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CONSTRUCTION

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

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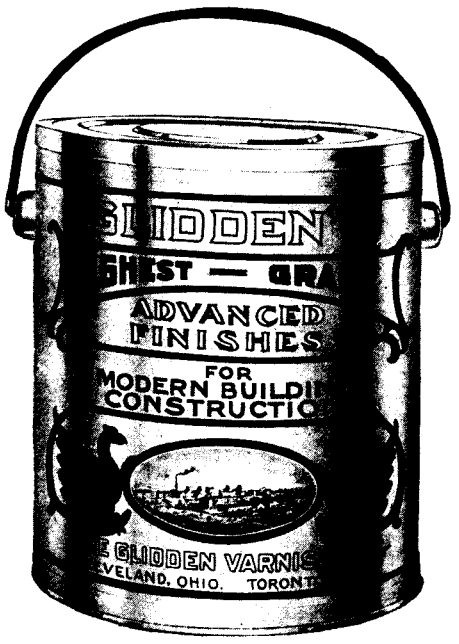

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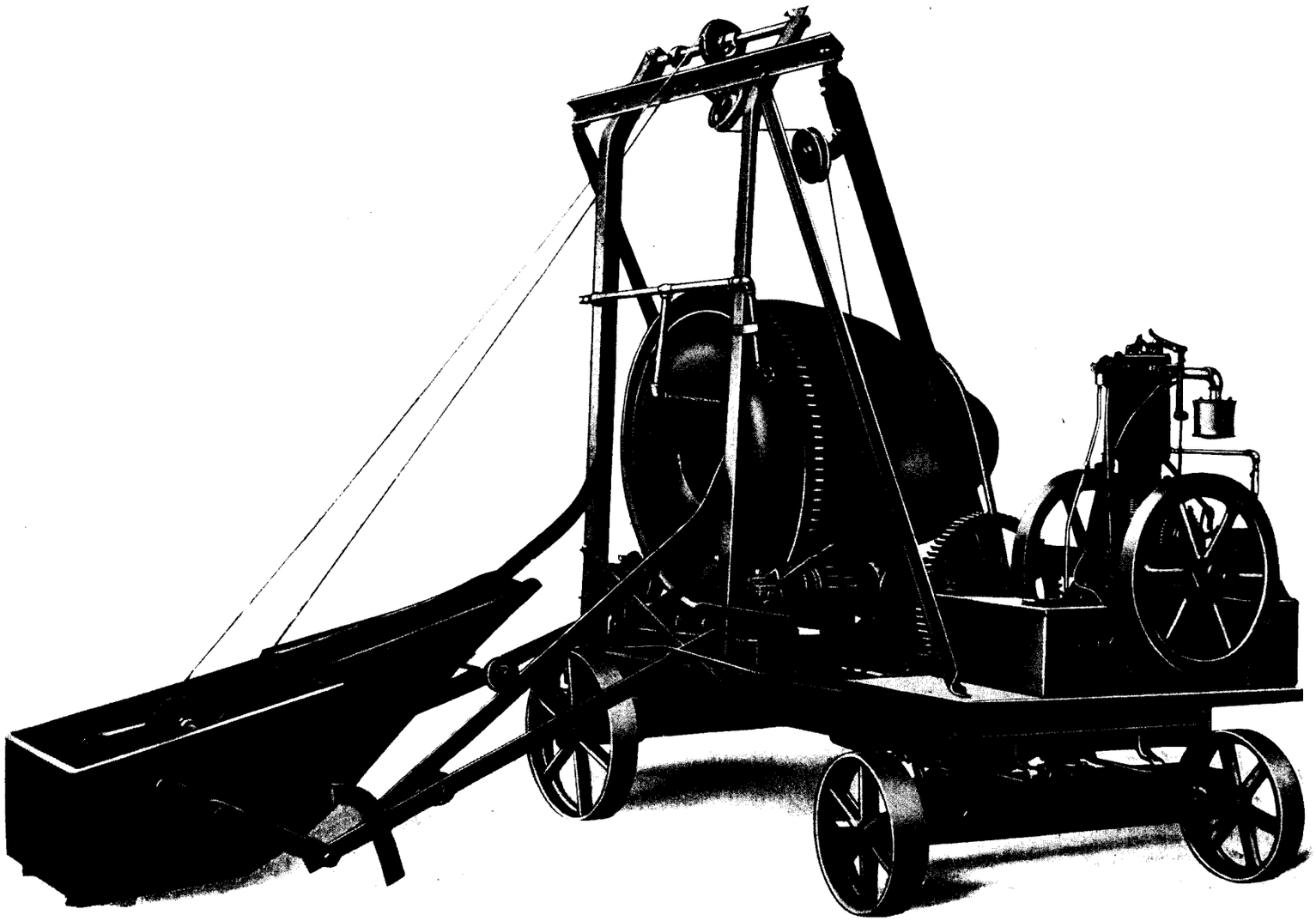

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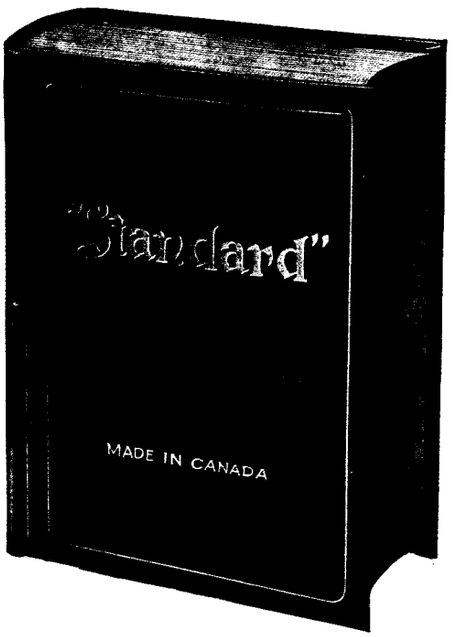

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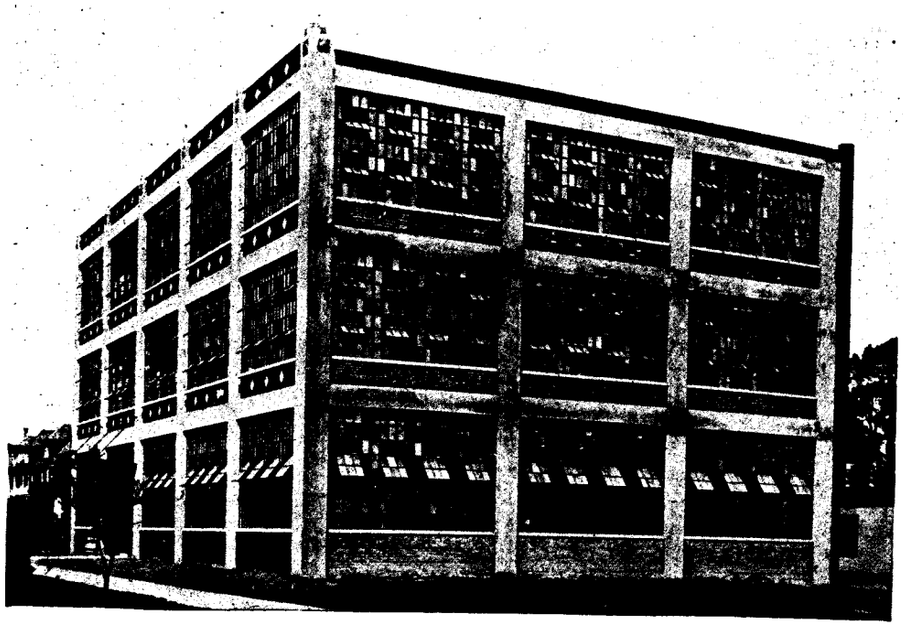

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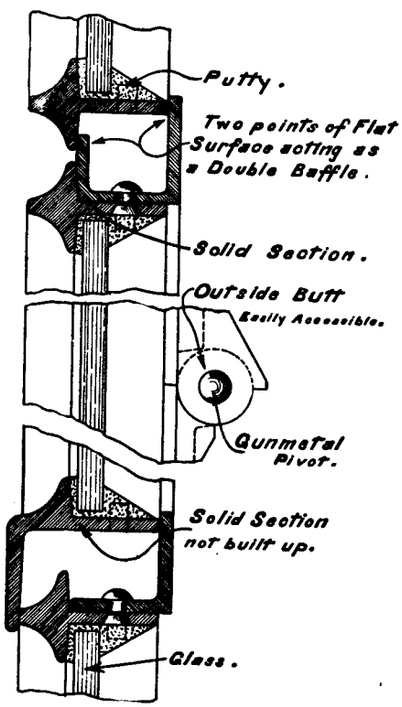

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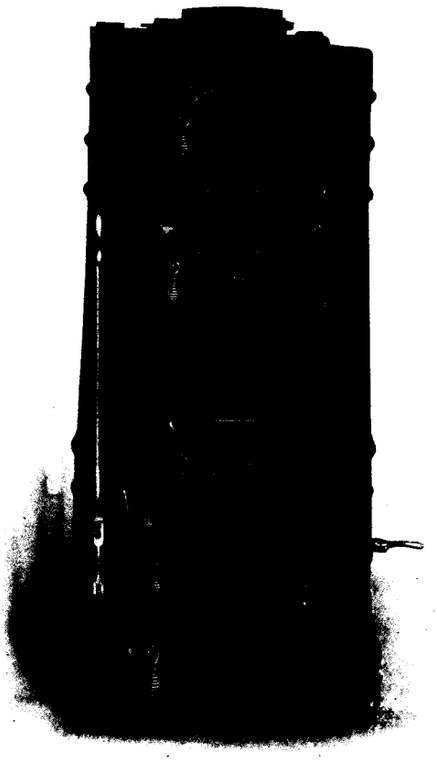

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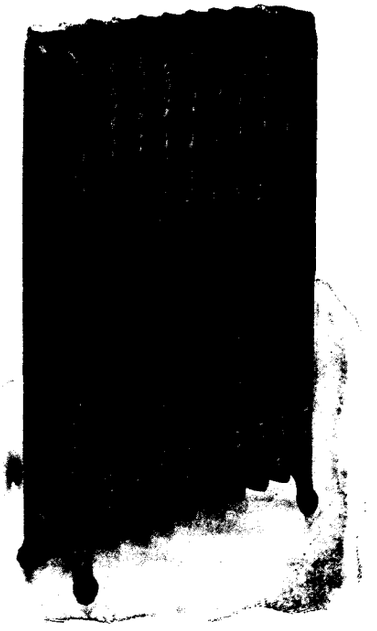

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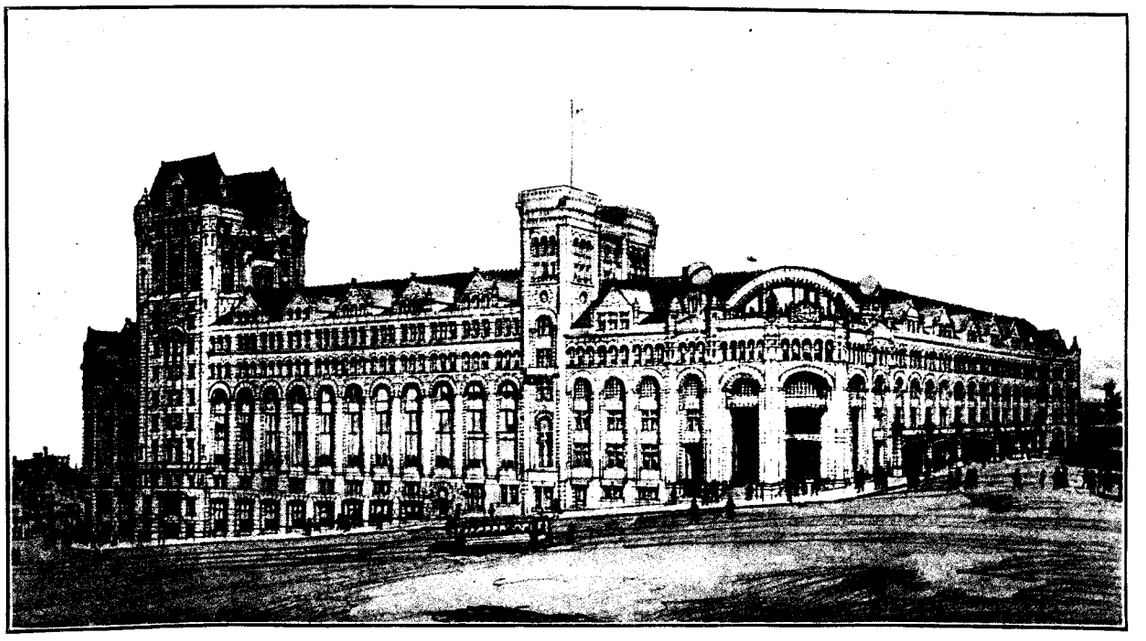

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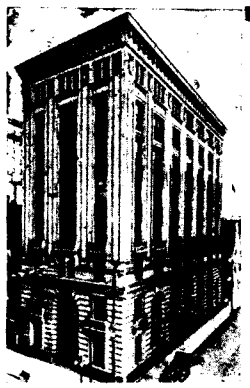

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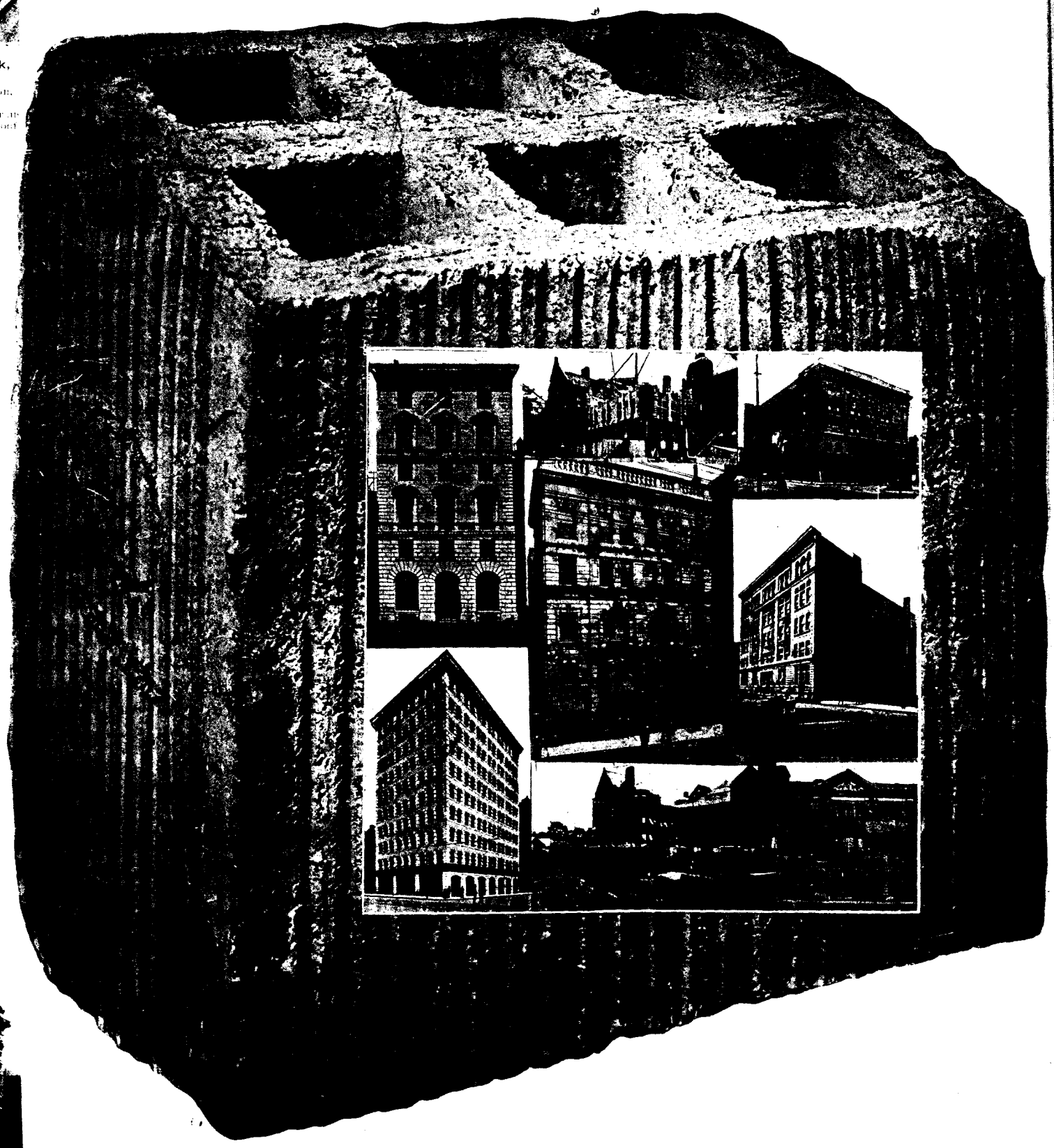

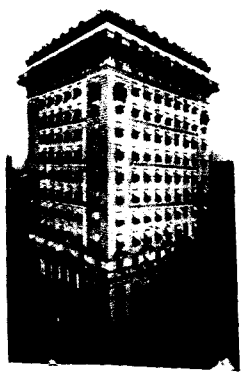

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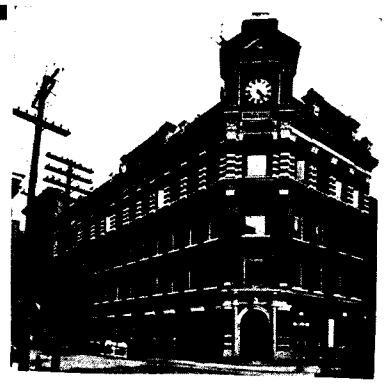

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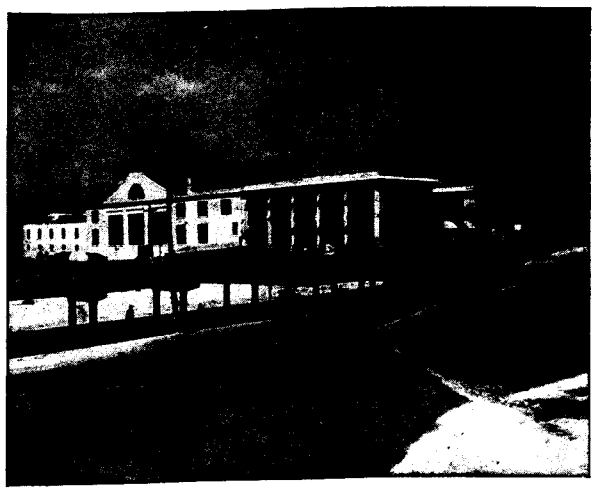

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M. PETERSON,
Secretary, Board of Control.

Board of Control Office,
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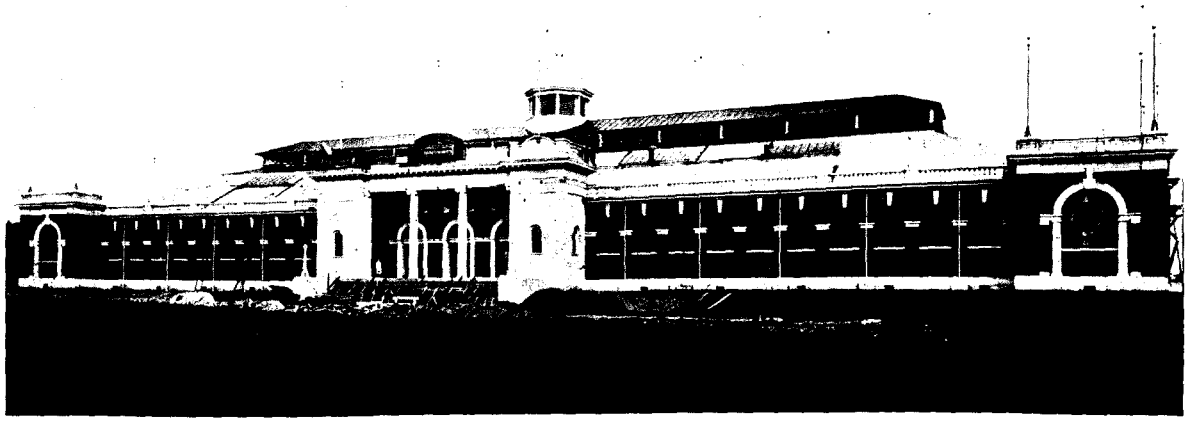

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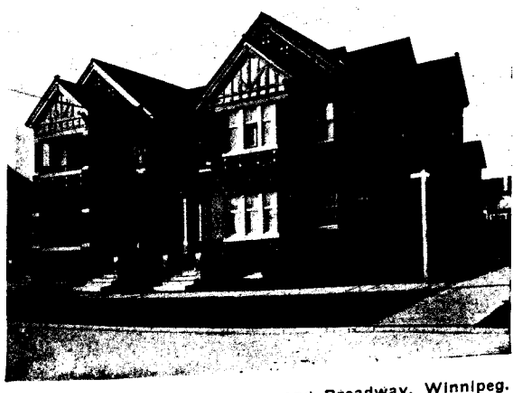
R. H. Metcalfe's Residence, "Norwood," Winnipeg. Wm. Fingland, Architect. Winder & Bowes, Plumbers. Bailey, Starr & Bird, Contractors.

