last summer and spring to get about a hundred and forty gentlemen in Canada to subscribe this other \$12,500.00, but we were not very successful. I guess the money stringency had something to do with it. We only had two responses out of some two hundred letters sent out asking for the money, but the Council at its last meeting decided that we get Mr. Baker to approach Lord Strathcona to supply the whole \$25,000.00 and that is what is being done now.

There was a movement started by some of the members in the east to ask the Government to subscribe or put aside a certain amount of money to establish a travelling scholarship in architecture and in each one of the allied arts. Personally I think the Government ought to do this because they are spending money for the country in a way they should not, and I think we should appoint a committee to interview the Government on the matter. It has been impressed upon them before and it would not be anything new to them, and they would be ready for it. I think that is one thing that should be taken care of.

I think we also require a Publicity Committee to keep our public press fully informed as to our aims and objects. With the different Provincial Acts that have been passed, the profession has been raised to a higher standard in the eyes of the public, and every year our work grows harder and we are really supposed to be expert in all the trades under the sun and to know a little of too many things.

A member was saying to me to-day we ought to try and unload a lot of things which are shoved on to our shoulders at the present time. It is a hard

thing to do. The architecture of the country is going ahead every year; in fact, I do not think we have to take a back seat now with any place on the face of the earth so far as that goes. I think we have some buildings in Canada to-day that would be a credit, no matter where they were placed.

I do not think I will say much more. We have a lot of business to attend to, and I am a great deal like the medical doctor who had a friend, a very worthy friend, who was a doctor of divinity. The medical doctor one day by mistake had a visitor call on him. After getting admittance, he said to the doctor, "you have changed a good deal since I heard you preach last." The doctor said "preach;" the visitor said "yes," and went on, "why, are you not the doctor that preaches?" and he said "no, I am the doctor that practises." That is about the way I feel.

AT the R.A.I.C. banquet held in Calgary, September 15th, Sir Gilbert Parker gave the following toast:

"You who represent the whole Dominion, you who are making the people realize and understand that culture and beauty go hand in hand with utility, the rewards that you receive,—that is the satisfaction of your own ideals and the satisfaction of the eternal elements of beauty, these are the greatest and most precious rewards that you can gain in all the failures and successes of your career.

"The man who can rise to the highest summits in the profession of architecture would rise to the same eminence in any other profession or walk of life to which he was attracted; because he had been successful in the one, so would he become capable and efficient in whatsoever other sphere of life his lot might be cast. As an instance of this I remember that Paderewski, the famous pianist, once told me that there was a time when his fingers forever seemed paralyzed, and he made up his mind that he would give up music, and enter the field of politics in Vienna. Had the eminent virtuoso thus changed his profession, he might have risen to as lofty a height in the world of politics as he has done in the world of music.

"I have a profound regard for the profession of the architect, and am indeed glad to have the opportunity of saying a few words to men of your ilk.

"I expect shortly to visit Montreal in order to deliver an address at McGill University on the occasion of the anniversary of the founding of that well-known seat of learning.

"I have chosen for my subject on that occasion 'The Arts,' for I feel that in most new countries art does not have the same encouragement that it has in the older lands. Architecture has made wonderful strides in this country, because it has adapted the methods and beauty of the great artistic countries such as Rome and Greece to the exigencies of a utilitarian age.

"I would like to see a department of fine arts established in every university in Canada, and I am

very glad to know that McGill University has lately founded such a department.

"Regarding the copyright bill, which was introduced into the British Parliament during the last session, and concerning the passing of which I have done my utmost, in spite of a good deal of opposition even from my own party; I happened to belong to a party which is at present not in power in the old land, and it was my duty on nearly every occasion to oppose legislation proposed by the party in power. When, however, the copyright bill was introduced into the House I felt that I could not oppose it, because for the first time in the history of British politics there was protection for the musician, and for the first time there was protection for the architect.

"There were members, many of my own party, who strenuously opposed the passing into law of this bill. Members would not protect the composer from the pirating of his works, neither would they protect the architect from his works being copied. In spite of opposition, I frequently rose in the House and spoke in favor of the measure, pointing out that such a bill would assist and protect the writer, musician and architect as no other act of legislation had ever done before. Perseverance told in the end, for the measure finally passed the House of Lords and received the Royal assent.

"Architecture is the first expression of the human race, then come painting, sculpture and music. Your position is not less to-day, for your profession appears to me to be one that is getting nearer to the people themselves than any other profession in your country. Pictures are getting fewer, for most of the valuable masterpieces hang upon and adorn the walls in the houses of millionaires, hidden away from the sight of the man in the street. But your fine buildings are every day made an education to the poorest of the poor.

"The splendid edifices that your skill and genius erect will last for all to see them, and learn the splendour of their beauty. Historic places such as the ancient cathedrals of the old land and on the Continent, mansions erected in the far away ages by the nobility of England, and fashioned by the hand of men like Christopher Wren and Grindley Gibbons, will last and endure when paintings and perchance music may have passed into oblivion. Take your profession seriously; look upon it as a profession that tends above all others to elevate and educate the minds of men and women.

"I have to construct just as you have to do, for every book of mine, such as it is, is an attempt at architecture. We are one in our failures and successes. You who represent the whole Dominion, and make the people realize and understand that culture and beauty go hand in hand with utility, the rewards that you receive, namely the satisfaction of your own ideals and the satisfaction of the eternal elements of beauty; these are indeed the greatest and most precious rewards that you can gain in all the failures and successes of your career."

