CONSTRUCTION

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Residential Structure in "Tudor" Design
(See Page 51.)

- MONTREAL -
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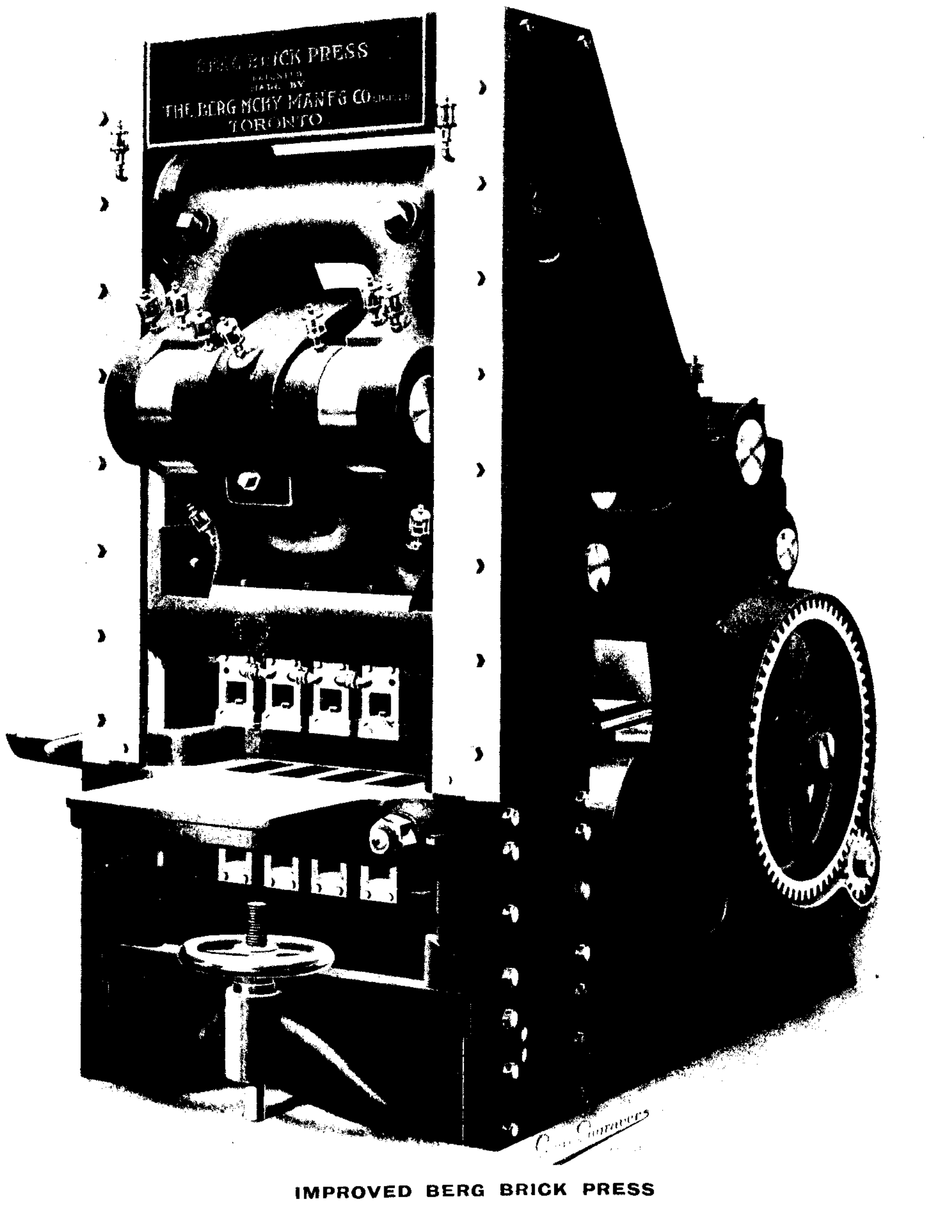

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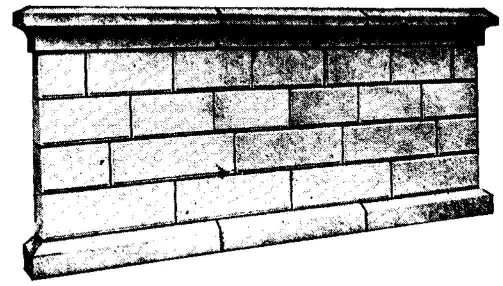
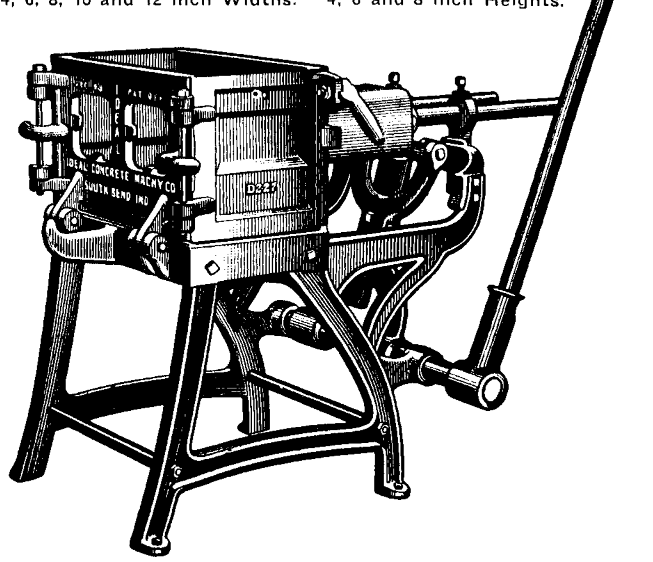
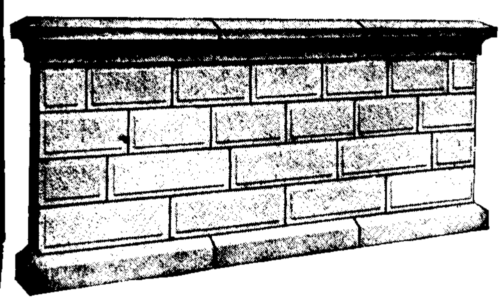
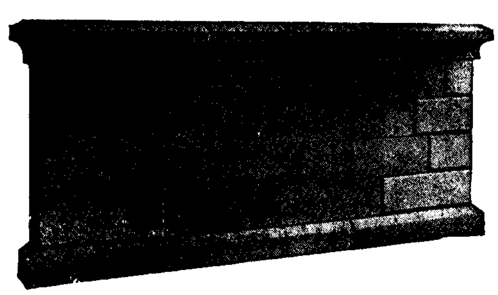
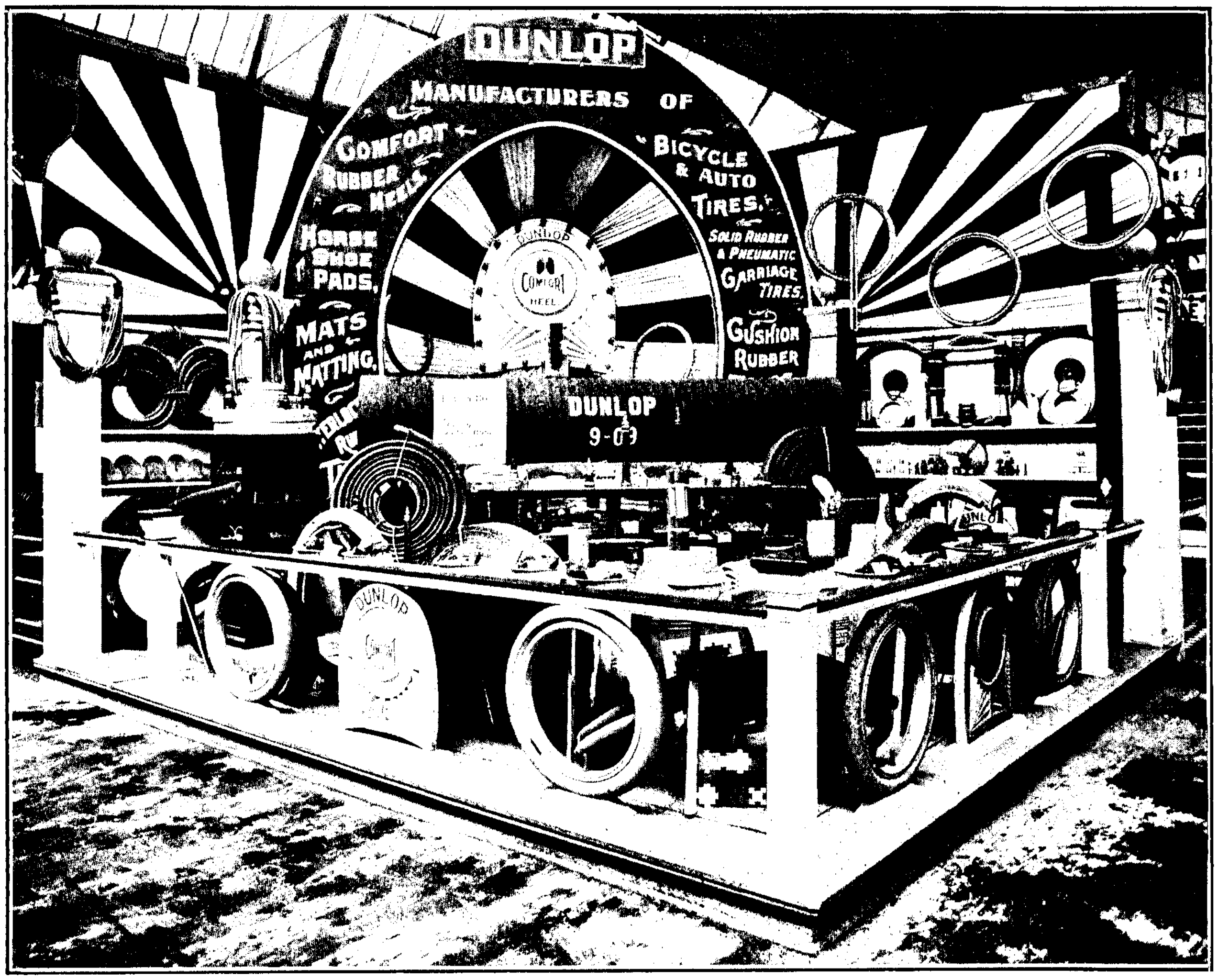








Grand Staircase Foyer of the Royal Alexandra Theatre, Toronto, of Circassian Walnut. John M. Lyle, Architect. Executed by the Globe Furniture Co., Ltd.



The above photograph of the Dunlop Tire and Rubber Goods Company's exhibit in the Main Building at the Toronto Exhibition will give readers of "Construction" an idea of the activity of the Dunlop Company in mechanical and general rubber lines. The Dunlop Company also had an extensive exhibit in the Transportation Building.

The work of building an addition to the Dunlop Rubber Works on Booth Avenue was begun this week. The new building will be detached and thoroughly fire proof. The equipment will be for the manufacture of automobile tires and mechanical rubber goods, the two departments which have encroached most on the present available factory capacity.

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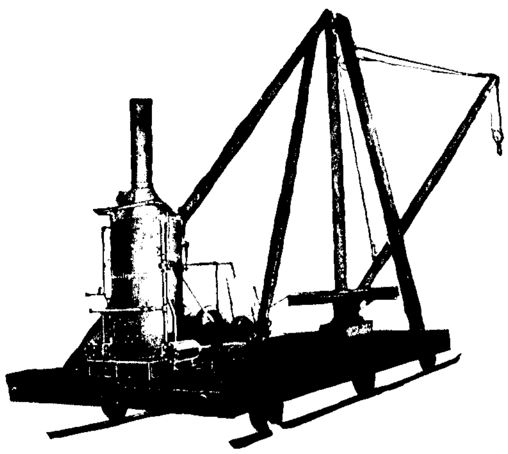

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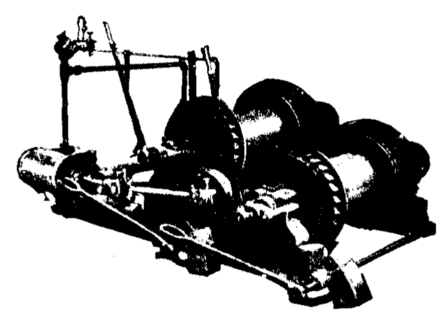

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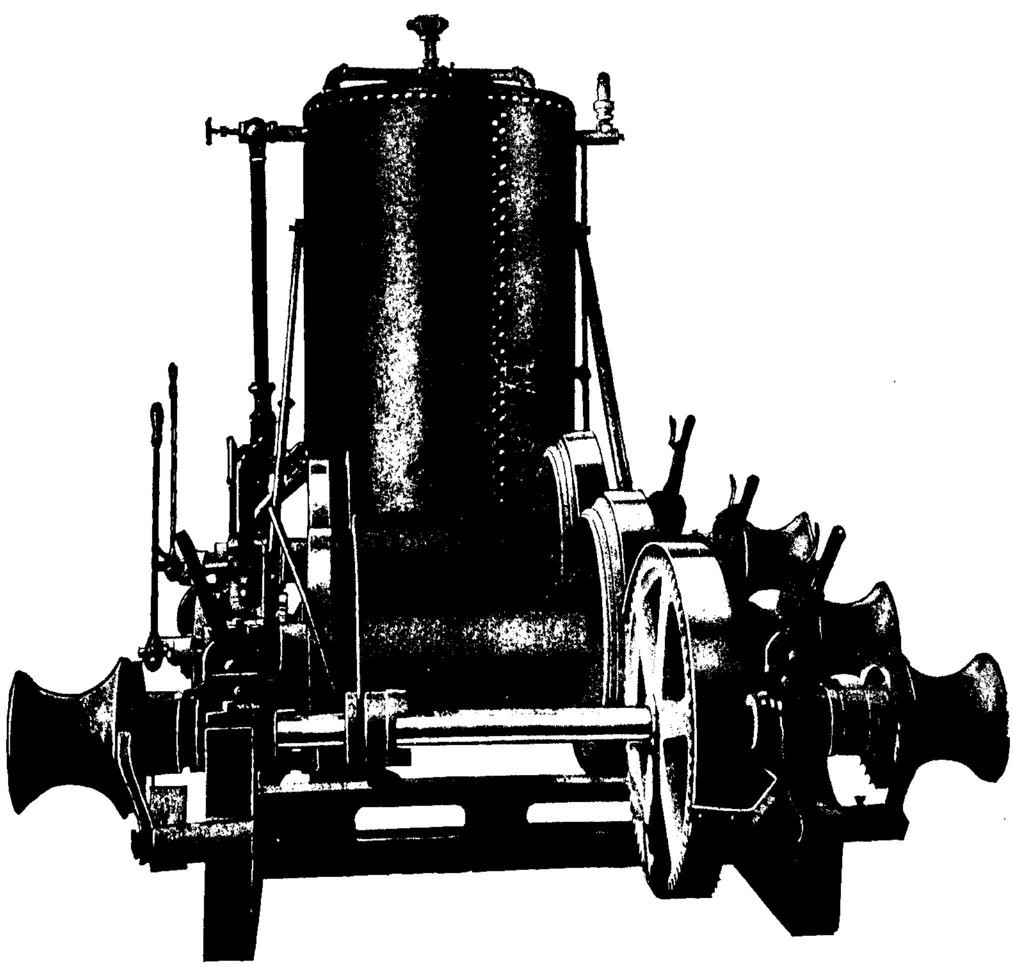

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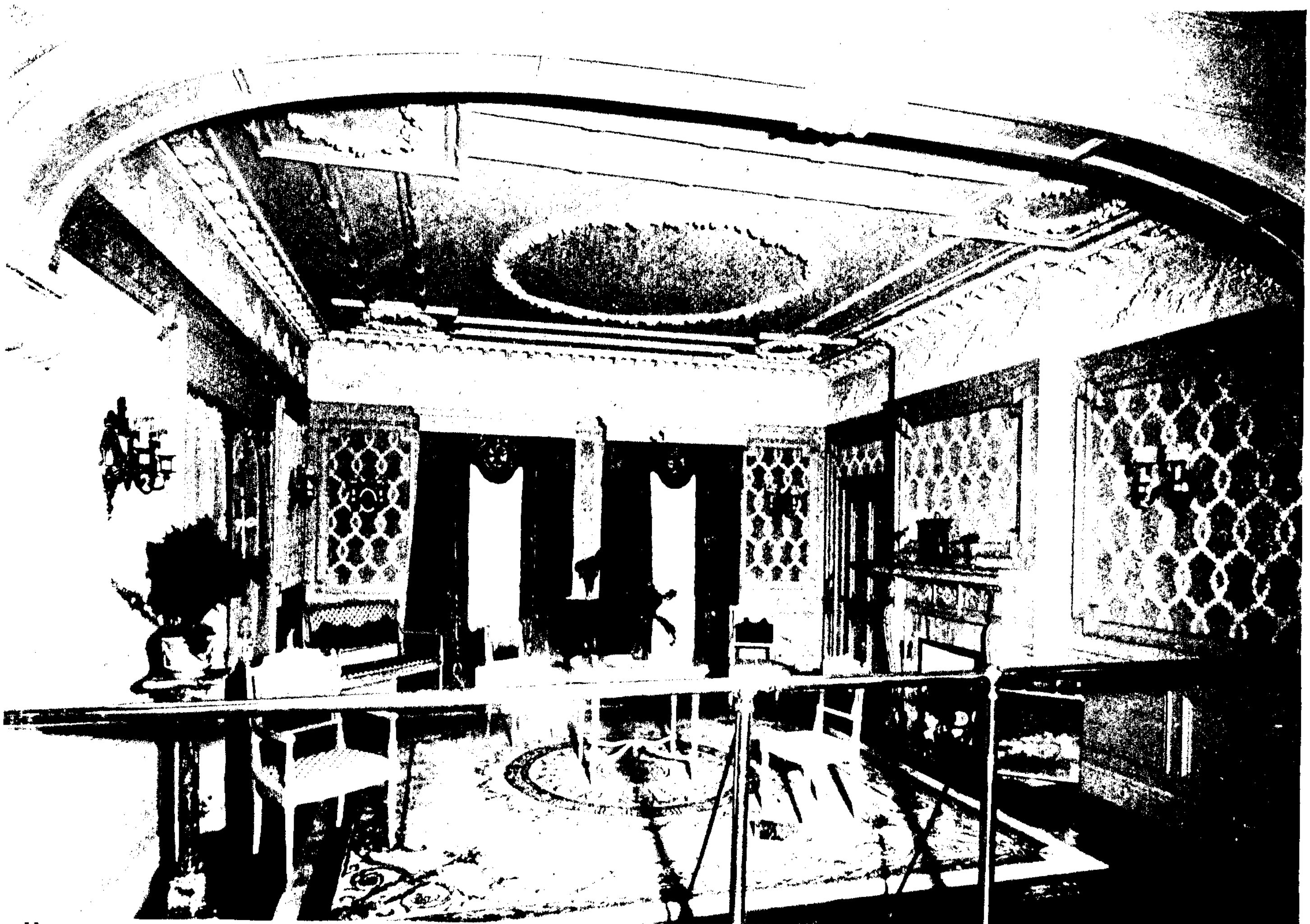

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Owners of fine residences invariably give as much or more attention to the *bathroom* than to any other individual room in the house. The fixtures of *that* bathroom must not only be *sanitary,* but in design they must have *artistic lines* and *aesthetic proportions;* in color they must be a pure, *snowy white,* to give the effect of *purity* and *cleanliness.* The bathroom should be the toilet room, in fact, as well as in name.

