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PANORAMA VIEW OF REGINA, TAKEN FROM THE TOP OF THE LEGISLATIVE AND EXECUTIVE BUILDING, ONE HUNDRED AND SEVENTY-EIGHT FEET FROM THE GROUND.

The meaning of patriotism and its abuse by those who are financially successful—Inducements to investors by reductions in labor and building materials.

STUPENDOUS problems are confronting the Canadian people which must be analyzed by serious thought and meditation. To some the proper solution means the very existence of themselves and those who depend upon their efforts; to many the outcome involves the work of a lifetime and forebodes happiness or cruel misery to thousands; while among others it appeals to a selfish and unpatriotic nature. The last are those who have grown rich through the enslavage of large numbers and who horde their wealth instead of allowing it to be used naturally for the interests of mankind. One of the first steps is to arrive at a definite and correct understanding of patriotism. Does it belong to the man who donates hundreds of thousands of dollars to further the terrific slaughter of innocent men and increase the misery in the world a million fold; who, by so doing, must either shut down his factory or dismiss a certain percentage of his employees? Is it part of the person who bitterly arraigns all people who hold a view different to his own, urging their complete annihilation at any cost, thereby taxing the poor beyond endurance; while he, in giving his proportion, hardly feels the effect? Is it the noble sentiment behind legislative authority which countenances vast appropriations to be spent for military equipment when it turns around, at the same time, and takes the food from our own people by shutting down all Government improvements throughout the Dominion? To be sure there is a strong feeling towards patriotism in each instance, but not the broad grasp which lifts a Government and her people into an enviable place among the nations of the world. One's true devotion to his country, his people and himself is to act for the best interest of all concerned, whether it be to pour out his life's blood at the front or wage a bitter warfare at home in behalf of its very existence. And this cannot be accomplished by raising the cost of living, already beyond the limit of reason, or by certain successful merchants and business corporations curtailing expenditures to the detriment of their own success as well as increasing the hardships endured under present conditions. They should evince a steadfast faith in their country's future and proceed with the improvements already contemplated. Every inducement possible is offered for private as well as public projects. The Builders' Exchange in Montreal at a general meeting held on the twenty-third of December reduced the wages of building tradesmen from twenty to twenty-five per cent. for the maximum rate. With building materials twenty per cent. cheaper than the cost six months ago and labor cut to a corresponding figure, it should prove a boon to all investors.

Regina, her settlement and steady growth—Her progress along industrial lines as well as in architecture —Her development a promise for future attainments.

REGINA, "the city of beautiful homes," received the first settler in 1882, and in less than one-third of a century has grown into a city of 50,000 population. Located in the midst of a vast prairie land, she became the seat of Government for the North-West Territories in the spring of 1883, thus assuming an important position in the opening of a country which has steadily developed into one of the wealthiest parts of the British Empire. She was destined to be a great city and the predictions of her early administrators have been more than realized. The first street car service to be inaugurated was in 1911, which system includes at the present time some thirty miles of car lines with modern equipment. Like all progressive communities, the city has made ample preparation for all public utilities such as railways, electric light, waterworks, power and gas plants. Plans have been prepared for the proper adjustment of thoroughfares, disposition of public institutions, location of residential sections, and the arrangement of parks and playgrounds. As for the varied scenery and natural growth, the prairie land is woefully lacking, but Regina has overcome this to a great extent by means of an artificial lake located between the Executive and Legislative buildings and the city proper; by enriching sections like Victoria park with all kinds of shrubbery, and by the planting of trees in abundance. Not only have the esthetic features been considered, but the practical as well. A large territory has been set aside for the erection of warehouses and factories which is fast developing into one of the most important industrial centres of America. Twenty-two railway lines either radiate from the city or are in the nature of preparation, which makes her the logical centre of distribution for the vast territories with which she is surrounded. Millions of bushels of wheat keep this network of railways extremely busy every year and the coming season should be no exception, as more fall plowing was done last year than ever before in the history of the province. Architecturally, Regina has every reason to feel proud of her accomplishments along this line. There are no Parliament buildings more dignified or better adapted to the needs of legislative work than the Saskatchewan capital. The commercial structures are expressive of an upward tendency in pure design; the warehouses and factories reveal considerable thought and attention in their exterior appearance; the churches are indicative of edifices erected for the purpose of worship; the homes are everything the word implies. The past and present of Regina show a rapid and wholesome growth worthy of considerable commendation as well as emulation.

LEGISLATIVE AND EXECUTIVE
BUILDINGS, REGINA, SASK.

EDWARD & W. S. MAXWELL, ARCHITECTS.

SCULPTURE PEDIMENT OVER MAIN ENTRANCE.

Legislative and Executive Buildings, Regina

EDWARD & W. S. MAXWELL, Architects

THE wonderful growth of Canada is hardly realizable to those stay-at-home residents of the East, until, awakening from their lethargy, and undertaking a journey from coast to coast, it is brought home to them that in this wonderfully resourceful country of ours we are in the making of a nation, which to-morrow will be one of the great and powerful people of this earth, a people who occasionally are doing things on a big scale, and of a quality that will not only command the attention of the best art critics to-day —but for generations to come.

It is greatly to the credit of those in prominent places, who control these matters, that results are obtainable that will be appreciated for all time, and while such is not the case in all Canadian undertakings, it makes it all the more creditable that such can be done if only proceeded with in an intelligent and broad-minded way. In such a spirit was conceived and executed the newly finished legislative and executive buildings for the Province of Saskatchewan at Regina.

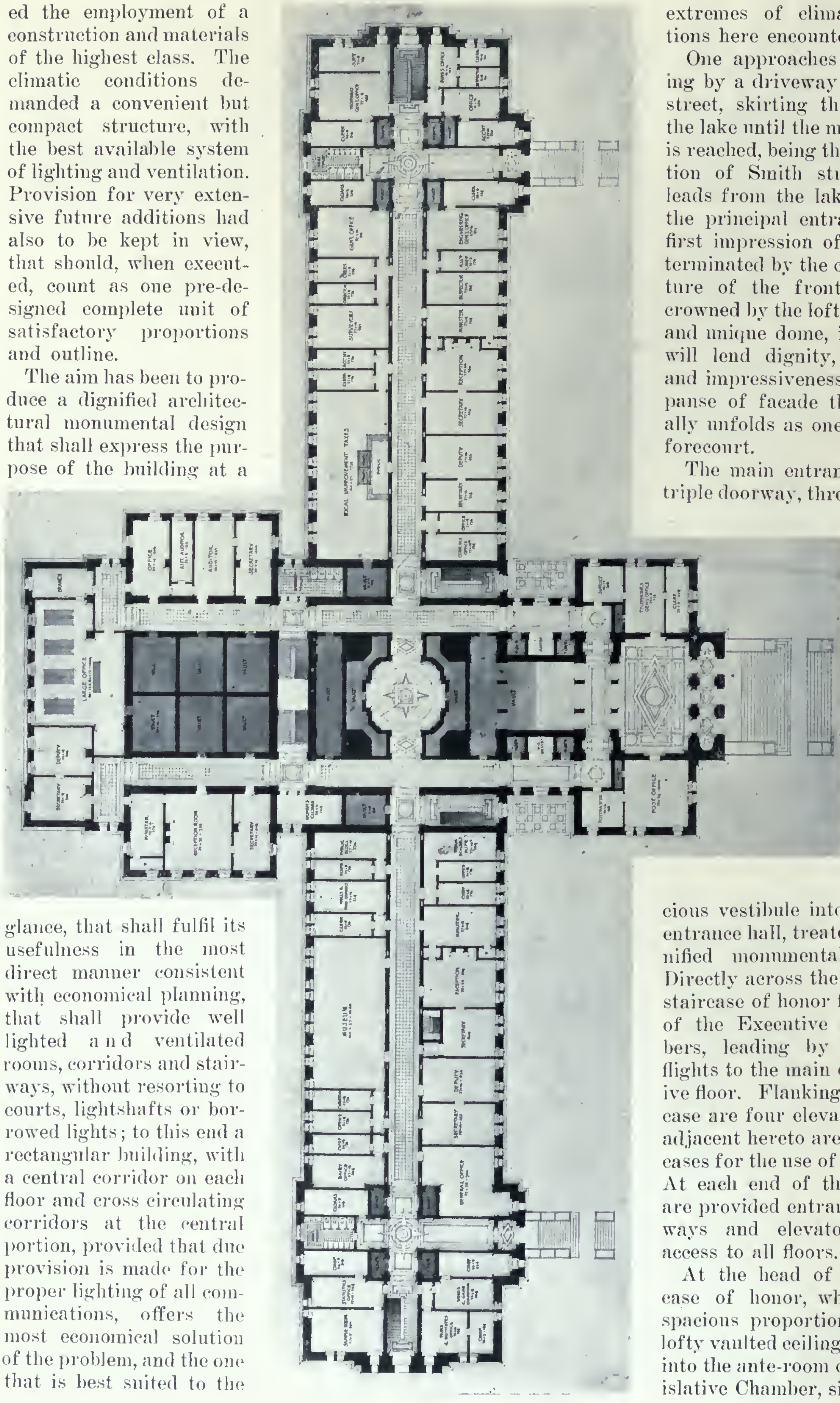
DETAIL OF MANTEL IN COUNCIL ROOM.

With the natural intercourse in trade and social life that follows from two such contiguous countries as Western Canada and the States to the south of it, it was only natural that when the problem of new buildings for the Province of Saskatchewan was broached that account should be taken of those on the other side of the boundary line. Recent structures had been erected in Minnesota and other Western States that were of most creditable and monumental design, upon which the skill of the greatest architects of the neighboring Republic had been concentrated; and to a large extent without having to consider the diminutive sums that are but too often the chief factors in deciding the scope of the structures undertaken on this side of the line.

It was but natural, therefore, that an international competition followed for the selection of the architects for Saskatchewan's buildings, the choice being confined to one American, one English and four Canadian firms, all chosen for their ability and standing in the profession. In making the award it was the good fortune to secure the services as judges of two leaders in their profession from the United States, in addition to one Canadian architect. The design of Messrs. Edward & W. S. Maxwell was unanimously awarded first place, and the building has been erected practically without variation in any particular from the competition design.

The problem was a difficult one, inasmuch as the monumental nature of the structure demanded the employment of a construction and materials of the highest class. The climatic conditions demanded a convenient but compact structure, with the best available system of lighting and ventilation. Provision for very extensive future additions had also to be kept in view, that should, when executed, count as one pre-designed complete unit of satisfactory proportions and outline.

The aim has been to produce a dignified architectural monumental design that shall express the purpose of the building at a glance, that shall fulfil its usefulness in the most direct manner consistent with economical planning, that shall provide well lighted and ventilated rooms, corridors and stairways, without resorting to courts, lightshafts or borrowed lights; to this end a rectangular building, with a central corridor on each floor and cross circulating corridors at the central portion, provided that due provision is made for the proper lighting of all communications, offers the most economical solution of the problem, and the one that is best suited to the extremes of climatic conditions here encountered.



GROUND FLOOR PLAN.
LEGISLATIVE AND EXECUTIVE BUILDING, REGINA, SASK.

One approaches the building by a driveway off Albert street, skirting the short of the lake until the main avenue is reached, being the continuation of Smith street. This leads from the lake shore to the principal entrance. The first impression of the vista, terminated by the central feature of the front elevation crowned by the lofty, spacious and unique dome, is one that will lend dignity, solemnity and impressiveness to the expanse of facade that gradually unfolds as one nears the forecourt.

The main entrance is by a triple doorway, through a spacious vestibule into the main entrance hall, treated in a dignified monumental manner. Directly across the hall is the staircase of honor for the use of the Executive and members, leading by two easy flights to the main or legislative floor. Flanking this staircase are four elevators, while adjacent hereto are two staircases for the use of the public. At each end of the building are provided entrances, stairways and elevators giving access to all floors.

At the head of the staircase of honor, which is of spacious proportions, with a lofty vaulted ceiling, one steps into the ante-room of the Legislative Chamber, situated beneath the dome, from which it receives its light, and on the major and minor axis of the building. To this room has been assigned an importance second only to that of the chamber itself, with its monumental treatment, spacious vertical and horizontal vistas.

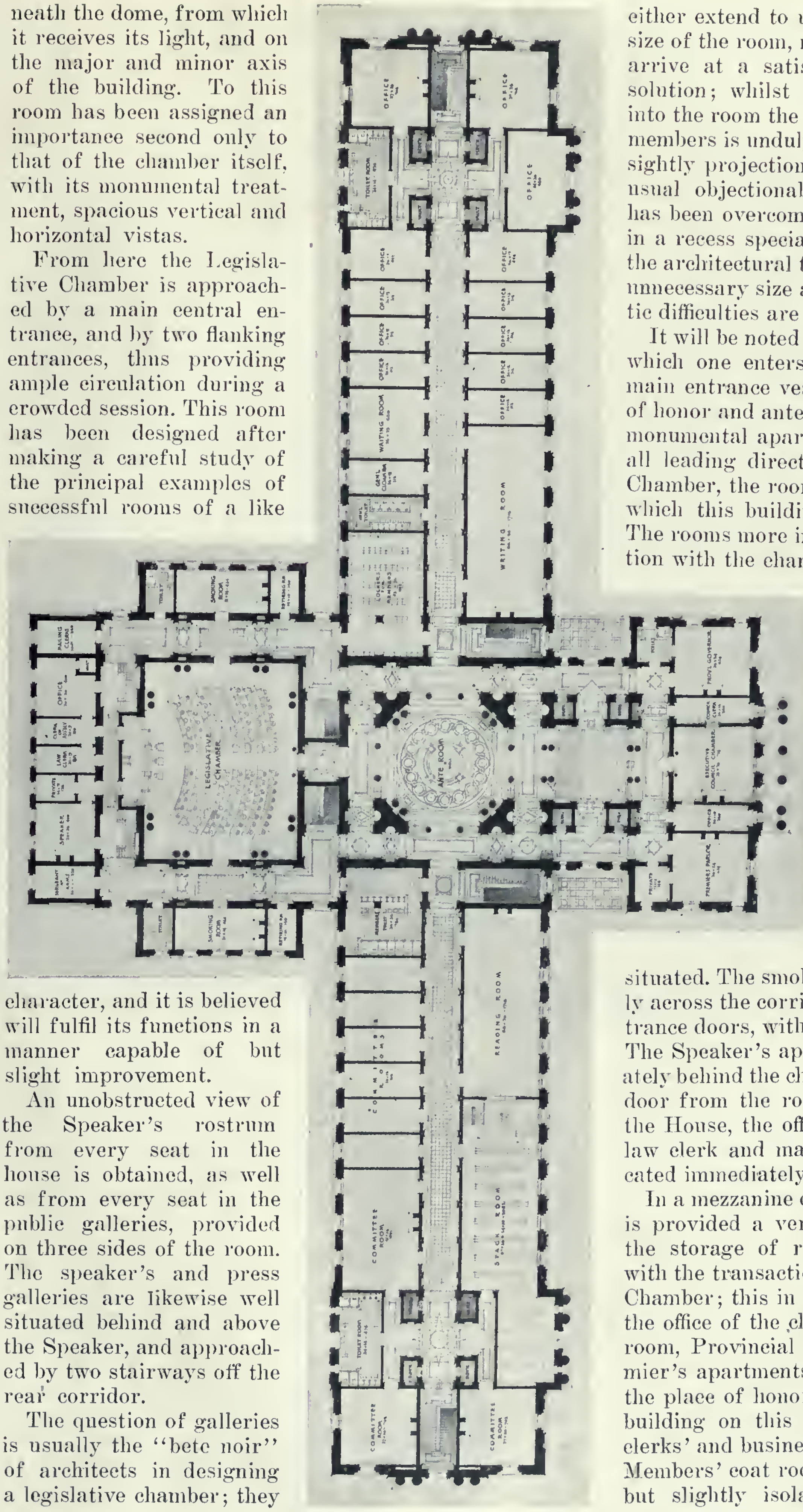
From here the Legislative Chamber is approached by a main central entrance, and by two flanking entrances, thus providing ample circulation during a crowded session. This room has been designed after making a careful study of the principal examples of successful rooms of a like character, and it is believed will fulfil its functions in a manner capable of but slight improvement.

An unobstructed view of the Speaker's rostrum from every seat in the house is obtained, as well as from every seat in the public galleries, provided on three sides of the room. The speaker's and press galleries are likewise well situated behind and above the Speaker, and approached by two stairways off the rear corridor.

The question of galleries is usually the "bete noir" of architects in designing a legislative chamber; they either extend to undue proportions the size of the room, rendering it difficult to arrive at a satisfactory architectural solution; whilst if made to overhang into the room the view of the public and members is unduly restricted by the unsightly projections. In this design the usual objectionable form of galleries has been overcome by placing each one in a recess specially provided for it in the architectural treatment of the room, unnecessary size and consequent acoustic difficulties are thereby avoided.

It will be noted that from the point at which one enters the building by the main entrance vestibule, hall, staircase of honor and ante-room, a succession of monumental apartments are traversed, all leading directly to the Legislative Chamber, the room above all others for which this building has been erected. The rooms more immediately in connection with the chamber are conveniently situated. The smoking rooms are directly across the corridors at the lateral entrance doors, with toilet rooms near by. The Speaker's apartments are immediately behind the chamber, with a private door from the rostrum. The clerk of the House, the office, sergeant-at-arms, law clerk and mail clerks are here located immediately at hand.

In a mezzanine over these apartments is provided a very spacious vault for the storage of records in connection with the transactions of the Legislative Chamber; this in addition to a vault in the office of the chamber. The Council room, Provincial Governor's and Premier's apartments have been placed in the place of honor at the centre of the building on this main floor, with the clerks' and business office near at hand. Members' coat rooms are convenient to but slightly isolated from the ante-



MAIN FLOOR PLAN.

LEGISLATIVE AND EXECUTIVE BUILDING, REGINA, SASK.

DETAIL OF MAIN ENTRANCE TO LEGISLATIVE AND EXECUTIVE BUILDING.

room. The reading room, stack room and committee rooms occupy the available space in the east wing, while the west wing is devoted to the writing room, the twelve offices for members, the public waiting room, lavatories, etc. It will be noted that all the rooms on this floor, as well as all other floors, are so arranged that there is no waste nor dark corridors.

In order to provide for future growth it will be noted that extensions may be built at each end of the building, and extended in a southerly direction indefinitely, so as to give any desired amount of accommodation without interfering with the building as at present designed; in fact, the extended building will be as complete a unit as if designed and erected all at one time.

It will be noted that the reading and writing rooms have been lighted from the north, which is important in a climate where the sunlight playing on the snow gives such an intense glare.

To the ground floor has been assigned the principal departments, viz: The Treasury, Public Works and Agriculture. The post office has been located at the main entrance. Ample male and female cloak rooms and lavatories and vault accommodation is provided, the latter as far as practicable opening off the rooms which they serve.

On the second floor is found the Attorney-General's Department, Departments of Education and Railways, the Provincial Secretary and Municipal Commissioners, while the draughting rooms in connection with the Chief Engineer's office of the Department of Public Works and the Department of Railways are located on the

DETAIL OF END PAVILION OF LEGISLATIVE AND EXECUTIVE BUILDING.

north side, where a suitable light is obtainable.

In the basement will be found the members' dining room, a smoking room, a private dining room and smoking room, the staff lunch room, with the kitchen department conveniently located to serve both dining and lunch rooms.

In addition to the elevator service for the members desiring to reach the dining room, two stairways for their exclusive use lead from near the Legislative Chamber direct to the dining and smoking rooms. A private stairway also leads from the stack room on the main floor direct to the newspaper files room in the basement.

The Government printer has been located in the west end of the basement, with a separate entrance door. The receiving, storing and distribution of supplies, etc., is thus facilitated. The balance of the basement is devoted to a storage chamber for each department, and for quarters for the janitor and engineer. The tunnel for the conveyance of heating pipes, wires, etc., from the power house to the building is so arragned that when the future additions are erected that the tunnel will be in the right relative position to serve them.

In designing the exterior of the building a free adaption of English Renaissance work has been employed, as being best suited to the requirements, and offering a logical, sensible and architecturally interesting solution of the problem that marks it unmistakably as representative of the British sovereignty under which the Province is governed.

The use of the light buff Tyndall stone is particularly happy when employed with discre-

ANTE-ROOM. ENTRANCE LOBBY.

EXECUTIVE COUNCIL CHAMBER.

LEGISLATIVE AND EXECUTIVE BUILDINGS, REGINA, SASK.

EDWARD & W. S. MAXWELL, ARCHITECTS.

PREMIER'S PRIVATE OFFICE.

tion in this style, and it is felt that no extended description of the facades is requisite. By careful study of the massing, fenestration, outline and detail, a building such as is herewith presented has proved to be all that could be desired to house the Legislature and Administration of what is destined to be one of the most important Provinces of the Dominion.

To this end, dignity, simplicity and purity of style has been combined with a monumental treatment of the best period of British architecture, to produce a building that it is believed will serve its purpose in the best possible way

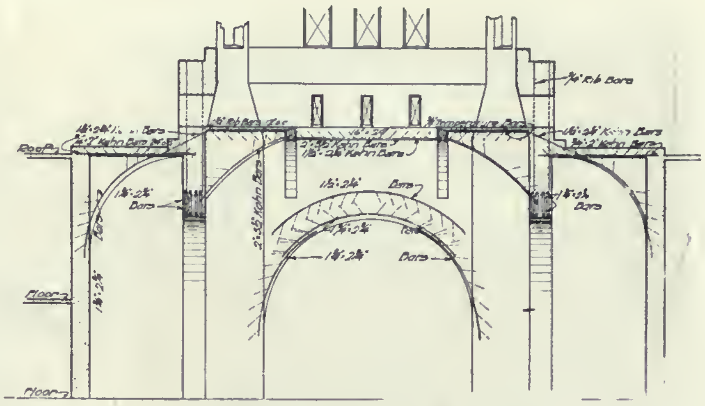
Construction.

The buildings are of what is known as "skeleton" reinforced concrete construction; the structural portions, such as floor slabs, beams, girders and columns, are of concrete, and constitute a monolithic skeleton or supporting frame work. Consequently the buildings are thoroughly fireproof and of a very permanent nature. In order to obtain these results it was unnecessary to alter any of the architectural details, and the adaptability of these materials to structures in which the details are quite complicated, is very well shown in many portions of the buildings.

The main structure covers a large area and is supported on concrete piles, which extend up to and are incased in the footings of the walls and columns. The footings are all of mass concrete, while those under the dome, which have to support very heavy loads, are reinforced to insure a proper distribution of the loads, as well as to tie the footing together, thus preventing any spreading of the supporting piles. All column reinforcement is wired to dowels which are embedded in the footings.

The columns support reinforced concrete beams and girders, which in turn carry slabs reinforced with rib bars. Trussed bars are used in the beams and girders, while the columns are reinforced with rib bars laced together with wire hooping. The interior columns are so spaced as to be embedded in the partitions, while the exterior columns are encased in the stonework of the outer walls. Wherever possible the beams are constructed over partitions so that in most cases each room has an unbroken ceiling. The slabs are finished in most of the building with sleepers, on which is laid a hardwood floor; other portions receiving a concrete finish added directly to the slab and floated smooth. The stairways are of solid reinforced concrete, with concrete steps moulded in place.

Structural steel trusses are used to support the ceiling of the assembly room, where the spans are unusually long. In the central portion of the building, from which the two main wings branch, a number of the beams are of structural steel. These are used to obtain the required headroom in places of large spans.

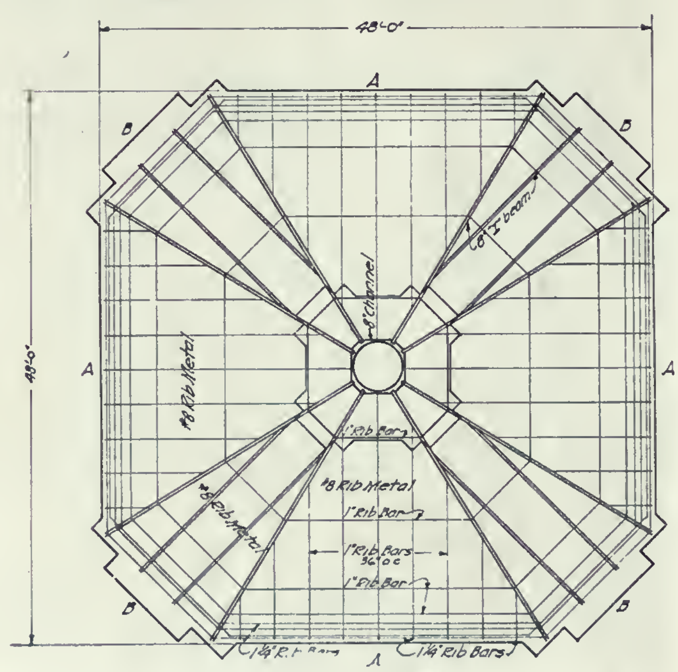


SECTION OF ROTUNDA BELOW DOME.

The galleries in the assembly room are of concrete slabs supported on steel beams.

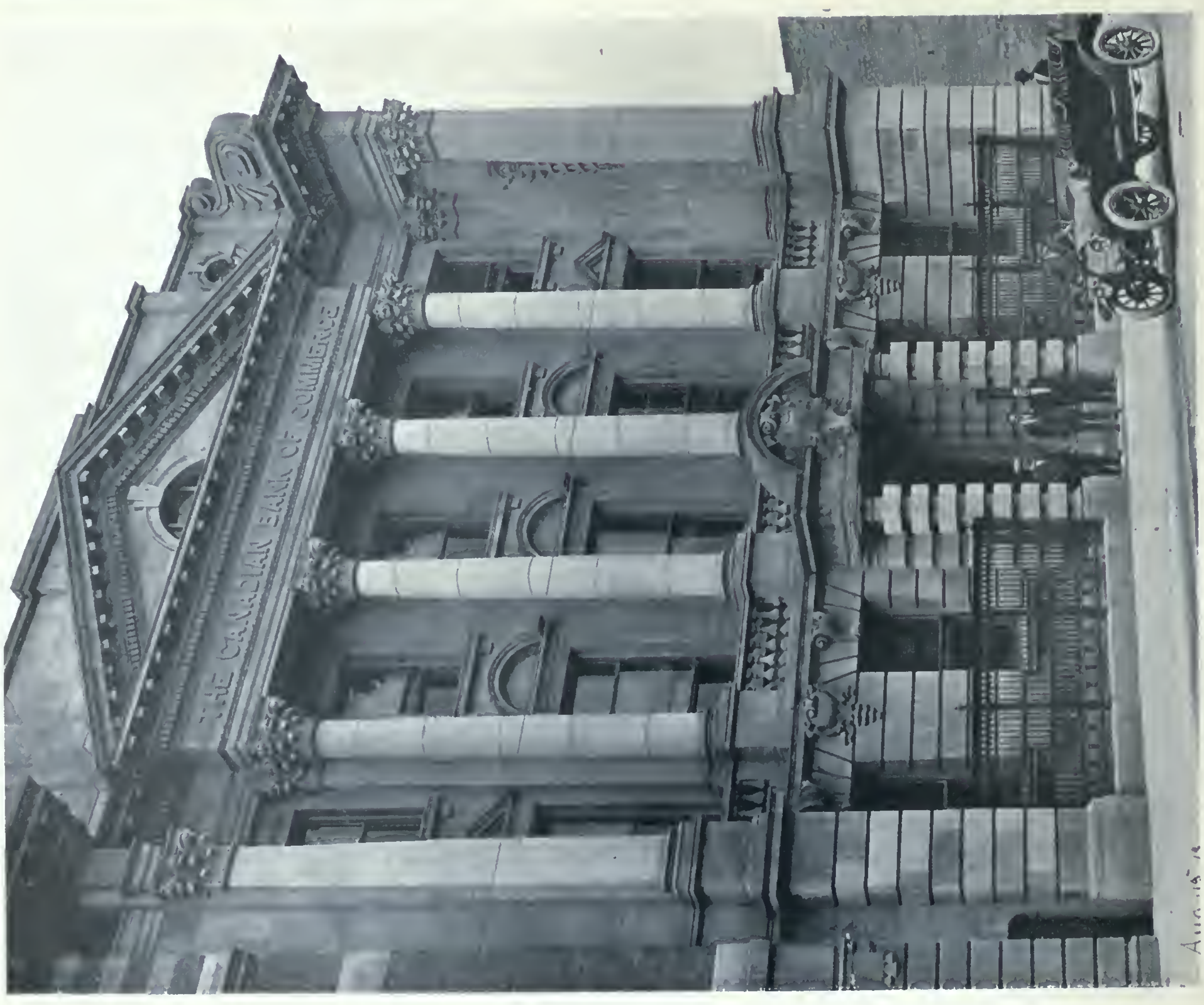
The central tower, fifty feet square, is surmounted by a large octagonal dome whose sides are formed of intersecting horizontal cylindrical planes. The four main surfaces, parallel to the sides of the tower, are larger than those diagonal to these directions, which latter surfaces give the effect of bevelled corners. The dome is composed of reinforced concrete slabs six inches thick at the peak and twelve inches at the base. At every corner is a curved eight-inch I beam. braced by an eight-inch channel. The slab reinforcement of the dome consists of rib metal in sheets and rib bars. The outward horizontal thrusts of the dome sides are distributed to the intersections by trussed bars, and the whole is tied in by horizontal rods. The four corners of the tower carrying the dome are of concrete. Around the inside of the tower, and at the main roof level, is a reinforced concrete gallery carried on arched brackets from the walls.

The power house is a considerable distance from the main building, the slabs, beams and interior columns being of concrete, while the exterior walls are of brick. The tunnel connecting this building with the main building is also of concrete construction.



PLAN OF DOME.

EXTERIOR AND INTERIOR VIEWS.
THE CANADIAN BANK OF COMMERCE, REGINA.
DARLING & PEARSON, ARCHITECTS.



Public Buildings at Regina

W. G. VAN EGMOND

EIGHT years ago Regina had a population of only about six thousand, and practically no public buildings worthy of note, whereas today the population is well over forty thousand, and the many excellent and splendid public buildings are the surprise to all visitors to this city.

During this period of rapid development it is gratifying to note that these buildings have been well and carefully designed, and are of good construction, as it very often happens that under similar circumstances, owing to the pressing need for buildings, due to the rapid expansion, they are rushed up without due thought and consideration being given to them. Almost without exception the Regina buildings of a public character have been designed on good architectural lines, and the construction substantial and practically fireproof in every instance.

Regina, being the capital of the Province, is expected to set a standard for other centres, and to a certain extent the whole country is judged by the architectural development of this city. It is, therefore, fortunate that the first public buildings erected have been of such a high order.

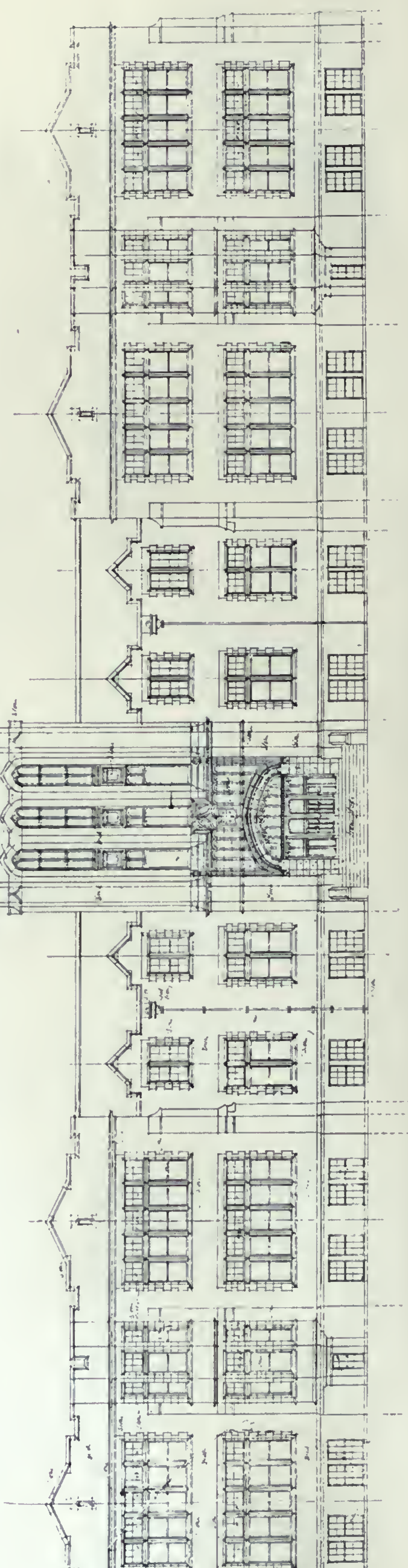
PUBLIC LIBRARY.

Regina is exceptionally favored in being the political, financial, industrial and educational centre of the Province, thus necessitating a large number of important buildings. But it had many difficulties to overcome, in that being situated in the centre of a flat plain it had no natural advantages, and owing to the regrettable gridiron plan of streets it was almost impossible to secure desirable locations for building sites. This handicap has received the careful consideration of the authorities, and in place of a small creek running through the southern part of the city, with prairie on each side, we now have quite a large respectable artificial lake; the property to the south being developed into a magnificent government park, providing an ideal site for the stately Provincial Government buildings. Part of the land to the north has been utilized for an attractive and useful city park, and the remainder given over to sites for educational buildings, which have been wisely placed with their axes centering on streets leading down to the heart of the city, thus overcoming the difficulties of the faulty street planning to some extent.

The outstanding edifice of Regina is the Parliament Building, admirably situated as stated above, and also facing on one of the principal city streets. This building is the result of very carefully prepared conditions of a competition limited to seven competitors, who were all paid for their services when entering the competition. Messrs. E. and W. S. Maxwell were the successful architects and have provided a building which ranks first among the government structures of Canada. The building is executed in buff Tyndall limestone, in classic Renaissance style, with a facade on broad and simple lines, in keeping with the surroundings, and surmounted by a well-proportioned dome of stone and copper. The interior planning has been carried out in a practical manner, providing for the various departments of government, and only in the central portion has a monumental effect been attempted. The main entrance leads to a wide, spacious marble stairway, which deserves special mention, and this leads to the main rotunda under the domed ceiling. Continuing across the rotunda is found the Legislative

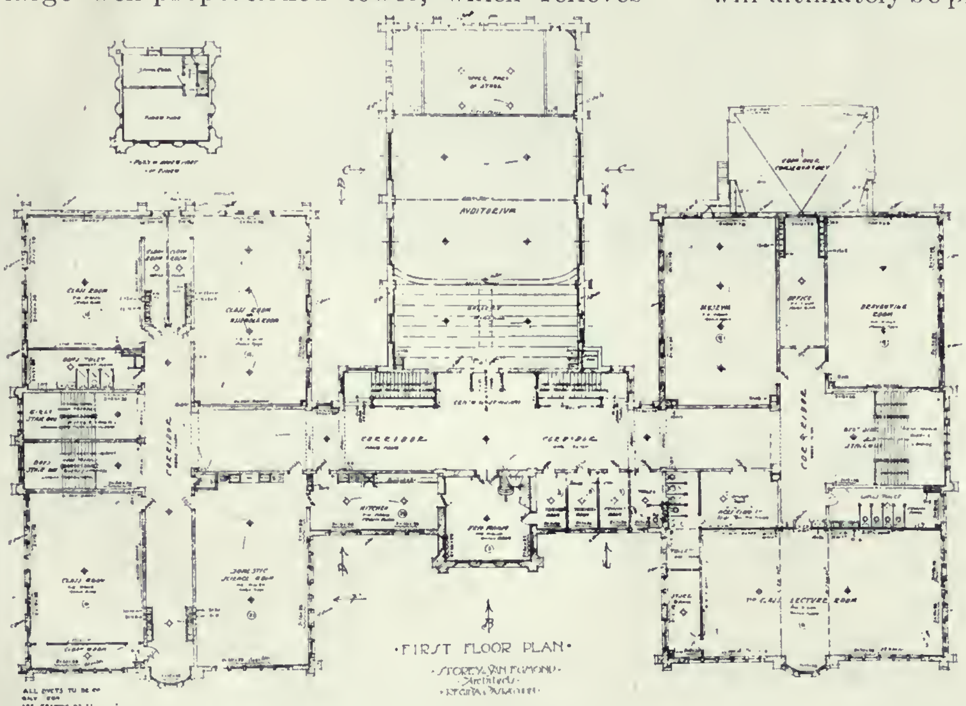
GOVERNMENT NORMAL SCHOOL,
REGINA, SASK.

STOREY & VAN EGMOND,
ARCHITECTS.



Chamber, which has received very simple and effective treatment. The building is fireproof throughout of reinforced concrete, the shell of the dome being also in concrete. The finish is of marble and oak, floors of marble, terrazzo and maple, and the rotunda and entrance stairs executed in marble, a light buff color predominating. It is worthy of note that the furniture for this building was built in Regina by a local firm of craftsmen from the architects' details.

On the opposite side of the lake are situated the Government Normal School, the Regina College and St. Chad's College, all carried out in Gothic treatment, and making a fine group of educational buildings. The former is the largest educational building in Regina, and has just been completed at a cost of $300,000. The exterior has been executed in red sand mould brick and stone, and the central feature is a large well-proportioned tower, which relieves



the otherwise low effect due to the building being only two stories in height. This principle of not more than two stories has been definitely adopted in this city for school buildings. The building is divided into three distinct sections; the right wing being the Normal School proper, and containing the necessary classrooms, library, museum, conservatory, plastic room, draughting room, manual training and domestic science rooms; the left wing is the Model School, or a complete public school, with classrooms, recreation rooms, assembly room, etc., and the central portion comprises the administration offices, teachers' rooms, dining room, main assembly room and gymnasium. Vacuum steam-heating is provided from two large internally fired boilers, and ample ventilation is given with two large fans sending fresh air to all rooms.

The Regina College at the present time consists of only one large building, to which is now

being added a large wing and tower. This is the first building of a group of buildings which will ultimately be placed on this site. The building is fireproof throughout, finished in oak, and the exterior of dark brown paving brick and stone.

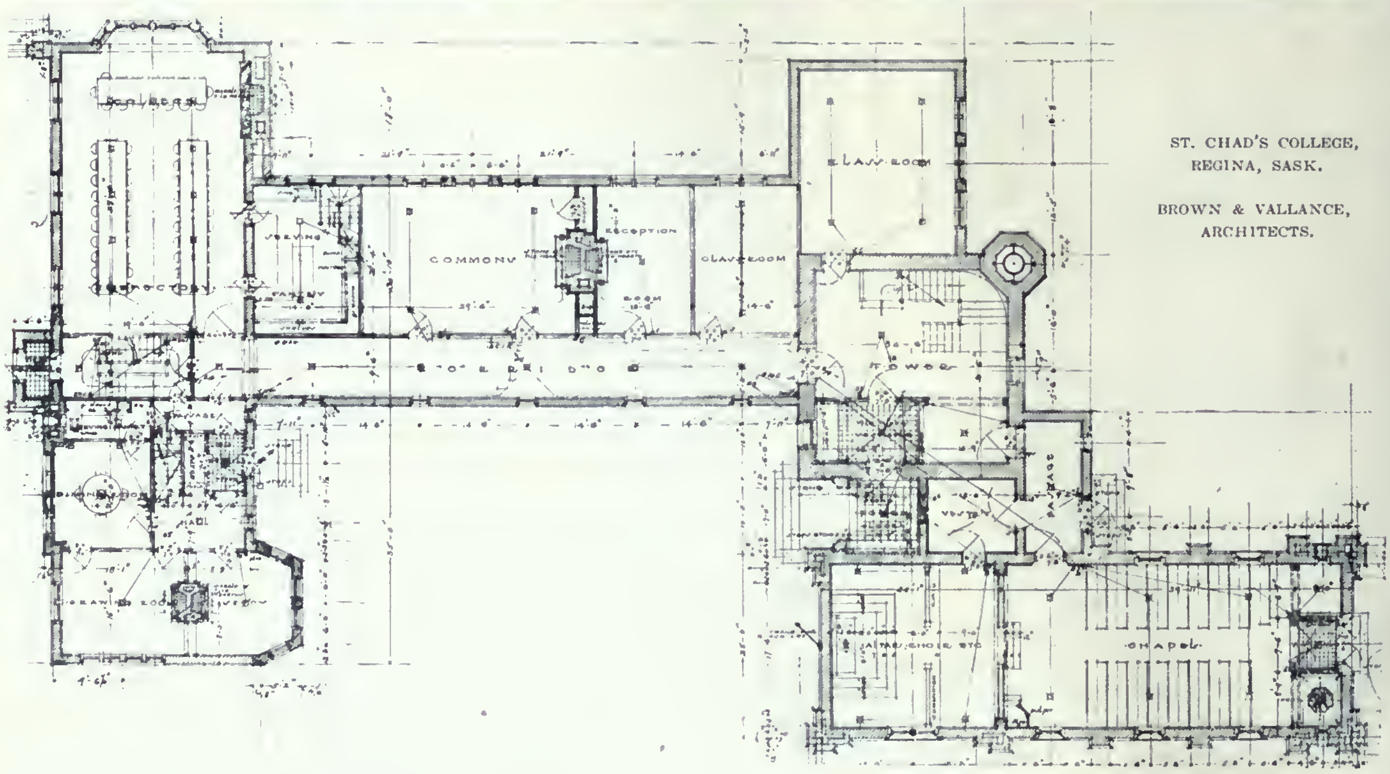
St. Chad's College has now three buildings on the site of many future buildings, which will include a magnificent Anglican cathedral, forming the centre of a well laid out scheme. The buildings now erected are the clergy house, secretary's residence and an interesting college building, with a small chapel of splendid design. These buildings are carried out in a very effective manner by the use of tapestry brick of a red and brown color,

LECTURE HALL, PLAN AND MAIN STAIRWAY. GOVERNMENT NORMAL SCHOOL.

laid with a heavy white struck joint and dark buff terra cotta of excellent detail.

In close proximity to the above buildings is the Regina Collegiate Institute, which is a large building of classic design, and executed in a very effective buff brick, with heavy raked joints and white stone. This building is fireproof of reinforced concrete, with tile partitions, iron and slate stairs, terrazzo corridor floors, with enamelled brick wainscoting. There are twenty-two classrooms, lighted from the left side of pupils only, a large assembly hall, recreation rooms, various laboratories, administration offices, library, and a large and well-appointed gymnasium. In this, as in all other school buildings in Regina, particular attention has been given to the heating and ventilation. The building cost $200,000.

There are many excellent public schools in Regina, the most important being the Wetmore, Connaught, Benson and Strathcona, all of these being fireproof throughout. Not only has the absolute necessity of making schools fireproof been accepted, but the essentials of school hygiene have been carefully considered, and the result is that the schools of this city are superior to many found in the larger centres of Eastern Canada, both in plan and construction, and many features might be studied to good advantage by other municipalities. The Strathcona was the first fireproof school built by the Regina Public School Board, which construction has now been adopted for all like buildings in the city. The principle of only two stories was also adopted definitely in this school. The building was built in 1910 at a cost of $70,000. The walls are of brick lined with tile, tile partitions, reinforced concrete floor construction. Corridors



ST. CHAD'S COLLEGE, REGINA, SASK.

BROWN & VALLANCE, ARCHITECTS.

ROYAL NORTHWEST MOUNTED POLICE BARRACKS.

have terrazzo floors, with glazed tile wainscoting. There are sixteen classrooms, each having light from the left side of pupils only, while teachers' rooms, library, rest rooms, etc., are also provided. The basement was kept well out of the ground to give good light for manual training rooms and domestic science rooms, which are located here. There are also large play rooms, toilets, boiler room, fan room, and janitor's rooms in basement. The stairs throughout are of iron and slate. The teachers and public enter at the centre of the front facade, two entrances being provided for pupils on the opposite side; also direct entrances to play rooms from outside. The building is heated by a low pressure steam system, with return tubular boiler. A positive system of fan ventilation is provided to all rooms. Shower baths are provided for all pupils. An intercommunicating 'phone system and automatic programme clock system are installed throughout. The exterior is of dark red sand-mould brick, trimmed with buff Bedford stone.

Regina is well provided with churches, although, unfortunately, there are none designed on true Gothic principles, which is now being recognized as the only style for edifices of this kind. The principal churches are the Metropolitan, Knox, First Baptist, Westminster, St. Paul's, St. Mary's and the Catholic Cathedral. The latter is particularly worthy of note, and has recently been completed at a cost of $200,000. Two very high well-proportioned towers are flanking features to the main front, giving a good appearance, and denotes careful study by the architect. The material used is light cream brick, with white stone. The Westminster Church is a well-planned building in classic style, and built of buff brick, with gray terra cotta columns and cornices. The First Baptist, Metropolitan and Knox Churches were partially destroyed in the cyclone which visited Regina a few years ago, but have been rebuilt. They face on Victoria Park, in the centre of the city,

COLLEGIATE INSTITUTE.

BAPTIST CHURCH.

KNOX CHURCH.

and form part of a splendid group of buildings surrounding this square.

Also facing on Victoria Park are the Regina Public Library and the Provincial Land Titles Building, the latter being an absolutely fireproof building, designed on broad and massive lines, and built of dark brown paving brick and white Canadian marble. The library is a small fireproof building, but very attractive. The material of exterior walls is a dark buff brick, with cut stone trimmings, and the style is classic. A marble entrance and stairway lead to the main rotunda, which has been treated in a very effective manner, and from this rotunda access is gained to all other rooms, the plan being an ideal one, and was selected in competition.

CENTRAL PRESBYTERIAN CHURCH.

Coming further down into the business centre of the city we find the Post Office and the City Hall. The Post Office is a large fireproof building in Tyndall limestone, the design being similar to other post offices designed by the Dominion Government architect, in classic style, with a heavy rusticated base and columns above. The City Hall is also fireproof and executed in red pressed brick and stone. This building cost $200,000, but unfortunately is too small for present requirements, and a new and better building will soon be required, which, it is hoped, will be located on a more suitable site.

An important civic building is the recently completed Horse Show and Winter Fair Auditorium, which is one of the largest of its kind in Canada. The outside dimensions are 200 feet by 330 feet, and a large arena is provided 85 feet wide and 225 feet long, surrounded by a wide promenade and seating for over six thousand people. Lecture rooms, dining rooms, offices, cloak rooms, carriage rooms, hitching ring, stables, toilets and stabling for two hundred horses are also provided. The entire building is steam-heated, including the large arena, and the total cost was $130,000.

Another building deserving of mention is the new city power house, which has just been completed by the city at a cost of $200,000, not including equipment. This building is situated on the shore of Wascana Lake, in a good residential district, but by careful designing and arrangement the building is an improvement to the neighborhood rather than a detriment. The exterior has received monumental treatment along massive lines, with large dark brown paving brick and cut stone, and the building has proved a desirable acquisition to the group of large buildings along the water front. By the installation of the most modern equipment the smoke nuisance has been eliminated.

A short distance out from Regina the new Provincial jail is nearing completion at a cost of $300,000. This is a fireproof building, and has been planned on the most modern lines, and

METROPOLITAN METHODIST CHURCH.

HOLY ROSARY CATHEDRAL.

the exterior design, while denoting the purpose of the building, is attractive. There is provision for one hundred and fifty prisoners, but the administration department is large enough for double this number, and the plan provides for the addition of a future wing to double the accommodation.

Regina has two large hospitals, the Regina General, built by the city at a cost of over $100,000, to which is now being added a large wing, a nurses' home and an isolation hospital, and the Grey Nuns' Hospital, built by the order of Grey Nuns.

The Bank of Ottawa, costing $50,000.00, is of fireproof construction and heavy enough for three or four additional stories, which accounts for the adoption of brickwork above the cornice. The rest of the front is of buff Tyndall stone. The building is constructed with a reinforced concrete frame of concrete beams, columns and floors; exterior enclosing walls of brick and stone, partitions of tile. The entire ground floor is devoted to banking premises, with marble floors and marble wainscoting in green and white. The stairs are of iron and marble, finish of oak. The first floor is occupied by the bank's solicitors and the upper floor is used as staff quarters.

INTERIOR OF HOLY ROSARY CATHEDRAL.

The Credit Foncier building, costing $45,000.00, is of reinforced concrete construction with two street facades in buff Tyndall stone. On the ground floor are provided the offices of the owners, with separate corner entrance. Another entrance leads to the two upper floors, which are laid out for offices and living quarters. The building is finished in oak throughout, with iron and slate stairs, maple floors, and mosaic floors in public spaces.

The Albert Court Apartments was the first apartment building built in the city of Regina. It was erected in 1907 at a cost of about $40,000.00. There are twelve large suites, each containing a drawing-room, dining room, two bedrooms, bathroom, kitchen, pantry, etc. Each suite opens to the rear on to a reinforced concrete balcony to which leads the tradesmen's stairs, which are of iron. There are two entrances, one for each

EXTERIOR VIEW AND ENTRANCE DETAIL. TELEPHONE EXCHANGE. STOREY & VAN EGMOND, ARCHITECTS.

CREDIT FONCIER. STOREY & VAN EGMOND, ARCHITECTS.

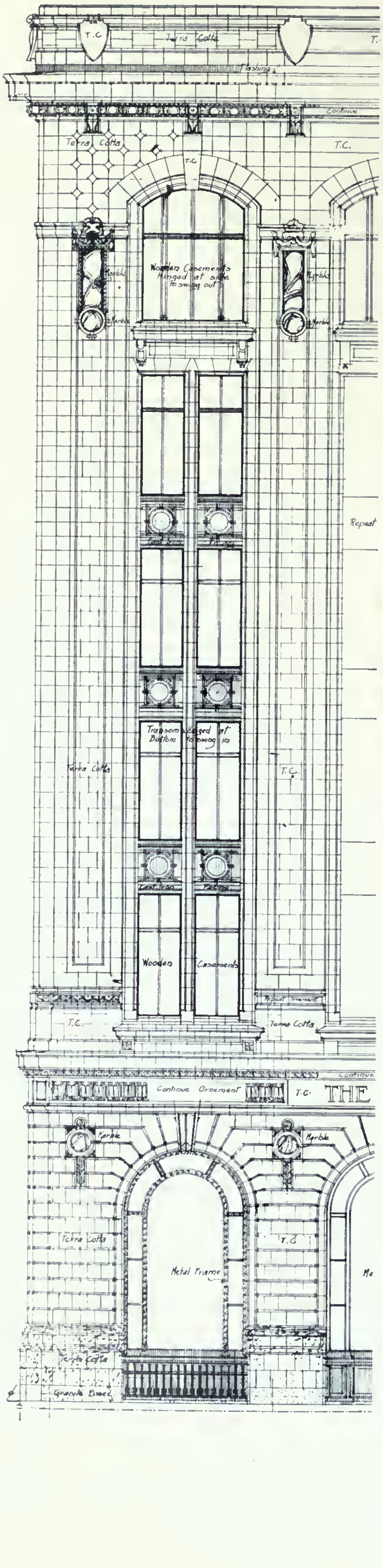
six suites. All finish throughout is of birch stained to represent mahogany, and floors are of maple. The walls are of brick and tile and finished on the outside with buff colored stucco plaster. All trimmings are of dark brown with the shingle roof in a warm red color. The base to the building is of red and black brick laid in Flemish bond, which harmonizes well with the buff walls and red roof. The Royal George Apartments was built at a cost of $35,000.00 and contains twelve separate suites. There are six suites, each containing a drawing room, dining room, two bedrooms, kitchen, bathroom and maid's room. Three suites, each having drawing room, dining room, bedroom, kitchen and bathroom; three suites, each having a large living room with alcove bedroom, kitchen and bathroom. Each suite has a private hall giving direct access to all rooms. There are two fireproof stairs at the rear, with concrete balconies at each floor. Many closets, cupboards and other conveniences are provided. Apartment house telephones are installed in each suite with centrals in the vestibules and so arranged that the caretaker can be called from each suite. In the basement are located two laundries, store room for each suite, boiler room, and caretaker's quarters. The exterior is executed in a dark brown paving brick with Bedford stone trimmings. The Eddy Apartments is well laid out on similar lines to the above, but the architect's details were not adhered to in the exterior design.

The McLaughlin garage is of ordinary warehouse construction, with solid brick walls, and cost about $35,000.00. Half the building is two stories and full basement and the other half for garage purposes only one storey without basement. The exterior is of dark red brick. The H. G. Smith warehouse is of first class slow-burning mill construction and cost $50,000.00. All main girders and columns are of large dimensions and there are no joist or secondary beams. The floors are of 2 x 6 on edge well spiked together, covered with waterproof paper and finished with 1 x 2 maple flooring. All floors are scuppered one inch in twenty feet and graded to hoppers on each floor which are connected to drains. All stairs and elevators are enclosed with brick fire walls with automatic steel doors at all openings. All walls, ceilings, posts, etc., are whitewashed throughout, except in office part, where the walls are plastered. The exterior is of dark red brick and buff stone.

A large wing is now being added to the general hospital at a cost of $150,000.00. This building is of fireproof construction throughout.

A description of Regina's public buildings would not be complete without some reference to the Royal North-West Mounted Police Barracks, where there are a number of large and interesting buildings. These surround the parade square and include the officers' quarters, Commissioner's and Assistant Commissioner's residences, drill hall, men's quarters, and a fine new building for officers recently completed.

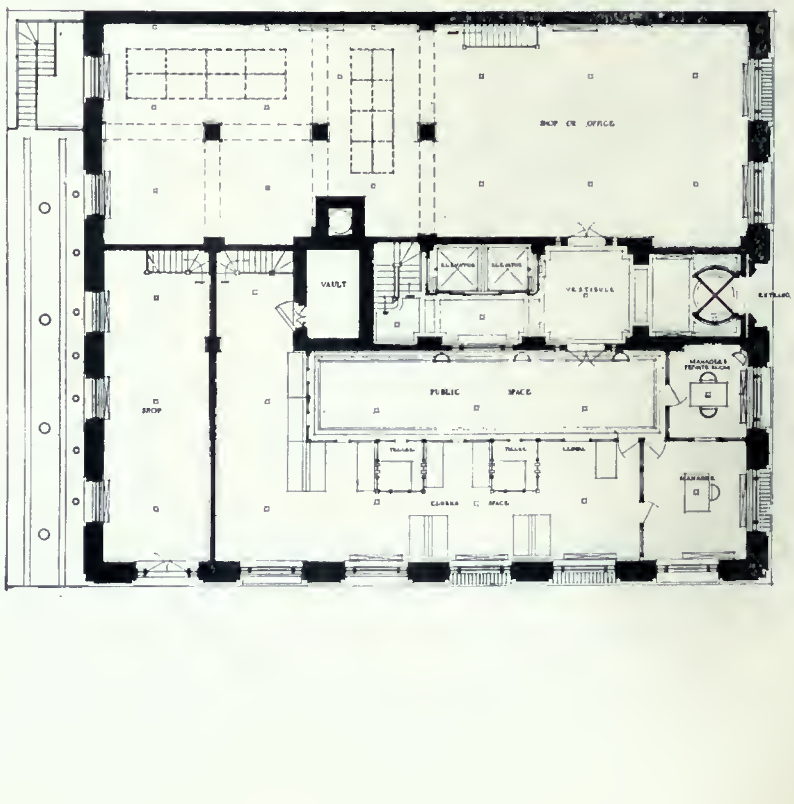
THE BANK OF OTTAWA. STOREY & VAN EGMOND, ARCHITECTS.



EXTERIOR AND GROUND FLOOR PLAN.

THE CANADA LIFE ASSURANCE COMPANY,
REGINA, SASK.

BROWN & VALLANCE,
ARCHITECTS.



Residential Work of Regina

F. C. PICKWELL

IN the hustle and bustle of Western business life the advantages of an artistic home are very often overlooked. In some cities, however, the Renaissance has become a reality through the enthusiasts of good architecture, and in the endeavor to grasp the true essentials in the matter of home building many artistic residences have been built. This is especially true in the case of Regina—the capital city of Saskatchewan. Several years ago a house costing $15,000 was quite a novelty, only two or three having been erected by enterprising citizens. To-day, however, there are scores of houses costing $15,000 and upwards, some even providing the comforts which belong to the better class of building, ranging from $35,000 upwards. The smaller dwelling usually takes the form of an artistic bungalow, and rows upon rows of such structures, costing anywhere from $3,000 to $10,000, are to be seen in the residential sections of the city. Regina has now become known as "a city of beautiful homes."

Overlooking the Parliament buildings and the extensive park laid out to the south are the homes of W. H. A. Hill, E. D. McCallum and H. M. McCallum. The Hill house, located on Albert street, consists of brick with stone trimmings, lending an artistic touch to certain features of the various facades. The walls are of solid brick, lined with hollow brick and double strapping. Upon the interior is a spacious billiard room in the attic, with fireplace ingle and alcove for card tables; also a living room panelled with oak to within twenty inches of the ceiling. The cost approximated $18,000.

E. D. McCallum's house, like the one just described, exemplifies the rapid progress made in this phase of architecture. Built upon new land, which in a few years will be attractively surrounded by foliage, it augurs well for the artistic development of this residential district. The first storey is constructed of stone, metal casement and leaded glass in the bay window. Erected in 1912 it cost in the neighborhood of $30,000.

W. G. Van Egmond's residence was erected several years ago at a cost of $6,000. It is built around a fireplace and gives the effect of a much larger house. The large living room with alcove fireplace and the dining-room are

W. H. A. HILL'S RESIDENCE. CLEMESHA & PORTNAL, ARCHITECTS.

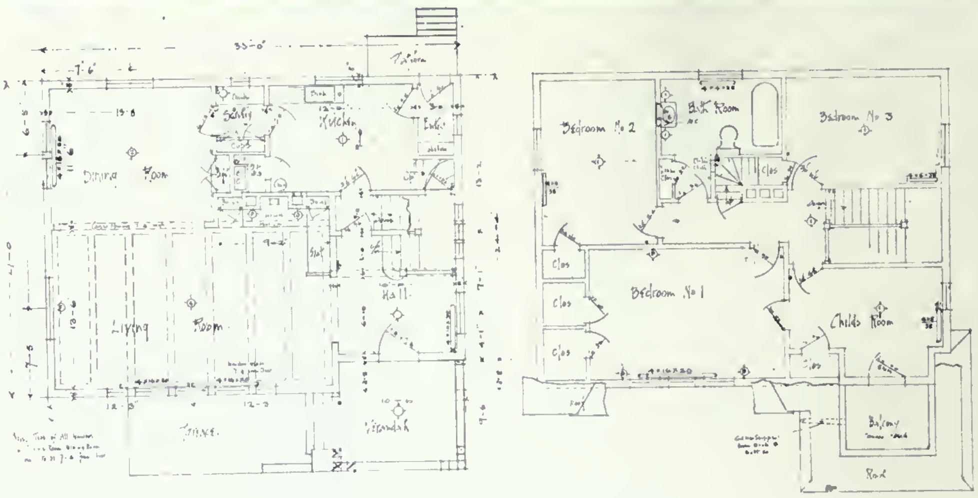
DINING ROOM AND LIVING HALL. E. D. MCCALLUM'S RESIDENCE, REGINA. F. CHAPMAN CLEMESHA, ARCHITECT.

E. D. MCCALLUM'S RESIDENCE. F. CHAPMAN CLEMESHA, ARCHITECT.

practically one, being divided by a large movable screen decorated the same as the walls of the rooms. The living room is stippled in a dark brown and red with stencil panels in gold and blue, the ceiling beamed simply in one direction with a gold band around panels of a buff color. The dining room to plate rail is of delft blue with green and rose stencilling, while the walls above and ceiling are in a light buff. The kitchen is connected to dining room by a service pantry and separated from reception hall by a smaller hall from which stairs lead to basement and side entrance. On the first floor are four bedrooms and bathroom, while in the attic are a billiard room and maids' room. The walls throughout are finished in a putty stucco finish, tinted or painted. The woodwork on ground floor, except kitchen, is antique brown, all woodwork in bedrooms and kitchen being in white, and all floors throughout of maple. The heating system is hot water. The exterior is executed with shingle walls and a certain amount of half timber work; the walls being stained dark brown, the roof a dark red, cornice of half timber work, etc., stained green, and stucco plaster a light buff.

The residence of H. N. McCallum, also situated on Albert street, is one of the most recent additions to Regina's high class homes. The first storey is of brick construction, the second of roughcast with wood panelling and overhanging eaves. A very spacious verandah assists in making this home a very attractive one. The cost of this house approximated $25,000.

J. M. YOUNG'S BUNGALOW. STOREY & VAN EGMOND, ARCHITECTS.



EXTERIOR ELEVATION, PLANS AND LIVING ROOM.

W. G. VAN EGMOND'S RESIDENCE.

STOREY & VAN EGMOND, ARCHITECTS.

The home of L. V. Kerr has attracted considerable attention by reason of its unique architecture. One of the main features is the large square tower which extends up several stories. A spacious sun porch and parlor has been built around the front portion of the house. The stables, coachman's quarters and garage are all built in connection with the house, forming a sort of "L" on the property measuring eighty-one by one hundred and twenty-five feet. Finished within in oak, the house, including garage, cost $30,000.

TOWN PLANNING

W. A. Begg

It is indisputable that a beautiful and efficient city is not an accident, but a reflection of the life of the people. Town planning should be comprehensive and orderly with the aim that the future city might be a fitting expression of the progress of the citizens in a noble pursuit of social, industrial and architectural achievements. The street planning was the first consideration in city planning and the possibility of success in the other problems, such as parks and public buildings, was largely dependent upon the way the streets were laid out.

In most countries there are cities where scientific city planning has been part of the municipal routine for years, and is regarded as a necessarily continuous function. In Germany, up to 40 per cent. of any area can be taken for streets and other public purposes, and it is generally recognized that it is for the good of the community. It is not done hastily or secretly, but the proposed plans are exhibited in the city hall before they are finally authorized.

In town planning, the first essential is a thorough knowledge of the site, information of the water supply and the drainage possibilities; also some knowledge of the existing highways. A suburb would have to be dealt with in the same way and a study of the town or city it adjoins will be essential. Then the city planner has to consider the lines of communication from point to point and the multiplication of these lines which determine the street plan. Out of the efforts to combine formality there has grown distinguishable types commonly known as the gridiron, or American plan, the radial, or circulating boulevards, the diagonal, superimposed on the gridiron, and the recent German type of extreme informality which is an imitation of mediæval town plans.

The gridiron plan was also to be found in the remains of Roman colonies. Pompeii was laid out on this plan, and the city of Turin, in Italy, and Chester, in England, owe their rectangular street plan to Roman origin. Its use in Canada is probably due to the simplicity, to the lack of understanding of town planning and to the subdivision of land for speculative purposes. This style of plan is also defective from its montony and impossibility to secure quietness in the residential quarters. The chief defect in the diagonal style of town planning, as in Washington and Philadelphia, lies in the numerous angular corners caused by introduction of the diagonal.

The radial system was developed principally in Germany and was brought about by the encircling walls and fortifications. This is beginning to have an influence on American town planners who are endeavoring to link up the large parks and encircling boulevards. Boston and Chicago show examples of the application of this idea to American city plans.

Many old cities have a cathedral or fortress which is the central point of interest in a modern city; this centre might well be the city hall, or, in a capital city, the government buildings. Having decided on the chief centre it might well be made the focus of two or three main radials —through it is not advisable that many streets, and, therefore, much traffic should circulate round an important building as suggested. Rough land close to a city, such as the valley of a stream, is suitable for park areas, and river and lake fronts should be bordered by wide thoroughfares. Low lying land should be secured for industrial sites, and the workingman's residential areas should be separated from the industrial site by a strip of park which would provide for the worker and his family.

Small community centres and playgrounds should be provided at about one-half mile distances as statistics show that small children will not go beyond that distance to play. They should also be located off the main streets of traffic.

H. M. MCCALLUM'S RESIDENCE. STOREY & VAN EGMOND, ARCHITECTS.

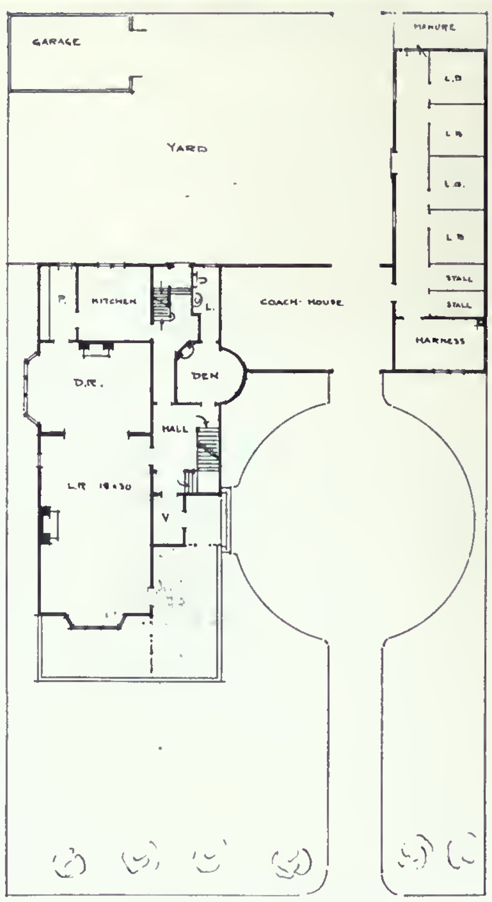
The width of streets is a very important matter, and the proper method to determine the width between property lines is an estimation of its greatest traffic requirements. In the planning of a new town this is impossible to foresee, but it should be good practice to adopt a width consistent with the most optimistic growth. The general adoption in Canada of a limit of sixty-six feet in least width has undoubtedly been a good thing, and it is also fortunate that there has been no limit placed on how wide a street might be. The result is that

EXAMPLE OF REGINA RESIDENCE.

all cities and railroad towns have at least one street from eighty to one hundred feet wide.

With regard to the improvement of Western cities, little can be done in the way of town planning until the municipal authorities acquire wider powers than they possess at present. No other question has so important a bearing on the future of street planning. The English movement began in 1904 and at that time there was a general demand that the municipal authorities be given the necessary town planning powers. It was not, however, until five years later that the legislation was passed by Parliament. A modified form of this Act has been adopted by New Brunswick and Alberta and its provisions are becoming pretty generally known throughout Canada.

Main thoroughfares should be from ninety to one hundred feet wide, secondary thoroughfares seventy to ninety feet, and local streets forty-eight to sixty-six feet in width. The Engineering Society should give the subject of such classification some study with a view of establishing suitable standards for municipal or provincial adoption. It was upon the treatment of street junctions that much of the effect of the city will depend. Sufficient space should be allowed and for aesthetic appearances a certain formality should enter into the design. Many streets centering on one point are not desirable. The main thoroughfares should not lead into one without giving the latter extra width for a distance to enable the traffic gradually to unite or separate.



L. V. KERR'S RESIDENCE.
CLEMESHA & PORTNALL, ARCHITECTS.

Dr. W. W. Andrews led the discussion which took place after the reading of this paper before the Engineering Society of Regina, and pointed out that city planning was for the purpose of conserving the lives of the citizens through the convenience of streets and beauty of parks and in other ways. Life interests should always be kept in the forefront of any city ideals. He suggested that the city should have an artistic committee with power to veto the erection of any structure injuring the park view or street line. He spoke of the diagonal street plan which might be carried out in the future planning of Regina, referring to Victoria park as the future civic centre and to a diagonal street through Lakeview to join the road leading to Moose Jaw, and another leading to Toy Hill.

Regina, Her Development

NORMAN A. RUSE

VIEW FROM VICTORIA PARK.

WHEN Regina was but in her infancy, her future was predicted, and by none other than Nicholas Flood Davin, one of the best parliamentary speakers, representing the prairies in the Federal House at that time. How well Davin's prophecy has been fulfilled can be seen upon careful study of the progress made in this prairie city. Situated in the very heart of the grain producing province of the Dominion, Regina has rapidly become known as a point of distribution, not only for farm implements, but for other necessities, such as foods, clothing, etc. The transcontinental railways selected the city for a great future; the early councillors who directed her destinies had similar optimistic views, carefully directing the growth and future possibilities.

Early in her history, Regina was favored with a far-seeing set of councillors. Not only was property set aside for parks, in sections which at that time seemed for beyond any possibility of settlement, but also a section comprising 640 acres was provided for warehouse and factory sites. On this property has grown and is still growing, one of the most notable industrial centres to be found in Canada. No smoky factories nor noisy warehouses decorate Regina's residential and business section, consequently the streets are clean in both parts, and while only a start has been made in the way of improvement, the appearance of public thoroughfares is quite artistic.

POST OFFICE.

The very latest ideas in town planning have been brought into use. The paved streets are of regulation width. The city has legislated against building structures closer to the street line than twenty-five feet, and maintains a boulevard on the inside of the sidewalk, approximately twenty feet in width. This practically means that the lawns in front of the residences are forty-five feet in depth.

Thousands of trees, especially suited to the prairie climatic conditions, have been planted out in the parks and on the streets of Regina, and are now beginning to materially add to the general appearance. In order to make this work more extensive the city established a nursery and greenhouse. In the nursery at the present time are one million trees in the process of cultivation. As soon as they are of the required standard they will be planted along the streets or in some of the parks. In the work of beautifying the city the merchants at large have joined, one firm recently giving five thousand large sized trees to school children for planting.

In the very extensive development which has been taking place at Regina, it will be seen that the beautifying of the city has not been disregarded, but on the contrary has been given every possible attention. At the present time the civic fathers have Professor Mawson, a noted expert on town planning, working on a scheme whereby

SCARTH STREET.

the beauty of the city will be greatly enhanced. In conjunction with Provincial Government, it is expected that a system of parks linked up with suitable boulevards and driveways will be provided.

This capital city of Saskatchewan has also become known as a point of distribution, twelve railway lines radiating from the city at the present time; and when all of the branch lines, for which bonds have been guaranteed by the Provincial Government, have been completed there will be twenty-two lines radiating from Regina. At the period when the railway companies accepted Regina as the logical centre of distribution for Saskatchewan and laid their plans accordingly, the implement companies, too, felt the advantage of locating in the city. In the model warehouse and manufacturing centre planned by the city councillors years ago are now housed thirty-one warehouses, from where twenty-five million dollars' worth of business was handled in 1912, making the city by far the largest point of distribution for farm implements in the world. This district is immediately across the tracks from the main business section, within three minutes' walk, and served by spur tracks from the three transcontinental railway lines.

BATHING PLACE.

From point of population, the growth has been rapid and substantial. With this has come a uniform increase in general business and extensive improvements, so that at the present time Regina may rightfully claim to be a city of permanency. This fact is all the more readily understood when the bank clearings for 1913 are taken into consideration and a comparison made with the figures for 1912. It will be seen that in practically every instance the weekly showings for 1913 presented a substantial increase over the figures for the corresponding periods of the year before, despite the financial stringency.

The population of Regina in 1902 was

Y. M. C. A., CREDIT FONCIER BUILDING AND ALDON BLOCK.

approximately 2,700. To-day it is estimated at 50,000, an increase of over 47,000 in ten years. The Dominion census showed 30,210 in 1911, which was a gain of practically 13,000 over the previous year, and allowing only 10,000 during the past two years, it will be seen that the estimate of the population at the present time is not out of the way, and is based on the growth in other lines. The number of houses constructed during the past year would also carry out this deduction. With the growth in population has come enhanced property values. The assessment figures show the extent of the increase, and if carefully studied will prove that the per capita wealth to-day is greater by far than that of ten years ago. The assessment figures are as follows: 1902, $1,062,628; 1909, $11,714,685; 1910, $13,066,398; 1911, $34,840,733; 1912, $70,000,008.

Despite the rapid growth and the heavy improvement works made necessary, Regina has been able to keep the tax rate extremely low, the rate for 1913 being fourteen mills on the dollar, including not only the general rate, but also the collegiate, library and public school rates. That it has been possible to do this is partly due to the fact that early in its career the aldermen provided for municipal ownership of certain utilities. This policy has been carried out by the city council, and it is likely that a still further venture will be attempted in the near future. The city now owns a street railway, an electric light and power plant, and a waterworks system, all of which pay substantial returns after the deduction of all charges. This surplus revenue has resulted in a low tax rate. In delving into municipal ownership, however, the city had to be careful of its borrowing power. Property owned by the city both in the warehouse section and in the residential districts was sold and the proceeds devoted towards the furtherance of the municipal ownership policy. In this way the borrowing power was conserved. The city owns all told several million dollars' worth of pro-

MUNICIPAL STOCKYARDS.

W. C. DOWNING FACTORY.

perty that could be utilized for such purposes.

Situated in the heart of the Saskatchewan wheat belt, Regina has become a recognized grain centre. Millions of bushels of wheat pass through the city yearly on the way to market. The various railway lines all serve as feeders, and have considerable difficulty in getting the grain out of the country. The production of wheat from the small portion of land that is under cultivation in the province will reach the total of at least 118,000,000 bushels, while the grain output will be 270,000,000 bushels. With the rapid settlement in the province, it is only natural to expect that the centres of life such as Regina will add greatly to their population.

As a city to live in, Regina has many inducements. The streets are nicely laid out, the lawns and boulevards well kept, and various forms of amusement provided. Aquatic sports, tennis, and golf all have their usual quota of followers. The other games, such as rugby and baseball, are popular, as well as the winter sports, skating, ice-boating and tobogganing.

The first settlers of Regina arrived in May, 1882, and subsequently a canvas town sprang up where the trestle bridge carries the main track of the C.P.R. across Wascana Creek, about a mile west of the centre of the city. The selection of the townsite was arranged jointly by the Government and the C.P.R. Co. Early in 1883 an officer of the North-West Mounted Police was sent to select a suitable place for the headquarters of the force, which had previously been in Winnipeg. On his return the lands at present occupied by the barracks were selected.

JOHN DEERE PLOW CO.

At this time an agreement had been completed between the Dominion Government and the railway company to enter into partnership regarding certain townsites, one of which was to be the seat of government for the North-West Territories. Four sections were selected and subsequently vested in Messrs. Osler, Scarth, Smith and Angus, trustees, to administer, and divide the net proceeds between the Dominion Government and the railway company. The name "Regina" was conferred on this townsite by the Governor-General, Lord Lorne, who had been requested to select a name for the future capital.

The arrangement for the control of the townsite by the trustees was terminated by Order in Council of 29th December, 1900, and by further Order in Council of 6th April, 1903, the

MCLAUGHLIN CARRIAGE CO.

granting to the municipality of the lots in the townsite which had reverted to the Crown, was authorized. By Order in Council, 27th March, 1883, the town of Regina was declared to be the seat of Government of the North-West Territories in place of Battleford.

The first school was opened in the town in the spring of 1883; the first Dominion Lands Office, a low frame building, was brought up on a flat car from Troy (afterwards called Qu'Appelle) and was placed at the corner of Broad street and Victoria avenue. In April, 1883, a public meeting was held to discuss the matter of the site of the proposed post office, the site finally selected being on Victoria avenue.

On 13th May, 1883, Lieutenant-Governor and Mrs. Dewdney arrived to take up their residence in Regina. On July 1, 1883, the city was made a money order point. Lots on South Railway street changed hands at $800 to $1,000 each. A public meeting and a citizen's committee was formed to carry on the business of the town. Mr. John Secord, barrister, was appointed sec-

H. G. SMITH WAREHOUSE.

retary. Sub-committees were appointed on finance, sanitation, fire and water and miscellaneous affairs. A committee was also appointed to draft a charter of incorporation, and the Finance Committee were instructed to collect two thousand dollars by public subscription for public works.

Elections for the North-West Council were held in August, 1883. Mr. Wm. White was selected for the Regina District. The Fifth Council of the North-West Territories was opened by Lieutenant-Governor Dewdney on August 22, 1883. A bill entitled "An Ordinance Respecting Municipalities" was introduced in the North-West Council on September 12, 1883, and a public meeting of citizens was called to discuss the matter of incorporation.

In October, 1883, a lot on Eleventh avenue near Rose street was sold for $275. At this time farm lands in the vicinity of the city were worth about $5 per acre.

CAMERON & HEAP, LIMITED.

On Monday, October 8th, the Civic Council met and took final steps to comply with the ordinance to provide municipal government. The Government Buildings, Council Chambers and Indian Office on Dewdney street were completed in October. The first telephones privately owned were introduced into the town at this time. Up to December, 1883, Regina had two chartered banks, the Bank of Montreal and the Merchants Bank.

Nominations for the first municipal elections took place on January 3, 1884. Two hundred and thirteen votes were polled. Mr. D. L. Scott, now Judge of the Supreme Court of Alberta, was the first mayor.

DEVELOPMENT IN REGINA

Malcolm Ross

WHILE numerous cities on the continent have been and are busy preparing plans at great expense, for schemes of general improvement, Regina, partly by foresight and design, and partly by good fortune, now holds a better position in regard to certain features of civic organization, than many of the other cities will when their schemes are worked out. This is especially true in regard to the economical arrangements for the transportation and distribution of goods. Distribution must necessarily commence at the railroads. The arrangement in Regina has been based on the establishment of warehouses and factories in an area so arranged that each is directly served by a spur track. The tracks are so arranged that cars may be reserved and delivered directly to the various railroads. A freight exchange or transfer yard

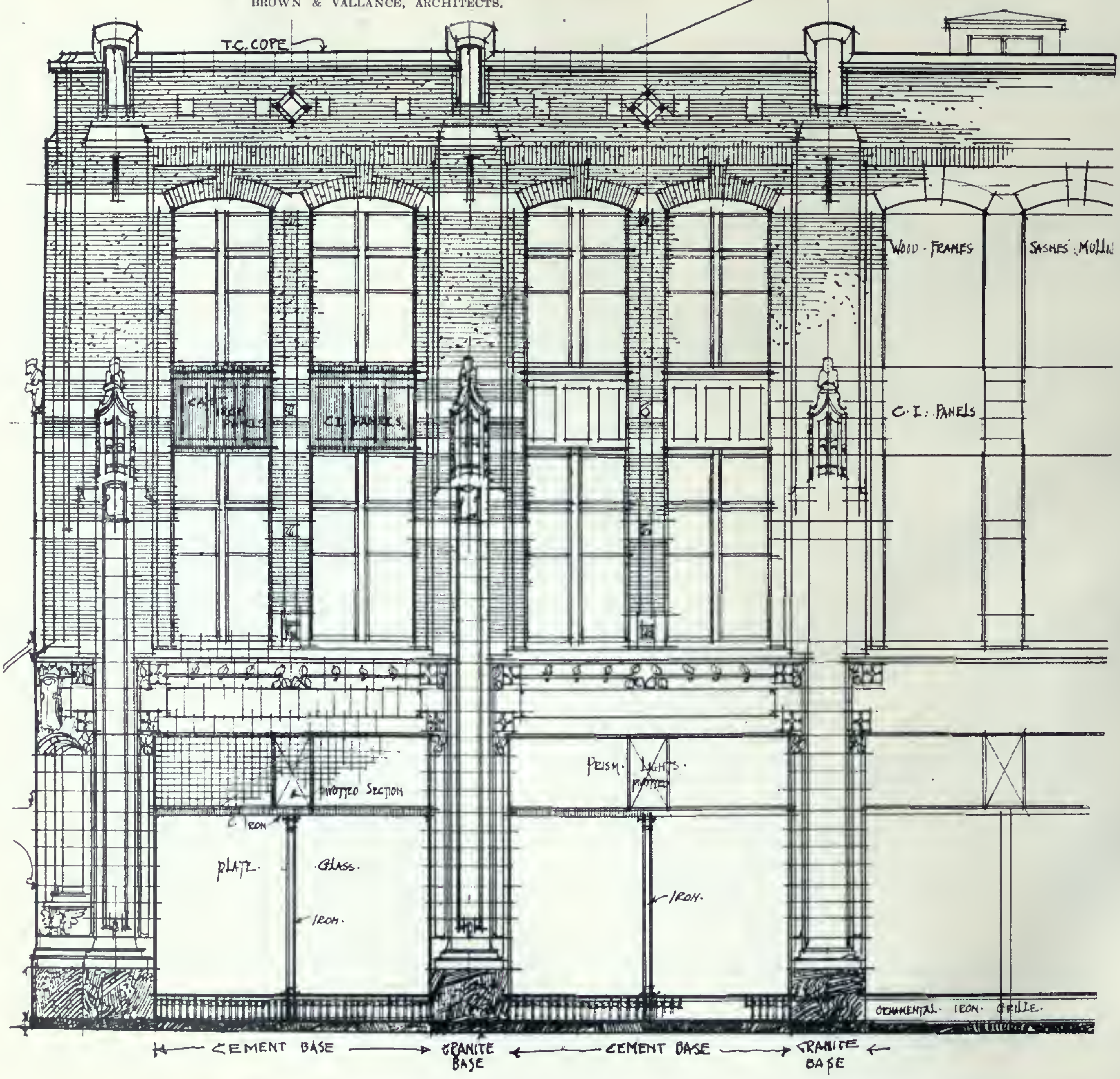
COCKSHUTT PLOW CO.'S WAREHOUSE.

outside the city will doubtless be taken into consideration before long, in connection with which will come the re-arrangement of some of the railroad entrances to the city, which, if left permanently, would entail much expense for subways, and interference with the transit facilities of the city generally.

Warehouse Rearrangement.—These are especially valuable in a distributing centre, obviating as it does all cartage from cars to warehouse and again from warehouse to cars. The effect on the congestion at the freight sheds, which existed up to two years ago, has been remark-

STORE BUILDING FOR THE C. W. SHERWOOD CO., LTD.

BROWN & VALLANCE, ARCHITECTS.



able. At that time drays had to wait from an hour to an hour and a half to get to the unloading doors. To-day there is not such delay, which means waste of time and money to the shippers and the public.

The wholesale and manufacturing district is distinctly separated from the business and retail district by the main line of the Canadian Pacific and the Canadian Northern Railway. There is no unnecessary trucking entailed as in cities where the wholesale houses are often some distance from the freight yards, often outside of the city, and separated to the extent of a half a mile or more from the retail section. The retail section is advantageously placed in relation to the residential districts.


CITY HALL.

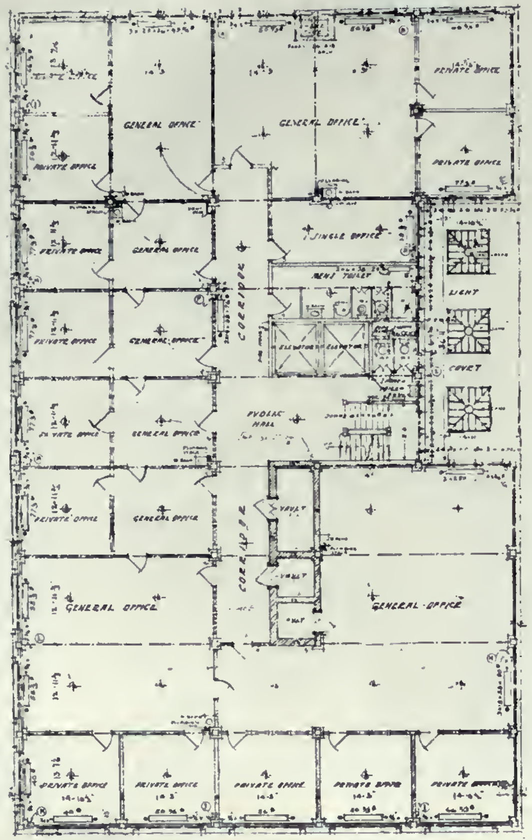
Fortunately the Province has a progressive Government and the Bureau of Surveys has drawn up a scheme providing for diagonal or radiating road allowances which covers the districts for which sub-division plans have not yet been registered, and there can be little doubt that it is only a matter of time and public appreciation of their economic possibilities before these roads will be continued as far as practicable toward the centre of the city.

Sanitary Features.—The important sanitary features of water supply and sewage disposal have been arranged, as the foundation of a comprehensive scheme which can be extended to provide for the requirements of the city for a considerable number of years to come. The water supply is of unusual importance. It is secured from underground springs and is practically removed from any possibility of contamination.

Social Progress.—In regard to the social features of town planning, not much has as yet been done. There is a definitely expressed desire from all quarters for more public recreation grounds and buildings, quite apart from ornamental parks. The housing and living conditions of the people who are unable, for various reasons, to keep them up to the standards known to be necessary for the welfare of the community, are being discussed. The application of the single tax system of taxation, which is being gradually introduced, it is believed, will go a long way toward improving conditions for a certain class. How far it will benefit the poorest and transient classes is yet to be seen.

Aesthetic Features.—In aesthetic possibilities, Regina is especially fortunate. Large open spaces have been reserved by the Dominion and Provincial Governments, some of which have since been turned over to the city. The largest of these adjoins the Legislative Buildings grounds, and with a good sized area of water and trees affords opportunity for the grouping of four public buildings with beautiful surroundings. Seeing the possible advantages to the whole province of this area, and the influence that could be exerted in shaping the standards of the growing cities and towns of the province by its means, the Government has secured the advice and services of a distinguished authority on town planning, landscape and architecture.


AUDITORIUM FOR WINTER FAIR AND HOCKEY.



TYPICAL FLOOR PLAN

OFFICE BUILDING
FOR
MCCALLUM, HILL
& CO.,
REGINA, SASK.

STOREY & VAN EGMOND.
ARCHITECTS.

VIEW FROM CENTRE
OF VICTORIA PARK.

ELEVATION FACING VICTORIA PARK.

Regina---Parks and Playgrounds

HIS WORSHIP MAYOR MARTIN

WHAT is being done by Western cities to improve the beauty features is little realized by the outside world. Regina is the capital city of Saskatchewan, and has been particularly active in the way of setting out trees, providing parks and other places of beauty and recreation. Thousands of trees are planted yearly, and in this way the barren prairie on which she was built has been converted into a settlement in which may be seen an abundance of green. As a city of parks, Regina has become noted; over two hundred and fifty-seven acres of land having been set aside and converted into beautiful districts. The largest individual park is the Wascana, which has an area of forty-seven acres, situated on Wascana Lake. It is interesting to note that this body of water is what might be termed an artificially created lake, situated well inside the limits of the city, and created by damming the river. To the north of the lake is situated the artistic creation, and immediately adjoining is the main residential section. To the south of the lake is located the Saskatchewan Parliament buildings and grounds, costing over $2,500,000, and considered to be the finest example of their kind in Canada. Surrounding the Parliament Buildings are also innumerable costly residences.

One feature of Regina's park development is Victoria Park, which is situated within two blocks of the City Hall. This plot is laid out in an ornamental scheme, an artistic fountain having been placed in the centre, while shrubbery and flowers are used to good advantage in beautifying it. There are other parks which have been improved considerably during the past few years.

In the way of athletic parks, Dominion Park is probably the most important, the area being about eight acres. It is located in the centre of the warehouse district and affords exceptional advantages to men employed in this section as well as to the athletic and sporting element of the public generally.

While plenty of provision has been made for athletic parks to accommodate the "grown ups," still the city is working on a scheme of park development for children which will provide for the needs of many years to come. It was only a few years ago that recreation spaces for children were first started, and a Children's Playground Association was organized in Regina. The City Act made no provision, however, for a grant to any such organization. The City Council were of one mind with regard to the expenditure; accordingly it was decided that the Parks Committee spend the necessary amount of money in having equipment for play grounds installed in one of the city's parks and at several of the schools. This resulted in more than a mere grant of money, the Playground Association receiving the co-operation of the five aldermen who were members of the Parks Committee. The first year's work was more or less experimental, but the results were satisfactory, which gave an added impetus to the movement. At the present time the city has a playground on almost every school ground in the city, and still reserves the large park set aside several years ago for playgrounds.

The city has now gone one step further and provided a skating rink on each of the school grounds in the city. The caretaker attends to the flooding of the rink and its proper maintenance, besides acting as a sort of supervisor. In this connection it might be stated that all of Regina's playgrounds are properly supervised. The playground movement may now be said to

PARK AT UNION STATION.

have passed the experimental stage, and become a fully developed civic undertaking.

One feature of Regina's development has been the following out of town planning lines; not only have parks been provided for with diagonal streets running through them, building lines established and numerous other features carried out as far as the retail and residential section of the city is concerned, but also the industrial district has been developed.

Before the most ambitious citizens had begun to think of Regina as a city of fifty thousand souls, large tracts of lands had been set aside by the townsite trustees to be used as parks, exhibition grounds, market place, etc. Included in these various areas reserved was a section of land, adjoining the main line of the Canadian Pacific Railway. As is well known, towns usually start to grow from the first railway line that passes through them, and in this respect Regina is no different from the others. The city has grown both north and south from the railway line, so that it is practically in the centre of the city. The section of land adjoining the railway on the north was kept for civic purposes. As the city began to assume more metropolitan ways, however, the council took its first step in the way of town planning. A large area was reserved for industrial purposes. Later the Grand Trunk Pacific and the Canadian Northern Railways constructed lines in such a manner as to almost surround this tract of land, giving access to every section of the district to each of the three railways, which have also constructed spur tracts to serve individual sites as the demand arose.

It is in this area that is located what has been termed the most economical industrial section in Canada. Sites have been sold at a nominal price in order to keep industrial concerns together, and although a fair amount of property has been sacrificed for industrial purposes, there is still considerable land retained. Thirty-six factories and over two hundred and fifty wholesale houses have been erected, and the amount of business handled by the implement warehouses at Regina alone during the year 1912 amounted to over $25,000,000. The city for several years past has had the honor of being rated as the largest point of distributing of farm implements in the world, and her prestige

ELEVENTH AVENUE.

in this regard is being added to year by year. One of the most recent additions to factories has been the W. G. Downing Company's fine building. This structure was erected on Fifth avenue, immediately west of Broad street, four stories in height with basement, and of brick construction.

VICTORIA PARK.

The railways and the railway lines directly connected with this "town planned industrial district" are: Canadian Pacific Railway, Canadian Northern Railway, Grand Trunk Pacific Railway, Great Northern Railway, Minneapolis and St. Louis Railway.

With the completion of lines for which bonds have been guaranteed by the Saskatchewan Government, there will be twenty-two railway lines radiating from Regina. The importance of Regina as a railway centre to the Grand Trunk Pacific Railway may be recognized when it is stated that this company is erecting a twelve-story hotel at the present time, to cost over a million; also a station, power house, laundry and train sheds costing approximately another million dollars.

The city authorities co-operate to every possible extent in making it profitable for industries located at Regina. When Regina first began to assure an industrial standing there were no spur track facilities, and all goods had to be loaded at the freight sheds. This caused a congestion at the freight sheds, teams being kept standing for a considerable time before being allowed to pull up to the unloading doors. There was a consequent excessive cartage charge. The system of spur tracks throughout the warehouse and factory district now makes it possible for each individual concern to load cars at their own factories, and by reason of the arrangement of the tracks, much of the inconvenience of the inter-switching is done away with. The City Council has under consideration a still further improvement which will mean much to the shippers. It is suggested that the spur track system be electrified, and whatever transferring or placing that may be required done by electric street cars operated under the Regina Municipal Street Railway Department. By this arrangement special attention will be paid to such inter-switching as is necessary at a nominal cost, and unnecessary delay will be avoided.


ALBERT COURT APARTMENTS.


ROYAL GEORGE APARTMENTS.

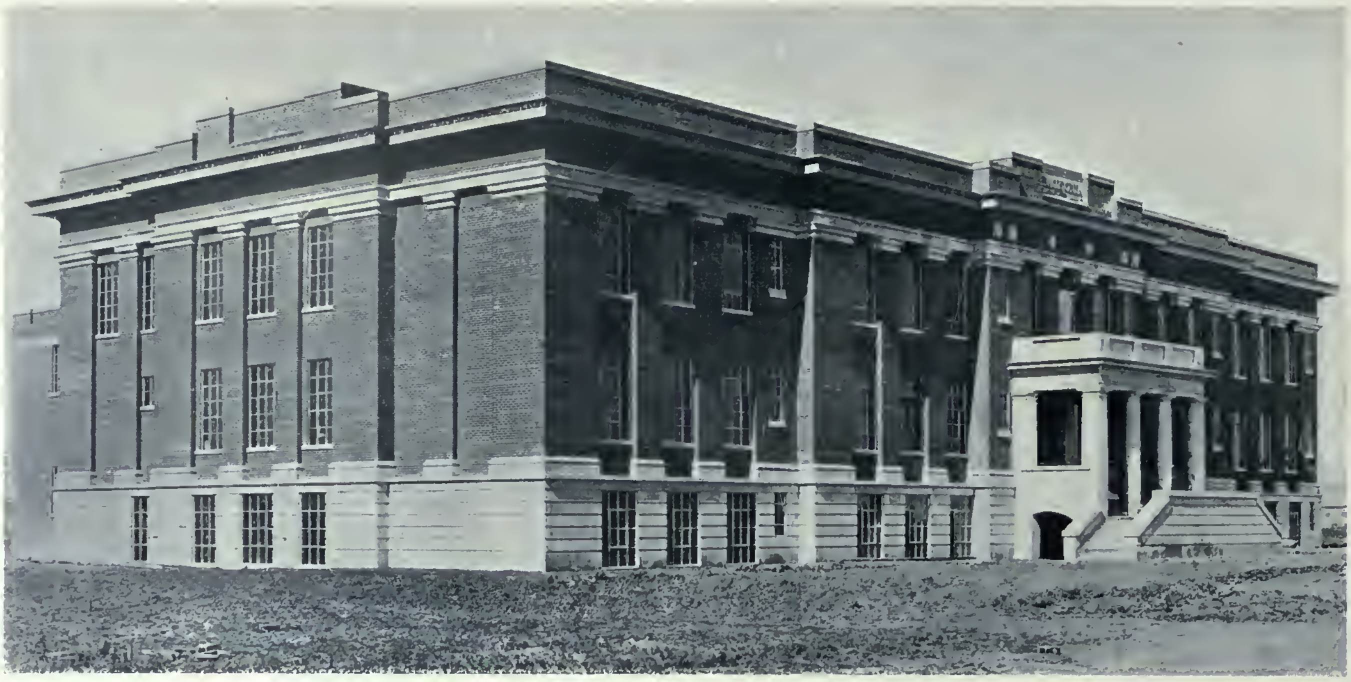
The new provincial jail at present consists of the main cell block, 60 by 200 feet, and administrative building 50 by 80 feet, with kitchen and chapel block about 40 feet square. The building is three storeys in height and of brick, stone and reinforced concrete construction, being fireproof throughout. The plans make provision for another block of similar dimensions, but it will not be built until needed.

Regina's scheme to solve the assessment problem for 1915 has met with very favorable comment, and from inquiries which have been made it is likely that other cities will take similar steps. The Regina scheme aims to secure valuations from the ratepayers and strike an equitable assessment on that basis. This step seems necessary owing to the fact that properties are not as realizable now as during the earlier part of the year.

The daylight saving scheme, which was given a practical test in Regina during the past summer, has proved more than satisfactory. The fact that the Chicago Chamber of Commerce executive of twenty-four business men voted unanimously in favor of the scheme speaks volumes for it and shows that Regina is not alone in this movement.

The convention, held at Regina recently, to further the aims of the closer community settlement scheme, was a decided success, the city hall auditorium being packed to capacity by delegates from all parts of Canada. Some very influential business men addressed the gathering.


EDDY APARTMENTS.



Connaught School, Regina

J. H. PUNTIN, Architect

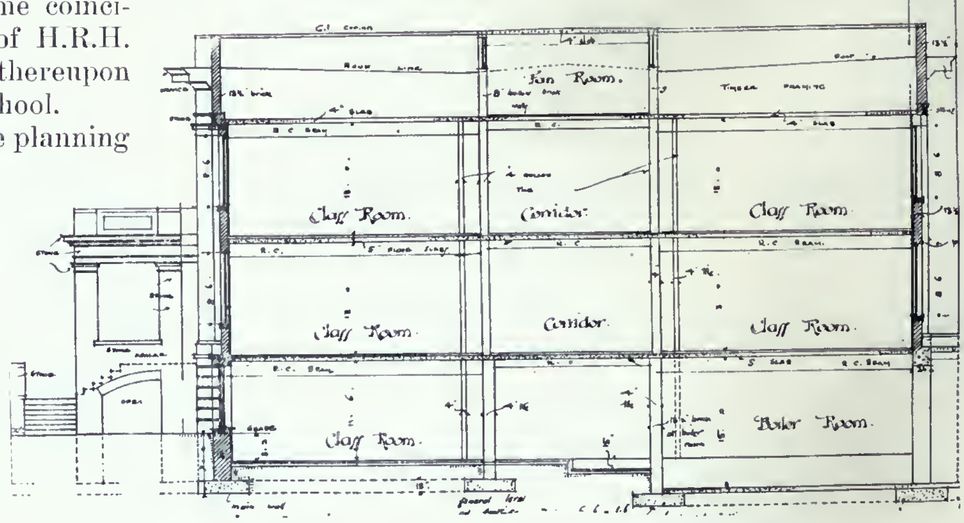
THE accompanying drawings and photographs illustrate the first of a series of three school buildings designed and erected during the years 1912, 1913 and 1914 for the Regina Public School Board, Province of Saskatchewan.

The schools of the city existing prior to the above date were mostly 8 and 12-room buildings, but the rapid increase in school population during 1911 and succeeding years demanded a larger type. After some months spent in travel, extending westward to the Pacific Coast, southward as far as Los Angeles, and through the Middle Western States, undertaken for the purpose of collecting information on the spot as to the result of recent developments in planning and equipping school buildings, Mr. Puntin recommended the adoption of the type treatment first exemplified in the building shown, which, commencing at a time coincident with a Western visit of H.R.H. the Governor-General, was thereupon known as the Connaught School.

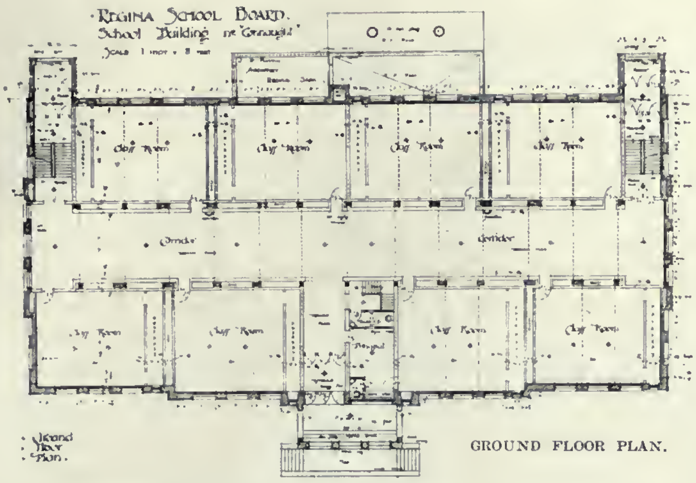
It will be observed that the planning of the building is comparatively simple, each floor consisting of a central hall or corridor, with class rooms arranged on either side. By always placing these buildings on the site with the main corridor longitudinally north and south, sunlight enters every class room daily, those on the east receiving morning sun, and those on the west the afternoon sun, while none of the rooms are exposed to the glare of southern exposure, which on the prairie is particularly trying in summer.

Another point may be noted regarding the position of main staircases, which are kept clear of the main corridor and separated from same by screen doorways glazed with wired clear plate glass. Noise of stair traffic is thus confined to the stair halls, cold is excluded, while at the same time perfect supervision is maintained. The carrying of main corridor, 18 feet wide, clear to outer walls of building without obstruction, enables same to be well illuminated by direct lighting, so that the scholars may be lined up and drilled in the halls without difficulty.

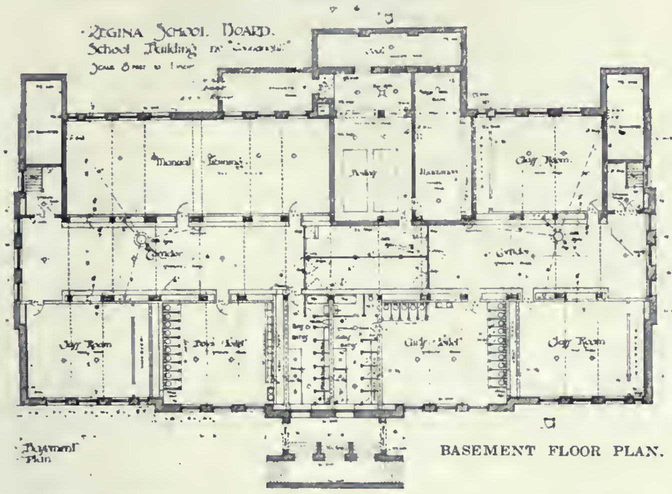
It will be observed, doubtless, that the



SECTION.



GROUND FLOOR PLAN.



BASEMENT FLOOR PLAN.

class rooms do not conform to 32 x 24 feet dimensions usually adopted in the States, but are generally 26 feet wide, and in certain senior class rooms 28 feet wide. The latter dimensions were adopted at the suggestion of educational advisers, who preferred to teach a class seven desks wide and six rows deep to a room narrower, having desks arranged six wide and seven deep. From the constructional standpoint, of course, the narrower standard has decided advantages, both on beam spans and loading, while as regards lighting the wider room requires special care on window dimensions and treatment.

Construction is fireproof throughout, reinforced concrete floor slabs carried on concrete piers at corridor and on walls at outer bearing. Interior partitions are of hollow tile throughout, and owing to the massed array of air ducts are doubled with a space of some 20 to 24 inches between the two lines of tile. By this means the class room is rendered soundproof, and wall surfaces kept unbroken, while in each class room a large stationary cupboard was enabled to be set back in duct space, thus taking no further projection into the room.

Owing to severe weather conditions prevailing during certain periods of the year in the West, the windows are double. The outer sash are of steel, divided into comparatively small lights, to minimize cost of repairs due to glass breakage, and having a portion, casement hung, opening outward. Inner sash are of wood set in wood linings and removable if required.

Class room floors are maple, dressed off, but not oiled, on 4 x 3 inch fir sleepers, embedded in cinder concrete on the floor slab. Owing to rapid construction the architect had waterproof roofing felt laid over the sleepers and cinder "fill" before laying maple, with the result that the latter has retained its even jointing. Corridor and staircase floors are in marble terrazzo, laid in panel effect to prevent irregular cracking.

The toilet rooms are provided in basement, being of generous dimensions, having shower and plunge baths adjoining. Walls and ceilings are white enamelled on cement, with white tile dado. Floors are of asphalt, which, although open to the objection of its somewhat dull color, proved so successful that all corridor floors and staircases in following school buildings were finished with this material. Partitions are of Vermont marble. Doors of toilet compartments are hung on spring hinges to open inward, so that when unoccupied the door stands back or wide open, by which means the teacher's inspection is facilitated and occupied compartments noted at a glance.

In accordance with the recommendations of Meyer J. Sturm, of Chicago, who was consulted on this question, plenum fans with air intake are placed in the machinery room of basement, with thermostatic and humidity controls working automatically on steam coils and washing screens. In fan room on roof, exhaust fans working at a slightly accelerated velocity, so as to slightly decrease air pressure in the building, remove foul air and discharge above roof line.

DETAIL OF MAIN FACADE.

Each class room has a duplicate set of inlets and exhausts, viz.: two sets of inlets and two sets of outlets, controlled by dampers and connected by means of galvanized air ducts with the fans. Corridors are equipped with plenum system only in order to minimize drafts, while toilet rooms vice versa are on exhaust system. By means of venting the closet bowls in toilet rooms with vents connected to duct space in rear, and in turn exhausting latter to roof fan, the toilet rooms have proved singularly free from odor.

The heating is accomplished by two 100 h.-p. boilers, operated at low pressure and assisted by complete vacuum system, with fittings throughout. Direct radiation is provided in each class room, automatically controlled by thermostats operating on air pressure valves.

Intercommunicating telephones connect each room with principal's office, while in each class room and corridor electric clocks, with programme attachment on the "Standard" system, keep synchronized time.

While desiring to provide good material and sound construction throughout, economy was kept in the foreground as an important factor in the design. The elevation treatment and interior finish are ornately simple, while the importance of providing special ventilating and sanitary equipment of superior quality and design caused the latter features to be grouped under a separate contract. Contract figure for all trades, excepting plumbing, heating and ventilating, amounted to $136,231; the other trades $31,860, making a total of $168,091, working out at a factor of 23.6 cents a cubic foot.

* * *

IN referring to the town planning in Regina, Malcolm Ross cites the Government as having secured the services of a man who has had a wide practical experience of such work in Great Britain, in several European countries and North America, so that it is reasonably certain if the plans submitted are fully carried out, that the results will show a combination of the high idealism evident in many American schemes modified by the practical expressions of such systems in older countries. The plan provides sites for handsome monumental buildings to be used for public and institutional purposes and also includes an area which it is proposed to develop as a residential district. In connection with this regulations have been prepared which will guarantee to the residents the continuance of good conditions and surroundings, and which will make it impossible for one resident to build or construct his buildings in such a way as to be a detriment to his neighbors. On this property the twenty-five foot frontage lot will be unknown, and areas up to two acres in extent will be available for homes so that opportunity will be afforded for the ambitious designer of domestic architecture.

In architectural features, Regina, for a city of its size, is very fortunate, for not only are there many well designed buildings, but opportunity has been found for placing them so as to form terminal features, and at the present time the view down several of the streets is completed by a costly building of excellent design. The general impression of the architecture seen on the residential streets is pleasing and the increasing use of brick and roughcast or pebble dash is giving an atmosphere of stability not usual nor expected in Western cities.

For a general town planning scheme, beyond what has already been done along this line with such excellent results, Regina offers an exceptional opportunity. The topographical features necessitate no costly engineering construction, such as is entailed in hilly and rocky country, and with the exception of a possible widening of portions of certain streets and the opening of a few diagonal streets, very little expenditure, beyond that normally required for city extension work, will be necessary.

* * *

ONE of the most disastrous fires that ever occurred in a manufacturing plant destroyed recently a part of the Edison works at West Orange, N.J. The fire broke out about 5.30 o'clock and before morning half of the plant was in ruins, involving a very great loss. The burning of this plant at once became a subject of widespread interest in engineering and insurance circles, as it involved the behavior of several types of buildings under unusual stress, including structures of reinforced concrete. The contents were of the most inflammable and heat-creating types, including wood used in the manufacture of cabinets, celluloid for films and wax for phonograph records, chemical supplies and other material of highly inflammable character. The burning of these materials subjected the buildings to the most intense heat. The floors in some of the concrete buildings were covered with wood, supported on wooden sleepers imbedded in the concrete, and here and there strips of wood had been imbedded in the concrete columns. So hot was the fire that not only were these wooden floors entirely consumed, but no evidence of the sleepers or strips remain other than the grooves in the concrete and the nails which held the floor down. The concrete slabs must have been red hot to consume the wooden sleepers in this way, and this fact is substantiated by actual observation during the process of the conflagration. In spite of this heat the concrete slabs in almost all cases are in perfect condition. In addition to floors of wood, the window frames were also of wood and the windows of plain glass. On every floor to which the flames gained access and ignited the contents, the latter was entirely consumed. Only the fire-resisting properties of the concrete floors saved part of the contents of the concrete buildings. Furthermore, had the concrete floors been unable to withstand the heat, there would undoubtedly have occurred an entire collapse of the buildings.

CONSTRUCTION

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

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

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TRADE NOTES

THE ENGINEER who is called upon to carry out work in Canada during the winter finds that the methods of construction which were satisfactory in the summer will need considerable modification to suit winter conditions. Concrete work, especially the lighter forms of reinforced concrete used in building construction, needs greater care and supervision. As a result of considerable experience gained during the last few years, it can be said that the freezing of concrete will not damage it if it has first had a chance to set under favorable conditions for about two days. The effect of the freezing is simply to delay the process of hardening, which will again proceed under suitable conditions, and will eventually attain its full strength. If concrete is frozen before it has commenced to set, it will not be injured if precautions are taken to prevent it from freezing again after it thaws until it is sufficiently hardened to withstand the effects of subsequent freezings. It is alternate freezing and thawing during the process of setting that causes the damage. To meet the foregoing conditions, when carrying out concrete work in winter, it is necessary to devise means of mixing the concrete with materials freed of frost, placing it in the forms before it has commenced to freeze, and then protecting it and keeping it warm for about two days. After that it may be allowed to freeze without fear of its being damaged. In the case of concrete-in-mass of large bulk it is unnecessary to apply external heat, as the large body of concrete will generate sufficient heat during the process of hardening to enable the mass to set; all that will be necessary is to protect the outside of the concrete so as to keep the heat in. This can best be done by covering the concrete with clean straw. For light sections of concrete, such as reinforced concrete, poured at a temperature not below 22 deg. Fahr., some engineers allow salt to be used in a proportion not exceeding ten per cent. There are many arguments for and against its use. The author prefers not to use it, except in marine works when the concrete is mixed with sea-water and the salt is admitted in that form. He has found that, instead of using salt, good results will be obtained for temperatures that do not fall below 22 deg. Fahr. by heating the water with a steam hose taken from the mixer boiler, and when necessary placing a few coke or wood fires on the heaps of sand and crushed stone, the usual precautions being taken to protect the concrete when in the forms, as described later. For lower temperatures than those referred to above, greater precautions must be taken to heat the ingredients by means of steam coils or radiators. The concrete having been mixed, and the portion of the work to be carried out decided upon, the floor immediately below it should be partitioned off with tarpaulins, and coke stoves arranged under the floor-slab, allowing about one stove to every eight hundred square feet of floor space. All loose dirt and snow must be removed from the forms with brooms, and a steam hose should be applied to remove all ice and frost, the steam playing continuously over the forms in advance of the concrete, thus warming them in readiness for the concrete. The concrete should be poured quickly and continuously, and as each section is completed a tarpaulin may be drawn over it, supported on wooden strips about six inches above the surface of the concrete. In most cases this protection will be sufficient, but during very cold weather it will sometimes be found necessary to form a sort of tent over the floor, in which extra stoves are placed to protect the workmen and the upper surfaces of the concrete. Great care must be taken to have the fires kept burning continuously for two days, after which the concrete may be allowed to freeze without fear. The work must be examined from time to time until it is found to be hardened sufficiently. During summer working the author has allowed the supports from the under side of slabs to be removed in four days, but on other occasions four weeks have not been found to be too long. There are many examples of concrete works which have stood the test of time without showing any signs of being affected by frost; but, on the other hand, a few cases have been reported of very serious corrosion due to the action of frost, such as bridge piers and reinforced concrete piles. Judging from the information available at present, concrete exposed in air in a dry locality need not be affected by frost any more than good building stone, and probably it will stand much better. Concrete always submerged under water is protected and need cause no anxiety. But concrete alternately wetted and frozen must be protected from frost. On work which is being carried out at Halifax, Mr. John Kennedy, M. Inst. C.E., is protecting the concrete piles between high and low water with a covering of wood about two inches in thickness, which it is hoped will prevent the action of frost.—Written by John Hammersley-Heenan, A.M.I.C.E., for *Engineering.*

* * *

THE LATEST bulletin received from the Herbert Morris Crane & Hoist Co., Ltd., illustrates the Morris worm-gear chain-blocks. Capable of lifting various weights, the problem of setting machines on their foundation, or hoisting same for repairs is readily solved. One diagram presents a block of only one-quarter ton capacity as compared with one with a hoisting credit of sixty tons. This is the largest standard chain-block made and stands a regular test of ninety tons, or fifty per cent. more than specified.

* * *

THE PIPE insulation contract for the new Utah State Capitol at Salt Lake City, R. K. A. Kletting, architect, and Jas. C. Stewart Co., contractors, was recently awarded to the H. W. Johns-Manville Company. The high pressure pipes will be covered with J-M asbestos-sponge felted pipe covering, a product made up of laminations of felt composed of asbestos and finely ground sponge. The heating pipes will be covered with J-M asbestocel pipe covering, which is built up on the arch principle. Sealed air channels run around the pipe instead of parallel with it, thus preventing the circulation of air and consequent heat radiation.

IN the erection of the Legislative and Executive Buildings at Regina the Kahn system was employed throughout in the reinforced concrete work, while the design was based on unit stresses as specified by the architects. All reinforcing steel was supplied by the Trussed Concrete Steel Co. of Canada, Limited.

* * *

TO CONSTRUCTION: In reference to "Standardization of Advertising Matter," the Council of the Saskatchewan Association of Architects, at their meeting on December 9th, passed a resolution endorsing the recommendations made by the American Institute asking advertisers to adopt standard sizes. The sizes mentioned in your article of the November issue are approved by this Association, and we would ask you to take any step that you think proper to bring these motions to the notice of advertisers.—F. Chapman Clemesha, Secretary-Treasurer.

* * *

THE refrigeration installations in the Sherwood store, Government buildings and Governor's residence were supplied by the Linde Canadian Refrigeration Company. The plant in the Sherwood store was installed for the purpose of cooling two showcases made of glass with four thicknesses, and six storage rooms, including a fur space. The entire cooling section has a total length of thirty-nine feet, breadth of twenty-three and height of thirteen. In addition to the above is an ice cream cabinet, all of which spaces are on the second floor. The work is accomplished by means of an ammonia compressor installed in the basement, which cools the brine circulated through the coils in the various rooms. The plant in the Government buildings is the same type of machine and arranged similarly to that in the Sherwood store. The spaces cooled are four rooms, in which perishable foodstuffs, used in connection with the luncheon rooms, are kept and stored, the ice cream freezers and cabinets being also cooled, etc., by the same machine. In the Governor's house is installed a small Co-2 machine.

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February, 1915 Vol. 8, No. 2

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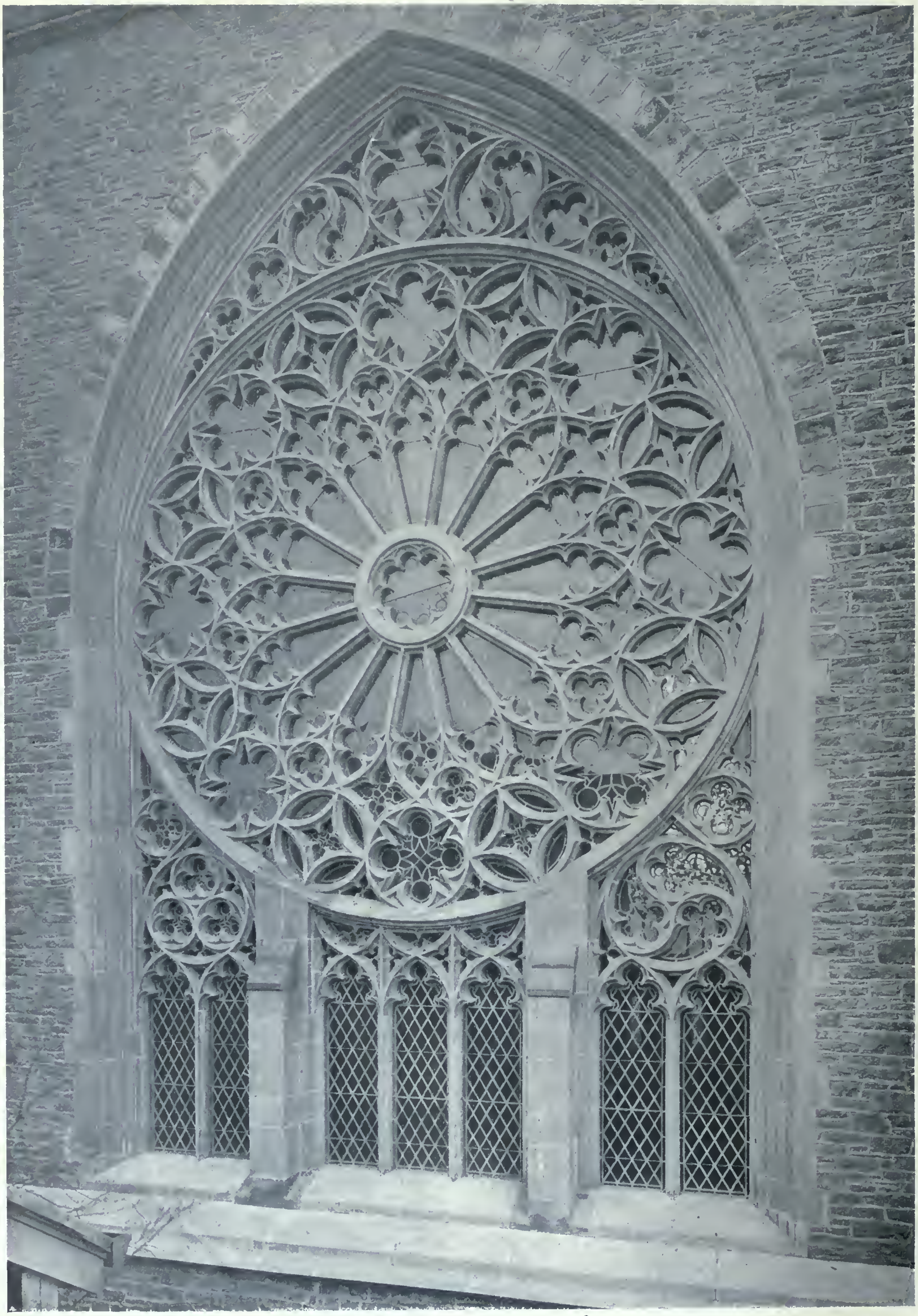


DETAIL OF THE ROSE WINDOW
IN TRANSEPT GABLES, ST. PAUL'S
ANGLICAN CHURCH, TORONTO.

The Conservation Commission in convention deals with the subjects of river pollution, forest loss by fire, and town planning throughout the Dominion.

THE SIXTH annual meeting of the Commission of Conservation, held in Ottawa, January 19, revealed the rapid progress of that organization in the handling of sanitary problems for Canada. The wide scope of its field and the efficiency of its members have and will produce results of lasting benefit to the people. It is surely gratifying to sense the work accomplished in respect to the hygienic conditions of our rivers. Already sixty-one sewage treatment plants have been installed throughout the Dominion. Still it is a matter of deep regret that the number is so small in face of the fact that there are fifty-seven systems of inland waters receiving raw sewage from one hundred and fifty-nine municipalities, while one hundred and eleven water supply systems are obtained from streams or bodies of water into which all kinds of pollution has been discharged above the intake points. This problem, along with the forest conservation and town planning, has been the outstanding feature of the Commission's work for the past year. Relative to the timber production, Sir Clifford Sifton states that the forest resources are over-estimated and that the year 1914 saw more fire loss than any other year since 1910. Here also the much deserved credit for the protective organizations established during recent years is overshadowed by the great need for even more efficient corps and much larger appropriations. The question of town planning has received more attention than all other problems. Practically every city and town in Canada has taken steps to improve the esthetic appearance as well as the practical nature of their thoroughfares, parks and public institutions. Better housing conditions have resulted and the standard of public health has been raised to a much higher plane. Still there are large sections of our municipalities suffering through the lack of attention, the conditions being identical to those so lamentable in other countries. The rapidly growing suburban sections, at least, should be safeguarded against such evils, both from a utilitarian phase as well as a humanitarian viewpoint. The maintainance of the Commission is comparatively small when contrasted with the incalculable benefits resulting through their consistent endeavor to bring the greatest good to the largest number. Preventative plans are more advantageous than the final recourse to remedial schemes. We hope the people will co-operate in every way possible with the furtherance of the work undertaken by the Commission, for herein lies the secret to the acme of sanitary conditions, economical progress and esthetic development.

The ecclesiastical work in relation to the present day needs and the symbolical character of its various parts in relation to the entire edifice.

TO BE ADMIRED by the layman and the critic on art, the ecclesiastical structure must impress one with a feeling of reverence. Character should express itself in the various details as well as in the general appearance. Nowhere can the love for gaudy display or the desire to "try a stunt" enter into the design. This might be permitted in a commercial building, the life of which is limited to a few years at the most, but not in the edifice erected to house an institution, whose very existence is founded upon principles of spiritual refinement, and which will stand as a forceful example to posterity of the sincerity and development attained during the present century. The designer of to-day is often held under restraint, either on account of petty jealousies or lack of resources. To plan with the same spirit that possessed the genius of former generations is impossible under our existing circumstances. The world is held in the throes of a commercialistic tendency which weighs heavily the value of the almighty dollar, a fact that has blunted the spiritual conception necessary for the evolution of a real home for worship. The character permeating the finished work of the conscientious architect during the Middle Ages was derived from a soul which was spiritually nurtured to comprehend the great teachings of the Bible and which knew no master except his own love for the beautiful. Naturally, then, do we turn to these examples for inspiration, and not in vain. And while we are erecting structures which in detail can be easily traced to a former period, still it is quite evident that the architect is not neglecting the matter of environment and is planning in accordance with present day needs and climatic conditions. An attempt is being made to erect the very best edifice with a definite purpose in view and a sincere regard for the materials employed and the natural surroundings. Many buildings convey the impression immediately of their absolute fitness to the locality in which they are placed. They also are more than a group of structural forms, for they comprehend the symbolical teachings and portray a certain amount of spiritual meaning. By grasping the exalted ideals of the Church so that the various parts are expressive of these ideals, the finished product cannot help but attain the standard of excellence revealed in the past and necessary for the future maintainance of the dignified attributes of Christianity. That the buildings presented herewith are evolutions of careful study in connection with forces which enter into Church work is very evident and should stimulate other efforts of a similar nature.

ST. PAUL'S ANGLICAN CHURCH, TORONTO.

E. J. LENNOX, ARCHITECT.

St. Paul's Anglican Church, Toronto

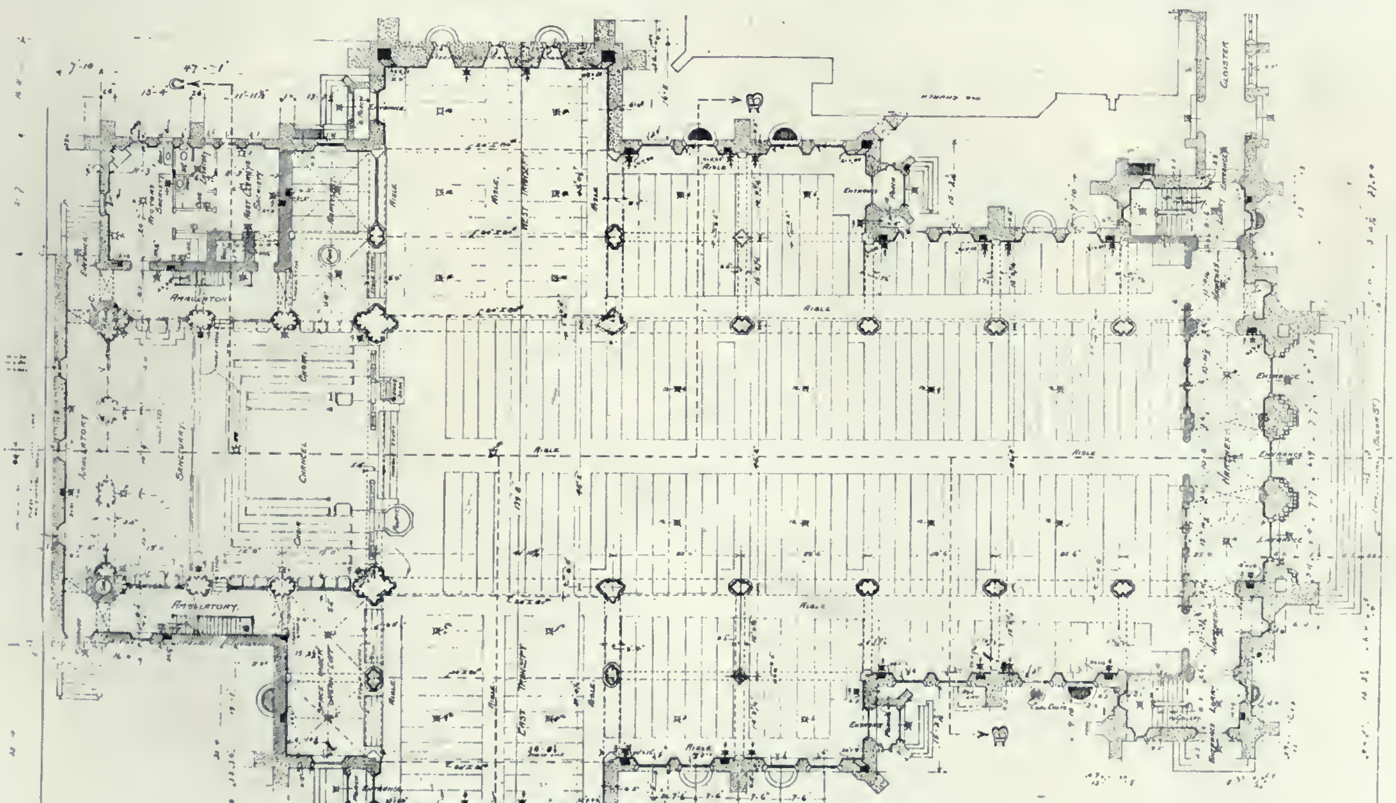
E. J. LENNOX, Architect

SYMMETRICAL dignity, while not essential to the temporary edifice, is indispensable to the permanent structure. In past ages the buildings which have become the inspiration of present day artists are those which reveal an innate desire upon the part of the architect to create a monument of noble proportions and harmonious relations of the various parts to the tout ensemble. Especially is this true of ecclesiastical work which strives to depict the lofty ideals of Christianity and the character which lies behind its outward manifestations.

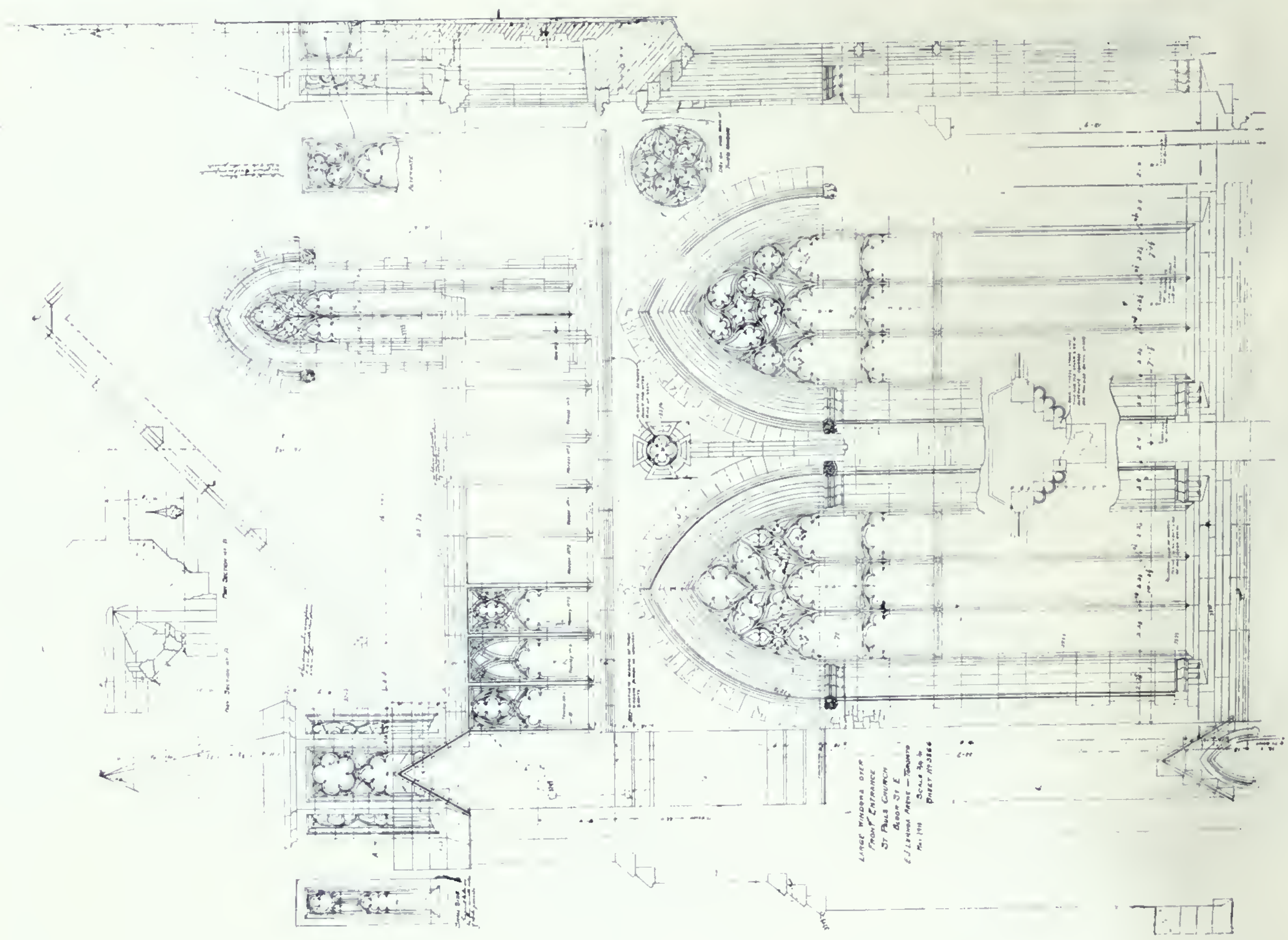
The modern church still reveals the wholesome attitude towards purity and truth, and while the examples of yesterday furnish ample material for study, still there are certain evidences of thought and personality permeating the work of the present day which tend to ennoble the house of worship. The following verse of Pope's, written to the Earl of Burlington when the latter published the drawings of Palladio's "Antiquities of Rome," meets with little sympathy by those who appreciate the large number of practical and chaste designs comprised in the realm of church architecture:

You show us Rome was glorious, not profuse,
And pompous buildings once were things of use.
Yet shall, my lord, your just, your noble rules
Fill half the land with imitating fools;
Who random drawings from your sheets shall
take,
And of one beauty many blunders make;
Load some vain church with old theatric state,
Turn arcs of triumph to a garden gate;

On the contrary, the endeavors to thoroughly appreciate the spirit of those early builders and derive from them the fundamental principles of unfettered art is producing on this continent many beautiful churches. Among these is included the new St. Paul's Anglican, located on East Bloor street, Toronto. In following the style of the early English and decorative period of the Gothic it presents a dignified and harmonious effect. Measuring two hundred and twenty feet in length, one hundred and forty in width, and ninety-seven in height, it is the largest church in Canada, with the exception of the Cathedral of Notre Dame in Montreal. Although planned with no galleries, the seating capacity is approximately twenty-five hundred,



MAIN FLOOR PLAN.



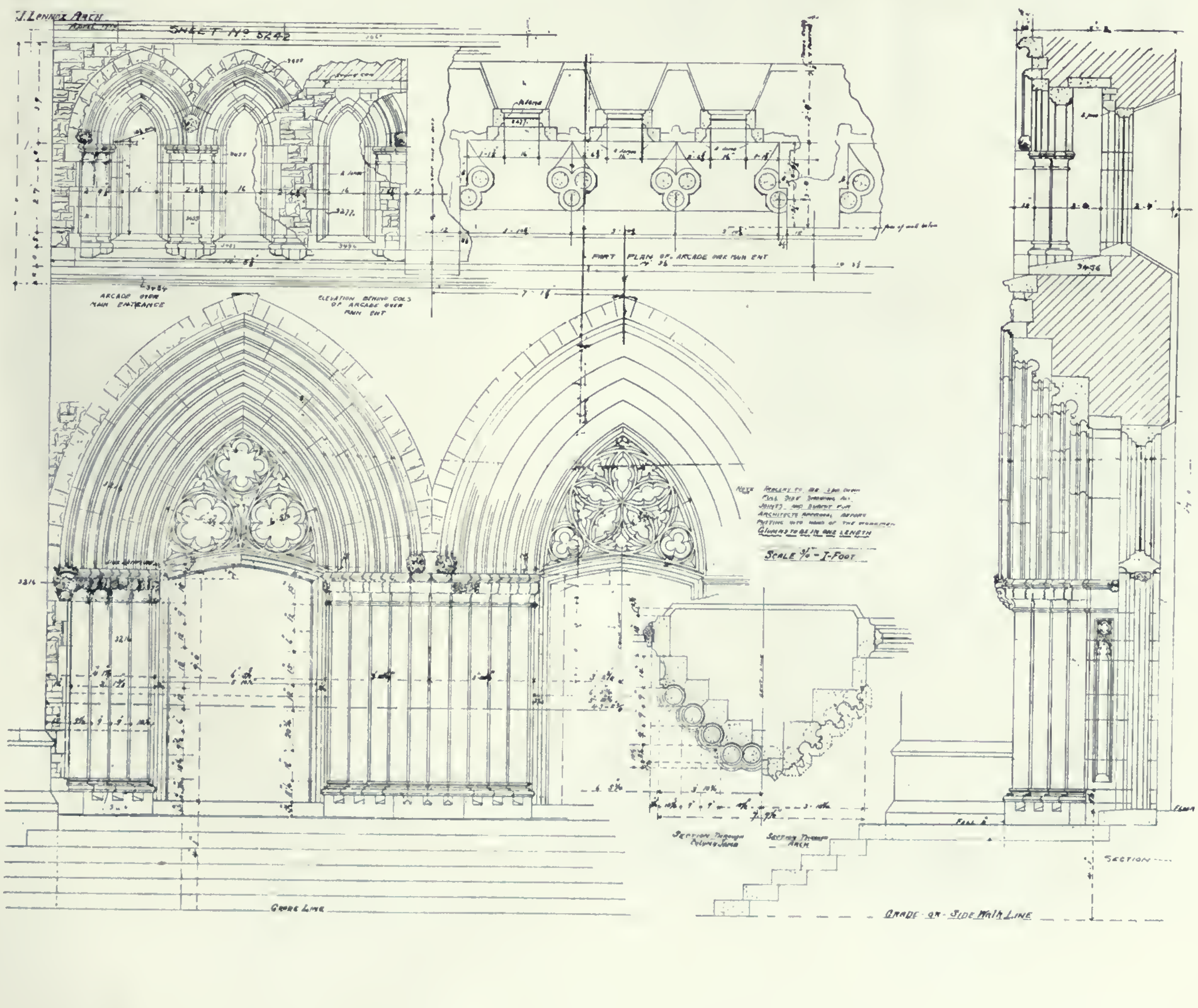
DETAILS OF WINDOWS AND GABLE OF MAIN ENTRANCE.

ST. PAUL'S ANGLICAN CHURCH, TORONTO.

DETAILS OF MAIN ENTRANCE.

ST. PAUL'S ANGLICAN CHURCH, TORONTO.

E. J. LENNOX, ARCHITECT.



with ample provision made for increasing this number. The size of the nave may be more readily appreciated by a comparison with other well known edifices:

Nave of	Length.	Height.	Breadth.
St. Paul's	152	91	76
Exeter Cathedral	140	68	72
Litchfield	173	57	67
Canterbury	178	80	71
Gloucester	174	68	84
Chester	145	78	75
Hereford	130	70	74
Westminster Abbey .	166	102	72

The interior is characterized by great light and space, a cluster of pillars separating the nave from the aisles, and the choir from the ambulatory. The arches in the choir are more pointed than those in the nave, and the mouldings are richer. The windows in the nave and transept clere-story are in threes, with traceried and cusped heads; in the choir they are in twos with deeper recessing and richer tracery. The corbels in the nave and transept are of stone angel heads, while in the spandrils of the choir angels are carved in various attitudes.

Ample provision is made on each side of the

INTERIOR VIEW, LOOKING TOWARDS CHANCEL.

The construction of the nave is in the form of stone columns with Gothic arches, springing from the same, above which is a clere-story, filled in with groups of stone-traceried windows. The chancel, forty-six feet wide and forty-eight long, conforms in design with that of the nave, the columns and arches being emphasized by cut-stone shafts and moulded lancet arches. Further emphasis is given to the chancel by an ambulatory formed around it, a feature generally pertaining to large cathedrals, but practically unknown in Canada. Extending along both sides of the nave are side aisles arched over to the main walls opposite each column.

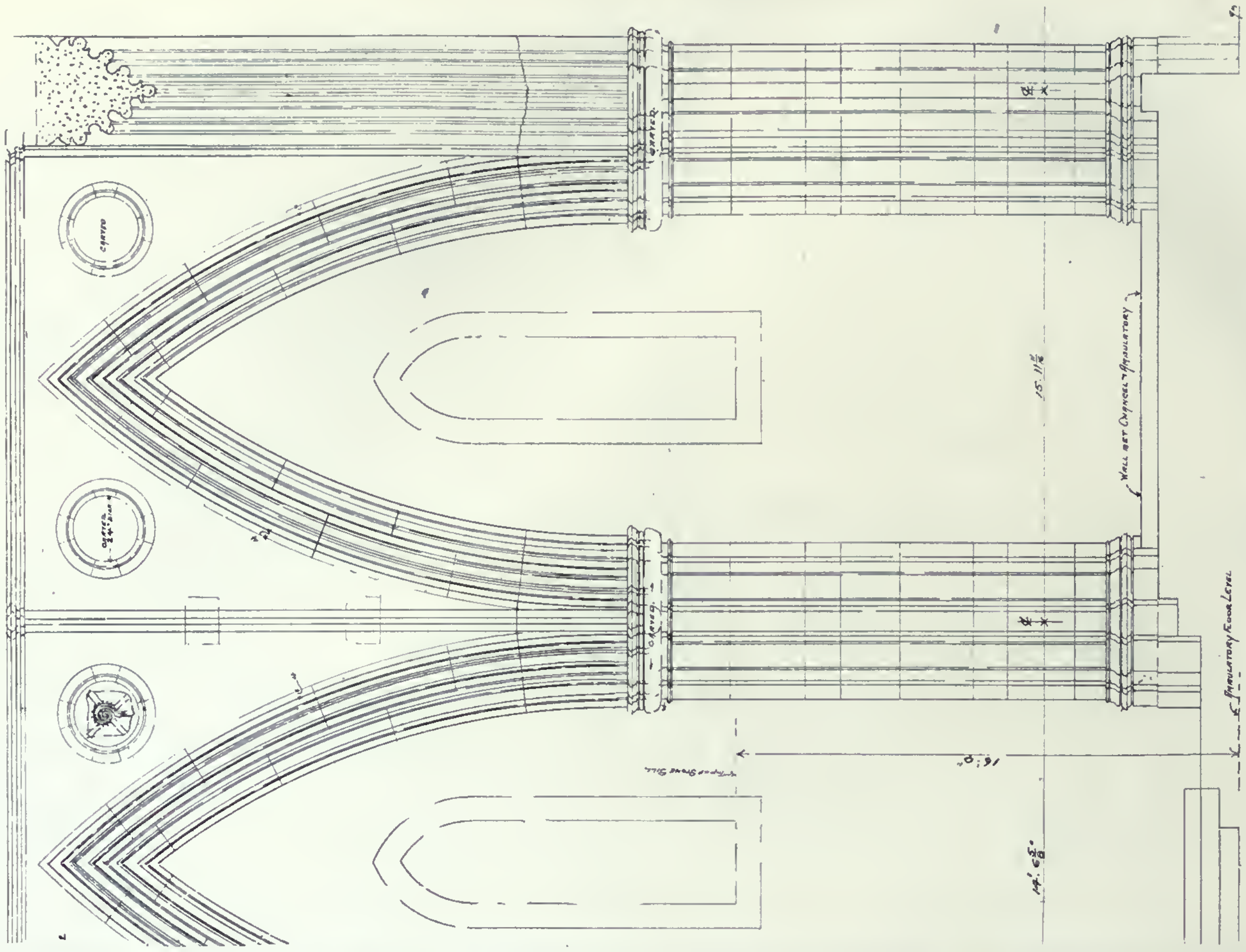
choir for the organ, by means of a lofty aisle in the transept. The floor is laid in composition stone flags; the aisles between the pews in composition red tiles; the choir in marble tiles—white, green and pink. The steps leading up to the choir and communion table are of white marble; the communion rail of green and pink marble. By means of the side aisles, two-thirds of the congregation are brought within seventy feet of the pulpit, while the choir and communion table are visible from practically all parts of the church. The three large traceried windows in the gable above the communion table rise over three lancet-pointed arches, behind which in the ambulatory are a corresponding number of small lancet windows. The effect of the light from these against the darker wall is to enhance the appearance of depth in the choir, which is not too deep to interfere with its practical purpose of providing adequate accommodation for the members.

Immediately inside the front entrance is a wide narthex, or vestibule, with groined roof, which forms the base of a gallery extending across the end of the building. The front of this gallery is formed by a beautiful cut-stone balustrade, with varied tracery in the arches. The roof is of open timber work, with Gothic tracery of a rich subdued color.

The pews and choir stalls are of dark oak, and add the needed touch of warmth to the gray stone interior and the soft gray finish of the walls. The pulpit is of carved oak, hexagonal in shape, enriched with cusped panels and figures. The communion table is also of oak, paneled and with elaborate tracery, finished on all four sides, and standing out on a marble tiled platform accessable on all sides. The electric fixtures are designed in harmony with the general architectural character of the building. They are of iron with dull finish, and hang by chains from the hammerhead of the roof on each side of the nave.

On the front facade there are three large entrance doors well impressed with splendidly designed arch mouldings and cut-stone tracery heads, all varying in design, above which there is an arcade with pointed arches, supported on isolated columns, extending across the front main and side wing gables. This arcade is decorated with columns and arched mouldings. Above this arcade are three large decorated windows—sometimes called "three-sister gables," constituting an attractive feature. These also are emphasized with columns and archivolt mouldings, and are filled in with stone mullions and variegated stone tracery. Above these windows is a stone tracery balustrade, set out in relief from the gable, characteristic of the typical cathedral front. Behind the balustrading rises, in plain relief, the main gable. The altitude from the sidewalk to the apex of the gable is ninety-seven feet. The gable is flanked on either side by heavy buttresses, which project about seven feet, terminating at each side of the gable in massive octagonal buttresses, which finish with variegated stone tracery pinnacles. On either side, also, are lower gables designed in har-


DETAIL OF INTERIOR.

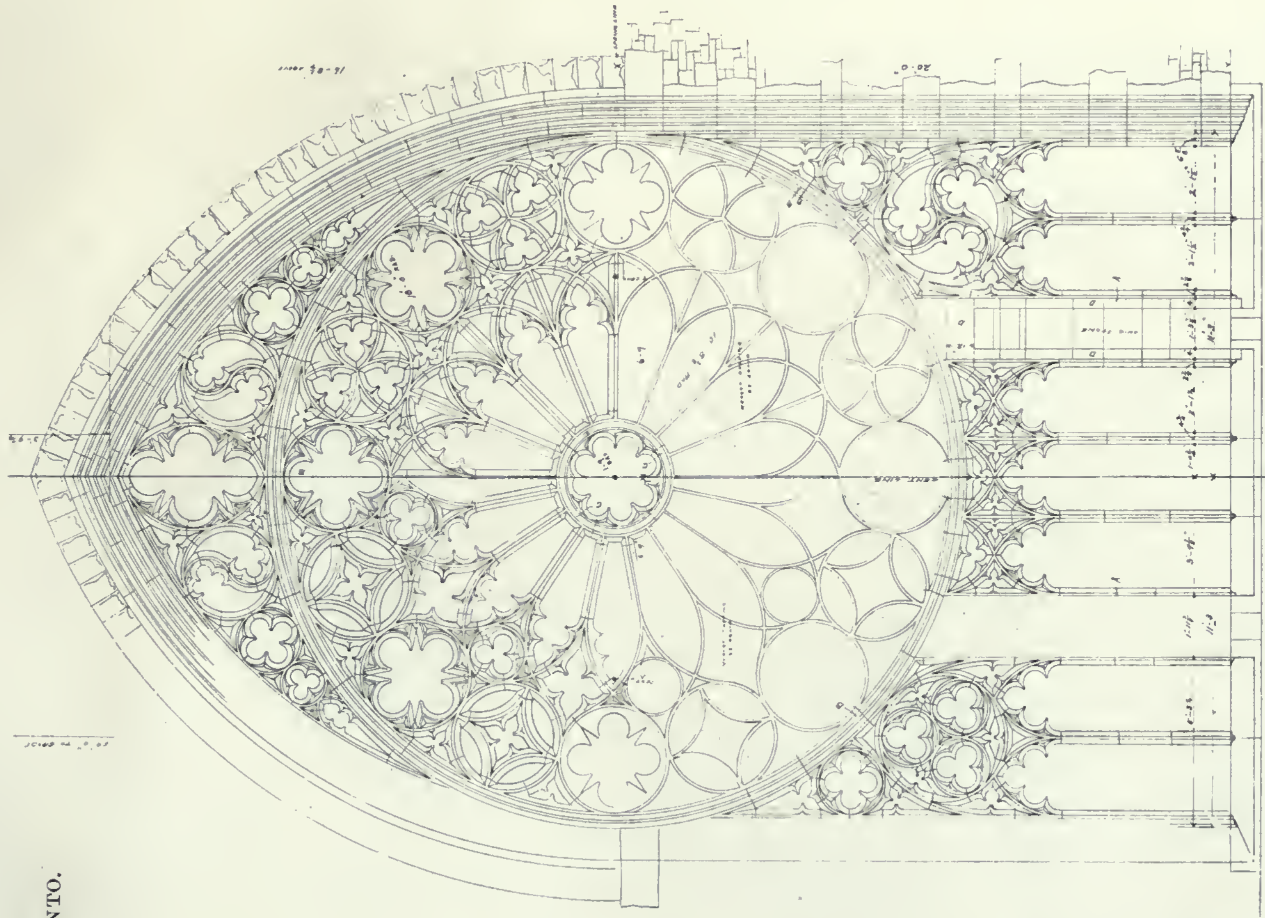


DETAILS OF CHANCEL PIERS AND ARCHES.

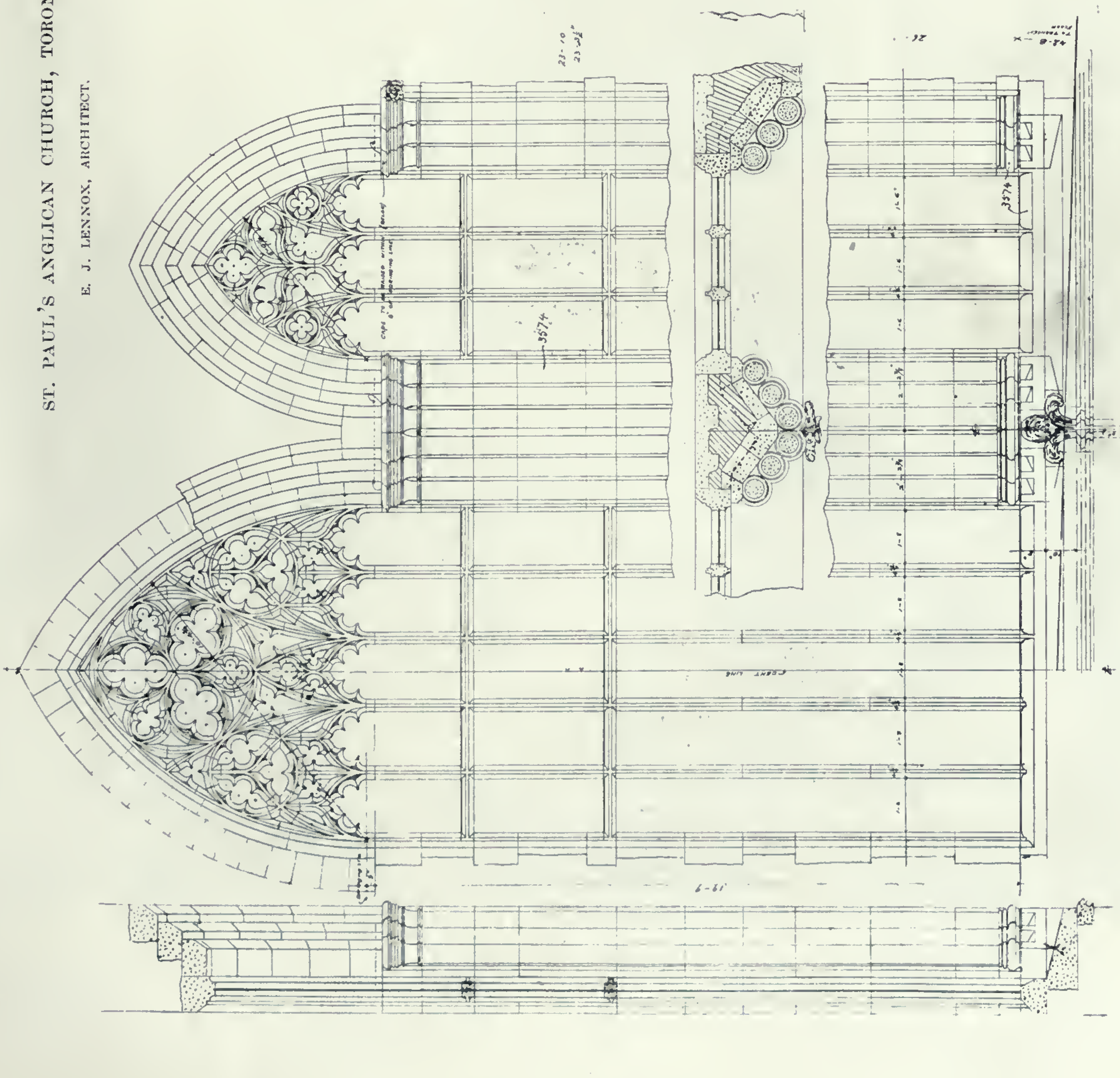
ST. PAUL'S ANGLICAN CHURCH, TORONTO.

ST. PAUL'S ANGLICAN CHURCH, TORONTO.

E. J. LENNON, ARCHITECT.



DETAIL OF ROSE WINDOW IN TRANSEPT GABLES.



DETAIL OF CHANCEL WINDOWS.

mony with the front gable. The stone-traceried windows and the balustrade, which are exquisitely varied in design, present a feature uncommon and striking in its attractiveness in the front facade.

The side elevations, which extend back two hundred and thirty-five feet, are emphasized by buttresses and large transepts in harmony with the front elevation—only that the detail is changed by the introduction of large rose windows, forty feet high and twenty-five feet wide, which take the place of the triplet windows in the front elevation. There is one of these rose windows in each gable, both showing individuality in design.

The structure cost approximately $350,000, containing every precaution possible to minimize the fire risk and insure perfect safety.

CHANCEL TABLE

Yonge Street Methodist Church, Toronto

BURKE, HORWOOD & WHITE, Architects

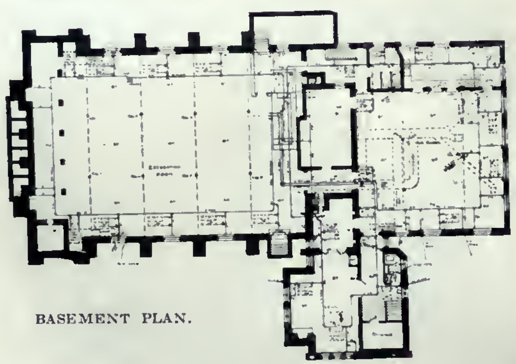
THE Yonge Street Methodist Church, standing at the corner of Summerhill avenue, is another evidence of the various denominational structures returning to the Gothic line of architecture. It presents a simple ornate treatment with the exterior in local gray stone. The church proper is fifty-eight feet by eighty-three, the Sunday school fifty-eight by forty-five, and the club room wing thirty-eight feet square.

The auditorium will seat nearly six hundred persons, the triple entrance off Yonge street being screened by a roomy vestibule extending across the entire width of the building, with staircases leading to the gallery. This end gallery in the auditorium accommodates about one hundred, while the gallery in the school section serves the junior classes when meeting with the main school. These junior classes are located in the wing above the parlor and vestry. The pulpit platform is located at the east end, backed by the choir and organ in a recess between the church and school portions, the choir accommodating some fifty singers. The wing on this floor provides for a large ladies' parlor, the main entrance to school building and the vestry.

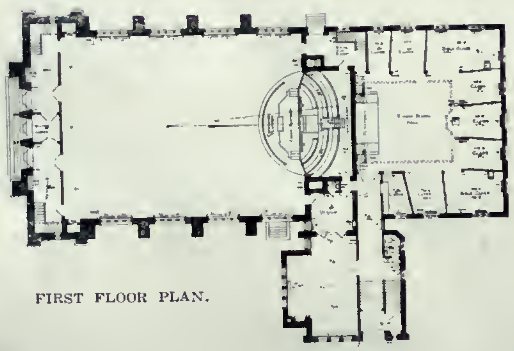
The school building contains the main room and eight class rooms, all of which can be thrown together by means of sliding doors. Conveniently placed in connection with this division is the library.

The basement beneath the auditorium is arranged as a large recreation room with a platform or stage at one end, and an outside entrance from the lawn in addition to an approach from the rear building. The basement under the Sunday school is devoted to the supper room, kitchen and lavatories, while the portion under the wing has a reading and club room with independent access from the street. The roof of the auditorium is carried on heavily framed, undressed timber of robust design. The heating is by steam, partially indirect, introducing fresh air, and the foul air is removed by ducts and heated flues. Cost, about $54,000.

VIEW OF MAIN AUDITORIUM FROM GALLERY.



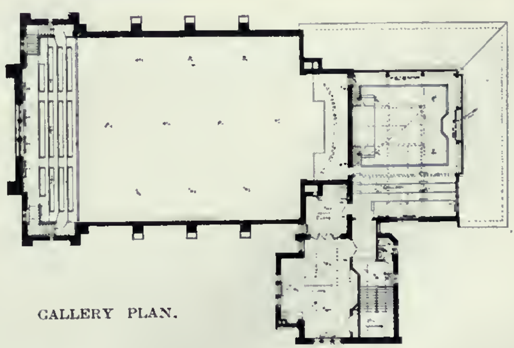
BASEMENT PLAN.



FIRST FLOOR PLAN.

YONGE STREET
METHODIST CHURCH,
TORONTO.

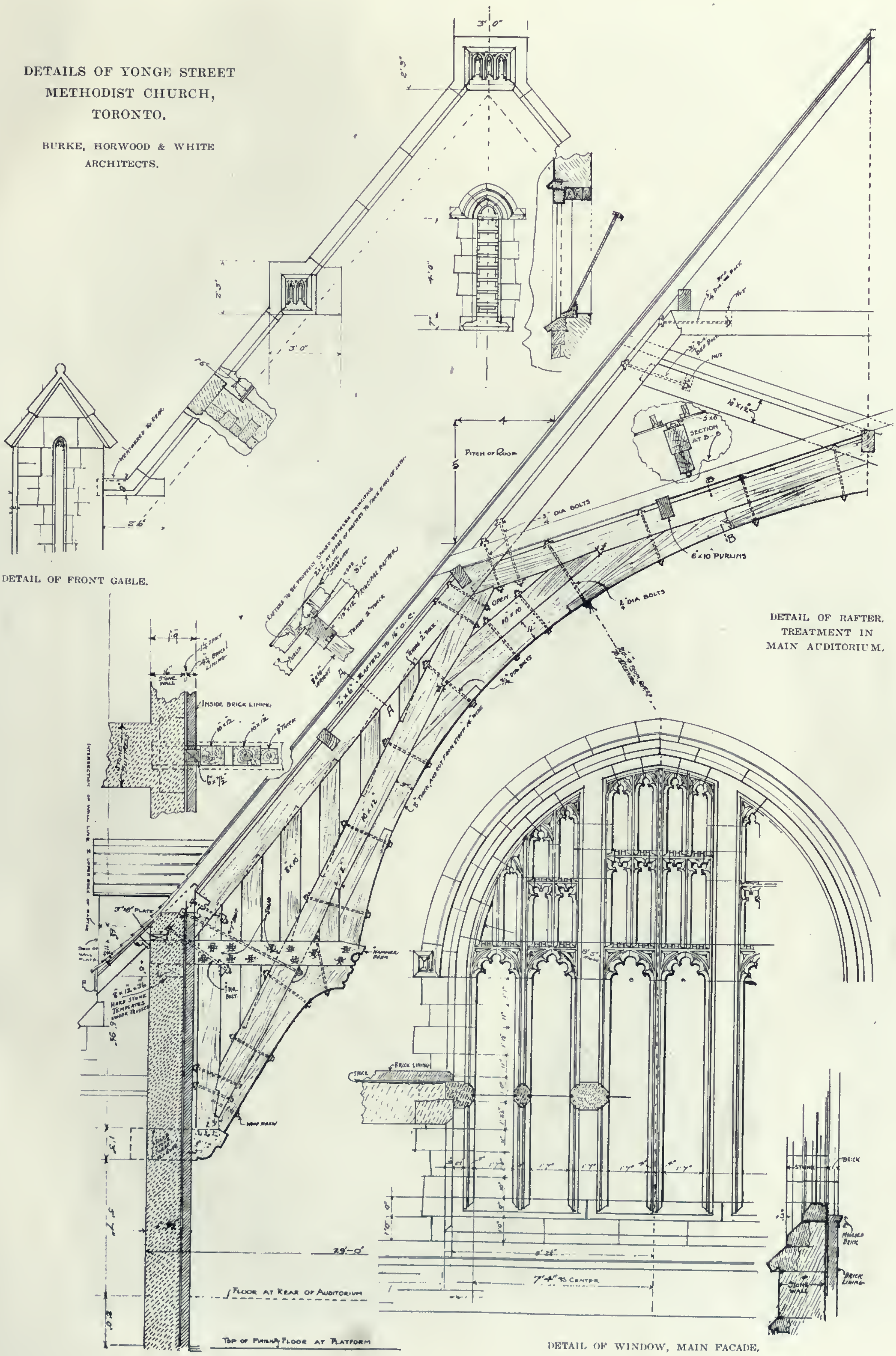
BURKE, HORWOOD & WHITE,
ARCHITECTS.



GALLERY PLAN.

DETAILS OF YONGE STREET METHODIST CHURCH, TORONTO.

BURKE, HORWOOD & WHITE ARCHITECTS.



DETAIL OF FRONT GABLE.

DETAIL OF RAFTER TREATMENT IN MAIN AUDITORIUM.

DETAIL OF WINDOW, MAIN FACADE.

TIMOTHY EATON MEMORIAL CHURCH, TORONTO.

WICKSON & GREGG, ARCHITECTS.

The Timothy Eaton Memorial Church, Toronto

WICKSON & GREGG, Architects

THE problem of ecclesiastical work is fast developing into a serious matter, due to the large annual influx of immigrants from other countries. So many sects, representing various devotional ideas, open up a field of unlimited possibilities. Were the various Provinces one religious community the designing of religious institutions would become a comparatively simple question, similar to conditions which existed in Europe during the Middle Ages. Each nation developed along one line a series of churches which present a high standard for each individual style. Here, however, we are forced to consider all denominations, making the different edifices a study peculiar to themselves.

One of Toronto's recent buildings, which reveals the character of church work being done in Canada, is the Timothy Eaton Memorial Church. The structure, while monumental, both externally and internally, is essentially practical, providing as it does for the greatest possible comfort in the way of unobstructed sight and sound. It has a frontage on St. Clair avenue of two hundred and thirty-eight feet and a depth of one hundred and thirty-four feet. It is built of grey stone with elaborately cut decoration, including the richly traceried windows. The main building with the Sunday school and belfry tower forms a most interesting group of buildings; with its ample grounds surrounded on three sides by streets, and set out as they are with a complete scheme of shrubbery. One of the interesting features of the building is the belfry tower, the apex of which is one hundred feet above the street level, and contains an installation of twenty-one bells.

The exterior and interior are designed in the late decorative period. The pews, pulpit, communion tables, organ cases, lighting fixtures and other furnishings were selected to harmonize with the treatment of the main building. The lighting fixtures are somewhat unique, the supports being of bronze, while the fixtures themselves have been made to harmonize with the decorative frieze, and are constructed with delicate open traceried work lined with silk, through which is obtained a soft light, the real illumination of the building being reflected from the ceiling. These fixtures can be lowered in a few minutes by means of powerful winches set above the ceiling.

The color scheme adopted for the interior is harmonious throughout, resulting in a delightfully

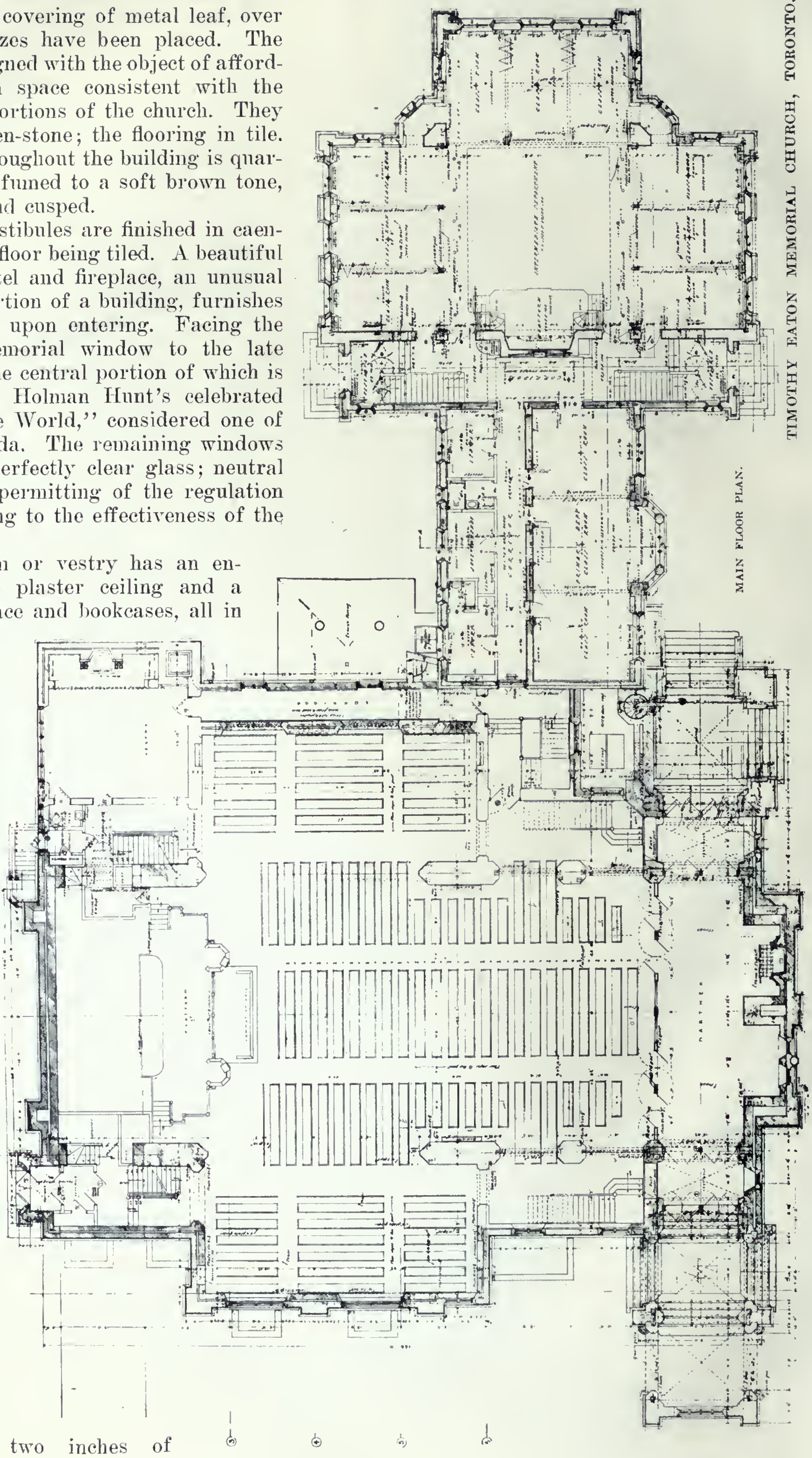
VESTRY.

warm effect. The decoration on the walls consists of an entire covering of metal leaf, over which colored glazes have been placed. The vestibules are designed with the object of affording the maximum space consistent with the architectural proportions of the church. They are finished in caen-stone; the flooring in tile. The woodwork throughout the building is quarter-cut white oak, fumed to a soft brown tone, richly traceried and cusped.

The spacious vestibules are finished in caenstone and oak, the floor being tiled. A beautiful Gothic stone mantel and fireplace, an unusual feature of this portion of a building, furnishes a welcome feeling upon entering. Facing the audience is a memorial window to the late Timothy Eaton, the central portion of which is a reproduction of Holman Hunt's celebrated "The Light of the World," considered one of the finest in Canada. The remaining windows are glazed with perfectly clear glass; neutral colored hangings permitting of the regulation of light, and adding to the effectiveness of the tout ensemble.

The board room or vestry has an enriched pendentive plaster ceiling and a recess with fireplace and bookcases, all in Gothic traceried quarter-cut oak and cut-stone. Under the auditorium there is a spacious room, decorated in light colors, adjoining which is the kitchen, equipped with sinks, electric and gas stoves, pantry fittings, etc., and the usual toilet rooms tiled and decorated. The main room will not only be used for banquets, but is arranged for interior bowling. Adjoining this is a room equipped with two bowling alleys.

The building has been designed with a view to obtaining perfect acoustics; the ceiling, instead of the usual plaster work, has two inches of



MAIN FLOOR PLAN.

TIMOTHY EATON MEMORIAL CHURCH, TORONTO.

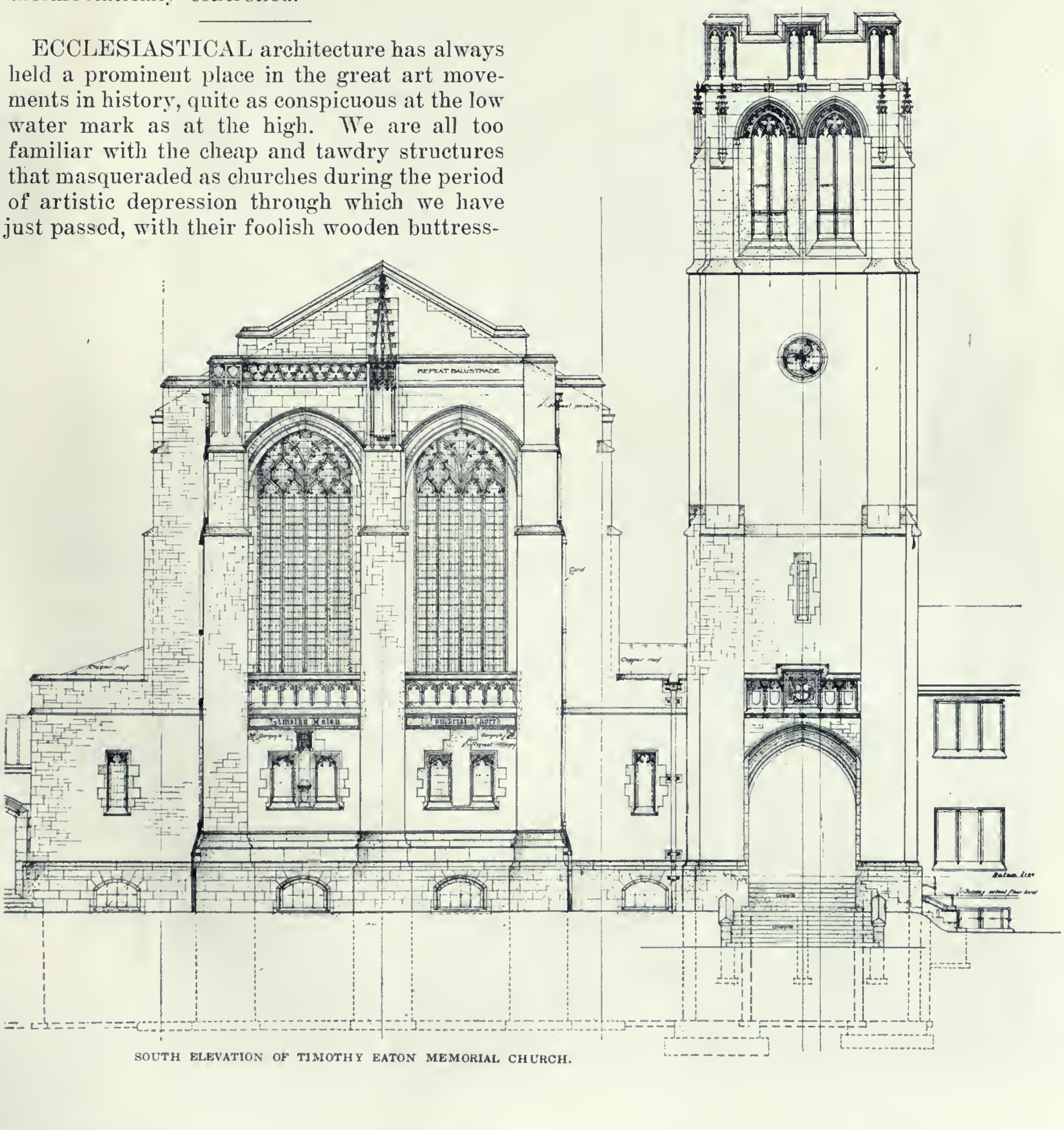
solid felt covered with repp. The organ is in a chamber with fronts facing two ways, and is complete in every way. There is also an echo organ, the air being supplied by two electric blowers. Not the least interesting feature of this church, and one rather unusual in this country, is the chime of twenty-one bells imported from London, England. These are operated from the floor just above the tower entrance, and practically any tune can be played on them.

The heating and ventilation are of the most modern type; air warmed to an even temperature is driven by a large fan into a space between the floor and the basement ceiling, entering the church through openings in the floor under the pews, thus getting an even and imperceptible distribution. There is installed another large fan for exhaust purposes. Both the heating and the ventilation systems are thermostatically controlled.

ECCLESIASTICAL architecture has always held a prominent place in the great art movements in history, quite as conspicuous at the low water mark as at the high. We are all too familiar with the cheap and tawdry structures that masqueraded as churches during the period of artistic depression through which we have just passed, with their foolish wooden buttresses and pinnacles, galvanized iron cornices and crockets, and contemptible ornamentation of all kinds. These fraudulent imitations that we have on every hand are rapidly being relegated to the scrap heap, or are being transformed, without much difficulty, into moving picture theatres.

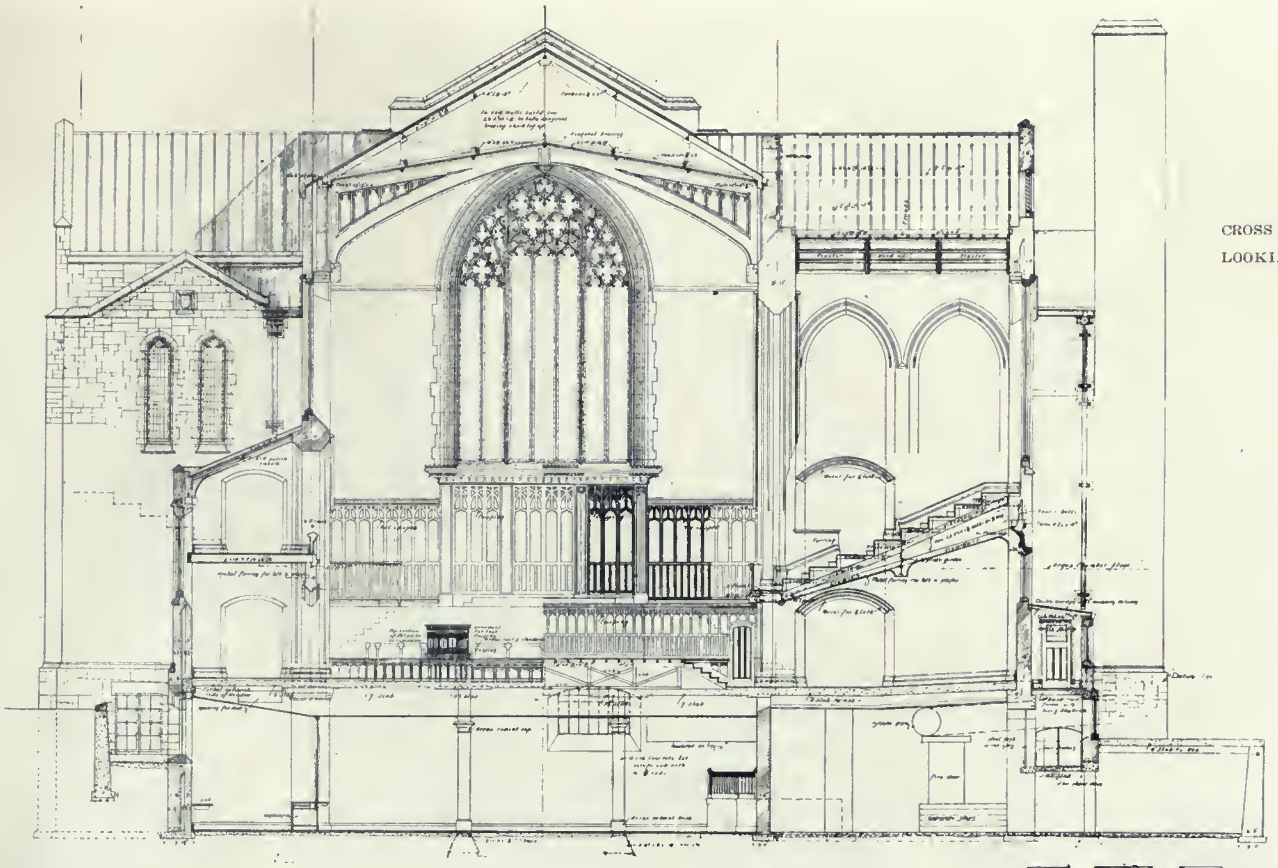
Compare these flimsy makeshifts with those matchless little buildings scattered so plentifully throughout the length and breadth of England; with their very intimate and human qualities which command so much of our wonder and admiration, and the result is certainly a sad commentary on the religious sincerity of the years just behind us.

It was during this age, however, that the first stirrings of a revival of good church building commenced, in a very small way at first, the study of the old models rarely going deeper



SOUTH ELEVATION OF TIMOTHY EATON MEMORIAL CHURCH.

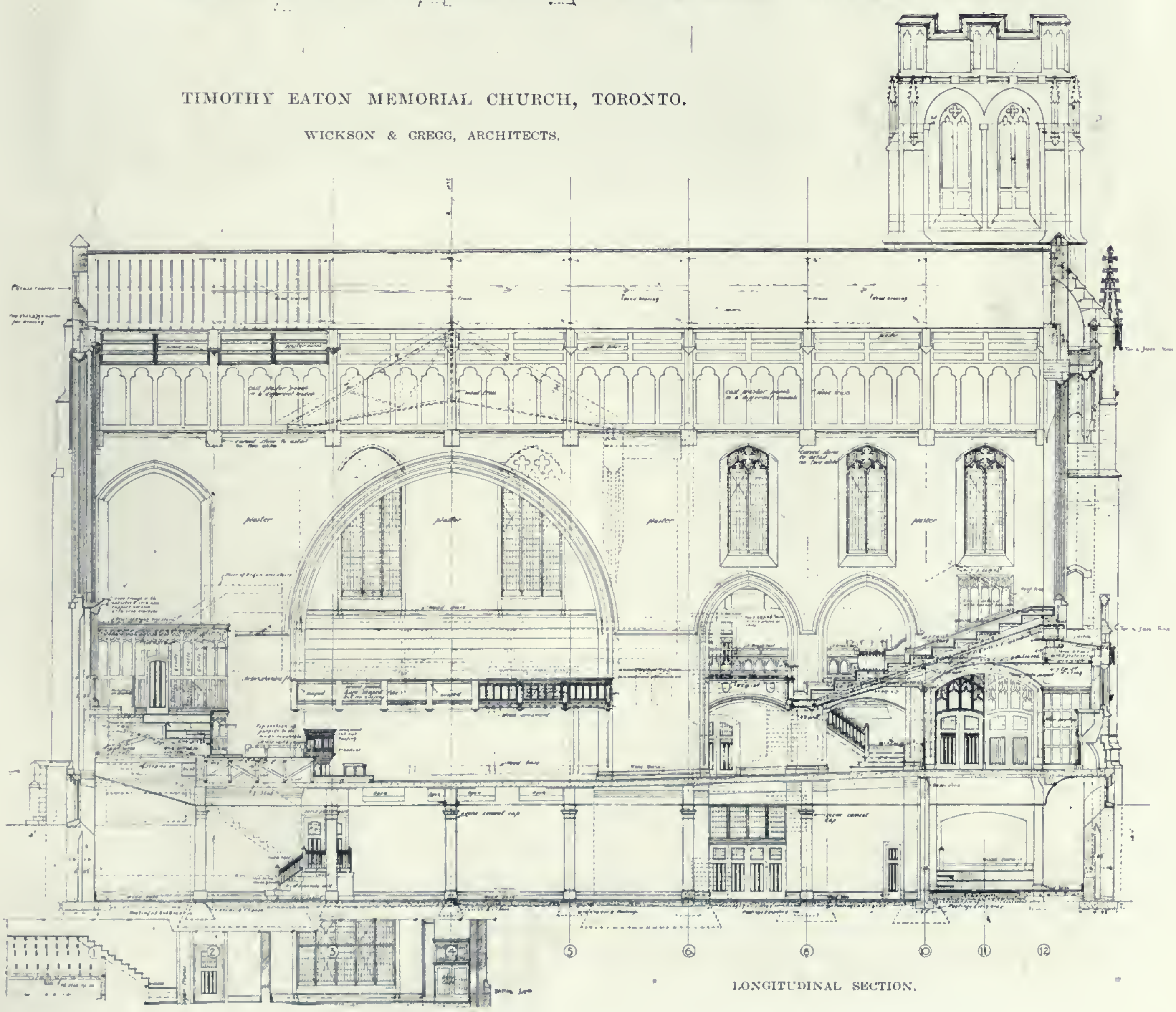
DETAILS OF PULPIT AND CHANCEL FURNITURE, TIMOTHY EATON MEMORIAL CHURCH, TORONTO.



CROSS SECTION.
LOOKING NORTH.

TIMOTHY EATON MEMORIAL CHURCH, TORONTO.

WICKSON & GREGG, ARCHITECTS.



LONGITUDINAL SECTION.

VIEW OF MAIN AUDITORIUM FROM GALLERY.

than the section of mouldings, or the patterns of the window tracery. But gradually the movement gained headway, with the result that the last generation saw great changes in the art of the church.

Under the leadership of the Pugins this movement began in England and was continued by Scott the Elder, Bodley, Pearson, Sedding and Paley; and in our own day by the younger Scott, Moore and Nicholson. In this country the work was taken up by Upjohn and Renwick, and continued by Vaughan and Messrs. Cram, Goodhue & Ferguson. In the hands of these men and their followers, there is hope that the churches of the coming generation will compare favorably with those of the Middle Ages. But, as art is a reflection of social conditions, we cannot hope to permanently establish a system of religious art without first producing those conditions which nourish it and encourage its growth. On the other hand, art is one of the most potent factors at the command of the church, and, did she but know it, one of the strongest agencies in freeing the people from that spirit of commercialism and materialism which is her worst enemy at the present time. We can, therefore, by a sincere and painstaking effort to produce noble church architecture, assist in establishing a condition of affairs which will make it possible to progress still further towards artistic perfection.

Whatever the form of worship for which the church is to be built, from the simplest to the most elaborate, it must be dignified inside and out. It must bespeak the purpose for which it is erected—the worship of God—and should be characterized by a solemn reserve and dignity.

Dignity does not necessarily call for symmetry, although a certain balance is desirable, but restraint is absolutely indispensable. Anything forced or overdone will ruin it, and, above all, any attempts at "picturesqueness" should be avoided. Nothing should be allowed to spoil that influence which we like to think a properly designed building of any kind has on the community. On the other hand, a too apparent striving after dignity sometimes produces quite the opposite effect, and the designer spoils his work by disclosing his tricks.

And this brings us to the much mooted question of honesty in design—not that this should apply to church building the least bit more than to any other structure; but in the same manner that we sometimes excuse an action in a hard-headed man of business that we would instantly condemn in the so-called church member, so we can tolerate an occasional sham in secular buildings that would seem like hypocrisy in the

VIEW OF MAIN AUDITORIUM FROM THE NARTHEX.

church. This may not be the ideal condition of affairs, but the fact remains that we must look to the church in all its parts as a model of honesty and genuineness.

The question of what is, and what is not, honest architecture has been much discussed, and the tendency of some theorists to stretch the dogma to the breaking point has resulted in much scoffing on the part of others. But to state it simply, it seems to me that honesty is merely the absence of deception, or, in other words, the absence of such frauds in a building as plaster decorated to imitate marble, furred plaster arches with or without painted joints, false chimneys built for the sake of balance, windows with shades pulled down permanently to hide solid masonry behind, grained metal doors and trim, and the like. Such things should be avoided by any self-respecting architect, whether in a church or any other building.

As the church in its broadest sense is undeniably a permanent institution, its outward and visible form, as embodied in its architecture, should be as enduring as it is possible to make it, and only those materials which have stood the test of time should be used in its construction. We can surely learn much from the builders of the Middle Ages; for while their masonry was not always the best, at least they built solidly; and their work, which has been now standing five centuries and more as a memorial of their sincere devotion to their church, will still be in active service long after our flimsy structures, built to the minimum allowed by building laws, will have been forgotten.

One requirement of the modern church which the mediæval builders did not have to contend with is the provision of an unobstructed view of at least the pulpit from the majority, if not all the seats. In the days when the service of the church was a vital part of the religious life of the people, when the direst calamity that could overtake an individual was to be cut off from the privileges of its sacraments, the attitude of the individual towards the accommodations provided for him by the church was quite different from that of to-day. Consequently such minor matters as interrupted views, insufficient illumination, or lack of an adequate heating system were not deemed worthy of consideration.

But to-day the situation is different. We must be comfortable in our pew; our prayer-book and hymnal must be well lighted; the temperature must be seventy and uniform, and we must see and hear as well from our pew as we do from our chair at the opera. This last condition is not always easy to meet.—*E. D. Robb.*

ST. JOHN'S EPISCOPAL
CHURCH, SASKATOON.

THOMPSON, DANIEL &
COLTHURST, ARCHITECTS.

St. John's Episcopal Church, Saskatoon

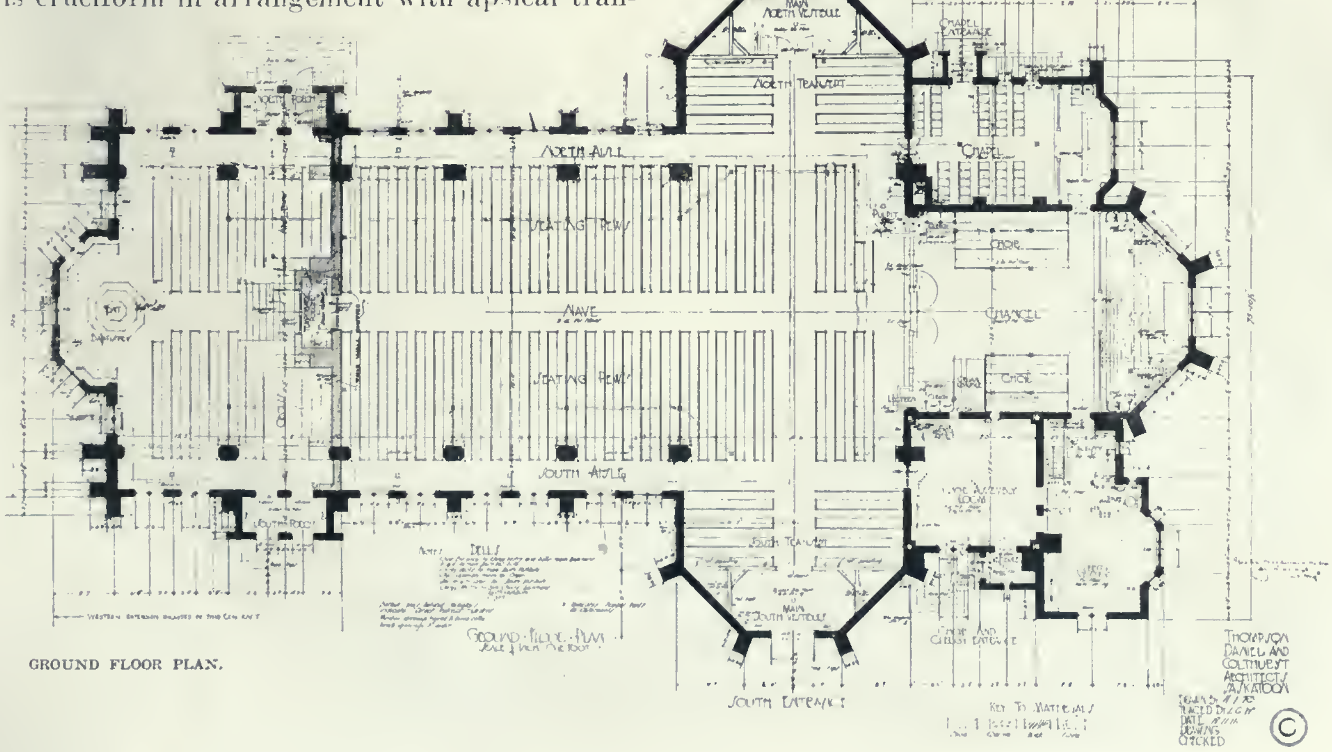
THOMPSON, DANIEL & COLTHURST,
Architects

"It is impossible to understand the development of church architecture without realizing its intimate connection with that of the doctrine, organization and ritual of the Christian Church as a religious community. In general it may be said of church architecture more truly than of any other, that artistically it is 'frozen music.'"

ECCLESIASTICAL work in the Western Provinces has hardly kept pace with their commercial activity; although several church edifices are exemplary of an abiding confidence in the sane and permanent growth of this section. Prominent among the more important buildings is St. John's Church at Saskatoon, by Thompson, Daniel & Colthurst, architects. The exterior is of Redcliffe brick, with all ornament and tracery of buff terra cotta; the base of a local rough faced granite; the roof of shingles laid with a design in dark grey and red upon a light grey ground.

The plan shows seating accommodation for eleven hundred, including the choir and chapel; is cruciform in arrangement with apsical transepts and chancel. The only portion of the building with basement is the chapel and the chancel, utilized for choir vestrys and heating chamber. Owing to the east end of the building being the main approach and the chief view, it was considered wise to place the spire at that end of the church, using the portion of the tower over the choir assembly room for the organ equipment.

Access to the chapel is provided from the exterior, also from the north transept, while the clergy have access through the chancel from



GROUND FLOOR PLAN.

the vestry, special attention being paid, in planning, to the convenience of processions. The main pillars supporting the clerestory walls are so placed as to obstruct the view of a minimum of the congregation. The chancel is divided from the nave by a rood-screen and dwarf wrought iron railings.

