VOL. 8 No. 11.

NOVEMBER, 1915

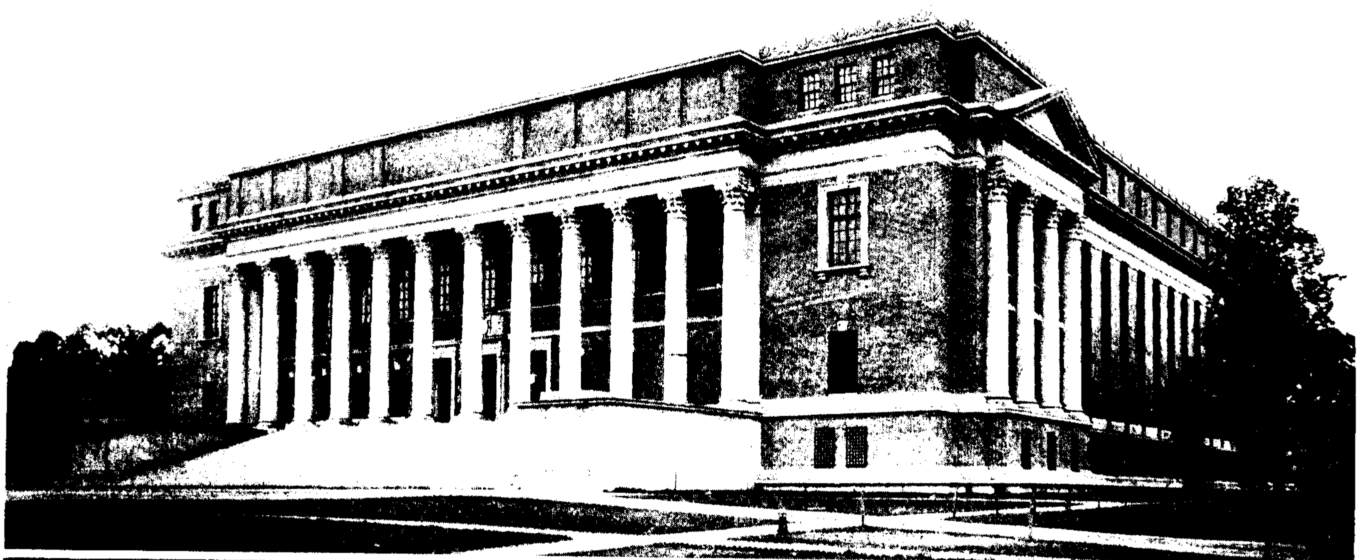
$3.00 per Year
35c per Copy

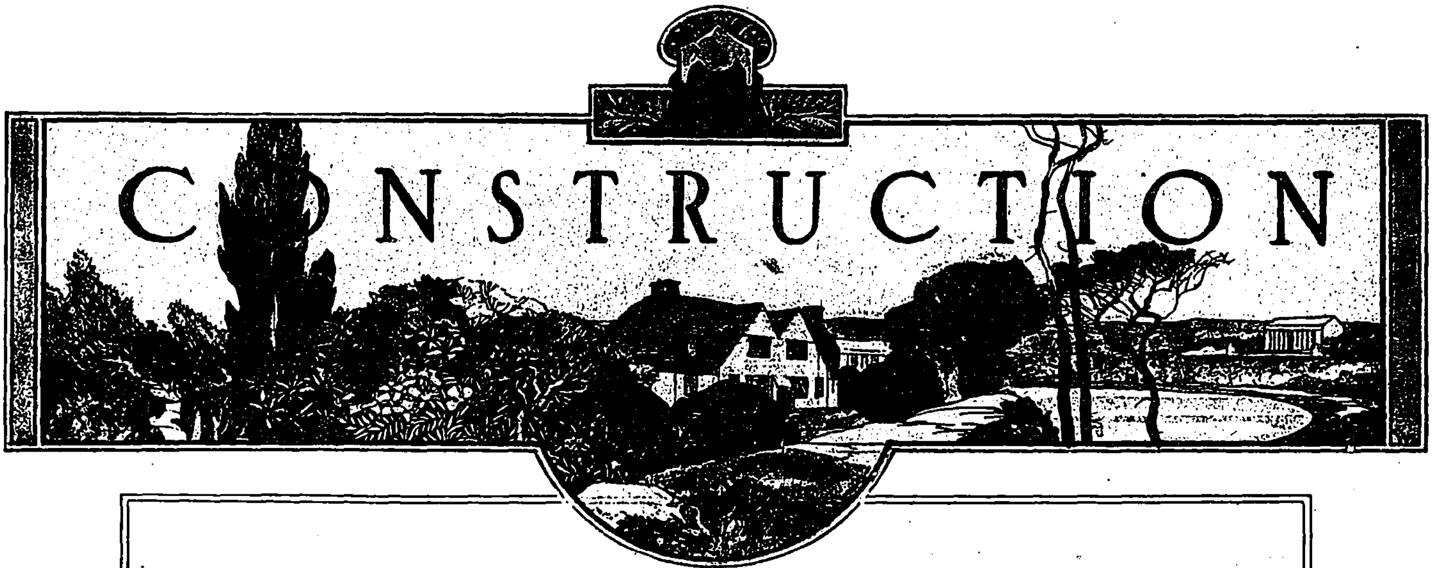
CONSTRUCTION

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

KNOX COLLEGE
TORONTO

OFFICE OF PUBLICATION
TORONTO
BRANCH OFFICES
MONTREAL -- WINNIPEG
NEW YORK





November, 1915 Vol. 8, No. 11

CONTENTS

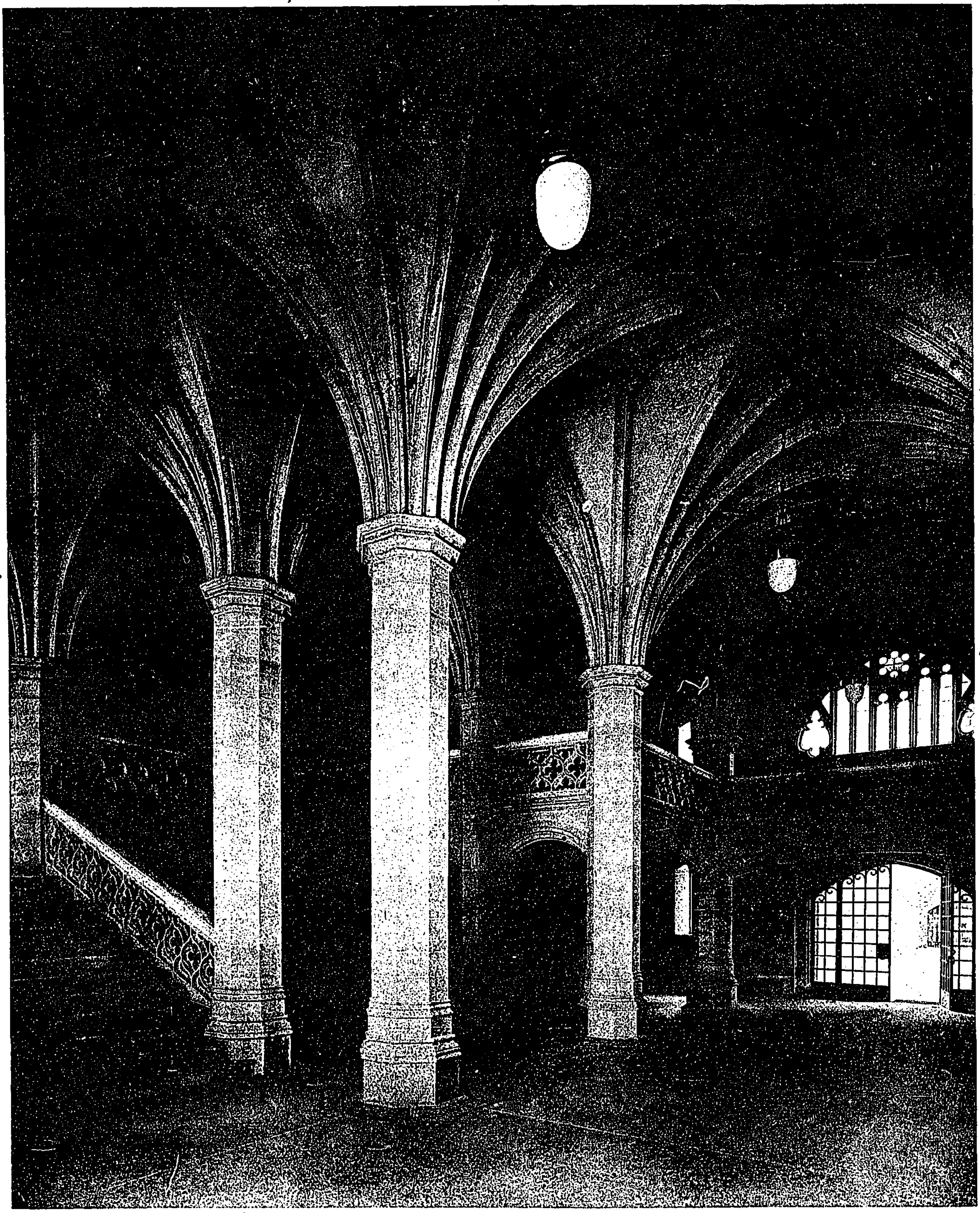
Full Page Illustrations

H. GAGNIER, Limited, Publishers

GRAPHIC ARTS BLDG., TORONTO, CANADA

BRANCH OFFICES

MONTREAL NEW YORK



DETAIL OF VAULTING.

KNOX COLLEGE, TORONTO.

CHAPMAN & M'GIFFIN, ARCHITECTS.

Knox College, Toronto

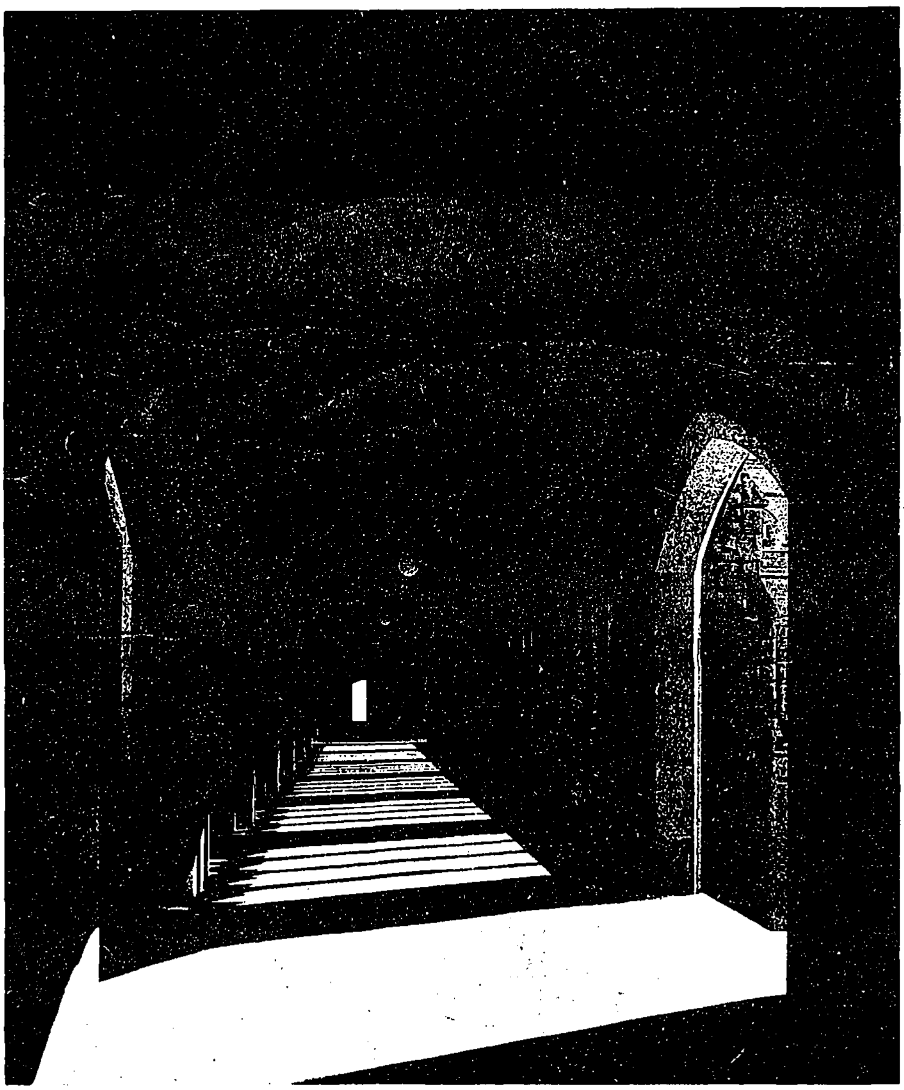
THE formal opening of the new Knox College brings prominently to the foreground two notable phases of development, one the substantial growth of the institution which it represents, and the other of still greater general importance, the realization to a most successful degree of the higher forms of building 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.

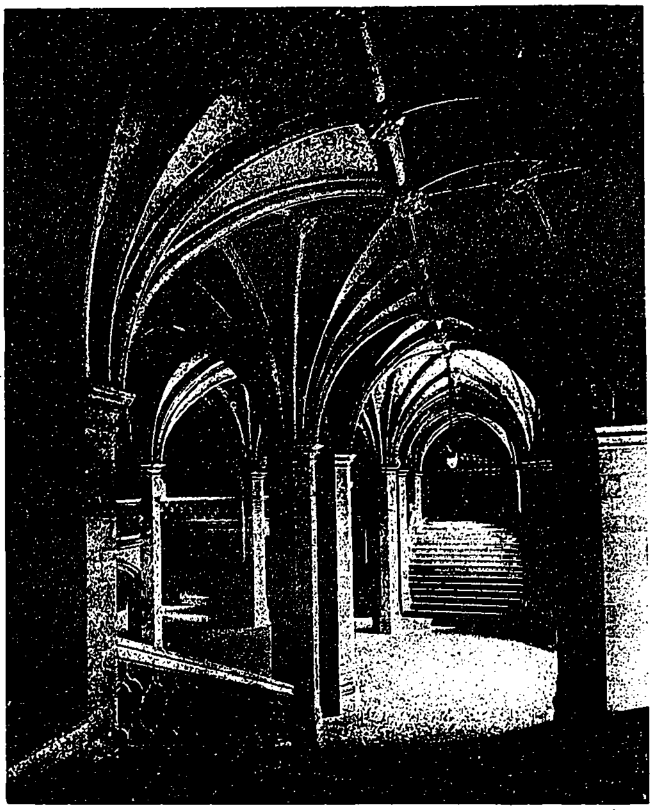
In the students' residences or dormitories are accommodations for slightly over one hundred students, the latter for purposes of control are separated into three distinct houses. Each house is four storeys high, has a reception room on the ground floor and bathing and lavatory accommodation on every 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.