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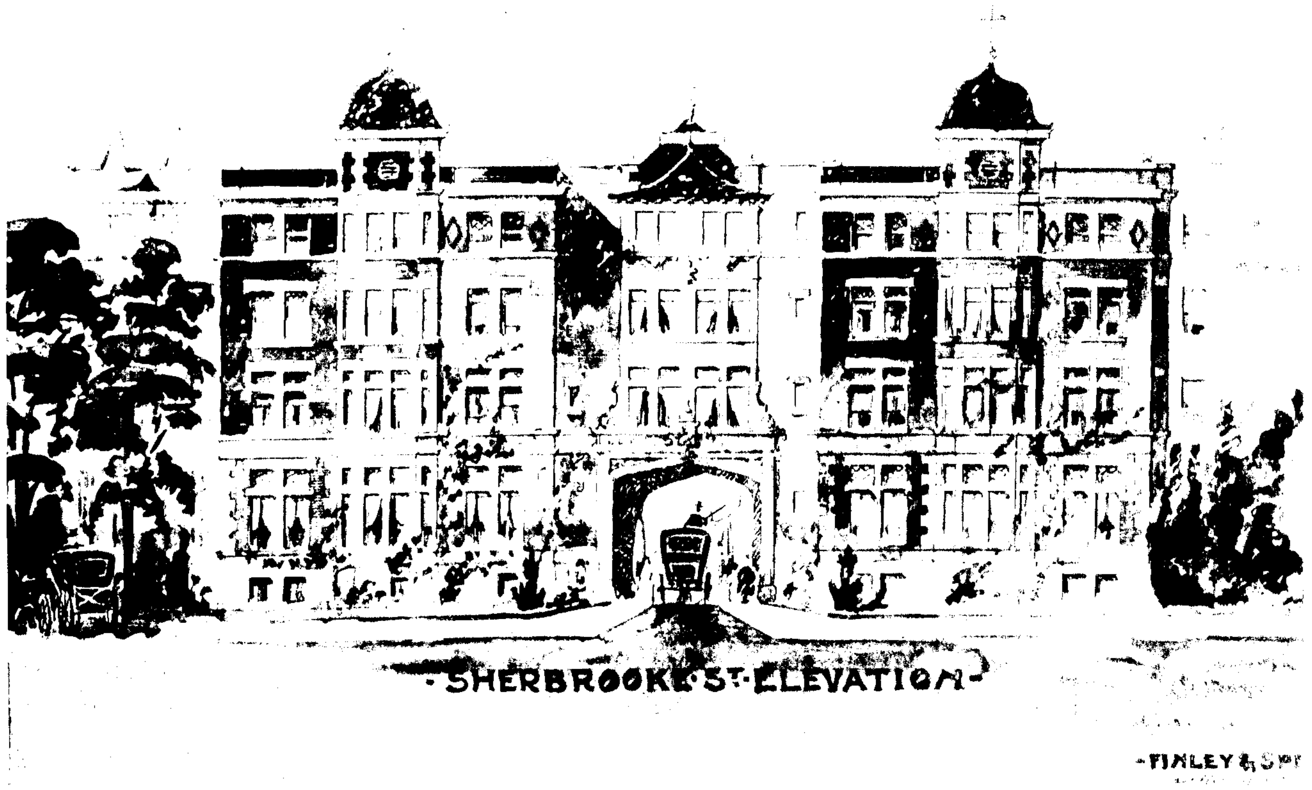

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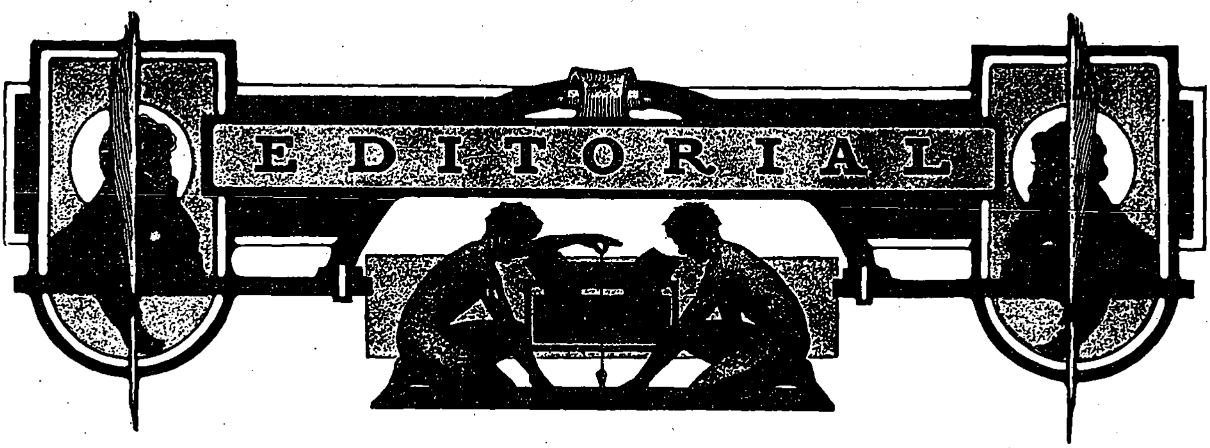


Building Progress in August.

WITH THE BEGINNING of the fall season at hand, there is every indication that the remarkable building progress made during the spring and summer months, will continue uninterrupted throughout the remainder of the year. In the east, west and central portions of the Dominion, plans have been formulated for a large number of important projects to be carried out within the immediate future, and unless adverse weather conditions come to blight the present prospects—and the steady manner in which the season has set in would indicate otherwise—the declining months of 1909 will in all probability prove to be the greatest fall building period Canada has yet recorded.

As regards August, the last of the summer months, operations were exceedingly active. Comparative figures, as supplied CONSTRUCTION from seventeen of the twenty centres reporting, place the average gain for the month at 34 per cent., a fraction in excess of one-third more than was registered for the corresponding period of 1908. The West, with one exception, has fully recovered from the slump experienced in the preceding month; the losses noted, but four in number, are scattered; and the general situation as based on the returns, well balanced, strong and active.

The biggest loss for the month has fallen to the lot of Stratford, where a decline of 89 per cent. has been recorded. Halifax is second in this respect, with a falling off of 81 per cent.; while Fort William and Edmonton lagged behind their figures for the corresponding period of last year to the extent of 4 per cent. and 3 per cent. respectively. This brief respite on the part of Fort William seems quite in order in view of the exceedingly strenuous manner in which she has been forging ahead since the beginning of the year; and as for Edmonton, the loss may be explained by the fact that several important jobs were held up pending the outcome of certain labor troubles which gave promise of an early adjustment and have in all probability been settled by this time, so as to permit the work to proceed.

Aside from these four places, all cities in the list show the balance to be substantial in their favor. Ottawa's gain of 202 per cent., the biggest increase per cent. tabulated fof the month, places her in the premier position. Calgary lays claim to second honor by an advance of 188 per cent., while Berlin ascends to the third highest rung with an increase of 150 per cent., an amount which amply attests to the rapid manner in which this industrious city is progressing.

Toronto, however, bears the palm for the largest volume of business, permits having been issued for new buildings, aggregating in cost $1,325,132; although Winnipeg is a close contender in this respect, with a total for the month of $1,133,850. The increase noted in each place is 4 per cent. and 85 per cent. respectively, and, in view of the high percentages attained in the preceding month, the showing made in either case is more than satisfactory. Information from Winnipeg states that the architects are extremely busy at the present time, and that a number of big projects will be shortly launched, so as to get the mason work done before zero weather is at hand.

In British Columbia, Vancouver noted an increase of 56 per cent., which more than offsets her loss in the preceding month; while Victoria recorded another gain by an advance of 6 per cent. Other Western gains are reflected in the comparative figures of Brandon and Regina, both of which surpassed last year's total for the month, by an increase of 38 per cent. and 9 per cent. in order named.

Throughout Ontario, all cities, with the exception of Stratford, made substantial headway. In addition to the advances made in Ottawa, Toronto and Berlin, as previously mentioned, other gains noted are: London 68; Brantford 35; and Peterboro 21 per cent. St. Thomas, Windsor and Port Arthur, while not submitting comparative figures, show in their relative amounts for the month—$193,400; $85,085 and $26,000—and especially so in the two first cases, figures which seemingly indicate that none of these places have suffered a reversal.

In the East, Sydney again registers an advance, her gain for the month being 37 per cent.; and Montreal, whose figures came to hand too late to be included in the accompanying table, noted an increase of 7 per cent. This is Sydney's fourth consecutive gain, while Montreal has exceeded the corresponding figures of 1908 for each and every month this year.

Practically all the cities included in the list report

	Permits for August, 1909.	Permits for August, 1908.	Increase, per cent.	Decrease, per cent.
Berlin, Ont.	$20,000	$8,000	150.00	......
Brandon, Man.	29,200	21,145	38.09	......
Brantford, Ont.	26,295	19,430	35.33	......
Calgary, Alta.	242,175	83,810	188.95	......
Edmonton, Alta.	99,707	103,352	......	3.52
Fort William, Ont.	168,935	176,725	......	4.40
Halifax, N.S.	25,117	132,773	......	81.07
London, Ont.	64,137	38,000	68.78	......
Ottawa, Ont.	317,200	105,000	202.09	......
Peterboro', Ont.	42,590	35,195	21.01	......
Port Arthur, Ont.	26,600	......	......	......
Regina, Sask.	168,224	153,112	9.86	......
St. Thomas, Ont.	193,400	......	......	......
Stratford, Ont.	2,125	19,700	......	89.21
Sydney, N.S.	18,9[illegible]	13,800	37.31	......
Toronto, Ont.	1,325,132	1,274,185	3.99	......
Vancouver, B.C.	841,020	538,930	56.05	......
Victoria, B.C.	141,040	132,770	6.22	......
Windsor, Ont.	85,085	......	......	......
Winnipeg, Man.	1,133,850	602,000	88.34	......
	4,665,697	3,457,927	34.92	......

that the amount of work on hand is such as to tax to the utmost the capacities of both the architects and contractors, and that there is no signs of a let up for some time to come; the general opinion being that in the next two months a far greater number of buildings will be undertaken than at any corresponding period in the past.

Architectural Exhibit at C.N.E.

THE EXHIBIT of architectural drawings, held in connection with the Canadian National Exhibition, demonstrated two things. First, that the public is interested in drawings of this character. and, second, that there is a need for an annual exhibit of this kind. There was no section in the Liberal Art Building which proved a greater attraction or elicited more favorable comment, and much credit is due to the Committee of the Ontario Association of Architects, under whose direction the exhibit was held, for the very excellent arrangement of the display in general and the admirable manner in which the drawings were hung. There was no time during the entire two weeks but what a large crowd was present, and no place in the building where the vast concourse lingered with greater interest than in the space generously alloted by the Board of Management for this purpose.

The drawings in the main consisted of well rendered colored work, and pen and pencil sketches, although a liberal sprinkling of splendid photographic reproductions was also in evidence. A most gratifying feature was the large number of exhibits made and the representative character of the work displayed. The entire wall space available was well occupied and the subjects shown embraced practically every branch of building design. Possibly the only disappointment in this connection was the fact that the affair was a trifle too local in character, the preponderance of renderings and photographs being exhibited by Toronto architects, although several Montreal and Ottawa firms, and a small number of architects in various parts of Ontario, also displayed their work. It would have been better had the representation been more general. This drawback, however, cannot in any way be ascribed to the lack of effort on the part of those in charge, but to the lack of initiative enterprise, and the delinquent attitude on the part of a large number of architects themselves, who hesitate to put a shoulder to the wheel until the machinery is in motion.

All in all, the exhibit was highly gratifying and the committee and those who exhibited and lent their cooperation, are to be congratulated upon its success. In view of the interest manifested by the public, there is no valid reason why it should not be repeated, and become an annual affair. It is to be sincerely hoped that the Exhibition Board will make it a permanent feature, and also that next year the architectural fraternity in every section of the Dominion, will be represented. An event of this kind gives the general public the greatest opportunity to view work of this class, and it can become the means of inculcating in the mind of thousands of people, a broader appreciation of the principles of good architecture and a greater desire for the application of these principles in their immediate surroundings.

Affiliation and Architectural Education.

TWO SUBJECTS that will in all probability form the basis for wide discussion at the second general assembly of the Royal Architectural Institute of Canada, to be held at Toronto, October 4, 5 and 6, will be the questions of affiliation and architectural education. Both evidently will have a vital bearing on the future of the architectural interests of Canada; and yet, if we are to judge from the experiences of other countries, the first is absolutely necessary, if the high standard desired in the other is to be successfully attained. While some of the provincial associations have, in a limited way, established a system of education, it is quite obvious that far greater and more satisfactory results could be obtained in this direction, if the various architectural bodies would unite and direct their undivided effort through some agency having a national scope.

In speaking of the advantages of co-operation as found in England, and deprecating the lack of this desirable condition in their own country, the committee on education of the American Institute of Architects, in their last annual report says: "Were the institute possessed of a junior body, bearing to it the relation maintained by the English Architectural Assbciation to the R.I.B.A., and acting as the concrete educational agency that stands between the office and the School of Architecture, taking over very largely the educational responsibilities of the institute, but subject to the advice and supervision of its Education Committee, then, in all probability, actual results would be more rapidly forthcoming than is now the case. For this reason, and without prejudicing the question from any other standpoint, the committee expresses the hope that way may be found for the union of the Institute and the League in one powerful and co-operative organization."

Continuing, the reports adds "that the pressing need of education to-day is not curtailment but extension, . . . the general broadening of the curriculum until it comes to lay more stress on the humanities and the other arts allied to architecture. . . . Until the end of time every prospective artist in any department of the Fine Arts must go to school, for the whole period of his life, to the monuments of past civilizations in Greece and Rome, Italy, France, Spain, Germany and England, but it is no longer necessary,, and if unnecessary then most unfitting, that we should be compelled to depend for our crowning education on the charity or the friendliness of another contemporary people. Every nation develops its own type of civilization, solves its own diverse problems after its own native fashion. American civilization is other than that of France, or Italy, or England, and art, which is the flowering of civilization, as well as its touchstone, must vary accordingly, however at one it may be at root with the art of all men at all times."

The latter remarks have an interest in that they indirectly point out a condition with which the architectural fraternity in Canada is confronted. We also have an individuality that differs from other countries, and therefore must develop an architecture that is compatible with our social ideas, tastes, customs and climate. Like America, we can benefit from supplemental studies and observations abroad, but it should not be necessary for us to be dependent on other countries for our higher educational advantages. What is needed more than anything else, is an enlargement of the departments of architecture already existing at McGill and Toronto Universities; the establishing of two or three additional schools; and the developing of an atelier system which will enable the younger draftsman to drill himself more thoroughly in the principles of design, and to come in closer touch and sympathy with the older architects and his fellow students. This, it seems, can only be brought about in one way, and that is by the affiliation of the various architecutral bodies in the Dominion. Perhaps, if this is effected, Government aid and co-operation might eventually be obtained; but until the architects stand as a unit in their endeavors towards a higher professional plane, their ideals at the best will be slow of attainment.

Where the Law Fails.

THERE IS A LATIN PHRASE to the effect that "necessity knows no law," which might be altered to read "there is no necessity for law." While this might sound somewhat anarchistic, it nevertheless has its application, especially where the law utterly fails to serve its purpose. As a case in question, we refer to the city of Westmount, P.Q., where a firm of contractors, after a series of unnecessary delays, and a rather protracted hearing, were found guilty of employing dishonest methods in the execution of their work, and punished by a fine of ten do'lars. Two charges were laid against the contractors, one that they were using inferior concrete in the construction of the foundations for several houses, and the second, that a portion of the foundations did not rest upon a solid footing. These charges were preferred by the City Engineer, who summoned that contractors into court, after they had persisted in ignoring the notice served upon them, that their work was being carried out in violation to the building by-laws and that certain changes must be made. The bulk of evidence introduced, fully corroborated the charges of the City Engineer. It was proven conclusively that not only were a portion of the foundation walls built upon an unstable footing, and not placed upon piles or carried down to a solid base as prescribed by the regulations, but that the material used was anything but concrete, the aggregates being unclean and mixed with earth and debris.

In view of this testimony, and the further fact that the defendants at first also disregarded the court's order to appear for trial, it seems that a fine of such meagre proportions renders the purpose of the law ridiculous and its existence of absolutely no statutory import. We believe, as with others, that "justice should be tempered with mercy" and that the "object of the law is not one of revenge"; but an over-weening leniency, such as this, kicks the very props from under what might be regarded as even a pretense at vindication, and completely emasculates the dignity and force of any legislative enactment. A law which admits of so small a fine, even as the minimum, in a case of this kind, cannot be respected as a wholesome measure or a benefit to the interest of good government. Dishonesty of this nature should not be dealt with as a misdemeanor; it is a more serious offense, and a crime which should exact a more severe punishment.

As it is, in the event of disintegration or the collapse of the walls, or the settling of the foundation—any of which, according to the evidence, is quite possible—the misfortune will be attributed directly to the fact that concrete was employed; and the technical press devoted to other building interests, will eagerly grasp the opportunity to give a garbled version of *another concrete failure*.

If a law is to be of any avail to mankind, it must protect society from tricky and fraudulent methods of this kind, and aid and encourage honest workmanship and legitimate enterprise in all fields of human endeavor. It is ridiculous to have building by-laws and regulations, if such measures are not supported and upheld by the courts.

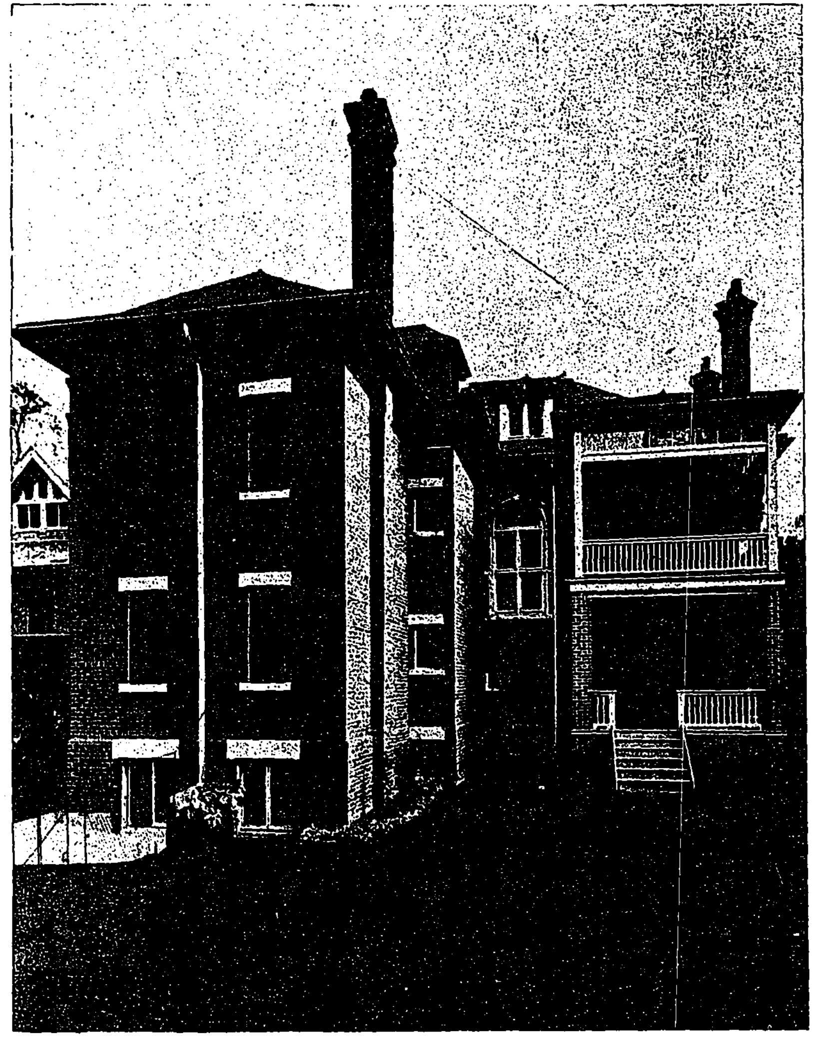
The Parliament Building Fire.

THE FIRE WHICH DESTROYED the west wing of the Parliament Building at Toronto recently again points out in a forcible manner the results of misdirected economy in building construction. Aside from the heavy damage to the building itself, the Government of Ontario has suffered an immeasurable loss in the way of valuable documents and records which can never be replaced, and which to-day would still be unharmed had fireproof methods been employed at the time the structure was erected. When the building was put up under the direction of a former administration, the low cost of its construction was made the instrument of political capital. It was compared to other structures, and referred to as an evidence of administrative economy, and as the exterior gave no evidence of its internal weakness, it was not until the party in power had been retired from office that the many existing structural defects in the building were discovered.

In an editorial comment upon the matter, one of the Toronto morning papers said: "An examination of the building made within recent years has revealed the cause of the cheapness. The exterior is of stone, and looks reasonably well. But the interior is flimsy. While the division walls in all large buildings are of brick, such is not the case with all the walls in the Parliament Buildings. While the joists in the public buildings that were said to be too expensive are of steel, and while the floors and the staircases in great buildings are usually of stone or marble or concrete, the joists and the floors and the stairs in the Ontario buildings are of wood. The building was so cheaply erected that the great lobby, while safe enough, betrays elasticity when crowded. The iron supports to the floors are thin and hollow. When raising the great central roof, one would have thought that a steel framework would have been employed. But the entire interior is wood. The architect, who was an expert, was clearly required to make everything of the cheapest, and to give as much gingerbread for as small an amount of money as possible. He did the best he could, and it is understood that after he had made his plans, further cheapening expedients were adopted. Since the present Government has been in office it has been exceedingly anxious about the condition of the buildings, and has had them examined with a view to improving them. But it has found that reconstruction is about the only remedy that is available. It has, however, expended some $25,000 in making the electric system safe, and has decided that the addition at the rear of the present structure shall be fireproof. The fire endangered the entire block, and it is a wonder that any part of it was saved. In a building of the fireproof type the damage done would have been little or nothing. The lesson of the fire is that economy can be carried too far. It is a direct loss when a building is put up cheaply, and it is not right to run to economical extremes where the structure is to contain valuable documents and is to serve the public for many years. The Toronto City Hall, as has been alleged, cost twice what was paid for the buildings. But it is only necessary to make a rough examination of the two structures to be convinced that the more expensive building was really the cheapest."