THE FOLLOWING address of welcome was extended to the delegates by Roland W. Lines, President of the Alberta Association of Architects:

Gentlemen,—Mr. Tregillus has welcomed you to the City of Calgary, so that it is my important duty to welcome you on behalf of the Alberta Association of Architects, and I have very great pleasure in having that privilege, and trust you will have an enjoyable visit.

Those who are visitors here will no doubt enjoy themselves, and we of course—we always have a good time. We feel greatly honored by the Institute of Canadian Architects because the Institute is a premier organization for the advancement of architecture in this country, and therefore it is an organization which we should all feel proud to belong to. Alberta, although it is one of the youngest of the provinces, has the honor of being the second to recognize the necessity for registration of architects. In 1905 and 1906 we passed a bill through the Provincial House in Edmonton making it necessary for all architects practising at that date in the Province of Alberta to become registered. Architects who, subsequent to that date, wished to practise had to prove to the Examination Board of the Alberta Association their ability to practise. So that, gentlemen, in future we shall only have duly qualified men practising in the Province.

This example, I am pleased to say, has been followed by several other Provinces, and very soon I hope we shall have every Province in the Dominion with a Provincial charter, and therefore have registration throughout the whole Dominion, and in addition to that, I hope to see all the provincial associations affiliated with the Royal Architectural Institute of Canada. That is one of the most important things on which we have set our hands, and although it was commenced only two years ago, a great deal has been done. It has been done under the guidance and influence of the Royal Architectural Institute, and it will only be completed when we have every Province in the Dominion with a Provincial charter and everyone federated with the Royal Architectural Institute of Canadian Architects. When that is complete, we shall have an organization which we should be very proud of, because it will have a great future, and it will control matters of award in architecture throughout the whole Dominion.

The Royal Architectural Institute of Canada is about beginning its career as a federation and has yet most of its work to do, a greater part at any rate, but there can be no question if all the members of the Institute are fired with the zeal for the advancement of our profession, we shall one day have a great organization, and there will be no limit to what we shall be able to do.

There are several suggestions I should like to make, and I would like to see the Royal Architectural Institute carry them out later. They can be discussed to-day, I think, and one of the first points is the nationality of members of our Association and

of the Royal Institute. This is a great problem and should be very carefully considered. We are having a number of men join and practising in our country who are not naturalized citizens, and I think it requires a great deal of consideration.

Then there is the question of standardizing examinations throughout the whole of the Dominion so that it will be just as easy or just as difficult for a man to become a registered architect passing an examination in Quebec as in Alberta.

Then there is the scheme for the promotion of study for architectural students, and also for the general enlightenment and education of the public in architectural subjects.

My opinion is that the Royal Architectural Institute should give all the assistance and guidance that is required by some of the Provincial associations who have agreed to obtain their charter. There are some of them in very awkward positions and require a little advice. They have not been able to get their charter, and it is very necessary that they do get their charter before they can become federated with the Royal Institute of Canadian Architects.

It has occasionally been said that an association of architects applying for a Provincial charter is an organization formed for the aggrandizement of its own members. As to this, I think all of us should give serious consideration, and I think I speak for all of us when I say that this is not the case.

Registration for practising as an architect makes it necessary for a man to become educated in architectural matters, and this will lead to very much better architecture in the future. As a natural consequence of this, we get a greater number of more qualified and more enthusiastic men in our profession, and we shall have, as an actual result a far greater number of well designed and finer buildings, which will be quite a national asset.

In no profession is it more necessary that the practitioner should be highly trained. An author will write a book, and after it is written, if it is considered no good, it is generally thrown away and nobody troubles about it. Another instance, a doctor makes a mistake on a patient and it is spoken about, but it is altogether different with an architect. An architect making a mistake builds a building that is a monument to him for generations, and it stands there for everybody to see, and is in the public view. So that you will see, it is necessary that an architect should be highly trained so that should there be any errors, they should be limited as much as possible.

Also you must remember the commercial importance and the wealth of any country is the trade in its buildings and its history is written in its architecture. It is therefore very necessary that the men who are going to portray the wealth and history of this country should be well trained, as well trained as can be found anywhere in the world and get as good an education as possible, and it is to this end we are forming our associations. It is necessary for us to take an active interest in the furtherance of our profession and the welfare of the Royal Institute of Canadian Architects.

The Modern Hospital

THE following digest is taken from "The Modern Hospital," edited by J. A. Hornsby and R. E. Schmidt, which treats of its architecture, its equipment and its administration. The preface considers in turn the charity hospital, the charitable and private hospital combined, and the private hospital, devoting considerable space to the financial aspect. Following this is part one, dealing with the hospital architecture, which purposes to place the various kinds of building materials, devices and arrangements before those interested in the building and management of hospitals.

The Site. Unsuitable sites hamper the growth of the institution. The more the location and surroundings of a hospital approach those desirable for a high class residence, so much more will the site be desirable. Ample air; distance from neighboring buildings, from the dust of the streets, from steam railroads, street traffic, electric railways and manufacturing plants—are all exceedingly important to the patients. Inasmuch as most hospitals must be maintained within the limits of large cities, close to their activities, they are built on restricted ground areas. In such cases the fresh air and ventilating devices must be more highly organized and, naturally, more expensive to install and operate. On account of the relatively high price of land, city hospitals frequently are built on the masse or block plan. The difficulty with this is to arrange the building in such a manner that every room

will receive direct sun-rays during some time of the day. This is practically an impossibility, and it is, therefore, desirable to plan so that the wards and rooms of the sick will receive as much sunlight as possible. The auxiliary rooms, such as pantries, chart rooms, and linen rooms, are then placed on the north side of the building. Many of the hospitals in which the best work has been done in this country are built on such plans; but where a semiblock or semipavilion plan is possible it is usually more desirable. The appearance of such a plan is that of a number of barrow strips, sometimes joined solidly and sometimes by cut-offs or necks. On such a plan all of the wards can usually be arranged to receive direct sun-rays during some hours of the day, and only so much of the northerly side of the building

is arranged into patients' living space as may be absolutely necessary, or for such as eye wards, where sunlight is not so necessary.