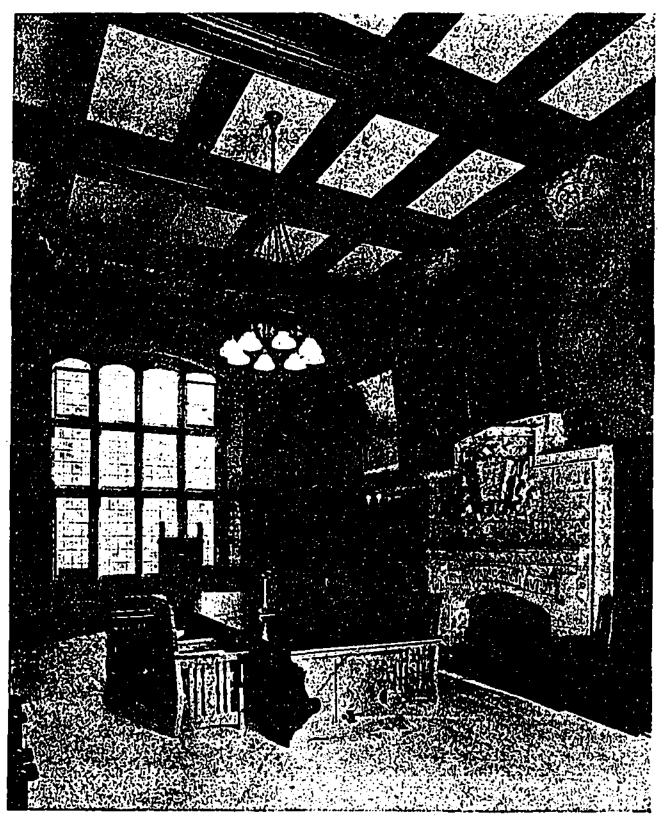
hundred and thirty-four feet in depth, and it has a slight slope to the south. The building faces St. George street on the west and the University lawn on the east, and the academic portion of the building was kept on the University side, while the residential portion adjoined the street. These two wings 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

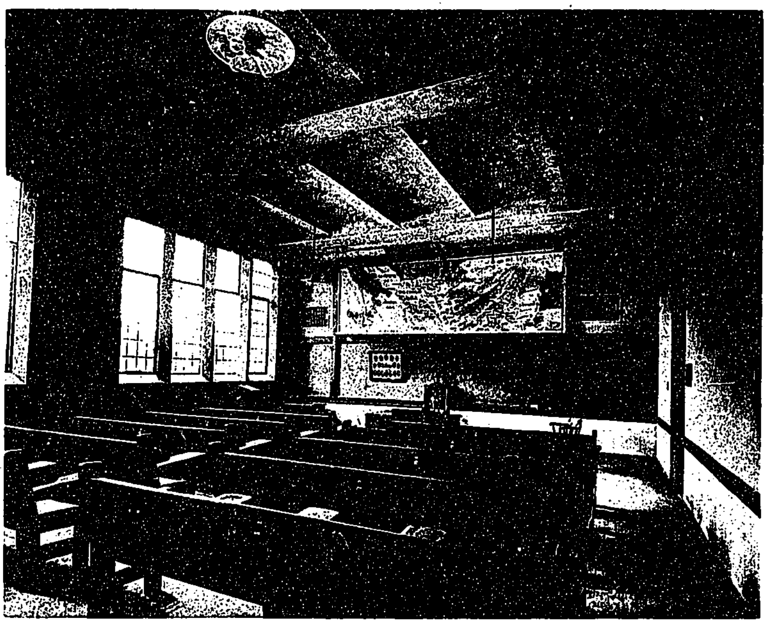
LIBRARY, KNOX COLLEGE.

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.

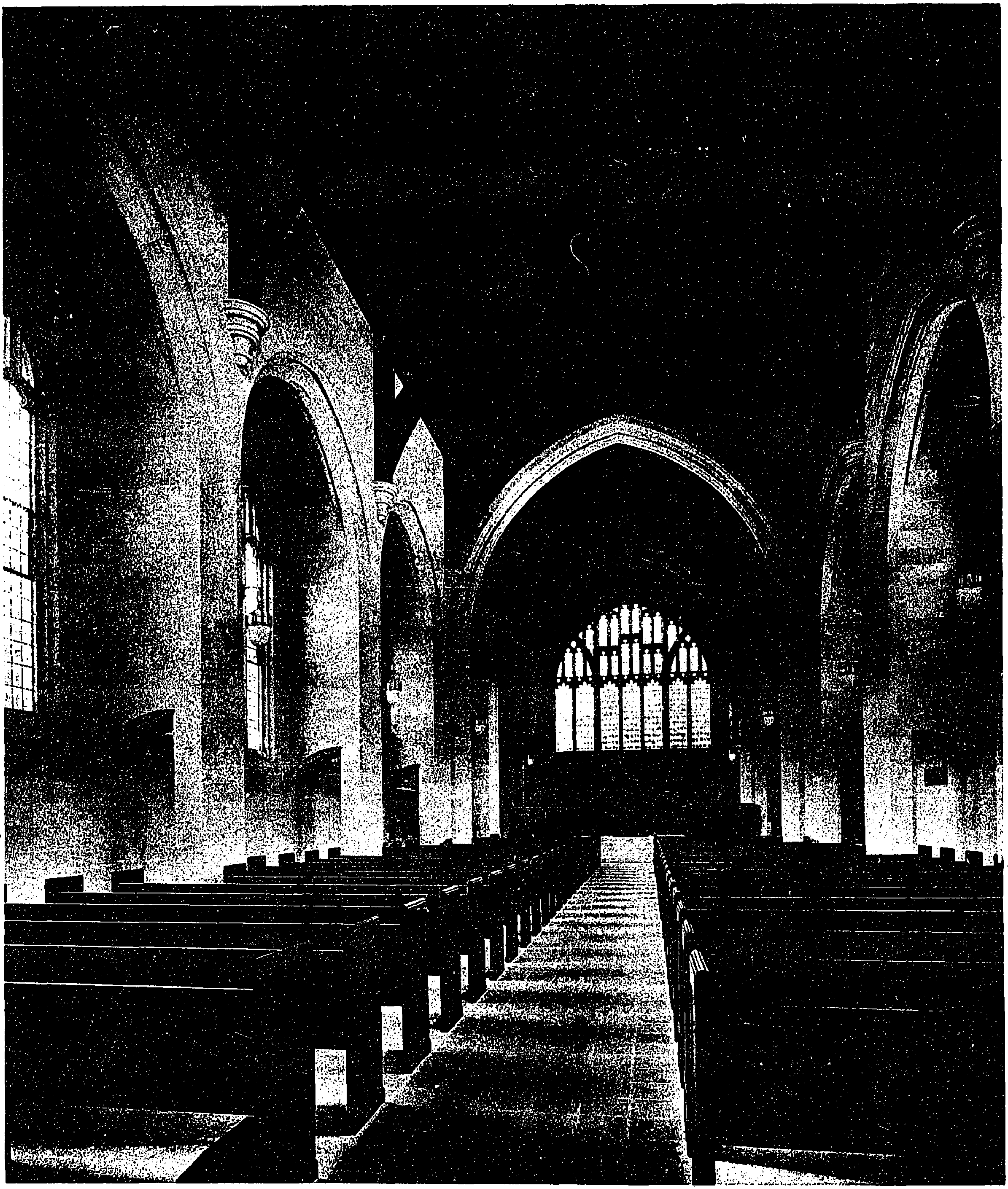
RECEPTION ROOM, KNOX COLLEGE.

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.

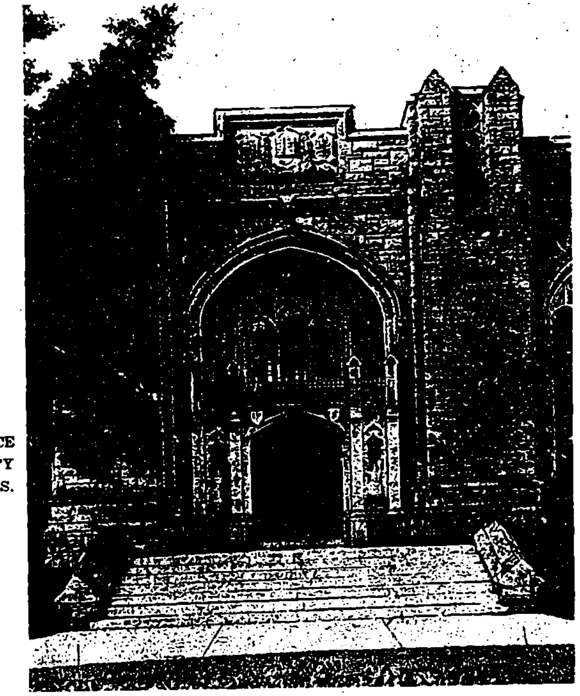
KNOX COLLEGE, TORONTO.

CHAPMAN & M'GIFFIN, ARCHITECTS.

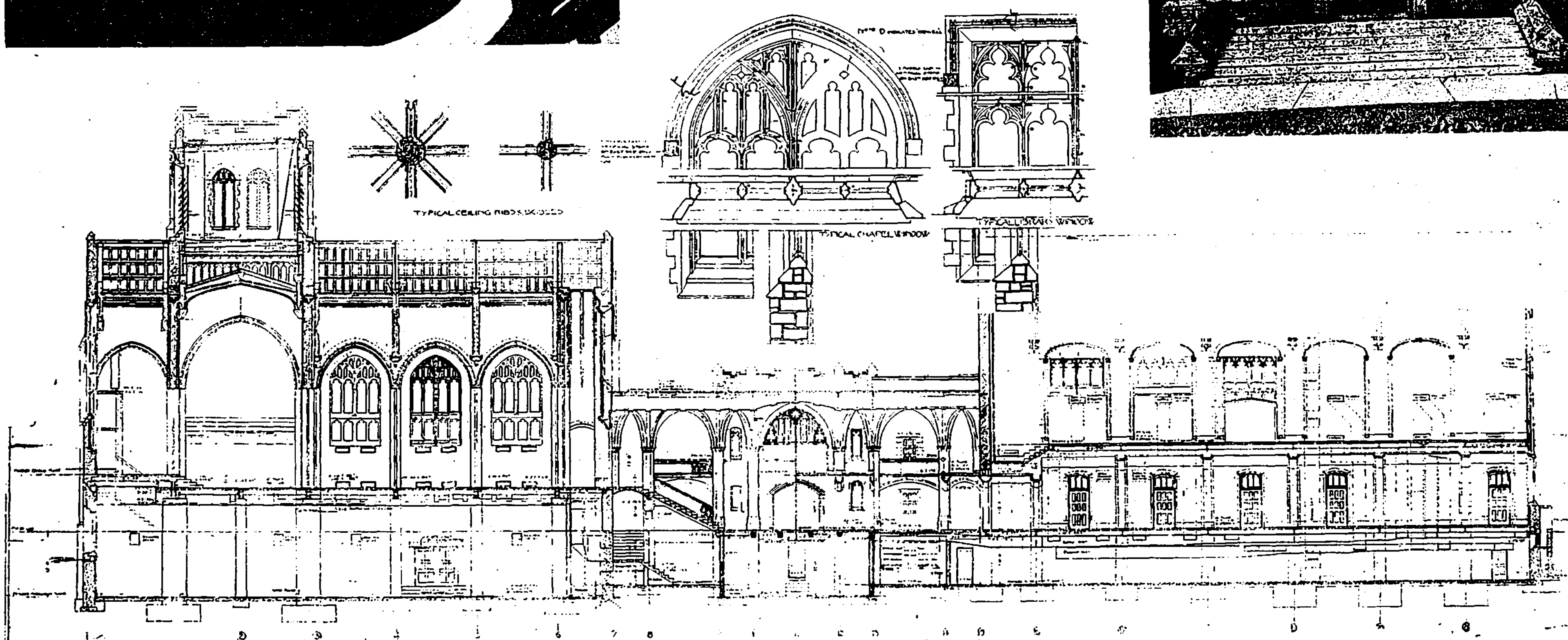
KNOX COLLEGE, TORONTO.

CHAPMAN & M'GIFFIN, ARCHITECTS.

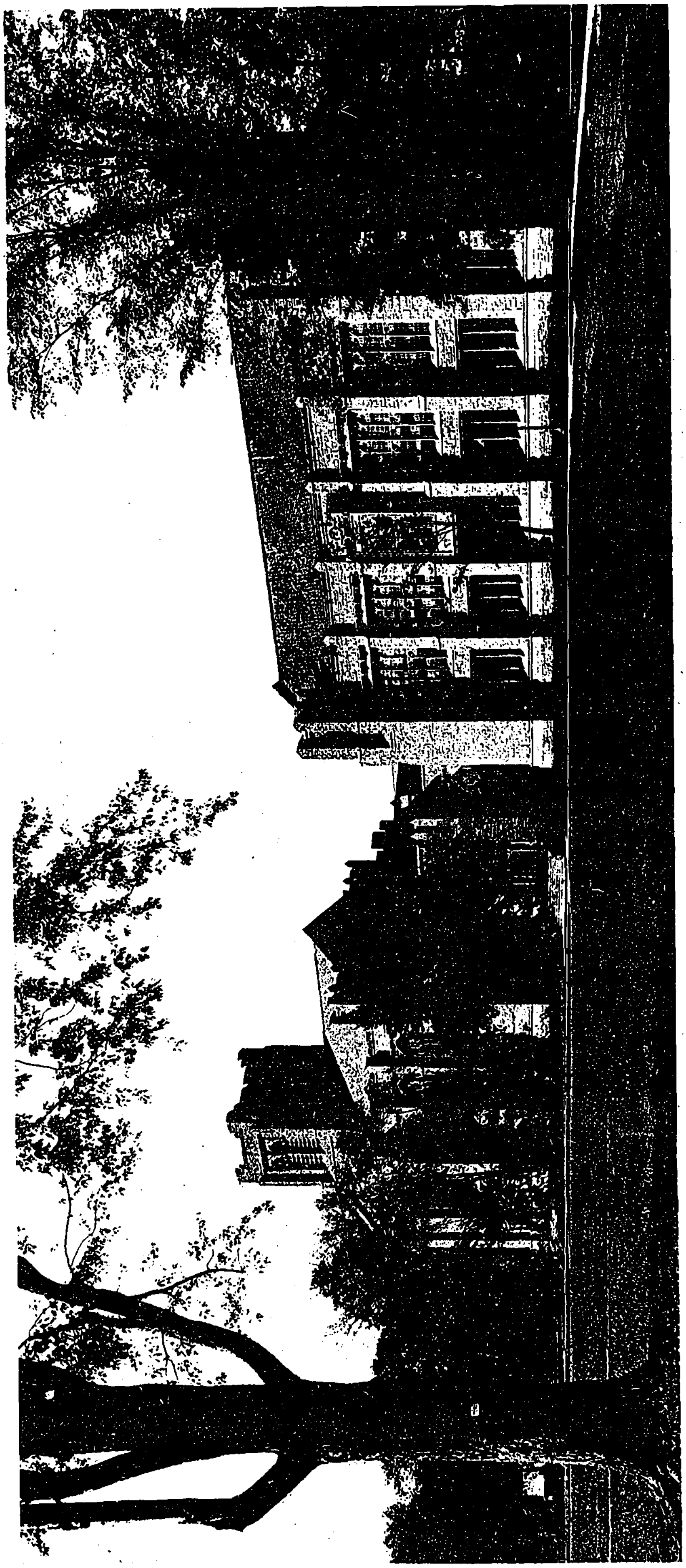
CONNECTING CLOISTER.



ENTRANCE FROM UNIVERSITY GROUNDS.



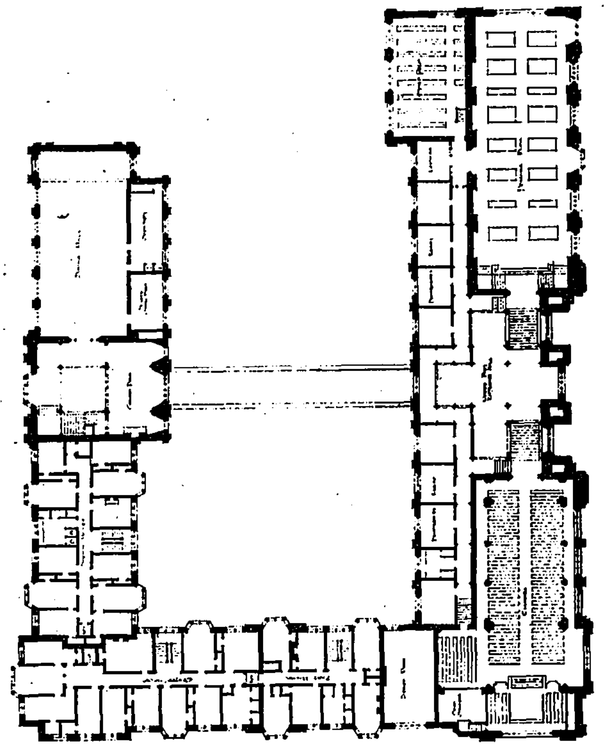
LONGITUDINAL SECTION LOOKING WEST, ACADEMIC PORTION.