Horticultural Building, Canadian National Exposition, Toronto. Geo. W. Gouinlock, Toronto, Architect.

THE splendidly preserved remains of the Baths of ancient Rome are a striking example of the care given to these matters at the various brilliant epochs of the world's history. What these baths meant to the elect in bygone days is now made possible for everyone by the widespread use of "Alexandra Ware." It represents the highest point in sanitation, convenience and beauty, and the number of homes, institutions and public buildings where it has been used gives everyone an opportunity of enjoying its advantages.



Duplex House, Corner Spence and Broadway, Winnipeg. Dolmer & Bonnette, Contractors. The John Plaxton Co., Ltd., Plumbers. Chas. S. Bridgeman, 20 Canada Life Building, Winnipeg, Architect.

Riverview Mansions, Winnipeg. R. H. Lear, Plumber. A. Simons & Co., Contractors. Chas. S. Bridgeman, 20 Canada Life Building, Winnipeg, Architect.

CONSTRUCTION

VOL. V NO. 9

CONTENTS FOR AUGUST, 1912

ILLUSTRATIONS

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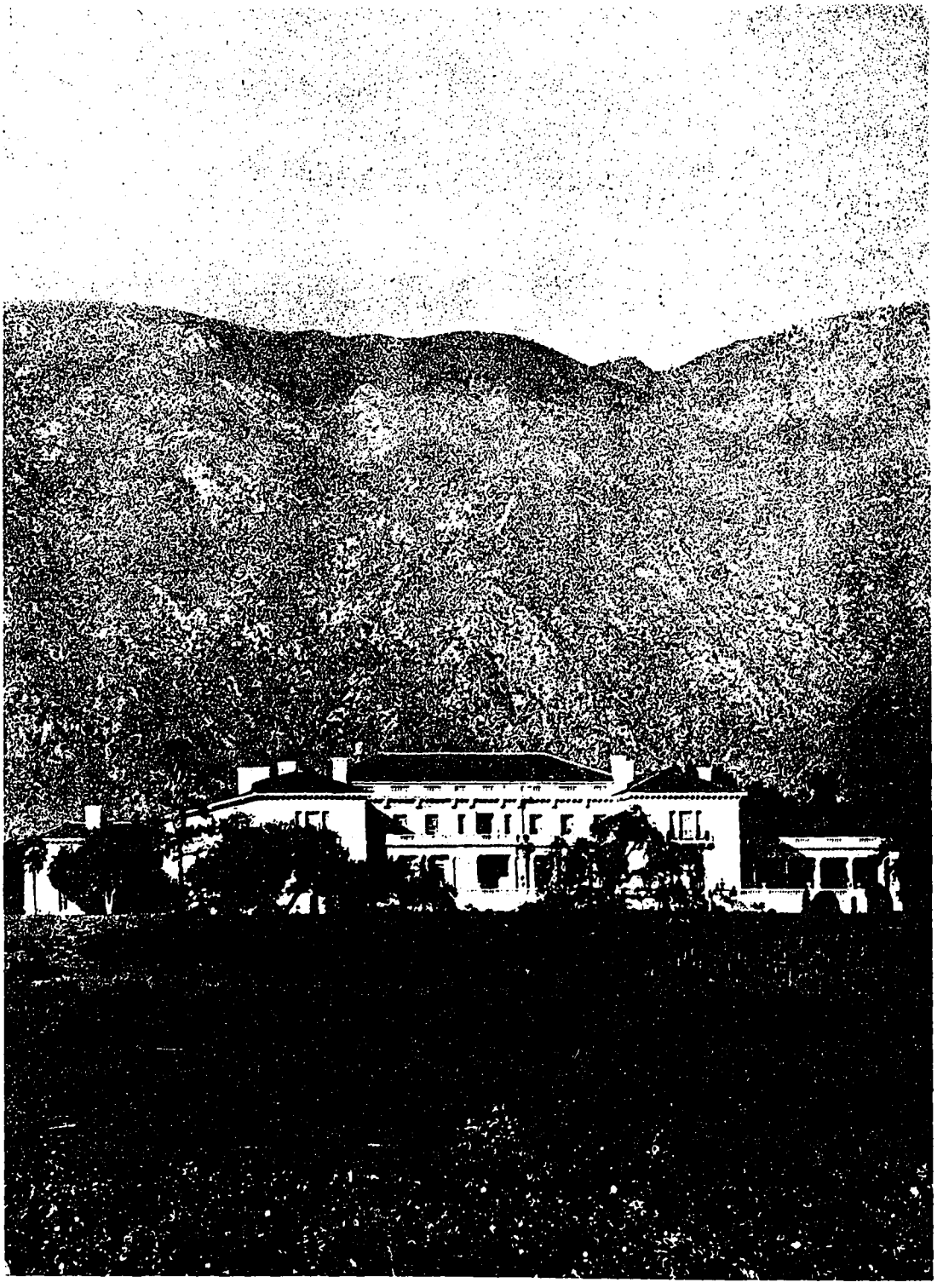


Huntington Residence, Oak Knoll, Pasadena, California. Hunt & Grey, Architects.

An important competition programme victory in the United States indicates that a firm stand taken by architects will bring results.

MISSOURI, the land of "show me," has given a demonstration of what architects can do in the way of regulating competitions that will be beneficial to the profession and public everywhere. Historically, the State of Missouri built a State House some twenty-five years ago. It appointed a commission, and this body sent out to architects a printed invitation. At that time there being, as to-day, a sentiment against improper competitions, the many faults of the programme were pointed out to the commission, with the result that it was withdrawn and one formed on lines satisfactory to the profession was substituted. A new State House is now projected, and the first experience forgotten, the commissioners issued a programme that was not only impossible from a professional standpoint, but pronounced illegal by the Attorney-General of the State. A second was evolved which observed all the legal requirements, but this also was objectionable to architects. The chapters of the American Institute of Architects of Kansas City and also St. Louis protested and asked the commission to make proper changes, but in spite of these protests the programme was printed and issued. The rule of the American Institute of Architects in regard to competitions is similar to that of the Royal Architectural Institute of Canada, and it is deemed unprofessional for any member to enter a competition the programme for which has not the approval of the Institute. The American Institute in effect has taken extreme measures in this regard, and at the last convention not only were the names of violators of the rule mentioned, but some were disciplined for so doing. It has thus become a fixed principle that the executive committee of the Institute and the committee on competitions approve of all programmes before it is permissible for any member to enter a competition. At this stage of the proceedings the Kansas City chapter, followed by that of St. Louis, passed formal resolutions of protest, and the standing committee on competitions of the Institute communicated with the commission, offering to assist in the revision of the programme. The resolution passed by the St. Louis chapter and which expressed the position of Institute members, was as follows: "Since the programme for the Missouri State Capital competition is at variance with good practice and custom, and with the recommendation contained in the code on competitions of the American Institute of Architects, and since this programme has not been approved by the subcommittee on competitions for this district, or by the standing committee on competitions, or by the executive board of the American Institute of Architects, this chapter shall consider it unprofessional and unethical for any of its members to enter this competition, and any members participating therein shall be subject to discipline by St. Louis chapter and the executive board of the American Institute of Architects." These protests of the chapters, backed by the active work of the Institute, convinced the commission that three-fourths of the well qualified architects in the United States would decline to compete under the terms offered, and a third programme has been issued containing all the requirements deemed necessary by the Institute. The result will be a double competition for a $3,500.00 building, the first ten selected in the preliminary trial being required to again compete, the winner to receive a commission at the Institute's required fee of six per cent., and the nine receiving one thousand dollars each. The significance of this is the apparent ability of architects to regulate competitions if the work is entered into energetically by the local architects supported by the full power of the national body. It is not venality, but ignorance of the requirements, and in public work often obstructing laws, that in most cases promotes the undesirable competition programme, and since this form of selecting an architect is a necessary evil and must be recognized, the more activity displayed by the profession in its regulation the better for the future of public architecture.

The complex position held by the architect a source of trouble in the adjustment of contracts between owner and contractor.

IN ENDEAVORING to overcome the anomalous position occupied by the architect in his relation to the owner and to the contractor, the architectural societies of England and of the United States have taken decided action in the issuing of conditions of contract forms, that of the

American Institute calling for signature by the contractor and the owner, and identified by the architect. The architect is sometimes the agent, sometimes the adviser to the owner, and sometimes the arbitrator between the contractor and owner. Thus the sixty-five hundred words under sixty-three articles in the "general conditions of the contract" of the American Institute of Architects seeks to cover all the contract conditions; and a similar document adopted by the Royal Institute of British Architects aims to place on a practical, operative and legal basis the business side of the position of the architect. The document issued by the American Institute is too new for any estimate to be made of its effectiveness. That of the Royal Institute is pronounced by some of its members to be inadequate, and by contractors to be unjust in many particulars, and its revision to render it more acceptable to the contractors without weakening its bearing upon the interest of the architects, is now occupying the thought of members in the Royal Institute. It is possible that, although the American architects have sought to profit by the mistakes of those in England in drawing up their first formal "conditions," that they will be criticized and held up for revision as have the several that have been formulated by the R.I.B.A. in its seventy years of activity. It is doubtful if a perfect adjustment can ever be reached without the architect waiving some of his professional prerogatives and becoming more of a professional man or more of a builder, yet the working out of some such form will prove a boon to the contractor, who has always occupied the position more or less of the nether millstone between the owner and his agent-adviser-arbitrator, the architect.

¶ *Toronto's housing scheme develops a co-operative aspect that is interesting as an experiment and promises success in operation and objects.*

THE DEVELOPMENT of the housing plan promoted by the civic authorities at Toronto under the corporate title of the Toronto Housing Company, Limited, is becoming interesting, and in some particulars unique. Starting with a general plan for relieving congestion in the city and providing houses that would meet the requirements and purses of trades people, it has in its charter developed into a co-operative company with wide commercial powers. The corporate papers issued by the Provincial Secretary contain a list of purposes and objects which range from the buying of land to the selling of groceries. The capital authorized is $1,000,000, divided into fifty dollar shares, and in addition to authority to carry on the general business of a land and building company, and that of contractors, manufacturers and general agents, the company is permitted to embark upon a wide programme of social, recreative and educational work. It is authorized to carry on the business of storekeeper in all its branches. By means of this section the civic company will be enabled to extend the co-operative scheme by supply of foodstuffs and household goods of all kinds, and that some such plan is under consideration is indicated by the concluding section, which gives the right to "make arrangements with persons engaged in any trade, business, or profession for the concession to the company, its shareholders, or customers, or others having dealings with the company, of any special rights, privileges and advantages, and in particular in regard to the supply of goods." Thus in Toronto will be operated a co-operative company, presumably under civic control, that will meet the dreams of the utopian socialist to the highest degree. There is a species of danger in giving to a chartered company such wide powers, but the experiment under provincial sanction and civic guidance is worth the making. It will tend to prove the feasibility of proper co-operation, and the results, both in their mistakes and successes, will be worth much more than the money invested to the people of Canada and of other countries that are working out the same idea, but without the liberty of action and the public welfare object that is behind this effort of amelioration, that has been taken up at Toronto. It is not in five years, but perhaps in ten, that the results may be weighed and a general estimate of the value of a municipal co-operative housing scheme brought to a definite estimate.

¶ *The Bloor street viaduct likely to be marred through deviation from the originally advised use of concrete to steel.*

AFTER showing a certain amount of wisdom in selecting the route for the Bloor street viaduct at Toronto that was recommended by those best qualified to judge both its æsthetical and practical value, the city authorities seem inclined to ruin the scheme by an ill advised selection of the material of which it shall be constructed. While in the preliminary discussion relative to the proposed construction but little was said regarding materials, the design was based on concrete because this material would make the viaduct interesting both architecturally and structurally, and this should not be deviated from. CONSTRUCTION holds no brief for either concrete or steel commercially. It has good friends and good business connections in either camp; but it decides off its own bat in regard to the material that should go into a particular construction without other thought than that which will cover all the conditions most perfectly. From the time of the Romans bridges have been built of stone, not altogether because of the structural strength of that material, but because of the architectural form and apparent strength which massive piers and strong arches impart to the structure. The contention of the city commissioner that he preferred steel to concrete because "bridges of concrete are as yet an experiment," stamps him at once as a man of little knowledge of things structural beyond the limits of the town he happens to live in. He has never seen the bridges (one of the longest spans in the world) at Pittsburg; that at Milwaukee which is the chief municipal bridge in that city, and those at New York, Philadelphia, Galveston, Spokane, Kansas City or San Francisco, and even nearby Peterboro',

nor has he appreciated their architectural proportions and harmonic joining with their surroundings. Nor has he knowledge of the corrosion of steel and the cost of its upkeep, particularly where the members of a bridge can be attacked by the fumes from coal-burning locomotives. The substantial sureness of concrete bridges, their lack of vibration that is destructive to the bridge and the nerves of those who live near them alike, gives another reason why concrete or stone is superior to any other fabric. But even if these differences did not exist, and they are here mentioned as facts and not in contention, the impossibility of giving to a steel structure that architectural form that is so necessary in the construction of the Bloor street improvement is of as great importance as its structural strength. In fact, in this location, where even the curve that has been given the route to conform with the contour of the ravine in order that its many beauties in as great a measure as is possible may be preserved, it is absolutely necessary that stone or concrete be used in the viaduct construction. When these individuals who have in charge the civic constructions in Toronto learn that they know nothing in regard to art, even its commercial value, that engineers, architects and artists, and the layman who has travelled and observed, do know, and instead of injecting their own opinions, or allowing themselves to be influenced by those whose only care is to sell a material or a property, defer to those of professional education and skill, then will the city begin to grow along lines of beauty, which stands for the highest degree of commercial worth. At present it is in the hands of the people to see that this Bloor street improvement be made a thing of strength and of grace by the use of the cheapest and best material of which it can be constructed, which is concrete.

¶ *The prospect of a proper plan and architecturally harmonious buildings at Ottawa for the future fame of the Dominion capital.*

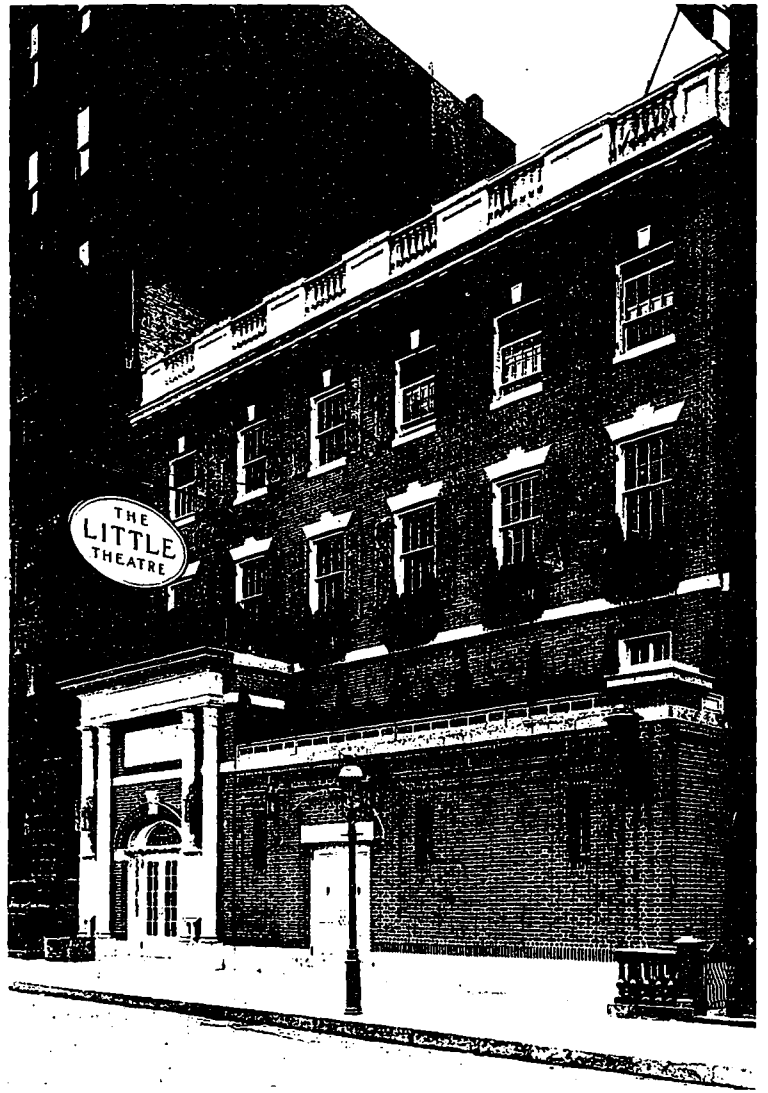
WHILE the capital of the Dominion of Canada did not have the advantage of a premier of intelligence and the expert knowledge of a French engineer in the laying out of Ottawa when it was founded as a governmental headquarters, the present premier, backed by a Minister of Public Works and progressive constituency, is trying to bring to Ottawa that same beauty of surroundings, architectural dignity in buildings and convenience in circulatory avenues as is enjoyed by the capital of the United States. For this these officials will be praised in the future when the foundations they have laid through the employment of the best architects and landscape engineers begin to show results in the harmonious combination of buildings and surroundings that go to make a beautiful city. But the task is so easy and free from extra expense that it seems the only logical procedure. The employment of an expert, from the cutting out of a garment or the planting of a field of potatoes to the improvement of a city, always pays the cost in the material and work saved, and in the additional product or use gained. As Washington has its ungainly and unsightly naval building to discount all beauty in the neighborhood of the White House, so Ottawa has many architectural mistakes of the past to interfere with perfect harmony, but these will gradually disappear and that disappearance can be taken into account in any well considered reconstruction plan. The main point is that the proper expert advice is to be employed and the buildings of the future placed where the plan designates, and designed by the best, and only the best, architectural talent of the Dominion.

¶ *The attitude of the Minister of Public Works toward civic improvement in Toronto a most encouraging feature.*

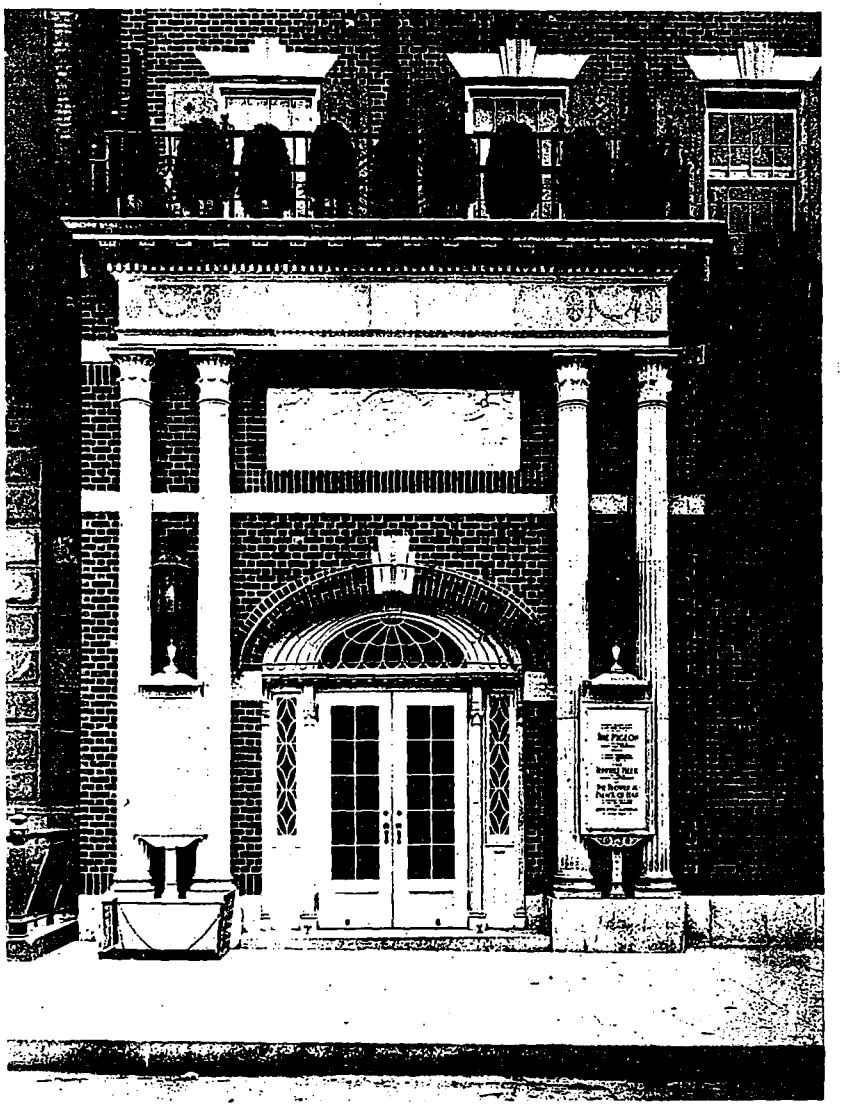
ASSURANCE by the Minister of Public Works that Toronto will receive consideration from the Dominion Government when Parliament meets, has been given. The liberal policy that is indicated by the Hon. F. D. Monk in his attitude toward the improvement in buildings and transportation facilities in the cities of the Dominion, is one of the most encouraging aspects of the present situation. The possession of a Minister of Public Works who is intelligent enough to see the necessity, and broad enough to do all that is possible in relief of acute situations, is exceedingly encouraging for the future of Canada.