MR. JUSTICE WARRINGTON in the case of Robertson v. Willmott says THE JOURNAL OF THE SOCIETY OF ARCHITECTS, London, has given a decision which is of interest to architects. Under a deed of partnership, dated November 7th, 1906, the plaintiff and defendant entered into partnership as architects and surveyors. There was a clause in the deed which enabled either party under certain circumstances to determine the partnership upon notice, but it was provided that if the dissolution took place within five years the defendant should not practise an an architect and surveyor within certain defined limits. The defendant within five years determined the partnership, and became assistant to an architect practising within the defined limits. The Court held that he was carrying on the profession of an architect in breach of the agreement, and granted an injunction. There appears adds the BUILDER, to be a distinction between carrying on a business and carrying on a profession as far as such covenants are concerned. A man may not be carrying on a business unless he is concerned in the profit or loss, but a professional man is exerting his profession whether he is using his professional skill for an other at a fixed salary or whether he is practising on his own account.

Front view, Residence of Mrs. W. P. R. Street, Toronto, showing brick garden wall and general detail of facade. W. A. Langton, Architect.



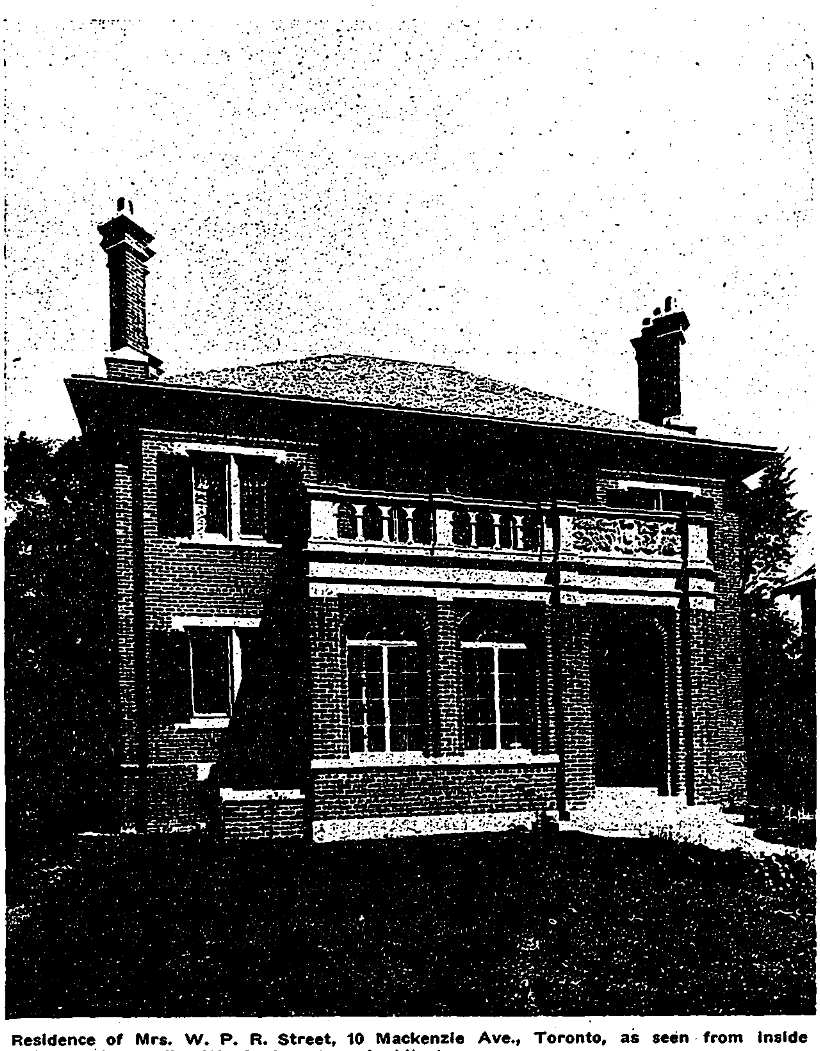
Rear view, Residence of Mrs. W. P. R. Street, Toronto, showing back porch and service wing projection. W. A. Langton, Architect.

RESIDENCE OF MRS. W. P. R. STREET.—A Noteworthy Addition to Toronto's Domestic Architecture.—Situated on a Double Fronted Lot and Built with Consideration to Site and Aspect.—Features of Design and Plan.

THE PLAN OF THIS HOUSE follows the scheme of a service wing projecting from the north-east corner. This, which is perhaps the best model for a south fronting house of sufficient size, is peculiarly suitable for this house because of the double fronted lot on which it is built.

The lot is 145 ft. from front to front, with a 15 ft. boulevard in addition on each street. The sidewalks are in both streets on the other side of the road. The building conditions require all houses to front on the south street, Mackenzie Avenue. Other houses in the row are set back about 30 ft. from Mackenzie Ave. This house is set back 53 ft., for the purpose of getting more garden space on the south side, and of clearing the other houses at the back so as to get more light and air. This brings the kitchen to the 30 ft. line on the north street, Dale Ave., and provides a cheerful outlook for that part of the house.

There are one or two other peculiarities which are worth noting as original features. There was no building on the lot to the east when the house was planned, and no outlook could be depended upon in that direction. It was necessary, therefore, to light the dining room from the south. Thus the principle difficulty of the plan was to keep the front quiet, with the two largest rooms and an entrance, and a verandah room not connected with the entrance, all crowding to the front to get on the sunny side of the house. To simplify this crowding, the sunroom and porch were combined in a projecting mass, leaving the main wall to take the character of its composition from the open order of the windows in the upper story, under which the drawing room and dining room windows are placed.



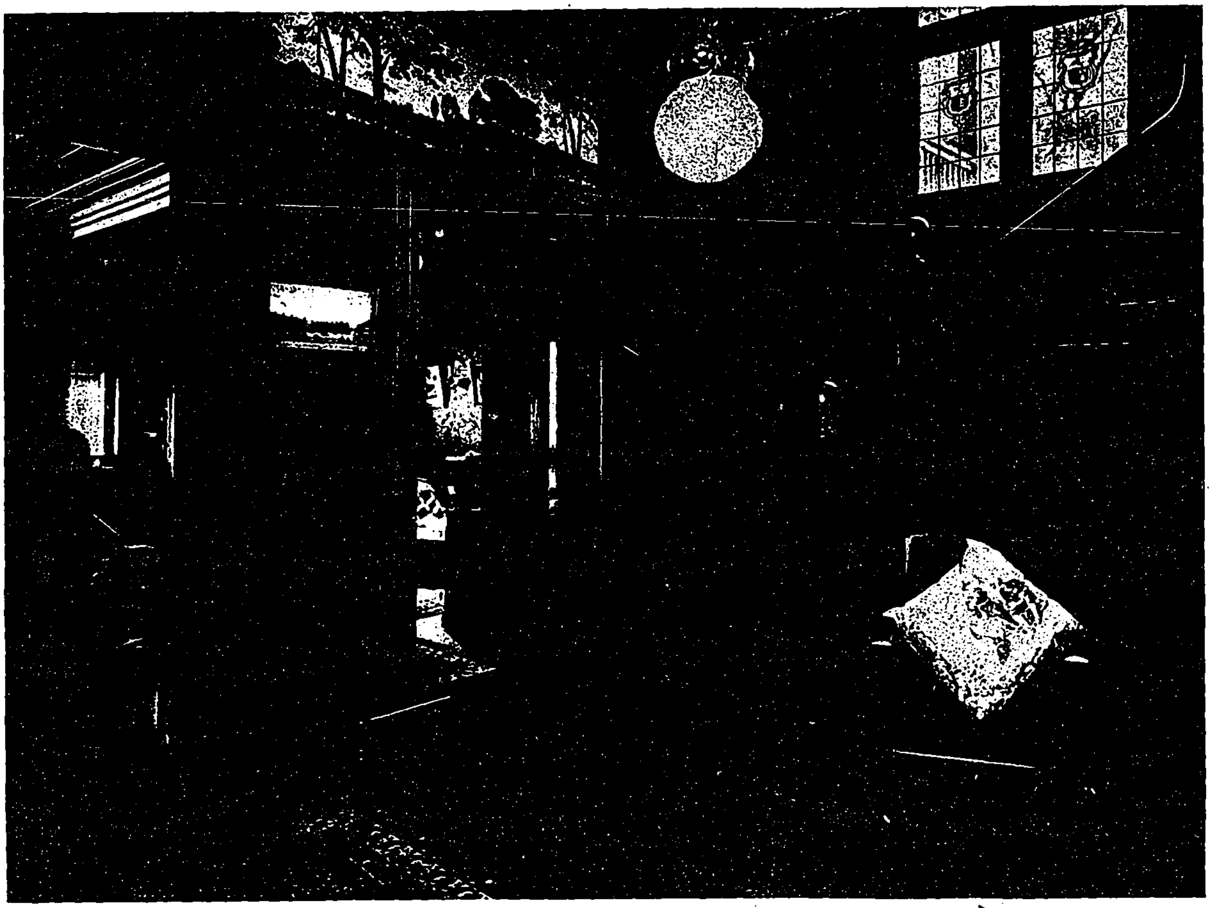
Residence of Mrs. W. P. R. Street, 10 Mackenzie Ave., Toronto, as seen from inside the garden wall. W. A. Langton, Architect.

The porch projection serves also the purpose of seating the building on the ground. This is desirable for the Toronto type of residence, isolated in its own grounds. In this respect, they are like country houses; but in respect of having people walking past, only 30 feet away, and carriages driving past at a distance not much greater, the ground floor windows are too much under observation, if the house squats low on the ground like the true country house. The floors of a city house, even in Toronto, must be high, if the residents are not to feel overlooked. Yet there is no doubt that close connection with the ground is more beautiful for a house which stands apart.

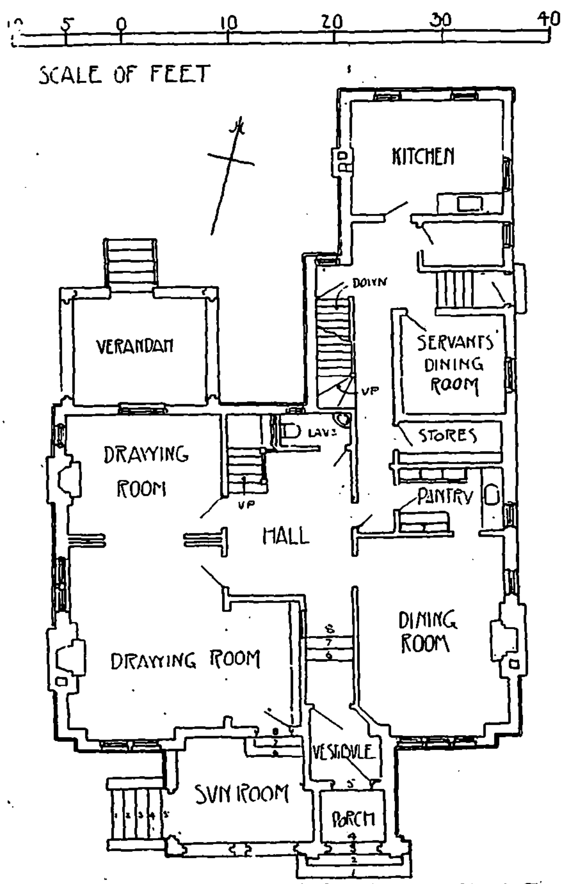
In this house the ground floor is 4 ft. above the ground, and the window sills are 6 ft. 6 in. But the sunroom, especially in its summer character of verandah (without the sash which appear in the view), is pleasanter near the ground; and the porch may be even lower. There is some distance to be gone, in getting from the porch to the hall, which is lighted from the other side of the house; and to have some of the steps inside gives a motive and apparent reason for the necessary passages. The porch floor is only 2 ft. above the ground, and the spread of the steps helps the feeling of being well down on the ground.

Unfortunately the designer, in his zeal for a secluded garden, has run the brick garden wall so high that the steps, which are an important feature of the front, are not seen, unless the gate is open.

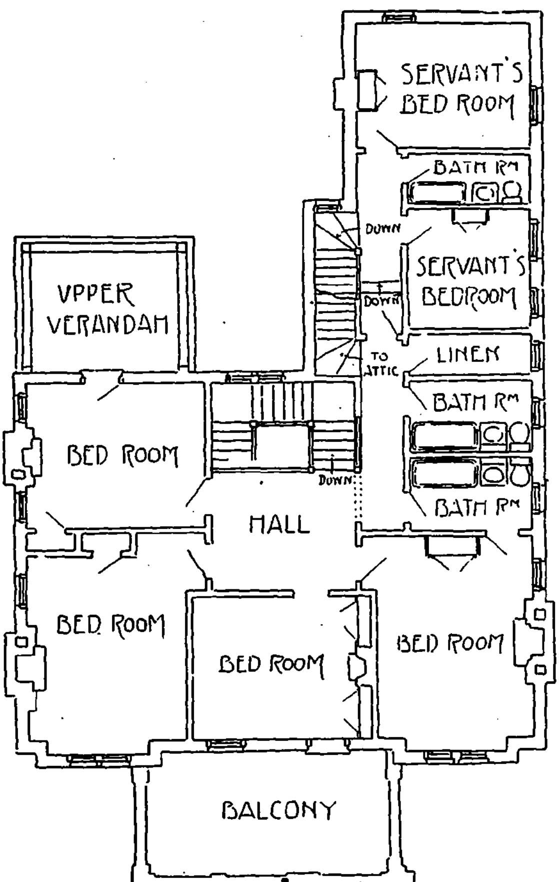
The plan in general has no unusual character, except on minor points dictated by special requirements. All



Entrance Hall, Residence of Mrs. W. P. R. Street, Toronto. W. A. Langton, Architect.



Ground floor plan, Residence of Mrs. W. P. R. Street, Toronto. W. A. Langton, Architect.



First floor plan, Residence of Mrs. W. P. R. Street, Toronto. W. A. Langton, Architect.

rooms on either the ground or first floor are grouped around a centrally situated hallway. The double drawing room, connected by sliding doors occupies the entire portion of the floor to the left of entrance; the front rooms connecting directly with the sun-room at the front,

Front elevation, Residence of Mrs. W. P. R. Street, Toronto. W. A. Langton, Architect.

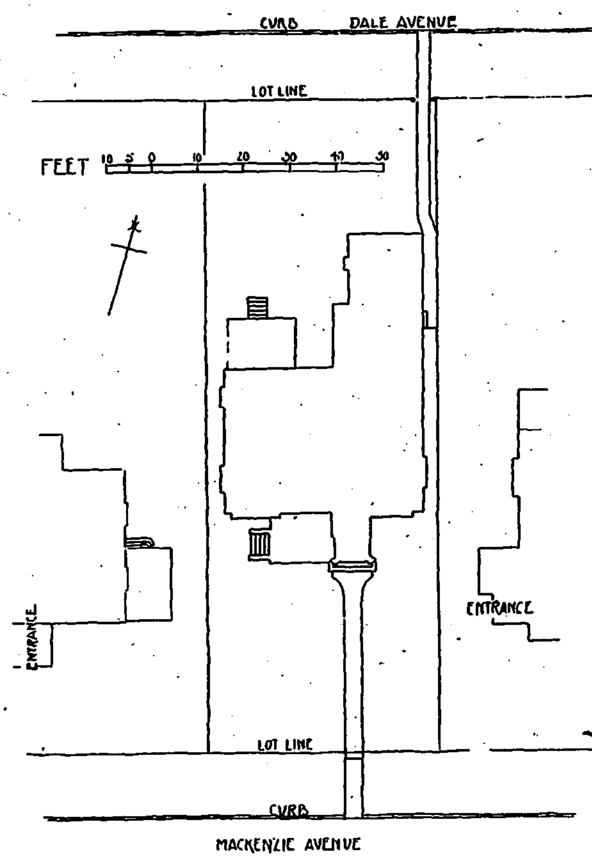
while the rear room opens into the verandah at the back.

The service section is confined entirely to the east of the hall, the dining room being at the front and separated from the kitchen at the rear, by a pantry and the servants' dining room.

All the living rooms and the bed-rooms with the exception of those of the servants have open fire-places. The attic floor is used for storage only.

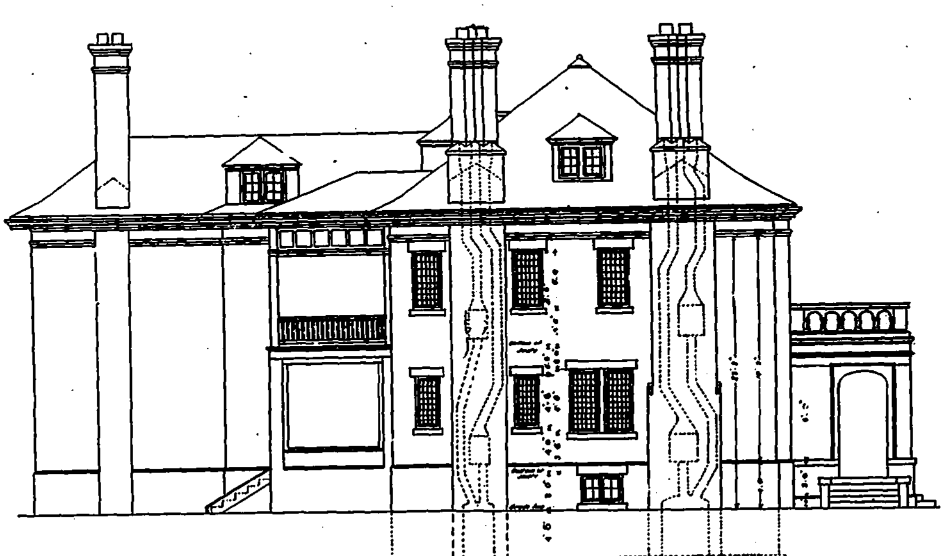
The bricks are John Price's red brick; the cut stone is Bedford lime-stone, and the slates are the never-fading green from Vermont quarries. The soffit of the cornice is plastered with cement plaster on metal lath.

A STEP WORTHY OF EMULATION on the part of many Canadian municipalities has just been taken in Washington, D.C., where during the past holiday months all schools buildings which are not non-combustible in their construction, have been equipped with fireproof stairways. Eighteen structures in all were improved in this respect and the school building system in general brought up to a higher plane of protective efficiency.

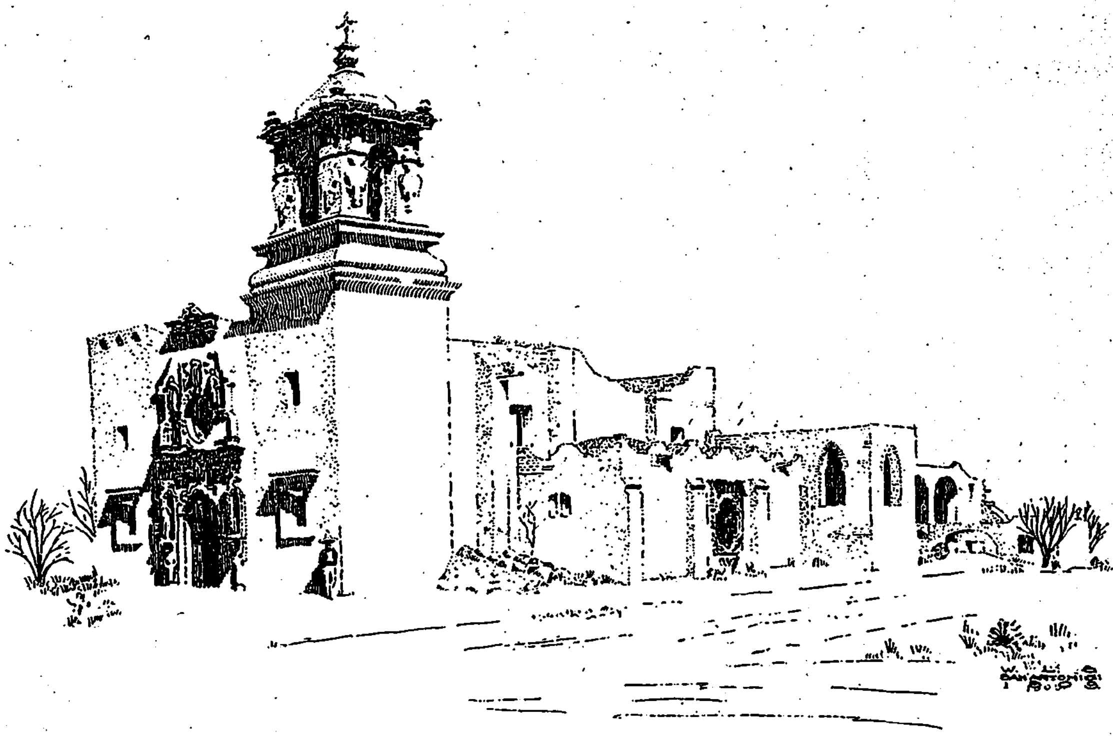


Ground plan, Residence of Mrs. W. P. R. Street, Toronto.