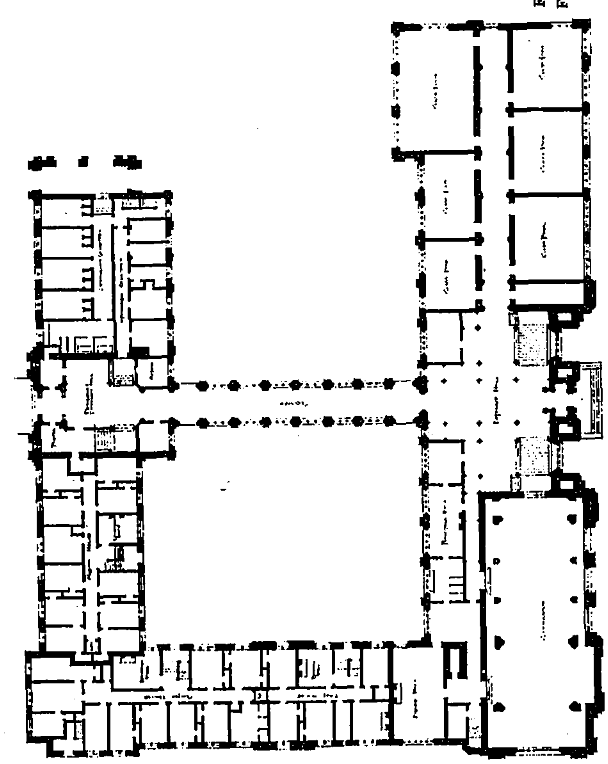
VIEW FROM UNIVERSITY GROUNDS.

KNOX COLLEGE, TORONTO.

CHAPMAN & M'GIFFIN, ARCHITECTS.



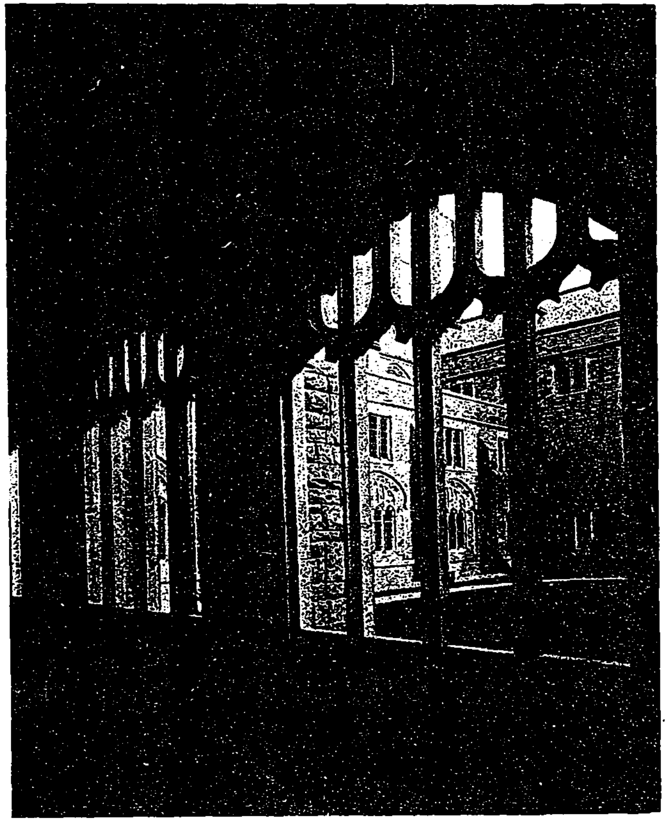
SECOND FLOOR.



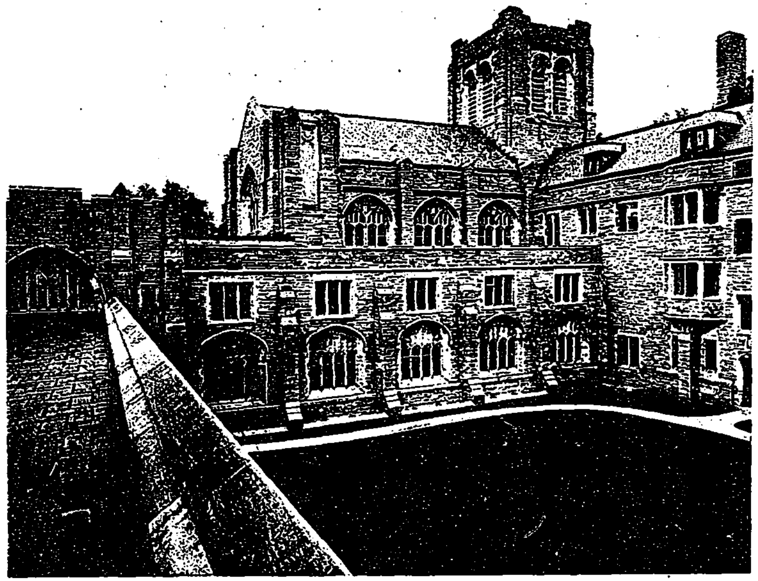
FIRST FLOOR.

KNOX COLLEGE, TORONTO.

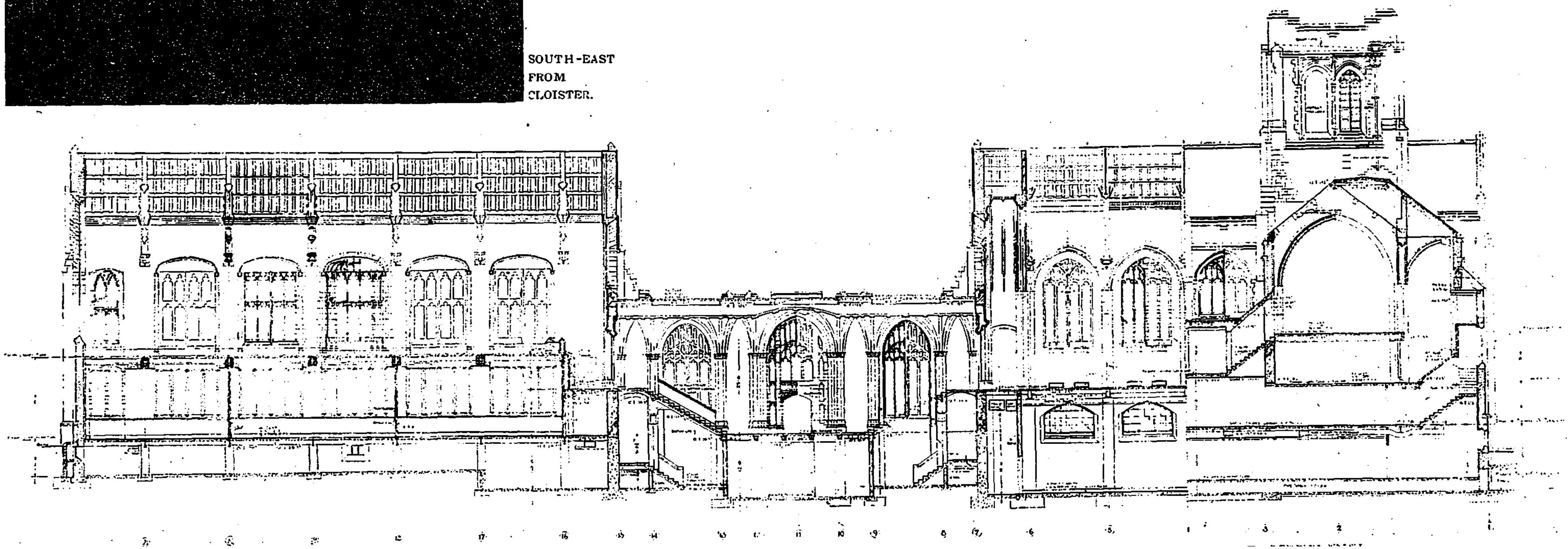
CHAPMAN & M'GIFFIN, ARCHITECTS.

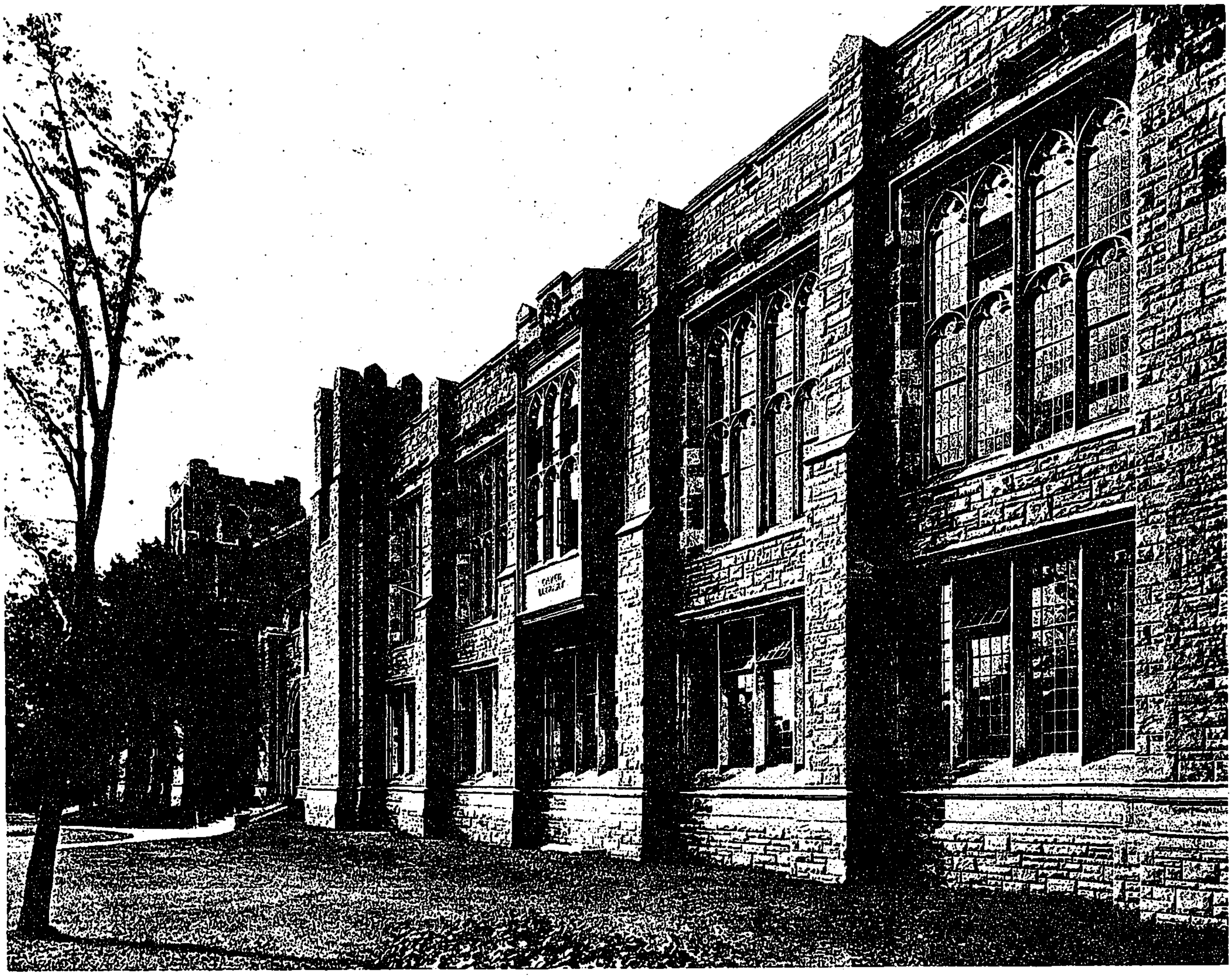


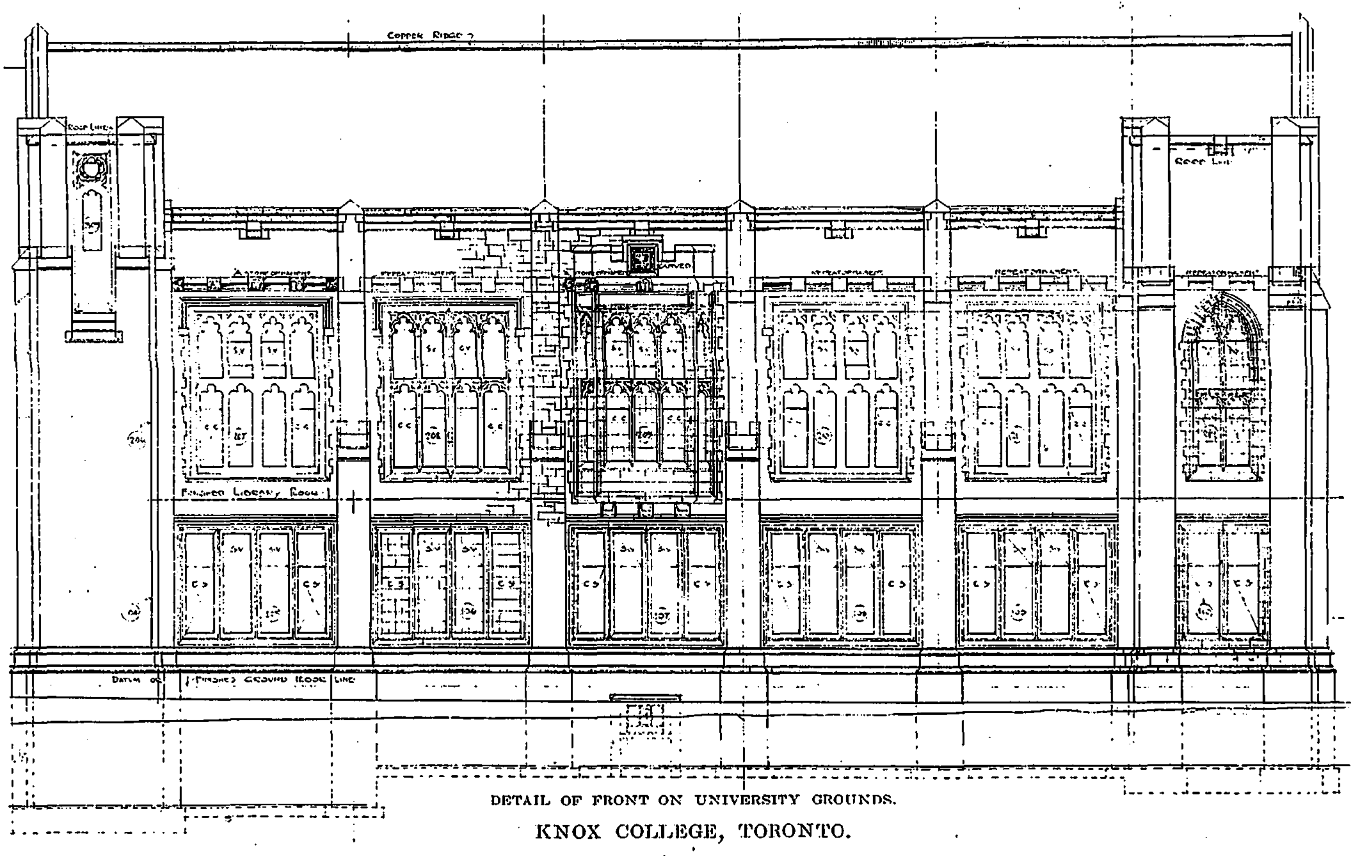
SOUTH-EAST FROM CLOISTER.



INNER COURT TOWARDS CHAPEL.