¶ *Death of Cecil B. Smith, an electrical engineer whose loss is one of the greatest yet sustained by Canada among the engineering profession.*

AMONG the brilliant and accomplished engineers that Canada has produced, most have largely won fame in foreign countries. Cecil B. Smith devoted his talents, and they were of the highest order, to the engineering problems of Canada. That this valuable engineer should be lost to his time and country at the age of forty-eight, before he had even reached the maximum of his ability and value, makes his death a distinctive loss to the people as well as to his profession. His specialty was hydro-electric power, and in this rapidly developing industry he had no superior. He constructed the Canadian Niagara Falls Company line, and for this received the Gzowski medal. He was a member, and at one time president, of the Canadian Society of Civil Engineers, a member of the Institute of Civil Engineers of Great Britain, and president of the Toronto Civil Engineering Club. Thus the death of Mr. Smith is a public loss that is beyond computation when it comes at the very outset of the development of Canada's water power resources, to which future manufacturers must look for motive power and her cities for heat and light. There are other engineers who will take up his work and many that in the future will live longer and rise to greater accomplishments, but there will be none endowed with the initial success or with greater promise of greatness in electrical engineering science than he who was cut off in the midst of a most successful career.



Façade.



Detail of Entrance.

The Little Theatre, New York. Harry Creighton Ingalls and F. Burrall Hoffman, Jr., Associate Architects.

A UNIQUE THEATRE IN NEW YORK

"The Little Theatre," an expression of education, taste, and refinement in theatrical art, with an atmosphere of simplicity in external design and decorative richness in the interior. Description reprinted from "The Architect."

THIS newest among the playhouses of New York differs fundamentally from them in more than mere physical characteristics. When we have marked, says The Architect, its modest size and limited seating capacity, the absence of boxes, balconies and gallery, the restraint of the decorative treatment, the character of the exterior—so extraordinarily remote from the usual conception of a theatre façade—we have stated some of the obvious differences. When we say that it was conceived and is owned and managed by a gentleman of education, taste and refinement for whom the theatre is a career, who regards the drama, not as a vehicle for the amassing of a fortune, but as an art of which the best manifestations should be presented as works of art in a setting and an atmosphere worthy of them, we have noted the spiritual lacunæ that divide The Little Theatre from the others. A man's house bespeaks the man and expresses him. This is the house of Mr. Winthrop Ames; the patrons are his guests for the nonce, in an old colonial house behind a garden wall, left behind in the march of progress, the simple front untouched and the interior remodeled by an amateur of the stage.

A work of art is to be judged primarily by the intent that lies behind it; if we get that, we can approach it with intelligence at least, if not with sympathy; we believe we have correctly interpreted Mr. Ames's intention and it is in the light of this interpretation that we should approach his theatre.

A man's house bespeaks the man and expresses him. It bespeaks him equally in the absence of expression of him and his personality. The architect provides a frame that may or may not accord with the portrait; this may result from lack of sympathy with the subject, lack of skill, lack of insight. The fabric may express the architect alone and in so doing signalize the lack of personality in the client who failed to impress himself upon the work. In this instance we feel a rare concordance, a sense of co-operation between the architects, Mr. Harry Creighton Ingalls and Mr. F. Burrall Hoffman, jr., and their client, that has produced something new and good and fine, and we venture to say inclusively expressive.

The illustrations and text presented here will give to those who have not been fortunate enough to make a personal inspection of the building some idea of what has been accomplished. An old-time house of dark red brick laid in white mortar, accented with French limestone (Pierre de Lens), bluish-green wooden shutters, white window panes and sash, and doors, an oval sign over the entrance, all bathed in a strong light from hidden sources, plants showing above the wall—this is the first impression and piques one's interest.

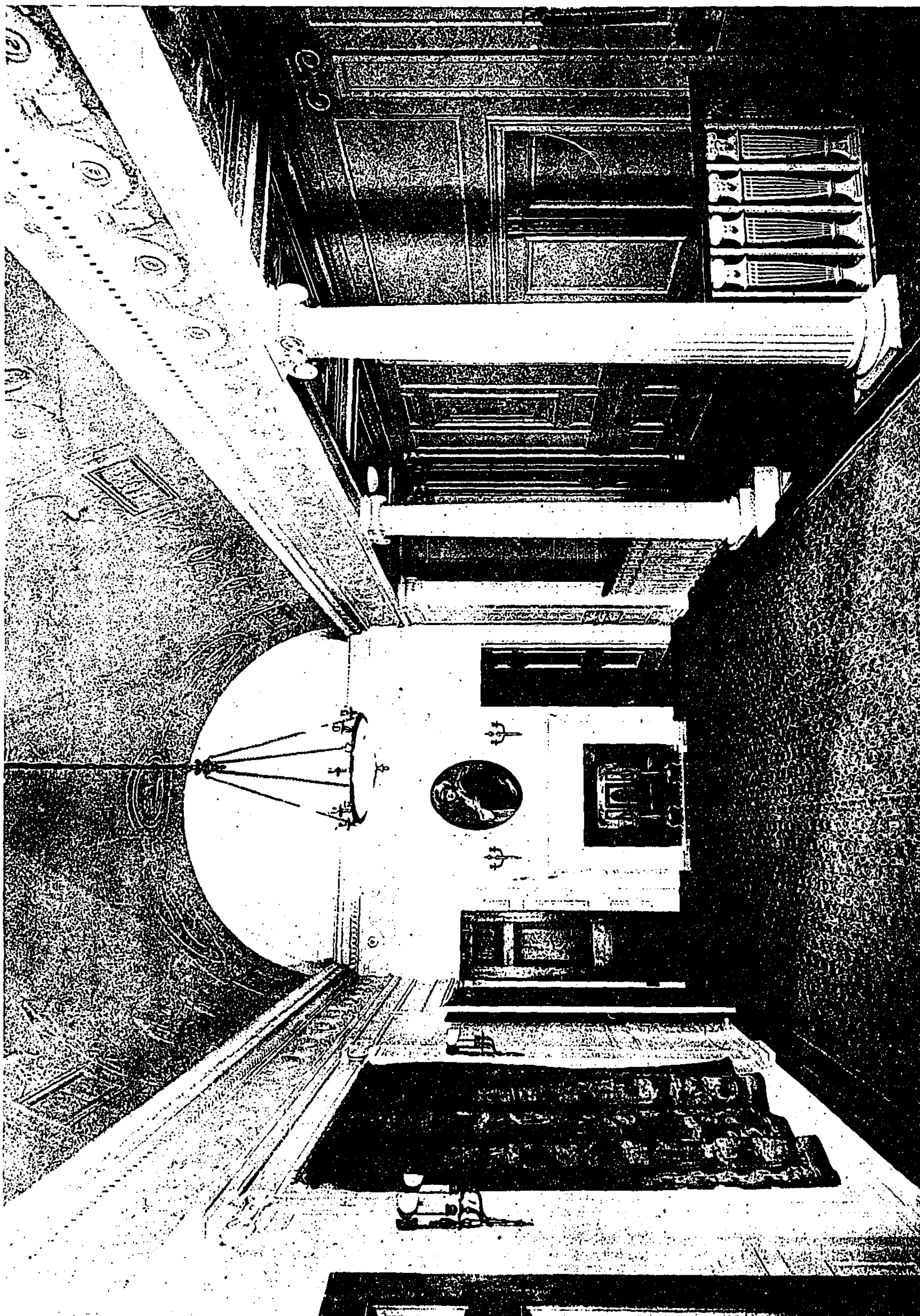
The entrance lobby is exactly in the picture; one would expect it; paneled to the ceiling in wood painted a pale ivory. A door to the left at the rear communicates with the open passage to the stage; to the right wide double doors open to the vestibule or foyer, barrel vaulted, painted like the lobby; at the far end over a simple fireplace is an oval decorative portrait painted for the place by Russell Greeley. The carpet is grey and lighter grey, and is the same throughout the house except in the men's smoking room.

The door to the left of the fireplace leads to the ladies' room, balancing the lobby in plan, painted like the vestibule and furnished with a large mirror and a dressing table, *chaise longue* and side chairs in mahogany with old rose armure coverings.

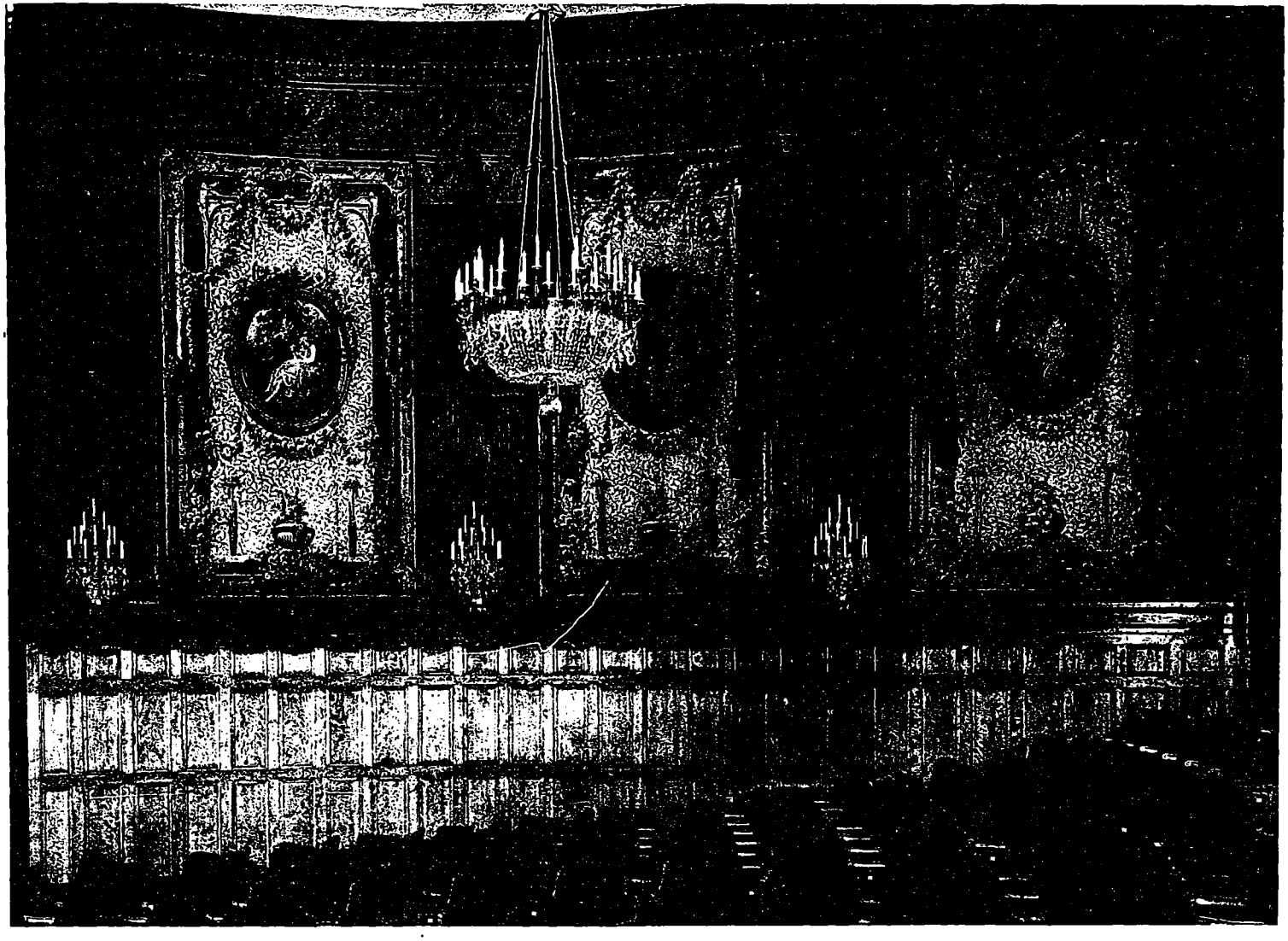
The stairs to the right of the vestibule descend to the tea room, which resembles a living-room in a private house, furnished in old English oak, with white paneled walls, blue-green curtains and grey carpet. Tea is served here during the entre-acts at the afternoon performance, and coffee at night, and it is always thronged at such times. It is also utilized as a cloak-room; on entering one goes down stairs and leaves his coat; during the first act the racks are pushed back into the corners of the fireplace alcove and hidden by handsome Spanish leather screens; after the performance patrons have the entire room in which to cloak themselves.

The men's smoking room on the level of the tea room, has a wainscot in birch stained like French walnut, yellowish-brown walls, cream ceiling, fixed benches along the walls and a red Welsh quarry tile floor.

Thus far, there is nothing extraordinary except the intimate, domestic air of the place, and the simple, good taste that pervades it. We might meet with the like in any theatre, provided the taste. But the auditorium is most unusual. It is as though a high and spacious room in a private house had been converted into a theatre, by putting in an inclined floor and cutting a proscenium opening in the further wall. It is restful, curiously domestic in quality, sober in color, perfectly lighted. The wainscot is

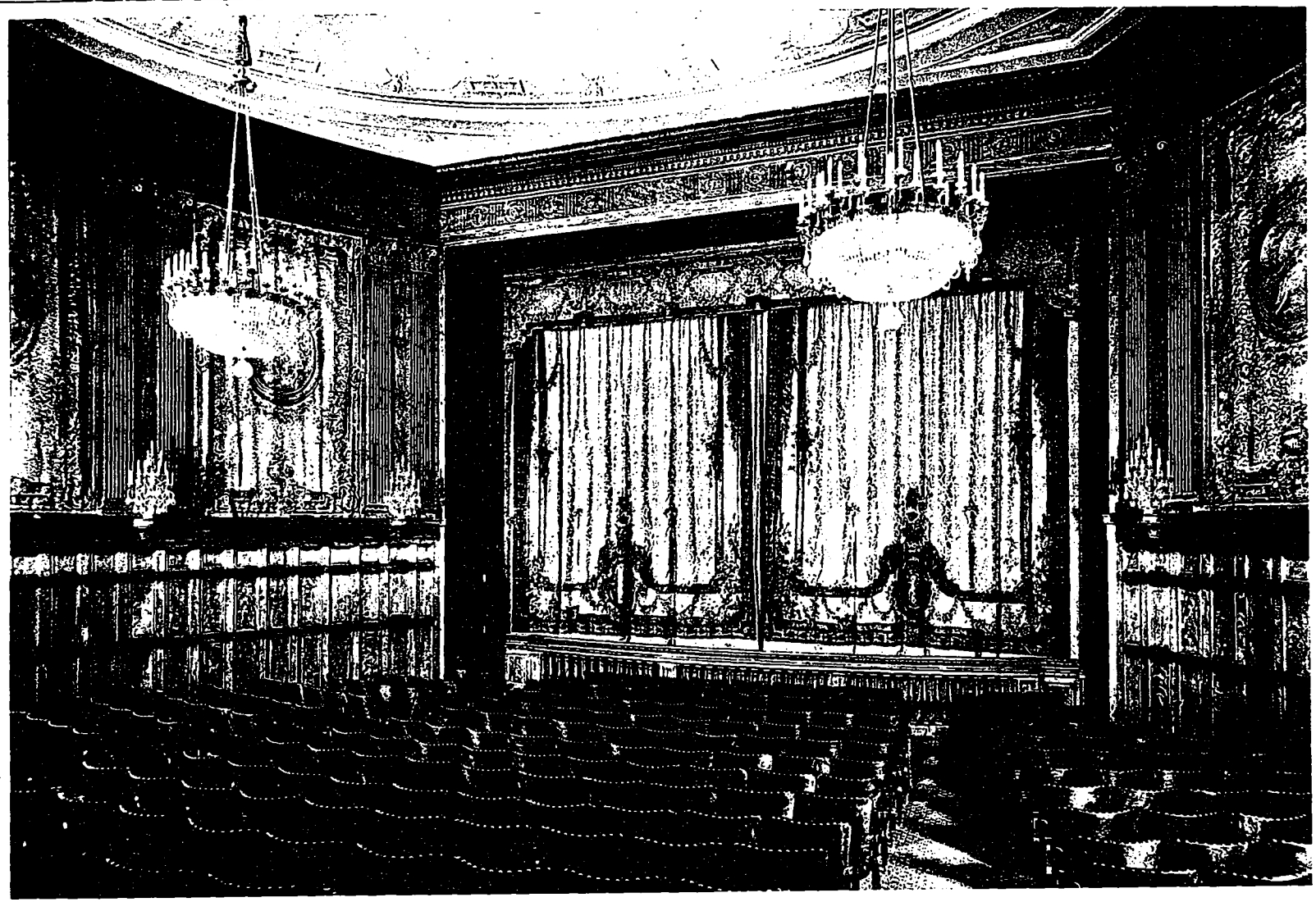


Foyer Hall.
The Little Theatre, New York. Harry Creighton Ingalls and F. Burrall Hoffman, Jr., Associate Architects.



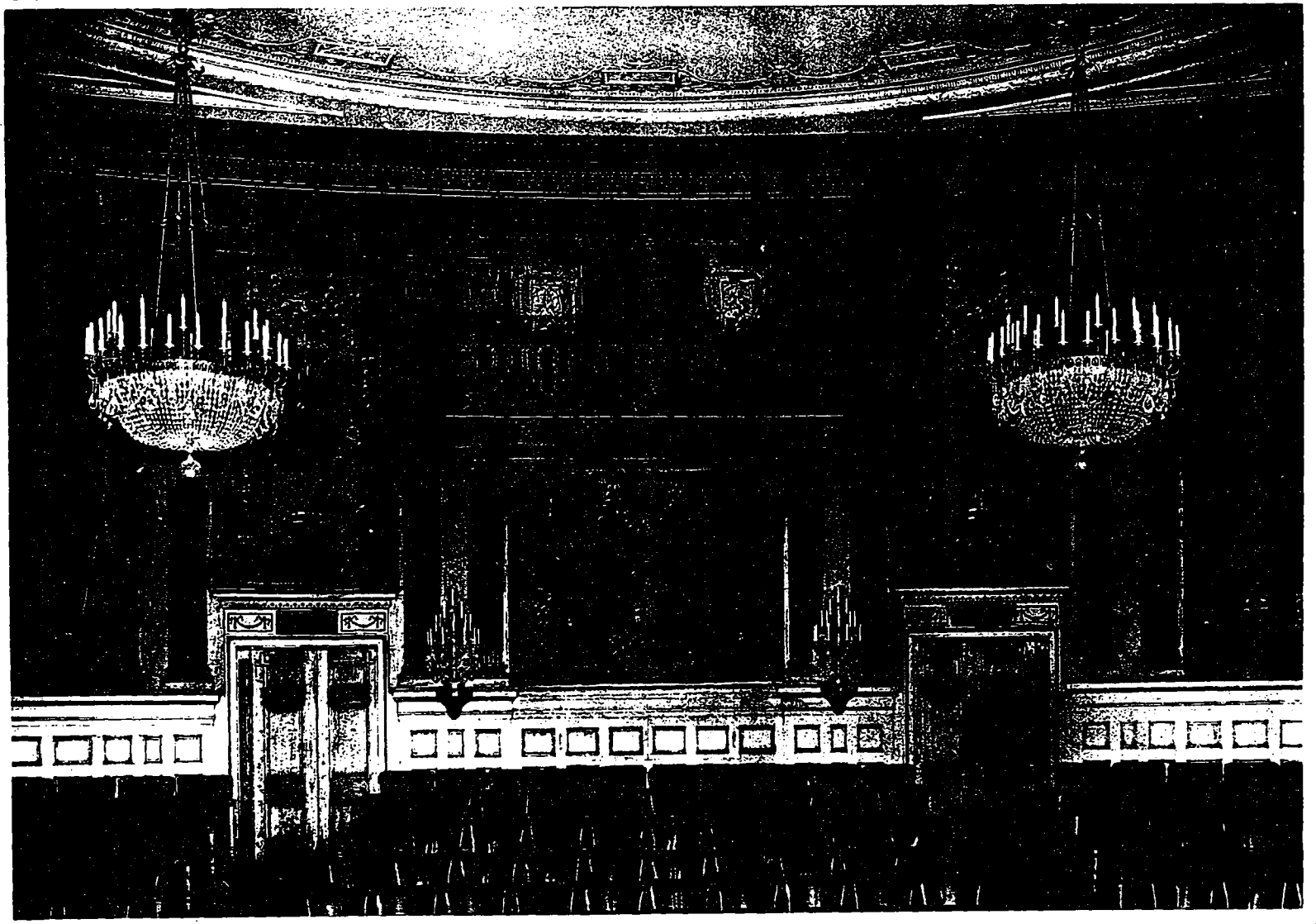
Entire Side of Auditorium.

The Little Theatre, New York. Harry Creighton Ingalls and F. Burrall Hoffman, Jr., Associate Architects.



Auditorium.

The Little Theatre, New York. Harry Creighton Ingalls and F. Burrall Hoffman, Jr., Associate Architects.