Planning the Hospital. A unit in proportion to the size of the proposed hospital should be designed and one of these incorporated in the whole plan for each department, such as male medical, female medical, male surgical, female surgical, maternity, private rooms, etc., each one as far as possible self-contained so as to keep the nurse close to her patients, and make it unnecessary to leave the unit while on duty; the surgical units should have a surgical dressing-room, the maternity department, a nursery, labor rooms, and accessories, and each of the others their special requirements. The units must be in easy communication with the kitchen, the general laboratory, the operating department, and other common divisions. A unit should have the following rooms:

- (1) The ward or private room;
 - (2) toilet room;
 - (3) nurses' toilet room;
 - (4) serving room or diet kitchen;
 - (5) a quiet room for one bed;
 - (6) bath room;
 - (7) utility or sick room;
 - (8) cabinet for linen;
 - (9) cabinet for medicine;
 - (10) station for nurses.
- If the units can be made large enough, one or more of the following will be of advantage: (11) A solarium; (12) a reception alcove or room. Where two or more units are close together, Nos. 3, 4, 5, 11 and 12 may sometimes be arranged so that they can be used in common. The accompanying plans, Fig. I., illustrate combinations of two, three, four and more units and the manner in which they are customarily assembled to obtain different capacities.

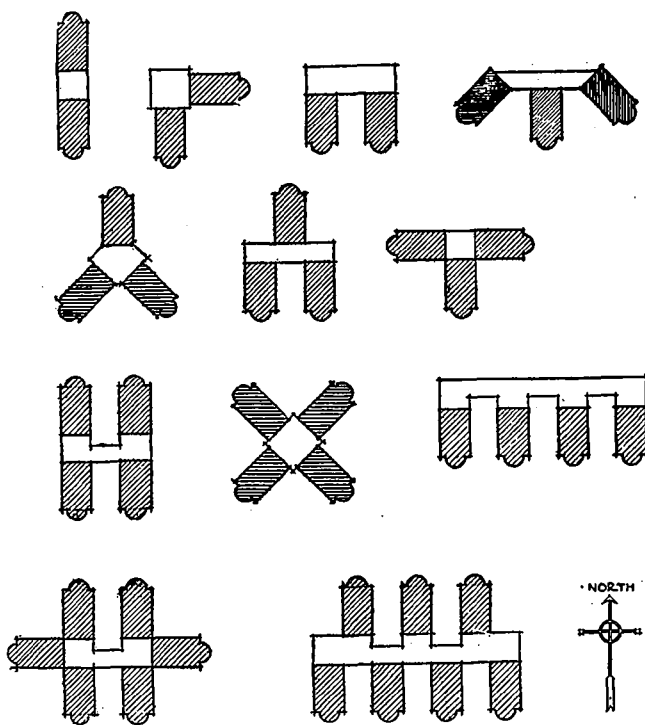


FIG. I.—VARIOUS COMBINATIONS OF UNITS.

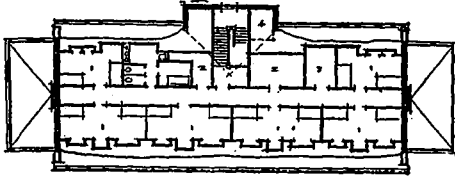
will receive direct sun-rays during some time of the day. This is practically an impossibility, and it is, therefore, desirable to plan so that the wards and rooms of the sick will receive as much sunlight as possible. The auxiliary rooms, such as pantries, chart rooms, and linen rooms, are then placed on the north side of the building. Many of the hospitals in which the best work has been done in this country are built on such plans; but where a semiblock or semipavilion plan is possible it is usually more desirable. The appearance of such a plan is that of a number of barrow strips, sometimes joined solidly and sometimes by cut-offs or necks. On such a plan all of the wards can usually be arranged to receive direct sun-rays during some hours of the day, and only so much of the northerly side of the building

illustrate combinations of two, three, four and more units and the manner in which they are customarily assembled to obtain different capacities.

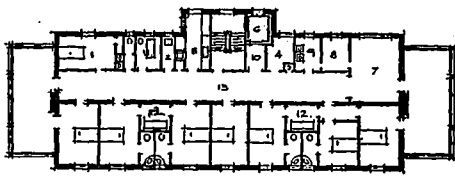
Floor Construction. The invention of reinforced concrete and reinforced tile has produced a fireproof construction which increases the cost of a hospital only from ten to twenty per cent. above the cost of one in which wood-construction floors are to be used. Two types are shown, Fig. II., the first of which contains a woven wire fabric in the lower layer of concrete in short spans and rods in longer spans; it also requires a strong concrete layer on its upper surface, firmly united to the tile. The second type shows two parts to the construction, the reinforced concrete joist and the hollow tile between; this is only a filling and may be cut out or formed into channels

specifications should establish a guaranteed result of refrigeration and a five-year guarantee against deterioration of the covering. Pipe-covering manufacturers who specialize in refrigerating insulation will agree to such guarantees.