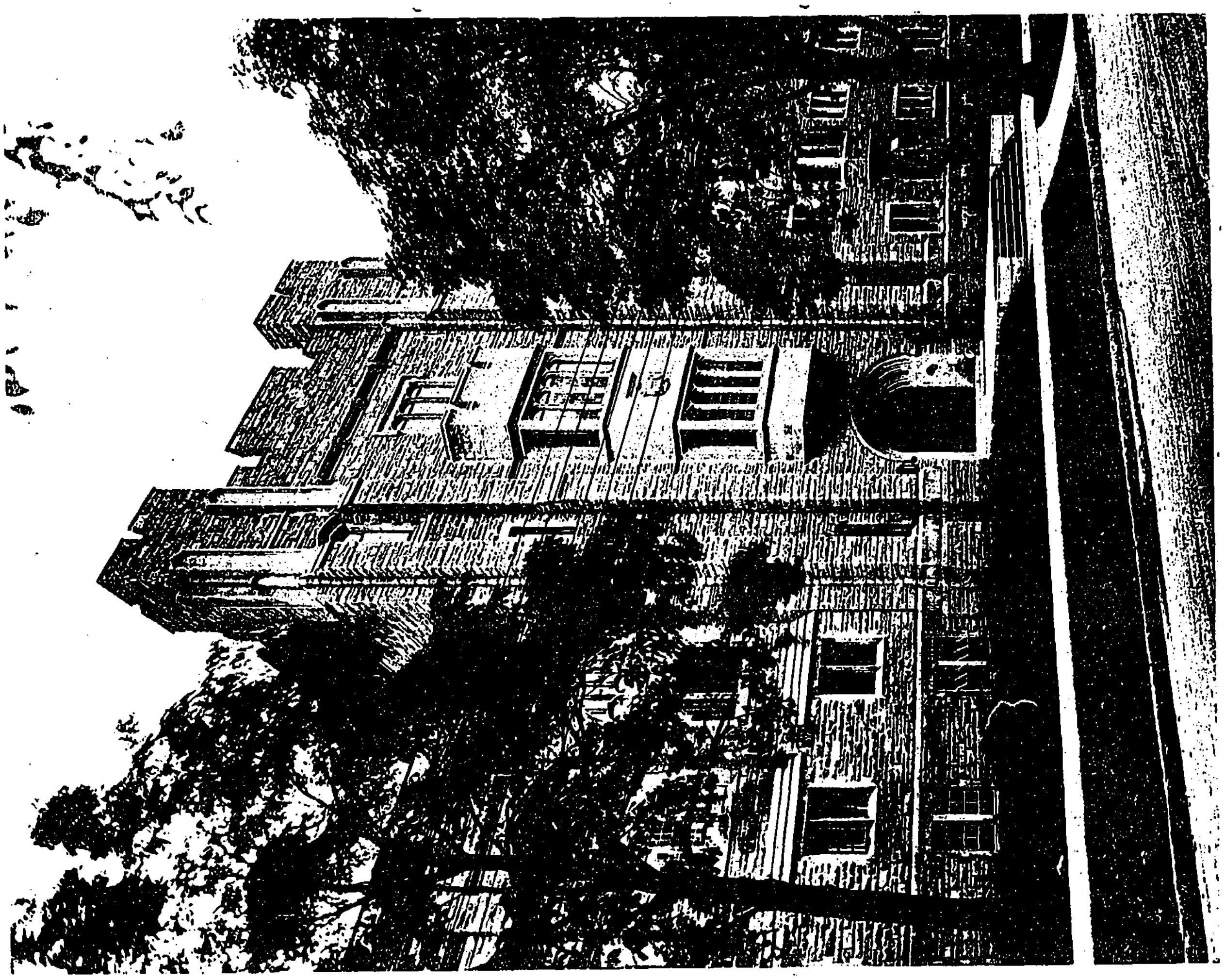


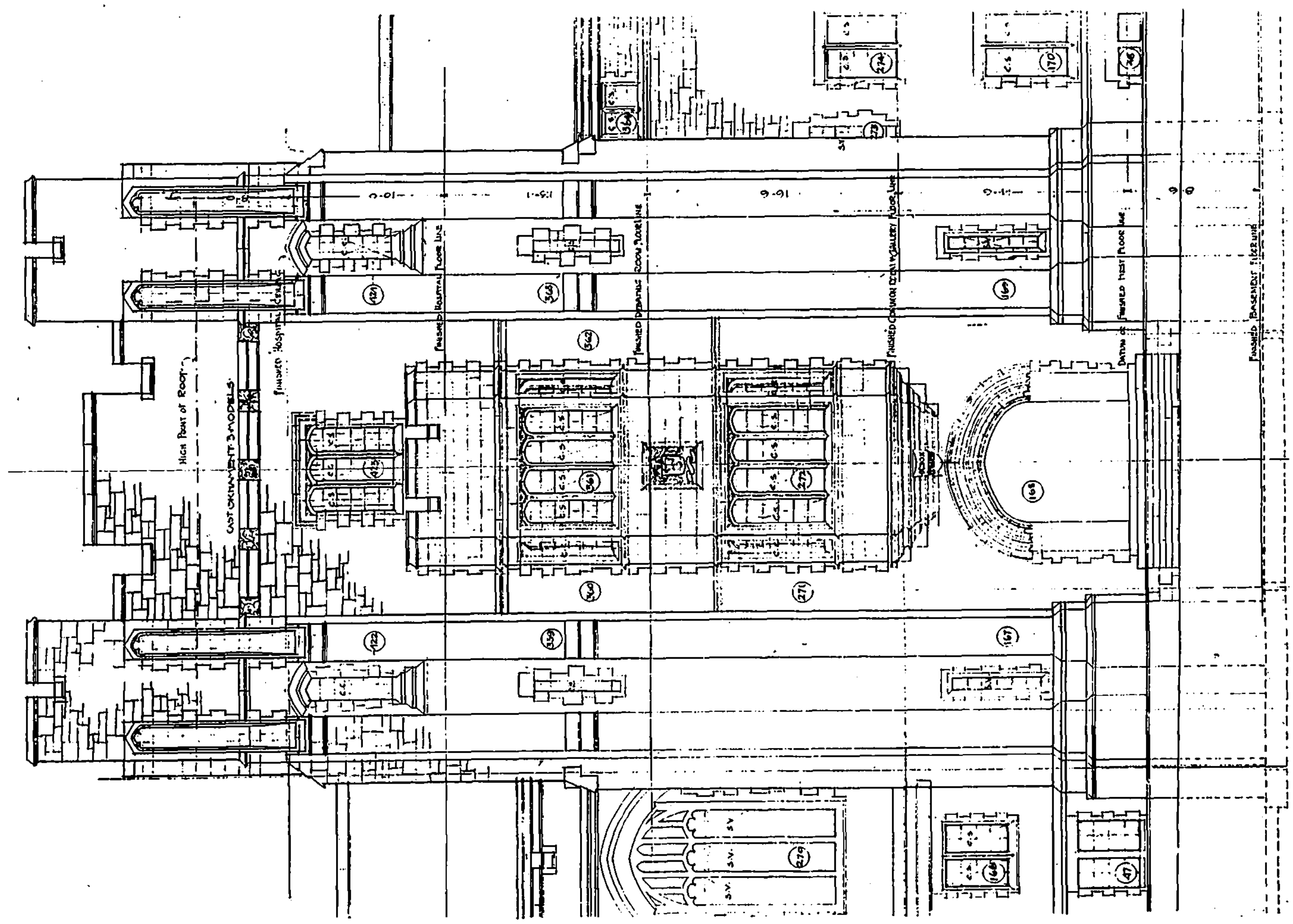


DETAIL OF FRONT ON UNIVERSITY GROUNDS.

KNOX COLLEGE, TORONTO.

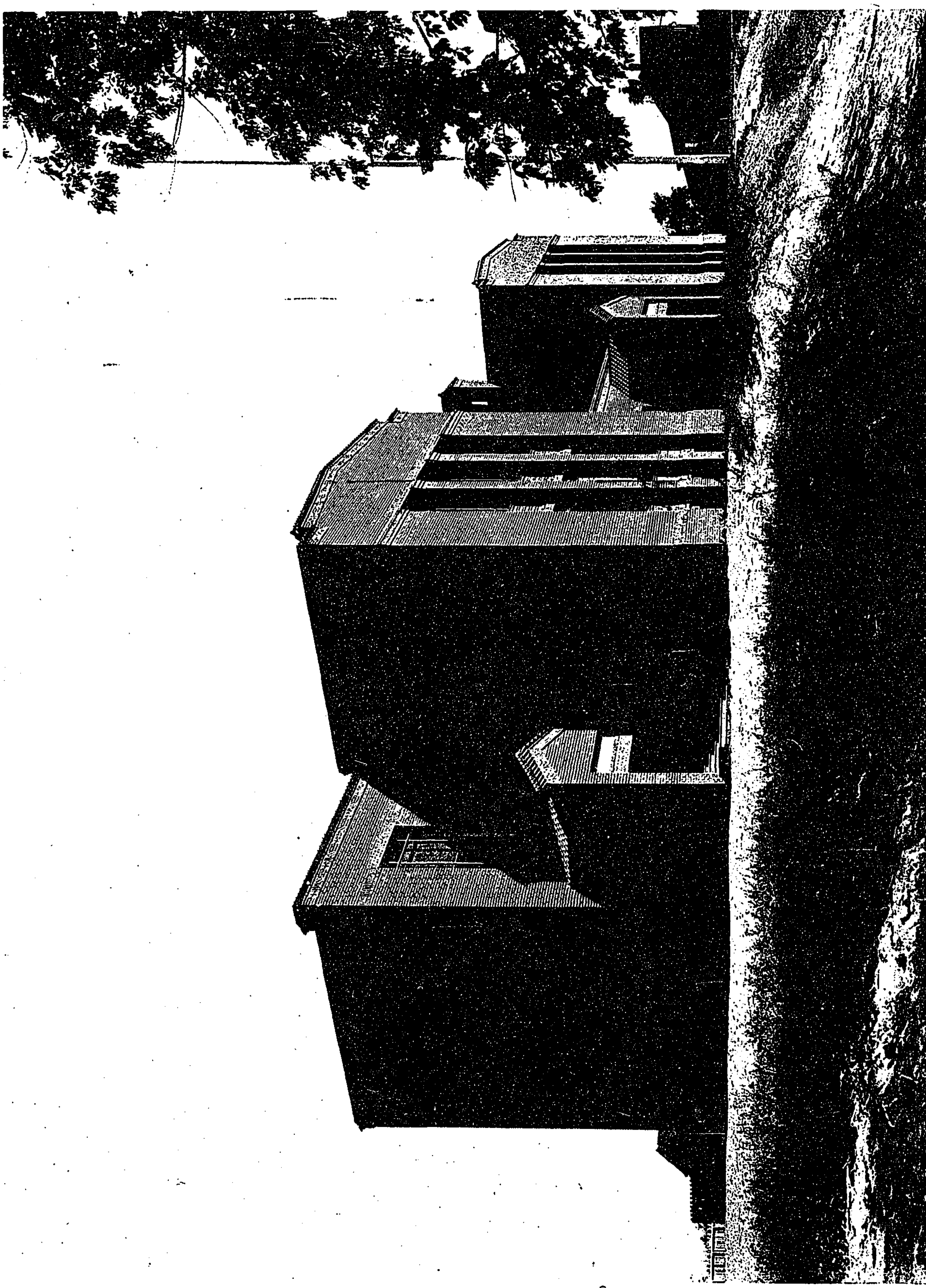
CHAPMAN & M'GIFFIN, ARCHITECTS.



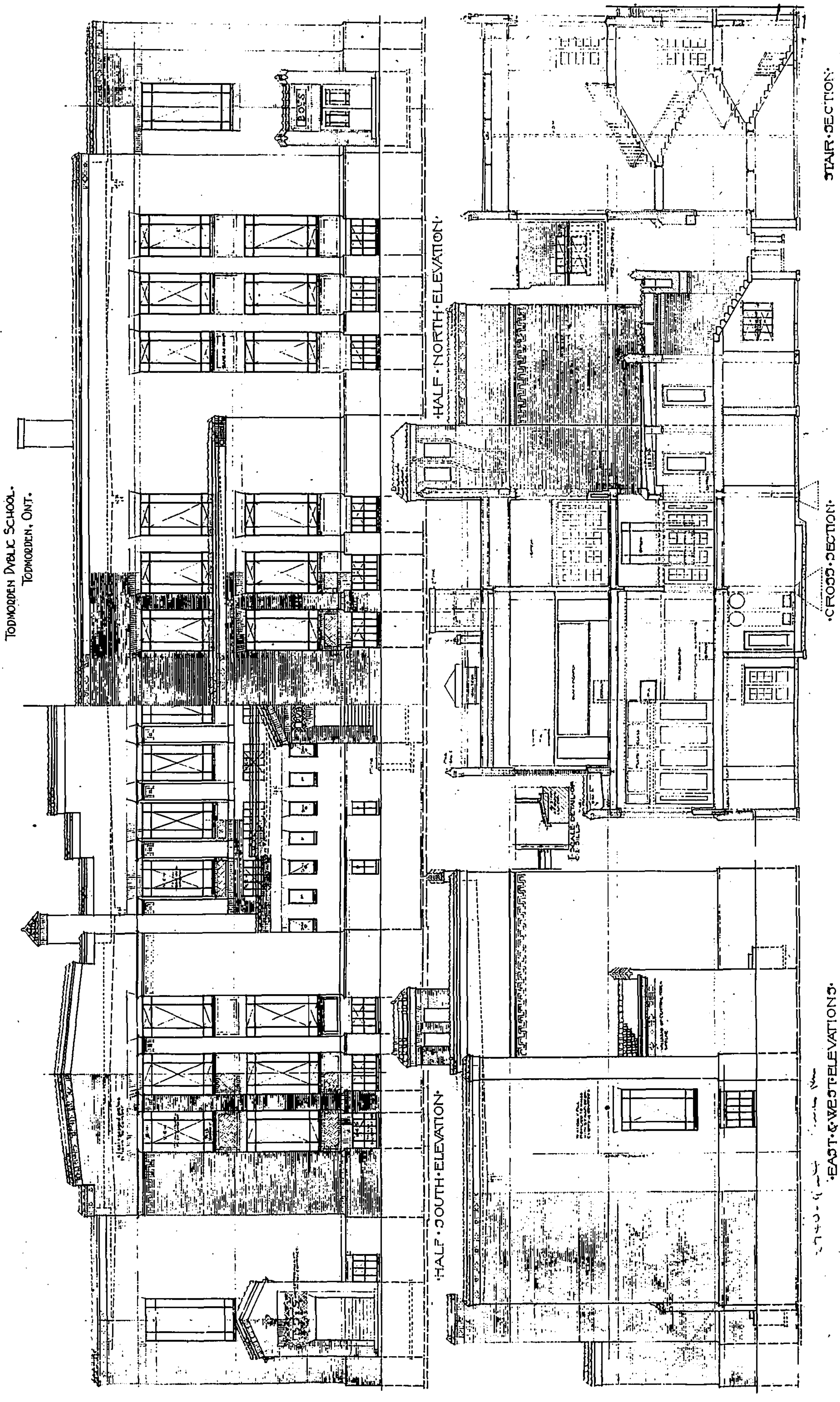


DETAIL OF WEST ENTRANCE.
KNOX COLLEGE, TORONTO.
CHAPMAN & M'GIFFIN, ARCHITECTS.

LINDSAY, BRYDON & GREIG, ARCHITECTS.