Back of Auditorium.
The Little Theatre, New York. Harry Creighton Ingalls and F. Burrall Hoffman, Jr., Associate Architects.

birch stained the color of French walnut; the pilasters and cornice above are plaster painted to match it, with faint traces of gold rubbed in on the capitals and cornice. The walls are hung with tapestry cloth, painted after Boucher in soft greys, blues and browns and dull cool reds. The ceiling is pale ivory and plays its part in the scheme of lighting. The seats are like the woodwork and are covered in brown Spanish leather; and the floor is carpeted throughout with the grey carpet already referred to, and which ties room to room most effectually. At the rear of the auditorium is a balcony large enough for an orchestra or a choir, and used also for a spot light. In the frieze above and to the left are concealed openings through which Mr. Ames can watch the performance from his private office over the vestibule.

The proscenium, so overdone and overtreated as a rule, is here merely the largest opening in the room, to which it belongs equally with the entrance doors. The jambs are slightly splayed toward the stage instead of toward the house, as is usual, and are painted a slightly darker shade than the woodwork, so as to kill disturbing reflections from the footlights. These jambs are of iron, set inside the brick opening and leaving a "tormentor" space for the prompter, the side scenes being set a few inches back of the proscenium opening so that he may watch the play; this space is also used for spot lights; above, behind concealed shutters, are other places for spot lights.

There are three curtains; the outer or draw-curtain visible in the illustrations has a field of light blue and dull gold silk brocade, a border of gold colored silk rep painted like the wall tapestries and an outside border of blue velvet of the same general tone as the field. The valance is similar to the tapestries.

Behind this is the guillotine curtain of light blue velvet with an applied border of silk.

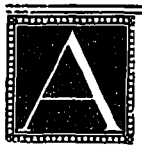
The draw-curtain starts to rise first and when about one third high, the second curtain follows and is raised out of sight, leaving the draw-curtain in loops around the opening or else entirely withdrawn as desired. Both these curtains are outside of the proscenium and run in iron slots covered with blue velvet to avoid reflections.

Behind the proscenium wall is the asbestos curtain, painted a darker blue than the guillotine, with a simple painted border.

The space for the orchestra is almost entirely beneath the stage, the sound of the music coming up to the audience pleasantly softened, through the opening between the orchestra railing and the stage. Another departure is in the disposition of the foot lights in the railing of this balustrade. All of the mechanical equipment is most complete and of the best. A revolving stage facilitates the setting of scenes, and differs from the one in the Century (formerly the New) Theatre, in that access to any part of the stage floor may be had from below. This was designed by the architects with the assistance of their consulting engineers, the Hooper-Falkenau Company.

The lighting of the house is beautifully done. In the auditorium the principal source of light is the two crystal chandeliers. These, and the side brackets (which are really candelabra and stand on the wainscot ledge) are candle fixtures, the flame-shaped bulbs half concealed in the candles so that the latter seem to be of translucent wax. In each of the chandeliers is an aluminum dish reflector with many lights around it. Each outlet is on dimmers and each separately controlled from the stage switchboard. When the lights go up the candles light up first and on arriving at full strength, the reflector lights slowly follow, throwing the light on the white ceiling whence it is diffused through the room. Two-thirds of the lights in the vestibule and other public rooms are on dimmers also controlled from the stage as signals; the other lights at the various outlets are on local switches.

The lighting of the exterior is equally well considered. Five lanterns of 250 candle-power each, serve to diffuse light along the lower part of the building and toward the entrance and exits; two spot lights of the same power illuminate the sign; while strip lights behind the flower boxes over the entrance and vestibule light the upper stories, producing all told a most effective night picture, gay, friendly and decent.



LESSON OF THE TITANIC

By F. W. FITZPATRICK

The risks of land construction from unstable and combustible building governed by the same principles, or lack of them, that influenced the greatest sea catastrophe of modern times.

IN EVERY way tremendous, that Titanic ship's final act of its brief career sets its name in the most conspicuous place in the history of the world's great catastrophes. The wise ones will now tell us why it happened, what should have been done, how the horror could have been prevented. All summed up, we will probably be impressed with the fact, and learn what we must have known before, that if common sense and care and discretion had been exercised such an accident could not possibly have happened. The mad striving for speed, the competition of the big companies for traffic, and the demand that that traffic makes and the alluring bait it offers for the gain of even an hour are the real causes; carelessness in enforcing laws as to sufficient lifeboats and all that sort of thing, or the lax laws that permit vessels to go to sea not properly equipped for every emergency, or the laws that permit them to follow certain courses that, though shorter, are more dangerous in certain seasons than are others, are but the secondary or contributory causes. The remedy? Why, set aside, quell, or hold in leash human greed for dividends, human lust for the glory of doing something that the other has not accomplished—regardless of at what risk in human life the victory has been won—and the human weakness of being careless with others' and our own lives and being so ready to go to any extreme and take any

chance in order to add a dollar to our gain or to save ourselves some trouble. Do these things, and neither a repetition of that appalling "accident" nor most of the others that now "happen" so frequently will be probable or even remotely possible.

The hopeless feature of it all is that while undoubtedly ships will now be compelled to always follow such a course as will assure their keeping out of the path of icebergs and that probably they will also be compelled to carry a fuller complement of lifeboats, our remedial efforts will cease there. That will be much, granted, but nevertheless pitifully little to apply and to use of the great lesson that should have been learned. We humans learn great truths as a whole most slowly. Each little detail has to be ramrodded into use piece-meal and via most forceful and impressive lessons, and we then absorb it most unwillingly, reluctantly, and it alone and without any regard to its part of the whole, but merely as if it were an entity itself.

Take for example our application of the great lessons taught us—who build the structures on the land—by that other dread devastator, Fire. We know, or ought to know, perfectly well how to build so that fire can do those buildings little or no harm. The knowledge is available, the requirements of good construction are, after all, simple and not over numerous, there is nothing involved nor super-difficult to learn, the whole science or art is, as a matter of fact, almost ridiculously simple. Yet we go on adding more and more fuel for future conflagrations to consume and then are duly appalled as each one happens! The lessons we really learn are as homeopathic doses of medicine. We take one little step at a time after being virtually kicked into taking it and we supinely sit down and wait until kicked again to make the next move.

We expect the law to compel us to do things. It would seem natural that we should make every effort to protect our lives and property of our own free will, but we invariably wait for the law to make us do so. Take this Titanic affair; the officers of the company now say that they carried as many lifeboats as the law compelled and they show the certificate of examining officers to prove that they left port with all the equipment and such that the law said they should. It is always the law, the law. If the law says that you must carry at least seven life preservers and you happen to have ten passengers, wouldn't it be common decency, but ordinary honesty and humanity to throw in three extra preservers just to make sure?

The Iroquois Theatre fire properly dumbfounded us. We knew perfectly well, though, that it was a possibility and had not yet happened only by the sheerest good luck. We then scampered around and grew very busy with *theatres*, but, mark you, theatres only. To-day we write building codes in which twenty pages are devoted to building generally and twenty-five to theatres specifically. Then the Collinwood disaster, and, as suddenly we were impressed with the fact that school buildings should have doors that opened out and no furnaces under the wooden stairs, and we are attending to that detail oh, so carefully, though a thousand others just as important are set aside with the most sublime nonchalance. Remember, however, that it is with the laws controlling such things that we are so busy. We are endeavoring to compel those precautions, one at a time. If we don't do it by law there are hundreds and thousands of us willing and anxious to do the same thing over again and take the same chances, and if the catastrophe should happen again those hundreds and thousands would shrug their shoulders and say that they had done *all* the law compelled. Good God, it makes one's blood boil to think of the inhumanity of man!

But even in the manufacture of those laws it is only the thing that is largely demonstrated, that is superforcefully impressed upon our dull wits, that receives any attention. We fail utterly to see its relation to other things.

Do you suppose that the San Francisco or the Baltimore horror has impressed the people generally and the bulk of the architects themselves, for that matter, with more than any one detail, with the fact that buildings should be better built? Not a bit of it. As far as San Francisco is concerned, the idea seems rather to be that earthquakes are bad things and scientists should devise some means of restricting their violence. To realize that if the buildings had been properly built they could not have been shaken down, and if properly constructed to resist fire, even if the earthquake had done some damage, the city could not have been destroyed by a conflagration. Experts tell us that had the fire not taken place the earthquake damage would not have exceeded ten million dollars. It was the fire that ran the damage into the hundreds of millions. And as for Baltimore, its lesson is almost forgotten. Perhaps we have a vague sort of an idea that something should be done to keep fires from occurring on windy nights. The simpler, the saner, the real cure for the evil, providing less, or, better still, no fuel for fire to exist upon hasn't yet been corkscrewed into where our brains ought to be. Not only were those two lessons almost entirely lost upon the entire country, as far as the problems in a general way are concerned, but in the two stricken cities themselves you'll find pretty nearly just as poor construction in the great bulk of the re-building as existed before the catastrophe.

Some day there will be a terrific loss of life in a department store fire, a store where aisles are cluttered up with bargain sale tables, great open courts four and five stories high, elevators and stairs also opened and not directly adjacent to the street, narrow and too few doors and the other etceteras that must be evident to anyone who thinks and can see, the etceteras that go to the making of the proper conditions for a wholesale holocaust. 'Tis the greatest wonder and excessive good luck that such a fire has not already happened. When it does there will be a scampering to rectify the one detail that seemed to contribute most to that fire's success. Nothing more! If another great fire occurs in another such store the detail that will be lessoned into us then will take root and not before.

TOWN PLANNING

By FREDERICK LAW OLMSTED

Prime considerations in the study and execution of town planning form the substance of an important expression by an authoritative expert, read before the Town Planning Congress held at Winnipeg on July 15, 1912.

THE PEOPLE of the Canadian West, from whatever source they come, are, as a whole, self-selected because of certain mental qualities. They would not be there if they lacked these qualities. I mean such qualities as a confident outlook upon the future, a willingness to enter upon new ventures and to give up minor advantages in the present for the sake of future good, a willingness to look facts in the face, and a habit of going directly to work to get what is needed. These are qualities common to the West on both sides of the border. But in the United States, the complicated systems of constitutional checks and balances, inherited from our eighteenth century forbears, so frequently interpose obstacles to a direct straightforward, practical approach by public action to any newly recognized objective, that the energies of our people are largely forced into private, individualistic, or extra legal, methods of accomplishing their wants, often at a great waste of time and effort.

If a new thing that needs to be done can obviously be done more promptly and effectively by some common agency, municipal or otherwise, than it can by individual effort, it accords both with the straightforward practical spirit of the West and with the practical Anglo-Saxon disregard of logical theories to go ahead and get it done that way, without splitting hairs over the question of whether the thing to be done falls into a previously conceived logical category of governmental functions or not—and similarly, if the new thing to be done can be most effectively handled by individual initiative it accords even though no very complete logical theory has with the same spirit to give scope to that initiative, been evolved to account for the practical difference of method.

I venture to believe that the majority of delegates are not theorists in government or in economics in all, but practical men looking for practical results and ready to use any practical businesslike means of getting the desired results, regardless of what camp of theorists may claim those means as their special pets.

There is a tendency among theorists and certain politicians to seek the appearance of logical consistency by so shaping their course that it can always be defended by the same set of arguments. With such men to admit any validity in the arguments of Henry George or to use those arguments in support of any practical proposition, stamps one immediately as a single-taxer, to be thenceforward regarded, according to the color of the particular theorist, as a dangerous foe of property rights or as a fellow enthusiast in a struggling cause. To object to a measure on the ground that it would hamper and depress individual initiative and curtail investment of private capital without corresponding public advantage, stamps one as belonging to another category, called by some, reactionary, by others, safe and sane.

But the practical man who is not a slave to labels and to precedent does what the circumstances seem to demand in each case, without any fear that he will commit himself to the whole socialist programme by doing one thing the socialists approve, or debar himself from taking the side of the conservatives in another matter. Of course, I here use conservative in its broad significance and not in its conventional application to a political party. Those who are by habit and theory always conservative in this broad sense are sometimes in the right and sometimes illustrate that definition of conservative applied by Grant White to certain timid and inert people during the American civil war. He said in substance that "the conservatives be they who, finding themselves in hot water, remain there lest they be scalded." It would be equally easy to define the progressives as those who, finding the frying pan too hot, precipitate themselves into the fire. But the man who steers his course directly toward definite, practical ends, and who selects his methods by the results they bring instead of by the company they keep, is saved by common sense from following any theory till it gets him into either of the situations held up to scorn by these definitions.

I believe, then, that you here gathered at Winnipeg, possessed of the Western spirit of activity and directness, and freed from many of the hampering legal technicalities which impede straightforward approach to practical ends in the United States, have before you a great opportunity.

Now the practical end in view in this business of town planning is to secure for a community of people as much as possible of the advantages of gathering close together with as little as possible of the drawbacks, so far, at least, as those advantages and drawbacks depend upon the physical conformation of the town and its equipment. That end cannot be approached with measurable success except by the expenditure of a great amount of effort and of capital by a great number of individuals working

from all sorts of mixed motives, of which one of the most universal and most effective is hope of personal financial gain, whether in the form of speculative profit on invested capital or compensation for services or both.

It is the business of town planning to watch this huge activity and the tendency of its results, to guard, so far as practicable, against its application in conflicting, wasteful, injurious ways, and to stimulate it and guide its application in efficient ways. As long as a town has before it any expectation of growth or change, town planning must be kept up. It is a continuous function, never finished until the town is dead.

No limit of time can be set beyond which the future is not to be considered in town planning; yet, as a practical matter, regard for the contingencies of the remote future must not be allowed unduly to delay or hamper provision for the immediate future.

No limit of space, such as an arbitrary municipal boundary, should check the town planner from studying and providing for any physical changes required by the probable growth of any community; yet, as a practical matter, the planning for remotely outlying improvements must not be done at the expense of pressing improvements closer to the heart of the town.

No hard and fast limit should be set to the scope and subject matter of town planning by any theory of the limits of governmental activity or the rights of the private property owner; yet, as a practical matter, town planners are under obligation to deal effectively in the first instance with those features of the town which depend wholly upon municipal initiative, and to concern themselves with the rest only in so far as they can extend their activities without neglecting their first obligation.

In other words, although the field be unlimited as to time, space, and subject matter, there are certain portions of the field which are of much more pressing practical importance than others, and town planners should bear this fact in mind and be careful not to bite off more than they can chew.

On the other hand, one of the great obstacles to the far-sighted planning of any active growing town is that the planning and execution of immediately necessary improvements is apt to absorb the whole time and energy of the technical staff available for the work of planning. It is therefore almost essential, in order to secure well balanced progress in town planning, to provide a separate and considerable appropriation for planning not directed to immediately necessary ends. It is of the judicious expenditure of such appropriations that I want to speak.

There are two important features of a town which can seldom be secured in any other way than by deliberate municipal initiative, and which can be economically secured only by providing for them in advance of an actually pressing need. Those features are adequate main arteries of circulation and adequate public recreation grounds.

Local streets will always be provided, after a fashion, on the initiative of landowners in any growing town, and as to them, therefore, only a certain degree of regulation and guidance need be exercised in behalf of the community. Public building sites can always be secured, after a fashion, as they become needed, although better results and sometimes greater economy may be secured by planning ahead and making provision for them in advance of actually pressing necessity; but unless steps are taken by municipal authority, long in advance, to secure from occupation by buildings all the ground which is likely ever to be needed for the main arteries of circulation and for parks and playgrounds and other large public open spaces, the community will pay a heavy toll.

I use main arteries of circulation in a very broad sense. Its interpretation in any given town involves a large part of the work of town planning for that locality, but always it involves more or less detailed consideration of the requirements of the future as to the location, size, and gradients of the main channels of storm water discharge, of sewerage discharge, of general street traffic, and of street railway traffic. Normally, it should also involve consideration of the requirements of the future as to other railway lines, including interurban and rapid transit lines and freight facilities, and sometimes commercial waterways.

The percentage of the whole town area required to make even a liberal provision for the future in respect to such main lines of circulation really involves so small an addition to the percentage normally set apart for local streets that it does not appreciably affect the convenient compactness of a town during the years before it grows up to the need of the increased means of circulation, nor does it at all diminish the total valuation of private lands. The chief danger of really burdening the community through setting apart such areas long in advance of the immediate necessity for their public use is two-fold. They are withdrawn from the many useful purposes to which they could be put if left in private hands, even without being built upon, and the public is burdened with their unproductive maintenance or even induced into undertaking large expenses of construction upon them long in advance of any real public necessity.

Of course, the mere careful planning of such a system of adequate main arteries of circulation does not involve any such danger, but in order that the planning shall lead to practical results it is usually necessary to take some legal steps to prevent the erection of obstructive buildings within the areas designated for the future arteries and to do so long before the public needs to use the whole of the reserved space. In most cases, however, by the time it becomes necessary to take any public steps to prevent the erection of buildings within such a reservation, it is reasonable to lay out within it, for present needs, a street of ordinary width (if such does not already exist), and at that time an easement can be taken on the rest of the area by establishing a building line which will permanently prevent the obstruction of the wider artery by buildings while leaving that portion of the land not yet required by the public to be used by the abutters for gardens or other such purposes.

Almost the same procedure applies to local parks and playgrounds as to district thoroughfares, and the German principle is a sound one which declares that whenever any tract of land is opened up for subdivision into streets and lots, a proper percentage of public open space to provide for *all the needs* of that locality *when fully populated* must be dedicated, or must be acquired by the municipality in the vicinity and assessed upon the land pro rata.

Equally important with establishing an adequate standard for main arteries of circulation and public open spaces, and providing for them while the land is yet but sparsely occupied, is the need of establishing a standard of open spaces for assuring light and air to all the buildings of a town before the unrestricted play of economic competition shall have imposed a wholly needless standard of crowding and darkness. No matter how far a town may see fit to go or how short it may see fit to stop, as concerns planning and regulating the development of private property in other respects; no matter whether it leaves the layout of local streets wholly to the initiative of landowners, or fixes every one of them according to a set plan; no matter what its building law may be; it owes to its citizens and to the whole body of its landowners the definite establishment of standards beyond which its landowners may not be driven by economic competition in crowding the land with buildings.

Ten thousand dwellings of a given cubic capacity and of a given quality of construction cost about the same to build when they are so spaced that every room is light and airy as when they are crowded together in a dark and pestilential slum. A town of a given population, other things being equal, has about the same total land valuation where it is spread sufficiently to giv eall its people decent living conditions as when large portions of them must live and work in dark and ill ventilated rooms.

Where unsanitary and uncomfortable crowding of the building masses is avoided the extra cost involved is mainly in a somewhat greater length of local streets with their underground service mains. That extra cost is so small a fraction of the total cost of buildings and lots as to be almost negligible, and it is not, of course, a desire to avoid this slight extra cost of street construction and maintenance which causes injurious crowding of building masses, but merely the pressure of commercial necessity where land values are fixed in relation to the rental derivable from the most crowded condition which is possible under the law without driving away tenants.

We are all familiar with the tendency. We all know that in towns of moderate size it is the exception for buildings to be so crowded as to darken each others' rooms unduly, while with increasing size and increasing land values, the temptation to crowd becomes greater by imperceptible degrees and the standard of the town by slow degrees is lowered. All of us who know New York are prepared to believe that there is absolutely no limit to the progression downward except in the establishment of minimum requirements by law.

It is just as easy to arrest the progress of congestion at an earlier point as at a later. It is just as easy to have a great city which is composed of well lighted and well ventilated buildings as a more congested city of equal population, living under less favorable conditions.