Such a step in many cities and towns in the Dominion, is not only necessary but imperative, and school boards should not await the repetition of the sad experiences of the past to impress this urgent need more vividly upon them. It is a case in which the "ounce of prevention" theory certainly holds good.



West elevation, Residence of Mrs. W. P. R. Street, Toronto. W. A. Langton, Architect.



Mission San Jose de Aguayo. Founded 1718—Completed 1731.

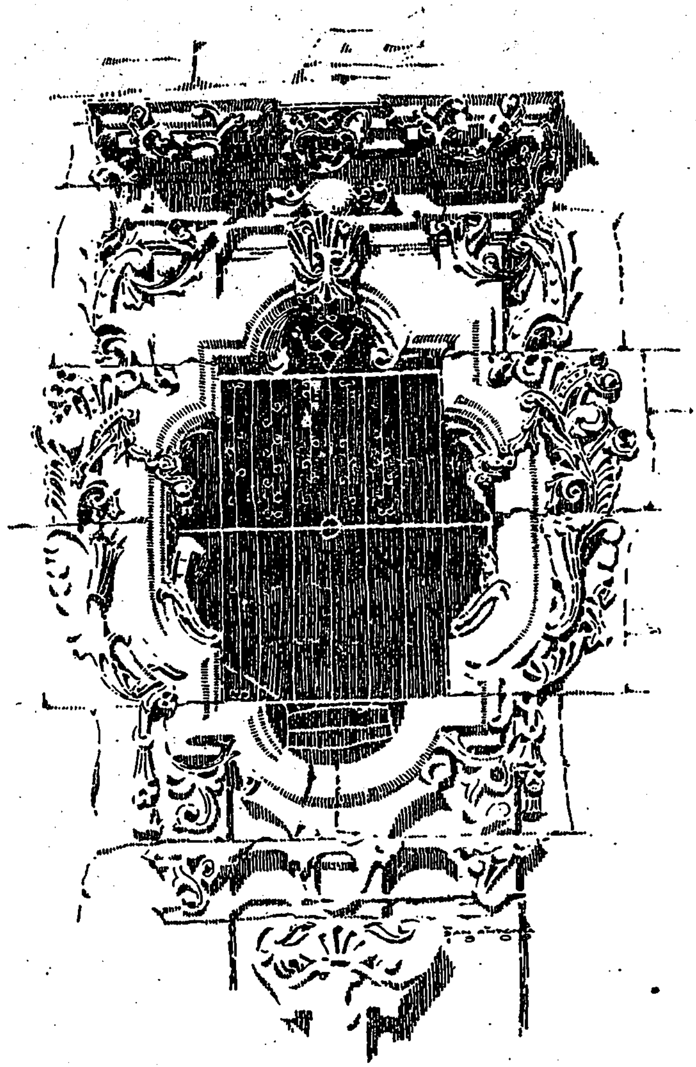
Mission of Nuestra Senera de la Concepcion Puressina de Acuna, built 1731.

THE MISSIONS OF SAN ANTONIO.—Worthy Examples of Pioneer Architecture Which Time is Rapidly Laying in Ruins.—Most Notable Group in America—Their Plan and Construction.—Built by Franciscan Friars in Early Part of Eighteenth Century.

Written and Illustrated by W. L SOMERVILLE.

ONE OF THE MOST PICTURESQUE and historical cities in the United States, as well as the oldest with maybe the exception of St. Augustine, Florida, is San Antonio, Texas. The stirring events that have been centred around it may be suggested by the fact that it has been under the flags of five different nations since it was first granted a charter by the king of Spain in 1733. It was eighteen years before this, however, that the Spaniards under Don Domingo Ramon with orders from the Viceroy of Mexico established a "presidio" or fort called San Antonio de Valero on the bank of the San Pedro creek, which runs through the present site of the city. About three years later, in 1718, the first mission was built under its protection by certain Alcantarine Franciscans of the College of Queretaro who called it by the same name. It was the church of this mission, afterwards rebuilt on its present site in 1744, about a quarter of a mile from where it was originally erected, called the church of the Alamo, that was the scene of one of the most terrific battles ever fought by men. Here, Crockett, Bowie Travis and a handful of brave Texans fought for the liberty of their country against an army of seven thousand Mexicans under General Santa Anna. This building still stands in the centre of the city as a monument to the heroes who were massacred within its walls.

Four other missions were also established by these industrious friars under the protection of the presidio. The first of these to be erected was Mission San Jose, situated about five miles south of the fort on the west bank of the San Antonio river. On the completion of this building in 1731 work was started on the other three missions, Mission of Nuestra Senora de la Concepcion Puressina de Acuna, or Mission Concepcion de Acuna as it is more commonly known, Mission San Juan de Capistrano and Mission San Francisco de la Espada. These missions were all erected on the banks of the San Antonio river south of the present site of the city, Mission Concepcion de Acuna being between Mission San Jose and the presidio, the other two being south of this mission about three miles apart in the order named.

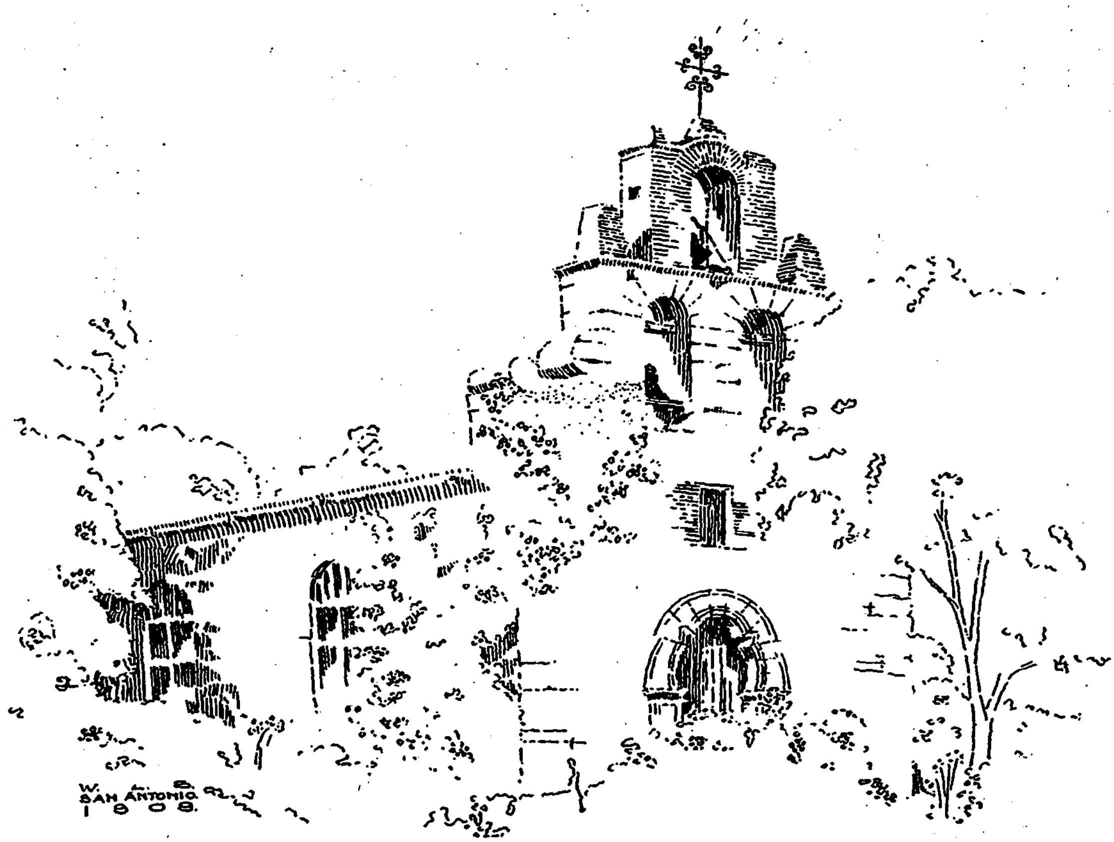


Baptisty Window, Mission San Jose de Aguayo.

These quaint old Franciscan missions, beautiful in their architecture because of the honest simplicity of their design, the excellence of their workmanship and the thoroughness and soundness of their construction are a subject of interest to every student of architecture who has had the opportunity to see them. The style was naturally that of the Spanish Renaissance of the early part of the eighteenth century showing strong characteristics of the Moorish influence then prevalent in the south of Spain. Of course the purpose for which these buildings were erected, the necessity of making them not only a place of worship but also a fortress, school and a place in which to reside presented a problem the solution of which in the national style of architecture required that it should be greatly modified. One might almost say it was a style in embryo which has not since been developed. In these buildings we do not find the elaborate ornament nor the exquisite iron work which were features of the Renaissance in Spain. The absence of these features are no doubt accounted for by the lack of skilled workmen. The stone carving is restricted to the occasional decoration of a portal, window or baptismal font. There are, however, traces of rich, brightly colored fresco work on sheltered portions of the fascade. The colors and patterns of a decidedly Moorish origin are still distinguishable.

The Mission San Jose de Aguayo, the first of the latter group of four to be erected, was dedicated to St. Joseph, the husband of the Virgin Mary, and was founded the year that Marquis San Miguel de Aguayo became the governor of Texas, 1718-1720, hence the name San Jose de Aguayo.

The church of the Mission or main building included beside the church a small chapel and the monastical quarters. The walls, which were built of large sandstone blocks quarried not far from the site of the building, are from two to six feet thick, being necessarily heavy on account of the immense weight of the stone vaulted roofs which they have to support. The exterior of the walls were plastered with a natural cement found in the vicinity, which has a cream white color and hardens with age. This was elaborately frescoed in bright colors which may have been used not only as an architectural effect but also to gain the admiration of the Indians who were fond of a display of color.



Mission San Francisco de la Espada, built 1731.

The most notable features of this mission are the richly carved portal on the main facade and the chapel window. This carving has been cruelly mutilated by thoughtless relic hunters who have chipped the ornament till it is impossible to see even the outline in places. Whole figures have been removed and others made headless.

Although the main facade may be criticised because of its style which is tainted with some Rococo innovations it can be seen even by the casual observer that the sculptor of this ornament was not of ordinary ability. The lines are free and graceful, the drapery and features of the saints and cherubs beautifully executed and the composition of the whole showing the talent of the designer and sculptor. Bishop Neraz thinks the figures to be the Virgin Mary, San Jose, San Benedictine, San Augustine and San Francisco.

The chapel window is considered by many to be a finer piece of work than the main facade. It is very similar in detail, the same mouldings and the ornament being used that occur on the portal to the church.

We have no idea of the interior of the church except that which can be surmised from the other missions of a similar type, the north wall having collapsed a number of years ago, carrying with it the stone vaulted roof. On the south side is a small room which was used as a chapel or baptistry. It is exceptionally well preserved and is still used by some Mexican families living in the neighborhood. It was roofed in the same manner as the church, having three small domes. This seems to have been a favorite mode of construction and is found in all the missions. The baptismal font is simply carved, the pilasters and domes having plain, coarse plaster mouldings and the rest of the interior being severally plain.

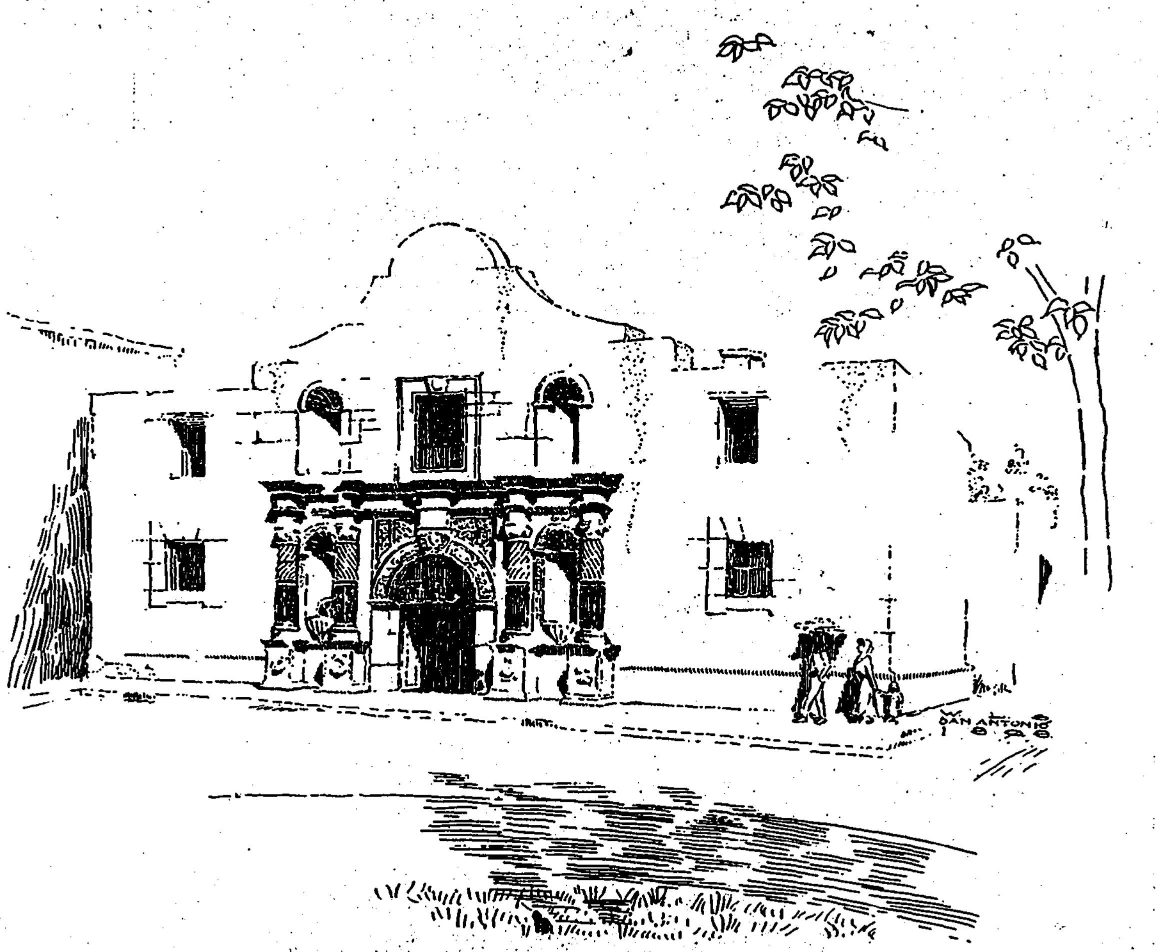
One of the crude but skilful pieces of construction so noticeable about these buildings, is the spiral staircase to the second story of the tower, located in the angle between the tower and the church wall. It is in ruins now, the walls around it having crumbled away, but some of the steps have been preserved. These were made out of logs roughly dressed with an axe into a shape resembling a panel of a wooden fan. The end toward the centre being part of a circle and the tread of a V shape. They were placed one upon an other, the outer end being built into the wall.

Back of the church, forming part of the same building, were built the living quarters for the friars, with a two storey cloister having a double series of semi-circular arches. This portion of the building which had fallen into a very dilapidated condition, was rebuilt by some Benedictine fathers from St. Vincent's Abbey in the Pittsburg Diocese, Pennsylvania, in 1859, with the intention of using it for scholastic purposes. It was they who built the atrocious pointed arches to some of the windows and the inside row of arches to the cloister; and it is well that they abandoned the mission before they completed their "improvements."

At the completion of this building in 1731, the foundation was laid for the Mission Nuestra Senora de la Concepcion Purissima de Acuna, which was named in commemoration of one of the most important of church feast-days, the Immaculate Conception of the Virgin. This mission is much the best preserved, which perhaps can be accounted for by the fact that being nearer to the city, it probably was the last to be abandoned. Architecturally, it is of little interest except for the fact that it gives us a better idea of the interior of these buildings, the roofs of the others being in ruins. The main facade is very simple. Two massive towers, having plain Roman arches opening in the upper story, rise at each side. The roofs are pyramidical, with small stones at each corner of the base of the same shape. The top of the side walls of the church, and the circular wall of the central dome are serriated in a primitive manner, giving one the impression that the builder had a Moorish prototype in mind, but also that he had a bad memory. The walls were frescoed, but with decidedly less refinement in the designs and colors than those found at Mission San Jose.

This mission, like all the others, faces west. The plan is in the form of a cross, with the towers forming two wings at the foot, the monastical portion being built south from the south wing. The interior of the church is very simple, the stone vaulted ceiling, series of arches and central dome being devoid of ornament. In each arm of the cross are altar places, and at the west end of the church over the entrance is the choir loft.

The erection of the Mission San Juan de Capistrano, named after Santa Geovanni de Capistrano, a friar of the Franciscan Order, born in the little town of Capistrano, in Abruzzi, Italy, 1386, and Mission San Francisco de la Espada, was started the same year as Mission Conception, 1731. These two missions were similar in design, being very unpretentious, but yet picturesque in their present ruinous condition.



Church of Alamo, Mission San Antonio de Valero, built 1744.

At the Mission San Francisco, an interesting architectural feature is the entrance door to the church, which is unmistakeably a Moorish, shouldered, horse-shoe arch. It is the only one of this type found in any of the San Antonio missions.

The Mission of the Alamo or San Antonio de Valero, the church of which is standing to-day, was the last to be erected. It was originally situated on what is now

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THE ARCHITECT UNKNOWN.—Masters of Design Whose Praises are Unspoken or Unsung.—Public Ignorant as to Creators in the Most Important of All Art.—A Plea for a More Deserved Recognition.—Architects' Names Should be Perpetuated in School Text Books.

By F. W. FITZPATRICK

OUR SCHOOL CHILDREN are thoroughly familiar with the names of the heroes and near-heroes of our wars and conquests; youths and maidens, in college and university, can prattle interestingly about the heroes of Greek and Roman history; men further advanced in erudite paths can charm us with the depth of their knowledge, even anent the intellectual Brahman, the chivalrous Rajput, the wild Bhil, or the naked Gond. The average man is surprisingly well read upon most subjects. He still remembers the heroes he was brought up on, even to the Spartan and the Gaul; is familiar with the name, too, of the great discoverers and historians; does not balk at those of famed musicians, astronomers, and *some* artists, and has the names of the celebrated authors of fiction right at the tip of his tongue.

But most wonderfully ignorant is he—our average man—of the names of those men who have contributed most to his and to his ancestors' comfort, education, and refinement—yes, to his civilization—the architects. Even among our erudite friends above mentioned, few—amazingly few in proportion to those versed in any other one art or science—dabble in architecture or know or care much about the men who are "charged with presiding over the structures that shelter man, his animals and the products of the soil; who build up those immense cities, their splendid monuments to our progress, those thousands of manufacturing plants, housing the prodigious industries of our times—men who have written and are writing history in ineffaceable characters of steel and stone."

Is it not surprising that so little is known of those men, and that so little importance is attached to their works in a silence to which we owe such marvellous creations; that is so useful, of absolute necessity to all our undertakings, and that absorbs so many millions in money and keeps such armies of men employed? Is it that familiarity with the results breeds an indifference to the causes? Then, too, is it not strange that the lesser arts outrank in popular esteem the mother art from which they sprang, and that whenever an architect also excelled in any other art he is invariably known and remembered for his works in that line rather than for the greater works he executed as an architect? Michel Angelo Buonarroti is far oftener mentioned as a sculptor or painter than as an architect, though his works in the latter capacity far outshone any of his efforts in the former. So with Bramante and Brunelleschi, and so with Ligorio, who, though a master in our art, is known to posterity merely as an antiquarian. Geber, the designer of the Giralda tower, little dreamed that he would be forgotten as an architect and remembered only as the inventor of a process that facilitated his calculations—for it was he who invented Algebra. So also is Lionardo de Vinci as often remembered, and far more gratefully, as the inventor of the lock-canal system, even now in use, than a great architect or painter.