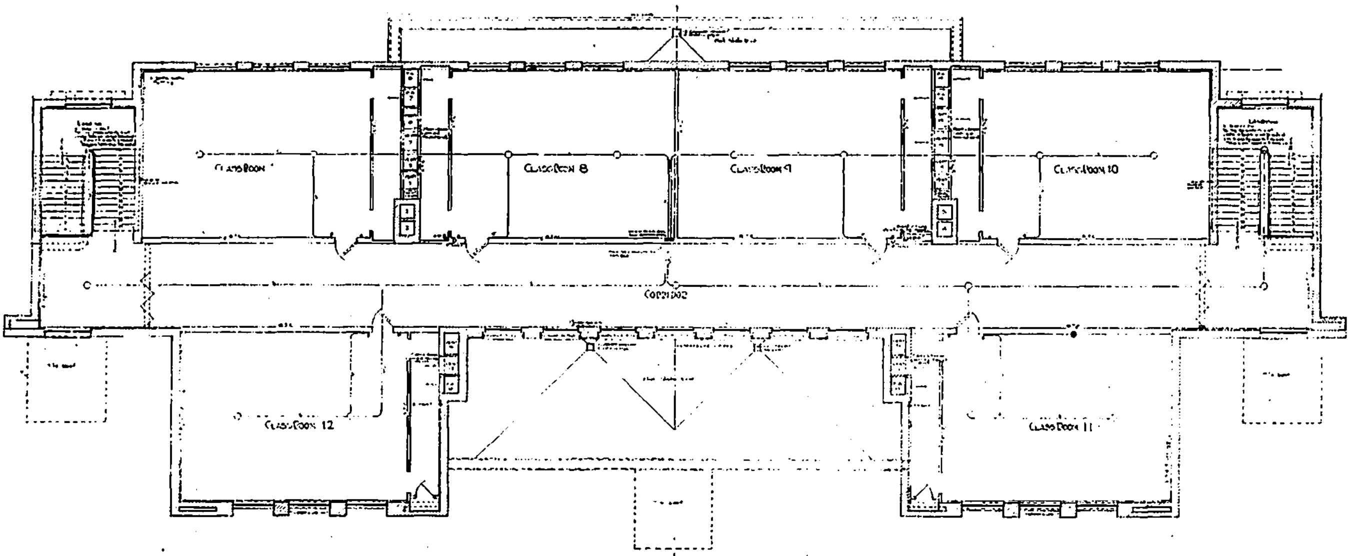


TODMORDEN SCHOOL.

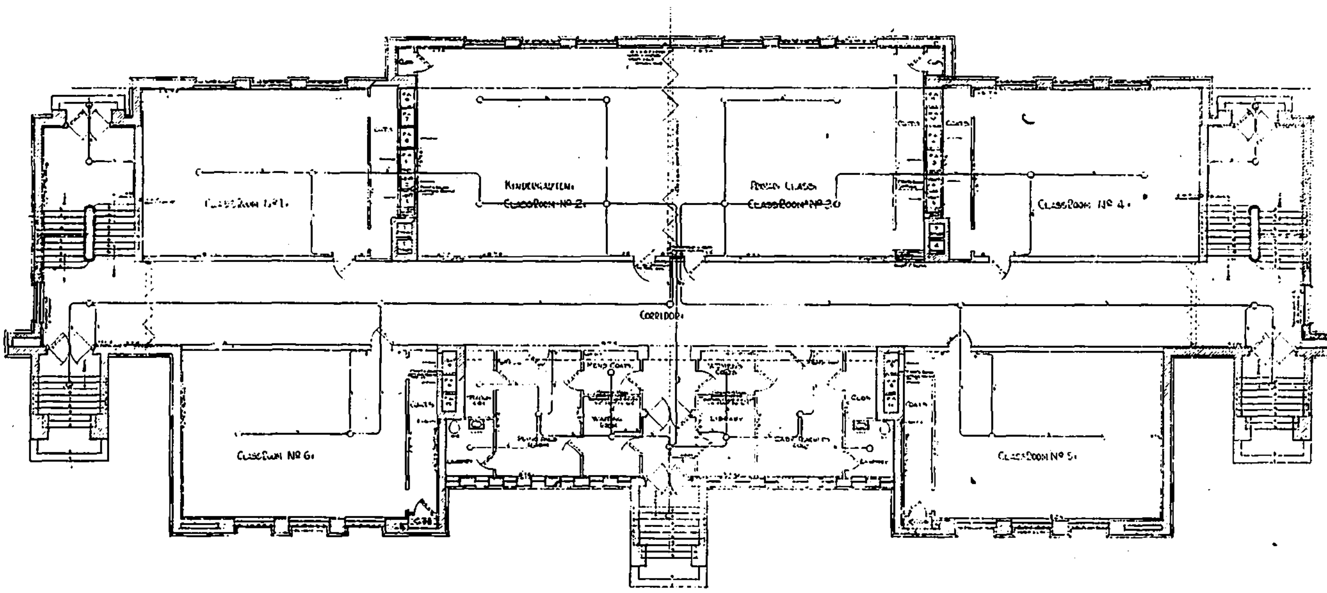


TODMORDEN SCHOOL.

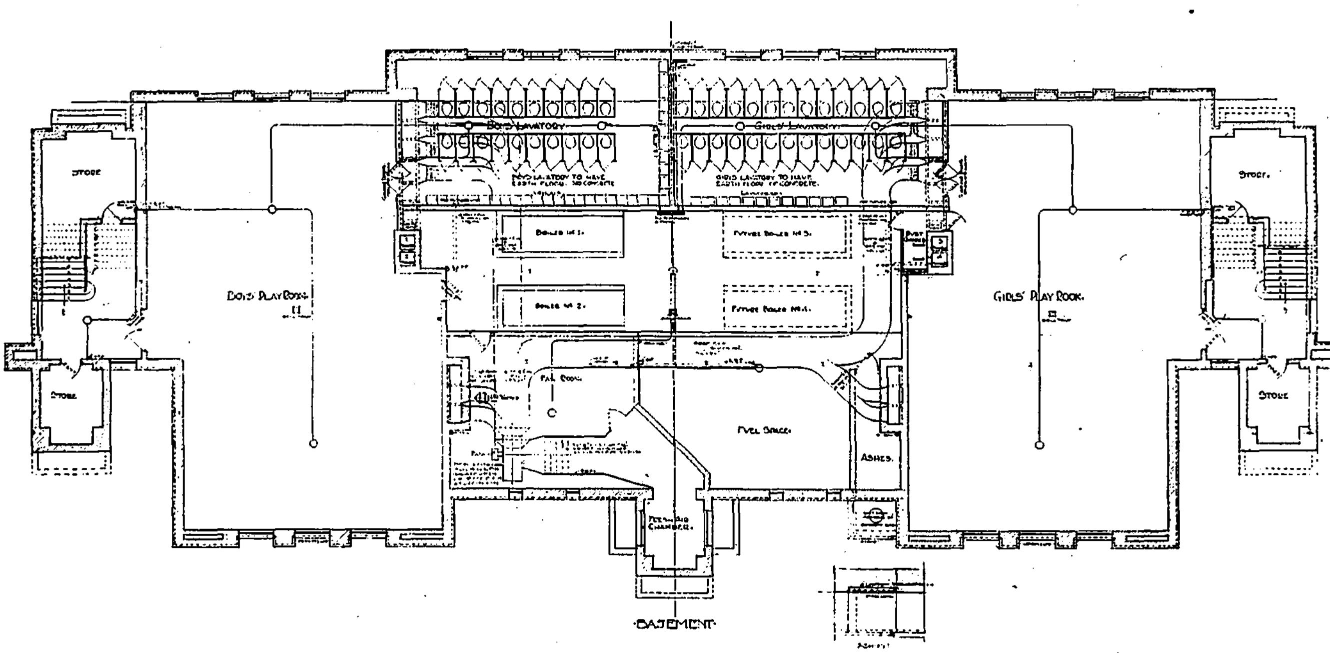
LINDSAY, BRYDON & GREIG, ARCHITECTS.



·SECOND·FLOOR·



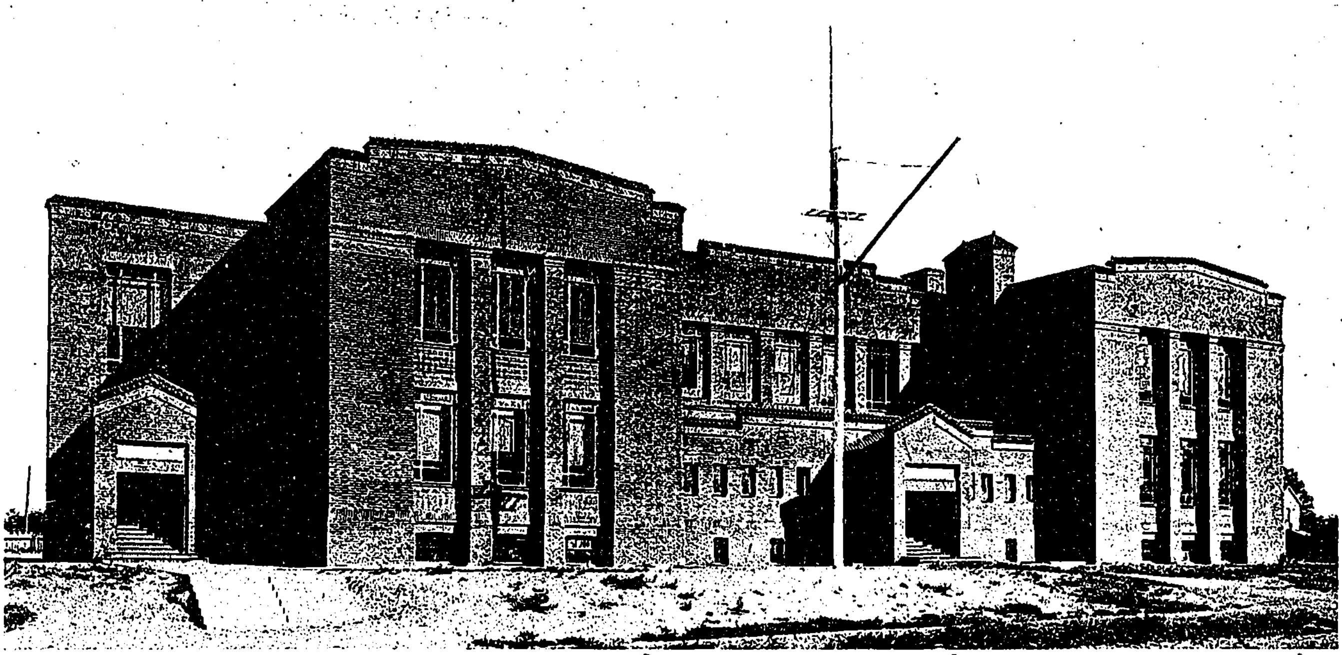
·FIRST·FLOOR·



·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.

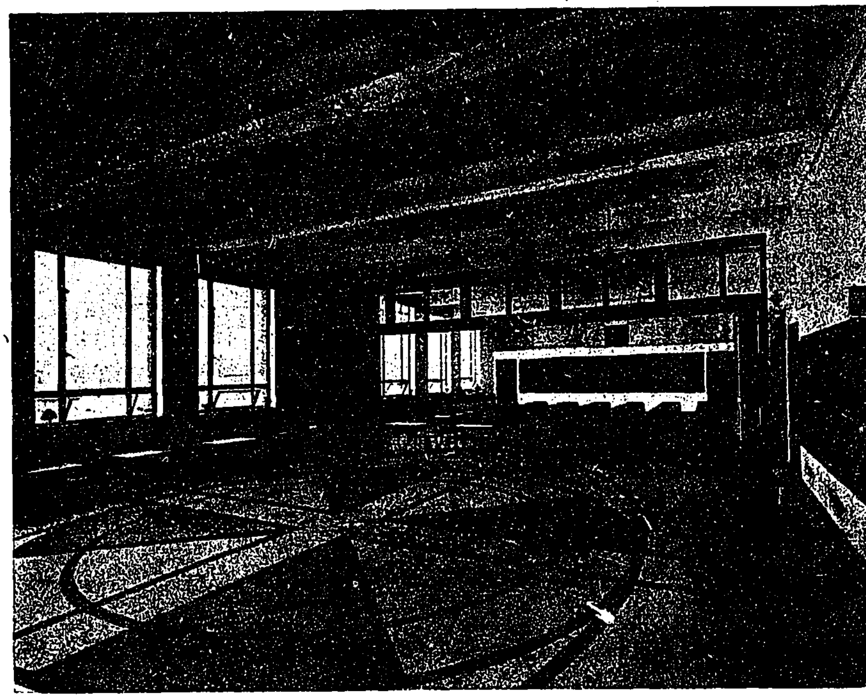
In the new Todmorden School the firm of Lindsay, Brydon & Greig have in a large measure accomplished both of these desirable conditions. The building is located on a three-acre site, forming a junction with Pape avenue on the east and Torrens avenue on the south, on which the main elevation faces, which 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.

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.

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 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.

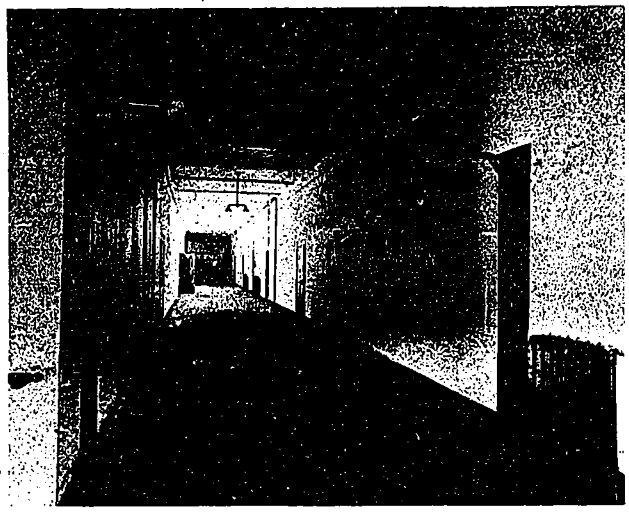
Where the door of an emergency exit has to be kept fastened ordinarily, it is better to secure it by a simple bolt enclosed in a glass case, rather than by a lock with the key suspended in a glass case; inserting a key in a lock is apt to prove troublesome when done in a hurry, and locks are apt to rust 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.

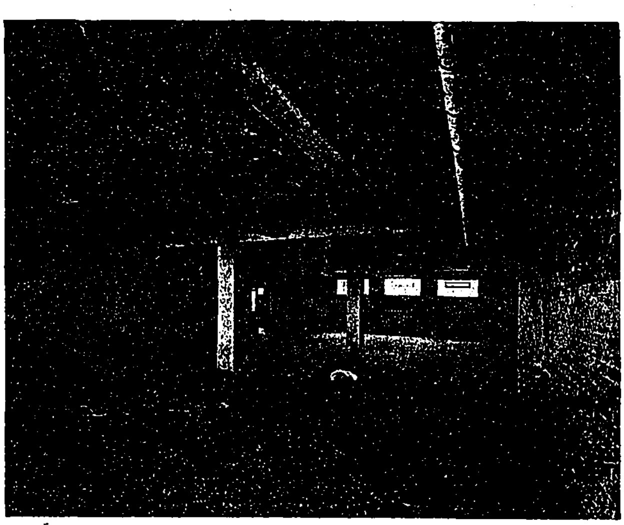
For higher floors the provision of an escape or ladder is advisable.

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.



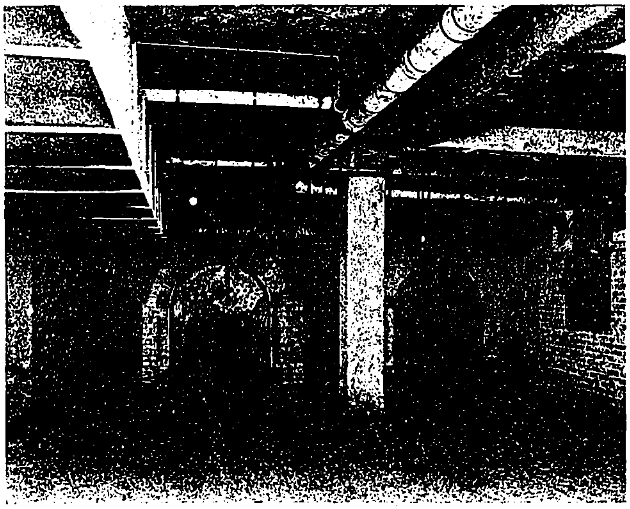
BASEMENT PLAYGROUND, TODMORDEN SCHOOL.