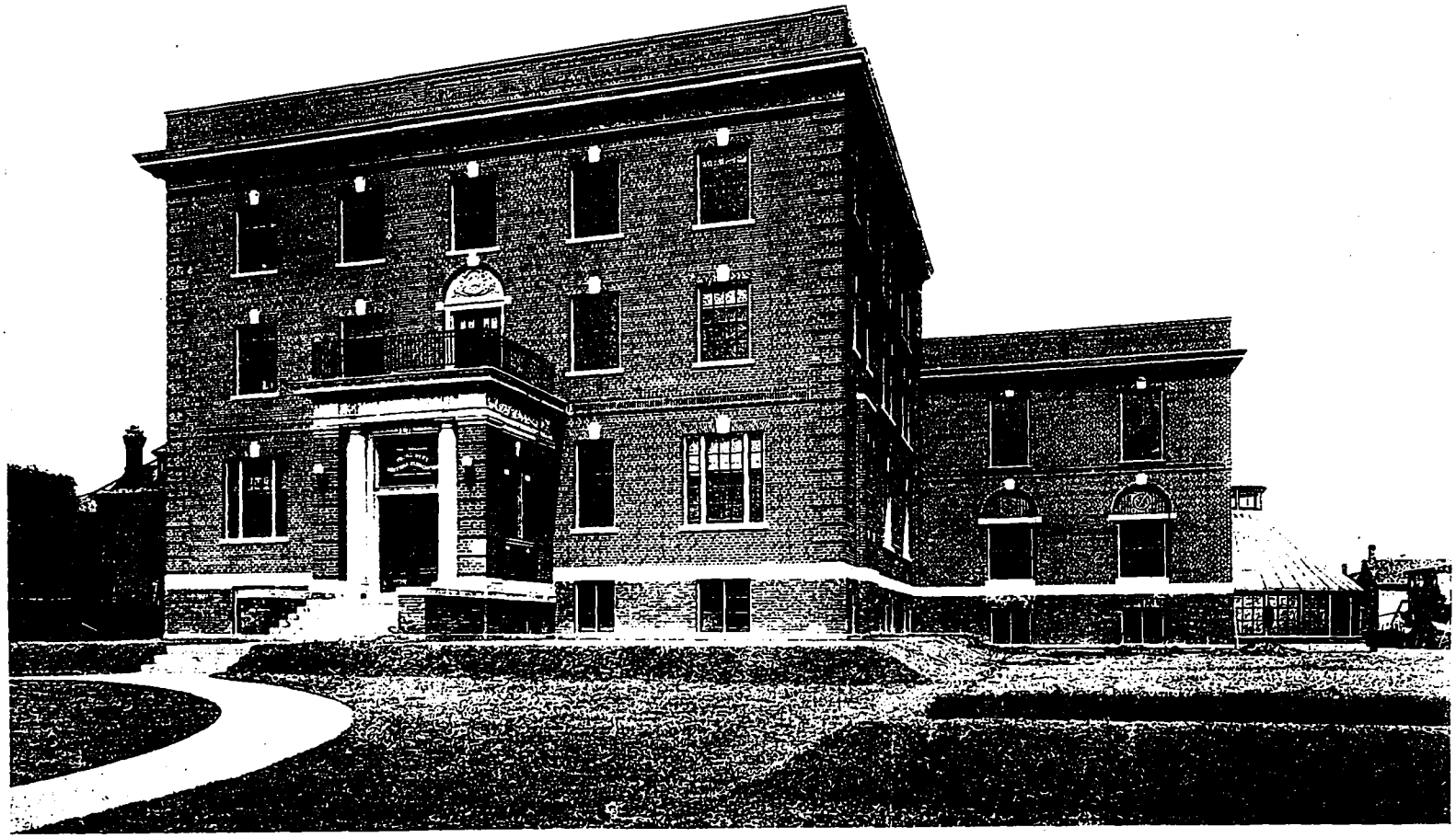
It is, therefore, one of the prime duties to be faced in town planning to define and firmly establish standards in respect to the obstruction of light and air by building masses.

Town planning is much more than the things I have been speaking of; there is, indeed, nothing in the town that lies beyond its purview, and it is, or should be, at all points, dominated by a keen appreciation of the æsthetic values that can be realized in solving the problems of town development; but I think it is fair to say that its paramount duty, at the present day, is to deal with the problems of assuring the future town, at all stages of its growth, of adequate main arteries of circulation, adequate public open spaces for recreation, and adequate spaces for the admission of light and air to every room in which its future citizens shall work and live.

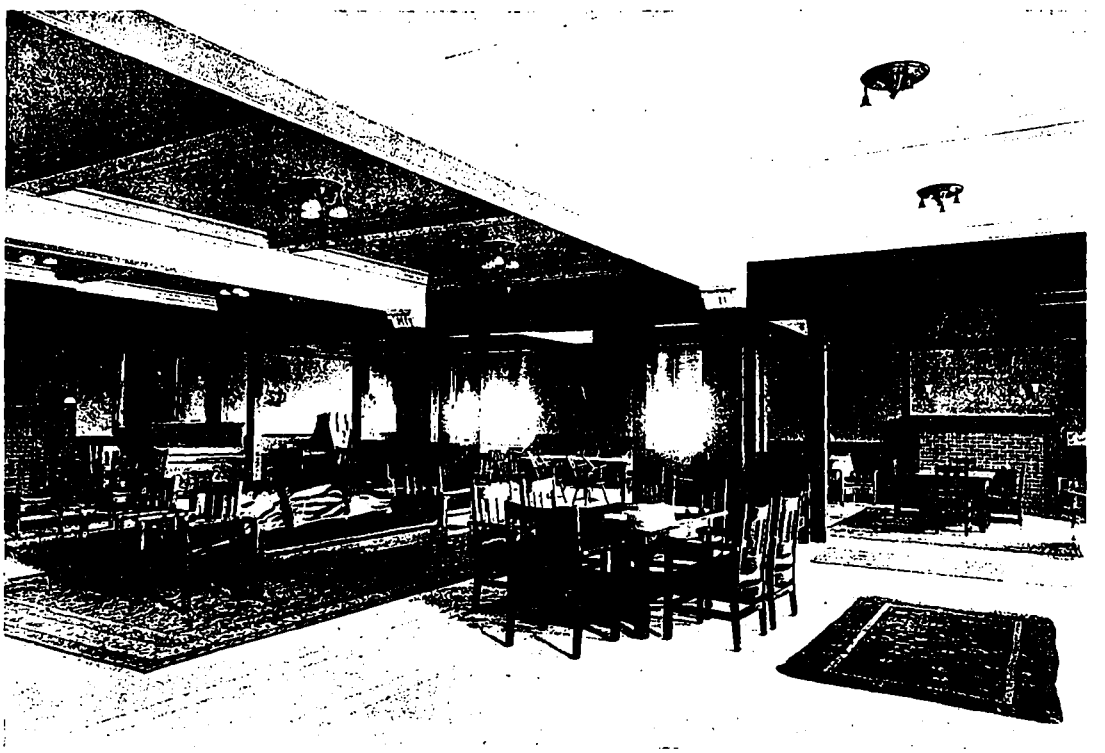
The opportunity before the cities of the Canadian West in respect to effective town planning is peculiarly favorable. If they will seize that opportunity and attack the problem directly and courageously in the light thrown by knowledge of successes and failures elswehere, they will not only profit their own citizens greatly, but will, I believe, materially advance the science and art of town planning for the benefit of the whole world.

A TYPICAL Y.M.C.A.

THE CONVERSATIONAL stage seems about as far as typical designing has gone in the direction of the building expressive of its purpose. But there are exceptions. In the United States we are seeing the passing of the classic dome on the public buildings, which did not express a purpose, but a vogue. In Canada the bank building is peculiarly expressive of its purpose in its solidity and the heavy lines of its construction in stone or its imitations. In both countries, however, the buildings for the Young Men's Christian Association have recently assumed a general similarity. From Beman to Burke, Horwood & White, who are among the most successful designers of these structures, there is a marked similarity of design. This is not due to imitation, but seems rather to be the result of circumstances. The purpose of the organization is to shelter as many members as possible, and still keep within the plain, dignified and beneficial purposes of the order. It is not a club that seeks to advertise itself in its external appearance, but one in which the plan for its variety of athletics and instruction is the dominating feature. So the plain brick façade, the regularity of windows, and the practical cornice is everywhere found, the art of the architect being noted in the proportions given to these features, that because of the very plainness make the Y.M.C.A. building an ornament to any city.



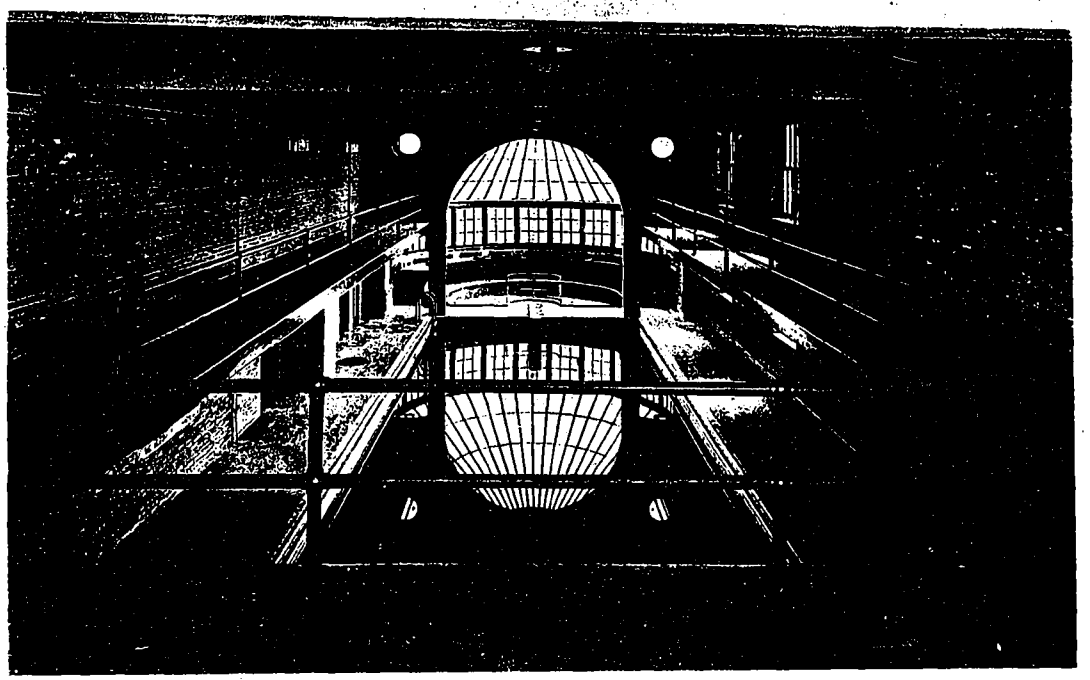
Broadview Y.M.C.A., Toronto, Ontario. Burke, Horwood & White, Architects.



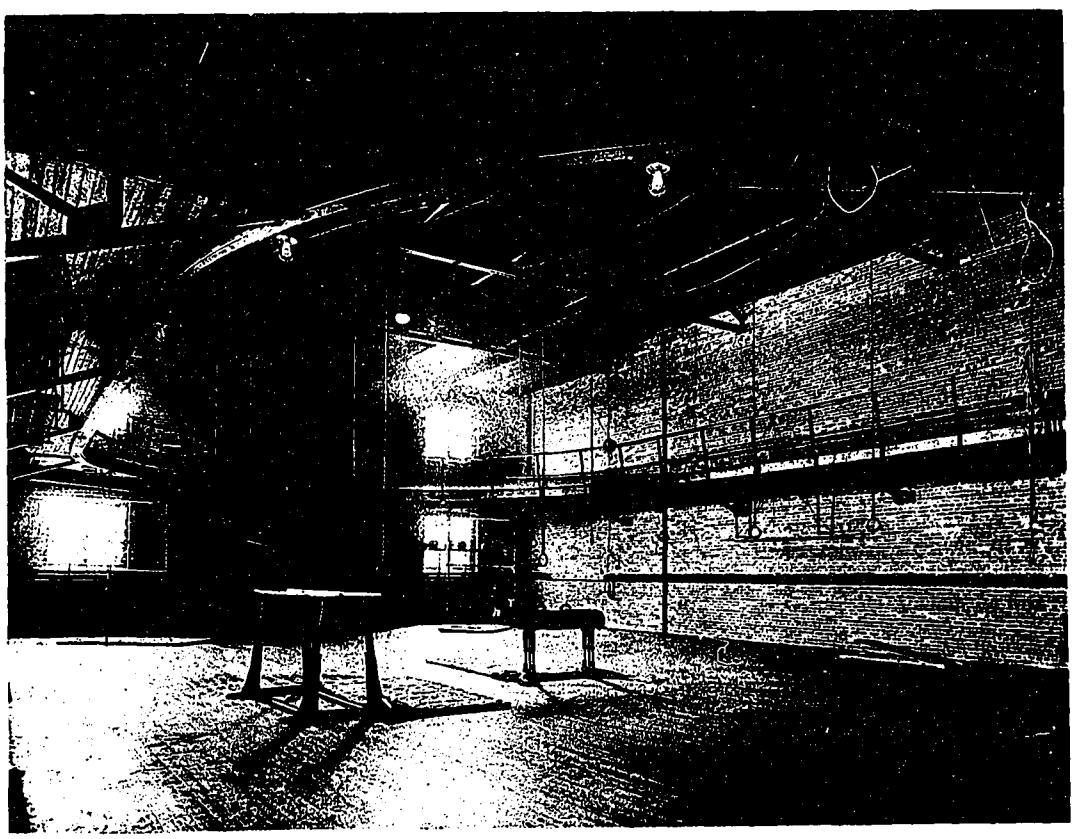
Main Lobby and Library

Main Lobby.

Broadview Y.M.C.A., Toronto, Ontario. Burke, Horwood & White, Architects.

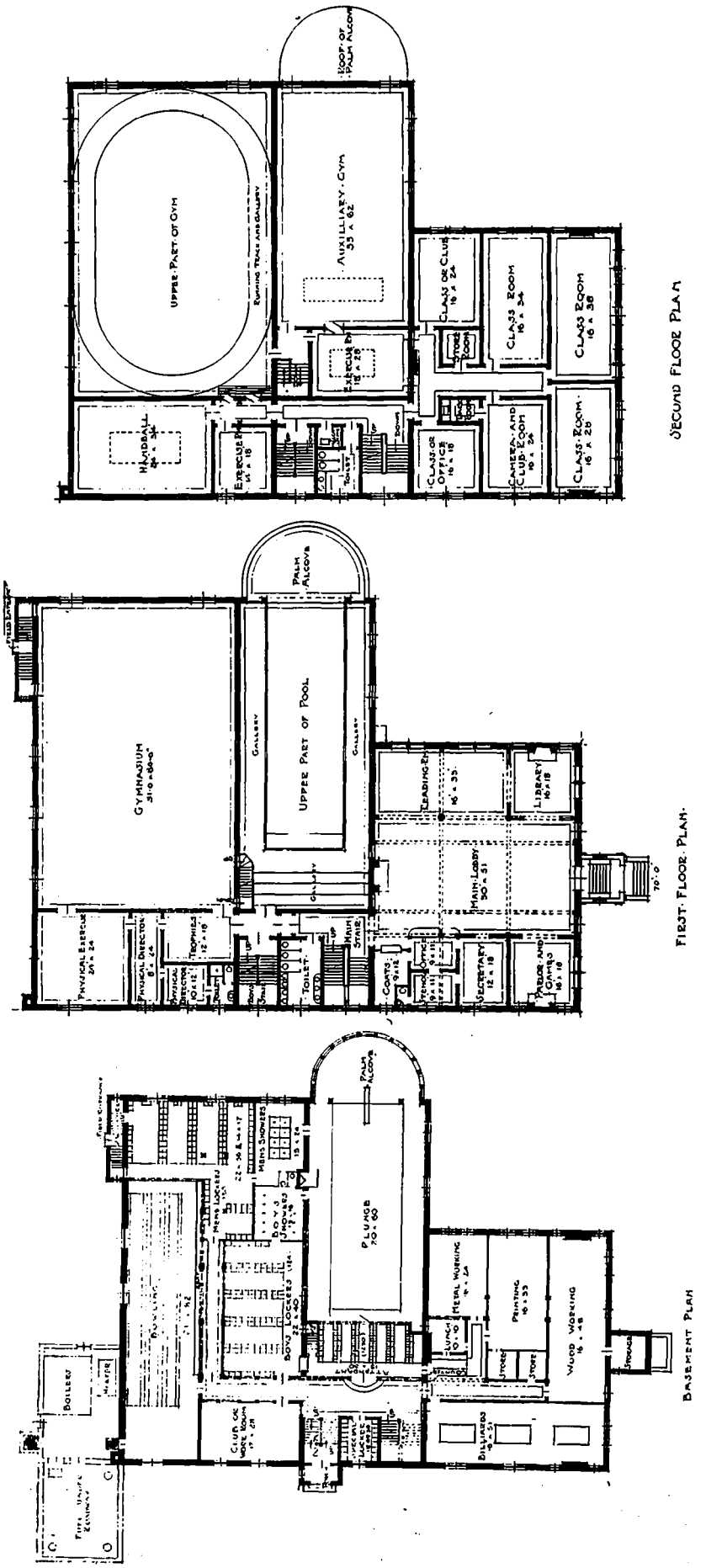


Swimming Pool.



Gymnasium.

Broadview Y.M.C.A., Toronto, Ontario. Burke, Horwood & White, Architects.



Plans of Broadview Y.M.C.A., Toronto, Ontario. Burke, Horwood & White, Architects.

CONSTRUCTION

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

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

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CURRENT TOPICS

CANADA, in the summer of 1913, will be honored by the meeting of the twelfth International Geological Congress, when upwards of one thousand of the geologists of the world will gather to inspect and study the typical geology and mineral resources of the Dominion from Halifax to Vancouver and from Niagara Falls to the Yukon. The congress will include professors from the leading universities and mining schools, officers of the various government geological surveys and mining departments, and geologists and mining engineers in private practice. The value of the annual mineral output of Canada has steadily increased year by year for the last thirty years, and is now over one hundred million dollars. Considering, however, the known resources and the enormous territory whose resources are unknown, this output is small, and Canada needs more men and more money for prospecting, development and operation. This she can best secure by attracting, not the general public, but those whose business it is to engage in such industries and who understand their management. Geologists and mining engineers are obviously those best able to influence opinion in their own countries on the subject in which they are recognized authorities, hence the opportunity afforded by the meeting in Canada of so many eminent specialists should not be neglected. Every effort should be made to show to the world that while our known mineral resources are large, we have an immense undeveloped territory awaiting the advent of the trained prospector.

* * *

A REFORESTATION Act, passed by the Ontario Legislature in 1911, empowered any county council, with the approval of the Minister of Agriculture, to pass by-laws for acquiring lands suitable for reforestation purposes, for planting trees on the lands so acquired, for protecting the resulting timber, for the management of both the land and the timber, and for raising money to an amount that will not increase the existing liability on this account at any one time to more than $25,000. The intention of this legislation is to encourage the utilization of otherwise waste lands in a way that will at once make them a source of revenue and produce an ameliorating effect on the climate of the locality. The county council of Hastings has taken the necessary steps to bring the reforestation act into operation in that county. The Trent River from Rice Lake to the Bay of Quinte runs through Northumberland; above Rice Lake it traverses, under other names, the county of Peterboro' and the provisional county of Haliburton. The main stream of the Trent, with its numerous affluents, runs through a rough country, most of it unfit for profitable farming but well suited for the growth of the Canadian pine, which at one time flourished indigenously and abundantly there. The destruction of the forests by ax and fire has been in many places so complete that there are not enough trees left to seed the vacant places. Apart from the value of a second crop of white pine timber, the process of reforestation will have the effect of regulating the available supply of freshet water so as to greatly improve the navigation of the Trent River.

* * *

STANDARDIZING various kinds of iron and steel sections has been actively taken up in England, and in conjunction electrical plant accessories was undertaken. The work as originally outlined has from time to time been expanded, and numerous subjects have been considered. Some idea of their diversity may be suggested by an enumeration of the several sectional committees. They are: Main, finance, publication and calculations, sections and tests for materials used in the construction of ships and their machinery, steel castings and forgings for marine work, iron for shipbuilding and ships' cables, bridges and building construction, railway rolling stock underframes and locomotives, with subcommittees on component parts and types, tires, axles, and springs, steel plates, copper and its alloys, iron for railway rolling stock, railway rails, tramway rails, tire profiles, screw threads and limit gauges, automobile threads, and also on small screws and screw heads, rolled and drawn sections, keys and

keyways, pipe flanges, cement, vitrified ware pipe, cast iron pipes for hydraulic power, water, gas and sewage, heating, ventilating, and house drainage, and for electrical purposes; electrical plant with subcommittees on generators, motors and transformers, prime movers, physical standards, telegraphs and telephones, cables, electric tramways and electrical plant accessories. Interested in the movement are the Institutes of Civil Engineers, Mechanical Engineers, Electrical Engineers, and Naval Architects.

* * *

CONCRETE construction has reached the far East. The Public Works Department of the Formosan Government has entered into a contract with the Trussed Concrete Steel Co., of Detroit, for the erection of a capitol building in Taihoku. The details of the contract are not fully known, but the cost of construction will be approximately $250,000. The structure will be 254 by 435 feet and four stories high. The Kahn system will be employed. The American Trading Co. (Tokyo branch) will sign the agreement on behalf of the contractors. The plans were made by a graduate of the engineering department of the Tokyo Imperial University. He was awarded the second prize of $500 for his design.

* * *

WIRE ROPE in its many varieties of manufacture is illustrated in an artistic and typographically excellent catalogue issued by the B. Greening Wire Co., Ltd., of Hamilton, Ontario. It illustrates wire ropes from the heavy 2¾ in. diameter (8⅝ in. circumference), composed of 114 wires with a breaking strain of 305 tons, weighing 12 lbs. per foot, down to the finest copper cord 1-16 in. diameter, composed of 42 wires with a breaking strain of 100 lbs., weighing .007 lbs. per foot. We find in wire rope of ½ in. diameter there are no less than twenty-five different kinds listed. Wire ropes of various constructions from galvanized strand for guying purposes, composed of seven wires, to the extra pliable hoisting ropes composed of six strands of thirty-seven wires each with a hemp centre, or 222 wires, are shown, but in addition to the large variety of qualities and constructions of wire rope shown, the B. Greening Wire Co., Limited, frequently have to make up specially wire rope of an entirely different construction to suit special extraordinary conditions or circumstances, and their experts are at all times at the disposal of their friends for consultation or advice. Our readers will understand by the above that this catalogue embraces practically every kind of wire rope that is at all likely to be called for and for almost any purpose—all kinds of hoisting, haulage, stay or guy ropes; drilling ropes, sand lines, ships' rigging, standing, running and hawsers; ferry ropes, sash cord made of bright steel wire, galvanized steel wire, or solid copper; pliable tiller ropes with 252 wires, such as used for clock weights, elevator hand ropes, vessel tiller ropes, and such purposes; hay fork rope, both for the track and running rope; railway ballast plow ropes, switch ropes, and separator ropes for threshermen and traction plowing, but in addition to the ropes there are a very large number of wire rope fittings and accessories such as blocks, pulleys, sheaves, wheels, turnbuckles, clevices, hooks, thimbles, rope grease and a very explicit description of splicing wire rope, but in many instances the greater value of this catalogue to our readers would be in the notes on how to care for and use wire rope, showing the best kind of rope to use for different purposes.