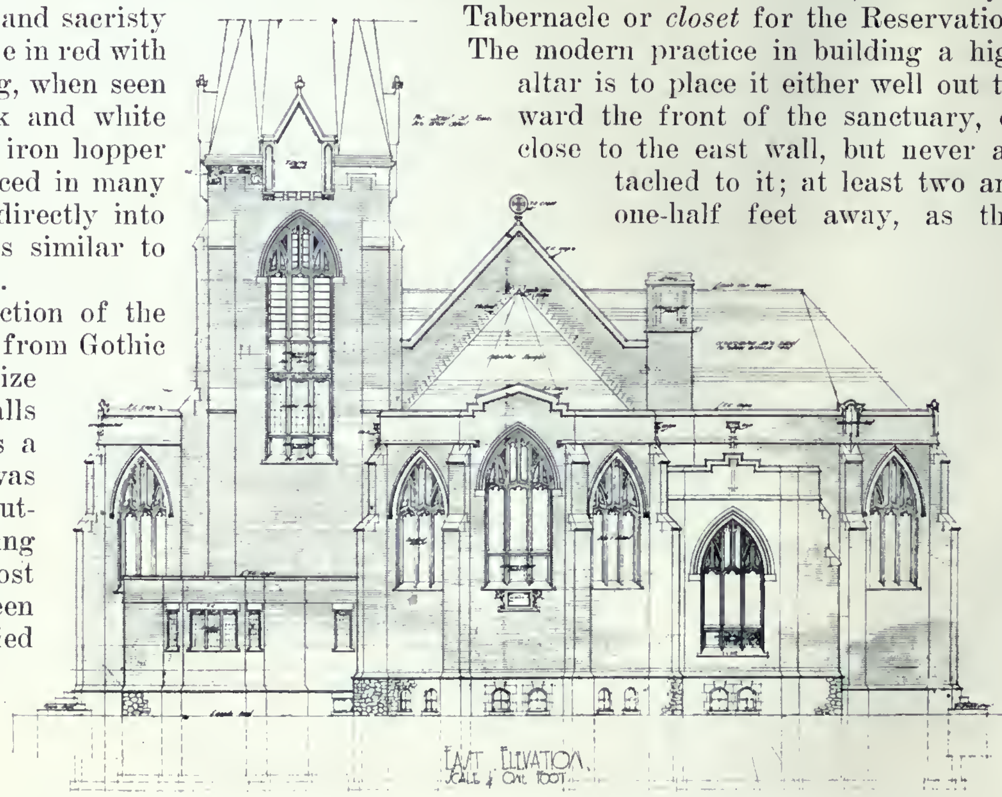
The interior is lined with a buff brick harmonizing well with the terra cotta dressings. The rood-screen, pulpit, lectern, altar and reredos, together with the font, are of white Carrara terra cotta in a dull glaze. The finish of the roof shows a richly ornamented hammerbeam design in Georgia pine; the panelling, doors, seating, etc., being all in oak. The effect gained by flooring the chancel and sacristy with nine-inch quarry tile in red with a wide joint, is pleasing, when seen with the interior brick and white terra cotta. Wrought iron hopper ventilators are introduced in many of the windows, fixed directly into the terra cotta grooves similar to the glazing throughout.

The general construction of the building is a departure from Gothic tradition. To economize upon thickness of walls and heavy foundations a system of curtain-wall was decided upon; the buttresses and pillars being carried down below frost level; the walls between buttresses being carried upon reinforced concrete beams. The exterior walls are divided into small panels so that they could have a uniform thickness of twelve inches, made up of the interior and exterior veneers with hollow tile centre or core.

Steelwork is used throughout the tower and spire, also in the roof trusses; curtain wall construction in the spire, while the foundations of this portion are of reinforced concrete. It was arranged when calling for tenders, that a portion only of the edifice could be erected, at present, if so desired, but when it was found that the building could be completed under the estimated cost it was decided to proceed with the entire structure.

The heating system adopted is the direct-indirect, by which fresh air is introduced through the radiators, and can be regulated by means of hit and miss grids. The excavation, drains and foundations were let upon a percentage basis, and cost $13,000. The contract for the superstructure complete was $103,000, making a total of $116,000.

THE Christian altar is a tablelike construction upon which the eucharistic sacrifice is offered. When fully developed it consists of a number of parts: a Mensa or table, a Predella or platform, a Ciborium or canopy, a Retable or steplike shelf, a Reredos or screen, and lastly a Tabernacle or *closet* for the Reservation. The modern practice in building a high altar is to place it either well out toward the front of the sanctuary, or close to the east wall, but never attached to it; at least two and one-half feet away, as this

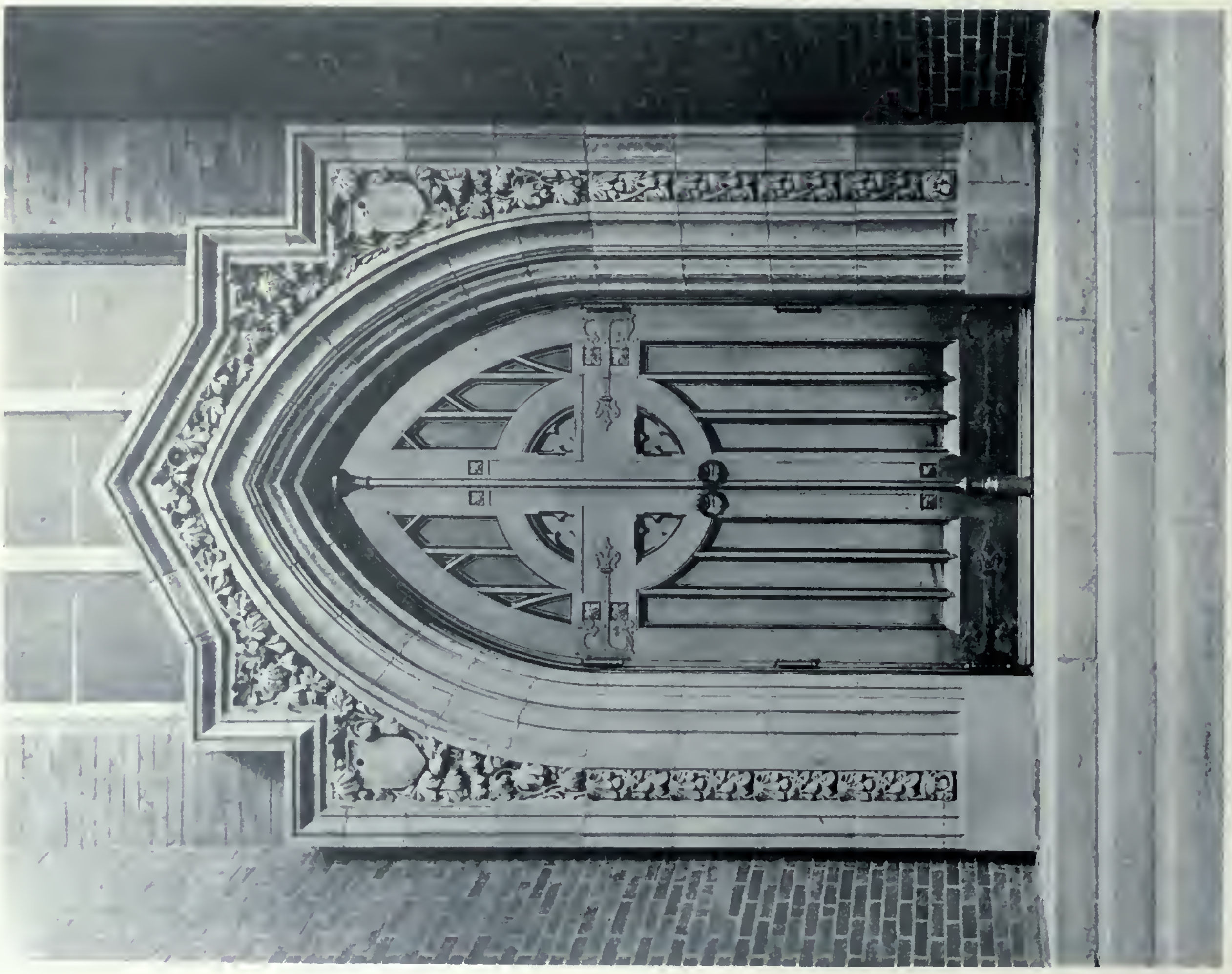



ALTAR.

space is needed as a passage, not only at the time of consecration, but at all times for the convenience of the sacristan. The altar itself is built on a platform projecting not less than four and one-half feet in front of the altar and at least fourteen inches at the side; this predella or foot-pace corresponds in length with the mensa, plus fourteen inches at either side, and would not be approached by less than two steps, with treads twelve inches to two feet wide and risers four and one-half inches high. If there is a reason to raise the altar higher, more steps are added, but always an uneven number, and never more than nine. The table, or mensa, of the altar is rectangular in form, a single, natural stone, seldom less than nine feet long and two feet wide, square at the edge, and supported upon stone piers, columns, a solid or hollow stone foundation, but never upon brackets, bricks, or artificial stone; these supports are covered with wood, stone, marble, mosaics, or metal, and ornamented in a manner consistent with an altar and in keeping with the style of architecture of the church; the mensa extends beyond its support, both at the front and sides, and on its upper surface five crosses are cut: one at each horn or corner and one in the centre, on the cover of a small square shallow cavity called a Sepulchre, a receptacle for relics; the height of the mensa above the foot-pace is three feet five inches. When the altar is very long the table is made of three slabs, but the centre one is alone the mensa, or in case the table is made of other material than stone or marble, there is inlaid in its body, midway between the south end (the Epistle side) and the north end (the Gospel side) and at an equal distance from the back and front edge, a Super-altar of stone which is the true mensa. Where there is a retable it is either as long as or longer than the mensa, and is built at its back or east edge, but never encroaches upon the same.

In the Primitive Church all altars, outside of those in the Catacombs, were made of wood, that is, until the time of Pope Evaristus (112 A.D.), who is said to have condemned their use, which prohibition was subsequently strengthened by Pope Sylvester (314-355 A.D.), and later on formulated by a Council of the Church. Throughout Western Christendom stone altars have been in use for ages, and even when wood or metal was employed the part of the altar on which the chalice and paten are placed was invariably made of stone. In some of the Oriental churches wooden altars are not unknown, although stone is the material of which they are usually built, except among the Copts, who sometimes employ brick. All of the first altars, both in the East and West, whether made of wood, stone, marble, or metal, were very simple, and consisted of a slab (mensa), resting on one or more legs, or on slabs at each end of the mensa, or on brackets projecting from a wall, and when in use covered with linen and silk embroideries studded with gems.—*Coleman.*

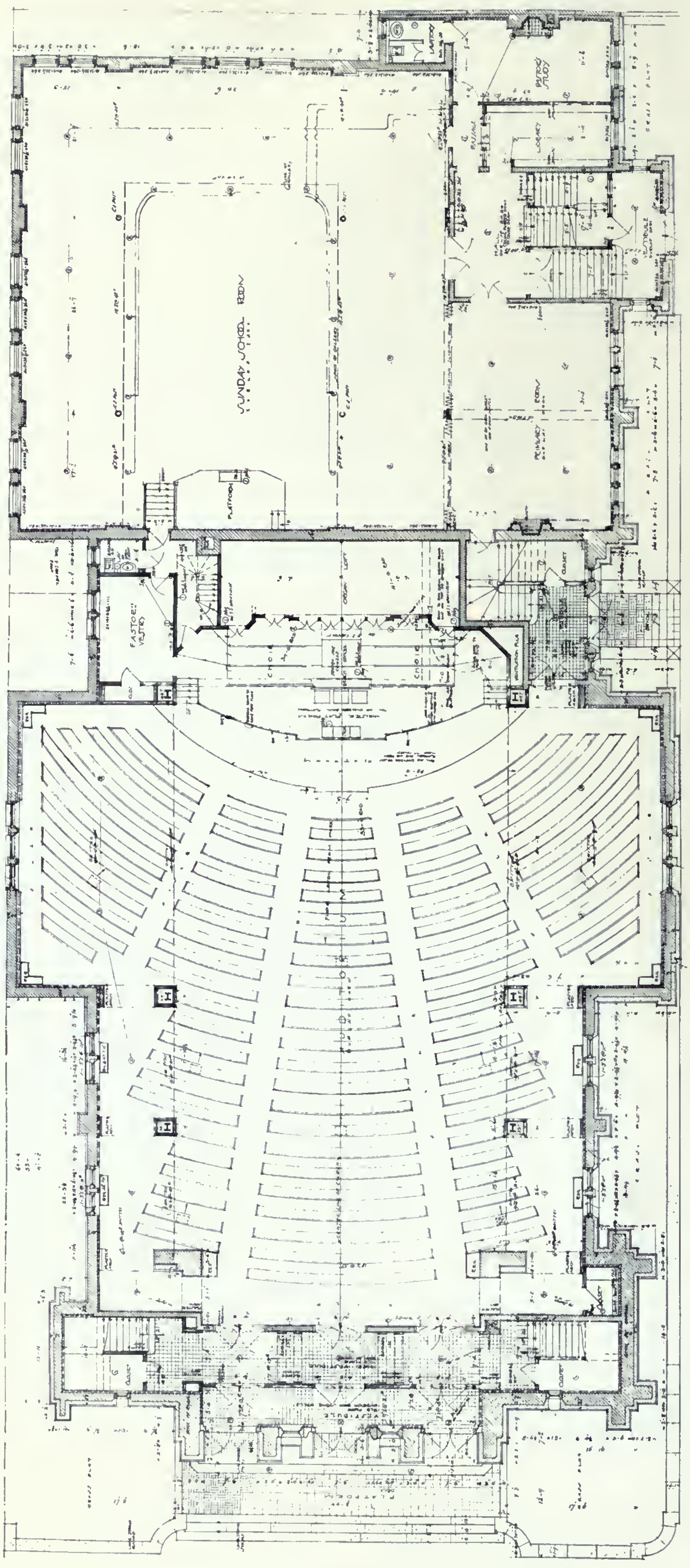

ROOD-SCREEN.



ENTRANCES TO ST. JOHN'S EPISCOPAL CHURCH, SASKATOON.

THE FIRST PRESBYTERIAN CHURCH, MONTRÉAL, QUE.

HUTCHISON, WOOD & MILLER ARCHITECTS.



FIRST FLOOR PLAN.

First Presbyterian Church, Montreal, Que.

HUTCHISON, WOOD & MILLER, Architects

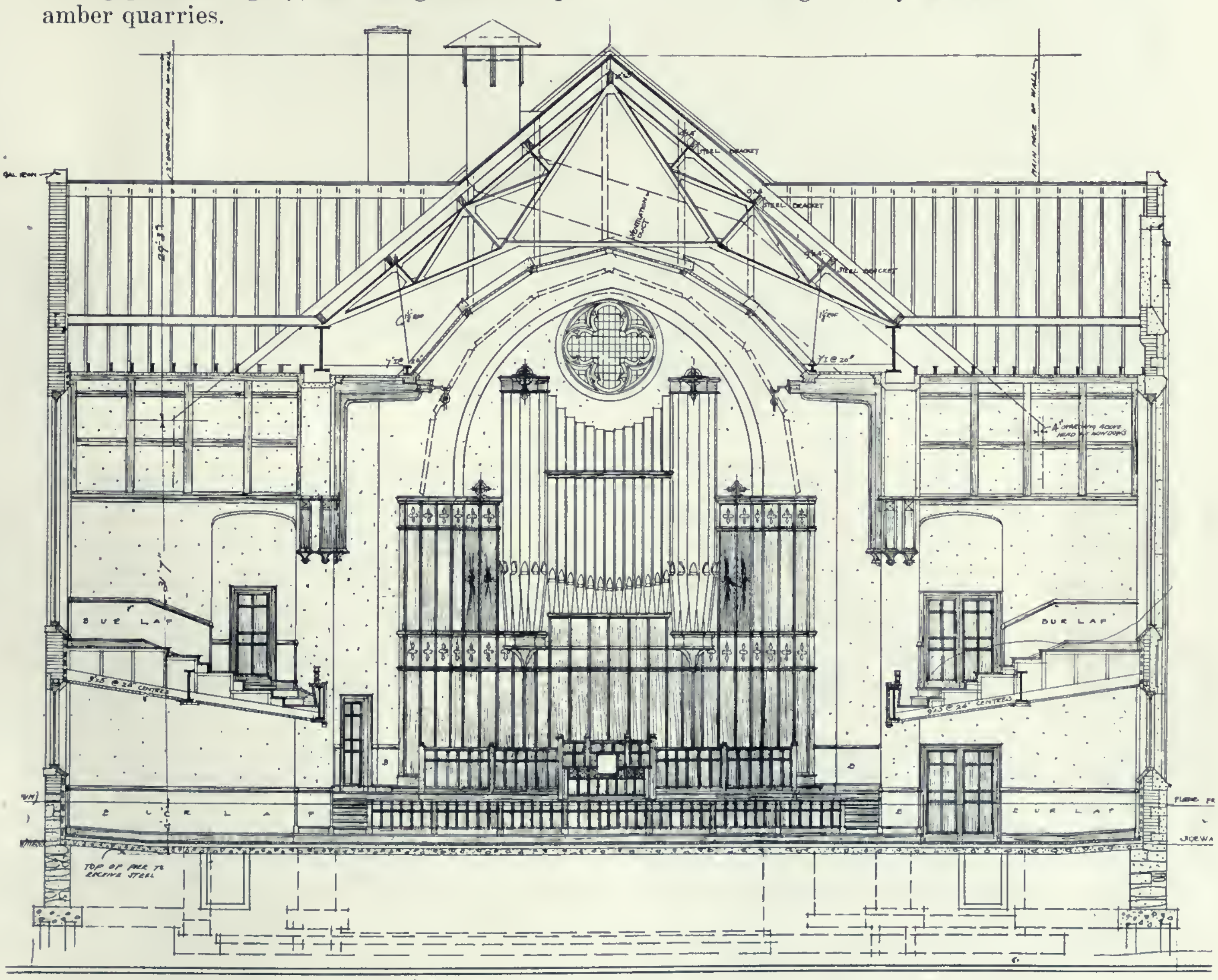
MONTREAL has been called "the City of Churches," not only from the number, but also on account of the chaste and dignified character of their architectural treatment. It has been held, and rightly so, that no significant success in church building is to be expected unless the style employed be regarded, understood and developed as a living one. If the designer is broad enough to comprehend the spiritual import and can implant these ideals into the material, then his work will live beyond the lifetime of its author. The mistake is so often made of growing indifferent to the problem at hand because one's efforts are not to be centred on a large edifice. Such a position should never be taken when it is realized that many of the world's choicest gems in art are small—structures cut pure in style and harmonious in proportion.

The Presbyterian Church located at the corner of Prince Arthur and Mance streets reveals a rugged but ornate facade, noted chiefly for its simplicity of style. The exterior is faced with mixed blue and green sandstone, cut rock face, and trimmed with the same material tooled. The roofing is of slate.

The building is designed to hold approximately eight hundred and fifty in the auditorium, and one hundred in the gallery over the vestibule, and possible future accommodation of two hundred additional by side galleries in the transepts. The Sunday school quarters are entirely at the rear of the building, being an auditorium with gallery on three sides, accommodating about six hundred. This is lighted partly from the side and partly from a skylight over the centre of the auditorium. The main school is surrounded by church parlors and other necessary rooms.

The interior is symmetrical in treatment with the auditorium, so designed that there is an unobstructed view from any sitting in the church of the whole of the platform, placed in the front of the chancel, the organ taking up the remaining space. The artificial lighting comes from ten fixtures suspended from brackets, each one containing eight candle lights. In addition there are side brackets of similar design. The walls are of sand-finished plaster, stained a deep green, which harmonizes with the dark brown finish given to the chestnut pews and woodwork used throughout. The ceiling plaster is gray, and the glass in simple amber quarries.

The heating of the church proper is by forced air, over pin radiators, placed immediately under each outlet duct. The air driven through the pipe duct by motor-driven fan is perfectly tempered by the heat from steam pipes, which also runs in this duct, and finally heated when passing through the pin radiators. During warm weather the fan can be used for introducing fresh, cool air into the building. The air in the auditorium, if comparatively fresh, can be reused by recirculation system back to the fan, or can be expelled through a vent shaft and perfectly fresh air introduced into the auditorium. The steam heating is supplied by a cast-iron steam boiler, while that of the Sunday school is altogether by hot water.



TRANSVERSE SECTION, LOOKING TOWARDS PULPIT AND CHOIR.

THE ART of architecture is that of beautiful building. We cannot build without knowledge—knowledge of material and construction, and the laws of stress and strain; and surely it is in the fitness of things that these should be expressed, not hidden? That is the kind of scholarship that an architect should show. Any other that he may have will all be to the good, and make him a better man, but he must not try and show it off in his buildings any more than in his ordinary talk and dealings. But a work of architecture must show more than knowledge; it must have some of that divine spark which no amount of study can generate. It is a Heaven-sent thing which I believe very many can get by sincerely trying to express their feeling of beauty in the most direct and unaffected way. Really trying to express beauty in terms of building material, because they feel the thing intensely, and not to gain praise or reward. That, and only that, will give life to art. And shall we presume to offer less to Almighty God in a building which is to be to His honor and glory?—*C. Spooner.*

CRAM, GOODHUE & FERGUSON, ARCHITECTS.

ST. THOMAS' CHURCH, NEW YORK CITY.

From the Architecture.

Twentieth Century Church Skyscraper

THE architectural firm of See & See, New York City, have presented to the *Christian Advocate* a plan for the future city church. They believe that the new problems of life must be met by new conditions. The ever increasing cost of living, the cosmopolitan people, the congestion, all of these things, and more, have brought about a different mode of life. The high cost of land has forced city architecture up and up until the poor church planted in the early days is completely smothered by its tall commercial neighbors. "We must find a new architectural expression for a church in terms of the skyscraper."

"Many of our churches occupy valuable sites, from which the former congregations have long ago moved, but are doing an ever increasingly valuable work among the people of the neighborhood; welding the rough material into good wholesome citizens. These organizations usually have great difficulty to meet their annual budgets, even though set in the midst of prosperous surroundings. Formerly church auditoriums could not be made large enough, and great stress was laid on preaching. We believe that time is passing, if not already gone. People are weary of listening to words; they want deeds. They want the more intimate personal touch that a smaller group affords. This tendency can be seen in the success of the small theatre and in the growing importance of the so-called institutional church."

Mr. See claims they have attempted a practical solution of an existing problem in New York City. There are other churches in the city in a similar financial condition, where this idea would apply in a modified form, altered to suit the local conditions.

The property in question is an extremely valuable one now, and is constantly growing more so. Its dimensions are 102 x 107 feet. The former well-to-do members of this church have either died or moved away. There is no one who can contribute any considerable sum for its support. While in possession of this extremely valuable property the church is really unable to meet the amount of the yearly indebtedness. It is, therefore, in the position of the rich pauper.

It is patent to anyone able to forecast the future of this locality to predict that this church will occupy one of the strongest strategic centres in New York. To sell the property for the large sum it would bring and rebuild elsewhere would mean a complete change in the character, traditions and membership of the church. An entirely new congregation would have to be built up from nothing, so that its success in the new location would be purely speculative; hence the desirability of radical measures to meet the changed conditions of its present neighborhood and keep the church where it is.

In the style of architecture chosen we have endeavored to make use of forms that by long custom have been accepted as associated with the best there is in church architecture. We have placed the church auditorium where it will be most accessible from the street, with the Sunday school and its various departments, also the rooms necessary for the other activities of the church, above it. These will be reached by two passenger elevators, also two stairways, used exclusively for this department, and having no connection with the portion of the building used for other purposes. A separate entrance with elevators and stairway has been provided for the exclusive use of the tenants in the upper part of the building.

The apartments located in the upper portion of the building have been planned for suites of two and three rooms. Or if occasion required, a larger apartment could be arranged to suit the special need of any tenant. In effect, this particular building has been designed with the idea of reducing the cares of housekeeping to the minimum. It will be a hotel, without a public dining-room, in which the tenants will furnish their own rooms. Each suite is arranged so that the occupants may provide their own meals or be served in their own apartments from a general kitchen provided for the purpose, which will be a part of the management of the building. The care of the rooms will be a part of the hotel service, also washing windows, etc., or the tenants may have their own individual maids and service at their option.

A large "duplex" apartment is planned in the tower, having two floors of bedrooms, with baths, etc., and provided with a private stairway from the living rooms. This apartment will command extensive and unusual views, and be extremely attractive. The main portion of the roof area will be utilized as a roof garden for the separate use of the tenants.

The architects have worked out the financial cost, also the income return, and have submitted it to realty experts. This indicates, on a most conservative basis of income, and generous cost of operation, a very handsome net return, which may be used as a "sinking fund" to gradually reduce the indebtedness occasioned by first cost, or from any other purpose thought desirable by those in control of the project.

They see no reason why such a church building as indicated in their plans and description cannot be made a thoroughly practical one, meeting every requirement of a church, including that of aesthetics.

Canadian Society of Civil Engineers

THE twenty-ninth annual meeting of the Canadian Society of Civil Engineers, held January 26 and 28 in Montreal, was attended by over three hundred delegates representing every city of importance throughout the Dominion. During the convention the members were entertained by a smoker concert in the rooms of the local society, at which time an illustrated lecture on submarine mining for coast defence was given by H. F. Meurling. Luncheon was served by Fraser, Brace & Company, Wednesday noon, after the delegates had visited the Cedar Rapids Mfg. and Power Co. and the Angus Shops. The annual banquet, held Thursday evening, concluded one of the most successful gatherings ever held by the Society, and should prove a great inspiration to the members in their endeavor to push ahead during the coming months in the face of seemingly insurmountable difficulties.

During the first session the reports of the various branches were read, showing the excellent results achieved by each organization. James White, of the Conservation Committee, furnished interesting data as to the progressive work effected under their sincere endeavors to benefit the Canadian people. The committee on specifications for water pipes stated that the present articles on cast iron piping were satisfactory and that it was impossible on account of the vastly different views held by engineers, to recommend any action respecting steel piping. P. A. Seurot of Montreal was the recipient of the Gzowski medal for his excellent article on "Subaqueous Tunnelling."

During the afternoon the President, Mr. Butler, in his address, referred to the European situation in feeling terms, reviewed the rapid strides made by Canada in trade, transportation facilities and population. The remarks of the president in respect to our waterways and the Government's duty at this critical time is commendable. In the course of his remarks he said: "The Atlantic seaboard is the outlet for the products of the prairies, situated some 1,500 miles inland. Our efforts in building railways with easy curves and grades, the enlargement of our canal system and the improvement of rivers, and particularly of the St. Lawrence route, have but the one object of putting a few more cents a bushel into the pockets of our farmers. The enlargement of the Welland Canal will allow the larger type of ship of 300,000 bushels capacity to pass down Lake Ontario and the River St. Lawrence to within 120 miles of Montreal. Great storage elevators will be erected at or near Prescott, and 1,000-ton barges will be towed through the present canal system to Montreal. Each incoming ship is known for days ahead, and the exact cargo of grain required can be in waiting for transfer by floating elevators.

"Ultimately, however, the larger lake ship will come through to Montreal, as it is quite practicable, and within the resources of the country, to convert the St. Lawrence river into slack water navigation by the building of eight dams, with duplicate locks, and as an incident thereof develop the greatest water power in the world, aggregating over 4,000,000 horse-power, eliminate the ice jams, and make practicable the navigation of the river in winter by the aid of powerful ice-breakers.

"It is a duty which our Government may well undertake at the earliest possible moment to secure a hydrographic and topographic survey of the St. Lawrence, so that accurate estimates of cost may be made, and proper regulations may be drawn to so regulate proposed power developments owned by private corporations that each may be brought into a component part of the completed whole. It would be difficult to place a limit upon the possibilities of such a power development situated on the greatest transportation route in the world. Cheap and abundant power means so much to the country."

President Butler, after dwelling upon the advisability of readjusting the tariff to meet the large discrepancy between the cost of our imports and exports, spoke feelingly of the late T. C. Keefer and Dean Galbraith.

During the session on the second day the committee presented a partial report on specifications. In offering same, Mr. Holgate said that they had compiled the form of general clauses from various sources, revising, altering and adding to as it was deemed advisable. He recommended that all contracts should embrace in one document: the agreement or contract itself; the tender or a certified copy of it; the specification; the general clauses; the signed drawings as tendered on; modified drawings agreed upon prior to signing of contract. After considerable discussion the report was referred back to the committee consisting of H. Holgate, E. G. M. Cape, R. de L. French, W. Chipman, J. G. G. Kerry; and the two new members, Messrs. Duggan and Safford, just appointed.

Before the final session closed the following officers were elected for the ensuing year: President, F. C. Gamble; vice-presidents, A. St. Laurent, E. E. Brydone-Jack; Council: S. P. Brown, C. B. Brown, T. A. J. Forrester, A. A. Dion, J. L. Weller, W. G. Chase, W. J. Kerr.

Architecture—a Profession or an Art?

MACKAY FRIPP *

BEFORE answering this oft-repeated question it seems necessary to define as clearly as may be what Architecture is. Architecture is building, but building is not of necessity Architecture. Architecture is building so planned, constructed and designed, as to rise above mere necessities. It may deserve the appellation Architecture without involving a greater expenditure of means on the same building as it might cost if so erected as to meet precisely the same requirements, and yet lack that character which can alone entitle it to be designated Architecture. It is this character, this quality which raises building, not into a science, but to the level of the fine arts.

A knowledge of the science of building will not alone suffice to produce Architecture, and the most erudite knowledge of Archaeology may also fail. Certainly the most extensive and intimate acquaintance with the business of building is not of itself Architecture; so it would appear that Architecture is not the product of science alone, or of Archaeology alone. and most certainly not the result of business aptitude or training; and yet in practise all of these things serve their purpose.

There are several types of practising architects and each type differs in his view regarding the classification of Architecture as a profession or an art. There is that variety of the genus whom we know as the self styled "practical man," the most hopeless of all, the most prevalent and the most positive. He is often, perhaps usually, possessed of no training or education in science or art or even in the professional business of building, still this type almost invariably holds all others in open scorn, aiming his shaft of ridicule particularly at the man of Diplomas, and yet he is, paradoxically, a firm believer in the urgent necessity for compulsory Registration. From this class come many men as successful commercially as they are unsuccessful in architecture, for they rarely lift their work to that level, though some by means of ghosts and able assistants receive credit for good work which is not their own. It usually happens that this type of practical man is the least practical of all, his want of trained knowledge standing always in his way, though frequently a carpenter by trade, he has never studied the use of materials; works by a sort of rule of thumb; rarely indeed becomes a decent draughtsman or a fairly skilled planner. He is quite often an astute business man and as such may become a considerable director of building operations; he serves us in this discussion as a negation.

There is the truly practical man, a bird of a very different plumage; an engineer by taste and habit of thought, immersed in formulae, wise in the theory of structures, cunning in all kinds of statics, progressive and eager in the value and application of the latest atom of scientific lore. He is the servant of his science rather than master of the Art of Architecture for if a man serve science he does not often consort with art. No man can serve both gods, each an admirable god, but the God of Art is spelled with a Capital G.

The Archaeological Architect fails in another and very different direction; he is the devotee of a style and juggles with the dead dry bones of the once lovely past; his Gothic must be of a certain period, correctly reproduced in the minutest detail, if French Gothic it must be all French and if English it must be uncompromisingly so, or possibly Greek is "the only drinking," a certain phase of the Roman, perchance of the Romanesque; should it be the Renaissance that tickles his architectural palate he sticks to his particular brand like a connoisseur of claret or port, being a Purist of the first water. His work may be undoubtedly most scholarly but is devoid of life and the pulsations of modern life as an Egyptian mummy at the British museum, and yet the man is an artist to his finger tips, for he loves his work and has a tender reverence for the phase he so faithfully endeavours to revivify. His imagination often vivid and refined leads him to dream of the architectural pageant of Rome, or Egypt, the mediaeval glories of Northern Europe. He is quite often an accomplished draughtsman and in a totally different vogue, as practical as our excellent man of science; even a clever man in business though not prone to boast of it; and naturally anathema to the Carpenter-Architect.

There we have the accomplished draughtsman whose aim in life it is to make modern buildings appear, on paper, to be old ones; an Aladdin's uncle in obverse offering in the workshop of Architecture, Old Lamps for New Ones. Wm. Morris expressed a distrust of the man who loved his drawings, fearing that his interest might be in the delight of rendering rather than in the true aim and end of architectural diagrams, the building, which is the real result.

The first mentioned practical man while util-

*Paper read before the Pylon Club, Vancouver, B.C.

ising the accomplished draughtsman to idealize by pen or brush either his own malefactions or the productions of his "ghosts" openly derides him as an "impracticeable artist chap" and for once strikes the nail squarely on the head.

We know fairly certainly how each of these several types regard the question of "Architecture, a Profession or an Art." The self-labelled practical man has no doubt but that he is a thoroughly representative member of a profession, the ethics of which may be epitomised as concerning 5 per cent., or as much as you can get of it. He is most certainly in favor of an Act of Registration, because he will come in on the ground floor and because it may reduce competition by ultimately excluding men of his own type, moreover it would tend to give him a more definite grip on that 5 per cent., the acquisition of which is the lone star on his professional azimuth. The man of science is a professional man, perfectly clear as to professional etiquette, professional ethics and professional fees; decidedly in favor of compulsory registration for he thinks it greatly to be desired that architects should "pass" in Formulas, Statics, and Strains in Structures. While absolutely satisfied that Architecture is a Profession, he is willing to concede there may be a leaning towards what may be termed an artistic profession.

The Scholarly Archaeologist is also quite decided in his opinion that Architecture is an Art, possibly also a profession; that the Art, and yes, the profession should be protected by statutory examination. He considers it scandalous that anyone scarcely capable of distinguishing Greek from Roman Ionic should be turned loose upon a confiding public to break every rule of order and style. The accomplished draughtsman while not enthusiastic about professional training in its relation to strains and stresses, plaguey dull subjects at best, considers registration desirable as it might tend to reduce, if not eliminate, his patron the carpenter architect, whom he has come to regard as a more or less necessary evil.

The consensus of opinion then is that Architecture is a profession with more or less artistic attributes. But fortunately for the Architecture of the period, certainly for the Architecture of the immediate future it is well that there are men who hold that Architecture is an Art or nothing: to whom registration and professional status are of no moment except in so far as they may develop education, or more properly speaking the cultivation and refinement of the artistic sense. They hold that science is but part of the means that enables creation to proceed soundly and logically; that the architect must in all things be practical, because in his art, sound planning is clever planning; that sound construction is inseparable from logical design, and that sound planning and sound construction are essentially economical; *ergo* sound business, but that sound methods alone do not raise building to the level of Architecture. The Architect who would add that quality to his work must impress upon it individuality. A sane study of Archaeology opens to the student the door of the great storehouse, tradition, an endless source of inspiration is found there, stored knowledge garnered from past ages. Draughtsmanship is a mere document, a means of conveying information and instructions in the most concise manner: drawings are mere diagrams recording ideas to be rendered into concrete form and if they fail in this, however great in technique, in craftsmanship, they fail in the first essentials.

These men study always all things that may quicken artistic appreciation and require the creative faculty; they go to nature, to the past, to the present, literature, the crafts, painting and sculpture. Form of art is searched—creation the object—but all logical creation the ideal. From such men rises now and again the epochal architect; from the work of such men in the aggregate comes epochal architecture.

The direction of building may be, is, a profession, but the Art which produced Architecture 4000 B.C. is the Art which produces living Architecture 1900 A.D., and is still the greatest of all forms of National Expression.

ARRANGEMENTS have been made whereby the ordinary rate of two cents per ounce applicable to all letters sent from Canada to the United Kingdom, will apply to letters addressed to British and Canadian troops on the Continent. The rate on ordinary letters from Canada for the Continent is five cents for the first ounce, and three cents for each subsequent ounce, so that this extension of the two-cent an ounce rate to letters addressed to our soldiers on the Continent is a decided reduction in favor of correspondence going to the soldiers.

WISE procedure in city planning will be greatly advanced when authority is vested in the city to exercise reasonable control over the development of private property in the interest of the public welfare, to prevent the inordinate inflation of land values which spring from the too intensive use of property for either business or dwelling purposes, and to appropriate for the public use and benefit an equitable proportion of the increment of land values erected by the common enterprise of the people and the general prosperity of the community.—*B. A. Haldeman.*

C. H. TOWNSEND, ARCHITECT.

ST. MARTIN'S CHURCH, WONERSH, ENGLAND.

From the Architectural Review.

NEFF & THOMPSON, ARCHITECTS.

BAPTIST CHURCH, CHURCHLAND, VA.

From the Brickbuilder.

Town Planning and Housing Reform in Canada

A RECENT number of "Conservation of Life," published by the Commission of Conservation, is devoted to a series of articles dealing with the housing problem and town planning. The following is taken from a discourse on "Town Planning and Housing Reform in Canada":

A great deal has been done in Canada in recent years to improve public health and to draw attention to the need for better housing conditions, but there is need for more enquiry and extended effort on the part of all who are interested in conserving human life and raising the standard of public health.

A comparatively new country, such as Canada is, has peculiar difficulties to contend with, but it has also peculiar opportunities. It can learn much and derive much benefit from the study of conditions in older countries, and at comparatively small expenditure of money it can take steps to prevent the creation of evils which, when once created, can only be remedied at great cost.

Most people are acquainted with examples of bad housing and bad sanitary conditions in one form or another. All civilized countries suffer from these conditions, and no measures have been taken to remedy them which can be accepted as suggesting a basis for a council of perfection in regard to what is called housing reform. But in some countries, notably in Great Britain, partial remedies have been found for the evils of bad housing and a high standard of sanitation has been attained. In so far as the attempts to remedy existing bad conditions have been so unsuccessful up to the present, it has been largely due to the fact that the bad conditions have been of such a long established character that their removal has to be a matter of gradual change over a long period of time. The change has to take place in the habits and opinions of the people themselves, as well as in the improvement of their housing conditions. In Canada we have allowed some conditions to grow up which are not what they should be, which are, in fact, as bad as they are in older countries, but we have still time to take advantage of the lessons which other countries have to teach us, and it will be well to do so before we allow the community to accept their present unsatisfactory conditions as inevitable or permit those who suffer from them to become habituated to them.

In any case it will be generally agreed that there is room for enquiry into housing and sanitary conditions, and that there is much that should and could be improved, even if the matter is considered solely from the utilitarian point of view.

But apart from the question of remedying existing evils it is of urgent importance that steps should be taken in this country of rapidly growing urban communities to prevent their recurrence in future.

It can be said with a greater measure of truth with regard to housing than perhaps with regard to any other social question, that "prevention is better than cure." What has been done in this latter direction in England points the way to a very real and very substantial success.

The comprehensive and constructive character of a town planning scheme in Great Britain will be gathered from the following table of the contents of the Ruislip-Northwood scheme. The scheme deals with an area of five thousand nine hundred acres, or over nine square miles, of land lying within the fifteen-mile radius of the centre of London. It consists of a map or plan and eighty-eight provisions, and, having been approved by Parliament, it can virtually only be altered by its consent.

The map of the scheme fixes the lines and widths of the main arterial roads, the position of all open spaces and parkways, the positions of the residential, shopping and factory areas, and the general layout of the town in all its bearings. It includes provisions with regard to: New streets (width, direction, position and how cost is to be met); widening existing streets; adjustment of street boundaries; naming of streets; relaxation of local by-laws; submission of all plans and subdivisions to local authority; minor modifications of plan if circumstances change; necessary diversion and closing of existing highways; appropriation at agricultural rates of land for garden allotments, cemeteries and public open spaces; reservation of land for private open spaces, and proper maintenance of same; donations of land by owners to local authority (90 acres) in exchange for certain privileges granted; fixing of building lines on all streets to secure adequate air space, protection of trees and room for further widening of streets if and when necessary; fixing the proportion of building subdivisions which may be covered by shops (half of area), dwelling houses (third of area) and other buildings; minimum cubic space per person to rooms, minimum window space in proportion to floor area, and limitation of projections from main buildings; limitation of the number of buildings to each acre (a maximum of 12 houses on the average and 20 houses on any one acre is prescribed); height of building (maximum 60 feet to eaves, and in no case higher than width of street); delimitation of areas which may be used for factories, shops and residences; size of living rooms (minimum 500 cubic feet); character of design of buildings; external larders for food, separate closet accommodation for each family, prevention of nuisances in gardens; prohibition of advertisements which interfere with amenity; height of fences; recovery of half of any value which is given to the land by making of the scheme.

These are some of the matters covered by this one scheme, but their importance is only realized by taking into account the powers given under the scheme to prevent unreasonable claims for compensation. In the first place, during the three years while the scheme was being prepared, no owner could erect any building or enter into a contract which would contravene the proposed scheme. For instance, he could not erect a building on any site without consent of the local authority. Secondly, no claim could be made for damage caused to property by fixing (1) building lines, (2) limiting the number of buildings to each acre, (3) preventing the erection of factories or shops on certain parts of the area, (4) limiting height or prescribing the character of the design of buildings, etc., if the Local Government Board decided that these things were reasonable for the purpose of amenity. Thus no overcrowding is permitted, either in regard to the amount of building on an area or in regard to the number of persons per room, and no person can claim compensation because he is thus restricted.

The scheme was carried through with the consent of practically all the owners, and it is claimed that the benefits it confers upon them are in excess of any loss they may suffer, notwithstanding that the public health gains immeasurably. Under such conditions slums become almost an impossibility without any cost to the community. The practical effect of the scheme in regard to the housing question is still to be tested, but it may be claimed even now that most of the evils of existing housing conditions will be prevented by its operation.

The cost of preparing the scheme and the maps, obtaining the consent of the Local Government Board and Parliament, over a period of three years, is given as $5,000. The chairman of the council has stated that seldom has a local authority obtained so much for so little outlay. Its ultimate cost to the council over the next thirty or forty years will probably be about $150,000, but for this it will have obtained advantages of incalculable worth, healthy housing conditions, streets of ample width, one hundred and twenty acres of public parks, pleasant amenities, security for owners of large residences, preservation of natural features, architectural control, etc. Moreover, it will only have paid for these benefits as the increase of the assessable value of the property provides the local authority with additional resources for that purpose. It may be claimed that the council will gain direct monetary value for all its expenditure without counting the indirect social advantages of the scheme. This is because of the fact that it has caused preventive measures under the powers given by the British Parliament in regard to matters which are usually neglected until it is too late to remedy them at reasonable cost. We thus see the supreme advantage of a preventive as distinguished from a remedial scheme.

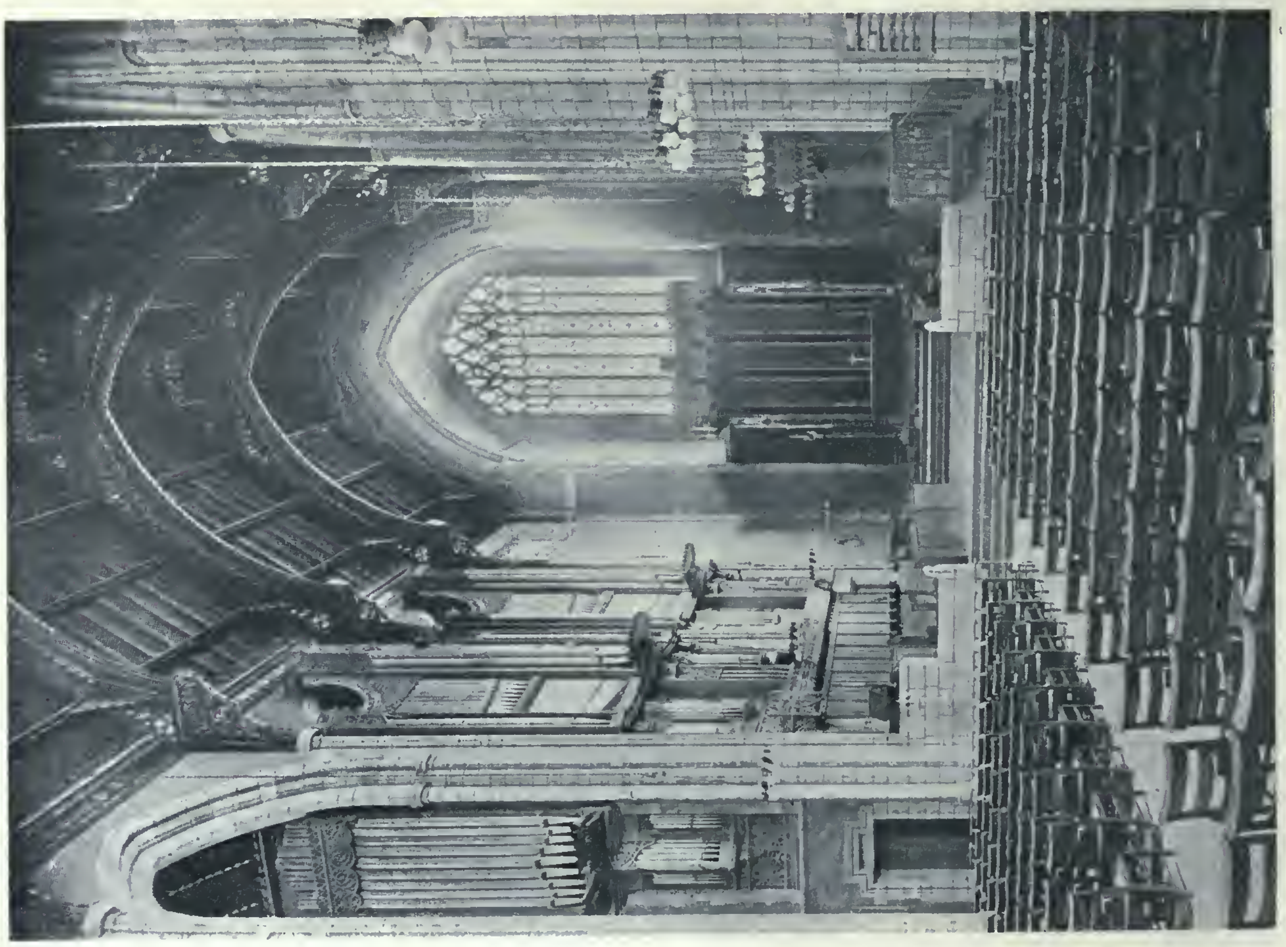
IN A PAPER presented recently by John Nolen, of Cambridge, Mass., before a session of the recent London Summer School of Town Planning, held at University College, the wide scope of this question in America was dwelt upon. Mr. Nolen gave the following reasons why more attention had not been given by us to the housing phase of civic improvement.

Until recent years, aside from great cities and other exceptional development, the characteristic houses in American cities have been relatively good, so far as city planning goes. The lots have been usually 40 feet to 50 feet wide and 100 feet or more deep, with not more than 8 or 10 houses to the acre.

The rights and limitations of municipalities have been such that so far as the planning goes, location, width, etc., of streets, the width and depth of lots, and character of houses, it has usually been determined before the outlying sections have been inclined within the city boundaries. Public opinion generally was not, and usually is not, yet favorable to the public regulation and control of the layout and character of residential neighborhoods.

On account of the Federal constitution, which provides that private property cannot be taken except for a public use and with due process of law and just compensation, it is very difficult and very costly to regulate or control the layout and character of residential neighborhoods. In many cases the State constitutions contain the same provision.

The disinclination of private capital, except in the cases of employers for their own employees, to respond to invitations and opportunities to invest in housing schemes, on the limited dividend principle, is another reason why housing has not apparently been given more attention by town and city planners. Co-operation in housing, as in other matters, has not succeeded in America as it has in Europe.



B. G. GOODHUE AND CRAM,
GOODHUE & FERGUSON, ARCHITECTS.

CHAPEL OF THE INTERCESSION, TRINITY PARISH, NEW YORK.

From the
Architecture

CONSTRUCTION

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

FREDERICK REED, Editor

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Vol.VIII Toronto, February, 1915 No.2

TRADE NOTES

EVELYN SHAW, the Hon. General Secretary of the British School at Rome, intimates that the open examinations for the Rome scholarships in architecture, sculpture and decorative painting, and for the Henry Jarvis studentship in architecture, due to be held in 1915, will be postponed for one year. Announcement will be made later of the date by which the works for these postponed examinations are to be submitted. Candidates who would have been qualified to compete for the 1915 scholarships shall not by reason of this notice forfeit their qualification to compete in the postponed examinations.—*Journal of the Society of Architects.*

THE twenty-fourth annual convention of the Province of Quebec Association of Architects was held in the association rooms, 5 Beaver Hall Square, Montreal, Saturday, Jan. 16, with Vice-President Joseph Perrault in the chair.

Mr. Perrault, in submitting the annual report, expressed his regret at the absence of the president, W. S. Maxwell, who was in Florida upon a combined pleasure and business trip. He emphasized the good work, the activity and devotion of the president for the welfare of the association, as well as the work of the secretary, J. Emile Vanier; the accounting of the treasurer, Hugh Vallance, and the constant attendance of the members of the council, Messrs. Fayette, Monette, Macfarlane, Macvicar and Peden. The members of the Quebec Section of the association, E. B. Stanley, second vice-president, and J. P. E. Dessault, ex-president, were also commended for their hearty co-operation.

An expression of appreciation was tendered to the members for their ready acceptance of the annual dues being raised to $15, as expressed in the general meeting on Aug. 24 last. The work of the committees was fully described by Mr. Perrault, twenty-one new members being credited to the membership committee, of which Frank Peden is the convener; one great loss, however, being the death, on the field of honor, of Prof. Doumic, while fighting with his regiment in France. Due activity was credited to the legal committee, and mention made of the publications added by the library committee.

Mr. Perrault explained the result of the examinations carried under the supervision of the Board of Examiners, of which Joseph Venne is the convener; also the work done by the committee on building by-laws, the year book, the travelling scholarship, new buildings, and Cartier Centenary. The vice-president spoke at length on the work done by the committee on fire prevention in securing thirty-seven inspectors to fight the appalling waste in the city of Montreal, the co-operation with the National Fire Prevention Association of Canada, to obtain reduction in the fire risks, the installation of sprinklers in public buildings and greater power to the fire commissioners to jail or punish incendiaries. Owing to the war the association was unanimous in cancelling the annual banquet, subscriptions to the amount of $85 having been taken up instead and forwarded to the "Fraternite des Artistes, France," for the support of families of soldiers fighting for humanity, liberty and universal peace. The officers elected for the current year are: President, Joseph Perrault; First Vice-President, E. B. Staveley; Second Vice-President, Hugh Vallance; Secretary, J. Emlie Vanier; Treasurer, D. Norman Macvicar.

THE afternoon session of the Clay Products Association, held in Toronto recently, was addressed by City Architect W. W. Pearse, who discussed the value of the by-laws of Toronto regulating buildings constructed from bricks, and comparing them with the by-laws in force in the large cities in the United States.

"In the United States," said the city architect, "brick set in lime mortar is permitted to carry eight tons to the square foot, and in cement eighteen tons to the square foot; whereas in Toronto brick set in lime mortar is only permitted to carry four tons to the square foot, and in cement only six tons to the same area. It will readily be seen that this allows of a very inferior brick being used in Toronto buildings. The following figures will also go to show that something is amiss somewhere," said the speaker, "for the Toronto by-laws allow four tons to the square foot on clay soil, or as much as is allowed for bricks laid in lime mortar. And, again, eight tons to the square foot is allowed on coarse gravel, or two tons more than is allowed for bricks laid in cement. It is quite clear," said Mr. Pearse, "that either the by-laws are wrong or the bricks manufactured in Toronto are. To determine which, I am going to have specimens of brick submitted to me by the various Toronto firms, that pressure tests may be made, and if, as I expect, the by-laws are wrong, I will do my best to have them changed."

* * *

THERE is in this issue of CONSTRUCTION a half-tone refutation of the fallacy which has been entertained by many Canadians—that if a church wishes to put in a piece of furniture worthy of the best traditions of ecclesiastical art, they must necessarily import it. We are pleased to demonstrate in these pages that Canadian manufacturers are fully equal to the task of turning out artistic church woodwork. The chancel stalls and rector's chair in St. Paul's Church, illustrated herein, are striking proofs of this fact. We are advised by the manufacturers, the Valley City Seating Company, of Dundas, that the whole of the decorative carving was carried out by their own experts.

* * *

THE SECOND edition of the Master Builders' Primer has just been published, containing interesting data regarding the making of wearproof, dustproof and waterproof concrete floors. The work presents specifications relative to public buildings in general as well as surfaces subject to heavy service. A long list of the most important structures wherein their concrete flooring has been laid is included, together with testimonials dealing with its use in the various types of buildings. This booklet of valuable information may be secured by writing their main office at Cleveland, Ohio.

A STEEL pontoon lock gate lifter recently built by M. Beatty & Sons, Limited, for the Department of Railways and Canals, to be used on the Trent Canal, was designed with a capacity of fifty tons and clearance of thirty-seven feet above the deck, enabling it to step any of the mitred gates throughout the entire length of the canal. The general design comprises a structural steel collapsible derrick mounted on a steel pontoon with separate steam engines for each operation. The pontoon supporting the derrick possesses two longitudinal and three transverse trusses so as to provide for the severe loads it will have to bear. The hull is constructed with rounded bilges and each end has a rake of forty-five degrees, while the length is fifty-five feet, beam twenty-seven and a half feet, depth nine feet. The derrick is built of structural steel in two units. The operation of raising and lowering the derrick is performed by a six by six double cylinder engine, the main engine having nine by nine double cylinders, double drums and link reverse. The operating levers are brought to one position for the convenience of the engineer. The pontoon is kept on an even keel by two movable ballast cars under deck. Each car is moved by a steel screw operated by independent six by six reversing engines. These engines are controlled by pendulum governors, automatically shifting the ballast to the proper position to put the pontoon on an even keel, whether it is under load or light, with the derrick upright or folded.

* * *

ARCHITECTURE is not one art, it is many. Architecture is not an art only, it is also a science and an industry. For the fulfillment of all this, many and different qualities are required. There are diversities of gifts but one spirit. All the gifts must be exercised with the one spirit, the single aim toward the perfection of the final result as an expression of the Fine Arts, as an example of sound and perfect construction, as a practical solution of an economic problem.—*R. Clipston Sturgis.*

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March, 1915 Vol. 8, No. 3

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BRANCH OFFICES

MONTREAL NEW YORK

FRANK DARLING, R.C.A.
ROYAL GOLD MEDALIST, 1915.

The Royal Gold Medal, 1915

The bestowing of the Royal Gold Medal for 1915 upon Frank Darling, of the architectural firm of Darling & Pearson, Toronto, is a matter of sincere gratification to every Canadian. Congratulatory expressions in our daily papers and professional magazines, as well as from prominent members in the realm of arts and letters, reveal a feeling akin to patriotic pride. And it is well within the rights of every person interested in the welfare of legitimate art to enjoy with Mr. Darling this marked distinction conferred for the first time upon a Dominion citizen. In former years the medal has commended the efforts of eminent architects in England, U. States, France, Austria, Italy, Germany, and Holland. To-day it has recognized the conscientious endeavor of Canadian men to raise the esthetic standards of architecture to a level commensurable with that of other nations, older and farther developed. The recipient is well known for his skill in the art of design, his love of the beautiful and his integrity towards the moral principles of his profession. These qualities, together with a broad grasp of the limitations to art, as well as its possibilities in this, a comparatively new country, has enabled Mr. Darling to exert a profound influence upon the sane growth of architecture throughout the Provinces. Living in a territory of great latitude and longitude, where climatic conditions vary from one extreme to another; where facilities for transportation have been somewhat meagre; where structural materials are obtained at considerable expense and time; where the tendency to commercialize all building projects has been rampant—living among these conditions foreign to the experience of European architects; it will be universally felt that the honor conferred upon Mr. Darling is a high tribute to one who has persistently devoted his efforts towards the artistic and moral development of his work.

The Royal Gold Medal is bestowed annually by the British Sovereign upon the individual selected by the Royal Institute of British Architects. The choice is invariably an architect, or a man of science and letters with architectural instincts, who is deemed most worthy to receive this well merited distinction. The custom was instituted by Queen Victoria in 1848, and the medal awarded each succeeding year, excepting the date of her death, 1901. Founded as an appreciation for distinguished services rendered in the realm of architecture, it has encouraged the members of the profession to unite in a wholesome endeavor to raise the quality of design to an exceptionally high standard. The broad, comprehensive grasp of the original idea, which has lasted over one-half a century, is revealed by the fact that the gift has been confined to no one country, but conferred upon men of varions nationalities whose life and energies have been devoted to the pure and broadening influences of their work. The intrinsic value, which has proven an incentive not only to the recipients, but also to others who have imbibed the spirit of their endeavors, is evidenced in the character of buildings erected throughout the countries wherein they lived. Naturally, therefore, we are pleased to see the medal come to Canada, for it bespeaks of keener competition, nobler architecture, and a deeper regard for the moral standing of our profession.

Frank Darling, the son of Rev. W. S. Darling, for many years Rector of the Holy Trinity Church, Toronto, was born at Scarborough, Ontario, in 1850. He was educated at Upper Canada College and Trinity College School, after which he began his preliminary work in the field of architecture. In 1870 he went abroad, continuing his studies under the tutorship of George Edmund Street and Sir Arthur Blomfield. Five years later he started upon his professional career and formed his present partnership with John A. Pearson in 1895. Mr. Darling's name is associated with many of the prominent structures in Canada, the largest number being erected in Toronto and vicinity. Among these might be mentioned the Toronto General Hospital, C.P.R. Building, Royal Ontario Museum; C. G. Electric offices; buildings for the Toronto University and Trinity College; head offices for the Bank of Nova Scotia as well as the Dominion, Union and Standard Banks; and innumerable residences. At Winnipeg are many examples, including the General Post Office, Grain Exchange, and homes for the Union, Nova Scotia and Imperial Banks. In addition to the planning of a Canadian Bank of Commerce for nearly every city of importance, might be mentioned the Sun Life at Montreal; Ontario Mutual Life at Waterloo; Canada Life at Vancouver, and Bank of Nova Scotia at Kingstown, Jamaica. This list could be greatly amplified, as no part of the Dominion has failed to come under the influence of his creative genius, but it is sufficiently large to show the varied character of the work as well as the general excellence in design and structural attainment. It seems quite fitting to add the name of Darling to the list of former recipients who are honored, respected and admired as great men in the field of architecture—men like Cockerell, Barry, Fergusson, Street, Webb, Viollet le Duc, Garnier, Pascal, Hunt, McKim, and Dorpfeld.

AN APPRECIATION—By F. S. Baker, F. R. I. B. A.

Canada is proud of Frank Darling, upon whom is to be conferred the Royal Gold Medal, which might be called the "V.C." of architecture, for it represents brave deeds accomplished, not without sacrifice. It is doubtful if any previous recipient of the medal was more innocent of its approach or more surprised upon receipt of the news. If I may venture, I would say let the people of Canada fully realize what this means. It means that Canadian architecture as exemplified by the works of Frank Darling has been found worthy by a council of distinguished architects in London, representing the Royal Institute of British Architects, to rank with that of the great nations of the world. A moment's thought will show the importance of good architecture in the appearance of our country and the impression given its visitors. It is distinctly uplifting.

Therefore this tribute to one of Canada's gifted sons is more far reaching than it might appear, and while the whole country from the Atlantic to the Pacific honors and acclaims him, the man himself, modest to the extreme, would be the first to say that the "Royal Gold Medal," although conferred upon him as the medium, is really conferred upon our beloved native land, Canada. It was the commissions of its people, and the courage of its people to spend money upon art which made possible the outward demonstration of his genius and masterful ability. Thus an architect upon whom is conferred this great honor shares it with the owners of his buildings, whose good taste and wise instructions often add to their artistic merit. That more honors, though none, perhaps, which he will more appreciate, may be in store for him is my personal wish.

AN APPRECIATION—By Edmund Burke.

It is said that "poets are born and not made"—some architects are.

Frank Darling's father started out tomake him a banker, but a hard-headed manager put him through an examination in arithmetic, and on seeing the result, pronounced the candidate unfit to be entrusted with financial transactions which might lead the institution into deep water sooner or later. In his maturer years Mr. Darling has, however, fully offset the cold shoulder, and great monetary institutions have been pleased to entrust him with the spending of millions on their palatial buildings.

Half a generation after the middle of last century saw him, a youth of sixteen, introduced to the drawing board in Henry Langley's office on the southeast corner of King and Jordan streets, where now stands one of his great bank buildings. The writer happened to be the sole pupil at this time, boasting six months' experience, while the same number of months Mr. Darling's junior in years—and his adoption of the profession, by the way, was about as haphazard as Mr. Darling's, having been sent to his uncle's office to finish out his college holidays as a punishment for getting into some boyish scrape, now long forgotten. Such are the slight circumstances which sometimes shape one's future destiny. The scapegrace, by his own choice, foolishly, chose not to return to school.

In those days the profession was looked upon by many as a haven for boys who were not able to qualify, or manifested a distaste for the Church, Law, or Medicine, who had no aptitude for business, or who "could not dig and were ashamed to beg." The odd boy in the family had a penchant for drawing, therefore, the distraught father an Architect would of him make. Those were the days when a student was not troubled with exams., and after his legal guardian had performed the necessary formalities he was turned loose in the office to study, work, or trifle as the mood took him.

Our principal was a pupil of Wm. Hay, of Edinburgh, who practised in Toronto for a few years, erecting, among other buildings, the General Hospital on Gerrard street east. He was a Gothicist, and under him Mr. Langley had as good a training in this style as any local man of his time. Naturally, the pupil imbibed the master's predilections, and all work approaching the ecclesiastic had to be Gothic in character. Mr. Darling had his full share in the best work the office afforded, and in addition to various churches and residences, made many of the drawings for the old Lieutenant-Governor's residence (now demolished), the Toronto General Post Office, and the Metropolitan Methodist Church, and at that early date began to manifest an individuality which developed as his powers grew.

When Mr. Darling had finished his pupilage in his home town and became a student or improver in the office of such a master of Gothic as George Edmund Street, of London, it looked as though no other style would find favor with him, and on his return to Toronto to practice a very considerable portion of his earlier work was in that style, notably St. Luke's Church and Trinity College Chapel, the latter probably the strongest of his designs.

In the early thirties of his age he competed for the Ontario Legislative Buildings, producing a clever design in Gothic, which, if erected, would have been a credit to the Provence, and which would undoubtedly have been adopted but for the treachery of an alien assessor. This design made evident the fact that a strong leader in his profession was in our midst, and gave promise of a brilliant future. With social opportunities and a host of friends impressed with his ability, his commissions have steadily grown in number and importance. His design, in 1907, in the competition for the Departmental and Justice Buildings at Ottawa was also Gothic of a type similar to that of the Ontario buildings, and would have harmonized thoroughly with existing structures.

One could have wished that his university buildings had followed at least some phase of Gothic, which would have been more in harmony with the grand old Main Building than the type of free Classic which he has chosen for most of the groups erected from his designs. While his contention that Norman Gothic was too expensive in construction, and not suitable for the lighting requirements of the buildings projected may have had force, a collegiate type of Gothic would have filled the requirements and would have given the various groups a unity which is now largely destroyed.

Mr. Darling's successes have probably been greatest in his banking buildings, notably that of the Canadian Bank of Commerce in Montreal, while his Winnipeg Post Office and the C.P.R. and Dominion Bank buildings in Toronto indicate his high abilities in other structures of a public character.

The architects of the Dominion have reason to be proud of their confrere, who has been honored with the Royal Gold Medal through the Royal Institute of British Architects, and this first compliment paid to a Canadian is fully appreciated.

To Mr. Darling the surviving members of the Old Guard, the Toronto Architectural Guild, with a host of others, offer their most hearty congratulations with the hope that he may be long spared to enjoy his well-earned distinction.

AN APPRECIATION—The Builder, London.

In recommending Mr. Frank Darling, of Toronto, for the Royal Gold Medal the Royal Institute of British Architects not only pays a just tribute to the long and honorable career of a fine artist, but also recognizes the great progress that architecture has made in Canada during recent years. To this progress no one has contributed more than Mr. Darling. Starting practice at a time when architecture as a fine art could hardly be said to exist in Canada, he did good pioneer work. In circumstances not altogether favorable to the production of the finest architecture he has not so much carried on its traditions as recreated them. Fortunate in his opportunity, he has always striven to justify it. In selecting an architect from Canada the institute creates a precedent of considerable interest, and to Mr. Darling falls the unique distinction of being the first architect from any of the Dominions to be acclaimed by the Royal Institute of British Architects as a worthy recipient of the highest honor it has it in its power to bestow.

A COMPLETE ROLL OF THE ROYAL GOLD MEDALISTS.

1848 Charles Robert Cockerell.
1849 Luigi Canina, Italy.
1850 Sir Charles Barry.
1851 Thomas L. Donaldson.
1852 Leo Von Klenze, Austria.
1853 Sir Robert Smirke.
1854 Philip Hardwick.
1855 J. I. Hittorff, France.
1856 Sir William Tite.
1857 Owen Jones.
1858 August Stuler, Germany.
1859 Sir G. Gilbert Scott.
1860 Sydney Smirke.
1861 J. B. LeSueur. France.
1862 Rev. Robert Willis.
1863 Anthony Salvin.
1864 E. Viollet-le-Duc, France.
1865 Sir James Pennethorne.
1866 Sir M. Digby Wyatt.
1867 Charles Texier, France.
1868 Sir Henry Layard.
1869 C. R. Lepsius, Germany.
1870 Benjamin Ferrey.
1871 James Fergusson.
1872 Baron Von Schmidt, Austria
1873 Thomas Henry Wyatt.
1874 George Edmund Street.
1875 Edmund Sharpe.
1876 Joseph Louis Duc, France.
1877 Charles Barry.
1878 Alfred Waterhouse.
1879 Charles Jean Melchior, Marquis de Vogue, France.
1880 John L. Pearson.
1881 George Godwin.
1882 Baron Von Ferstel, Austria.
1883 Fras. Cranmer Penrose.
1884 William Butterfield.
1885 H. Schliemann, Germany.
1886 Charles Garnier, France.
1887 Ewan Christian.
1888 Baron Von Hansen, Austria.
1889 Sir Charles T. Newton.
1890 John Gibson.
1891 Sir Arthur Blomfield.
1892 Cesar Daly, France.
1893 Richard Morris Hunt, U.S.A.
1894 Lord Leighton.
1895 James Brooks.
1896 Sir Ernest George, A.R.A.
1897 Dr. P. J. H. Cuypers, Holland.
1898 George Aitchison.
1899 George Frederick Bodley.
1900 Professor Rodolfo Amadeo Lanciani, D.C.L.Oxon., Italy.
1901 (Not awarded, owing to the death of Queen Victoria.)
1902 Thomas Edward Colleutt.
1903 Charles F. McKim, U.S.A.
1904 Auguste Choisy, France.
1905 Sir Aston Webb, K.C.V.O., C.B., R.A.
1906 Sir Alma-Tadema.
1907 John Belcher.
1908 Honore Daumet, France.
1909 Sir Arthur John Evans, D.Litt., F.R.S.
1910 Sir T. G. Jackson, Bart., R.A., LL.D.
1911 Wilhelm Dorpfeld, Ph.D., D.C.L., F.S.A., Germany.
1912 Basil Champneys.
1913 Reginald Blomfield, R.A.
1914 Jean Louis Pascal, Membre del'Institut de France.

EL PRADO, THE PANAMA-
CALIFORNIA EXPOSITION,
SAN DIEGO, CALIFORNIA.

The Panama California Exposition held in San Diego the resultant of a fixed idea relative to constructive work in exhibits and architecture.

TO THINK of San Diego with less than forty thousand inhabitants, and located far from any railway centre of importance, opening to the world an exposition of one year's duration seems incredible. Especially since San Francisco is also celebrating the great engineering project of the Panama Canal with a universal exposition, treating in tangible form the progress of the past in its civilizing influences. Realizing they could not hope to succeed with a scheme resembling the great fair at 'Frisco, the people of San Diego decided to shape their efforts so as to accomplish the acceleration of agricultural development in that section of the State. They interested only those whose goods would create a market in the local territory, which naturally led to a constructive exhibition. One of the first results was to induce the International Harvester Company to reserve two hundred and forty thousand square feet of land, including an orchard, demonstrating the use of their implements under actual field conditions. In ten weeks ninety per cent. of all available space was contracted for by the leading manufacturers in America. Another endeavor was to maintain a high standard in the games and "thrillers." Nothing old was allowed, as evidenced by the refusal of "Creation," which proved the greatest attraction at the St. Louis Exposition. The same vigorous censorship was utilized in all phases of the work. Instead of the lifeless exhibits, action, novelty and interest were demanded; as a result the method of weaving, knitting and manufacturing various fabrics is being demonstrated, while craftsmen are carving ivory, enamelling jewelry, beating copper and weaving hats. In respect to outdoor exhibits there are acres of citrus fruits; model ranches of vegetables and berries; fruit farms; sheep sheared by electricity; cows milked by compressed air—all true pictures of the capabilities of machinery and brains. Having settled on an ingenious fair, with creative exhibits throughout, it was essential to furnish the proper architectural setting. And the choice is characteristic of all the decisions made by the committee in charge. Re-born, as it were, the Spanish-Colonial style is not only attractively beautiful, but it affords a Renaissance of romantic art and architecture which should be a vital part of the present life in Southern California. Surrounding the buildings are groups of multicolored foliage representing all parts of the world, including the Scotch heather, the green and red pepper trees from Brazil, the acacias from Australia. The site, buildings, exhibits, gardening—all unite into one perfect symphony, the result of common sense ideas.

"Build Now" is becoming a much discussed topic in papers of all description on account of the unusually low cost of materials and wages.

"BUILD NOW." It is hard to find an influential newspaper or magazine which is not endeavoring to persuade its readers to grasp the significance of the above words. And no public medium is following the dictates of its conscience or working for the best interests of its patrons if it does not urge them to "build now." There are ample reasons for emphasizing this fact at the present time; chiefly the low levels reached in building materials resulting from the war depression. It is safe to predict that structural steel, iron, brick and cement will not be as cheap for many years to come. In fact all products have reached a comparatively low basis and should offer a strong inducement to the man who has any idea of erecting a home, enlarging his factory or adding one more structure to meet the growing demand of commercialism. Committees who were ready to proceed with society temples, churches, libraries, etc., could bring about a twenty-five per cent. saving by taking advantage of the present low prices. Another item is the cheapness of labor, brought about by the lack of confidence in the future development of our country by capital and consequently the lack of employment for those belonging to the various trades. Many promises augur well for Canada during the present year. A conference was held recently in Winnipeg between the Canadian Manufacturers Association and farmers' organization relative to opening up the vast area of untilled acres in the Western Provinces. Their scheme to populate the vacant prairie with peasants made homeless by the war will eventually bear fruit and be the means of helping to right conditions. Many of our industries have been given large orders for various commodities required in the warring nations. The Government is also alleviating the situation by going ahead with her contracts for vast improvements. Premier Asquith announced in the British House of Commons that over one hundred and fifty million dollars would be devoted for the use of self-governing dominions in order to remove the necessity of their making loans. This will, in itself, help at a time most critical. The general falling off in building figures naturally brings about better results. As some one has suggested, competition is keener, and in order to meet it companies are forced to think out new methods for reducing the cost of an article without impairing the quality. The shrinkage of internal consumption as well as the loss in export trade has caused the manufacturer to lower his prices. Surely no time for the erection of needed institutions could be more profitable to all concerned than the present.

Opening Day
January 1st, 1915

Written by
John Vance Cheney

Morning brings the silver to the sea,
  The hills are gilded, all as one,
The blue heavens bend, caress transplendently
  The halcyon Harbor of the Sun;
The colors of her country's flag unfurled,
To-day calls San Diego to the world:
"Hither, good peoples, feast with me
  Under the palm and olive tree!"

Lark and linnet from the canyon come,
  The mesa sends a greeting-song,
While bees among the roof-tree roses hum,
  And soft winds run warm ways along;
'Tis Nature's welcome blent with pastoral praise
Of old ranchero and adobe days,
  Wherein the acacia's mocking-bird
  Tries angel strains pale Serra heard.

The cradle city of the Golden State
  Signals every ship that roves;
Veer, proud beaks, steer in the Silver Gate,
  Honor your hostess of the groves,
The orchards, vineyards, and the Hills of Dream—
On them all the shadow and the gleam
  Of apt romance, jealous for men
  And days that will not come again!

Listen! deep in the rabbit's chaparral,
  Hark! in the rivered sycamore,
The live-oak and the pine, wood-voices tell
  New things with those oft told before;
As from the singing-tree of Araby,
The winds are weighed with gracious prophecy
  Of a fair city, like to none—
  Our Plymouth of the Setting Sun.

Here Saxon purpose shall instruct the day,
  Cancel from time invalorous hours,
The conqueror house him, blue-eyed children play,
  White-bosomed mothers mind the flowers;
Here, haply, science mount to prouder place,
Art's forehead wear some rich, indigenous grace,
  Sunward Cuyamaca don
  The crown once worn of Helicon.

Ride to her, ships, glide through the Isthmian Way
  To her called of the Destinies;
Rank, at her feet, far round Cabrillo's bay,
  The pageantry of argosies!
Sail to her, nations, come; but from her breast
Pluck not the olden peace, the rose of rest,
  The mystic trust the Mission had,
  The padres, in God's russet clad.

Morning brings the silver to the sea,
  The hills are gilded, all as one,
The blue heavens bend, caress transplendently
  The halcyon Harbor of the Sun;
The colors of her country's flag unfurled,
To-day calls San Diego to the world:
"Hither, good peoples, feast with me
  Under the palm and olive tree!"

Panama-California Exposition, San Diego, Cal.★

F. R. MAJOR

SOMETIMES known as the "San Diego Exposition," but more properly mentioned as the Panama-California Exposition, this great epitome of Spanish architecture and ancient traditions was opened January first, 1915. Located in the Balboa Park, it dominates the city and bay with its commanding site some three hundred and fifty feet above the sea level. Vessels one hundred miles away can readily distinguish the great light from the dome of the California State building, which forms the entrance feature, in conjunction with the Fine Arts building. From the commanding height one can look up the valleys through the finest fruit section of the country to the low hills of Mexico, less than twenty miles away, or back to the high peaks of the Sierras. In the foreground is a sweeping canyon, three years ago a barren waste, to-day a thick jungle of palm, acacia, eucalyptus and cypress, flashing here and there with brilliant wild flowers.

The possibilities which flowers suggest have been utilized to the utmost, also the climate, which knows neither frost nor severe heat, but a steady twelve months temperature and abundant water supply from the hills, which comes seldom on the coast. The buildings fronting on the Prado and the plazas carry long, arched arcades, over whose pillars climb the blazing vines of Southern California; the iron gratings being concealed by low shrubbery, beds of gladiolus and poinsettia; the lawns lined with black acacia. The patios are thick with floral life which grows rampant to the small rug-covered balconies; to the towers and domes, to the archways where mission bells swing.

DON SEBASTIAN VISCAINO.

Where the canyon is a hundred yards distant there is a broad lawn with an occasional pergola, over whose beams are woven the rose, honeysuckle and bougainvillea, while a border of other flowering plants is arranged along the edge of the gulf. There are formal gardens and cool walks beneath the palms; also a quiet grove of pepper trees between which appear frail vistas of the buildings on another plateau, or the sturdy Point Loma, where are concealed the guns of Fort Rosecrans, or the rocky outlines of the Coronado Islands, lying in Mexican waters.

The rose trellis surrounding the Exposition grounds includes six hundred and fourteen acres, but outside is the remainder of a fourteen hundred acre park which has been improved in a similar manner, so that it might be included in exposition property. Unlike most world's fairs of the past, San Diego has ample space for the better display of her beauties, and in that factor finds a highly important attribute to the general harmonious beauty. The large buildings at San Francisco do not appear at this Exposition 600 miles south, for San Diego has utilized nature wherever possible, placing many of the industrial exhibits out of doors.

Appreciating an extraordinary opportunity to stray from the world's fair conventions, San Diego created a new idea in architecture, new in respect to exposition building, although a renaissance of the Spanish art and architecture which was established on the lower coast in the latter part of the eighteenth century. By one of those sins of omission which it is hard to explain the glories of that school had been allowed to die out. San Diego chose to revive them, and in doing so has revealed anew the remarkable possibilities of this style, and also has given the world something approaching a sensation in the architectural treatment of exposition structures.

To the artist who has traveled extensively through Spanish America, the exposition will reveal some interesting suggestions of famous buildings already familiar. The buildings, as stated, are of the Spanish Colonial, after the various types of cathedral, old and new mission palaces, country residences, and municipal buildings, portraying throughout the general ideas and details which can be noted in many places of Central and South America. Thus the Home Economy building resembles the hacienda of the Conde d'Heras; the Indian Arts building suggest the Sanctuario de Gaudalonpe at Guadalajara, Mexico. In the Science and Education building are found points resembling the cathedral at Puebla, Mexico, while in the Varied Industries building, often designated as the

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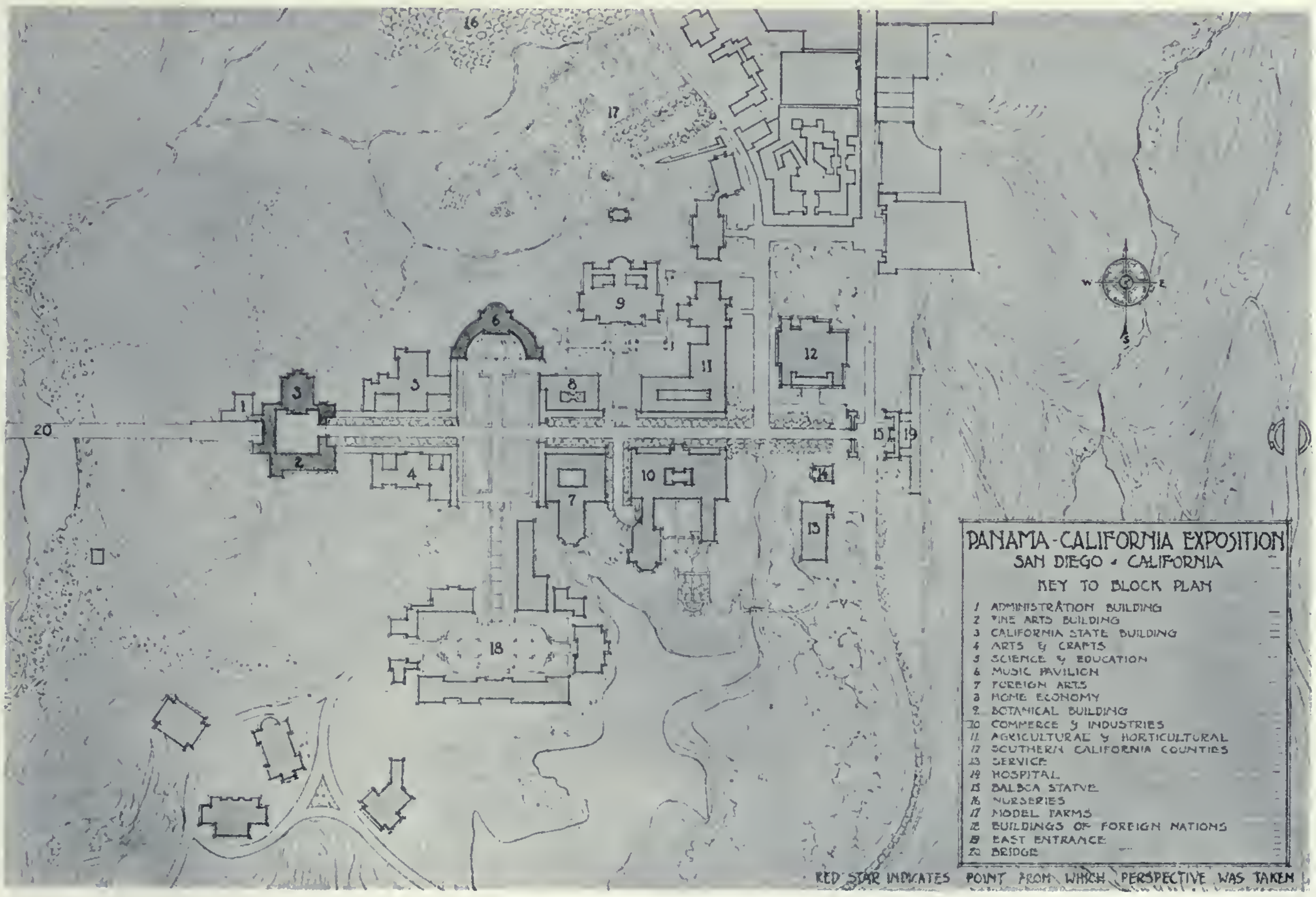
NORTH FACADE OF THE FOREIGN ARTS BUILDING AT THE PANAMA-CALIFORNIA EXPOSITION, SAN DIEGO, CALIFORNIA.

Agricultural and Horticultural building, are resemblances to the eighteenth century monastery at Queretaro, Mexico. The California State building adheres somewhat closely to the beautiful cathedral at Oaxaca, Mexico.

The San Joaquin Valley building is typical to any one of half a dozen municipal buildings in Spanish America, although the minor details originated in the mind of the architect. The building of Kern and Tulare Counties suggests strongly a number of palaces, while the unique building which New Mexico has erected is a copy of the old mission on the rock of Acoma in New Mexico, with a few details introduced from the church at Cochita. In the Painted Desert, these resemblances are equally marked; the larger pueblos being copies similar to those at Hopi and Taos. The interior of the lower structure, where the Rio Grande tribes are quartered, is a replica of the ancient Governors' Palace, El Palacio Real of Onate at Santa Fe. The buildings and small structures throughout the Painted Desert are exact imitations of typical scenes in the great Southwest.

The principal approach to the grounds is across the great Puente Cabrillo, the first large cantilever-unit viaduct of reinforced concrete to be erected, its seven piers rising from a pool in the canyon one hundred and thirty-five feet below. The puente may be considered as a portion of the west group, comprising the California State building, and the Fine Arts building, as well, the triple group costing something in excess of $500,000. From an engineer's standpoint the bridge is interesting chiefly by reason of its importance in railroad construction, a feature which has attracted wide attention from the heads of various companies. Each pier sustains the weight of one-half the arch on each side, with a space of about one inch left to break the arch and to afford space for expansion of material without affecting the strength of the structure.



"Our great difficulty," explained the chief engineer for one of the northern transcontinental roads, "has been in bridging streams which are seasonably turbulent. A single span across such a stream is extremely expensive, and the piers we might erect are in danger each year of being washed away or weakened so that the whole structure must be rebuilt. This, I believe, is the answer. Each pier is a unit; hence, if one is washed away the others will remain, and temporary beams can be laid across the gap so as not to interfere with traffic while the washed-out unit is being replaced. This will mean not only a decreased construction cost, but the saving of traffic revenue which at present we are forced to sacrifice during the rebuilding."

After crossing the Cabrillo bridge, beneath which is a small lagoon reflecting its great arches, we enter through a florid gateway to the Prado, on either side of which are erected the main buildings. This long vista is interrupted by the statue of Balboa, situated just within the

A LOGGIA OVERLOOKING EL PRADO.

east entrance. The first group consists of the California State building and the Fine Arts surrounding a small plaza. Both edifices are of reinforced concrete, with concrete stone facades. The California State building is designed similar to an old Spanish cathedral, with its rich and intricate entrance treatment, large colored tile dome and lofty tower.

The Fine Arts building, with which it is joined by a double arcade, is entirely different in design, following the quiet, almost severe, lines of the Old California Mission, with the rough adobe cloister, roofed by rough wooden beams, and the deep window recessions practically the only ornament appearing about its blank walls. The interesting feature is that two buildings so entirely different in character, but both of Spanish Colonial design, can stand in such close proximity and still harmonize. This is one of the rare beauties of the Spanish architecture, whose spirit and design has been followed with painstaking accuracy throughout the grounds.

Off on the lower plateau, for example, where the State buildings stand, is the New Mexico building, also Spanish Colonial, and also mission, but of the older mission type which came into being a century and a half before the California type. It partakes of the Pueblo Indian style, with straight lines, no arcade, and rugged simplicity throughout, and yet is as unmistakably Spanish as the fine old cloistered mission of later date. On the lower edge of the Plaza de Panama, some five hundred yards beyond, is another type, the palace, and a bit further the municipal building. Away beyond, at the foot of the "Isthmus," which is San Diego's name for the old-time Midway, or Pike, is a structure purely Moorish, with the pointed arch, the arabesque, the minaret and the other Moorish features which eventually became absorbed in some measure by Spanish architecture itself. At the east end of the Prado one of the buildings has the colored cornice, a blaze of crimson and gold, the only one of the main buildings to carry that feature.

SAN DIEGO EXPOSITION

P. Taylor

No single feature of California, aside from the majestic wonders of the State, has attracted more interest than the old Spanish missions which stretch all the way from San Diego de Alcala to San Francisco de Solano. No other spirit of architecture is so completely in harmony with the California landscape. Certainly none is associated more definitely with the rare old Spanish traditions which still live in California's life of the present day, and yet there

COMMERCE AND INDUSTRIES BUILDING.

has been a singular neglect of the Spanish-Colonial type in the construction of new buildings along the coast.

This circumstance was fully realized by the management of the San Diego Exposition five years ago, when plans were being made for the buildings which should stand on top of the lofty mesa which looks down over the sea and back over the canyons to its mountains. The exposition might have gone ahead and erected buildings of Greek or Roman type, or other conventional types which have appeared at all world's fairs of the past. Beyond a doubt the result would have been beautiful, for all buildings are beautiful when they are set in the gorgeous landscape which is possible in California as a whole, and in Southern California in particular.

Beautiful the result might have been, but nothing would have been created. Consequently the exposition adopted a different plan, and now offers to the world something which is not only wondrously beautiful, but also is creative, in that it has brought about a genuine renaissance of the glories of Spanish art and architecture, and something which is productive of a very great appeal to the romantic tendencies which linger in the most prosaic. The impression of the architects who have seen the exposition in the city of the far Southwest is that there has been revived an art which should have been revived decades ago, but which, now recreated, is destined to take on new life and strength and to last for many years to come.

The visitor comes to the edge of Balboa Park from the wharves or the railway station, passing en route buildings typical of a busy twentieth century city. The rattle of street cars and the hum of modern industry fill the way. One bursts through a grove of palms to find himself at the end of the quarter-mile Puente de Cabrillo, rising from the depths of a lagoon in the canyon far below. After crossing this impressive viaduct you come to the great stone highway, not spick and span as though it had been built especially for this occasion, but softened by the sandblast; chipped here and there to bring about the appearance of antiquity.

It is just such a gate as might have stood at the portal of a city in old Spain of two or three or four centuries ago. Entering through the gateway, immediately the hum and bustle of the twentieth century tidewater city die away. At one side is an impressive cathedral, copied in many essential details from the magnificent cathedral at Oaxaca, Mexico. At the other side is a plain old mission of the California type, and right away is noticed the charming feature of this Spanish-Colonial architecture; the ornate cathedral faces squarely into the sombre old mission, and yet there is no clash, no discord.

Down the El Prado are rows of black acacia set in verdant lawns; on either side beyond the lawns, is a thick hedge of poinsettia, its crimson flashing brilliantly against the green of the coprosma and the other shrubs. Just beyond this hedge rise the long Spanish arches which line the arcade stretching from La Puerte del Ceste clear along the Prado. Here is another old mission of the California type, and over across the canyon a mission of the older New Mexico type, quite as much Indian as Spanish. In one place is a building of the pure municipal type seen to-day in all Spanish-American cities; in another a rustic residence, and there an urban palace. Another building at the end of the Isthmus—the name given to San Diego's amusement street like the Pike and Midway of previous years—introduces the Moorish arabesque, minaret and other features which have been partly adopted by Spanish America itself.

PATIO, SOUTHERN CALIFORNIA COUNTIES BUILDING.

Everything is Spanish-Colonial, and yet there is variety sufficient to lend fresh charm to the ensemble. Openings in the long arcades lead into quiet patios, whose calm is broken only by the splashing of a fountain of Pan. Rose-covered gateways lead into pergolas which dot the broad lawns adjoining the buildings and stretch back to the brink of the canyons; curious exedras are arranged in the botanical gardens; stone balconies look out over the gulches which have been planted with an endless variety of semi-tropical plants. These canyons furnish a most important feature of the general landscape.

One reason for the extraordinary results which San Diego has brought about with a limited amount of money is that Balboa Park supplied a site which is quite incomparable in exposition work. The great mesa occupying the centre of the fourteen hundred acre park is cut by deep ravines whose contour furnishes admirable opportunity for the development of most appealing treatments. The canyons, like the mesa, were originally of hard-baked adobe in which grew nothing except cactus and sage and chaparral, but by the liberal use of dynamite, by ploughing, harrowing and watering, they have been made to bloom into a succession of great gardens which probably have no peer in America.

The height of the bridge has been accentuated by the use of Italian and Monterey cypress. Beyond the zone where these trees are used, is a wealth of eucalyptus and acacia. Some of the trees are the varieties which bear the brilliant crimson and golden blooms. The end of one canyon has been devoted entirely to a variety of palms, which are also used extensively elsewhere in the general scheme. The brilliant canna and the soft grays of the acacia Baileyana and some of the rarer grasses have been used to add further color.

Not only was San Diego endowed at the outset with this admirable site, but it was also blessed with the quite invaluable gift of a changeless climate, that knows no frost or torrid heat, and allows the most amazing riot of hundreds of varieties of trees, shrubs, clambering vines and small blooming plants. Over all the arcades sweeps this display of vines, with the purple bougainvillea used extensively in the Plaza de Panama, the brick red bougainvillea along El Prado; roses in one patio, clematis in another, jasmine and honeysuckle elsewhere. The effect of this floral display is of great importance.

There is another point which impresses the architect and the engineer alike. There has been little at previous world's fairs more genuinely depressing than the sight on the day after the fair closed when the tearing down of the buildings began. The structures at San Diego have been built to stay—that is, those structures which are entitled to permanancy. The smaller buildings along the Isthmus, being erected purely for amusement, will be demolished immediately.

The great west quadrangle, dominated by the California State Building, built entirely of steel and concrete, will be used to house the museum exhibits which have been donated to the exposition with the definite understanding that they are to remain as long as the building itself stands. The wealth of rare flowers in the Botanical buildings is assembled for permanent use, as that is also erected of steel and concrete. The Administration building, the fire station, the hospital and the other service buildings are for permanent park use. The great music pavilion which stands at the lower end of the Plaza de Panama, is of similar construction, and becomes the property of the city immediately after the exposition company is dissolved. All other buildings are of staff and plaster, but placed on a firm backing of metal lath. Furthermore, the entire absence of frost, sudden changes of temperature, gales and drenching rains from this particular section of the San Diego valley makes certain a much greater degree of permanency than would be possible elsewhere. The life of these buildings is figured at from twenty to thirty years.

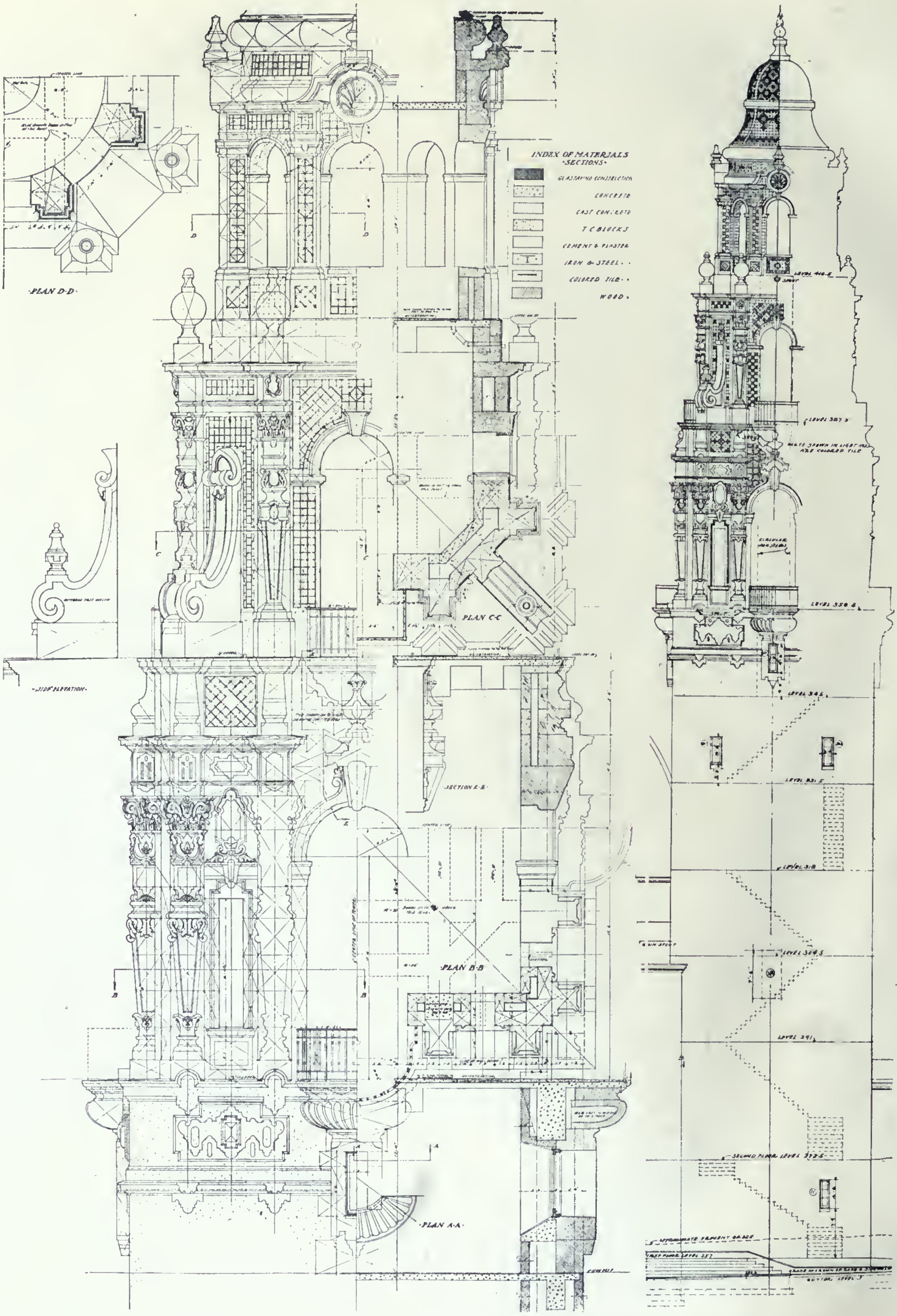
The supplementary features which have been introduced by the exposition management to carry out the Spanish ideas are in a rare spirit of harmony. Not only are the buildings purely Spanish, but the guards and attendants at the exposition throughout 1915 are attired as conquistadores and caballeros; the bandsmen are dressed in Spanish uniform; the dancing girls who appear in the Plaza de Panama and at different points along El Prado, are dancing girls in the bright costumes of old Spain. Some of the fiestas which will rank as special events are the fiestas of the Spanish-American countries.

In the field of special events are the religious ceremonies of the Aztec and Toltec, and other ancient red races, inseparably associated with the architecture itself. Very little is left to the imagination, save the feat of transporting ourselves backward three or four centuries and realizing that this magic city on the mesa is the

PATIO, SCIENCE AND EDUCATION BUILDING.

place dreamed of by Cabrillo four centuries ago, and by the succession of conquistadores and padres who followed after. It is an Exposition Beautiful in appearance and in spirit alike.

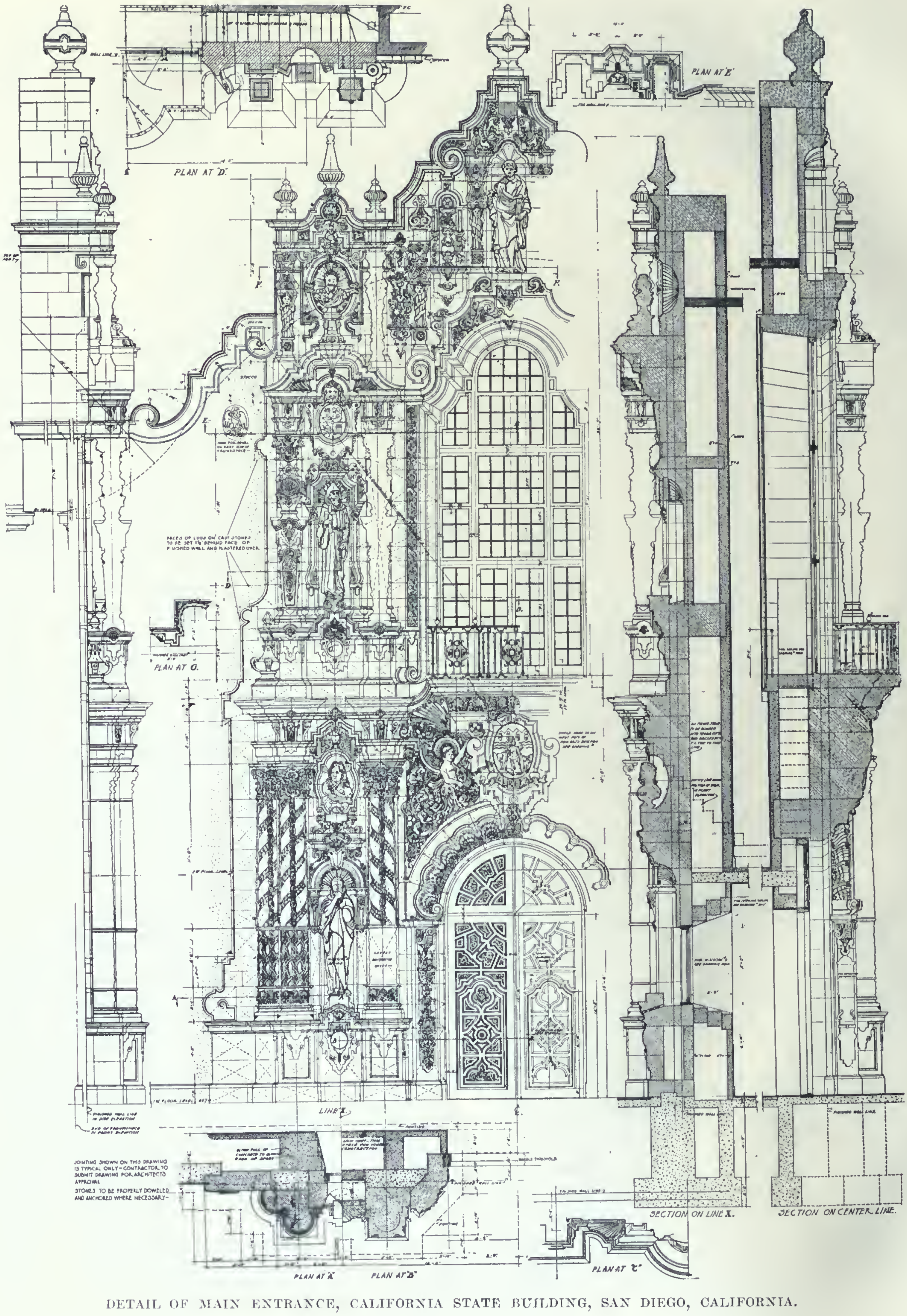
With the exception of the west quadrangle, which was the work of the architectural firm of Cram, Goodhue & Ferguson, the designing of the exposition was the work of Frank P. Allen, Jr., well known in exposition work.



DETAILS OF TOWER, CALIFORNIA STATE BUILDING, SAN DIEGO, CALIFORNIA.

CRAM, GOODHUE & FERGUSON, ARCHITECTS.

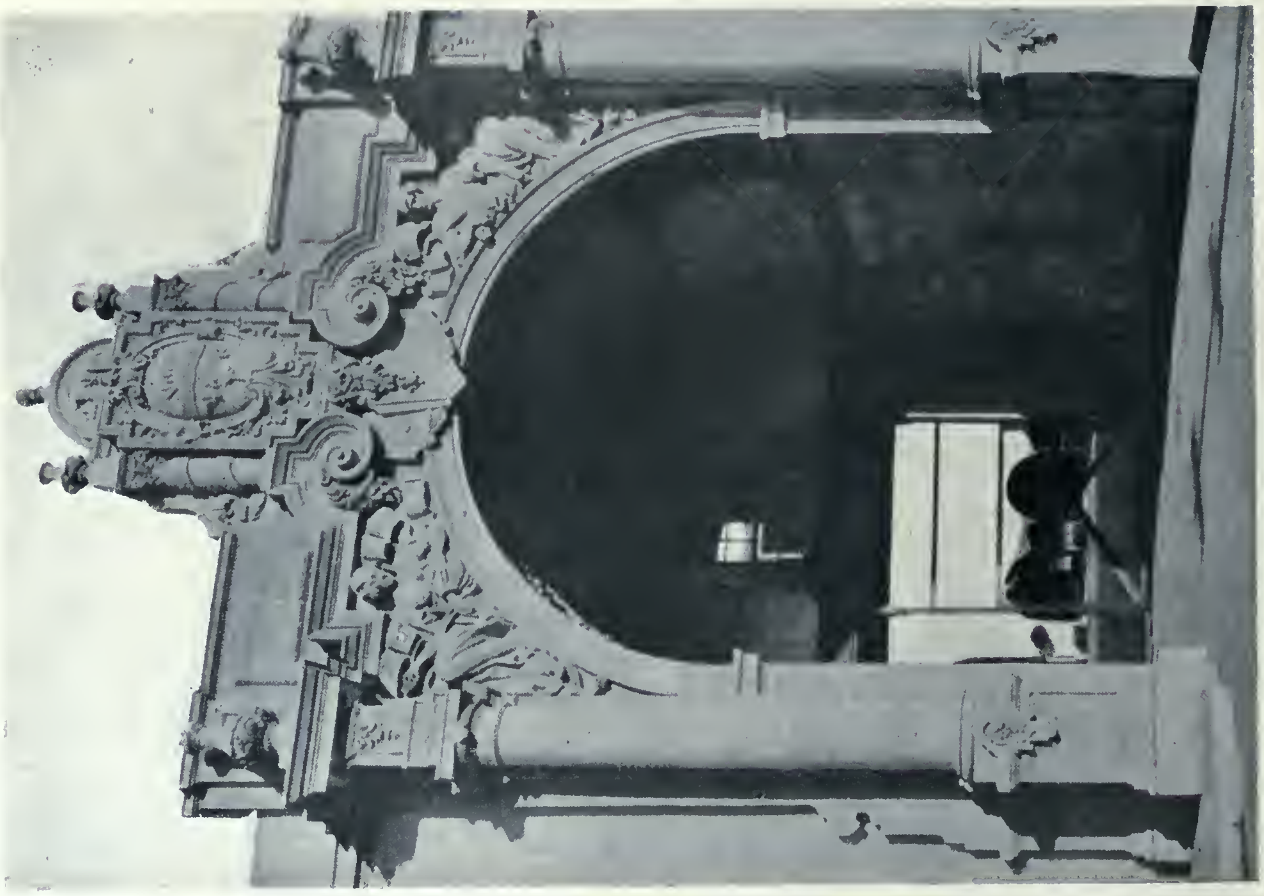
CALIFORNIA STATE BUILDING, SAN DIEGO, CAL.

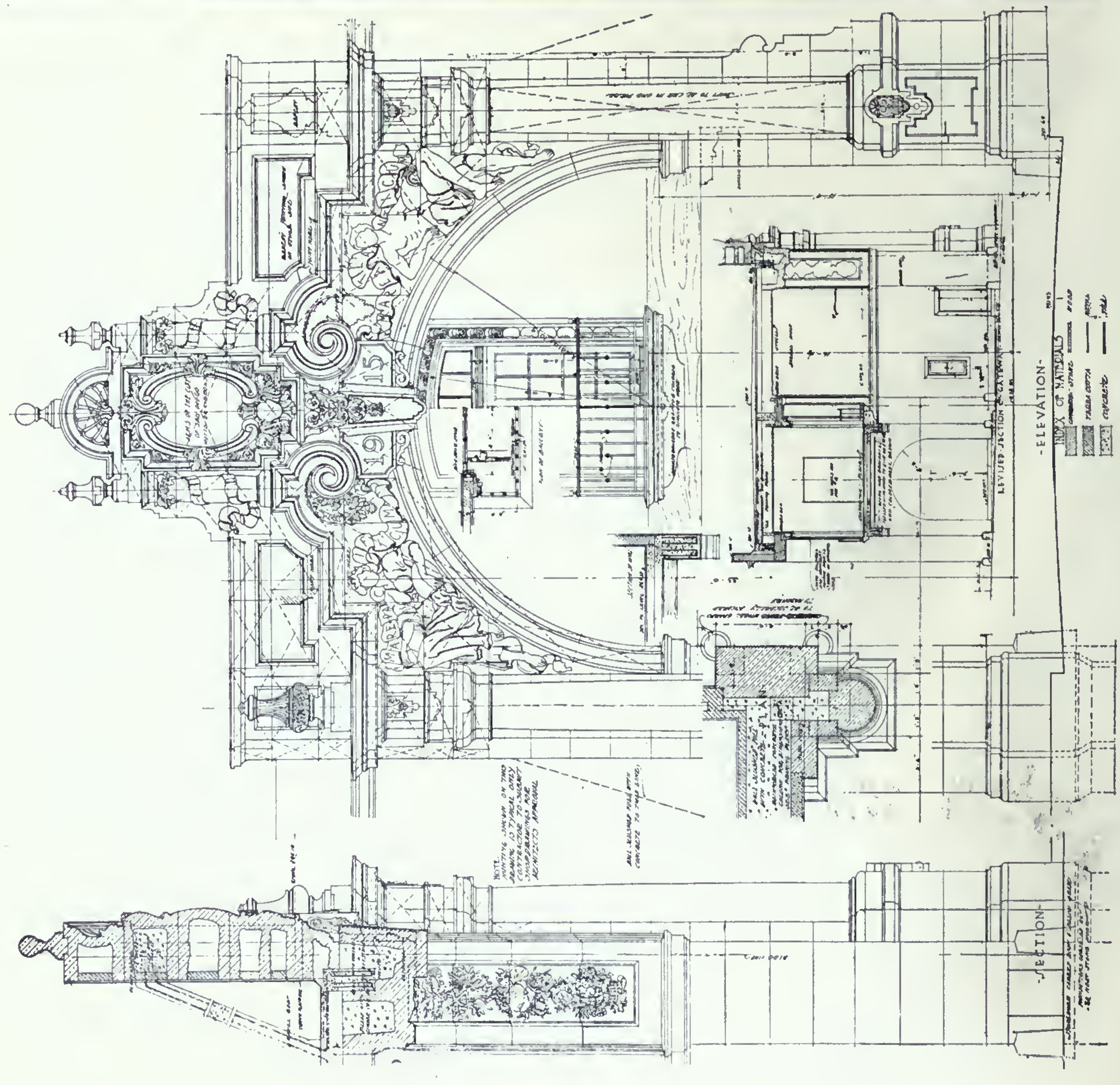


DETAIL OF MAIN ENTRANCE, CALIFORNIA STATE BUILDING, SAN DIEGO, CALIFORNIA.

CRAM, GOODHUE & FERGUSON, ARCHITECTS.

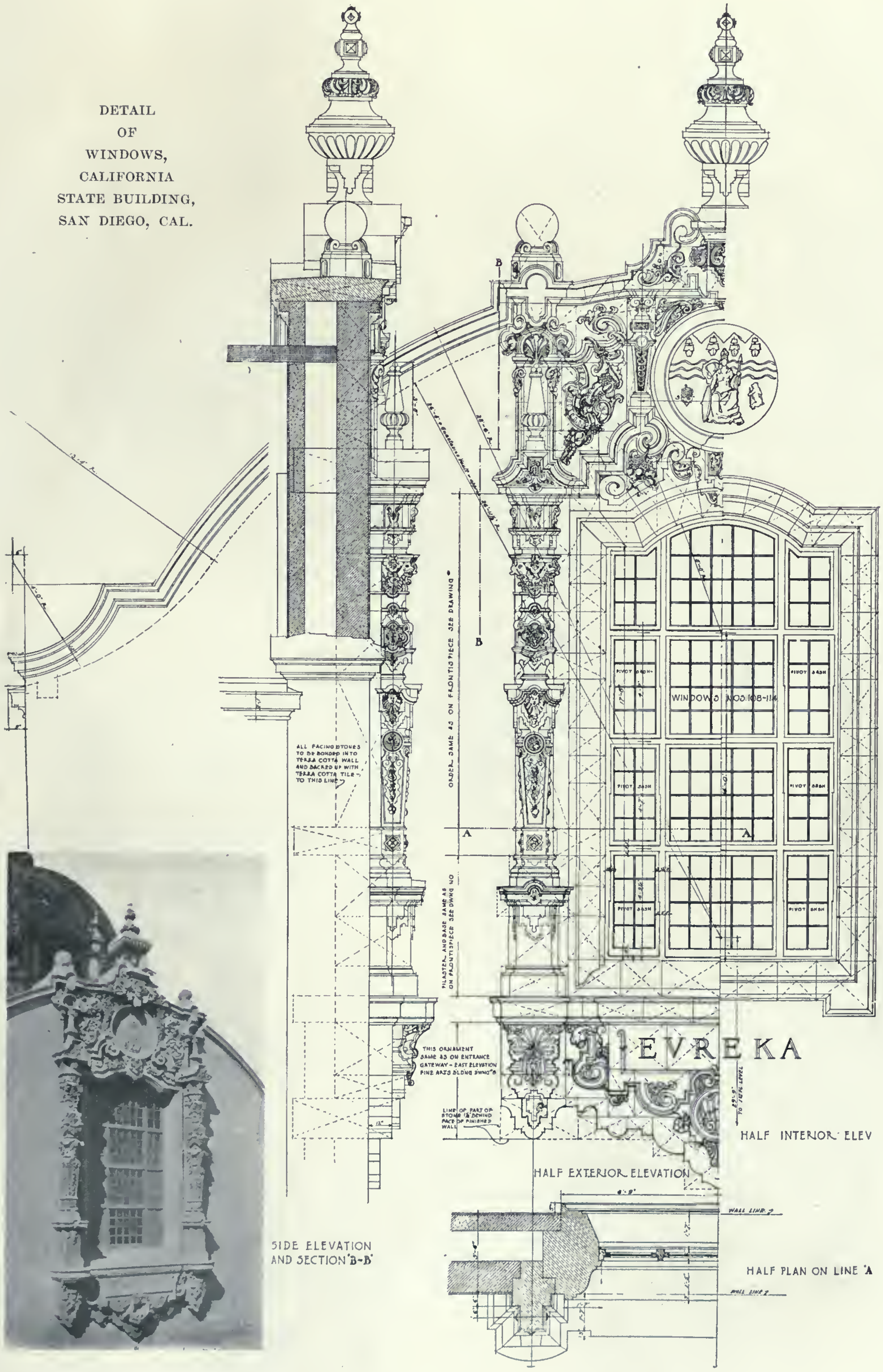
DETAIL OF MAIN ENTRANCE, CALIFORNIA STATE BUILDING, SAN DIEGO, CALIFORNIA.

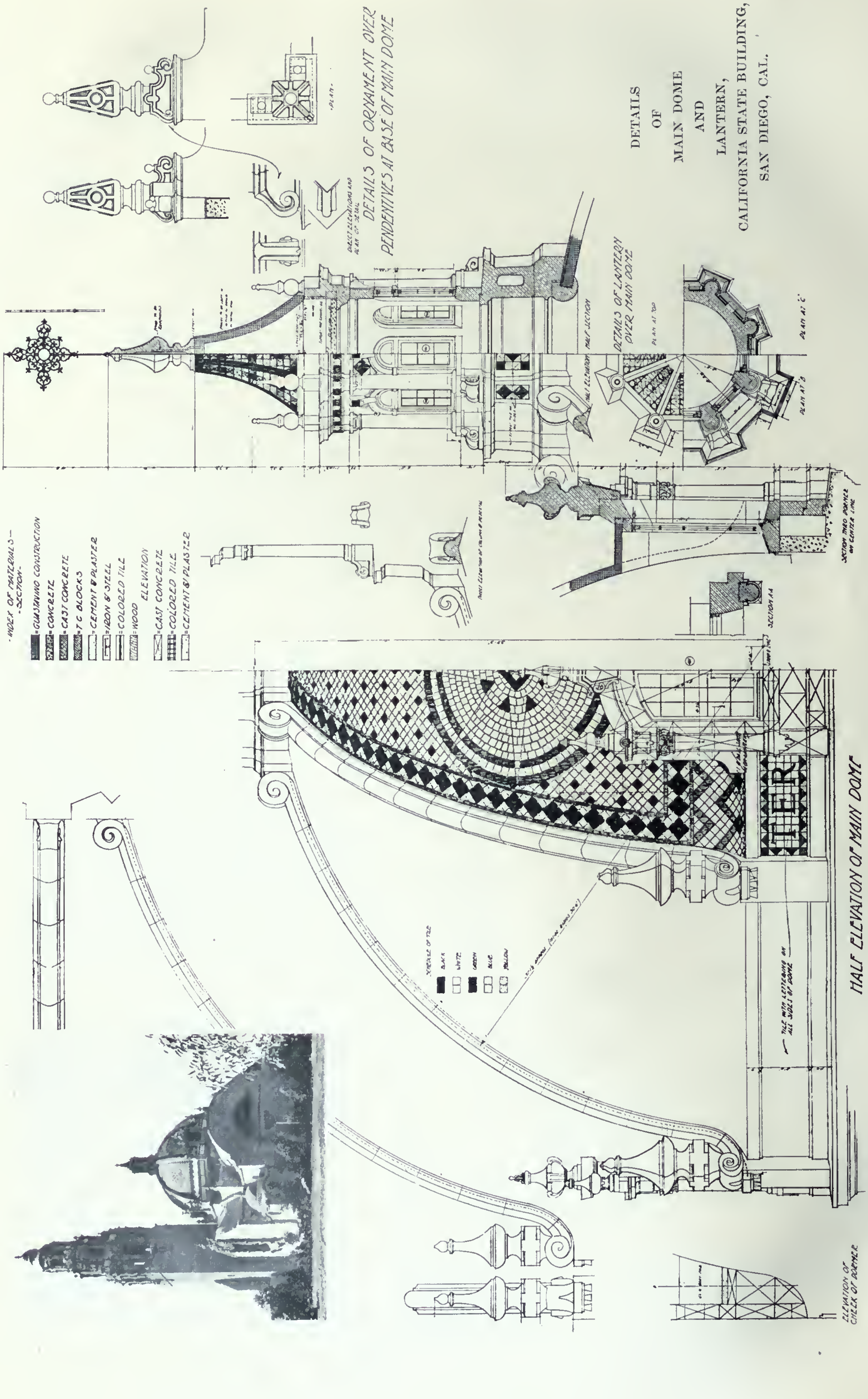




ENTRANCE GATEWAY, PANAMA-CALIFORNIA EXPOSITION, SAN DIEGO, CAL.

DETAIL OF WINDOWS, CALIFORNIA STATE BUILDING, SAN DIEGO, CAL.





DETAILS
OF
MAIN DOME
AND
LANTERN,
CALIFORNIA STATE BUILDING,
SAN DIEGO, CAL.

TWO VIEWS OF BOTANICAL BUILDING AND GARDENS.

PANAMA-CALIFORNIA EXPOSITION, SAN DIEGO, CAL.

THE great St. Louis exposition did not make running expenses. When Buffalo closed the doors of its show, the State of New York had to cover a heavy deficit. The management of the Jamestown fair could not pay its debts; its affairs are still in the hands of a receiver. New Orleans has not yet returned to the United States Treasury the money it borrowed to make its exposition go.

These sobering facts confronted San Diego four years ago when the wave of enthusiasm had passed, leaving in the hands of the committee signed pledges for contributions aggregating several million dollars. "Can we do it?" they asked one another.

Viewed from a distance, say from Chicago or St. Louis, the attempt to hold a twelve months' exposition in the lower left hand corner of the country, in a small city facing the empty Pacific and abutting on the line that separates bull- from prize-fights, seemed preposterous. Like the project itself, the very name San Diego, confusingly similar to the American pronunciation of the Cuban Santiago, had an outlandish flavor. San Diego was almost unknown east of the Rockies; in truth, polo players the world over knew well the lightning-fast Coronado field; battalions of Army and Navy people built homes in the lemon groves overlooking the bay; interlocking directors, malefactors of great wealth, corn kings from Dubuque and wheat barons from Kansas and Dakota appeared every winter in large flocks of private cars, but the mass of the people, the filling between the upper and the nether crust, knew as much about San Diego as it did about Louvain or Lemberg. The aggregate geographical knowledge of the New Jersey Legislature, for instance, was so limited that it placed San Diego right alongside of San Francisco while in fact the two cities are as far apart as Chicago and Buffalo. And San Diego was at the end of a branch line, hitched to the country's steel arteries of trade by a single track.

The Wise Men of the East opined that San Diego had bitten off more than it could chew.

San Diego, having the money safely in hand, calmly, courageously reviewed the situation.

EAST ENTRANCE TO VARIED INDUSTRIES BUILDING.

It admitted that St. Louis, Jamestown, Buffalo had been financial failures. But San Diego advanced the counter-proposition that the two expositions held on the Pacific Coast had been brilliantly successful from every standpoint. Portland cleared a handsome amount above its running expenses, and Oregon dates its awakening, its rejuvenation from the Portland fair; Seattle started with a debt of six hundred thousand dollars before the gates were opened. This debt was paid out of the receipts and enough was left over to pay the stockholders a dividend. Seattle had, within a radius of one hundred and fifty miles, approximately six hundred thousand people to draw from; within a like circle San Diego has eight hundred and fifty thousand souls and their pocketbooks at its disposal.

Pondering upon these things, San Diego cheered up considerably. Its confidence grew when it began to calculate the drawing power of that novel journey, a trip through the Panama Canal. And it became supremely confident of potential success when it dwelt on the magnetic pull of the triple attractions of 1915: the great world's exposition at San Francisco, its own Panama-California exposition and the everlasting exposition that reaches from the glaciers and geysers of the north to the sequoias, the waterfalls and the Grand Canyon of the south.

But the success of the San Diego exposition was *potential* only. A bare hook catches no trout even in the best pool. A mere exposition would not draw the crowds. To win out, to attract visitors in droves, to draw them through the gates again and again, San Diego must offer something entirely new, startlingly original, must build an exposition of surpassing charm and beauty.

KERN AND TULARE COUNTIES BUILDING.

Nueva Espana by the Silver Gate was San Diego's solution of the problem.

Moorish architects, Moorish craftsmen designed and executed the immortal palaces of Old Spain. When Ferdinand and Isabella had driven the Saracens from Iberia and confiscated the Moorish treasure they added the rich ornamentation, the bizarre elements of the French baroque to the Moorish groundwork of the new palaces. In New Spain, in the treasure house of the Americas, the *nouveau riche* Colonials, anxious to surpass the mother country in the splendor of their mansions, increased the wealth of the ornamentation. This wonderfully effective, boastfully rich style of architecture was chosen as the dominant note of the exposition. The mansions, the palaces, the cathedrals and public buildings of Cartagena, of Monterey, of Mexico City, of New Spain's most resplendent capitals were selected as models and reproduced along the brow of the ridge that overlooks the city, the glinting bay, the blue sea. Six Californian districts, realizing the artistic value of a finished, complete picture, allowed the exposition to design their buildings and to place them so that they formed integral parts of a harmonious ensemble.

San Diego has not erected groups of unrelated buildings scattered here and there over the grounds. San Diego has built a city, not an exposition. It has selected the architectural jewels created during the most sumptuous epoch on the Spanish Main, adapted them to its purposes and arranged them with infinite care along the calles and plazas and prados to create a perfect illusion. Even the hospital and the quarters of the fire department were made to serve as harmonious parts of the Spanish city.

The focal point of the remarkable picture lies just beyond the main entrance, beyond the audacious hundred-foot-high arches of the white bridge thrown across a deep canyon. Like unto the parapet of a fortified city, so the massive walls of the buildings rise from the far slope of the canyon, barring the way except where, at the end of the bridge, a noble arch gives access to a rectangular court of austere simplicity, one side filled by a tile-floor chapel, ascetic in its stern lack of adornment. On the opposite side looms the bulk of the exposition's dominant structure, of California's own building.

It is a cathedral, of a design so startling, so extraordinary that, standing alone, it would be an oddity. The square base of the detached tower, the sides of the facade rise to the cornice absolutely plain, devoid of the tiniest ornamentation, massive as the strength of the Lord, simple as the strains of the Angelus. And in the centre of the facade, reaching around the wide doors from the ground to the peak of the pitched

PUENTE CABRILLO.

roof, there rises a gigantic sculptural panel telling the history of the Californian missions in such a riotous display of carved detail that the contrast almost hurts the wondering eye.

But the contrast does not cease with the facade. Above the square base rises a many-storied tower as boldly ornamental as the base is plain, inset with tiles of blue, black and yellow, girdled with balconies of glistening bronze, surmounted by a golden sphere that carries Coronado's galleon as a weather-vane.

VARIED INDUSTRIES BUILDING.

The roof of the nave has still another surprise, a tiled dome so vivid in color that its hues are discernible from the bay, many miles distant. The dome and the tower are the landmarks of the exposition. They dominate the picture, appear at the end of green vistas, are framed in numberless arches and give the visitor the motif as he enters.

Beyond this pile of concrete and steel lies secular Hispanola, the creamy-white Spanish city with the cupolas of blue and gold, of black and yellow, with its swarms of pigeons fluttering from a hundred towers.

At previous expositions the buildings plainly revealed what they were; naked ribs of staff gazed unashamed through holes in the plaster even before the lights were turned on; a week after the opening noble columns of Carrara marble displayed the two-by-fours of their skeletons and revealed their origin.

Not so in San Diego's exposition. Except for the trained eye it is almost impossible to detect where the steel-and-concrete work ceases and the temporary construction begins. The illusion of permanence and solidity is complete to the finest detail. So solidly have these structures been built, so carefully has the plaster been put on the metal lath that they will last longer, show fewer traces of deterioration than the average Californian apartment house.

There is no discernible difference between the real roof tile and the plaster imitation. It was a difficult problem to wipe out this difference, but the builders solved it. After numberless experiments they oiled the plaster tiles, gave them a coat of zinc, finished them off with common brick ground into dust and lo! the thing was done. In both permanent and temporary structures the patios, the enclosed courts, are paved with heavy brownish tiles; though the difference in cost between the real thing and the make-believe is astonishing, neither eye nor foot can tell one from the other.

Laying aside for the moment the beauty and unity of design, the attention to detail, the solidity of construction, there is still another, a most important factor that adds life, color and character to the picture.

Refresh your memory. Resurrect the view-books of the Chicago, the St. Louis, the Buffalo, the Omaha expositions. Scan the pictures closely. Note the blank, bare walls of unbroken white, the utter lack of a green cover except along the very base; note the monotonous clumps of puny bushes, the utter lack of shade, of sizable trees. It could not be done. Nature was shackled; the best, most expensive efforts of the landscape gardener were dwarfed to insignificance by the ponderous masses of architecture in a climate that put plant life to sleep from September to April.

In San Diego plant growth rarely ceases. Eucalyptus rise from the seed to a height of fifty feet in less than five years; walnut saplings add twelve feet to their stature in a season; out of the castor bean a shade tree will grow in two years; nasturtiums and geraniums become weeds, calla lilies and daisies are used as hedges.

San Diego's is the first exposition able to give the landscape architect an unrestricted opportunity to produce results.

Four century plants were the pride of the St. Louis exposition gardener's heart; at San Diego no one took the trouble to count them. A single poinsettia flower is worth a dollar in New York on Christmas day; at San Diego thousands of the crimson blossoms are now standing out vividly against the background of creamy walls. Chicago's flower lovers are now putting earmuffs on their potted azaleas and oleanders; at San Diego man-high jungles of the glorious shrubs fling their perfume joyously into the gentle wind. Red clusters of the pepper berries are swaying in the lacy foliage; broad banana leaves with wine-red midribs, the graceful fronds of the cocos plumosa, the broad fans of the Canary Island palm, the drooping branches of the same date palm over which He rode into Jerusalem are silhouetted sharply against the smiling sky, against the softly resplendent facades of the Spanish palaces.

And the odors! Ten thousand flowering acacias are now bursting into flaming, odoriferous bloom; by-and-by the heavy perfume of the orange blossoms will pervade the exotic city; from January to January each month will have its attar of roses, its own perfume, its special wealth of blossoms. And every month the grass will be green, the air soft and cool; every month thrush, mocker, linnet, finch and oriole will be singing in the trees, in the foliage of a dozen hues whose colors fill the canyons and arroyos between the palaces. Never has there been such an exposition, one vast botanical garden, the finest, rarest specimens of plant life growing and thriving in the open air. Whosoever loves flowers and trees will find it hard to leave San Diego's exposition.

Were the Wise Men of the East right? Or did San Diego succeed in creating an exposition that strikes a new note, that is different?

The constructive note is only one voice in the great exposition chorus; did it sing alone, the fair would be monotonous. San Diego's show does not lack the variety that is the spice of life, war news and expositions. Though the exhibits in a score of buildings erected by Western States and their subdivisions are devoted to the constructive campaign, the splendid palaces erected with the exposition's own funds present a different picture.

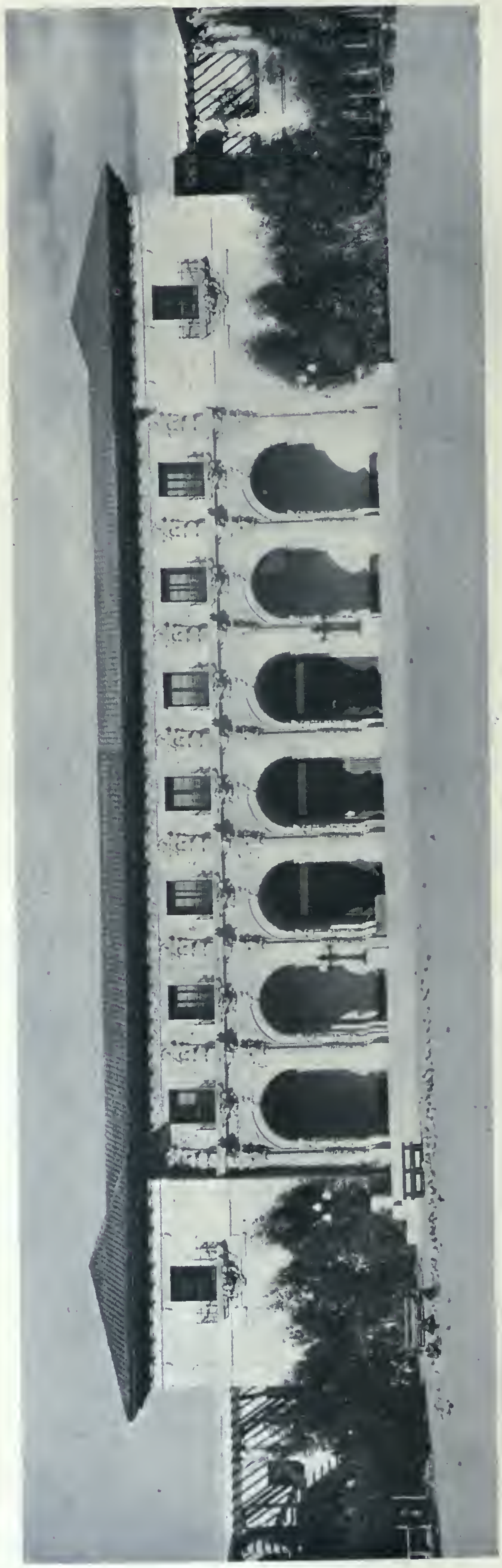
Industry, commerce, trade, art, education, science, achievements and processes in every branch of human endeavor are on parade in the resplendent palaces; the number and variety of the outdoor exhibits is greater, thanks to San Diego's climate, than at the largest of past expositions. Even the gigantic organ, gift of John D. Spreckels, stands outdoors under the blue sky.

Nor has the Street of Thrills been neglected. It is half a mile long and filled on both sides with

ENTRANCE TO VARIED INDUSTRIES BUILDING.

novel amusement devices. There'll be no lack of clean fun on the "Isthmus."

The exposition management exercises direct supervision over all steps taken to receive the visitors, to inform them of the available accommodations, over the transportation to hotels and apartment houses, over the rates charged and the service rendered. No visitor is to leave with a complaint on his lips or rancor in his heart.



TWO BUILDINGS OF LOCAL INTEREST AT THE PANAMA-CALIFORNIA EXPOSITION, SAN DIEGO, CAL.

BOTANICAL GARDEN, LOOKING WEST.

Last fall the general manager and the directors of the biggest concern manufacturing agricultural implements came to San Francisco, towing an appropriation of a hundred thousand dollars for an exhibit. They saw the rising walls of the City of Color by the Golden Gate, nodded beaming approval, cut the rope, left the appropriation and departed—due east.

San Diego lies six hundred miles due south of San Francisco. San Diego likewise was building an exposition; San Diego also wanted an appropriation for an exhibit from the biggest concern manufacturing agricultural implements. When the directors headed due east, ignoring the existence of the second exposition, San Diego rolled up its sleeves, took a deep breath and began manipulating the levers until its joints cracked.

San Diego succeeded, pulled the general manager of the biggest agricultural implement concern back across the continent. He came, without his directors, without an appropriation, but with an exceedingly active prejudice. He did not want to come. To his mind the trip was a waste of time, and he did not hesitate to say so when he reached the office of the Director-General. His firm was spending a hundred thousand dollars on an exhibit covering twenty-five thousand square feet of floor space at the Big Fair; he could see no reason why the claims of the San Diego exposition should not have been turned down politely by correspondence.

The Director-General smiled. That is one of his peculiarities, this friendly, disarming, quiet smile forever breaking out beneath the cropped red moustache. Also, he talked, quietly, in an even, level, friendly voice. And he talked to the point, talked straight business.

When the general manager of the International Harvester Company departed from San

VIA DE LOS ESTADOS.

Diego he left behind him a reservation for one hundred and twenty thousand square feet of space. In Chicago he put the case before his directors. They authorized him to sign a contract for two hundred and forty thousand square feet of space. Also, they authorized him to erect a special exhibit building at San Diego; furthermore, they authorized him to plant an orchard in which to demonstrate the use of the implements under actual field conditions. The building is now ready; the orchard blossomed this spring, is being irrigated and cultivated regularly.

EXAMPLE OF ELABORATE DECORATION.

You know and I know that times were hard last fall; we both know that individual firms as well as nations held back last year, trimmed sails, cut expenditures. How, then, did the Director-General with the freckles, the red moustache and the frank, boyish smile succeed in opening the purse and arousing the exhibit enthusiasm of a skeptic implement manufacturer at a time when the corn-belt farmers were renewing their notes?

The answer is very simple.

He took the manufacturer upon a statistical mountain and showed him the biggest undeveloped market for agricultural implements in the United States; then he showed the manufacturer, proved it by the books, how the fair would open its gates without a cent of debt, but with a nice lump of cash left in the treasury; thereafter he took him through the grounds and showed him just how the Panama-California Exposition at San Diego was to help develop this potential market. In his talk the exposition chief left the moonshine on the silvery bay, kept his feet on the solid ground of cross-indexed, double-checked facts, and presented a business proposition that landed the implement man's signature on the dotted line.

Skeptics by the score have traveled over the same route with the Director-General. All of them ceased scoffing after they had seen and listened; went home thoroughly convinced that the fair in the southwest corner of the country would not only be an assured financial success, but that it would also have a pronounced effect upon the character and management of future expositions, would give a tremendous stimulus to the growth of the southwest.

Of skeptics there had always been a plentiful supply ever since San Diego in 1910 proclaimed that it would hold a twelve-month exposition to celebrate the opening of the Panama Canal. It did not seem reasonable that a town of less than forty thousand inhabitants, located at the end of a branch line, should succeed in putting on a show really worth while seeing, without mortgaging its last shirt and breaking its financial back. Portland, with almost two hundred thousand population, had been helped out by a fat appropriation from the State of Oregon for an exposition of much smaller size than the projected San Diegan enterprise. Seattle had two hundred and seventy thousand people when it undertook its fair, yet Seattle raised only twelve hundred thousand dollars and was six hundred thousand dollars in debt when the gates were opened. How could little San Diego, barely one-sixth of Seattle's size, expect to finance and carry through an exposition of greater magnitude? It seemed preposterous.

But San Diego did it! San Diego by subscriptions and municipal bond issues raised three million dollars without going beyond the city limits, thanks to D. C. Collier, the enthusiast whose boundless faith and energy started the ball rolling and kept it going. Collier's efforts financed the exposition; Frank P. Allen, Junior, the man who built Seattle's fair, looked after the physical features of the project, planned the grouping and design of the buildings, got ready to transform the barren slopes and deep arroyos into a fairyland of tropic foliage. Eighteen months ago the blue-prints were ready for the builders—but the spirit, the exact, specific purpose of the projected exposition had not yet materialized.

San Francisco's exposition was universal, all-inclusive. It proposed to record, in visible, tangible form, the progress of civilization in all its phases; it was to be the final summary of man's past achievements. San Diego could not do the same thing on a smaller scale; San Diego could not even segregate Latin America and chronicle its achievements, because the South American republics would be represented at both fairs. Never was the need of a distinct, outstanding individuality, of a differentiating purpose more pressing than at San Diego eighteen months ago.

ENTRANCE DETAIL TO BOTANICAL BUILDING.

A rancher supplied the individuality, furnished the purpose, solved the problem. They made him Director-General, put the exposition into his hands as a reward. It was this rancher who landed the International Harvester Company for the biggest exhibit ever made anywhere by an individual firm.

H. O. Davis, the man with the quiet voice and the boyish smile, did not seek the office. He would still be raising blue-blooded stock at Yuba City if the supervisors of Sutter county, California, had not appointed him exposition commissioner, charged with the duty of arranging the county's exhibit at the two Californian fairs. In this capacity the rancher—he was a newcomer in California, having sold his manufacturing business in Chicago only a few years previously—came to San Diego, bubbling over with ideas that attracted the attention of Allen, the builder. Allen asked the rancher to stay; Collier, father of the exposition, made him assistant to the president and went abroad. Within a few months the board of directors appointed the newcomer Director-General, discharged all committees except the executive committee, gave the new chief a free hand and told him to carry out his ideas; to build an exposition with a constructive purpose. That purpose was the settlement of the still unproductive arable lands in the southwest quarter of the United States, the acceleration of agricultural development in San Diego's potential trade territory, an area that comprises a million square miles covering the southern part of California, all of Arizona, western Texas and New Mexico, a part of Colorado, the southern half of Utah and Nevada. In this territory the Panama Canal will enable San Diego to lay down goods for less money than it costs to ship them from the manufacturing points in the East or Europe, across the continent by rail.

VIEW FROM CANYON CABRILLO.

"Holy Gila Monsters!" said the Illinois tourist. "Do you mean to say that there is anything worth developing in that country? Why, it's drier than a Kansas town after a revival campaign. How much room for real farms, not cattle ranches, is there in that desert country? You got to show me the green spots."

No one knew. The Director-General did not know. But he proposed to find out. Hiring a corps of statisticians, he investigated every county, every valley and plain containing more than fifteen hundred cultivated acres in the territory. He enumerated every acre, irrigated or dry-farmed, in the region, determined the principal products of every valley, the rate at which production had grown between 1909 and 1913, compiled data on the rainfall, the length of growing season, on transportation and educational facilities. Above all, he ascertained how much raw land was left in every county or valley that could be made productive either by irrigation or by dry-farming methods, checking and verifying the figures thus collected most carefully.

PLAZA DE PANAMA.

The totals obtained in this painstaking survey surprised the Director-General. They showed that in 1913 eight million irrigated and non-irrigated acres were producing crops in the southwest; they also showed that this territory in addition contained forty-four million acres of untilled agricultural land, and water enough to irrigate almost half of this immense area.

In Western Canada less than twenty million acres are in crop this year. These twenty million acres, with a short growing season and rigorous winters, have pulled a hundred thousand American farmers across the line every year for a decade; these twenty million cultivated acres have built the cities of Winnipeg, Calgary, Edmonton, Regina, Saskatoon, Prince Albert and a score of lesser towns. In the southwest the survey showed that forty million virgin acres were available for settlement, half of them susceptible to irrigation and specialized intensive cultivation. There was room for seven hundred thousand new farms, for a farm population of five millions over and above the total present population of sixteen hundred thousand souls. In the establishment of these seven hundred thousand new farms a billion dollars' worth of lumber would be needed for buildings and fences; they would require at the start twenty million dollars' worth of plows and harrows, twenty-six million dollars' worth of rakes, over a hundred million dollars' worth of pumps and engines. For farm equipment, tools and implements, for building material, furniture and household necessities, those seven hundred thousand new farms would offer an initial market worth five billion dollars to the manufacturers. Would they go after this business with an exhibit at San Diego?

Having compiled these detailed data, Director-General Davis did not begin his campaign for exhibits until March first of last year. On that date he sent out six high class salesmen to present the statistics and arguments to a selected list of manufacturers. Within ten weeks ninety per cent. of the available space was gone, contracted for by manufacturers whose eyes were suddenly opened to the magnitude of the virgin field in the southwest. The remaining ten per cent. did not go begging. The Director-General was saving the space for emergencies, was actually turning down proffered exhibits.

And when the commissioners of States, counties and districts arrived with their exhibit plans, they ran full tilt into that same inflexible determination to have a constructive exhibition. They were asked to put up exhibits of real value to the visitors, exhibits that would visualize the opportunities in the southwest at a glance. It was the Director-General's idea to have a large-scale wall map part of every State's or county's exhibit. This map was to show every railroad line, the accurate dimensions of every town, every mile of road and its character, every school-house in its right location, every forty-acre field of grain, alfalfa and other field crops, every orchard and vineyard. In addition, these maps were to show not only the available area of irrigable virgin land and its location, but the character of this raw land, the quality of its soil, its adaptability to the production of alfalfa, fruits or vegetables. The Director-General opposed the indiscriminate exhibition of embalmed fruit, tall cornstalks, sheaves of grain and giant vegetables. He insisted upon a show that would furnish the visitor in a week with more accurate, reliable information, with a better picture of agricultural conditions and opportunities in the southwest than he could hope to obtain through a year's expensive travel.

And he censored the exhibits. They had to be not only instructive, meaty, of practical value, but they also had to be true. Misleading exhibits were worse than no exhibits at all, the Director-General insisted. He gained his point. The old-time boom stuff, the yodeling of the land speculator with the heat-treated, vanadium steel conscience will be conspicuously absent at the Panama-California Exposition.

Novelty is the cornerstone upon which the success of any exposition is built. The mere size of Chicago's White City, the mass and variety of its exhibits and amusements, the sham magnificence of its classic structures, lifted it far above any preceding effort. And since the World's Columbian Exposition the builders have found it extremely difficult to surpass the Chicago climax. At San Diego, however, a new exposition note has been struck. It is best expressed in the experience of the men whose fantastic attraction was the strongest money-getter on the St. Louis Pike. They came and asked for a concession.

FOREIGN ARTS BUILDING.

"What kind of a show do you want to put on?" inquired the Director-General.

The visitors' chests expanded visibly.

"Creation!" they replied in unison. "The biggest drawing card at the St. Louis Exposition." And they leaned back to let the announcement take effect.

"I'm sorry," replied the Director-General, "but you can't have any space unless you devise something different. Your attraction has become identified in the popular mind with the St. Louis Exposition. We can't afford to imitate even if you would draw the crowds. Think up something fresh, something new and we'll welcome you with open arms."

Nor did the Director-General limit this policy to the multitude of amusement devices. With

HOME ECONOMY BUILDING.

equal rigor he applied it to the exhibits themselves.

"The time for the mere exhibition of finished products in a state of dignified repose has passed," he explained. "Rows upon rows of polished electric motors, stacks of beautiful fabrics, miles of commodities, machines and products endlessly repeated weary the eye, tire the feet and bore the brain. The same thing can be seen any day in a department store, a wholesale house or an art bazaar. We refused to have these lifeless exhibits in our buildings. We demanded action, novelty, interest—and we got it. We will exhibit processes, not the product alone. In our textile exhibit, eight looms installed by different manufacturers will show the exact method of weaving various fabrics. Underwear, hosiery, knit goods, woollen and cotton fabrics will be made right before the visitor's eyes. We won't have an exhibit of Japanese art handicraft. We'll have the craftsmen themselves carving in ivory, weaving the tall Formosan hats, beating copper, lacquering and enameling jewelry. Our traction engines won't stand in solemn rows like wooden horses; they'll be out on a hundred-acre field in active competition, each one trying to show that it can plow the deepest furrow, haul the heaviest load in the shortest time at the lowest cost. There will be life, action, movement in all our exhibits. Seventy-five per cent. of their number will show processes of production or the use and application of the product. Those that do not lend themselves to this treatment will be historical in character, will show the evolution of the appliance from its crudest form to its present perfection. And there won't be endless repetitions. We have limited every line of industry, every branch of manufacturing, to two exhibits, except, of course, agriculture and everything pertaining to it, in order to avoid monotony and tiresome duplications."

More than any exposition ever held, San Diego is laying stress upon outdoor exhibits. Sheep will be sheared by electricity, cows milked by compressed air, fruit trees sprayed by gasoline, under the deep blue sky the year around. And there will not be a single "Keep Off the Grass" sign anywhere within the grounds.

A visit to the average exposition is not a vacation; it is hard, strenuous, albeit pleasant, work. San Diego's exposition will be restful. Green lawns have been spread everywhere, winding paths lead through the groves of exotic trees, shady belvederes with spacious seats have been built at a hundred points, exposed to the cool breath of the Pacific trades, offering vistas of the city far below, of glinting bay and blue ocean, of the Coronado islands' purple silhouettes on the far horizon. All around the exhibit buildings, green arms reaching into the spaces between them, is a sea of multicolored foliage brought from the far corners of the earth, of flowering shrubs and ornamental bushes whose odor and color are even now pervading the buildings. Strange combinations impossible in

OUTDOOR ORGAN.

other climes are to be seen. Scotch heather is blooming in the shade of green-and-red pepper trees from Brazil. Slender cocoa palms from the South Seas and flowering sweet-scented acacias from Australia—there are twenty-seven varieties of them—line the streets; bougainvilleas of deepest purple, rising from green lawn, climb the creamy walls of the palaces around the Plaza; bougainvilleas glowing with color borrowed from the heart of the red flame cover the facades of other groups. The greatest botanical garden in all the world is but a poor lifeless catalogue of single specimens compared with the wealth of massed plant life at San Diego's exposition. And every species of plant will be a living exhibit, plainly marked with its workaday common name and adorned with its stilted scientific cognomen. For the nature lover San Diego's exposition will be a source of costly delight, again and again he will deposit his obolus at the gate to explore the close ranks of the world's flora.

It takes a great deal of money to keep an exposition open and running twelve times thirty days. Some of the recent shows could not keep going five months without a deficit. San Diego, about as far from the geographical centre of population as it is possible to get without dropping off the map, fully realized the magnitude of the task ahead of its exposition management. To make the fair a financial success, more people had to be drawn through the gates from a longer distance than at any previous exposition. And the visitors of the first six months must bring the crowds during the last half of the show; they must be sent home so filled with enthusiasm that their descriptions will bring their friends to the Silver Gate. This enthusiasm, however, could not be aroused by an exposition of the home-cooked variety. It must be novel, and it must have a foreign exotic flavor. Therefore San Diego built an exposition that does not look like an exposition at all.

Some of the buildings are permanent, consist of reinforced concrete and steel; others are of the usual staff-and-plaster construction; but the eye cannot discern the difference. They all look as though they had been built for the ages. So careful and painstaking has been the modeling, so close the attention to the fine details, that the sumptuous carvings of the rich facades produce a perfect imitation of hewn stone effects; real tile and imitation are used side by side, yet the uninitiated cannot tell one from the other, and the tile floors of the monastic patios would puzzle even an expert.

In all its details the San Diego exposition gives a true picture of the richest, most beautiful part of a Spanish colonial city. Even the

UTAH BUILDING

pigeons are there, hundreds of them cooing in the towers of the palaces. The names of the streets, avenues and boulevards are all in sonorous Castilian; the gatekeepers, guards and attendants will appear in Spanish costumes; Spanish dishes will be served in Spanish restaurants, even the advertising copy of the exposition will be flavored and spiced with quotations from the Spanish poets in the original.

To obtain the early visitor's enthusiastic co-operation, Director-General Davis has gone to extraordinary lengths. He is determined that every visitor shall receive full value for every dollar he spends within the grounds. The contracts with the concessionaires dispensing food and drink within the enclosure provide not only a rigid regulation of rates and prices, but they also provide for a strict supervision of food preparation and service. Every kitchen will be on exhibit; no partition can be used except it be made of plate glass. All the ice cream, candy and lemonade must be made in full view of the audience. Unclean, questionable or crooked attractions have been excluded. Every possible precaution has been taken to protect the visitor against fraud or deception within the grounds.

But the Director-General has gone a step farther. The exposition management's protective hand will greet the visitor before he lands in San Diego, before he has reached the grounds.

"We have decided that the exposition shall not be used as a cloak behind which extortion can be practised," declared the Director-General—without a smile. "We will see to it that even during the months of the greatest crush every visitor can obtain a clean, comfortable room for a dollar and a half a day, for two dollars and a half a day with private bath. All hotels, rooming and apartment houses are under contract to fix their rates for the exposition year, this rate not to exceed the price demanded during the height of the tourist season in an ordinary year. Under the contract this rate cannot be raised, and every room must have a card stating this price on display. The contract provides for a penalty of a thousand dollars for violation of its provisions, and the exposition

MONTANA STATE BUILDING

stands ready to refund to every visitor the amount of the overcharge beyond the rate as contained in the published lists. We want the visitor to depart with a sweet taste in his mouth, and we are going to see that he does."

In reply to my question, "How much money will you have to borrow on your gate to complete exposition?" it was shown that they had on hand a fund of sixty thousand dollars from the sale of concessions. That fund is untouched, draws four per cent. and is growing. They will have money to lend instead of borrowing it, and will open with $100,000 in the treasury.

"Don't judge San Diego by the standard of previous expositions," said the Director-General. "It isn't fair. We are all new in the business. We had no precedent to cling to. We were forced to proceed on entirely new lines, make our own way irrespective of what others had done."

That is the reason why the Panama-California Exposition will be an unprecedented success.
—*By W. F. Woehlke, in "Sunset."*

PLAZA DE CALIFORNIA.

Building for Bowles Lunch Room, Toronto

HAND, HARRIS & MERRITT, Architects

SO much has been written of the problems and the success, or possibly failure, of our architects to design fittingly the tall building that we have perhaps overlooked what may well be an even more difficult problem, that of designing a small building to be placed immediately against the mass of a tall one—one that cannot from the nature of its intended use be made monumental in scale as is possible in the case of a bank structure. The building for Bowles' Lunch Room at 7-9 King street east, Toronto, is a particularly happy and successful solution of this problem, in which the architects have combined the delicacy and refinement of the period in English architecture made historical by the brothers Adam, with just that touch of modernity which these masters might have given if they had at hand the materials now available. The building has the atmosphere of having been designed in the spirit of the times when four-storied buildings were being erected in our cities. It is interesting to observe the use of a matte finished enameled brick as a structural unity with the design and the skillful blending of the color so that none of the quaintness is lost. This affords a relief from the usual glaring white glaze and marks a great advance in the possibilities of this material, which, in spite of its many recommendations, has been heretofore avoided by architects notwithstanding the practical necessity in these days of using a material which can be cleaned without detriment to its texture or appearance.

The building is used entirely for the purposes of the owners, the basement being devoted to the barber shop, lavatories, and a most interesting room for pocket billiards. This latter with the corridor show most suggestive examples of the use of brick in interior work and some very clever tiling in the floors and ceiling of the entrance hall. The entire ground floor is given over to the lunch room, finished in cream white veined statuary marble, with a light Formosa marble base; the tiling above in tones to harmonize, while the pattern on walls and ceiling are brought out with rich ivory. The lighting is of the semi-indirect type, in this instance using genuine alabaster globes which result in a most pleasing warmth of color.

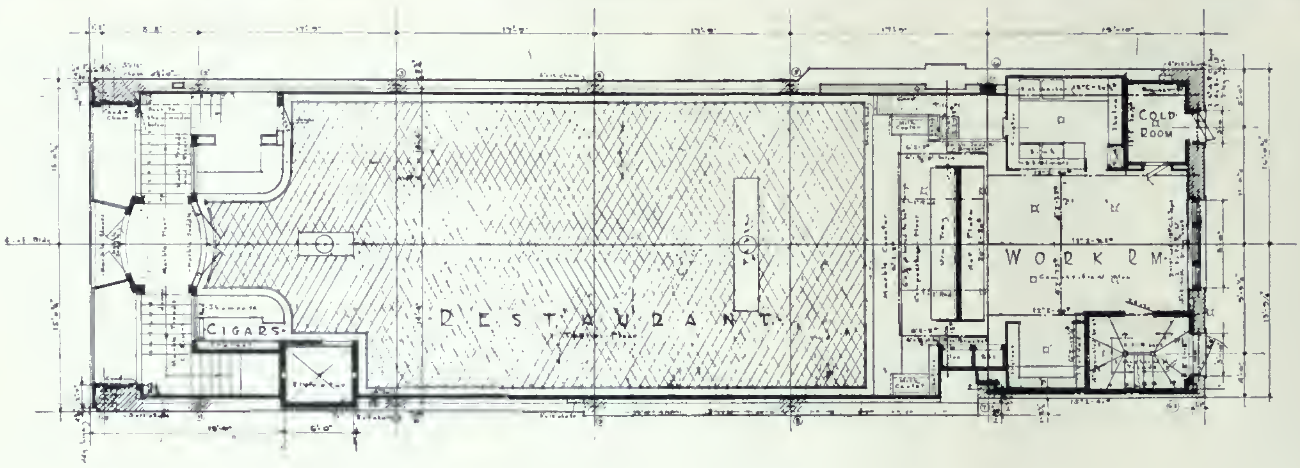
The next two floors are devoted to billiard rooms, with panels of leather and painted fabric, the stripping and cap moulds in walnut. The top floor has been fitted up for the use of the architects, Messrs. Hand, Harris & Merritt, and fittingly completes a building each floor of

RECEPTION HALL, ARCHITECT'S OFFICES.

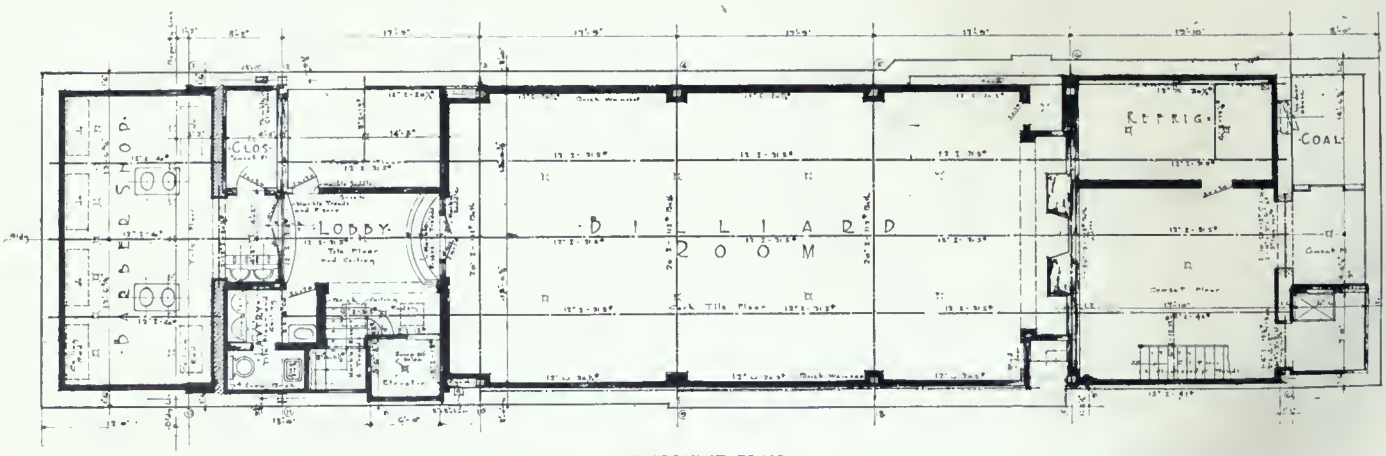
which has many features and details of interest.

The building is ventilated throughout, the fans being located in the housing on the roof. Access to the several floors is obtained by a high speed automatic elevator in addition to the stairs. The cost was approximately $175,000.

RESTAURANT.



GROUND FLOOR PLAN.



BASEMENT PLAN.

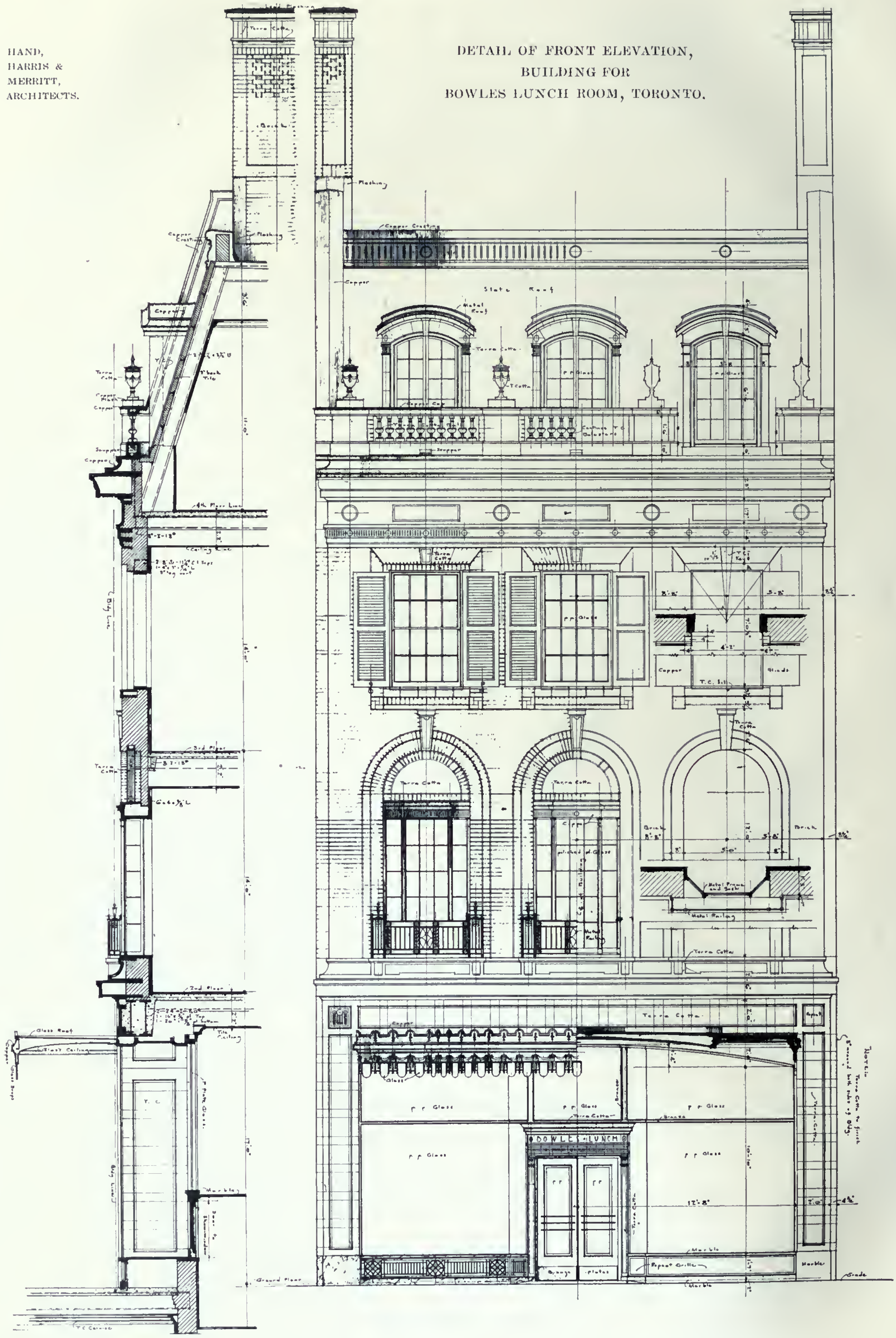
BUILDING FOR BOWLES-LUNCH ROOM, TORONTO.

HAND, HARRIS & MERRITT, ARCHITECTS.

BUILDING FOR BOWLES LUNCH ROOM, TORONTO.
HAND, HARRIS & MERRITT, ARCHITECTS.

HAND,
HARRIS &
MERRITT,
ARCHITECTS.

DETAIL OF FRONT ELEVATION,
BUILDING FOR
BOWLES LUNCH ROOM, TORONTO.



BILLIARD HALL IN BASEMENT FOR BOWLES LUNCH ROOM, TORONTO.

CONSTRUCTION

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

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

Entered as Second Class Matter in the Post Office at Toronto, Canada.

Vol. VIII Toronto, March, 1915 No. 3

THE Canadian Ice Machine Company, Ltd., announce the removal of their head office, shop and warehouse to 82 Chestnut street, Toronto.

* * *

WM. CONNERY, for several years a member of the firm of Ellis & Connery, Architects, Manning Chambers, Toronto, has withdrawn from partnership, and opened offices in Suite 410, fourth floor of same building.

* * *

ELLIS & ELLIS have formed a co-partnership for architectural practice, and will continue the offices in the Manning Chambers, Toronto, of Ellis & Connery, recently dissolved. The members of the firm are J. A. Ellis and his son, H. C. Ellis, formerly with Charles A. Platt, architect, New York City.

IN THE *Luxeberry News,* published every month, Berry Brothers, in commenting on their advertising for 1915, say: "Never was more care used in selecting the mediums in which to place our advertising for 1915. We feel that here is the opening of a big year, a better year and we are prepared to do our part. Will you do yours?" Among the list of magazines employed for their various announcements are the following architectural publications: *American Architecture, Architect Record, Architecture,* and CONSTRUCTION. The company has opened a new branch in Savannah, enabling them to give better service to their southern trade.

* * *

ARCHITEC-TONICS, the Tales of Tom Thumtack, architect. New York: The Wm. T. Comstock Company. Cloth, illuminated, 5 x 7, 175 pages, 100 illustrations. Price, $1.50 net. This is the first time that architects can claim to have recognized literature in the field of fiction. We have stories about millionaires, manufacturers, all kinds of business men, farmers and quite a little about engineers, but never a word about an architect. Here it is and it is presented with all the taste that an architect is supposed to have. The book is designed from beginning to end, from the gorgeous illumination of the cover, the book plate, the frontispiece and title done in colors and the many illustrations of the various stories which fit the point and tell the tale, there is evidenced a fine workmanship that is unusual in fictional literature. These are a series of tales about the experiences of an architect. They tell his views of life in little stories, about the things which happen when buildings are built, lived in and torn down, the tales of the office and the architect's views of the client. There is humor and fun and pathos. They are little tales from real life and they are told briskly and with lightheartedness. Nothing since the days of Cruikshank has equalled the cleverness of the illustrative sketches. The book will furnish recreation for many besides the professional man, and every one who knows an architect ought to have a copy just to acquaint himself more fully with the species.

April, 1915 Vol. 8, No. 4

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H. GAGNIER, Limited, Publishers
GRAPHIC ARTS BLDG., TORONTO, CANADA
BRANCH OFFICES
MONTREAL LONDON NEW YORK

BUILDING AT HAMILTON, ONT., ERECTED IN 1840. FORMERLY A STOVE STORE AND TINSHOP. AT PRESENT PART OF GURNEY FOUNDRY COMPANY.

EARLY ARCHITECTURE IN CANADA.

The quaint structure shown as our frontispiece is located on John street, Hamilton, and has become an integral part of the Gurney Foundry Company. It was built in 1840 by Alexander Carpenter for a stove store and tinshop, afterwards it became the office and wareroom in connection with the foundry works of Gurney & Carpenter. Previous to this, however, the upper storey was used by the Masons as a lodge room, then as a tavern and rooming quarters for travellers. The building, on account of its style, is often referred to as a place where religious services were held, a mistaken idea probably arising from the fact that seventy years ago a frame structure on the lot adjoining was used by the Presbyterians. There are many interesting structures which demonstrate the artistic temperament prevalent among our early builders and through the hearty co-operation of our readers we hope to show the most worthy examples in the various sections throughout Canada. We would solicit your aid in order that no existing monument of the past worthy of record should fail to become the property of everyone. The struggle for success often robs us of these early gems and will within the next decade remove the vast majority that have not already been destroyed.

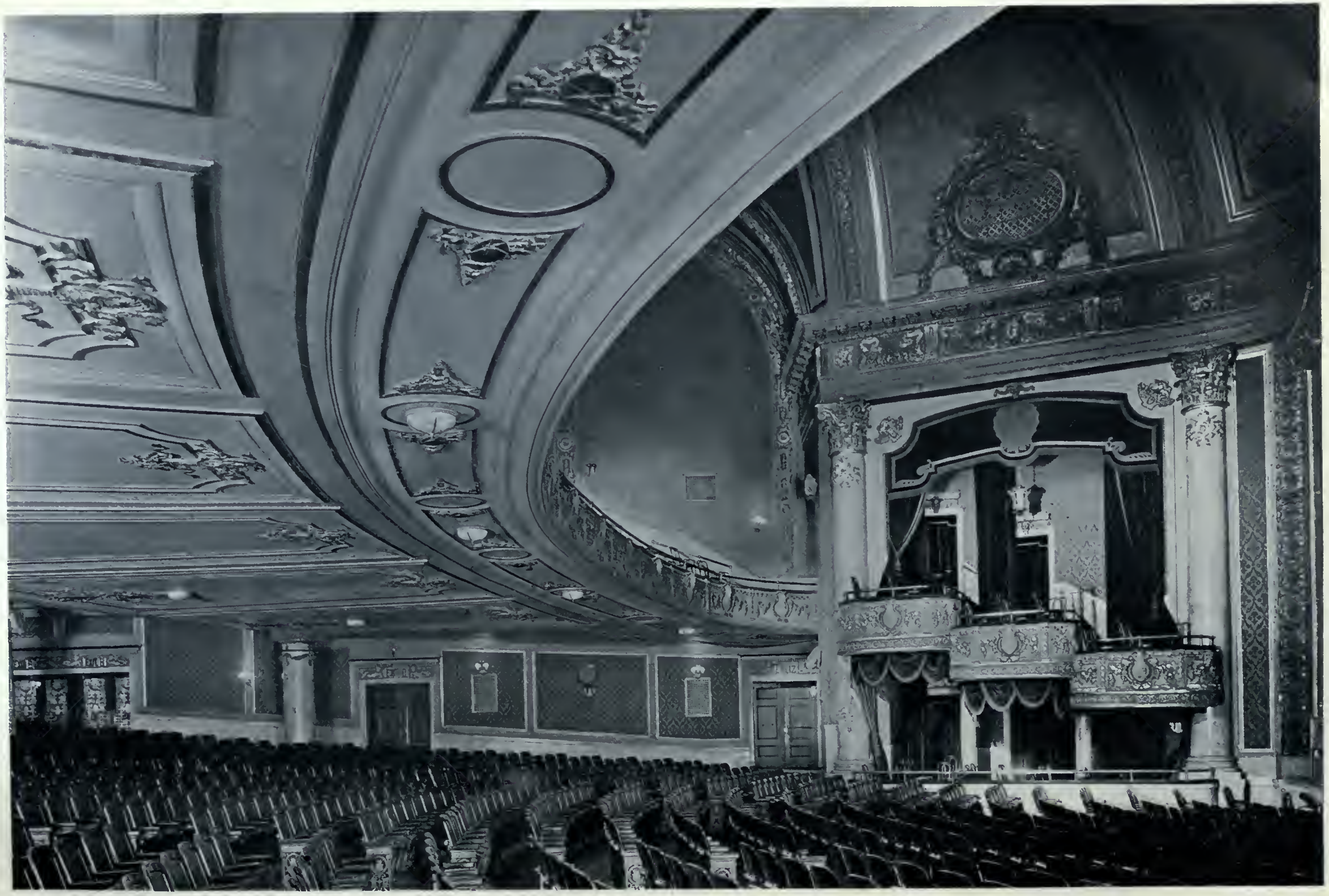
THE MODERN THEATRE.

The theatre is characteristic of the present era, when all our efforts seem to be centering around the whims of pleasure and wealth. There is everywhere evinced a desire upon the part of the people to find temporary relief from the nerve-wrecking experiences of keen competition; from the increased outlay caused through the gradual rise of edibles; from the unnatural struggle along commercial lines, and from the natural results brought about by the terrific warfare in Europe. That the stage is and always has been an expression of the culture and civilization of a nation is undeniable, and present conditions might lead us to pessimistic deductions. However, if the desire for plays of a lighter vein is growing it should not be condemned indiscriminately, for very often the burden of living is removed by a hearty laugh excited through the foolish antics of a clever comedian. But we must have a care lest this keen relish for light amusement paralyze our tastes for the real things of life. Such an impulse naturally forces the architect to cater to the popular feeling and introduce into his work a spirit less serious than his careful study into past art warrants. It presents an entirely new problem and will put to a test his ability to meet the task and still maintain throughout his work a wholesome and uplifting influence which will be of a lasting character.

DOMESTIC ARCHITECTURE IN ENGLAND.

The charm of the English home is no longer confined to the knowledge of the artist who wanders through her various counties so richly laden with manor houses and castles. Our own architecture has been influenced so materially by the trained skill of her designers that we are often privileged to see buildings, and even live in them, which only need the touch of an older and more natural setting to fancy ourselves in the Mother Country. Although the Norman keep and the fortified manor were the first germs of our present dwelling, it was not until the fifteenth century that a determined effort was made to obtain a distinct architectural effect to the buildings as a whole. As to the special features like doorways, fireplaces, windows and roofs, a simplicity of treatment was maintained up to the Renaissance period, when a free reign permitted of houses built for comfort and splendor. The chimney-piece, which is felt to be the cheerful spot in a home, did not come into vogue until the Elizabethan era, the wall fireplace preceding the central hearth. Windows and doorways were originally small, due to the necessity for adequate defence, sometimes the light openings being only four inches wide; while the ceiling was only considered as the underside of the floor above, and not until the sixteenth century did they consider it seriously in the way of moulded decorative effect. At this time, however, domestic architecture received its greatest development through the revival of learning when Italy inflamed the world with her new thought in science, religion, learning and art.

From the sixteenth century the æsthetic phase of building as well as the practical became an important factor, enriching all countries with examples of architecture which have and will continue to prove a great source of inspiration to the planner of homes.



LOEW'S YONGE STREET THEATRE, TORONTO—VIEW OF MAIN ENTRANCE.

Loew's Yonge Street Theatre, Toronto

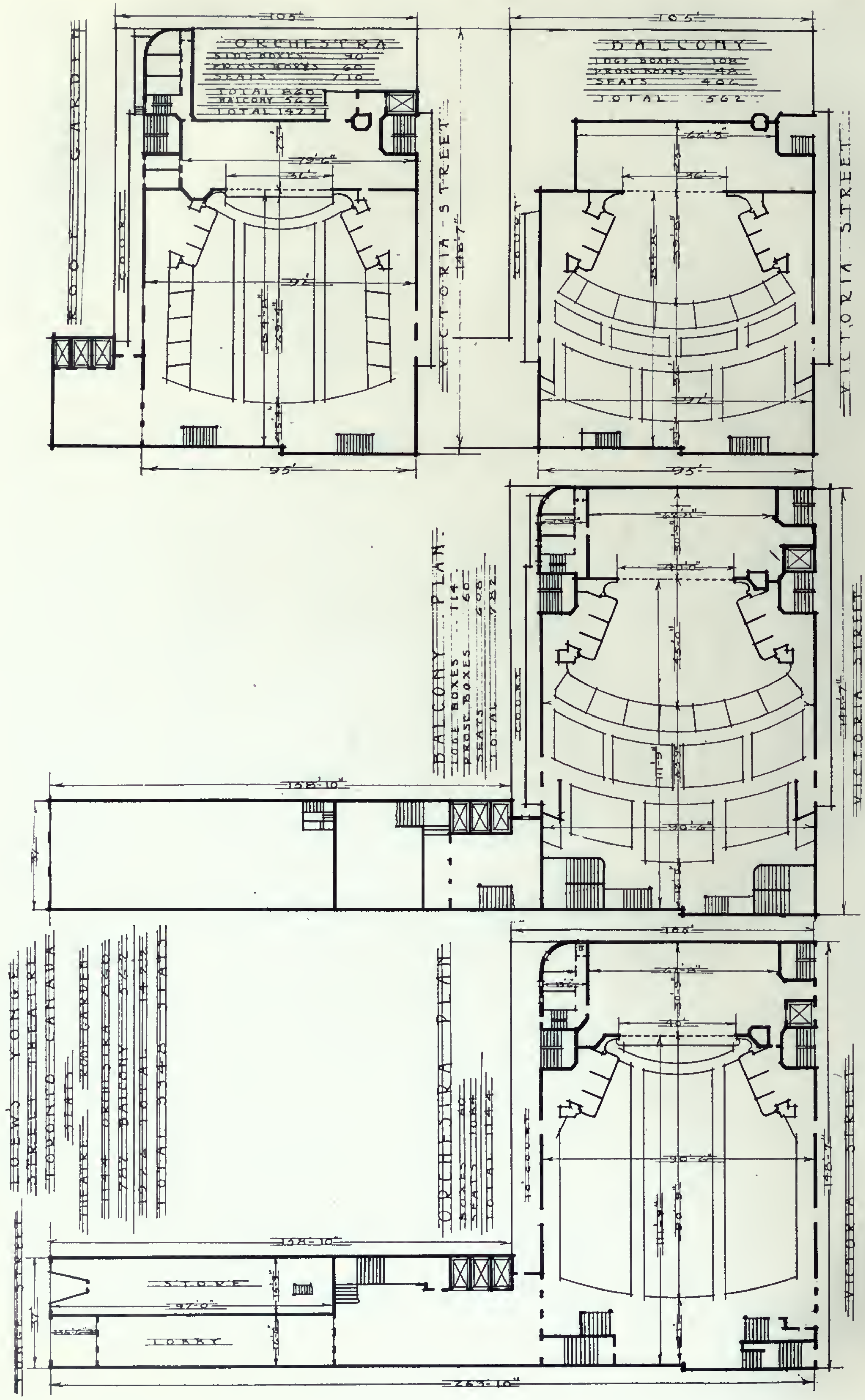
LOCATED in the heart of the business section and on the main thoroughfare of the city, this theatre presents one of the greatest sources of pleasure to be found in Toronto. The building is unique in that it provides two complete theatres on the same site, affording accomodations for over thirty-three hundred people. The main entrance leads from Yonge street, the facade conspicuous mostly for the large electric sign above. Passing through the ticket vestibule with its walls in marble, floor in terrazzo, and decorative ceiling from which hangs a dull bronze fixture of sixteen lights and central bowl; we enter the long narrow lobby treated in Italian renaissance. Each side consists of nine large panels separated by artificial Sienna marble columns. Plaster mouldings in each panel act as a suitable framework for the imported red tapestries of floral pattern. Above each division occurs the name of some illustrious person whose work contributed towards the betterment of the stage, such as Goethe, Shakespeare, Wagner, Schiller, Ibsen, etc., while directly opposite are the various phases of theatrical life as comedy, music and tragedy. The floor of panelled terrazzo and ceiling of tinted plaster carry out the wall divisions and lend a proportionate harmony to the tout ensemble.

Between the theatre proper and the outer lobby is the grand stairway of Tennessee marble treads and risers adjoining which are three exceptionally large elevators, each one furnishing access to the winter garden. To the right of the elevators are stained glass doors leading to the orchestra of the main theatre. This as well as the roof garden is a one balcony house which modern practise and wide experience has proven the most economical and satisfactory type. The main auditorium is one hundred and ten feet from the rear wall to the stage and ninety feet across, providing accommodation for eleven hundred and forty-four. From the twelve foot promenade lead the marble stairs to the balcony directly behind which are enclosed stairs accessible to the roof garden from the street and the grand stairway lobby. The general design of the lower theatre consists of a marble wainscot three feet six inches high above which are red floral tapestries cut into panels by drab borders eight inches in width and narrow gilded mouldings. The carpet is a rich rose Wilton blending with the other decorations.

The boxes are treated in ornamented plaster with panels of lattice work covered by fruit and flowers in bold relief. The heavy curtain is of embroidered valence made of gold silk velour and finished with a corresponding fringe. All the other curtains are of the same material including the cut draperies, beneath the balcony boxes, while the walls have the same rich silk damask as in the panels of the main auditorium.

The striking feature of both houses is the absence of obstructing columns which are usually a matter of considerable annoyance to the patrons. The main columns supporting the balconies weigh up to two hundred and twenty-eight pounds per foot, made necessary in order

OUTSIDE TICKET VESTIBULE.



LOEW'S YONGE STREET THEATRE, TORONTO.

THOMAS W. LAMB, ARCHITECT; STANLEY MAKEPEACE, ASSOCIATED.

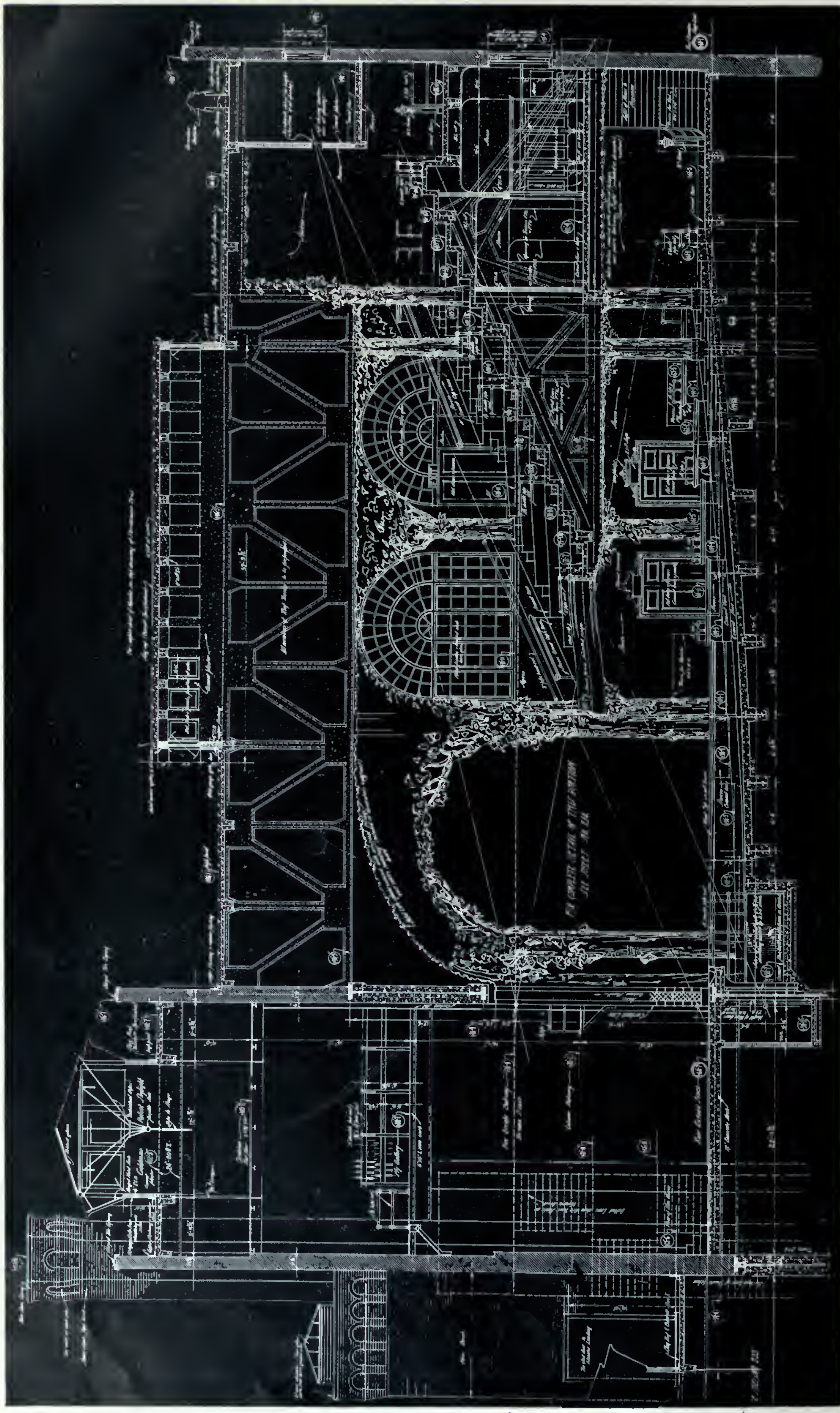
to carry the heavy transverse truss which spans the entire width of the auditorium and weighs approximately thirty tons. This truss in turn supports the cantilever trusses of the balcony the uplift of which are provided for by the columns and girders in the rear of the seats as well as by wall anchorages. All main members of the trusses are protected by a heavy facing of concrete which render them fireproof and increase the effective sections. The erection was accomplished by means of a single guy derrick placed on the ground floor level and only one movement was necessary for the entire work when it was raised to the main roof level. The derrick had an eighty foot mast, seventy-five foot boom and capable of lifting a clear load of thirty tons. The total weight of structural steel in the building was six hundred and fifty tons; costing when erected approximately $53,000.

The scheme of decoration for the roof garden is novel in itself and depicts the idea of an outdoor theatre in striking reality. In order to produce the effect of tree trunks and foliage, the columns are covered with cement plaster modeled in the formation of rough bark and painted in all its true colors. The entire ceiling under the balcony as well as the main ceiling, is covered by a wire lattice supporting the foliage, which consists of five thousand real beech branches dipped in a chemical preparation that renders them absolutely fireproof. The whole effect is greatly enhanced by the myriad of small wrought iron lanterns of vari-colored glass scattered throughout the foliage of the ceiling. In order to furnish the proper acoustical effect that portion of the roof which forms the sounding board is constructed of metal lath and plaster and in order to make it harmonize with the balance of the decorations it has been

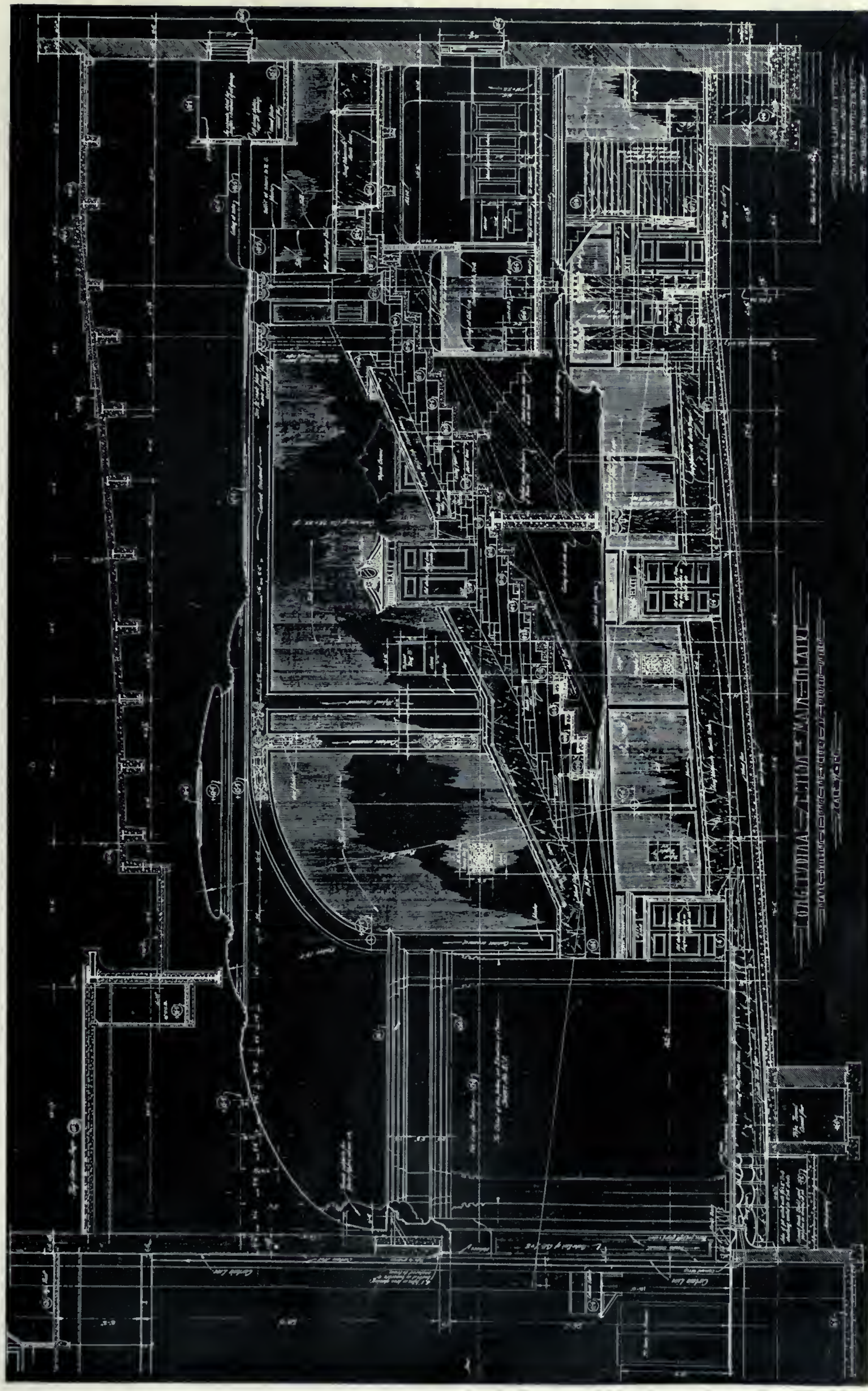
LOBBY.

painted with a landscape scene blending in with the foliage around the proscenium boxes. A large skylight in the main roof which may be opened in sections permits of perfect ventilation, and in conjunction with all the exit doors and side windows the garden becomes in reality an outdoor place of amusement as its name implies.

A ten foot court has been provided at the east side of the building for exit purposes in which are fire escapes from both the lower house and the roof garden. Level platforms lead



LOEW'S YONGE STREET THEATRE, TORONTO—LONGITUDINAL SECTION OF ROOF GARDEN.
THOMAS W. LAMB, ARCHITECT; STANLEY MAKEPEACE, ASSOCIATED.



LOEW'S YONGE STREET THEATRE, TORONTO—LONGITUDINAL SECTION OF MAIN THEATRE.
THOMAS W. LAMB, ARCHITECT; STANLEY MAKEPEACE, ASSOCIATED.

PROMENADE OF MAIN THEATRE.

The heating and ventilating system has been planned carefully and combines every sanitary feature known to modern science. The fresh air is drawn in from the street through an air washer, passes over tempering coils from whence it is driven throughout the building by a blower, being automatically controlled by thermostats distributed in the auditorium.

The entire structure is thoroughly waterproof and fireproof. Under the seating of the ground floor is a three ply felt and pitch course laid on a proper cinder concrete mixture with a topping of four inch protection coating. The building cost approximately $490,000.

directly from the exit doors to the fire escape stairs which descend to the court levels in a brick-enclosed tower. This tower provides additional advantage by connecting the stairs directly to the court level without any obstruction to the court itself. Two similar towers are used on the rear of the building and so constructed as to prevent any congestion whatever on the street. The emergency exit stairs leading from both houses, which are in addition to the outside fire escapes, are entirely enclosed in fireproof partitions and each theatre is separated without direct communication with one another. An elevator has been provided in the rear of the building which serves to carry scenery and performers to the stage of the roof garden. This arrangement permits the transfer of acts from one house to another without any delay.

In this connection it might be interesting to review briefly, with the assistance of the Encyclopedia Britannica, the development of the Theatre. The word is derived from the Greek, meaning "a place for seeing," and constitutes a building specially devised for dramatic representations.

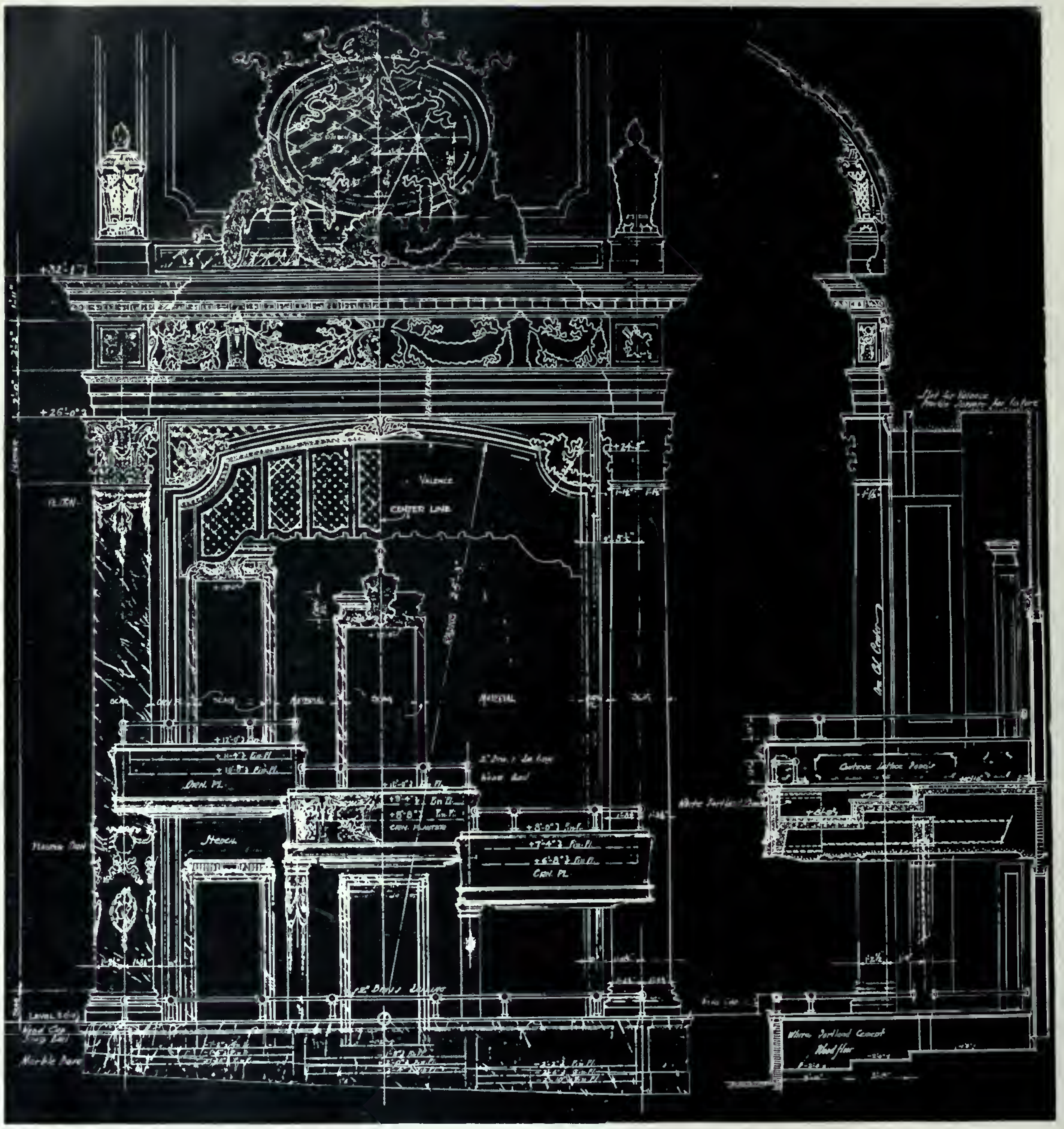
The drama arose from the choric dances in honor of Dionysus, which were held in a circular dancing-place in his precinct at the foot of the Acropolis at Athens. When the leader of the chorus held a dialogue with the remaining *choreutae* he mounted the table which stood beside the altar of Dionysus in the centre of the *orchestra;* but as the number of actors and the importance of the dialogue increased, it became necessary to erect a platform at the side of the dancing-place and a booth in which the performers could change their dresses and masks. At the same time temporary wooden stands were set up for the spectators, who no longer ranged themselves around the whole ring, but only on the slope of the Acropolis, facing southward. We are told that the collapse of the wooden stands in 499 B.C. led to the erection of a permanent theatre; this was not, however, a stone building. Embankments were made for the support of the spectators' benches:

EXITS TO GRAND STAIRWAY AND LOBBY.