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,



BOILER ROOM, TODMORDEN SCHOOL.

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.

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.

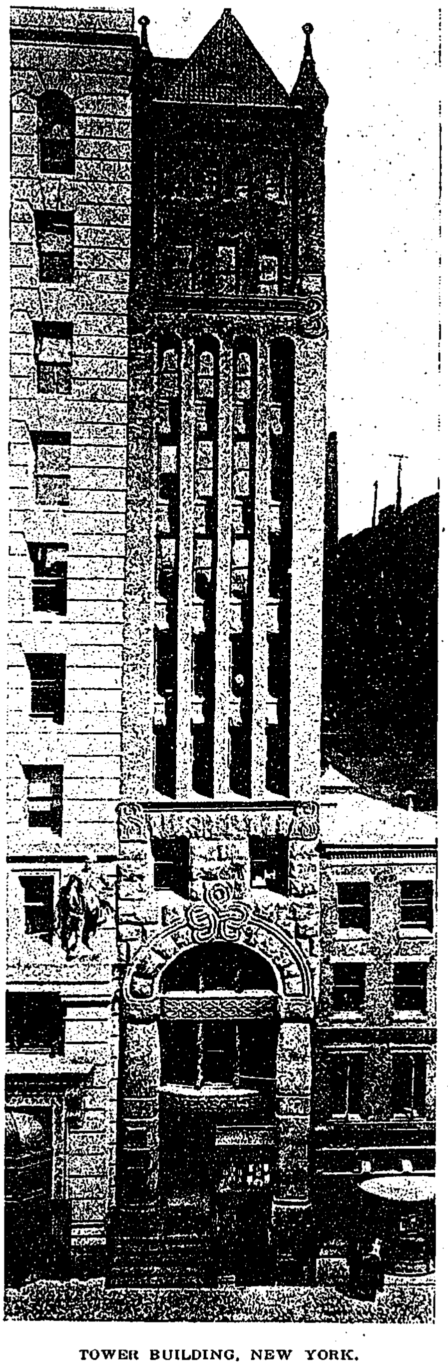
The Skyscraper

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.

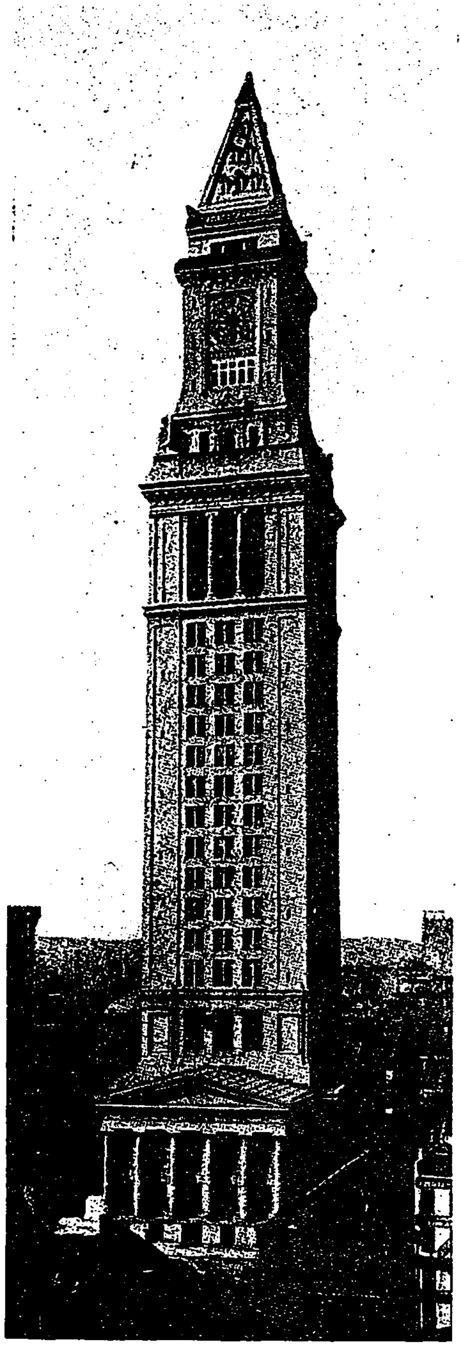
In Chicago, where this type of foundation is in common use, the sand is of an alluvial nature, which is subject to shrinkage under compression, and can be pumped out like so much water. The engineer accordingly has to be very careful to arrange his total load of the building in such a manner so that 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.

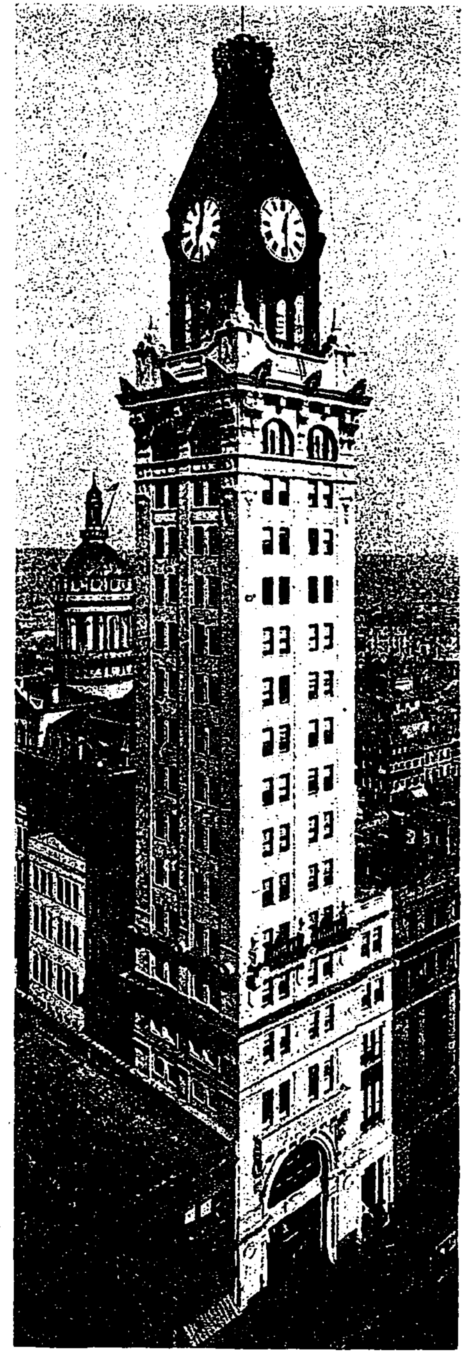
Another type of foundation in frequent use, and very much more ingenious, is the pneumatic caisson. This is founded on the direct principle of the diving bell, *i.e.*, under compressed air. These foundations are in the form of long tubes, and go down to the actual rock bottom, which may be 40 or 50 feet 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-



U. S. CUSTOMS HOUSE, BOSTON.

EQUITABLE BUILDING, NEW YORK.



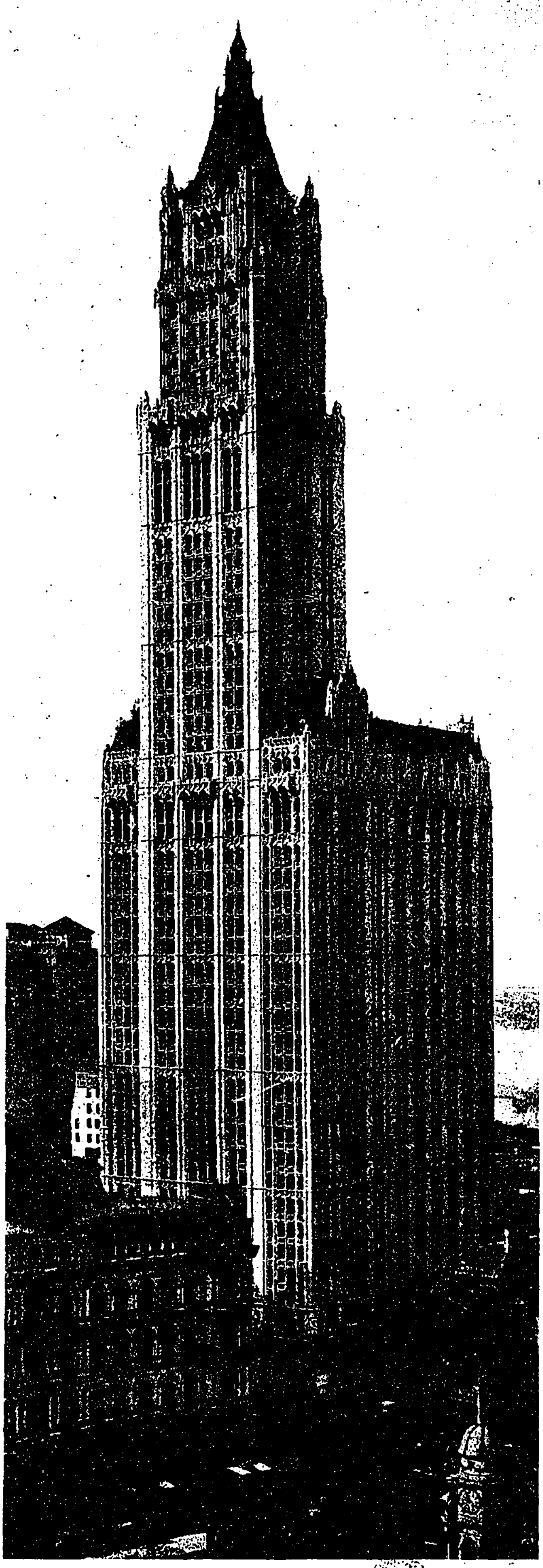
MARYLAND CASUALTY BUILDING, BALTIMORE.

"THE SKYSCRAPER."

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.

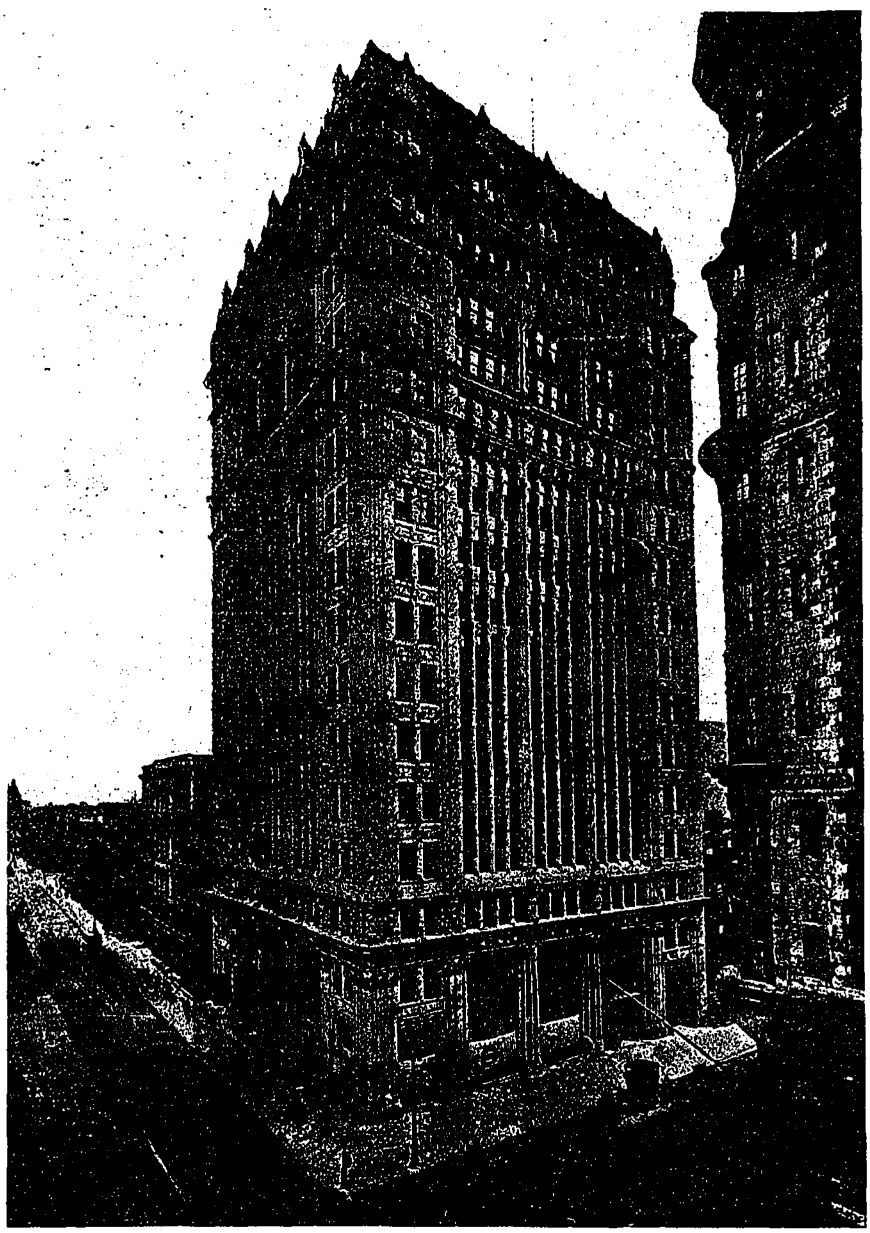
As soon as excavation commences the scene becomes one of most lively interest. There is something very alluring to the gaze in the hole, judging from the great crowds which are drawn towards it. There seems to be good company in the shouts of the teamsters, the grinding of the concrete mixers, the operations 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.

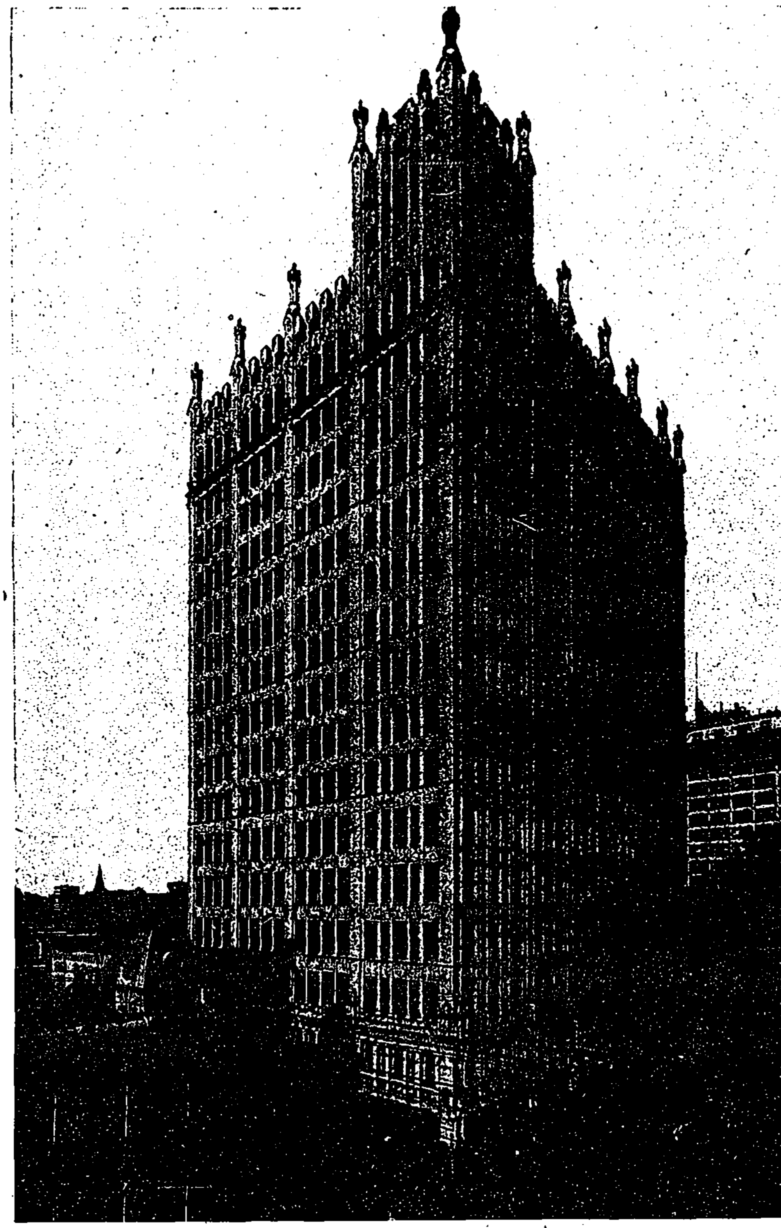


EMMET BUILDING, NEW YORK.