Though it would be a most fascinating digression we are not now concerned, in this rambling plaint, with any speculation as to the authors of those ancient structures in the primeval cities of Phoenicia, China, Chaldea, and Egypt, where architecture, as an art, may be said to have had its birth; nor may we trace down, even briefly, the early history of that art, nor how, through the testimony it offers us, we can trace our ascent back through Britain, France, Italy and Greece to the Druids, and our relationship, through the latter, to the ancient peoples of Syria, Persia, Arabia, and that Sanskrit-speaking race that entered India across the upper Indus and settled in the Punjab, during the Kali Yug epoch, at least five thousand years ago. In this brief passing we can give merely a passing glance at the names of a few from among the hundreds of architects of past and present times whose works well merit the placing of their names upon the "tablets of the Immortals," among those of the heroes to whom we and future generations should burn incense.

We read much of Pericles, and how, under his wise management of public affairs, the Parthenon—Greece's most perfect example of architecture—was erected in 428 B.C. Ictinus, of Athens, was its architect, assisted by Callicrates. Phidias did the statuary and decorations only (although he is generally credited with the entire design) and won immortal fame. That pile is, even today a model for us, a standard of perfect proportions. How many readers who know *all* about Phidias, Pericles, and the Parthenon ever heard of Ictinus? The temple of Apollo Epicurius, on Mount Cotylus in Arcadia, is another beautiful example of that master's skill. Archias of Corinth, who flourished in the fifth century B.C., is also a name to conjure with, as is that of Cleomenes of Athens, who planned the city of Alexandria in Egypt, and Isotratus who added so much to that city. We ought fondly to remember the name of Calimachus, if for nothing else, at least on account of the pretty fable connecting his name with the origin of the Corinthian capital. Then should we also inscribe upon our tablets the names of Hermodorus of Salmis, who designed the temple of Jupiter Stator, in the Forum at Rome, and of Cyrus, who, just before the Christian era, was Cicero's friend and architect. Who has greater right to fame than Vitruvius Pollio of Fano, one of the greatest writers on our art, an authority still in use, the Blackstone of architecture? Then, in the same century—the first after Christ—Vespasian and his son Titus astonished Rome with the Coliseum, that vast amphitheatre (seating over 80,000 people and built in less than three years) that we know so well and have seen pictured so often even if we have not seen its ruins. I venture to assert that not one out of a hundred thousand people—no, nor one out of a million—ever heard the architect's name. The matter is apparently so very insignificant that some historians merely surmize that Rabirius was the man, while others vaguely hint at the name of Mustius.

Volumes have been devoted to abusing the fawning friends and advisers of the sensuous, albeit great, Nero. Their names and those of his freedmen and principal slaves are well-known, but—perhaps luckily for the profession—we never read the names of Celer nor of Severus, his architects and chums—men who, when he and his court grew sluggish in devising new deviltries, were called on and always produced some rare and exciting diversion. They "induced him to build" (how familiar that expression sounds) his famous "golden house," and led him into other wild extravagances that contributed much to his final downfall.

Of far different timber was the sage Antonius, better known as a senator of ancient Rome than as *merely* an architect, although he was prouder of his design for the Baths of Aesculapius, and they were remembered longer far than any of his brilliant achievements in the political field.

Metrodorus of Persia, who built much in India and in Constantinople, deserve mention and remembrance as being the first Christian architect.

One of the first acts of Justinian upon ascending the throne of the East, in 527 A.D., was to invite Anthemius, the architect, to Constantinople. He was a Lydian, a man of genius. He designed the Church of St. Sophia for his emperor. While the temple of Minerva and the Pantheon were domed structures and antedated this church, yet it is the first example of an aerial cupola ever built, a noble pile, still standing and the wonder of every visitor. St. Mark's at Venice, built by Ausciles the Greek, in the ninth century, and hundreds of other buildings down to our own days, had their cupolas patterned after this ancient model.

Architects have ever been known as men of exemplary lives—there being rare exceptions, of course—but few, however they may have merited it, have ever been "sainted." The Catholic Church has conferred the honor of canonization upon but three of the profession, and that for no architectural reasons; all three—St. Germain, St. Avitus and St. Agricola—who lived in the sixth century, being bishops of great sees in France. There have been other bishops, fifty or more, and archibishops, abbots, priests, and monks galore in our ranks, or, rather men of both ecclesiastical and architectural attainments. It is not surprising, however, for, from the eighth century all through the middle or "dark" ages, all learning, letters, and arts were confined to the clergy of Europe; the laity being "confined" mostly in each other's castle-dungeons or to cutting each other's throats. York Cathedral was completed by three succeeding bishops, Egbert, Albert and Eaubald. Old St. Paul's was designed in 1033 by Mauritius, Bishop of London; and Rochester Castle and the old White Tower of London were designed by Bishop Gundulf of Rochester.

The thirteenth century saw, if not the birth, at least the springing into prominence of the semi-religious orders of Masonry, that exercised a most wonderful influence over the art of building; even the name "architect" being lost for a time. "Master-mason," "Supervisor," or "Surveyor" were the titles of those under whom great public works were erected, so that in the more powerful states of Europe the church practically controlled both building and architects for a period of nearly five hundred years.

Why should Romualdus of France be forgotten—he, who in the ninth century built the great cathedral of Rheims, the first example of Gothic architecture? Or Buschetto, who in 1016 gave us the Duomo of Pisa, the first example of the ecclesiastical style of art that made the Lombards famous in their time?

Dioti Salvi, who designed the Baptistery of Pisa, and the German Wilhelm, who built the leaning tower of that city, both merit some recognition, and surely so do Pietro Perez and Erwin von Steinbach, who gave us, respectively, the grand old cathedrals of Toledo and of Strassburg. Brunelleschi, born in 1377, acquired fame as a sculptor and as an engineer, but the noble monument he left to his skill as an architect—the dome of Santa Maria del Fiore—should alone suffice to cause his name to be inscribed among the elect.

Bramante Lazzari, who first designed St. Peter's at Rome; Rafaelle d'Urbino, the St. Gallos, and Perruzzi, who later carried on the work, surely merit some recognition, although Michel Angelo de Buonarroti changed much and nearly completed that great building. Then, too, Jacapo della Porta, Domenico Fontana, Ligorio, and Carlo Maderno contributed to the completion of St. Peter's, finishing it just one hundred years after Bramante's first design was made. Credit is due then, if for nothing else, for carrying out Michel Angelo's designs with so few changes.

What versatility, what splendid talents, were possessed by those old masters of the Roman school founded by Bramante, and how many there were of them in that sixteenth century, so redundant of great men and great events in the world's history. Michel Angelo—the "grand old man of Rome," the dignified and haughty, before whom even the Grand Duke Cosmo, the tyrant of Florence, stood uncovered, whom popes and rulers courted—stood prominently alone as an architect. Had he not won fame so, his "Moses" was sufficient to insure him honor as one of the greatest sculptors. Had fame still been lacking, his paintings in the Sistine Chapel would make him rank with Titian as a painter. Still, more, he was a poet whose works, had they not been overshadowed by his towering mastery of other arts, would have placed his name among the greatest of his time. Raphael, the dreamer, the beloved, the idol of Italy, enriched that century with his marvelous works, and Leonardo da Vinci was the miracle of that age of miracles. Think of the endowments of that one man. An architect, chemist, engineer, musician, painter, poet, philosopher, inventor, and discoverer, and *excelling* in each and every attainment. His writings show him to have anticipated by the force of his own intellect some of the greatest discoveries made since his time by Galileo, Keppler, and Castelli, the system of Copernicus, and the theories of recent geologists. Barozzi da Vignola, the designer of the Farnese Palace at Caprarola, was one of the last of that school, and that palace is to-day used more than any other by our students and disciples as a standard of Italian architecture.

Who has not read of the Tuileries, the Luxembourg, and the Louvre in Paris, and how few ever know or care that Philibert de Lorne, Jacques de Brosse, and Claude Perrault were their designers?

With us of the English race Inigo Jones and Sir Christopher Wren ought to be household names. The first designed Whitehall, Lincoln's Inn, and Covent Garden; the latter—besides being the architect of St. Paul's Cathedral and erecting the largest palace and most stupendous hospital in all England—found time to plan the rebuilding of the city of London after the great fire of 1666, and to design pretty nearly every church in the new city. Old England has contributed many other men "whose works live on among us though their names be forgotten." Sir William Chambers, the Pugins, Joseph Gwilt, Ferguson, George Edmund Street, and Sir Gilbert Scott, merit a better fate than the oblivion into which every architect knows he will ultimately be thrust.

One reads of a great battle in ancient or modern history, and the names of the generals who led the contending forces will immediately present themselves to the memory; a quotation from a well-known poem instinctively recalls the author; the recollection of a great speech brings to mind the orator; and the name of the artist is always associated with or appended to a painting. Yet, however great, however beautiful, a building may be, and however much we may admire and appreciate it, how few of us ever care a rap who *its* author is? We all know and admire the Grand Opera at Paris and have seen it pictured, at least, time and again, but who ever associates it with or thinks of Charles Garnier?

The United States, young as it is, is replete with noble monuments that we visit and cherish and are proud of, but whose authors are to us unknown—mere insignificant incidents. Even the little children in the public schools, living thousands of miles from Washington, know the Capitol building. It is held up to them as one of the great buildings of the world. Its history, is familiar to them; how its great dome and its wings were added in later years, and so forth; but never heard of, or even a hint being given to a child by parent, teacher, or text-book that Hallet first designed it, or that

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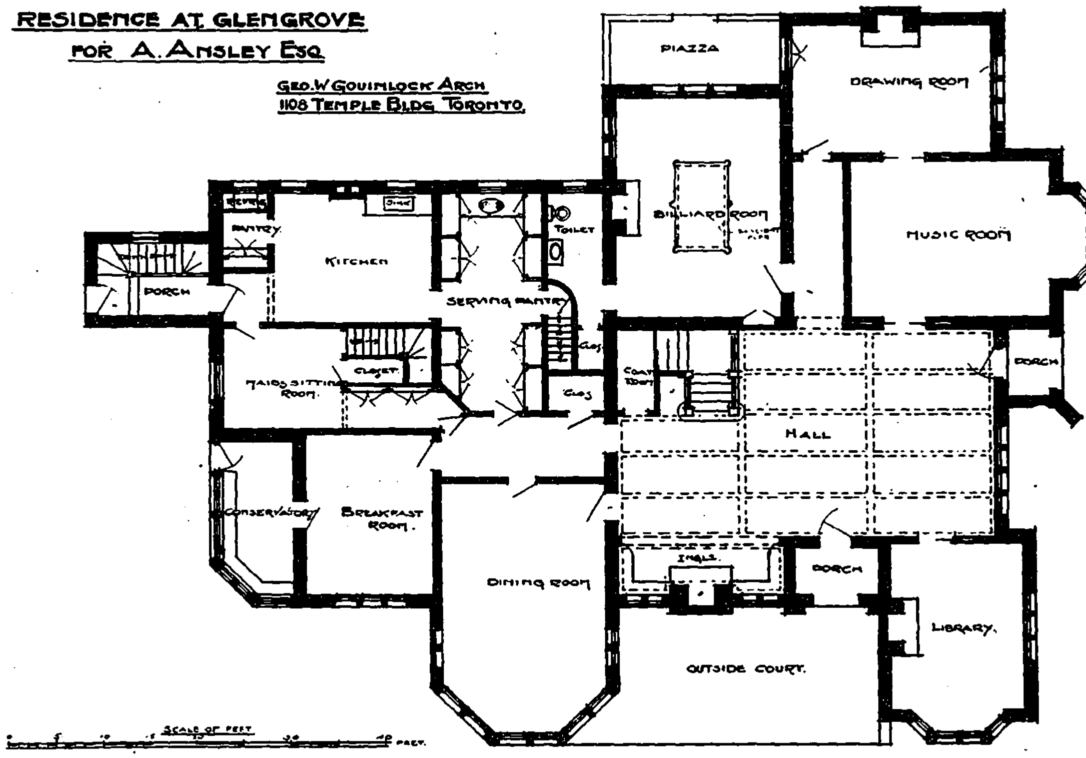
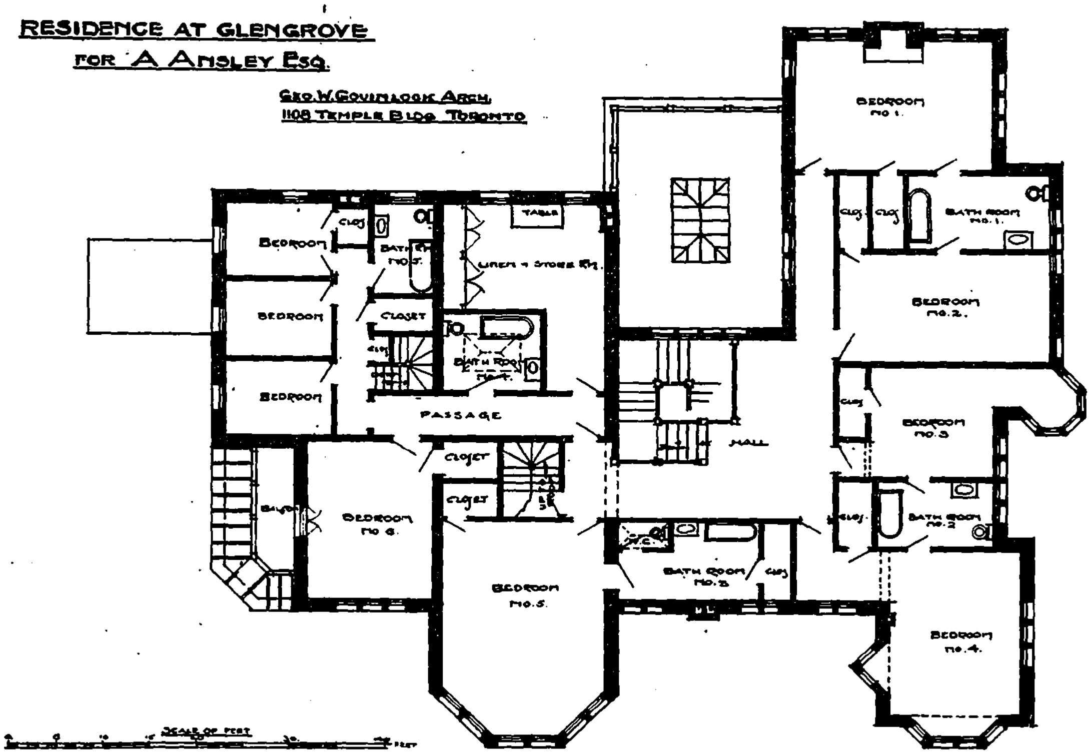


Ground floor plan showing the large reception hall, with beamed ceiling and large ingle-nook. Note the perfect division between the living and services portions of the house, and yet the direct and convenient accessibility from one part of the floor to the other.



First floor plan, showing the arrangement of the various rooms and built-in wardrobes. The location of the bathrooms is noteworthy, as it gives each of the main sleeping chambers the immediate advantage of this desirable feature.

Residence of Mr. A. Ansley at "Glengrove," an estate in Eglinton, a suburb of Toronto. Geo. W. Goulnlock, Architect.

RESIDENTIAL STRUCTURE IN "TUDOR" DESIGN.—

Situated on an Estate of Forty Acres.—External Walls Built of Artificial Stones.—Plan Effects Perfect Division Between Living and Service Portions.—Location of Bathrooms a Feature.

IT MAY HAVE BEEN THE SITE which suggested the architectural treatment, but whether or not this was an influencing factor, nothing more appropriate than the "Tudor" could have been selected as the style. In order to more fully appreciate the fitness of the design, one must picture in the mind's eye a manor-house of this period, with its towers and battlements, situated on an eminence, and overlooking an estate of forty acres generously endowed with trees and verdure, and possessed of exceptionally splendid natural advantages. At the back the house stands but a short distance from the brow of a deep ravine, which passes it on the north; while from the south, through rows of pines, a macadamized driveway leads up from the public road to the entrance porch.

The house is the home of Mr. A. Ansley, at "Glenwood," an estate in Eglinton, a suburb of Toronto, on the north, and both in design and plan is an interesting adaptation in recent domestic work. The exterior of the house is characterized by plain lines and surfacing, the directness of the walls being broken only by the towers or projecting bays, which, together with the battlements and treatment of the windows and entrances, serves to give the exterior its decorative detail and individuality of character. These bays are placed on either side of the main entrance, the one to the left being octagonal in shape and rising a full story above the balance of the structure, while a third bay projects from the music room at the east of the house.

From the main entrance, one passes into a spacious hall, having a large fireplace with two windows and comfortable wall seats, in a recess at the left of the doorway. The woodwork is of Flemish oak, the ceiling beamed and the walls dadoed to the height of 7 ft. 6 in. Under the open staircase is a conveniently situated coat room, while at the side are four windows, together with a doorway to a small porch, overlooking the east lawn.

The arrangement of the various rooms, is noteworthy, the plan effecting a perfect division between the living and service portions of the house, without in any way interfering with the directness or convenience of access from one part of the floor to the other.

Across the hall from the entrance, is the music room, which in turn opens into the drawing room at the rear, having a large open fireplace. These rooms are trimmed with white wood finished in ivory enamel, and can be closed off from each other by means of sliding doors. Additional access to the drawing room is obtained through a passage, which also gives entrance to the billiard room, at the right of the music room. The billiard room is provided with an open hearth and a private lavatory, and at the rear overlooks the porch, which opens from the side of the drawing room. The library is at the front of the house, having a most desirable location in the bay at right of porch, and being well apart from the other rooms.

To the left of the hall is the dining room, finished in mahogany, the half of which takes up the entire floor space in the main bay projection. Adjoining it and having a separate entrance from the passage, is the breakfast room with a door leading into a flower conservatory. Back of these rooms are the maids' sitting room, back staircase, kitchen and servery—the latter being admirably equipped with built-in features, and forming a convenient intermediary between the kitchen and dining room.

Upstairs the rooms are of a good size and well arranged, each being provided with a large individual clothes-closet and finished in ivory enamelled white wood. The servants rooms and a large linen and storage room are located immediately over the culinary department and are well apart from the other section of the floor. A noteworthy feature of the plan is the bathrooms, which are so located as to adjoin all main sleeping chambers.

The house was designed and erected under the supervision of Architect Geo. W. Gouinlock. The outside walls are of artificial stone, furnished by the Art Stone Company, Toronto; the block being of the hollow type and tooled faced.

A CURIOUS HOUSE.

A PLAIN, PLASTERED STONE HOUSE about 50 yards from the ancient city hall of Nuremberg, Germany, has nothing to distinguish it from the other old houses of the neighborhood except that it is built of lithographic stone, worth from 6 to 21 cents a pound. So lithographers who go to Nuremberg wander from the worn tourist trails to see the wonder. The house was built about 1680, nearly one hundred years before Alois Senefelder, the dicoverer of lithography, was born. Andreas Lichtenstein, who built it, took the stone easiest to get, and secured it for the trouble of carrying it away. Now the material in the building is worth about $4,000. The present Andreas Litchenstein, a descendant of the man who built the house, has said "Nein" about once a month for the last twenty years to speculators who want to buy his home and tear it down for the stone. It is his home and was that of his forefathers and he refuses to part with it. So lithographers, with thoughts of rising prices, look and sigh. Lithographic stone is found in commercial quantities only in Bavaria. The largest quarries are near Nuremberg.

THE MISSION OF SAN ANTONIO.—Continued from Page 47.

known as the Military Palaza, but was abandoned and reconstructed on its present site in 1744.

It is thought by some authorities that the Alamo was similar in design to that of Mission Conception, having a tower on either side. This is altogether likely as the plan of both churches are the same, and the thickness of the walls around the small rooms on either side of the entrance indicate that the walls were built to a greater height.

The entrance was a good example of late Renaissance, but is so badly chipped that little of its original beauty remains.

After the siege of the Alamo in 1836 by the Mexicans under Santa Anna, the building was left in a state of complete ruin. The debris not being cleared away till about thirteen years later, when U. S. troops took possession. It was impracticable to restore it completely, so the walls were simply built to an even height, with the exception of the front, which was carried a little higher. A wooden roof was added, and it was otherwise made inhabitable.

The missions of San Antonio are the most important groups in America, and form part of the chain which were built by the Franciscans on their Christianizing march extending through Northern Mexico, Southern California, and East from the Rio Grande through Texas to the Mississippi. Although of such historical importance, but little is known of them except through tradition and what is found in documents belonging to the church.