GENERAL VIEW OF ROOF GARDEN.

the stage buildings were of wood, and, although some traces of a stone theatre belonging to the end of the 5th century have been pointed out, the "theatre of Dionysus," whose remains may still be seen, is in the main a work of the 4th century. It was completed soon after 340 B.C. under the administration of the statesman and financier Lycurgus. Alterations were made in the stage-buildings in the Hellenistic period, under Nero, and again in the 3rd century A.D. Although the prototype of Greek theatres, it is not the most perfectly preserved. Amongst those of purely Greek design the most typical is that of Epidaurus, which was built in the latter part of the 4th century B.C. by Polyclitus the Younger. The largest known to Pausanias was that of Megalopolis, excavated by the British School at Athens in 1889-91, in which the stage buildings were replaced by the Thersilion, a large council-chamber. Others of importance for the study of the ancient theatre have been excavated at Delos, Eretria, Sicyon and Oropus. None of these, of course, is contemporary with the classical period of the Greek drama, and their stone stage-fronts belong to the Hellenistic period.

STAGE OF ROOF GARDEN.



DETAIL OF BOXES.

The Romans, by their use of the arch in construction and also of concrete for vaulting, were enabled to erect theatres on level ground, such as the Campus Martius at Rome, where an elaborate structure, usually in three stories of arcades, took the place of the natural hill-slope of Greek theatres. The Roman theatre thus became an organic whole; the auditorium and stage buildings were structurally connected, and the orchestra was entered from the wings, not by open passages, as in Greece, but by vaulted corridors. The orchestra was no longer used for the performances (whether dramatic, musical or merely spectacular), but was reserved for senators and other persons of distinction. Hence arose the necessity for lowering and enlarging the stage. It is hard to say when this change was made or at what date it was first introduced into Italy (if it did not originate in the west). The larger of the two theatres at Pompeii dates from the Hellenistic period, but was thrice reconstructed, and it is not clear to what date we are to assign the low stage of Roman pattern; possibly it belongs to the earliest period of the Roman colony at Pompeii founded by Sulla (B.C. 80). The theatre of Pompey is said by Plutarch to have been copied from that of Mytilene, which suggests that the Roman theatre was derived from a late Greek model; and this is made probable by the existence of transitional forms.

During the Republican period the erection of permanent theatres with seats for the spectators was thought to savor of Greek luxury and to be unworthy of the stern simplicity of the Roman citizens. Thus in 154 B.C. Scipio Nasica induced the senate to demolish the first stone theatre which had been begun by C. Cassius Longinus. Even in 55 B.C., when Pompey began the theatre of which remains still exist in Rome, he thought it wise to place a shrine to Venus Victrix at the top of the cavea, as a sort of excuse for having stone seats below it—the seats theoretically serving as steps to reach the temple. This theatre, which was completed in 52 B.C., is spoken of by Vitruvius as "the stone theatre" *par excellence*: it is said by Pliny to have held 40,000 people. It was also used as an amphitheatre for the bloody shows in which the Romans took greater pleasure than in the purer intellectual enjoyment of the drama. At its inauguration 500 lions and 20 elephants were killed by gladiators. Near it two other theatres were erected, one begun by Julius Caesar and finished by Augustus in 13 B.C., under the name of his nephew Marcellus, and another built about the same date by Cornelius Balbus. Scanty remains exist of this last theatre, but the ruins of the theatre of Marcellus are among the most imposing of the buildings of ancient Rome.

A long account is given by Pliny of a most magnificent temporary theatre built by the aedile M. Aemilius Scaurus in 58 B.C. It is said to have held the incredible number of 80,000 people, and was a work of the most costly splendour. Still less credible is the account which Pliny gives of two wooden theatres built by C. Curio in 50 B.C., which were made to revolve on pivots, so that the two together could form an amphitheatre in the afternoon, after having been used as two separate theatres in the morning.

All Roman provincial towns of any importance possessed at least one theatre; many of these are partly preserved. Covered theatres were sometimes built, whether on account of climatic conditions (as at Aosta) or more commonly for musical performances. The best preserved is the Odeum of Herodes Atticus, at the south-west angle of the Athenian Acropolis, which has a semi-circular orchestra. It was built in the reign of Hadrian by Herodes Atticus, a very wealthy Greek, who spent enormous sums in beautifying the city of Athens in honor of his wife Regilla. Its cavea, which is excavated in the rock, held about 6,000 people; it was connected with the great Dionysiac theatre by a long and lofty porticus or stoa, of which considerable remains still exist, probably a late restoration of the stoa built by Eumenes II, of Pergamum. It was also a common practice to build a small covered theatre in the neighborhood of an open one, where performances might take place in bad weather. We have an example of this at Pompeii. The Romans used scenery and stage effects of more elaboration than was the custom in Greece.

Vitruvius mentions three sorts of movable scenery: facades representing public buildings; for comic plays, private houses with windows and balconies; and for the satyric drama, rustic scenes, with mountains, caverns and trees.

During the middle ages miracle plays with sacred scenes were the favorite kind of drama; no special buildings were erected for these, as they were represented either in churches or in temporary booths. In the 16th century the revival of the secular drama, which in the reign of Elizabeth, formed so important a part of the literature of England, was carried on in tents, wooden sheds, or courtyards of inns, mostly by strolling actors of a very low class. It was not till towards the close of the century that a permanent building was constructed and licensed for dramatic representations, under the

DETAIL OF BOXES.

THIRD LANDING OF GRAND STAIRWAY.

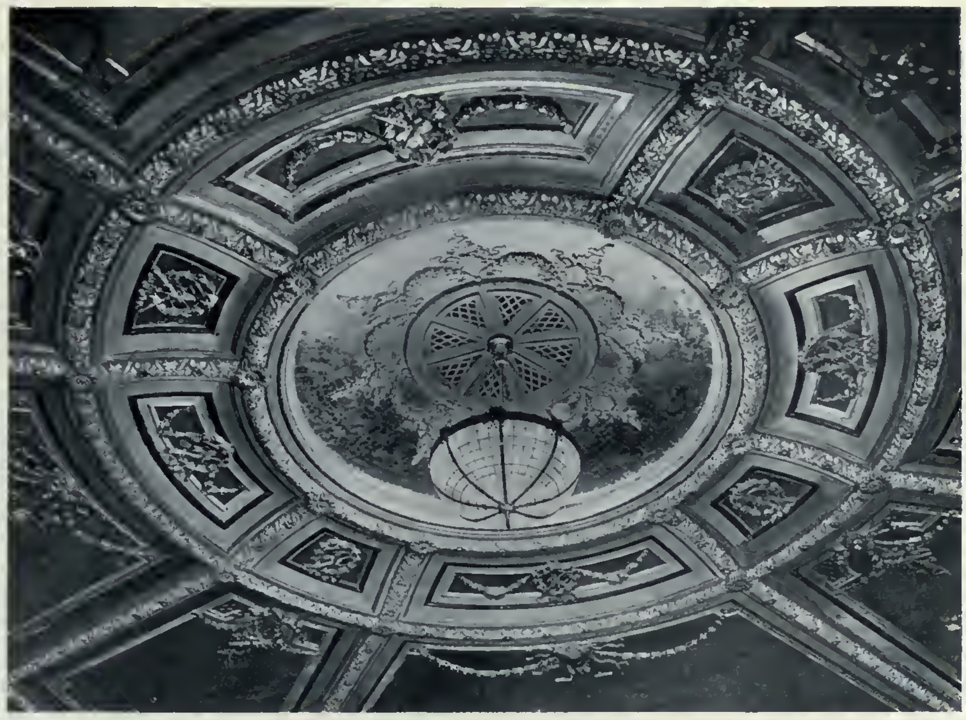
management of Shakespeare and Burbage.

The first building specially erected in London for dramatic purposes was built in 1576-77 by the actor James Burbage. It was constructed of timber and stood in Holywell Lane, Shoreditch, till 1598, when it was pulled down; it was known as "The Theatre" *par excellence.* Of almost equally early date was the "Curtain" theatre, also in Shoreditch; so called from the plot of ground, known as "The Curten," on which it stood. It probably continued in use till the general closing of theatres by order of the Parliament in 1642. The "Globe" theatre, famous for its association with Shakespeare, was built by James Burbage, who used the materials of "The Theatre," in the year 1599. Its site was in Southwark, in the Bankside, near the "Bear Gardens." It was an octagonal structure of wood, with lath and plaster between the main framework. It was burnt in 1613, rebuilt, and finally pulled down and its site built over in 1644. Its name was derived from its sign of Atlas supporting the globe. Near it were two less important theatres, "The Rose," opened in 1592 by Henslowe, and "The Swan" (see below), opened in 1598 and partly owned also by Henslowe; like the Globe, the latter was an octagonal wood-and-plaster building. The "Blackfriars" theatre, another of the Burbages' ventures, was built in 1596, near the old Dominican friary. The "Fortune" theatre was built by Edward Alleyn, the actor, in 1599, at a cost, including the site, of £1320. It stood between Whitecross Street and Golding Lane. It stood as late as 1819, when a drawing of it was given by Wilkinson (*Londina illustrata,* 1819). The "Red Bull" theatre was probably originally the galleried court of an inn, which was adapted for dramatic purposes towards the close of Elizabeth's reign. Other early theatres were the "Hope" or "Paris Garden" theatre, the "Whitefriars" and "Salisbury Court" theatres, and the "Newington" theatre. A curious panoramic view of London, engraved by Visscher in 1616, shows the Globe, the Hope and the Swan theatres.

The plan of the first English theatres appears to have had no connection with those of classical times, as was the case in Italy: it was evidently produced in an almost accidental way by the early custom of erecting a temporary platform or stage in the middle of the open courtyard of an inn, in which the galleries all round the court formed boxes for the chief spectators, while the poorer part of the audience stood in the court on all sides of the central stage. Something similar to this arrangement, unsuitable though it now seems, was reproduced even in buildings, such as the Globe, the Fortune and the Swan, which were specially designed for the drama. In these and other early theatres there was a central platform for the

GRAND STAIRWAY.

stage, surrounded by seats except on one side, where there was a "green-room" or "tireynge-howse." The upper galleries or boxes completely surrounded the stage, even the space over the green room being occupied by boxes. This being the arrangement, it is easy to see why the octagonal plan was selected in most cases, though not in all—the Fortune theatre, for example, was square. An interesting specification and contract for the building of the Fortune theatre is printed by Halliwell-Phillipps. In all its details the Fortune is specified to be like the Globe, except that it is to be square in plan, and with timbers of heavier scantling. The walls are to be of wood and plaster, the roof tiled with lead gutters, the stage of oak, with a "shadow" or cover over it, and the "tireynge-howse" to have glazed windows. Two sorts of boxes are mentioned, viz., "gentlemen's roomes" and "twoo-pennie roomes." A woodcut showing this arrangement of the interior is given in a collection of plays edited by Kirkman in 1672. The vexed question of the construction of these theatres has been much discussed in recent years. In 1888 a drawing of the Swan theatre, apparently copied from a rough drawing in a London letter from the traveller Johannes de Witt, was discovered by Dr. Karl Gaedertz in a manuscript volume in the Utrecht University library, consisting of the commonplace book of Arend van Buchell (1565-1641). While undoubtedly authentic, and probably broadly accurate, this copied sketch cannot be accepted, however, as giving the regular or typical plan of the contemporary theatre, as in some respects it does not fulfil the known conditions of the stage. What the typical plan was, if (as is probable) one actually existed, has led to much learned conjecture and great difference of opinion as regards the details required by the interpretation of contemporary stage directions on the necessities of the action in contemporary drama. The ingenious reconstruction drawn by W. H. Godfrey in 1907, of the Fortune theatre, following the builder's specification, appears to approach very nearly to satisfying all the requirements.



CEILING IN MAIN THEATRE.

In the 16th and 17th centuries a favorite kind of theatrical representation was in the form of "masques," with processions of grotesquely attired actors and temporary scenic effects of great splendour and mechanical ingenuity. In the Reign of James I. and Charles I., Ben Jonson and the architect Inigo Jones worked together in the production of these "masques," Jonson writing the words and Inigo Jones devising the scenic effects, the latter being very costly and complicated with gorgeous buildings, landscapes, and clouds or mountains, which opened to display mimic deities thrown into relief by colored lights.

DETAIL OF CORNICE AT BOXES.

SHEA'S HIPPODROME, TORONTO.
LEON H. LEMPERT & SON, ARCHITECTS.
CHARLES J. READ, ASSOCIATED.

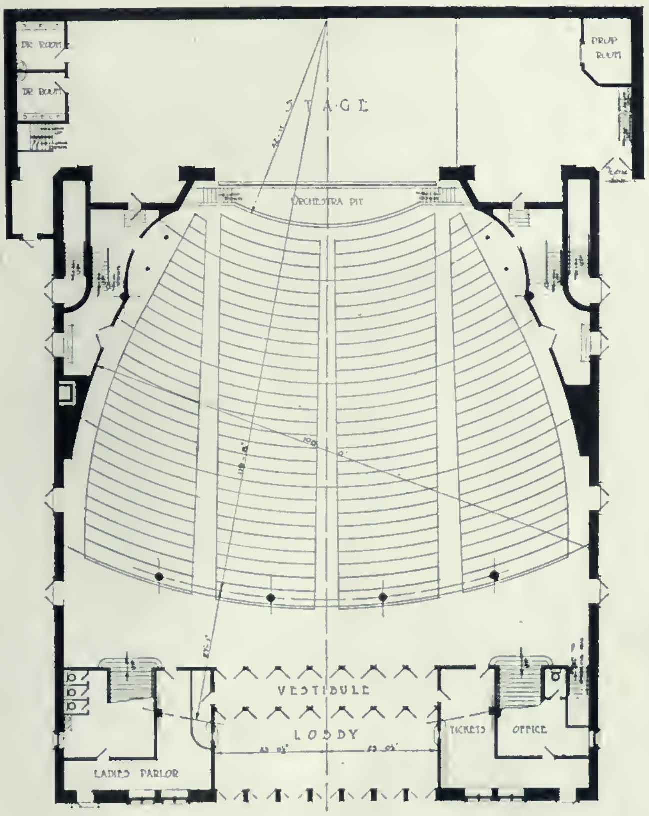
Shea's Hippodrome, Toronto

THIS THEATRE, facing the City Hall on Terauley street, furnishes an example of the latest development in vaudevillic architecture both as to design and general arrangement. The exterior is finished in white enamelled brick and terra cotta with glass and copper towers at either corner, which are equipped with an interior illumination visible for a great distance. A massive copper marquee extends the full length of the forty-six foot entrance, covering the entire width of the approach.

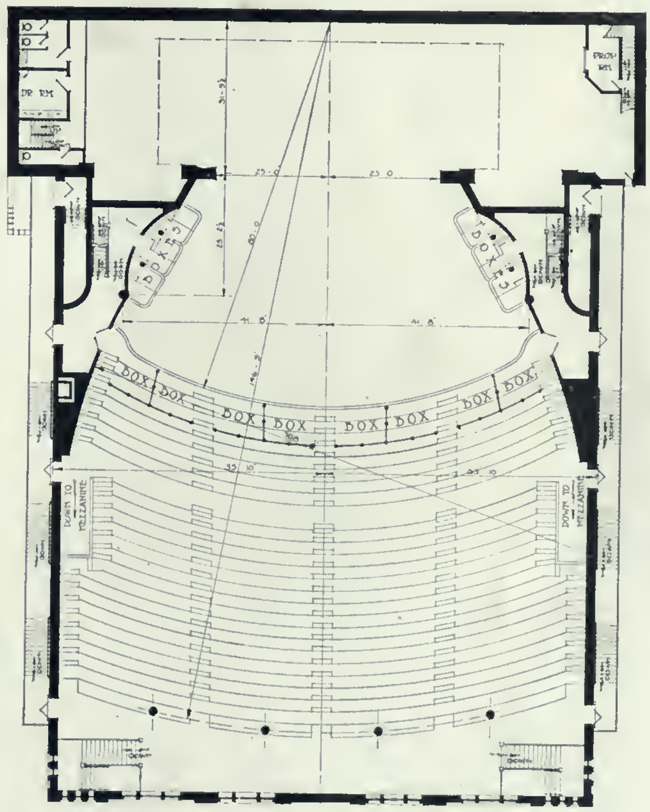
The theatre has a seating capacity of approximately three thousand, divided about equally between the orchestra and balcony. There is no upper gallery and the elimination of this feature, together with the desire to obtain the proper seating capacity to accommodate the patrons, has necessitated the use of the area comprised within the walls of the Hippodrome. The lobby is forty-six feet wide, far larger than any other in Toronto, and is decorated in the prevailing tones of the theatre proper; ticket windows are located on both sides of the lobby so as to facilitate the sale and thereby eliminate the long waits for the purchase so common in the average theatre. Between the lobby and the theatre proper is the vestibule with seven double entrances opening into each and two side doors, one leading to the ticket space, the other to the ladies' parlor, which takes up the entire frontage of the building at one side of the lobby.

The prevailing colors of the decorations are cream, rich golden tones and soft greys, with the ornamental relief work finished in old ivory and gold. The main ceiling consists of decorative panelling with a massive dome effect in the centre, illuminated by indirect lighting. The chairs are upholstered throughout in perfect harmony with the cut drapery of the boxes and the carpets.

The sounding board is enriched with handsome mural paintings, while electric lights, both direct and indirect, have been introduced into the decorations at all available points.

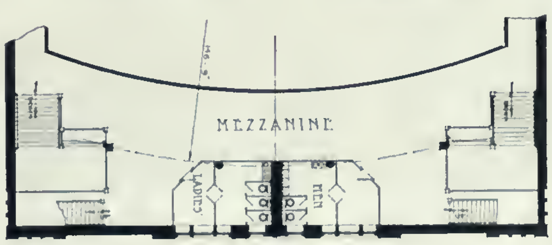


ORCHESTRA FLOOR PLAN.



BALCONY FLOOR PLAN.

PLANS OF SHEA'S HIPPODROME, TORONTO.



LEON H. LEMPERT & SON, ARCHITECT.

CHARLES J. READ, ASSOCIATED.

SHEA'S HIPPODROME, TORONTO—ENTRANCE LOBBY AND ORCHESTRA PROMENADE.

SHEA'S HIPPODROME, TORONTO—DETAIL OF BOXES.

The front portion of the balcony has been given up to private boxes, separated from the balance of the balcony by heavy brass railings. In the construction of the theatre over five hundred and fifty tons of steel and iron have been used for the structural work alone, and a large amount in addition has been used for the stairs, fire-escapes, etc., so that every possible safeguard has been taken to make the structure one of the safest and most substantial of its kind. The balcony is built on the new method of cantilevering that has but lately come into practice and which makes possible the construction of a theatre of the vast proportions of the Hippodrome without the use of obstructive columns on the first floor.

Instead of the customary high ceiling under the balcony on the orchestra floor, the soffit has been lowered and the space between converted into a commodious mezzanine accessible by two Carrara marble stairways, each nine feet wide and located at either side of the lobby. There is a comparatively slight rise to this mezzanine from which the patrons enter the balcony on a level, thus eliminating a long and tedious climb. The mezzanine contains a large parlor for the ladies and a smoking-room for the men, both facing Terauley street, with large windows giving them a bright and pleasant appearance at all times.

The auditorium proper is separated from the exterior walls by spacious lobbies at the sides, which afford a space for promenading during the waits and also prevent any possibility of cold air entering the auditorium through the side exit doors. These vestibules are connected direct with the private boxes as well as the orchestra floor and balcony, and have safety exits direct to the areaways at the sides of the building. At the rear is the stage, thirty-two feet in depth with three tiers of dressing-rooms separated by means of a fire wall. In the basement is an additional smoking-room, reached from the rear of the auditorium by a short flight of stairs; with windows opening on the side area.

ORCHESTRA VIEW LOOKING TOWARDS STAGE.

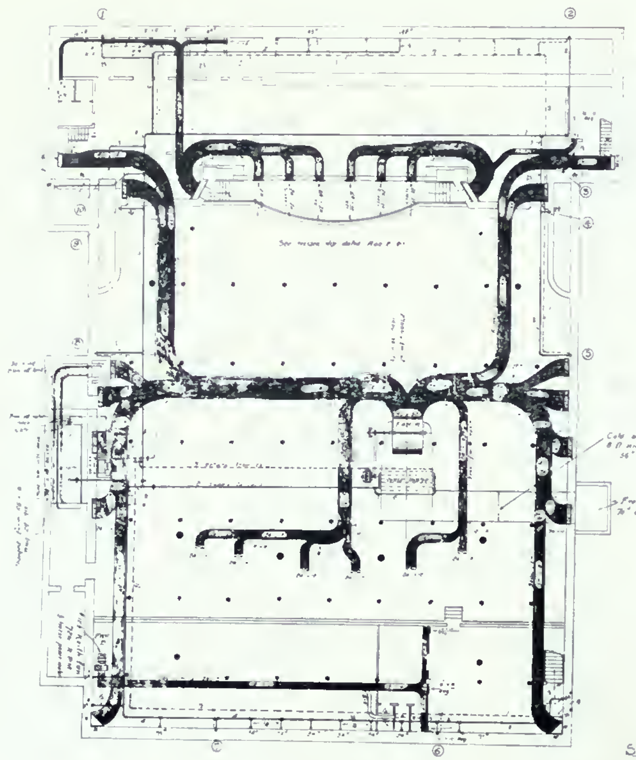
A combined system of heating and ventilation has been installed, using the direct and indirect radiation. The auditorium and dressing-rooms above the basement will be heated by the mechanical blast system, while the auditorium, dressing-rooms and toilets on the east side will have the exhaust system of ventilation. Fresh air is taken in beneath the fire escape on the north side through a cold air duct seven by eight feet, passing over heating coils into a steel plate blower from whence it is forced through a system of sheet metal ducts and delivered to the auditorium. The foul air is removed through a series of metal exhaust ducts leading to an exhaust chamber, and thence taken to the outside at the roof by means of disc fans. The heating coils are in five sections covering an area of 3,982 square feet in double tier, the vento loops being set on five-inch centres. A galvanized iron screen of one-half inch mesh is placed in fresh air intake as well as in front of each disc fan exhauster near the roof. In each supply and exhaust opening in the main auditorium is a register screen of flat ribbon mesh, including three circular vent openings in the ceiling of the balcony and four in the gallery ceiling. Between each set of entrance doors in the lobby are tall narrow cast-iron radiators capable of being removed during the summer months. The heating system can be maintained at a temperature of 70° F. when it is zero without; while the system of ventilation into the main auditorium can supply and exhaust 54,000 cubic feet per minute without undue draft or noise.

In the plumbing system are two nine-inch street connections, the southerly one running to a sump pit, the other used for all lavatories and the four conductors in pipes from the roof. Two sump pits of cement emptied by means of an automatic rotary pump are used for the lavatories in the dressing-rooms at the rear of the basement; also from the three-inch weeping tile around the outside walls and the floor wastes in the boiler room. The fixtures throughout the building consist of fifteen closets, eleven urinals, twenty-two wash-basins, one sink, and a three-hundred-gallon water tank connected with a heater of one hundred gallons per hour capacity. In addition to the fire hose system is a complete sprinkler outfit, including a twenty-thousand-gallon tank on the roof equipped with alarm valve.

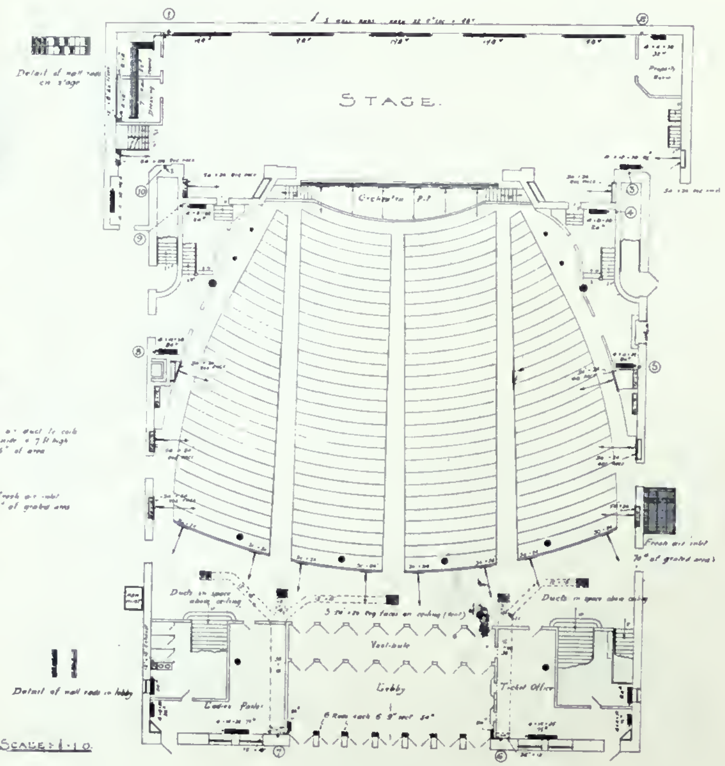
A noticeable feature is the adequate protection against fire, for in addition to the materials employed, which are absolutely proof against conflagration, there are two fire-escapes which are accessible from the numerous exits throughout the building. These lead into fire-towers set inside the building line, thereby removing from the areas all possible obstruction to the free egress of the people, who may make use of the remaining side exits along the ground floor. All doors, casing and interior trim in the building are kalamined and finished to imitate mahogany. The construction of the doors consists of a wood core of non-resinous lumber thoroughly kiln-dried and covered with heavy metal drawn through steel dies. The panels and rails are stamped in separate pieces of metal with the joints seam-locked, thereby securing the covering in a manner permitting of expansion and contraction.

VESTIBULE.

The theatre throughout is of reinforced concrete and erected as a permanent structure, adhering closely to all the conditions required by the local by-laws. All curtains are of an inflammable material and every separate unit in the planning has been carefully studied in regard to the safety of the patrons as well as the artists. The general warmth of the color scheme with the harmonious blending of the marble, plaster ornament, mahogany finish to the doors and trimmings, and furnishings, produce a feeling of restfulness so necessary in a theatre of this nature. It is felt that this building presents full value for the $245,000 spent in its erection.

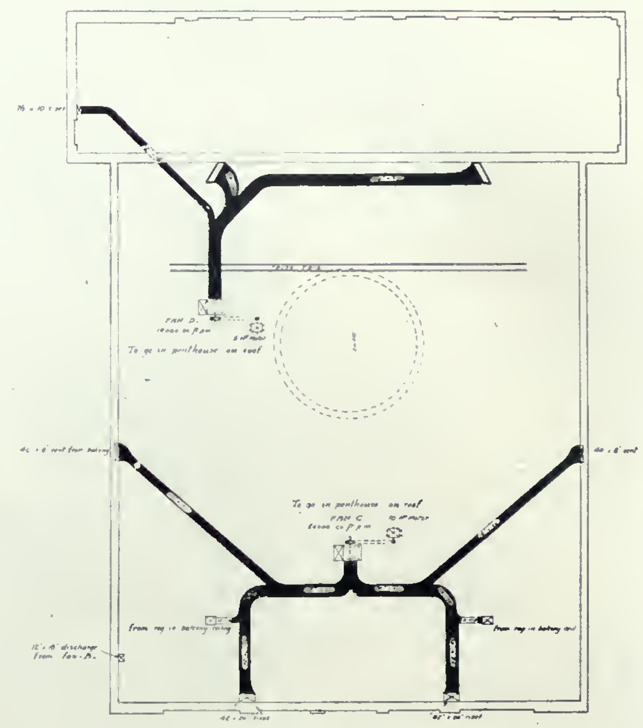


BASEMENT PLAN.

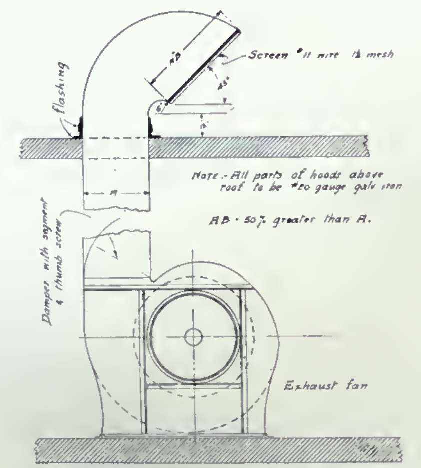


SCALE $\frac{1}{8}$-1-0

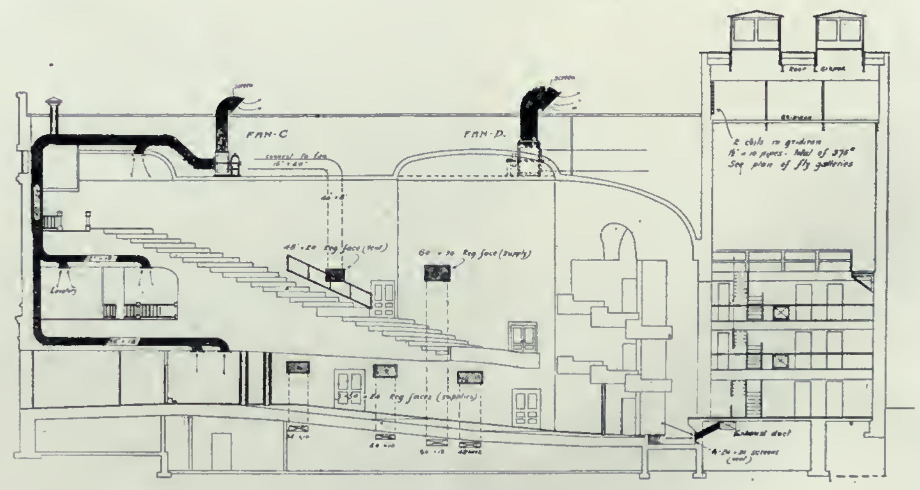
ORCHESTRA FLOOR PLAN.



ATTIC SPACE PLAN.



DETAIL OF DISCHARGE HOODS ON ROOF CONNECTING TO DISCHARGE DUCTS OF EXHAUSTERS.
TYPICAL FOR FANS B-C-D



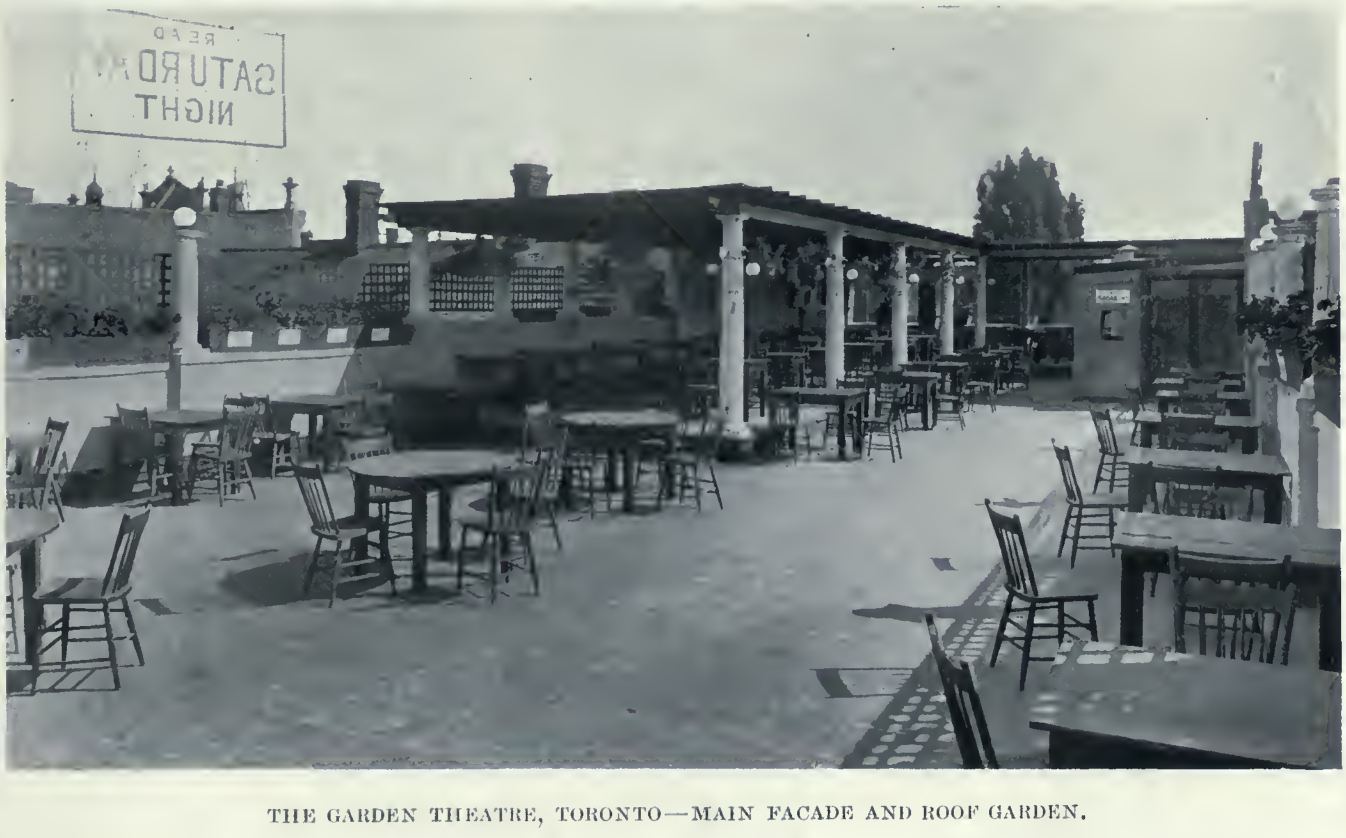
LONGITUDINAL SECTION.

HEATING AND VENTILATION PLANS
FOR
SHEA'S HIPPODROME,
TORONTO.

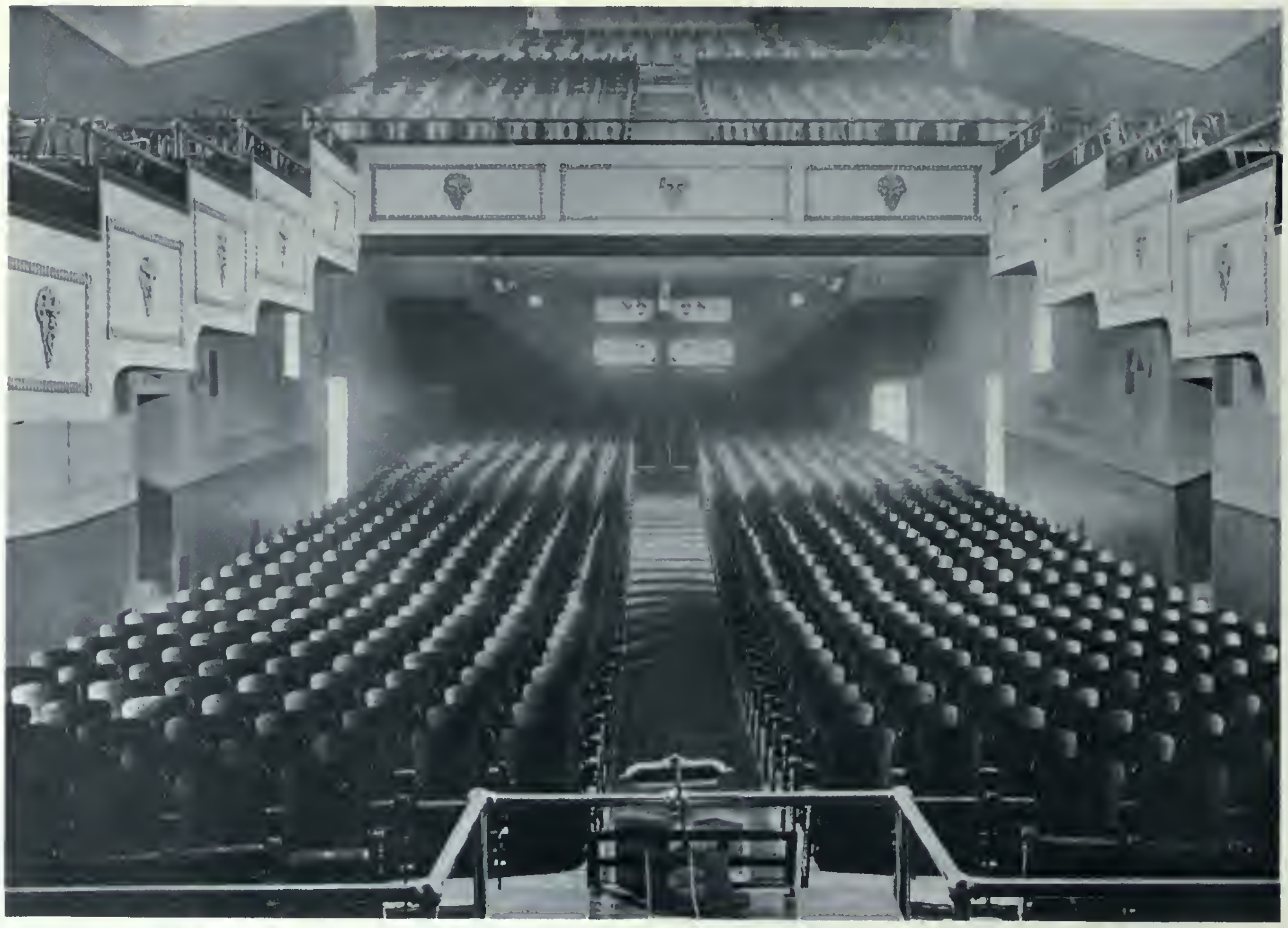
LEON H. LEMPERT & SON, ARCHITECTS.

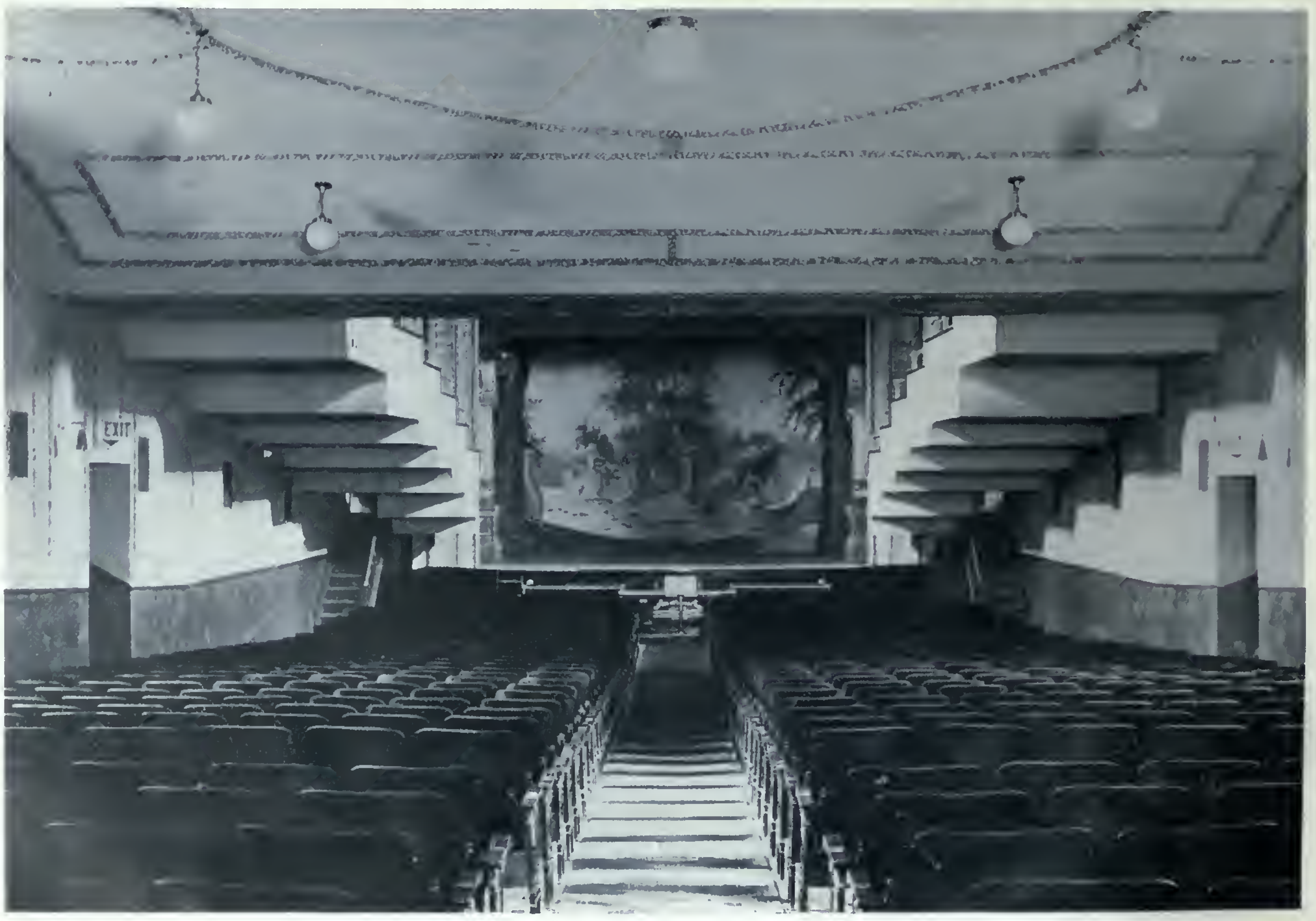
CHARLES J. READ, ASSOCIATED.

FRED. ARMSTRONG CO., HEATING AND VENTILATING ENGINEERS.



THE GARDEN THEATRE, TORONTO—MAIN FACADE AND ROOF GARDEN.





BEAVER THEATRE, TORONTO—TWO INTERIOR VIEWS.

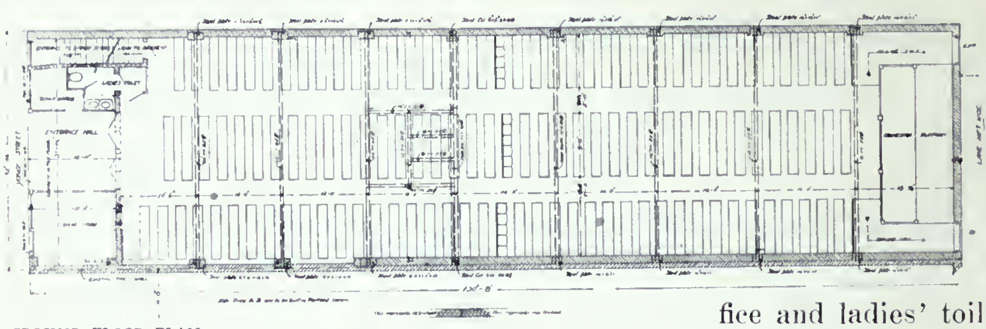
NEIL G. BEGGS, ARCHITECT.

BEAVER THEATRE, TORONTO

SITUATED at No. 1784 Dundas street, in West Toronto, this theatre is somewhat more pretentious than the average moving picture building. The main facade is designed in buff terra cotta of a smooth glossy finish with the mirrored entrance doors of quarter sawed oak. A ticket lobby is planned between the two stores which are of unusual interest in having glass fronts on a curve measuring sixteen feet square. The lobby itself and foyer have alternate mirror panels in frames of terra cotta and rouge-noir marble with the other panels in Italian marble. Upon the interior the treatment is in old ivory and green with a mural centre decoration of flying cupids. The seating capacity is eight hundred. On account of the narrow lot, fifty by one hundred and seventy-six feet, the boxes extend along the sides, causing the main gallery to be placed fifty feet from the stage. In addition to the stores and main auditorium the ground floor provides four large dressing rooms, toilets, retiring rooms, etc.; the basement accommodates large tiled barber shop, boiler room and ventilating apparatus; the mezzanine floor has manager's office and janitor's quarters; the second floor furnishes five offices with all sanitary conveniences and having a common waiting room in which is an effective stained glass window. The picture curtain is made of a special fireproof material under the direction of Mr. Joy, the manager. A large orchestral equipment has been installed at the cost of $15,000 capable of producing all sounds necessary in the general run of pictures, and operated by one musician. In the gallery the color scheme consists of bronze of varied subdued tints, while the proscenium and sounding board is heavily decorated in relief work. Beneath the stage a large fan is used to drive the tempered air throughout the building, provided with the usual mechanical equipment. A complete system of stand pipes, fire hose, and lighting has brought the building to a state of high efficiency. The theatre is absolutely fireproof, the doors being kalamined; the roof of tile and gravel composition; the walls of brick. The entire cost of the building was approximately $60,000, and the architect, Neil G. Beggs, has endeavored to use all Canadian materials in connection with the work.

THE BIG NICKEL THEATRE, TORONTO

J. W. SIDDALL, Architect



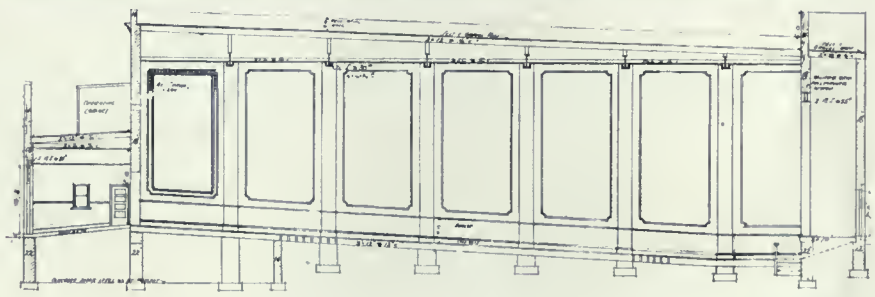
GROUND FLOOR PLAN.

THE Big Nickel Theatre demonstrates clearly the use of design and practicability as evidenced in the placing of the posters. Contrary to the usual custom this building was planned to maintain an artistic feeling after the customary advertisements were put in place, a scheme well worthy of notice by architects and builders who contemplate erecting structures of this nature. Here the posters are placed in a natural framework which gives the necessary display and becomes at once a part of the general design. There is a frontage of thirty-three feet and a depth of one hundred and thirty feet having the entrance at the sidewalk level and a fall of four feet for the entire length. The main facade is tastely treated in two colors of buff brick laid in diaper pattern, and wired glass in steel frames. On one side of the entrance hall consisting of wood painted white is a cigar store, on the other the ticket office and ladies' toilet. The floor is treated in tiling of white, green, brown, red and black, with a mosaic pattern of the big nickel in the centre.

The auditorium seats approximately six hundred and impresses at once the fact that it has been planned for a moving picture theatre. The walls have a green burlap dado with walls above painted a rich red while the ceilings are panelled and ornamented. The operating booth is placed far enough to the rear so as to allow of two large office rooms on the second floor reached by a private entrance from the main street. At the rear is a platform twenty-seven by four and one half feet, the screen being built into the wall. Directly in front of the platform is a pit with a mechanical organ which has all the stops needed to imitate the natural sounds and lend a touch of reality to the pictures themselves. The building is fireproof throughout with brick and steel, costing about $14,000.

YORK THEATRE, TORONTO

CHARLES J. READ, Architect



LONGITUDINAL SECTION.

THE rapid strides of moving picture shows have changed the preliminary plan of using any temporary structure available, for the erection of a building adaptable for the work and of a permanent nature. They are commendable in that they are sanitary, fireproof and equipped with all the modern conveniences necessary for the enjoyment of the general public. Another feature is the unobstructed view of all seats in the house and the general depression of the floor towards the stage, which eliminates the annoyance experienced when forced to sit behind a taller person on a perfectly level space. The picture board is also built in the rear wall or made stationary, while the material is of such a nature as to absorb the light and not reflect it.

The York Theatre is built with eighteen-inch brick walls having a twenty-two inch width beneath, the exterior being of tapestry brick. The prevailing colors are deep reds and browns with white joints. The main facade forms a suitable design for the entrance and does not extend to the full height of the building. In harmony with the brick are the window treatment, base course, cornice and parapet, the former being of stone. A pleasing lighting treatment consists of seven globes spaced along the frieze. In the space between the parapet and the main structure is located the operating cabinet directly over the entrance lobby. The vestibule is fifteen by twenty-five feet, having the ladies' parlor at one side and the ticket office on the other, with stairs leading to the cabinet. The doors are quartered oak, which material is used for the trimming throughout; the wainscot of white tile, the floor of mottled gray terrazzo; the ceiling of light green plaster, decorated in low relief. The auditorium, one hundred and thirty feet deep by fifty-two wide, seats nine hundred with loges holding ten people each placed in the rear. At the rear is a narrow platform with metal lath and plaster screen. Cost was $25,000.

COMPTON WINYATES MANOR HOUSE, WARWICKSHIRE, ENGLAND.

Mediaeval Domestic Architecture in England

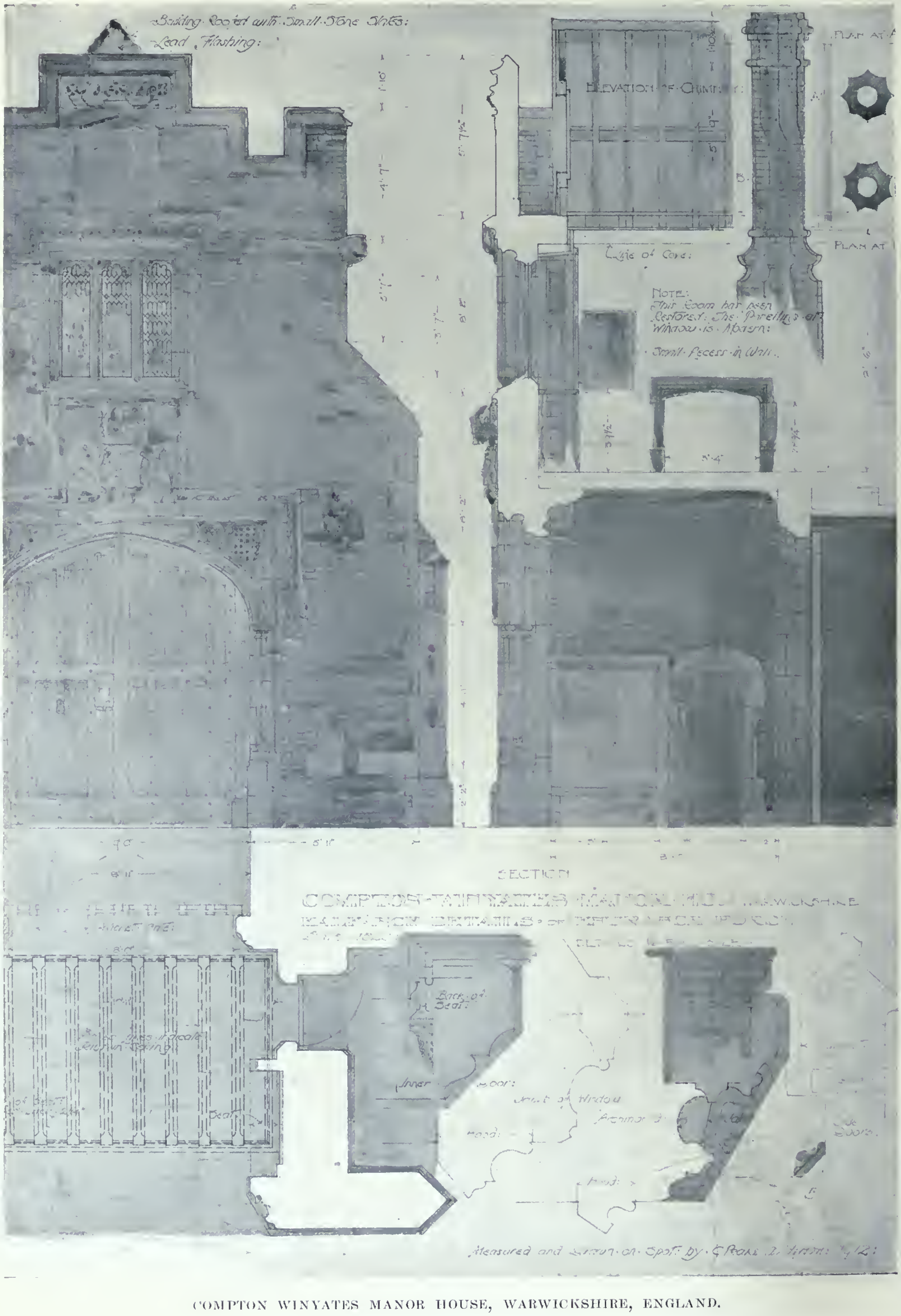
C. PEAKE ANDERSON

OF the two branches of Gothic work in England, Ecclesiastical and Domestic, I have chosen the unusual course of giving domestic work the precedence for two reasons. We are so prone to accede to the popular estimate that the suggestion that the domestic side of an architectural style should be studied before the ecclesiastical side will probably be received with surprise, if not with resentment; yet this is one reason why I propose treating of the two sides of Gothic architecture in this order, because I believe the suggestion to be a wholly defensible one, for not only is it more likely that the germs of an architectural style will be found first of all in the houses of the men who used it; and in this connection I am, of course, considering the abbeys and priories as essentially domestic in character, though we too often associate the idea with the abbey or priory church; but as all architecture tends to pass from simplicity to elaboration, so we are safer to consider the style first of all in its simplicity in domestic work before we attempt to discuss it in its state of ecclesiastical elaboration. My other reason is this, that probably for the first time in history, of the two branches, domestic work is claiming the major share of the attention of the architectural profession; its rightful share, I might say, for the home is of greater importance than the church.

Satisfactory evidence of the interest that has arisen in domestic work is the number of books dealing with this side of architecture that have appeared in recent years: the lesser books on houses and all that appertains to them are legion; and two outstanding books have just been published, "The Houses of Mr. Lutyens" and "The Houses of Mr. Platt"; while mediæval domestic work has come into its own in the appearance of Messrs. Gardiner & Stratton's splendid work on "Tudor Architecture in England."

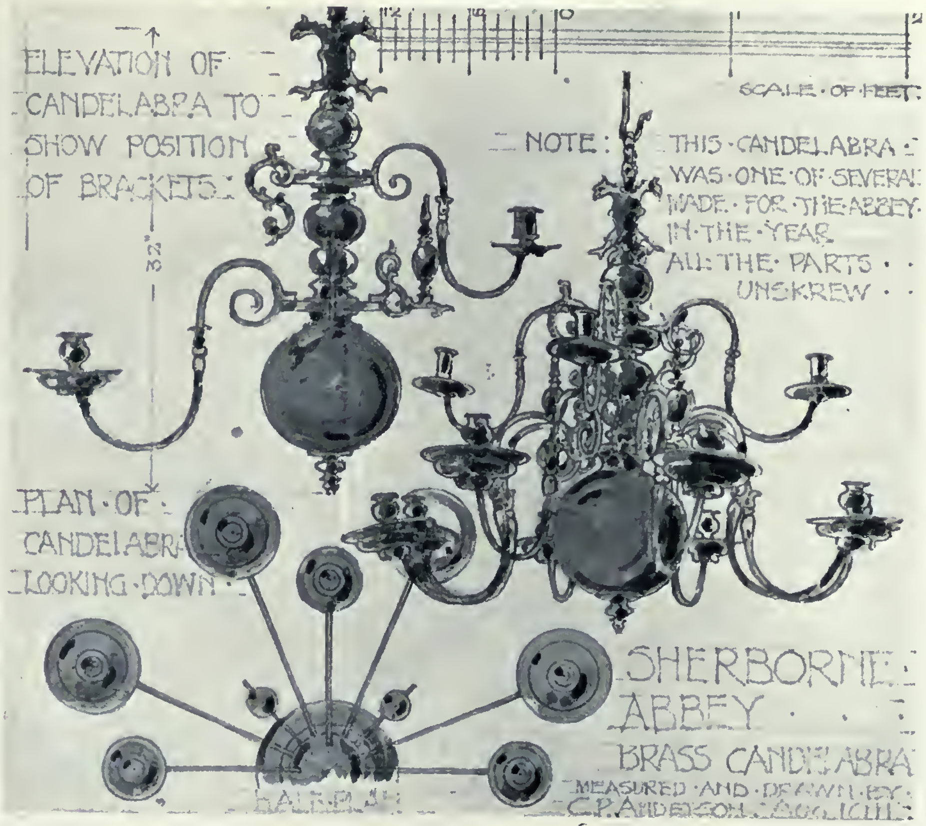
I do not propose to trace the evolution of English domestic work from the rude Norman Keep, as those in the Tower of London, Dover Castle or Kenilworth, down to the last great mansions of the Tudor style—Haddon Hall, Kirkby Hall, Barrington Court, Compton Win-

PORCH ENTRANCE. COMPTON WINYATES. BAY TO HALL.



COMPTON WINYATES MANOR HOUSE, WARWICKSHIRE, ENGLAND.

MEASURED DRAWING BY C. PEAKE ANDERSON.



yates, and the host of other great houses that are the standing monument of the expansion of England in the fifteenth century—for such as desire a treatise on the evolution of the house this is admirably done in Mr. Gotch's "Growth of the English House," but I will rather discuss such of these houses as I have studied in detail in an endeavor to find wherein the charm of the buildings in that style lies, for they do hold a charm distinct from that of all other architectural work. Critics differ as to which of all the English houses deserves first place, and they differ in choice in so far as they differ in regard to that which they value: to one the somewhat "shaggy" Haddon Hall appeals, set among rocks amidst trees on the bank of the Wye; to another a stately building sitting mid spacious lawns, such as Barrington Court, Montacute or Hatfield House proves irresistible; and for yet another, one of those romantic piles, now, alas, too often ruined, half house, half castle, that dot the English country-side—Kenilworth, Warwick, Richmond and their like holds special charm—buildings whose masses of masonry vie with the masses of the cathedrals, and whose embattlemented towers o'erlook the crows' nests in the summits of the trees.

But, after all, there is one type of Tudor house which is so essentially English in character, and so at home in English scenery, so that, when we speak of English domestic architecture, it is of it, the simple brick or stone manor house that seems to sleep among enchanted woods, by quiet waterways, most often that we think; that it is to the house that best portrays that type that we must turn for the perfect English home of mediæval days; and of this type the supreme example is undoubtedly Compton Winyates.

Compton

SCHOOL BUILDING AT SHERBORNE ABBEY.

Winyates Manor House in Warwickshire is situated about eight miles west of Banbury, and, lying as it does in a tree-encircled hollow, hidden away from the vulgar eye, it somehow reminded me when I saw it first of those lines of the "Morte d' Arthur":

"Where falls not hail nor rain nor any snow,
Nor ever winds blow loudly, but it lies
Deep meadowed, happy, fair with orchard lawns,
And bowery hollows crowned with summer seas."

To come by these roads through sleepy villages, villages where the laughter of the children, and even the barking of the dogs seems as in some dream, and to wind down that last hill from which glimpses of the manor house may be had as you descend, and to come at last past a time-worn chapel and ancient lily pond, to this mellow English home is to pass by easy stages into an enchanted land.

The house dates from about the year 1520 A.D., and in plan is comparatively regular, in that it is built round a rectangular courtyard, which courtyard is entered through the archway in the entrance porch, which is placed more or less centrally on the S.W. front. On the opposite side of the courtyard are the hall, which is entered from the screens, the buttery and the kitchen; on the E. corner, and opening off the upper end of the hall, are the family rooms and a grand staircase to the upper floors. On the S.E. side are the chapel and drawing room, and the opposite side of the house is appropriated to servants' quarters, etc.

As I have said, the house is more or less rectangular in plan, but in elevation, however, it is a most delightfully irregular mass, building up from the low two-storey front to the high and picturesque group on the S. corner.

The materials of which the house is built are a beautiful brick, which runs in colors from black—which is used here and there as a diaper—through a rich dark purple and madder to a light grey and red; with a cut stone that has weathered to a mellow light sienna color; and an almost black oak which is used with effect in the half-timbered gables. Everywhere time has toned down the harshnesses of the varied materials, and over all she has flung a mantle of creeping plants and mossy greenery.

Needless to say the whole house is full of interest, but that which probably interests the architectural student most is the beautiful entrance porch; this is, as it were, the gem of which the rest of the house is the setting; its proportions are perfect; its de-

DETAIL OF HADDON HALL.

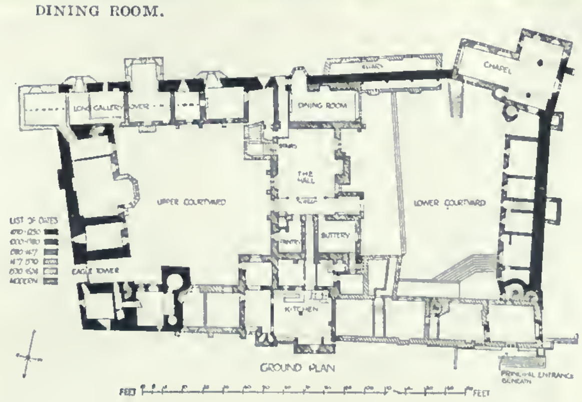
GENERAL VIEW OF HADDON HALL.

DINING ROOM.

tails belong to that most interesting period of hesitation that marked the later stages of Tudor work before it changed into English Renaissance; and on the whole this porch is one among the smaller pieces of domestic work in England most worth study.

It is hardly necessary, in so short a paper as this, for me to tender excuses for jumping from Warwickshire to Derbyshire; from Compton Winyates to Haddon Hall; indeed, it requires no excuse, for this reason, that, as Compton Winyates stands for that later style of domestic work done when English nobles were no longer afraid of their neighbors and could build without the old defences of moat, wall and keep, so Haddon Hall is probably the best example of the earlier manners.

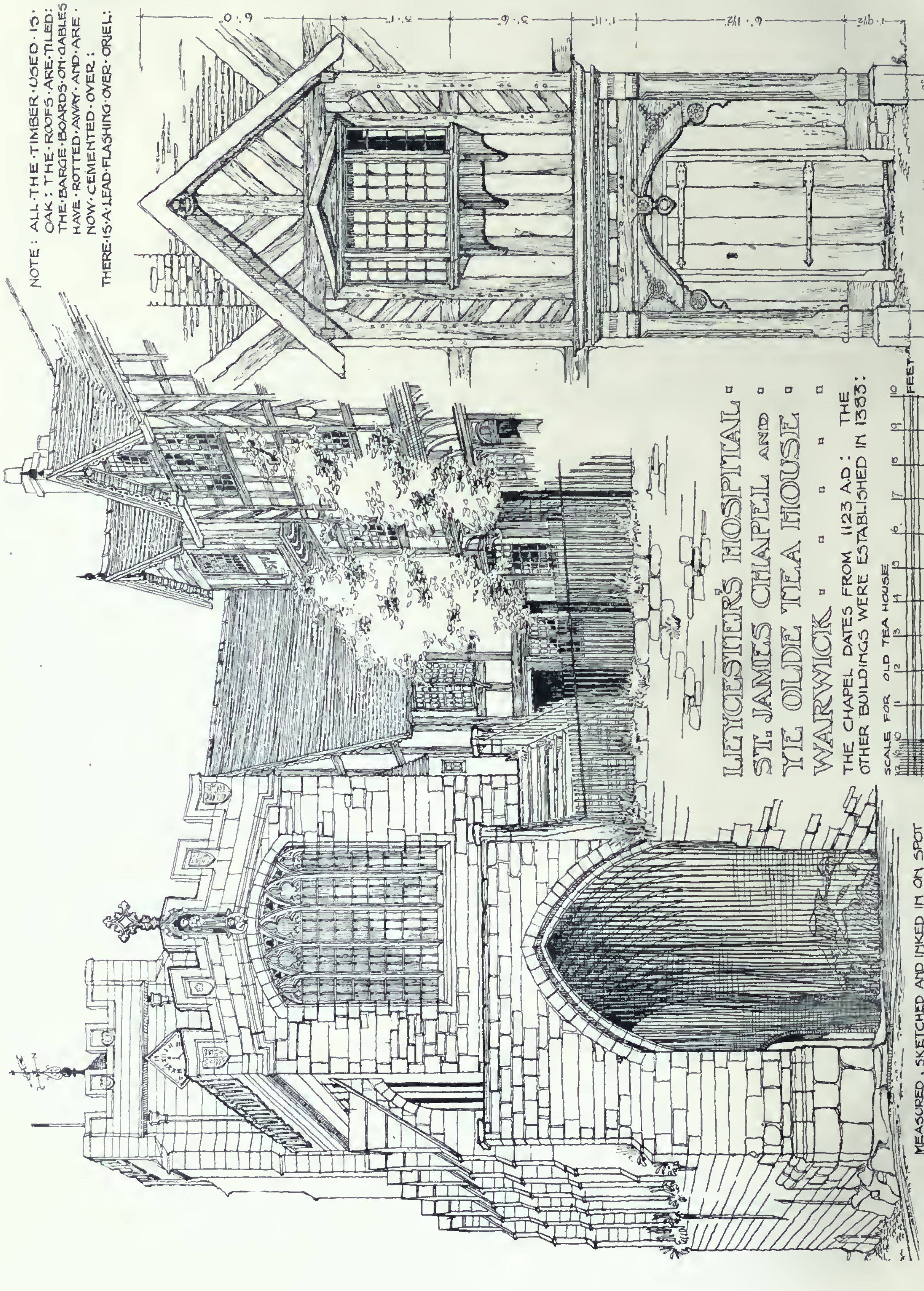
Haddon Hall dates from the twelfth century, a portion of the chapel, part of the eagle tower over the east entrance, and much of the west wall being of this period. The dining room, hall, buttery, etc., and kitchen; in fact, practically the whole of that block which lies between the two courtyards, is of the fourteenth century. The chapel is of the fifteenth century, and most of the S.W. wing belongs to the latter part of the fifteenth and beginning of the sixteenth century. What remains of the twelfth century work indicates that the house that then existed must have been almost co-extensive with the present, but practically the whole



HADDON HALL, DERBYSHIRE.

house was rebuilt in the fourteenth century.

The house stands on a hillside facing west, and is built around two courtyards, the east of which is known as the upper, and the west—that entered first by the public to-day—as the lower. The grouping of the building is very irregular and massive, parts are heavy and uninteresting—built rather for protection than for beauty of proportion, but other parts, notably the chapel and south, or garden front, are interesting in the extreme. The long gallery, in the S.E. corner, contains fine Jacobean panelling,



FIREPLACE IN HADDON HALL.

DETAIL OF SOUTH WRAXALL MANOR.

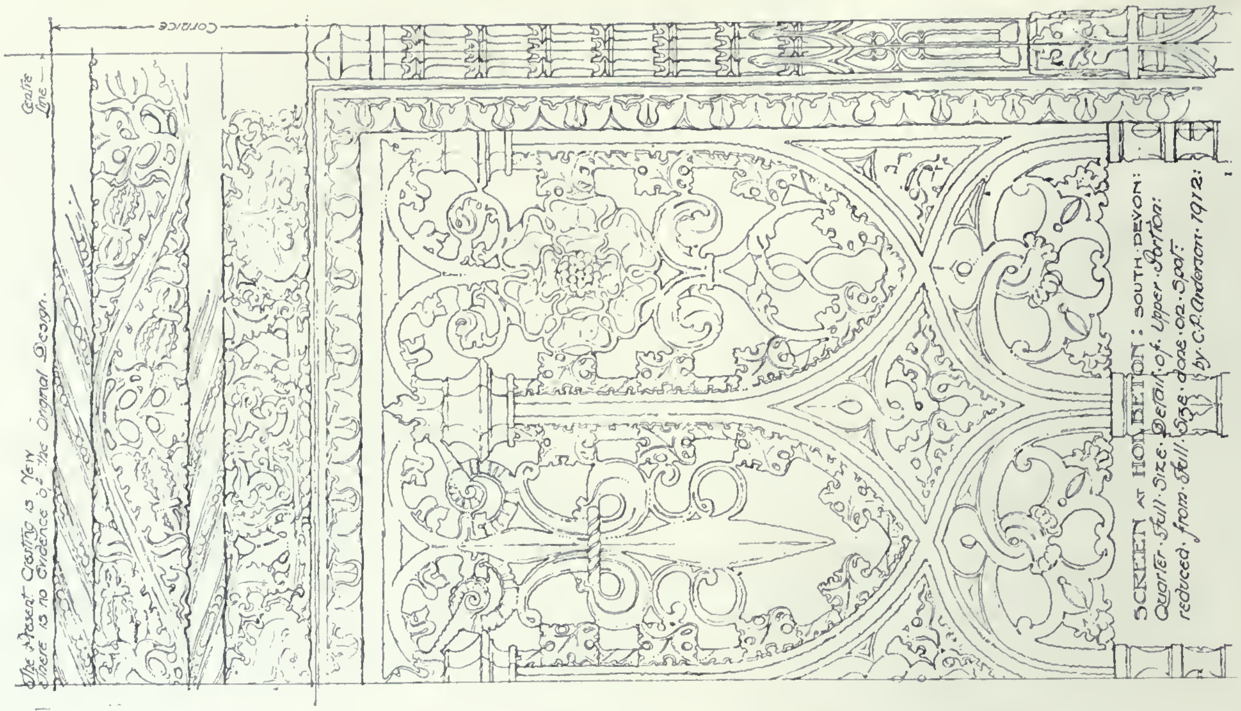
but the most interesting work in the whole building is contained in the very beautiful hall and dining-room, which, with the drawing-room, are too well known, from frequent illustration, to need description.

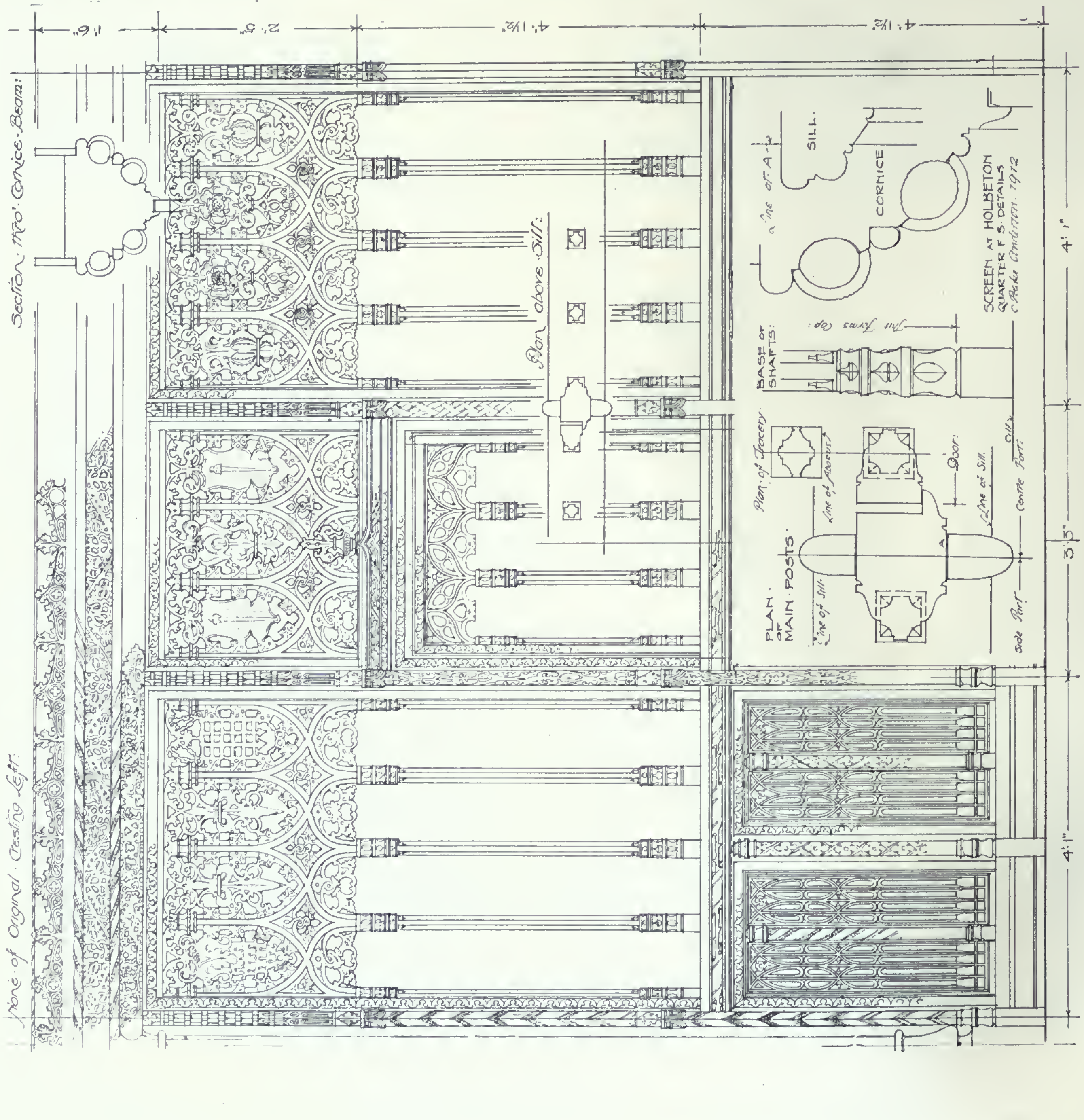
In Haddon Hall there is none of that variety in the use of material that lends so much charm to Compton Winyates; in fact, as I have said, the first impression is of a somewhat shaggy building, for it is built entirely of a rough rubble with cut stone trimmings, and the mouldings are heavy and a trifle coarse; here and there are lead rain water heads of charming design, and inside are many pieces of fine woodwork, but it is to its general effect that we must look for its real interest.

In it is seen such variety of period, ranging from a Norman column to Jacobean woodwork; it is, though originally fortified, yet so thoroughly domestic in character, and has so completely escaped the hand, both of the vandal and of the restorer, that it is small wonder that yearly thousands of visitors pace its courtyards and its galleries, and that over all it exercises its potent charm—the charm of Tudor architecture.

From Haddon Hall in the northwest to South Wraxall, near Bath in the southwest, is some-

SOUTH WRAXALL MANOR, NEAR BATH.





SCREEN AT HOLBETON, SOUTH DEVON.

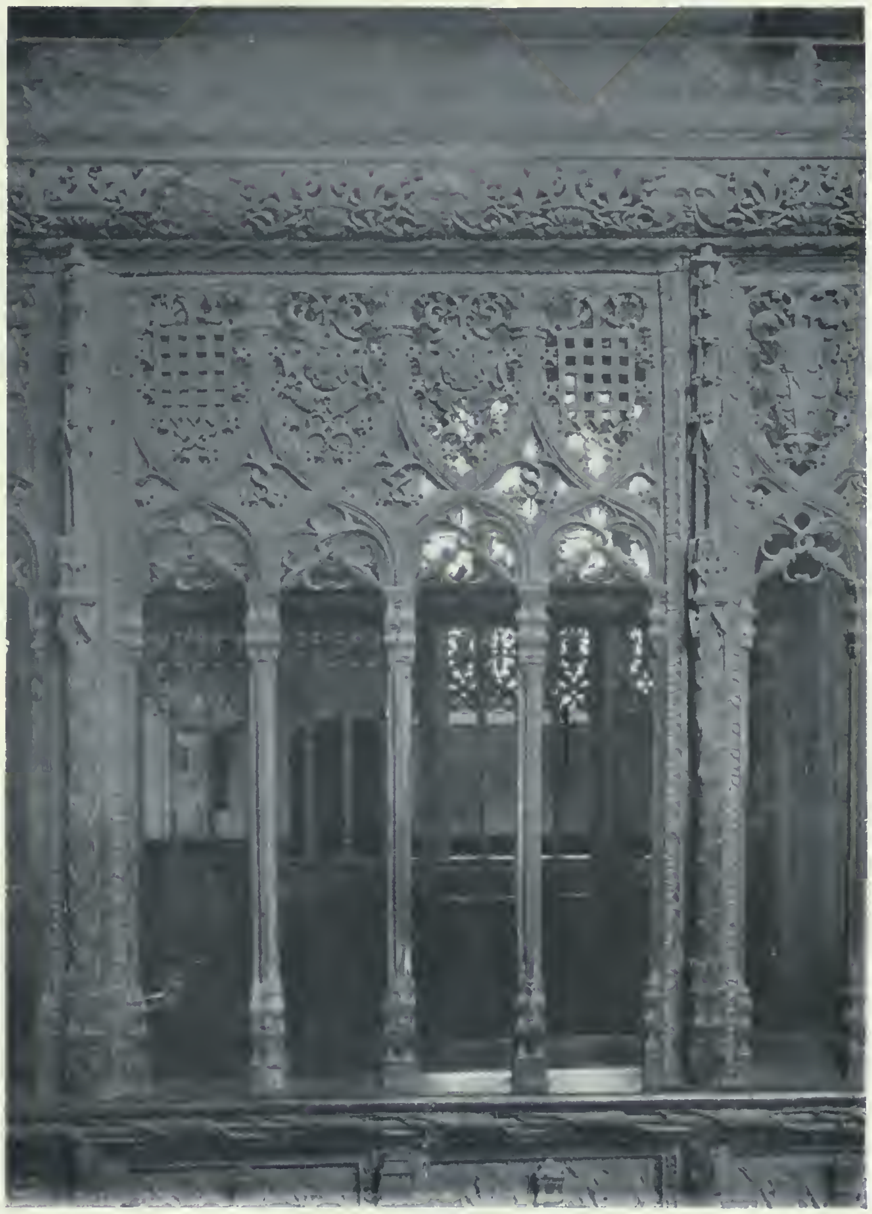
MEASURED AND DRAWN BY C. PEAKE ANDERSON.

what of a far cry in England, but as South Wraxall Manor House stands for that other type of country house—the smaller manor house--it is worthy of note. It also belongs—as does Compton Winyates—to that period when the necessity of defence no longer affected the design of domestic work. The house is built around three sides of a courtyard, which is entered through the entrance porch. The exterior has many points of interest: the porch before mentioned, the large square bay in close juxtaposition to pointed windows, and the use of Jacobean columns in the windows in the rear elevation; and inside there are elaborate stone mantelpieces of Jacobean design, and plaster ceilings of interest.

Within a stone's throw of South Wraxall is Great Chalfield Manor House, very similar to it in many ways, but now, unhappily, much restored: and both these houses are very close to the border of Somerset County—the heart of the West of England—a sleepy county, where even the architecture seems asleep. This certainly applies to Muchelvey Abbey, which lies just south of Langport, right in the centre of Sedgemoor, a tree-encircled group—the abbey, the abbey church, and the fourteenth century vicarage, all hidden away among willow trees on the banks of a slow stream. The church has some fine tiling on the chancel floor, but few visit it; the abbey contains some lovely rooms, but no one lives in them, and the vicarage is almost a ruin. Here is a place in which one can get very near to the secrets of the charm of Gothic work, a spot untouched by the ravages of change—a spot outside of to-day.

The Somerset houses are noted—Montacute House with its gardens, Montacute Priory, Clevedon Court, Lytes Cary, Sandford Orcas, Brympton d'Evercy, with its later front by Inigo Jones, and one of which I wish to make note—the abbey farm at Preston Plucknett.

This farm stands off the main road, just north of Yeovil. The buildings are ranged round a large square. On the east is the house itself, with its long, low roofs and its unique Louvre chimney, its entrance porch and its original hall, which is now the home of a cider press. South of the house is what may well have been the original duck pond. On the north side of the group stands the magnificent tithe barn, with its chestnut roof—a good example of its kind—and showing the old wind-bracing between the principal rafters. The interior of this barn is quite well lighted—as may be seen from the illustration—by the very narrow piercings in the thick walls.



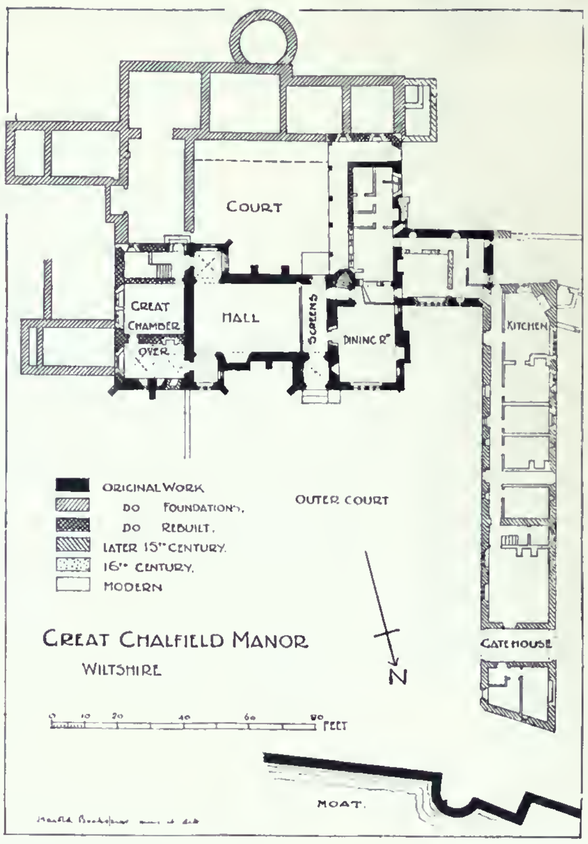
DETAIL OF SCREEN AT HOLBETON, SOUTH DEVON.

On the other sides of the square are barns and stables, all of which have been repaired, but all of which show traces of the earlier building. The whole group is built of a warm local stone, with bands of light yellow Harn Hill stone, from that splendid quarry which still supplies the best building stone in that district.

So much, then, for four typical English houses, chosen almost at random, but each exhibiting a special type.

I have not found time to touch on many of the interesting sides of Tudor domestic archi-

tecture, half-timber work, for instance, has wholly escaped this paper; so also have the great brick mansions of East Anglia. More than that, I have not even mentioned Oxford and her colleges. Oxford—"steeped in sentiment as she lies, spreading her gardens to the moonlight, and whispering from her towers the last enchantments of the Middle Age."

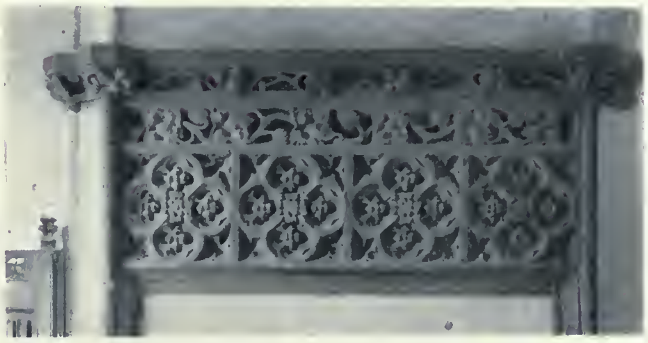


The buildings which I have selected have been chosen quite at random, and purely because they happen to have especially interested myself.

I have attempted no summary of Tudor architecture, and, except as it arose from the study of some building presented, I have made no effort to find either its roots or its possibilities. These lie outside the scope of a paper, and, indeed, for myself, lie outside my thoughts on the subject. We are killing much of the charm of life to-day because we are seeking to know too much about it. I have worked on the assumption that one can know and love a style of architecture just as one can know and love a person—without the necessity of an intimate knowledge of their heart action, or of the state of their digestive organs. We shall gain more from a study of the spirit in which our forefathers worked than can ever be gained from a minute inspection of their works.

One or two broad conclusions I am safe in drawing in justification of my statement that I was in search of the secret of the charm of Tudor work—and I am done. Am I but beating a time-worn drum when I say that the absolute necessity for truth is the first of them? In all my study of mediæval work I found no piece of sham; when the mediæval builder used wood he *used* wood; he held up his floors on oaken beams; he held up his walls on oaken beams, and he framed his magnificent roofs out of solid timber, and with this, as with all his materials, he exercised a regard for its just uses and limits.

There were no tin cornices in Ancient Greece! My second conclusion is: that much of the charm of old work arises from the mediæval builder's intimate knowledge of his materials; his was a place in a great tradition, and generations of loving study helped him to achieve his charming effects.



GENERAL VIEW. MUCHELVEY ABBEY. DETAIL OF MANTEL.

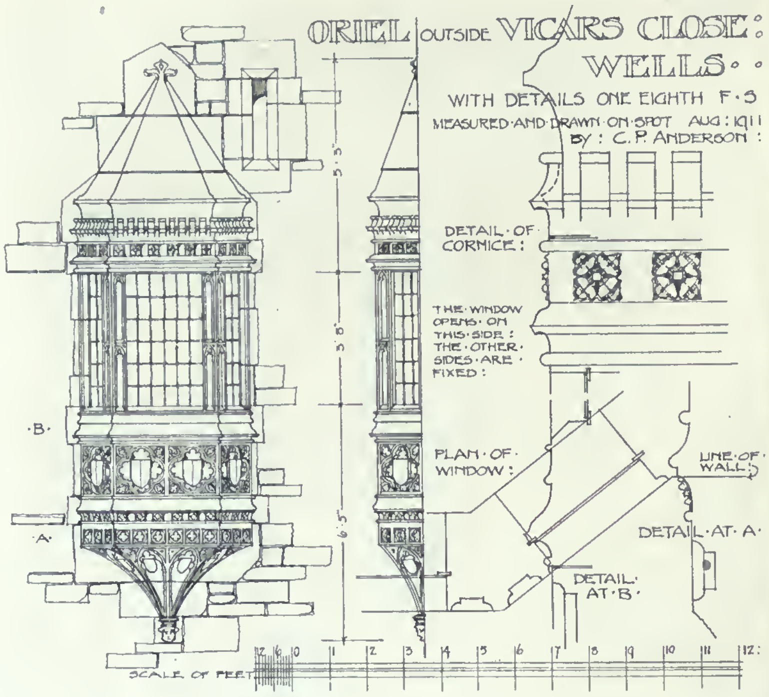
My third and last conclusion is that the mediæval builder managed to solve the difficult problem of how to achieve breadth of proportion without sacrifice of utility. We have come to this pass to-day, mainly, I fancy, because of our parsimonious attitude towards our materials, that we consider beauty of exterior and utility of plan as—if not diametrically opposed to each other—at least difficult to combine without sacrifice of utility.

Our god—"Utility." Our forefathers worshipped at the feet of a deity somewhat more divine. Much of the charm of mediæval work arises from its thoughtful use of materials; more arises from its breadth of vision—a vision that did not consider materials in their minimum dimensions.

Its final appeal: The appeal of all true architectural work is its intrinsic worth—its height, its depth, its breadth—in one word, its truth.

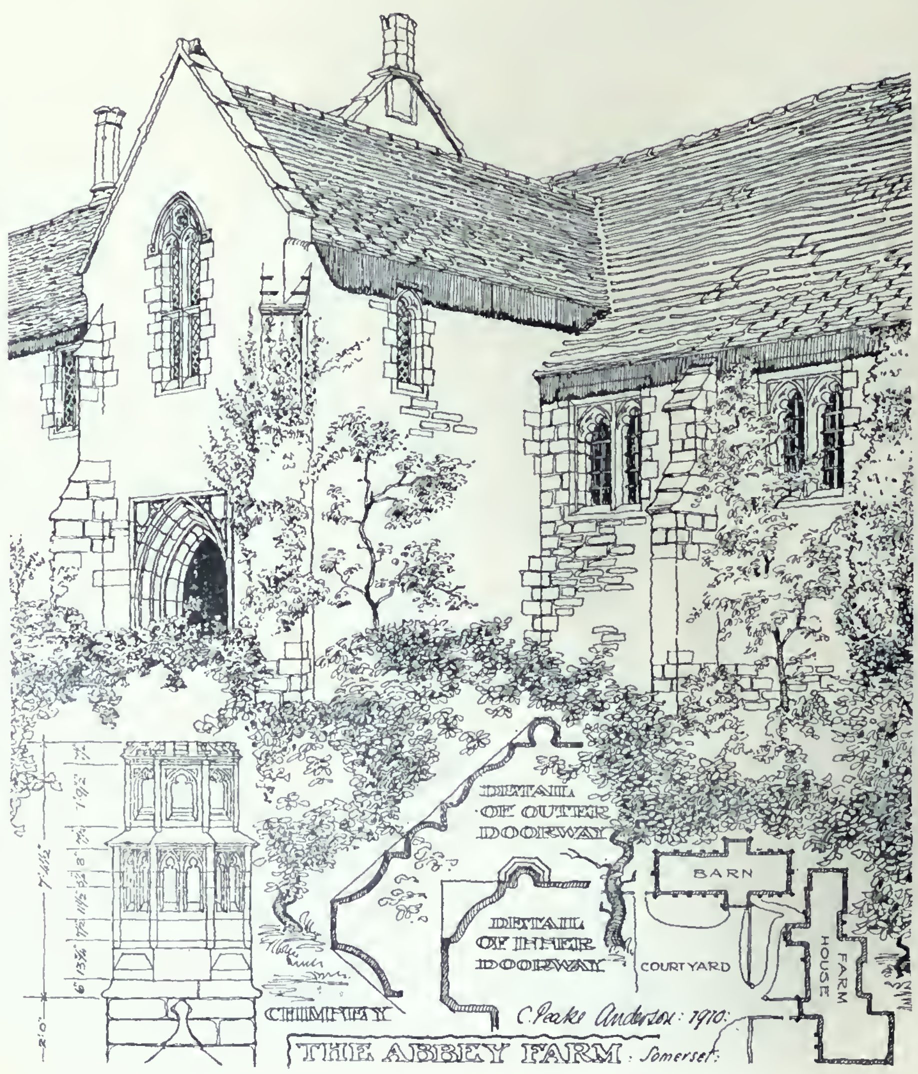
The most complete and most interesting house of the fourteenth century is the well known Haddon Hall in Derbyshire. It consists of two courts, the hall being placed in the wing which divides them. It is thus protected on both of its long sides, and is thereby enabled to have larger windows than if it had been on an outside wall. The exterior walls of the earlier parts of Haddon have comparatively few windows in them, and these of small size; and as the kitchen is one of the rooms so lighted it is dark, in spite of a larger window inserted in the sixteenth century, to a degree which horrifies housewives of the present day. Haddon

DETAIL OF MUCHELVEY MANOR, SOMERSET.



DETAILS OF MEDIAEVAL DOMESTIC ARCHITECTURE IN ENGLAND.

DRAWN BY C. PEAKE ANDERSON.



BRYMPTON D'EVERCY, SOMERSET.

being built on the slope of a hill could not be protected by a moat, hence it was more than ever necessary to be careful about external apertures.

It is curious to observe on a plan of the house how much thicker the external walls are than the internal, and how few windows look outwards; they nearly all look into the courts, and of those that look out over the country most are of later date. The plan also shows very clearly how the disposition of the hall follows the orthodox lines. It is entered through a porch at the end of one of its sides; the porch leads into the "screens"; on the right is the hall entered through a panelled wood screen with two openings. On the left are three doorways—one to the buttery, one to the kitchen-passage, and the third to the pantry. At the end of the screens is a door leading into the upper court. The kitchen department is large, rambling, and ill-lighted, but when the house was in full occupation an enormous amount of work had to be done here, and doubtless the fire itself sufficiently supplemented the scanty daylight.

At the upper end of the hall is a range of rooms of two storeys, devoted to the use of the family; and doubtless in the fourteenth century it was already of two storeys, although apparently it only extended at that period from the front or west side of the hall as far eastwards as to overlap the east side of the upper court. It is difficult to disentangle these rooms from the additions and alterations of later years, for in the early part of the sixteenth century the rooms immediately contiguous to the south end of the hall were improved, and a new range was built on the top of the curtain wall, which ran from the hall wing westwards to the chapel. Again, towards the close of the same century, the long gallery was built over the ground floor rooms forming the south side of the upper court, and apparently this wing was prolonged

GARDEN FACADE, BRYMPTON D'EVERCY.

GENERAL VIEW OF GARDEN FACADE.

DETAIL OF PLAN.

GARDEN HOUSE.

MONTACUTE HOUSE
SOMERSET, ENG.

GENERAL VIEW OF HOUSE AND BARN,

in order to give that extreme length to the gallery which was so characteristic of Elizabeth's time. This prolongation carried the south front beyond the line of the east front, an arrangement very unlikely to have been adopted while the house was still fortified.

Another curious and instructive feature is the gallery or gangway which is carried along the east side of the hall. This is not an original gallery, but was erected in order to connect the south rooms with those on the north, which previously had been completely severed from each other by the lofty hall.

Haddon Hall, therefore, taken as a fourteenth-century dwelling, shows that protection from casual attack was still essential, but that there was a great amount of separate accommodation for the members of the household. The rooms, however, were arranged without much regard to convenience. They were placed in long and somewhat straggling ranges of single apartments leading one into the other. Privacy was much more studied than it had been in the preceding centuries, but it was provided to a degree that falls short of modern requirements.

The fact that the only entrance through which a wheeled vehicle could enter the place was a secondary archway up the hill beneath the Eagle Tower, brings home to us again the fact that the usual means of locomotion was at that time either on foot or on horseback.—"The Growth of the English House," by J. A. Gotch.

ENTRANCE PORCH.
ABBEY FARM, PRESTON PLUCKNETT, SOMERSET.

FRONT ELEVATION.

CONSTRUCTION

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

FREDERICK REED, Editor

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Vol. VIII Toronto, April, 1915 No. 4

IN THE DEATH of Thomas R. Johnson, Tuesday, March 30th, at his residence, 629 West 115th street, New York city, the profession of architecture has lost one of its most accomplished and brilliant members. He was born in Toronto, Canada, March 11, 1872, of English descent, some of his ancestors coming to America with William Penn. Mr. Johnson studied at the art schools and technical schools in Toronto, where he was early recognized as possessing rare artistic talents. He wished to become a painter, but yielding to his father's wish, chose architecture as his profession and entered the office of E. J. Lennox, a well known architect in Toronto. He went to New York in about 1896 and was connected with the offices of several architects, including those of Ernest Flagg and Edward P. Casey. He entered the office of Cass Gilbert as an assistant in April, 1900. He was admitted to a partnership interest in this office several years ago, and has had an important part in many of the buildings under Mr. Gilbert's charge during this period. Mr. Johnson possessed to a rare degree the qualifications of an architect; he was thoroughly versed in all phases of his art; he was a designer of rare ability; he was a draftsman of extraordinary skill. A master of every form of architectural draftsmanship, he had a keen and delicate sense of color and form in painting and sculpture. He was a deep student of architectural precedent and at the same time possessed exceptional inventive powers as an artist not only in the intricate detail of architectural ornament, but in the larger forms of planning and composition. His untiring industry and enthusiasm for his art were inspiring to all who worked with him and his singularly unselfish and lovable personality endeared him to all who knew him.

* * *

THE annual general meeting of the Architectural Institute of British Columbia was held recently in Vancouver. The usual good-fellowship was manifest and in spite of present conditions a feeling of optimism prevailed relative to the future outlook. After the various reports had been read and adopted, the following officers were elected for the coming year: President, R. Mackay Fripp, F.S.A.; vice-president, W. T. Dalton, F.R.A.I.C.; honorary secretary, Fred L. Townley; honorary treasurer, S. B. Birds, A.R.I.B.A.; council: S. M. Eveleigh, A.R.A.I.C.; J. W. Keagey, J. J. Honeyman, W. F. T. Stewart, G. D. James, R.I.B.A.; G. L. Wright, L.R.I. B.A.; R. P. S. Twizell, A.R.I.B.A.; K. Bryan.

* * *

THE OFFICES and factory of the Ideal Concrete Machinery Company, Ltd., has been removed from London to Windsor, Ontario. The new plant is built entirely of concrete blocks made from the company's machinery and demonstrates the practical use of this material for factory construction.

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FIRST METHODIST CHURCH, HAMILTON, ONT.

W. E. N. HUNTER, ARCHITECT.

GROWTH OF HAMILTON, ONTARIO

Hamilton, Ontario, has grown from a small farm, laid out in city lots by George Hamilton, 1813, to a manufacturing centre of one hundred thousand people. Along with its rapid development in industrial, commercial, financial and civic lines is noticeable the rapid strides in architecture. The new Public Library, Young Women's Christian Association, Registry Office and First Methodist Church are indicative of a sane and wholesome attempt to furnish the city with buildings of esthetic taste, practical in plan and of a durable nature. Aside from the above are many others of equal merit which have been erected in recent years as well as several in the course of construction, among which might be mentioned the New Royal Connaught Hotel. This structure will cost over a million dollars and compares favorably with similar hostelries in other countries. The output from the four hundred factories which has caused Hamilton to be referred to as the Birmingham of Canada is forcing an expenditure of three million dollars on the harbor, which will be of great commercial value to the city.

ECCLESIASTICAL ARCHITECTURE

It is extremely gratifying to present in this issue an article on English church work by C. P. Anderson, who has enjoyed living among these monuments of inimitable grandeur. That he has imbibed the feelings of sincerity and devotion depicted by the great architects in the buildings themselves is quite evident from his sketches and his words. In our own endeavor to make the church structure an inspiration to everyone it might be well to study the spirit which enabled these artists to erect out of lifeless materials edifices which arouse a profound reverence for the teachings of Christianity. Some one has said: "The art of literature has largely superseded, or supplanted the gothic, as an educational necessity and made of it a luxury." Literature is a great educator but will never bring about the abolition of lofty ideals as expressed by the student who writes his thoughts in works of art. We must build as we think and in so doing impress the people with the things which tend to elevate and ennoble. Sincerity is the one characteristic much needed in the development of true ecclesiastical architecture and the building should embody the great truths contained therein. It is only natural in this modern age to lose sight of the mediaeval gaiety which permeates its work, mainly because we are not profound enough to give it the necessary dignity, but in designing, the thought should always be uppermost that a structure which inspires from without will clarify the teachings within. Therefore in church work the building should depict noble attributes of Christianity.

ROAD CONVENTION HELD IN TORONTO

Considerable interest was manifest at the second Canadian and International Good Roads Convention held recently in Toronto which will undoubtedly prove to be the greatest incentive towards the betterment of our poorly constructed highways throughout the Dominion. This question is an important one to architects, engineers and contractors and should be considered more seriously. All building is hampered if the means of communication has had no practical solution. Congested areas in our financial centres, shopping districts, manufacturing quarters, etc., can be traced more or less to the lack of foresight in supplying adequate space for the administering of traffic. Streets in relation to the present and future needs of the communities wherein they serve are essential to their sane growth and ought to form an integral part of the whole arterial scheme in each respective city. The commercial activities, industrial trade, civic growth and home life—all are related to the proper planning of roads. Thomas Adams in his address on the Scientific Planning of Roads in Towns and Cities refers to our pride in enjoying a state of government based on democratic principles while we still follow the principles of the anarchist in the planning of our highways. He with other leading authorities dwelt upon our failures and our advancement, impressing the one absolute need of exercising foresight and common sense in regard to the whole system of traffic in our cities and towns. Surely the spirit which prevailed at the conference just held augers well for the future welfare of Canadian highways and cannot fail when backed by representative men.

DETAIL OF EXTERIOR,
FIRST METHODIST CHURCH,
HAMILTON, ONTARIO.

First Methodist Church, Hamilton, Ontario

THE city of Hamilton is fortunate in possessing an ecclesiastical structure of extreme merit when viewed from every phase of architectural work. This edifice, opened May 10, 1914, occupies a square enclosed on three sides by King, Wellington and Main streets. The site, two hundred by three hundred feet, provides an excellent setting in conjunction with a public park opposite King street upon which thoroughfare the main facade faces. The exterior is treated in buff tapestry brick with raked out joints of five-eighths inch thickness; artificial stone trimmings of crandelled surface and rubbed finish; pitched roofs of purple slate and tile, and dome treated in a deep red Spanish tiling.

The problem in ecclesiastical work, especially in the Methodist, Congregational, Baptist and Presbyterian churches, where the preaching is the most important part of the service, is to provide a well-shaped auditorium, unobstructed and direct view of speaker and choir, and good acoustics. All three are about equally important. In this case it was all important to get a large auditorium and Sunday school at a low cost. The location being so prominent, and the church the first Methodist church in Hamilton, the architect decided to give it a monumental treatment, and elected to work it out in the Italian Renaissance style as well as possible, subject to the limitations of cost and utility.

The building is two hundred feet long by one hundred and ten feet wide. The auditorium seats sixteen hundred persons, the choir sixty, and the Sunday school proper, nine hundred and fifty; besides this there is a large kindergarten department in the basement of the Sunday school to accommodate three hundred and fifty scholars, and capable of grading or subdividing.

There are five large entrances to the building, three to Sunday school and two main entrances to the church. Two of the entrances to the Sunday school are also used for the church; and in addition is a wide basement or area entrance to the gymnasium or social hall, so that this room may be used without passing through any other part of the building.

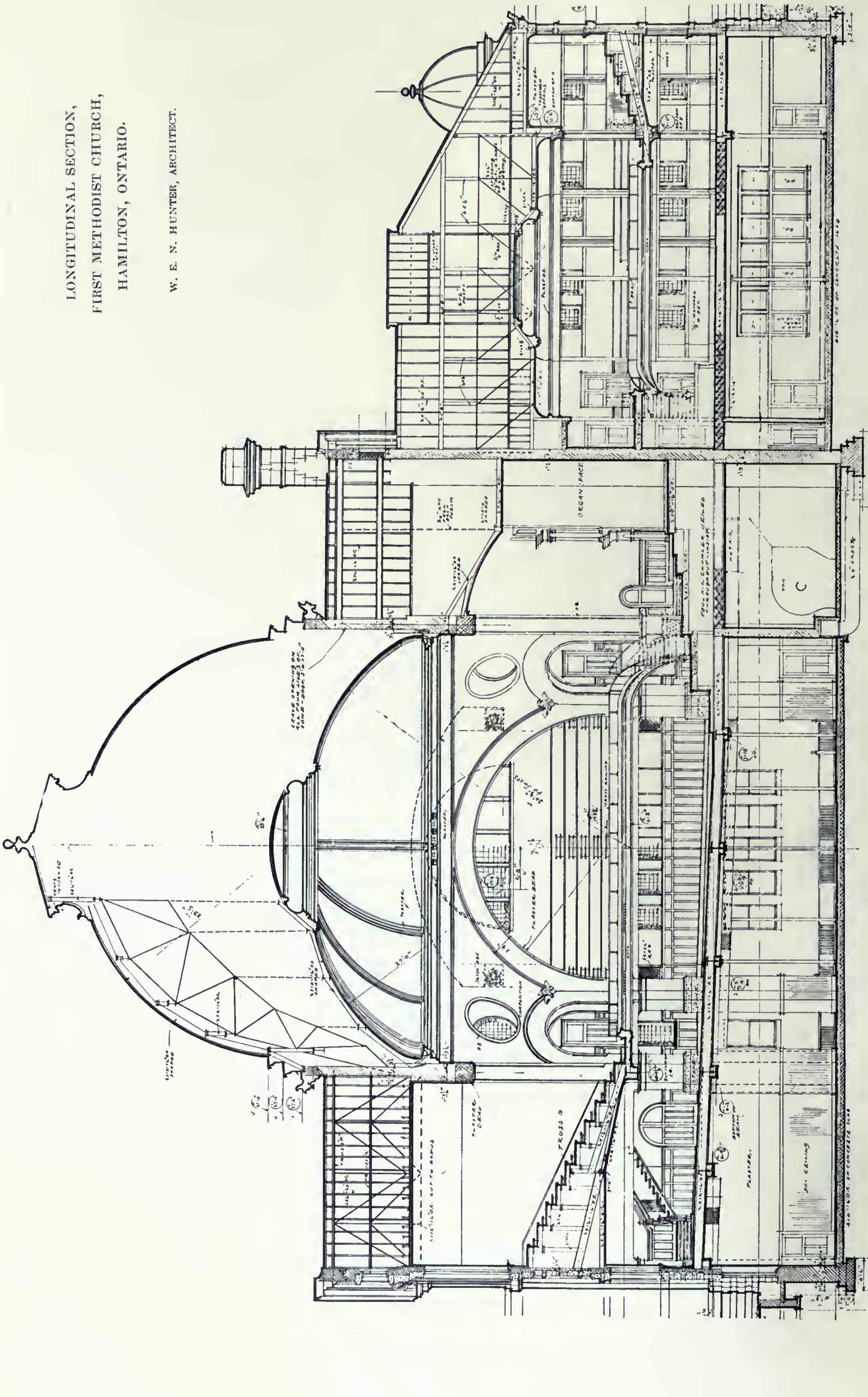
The most important feature is the large auditorium surmounted by a dome sixty feet in diameter, supported on eight large reinforced concrete piers and arches—four small and four large ones with a thirty-six foot span.

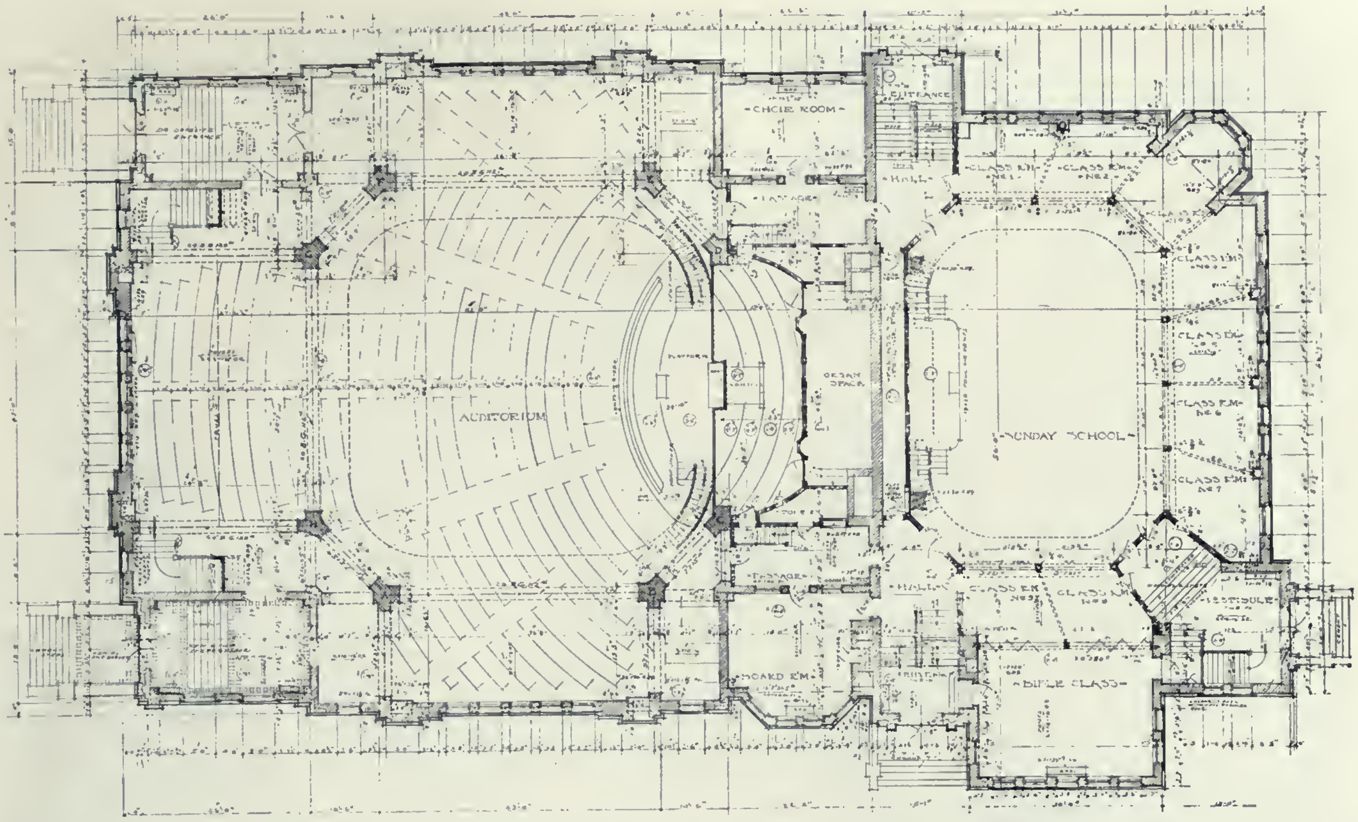
The decoration of the auditorium is very striking, the colors blending in a restful harmony. The tones are a sage green ground with enrichments in stencil for border, forming a background for the treatment of the arches, piers and dome. The piers and arches have a dull bronze finish and the dome gold with relief work in the ribs and cornices; the panels are enriched with large acanthus leaf design. The dome is the central feature of the building, and the glow of light thrown up into the top is reflected into the room proper, furnishing a soft, well diffused light. At the base of the dome indirect mirror reflectors are used, while at the top of the interior dome, sixty feet from the floor, is a ring of electric lights placed in rosettes, giving the effect of golden pollen in a flower. Under the cornice of the dome is the same treatment, which tends to lighten up the shadows caused by the strong indirect light above the cornice. The system of lighting throughout is the semi-indirect.

The interior finish in all halls, stairs, first and second floors is clear white oak, fumed to soft rich brown, the other woodwork is southern pine finished natural. The art glass is a simple amber opalescent field in rectangular panels, with laurel leaf border in soft green and woody browns. In the vestibule is a wainscoting of soft gray brick, Norman size with stone cap and base; vaulted ceiling and red tile six by nine inches with ornamental inserts.

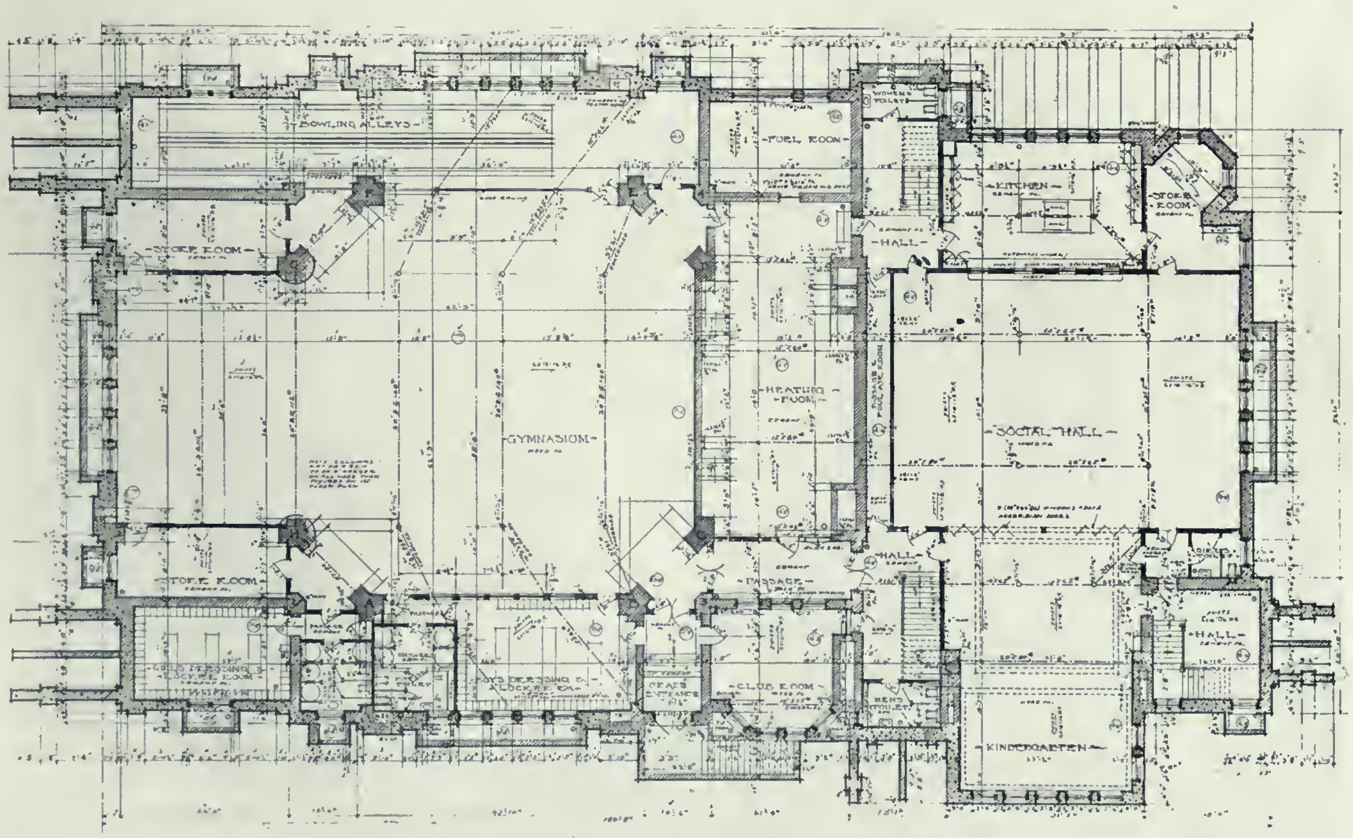
LONGITUDINAL SECTION,
FIRST METHODIST CHURCH,
HAMILTON, ONTARIO.

W. E. N. HUNTER, ARCHITECT.





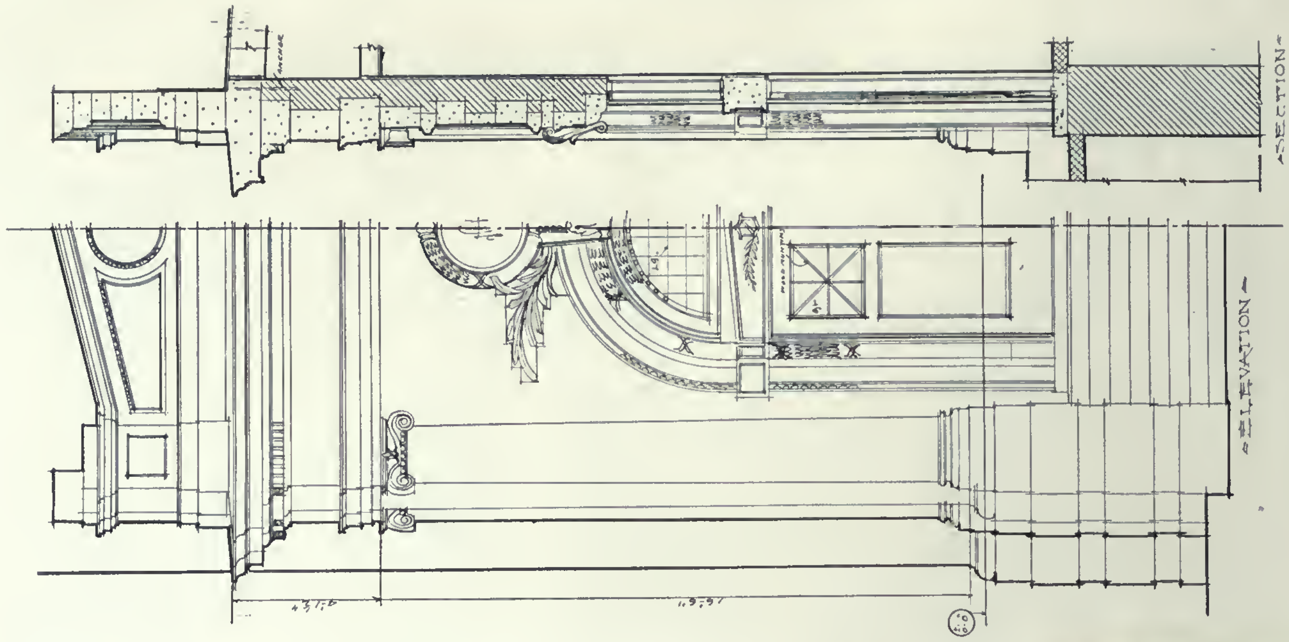
FIRST FLOOR PLAN.

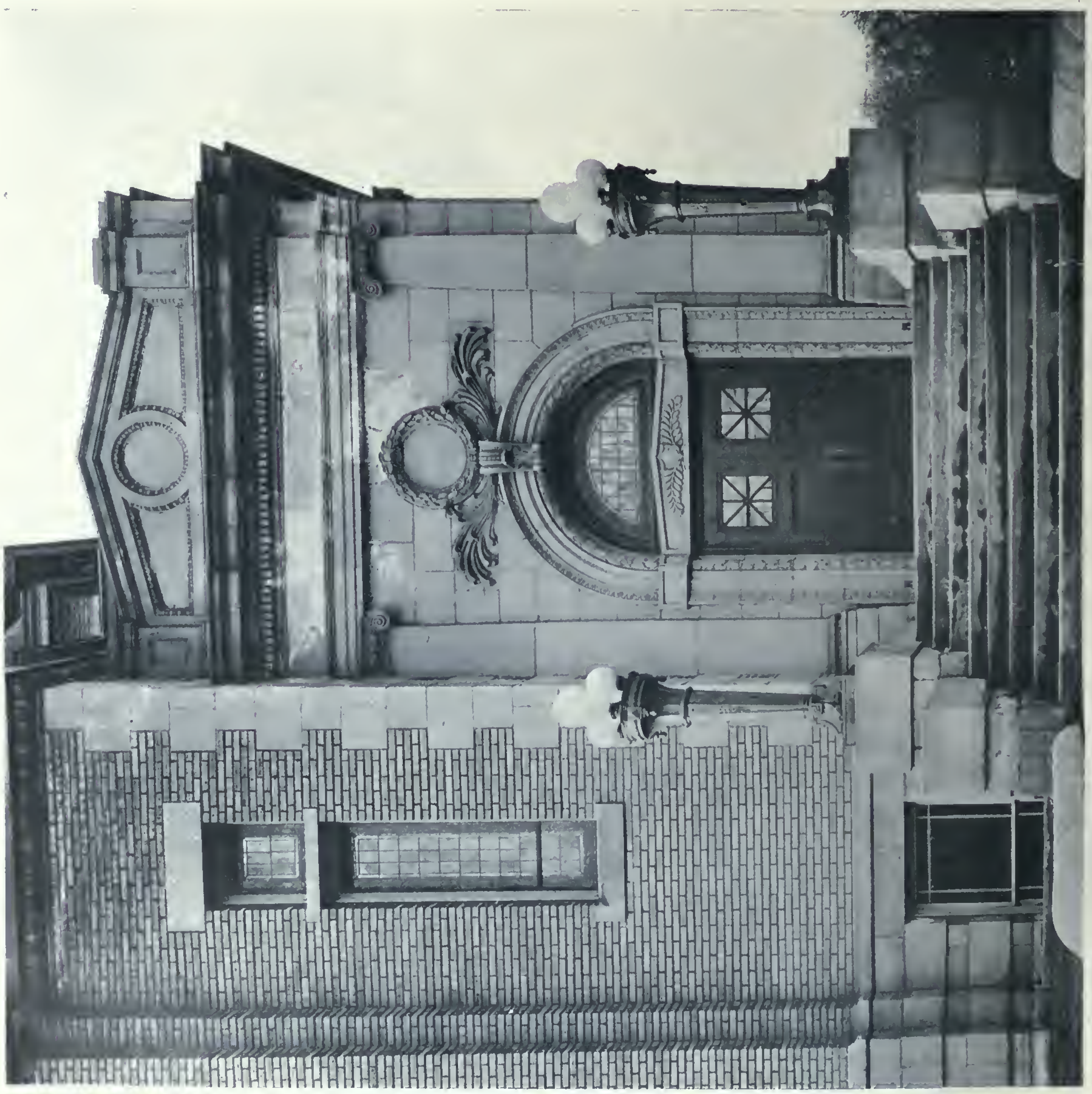


BASEMENT PLAN.

FIRST METHODIST CHURCH, HAMILTON, ONT.

W. E. N. HUNTER, ARCHITECT.



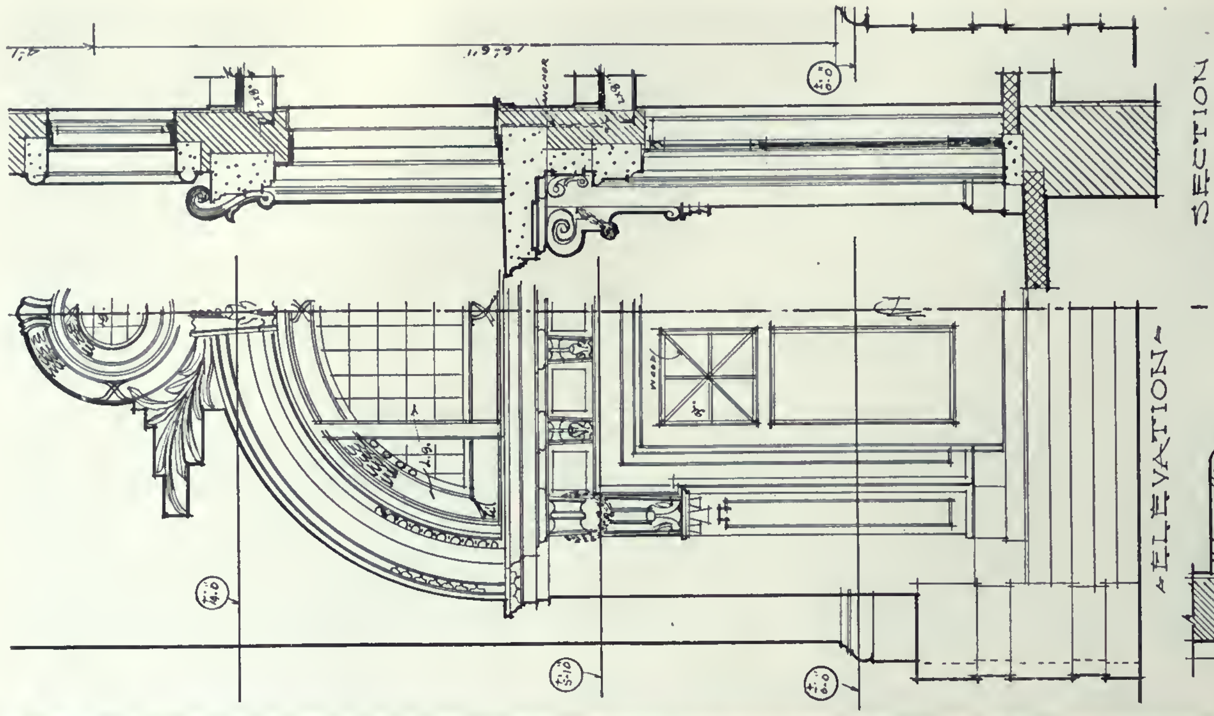


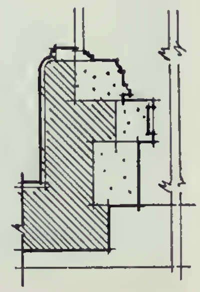
DETAIL OF FRONT ENTRANCES.

FIRST METHODIST CHURCH, HAMILTON, ONT.

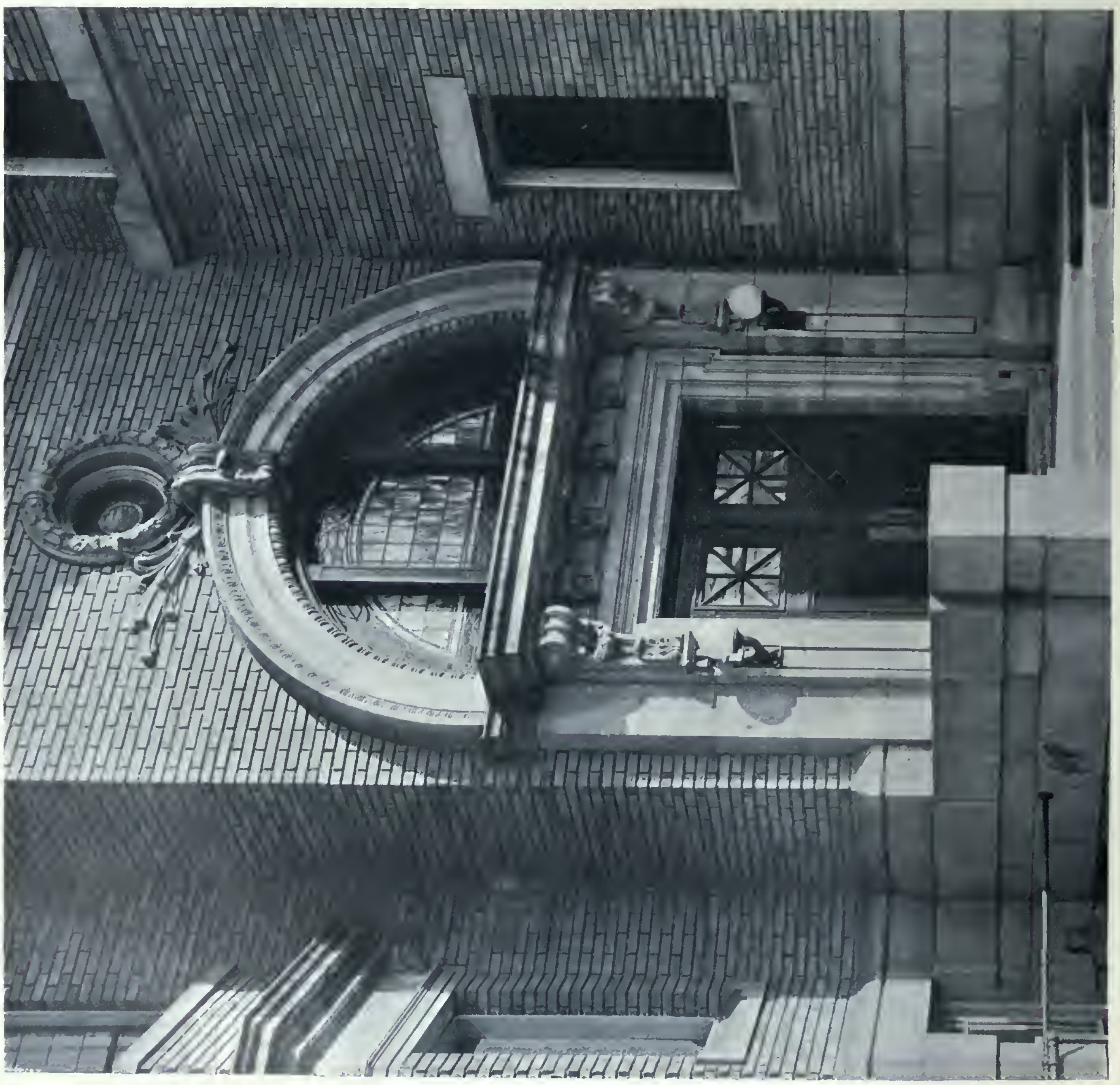
TWO VIEWS OF MAIN AUDITORIUM.

FIRST METHODIST CHURCH, HAMILTON, ONT.





DETAIL OF SIDE ENTRANCES.
FIRST METHODIST CHURCH,
HAMILTON, ONT.



The Sunday school is arranged with a large assembly room in the centre, lighted by skylight leaded glass, surrounded by class rooms, each one seating thirty scholars and entered on each floor by means of rolling partitions. A large ladies' parlor on the second floor is connected with the class-room by folding or accordian door, and a large Bible class room on the first floor, each of which seats one hundred and twenty persons. A special feature of the Sunday school is an orchestra balcony over the platform, and Choralcello screen on each side. In the face of the balcony railing is a moving picture screen that may be rolled up out of sight and used at a moment's notice.

The gymnasium, consisting of two bowling alleys, dressing rooms and lockers are under the auditorium or church proper, and when used for entertainment will seat about one thousand persons. The dining-room seats three hundred.

MAIN AUDITORIUM.

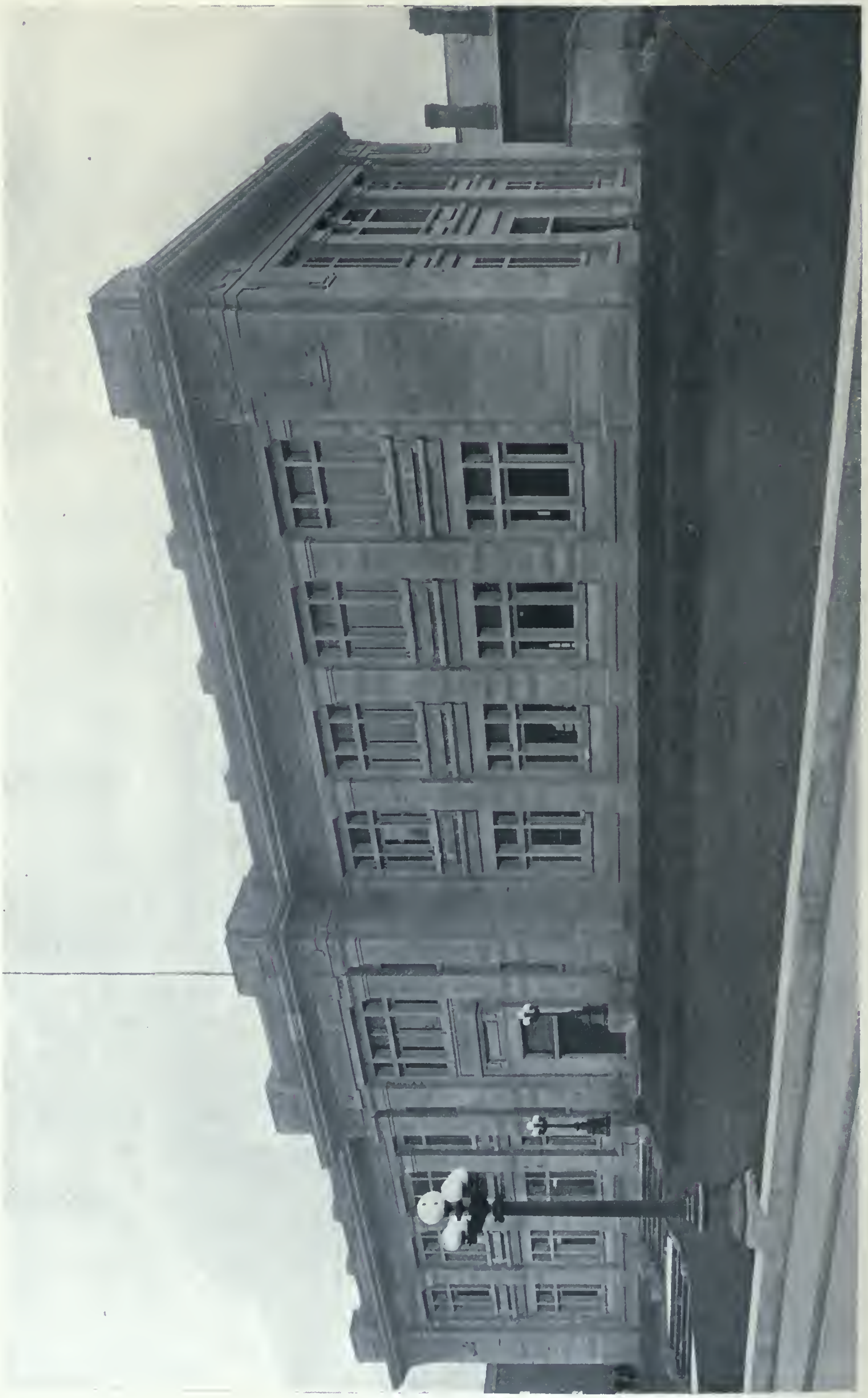
One of the important things in church building is the heating and ventilating. The system in this building is known as the fan system; the fresh air passing over steam coils and into the building at an average velocity of three hundred and fifty to four hundred feet per minute, and drawn off by vent shafts through the roof. Direct steam is used to heat all outlaying points, such as vestibules, halls, toilets, board room, parlors, kitchen, shower room, etc. Re-circulating dampers are provided, so that the air in the building can be re-circulated over steam coils and into the building, until the audience assembles, when the fresh air is drawn over the coils and the foul air expelled. The electric fan is ten h.p. and the steam boiler one hundred and twenty h.p. The air is changed four times per hour and controlled in various rooms by means of dampers or deflectors in pipes or ducts, also cables to control board in the boiler room.

In planning for a heating and ventilating sys-

tem for a church auditorium, a convenient method is to assume one hundred occupants as a basis, or "unit," and proportion the different parts of the apparatus according to the data given in the following table from an article by C. L. Hubbard on The Heating and Ventilation of churches. In this way the size is easily approximated for the conditions in any particular case, and space may be reserved in laying out the plans; while the location of flues and registers may be determined in a general way.

Proportions of Furnace Heating Apparatus for One Hundred Occupants, Outside Temperature 0: Air supply per minute, 2,000 cubic feet; Grate area of furnace, 5 square feet (30 inches diameter); Air passages through furnace, 6 to 7 square feet; Grate area of stack heater, 0.78 square feet (12 inches diameter); Chimney flue, 40 to 50 feet high, 70 square inches for round flue (10 inches diameter), 90 square inches for rectangular flue (8 inches by 12 inches); supply and vent flues, 8 square feet; cold air duct, 7 to 8 square feet. This data is for average conditions; for especially exposed locations, increase furnace grate area from five to ten per cent, or even more, all other dimensions remaining the same as in above table.

SUNDAY SCHOOL ROOM.



PUBLIC LIBRARY, HAMILTON, ONT.

A. W. PEENE, ARCHITECT.

New Public Library, Hamilton, Ontario

THE library is an institution of the past, for archaeological excavations have furnished us with relics of imperishable burned clay tablets. When we realize how valuable these records are towards the linking of present to past, we wonder what future generations will think of our temporary materials of paper and ink which soon decay. According to C. C. Soule the first mention of a separate public library was in Egypt in the time of Ptolemy Philadelphus, the third century B.C.

The spread of libraries at this time was rapid and by the fourth century A.D. there were twenty-eight public libraries in Rome. From this time to the close of the western empire, A.D. 476, we know little or nothing of the buildings themselves and their architectural merit.

The growth of libraries was greatly influenced by monastic orders. They were introduced into England about the sixth century. The first rooms were located over cloisters with long windows opening directly into each alcove, the exterior of which becomes the precedent for our modern stock rooms. The earliest types of libraries were long and narrow, while great attention was paid to the question of lighting—for example, the room at Zutphen, Holland, 1289, was one hundred and twenty feet long and thirty-six broad with nineteen large windows; the one at Clairvaux, 1517, one hundred and ninety feet long by seventeen broad, well lighted on both sides. During the Reformation over eight hundred "papistical" libraries were destroyed, the only survivors being at Oxford and Cambridge, aside from the cathedrals. Wall shelving spread rapidly and became the progenitor of early American interiors which have given away to the modern stock system first used at the University of Leyden in 1610. Two centuries later Leopoldo della Santa published in Florence a book on library construction from a utilitarian standpoint which influenced the planning of the Newberry Library at Chicago. But the first distinctive types on this continent were the Astor Library in New York, 1853, and the Boston Public Library five years later. The large accumulation of books led to the adoption of the "stack," although bitterly opposed by many prominent librarians. The final spur to this type of building has come through the Carnegie gifts. Up to January, 1905, he had given 1,290 buildings to the English-speaking people at an aggregate cost of $39,325,240, three-fourths of which went to the United States. By January, 1914, he presented to the United Kingdom and Colonies 2,570 buildings costing $60,795,322. Of this number the province of Ontario has secured one hundred and six, including the one at Hamilton, designed in Indiana limestone with a total expenditure of $160,000.

MEN'S READING ROOM.

The architectural treatment of the library building at Hamilton has broken away somewhat from the fettered condition arising from precedent. It has grasped the essential requirements of use, fitness and artistic excellence. For in this type of structure the first point to be considered is ample space for the work to be transacted. Naturally local conditions qualify the amount allotted to the various departments, although certain principles are general in their application. The lay-out is most important and has to be considered with a view to its class, scope, size, site, environment and upkeep. Every facility must be arranged for the economical performance of the work done by the staff and at the same time provide the public with every convenience.

Here the public enter into a stair lobby leading to the upper floor. The plans consist of one large space divided into various departments by means of screens which permit of an exceptional lighting opportunity and allow of a minimum

UPPER HALL.

working corps. It also is quickly understood by the stranger who sometimes experiences considerable embarrassment in exploring unfamiliar corridors. Special attention should be paid to the staff who should have the benefits of pure air, good light and practical planning. Economy of time leads to the best disposition of various departments from the administrative viewpoint, and this in turn brings the working corps up to the highest state of efficiency.

The problem of heating and ventilation in libraries is of the utmost importance. Dr. Billings, of the New York Public Library, published a volume on this question in which he feels that if any sacrifice is necessary it should come from another source. He says it is important that those who form and direct opinion on this subject should look to it that the buildings which they plan, especially these in which numbers of men, women or children are to be brought together, are so constructed and arranged that no one shall poison himself or others by the air which he expires. Among the first points which the designer must know is the amount of money for ventilating purposes and which of several methods will this cover to satisfy the character and location of the building. No matter how much he may be inclined to neglect certain phases of the work, or if he runs up against ignorant committee-men the architect should always insist on the proper methods for heating, ventilation, drainage and plumbing.

As for the style of a library design, this is essentially a matter belonging to the architect and the nature of the city wherein it is to be erected. It has been wisely stated that a structure which is a work of art is in itself a powerful educational factor; that a dignified building commands respect for the work with which it is associated; and that an attractive exterior and pleasing interior are great inducements towards the use of the building. Surely in the case of an edifice devoted to the sphere of learning, it should present an example of the noblest and best in modern design. As for the personal conduct of people, they are more considerate and quiet in a dignified structure which instills into one a feeling of respect. When this feeling is aroused by the external appearance it should not be lessened by the design within. It should be elevating and cheerful but not elaborate enough to attract the people and take their thoughts away from the real use for which it has been erected. Nowhere is this more clearly demonstrated than at the Boston Public Li-

ROTUNDA.

brary, where thousands of visitors go trooping through to see the Frescoes of Purvis de Chavannes Abbey, Sargent and others, thereby taking the reader's thought from his work and centering it upon the unthinking intruder.

In planning the building the librarian is an important factor and becomes more so as the number of departments and rooms increase. Sturgis says: "As the library grows, the rudimentary divisions still prevail, sub-divided according to special needs, such as separation of books, as under art, music, patents, etc.; separation of work, as librarians, delivery, janitor, etc.; separation of readers, as adults, children, serious and light reading, etc." The principles change only in their application to the relations of books, administration and students. And as this need arises the librarian is responsible for the practical advice which enables the units to become one practical ensemble.

Relative to the furnishings, they should be chosen for their special use and fitness in every detail. Their architectural effect must be subordinated although there is no reason why they shouldn't harmonize with the general surroundings. In this respect the architect should insist on furniture of a simple ornate design, easy to handle, and comfortable. They should not, however, be too cheap, for unsightly accessories are unprofitable, and they should be colored with soft and soothing shades in order to protect the eyes.

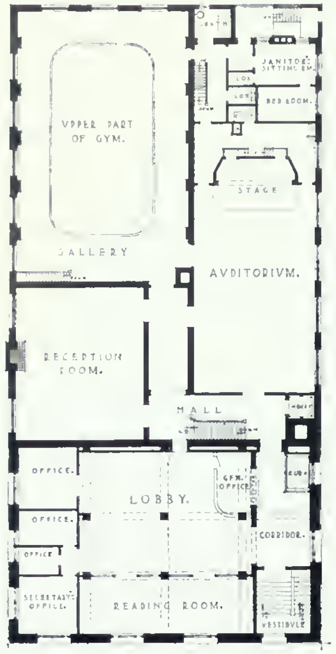
In commenting on the lighting of libraries, L. B. Marks, Consulting Illuminating Engineer, New York City, claims that the design of the illumination involves considerations which are quite unlike those that ordinarily confront the illuminating engineer, and are in many respects more difficult to meet than in almost any other class of buildings. Very often economy of operation is a governing factor in the design of library illumination. In planning the lighting installations of the Carnegie branch libraries, economy of operation was of perhaps more than usual importance as the libraries purchased electric current for lighting from the public service company at the retail rate. The aim of the design of lighting in libraries is to secure sufficient illumination on the reading tables and bookshelves; sufficient illumination for the library staff to oversee the entire floor; sufficient illumination to provide a moderate reading light in all parts of the room; moderate cost of installation; economy of operation; simplicity in construction.

COUNTY AND CITY
REGISTRY OFFICE,
HAMILTON, ONT.

MCPHIE, KELLY & DARLING,
ARCHITECTS.

Y. W. C. A. Building, Hamilton, Ontario

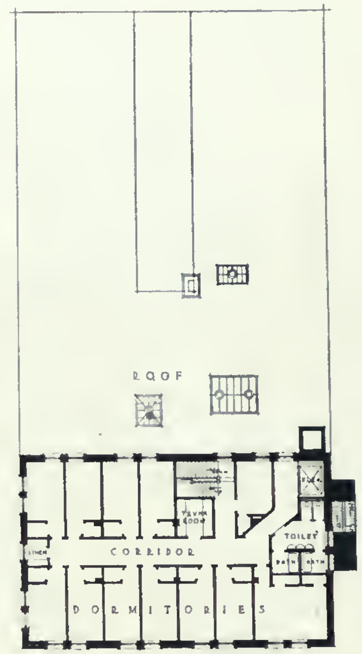
THE Young Women's Christian Association building at Hamilton is designed to meet the ever changing needs of a growing institution, and each room has been considered in respect to present demands, as well as future exigencies. Constructed of reinforced concrete, the exterior is faced with varied shades of red tapestry brick laid in a Flemish bond with dark brown joints raked out, and matt glazed terra cotta trimmings of a light cream color. The outside concrete columns are concealed, excepting at the rear, which anticipates further extension when conditions warrant such improvement. The main lobby, reached through the vestibule and corridor, is finished in fumed oak, with a panelled dado seven feet six inches high; the floor consisting of mosaic tile and marble base, which material is also used for the corridor and reading room, the latter being separated from the lobby by means of a glass screen. The main vestibule is treated throughout in Royal antique marble; the offices in oak and the elevator enclosures in cast-iron with wire chipped plate glass at all floors. In the basement the pool is equipped with marble showers and a plunge lined with mosaic tile and glazed terra cotta; ventilated by the exhaust fan system; heated with steam jets controlled by a circulating pump and arranged to accommodate an adequate filter plant. All floor construction in basement is terrazzo, excepting the gymnasium. On the second floor are class rooms in conjunction with a large private sitting room, to the rear of which are dormitories. The dining-room, sixty-six by forty feet, occupying a prominent position on the third floor, is finished in cypress, stained a dark brown; the walls above the panelled wainscoting being tinted stucco, the floor of terrazzo and the ceiling of wooden beams, encasing richly moulded plaster panels. In the kitchen cleanliness is the keynote, with cypress in its natural color, marble-top tables, porcelain sinks, steam tables and ice machine operated in serving room by a switch. The fourth, fifth, sixth and seventh floors are typical, arranged entirely for dormitories with proper toilet facilities, having tile floors, marble base, and enamelled walls and ceilings. Each floor is provided with a trunk room, linen closet and slop sink room; the stairs are of concrete, covered with Italian marble, the balustrades and newels of ornamental iron. The rooms, finished in stained cypress, are planned to take two beds, and possess a clothes closet large enough to accommodate two people. At the rear of each dormitory floor is a balcony, while the roof is used for a garden. Between the seventh floor and the roof, arrangements have been made for storage space, janitor's workshop and large dormitory room. The elevator is an electric with necessary mechanical equipment in the basement. In the general office is installed a private phone system which connects each part of the Y.W.C.A. with the administrative corps. In every detail the work shows a keen appreciation for the comfort of the girls within and reflects great credit upon the institution. The building, which is fireproof throughout, has floors consisting of tile and concrete construction, costing approximately $95,700 including the architects' fee.

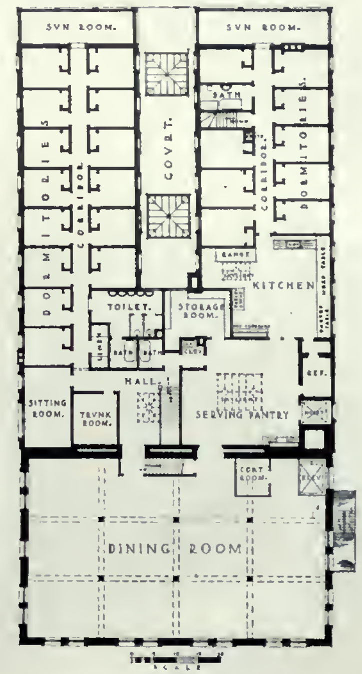


GROUND FLOOR.

BASEMENT.

MAIN ENTRANCE.





TYPICAL FLOOR.

THIRD FLOOR.

YOUNG WOMEN'S CHRISTIAN ASSOCIATION BUILDING,
HAMILTON, ONTARIO.

MILLS & HUTTON, ARCHITECTS.

DETAIL OF CORNICE AND UPPER STORIES.

YOUNG WOMEN'S CHRISTIAN ASSOCIATION BUILDING, HAMILTON, ONTARIO.

MILLS & HUTTON, ARCHITECTS.

LINCOLN CATHEDRAL.

YORK MINSTER.

TWO EXAMPLES OF ENGLISH CATHEDRALS.

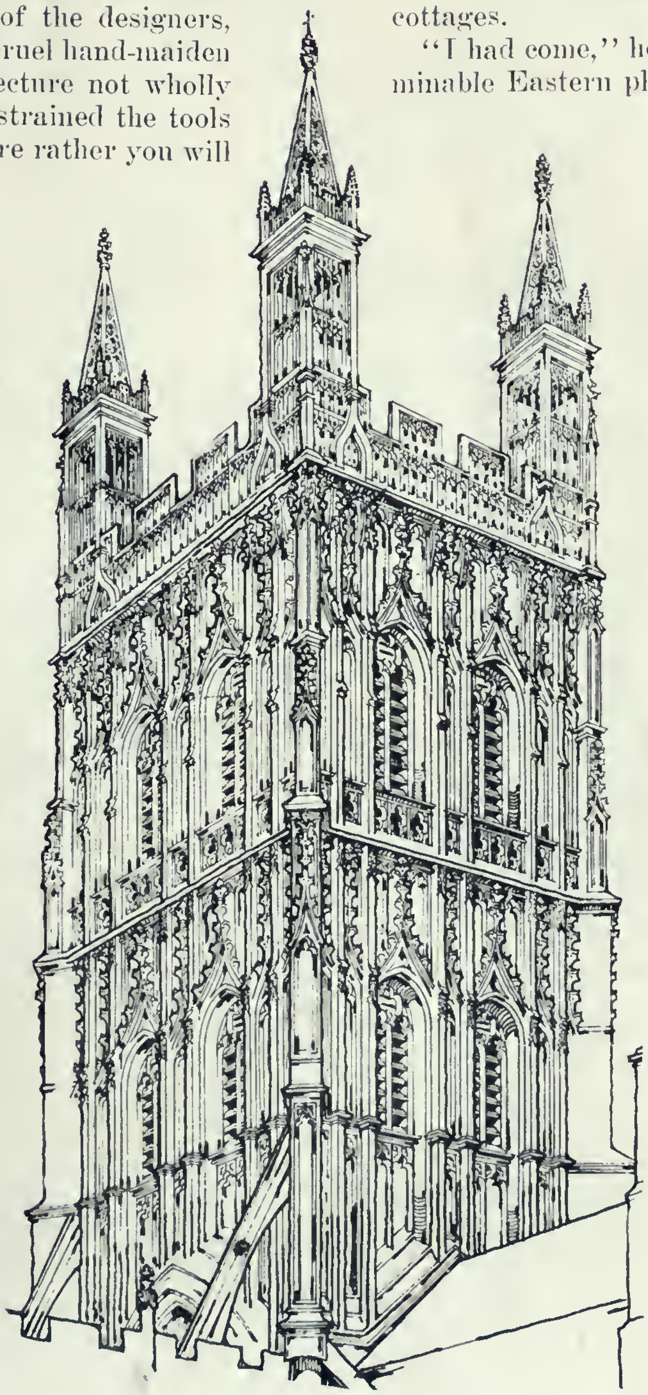
Gothic Ecclesiastical Work in England

C. PEAKE ANDERSON

I KNOW of no better introduction to Gothic work in England—a subject, by the way, wide as the heavens and perhaps as difficult to find a focal point in as are the night skies—than to suggest, that, for a starting point you concentrate your attention on one of the brighter stars of the firmament, to wit, a great cathedral. In this way, at the outset, you will at least have learned to know a star of the first magnitude, and you will have started off on your tour of observation with this advantage, that here you have Gothic work in its entirety: here is no small edifice in which necessity has placed her curb on the aspirations of the designers, nor "Lack of Funds," a cruel hand-maiden of the goddess of architecture not wholly unknown to ourselves, restrained the tools of the craftsmen. But here rather you will learn to know Gothic architecture in its width and length and height, Gothic architecture in its sublimity.

There are but two spots in all England on which our forefathers, seizing on those advantages which nature had bestowed, raised a cathedral worthy in the highest sense of the word "sublime." The one is on the right bank of the river Wear from which Durham's Norman bulk looks down upon the waters. The other is that hill from which, with its three towers fronting the sunsets, the cathedral church of Lincolnshire dominates the plain.

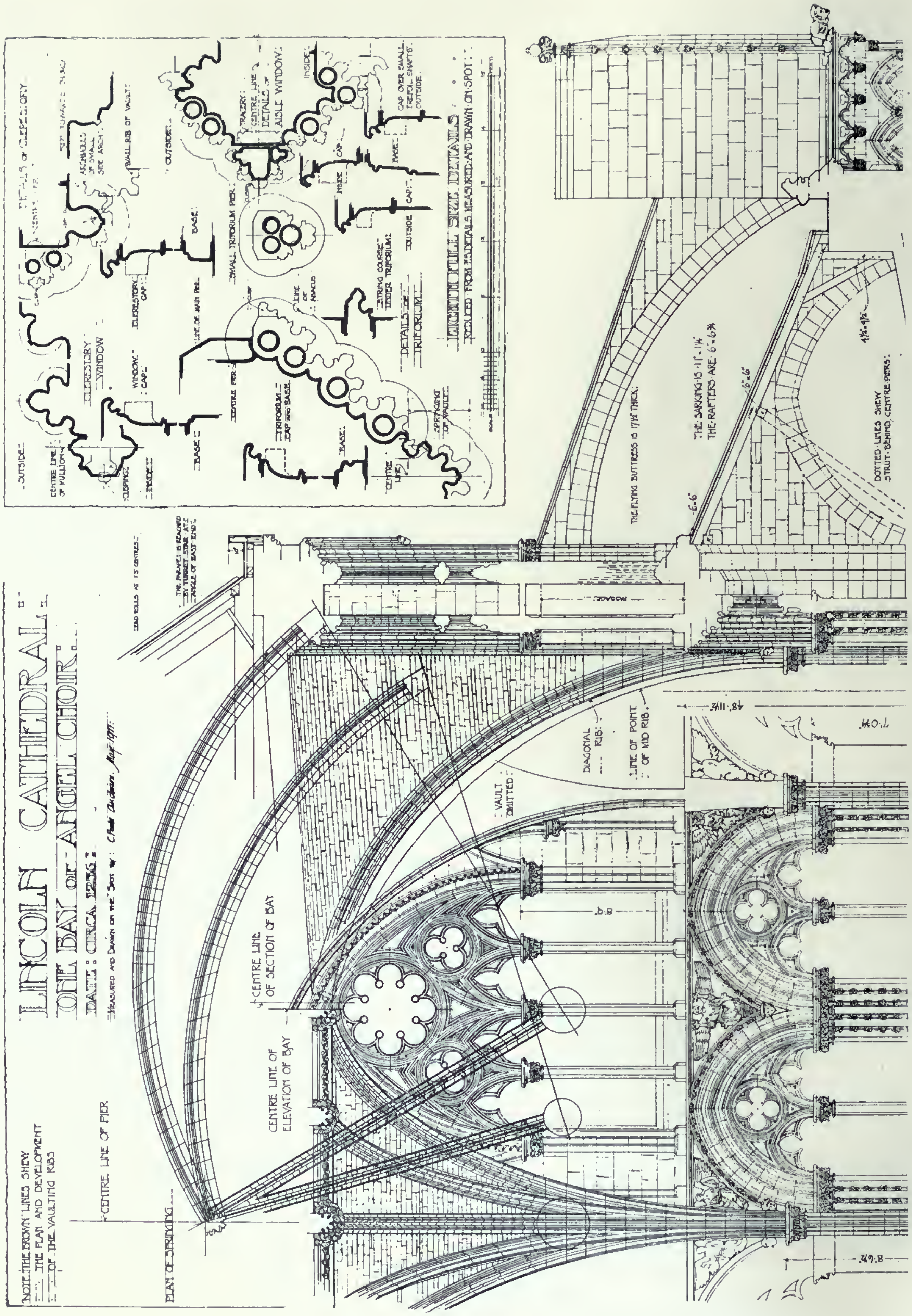
G. K. Chesterton beheld a vision once in a street of the town of Lincoln, and he has told in his inimitable manner how "An optical illusion accidentally revealed to him the strange greatness of Gothic architecture." Because it may impress on you a point of view from which to survey Gothic architecture, a point of view which is largely lost sight of with dire results in these days when we are all crying out for "Life in Architecture," and because it may suggest a new manner in which to look for the spirit of Gothic, I will quote a portion of what Mr. Chesterton said. Approaching Lincoln, he tells us that in the smoky distance he beheld the Cathedral Towers, and in the nearer distance some large furniture vans, which, owing to the fact that a low stone wall cut off their wheels, and to the fact that they resembled in color the surrounding cottages, he actually took for cottages.

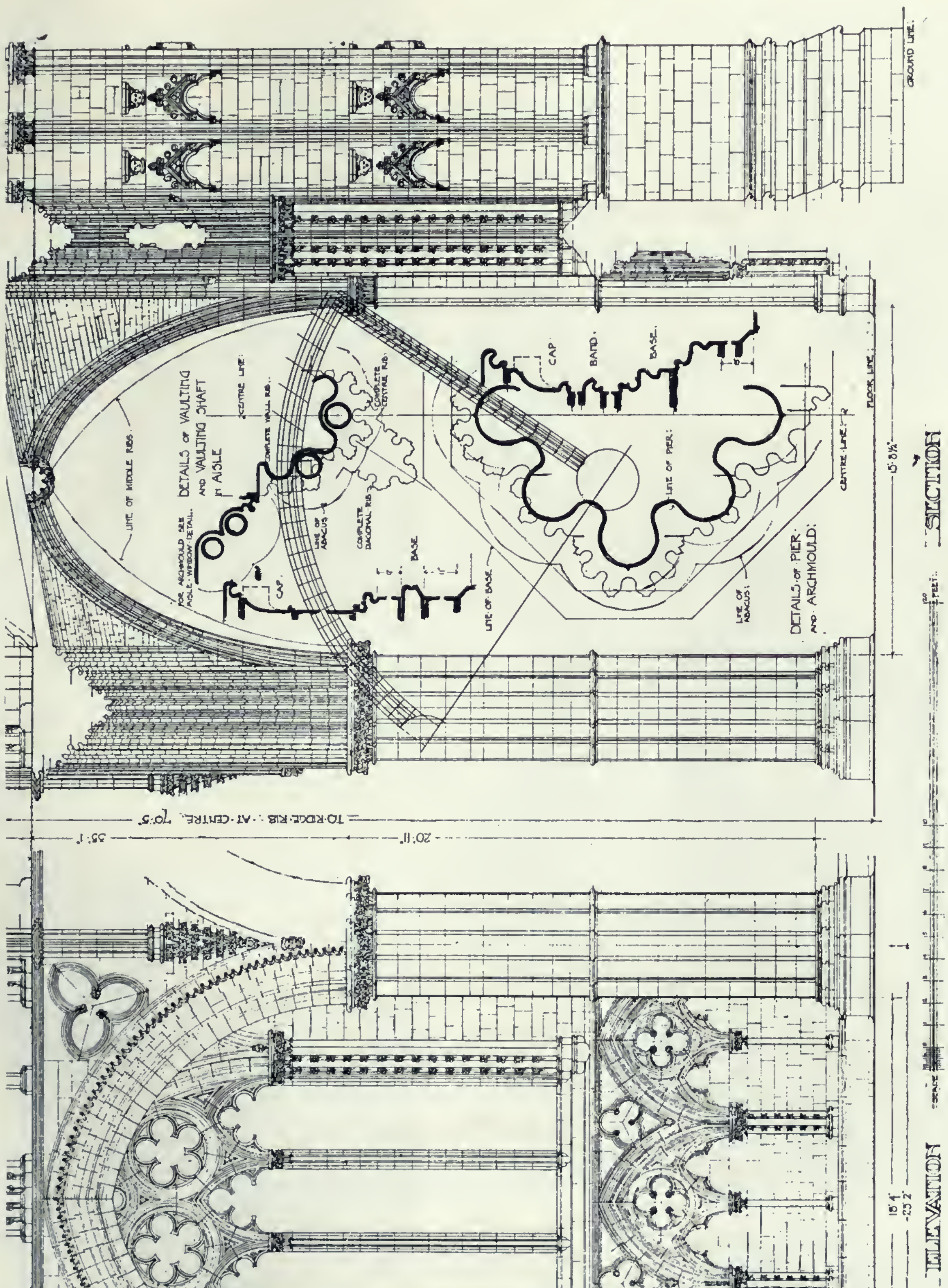


TOWER OF GLOUCESTER CATHEDRAL.

"I had come," he says, "across that interminable Eastern plain which is like the open sea, and all the more so because the one small hill and tower of Lincoln stands up in it like a lighthouse. I had climbed the sharp, crooked streets up to this ecclesiastical citadel; just in front of me was a flourishing and richly colored kitchen garden; beyond that was the low stone wall; beyond that the row of vans that looked like houses; and beyond and above that, straight and swift and dark, light as a flight of birds, and terrible as the Tower of Babel, Lincoln Cathedral seemed to rise out of human sight.

"As I looked at it I asked myself the questions that I have asked here; what was the soul in all those stones? They were varied, but it was not variety; they were solemn, but it was not solemnity; they were farcical, but it was not farce; What is it in them that thrills and soothes a man of our blood and history, that is not there in an Egyptian pyramid or an Indian temple or a Chin-


LINCOLN CATHEDRAL:
ONE BAY OF ANGEL CHOIR:
DATE: CIRCA 1256:
NOTE: THE BROWN LINES SHEW THE PLAN AND DEVELOPMENT OF THE VAULTING RIBS
CENTRE LINE OF PIER
PLAN OF SPRINGING
CENTRE LINE OF ELEVATION OF BAY
CENTRE LINE OF SECTION OF BAY
VAULT OMITTED
DIAGONAL RIB
LINE OF POINT OF MID RIB
THE FLYING BUTTRESS IS 1'7½" THICK
THE SARKING IS 1"-1¼"
THE RAPTERS ARE 6"-6¾"
DOTTED LINES SHEW STRUT BEHIND CENTRE PIERS
EIGHTH FULL SIZE DETAILS
REDUCED FROM FULL SIZE DETAILS MEASURED AND DRAWN ON SPOT
DETAILS OF TRIFORIUM
CLERESTORY WINDOW
DETAILS OF AISLE WINDOW
SMALL TRIFORIUM PIER
PASSAGE



LINCOLN CATHEDRAL, ENGLAND—DETAIL OF ONE BAY OF ANGEL CHOIR.

(The preceding page is a part of this detail.)

MEASURED AND DRAWN BY C. PEAKF ANDERSON.

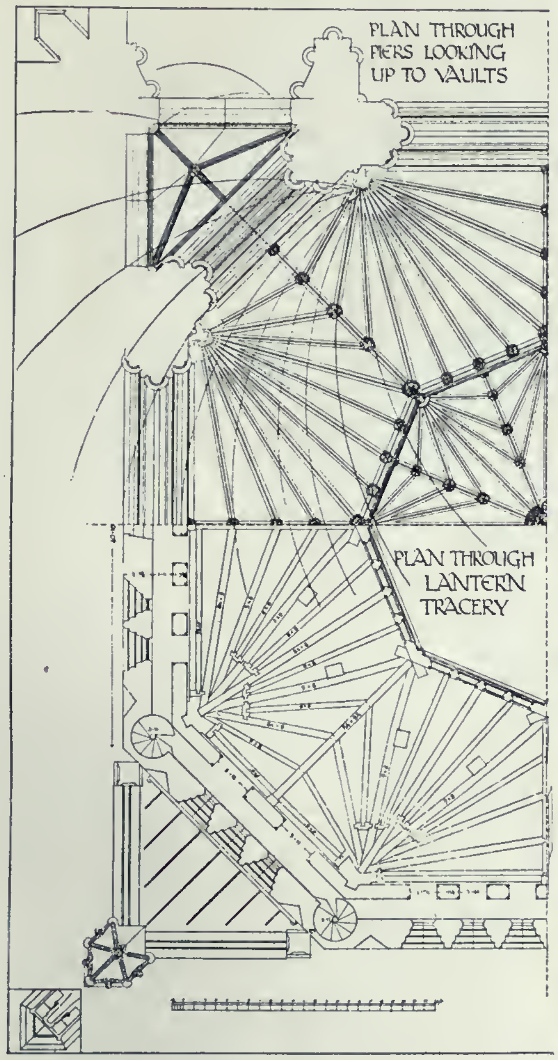
DETAILS OF
LINCOLN CATHEDRAL,
ENGLAND.

FROM LEFT TO RIGHT:—

TRIFORIUM ARCADE;
WALL ARCADING;
CARVED CAPITAL;
CHAPTER HOUSE;
SIDE CHAPEL;
EXTERIOR ARCADING.

ese pagoda? All of a sudden the vans I had mistaken for cottages began to move away to the left. In the start this gave to my eye and mind I really fancied that the Cathedral was moving towards the right. The two huge towers seemed to start striding across the plain like the two legs of some giant whose body was covered with the clouds. Then I saw what it was.

"The truth about Gothic is, first, that it is alive, and second, that it is on the march. It is the Church Militant; it is the only fighting architecture. All its spires are spears at rest; and all



PLAN OF OCTAGON.

ELY CATHEDRAL. VIEW OF OCTAGON.

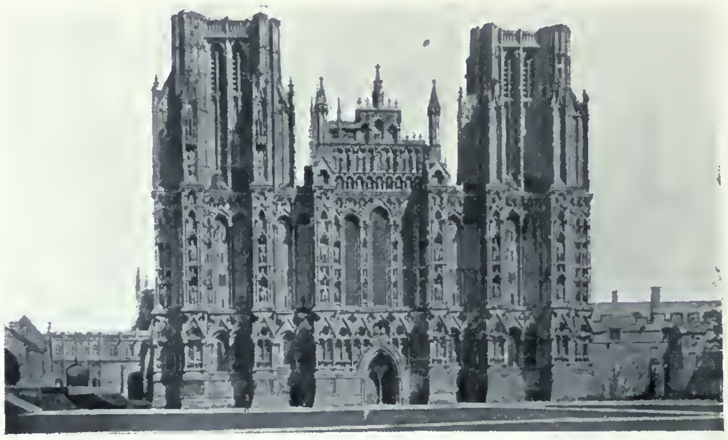
its stones are stones asleep in a catapult. In that instant of illusion, I could hear the arches clash like swords as they crossed each other. The mighty and numberless columns seemed to go swinging by like the huge feet of imperial elephants. The graven foliage wreathed and blew like banners going into battle; the silence was deafening with all the mingled noises of a military march; the great bell shook down, as the organ shook up, its thunder. The thirsty-throated gargoyles shouted like trumpets from all the roofs and pinnacles as they passed; and from the lectern in the core of the cathedral the eagle of the awful evangelist clashed his wings of brass."

Not so, however, was my vision of this Cathedral Church, for I saw it first from the great straight Roman road that runs to the north from Lincoln; saw it first as the evening sun was sinking in the west, as the grey mists were beginning to creep over the marshes, dimming the distances, and hiding the lower slopes of Lincoln hill until the great church seemed some ghost fortress of the twilight; saw it first an ethereal city, floating in the limpid air. As we neared the town, and the mists grew thinner so that we could discern the red tiled houses that clustered, rank upon rank of them, about the slopes of the hill, and the great dark towers that seemed to buttress back against the East—such was the sharp perspective as we stood below; I saw it not "striding with clash of arms," but silent, and stern, even as some giant sentinal on guard above a sleeping encampment, awake but motionless, I saw these guardian towers of Christendom watching the encrimsoned west where the pagan god, the sun, had sunk behind dark battlements of cloud.

For it matters little to you whether you see Gothic architecture as "clad in armor with

ELY CATHEDRAL.

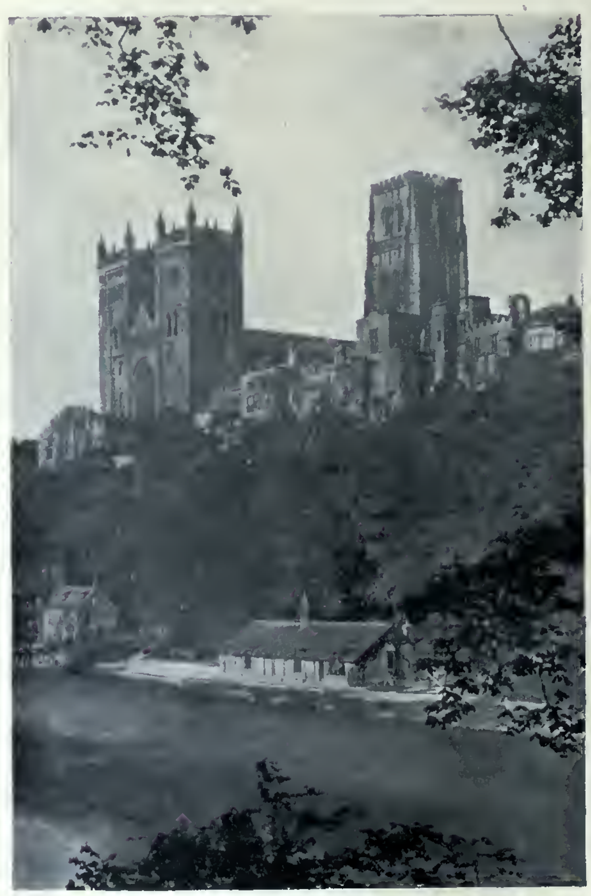
LICHFIELD CATHEDRAL.



WELLS CATHEDRAL.

GOTHIC ECCLESIASTICAL WORK IN ENGLAND.

CHESTER CATHEDRAL.



DURHAM CATHEDRAL.

WORCESTER CATHEDRAL.

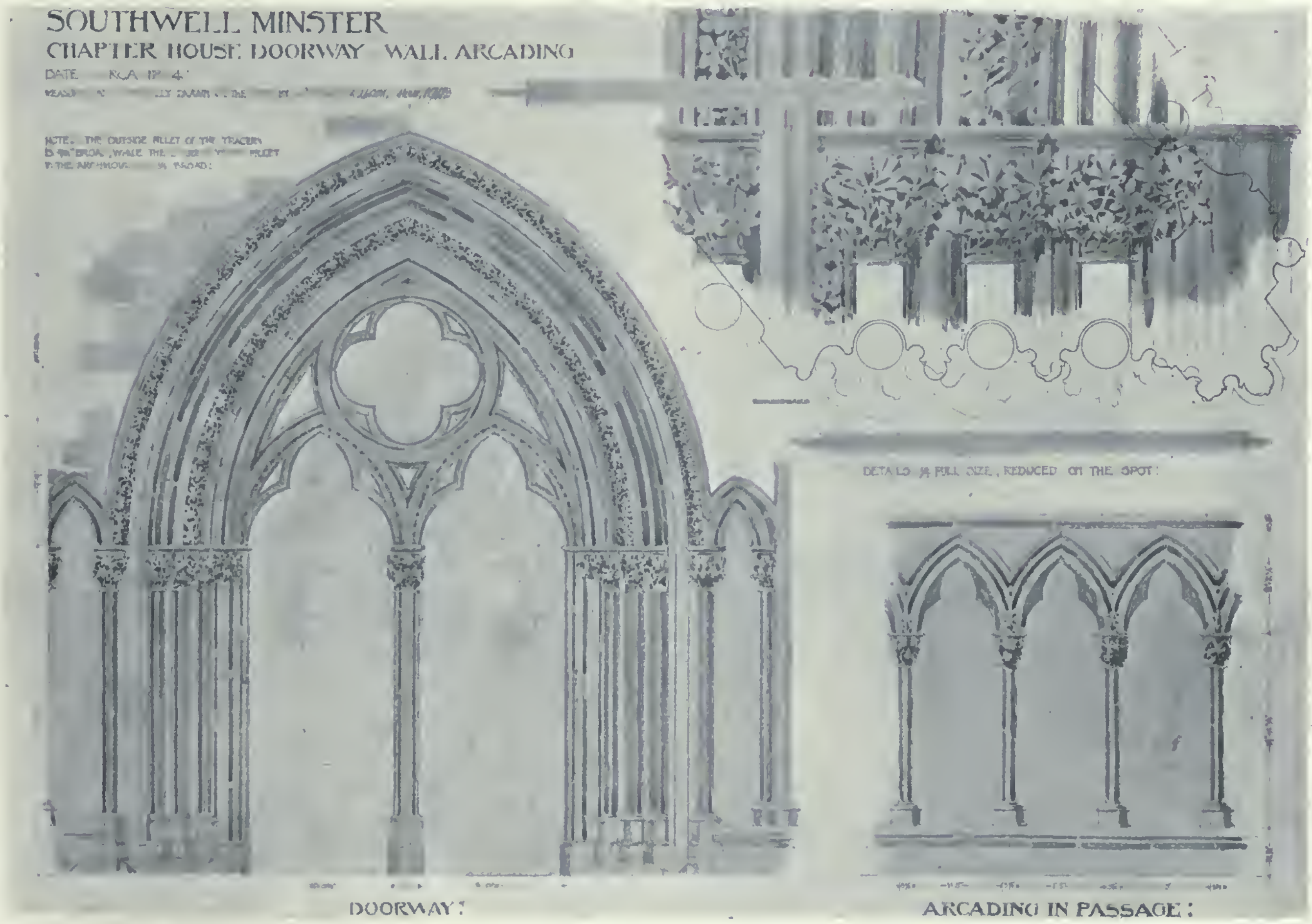
spears at rest" or couched for attack; it matters not whether "the gargoyles shout" for you, or "ghost bells toll" for you, or whether "graven foliage wreaths and blows like banners going into battle" to your entranced sight; it matters not though you *never* see it "stride across the Plain" with great imperial feet, so you see it as it certainly was to those men who builded it—a putting into tangible form of all those aspirations around whose feet men dwelt secure while heathen deities still danced in forest glades, and Pan still piped by the sequestered waters.

Thus it was, then, that we came by the Roman road to Lincoln, and thus it was we saw it in the twilight almost a city of enchantment, certainly of dream-crowned towers.

The morning showed us the church we had come to see as we then dimly guessed it to be, and as further knowledge proved it—the finest of all the Cathedrals in England. For if Durham be majestic, yet its Norman is rather Romanesque than Gothic. If Salisbury's exterior, set as it is amongst its stately elms, is one of the fairest sights in England, yet its interior is no less than harsh. Canterbury, Ely and Gloucester have lovely towers; and Gloucester lovely cloisters, and Peterborough and Wells, great west fronts, yet Lincoln is amongst them as a queen among fair women; she has a completeness that the others lack. From the great Norman archways in her west front to the east window in her "Angel" choir, she is an epitome of the greatest Gothic periods.

It was most especially to study the justly famous "Angel" choir that we had come to Lincoln. This choir is reckoned by many to be the finest piece of early English work in England. We felt that we could do no better than completely measure a bay of it, and the resultant drawing, and knowledge gained we count more than adequate reward for the days of study.

While Lincoln is, as I have said, an epitome of Gothic, and a perfect mine of interesting work, space only permits that I mention the choir screen with its lovely carved diaper work; the great chapter house, sixty feet in diameter; and the cloisters; or do more than touch on the beauties of the exterior: The famous "Galilee" porch to the south transept, the south-east door, or the group of south-east transept and central tower. I must mention, however, that the Cathedral is built of a warm yellow stone which has made it the delight of succeeding generations of water-color artists, and note, both inside and out, the admirable use of Purbeck marble, that most perfect material for columns and slender shafts, to great advantage. If Lincoln Cathedral be like a rich man who has many flocks, there is, not far distant from it a cathedral church which is indeed the poor man who has but one ewe lamb, a lamb, for-



CLOISTERS IN GLOUCESTER CATHEDRAL.

tunately in this case, never to be taken from it.

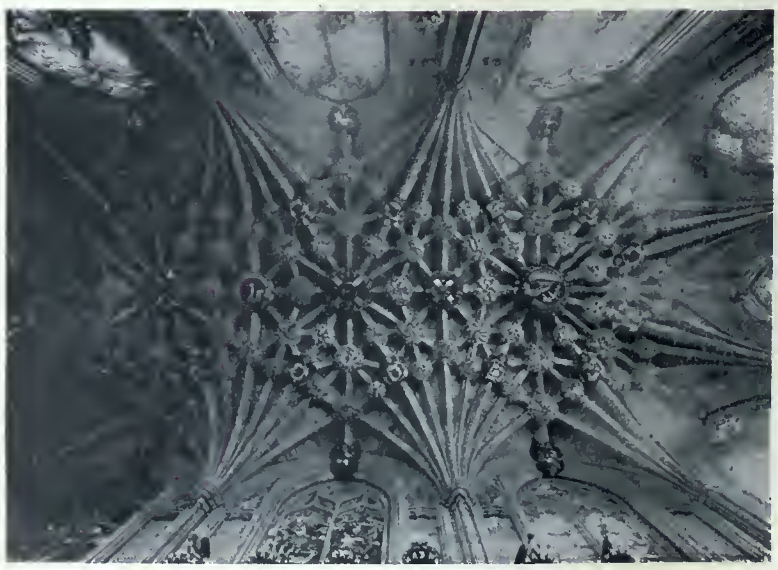
Southwell Cathedral became a cathedral only in 1884, A.D., but the church itself is of Norman date, and it is out of a nave frankly heavy and uninteresting that you pass to a chapter house that is one among the glories of all Gothic work. The doorway to this chapter house is the most perfect example of the "naturalistic" phase of "decorated" work in England. The chapter house itself was built around 1294 A.D., and is one of the two in England that have no central pillar, the other being York where the vault is of wood; here, however, the vault is of stone as is the whole chapter house, and we begin to wonder, as we look at these stone caps of the doorway which are all, be it known, of one large stone, whether any advance in stone carving be possible on these thin stems which rival the work of Grinling Gibbons. The student will leave Southwell, as we did, well satisfied that the digression to this out-of-the-world little cathedral has been amply repaid.

To mention York brings me back to the most mediaeval city in Britain, to the city in which its cathedral church seems most at home. Its walls, its gates, its old-world churches, and houses all standing in narrow old-world thoroughfares, its famous street, "The Shambles," known to artists probably the whole world over, all create an atmosphere for, and lead up to and enhance the interest of its wonderful cathedral.

The cathedral itself is a storehouse of fine design. Its wonderful windows are well known, its east window, which is the second largest in England, its west window which rivals that at Carlisle in beauty, and the "Five Sisters," in the north transept, which stand for all that is most sublime in pure Gothic architecture, and which have been, as all fine work must sometime be, the inspiration of artists in other spheres; D. T. Cameron, to mention but one, has found in them inspiration for his etcher's needle. All these windows retain their original glass, a circumstance which aids not a little the beauty of the dignified and spacious interior of this the largest English cathedral.

To be in York means to be in the centre of a great Gothic district; Beverley Minster with its west towers which outrival those of York, Hull, Hedon and Patrington on the estuary of the Humber; Selby Abbey, restored since the unfortunate fire of some years ago; Ripon, Knavesborough, Fountains, Rievaulx, Jervaulx, Byland and Guisborough are all near York and all well worthy of study. While the drawings of Skelton church, just outside York, of the lovely wooden lectern in All Saints Pavement, and of the Norman porch of St. Margaret's church, both in York itself, show what a wealth of interest even the smallest churches contain.

As far as ecclesiastical work is concerned, England may be divided roughly into four Gothic districts. The north we have touched on; it stretches northwards from Lincoln and includes York, Durham and Newcastle, and westwards to Carlisle and Furness Abbey. The central group contains the cathedrals of Lichfield and Oxford, Peterborough, Ely and Norwich, and might well be taken as reaching as far



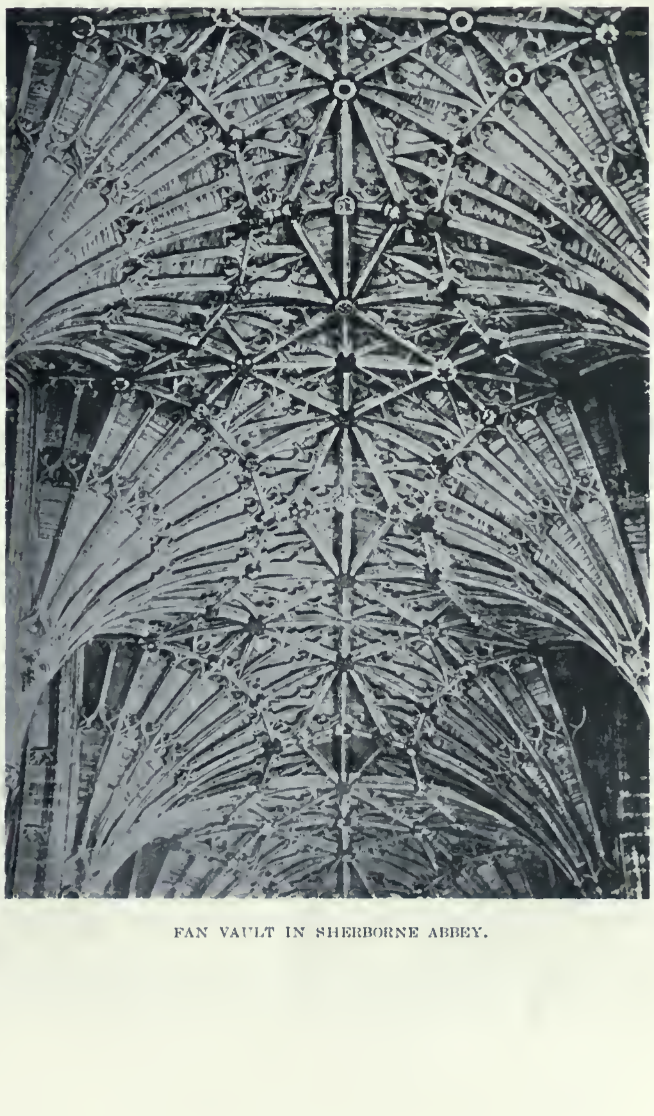
CEILING VAULTING, THISTLE CHAPEL, EDINBURGH.

CLOISTERS IN WELLS CATHEDRAL.

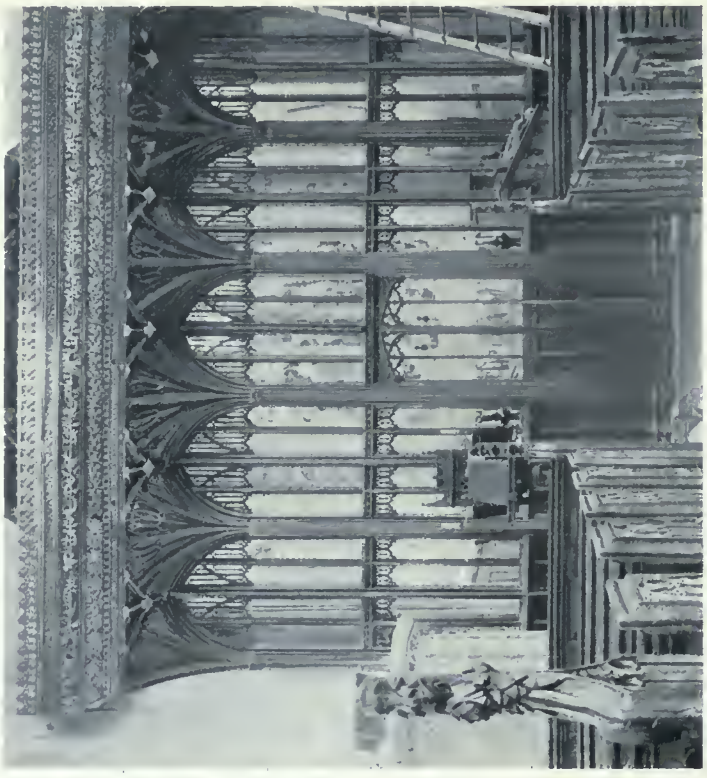
south as London. This great district contains numberless churches of note such as Hettering, Oundle and Heckington in the centre; Warwick, Stratford-on-Avon, Burford and Fairford in the west; and the great group of East Anglian churches: King's Lynn, Fakenham, Walsingham, Swaffham, Aylsham, North Walsham, Wymondham, Bury St. Edmunds and Lavenham in the east. This is the district, moreover, of the painted rood screen and hammer-beam roof.

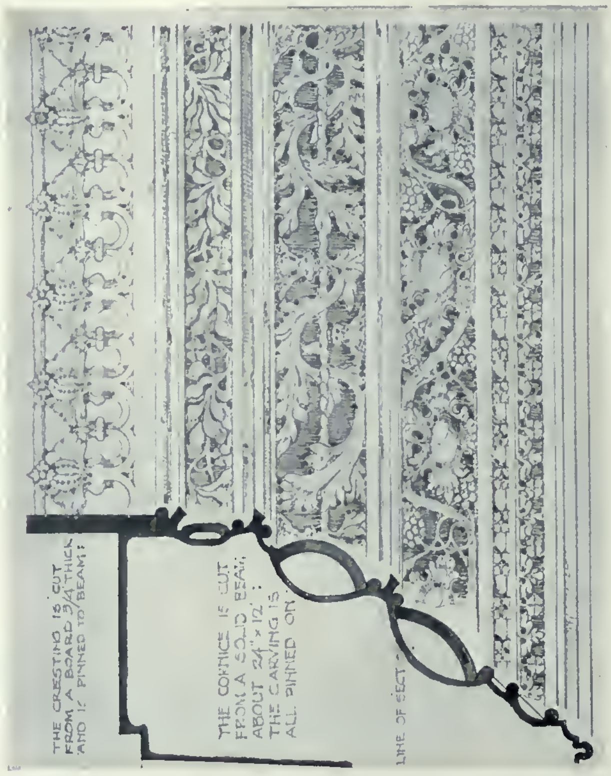
The south might be taken as stretching from London to the English channel, and from Canterbury in the east to Christ Church in the west, and contains the cathedral churches of Salisbury, Winchester, Chichester and Rochester, and all the wealth of small churches of Kent, Surrey and Sussex. Last, but by no means least, there is the great western school of Gothic, and it is with this work, that, for many reasons, I personally spent most time. Here the work is more intimate than in any other district in England. And here are cathedrals which, while indeed not comparable with the great cathedrals of the north and east as regards bulk and general dignity of mass, yet bear comparison with any in England for general charm and interest of detail. Here are Gloucester and Worcester with the Abbeys of Tewkesbury, Pershore, Malvern and Tuitem. Here are the cathedrals of Wales, Llandaff and St. Davids, and the few lovely little Welsh screens. Here is the parish church work of Somerset, of like date, and quite comparable with the work of East Anglia. This work centres around Wells Cathedral and includes such churches as St. Cuthbert's Church, Wells, Glastonbury, Bath, Bristol, Langport, Muchelney, High Ham, Yeovil, Sherborne, Taunton and Minehead, and a host of smaller and less known churches which, however, are full of interest to the student. And here finally is Exeter cathedral, with one of the most charming interiors in England, and a centre of interest for Devonshire, the county whose church work suffered least during the dangerous period of the Reformation, and which, as a result, contains probably the finest collection of Gothic church wood-work in the world.

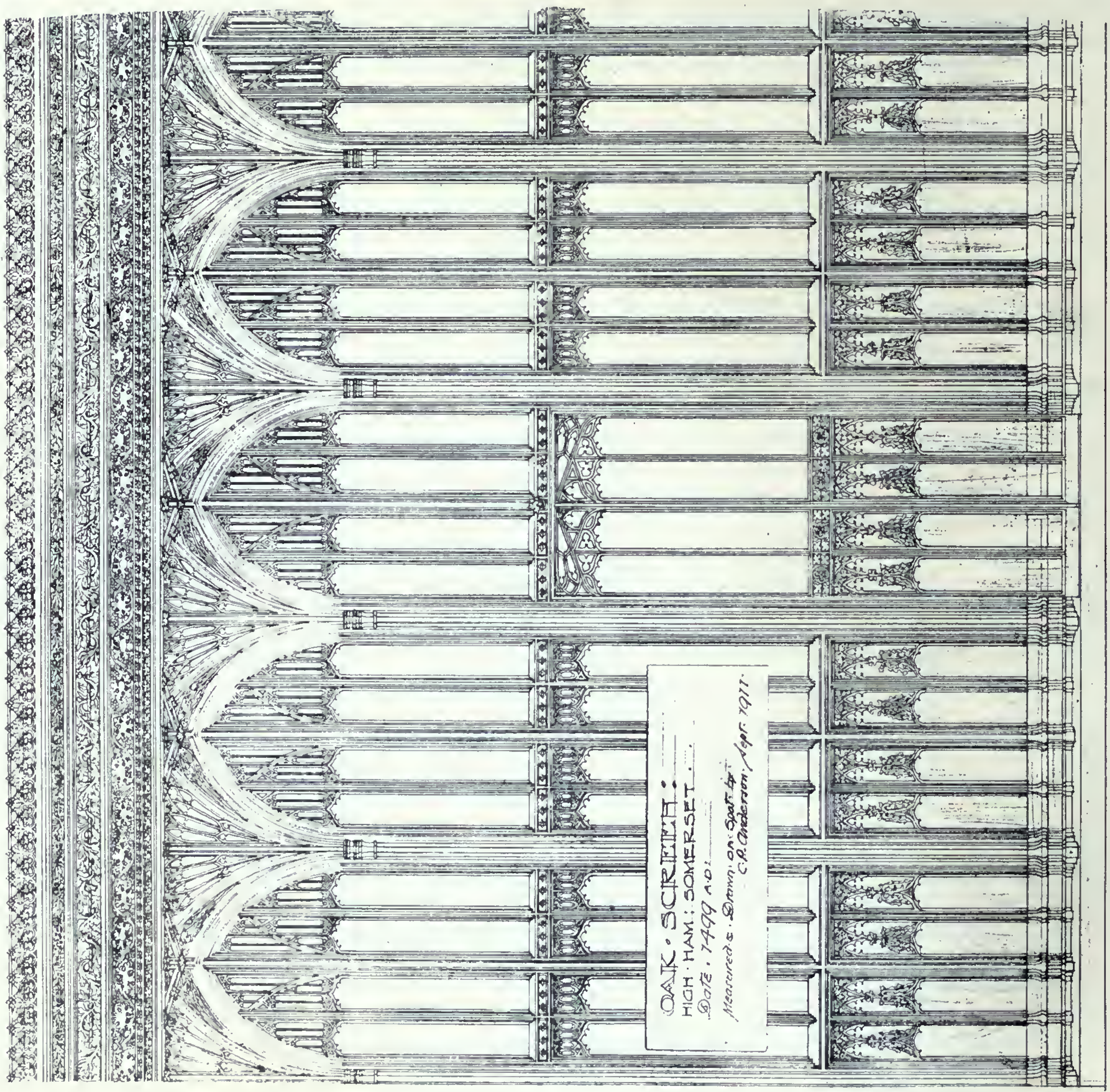
Thus then, in a most hasty manner, I have reviewed the Gothic Ecclesiastical Work of England. To the Canadian student the division of English Gothic work into groups may at first seen unnecessary, but once over there in England—and I cannot insist too strongly that Gothic work must be seen and studied "on the spot" if any real knowledge of it is to be attained, the student will find so much more than he anticipated, that such a division of the work to be studied will help him to "find" himself. And as the work was originally done by different schools, belonging roughly to the districts I have mapped out, the student will, if he studies



FAN VAULT IN SHERBORNE ABBEY.