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 purpose 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.

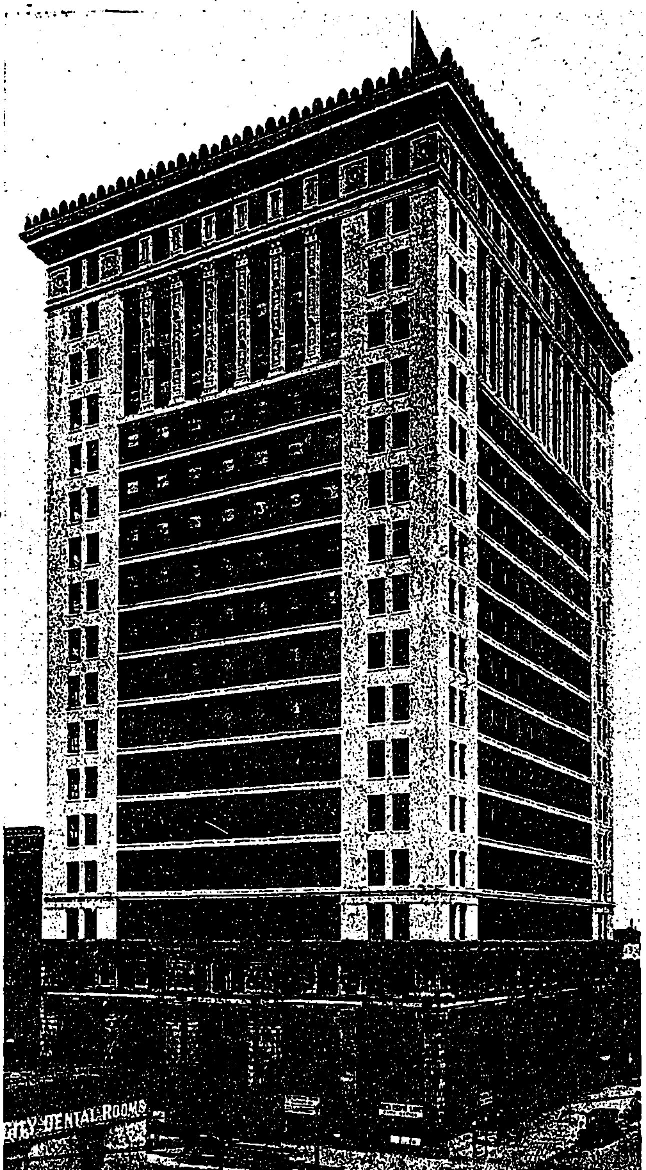


BUSCH BUILDING, DALLAS, TEXAS.

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.

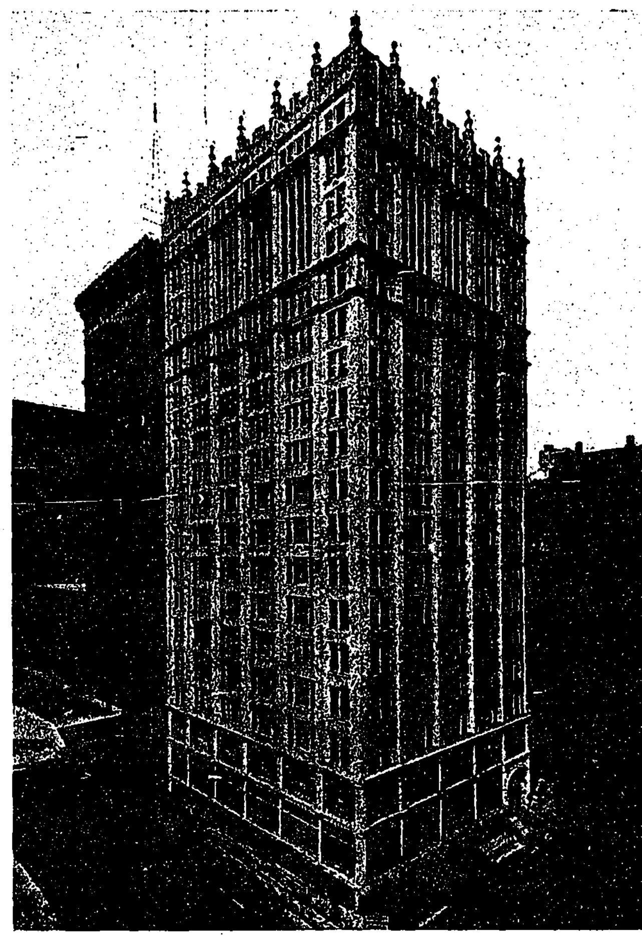
In the three movements affecting tall and heavy buildings we have, then, particularly in the expansion and contraction movement, which is of daily occurrence, and which affects skyscraper buildings as well as all other tall structures, a condition which must be taken into consideration when planning 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.

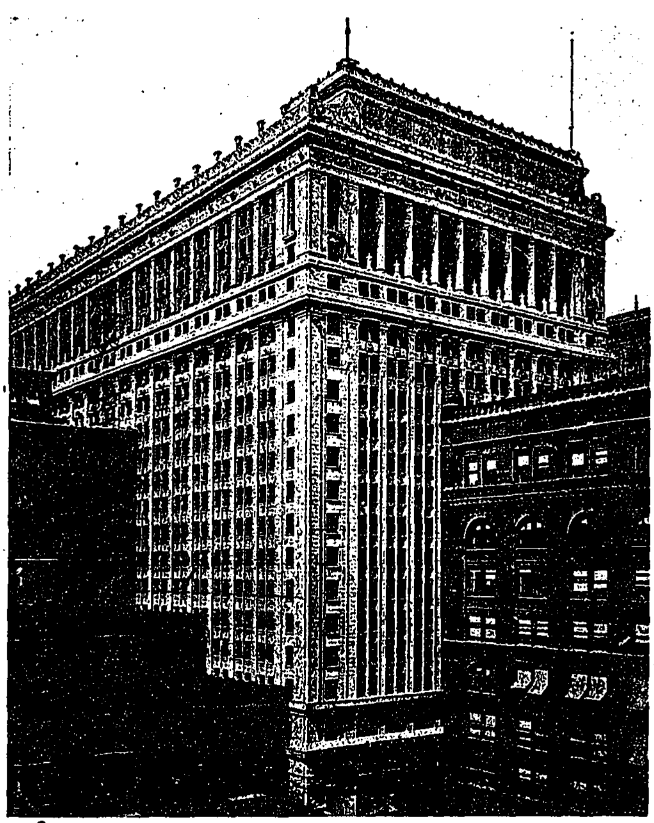
In Chicago, we find that the direct causes that led to the first example of true skeleton construction were—(*a*) the necessity for increased height; (*b*) which the character of the supporting soil rendered impossible on account of the weight of the then prevailing type of massive masonry walls and 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.



NORTH AMERICAN BUILDING, CHICAGO.

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.

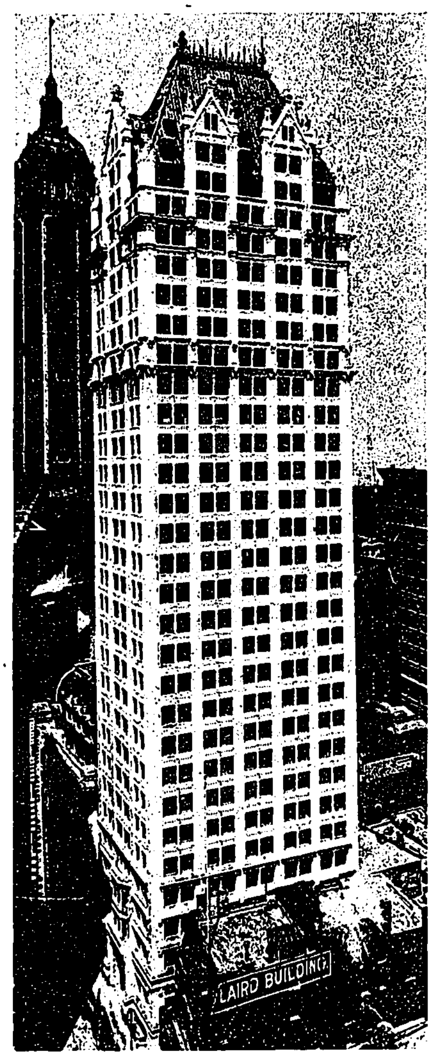


NATIONAL BANK BUILDING, CHICAGO.

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 assiciation 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

H. GAGNIER, LIMITED, PUBLISHERS
Corner Richmond and Sheppard Streets
Toronto - - Canada

WESTON WRIGLEY, General Manager
W. J. CAMERON, Advertising Manager

BRANCH OFFICES:
MONTREAL---171 St. James Street
NEW YORK---10 East 43rd Street

CORRESPONDENCE.—All correspondence should be addressed to "CONSTRUCTION," Corner Richmond and Sheppard Streets, Toronto, Canada.

SUBSCRIPTIONS.—Canada and Great Britain, $3.00 per annum. United States, the Continent and all Postal Union countries, $4.00 per annum, in advance. Single copies, 35c.

ADVERTISEMENTS.—Changes of, or new advertisements must reach the Head Office not later than the twentieth of the month preceding publication, to ensure insertion. Mailing date is on the tenth of each month. Advertising rates on application.

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

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

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.*

Barrett Specification Roofs

Made in Canada

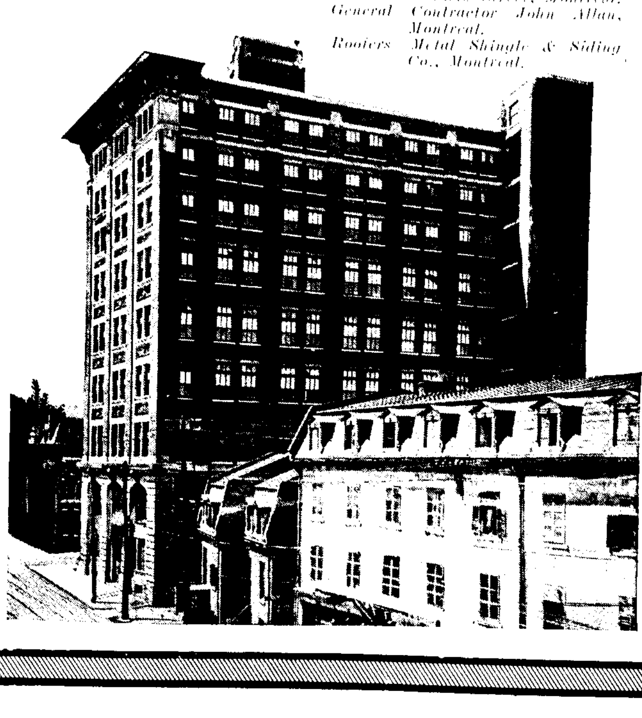
Cost nothing to maintain

If you incorporate The Barrett Specification verbatim in your building plans, you then will get—

1. —a roof that has a lower cost per year of service than any other roof covering known.
2. —a roof that costs nothing to maintain.
3. —that is endorsed by the Underwriters' Laboratories and takes the base rate of insurance.
4. —a roof that will give twenty years or more of service.
5. —that is recognized as standard everywhere and that to-day covers a great many of the first class buildings in the country.

We should like to send every architect, engineer and owner of buildings a copy of the Underwriters' Laboratories Report on Barrett Specification Roofs and also a copy of The Barrett Specification. Address nearest office.

Barrett Specification Roof on the Bell Telephone Co. Exchange, Ontario Street, Montreal. General Contractor John Allan, Montreal. Rooters Metal Shingle & Siding Co., Montreal.



Special Note

We advise incorporating in plans the full wording of The Barrett Specification, in order to avoid any misunderstanding.

If any abbreviated form is desired, however, the following is suggested:

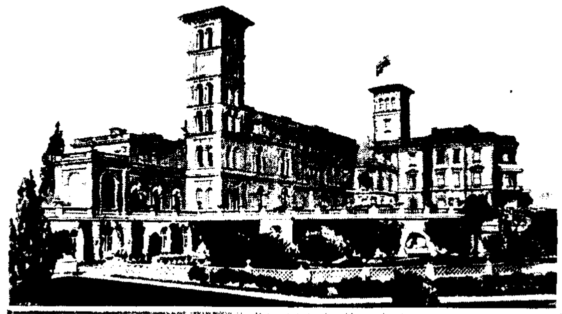
ROOFING—Shall be a Barrett Specification Roof laid as directed in printed Specification, revised August 15, 1911, using the materials specified and subject to the inspection requirement.

THE PATERSON MANUFACTURING COMPANY, LIMITED

MONTREAL TORONTO WINNIPEG VANCOUVER

THE CARRITTE-PATERSON MANUFACTURING COMPANY, LIMITED

ST. JOHN, N.B. HALIFAX, N.S. SYDNEY, N.S.



OSBORNE HOUSE, ISLE OF WIGHT
FORMER RESIDENCE OF THE LATE QUEEN VICTORIA OF ENGLAND

ROYAL PALACE OF LA MAGDALENA
SUMMER RESIDENCE OF THE KING AND QUEEN OF SPAIN

SANDRINGHAM HOUSE
COUNTRY RESIDENCE OF THE KING AND QUEEN OF ENGLAND

Royal Palaces in which "Standard Sanitary" Plumbing Fixtures were installed—a few notable examples of their world-wide popularity

"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.

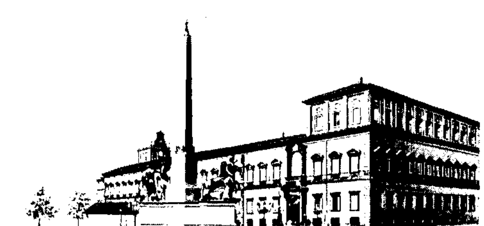
Standard Sanitary Mfg. Co.
Limited

General Offices and Factory: Royce and Lansdowne Aves., Toronto, Ontario

TORONTO STORE
55-59 Richmond Street, West

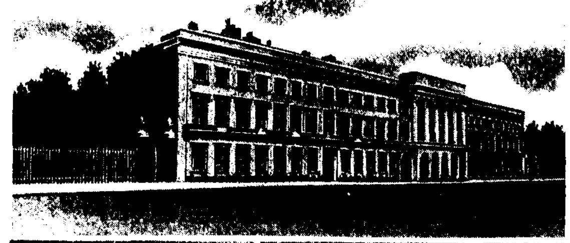
HAMILTON STORE
20-28 Jackson Street, West

BALMORAL CASTLE
SCOTTISH RESIDENCE OF THE KING AND QUEEN OF ENGLAND



THE QUIRINAL
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ITALY, ROME

BUCKINGHAM PALACE
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ENGLAND, LONDON



PALACE OF THE KING OF THE BELGIANS
BRUSSELS

TURNBULL ELEVATOR

Manufacturing Co. Toronto. Canada.

Technical High School, Toronto

Is equipped with TURNBULL ELEVATORS
for Freight and Passenger Service.

Represented by

G. E. Brennan & Co., Vancouver, B. C.
Cunningham Electric Co., Limited, Calgary and Edmonton.
Northwestern Electric Limited, Regina.
Walkers, Limited, Winnipeg.
General Supply Co., Limited, Ottawa.
A. R. Williams Machinery Co., Limited, St. John, N. B.