* * *

NEEDING more money for their schools than was being raised by taxation, the inhabitants of Wake County, N.C., adopted the unique expedient of cultivating the land surrounding the schools, the money obtained from the sale of the crops being used for the benefit of the school. Seventeen such school farms were operated last year. They were worked by 1,200 persons—men, women, and children—who contributed their labor free. The net gain from the enterprise was nearly $1,200. This new movement to raise additional funds for the country school is described in a monograph just issued by the United States Bureau of Education for free distribution.

* * *

A PROPOSAL has been made, and is now receiving influential support, for establishing a professorship of town planning at London University. The idea originated with Mr. John Burns, who suggested at the town planning exhibition, held at Crosby Hall some time ago, that some wealthy person should endow such a chair; and since then Mr. Herbert Warren, of the Garden City Association, has several times urged its desirability. The matter was at first referred to the executive committee of the association and now a strong committee is being formed to further it. The recent conference on town planning showed that there is among the local authorities of the country a great deal of keen interest in this subject. Enthusiasm for the movement, indeed, very often outstrips the knowledge of the principles of town planning, which is natural, seeing that those who are at present the technical advisers of the borough and district councils had no opportunity of studying the new theory and practice of town planning when they were preparing for their careers as architects or surveyors. It is for this reason that the creation of the proposed chair at London University is now being urged. It is intended, if the proposed chair is founded, that architectural students should have the opportunity of attending the lectures on town planning as part of their professional studies. Instruction is already given in this subject at Liverpool University by Prof. Adshead and at Birmingham by Mr. Raymond Unwin, and it is strongly felt that students in London should have the same facilities. Sir Philip Magnus, M.P. for London University, Sir William Collins, and Sir Henry Miers, the principal, have expressed great interest in the scheme. It is supported also by Sir Aston Webb, R.A., and Mr. John Burns has offered several valuable suggestions. A professorship at London University, says the Times, should have an en-

dowment of $3,000 a year, and a lectureship of $1,500.

* * *

THERE ARE in this country, according to statistics recently compiled by the H. W. Johns-Manville Company, over $100,000,000 invested in the moving picture business. This investment is divided among 16,000 theatres, which give regular performances, and a large number of halls, churches and clubs where the moving pictures are displayed only occasionally. Considering the amount of money thus invested, the 15,000,000 people who, it is estimated, attend these performances daily, and the inflammable nature of the celluloid films which are in constant danger of being ignited by the intense heat of the projecting lamp, the matter of using a proper form of fireproof booth to enclose the operating apparatus is of importance to the owners as well as the patronizers of these moving picture establishments. A burning film is practically unquenchable by water or by any known chemicals, and the fire is self-supporting and spreads with great rapidity, generating an intense heat and dense, noxious fumes and smoke. In consequence, when a film becomes ignited it often results in a fire destructive to both life and property. To prevent such a catastrophe a new ordinance went into effect in New York State, July 24, 1911, which requires every moving picture theatre booth to be built of asbestos board supported upon an iron framework. The effect of this new law has been closely watched by those interested in the matter, and the results have been particularly favorable to its general adoption throughout the United States. Massachusetts, Maine, Connecticut, New Hampshire, Vermont, Rhode Island, Pennsylvania and New York, besides the National Board of Fire Insurance Underwriters and the New England Insurance Exchange, have approved the use of asbestos booth construction.

* * *

THE BARDSLEY oil door check and spring is a device which can be applied to either hand of either side of the door without any change. There is a novel device which entirely prevents the leaking of oil as well as an attachment by means of which the checking power is removed when the door is nearly closed. The feature is very valuable for door closing against draught, or hard to latch. Gardner sash pulleys are manufactured by the largest manufacturers of pulleys in the United States and their pulleys are used extensively by that Government. Any kind of pulley for doors and windows are promptly made and will be guaranteed satisfactory in every respect. The Falkirk Iron Company's baths are so well known in England that their entrance in the Canadian field has been greeted with pleasure by the leading architects in this country. Special attention is given to packing, which is done by skilled and experienced workmen in the most approved manner. The packing has been made a special study and the baths are securely and thoroughly packed singly or nested in strong crates, the roll edges of Independent baths being entirely encased. The Falkirk Company have also appointed Solomon & Spielmann agents for their full line of cooking apparatus and this company will be glad to give particulars to architects and contractors looking for a range which will give splendid satisfaction and excellent wear. A gas heater, steam jacketed pans, hot closet and carving table, double charcoal grill, coke grill, coffee and milk urns and many other necessities for the kitchen and apartment are included in the company's display and represent one of the most complete lines in this respect that has ever been introduced on the Canadian market. Interiors, mantels and register grates are also handled by Solomon & Spielmann, and their artistic beauty is a great boon to those architects who wish to incorporate these comforts in Canadian homes.

* * *

THE CANADIAN Fairbanks-Morse Company, Limited, has secured the Canadian agency for the Orenstein-Arthur Koppel Co., of New York, consulting engineers and manufacturers of portable railways, industrial railways, narrow gauge sidings, narrow gauge public railways, and railway equipment of all descriptions. The works of the Orenstein-Arthur Koppel Company are located at Koppel, Pa. They have been in business thirty-five years and have built and developed industrial and narrow gauge railways of every description in all parts of the world.

* * *

CARTER & CO., LTD., the well-known tile manufacturers of Poole, England, recently called a meeting of their employees regarding the Insurance Act, when Mr. Charles Carter, who presided, informed the employees that it was the intention of the directors to pay the employees' contribution, as well as the employers'. The announcement was received with much gratification.

* * *

MR. W. W. LA CHANCE, architect, Saskatoon, and Mr. Chas. J. H. Munro, architect, Hamilton, Ont., formerly with Munro & Mead, architects, of Hamilton and Toronto, have opened an office in the Gibson Block, Yorkton, Sask., and would be pleased to receive manufacturers' samples and catalogues, etc. Mr. Munro will have charge of the Yorkton office.

* * *

JAMES H. CRAIG, B.A.Sc., formerly Fellow in Architecture, University of Toronto, and H. Harrison Madill, B.A.Sc., of late with the architectural firms of John M. Lyle and J. A. MacKenzie, announce that they have formed a partnership under the name of Craig & Madill, with offices at Nos. 304 and 305 Manning Chambers, Toronto, where they will conduct a general practice of architecture.

* * *

CORRECTION.—The article on sub-structural waterproofing in July issue was written by J. R. Mickle, structural engineer for the Pinchin, Johnson Company of Toronto, whose name and personality, as well as his engineering ability, is familiar to architects and contractors throughout Canada and the United States. The types made the name Wickle.

CORROSION OF IRON

By L. ARCHBUTT, F. I. C.

Abstract of a paper read before the Derby Society of Engineers and republished from "Engineering" as an authoritative pronouncement upon the subject, with hints for prevention and correction in structural steel.

THE SUBJECT, the corrosion of iron and the protection of structural ironwork, is one of very great importance and no little anxiety to engineers. It is a subject of considerable complexity, and one to which adequate justice cannot be done in the short space of one lecture. He will therefore have to ask your indulgence if he has to treat it in a somewhat sketchy manner; but he will endeavor to put before you some of the main facts which our present knowledge shows to be of importance. It is a subject on which a vast amount of literature exists, and on which a great deal of work has been done; but it is within only quite recent years that the work done has been systematic, and very much still remains to be done.

Iron and its alloys with carbon and some other elements which we call steel, is the most useful of all metals, on account of its great strength, abundance, and general adaptability for constructional work; but, unfortunately, it is also one of the most perishable of metals under the atmospheric conditions which are normal in this and many other countries, and under water. It is easily attacked by nearly all acids, by alkalis under certain conditions, and by oxygen in presence of water, and yet if it can only be kept dry and in a clean atmosphere it will remain unchanged for centuries. Dry air, at the ordinary temperature, has remarkably little effect upon iron. Zumstein, in August, 1820, fixed a polished iron cross on the summit of Monte Rosa, and on visiting the spot twelve months later found the iron quite free from rust, and with only a slight bronze-colored tarnish upon the surface. At temperatures much above the normal, oxygen, of course, readily attacks iron; but for rusting to occur at the ordinary temperature, and at temperatures below and not much above the normal, the presence of water is essential. In damp situations, as we all know to our cost, iron and steel oxidize rapidly, becoming converted into the familiar red rust, and this process is hastened by the presence in the air of carbonic acid, nitric acid, sulphurous and sulphuric acids from the combustion of coal and imperfectly purified coal-gas, such as the gas companies are allowed to sell us, chlorine and hydrochloric acid from chemical works, etc. These acid gases are not nearly so injurious in the absence of water as in its presence, and generally it may be stated that the cleaner and drier the air the longer will iron last in it. A remarkable instance of the preservation of unprotected iron in a by no means dry atmosphere is the celebrated iron pillar in the Mosque of Kutab, near Delhi, built up of iron blooms forged nearly 3,000 years ago, yet said to be so free from rust as to be merely tarnished upon the surface.

Pure water, free from oxygen and carbon dioxide, has so little action upon iron that if a clean strip of the metal be dropped into boiling distilled water in a clean glass flask, well boiled with the water, and the flask sealed up while the water is boiling, the bright surface will remain untarnished for an indefinite period, though a few spots of rust may form here and there owing to local impurities in the metal. There seems to be n odoubt that the iron dissolves to a very slight extent in the water, but whether it would dissolve in chemically pure water is still a doubtful point, owing to the extreme difficulty in obtaining water absolutely pure and free from every trace of carbon dioxide. Water vapor, oxygen, and carbon dioxide, either singly or together, have no action upon iron or steel at ordinary temperatures, provided the water vapor is prevented from condensing upon the iron. Museum specimens of iron or steel, such as broken test-pieces with their bright, fractured surfaces, can therefore be preserved indefinitely free from rust, if the precaution be taken to maintain their temperature well above the dew-point of the air in the room or case containing them.

About 1903, Whitney, an American investigator, proposed an electrolytic theory, denying that the presence of an acid was essential, and maintaining that iron could rust in the presence of oxygen and water alone. Whitney and his followers, Walker, Cushmann, and others, maintain that the process is purely electrolytic, the water condensed on the surface of the iron, or in which the iron is immersed, being supposed to be dissociated to a small extent into free hydrogen and hydroxyl ions carrying opposite electrical charges. A minute quantity of the metal iron is supposed to dissolve in the water, forming free ferrous ions, a proportionate number of hydrogen ions becoming deposited upon the surface of the metal and losing their electric charges. In the union of the ferrous ions in the water, and the hydmean time, the ferrous hydroxide formed by the union of the ferrous ions in the water, and the hydroxyl ions becomes oxidized by the oxygen, and separates out of solution as red ferric hydroxide or rust. More metallic iron then goes into solution, and the process continues. The truth of this electro-

lytic theory depends upon the proof (1) that chemically pure water is capable of conducting a current, and (2) that pure iron can dissolve in chemically pure water. As the difficulties in the preparation of chemically pure water, free from the least trace of carbon dioxide, have hitherto proved insurmountable, the truth of the electrolytic theory still remains to be proved, and it is hotly disputed by the advocates of the rival theories. A very clear and able account of the electrolytic theory of corrosion is contained in a paper by Dr. W. H. Walker, read before the Iron and Steel Institute in 1909 (vol. i., page 69). It cannot be denied that electrolytic action plays a very important part in corrosion, but that is quite another thing from admitting the rationale of corrosion as explained by the electrolytic theory.

A third theory was suggested by Dunstan, Jowett, and Goulding a few years ago. Dunstan also believes that iron can rust in presence of oxygen and water alone without the intervention of any acid. He found that certain substances, which, when dissolved in water, prevent the formation of rust, also destroy or prevent the formation of hydrogen peroxide, and that, on the other hand, rusting readily occurs in the presence of other substances which have no action upon hydrogen peroxide. He therefore concluded that hydrogen peroxide played an important part in the rusting of iron, although, curiously enough, he was never able to detect a trace of it in the water in which iron was rusting, though readily detected in the water in which certain other metals, such as zinc and aluminium, were undergoing oxidation. Dunstan and Hill, in a more recent paper, claim to have detected traces of hydrogen peroxide in the case of iron. Fatal objections to this theory are, however, the facts that chemically pure hydrogen peroxide is entirely without action upon iron, and that iron has been shown to rust easily in the presence of potassium iodide and certain other substances which decompose hydrogen peroxide.

The most conclusive experiment proving that iron free from more than traces of impurity will not rust when kept wetted with water containing oxygen, but quite free from carbonic acid is due to the ingenuity of Friend. A hollow cylindrical bulb of iron or mild steel, closed at one end, is fitted with a rubber stopper carrying two glass tubes, by means of which a current of cold water is caused to circulate through the bulb. The outer surface of the bulb having been brightly polished with emery cloth, it is fixed in the upper part of a glass flask containing some fairly strong caustic potash solution. The air in the flask is reduced somewhat in pressure, and the flask is then hermetically sealed. By thoroughly shaking the caustic potash solution in the flask every trace of carbonic acid is removed from the walls of the flask, the surface of the steel, and the enclosed air. The potash solution is then heated nearly to boiling, whilst a currnet of cold water is caused to circulate through the bulb, causing water quite free from any trace of acid to condense upon the surface and gradually wash off the potash solution. Under the conditions of this experiment the iron or steel, though wetted with water containing dissolved oxygen, remains bright and unrusted for an indefinite period, though an isolated spot of rust may form here and there owing to some local impurity in the metal. It had been objected that in this experiment the surface of the iron is rendered "passive" by the potash which is washed over it, and thereby protected from rusting, but Friend has shown that the so-called passive state of iron produced by the action of alkalis is not a true passive state, such as is produced by the action of strong nitric acid and some other acids, and which is believed to be due to the formation of a superficial protective film of oxide. The apparently passive state produced by alkalies is an effect due to the absorption of the alkali by minute pores in the surface of the metal, and held there with considerable tenacity. If this alkali be thoroughly washed out with distilled water, the passivity disappears, and Friend claims that it is thoroughly washed out under the conditions of his experiment.

However interesting it may be from an academic standpoint to settle the very vexed question whether the presence of an acid is, or is not, essential to the rusting of iron—and its interest is proved by the fact that for the last ten years it has been the subject of experiment by a host of investigators in this country, Germany, and America—the practical importance of the point is largely discounted by the fact that under natural conditions the acid is always there. All water condensed from the atmosphere, whether in the form of rain or dew, besides being saturated with oxygen, contains in solution carbonic acid, and to this must be added, in the neighborhood of towns where coal is burnt, and where chemical works exist, stronger acids, such as sulphuric, hydrochloric, and nitric acids. These acids commence the attack upon the iron, but it is the oxygen which converts the product into rust, and, by removing the dissolved iron from solution and liberating the acid for a fresh attack, is the most potent agent in promoting corrosion. In a recent paper by Longmuir it is shown that rain falling in a manufacturing district may contain as much as 7.3 gr. of sulphuric anhydride and 8.1 gr. of chlorine existing as chloride in 1 gallon, and that the sulphur in chimney soot may range from 1.44 to 3.60 per cent., or, if expressed as sulphuric anhydride, from 3.60 to 8.59 per cent. Much of this exists as sulphuric acid. Iron rust formed in towns always contains sulphuric acid. Longmuir mentions a case where steel ingots containing as little as 0.02 per cent. of sulphur gave rust containing 1.25 per cent. when allowed to rust in the open air.

Sulphuric acid, formed by the combustion of coal in locomotives, is the active cause of the serious corrosion of rails which sometimes takes place in tunnels. In the rust from such rails in active service the author has found twelve times as much sulphur as could have been derived from the steel rail itself. He has calculated that in the case of a particular tunnel the steam from the locomotives on condensing to water would form drops containing at least 0.41 per cent. of sulphuric acid, which would be highly corrosive to steel, and in the surface dirt scraped from newly-

laid rails in this tunnel he found 3.33 per cent. of sulphuric acid soluble in water. A short length of rail, 4 ft. long, was placed in this tunnel in the 6 ft. space, clear of the ballast, on two wooden pegs in February, 1898. After remaining for 3¼ years exposed to the air and smoke-box gases it was removed for examination and analysis.

The piece of rail was corroded all over with rust and dirt, varying in thickness from about 1-12 in. to ¼ in., and composed of two layers, an inner dense layer, about 1-16 in. thick, of red and yellow oxide, and another soft black layer, thicker on one side of the rail than the other, partly consisting of soot, but mixed with bright yellow basic sulphate of iron, containing 10.85 per cent. of combined sulphuric acid. Some of the rust was detached from the rail and submitted to analysis. Some drillings were also analyzed, taken from the rail itself. The rust contained 61 times as much sulphur (existing as combined sulphuric acid) as was contained in the rail from which it was formed.

The rust attached to iron in active corrosion will sometimes be found to be composed of layers which are red and yellow on the outside, and more or less dark-green or black inside, in contact with the iron. The outer layers, where the oxidation has proceeded farthest, are ferric hydroxide, the inner layers ferrous hydroxide. The presence of the two oxides is interesting, because it shows that iron in contact with the moist red oxide, under conditions where it cannot readily obtain oxygen from the air or from water, will take it from the more highly oxygenated red oxide, with formation of the lower green oxide. This kind of action takes place at great depths under water, where the supply of oxygen is limited.

When iron becomes converted into red rust, it has been estimated that the volume increases ten times. This enormous expansion has a very important bearing upon the instability of ferro-concrete when the embedded iron or steel is not absolutely protected from the possibility of corrosion.

To the other causes which lead to the corrosion and destruction of ironwork must be added the action of bacteria. There are many kinds of bacteria in whose life-history the element sulphur plays an essential part. Some reduce oxidized sulphur compounds to sulphuretted hydrogen; others oxidize the sulphuretted hydrogen and store up the sulphur; others, again, further oxidize the sulphur to sulphuric acid, and produce an acid condition in the soil. In an interesting paper by Mr. R. H. Gaines mention is made of serious damage to the foundation structure of a bridge crossing Lake Hauser, in Montana, which is said to have been traced to the action of a bacterium, *Gallionella ferruginea*, which eliminates an acid secretion by which iron is dissolved, and then assimilates the iron, which ultimately becomes converted into ferric oxide in its cell walls. Many bacteria which feed upon iron in a similar way are known, and some of these cause great trouble in water pipes, forming masses of the red oxide which eventually choke the pipes. The remedies for the external corrosion of ironwork caused in this way, recommended by Gaines, are free drainage, by which the acid secretion is carried away, and, where this is impracticable, mixing slaked lime with the soil to neutralize the acid which is formed. Cushmann found that the addition of 5 per cent. of lime to boggy, sour land exerted a very marked protective influence on iron embedded in it.

As rusting is essentially a process of oxidation, and is dependent upon the oxygen dissolved in water, considerations such as the superficial area of the water, the rate of flow of rivers, and the depth of immersion of the iron, have an important bearing in connection with immersed structure such as the piers of bridges. As water obtains its oxygen from the atmosphere, it is well to remember that oxygen is much more soluble in water than nitrogen, and that the ratio of oxygen to nitrogen in the gases dissolved in water is 1:2, whilst in air it is only 1:4. In still water, as in tanks, the rusting of iron can be checked by interposing between the surface of the water and the air some insulating material. Charcoal, for instance, has a greater power of absorbing gases, and in experiments made by Heyn and Bauer it was found that the relative rate of corrosion of wrought iron in distilled water was reduced from 100 to 68 by suspending a block of charcoal in the water, and from 100 to 20 by covering the surface of the water with a layer of powdered charcoal. The depth of immersion influences the rate of corrosion in two ways—(1) by its effect on the dissolved oxygen; and (2) by the difference in the intensity of light. Gases diffuse through water slowly; consequently the oxygen which the iron removes from the water in rusting is more rapidly renewed near the surface, and as rusting is promoted by light it goes on more rapidly the less deeply the iron is immersed. At the surface, where the oxygen and light are in greatest abundance, and where also the temperature is highest, the corrosion is greatest and the iron, if unprotected, may even be cut through at this point.