Time is rapidly doing its destructive work, and it will not be many years before the worthy examples of pioneer architecture in America will have entirely disappeared.

The author is indebted to "San Antonio de Bexar," by Wm. Corner, for a great deal of the historical data.

THE ARCHITECT UNKNOWN.—Continued from Page 49.

Hadfield, Hoban, Latrobe, Bulfinch, Walter and Clark added to it and completed it; or, that the Treasury Building—the Parthenon—the most chaste and beautiful design ever executed in the country, is the work of Robert Mills, Walter, Young and Rogers; that Thomas Jefferson designed Virginia's capitol at Richmond; or that R. M. Upjohn designed Connecticut's handsome capitol at Hartford; or that Fuller designed the Parliament Buildings at Ottawa.

The fame of Trinity Church at Boston is spread far and near, and who has not seen in his own town a replica—a copy in a minor chord—of the magnificent court-house at Pittsburg? Another ten years, and how many Bostonians even will remember that H. H. Richardson designed both?

There are men among us who have performed feats of daring as our steel and brick structures, the like of which have never even been attempted in other lands, may well be called. We admire those huge many-storied buildings of New York and Chicago, of Toronto and Montreal; they impress us by their size, beauty, and (in spite of their height) their grace; but it would be altogether uncalled for and out of place for anyone to inquire who designed them. And but a while ago the world was surprised with an aggregation of buildings of greater magnitude, of nobler design, and of greater impressiveness than had ever been grouped together on the globe. The World's Fair buildings at Chicago mark an epoch in the history of architecture, a great revival of classic art, yet, unlike other buildings, we have not even their ruins to contemplate. They can be to us but a beautiful dream. Surely we cannot afford to relegate to absolute oblivion the names of the men who by that work contributed so much to our own education and pleasure, and made us, as a people, better known and respected by the other peoples of the earth than we had ever been or could ever expect to be by any other agencies. I would not inscribe those names upon mere tablets of marble or of bronze, nor would I erect a great monument to their memory, but I *would* make them known and loved by a far surer way; I would inscribe them in our school text-books, that our children and their children's children might grow accustomed to the now unwonted sight of the names of our great architects enrolled among those of our leaders, our warriors, our jurists and our poets.

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Vol. 2 Toronto, Sept., 1909 No. 11

Current Topics

THE LONGEST BRIDGE IN THE WORLD crosses the Yellow Sea near Sangang, China. Its name is the Lion Bridge, and its length is 5¼ miles. The deck which is 70 feet above the water, is supported by 300 huge arches, and the structure is enclosed in a network of iron.

* * *

CANADIAN MANUFACTURERS, writes Trade Commission H. R. Poussette in a recent report from Durban, South Africa, who are interested in the supply of railway materials and equipment, should have their names placed on the lists of the Agents General for the Transvaal, Natal, Orange River Colony, Cape Colony, and also of the British South Africa Company.

* * *

ONE OF THE LARGEST STONES ever quarried was produced from a granite ledge in the State of Maine, and was intended to serve as one of the columns to support the dome of the Episcopal Cathedral of St. John the Divine in New York. For one reason or the other, however, it was never removed from the quarry. The stone was 64 feet in length, 8½ feet thick and 7 feet wide, its height being 310 tons.

* * *

MEMBERS OF THE R.I.A.C. should not overlook the fact that the second general assembly is to be held at Toronto, October 5, 6 and 7, when many subjects of importance to the profession will come up for discussion and consideration. The greater the attendance the better, and the more support and co-operation manifest, the greater the success of the Institute. It is only through a national organization of this kind that anything tending towards the uplifting of the profession in general, can be definitely accomplished.

OCTOBER THE FIRST is the date set for the laying of the corner stone on the new Parliament Buildings in Edmonton. The ceremony will be performed by His Excellency Earl Grey, who will then be returning from his trip to the Yukon.

* * *

COBALT'S BUILDING REPORT, for the week of August 22-28 leaves no doubt as to the manner of progress which is being made in reconstructing the burned district. During that period forty-five permits were issued for buildings aggregating in value over $100,000, a record never before equalled. The structures will be of a more substantial and permanent type than the ones which they are to replace, one permit calling for a three-story building of solid concrete construction.

* * *

THE BOARD OF EDUCATION, Edmonton, Alta., has appointed Mr. G. E. Turner, a local man, to the newly created office of Commissioner of Public School Buildings, at a salary of $2,000 a year. Mr. Turner severs his connection with the Provincial Architectural Department to accept this new position and he is exceptionally well equipped for the duties of the office. His work will consist of the planning and supervision of all new school buildings and additions, and the superintending of all necessary repair work to existing structures.

* * *

AMONG THE IMPORTANT STRUCTURES under way and in contemplation at Chicago (Ill.), are several depots which in magnitude and appointments will give that city one of the most complete series of terminal stations in the world. These include a $25,000,000 structure which the Pennsylvannia Railroad in conjunction with the Chicago Alton; the Chicago, Milwaukee and St. Paul, and Chicago Burlington and Quincy, will erect to replace the present Union Station. The new building will be erected according to the "City Beautiful" idea and will be located along side the $20,000,000 terminal which the Chicago and Northwestern Railroad is building at the present time. Another and more costly station is a $30,000,000 terminal at State and Twelfth Streets, which the directors of the Chicago and Western Indiana Railroad has now under consideration. This terminal will replace the Polk Street Station, which is used by the Wabash, the Erie, the Atchison, Topeka and Sante Fe, the Monon, the Grand Trunk and other railroads.

* * *

STONES OUGHT ALWAYS TO BE TESTED by tapping them over, either with a hard pebble or a light hammer, in order to ascertain if they have any vents or sandholes, whose presence is detected by a dull sound, which is unmistakable when it has once been heard in contrast with the metallic ring of a smart blow on sound stone. This applies to stones of almost all descriptions, though it may be noted that softly-compacted sandstones or oolitic limestones will sometimes emit a dull ring. This does not indicate local faults, but a general weak structure, and should always be taken as an indication that the stone in question should be viewed with suspicion. If it be placed in water, it will in all probability be found to absorb a large amount, owing to its loose and spongy character; it is probably liable to disintegration, and to the penetration of moisture. There are other easily-applied tests for stones, such as immersion of small, freshly-cut chippings in a glass of water, in which they should be left for half an hour, and then vigorously stirred, when, if they are loosely compacted or contain any appreciable amount of clayey substance, the water will turn muddy. It is not a test, however, which is often employed, and practical men are more inclined to rely upon a thorough inspection by tapping than anything else.

WATER PIPES OF TERRA COTTA were used in Crete forty centuries ago. Those supplying drinking water consisted of a series of subconial tubes socketed into each other with collars and "stop ridges," so constructed as to give the water a shooting motion, thus preventing accumulation of sediment.

* * *

ONE OF THE MOST SACRED SHRINES in India, which has been for centuries the goal of pilgrimages from all parts of that land, is the great temple of Ramesvara, sacred to Rama, situated on an island close to the mainland, in the channel between South India and Ceylon. Its most striking features, says the SLATE TRADE GAZETTE of Hull, Eng., is the wonderful corridors which adorn it. The south corridor is 700 ft. in length, and it is the longest in the world, except that in the Vatican. The most attractive of all the Chalukyan (a dynasty ruling from about 400 A.D.) shrines is the great temple of Siva at Halebid, about twenty miles from Belun, delightfully situated on a terrace near the shores of a lake. It was left unfinished in the year 1270 A.D., the towers never having been added. It is one of the most remarkable monuments in India. One of the pavilions in front contains a huge image of the Bull of Siva. In the interior are some remarkable black stone pillars, which look as if they had been turned in a lathe. This temple is unmatched in the variety of its details and the exuberance of fancy shown in its ornamentation. There is, perhaps, no other temple in the world on the outside carving of which such a marvellous amount of labor has been spent. It gives some idea of the enormous amount of sculpture with which this temple is covered when it is mentioned that the lowest band of the frieze alone contains a procession of about 2,000 elephants, no two of which resembles each other.

* * *

ONE OF THE FEATURES of the building situation so far this year, has been the absence of strife between employer and employee. True, Winnipeg is experiencing some difficulty with the carpenters but the indications are that the near future will see everything amicably settled. On the whole, everybody is apparently getting his share of the world's goods, and is satisfied to leave well enough alone. That a condition of this kind obtain, is greatly to be desired, as it means greater advancement and prosperity for all concerned. In commenting upon the situation in general the LABOR GAZETTE for August says: Reports with regard to building continued to indicate the projection of new work in all lines of construction upon a larger scale than at the corresponding period of last year. Important gains are shown in most of the large cities and towns in the estimated cost of improvements for which permits have been taken out. The trades have been exceptionally free from labor troubles, and at the close of the month indications were for continued activity until the end of the season. The following table shows the extent of building during the first six months of the present year, as compared with the corresponding period of 1908, in nine of the principal cities of the Dominion:

City.	Six months.	Six months.
Toronto	$5,013,245	$8,829,375
Montreal	1,500,000	4,283,910
Winnipeg	2,238,250	5,462,450
Vancouver	3,354,050	3,410,195
Ottawa	875,225	2,607,665
Halifax	362,770	374,900
Regina	156,183	362,645
Calgary	409,090	949,110
Edmonton	1,792,810	1,092,220

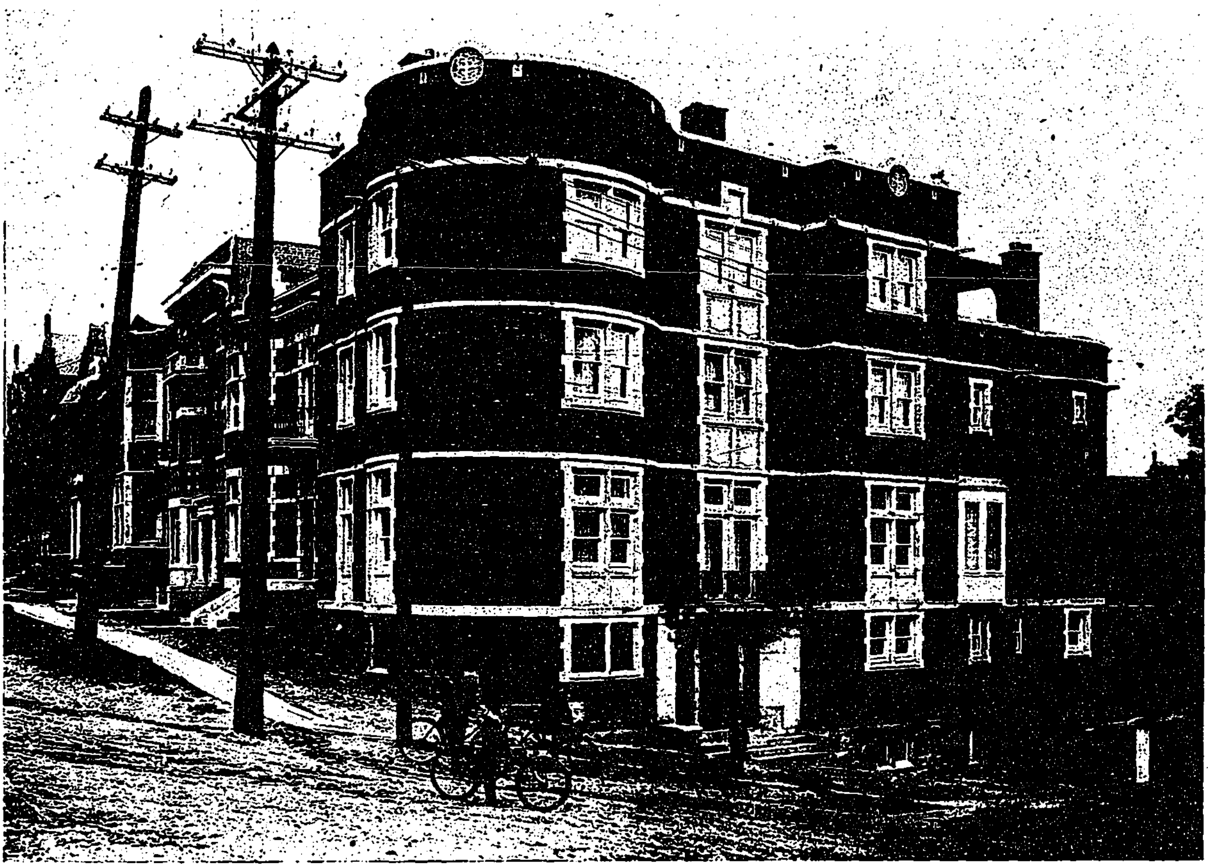
SPANNING 274 FEET and over 300 feet high, a natural bridge, said to be the largest known, has been discovered by members of the Utah Archæological Society, which has returned from an expedition along the Colorado River in Northern Arizona and Southern Utah. The bridge is located four miles north of the Arizona line in the State of Utah, six miles east of the Colorado River. On its top were found imbedded several fossils of remarkable size, indicating the presence in earlier times of giant animal life.

* * *

WHEN IS A SITE NOT A SITE is the question recently brought before an English justice, and the decision is one that must be of interest to a great many persons and communities, says the ARCHITECTURAL RECORD. The late proprietor of the Birmingham Daily Post, John Feeney, bequeathed to the corporation of his city £50,000 for the erection of a new picture gallery "on a site provided by the Corporation." Splendid municipal buildings were projected on Edmund Street, and the question arose whether, if the basement, ground floor and part of the first floor were used for offices, the balance of the structure—or so much of it as might be needed—might not be used for the gallery under the terms of this bequest. The court decided that Mr. Feeney's purpose was to restrict his legacy to the cost of construction as distinguished from site, and therefore that the word site should be interpreted in this connection as applying to a superficial area, which may include no land or ground as properly understood. With reference to the future at least such an interpretation may well hold. If accepted, any testator who so desires can easily insert henceforth the words "separate structure" to indicate his wish for a distinct building; and if he is not particular that the structure should be used for the purpose designated and nothing else, such interpretation may facilitate the execution of his purpose.

* * *

AN IDEA OF THE MAGNITUDE of the gigantic chimney recently completed at Great Falls, Montana, may be gained from the fact that if the stack could be laid on the ground it would form a tunnel through which three railroad tracks of standard gauge could be laid, side by side. The heaviest types of Mogul engines, each one coupled to 11 freight cars could stand on the tracks without projecting from the tunnel ends, while at the base end there would be room for a platform on each side of the tracks, seven feet in width. The bricks alone used in its construction would make a six-foot sidewalk, over two and a half miles in length. With them, and the concrete used for the foundation, a dozen eight-roomed houses could be built; and the lumber used for the erecting scaffold would be sufficient to finish them complete. Inside the top of that chimney, as it now stands, a circular table could be set up, with seating capacity for one hundred and twenty-five persons, and with ample room in the centre for an adequate force of waiters. There are but four buildings on earth which exceed this great shaft in height—the Eiffel Tower, 1,000 feet high; the Metropolitan Life Insurance Company's building in New York, 657 feet; the Singer Company's building, also in New York, 612 feet, and the Washington Monument, 555 feet high. The enormous capacity of the chimney is perhaps best understood from the fact that the 2,000,000 cubic feet of gas it discharges from the smelters every minute, if of the illuminating variety, would be more than sufficient to light the entire city of Greater New York, without calling upon the aid of electricity. The height of the stack, which was previously described in these columns is 506 feet. The nearest approach in size to it being a 454 foot chimney at Glasgow, Scotland.



Town residence recently erected at the corner of Cote des Neige Road and Pine Avenue, Montreal. Saxe and Archibald, Architects.

A TOWN-HOUSE OF UNIQUE PLAN.—Built on an Irregular and Sloping Site.—Interior Characterized by Semi-Circular and Oval-Shaped Rooms.---General Arrangement Compact and Odd Corners Advantageously Utilized.

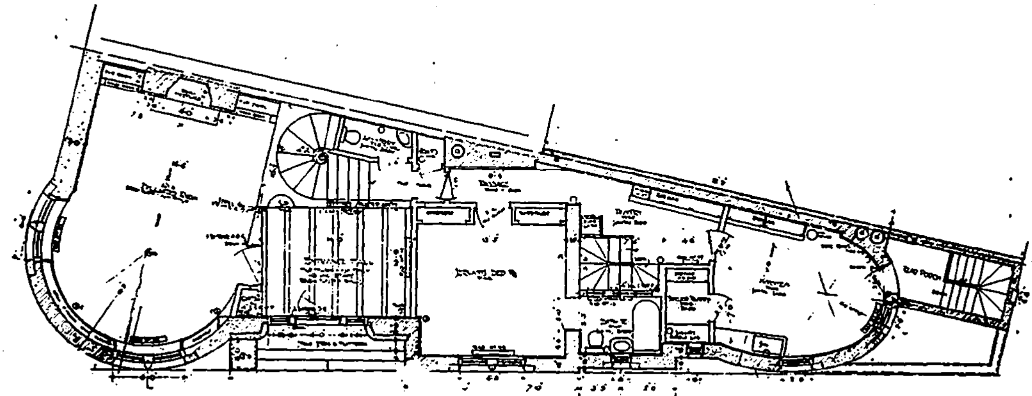
RATHER AN UNUSUAL and attractive residence of the town-house type, has recently been completed in Montreal, at the corner of Cote des Neiges road and Pine avenue. The main interest in the house centres in the fact that it shows an admirable solution of a problem infrequently met with, that of fitting an irregular and sloping site with a residential building having an architectural feeling in both its exterior and interior lines. The ground on which the house is situated has a fall of sixteen feet in its length, tapering at the lower extreme, and is of such a limited area that the entire lot had to be built upon.

The exterior, which exhibits in its treatment a leaning towards the Tudor, is carried out in brick with wide mortar joints, the door and window trimmings being of Roman stone. At the top the walls are finished with a parapet of simple design, while at the corner where the streets intersect they meet in a slight semi-circular projection, a feature which admits of an interior which is unique and interesting in plan.

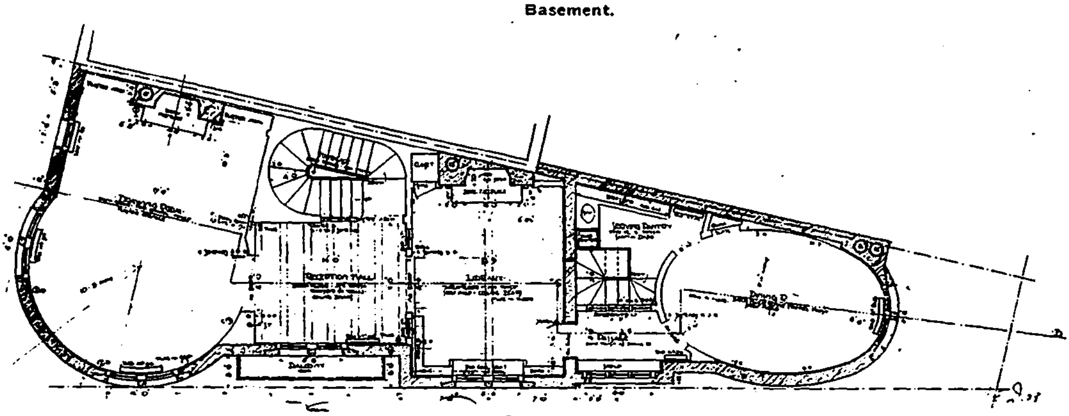
From the entrance, which is centrally located on the basement floor, one passes into a large hall, finished in ash and with beamed ceiling and rough plastered walls. The floor is of tile, and at the back is an open staircase which rises at this point up to the top floor. To the left is the billiard room, a semi-circular, semi-square shaped room of spacious dimensions, having a large brick fireplace and lighted, owing to its location, from high placed windows.

The plan of this floor, as with the other floors, effects a number of economies in the utilization of odd corners which in a less carefully considered house of this type would result in an excess of waste space. A lavatory and coat room, both having tiled floors, find a convenient place in the area back of the staircase. To the right of this is a passage having a servant's bedroom opening off at the front, and leading to a semi-oval shaped kitchen at the end. Between these two rooms the space is taken up by the butler's pantry, dumb waiter and staircase, all compactly arranged—the staircase and dumb waiter connecting with the dining room above and also with the subbasement, containing servants' sitting room, laundry, furnace room and storage compartments.