DETAILS OF OAK SCREEN AT HIGH HAM, SOMERSET, ENGLAND.

by these districts, get much nearer to that secret of much of the charm of English Gothic work—its complete sympathy with its surroundings.

This brings me to my last point, a point which I emphasized in the former paper on Domestic Work in England. It is the question of materials.

In church work we find the builder less bound to the use of local materials than he was in domestic work, for the church possessed funds which the private man did not, and so was able to bring desired materials from a greater distance. This explains the presence of Purbeck marble in northern England, a stone quarried in the very south of England; it explains the presence of French caen stone at Chichester, and of Somerset Oolite at Christ Church, Dublin; moreover, by means of the funds at her disposal a church could bring a group of masons, or as they were then called, a Guild of Craftsmen, from one part of the country to another. It is told, in this connection, that a Bishop of Canterbury sent to a brother Bishop in Elgin, five hundred miles away, the masons who built Elgin Cathedral; and this greater freedom explains that great uniformity which distinguishes church work in comparison with domestic work in England.

But while noting these lesser facts the student must never lose sight of that greater thought of Gothic work in England, and especially of good Gothic work anywhere, be it ecclesiastical or domestic, that one great all important truth of Gothic architecture—that it is essentially an architecture of materials. This is that for which we need to go back to mediaeval work more than for anything else to-day, to learn anew the first uses of materials, and to learn aright of their possibilities and of their limitations; for only through sympathy with our materials are we in sympathy with the true life spirit of architecture.

DURHAM and Ely Cathedrals are often classed together in histories of architecture. Durham, however, is a particularly magnificent example of Norman work, a most remarkable specimen of a war-like period. Certain small contemporary churches in England may surpass Durham Cathedral in richness and ingenuity of detail; but to those who prefer the stern grandeur of the Norman style, Durham Cathedral in its bold simplicity of conception stands unrivaled.

BEAUCHAMP TOMB, WARWICK.

WEST DOORWAY, ROCHESTER CATHEDRAL.

Ely Cathedral, though it is of Norman or Early English architecture mainly, does not have, as a whole, the purely Romanesque character of Durham. While the nave, transepts, and West Tower are Norman, and the beautiful Galilee Porch—"a perfect gem of exquisite architecture," "the most gorgeous porch of this style in existence"—is Early English, the remaining parts of the buildings are Gothic or Renaissance architecture. But as so much of the Norman and Early English work still stands it is of exceptional interest to the antiquarian or the lover of early architecture. To some it may be of even greater interest than Durham Cathedral, for it represents both Norman and Gothic architecture of a very remarkable type.

The distinguishing feature of Ely, however, is its great octagon and lantern over the crossing of nave and transept. In 1322 the great tower, which occupied this part of the cathedral, fell, destroying also three bays of the choir. No one was better fitted to repair these damages than Allan of Walsingham, "The Flower of Craftsmen." That he was singularly adapted for such a stupendous undertaking is evidenced by the remarkable result achieved.

The traveler in North Germany will remember the lofty and imposing Romanesque cathedrals and churches, with bold steeples and high towers which are so characteristic of that country's early architecture. Often four, or even five, lofty pinnacles stand pointing heavenward, but they are almost invariably dominated by an octagonal tower of great dignity, marking the crossing. The cathedrals of Osnabruck, Limburg-on-Lahn, and Mayence; the minster at Bonn; and the churches of Gelnhausen, Laach, Sinzig, and St. Quirinus at Neuss, with many others, well illustrate their "National Thirteenth Century" style. It almost seems as if "The Flower of Craftsmen" must have had such structures in mind; but his lantern and its supporting octagon here at Ely far surpassed the early German examples—if they were his examples. Fergusson says that the roof of the octagon is the only Gothic dome in existence, and certainly it is unique in England. The whole is of both wood and stone construction.

The nave and transepts, of the severest type, are full of dignity and beauty. Here is Norman architecture indeed at its best. The simple and massive piers, the cushion capitals of absolute plainness, the early work in the transepts, that oldest part of the present edifice, all give the one impression that is ever present in such a cathedral; that is, the peculiar mystery and grandeur of Norman architecture. Scholars have often conjectured what the result might have been if Norman architecture had ever reached its full consummation. The Gothic, into which it merged, has a marvelous beauty of its own, a grace and an inspiration that are unequaled; but Gothic buildings lack some of the quality of mystery, and they have not to such a degree that kingly majesty.—*A. Curtiss.*

ARCADE IN NORTH AISLE OF LINCOLN CATHEDRAL.

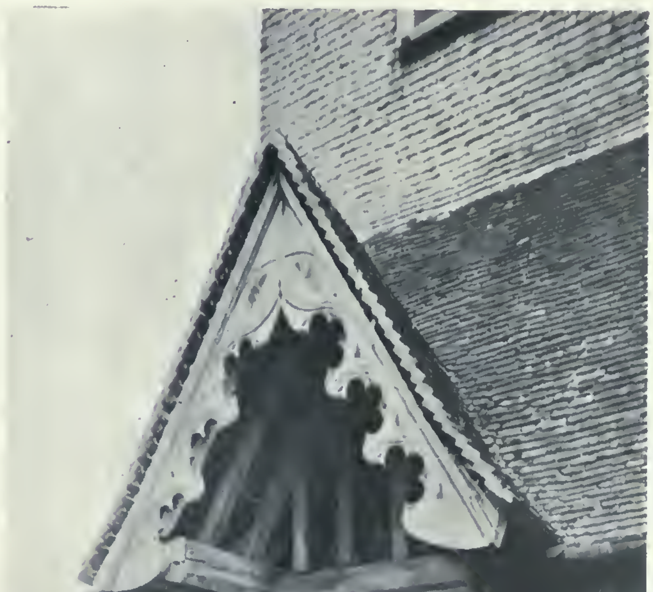
CAPITALS IN SOUTHWELL MINSTER.

THE cathedral of St. Cuthbert, Durham, rising immediately from the steep wooded bank of the river, is surpassed in beauty by no other English cathedral. Its foundation arose from the fact that here, after wandering far over the north of England, the monks of Lindisfarne rested with the body of St. Cuthbert, which they had removed from its tomb in fear of Danish invaders. This was in 995. Soon afterwards a church was built by Bishop Ealdhune, and the see was removed hither from Lindisfarne. The peninsula was called Dunholme (Hill Island) which in Norman times was softened to Duresme, whence Durham. It is said that the monks of Lindisfarne, knowing the name of the place where they should find retreat, but ignorant of its situation, were guided hither by a woman searching for her cow, and the bas-relief of a cow on the north wall of the church, commemorates this incident. In 1093 Ealdhune's church was rebuilt by Bishop Carilef, who changed the early establishment of married priests into a Benedictine abbey. The grand Norman building in which his designs were carried out remains with numerous additions. The stone vaulting is particularly noteworthy. The choir contains the earliest work, but Carilef's eastern apses made way for the exquisite chapel of the Nine Altars, with its rose windows and beautiful carving, or late Early English workmanship. The nave is massive Norman, with round pillars ornamented with surface-carving of various patterns. The western towers are Norman with an Early English superstructure. The famous Galilee chapel, of the finest late Norman work, projects from the west end. The central tower is a lofty and graceful perpendicular structure. Other details especially worthy of notice are the altar screen of *c.* 1380, and the curious semi-classical font-cover of the 17th century. There is a fine sanctuary-knocker on the north door. The cloisters are of the early part of the 15th century. The chapter-house is a modern restoration of the original Norman structure, a very fine example, which was destroyed by James Wyatt *c.* 1796, in the course of restoration of which much was ill-judged. The cathedral library, formerly the dormitory and refectories of the abbey, contains a number of curious and interesting printed books and MSS., and the portable altar, vestments and other relics found in St. Cuthbert's grave. The Galilee contains the supposed remains of the Venerable Bede. The total length of the cathedral within is 496½ ft., the greatest height within (except the lantern) 74½ ft., and the height of the central tower 218 ft.

WORCESTER is in Worcestershire, a midland county, 120 miles from London. Vigorna, the Roman name, was mispronounced by the Saxons Wigerna. Cæster, meaning a fort, was added, hence Worcester.

Archbishop Theodore advised the founding of a see at Worcester in 673, but it was not carried into effect till 780. The building was finished by Oswald in 983; rebuilt in 1100 by Bishop Wulfstan. It is a cathedral of the New Foundation, and is dedicated to the honor of the Blessed Virgin, St. Peter, and the Holy Confessors, Oswald and Wulfstan. Its dimensions are: length, 394 feet; width at transept, 126 feet; height of central tower, 196 feet.

There are few cathedrals in which so fine an unbroken vista from end to end can be obtained. The church is noted for its admirable proportions. The crypt is very old and curious, and is



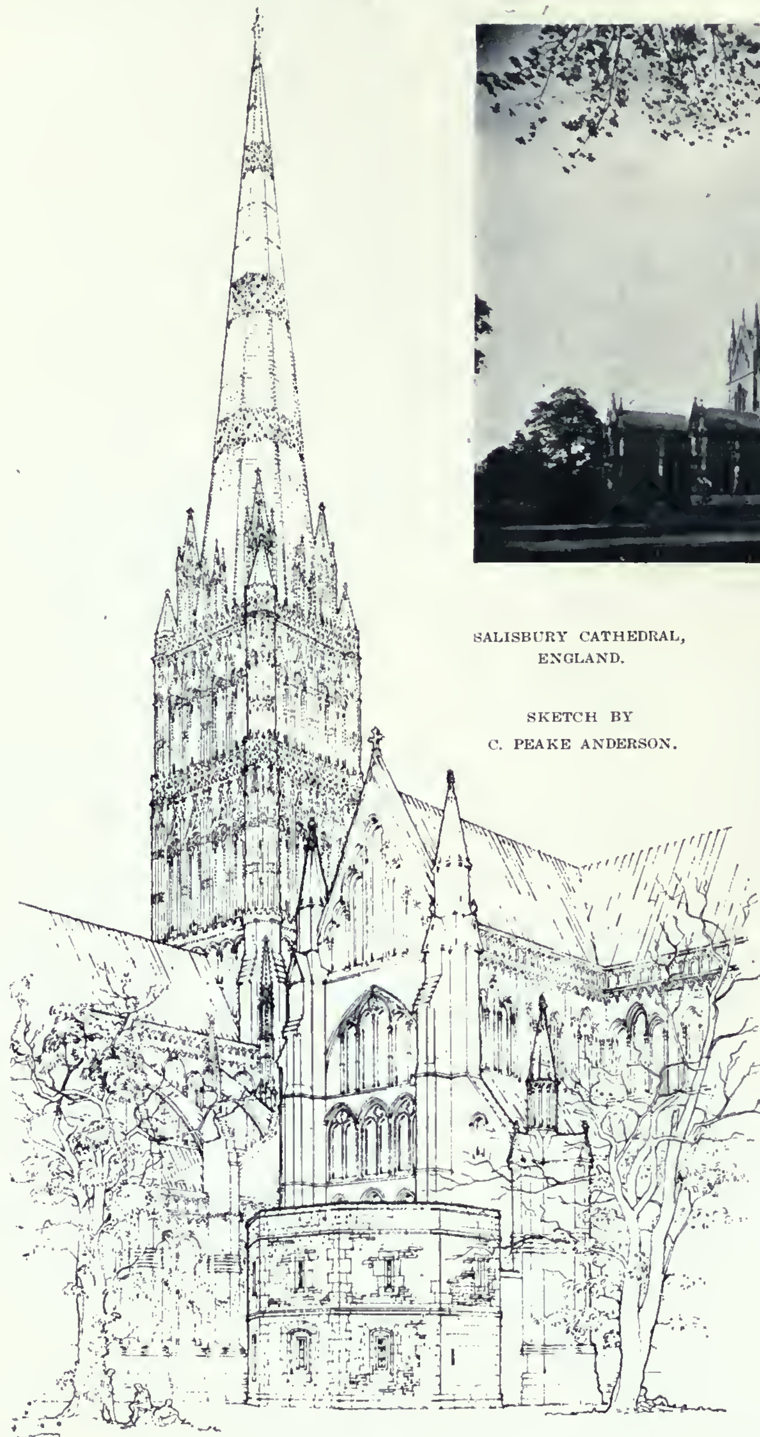
PORCH OF HIGH HOLDEN CHURCH, KENT.

one of the chief glories, not only of this cathedral, but of all English architecture. It has been compared to the mosque of Cordova in the impressive solemnity of its effect.

* * *

Chester is in Cheshire, in the western part of England, 180 miles northwest of London, and sixteen miles from Liverpool. Chester meant *the* chester, the great camp, Chester par excellence. Winchester, Chichester, Rochester, Dorchester, Silchester, Gloucester, Worcester, and Leicester were all Roman camps or forts, but of less importance. Cheshire has the same derivation.

Tradition has it that a Druidical temple once stood on the site of the cathedral, followed by a temple of Apollos. The first Christian foundation was a nunnery for St. Werbergh, the daughter of the Mercian king. Then it became an abbey church, which was at first dedicated to St. Werbergh, but was rededicated by order of Henry VIII. to Christ and the Blessed Virgin. It is a cathedral of the New Foundation. Its dimensions are: length, 350 feet; width at transept, 200 feet; height of tower, 127 feet.



SALISBURY CATHEDRAL, ENGLAND.

SKETCH BY C. PEAKE ANDERSON.

The west front is a singular and beautiful composition, but crowded by the king's school, which is built against one of the flanking turrets. The turrets are octagonal, and have belts of panelled tracery and embattled parapets; the doorway and the large window above it are in the modern perpendicular style. The south transept is unique and entirely different from the north side; it was long used as the parish church of St. Oswald, and is as large as the choir, and almost as large as the nave.—*M. J. Taber.*

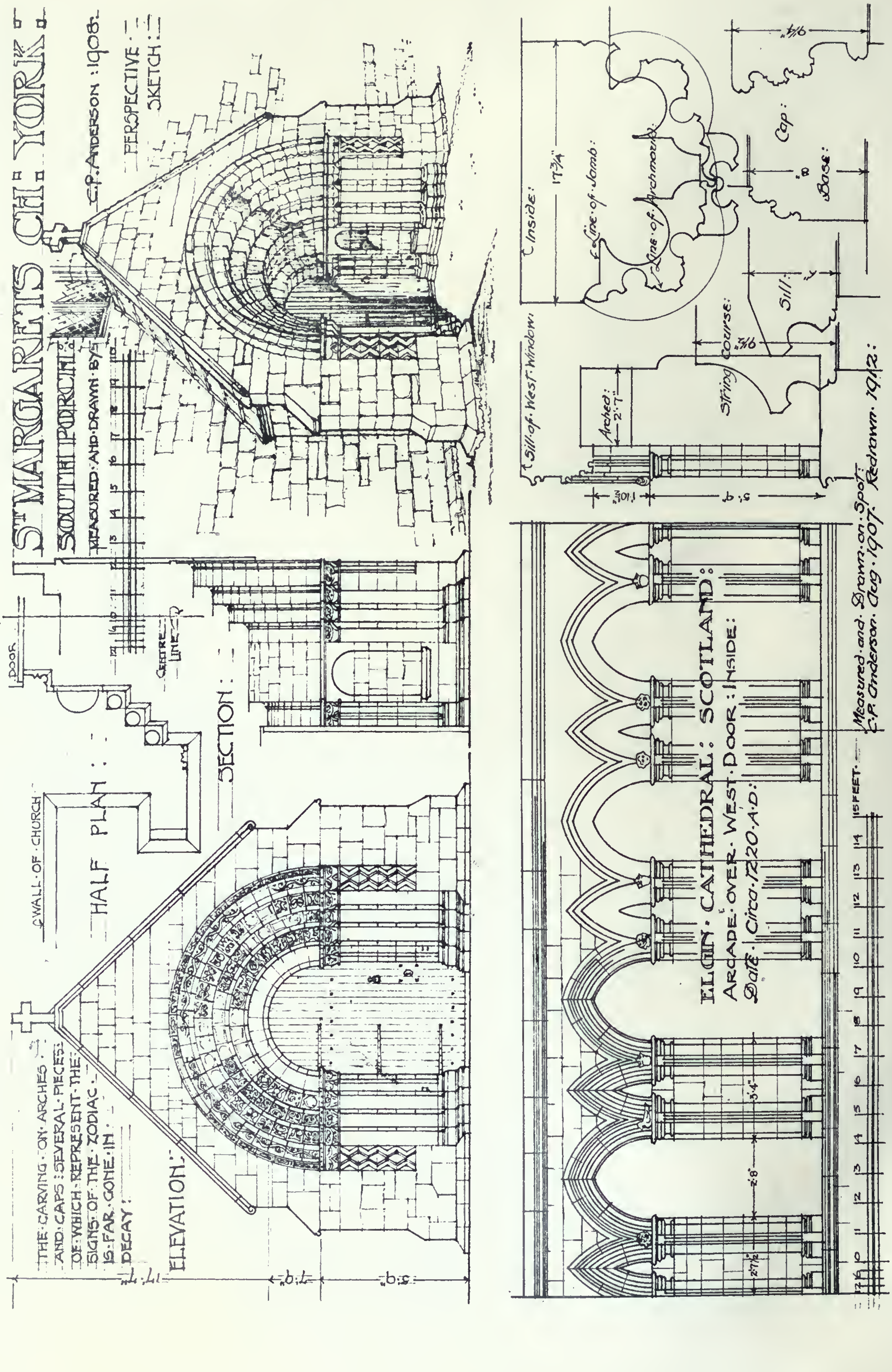
LICHFIELD has been a bishop's see since Anglo - Saxon times, and among its earliest bishops was St. Chad, who advanced Christianity in England. For a short period Lichfield boasted an archbishop, during the reign of Offa, king of Mercia, who persuaded the Pope to grant his kingdom this honor. No trace of any Anglo-Saxon building is left, and of the Norman church that was next erected only the west part of the choir remains. The present cathedral, built in the Early English style of Gothic, was commenced about 1200, and was not finished until 1325, builders being employed all the time. Though numbered among the smaller cathedrals, Lichfield is very beautiful, possessing a great charm in the ruddiness of the stone used in its construction. Its most striking features are the three graceful spires, the sculptured west front, and the large Lady Chapel. Owing, unfortunately, to its being fortified, the cathedral suffered much damage when besieged by the Roundheads during the Civil War. Windows and statues were broken, brass stripped from the tombs, registers burned, but the worst calamity was the destruction of the central tower. After the Restoration the cathedral was carefully repaired, greatly due to the efforts of good Bishop Hacket, who spent his time and money upon the work. The central spire was rebuilt by Wren.

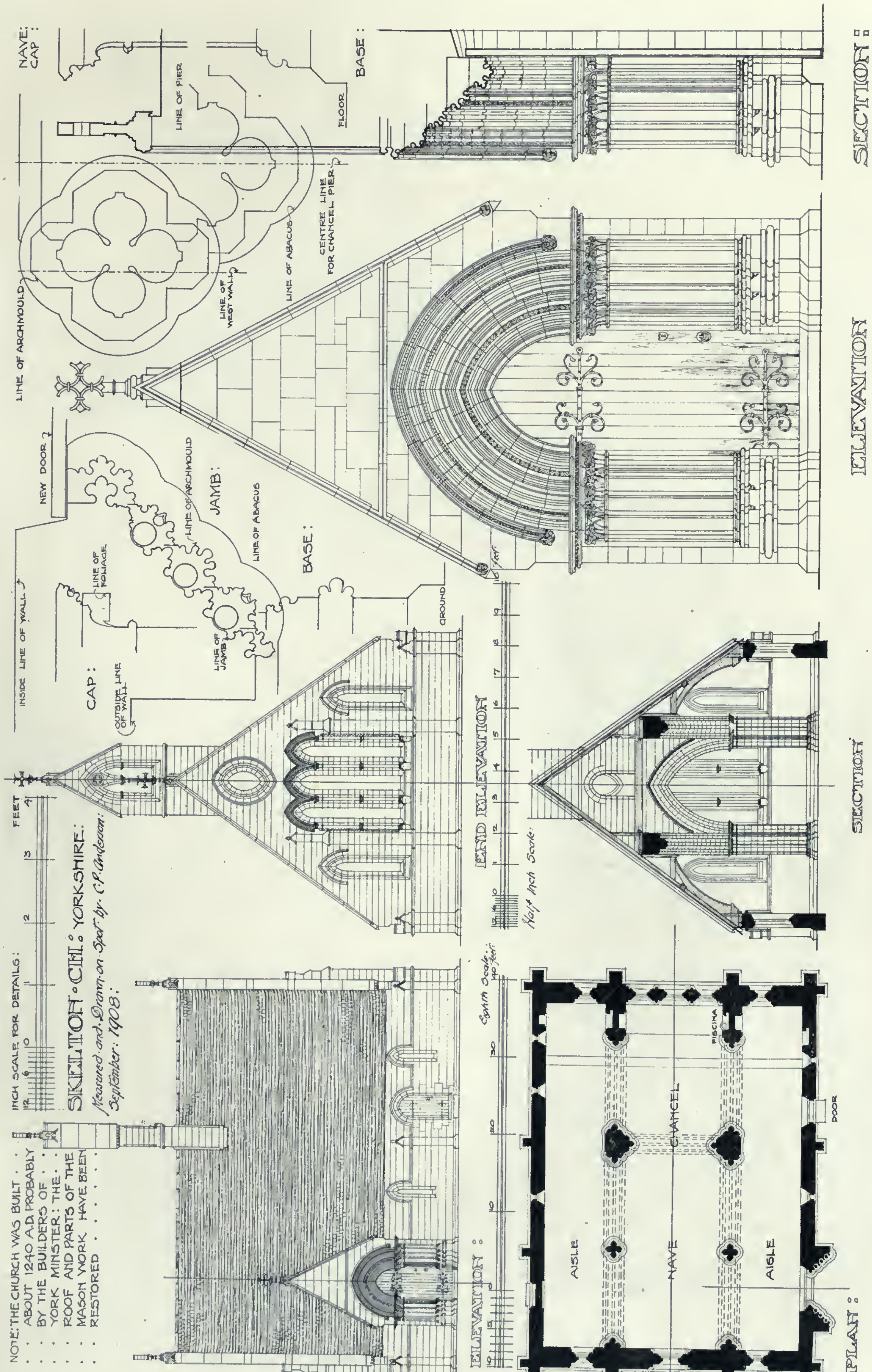
* * *

Wells is essentially an ecclesiastical town. It has no history of its own, no great family has ever lived there, and it has no manufactures—it has simply grown up round the cathedral. For these reasons the quiet little Somersetshire town has preserved much of its antiquity and fascination. The presence of the natural wells, which are still to be found in the gardens of the Bishop's Palace, probably induced King Ina in 704 to found a college of secular canons. Here a monastery grew, and subsequently became a bishop's see. John de Villula transferred his seat to Bath in (*circa*) 1092, and in 1139 the title was altered to Bishop of Bath and Wells. Wells is one of the smallest of the English cathedrals, and is in many ways the most beautiful. The clear space in front emphasizes the glorious way in which the three massive towers harmonize with the ruins of the Bishop's Palace, the remains of the Vicar's Close, and the chapter-house. The present building was commenced in 1121, but Bishop Joceline of Wells (1206-1242) rebuilt it from the middle of the choir to the west end. The Early English work shows considerable differences to that in Salisbury and Ely Cathedrals, being carried out by a local school of masons, who show considerable originality in design. The glory of Wells is centred in its west front. The deep buttresses on the towers cast shadows which only serve to show up the marvellous sculptured figures of saints and kings, which may represent a Te Deum in stone. The inside of the cathedral is remarkable for the inverted arches which were put in the chancel to support the towers. Bishop Beckington built the three arches to the close.—*G. Home.*

THE cathedral of St. Peter, at York, commonly known as the minster, has no superior in general dignity of form among English cathedrals. It is in the form of a Latin cross, consisting of nave with aisles, transepts, choir with aisles, a central tower, and two W. towers. The extreme external length of the cathedral is 524 ft. 6 in., the breadth across the transepts 250 ft., the height of the central tower 213 ft., and the height of the western towers 202 ft. The material is magnesian limestone. The cathedral occupies the site of the wooden church in which King Edwin was baptized by Paulinus (*q.v.*) on Easter Day 627. After his baptism, Edwin, according to Bede, began to construct "a large and more noble basilica of stone," but it was partly destroyed during the troubles which followed his death, and was repaired by Archbishop Wilfrid. The building suffered from fire in 741, and, after it had been repaired by Archbishop Albert, was described by Alcuin as "a most magnificent basilica." At the time of the Norman invasion the Saxon cathedral, with the library of Archbishop Egbert, perished in the fire by which the greater part of the city was destroyed, the only relic remaining being the central wall of the crypt. It was reconstructed by Archbishop Thomas of Bayeaux (1070-1100); but of this building few portions remain. The apsidal choir and crypt were reconstructed by Archbishop Roger (1154-81), the S. transept by Archbishop Walter de Grey (1216-1255), and the N. transept and central tower by John Romanus, treasurer of the cathedral, (1228-56).

With the exception of the crypt, the transepts are the oldest portions of the building now re-


ST MARGARET'S CH: YORK:
SOUTH PORCH:
MEASURED AND DRAWN BY
C.P. ANDERSON : 1908:
PERSPECTIVE SKETCH:
DOOR
CENTRE LINE
WALL OF CHURCH
HALF PLAN:
SECTION:
ELEVATION:
THE CARVING ON ARCHES AND CAPS : SEVERAL PIECES OF WHICH REPRESENT THE SIGNS OF THE ZODIAC : IS FAR GONE IN DECAY:
ELGIN CATHEDRAL: SCOTLAND:
ARCADE OVER WEST DOOR: INSIDE:
Date: Circa 1220 A.D:
Measured and Drawn on Spot.
C.P. Anderson. Aug: 1907. Redrawn 1912:
Sill of West Window:
Inside:
Line of Jamb:
Line of Archmould:
Cap:
Base:
String Course:
Sill:
Arched:
15 FEET



DETAILS OF SKELTON CHURCH, YORKSHIRE, ENGLAND.

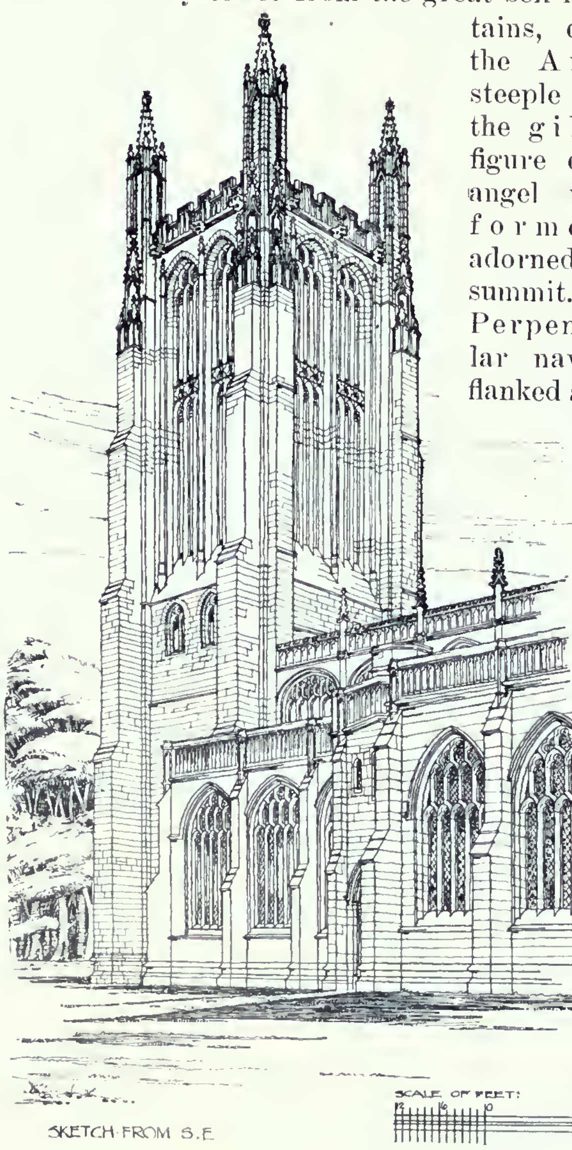
MEASURED AND DRAWN BY C. PEAKE ANDERSON.

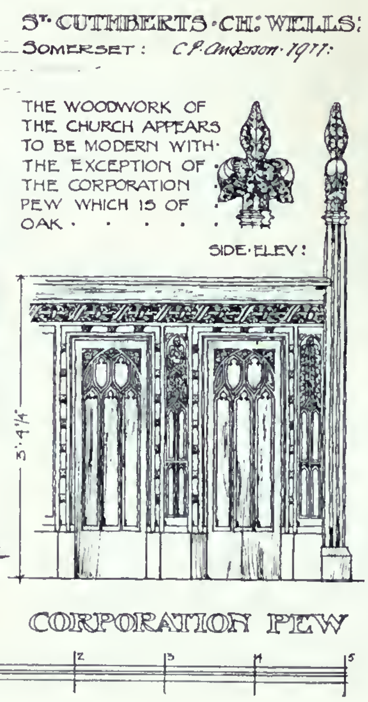
maining. They represent the Early English style at its best, and the view across the great transept is unsurpassed for architectural effect. The S. transept is the richest and most elaborate in its details, one of its principal features being the magnificent rose window; and the N. transept contains a series of beautiful lancet windows called the Five Sisters. The foundation of the new nave was laid by Archbishop Romanus (1286-96), son of the treasurer, the building of it being completed by Archbishop William de Melton about 1340. The chapter-house, a magnificent ornate building, was built during the same period. The W. front, consisting of a centre and two divisions corresponding with the nave and aisles, has been described as "more architecturally perfect as a composition than any other English cathedral," the great window above the door being considered by some superior to the famous E. window at Carlisle.

DETAIL OF BOSS, WESTMINSTER ABBEY.

* * *

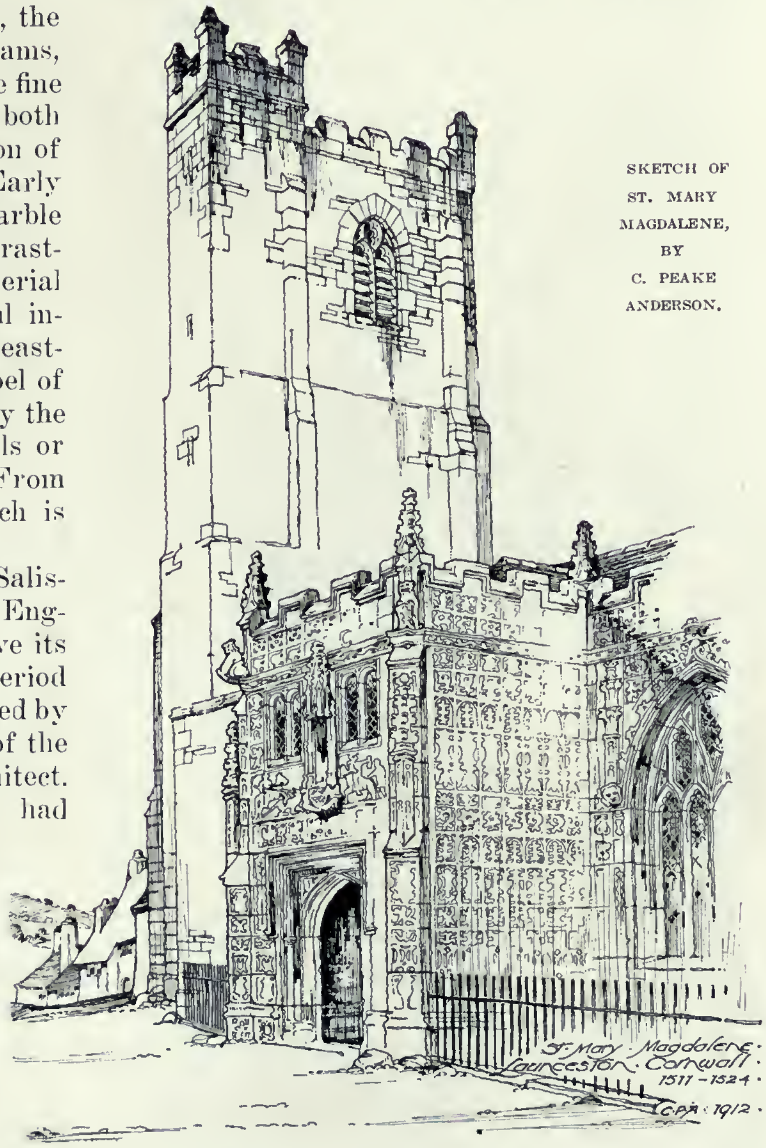
The perpendicular tower of Canterbury Cathedral is the most notable feature of the exterior. It rises in two storeys to a height of 235 ft. from the ground, and is known variously as Bell Harry tower from the great bell it contains, or as the Angel steeple from the gilded figure of an angel which formerly adorned the summit. The Perpendicular nave is flanked at the west front by towers, whose massive buttresses, rising in tiers, serve to enhance by contrast the beautiful effect of the unbroken straight lines of Bell Harry tower. The south-western of these towers is an original Perpendicular structure by Prior Goldstone, while the north-western was copied from it in 1834-1840, replacing a Norman tower which had carried a spire until 1705 and had become unsafe. The north-west and south-west transepts are included in Chillenden's Perpendicular reconstruction; but east of these earlier work is met with. The south-east transept exhibits Norman work; the projecting chapel east of this is known as Anselm's tower. The cathedral terminates eastward in a graceful apsidal form, with the final addition of the circular eastern chapel built by William the Englishman, and known as the Corona or Becket's Crown. St. Andrew's tower or chapel on the north side, corresponding to Ansel's on the south, is the work of Ernulf. From this point westward the various monastic buildings adjoin the cathedral on the north side, so that the south side is that from which the details of the exterior must be examined.





When the nave of the cathedral is entered, the complete separation of the interior into two main parts, not only owing to the distinction between the two main periods of building, but by an actual structural arrangement, is realized as an unusual and, as it happens, a most impressive feature. In most English cathedrals the choir is separated from the nave by a screen; at Canterbury not only is this the case, but the separation is further marked by a broad flight of steps leading up to the screen, the choir floor (but not its roof) being much higher than that of the nave. Chillenden, in rebuilding the nave, retained only the lower parts of some of the early Norman walls of Lanfranc and the piers of the central tower arches. These piers were encased or altered on perpendicular lines. In the choir, the late twelfth-century work of the two Williams, the notable features are its great length, the fine ornamentation and the use of arches, both round and pointed, a remarkable illustration of the transition between the Norman and Early English styles; the prolific use of dark marble in the shafts and mouldings strongly contrasting with the light stone which is the material principally used; and, finally, the graceful incurve of the main arcades and walls at the eastern end of the choir where it joins the chapel of the Trinity, an arrangement necessitated by the preservation of the earlier flanking chapels or towers of St. Anselm and St. Andrew. From the altar eastward the floor of the church is raised again above that of the choir.

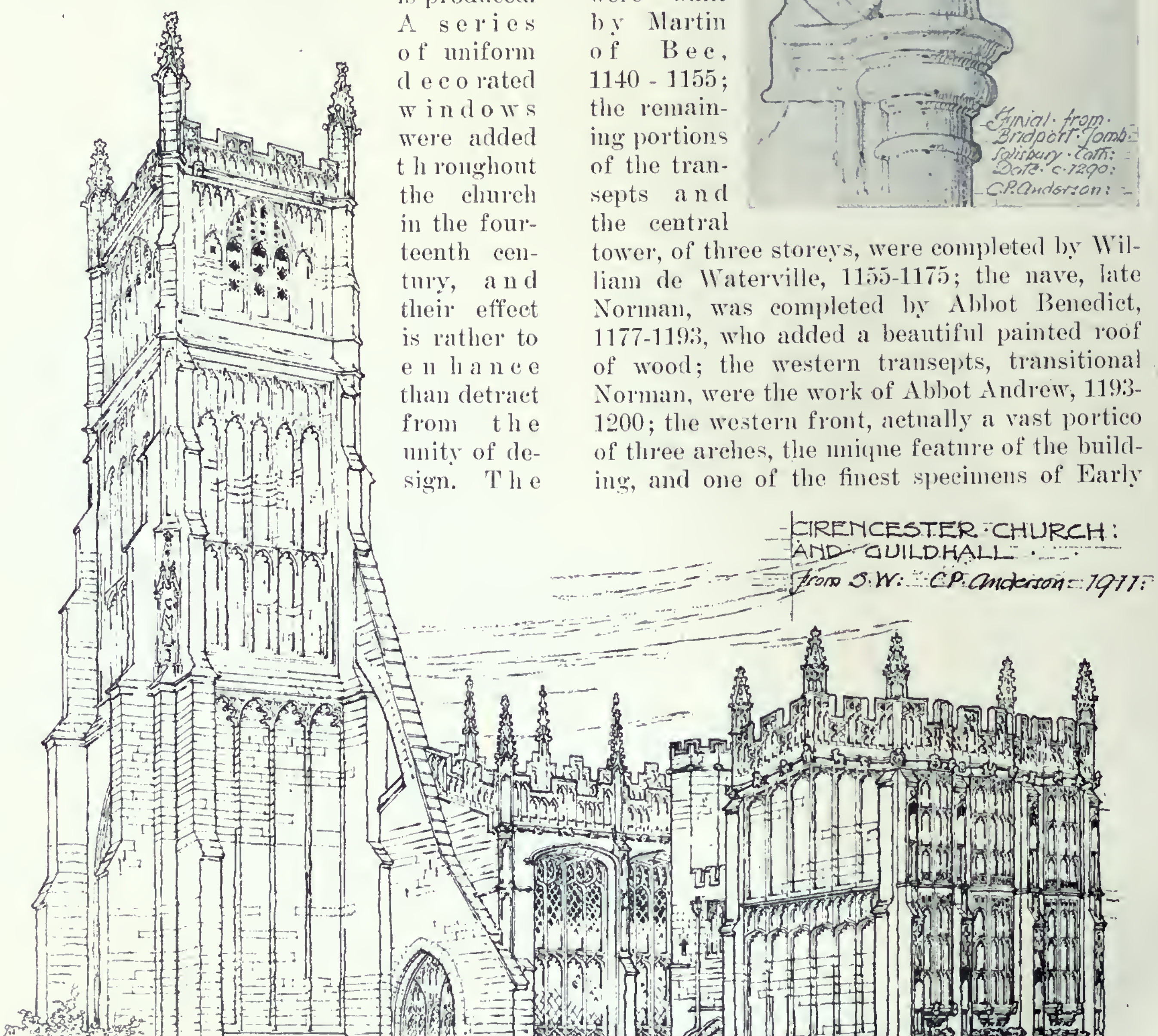
The cathedral church of St. Mary at Salisbury is an unsurpassed example of Early English architecture, begun and completed, save its spire and a few details, within one brief period (1220-1266). There is a tradition, supported by probability, that Elias de Derham, canon of the cathedral (d. 1245), was the principal architect. He was at Salisbury in 1220-1229, and had previously taken part in the erection of the shrine of Thomas a Becket at Canterbury. The building is 473 ft. in extreme length, the length of the nave being 229 ft. 6 in., the choir 151 ft., and the lady chapel 68 ft. 6 in. The width of the nave is 82 ft., and the height 84 ft. The spire, the highest in England, measures 404 ft. (For plan, see "Architecture": (*Romanesque and Gothic in England.*) The cathedral, standing in a broad grassy close, consists of a nave of ten bays, with aisles and a lofty north porch, main transepts with eastern aisles, choir with aisles, lesser transepts, presbytery and lady chapel. The two upper storeys of the tower and the spire above are early Decorated. The west front, the last portion of the original building completed, bears in its rich ornamentation signs of the transition to the decorated style. The perfect uniformity of the building is no less remarkable within than without. The frequent use of Purbeck marble for shafts contrasts beautifully with the delicate grey freestone which is the principal building material. In the nave is a series of monuments of much interest, which were placed here by James Wyatt, who, in an unhappy restoration of the cathedral (1782-1791), destroyed many magnificent stained-glass windows which had escaped the Reformation, and also removed two perpendicular chapels and the detached belfry which stood to the northwest of the cathedral. One of the memorials is a small figure of a bishop in robes. This was long connected with the ceremony of the "boy bishop," which, as practised both here and elsewhere until its suppression by Queen Elizabeth, consisted in the election of a choir-boy as "bishop" during the period between St. Nicholas' and Holy Innocents' Days. The figure was supposed to represent a boy who died during his tenancy of the office. But such small figures occur elsewhere, and have been supposed to mark the separate burial-place of the heart. The lady chapel is the earliest part of the original building, as the west end is the latest. The cloisters, south of the church, were built directly after its completion.



SKETCH OF ST. MARY MAGDALENE, BY C. PEAKE ANDERSON.

The cathedral of St. Peter at Peterborough is the third church that has occupied the site; the first, founded under Penda, king of the Mercians, about 656, was entirely destroyed by the Danes in 870, and the second, founded in King Edgar's reign, was accidentally burnt in 1116. The present building, founded in the following year, was, inclusive of the west front, 120 years in building, being consecrated on the 4th of October, 1237. It embraces in all, however, eight periods of construction, and in no other building can the transition be better studied through the various grades of Norman to Early English, while the later addition is an admirable example of Perpendicular.

The erection proceeded as usual from east to west, and, while an increase in elegance and elaboration is observable in the later parts, the character of the earlier buildings was so carefully kept in mind that no sense of incongruity is produced. A series of uniform decorated windows were added throughout the church in the fourteenth century, and their effect is rather to enhance than detract from the unity of design. The choir, early Norman, terminating in an apse, was founded in 1117 or 1118 by John de Sais or Sez, and dedicated in 1140 or 1143; the aisles of both transepts and the whole of the south transept were built by Martin of Bec, 1140 - 1155; the remaining portions of the transepts and the central tower, of three storeys, were completed by William de Waterville, 1155-1175; the nave, late Norman, was completed by Abbot Benedict, 1177-1193, who added a beautiful painted roof of wood; the western transepts, transitional Norman, were the work of Abbot Andrew, 1193-1200; the western front, actually a vast portico of three arches, the unique feature of the building, and one of the finest specimens of Early

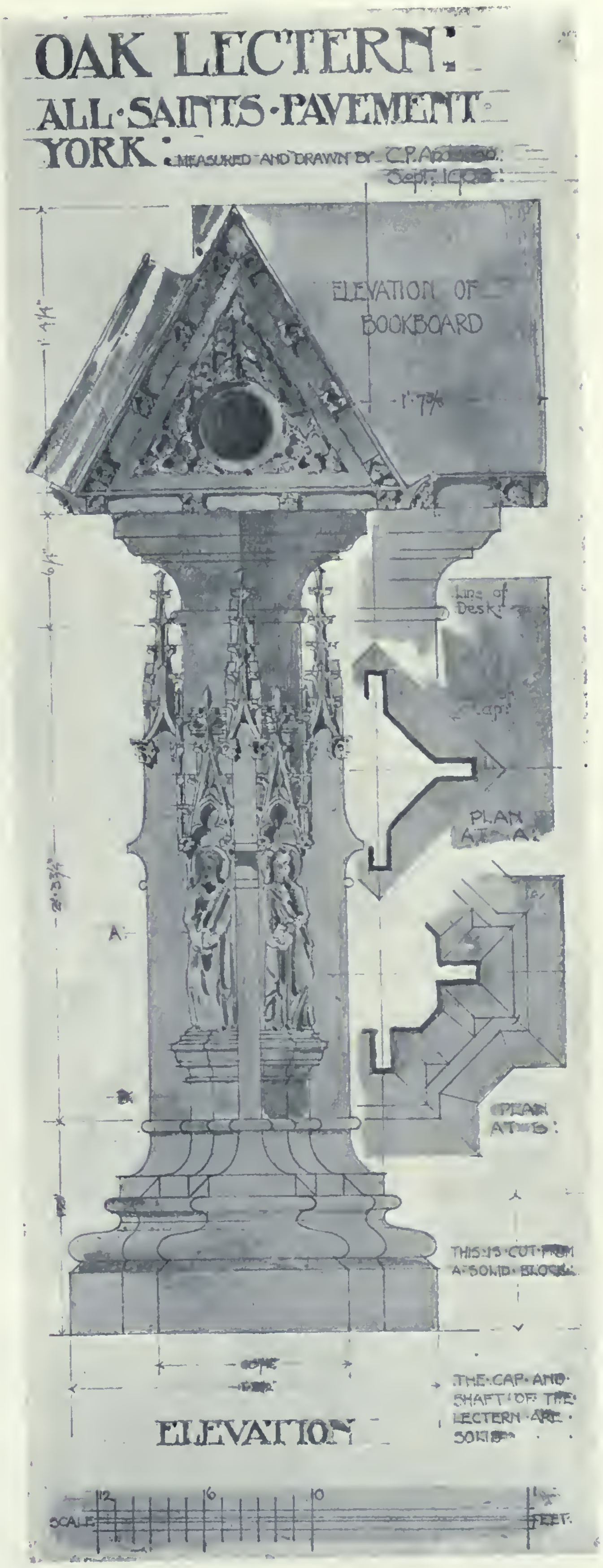


English extant, must have been built between 1200 and 1250, during which period there were several abbots; but there exists no record of its reconstruction. The lady chapel, built parallel with the choir by William Parys, prior, was consecrated in 1290; the bell-tower was erected by Abbot Richard between 1260 and 1274; the southwest spire, the pinnacles of the flanking tower of the west portal, and the enlargement of the windows of the nave and aisles were the work of Henry de Morcot in the beginning of the fourteenth century; the "new building" or eastern chapel in the perpendicular style, begun in 1438, was not completed till 1528. In 1541 the church was converted into a cathedral, the abbot being made the first bishop. The extreme length of the building is 471 ft., and of the nave 211 ft., the breadth of the west front being 156; the height of the central tower, as reconstructed in the fourteenth century, was 150, that of the spires and tower of the west front is 156 ft. In 1643 the building was defaced by the soldiers of Cromwell, who destroyed nearly all the brasses and monuments, burnt the ancient records, levelled the altar and screen, defaced the windows, and demolished the cloisters. To obtain materials for repairs the lady chapel was taken down. In the latter part of the eighteenth century the church was repaved. In 1831 a throne, stalls and choir-screen were erected and other restorations completed. On account of the insecure state of the central tower in 1883 it was taken down; and its reconstruction, exactly as it stood with the exception of the four corner turrets added early in the nineteenth century, was completed in 1886. The choir was reopened in 1889, after being closed for six years.

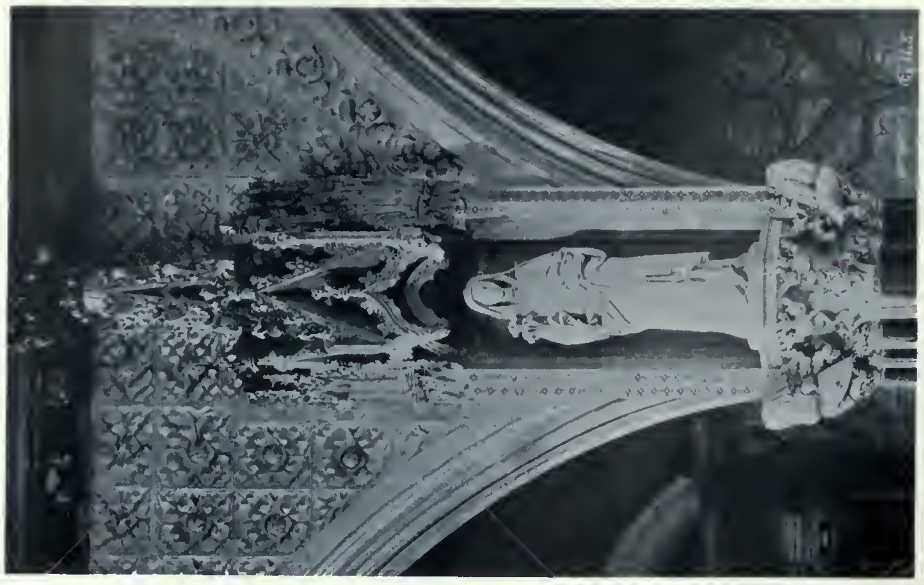
* * *

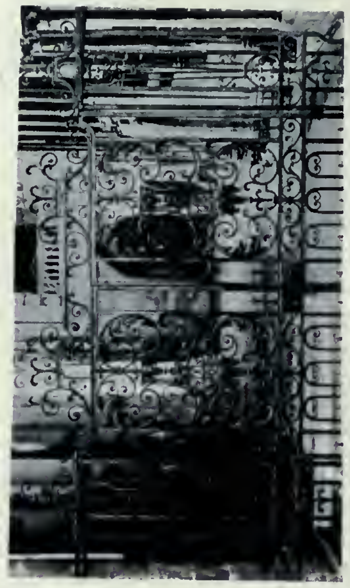
In 1895 the restoration of the west front and other parts was begun in the face of considerable adverse criticism; but the work was carried on with the utmost care. During the carrying out of this work many interesting discoveries were made, the most important being the site of the cruciform Saxon church, enclosed within a crypt under the south transept.

The church of St. Mary and St. German at Selby, belonged to a Benedictine abbey founded under a grant from William the Conqueror in 1069 and raised to the dignity of a mitred abbey by Pope Alexander II. The monastic buildings have practically disappeared, but the church was a splendid building of various dates from Norman to Decorated, the choir and Lady chapel representing the later period. The nave passes from Norman to Early English in the course of its eight bays from east to west and also from the arcade through the triforium to the clerestory. About midnight of the 19th-20th of October 1906, a fire broke out in the Latham chapel adjoining the north choir aisle, in which

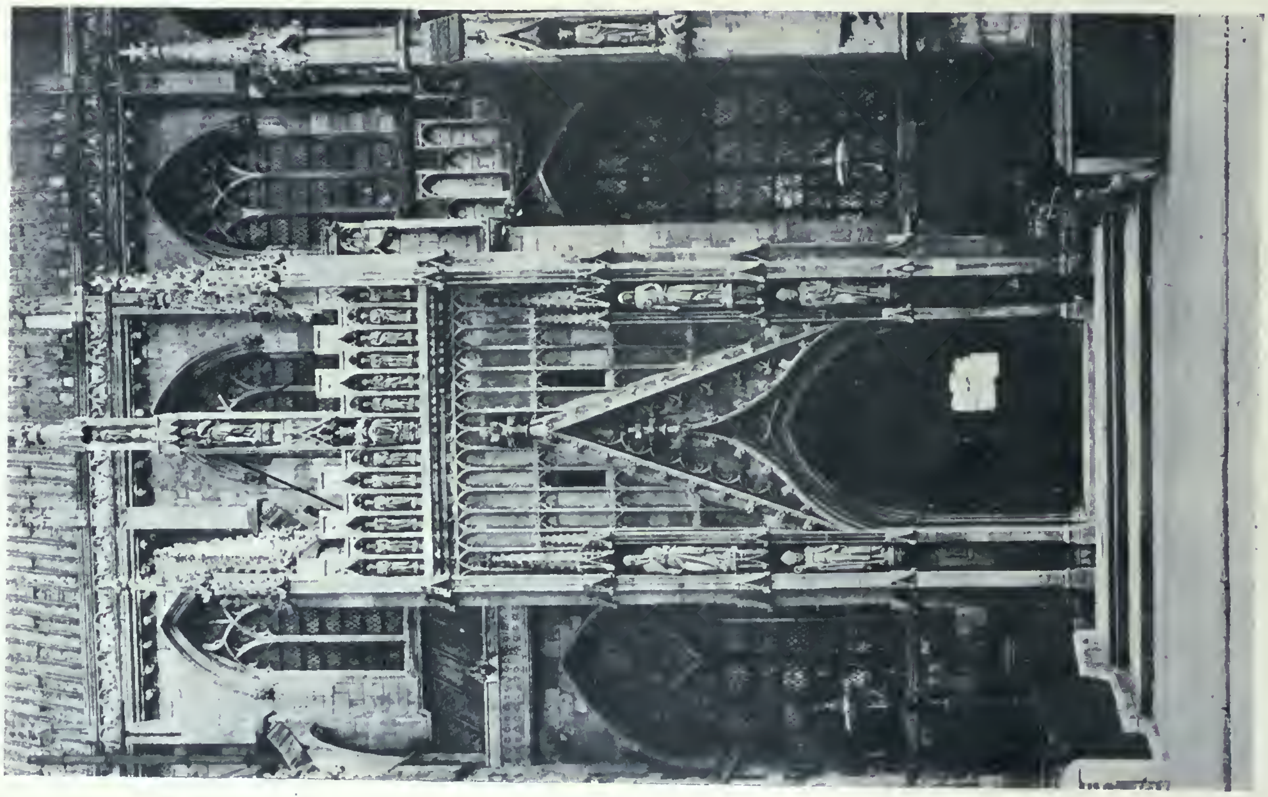


a new organ had recently been erected, and soon involved the whole building. Especially serious damage was done in the immediate neighborhood of the chapel, the oak-groined roof and rich fittings of the choir were wholly destroyed, but the finely moulded arches and the magnificent tracery of the east window survived in great part.—*Encyclopedia Britannica.*



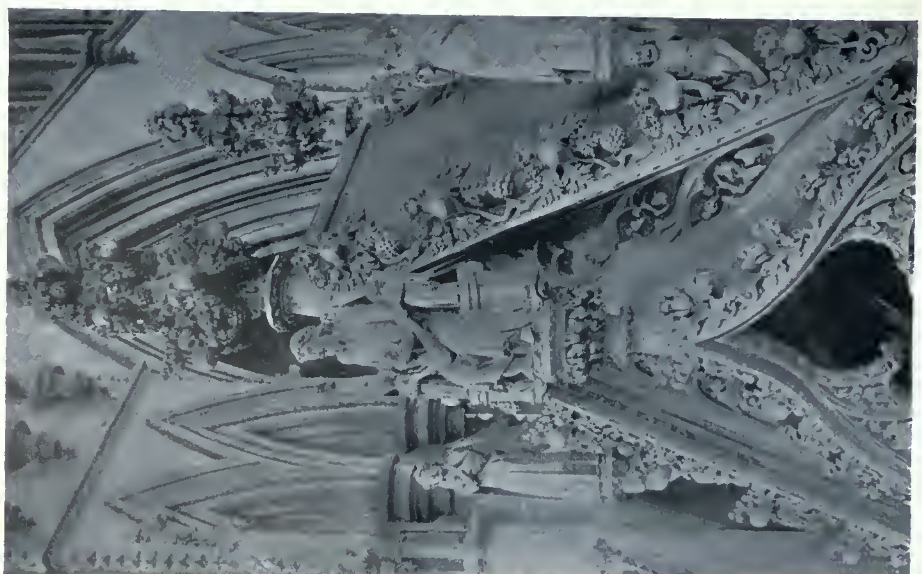


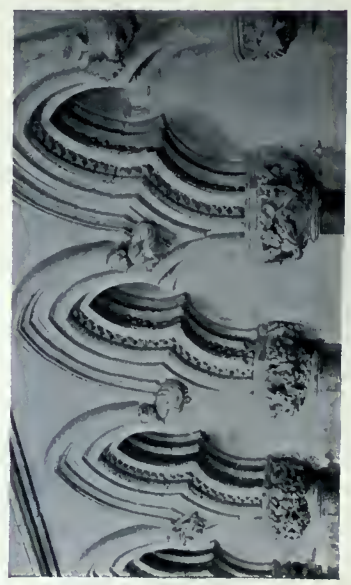
SCREEN NICHE AND IRON GATES.



NORTH PORCH.

DETAILS OF BEVERLEY MINSTER, ENGLAND.





PERCY SHRINE AND WALL ARCADING.

CONSTRUCTION

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

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

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Vol. VIII Toronto, May, 1915 No. 5

H. P. KNOWLES, architect, announces the removal of his offices to Vanderbilt Concourse Building, 52 Vanderbilt avenue, at 45th street, New York City.

* * *

A NEW architectural firm is Hynes, Feldman & Watson, 105 Bond street, Toronto. Members of the partnership are J. P. Hynes, for the past several years located at 199 Yonge street; I. Feldman, lately practising at 44 Adelaide street west, and A. E. Watson, until recently with John M. Lyle, architect.

* * *

THE annual meeting of the Toronto chapter of the Ontario Association of Architects was held in the association rooms, 94 King street west, on Tuesday, May 4th. The report of the secretary-treasurer revealed a very satisfactory condition of affairs, there being at the present time a membership of 75. The officers elected for the year are, Ralph K. Shepard, 43 Scott street, chairman, and Isadore Feldman, 105 Bond street, secretary-treasurer.

THE Board of Trade at Kamloops passed a by-law recently voting the sum of $85,000 for the completion of the Hydro-Electric system, upon which half a million dollars has already been expended. This equips the city with a splendid power plant, and means another link in its chain of progress.

* * *

BRITISH COLUMBIA mills are now tendering on one of the largest lumber contracts ever opened for world-wide competition. Through the British Government the Chamber of Deputies of France is asking for a supply of 500,000,000 feet of lumber to be used in the construction of 100,000 two-roomed houses. These small homes are to house the section of France's population which has lost its all through the ravages of war. It would not be surprising if one of the British Columbia mills secured the contract. This would be one of the greatest booms the lumber-cutting plants of this province had ever received. Owing to the fact that the French Government will want the lumber as early as possible, it will most likely mean that the firm which secures the contract will have to let subcontracts.

* * *

"KNOW Canada! make Canada known!" is a striking sentence in the war year edition for 1915 of that popular booklet, "5,000 Facts About Canada," compiled by Frank Yeigh, of Toronto, who knows Canada as probably few Canadians do. Fifty chapters are devoted to such subjects as agriculture, area, banking, census, immigration, mining, manufacturing, trade, etc., and a page of Canadian war facts show how up-to-date it is. Sketch maps are included of the Dominion in 1867 and 1915. Copies may be had from progressive newsdealers, or by sending 25c. to the Canadian Facts Publishing Co., 588 Huron street, Toronto, Canada.

* * *

AT the recent gathering of the Alberta Association of Architects, held at Edmonton, the retiring president, James Henderson, spoke feelingly of the men who have volunteered for active service, and congratulated the profession on the large number it had contributed to the cause. The following officers were elected for the ensuing year: President, J. J. O'Gara, Calgary; Hon. President, Jas. Henderson, Edmonton; First Vice-President, R. P. Blakey, Edmonton; Second Vice-President, G. H. MacDonald, Edmonton; Hon. Secretary, W. G. Blakey, Edmonton; Hon. Treasurer, W. D. Cromarty, Edmonton; Council, G. Fordyce, Calgary; R. W. Lines, Edmonton; R. P. Barnes, Edmonton; C. L. Gibbs, Edmonton; C. S. Burgess, Edmonton; Representative on University Senate, Jas. Henderson, Edmonton.

AN interesting pamphlet has just been issued on the J-M Keystone Hair Insulator, by the H. W. Johns-Manville Company. It states clearly the qualities for which it merits consideration and presents various buildings wherein this material has been used. Several drawings illustrate the method of applying the insulator to side walls and floors, together with a description in each case.

* * *

THE new factory for the Lord & Burnham Company, Ltd., of Canada at St. Catharines, Ont., consists of woodworking, ironworking and erection shops in conjunction with a boiler room and other necessary divisions. The buildings, 225 by 275 feet, are of steel construction with concrete foundations, brick walls and steel trussed roof holding glass or concrete with patent roofing compound. The shops are equipped with a sprinkler system and heated by means of overhead coils. Two sidings have been arranged, the first to accommodate the incoming freight on one side of the factory, the second to handle all outgoing products. These buildings, together with the other factories at Irvington, N.Y., and Des Plaines, Ill., cover twelve acres of floor space.

* * *

A COMMISSION of French architects, comprising building experts from the cities and towns destroyed by Germans, some of which, such as Rheims, Arras, Senlis and Roye, are called "the assassinated towns," have already drawn up plans for rebuilding on a larger and better scale. In Rheims, for instance, an area of fifteen hectares will be entirely newly outlined; also in the town of Chermont in the Argonne, where six new streets and three hundred houses will be constructed, a vast amount of building material, machines and implements for municipal reconstruction on the best possible hygienic practical basis will, in the opinion of leading French architects, soon be required. A large portion of what is needed will be sought in the United States. The outlook in Northern France and Belgium is for enormous building activity in the future.

* * *

THE following letter, received from W. H. C. Mussen, President of the Mussens Limited, Montreal, is given in full in order that the company may explain their present status and future aims:

To Whom it may Concern: We have much pleasure in notifying you that Mr. John J. Robson, Chartered Accountant, of Montreal, who was recently appointed Provisional Liquidator, has, by order of the Court, been appointed permanent liquidator to this company. The Court has also granted our application to be allowed to continue the business for a period of six months. We take this opportunity of notifying you of these facts and advising you that we feel able to demonstrate to our creditors that we will succeed in the efforts which will be put forward to reduce our stock, collect our open accounts and materially reduce overhead charges, with a view to getting into a position to reorganize and continue in business.

While we are in liquidation, we are carrying on an active campaign for business, and we trust that we may continue to receive your support. We have a good connection throughout the country and all purchases made by us from now on will be paid for by the liquidator. Operating as we are, under the most strenuous conditions which have ever existed in Canada, we know that it will take some time to achieve the result at which we are aiming, but if we continue to receive the support of our principals as in the past, we are satisfied we can show good results and ultimately re-establish this business on its old footing.

Since the liquidation proceedings were put into effect, we have been flooded with letters from the manufacturers, as well as from our customers, extending their hearty support and assuring us of their continued patronage. We, therefore, take this opportunity of thanking our friends for this evidence of confidence in us and in our ability to win out. We also desire to impress upon our customers the fact that we are carrying on "business as usual," and that, although we were always pleased to receive their orders, we are now more anxious than ever to be favored with same.

We conclude by asking our principals to continue the support which has been so freely given us in the past, and we ask our customers to give us an opportunity of supplying them with any material which they may require. All inquiries will be promptly attended to and orders will be filled without delay.

* * *

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BRANCH OFFICES
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HOUSE AT ST. CATHARINES, ONTARIO.

A. E. NICHOLSON, ARCHITECT.

The Home of To-Day

"The call of the wild" is gradually changing our forests and streams from a rough, untenable region into vast country estates with pretentious homes and gardens or smaller divisions dotted with attractive bungalows and inexpensive but artistic dwellings. The former dread of rural living with its accompanying crudeness has disappeared. In its stead has come a longing to escape from the cramped and artificial atmosphere of our cities and enjoy the freedom and wholesomeness of natural surroundings. The desire is all the stronger since it is possible to combine the beauties of nature with modern conveniences.

Doubtless one of the great factors in producing such a radical change is the high cost of living, which has brought about a state of unrest. The price of food has risen rapidly, which naturally effects all phases of our existence. In direct contrast is the garden of our own fertile imagination, which we plant in hope, watch its daily growth with keen satisfaction, and take great pleasure in the final results. The same may be said of the live-stock, the grain, the chickens and the flowers—all a means of bringing color back into the wan expression and vigor to the care-worn body.

Along with the rejuvenation of the physical self from the abandonment of city shackles comes an eager desire to enjoy a real home in a real way. It must be convenient in arrangement, possessing the small accommodations which lend interest and charm to the general plan. The relation of the natural surroundings and the house, both externally and internally, should be brought into close harmony. The creation of man's genius should be inspired by the spirit of freedom, grace and beauty which affords such an artistic setting for one's work.

The last thought leads us to the conclusion that no dwelling can be termed successful unless it is built according to need rather than precedent. In this phase the designer can advise the client, thereby preventing the inclusion of any feature, antiquated or in bad taste. The owner in turn can keep the architect from yielding to the conventional and traditional, which often fails to meet the requirements of the size, the site or the amount of money available. By a careful analysis of the existing needs and a conscientious effort on the part of both to plan accordingly there is little doubt but that the finished product will be a real comfort from the esthetic side, as well as the practical.

So often the real harmony is lost by the introduction of too many craftsmen. After the architect comes the decorator, who, in turn, gives way to the furnisher. When completed there seems to be a discordant note. Somehow the sense of harmony has been lost and the client realizes that his dream is far from a reality. If the designer is really an artist he should be allowed to grasp the desired result from the very beginning and carry it through to the minutest detail. By so doing he plans with his decorations and furnishings in mind from the first, and consequently makes them a part of the whole scheme. This leads to creative work on a much broader plane and furnishes the right incentive for a man's best efforts.

It has been stated that the mainsprings of action in all of Barry Parker's home work in England and the reasons for the vitality and charm of everything he does, are the inherent principles that use and fitness alone must rule the planning and construction of all buildings, and that each structure must be designed as a whole and carried down to the last detail of furnishing. It is also true that Mr. Parker seeks the co-operation of his client in order to appreciate the tastes, needs and requirements of the people for whom he is to design the house. By adjusting his ideas of beauty to those of utility, and in turn persuading the owner to make certain concessions, the necessary sacrifices resulting therefrom produce a more artistic, comfortable and commodious house.

The love of the beautiful is a great boon to all progressiveness. Let us enjoy the constant appearance of inspiring buildings and the natural level of our character will be raised immeasurably. It is the unsightly which works on the nerves and makes people irritable, but let these same persons be surrounded by the beauty of sight, sound and smell, and they will immediately experience a feeling of restfulness. This, then, should enter into all home building, featuring such spots as the fireplace and the living room, with its comfortable furniture and pleasing design. One of the main essentials to this quiet repose is the question of color. Bright shades are conducive to cheerfulness, while others create a restlessness, dark ones are prone to engender melancholy or lend themselves by careful handling to ease and repose.

It is more than satisfying to see the high standard set by Canadian home builders, which betokens a development in domestic architecture that will eventually give us a characteristic style all our own, and as distinctive as the English house with its charming grace.

Characteristics of the Home

THE ENDURING QUALITY.

"I would have our ordinary dwelling houses built to last, and built to be lovely; as rich and full of pleasantness as may be, within and without. . . with such differences as might suit and express each man's character and occupation, and partly his history. . . When we build, let us think that we build for ever. Let it not be for present delight, nor for the present use alone; let it be such work as our descendants will thank us for, and let us think, as we lay stone on stone, that a time is to come when those stones will be held sacred because our hands have touched them, and that men will say as they look upon the labor and wrought substance of them, 'See! this our fathers did for us.' For, indeed, the greatest glory of a building is not in its stones, nor in its gold. Its glory is in its age, and in that deep sense of voicefulness, of stern watching, of mysterious sympathy, nay, even of approval or condemnation, which we feel in walls that have long been washed by the passing waves of humanity. . . And it is not until a building has assumed this character, till it has been entrusted with the fame, and hallowed by the deeds of men, till its walls have been witnesses of suffering, and its pillars rise out of the shades of death, that its existence can be gifted with language and life. For that period, then, we must build; not, indeed, refusing to ourselves the delight of present completion. . . but taking care that we sacrifice no enduring quality, and that the building shall not depend for its impressiveness upon anything that is perishable. . . And when houses are thus built, we may have that true domestic architecture, the beginning of all others, which does not disdain to treat with respect and thoughtfulness the smaller habitation as well as the large."—*John Ruskin.*

* * *

THE ESSENCE OF FITNESS.

"On going over a house you feel cheated if you find polished hardwood and marble freely used in the reception rooms, while bedrooms and offices are in painted deal, cheap and tawdry. The same degree of durability may be used without any sacrifice of fitness, just as you may have fine finish and smoothness in a jewel case, while strength and durability, equally valuable, belong to the travelling chest. Let no one suppose beauty can be wed to greed or vanity. A nation produces the architecture it deserves, and if in the main it is materialistic and sordid, we shall find all material qualities considered first and the moral and spiritual ones scarcely at all. Greed will crush out generosity, and shams will smother poetry and sentiment. Men will prefer the imitation grandiose to simplicity and dignity. Things will not be what they seem. Bodily comfort and luxurious enjoyment will be valued above grace and refinement. Indeed, the modern materialist will not admit there can be any moral qualities suggested or conveyed by architecture. He sees no harm in jointing his stucco to imitate stone construction. So it is we see what we look for.

"We must look for noble moral qualities in our fellow-creatures if we desire to find beauty. At present the world does not seek beauty, but expects to be given it for nothing—thrown in with a pound of tea. But nothing can be had for nothing in this life; and we must be prepared to pay—that is, make some sacrifice—for beauty, the sacrifice at least of devoted thought and loving endeavor. Let breadth, goodness and strength be the keynote throughout your building, and then no one will feel cheated."—*C. F. A. Voysey.*

* * *

THE ART OF PLANNING.

"In planning the arrangement of the house itself one should always be careful to leave free and ample spaces for the social life of the family, avoiding all unnecessary partitions which would entail extra outlay and add complexity to the housework. The living room with its fireplace should centralize the interest of the interior and sound the keynote of comfort and hospitality. The dining room and kitchen should be so arranged as to minimize the housewife's steps, and where no maid is kept the most sensible plan is to have the kitchen large enough to allow some of the meals to be taken there. For there is no reason why this part of the house should not be as cheerful and attractive and homelike as any other, and certainly where the mother has to do all her own work, both she and the family would get more real comfort by simplifying the serving of meals as much as possible. The convenient arrangement of stairway, bedrooms and bath, and the provision of ample closet and storage spaces will likewise need serious consideration. And in this connection we cannot emphasize too strongly the fact that the servant problem as well as many others of individual and national importance may be solved by the right kind of architecture.

"In the first place, the house should be itself, not an imitation of other houses; free from all false pretense or affectation of a luxury it cannot attain. In fact, style is the least important thing. If the house is built strongly and carefully, of suitable materials, to meet the owner's needs, with due consideration for beauty of proportion and detail, then it will be a law unto itself; it will have created its own style. And how much more permanent and wholesome an influence will such a dwelling have upon the lives of those within, and especially upon the children whose minds retain so easily the impressions of their early surroundings. They will unconsciously learn from it independence of thought, fearlessness of expression, love of simplicity and beauty and the sincerity of a true home atmosphere. When the building of our houses is undertaken in this spirit, then, and then only, may we hope to evolve an architecture that will last. Then only can we express in our homes that spirit of practical democracy which promises to be the ruling influence in our coming national life.—*Gustav Stickley.*

* * *

THE INFLUENCES OF COLOR.

"In no other field has the right use of color been so neglected as in the furnishing of the home, and nowhere else could its influence be so wide or beneficent. The individual, spontaneous choice of color is not always best or wisest in the furnishing of a home. First, the mental influences of color must be taken into account. Consider, for example, the effects of the three elemental primary colors—yellow, red and blue. Yellow is nearest to sunlight. Morbid dispositions require this color, although they do not choose it. Yellow brings cheer and light into a dark, gloomy room. Red is symbolic of blood, fire and excitement. Since the keynote of all homes should be rest, and red in any large area destroys restfulness, it should be handled with special caution. It may be introduced successfully into drawing rooms, club rooms and dance halls, where gaiety and a certain amount of excitement are desirable. Turning now to blue, we find that it is calm, retiring, repressing in character. It is the coldest color note, and makes a room restful and cool. For this reason it is especially pleasing in warm sections of the country, in summer homes, in sunny south rooms, and also in bedrooms—for it is always suggestive of rest.

In addition to these primary elements, there are three equally powerful ones known as binary colors—orange, violet and green. Orange, the combination of yellow and red, is symbolic of light and heat, which makes it the hottest color possible. Since it is the strongest and most intense of colors, it should be used only in small areas, for emphasis. Violet, composed of red and blue, suggests heat and cold combined—which results in ashes. It is the color of shadows; it expresses restrained heat, or mystery and gloom, and this is the psychological reason for its use in mourning and in religious rites. The use of violet is not often practical in home furnishings, although it may be used to dim a room having too much sunlight. Violet hangings are pleasing where there is a large window expanse. Green, the result of mixing yellow and blue, expresses light and coolness. Generally speaking, it is the most successful color that can be used in interior furnishing, for it eliminates the nerve-exciting red, and combines rest and cheer—than which nothing can be better for a home. Color value should be consistent also with scale. That is, pale colors are appropriate for small rooms and for furniture which is light and delicate, while dark colors should be used in large, 'architectural' rooms and with furniture which is heavy in build."—*Marie Hall.*

* * *

THE OFFICE OF DECORATION.

"'Decoration,' said Morris, 'is the expression of man's pleasure in successful labor.' And this simple definition is particularly applicable to the art of home-making—from architecture down to the smallest furnishings and fittings of the interior. The office of decoration, he adds, is two-fold: 'To give people pleasure in the things they must perforce use,' and 'to give people pleasure in the things they must perforce make.' It is interesting to study these words—'pleasure in successful labor'—for they suggest an important principle—namely, that beauty, to be permanently satisfying, should be a natural, joyous outgrowth of practical conditions; that, like the flower, it should have its roots in the ground. The phrase recalls, too, that other axiom—that one may decorate construction, but never construct decoration—a rule that every home-maker should keep in mind. 'The world is still deceived with ornament,' lamented Shakespeare, and for many years this has been widely true. But the deception is one that is being gradually and steadily discarded, especially in the building of our homes. We are no longer satisfied with the kind of architectural frills that can be "nailed on." Ornate designs and gilded imitations are ceasing to attract us. The lure of the fake antique, the fascination of the imported product, and the charms of the once-popular but useless bric-a-brac, are on the wane. Instead we are building and furnishing and decorating for permanency. Good taste and intrinsic beauty are guiding our choice of fittings—not the ephemeral and unreliable tyrant known as "fashion." More and more we are doing our own thinking and planning and selecting, and expressing our own individuality in an environment that we ourselves help to create."—*The Craftsman.*

HOUSE NO. 1.

HOUSE AT TORONTO, ONTARIO.

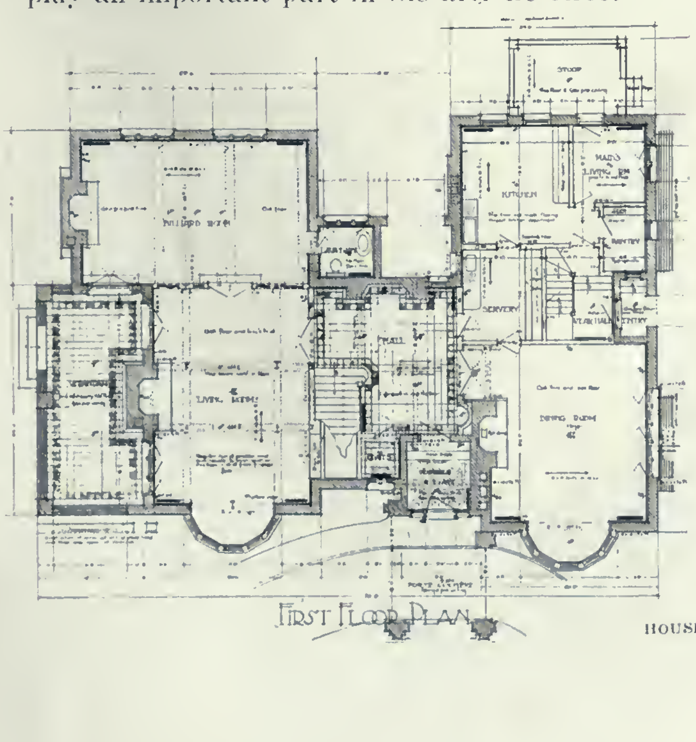
PAGE & WARRINGTON, ARCHITECTS.

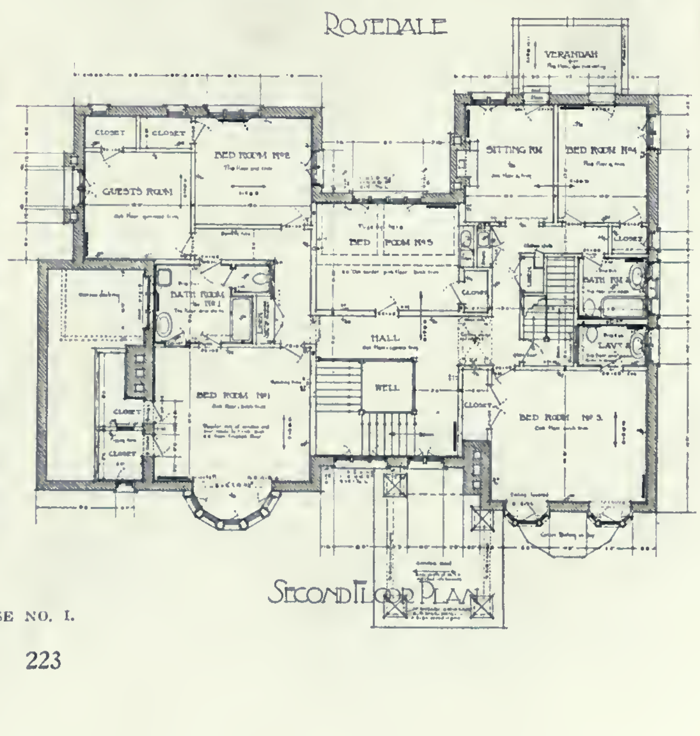
DINING ROOM. HOUSE NO. I. BILLIARD ROOM.

Houses at Toronto, Ontario

THE house work in our suburban and country districts is gradually undergoing a complete change. Doubtless this fact is due to the interest manifested by clients who appreciate that the home of to-day is an important factor in their own happiness as well as a matter of no little importance in the education of their children. Another reason may be ascribed to the large increase of well-to-do people who believe in using part of their wealth at least for the betterment of their domestic living. Many sections are architecturally improved by the ruling that all houses must cost a certain fixed price and when such a condition exists the builder always seeks the services of one competent to design a home as tasty and attractive as those belonging to his neighbors.

With the abundance of building materials found in practically every locality, all of which play an important part in the artistic effect of carefully studied buildings, there is no excuse for the lack of proportion and harmony which has prevailed in the work of recent years. And it is evidenced everywhere that the home is assuming its proper sphere in the minds of everyone, a circumstance which enables us to illustrate houses of distinctive charm and esthetic value. The native field stone leads itself to rich and rugged results with colors varying from pale tones of blue and gray to the richer shades of green and red. Brick has and always will be one of the principal functions in residential work. The charm of the material is found in its mellowing qualities as years go by, as well as the intrinsic value of its colors, texture, varieties, bonds, etc. Another medium of unusual popularity is the cement finish capable of varying from the smoothest to the roughest surface and enriched by means of pebbles, tiles and color ingredients. Wood still retains its





HOUSE NO. I.

HOUSE NO. I. LIVING ROOM.

charm when accompanied by natural surroundings. While half-timber work produces beautiful results if handled by artists who believe in honesty in workmanship and usage. Combinations of two or more materials are equally successful and afford a wide latitude to the architect.

The accompanying examples located in Toronto show exclusively the great strides made in house work among our suburban districts and should prove an incentive to more serious endeavor upon the part of all designers. A brief description of each building is given in order to add interest to the illustrations themselves.

House No. I.—The first residence to be shown in this connection is located at 30 Whitney avenue, and possesses an individual character in its white stucco treatment and green trimmings. The tile roofing, the chimney pots of tile, the down pipes, the rain water heads—all are of a greenish tone which brings the entire structure into perfect harmony. Casement windows are utilized with leaded glass. Upon the interior the vestibule, upper and lower halls are panelled to the ceiling in oak stained a rich dark brown. The halls are supplied with stone fireplaces, oak mantel and floors of red Welsh quarrie tiles with narrow black tile strips forming the joints. In the vestibule is laid flagstone for the flooring. The living room is panelled and beamed in mahogany, possesses a parquet floor, stone fire place and mahogany mantel; the dining room, while different in style, contains the same furnishings as the living room but executed in walnut. An attractive spot is the sunroom with its stucco walls and ceilings, floor of grey tile six inches square arranged in design with narrow green tile strips forming the joints. All rooms on the second floor have oak flooring; all bathrooms tiled floors and walls. The heating system is hot water supplied from twin boilers. One of the features which enter into the general effect of a successful design is the selection of the hardware, a matter of neglect among the majority of designers. In this plan considerable attention was given so that the thumb latch type of the various metals would match the general color scheme of the rooms; consequently black iron is found in the halls; polished brass in living room; bronze in dining room, and nickle in kitchen and bathrooms. The building has

HOUSE NO. I. HALL.

exterior walls of brick and cost approximately $30,000.

House No. II.—Probably no residence could have a better setting than this home situated on a corner lot facing the open square and located close to the new Government House. Exceptionally fine views are to be appreciated in every direction and lend additional interest to the structure finished in rubble masonary. The stone work is a mixture of Port Credit gray with a sprinkling of seam-face, red and blue Lakestone partly rounded. The roof is of Spanish tile; the verandah of Welsh quarry tile flooring. Upon the interior the hall is trimmed in quarter cut white oak; library and sitting room in cypress; dining room panelled in Circassian walnut in the Renaissance style with built-in side-board, carved mantel and heavy enriched staff ceiling containing inset electric lights; reception room has walls and ceilings decorated in the Adams style with marble fireplace; kitchen and bathrooms are tiled throughout. The windows are glazed with leaded glass. The house, conservatory and garage cost approximately $40,000.

House No. III.—Constructed entirely of mixed Credit Valley and Lakestone this building is charmingly located at Mimico Beach in a beautiful park of seven acres close to the lake shore. The feature of interest upon the interior is the large combined living room hall and dining room with two fireplaces finished in cypress. The building presents an attractive country residence and cost in the neighborhood of $9,000.

House No. IV.—It is situated overlooking the ravine in Strath Gowan estate in North Toronto and enjoys a setting of unusual interest and picturesqueness. The walls are of brick with the exterior finished in a smooth white stucco. The dining room is panelled in mahogany with a delicate staff ceiling; the hall and living room in quarter cut oak. The house was erected for $12,500.

House No. V.—Another example of the many homes which graces our suburban districts is this one located on Russell Hill road. The exterior is finished in yellow stucco on brick with a relief afforded by the white woodwork, green shutters and brown shingle roof. The entrance is in the basement with large billiard hall adjoining, all floored in red quarry tiles and walls panelled in quarter cut oak stained brown; which material is also employed for the ground

HOUSE NO. II. TORONTO, ONTARIO.

CHADWICK & BECKETT, ARCHITECTS.

floor, the hall and dining room being panelled. The cost per cubic foot was 33 cents.

House No. VI.—This structure occupying a prominent position at Clarendon Avenue and Poplar Plains is built of brick with gray stucco and brown woodwork. Upon the interior the treatment is in oak stained brown. One of the special features of the residence lies in the fact that all the important rooms have a southern exposure. It is well constructed and cost approximately 28 cents per cubic foot.

House No. VII.—This house is built on a lot overlooking the Rosedale Golf Course, the garden running down to the creek bounding the course, affording beautiful views from all sides. It has an area of fifty-four feet by one hundred and five feet, exclusive of the paved verandah twenty feet by fifty feet, which extends across the east end. The external walls and some of the partition walls on the principal floor are of hollow tile, and the outside is roughcasted in a natural color. There are five reception rooms, eleven bed rooms, five bath rooms, and the usual servants' quarters. A pleasing feature is the vista obtained from the hall and vestibule as you enter the house, the wooded ravine being seen through the glazed doors and screen of the garden entrance. The whole of the main floor and staircase is finished in quarter cut oak, the floors throughout being hardwood. Steel casement windows with leaded panes have been used. The cost is approximately twenty-two cents per cubic foot.

House No. VIII.—This residence, located at Weston, Ontario, is of frame backing, with pebble dash finish. In order to obtain perfect construction with a view to minimizing the danger of cracks in the exterior coating it was decided by the architect to have the carpentry work done by day labor. The decision was eminently satisfactory as no break in the pebble dash has appeared, the structure being built in 1912. In attaining this result it was found that solid brick could have been substituted in place of the frame at a lower cost which was approximately $5,600. The outside walls are constructed of two by four inch studding, covered with seven-eighths sheeting which in turn is protected by heavy fire and waterproof felt strapped with one by two inch pieces and over all is wood-lath reinforced at the angles with metal lath. The first coat of stucco was allowed to dry thoroughly before the application of the second and washed limestone chippings dashed into the surface. Attention was taken to avoid any construction which would tend to cause shrinkage in the walls. The interior trim is quarter cut oak fumed on the ground floor; the bedrooms of basswood painted white. Upon the verandah are laid nine inch squares of Welsh quarried tile, while the fire place in the living room is treated in ceramic tiles of various mixed designs.

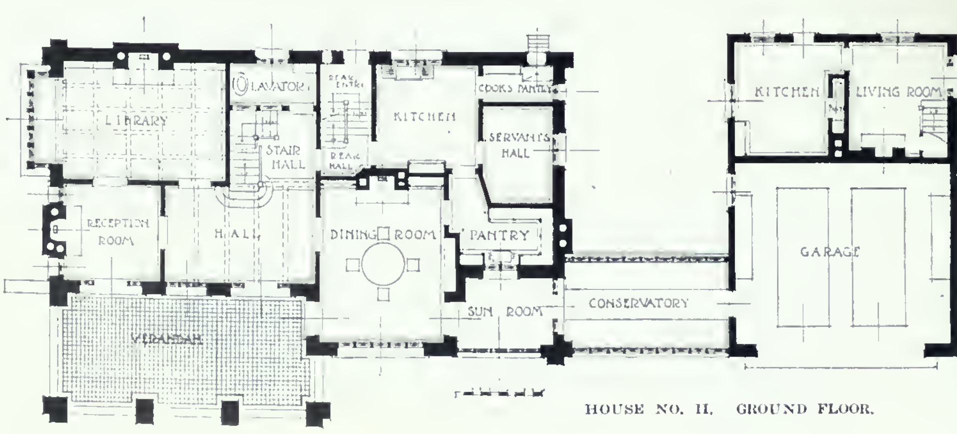
HOUSE NO. II. SITTING ROOM.

This last example in avoiding sham recalls Ruskin's statement that, "whenever the arts and labors of life are fulfilled in this spirit of striving against misrule, and doing whatever we have to do honoraby and perfectly, they invariably bring happiness. A great architect does not build with less instinct than the beaver or the bee, but with more—with an innate cunning of proportion that embraces all beauty, and a divine ingenuity of skill that improvises all construction.

House No. IX.—The problem of this house at

HOUSE NO. II. DINING ROOM.

Weston was to erect a six roomed dwelling with bath and other accessories at an outside figure of $3,200, inclusive of everything. The building was completed for a sum slightly less than the amount stated, accomplished by using direct methods without detracting from the esthetic value for which the designers had striven. River stone is used for the foundation walls up to the ground floor joist-level as this material is local; plain red brick laid on one-half inch white weather cut joint is employed up to the light gray line, mortar applied to solid brick with deep yellow marble chips dashed into same when in a plastic slate. The lintels over the ground floor windows as well as beams of the porch and verandah are constructed of two by twelve inch pine in the rough, fastened together with the large bolt heads showing, there being no attempt made to conceal the fact that these supporting members are built-up beams. There are practically no eaves, the gutters being attached to the fascia which is in turn fastened securely to the pebble dash. A further reduction in cost was effected by detailing the inside of the window frames so as to take the place of extra trim around the openings. The verandah with concrete floors and accessable to the dining room faces the south and has absolute privacy from the public. Located at the angle formed by the street, the bay window of the living-room takes advantage of an extensive view. The house was built in 1914 and presents a charming ensemble without any suggesing or straining for effect.



HOUSE NO. II. GROUND FLOOR.

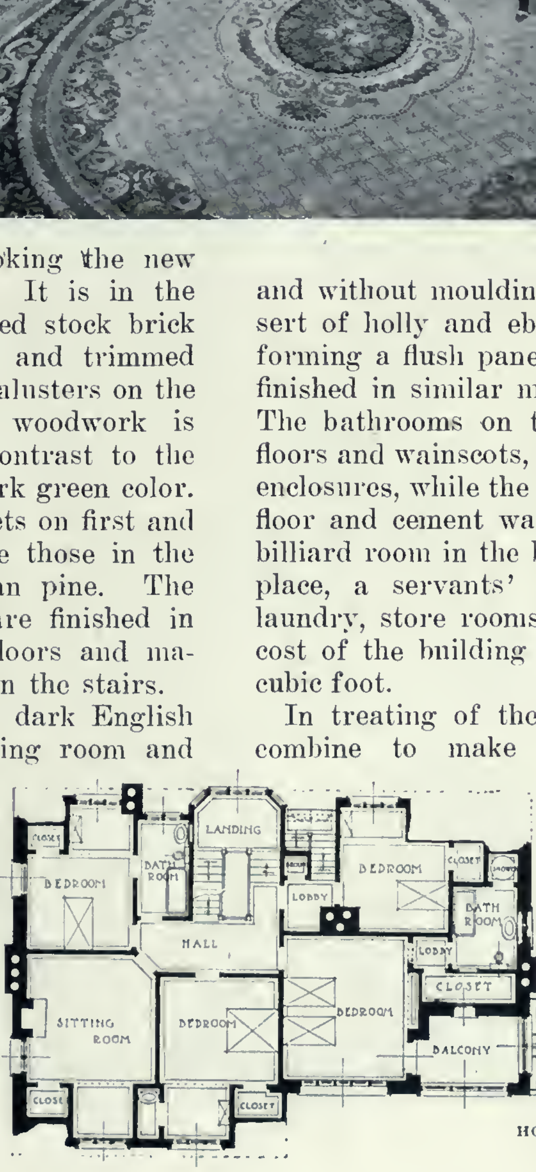
House No. X.—This residence is situated on Douglas

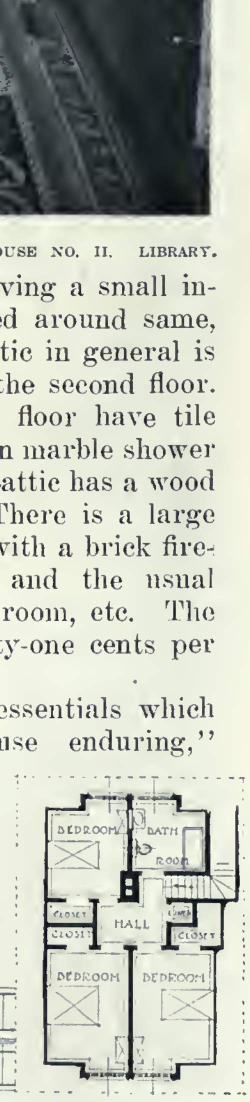
HOUSE NO. II. LIBRARY.

Drive, North Rosedale, overlooking the new Government House property. It is in the Georgian style, built of dark red stock brick with wide white mortar joints and trimmed with grey stone, stone rail and balusters on the front balcony. The exterior woodwork is painted white, and furnish a contrast to the shutters, which are painted a dark green color. The floors in all rooms and closets on first and second stories are of oak, while those in the attic are quarter sawn Georgian pine. The halls from first floor to attic are finished in white enamel with mahogany doors and mahogany newels, rails and steps on the stairs.

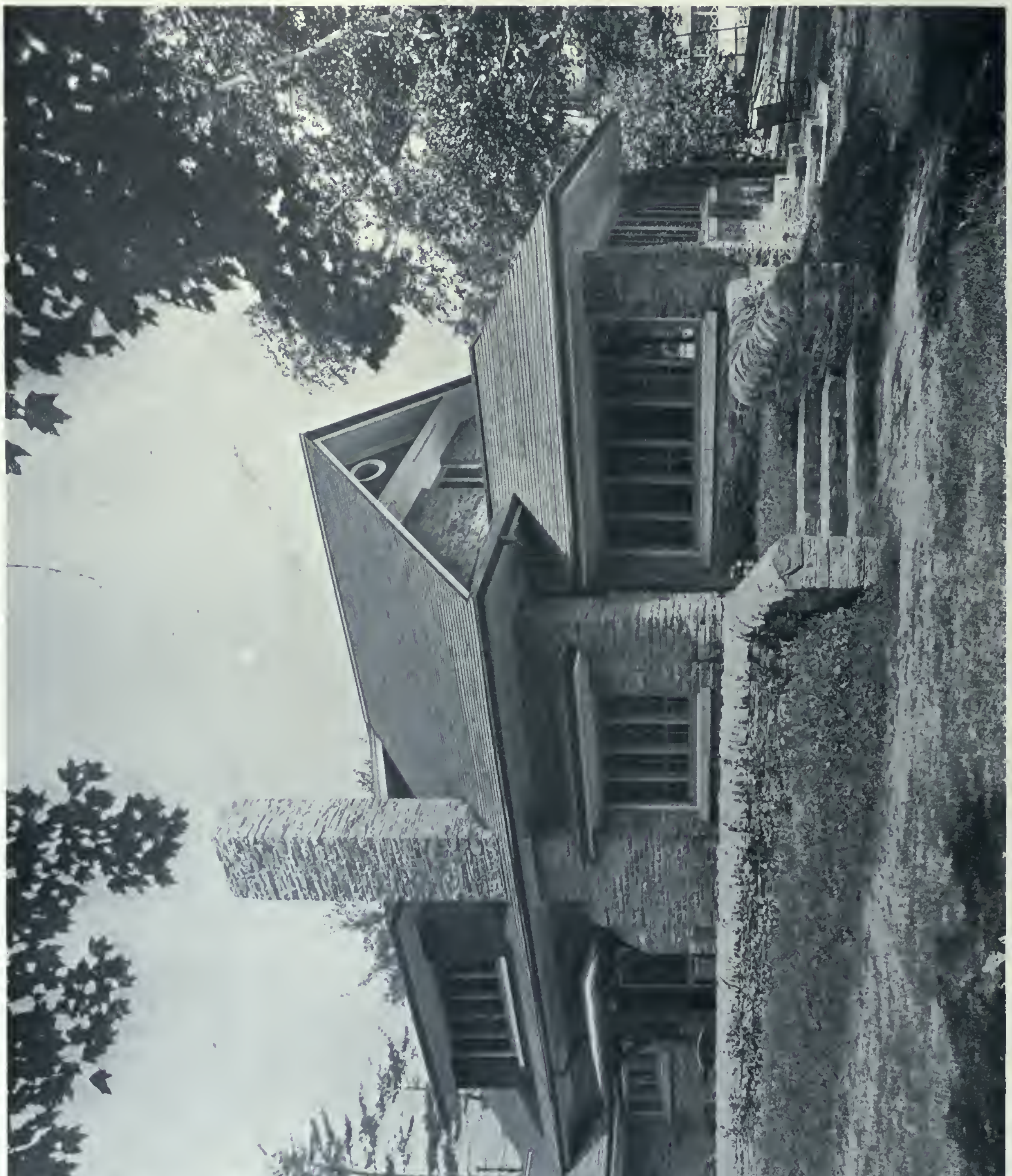
The living room is treated in dark English quarter sawn oak, and the dining room and reception room in birch mahogany. The walls of these principal rooms, as well as the halls, are painted on fine canvas having a general tone of color carried throughout with a soft stippled and slightly shaded effect. The rooms in second story are all decorated in white enamel, the doors in this story being of select mahogany with surfaces finished entirely flat and without mouldings, but having a small insert of holly and ebony carried around same, forming a flush panel. The attic in general is finished in similar manner to the second floor. The bathrooms on the second floor have tile floors and wainscots, also Italian marble shower enclosures, while the one in the attic has a wood floor and cement wainscot. There is a large billiard room in the basement with a brick fireplace, a servants' bathroom and the usual laundry, store rooms, furnace room, etc. The cost of the building was twenty-one cents per cubic foot.

In treating of the various essentials which combine to make "the house enduring,"

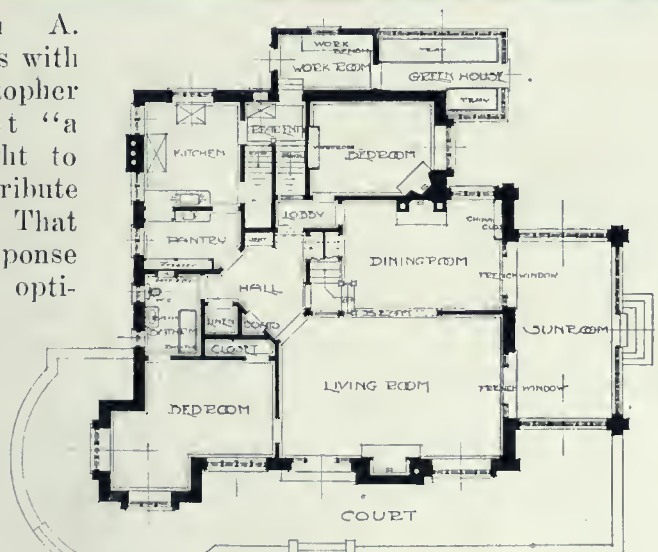


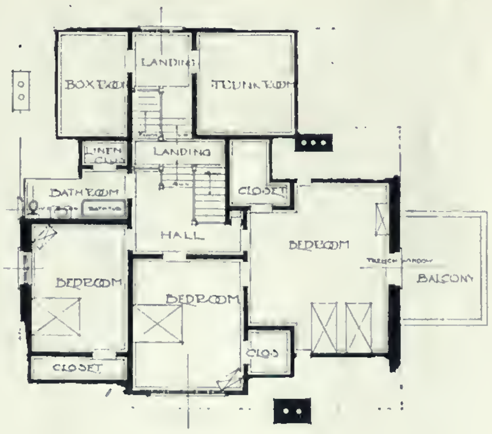


HOUSE NO. II. FIRST FLOOR.



HOUSE NO. III. MIMICO, ONTARIO.
CHADWICK & BECKETT, ARCHITECTS.



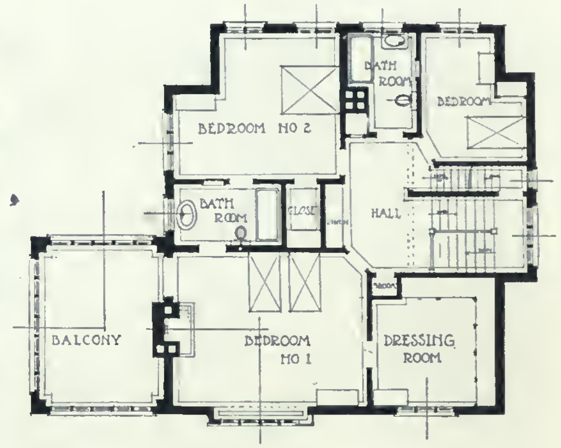


LIVING ROOM AND PLANS.

HOUSE NO. III.

Benjamin A. Howes agrees with Sir Christopher Wren that "a building ought to have the attribute of eternal." That the first response of our easy optimism to this is to point to the increasing tale of our fire-proof structures. But the accident of fire is by no means the only, perhaps not the principal, agent of building disintegration and destruction. Barring the hazard of earthquake, tornado, and flood, many fire-resisting buildings yield extensively to the tooth of time and of weather. Certain it is that the truly enduring house must add to fire safety many other qualities which are very deserving of study by those who plan a permanent home.

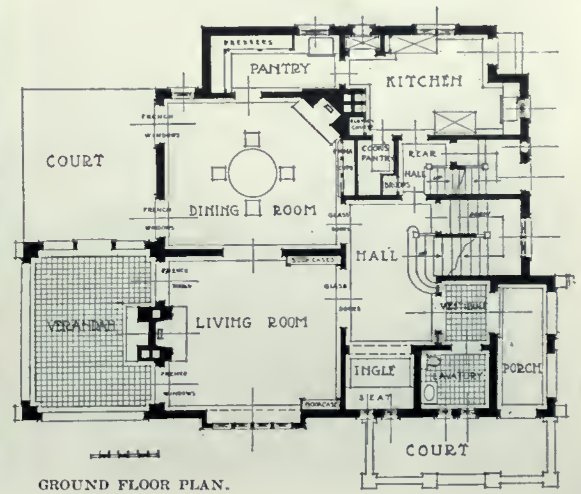
Endurance is after all, and in spite of theory, less a question of materials than of integrity of structure and protection against destructive agencies—rending movements, water penetration, and fire. The reason why reinforced concrete makes the most indestructible building is not that it is fireproof, but that it stands highest on all three of these counts. But protection against weather and against strains can



FIRST FLOOR PLAN.

HOUSE NO. IV. TORONTO, ONTARIO.

CHADWICK & BECKETT,
ARCHITECTS.



GROUND FLOOR PLAN.

result in great endurance even in a non-fireproof house.

The most universal and fundamental requirement for endurance is protection; and the two regions for most intensive protection are the foundations and the roof. In other words these are the two most important and most neglected parts of a house from the point of view of endurance. People think that in the cellar, at least, economy will not much matter. But the fact is that settling and movement in the foundations is the most fatal agency of destruction to the house as a whole. Cracks in walls about chimneys, displacement and rupture of pipes and wire connections follow inevitably. Deterioration of plaster and woodwork is often blamed on the materials themselves or their placing, when it is only the result of abnormal strains in the structure, due to movement in the foundations, or to the destructive effect of weather through the roof.

HOUSE NO. IV. DINING ROOM.

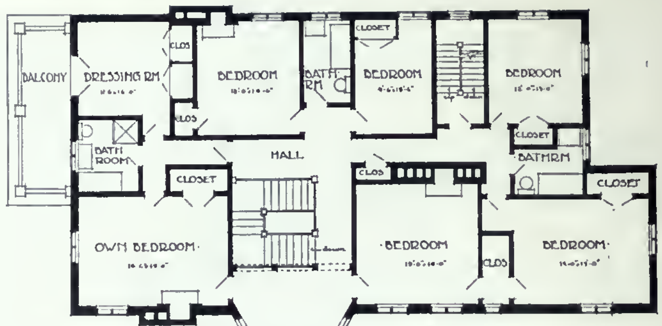
With the fireproof requirement, under some limitation of cost (shutting out cut stone, for instance) for the outer walls of the house, reinforced concrete, b r i c k, and rough stone (all furred with hollow tile), are all extremely lasting. Without the fireproof requirement, but with the demand for an exterior which needs no refinishing, the cypress siding or shingle, creosote stained, will be found the most lasting.

Whatever the material of walls, h o w e v e r, the danger point, and the firing line, too, of the house that shall be enduring, is the roof. Doubtless the roof materials most permanent in themselves are clay tile and slate. As for the stained shingle roof, everyone knows about what its average life is—longest, probably, in cypress, as the present supply of lumber goes.

But it is the conditions of protection that are fundamental, and to these the shape is very important. It may be said in general that the simpler the roof, the longer-lived, for the more dormers, hips, and valleys, the more weak spots. The timber roof—and ninety-nine out of a hundred roofs are timber below, even if slate or tile above—should be first of all closeboarded. Then, under slate or tile, should be two layers of reliable tarred or asphalted felt.

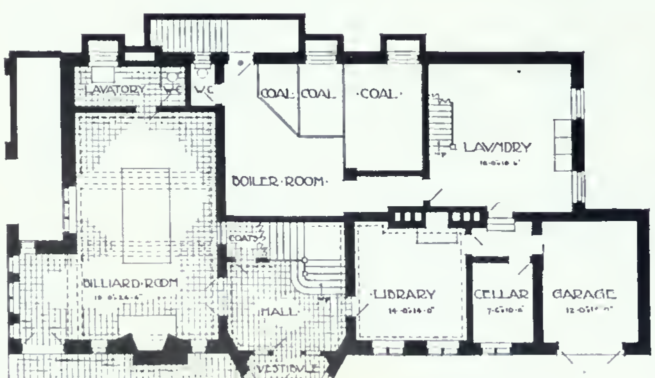
HOUSE NO. V. DINING ROOM.

HOUSE NO. V.
TORONTO, ONTARIO.

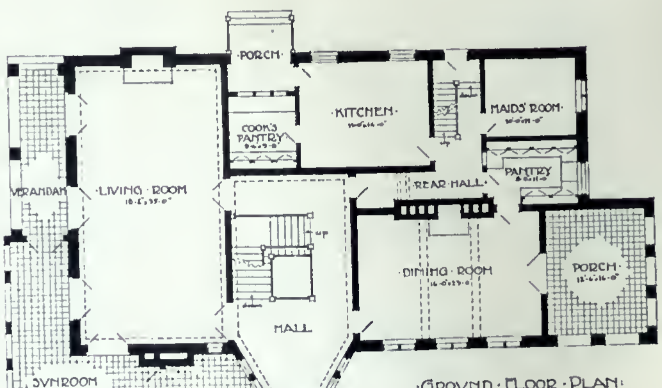


·FIRST· FLOOR · PLAN·

EDEN SMITH & SONS,
ARCHITECTS.



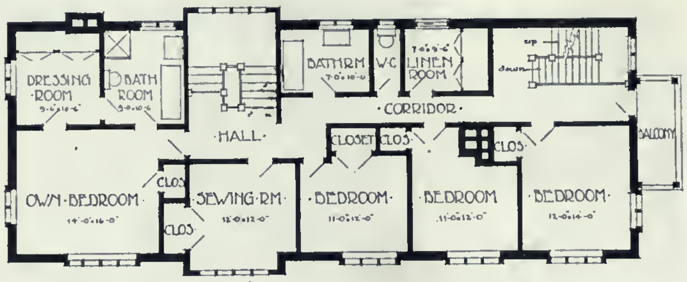
BASEMENT PLAN



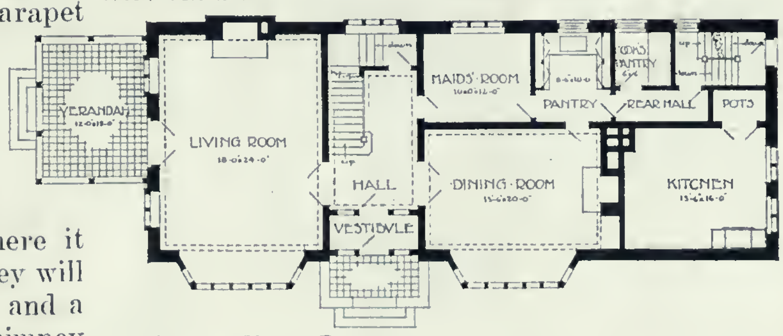
·GROUND · FLOOR · PLAN·

HOUSE NO. VI. TORONTO, ONTARIO.

EDEN SMITH & SONS, ARCHITECTS.



FIRST FLOOR PLAN:



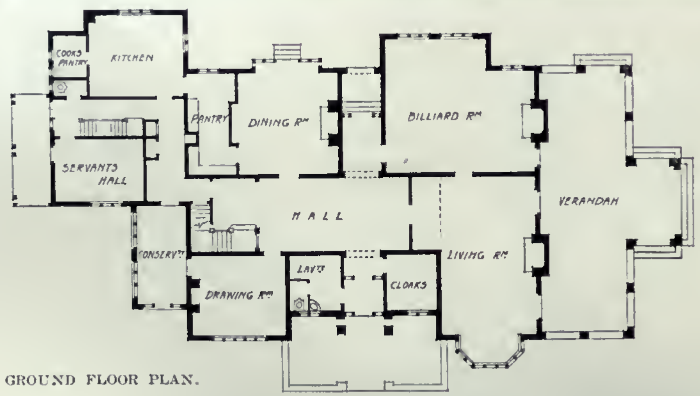
GROUND FLOOR PLAN

There are tiles of special shape for ridges and valleys; but when tile meets an opening or wall, or when slate, asbestos or wood shingles meet at an angle, flashing is necessary.

Flashing is the special protection provided at joints to make them water-tight, such as where the roofing meets chimney or parapet wall, or meets itself at ridges and valleys. While flashing is done with everything from tarred paper to tile, the universal and the only material for enduring work is copper. Tin or galvanized iron will rust out in spite of painting.

The weakest link in your roof is where it meets the chimney. The enduring chimney will be of brick, with burned clay flue lining, and a slab of concrete cast in place for the chimney cap. This keeps water out of the joints. Look at the jerry-built houses you pass, and see how many chimneys show mortar washed out of the joints of the top bricks. Where bricks are laid in lime mortar you see, the acids from the smoke attack the mortar, and loosen the bricks, and it is principally to prevent those acids washing down that the wide cap is necessary. Better still is a big flagstone cap, with a hole cut in the middle.

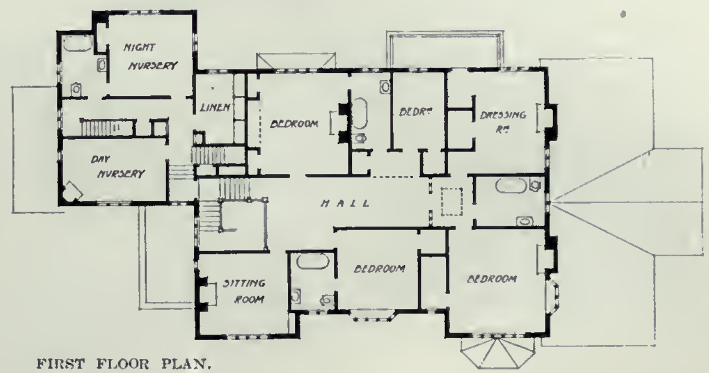
But to return to our flashing. In its simplest form it is a piece of metal lying over the edge of the roofing and turned up on the chimney and built into a joint. But this does not allow for the go-and-come of the structure, and sooner or later pulls away somewhere. For enduring



GROUND FLOOR PLAN.

HOUSE NO. VII. TORONTO, ONTARIO.

ALLAN GEORGE & MOORHOUSE, ARCHITECTS.



FIRST FLOOR PLAN.


HOUSE NO. VII. LIVING ROOM.

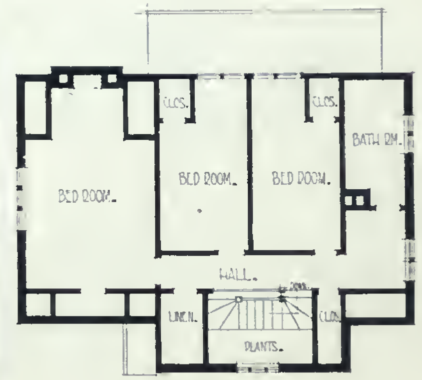
work, counter-flashing is necessary. The chimney flashed and counter-flashed can give to a hurricane, the lapping allowing for such strains. The counter-flashing must be built into the chimney, and turn up again on the inside. This keeps dampness from following the chimney down through into the interior plaster by lamp-wick action,— a destructive consequence of skimped flashing.

In the matter of roof drains (gutters and leaders), copper is also essential. The best gutter is hung from the eaves with a copper apron running back under the slate or tile. This is a protection against firebrands lodging in the gutter, the only way the wooden underpinning could catch fire from the outside. It also provides for a condition common in regions of large snow-fall and continued cold. Snow melts at the apex of the roof, where it is warmed from the inside, and water runs down and freezes at the eaves, forming an ice dam, then backs up against this under the lower slates, and comes through.

The leaders or vertical rain-pipes should be of copper and corrugated, better square than round. Not many people see the reason for this until they stop to think that when such a pipe freezes, the square contour allows the sides to bulge out, just as do the corrugations. They will flatten out into a cylinder, giving the maximum content, without breaking. The leader should enter a cast-iron pipe at least two feet above the ground, connected with the underground drain-pipe. Windows are a much disputed point for the enduring house. The steel casement is indispensable to the fireproof house, and most durable for the non-fireproof. The better grades are perfectly weatherproof, require fewer repairs than the double-hung type, are more favorable to ventilation—and more resistant to over-draping!

The last weak point of the house exterior is the porch floor. This, to be lasting, should be of brick, tile, or cement (cement or tile upstairs), with an imperceptible slope away from the house. If the sleeping-porch must have wood underfoot, this can be obtained as a sort of removable wooden carpet, in sections, on top of the cement.


HOUSE NO. VII. HALL.



FIRST FLOOR PLAN.

HOUSE NO. VIII. TORONTO, ONTARIO.

LINDSAY, BRYDON & GREIG,
ARCHITECTS.

GROUND FLOOR PLAN.

Even if the outside of the house be invulnerable, verily the cellar is its Achilles's heel. Nothing can bring black despair to the suburbanite like a creeping insidious trickle behind his good stored potatoes or his furnace pit. And the worst of it is that the cellar that once develops a leak is hard to cure. To be enduring, it should be built staunchly from the first, somewhat as follows: First of all, drains should be laid about the foundations to intercept ground water. If it appears that the ground water level is high, it is better to build the cellar floor above the water-level and then terrace, than to go into the costly and elaborate waterproofing of pitch and felt that will be necessary to make the cellar a watertight bowl. The cellar walls should be of solid concrete, rubbed smooth, with a band of reinforcement run just below the first floor, especially where openings occur. In all cases a separate concrete foundation should be built under the chimneys. Further reinforcements is not needed except in the event of unstable foundations.

HOUSE NO. VIII. HALL.

Ventilate the cellar by a flue from the waterheater, so that a continuous slight heat in all seasons will draw the air upwards, preventing damp and consequently rusting. Illuminate the cellar by means of a vault light, as this form of a cellar window is not easily broken. Though not strictly required, a cool room partitioned off from the warm space and ventilated from without, will furnish ample refrigeration for stored apples, preserves, vegetables, etc. If possible the room should project out from the cellar.

The main scheme of the modern cellar is to accommodate the furnace and plumbing connections, for which purpose it need extend only under part of the house, provided a proper concrete base is laid. Every client is interested in the question of the most enduring heating plant. Probably in this form the problem is misleading, since all good systems have a long life and need little repair. It would be better to seek one which is least destructive to the other materials of the house, and accordingly to certain critics it would seem that hot water is advisable as giving a gentler and more equal heat. With some indirect heat for the living and dining rooms, by means of air passed through a dust straining chamber; together with fireplaces in living and dining rooms, air conditions are nearly ideal. Hot air is universally accepted for a small house that is often closed in winter; or for a large summer house, because of the danger and destructiveness of frozen pipes. To-day it is

HOUSE NO. VIII. LIVING ROOM.

LIVING ROOM.

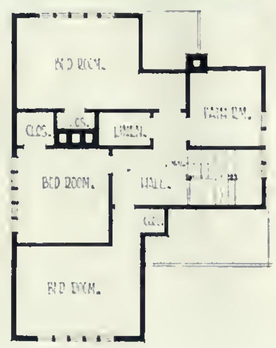
FIRST FLOOR PLAN

HOUSE NO. X.
TORONTO, ONTARIO.

BURKE, HORWOOD
& WHITE,
ARCHITECTS.

SECOND FLOOR PLAN

HOUSE NO. IX. TORONTO, ONTARIO.
LINDSAY, BRYDON & GREIG, ARCHITECTS.



commonly believed that hot and cold water pipes above the cellar ceiling should be of brass, standard iron pipe size, tinned and nickle-plated where exposed; that drain pipes above the cellar floor should be galvanized wrought iron. Lead pipes are subject to sagging, pocketing, freezing, and are liable to be gnawed by rodents in search of water, while galvanized steel is liable to pitting and rusting. The piping layout should be such that distribution takes place in the cellar and runs straight up through the partitions. As for the fixtures in the lavatories, toilet bowls and tanks, those of vitreous are preferable. The enduring pantry sink is of white enamel with ash drain boards hinged from the wall; the kitchen sink may be porcelain or enamelled iron.

Far wider in importance is the interior structure of the walls, floors, and stairs, together with their finish. While not fireproof the frame structure may be very durable if built in the fashion of our grandparents, and prove to be "fire-delaying" by having all pockets and runways filled with mineral wool in addition to four feet of mineral wool or cinder concrete behind the lathing on each floor. Running electric wires of all kinds in conduits will further decrease fire hazards, all of which is problematic; electric fittings sometimes pulling apart owing to the shrinkage of wooden supports, and where fire protection depends so much upon hidden work, some of it may be slighted. The most enduring house will have an interior floor and stair structure of reinforced concrete or of hollow tile in concrete. While partitions will combine endurance and convenience by being laid upon hollow tile or plaster blocks. With the present tastes in interior decoration, a patent self colored plaster is probably the most enduring finish for walls; ceramic tile, terrazzo, composition flooring and hardwood being practical for the various needs of floor materials.

Domestic Architecture and Sanitation

WALTER CAVE, F. R. I. B. A.

IT is generally supposed that an architect's connection with sanitary conditions of a house is summed up in the one word, "drains." Whilst there is no doubt that he is primarily responsible for these important and necessary adjuncts to all dwellings, I venture to think that there are other matters which come within his province which have a great deal to do with the health and comfort of the inhabitants, and I shall endeavor to point out some of those details in the design of a house for which he is responsible, and which, if not carefully considered from the outset, are much more difficult to rectify in the future than the actual drainage.

Dirt of all kinds is undoubtedly one of the greatest enemies to health, and its evil effects can be largely avoided by taking due precautions in designing the details of a house and its fittings. For instance, the floors of sculleries, kitchens, larders, bathrooms, water closets, etc., which it is usual to make of some hard impervious material, such as tiles or cement, should be made to join the walls with a hollow angle, and not at a right angle which no broom can clean, so that in the constant washing they require a rim of dirt is not allowed to remain all round the rooms.

It has been argued that cement floors are inclined to become dusty with wear and are cold to stand on. As an alternative, I know of a distinguished architect who lays these cement floors in the offices of his houses, and after they are thoroughly dry has linoleum or a cork carpet glued direct to the cement, with good results.

Hardwood floors, such as oak, teak and maple, are better than deal if they can be afforded, but where deal boards have to be employed, as is usually the case in bedrooms, they should not be washed with a scrubbing-brush, as this tends to make the floors swell and then contract, so that the joints eventually become wide open, and, if for economy's sake they are not tongued or otherwise jointed, the water, and with it the dirt, is deposited on the top of the plaster ceiling of the room below. Anyone who has seen the floor boards removed from a floor with "butt" joints will appreciate what I mean, and shudder at the accumulation of dirt, which is a menace to health. If deal floors have to be used, even of the cheapest sort, I think the best treatment is to stain and wax polish the floor boards so as to ensure a hard surface, which should be wiped over with a damp, not wet, cloth.

Another important point is the window, generally the only means of ventilation, both its position in the wall and its construction. From the point of view of health the top of the window should be near the ceiling, and that part nearest the ceiling made to open easily. If the window is a sash one, known in France as the guillotine, this is easily achieved, but with the casement it is not so simple. Should there be a transom, there are many methods of opening the upper lights involving gear, or cord, or a pole, but all those appliances are of a more or less complicated nature, and as these lights are usually inaccessible, care should be taken to select the simplest form.

The cleaning of windows must not be overlooked, and the casements which have a hinge halfway along the sill so that they open both outwards and inwards are very easily managed, and unless in a very exposed position are watertight.

Again, the position of the window in relation to the door, bed, and fireplace is a matter that often seems to be left to chance or entirely subordinated to the exterior elevation. How often do we find, especially in hotels, a fair-sized bedroom, in which it is impossible to put a bed without its being in a direct draught, a very serious mistake which is often impossible to correct. Speaking of the position of bed and window reminds me of a certain client of mine who found fault with a bedroom I had planned for him, where the bed was against the wall at right angles to the window, an ideal position, I thought, which I had taken some pains to arrive at. He complained that he did not like facing the light. I explained that I thought this was not the case, and that he would have had cause for complaint if the window had been opposite the foot of the bed. His reply was that he did not sleep on his back, but on his right side! This was a view of the matter which was new to me, and I now consult my clients on this point beforehand.

Dirt and dust can be minimized nowadays to a large extent by the use, where possible, of electric light, which not only does not deposit a dirty layer on all available surfaces, but from its simplicity and effectiveness can light up many of the dark corners which we find in old houses before it becomes almost universally used. There is also the vacuum cleaner, which has now become a simple and economical method of getting rid of dust in the household, and if installed at the very beginning of things not an expensive luxury, and I firmly believe will soon be considered a necessity in every house.

Another distracting cause of dirt is the hot-water pipe, which we cannot do without. The greatest care should be taken in casing it and covering it with non-conductive material, though this latter is often a horrible mass of dirt, and only hidden by a thin casing of wood, which is usually cracked at all its joints, which are in perpetual mourning with their black edges. How can this be overcome? Firstly, what is the cause? The pipes being hotter than the wall of the room, there is a constant current set up between the hot and the cold surfaces, and where this takes place the dirt floating in the air is deposited on the rough edges between.

Another instance of this, and one which is not always understood, is that one often sees a white line in the corner of a room, especially where the inner wall joins the outer. This again is due to two surfaces of different temperature. The outer wall, varying with the outside temperature, is generally several degrees hotter or colder than the inside walls, hence a currrent of air is set up between the two, and, as a current does not enter an angle with the precision of the paperhanger, it shirks the actual corner itself and deposits the dirt on either side, leaving, as I have said, a white angle innocent of dirt. This, to a large extent, can be avoided by again a precaution in the first place. A good hollow outer wall, with its air-cushion, is an excellent non-conductor, and when the two walls are the same temperature no draught is set up. Draughts are not only dangerous and disagreeable in themselves, but they are always laden with dust, which is deposited, as I have shown, in all kinds of places —doors, keyholes, badly-fitting windows, etc. The greatest care should be taken with all joinery in a house, and here again the architect comes in, and money spent on good joinery is well spent.

The amount of dust that can be collected in book-shelves is extraordinary, and in towns bookcases should have glass doors; but this is, to my mind, objectionable, and I think a great deal of the pleasure to be got from books is done away with if doors have to be opened before a volume can be reached.

Amongst the many details in a house that require special attention are the sanitary fittings. Baths, for instance, should not be cased in, and should stand clear of the wall, so that they can be easily cleaned, and should be carefully selected, so that they empty themselves quickly and thoroughly. The same also applies to lavatory basins and sinks. Cupboards frequently placed under both the latter fittings should be avoided, as they are generally receptacles of all kinds of rubbish which collects dirt and dust.

Wardrobes and cupboards should all have a floor of their own raised a few inches above the floor of the room, not only to facilitate cleaning out, but to prevent the dust on the floor entering under the doors whenever the room is swept.

Dust traps should be avoided as far as possible, and can be, with care and thought in designing a house and its fittings, not to mention furniture.

These remarks apply more particularly to town houses, where dust is ever present; but even in the country this cannot be avoided altogether, and the same care in designing is required. The open fire, almost a religion amongst English people, is responsible for a great deal of this dust; but the more modern kinds of slow combustion grates, with a grating through which the ashes fall into an enclosed receptacle, can reduce this dust to a large extent, and are certainly a most economical form of the open fire. Gas fires and gas cooking stoves are gradually superseding the open coal fires, and are cheap and efficient, and overcome many of the above objections and help to minimize work, which is, needless to say, an important point in domestic economy to-day.

Cupboards, the delight of womankind, should be lit if possible. The opening of the door so as to let the light in is often neglected.

The old houses which delight the housewife, with their deep cupboards, which were usually hideous dust-traps, were often due to thick walls and to bad planning, or rather to no planning at all. The rooms seem to have been arranged quite haphazard, with ill-lit passages at various levels. All this can be rectified with care in the first place. I heard of an architect who told his client's wife that he always began his plans with the cupboards and then fitted his house round them!

The careful planning of a house with a view to economizing service is becoming more and more important, and the inside lines of communication between the various parts want careful attention. Again, the position of the larder is very important from the point of view of health. How often do we find it placed between the servants' water closet and the coal-hole, and the dust-bin under the window outside! Care and experience in planning are most necessary to overcome such difficulties.

Again, the storage cisterns for drinking and ordinary domestic water require special attention. They are frequently placed in the roof, which in itself may or may not be properly boarded and dust-proof. Generally it is not, and the condition of these cisterns holding the drinking water for the house is disgusting. They should always be properly cased and covered in, easy of access, and lit in such a way that they can be readily cleaned.

DETAIL OF MAIN ENTRANCE.
HOUSE AT TORONTO, ONTARIO.

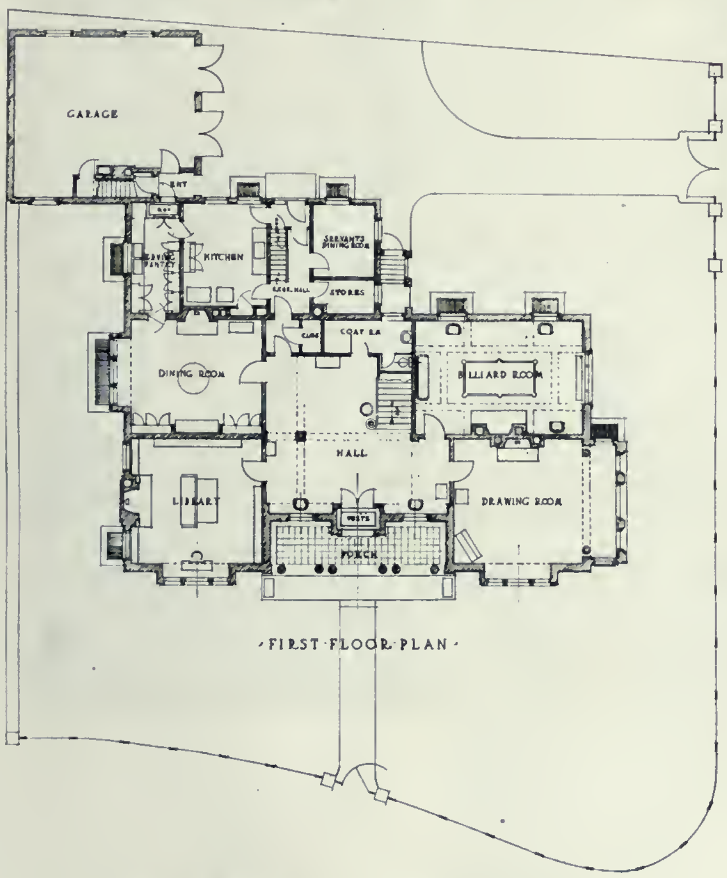
BURKE, HORWOOD & WHITE, ARCHITECTS.

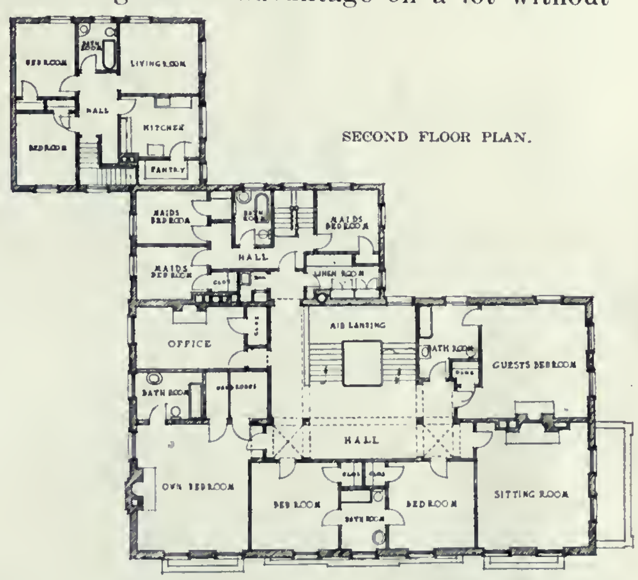
House at Toronto, Ontario

BURKE, HORWOOD & WHITE, Architects

AMONG the problems with which an architect has to deal, there are probably none of greater interest to the profession and public alike than house planning; this is particularly true of Canada, where so many people own their homes, and where, on every side, are evidences of progress and development along sane and sensible lines of domestic planning and building.

It is an undisputed fact that the most successful house plan is the one built around and expressive of the home life of the family; it is this feature that makes for the homelike atmosphere so characteristic of English domestic work, and one that until recently has not been appreciated by our American neighbors, who are now, however, becoming, so to speak, very much more at home with their domestic work. Proof of this





is to be had in the many excellent examples of recent work which show serious thought, have a delightful atmosphere, and are carried out with a feeling of restraint which has resulted in a distinct individuality. This is due in a great measure to the advance and improvement of architectural training and its influence on the public. Restful simplicity and an appreciation of the simpler and more refined forms has taken the place of over-ornamentation, and that striving for effect at the sacrifice of utility and economy which was errant in a great deal of the work up to a few years ago in the various cities.

Probably in no other city on the continent has domestic work attained more variety or a greater measure of success than in Toronto, which has frequently been referred to as a "City of Homes." Our residential and suburban districts have offered many opportunities for the development of house work on a high standard, but while our homes have, as a general rule, been well planned and well built, we are as yet in the early stages in the study of the development of properties and the possibilities of landscape work. To locate a house upon a site without due regard to its setting and surroundings, is an injustice to both the house and to the site. Occasionally a well-designed house is placed to great disadvantage on a lot without any apparent consideration having been given to the setting which such a house requires and deserves. A bit of green lawn with shrubs, plants or a few flowers placed at proper points, will do much to relieve a house of its bare look. The value of trees on a site should be carefully considered, as they form a pleasing break in the sky line, soften and lend color to the landscape, and give character, scale and outline to the building.

The proper decoration and furnishing of the house is just as important as the general design. It is rather a matter of considerable regret that many clients seem to think the services of an architect are not required beyond the actual planning and building of the house itself, and without wishing to unduly criticize the ability and taste of the client in such matters, it seems essential that the architect should be consulted on the decoration and furnishing of the building which he has designed. Failure to do this is often due to a desire for economy, in the belief that architects have expensive tastes, but it it probably more often due to the client's desire to be left alone to do as he or she pleases. How many houses have suffered in the decoration and furnishings through this policy? It may here be pointed out that most architects of any standing have a sincere pride in their work and are naturally concerned in anything that adds to or detracts from the appearance of their building in the way of furniture and decoration. A good house can be dropped to the commonplace by lack of attention to its furnishings, but on the other hand, a poor house, architecturally, may be lifted considerably and made quite acceptable by proper and suitable decoration and furnishing.

GENERAL VIEW OF EXTERIOR.

A consistent endeavor by the architects to make the plan and furnishings in complete harmony is quite manifest in the accompanying illustrations of the James Ryrie's house.

Situated on a lot of irregular shape, following the curved and pleasing outlines formed by the intersection of Chestnut Park road with Roxborough street, the structure is in every way suitable to the site, which forms the apex of an interesting group of properties at one of the principal gateways to western Rosedale. Designed on Georgian lines, and carried out with a feeling of restraint, the house possesses that quiet, homelike atmosphere which is so characteristic of the style and expressive of the owner's purpose.

The broad front, featured by a dignified loggia, is approached from Chestnut Park road through an arched gateway. The walls are built of deep red stock brick, laid up English bond, with large white motar joints, the trimmings and features being executed in a grey limestone, which, combined with the white woodwork and green shuttered windows, forms a pleasant and attractive color scheme, that is further enhanced by the foreground setting of trees and green lawn, enclosed by an iron fence of effective and suitable design, the entrances and driveways being flanked by well-proportioned stone piers.

The plan indicates a well studied scheme, direct in its arrangement, the rooms being grouped around a large central hall, which forms the keynote to the general scheme, the feature being a broad stair with spacious landings, which, owing to their size and location, lend themselves admirably to decoration.

On the ground floor, to the left, are the library and dining-room, and on the right the drawing-room and billiard-room, the arrangement being such that the privacy of each room is readily preserved. The size of these rooms, and the manner in which they open up on the hall, permit of good circulation and interesting vistas. The service portion is approached from the main hall through a lobby to the service hall, which has a back entrance from the court at the rear.

On the left of the service hall, and adjacent to the dining-room, are the kitchen and serving pantry, and on the right are the servants' dining-room and stores. Facing south on the rear court, and connected to the service wing, is a large garage, with accommodation for two cars and with chauffeur's apartments over same, consisting of living-room, kitchen, bedrooms and bathroom.

DRAWING ROOM.

The arrangement of the second floor is similar to the first. The bedrooms open off the main hall, the servants' quarters being at the rear, approached by a separate stair. The staircase hall on this floor is flanked by a corridor treatment, the ceilings being groined at the intersections. The third floor contains four large bedrooms, a bathroom and a storage-room—the service wing being stopped at the second floor—and the hall is featured by a pipe organ, the case being of special design to conform with the architectural character of the surroundings, and opens out on to the right side of the hall overlooking the stair. The organ is operated from a console located on the south side of ground floor hall opposite the main entrance.

The interior finish, decorations and furnishings are carried out in a manner that indicates careful consideration, every detail being studied with a view to preserving the architectural character and quiet homelike atmosphere. The main hall is finished in white enamel, the doors and stair trim being in mahogany, with furniture to match. The walls are hung with a patterned paper of suitable design, the field color being buff and the ceiling and enriched cornice is finished in a soft cream tone. At the first landing of the main stair is a stained glass window designed in keeping with the general architectural treatment. The drawing-room is finished in white enamel, and is featured by a typical Georgian fireplace, with bronze lining, Grecian marble facings, and a delicately detailed trim, enriched with simple and effective carving. The large bay to the south is screened by side columns and pilasters. The ceilings and enriched cornice are finished in old ivory, and the walls are hung with a pink-toned pattern paper. The window hangings are in French grey. The library, with its built-in bookcases surrounding the room, is finished in mahogany, with furniture to match, and is featured by a large fireplace with soft grey tile facing, and polished steel grate and fittings of Georgian design. The walls are covered with Japanese grass cloth of a buff tone, and the hangings and rugs are of blue with gold relief.

The dining-room is panelled to door height, and the woodwork is finished in white enamel, the west side being featured by built-in china cupboards and sideboard recess, and the east side by a fireplace of excellent proportion. The furniture is mahogany. The billiard-room is panelled to a height of 6 feet and finished in

LIBRARY.

BILLIARD ROOM.

quarter cut oak, with a large brick fireplace on the west side. The ceiling is divided into panels by shallow plaster beams, the centre panel being vaulted.

The bedrooms are of large size and are tastefully papered, the woodwork being finished in white enamel with mahogany doors. The fireplaces to the principal bedrooms are of simple design, well detailed and of a refinement and scale in keeping with the general treatment. The sitting-room on second floor is finished in fumed oak, and is featured by a large fireplace flanked by pilaster trim. The bathrooms are tiled and fitted in the most modern manner, with plumbing fixtures of the latest design.

DINING ROOM.

In the basement is a laundry with outside approach, boiler rooms and general storerooms. The house is heated with hot water, circulating from boilers set up in twin arrangement, and cost when completed approximately twenty-five cents per cubic foot.

In referring to the sanitary science on the comfort of country homes, H. Freyberg, of England, furnishes the following items, which may prove of benefit in connection with work in the Canadian field: The importance of elevation, position, aspect and subsoil of the site can scarcely be over-rated. Rarely, if ever, does the architect find a site ideal in all respects provided for his use. Fortunate is the professional man who is allowed to exercise an actual selection between two or more alternative positions, but in so many cases the client is already bound down to one particular spot before the architect's advice is sought, and even where he is able to advise, his decision must of necessity be influenced by many factors in addition to that

MAIN HALL LOOKING NORTH-EAST.

of simple sanitary suitability. The duty of the architect is, after careful examination of the site with its particular difficulties, to make up his mind to deal with them by skill and forethought, so that the result shall give satisfaction to his client and reflect credit on himself, bearing in mind that the greater difficulties there are to overcome the more interesting the piece of work becomes. Should the architect be allowed much scope in site selection then he should bear in mind that an elevation of moderate height possesses many advantages, while extremes in either altitude or depression present many disadvantages, possibly attended with discomfort to the future occupants of the house. Sunshine is absolutely indispensable, and a site upon which the sun's rays do not shine very much must be eschewed, unless it is capable of improvement by felling timber or the removal of other obstructions to light and air.

In the country, if there is no street to face, the principal front can generally be constructed towards the S.E., where the morning room, dining-room, library and entrance hall should be. This will leave the S.W. front for the drawing-rooms, boudoir, conservatories, etc., the kitchen and domestic offices will be most suitably placed on the N.E. side, and then, with a large central hall and grand staircase, the planning will be completed by placing the sanitary arrangements on the N.W., if possible in a wing to themselves. This arrangement will allow the sun to get right round the house during some parts of the year at least. The principal views must be taken into account in order that the best may be made of both aspect and prospect, but avoiding, if possible, a due north and south arrangement.

MAIN HALL LOOKING SOUTH.

COTTAGES, GARAGE AND STABLE BUILDINGS, ARMOUR HEIGHTS, TORONTO, ONTARIO

ALLEN GEORGE & MOORHOUSE, Architects

THIS group of buildings is erected a short distance from the big house now being built on twenty acres of property above York Mills. The pair of cottages are occupied by the gardener and cow man. The garage, 50 feet long, coach house and stabling are arranged around a paved court yard, after the English plan, the cow stables and kennels being at the back abutting on a large meadow, while extensive chicken houses and runs are planned with a southern aspect behind the garage. There are stable mens' and helpers' rooms with a bath above the garage, and a heating plant below it which takes care of the cottages, garage, coach house and harness room. Each cottage contains three rooms on ground floor, three bedrooms with a bath above, and a laundry in the basement. All external walls are of hollow tile construction, rough casted; the roof being shingles, stained brown.

Roof Coverings

R. E. LINDSAY, B. A. Sc.

THE builder of to-day realizes more and more the necessity of permanent construction. To obtain this end he must give careful consideration to the selection and application of those parts which are to protect the building and its contents from the action of the elements. In the selection of materials, the elements of chief consideration are:

1. Resistance to weather. The primary essential of roof coverings is that they successfully withstand the attacks of rain, wind, heat, cold, snow and ice. The joints of the covering material should be so constructed as to permit of all expansion and contraction consequent upon variations of temperature. They also should not be retainers of water, since this on freezing would cause their rupture. The roofing material should not absorb too much moisture, for if frozen in this condition it would mean its failure. To satisfy all these conditions not only must the surface be impervious, but the joints must be constructed so as to prevent the failure of the covering at its connections.

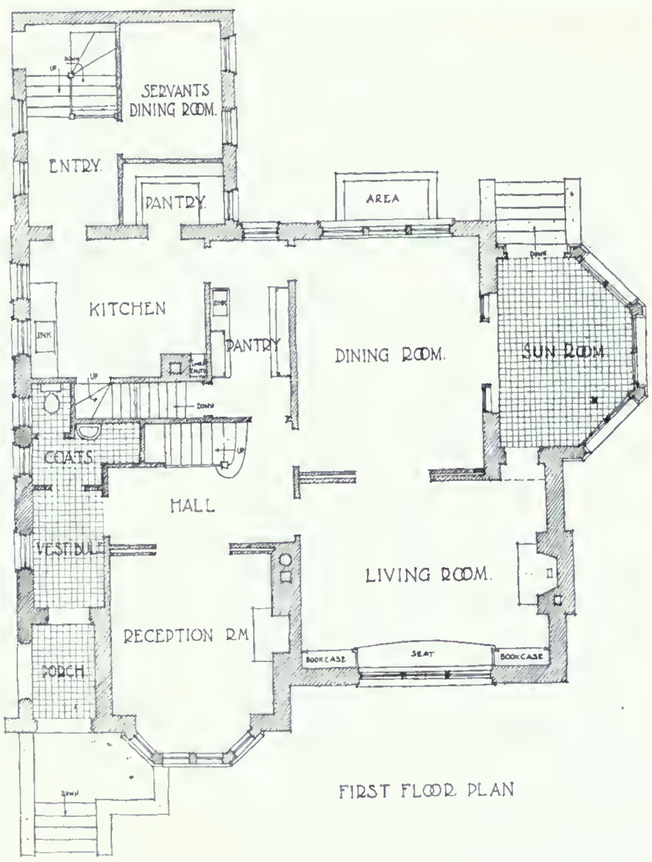
2. Strength and Rigidity.—In addition to acting as a covering and enclosure, the roofing material should be capable of bearing its part of the imposed loads and transfer them by arch or bending action to the trusses or walls. Under ordinary conditions the covering should be strong enough to withstand without excessive deflection, the wind pressure, snow load and any accidental live load which it may from time to time have to endure. The wind load on roofs varies for different pitches and with the amount of exposure of the roof. The snow load depends upon the latitude of the place where the building is located, the pitch of roof, and to a certain extent on the kind of covering. In addition to carrying the imposed loads the covering should, if necessary, be capable of contributing to the lateral stiffness of the building. The connection of the covering to the purlins or rafters should possess sufficient resistance to prevent its bodily displacement by the wind and such qualities of resistance as conditions necessitate.

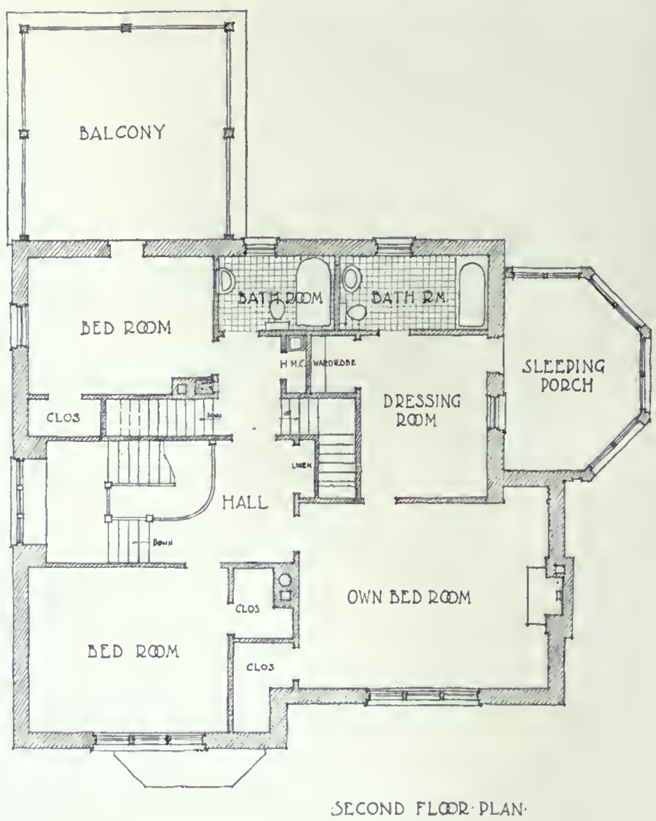
3. Fireproof.—While resistance to fire is a requirement which varies somewhat with the character of the building and its location, the importance of it generally may be more forcibly impressed by the treatment under this heading. Moreover, nearly all roofs are more or less subjected to the action of fire, and the use of a fire resisting roof on any building will affect a saving in the matter of insurance. A large percentage of the enormous fire losses on this continent are due to exposure; that is, the fire is spread from one building to another. One of the most important factors contributing to the spread of such fires is the combustible roof. The report of the National Board of Fire Underwriters on the San Francisco conflagration emphasized strongly "the importance of fire-resisting roofs," and similar comments may be noted in reports on other conflagration. As a result, the use of fire resisting roofs in the central parts of many cities is now obligatory. In designing a standard to afford a means of classifying roof coverings independently of the roof structure upon which they are applied and according to their fire resisting value, the National Fire Protection Association has considered the following: (1) inflammability of the roof covering; (2) fire retardent properties, (a) ability to resist spread of fire on the surface, (b) protection afforded the roof structure against exposure to high temperatures; (3) blanketing effect upon fires within buildings; (4) flying brand hazard of the covering. Outside of the ordinary dangers from fire some roofs possess an advantage over others in the case of lightning. "Roofs constructed of good conductors of electricity do not require any other protection against lightning, as they serve to scatter the currents and thus dissipate their energies without danger of actual ignition."

4. Durability.—A good roof should last without repair as long as the building it covers stands without repair. It should wear well, resisting abrasion from weather. Thoroughness in the preparation of the flashings, around openings and other parts subjected to special wear is of vital importance. The thickness of material used at these points should be such as to provide sufficient resistance.

5. Least Expense. The roof covering chosen for a certain building should be that which in the ultimate analysis gives the greatest service for the longest time at the least expenditure, including original cost and maintenance. Herein lies the necessity of careful selection. The first cost may be low and the maintenance cost high. "The annoyance and indirect expense occasioned by leaky and short lived roofs is rarely compensated for, by any possible saving in first cost. It is the duty of the builder to balance the factors of first cost and maintenance computed on the probable life and service of the structure.

It is obvious that no one roofing material will be satisfactory to cover all classes of buildings. Attention must be paid to the uses for which the structure is intended and to its temporary or permanent use, as also the effect on the appearance of the building.—*Applied Science.*





HOUSE NO. I., WINNIPEG, MANITOBA.

JOHN D. ATCHISON & CO., ARCHITECTS.

Houses at Winnipeg, Manitoba

FRANK N. RUTTAN

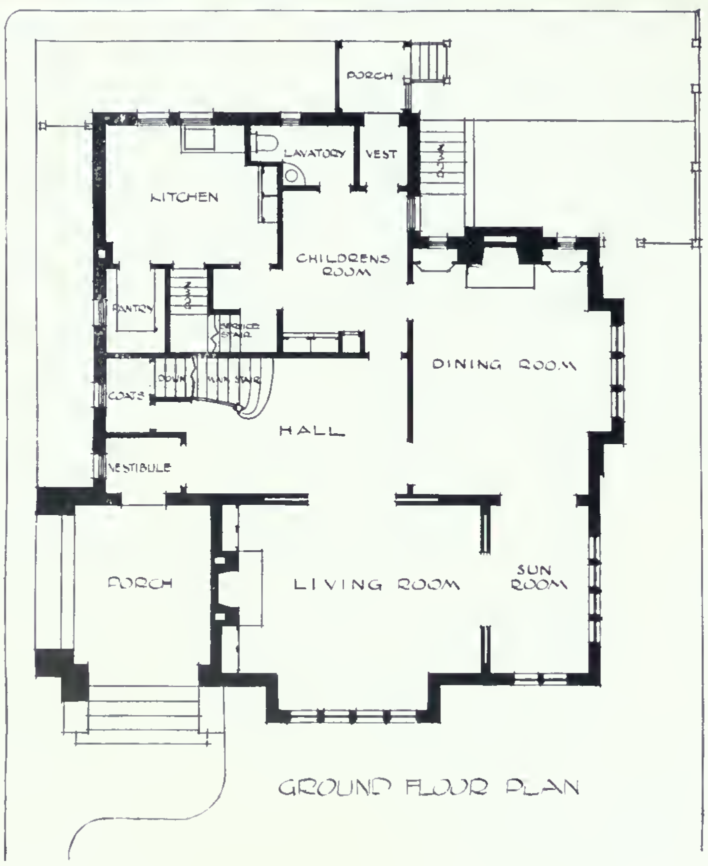
THE houses illustrated in this group range in cost from $20,000 to $25,000, and give a good indication of the type of medium sized residence being erected in Winnipeg at the present time. In all of these examples is evidence that the architect not only endeavored to produce an economical and well arranged plan, the first consideration in a house of this class, but he also has been able, through the co-operation of the client and the extent of the appropriation, to produce a design of artistic merit, carried out in materials of high quality and of a character in keeping with the desire to build a substantial home, unpretentious and in perfect taste.

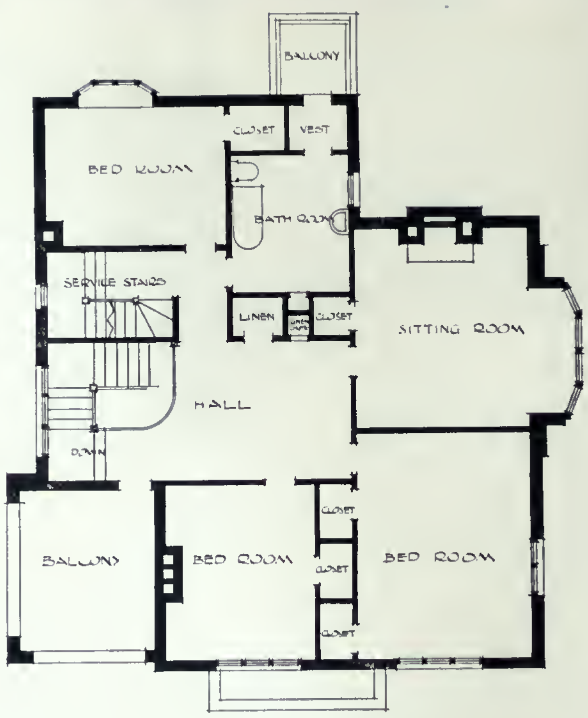
In any city you may notice houses by the score whose chief claim to attention is the multitude of ideas, or one might more properly say "stunts," with which they have been loaded, until they fairly seem to groan under the burden. As public taste develops under proper guidance, the simple, well-proportioned house is happily more frequently met with, while the house of countless unrelated and ill-proportioned parts gradually gives way. Not the least of the influences which guide the public to an appreciation of good architecture has been the desire for and study of old furniture, the best types of which combine many of the good qualities of a well-designed house, the abstract qualities of which are more readily understood from the furniture than from the house, which is by nature more complicated.

HOUSE NO. I. LIVING ROOM.

House No. I.—Set well back from the street line on a wide lawn, a quiet and restful appearance is presented by this house, due largely to its simple lines and the harmonious combination of tapestry brick in the walls and the well blended slate roof. Bedford stone is used in the base, entrance and corbels. Together they produce a very satisfactory color scheme. The rooms are not large, but are well arranged and well proportioned. The upper floor also is well arranged and presents all the essentials necessary to produce a satisfactory bedroom floor. In the roomy attic are located servants' bedrooms and bathroom. The entrance porch is paved with tile, as are also the vestibule and coat-room beyond it. The hall is finished in oak, and is lighted by a large, lead-glazed window on the stair landing. The living room has a mahogany cornice and trim, and contains a large fireplace and built-in bookcases, with a window seat between them. The dining-room, with the sun-room off it, is well placed to obtain the morning light, and is, perhaps, the most successful room in the house. The woodwork is white, and the plaster work in the ceiling very agreeably executed. The bedroom floors are finished in white, with wardrobes in the principal bedroom and dressing-room.

House No. II.—This dwelling is interesting from a structural point of view, in that it was probably the first house in Winnipeg to be constructed of hollow tile, interlocking tile having been used with a facing of rough face brick in dark tones. The gables and oriel windows, half-timber and wide verge boards are typical of the old English type on which the house is modeled, the ensemble being interesting, both in composition and detail. In the lower storey the groups of casement windows dressed with stone are also in keeping, and add much to the appearance of the interior. The casement sash and frames are of steel of English manufacture. The living-room, dining-





HOUSE NO. II., WINNIPEG, MANITOBA.

JORDAN & OVER, ARCHITECTS.

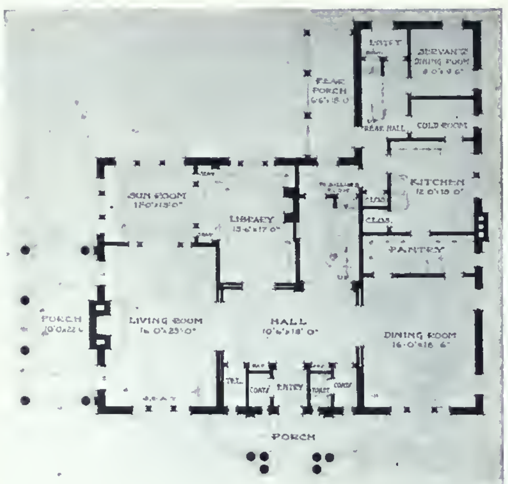
room and sun-room are nicely placed in relation to one another and to the hall, which is quite large. This portion of the house as well as the upper floor hall, is finished in oak, the sitting-room in fir. Between the kitchen and the dining-room is placed a small room, planned chiefly for the use of the children, who may use it as a dining-room. Entrance is had from the rear entry, and the upper storey reached by means of the service stair, so that it is not necessary for the children to use the front hall or main stairway.

HOUSE NO. I. DINING ROOM.

House No. III.—No more suitable or appropriate model for domestic work can be found than that based on the old Colonial type, combining as it does both dignity and charm. Graceful and pleasing, its forms may readily be adapted to present use, so that the design loses nothing in character or individuality if due observance is given to the spirit of colonial work and care taken to harmonize its forms in such a manner that full expression is given to the intention and purpose of the design.

The exterior of this house expresses well the straightforward and simple plan, and fulfils the promise of orderliness and comfort which greet one on entering. The entrance hall is well proportioned and pleasing in detail. The whole of the interior, with the exception of the library, is finished in white. The photographs show the principal rooms and the stair hall, which has a typical colonial stair. The dining-room has a plaster cornice with narrow enriched frieze, and the walls are painted a light ivory tone, the surfaces broken up by panels formed by mouldings planted on. This room has a low panelled dado at chair rail height, at which level there is, on the side next the entrance from the hall, a wide shelf supported on carved brackets and used as a service table. The living-room and sun-room, like the dining-room, show the same good taste in detail and color scheme, which latter is quiet and harmonious throughout, the rugs and hangings having been designed particularly for the rooms in which they are placed. The kitchen and pantries are well fitted with shelving and cupboards, all arranged to minimize work and render it systematic. In the basement a future billiard room is provided for.

HOUSE NO. II. DINING ROOM.



GROUND FLOOR PLAN.

HOUSE NO. III.,
WINNIPEG, MANITOBA

R. G. HANFORD,
ARCHITECT.

SECOND FLOOR PLAN

LIVING ROOM.

DINING ROOM.

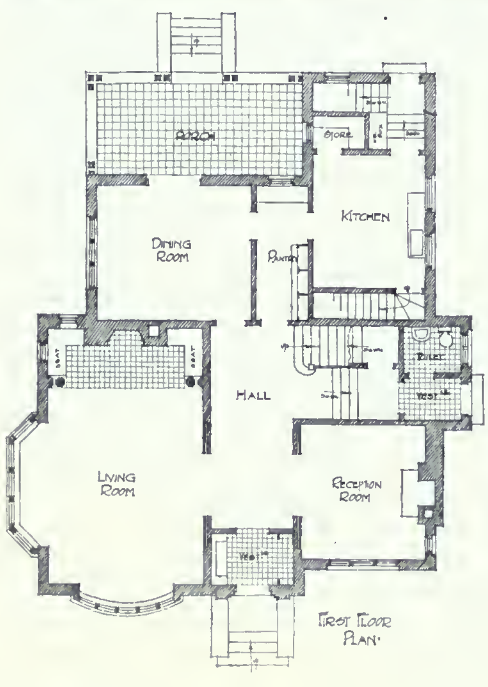
House No. IV.—Based on one of the types of modern English domestic work, this house exhibits a certain severity of outline, due to the square, compact plan, but relieved skillfully by the long sloping roof lines and quaintly combined gables. The house is built of solid brick, roughcast, the sills and window arches and the gable copings in red brick, giving a pleasing touch of color. The roof is shingled and stained a deep brown. At the rear the sleeping porch is included under the main roof, where it adds to the appearance of the house, instead of, as so often happens, forming an incongruous adjunct. The entrance hall and living-room are trimmed in quarter-cut oak, the hall panelled to a height of six feet, while the dining-room and reception-room are in white enamel. The upper floor is finished throughout in white, and includes two tiled bathrooms, while there is also a servants' bathroom in the attic. This house was built, with the garage, at a cost of $24,000.

HOUSE NO. III. HALL.

House No. V.—The building is a good example of the advantage and value obtained by the use of one constructive material combined with simple lines and pleasing proportions. Striving after effect is always a mistake, particularly in the design of small houses, and here may be seen how much character can be obtained by very simple means. The entrance feature harmonizes well with the general proportion of the front elevation, and as it is set only one step above the grade it brings the house into pleasing relation with its grounds. The living-room is finished in oak, with a fireplace in oak and tile. The dining-room has a low panelled dado in white wood, the base and capping being birch stained mahogany. The ceiling is divided into nine equal panels by narrow mahogany members. On one side of the room china cabinets are built-in on either side of the casement window, with a seat between over the radiators. The hall, panelled in white to the height of five feet, forms, with its colonial stair, a very pretty feature. The second floor of the house is finished in white, the doors of mahogany in perfect accord.

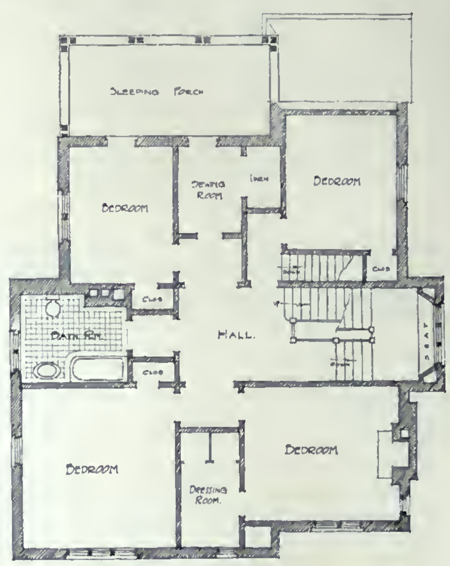
The question of lighting our homes has become such a vital question that the following

HOUSE NO. III. STAIRWAY.



HOUSE NO. IV.,
WINNIPEG, MANITOBA.

HENRY R. LINNELL,
ARCHITECT.



·Second Floor Plan·

is presented from an article on the theoretical, scientific and practical phases of the subject, by F. Laurent Godinez, in the "Architectural Record":

The problem of home lighting resolves itself into a discussion of those conditions which can best be satisfied by the application of a few basic principles. It is indeed a wide gap between the city house and the three-room flat—and the interval separating the city house and country house is equally hard to span. The tendency has been to limit lighting discussions to a consideration of isolated cases which are not representative, because they are extremes, excepting the writings of manufacturers' press agents, which unfailingly prescribe one remedy for all lighting ills. The mind of the reader has been confused in attempting to differentiate between various forms of lighting equipment, whereas the real issue involves a co-relation of fundamentally important factors, without which the equation of light cannot be solved.

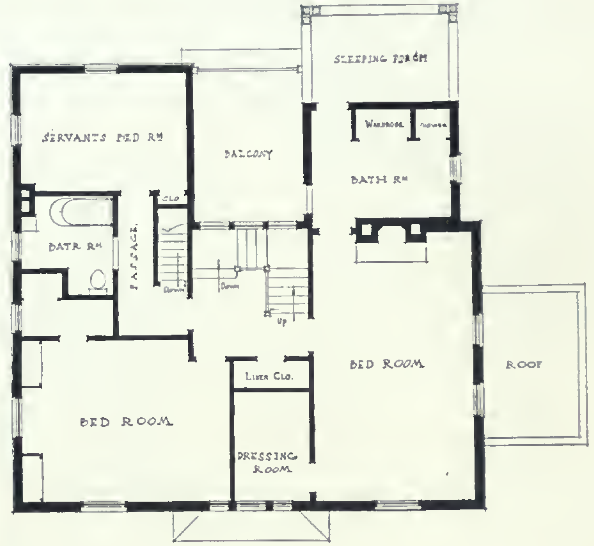
It is, of course, necessary to consider extremes where thousands of dollars are expended upon the lighting of a single room, but it is more important to consider the other extreme where the entire lighting equipment of the small flat must be restricted within the sum of one hundred dollars, including wiring, gas piping and fixtures.

We have reached a stage of "economy" in the use of illuminants which enables us to take a step from out of the beaten path and use artificial light, so that the occupants can derive something more than the wherewithal to see by.

In Germany the tenant is expected to bring his lighting fixtures with him, only the outlets being provided, which at least gives him the opportunity of satisfying individual requirements, and not being obliged to put up with lighting fixtures which do not illuminate in the implied sense. In discussing this subject, my object is to present a critique of residence lighting which includes an analysis of fundamental principles, which are violated in either the extremes or average condition, and first amongst these is the question of color of light involving a consideration of physiological and psychological phenomena.

HOUSE NO. IV. LIVING ROOM.

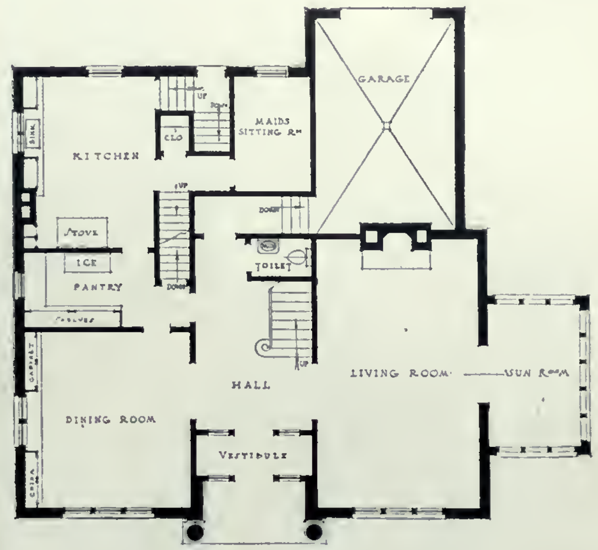
Technically, the human eye must not be exposed to light sources having an apparent brightness greater than five candle power per square inch. The following table shows how we



SECOND FLOOR PLAN.

HOUSE NO. V., WINNIPEG, MANITOBA.

HERBERT B. RUGH, ARCHITECT.



·FIRST·FLOOR·PLAN·

have exceeded the danger mark in the past few years:

Source of Light.	Apparent Brightness (in candle-power per square inch).	Color of Light.
Candle	4	Yellow
Oil lamp	8	Yellow
Edison electric lamps, carbon 3.5 watts per candle	375	Yellow
Mazda (tungsten), 1.15 watts per candle	1,000	White
Welsbach gas mantle	50	White or Yellow
Sun on horizon	2,000	......

From the above it is apparent that the increase in source brilliancy of our illuminants has been gradual, and the color of their light yellow up to the advent of the tungsten lamp, when an abrupt increase in apparent brightness and an equally abrupt change in color (from yellow to white) took place.

This change affected the lighting of the home in that the advertised economy of the new electric lamp (at that time discounted by its fragility) persuaded its adoption, under the impression that the white quality of light was desirable, being so advertised.

HOUSE NO. V. LIVING ROOM.

Considering first the effect of white vs. yellow light on the eye, we find that for centuries humanity has been accustomed to a white reading page, made yellow by the color of artificial light, and that with each successive illuminant improvement the relative increase in brightness was offset by the color permanence of the light, which remained yellow. With the advent of the Welsbach mantle in 1887, following the first electric lamp in 1880, the eye was subjected to a change of color from the yellow gas flame to the (then) greenish-white incandescent gas mantle. The Welsbach makers, however, soon realized that a white light while suitable for color matching and other industrial occupations, where true color values are important, was unsuitable for lighting of the home, and therefore perfected a gas mantle which appears to the eye as agreeable and mellow as the oil lamp. With the advent of the tungsten lamp, however, no word of warning as to its dangerous intrinsic brilliancy or the unsuitability of its white light was forthcoming, and as a result, its adoption over the carbon filament type, for economic reasons, transformed the reading page from yellow to white, thereby making reading more difficult, owing to the abrupt contrast of the small black type against the glaring white page. While glazed paper causes sharp reflections of light, which blurs and obscures one's sight, an unglazed paper diffuses light without glare. It is too much to ask or expect of publishers that they immediately change their methods to compensate for the negligence of the illuminant manufacturer, who should print some few words of warning upon the boxes in which his lamps are sold, thereby having a far-reaching effect. It is equally unfortunate that there is no society organized for the purpose of discriminating between lighting equipment which is conducive to eye comfort, or absolutely unphysiologic. Regarding this question of white or yellow light, Wm. J. Beardsley, an architect, who is responsible for the New York State Penitentiary buildings, informed the writer that his draughtsmen (over fifty in all), who are employed from all sections of the country, are continually taking the tungsten lamps out of the sockets in the draughting room and substituting lamps of the carbon filament type, owing to their decided preference for a working light of a yellow amber tint, not causing too decided a contrast between the black ink and the tracing cloth or white paper. Thousands of letters have been received from those who have tried the experiment of reading with a white, or amber light, as suggested by the writer (through the medium of leading magazines and newspapers) and the expression of opinion is unanimous in favor of a yellow over a white as a reading light. It is a simple matter to satisfy one's self regarding this by substituting an amber light gas mantle for a white light gas mantle, or by placing over a tungsten lamp some translucent material, such as yellow silk, paper or gelatine film. One trial will convincingly demonstrate my contention, which applies equally to installations of indirect lighting, where the remedy lies in placing a film of yellow gelatine over the silver-plated reflectors, so that a white ceiling becomes a diffuser of yellow instead of white light, after which the ceiling can be permanently tinted the proper color. Up to this point I have discussed the physiological aspect with reference to the reading page alone, my object being to indicate one physiological requirement of good lighting, which applies with equal force to the opposite extremes represented by the plebeian's tenement or the patrician's mansion. There is another very good reason why a yellow light is more desirable for the home, and that has to do with the actual appearance of a room's occupant as influenced by the color of light therein.

The idea of considering the effect of light, as it looks to the eye, is new and quite opposed to the "efficiency-economy-utility" doctrine of most illuminating engineers, but when all has been said it is the eye alone which tells the story to the mind, and there is no reason why the "economy" of modern illuminants should not be utilized gracefully, in lighting which appeals to both the physiologic and aesthetic. The home is presumably a haven of rest. Repose is the one element which should predominate in its atmosphere. All reasoning is by comparison, whether by conscious or sub-conscious mental activity. The predominance of what may be termed the "white light effect" in office buildings, where thousands of workers engaged in clerical labor are obliged to ruin their eyesight by unnatural lighting which is unphysiologic to the degree superlative, has impressed the subconscious mind forcibly with an association of white light with working conditions. But the light in the home should not suggest to the tired mind of the business man the glaring lighting of the office, subway or shop window. A prominent ophthalmologist states.

"So many of my patients suffer whenever they go out at night, that it has become necessary to prescribe auxiliary glasses opaque to ultra-violet light (amber in tint) to be worn over their refracting lenses, in order to subdue the excessive glare which the eye is exposed to from all sides in these days of unphysiologic lighting."

The engineering element seems utterly at a loss to comprehend why a light approximating the harsh white daylight effect is not desirable for the home at night. In their endeavor to imitate Nature so closely, they have evidently forgotten that the setting sun indicates a period of rest—in the Creator's plan—and that an attempt to turn night into day is diametrically opposed to Nature's teachings. But it is entirely natural to emphasize the peace and quiet of eventide in the home by lighting which is subdued yet harmonious—in itself a symbol of repose to the eye.

It is amazing to note the transformation of an interior effected by changing from white to amber light—for the white light, which is so unkind to the features, creates likewise a garish atmosphere, showing everything to its worst advantage. The rich brown, yellow, gold and red tones, which predominate in furniture and decorations, are rendered flat and lose all their warmth and feeling. Architectural draughtsmen should try this experiment of changing a white to an amber light and observe the pleasing modification.

As to the design of lighting by the architect, providing for this subject of color, the question naturally arises as to the advisability of modifying the color of the source itself, or accomplishing the desired effect by enclosing the source within some color-modifying device. Maintenance is always an important subject to be considered, and very often through negligence a lighting arrangement, which was quite effective when first installed, becomes entirely unsatisfactory by substitution of wrong sized lamps. Assuming that amber light gas mantles, or tungsten lamps with amber-tinted bulbs, were specified by the architect, what assurance could he have that these would not be replaced by white light lamps, as renewals?

The better plan is for the architect to design equipment for residential use, which is constructed to insure the proper color effect, based upon the use of a white light source. With indirect lighting, as previously mentioned, the ceilings can be tinted, unless such procedure is opposed to the color scheme of the room.

There are times when even a greater variety than is afforded by general or local lighting, in any form, is an agreeable change, and in order to make possible such lighting, the architect can assist by specifying an adequate number of base-board outlets. The lighting of the pianola-piano, where silk candle shades are placed so as to compliment the players' or soloists' features, yet give sufficient light for reading (evidenced by clearness of the metrostyle line on the pianola roll) would have been difficult to accomplish had not the architect placed a base-board outlet below the lamp, on the side wall. Lights like these must always be subordinated—and predominance on their part unbalances the ensemble. The charm and appeal of these small lights is very great, and it is to be regretted that manufacturers in this country have ignored the possibilities lighting affords. Undoubtedly the day will come when lighting equipment, comprising fixtures, glassware and lamps, will be designed and manufactured with a view not only to conform with architectural requirements, but with living requirements as well, and we will then realize that we were in the "Dark Ages of Lighting."

Importance of Ventilation in Our Dwellings*

THE few remarks that I will make on this subject are merely reminders of the one great fact—the importance of good ventilation in our dwellings.

I shall take no time at all to dwell on the different methods or any particular system that would be introduced for the purpose of ventilating, for, in order to do that, figures and illustrations would also have to be introduced.

Records of ventilation by means of bellows and blowers are to be had, by the Romans, and later by the Germans. Without doubt, however, the British attempt marked the beginning of ventilation as we to-day understand and use the term.

Probably the first effort to ventilate a room of any considerable size was made by Dr. J. F. Desaguliers, who in 1723, arranged a ventilating apparatus for the British House of Commons. This apparatus was used for upwards of eighty years, being replaced early in the nineteenth century by a system of fans propelled by hand. These fans were arranged to exhaust the foul air at the top of the building.

The early attempt at ventilation was to remove the air vitiated by the exhalations of many people occupying a single room and of the candles or various styles of lamps used for lighting.

With the introduction of the present day type of heating apparatus came the greater need of ventilation in order not only to exhaust the foul air, but also to provide a supply of fresh air to replace that vitiated by the breath of the persons occupying a building, and also the oxygen consumed by lamps or gas burners for illuminations.

We know that the all-important element or quality of the atmosphere is oxygen, and without it we can have neither heat nor light. It is necessary to sustain life, for without its presence all living beings would die. Without oxygen, fuel will not burn, for it is required in the chemical process of combustion.

The atmosphere we breathe is composed principally of about one part oxygen to four parts nitrogen, together with more or less vapor, or water in a gaseous state, which is known as humidity. Oxygen is the life sustaining quality of air, which is diffused by the nitrogen.

There is also present in the atmosphere carbon dioxide, or carbonic acid gas, which by itself is not so particularly harmful. However, under certain conditions it is detrimental to health, not from the small amount usually present in the air, but when present in larger quantities due to the exhalations from the lungs of several persons congregated in one room. It then produces a feeling of closeness or stuffiness, causing headaches, and is otherwise detrimental to health.

The poisonous matter thrown into the air, or given off, by our bodies is also the source of great danger to health; for example—confine a person in a tight enclosure, that person will live as long as there is oxygen to breathe, depending of course upon the size of the enclosure; the oxygen will eventually be consumed and the person choke or suffocate, being poisoned by the carbonic acid gas and the impurities exhaled from his own body.

If our exhalations are poisonous to ourselves, what then may be said of the risk entailed by living in or temporarily occupying crowded rooms, such as offices, workrooms, or places of amusement even, where we are breathing the foul air exhaled from the lungs of our neighbors, some of whom may be suffering from tuberculosis or other diseases, and so contaminate the air with the germs of such diseases?

As another example, enter your own friend's house where a social gathering is celebrated. Enter the house from outside where the air is pure into brilliantly lighted rooms not sufficiently ventilated, and possibly more or less crowded, a feeling of suffocation is at once apparent. A person not strongly constituted or in good health may in a rather short time faint from lack of air, while a stronger individual may perhaps become accustomed to it and soon fail to notice the oppressing effects of the foul atmosphere of the room.

However, it might be to advantage to remember that the use of electricity for lighting purposes has done much towards maintaining the purity of the atmosphere under such circumstances. That the need of ventilation has long been recognized by physicians, architects and engineers is shown by the several works by the most prominent men treating upon this subject.

It is repeatedly asked what amount of air is necessary for ventilation? This question may be answered by a number of examples. Perfect ventilation might be said to be the exhausting of the foul air and the admitting of the fresh air in such quantities that the inhabitants of a room or building would never inhale the same air twice, or, in other words, would breathe air inside the building of the same purity as that on the outside.

Such a state, however, is neither practical nor necessary. With the size and condition of a building and the probable number of occupants

*An article read before the Sanitary Inspectors' Association of Western Canada by J. E. Thomas, Sanitary Engineer and Health Inspector for the City of Moose Jaw.

known, it is possible to estimate very closely the air supply necessary to maintain a certain amount of purity within the building. We know that not so many years ago a fresh air supply of 30 cubic feet per hour per person was considered sufficient; to-day we look for six times that amount, i.e., 1,800 cubic feet per hour as being the minimum supply essential, even in an office or a dining room. In hospitals we want 3,600 cubic feet per bed, assembly halls 3,660 per seat, bedrooms and workshops 3,600 per person, theatres and ordinary halls of audience 2,000 per seat.

Last September Dr. Evans, of Chicago, during his lecture in the Public Health Convention, told us that within a certain congested area in New York City there were 75,000 consumptives; that there was no question but that this terrible showing is due to the over-crowded dwellings, especially the sleeping rooms, and the workshops, or more popularly designated as sweat shops, where the admission of a small percentage of air would work wonders in the elimination of disease.

The average individual spends one-third of his, or her, life in the bed or sleeping room. How much rest or physical relaxation do we enjoy without the necessary amount of fresh air to breathe? Sleeping rooms should, therefore, be well ventilated, and this may easily be accomplished by the thorough airing of the sleeping room during the day, and the opening of the windows at night. By giving the matter a little thought and attention the bed may be so located that no severe draughts are felt by the occupants.

However, to properly ventilate the room it should have its separate pure air supply, tempered by heating and ventilating duct leading from the room to the main ventilating stack of the building.

A building may be properly ventilated only when adequate provision has been made by the architect and builder of such stacks, flues or ducts as may be necessary for the system of ventilation to be adopted. There are two general methods of producing ventilation, namely, natural and mechanical.

However, as we are considering the ventilation of dwellings, my remarks must be confined to the former, as the latter is seldom, if ever, utilized for buildings used as dwellings otherwise than flats in conjunction with business blocks of large dimensions.

Natural ventilation as expressed and understood is caused by ducts so constructed that the velocity of the outside air or difference of temperature produces a change of air within a building. This method by itself is hardly satisfactory, but when assisted by heating surfaces placed within the exhaust flues and warming the entering air by passing it over or between the heated surfaces of radiators in a manner commonly styled indirect heating, is productive of good results.

The two methods most commonly adopted to answer the purpose of good ventilation are: (1) By employing a main ventilating shaft centrally located in the house, into which foul air ducts from the various rooms should be connected. (2) By utilizing the chimney as a ventilating shaft.

As most modern houses are equipped with a fireplace, the latter method would probably be more favorably considered. However, it must be said, that the importance of chimneys as ventilating mediums is not always recognized. The open fireplace, when in use, provides a most successful means of exhausting the foul air from a room.

A chimney or stack may be successfully used by running a smoke flue constructed of boiler iron through the centre of the shaft and surrounding it with ventilating ducts of such number and size as may be necessary to accommodate the rooms to be ventilated. These ducts should rise to the height of the brickwork of the chimney, on the top of which there should be erected an iron canopy open at the sides. The smoke flue should protrude through the top of the canopy.

The smoke flue warms and expands the air in the ventilating ducts, inducing an upward circulation which exhausts the foul air from each room and discharges it into the atmosphere outside under the canopy at the top of the chimney.

This method of ventilation, in connection with indirect radiators for warming, is quite successful and by slight modifications may be readily adapted for many small buildings. For residences this is quite a satisfactory arrangement.

* * *

One of the most important points to observe in building operations is that of keeping dampness out of all parts of the structure. The dampness may be caused by there being no damp-proof course; the damp rising from the ground; the damp earth against the walls; rain soaking in through porous parapet walls and copings; driving rains against walls; burst pipes or leaks in roofs and other causes avoidable by a proper state of repair being maintained. Beyond this last cause, which should never occur at all, to attempt after the building is occupied to remedy any of the other five omissions or faulty construction is a costly operation. For example, the cost of inserting a damp-proof course into a wall constructed without one is about as five or six to one, according to the material used, as compared with the cost of putting one in at the time the building is erected.

Houses at Montreal, Quebec

PHILIP J. TURNER, F. R. I. B. A.

AN architect at the present time has to be the sole creator of his work. Such was not the case in the olden days when trade and craftsmen's guilds existed. The architect was then the master mind with a body of trained men under him who not only worked with him, but understood his aims and ideas, each in his own department, carrying them out, not mechanically but with a personal interest which reflected itself in the general result. This old spirit of craftsmanship is dead and the workman now produces nothing but what is detailed for him.

In spite of many handicaps it will almost invariably be found that if an architect of good standing is given a free hand, the house he designs will be a real success—harmonious in all its parts, being carried out as a single scheme in obedience to the direction of one trained mind. But it is seldom that an architect has a free hand, and as Guy Dawber, one of England's foremost domestic architects has so aptly said: "His art is usually a thing of compromise, and what can be more disheartening to a man of genius than compromise in an essential of design and art?"

An architect's zeal for his profession forces him to look ahead; he cannot be content to stand still and take things as they are. New schemes, better and more modern methods, simpler treatments and broader effects are ever before him in his thought, and he is inclined to lose heart when compelled by a client to abandon his efforts to produce something really artistic and good. It is well known that both Montreal and Toronto possess several excellent examples of Domestic Architecture. "What are some of the features of a good house?" it may be asked. In the first place the use of different kinds of building materials in the same house should be avoided. What is more distressing, for instance, than to see such materials as stone, brick, roughcast and half timber-work employed on the building of a single house? In the construction of suburban or country houses the texture and color of the walls play a far more important part than a variety of features in different materials. Breadth of treatment is absolutely essential to the repose and dignity of the whole composition and this can never be obtained if the wall surface is broken up with ornament and unnecessary detail. Then again, position and locality should be taken into consideration when building. Nothing could be more out of place than the use of imported glazed tiles for the roof of a house which stands among fine old trees.

Now that building materials can be so easily imported from other countries, some clients select strange and often startling materials for their homes, with the result that the whole neighborhood is spoiled by the jarring effects of widely varying types of houses, built of

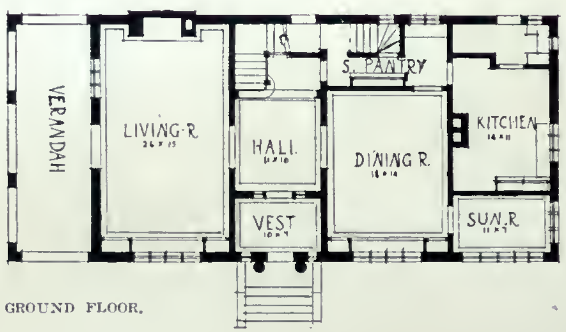
HOUSE NO. I. MONTREAL. SAXE & ARCHIBALD, ARCHITECTS.

HOUSE NO. II.

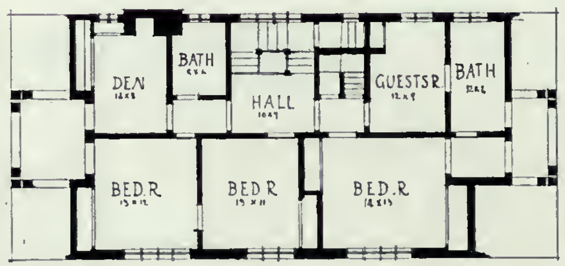
SAXE & ARCHIBALD, ARCHITECTS.

VIEW ABOVE—LIVING ROOM.

VIEW BELOW—DINING ROOM.



GROUND FLOOR.

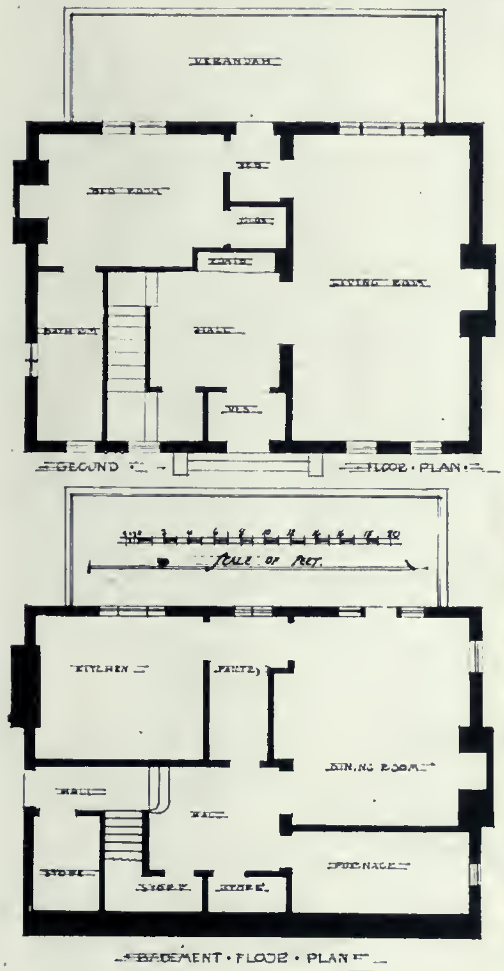


FIRST FLOOR.

violently contrasting substances. A successful architect in the best sense of the word should foster local traditions, and encourage local industries and trades. It is better to build with materials which have been tried than to employ those which are out of harmony with the district.

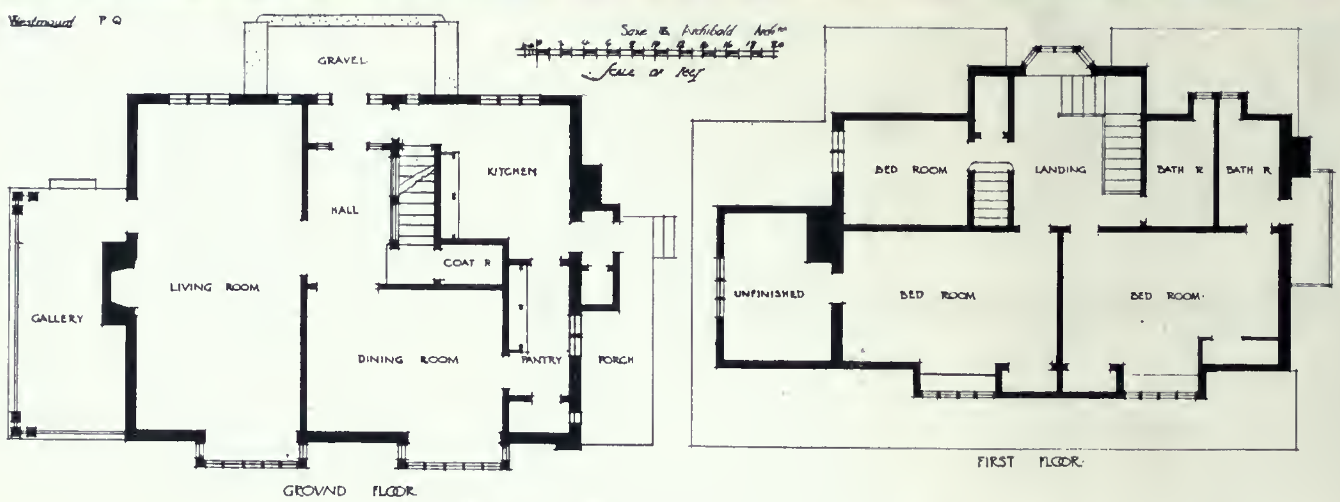
The illustrations in this article give examples of some of the smaller houses of a better type to be found in Montreal and Westmount. The favorite residential districts are undoubtedly on the slopes of Mt. Royal. Here a splendid panorama is to be obtained, in most places, of the St. Lawrence River and the city itself, while in the far distance the mountains of Maine State can be seen on a clear day The mountain, having many natural advantages, forms a unique setting for residences. In many cases the slopes are very sharp, which fact involves unusual and careful planning on the part of the architect. The front walls of a house, for instance, will often be two or three floors above the back. Whilst such conditions lend to a properly designed house much that is interesting, constructional difficulties are considerably increased, the matter of surface water, which abounds in the peculiar lamination of the rock composing Mount Royal, being one of the greatest.

The flat-hopper type of roof, with the down-pipe taken through the house is considered by some Montreal people to be the one and only form of roof to be used for the cold and heavy snow-falls experienced in this district. From a practical point of view the flat pitch and gravel roof is certainly satisfactory. We know the objection, if not danger, of occasional avalanches of snow from a sloping roof, also of icicles falling from the eaves when melted by the sun. Granted these objections—which are only serious when a house is built directly on the street line—there is no question but that a pitched roof is far more pleasing to the eye than a flat one. To look down from a high level upon a vast stretch of flat roofs, embellished for the most part with strange looking skylights and scuttles projecting above the roof, is, to say the least, not an inspiring sight.



HOUSE NO. III. SAXE & ARCHIBALD, ARCHITECTS.

A good example of a house with a flat roof, is however, to be found in House No. I, located at 128 Cedar Avenue. It was erected by Saxe & Archibald, who have gained a well-deserved reputation in Montreal for their domestic work, their designs always displaying true artistic individuality. This house was built two years ago at a cost of $23,000. The exterior is simple in treatment but carefully considered. The stone panels on the front, the recesses formed in the brickwork, the projecting band cornice, are all introduced with good effect, giving in-

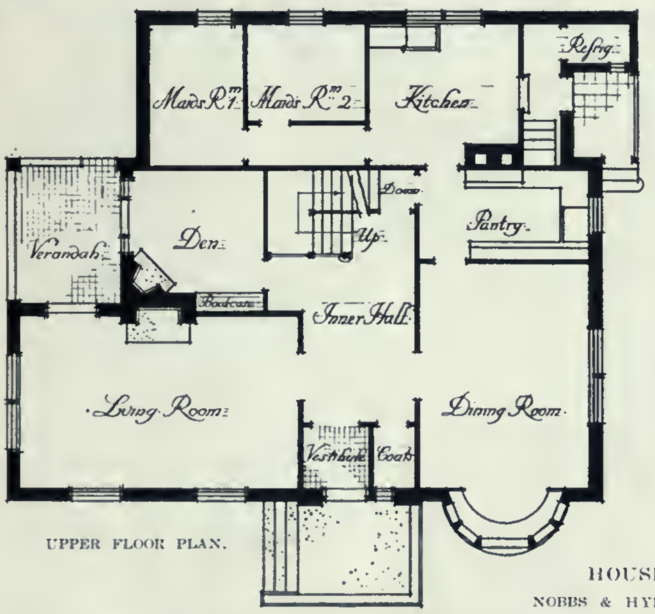


HOUSE NO. IV. SAXE & ARCHIBALD, ARCHITECTS.

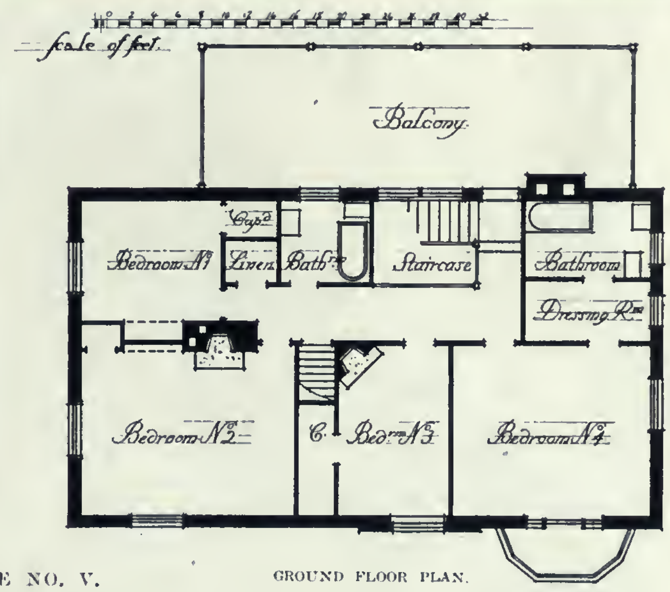
terest to the whole design. The walls are built of plastic bricks, which are carried down to the ground instead of being erected on a base of stone and concrete at the ground floor level, which is the more usual practice in this district.

House No. II at 305 Cote des Neiges, is a well-designed and economically built house of red plastic brick, by Saxe & Archibald, costing approximately $13,000. The proportion is particularly good and shows a very satisfactory roof of green slate, well adapted to a perfectly straight plan. In houses of this type it will be noticed that the grouping of the whole is what gives complete satisfaction—simplicity, without the introduction of a great variety of features and materials, being the key note. The woodwork is painted white and the main eaves are panelled. One feature of the exterior is the sleeping porch at the end of the building; this addition is found in most of the modern houses of to-day. The interior shows the same care and thought of the artist as is portrayed by the exterior.

Another house by the same architects is No. III, at 68 Westmount avenue, built for H. Mortimer Lamb, Esq. It is built on a steep slope, with a fine view of the city and St. Lawrence from the verandah at the back. The house is



UPPER FLOOR PLAN.