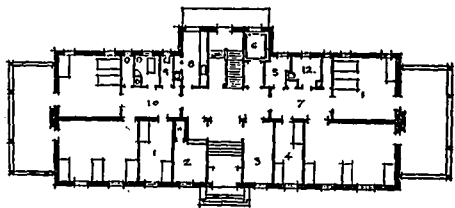
Laundry Chutes. A newly devised laundry chute, shown in Fig. X., consists of rings of iron, glass lined on the inside, and is made in sections or rings, 3 or 4 feet long, and of any desired diameter. The sections are made gasketed, so that they fit watertight one against another, and the chute can be made of any desired length in that way. The joints are fitted so closely that they can thus be washed out at any time with hot or cold water shower at the top. The glass is fused into the metal at a



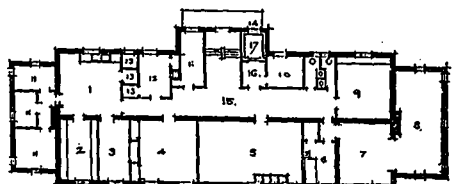
LATTICE PLAN



SECOND FLOOR PLAN



FIRST FLOOR PLAN



BASEMENT PLAN

FIG. XI.—PLAN FOR SMALL HOSPITAL.

1. Nurses' or female help bedrooms.
2. Storage room.
3. Linen closet.
4. Elevator shaft.
5. Bath and toilet rooms.

1. Private room.
2. Utility closet.
3. Medicine closet.
4. Linen closet.
5. Duty room or floor pantry.
6. Elevator.
7. Operating room.
8. Sterilizing room.
9. Surgeons' preparation room.
10. Antispace to elevator.
11. Public bath and toilet rooms.
12. Private bath and toilet rooms.
13. Corridor.

1. Wards.
2. Office.
3. Parlor.
4. Interns' room.
5. Linen closet.
6. Elevator.
7. Men's department corridor.
8. Duty room or floor pantry.
9. Utility closet.
10. Women's department corridor.
11. Vault.
12. Public bath and toilet room.

1. Kitchen.
2. Pantry.
3. Helps' dining room.
4. Nurses' dining room.
5. Laundry.
6. Engineer.
7. Boiler room.
8. Coal room.
9. Drug room.
10. Morgue.
11. Storage.
12. Sewing.
13. Refrigerators.
14. Ambulance entrance.
15. Basement corridor.
16. Elevator antispace.
17. Elevator.

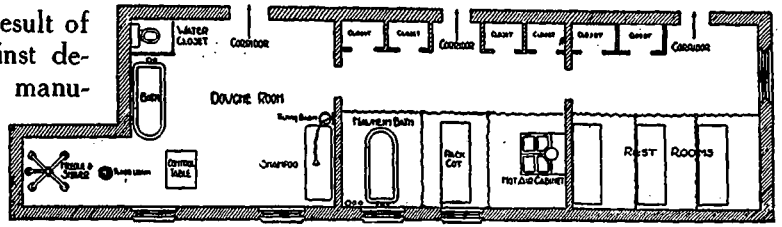


FIG. XII.—ARRANGEMENT FOR HYDROTHERAPEUTIC SUITE.

There are questions of light, and perhaps problems of ventilation and heating, that render the scheme of architecture more complicated. In figure XI. are shown the plans of a small building, the width of which is 33 feet, the length 111 feet, and contains the following beds:—First floor: 4 three-bed wards, 12; 1 two-bed ward, 2; interns, 2. Second floor: 8 one-bed wards, 8. Third floor: Nurses and help, 12. Basement: Fireman, 1. Total number of beds, 37. Each of two first-floor wards will accommodate an additional bed, making a total of 39 beds. The cost of this building should not exceed \$38,500. If the three floors and all partitions are built of fireproof construction, and slate roof on

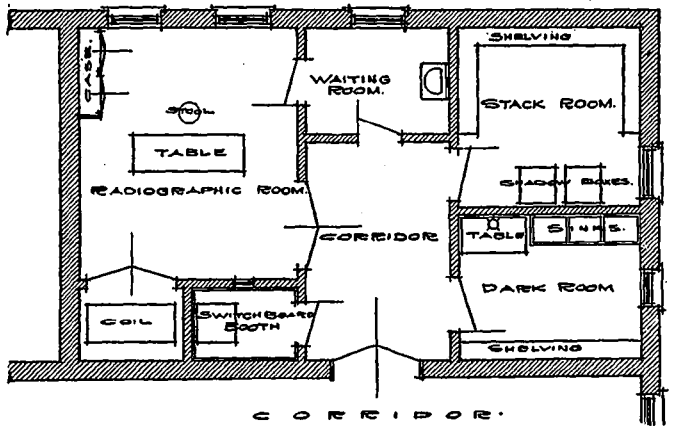


FIG. XIII.—X-RAY DEPARTMENT FOR SMALL HOSPITAL.

wood roof construction, the cost should not exceed \$45,000, or about 33½ cents per cubic foot.

Hydrotherapy. Figure XII. is a well designed hydrotherapeutic suite which may be elaborated or contracted to conform to any special conditions desired.

X-Ray Suite. Figure XIII. is a most convenient plan for an X-Ray department in a small hospital, where practically all the apparatus must be housed in one room.

Milk Station. The plans for a practical milk laboratory are shown in figure XIV. This satisfies as nearly as possible the health authorities of the larger cities in their demand for efficiency in methods of pasteurization.