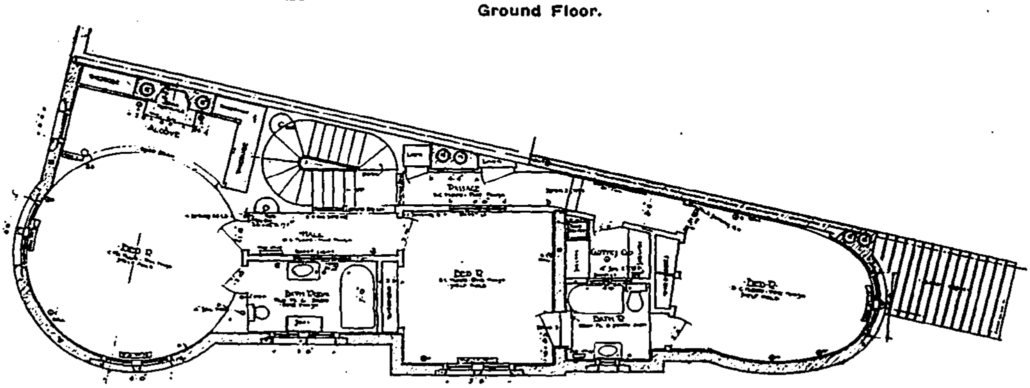
On the ground floor the reception hall is similar in size and finish to the entrance hall over which it is placed, save that the walls are carried up with a panelled wainscot. The drawing room and the library, both having large open fireplaces, occupy relative positions to the billiard hall and servants' bedroom on the floor below; the former being identical in contour, and the latter taking up the entire space from wall to wall. A passage from the library, at the front, gives access to the dining room, which is oval in plan and has an adjoining service pantry in space back of passage. Both the drawing room and din-



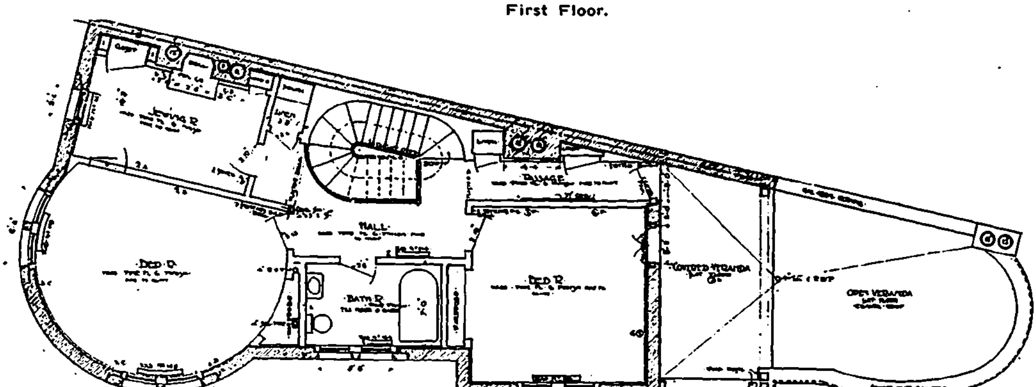
Basement.



Ground Floor.



First Floor.



Attic Floor.

Floor plans of residence, cor. Cote Des Neige Road and Pine Ave., Montreal, showing the arrangement of the rooms and the solution of a rather unusual problem. Saxe and Archibald, Architects.

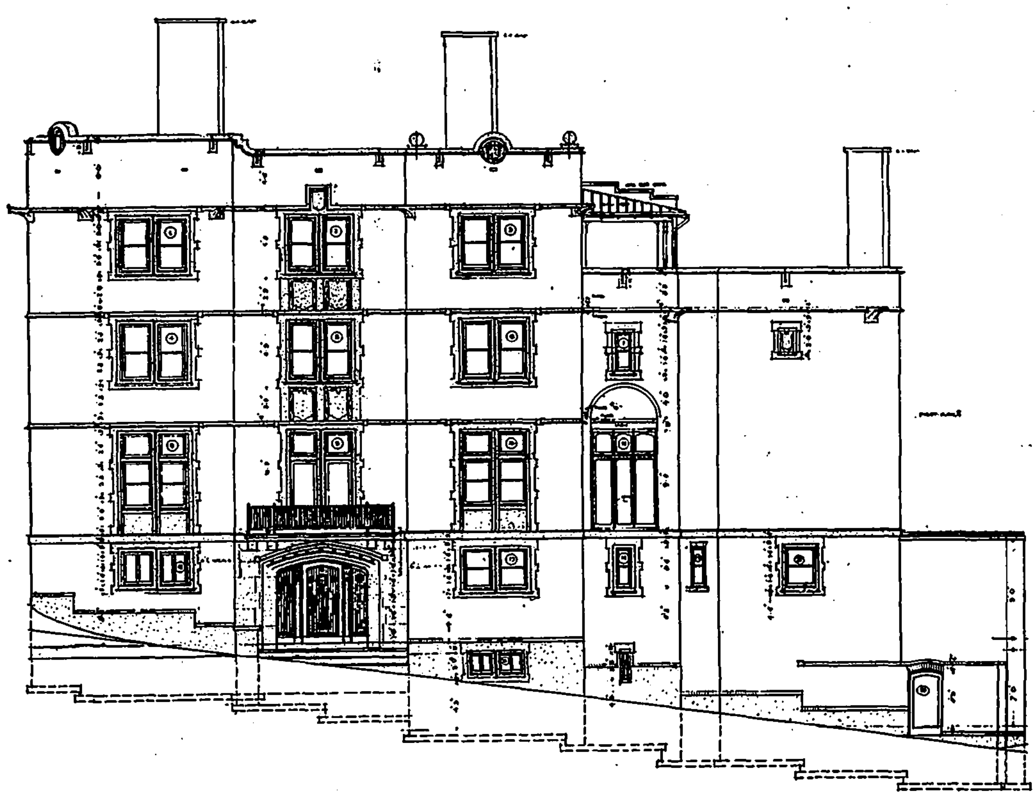
ing room are finished in white enamelled pine, while the woodwork in the library, which has a built-in window seat with bookcase on either side, is carried out in ash.

The first floor contains three bedrooms with adjoining bathroom facilities, and is amply provided with wardrobe and linen accommodations. The plan in arrangement and in the design of the end rooms partakes of the character of the other floors, as does also that of the second or attic floor, which has two bedrooms, sewing room, and bathroom. A splendid feature of the attic floor is a covered roof verandah opening off the floor at the narrow end of the house, and affording a view of the entire city.

The building was designed by and erected under the supervision of Architects Saxe & Archibald, of Montreal.

FIREPROOF FACTORY BUILDINGS FOR THE COUNTRY.

NOTWITHSTANDING THE PROGRESS which is being made at the present day in fire resisting construction, the fireproof factory building in localities without fire fighting facilities is still something of a rarity. Mill construction has the preference, and wooden factories are often erected to house valuable equipment and manufactured products and the materials from which they are made. In populous centres the fireproof industrial building is gaining in favor. The risk of conflagration is greater than in a small town, but, on the other hand, there is usually adequate protection, both in the way of apparatus and water supply. The insurance rate is less in the city, from which it may be deduced that the risk is greater in the country and the need of fireproof buildings correspondingly important. Probably there is insufficient general knowledge of the rapid strides that have been made in the development of the several elements entering into fireproof construction by which its cost has been lessened. As compared with the slow burning type, the cost to-day is only about 10 per cent. more for a building in which the hazard of fire may be considered negligible under ordinary circumstances, especially in neighborhoods where there is no risk from outside. In exceptional cases, where the contents are of an especially inflammable nature, the argument may not hold, but such instances include few machine shops or factories in the metal industries. While the initial investment is somewhat greater, against this is the offset of a decreased insurance rate, which materially reduces the additional annual interest on the investment. In a recent case a canning factory located on Cape Cod, outside of a zone of fire protection, was built on fireproof principles and equipped with a complete sprinkler system, and the result was a decrease in the insurance rate from $2.25 to 75 cents. In mill construction where oil is freely used in manufacturing, as is the case in many metal industries, the risk of serious fire increases with the passage of time, the saturated woodwork becoming more and more inflammable with the drying influence of age.—CARPENTRY & BUILDING.



Front elevation, town residence, corner of Cote des Neige Road and Pine Avenue, Montreal. Saxe and Archibald, Architects.

SOUTH AMERICAN COUNTRIES are fast recognizing the need and importance of better sanitation, and several of the governments are investing large sums in providing modern water supply, drainage and sewerage systems. In order that nothing may interfere with present or contemplated improvements of this nature, the Venezuelian Government has issued a decree placing such articles as sanitary water-closets, urinals, inodourous sewer traps and kindred devices on the free-list. Canadian dealers in these lines, who are looking for outside business may do well to investigate this market.

FIELD-MADE CONCRETE.*—Essentials to be Considered in the Selection, Preparation and Application of the Materials Used.—Good Workmanship and Rigid Superintendence of Vital Importance.—Failures and Unsatisfactory Work Unexcusable. By WALTER J. FRANCIS, C.E.

THE OLD COLLEGE SONG in referring to certain high dignitaries says "There are some of them good, and some of them not." This saying certainly applies to concrete structures. And just here I would not wish to be understood as saying that no other type of construction is unsatisfactory. We must recognize that every system of construction has its place. There are places where no one would dream of using anything but wood. Other conditions might demand stone or brick, while still others could best be carried out in concrete. A judicious builder will find that at many times combinations of the various systems will produce the best and most economical results. As a financially disinterested engineer one must seek to know the virtues of every type of construction and to apply each one in the place where it is best suited. Concrete construction and its latest development, reinforced concrete, has in a very few years proven its claim to a place amongst the highest class of permanent and fireproof construction. It has passed through all the stages of development inevitable in every system destined to survive and in its short life has passed through those changes with amazing rapidity. A few decades ago concrete was considered only good enough to be put out of sight in foundations, or into utilitarian structures usually cheap and nasty. Rapid development caused its most ardent friends to try to use it for everything, an effort which resulted in finding what it is not adapted for and in placing it where it stands to-day and where it apparently quite properly belongs. But we are learning, and I take it that while one of the objects of this Association is to advance the use of cement throughout Canada it is no less its duty to see that it is not improperly used. To the mind of the writer two important advances are necessary before concrete can be successfully used for purposes for which it has been tried with varying success within the past few years in the architectural field. One of these is the development of lines of architectural design to suit the material, and the other is the production of a cement which will give a pleasing color effect.

Concrete as we understand the term to-day refers to a combination of Portland cement, sand, stone and water. As a system of construction it is comparatively new and many of our engineers who have not yet passed the prime of life recall the time when Portland cement was first introduced. Its introduction meant the passing of the older hydraulic limes and natural cements and the entrance of a new and scientific method of construction. The structures which for centuries had been built of masonry were to be replaced by a material differing in every point for the constructor. The old standard methods of building meant the adding of element to element already prepared off the site of the building, each bearing in itself some definite relation to the building, whether wood, brick or stone. Concrete meant the application of the atom, so to speak, the employment of the particle of cement, the grain of sand and the bit of broken stone, all of which were delivered to the building in the crude form without having passed the hand of any artificer. It is perhaps to be wondered at that more failures and unsatisfactory examples of the new construction have not occurred, for even to-day we hear of structures of wood, brick and stone failing the requirements of the builder notwithstanding the fact that these types are as old as the hills themselves. Even steel with its inherent and tremendous strength handled by the bright minds of the engineering world does not always accomplish the aim of the designer. The great weakness of human nature is to remember the evil and forget the good. One chafes at missing a street car, not recalling that he has successfully boarded the preceding twenty cars he desired. Because Quebec bridge fell or a load of hay went through a fifty-foot steel span over a township creek the whole system of steel bridges is not to be condemned. If someone has erred in prematurely removing the forms in a concrete building surely that is not the fault of the concrete building. In case a brick wall capable of sustaining great loads when properly braced is loaded before the bracing is placed and as a consequence falls it cannot be said that brick construction is to be condemned. It is to be deplored that bad news travels faster than good. Let a trifling accident happen in a building and immediately the news is flashed far and wide but no reference is made to the thousands of structures that are being safely erected throughout the land.

Wherever concrete has failed the writer believes that in many cases the failures have been the result of overzealousness on the part of its friends. Concrete construction just like every other construction requires a reasonable amount of care. The cry of cheap labor for concrete has been overdone. It is true that cheap labor can be used and should be used in the making of concrete, but it must be recognized that even the employment of cheap labor has a limit. Wood is probably more easy of manipulation than any other construction material but no one would think of erecting even the simplest wooden structure without a certain number of carpenters. Bricklayers require considerable training before they can lay bricks passably well. Stonemasons and steelworkers require long training in their trades. Concrete construction does not need the same proportion of skilled labor as some of the other systems but for satisfactory work it certainly requires the employment of men who understand something about what they are doing.

Of the highest types of permanent construction at the present time both for engineering and architectural purposes concrete is one. For many purposes its economy in cost renders it superior to any other form of construction. Its almost universal application in the construction of culvert and bridge abutments, in foundations of all kinds, in sewers and conduits, and for architectural purposes is ample proof of its general excellence and durability as judged by the best builders of the day. Good honest concrete need make no apology for its appearance wherever it is properly used. That there are some unsatisfactory examples cannot be denied. Even, although the art is a new one, it is the firm conviction of the writer that in the majority of cases these unsatisfactory examples are absolutely inexcusable. It is in the interest of the art and in the interest of every member of this Association that these matters should be frankly and carefully discussed.

The question may be asked, in what sense can concrete structure be unsatisfactory? The answer is from design, quality, surface finish, or color, or a combination of all these points.

ARCHITECTURAL FEATURES AN ADVANTAGE.

In the eye of the architect and artist the engineer's design is probably classed amongst the crudest of all things here below, and while it is not conceded that the productions of the architect are always "things of beauty and a joy forever," still it cannot be denied that many

* Paper read at Toronto before first annual convention of the Canadian Cement and Concrete Association.

of our engineering structures are an offence to the eye. The most utilitarian bridge abutment can by the introduction of a base course, a coping and a pilaster or two, be made a structure which is pleasing in its effect and which in the end may be more economical to build. It is a well known fact that very large planes show up the little inaccuracies of workmanship very glaringly, and the effort to get a perfect plane is very costly. The introduction of the pilaster or a break of some sort obviates this difficulty entirely, gives the builder a reasonable chance to make satisfactory lines and saves him expense in endeavoring to get unreasonable accuracy.

Another element seems to be creeping into design in the present day which is not calculated to be to the advantage of the structure. It is the effort of designers to save material by the introduction of counterforts and angles of all kinds in order to save concrete. To obtain the best results the builder should be given a fair chance with his form work and in the end it will be found more economical not to use unduly thin walls. Labor costs must be considered along with material costs.

But of greatest interest to the engineer is the element of quality of the concrete. This matter of quality may effect the strength or the water-tightness, or both, and in many instances either of these defects may be serious. The defect in quality may be the result of inferior materials, improper formulae, imperfect manipulation or all combined.

First, let us consider the mixture. When a doctor writes a prescription there is always one unwritten element in that prescription for which he depends upon the dispenser. That element is common sense, sound judgment, experience, or call it what you will. Without it a satisfactory medicine will not be produced. The same reasoning applies no less to the formulae for concrete. The best materials that were ever made can be put together in such a way as to form an absolutely useless building material, while with nature judgment a competent builder can with materials of a lower quality make a passably good concrete.

Many specifications do not define clearly what the concrete is to be composed of. They do not say whether the cement is to be measured by the packed barrel or by the loose measure. They do not say possibly what shall constitute "sand," although at the same time they may give a fairly clear definition of what the stone is to be like.

STANDARD COMMERCIAL UNIT NEEDED.

One of the great difficulties with which the careful builder has to contend at the present time is the commercial unit of cement. A "barrel" of cement may mean almost anything. The barrels themselves vary in size, and if with this variation you combine the fact that cement in being packed may be made to shrink over 25 per cent., it will be readily appreciated that some definite understanding should be arrived at. The writer sincerely hopes that at no distant day the commercial unit of cement will be the pound or the even hundredweight. There seems to be no good reason why bags containing one hundred pounds of cement should not be the commercial package. For all practical purposes one hundred pounds of cement can be considered as one cubic foot, and if such a package were in common use a very easy comparison could be made between various mixtures at any time. As it is, it is almost impossible to compare the mixtures of any two jobs or to tell just how much cement has been used. As we find things to-day for practical purposes a bag is a bag, or a barrel is a barrel, no matter what the actual size or weight may be. This is further complicated by the fact that some measuring devices are in use which measures the cement loose. The adoption of the hundred pound bag would not increase the labor of handling and would not make the package too heavy to handle. The farmer and the miller handle regularly 120-pound bags of wheat. The adoption of the hundred weight unit would also facilitate accounting.

The cement on every important job should be carefully and regularly tested. Do not use it without tests. Of all the standard tests the writer considers the boiling or constancy of volume test to be by far the most important to the field man. This test is designed more particularly to develop those qualities which tend to destroy the strength and durability of the cement. Failure is revealed by cracking, checking, swelling, or disintegration, or all of the phenomena. The constancy volume test should be made every time. Practically all the standard brands will always pass the tensile and fineness tests, but the writer has known many of them to fail at times in the boiling test. Failure to pass the boiling test may mean that it is only necessary, if nothing better can be done, to pile the cement with plenty of air space so that the free lime present may have an opportunity to air slake. This may take six weeks, but even at that it may be the only remedy. The writer has been forced at times to deal with thousands of barrels of cement in this way, cement which had passed all the other tests quite satisfactorily. Where possible, of course, such cement should be removed from the work and replaced by satisfactory material. The writer does not for a moment wish to belittle the standard tests: he only wishes to point out the advantage of one of the speediest and easiest of the tests on cement, and at the same time for construction purposes one of the most important. The boiling test is described in the latest Canadian Government Specification as follows: To test the soundness of cement, at least two pats of neat cement mixed for five minutes with 20 per cent. water by weight, shall be made on glass, each pat about three inches in diameter and one half inch thick at the centre, tapering thence to a thin edge. It should be well trowelled to work out air bubbles and surplus moisture. The pats are to be kept under a wet cloth until finally set, when one is to be placed in fresh water for 28 days. The second pat will be placed on the rack in a Faija hot bath tank over the vapor of water heated to 170 degrees Fahrenheit, and allowed to remain there from three to four hours, after which it will be placed in hot water at a temperature of 170 degrees Fahrenheit, there it will remain for the balance of the 24 hours and then allowed to cool. In some cases it will be found desirable to raise the temperature of the water to the boiling point. Neither samples should show distortion or cracks.

It is not necessary here to refer to such matters as the ordinary care required in storing the cement and keeping it properly dry.

GRADING OF MATERIALS.

The next question in the quality of materials is that of the sand. The old idea of having sand uniform in grain and absolutely sharp and clean is now being somewhat departed from. The sand must be practically clean and contain say not more than three or four per cent. of loam. That it must be sharp is not necessary. The grading of the size of the particles, however, is of the greatest importance, and the ideal concrete may be said to be made of materials graded all the way from the particles of cement to the coarsest aggregate. In the writer's judgment it is quite immaterial whether crushed stone or gravel is used, but it is material to have a dense mass, and the best and most economical way of obtaining this density is to have graded material. Before starting any work of importance determine with great care by any of the standard methods the proportion of voids in the sand and the proportion of voids in the gravel or broken stone, and be sure that the combination of the materials selected is such that the mass will be without voids. The ideal concrete is obtained when the cement fills all the voids in the sand and the resultant mortar fills all the voids in the aggregate. Keep in mind that the strongest concrete is obtained with the greatest proportion of coarse material that can be used. A surplus of sand is detrimental to making a strong concrete. After the proportions are determined from the tests make a number of samples of concrete to the adopted formula so as to check up the result. This is of very great importance both for economical and constructional reasons. Break the samples and examine the fracture closely. In his practice the writer likes to consider as "sand" all the material up to about one-eighth of an inch in size, and he has succeeded in some instances in making a very strong and dense concrete with a formula which might be stated as one of cement, two and a half of sand and eight of gravel. It is very rarely, however, that this can be done as very few pits furnish such an even grading. In using pit run the voids must be determined regularly.

The references that have been made to the grading of the gravel as an aggregate also apply to the grading of broken stone. One uniform size of stone is not advisable or desirable for the resultant concrete will not be so economical as with graded sizes.

Let me repeat—make some more samples of concrete and examine the fracture.

DRY AND WET MIXTURES.

In considering the quality of concrete the mixing is of vital importance. In the best works to-day the comparatively wet mixture is used and the day of dry concrete is past. With dry mixtures perfect water-tightness is very difficult to obtain and imperfect mixing is more likely to result than when more water is used. On general principles batch mixers are to be preferred. It is a well known fact that a lean mix may be increased in strength very materially by continued manipulation in the machine, and it is also well known that a rich mix insufficiently turned may result in a poor concrete. Wet concrete also insures density. It is practically impossible to make the workman ram a dry concrete and obtain a density equal to that resulting from a wet mixture. A wet mixture also facilitates the placing of "plums" or boulders in the mass. A wet concrete can safely be filled with clean boulders until no more can be forced into it, and this is the only way in which boulders can be perfectly embedded. So long as the stones can be forced into the wet mass the writer can see no object whatever in naming fixed distances to be required between the boulders or between the boulders and the face of the walls. Work the concrete after it is placed in the moulds. If you will use a dry mix, pound it. Then pound it some more. And when the men object to do more pounding make them ram it. If you have a wet mix work it, agitate it, get all the air and water bubbles out.