GROUND FLOOR PLAN.

HOUSE NO. V.
NOBBS & HYDE, ARCHITECTS.

constructed of wood framing on a plastic brick foundation, the former being covered with metal lath and cement roughcast. The overhang at the first floor just gives the necessary breadth required to a house of this type. The white birch trees form a delightful setting to the whole. The large roof covered with English red tile provides space for an artist's studio, with large windows to the north end, whilst on the first floor there are four bedrooms and bathrooms.

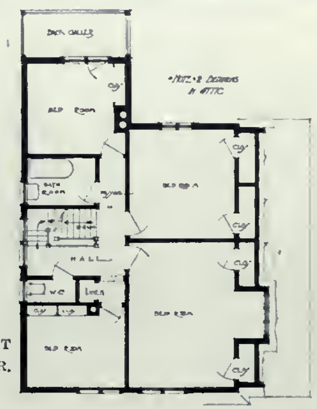
House No. IV. on Sunnyside road, Westmount, is one of Saxe & Archibald's earlier houses, and has a distinctly Old Country aspect about it. From the illustration it will be seen that it is built on a steep slope of the mountain side. The base is of stone, taken from the site with cement roughcast walls above on metal lath. The steep pitch roof is covered with a heavy American red tile and plain red tiles on the gable ends. The plan is carefully thought out. Both the front and tradesmen's entrances are conveniently placed to the kitchen, access

DRAWING ROOM.

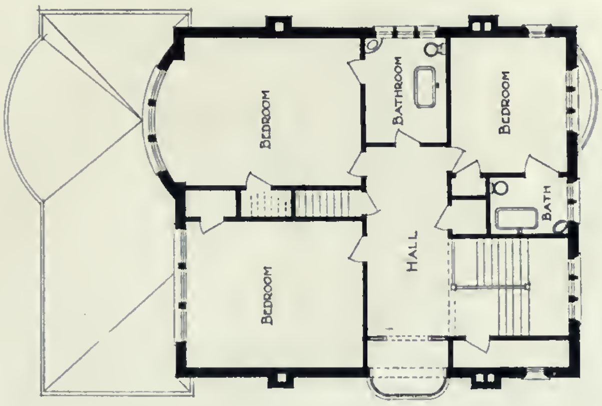
HOUSE NO. VII,
MONTREAL.

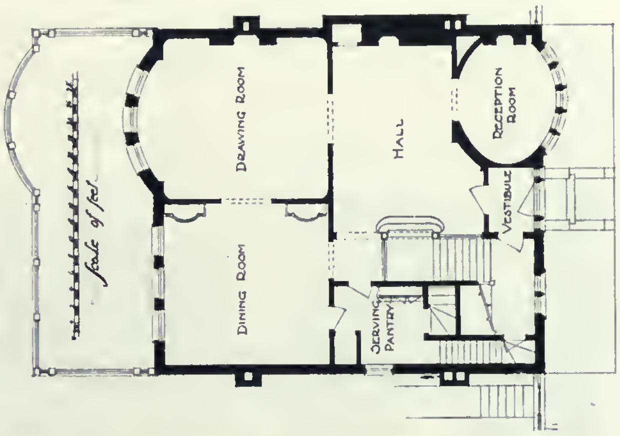
PHILIP J. TURNER,
ARCHITECT.

GROUND
FLOOR.



FIRST
FLOOR.





GROUND AND FIRST FLOOR.

HOUSE NO. VI,
MONTREAL.

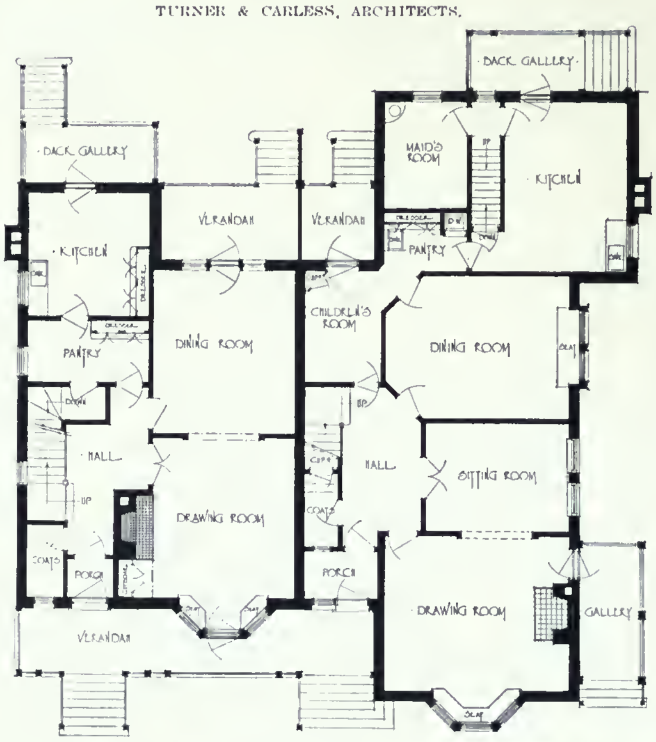
ROBERT FINDLAY, ARCHITECT.

being obtained through the former without passing through the hall. The principal rooms are situated on the opposite side of the building to the entrance, so as to command the best view and aspect.

GROUND AND FIRST FLOOR PLANS.

HOUSE NO. VIII.

TURNER & CARLESS, ARCHITECTS.

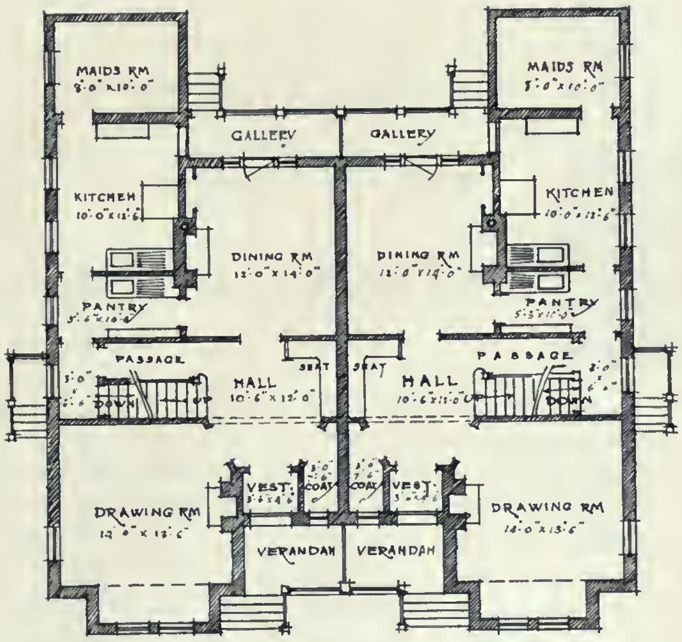


At 595 Pine avenue is house No. V., designed by Messrs. Nobbs & Hyde, and built in 1911. The roof is of green slate, with a bell-mouthed curve at the eaves. The walls are of vari-colored tapestry bricks, with pressed red bricks at the quoins string, and base courses. The base of the walls is finished in cement rough-cast.

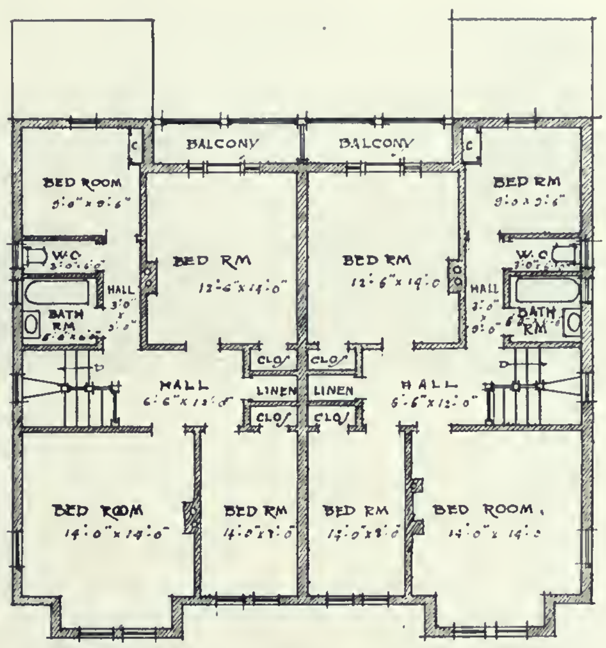
The architect of house No. VI. at 598 Pine avenue is Robert Findlay, the walls being of light buff pressed bricks, with Indiana limestone quoins and trimmings, the roof of shingle tile. The base is of Montreal limestone, and the roof of large American red tiles. In front of the house the sidewalk is paved with red quarry tiles with a margin of red brick and stone.

Situated on a steep hillside, with verandahs overlooking the city towards the south, this building, erected in 1911, lends additional charm to its natural warm and domestic appearance. Upon the interior the reception hall follows the sixteenth century French style in white; the main hall Georgian, the dining room in panelled mahogany with tapestry walls, and the drawing room in Louis XV. The approximate cost was $20,000.

House No. VII. at 272 Macdougall avenue, Outremont, was erected in 1910 of solid three-inch plank construction; the outside walls being covered with plastic bricks, having a concrete base. The cost of this house completed was $9,000. Half timber construction, with cement roughcast between the studs, has been introduced in the main gable, the upper portion of which overhangs the lower. The roof in turn overhangs eighteen inches in front of the main gable, giving to the whole design



GROUND FLOOR.



FIRST FLOOR.

HOUSE NO. IX.

PHILIP J. TURNER, ARCHITECT.

the effect desired by the owner—of an Old Country half-timbered gable end. The steep slate roof on the west side is continued down to first floor level as a cover for the gallery, ten feet wide, which extends the whole length of the house. The living room, dining-room and hall are finished in chestnut. The main feature of the living room is the ingle nook, which is paved in red quarry tiles. The accommodation shown by the plans comprises on the first floor four bedrooms and bathroom, and two large bedrooms in the roof.

The semi-detached houses, No. VIII., located at Maplewood avenue, completed this year, were planned with a desire to avoid the appearance of semi-detached houses of the usual type. The larger part is occupied by the owner, is absolute simplicity, and was dictated by taste and economy, bringing the total cost to $23,500, which is at the rate of 24 1-2 cents per cubic foot. This low figure was obtained on a rocky site, where a considerable amount of blasting and uphill haulage was inevitable. The brick walls are covered externally with rough-cast of small limestone clippings and cement.

The semi-detached houses No. IX. at Grosvenor avenue, Westmount, were built in the winter of 1908-9 at the low cost of $10,250, which is equivalent to 17 1-2 cents a foot cube. They are of solid plastic brick construction, and, as the plans indicate, each house provides accommodation for four bedrooms and three open fireplaces. The finish of the downstairs rooms is in chestnut, with birch floors.

The problem of the home is not confined to the desire of shelter only, but rather to express the individuality of the owner and the designer. We are endeavoring to feel once more the

spirit of our forefathers, who worked with a sincere appreciation for beauty untarnished by the commercialistic tendencies of to-day. When the small home builder longs to feel that his dwelling breathes the spirit of himself, and that the architect has given every attention to making his desires a creation of charm and dignity, then we will see the suburban districts and country highways teeming with small artistic structures, each possessing in itself a harmonious relation with the surroundings and the people who live within. Some one has said that there is so much that is vital in this matter of the building of a home; it is so closely allied to the most intimate and wonderful of human experiences, so irrevocably bound up with both individual and family growth, that one cannot help feeling that those who go through life without at some period or other achieving this primitive but important undertaking, have missed one of the most subtle and far-reaching opportunities for personal happiness and self-expression that the world can hold.

The Greenhouse and The Conservatory

NO house is quite complete without a glass-covered section, a fact which meets the prevailing opinion among home builders. It may be of ample proportion or inexpensive, suitable to the character and style of the living structure itself. That the Canadian field is adaptable for conservatories and greenhouses is proven by our climate, which furnishes plenty of sunshine even in the coldest weather, so necessary in the proper cultivation of flowers and vegetables. The exterior is considered from the esthetic side, and every endeavor is used to make it harmonious to the other surrounding buildings; while the interior is planned in reference to utility and practicability. In other countries the greenhouse has become an integral part of the general scheme, and is gradually assuming a similar position in our own provinces.

The expert advice of men who devote all their time and energy to this phase of work is enabling the architect to carry out his idea from the very beginning, so that no discordant note is introduced after his work is completed. This assistance is necessary in view of the technicalities arising from such construction, and also to the condition that the ordinary laws of radiation, light and ventilation do not apply. Many characteristics have to be taken into consideration, and it is essential that the client, architect and greenhouse critic hold conference in order that each may feel the final results satisfactory from every viewpoint.

The problems arising from existing circumstances, such as position, general contour of land, shape, etc., are so varied as to make this adjunct a matter of considerable importance. As seen in the accompanying examples the general surroundings figure extensively in the character of the building. One shows a combination of greenhouse and garage, where the heating plant answers for both and illuminates all danger arising from gasoline fumes coming in contact with the heater. All undesirable background of fences and buildings can be hidden, and that which often proves an eye sore is replaced by an attractive setting for flowers and shrubbery.

Conservatories can be divided into two main types—the wood and the iron frame. Of the two the latter is the most permanent and satisfactory, for when properly designed is far more rigid than the wood, reducing the breakage of glass from wind stress. The members also are smaller, thus reducing the shadow cast to a minimum, heavy pillars and woodwork being a great detriment to efficiency. With the metal frame construction we have an opportunity of using the curved eave, which adds to the attractiveness of the building, as well as to its effectiveness. With the curved eave the gutter is run in combination with the sill, cast in one unit, and laid as a cap on the foundation wall, to which all the superstructure is bolted. The best form of glazing is the lapped glass, laid in putty and secured by good strong glazing points. Care must be taken not to make too large a lap or moisture will collect in winter under the lap, freeze and crack the glass, while the best putty should be used.

Probably no question arises of more importance than heating. As it is practically a horizontal system it varies considerably from the ordinary house equipment. From an economical standpoint the hot water is preferable, since it

furnishes the required temperature at night without the need of a fireman. It also prevents a drying out of the soil in the trenches and gives an equable heat. Care should be taken in the selection of the system used, as it is important to have a perfect and rapid circulation of the water, which can be obtained only by the proper introduction of control valves.

In referring to the various types of greenhouses, F. F. Rockwell, in an article published recently in "American Homes and Gardens," states that the practical advantages of a home greenhouse are numerous. First of all it offers the means of having a real garden all through those months of the year which are usually barren, and fresh vegetables can not only be grown more cheaply than one can buy them in the winter markets, but they are of greatly superior quality. And then there are the flowers which have the practical value of bringing the cheerfulness and sunshine of their beauty into the dreariness of winter days. In addition there is the saving which can be effected by carrying through the winter plants that would otherwise perish and have to be bought new again in the spring, and the possibility of propagating one's own supply from cuttings and from seeds. Still another item of importance is the early spring vegetable garden out of doors; the possibilities offered with the home greenhouse at one's command are very great, as it can be put forward several weeks and made much more efficient in every possible way than it otherwise could be.

The glass structure which offers you the above conveniences may vary from the simplest sort of a glass-covered addition to the house to an elaborate structure with a high dome for the accommodation of large palms and various compartments for fruits and orchids and roses, with the respective conditions required for their special culture. But, fortunately, the amount of pleasure will not depend upon the size of the house at all, as you may derive considerable enjoyment from a few square yards which you can manage yourself in your own way.

The simplest type of greenhouse is the conservatory, which may be built on to one of the living-rooms or made by putting a glass side or roof on part of the verandah, or by utilizing for this purpose some other adaptable feature of the house; but the conservatory usually is simply a place to keep flowers and is used largely as a living-room also, but does not as a general rule present the facilities for growing vegetables and for starting plants which in most cases will be desirable to the garden-maker.

The lean-to-type of house, which may be described as half a greenhouse set against the side of a dwelling, is the next simplest form and has the advantages of economy in cost of construction and in space required, and usually in heating arrangements, as it is quite customary that the heating system used in the house can be readily utilized also for heating the greenhouse under these conditions. Then being thoroughly sheltered and having one side composed of the house wall it is very easy to heat. Its chief disadvantages are that the light is admitted from one side only and frequently sunshine cannot be had for the entire day, while sometimes it is difficult to arrange for thorough ventilation in hot weather; but, nevertheless, where the amount to be invested is limited, and the house and grounds are so arranged that a good position for it can be found with a southern exposure, it is generally the best to use.

CONSTRUCTION

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CURRENT TOPICS

BUILDING permits issued in 67 American cities during the four months ended April, 1915, totaled $191,056,490, or only 6 per cent. less than in the corresponding period of last year.

* * *

FRANK N. RUTTAN has opened an office in suite No. 802, Confederation Life Building, at Winnipeg, for the practice of architecture. Mr. Ruttan, son of Col. H. N. Ruttan, who held the office of City Engineer of Winnipeg for thirty years, is a McGill graduate, receiving his degree in 1908. Manufacturers' supplies and catalogues are solicited.

CHARLES LEONARD WEISNER, for the last five years general manager of the National Fireproofing Company of Canada, Limited, died at his home in Toronto on May 15th. He was born in Buffalo, N.Y., in 1863, and located in Toronto eleven years ago, being connected with several contracting firms until he became agent for the National Fireproofing Company, of Pittsburgh, Pa., and later, when the Canadian company was formed, was appointed to the position he held at the time of his death. He was a member of the Engineers' Club of Montreal. He is survived by a widow, a daughter and two sons.

* * *

AT the present time there is $1,450,000 worth of school building going on in Toronto, and the Property Committee of the Board of Education has only lately awarded contracts for the construction of the new Administration Building on College street, which, it is expected, will cost $100,000. This will bring the total well over the million and a half mark.

The following additions are being made to schools: Leslie street, $54,000; Regal road, $105,000; North Toronto high school, $55,000; Roden school, $35,000; John Fisher, $60,000; Withrow avenue, $50,000, and Bedford Park, $28,000. The following annexes are being constructed: Ryerson school, $60,000; Essex school, $67,000; Palmerston, $58,000; Brock, $55,000, and Huron, $35,000. The new schools in course of construction are: Runnymede, $57,000; Givens, $180,000; Pape avenue north, $57,000; Commercial high school, $280,000; Leslie street north, $59,000; Dewson street east, $50,000, and Niagara street, $110,000.

* * *

THAT the conservation movement has made distinct progress during the past year is clearly indicated in the "Fifth Annual Report" of the Commission of Conservation, which has just been issued. In his annual address, the Chairman of the Commission, Hon. Clifford Sifton, covered the commission's activities with respect to waters and water-powers, minerals, public health, agriculture, fisheries and fur-bearing animals and forests, indicating clearly and succinctly a number of the problems that had been grappled with and the advances that had been made in their solution.

With respect to water-powers, lengthy reports are presented covering the work in connection with the water-power surveys carried out in Western Canada. Two volumes will be issued later giving the results of these surveys, and will prove of great value to those who are interested in the development of the water-powers of Canada. The work contains a number of splendid illustrations, and gives in concise form much information that is of importance to all Canadians devoted to national conservation.

THE Post Office Department at Ottawa announces that letters addressed to prisoners of war in Germany (letters should be left open), postcards and postal parcels should be addressed as follows: 1, Rank, initials, name; 2, regiment, or other unit; 3, British (or Canadian, French, Belgian or Russian) prisoner of war; 4, place of internment; 5, Germany. Place of internment should be stated always, if possible, and parcels cannot be accepted unless place of internment is stated. All addresses must be in ink. Communications should be limited to private and family news and to necessary business communications, and should not be sent too frequently. No references to the naval, military or political situation, or to naval or military movements and organizations are allowed. Letters or postcards containing such references will not be delivered. Friends of prisoners of war are advised to send postcards in preference to letters, as postcards are less likely to be delayed. If letters are sent, they should not exceed in length two sides of a sheet of notepaper, and should contain nothing but the sheet of notepaper. On no account should the writing be crossed. Letters cannot for the present be accepted for registration. Postage need not be paid either on letters or parcels addressed to prisoners of war. No letters should be enclosed in parcels, and newspapers must not on any account be sent. So far as is known there is no restriction on the contents of parcels; tobacco may be sent, and will be admitted duty free, but foodstuffs of a perishable character should not be sent. Parcels should not exceed 11 lbs. in weight. Remittances can be made by money order to prisoners of war. Instructions as to how to proceed can be obtained from postmasters of accounting post offices. The transmission of coin, either in letters or parcels, is expressly prohibited. Postal notes and bank notes should not be sent. It must be understood that no guarantee of the delivery of either parcels or letters can be given, and that the Post Office accepts no responsibility. In any case, considerable delay may take place, and failure to receive an acknowledgment should not necessarily be taken as an indication that letters and parcels sent have not been delivered. So far as is known, prisoners of war in Germany are allowed to write letters or postcards from time to time; but they may not always have facilities for doing so, and the fact that no communication is received need not give rise to anxiety.

* * *

TOLSTOY asked a Russian peasant what he would do if he were told that to-morrow would be the day of judgment. "I would plough," said the peasant—and it was the best answer in the world. If judgment day should come, let it find us doing our duty.—*Luxaberry News.*

THE variety of things which modern science is able to evolve from a lump of coal is shown in graphic fashion by the Barrett Manufacturing Company in its exhibit at the San Francisco Exposition. An enromous block of soft coal is shown surrounded by its innumerable children; ammonia, illuminating gas, crude benzol, coal tar and coke. The crude ammonia is the parent of household ammonia and of the anhydrous ammonia used in producing artificial ice; also ammonium chloride, an important element in electric batteries; ammonium nitrate used in the production of high explosives; ammonium bicarbonate, valuable in the modern baking of food; and most important of all ammonium sulphate, a powerful soil nitrifying agent which is becoming of enormous importance to farmers as a fertilizer. Plants of various kinds are shown that have been grown with and without the ammonium sulphate under identical conditions, exhibiting a striking difference in the strength of the crops. Crude benzol has a progeny of analine dyes in all the colors of the rainbow; is of great importance in the manufacture of automobile tires and in the production of artificial leather, while toluol is a basis for modern high explosives and much in demand during war time. Coal tar enters into the composition of tarvia, the bituminous binder for building automobile-proof roads; tarred felt and pitch used for roofing all the great commercial buildings; ready-roofings employed by farmers for their barns; felt and building papers for the lining of walls to keep out heat and cold; waterproofing felts allied with pitch for the lining of excavations, basements and tunnels to exclude dampness of the soil. There also is paving pitch used in the joints of block pavements for city streets, and creosote oil which can be impregnated into wood, thereby making it proof against decay and furnishing wood blocks for street pavements, durable piling, long-lived fence posts and mine timbers. In addition, coal tar is the parent of innumerable chemical and medical products, especially phenol or carbolic acid, an indispensable medical disinfectant with innumerable industrial uses, including the process of manufacturing phonograph records. Naphthalene or coal tar camphor is useful in keeping moths out of clothing. Among the other products in the carbolic branch are picric acid, a high explosive, and a long list of bactericides and disinfectants, including pyxol, which is twenty times as powerful as carbolic acid, and is death to germs of all kinds, yet perfectly harmless to animal life. Coke is useful as fuel and has special value in the steel industry. The Barrett Company's exhibit shows many of the processes, has been well planned, and is located in the Palace of Mines and Metallurgy.

BURROUGHES & WATTS, LIMITED, in a hundred-page catalogue, show a limited selection of examples from the large and varied stock of billiard tables, accessories and fittings which may be seen in all branch offices throughout the Dominion. The work contains particulars of the improvements made in billiard table construction, especially the steel vacuum cushions which have received universal recognition for their fastness and accuracy. Specifications are included for each table illustrated, as well as for marking boards, cabinets, cue racks, etc. Many cuts of settees, card tables, lighting fixtures and other sundries are also included, which tend to make this book of extreme value.

* * *

A HIGHLY instructive booklet on concrete reinforcement comes from the Canada Wire and Iron Goods Company, containing working tables assembled by their engineering department. The properties of concrete are clearly defined; tables presented on bending moments; formulas for slab depths, reinforcing and quantity. With additional information such as the weights of different materials, bearing power of ground, pressure of wind and violent hurricane, as well as various wire gauges, this work should be highly beneficial in handling problems wherein concrete is employed. Engineers and contractors may obtain same by addressing this company at 182 King William street, Hamilton.

* * *

THE catalogue published recently by the Dominion Bridge Company, Limited, reviews the wonderful growth of this concern from the original small factory located in Toronto, and known as the Toronto Bridge Company, to its present extended works at Lachine. Illustrations of their plant and shops at Lachine, Ottawa, Winnipeg and Toronto are shown, as well as bridges, subways, ferry landings, viaducts, buildings, roof trusses, cranes, etc., erected by them. The book is neatly bound in a sage green and gold cover.

* * *

THE new 296-page catalogue just issued by the Richards-Wilcox Canadian Co. is notable for the care that has been shown in supplying architects and engineers with very complete detail. The comprehensiveness of the line and the service rendered by the engineering department make this work worthy of just consideration at the hands of all architects who aim at the best results in sliding door hardware.

* * *

THE Walkerville Roofing Manufacturing Company has issued a circular relative to their "Red Ribbon" materials employed in roofing, sheathing, painting, etc. Reasons are stated why their slate shingles have proven satisfactory and reliable.

AN unusual and highly commendable book has been compiled by the John Lysaght, Limited, under the title, "Men on Service in the War and Roll of Honor, 1914." In the introduction it states that 1,449 men from their works and 67 from their office staff, or over one-quarter of the total number of employees in their firm, were—at the time of publication—on active service for their country. The text reviews the causes leading up to the war and gives a complete list of the men who volunteered from the company's works at Bristol, Newport, Scunthorpe and Wolverhampton. At the end is given the Roll of Honor, with space for additional names of those who might be killed or wounded in action. It is a worthy tribute from a large concern to the men who have given their best to forward the interests of the company and now their country.

* * *

THE Otis Elevator Company, with offices in ninety-nine cities in the States and twelve throughout Canada, have issued a fifty-six page catalogue on gravity spiral conveyors. The book contains descriptive matter, photographic illustrations and drawings of work already executed, with a partial list of their installations.

* * *

BY addressing the Cast Stone Block and Machine Co., Limited, of Windsor, Ont., the architects may obtain a valuable catalogue on hollow cement building blocks made by the poured system. A Toronto plant has been located recently at Yonge street and St. Clair avenue under the firm name of Granite Concrete Block Co., Ltd.

* * *

PROBABLY no more attractive or better illustrated booklet has been published than the one on Presto radiators by the Pressed Metal Radiator Company. The Canadian territory is handled by the Waldon Company, Limited.

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July, 1915 Vol. 8, No. 7

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Full Page Illustrations

H. GAGNIER, Limited, Publishers

GRAPHIC ARTS BLDG., TORONTO, CANADA

BRANCH OFFICES

MONTREAL NEW YORK

THE ROYAL BANK BUILDING, TORONTO.

ROSS & MACDONALD, ARCHITECTS.

Letters of Merit

THE ROYAL GOLD MEDAL, 1915

The President and Council of the Royal Institute of British Architects,

Gentlemen: I was more than surprised when your Secretary's letter arrived informing me that the Council of the R.I.B.A. had nominated me for the Royal Gold Medal for 1915.

The bestowal of such a signal honor, unlooked for and totally unexpected leaves me at a loss to express adequately my thanks and appreciation of the compliment paid me—and through me to the profession of which I am a member and to the country of which I am proud to be a citizen.

As a Canadian born and bred and an Imperialist from the bottom of my heart I welcome everything that tends to bind more closely together the Mother Country and the great Dominions beyond the seas, and can think of nothing better calculated to help bring about in its own way such desirable results than this gracious action on the part of the Institute. That a body of such eminence as the R.I.B.A. should have singled out Canada as the first of the overseas Dominions to receive the Gold Medal will, I know, be valued by the architects of this country as a very great honor paid to a profession not hitherto overburdened with public recognition though striving manfully to uphold, often against very adverse conditions, the standing and dignity of the profession. As to myself you value, I fear, too highly whatever I may have done in this direction.

As for my architectural work, surrounded as you are by the masterpieces of our art, I have to thank you very cordially for the kind and lenient eyes with which you have looked upon it. You do me gentlemen, far too much honor.

I wish very much I could have seen my way clear to have gone across and received the Medal in person. In not doing so I trust you will acquit me of any discourtesy, but as you all know only too well, things are not normal and the world is out of gear and I find it quite impossible to manage it.

Again I have to thank you for your kindness in electing me an Honorary Fellow of the Institute—an honor I deeply appreciate and highly value. To be a member of the Institute is a distinction I have long coveted.

Yours very faithfully,

(Signed) Frank Darling.

The letter of acceptance by Frank Darling, of the Royal Gold Medal is indicative of the wise selection made by the R.I.B.A. This reward is an acknowledgement of Mr. Darling's consistent endeavors in the sane progress of Canadian architecture; of the gradual evolution towards an esthetic art and of the spirit which permeates the entire working corps of the profession.

PROTEST AGAINST PROJECTING SIGNS

To His Worship the Mayor and City Council, Toronto.

Sirs: At a meeting of the Toronto Chapter of the Ontario Association of Architects held on the 18th instant, it was resolved to memorialize the City Council regarding the question of projecting signs.

It will be conceded by anyone who has the slightest regard to appearances that the streets of Toronto are fast becoming a hideous nightmare of street signs.

The effect upon visitors coming from places where some control of the appearance of streets is in force must be startling in the extreme.

The growth in the nuisance has been so gradual that we, perhaps, do not realize the full significance of these obstructions and obsessions.

The competition of these signs has become so great that new installations are increased in size, till, in some places, the view up or down the streets is practically blocked, and the value of adjoining signs nullified.

The result is that the older and smaller signs are practically blanketed and useless, and persons looking for a particular shop are only confused in their search. People agitate for the removal of telegraph and telephone poles but tolerate quite as evil a disfiguration of our streets in the nature of projecting signs.

We would respectfully suggest that the Council shall exercise its authority (clause x by-law No. 5514), and that at the expiration of such license or a reasonable time thereafter, it be not renewable.

We also suggest a regulation that a limit be placed on the size of signs and that they be not allowed to project more than nine inches, or one foot in front of the building. This would give ample room for the installation of electric lights behind signs placed on the fronts of the buildings, and would, moreover, put all parties on an equal basis.

We also suggest that some regulation be devised looking towards the more sightly arrangement of marquises or awnings. At present there is no uniformity or attempt to align adjoining erections.

On behalf of the Chapter,

(Signed) Isadore Feldman, Secretary.

That this protest is worthy of commendation is felt by practically every individual in Toronto, with the exception perhaps of those who know no pleasure except in the acquirement of wealth. Surely the artistic temperament of our people should not be seared by the constant view of street signs which are absolutely foreign to the design of the buildings themselves and which are conducive to traffic congestion as well as the destruction of life and property.

THE ROYAL BANK BUILDING, TORONTO.

In showing the Royal Bank Building we have illustrated the last of the three tall structures recently erected at the junction of King and Yonge streets, Toronto. This edifice is the highest building in the British Empire, and naturally brings up the much-argued question of the advisability of constructing skyscrapers from an economical, sanitary and artistic standpoint. It must be admitted that scarcity of land has had little or no influence whatever in the final decision as to the height in Toronto, since so much space is available within a very short distance of the site in question. Even in cities like New York, Chicago and Philadelphia, where land is worth fabulous sums, action is being taken to limit the height. In New York City an ordinance was proposed with three hundred feet as the maximum for the main building, with the privilege of extending twenty-five per cent. of the floor area as high as desirable. Some streets are to have the right to erect structures twice the street width, and when a greater height is necessary the building is to be set back, step fashion, one foot laterally for every four feet in height. In Pennsylvania an act has been drafted to allow cities a maximum height of two hundred and fifty feet, and they may provide for greater elevation by receding certain distances from the building line of the street. These deductions have been carefully arrived at, and if the reasons for such conclusions are just, then it would be well for us to formulate laws which could not be set aside at will by corporations of influence and wealth.

RESTORATION OF LOUVAIN LIBRARY.

The John Rylands Library at Manchester, England, is making a careful selection of books, with the intention of presenting same to the Louvain University as a sympathetic expression of their feelings towards the institution, as well as an effort to assist in restoring this once famous library. The books are to be held until such time as it will be safe to forward them to the university. It is to be hoped that this worthy action will interest other libraries and rich benefactors to assist in making the new collection as large and valuable as possible.

LACK OF PATRIOTISM.

Considerable space has been devoted to the "Build Now" slogan, urging people to take advantage of the cheap materials and labor. This advice is good, and should be given all the consideration which it merits. But the fact must not be lost sight of that the banks and loan companies are not willing to advance the necessary capital for the client to push ahead various projects. Everyone is heartily in sympathy with making the statement "Business as Usual" a reality, and such would be the case if the work already contemplated could be executed. Canada is not undergoing a money stringency according to the bank statements, which leads to one conclusion. In view of the truth that building materials have dropped materially in price, the allied trades are anxious to render service at greatly reduced prices, the architects have plenty of work held up by lack of loans—in view of all this we can only attribute a lack of patriotism to the financial institutions, who refuse to encourage legitimate building.

A FALSE IDEA OF AUTHORITY.

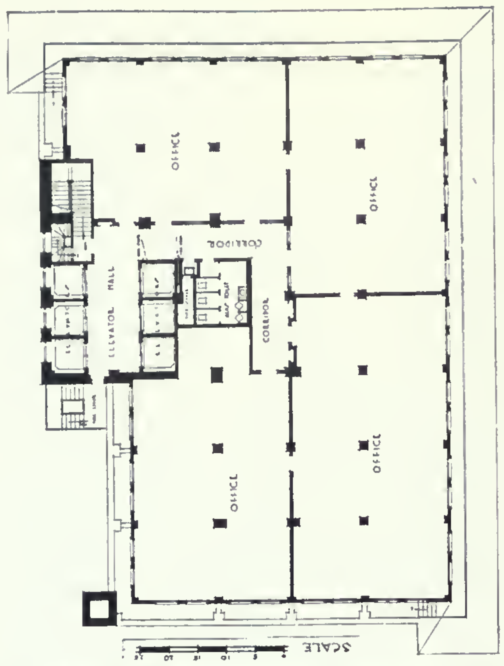
An interesting point has been raised in the investigation of the Manitoba Parliament Buildings. F. W. Simon, architect of the work, was ordered by Hon. G. R. Coldwell to provide caissons instead of concrete piles for the foundations. Contrary to his better judgment, Mr. Simon ordered the drawings made in England, but on account of the need for haste they were cancelled and made in another architect's office. Desiring to see that his plans were properly executed he asked of the Government the privilege of supervising the construction, and was informed that he had as much right as any other citizen to draw the Government's attention to any flaws in the work. It would seem to be a misuse of authority if officials in high standing were allowed to prevent an architect from supervising the work for which he may be held responsible. This is a matter of considerable import and should not be passed unnoticed.

DEATH OF RENE P. LEMAY, ARCHITECT.

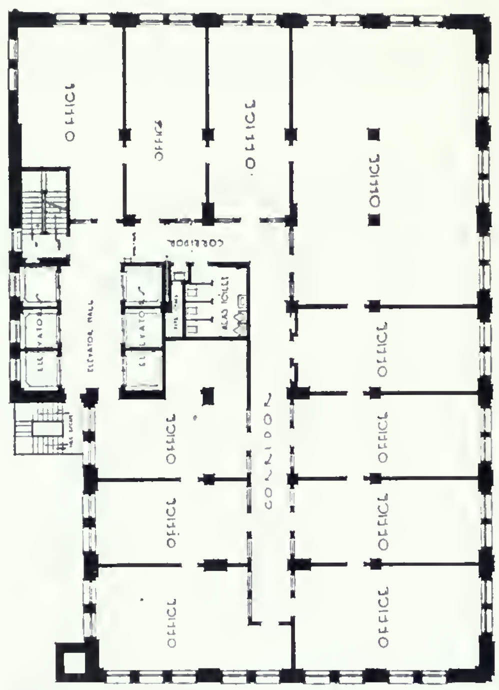
The architectural profession will sincerely regret the death of Rene P. Lemay, whose consistent efforts have been felt in the upbuilding of his native city, Quebec. His work has reached out beyond the field of architecture, having been on the City Council for six years, during which period he showed a marked interest in civic affairs. Among the many buildings credited to Mr. Lemay may be mentioned Quebec Technical School, Caisse d'Economie, Merger Building, St. Patrick's Church, St. Roch's, Chicoutimi Cathedral and Seminary. His early training was received under the direction of F. X. Berlinguet, of Quebec, and other professional men in the United States. His exemplary life and devotion to the high ideals of art should prove an inspiration to the younger men, who will be called upon to maintain the high standard already established by him.

THE ROYAL BANK BUILDING, TORONTO.

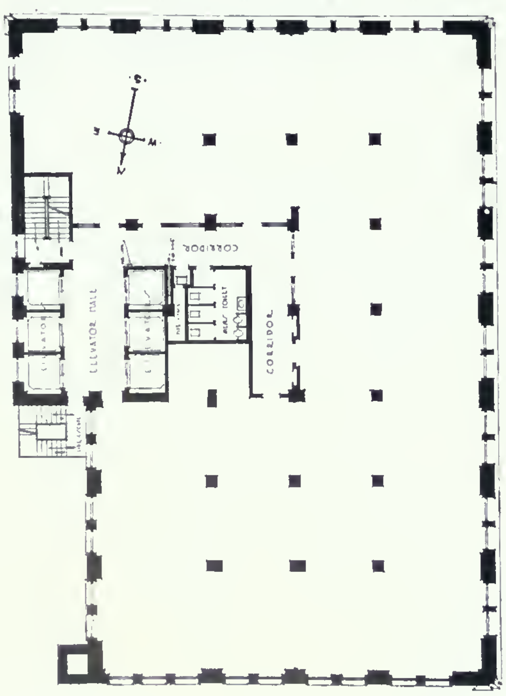
BANKING ROOM DESIGNED BY
CARRERE & HASTINGS AND
EUSTACE G. BIRD, ARCHITECTS.



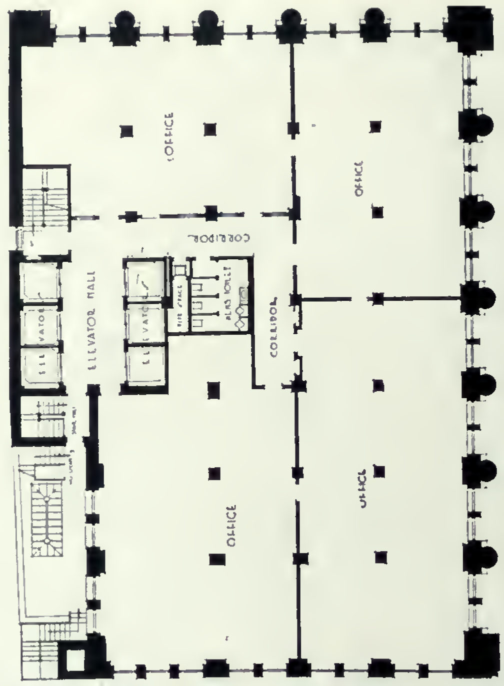
TWENTIETH FLOOR PLAN.



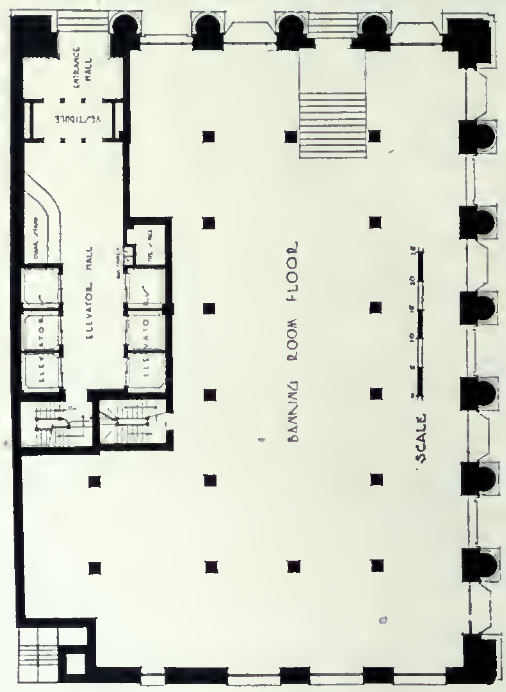
TYPICAL OFFICE PLAN.



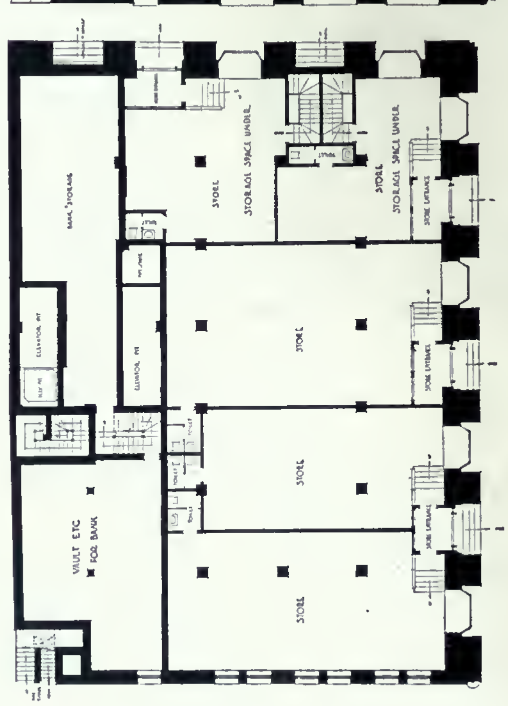
TYPICAL FLOOR PLAN.



SECOND FLOOR PLAN.



FIRST FLOOR PLAN.



GROUND FLOOR PLAN.

THE ROYAL BANK BUILDING, TORONTO.

ROSS & MACDONALD, ARCHITECTS.

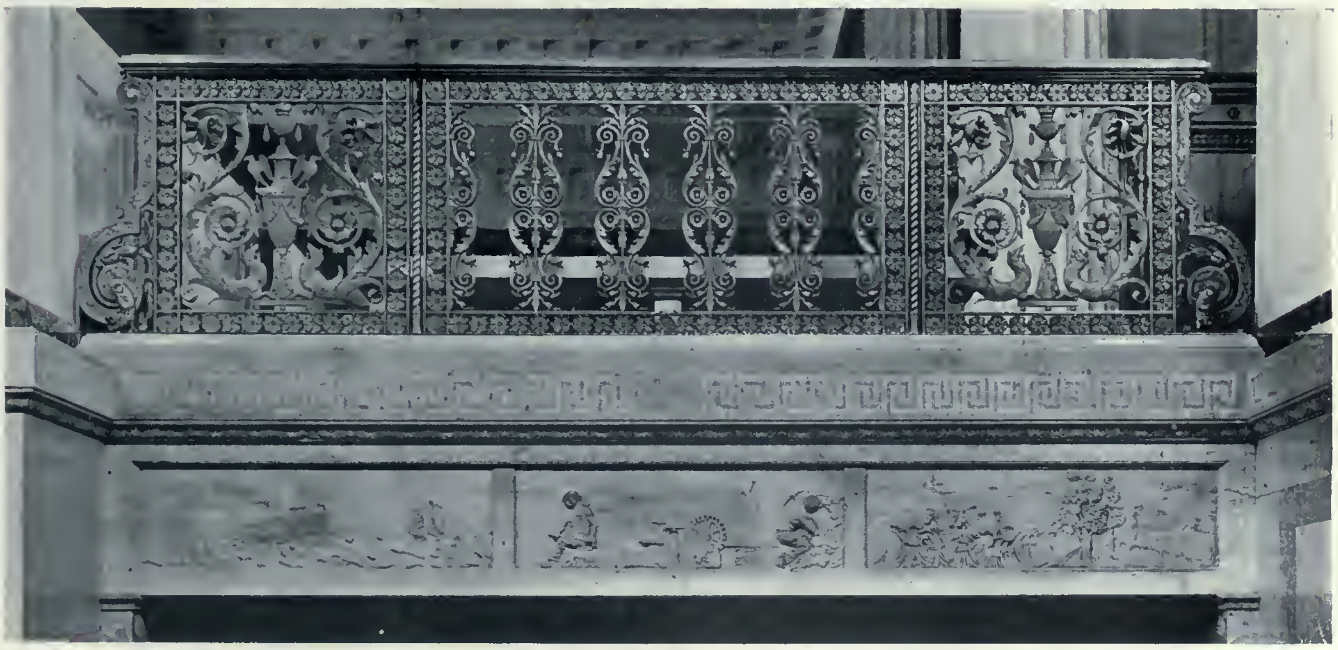
The Royal Bank Building, Toronto

THE progress in skyscraper construction is nowhere better exemplified than in the Royal Bank building, Toronto. Exceeding all other structures in the British Empire in height, it bears such distinction with an air of dignity through its severe commercial aspect. The lower stories especially are worthy of careful observation. Here the main banking space has been preserved in the exterior treatment while still retaining the retail value of the site for shops and stores. The junction of Yonge and King streets represents the centre of the commercial district, and demands the utilizing of every available square foot. In order to preserve an unbroken design for the banking room and still provide a series of stores with entrances from the street, the first floor is reached by a monumental stairway, while the shops are accessible by steps descending to the ground floor. The latter are arranged so as not to interrupt the harmony of the general appearance and still have sufficient definition for the purpose for which they are intended to serve.

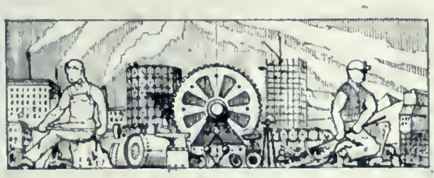
The building proper, which rises two hundred and fifty-five feet above the sidewalk, is surmounted by a twentieth story set back from the street line and a pent-house, bringing the total height to three hundred feet. The two main elevations facing Yonge and King streets consist of the customary divisions, the base course being grey granite with the columns of Indiana limestone, the shaft and cornice finished in a light cream-colored semi-glazed terra cotta. The rear elevations are treated in a pressed brick harmonizing with the general tone of the principal facades. All limestone is finished with a rubbed face and the granite with fine axed face excepting washes, jambs, soffits, sills, mouldings, etc., which are chiselled; while the back of the stone is plastered to a minimum thickness of one-quarter inch with non-staining mortar.

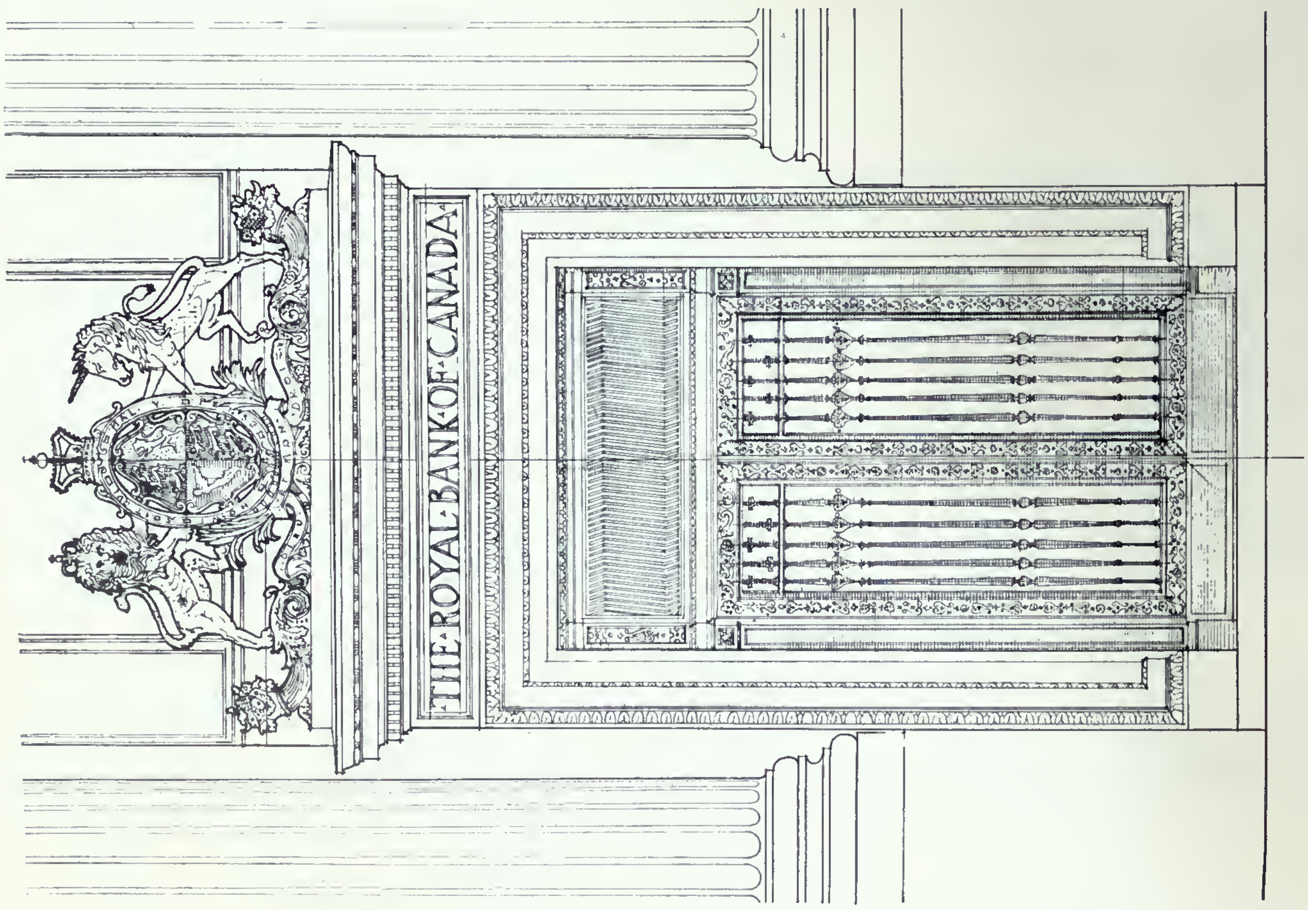
The Guardian Realty Company, who have leased the first floor for a period of years, will enjoy a banking space of unusual merit both in appearance and comfort. The rooms are accessible from King street through two public entrances with solid bronze doors three inches thick, and from the elevator hall. The arrangements between the main exchange banking room and the savings department below are so adjusted as to form practically a unit with perfect circulation. The offices of the manager, assistant manager and accountant are all en suite and open directly on to the public space. Connected with the savings department is a ladies' room.

Marble enters extensively into the treatment



DETAILS OF FRIEZE IN MAIN BANKING ROOM OVER STAIRS LEADING TO THE SAVINGS DEPARTMENT.





ENTRANCE DETAILS TO THE ROYAL BANK BUILDING, TORONTO.

of the banking room; the walls, columns and floors being treated in highly polished Tavernelle marble with the inlaid work from a different strata and furnishing a necessary feeling of warmth. The main stairway is of solid Bassville marble, while the base around the entire room as well as the plinths of the columns is of black and gold. A Canadian marble has been used throughout the vaults, hallways, cloak rooms, etc. The public cheque desks and seats are of solid Istrian marble, the legs being poses from a sterilizing apparatus. A plunger elevator is installed for easy access to the silver safety deposit and book vault, the automatic control in connection with this device being tool-proof. For the convenience of the customers has been installed a safety deposit vault, security vaults and book vaults, lined with three-inch steel, while each of the doors and vestibules weigh twenty-five tons. The general lighting of the room is accomplished by concealed indirect reflectors so arranged above the counter

DETAIL OF YONGE STREET FACADE.

modeled after the well-known table in the Vatican at Rome. Overhead is an elaborate plaster ceiling, which, with the "old statuary" bronze in the stairs, screens, balcony and doors, lends to the tout ensemble a rich and artistic treatment.

The entire banking suite is heated by direct and indirect steam under thermostatic control and ventilated with a system of mechanical ventilation which ensures fresh air at all times. Sterilized and cooled water is run to various fountains at different points for drinking purposes from a sterilizing apparatus.

screen to ensure the best architectural effect as well as the practical lighting of the premises. The lighting of the counters is likewise accomplished by indirect reflectors.

Passing from an outside lobby of Indiana limestone six by eighteen feet, the elevator hall is entered through a small vestibule with a series of plain bronze doors. In addition to the main stairs, cigar stand and steps leading to the main banking room are six direct-connected electric elevators operating approximately seven hundred feet per minute. The walls have a ten-foot marble dado above which is a chaste and ornate plaster ceiling; the floors are of light marble with dark border of same material. The corridors throughout the building have plaster walls and ceilings of cream tint, "Tanguile" mahogany woodwork, and floors of small marble tile laid in pattern.

DETAIL OF FRIEZE AT SECOND FLOOR.

Next to the main banking room in general interest are the floors accommodating the Toronto Board of Trade. This organization occupies the nineteenth and twentieth stories as well as other rooms in different parts of the building. After the roof had been built the Board decided to occupy the two top floors, which necessitated quite a change in the structural scheme. In order to adequately provide suitable quarters, five columns had to be removed on both floors. This threw additional loads on the adjoining columns, which were reinforced down to the eleventh floor by encasing them solidly with concrete, at which level the regular construction was able to assume the extra load. In this operation the large assembly room with a sixteen-foot ceiling height was obtained with no columns to obstruct the general view. The entire floor is covered with a cork carpet on cement with walls and ceiling of tinted plaster. Aside from the assembly room, the nineteenth floor contains the general office, the board room, market suite, committee rooms, private luncheon booths and council chamber. The last room accommodates nicely the long mahogany table with nineteen seats upholstered in deep brown leather. The walls are tinted a light green with carpet to match and fireplace, above which is an elaborate carving of the coat of arms.

The twentieth story sets back eight feet from cornice projection, providing a lounging promenade on all sides with excellent views over the city and across the bay. The floor is covered with red tile blocks and protected by awnings extending full length, which also add additional comfort to the dining, reading and lounging rooms of the club. In the dining-room are thirty-four small tables, which seat one hundred and thirty. The furnishings in French gray, the cork flooring in green, the walls tinted a light green, the general woodwork in mahogany, and the ten hanging semi-indirect ceiling fixtures all combine in making this room unusually attractive. The silverware, dishes and table linen have the crest of the board; while the walls are relieved by paintings of Toronto as it existed in 1820, 1842, and 1854. Opening into the dining-hall are the lounging and reading rooms, covered with heavy Canadian Wilton carpets of conventional design in green and deep blue. The wicker chairs and divans are uphostered in a floral pattern with subdued tints in perfect harmony with the other furnishings. One of the interesting features is the kitchen with its gas range, vegetable steamer, stock pot, broilers, steam tables, plate warmer, refrigeration equipment, and washing table constructed in tiers and provided with vegetable trucks underneath.

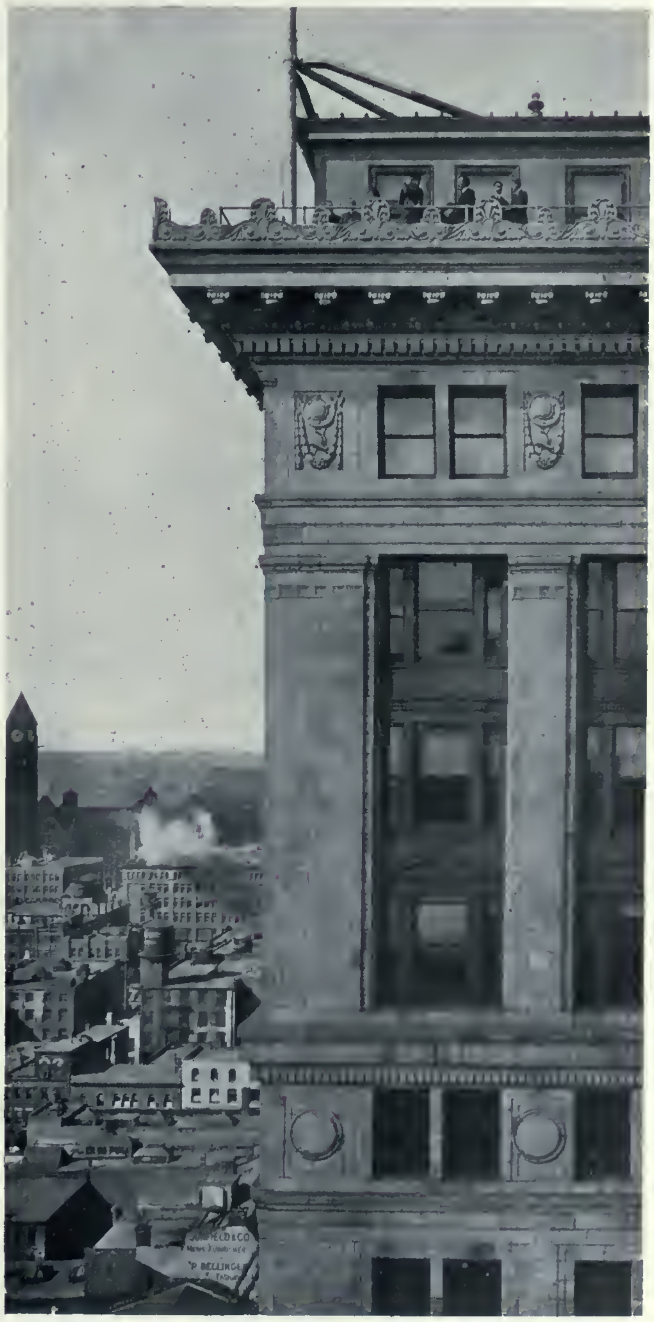
In order to insure ample protection from fire the window frames, mullions, transom bars, etc., to the first floor and in the elevator shaft are of steel, while the remaining are of cast iron; the floors are all of hollow terra cotta arches set between the steel beams in lasting cement mortar, excepting ground and basement, the latter being concrete with top cement coating divided into squares measuring twelve inches; the partitions are porous terra cotta four inches thick if less than fourteen feet high and six inches if over; the stairs from elevator hall are of iron with marble treads and risers to the second floor level; the fire escape from the ground floor to the roof at the rear of the building is of wrought iron. All toilets are finished with white marble wainscot seven feet high and floors of one and one-eighth inch marble tiles.

In the basement are located the boiler rooms, motor and fan rooms, engines, condenser for cooling water from boilers, sump pump which is operated by automatically controlled electric air compressors.

The machinery is located on a floor higher than the boiler-room, which contains also a pair of direct connected centrifugal pumps driven independently by two forty horsepower electric motors, which furnish the domestic water supply to all floors above the tenth story, the ten lower floors being furnished with water direct from the city mains. In connection with these pumps there is a large auxiliary supply tank in the basement in case the city pressure should be turned off. On the opposite side to the pumps is a large air washer and conditioning apparatus, which not only washes but also warms and humidifies the air. This is provided in connection with the system of indirect heating, all of which is used only in the banking premises, which requires approximately three thousand square feet. The remaining portion of the building has twenty-two thousand square feet of direct radiation heat. Over five miles of piping was used for the heating only. The ventilation system, which included all the local vent from the lavatories, required over twenty-five tons of galvanized iron, in addition to five tons of black sheet iron used in the fans, air washers and smoke stacks.

There are two steam tubular boilers of one hundred and twenty-five horsepower, sixteen feet long and seventy-two iches in diameter, each suspended by four heavy hangers with steel plate pads riveted to the boiler. The grates are cyclone self-locking and required to maintain a temperature of 70° with a five-pound head of steam when it registers without ten below zero. The system installed permits of shutting off any section of risers by connecting the steam mains to the boilers with a pair of heaters.

In ventilating a fresh air supply fan furnishes 8,725 cubic feet per minute to the basement and first floor, the banking room receiving slightly over half the amount through fifteen inlets. The fresh air is drawn into the building through a cold air chamber supplied with tempering coils, air washers and reheating coils. The supply fan, twenty-seven inches in diameter, rotates four hundred and seventy feet per minute, sending the air across the ceiling of the basement from where the vertical branches take it to the respective rooms. The exhaust fan



DETAIL OF CORNICE.

ENTRANCE FROM KING STREET.

ELEVATOR HALL DETAILS.

THE ROYAL BANK BUILDING, TORONTO.

located in the pent house on the roof, with a rotation of four hundred and eighty times per minute, expels the foul air from the main duct, thirty-eight by twenty-four inches through a thirty-inch square discharge cap of thirty-two ounce copper. The material used for the supply and discharge pipe is 18-gauge galvanized iron.

In excavating, the soil was found to consist of an upper layer of clay extending to a depth of thirty feet, covering a three-foot layer of hard and scaly clay, which in turn topped a deep strata of very dense shale, resisting in test a load of seventy tons per square foot. The excavation was started September, 1913, the steel work in February, 1914, and the stone and terra cotta in the following April. In referring to the constructional features of the Royal Bank the Canadian Engineer states, that as no part of the basement is excavated down to the shale, caissons were sunk through the clay until bed rock was reached at each of the forty-one points where a column foundation was required. Each column is carried upon a separate pier, with the exception of those which are carried on cantilever girders, or on plain girders. All piers, with the exception of those along the extreme north end of the building, are circular in plan, and vary in diameter from 4 ft. 4 in. to 6 ft. 8 in. at the top, according to the proportion of the load that is transmitted to them. These piers are increased in diameter at the bottom by an additional two feet in each case, the enlargement tapering through a height of three feet. On an average, each pier carries a load of about fourteen tons per sq. ft. Owing to the nature of the soil, in sinking for piers it was found unnecessary to use any form of hollow caisson or piling, as the clay walls were self-sustaining. Consequently these excavations were made exactly of the size and shape required, and on bottom being reached, were filled in with concrete to the requisite height to take the grillages. The concrete used was of a 1:2:4 mixture, the stone being about 1½-in. gauge.

The grillages were composed of steel I-beams varying from 10 in. of 30 lb. to 24 in. of 100 lb., those for the main columns being composed of two sets of four 15-in. of 50 lb. I's, and each set of four beams being connected by means of ¾-in. through-bolts with pipe separators between the beams. One set was placed at right angles to, and above the other upon the concrete piers. They were carefully levelled up and the whole then grouted in level with the top of the uppermost grillage.

SAVINGS DEPARTMENT.

Each of the piers constructed as above are capped with a heavy cast iron column base. These bases were cast from tough grey iron. The actual test made on coupon bars one inch square in section and twelve inches long, loaded at the centre, gave on an average a breaking load of 30,000 lb. The upper surface of the cast iron bases is planed true and parallel to the lower surface, and holes are drilled for bolts to connect the columns to bases. In designing these bases provision was made for one inch of grout between the base and the steel grillages. In setting, small wooden wedges were used under the corners of the castings, by which means the bases were set dead level, and raised or low-

TYPICAL CORRIDOR.

DETAIL OF CORNICE,
MAIN BANKING ROOM,
THE ROYAL BANK
BUILDING, TORONTO.

ered to the exact elevation required. Grouting was then introduced through vertically cored holes at the centre of the casting, and by this means the space between grillage and base was thoroughly filled in. The wedges used in levelling were not removed, and, being of wood, will give under any compression to which they and the grouting may be subjected, thus insuring even distribution of the load over the whole surface without damage to the castings.

All piers are circular in plan, with the exception of those under the five columns along the north end of the building, and the two columns carrying the smokestack at the northeast corner of the building. The five columns are each carried by four plate girders bolted together as one, and running parallel to and under the north wall. Owing to the depth of the basement at this end of the building, bed rock is not more than ten and eleven feet below the column bases, and it was not necessary to use cantilever girders to carry these five columns. Instead, a trench was cut along the extreme northern limit of the lot, extending inwards about three feet, and downwards to bed rock. This trench was filled in with concrete to the requisite height, diagonal tie rods being inserted, which later formed part of the horizontal reinforced concrete struts running at right angles to the girders. On this concrete wall were placed the plate girders already referred to. Twisted steel anchor rods were then hooked into the projecting plates provided on girders, and laid in a trench 2 ft. 6 in. wide by 5 ft. deep, extending out at right angles to the girders and butting on to the caissons of the next row of columns. The girders, and trench with rods, were then filled in with concrete, the outer girder being grouted with neat cement flushed in to lot limit. The girders are surmounted by cast iron column bases, levelled and grouted as previously described.

The foundations for the two columns constituting the main and auxiliary columns at the southwest corner of the building are worthy of special mention. The main column runs up to the full height of the building, but the auxiliary stops at the third floor level, and carries the wind bracing up to that point. Above the third floor the wind bracing is carried by the main column. The pier for these columns is circular in plan, and is surmounted by a special grillage composed of a bottom course of five and an upper course of six 12-in. to 40 lb. I-beams, the latter course laid at right angles to the lower. It will be noticed that the beams in the upper course are carried diagonally towards the centre of the building, to form a base for the auxiliary column. The weight thus applied would cause an eccentric loading upon the pier, the load centre approaching towards the inner wall of pier. To overcome this eccentricity of loading, the position of the pier has been moved diagonally inwards by 2¾ in., thus concentrating the combined load about the centre of the pier.

DETAILS OF MAIN BANKING ROOM.

The five columns on the east side of the building abut on an existing structure, and commence from a level considerably above the rock (as very little basement excavation was required under this portion of the building). They are carried upon cantilever girders, which are each carried in turn by two circular caissons surmounted by single grillages composed of four

RAILINO AT MEZZANINE FLOOR OF BANKING ROOM.

15-in. I-beams. The girders are each built in three longitudinal sections, and are bolted together through diaphragms after being set in place. The spaces between the girders are filled with concrete, and are also encased in the same material. A cast iron column base is set at both ends of each girder and grouted in.

It is interesting to note that twenty-six hundred tons of steel was used, one and one-fifth million common brick, and approximately two hundred and sixty-six thousand face brick. The over all dimensions are one hundred and twelve feet on Yonge street and eighty-one feet on King. Each typical floor has a rental space of six thousand two hundred and fifty square feet. The completed structure, including all fees, cost $1,250,000.

ENTRANCE IN BANKING SCREEN.

PROGRESS in building construction is nowhere better illustrated than by the three substantial buildings that have succeeded each other on the site of the Bankers' Trust Building in Wall Street, New York. In 1880 the Manhattan Trust Company erected a fine up-to-date eight-storey commercial building on this corner, equipped with the very latest devices that only a wealthy concern can afford. Within the space of eleven years the building had g rown so out of date that it was removed and the twenty-six storey Gillender Building erected.

This skyscraper was built in the best manner of the time and equipped with every known convenience with the prospect of standing for centuries, yet in two decades it was demolished, thrown into the scrap-pile and the present Bankers' Trust Co. Building of a height of thirty-eight storeys erected in the place. Nor is this exceptional; the Thorley Building in New York, a modern steel structure, was demolished to make place for the present New York Times Building, and the Rand-McNally Building in Chicago, one of the early marvels of tall building construction in that city, has given way to a taller, more modern structure.

With the skyscraper approaching the age of thirty years, we find the first generation, so to speak, passing away. It seems scarcely credible on looking on the pictures of the larger American cities for thirty years ago that the marvelous change in the skyline all occurred in the span of one generation. And there is no indication of a slackening or decline in this activity. New York is still building enormous high buildings at an accelerated rate averaging about one each month of the year. The seemingly incredible point is now reached where a few of the earlier tall buildings are being removed to make place for higher ones. Structures regarded a score of years ago as destined to stand for centuries, as structures of such rivetted strength and erected with such travail that it would be well-nigh impossible to take them down, are now old-fashioned, and eligible for the scrap-pile. Such is the pace of building progress in the metropolis.

In 1915, it is literally easier to cut down a steel column than to cut down a tree or cut through a block of stone. With a portable oxygen-acetylene flame, steel work is now cut apart in a few minutes with no physical exertion. Indeed an anarchist or lunatic reckless of consequences could, single-handed, cut down any of the tall steel structures in a few hours if free from interference. So does science work miracles of invention and discovery, and from generation to generation multiply the facilities for weal and woe. Let no man attempt to prophesy, therefore, the marvels that the future may hold in store.

As the tall building enters upon its second generation, one naturally inquires,—What of the future? Can they be built higher? What is the limit? Disregarding for the moment the question of legal limitation and artificial restriction of height, it is evident that the answer is bound up with the scientific evolution of the years to come. At no time has the architect been more ready to seize and apply the last word in scientific research. Indeed, it is the price of his success and continued favor and prosperity. The architect who does not keep in touch with building progress and the latest application of science will soon find himself drifting steadily to the rear. Indeed even to stand still is to find oneself moving backward by contrast with the onward current. The modern tall building is a marvel of up-to-date scientific appliances. Without scientific engineering not only could not such buildings be constructed, but they could not be maintained or rendered habitable. It is apparent therefore that radical scientific discovery or invention will profoundly affect the future of these structures.

It is only necessary to contrast a European building with a typical American building to realize the extent to which applied science dominates the latter. Sometime

LIGHTING FIXTURE IN BANKING ROOM.

DETAIL OF MEZZANINE IN BANKING ROOM.

DINING ROOM.

BOARD OF TRADE KITCHEN.

ago while escorting a group of visiting engineers, members of an International Congress of Engineers, through several of the larger buildings in New York City, a Russian engineer said to me, "Science is evident in everything, even in the sweeping and cleaning. Your skyscrapers are dollars invested scientifically!" Later pointing to the S on the dollar-sign, he said, "your captains of industry are the shrewd men who early guessed that that S stands for Science, who imported chemists and engineers to develop by Science the various industries, steel, oil, copper and building materials." To-day an architect must know more than art; he must be a scientist or employ a scientific staff.

One has only to call to mind his travels abroad, his experiences with "lifts" that lifted up but not down, with plumbing without back air-vents, and recall the huge porcelain stoves pointed to with pride as marvels of heating and ventilating apparatus, to realize American building progress. The comforts and conveniences that the American accepts as a matter of course are all very new, very recent, and are not to be found in the most marvelous chateaux of France or the most attractive Venetian palaces. Our model tenements far excel the Doges' Palace in fireproofing, sanitation, comfort and convenience. In skilful building construction and marvellously convenient appurtenances, America leads the world.

DETAIL OF BANKING ROOM.

People have been attracted to the larger office buildings, hotels and apartment houses, not because they are large or high, so much as because of the superior excellence of their appointments and conveniences and the guarantee of safety from fire which they give. In a large office building or hotel properly designed with the steel frame fireproofed with baked clay, one is safer on an upper floor than in an old style five-storey building. Every new improvement is costly at first and is to be found only in the larger buildings where the cost pro rata is lessened by the number utilizing it. Thus the larger and higher the building the more up-to-the-minute it will be found to be in catering to the convenience and comfort of its tenants. The size and height of a building is therefore an index of its superiority in all respects.

There is here evident a fundamental natural principle—in union there is strength. There is also safety, comfort, convenience and the superior service and efficiency born of concentration. This explains why buildings tend to be high and also in part why they tend to be higher and higher.

Probably as a matter of economy of operation, the limit of height is about thirty-two storeys, but towers of twice that height, no

CLUB ROOM, BOARD OF TRADE

TREATMENT OF TYPICAL OFFICE SPACE.

doubt, will be constructed. There is no engineering drawback to the erection of such a structure or one even higher.

Still, probably no building exceeding fifty or sixty storeys will be constructed for some years. While the general trend is upward, a more detailed study of the statistics reveals a curious wave cycle in very high building construction as shown in our cities. This is probably due to the fact that there is a certain advertising prestige attached to the tallest building in a city, particularly in New York, with the result that there is strong competition for a while for the height record, and then a lull or period in which no very tall structure is projected. There is also the factor of over-production and adjustment after a number of tall buildings are completed and available for occupancy. This gives periods of pronounced activity, and more or less depression in very high building construction about sixteen years apart. New York has recently passed through such a period of competition for the highest record in the construction of the Singer Building, the Metropolitan Tower and the Woolworth Building, and it would seem likely that such a period of culmination will be succeeded by a period of indifference or decline of interest among financiers, engineers and the general public. Even the engineers who have had to do with this point of culmination are dubious; they have strained themselves to exceed the height record of sixten years ago, and for a new cycle a new, younger ambitious generation must be awaited.

That skyscrapers of more modest height are steadily being built in New York is beyond question. One has but to consult the existing records showing the total storeys in high buildings built year by year in New York. While there are evident in the curve times of lesser activity due to financial uneasiness, nevertheless the high building movement in New York has been steadily maintained, and at the present time is culminating in a period of unprecedented activity. Such activity would appear to indicate strongly that such structures are paying investments, for there is apparently no evidence of a falling off in production, even though there are numerous old-style buildings which are not fully occupied. Tenants find it helps business prestige and success to be occupying better office quarters and utilize the latest facilities so that a new tall building soon fills up, drawing the best class of tenants from the low antiquated structures about it.

It is but another illustration of the old business principle, "Quality wins." The commercial man having evolved a superior structure to meet his needs, it was not long before its

ELEVATOR HALL.

advantages led to the promotion of such buildings for quasi-business interests, and ultimately for apartments, hotels and clubs, and even church activities. In the better class of tall buildings the better light, air and service, and the quiet of the upper floors render them most desirable. They can be made absolutely safe against fire. Indeed nowhere does one seem more secluded and remote from the seething town than in a room in the pinnacle of a skyscraper. Here, strange as it may seem, time, space, and the eternal verities steal into one's thought as one gazes o'er land and sea for sixty or one hundred miles and then look down on the ant-like specks below. The poetry and democracy of the skyscraper we must leave to the poet and commentator of the future, confident that, when our cities are as old as Venice and Florence, our buildings will be one of the wonders of the world, and that, the softened record of time forgetting the harshness, the strife of the moment will speak but of the greatness, the glory, the indomitable energy and aspiration of the present hour. Let the architect who deplores modern conditions but turn the pages of the lives of Michelangelo or Benvenuto Cellini for examples of the strife and struggle and actual violence and personal danger that attended the practice of art in the glorious times past. An architect is not now set upon with swords and pikes by the henchmen of a rival, nor does he often bear to the grave a countenance mashed by an angered competitor, as did the great Angelo. It is no longer necessary for an architect to be a military engineer to gain the favor of a prince or be a sturdy man of arms ready to report with armed retainers at the call of his vassal.

ENTRANCE DOORS TO VAULT SPACE.

And yet it is true as ever that he must be in affairs, not in military affairs, perhaps, or in the street broils of the factions of the town, as was the rule in Florence and Venice, but in the larger sense he must be a man of affairs posted on what is going on, and on new methods and materials, their merits and possibilities.

The tall building has succeeded thus far on its merits, which is a typical American proposition. Yankee ingenuity has evolved the best building in history. The practical man and the scientist have each contributed his best efforts to its success. The professor has been hailed in his labortory, called from his calculus. Get us something to do this, stop that, keep down the pressure of the unresting tides, help us weather the tempest's gusts and stand fast against its thrust. Get us an antitoxin for a disease of concrete-steel. Give us better metals.

This century can build taller buildings if called for. America can take from France the prestige of the Tour Eiffel, the tallest structure raised by hand of man, and outdo it in every form and feature. It has but to be called to the test; fresh from the conquest of the Panama Canal, where Gustave Eiffel, builder of the tower, designer of the Liberty Statue in New York harbor, failed ignominiously. Who doubts that the American engineer, successful where the Frenchman failed, can not excel the 300-meter tower of Eiffel?

As for the architecture, the architect must rise to the demands and possibilities of the hour. The dominant Americanism shines forth in many of the older tall buildings despite the drapery of dead forms of the Old World architecture with which they are covered.

Because a sensible Greek or Goth made a thing of beauty out of a waterspout by carving it into a lion's head or a gargoyle, must America forever have copies of these strewn over her buildings? The poverty of imagination and inspiration with which some of our architects have responded to the Gift of Time in the skyscraper is pitiable. Long have they been in learning that art is not something apart, but is the caress of an aspiring imagination to the work of the hour.

In the future the tall buildings will, no doubt, continue to maintain their supremacy in scientific safety and convenience, and when interest

DETAIL OF MECHANICAL EQUIPMENT.

revives in the height record, after a period of rest, no doubt they will go higher still in the form of towers. Now that the scientific side of their development is highly perfected, one may naturally expect to see an effort to make them marvels of art as well as of scientific construction.

To achieve this, the architect must give way to the engineer or must once again gain the common touch, must know processes and products, the vital energies, the laboratory, even the dust of the trades, as did Phidias, Angelo and Leonardo da Vinci.

Then may be expressed the possibilities, the aspiration, the genius of his period, and the transplanted architecture of Europe will appear exotic, and America come into the heritage of Time and of the Ages, — American Art—virile, true, fundamental as the life processes of the nation, characteristic as the glories of her predecessors in the pageant of history.

Then will the tall buildings of the future take place not only among the world's greatest feats of engineering, but become also worthy monuments of the life of their time, become works of art and architecture. — *D. H. Ray, Sc.D.*

IN discussing the height of buildings, D. Knickerbocker Boyd, of Philadelphia, proposes that "any owner who contemplates erecting on any given street a building which will attract more people and more business to that particular portion of the street than it can be reasonably expected to accommodate, or worse still, than it actually will accommodate, should be made to furnish a somewhat adequate amount of space, or rendezvous, in front of it." He therefore suggests that the height of buildings erected on the present regularly established building line be limited to one and one-quarter times the width of the street or open space upon which the structure faces. This would give on a street 50 feet wide a 62½-foot high building (if erected at the usual building line), which would be equivalent to a six-storey building used for residential or office purposes or a five-storey light manufacturing establishment. Any building taller than this initial height should then, he thinks, be so set back that the cornice or top of its perpendicular face shall not extend above an imaginary line, which might be called the "building and height line." If this imaginary diagonal be drawn from the curb of any of these streets, assuming the sidewalk to be one-quarter the width of the street, to the top of any building which is the limit of height above mentioned at the normal building line, and continued into space, it becomes the line of restriction. Thus to go up, one must igo back, forcing the face of the building back from the curb.

VIEW OF BOILER ROOM.

Some Possibilities in Ventilation

A. H. BARKER, B.Sc., B.A. *

NO PERSON who has carefully studied the problems of ventilation from the scientific standpoint can fail to have asked himself the question whether the theory of ventilation, as the ventilating engineer now knows it, can properly be called a science. Is there sufficient information on the subject of ventilation to make the application of that word to this knowledge appropriate? Modern practical science is nothing if it does not imply more or less exact knowledge. Some so-called sciences of the philosophical or metaphysical order appear to consist very largely of theories which never can be brought to exact tests. These are doomed by their essential nature to be what they are—namely, speculation more or less interesting and more or less probable, but always matters of opinion.

These, however, are not sciences as the term is understood by the engineer, but philosophies. They do not consist of exact experimental knowledge, but of intellectual theories. All true sciences in the engineer's sense in their initial stages probably pass through a period in which they consist largely of speculation and theories, some of which may or may not be borne out by subsequent experiments. Some of these sciences, such as chemistry or physics, at first consist of theories originally evolved in the effort to explain objective facts. If the facts are only partially observed, understood, or known, the theories will probably be erroneous. As the scientific world becomes better acquainted with the facts as they actually are, theories are modified to suit the known facts. They can be tested by specially-designed exact experiments. When, by a process of trial and error, theories are eventually evolved which will stand all known tests, some totally different in principle from others, and when the existence of facts previously unknown may be correctly deduced from the assumption that the theories are true; then, and not until then, can the science of which they form a part be said to be on a sound basis. There are other branches of science in which the theories cannot be put to exact tests, though their substantial truth is obvious from mathematical considerations.

Other sciences particularly applicable to engineering work are based on exact experimental science, though the conditions of practical application are such that it is in most cases impossible in practice to prove the accuracy of the theories on which they are based. Other experimental sciences, such as physiology, deal with problems of such extreme complexity that, though they are theoretically capable of investigation by exact methods, yet their complexity, and the number of known, though uncontrollable, factors are so great, and the number of unknown factors so doubtful, that it is difficult to obtain self-consistent experimental results to anything like the degree of accuracy which is considered necessary in other sciences.

The theories of the science of ventilation, such as they are, partake, to a certain extent, of all these characteristics. Its theories are at present in pretty much the same condition as were those of physics at the time of Newton. The number of uncontrollable factors is very great, greater than in most other branches of engineering. The number of unknown factors is probably considerable. The results which can be secured do not therefore approach in accuracy those which can be obtained in many other branches of engineering. All who have been practically engaged in the difficult task of securing generally satisfactory ventilation in occupied buildings know that it is impossible to lay down in exact terms the physical conditions which are required to be secured. Most of us could quote examples of buildings on which large sums have been spent in the effort to secure good ventilation, which, from the point of view of the comfort secured have been total failures. The reason for these failures are not always easy to define.

The science of ventilation, properly so called, has as its first duty to elucidate all such matters. All of those who have thought on the subject, and have had some practical experience, have their own theories. The special peculiarity of this branch of engineering is that it is exceedingly difficult to bring any of these theories to a crucial test. It is the first duty of the science to overcome this difficulty, which is partly inherent in the subject itself, and partly arises from the fact that the criterion of success is at present very indefinite. The only object we can specify at present is to produce feelings of comfort and a healthy climate. We cannot at present lay down the conditions necessary to secure this end in terms of physics and chemistry. Our knowledge is only general, not exact; qualitative, not quantitative. How can one get a measuring instrument which shall indicate, for instance, the feeling of comfort, especially having regard to the fact that what is one person's comfort is another's discomfort? A refreshing breeze to one man is an ear-aching draught to another man. A bald-headed man is not on the same basis as a person with a shock of hair. Still

*Extracts from lecture delivered at the University College in England.

more difficult is it to experiment on the effect of different conditions on health. The result, experimentally observed, does not arise perhaps for several years after the experiment is made, and it is complicated by the existence of a large number of other conditions which have a decided effect on the total result. Similar difficulties always must occur in any experiments on a human being.

I wish to consider the general direction of modern theories on these subjects, and the character of the investigations which we have in view for this year in this department for the purpose of putting some of them to the test.

In the first place, so it seems to me, the science must direct itself to the investigation of the fundamental question, which is as yet far from being decided. How can we lay down quantitatively in terms of physics and chemistry the objects for which we are striving? It is only recently that it has been borne in upon us that all the old-fashioned theories about carbon-dioxide, organic poisons, and the like, have been blown to the four winds by such experimentalists as Dr. Leonard Hill and Dr. Haldane. In place of them we have had theories of ventilation, according to which its function has practically nothing to do with the elimination of carbon-dioxide and the chemical purity of the breathing air. Instead, its object is said to be to remove heat from our bodies, and water vapor which we have breathed out; in general terms to prevent us from getting too warm.

That is one group of questions which must be settled definitely—to what extent efficient ventilation consists merely in the adequate removal of heat from our bodies and organic smells and water vapor.

I do not think it is possible for any impartial person, who has critically studied the mass of experimental evidence in support of this view, to avoid the conclusion that if it is not the whole truth, it is, at any rate, very largely true that what Dr. Leonard Hill calls "heat stagnation" is responsible for many, or, perhaps, most, of the effects to which we have been accustomed to refer as those of defective ventilation.

For my own part I am, however, equally sure that this fact cannot be the whole truth—that there is something in ventilation over and above the loss of heat and the suppression of smell. I am quite convinced that all air of the same temperature, pressure, humidity, and velocity, has not the same effect on the human organism That there is some quality other than temperature, humidity and velocity in the air itself which makes some air different in effect from other air. What it is can at present only be conjectured. From experience I believe that air loses that quality, whatever it is, which, with present knowledge, we can only describe as "crispness," when it passes over accumulated dirt, or into close contact with metal, or through a long underground pipe channel, or when it is heated by hot surface, and that this quality of crispness is not merely a matter of temperature, humidity, smell or velocity. Invalides feel the air of one place has a different effect on them from that of another place. If it were not so there would be no justification for sending people away to a special climate. It is important, however, not to lose sight of the fact that one cannot draw definite scientific conclusions from the sensations of any person, especially an invalid. Many of the sensations of every person are due to imagination and psychological influences, and not to objective facts, and these are most unreliable as a guide. There are persons not unduly sensitive, imaginative or susceptible to differences of climate, who find certain places or certain buildings of which the air, hot or cold, damp or dry, moving or at rest, has a stimulating effect on them, and other places or buildings which have the reverse effect. So far as it is possible to tell, this is not a subjective effect at all. I am sure from observations I have personally made that such differences are not merely due to differences in temperature, humidity or velocity.

Leaving out of count, however, for the moment the question whether or not it is the whole truth, I think we may provisionally accept the theory that temperature, humidity and velocity of air in a room are points of a very great importance in ventilation, of far greater importance indeed than chemical composition, and that one of the chief, but not the only, reasons for this importance is that they determine jointly the rate of heat loss from the body.

Let us consider where the acceptance of these facts leads us to in practice. If we accept the view that the object of controlling the temperature, humidity and velocity of air is *solely* to regulate the rate of heat loss from the body, it will be evident that the only instrument we require to measure the effect of ventilation is one which will enable us to determine the joint effect of these three factors so far as they affect the abstraction of heat from the body. On this assumption the possession of such an instrument at once raises the science of ventilation to a higher plane, for it enables us to measure the success of a scheme of ventilation objectively. At present we rely on the expression by individuals of subjective sensations. Up till recently no instrument has been available which enables us to measure this illusive quantity objectively. Air analysis is well known to be most fallacious as an indication of the feelings of comfort. Professor Hill himself has devised two instruments, which have for their object the determination of the degree of joint influence of the surrounding conditions in abstracting heat from a surface as nearly as possible approximating to the condition of the skin of the body. The simplest of these, which Professor Hill calls the "katathermometer," is in essence a delicate calorimeter consisting of a thermometer with a large bulb. The instrument is read by noting the rate at which it falls when it is raised approximately to the temperature of the human body and placed in the conditions or surroundings which it is desired to investigate. This instrument appears to contain the essential principle of what is required, although, so far as I can judge from the little experience I have had of it, the theory of the instrument needs to be worked out more fully than it has been up to the present.

The second instrument is the joint invention of Professor Hill and Professor Griffiths, to which they have given the name of the "caleometer." It is an electrical instrument, the object of which is to determine the amount of electrical energy required to maintain a coil of wire at the temperature of the human body in the given surroundings. Fundamentally this instrument has essentially the same object as the katathermometer. Both of these instruments will, I think, need careful calibration, and perhaps development in some details before they will be generally accepted by the ventilating profession.

Let us consider for the present only those factors which have an obvious effect on the heat lost, although with the reservation that the joint effect of the three factors in regulating the heat lost is probably not the only effect of importance which the individual factors have. One cannot avoid the conclusion that movement of air has a pronounced effect, quite independently of its effect in promoting loss of heat. Let us examine the physical effect of different volumes of air in cooling one individual. An ordinary human body may, perhaps, be taken to give off heat at the rate of 350 B.T.U. per hour. Of this total quantity something like 200 B.T.U. is given off in the form of radiation and convection together, and 150 B.T.U. is evaporization from the surface of the skin and from the lungs. If, therefore, we rely on the passage of air over the body to remove this heat and this vapor, we must examine the effect of these quantities on different volumes of air at, say, 60 deg. Fahr. and 65 per cent. humidity. It should be noted that this is a purely physical result, dependent on definitely known, though somewhat variable, factors. It will be noticed that I have included the heat radiated from the body with the total heat. In fact, some of this radiation will be absorbed by the walls, and will not be communicated to the air. The amounts are difficult or impossible to determine. I have therefore thought it best to include the whole of the radiated heat with that convected, in order to derive the maximum possible effect. It is evident that if we fix as an arbitary limit a rise in temperature of 3 deg. and a rise in humidity of 5 per cent., both above our arbitrary standard, we shall find that not less than 3,500 c. ft. of air per hour per head must be supplied, as a minimum for satisfactory ventilation on this basis, or roughly 1 cub. ft. per second per head. Let us take this as a provisional value for satisfactory ventilation. It is at least three or four times as much as is commonly now considered tolerable ventilation.

Let us now consider the possible different ways of introducing the air. It may be imagined to be introduced in a vertically upward direction, the fresh air coming in uniformly round the person's feet and being removed at the ceiling. That is a state of things which is described in my book as being pure upward ventilation. There are very few buildings ventilated in this manner. The best known example is the House of Commons. In spite of the enormous volume of air passing through that chamber, the bad ventilation is notorious. It is clear that the effect of this method of introducing the air must be to drive the heat and vapor given off by a man's body up into his face, so that his face gets the hottest and most humid air, and his feet the coldest and driest. This condition is the exact opposite of a desirable state of things. I believe that physiologists are all agreed that the rate of loss of heat from the face and hands ought to be far greater than that from the feet. This would seem to indicate that from this point of view downward ventilation, as it is called, is superior; and it has certainly been my experience that well-designed systems of downward ventilation cause less trouble and complaint than do those in which the direction is upwards.

But let us consider the effect of passing this quantity of air vertically in either direction over a man's body. Suppose each man occupies a floor space of 6 sq. ft. Taking his own mean cross-sectional area as 1 sq. ft. this leaves 5 sq. ft. for the passage of the air. The mean upward velocity of the air over this space will be about 2½ in. per second. The air in actual contact with his body being entangled with his clothes will have a considerably smaller velocity than the mean. The heat from the body may cause a local circuit similar to a vortex-ring, but in any case the velocity of the air close to the body can never exceed a very few inches per second if the direction of the ventilation is either upwards or downwards. As this is absolutely insufficient, it is my own belief that neither pure upward nor pure downward ventilation is desirable; and this was the point of the chief criticism of the present ventilating arrangements of the House of Commons. Neither the one nor the other represents Nature's method of ventilating the human body. This is in all cases done by a horizontal velocity of wind. My own view, which I hold very strongly, is that a horizontal velocity must also be produced before indoor ventilation can be regarded as satisfactorily accomplished.

For one reason, a vertical current does not admit of a sufficiently high rate of heat removal. It does not prevent the heat from stagnating round the body. I believe also that some horizontal velocity of the air is necessary, either to stimulate the nerves of the skin or for some other physiological purpose, quite independently of the loss of heat from the body. The reason is, of course, a question of physiology. Of the fact itself I am quite sure as a matter of experience—namely, that a generally satisfactory draughtless ventilation is a contradiction in terms.

If it be granted that a satisfactory feeling of freshness cannot be secured without some horizontal movement of the air over the face, the question at once arises—what movement of air is necessary? If we are engaged in the difficult task of ventilating big spaces where a large number of people are crowded, and where the air is very hot and moist, what velocity of air are we to aim at producing? As practical persons we can only answer this question by laying down that it is to be not greater than a velocity that all people will endure without complaining. If we produce a greater velocity than this, then sensitive persons will complain of draught, and we shall find ourselves in trouble. We must therefore find by experiment what is the maximum velocity which people will endure. That question can only be decided by elaborate experiment.

What one would desire to be able to do in this connection is to prove that a certain person could endure without discomfort in humidity conditions represented by, say, 65 per cent., an air current at a temperature of, say, 60 deg. and a velocity of 18 in. per second, but that a current at the same temperature and humidity, with a velocity of 22 in. per second, would begin to be felt as an uncomfortable draught. This condition would represent that person's maximum. The same person in the same conditions might find a velocity of 12 in. per second perceptibly refreshing, whereas a velocity of 9 in. per second would begin to be felt as rather stagnant and stuffy. This, therefore, would represent that person's minimum.

It will be evident that as these figures merge into one another by imperceptible degrees, and as the only possible measuring device is the sensation of the person under test, a correct determination will be of extraordinary difficulty. Such figures obtained from one person would not be sufficient. It would be necessary to subject as large a number as possible of persons of different physique to the same experiment, and take as careful note of the effect in each case as possible. By this means we may conceivably arrive at a certain medium velocity of air of suitable temperature and humidity, which should not be perceptible to anyone as an uncomfortable draught, while in all cases it produces a feeling not of cold, but of refreshment. This is the velocity of air which the ventilating engineer should aim at producing. This velocity must depend, to some extent, both on the temperature and the humidity of the air. For instance, a velocity of 18 in. per second, which, for want of a better, we may take as a provisional standard, would produce quite a different effect when the air was at 60 deg. and the humidity at 65 per cent. than when the temperature was at, say, 65 deg., and the humidity, say, at 80 per cent. To make our experiments complete, we should have to develop a set of equations showing the relation between the value of the three variables in respect of their effect on the sensations of the human being. For instance, possibly it might be found that an increase of 2 per cent. or thereabouts in the relative humidity might approximately neutralize a drop in temperature of 1 deg. at or about the standard temperature. I have no doubt that if such experiments were carried out it would be found that all persons could endure a velocity of air possibly 6 in. per second greater at 65 deg. and 80 per cent. than at 60 deg. and 65 per cent.

In determining, therefore, what is the desirable air velocity in a room, we must take count of the existing conditions of temperature and humidity. Let us assume the following rule for satisfactory ventilation so far as such can be secured by the control of three conditions: That the air temperature should be, say, 60 deg. Fahr., and the humidity 65 per cent., and the general horizontal velocity should not be far from 18 in. per second. Present knowledge properly applied would enable us to ensure that the first two of these conditions were maintained—that is to say, a competent person could design a plant which should deliver any desired supply of air at 60 deg. and 65 per cent. humidity. We have now to inquire how far it is possible to secure the third condition—namely, that the horizontal velocity should not be far removed from 18 in. per second. In what way can this horizontal velocity be secured in practice? We may imagine air driven over the audience from front to back or from back to front, or from one side to the other. My own view is that the best method would be from the front to the back.

It is a general maxim that fresh or cold air must be introduced at a certain height, say 8 ft. or so above the floor. Even on this we are not agreed. There are persons who do not approve of the introduction of air overhead for fear of producing what is called a "down-draught" on people's heads. That there is something in this view cannot be denied. If one chief function of ventilation is the removal of heat and moisture, then it is clear that we can only ventilate a room by introducing air colder and drier than the average air of the room. The body of each person present in the room is continually warming and moistening the air, and this heat and moisture must be dispersed by the introduction of colder and drier, and the drawing-off of warmer and more moist, air. But air which is cold and dry is of necessity heavier than that which is warm and moist. It therefore follows as a mathematical certainty that if cold, dry air is introduced overhead it will fall to the floor so soon as it is free, and is surrounded by air which is warmer and more moist. In other words, it will produce a down-draught. This would only be tolerable if it were practically imperceptible. It could only be imperceptible if it were introduced not in a mass, but in finely divided streams. This implies that at least a large part of the wall through which it is introduced should consist of gratings. Any air which we introduce overhead must be at such a temperature and humidity that it does not cause a current round people's heads greater than the allowable maximum. We ought, therefore, to be informed under what precise conditions cold air can safely be introduced overhead. This is a matter quite capable of exact investigation, and we ought not to be compelled to rely on guesswork, as we are at present.

Let us consider then the practicability of a scheme for driving the air from the front of a room to the back. I will take a concrete case of a room in the country in which I was lecturing some time ago containing about 100 persons. The size of the room was about 20 ft. wide by 40 ft. long and 11 ft. high. This allows about 8 sq. ft. of floor space and 88 cub. ft. of air space per person. It would not be possible in practice to cause a horizontal current to occupy a shallow layer just over the heads of the audience, and keep the air more or less stagnant at a higher level, where, of course, the current is useless as far as its direct effect on the audience is concerned. We can only assume that the current must occupy the whole of the vertical cross-section of the room between the heads of the audience and the ceiling. If we are to imagine that a uniform current of 20 in. per second is maintained over this audience over the whole cross-section from front to back, the amount of fresh air called for even in this low room would be about 1,320,000 cub. ft. per hour, or about 150 interchanges per hour, or 13,200 cub. ft. per head per hour.

There are few persons who would advocate the spending of so large an amount of money necessary in order to secure theoretically perfect ventilation for a room of this size, and I am sure there is not an architect in the world who would willingly consent to the whole of the front of the room being occupied by gratings in full view of the audience. Of course, if the audience were larger, the requirements would be proportionately heavier. An audience of 2,000 persons would require at least ten of the largest size of multivane fans now catalogued by makers, each standing 12 ft. high. The total power required to work the fans would in this case be not less than 80 horse-power. The fan-power would, of course, be required whether the air supply were all fresh or were recirculated. If we are to imagine the air recirculated, it is clear that, in order to keep the humidity down, it would have to be de-humidified as it passed through the underground trunk.

The only practical way of de-humidifying the air to an exact value at present known is to cool it to such a point that, when it is absolutely saturated at that point, it contains the requisite amount of absolute humidity. It is then warmed up to the desired temperature. Now, the plant for this apparatus would be very expensive indeed. In order to kill the possible smell of human beings in the air, it would be necessary not only to de-humidify, but also to pass it through a spray of disinfectant, such, for instance, as a solution of permanganate of potash, which would probably kill all the smell.

We have now to inquire whether any smaller requirements would serve the purpose. It will be remembered that, calculating from a certain arbitrary allowable rise in the temperature and humidity, we deduced the allowance per head per hour as 3,500 cub. ft., whereas calculating from an arbitrary velocity over the audience in a room 11 ft. high, we arrived at 13,200 cub. ft. per hour. If we could reduce the height of the stratum of moving air, we could reduce the quantity of air in proportion, and still maintain the standard velocity. But it is impossible to conceive a large room for 100 persons less than 11 ft. high. If we have a higher room—such, for instance, as the Albert Hall or the House of Commons—even such an allowance as 13,000 cub. ft. per head per hour would of necessity be quite lost if we attempt pure horizontal ventilation. The main stream of air would follow the line of least resistance. In ventilating a room of this kind, therefore, it seems that the only practicable solution is a combination of horizontal and downward ventilation when such is attainable, so as to pull the main stream of air into contact with the audience; otherwise it will be lost above the heads of the audience.

One of the main effects which the modern theories of ventilation will have on our practice, if they are carried out, will be to produce a sharp difference of opinion between the physiologist and the heating engineer in regard to the method of heating by means of hot radiators and pipes. The main effect which radiators and hot surface generally have on the condition of a room is to raise the temperature of the air, and, worse than this, they make the upper strata of air warmer than the lower.

The modern view which physiologists take of this matter is that the breathing of hot air is distinctly deleterious, in that it causes the membranes of the nose to get into such a condition as easily to absorb the germs which produce the disease known as cold in the head and other respiratory diseases. Within limits, the cooler the air breathed, the better it is from the point of view of pure hygiene. Physiologists also take the view that it is extremely undesirable that the temperature at head level should be higher than at foot level, since it causes certain movements of the blood in a contrary direction to what is desirable. It is quite obvious that since warm air is lighter than cold air, there cannot fail to be a tendency for the temperature at high level to be greater than at low level when the heat is introduced by warming the air. This effect is always found in a radiator-heated room. From this point of view, radiator-distributed heat may be regarded as undesirable from the point of view of hygiene. The effect is well known to be influenced very largely by the temperature of the radiator. The higher the temperature of the radiator the greater is the difference between the upper and the lower layers of air in the room.

The distribution of heat by radiators is, however, so convenient that it is impossible as a practical proposition to recommend its abandonment whether or not it conforms strictly to the requirements of hygiene. It is for this reason very desirable that the necessary amount of heat should be communicated to a room by large radiators at a low temperature, rather than by small radiators at a high temperature. It is also necessary that the feeling of warmth in a room should be properly maintained, but it is also very desirable in the interests of the individual that he should accustom himself to living in a relatively low temperature.

The only means whereby this feeling of warmth can be secured apart from the warming of the air is by increasing the amount of energy in radiant form passing through the room. This radiant energy is always expensive to maintain, firstly, because a large part of the heat given off from a radiant body is always converted heat, and because a large part of that which is given off as radiation at once passes away through the window glass and the cold walls of a room, and is thereafter largely lost, so far as its effect on the inhabitants is concerned. On the other hand, heat communicated to the air of a room is not only easier to produce, but also remains in the room as heat for a much longer time. This is one reason why an open fire is so extravagant, desirable as it is in many ways. A large part of its heat is sent up the chimney as hot air. That part of the heat which is given off as radiation, unless it impinges on the body of the person in the room, is immediately lost, either by absorption or transmission through the window glass. It is difficult or impossible to obtain a correct balance-sheet of the heat given off when coal is burnt in an open fire, for the reason that the heat radiated is so illusive that it cannot easily be measured without very elaborate appliances.

It will be seen, therefore, that the modern theories of ventilation, which at first sight appear to render possible a reduction in the heat cost of ventilating a room, in reality have a very marked tendency in the opposite direction. They increase to a very large extent the practical difficulties, the amount and expense of the plant required, and they increase also the cost of upkeep. If they are to be carried into practice they will call for something like a transformation in methods of building, and they will certainly be regarded with acute disfavor by every architect who is interested in the interior appearance of a large room.

I will summarize now the observations which appear to me to be necessary in order that we may get a complete idea of the state of the ventilation of any given room. We must have the wet and dry katathermometer readings. We must know the absolute temperature of the air, and the mean radiant temperature. We should have readings indicating the velocity of the air at all parts of a room when the room is full. We should have also the analysis of the air, and particularly know what amount of organic products and dust exist in the room. We should take the electrical readings, and determine the degree of ionization of the air of the room.

It will be seen that this is a sufficiently formidable list. It would not be possible for anyone to take all these readings with any sort of care even for a small room under a couple of hours' hard work. He should also be provided with very expensive and elaborate apparatus. I am not, of course, suggesting that such a series of observations would be possible in practice when a room is occupied, but it merely shows what a very extensive subject we are dealing with, and how little anyone would be justified in concluding that the subject of ventilation can be treated in a cut-and-dried manner.

MCGILL STREET BUILDING, MONTREAL.

R. E. BOSTROM, ARCHITECT.

Wind Bracing in Tall Buildings

R. S. PATTERSON, B. A. Sc. *

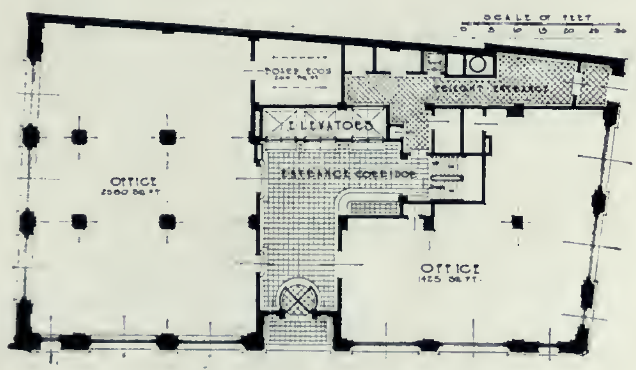
THE question of wind bracing in tall steel buildings of the skeleton type has evoked considerable discussion as to methods and design in the last few years. One class of structural designers has made ample provision in the steel frame for lateral stiffness based upon direct computations of wind stresses; while on the other hand, another class has ridiculed all mathematical treatment, and used "rule of thumb" methods for design. The exact treatment of this part of building design would lead to hopeless intricacy whether diagonals, knees, or portals are employed to transmit the lateral wind pressures. Although an exact determination of stresses is difficult, if not impossible, it does not follow that a mathematical analysis is useless and without any rational basis. The investigation of the stability of a steel frame building subjected to wind pressures must be solved in accordance with the fundamental laws of mechanics and strength of materials as determined from the theory of flexure.

In very tall buildings the calculation of wind stresses and the design of frame work to afford the most rigid and economical resistance to them, while conforming to architectural requirements, are matters which sometimes have relatively large dimensions in both directions, the inertia of the building, the stiffness of walls and floors and the inherent strength of the beam and column connections generally used, may afford sufficient rigidity, and precise calculations are often omitted.

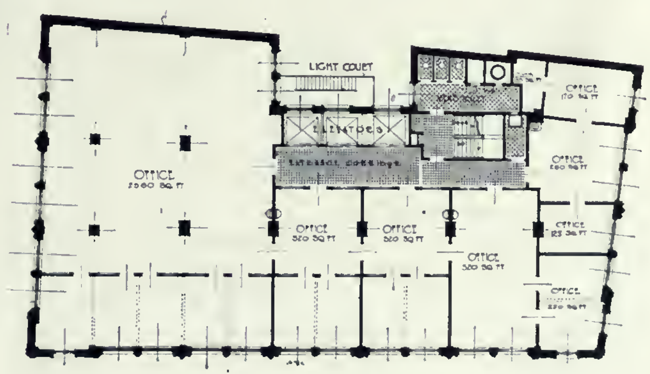
When the building is comparatively tall and narrow the elasticity of the steel frame makes it necessary to make definite provision against horizontal forces in at least one direction, the steel skeleton being usually considered as a vertical cantilever exposed to horizontal wind forces in every direction, in the upper part at least, and sometimes for the entire height of one or more sides not protected by adjacent buildings. In the usual case of a transverse bent of several columns it is impossible with the means of analysis at present available to determine how much of the vertical loading on these columns is transferred by the wind pressure from each column at windward side to each column on leeward side, although it is absolutely certain that such a redistribution takes place. This condition makes it impossible to determine with certainty both the horizontal shears transmitted through the columns and the bending moments to which columns and girders are subjected.

The design of the steel frame of high buildings must certainly include as one of its main features suitable effective provisions for wind loads whose effects run through the entire height of the structure, and by which the transferred loads influence materially the foundation pres-

*Written for *Applied Science.*

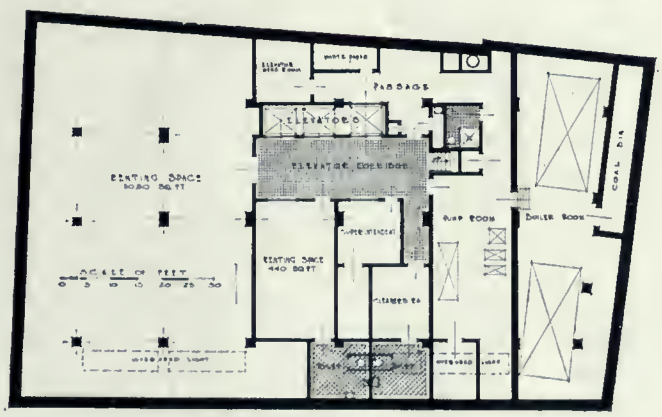


GROUND FLOOR PLAN.



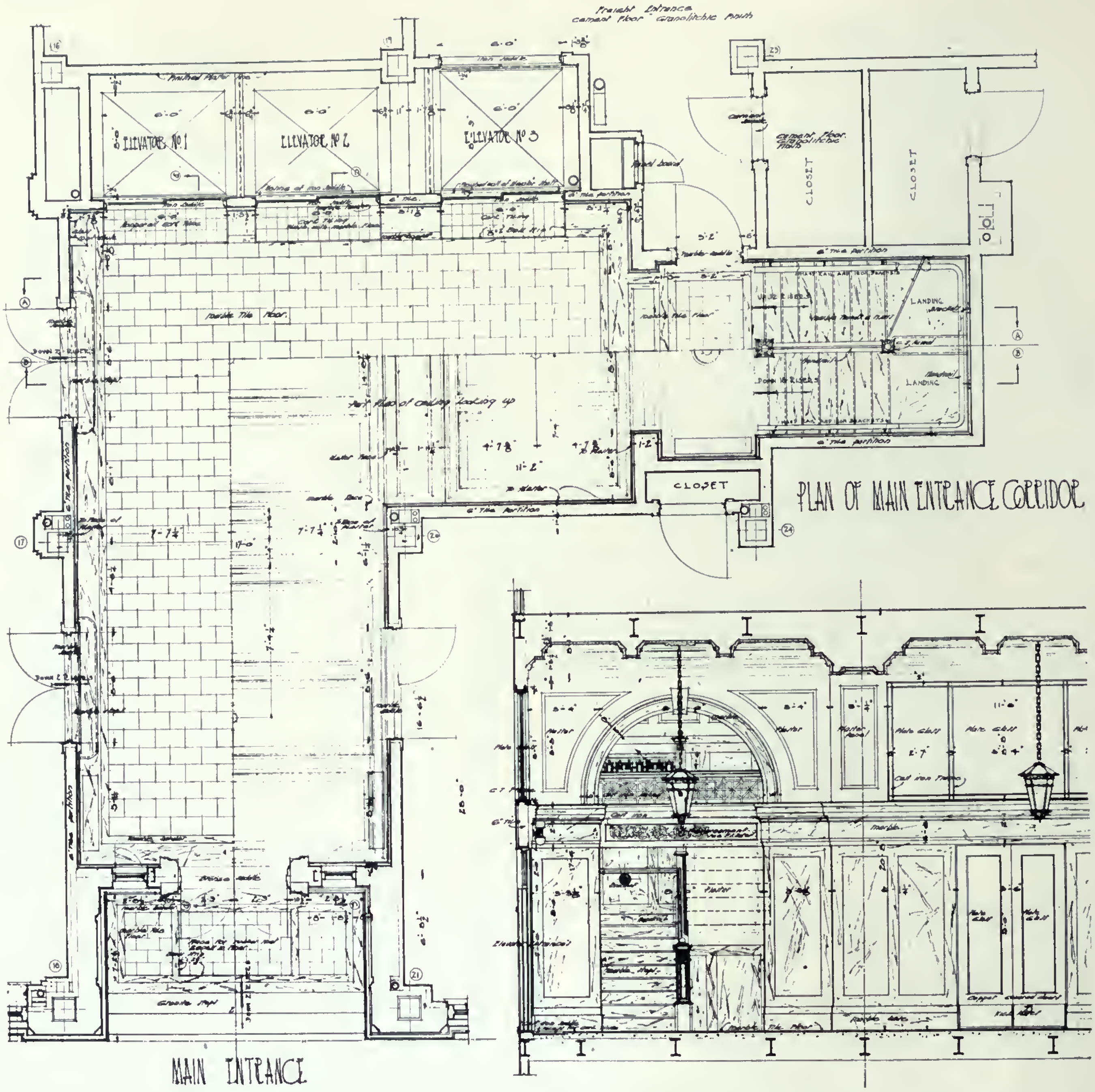
TYPICAL FLOOR PLAN.

M'GILL STREET BUILDING, MONTREAL.



R. E. BOSTROM, ARCHITECT.

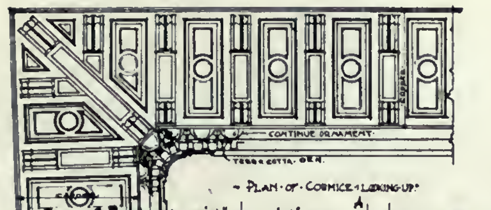
BASEMENT FLOOR PLAN.

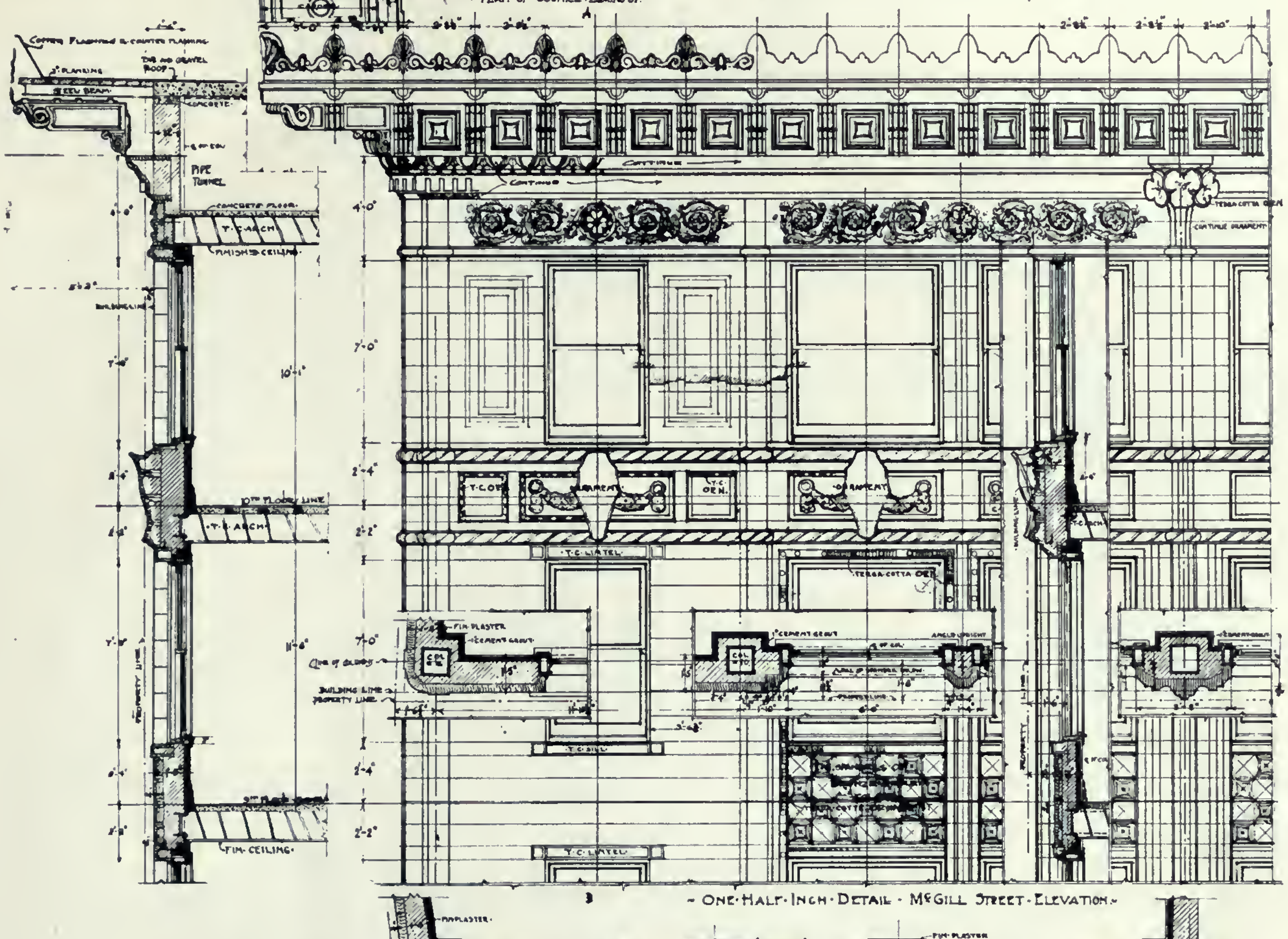


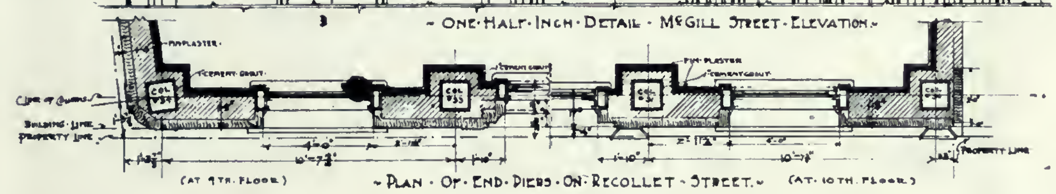
DETAILS OF MAIN ENTRANCE CORRIDOR, M'GILL STREET, BUILDING, MONTREAL.

sures if satisfactory results are to be obtained.

Wind Pressures:—Wind pressures on small surfaces have been recorded as high as 50 pounds per square foot, but it is doubtful if such pressures exist on large surfaces, as sides of buildings. A few of the influences which affect the intensity of wind pressures will be summarized briefly: Effect of Altitude on Wind Pressures.—Since air is lighter in greater altitudes the wind pressure will also be less. In addition to and quite distinct from this, it is also clearly recognized that the pressure varies as the distance above the general level of the surrounding territory, increasing towards the top of the structure. Effect of Temperate Changes.—W. H. Whitten made a careful study of the effect of temperature changes, and his conclusions were: (1) That the pressure increases as the temperature drops, if the velocity is constant and barometer readings normal; (2) that the pressure increases and diminishes as the barometer rises and falls. Effect of Suction.—Rapidly moving air produces a suction on the leeward side, there being a partial vacuum developed in the constant vortex or eddy on this side. Professor Albert Smith reduces the following laws with regard to suction: (1) Increase in height tends to increase relatively the average amount of suction on the leeward wall; (2) the relative amount of air flowing around the end of building increases as the height increases. Effect of Gusts.—The maximum wind pressures are of short duration, probably only for a second, but sometimes occur at intervals, and thereby tend to set up an oscillation in structures they are capable of influencing. To some extent the wind impulses are absorbed in overcoming the inertia of the structure, being exhausted in internal work. Should the wind come in gusts, overcoming the inertia of the building, and causing the building to oscillate, and if the oscillations and wind impulses







EXTERIOR DETAIL OF CORNICE, M'GILL STREET BUILDING, MONTREAL.

act together, the vibration would be increased and there would be danger of the building collapsing. Existing experiments tend to indicate the period of vibration of a tall building is several seconds (about 2 to 4 seconds), and thus the likelihood of such an agreement taking place does not seem possible. It seems advisable that the increased pressure due to gusts should be considered in designing tall building frames.

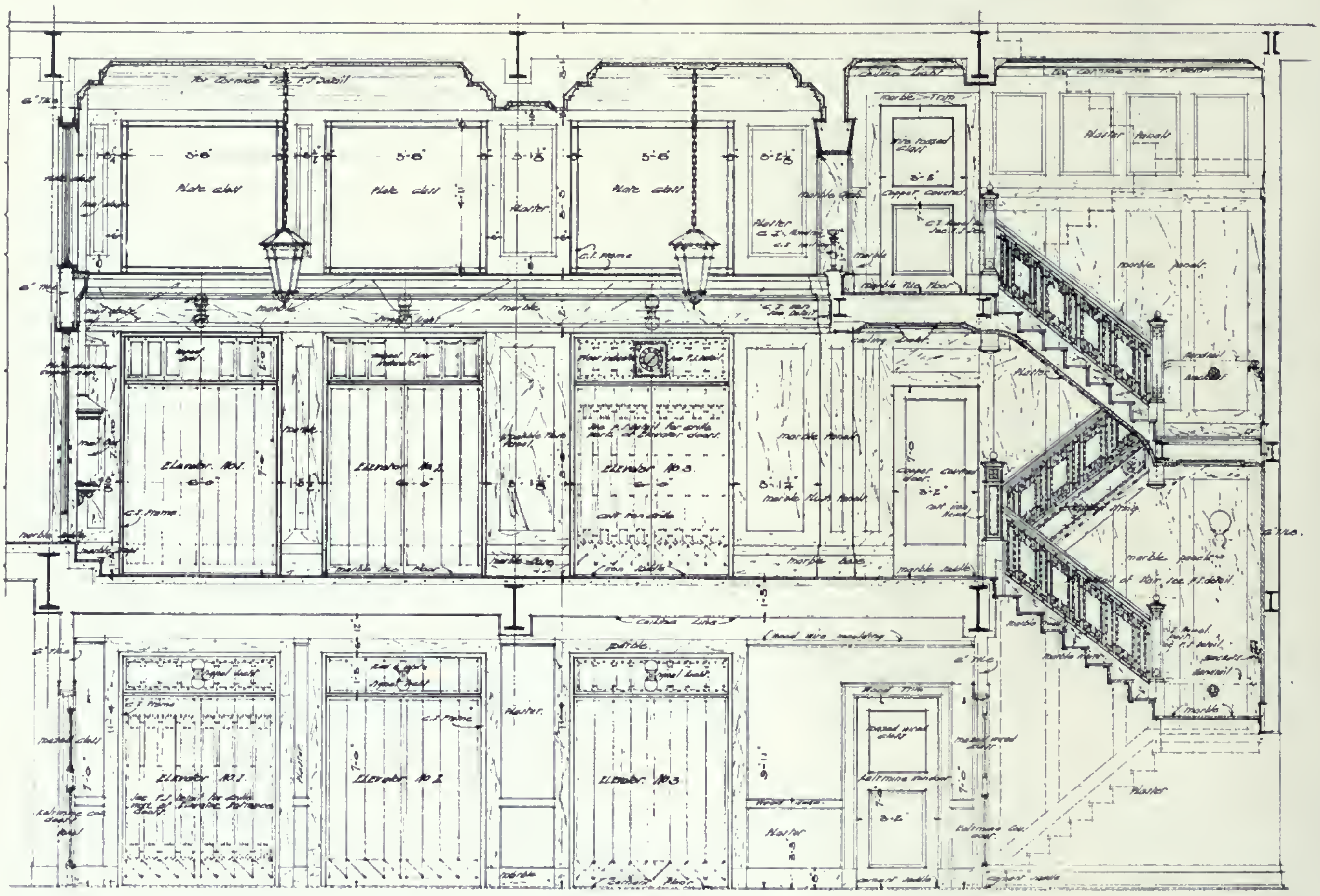
Effect of Wind on Buildings:—The effect of wind pressure tends to overturn the building on its base. In tall narrow buildings this overturning effect must be investigated, and if necessary, provision made for it by anchoring the columns of the foundations. Common specifications state that if the overturning moment exceeds 75 per cent. of the moment of stability, anchorage for the columns must be provided. From the footing plan the column loads and their point of application can be taken off and by the principle of moments the point of application of the resultant weight can be found. Knowing the magnitude and point of application of the resultant weight, the moment of stability can be readily computed.

It may give way in a horizontal direction under the influence of shearing forces either by lateral displacement from its foundations or by buckling of its various members on account of their weakness to resist these forces. If the buildings were safe against overturning it would ordinarily be safe against sliding bodily, and for the sliding tendency to be considered the width of the base must be two-fifths or more of the height. The tendency to shear the connections is one of the most important features of wind pressure. Special attention should be given the column splices and the connections of floor girders to columns. The details should be sufficient to develop the strength of the main part of the member and to give the required rigidity at the joints.

Deflection in a bent to leeward due to wind pressure will be the result of a combination of three actions—first, the elongation of the tension columns and the shortening of the compression columns; second, the deflection of the floor girders; third, the deflection in the columns, Factors affecting the amount of deflection are the sizes of the columns, their unsupported heights, and the number of columns in a cross section. In buildings in which the ordinary beam connections are used with no special bracing, as the connections are capable of transferring only small bending moments, the deflections will be large. It will be seen that if the girders cannot take care of any bending at the connections, and there is no other factor to resist distortion, then the frame must simply close upon itself under lateral forces.

The few experiments on the deflection of tall buildings seem to reveal the fact that the actual deflection is less than the computed. Experiments on a seventeen-storey building by Dr. Melick show that walls and partitions reduce the deflection about 40 per cent., and they seem to be secondary and not primary agencies in resisting distortion to wind. His conclusions were that, when proper account is taken of the velocity and pressure of the wind, vibrations and deflections computed on the basis of the steel frame resisting all the pressure, will be only slightly in excess of those actually existing. A twisting as well as a direct deflection will be induced in the building if the bracing is not symmetrically disposed with respect to the centre line of the building.

Necessity of Wind Bracing:—The New York building by-law requires that all buildings exposed to the wind (except those under 100 feet in height, in which the height does not exceed four times the average width of the base) be designed to resist wind pressure. This may be regarded as representative of the type of building requiring no bracing. In structures of the skeleton type which have relatively large dimensions, the dead weight of the building, the stiffness of the walls, partitions and floors, and inherent strength of column and girder connections may afford sufficient rigidity, and precise calculations are often omitted. The relative merits of each of the elements mentioned in the above statement for resisting wind pressures will be discussed in detail. The stability of a steel frame building must depend upon its dead weight or its steel framework. The weight of



DETAILS OF MAIN ENTRANCE CORRIDOR, M'GILL STREET BUILDING, MONTREAL.

the building affords some resistance, but it is not altogether a dependable quantity. The greater the weight the greater the moment of stability. The moment of stability may be computed as previously outlined under "Effect of Wind on Buildings." Distortion may be resisted by the compressive strength of the curtain walls, but as they are usually cut up by numerous windows they cannot be relied upon to act in conjunction with the steel frame.

Partitions as ordinarily constructed are too thin to resist shearing stresses, and their location is never definitely and finally known to the designer, in as much as they are liable to removal at the will of the tenant. They are often omitted permanently on the first floor, and in many cases are not put in the upper floors until rented, when the tenants' wishes as to subdivision can be learned. Mr. Purdy states that if partitions be omitted on one floor it is nearly as bad as if they were omitted on several. It is doubtful if much reliance can be placed upon partitions for cross framing to transfer shearing stresses into vertical reactions.

Floors are effective in producing a redistribution on wind stresses from the windward to the interior and leeward columns. Tile arches assist the wind bracing of the structures, because they fill the total depth of the steel beams, and act as horizontal bracing for the entire structure. In comparison with this, concrete floor slabs rest only upon the upper third of the beams and are usually one-third the depth of tile arches. They cannot efficiently transmit the horizontal stresses, and, by reducing the efficiency of the floors as braces, increase the amount of steel necessary to provide against horizontal stresses. There is also some resistance to lateral strains combined through the various connections of the beams, girders and columns, but it is proportional to the details employed in such connections.

ONTARIO CLUB ROOM, M'GILL STREET BUILDING, MONTREAL.

The above considerations will not readily admit of calculations and in using them much will depend upon the experience and judgment of the designer. It may be said that partitions, walls, floors, etc., as ordinarily constructed, cannot be relied upon to act in conjunction with the steel frame in resisting wind forces, and there will be a limit beyond which the steel frame can take up such forces. Modern steel office buildings as built to such great heights, especially in proportion to their width, are so destitute of the ordinary means of resisting wind forces that it is necessary to give the subject much more consideration. The designer cannot rely upon the elements of strength, uncertain in value and irreducible to calculation. He must make provision in his design of the steel frame to resist these horizontal forces and reliance must be placed upon some form of metal bracing to carry wind stresses. This may be obtained by means of rigid connections and special bracing members. In many high buildings, for example, the Woolworth Building, the entire wind stresses are carried by the wind bracing, no reliance being placed upon walls or partitions, except parallel to the long side of the building. The tower was designed independently, as if standing alone.

The steel frame is generally run up ahead of the walls and partitions. In several instances the frame work has been wrecked during erection; in other cases it was found to sway under wind pressure, making it necessary to put in temporary bracing to stiffen the framework. The steel frame of a building should be treated as an independent structure the same as the towers of a viaduct, and should be able to resist the wind forces on all surfaces exposed during erection. This should be accomplished by substantial bracing or by designing the column and girder connections so that they may be able to

ONTARIO CLUB ROOM, M'GILL STREET BUILDING, MONTREAL.

DETAIL AND GENERAL VIEW.

ENTRANCE HALL, NEW BIRKS BUILDING, MONTREAL.

NOBBS & HYDE, ARCHITECTS.

resist the bending stresses produced by wind pressure. C. C. Schneider specifies that the steel framework shall be designed for a wind pressure of 30 lbs. per sq. ft. on all exposed surfaces composing it, and the framework shall be considered as an independent structure without walls, partitions or floors. In proportioning the members of the structure for these temporary wind strains it is permissible to use higher unit stresses than for permanent work, *e.g.*, 20,000 lbs. per sq. in.

The Municipal Building, New York, is twenty-five storeys high, and has large lateral dimensions. No special bracing was used, but reliance for resistance to wind pressure was placed on its inertia, the stiffness of its girder connections, and the strength of its hollow tile floors. The curtain walls were begun several storeys up from the curb. After the curtain walls had been placed in for a few storeys above this level the framework began to sway under wind pressure, and it was necessary to fill in the lower storeys before erection could be continued. This shows that the steel framework must be proportioned for wind stresses during erection.

Observers will have noticed cross sections of buildings of similar dimensions and almost identical in character and general planning—where one structure is made to depend upon cross-partitions, end walls and the ordinary girder connections, with columns for transferring horizontal stresses to the foundations, while the other has a distinct system of structural bracing capable of caring for similar forces. It would seem that either one owner was put to unnecessary expense or that the other has not proper insurance on his structure. The question naturally presents itself, whether modern steel buildings are being constructed with the same factor of safety against the various forces to which they are subjected, whether vertical, horizontal, or otherwise. From an engineering standpoint it seems reasonable to provide for each of the destructive forces to which it is subjected to a degree at least proportionate to their probabilities.

Disposition of Wind Bracing:—The bracing, no matter which type is used, should be vertical and reaching down to some solid connection at the ground. It should be arranged in some symmetrical relation to the outlines of the building. For example, if the building is narrow and is braced crosswise with one system of bracing it should be braced midway between ends of the building. If two systems are used they should be equidistant from the ends. The symmetrical arrangement is necessary to secure an equal service of the systems and prevent a tendency to twist.

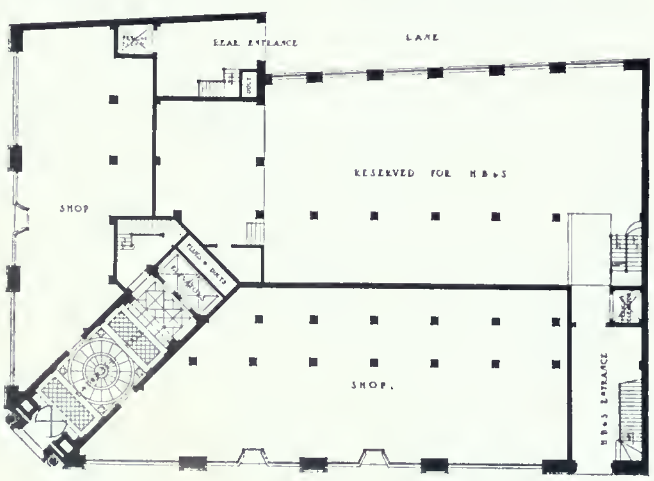
It is believed to be economical to brace each transverse bent. The girders must be designed to act as win bracing, and the columns proportioned for both axial and bending stresses from wind. If the ordinary girder connections are used in a transverse bent, it does not seem likely that the columns on these sections can receive any appreciable wind stress, either axial or bending. Each braced bent must be designed for the full force of the wind contributory to the area under its influence. The proper selection of sections for the economical disposition of wind bracing must remain a matter of judgment.

Wind Bracing by Rigid Connections Without Diagonals, Knees, Gussets or Portals:—In buildings of relatively large dimensions, in which the ratio of height to width is small, sufficient lateral stiffness to wind pressure may be secured through rigid column and girder connections without introducing special wind bracing in the steel frame. The following types are effective in producing greater rigidity at the joints and connections: Type 1.—Continuous column splices.—Considerable stiffness may be secured by using continuous column splices, where the columns are made in two-storey lengths and staggered as to splices, *i.e.*, only every alternate column is spliced at a floor. In present practice, however, all columns are usually spliced at the same floor, thus facilitating

NEW BIRKS BUILDING, MONTREAL. NOBBS & HYDE, ARCHITECTS.

ENTRANCE DETAIL, BIRKS BUILDING, MONTREAL.

erection. When column splices are properly made they made be considered stronger than the main section of the column. The splice should be of sufficient strength to take the shear and flange tension due to bending. Type 2.—The use of beam connections in framing beams and girders to columns.—The ordinary method of framing beams and girders is by means of shelf angles and column brackets. This does not stiffen the frame to any extent. A much more effective method is secured by using the ordinary beam connections in framing the beams and



FIRST FLOOR PLAN, BIRKS BUILDING, MONTREAL.

girders to the columns. This type of bracing was used in the upper eight storeys of the Dominion Bank Building, Toronto. The beam connections stiffen the frame during erection as well as after the building has been completed. A stiffer frame will result if the beams run transverse to and the girders parallel to the longest dimension of the building. A beam should come at each column in order to give lateral stiffness to the frame. Type 3.—Greater rigidity may be secured by using beam connections and also rivetting the flanges of girders and beams to the columns by means of corner angles. The usual corner angles are 8 x 6 in. or 8 x 8 in. Buildings are not ordinarily figured for wind longitudinally; this type seems to be amply suited for bracing the building in that direction. This method has been employed in the United Fire Companies Building, New York, and the Continental and Commercial National Bank Building, Chicago.

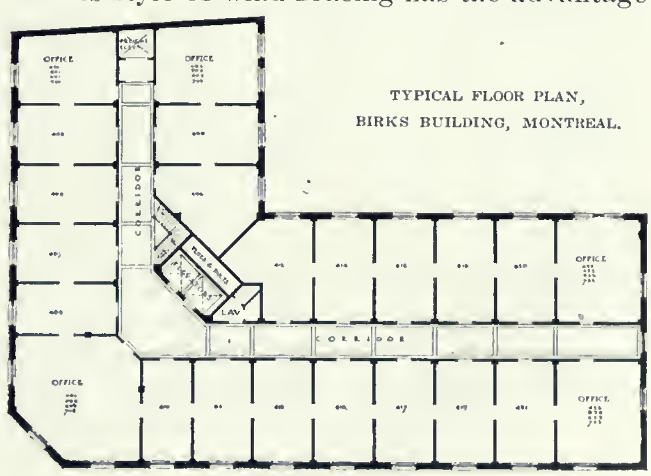
It is known that beam connections are capable of transferring only small bending moments, and that the columns can take only a small wind stress, either axial or bending. Mr. Forchhammer states that beam connections are not rigid but flexible. As to whether rigid or flexible connections are preferable in steel frameworks is a matter of some importance. The rigidity ob-

LOBBY TREATMENT, BIRKS BUILDING, MONTREAL.

tained by rigid connections is followed by the uncertainty of statically indeterminate structures. The stresses due to uneven settlement of columns, for instance, may run very high in rigidly connected frameworks. Mr. Forchhammer favors the use of rigid connections at the side columns and flexible connections at the inside columns. However, to concentrate all the wind resistance in the outside columns does not seem advisable as the effect of uneven settlement might be more serious in this case, for in the outside, columns in which the whole stiffness of the frame lies might be seriously over-strained. It would seem that a stiff connected frame is the only proper and practical solution of the problem.

Type 4.—By deep web connection angles.—Sometimes it is advantageous to obviate special bracing as diagonals or knees, which tend to obstruct the clear floor space, and which require difficult connections. A good substitute may be had if floor girders and beams are web-connected to the columns so as to give very deep and rigid joints that can be relied upon to develop sufficient stiffness to resist distortion from wind pressure. In the City Investment Building, New York, deep heavy connection angles were shop-rivetted to the columns and field-rivetted to the webs of the I-beams. Type 5.—Continuous wall girders.—In this type the wall girders are made continuous across the face of the column for the whole length of the building. The webs of the girders are carried past the flanges of the columns, the inner flanges being cut flush with the web. The connection between the wall and the girder is made by a deep gusset plate rivetted across the face of the column and serving both as a splice plate and a knee brace against win stresses. The gusset plates are usually connected by heavy connection angles to the outside of the column flange, the gusset plate being parallel with the column web.

This style of wind bracing has the advantage



TYPICAL FLOOR PLAN,
BIRKS BUILDING, MONTREAL.

of avoiding all tension on the head of the rivets and transmits the stress entirely through direct rivet shear. It is, therefore, theoretically advantageous and proves easy and cheap in construction and erection. In a thirty-five-storey office building in Seattle, rigidity against wind stresses is given to the building by a continuous belt of 30-inch wall girders running around the entire building. The gusset plate is field-rivetted to the girder webs, and field-connected to the flanges of the columns by heavy connection angles shop-rivetted on the outside of both the column flanges.

Type 6.—Horizontal X bracing or trussing in

UNITY BUILDING, MONTREAL. D. J. SPENCE, ARCHITECT.

the floors is sometimes used to distribute the stresses among the interior columns, particularly if the vertical wind bracing is placed entirely in the exterior walls. The horizontal bracing used on the fourth and the sixth floors of the Commercial Bank Building, Chicago, consists of single and double angles laid above the floor beams and rivetted to connection plates at the columns. In most cases the gussets or connection plates cannot extend through to the columns, and are rivetted, therefore, to the connection plates on the fifteen-inch channels forming the lines of spandrel bracing at these points.

Vertical X Bracing:—The simplest form of bracing is by a system of vertical X bracing in the panels between the columns and floor girders to transmit the pressures developed by the wind pressure to the foundations. The rectangular shape of a building can be effectively and economically preserved against distortion from wind pressure by means of diagonals. For this type of bracing the stresses are statically determinate and the ease with which the stresses may be computed and the design facilitated makes this type very desirable.

Advantages and Disadvantages.—Diagonal braces of structural shapes, either angles or channels, make the stiffest bracing, and should be used in a few bents of a tall building. Metal rods with pin connections have been used, but modern practice shows a preference for structural shapes with rivetted connections. If metal rods are used they should be tight in every connection, for if there is any play or movement possible between members it cannot be very efficient. Architectural requirements limit the use of diagonal bracing, as it interferes materially with the window and door spaces, corridors and other features. A complete system of diagonal braces cannot be placed in the outside walls on account of the numerous windows. It can often be arranged in the interior walls and partitions with no inconvenience to the design of the buildnig.

Diagonal bracing imposes the condition that a comparatively thick partition be placed in the plane of the bracing for cover and protection of the steel. In the ordinary office building this condition divides the floor surface into box-like suites, usually of the same shape and size. No large opening, no freedom in the selection of a position for an opening or corridor—in short, no effective architectural medium—can be used for joining adjacent suites through such a partition. Usually the doors must be small and also in the centre of a panel or in one side, according to the type of diagonal bracing used. Corridors must either extend along the wall, thus cutting off a great deal of window light, or down the centre of a panel, creating a row of offices on each side of the hall. These limitations will often result in very shallow offices, and sometimes in no direct communication between suites.

Analysis of Stresses:—Diagonal bracing is essentially a two-column or single panel type of bracing, the usual practice being to brace odd panels rather than a continuous system. Such a braced frame is usually regarded as a cantilever truss fixed at the ground by its own weight. The diagonal members are similar to the web members of a truss and the columns act as the chords of the wind truss. The columns may be either in tension or compression, according to the direction of the wind, and in the later case it is added to the static load. The wind pressure is assumed to act horizontally and applied at the panel points. The exposed area tributary to a panel point is equal to the sum of one-half the story height at the point, plus one-half the height of the storey below, multiplied by the width of the area affecting the bracing in the panel under consideration. From a study of a stress diagram it will be seen: (1) That the compression (or shear as it is commonly called) in any floor girder is equal to the load at that point plus all of the panel loads above; (2) the stress in any diagonal is equal to the shear in the floor girder above multiplied by the secant of the angle which the diagonal makes with the horizontal; (3) The compression in the upper storey leeward column is equal to the vertical component of the stress in the diagonal. The compression in the leeward column of any storey is equal to the vertical component of the stress in the diagonal in that storey plus the compression in the column of the storey above. The vertical component of the stress in the diagonal is equal to the shear in the floor girder at the top of the storey multiplied by tan of the angle between the diagonal and the horizontal. If we denote this vertical component by the term increment, then the compression in the leeward column equals the increment for that storey plus the compression in the storey above: (4) It can be seen that the tension in the windward column in any story is equal to the compression in the leeward column in the storey above; (5) the uplift at the base of the windward column is the quotient of the moment of the resultant wind and the distance centre to centre of the columns. If this uplift exceeds the weight of the frame and its loads, anchorage of the column to the foundation will be necessary.

The column stresses from wind on this type of bracing (diagonal) are direct and statically determinate. In practice the diagonal members frequently cannot be designed so as to have the gravity axis of the columns, girders and diagonal members meet in a common point and some bending stresses result in the columns and girders. The floor girders are usually shallow, and though the connections are rivetted they cannot be said to be rigidly connected, and the bending moments in the columns and girders due to whatever rigidity these connections may have are neglected. With diagonals, the stresses in theory are all direct, and there is no bending, with rivetted connections. However, as is usually the case in buildings, there will be secondary stresses due to the elongating and shortening of the members that take direct stresses.

The tensile stress in the windward column must not exceed the dead load plus a small live load; otherwise anchorage must be provided to resist the upward reaction, and the column spliced for tension. When this occurs the limit of efficiency of the bracing is reached, as it is impracticable to anchor or splice the columns. The dimensions and weight of a building are usually such that, considered as a whole, its moment is sufficient to give it stability against overturning, but in rare cases the margin has been so small that additional security has been provided by anchoring some of the columns to the foundations, notably in the case of the Singer Tower in New York.

Wind Bracing Without Diagonals:—In a steel frame building with rectangular panels, *i.e.*, without diagonals, its stability is dependent on the bending resistance of its various members. A correct determination of the stresses due to vertical floor loads as well as to horizontal wind forces, requires a consideration of the deformations of all the members of the frame. Hence, the stresses are statically indetermin-

ROYAL TRUST BUILDING, MONTREAL.
M'KIM, MEAD & WHITE, ARCHITECTS.
BAROTT, BLACKADER & WEBSTER, ASSOCIATED.

ate and the stresses in each member are functions of all those in all the other members. The rigid solution is too long and cumbersome for practical use in actual designing and approximate methods must be resorted to. For simplicity it is customary to figure the wind stresses independent of the direct stresses from vertical loads. This practice has led to the development of several approximate methods, each with specific assumptions as to distribution of direct stresses and column shears. Some of the assumptions made for determining wind stresses will not hold under vertical loads. No assumptions that can be made will give correct stresses when the columns and girders are proportioned for direct loads and bear little or no relation to the stresses induced by the wind. It is common to consider a transverse bent of a steel frame building as a cantilever beam, uniformly loaded, the columns acting as flanges and taking a part of the vertical reaction proportional to their distance from the neutral axis.

Location of the Neutral Axis:—Before the direct stresses in the columns can be determined it is necessary to locate the neutral axis of the bent. The neutral axis is determined by the column spacing and their sectional areas, and it is found independent of vertical loads. It can be readily computed, if we consider vertical loads, when we know the magnitude and point of application of column loads on the footings. This neutral axis will not be coincident with the centre line of the building, unless the loads are symmetrically applied to the footings. In a steel frame building this is but seldom the case. A heavy spandrel wall on one side and a

ENTRANCE TO ROYAL TRUST BUILDING, MONTREAL.

curtain wall on the other, unequal loading due to elevator framing, stairways, vaults, etc., are some of the things which made it necessary to determine the neutral axis for each bent by independent calculations. Since the sectional areas of the columns may be taken as proportional to their loads it will be sufficiently accurate for all practical purposes to locate the neutral axis independent of column loads.

Direct Stresses in Columns:—When the neutral axis has been located then the direct stresses in the columns can be determined. As in a beam under flexure the fibre stresses vary directly as their distance from the neutral axis, so in a transverse bent the direct stresses in the columns will be proportional to their distances from the neutral axis. It is assumed that all columns on the windward side of the neutral axis take a direct stress of tension and those on the leeward side a direct stress of compression.

Column Shears:—A common assumption is that the horizontal shear on any plane is equally distributed among the columns cut by that plane. This is true if each column has the same moment of inertia, but if the moments of inertia are different the horizontal shears taken from the columns will vary as their moments of inertia..

Wind Stresses in Rectangular Building Frames:—The common methods for computing the wind stresses in the main members of a steel frame building with rectangular panels will be given and the method modified later where knees, plate girder, or portal bracing are used.

Cantilever Method.—This method was developed by A. C. Wilson and explained in detail in the "Eng. Record," Sept. 5, 1908. It is slightly modified by R. Fleming in "Eng. News," March 13, 1913. The following statements are taken from Mr. Wilson's article entitled, "Wind Bracing with Knee Braces or Gusset Plates." "If a beam of rectangular section be loaded as a cantilever with concentrated loads, it is possible by the theory of flexure to find the internal stresses at any point. If, however, rectangles be cut out of the beam between the loads, there will be a different condition of stress. What was the horizontal shear of the beam will now be a shear at the point of the contra-flexure of the floor girders, causing bending, and, as in the beam, the nearer the neutral axis the greater the shear. The vertical shear in the beam would be taken up by the columns as a shear at the points of contra-flexure, and the amount of shear taken by each column would, as in the beam, increase towards the neutral axis. The direct stress of tension or compression in the beam would act on the columns as a direct load of either tension or compression, and, as in the beam, would decrease towards the neutral axis. Each intersection of column with floor girders would be held in equilibrium by forces acting at the points of contra-flexure; and to find all the forces acting around a joint at any floor the bending moments of the building at the points of contra-flexure of the columns above and below the floor in question are found, as will be explained later. It is assumed that if a beam of constant, symmetrical cross-section and homogeneous material is fixed

DETAIL OF CORNICE ON ROYAL TRUST BUILDING, MONTREAL.

at both ends, and that if forces tend to move those ends from a position in the same straight line to a position to one side with the ends still parallel, reverse bending will occur with the point of contra-flexure in the centre of the unsupported span. And since this condition exists in all columns and floor girders it will be necessary to find the shears at the points of contra-flexure as well as the direct stresses in all the members."

In order to find all the internal stresses it is necessary to find the total horizontal shear and overturning moment of the wind at the line of contra-flexure of each story columns. After finding the position of the neutral axis and the direct stresses in the columns, the method of finding the column and girder shears and moments will be the same for the general as for the special case in which the sectional areas and column spacing are equal.

Portal Method "A" (Column Shears Equal: —Assumptions:—(1) The bent is assumed to be a series of independent portals; (2) the shears taken by each column are proportional to their moments of inertia. For equal column spacing and assumed equal moments of inertia, the interior columns have their vertical components neutralized by the equal stress of opposite direction caused by the contra-flexure of the columns, and the outside columns take all of the vertical reaction of the bent. If the spacing between columns is unequal, the direct stresses from adjacent panels are unequal. The resultant is a direct stress between the two portals considered. The direct stresses in the interior columns are zero, and outside columns only have direct stresses. The direct stress in the outside columns at any storey is equal to the overturning moment about its point of contra-flexure divided by the width of the bent.

Portal Method "B":—It is assumed that the interior columns take twice as much horizontal shear as the outside columns. This assumption gives a much better distribution of metal and seems to be a more rational assumption than that of method "A." If the building has self-supporting walls and the outer columns carry floor loads only, assuming the moments of inertia of the outside columns to be one-half that of the interior columns, the shear taken by the outside column will be half of that of the interior columns, and the problem is similar to the preceding one. It will be observed the moments calculated by this method compare favorably with those calculated by the cantilever method. A justification of the assumption made in this method is herewith given. In a rolled beam or plate girder it is common to assume the shear as uniformily distributed over the entire cross section. The intensity of the shear at any point is equal to the total shear divided by the area of the web plate. The portion of the total shear taken by any section of the plate would then be equal to its depth divided by the depth of the girder.

Knee Bracing:—Types.—1. Detached knee braces; 2, solid web knee braces, brackets, or gusset plates as they are commonly called. Detached Knees.—Detached knees are usually built of structural shapes, either angles or channels. Where the stresses are small the brace may consist of a single angle or two angles back to back, as in the Dominion Bank Building. For moderate stresses a single channel or two channels back to back may be sufficient. In the lower storeys of tall buildings where the stresses are large, very deep and heavy knees must be used if there is to be any considerable reduction in bending stresses. Solid Web Knees.—A very efficient wind brace member is a deep plate girder at each floor level with a special end connection, either by means of large gusset plates or an extension of the column web.

Discussion on Knee Bracing.—Knee bracing, whether detached or solid web knees, while an effective and efficient method, is not often a practical method of bracing a building, except in the end or wall sections of a building, because of the interference of the knee with the floor space. Knee braces do not appreciably diminish the bending in the columns unless placed both at top and bottom of girder; and for economy double knees should be used. In general no advantage is gained by making top and bottom knees of different depths. If knees are used only at top of storey they should be deep and heavy. The deeper the bracing the greater will be the reduction in bending stresses. If the double knees be deep enough to intersect the column at mid-storey height, the bending in the columns will be reduced to zero. The same is true of the girders if the knees intersect the girder at mid-span. When the solid web knee brace is used, the bending stresses will be carried mainly by the stiffening angles. Although the solid web knees are not usually deep, they are usually stiffened by 3 x 3 in. angles; it is recommended that if the knees are made deep, the angle stiffeners should be made about half as heavy as when they compose the entire brace. The extra cost of the solid web knee brace is warranted, as the extra metal is not lost; it gives a very rigid joint, takes care of the large bending moments at the connections, and besides performs the function of a knee brace.

Portal Arch.—Where exceptional stresses require heavy bracing the portal arch has been used, notably in the Woolworth Building. The Portal arch consists of a solid web plate out of which the arched opening is deducted, stiffened by angles bent to the curve of the opening. The bracing is field-rivetted by means of connection angles to the flanges of columns and girders. In the Woolworth Building the portals were proportioned for the combined stresses due to live and dead and wind load. The portal webs were field-rivetted to the columns through the projecting cover plates of the latter.

Working Stresses for Wind Pressure and Specifications:—The impracticability of using diagonal braces in the majority of buildings makes it necessary to have recourse to solid web or detached knee braces, and deep plate girders to provide the requisite lateral stiffness in at least some directions. When the diagonal is removed its stress is taken up by bending in the columns and floor girders. The columns and floor girders must be designed to carry the resulting and combined stresses.

The method of combining bending with direct stress in such members as columns and floor girders is not simple, involving as it does functions of the correct section (section modulus) and is necessarily a matter of trial. It is difficult to assign judicious working stresses in such a combination, especially as there are practically no experimental data to guide the judgment. It is practically certain that the greatest permissible stress where bending is involved may be greater in a member than where a stress in a member is all direct, for in the former case the greatest stress exists along a line, and not uniformly over the entire cross section. It is an open question that an excess of 10 to 20 per cent. may be permitted.

Most building by-laws have the common specification of 30 lbs. per sq. ft. for wind pressure, on the actually exposed surface, and permit an increase of 20 to 50 per cent. in working stresses for combined stresses due to wind, live and dead loads; but the section shall not be less than if the wind forces be neglected. Chicago and San Francisco specify 20 lbs. per sq. ft. with an increase of 50 per cent. in working stresses. C. C. Schneider, in his "General Specifications for Structural Work of Buildings," calls for a wind load of 20 lbs. per sq. ft., and allows an increase of 25 per cent. for bracing and combined stresses due to wind and loading. Ketchum's specifications for "Steel Frame Buildings" permit an increase of 50 per cent. in working stresses for combined stresses.

* * *

THE McGill street Building, Montreal, illustrated in this issue, is a commercial building of the better class, being devoted entirely to offices. It occupies a small plot of ground 7,000 feet area, facing three streets and giving an excellent opportunity of utilizing on the typical floors a maximum amount of space; approximately 5,000 square feet for each floor. As will be seen from the plans, the elevators are located in the centre of the rear portion of the building opposite a general entrance which allows on the typical floors the shortest amount of corridor space to reach the various offices.

The building is constructed with a steel frame fireproofed with terra cotta. The exterior has a base course of polished pink granite and walls of brick faced with matt-glazed white tile; The spandrels from 4th to 9th floors treated in a bronze-green color terra cotta. The five-foot cornice is of copper; the spandrels at the 2nd floor level and the frames at the 1st and 2nd floor windows being of cast iron painted dark green.

The corridor of the ground storey is floored and wainscoted with marble; elevator fronts designed in wrought iron and glass; typical corridors floored in marble, while the elevator shafts and stairways are cut off from each floor by fireproofed partitions and doors with wired glass. The heating system of the building is a one-pipe gravity system. Accommodations have been arranged on the tenth floor of the building for the National Club of Montreal, one of the popular lunching clubs of the city.

CONSTRUCTION

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THE New York *Tribune,* in commenting on the question of tall buildings, mentions the fact that in New York's skyscraper belt, where the buildings run from one to fifty-five floors, their average height is under six stories and a half. Only half a dozen skyscrapers in all the city may fairly be called beautiful, though a larger number are admirable feats of engineering. All the more noteworthy, then, is the calculation of the secretary of New York's height of buildings commission that, allowing for depreciation, the skyscraper's investment return is but 2½ per cent. Nor does this class of edifice profit the community more than the individual. The cost in light and air is supplemented by the fact that skyscrapers burst sewers with their outflow and force the city to install a high pressure system for fire fighting. One often hears arguments against the construction of high buildings based upon esthetics. The most appealing argument is likely to prove that of dollars and cents. Unless as an advertising proposition (which need not greatly concern us), skyscrapers don't pay. New York has found this out rather expensively. The results of the experiment are respectfully referred to all those growing cities in which, as a matter of local pride, skyscraper construction is now so earnestly proposed.

* * *

IT IS not only with iron, steel, and copper that the battles of France are being fought, but with wood as well. And, while the outlays for arms and ammunition are enormous, they do not represent a more oppressive tax upon the French people than will be the net cost to that country of the present reckless destruction of her forests, that, at least, is the view of one Frenchman of note, M. Jean-Paul Alaux, an eminent architect of Paris, who is now at the front, and has had many opportunities to view the devastation that war works in the wooded countries along the battle-front. In *American Forestry* for March he declares the havoc of the European War in this respect to be "without precedent in history," and names the following causes contributing to it: "1. Cuttings by the military authorities for strategic reasons and for permitting the more effective use of artillery. 2. Cuttings for the purpose of building trenches, shelters, and roads. 3. Cutting for fire wood for the military kitchens and for fuel with which to warm the shelters. 4. Cutting by the enemy and the taking away of timber as valuable booty. 5. Damages by projectiles and by fires, whether due to accident or design."

Even as far south as Paris the forests have already been damaged by the war, for in the threatened attack on Paris in the first weeks of the German invasion it was deemed necessary to cut paths in some places for the artillery fire, and to destroy possible ambushes available to the enemy. The forest of Vitrimont has been completely razed, as has the beautiful wood near Neufchateau, before the fort of Bourlemont. In the forest of Champenoux every tree was cut down to a height of three feet. The forest of Maux, the plateau of Amance before Nancy, the wood of Crevie, near Arancourt, and many others, have been either destroyed or terribly gashed.

The French Department of Forestry has already restricted to a large extent the uses that may be made of the larger forests by the military. But it is difficult to enforce these regulations.—*Literary Digest.*

THE following article on Civic Improvement, by H. Purdy, won first prize in the recent Ottawa Collegiate competition, offered by Controller Harold Fisher, of Ottawa:

The impression of a city which its visitors and residents receive is dependent, far more than is generally supposed, upon the appearance of its streets—that is, the street surfaces and fixtures as considered apart from the buildings.

In order that the streets may have the best possible appearance, they should be constructed by competent engineers, and when in use must not be neglected. Repairs should be made at the slightest sign of a break. If the repairs are neglected, the breaks become rapidly larger, with injury to the appearance of the street, and much larger increase in the cost of repairs.

No municipal money is put to a better use than that of keeping the streets in good condition. Accidents and breakdowns are avoided, with the result of saving much expense to vehicle owners.

One of the evils suffered in Ottawa is the constant tearing up of streets for the purpose of laying pipes of various kinds. In streets properly designed, the piping system for gas and water should be provided with all the room that is needed, with a sufficient number of side outlets to take care of future connections.

Curbstones should not be more than six or eight inches above the roadway leading into a yard. The corners of a sidewalk should have a radius of not less than six feet. The sidewalk should have a gradual slope toward the street, and should be as smooth as possible.

Manhole covers in the sidewalk should be exactly flush with the sidewalk at their edges, and should not rise more than an inch at their centres. They should be entirely free from spikes and rivets.

No steps leading upward or downward from the sidewalk should be permitted outside the building line, and no railing of any kind should be permitted on the sidewalk.

No showcases or obstructions of any kind should be permitted on the sidewalk.

The placing of temporary bridging or planking from trucks in the street across the sidewalk to the building should be prohibited. This is an abuse practised in Ottawa and pedestrians must constantly take to the streets to get around these wagons. This should be avoided by constructing recesses into the building into which the trucks could be backed for unloading.

In the construction of new buildings the use of the sidewalk should be preserved at least half its width, and for the remainder, which is occupied by builders, a rental should be paid to the city. A further rental should be paid to the city for the storage of building material in the streets, such as sand, stone, etc., and the use of the streets for mortar and hoisting machines.

Fire hydrants, especially in prominent streets, if not placed against the building wall, should be sunk below the surface, not only for appearance, but to avoid the danger from freezing in winter. Covers for such hydrants should be flush with the sidewalk, and properly marked. Objection may be made that in case of fire such hydrants would be difficult to find, but this is overcome by signs placed on the building, directly over the hydrant, in the form of a red "H," and by other signs with arrows pointing both ways, stating the distance to the fire hydrants in either direction.

Advertising signs, or signs of any kind, should not project from the building unless at least twelve feet above the sidewalk, and in no case should they project more than three or four feet. No buildings should carry any sign except that of the business conducted in it, and the size and design of large signs on the tops of buildings should be approved of by the city hall officials.

The cultivation of shade trees has proved very advantageous in European cities. Not only do trees, in affording shade, increase the attractiveness of the street; they also reduce the amount of flying dust, temper the winds, and improve the air to the healthfulness of the city. Shade trees should be planted from two to two and a half feet back from the outside of the curb, and an earth surface of from two and a half to two feet in diameter left around the trunk for watering purposes. In addition to this, a desirable method of watering is that of gutter seepage, a hole being cut in the curbing, protected by a grating, and the water finds its way through the earth to the tree roots.

I think if you follow my advice Ottawa will be the model city of North America.

* * *

THOMAS ADAMS, in addressing the Board of Trade meeting held recently in Kingston, Ont., said that he was particularly interested in town-planning because it was a means, and the only means, of taking care of a number of things that are bound to arise at a future time as cities grow. In speaking of the necessity of proper sanitation in a city, the speaker said that the country took great precautions to see that every immigrant when he came into the country had no infectious disease. The Government, however, after he was here, did not take any precautions to see that he was kept in good health. Any city depends upon its industries for its growth and everything in the city must be taken into consideration and organized in a business like manner so that the best results would come for the money expended, and to do this properly each branch must work in harmony with the other.

A TOWN Planning Act has been passed into law in Nova Scotia which will revolutionize the methods of developing real estate and controlling building operations in that province. The Act is to a large extent compulsory and is in advance of anything of the kind in the world.

Under the Act a Local Town Planning Board must be appointed in every urban and rural municipality, and a town planning controller has to be appointed for the whole province. No street can hereafter be laid out, nor any subdivision made unless the plans are approved by this Board. Within three years every Board must either prepare a town planning scheme or a set of town planning by-laws with the following minimum requirements:— (1) The distance between buildings to be not less than 60 ft. and up to 100 ft. on opposite sides of existing streets, both in respect of new buildings and reconstructed buildings, and to be not less than 80 ft. on new main thoroughfares, whatever the width of the street. (2) Land to be reserved for new main thoroughfares not less than 60 ft. in width, and provision made for allowing narrow streets of from 24 ft. to 40 ft. where not required for through traffic. (3) The number of dwellings to be limited on each acre, all windows of dwellings to have adequate light and air, separate areas to be prescribed for dwellings, factories, stores, etc.

Property is not to be deemed to be injuriously affected for purposes of compensation by reason of the following restrictions on its use, if the Commissioner of Public Works is satisfied that they are reasonable for the purpose of securing amenity:—(1) Prescribing space about buildings; (2) Limiting the number of buildings to the acre; (3) Limiting the height of buildings; (4) Prescribing the use or character of buildings, *i.e.,* whether the land shall be used for dwellings, factories, etc.

It is an essential part of the Act that there shall be co-operation between municipalities and owners and between adjacent municipalities. Ample safeguards are provided to prevent any person erecting buildings or sub-dividing land so as to contravene a proposed scheme or by-law, while either is being prepared. The Local Board has power to buy land up to 200 feet in depth on the frontages of new roads or reconstructed roads. The price of any land to be expropriated must be the market value and no extra allowance is to be made for compulsory purchase. The Act has been drawn up in consultation with the Commission of Conservation and immediate steps will be taken to put it into force in the province.

Although Nova Scotia has now the most advanced Act, New Brunswick is likely to give birth to the first statutory town planning scheme in Canada under its Act of 1912. The city of St. John has appointed a commission to prepare a scheme and steps are being taken to deal with an area of 10,000 acres.

* * *

"WHEN the east wind came I saw with proprietary alarm the point—shore on Lake Erie—wearing away. Everyone who came along told me how to save the point. For weeks they came. Heavy driftwood was placed in times of peace, so that the sand would be trapped in storm. No one failed me in advice, but the east wind made matchwood of all arrangements. . . . The high water would wash and weaken the base, and in the heaviness of the rains the bulk of earth above would fall—only to be carried out again by the waves. The base had to be saved if a natural slope was ever to be secured. Farther down the shore I noted one day that a row of boulders placed at right angles with the shore, had formed a small point, and that a clump of willows behind had retained it. This was a bit of advice that had not come so authoritatively in words. I followed the cue, and rolled up rocks now like an ancient Peruvian. It was a little jetty, that looked like a lot of labor to a city man, and it remained as it was for several days. One morning I came forth in lashing weather—and rubbed my eyes, for the jetty was not in sight. It was covered with a foot of sand, and the clay was dry at the base. A day's work with a team after that in low water, snaking the big boulders into line with a chain—a sixty-foot jetty by sundown, built on top of the baby spine I had poked together. No man ever spent a few dollars more profitably. Even these stones were covered in time, and there was over a yard of sand buttressing the base of the clay and thinning out on the slope of shore to the end of the stones. Later when building, I took a hundred yards of sand from the east side of the stone jetty, and it was all brought back by the next storm."—*W. L. Comfort.*

* * *

THE water-temple which stands in the Palace of Machinery at the Panama-Pacific Exposition was designed by E. B. Brown, architect. The fountain at the pinnacle of the water-temple pours a constantly flowing stream of water over the cement dome which runs along the eaves and then down through the eight supporting pillars of the temple to its base, from which point it is pumped back to the roof again. There are plate-glass inserts in each pillar, and the interior of each is lighted with concealed electric lights, showing a miniature Niagara between walls of cement. A semi-indirect electric light gives a restful and pleasing effect inside of the temple, which stands sixteen feet high, with its walls thoroughly waterproof with Ceresit waterproofing compound.

IT IS ESTIMATED that an expenditure of $4,000,000 will be required to put the Canadian Sault harbor into the shape that it is contemplated it should be eventually. The new harbor headline makes provision for a waterway at least 1,000 feet wide in Canadian water all the way from the foot of the ship canal to the eastern limit of the city. In dredging the waterway this width to a depth of 30 feet in that section, a great deal of work will have to be done, for the water in Canadian territory east of the Government dock is for the most part very shallow, and there is a lot of rock in the bed of the river. It must be added, however, that this is probably the most expensive section along the whole length of the "all-Canadian" waterway that has been under discussion. Any work that is to be done at the Sault will, of course, be spread over a number of years, and the expenditure will be comparatively small at any time.

* * *

THE bent wood furniture installed in the dining-room of the Board of Trade club rooms, in the new Royal Bank Building, Toronto, was furnished by J. & J. Kohn, of Toronto. The same furniture has been specified and installed recently in a large number of Canadian hotels, clubs, etc., among the more important of which are the Chateau Laurier and New Russell Hotel, Ottawa; Windsor Hotel and Montreal Club, Montreal; American Club, Ontario Club, and Central Y.M.C.A., Toronto; Fort Garry Hotel, Winnipeg; Prince Edward Hotel, Brandon; Chateau MacDonald, Edmonton; Vancouver Hotel, Vancouver; and Empress Hotel, Victoria. Other installations include the Cafeterias at Toronto, Child's Restaurants at Toronto and Montreal, and the Hudsons Bay Company's store at Calgary.

* * *

SUPERINTENDENT R. P. Miller of the Bureau of Buildings, New York City, prepared recently a list of the tall buildings on Manhattan Island in which there are only 1,156 structures of ten stories or over. Among these are 179 with ten stories, 181 with eleven, 191 with twelve, 389 with thirteen, 14 with forty-four and quickly reducing to one with fifty-five. Basements also are included in the list where the floor of the first story is above grade and where there is an entrance into the basement from the street.

* * *

A VERY interesting and instructive booklet has been issued by Samuel Cabot Inc., Boston, on the sound proofing of floors and partitions in schoolhouses. Many illustrations of buildings are shown wherein their "Deadening quilt" has been used together with testimonials.

THE question of affording absolute security to the patrons of the Royal Bank, shown in this number, in the safe deposit department and also for the protection of cash, securities, etc., belonging to the Bank, has been adequately provided for in the elaborate steel vaults. These vaults are lined throughout with heavy plates of drill proof chrome steel, built inside of re-inforced concrete walls 18 in. in thickness and consist of safe deposit vaults, cash and security vaults, book vaults and auxiliary silver safe deposit vault. The safe deposit vault, cash and security vaults have outside doors of solid steel which are 13½ inches in thickness, with inside doors 3½ inches, which are locked by an elaborate system of bolt work, each door having twenty-four round steel bolts 3 inches in diameter and secured by double combination locks and four movement time locks so arranged that they will work independently of the other, thus affording quadruple protection against lock-out. The doors are hung on steel crane hinges with ball and roller bearings so adjusted as to be easily swung with the pressure of one hand. The final operation of closing the door, however, is accomplished by a pressure mechanism of special design, which forces the door into the jamb with such force that the joint between the door and frame is absolutely air-tight and lock-proof. The work was installed by the York Safe and Lock Company.

* * *

THE Liquidator of the Dominion Marble Co., Limited, in liquidation, reports to have on hand a considerable stock of sawn, imported and domestic marble which he will be willing to dispose of to contractors, marble dealers or any person desiring the same at a considerable reduction under inventory values.

* * *

A NEW wall board made entirely from Canadion products is being placed on the market by the Hinde & Dauch Paper Company.

* * *

August, 1915 Vol. 8, No. 8

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Full Page Illustrations

H. GAGNIER, Limited, Publishers

GRAPHIC ARTS BLDG., TORONTO, CANADA

BRANCH OFFICES

MONTREAL NEW YORK

COLONIAL MANTEL IN JOHNSON
HOUSE, ON HAMILTON STONE
ROAD NEAR ST. CATHARINES, ONT.

Observations

THE MODERN HOTEL.

In order to establish and maintain a reputation the hotel of to-day must have an attractive exterior, a home-like feeling within, comfortable bedrooms, good food and genial management. The tastes of the people must be met, and while the designer fails to grasp at times the main essentials, still the vast majority of hostelries seem to be a complement to the heterogeneous mass which lives within. It is no longer necessary to appeal to the lovers of display and gaudy decoration, but rather to those of refined tastes. The character, the charm, the restfulness—all weigh heavily in the layman's view of a successful hotel. And every day witnesses a rise in the wholesome standard of real art in this phase of work.

THE FEAR FOR ITALY'S TREASURES

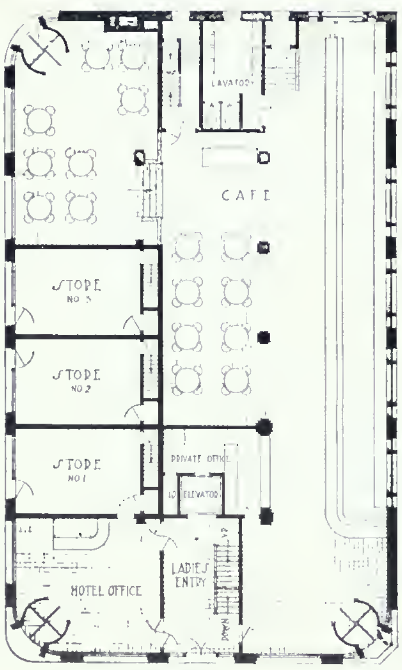
Italy's entrance into the present world's conflict is a matter of sincere regret to all lovers of art—not from a commercialistic viewpoint, but from the dread that some of her priceless treasures may become a pile of ruins. Only recently was Venice, "the most glorious and perfect shrine of all that is best in human achievement," attacked by a hostile foe. What the future holds in store for her we do not wish to contemplate, but a silent prayer is being offered for the preservation of her palaces, her paintings and her endless glories. Were we living in an artistic age there might be some ray of hope in case she falls a prey to the ravages of the enemy, but once the splendor of Venice passes away it will be gone forever. Many of us have enjoyed loafing in the lazy gondolas as we drank in the beauties of her Byzantine, Gothic and Renaissance architecture, the supreme manifestations of Italian art for ages. And in order to awaken our sleeping memories and present to others a little touch of the spirit which endears this city of canals to everybody there is presented in this issue an article by Sir Martin Conway, with a few additional paragraphs taken from Ruskin's Stones of Venice.

AN OPPORTUNE TIME TO BUILD.

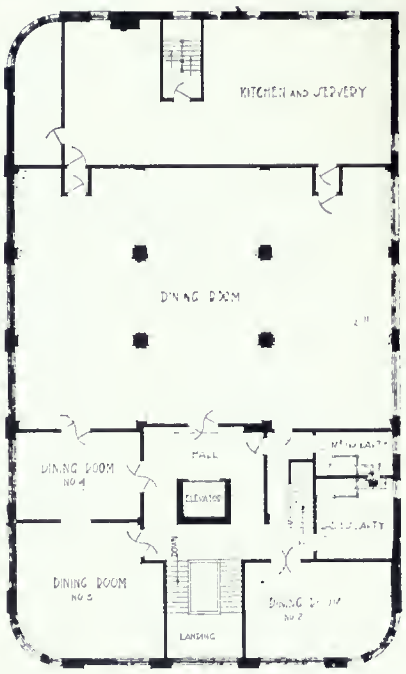
In considering the various phases of building enterprises does it not seem advisable to push through to completion whatever projects may be already contemplated. The cheapness of labor and materials is still the potent argument, although the dependence of building trades, manufacturers, etc., upon the work being executed should be a matter of no little import in planning for the general welfare of our country. One other point should be suggested in this connection—the increase in the cost of building is bound to occur after the signing of peace terms. Then there will arise conditions innumerable; labor may be extremely scarce, either on account of the amount of work or troubles arising amid the buzz of prosperity, when profits are not equitably proportioned; materials will leap to their former prices and may go far beyond, so that instead of saving twenty per cent. on present rates the cost may mean an increase of forty per cent. With the work delayed by the war, in addition to that which circumstances will demand, it is safe to predict a tremendous boom in the building world directly after the crisis is over. And if this is true, as many experts prophesy, then the client who builds now will ever be thankful he took advantage of existing conditions, from a financial viewpoint as well as a mental attitude.

WORTHY PROJECTS FORGOTTEN.

How often the lofty inspiration of an individual or a corporation quickly fades away. Probably every week we read with extreme satisfaction that some big undertaking is about to be started which will prove a boon to the citizens. Recently the Toronto Board of Control approved of a new post office square; the various railways and manufacturing plants agreed to use a smokeless fuel or instal smoke prevention plants; the Electric Light Company declared themselves as ready and willing to clear all the business section of service poles and bury the wires in conduits; the G.T.R. and C.P.R. announced work immediately upon their new Union Station. All these, like other worthy projects, have awakened hopes within which have been gradually smothered by the passing of time. Were these going ahead in addition to the Bloor Street Viaduct and the Waterfront development Toronto would be enjoying an unusual period of prosperity. There is nothing more conducive to hard times than hoarding up the means whereby honest and non-speculative enterprises may be assured. The banks, the financiers and the Government cannot grow careless, but for the sake of Canada's future welfare let them honestly weigh what it means to every individual person to further such work, and then there will be no bitter distress among the people, and in spite of war we will have live wide-awake communities.



GROUND FLOOR PLAN.



FIRST FLOOR PLAN.

SECOND FLOOR PLAN.

ST. CHARLES HOTEL, TORONTO.

HYNES, FELDMAN & WATSON, ARCHITECTS.

The Modern Hotel and Restaurant

IN the development of the modern hotel or public restaurant one of the chief essentials is the practical arrangement of the plan. How to economize in the utility of space, so that every square foot of flooring is available and still maintain a proper sequence between the various departments is a matter of no little import. This is especially true in hotels where the entire building forms a complete unit and the harmonious working of each division is dependent upon the facilities for handling the *tout ensemble.*

The St. Charles Hotel, located at the corner of Bay and Richmond streets, Toronto, presents many interesting features. It lends an unusual and attractive appearance in its novel treatment; the light cream terra cotta piers, with their panelling extending to the frieze, furnishes an upward motive; the window trimmings and marquise in bronze harmonize with the general color scheme; the exterior, with globe lights at the intersection of each pier with the frieze above, provides adequate lighting to give the proper effect in the evenings.

In designing the St. Charles, the height was fixed, as wood joisting, which has been employed in this connection, is only allowed in buildings not exceeding thirty-five feet. Otherwise the structure is absolutely fireproof, consisting of steel, brick and terra cotta on a concrete foundation. In limiting the height of the entire building for the reason stated above, the dining-room, barroom, etc., were forced to forego high ceilings, and consequently had to be designed in low relief. The dining-room, forty by sixty feet, is rather spacious for the height, which appearance has been counteracted by the constructional columns being encased in very large piers, the bold effect being softened by trellis work with shirred silk behind. Within each pier and at the top have been placed changeable lights, which throw out a softened glow, ranging from a delicate red to a light green. The walls of the room are finished in a Belgian gray, the trellis work being a pale green with light blue strips enclosing it, which shade is also found in parts of the cornice. On the ceiling the beams have a trellis band with sufficient foliage to give it a slight touch of home comfort; the large panels are of cream effect with a greenish band around, from which in low relief stand out the Tango dancing figures, revealing a desire to eliminate period and historic ornament and depict instead one of the chief functions which enters into modern social life. From each of the nine ceiling panels hangs a lighting fixture of silver finish, which, with the wall brackets of like material, furnish ample artificial illumination. The six large windows are draped in old rose curtains, a shade similar to that found in the screens and large centre rug.

Fully as interesting as the dining-room, but quite differently decorated, is the barroom. The floor is of square red tile, and the seven-foot dado of a variegated mat glaze tile, with a pre-

ENTRANCE TO PRIVATE DINING ROOM, ST. CHARLES HOTEL.

THE BAR, ST. CHARLES HOTEL.

dominating bluish tone and wide recessed joints. The portion above the dado when finished will have a conventionalized design representing the seasons; the ceiling ivory white to give proper value to the semi-direct lighting scheme of dull bronze fixtures, each one having eight small frosted globes beneath. Space has been planned for a double row of tables, to be used as a cafe in connection with the bar, while adjoining is another cafe opening into it but raised two feet higher, which guarantees a certain amount of privacy.

The private dining-room is tastily decorated with deep foliage tapestry effect, in harmony with the dull bronze finish of the pilasters, cornice, ceiling and trimmings. The ladies' reception-room has a general tone of Belgian gray; the hardwood floor partly covered with a heavy old rose rug, trimmings of white woodwork; walls of cherry floral design. The building cost $100,000.

Directly north of the St. Charles Hotel, on the corner of Queen and Bay streets, is the Bowles' Lunch, a frank solution of the difficult problem in designing an attractive two-storey structure, with the ground floor mainly plate glass. The exterior is of pink granite base, ivory matt glazed terra cotta, asbestos roof, copper windows, Circassian walnut doors with white enameled trim. The restaurant space has a two-inch hexagonal ceramic tile floor, verde antique base, seven-foot veined statuary marble wainscot, walls and ceiling of cream matt glazed tile with eight-inch plaster cornice between. Among the furnishings are the counters and sugar tables of Skyros marble, chairs of mahogany, cigar stand of Circassian walnut. In the small cigar store, treated with walnut and cork tile flooring, is a series of decorative panels in color, which depict the colonists meeting the Indians, bartering for trade, loading tobacco on boat, feast in cabin, landing in England, selling of tobacco, receiving knighthood—finally contentment and pleasure.

In the basement is installed an automatic refrigeration plant, ventilating equipment, helps' suite, boiler room, ice boxes and barber shop. There are two intakes at Queen street, through which the air is drawn over temporary coils, air washer and reheater, after which it is drawn into the main restaurant and then exhausted by a roof fan. The basement is finished in white enameled brick for walls and red quarry

DINING ROOM, ST. CHARLES HOTEL.

tile for floors. Over the restaurant is the billiard room, forty-two by eighty-eight feet, with a clear span. The floor is of cork tile, the walls of an eight-foot mahogany wainscot, with ivory tinted plaster above. The cost of the entire building was $96,000.

East of Bowles' Lunch, on Queen street, is McConkey's new restaurant of absolute fireproof construction, and designed so as to carry eleven storeys, the remaining ones to be built as desired. The exterior is faced in green and white matt glazed terra cotta, with green Tynus marble used for the pedestals of the large pilasters. The entrance hall, designed similar to the main restaurant, opens directly into it as well as to the second floor, by a marble stairway. Accommodations have been made for one hundred and sixty special chairs with wide service arms. The walls have an apollino green and pink marble dado, five feet high, with marble pilasters every seventeen feet, which carry the heavy beamed ceiling. Above the dado the walls and ceiling are covered with dull glazed white tile, paneled with green lines; in the centre of the wall surface is a painted tile panel set in green frame. The ceiling and beams are protected by six by three inch dull white tiling laid in herring-bone pattern, carried down at the sides to form a large cove.

On the second floor the restaurant will seat at tables one hundred and eighty-five. Extending from the eight-foot dado of fumed oak are heavy pilasters with moulded base and caps of same material reaching to the large cross beams, which in turn are joined by smaller wooden beams, forming spaces for decorative plaster effects. A marble dado seven feet high and tile floor is placed in the ladies' public lavatory; also in the men's public toilet located in the basement.

HOTEL HEATING AND VENTILATION

IN discussing the subject of heating, Werner Nygren, consulting engineer, in a special hotel number of the "Architectural Review," claims that the modern American hotel leads in almost every convenience and improvement which mark our progress. As a direct result of this, conditions have developed which were never even thought of when the older hotels were designed. When hotels were built on a small scale, having little or no plumbing, illum-

LADIES' RECEPTION ROOM, ST. CHARLES HOTEL.

inated by oil or gas, and heated by open fireplaces, many physical discomforts were willingly put up with, and the engineering problems which at that time had to be solved were comparatively simple. This is not the case to-day, when a hotel is not only a stopping-place for those who travel, but also a public restaurant, a place of amusement, a club, and a home—all of which necessitate an equipment both costly and complex.

The introduction of steam heat added very little complication. The high-pressure steam plant nowadays required to furnish steam for cooking, refrigeration, and the generation of electric current for light and power has, on the other hand, brought about considerable complication. Conditions incidental to the plant, together with conditions resulting from the tendency to design the hotel with the idea of utilizing every square foot of its plot, even to the extent of going into the ground for space, have created the demand for the extensive ventilating apparatus which to-day forms a prominent part in the equipment of the up-to-date hotel.

A great deal is expected from a ventilating plant in such a hotel. Besides keeping the air pure and fit for breathing purposes, it is required to provide the greatest possible bodily comfort, not only for the guests, but also for the help which toils in the kitchen and other hot and disagreeable departments. It is, therefore, very important that it be given the proper attention when designed, as it cannot do full justice to its purpose under adverse conditions. The mere designing of ventilating-apparatus does not include all that which rightly belongs to this department of engineering. The experienced engineer makes it his business to advocate, specify, or take proper measures against excessive heat and chilling effects, and to confine such heat or chilling effects as cannot be prevented, which otherwise would have a disturbing influence.

If proper precautions are not taken it is futile to expect satisfactory results from any heating and ventilating apparatus, least of all in a hotel. It does not occur to the average person that a room can be well ventilated unless it is kept at a low temperature. Yet this is perfectly possible, and often the case. Besides overheating due to warm floors and walls, which is the most common complaint, down-draft from windows, cold ceilings and wall-surfaces, as well as depositions of moisture, frequently laid directly to defective ventilation, are usually the result of neglect in taking the proper precautions.

Heating Methods.—Direct heating by means of radiators placed on the outside walls beneath the windows is generally satisfactory, and the simplest heating method for a hotel. Indirect heating, either by warm fan-blast or warm air heated by indirect stacks, if well designed, will give satisfactory results. Heating by radiators having direct communication with the outside air, known as the direct-indirect system, is too unreliable and generally unsatisfactory to be recommended for a hotel.

Irrespective of method, the heating should, as far as possible, be accomplished independently of the ventilation. While the two processes must be considered together, inasmuch as they have considerable influence upon each other, it is of the utmost importance that they do not conflict.

To introduce fresh air supply at high temperature for the combined purpose of heating

MAIN OFFICE, ST. CHARLES HOTEL.

THE BAR. ST. CHARLES HOTEL.

kind the greatest difficulty is to provide space for flues and registers. In order to secure satisfactory results, it is important that the warmed air be introduced near the floor, and in such a manner that it is evenly distributed over the outside walls and at the windows, and to do this without disagreeable drafts. The low velocity which is required to accomplish this necessitates very large and unsightly registers. Floor-registers are not to be recommended, because they invariably become receptacles for all kinds of dirt.

When heating with stacks at the base of the individual flues it is preferable to control the air and leave the steam on the heating-stacks continually. The control of the air can be done either by by-passing the air around the stacks when no heat is required or else by shutting off the air supply. The latter is usually to be preferred, as it is extremely difficult to avoid draft from registers located near the floor when the temperature of entering air is at or below the room temperature.

In dealing with indirect heat for the bedroom portion of the hotel, it is impracticable to heat the air by individual stacks and individual flues, due to structural conditions, leaving no other alternative than to heat air at central stations and distribute it by means of fans. To instal a system of this kind has also many difficulties in

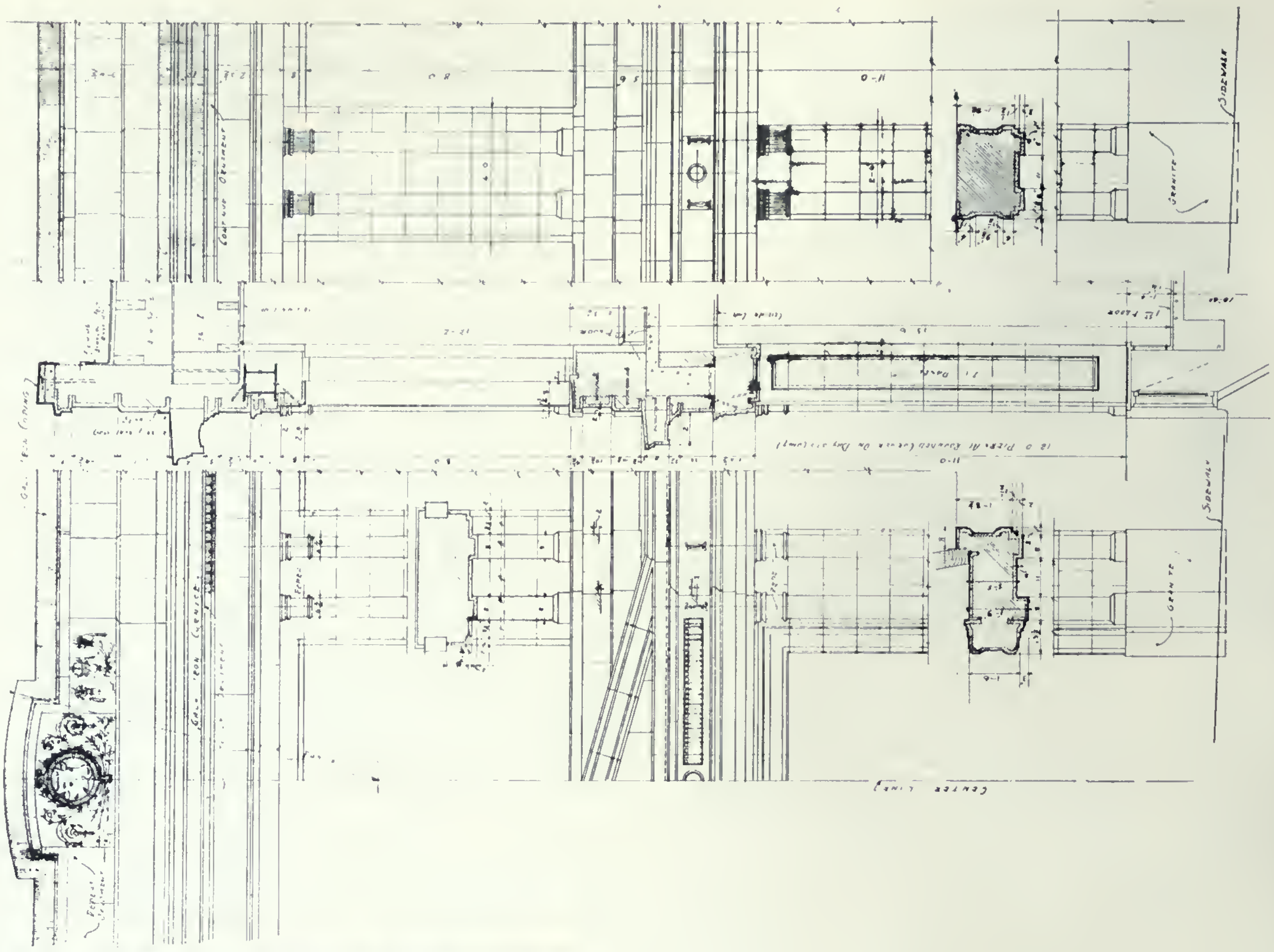
and ventilating public rooms should, therefore, be avoided, as it becomes very difficult to secure the proper control by such means. Wherever space conditions permit the installation of radiators it is by far the simplest to accomplish the heating by direct radiation, and introduce fresh air supply for ventilation at room temperature or slightly above or below same. Moreover, it is a decided advantage to instal heating-surfaces below the windows in rooms of this kind, as such heating-surfaces will tend to counteract down-draft and heat the air entering through leaks around the window-sash during strong winds.

If, on the other hand, as is sometimes the case, radiators are objectionable, indirect heating must be resorted to. This, however, is usually coupled with considerable difficulty, as it involves additional flues and registers, which are objectionable in highly decorated rooms, and indirect heating-stacks, ducts and fans, which add complication to the apparatus and occupy valuable space in the rooms below.

Fan-blast is required for heating of this character, as natural-draft indirect heat will not operate for rooms kept under a plenum, as is the case with the public rooms in a hotel, where the first consideration is to push back, as far as possible, the air from kitchens and serving-rooms which carries odors.

With a heating system of this

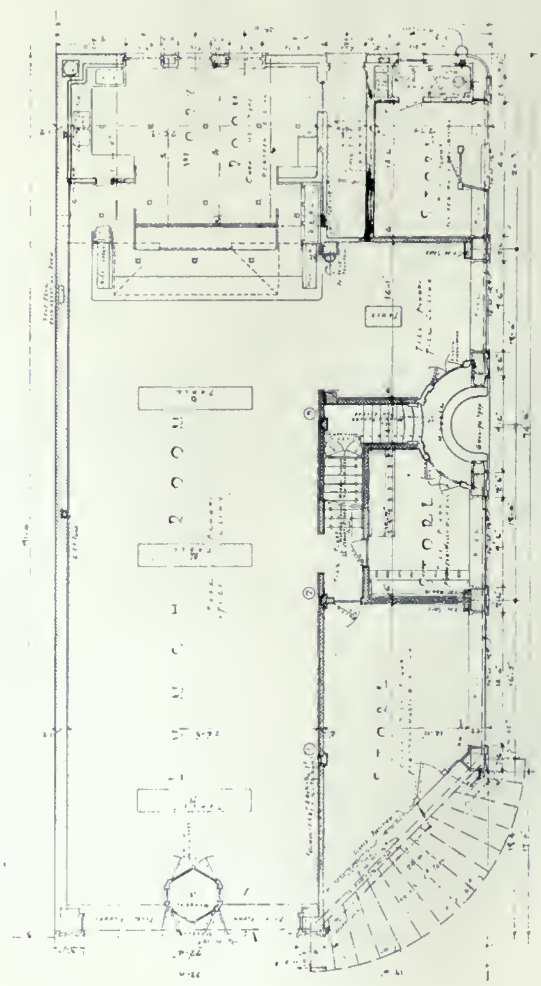
ST. CHARLES HOTEL.



DETAILS AND GROUND FLOOR PLAN.

BOWLES LUNCH BUILDING, TORONTO.

HAND, HARRIS & MERRITT, ARCHITECTS.



BOWLES LUNCH ROOM, TORONTO.

the way of securing the proper space conditions necessary for the distributing system.

All the above statements as to the heating hold good for either steam or hot-water heating. While steam heating is usually adopted for hotels, this does not signify that steam heating is superior. There is no good physical reason why hot-water heating is not used for a hotel. It is somewhat more costly to instal, and since the economy in operation does not enter to any great degree when large quantities of exhaust-steam are available, as is usually the case in hotels, it nearly always goes by the board, despite its advantages. Larger radiators are required for hot-water than for steam heat. This is of some consequence with the architect, who usually finds it difficult to make room for even the steam radiators.