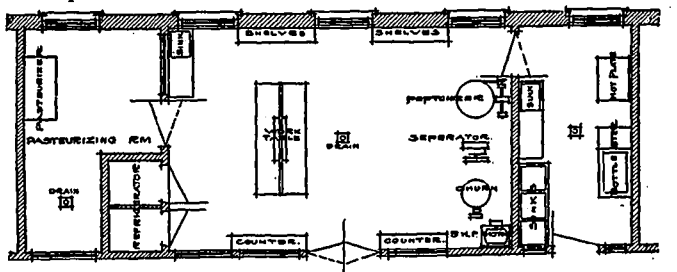


FIG. XIV.—FLOOR PLAN FOR MILK STATION.

temperature of about 2600 deg. F. and does not crack or split off under any variations in temperature. The bottom of the chute ends in a drain-pipe with trap and grate, so that it is perfectly clean and sweet all the time. At the top there is a shower crown for hot and cold water for cleaning purposes. The top of the chute is led to the roof, and is covered with a hood.

Small Hospital. The principles of hospital architecture apply equally in the small and the large institution. The radical difference between the two is simply that one contains a very few units and the other a great number of units. In the large hospital there are questions of transportation of food and hospital supplies that do not apply in the small insti-

CHARLES S. COBB, who has had charge of the architectural department of the Toronto Technical School for the past two years, has opened an office for practice in the new C.P.R. building.

* * *

WALTER N. MOORHOUSE, until recently with the firm of Sproatt & Rolph, has entered into partnership with Allan George, son of Sir Ernest George, who is at present practising in Toronto at 67 Victoria street.

GEORGE N. MOLESWORTH, formerly of the firm of Bovell & Molesworth, 449 Yonge street, and Gordon M. West, until recently with Architect George W. Couinlock, have opened a joint office in Bank of Commerce building at 2 College street, Toronto.

* * *

THE PEDLAR PEOPLE will move from their present location on Bay street to the new Art Tailoring building, corner of Markham and College streets, Toronto. The company has secured a ten years' lease and ten thousand square feet of floor space will be used for offices and warehouse purposes.

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THE PARIPAN lacquer enamel, which has been so successfully employed in the decorative scheme of the new Toronto General Hospital, is of an English enamel of high grade. It has been used in some nine hundred hospitals scattered throughout the British Empire and has withstood the continued washing and general wear in the older institutions for fifteen years. The material lends itself to various treatments and can be applied in flat tones or glossy tints. The paripan enamel is handled by Sturgeons Limited.

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IN A RECENT LECTURE Edward Howard Griggs expressed his thought of architecture in the following words: "Music takes sound forms in nature in their lower relation and recombines them in harmony with human sensibility and intelligence. Architecture does the same with dimensional forms in nature, and in both arts is to be found the most far-reaching application of mathematical principles. Goethe speaks of architecture as frozen music. Browning, in more significant language, speaks of music as liquid architecture. One art is to space what the other is to time."

* * *

THE MODERN HOSPITAL is the title of a book recently published which treats of the hospital in relation to its inspiration, its architecture, its equipment and its operation. The work is edited by John A. Hornsby, M.D., Secretary Hospital Section, American Medical Association; member American Hospital Association, etc., and Richard E. Schmidt, architect, Fellow American Institute of Architects. The book contains six hundred and forty-four pages with two hundred and seven illustrations of plans, structural details, finished rooms, equipment, etc.

Philadelphia and London: W. B. Saunders Company, 1913. Octavo volume, cloth, \$7.00 net; half morocco, \$8.50 net. Sole Canadian agent is the J. F. Hartz Co., Ltd., Toronto.

* * *

THE FOLLOWING well known companies furnished material for the new Toronto General Hospital, which merits the universal approval it is receiving in relation to its constructional features and equipment: Architectural Bronze and Iron Works, iron fences and lamps; Berry Brothers, liquid granite; Canadian Fairbanks-Morse Co., scales; H. N. Dancy & Son, Ltd., masonry; R. C. Dancy, plastering; Dennis Wire and Iron Works Co., ornamental iron; Dominion Bridge Co., steel; Don Valley Brick Works, brick and porous terra cotta; A. D. Grant, plaster work; W. J. Hynes, plaster work; Lautz Co., marble and tile; W. J. McGuire, wiring; G. B. Meadows, ornamental iron; Pedlar People Ltd., metal lath; R. Robertson & Sons, general contractors; Sturgeons Ltd., paripan enamel; Teagle & Son, masonry; Turnbull Elevator Mfg. Co., elevators.