A DIRECTORY FOR ARCHITECTURAL SPECIFICATIONS & CONTRACTORS' SUPPLIES & MACHINERY

Adamant Plaster.
Stinson-Reeb Builders' Supply Co.

Air Washers and Humidifiers.
Sheldons Limited.

Architectural Bronze and Brass Work.
Canada Wire & Iron Goods Co.

Architectural Iron.
Canada Wire & Iron Goods Co.

Architectural Stucco Relief.
Hynes, W. J., Ltd.

Architectural Terra Cotta.
Toronto Plate Glass Imp. Co.

Asbestos Products.
Canadian H. W. Johns-Manville Co., Ltd.

Bank and Office Railings.
Canada Wire & Iron Goods Co.

Bank and Office Window Blinds.
Canada Wire & Iron Goods Co.

Bath Room Fittings.
Canadian H. W. Johns-Manville Co., Ltd.
Robertson Co., James B.
Standard Sanitary Co.

Bent Glass.
Toronto Plate Glass Imp. Co.

Belting.
Canadian H. W. Johns-Manville Co., Ltd.
Gutta Percha and Rubber Mfg. Co., Ltd.

Blowers.
Sheldons Limited.

Boilers.
Beatty & Sons, Ltd
Clare Bros Co
Goldie & McCulloch Co., Ltd.

Brass Works.
Robertson, James B. Co.

Brick and Terra Cotta.
Dartnell, Limited.
Don Valley Brick Works.
Stinson-Reeb Builders' Supply Co.

Bridges.
Dominion Bridge Co.

Building Paper and Felts.
Bird, F. W. & Son.
Canadian H. W. Johns-Manville Co., Ltd.
Paterson Mfg. Co.

Building Supplies.
Bird, F. W. & Son.
Canadian H. W. Johns-Manville Co, Ltd
Dartnell, Limited.
Stinson-Reeb Builders' Supply Co.

Caen Stone Cement.
Hynes, W. J., Ltd.

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

Cars (Factory and Dump).
Sheldons Limited.

Cement (Fireproof).
Canadian H. W. Johns-Manville Co., Ltd.
Dartnell Limited.
Stinson-Reeb Builders' Supply Co.

Cement Tile Machinery.
Stinson-Reeb Builders' Supply Co.

Cold Storage and Refrigerator Insulation
Bird, F. W. & Son.
Canadian H. W. Johns-Manville Co., Ltd.

Concrete Construction (Reinforced).
Pedlar People, The.
Trussed Concrete Steel Co.

Concrete Mixers.
Dartnell, Limited.

Concrete Reinforcement.
Page Wire Fence Co.

Concrete Steel.
Canada Wire & Iron Goods Co.
Noble Clarence W.
Pedlar People, The.
Trussed Concrete Steel Co.

Conduits.
Canadian H. W. Johns-Manville Co., Ltd.
Conduits Co., Ltd.
Northern Electric Co., Ltd.

Contractors' Supplies.
Beatty & Sons, Ltd
Dartnell, Limited.
Stinson-Reeb Builders' Supply Co.

Cork Board.
Canadian H. W. Johns-Manville Co., Ltd.

Corner Beads.
Pedlar People, The.

Cranes.
Beatty & Sons, Ltd
Dominion Bridge Co., Ltd.

Crushed Stone.
Stinson-Reeb Builders' Supply Co.

Cut Stone Contractors.
Dartnell, Limited.

Damp Proofing.
Ault & Wiborg Co.
Cabot, Samuel, Inc.
Paterson Mfg. Co.
R.I.W. Damp Resisting Co.

Deposit Boxes.
Goldie & McCulloch Co., Ltd.
Taylor, J. & J.

Door Hangers.
Reliance Ball Bearing Door Hanger Co.

Drills (Brick and Stone).
Northern Electric Co., Ltd.

Drying Appliances.
Sheldons Limited.

Dumb Waiters.
Turnbull Elevator Co.

Electrical Apparatus.
Northern Electric Co., Ltd.

Electric Hoists.
Beatty & Sons, Ltd
Turnbull Elevator Co.

Electric Wire and Cables.
Robertson Co., James B.

Elevators.
Otis-Fensom Elevator Co.
Turnbull Elevator Co.

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

Elevator Enclosures.
Canada Wire & Iron Goods Co.
Turnbull Elevator Co.

Enamels.
Ault & Wiborg Co.
Berry Bros.

Engines.
Goldie & McCulloch Co., Ltd.
Sheldons Limited.

Engineers' Supplies.
American Lead Pencil Co.
Robertson Co., James B.
Sheldons Limited.

Exhaust Fans.
Northern Electric Co., Ltd.
Sheldons Limited.

Expanded Metal.
Leslie & Co., A. C., Ltd.
Noble Clarence W.
Pedlar People, The.
Stinson-Reeb Builders' Supply Co.

Expansion Bolts.
Northern Electric Co., Ltd.

Fire Brick.
Dartnell, Limited.
Stinson-Reeb Builders' Supply Co.

Fire Door Fittings.
Allith Manufacturing Co.
Canada Wire & Iron Goods Co.

Fire Extinguishers.
Canadian H. W. Johns-Manville Co., Ltd.
Northern Electric Co., Ltd.
Vogel Co. of Canada, Ltd

Fire Escapes
Canada Wire & Iron Goods Co.
Reid & Brown

Fire Proofing.
Dartnell, Limited.
Don Valley Brick Works.
Noble Clarence W.
Pedlar People, The.
Trussed Concrete Steel Co.

Fireproof Steel Doors.
Canada Wire & Iron Goods Co.
Pedlar People, The.
Stinson-Reeb Builders' Supply Co.

Fireproof Windows.
Galt Art Metal Co.
Pedlar People, The.
Stinson-Reeb Builders' Supply Co.

Fire Sprinklers.
Vogel Co. of Canada, Ltd

Flooring.
Bird, F. W. & Son.
Canadian H. W. Johns-Manville Co., Ltd.
Gutta Percha and Rubber Mfg. Co., Ltd.
Seaman-Kent Co.

Furnaces and Ranges.
Clare Bros., Limited

Galvanized Iron Works.
Pedlar People, The.
Sheldons Limited.

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

Glass.
Toronto Plate Glass Co.

Greenhouse.
Lord & Burnham Co.

Grille Works.
Canada Wire & Iron Goods Co.
Taylor, J. & J.
Turnbull Elevator Co.
Tuttle & Bailey Mfg. Co.

Hangers.
Allith Manufacturing Co.

Hardware.
Allith Manufacturing Co.

Heating Apparatus.
Clare Bros., Limited
Goldie & McCulloch Co., Ltd.
Northern Electric Co., Ltd.
Sheldons Limited.

Heating Engineers and Contractors.
Sheldons Limited.

Hoisting Machinery.
Beatty & Sons, Ltd
Gillis & Geoghegan.

Iron Doors and Shutters.
Canada Wire & Iron Goods Co.
Taylor, J. & J.

Iron Stairs.
Canada Wire & Iron Goods Co.

Installation.
Bird, F. W. & Son.
Seaman-Kent Co.

Interior Woodwork.
Seaman-Kent Co.

Jail Cells and Gates.
Canada Wire & Iron Goods Co.
Goldie & McCulloch Co., Ltd.
Taylor, J. & J.

Joist Hangers.
Trussed Concrete Steel Co.

Lamp Standards.
Northern Electric Co., Ltd.
Seaman-Kent Co.

Lath (Metal).
Noble Clarence W.
Pedlar People, The.
Stinson-Reeb Builders' Supply Co.
Trussed Concrete Steel Co.

Laundry Tubs.
Toronto Laundry Machinery Co.

A Billiard Parlor, containing our Handsome Kling Tables.

WHY NOT HEED THE EXPERT

The general understanding of an expert is that he must have long, personal, and practical experience.

That experts in Billiards and Bowling consider Brunswick Service first is evidenced by the fact that over 90 per cent. of the Fine Billiard Parlors and Bowling Alleys in Canada are equipped by the Brunswick Balke Collendar Co. of Canada, Limited.

Our Catalogue illustrates exclusive designs, the work of our own artist.

The compound construction of the frame work of our tables is not attempted by other makers.

The Monarch Cushions are proved faster than any other cushion—without any artificial re-inforcing. Orders to replace other cushions after a very few years with the Monarch prove it is most durable.

Before buying write for Catalogue and proof of superiority.

The Brunswick Balke Collender Co., of Canada Limited

TORONTO, MONTREAL, WINNIPEG, VANCOUVER, EDMONTON.

ALWAYS USE

Hammer Brand Plaster of Paris

CALCINED · PLASTER · MANUFACTURING COMPANY · ALBERT

HAMMER · TRADE · MARK · BRAND · 1854

HILLSBOROUGH · NEW BRUNSWICK · F

Manufactured for Half a Century.

The Standard of Excellence.

TRY IT and compare its surface covering capacity with other Brands.

Manufactured Solely by

Albert Mfg. Company

Hillsborough, New Brunswick, Can.

Brick, Stone, Cement and Concrete Surfaces

can be preserved and given a pleasing uniform appearance by the application of Toch Brothers'

"LIQUID KONKERIT"

A liquid cement paint in colors for interior and exterior use.

"Liquid Konkerit" not only decorates, but preserves and weather-proofs, the surface to which it is applied, and eliminates that coarse, dirty appearance so common to ordinary reinforced concrete work.

Light-Wells, Passage Ways, Interiors of Factories—wherever the maximum of light is required—should be coated with "Liquid Konkerit Primer," followed by a finish coat of white "Liquid Konkerit" or Flax-Sieco ready mixed paint.

May we or our nearest distributor send you copy of new booklet and color card?

"Made in Canada" by

R.I.W. DAMP-RESISTING PAINT COMPANY

202 Mail Building, Toronto. Factory: Oakville, Ont.

DISTRIBUTORS:

Dartnell, Ltd., Montreal.

Black Building Supply Co., Ltd., Toronto.

Western Paint Co., Winnipeg.

Can. Equipment & Supply Co., Ltd., Calgary and Edmonton.

¶ There are various mediums through which to advertise architectural products, but just as soon as an advertiser withdraws his announcement from a legitimate architectural journal, just so soon does he admit that his product is not for architectural purposes.

ARCHITECTURAL DIRECTORY—Continued.

Lighting Fixtures.
Tallman Brass & Metal Co.

Marble.
Dartnell Limited.
Robertson Co., James B.

Metal Shingles.
Pedlar People, The.

Metal Store Fronts.
Dartnell, Limited.
Pedlar People, The.

Metal Walls and Ceilings.
Noble Clarence W.
Pedlar People, The.

Non-Conducting Coverings.
Ault & Wiborg Co.
Canadian H. W. Johns-Manville Co., Ltd.

Ornamental Iron Work.
Canada Wire & Iron Goods Co.
Turnbull Elevator Co.

Packing (Steam).
Canadian H. W. Johns-Manville Co., Ltd.

Packing.
Canadian H. W. Johns-Manville Co., Ltd.
Gutta Percha and Rubber Mfg. Co., Ltd.

Paints (Steel and Iron).
Canadian H. W. Johns-Manville Co., Ltd.
Dartnell, Limited.
Paterson Mfg. Co.

Paints and Stains.
Berry Bros., Ltd.
Dartnell Limited.
Robertson Co., James B.

Pencils.
American Lead Pencil Co.

Pipe Covering.
Canadian H. W. Johns-Manville Co., Ltd.

Plasters.
Canadian H. W. Johns-Manville Co., Ltd
Crown Gypsum Co., Ltd.
Hynes, W. J.

Plate and Window Glass.
Consolidated Glass Co.
Toronto Plate Glass Co.

Plumbers' Brass Goods.
Robertson Co., James B.

Plumbing Fixtures.
Canadian H. W. Johns-Manville Co., Ltd
Robertson Co., James B.
Standard Sanitary Co.

Porcelain Enamel Baths.
Canadian H. W. Johns-Manville Co., Ltd
Robertson Co., James B.
Standard Sanitary Co.

Refrigerator Insulation.
Bird, F. W. & Son.
Canadian H. W. Johns-Manville Co., Ltd

Reinforced Concrete.
Canada Wire & Iron Goods Co.
Noble Clarence W.
Pedlar People, The.
Trussed Concrete Steel Co.

Relief Decoration.
Hynes, W. J.

Roofing Paper.
Bird, F. W. & Son.
Canadian H. W. Johns-Manville Co., Ltd
Paterson Mfg. Co.

Roofing.
Bird, F. W. & Son.
Canadian H. W. Johns-Manville Co., Ltd
Paterson Mfg. Co.
Pedlar People, The.

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

Roofing (Tile).
Dartnell Limited.

Rubber Tiling.
Gutta Percha and Rubber Co.

Safes (Fireproof and Bankers').
Goldie & McCulloch Co., Ltd.
Taylor, J. & J.

Sanitary Plumbing Appliances.
Canadian H. W. Johns-Manville Co., Ltd
Robertson Co., James B.
Standard Sanitary Co.

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

Sheet Metal.
Leslie A.

Sheet Metal Workers.
Galt Art Metal Co.
Pedlar People, The.
Sheldons Limited.

Shingle Stains.
Cabot, Samuel, Inc.
Robertson Co., James B.

Sidewalks, Doors and Grates.
Canada Wire & Iron Goods Co.

Slate.
Robertson Co., James B.

Staff and Stucco Work.
Canadian H. W. Johns-Manville Co., Ltd
Hynes, W. J.

Steam Appliances.
Sheldons Limited.

Steam and Hot Water Heating.
Sheldons Limited.

Steel Concrete Construction.
Noble, Clarence W.
Pedlar People, The.
Trussed Concrete Steel Co.

Steel Doors.
Canada Wire & Iron Goods Co.
Pedlar People, The.

Structural Iron Contractors.
Dominion Bridge Co.
Reid & Brown.
Structural Steel Co., Ltd.

Structural Steel.
Dominion Bridge Co.
Reid & Brown.
Sheldons Limited.
Structural Steel Co., Ltd.

Telephone Systems.
Northern Electric Co., Ltd.

Terra Cotta Fireproofing.
Dartnell Limited.
Don Valley Brick Works.

Tile.
Dartnell Limited.
Don Valley Brick Works.

Valves.
Robertson Co., James B.

Varnishes.
Ault & Wiborg Co.
Berry Bros.

Vaults and Vault Doors (Fireproof and Bankers').
Goldie & McCulloch Co., Ltd.
Taylor, J. & J.

Ventilators.
Pedlar People, The.
Sheldons Limited.

Wall Finishes.
Berry Bros.
Dartnell Limited.

Waterproofing.
Ault & Wiborg Co.
Bird, F. W. & Son.
Cabot, Samuel, Inc.
Canadian H. W. Johns-Manville Co., Ltd.
Paterson Mfg. Co.
Dartnell Limited.
Stinson-Reeb Builders' Supply Co.

Waterworks Supplies.
Canada Wire & Iron Goods Co.
Robertson Co., James B.

Window Guards.
Canada Wire & Iron Goods Co.

Wire Cloth.
Canada Wire & Iron Goods Co.

An Index to the Advertisements

If You Believe in Your Own Product=Put it to the Front

The first big, competitive exposition of building materials of all kinds, where the prospective builders---tens of thousands of them---may judge for themselves which is the best, safest, most attractive and most economical house, to be held in

Cleveland, Ohio, Feb. 16th to 26th, 1916

The future building of all the Middle-western Country will be influenced by the

First American Complete Building Show

Canadian Architects, Engineers and Contractors will find this show not only of great interest, but extremely valuable from the viewpoint of the information to be gained. Come and meet the leaders in the building trades. Get the benefit of the latest methods and ideas, and the inspiration for more effective work that this opportunity affords.

A few choice locations are open, but you will have to hurry. More than 70 per cent. of space was sold by voluntary application.

Write for Floor Plan and Particulars at Once

Complete Building Show

Leader-News Building **Cleveland, Ohio, U.S.A.**