Steam Distribution for the Heating.—In heating a hotel the exhaust-steam from the plant should be utilized and circulated at a pressure not exceeding two pounds per square inch, and all heating-surfaces and piping proportioned in accordance with this pressure.

A return-line vacuum system is preferable to an ordinary two-pipe gravity system, and very much superior to any one-pipe system; first, because steam circulation can then be established at any pressure above, at, or slightly below the atmospheric pressure; second, because the air expelled from the steam is carried away by the return-pipes, together with the water of condensation, thus doing away with air-valves on the radiators; third, because each radiator requires but one control-valve for operation, as the return-valve is automatic and requires no other attention than an occasional adjustment; fourth, because the pipe sizes can be reduced considerably, particularly the radiator connections and the return-piping; and, fifth, because dry returns can be used, which permit mains to be run at the basement ceiling instead of at the floor, thus eliminating trenches.

While there are a number of vacuum return-line system appliances on the market for which all sorts of claims are made, there are but a few that can be relied upon; and it is, therefore, as difficult as it is important to select the right kind. It must be borne in mind that the success of a system of this kind for hotel work depends as much upon noiseless operation and a minimum amount of adjusting as upon the fulfilment of the freely offered guarantees as to economy. Appliances of this kind which have proved successful in factories, mercantile establishments and even office buildings, may prove a complete failure in a hotel.

Temperature Control.—Automatic temperature regulation plays a more important part in a hotel than in almost any other kind of a building. In public rooms, particularly if artificially ventilated, it is not possible to secure a uniformly satisfactory result without it. In the bedroom portion, where hand-control is often all that is provided, automatic regulation is found both practical and economical.

Thermostatic regulation for bedrooms eliminates the unfavorable impression made upon a guest entering his room and finding it cold or ex-

RESTAURANT, BOWLES BUILDING.

cessively warm, due to the fact that the heat has been left turned on or off for a long period—an impression which creates in his mind the idea that there is something wrong either with the heating or with the management.

Automatic heat regulation is also a good investment. It eliminates waste of steam through overheating, which is a saving in fuel when exhaust steam is not sufficient for the heating purposes.

Concealing of Radiators.—In a great many hotels it is customary to screen the radiators. This is purely a matter of consistency in the architecture and has no material influence upon the heating, provided ample openings at the top and bottom are provided for air circulation. Proper screening requires but a very slight increase in heating-surface above the minimum required with the radiators exposed. All radiator screens should be designed with removable fronts, hinged tops, and be properly lined so as to permit cleaning; otherwise, they are apt to become receptacles for the great accumulation of dust and dirt of all kinds.

BILLIARD PARLOR, BOWLES BUILDING.

Ventilating Requirements for Public Rooms.—As previously alluded to, the ventilating problem involves certain measures that will reduce the ventilating requirements to a minimum. An ounce of prevention is worth a pound of cure in ventilation as much as in any other instance. Warm floors and partitions will under certain weather conditions make a room with the sweetest atmosphere seem stuffy and ill-ventilated. No matter how much fresh air is forced into such a room, it will not be comfortable.

In general, it is not possible to force a very large quantity of fresh air into any room without disagreeable drafts if the entering air is cooler than the room temperature; nor is it possible to exhaust an unlimited quantity of air, for the same reason. Moreover, any attempt to reduce excessive heat by the introduction of a large quantity of air at moderate temperature would mean apparatus of abnormal size, and to do this by a moderate quantity of air at a very low temperature would involve artificial cooling; either of which would increase the first cost, as well as the operating expenses, far beyond what it would cost to apply the proper protection for preventing excessive heat transmission.

The unsightliness of registers when too large or too numerous is another reason why it is important to minimize as much as possible both the fresh air supply and the exhaust ventilation. It must be remembered that the register openings should under any and all conditions be in direct proportion to the amount of air. The mistaken notion that any amount of air can be forced through an opening, and the repeated hints that a few more revolutions of the fans will compensate for reduction in area of register openings, do not alter the physical laws governing this principle. The sum and substance of it is that the registers must be sufficiently large to permit the passage of the required quantities of air at a certain velocity, which velocity, if too great, will create disagreeable drafts and possible noise at the registers. How great this velocity should be is in turn dependent upon the location of the registers, height of the rooms, etc. The direction of the air-flow must also be taken into account in determining the sizes of the air-supply registers.

The above refers, of course, to such public rooms as require a continuous change of air for the combined purpose of keeping the air in the room occasionally pure and offsetting the heat given out by the occupants and the illumination.

Precautions which materially reduce the ventilating requirements are: walls with air-spaces around shafts containing hot pipes and ducts; partitions with air-spaces separating rooms which are necessarily hot from rooms desired to be kept at a lower temperature; the application of non-conducting material on ceilings over rooms and spaces in which a high temperature cannot be avoided, as well as on walls and partitions where space conditions do not permit air-space construction; a thorough and complete blocking-off of all furring-spaces at floors, particularly at the floor above the basement, so as to prevent undesirable heat rising into the furring-spaces; and proper non-conducting covering on all steam and hot-water pipes and on flues and ducts conveying heat, including those concealed in furring, suspended ceilings and shafts.

The amount of ventilation required for each room is a matter of special study, as it depends entirely upon local conditions to such an extent that two cases are seldom alike. Ballrooms, banquet-rooms, dining-rooms, cafes, lounging and smoking-rooms, require different amounts. All require, however, both air-supply and exhaust-ventilation by mechanical means. The dining-rooms, cafes, foyers, reception-rooms, and writing-rooms can, as a rule, be well ventilated by admitting the air-supply near the ceiling and exhausting through registers near the floor; and in individual cases, both near the floor and the ceiling; still, there is no hard-and-fast rule for a successful treatment.

Ballrooms, banquet-rooms and other similar rooms where large groups of people come together should preferably be provided with special ventilating systems arranged for reversing, so that the fresh-air supply can alternately be admitted near the ceiling when the exhaust is taken near the floor, and vice versa.

This method of reversing, which is quite new, is by no means an expensive feature, as no additional registers or flues are required. The air-supply registers are merely changed to exhaust registers and the exhaust to supply registers when the reversing occurs.

In case of a ballroom, which is usually of considerable size, it is by far the best to provide individual air-supply and exhaust fans, as the problem warrants. In such a case the reversing device can be situated near the room which it serves, although it is not important where this device is located as long as it is accessible and can be properly connected with the air ducts. Incidentally, it is always desirable to have an individual air-supply fan for a ballroom, as it affords a convenient means for a rapid raising of the temperature of the room after dancing by introducing the air-supply at a high temperature until the desired room temperature is reached

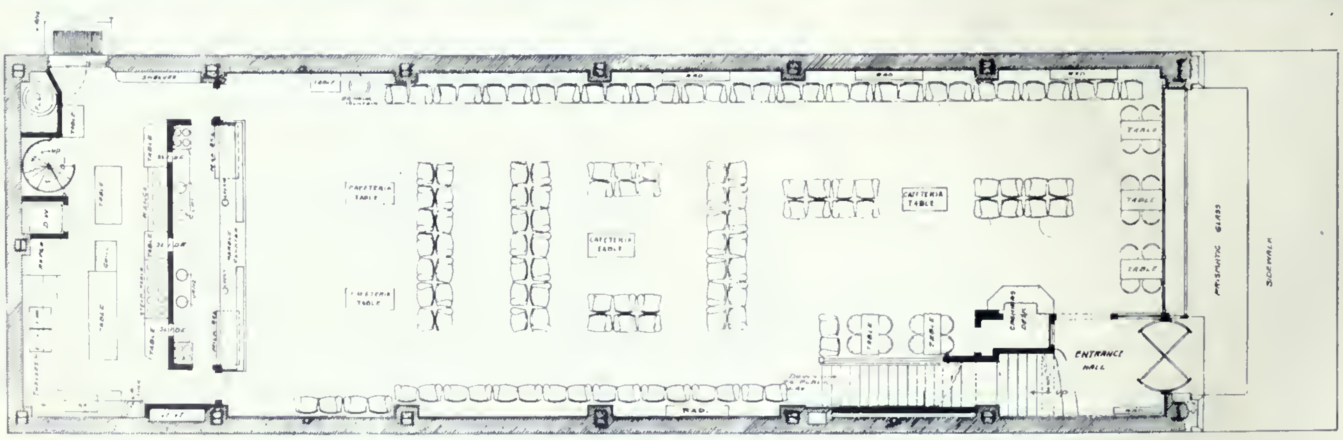
In the case of banquet-rooms and other smaller rooms kept at constant temperature, in which upward ventilation is at times desirable, the reverser can as a rule be located in the basement, the air-supply taken from a main trunk duct supplying several rooms, and the exhaust taken from the reverser to a general exhaust fan.

Toilet-rooms require, as a rule, no air-supply ventilation, but should have very active exhaust and be provided with louvres or registers in the doors for ingress of air to make the exhaust-ventilation effective. Interior bathrooms should be ventilated in a similar manner.

DETAIL OF RESTAURANT, BOWLES BUILDING.

Treatment of the Air-Supply.—The fresh air supply before it is introduced is required to be cleaned at all times, tempered in the colder weather, and humidified only under exceptional conditions, and when specially required.

The cleaning of the air is done either by air-washers or by dry filtering. The tempering is done by passing the air over coils or stacks before it enters the blowers. The moistening is done by the air-washers, when such are installed, and by evaporating water in pans located in the tempering-coil casings when no air-washers are used. The moistening requirement in a hotel is, however, very small, and in some localities entirely uncalled for. For this reason air-washers are objectionable in hotels near the sea-



GROUND FLOOR RESTAURANT,

McCONKEY'S LUNCH BUILDING, TORONTO.

E. J. LENNOX, ARCHITECT.

coast, where the atmosphere is usually moist, because they add moisture at times when excessive moisture prevails. Dry filtering by means of cheese-cloth filters is, on the other hand, unsatisfactory in very smoky localities, although it answers very well in hotels located where the atmosphere is reasonably clear, as in New York and Boston.

The tempering of the air-supply is a very important process, that must be done evenly and accurately. Automatic heat-control for the tempering-coils is indispensable in connection with this process.

Ventilation of Working Departments.—The ventilation of the boiler-room, engine and machinery rooms, kitchens, bakeries, sculleries, serving-rooms, pantries, laundries and similar rooms is of the utmost importance, and cannot very well be excessive. In matters of this kind it is important, besides securing comfort for the employees, that all heat, vapor and odors be confined as much as possible to the respective departments. This can be accomplished only by proportioning the ventilation in such a manner that the exhaust-ventilation in these departments becomes greatly in excess of the fresh air supply. The reverse should, of course, be the case in the ventilation of the public rooms, so as to establish air currents away from the public rooms. Local ventilation and heat-removal are of paramount importance. In the case of the kitchen, a powerful exhaust should be provided from the hoods over the ranges, broilers, kettles, bain-maries, urns, etc. The same holds good over bakery ovens and boilers, dryers and mangles in laundries. In the boiler-room, engine room, pump and machinery rooms, the air-supply should, as far as possible, be distributed near the floor, and the exhaust taken from the ceiling, avoiding strong air currents over hot surfaces. The air-supply for a kitchen must be distributed with considerable care, as the temperature of a kitchen is under any condition necessarily high, and cold drafts are, therefore, very objectionable.

Considerable fresh cold air must constantly be supplied to a hotel kitchen in order to keep down its temperature and make the exhaust-ventilation effective. Such constant air-supply should, therefore, be distributed all around the room, and as far as possible from the ranges and steam fixtures. It is not always possible to introduce air at low temperature at the ranges, on account of the draft; and since it is inadvisable to add any heat to the air-supply, on account of the temperature in the room, it is most expedient to arrange for an intermittent air-supply near the ranges and steam fixtures, as shown in diagram below.

Air taken from a cooler portion of the room can thus be recirculated, merely producing a fanning effect, at times when it is objectionable to introduce unheated air, and air at external temperature introduced when not found objectionable.

Ventilating Apparatus.—Centrifugal fans are the proper type to use for the air-supply system. The same type should also be used for exhausting air under any appreciable resistance, while disc fans can be, and often are, used for exhausting air when the flue-velocity is low and the resistance is slight.

Both air-supply and exhaust fans should be made as large as practicable, to insure efficiency with the minimum operating cost.

Fans should all be driven by slow-speed electric motors, direct-connected to the fan-shafts, and designed for variable speeds of considerable range. The slow-speed principle is very important, because it is more economical to run large ventilating fans at slow speed than small fans at high speed, and, furthermore, the slow-speed fans are practically noiseless.


GROUND FLOOR RESTAURANT, M'CONKEY'S BUILDING.

For conveyance of air, galvanized iron ducts and flues should be used throughout, in each case forming a continuous passage for the air from the air-supply fans to the registers, and from the exhaust-registers to the exhaust-fans. Air passages formed for furring, suspended ceilings and plastered coves are not only unsanitary, but increase the fire risk to such an extent that they should never be resorted to.

The velocities and formation of the ducts and flues cannot be entered upon to any extent in this article. For the sake of economy in operation, it is advisable to proportion the ducts and flues as generously as possible. Individual air-supply flues should not be proportioned for a higher velocity than twelve feet per second, whereas the velocity in the individual flues for exhaust should not exceed ten feet per second. The velocity in the main ducts can, of course, be considerably higher, depending in turn upon their size and length. A velocity of thirty feet per second may be considered conservative in the main trunk ducts at the blowers, with the reduction in velocity as the distance from the fans increases and the cross-sectional area decreases. The same holds good in reverse proportion for the exhaust ducts, with the exception that the velocity at the inlets of the exhaust-fans should not exceed twenty-two to twenty-four feet per second. There is, however, no hard-and-fast rule, as local conditions are determining factors to a very large degree.

The disposition of ducts and flues is no small problem. This can be solved only by the most exhaustive study when the plans are being prepared. Vertical flues naturally go back of the furring, whereas the main ducts are generally run at the basement ceiling.

Central Plant.—The power plant, which by necessity is a part of every large hotel, is in itself a large problem and too intricate to be more than briefly commented upon in this article. Some of the larger hotels in this country have boiler plants ranging from two to three thousand horse-power capacity and electric generating plants capable of developing from 1,200 to 1,500 kilowatts. Such an equipment, with the number of appurtenances and the piping required in connection with the same, together with the main appurtenances of the heating and ventilating apparatus, the refrigerating and ice-making plant, elevator machinery, pumps, tanks and heaters of the plumbing system, air compressors, pneumatic tube and vacuum sweeping equipments, usually occupies an entire sub-basement.

SECOND FLOOR RESTAURANT, M'CONKEY'S BUILDING.

Interior Decorations

IN referring to interior decorations, Henry J. Davison, whose best work is found in the Bankers' Club of America and the Lawyers' Club at New York City, states that certain colors have a certain definite effect on masses of people. The human soul has so many prejudices that individuals are affected differently, according to past associations and experiences with certain colors. Just as a strain of music or a waft of perfume recalls to us in a flash some terrific emotion experienced many years past, and supposedly forgotten, so a certain color may be associated with some extremely disagreeable experience and therefore always bring us extreme discomfort. For instance, when we enter a lavender room we suddenly may become pensive and melancholy, or perhaps, irritable; and may be wholly ignorant of the fact that the color has brought up disagreeable memories.

During his discourse Mr. Davison said:—"Do not imagine that all this is vague theory. I have made color a life-time study and deduced facts which sound like didactic statements from literally thousands of instances. That is the only way scientists determine anything; they study innumerable cases, and when they find the same conditions prevailing under the same circumstances every time they deduce a law which operates unfailingly.

"I remember a big piece of work I did in a house, a part of which consisted of a yellow and also of a blue room. Two powerful captains of finance frequented the club. One passionately loved the yellow room. He used to say naively, 'I can sit in the yellow room all day.' Undoubtedly, this was due to the fact that he was a self-made man who had worked hard and never had had any warmth or color in his life. This golden glow meant to him relaxation—the joys of boyhood.

The other man inevitably drifted to the blue room, showing a predilection for blacks and blues; for recesses and shadows. He is a lawyer who protects millions of dollars—an abstractive man, who loves spider webs, the spinning of schemes. Every shadow and recess in a room delights him. He cannot stay away from that blue room. This is because he never explodes or gives way to irritability or passion. Not having the outlet his pent up energies crave the stimulus of color.

"Red is universally aggressive. Orange expresses heat. Have you never questioned why the Italians and Spanish, although living in hot countries, always dress in red and yellow, and eat red peppers and violent drinks? It is because they give out so much heat that they are obliged to restock their heat and energies.

"Blue stands for serenity and coolness. Violet is mystic and contemplative. There is no doubt in my mind that the theological symbolism of color, which is a tremendous study in itself, was founded upon actual knowledge of psychology. You know that even as late as the Italian Renaissance the great painters, such as Raphael, were obliged by the church to express certain theological symbols, such as blue for the Madonna's robe, signifying religion or faith; green for hope, and white for purity.

"Take our everyday lives; although in general the sexes are differentiated somewhat in taste and expression, color is not so much a matter of sex as of temperament. Strong elemental colors are regarded as masculine, while the tinted ones, to which white has been added, expressing subtlety and delicacy, are feminine. Still, I have seen strong, manly men sometimes react to exquisite colors. People of the same sex but different temperament express wholly different colors and forms.

"Can you imagine Queen Elizabeth and Marie Antoinette wearing the same costumes and enjoying the same furniture? The dominant, aggressive, masculine queen wore certain costumes and surrounded herself by certain strong, well built furniture. The dainty, aristocratic French sovereign expressed her period by delicate Dresden china figures, spindle legged furniture and all sorts of fragile, rococo and ornate furniture and tapestries.

"If you do not think that color has a real physical effect on people you should see some men almost go crazy if subjected to violet. A doctor experimented recently with an apparatus —I think they call it a pulsometer—which showed the pulse going up or down, according as the person was subjected to one or another color.

"In Yale University tests were made which showed that men when subjected to red displayed 50 per cent. more muscular efficiency than under other colors. The effect was measured by instruments on their wrists, and it was shown that when subjected to purple the pulse would go away down."

"Nations have color, and national tastes change. We could express America by one color, France by another, with real meaning. Chickens have been fed aniline dyes and the egg that forms is in concentric rings, each being of the color fed the hen at the time that portion of the egg was forming. This is a mere physical experiment.

"But it is people who are eternally fascinating. Always and forever we are asking, What is art? Tolstoy answered, 'The transference of emotion.' William Morris said 'art is man's joy in his work.' Color is rejection—or the bouncing away. Color is a language. It has an alphabet, spelling, grammar and paragraphs. The three letters in the color alphabet are red, yellow and blue. Every room must have some of each of these, whatever the proportion. Sometimes I call them the parents. (You know, of course, that there are 3,000,000 colors.) Red marries Yellow and they have one child—Orange. All the rest of the three million colors and tints are their offspring.

"Tints, of course, merely have more or less white mixed in. Mixed color is dirty. Not one house painter in eight hundred can mix colors. Pure color is 'grayed' or 'browned' or 'blacked.' The shade produced depends on time and the effect of one color soaked into another. No dyer can guarantee absolutely what color will finally emerge. Color depends on what company we keep. Colors must be very fastidious; they cannot risk evil associates, lest their blood be debased.

"All artists use the same paint; they are marvellous only in the mixture of the colors and the proportions used."

"Decoration is applied psychology! If your house does not express you it is a setting without a stone. Your taste may be guided, but if your abode merely expresses the conventional schemes or predilections of a hired decorator it is a Smith house or a Jackson room, but not the emanation of your soul!

"The history of household furniture is intimate and fascinating. It usually is founded on physical facts and customs. For instance, the chair of a certain period had high rungs, because in that age, even in king's houses, there was no sanitation, and garbage, water, dirty little animals and rats might render the floor unfit for milady's dresses. So she kept her feet well up from the stone floor!

"In most forms of art expression, however eccentric they may appear, there is a reason. But when we get away from home furnishings, from tapestries of delicate hue, and spindle legged or carved mahogany, or gilt furniture, and come to the realm of human beings, there enters in a spirit of mysticism, of uncertainty, of eternity. That is why we speak of soul portraiture, which sounds vague and irrational to the dull realists, but is founded on eternal verities.

"If it is scientifically proved that different colors actually affect a person's temper and mood, it stands to reason that we should study not only color effects in general but in their relation to individual men and women. Why torture a sensitive young girl by giving her a blue bedroom if it render her nervous, depressed and melancholy? She may not realize what it is that is affecting her spirits and nerves, but that should be the concern of the color specialist.

"In deciding on your own color schemes avoid affectation and the following of some didactic teacher. Be yourself. Each individual is a facet of the diamond of life. Why should a hustling, rich society women or a practical prosperous business woman garbed in a tailor-made suit of the twentieth century go in for 'periodism' and dwell in an ornate Marie Antoinette room? Nothing is more absurd and incongruous. If folks understood color and harmony there would be no friction and fewer divorces!

"Every work of art is, in one sense, a lie. Painters cannot paint light. They cannot reproduce Niagara on a three foot canvas. Truth is reached through error, as it were—through the great illusion. In entering a crowded, busy downtown skyscraper office building in the heart of New York the visitor must be impressed with distance, with dim, cathedral-like spaces.

"The Bankers' Club is, in floor space (100,000 square feet), the equivalent of a 400-room hotel! A decorator not only must select colors which will not throw the occupants of a room into a rage, but he must have a thought for eye strain and ear strain; must regard the nose, the sense of touch, the palate, and even the legs!

"Americans are wearing out their eyes because of the intense light of the many windowed office buildings. The top storey of a steel skyscraper has no skyline or vista or partitions, so that the decorator has some problem to make it cosey and homelike.

"People are just waking up to the fearful strain of noise in a big city. The vibrations from hundreds of voices crossing and recrossing each other in a room are as real and assail the nerves as disagreeably as little popguns shot off in every direction! I try to counteract this in color and line and bring about repose and serenity.

"So much for the eye and ear. The nose must not be assailed by unpleasing odors in a club, and the palate must be pleased with the aid of lovely æsthetic surroundings. This former takes in ventilation.

"Even the texture of fabrics and leathers has an effect on the temper and the soul, so that the body-fitting chairs must have certain materials in upholstery to inspire peace."

VENICE

Arti cleby Sir Martin Conwayin "Country Life." Photos taken by F. R. Major.

THAT Italy should have come into the war as our ally is, of course, matter of satisfaction to all her lovers, but it is a satisfaction tempered with fear. For Italy is the trustee of so much that all the civilized world holds dear—the priceless treasures of art bequeathed to her by her ancestors of so many bygone generations. The very landscape of Italy is precious, and even her smaller and remoter towns contain monuments not to be paralleled elsewhere. Thus little Cividale, close to the Austro-Italian frontier and on one of the main highroads leading north-east out of the plain of Venetia, is alone worth more than money could repay; and Cividale has heard the guns. Cividale, Udine, Aquileia, Grado—how pleasantly the names slip from the tongue, and what charming memories each evokes in those who really know their Italy. But the light of all of them pales into insignificance before the sun-bright glory of Venice—Venice which all the world worships and everyone knows to be unique. Even Rheims, splendid as it was, was only one of several superb Gothic cathedrals of the highest rank, but Venice is not one of several, not even one of two. It stands alone in the world; there is no city like it. Once, indeed, Venice did not stand so unrivalled, but that was before the Ottoman conquest of Constantinople. The old Constantinople of East Imperial days has been wiped out by the unspeakable Turk, excepting only her central gem, the church of Hagia Sophia, and that is but a shell, swept and garnished of all the fair furniture it was designed to hold and to set off. Venice is, as it were, a piece of old Constantinople preserved in the pious west, whereby we are able to learn what Constantinople once was like. That was the great Venice—the Venice of the twelfth, thirteenth and fourteenth centuries—the Venice of St. Mark's and the Doge's Palace, and the Byzantine and early Gothic palaces along the Grand Canal. Time has worn much of that older Venice away, but what remains of it includes, perhaps the most precious of all the buildings that now stand anywhere together, still in use, on the face of the earth.

DETAIL OF PLAZZA DUCALE.

The glory of Venice is St. Mark's. Hagia Sophia may be a yet more beautiful building, but St. Mark's is a building with its treasures complete within. Both are essentially

SCENE IN CHIOGGIA.

Byzantine buildings, one representing the first great epoch of Byzantine splendour, the other expressing the revived glories of the Byzantine Renaissance. But whereas Hagia Sophia was built at one effort, St. Mark's was a growth. Two earlier churches stood successively on its site. The third is more perfect than either. The brick core of it was begun about the time of our Norman Conquest, and from that day till the sixteenth century almost every generation added to the beauty and wealth of the monument. Wherever victorious Venetian fleets penetrated they brought home some precious marbles, some finely carved capitals, or other rare objects to be built into the shrine of "their own Evangelist." If they plundered it was not after Teutonic fashion for destruction's sake, but in order to create. The brick walls of St. Mark's are now wholly covered with fair marbles, many of them inlaid with sculpture or mosaic. The facade is adorned by scores of columns and capitals, some of them of exceeding rareness. The interior vaults are wholly lined with mosaic. All the altars, the lamps, the pulpits, the galleries, are precious as in no other church, and many of them have come from unrecorded eastern shrines. Sometimes they are built up out of fragments, preserved and re-used in new combinations and now venerable in their reassemblage. No interior in the world can compare with that of St. Mark's for splendour. The subdued lustre of gold, the rich harmony of color in marble, porphyry and glass, the bronze lamps and doors, the fine sculpture in many materials—all are rich, all are rare, and every detail is historically interesting. If we could know whence came and who brought each marble panel or porphyry shaft which now finds its almost perfect position in the complex whole, we should by them alone be able to form a catalogue of the great men and great deeds of Venice. Yet even more wonderful than the objects themselves is the art whereby they have been combined into this incredible whole, this matchless unity, this summary of the passions and strivings and adorations of half a thousand years, and those the centuries that included the crusades and the great age of chivalry and the making of Europe.

The foundation of Venice was caused by the invasion of the older Huns, the Huns who could not help being barbarians of the lowest class because they never had had a chance to be civilized. They came raging and ravaging down into Italy, and the people of Aquileia fled from their fury and took refuge on the islands among the lagoons, where they founded first Torcello and then Rialto (afterwards called Venice). Torcello still remains, like a stranded vessel of an ancient type, upon its sandbank, with churches that look older than they are, but yet are ancient enough. The soil of Torcello yields carved stones that may have come from Aquileia

TYPICAL VENETIAN BRIDGE.

MAIN FACADE OF ST. MARK S.

itself, and below them yet older antiquities, going back to the days when Mediterranean commerce was in the hands of Mycenæan people.

Venice, Torcello, Murano, Malamocco, Chioggia—how they sing through one's memory! For these places capture the affection of everyone as no other place can. Even Italy cannot rival them elsewhere. Florence, Rome, Capri, Palermo—lovely and fair as they are—possess no equal fascination, nor do Como, nor the Alps, nor Geneva's lake, nor the cathedral cities of France, love them as we may. Venice is above and beyond them all, the very centre and kernel of the beauty of the world. A day in Venice is an epoch in the lifetime of any really living person, anyone not wholly dead to beauty, anyone with a soul not altogether atrophied. That wonderful lagoon, so sunny, so still, with the graceful boats strewn about and the matchless tower of St. George and the Campanile reflected to left and right in the mirror of the landlocked sea! The incredible fascination of the Doge's palace, with its tessellated wall, faintly pink, above the lace-like interlacings of the wonderful colonnade, which Ruskin revealed to the admiration of the world! How it all draws together and leads the gliding gondola on to the mouth of the Grand Canal, that water highway fringed with palaces where sea and city meet and blend! Palace after palace, Byzantine, Gothic, Renaissance, succeed one another, each like the home of a fairy prince, glittering with broken reflected lights from below. Here there is a little garden where pinks blossom on the parapet and oleanders peep over the walls. And there is a little courtyard with its carved wellhead in the midst, and other little palaces looking down upon it all around. Everywhere is some attractive detail, some bit of exotic carving framed aloft on a house facade, a mere writhing, perhaps, of two clasped beasts, or a couple of birds flanking a vase, or a Byzantine emperor within a round medallion—spoil from some far off victory which the owner of the palace brought home and affixed for remembrance of a great deed of war. The little canals, too, with their endless bendings and twinings, how delightful they are! Each house that is reflected in them different from its neighbor, different in date, in style, in size—answering the special needs and likings of a particular man or family and no other. What glimpses we get through door and window into dark, mysterious passages and chambers, within which surely no ordinary men and women can dwell! Here, if anywhere, should be the home of romance, of the unexpected, the unusual, the unimagined.

That, after all, is the keynote of Venice to the foreigner—Romance! If we were to live there it would go, no doubt, as it is liable to vanish from the Alps and the sea and the desert when we become too familiar with them. The worst of living too long and seeing too much

A NARROW THOROUGHFARE.

CHURCH OF S. M. DELLA SALUTE.

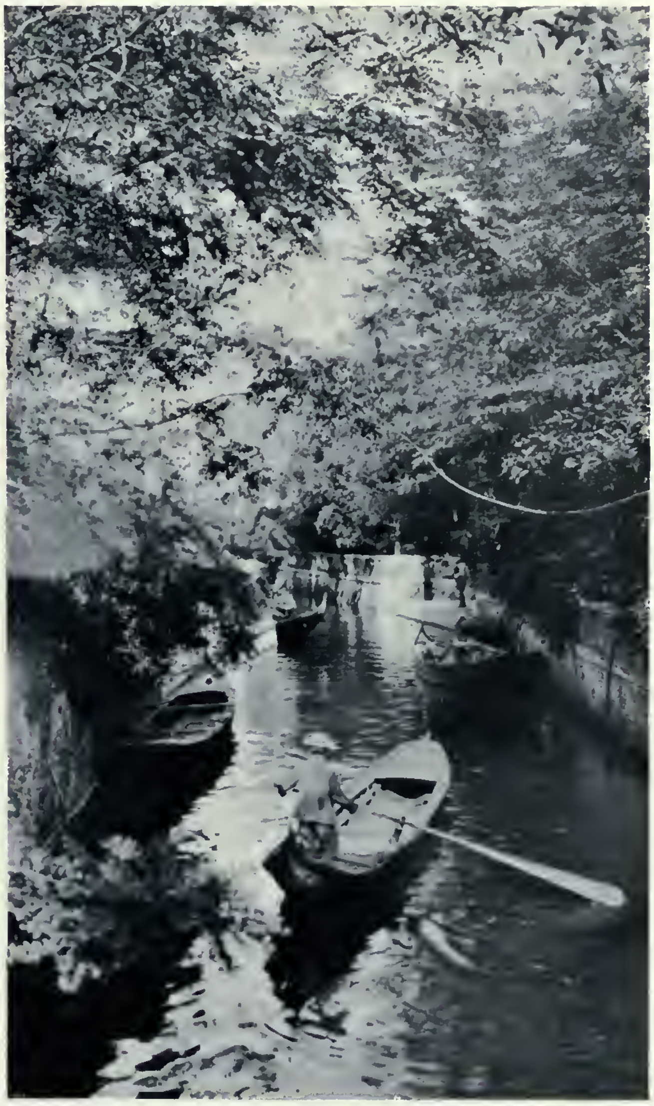
is that everything is liable to become commonplace in these dangerously material days. We no sooner become conscious of what seems to be a mystery than we must needs examine and explain it and drive the mystery away; and with the mystery gone romance vanishes also. What a loss! For life has nothing so precious to give as romance, which is a state of mind the very reverse of scientific understanding. It is romance that gives to youth its glory, to manhood its ideal, and gilds the memories of old age for those who have preserved the rare jewel of that power. For most people romance is banished from their every-day life, gone beyond recall from their homes. Such can only for a brief spell recover it by wandering forth into some new world. They may find it in music or in the drama till those also become stale, or they may catch a renewed glimpse of it in some flaming sunset or a sudden vista of snowy mountains. But it is at Venice that they are most sure to come up with romance once more and so renew the thrill of childhood if only for a moment in their *blasé* hearts.

It is remarkable that the love which all the world now bears towards Venice should be a modern emotion. The strangeness of the place was always famed abroad, but of its beauty we read little or no mention in the older writers. Coryat and such travellers were more amused by Venetian society than by Venice itself; yet the city must have been more resplendently beautiful in their day than ever since, for later centuries have seen a sad destruction of its beauties and a replacement of many a rare feature by the ordinary. It is easy now to realize that the culmination of the beauty of Venice must have come about the beginning of the sixteenth century, at which time the Hungarian, Albert Durer, spent a year within it, and we possess the letters he then wrote home to his friends. In none of them does he make any reference to the beauty of Venice. Yet, if it is glorious now in its decay, what must it have been then, when it was alive with an art-inspired folk, splendidly dressed and magnificent in their ways of life and their almost continuous ceremonials. Even the Renaissance was splendid in Venice and left the old work respectfully unharmed. That period was followed by one of sordid neglect and indifference which lasted almost down to the days of Ruskin. Turner and other English artists, indeed, had preceded him and had interpreted the beauty of Venice in their pictures and drawings; but he first, with any power and emphasis, made the stones of Venice appeal in language to the ears and through them presently to the eyes of men. Turner taught Ruskin, Ruskin taught England, and England taught the world to see Venice for what she is; and only just in time, for the days of great peril for her were come, and there was barely time to save what threatened to vanish away after centuries of neglect. The renewed interest was at first

A VENETIAN PALACE.

rather injurious than salutary, as the destructive restoration of the Fondaco dei Turchi still glaringly demonstrates. But a better understanding followed, with the result that St. Mark's was rescued none too soon, and the Doge's Palace likewise, and many another old *casa* or *palazzo* that would have been pulled or fallen down had the old indifference continued.

And now all is in peril at Venice as at Constantinople, and any day we may hear of some ghastly tragedy—a bomb on St. Mark's, a shell in the Doge's Palace, a torpedo under the Rialto. Such knowledge is not ours only, but still more keenly realized by our Italian Allies. It will add strength to their patriotism and will make them yet more determined to conquer and keep the hated enemy off their sacred soil. That they may be enabled so to do will be the prayer of every lover of things beautiful.



A SHADED STREET.

AS the boat drew nearer to the city (Venice), the coast which the traveller had just left sank behind him into one long, low, sad-colored line, tufted irregularly with brushwood and willows; but, at what seemed its northern extremity, the hills of Arqua rose in a dark cluster of purple pyramids, balanced on the bright mirage of the lagoon; two or three smooth surges of inferior hill extended themselves about their roots, and beyond these, beginning with the craggy peaks above Vicenza, the chain of the Alps girded the whole horizon to the north—a wall of jagged blue, here and there showing through its clefts a wilderness of misty precipices, fading far back into the recesses of Cadore, and itself rising and breaking away eastward, where the sun struck opposite upon its snow, into mighty fragments of peaked light, standing up behind the barred clouds of evening, one after another, countless, the crown of the Adrian Sea, until the eye turned back from pursuing them, to rest upon the nearer burning of the campaniles of Murano, and on the great city, where it magnified itself along the waves, as the quick silent pacing of the gondola drew nearer and nearer. And at last, when its walls were reached, and the outmost of its untrodden streets was entered, not through towered gate or guarded rampart, but as a deep inlet between two rocks of coral in the Indian Sea; when first upon the traveller's sight opened the long ranges of columned palaces,—each with its black boat moored at the portal,—each with its image cast down, beneath its feet, upon that green pavement which every breeze broke into new fantasies of rich tessellation; when first, at the extremity of the bright vista, the shadowy Rialto threw its colossal curve slowly forth from behind the palace of the Camerlenghi; that strange curve, so delicate, so adamantine, strong as a mountain cavern, graceful as a bow just bent; when first, before its moonlike circumference was all risen, the gondolier's cry, "Ah! Stali," struck sharp upon the ear, and the prow turned aside under the mighty cornices that half met over the narrow canal, where the plash of the water follow-

HOUSES ALONG THE GRAND CANAL.

ed close and loud, ringing along the marble by the boat's side; and when at last that boat darted forth upon the breadth of silver sea, across which the front of the Ducal palace, flushed with its sanguine veins, looks to the snowy dome of Our Lady of Salvation, it was no marvel that the mind should be so deeply entranced by the visionary charm of a scene so beautiful and so strange, as to forget the darker truths of its history and its being. Well might it seem that such

COLLEONI'S STATUE.

a city had owed her existence rather to the rod of the enchanter than the fear of the fugitive; that the waters which encircled her had been chosen for the mirror of her state, rather than the shelter of her nakedness; and that all which in nature was wild or merciless,—Time and Decay, as well as the waves and tempests,—had been won to adorn her instead of to destroy, and might still spare, for ages to come, that beauty which seemed to have fixed for its throne the sands of the hour-glass as well as of the sea.

And although the last few eventful years, fraught with change to the face of the whole earth, have been more fatal in their influence on Venice than the five hundred that preceded them; though the noble landscape of approach to her can now be seen no more, or seen only by a glance, as the engine slackens its rushing on the iron line; and though many of her palaces are for ever defaced, and many in desecrated ruins, there is still so much of magic in her aspect, that the hurried traveller, who must leave her before the wonder of that first aspect has been worn away, may still be led to forget the humility of her origin, and to shut his eyes to the depth of her desolation. They, at least, are little to be envied, in whose hearts the great charities of the imagination lie dead, and for whom the fancy has no power to repress the importunity of painful impressions, or to raise what is ignoble, and disguise what is discordant, in a scene so rich in its remembrances, so surpassing in its beauty. But for this work of the imagination there must be no permission during the task which is before us. The impotent feelings of romance, so singularly characteristic of this century, may indeed gild, but never save the remains of those mightier ages to which they are attached like climbing flowers; and they must be torn away from the magnificent fragments, if we would see them as they stood in their own strength. Those feelings, always as fruitless as they are fond, are in Venice not only incapable of protecting, but even of discerning, the objects to which they ought to have been attached. The Venice of modern fiction and drama is a thing of yesterday, a mere efflorescence of decay, a stage dream which the first ray of daylight must dissipate into dust. No prisoner, whose name is worth remembering, or whose sorrow deserved sympathy, ever crossed that "Bridge of Sighs," which is the centre of the Byronic ideal of Venice; no great merchant of Venice ever saw that Rialto under which the traveller now passes with breathless interest: the statue which Byron makes Faliero address as of one of his great ancestors was erected to a soldier of fortune a hundred and fifty years after Faliero's death; and the most conspicuous parts of the city have been so entirely altered in the course of the last three centuries, that if Henry Dandolo or Francis Foscari could be summoned from their tombs, and stood each on the deck of his galley at the entrance of the Grand Canal, that renowned entrance, the painter's favorite subject, the novelist's favorite scene, where the water first narrows by the steps of the Church of La Salute,—the mighty Doges would not know in what spot of the world they stood, would literally not recognize one stone of the great city, for whose sake, and by whose ingratitude, their grey hairs had been brought down with bitterness to the grave. The remains of *their* Venice lie hidden behind the cumbrous masses which were the delight of the nation in its dotage; hidden in many a grass-grown court, and silent pathway, and lightless canal, where the slow waves have sapped their foundations for five hundred years, and must soon prevail over them for ever. It must be our task to glean and gather them forth, and restore out of them some faint image of the lost city, more gorgeous a thousand-fold than that which now exists, yet not created in the day-dream of the prince, nor by the ostentation of the noble, but built by iron hands and patient hearts, contending against the adversity of nature and the fury of man, so that its wonderfulness cannot be grasped by the indolence of imagination, but only after frank inquiry into the true nature of that wild and solitary scene, whose restless tides and trembling sands did indeed shelter the birth of the city, but long denied her dominion.

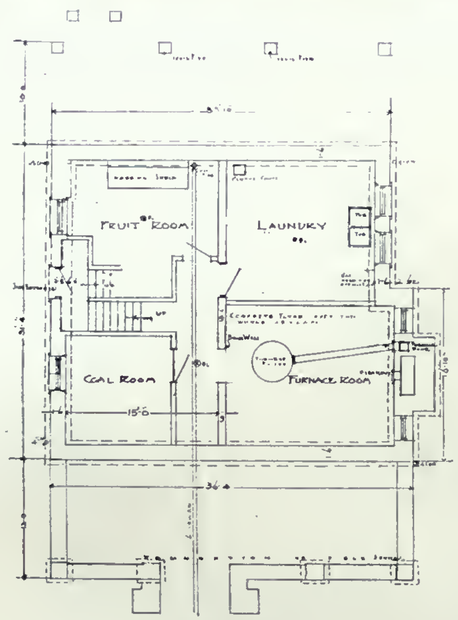
Seven miles to the north of Venice, the banks of sand, which near the city rise little above low-water mark, attain by degrees a higher level, and knit themselves at last into fields of salt morass, raised here and there into shapeless mounds, and intercepted by narrow creeks of sea. One of the feeblest of these inlets, after winding for some time among buried fragments of masonry, and knots of sunburnt weeds whitened with webs of fucus, stays itself in an utterly stagnant pool beside a plot of greener grass covered with ground ivy and violets. On this mound is built a rude brick campanile, of the commonest Lombardic type, which if we ascend towards evening (and there are none to hinder us, the door of its ruinous staircase swinging idly on its hinges), we may command from it one of the most notable scenes in this wide world of ours. Far as the eye can reach, a waste of wild sea moor, of a lurid ashen grey; not like our northern moors with their jet-black pools and purple heath, but lifeless, the color of sackcloth, with the corrupted sea-water soaking through the roots of its acrid weeds, and gleaming hither and thither through its snaky channels. No gathering of fantastic mists, nor coursing of clouds across it; but melancholy clearness of space in the warm sunset, oppressive, reaching to the horizon of its level gloom. To the very horizon, on the north-east; but, to the north and west, there is a blue line of higher land along the border of it, and above this, but farther back, a misty band of mountains, touched with snow. To the east, the paleness and roar of the Adriatic, louder at momentary intervals as the surf breaks on the bars of sand; to the south, the widening branches of the calm lagoon, alternately purple and pale green, as they reflect the evening clouds or twilight sky; and almost beneath our feet, on the same field which sustains the tower we gaze from, a group of four buildings, two of them little larger than cottages (though built of stone, and one adorned by a quaint belfry), the third an octagonal chapel, of which we can see but little more than the flat red roof with its rayed tiling, the fourth, a considerable church with nave and aisles, but of which, in like manner, we can see little but the long central ridge and lateral slopes of roof, which the sunlight separates in one glowing mass from the green field beneath and grey moor beyond. There are no living creatures near the buildings, nor any vestige of village or city round about them. They lie like a little company of ships becalmed on a far-away sea.

Then look farther to the south. Beyond the widening branches of the lagoon, and rising out of the bright lake into which they gather, there are a multitude of towers, dark, and scattered among square-set shapes of clustered palaces, a long and irregular line fretting the southern sky.

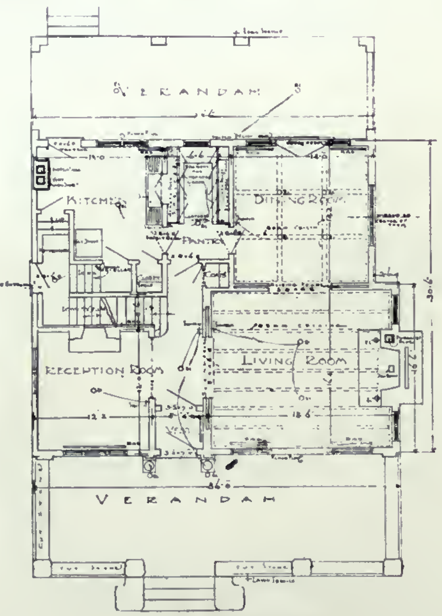
Mother and daughter, you behold them both in their widowhood,—Torcello and Venice.

The decay of the city of Venice is, in many respects, like that of an outwearied and aged human frame; the cause of its decrepitude is indeed at the heart, but the outward appearances of it are first at the extremities. In the centre of the city there are still places where some evidence of vitality remains, and where, with kind closing of the eyes to signs, too manifest even there, of distress and declining fortune, the stranger may succeed in imagining, for a little while, what must have been the aspect of Venice in her prime. But this lingering pulsation has not force enough any more to penetrate into the suburbs and outskirts of the city; the frost of death has there seized upon it irrevocably, and the grasp of mortal disease is marked daily by the increasing breadth of its belt of ruin. Nowhere is this seen more grievously than along the great north-eastern boundary, once occupied by the smaller palaces of the Venetians, built for pleasure or repose; the nobler piles along the grand canal being reserved for the pomp and business of daily life. To such smaller palaces garden ground was attached, opening to the water-side, which was wont to be covered in the evening by gondolas; the space of it between this part of the city and the island group of Murano being to Venice, in her time of power, what its parks are to London.—*W. Ruskin.*

FRONT AND REAR VIEWS.



CELLAR PLAN.

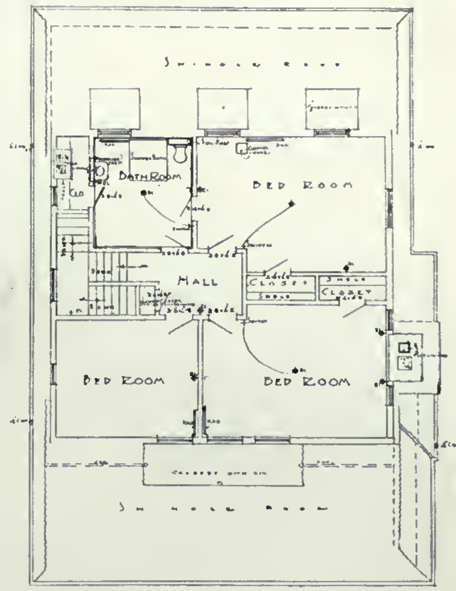


FIRST FLOOR PLAN.

HOUSE AT HAMILTON, ONTARIO.

HERBERT H. NEW, ARCHITECT.

Building on Main street is designed in shingles stained brown, columns and chimneys in field stone, roof of green shingles. Upon the interior the living room, hall and stairs of quartered oak, with a four-foot six-inch panel dado and beamed ceiling; field stone fireplace and bookcases. Reception room in white pine finished in white enamel; dining-room in birch stained mahogany, with panelled dado five feet six inches and beamed ceiling; kitchen painted white. Second floor in white, with birch doors stained mahogany. Hot water heating. Cost approximately $5,000.



SECOND FLOOR PLAN.

Cottage Housing

MAURICE B. ADAMS, F. R. I. B. A.

THE need of cottage provision is undoubtedly one of the most pressing problems of the day, and linked with it certainly is the question as to how best to get the laborer "back to the land." Temperament and love of excitement, with the increasing zest for amusement, have had a good deal to do with this difficulty of keeping able-bodied men and women on the land. Certainly it will never be accomplished unless you make it worth a man's while to stay on the soil, and that must be done by degrees to be permanent and effective.

Occupying ownership furnishes the only true solution of this extremely far-reaching national difficulty. Cottages have little in common with the Mistress Art of architecture, but are the outcome of daily needs, traditions, manners, and habits of workaday families engaged on the land—not the sediment of society, for the dregs of humanity have less than a nodding acquaintance with the aristocracy of industry.

In sparsely-populated agricultural localities, cottages should not be so isolated as often happened in the past, although no doubt the farm laborer does still need to be located near his work. Children's education has to be thought of, and much misery is caused in times of sickness by being beyond the reach of a helping hand. Besides all this, neighborliness is an enormous factor in life. Groups of cottages, therefore, are preferable, and also are less expensive to carry out than single ones. Combined water supply and drainage cost so much less than individual installations. Successful cottage-work must depend on simple ideas, avoiding any attempt at architecture in the ordinarily understood sense of the word—that is to say, cottages must be free of all affectation of style. Pleasing proportions and nice groupings unassumingly managed constitute the sum-total, all told, for good results. To worry a rustic's cottage, by the wayside or in the hedgerow, with platitudinous detail can only arise from a loss of artistic judgment or sterility of imagination. To waste labor and material trying to make a tricky villa resemble an old-world cottage is sheer folly. The historic charm of these homes originated from frank conditions and methods indigenous to the soil, with workmanship done in a vernacular way.

The value of scale in color must be recognized in any well-thought-out design. Red brick is apt to look crude or too assertive; so, if a choice is possible, darker or brindled shades and thin shapes are preferable. Purple slates are out of place with red brick in a clay district where tiles are made. Slates go better with masonry, and red pantiles, though cheap, are too big in scale for little structures. Flint facing with red-brick or tile-dressings wants a lot of beating, provided a cream-colored mortar is used. Snap flintwork is too expensive for cottages. When random masonry is employed with wide, uneven joints, the walling is much increased in interest by garnetting with pebbles or little pieces of black ironstone stuck into the mortar. I have used salt-glazed bricks with good effect for house-walls facing the sea and actually built on the shingle shore. For walls under bay-windows, salt-glazed brick is also valuable, keeping out the damp, so often a source of trouble in such positions, owing to the water running down from much glass surface. Grey stocks look nice for cottages; but the size of bricks makes them difficult to use unplastered. Cob cottages roofed with thatch nearly always look delightful; they are warm in winter and cool in summer, and last a long time. Deep eaves are essential, of course, and the plinth of the walls of thatched buildings should be tarred or asphalted, on account of the drips from the roofing. Unbroken roof-lines are of the utmost consequence in buildings of this class, while horizontal proportions are so essential that not even breadth of walling—always so valuable—can claim a prior place for insuring success.

The only reliable way in which to produce satisfactory cottages—which must, of course, be modern—is to intelligently learn the lessons taught by the old vernacular work scattered up and down the countryside. May I enumerate a few very simple points which occur to me, though most of them are patent to anyone who uses his eyes? When half-timbering is employed, never use small scantlings, but follow historic solid methods and sizes, with curved stuff as grown, and carefully selected, for the shaped framings in honest carpentry, well pinned, and in oak left from the saw or adze to weather. It will stand quite well in big scantlings, if green. Old and seasoned oak fresh worked will shrink and split more or less when exposed to the wind, sun and rain. Teak makes the best sills, and will not so readily turn up and twist in hot weather. Brick nogging or pargetted fillings look best in grey lime, properly used, with sharp sand of light color, and it has a better appearance than Portland cement. Concrete-breeze slabs, used either double or singly, can be grooved into the timber framings and rendered over. The natural surface of lime mortar should be left untouched, for color-wash is not to be compared with it. Decorated, diapered and trowelled pargettings are familiar in many parts of England, also plastered figurework and foliations of great beauty.

Deep eaves always improve the appearance of cottages, and when tile-hanging is used, the bottom verge-courses should tilt out boldly with a decided drip, throwing the water off the lower walling and keeping it dry, besides adding a welcome shadow just where it is wanted to give emphasis to horizontal lines, so very characteristic of old domestic work. When barge-boards are used, they are preferably plain in cottages. Cob-walling suggests rounded corners and restriction to one-storey building. Windows and door openings in cob walls are pleasingly strengthened with random-ended courses of red roofing-tiles for the jambs. If a little decoration is needed occasionally, terra-cotta pins pushed into the face of the cobwork, in diapers or other simple patterns, sparsely managed to emphasize points, and not scattered about, will be found effective.

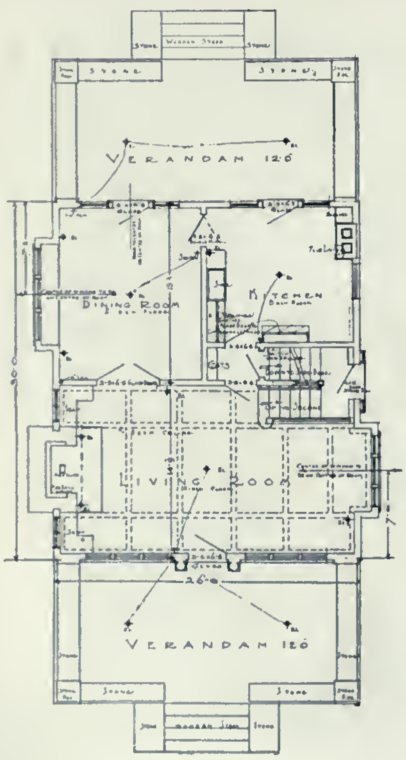
Nothing adds to the charm of home interiors like good plastering, and artistic attention to stucco detail repays itself more than anything. For example, in ceiling-coves above the walls, or to soffits for bay treatments, in buildings where handsome ceilings and rich cornices might be out of key with the general scheme, much effect can be obtained for trifling extra cost. On the other hand, it always seems a doubtful expedient to affect a barnlike eccentricity by using rough construction such as we see adopted for gentlefolks' cottages, under the supposition that this style of thing is very arty and chic, particularly when combined with random-built masonry or rough brickwork in big fireplaces which smoke like fun, and, to stop their nuisance, end up by resorting to the use of American stoves for anthracite coal. Fussy-shaped ingle-nooks in such rooms surely are reminiscent of old bar-parlors with rough ceiling-beams and big posts of timber of little use structurally, and looking more fit for the cowbyre than a modern parlor.

On the other hand, there is undoubtedly a perfectly natural and artistic quaintness, at once homely and comfortable, without evident effort, as the outcome of taste in the use of long low windows or pretty oriels and commodious bays, with pleasant vistas, so unassuming and befitting in cottage interiors, with peeps through the open casements into the sunlight and the garden suggesting the mystery of perspective and beyondness. Contentment is inspired by such simple possibilities, and the treatment, being reposeful, is unlikely to wane or become out of fashion. Meretricious effects soon tire, having only a transient character, which is apt to become uncanny. When good-patterned wallpapers are judiciously used, they are comfortable to live with, and last a long time. Whitewashed walls show off oak furniture and pictures to advantage, displaying tulips and roses delightfully. Consequently, no better setting need be required for well-dressed ladies. In Englishmen's houses the chimney-piece and fireplace is the centre of home comfort, where refinement and individuality of treatment ought to find recognition. A pretty grate is certainly a desideratum. Choice carpets and well-chosen rugs are of the utmost importance in any well-furnished home. Few things tell more as an evidence of an artistic temperament. Easy-chairs of good shapes are essential, and are not exclusively a concession to old age. Activity in labor or sport equally justifies the enjoyment of rest, and where better than in the home? Why should clubs have the monopoly? Cottages for workaday people ought to harmonize with precisely the same qualifications as to restful ideas; but they can scarcely be made too simple. Lime-white for walls is more suitable than paltry-patterned wallpapers, and is far more sanitary. Rounded corners to angles of walls next the ceiling, as well as along the skirting, are less likely to harbor dirt, and are more readily cleansed. Ledged doors with latches are more appropriate than panelled doors with mortised locks.

The outstanding drawback about so-called "standard cottages" for laborers in country places is their inadequate size, giving no room "to swing a cat"; and yet healthy men and growing boys, working from morning till night in the open fields, developing their muscles like cart horses, are to be cramped up, with scarcely more than a gangway between the table and the hearth to turn in, or stretch out their tired limbs when the day's task is over. After being exposed to the wind and weather from sunrise to sunset, such people rather enjoy a stuffy atmosphere at night time, when they like to feel warm: hence their disinclination to open the windows. But that is no reason why their keeping room fire should be set in a draught between the front and back doors. As a matter of fact, one door is, generally speaking, sufficient for a house of this sort. It is a mistake to provide parlors. They encourage taking a lodger, leading to troubles later, and parlors are occupied for storing a lot of dust-collecting rubbish, and seldom are used except for funerals. In middle-class cottages it is wise to reduce the parlor in order to enlarge the living room, or the parlor may be arranged as an alcove out of the other, for use at meal times. But a small separate room in which to see visitors and for personal business is desirable. Staircases in the better type of cottage should be located out of sight of the front entrance.

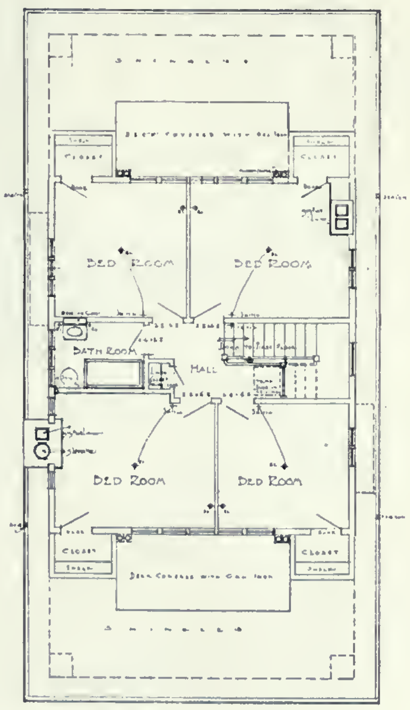
HOUSE AT PORT NELSON, ONT.

HERBERT H. NEW, ARCHITECT.



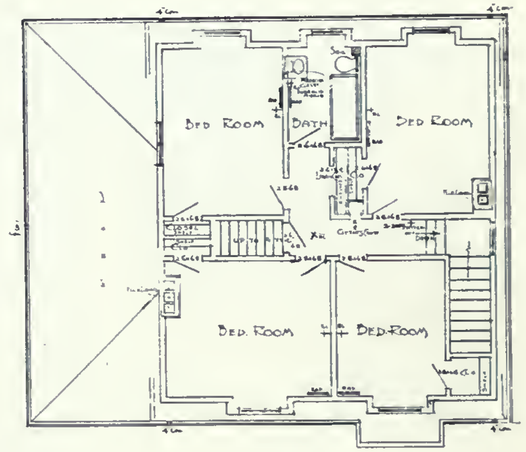
FIRST FLOOR PLAN.

A summer home located at Pine Cove, Port Nelson, Ontario, one facade overlooking the lake. Exterior treated in shingles stained brown, with verandah and chimneys of field boulders. Interior finished in Georgia pine on first floor; living and dining-rooms stained dark brown, and kitchen in natural wood; second floor painted white. Living room contains boulder stone fireplace opening four feet in width. Cost approximately $3,500.



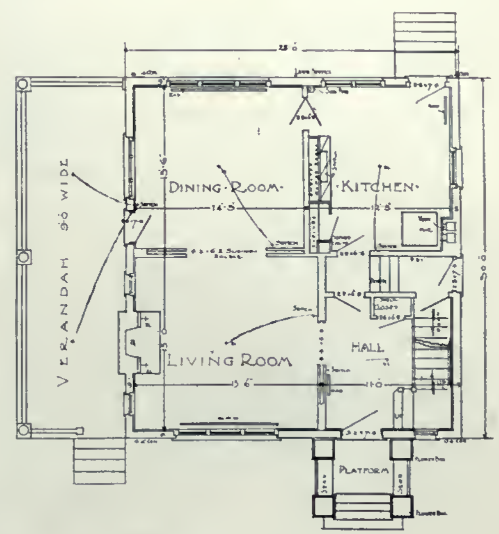
SECOND FLOOR PLAN.

HOUSE ON FAIRLEIGH AVENUE, HAMILTON, ONTARIO.
HERBERT H. NEW, ARCHITECT.

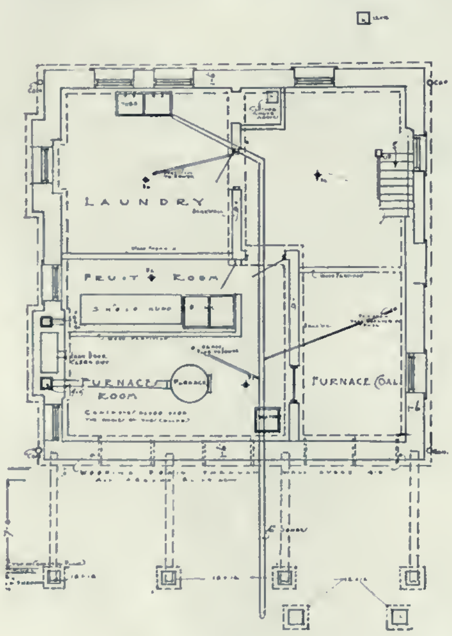


SECOND FLOOR PLAN.

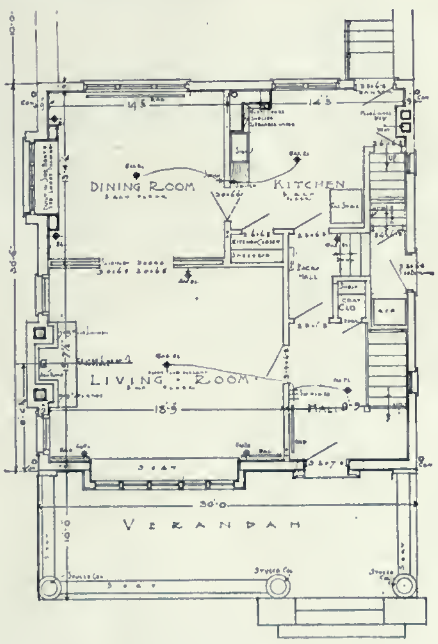
Interior finished on first floor, except kitchen, in white wood stained brown. Birch floors and pressed brick fireplace in living room. Second floor painted white throughout. Exterior of pressed brick; first and second stories of shingles stained green. Hot water heating. Cost $3,500.



FIRST FLOOR PLAN.



CELLAR PLAN.



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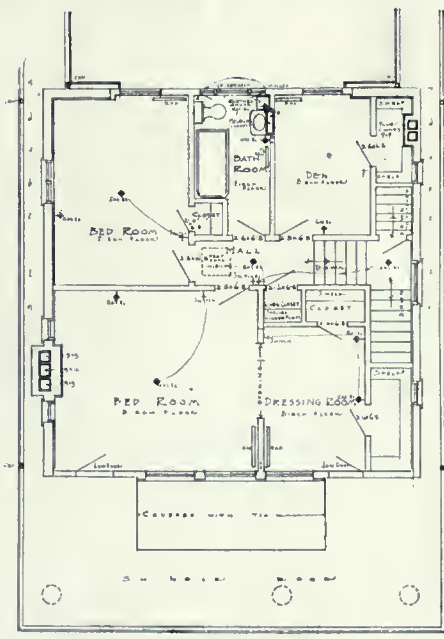


SECOND FLOOR PLAN.

HOUSE AT HAMILTON, ONTARIO.
HERBERT H. NEW, ARCHITECT.

Exterior of dwelling located on Mapleside avenue, designed in stucco on rough stock brick, with verandah stucco columns. Interior is finished in birch stained mahogany on first floor, with the exception of kitchen. Pressed brick fireplace in the living room; built-in sideboard in the dining-room, which is panelled with three-inch strips and plate rail five feet six inches from the floor. This building represents one of Hamilton's inexpensive residences.

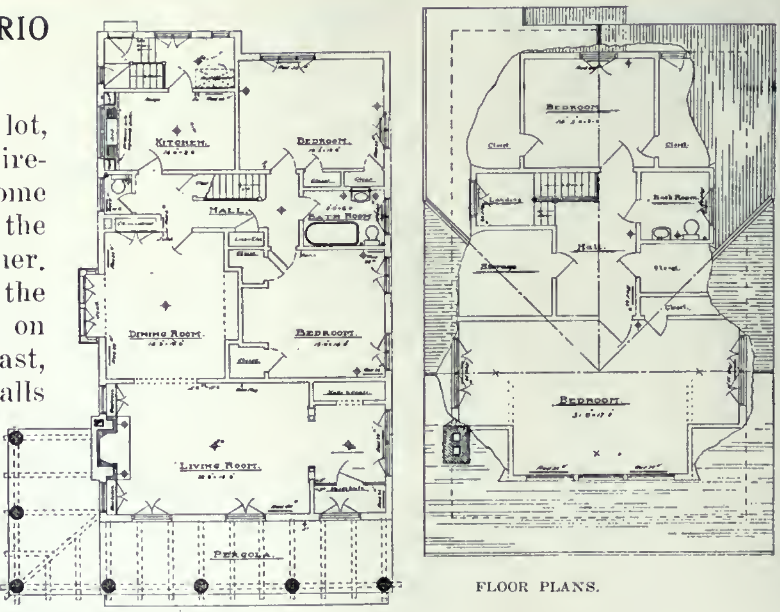
BUNGALOW AT HAMILTON, ONTARIO

W. H. HUNKIN, Architect

THIS bungalow stands on a fifty-foot lot, and was designed to meet the requirements of the owner, who desired a home which might be as cool as possible during the summer, and easily warmed in cold weather. The result has been obtained by building the external walls with hollow tile, finished on the outside with Portland cement roughcast, colored to a pale buff. The foundation walls are of cement concrete, with footings of the same material, and a weeping drain constructed of 4-inch field tile pipe, covered with broken tile and a foot of very coarse gravel, in addition to 6 inches of hard dry filling under the cellar floor. The pergola floor is of concrete 6 inches thick; the columns of 18-inch line pipe set on end and filled solid with cement concrete; stone caps, and roughcasted the same as the walls.

The living room has large French windows, opening on to the pergola; a dark red brick mantel with heavy shelf; bookcases on each side with windows over and a beam and column opening between living room and vestibule.

The dining-room bay window is fitted with a box seat, a built-in china cabinet, and a recess facing the window with console and mirror over. The bedrooms are well provided with closets, while a linen closet is located in the stair hall, and a cupboard for brooms, etc., under the stairs.



FLOOR PLANS.

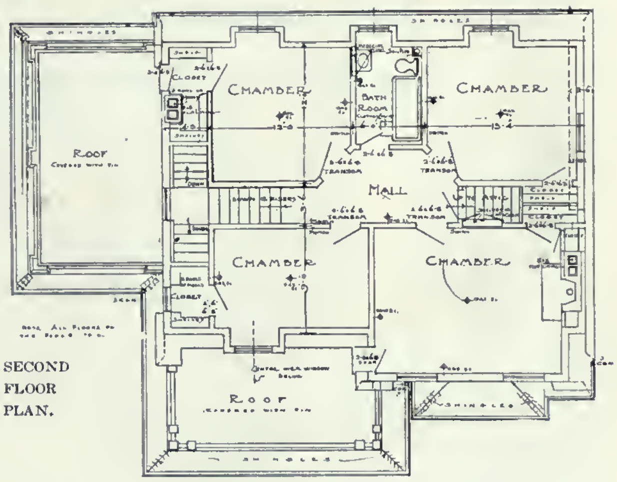
The kitchen is fitted with a built-in cabinet, complete with drawers, cupboards, etc., combining in a practical manner the essentials necessary to a building of this nature, where the one floor comprehends the larger part of the plan.

The plumbing is of the best quality, and includes an automatic gas-boiler and porcelain enamelled tubs in laundry. The trim throughout is of whitewood, finished in white enamel, and the floor of all rooms on the ground floor except kitchen and bathroom are double; finished with narrow oak strips and polished with sanitary floor polish. The building is warmed by a system of gas heating, and cost when completed 17 cents per cubic foot.

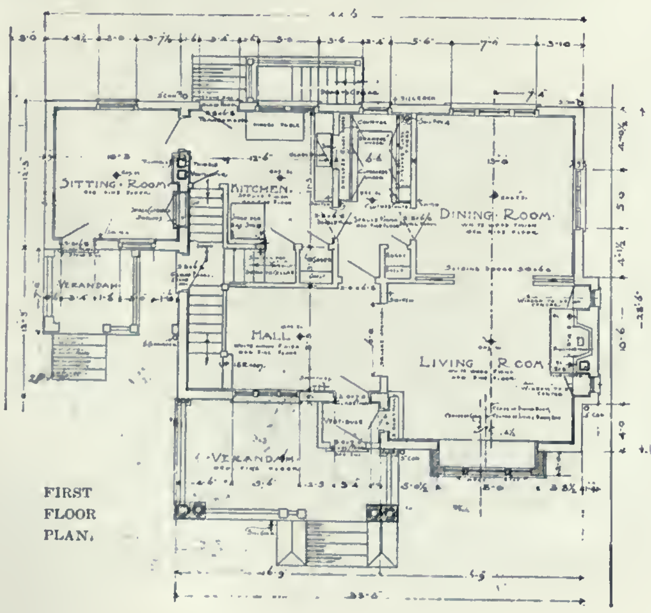
HOUSE AT HAMILTON, ONTARIO.

HERBERT H. NEW, ARCHITECT.

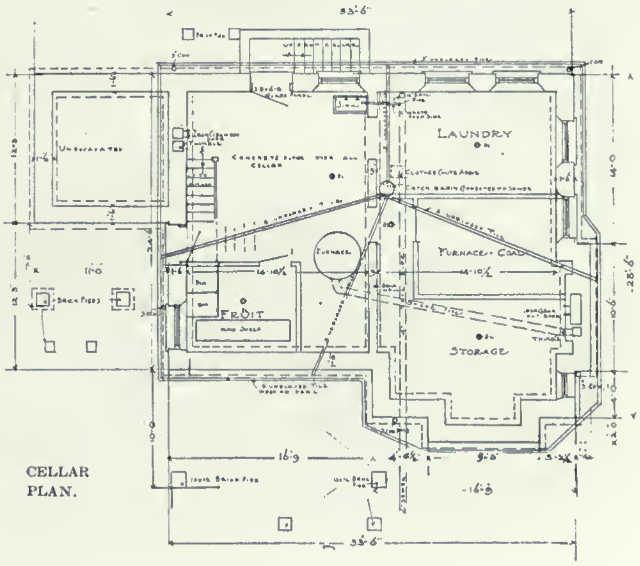
Located on Glenfern avenue, exterior is treated in local red pressed brick with shingles above stained brown on gable ends and green on roof. Interior finish consists of white wood stained brown on first floor with pantry and kitchen of painted white pine; on second floor woodwork painted white with doors stained mahogany. Floors throughout of birch. Hot water heating. Cost approximately $5,000.



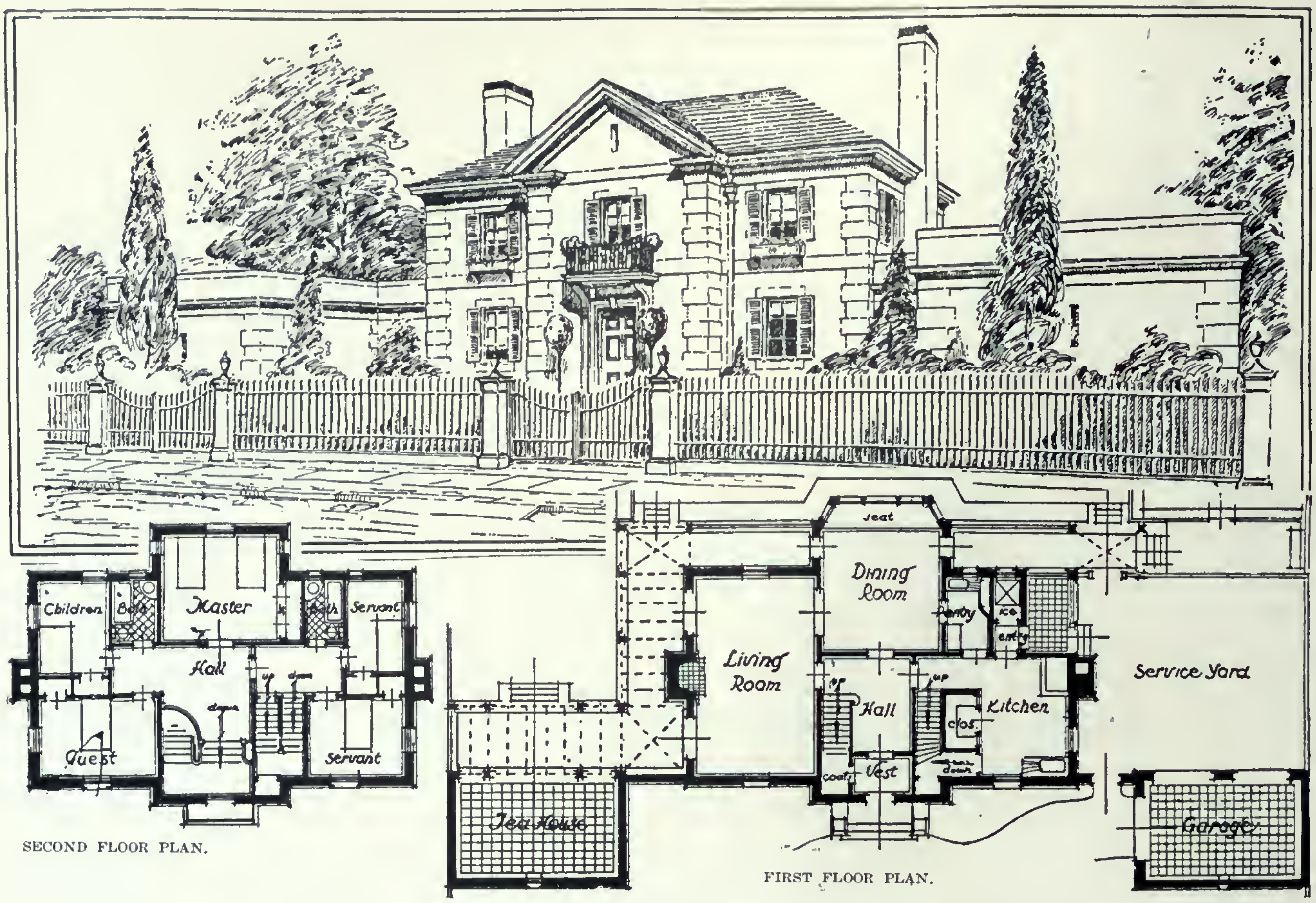
SECOND FLOOR PLAN.



FIRST FLOOR PLAN.

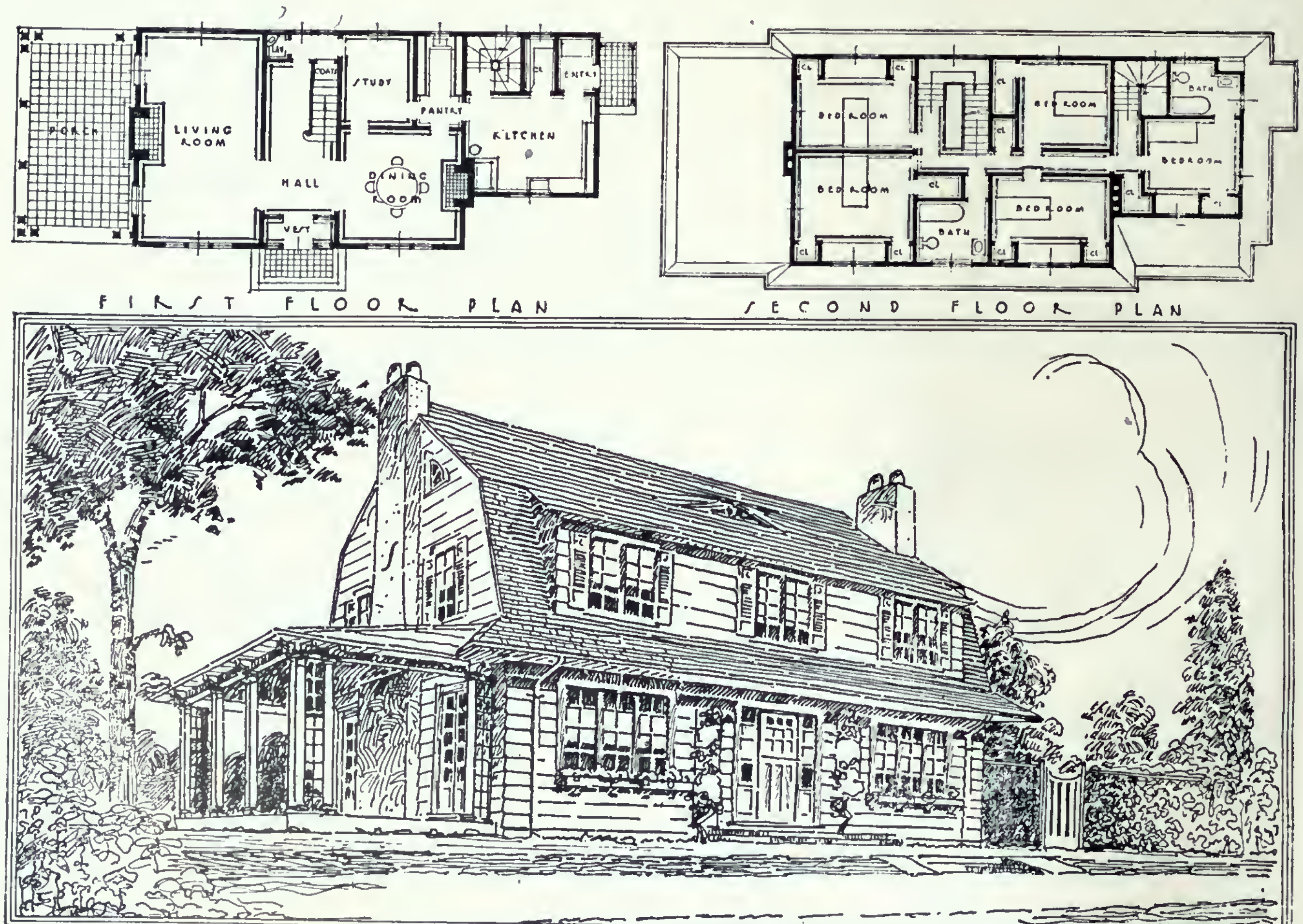


CELLAR PLAN.



COUNTRY HOUSE COMPETITION FOR $7,500 HELD BY THE "NEW YORK SUN."

The house above, by C. M. Foster, is of terra cotta block construction with exterior of warm gray stucco. The other design, by L. C. Licht, consists of wide clapboards ten inches to the weather.



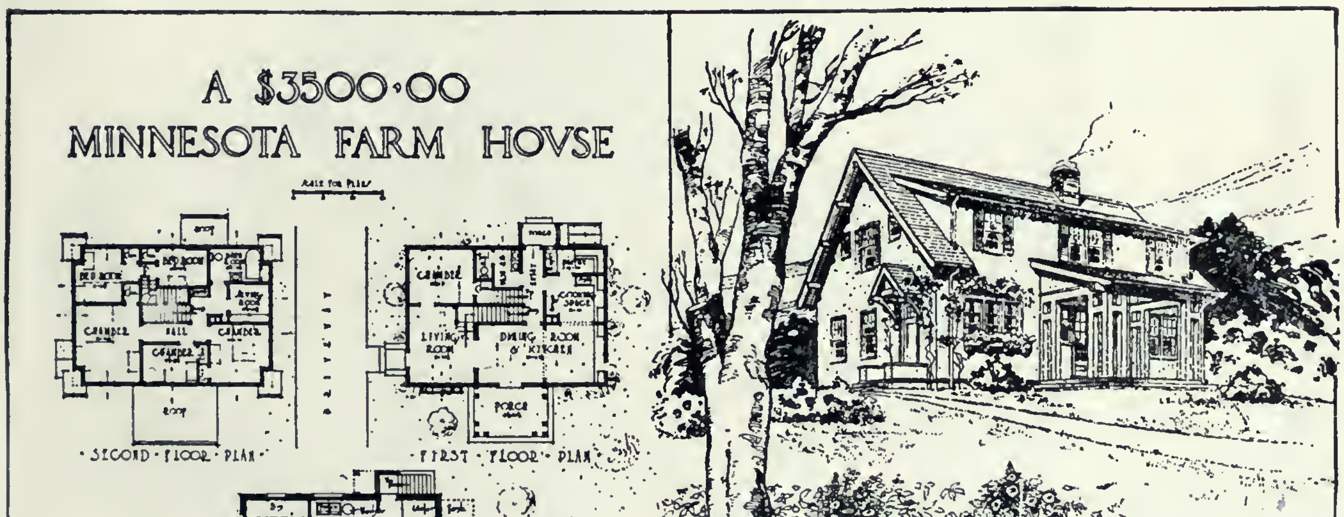
PRIZE DESIGN.

PRIZE DESIGN.

Competition for a Farm House

A COMPETITION for a model farm house was held recently by the Minnesota Art Society, which organization is an active force in the Minnesota State Government. The programme for this model farm house competition provided for ten rooms at a cost of $3,500. The location of the house is assumed to be on a partly wooded knoll, near a country road, and adjacent to other farm buildings. There is a basement under the entire house, providing space for heating, water supply, and lighting apparatus and for storage rooms. On the first floor is a living-room, a bedroom, a dining-room, a kitchen, or a dining-room and kitchen combined, a pantry with space for refrigerator, and a washroom and closet for the farm help. On the second floor there are five bedrooms, a bathroom, and a small sewing-room. The two bedrooms for the use of the farm help are separate from the others, being approached by a special stairway leading from the washroom on the first floor. The methods of heating and lighting and the character of the plumbing are determined by the limit of cost and the house is figured on a basis of 15 cents to the cubic foot of space, with the porches estimated at one-fourth of the total cubage.

The results of this competition have been so satisfactory that it is to be hoped some similar scheme may be promulgated in behalf of our own agricultural districts. When Canada depends so much on the yearly crop every effort should be made to induce the sons and daughters to remain at home, and this can only be brought about by making the home attractive and comfortable.



FIRST PRIZE DESIGN, HEWITT & BROWN, ARCHITECTS.

The Use of Graphs in Recording Business Data

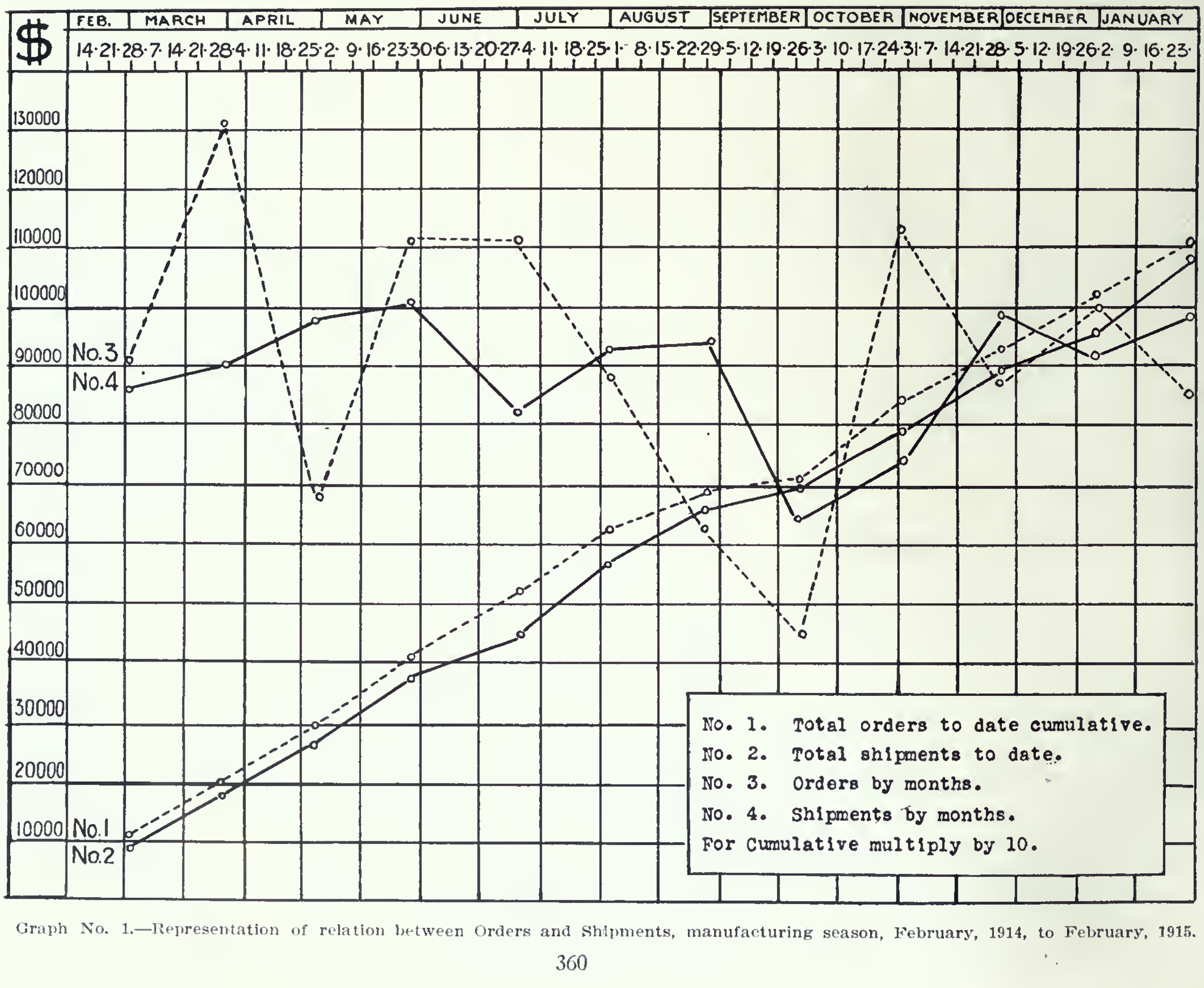
WILFRED G. ASTLE

IN the different departments of any business institution there is always accumulating a mass of figures relating to the different phases of the business. These records, if properly tabulated and arranged, are valuable assets. A study of the data at hand permits forecasting the future, and also provides a means of detecting leaks and losses, rising costs, decreased sales and diminishing profits.

All records should be arranged so that comparisons can be made. This is illustrated even in the daily papers, when in the bank clearance reports or records of the movement of grain and live-stock, figures are shown for yesterday, the same day last week, the same date last month, and the same date last year. The arrangement of data so that comparisons can be made always permits of recording the history of a business by means of graphs, which are like pictures in that they convey facts to the mind more directly and clearly than descriptions. The use of graphs can be applied in many ways to give a clear mental vision of the condition of any business. The average financial statement, for instance, is not readily analyzed by men who are not used to such analysis, and as a supplementary visualization of such statements and in other ways the graphic method has distinguished advantages.

Graphs consist of lines drawn on cross-section paper, and these lines connect points which have been placed on the paper, the points representing by scale in one direction on the paper the date on which the record was taken, while the position of the point in the other direction represents by scale the record of that date.

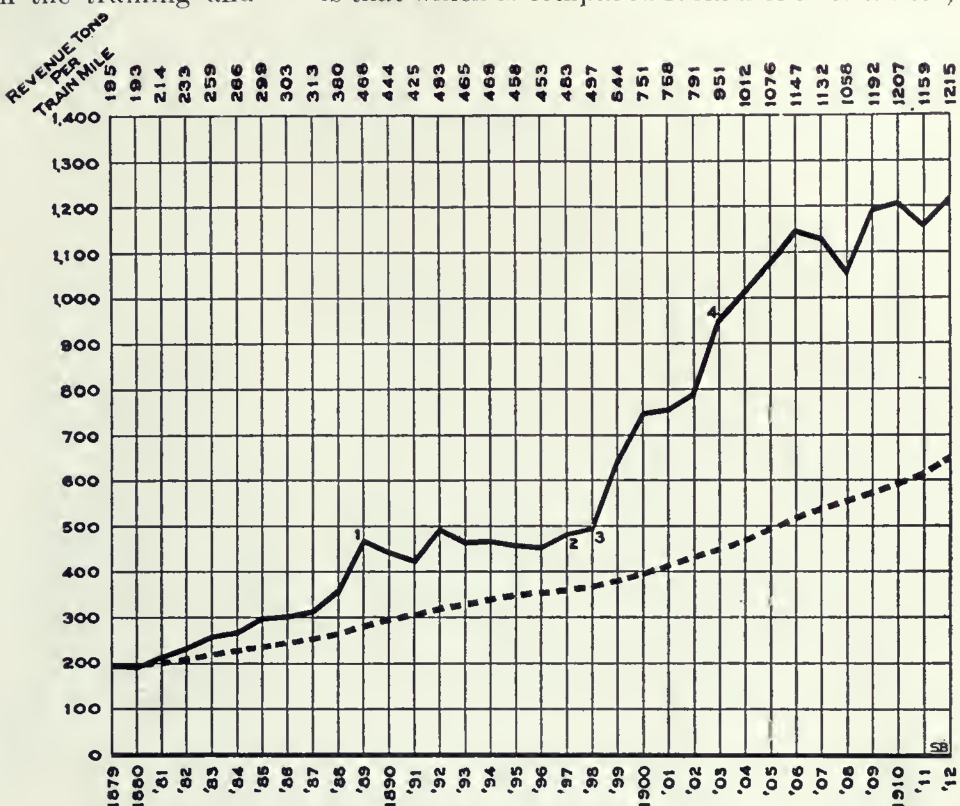
Graphs were first used by mathematicians to represent values indicated by different equations. After the mathematician came the engineer, who by means of graphs made maps of proposed routes of railroads, showing the difference in elevation at each point along all the proposed route. By these maps he was enabled to choose a route with few grades and with a minimum of cuts and fills, and his work was greatly facilitated, while the cost of the work



Graph No. 1.—Representation of relation between Orders and Shipments, manufacturing season, February, 1914, to February, 1915.

was as low as possible, future maintenance and cost of operation taken into consideration. Mechanical engineers make use of graphs in indicating the performance of engines and dynamos under different speeds and loads, or a combination of both, which enables them to determine under which condition the machine works at highest efficiency.

When men of engineering training began to enter the commercial field as sales managers, etc., they brought with them the training and knowledge which enabled them to picture by graphs the results which were being obtained by them in business. Instances have been known where the most important and radical steps were inspired by reflection over a graphical chart. On the other hand, there are managers who can appreciate only the numerical and tabulated figure method of making charts or reports, and who consider any conversion of numerical records into graphs as needless waste of time. It is well worth while for those who have not used graphical methods to consider that every successful manager makes scientific use of his imagination when his intuition or judgment tells him that certain steps are necessary, and if certain helps to guide this intuition or judgment can be gotten from graphical charts which do not require a great deal of time or expense to prepare, then these charts are certainly worth while.



Graph No. 2.—Yearly average of revenue tons per train mile on the Pittsburg and Lake Erie Railroad. The slanting line shows a moving average.

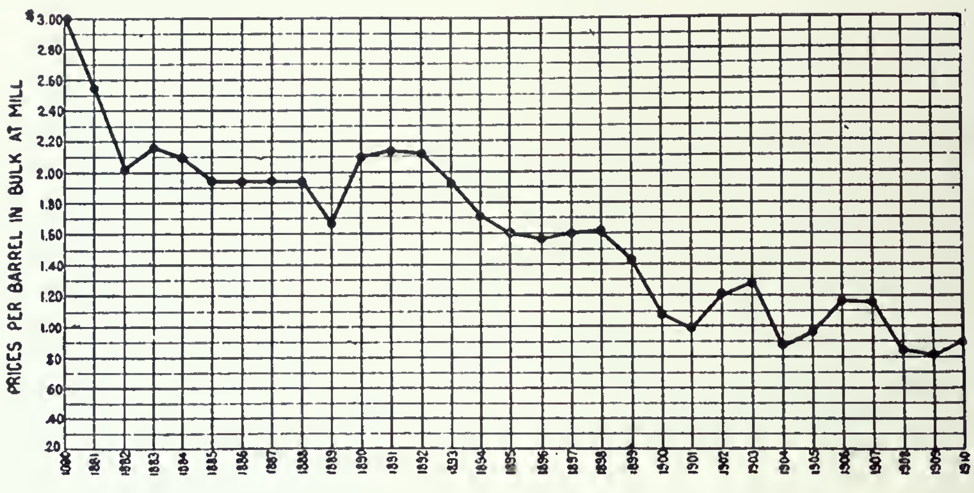
This graphic method of stating statistics, though inferior to the numerical in accuracy, has the advantage of enabling the eye to take in at once a series of facts. This advantage is not of first importance when considering only one set of facts. Accuracy is then more essential than ease and rapidity of representation. But ease and rapidity are essential when comparing many sets of facts, because if the mind is delayed long in taking in the general effect of one set, it loses count of the others. Therefore, the function of the graphic method can be defined as the comparison of different sets of statistics.

Another function of graphic charts is the indication of the true influence of one set of facts upon another, as for instance, it is known that cost varies with output. Therefore, in starting a new business or shaping new plans it might be desirable to know just what this variation was likely to be in order to estimate how much business would be necessary to overcome the initial expenses, and what profits should be realized from a given volume of business. Graphs will show far more clearly than statistical tables the variations of two factors in relation to each other.

Still a third class of information which can be advantageously studied with the aid of graphs is that which is compared from month to month, such as costs, sales, output, etc. Almost any kind of information can be plotted with time, as the horizontal co-ordinate, and the desired information as the vertical. Curves should always work out from the left-hand side and never from the bottom up. The advantage is that the curve can be kept up to date, that comparisons with previous and standard conditions are grasped more easily and present the results over a long period of time. For instance, the average market price of a product for every business day in the year can be shown in much less space than is possible in any other way. In the matter of output, sales, costs, etc., it is customary to carry in addition to the quantity for the period, the cumulative total for the year. The height of this curve always shows the total business to date and its slope shows whether the tendency is to increase, remain stationary or fall off. Conditions making for or against improvement may be caught and reached sooner than they would be if tabulations of figures were used. For instance, note how quickly you catch the relation between orders and shipments in graph No. 1. It also shows a cumulative total and illustrates the plotting of two or more curves to scale on the same chart.

There are three elements in graphical records which are important, namely, the selection of material to be graphically recorded, the devising of methods of presenting it, and the use to be made of the graphs after they are plotted. There is no advantage in making records which are not to produce some effect, either in impelling toward improvement or in indicating unusual conditions. In using the graphs the method adopted by some companies of making them the basis for special or regular conferences is to be commended. The important thing is to be sure that the graphs appeal effectively to the individuals most directly concerned.

Information may be charted in many different



Graph No. 3.—United States Geological Survey Chart, showing the prices of cement from 1880 to 1910. Columns of printed figures or a series of vertical bars could not portray this information as vividly as it is brought out by the use of the curve shown above.

ways. Under present conditions, if six men were given a set of figures and asked to chart these figures, the six resulting charts would be widely divergent in method. Though variety in method of charting is sometimes desirable in large reports where numerous illustrations must follow each other closely, or in wall exhibits where there must be a great number of charts in rapid sequence, it is better, in general, to use a variety of effects simply to attract attention, and to present the data themselves according to standard well known methods.

Graph No. 2 is worthy of attention as a model of good practice which may be studied carefully by any one just beginning to plot curves. This graph shows the yearly average of revenue tons per train mile on the Pittsburg and Lake Erie Railroad. The dotted line in this graph represents a progressive average of all the points on the curve above. The dotted line, of course, coincides with the solid line at the first point where there is only one point to consider in the average. Figures for the dotted lines are obtained by averaging the figures for the first two years, then the first three years, then the first four years, etc., until the last point on the dotted line represents an average for all the points on the solid line.

The following features of graph No. 2 are pointed out for the benefit of any one who may have curves to plot: 1. The zero line is a much broader line than the co-ordinate lines. 2. Heavy lines are not used at the right- and left-hand edges, since the chart does not start or end at the beginning or end of time. 3. All lettering is so made that it can be read horizontally or from the right-hand edge of the sheet. 4. Years are given with four figures for every tenth year ending in zero. Other years are indicated with two figures, to be more quickly read. 5. All lettering and figures on this chart were made by hand, showing the perfection which may be attained in lettering. 6. The curve itself stands out clearly from the co-ordinate lines. 7. Figures at various points along the curve indicate matters which are worthy of special notice. Foot notes are not given here, however, as they are only of highly technical interest. 8. Figures for the value of points on the main curve are given at the top of the chart immediately above each corresponding point on the curve. Values may be read correctly from the upper figures rather than guessed at by estimating them roughly on the left-hand scale. 9. The statement, "Revenue tons per train mile," at the upper left-hand corner, is purposely printed diagonally so that it may serve as a heading for each of the two columns of figures, one at the left and the other at the top of the chart. The diagonal arrangement gives a neater effect than can be obtained otherwise. 10. Though figures for the dotted curve could be shown at the top of the chart, the dotted line is of only minor interest here. It is accordingly best to avoid the two columns of figures at the top in order that the figures for the main curve may stand out more prominently.

Graph No. 3 gives a good idea of the utility of the curve method of showing concisely a large quantity of data. If the figures for the price of cement had been expressed in dollars and shown in a long numerical column, there would be very few readers who would take the trouble to follow the long column of figures and notice the fluctuations from year to year. The curve, however, gives all the variations in price at a glance and shows in most striking manner the great re-

(Continued on page 363.)

CONSTRUCTION

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

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

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Vol. VIII Toronto, August, 1915 No. 8

(Continued from page 362.)

duction which occurred in the price of cement as manufacturing facilities improved and increased. A curve of this kind greatly stimulates thought, for one immediately wishes to know the cause of each of the peaks and valleys in the curve. One gets a vista of recurring periods of financial boom and of financial depression, and a glimpse of such factors as new developments in methods of manufacturing cement and the constantly increasing demand for the product.

While I would not advocate the indiscriminate adoption of the graphical method of recording data, there are many cases where such presentation will put life and vitality into statistics whose study otherwise would be largely neglected. An examination of present practice leads to the conclusion that where data are filed merely for reference at long intervals they may be more compactly recorded in tabular form. Where the purpose is to arouse interest and co-operation on the part of those who have it in their power to reduce costs or to improve performance, the graphical form is, by all odds, preferable. Just as the "eye-gate" is a much readier entrance to the mind than the "ear-gate," so the diagram or picture appeals to the mind more graphically than does a number represented by figures.

The use of graphs by large corporations, and the building up of a national business in the sale of graphic data by a statistical organization, should indicate to broad-minded business men that graphic methods are valuable.

* * *

PREFACE to "Engineering for Architects," by De Witt Clinton Pond, Instructor of Architectural Engineering at Columbia University: "Architects often encounter problems in engineering that can be solved with the aid of simple mathematics and a handbook, published by a steel manufacturing company. It is the case, however, that for a certain problem the method of attack is unknown, and the architect is forced to go to an engineer or else risk failure of his structure. In some cases unnecessary cost is incurred through lack of knowledge of the supporting strength of structural members, and the need of such kowledge is felt. It is to furnish such information that this book has been written. The author does not pretend to introduce any new methods of calculation, nor to give the only methods that may be used. He is simply placing at the disposal of architects such information as will make possible the design of floor beams, girders, column sections, grillage beams, and simple roof trusses. There are, of course, shorter methods that experienced engineers employ; there are entirely different ways in which structural members may be designed; but in case nothing whatever is known of design, it is the hope of the author that this book will give such information as will make the solving of simple engineering problems possible." Published by the Columbia University Press, New York City. $2.00 net.

* * *

THE SECOND edition, revised, of the book entitled "Bungalows, Camps and Mountain Houses," has just been issued by the William T. Comstock Co., New York City. The work presents the thoughts and ideas of thirty-two different architects, all recognized designers of bungalows. The new edition contains two hundred illustrations, showing eighty designs with exteriors, interiors and plans. A feature of the new edition is the article by C. E. Schermerhorn, A.A.I.A., being a condensed account of the requirements for planning a bungalow. It contains a plate showing twenty-two different schemes for laying out the floor plans of a bungalow, and in addition a lot of little detail sketches showing how to plan conveniences in the house, such as built-in furniture, kitchen arrangements, closet space, cupboards, etc. Price in cloth, $2.00.

RALPH T. COE, manager of the Canadian Sirocco Co., Ltd., Windsor, since the organization of the company, has resigned to enter the engineering service and sales field in New York State. Mr. Coe has been appointed district manager for Warren, Webster & Co., and the American Blower Co., and will have offices at 519 Insurance Building, Rochester, as well as at 19 Live Stock Exchange Building, Buffalo.

* * *

THE OLD brown stone mansion, one of the survivals of that not yet distant period when our merchant princes thought Murray Hill the centre of residential New York, has been acquired by the H. W. Johns-Manville Company with the unique idea of showing in appropriate surroundings all the various lighting fixtures for the modern home or office. The old rooms have been restored and handsomely furnished and each one filled with lighting fittings appropriate to its character. Drawing, dining and bedrooms, hall, stairs and office, all have their correct setting, and here the architect or his client can come and study quietly the exact effect of each form of light and each kind of fixture. Hitherto the trouble in displaying lighting equipment has been that it was impossible to get a correct idea of the complete fixture in advance. The metal parts came from one house, the glassware from another; and, if any special design or scheme were called for, it was only obtainable after considerable trouble. Under the new arrangement the various departments of lighting design will be co-ordinated and in co-operation with the architect, it will for the first time be possible to arrange a lighting system which shall form an architectural unit with the building as a whole. Here may be seen to advantage the Frink system, the Mitchell Vance lighting fixtures, and the Gill Company's Parian glassware, all handled by the Johns-Manville Company.

* * *

THERE WOULD be no need of the slogan "build now" if work were going ahead as fast as greenhouses and conservatories in the Canadian field. The Lord & Burnham Co., Ltd., are manufacturing in their new plant at St. Catharines, Ontario, material for the following buildings: Complete erection of a range of curvilinear greenhouses, consisting of palm house, show house, and other compartments, for Sir John Eaton, Toronto; complete erection, including masonry, workroom buildings, etc., of two iron frame greenhouses, each seventeen feet eight inches by fifty-eight feet four inches, for Sir William Mulock, Toronto; a palm house, grapery and general growing house of curved eave construction, for Major W. H. Merritt, of St. Catharines, Ont.; a curved roof conservatory, together with a glassed-in pergola, for G. K. Fraser, Hamilton, Ont.; a curved eave greenhouse eighteen feet by forty-one feet eight inches, for F. Magee, Port Elgin, N.B. The foregoing houses are all for private estates, and all of full iron construction. Commercial greenhouses are being erected for Wm. Mousley & Sons, Weston, Ont.; A. N. Carriere, Strathmore, Que.; R. L. Dunn, St. Catharines, and H. Newsome, St. Thomas, Ont. Lord & Burnham Company, Limited, have received more work in Canada during the first five and a half months of 1915 than they have previously received during any full year since coming to Canada.

* * *

ORRIN S. GOAN, of New York City, was elected president of Berry Brothers, varnish makers, of Detroit, at a meeting of the company's directors, which selection gives the company a head who will be able to devote all his time to its interests. Mr. Goan was named a director of the company to fill the vacancy due to the death of George H. Russel. W. R. Carnegie, heretofore assistant treasurer, was elected successor of Mr. Russel as treasurer. Other officers of the company are: Vice-president, E. W. Pendleton; secretary, Edwin Lodge; assistant secretary, F. L. Colby; general manager, James S. Stevenson. Its capitalization is $3,000,000, of which $1,500,000 is seven per cent. cumulative preferred stock. Besides the plant in Detroit it operates others in Chicago, Baltimore, Cincinnati, St. Louis and San Francisco. Plans for opening plants in Europe were interrupted by the war.

* * *

CLARK T. MORSE, formerly Montreal and Toronto district manager for the Canadian Sirocco Co., Ltd., has been transferred to the head office at Windsor, Ont., to take charge of the engineering and sales work in place of R. T. Coe, resigned. A. M. Nichol contiues in charge of Eastern Canadian sales, with headquarters in McGill Building, Montreal.

* * *

September, 1915 Vol. 8, No. 9

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Full Page Illustrations

H. GAGNIER, Limited, Publishers

GRAPHIC ARTS BLDG., TORONTO, CANADA

BRANCH OFFICES

MONTREAL NEW YORK

THE WINDSOR STREET STATION, MONTREAL, QUEBEC.
W. S. PAINTER, ARCHITECT.

Panama Exposition and Fire Loss

CREDIT TO WHOM CREDIT IS DUE

Deserving of unstinted praise are the builders in San Francisco. Within a space of three years six hundred and twenty-five acres of unimproved land has been transformed into a city of palaces with growing gardens, flowers, paved thoroughfares, fountains and all the various features which enter into the dreams of artists. Of this large space over sixty-four acres is devoted to the main Exhibition buildings, erected from the plans of our best architects, in a most practical and thorough manner. To prevent casualties due to weakness in construction or inflammable material the greatest of care was taken in the erection of each individual structure. Equal credit is due the engineers and designers. In preparing the site the problem was to remove the water from the submerged surface at Harbor view and replace it with soil. Over 200,000 yards of reclaimed area was finally covered with eight inches of dirt brought from all parts of California. To the architectural profession is due the charming atmosphere which permeates the entire display. Never in the history of world fairs has there been such a living, fascinating mosaic of color. The first view is enchanting, the last a memory, wherein the law of color harmony will live through its wonderful portrayal. And to pass unnoticed the landscape architects who furnished the harmonious setting for this city of color would mean a slight to those who have made the tout ensemble a marvelous work of art. Changing from the golden hue of pansies and daffodils to the scarlet tints of tulips and azaleas and then to begonias and so on until the Father of Time closes the gate, the millions who are privileged to enjoy this realization of Spanish castles, cannot help but feel that even the far famed glories of the Babylonian Hanging Gardens have been surpassed.

PREVENTION OF FIRE LOSS

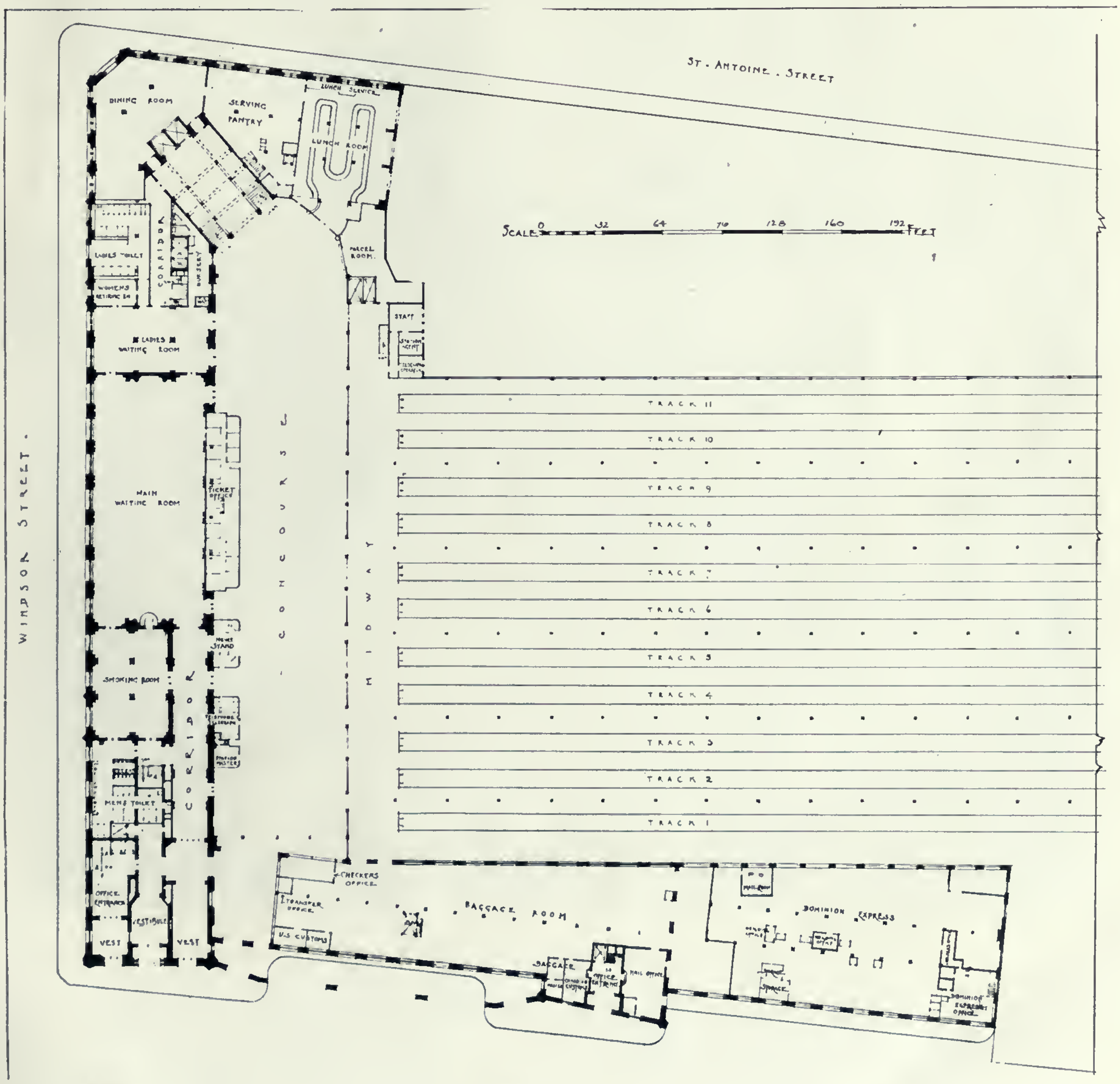
The work of the National Fire Protection Association in educating the people to the irretrievable losses due to fires, is highly commendable. It is unquestionably due to their united effort that the recent damages effected by fire have been the lowest for many years. Their educational campaign more than warrants a continuance of the work and the broad ideas advocated during a recent session will reduce still more the enormous loss to Canada. These measures, if adhered to, will allow labor and capital to enter new fields of development instead of being used to restore the needless waste. The points enacted by the association are given herewith: 1. The encouragement of fire-resistive building construction through the adoption of improved building codes by all states, cities and towns; the inclusion in such codes of adequate rules for exit facilities based on the occupancy for all buildings, and the general recognition of the fact that although fire-resistive construction is of the greatest possible importance, it is of itself not sufficient. The lesson of the greatest factory fire of the year is that large industrial buildings, even if built of cement and steel, must be subdivided by fire walls and must have adequate means of stopping fires in their incipiency. 2. The adoption of laws or ordinances requiring the installation of automatic sprinkler systems as fire extinguishing agents in all factories, commercial establishments and city blocks. The adoption of ordinances requiring the construction of fire division walls not only as a property protection device but as providing the best life-saving exit facility. 3. The establishment by law of a Fire Marshal in every state, who shall not be a mere political office holder, but a trained man with trained assistants competent to direct the work as statistician, educatos and prosecutor. 4. The investigation of the cause of all fires by public officials, and the enactment of laws fixing personal liability for damage resulting from fires due to carelessness or neglect. 5. The consolidation of all legal forces so as to provide for the systematic inspection of all buildings by local firemen, and technically trained building and factory inspectors so as to insure the vigorous enforcement of rules for cleanliness, good housekeeping, and the maintenance of safe and unobstructed exits, fire-fighting apparatus and other protective devices. 6. The especial safeguarding of schools, theatres, factories and all other places in which numbers of people congregate or are employed. 7. The vigorous state and municipal regulation of the transportation, storage and use of all inflammable liquids and explosives. 8. A careful study of municipal water supplies, their adequacy and reliability with special reference to their adequacy in case of conflagrations. 9. The universal adoption and use of the safety match. 10. The education of children and the public generally in careful habits regarding the use of fire. It is felt that Industrial Canada brings forth the right appeal when it states that Canadians could not do better than make this a fire prevention year and, by education and co-operation, try to forward the important task of reducing the appalling destruction which annually falls upon life and property in this country.

THE WINDSOR STREET STATION, MONTREAL, QUEBEC.

The Windsor Street Station, Montreal, Quebec

WHEN the doors of the Windsor Street Station of the Canadian Pacific Railway were thrown open to the general public it marked a great advancement in terminal structures. Three years of constructional work, following months of careful planning, evolved one of the largest stations in Canada, which not only caters to the vast throng of travellers, but houses as well the head offices of the company. Covering one complete block, with the three main facades facing Windsor, Osborne and St. Antoine streets, it forms a massive pile of grey stone, with its unusual height dominated by a huge tower.

Located on a hill, the large concourse is approached from one street on the level, and from the other by means of immense elevators. Skylights extending the full length of the concourse furnish excellent natural lighting, which effect is also produced in the eleven track shed, over one thousand feet in length, ventilators being placed in the roof to expel all smoke. Running parallel to the concourse is the main waiting room, with the ticket offices between and the ladies' and men's waiting spaces at the ends. The general finish is of marble, with the design kept simple and effective, the lighting accomplished by lamp standards with incandescent tungsten lamps in clusters of six surrounding a large centre globe of white glass. At the end of the concourse, near the elevator approach from St. Antoine street, is located the



GROUND FLOOR PLAN.

DETAIL OF MAIN WAITING-ROOM, THE WINDSOR STREET STATION, MONTREAL, QUEBEC, DESIGNED BY BAROTT, BLACKADER & WEBSTER, ARCHITECTS.

dining-room, restaurant and serving pantry, tastily decorated. At the opposite end of the concourse, and running along Osborne street, are the baggage and express rooms, with necessary offices, etc. Directly underneath the trainshed are accommodated the huge vaults and emigration quarters with natural lighting, on account of the slope towards St. Antoine street, where the entrances to this department have been arranged.

The first floor, aside from completing the lofty height of the concourse and waiting-rooms, is laid out for the car accountant's staff, as well as the quarters for the treasurer, paymaster, car service, baggage agent, manager and accountant of eastern division, and superintendent of terminals. On the second floor are housed the staffs for the president, general passenger and traffic, tourists, etc.; on the third floor auditors for agencies, disbursements, as well as freight traffic staff, press bureau and advertising department; on the fourth floor engineering rooms, and auditor of passenger receipts; on the fifth floor auditor of freight and telegraph. The tower plans, seven in all, are used respectively for the departments of photography, general fall, hotel, building construction, engineering clerical corps and tank room.

The following description of the mechanical equipment is authorized by the publicity department of the C.P.R.: In the boiler room is installed a battery of three four hundred horsepower water tube boilers, each equipped with superheaters and containing one hundred and forty-four four-inch tubes of four thousand square feet heating surface. The grate area is eighty-six square feet, and the boilers are operated under natural draught. The stack is of white brick, and two hundred and twenty feet high; the inside diameter at top being twelve feet, and the outside diameter sixteen feet. The three boilers are equipped with stokers of the chain grate type, while two simple five-inch by five-inch steam engines operate the grates. The engines are belt connected to an eccentric shaft, and a ratchet drive is the medium through which the eccentric rods are attached to the grates. The number of teeth per stroke is adjustable. Thus the attendant can soon adjust the speed of his grates so that the required head of steam is maintained under ordinary conditions. The depth of the fire can also be regulated up to a depth of twelve inches. At present steam of one hundred and fifty pounds pressure, superheated one hundred and fifty degrees, is being obtained from a three-inch depth of fire. The boilers are equipped with an automatic damper regulator, the pressure of the steam acting on a piston indirectly, through a hydraulic application, and this acts on the engine through a throttling valve. This regulator also controls the amount of damper opening, and keeps the steam pressure practically uniform.


MAIN WAITING ROOM.

Coal is brought to the power house in standard coal cars and is dumped into huge bins in the bottom of which are hopper-shaped openings. Out of these hoppers the coal is passed through the slide gates into the chutes. The slide gates measure out one-half ton of coal at each operation. The coal passes down the chutes and is delivered to the grates. Ashes are automatically dumped from the fire box into a concrete bin at the rear of the boilers. From this bin, they are raked out through passageways into dumping trucks running on a track at the rear. These trucks are run on to an elevator operated by the city water pressure, and are raised up to the ash receiving bins, where the truck is dumped. The dumping is accomplished by a special lever, being easily handled by one man. The ashes go into receiving bins from whence they are loaded through chutes into freight cars to be used for ballasting and filling in on the road construction.

There are two independent boiler feed units of the vertical single cylinder steam driven

ENTRANCE LOBBY.

water heater is also in the boiler room, but as it is so closely connected with the heating system it was thought advisable to describe it under that head.

The boiler room is situated at some little distance from the engine room; steam is therefore conveyed to the engines through a tunnel, some seven feet square, for a distance of seven hundred feet. There are four pipes through the tunnel; one of eight inches diameter heavily insulated carrying the superheated steam. A similar pipe runs immediately below it carrying saturated steam to be used in the event of a break down in the superheating system. A heavily insulated ten-inch pipe carries the exhaust steam back to the feed water heater, and a well insulated four-inch pipe carries the hot water of condensation back to the feed water heater. The idea of superheating the steam was to be able to carry it through the tunnel and deliver it to the engines dry and without reduction in pressure.

type, each being capable of supplying the full boiler capacity. The suction is taken from the feed water heater. Each pump is capable of delivering five thousand one hundred Imperial gallons per hour when making twelve double strokes per minute, against a boiler pressure of two hundred pounds, the feed water temperature being about two hundred and ten degrees Fahrenheit. The bore of the steam cylinders is ten and one-half inches, and that of the pumps eight inches, the stroke of both being twenty-one inches.

A carbon dioxide recorder is fitted to the stack, and adjustments are made to the dampers, grate speed, etc., enabling soft coal to be burned with almost a total absence of smoke. The safety valves are set to blow a little in advance of one hundred and fifty pounds, and the whole system is controlled automatically, while the attendants and engineers have at all times available complete information concerning each and every part of the apparatus. The feed

There are thirteen elevators in the building which operate from hydraulic pressure supplied from the pumps in the engine room. This includes three sets of duplex pumps, two of which are of five hundred U.S. gallons per minute capacity. They are each double acting, outside packed, and are driven by two sets of tandem compound steam cylinders, of fourteen inches high pressure and twenty inches low pressure diameters. The diameter of the pump cylinders is nine and one-half inches, and the stroke is fifteen inches. The third pump is larger, having a capacity of one thousand U.S. gallons per minute. Its steam cylinders are eighteen inches and twenty-nine inches in diameter for the high and low pressure cylinders respectively, while the pump cylinders are twelve inches diameter and the stroke eighteen inches.

The pumps supply water at one hundred and fifty pounds pressure per square inch to the tanks for operating the elevators, and are equipped with a hydraulic governor. The water tanks are all air-cushioned to prevent injury from water hammer and to assist in governing the pumps. The air cushion prevents the pumps from ever having to run at an excessively high speed to supply water in the case of a sudden drain on the tanks. The air for the air cushions is supplied by two two-stage, steam-driven air compressors, with eight-inch bore steam cylinders and air cylinders of six-inch and three-inch bore. Both compressors are alike, and have a stroke of eight inches. They supply air at one hundred and fifty pounds pressure per square inch, and usually receive air from the tank into which the large compressor discharges. This air is compressed to eighty pounds per square inch, and the little compressors step it up to one hundred and fifty pounds. They can also be operated independently of the large compressor and then use atmospheric air. The deepest elevator shaft is about two hundred and fifty feet below the surface of the ground.

The large service pump is a single cylinder vertical and steam-driven unit, similar in design to the boiler feed pumps. The steam cylinder is over the pump cylinder, and its valve is actuated from a link attached to the piston rod. The steam cylinder is of sixteen-inch bore, the pump cylinder of ten-inch bore, and the common stroke is twenty-one inches. This pump is capable of delivering twenty-four thousand three hundred Imperial gallons per hour against a head of one hundred and seventy feet when supplied with steam at one hundred pounds pressure, and back pressure of three pounds. It is capable of maintaining a pressure of fifty pounds per square inch at the fire hydrants when three standard seven-eighth-inch nozzles are being used. It is a reserve unit for emergency calls.

The use of compressed air throughout the terminal is rather extensive. The main uses are, however, for charging train lines, testing air brakes and blowing out boiler tubes. There are, of course, many other minor uses, but the greatest quantity of air is consumed through the three above mentioned channels.

The main compressor is a single stage machine, with a simple steam cylinder, fitted with a tail rod. The steam cylinder is fourteen-inch bore, and the air cylinder twelve-inch bore, the common stroke being eighteen inches. The machine compresses to eighty pounds per square inch. The air cylinder waterjacket receives its supply from the city mains, and although the machine is not of the latest design, yet owing to a previous excellent record it has been still retained for service in the terminal. The two smaller compressors are two-stage machines used in connection with the air cushioning in the elevator water tanks.

The refrigeration system caters to a very extensive and important department. There are three ammonia compressors, all of them steam driven. Of these, two twenty-ton units of horizontal design expand the ammonia in a common tank, the brine being used for ice-making. Brine circulation is by means of two five-inch by five-inch duplex pumps. The third and smaller unit is of five-ton capacity and of the vertical marine type. The ammonia is ex-

LADIES' WAITING ROOM.

SMOKING ROOM.

panded in an independent brine tank and this brine is used to cool the drinking water, freeze ice cream and cool the cold storage rooms. The circulating pump is a four-inch by four-inch duplex pump. The steam supplied to these engines passes through a reducing valve and is delivered to them at one hundred pounds pressure. With the assistance of the governors this tends to make the operation of the systems quite uniform. The delivery temperatnre can be easily brought down to fourteen degrees Fahrenheit or lower on the very warmest days. There is also installed a brine delivery temperature recorder.

The artificial can ice-making plant is capable of freezing twenty-five tons of ice per day, the latter being used in the dining and lunch rooms and on the dining cars. The brine is used to cool the drinking water. The water first passes through filters, and is then cooled to forty degrees. After it leaves the brine tanks, it is pumped to the various tanks by a three-cylinder single-acting four-inch by six-inch pump, which is gear-connected to a five horse-power volt motor. A second similar pump is mounted near this pump, but up to the present the demands have not been beyond the capacity of the one pump. The capacity of one pump is one thousand Imperial gallons every twenty-four hours.

END OF CONCOURSE.

The vast quantity of piping in the boiler and engine rooms would render it often very difficult to locate or trace particular lines. Thus, a color scheme has been introduced, and this is followed to a great extent throughout the whole building. A yellow pipe carries live steam; a black pipe, exhaust steam; a blue pipe, hot water; and a red pipe, cold water. The heavy cork insulation on the brine piping is also painted black, as for the exhaust piping, but on account of the lay-out no confusion is caused. For hot water heating in wash rooms, low pressure or exhaust steam is passed through coils in two tanks in the engine room, but for heating water used in the wash rooms above the fifth floor a third smaller tank is employed, through the coils of which live steam is passed.

There are three large tanks in the top of the building which supply water to the lavatories. If these tanks are ever filled too full, and are liable to overflow, a red incandescent lamp in the engine room warns the engineer of the fact. Should, however, the water supply be normal, a white light is kept burning to acquaint him of the fact. A constant record of the pressures of the live and exhaust steam is kept by continuous recording instruments.

DINING ROOM.

The whole heating system is on the vacuum principle. The steam employed is the exhaust of the various engines, and on cold days this is supplemented by boiler steam passed through a reducing valve. The steam passes into the main exhaust header, from which all steam heating lines lead. At night, when but few of the engines are running, the heating system depends largely on the boilers for the source of supply.

There are three pumps which extract the water of condensation from the returning steam and pump it through the four-inch pipe in the tunnel to the one thousand five hundred horsepower feed water heater. The pumps are all of the same size, namely, eight-inch by ten-inch, with a stroke of twelve inches, which create a vacuum of about ten inches. The exhaust steam passes back through the tunnel and enters the feed water heater. The temperature of the water as it enters the boiler is about two hundred and ten degrees Fahrenheit. A temperature recorder regulates the temperature of the feed water. Aside from the ordinary steam-heating system there are installed several steam lines to the roofs of the buildings and train sheds, to melt the snow when a sufficient quantity accumulates.

The problem of ventilation was a difficult one, and the very efficient system installed certainly reflects great credit upon the designers. Several large fans are employed of the multivane type and arranged so that the air is thoroughly screened as it is taken from the atmosphere. The ventilating system can really be divided into three small systems. In each of these, the air is heated before being washed, and again reheated after washing to seventy degrees

LUNCH COUNTER.

Fahrenheit. The air, in the largest of these three systems, passes from the atmosphere to the heating steam radiators and on to the washing chamber, where it passes through sprays of water. The water is pumped by two centrifugal pumps, each direct connected to five horse-power motors. From the water sprays it passes through the second steam radiator set and then on into the fan, which is ninety-three and one-quarter inches in diameter by forty-nine and three-sixteenths inches wide, and delivers one hundred and two thousand cubic feet of air per minute against a pressure of one and one-quarter inches of water. It is direct connected to a ten-inch by twelve-inch engine, which runs at one hundred and sixty r.p.m. This system delivers air to the main floor offices, waiting-rooms, dining-room and restaurant.

The second system ventilates the offices and corridors on the upper floors. The air washer receives water from a centrifugal pump direct connected to a five horse-power motor, the fan

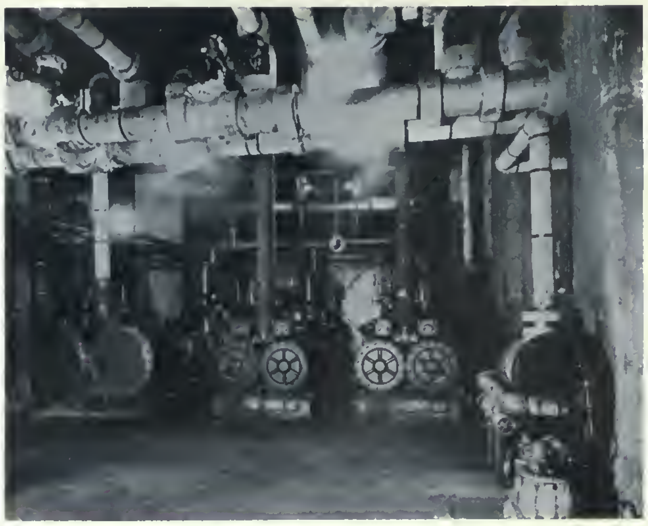
BARBER SHOP.

being fifty-two and one-half inches in diameter by twenty-eight and one-eighth inches wide, and is capable of delivering thirty-one thousand three hundred cubic feet of air per minute against a pressure of one inch of water. It is direct connected to a seven-inch by ten-inch engine, which runs at a speed of two hundred r.p.m.

The third system supplies air to the vaults and emigrant rooms, and also the Chinese detention rooms. This air washer receives its supply of water from a centrifugal pump direct connected to a five horse-power motor. The fan is seventy-two and seven-eighths inches in diameter by thirty and one-half inches wide; capable of delivering forty-two thousand cubic feet of air per minute against a water gauge pressure of one inch, and direct connected to a ten-inch by ten-inch engine running at one hundred and sixty r.p.m. In the Chinese and emigrant quarters, three exhaust fans are located on the ceiling. Two of them are No. 80, steel plate, blower fans, belt connected to five horse-power motors, while the third is a twenty-four-inch propeller fan, belt connected to a two horse-power motor.

The main exhaust fan is located in the engine room, near the ventilating fans, fifty-eight and

NURSERY



DUPLEX PUMPS FOR ELEVATORS.

one-quarter inches in diameter by thirty and fifteen-sixteenths inches wide, and is capable of delivering thirty-one thousand five hundred cubic feet of air per minute against a one inch water gauge pressure. It is direct connected to a six-inch by six-inch engine running at two hundred and seventy r.p.m. The air in cold weather is delivered at seventy degrees Fahrenheit. The specifications call for the following changes of air and the system has fulfilled the requirements to the satisfaction of the company: Toilet rooms every six minutes; exterior toilets every eight minutes; offices every twelve minutes; waiting rooms every twenty-five minutes; smoking rooms every twenty minutes; dining and lunch rooms every fifteen minutes; kitchen every twelve minutes.

The applications of electricity are many and varied, and numbers of devices involving them are being installed at the present time. Throughout the building, clocks are distributed which are controlled electrically by one master clock. This ensures all clocks being always absolutely correct. One man is enabled by an electrical announcer to inform people in all parts of the station as to the arrivals and departures of trains, and such other information as may be necessary. The announcer merely speaks into a transmitter and his voice is reproduced in various places over the building. This announcing apparatus is placed in all parts of the concourse, waiting-rooms, dining-room and restaurant.

The switching and signal tower at the entrance to the yards is able to control the yard entirely by electrical devices. The switches are opened or closed and all the signals manipulated by the proper switches being operated in the little tower. A model plan of the yard is located in the tower, and on this plan a bright electric glow shows the particular section of the track on which a train is standing. Thus the switch man has at all times an accurate and complete knowledge of the progress of all trains in the yard. Every switch that is thrown, every signal moved, sends back to the tower an automatic confirmation of the event after it has transpired. The system is automatically interlocking, and thus guards against the possibility of a collision. Should the source of supply of electricity fail, the tower is not useless. In the basement there is a battery of storage cells which are quite capable of supplying sufficient electricity to run the equipment for two days at least.

To facilitate the handling of baggage several large baggage trucks are equipped with storage batteries and motors. These trucks can receive baggage from a train and quickly have it in the baggage room for delivery. In this way two men can handle a large quantity of baggage very rapidly. These trucks are charged each night.

In an article on recent railway stations, in the "Architectural Record," H. D. Eberlain states that station building, indeed, is our newest form of architectural activity, if we except hangars and landing stations for aeroplanes and dirigibles, or modified show houses for "movies." It is a form of structural expression that was left for the nineteenth century to originate, and for the twentieth century to bring many stages

ELECTRICAL EQUIPMENT.

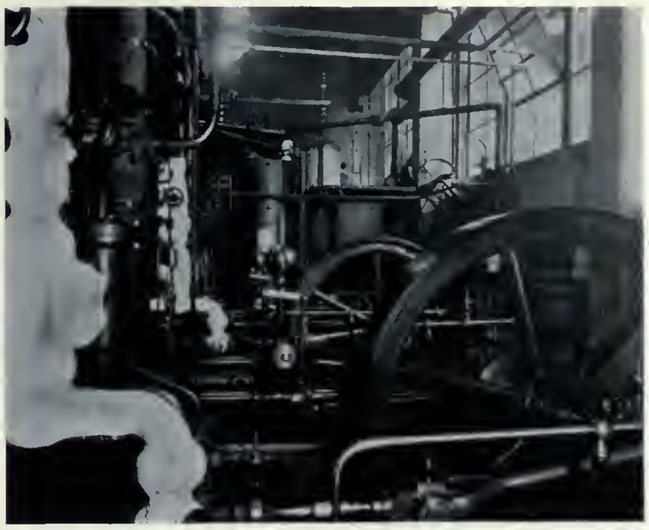
on the road to perfection. All other edifice types have centuries of architectural precedent back of them—theatres, libraries, churches, collegiate groups, banks and even hotels, whose most modern developments have been both indirectly and directly due to the influence of railroads.

This dependence on the workings of evolution and timely adaptation of traditions is sane and natural, just as much in architecture as elsewhere. All our best work in any field of human enterprise must necessarily have a foundation on which to build, a fruitful soil of tradition from which it springs. Originality cannot be made to order. The man who deliberately sets out to be original, who wilfully casts aside tradition and ignores the experience of his predecessors and contemporaries, who says, "I am going to do something quite new and unlike anything that has ever been done before," generally succeeds in doing something quite asinine and hideous. Abundant examples of distressing gaucheries, inspired by this insensate mania to do something merely different, are not wanting in the world of art and elsewhere. Originality, that is, sane originality, is a growth and must come through the reasonable combining, adapting and modifying of well-known forms, as commonsense and the obvious exigencies of the occasion demand; and that is precisely the way it has come in the instances now claiming our attention.

From the very nature of the problem, a large element of pure engineering is necessarily involved in station planning and hitherto much actual progress has been achieved, both in respect of engineering and architectural excellence, for which due praise is to be meted out severally to architect and engineer. Within recent years this advance has been conspicuously marked. With the completion of each newest station of importance, the public is apt to feel that the goal has been reached, the perfect ideal realized; and then, within a few months, perhaps, or years, comes some radical change, due to electrification of motive power, subway arrangements or what not, and we find the erstwhile paragon full of imperfections and unsuited to altered conditions. At any rate, no absolutely fixed, distinctive type has yet been evolved, and theories, while not altogether in a state of flux, are, nevertheless, not fully established.

Certain principles of station design, however, have been gradually gaining clearer definition and more general acceptance, and render it possible to establish special canons of criticism applicable to station architecture. Because of the large proportion of purely engineering work involved in their plan, it becomes necessary to regard railway stations, more than almost any other class of buildings, in their dual capacity, as, in the first place, satisfactory solutions of wholly practical requirements, and, in the second place, fitting embodiments of artistic conceptions.

The solely practical requirements for a modern city railway station may be broadly classified under the two comprehensive heads of (1) cost and (2) efficiency. In considering the former it is well to make two divisions, the initial cost and the cost of upkeep. Under initial cost will be included the outlay for real estate and all expenses contingent upon the purchase of materials, the erection of the fabric and the installation of all equipment. Under the head of upkeep are to be counted the charges for heat, light, cleaning, service and various sundries. Railroad treasuries are not inexhaustible mines of wealth, and the cost of buildings and their maintenance has to be counted beforehand, just as carefully, and planned with as much regard for economy as in the case of private in-



REFRIGERATION PLANT.

dividuals or small corporations. Inasmuch as the maintenance of a railway station is accounted a part of the company's fixed administration charges, and the first cost should represent not an unbusinesslike and capricious bit of extravagance but a part of the railroad's permanent capital investment, from which the stockholders are justified in expecting a reasonable return, the principle of close economy—this does not, however, mean narrow-minded, pinchbeck parsimony—and avoidance of unnecessary expense should be observed as one of the first essentials in making preliminary designs.

A second important principle, the principle of direct communication and facility of circulation, is to be deduced upon the score of efficiency. The intelligent observance of this principle will preclude congestion in handling passenger traffic, the congestion that too often occurs in

SKYLIGHTS OVER TRAIN SHED.

passage to and from trains or through the mingling of waiting passengers with those passing quickly in or out.

A third principle, also ranged under the head of efficiency, stresses convenient arrangement and economy of space. Conscientiously following its lead, the architect will endeavor to place all the facilities for the accommodation of patrons as close together, and as near the central part of the station, as possible, so that they may be readily accessible. He will also endeavor to make the distances to be traversed by the incoming or outgoing passenger, between trains and exits or entrances, as short as may be. Plumbing, ventilation, light and a hundred other details, while they are to be largely considered under the distinctly practical side of the work, have no especial bearing upon the essential requirements of plan.

We pass now to the purely architectural requirements of urban railway stations and the noting of another set of principles concerned therewith. If any reader is disposed to cavil at placing architectural considerations second in order, let him remember that this order is strictly logical, that the plan with all its efficiency and engineering problems must be satisfactorily developed first before the skeleton can be clothed with a form of grace, and that a departure from this method of procedure almost invariably spells failure. Such failure, too, is more noticeable in a station than in any other building, because of the constant emphasis placed upon practical requirements by the conditions of daily usage. It would not be a hard matter to point to cases where the logical method of working seems to have been forgotten at times and with the result that might naturally be expected. If the axiom that the exterior of a building should express its purpose is conscientiously observed, it is obvious that the desired correspondence can be achieved only by working outward from the interior plan which may be regarded as the visible embodiment of the purpose. Any other method is architecturally dishonest.

From an examination of the trend of station architecture in past years one may trace the growth of at least three well defined principles. The first of these is architectural responsibility on the part of the railroad to the public. This recognition of responsibility on the part of railroad management is to be interpreted not merely as a concession to public taste, but as a desire to bestow worthy treatment, suitable to the dignity of the community, upon a building that is in effect the gateway to the city.

Next comes the principle of just expression of architectural purpose in form of structure, involving the adaptation of a style to manifest needs, the achievement of a somewhat monumental effect in accord with the building's importance, and, finally, the elimination of all inappropriate or meaningless detail.

Last of all is the principle of congruity with surroundings which demands that a railway station, which affords a large latitude in the choice of architectural type, should be in keeping with the other representative buildings of the community in which it stands.

CONCOURSE.

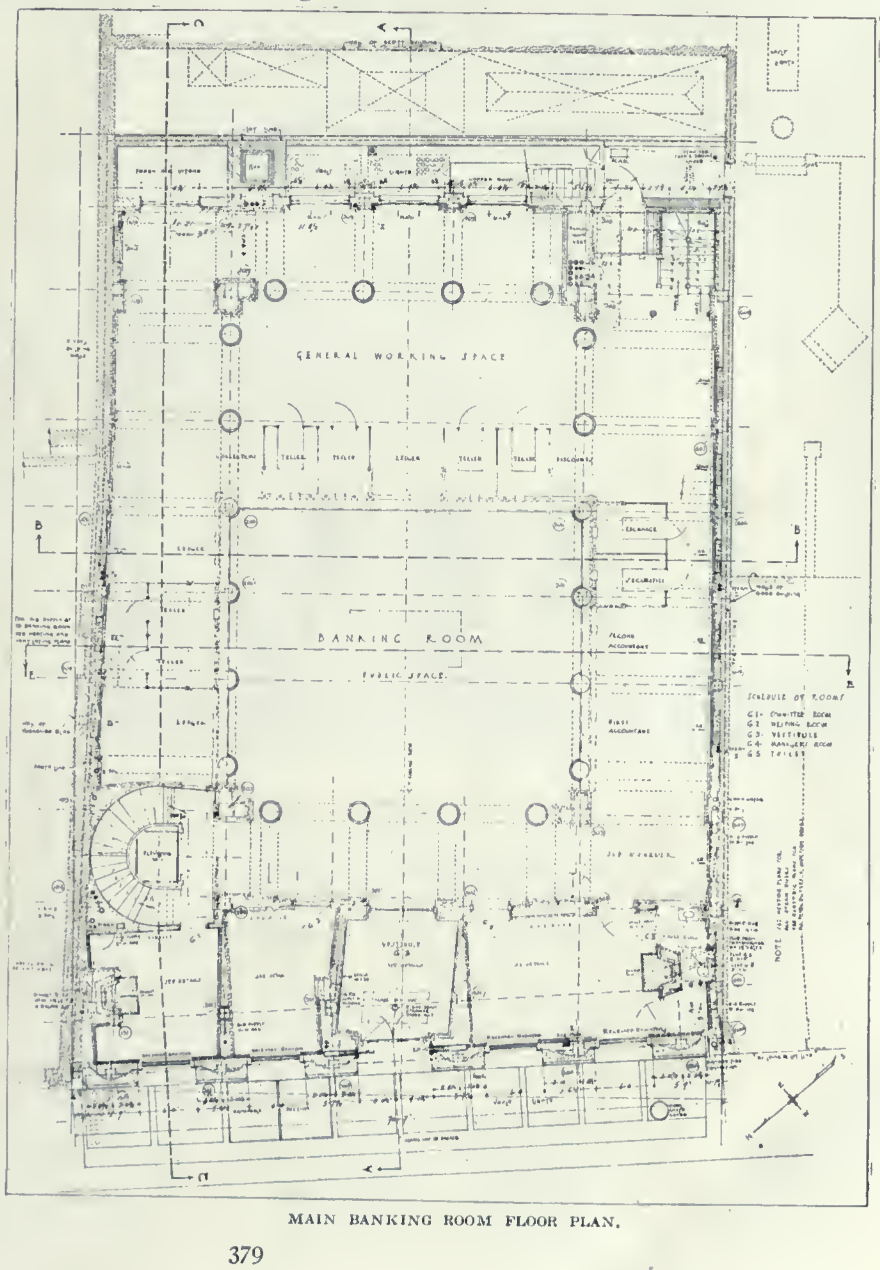
Bank of British North America, Montreal, Quebec

A BANK to possess the necessary facilities for proper administration must be a resultant of the combined efforts of banker and architect. This is often a serious difficulty, as the banker lacks the faculty, as a rule, of interpreting plans, while the architect can rarely spare sufficient time to inform himself of the various needs and proper methods for executing same. Sometimes the trouble is evaded by calling in the services of a specialist, who becomes the official medium between the client and the designer, thereby facilitating the work of both.

In the Bank of British North America, located on St. James street, the firm of Barott, Blackader & Webster have successfully solved the problem, adapting the design and arrangement to meet the present needs and still adhere to the architectural style of the original structure. They have secured the greatest amount of efficiency in the available space and brought the administrative corps in close relation to the general public.

Upon entering one passes through heavy walnut doors elaborately carved into the vaulted vestibule lined with marble, which in turn opens into the banking room proper, seventy-four feet long, sixty-five wide and thirty-five high. Twenty fluted columns, eighteen feet in height, support the clere storey, while above is a deeply coppered ceiling, richly ornamented and painted in varying harmonious shades, with the ornament picked out in gold leaf and color. The screen and counter is one hundred and five feet in length, the latter supporting a low polished bronze and glass screen, except where enclosures are required for the tellers' cages, at which place the screen is of a greater height and formed of bronze pilasters and cornice, with bronze mesh enclosures at the rear and sides. The trim and fixtures throughout are of mahogany, and the floor in the clerical section of compressed cork, and that in the public space of marble.

In order to obtain the maximum amount of direct light for the banking room, the side walls of the building were recessed to form courts above the main ceiling and skylights installed over the side clerical sections, the clere storey being pierced with openings into the same side courts, while in addition to these large windows are located in the rear wall of the room. Facing the principal street and directly off the banking room are located the local manager's office, and rooms for correspondence and committees. The general manager's and executive offices are over the banking space, the former being twenty-six by twenty feet, designed in mahogany, and amply lighted by three large casement windows. On the second floor is located additional clerical and staff offices, while on the present top floor ample accommodation is provided for the use of the staff, consisting of living and bedrooms, dining-room and kitchen in addition to a large filing room.



MAIN BANKING ROOM FLOOR PLAN.

The main facade and returns are faced with granite, the lower portion of the building forming a heavily rusticated base supporting the free standing Ionic colonnade, thirty-five feet in height, surmounted by a pediment, in the tympanum of which is carved a shield with the bank's coat-of-arms thereon and enclosed by a wreath. The side and rear of the building are faced with sand-lime brick, with the exception of the recessed courts, where enamelled brick

THE MAIN FACADE.

has been used. All windows in the courts and at the rear are of hollow metal, glazed with wire glass. The building is of a steel skeleton construction, there being about six hundred and fifty tons of steel utilized. In order to eliminate columns throughout the large office sections and in the banking room, clere girder spans were adopted, which make the building practically supported by four pylons at the corners, and designed so as to accommodate future additional storeys when needed. The floor construction throughout is of reinforced concrete; the partitions and furring of terra cotta. The building is equipped with the most modern ventilating, heating and plumbing systems, with auxiliary boilers for breakdown service.

The main security vault is located in the rear of the basement, constructed of three-inch laminated steel plates, enclosed with heavy reinforced concrete walls and floor construction, and equipped with heavy double doors and electrical protection. The vault is isolated from the main walls of the building, allowing inspection space around all sides. Immediately below the security vault in the sub-basement is a large fireproof book vault. The general treatment throughout the building is of quartered oak, with the exception of the special offices and main rooms, where mahogany is used; the floors of the clerical section are of rock maple, and in the special rooms are of herringbone quartered oak. Elevator enclosures are of bronze on the main floor, and ornamental iron throughout the balance of the building, while the main and rear staircases extending from the basement to the roof are of marble with wrought ornamental iron rails.

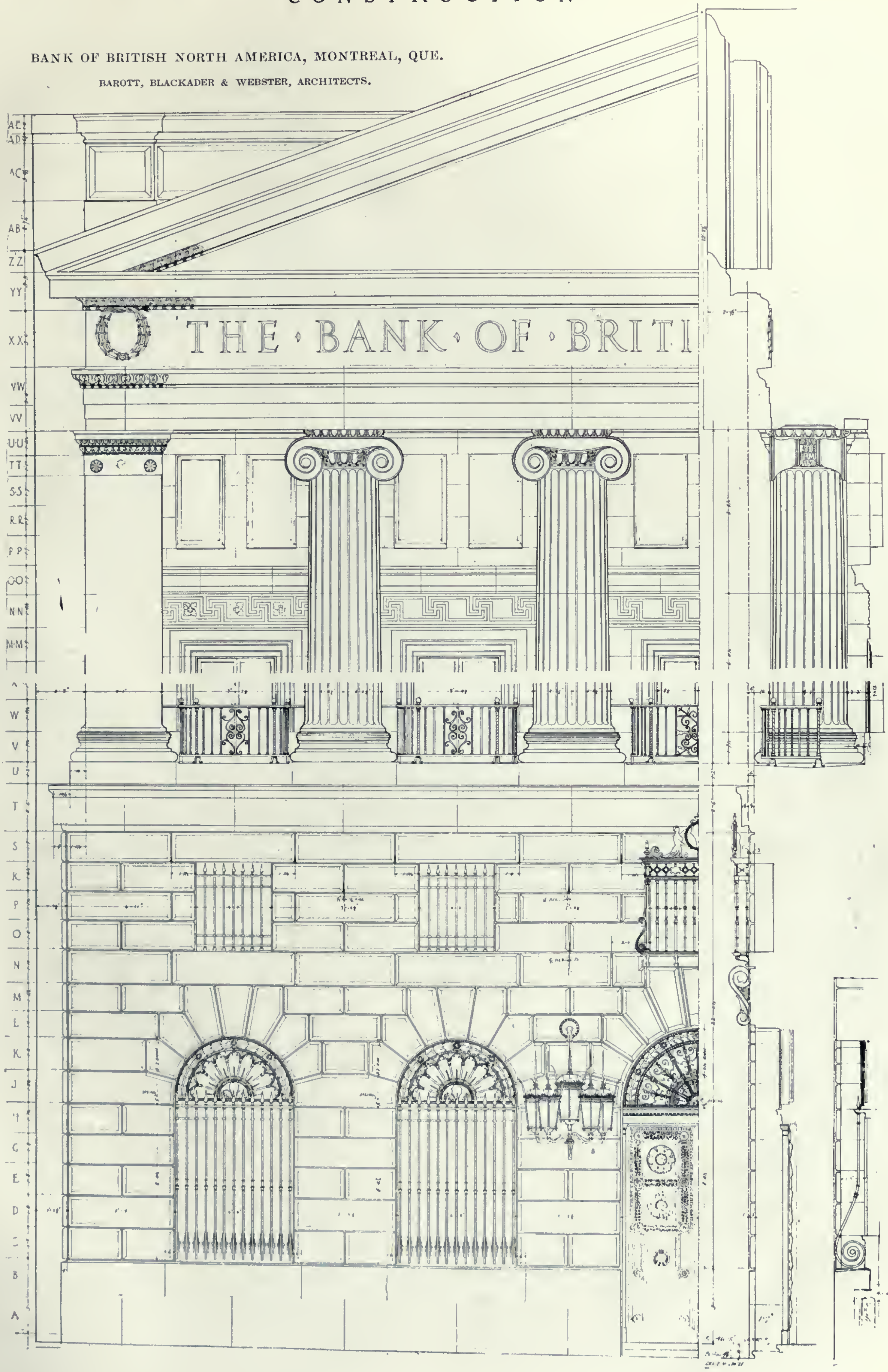
The following article on heating and ventilation of banking rooms was prepared by Charles L. Hubbard, an authority of considerable experience in matters of this nature:

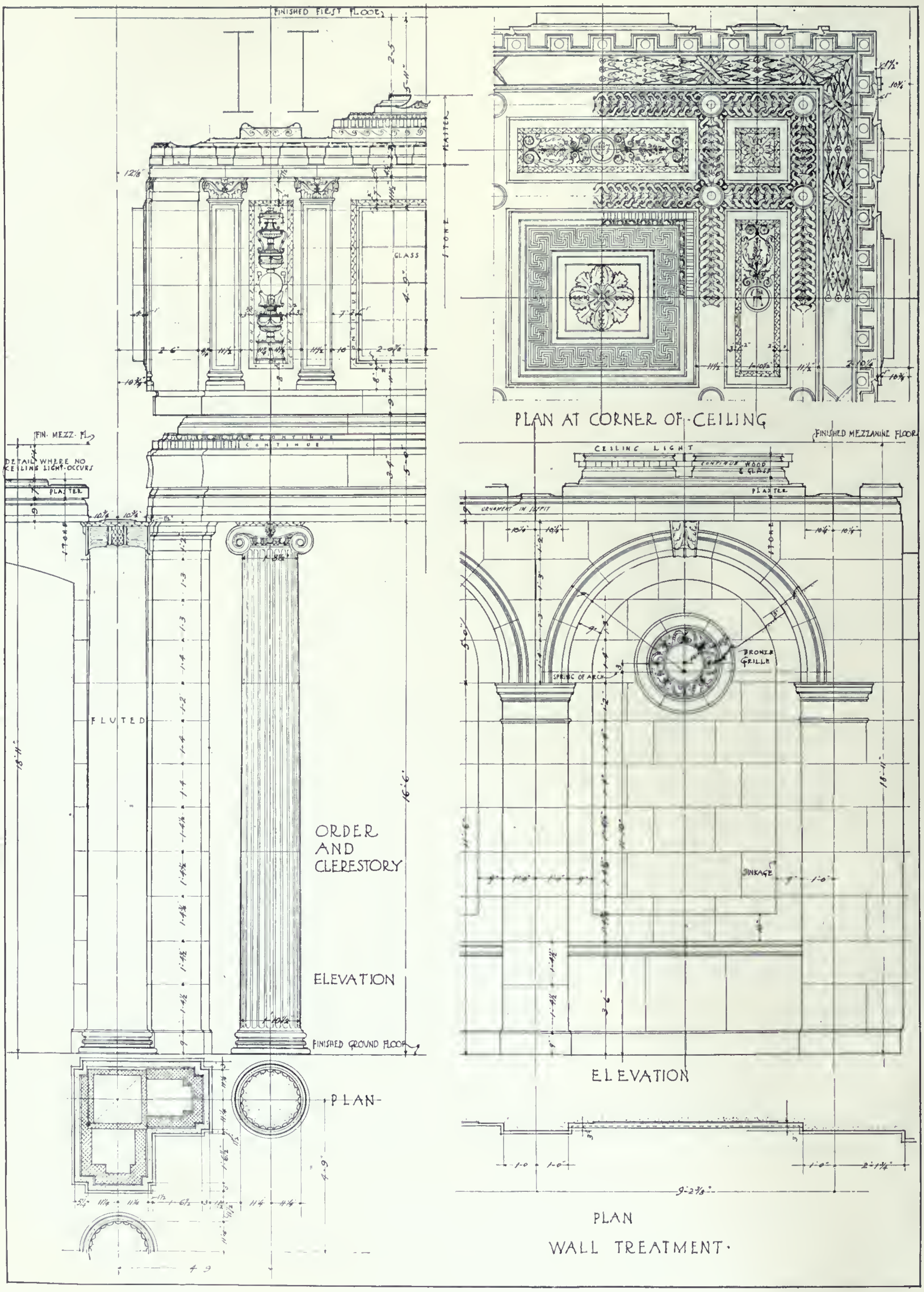
Ventilation of Banking Rooms.—The best results are obtained in rooms of this kind by the use of fans, both for supply and exhaust. The location of these will depend somewhat upon the arrangement of the building. Ordinarily the supply outfit is placed in the basement, although in some cases it may seem best to locate it above the rooms, and discharge the air into the flues leading downward. Vent flues from the first floor are usually gathered at the basement ceiling and connected with an exhauster discharging into a special shaft leading to the top of the building. There are various ways of admitting the warm air to the main banking room. If the system is to be used for heating only, and not for cooling in the summer time, it is a good plan to bring in a considerable proportion of the warm air through long narrow slots in the window sills, and through elevated registers in or near the outer wall. A certain amount should also be supplied to the public space by means of grilles along the inner wall or through centrally located columns.

Exhaust ventilation should be through grilles or registers placed near the floor, part in the

BANK OF BRITISH NORTH AMERICA, MONTREAL, QUE.

BAROTT, BLACKADER & WEBSTER, ARCHITECTS.





DETAIL OF MAIN BANKING ROOM.

BANK OF BRITISH NORTH AMERICA, MONTREAL, QUE.

BAROTT, BLACKADER & WEBSTER, ARCHITECTS.

base of the counter and part in both outer and inner walls, if the room is of considerable width. In long narrow rooms the fresh air is often brought in through a series of registers, about eight feet from the floor, located in the outer wall, and the exhaust taken off through openings near the floor along the opposite side of the room. An examination of the plans of a considerable number of the latest installations of this kind shows quite a variation in treatment as to the location of air inlets and outlets. Much seems to depend upon the available space for flues, and the only general rule followed appears to be the admission of air at an elevation of seven or eight feet and its removal at or near the floor. In several of the plans examined, the larger proportion of both supply and vent registers were located along the same wall. When a washer or other cooling device is used, and the air is admitted in summer at a temperature considerably below that of the room, a somewhat different flue arrangement must be provided than noted above. Ordinarily the space along the outer walls, next the windows, is occupied by desks, and if the cooler air were admitted in the usual manner, it would at once fall upon the heads of those sitting below.

With systems of this kind the air should be introduced along the inner walls, or at the opposite side of the public space, and exhausted at the outer walls after having become diffused and raised to the normal temperature of the room. This arrangement works equally well with warm air, provided direct radiators and shields are placed in the windows. Whatever the method of ventilation, a sufficient number of direct radiators, or rotation heaters, should be provided to warm the room to a comfortable temperature when the fans are not running. In general, we may say that the air should be heated to about 72 or 74 degrees at the fan, and delivered to the room partly at this temperature and partly at a higher temperature by passing through re-heaters beneath the window flues, these being available as rotation heaters, when the fan is not running, by the manipulation of switch dampers.

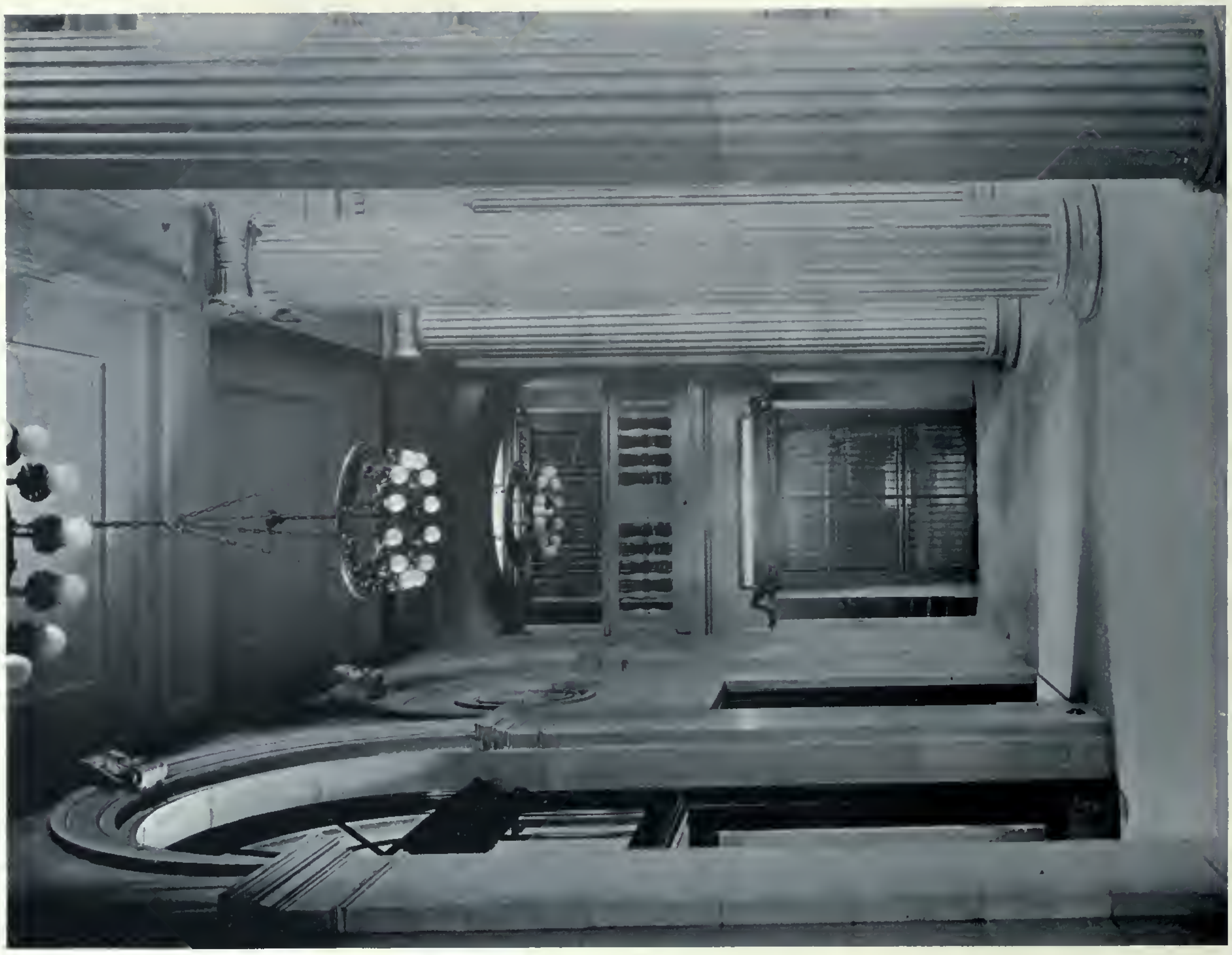
Private offices may be heated by direct radiation, either encased or exposed, or by re-heaters at the base of the supply flues. Sometimes direct radiators are screened and the air supply brought in back of them.

Volume of Air Supplied.—When the probable number of occupants is known, it is best to proportion the air supply upon this basis, allowing at least 40 cubic feet per minute each. When this information is not available, a certain number of changes per hour may be provided. Under ordinary conditions from four to five changes should be furnished in the smaller rooms of an office building and from three to four in banking rooms. If the rooms are very high, the number of changes may be reduced.


MAIN BANKING ROOM.

In a building recently erected, a banking room 58 feet in height was satisfactorily ventilated with two changes per hour. When designing a ventilating equipment for rooms of this type, the exhaust system need have a capacity only about 0.6 to 0.7 that of the supply system, as a considerable amount of air will find its way out by leakage.

Vault Ventilation. — Safety deposit and storage vaults require special treatment, because, when closed at night, there must



ENTRANCE LCBBY.

MAIN BANKING ROOM.

BANK OF BRITISH NORTH AMERICA, MONTREAL, QUE.

be no access whatsoever through the air ducts.

There are various ways of overcoming this difficulty. In one case a small centrifugal fan is supported upon the wall at the rear of the vault and arranged by means of a shallow ceiling duct to draw air from the upper part of the doorway. This air being taken from a well-ventilated corridor, and therefore of good quality, is delivered at several points in the rear and along the sides of the vault and passes out under a slight pressure through the lower part of the doorway. Another plan is to omit the special fan and connect with the regular ventilating system by means of a removable sleeve, which is disconnected at night when the doors are closed.

Ventilation of Special Rooms.—Exhaust ventilation is provided for toilets, kitchens, lunch rooms, etc., by means of separate fans, in order to make them independent of the banking rooms. Whenever a room is likely to contain smoke or unpleasant odors, the flow of air should be outward, hence a supply is usually drawn from the corridors and discharged outboard, instead of being furnished by a special supply fan under pressure.

Rooms of the above type require from five to six changes per hour under average conditions, and often more in special cases.

Air Washing and Cooling.—Air washers are now generally included in the ventilating equipment of all buildings of this type, both on account of the more healthful quality of the air supply and for protecting the building and its contents against injury from soot and dust. These devices are easily equipped for humidity control and may be used for air cooling in the summer.

The amount of cooling effect will depend somewhat upon local conditions and may be increased by taking the spray water from the city mains or deep wells. In some cases a refrigerating plant is installed, and brine or other cooling medium circulated through the heating coils.

DAYLIGHT ILLUMINATION*

The illumination of buildings by natural light, as obtained by forming openings in the walls and ceilings of rooms, is an operation which so materially influences the structure and the subsequent utility and value of all buildings, to say nothing of the architectural and other amenities, that one is rather staggered to find that practically no rules exist which determine what width, height, and arrangement of glass area will afford adequate illumination for any given size of room. Still more strange is it to find no recognized criterion in existence as to what is adequate natural illumination for any given purpose, such, for instance, as a school, a library, a dwelling-house an office, a retail shop, or a workshop.

By means of vertical windows we admit to our rooms a small proportion of the illumination enjoyed outdoors, but what that proportion should be for any specific purpose has yet to be defined. When we come to consider the matter we find that the daylight source varies from month to month and from hour to hour on normal days by several hundreds per cent., whilst on many days it will vary by 50 per cent. to 100 per cent. in the course of a few minutes.


MAIN BANKING ROOM FROM LOBBY.

A thousand foot-candles of daylight or sunlight is less trying to our eyes than ten foot-candles of artificial light. This is possibly due to the fact that we have only been accustomed to the use of the latter for, say, 150 years or so —a period which is extremely minute in comparison with the countless ages through which our eyes have developed under natural light.

The eyes of many people are particularly susceptible to color, and if the walls of a room be covered with a white paper with a light-pink pattern, the eye, noting their cheerful lightness, will pronounce the room a light one,

*Paper by P. J. Waldram, England.

whether it really be so or not. On the other hand, if the walls be dull grey or brown, as in the Court-rooms of the Royal Courts of Justice, one is obsessed by their sombre gloom, and will find it most difficult to avoid the conclusion that the courts are dull and badly lit, even though by virtue of their high windows or lantern lights they may really enjoy a degree of illumination for reading and writing such as is received by very few ordinary rooms, and may be able to dispense with artificial light on a winter afternoon for a considerably longer period than would be possible in a room lit with windows of the ordinary height.

We must also make ample allowance for the fact that clear blue sky necessarily suggests the idea of unobscure sunlight which give the most intense degree of illumination which our eyes will stand; whilst on the other hand clouds indicate a material reduction of such light. But these are outdoor conditions, and as we have taken to living and working so much indoors our intuitive impressions are apt to prove deceptive unless we recognize that blue sky gives us very little of that diffused light upon which all interiors must depend when they are not receiving the sun's rays, direct or directly reflected. White or very light grey clouds, in fact, materially increase the illumination of interiors.

MANAGER'S SUITE.

(1) Minimum Illumination. — Photometric data is needed to determine the value in foot-candles of minimum natural illumination required by average persons. It naturally varies for different purposes.

(2) Minimum Ratio of Inside to Outside Illumination.—Some years ago the writer suggested that owing to the large and often rapid fluctuations of daylight the only exact photometric standard one could take was the ratio of the brightness of the zenith sky to the inside light; and that the only standard without instruments was the inside illumination enjoyed at sunrise and sunset on clear winter days, at which times the zenith sky is of at least approximately similar brilliance. This is really a very low criterion, the brightness of zenith blue sky being then only about 100 foot-candles in round figures. It is seldom darker than this between sunrise and sunset, and is generally much brighter even on wet days in winter in towns. Between sunset and sunrise, or when the sky is, in abnormal weather, darker than 100 foot-candles, it would appear to be unreasonable to expect any room to be lit by daylight. It must be noted that the light at sunrise or sunset with a clear sky is increasing or decreasing rapidly. It would not be correct to make such a test at, say, Plymouth without allowing for the fact that the sun there rises or sets sixteen minutes later than the calendar time owing to 4 deg. of west longitude. Any test should, of course, be made at sunrise in rooms facing west and at sunset in rooms facing east.

For offices and domestic apartments the following ratios were suggested, viz.:—That the requirements of ordinary comfort cannot be said to be infringed at any point where it was possible to read at sunrise and sunset on a clear winter day. This is equivalent to a ratio of 0.1 per cent. (1-1000) of the light derived from a small portion of the zenith sky, 0.2 per cent. of the total light from an unrestricted full hemisphere of sky of the same brightness, such as would be observed on a white card placed on a roof under a uniformly grey sky, and 0.4 per cent. of the illumination falling on a white card on the window sill with a free horizon.

For schools it would appear that the desirable minimum is somewhat in the neighborhood of two and a half times as much as in offices—viz., that the darkest desk should receive 2½ thousandths (0.25 per cent.) of the zenith light, 0.5 per cent. of the roof light, or 1 per cent. of the light on the window sill with a free horizon.

This is equivalent to saying that at sunrise or sunset in a clear winter sky, or at other times when the sky has an apparent brightness of, roughly, 100 foot-candles, the worst part of an office should receive a minimum of one-tenth of a foot-candle and the worst desk in a school one-fourth of a foot-candle.

(3) Relative Lighting Value of Different Elements of Sky.—The writer suggests that this important and even fundamental data can be most easily obtained by placing a large spherical wire cage outside the window of different model rooms and ascertaining the effect upon any given part of the interior produced by blocking out alternative angular divisions of sky. Possibly the relative values thus found might be identical for all ordinary conditions, possibly certain elements might be more valuable in some cases than in others; but even in the unlikely event of a number of different sets of ratios being found to be necessary for different conditions of window height and width to depth and width of room they could easily be printed in the different angular squares of similar diagrams on tracing-paper, the appropriate tracing selected, and the true value of the actual sky lost and retained in any case could be at once computed.

Only when we really know the different lighting values of different elements of sky can we determine what degree of obstruction will affect any user of given premises. The determination of this obviously affects huge sums, not only of private expenditure, but also of public funds, as in the case of schools, where it is often necessary to determine whether old buildings shall continue, whether they can be improved or must be rebuilt on a new site, and whether they may be extended on the same site to cope with the needs of growing districts.

With regard to this important point, the amount of experimental data available is also very meagre. Tests of the daylight illuminations on a card placed at different parts of rooms first when obstructed and then when shaded with a small card which just blocks out direct light from the window glass and leaves only the reflected light tend to show, as would be expected, that at and beyond the "effective range" of a window light reflected from the walls and ceilings, especially the latter, is a much larger proportion of the total light available than it is in positions nearer to the window, although it is naturally greater there. The writer has not, however, had time to make sufficient numerous tests on model rooms papered in different colors to be able to give any definite opinion as to the necessary co-efficient reflection in walls and ceiling paper which is essential to keeping any part of a given room up to a given standard.

The collation of sufficient data to determine this problem from actual rooms would be a

OFFICIAL SUITE.

stupendous task, and it is indeed fortunate that the daylight conditions of rooms are exactly repeated in scale models in which the effect of different arrangement of window space, wall surfaces, and sky obstruction can be studied at a minimum expense. It is also more than probable that an artificial sky could be reproduced by a hemisphere of cotton-wool on a wire framework which would give the same photometric readings under artificial light, as a uniformly grey sky; and thus materially reduce the extent of experimental labor, which might otherwise be so tedious that comprehensive results would be almost prohibitive.

With regard to the proper width of window for a given width of room, and the relative value of lateral sky for lateral lighting, writer has as yet made but few observations.

ENTRANCE DETAIL.

BANK OF BRITISH NORTH AMERICA, MONTREAL, QUE.

BAROTT, BLACKADER & WEBSTER, ARCHITECTS.

Standardization of Drainage Tests and Certificates

G. BERTRAM HARTFREE *

IN testing drains, the common practice is often one or other of the following extremes: Solely by smoke test (and for which only a single smoke case may be used); this may detect a serious leakage, but in no event, unless the pipes are uncovered, can a negative result be taken as a proof of soundness of pipes; the alternative is the pressure hydraulic test, which is unfair unless the owner's consent has first been obtained, after fully explaining its nature and effects. Many sanitarians advocate that old as well as new drains should be required at all times to withstand this test; were this common practice, the condemnation of stoneware drains and substitution of heavy pattern cast-iron pipes would result, as experience, with over a thousand drains, has shown that very few, if any, stoneware pipes will withstand such pressure. The best found, which had been laid ten years, sixty yards in length, and pipes with the original Stanford joint, had but three leakages, which were small.

The sanitary engineer, dealing with an existing drain, faces the problem of accurately obtaining information for the purpose of advising his client (the intending occupier) without injuriously affecting the property of the other party. Should a pressure water test be decided on, this should be limited to such head as would operate at any point in case of stoppage, unless a special covenant to a greater head be agreed upon. The practice of plugging all inlets and testing with a head of water equal to the height of a water closet above the ground floor is, in the absence of an agreement, unfair, as the drain under no condition would be subjected to this pressure, and in the absence of the owner's consent might lead to action for damages. A test rarely applied, but exceedingly useful when pressure is to be applied, is by compressed air, which gives uniform pressure throughout the system. This can be applied excessively; in fact, with stoneware pipes it may be taken that it is an easy matter to increase pressure with air or water and cause a failure; but compressed air applied in moderation has much to recommend it, and in the absence of special conditions I would have no hesitation in approving, as sound, any stoneware drain that withstood for half an hour an internal pressure of one pound to the square inch.

*Paper read before the R.S.I., England.

When pressure tests are not specified, common practice is to apply one of the following: (1) Smoke test by case or machine. (2 Chemicals. (3)Colored or measured water. These are useful for particular purposes, but although the test appears satisfactory, it is no proof of a safe drain. Should a smell be presumed to arise from an indefinite spot, the chemical test may be useful in proving the presumption and localizing a particular point; the smoke test may make it visible, but these without some other proof are no guarantee that leakages, small or large, do not exist. As an example, a drain, which from other tests was known to be defective, but which, subjected to smoke under pressure on six separate days, showed an escape on one occasion only. This variable result may be attributed to several causes. Atmospheric conditions largely affect smoke, and the practice of plugging up all openings before applying this test is to be deplored, as experience shows that generally the whole volume passes to a particular direction and the remainder of the system is uncharged. In consequence, no outlet should be stopped until the normal air is replaced by smoke-laden air. Another point to be borne in mind is that smoke naturally rises, and a downward leakage towards a water supply remains undetected. Colored liquids are often used for the latter purpose: it is a lengthy procedure hunting for possible leakages from drains to water supply, and a true negative result can rarely be obtained by the process; for, as with smoke, a saturated earth may not pass the reagent, although when the soil is dry pollution takes place; *vice versa,* a dry earth may absorb the testing liquid, but, with its absorbing capacity reached, contamination of water supply follows. I have on record one instance of a drain that withstood a pressure due to a head of eighteen inches at a particular point, but owing to a defective gradient was relaid, and the cement joints, upon opening the ground, were found cracked, a large amount of grease and soap passing through, having filled the crevices, secured them against a water test.

The use of colored water, as generally practised, is to ascertain the courses of pipes or the presence of stagnant fæcal matter. Although rarely used, the best method is to first flush the drains with clear water and then pour down a light pink solution of permanganate of potash, this having a distinct advantage over other colorings, as foulness causes a chemical reaction resulting in a brown coloring. By increasing the proportion of the chemical, and by observation and practice, a good general idea of the internal condition of drains can be ascertained. Except when drains are very defective, the measured water test is of little use, owing to the difficulty of ascertaining at the lower end the exact quantity of water arriving, but is desirable in conjunction with other tests when low pressure is applied.

Three grades for purposes of standardization are proposed: high pressure, medium pressure, and low pressure. In comparison with these, the test applied by the local health department may be described as non-pressure. It is presumed, in connection with the high-pressure test, that the drains will be required to withstand any future test that may be applied; consequently hydraulic standard cast-iron pipes jointed with molten lead must be used and made to withstand a compressed air test not less than ten pounds to the square inch, the invert so true that with a diameter of four inches a three-and-a-half inch vulcanite ball, placed in the highest part of the drain, will by its own weight roll to the outlet of the section.

For a medium-pressure test: air compressed not less than two and one-half pounds to the square inch, or water with a minimum head of two feet is applied, and the vulcanite ball required to pass through after receiving a reasonable propulsion.

The application of a low-pressure test, that shall be equitable to the interests of owner as well as occupier, is difficult but not impossible, and can be carried out in the following manner: A point of access at the lowest end of the system is imperative; from thece, the drain having been well flushed and the results noted, the low-pressure air test is applied, first stopping all untrapped openings, as well as the drain at testing point, at which a plug is connected to a long rubber tube, through which a pressure of air, insufficient to unseal the traps, but enough to displace the water in the U-shaped gauge of the apparatus, is applied. Generally, blowing in a detached end of the tube, pinching the same and forcing over the open end of U gauge is practised, but a better course is to use a small pump. This overcomes the objection to contact to mouth from drain, and also enables the level of displaced water in the gauge to be raised to a definite height. According to the time the water remains stationary in the gauge, so the condition of the drain may be taken, with long lengths; some time will be taken to obtain sufficient pressure, and it must be remembered that a loose inspection cover will defeat the test. This will illustrate the important fact that often after the expenditure of large sums in making drains to withstand higher pressures, the object is defeated by cheap, improperly fitting covers.

It is claimed for some smoke machines that they can be used for both low pressure air and high pressure smoke tests; possibly with great care this may be done, but their cumbersome make is an objection to general use, and, unless constantly cleaned, carbon deposits in the tubes cause irregular results. Following the air test smoke should be applied, as it is important, even with sound drains, that the ventilating openings be tested to ascertain that they are free, especially when they are not protected by wire domes. For the purpose of obtaining the fullest information colored water should be applied, followed by passing (floating or washing) a sphere, the diameter of which should be at least three-quarters that of the pipes, and in the event of obstruction, by the use of rods or mirrors further information can be obtained. The foregoing test is not recommended for systems the previous history of which is unknown, but where a reliable certificate has been obtained as to a successful medium pressure test, it is generally sufficient to satisfy the requirements for stoneware drains.

A private drainage report should be headed with a brief description of the grades of tests that may be applied, and a certificate should be treated in a similar manner, or should refer to a specified report.

In case of low-pressure test the water supplies need most careful examination, especially when on the same site; and in such event it may be desirable to recommend that some portion of the drains be made to withstand a higher pressure if there be any possibility of future stoppage of drains causing contamination of a well. Even when drinking water is from a safe source, a rain supply intended for washing must be carefully considered.

Concise drainage certificates are advantageous, but in the interests of all parties concerned they must contain detailed particulars of tests applied, and refer to any previous report.

In conclusion, I trust I have proved: (1) That is is far easier to apply a test that will condemn a drain than one that will show it to be reasonably sound; (2) by adopting standard tests there would be little difference in the separate reports of two competent persons, which would remove the present vexation to owners and their agent who, having previously been put to considerable expense to satisfy the adviser of one tenant, finds these requirements condemned on behalf of a subsequent prospective occupier; (3 if the "water test" is at all times a reasonable test in the absence of a special agreement, the use of ordinary stoneware drain pipes represents money wasted.

Panama-Pacific International Exposition, San Francisco

ON February 20, 1915, the Panama-Pacific Exposition at San Francisco was formally opened, and more than four hundred thousand people celebrated the beginning of a new epoch. Held in honor of the greatest engineering accomplishment in the world's history, it is quite pleasing to see the consistent effort put forward to make the Fair a worthy one in every respect. Covering 2,663,183 square feet of area and representing an expenditure of $300,000,000, it is spoken of universally as the greatest achievement in the art of building.

ORGAN TOWER, COURT OF ABUNDANCE.

In planning the exposition it was decided to divide the buildings into three principal groups, massing the great exhibition palaces in the centre, while the pavilions of the nations, and State buildings, lie to the west and the amusement section, the "Zone," is located nearest to the heart of San Francisco. The base of the central group is a great quadrangle composed of eight immense exhibition palaces, similar in character and separated by three great courts running north and south between the three pairs. In the centre is the vast Court of Honor, the Court of the Universe; on the west is the Court of the Four Seasons; on the east is the Court of Abundance. Huge colonnades screen the walls of the buildings, extending from the openings of the courts upon the harbor back to the courts themselves, and almost encircling them. The walls of these vast corridors are red, their vaults Venetian blue. Red, blue, green, and golden brown in pastel shades line the recesses in the courts, silhouetting in color great groups of statuary placed within niches. Superb mural paintings by William DeL. Dodge, Frank Brangwyn, Milton H. Bancroft, Edward Simmons, and other famous artists, have been placed upon the walls of the courts behind the colonnades or upon the vaults of great triumphal arches.

The huge domes rising from the centre of eight of the main exhibit palaces are their most conspicuous architectural feature. These domes rise 160 feet above the floors of the buildings, are 100 feet in diameter and are set upon great octagonal bases that rise at the intersections of transverse and longitudinal naves that run through the centres of the palaces. The lattices in the bases beneath the domes are of green with glints of gold showing between their intersections.

To the south of this group of buildings is the beautiful South Garden, flanked on one side by the wonderful Palace of Horticulture, with its Saracenic architecture suggested by the Mosque of Sultan Ahmed I; and on the other by the magnificent Festival Hall. To the west of the main group is the Palace of Fine Arts, a creation that well merits its name.

The central architectural feature of the grounds is the Tower of Jewels, a Babylonian effect that rises 435 feet high by a series of seven decorative terraces, and is surmounted by a triumphal group of figures supporting a globe, typifying the world. Suspended upon its walls are 125,000 "jewels" of cut glass that scintillate in the sun, and at night glisten and radiate multitudes of beams reflected from the many colored lights that are arranged to play upon the tower, as well as most of the other principal buildings. Through the base of this tower entrance is given to the Court of the Universe by an archway 125 feet in height, and set within a vast colonnade in its base are the two great fountains, the Fountain of El Dorado and the Fountain of Youth.

EXPOSITION GROUNDS, FROM THE PRESIDIO.

Contrary to general expectation, the architecture of the exposition buildings is not of the Mission style, but the prevailing character is rather the Italian Renaissance and Greco-Roman. There is, however a flavor of Spanish architecture, but of the highly ornate High Renaissance Spanish style, and the Hispano-Moorish. Decorative detail has been used with a lavish hand, but also with taste and judgment, and days could be spent in studying and admiring these subordinate features alone. Upon the architectural effects and details the best thought of the country has been bestowed, and the results have surpassed anticipation.

The general character of great fairs has tended to settle into certain general lines, but in the case of the Panama-Pacific the richness and variety of the architecture and the luxuriance of the decorative detail preclude all possibility of an impression of sameness, while a special feature of the decoration gives the exhibition as a whole a daring character of novelty and a beauty that is individual.

The special feature which gives a startling beauty and brilliancy to the entire scene, is the introduction of color, not for an occasional contrast, but everywhere, and making the whole scene poly-chromatic. We know that the Greeks in their most beautiful creations did not rely on form alone for their effects, but used colors liberally, not only in their architectural work, but in their sculpture, and this is the plan adopted at San Francisco. Early in the preparation of the plans the management called in Jules Guerin. He has wrought on this six hundred and thirty-five acre canvas a harmonious picture, vivid in color and beauty. In contrast with other similar undertakings there are here none of the great familiar areas of white showing up on every side, for white has been entirely eliminated from the color scheme everywhere. In its place we have the marvelous blending of brilliant shades of red, orange, and blue with the green of the trees and shrubbery and the soft, warm buff of the walls of the buildings, for this shade has been adopted as the universal tint for all of the large blank surfaces. The many domes are gold and copper green, while the roofs show in some places the old red Spanish tile, while others are cerulean blue. The capitals and friezes are picked out in gold, blue, and orange, while the colonnades show pleasing contrasts of warm buff against Pompeian red.

These colors are not applied as paints or stains, but as pigments mixed with the material of which the surfaces of the buildings are composed; and this is of the character of cement rather than of the once familiar "staff," for which reason the colors are not as easily or as quickly affected by the weather. Furthermore, the surfaces have a natural stipple character that softens the color effects and eliminates all disturbing reflections. Cunningly arranged in the decorations of capitals, and in the flutings of columns, are numerous electric lights, which, with the many searchlights distributed about the grounds, illuminate the buildings at night and startlingly bring out their beauties.

COURT OF THE FOUR SEASONS.

THE ART EXPOSITION

The following description is taken from a critical review by Eugen Neuhaus, who is assistant professor of decorative design at the University of California, and member of the International Jury of Awards in the Department of Fine Arts of the Exposition:

It is generally conceded that the essential lesson of the Exposition is the lesson of art. However strongly the industrial element may have asserted itself in the many interesting exhibits, no matter how extensive the appeal of the applied sciences may be, the final and lasting effect will be found in the great and enduring lesson of beauty which the Exposition so unforgetably teaches.

The visitor is at once stirred by the many manifestations of art, presented so harmoniously by the architect, the sculptor, the landscape architect, and the painter-decorator, and his attention is kept throughout by artistic appeals at every turn. It must be said in the very start that few will realize what is the simple truth—that artistically this is probably the most successful exposition ever created. It may indeed prove the last. Large international expositions are becoming a thing of the past on account of the tremendous cost for relatively temporary purposes.

There is still much of the popular conception abroad that the West has only very recently emerged from a state of semi-civilization inimical to the finer things of life, and to art in particular. But we may rest assured that the fortunate outsider who allows himself the luxury of travel will proclaim that the gospel of beauty has been preached most eloquently through the Panama-Pacific International Exposition.

The critic who prefers to condemn things will find small opportunity here, no matter how seriously he may take himself.

The first sight of that great mosaic, from the Fillmore street hill, at once creates a nerve-soothing impression most uncommon in international expositions, and for that matter, in any architectural aggregate. One is at once struck with the fitness of the location and of the scheme of architecture. Personally, I am greatly impressed with the architectural scheme and the consistency of its application to the whole. I fear that the two men, Mr. Willis Polk and Mr. Edward Bennett, who laid the foundation for the plan, will never receive as much credit as is really due them. I hope this appreciation may serve that purpose in some small way.

It was a typically big Western idea, an idea that as a rule never gets any further than being thought of, or possibly seeing daylight as an "esquisse"—but seldom any further than that. The Burnham plan for San Francisco was such an unrealized dream, but here the dream has achieved concrete form. The buildings as a group have all the big essential qualities that art possesses only in its noblest expression. Symmetry, balance and harmony work together for a wonderful expression of unity, of oneness, that buildings which are wholly de-

PROMENADE BEFORE THE PALACE OF FINE ARTS.

voted to profane purposes seldom show.

I do not know how many people who visit the Exposition are so constituted as to derive an aesthetic thrill from artistic balance, but I imagine that any person, no matter how inexperienced in matters of art, will rejoice at the fine feeling of orderly arrangement of major forms which runs through the entire grouping. It is simplicity itself, and it serves an excellent practical purpose, enabling one to visit the Exposition without being left a nervous wreck at the end.

The main entrance leads one into the physical centre of the Exposition. From there, on the first visit, one realizes the existence of an equally large area on either side, covered with objects of interest.

The main exposition, composed of a compactly arranged group of large buildings of approximately equal size, is symmetrically placed on either side of the main central court, the Court of the Universe. This sends out its avenues into two equally proportioned side courts—the Court of the Four Seasons on the west and the Court of Abundance on the east. While the main court rests right in the centre of the eight buildings, the side courts fit snugly into the centre of the four buildings on either side. This arrangement of large masses, comprising the bulk of the Exposition, creates a grateful feeling of repose and of order, without being in the least uninteresting, for while there is perfect symmetry, on the one hand, in the larger masses, there is plenty and ever changing variety in the minor architectural forms and embellishments. The same balance, the same interesting distribution of architectural masses, continues on either side of the main building. In Machinery Hall, on the one hand, and the Fine Arts Palace on the western side, perfect balance is again maintained. That is, however, not the end of it all. Loosening up in a very subtle way, we find cleverly arranged the buildings of the various States of the Union and of foreign nations on the western side of the Fine Arts Palace, while at the other extremity of the main group, screened by Machinery Hall, is the amusement section, officially labelled "The Zone."

I do not suspect that the Zone is intended to give any artistic thrills. If so, I would propose to call it "The Limit," and so I drop it as a subject for further artistic reference. It is invaluable, however, as an object lesson in showing the fatal results of the utter disregard of all those fundamental laws of balance, harmony, and unity so uniformly and persistently applied through the seriously designed main body of the Exposition. There is no harmony whatever in the Zone anywhere, either in the form, style, or color, unless it be the harmony of ugliness which is carried through this riotous

PALACE OF FINE ARTS.

melee of flimsiness and sham. I cannot help but feel that this hodge-podge will convince the most doubting Thomas who might believe in the mob rule of hundreds of conflicting tastes. The Zone is not an improvement on similar things in former Expositions. Save for certain minor exceptions at the entrance, it will serve as a wonderfully effective illustration of the taste of the great masses of the people, and as a fine business investment.

So far, we have moved only along the east and west axis of the Exposition. The north and south development is not without its charm. The terraced city of San Francisco, on the south, without a doubt looks best on a densely foggy day. With its fussy, incongruous buildings — I hesitate to call them architecture—it serves hardly as a background for anything, let alone a group of monumental buildings. The opposite side, where Nature reigns, atones for multitudes of sins that man committed on the city's hills. But how great an opportunity there was lost! There are, however, some indications at the western end of Broadway that give fine promise for the future.

The bay and its background of rising hills and blue mountain sides provide the wonderful setting that so charmingly holds the Exposition. The general arrangement of the Exposition pays its respects to the bay at every possible angle. The vistas from the three courts towards the bay are the *pieces de resistance* of the whole thing. It was a fine idea, not alone from an economic point of view, to eliminate the two arches which appeared in the original plan at the end of the avenues running north from the Court of the Four Seasons and the Court of Abundance. There is hardly anything more inspiring than to stand in any of the three courts and to look north through those well proportioned colonnades over the blue bay towards the purple foothills of Marin County, crowned by the graceful slopes of Mount Tamalpais on one side and the many islands of the bay on the other. It is surprising into how many enchanting vistas the whole arrangement resolves itself. For the city-planner the Exposition contains a wonderful lesson. What fine cities we might have if some artistic control could be exercised over the buildings which are to stand opposite the junction of one street with another, not only at right angles, but also at lesser degrees—for instance, in all cases of streets running into Market street from the northwest.

To point out some particularly fine vistas, among many, we should mention that from the Orchestral Niche in the Court of the Four Seasons, looking toward the bay, or from the same court toward the Fine Arts Palace—and many more. The natural background seems to have been considered always, even in the arrangements of the smallest apertures. One should not overlook the two open courts which run off the main avenue, like charming coves in an island, into the main group of buildings, connecting at their ends with the Court of the Four

DETAIL OF COLONNADE, PALACE OF FINE ARTS.

Seasons at the west and the Court of Abundance toward the east. These two, the Court of Palms and the Court of Flowers, have not so much the charm of seclusion of the more centrally located courts, but their architecture makes them of great interest.

As to the style of the architecture of the main group of eight buildings, it has been called classic. If one means by that something excellent, something in good taste, we must admit that it is classic indeed. However, on closer examination it becomes very evident that the individuality of many men has found expression in the architectural structural forms, as well as in the minor and decorative forms.

The main Tower of Jewels, by Carrere and Hastings, marking the centre of the whole scheme, has a distinct character of its own. There is no doubt that it is effective, but while its chief merit lies in its colossal proportions and its relative position, I feel that it lacks that oneness of conception that characterizes almost every other architectural unit in the Exposition. One feels too much the stacking up of storey after storey, that effort to fill the requirements of a given great height, very much as a boy sets up blocks of diminishing size, one on top of the other, until he can go no further because there are no smaller blocks. The whole effect of the tower is too static. Of its architectural motives, almost too many seem devoid of much interest, and like the column motive, repeated too often. The very effective and decorative employment of "jewels" tends to loosen up and enliven the structure very much. On a sunny day the effect is dazzling and joyous. The tower has a feeling of dignity and grandeur, commensurate with its scale and setting. However, its great height is not apparent, owing largely to its breadth of base. The Sather Campanile in Berkeley looks higher, though it is actually one hundred and thirty-three feet lower. The side towers at the entrance of the Court of Palms and the Court of Flowers, while not so imaginative as the main tower, are far more sky-reaching. As towers go, John Galen Howard's tower at the Buffalo Exposition in 1901 stands unsurpassed in every way as an exposition tower.

VIEW INTO THE COURT OF ABUNDANCE.

The main Court of Honor, or Court of the Universe, as it is also called, designed by McKim, Mead & White, impresses by its tremendous dimensions, which operate somewhat against its proper enjoyment. I believe that the court is too large—so many things are lost in it, and it does not convey the quality of shelter that the two lesser courts possess in such marked degree. The Court of the Universe will never be the resting place of the masses of the people, in spite of the recently added attraction of the band stand, a mixture of Roman and Arabic architecture out of keeping with the surroundings. The conventional architectural motives of this great court do not help very much in tempting one to stay, and if it were not for the great arches on the east and west and the very fine view toward the Column of

Progress, I would feel tempted to classify it as a piece of architectural design of the stereotyped variety. It has all the great qualities and faults of the court in front of St. Peter's in Rome. There is too little play of landscape gardening in and near the Court of the Universe, a condition which will remedy itself with the breaking into bloom of the great masses of rhododendron which have been installed in the sunken garden in the centre.

Like all careful interpretations in the classic architectural traditions, the Court of the Universe has a great feeling of dignity and grandeur, which gives the visitor a feeling of the big scale of the rest of the architecture. The court lacks, however, the individual note of the two side courts.