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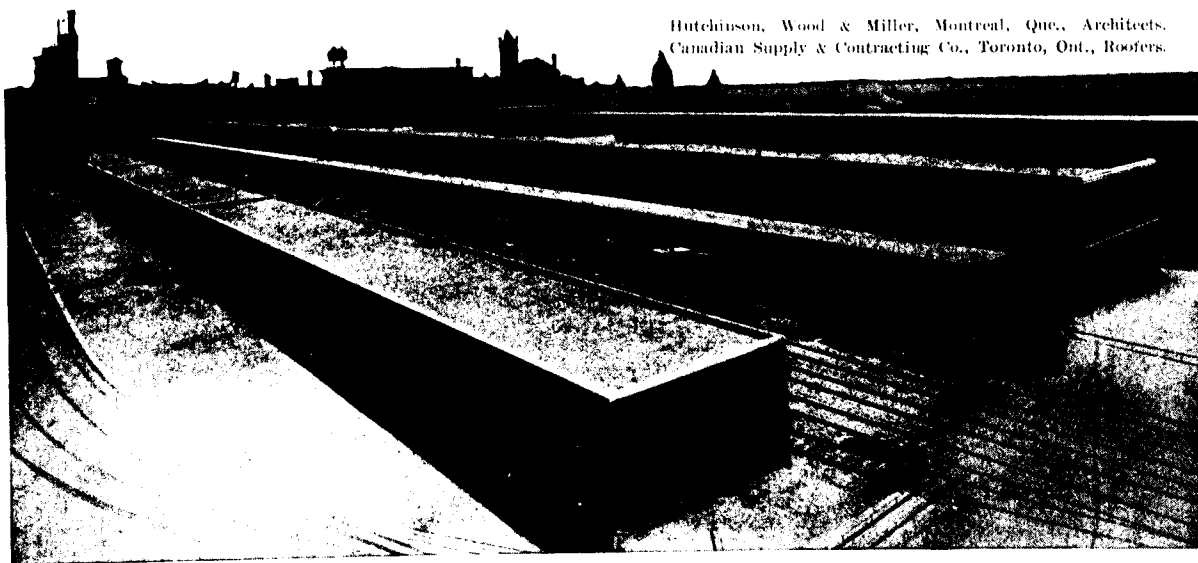
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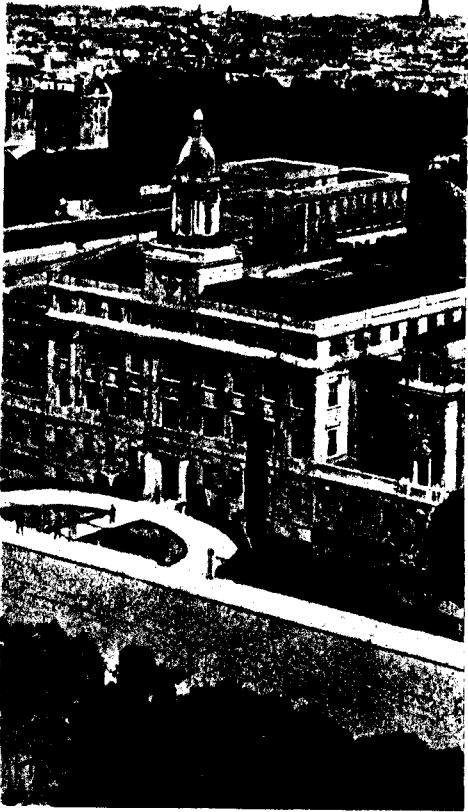
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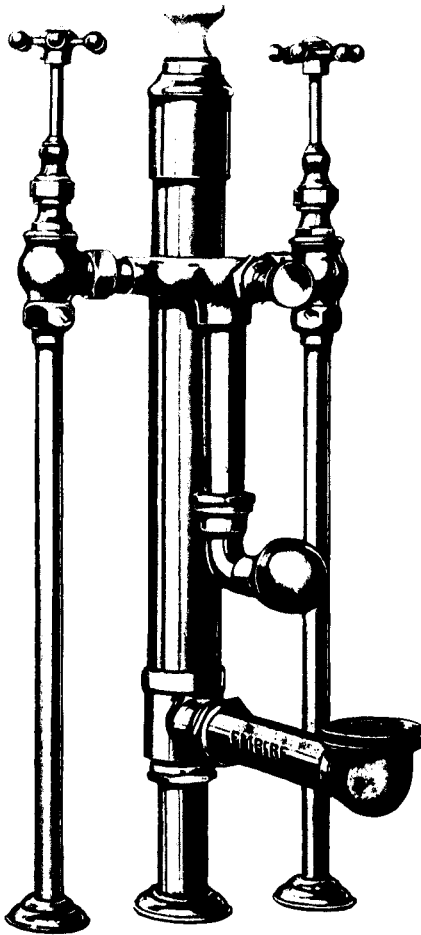
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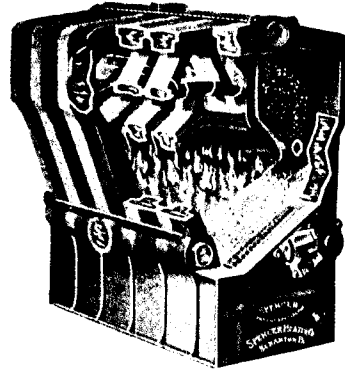
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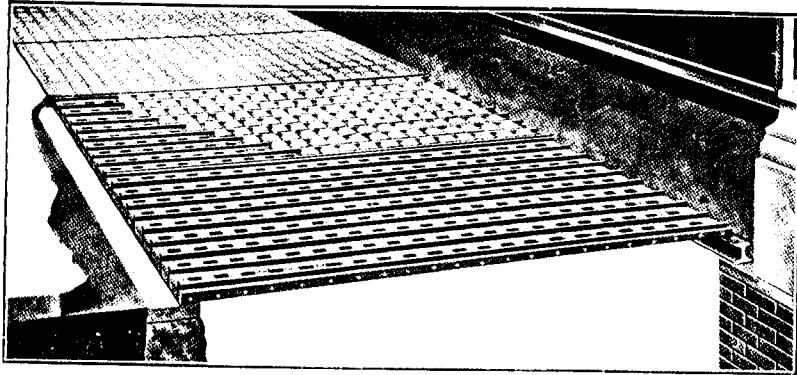
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upon the glass which results in breaking and shaling, in addition to which each lens is coated with a soft cushion of our malleable coating further insuring the life of all the lenses against contraction and expansion. The pre-formed slab is thoroughly water-proofed at the factory insuring an absolutely watertight construction free from rust or corrosion from beneath or on the surface which is common with vault light construction having cast iron or wrought steel forms.