For structures exposed to the atmosphere, by far the most widely adopted and convenient method of protection is by painting. Paints for ironwork may be divided into two classes: (1) varnishes, containing no pigment, generally solutions of bitumen, coal tar pitch, stearine pitch or wool pitch in tar oils; and (2) true paints, composed of a finely ground pigment suspended in a vehicle which is generally linseed oil. The number of such paints and varnishes is legion, and as each one, according to the statement of the vendor, is "perfect," they must all be equally good, and therefore I am spared the necessity of entering further into their individual merits and comparing one with another. I think our time this evening may be more usefully spent in discussing broadly the features of a good protective paint and the conditions essential for success. Of first importance is the preparation of the iron for the priming coat. I am considering here new ironwork, and not work which has already been painted. The sooner the iron receives its priming coat the better, and the greater the care and attention bestowed upon this priming coat the better will be the result for ever after. I think this

is, perhaps, the reason why the stencil marks upon girders and such like are frequently cited as testimony to the value of white lead. They are put on while the girder is new, even hot, and quite dry, and they can be still found underneath the subsequently applied paint when it flakes off or is scraped off for re-painting. The iron for the priming coat should be quite dry, preferably even warm, so as to ensure dryness ,and free from every trace of rust. Some engineers allow the iron to rust in order to remove mill-scale, but it is safer to remove the mill-scale by sand-blasting or wire brushes rather than allow rusting to commence. Rusting involves pitting, and unless the rust is scraped out of the pits down to the bare metal—a difficult and expensive process—rusting will go on underneath the paint. In experiments conducted with a great many well-known paints and varnishes I have found nothing better for the priming coat than genuine red oxide of lead—"red lead"—and genuine boiled linseed oil. The lead and oil should be ground together in a mill—not merely mixed by stirring—and should be of such consistency that when painted upon a vertical surface the paint will not run down. This, of course, means a fairly thick paint, and one that requires the expenditure of a liberal amount of "elbow grease" in its application. For it needs to be well spread with a good brush, not merely daubed on, but well worked into the corners and crevices, and not too thickly. I would employ the best workmen in putting on this priming coat, working under rigid inspection, and allow three or four days for the paint to thoroughly dry. The contractor's men can then come along and put on the subsequent coats, which can be of any desired color and almost anybody's "anti-corrosive paint." The priming coat should contain no drier—it is not needed—and no turpentine or other spirit—nothing but genuine red lead and genuine boiled linseed oil.

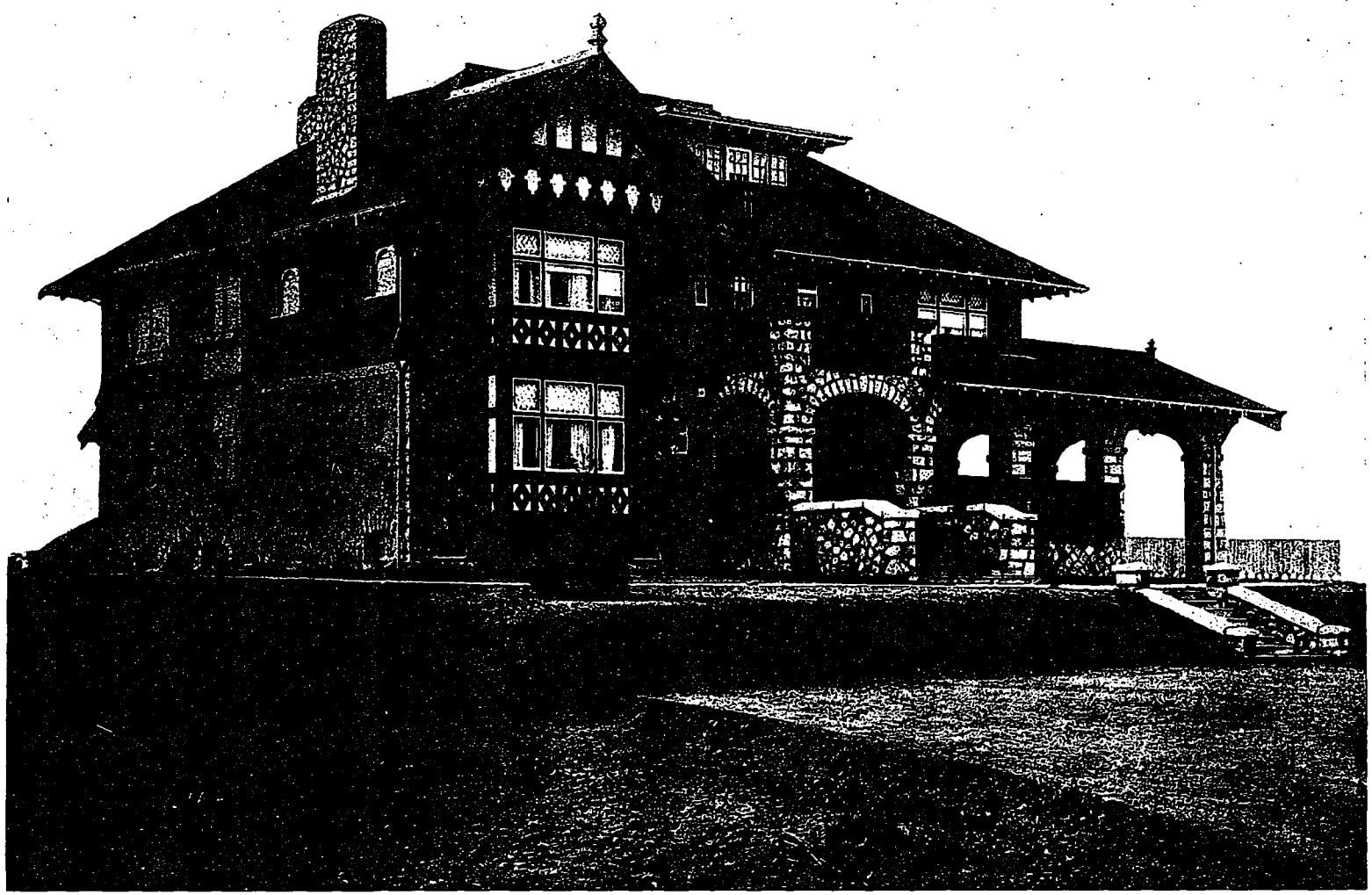
The so-called "drying" of linseed oil is, of course, a misnomer. The oil does not dry in the sense that a water paint dries—by evaporation of water; linseed oil dries by absorption of oxygen, which converts the fluid oil into a solid elastic skin of oxidized oil, and it is not desirable that any turpentine or other volatile spirit should be present which would evaporate and impoverish the skin. I am not a believer in tar varnishes for exposed ironwork. They all tend to harden and become brittle; at least this is my experience of such as I have tried. Neither have I yet found any oil to take the place of linseed oil. There are, of course, many other drying oils, and a very few, such as poppy and hempseed oils, can be used for painting, but at the present time suitable oils of this class are not available commercially, though they, no doubt, find their way into linseed oil as adulterants.

Even dry paint film is composed (1) of the pigmentary particles, and (2) of the oxidized oil varnish, which cements the particles together and sticks them on to the surface which has been painted. It is important to remember that oil films are by no means impervious to gases or to water vapor. Many ingenious experiments have been made in order to measure the relative permeability of dried oil films, by stretching them over bottles containing hygroscopic substances, and noticing the relative increase of weight from time to time. It has been shown in this way, that under the conditions which usually apply in painting, genuine boiled linseed oil gives a film more impervious to water than any other oil tested, but that the addition to the boiled oil of 0.5 per cent. of paraffin wax reduces the permeability by one-half, without appreciably reducing the rate of oxidation or "drying" of the paint. To show what this may mean in the protection of iron-work from rusting, Friend took three strips of pure iron foil, polished them, and coated one with a mixture of boiled linseed oil and tung oil, and the other with the same oil in which 0.5 per cent. of paraffin wax had been dissolved. When the oil films had dried, the three pieces of foil were suspended in tap water for thirty-one days and then cleaned, dried, and weighed.

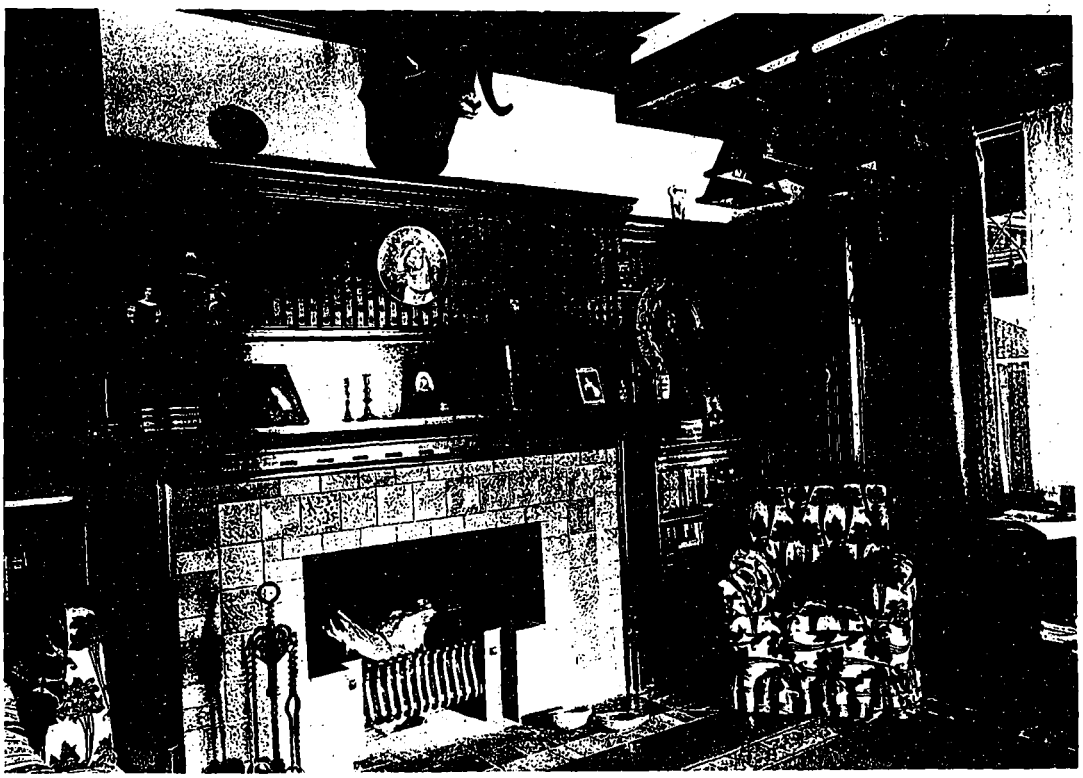
Turning now to the pigmentary part of the paint film, R. Job, in a paper read before the Franklin Institute in 1904, showed the importance of excessively fine grinding of the pigment. The particles should be small, not exceeding one-thousandth of an inch in diameter, and of uniform size, in order that the film may be filled as completely as possible with the pigment, and the particles packed together as closely as possible, leaving no free oil spaces through which water can obtain access to the surface under the paint. You will see from these brief remarks how many factors enter into the successful protection of iron and steel work by painting.

In places where water lodges, such as the bottom flanges of the girders of bridges, there is probably no better protective than Portland cement, with which the hollow spaces can be filled, as recommended by Herriott, but if used as a wash, Portland cement lacks adhesive power, and flakes off. In damp situations, therefore, such as the undersides of railway bridges, protection by painting becomes more difficult, and it is especially in such places that a good priming coat on the new material will repay all the trouble spent over it.

One of the most successful methods for the preservation of underground iron was patented many years ago by the late Dr. Angus Smith. In this process, as described by the author in his specification, coal-tar is boiled until all the water, the ammoniacal liquor, and the lighter oils are expelled, and the prepared tar is applied to the cast iron fresh from the mould. The process was invented for the preservation of water pipes. The pipes are taken immediately they have been cast, before they have had an opportunity of rusting or acquiring any moisture, and after fettling they are put into a stove and brought to a temperature of 300° Fahr. They are then lowered in a perpendicular position into the prepared tar heated to the same temperature, and left there for a sufficient time for the hot and fluid tar to thoroughly soak into the pores of the metal, then lifted out and allowed to drain. This process is carried out at all the large iron works in this neighborhood where pipe-making is carried on.



Residence of W. J. Blake Wilson, Vancouver, British Columbia. J. C. MacKenzie, Architect.



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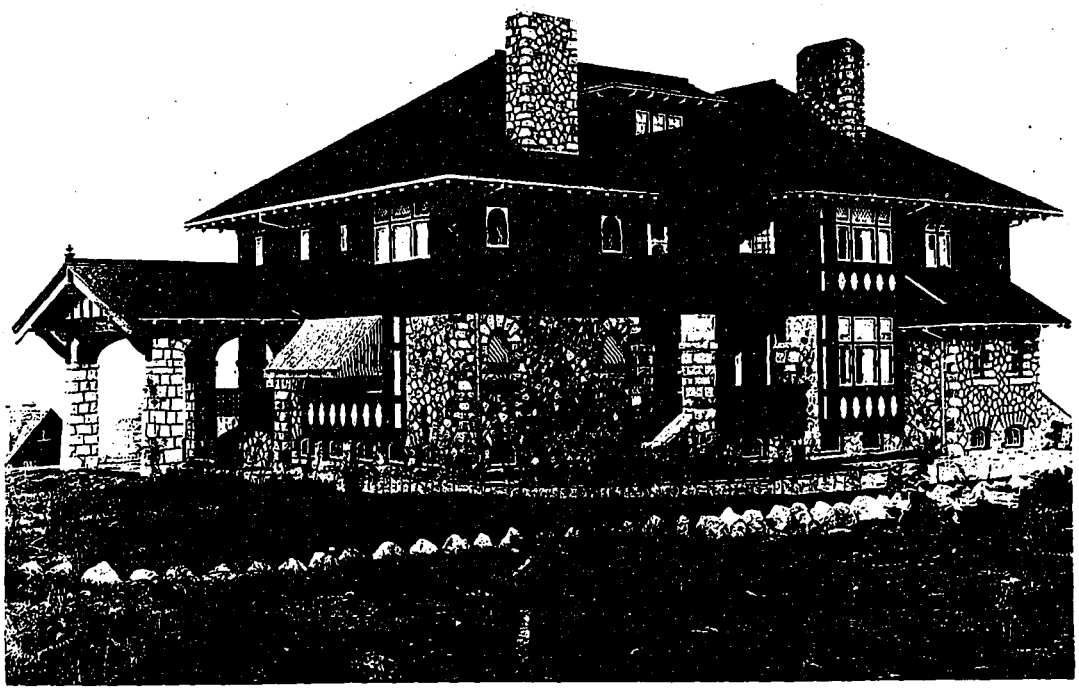
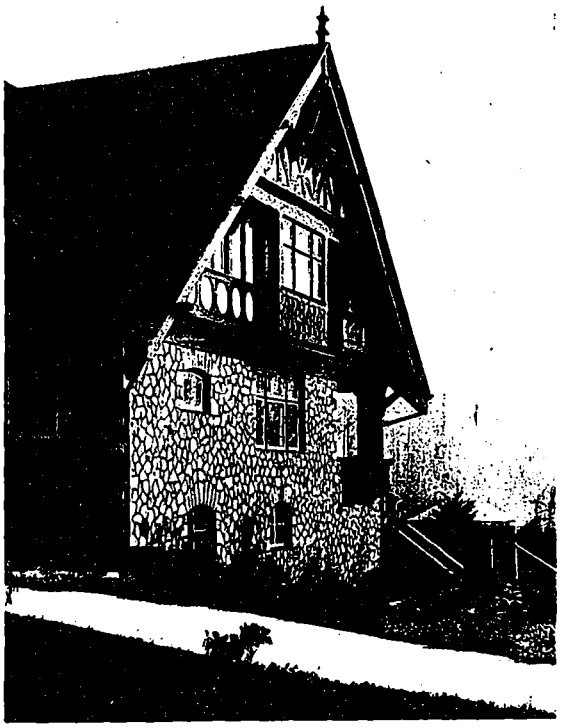


Residence of W. J. Blake Wilson, Vancouver, British Columbia. J. C. MacKenzie, Architect.

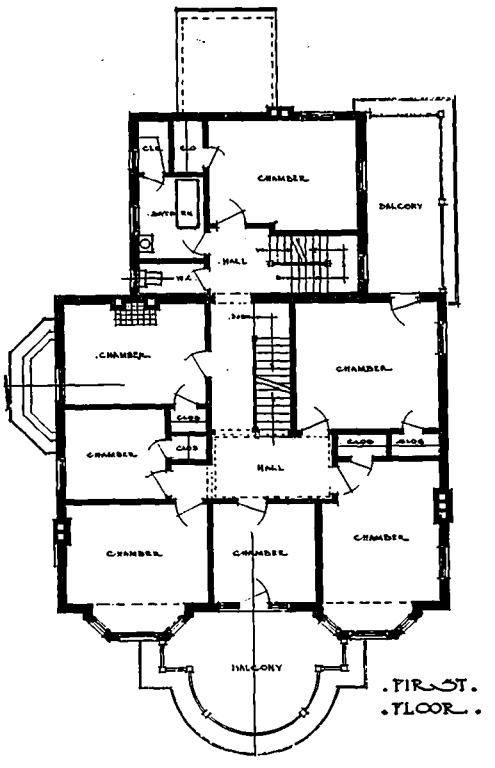
Hall.

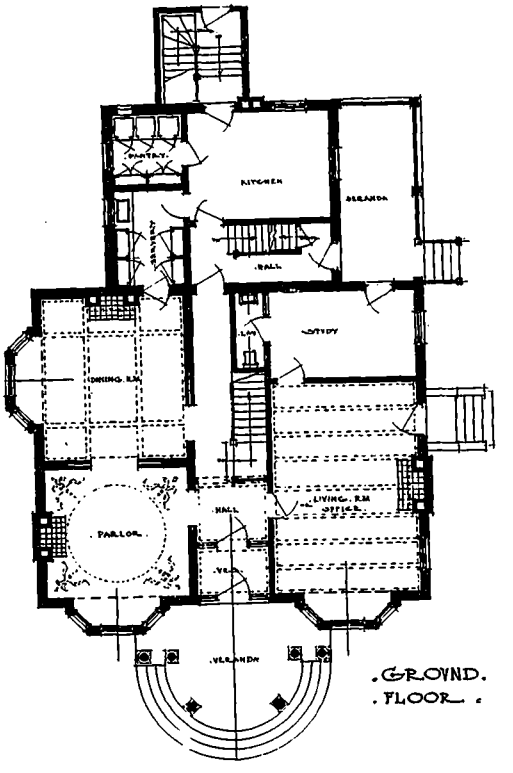
Dining Room.

Residence of W. J. Blake Wilson, Vancouver, British Columbia. J. C. MacKenzie, Architect.



Residence of W. R. Arnold, Vancouver, British Columbia. J. C. MacKenzie, Architect.

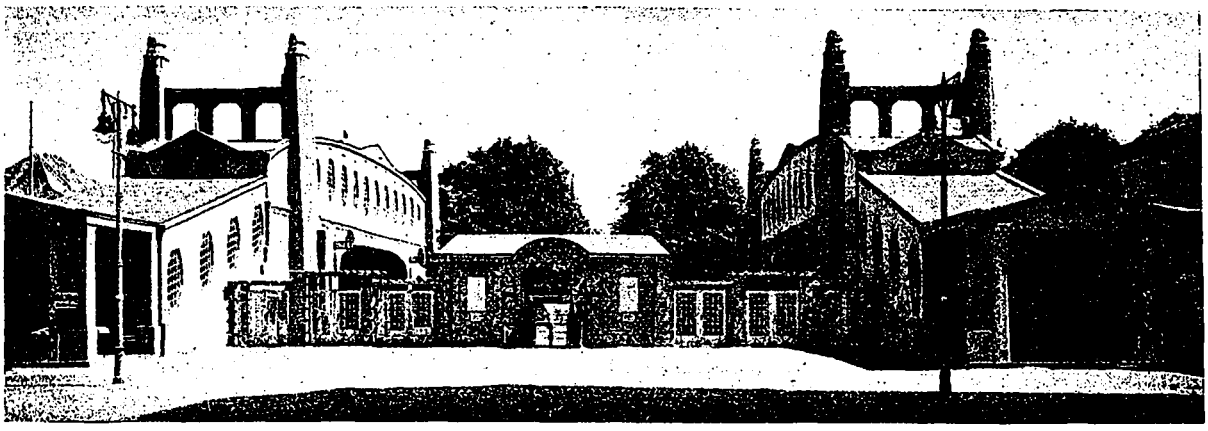




RECTORY OF ST PETER'S CATHOLIC CHURCH. TRENTON, ONT.

ELLIS & CONNERY, ARCHITECTS. TORONTO. ONT.

This well-planned Rectory is creditable to the architects who are responsible for the design. It is unique from the fact that its construction and labor supervision was undertaken by the pastor, the Rev. Father J. J. Connelly, who gave the work his intelligent and personal attention during the completion of the building, finding time for his parochial duties during its erection. The residence is constructed of Milton pressed brick and Ohio sandstone trimmings, with Canadian slate roof. The exterior work is painted white. The interior is trimmed with oak throughout with quarter-sawed oak floors. The fireplaces are of brick.



Concrete Viaduct over Street at Dresden, Germany. Prof. Martin Dalfer, Architect.

A REINFORCED CONCRETE PASSENGER BRIDGE

The problem of an artistic reinforced concrete passenger bridge, in which the structural lines aid in securing a pleasing architectural design, solved at Dresden, Germany.