Toward the west, passing through a very characteristic avenue, in the style of the happiest phases of the Italian Renaissance to be found in Florence, one enters the Court of the Four Seasons, by Henry Bacon of New York. The chief quality of this court is that of intimacy. While by no means so original as the Court of Abundance, it has a charm all of its own, in spite of its conventional architectural characteristics, which are really not different from those of the main Court of Honor. However, a very happy combination of gardening effects and architecture, together with the interesting wall-fountains, screened by stately rows of columns, makes for a picture of great loveliness. Of all the courts, it has the most inviting feeling of seclusion. The plain body of water in the centre, without statuary of any kind, is most effective as a mirror reflecting the play of lights and shadows, which are so important an asset in this enchanting retreat. During the Exposition it will serve as a recreation centre for many people who will linger in the seclusion of the groups of shrubbery and watch the shadows of the afternoon sun creep slowly up the surrounding walls.

ROTUNDA, PALACE OF FINE ARTS.

As an Exposition feature, the Court of the Four Seasons is a decided innovation. At St. Louis, for instance, in 1904, everything seemed to have been done to excite, to over-stimulate, to develop a craving for something new, to make one look for the next thing. Here, in the Court of the Four Seasons, one wants to stay. Most emphatically one wants to rest for a while and give one's self over entirely to that feeling of liberation that one experiences in a church, in the forest, or out on the ocean. I could stay in this court forever. To wander into this Court of the Four Seasons from any one of the many approaches is equally satisfactory, and it will prove a very popular and successful Exposition innovation.

Speaking of the courts, one is bound to yield to the individual note of Louis Mullgardt's Court of Abundance, on the east of the Court of the Universe. Of all the courts it has, without a doubt, the strongest individual note. It seems on first acquaintance to be reminiscent of the Gothic, of which it has, no doubt, the quality of lightness, the laciness, and the play of many

PROMENADE, COURT OF ABUNDANCE.

fine apertures and openings. It has, however, neither the Gothic arch nor the buttresses of that period, and so far as its ground plan goes, it is thoroughly original. It looks as if carved out of a solid block of stone. This monolithic quality is particularly well brought out in the tower on the north. While not quite so intimate as the Court of the Four Seasons, it conveys a feeling of shelter and seclusion very well by showing an uninterrupted wall motive on all sides. The sculpture symbolism of this court is particularly fine. We shall return to it in a consideration of sculpture.

The two minor courts by George Kelham are particularly fortunate in their open location toward the south. Their sheltered and warm atmosphere is quite in keeping with the suggestion of Spanish Renaissance which has been employed in the constructive and in the many decorative motives. The western court, or Court of Palms, is made particularly attractive by a sunken garden effect and pool. The effect of the Court of Flowers is similar in every way to its mate on the east.

A consideration of these two courts, with their towers, leads easily into a study of the outer facade, which, so to speak, ties all of the eight palaces together into a compact, snug arrangement, so typical of the Panama Exposition.

Bliss & Faville, of San Francisco, are responsible for the very skilful use of simple, plain surfaces, accentuated and relieved here and there by ornate doorways, wall-fountains, niches and half-domes. On the south, along the Avenue of Palms, are found some very fine adaptations of old Spanish doorways, which deserve to be preserved. It is regrettable that we have no large museum on the coast where these fine doorways in the outer walls of the Palace of Varied Industries could be preserved permanently. The travertine marble has nowhere been used more effectively than in just such details. The entrance of the Palace of Education at the western end of the south facade is also of great beauty of design.

On the western end two huge niches or half-domes command attention by their noble beauty and fine setting amidst great clumps of eucalyptus. On the north, no special effort has been made. There is, however, a decorative emphasis of the doorways along the entire front. On the east, facing the Palace of Machinery, some very fine doorways, very much like some of the minor ones on the south, furnish the decoration. It was no small task to bridge the many diversified architectural motives which penetrate into the outer wall from within, in the shape of many avenues and courts, and one can appreciate the difficulties of the designer who met so well these conflicting requirements.

Of the detached palaces outside of the eight forming the rectangular block nucleus, the Palace of Machinery attracts by its enormous

PORTAL, VARIED INDUSTRIES PALACE.

JEWELLED TOWER FROM SOUTH GARDENS.

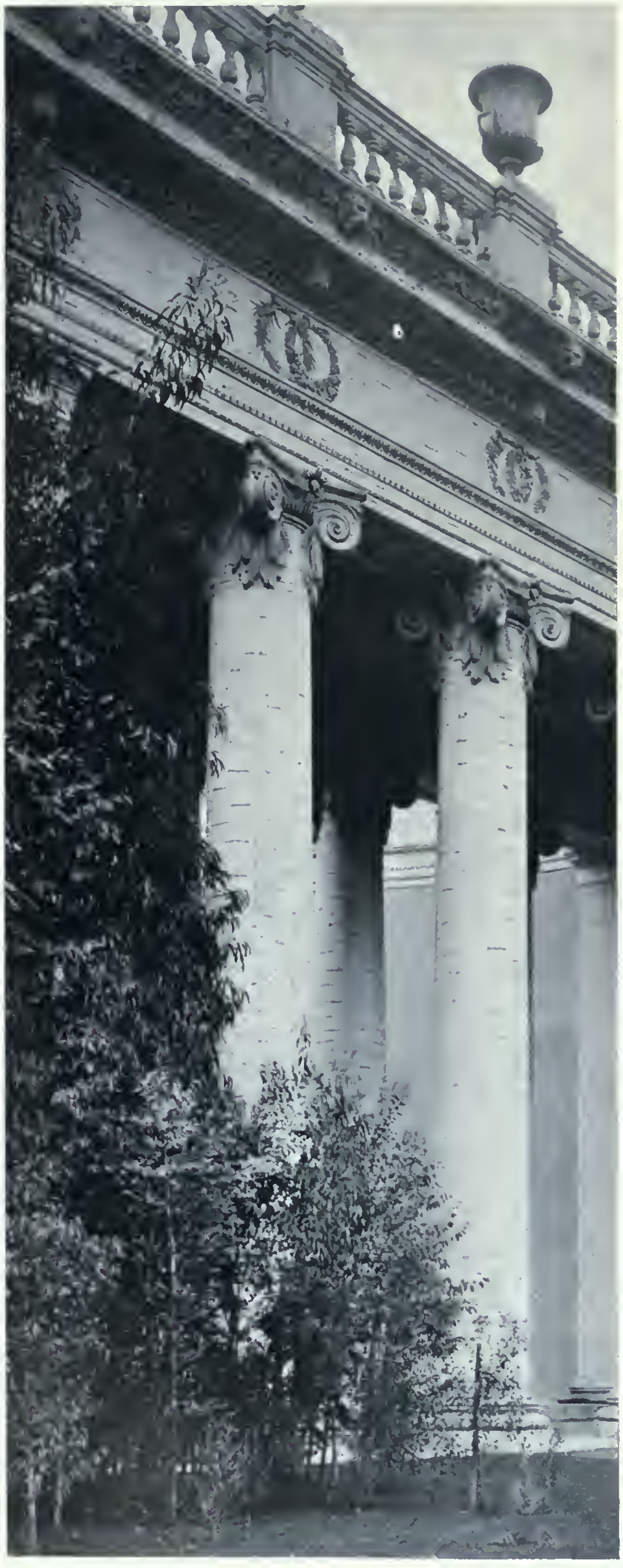
size. I am not interested in how many kegs of nails and iron bolts and washers went into its anatomy. They add nothing to the artistic enjoyment of this very massive building. One point, however, in connection with the liberal use of the raw material is of artistic significance, and that is that the internal structural aspects of this great palace, as well as of the others, are not without charm and interest. It is only in recent years, and particularly in America, that the engineer has dared to invade the realm of the artist by attempting to make the constructive, anatomical material, like uprights, bracings, trusses, and beams, assume artistic responsibilities. It has been for many years the custom to expect the engineer to do his share in obscurity with the idea that it ultimately will be covered up by the work of the architect. The extraordinary development of engineering in this country, to meet new and original problems, sometimes of colossal proportions, particularly in the field of concrete design, has resulted in some conditions heretofore entirely unknown. I feel with much satisfaction that the unobscured appearance of the wood construction in the Palace of Machinery is very pleasing, owing to its sound constructive elements, as well as to a very fine regard for pattern-making in the placing of the bolts and braces. Here we discover the engineer in the role of the artist, which he seems to enjoy, and which offers endless new opportunities, particularly in the field of concrete construction, as well as in wood. The great size of the Machinery Palace is much more enjoyable from within, on account of the constructive patterns left in the raw, than from without, where there is not enough animation in the many plain surfaces of the outer walls. I do not know that it is customary to put the engineer's name, together with that of the architect, on a building; the time is approaching very rapidly when we shall be in duty bound to do so.

Aside from the structural charm of the inside, the outer facade of Machinery Hall is not entirely devoid of architectural interest. Its general forms are apparently those of an early Christian church, although its decorative motives are all indicative of the profane purposes for which it is used.

Festival Hall, by Farquhar, of Los Angeles, at the east end of the south gardens, does not look particularly festive, and it is not original enough to shine by itself, like its very happy mate at the south end, the Horticultural Palace. There is nothing like this Horticultural Palace anywhere on the grounds in its gorgeous richness of decorative adornment. It has no relation to any other building on the site. It is very happy, with its many joyous garlands, flower-baskets, and suggestions of horticultural forms —all very well done—so very much better done than so many of the cheap period imitations so common to our residence districts. It is so de-

CORRIDOR, CALIFORNIA BUILDING.

cidedly joyous in character that people looking for Festival Hall wander over to the Horticultural Palace, attracted by the very joyousness of its scheme.



DETAIL OF COLONNADE.

Good rococo ornamentation is rare abroad and even rarer in this country, which is essentially opposed in its tendencies and in its civilization to those luxurious days of the French kings who created the conditions under which this very delightful style could flourish.

The Horticultural Palace is a great success as an interpretation of a style which rarely finds a sympathetic expression in this country. I do not feel at all that it ought, but in a case of this kind where a temporary purpose existed, it was happily chosen.

Of all isolated units, none causes greater admiration than the Fine Arts Palace. It presents the astounding spectacle of a building which violates the architectural conventions on more than one occasion, and in spite of it, or possibly for that very reason, it has a note of originality that is most conspicuous. Everybody admits that it is most beautiful, and very few seem to know just how this was accomplished. Many of the "small fry" of the architectural profession enjoy themselves in picking out its faults, which are really, as suggested above, the reason for its supreme beauty. Save for Mullgardt's court, it is the only building that seems to be based on the realization of a dream of a true artistic conception. With many other of the buildings one feels the process of their creation in the time-honored, pedantic way. They are paper-designed by the mechanical application of the "T" square and the triangle. They do not show the advantage of having been experienced as a vision.

With Bernard Maybeck's Palace of Fine Arts, one has the feeling that this great temple is a realized dream; that it was imagined irrespective of time, cost, or demand. Like all of Maybeck's buildings, it is thoroughly original. Of course the setting contributes much to the picturesque effect, but aside from that, the colonnades and the octagonal dome in the centre of the semi-circular embracing form of the main building present many interesting features. There is a very fine development of vistas, which are so provided as to present different parts of the building in many ever-changing aspects. On entering the outer colonnade one forgets the proximity of everyday things; one is immediately in an atmosphere of religious devotion, which finds its noblest expression in that delicate shrine of worship, by Ralph Stackpole, beneath the dome. This spiritual quality puts the visitor into the proper frame of mind for the enjoyment of the other offerings of art within the building. Mr. Maybeck has demonstrated once again that his talent is equal to any task in the field of architectural art. I wish we had more of his rare kind and more people to do justice to his genius.

Not far from the Palace of Fine Arts, on the shores of the bay, the monumental tower of the California building fits well into the scheme of things. Seen from a distance, from numerous points across the lagoon, it offers a great many effective compositions in connection with some

CEILING TREATMENT OF ARCADES.

very decorative groups of old acacia trees, the legacy of an old amusement park of the bygone days of San Francisco—the old Harbor View Gardens. In the shade of these old trees a fine old formal garden of exquisite charm, screened from the eyes of the intruder by an old clipped Monterey cypress hedge, really constitutes the unique note of this typically Mission building. The architect, Mr. Burditt, deserves great credit for an unusually respectful treatment of a very fine architectural asset. This very enchanting old flower garden, with its sundial and cozy nooks, has an intimate feeling throughout, and it furnishes the delightful, suggestive note of old age, of historical interest, without which it would never have been convincing.

Aside from the outdoor features, the building, exclusive of the county annex, discloses a very fine talent in a very happy combination of classic tradition and modern tendencies. The building is altogether very successful, in a style which is so much made use of but which is really devoid of any distinct artistic merit. Most of the examples of the so-called "Mission style" in California are very uninteresting in their decorative motives, however big their ground plans may be in their liberal use of space.

The Oregon building is just across the way from the California building, and as an object of artistic analysis it is a most interesting single unit. Personally, I am not enthusiastic over it. It was most decidedly a very illogical idea to select a building to represent Oregon from a country which has nothing whatever in common with this northern State. One could hardly discover a more arid country, devoid of vegetation, particularly of trees, than Greece; and to compare it with the apparently inexhaustible wealth of virgin forests of Oregon makes the contrast almost grotesque. Besides, a building like the Parthenon, designed to grace and terminate the top of a hill, is surely not adapted for a flat piece of ground like the Exposition field. And in the choice of material used in its construction it shows a lack of appreciation for the fitness of things generally. The Parthenon was designed to be made in stone, as much for the construction as for the light color effect of the marble. Only the light color play of its exterior would do against a placid blue sky to relieve the otherwise exceedingly simple rigidity of its massive forms of construction. To make an imitation of this great building in uncouth, sombre, almost black pine logs of dubious proportions is hardly an artistically inspired accomplishment.

There must always be a certain regard for the use of the right material in the right place. A wooden bridge will disclose its material even to the uninitiated at a very great distance, because everybody knows that certain things can be done only in wood. A stone, concrete, iron, or cable bridge, for example, will each always look its part, out of sheer material and structural necessity. A log house would have been far better and more successful than this pseudo Parthenon. It is in the same class with the statues of Liberty made from walnuts that are the great attractions in our autumnal agricultural shows. The State of Oregon, however, is well represented by a fine, immense flagpole, which could hardly have been cut anywhere else than on the Pacific Coast.

Of other State buildings in this neighbor-

ITALIAN TOWER, FROM SOUTH GARDENS.

LOOKING INTO COURT OF FLOWERS.

PROMENADE, PALACE OF AGRICULTURE.

hood, a number are impressive by their cost, like the New York building; others, again, by historical suggestions of great charm. There are several which reflect in a very interesting way the colonial days of early American history; and buildings like those of New Jersey and Virginia, in spite of their unpretentiousness, are very successful. Nobody would take them for anything else but what they represent.

The Pennsylvania building shows a very fine combination of the classic and of the modern. It was originally designed to hold the Liberty Bell. In order to avoid the necessity of building a fireproof building, the open hall was adopted, with its inviting spaciousness, and two lower enclosing wings at the side. The arrangement of the Pennsylvania building is formal, owing to its symmetry, but not at all heavy. Its decorative detail is full of interest, and to discover Hornbostel of New York, the designer of the Oakland City Hall, as the author of this building, is a pleasant surprise.

Nothing excites the Exposition visitor more than the color scheme of the buildings. But "excite" is really not the proper word, because there is nothing exciting about it. Nothing was farther from Mr. Guerin's mind than to create excitement, unrest, or any of those sensations that might lead to fatigue or even to a nervous breakdown. We understand fully by this time that it was Jules Guerin who is the responsible artist, and who supervised the putting into existence of the first real "Guerin" that ever was. Mr. Guerin has the distinction of being the first director of color and of decoration ever appointed for an International Exposition.

It must become evident to any person who is at all familiar with the fascinating tonal designs Guerin produces for many of our leading magazines that what he did was nothing but to paint nature as he has been used to represent it in his pictures. Guerin must have had a glorious time with that first great opportunity, so seldom to happen, of putting all those pet colors of his into the actual outdoors, there to feast his eyes upon them. It was a daring and novel undertaking, most successful in a large way. I hope we are going to benefit by this successful experiment and begin to give life to our dreary cement facades, mournful roofs, and lifeless window-sashes, ornamentations, and what not. We are, I admit, hopelessly at the mercy of the house-painter, who knows much about estimates, something about paint, and little about color. I hope we are going to learn the difference between paint and color, the purely physical, meaningless thing on the one hand, and the intelligence-conveying, pleasure-giving element on the other.

Guerin certainly knows color, and I take it for granted that a man of his training and experience knows how to use paint. His Exposition buildings look for all the world like a live Guerin print taken from the "Century Magazine" and put down alongside of the bay which seems to have responded, as have the other natural assets, for a blending of the entire creation into one harmonious unit. I fancy such a thing was possible only in California, where natural conditions invite such a technical and artistic innovation.

The general effect is one of great warmth. The basic tone of the travertine furnishes a very rich foundation for the other colors added. The whole range of color is very simple, and it is simplicity and repetition over large areas that make the colors so effective. There are three different greens, for instance—the patina green on many minor domes, suggesting aged copper surfaces; a very strong primary green, on the small doors of the palaces and most of the lattice work; and another very pale, pinkish green, a sort of an abalone shell green, used on all the flagpole bases, always topped off with a light pinkish red, used above the light green base on all the flagpoles.

Then there are the reds, a number of different reds, running from a pinkish brick color to a darker russet red, to be found exclusively in all vertical panels serving as background for detailed statuary—for instance, in all the courts. Next to the red there is a brilliant orange, used in relatively small quantities here and there in the mouldings, as around the Brangwyn paintings in the Court of Abundance.

This leaves yet to be named the few soothing blues that abound in the ceilings, in the deep recesses of the walls, and the coffered arches, serving as backgrounds for the many richly-modeled terra cotta rosettes.

This is practically the entire range of colors, but they assume, of course, endless variations of tone and intensity, owing to the difference of the surfaces and the play of light and shadow. The relation of the whole color scheme to the colors furnished by nature is by no means accidental. The effect of the ensemble, on a calm, sunny day, is hard to describe in its gorgeous beauty.

The pressing into service of nature as applied to color was particularly inviting, of course, on the bay side, where simple sweeps of skies, foothills, and plain bodies of water furnish almost ideal conditions. This is true in a similar way for the background in the west, but toward the south—well, we had better forget such mournful outward aspects of our great city of San Francisco, known around the world for its gay temperament.

VESTIBULE DETAIL, PALACE OF MACHINERY.

Appreciating the importance of detail, Guerin extended his color treatment to practically everything presenting surface. Nothing could escape his vigilant eye. Even the sand covering of the asphalted roads is of a peculiarly attractive blend. It seems like a mixture of ordinary sand with a touch of cinnamon. Even that corps of stalwart guards had to submit to a tonal harmony of drabs, with touches of yellow metal, warm red puttees, and neat little yellow Spanish canes. They all seem very proud and appreciative of their part in the concert of colors, and they speak of it with feeling and reverence. Not long ago, during a rather stormy, wet day, I happened to notice several of these cicerones hiding in a doorway of one of the palaces, looking most disconsolate. The reason for it became immediately apparent; the un-Californian weather had forced them to put on civilian overcoats of indescribable hues, and the shame of being out of color was plainly written in their faces. It shows that art is largely a matter of education.

I fancy that all that a respectful and appreciative public could do, in order to live up to the occasion, would be to have Exposition suits built of pongee silk, or some other harmonious material. So far, on all of my visits, I observed a shocking preponderance of black, which I hope will eventually yield to the softer colors of lighter materials, with the arrival of warmer weather.

The careful observer will find that the crimson vermilion red of the fire alarm boxes had to yield to a more refined vivid orange, much, I understand, to the consternation of the Exposition fire marshal, who must have been shocked at this intrusion.

ARCADED PROMENADE.

COURT OF ABUNDANCE.

The horticultural effect of the grounds, flower beds and shrubbery will always adapt itself properly to the color scheme, and a preponderance of warm yellows, reds and orange will simultaneously fill out the garden areas. At first yellow pansies and daffodils had control, to be replaced in due season by the uniform appearance of tulips, hyacinths and successions of other flowers. This progressive appearance of new flower carpets will provide ever-changing elements of interest throughout the entire period of the Exposition.

It seems only right at this time to speak of the great and modestly contributed services of John McLaren. He, with his wide experience and unceasing energy, created the garden setting which ties all the buildings into a natural harmony. Hardly ever have trees, shrubs and flowers been used in such profusion in an exposition. Conventional in aspect, all great expositions in the past have been lacking in the invigorating elements, no matter how naturalistic the site may have been. The few scraggly pines of St. Louis looked more like undesirable left-overs of a former forest than like a supporting feature of the Exposition picture.

The stony look of many former expositions is not evident at San Francisco. Considering the fact that the Exposition is largely on made ground, it is amazing what has been accomplished. With the exception of the few scattered remains of an old amusement park—the Harbor View Gardens—so charmingly utilized in the courtyard of the California building, practically all the trees and shrubs had to be brought in from the outside, whole gardens being moved by Mr. McLaren "en bloc."

Like everything else, from the architecture down, the garden aspect of the Exposition is not frugal nor skimpy, whatever floral effects are used. Like shrubbery, trees occur in great profusion, and without regard for difficulties in transplanting.

CONSTRUCTION

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A. H. McPHAIL, formerly of Sault Ste. Marie, Ontario, and Irvin S. F. Walker, of Walkerville, have formed a co-partnership for the practice of architecture, and will be located at 48 Ouellette avenue, Windsor, Canada. Catalogues and manufacturers' supplies solicited.

* * *

THE LAYING of the foundation stone of the new union station at Quebec, August 12, marked a new epoch in the history of the ancient capital. The ceremony was performed by Mayor Drouin, and was witnessed by a large gathering including the Lieutenant-Governor and Mrs. Leblanc, Premier Gouin, many public men and a number of Canadian Pacific Railway officials, prominent among them being F. L. Wanklyn, of Montreal, and H. V. Mapes, C.P.R. engineer of buildings. Mr. Wanklyn said that the Canadian Pacific Railway was looking towards the future in this matter, assured that the progress of the port of Quebec demanded the most serious consideration, so far as it was a question of passenger terminus.

THERE has been a curious result of one of the fires caused by suffragets in 1914. The fire in question practically destroyed the historic Church of St. Mary at Wargrave, near Henley, which, among other interesting objects, contained the tomb of Thomas Day, the author. In the restoration it was found that the present casing of red brick is only a covering for the original Norman tower. The latter proves to be a very fine example of Norman architecture —one of the best, in the opinion of experts, existing in England. When the tower was cased with red brick is a mystery, but the work was probably done in the reign of Henry VII., or that of Henry VIII. Among other discoveries made as a result of the performance of the suffragette "arson squad" are a number of vaults under the chancel, of which no one had guessed the existence.

* * *

GRADUALLY the profession of architecture is assuming a standing similar to that of the lawyer, clergyman and physician. Two recent legislative acts happening in sections quite distant from each other indicate, to a large extent, the general attitude towards the registration of architects. During the last session of the Legislature the following amendment to the Act incorporating the Saskatchewan Association of Architects was passed, which is undoubtedly one of the most restrictive measures on the statutes of any province in Canada, and prohibits unqualified persons from practising architecture in Saskatchewan: "Any person who, not being an architect and registered under this Act, supplies, for hire, gain, or hope of reward, plans, blueprints or specifications for use in the erection, enlargement or alteration of any building not being built for himself or by himself as contractor for another person, shall be liable on summary conviction to a fine not exceeding twenty-five dollars for the first offence, and not exceeding one hundred dollars for every subsequent offence, and he shall be incapable of recovering any reward or disbursements on account thereof." The other is an amendment to the law of New York State, entitled "A law relating to general business." Here the section provides that a citizen twenty-one years of age of good moral character may apply for examination or certificate of registration, but before securing such a certificate, he must have graduated from high school and completed the equivalent of two years of college. He must further have had five years' practical experience in the office or offices of a reputable architect or architects. Graduates of a recognized architectural school with three years' practical experience are all eligible for examination. It has taken nine years of continuous effort to secure the passage of this measure.

TWO VIEWS OF COMPETITIONS

Looked at broadly, a competition is a great waste of skilful effort. It is true the prize, or prizes, given may be of higher value than is the professional value of the individual design, or designs, to which they go. They never, or seldom, represent the professional value of all the designs submitted, and thus the client has received more than fair value for what he has given. He has called forth a large amount of work for his own benefit for which he has paid nothing, and which is worthless for any other purposes, and has thus been the cause of much wasted labor. The difference between a competition and a lottery is, after all, but small; in the second the stakes are in money, in the first they are in labor. It is true that the one is a gamble whose success depends on chance, the other is one whose success depends on skill; but there are elements which handicap the skill of some of the competitors, and there is an element of chance in the decision of those who select the prize winners. If, then, there are any advantages in architectural competitions, they lie on the side of those who invite them; but we are speaking on the side of the competitors, and in their interests we feel that it would be well if competitions were abolished. Nothing of the kind prevails in any other profession, except in a very limited way in engineering, and the architectural profession would gain in dignity if it proscribed them.—*Indian Engineering.*

Competition necessarily spurs a man to greater individual effort, and while it is expensive—to the loser, for sometimes a competitive design will cost as much as $5,000—yet in the end the whole art and craft of architecture must benefit. The time seems to have come when an abandonment of the personal method of awarding design commissions will be reached. Necessarily this personal plan is rather limiting to the architect, for it tends to keep his work in a specific groove. The man who has designed a good church is likely to find himself receiving commissions for more churches, while the architect of a railway station, a library or a theatre will soon recognize that one task of this sort leads to another in the same field. Competition is likely to remove this and to broaden the whole field.—*Egerton Swartwout.*

* * *

THE CONSTRUCTION of the Exposition grounds and buildings at San Francisco, Cal., involved practically the design, construction and administrative organization for a complete, living city, at once idealistic in its architecture, for it had to represent the highest development of the art, and yet be severely practical in construction and management, for its space of life is very brief. The total construction cost amounted to $14,500,000, one-half of which was expended on buildings, and the balance on acquisition and preparation of site and supplying the engineering, sanitation, fire protection, water supply, heating, lighting, and other utility features. All this was accomplished within a space of three years and the result is the transformation of 625 acres of unimproved land (184 acres of which were marsh and tide land) into 64½ acres of main Exhibition palaces, 100 acres of growing gardens, trees, shrubs and flowers, 15 miles of asphalted roads, and other improvements.

* * *

TO insure rapidity of construction of the Panama-Pacific Exposition buildings, and to simplify organization problems, all of the work susceptible of definite specifications was let by contract, and it required nearly 1,000 contracts, varying from nominal amounts to $800,000.00. No body of men can appreciate what all this really meant better than the thousands of visiting builders who will, with their ladies, enjoy the enchanting scene by the Golden Gate in October next.

The main Exposition buildings, except a portion of the Palace of Fine Arts, the Tower of Jewels, and the great dome of the Horticulture building, were constructed on massive timber frames, and some idea may be obtained of their magnitude from the fact that this work involved the use of 80,000,000 feet B. M. of lumber, 80,000 lineal feet of two-inch hardwood pins, 6,200 tons of bolts, rods and plates, 3,500 tons of structural steel, 1,000 squares galvanized sheet metal, 920,000 square feet of glass, 18,000 tons hardwall plaster, 800,000 feet timber piling and 38,000 rolls prepared roofing.

* * *

AN INTERESTING catalogue for 1916 has been issued by the Reliance Ball Bearing Door Hanger Company, containing illustrations and description of their single hangers, also a complete list of their agents. This valuable booklet can be obtained by writing the company at 30 East 42nd street, New York City.

October, 1915 Vol. 8, No. 10

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H. GAGNIER, Limited, Publishers

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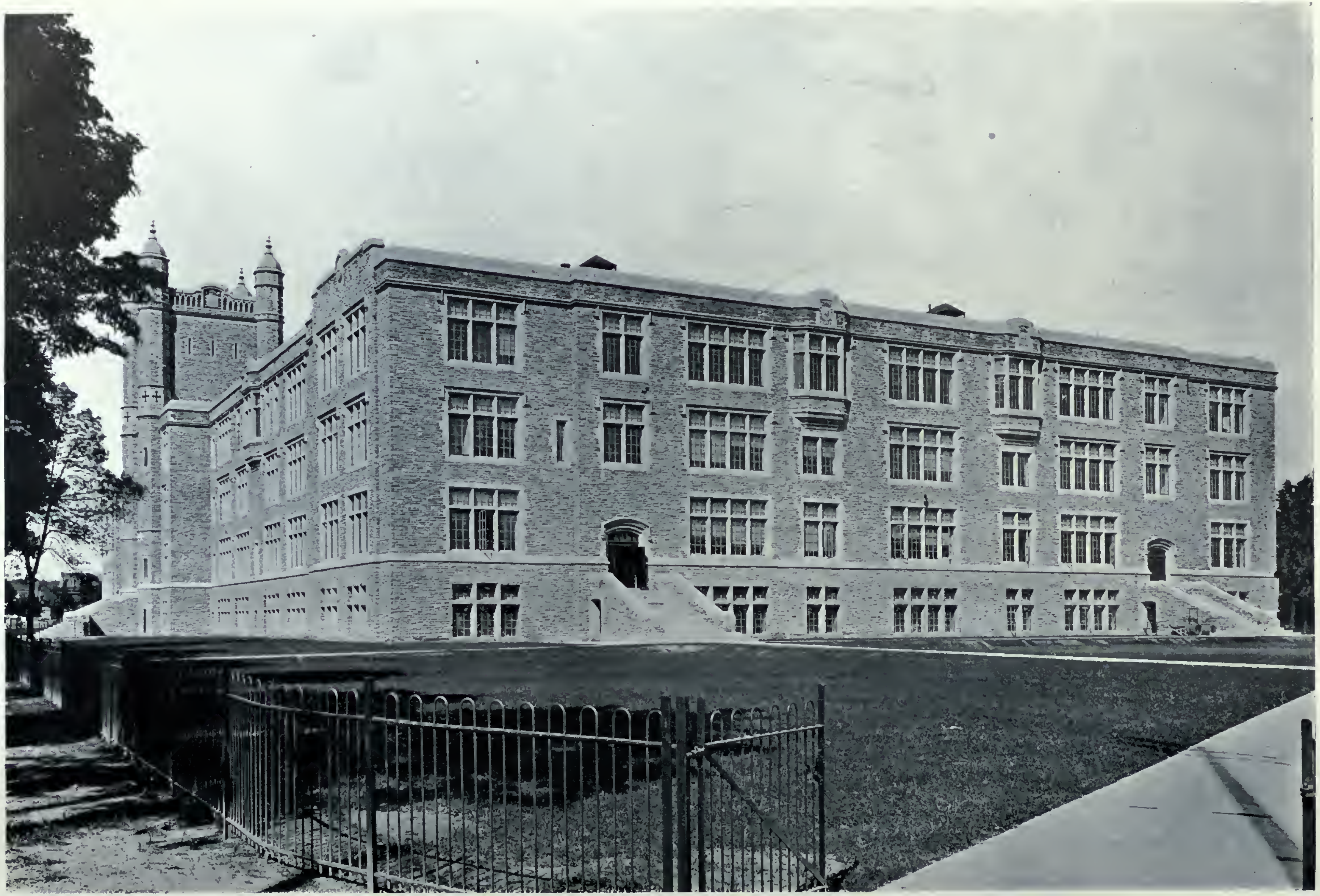


CENTRAL TECHNICAL SCHOOL, TORONTO.

ROSS & MACDONALD, ARCHITECTS.

Editorial

NEW CENTRAL TECHNICAL SCHOOL, TORONTO

The new Central Technical School of Toronto marks an epoch in the progress of modern education. Its future will be a great accomplishment of the present ideas. No one can appreciate the influence such training will exert on the political as well as domestic trend of our country. It is well, therefore, that the institution has been housed in a modern up-to-date structure, for endeavors of this nature are not temporary. Taking up two city blocks, the site amply accommodates the building four hundred and twenty-five feet in length, and in time when the nearby shacks are demolished and a wide approach planned from Bathurst street, the work will be heartily commended by all. It will stand as a living monument to the common sense occasionally exhibited in the present generation.

REVIVAL IN BUILDING LINES

It is encouraging to see the disappearance of the pessimistic expression which has prevailed since the first day of the present struggle among the European powers. The Government, the moneyed corporations and the individual all seemed to encourage hard times by their attitude towards the stoppage of legitimate building projects. Gradually they have felt the wave of prosperity which is sweeping over the States and consequently are benefiting by it. That Canada should not go ahead in a certain ratio is a mistaken idea and what we all need is more confidence in the exhaustless resources scattered throughout the Provinces. One of the wholesome signs of a reversal of feeling is the activity shown in connection with the new Toronto station. The site will soon be in readiness for a rapid completion of the proposed structure, which will accommodate the new post office. This will mean renewed life in many factories and should be followed by other undertakings which have been temporarily shelved.

PUBLIC COMFORT STATIONS

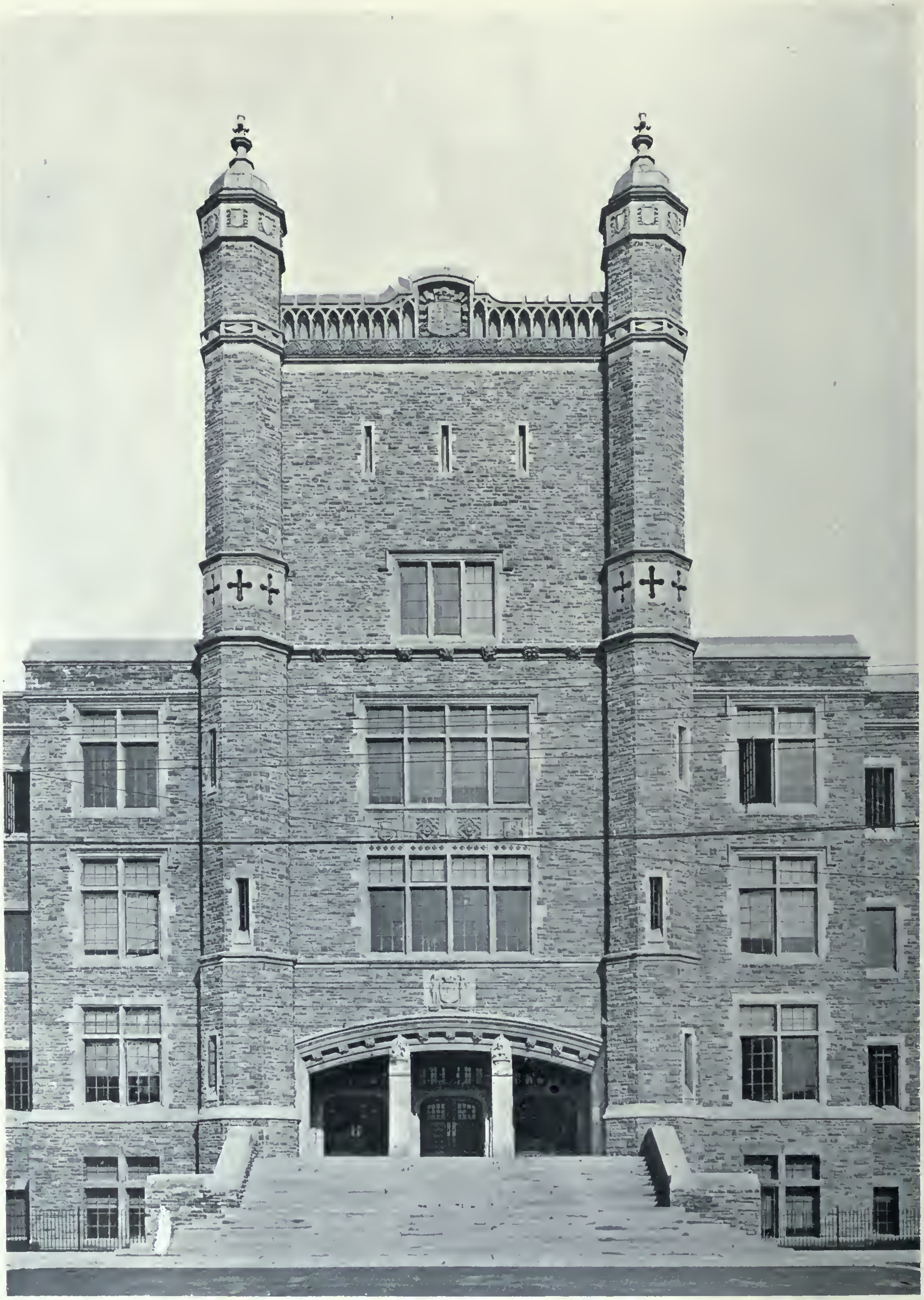
Much valuable assistance has been obtained from foreign countries after a thorough study of their problems and the manner in which they have been met. Much more could be absorbed to our credit. One fact especially seems to impress us: the lack of public comfort stations. Every city and town should realize the extreme necessity of such conveniences from the standpoint of health alone. We appreciate the great need and still remain inactive to our general interests. Foreigners who know the value of this work are greatly surprised at progressive cities like Winnipeg, Montreal and Toronto neglecting to arrange proper facilities in a sanitary and esthetic manner. Our false modesty will at least provide artistic arrangements which would be quite commendable—but the main point is to consider the matter seriously and take some action in this direction. Every year of delay makes the work all the harder and more expensive.

SCHEME TO DESTROY NIAGARA FALLS

It seems impossible for a year to pass without some scare as to the mercenary tendencies of the present era stepping in and raising havoc with the natural beauties which have managed to escape up to this time. It is hardly creditable that schemes for injuring the Niagara Falls and the Rapids are entertained, but both the States and Canada have fought such propositions for years and will do so until they become broad-minded enough to settle it once for all. W. H. Barker, of Montreal, absurdly claims that a plan to generate 2,250,000 electrical horsepower under the falls by taking the water through penstocks projected into the falls would in no way injure the present effect. It is to be hoped that when this is submitted to the New York State Legislative Commission they will waste no time in discussing it, for such schemes should never be presented, let alone considered seriously.

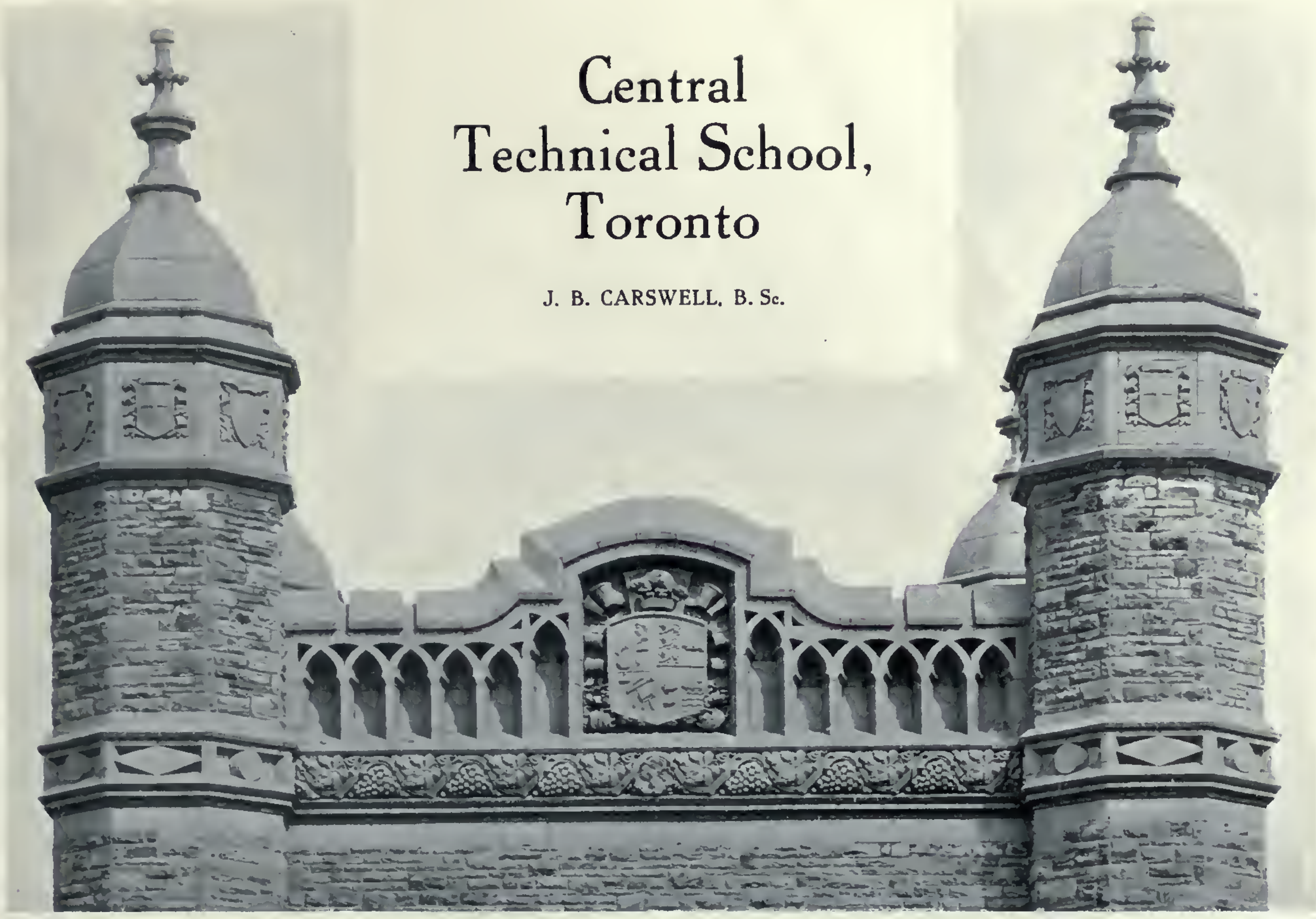
CHANGE IN EDITORIAL STAFF

Construction regretfully announces that this issue will be the last under the supervision of its present editor. Frederick Reed has been with the journal for three years, and the high standard maintained throughout that period is the greatest tribute which can be paid for his services. Mr. Reed wishes to thank the readers for their helpful criticisms; the architects and engineers for their co-operation in the presentation of Canadian work; and the contractors for their hearty support at this critical period. He asks a continuance of former loyalty towards Construction and sincerely trusts that all parties concerned will strive to keep its present wholesome character and thereby hold its place among the few leading architectural journals of Europe and America.



MAIN TOWER, CENTRAL TECHNICAL SCHOOL, TORONTO.

ROSS & MACDONALD, ARCHITECTS.



Central Technical School, Toronto

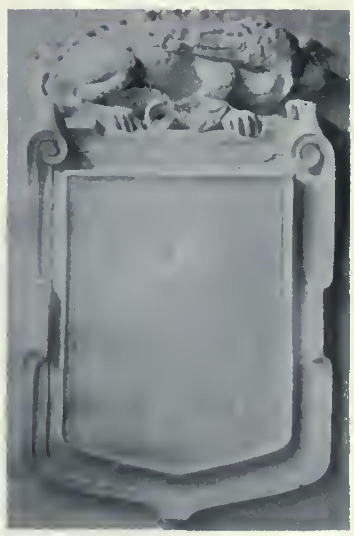
J. B. CARSWELL, B. Sc.

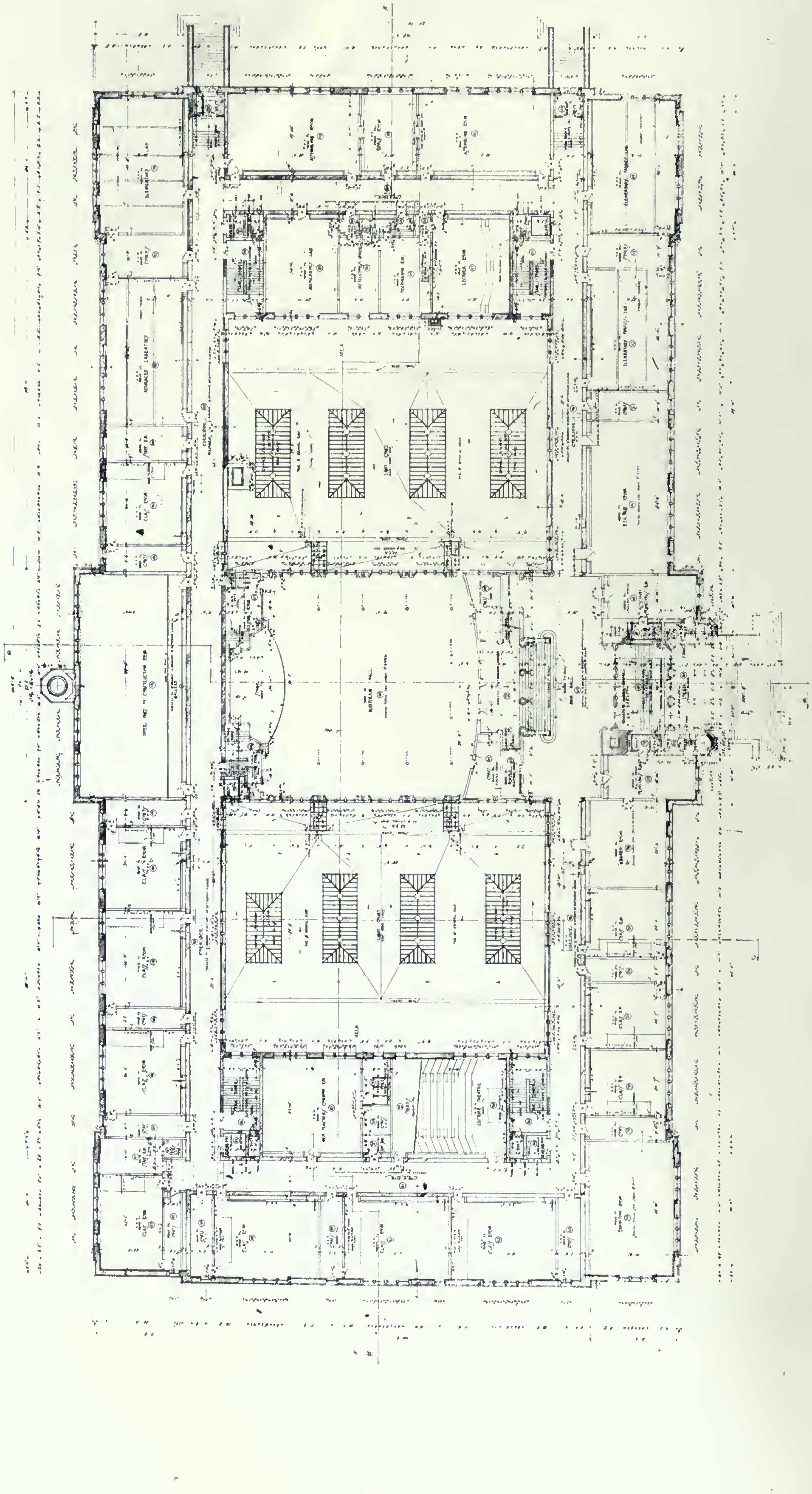
SITUATED in the geographical centre of the city and occupying two whole blocks, the Central Technical School stands completed to-day, a beautiful and lasting monument to the determination and energy of the little minority who realized the importance and the great future of technical education.

The building stands well back within its grounds and faces public streets on all four sides, so that each elevation is treated with almost equal value. The overall dimensions are four hundred and thirty feet along Lippincott and Borden streets, and two hundred and twenty-eight feet along Harbord and Lennox streets. The size of the site allows for the accommodation of a football field at the north or Lennox street end, and tennis courts at the Harbord street end. There are four main floors with fourteen feet six inches clear ceiling height, including the basement, the floor of which is only four feet below grade. Above the main entrance on Lippincott street, raises a

large tower of imposing dimensions, which relieves the length and lends dignity to the whole structure.

The building is Gothic in character, the exterior being of local limestone laid up in Scotch rubble masonry, while a very pleasing color effect has been obtained by blending about twenty per cent. of pure grey with eighty per cent. of pink and grey or piebald stone. The steps, platforms leading to the entrances, and the base course are all of the same kind of stone, but cut from pure grey dimensioned stock. The trim to the basement windows, on account of the greater ease in cutting, was made from "Grey Canyon," and the match between the two stones is nearly perfect, so much so that only an experienced eye can detect the difference. The trim to these windows is rock faced to blend with the adjoining work, the endeavor being not to accentuate these openings. Above the moulded water-table at the first floor level which forms the top member of the base proper, the

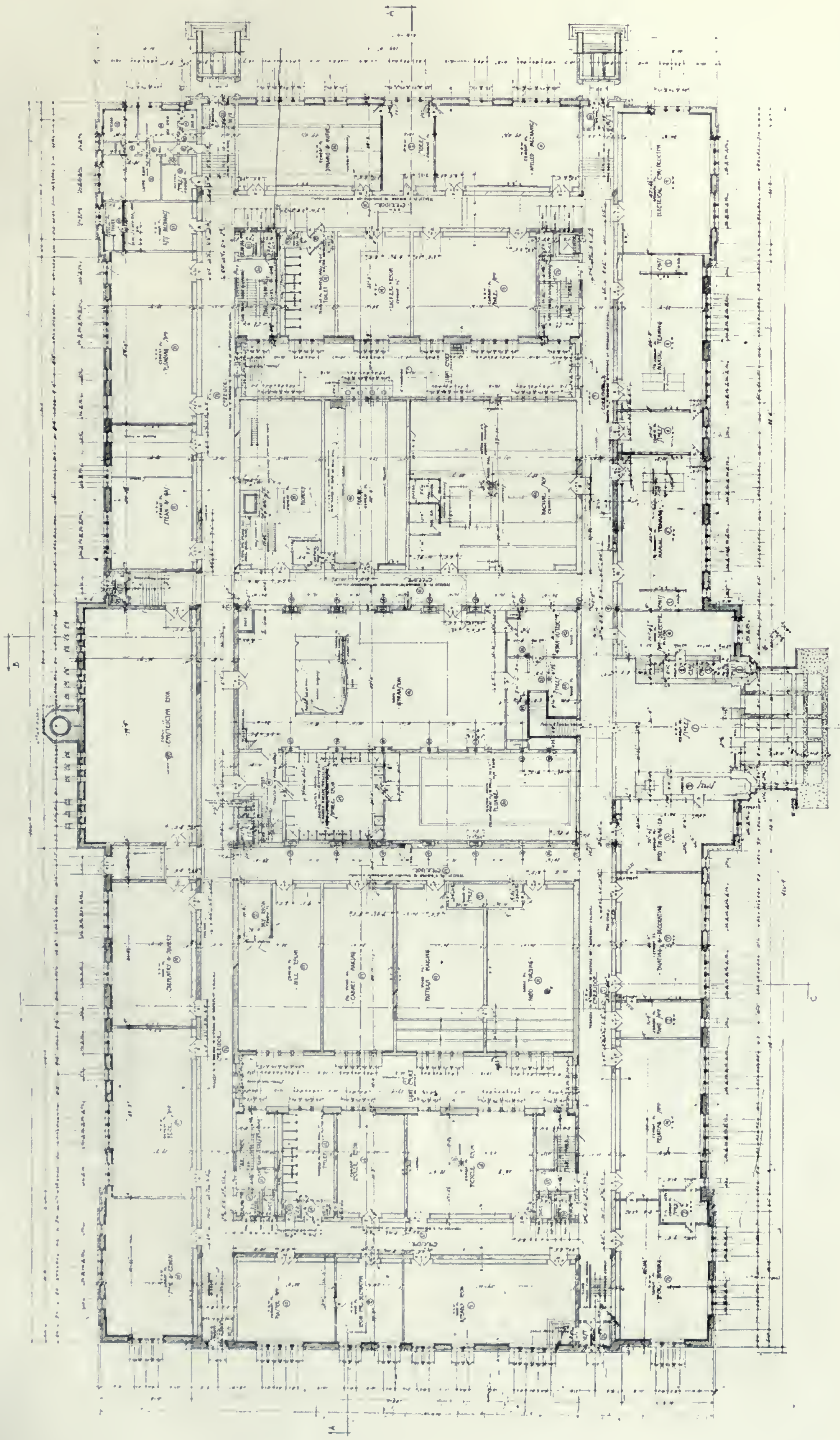




FIRST FLOOR PLAN.

CENTRAL TECHNICAL SCHOOL, TORONTO.

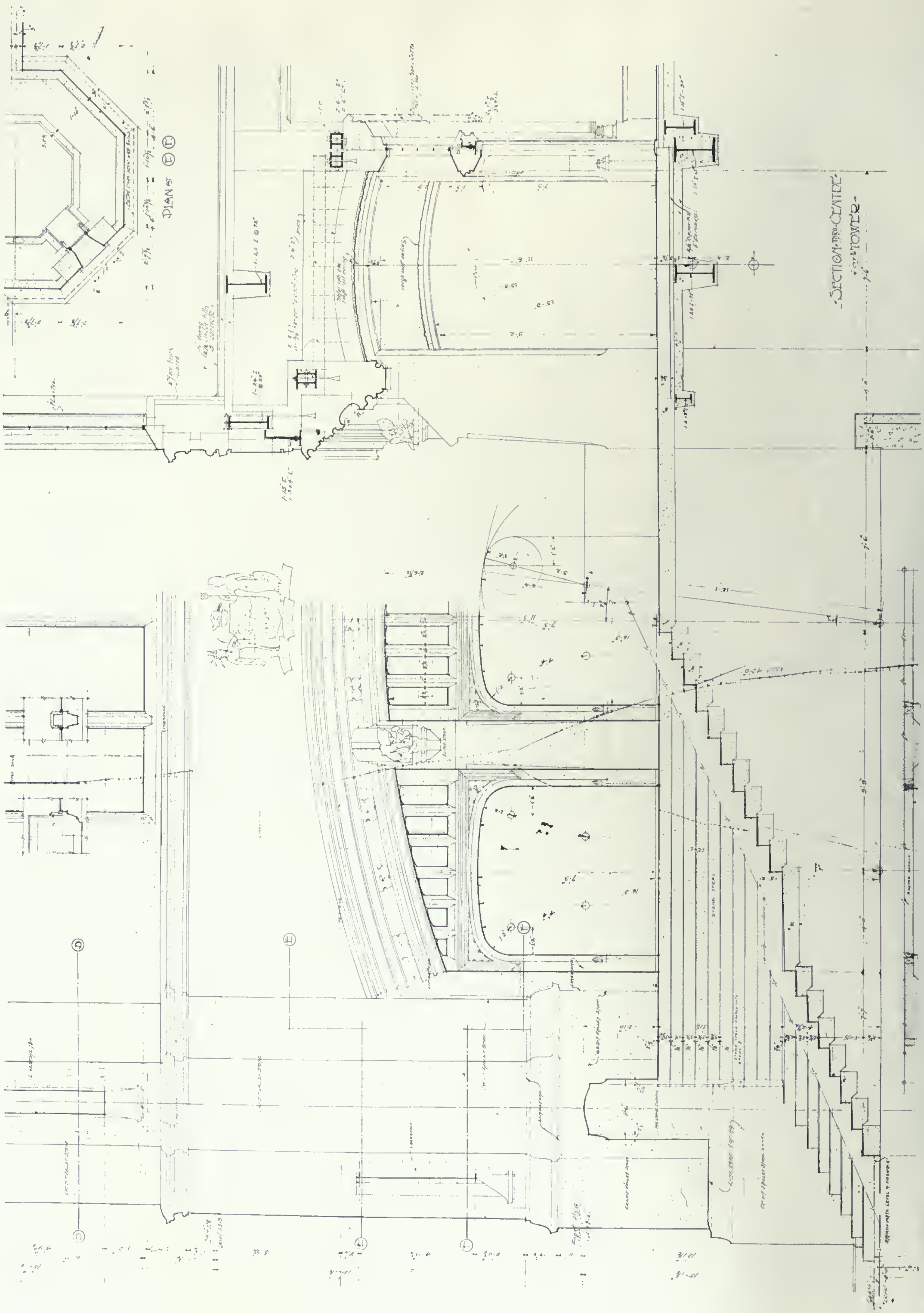
ROSS & MACDONALD, ARCHITECTS.



BASEMENT PLAN.

CENTRAL TECHNICAL SCHOOL, TORONTO.

ROSS & MACDONALD, ARCHITECTS.



ENTRANCE DETAIL.

CENTRAL TECHNICAL SCHOOL, TORONTO.

ROSS & MACDONALD, ARCHITECTS.

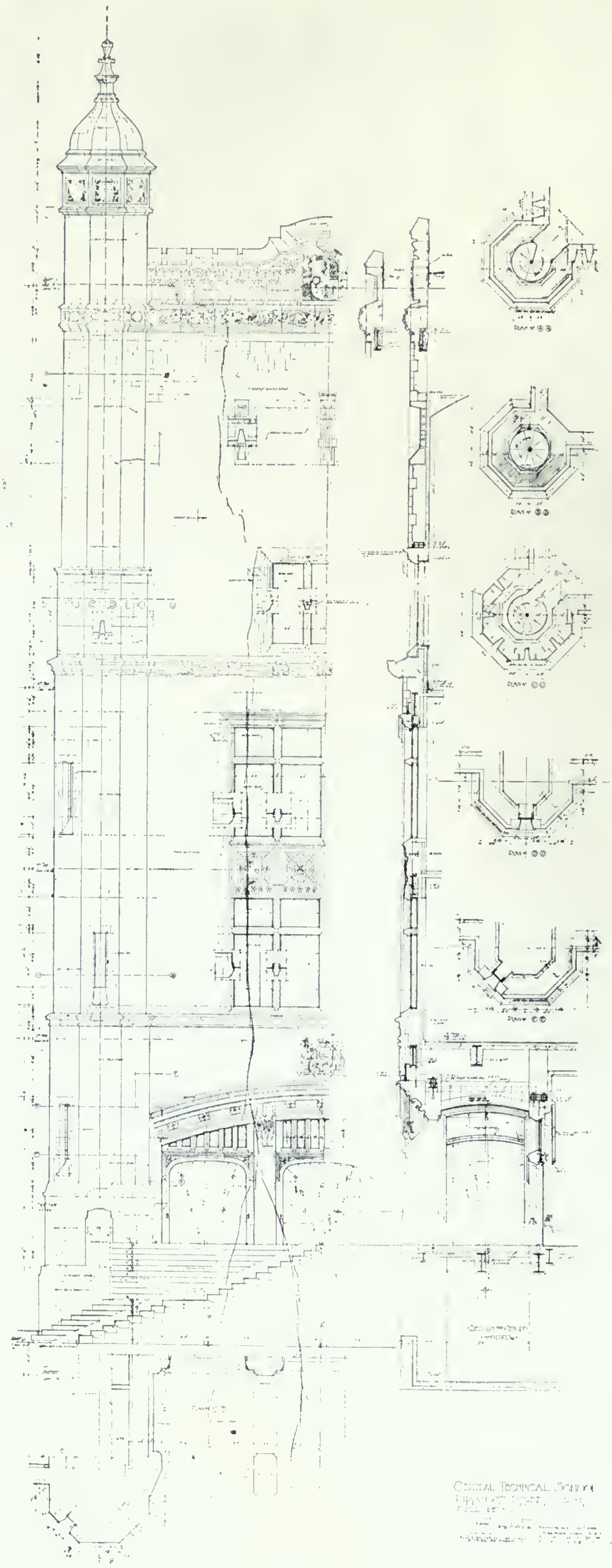
window trim is all in dressed Indiana limestone. At the third floor ceiling line this changes again to glazed terra cotta to match with the Indiana stone. The cope all around the building and the ornamental work on the tower is in the same material. The two large interior courts of the building, each one hundred and fifteen feet by ninety feet, are finished with a light buff pressed brick.

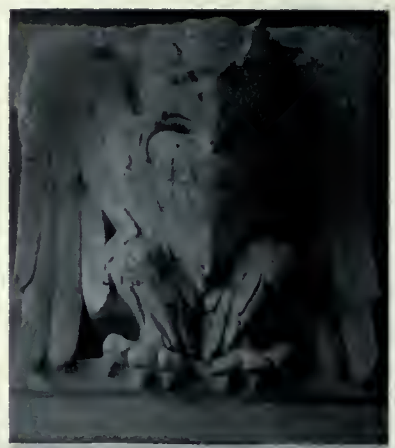
There are eight subsidiary entrances to the building, apart from the main entrance. On Harbord street side two flights of steps lead to the girls' entrance on the first floor, beneath which stairs are entrances to the basement corridors. On the north side are two boys' entrances, one of which is provided with a bicycle ramp; while on the rear are two freight entrances, one being provided with a ramp for the handling of heavy material.

Entering by the broad flight of stairs on Lippincott street we pass under the heavy stone archway supported by two buttresses capped by stone grotesques representing "Industry" and "Science." The three pairs of main oak doors, Gothic in design, lend interest to the entrance. From the vestibule a flight of marble stairs leads through another series of doors to the main hall executed in cream semi-glazed terra cotta. Facing the entrance is another flight of marble stairs leading up to the auditorium, continuing right and left up to the auditorium balcony, also to the second and third floors. Canadian marble was used for all these stairs, and it is interesting to note in this connection how successful was the effort to use Canadian material wherever possible. Every brick in the building and the entire masonry shell are composed of Canadian goods, excepting the window trimmings.

ENTRANCE DETAIL.

Leading north and south from the main hall are the corridors which continue right round the building with class-rooms leading off on either side. These are repeated on all floors in the manner shown on the accompanying plans, there being close to one mile of these corridors, which are eleven feet broad, with terrazo floors, pressed brick walls ten feet six inches high and





DETAILS OF

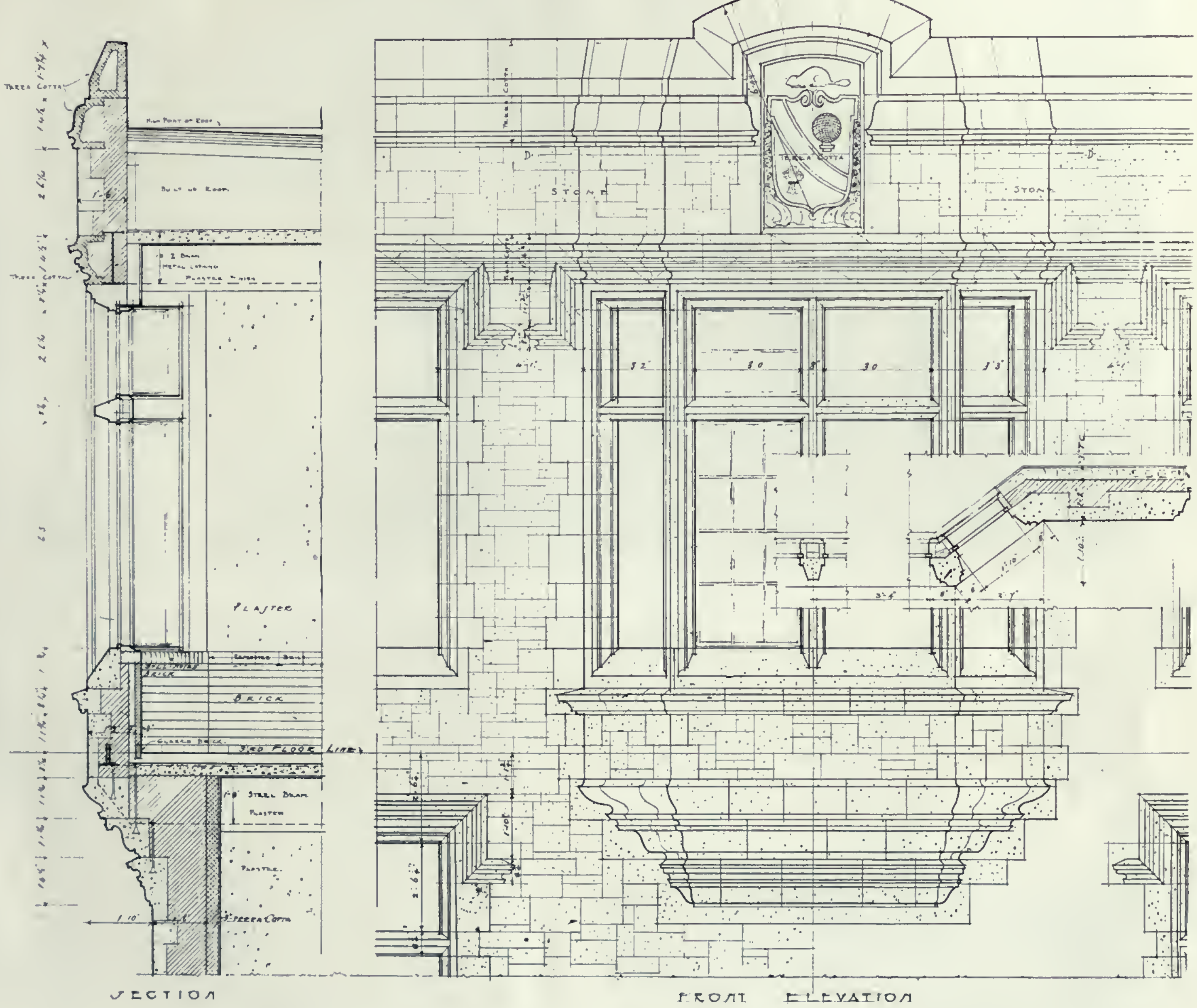
CENTRAL TECHNICAL SCHOOL,

TORONTO.

ROSS & MACDONALD, ARCHITECTS.

barrel-arched ceilings in plaster. The walls start with a dark chocolate colored glazed brick course at the floor level, with a three foot six inch dado of dark buff unglazed brick above. The cap of the dado is a single header course on edge of a darker brown brick from which rises the main wall of light-colored buff brick. The top course is a simple moulded header course on edge, from which springs the plastered ceiling, the plaster being tinted to blend with the color scheme.

with oak stiles, surmounted by a heavy oak cap-rail. All the sand-finished plaster in these upper panels has been "scumbled" with a rich mixture of reds, browns and greens, the brown predominating, and the frieze above is treated with a stencilled design on the same scumbled field. The entrance to this room is emphasized by a richly carved doorway with the letters "C. T. S." in relief in the pediment; the ceiling is panelled in plaster, tinted in dark cream,



DETAIL OF ORIEL WINDOW.

The rooms calling for special mention on account of their architectural merit are the board room, exhibition room and reading room or library. The woodwork and plaster work, both ornamental and plain, through design, decoration, and surface treatment, harmonize with the Gothic exterior and at the same time stand as very fine illustrations of craftsmen's work. The first room above referred to is the board room. Red oak is used in this room, as throughout the building, the walls being panelled to a height of three feet, while above this are plaster panels

with light ribs running in both directions, wiped off in light brown. From the intersection of these beams hang inverted bowl fixtures, the glass etched with a grape and leaf design.

In the north-west corner of the same floor is the exhibition room, which has been treated very similarly to the board room, excepting that the plaster panels above the 3 ft. dado are replaced by a continuous cedar dado, finished with a dark oil stain, on which drawings and exhibits will be mounted. The ceiling in the

MAIN HALL.

field is plain sand-finished plaster, with one band of enrichment, showing the grape and leaf ornament, and a molded cornice, the ornamental work being wiped off in a slight neutral tone. Frieze, cornice, enrichment and ceiling are stepped up in tone from a grey cement to a light cream. Measuring forty-eight feet long by thirty feet broad, the room is beautifully lighted by the large casement windows on both sides.

CORRIDOR.

The reading room to the south of the main hall is the only other room on this floor which departs from the regular severe treatment. It is lighted on the west side, and the other three walls are lined with red oak book-shelving nine feet high, the color necessary to the room is furnished by the books themselves. The dimensions are fifty-five feet by twenty-eight feet. The balance of the floor is taken up by a series of class rooms devoted to mathematics, physics, etc., the average size of which is thirty feet by fifty feet. At the south end are the physical laboratories, equipped very thoroughly with permanent tables specially designed for their immediate use and purpose.

Each floor has one general lecture room, with a preparation room leading off, and at the north end of the first floor is a large amphitheatre, which will be used principally for public lectures, having a seating capacity of over 200, with a ceiling height of two storeys. At the rear there is a moving picture cabinet. The rooms on the second floor, devoted entirely to the needs of women students and equipped for domestic science and domestic art, including cooking, housekeeping, laundry work, sewing,

INTERIOR VIEW, MAIN ENTRANCE DOORS.

millinery, dressmaking, etc., and also the rooms on the third floor equipped for chemistry, machine drawing, architectural drawing, etc., from a construction point of view are all treated alike. The walls are faced with pressed brick to a height of three feet, the color scheme in this dado being the same as described for the corridors, the bricks, however, being set up on edge to show what is usually the bed. The cap of the dado and all corners, angles and window sills are bull-nosed, and the plaster-face of the wall above is set back three-quarters of an inch; the ceiling is plastered right on the floor slab, with beam-haunching exposed, the plaster being tinted a rich buff stepping up from the brickwork to the lighter ceiling above; the window shades are a subdued olive green tone. All the rooms are flooded with light, and the result is very pleasing.

The building of the partitions between rooms was rather interesting. Up to the three-foot height the wall consisted of two faces of pressed brick on edge, as explained, with a three-inch terra cotta core. By increasing the terra cotta to four inches above the dado, and adding on two thicknesses of plaster, the necessary step-back was obtained to accommodate the bull-nosed cap and furnish a pleasing effect.

The exterior walls and the main corridor walls take all the floor loads, transmitted in the typical spans by twenty-inch I-beams, No. 72, eight feet on centres; the auditorium section in the centre of the building is, however, of skeleton steel construction. The ceiling of the auditorium, which also forms the floor of the third floor high level, is spanned by six eighty-foot girders, six feet deep, and each weighing about

AUDITORIUM STAGE.

DETAIL OF DOORWAY, BOARD ROOM.
CENTRAL TECHNICAL SCHOOL, TORONTO.

twenty-three tons, mounted in two pieces, the centre joint being finished by field rivetting.

The auditorium is a handsome room, eighty feet broad and ninety feet long, consisting of the main floor approached from the entrance hall and the gallery leading off the second floor hall. It has a seating capacity of practically one thousand three hundred people. The walls are panelled in red oak to the height of the window sills, both on the main floor and on the gallery, above which is sand-finished plaster toned to a neutral cement color and lined off in imitation masonry. It is lighted both on the north and south through hope metal casements with leaded glass. At the east end is the stage, capable of seating comfortably about one hundred people, and above a large, simple-molded proscenium arch. The ceiling has heavy plaster beams running across the breadth, with smaller beams intersecting, the intersections being finished with modelled bosses. The main beams rest on massive corbels, each beautifully enriched with varied grotesques of a Gothic type, which tend to relieve the severe lines of the beams themselves. From the centre of each ceiling panel hangs a solid cast bronze lighting fixture, also Gothic in design. The Gothic treatment, the general proportions and the subdued tones create a very restful atmosphere in this room. Immediately over the auditorium is situated the art department, a series of class-rooms with maple floors, plastered walls, panelled to a height of nine feet, with cedar dadoes, and lighted both from the light courts and from the roof.

The basement of this building consists of a series of workshops, each one allocated to a different trade. These rooms are about fifty feet by thirty feet; the window sills being level with the grade outside, so that the lighting is in no way interfered with. The walls are lined by pressed brick to the level of the soffits of the ceiling beams; the dado in the corridors is carried round these rooms; the ceilings are plastered, and the floors have a hardened cement finish; the walls, as in all the class-rooms above, are generously lined with four-foot slate blackboards; in fact there is just three-quarters of a mile of these blackboards in the building. Sliding sections are provided behind the lecturers' tables, with fixed sections behind. In the rear of the basement is a large construction room, eighty feet long, thirty-seven feet broad, with a thirty-foot ceiling, the walls of which

BOARD ROOM.

LIBRARY.

AUDITORIUM HALL.

boxes, a shower room with twenty-four showers equipped with anti-scalding valves. This room has a terrazo floor, and partitions between showers of white marble. The plunge leading off from the showers is fifty feet long by twenty-two feet broad, completely lined with white ceramic mosaic tile, which is carried across the floor and up the walls to a height of six feet. Above the sand-finished plaster is a white oil paint treatment toned with a slight touch of grey.

On all floors, except the first, large toilet rooms are provided at either end of the building, with terrazo floors, white marble divisions and wall dadoes. A battery of twenty-two cast iron enamelled wash-hand-basins occupies the centre of the room. On one wall is a row of fifteen solid porcelain urinal stalls, and on the other wall are ten water closets with vents and oil flush valves. The slop sinks are in separate rooms off the main corridor.

The sub-basement of the building is at a depth of twenty-seven feet below the sidewalk, reached by a stair from the basement corridor. There are four large units in the sub-basement—the fan room, engine room, boiler room and pump room. The fan room, containing the ventilating plant and other miscellaneous equipment, is a large room eighty feet long by forty-five feet broad, with a twenty-foot ceiling. The heavy concrete walls forming the sides of the room were rubbed down after the forms were removed and whitewashed, the ceiling being plastered and whitewashed also.

The engine room, leading off the fan room, is finished in a more pretentious manner. Measuring forty-three feet by forty feet, with a twenty-foot ceiling, the walls are finished in six by three-inch white glazed tiles to a height of nine feet, above which the plaster is

are lined the full height with pressed brick. Four large clere storey windows give ample light. It is the intention to build two full-sized houses at the one time in this room, the students from every workshop in the basement taking part in the operation.

Immediately below the auditorium are placed the rooms for physical instruction. These consist of a well-equipped gymnasium, ninety-two feet by forty-eight feet, with a running track above; a dressing room with forty dressing

DETAIL OF AUDITORIUM.

DOMESTIC SCIENCE KITCHEN.

EXHIBITION ROOM.

finished in white enamel paint. The floor is of six by six-inch red Welsh quarry tiles struck off in grey joints. A large mezzanine gallery runs around three sides of this room, accommodating the main switchboard, and giving access to the operating engineer's office and storeroom.

The boiler room, containing the battery of boilers, and the pump room leading off, are each finished in the rough, the same as the fan room, the latter being an inside room, while all the others are lighted from the street by large windows looking into light areas.

The building throughout is entirely fireproof. Four fire stairs are located one at each corner, and these, in conjunction with the numerous exits and the wide corridors, ensure the perfect safety of the pupils and staff. Accommodation is provided for four passenger elevators, one alongside each of the fire stairs, but for the present only one has been installed, at the south-west corner.

The conditions of competition for the selection of an architect were issued by the Board of Education on March 30th, 1912. The ensuing winter was spent by the successful competitors in studying the big problem and preparing the working drawings and specifications, and on April 29th, 1913, the building contracts were signed and work on the site was commenced.

Two whole city blocks are occupied by the building. These had previously been cleared of the old structures, and the steam shovels got off to a good clean start. About five feet below the surface the clay commenced to harden up, and fifteen feet down it became so hard that dynamiting had to be resorted to. At the extreme depth of thirty-five feet practically no impression at all could be made on the material with the pick. Six weeks later a start was made on the main exterior walls, commencing on the north wing, and during the summer this work proceeded rapidly. The heavy concrete walls in the sub-basement were simultaneously pushed ahead, and when winter set in it found the walls well up towards the second floor level, the basement and first floor steel laid, a portion of the floor slabs poured, and the sub-basement roofed over and protected. For practically three months the work was suspended by the very severe weather experienced during this winter. The building lay in this exposed condition, sub-

PHYSICAL LABORATORY.

TYPICAL CLASSROOM.

ject to continuous zero weather, and it is interesting to note that a very careful examination failed to reveal the slightest damage when the spring weather set in, despite the fact that no protection was given to either the floors or the footings. With the advent of spring a start was made with the steel skeleton for the auditorium section in the centre of the building. The brickwork was also pushed ahead rapidly, and as this comprised finished pressed brick interiors as well as backing brick, it became necessary to employ quite a little army of laborers clearing away debris, protecting the finished work, and keeping things clean.

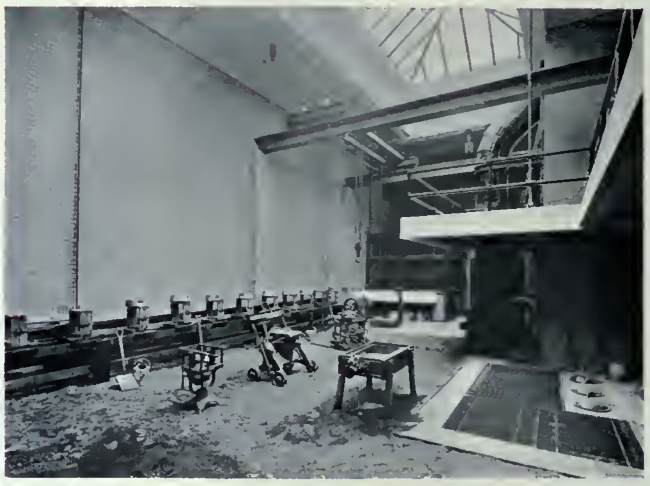
In the height of the summer months, between five and six hundred men were employed on the job, of whom about one hundred and fifty were bricklayers, and it took the little quarries sixty miles from Toronto all their time to supply the necessary amount of limestone. By the end of November the plaster work was finished and the building all closed in. The carpentry was commenced about Christmas time, and the entire building finished and handed over to the board on the 5th of June, 1915, five weeks after the contract date.

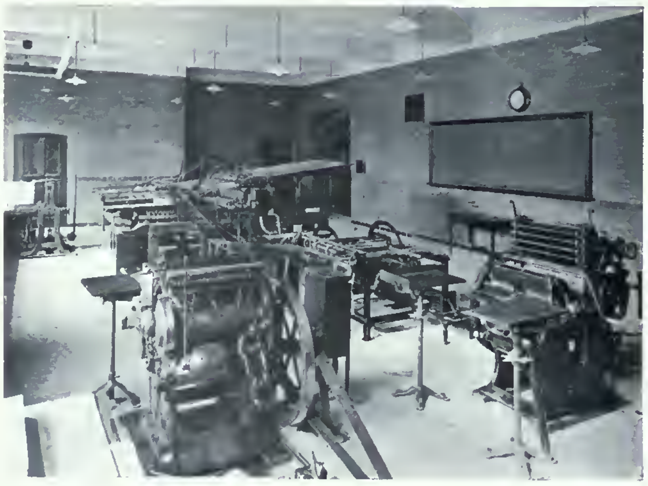
Meantime the work of equipping the school was well under way. This big task, entailing the outlay of close on $300,000, was carried out principally by Dr. McKay and his staff, the architects and engineers assisting where constructional features were involved. Towards the end of August of the present year this equipment was pouring into the edifice in an endless stream, and by the 31st of the month everything was in its appointed place and the structure opened for business, complete in every detail.

The cost of the building, exclusive of the equipment, but including all the mechanical features, and all architects' and engineers' fees, has been $1,426,400.00, giving a cubic cost of 26 cents. The site cost approximately $300,000.00, so that in round figures the whole expenditure has been two million dollars.

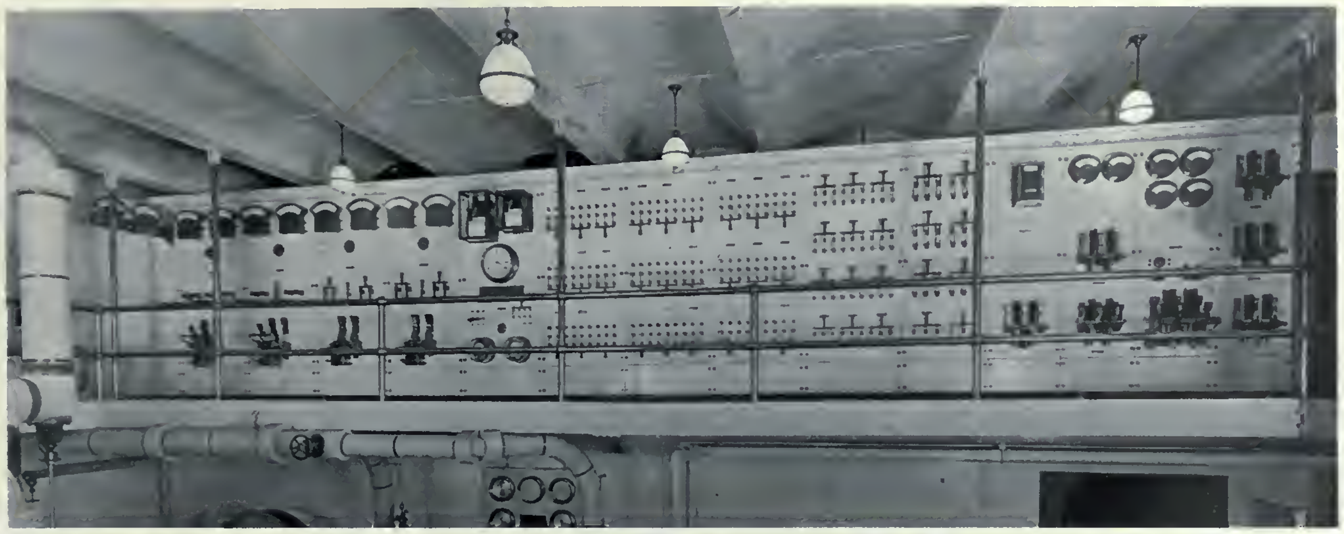
The floor area is one hundred and eighty-four thousand seven hundred and fifty square feet, and the accommodation is estimated at five thousand night students and two thousand five hundred day students. The safety, health and comfort of both students and staff have been subjects of very serious study, and the plumbing, heating, ventilating and other service features installed by the consulting engineers, and described elsewhere, are indeed worthy of examination. All the materials used in the building have been selected with a view to economy in first cost, as well as in maintenance, combining constructional value and architectural merit.


MILL ROOM.


FOUNDRY.


PRINTING SHOP.


MACHINE SHOP.



Central Technical School, Toronto

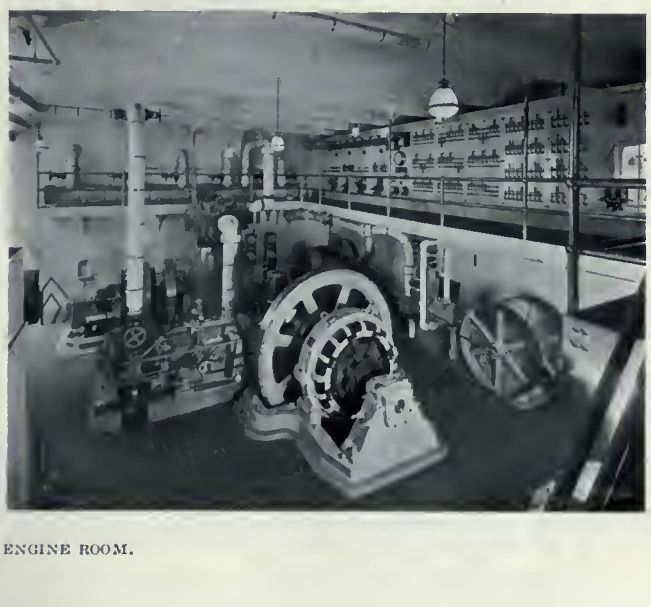
Mechanical, Electrical and Domestic Engineering Equipment

ALMOND D. WOODMAN

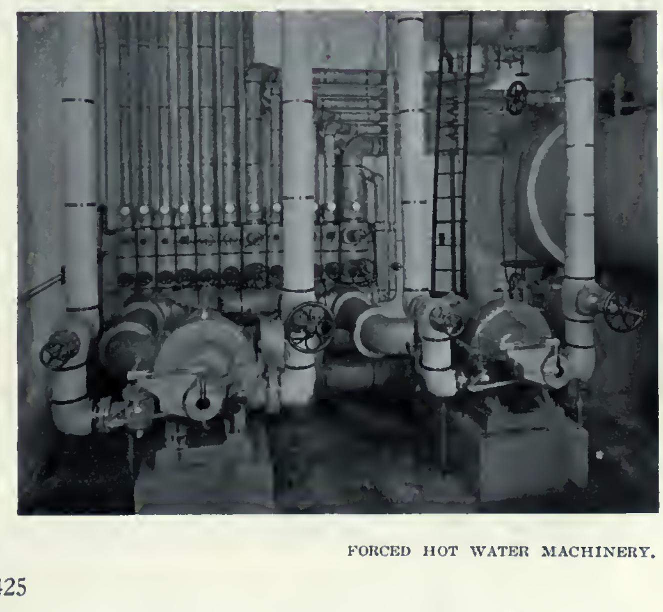
THE engineering equipment of a technical school is one of the most important and difficult parts of the building construction. It forms the sinews, muscles and nerve sinews through which the whole body acts, and if in any particular it is at fault, incomplete, or goes wrong, the entire teaching and student body suffers. Special engineering talent and a free hand for the designer to do his best are, therefore, most essential, and the Advisory Industrial Committee of the Toronto Board of Education early recognized these facts, and in preparing the programme of architect's competition for new Central Technical School stipulated that the board would "retain the joint services of architects and engineers."

The total works placed under the engineers' jurisdiction amounted to some $350,000, which the engineers, being guided by previous experience, divided into twenty odd contracts, so as to eliminate agents' and middlemen's commissions and obtain a maximum of value for a minimum outlay. The works thus divided consisted of complete steam and electric power plant, heating, ventilating and plumbing, switchboards, wiring and illumination, elevators and refrigeration, filtration, cold storage boxes, clocks, bells, phones, vacuum cleaning, and the fitting of all laboratory cabinets with engineering requirements. Some idea of the magnitude of works involved can be gathered from the following summary of gross quantities:

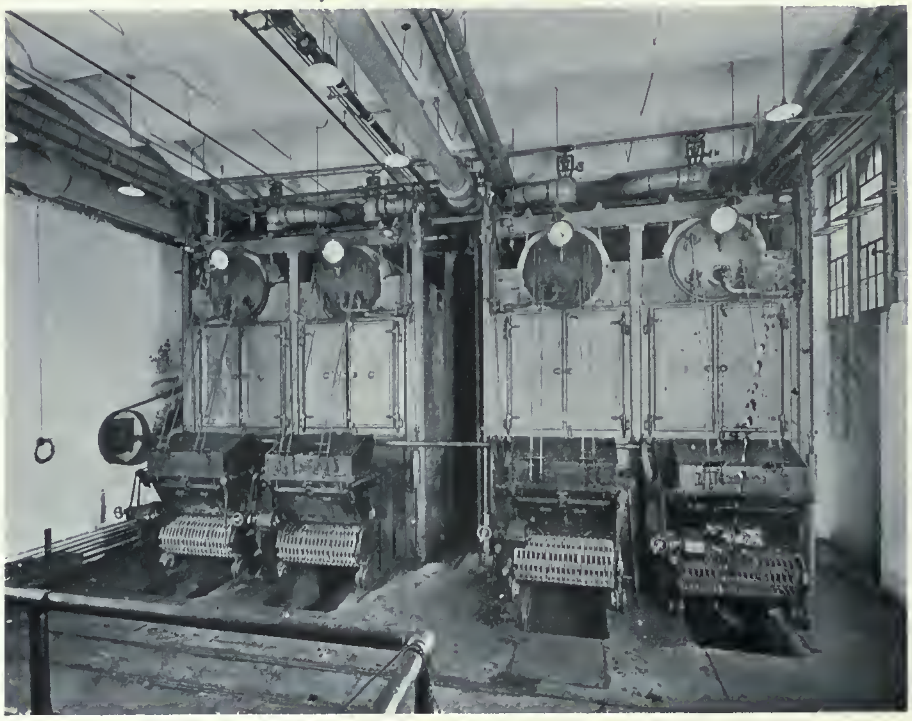
Boilers	4	750	h.p.
Engines	4	650	h.p.
Generators	3	475	k.w.
Motor generators	1	75	k.w.
Air compressor	1	314	cu. ft.
Ammonia compressor	1	12	tons.
Filter plant	1	4,000	gal. hour.
Main switchboard	1	42	ft. x 8 ft.
Number of panels		17	
Switchboard cap		550	k.w.



ENGINE ROOM.



FORCED HOT WATER MACHINERY.



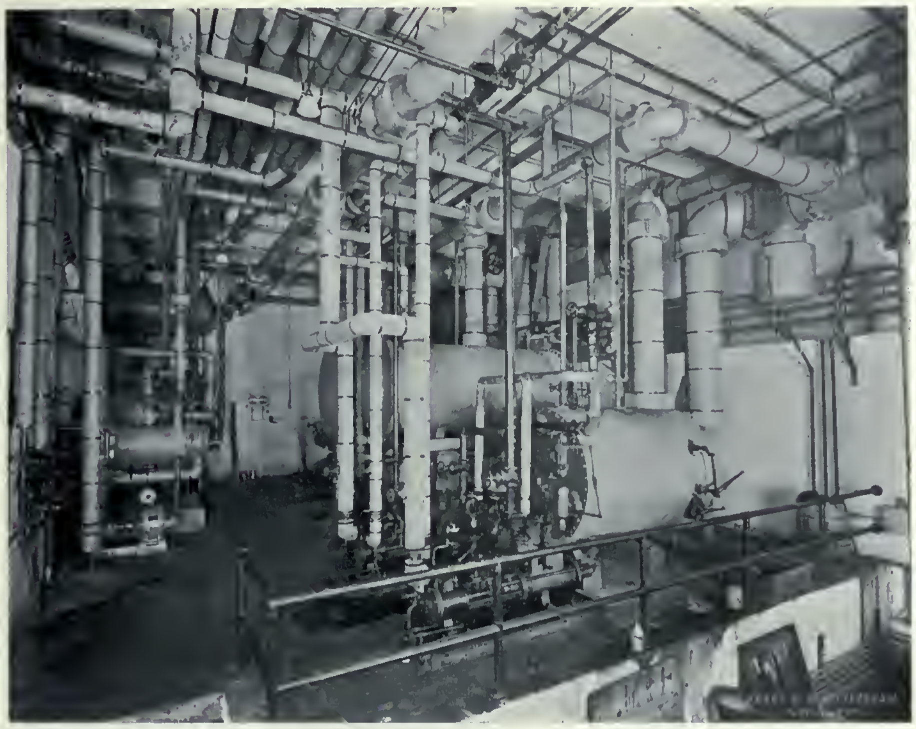
BOILER ROOM.

Length gal. iron ducts .	5 miles
Air washers..	2
Sq. ft. direct radiation .	50,000
Sq. ft. indirect radiation	17,000
No. rooms ventilated .	330
No. plumbing fixtures ...	600
Capacity coal bunkers ...	1,000 tons

No. distributing panels—light.	24
No. distributing panels—power	18
Main circuits	4
Branch circuits	55
Lineal ft. conduit	30 miles
No. lighting fixtures	2,000
Total candle power	550,000
Cu. ft. ventilation per min...	180,000
Fresh air fans	2
Exhaust fans	3
Area fresh air intake	25 ft. x 10 ft.
Area fresh air duct	5 ft. x 10 ft.

Special engineering problems were observed and arranged as follows: (1) To use Canadian material and apparatus wherever possible. (2) To provide a mechanical engineering equipment that could be relied upon to furnish light, heat and power at all times and for both day and night use; to arrange large portions of the same so as to give a duplicate, or breakdown service, and as regards electricity for light and power to further provide for using current from outside sources or from school plant, either one or both simultaneously, as desired. (3) To include in the specifications such an assortment of apparatus as to familiarize the student with all the leading makes of engines and other units most likely to be encountered in later life. (4) To so distribute and supply outlets for gas, electricity, compressed air, hot and cold water, etc., at all experimental and demonstration tables and in shops, laboratories, etc., that demonstrations and classes could move like clock work. (5) To further provide that entire departments could be later changed over, if desired, the vocational pursuits studied being entirely different from those previously allocated, and the requisite changes in lighting and power circuits, gas, water, air, etc., be made without demolition of floors, walls, ceilings and other permanent works. (6) To provide such a domestic engineering equipment as would render the building perfect from a sanitary and utilitarian standpoint—good ventilation and heating; ample supply of continuous hot and cold water; adequate toilet and lavatory accommodations, including plunge and shower bath facilities; good uniform and scientific illumination, both day and night classes being regularly held from September to June. (7) To keep the cost as low as might be found consistent with all the above and many other requirements, and to provide for the board the service which the public demanded without incurring the charge of extravagance which the public so readily advances. How all the above has been provided

STEEL FRAMING SHOWING ADVANCED PIPING.

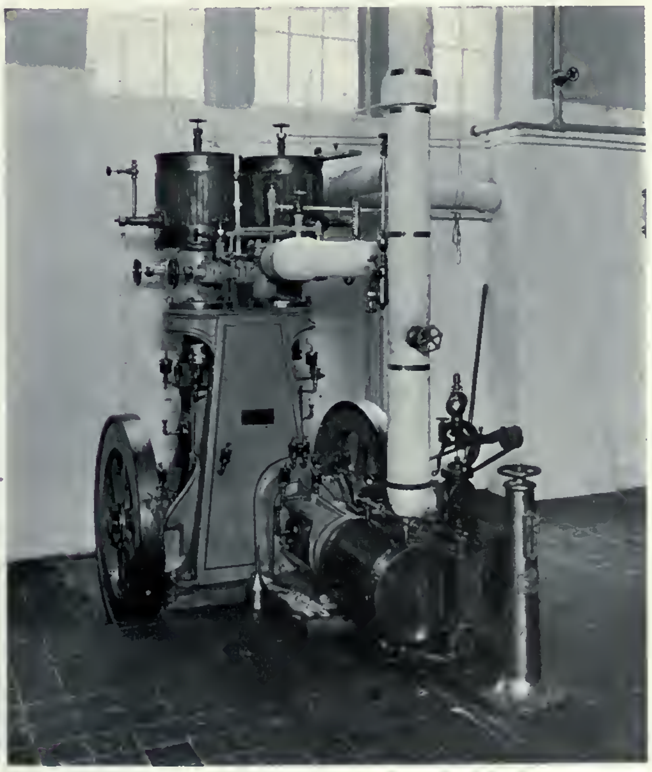

PUMP ROOM.

can only be fully realized by an inspection of the building, but the more general lines adopted can be gathered from the following abbreviated description:

The light, heat and power plant is of sufficient capacity to provide for every requirement, and all units are the best the market affords, each one being considered the standard of its particular type. It is the intention of the board to generate its own light and power, for both economic and educational motives. A most favorable contract has, however, been arranged with the Hydro Commission whereby a constant amount of current is continually purchased and used, the same being equal to the summer peak-load at which time the plant may not be operated; all current needed in excess of this amount being generated on the premises.

The boiler plant consists of four water-tube boilers, having a total capacity of seven hundred and fifty horse-power, the same being fitted with chain grates and super-heat. Special meters are provided for measuring steam generated by each boiler; also for weighing coal, a carbon dioxide recorder for measuring unconsumed combustible in the smoke, pyrometers for recording temperature of flue gases at various heights in the chimney, draft gauges, and many other accessories for conducting scientific tests and teaching pupils how to reduce the cost of boiler operation to a scientific minimum.

The engine room is most beautifully finished with flooring of red Welsh tiling, side walls of white tile dado, and white enamel finish above; a large mezzanine balcony accommodates the switchboard, and commodious quarters for engineers are provided leading from the same; space occupied forty-three feet by forty feet, height of ceiling twenty feet. The engine equipment is most complete, and presents a considerable assortment, all the most approved types being in evidence. A vertical compound high speed engine of the combined throttling and cutoff type, three hundred and sixty-five horsepower capacity, is direct connected to a two hundred and fifty k.w. three-wire d.c. interpole generator. A four-valve Corliss type engine of one hundred and fifty horse-power capacity is direct connected to an interpole three-wire d.c. generator of one hundred k.w. capacity. A simple horizontal engine of the fly-wheel governor type, seventy-five horse-power capacity, is direct connected to a three-wire d.c. generator of fifty k.w. capacity. A motor generator set consists of one hundred and twenty-five horsepower, three-phase induction motor direct connected to a three-wire d.c. generator of seventy-five k.w. capacity. A single stage air compressor is direct connected to a steam engine and furnishes compressed air to all shops, laboratories, etc. A single-acting vertical ammonia compressor is direct connected to a horizontal engine and serves to operate a brine circulating system, which in turn is used to cool drinking water, make artificial ice, and operate cold stor-


REFRIGERATING UNIT.

TYPICAL TOILET.

purifying, aerating and heating water for the swimming pool. The heating and ventilating system is most simple and interesting; "hot water heating with forced circulation" has been adopted in which system the scheme is, briefly, this: The water for heating is first warmed in large heaters, then made to circulate rapidly through mains, radiators and fan coils by means of centrifugal pumps, afterwards being returned through the heaters with an incredible small loss of temperature. The particular advantages of this system are as follows:—(1) Exhaust steam from engines, pumps, etc., may be used in the heaters and afterwards returned to boilers through proper oil-filters; this application of exhaust removes all back pressure from engine and pumps, increases their efficiency and renders unnecessary large size mains for conducting steam to the radiators, or the purchase of any special radiator valves, vacuum specialties, or other patented apparatus. (2) Live steam can be automatically used to supplement the exhaust steam as needed. (3) The temperature of the water circulated can be maintained either above or below the boiling point, can be controlled or regulated at the heaters, and there is thereby offered a simple and ready means of varying the temperature of the water to suit outside climatic variations. (4) Water can be transmitted great distances with uniform velocity, small temperature loss, and through extremely small pipes which saves many thousand of dollars in cost of piping system; also there is less expansion trouble, and reduced repair bills owing to reduced number and size of fittings, valves, etc., and there is no air-binding and no knocking or "hammering" of pipes. (5) Buildings maintain a more uniform temperature, do not cool down at night, and less coal and attendance is required. The steam circulating

age boxes and refrigerators located in lunch room, domestic science halls and living apartments. The main switchboard is of white Italian marble, forty-two feet by eight feet, all instruments being of copper and with brass handrail around switchboard platform. There are seventeen panels, and the board is so arranged that every department and many individual rooms can be supplied with either direct current from the school or with alternating current from outside service wires.

The pump and heater room contains all the apparatus for pumping and heating water for boiler-feed, domestic service, heating and ventilating system, etc.; also the filtration plant for

SHOWER BATH.

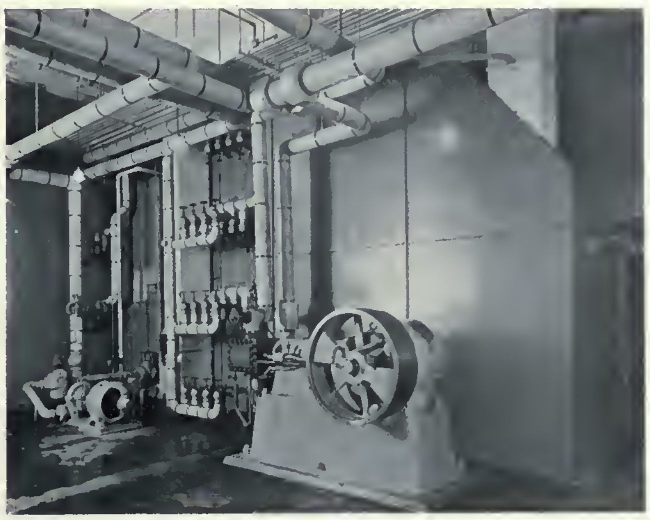
pumps, exhaust and live steam heaters constitute the only specialities in the heating system, and no patents were involved. Exhaust steam from pumps is used in the heaters. Heaters are fourteen feet long; exhaust heater sixty-four inches, and live steam heater forty-nine inches in diameter. They have a combined capacity to carry over two hundred and fifty thousand square feet of radiation, and have over three miles of one-inch brass tube heating surface.

The ventilating system is of the plenum type, the building being divided into two units, and each unit having its own fresh air fan, air washer, tempering and re-heating coils, automatic by-pass dampers for regulating temperature of air, etc. Approximately one hundred and eighty thousand cubic feet of air is supplied per minute, warmed to seventy degrees, washed, purified and humidified and passes through over five miles of galvanized iron duct work to and from three hundred odd rooms. Exhaust fans are also supplied for laboratories, toilets, forges etc. Fan coils are heated by hot water from forced circulation system. Both direct and indirect radiators are equipped with automatic temperature regulation. Cost of heating and ventilating system including boilers, pumps, heaters, sheet iron ducts, flues, etc., was approximately $150,000.

The lighting of the building is varied to suit requirements. Glass rooms have direct-indirect lighting, the ceiling, side walls, and reading line thus having uniform illumination; drafting and art rooms have semi-indirect lighting, the greater part of the lighting being thus "reflected;" the auditorium and main corridors have special decorative semi-indirect fixtures; shops are lighted by direct illumination and in many instances individual drops are provided for the various machines.

The wiring of the building is so arranged as to facilitate repairs and alterations and to permit of changing departments, pulling new wires, installing conduits, etc., at a minimum expense. From main switchboard in engine room all main feeders are run in exposed conduit in main air-ducts under basement corridors to six large vertical brick shafts or "wire-ducts," extending to upper floors, whence they are carried to various distributing panels throughout the building. Lighting is by three wire feeders with two wire branches, having "cut-out" boxes on each floor. Over thirty miles of conduit and copper wiring is installed.

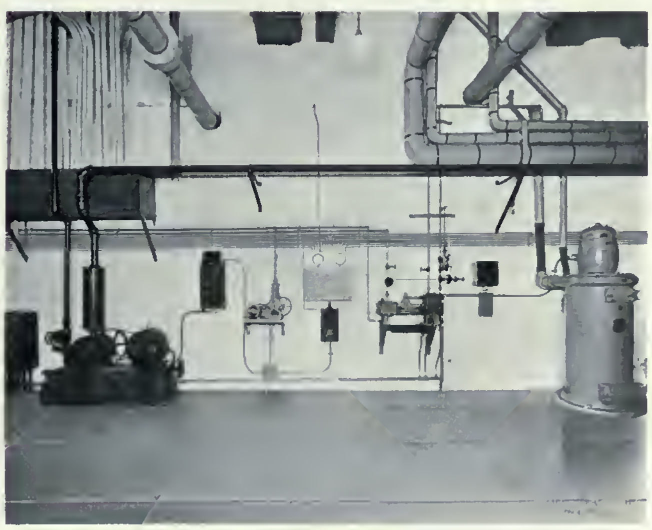
The plumbing system is of the very best; fixtures are well chosen and splendidly installed. There are large toilet rooms and lavatories at each end of the building on all floors except the first, together with numerous well-appointed smaller lavatories for teachers and employees. Individual urinal stalls are of solid porcelain;



FAN ROOM.

w.c.'s are of porcelain with suitable vents; urinals and w.c.'s have individual oil-regulated flushometers. Batteries of twenty odd wash basins are installed in each large lavatory; drinking fountains are at diagonal corners of all floors; shower baths have anti-scalding valves, and filtering apparatus for swimming pool has a capacity of 4,000 gals, per hour. A most unusual feature of the plumbing installation was the erection of considerable portions of the piping, soil risers, etc., in advance of the general building construction, the same being for weeks tied to the steel work, this being necessary to accommodate the unusual type of floor construction.

Inter communicating phone systems, master clock systems, fire and call bells, vacuum cleaners, etc., offer no particular deviation from established customs; they are, however, quite elaborate and naturally more extensive than in an average sized school building; vacuum cleaning outlets are provided for all important rooms; phones can be used for either "outside" or "inside" service; the breaking of a fire glass sounds alarm in the principal's, engineer's and



VACUUM PLANT, DAMPER CONTROLS AND VACUUM CLEANER.

GYMNASIUM.

PLUNGE BATH.

telephone offices, indicates exact location of the call and sounds all fire bells; clock system is of the program type.

Passenger elevator of the double worm gear, drum type electric driven, has a capacity of 30 pupils and a speed of two hundred and fifty feet per minute; freight elevator has a capacity of four thousand pounds and a speed of seventy-five feet per minute.

Laboratory and shop equipment is so extensive as to require a whole volume to describe. Some $200,000 has been invested in class room chairs, tables, machinery, experimental apparatus, physical and chemical laboratory cabinets, etc., the major portion of the same being purchased by the Board of Faculty. All cabinets, etc., were built to careful detail drawings and the fitting up of the cabinets alone with gas, electricity, compressed air, etc., cost over $35,000 and required over 150 individual drawings.

To public school boards and building committees generally it is another example of the ability to erect a magnificent structure—costing millions—without any extravagance, incompetency or political interference.

To the cause of technical education the school marks the passing of an important milestone—the completion of one of the largest schools in two hemispheres; also it will serve as a model for buildings of this kind for years to come.

To the student, whether embryo architect or mechanic, or a young woman pursuing a vocational training, it spells opportunity, and there will be found every requisite for securing a good educational ground-work amid most pleasant and sanitary surroundings.

To the teaching and operating staff it should prove a source of self congratulation, while without doubt it will be found that as regards ease, simplicity and economy of mechanical and domestic plant operation it will rank with the best the world affords.

WOODWORKING MACHINERY.

LOCKER ROOM.

Some Future Developments in Heating and Ventilation

By A. H. BARKER, B. Sc. *

IT is somewhat surprising, in view of the immense importance to mankind of the twin sciences of heating and ventilation, that the amount of attention hitherto paid to the scientific aspects of these subjects, both on the part of the scientific man and of the engineer, should have been so small. The subject, indeed, is hardly seriously regarded as capable of scientific treatment by the average engineer, who probably looks on it as a branch of plumbing or building, calling for a certain knowledge of rule of thumb and a certain amount of practical experience, but at the same time hardly a fit subject for the scientific engineer. Although the science of this subject is yet in its infancy, the author is anxious to secure a more just recognition of its position as a serious branch of engineering, and takes this opportunity to explain to his brother engineers how and why this view is a totally erroneous one, and to discuss the general nature of some of the problems yet unsolved. It may safely be said that there are more unexplored problems of science and greater difficulties attending their solution in the case of heating and ventilating than in almost any other branch of the profession, and the author has had some experience of a good many. In Germany, that uninspired land of detail, where the minutiæ of the subject have been thrashed out with a meticulous care which seems to us to be almost absurd, the real essence has been entirely missed.

This erroneous view of the science as a mere matter of rule of thumb has been fostered in the past by the extremely unscientific manner in which the subject has been treated by writers of technical books in America and England. Any educated engineer studying some of this literature must be driven to the conclusion that there is really no science whatever in the subject.

The reasons why it has failed hitherto to come up to the standard attained in other branches of engineering are not difficult to understand. They are the immense complexity of the factors which go to make up any given result, the difficulty of defining in terms of exact science what that result is or should be, the fact that the criterion of success up to the present has, of necessity, been the feelings of individuals rather than the readings of scientific instruments. Added to these is the immense power of adaptability of the human organism to varying conditions, which tends to make actual variations of conditions appear unimportant in practice. The circumstance which differentiates this branch of engineering from almost all others and at the same time introduces difficulties unknown in all other branches is that we have here to take account of the variable human factor, both as to its physiology and its pyschology, as an essential part of the problem. In this sense we trench on the domain of the physiologist and hygienist to a degree unknown in any other branch.

It is easy to understand that this combination of difficulties tempts the busy practical man to be satisfied with any sort of result, and to leave to nature the task of adapting the organism of the sufferer to the conditions produced by the engineer—a task which she can often accomplish, but often not without injury to the individual. The present lack of exact knowledge makes it difficult or impossible to hold the practical man to any precise standard of accomplishment. In other words, the practical man can get along somehow, with a very small modicum of knowledge. It is the general attempt to do so which has led to the undoubted state of discredit in which this branch finds itself to-day.

All engineering is merely glorified common sense. The training of an engineer leads him to try to deal in a common-sense way with objective facts as he finds them. In this branch the first obstacle is the great difficulty of finding what are the facts.

Consider, for instance, the first problem which would meet a scientific engineer endeavoring, without previous experience, to arrange a satisfactory scheme of ventilation for a building. He would commence with the assumption that the artificial ventilation of a building consists in forcing in a calculated volume of air, a task which, if he were familiar with fans and the laws of the flow of air in ducts, he might think he could easily accomplish. After he had made one attempt to satisfy the occupants of the building by proceeding on the assumption that this is the only requirement, he would find out that one essential factor in the problem was to study the distribution of the air currents in the building itself.

Even in a small building, this is in itself a problem of very great difficulty. Although each one of these currents obeys laws of nature as rigidly accurate as any other laws of nature, yet the number of influences having an effect on the air currents is so enormous that the complexity of the result is almost immeasureable. In the attempt to lay down in terms of exact science the laws which govern this result, any person might well be baffled and unable to trace with any clearness the operations of any law at all. The reason is, of course, not that the law is not there, but that it is so complex that it

*Extracts from a paper read before the Society of Engineers.

would take almost a superhuman intellect to analyze it completely.

Further, who can say what system of air currents in a room—say a theatre—is to be aimed at? We all know that complaints of the ventilation of almost every public room are universal. Yet there is no general agreement, either what is wrong or what is needed to put it right. How is it possible to hold the ventilating engineer responsible for a poor result when no one can specify what the result ought to be?

I have made reference to the complexity of only one of the constituents of ventilation. Those of heating are no less complex. We have two totally distinct forms in which heat is delivered into the room—namely, convection currents of heated air and radiant energy. These are as distinct from one another as light is distinct from sound. Yet, up to the present, no formal recognition of their entire separation from one another has been recognized in current literature. The cause for this is easily seen to be that, different as these two forms of what for convenience we call heat are from one another, yet they can be instantaneously transformed from one to the other and back again. Their measurement, again, is not a problem to be easily solved. No sooner does one measure the amount of radiant energy than the mere act of measuring it turns it, or part of it, into convected heat.

The difficulty, however, which is the most baffling in the attempt to reduce this subject to an ordered science is the fact that the object of both heating and ventilation, though primarily physiological, is also to some extent psychological. The primary object is to keep the inhabited rooms healthy; of almost equal importance is the necessity to keep them comfortable. The effect of any given condition on the human body is, if possible, more complicated than the laws which govern air currents and heat flow. The physiologist cannot yet tell us in exact terms what are healthy conditions for inhabited rooms. He can give us generalities only, and the experiments on which even these generalities are based are far from convincing. He cannot even, for instance, tell us what is a healthy temperature for human beings to live in, nor does he seem to realize that when he speaks of "the temperature of a room" he means merely the temperature of a thermometer suspended in the room.

Some physiologists say (and the author agrees) it is desirable in the interests of health that the temperature maintained should be as low as a human being can endure without real discomfort. Yet others will say this is nonsense, that the room should be so warm that the man feels comfortable without any effort. Neither can anyone tells us within 300 per cent. how much fresh air per head per hour is the minimum consistent with health. Indeed, as a fact, such a crude statement would have no meaning in the real science of the subject. It depends on the temperature, humidity, and a score of other things. Physiologists cannot agree as to the chemical nature of healthy and unhealthy air. Books on the subject of climate do not give any explanation of what physical conditions constitute a bracing or relaxing climate. Indeed, most of the hygienists do not seem to realize that such words need any further description.

The matter is yet more complicated when we consider that one object the heating engineer has in view is to make persons comfortable. We here come across the baffling fact that a man is comfortable when he thinks he is comfortable. If we can make him imagine he is comfortable without the alteration of any single condition, we can make him feel comfortable. Make a man imagine he is cold or feels a draught, and he will at once want to shut all the windows. Convince him, on the other hand, that to shut the windows is unhealthy and stuffy, and the same man will not be comfortable unless the windows are open. One can train oneself to feel comfortable in anything.

In further illustration the author will refer to a psychological experiment he made on a medical man who was a guest at his house some years ago. We were sitting in a room which had a thermometer suspended on the wall. The visitor made some remark about a "shoemaker's wife" and complained of the room being cold. It was freezing outside: the thermometer on the wall read 54 deg., and was a correct one. The author's view is that such a thermometer reading is quite consistent with health and comfort when it is freezing outside. We fell to a discussion of temperatures, and it was suggested, as an experiment, that the temperature of the room should be gradually raised until the guest felt comfortable, to ascertain whether he found a temperature of 60 deg., too high. The room was provided with a fairly powerful heating apparatus. The author went into the cellar, pretended to stoke up the boiler, and to turn the radiator full on. As a matter of fact, nothing was done either to the boiler or the radiator, though the doctor was allowed to hear the clattering of the fire-doors and fire-irons. After a short interval the thermometer was changed unobserved by the visitor for another precisely similar in appearance which read 6 deg. too high. When it had been placed on the hook without his seeing the change, it was shown to him, and he was asked whether that temperature made him more comfortable. He said the temperature was then just right for him, neither too hot nor too cold, although the real thermometer reading was precisely the same as it had been in the earlier part of the evening. That little experiment is most illuminating as showing the extraordinary difficulties attending an attempt to treat this subject scientifically.

It is an undeniable fact that a room filled with air which, so far as chemical analysis can detect, is absolutely pure, may feel very stuffy. For instance, in the House of Commons, on the ventilation of which the author has experimented for many months for the Committee of the House, the air in the Debating Chamber is, chemically speaking, as pure as in any room in the world. Fresh air simply pours into it in extravagant volumes. In a moderately full house there are no less than 13,000 cubic feet of air supplied per head per hour. Yet it produces, without any possible doubt, the effects which we are accustomed to think of as associated with defective ventilation—lassitude, sleepiness, infection, and so forth. Complaints are loud and quite general.

A room may, on the contrary, feel fresh and sweet in which, judged by chemical standards, the air is very bad. The author has analyzed air containing 25 volumes per 10,000 of CO_2 which felt as fresh as a spring morning, although 10 volumes is regarded as the extreme allowable impurity in current science. There must be some combination of chemical or physical conditions which accounts for the effect so far as it is objective—when it is purely subjective, of course, it is impossible to analyze the effect. Nobody up to the present has ventured to specify what is that combination.

Now the future of the sciences of heating and ventilation depends, on the scientific side, on the further analysis of the conditions which produce the feeling of comfort and other effects. On the practical side they consist of the application of those discoveries so as to bring under control each of the conditions, and on the further developments of economy of construction and transmission and the better control of the forces we bring into play. Before we can get a step further we must be able to express, in exact terms, each of the chemical and physical conditions which go to make up the sum total of the room condition.

The criterion of our success, as I have said, is, and must be, the effect on the feelings of an individual. But we must, in order to give this subject a scientific basis, be able to translate the feelings of an individual into terms of measurable physical conditions, and this is our first difficulty. We may lay down certain physical conditions which we conceive to be necessary to the production of comfort and health, and we may direct all our attention towards producing those conditions. We may succeed completely in doing so, and find that when we have done it that some individuals will find that those conditions are not such as are necessary for their personal comfort. We may then get other bases to work upon and still find that the new bases themselves are not any more suitable than the first.

It is clear that the only legitimate function of the engineer as such is to produce and control certain specified conditions. The criterion of his success must not be the self-contradictory feelings of the occupant of the building, but they must be the exact readings of well-defined measuring instruments, such as radiometers, hygrometers, air meters of various kinds, apparatus for the analysis of air, dust counters, thermometers, and other instruments.

The other half of the problem is for the physiologist and the hygienist—viz., to specify what are the conditions which will be regarded as healthy and comfortable. It involves essentially experiments on human beings which are in their very nature illusory and extremely difficult. In essence they are, in reality, so many attempts to calibrate human beings. The science of the subject is only in its infancy as yet. Future developments depend on the analysis of these problems to no small an extent.

It will be evident that the problems of heating and ventilation are closely associated. We cannot even consider problems of heating without simultaneously considering those of ventilation. We have, for instance, to consider the effect on the human organism of warm air and cold air. A further important point in connection with ventilation is to determine the effect on the human organism of different quantities of dust in the air. The investigation of such a matter naturally imposes on us the necessity of determining with some accuracy how many particles of dust do exist in a particular sample of air. As this number runs into millions per cubic inch, it will be evident that very special methods are required for counting them. The measurement of the dust particles is clearly only one side of the problem. We have also to measure the effect of different degrees of dustiness on the human organism. That is obviously a matter of great difficulty and concerns the physiologist, and is more appropriate to the physiological than to the engineering laboratory. In no respect has the science of heating and ventilation been more backward than in the knowledge of laws governing the movements of air. If we compare, for instance, what is known of the laws of electrical currents with the corresponding laws of pneumatic flow, we shall see that in the one case the knowledge is, for practical purposes, complete and definite, enabling calculations to be made with the utmost precision and, what is more important, enabling the results of the calculations to be carried out in practice.

MUSE FINDING THE HEAD OF ORPHEUS,
PANAMA-INTERNATIONAL EXPOSITION,
1915, SAN FRANCISCO, CALIFORNIA.

Panama-Pacific Exposition, San Francisco, California

THE SCULPTURE

WHAT dream was ever more prophetic than that of Jules Guerin, as he stood at the Golden Gate and silently gazed upon the men converting the mud flats into a realm of beauty. To repeat his words:

"And as I watched those busy, bare-armed laborers, I had a vision—a dream of the beauty for which they were slowly laying the foundation stone. . . The brown marsh had vanished, the workmen were gone, and in their place arose what seemed a fairy city—a meeting place of the nations such as no country had ever known before—a thing of sunlight and color and joy. And as I looked upon it, I knew that it was the architecture of the New World, conceived by men of ideals and imagination, built by eager hands, adorned with the work of artists and sculptors, and filled with specimens of the finest craftsmanship of many lands.

"As I looked down, the city of my dreams grew clearer, and shaped itself into more definite form. I saw the red tile roofs of vast buildings, the climbing towers, the huge domes of green and gold that glittered in the strong California sunlight. I beheld the great triumphal arches, the long rows of majestic colonnades, and the gigantic groups of statuary intimate in color and texture to the buildings. I looked down upon the wide avenues and roadways with their dark green sentinels of shrubs and trees into the vivid, flower-filled gardens and high, open pavilions, and over the splashing fountains and broad pools of water that mirrored, with the deep blue of the sky, shifting colors of vine-clad column and wall and dome. Long, arch-framed vistas drew my eyes past hall and court and statue out toward the water and the hills, beyond the green lawns and terraces that sloped down to the bay.

WOOD NYMPH, BY ISADORE KONTE.

"On every hand was the beauty of splendid color—the wonderful vibrating blue of sky and water, the terra cotta of the roofs, the living green of grass and trees, the orange and vermilion of the flower-beds, the shining gold of dome and statue, and the soft buff tones of roadway and arch and wall—a great architectural pageant in which builder and sculptor, painter and gardener, had each contributed his vital efforts toward the common goal."

This dream has become a reality, quite evident to all who pass beneath the lofty archway of the tower gate into the Court of the Sun and Stars. Here is presented a vast oval courtyard, around which colonnades sweep to the right and to the left. On the central axis in these directions are triumphal arches 160 feet high, the crowning sculptures of which represent "The Nations of the East" and "The Nations of the West." The two main free standing monuments of the court are the Fountains of the Rising and of the Setting Sun, occupying positions relatively east and west. Flanking the main axis of circulation of the court north and south, at the level of descent into the sunken garden are titanic figures in horizontal composition, of the four elements, Fire, Water, Earth and Air. These are of a great scale and placed close to the ground, are capable of a symbolically imaginative rendering. On the upper ramps of the sunken garden of the Court of the Sun and Stars, in positions facing the arches are vertical groups of two figures each, representing "Order and Chaos" and "Eternity and Change."

Advancing down the forecourt there is a pool of placid water in which the great tower is reflected. The tower is decorated with much sculpture of a purely ornamental kind, as well

NATIONS OF THE WEST, BY ROTH, LENTELLI & CALDER.

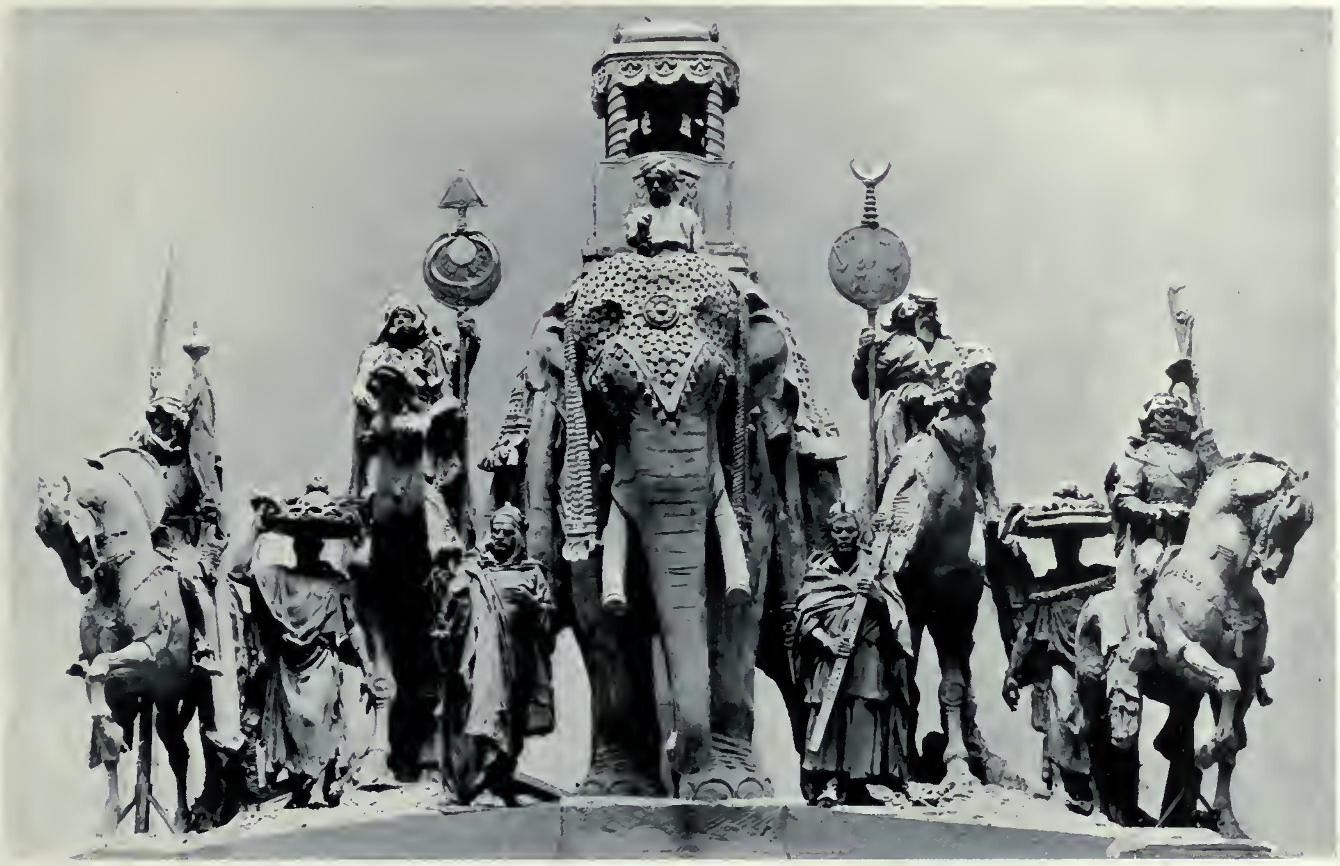
From left to right: 1. The French-Canadian—the trapper on horseback. 2. The Alaskan with totem poles on her back. 3. The Latin-American on horseback. 4. The German. In the centre is the old Prairie Schooner drawn by oxen. Atop, pushing out, is Enterprise leading the group westward, a white boy and a colored boy on either side, the Heroes of To-morrow. Marching in front is the stalwart Mother of To-Morrow. Then follow: The Italian. The Anglo-American, also astride a horse. The Squaw with her papoose basket. The American Indian on his horse.

as a repeated typical equestrian figure of an armored horseman. At the level of the spring of the great arch are pedestals which support standing statues of types representing Philosopher, Adventurer, Priest and Soldier. Terminating the open colonnades on each side of the tower gate mural fountains have been created by Mrs. Harry Payne Whitney and Mrs. Edith Woodman Burroughs, portraying El Dorado and Youth.

In the Court of the Seasons, situated between the Agriculture and Educational buildings, the sculpture symbolizes the benign forces of nature. A great group representing Nature herself occupies the pedestal beneath the archway of the head of this court. Here the work is all founded on the tales of the Arabian Nights. These inspired the composition of the central fountain, while the minor decorations of the facades, finials, caryatides, etc., supplement this imaginative mass. The doorways are all flanked by strange visaged lions and the attic studded with figures of Oriental slaves.

For the Court of the Palms the western fairy tales have spurred the sculptor to new imagery, with Beauty and the Beast as the subject for the central fountain. At the entrance to the Courts of the Flowers and of the Palms on the southern esplanade and in front of the gateways of Columbus and of Balboa on the sea esplanade are four equestrian statues, one in front of the Court of Flowers of the American Indian, another in front of the Court of Palms of the Pioneer; a third beneath the Gateway of Columbus representing Cortez, and, beneath the Gateway of Balboa, a fourth portraying Pizarro.

The Court of Abundance, called by the architect the Court of the Ages, which is the most eastern of the three great inner courts, is, in more senses than one, the most modern of the Exposition. Its style is intensely original and cannot be accredited to any mediæval or ancient period, although it suggests Spanish Gothic. The interest of the court centres in its great tower and in the Altar of Human Evolution in its southern facade, the groups for which were modelled by the sculptor Chester Beach. The altar is set upon the third level of the tower, about 100 feet above the pavement. The first and lower group, which stands upon the second level of the tower, just above the arch of the main entrance of the court, is of the Stone Age. Above this is the second group of the Middle Ages, flanked by single figures, one male and one female, symbolical of the violent struggle in evolutionary change. Above the altar is the third group, representing the ages to come, which might be called "The Divinity of the Future." This group is composed of a seated



NATIONS OF THE EAST, BY ROTH, LENTELLI & CALDER.

From left to right are: 1. The Arab Sheik on his Arabian steed. 2. The Negro Servitor with fruits on his head. 3. The Egyptian on his camel, bearing a Mohammedan standard. 4. The Arab falconer with bird on his wrist. 5. The splendid Indian Prince on the back of the elephant. 6. Inside the howdah the Spirit of the East. 7. The Llama from Thibet with his rod of authority. 8. The Mohammedan with his crescent standard. 9. Another Negro Servitor. 10. The Mongolian on his horse.

goddess, whose posture and crown of a rayed sunburst suggest something of the spirit of the East, and whose eyes gaze fixedly forward.

In a book recently published, under the title "The Art Exposition," the author, Eugen Neuhaus, devotes part of the work to sculpture. Mr. Neuhaus' criticism carries considerable weight, as he was a member of the International Jury of Awards in the Department of Fine Arts of the Exposition. He says the sculptural decorations of the Exposition are so much a part of the architectural scheme that their consideration must no longer be delayed. The employment of sculpture has been most judicious and has never lost sight of certain architectural requirements, so frequently overlooked. While there are a great many examples of sculptural decorations at the Exposition, there does not seem to be that over-abundance of ornamentation so often confused by the public with artistic effect.

The best compliment that can be paid to the Exposition sculpture is that it is not evident at first and that one becomes aware of it only in the course of studying the architecture. I do not think that, with the exception of the Column of Progress and the groups of the Nations of the East and of the West, the Exposition has produced, through its very unusual and novel opportunities, any great work, or presented any new talent heretofore not recognized; but it will most certainly stand a critical examination and comparison with other exposition sculpture and not suffer thereby. As a matter of fact, a number of the sculptors of our Exposition were commissioned to do similar work at St. Louis.

In one respect our Exposition must immediately claim originality—that is, in the elimination of the glaring white, with its many ugly and distracting reflected lights, insisted upon for years, in practically all the great expositions of the past. This absence of white is surely a very novel and very helpful feature, from an artistic point of view. The Travertine staff material used, the highly successful work of Mr. Paul Denneville, with its innumerable fine accidental effects, so reminiscent of the tone and the weatherbeaten qualities of really old surfaces, is an asset that the sculptors among all the collaborating artists gratefully acknowledge.

The artistic value of the Travertine lies in its beautiful expression of architecture as well as of sculpture. A plain wall becomes a matter of interest and comfort. An ornamental feature or sculpture obtains a wonderful charm and delicacy in this material which is particularly unique in sculpture. The natural Travertine is a sedimentary deposit dating back, it is claimed, to the glacial ages. That imitated here forms the bed of the River Tiber near Rome and was extensively used for ages in the early Roman and Greek era as a building stone for their temples and works of art. While a poor material in cold climates, because of its striation, it was always sought in Italy for its wonderful texture and tone. It was used in the Coliseum and in many other buildings erected during the Roman period.

It is evident that there has been a very happy and close co-operation between the architect and the sculptor—a desirable condition that, unfortunately, does not always exist. Architects will sometimes not allow the sculptor to give full expression to his ideas, will put unwarranted restrictions upon him, and the result is very one-sided.

FOUNTAIN OF ENERGY, BY STERLING CALDER.

I had the pleasure of seeing much of the sculpture grow from the sketch to the finished full-scale work, and the kindliness and the vigorous personality of Mr. Stirling Calder added much charm and interest to this experience. Mr. Calder has been the director of the department of sculpture and the inspiration of his own work penetrates that of all his fellow-artists. Among them are many specialists, such as Frederick Roth, for instance, as a modeler of animals, who shows in the very fine figure of "The Alaskan" in the Nations of the West that he is not afraid nor unable to model human figures. Practically all of the animals in the grounds show the hand of Roth.

Like Roth, Leo Lentelli did a good share of the task. His work is characterized by much animation and spirit, but well balanced wherever necessary, by a feeling of wise restraint. I remember with much horror some of the sculptural atrocities of former expositions that seemed to jump off pedestals they were intended to inhabit for a much longer period than they were apparently willing. Repose and restraint, as a rule, are lacking in much of our older American sculpture, as some of our Market street statuary testifies. It seems that our unsettled conditions find an echo in our art. It is much to be hoped that a certain craving for temporary excitement will be replaced by a wholesome appreciation of those more enduring qualities of repose and balance.

Calder's work, no matter how animated, no matter how full of action, is always reposeful. His "Fountain of Energy" gives a good idea of what I mean. It is the first piece of detached sculpture that greets the Exposition visitor. Its position at the main gate, in the South Gardens, in front of the Tower of Jewels, is the most prominent place the Exposition offers. It is worthy of its maker's talent. Its main quality is a very fine, stimulating expression of joyousness that puts the visitor at once in a festive mood. The Fountain of Energy is a symbol of the vigor and daring of our mighty nation, which carried to a successful ending a gigantic task abandoned by another great republic. The whole composition is enjoyable for its many fine pieces of detail. Beginning at the base, one observes the huge bulks of fanciful sea-beasts, carrying on their backs figures representing the four principal oceans of the world: the North and South Arctic, the Atlantic, and the Pacific. Some are carrying shells and their attitudes express in unique fashion a spirit of life and energy which makes the whole fountain look dynamic, in contrast with the static Tower of Jewels. Everything else in

FOUNTAIN IN COURT OF ABUNDANCE. BY ROBERT AITKIN.

this fountain has a dynamic quality, from its other inhabitants of the lower bowls, those very jolly sea-nymphs, mermaids, or whatever one may want to call them. They are even more fantastically shaped than the larger figures. In their bizarre motives some of the marine mounts look like a cross between a submarine and a rockcod.

Rising from the very centre of the fountain basin, a huge sphere, supported by a writhing mass of aquatic beasts, continues the scheme upwards, culminating in the youth on horseback as the dominating figure of the whole scheme. The sphere is charmingly decorated with reclining figures of the two hemispheres and with a great number of minor interesting motives of marine origin. The youth on horseback is not exactly in harmony with the fountain; one feels that the aquatic feeling running through the rest of the fountain is not equally continued in this exceedingly well-modeled horse and youth and those two smaller-scaled figures on his shoulders—I feel that the very clever hand of a most talented artist has not been well supported by a logical idea. Their decorative effect is very marked, taken mainly as a silhouette from a distance. They are no doubt effective in carrying upwards a vertical movement which is to some extent interfered with by the outstretched arms of the youth. Mr. Calder has given us so very many excellent things, alone and in collaboration with others throughout the Exposition, that we must allow him this little bizarre note as an eccentricity of an otherwise well-balanced genius.

As long as we are in the South Gardens, we might take the time to investigate the two fountains on either side of the centre, towards the Horticultural Palace on the left and Festival Hall on the right. There we find a very lithe mermaid, used alike on either side, from a model by Arthur Putnam. Many of us who for years looked forward to the great opportunity of the Exposition, which would give Arthur Putnam a worthy field for his great genius, will be disappointed to know that the mermaid is his only contribution, and scarcely representative of his original way in dealing with animal forms. The untimely breakdown, some two years ago, of his robust nature prevented his

DETAILS OF FOUNTAIN, BY ROBERT AITKIN.

giving himself more typically, for his real spirit is merely suggested in this graceful mermaid.

Sherry Fry's figural compositions on the west of Festival Hall might well be worthy of a little more attention than their somewhat remote location brings them. The two reclining figures on the smaller domes are reposeful and ornate. A stroll through the flower carpets of the South Gardens, amidst the many balustrade lighting Hermae, discloses a wealth of good architectural sculpture, which in its travertine execution is doubly appealing.

END OF THE TRAIL, BY JAMES EARLE FRASER.

There are four equestrian statues in different places on the north side of the Avenue of Palms. Two are in front of the Tower of Jewels, the "Cortez," by Charles Niehaus, and "Pizzaro," by Charles Carey Rumsey. The third is in front of the Court of Flowers, and the last at the entrance to the Court of Palms. The two latter, Solon Borglum's "Pioneer," and James Earle Fraser's "The End of the Trail," belong as much together as the two relatively conventional Spanish conquerors guarding the entrance to the Court of the Universe.

The symbolism of the "Pioneer" and "The End of the Trail" is, first of all, a very fine expression of the destinies of two great races so important in our historical development. The erect, energetic, powerful man, head high, with a challenge in his face, looking out into early morning, is very typical of the white man and the victorious march of his civilization. His horse steps lightly, prancingly, and there is admirable expression of physical vigor and hopeful expectation. The gun and axe on his arm are suggestive of his preparedness for any task the day and the future may bring.

Contrast this picture of life with the overwhelming expression of physical fatigue, almost exhaustion, that Fraser gives to his Indian in "The End of the Trail." It is embodied in rider and horse. Man and beast seem both to have reached the end of their resources and both are ready to give up the task they are not equal to meet.

The psychology of this great group is particularly fine. It is in things like these that our American sculpture will yet find its highest expression, rather than in the flamboyant type of technically skilful work so abundantly represented everywhere. "The End of the Trail" could have been placed more effectively in the midst of, or against, groups of shrubbery in a more natural surrounding, where so close a physical inspection as one is invited to in the present location would not be possible.

The Tower of Jewels, however, with its lofty arch and suggestion of hidden things behind it encourages the spirit of investigation. On entering this great arch, one is suddenly attracted by the pleasing sound of two fountains, sheltered in the secluded abutting walls of the great tower. Minor arches, piercing the base of the tower west and east, open up a view toward these sheltered niches, harboring on the right the Fountain of Youth, by Mrs. Edith Woodman Burroughs, and the Fountain of El Dorado at the left, by Mrs. Harry Payne Whitney. These two fountains are totally different in character, and they could well afford to be so, since they are not visible as a whole at the same time, although physically not far apart.

Mrs. Burroughs' fountain is very naive in feeling, very charming in the graceful modeling of the little girl. The decorative scheme of this poetic unit is very simple and well-sustained

FOUNTAIN, BY BERNARD MAYBECK.

throughout its architectural parts.

Mrs. Harry Payne Whitney's fountain is of the intellectual, dramatic kind. The treatment of this almost theatrical subject is well balanced. While it does not possess any too much repose, it is very effective. In general there are three parts to this fountain; the central doorway of Eldorado, just ajar, disclosing faintly this land of happiness; while on either side are two long panels showing great masses of humanity in all manner of positions and attitudes, all striving toward the common goal. Some are shown almost at the end of their journey, overtaken with exhaustion; others more vigorous are lending a willing arm to the support of their less successful brothers and sisters about to fall by the wayside. The whole composition of those two friezes shows Mrs. Whitney as a very skilful and imaginative artist. It is a gratifying spectacle to see a woman such as Mrs. Whitney, so much heralded, possibly against her own inclinations, in the society columns of New York, find the time to devote herself to so serious and professional a piece of work as the Fountain of Eldorado.

Passing through the Tower of Jewels into the Court of the Universe, one's attention will be attracted to a number of pieces of detached statuary. The most important among them is "The Four Elements," by Robert Aitken. We all remember Aitken as the very promising young man who left us before the fire to make a career in the East, after having exhausted all local possibilities, the Bohemian Club included.

FIGHTING BOYS, BY JANET SCUDDER.

THE SCOUT, BY CYRUS DALLIN.

His figures of the Four Elements are typical of his temperament, and he acknowledges in them his indebtedness to Michael Angelo without being in the least imitative. These four figures are allegorically full of meaning, and taken simply as sculpture, they are excellently modeled. His "Fire," showing a Greek warrior defending himself from the fiery breath of a vicious reptile, is novel in its motive, while "Water" discloses Father Neptune bellowing out into the briny air, accompanied by dolphins in rhythmic motions. "Air," on the south, discloses Aitken as the skilful modeler of less muscular forms of a winged female figure, which in itself, without the birds, is suggestive of its meaning. It was very daring to introduce the story of "Icarus" in this group, by the small-scaled figure of this first mythological aviator on the outside of the wings of the larger figure. It helps to add a note of interest to an otherwise not so interesting part of the group.

The Fountains of the Rising and the Setting Sun are most impressive by their architectonic quality, and Wienman's clear style of modeling is seen at its best in the Tritons in the fountain bowl. The figure of the Setting Sun is one of the finest figures of the entire Exposition. The suggestion of the termination of day, indicated in the folding of the wings and in the suggestion of physical fatigue, is very well conveyed. A fine relaxation runs through the whole figure.

The Rising Sun, on the other side, has all the buoyancy of an energetic youth ready for his daily task. With widespread wings, looking squarely out into the world, he seems ready to soar into the firmament. The contrast is admirable in these two figures, and Wienman deserves all the popular applause bestowed upon his work.

FOUNTAIN OF EVENING, BY ADOLPH A. WEINMAN.

Paul Manship has contributed two groups at the head of the east and west steps leading to the sunken gardens, each group consisting of two figures, one representing Festivity, the other, Art and Music. These groups are used alike on either side. Manship deserves to be better represented in the Exposition than by these two groups alone. His position as one of the very successful of our younger men would have warranted a more extensive employment of his very strong talent.

It is rather a flight from those Manship figures to the colossal groups of the Nations of the East and of the West, but one is irresistibly drawn to these wonderfully effective compositions. Their location makes them the most prominent groups in the Exposition ensemble.

The harmonious co-operation of Calder, Roth, and Lentelli has resulted in the creation of a modern substitute for the old Roman quadriga, which so generally crowns triumphal arches. Both groups are so skilfully composed as to have a similar silhouette against the blue sky, but individually considered they are full of a great variety of detail. It was an accomplishment to balance the huge bulk of an elephant by a prairie schooner on the opposite side of the court. Considering the almost painful simplicity of the costumes and general detail of the western nations as contrasted with the elaborately decorative accessories, trappings, and tinsel of the Orient, it was no small task to produce a feeling of balance between these two foreign motives. But what it lacked in that regard was made up by allegorical figures, like those on top of the prairie schooner, used not so much to express an idea as to fill out the space occupied by the howdah on the other side. There is a great deal of fine modeling in the individual figures on horse and camel back and on foot.

In either one of the two groups much has been lost in the great height of the arches. Figures like "The Alaskan," "The Trapper," and "The Indian," for instance, are particularly fine and they would be very effective by themselves. "The Mother of To-morrow" in the Nations of the West is a beautifully simple piece of sculpture.

The Nations of the East, like the West, in its entirety, is the conception of A. Stirling Calder, who modeled the pedestrian figures. With Mr. Calder, Messrs. Frederick G. R. Roth and Leo Lentelli collaborated. The huge elephant in the centre of the group was modeled by Mr. Roth, also the camels. The mounted horsemen were modeled by Leo Lentelli. From left to right the figures are—an Arab warrior, a Negro servitor bearing baskets of fruit, a camel and rider (the Egyptian), a falconer, an elephant with a howdah containing a figure embodying the spirit of the East, attended by Oriental mystics representing India, a Buddhist Lama bearing his emblem of authority, a camel and rider (Mahometan), a Negro servitor, and a Mongolian warrior. The size of the group, crowning a triumphal arch one hundred and sixty feet in height, may be inferred from the fact that the figure of the Negro servitor is thirteen feet six inches in height.

On the arch beneath this group are inscribed these lines by Kalidasa: "The moon sinks yonder in the west, while in the east the glorious sun behind the herald dawn appears. Thus rise and set in constant change those shining orbs and regulate the very life of this our world."

The Nations of the West, crowning the arch of the Setting Sun, is also the conception of A. Stirling Calder, who modeled the imaginative figures of "the Mother of To-morrow," "Enterprise," and "Hopes of the Future." Messrs. Leo Lentelli and Frederick G. R. Roth collaborated in their happiest style, the former producing the four horsemen and one pedestrian, the Squaw, and the latter the oxen, the wagon, and the three pedestrians. From left to right the figures are, the French Trapper, the Alaskan, the Latin-American, the German, the Hopes of the Future (a white boy and a Negro, riding on a wagon), Enterprise, the Mother of Tomorrow, the Italian, the Anglo-American, the Squaw, the American Indian. The group is conceived in the same large monumental style as the Nations of the East. The types of those colonizing nations that at one time or place or another have left their stamp on our country have been selected to form the composition.

The following lines by Walt Whitman are inscribed on the arch beneath the group of the Nations of the West: "Facing west from California's shores, inquiring, tireless, seeking what is yet unfound, I a child, very old, over waves towards the house of maternity, the land of migrations, look afar: look off the shores of my western sea, the circle almost circled."

It is popularly conceded that these two groups are magnificently daring conceptions, richly worked out. They are probably the largest groups of the kind ever made, the dimensions of the base being fifty-two by thirty-eight feet, and the height forty-two feet.

Looking seaward from the Court of the Universe the Column of Progress commands attention, crowned by the "Adventurous Bowman" and decorated at the base with a frieze symbolizing achievement, or progress. The very fine symbolism in this column deserves to be studied. The position of the column itself is most artistic in its relation to the surroundings. It is too bad, however, to see the view from the main court toward the column spoiled by a music pavilion of dubious architectural merit. The effect of the column as seen from any point is inspiring in its monumental grandeur. The group on top, the Bowman, represents man's supreme effort in life. He is supported on the left by his fellow-man, adding strength and steadiness to his aim, while on the right the crouching figure of a woman watches anxiously the sureness of his aim. She holds ready in her hand the laurel wreath which she confidently feels will be his just reward.

The great Column of Progress is the first column in the world, so far as I know, whose design was inspired by a purely imaginative motive, and the first sculpture column at any exposition. It must be considered the most splendid expression of sculpture and architectural art in the Exposition. Mr. Calder may justly feel proud of this great idea, and Mr. Hermon MacNeil has added new laurels to his many accomplishments in the free modeling of the very daring group on top.

The column itself is decorated with the spiral ascending motive of the Ship of Life, while at the base Isadore Conti expresses the striving for achievement in four well modeled panels of huge scale, representing human life in its progressive stages, showing men and women in attitudes of hope and despair, of strength and weakness, in the never ending task of trying to realize human destiny.

DETAIL OF STATUTE, FOUNTAIN OF EVENING.

The Court of the Four Seasons harbors four groups by Piccirilli, representing the seasons in the conventional way, dividing the year into four distinct parts—spring, summer, autumn, and winter. These four groups of Piccirilli are not equally successful. By far the most effective is the one representing winter. The severe rigidity of the lovely central standing figure expresses well that feeling of suspended activity which we associate with the conventional conceptions of the season of dormant life. The kneeling side figures are in full harmony of expression with the central figure. They support very well the general scheme.

The next best, to my mind, seems "Spring," on account of the very fine psychological quality of the standing figure in giving expression in a very graceful fashion to that invigorating and reviving quality of our loveliest season. The two side figures seem to be gradually awakening to the full development of their powers.

BOWMAN. BY HERMON A. MACNEIL.

Next to "Spring," "Fall," by the fullness of the decorative scheme, suggests Peace and Plenty in the preparation for the Harvest Festival and in the touch of family life of the mother and child on the right.

Mr. Piccirilli's naturalistic modeling does not express itself so well in "Summer." There is so little strictly architectural feeling in that group. I think that Albert Jaegers, with his two single figures on top of the two columns flanking the Orchestral Niche, actually represents our own two seasons much more successfully than does Piccirilli. Jaegers' "Rain and Sunshine" should be used to name the court properly—"The Court of the Two Seasons," as we know them in California—the dry season, the season of harvest; and the wet season, the one of recuperation. I regret that here an opportunity was lost to add distinction to the many different features of a great undertaking.

Jaegers has contributed also the figure of "Nature" on top of the music niche and the capital bulls on the pylons toward the north of the court. These terra cotta bulls are surely worthy of the adjective derived from them. Their relative size is very good, and to see them in the richness of their color against the upper regions of a dark blue sky is very effective.

Directly north of the Court of the Four Seasons stands Miss Beatrice Evelyn Longman's Fountain of Ceres, originally planned for the centre of the court, but so very effective all by itself between the dignified colonnades of the avenue. The fountain is most impressive by its fine architectural feeling, so uncommon in the work of many women sculptors. The general feeling of it is refinement, combined with great strength. It is fully deserving of monopolizing a fine setting of dignified architecture, so richly emphasized by some of the finest old yew trees in the grounds.

In the Court of Abundance a riot of interesting architectural sculptural details invites the attention of the visitor. Beginning with the lower animal forms, such as crabs and crayfish, etc., the entire evolution of Nature has been symbolized, reaching its climax in the tower, where the scheme is continued in several groups in Chester Beach's best style. The lowest of these groups shows the Primitive Age, followed above by the Middle Ages and Modernity. The great charm of this finest of all the towers in the Exposition is its wonderful rhythmic feeling. The graceful flow of line from the base toward the top is never interrupted, in spite of the many sculptural adornments used on all sides. In front of the tower are two very ornate illuminating shafts, showing Leo Lentelli's diabolical cleverness in making ornament out of human figures. Leo Lentelli's style is particularly well adapted to Mullgardt's Court of Abundance. Its care-free, subtle quality, full of animation, presenting new motives at every turn, is most helpful in the general spirit of festivity which characterizes this most interesting of all the courts.

Aitken's Fountain of Life in the centre of the court is totally different. Full of intellectual suggestion, it is almost bewildering in the story-telling quality of its many details. Aitken's fountain, which is situated in the centre of a basin a hundred and fifty feet long by sixty-five feet wide, rises directly from the water. The main structure consists of a series of four groups of heroic-sized figures, carved in pierced relief, each flanked by colossal bronze Hermes, their arms reaching around the structure and held together by animal forms of reptilian or fishy origin. All these forms and figures surround a globe of enormous size, typifying the Earth, over the surface of which streams of water are thrown from the reptilian chain motive.

Leading up to the main structure is a group of ten crouching figures, symbolizing Destiny in the shape of two enormous arms and hands, giving life with one and taking it with the other. Here, on the left side, are arranged figures suggesting the Dawn of Life, while on the right are men and women depicting the fulness and the end of existence.

In the first, Prenatal Sleep, is the crouched form of a woman, while successively come the Awakening, the Ecstatic Joy of Being—or it may be the Realization of Living; the Kiss of Life, with the human pair offering up their children, representative of the beginnings of fecundity; a female, strong of limb and superb of physique, enfolds in her arms two infants, while her mate, of no less powerful build and rude force, kneeling beside her, gives her an embrace typical of the overpowering parental instinct. Here is the suggestion of the elemental feelings, the beginnings of things.

Between the first group and the central one comes a gap, a space typical of that unknown time in history when conjecture alone permits speculation, and the story is taken up again with the first of the central groups, wherein stands a figure of Vanity, glass in hand, symbolizing the compelling motive of so much in human endeavor. To her left, in enormous contrast, are primitive man and woman, treated with great realism, these two carrying their burdens of life, in the form of their progeny, into the unknown future, their expression that of rude but questioning courage, the man splendid in his virility, superb in the attitude of his awkward strength, ready to meet what-

THE GENIUS OF CREATION, BY DANIEL CHESTER FRENCH.

ever be the call of earth. His mate meanwhile suggests the overwhelming and eternal instincts of motherhood.

An archaic Hermes, dividing these figures from the next group, allows for a space of time to elapse, and we come to their children, now grown to manhood and womanhood, in their rude strength finding themselves, with the result of Natural Selection. This is a group of five personages, the centre figure a man of splendid youth and vigor, suggesting the high state both of physical and intellectual perfection, unconsciously attracting the female, two of whom regard him with favor, while two males on either side, deserted for this finer type, give vent to deep regret, despair and anger. One attempts by brute force to hold the woman; the other reluctantly gives up his choice, in the obvious futility of his unequal intellectual endowment to comprehend.

From this to the Survival of the Fittest we have a militant group, in which physical strength begins to play its part, and perhaps discloses the first awakening of the war spirit, the woman in this case being the exciting cause. The powerful chieftains struggle for supremacy of their time and tribe, their women making futile efforts to separate them. Here the sense of conquest receives its first impression and is finely indicated, with admirable action, while there is the symbolism of the conflict of the nations that has ever gone on, for one cause or another, and that struggle for the female which has ever been the actuating motive in war, conquest, and, for that matter, peace.

The next group—always separated by the solemn and dignified Hermae—discloses "The Lesson of Life," wherein the elders, with the experience of the years, offer to hot-headed youth and to the lovelorn the benefit of their own trials and struggles. A beautiful woman is the central figure. She draws to her side splendid manhood, the Warrior, willing to fight for his love and his faith. To his left his mother offers him her affectionate advice, while to the right a father restrains a wayward offspring who, rejected by the female, is in a state of frenzied jealousy. Finally two figures represent Lust, a man struggling to caress the unwilling woman who shrinks from his embraces, and we are led down from this pair out of the composition to the crouching group at the approach of the structure, referred to at the beginning of this description, who here are departing from the central composition.

First is a figure of Greed looking back on the Earth. He holds in his hands a mass suggestive of his futile and unsavory worldly possessions, the unworthy bauble toward which his efforts have been directed. Back of him we have the group of Faith, wherein kneels a Patriarch, who offers consolation to a woman to whom he presents the hope of immortality, holding in his hands a scarab, ancient symbol of renewed life. Next come two recumbent figures, a man and a woman, the first, Sorrow, the other typifying Final Slumber. These are about to be drawn into oblivion by the relentless hand of Destiny.

In the centre of a formal parapet at the end of the basin of water, sixty feet from the fountain, is a colossal figure symbolic of the setting sun, Helios, the great orb having thrown off the nebulous mass that subsequently resolved itself into the earth.

In the immediate neighborhood of this Court of Abundance is found Sherry Fry's figure of Neptune's Daughter, in the open court north of the tower. The figure is not in keeping with the scheme of Mullgardt's court, extending in this direction. The effect of this figure, no matter how graceful it may be, is unquestionably too physical, in a certain measure owing to the opportunity for close inspection.

On the south of the Court of Abundance, in the Court of Flowers, Edgar Walter's fountain has been placed. "Beauty and the Beast" have been combined in contrasting fashion, with much effect, by associating the youthful charms of a graceful maid with the angular ugliness of a dragon, who seems to feel honored by having been selected as the resting-place of a creature from outside his realm. He seems to be almost hypnotized into a state of abject lifelessness. The effect of this juxtaposition of the round forms of the human body and the almost geometrical angularity of the fabulous beast is very interesting and adds a new note to the many other ideas presented. The architectural scheme of the fountain is made doubly interesting by a rich use of animal forms of humorous character.

The immediate vicinity of the Laguna remains still to be investigated in regard to sculptural adornments. The dozen or so niches in the west front of the main building present a repetition of two individual groups by Charles Harley, of New York, of decidedly archæological character—"The Triumph of the Field" and "Abundance." They are most serious pieces of work, possibly too serious, and they are in great danger of remaining caviar to the masses on account of the complexity of their symbolism and the intellectual character of their motives. Their setting is most attractive, amongst groups of trees and shrubs.

Maybeck's Palace of Fine Arts is so overwhelming in its architectural effects that one seldom feels like doing justice to the fine sculptural detail everywhere in this building. Ralph Stackpole's interesting Shrine of Inspiration is the most charming bit of sculpture, more detached in its effect than most of the other motives. Bruno Zimm's eight fine friezes, showing the development and influences of the arts in a very severe, almost archaic style of modeling, add a fine note to the dome, and Ulric Ellerhausen's equally architectonic friezes are in good style and are in thorough harmony with the classic quality of this great palace.

It is, of course, not possible to name all of the many pieces of architectural sculpture used at the Exposition. The general effect one receives is that it represents the best that is possible in exposition sculpture to-day. It gives evidence of the increasing development of the qualities of design, as contrasted with the so much looser work of former expositions. Seldom before have sculptors anywhere, since sculpture and architecture first worked hand in hand, so played their most important roles together in the ensemble setting that constitutes our Exposition visually. On arch or column, in niches, in fountains, and in free-standing groups, they sing of many themes, and always in harmony, but with no loss of character or individuality. There is no doubt of it, that, for an Exposition, sculpture is the most important of all the arts, because it is the most human. Without it, architecture would be cold and without appeal. I foresee a great future for sculpture in America.

CONSTRUCTION

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Vol. VIII Toronto, October, 1915 No. 10

THE BEAUTY OF THE AGE

A. C. Benson

I AM going to attempt to say a few words about the beauty of ancient buildings, what it consists in, how we are to recognize it, and why we must try to recognize and preserve it.

An old and beautiful thing has two quite distinct kinds of beauty, though it is not always easy to say where one begins and the other ends. It has original design and conception, which Ruskin rightly says ought to be called expression, and which is, technically speaking, the classical quality in beauty; it has also the beauty of association, a varied and slowly acquired thing, which gradually draws into itself all sorts of interests and delights, deposited, as Pater says, cell upon cell; and this beauty of association is definitely a romantic beauty, not a question of form and proportion, but a power of evolving a sort of spiritual music, in which themes and motifs outline themselves for an instant and disappear again. . . . . .

What I propose to speak of to-day is the power of association; and though in one sense it cannot be called beauty pure and simple, yet it is a very real and true sort of beauty, though a complicated one, in the sense that it appeals to the spirit with a subtle and delicate sort of charm, and awakens all sorts of remote and musical echoes in the soul, like the music which lingers round vaulted roofs, when the organ utters the last huge chords of the high-piled symphony, and sinks into an awe-struck silence.

But the main difference is this, that the beauty of expression of which Ruskin speaks is a thing in itself, as distinct as Higher Mathematics; an absolute quality, depending upon some hidden psychological law, which tells even the untrained mind what is in due proportion and what is not—while the beauty of association is a subjective thing, contributed to a great degree by the spirit of the individual man who perceives it. The more highly stored that the mind behind the eye is, the more rich its memories, the more deftly and swiftly that it summons up and applies its garnered impressions, the more that it knows and feels, the more fertile and accessible its sympathies are, by so much the more appealing does the romantic force of association become.

What is so deplorable about modern restoration is that it is all a submissive harking back to an arbitrary period of Church art. It is not a departure, it is a tame virtuosity, desiring, if possible, to reconstruct a vanished atmosphere, without any real knowledge of what that atmosphere actually was. The essence of the old building and decoration was to have a few fine dignified things on which the eye might rest with unsated pleasure, for ever discovering fresh beauties. But the new theory is to cover up everything with tawdry and flashy decoration, which gives perhaps a scenic sort of pleasure at first sight, and which breeds an ever-increasing disgust at the continued contemplation of its shallow trickeries. . . . .

I believe with all my heart in a beauty of strict form. . . . But I believe also in the immense interest and charm of development and accretion—what Ruskin calls Association. I like to see and to preserve the best that people could do, whether it is a gaudy Jacobean tomb crowded with obelisks and emblems and a stiff-ruffed figure in veined alabaster, or even a wigged divine clasping a marble book, among lachrymose cherubs and cinerary urns. Those who ordered and those who designed such things thought them beautiful; and nothing which has ever engaged the affections and devotions of human hearts can ever wholly lose its charm. . . . .

Anyone who has ever broken up a home and parted with familiar furniture must surely have had the feeling that the old chairs and tables are being unjustly used, and that they will not really ever feel happy with their new owners; and the love of a home is a complex thing, because a house has all the charm of a picture or a book, in that it is an expression of human personality, a symbol of human desires and designs; and then it acquires too the secondary charm of having been the scene and witness of human adventures and events, so that the beam of the roof and the stone of the wall have become inseparably connected with human emotions and hopes and fears, and have a sanctity of which they cannot be divested, which even the prosaic Romans felt and rendered in the untranslatable phrase *admonitus locorum*—the spirit and influence of a place—the way in which a scene, which is associated with the horror of a calamity, or which has been the haunt of a genius, can tacitly warn a human heart to forbear, to beware, to make a choice, or to follow a high example. That is the spiritual side of what I have called the beauty of age—its real and potent effect upon the emotions of men. . . .

And then, too, in a less ethical and a more artistic region, there is the beauty which falls upon a building from the accommodation of all its mutual parts, through the touch of rain and sun, the pressure of wind, the strains and stresses of the earth, the movements of the soil, the slow passage of hidden streams, the thrust of burrowing tree-roots, the settling-down and distributing of the weights of wall and roof. When a building is first set up it has a mathematical rigidity and precision, as of a box of stone half embedded in a field. Then the slow process begins; here a softer passage of soil causes a settlement, a corner begins to shift away, and the rest of the house inclines a little to retain the fabric in its place; the roof timber warps and bends, and the tiles dip and waver in outline; all this is a pure gain, because the beauty of the underlying form is there, under the tiny deviations which relieve the eye from a too mathematical precision. The house leans and gathers itself together, and at last comes to look, not as if it were set upon the soil, but had grown up out of it, like a rock or a tree. It is no longer an intruded thing, but a part of the scene. Meanwhile every surface is feeling the influence of the chemistry in the air; the sharp edges are softened, the lichen spreads its delicate patches, the sun bleaches the southern surfaces, the moss creeps along the sheltered ledge; the whole fades and glows into a soft harmony of color and outline.

So my first and last plea is that we should dare to let things alone, even if we do not understand them or think them beautiful, for the sake of the tender care which set them in their place, just so and not otherwise, and in the name of memory and reverence and love. For taste is a very changeable and inconstant thing, but reverence is eternal. The old house, the old church, ought to mean something to us, and we must not lightly change and deface them. Of course we must not let such emotions hamper our lives, and still less unfit us for harder and baser conditions. We ought not to grow more and more fastidious by experience, and if we find ourselves growing more and more disgusted and impatient if we cannot have things to our mind, then we are setting art before life, and not simply using it to enrich and strengthen life. If we are dealing with old and venerable things, we ought to do as little as we can to them; mending and repairing, but not what is called restoring. For a restored church is not a new church and it is not an old church—it is a new church without its originality, and an old church without its dignity.

And, if additions must be made for use and life, let them be frank additions, and not an attempt to fake what is old. The beauty of age is very easily marred, and it cannot be imitated; and I am sure that whatever art is, it must be sincere. It is the emotion which art can give which makes it worth while; but it must be a real emotion, and not a bit of clever self-deception. A love of story-telling and character-moulding is typical of the decline of real emotion. As Milton said of the staircase of heaven, "Each stair mysteriously was meant." There is a mystery and a meaning in it all. We do not know exactly what it represents, but we must do our bests to interpret its meaning, and then we must be serious about art, if we are to get any help from it, but never solemn. It is being solemn about art when we try to make it produce fictitious effects just for the luxury of the emotion, but it shows a lack of all seriousness about it if we can misuse and deface a beautiful thing and destroy the rich beauty which only time and use and reverence can create.

* * *

AT the last meeting of the Council of the Architectural Institute of British Columbia, Inc., the following action was passed: "Resolved, "A record shall be kept by the honorary secretary of all members of the Institute in active service during the war. Such members are requested to advise the honorary secretary from time to time as opportunity offers, of movements, transfers, promotions, rank, and condition, together with such details of actions in which they participate as will enable the record to be made complete. Any member wounded or taken prisoner especially requested to so advise the honorary secretary as promptly as possible, in order that the Institute may render assistance in any way possible."

ANNOUNCEMENT has been received of the death of Joseph S. Henderson, president of Brandram-Henderson Limited. Mr. Henderson died at Halifax, July 31st after having brought this company up to its present state of efficiency and high standard. The organization will feel the loss keenly although the work will suffer in no way on account of the systematic foundation supporting the institution, mainly laid through the efforts of Mr. Henderson.

* * *

THE mechanical, electrical and domestic engineering equipment installed in the new Central Technical School, Toronto, was under the supervision of the Canadian Domestic Engineering Company, Limited, of Montreal. The author of the article treating of the mechanical work, Almond D. Woodman, is president of the above company, and has kindly co-operated in presenting this phase of the institution in a comprehensive manner. CONSTRUCTION is also indebted to J. B. Carswell, associated with the firm of Ross & Macdonald, for his treatise of the architectural features.

* * *

STEEL LOCKERS are rapidly becoming recognized as a necessity in modern well-organized establishments and institutions. They provide safety and security for each individual's clothes and personal effects. Also they conform to sanitary and insurance requirements and make for order, tidiness and system wherever used. An important installation of these lockers has been made in connection with the new Technical School, Toronto, for the use of teachers and students. There are nine locker rooms in the school containing in all one thousand lockers. Each locker has a different lock and the entire installation can be inspected by the use of a master-key. Each locker bears a number plate showing the number of the locker and also the room number. With this as a basis, a system has been worked out whereby those in charge may at all times know which student is responsible for the key of any locker. A tag is attached to each key and this tag bears the same locker number and room number as the locker itself. These lockers were supplied and installed by the Dennis Wire & Iron Works Co., Limited, London and Toronto, Canada, and are a splendid example of material and workmanship. Lockers manufactured by this firm, bearing their trade mark "Dennisteel," have been installed in practically every type of building, from one end of Canada to the other. They are used in offices, banks, factories, gymnasiums, schools, colleges, lodges, fire stations, hospitals, hotels, etc. The Y.M.C.A.'s of Canada have been large purchasers, while in Toronto "Dennisteel" lockers are installed in a large number of high schools.

For locker purposes, it seems that steel is highly preferable to wood. Steel lockers are theft-proof and almost unbreakable. They are non-inflammable and economize on floor space. They will not absorb moisture and vermin will not breed on steel. The appearance of steel lockers is excellent and with ordinary usage this class of material will last indefinitely.

* * *

A CEMENT TESTING Machine similar to one shown above was installed in the Toronto Technical School by the Canadian Fairbanks-Morse Co., Limited. The machine was supplied with tension attachment and had a capacity of 2,000 lbs. They also supplied percentage scale, briquette moulds, sieves, Vicat apparatus and Gilmore needles for use in connection with same.

* * *

MASTER BUILDERS' METHOD, it is claimed, eliminates the porosity of concrete floors by the use of Master Builders' Concrete Hardner, a finely-divided, chemically-treated and extremely hard material that is mixed with the sand and cement for the topping of the floor. When properly incorporated in a concrete floor topping, this hardner gives a high tensile and compressive strength, and enables the floor to withstand abrasion to an exceptional degree. Added to ordinary concrete in accordance with Master Builders' Method Standard Specification, it creates a concrete floor that is extremely dense, wear-resisting, dustproof and waterproof.

It not only treats the surface but is mixed right into the topping of the floor, binding, hardening and strengthening it, and making it exceptionally durable. It is further claimed that a concrete floor properly laid by this method, will under ordinary conditions, resist wear almost indefinitely. There will be no dusting, no hollows or ruts to be gradually ground and crushed into trouble-giving holes. Other considerations which recommend its use are the elimination of painting, patching and replacement, thus insuring a concrete floor of a permanent character from the first. A splendid example of the application of the Master Builders' Method is seen in the floors of the new Technical School illustrated in this issue, which represents one of the more important recent contracts for which this material is specified.

* * *

IT IS SAFE to say that the book making the greatest impression on all visitors to the Panama-Pacific International Exposition, and also on those who cannot visit, but who are interested in it, is "The Art of the Exposition," by Eugen Neuhaus. Mr. Neuhaus, himself a painter, assistant professor in the Art department of the University of California, and chairman of the Western Advisory Board of the Department of Fine Arts in the exposition, is well fitted to write of the architecture, sculpture, color scheme, landscape gardening, mural decorations and illumination of the exposition, all of which he has discussed in this volume. The work is illustrated by thirty-two handsome duo-tone prints, showing the best of the exposition art. It is far more than a guide, it is a splendid interpretation of the form and color that make this exposition the most wonderful ever achieved. As a piece of book making, "The Art of the Exposition" is beautiful, printed on toned antique paper, bound in full fawn sunburst boards richly stamped, with uniform end papers and jacket. The price is $1.50 net, published by Paul Elder & Company, San Francisco. A companion book, on the art galleries of the exposition, by Professor Neuhaus, is now in preparation and will be published in the very near future.

* * *

THE James Smart Manufacturing Co. has issued a circular relative to the silent sanitary school desk, which represents the latest improvements in connection with this phase of school work. It presents in a lucid manner the various features which commend it for general use.

* * *

IN COMMENTING on the resignation of the head of the sales department and the combining of this work with the Advertising under one head, the president of Berry Brothers, says: "It occurs to us that this change, coming at a time when some of our competitors have been reducing their forces of salesmen, may give rise to a feeling of apprehension lest we may contemplate such a course ourselves. We take occasion, therefore, to reassure each and every one of you, and to state that we contemplate no change of such a character. It is our desire and intention to continue the arrangements now existing between us and all of those salesmen who have been instrumental in building up and maintaining this business. The general policy of this company toward its employees will continue unchanged. Rewards for meritorious work will be as large as they have ever been and the appreciation will be as sincere. A continuation of the loyal support you have given us in the past will be met with the same spirit on our part." Such sentiment is worthy of emulation and will go a long way towards bettering the unnatural conditions of depression.

* * *

"ACHIEVEMENTS in Modern Heating and Ventilating" is the title of an instructive booklet issued by the James Smart Manufacturing Co. In this work the Kelsey warm-air generator system is thoroughly described and illustrated with many examples of buildings wherein it has been installed.

* * *

THE contract for building the superstructure of the railway bridge over Smoky River, Alberta, for the Dominion, Dunvegan & British Columbia Railway has been awarded to the Dominion Bridge Co., Ltd., and the material will be fabricated in this company's Winnipeg establishment, which is one of the largest and best equipped west of the Great Lakes. The bridge will consist of two 86-foot deck plate girder approach spans, six 120-foot deck spans, and one 125-foot through truss span which will span the main channel of the river, the steel in the superstructure weighing nearly 1,200 tons. This is one of the most desirable bridge contracts ever given out in the west. The concern has only recently completed the erection of a similar bridge for this railway over the Athabasca River.

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November, 1915 Vol. 8, No. 11

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H. GAGNIER, Limited, Publishers
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MONTREAL NEW YORK

DETAIL OF VAULTING.

KNOX COLLEGE, TORONTO.

CHAPMAN & M'GIFFIN, ARCHITECTS.

Knox College, Toronto

THE formal opening of the new Knox College brings prominently to the foreground two notable phases of development, one the substantial growth of the institution which it represents, and the other of still greater general importance, the realization to a most successful degree of the higher forms of building design to which the artistic impulse of the Canadian mind is rapidly turning. It stands as a conspicuous achievement among the newer works which has come to take place in the University group; and reflects deserving credit upon its designers, Messrs. Chapman & McGiffin, whose solution of a most difficult problem has resulted in an institution which picturesquely adds to existing structures on the grounds, and shows an interesting grasp of the complex requirements which its various offices necessarily involve.

Briefly summarized, the organization to be housed in the new college buildings can be divided roughly into the six elements of the chapel, the library, the academic portion, the administrative offices, the residences or dormitories, and the dining hall, with its accompanying services.

The chapel seats slightly over five hundred people, and is about ten feet above grade level, having below it a gymnasium with locker and shower rooms adjoining. The library consists in a large reading room, adjoining a modern stack room, the latter having a capacity of seventy-five thousand volumes and an office for the librarian controlling both the stack room and the reading room. For academic purposes there are six class rooms and a corresponding number of professors' rooms; the class rooms varying in seating capacity from twenty-five to sixty. The administrative portion consists in a waiting room, a general office, the principal's private office and a large board room; the latter room has been given considerable dignity owing to its possible use for other purposes than those only connected with the college.

In the students' residences or dormitories are accommodations for slightly over one hundred students, the latter for purposes of control are separated into three distinct houses. Each house is four storeys high, has a reception room on the ground floor and bathing and lavatory accommodation on every floor, and in practically all cases a student has been given a room to himself. The dining hall accommodates about one hundred and fifty men in tables running lengthwise and a "high" table across the end. A students' common room and a private dining room forms part of this group, as well as the necessary serving pantry. Below the dining hall is a floor devoted to the servants' accommodation, and below this is the kitchen with the necessary store rooms, etc. In addition to the foregoing there are two debating rooms, or club rooms, and a small hospital in the St. George street tower.

The site chosen for the college measures three hundred and fifty feet in length by two

CLOISTER THROUGH QUADRANGLE.

STUDENTS' DINING HALL, KNOX COLLEGE.

ENTRANCE, ACADEMIC PORTION, KNOX COLLEGE.

hundred and thirty-four feet in depth, and it has a slight slope to the south. The building faces St. George street on the west and the University lawn on the east, and the academic portion of the building was kept on the University side, while the residential portion adjoined the street. These two wings are connected on the south side, thus forming three sides of a quadrangle from which the three residences are entered. The completed scheme takes into consideration the extension of the building at some future date, so as to enclose the quadrangle on the four sides. An open cloister traverses the quadrangle, giving a protected passage across the court from the academic to the residential portion of the buildings.

The plan is framed on an axis running from the St. George street entrance to the academic entrance through the above mentioned cloister. Crossing this axis at the eastern end is the main axis of the chapel on the south, and the library on the north, both of these main architectural features being on the second floor. On the first floor the above axis is paralleled by two secondary axes, the northern one through the corridor dividing the class rooms and the southern one through the corridor communicating with the administrative offices. This system of

LIBRARY, KNOX COLLEGE.

paralleling the axes works in well with the vestibule, and simplifies what would have been otherwise a complicated plan. The east and west axis is crossed at its western end by the dining hall axis, this important room being also on the second floor. Although the residences are worked out with a central corridor owing to their being separated into three houses the axes do not carry through except for the exterior grouping effect.

The exterior design has been conceived in a modified form of collegiate Gothic that was best adapted to the materials and funds available, and an effort was made to give this style a feeling of massive solidity expressive of the traditions associated with the denomination that the college represents. The distinctive character appertaining to the different elements composing the college group was preserved and emphasized. On the St. George street elevation the composition was adopted of a central tower flanked on the north by the dining hall and on the south by a dormitory wing, while on the University elevation the exact opposite principle was adopted, as there are two large flanking features, with a low feature between. This composition was adopted partly to contrast with the St. George street composition, which is also

BOARD ROOM, KNOX COLLEGE.

LECTURE ROOM, KNOX COLLEGE.

that of the adjoining University College building, but mainly to obtain the suggestion of a group of buildings surrounding an inner quadrangle, which is the essential beauty of the self-contained community life of a college. This was considered of such importance that the main University entrance was given the expression of a gateway leading into the private domain of the college rather than the more ordinary architectural composition.

Credit Valley grey sandstone, with Indiana limestone trimmings, is used for the exterior walls, while the frame work and floor system is of steel system with concrete slab construction; the roof of the chapel, library and dining hall being the only non-fire portions. The flooring of the dining halls and the aisles of the chapel are of quarry tile, the main stairs are of marble, and the halls and residences are of terrazzo. One of the unique features of the interior construction is the excessive use of articles of stone cast on the premises. The trim throughout is of oak, including the wainscoting and timber roofs wherever used.

The heating and ventilation is controlled by a central power heating plant which supplies the entire University group. The steampipes are brought in at the southern end of the building through a large central passage, which also contains the fresh air room, the air being brought down the towers flanking the entrance, and forced by the fan through ducts to the library and class rooms on the right and on the left under the gymnasium gallery to the side walls of the chapel and straight down the passage, separate exhaust fans being provided for the dining hall and reunion room. All bedrooms in the residential section are heated by direct radiation. The chapel library and academic rooms are ventilated by indirect radiation and heated by direct radiation. The foul air is taken off near the floors, assembled in the roof space and exhausted through the louvere opening in the towers.

The design from which the buildings were erected was selected from a large number of competitive drawings submitted at the time the project was determined, and which were adjudged by the Board of Management, acting with and upon the expert advice of two professional assessors, namely, Professor Percy E. Hobbs, of the School of Architecture, McGill University, and Mr. Frank Darling, this year's gold medalist of the Royal British Institute. Under these auspices a programme was prepared which embodied conditions such as recognized architectural bodies have persistently demanded, and the award was unanimously accepted as a fair and impartial decision by all competing parties. One of the stipulated conditions was that the award of the assessors should be accepted by the promoters, while another of equal importance, and which has influenced subsequent undertakings of a similar nature to an extent which at least has confined the work to British architects, restricted the competition to practitioners who were bonafide residents of the Dominion. That the confidence of the promoters in native ability was in no way displaced is proven both in a large number of excellent designs submitted at the time and by the now completed structure. With the exception of certain minor changes, made necessary by arbitrary requirements, the buildings have been

GYMNASIUM, KNOX COLLEGE.

RECEPTION ROOM, KNOX COLLEGE.

erected in strict adherence to the design and specifications of the original scheme. The cornerstone of the college was laid October, 1912, which brings the time required for construction slightly under three years. The buildings, including $10,000 for library stacks, cost approximately $570,000, while the interior finish, inclusive of wood work in chapel, represents an additional outlay of about $25,000, this is exclusive of furnishing, which is provided from a separate fund.

ABOUT eight years ago a young man, hitherto unknown to educational experts, became superintendent of the public schools of Gary, Ind. He had the unusual opportunity to start an educational system with a clean slate. When Mr. William Wirt took charge of the Gary school system the town itself existed mainly in the form of surveyors' blue prints and architects' plans. Mr. Wirt, therefore, did not have to undo any mistakes of the past; his school system, architecturally and educationally, was all in the making; he had the rare opportunity to do something new. Stories that presently issued from Gary showed that he was making use of this virgin soil. In Gary the school became the great community centre, where children spent practically the whole day, where they not only gained an education but played, worked, learned trades, engaged in athletic contests, listened to lectures, danced, went in swimming, and indulged in other things indispensible to a well-rounded citizen. The new school building itself portrayed this new educational idea. It was a huge structure, sheltering under one roof kindergarten, grammar grades, high school, and the first two years of college. It taught blacksmithing and printing as well as arithmetic, French, Greek, and chemistry; it was, indeed, a great trade school, hardly any department of useful mechanics being omitted. The building itself was only part of the institution. It rested in the midst of a great park, surrounded by swimming pools, small playgrounds for little children, tennis courts, track field, baseball diamonds, football grounds, besides a general sauntering place for band concerts. The building contained two gymnasiums, one for girls and one for boys—both accessible to the general public in the evenings—and a hall that could be used for lectures, dances, or theatrical performances. Children went to this school in the morning and stayed all day. They had a period in the schoolroom, then a period in the playground, then another in the schoolroom, and so on. Gary children did not leave their school at three in the afternoon and adjourn to the back alleys, where they could initiate themselves in urban vices; they found endless diversions on the school premises. The school was open six days a week and fifty-two weeks a year; it was a case of complete utilization of plant with no leakages from wasted time.

The novel Gary system is spreading. Mr. Wirt spent part of last year in New York city, developing his ideas in the public school system. He will try out the Gary plan in detail next year in eleven schools in the Borough of the Bronx. Physical conditions in New York are apparently not so favorable as in Gary; nevertheless this young educator believes that the essentials of the Gary plan can be adapted to a large city.—*The World's Work.*

STUDENTS' ROOM, KNOX COLLEGE.

CHAPEL.

KNOX COLLEGE, TORONTO.

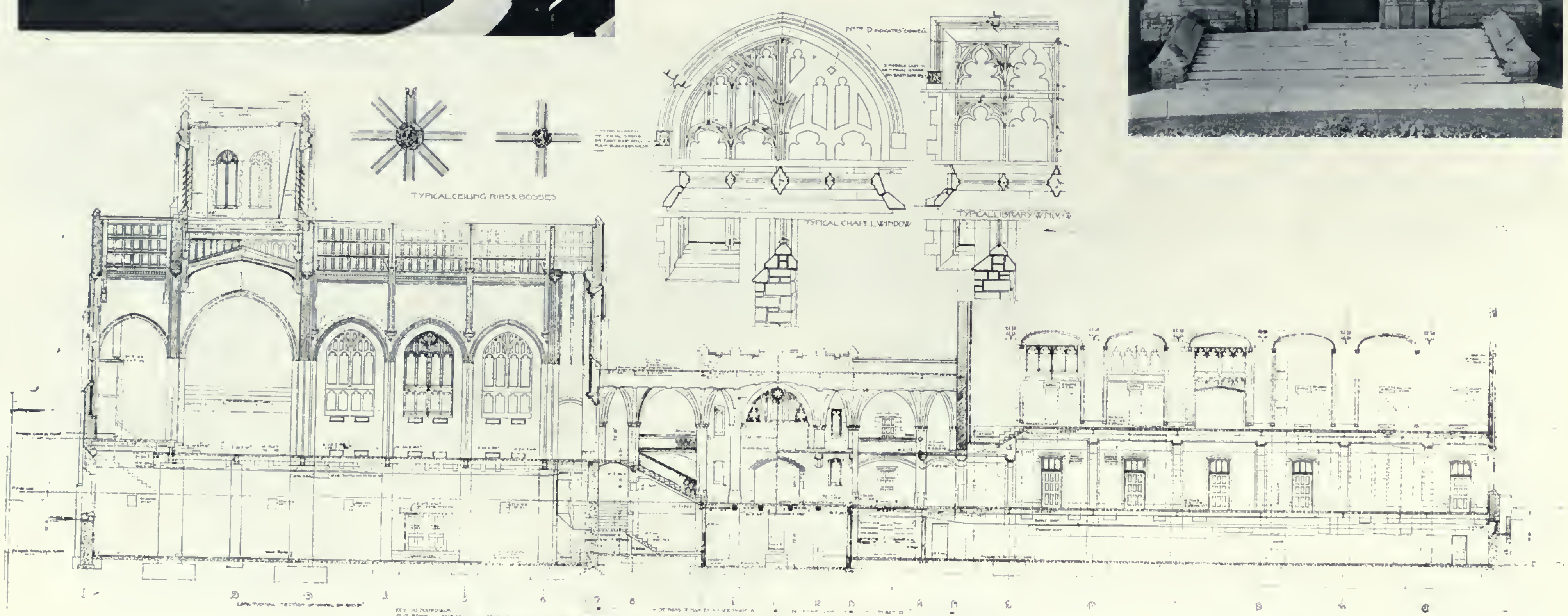
CHAPMAN & M'GIFFIN, ARCHITECTS.

KNOX COLLEGE, TORONTO.

CHAPMAN & M'GIFFIN, ARCHITECTS.

CONNECTING CLOISTER.

ENTRANCE FROM UNIVERSITY GROUNDS.

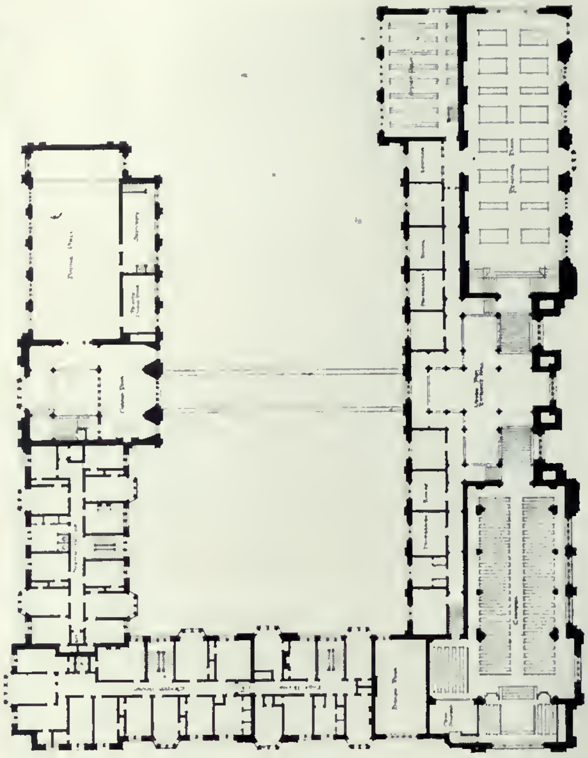


LONGITUDINAL SECTION LOOKING WEST, ACADEMIC PORTION.

VIEW FROM UNIVERSITY GROUNDS.

KNOX COLLEGE, TORONTO.

CHAPMAN & M'GIFFIN, ARCHITECTS.



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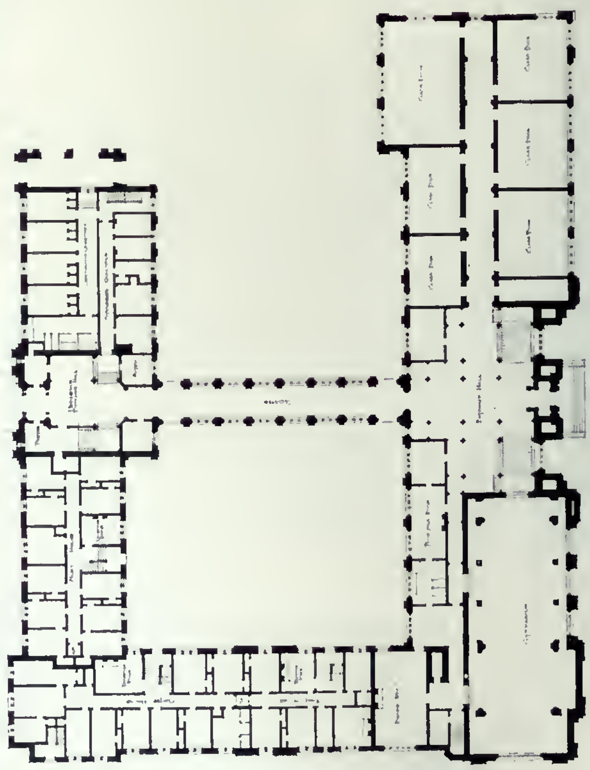


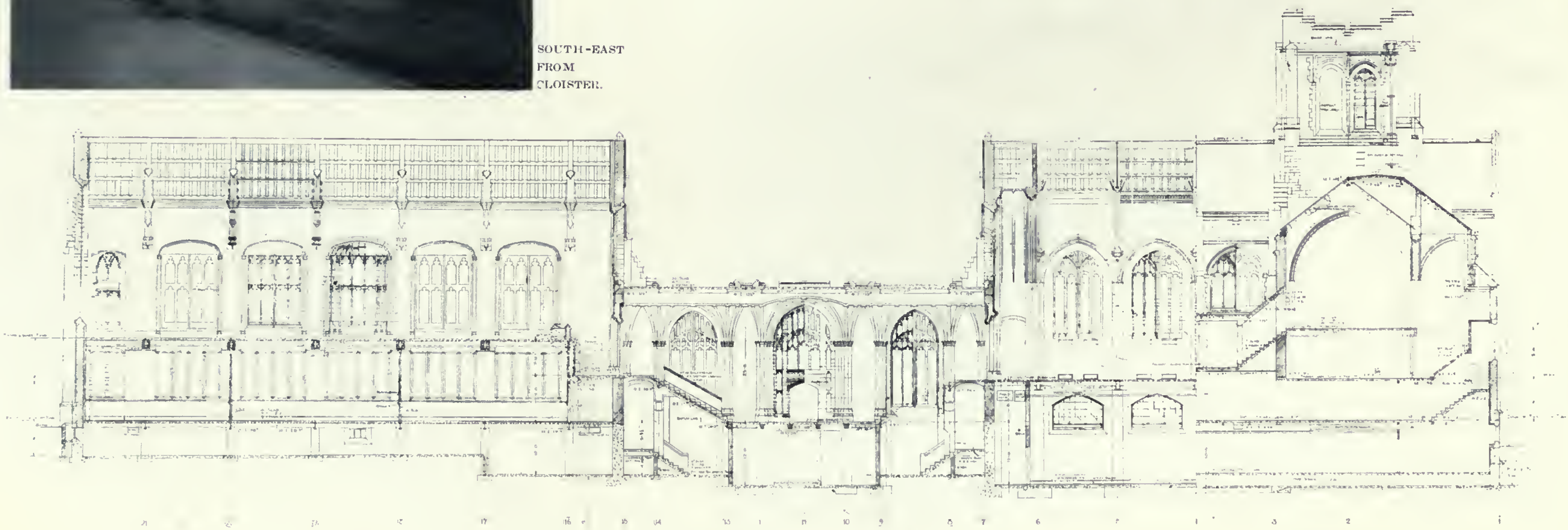
FIRST FLOOR.

KNOX COLLEGE, TORONTO.

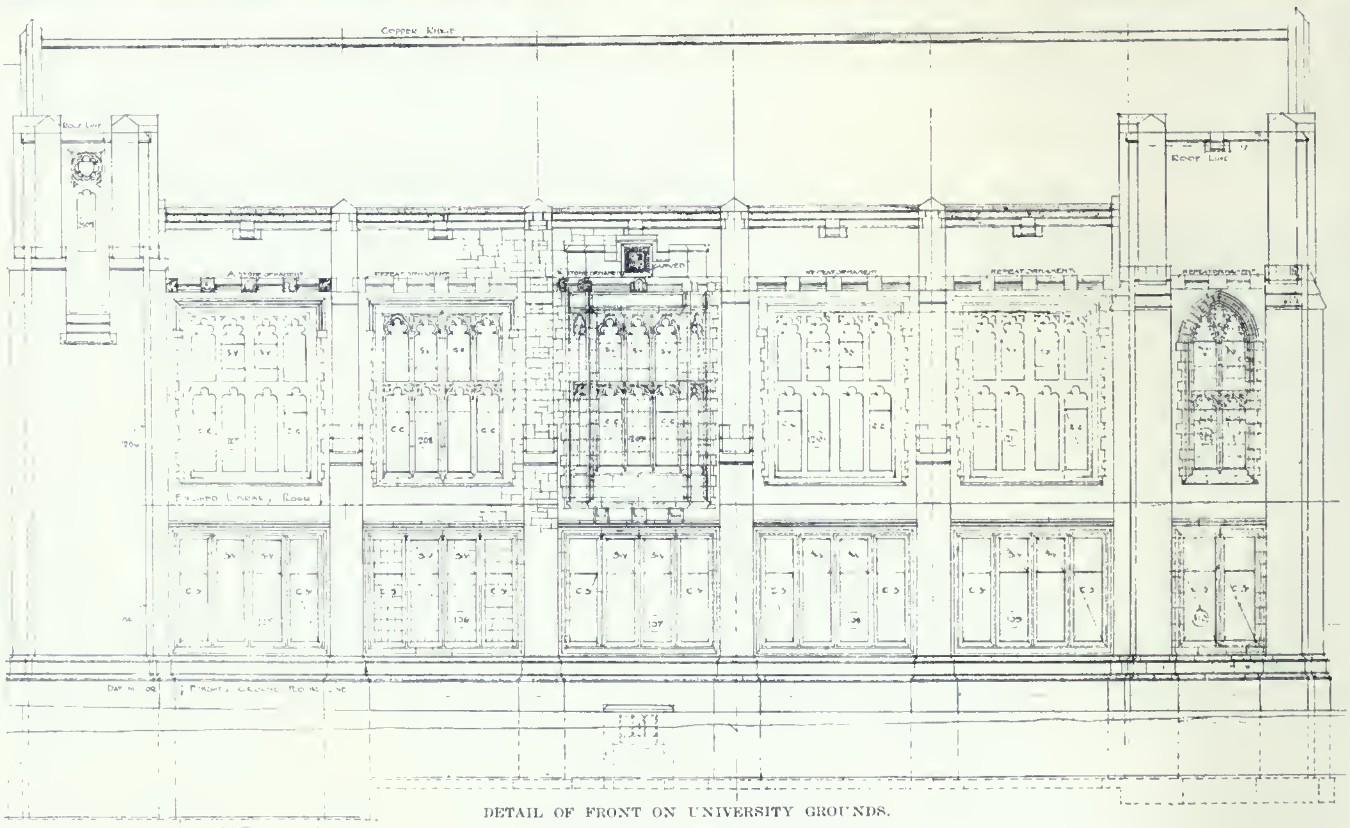
CHAPMAN & M'GIFFIN, ARCHITECTS.