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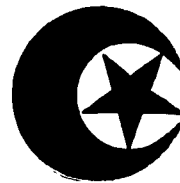
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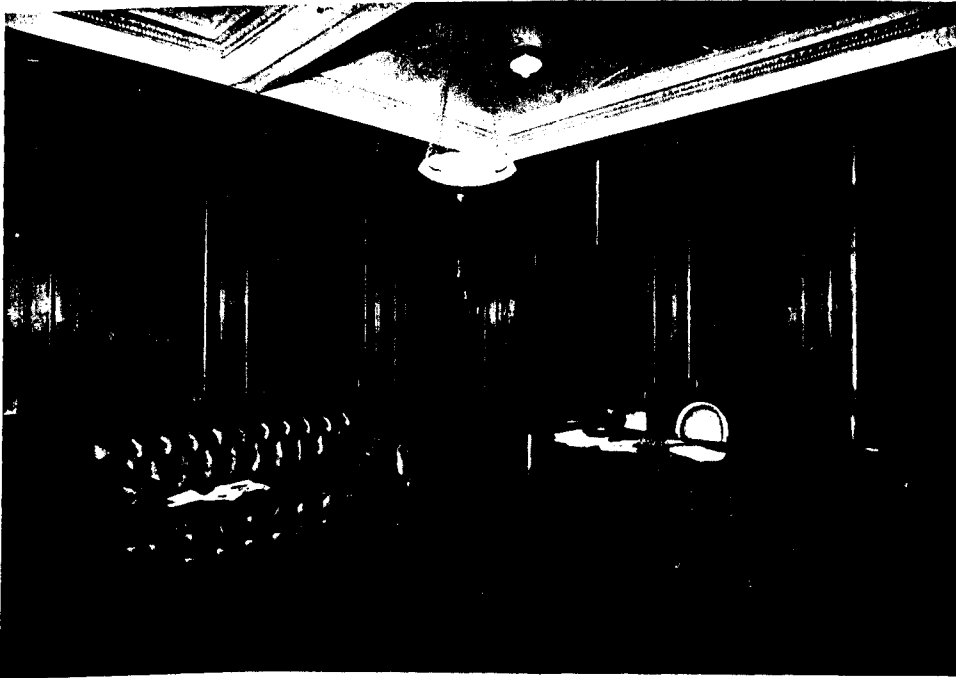
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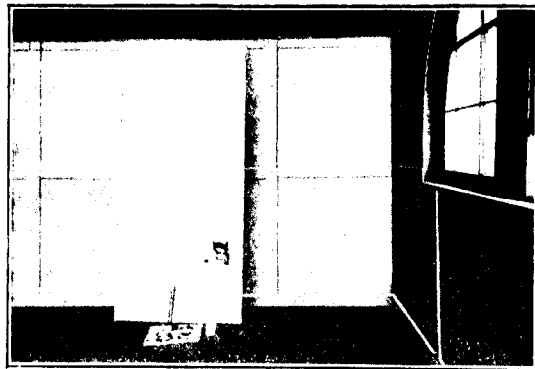
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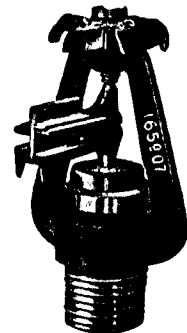
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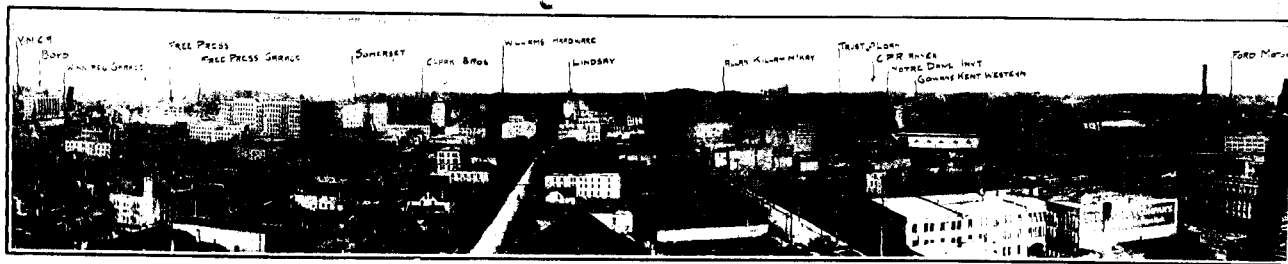
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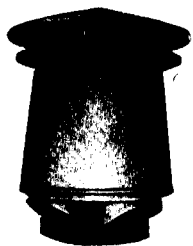
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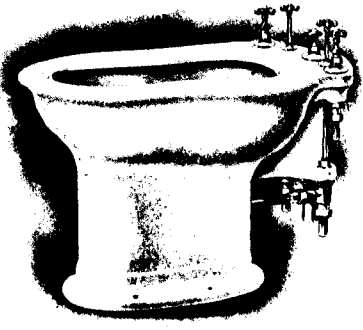