THE IDEA of building a structure of concrete is about forty years old, though it is, of course, well known that the Romans made extensive use of concrete in bridges in the body of their piers and arches, the surface being faced with tufa and travertine, their constructive methods and the details of their anchors being plainly visible on the part of old Ponte Rotto which still remains.

The same system of construction was extensively used on public works during the latter half of the eighteenth century and the first part of the nineteenth, but it was not until 1840 that a bridge was made almost wholly of concrete, at Grisoles, in France. It was the work of the eminent French engineer, M. Le Brun, who erected a span of 39 ft. 4 in. over a branch canal of the Garonne. The only place where material other than concrete was used in this bridge, was in the exposed end of the arch ring which was faced with brick, and at the four vertical abutment edges below the springs which were faced with stone. All other exposed parts, including the soffit and spandrels, were of concrete.

Ten years after the completion of this little bridge, the building of the Grand Maitre aqueduct in France was begun, the construction of which continued for fifteen years. The long series of arches carrying the aqueduct was made wholly of concrete, the magnitude of the undertaking being hardly excelled by any later works. The surface finish on this aqueduct, however, was not satisfactory, for when concrete arches were again used in France about 1855, on many fine bridges, some of which are masterpieces of constructive art, they were faced with stone in a method similar to that employed by the Romans. These bridges include Ponts au Diable, Austerlitz, Notre Dame, Napoleon, Invalides and Alma.

Experimental treatment of arch faces was again tried in 1868, when a 75 ft. concrete span was erected near Gloucester road station over the Metropolitan Extension Railway, London, the arch face being lined to represent ashlar. This attempt at imitating stone was not satisfactory, and has not since been greatly favored. It was found, however, that while bridges with concrete faces appeared to be æsthetic failures, they could be quickly built at small cost, and for several years following 1873 they were generally used in Ireland by Nathaniel Jackson, for spans of 18 to 45 ft., for highway crossings in the rural districts, and on private estates.

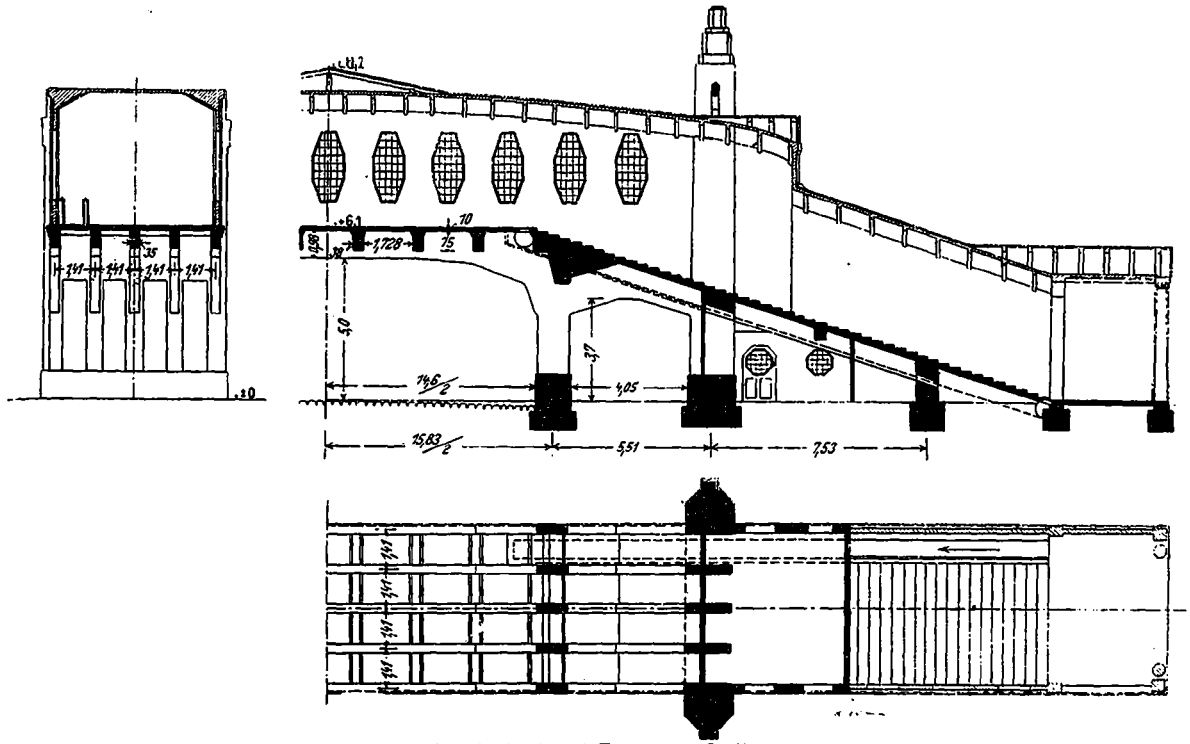
It appears, therefore, that many of the methods recently used for producing satisfactory surface finish on concrete bridges, were tried by others more than forty years ago, before this type of construction came into any general use, and at least twenty years before the construction of the first concrete bridge in America. On this side of the Atlantic the art has since kept pace with the best in either country, as bridges at Pittsburg, Milwaukee, Kansas City, Spokane and other as widely separated localities in the United States attest with concrete bridges of the greatest span as well as appropriate architectural form.

During the last year a covered passenger footbridge was erected over a street in Dresden, which for its artistic design deserves special attention. The problem so ably solved by Prof. Martin Dalfer, the architect, was no easy one, as reinforced concrete does not always lend itself to the most artistic effects; but Prof. Dalfer, without any attempt at obscuring the necessary structural lines of the material, has combined a good practical design with pleasing results, and without the use of any extraneous embellishments.

The photograph of the architect's solution of the problem shows the clear and distinct lines of the supporting members, which stand out plainly from the more richly decorative superstructure. This not only serves to cover the passage, but at the same time gives the whole fabric that breadth and massiveness which is desirable in a work of this type and importance.

The bridge is used to connect two portions of an exhibition park, which were divided from one another by a broad street. To facilitate the traffic conditions, two bridges have been arranged for passengers proceeding in opposite directions, as shown in the general view.

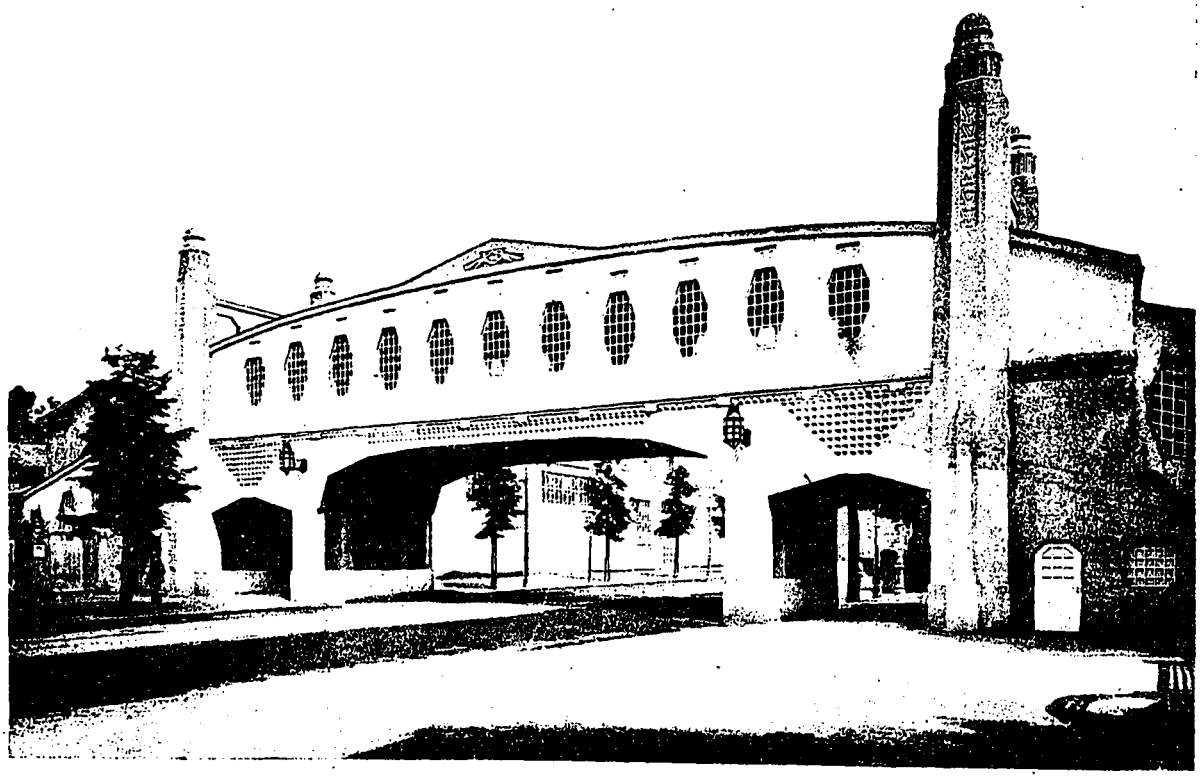
Transverse and longitudinal sections of the bridges



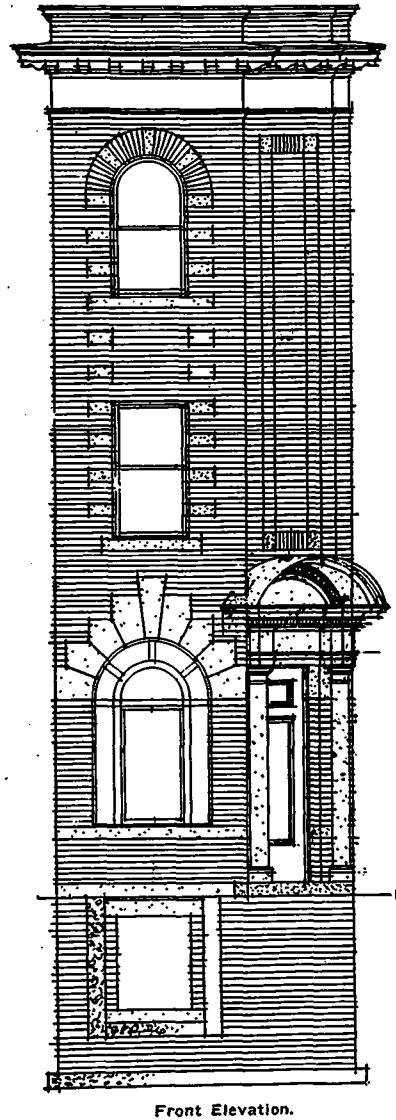
Longitudinal and Transverse Sections.

are shown, from which it will be seen that the roadway is supported by five girders. These are placed 4 ft. 8½ in. on centres, and are 14 in. broad, 3 ft. 3 in. high. The clear span over the street is 48 ft. 8 in., with additional clear spans of 13 ft. 6 in. over the sidewalks. Cross beams 15 in. wide by 30 in. deep and spaced 7 ft. on centres are placed between the main girders over the roadway. These carry in connection with the girders a reinforced concrete slab 4 in. thick.

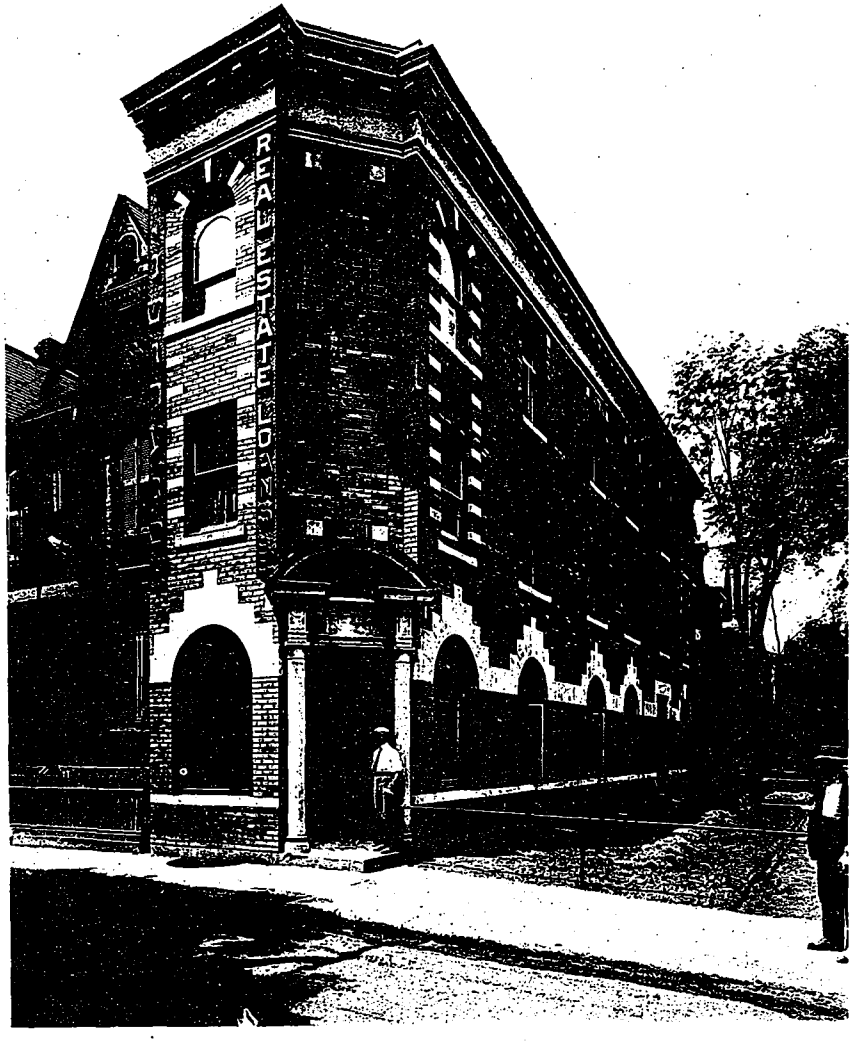
The superstructure of the bridge consists of wooden principals at intervals of 3 ft. 8 in. These are boarded on each side and plastered, and the roof is covered with tar paper.

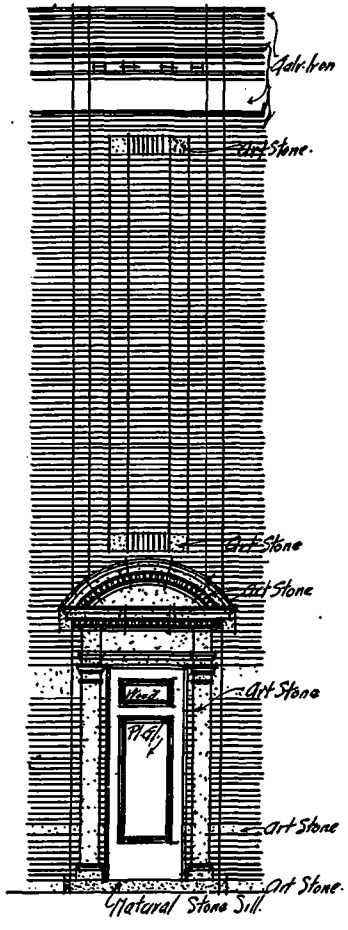


Concrete Viaduct over Street at Dresden, Germany. Prof. Martin Dalfer, Architect.



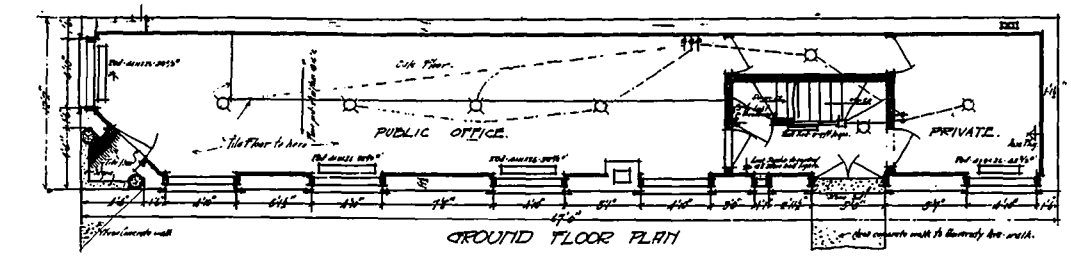
Front Elevation.



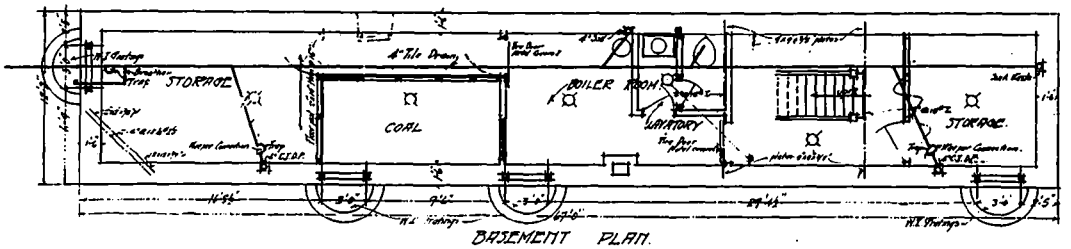


Elevation of Entrance.

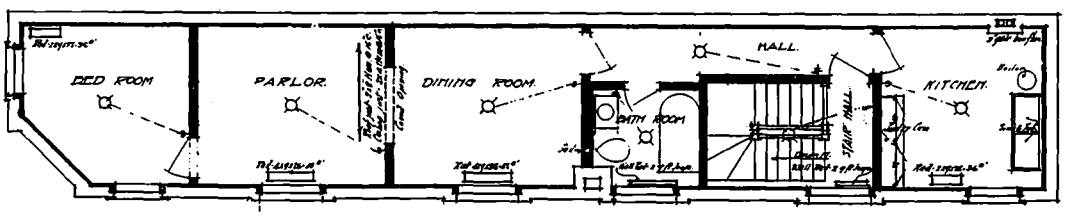
Premises in Toronto for H. Rottenberg. Isadore Feldman, Architect. A study in utilizing a narrow lot. The width of this lot is 12 feet 2 inches.



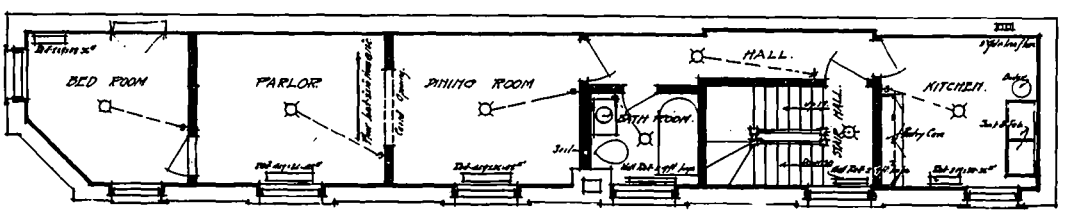
GROUND FLOOR PLAN



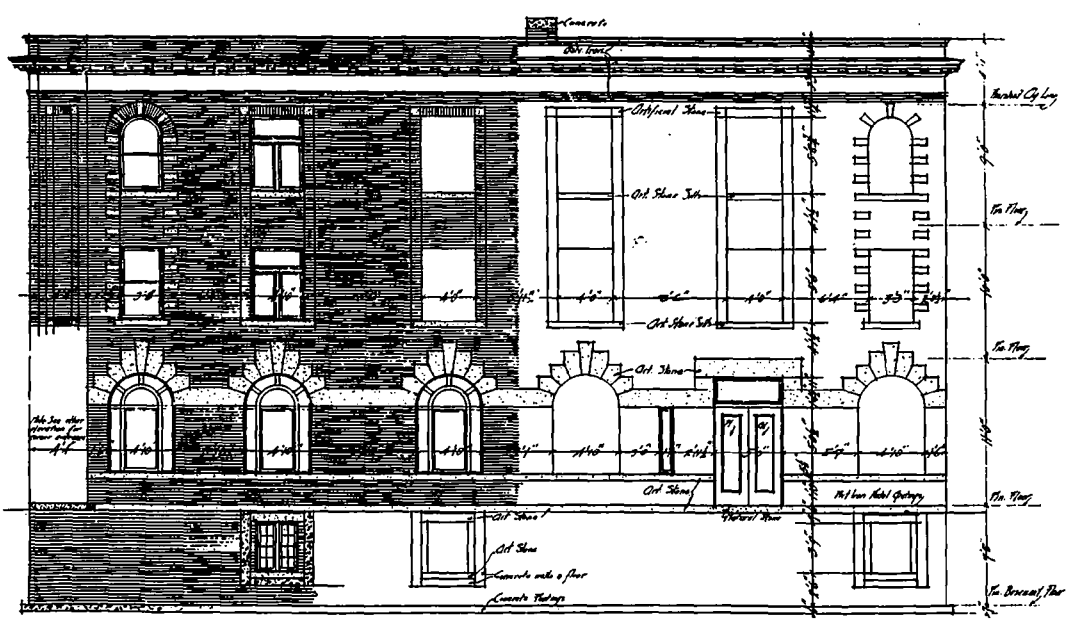
BASEMENT PLAN.



SECOND FLOOR PLAN



FIRST FLOOR PLAN



Side Elevation.

Premises in Toronto for H. Rottenberg. Isadore Feldman, Architect. A study in utilizing a narrow lot. The width of this lot is 12 feet 2 inches.

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We know that if all buildings were covered with Barrett Specification Roofs, roof troubles would be practically nil.

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Speil Note

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

If an 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.

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