SOUTH-EAST FROM CLOISTER.

INNER COURT TOWARDS CHAPEL.



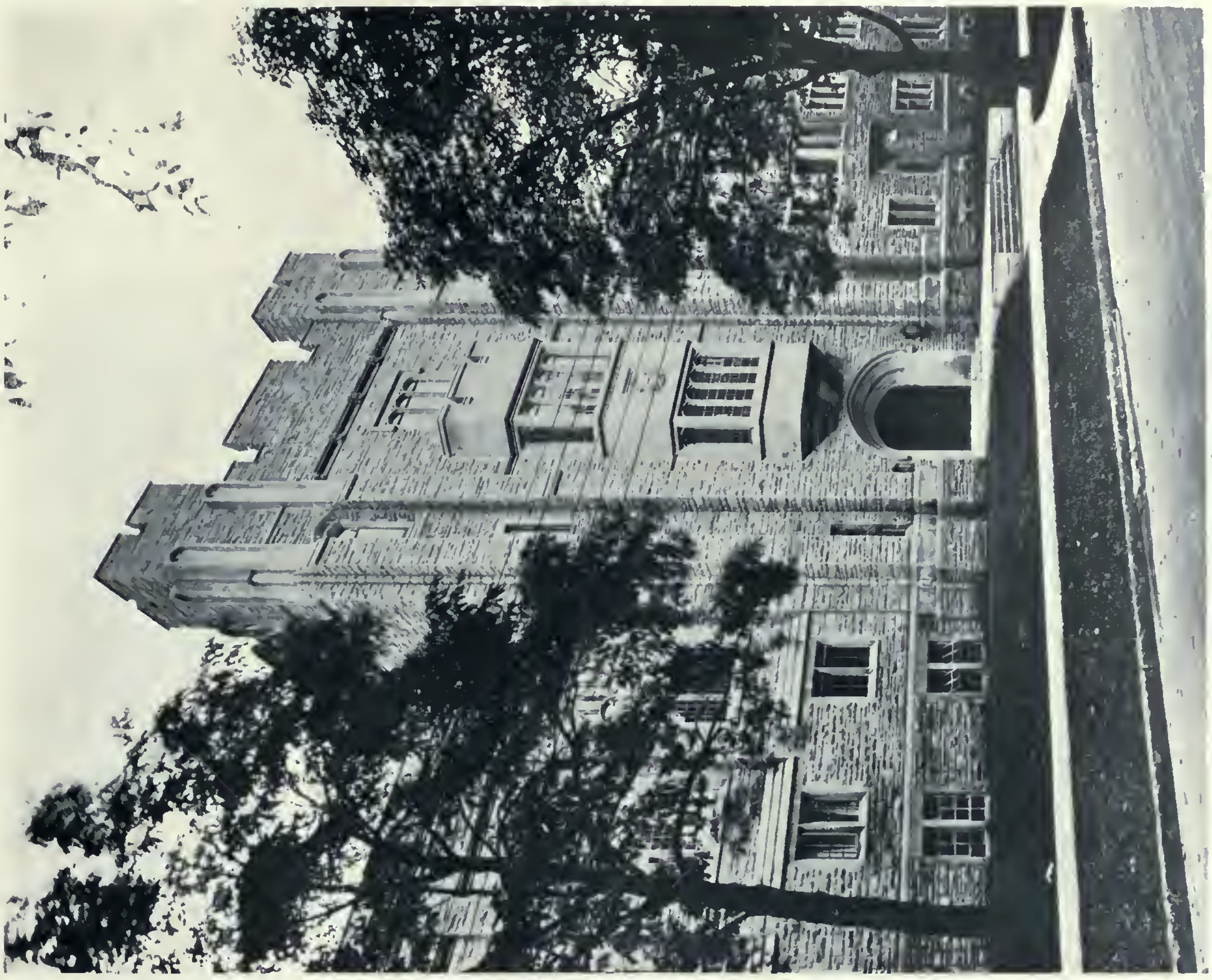
LONGITUDINAL SECTION LOOKING EAST, ACADEMIC SECTION.



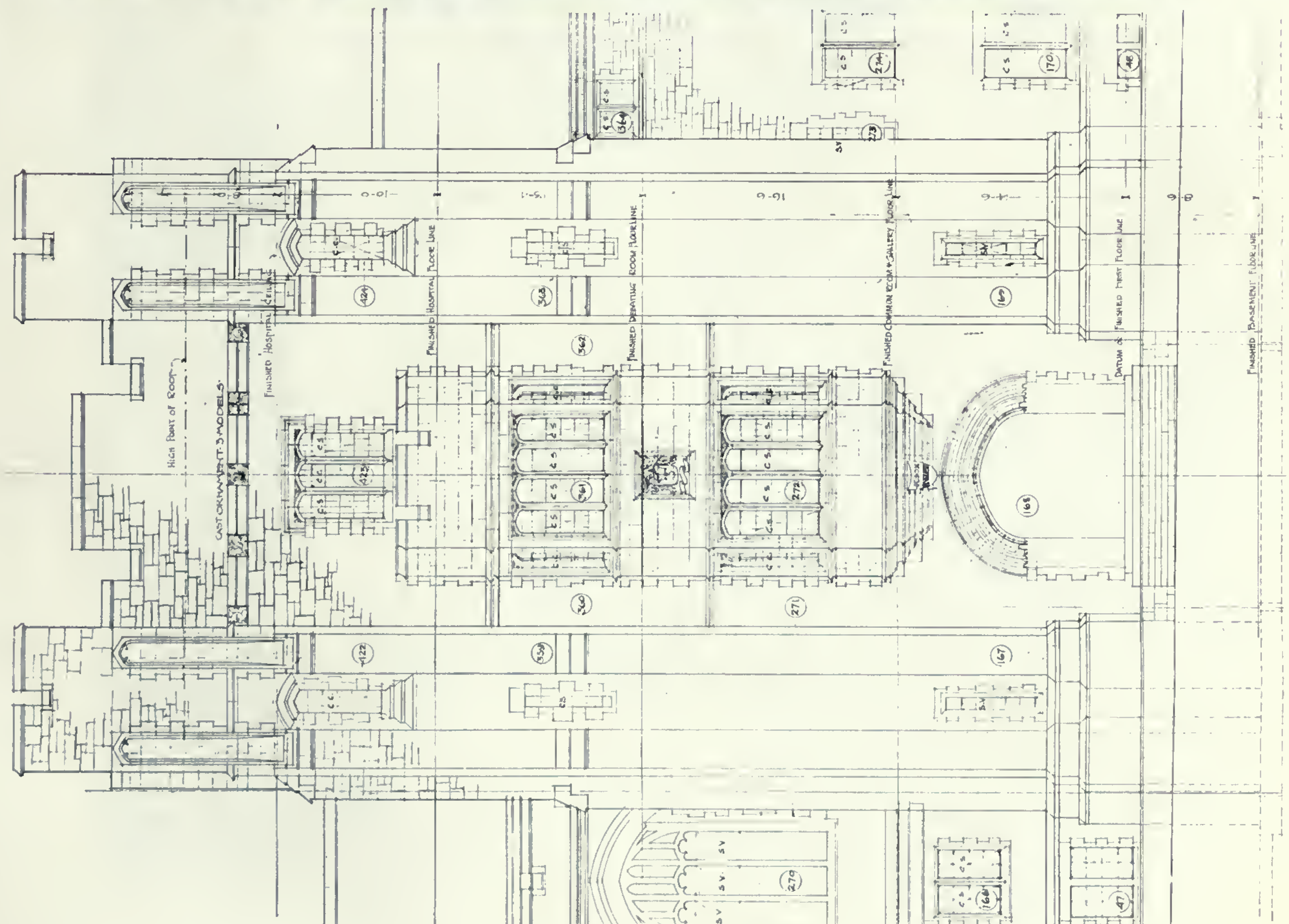
DETAIL OF FRONT ON UNIVERSITY GROUNDS.

KNOX COLLEGE, TORONTO.

CHAPMAN & M'GIFFIN, ARCHITECTS.

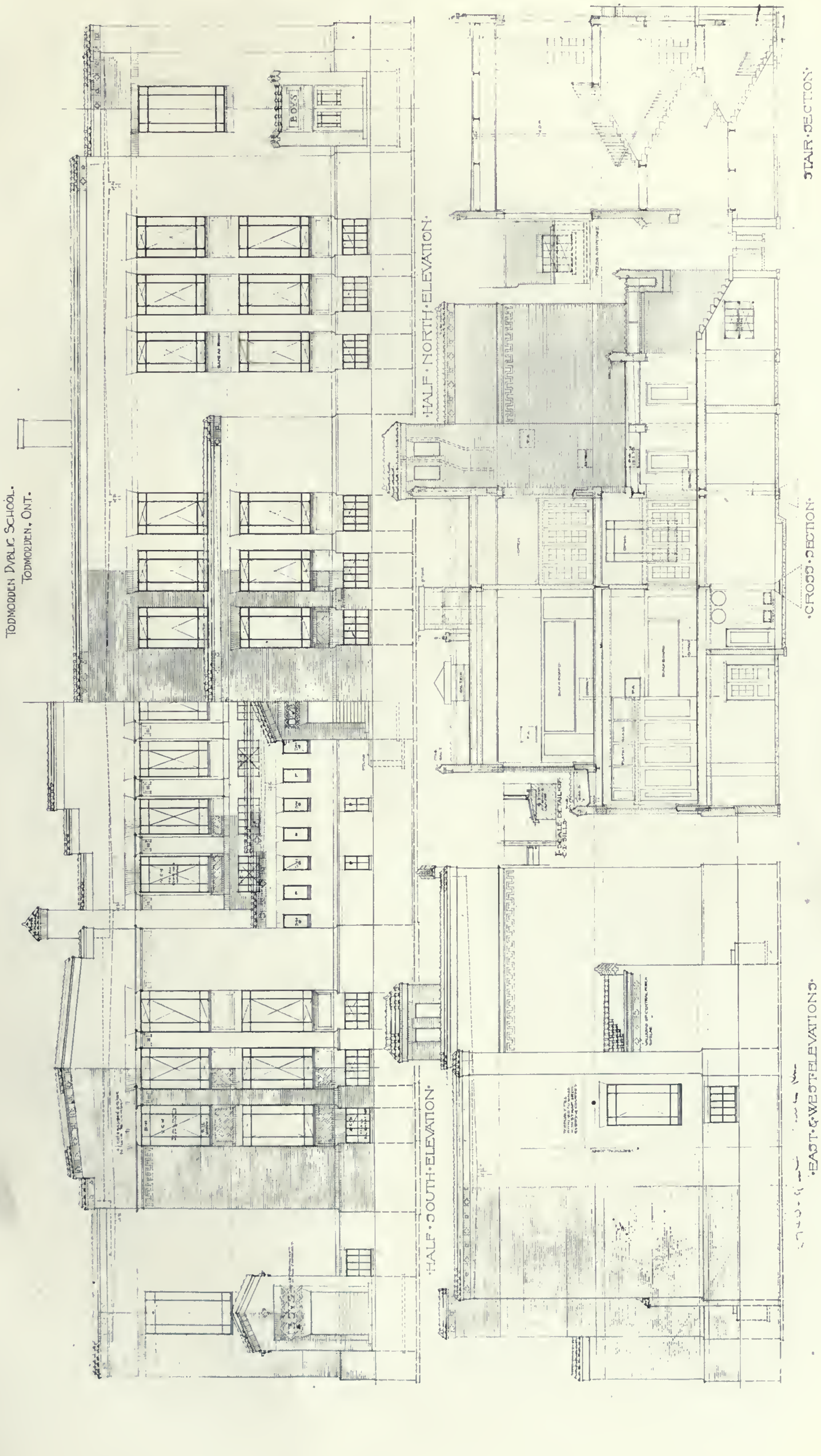


DETAIL OF WEST ENTRANCE.
KNOX COLLEGE, TORONTO.
CHAPMAN & McGIFFIN, ARCHITECTS.



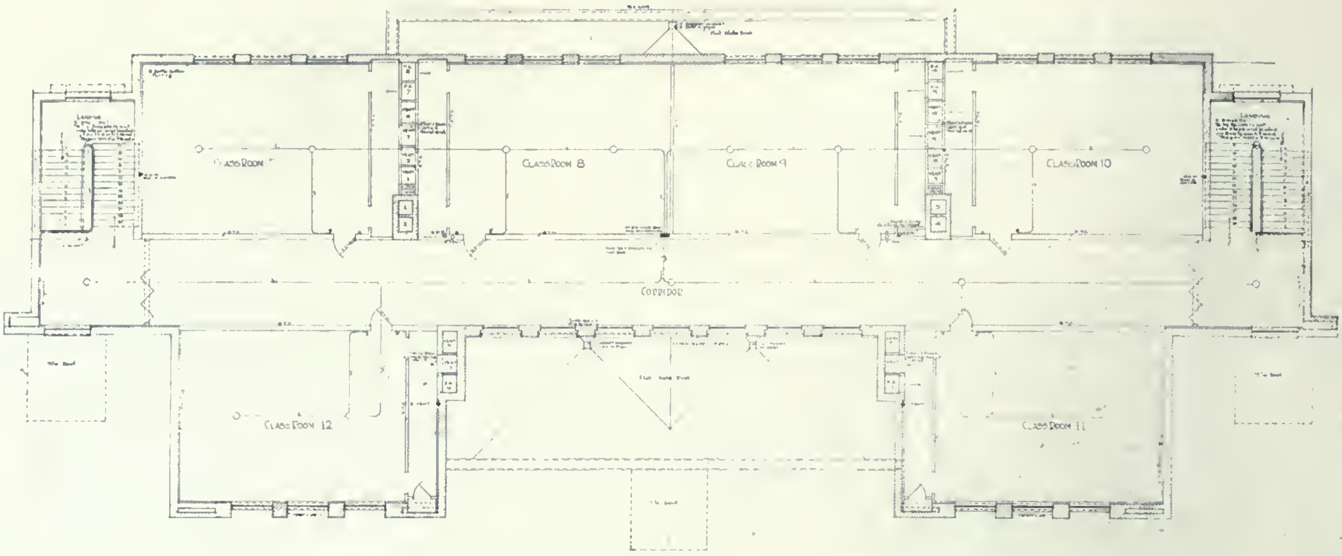
LINDSAY, BRYDON & GREIG, ARCHITECTS.

TODMORDEN SCHOOL.

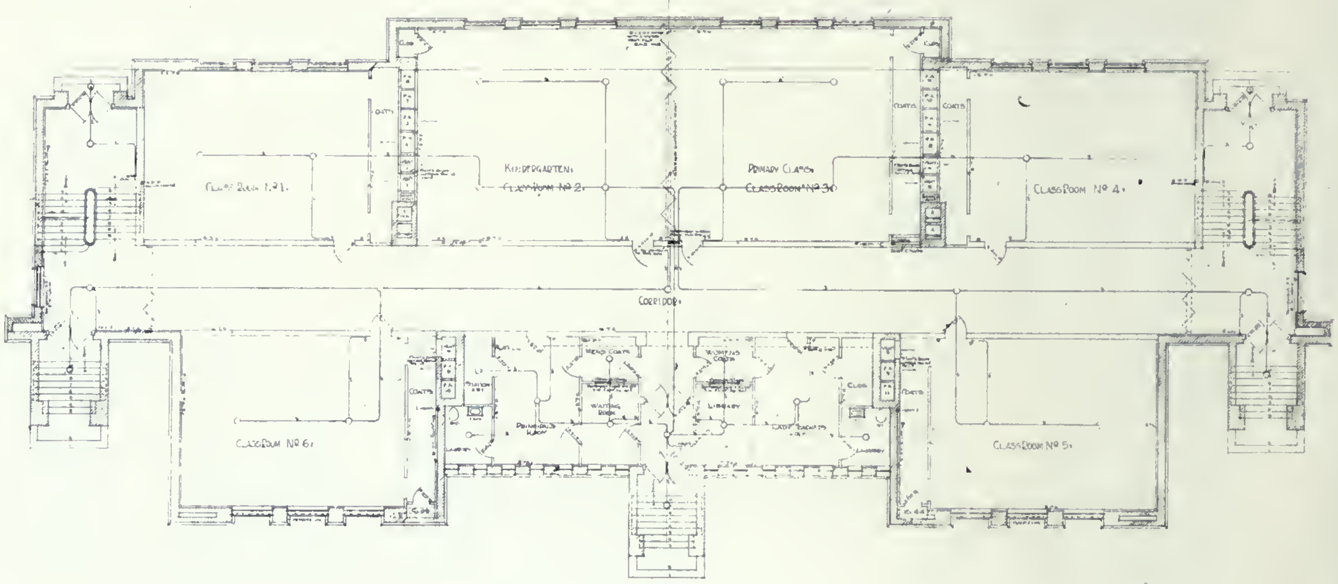


TODMORDEN SCHOOL.

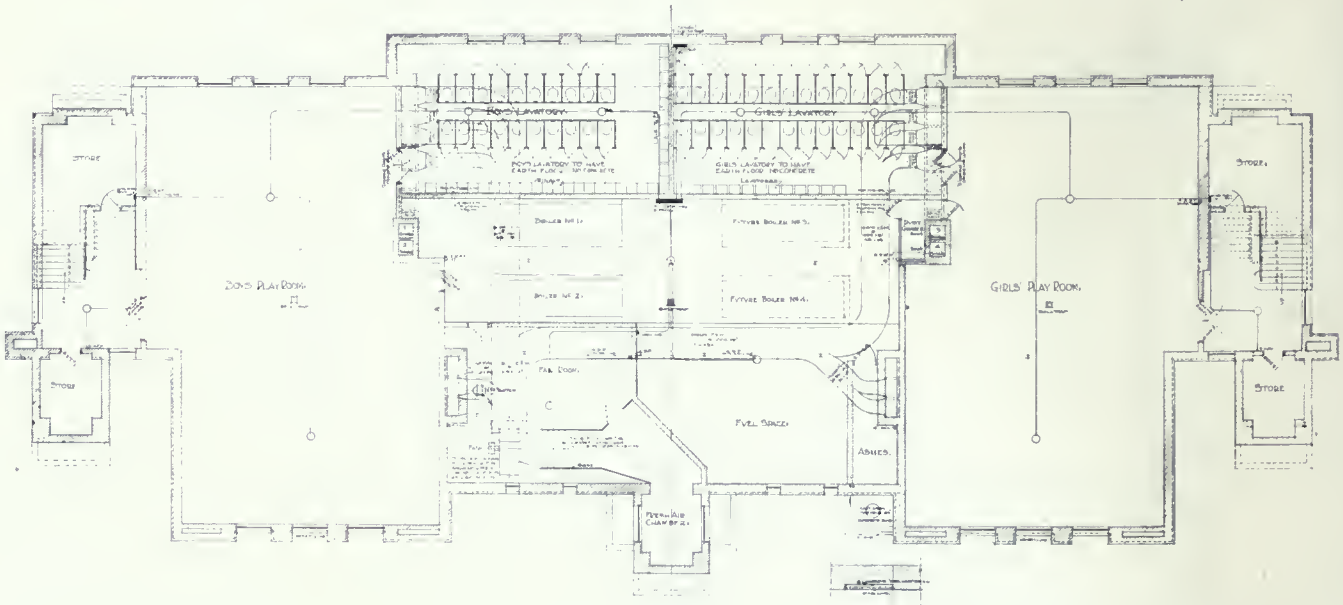
LINDSAY, BRYDON & GREIG, ARCHITECTS.



·SECOND·FLOOR·



·FIRST·FLOOR·



·BASEMENT·

TODMORDEN SCHOOL.

LINDSAY, BRYDON & GREIG, ARCHITECTS

SOUTH ELEVATION.

Todmorden School

THE danger which is always present in non-fire resisting, or even partly non-fire resisting buildings, is in itself sufficient reason for the abandonment of these types of construction in school work if funds will permit. Not only will the reduced cost in upkeep more than justify any additional initial expense, but where non-burning materials alone are used the elimination of wood floor joists and trim result in a more sanitary building.

In the new Todmorden School the firm of Lindsay, Brydon & Greig have in a large measure accomplished both of these desirable conditions. The building is located on a three-acre site, forming a junction with Pape avenue on the east and Torrens avenue on the south, on which the main elevation faces, which allows ample ground space for future extensions in addition to adequate accommodations for outdoor recreation purposes.

The design of the building, which exhibits a Greek feeling, is adapted for brick construction, and no stone is used in any part of it. The wall head copes are covered with Spanish roofing tile, and with the exception of the sills, which are of cast iron made in special moulds to fit the steel sash, the school is a completely fire clay job. The exterior treatment throughout is simple and direct; the only ornamentation used is the bands of panelled diaper work over the window heads, around the cornice of the main pylons, and under the wall head copes.

There are five entrances to the building, the central door being for visitors who may wish to consult with the principal. The boys' and girls' entrances to the front and rear are planned in conjunction with the stairs at the east and west ends of the corridors. The main corridors extend right through with class rooms on both sides, except in the south centre, where the space is reserved for light. The teachers' rooms are next to the central entrance, the principal's room being to the west, next to the class room over which he presides. Both principal's and teachers' rooms have lavatories adjoining. Between the roof of these rooms and the first floor ceiling, lighting is obtained to the first floor corridors, while over this are the windows to the corridors on the second floor. The kindergarten is planned along with the primary class to form an assembly room for ratepayers and other public meetings. These rooms are separated by sliding doors for school use, and both have north light with doors facing the central entrance, so as to provide direct exit.

Of special note are the stairs. These are cast in concrete and finished in terrazzo at the factory, and are built in place, one end resting on the wall. The outer end requires no stringer, the steps being self-supporting. The hand rails are brass, carried on black iron railings; and the external steps and landings are of slate with brick risers.

The structure is planned to be extended to twenty-four rooms, and provision has been made to simplify as far as possible the connecting of new work to that already existing. The new wings will extend northward, so that the finished building will be E-shaped in plan, the stairs having been placed in position to

CLASS ROOM, TODMORDEN SCHOOL.

serve both the present and future requirements. All class rooms are equipped with a cloak room and closet. They are of the usual size for public school work, seating forty-eight pupils, and are lighted from the left-hand side by large three-light windows facing in the present building north and south.

In the basement are the playrooms, lavatories and heating and ventilating plant. The playrooms are very large, with concrete floors, and give direct access to adjoining lavatories. The heating and ventilating chamber is in the centre of the building, and is laid out to take care of the completed school. Connected with it there is a dust chamber to receive the dust from the chute from the upper floors, and provision is made to conveniently remove the ashes. The lavatories are not equipped at present with fixtures, as in the district in which the school is located there is no sewerage drainage, and all rain water seepage is drained to Pape avenue. However, the drains and vents are in place, so that the installation of the plumbing will be a simple matter.

Both the floor system and partitions are of terra cotta tile carried on structural steel. The floor tile is finished on top with cinder concrete to give a base to the flooring, and the exterior walls are of pressed brick in varied tones, with special made moulds for base and cornice.

The interior walls are furnished to sill height with a Keene's cement dado, and plastered above with lime plaster. In the coat rooms the Keene's cement is carried to the coat rail. The blackboards used are slate.

The flooring is of fireproof composition, an attractive buff in color with dark borders, and a sanitary wall base. The special design of the floor of the kindergarten room is shown in the illustration. It contains a novel feature in which marching paths are marked out in various colors in a design worked into the flooring material, this being the first time this method of permanently marking a floor has been adopted in a Canadian school. Besides being attractive, it provides a sanitary dust-proof floor, the fireproof feature of which should be considered every time a school is erected.

The air for ventilation is drawn over ventu stack radiators and delivered in the usual way through galvanized iron ducts to the foot of vertical shafts built of terra cotta tile. These

NORTH ELEVATION.

STAIRWAY, TODMORDEN SCHOOL.

shafts are graduated to give equal velocity throughout; the extract shafts from the coal rooms exhausting to the roof space, which is relieved by star ventilators of large capacity.

The roof is felt and gravel on its highest elevation, and flat slate on felt where seen from the windows, with the exception of the porch roofs and wall head copes, which are of Spanish red tile, as above mentioned.

The interior doors throughout the building with the exception of the basement, are of steel. The external doors and frames are kalamined in brush brass and are of local manufacture, the basement door being also kalamined steel. The windows are of the steel casement type, glazed with plate glass and are arranged to ventilate the rooms without direct cold currents blowing on the pupils. The basement windows are factory sash glazed with wire plate glass. All doors and window frames except the doors of the brass kalamined type previously referred to, are finished with flat enamel in pleasing green tones.

The corridors are closed when the scholars are not in the rooms by expansion gates. This prevents running through the school and excessive tracking of the floors in consequence.

THE following recommendations issued by the National Fire Brigades' Union of England in reference to fire protection in schools, may prove of interest by comparison and for such suggestions as they may contain.

Emergency Exits.—These should be arranged as far as possible at opposite ends of the building, so that in the event of one being rendered impassable by smoke or fumes, the other will probably be available.

It is of first importance that those occupying the building should be regularly drilled so as to become familiar with the use of these exits. It should be borne in mind that possibly, owing to the fusing of an electric wire or destruction of a gas pipe, the exit may have to be carried out in the dark.

Where the door of an emergency exit has to be kept fastened ordinarily, it is better to secure it by a simple bolt enclosed in a glass case, rather than by a lock with the key suspended in a glass case; inserting a key in a lock is apt to prove troublesome when done in a hurry, and locks are apt to rust up.

The glass covers for enclosing bolts should be supported on two opposite sides only at ends of longest axis, so that they will break in the middle without splintering, and fall out clear so as not to cut the operator.

Fixed Appliances for Escaping From Upper Windows, Etc.—The windows of dormitories, etc., should not be barred. In the absence of proper fire staircases, for first floor windows a simple rope of good thickness suspended from a hook attached to an iron bracket, fixed to the outside of the building either just above or on one side of the window will probably afford sufficient means of escape in the event of need. The ropes should be kept inside near the windows. To guard against improper use they should be tied up with a thin tape and sealed.

Give careful instructions that the end of the rope is never to be dropped out of a window

CORRIDOR, TODMORDEN SCHOOL.

EXPANSION CORRIDOR GATES, TODMORDEN SCHOOL.

until the other end is securely attached to the fixed hook on the wall outside.

For higher floors the provision of an escape or ladder is advisable.

Frequent drills in the use of exit appliances are essential, and should be under the supervision of selected members of the staff, specially appointed and instructed in the method of removing the pupils.

Where there is a sanitorium an adequate number of the staff should be permanently told off for the safe removal of the patients. If the sanatorium is a detached building the "Suggested Precautions for Hospitals" might apply.

Extinguishing Appliances.—Schools should be provided with a suitable fire plant; this may consist in the first place of chemical extinguishers of simple construction, fire buckets or hand-pumps, placed in conspicuous positions throughout the building. The water in hand-pumps or buckets should be frequently changed, and extinguishers periodically recharged, to ensure their being instantly ready for use.

In laboratories especially, the chemical extinguisher will be found most serviceable, as fires arising from oils, spirits, and like inflammables should not be attacked with water. Bins (with scoops) containing sand, asbestos sheeting, heavy sacking, or like material for smothering the flames should be kept at hand where chemical and other experiments are conducted.

BASEMENT PLAYGROUND, TODMORDEN SCHOOL.

In schools where a supply of hydrants with water under requisite pressure is not available, some form of engine is desirable.

Where indoor hydrants are provided, they should be fixed in such positions as not to interfere with or be in the way of clearing the building of its occupants. The hose (flaked or coiled from centre, with branch-pipe attached, and connected with the hydrant) should lie in a swinging cradle hung up in such a position as to ensure it being safely and easily run out.

The person discovering the fire should at once sound the fire alarm and summon, or cause to be summoned, the local fire brigade, then get to work as follows:—

With hydrants, if single-handed, take branch, run out the hose in the direction of the fire, lay branch back on the hose and return to hydrant, turn on water, hurry forward, pick up branch, and attack fire.

BOILER ROOM, TODMORDEN SCHOOL.

With short length of hose the water may be turned on at the time of taking the branch, but this method should only be adopted by experienced hands.

When two persons are available, one should take the branch and run out the hose, the other stand by the hydrant to turn on the water when all is ready.

There is a grave source of danger in locked-up store-rooms and cupboards, and it is most essential that an automatic alarm be installed in each such store, in order that a fire may be detected in its initial stages, and extinguished before it attains large proportions and causes a great amount of smoke to accumulate, which will sooner or later permeate the building, creating alarm and danger of suffocation.

The Skyscraper

RAYMOND H. COLLINGE

IN order to trace the origin of the skyscraper one does not have to go very far back. The ten-storey Tower Building, New York City, was the first example, being only 20 feet wide and built in 1889. The economical advantage of this greatly enlarged floor area was quickly realized, and other buildings of increasing elevation soon grew, until we enjoyed such buildings as the Metropolitan Life, 693 feet (1909); the City Investments Building, 32 storeys and 486 feet high; the Singer Building, 612 feet high (1905-1908), and finally the Woolworth Building, with its extraordinary tower and 42 storeys; these, with many others, presenting a broken skyline of amazing appearance.

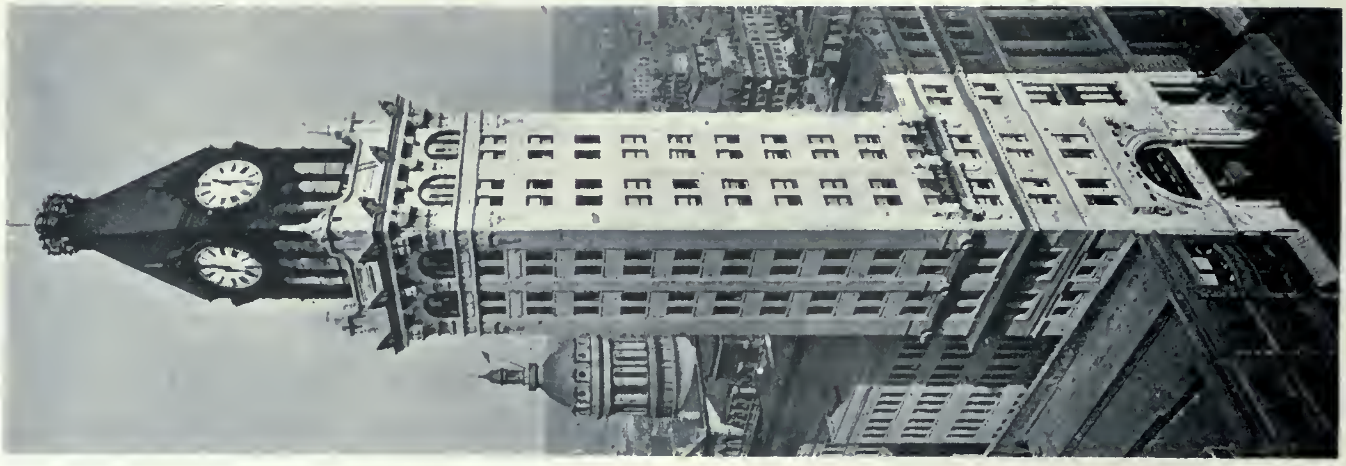
The most important consideration in the construction of a skyscraper, after having considered the height of the building in relation to the cost of the site, is to test the quality of subsoil for the foundations. This is generally accomplished by excavating a pit until rock bottom is reached, or a satisfactory strata of hard-pan capable of carrying a load from 500,000 to 800,000 pounds. In New York the engineer encounters great difficulty with quicksand; many of the lighter buildings of seven storeys being carried on a bed of compressed sand about 30 feet below the surface. This, however, is not capable of taking heavy isolated column loads, which necessitates the whole area being covered with a layer of concrete two feet thick, on which is laid a grillage of long I-beams set closely together, and grouted in to form a solid mass with the concrete below. Over this is placed in locations that receive the actual column loads deep and heavy built up girders, constructed so as to take a weight equivalent at times to three million pounds.

In Chicago, where this type of foundation is in common use, the sand is of an alluvial nature, which is subject to shrinkage under compression, and can be pumped out like so much water. The engineer accordingly has to be very careful to arrange his total load of the building in such a manner so that it will settle evenly over the whole surface, as a settling has to take place, and an uneven settlement would be disastrous. The floors in such case are generally calculated four to five inches higher than the datum level to allow for such action. This type is called the raft foundation, whether on account of its floating nature or its construction, one is unable to say.

TOWER BUILDING, NEW YORK.

Another type of foundation in frequent use, and very much more ingenious, is the pneumatic caisson. This is founded on the direct principle of the diving bell, *i.e.,* under compressed air. These foundations are in the form of long tubes, and go down to the actual rock bottom, which may be 40 or 50 feet below the surface. The process of constructing these is attended with very great risk to the operators, and at the risk of being too technical I will describe it as simply as possible. The circular excavation is made as far as the nature of the soil will permit and a socketed cylinder is inserted, capped by a compressed air chamber with an air lock overhead. Excavators work within and remove the soil until space is made for another length, the pressure of the air keeping back the running sand or water until each successive length has been fitted. These are operated by men of robust physique in four or five-hour shifts. This operation being concluded, the next step is to fill the caissons thus constructed with concrete while still under compression of air. During the operation the most unpleasant part of the whole operation is experienced, for as the concrete rises in the caisson, the compression becomes greater, while the air space grows less, causing considerable discomfort to the workmen.

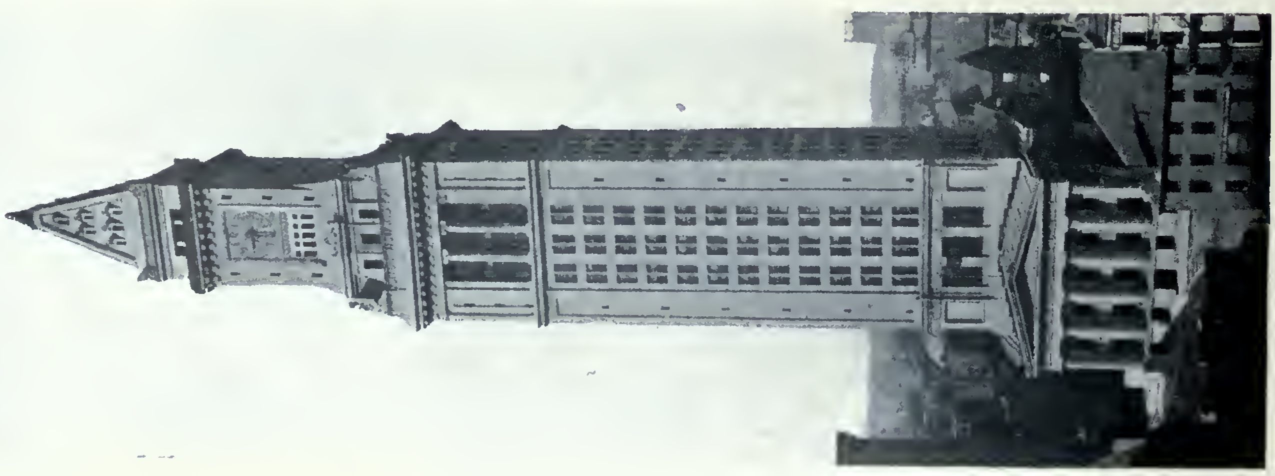
It often happens that the ad-



MARYLAND CASUALTY BUILDING, BALTIMORE.

EQUITABLE BUILDING, NEW YORK.

"THE SKYSCRAPER."



U. S. CUSTOMS HOUSE, BOSTON.

joining building is an old one with a much shallower foundation than that of the new structure, and in law the proprietor of the new work is bound to protect the foundations of the adjacent building if they are over 10-12 feet deep, all of which means shoring and suspending the flank wall while a sub-foundation is erected. This is the most dangerous of all the jobs with which an engineer is confronted in works of such magnitude. There are two or three ways of dealing with this situation, depending on the nature of the soil. In Toronto it is a simple problem, the soil being a hard clay in most cases, and the basement not too deep, making it possible by means of brickwork. After the defective portions of exposed foundations have been removed and the wall shored and jacked up for a section of from six to eight feet, depending on the nature of the masonry over, the soil is then removed to the level of the new foundation and brickwork built up in cement; the operation being repeated for section after section until the whole sub-foundation or underpinning is completed. In other towns, however, where soil will not permit of this method, and rock bottom has to be reached, other and more complicated means are required, often taxing very severely the ingenuity of the contractors' engineers.

Where a sand sub-soil formation occurs a series of cylindrical piles are set at stated intervals; the masonry of the old wall being prepared much in the same way as described before. A beam is then inserted horizontally close under which a powerful jack is placed, pressing down a section of pipe approximately fourteen inches in diameter. The jack gradually presses this down, using the weight of the wall as counter-pressure; while a jet of water, washing with great force inside the cylinder, throws out through a waste prepared for it the loose sand and water within. This jacking and water pressure is maintained continuously until length after length of pipe has been inserted. When the whole reaches rock bottom the pipe is grouted in solid with concrete, thus forming a stilt. The intervening portions of masonry are then chased to receive steel work connected with beams at the head of the jacks, which are removed and the columns completed to under side of beams.

As soon as excavation commences the scene becomes one of most lively interest. There is something very alluring to the gaze in the hole, judging from the great crowds which are drawn towards it. There seems to be good company in the shouts of the teamsters, the grinding of the concrete mixers, the operations of the steam shovels, the arrival of materials and the unloading of same. The concentration of many activities and their attending noises are comforting

WOOLWORTH BUILDING, NEW YORK.

at the same time to the eye and the ear, because there is something doing. The cellar is no sooner started than load after load of lumber appears at the site, which is quickly turned over to the hammer and saw men, who rapidly erect a two-storey gangway on the street side of the lot. Built of strong uprights, the upper gangway forms a bridge for unloading purposes, with a platform for contractors' offices and various shops. The first floor provides a gangway and protection for the public, with a hoarding shutting off the busy scene from the public eye. The man in the street naturally loses his interest until the steel work begins to show above the level of the first storey of the gangway. In the meantime the contractors have had to contend with the various difficulties in connection with the foundations. All the steel work forming the skeleton frame that rises so rapidly has for some weeks previous to the start of the excavation been in the process of manufacture in the factories; each piece being designed to take the load which is apportioned to it. From a drawing, every rivet hole is set out, those marked for shop rivets fitted in the shop, while those marked for field rivets are left open for assembling on the job, where the rivets are heated and driven into place with compressed air. In good work, all column connections and plate girders are inspected in the mill by competent inspectors, which saves considerable delay and trouble, since the necessity for rejection of one piece in the field may be the means of holding up a large amount of work for bad workmanship, and impossible connections are quickly detected. The columns are erected two floors at a time; a plank landing formed upon which is set the giant lattice gin pole with its far-reaching arm.

I should have mentioned that at an early stage of the work, before the grillage is set on the concrete caissons, the foreman steel-erector surveys the job, and at convenient points most likely to be of use to him in foundation work he sets a small iron beam with steel wire loop attached in the green concrete. The loop projecting above the concrete forms the means of anchorage to the long guy ropes which support the huge crane on its first staging. The crane is moved every two or three floors. The columns are plumbed as each length is added, and carefully adjusted to one-eighth of an inch, which is necessary, apart from good workmanship, for the assembling of each beam must be perfectly correct. The erection of these great skeleton frames is spectacular, when the iron-erectors unconsciously give the spectator many a thrill as they remain suspended, swaying many hundreds of feet above the thoroughfare, adjusting the chain tackle or fitting a floor beam in its connection with sled and riming pin.

The flooring, generally of tile arch, is started just as soon as the structural beams are completely riveted. This tile arch is a most ingenious contrivance, and used chiefly on account of its strength and lightness to handle. At a convenient point an endless carrier is put in operation, which increases in height as the steel mounts up floor by floor. The tiles are fed to this and discharged at their destination, where they are set in position in cement mortar. Centring especially designed for the pur-

EMMET BUILDING, NEW YORK.

pose is easily set up and removed, so that it can be reused continually without any cutting to waste. The floor setting is effected very rapidly, and the material stacked at various stages as required. The outer walls are generally designed for terra cotta; the lower storeys and basement being either of marble or granite. Terra cotta is considered the most economical, because of its being easily handled, its lightness and quickness of setting. It can also be designed on the exposed surfaces to relieve the vast wall surfaces without over-elaboration and in scale with the building.

Engineers, in collaboration with the architects, lay out the basement and sub-basement for boilers, generators, feed pumps, and compressing tanks. In arranging conduits and wiring for heating, lighting and plumbing, which involves the setting up of miles of piping, considerable time has to be taken for careful consideration in the laying out of the plans. The direction of any pipe having been ill-considered may cost many hundreds of dollars before a correct location can be made, which causes the extras to mount up.

For Toronto the hydraulic type of elevator seems to be well favored. Both the C.P.R. and Traders Bank have a long shaft set in the ground the full depth of the building, the car being elevated by water pressure and lowered by discharge. In New York, where solid rock is close to the surface, the electrical types, therefore, of necessity, are used.


BUSCH BUILDING, DALLAS, TEXAS.

THE city of Chicago, built as it is on sub-strata of clay, furnishes the most interesting study of the movement of buildings, and the greatest number and variety of examples. All of the early skyscrapers of that city were carried on floating foundations or on piles driven deep into the clay. These buildings without exception settled into the soil due to their weight, the distances they settled varying from three to over five inches. Many of these buildings, notably the Great Northern Hotel, are partially carried on jacks and periodically levelled up as settlements occur, then, after all subsidence has taken place, and the buildings have finally come to rest, the jacks are removed and the foundation walls filled in with masonry.

That is one of the movements of buildings, then, settlement; but settlement takes place only in those buildings erected on floating foundations. When the footings are extended down to bed rock, as all footings for present-day buildings in Chicago are, the amount of settlement that takes place is nil, and may be disregarded.

But even buildings with their footings carried to bed rock lean, or are racked out of plumb, and the taller the buildings the more they are likely to lean, although the amount they are out of plumb is seldom enough to endanger the structure. Recently the Unity Buildings at Chicago was straightened, being considered "unsafe, but not dangerous," at thirty inches out of plumb. It is impossible to prevent the big buildings from leaning. Some of them are not straight when they are finished, but that does not impair their safety, and it is probably safe to say that every building in Chicago leans more or less. If they are on floating foundations they also settle gradually. But there is still another movement of buildings, and the most interesting of them all to consider. For instance, the Eiffel Tower swings perceptibly in the wind, and even stone shafts like those of the Bunker Hill and Washington monuments move several inches at the top. In these cases the cause of the action is not only the wind, but the heat of the sun. The side that is towards the sun expands during the day more than the side in shadow. An interesting device has been employed to show the movement of the dome of the Capitol at Washington.

WOODMEN OF THE WORLD BUILDING, OMAHA, NEBRASKA.

A wire was hung from the middle of the dome inside the building down to the floor of the rotunda, and on the lower end of the wire was hung a 25-pound plumb bob. In the lower point of the weight was inserted a lead pencil, the point of which just touched the floor. A large sheet of paper was spread out beneath it. As the dome moved, it dragged the pencil over the paper every day. The mark made was in the form of an ellipse six inches long. The dome would start moving in the morning as soon as the rays of the sun began to act upon it; and slowly, as the day advanced, the pencil would be dragged in a curve across the paper until sundown, when a reaction would take place and the pencil would move back again to its starting point. But it would not go back over its own pencilled track, for the cool air of night would cause the dome to contract as much on the one side as the sun had made it expand on the other, and so the pencil would form the other half of the ellipse, getting back to the original point all ready to start out again by sunrise.

In the three movements affecting tall and heavy buildings we have, then, particularly in the expansion and contraction movement, which is of daily occurrence, and which affects skyscraper buildings as well as all other tall structures, a condition which must be taken into consideration when planning the buildings. Lines of steam pipes, stocks of draining pipes, lengths of water pipes, vacuum cleaning pipes, refrigeration system pipes, electric wire conduits and the various networks of tubing which cross and criss-cross inside of a building, will naturally be more or less affected by the movements of the building; and if long life is expected of these various systems of piping, they must be so installed that they can "give" under the movements of the building without damage to the piping, and sufficient to compensate for the change of position.

Besides pointing out the necessity for flexibility for the piping systems in tall buildings, the movement of buildings shows how desirable it is to have solid foundations, the footings of which extend down to bed rock. Floating foundations are all right for some kinds of buildings, but for the skyscraper type there is nothing so good as the solid rock of old Mother Earth.—"The Stone Trades Journal."

OUR most unruly problem, the tall building, is the result of the logical working of the law of supply and demand. It is neither fantastic, avoidable, nor useless, will not yield to adverse legislation, because public necessity formulates a public opinion that will not legislate. It is amusing to read in the publications of fifteen years ago the diatribes against it, and prophecies of its early extinction which were provoked by the modest fifteen and twenty-storey structures of that time. The architect of the then tallest building in New York announced in print his belief that the end of tall buildings was in sight. Structures of twenty-five, thirty, forty, fifty, and even sixty storeys have been the answer. It furnishes a typical example of practical necessity and mode of existence creating a movement which ends in something distinctly characteristic of a people, and in this instance steel construction and the tall building are affecting us as did the round arch and vault of the Romans. The business centres of such cities as New York and Chicago, as created to meet the conditions of 1860 to 1870, were soon outgrown, and the necessity for larger and better buildings became apparent. The established business centres could not be, or, at least, were not, moved, property values and the existing inter-relations in those centres being of too great moment at the time. This generally prevalent condition produced different immediate results in different sections of the country, which long since have converged into an established common practice.

In Chicago, we find that the direct causes that led to the first example of true skeleton construction were—(*a*) the necessity for increased height; (*b*) which the character of the supporting soil rendered impossible on account of the weight of the then prevailing type of massive masonry walls and interior columns, and which could not be overcome unless (*c*) a system of construction be devised stronger and of less weight than other types, which was accomplished by the device designated by us as the "Skeleton Steel Construction."

The system as developed is a simple one in principle, consisting of supporting columns of steel or cast-iron, braced in all directions, and riveted or bolted to the horizontal girders and beams, which not only support the floor construction, but, more important still, also carry, storey by storey, the outer walls of the structure, which thus cease to have constructional value, becoming a thin screen of material that serves to enclose the building and to protect the steel fabric from exposure.

The outer walls being but screens, the masonry supporting nothing, their piers were in consequence easily reducible to a minimum surface width, and the area of glass could thus be largely increased, thereby giving a maximum lighting to the interior, a device rendered necessary by the generally increased height of our buildings fronting upon streets that could not be increased in width. The walls, being non-supporting, could be reduced to a minimum thickness, thus providing an important addition to the interior area of each floor, and materially increasing the earning power of the building—an imperative necessity because of the rapid rise in ground value in central business districts.

NORTH AMERICAN BUILDING, CHICAGO.

NATIONAL BANK BUILDING, CHICAGO.

None of this development would have been possible, however, if it had not been for the American type of elevator, which was promptly developed in response to this new demand, and has kept pace with it ever since by evolving new principles of construction and operation necessary to cope with the constantly increasing height of buildings and the enormous increase in service, both as to speed and volume of traffic. This type has come to stay, because of its attributes of structural endurance, safety, economy in first cost and of upkeep, and its general suitability to our modern conditions.

The development of the exterior treatment of the tall building architecturally has been exceedingly interesting. Briefly stated, our fundamental principle in design seems to have become established by treating the tall structure as a column with its base, shaft, and capital. In all of the best and most pleasing examples of the later work this element appears, and we find the lower storeys grouped in a single architectural composition supporting a long vertical and shaft-like series of storeys grouped into a simple treatment that carries the eye upward without interruption to the crowning feature of the entire design, which again is a series of storeys combined into the capital, as it were, of the mass. The pleasing variety of thought in the handling of this scheme of treatment is one of the best features, and, generally speaking, is now characterized by a sober, refined self-control and a truly architectural spirit. In the classic feeling of the Italian Renaissance the municipal building of New York is unquestionably one of the best solutions of the problem on these lines that we have, while in the West street building and in the Woolworth building, both in New York, we have equally good examples of the application of Gothic feeling and detail.

In pointing out the consummation of this century and a half of architectural growth in my country, I would have you enter the harbor of the city of New York on a transatlantic liner, and from that point of view for the first time observe the buildings of the lower end of Manhattan Island, with their towering and amazing skyline and mountain-like mass of architectural grouping, picturesquely artistic and truthfully expressive of the spirit of our lives and activities.

LIBERTY TOWER, NEW YORK.

I believe that it will grip the imagination of any observer, whether he sees it for the first or the hundredth time, and that he will experience from it that flow of thought and impression which is produced only in the presence of some great and inspiring thing. To me it illustrates the quality and the character of our people, their aspirations, and their peculiar genius in terms of architecture, as do our mountains and valleys, our lakes and rivers, the physical character of our land. Prosperity, wealth and power we are surely possessed of, and we are as surely acquiring from the artistic wisdom and traditions of Europe that which is useful and good for us to have, and are applying it intelligently to our needs. As a people we are learning to respect and revere art, and to value its uplifting influence, and with these fundamentals to build upon, and with the artistic forces that are ever active amongst us, the future of American architecture will be worthy of high regard.—*F. M. Andrews.*

H. C. Kent, F.R.I.B.A., objects to skyscrapers on humanitarian grounds, since the occupants of the lower stories work by artificial light; on the increase in constructive and fire risks; on æsthetic grounds, believing that a continuous street of towers cannot possess a beauty of proportion. He suggests as a limit for height one and one-half times the width of the street the building faces. If any greater height is required it should only be permitted by setting back such additional stories two-thirds of their height, thus preserving the same angle of sunlight.

Michigan Registration Act

THE new Registration Act which recently became effective in the State of Michigan, places the regulating of the practice of architecture within its jurisdiction almost entirely under the control of the profession. It provides for a board of examiners composed of architects who have been in acitve practice as principals within the State for not less than ten years previous to their appointment, with the condition that one of its members is to be the senior professor of architecture at the Michigan University. Full authority is given the board to conduct examinations in accordance with the provisions of the Act, with power to amend, modify and repeal such rules and regulations as may be deemed necessary from time to time. In view of what has been accomplished in the way of similar legislation elsewhere in the United States, together with the serious attention which has already been given to the need of registration here in the Dominion, the full text of the Michigan law is published herewith, believing that it may aid in the way of suggestion when this important subject is again taken up for discussion by any of the provincial bodies:

REGISTRATION OF ARCHITECTS.

Section 1. No person shall use the title "architect," or any variation of the same, or use any other words, letters or device to indicate that the person using the same is an architect, after six months subsequent to the passage of this Act, without being registered as an architect, in accordance with the provisions of this Act. Any person who shall have been engaged in the practice of architecture under the title of architect prior to the time this Act takes effect, may secure such certificate in the manner provided by this Act.

Section 2. Any person engaged in the business of drawing plans and specifications for the erection, enlargement or alteration of buildings for others, and to be constructed by other persons than himself, is hereby declared to be an architect within the provisions of this Act. The term "building" in this Act shall be understood to be a structure, consisting of foundations, walls and roof, with or without the other parts; but nothing contained in this Act shall be construed to prevent any person, firm or corporation, whether owner, contractor, mechanic or builder, from making plans or specifications for, or supervising the erection, enlargement or alteration of any building that is to be constructed by any such person, firm or corporation, or its agents, servants or employees.

BOARD OF EXAMINERS.

Section 3. The Governor shall, within sixty days after the passage of this Act, appoint a board of five examiners.

Section 4. Such board of examiners shall be composed of architects who shall have been in active practice as principals in the State of Michigan for not less than ten years previous to their appointment, and who are otherwise qualified to serve as examiners: Provided, however, that the senior professor of the College of Architecture of the University of Michigan shall be appointed as one of said examiners.

Section 5. These examiners shall be appointed to hold office for one, two, three, four and five years respectively, and thereafter, upon the expiration of the term of office of each person so appointed, the Governor shall, on or before the first day of July in each year, appoint a successor, to hold office for a term of five years.

Section 6. Any vacancy occuring in the membership of the board shall be filled by the Governor for the unexpired term of such membership.

RULES AND REGULATIONS.

Section 7. The board shall adopt rules and regulations for the examination of candidates for registration, in accordance with the provisions of this Act, and may amend, modify and repeal such rules and regulations from time to time.

Section 8. This board shall, in accordance with the provisions of this Act, examine into the qualifications of, register and issue certificates of registration to those desiring to use the title of architect, or to practice as architects in the State of Michigan.

MEETINGS OF BOARD.

Section 9. The board shall hold its first meeting within thirty days after its members are appointed, and thereafter shall hold regular meetings on the first Mondays of April and October of each year, and shall hold special meetings between said regular meetings at their discretion.

EXPENSES OF OFFICERS AND MEMBERS OF BOARD.

Section 10. The board of examiners shall be entitled to no compensation for their services; they shall, however, be reimbursed for travelling, clerical and other actual expenses incurred in the performance of their specific duties, under this Act: Provided, That all expenses of the board shall at no time exceed the amount of moneys received and on deposit and to the credit of this board under the workings of this Act.

Section 11. All moneys and fees collected or received by the treasurer under this Act are to be properly recorded and receipted for and deposited with the State Treasurer.

Section 12. All moneys paid out by the board shall be through the State Treasurer on properly drawn vouchers, signed by the president and secretary of said board.

Section 13. All moneys received by the State Treasurer under the provisions of this Act shall be kept in a separate fund, to be drawn against only for the expenses of this board.

QUALIFICATIONS, EXAMINATIONS, ETC.

Section 14. Any person of legal age and of good moral character, upon the payment of a fee of ten dollars, may apply for examination for registration under this Act.

Section 15. The applicant shall satisfactorily pass an examination in such technical and professional courses as are established by the board of examiners.

Section 16. The examination shall have special reference to the planning, design and construction of buildings; the examination shall be in two parts, A and B, as follows:

A. This shall be a test of the knowledge of the candidate of the strength of materials, construction and architectural design;

B. This shall be a test of the ability of the candidate to make practical application of the above knowledge in the professional work of an architect, and in the duties of a supervisor of the construction of buildings.

Section 17. In lieu of the first part of the examination, "A," the board of examiners may accept a diploma of graduation from a recognized college or school of architecture whose requirements conform to the standard minima of the Association of Collegiate Schools of Architecture.

Section 18. The second part of the examination, "B," must be taken by all candidates.

Section 19. In lieu of all examinations the board of examiners shall accept registration or certification as an architect in another State or country where the standard qualifications for the same are not lower than those required by the board of examiners under this Act.

Section 20. The board of examiners in lieu of all examination shall accept satisfactory evidence as to the applicant's character, competency and qualifications, and satisfactory evidence that the applicant has been actually engaged in the practice of architecture under the title of architect on his own account or as a member of a reputable firm or assieiation prior to February five, nineteen hundred fifteen, providing the application for such certification shall be made within six months of such date.

CERTIFICATES.

Section 21. The result of every examination or other evidence of qualification, as provided by this Act, shall be recorded by the secretary of the board of examiners, and said board shall issue a certificate of registration to every person having passed such examination or as being otherwise qualified to be entitled to receive same.

Section 22. Every person upon registration under this Act shall pay a fee of twenty dollars to the board of examiners, and shall thereupon receive a certificate of registration.

Section 23. Every registered architect shall, within thirty days, record his or her certificate of registration with the Secretary of State of Michigan.

Section 24. The board of examiners may revoke any certificate, after thirty days' written notice to the holdes thereof, and after a hearing before the board of examiners, upon proof that such certificate has been obtained by fraud or misrepresentation, or upon proof that the holder of such certificate has been guilty of malfeasance or gross incompetency in connection with his practice or architecture.

VIOLATION.

Section 25. Any violation of the provisions of this Act shall be a misdemeanor, punishable for the first offence by a fine of not more than one hundred dollars, and for a subsequent offence by a fine of not more than five hundred dollars or imprisonment for not more than one year, or both, in the discretion of the court.

* * *

ONE BOOTH at this year's Electrical Exposition at New York of exceptional interest for both the business man and the woman-who-plans-her-home, is the exhibit of Johns-Manville Company, who are pressing home the importance of correct lighting—and the fact that the great majority of offices, shops and homes to-day are incorrectly lighted—in many cases at probably greater expense than for the right way. In the Johns-Manville lighting department are men who *know how* in every phase of lighting and illumination. They are the specialists who have worked out, in co-operation with America's foremost architects, the illumination and lighting plans for big office buildings, model factories, wonderful salesrooms, cathedrals—and homes by the thousands. The Johns-Manville Company is now the exclusive sales agent for the three different phases of lighting.

CONSTRUCTION

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

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

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Vol. VIII Toronto, Nov., 1915 No. 11

ECONOMY TO BUILD NOW

INDIVIDUALS with a knowledge of true values and an eye to the future will hardly fail to recognize the present low market of labor and building materials, and the exceptional opportunity offered for judicious investment. The saving to be effected means more than the rate of bank interest covering a number of years—a period in excess of what the war will in all probability last, and will result in the investor being fully established and prepared when the resumption of normal days are again on hand. While this may not be a time for unwarranted expenditure, there is no real reason for any contemplated building project being deferred. Although a trade disturbance due to the war is being felt, Canada is not as hard hit as what usually happens under the ordinary seventh year periodic depression. Manufacturers that would, perhaps, be otherwise disengaged are busy in the production of war supplies, Plants have been converted for the purpose of munitions and other urgent necessities. Many firms including the boot and shoe and clothing producers, as well as the textile and knitting plants, are well supplied with orders for soldiers' equipment in addition to the present trade demand. Steam and electricity are driving throughout the twenty-four hours of the day, machinery which in many cases operated less than half the time before, the farming districts have had a gratifying crop yield with the best market prospects in years. And so ad infinitum much could be cited in evidence of commercial and rural activity. All this means material, labor and occupation. The difficulty which presents itself is more a reflex of conditions abroad, rather than an industrial breakdown within. What is required is just a little more confidence in ourselves, a sort of conscious awakening to our unlimited natural resources and what they economically represent. By building now one can best conserve his own interests, in addition to working a real benefit to the community. Prices affecting all trades submitted on work prior to the outbreak of hostilities, and which has since been figured without any revision of plans or change of specifications show that at least fifteen per cent. or better can be saved in the erection of buildings at the present time. Architects were never in a position to offer greater service in studying and meeting the requirements of their clients. In addition to exercising every care to plan and detail they are able to give that personal supervision which would be impossible in a more busy period; thus obviating the possibility of extras or any other phase of dissatisfaction that would, perhaps, otherwise arise. These are considerations which should be of special inducement particularly to home building and municipal governmental boards, in carrying out contemplated work and needed improvements, and should do much towards stimulating trade activities and bringing about at least to a degree a revival in the building conditions.

* * *

THE present feeling in reference to Germany must not preclude the forceful object lesson in building economy presented in the strikingly low fire losses in its chief city, Berlin. A report by the U.S. Consul General stationed there, states that this is due among other things to the small quantity of wood used for structural purposes, the limitations of the height of buildings to 72 feet, and, no doubt principally, to the temperament of the people. All real (immovable) property in Berlin is required by law to be insured in the so-called Municipal Fire Society. The report of this institution for a recent fiscal year announced fire losses in the course of the year amounting to $260,529 on policies aggregating $1,314,367,233, or $0.20 of indemnity paid for each $1,000 of insurance. The average for the decade 1902-1911 was $0.21.

WINNIPEG has just adopted a by-law limiting the height of buildings. Its provisions were formulated by a joint committee representing a number of organizations, architectural, town planning, real estate, building, etc., and it was passed without opposition from any quarter. It provides that no building shall exceed one and three-quarters times the width of the street, nor, in any case, be more than one hundred and ninety-eight feet high, nor contain more than twelve stories. Cornices, roofs and parapets are included in these heights, but the roof may be covered with a roof garden, and pent houses, etc., one storey high, set back twenty feet from the street, may cover twenty-five per cent. of the roof area. Towers, with restrictions as to area and position, may be three hundred feet high. There are three main streets, each one hundred and thirty-two feet wide. On these the limitation of twelve stories would make the ordinary commercial building about one hundred and sixty-five feet high, while for department stores, etc., requiring high ceilings, one hundred and ninety-eight feet is allowed for twelve stories, which is only one and one-half times the width of the street. Practically all other streets are sixty-six feet wide, so that the rule would give a limit of height of one hundred and fifteen feet six inches, or about eight stories. Fortunately no buildings at present exceed these limits.

* * *

THE Building Data League, Inc., was instituted in New York City recently to obtain for and, through the publication of magazines, pamphlets, bulletins and otherwise, to furnish to such architects and engineers, and to such others having a common trade, business, financial or professional interest with architects and engineers, as may become members of the corporation, information in regard to building materials, devices and apparatus and any and all articles, materials and methods used in the construction, operation and maintenance of buildings, bridges, viaducts and other structures of every kind and character, and generally in the improvement of real property, and for that purpose to make or cause to be made investigations, examinations, tests and analyses of such building materials, devices, apparatus and other articles, materials and methods; and to list or register any and all such building materials, devices, apparatus and other articles, materials and methods as shall appear to be so manufactured and marketed as to be suitable for the consideration or use of its members; and to obtain in any lawful manner and furnish to its members, accurate and reliable information as to the character and standing of merchants, engaged in or connected with the manufacture or sale of such building materials, devices, apparatus and other articles and material sor in or with the use of such methods; and also to obtain in any lawful manner and furnish to its members accurate and reliable information as to the character and standing of draughtsmen, superintendents and other persons employed by architects and engineers.

The league is the outgrowth of the Architects' Bureau of Technical Service with offices at 105 West 40th street, New York City. A magazine titled *The Building Data Bulletin* is published each month.

* * *

TWO curious cases of the effect of water deep in the soil that supports edifices marked for perpetual preservation have recently been given to the public. The earlier one is that of St. Paul's Cathdral in London. Some years ago it was noticed that in certain parts of the building cracks were appearing in the walls; a sure sign in so old a building that it was changing its position with a movement which was not uniform throughout the structure. As a result of long and searching investigation the conclusion was reached that the settling of the building was due to the drying up of the subsoil in consequence of the deep drainage effect of the electric railway subways in the vicinity. Steps have been or will be taken to counteract the effect of the drainage, but the value of the resulting moral will, for the thoughtful, always remain unimpaired.

The later instance, teaching the same lesson, is that of Mount Vernon, the home of George Washington on the high banks of the Potomac near his namesake city. The residence and grounds are now owned by the United States, and kept as a prized memorial to the "Father of his Country." For many years it had been noticed with regret that the high bank on which the mansion stands was crumbling away through the erosive action of the water of the tidal estuary on the subsoil of soft material saturated with rain water, percolating from the surface. The chronic effect was the breaking away of the bank, which at last threatened the destruction of the whole foundation, with the building that stands on it. In the case of St. Paul's the remedy was to restore humidity to the soil and thus keep it from shrinking; in the case of Mount Vernon it was to draw the water from the soil and thus make the latter more solid and stable. A small drainage tunnel was driven back from the river through a layer of sandstone. Immediately a heavy flow of water began, and continued for several months. This gradually became less in volume until it reached a quantity presumably equal to the rainfall, which is its source of supply, and there it now remains.—*The Globe.*

December, 1915 Vol. 8, No. 12

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Full Page Illustrations

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MONTREAL NEW YORK

INTERIOR OF CHAPEL,

ST. AUGUSTINE SEMINARY.

A. W. HOLMES, ARCHITECT.

St. Augustine Seminary, Scarboro

A Magnificent Building Situated on the Bluff East of Toronto, and Commanding a View of Lake Ontario and the Surrounding Country. It Owes its Being to The Generosity of a Toronto Millionaire

AT stop twenty-seven on the Kingston road is the main entrance gate and lodge to the beautiful grounds of St. Augustine's Roman Catholic Theological Seminary. The property, comprising one hundred and twenty acres, extends from the Kingston road to the lake, and takes in about the highest part of Scarboro' Bluffs, at a distance of five hundred feet from the road, and approached by a concrete roadway and sidewalk, and on the highest part of the property is located the seminary, facing towards the city.

The buildings are completed, with the exception of the wings, running eastward from each end of main building and indicated "future wing" on ground plan. The building complete is arranged for the accommodation of three hundred students and sixteen professors. It is the intention to proceed with one of the wings next spring.

A portico, having granite columns and balustrade, form a covering to the driveway and the granite stairway leading to the principal entrance. Heavy bronze doors lead into the reception hall, which is treated in a somewhat heavy and simple manner, with Ionic pilasters and beamed ceiling, in Caen stone cement finish, and marble mosaic floor. The main staircase hall and corridor adjoining have similar treatment to the reception hall. Professors' rooms and two lecture halls and the stairways occupy the rest of ground floor of the main building. Each professor's suite consists of a study, bedroom, bathroom and wardrobe. The grand stairway in centre extends from the ground floor to third floor, the principal entrance to the chapel being under the central landing at ground floor. The stairways at either end of main building run from basement to top, the north stair well being provided with an elevator. All stairways are of wrought iron, having slate treads. The first, second and third floors of the main building very only slightly, each containing students' rooms, with a professor's suite at each end of the coridor, and class-rooms. Each student's room is sixteen feet six inches by eleven feet five inches, and contains lavatory and hot and cold water service and a wardrobe. The towers at each end of the building contain the general lavatories for each floor. These are cut off from main building by a lobby, and are fitted up with marble stalls and partitions and tile dadoes and terrazo floors.

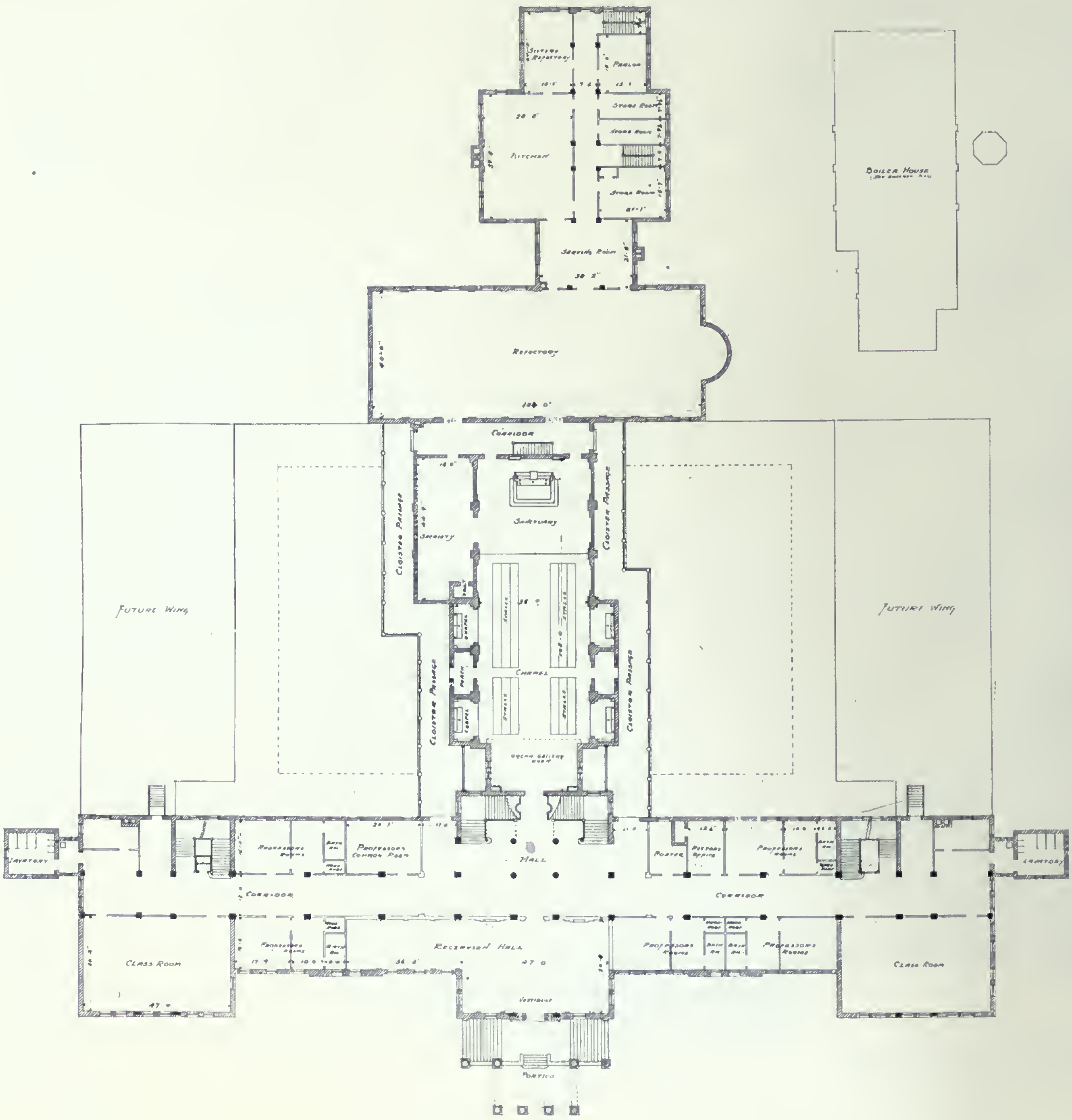
From the third floor a stairway leads up to the gallery in dome, and from base of dome are entrances on to the roof, which is used as a promenade.

Chapel.—The chapel, entered from the main staircase hall, is carried out in an Italian character, the floors are of marble mosaic, the walls finished in Caen stone cement, the ribbed and coffered ceiling in "staff."

MAIN ENTRANCE, ST. AUGUSTINE SEMINARY.

ST. AUGUSTINE SEMINARY, SCARBORO.

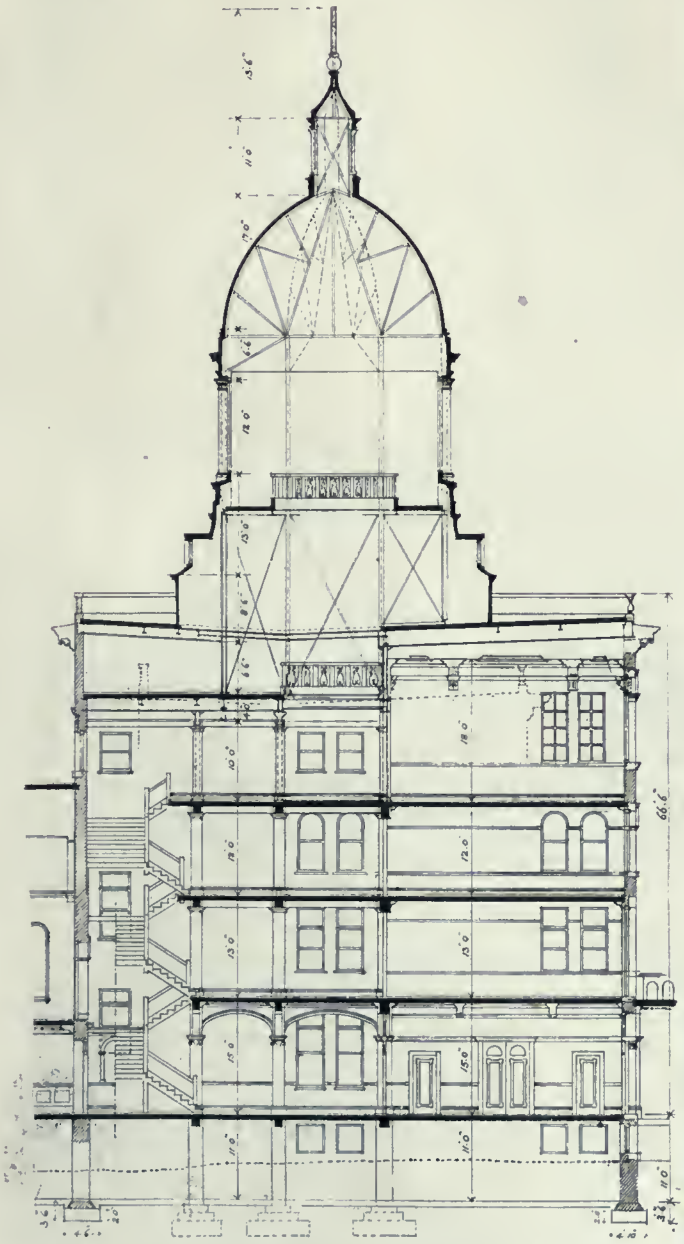
A. W. HOLMES, ARCHITECT.



GROUND FLOOR

The five altars, and also the reredos of the high altar, and the steps and dadoes of the sanctuary are of marble. The stalls and other furniture are quarter-cut American white oak.

The greater part of the gallery is occupied by a beautiful organ (a gift of Mrs. French), the console of which is placed on the chapel floor adjoining the rear stalls. Exits are provided on each side of the chapel leading on to the cloister passages. Steel trusses support the chapel roof, and also carry the staff ceiling. The roof is reinforced concrete, covered with slate.



SECTION THROUGH MAIN BUILDING, ST. AUGUSTINE SEMINARY.

The refectory is approached from the main building by cloister passages carried along either side of the chapel, from main staircase hall to corridor at rear of chapel. The refectory is one hundred and four feet by forty feet and twenty feet high. The stairway in the corridor leads to the gymnasium, which is the same area as refectory. Adjoining the gymnasium are shower baths and lavatories, etc.

MAIN HALL AND STAIRS, ST. AUGUSTINE SEMINARY.

Owing to the formation of the ground levels, the basement storeys of the refectory and kitchen buildings are clear above the grade line. The basement storey of the kitchen contains ice machine and refrigerating plant and store rooms, also laundry department. The ground floor contains the kitchen, which takes in two storeys in height, and sewing room and store rooms, also refectory and parlor for the Sisters.

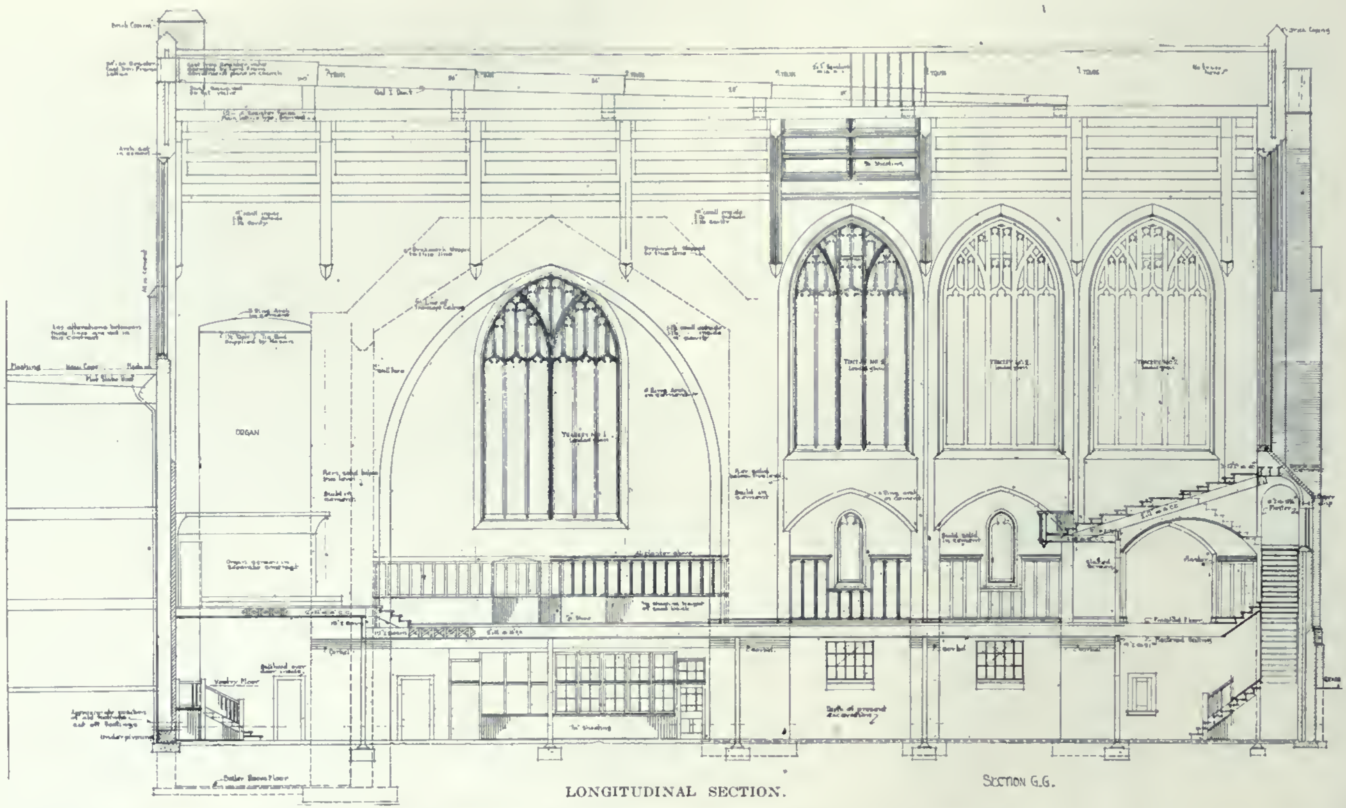
Lighting is supplied from the city service. All heating pipes, conduits, etc., are carried through a subterranean passage connecting the powerhouse with the main building, as indicated on basement plan.

The building is of fireproof construction, the principal materials being brick for all bearing walls, and floors and roofs of reinforced concrete, and partitions of porous terra cotta.

Sanitary fireproof composition flooring has been used extensively.

The dome, thirty feet in diameter, is of steel and concrete, and covered with copper. The total cost of the building amounted to over four hundred and fifty thousand dollars.

ENTRANCE HALL, ST. AUGUSTINE SEMINARY.



LONGITUDINAL SECTION.

SECTION G.G.

SOUTH VIEW, KNOX PRESBYTERIAN CHURCH, STRATFORD.

LINDSAY, BRYDON & GREIG, ARCHITECTS.

Knox Presbyterian Church, Stratford

One of The Best Examples of a Modern Church to be Found Outside of The Large Cities

THE new Knox Church, Stratford, has been built to take the place of the original building, which was, unfortunately, struck by lightning and burned beyond repair.

The new building is cuneiform on plan, with a nave forty-five feet clear in width transepts, chancel, narthex and small gallery over the narthex.

The entrances are wide, each doorway having two pairs of double swivel doors, and at the dedication services, when the congregations were more than the actual capacity of the building, *i.e.,* one thousand two hundred, the place was cleared in seven minutes. The narthex and porches are very commodious, and allow plenty of crush space and room for standing around.

The main floor of the church is divided into side aisles, which are passages only, with no seats in them; and centre aisle and the transepts. The view of the pulpit is clear from every point, and the choir is as well seen as necessary. The flooring is of maple.

The gallery is specially comfortable, being kept as low as possible to give proper length to the interior and to shorten the stairs. The stairs start up from either end of the narthex and meet in the centre of the gallery under the great window.

The chancel contains choir stalls for sixty choristers, pulpit, font, communion table, minister's chair, which has a rich drape over the back, and elders' seats. On both sides the organ is grouped over projecting organ cases. The consol is behind the elders' seats in the centre of the chancel. The organ chamber is to one side of the chancel, with large arches, both to the chancel and the transept. The pipes on the side of the chancel next the organ chambers are speaking pipes, but those on the opposite side are for future solo organ.

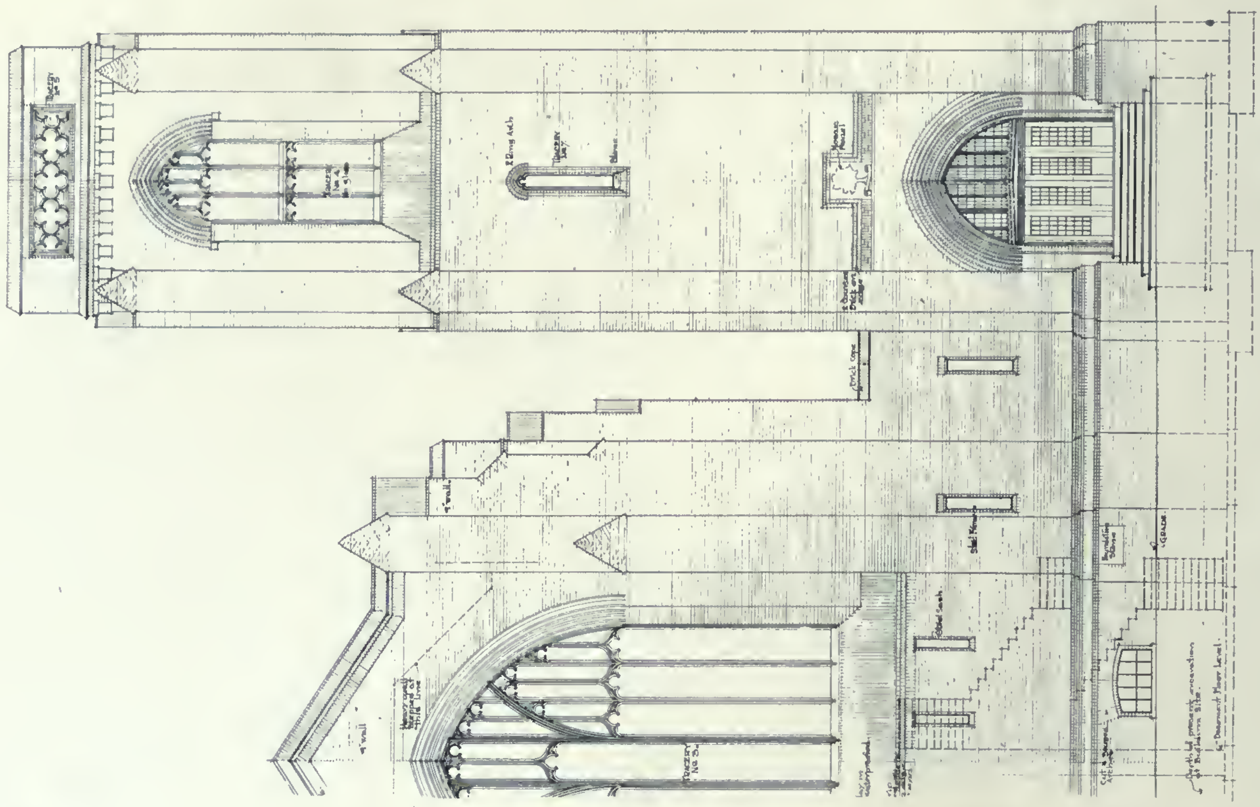
The choir vestries are under the organ chamber, but on level with the chancel floor, the access being very easy. The minister's vestry is below the choir vestries.

The basement accommodates the banqueting hall, kitchen, heating chamber, large coat room and men's and women's lavatories and fireproof vault. It is entered from the Sunday school and from the church narthex. The lighting is excellent. Service from the kitchen is convenient —as those serving the tables do not require to enter the kitchen, but lift the trays from the service screen.

The heating chamber is under the vestries, and is arranged to heat the Sunday school in the future as well, the two boilers installed having

NAVE, KNOX PRESBYTERIAN CHURCH, STRATFORD.

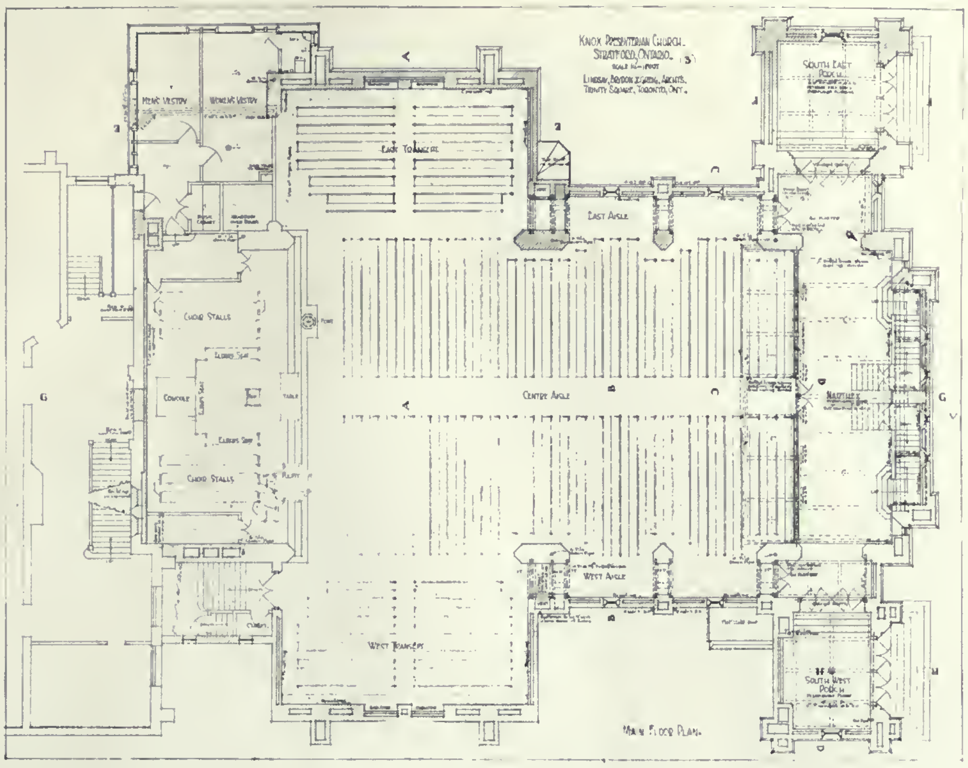
SIDE AISLE, KNOX PRESBYTERIAN CHURCH, STRATFORD.



SOUTH ELEVATION.

KNOX PRESBYTERIAN CHURCH, STRATFORD.

LINDSAY, BRYDON & GREIG, ARCHITECTS.



MAIN FLOOR PLAN,

KNOX PRESBYTERIAN CHURCH, STRATFORD.

LINDSAY, BRYDON & GREIG, ARCHITECTS.

SECTION C.C. SECTION D.D. SECTION H.H.

sufficient capacity required for this purpose.

The heating is by a modulation system by direct and indirect radiation. The indirect radiators heat the basement when they are not required in the church.

The lighting of the church is by specially designed fixtures hung on chains on both sides of the nave. The basement is lighted by indirect fixtures.

The style of architecture is rectilinear type, suitable to brick and cement stone, the effect being obtained more from mass than detail.

The details of the tracery are kept open, so that the casting is simplified; no attempt is made to imitate cut stone moulding.

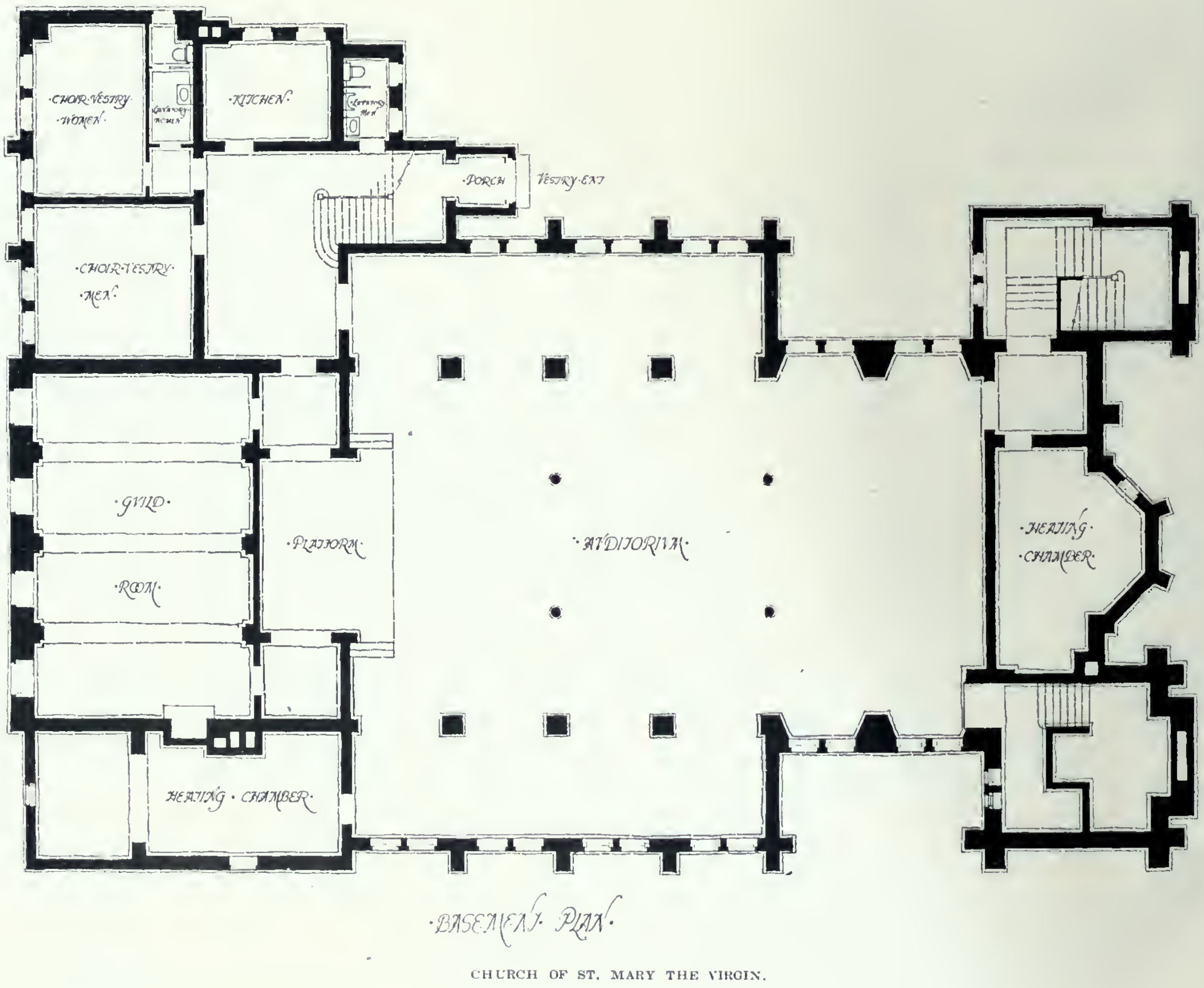
The windows at present filled with white glass actually over-light the interior, but when they are all filled with stained glass the lighting will be pleasantly subdued.

The great window over the gallery and the three windows over the chancel are at present filled with stained glass, the subjects being the "Ascension," the "Sermon on the Mount" and the Old and New Testament Prophets, prospectively, and a complete scheme has been drawn up for future decoration of the other windows.

The interior is finished in chestnut, stained a rich brown. The ceiling is entirely wood, in the church and also in the narthex. The walls are panelled eight feet high, and the chancel panelling and organ screens are eleven feet high, forming a sounding board. The seats and chancel furniture are to special detail of quartered oak, fumed. The narthex and porch floors are of fireproof composition.

The general effect of the exterior is massive; the high walls and deep buttresses give the dignity necessary to a building which occupies the principal corner in Ontario street. The whole building dominates the surrounding neighborhood, and can be seen well from the railway as a distinct landmark, the rich tapestry brick being thrown up in relief against the yellow brick common in the neighborhood.

The acoustics are a happy medium, the interior has the ring or resonance necessary for music, and yet the preacher is well heard, there being no echo; no kind of correction has been found necessary.



CHURCH OF ST. MARY THE VIRGIN.

Church of St. Mary The Virgin

THE Church of St. Mary the Virgin, on Westmoreland avenue, Toronto, is a brick church, in which there has been throughout an adherence to brick design, without any attempt to imitate the effects of Gothic design in stone. For this reason there is no tracery in the windows.

Large windows were needed in the east and west ends, as there is no clerestory and the side lighting comes chiefly from the outer walls of aisles. In the absence of tracery, this large window area at the east and west ends has been got by grouping single windows in threes; and in the side walls they have been grouped in pairs.

The jambs of windows and all openings are enriched only with bevelled brick, usually double recessed. There is no other enrichment to the brickwork, except, on the outside, dark headers taken from near the fire. . With the help of excellent brick and workmanship, there is a certain dignity and richness in the mass of the brickwork, and in the constantly recurring bevelled edges, which is not unworthy of monumental design.

There is, of course, plenty of stone in the proper places: Stone steps, stone sills and drips and springers, stone buttress caps, copings and kneelers; stone columns on the inside, and stone corbels for the trusses. These latter are left rough, to be carved, some day, with heads of the Apostles. In a general way, however, though there is stone wherever durable construction requires it, there is none at all that is intended merely for enrichment.

The roof is of Douglas fir, stained dark with solignum stain.

The windows are glazed with white rolled cathedral glass, leaded in rectangles. External colors of sky, clouds, trees and brick walls diversify the tone of this glass; but the prevailing tone is white, and is repeated down the body of the church by the ground glass of the electric light lantern pendants.

As the seating is of the same color as the roof, there are but three main colors in the interior—red brick, brown woodwork and yellowish white glass. The stone is also red, from New Brunswick.

In order to get a high basement, twelve feet

INTERIOR VIEW, LOOKING WEST, CHURCH OF ST. MARY THE VIRGIN.

INTERIOR, LOOKING EAST, CHURCH OF ST. MARY THE VIRGIN.

in the clear, the floor of the church is eight feet above the grade line, requiring an ascent of fourteen steps to reach it. These steps have been kept inside, partly for convenience and economy, and to allow the building to extend to the front as far as possible, but chiefly that the height of the church floor might not be "accused" on the outside. The entrance doors being only two steps high, the church has the look of close connection with the ground which we are accustomed to see in old churches, and to desire in modern churches in order that the single purpose of the church may be manifest in its exterior appearance.

The mediæval parish church in England was just as "institutional" as our churches of any denomination are in Canada. They had the full equivalent of the modern guilds, clubs, festivals, and even sales of work (chiefly then of things to eat), and the place of our civic holidays, labor days, etc., was filled by an abundance of holy days in which the social life of the parish centred in the church. But they had not discovered the high basement. When they had a basement at all, they buried the dead in it, but not the living. The floor of the church—which really was a floor, not being hampered by fixed seats—must have served for such assemblies, and a devotion that, if less profound, was more all-embracing, sanctified all that was done in the name of the church.

Our greater complexity is symbolized by the inhabited basement. The exterior of the church suffers as a consequence in unity of design.

EXTERIOR VIEW, CHURCH OF ST. MARY THE VIRGIN.

CHAPEL OF ST. MARY THE VIRGIN.

The basement of the church before us now, and indeed the whole church building, consists of two parts, *viz.*, the space under the body of the church and the rooms under the chancel and in the vestry wing. The large assembly room under the main body of the church is heated only by the hot air, which is the main reliance of the church. This heat is only on for Sundays or special occasions. The rooms of the vestry wing on both floors, and the guild room under the chancel, which are cut off from the assembly room by doors, are heated by hot water, and are kept always warm. Here is the part of the church in which the daily services and weekly meetings are held. The guild room and choir vestries are equally available for meetings.

The chapel, for the daily and minor services, is fortunately lifted above the basement, and opportunity has been taken to give it a proportional loftiness which cost prohibited for the large area of the main church.

St. Ann's Church, Toronto

THESE buildings, having the principal elevations facing Gerrard and DeGrassi streets and First avenue, were completed (with the exception of the towers) last year, the church being dedicated by His Grace Archbishop McNeil on July 26th.

The church and rectory are of St. Mary's stone, with Indiana stone dressings to the first storey, and art stone cornices and architraves, etc., above. The character is that of a Roman church of the sixteenth century, and is planned to accommodate eight hundred and fifty. The interior width is sixty feet, the nave thirty feet wide, separated from the aisles by Corinthian colonnades and finishing in a barrel-vault ceiling, divided into bays by heavy ribs, springing from pilasters above the columns. The aisle ceilings are groined and vaulted. The sanctuary and side chapels have apsidal ends, and are furnished with marble altars and statuary. The sacristy is built around the chancel with entrances to sanctuary on either side, and the sacristy entrance on east side communicates with the rectory, which faces First avenue. A lofty basement, of the same area as church, is used as a parish hall. The interior ornamental work is carried out in "staff," and the walls and ceilings finished rough stucco.

Entered from the narthex is the baptistery, in ground floor of east tower. This is octagonal on plan and finished with dome vault. The west tower has entrances to church and basement and stairway to organ gallery.

The total cost of the buildings amounted to about one hundred and ten thousand dollars.

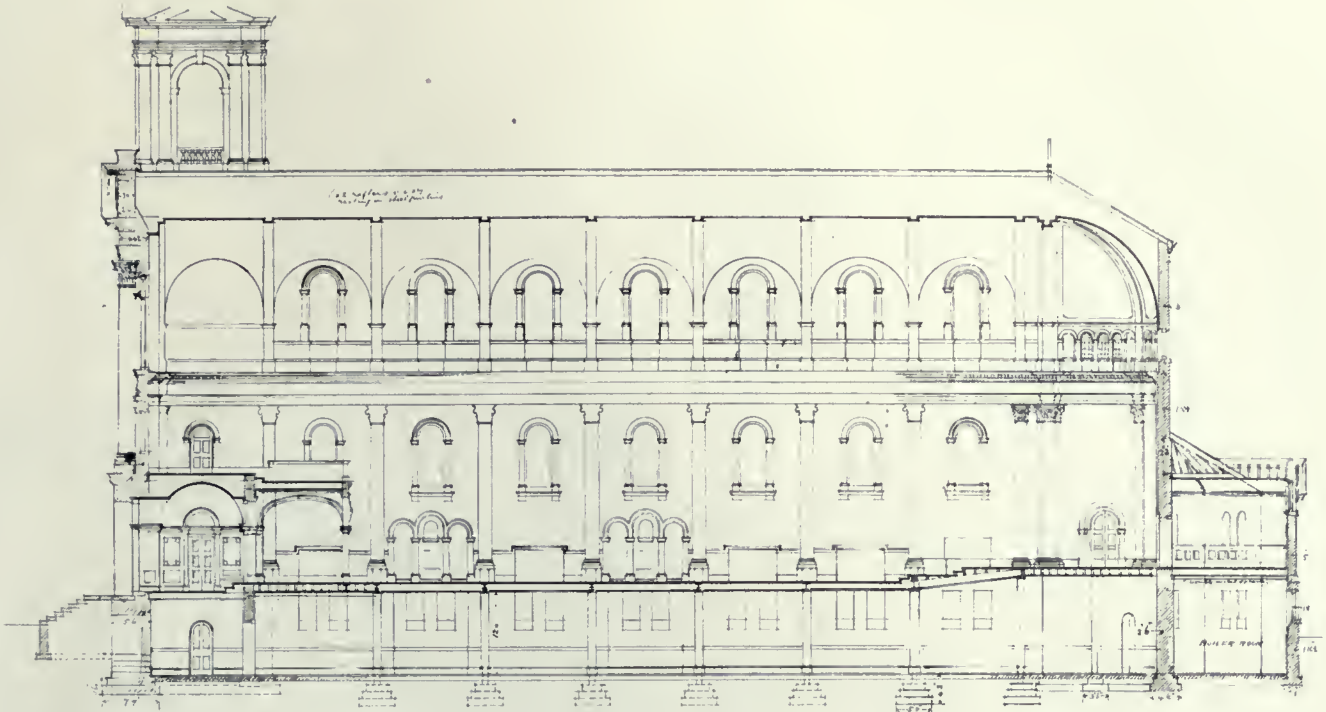
FRONT VIEW, ST. ANN'S R. C. CHURCH.

REAR VIEW AND PRESBYTERY, ST. ANN'S R. C. CHURCH.

INTERIOR, SHOWING ORGAN LOFT.

ST. ANN'S R.C. CHURCH.

A. W. HOLMES, ARCHITECT.

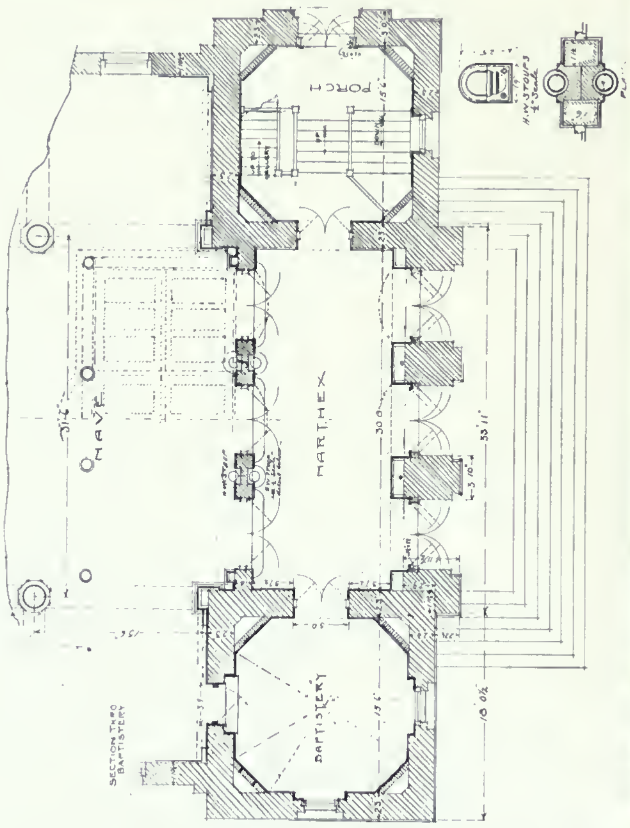


LONGITUDINAL SECTION

INTERIOR VIEW, ST. ANN'S R. C. CHURCH.

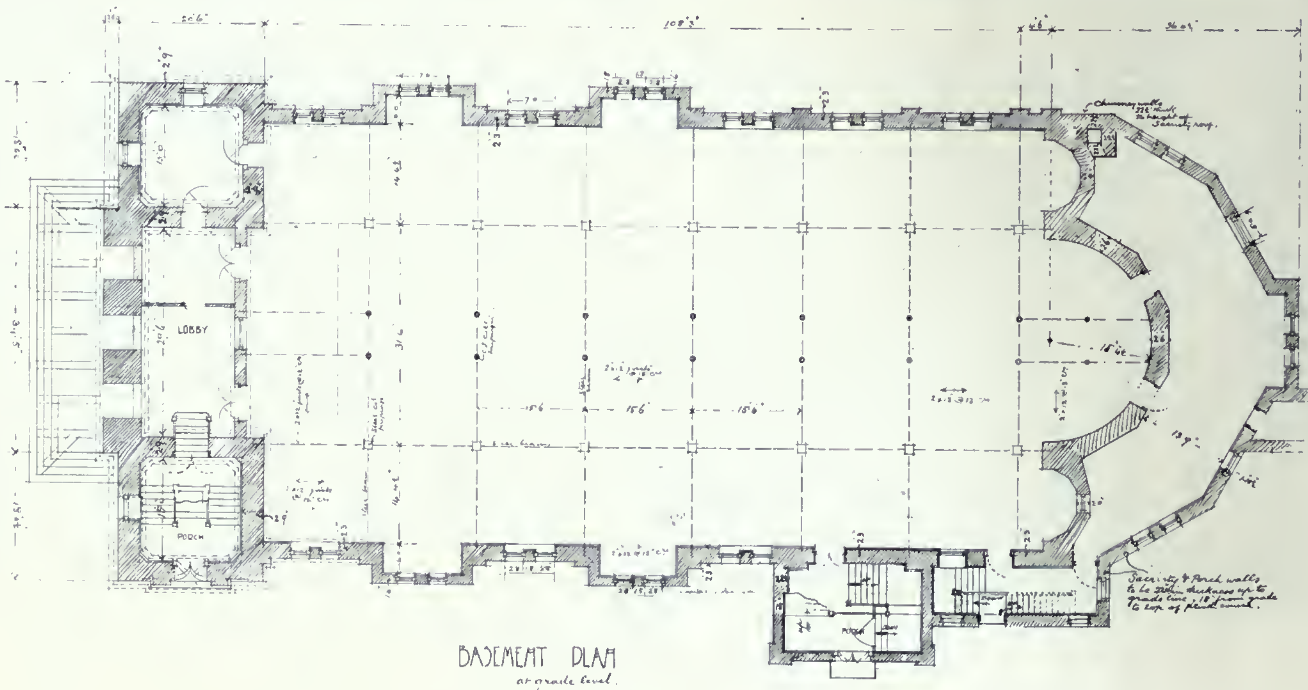
A. W. HOLMES, ARCHITECT.

A BROADER use of marble for the exterior of public and semi-public buildings has in the last few years become quite noticeable. An important project showing the employment of this material on which construction work has recently begun is the new Field Museum of Natural History at Chicago, which is being built at a cost of $5,000,000. The structure will be completed, it is expected, in less than three years, and more than three thousand men will be employed in the work. When finished it will be the largest marble building in the world. It will consist of three storeys and a basement, and will cover an area of seven hundred feet by three hundred and fifty feet. The floor area of the museum will be six hundred and seventy thousand square feet, of which four hundred thousand square feet will be devoted to exhibition purposes. The remainder will be used for scientific laboratories, lecture halls, offices and a restaurant. The material employed will be native marble.



NARTHEX, BAPTISTRY, NAVE AND PORCH, ST. ANN'S R. C. CHURCH.

VIEW OF ALTAR, ST. ANN'S R. C. CHURCH.



Kew Beach Presbyterian Church

KEW BEACH CHURCH is situated on the east side of Wineva avenue, north of Queen street. The old church, which was converted into a Sunday school, is to the south of the new building.

The plan is a solution of a problem set the architects by the committee, and produced by an inadequate lot, which had the further disadvantage of being very steep. The building contains main auditorium, chancel, gallery, organ loft, choir and minister's vestries, which form a wing connecting to the Sunday school. The structure is of pier construction, with curtain walls, the windows taking up the whole area between the buttresses. The buttresses are not ornamental only, but do their share in carrying the huge roof trusses. The roof trusses rise from the floor level, the supporting column being bolted to concrete abutments. The foundation is of concrete to the main floor, but the brick covers it from the grade level.

The upper walls are entirely of stock brick, faced inside and outside, so that there is no plaster. The walls between the piers are panelled with chestnut. The piers are finished in brick to the floor. All the woodwork, including the furniture, is chestnut stained. The windows are cement stone, with steel sash and leaded glass. All windows are double glazed to prevent radiation of heat outwards in winter time. The choir is seated antiphonally with the consol central behind a screen. The communion table is in the centre, and the font and pulpit on either side. The organ is over the choir in the end of the church.

The acoustics of the church are perfect, both for music and speaking, and all seats have a clear view of the pulpit and choir.

Access to the gallery is from one end of the narthex, which is inside it. The basement is unfinished, but is left for future use, and entrances are arranged from both ends. A small kitchen and men's and women's lavatories are placed in the basement.

The heating is by a system of five hot-air furnaces.

The electric lighting is by a system of direct-indirect fixtures, which is economical and easy on the eyes. This can be better understood by reference to the photographs.

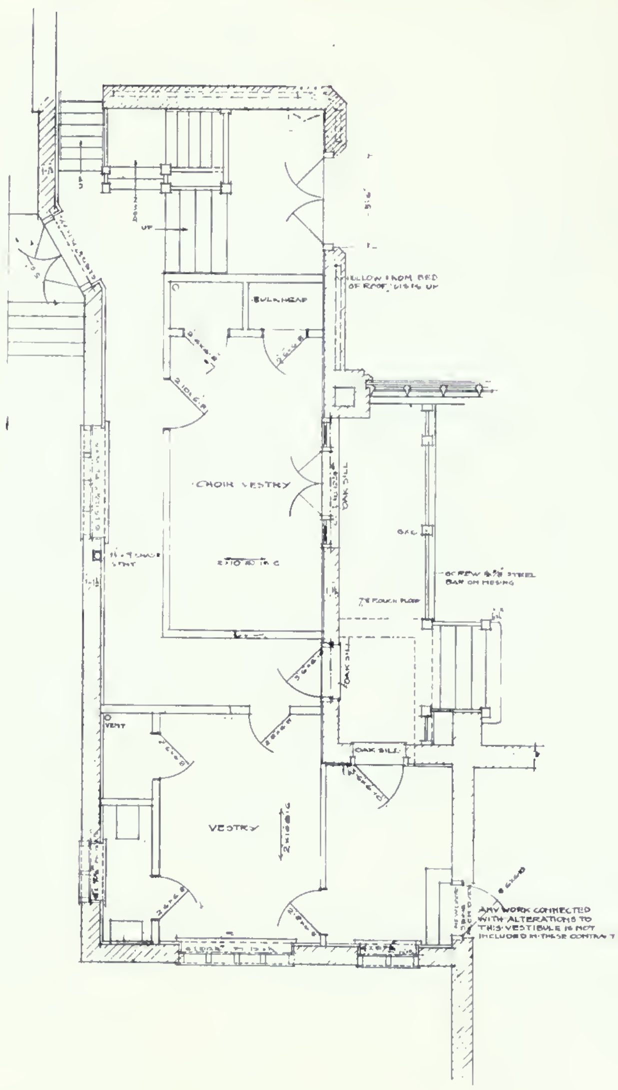
To test the economic value of the tar sands of Northern Alberta, it is proposed by the Department of Mines of that Province to build sections of country roads in various parts of the Province, using these sands for surfacing material.

KEW BEACH PRESBYTERIAN CHURCH. LINDSAY, BRYDON & GREIG, ARCHITECTS.

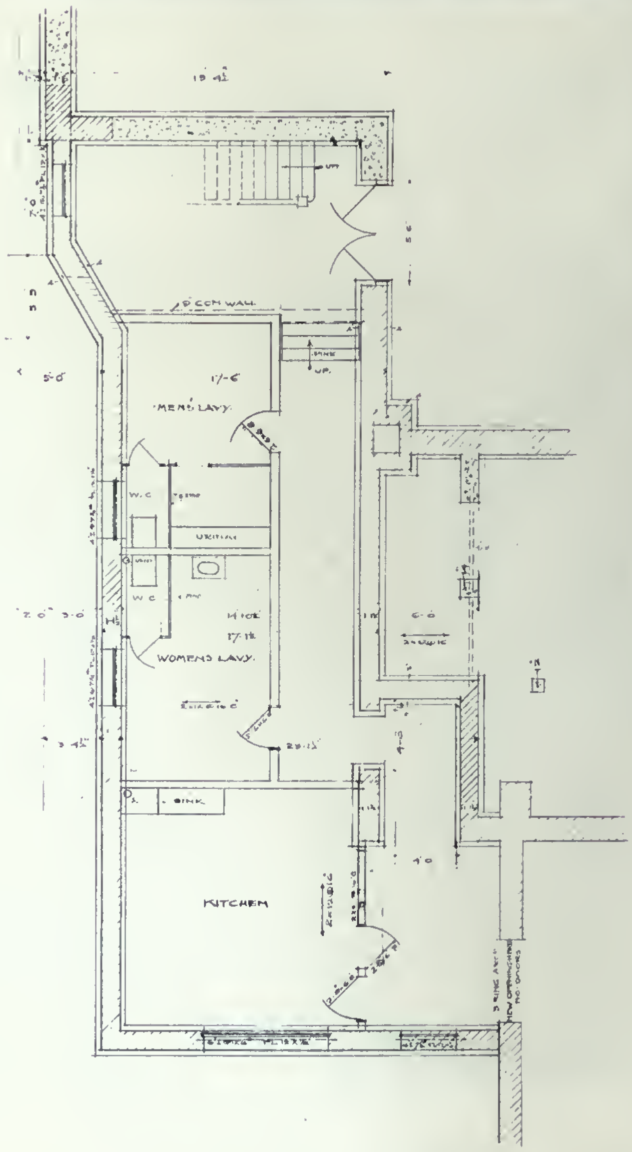
EXTERIOR, S.E. CORNER, KEW BEACH PRESBYTERIAN CHURCH.

CANADA is generally recognized as one of the foremost power-producing countries of the world. Her numerous rivers have immense potentialities, and within the area of population reasonably to be anticipated in the near future, is estimated to have water-power possibilities aggregating 17,764,000 horse-power, while some 1,712,193 horse-power of this amount has already been developed.

ENTRANCE, KEW BEACH PRESBYTERIAN CHURCH.



PLAN OF VESTRY, KEW BEACH PRESBYTERIAN CHURCH.



PLAN OF PART OF BASEMENT, KEW BEACH PRESBYTERIAN CHURCH.

Progress in Paint Manufacture

NOEL HEATON

I AM afraid that the majority of architects still look upon the subject of painting more or less in the light of a side issue, regarding the function of paint as of too little importance from a structural point of view for the question of its proper composition and use to demand serious attention.

Fundamentally, paint is composed of a finely divided solid portion, or pigment, and a liquid portion, or vehicle, which has the property of changing into a tough adhesive solid on exposure to the air, thus binding the particles of pigment to the surface. This change is commonly known as "drying," but is in reality a complicated chemical reaction, the control of which forms one of the most vital problems in the production of efficient paint.

The conditions which paint is called upon to fulfil in the protection and decoration of buildings are many, and a perfect paint would excel in numerous properties, which may be summarized thus:—(1) Perfect freedom of working. (2) Great "body"; that is, power of hiding the surface. (3) Power of "drying" quickly and uniformly to form a film having the characteristics—(4) Elasticity, to enable it to follow the expansion and contraction of the surface. (5) Hardness, to protect the surface from mechanical injury. (6) Impermeability to moisture and gases, to enable it to protect the painted surface from the effect of frost, corrosive agents, and so on. (7) Chemical stability and inertness, to enable it not only to resist attack by the same agencies itself, but to remain indefinitely without suffering any internal or external chemical change.

We must, of course, take it as an axiom that no paint is ideal in the sense of possessing all these properties fully developed. The problem of paint production is to strike an effective balance between these conflicting requirements. One of the most remarkable features of modern scientific research has been the bringing into prominence of the enormous influence that can be exerted by agencies so slight as to appear at first sight insignificant. One need only call to mind as an illustration the far-reaching influence of radium, which exists in such minute quantities that the world's present supply could be held in one hand. This applies as much to the paint industry as to other branches of applied chemistry. Research has shown, for example, that the "drying" of the oil and the durability of the resultant film of paint are influenced to a remarkable degree by the presence of certain metallic salts in extremely minute quantity.

Such subtle reactions may be applied to improving the qualities and eliminating the known weaknesses of those materials which have been proved by long experience to be the most efficient, and true progress has lain rather in this direction than in the more obvious one of endeavoring to replace them by new materials possessing theoretical advantages which in general prove in practice to introduce at the same time new and unforeseen defects. Both methods have, however, been practised, and there has thus arisen in the industry two schools of thought—those who follow the principle of applying scientific research to solving the problem of increasing the efficiency of paint by improving the manufacture of existing materials, and those who attempt to cut the Gordian knot by abandoning well-

SOUTH AISLE, KEW BEACH PRESBYTERIAN CHURCH.

known materials in favor of others possessing theoretical advantages. I must frankly confess myself a believer in the former method, for the reason that one has a sound basis of accumulated experience to direct the most profitable line of enquiry, for the problem is complicated by so many factors in actual use—the influence of varying conditions of exposure, environment, etc.—that it is only by years of practical experience that the qualities and defects of any material become fully understood.

The danger of introducing new materials and rejecting old ones lies, therefore, in the fact that, whilst the new material may show some specific advantage under favorable circumstances, this may be far outweighed by defects which manifest themselves under different circumstances. An instance that immediately occurs to one in this connection is the question of abandoning the use of white lead in favor of other pigments, on account of certain technical and economic disadvantages. This pigment is one of the most valuable ingredients the paint manufacturer has at his command. It has been in use for so long, and the experience of its use is so great, that its merits and defects are well known from every point of view.

One technical problem presented by its use illustrates very well the difficulty of making progress by the method of substitution—namely, the discoloring effect of air containing sulphuretted hydrogen, owing to the gradual formation of lead sulphide. Theoretically, the substitution of white lead by oxide of zinc would obviate this, not because sulphuretted hydrogen has no action on it, as is too often incorrectly stated, but because the sulphide of zinc formed is white, and therefore the action does not become apparent by discoloration. In practice, however, it is found that, whereas the action of such impure air is merely to discolor the surface of the lead paint without impairing its durability, when zinc is substituted this difficulty is only obviated at the sacrifice of the most valuable property of the paint—its protective value; for the paint under such conditions rapidly disintegrates in a manner that appears unaccountable until we investigate more closely the chemical reactions involved, when we discover that the action does not stop with the formation of the sulphide. Oxidation ensues, with the production of sulphate of zinc, which is freely soluble in water; the paint, in consequence, becomes useless as a protection against moisture, which causes it to disintegrate rapidly by dissolving away the now soluble pigment. In the case of white lead a similar cycle of reaction takes place, with the essential difference, however, that the lead sulphate so formed is quite insoluble and only inferior to the original white in durability, so that the ultimate effect is, for all practical purposes, to restore the original condition of affairs.

It is quite conceivable, moreover, that research on the lines of improvement rather than substitution may obviate this disadvantage of discoloration in the case of white lead. It is suggestive to note in this connection that white lead was freely used in mediæval times for tempera painting, for which purpose it was mixed with a medium consisting largely of yolk of egg.

MR. F. S. BAKER, F.R.I.B.A., Toronto, has moved from his temporary quarters on Selby street to offices at 721 Traders Bank Building.

UNLESS a municipality does some municipal thinking it will never attain full development as a municipality. The leading citizens must be able to see beyond their own interests. Every one who is able and willing to work must have an opportunity. It is idleness that kills. A municipality will not enjoy a healthy growth unless all parts of it are developed symmetrically. The leaders in a municipality should make a study of municipal conscience and consciousness—and there should be no selfishness mixed with it.

INTERIOR OF AUDITORIUM LOOKING TOWARDS STAGE, CONGRESS HALL.

Congress Hall, Montreal

THE handsome new Congress Hall adjoining St. Patrick's Church, corner Dorchester and St. Alexander streets, Montreal, is one of the new buildings of note erected during the past year. This edifice, reflecting credit on both architect and builder, was erected by the voluntary offerings of the congregation of the parish of St. Patrick.

The corner-stone of Congress Hall was blessed, according to the Catholic custom, on Sunday, October 18th, 1914, by the Most Reverend Archbishop Bruchesi. A magnificent ceremony marked the event, and His Grace happily designated Congress Hall as the palace of prayer, charity and fine arts.

Though intended as a sacristy in connection with the big Irish Catholic place of worship, Congress Hall, named as a memorial of the great Eucharistic Congress, held in this city in 1910, is destined for a number of parochial purposes, and to serve as well for the headquarters of the administration of the various activities, religious and social, that are carried on in the foremost English-speaking parish of Montreal.

Architecturally, and from the viewpoint of destined service, Congress Hall is a unique departure from the general style of semi-religious buildings attached to many of the larger city churches. It is comprehensive, to say the least, as a glance at the list of parochial departments provided for will show. Of unusual interest and significance in a structure of this kind, and with so central a location, is the auditorium. As a private theatre for school tableaux, illustrated talks, etc., to the children, a hall where the big folk may gather to hear prominent speakers in choice lectures and conferences, as a concert room, and as the charming locale for future well-set social functions, this feature alone of the new building is going to contribute in no small degree to the entertainment and cultural development of English-speaking Catholics.

BAPTISTRY, LOOKING EAST, CONGRESS HALL.

A beautiful lady chapel, and a splendidly modern auditorium, lighted from above, with balcony, stage and four dressing-rooms, and with smaller rooms for board meetings of wardens and trustees, local societies, private gatherings, etc., a choir practice hall, a banquet room with kitchen annex and cloak rooms occupy the upper storeys.

The entire ground floor is reserved for a sacristy, with baptistery, confessional for the deaf, vault, a spacious vestry for the altar boys with lockers, lavatories, etc., a large sodality room and quarters for the Sisters in charge. This part of the hall was completed first, the rapidity of the construction being a matter of special congratulation to the builders.

CHAPEL, SHOWING ALTAR AND SEATS, CONGRESS HALL.

CONGRESS HALL.

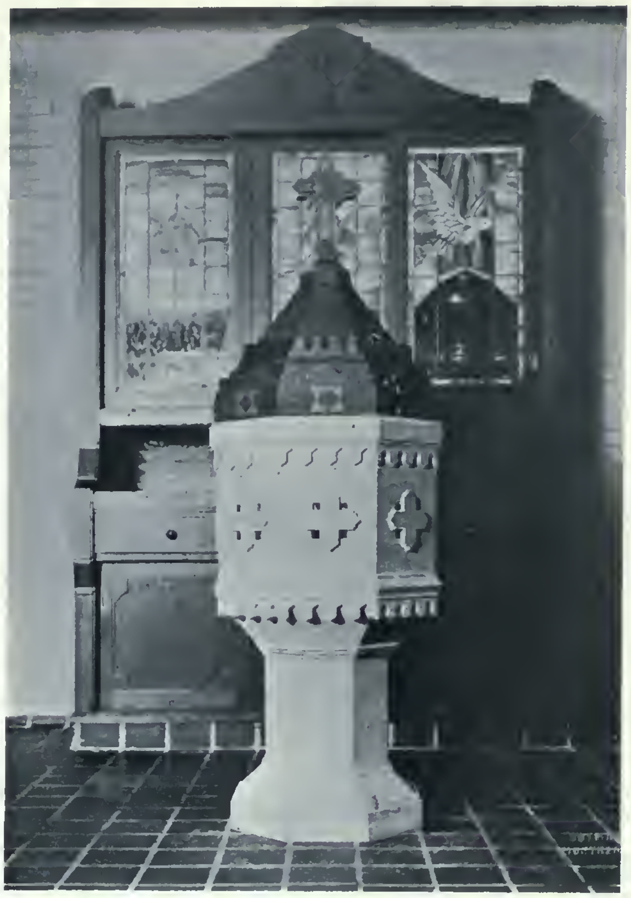
NORTH-EAST VIEW.
HYNES, FELDMAN
& WATSON,
ARCHITECTS.

FIRST FLOOR PLAN,
CONGRESS HALL.

FOURTH FLOOR PLAN,
CONGRESS HALL.

BASEMENT PLAN,
CONGRESS HALL.

SECOND FLOOR PLAN,
CONGRESS HALL.



FRONT IN BAPTISTRY, CONGRESS HALL.

The style is that of cubist architecture, a novel deparatnre, built upon the principle that human endeavor models, upon the straight line, the square and the cube. The old world monastery idea of stone and brick were woven into the plans of the architects. Messrs. Hynes, Feldman and Watson have also the designing of the furniture, which is surety for its artistic original individuality.

The building, which is fireproof, contains thirty-five rooms, and is constructed of reinforced concrete and Montreal limestone, the latter to match the material used in St. Patrick's Church and presbytery. The building is four storeys high, and every floor is of tile.

Throughout the interior the walls are buff pressed brick, with floors of square red Welsh tiles. Special mention should be made of the elevators, the ventilation plant, and also of the conservatory, in which will be tended the flowers and plants used to decorate St. Patrick's for imposing religious functions and national demonstrations, such as it has been so often the scene in the past.

There are many features that deserve attention in this building. The company that installed the steel sash and concrete construction made a straight gallery beam in the auditorium in one span sixty-eight feet long, the longest in Canada. This reinforced concrete work was done by a Montreal firm. In the auditorium there are no visible columns, clear sight of the stage being afforded from every part of the auditorium. All the wiring and piping is also invisible, a somewhat rare feature, even in up-to-date buildings. All doors also open outwards, although the building is fireproof.

In the basement are the paint and carpenter shop, furnaces and storage premises.

That the builders have not lost much time is shown by the fact that work on the excavations was begun on August 3rd, 1914. On April 5th the first concert was given in the chapel.

With the extras and additions, which include the furniture, the cost will not fall far short of one hundred and seventy thousand dollars.

LAWS OF STATES ON SCHOOLHOUSE VENTILATION

Forty States of the Union have taken some legal action toward safeguarding the sanitation of public school buildings, according to a bulletin on "Schoolhouse Sanitation," just issued by the Bureau of Education of the United States Department of the Interior. "Probably nine-tenths of the existing regulation of this sort has come within the past decade," declares the bulletin. "Each State profits by the experience of 47 others. A law passed in one extreme of the country to-day is copied next month or next year by a State 2,000 or 3,000 miles distant."

Thirty-eight States have some legal provision regarding the school site, according to the bul-

PEWS IN CHAPEL, CONGRESS HALL.

letin. Nearly all of these provisions are State-wide in their application, and are mandatory in character. These provisions include the proximity of "nuisances," availability of the site, and size of the site. Nineteen States have laws prohibiting the location of school buildings

BOARD ROOM, CONGRESS HALL.

within a specified distance from places where liquor is sold, from gambling houses, houses of prostitution, and noisy or smoky factories.

Thirty of the States have sought to regulate the water supply of the public school. "The revolt against the common drinking cup," says the bulletin, "has come within the past five years. Kansas was the pioneer, but other States followed rapidly, so that now half of the entire number have either a law or a regulation regarding drinking cups."

Some form of protection against fire and panic is found in 36 States. Blanket regulations, or the power to make such regulations, exist in 12 States. General or special construction with a view to fire prevention is dealt with in 10 States. Less than half the States, according to the bulletin, have any legal word on ventilation. In the matter of cleaning and disinfecting, slightly more than one-fourth of the States have regulations which control conditions to any degree outside the districts themselves. Some of the laws and regulations are almost model; others are wholly inadequate. A few State boards of health have done notable work in this particular. Special cleaning and disinfecting follow in seven States immediately upon discovery in any school of any of a certain class of diseases.

GUTTER FOR SLATE ROOFS

WHEN IT IS required to insert a new gutter to a slated roof, says a contemporary, it is often necessary to remove the lower two or three rows of slates to allow for the lead or other gutter material to be inserted. As the slating nails are covered up by the slates, it is not possible to extract the nails unless the slates above are removed. For the purpose of removing the nails the slater uses a "ripper," which has a thin blade and is inserted between the slates, and a slotted end allows for the clipping hold of the nails. A sharp tap on the ripper shears the nails and allows for the removal of the slates.

The replacing of the slates after the gutter has been placed in position presents a little difficulty. If one row of slates, which includes the double eaves course, has been removed it will be found that the eaves course can be nailed at the sides of each slate, and when the next course of slates is in position the nails will be covered. The course over the eaves course cannot be nailed, and is fixed by means of narrow strips of lead or zinc, which are nailed to the boarding through the small space left between each slate. The ends of these strips are turned over, and when the slate is inserted under the slates, the turned-up end clips the slate and prevents it sliding down the roof. If two rows of slates are necessary to be removed it will be found that the bottom row, comprising the eaves course and the slates immediately over, can be nailed, and the next row will have to be fixed as before mentioned. As regards the fixing of a parapet, or any other gutter, it depends upon the form of gutter used, and the construction of the roof at eaves, whether it is necessary to remove the slates or not.

MAIN ENTRANCE, DORCHESTER STREET, CONGRESS HALL.

For King and Country

NO profession has offered itself more freely than the architectural in Canada. Previous to the war, many members had taken an active part in military affairs, and not a small number had already seen active service. It is estimated that up to the present time, eighty-five per cent. of those engaged in the profession have enlisted; this is not at all surprising, as there are instances of whole office staffs having joined the colors. Both members of the firm of Chadwick & Beckett have appointments on the Canadian Expeditionary Force.

Lieut.-Col. Vaux Chadwick organized and commanded the 4th Canadian Mounted Rifles, now overseas, and from that regiment was selected for an appointment on the Headquarters Staff, later resigning to take over the command of the Hundred and Twenty-fourth Battalion, which he is organizing from the Governor-General's Body Guard and Ninth Mississanga Horse.

Col. Beckett was appointed commander of the Ninth Mississanga Horse, from which he was transferred to command the Seventy-fifth Battalion for overseas service.

From the offices of Ross & McDonald twenty-three out of thirty members of the staff have gone overseas with the first contingent. P. Debray returned to his regiment in the French Reservists; Sergeants E. F. Morgan and F. Higginson, with Pte. A. L. Johnston, joined the Grenadier Guards (Montreal); Capt. H. O. Ives and Pte. P. Slessor with the Thirteenth Battalion (Fifth Royal Highlanders). The latter was wounded and made a German prisoner.

Lieut. J. Jensen enlisted with the Automobile Machine Gun Corps of Ottawa. Lieut. A. Lochead rejoined his regiment, the Royal Scotch Fusiliers of Glasgow, and L.-Corp. W. Graveley, Third Battalion (Queen's Own Rifles, Toronto). In the second contingent five men enlisted with the Victoria Rifles, Montreal: Sergt. C. Dolphin, Corp. H. Patterson, Sergt. H. A. Dawson, Ptes. H. E. Routledge and C. Clarke. Five men were with the third contingent: Capt. G. Shearer, 27th Field Battery; Lieut. H. B. Rugh, Forty-fourth Battalion of Winnipeg; Ptes. J. R. Jeffrey and A. Hamlet, Fifth Mounted Rifles, Sherbrooke, and P. B. Richardson was drafted into the C.P.R. Engineering Corps. A number of men enlisted after having left the employment of the firm, among them being R. E. L. Hollinshead, who was killed in action; Pte. W. Symmonds, Thirty-fifth Battalion, Toronto, and Ptes. P. J. D'Alton and John Drew, of the Twenty-fourth Battalion, Montreal.

COLONEL VAUX CHADWICK.
Commanding 124th Battalion, Exhibition Camp, Toronto.

Eight men have gone overseas from the office of Darling & Pearson, four having already gone to the firing line: Corp. T. C. Pomphrey and Sergt. Wm. Ferguson, Fourteenth Battalion, Third Brigade, France; Lieut. S. W. Rowatt, Seventy-fifth Battalion, first contingent; Pte. L. Patterson, Twelfth Reserve Battalion; Pte. G. Kereland, Thirty-fifth Battalion; Pte. D. C. Carmichael, Royal Fusiliers; Pte. J. C. Bartholomew, Third Battalion, and Corp. F. T. Trapp of the Troop Supply Column.

Both members of the firm of Page & Warrington—Lieuts. Page and Warrington—have joined the third contingent.

Major McDougall, who had seen active service in South Africa, enlisted with the first contingent, taking with him four men from the Board of Education, Ptes. A. Abercrombe, H. A. Rhodes, U. C. Rhodes and H. Barber of the Artillery.

Sergt.-Major Wm. Price and Lieut. Arthur Everett, from the office of Burke, Horwood & White, returned to England to instruct in caval-

COLONEL BECKETT.
Commanding 75th Battalion, Exhibition Camp, Toronto.

ry. E. V. Reid and H. Pell have gone overseas with the Royal Naval flying squadron. Pte. G. Hedley, who joined the Artillery in the first contingent, was seriously wounded in one of the first engagements.

Capt. McGiffin, of the firm of Chapman & McGiffin; Lieuts. Molesworth and West of the same firm, are all members of the third contingent. Two men, Ptes. C. F. Wellington and F. W. Burnett, from the office of C. R. Reid, Toronto, are with the Engineers.

Major Eden Smith, of the firm of Eden Smith & Sons, and Major Sanford Smith, of Bond & Smith, represent two of the leading architectural firms of Toronto; the latter having gone to the front with the first contingent. The former was attached to the Thirty-fifth Battalion, from which he was drafted to take charge of the draft reinforcements of the Third Battalion, France.

COMPLETE BUILDING SHOW

In Cleveland, Ohio, U.S.A., during the month of February, 1916, will be held the first Complete Building Show ever held in the United States.

This exhibition will be patterned after the justly famous Building Trades Exposition, which has been a bi-annual event in London for many years. Like it, the Cleveland show will be open to every kind of material which takes it out of the field of "trade" shows.

Many cement shows, clay shows, real estate shows and lumber shows have been held in the United States—but it remains for Cleveland to have the first general exposition ever held in the States within which every sort of material is to be impartially displayed.

Backed as it is by sixty manufacturers and dealers in building materials, it is purely an educational demonstration for "the man about to build." It is not to be conducted for profit. It has not even a professional manager. Its affairs are in the hands of an advisory committee made up of those who have unselfishly put their money into the venture. The sub-committees having each specific work in their hands, are composed of members of the general committee.

Success for the Complete Building Show is that it will move. There will be no dead exhibits—no endless array of booths. Several houses, complete except in size, will be erected, and the grounds surrounding them planted, fenced and so laid out as to present a finished picture to the eye.

This is made possible by the grouping of displays into community exhibits. In this manner it is possible to have more pretentious displays at a less cost than as though each manufacturer or dealer were to maintain an individual exhibit.

A distinct feature of the Complete Building Show will be the architectural exhibit, in which will be shown the drawings submitted in a contest that is to be conducted by the Cleveland Chapter of the American Institute of Architects, under the auspices of the Complete Building Show Company. This will give opportunity for showing the building in every stage, from the architect's plans through the various types and mediums of construction to the finished building, equipped with the latest work-saving and safety appliances.

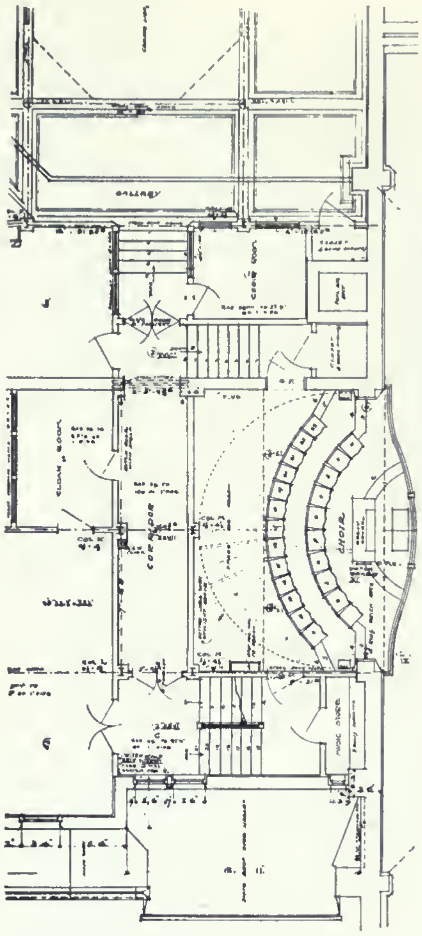
The prizes being offered in this contest are sufficiently large to assure its being more than a local affair. The competition is for small low-priced houses—in short, workingmen's homes. This type of building is attracting great attention in the States and this competition promises a wide interest.

It is aimed to make this the most widely advertised exposition, of its kind, ever held in the United States. A feature of this publicity compaign will be the giving away of a complete house free. The competition, under which this house will be awarded, will be such as to link it directly to the exhibits in the show and will eliminate the "guessing" features of the average contest. Roughly, it will be a popularity contest among the various materials and fittings, which would enter into the "ideal" home. A careful study of the show will be necessary to successfully compete for the free house.

The exhibits are to be grouped into four general classifications: Building Materials and Construction; Equipment and Devices, Interior Finish, Decoration and Furniture; Real Estate and Gardens, Art, etc.

CHANGES IN BY-LAWS

At the present time the members of the Canadian Society of Civil Engineers are being asked to vote on certain amendments to the by-laws of the association. One of the most important of these is the suggestion which, if followed out, will tend to make the society a hide-bound close corporation and would keep many men from membership who would be not only highly desirable, but who would be a decided acquisition. A change, such as suggested, would be dangerous to the society and a menace to its best interests. If the members are wise they will not be guilty of retrogression in this respect. It should be borne in mind that any attempt on the part of the organization to make membership difficult will have a boomerang effect upon every effort the society may make to secure legislation, having in view protecting civil engineers or defining their status in the Dominion.

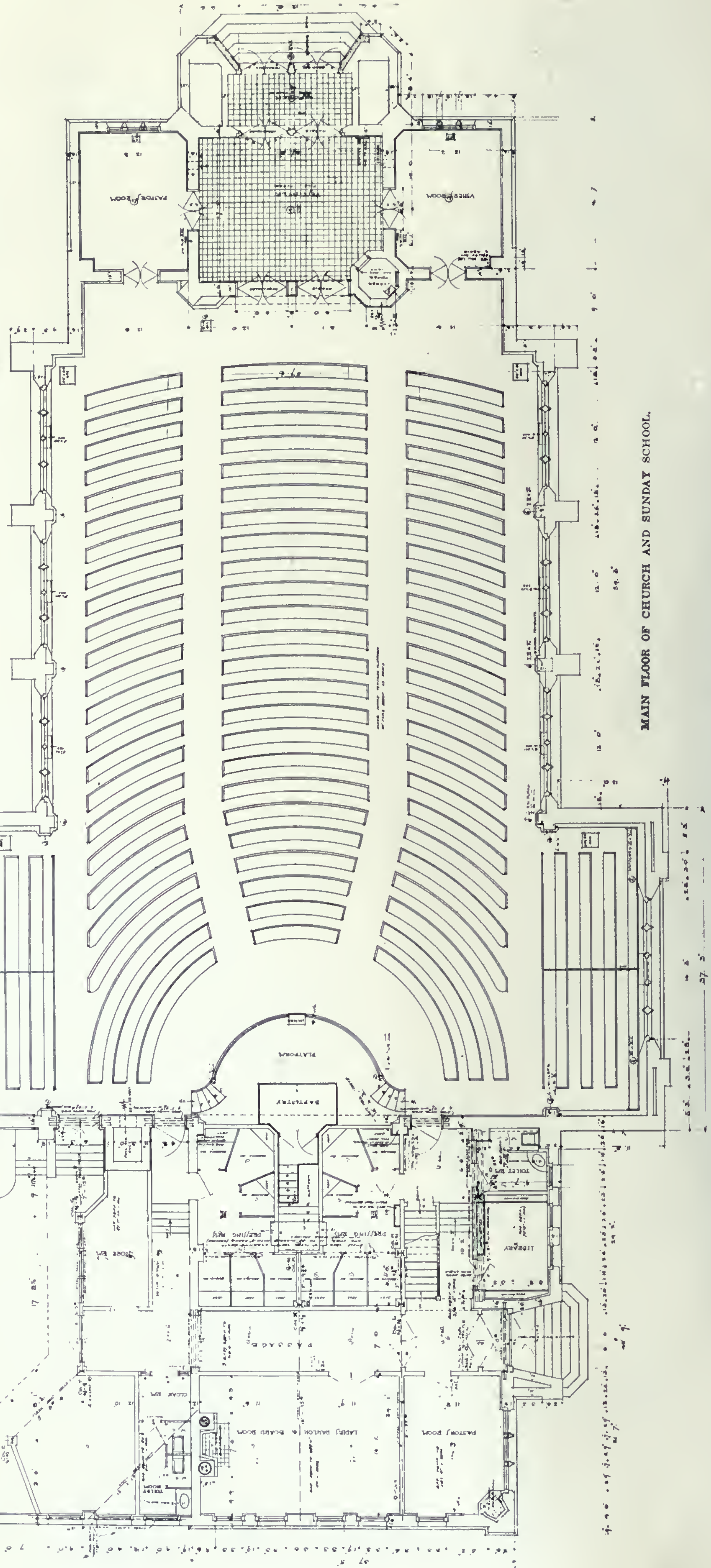


PLAN OF CHOIR GALLERY.

OLIVET BAPTIST CHURCH,

MONTREAL.

DAVID R. BROWN,
ARCHITECT.



MAIN FLOOR OF CHURCH AND SUNDAY SCHOOL.

CONSTRUCTION

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

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

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FRASER S. KEITH - - - EDITOR AND MANAGER

Vol.VIII Toronto, Dec., 1915 No. 12

CANADIAN PROSPERITY

A year ago it looked to most Canadians should the war last another year that not only would industry be paralyzed but that the country generally and its citizens would be on the verge of ruin. The unexpected, however, has happened and the situation is a paradox. Nationally Canada has never made such advances towards prosperity in her history, as she has during the past twelve months.

Munition orders amounting to over $600,000,000 have kept our factories working overtime, provided work for tens of thousands of mechanics and others who would otherwise have been idle, and supplied ready money, in many cases, in abundance. A record wheat crop of 336,258,000 bushels of wheat surpassed the most roseate forecasts of the well informed during the growing stages of the season. This crop was seventy-five per cent. greater than the average of the past five years. For the first time in the history of the Dominion, Canada shows a favorable trade balance. According to the Minister of Finance, the total revenue for the Dominion for the month of November was $17,072,456, an increase of $7,576,920 over that of November last year and the largest of any money in the history of the Dominion. The latest monthly statement of Canada's trade shows that we exported during October nearly $80,000,000 worth of goods. This is about double the value of goods exported during October, 1914. The huge increase is not due to any particular movement of manufactured goods such as war munitions, but to a notable increase to practically all kinds of trade. For Canada's war loan of $50,000,000 there was subscribed a sum of $110,000,000, the surplus of which is to be used for the credit of Great Britain in this country. Canadian banks have on hand $120,000,000 more than they had a year ago. The combined gross earnings of the Canadian Pacific Ry., the Grand Trunk Ry. and the Canadian Northern Ry. for the last nine days of November were the second largest total on record, being exceeded only by the final period of October and as compared with the corresponding period a year ago an increase of 58.4 per cent., a new high record in history. A further and very satisfactory index to conditions is the record of building permits in seventeen Canadian cities during the month of November which show an increase of 55.7 per cent. over the same month last year.

The present war is making Canada a nation among nations and arousing within her, to resultant action, the latent strength of her resources to such an extent that the world at large must realize how great are her possibilities.

STANDARD BUILDING LAWS

The standardizing of the building by-laws of Canada has been undertaken by the Commission of Conservation at Ottawa. At present the Commission is investigating the various fire losses throughout the Dominion and the adequacy or otherwise of the fire protection in the different centres. The object, in keeping with the utilitarian purposes of the commission, is to evolve a set of by-laws applicable to villages, towns and cities and the various districts in cities which when standardized to meet the requirements of the group for which they are intended will apply in the same way to every like district.

The importance of this step undertaken by the Conservation Commission cannot be over-estimated, involving as it does the present fire loss and concerning the growth along definite lines of the different centres. It is a movement that should have the hearty co-operation of architects, manufacturers of building materials and fire underwriters.

City Architect Pearce of Toronto, when requested by the commission for his advice, made the following valuable suggestions:

"In my opinion you are carrying out a much-felt want. This department at the present time is working on the revision of the city building by-law and we have found great difficulty in getting accurate data with reference to Canadian products which might be used in buildings in order to protect them from fire.

If I might suggest it (if there is not one already established of which I am unaware) I think it would be an excellent thing if some central bureau could be maintained whereby the different municipalities could get full information with reference to the fire resisting qualities, and also the strength of the different materials used in the buildings. I might say that in a great many cases this department is forced to get its information either from the Fire Underwriters or from the different cities located in the United States. This, it appears to me, to be a very poor policy to have to pursue. At the present time we are making use of the testing laboratory of the University of Toronto, but, unfortunately, this is closed to us during the time the school is in session.

It would also be an excellent thing if there could be some advisory code gotten up to guide the different Canadian municipalities with reference to the minimum requirements which the municipalities should enforce with reference to fire protection, leaving it to the municipalities themselves to enforce a more rigid code if they so desire to do. I do not think it would be possible to have a uniform building code for all sections of the Dominion on account of the great differences in climatic and physical conditions, water supplies, etc. This opinion, I might add, was concurred in at a recent meeting of the Building Superintendents, Fire Commissioners, etc., which was held this year in New York City tnd which was attended by the writer."

NEED FOR REFORM

Allusion was made in these columns to the unbusinesslike and bigoted action of the Toronto Board of Education in refusing to entertain the lowest tender on a plumbing contract because the business man submitting it was a Roman Catholic. There was no question of the strong financial standing of the firm in question or of its ability to carry out the contract. Merely because they thought they would gain votes among the least intelligent members of the community, the trustees decided to take cash out of the pockets of public school supporters to vindicate sectarian prejudice. It is gratifying to note that the Separate School Board and the Roman Catholic ecclesiastical corporation of Toronto diocese have never done anything to justify such a step—if the waste of public money could under any excuse be justified. During the past year Roman Catholic institutions have been doing a great deal of building and renovating, and in every case the contracts have been awarded to the lowest tender. Enquiry shows that even in cases where the differences between the lowest and the next lowest tender were very slight the businesslike practice of giving the work to the former has been steadily pursued to the advantage of Protestants tendering, and the question of creed absolutely ignored. This is not a mere general statement, but is proven by the names of the following Protestant firms who have carried out contracts for Roman Catholic institutions during the past year or are engaged on work still in progress. The mason work on St. Cecilia's school went to Samuel Young; concrete work on several separate schools to William Purvis (who, by the way, is a prominent Orangeman), and to the Ramsey Contracting Company. Contracts for electrical work in the schools have gone to George Beatty and to Cornish Brothers, for heating to the Toronto Furnace Company; for plastering to Henry Beaver; for sheet metal work to W. E. Dillon, and for roofing to Douglas Brothers, all Protestant concerns.

So much for the separate schools; the same policy of placing business considerations above creed prejudice has been pursued by the clergy. At Oak Ridges, near Toronto, the Christian Brothers are erecting a magnificent training school, at a cost of a quarter of a million dollars. In connection therewith Thomson Bros., a Protestant firm, have a contract which it is said amounts to $100,000. For the new Parish hall of St. Paul's (R.C.) Church, James A. Wickett, Ltd., have a contract. For St. Clair's Church, on St. Clair avenue, and St. Anthony's Mission Church, Fred Holmes is the contractor. Cecil Waters was the successful tenderer for the Church of the Holy Name and the Priest's house attached thereto. The mason work on the Church of St. Vincent de Paul went to Dancy Bros. The Presbytery being erected for Rev. Dr. Treacy, on Pacific avenue, is in the hands of Gordon Bros., and the new Roman Catholic office building on Bond street is being built by Fred Holmes. When it is borne in mind that these contracts represent only the past year's activities, the picayune meanness of the Toronto Board of Education, to say nothing of its reckless misuse of public money, becomes the more apparent.—*Saturday Night.*

The Imperial Oil Building

AMONG the larger buildings planned and to be rushed to completion immediately, is the Imperial Oil building, which will be located on Church and Court streets, Toronto. The building was planned by Clinton & Russell, Dominion Bank Building, architects for the Imperial Oil Co.

A number of unique ideas, new to office building construction in Toronto, have been introduced. The building will be of steel with fire-

IMPERIAL OIL BUILDING,
Church and Court Streets, Toronto.

proofing throughout, rising seven stories, with basement; it will occupy seventy-six feet on Church street and one hundred and fifteen feet on Court street, with a twenty-three foot driveway at the westerly end of the building. The style will be an adaptation of the Italian Renaissance in Bedford limestone, similar to that used in the new Toronto Registry Office, supplied by the Indiana Quarries Co.

A portion of the basement will be devoted to squash court, gymnasium, shower, and locker rooms, for the use of the tenants of the building, in addition to the usual boiler, fan, pump and switch-board rooms.

The first floor will be used as a banking room and stores. The banking room will be occupied by a Canadian chartered bank. The main entrance to the building will be from Court to the elevator hall leading to three large elevators, and the tower staircase. Both the elevator shafts and staircase will be enclosed in six-inch terra cotta, with the stairs of cast iron construction and slate treads; the doors and trim are to be of steel, with polished plate wired glass.

In the rear portion of the building, adjacent to the driveway, display rooms for the Imperial Oil products will be located, also gasoline storage tanks, waiting rooms, and conveniences for the use of motorists.

All of the upper floors will be occupied by the Imperial Oil Company and its subsidiary companies, and will be finished in marble with floors of marble mosaic; all doors and trim will be finished in steel. Special attention has been paid to the board room design, which will be finished in panelled mahogany with ornamental plaster ceiling.

The general contract for the building has been let to Thompson, Starrett Company of 51 Wall street, New York City, who in turn will sublet all trades to Canadian contractors, having already let the structural steel to the Dominion Bridge Company; the masonry and fireproofing to Witchall & Sons; steel casements and trim to the A. B. Ormsby Company.

A number of the elaborate details of the banking room were reproduced by the Canada Blue Printing Company, 89 Jarvis street, on their new rectiograph. The tracings were not available, so that it would have been a week's work for a draughtsman to trace the blue prints; instead, the rectiograph photographed and produced twelve prints in three hours. This machine also eliminates the pantograph in the reduction and increasing of scale drawings by an ingenious device. The low cost of production combined with the efficiency of this invention should be investigated by every architect, engineer and draughtsman, being the only one used for commercial purposes.

GOOD ROADS CONGRESS

The third Canadian and International Good Roads Congress is to be held in Montreal in the early part of March. Delegates will be present from every Province in the Dominion, from the United States and from Great Britain. In addition there will be representatives of engineering societies, boards of trade, good roads organizations, manufacturers' associations, automobile clubs and members of agricultural associations.

Prosperity Paragraphs

FORGING AHEAD.

"Canada in the next thirty years will grow more than any other part of the North American continent has grown in any thirty years."—Clarence W. Barron, editor of the "Wall Street Journal."

EXPECT BIG EMIGRATION.

A well-known American writer thinks that the signing of peace will lead to an emigration movement that will amaze the world. After the Franco-Prussian war in 1870, 200,000 Germans settled in three American States—Nebraska, Minnesota, and Iowa.

TORONTO BUILDING INCREASE.

The City Architect issued permits to the value of $800,000 during November, which shows a decided increase over any month since last June. When it is taken into consideration that November and February are calculated to be the two quiet months of the building year, this is an omen which cannot pass without reflection.

CANADA WILL GET MORE.

The output of munitions in Britain and France has now reached a stage which makes the Allies independent of other supplies, and it is unlikely that any further contracts will be placed in the United States The financial importance of this development need not be emphasized to Canadians who will continue to share in any new orders given.

BANKING BUSINESS GROWS.

The steady increase of bank clearings from week to week over the corresponding periods of last year is a pleasing indication of the fact that the period of depression in Canada is a thing of the past. Recently the Canadian clearings aggregated $198,892,000 as against $157,200,000 the same week last year. The percentages of increase in the various cities were: Montreal 24.1; Toronto, 10.1; Winnipeg 64.4; Ottawa, 4.0; Calgary, 59.8; Quebec, 4.7; Halifax, 3.4 and Regina 50.2.

INDEX OF THE TIMES.

Net profits of the Canadian Pacific Railway for the month of October were $6,579,434 which was about treble the showing made in recent previous months, and an increase over last year of $3,258,106. Gross earnings were $13,443,214; working expenses, $6,863,780; net profits, $6,579,434. For the four months ended Oct. 31. the figures are: Gross earnings, $40,413,207; working expenses $22,845,754; net profits, $17,567,453. In October, 1914, net profits were $3,321,328 and for the four months ended Oct. 31st, 1914, $14,820,980.

LOOKING TO CANADA FOR INVESTMENT.

Investors in the leading financial centres in the United States are now looking to Canada as a new field for profitable investment, states Mr. Allen D. Alberts of Minneapolis, president of the International Rotary Clubs, journalist, political economist, sociologist and keen student of current affairs. Mr. Alberts, who is regarded as an authority on economics, and is a professor of applied economics at the Minnesota University, is on a tour of the principal cities of the United States and Canada, making a study of the "forces that build cities" and securing data for authoritative works on that and applied subjects.

INCREASED TRADE.

Trade statistics published by the Dept. of Trade and Commerce show that for the twelve months, ending with October, exports of Canadian produce increased by $96,296,139, while imports of merchandise increased by $92,908,747. Total exports for the nine months amounted to $509,092,245, while total imports amounted to $421,677,217 leaving a balance of trade in favor of Canada of $87,415,028. Exports of animal produce for the twelve months totalled $89,471,675, an increase of $25,757,405. Exports of agricultural produce totaled $158,453,160, a decrease of $6,318,-923. Exports of manufactured products totalled $130,848,327, an increase of $65,393,597, or of 100 per cent.

FACTORIES BUSY.

Speaking of conditions in Eastern Canada, Mr. C. J. McCuaig, President of the Sherbrooke Railway & Power Company, Director of the Ottawa Light, Heat and Power Company, and Director of a large number of big enterprises, stated that the industrial situation is particularly good. The textile mills around Montreal and elsewhere in the Province of Quebec are once more working full time, compared with about seventy per cent. capacity a year ago. Firms manufacturing all kinds of steel products used in shells are working night and day. Chemical companies cannot turn out enough goods; and factories turning out a great diversity of products are working right up to their limit.

RAILWAY EARNINGS MADE RECORD.

The combined gross earnings of the Canadian Pacific Railway, the Grand Trunk Railway and the Canadian Northern Railway for the last nine days of November were $6,539,507, the second largest total on record, being exceeded only by the final period of October (10 days). Compared with a year ago, the increase is $2,413,325, or 58.4 per cent., a new high record in history, comparing with 51.3 per cent. in the third week, 48.3 per cent. in the second. 43.9 per cent. in the first, 50.9 per cent. in the fourth week. October, 39.7 per cent. in the third, 23.9 per cent. in the second. 19.5 per cent. in the first, and 2.7 in the fourth week, September. Every prior week since war began showed a decline.

GREATEST REVENUE.

The war budget is giving results exceeding the most sanguine expectations of the Minister of Finance. The total revenue for the month of November is $17,072,456, an increase of $7,576,920 over that of November of last year, and the largest of any month in the history of the Dominion.

Between increased revenue and decreased expenditures the financial position this year as compared with the previous year shows a favorable balance of twenty-seven million dollars. The Dominion is thus daily being made stronger to meet the increasing heavy expenditures of the war. The expenditure of Dominion revenue on ordinary and capital account for eight months ending Nov. 30th, is $13,000,000 less than for the same period of the preceding year.

FAVORABLE TRADE BALANCE.

For the six months ending with September of this year Canada's total trade in merchandise was $486,966,000, or $18,440,000 more than it was for the corresponding six months of last year, for the most part under ante-bellum conditions. While imports of merchandise during the past six months show a relative decrease of thirty-eight millions, exports of Canadian produce show an increase of sixty-five millions. For September exports totalled $46,129,000, and increase of $14,333,000 over September of last year. Of this increase four millions is credited to manufactures, three millions to animal produce, and five millions to agricultural produce. As for the balance of trade, it is interesting to note that the total exports for the past six months have been $246,000,000 as compared with total imports of $213,-000,000.

ENORMOUS GAIN.

This year Canada will have a wheat crop of two hundred and fifty million bushels, of which two hundred millions will go for export direct to Great Britain. If you add that to the direct war orders, Canada will have a bigger total of exports in 1915 than she has ever had in her history. Hitherto Canada has always bought more than she sold, imported more than she exported; and as Hetty Green says, because everybody was buying they called it prosperity.

This year Canada will sell from two hundred million to three hundred million dollars' worth more than she buys, and the difference must be settled with her in gold; and when the tide sets that way Canada will be swept clean out of her glooms and dumps, to such a level of prosperity as she has never known.—A. C. Laut—"Saturday Evening Post."

CANADA'S LOAN.

On Nov. 22 a new era in the financial life of Canada was inaugurated. The domestic loan of $50,000,000 is the largest ever issued in the Dominion. From the favorable reception accorded it in the press together with the assurances of large under writings by financial concerns indicate that it will be a complete success. Apropos of this the words of the Hon. Mr. White of Toronto the other day are significant.

"The balance of trade is now in Canada's favor, and the excess of exports over imports can be applied to the liquidation of our interests and our indebtedness to foreign countries. We are now in a position to raise a considerable portion of our war expenditure in the Dominion, and the people will be asked to show that we have money to uphold the cause we know to be just and the ideals for which we stand."

CONFIDENT OF CANADA'S STABILITY.

Sir Edmund Walker, President of the Canadian Bank of Commerce, expresses the opinion that Canada is well able to finance its part in the war for another three years, without imposing unduly heavy increases in taxation.

"We are confident of our financial stability," said Sir Edmund. "We have been borrowing from United States and Great Britain in the past, but this will not be necessary in the future, because of the splendid grain crops present and prospective. Winnipeg advices state that never in the history of Canada's flour trade have times been so good as the present. There is an enormous demand for export at various western points. Both New York and Boston orders have recently poured in for shipments to Italy and France. The Canadian ports are supplying the British trades direct. Country demand is vigorous both for flour and for mill feed, both sides of the line."

OCTOBER'S TRADE ADVANCE.

The latest monthly statement of Canada's trade shows that Canada exported during October nearly eighty million dollars' worth of goods. This is about double the value of goods exported during October, 1914. The huge increase not due to any particular movement of manufactured goods, such as war munitions, but to a notable increase in practically all lines of trade. Exports of agricultural products increased in value from $17,-900,000 for Oct. 1914, to $39,833,000 for the past October. The export of animals and their products increased by $4,000,000; manufactured goods by $5,700,000, minerals by $1,500,000, and so on all along the line. The statement shows that Canadian trade for the past seven months in 1914, total exports were larger than imports by $83,000,000. Canada is experiencing a notable business revival, the trade expansion resting on the record crop of this year, while the business stimulus expected from the trade in war munitions has yet to reach its maximum.

THE NATION'S GRANARY.

Canada's wheat harvest of 336,258,000 bushels from 12,986,000 acres, an average yield of 25.89 bushels, surpasses the most roseate forecasts of the well-informed during the growing stages of the season. This yield is 104,541,000 bushels, or 45 per cent. more than the best previous record, which was made in 1913. Compared with last year's rather disappointing harvest of 161,280,000 bushels, the increase is 174,978,000 or 108 per cent. The substantial nature of this growth in production is shown by the fact that the harvest returns are 72 per cent. greater than the average for the past five years. The same satisfactory and highly important success has been attained in other grain crops. The aggregate yield of oats is 481,035,000 bushels from the 11,365,000 acres under crop. The barley harvest is 50,868,000 bushels from 1,509,350 acres, an average yield of 33.7 bushels per acre. The average yield of rye is 22.07 bushels, the aggregate being 12,604,700 bushels from 1,009,600 acres. Flax seed has become an important crop and the harvest record is 12,504,700 bushels from 1,009,600 acres, or 12.48 bushels per acre.

Construction News

ASYLUMS AND HOSPITALS.

BERLIN.—A by-law will be submitted to ratepayers to grant $5,000 for an addition to hospital

BERLIN AND GALT.—The two towns have purchased a site for the erection of a House of Refuge.

HAMILTON.—The city will erect a hospital for soldiers to cost $15,000.

STRATFORD.—The city will erect an addition to the hospital; cost $7,000.

BRIDGES, WHARVES AND SUBWAYS.

BELLEVILLE.—Hastings County has passed a by-law to erect bridges to cost $20,000.

BUSINESS BUILDINGS AND BANKS.

TORONTO.—Thompson Starrett, 51 Wall street, New York City, have awarded the following contracts on the new Imperial Oil building, Church street: Masonry and fireproofing, Mitchell & Son, 156 St. Helens avenue; steel sash and trim, A. B. Ormsby Co., King street west; structural steel, Dominion Bridge Co.

TORONTO.—The Royal Bank have plans for a bank addition, Danforth avenue and Dawes road. Purdy & Henderson, new Birks building, Montreal, P.Q.; cost $14,000.

TORONTO.—W. H. Mallory, architect, 65 Adelaide St. W., has awarded the following contracts on Ellis Bros.' store, Yonge St.: Mason, Thomson Bros.. 151 Rusholme Rd.; Carpenter, Geo. Sparrow, 110 Church St.; Sheet Metal, Feather & Roadhouse, 528 Front St. W.; Steel, Hepburn & Disher, 18 Van Horne St.; Plumbing, Heating and Ventilation, Bennett & Wright, 72 Queen E.; Plastering, Taylor & Nesbitt, 18 Havelock St.

WINDSOR.—J. C. Pennington, architect, has awarded the Humphries Construction Co. the contract for alterations to Dougall Block.

WINNIPEG, MAN.—The Bank of Hamilton, J. P. Bell, general manager, will erect a large office building.

CLUBS AND SOCIETIES.

BRIDGEBURGH.—Whitehall Club building was destroyed by fire. Dr. H. B. Cobb, Buffalo, N.Y., Pres.

TORONTO.—The East Toronto I.O.O.F. have plans prepared for a new lodge hall to cost $5,000, located on Barrington Ave.

VICTORIA, B.C.—Labor Temple, Limited, contemplate erecting a new hall on Pandora avenue.

ELECTRICAL CONSTRUCTION.

BURGESSVILLE.—A bylaw to erect a hydro electric plant will be voted upon Dec. 16.

SPRINGFIELD, ONT.—The ratepayers will vote December 9 for a hydro electric plant.

STRATHROY.—The town will extend its electric system and water supply.

WEST LORNE.—A by-law will be voted upon to instal a hydro electric plant.

WINDSOR.—The city will spend $50,000 on the extension of its hydro electric system.

GAS PLANTS, ELEVATORS AND WAREHOUSES.

BARNET, B.C.—W. J. Prout has been awarded the general contract for a warehouse. Cost $150,000.

MONTREAL.—Tenders are open for the erection of a warehouse for the Dominion Government.

MONTREAL.—W. B. Shaw, care of Montreal Electric Co., has plans for a warehouse on St. Antoine street; cost $5,000.

PETROLEA.—Stonehouse Bros. have awarded D. McPherson a contract to erect a 100 x 50 addition to their garage.

TORONTO.—Architect McConnell, 176 Yonge street, has plans for a warehouse to cost $20,000 for W. H. Harris, Richmond street west.

TORONTO.—R. H. Abraham, architect, has plans for an addition to the Mounce Storage Co. warehouse, Parliament street.

TORONTO.—Oxley and Hunter, engineers for the new Automobile and Supply warehouse on University Ave., Toronto, have awarded Teagle and Son the mason contract, McGregor and McIntyre the steel work, the Crescent Concrete Co. the reinforced concrete.

TORONTO.—Toronto Hydro Electric Commission propose erecting offices and warehouse to cost $450,000.

TORONTO.—W. H. Harris, Standard Bank building, has plans for an $18,000 warehouse on Richmond street. Mr. McConnell, architect, 176 Yonge street

VANCOUVER, B.C.—Walker Bros., 307 Pender street, Vancouver, B.C., suffered a $12,000 fire loss to their garage.

VICTORIA, B.C.—The Davie Shipbuilding Co., Levis, P.Q., have been awarded the contract for a ferry boat to cost $400,000, from the C.N.R.

MILLS AND FACTORIES.

CHATHAM.—The Dominion Sugar Co. of Wallaceburg, D. M. Gordon, President, have awarded the general contract, for the new million dollar plant at Chatham, to the F. W. Marks Construction Co., Cleveland, Ohio., who will sublet all trades.

GEORGETOWN.—The ratepapers have granted Henry Corks $6,000 to aid in the erection of a woollen mill.

HAILEYBURY.—The Riordan Paper Co. have purchased a site for the erection of a paper mill.

HAMILTON.—Proctor and Gamble are erecting a 50 x 30 two-story addition to their factory.

HAMILTON.—Steel Company of Canada will enlarge their plant.

HAMILTON.—The Dominion Steel Foundry Co. will erect four new buildings.

KINCARDINE.—The Ontario People's Salt Co. contemplate erecting a 15,000 addition.

KINCARDINE.—Wm. Mitchell will erect a knitting mill.

LONDON.—A. E. Nutter, architect, Dominion Bank Building, London, has awarded the general contract to John Puterbough for the erection of a factory for the London Peerless Hosiery Co. Cost $10,000.

PETERBORO.—M. Kylie has plans for a new ice house on Rogers street.

PORT MOODY, B.C.—The Port Moody Steelworks Co. have plans prepared for a new mill.

QUEBEC, P.Q.—The Imperial Oil Co. contemplate erecting a factory for the manufacture of asphalt.

SANDWICH.—The Willys-Overland Motor Co. propose erecting a large plant.

ST. CATHARINES.—Chemical Refinery, Limited, will erect a potash factory.

ST. CATHARINES.—The fire loss of $80,000 to the Maple Leaf Milling Co. will be rebuilt.

ST. MALO, P.Q.—Eastern Canada Steel Co. suffered a $10,000 fire loss.

SYDENHAM.—Robert Cochrane will erect a cheese factory.

TORONTO.—The Canadian Tygard Engine Co., Royal Bank building, are preparing plans for a new factory on Kingston road, cost $30,000.

WINDSOR.—The Curtis Co. have purchased a site for an addition to their factory.

WHITBY.—Whitby Silk Mills Co. will erect a new factory. The ratepayers will vote on a by-law to grant certain concessions.

PUBLIC BUILDINGS.

KINGSTON.—Lusman & Cohen awarded the heating and plumbing to Lemmon & Sons, carpenter work to W. J. Gates, on the building which they are preparing as a soldiers' barracks.

LONDON.—A. M. Piper, city architect, is calling tenders for new Fair building.

LONDON.—The city contemplate erecting a building for live stock purposes.

PETERBORO'.—By-law to be voted upon to erect exhibition buildings; cost $30,000.

PORT COLBORNE.—The congregation of St. James Church, Rev. D. Russell Smith, pastor, have endorsed an expenditure of $15,000 on a new church.

THE PAS, MAN.—The Provincial Government will erect new Court House.

TORONTO.—The city will erect two firehalls, one at Earlscourt to cost $25,000, the other at Wychwood to cost $37,000.

TORONTO.—The city will erect sixteen new buildings to cost $3,000 each, located at the Exhibition grounds.

TORONTO.—The city will erect a waiting room at Sunnyside to cost $8,000.

WELLAND, ONT.—The city will erect two buildings, 100 x 20, for military purposes.

RAILWAY CONSTRUCTION.

EDMONTON, ALTA.—The city will extend their street railway lines. Mr. Harrison is commissioner.

RESIDENCES AND FLATS.

LONDON.—Watt and Blackwell, architects, Bank of Toronto Chambers, have prepared plans for an apartment building on Wellington St., cost $20,000.

MONTREAL.—W. H. Mallory, 65 Adelaide St. E., Toronto, is preparing plans for a modern residence in Westmount.

MONTREAL.—W. H. Taylor, 2310 Gouin boulevard, has plans for residences; cost $4,000.

OSHAWA.—S. M. McLaughlin is having plans prepared for a large modern residence.

WESTPORT.—J. F. McNally, secretary of St. Edward's Church, Westport, is calling tenders for a new presbytery.

WINDSOR.—P. Osterhout will erect three residences to cost $7,000.

VICTORIA, B.C.—H. L. Griffith, architect, has plans for a $9,000 residence for H. F. Bullen.

TORONTO.—The following are erecting brick residences: A. Beck, Nairn street and Morrison avenue, cost $3,000; E. M. Brette, 39 Rainsford road, cost $2,000; H. E. Crowne, 48 Rhodes avenue, one pair residences, on Rhodes avenue, cost $3,200; Devins Bros., 51 Bird avenue, residence, Lauder avenue, cost $8,000; S. Donnelly, 773 Shaw street, residence, Shaw street, cost $2,000; J. Durham, 93 McKay avenue, three residences, McKay avenue, cost $6,000; McMillen & Costain, 166 Main street, residence, Enderby road, cost $2,000; E. H. Fearon, 434 Montrose avenue residence, Montrose avenue, cost $2,000; S. B. Green, 650 Annette street, residence, Hutchinson avenue, cost $3,500; S. B. Hinder, Heath street and Oriole road, store at Bloor and Sherbourne streets, cost $5,500; I. R. Hunter, 50 Chicora avenue, one pair residences, Glencairn and Heather streets, cost $6,500; H. B. Jackson, Bracken avenue, residence, Bracken avenue, cost $7,000; H. Lucas, 118 Felstead avenue, one pair residences, Felstead avenue, cost $7,000; Jas. Mackenzie, 1425 Queen street east, two residences, Indian road, cost $7,000; Wm. Morley, 114 Greenwood avenue, builder J. Claxton, 250 Shaw street, one pair residences, cost $7,000; D. McKinley, 1199 Dovercourt road, residence, Dovercourt road, cost $3,000; McMillan & Costain, 166 Main street, one pair residences, Enderby road, residence, Neville Park road, cost $2,500; Muir & Lumb, 30 Hazelwood avenue, residence, Fifth avenue, cost $5,000; Mrs. Martin, 120 Kenilworth avenue, residence, Kenilworth avenue, cost $2,500; Muirhead & Medland, 130 King street east, stores and apartments, St. Clair avenue, cost $15,000; Purton & Chennells, 634 Christie street, residence, Frederica street, cost $6,000; J. Peacock, 1066 Queen street west, two pair residences, cost $7,500; J. Peppiatt, 12 Well's Hill avenue, residence, Keewatin avenue, cost $4,000; Wm. Rive, 89 Galt avenue, residence, Galt avenue, cost $2,500; C. B. Routcliffe, 417 Erie terrace, residence, Drayton avenue, cost $2,000; Mrs. F. Spragge, 17 Willcock street, residence, George street, cost $3,000; P. L. Spiers, 20 Biggar avenue, residence, Lauder avenue, cost $2,500; Miss Strachan, care of 199 Yonge street, builders Ham Bros., 83 Salem avenue, residence, Indian road, cost $5,000; C. F. Skipper, 17 Strathmore boulevard, residence, Neville Park boulevard, cost $2,500; W. Williams, 33 Cloverdale avenue, residence, Dufferin street, cost $3,500; S. F. Wilson, 5 Dale avenue, residence addition, Dale avenue, cost $2,500; H. C. Long, 605 Traders Bank building, two residences, Keewatin avenue, cost $10,000; T. W. Robinson, 11 Evelyn crescent, residence, Glendowyne avenue, cost $2,500; N. Hicks, 612 Delaware avenue, two pair residences, Oakwood avenue, cost $11,000; H. A. Johnston, 63 Normandy boulevard, residence, cost $3,000; Cox & Cummings, 36 Canada Life building, residence, Pine crescent, cost $5,000; H. Lucas, 118 Felstead avenue, two pair residences, Bathgate avenue, cost $8,000; W. Nye, 1471 King street west, residence, Bartlett avenue, cost $2,200; R. T. Robinson, 1310 Lansdowne avenue, stores and residence, St. Clair avenue, cost $4,500; W. J. McWaters, 28 Kingswood road, residence, Neville Park boulevard, cost $3,500; W. Humphrey, 83 Wellesley street, one pair residences, Kent road, cost $4,000; A. Larkin, 6 Ravensden avenue, one pair residences, Mackay avenue, cost $5,000; W. Williams, 33 Cloverdale avenue, brick residence, Dufferin street, cost $5,000.

SCHOOLS AND COLLEGES.

BEAMSVILLE.—A by-law to erect a high school has been passed. W. D. Fairbrother, clerk. Cost, $20,000.

BELMONT.—A new addition to the school will be erected to cost $6,000.

FARNHAM, P.Q.—Chairman G. L. Elmos, of the Protestant School Board is calling tenders for a new school.

GALT.—The city contemplate erecting a new school; cost $50,000.

HAMILTON.—The city contemplate erecting a school at the Beach.

INGERSOLL.—The by-law to erect a $70,000 school has been passed.

LAMBTON MILLS.—S. B. Coon and Sons, Ryrie Bldg., awarded the general contract on the Lambton School to S. Barrett, cost $20,000.

LONG BRANCH.—J. Doughty, Lake Shore Road, has received the heating contract, D. W. Hall, 244 High Park Ave., roofing, and R. C. Johnston, 17 Galley Ave., glazing on the new school, from Smith & Wright, architects.

MOTHERVILLE.—W. W. Rogers, Secretary of the School Board, is calling for tenders for a new school.

MOUNT DENNIS.—Work has started on a new school to cost $22,000.

OTTAWA.—$180,000 will be spent for additions and improvements to the high school.

POINT DU BOIS, MAN.—The town will erect a new school to accommodate fifty pupils.

TORONTO.—Sproat & Rolph are preparing plans for the new St. Andrew's College in North Toronto.

TORONTO.—The following have contracts on the new training school for the Salvation Army on Davisville Ave.: Mason, Ham Bros., 83 Salem Ave.; Heating, Sheppard & Abbott, 78 Harbord St.; Concrete, the Crescent Concrete Co., Temple Bldg.; Steel, McGregor and McIntyre, 1139 Shaw St.

WINDSOR.—A by-law has been passed for the addition to the Sandwich East School; clerk, Wm. St. Doris.

WINDSOR.—The Separate School ratepayers have passed a bylaw to erect a new $60,000 school.

THEATRES AND RINKS.

TORONTO.—Darling and Pearson, architects, are preparing plans for the new Trinity College Building, Hoskin Ave., and ladies' residence on St. George St.

TORONTO.—H. C. Crane, architect, Detroit, is preparing plans for the re-erection of the Princess Theatre, King St., work to start in spring.

WATERWORKS, SEWERS AND CANALS.

BROCKVILLE.—Roberts Co., Darby place, have been awarded the contract for a new filtration plant; cost $85,000.

CHATHAM.—By-laws have been passed to construct sewers and reinforced concrete pavements.

EDMONTON, ALTA.—The city contemplates a $75,000 sewage disposal plant.

GUELPH.—The city will construct sewers to cost $6,000.

LONDON.—Blight & Fielder have been awarded sewer contracts.

MARKHAM.—The town contemplate constructing sewers; cost $5,000.

MONTREAL.—Plans are being prepared for sewer work to cost $1,000,000.

OTTAWA.—The city will pave Rideau street with wood block and asphalt.

SARNIA.—A by-law will be voted upon Jan. 1 to spend $12,000 on water mains.

SARNIA.—Tenders are open for pipe sewer work. John A. Beard, Engineer.

SMITH'S FALLS.—The town will extend its sewers and water mains.

TORONTO.—The city of Toronto have let the following sewer work: McCormick street, Toms Contracting Co., $743; Perth street, Toms Contracting Co., $744; Shipman avenue, Connolly-Agnew, $327; Gunn's road, Mayes Contracting Co., $948; Heintzman avenue, Mayes Contracting Co., $388; W. Taylor received Dodds avenue, $2,887; Boler street, $347; Symes road, $1,887; Keele street, Grant Contracting Co., $635; Mulock avenue, Grant Contracting Co., $640; Gunn's road south, Long & Gentile, $1,340. The West Toronto outlet, division No. 2, via St. Clair avenue, went to Jennings & Ross for $22,000; the city's tender was $38,750.

PERSONALS.

Eden Smith & Son, 199 Yonge St., Toronto, will move to 23 Scott St. immediately.

Mr. Madill, of Craig and Madill, is lecturing on architecture at the University of Toronto.

B. R. Coon, B. Sc., of S. B. Coon & Son, Toronto, is improving after his recent serious illness.

Since the death of Mr. Storey, of Storey & Van Egmond, Calgary, Mr. Van Egmond has decided to retain the old name of the firm.

Clinton & Russell, of New York City, architects for the new Imperial Oil building, Church St., Toronto, have appointed Mr. Havill, associate architect, with offices in the Dominion Bank Building, Toronto.

Mr. George Goodwin, formerly one of the largest contractors in Canada, died at his home in Ottawa, Sunday, Nov. 28. Mr. Goodwin constructed many railways, canals and public buildings in Canada, his last achievement being the construction of the Victoria Memorial Museum, Ottawa.

Kivas Keeldar Tully, a pioneer architect of Saint Louis, and for the last thirty-five years employed by the U.S. Government, died in that city on October 17 at the age of sixty-two years. Mr. Tully was born in Toronto, a nephew of the late Kivas Tully, Ontario Provincial Architect, where he received the rudiments of an engineering training in the Government Model School. His work in St. Louis is represented by several churches, and the reredos and spire of the Cathedral. Mr. Tully was a member of the Mississippi River Commission, a Fellow of the American Institute of Architects (1890) and a corresponding member of the Society Central of Architecture of Belgium.

UNIQUE BRONZE WORK.

The bronze cover of the baptismal font, illustrated in the description of Congress Hall, is a unique and notable piece of workmanship. On account of all surfaces being of smooth finish and all lines being straight, greater mechanical efficiency was necessary than for more ornate work. This cover works on a ball-bearing pivot, and the least effort of the priest will uncover the font, making it very convenient. It was manufactured by John Watson & Son, Limited, Montreal.

MAJOR E. G. M. CAPE, HONORED.

The Montreal Builders' Exchange joined with a representative gathering of soldiers in tendering a complimentary dinner to Major E. G. M. Cape, the commanding officer of the 3rd Overseas Battery, Siege Artillery. Major Cape has been an outstanding figure in contracting circles in Montreal during the past ten years. Advantage was taken of the occasion to present Major Cape with a regulation service pistol.

A notable feature in connection with the dinner was the fact that of the one hundred and fifty members of the Builders' Exchange present, the majority had sons or relatives on active service. Mr. John Quinlan, president of the Builders' Exchange, took the chair, and with him at the head table were Major Cape, Lt.-Col. John Costigan, Thos. Gilday, Lieut. Linton, Alex. Bremner, Wm. Rutherford and Capt. A. Charlebois.

IMPERIAL MUNITIONS BOARD.

The direct result of the visit of Mr. D. A. Thomas to this country has been the creation of an Imperial Munition Board superseding the Dominion Shell Committee. The reconstructed board has at its head J. W. Flavelle, of Toronto, who will act as chairman, with executive and administrative powers. General Alex Bertram, former head of the committee, will in future hold the position of deputy chairman, with the following others comprising the board: Hon. Col. David Carnegie, (member of former committee), G. H. Dawson, C. B. Gordon, J. A. Vaillancourt and E. R. Wood, the latter four being new members.

In addition to the forming of the above new board, a Commission has been established to make inquiry into the supply and sufficiency of raw materials in Canada required for the production of munitions of war, and as to the best methods of conserving the same. The following are the members of this new Commission: Col. Thomas Cantley, head of the Nova Scotia Steel Co. of New Glasgow; E. Carnegie, of Welland; Geo. H. Watts, of Toronto; Robert Hobson, of Hamilton; Senator William C. Edwards of Ottawa and Geo. G. Mackenzie, B.Sc., Superintendent of Mines, Ottawa.

VANCOUVER BRANCH CIVIL ENGINEERS.

The first general meeting of the Provincial Division of the Canadian Society of Civil Engineers is being held in Vancouver on December 10th and 11th. The schedule of papers to be read and discussed during the coming season is as follows:

Dec. 16—The Vancouver Grain Elevator, C. D. Howe, Engr. Dom. Govt. Grain Commissioners; 1916, Jan 6—The Bridges of the C.N.R. Ry., J. L. Harrington, M. Can Soc, C.E.; Jan. 20—Some Remarks on Railway Location Problems in British Columbia, C. E. Cartwright, M. Can. Soc. C.E.; Feb. 3—The North Arm Jetties of the Fraser River, C. C. Worsfold, M. Can Soc. C.E.; Feb. 17—The City of Kamloops Power Plant and Pumping Systems, H. K. Dutcher, M. Can Soc. C.E.; Mar. 2—The Prince Rupert Docks of the G. T. P., J. H. Pilsbury; Mar. 16—Electric Dredging and Hydraulic Sluicing, F. D. Nims, M. Am. I.E.E., Mar. 30—Pneumatic Foundations, E. G. Mathieson, M. Can. Soc. C.E.; Apr. 13—Water Powers of British Columbia, G. R. G. Conway, M. Can. Soc. C.E.; May 4—Election of Officers.

A paper is also promised by Professor R. W. Brock on "Geology as applied to Engineering," and it is hoped that arrangements can be made for a paper on the Rogers Pass Tunnel.

ANNUAL MEETING, SASKATCHEWAN ASSOCIATION OF ARCHITECTS.

The annual meeting of the Saskatchewan Association of Architects was held on Wednesday, October 27th, in the offices of the President, Regina, Sask. Members were present from the different parts of the Province, including Saskatoon, Moose Jaw and Prince Albert, besides the local members.

Mr. A. G. Creighton and Mr. R. M. Thompson were re-elected to the council for three years and the election of officers resulted as follows:

President, Mr. W. G. Van Egmond, Regina; Vice-Presidents, Mr. A. G. Creighton, Prince Albert, Mr. R. M. Thompson, Saskatoon; Secretary-Treasurer, Mr. F. W. Knight, Regina; Prof. A. R. Greig, Saskatoon; R. G. Bunyard, Moose Jaw; H. Cooper, Saskatoon.

The Examining Board were elected as follows: Chairman, Prof. A. R. Greig, Saskatoon; Secretary, R. M. Thompson, Saskatoon; W. G. Van Egmond, Regina; H. Cooper, Saskatoon; A. G. Creighton, Prince Albert.

In the President's address particular attention was drawn to the amendment passed at the last session of the legislature amending the charter of incorporation whereby it is now illegal in the Province of Saskatchewan to provide plans for buildings except by a registered architect unless as owner or as contractor for another person. The president pointed out that this is the most advanced legislation relating to the practice of architecture in Canada and should prove of great benefit to the profession and to the public generally.

In the secretary's report reference was made to the following: An architectural library has been established in connection with the Association, about $600 worth of books having been bought and are now in the library of the University at Saskatoon and are for the use of all members. The books will be sent by mail to any member forwarding the postage. This will form the nucleus of a large library and will be at the disposal of the students at the university taking up an architectural course. It is proposed to establish a chair of architecture at the University when the time is opportune.

Eighteen members of the association have joined His Majesty's forces, including the secretary, Mr. F. C. Clemesha and Mr. D. Webster, also a member of the council. One member, Mr. Allan Richardson, was killed in action at the battle of Festubert. It was decided to keep all members who have enlisted in good standing for the duration of the war.

In accordance with a motion made at the last annual meeting the council took legal advice as to the right of an architect to put a lien upon a building. No hesitation was given in advising that a duly qualified architect has the right in this Province to file a lien against a building for the full amount of his fees.

The following were appointed delegates to the R.A.I.C. for the year 1915-16: Mr. W. G. Van Egmond, Mr. R. G. Bunyard, Mr. F. C. Clemesha, and Mr. D. Webster.

The sum of fifty dollars was voted to the Patriotic Fund.

The next annual meeting will be held in Regina.

BOOKLETS, CATALOGUES, ETC.

THE INTERIOR BEAUTIFUL.—A folder has just been issued by the Sarnia Metal Products Company, Limited, Sarnia, Canada, illustrating in an artistic manner a number of two-color interior views suggesting the solution of the problem of interior decorations in the home. Views are shown of a typical bed-room, dining-room and reception hall, showing how well adapted the metal products are to interior finishing.

GLOBE METAL SHINGLES.—This is the title of a twelve page booklet just issued by the Globe Iron Roofing & Corrugating Company of Cincinnati, Ohio, illustrating the various types of shingles manufactured by this firm. It also contains instructions for applying them.

CONDULET SUGGESTIONS.—A well-printed catalogue containing thirty-two suggestions, each one illustrating an actual installation, has been received from the Crouse-Hinds Company of Canada, Limited, Toronto. It contains timely information to all having to do with electrical installations of any kind.

BRICK CATALOGUE.—The Hydraulic Press Brick Company, St. Louis, Mo., with offices in principal cities of this country, has just published a new catalogue, descriptive of Hy-tex brick. In this catalogue are shown, by means of colored plates, not only individual bricks of the various lines of manufacture, but also colored reproductions of sections of walls laid up with the more popular varieties of Hy-tex brick. The text portion of the catalogue describes the various products in detail, discusses the architectural merits of brick, gives reasons for the adoption of Hy-tex products, and much data that is of interest and value to the architect in determining the materials that best meet his requirements.

INCINERATORS.—The Borge Incinerator Corporation, Flat Iron Building, New York, has recently published a looseleaf catalogue, describing standard and special incinerators for municipalities, institutions, banks, hotels, restaurants, factories, department stores, clubs and private residences.

FIREPROOF HOUSES.—A booklet presenting the principles and methods of fire-proof construction for dwellings, together with a detailed description of a fire-proof house and a fire-proof bungalow, has recently been published by the General Fireproofing Company, Youngstown, Ohio.

STEAM TRAPS.—The Automatic Steam Trap & Specialty Company, Detroit, Mich., has issued Catalogue No. 8, describing the Barton Expansion Automatic Steam Trap. The principal of the Barton trap is an expression of one of the simplest and most dependable laws of mechanics. In accordance with it the condensed water in the trap causes a lowered temperature which instantly contracts the inner sleeve and automatically and positively opens the trap for water to escape. The temperature again raised by the steam automatically closes valve by expanding sleeve and prevents any escape of steam.

TECHNICAL SOCIETIES.

UNION OF CANADIAN MUNICIPALITIES.—President, T. L. Church, Mayor of Toronto, Ont.; Hon. Secretary-Treasurer, W. D. Lighthall, K.C. Ex-Mayor of Westmount; Asst. Secretary, G. S. Wilson, 402 Coristine Bldg., Montreal.

ALBERTA ASSOCIATION OF ARCHITECTS.—President, Jas. A. Henderson, F.R.I., B.A., Edmonton; Hon. Secretary, W. D. Cromarty, Edmonton.

MANITOBA ASSOCIATION OF ARCHITECTS.—President, H. E. Matthews, Winnipeg; Secretary, R. G. Hanford.

ROYAL ARCHITECTURAL INSTITUTE OF CANADA.—President, H. C. Russell, Winnipeg, Man.; Hon. Secretary, Alcide Chausse, No. 5, Beaver Hall Square, Montreal Que.

ONTARIO ASSOCIATION OF ARCHITECTS.—President, C. P. Meredith, Ottawa; Secretary, H. E. Moore, 195 Bloor St. E., Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS. Secretary, J. Emile Vanier, No. 5, Beaver Hall Square, Montreal.

ARCHITECTURAL INSTITUTE OF BRITISH COLUMBIA. —President, Hoult Horton; Secretary, Fred L. Townley, 325 Homer St., Vancouver, B.C.

TECHNICAL SOCIETY OF PETERBORO.—Bank of Commerce Building, Peterboro. President, N. C. Mills, P.O. Box 995, Peterboro, Ont.

SOCIETY OF CHEMICAL INDUSTRY.—Wallace P. Cohoe, Chairman; Alfred Burton, Toronto, Secretary.

CANADIAN CEMENT AND CONCRETE ASSOCIATION.—President, Peter Gillespie, Toronto, Ont.; Secretary-Treasurer, Wm. Snaith, The Thor Iron Works, Toronto, Ont.

CANADIAN CLAY PRODUCTS' MANUFACTURERS' ASSOCIATION.—President, Chas. A. Millar; Secretary-Treasurer, J. R. Walsh, Toronto.

CANADIAN ELECTRICAL ASSOCIATION.—President, Col. D. R. Street, Ottawa, Secretary, Alan Sullivan, Confederation Life Building, Toronto.

CANADIAN FORESTRY ASSOCIATION.—President, William Power, M.P., Secretary, James Lawler, Journal Building, Ottawa.

CANADIAN GAS ASSOCIATION.—President, Arthur Hewitt, General Manager Consumers' Gas Company, Toronto; John Kellilor, Secretary-Treasurer, Hamilton, Ont.

CANADIAN INDEPENDENT TELEPHONE ASSOCIATION. —President, W. Doan, M.D., Harrietsville, Ont.; Secretary-Treasurer, Francis Dagger, 21 Richmond street West, Toronto.

CANADIAN INSTITUTE.—198 College Street, Toronto. President, J. B. Tyrrell; Secretary, Mr. J. Patterson.

CANADIAN NATIONAL ASSOCIATION OF BUILDERS' EXCHANGES.—Western Section—President, C. R. Frost, 609 Second St., Edmonton, Alta.; Secretary-Treasurer, A. M. Frith, 224 McDougall Ave., Winnipeg. Eastern Section—President, Geo. Gander, Toronto; Secretary-Treasurer, P. L. Fraser, Builders' Exchange, Toronto.

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