Fig. H026

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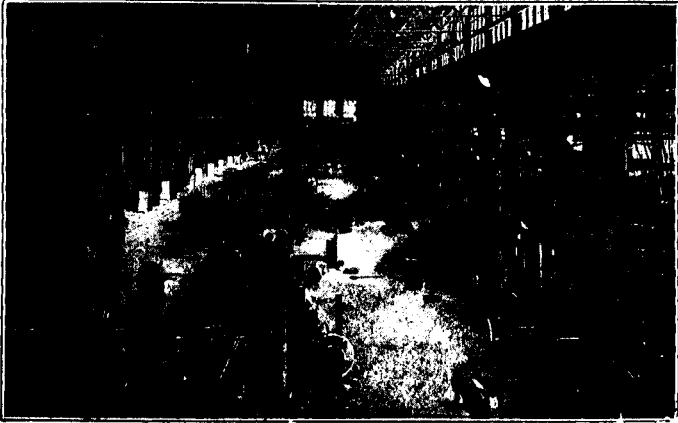
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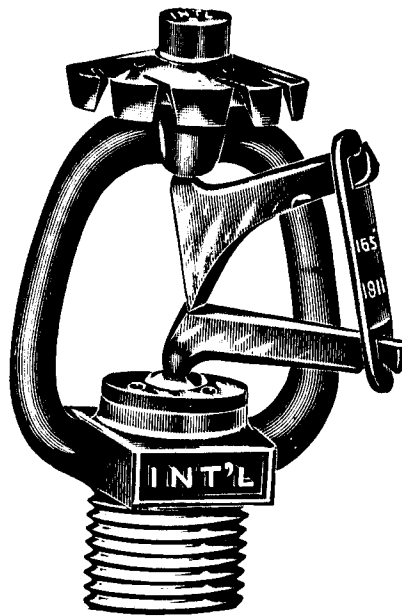
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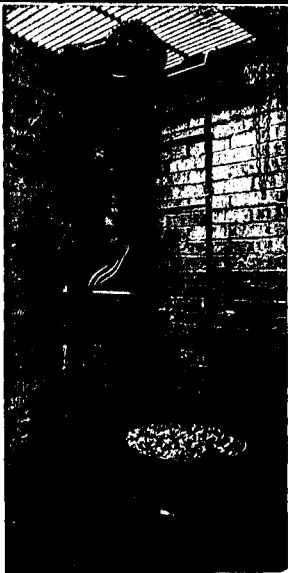
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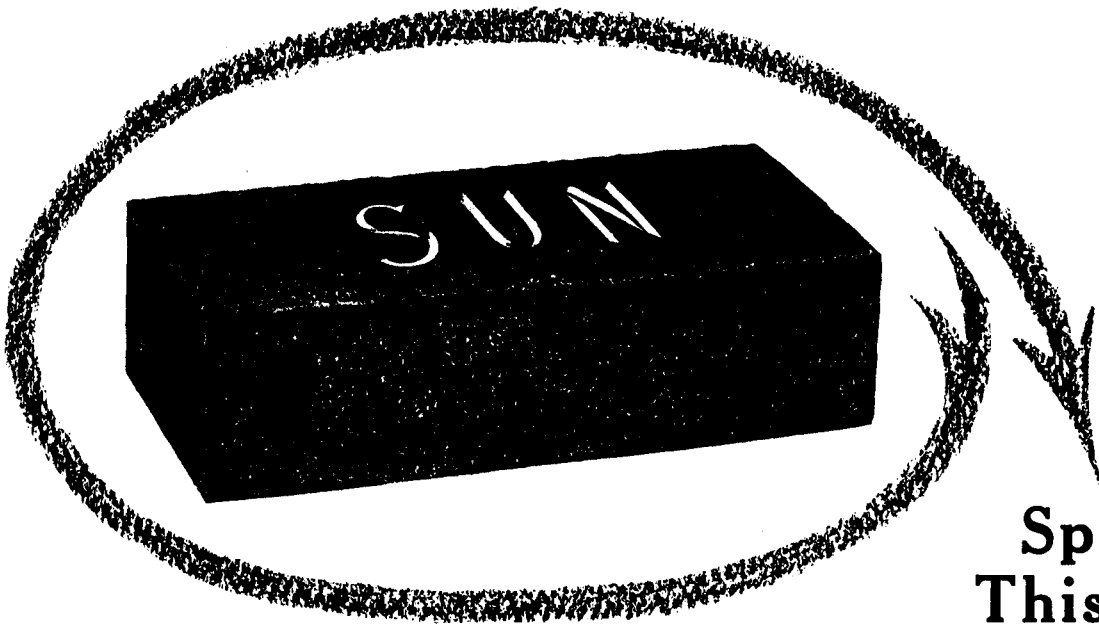
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Galt Art Metal Co.
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Pedlar People, The.
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- Marble.**
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Meadows, Geo. B. Co., Ltd.
Turnbull Elevator Co.
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- Packing.**
Canadian Fairbanks-Morse Co.
Gutta Percha and Rubber Co.
McAvity, T. & Sons.
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Dartnell, E. F.
Imperial Varnish & Color Co.
International Varnish Co.
- Paints and Stains.**
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Brandram-Henderson Co.
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Imperial Varnish & Color Co.
Pinchin, Johnson Co.
Robertson, James B.
- Perforated Steel.**
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- Pipe Covering.**
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- Pasters.**
Brandram-Henderson Co.
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Hynes, W. J.
- Plaster Corner Beads.**
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Robertson Co., James B.
Standard Ideal Co.
Standard Sanitary Co.
- Pneumatic Tools.**
Mussens Limited.
- Porcelain Enamel Baths.**
Robertson Co., James B.
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Wettlaufer Bros.
- Radiators.**
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Trussed Concrete Steel Co.
- Relief Decoration.**
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- Revolving Screens.**
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- Rock Crushers.**
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- Roofing.**
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Bird, F. W. & Son.
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Metal Shingle and Siding Co.
Patterson Mfg. Co.
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- Roofing (Slate).**
Ormsby, A. B., Ltd.
- Roofing (Tile).**
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Pedlar People, The.
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Standard Ideal Co., Ltd.
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Trussed Concrete Steel Co.
- Steel Doors.**
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Feather & Roadhouse.
Mussens Limited.
Ormsby, A. B., Ltd.
Pedlar People, The.
- Structural Iron Contractors.**
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Dominion Bridge Co.
Reid & Brown.
Structural Steel Co., Ltd.
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Dominion Bridge Co.
Mussens Limited.
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- Wall Finishes.**
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Imperial Paint and Color Co.
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