To cleanliness hig virtues have been ascribed. A builder cannot make a good job in concrete without cleanliness. Chips, dirt, and disintegrated concrete dust will not make concrete although we regret to find that at many times it has helped to swell the yardage. The greatest cause of the difficulty in bonding new concrete to old is dirt. Keep a hose handy with plenty of water pressure and do not hesitate to use it freely for cleaning purposes.

And here a word about temperature and weather conditions. Mass concrete can be safely carried on at zero weather. Care is required as well as additional money. The concrete must be kept from freezing until after it has acquired its initial set and considerable hardness. It should not thaw out and freeze at intervals during the process of hardening. A blazing sun on a hot summer day may be quite as detrimental to concrete as the frost of winter. It is very desirable and at times quite necessary to have a supply of water on hand to prevent drying out and to assist the concrete to mature.

Wet concrete also enables the builder to produce a face better than that which can be obtained from any other method, a face better in durability as well as in appearance. The custom of using a faced mortar seems to be a needless expense and even a deteriment; and expense since it does not obtain any better result nor even as good a result as that got by the wet mass, and since it adds difficulties in the way of having to use a mortar instead of an aggregate, and since it also adds cost in placing and keeping the mixtures separate; and a detriment since we are placing together two bodies having a different co-efficient of expansion, two masses having essentially different structures. Pure mortar under variations of temperature does not act in the same way as mass concrete and it is not surprising to find that when bonded together they will not act in unison under ordinary climatic conditions. In a concrete wall built with face mortar the mortar is exposed to all the variations of temperature. It acts as a protector to the coarser mass behind it, which therefore, does not receive the same temperature shocks. It is not surprising then to find that cracks develop in the mortar. The writer is aware of many cases where face mortar, so good as to be crystalline in structure, has developed hair cracks at about eight foot squares all over its surface, the cracks extending through the mortar face to the body of the concrete behind.

FINISH AND COLOR.

The most satisfactory concrete finish that can be obtained for exposed surfaces, is when the formwork has been so well put up and the concrete so well placed that no patching is required after the forms are removed. The slight variations in color and texture of such a perfect surface give it a character which cannot be obtained in any other way. The use of the plasterer's trowel and the various washes should be discouraged on all heavy engineering structures. These means give a hasty, unworkmanlike and characterless tone to the structure at the start and also give a surface which does not improve with age. The natural finish on the other hand rather improves with time.

An attempt has been made to improve the surface of concrete structures by imitating stonework. On general principles imitations should certainly be avoided. Concrete has enough virtues to require no apologies for its appearance. In the oldest structures of stone the idea was to hide the weakest parts, the joints. Appreciating the difficulty of this, designers later adopted them as a feature. Attempts to make concrete look like stone by making marks to imitate joints is inexcusable. Good honest concrete need not stand as an imitation.

Concrete surfaces are also unsatisfactory at times on account of color. In some instances this is immaterial, but in others it should be considered. The color of the surface may be the result of the cement itself, of the sand used, or even the staining by the wooden forms. It is usually not difficult to get a cement that is a good color. Ordinary pine planking for the formwork will not stain unduly, and a little care in selection from the pit may obviate the difficulty arising from the sand. The question of color, however, is one which more particularly concerns architectural constructions.

While concrete may be considered a modern method of construction the combination of the use of steel and concrete is very recent. It is less than half a century since the first genuine reinforced concrete was made and for a considerable period its use was confined to the manufacture of such unpretentious articles as flower pots and tubs. The first instance of the use of the combined material which we know in this country as reinforced concrete was about thirty years ago when in New York State, Mr. Ward erected a small house using rods in the lower sides of his beams much as we use them to-day. The French and the Germans at about the same time began to develop the new system and its growth has been so rapid that it has probably outstripped all the new arts of modern times. From the building of a rowboat in 1856 to that of a sixteen-storey sky scraper in 1903 is a tremendous stride, and to-day the system of reinforced concrete is worthy to be considered with the highest types of permanent and fireproof architectural construction. The reinforced concrete engineer is invading even the domain of his brother who works with steel, and we find railway bridges and viaducts being constructed in various places. For railway bridge superstructure time alone can prove the suitability of reinforced concrete. That cracks may be developed by the variations from trains or locomotives there may be good reason to think, in which case the steel would be exposed to those elements which will seriously deteriorate it. The suitability of reinforced concrete for architectural purposes, however, is past the experimental stage. Certain well defined designs are now recognized as good practice. Formulae have been developed which enable the engineer to design in reinforced concrete as rationally as he can do so in structural steel.

Well designed reinforced concrete buildings possess certain virtues in a very marked degree. Some of these qualities assert themselves quite forcibly,—fire resistance, absence of vibration, increasing strength with age, rigidity, sound proofness and economy are very marked. In many cases reinforced concrete demands consideration side by side with structural steel skeletons, but there are cases where reinforced concrete cannot for practical purposes be considered, as for instance the construction of a building during the winter season.

It is not our purpose here to enter into a discussion of design with which the standard authors deal so fully, but rather to refer briefly to some points which must be carefully watched in the field after the outside man has received his designs from the office.

In the present state of the art these designs will probably not call for any concrete to be exposed in the exterior of the building, in any building at least where architectural effect is aimed at. The building will probably be composed of a reinforced concrete skeleton with an exterior of brick or stone.

Some reinforced concrete buildings having concrete exteriors have proven unsatisfactory from the fact that up to the present no distinctive design has been developed to suit the material and until the architects succeed in developing suitable lines the use of concrete for exteriors is not recommended.

As well as lines, the element of color enters strongly into the architectural objection. Portland cement and ordinary sand do not give a pleasing color effect, but it is probably only a matter of time before a cement will be put on the market which will get away from this difficulty.

SUPERINTENDENCE OF WORK.

The building superintendent requires to take care of all the points that have been mentioned in connection with the field work of ordinary concrete and he has in addition to carefully watch the placing of his reinforcing. He must appreciate the fact that he has placed in his hands the crudest kinds of building material, with respect to which he is the chief workman and master builder. He has no shop work to fall back upon and blame for errors. He has been given the details of a highly scientific structure and he is responsible for carrying them out. The steel must be properly and accurately fabricated and correctly placed and held in the moulds. The columns must be of the proper size and perfectly plumb avoiding eccentric stresses. In short the concrete building superintendent must realize that he combines in himself the shop superintendent and the foreman erector.

The necessity for a wet mix required by his brother superintendent working in the heavier classes of concrete is still greater for the buildings. Without a wet mixture he cannot properly fill the forms. The building members are comparatively small and filled with reinforcing steel. Mechanical pounding is out of the question. Use the mixture wet and work all around the forms and the steel. In columns use long rods or gas pipes for manipulating or puddling the concrete.

Again, without a wet mixture the steel cannot be properly and thoroughly embedded. Unless you can flush up the wet mortar of the concrete against the surface of the steel adhesion cannot be secured. The writer recalls an instance of the demolition of a portion of a concrete structure in which a very rich but dry mixture was used, and in many parts there was no adhesion.

This brings up the subject of the adhesion of concrete and steel. In the mind of the layman this property is a very vague and doubtful one. In reality it is a very positive and definite quality. Let any doubter go to a mixing machine that has not been thoroughly flushed out with water on stopping operations and after it has stood a few days, and give him a hammer or a chisel and let him try to clean that concrete off the bright smooth steel interior. There will be no further doubt on the question of adhesion. And then let him remember that the interior of that machine is very smooth compared with the surface of the rods usually embedded. There is absolutely no doubt about the adhesion of concrete to plain steel. Set up the requisite amount of agitation in the concrete by puddling it and it will adhere to the steel. The manipulation is necessary and if it is not done no amount of mechanical bond will save the structure.

As far as the writer's observation has extended practically all the accidents in reinforced concrete buildings have resulted from the premature removal of the formwork. Give the concrete time to set up and there will be no trouble from this cause. The time necessary can only be judged by experience. Ten days in some cases is as good as three weeks in others. A bridgeman will not remove his falsework until the riveting is safely completed. A builder will retain the bracing until the building is complete in itself. No greater amount of good judgment is required for concrete.

Something has been said about cleanliness in concreting on heavy work. Let it be said again. Keep the work clean. Chips and shavings and snow are not good reinforcing materials. If the superintendent is good he will be clean, and if he is not clean he won't be happy if he thinks at all.

And don't put up light building work in reinforced concrete during freezing weather. If you are compelled to do so be careful. It can be done but it means money and eternal vigilance.

Don't let a blazing sun shine on your new concrete when the thermometer stands at 80. Give the cement a chance.

Throughout the discussion the element of cost has been carefully avoided in order that it might be emphasized at the end. The cost is sometimes an unsatisfactory element—why? Because, after all ordinary and economical methods have been used, there remains the desire to get something in concrete that would never be thought of for other types, a polish finish. An owner may demand his concrete beams and columns to be mathematically true, but he would not dream of exposing in his halls or factory it may be the corresponding members if the building were of steel. He would be satisfied possibly with the rough unevenesses of a brick wall with its dust catching surfaces, but in concrete he wants it like a billiard table. Do not attempt to get mathematical planes in concrete building work. If a perfectly smooth surface is demanded use common plaster. In this way

(*Concluded on Page 74*).

View of rotunda, new Public Library, West Toronto, looking towards the entrance, and showing detail of ceiling and walls. Ellis and Connery, Architects.

View looking through rotunda and toward men's reading room, new Public Library, West Toronto. Ellis and Connery, Architects.

New Public Library, West Toronto. Ellis and Connery, Architects.

WEST TORONTO'S NEW PUBLIC LIBRARY.—A Practically Planned and Substantially Built Structure.—Provides Ideal Accommodation for Both Public and Staff.—Interior Arranged so as to Bring All Rooms Under Immediate Supervision of Librarian.

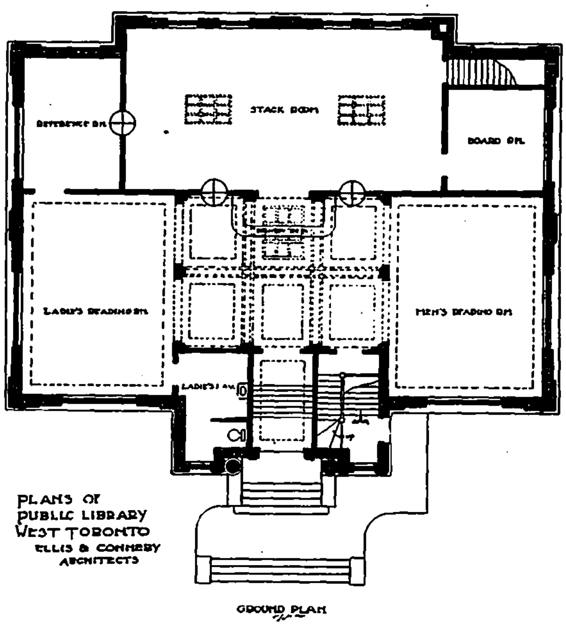
THE PUBLIC LIBRARY, in that it supplies an economic and educational want, has of necessity become a component part of our system of municipal organization. There are few, if any, of even the smaller towns and villages, which cannot boast of certain advantages in this respect. It provides an abundance of good reading for those who find time to indulge themselves that way. The student uses it to supplement his class studies; the scientist for additional research; the journalist and litterateur, its works of reference; and the poor man finds within it the newspapers and current periodicals which his meagre income will not permit him to buy. In short, the public library is a storehouse of lore with books for the naturalist, volumes for the artisan; works on history, art and industry; tales of romances, masterpieces of literature and innumerable other subjects which one and all are privileged to consult and enjoy.

At the present time, a large number of the smaller municipalities are concerned with the matter of providing housing accommodations that will adequately meet the requirements which such an institution necessitates, having either through their own resources or through the aid of philanthropists reached that point where they are in a position to erect a building to be used exclusively for library purposes. The problem, therefore, with which these places are dealing, is the problem of design and plan, and how to secure the greatest return for their investment, viz., a building having dignity and character in plan and elevation, arranged so as to bring the various rooms immediate under the supervision of the librarian and his assistants, and providing the maximum degree of accommodation with the minimum cost of up-keep.

While the amount usually available is not sufficient to provide an absolutely fireproof structure, the building, owing to the character and value of its contents, must be safe and substantially constructed, with the hazard of fire reduced to the lowest point compatible with the sum invested. In addition to the library proper, the plan should provide for a lecture room, as the lyceum feature is coming to be more fully recognized as an important adjunct to the library system; and as for lavatories and similar conveniences, these should be located so as to effect the greatest economy in plan, and equipped with a view of obtaining the highest degree of sanitary efficiency.

One of the more recently completed buildings of this character is the new public library at West Toronto. It is a square, practically planned building, one story and basement in height, and designed with a modern classic feeling. The walls are of red pressed brick laid up with black mortar points, the floor system of concrete, and the entrance cornice and window trimming are executed in Ohio sand stone. A low parapet and simply designed belt course helps materially in giving the building a pleasing breadth of character; while the entrance, having easy ascending steps and embellished with columns of the Corinthian order on either side, assists in imparting to the whole the feeling of dignity which such a building should possess.

The interior plan of the building effects the greatest economy in the utilization of space and provides an ideal arrangement in every respect. Inside the entrance is the vestibule which in turn opens into a large rotunda trimmed and furnished in quarter-sawed white oak having a polished surface. The walls are finished in a brown

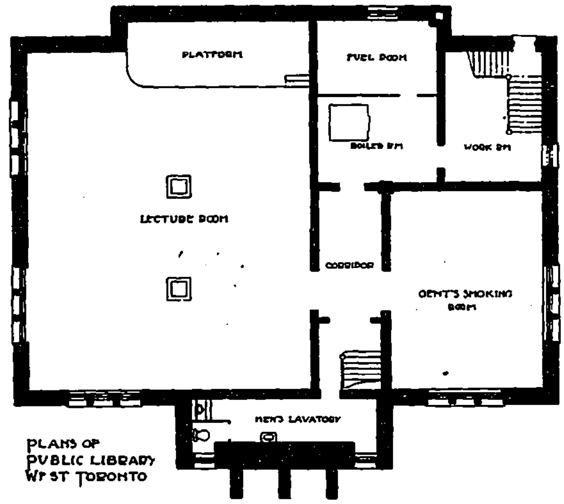


Ground Floor Plan.

toned stucco; the pilasters, capitals and cornice in white keen cement; and the ceiling crossed with enriched white plastered beams forming deep recessed panels, the centre one of which providing a skylight over the delivery desk.

To the left and right of the rotunda are the ladies' and men's reading rooms, the former having direct lavatory accommodation, and a doorway leading to the reference room situated at its rear. Both of these have large windows, to insure plenty of light and adjustable electric pendants over the tables. Immediately back of desk is a stock room of spacious dimensions, having the board room to its right, together with a staircase leading to the work room in the basement. The delivery desk, being placed opposite the entrance, enables the librarian or the clerks to have a commanding view of both reading room and to exercise complete supervision over the entire floor. The floors throughout have hardwood surfaces, and the rooms in general are similar to the rotunda in finish and appointment.

Access to the basement is obtained either from the outside or the rotunda, the stairway being conveniently situated in the space between the vestibule and men's reading room. This floor contains a large lecture room occupying one half of the floor space, a smoking room, men's lavatory, boiler and fuel compartments and work room.

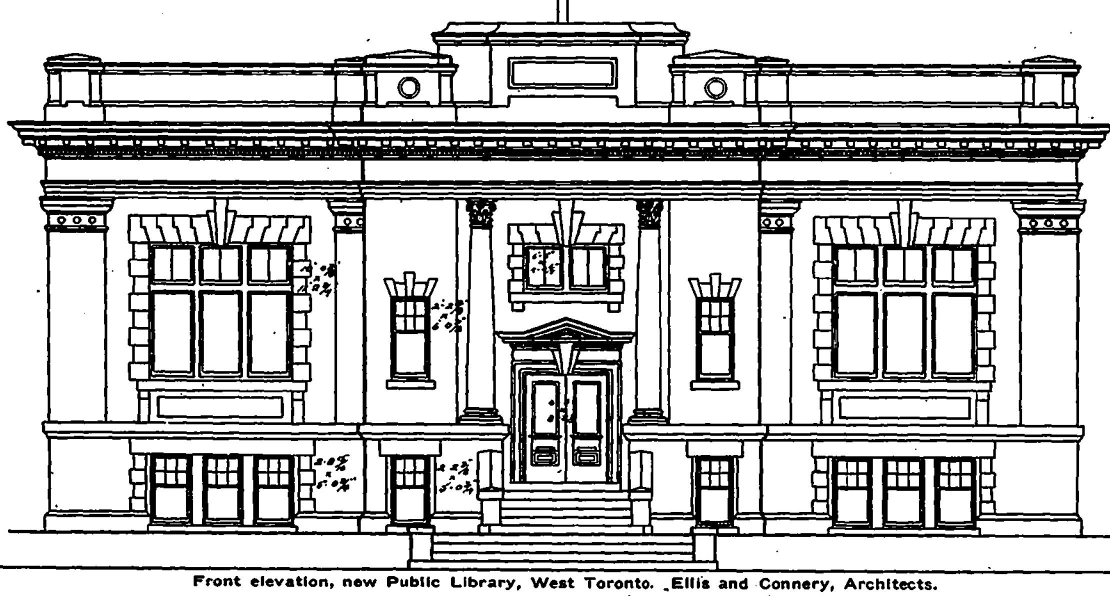


Basement Plan.

The lecture room is separated from the other rooms by a corridor, and the lavatory is placed in the space underneath the main entrance.

The architects of the building were Messrs. Ellis & Connery, and the various branches of the work were executed by the following firms: Masonry, Teagle & Son; carpenter work, Smith & McElroy; heating and plumbinb, R. Paterson; plastering, Collyer & Lewis; painting and glazing, Jas. Casey; roofing and sheet metal work, A. Mathews; electric wiring, Gas and Electric Power Company.

The building was a gift to the city from Mr. Carnegie, and it is an acceptable addition in every way to the already large list of similar institutions which have been made possible through his benefactions.



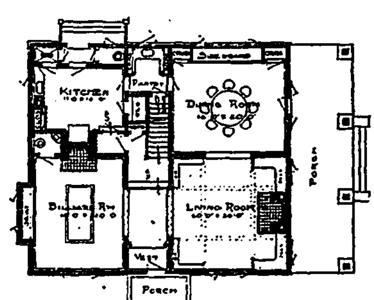
Front elevation, new Public Library, West Toronto. Ellis and Connery, Architects.

Design No. 1—A country house especially adapted to a site which is slightly elevated and the immediate grounds somewhat open. It is built entirely of wood on a foundation of field stone. The lower story and part of the second is covered with eight-inch weather boarding ⅞ of an inch thick; the shingles are of the rived kind and the vertical gable boards V-jointed. The three belt courses, stained a darker tone than the rest of the walls, materially assist to give the house its low, bungalow like appearance.

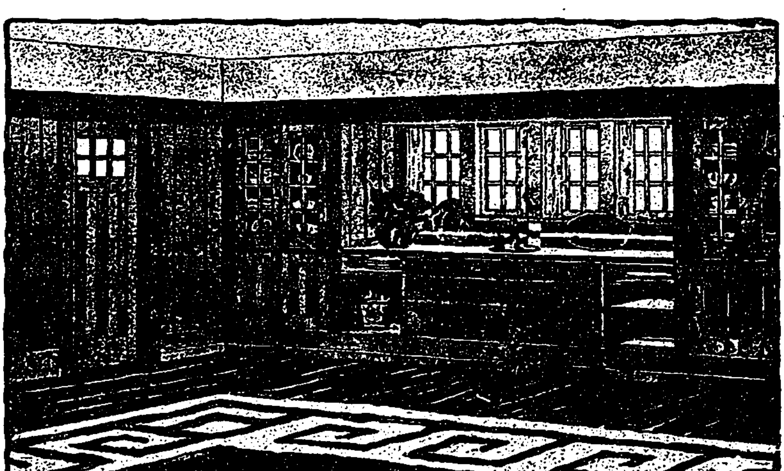
COUNTRY HOUSES AND COTTAGES.—Small and Moderate Sized Dwellings Which Express a "Ruskin" Truthfulness in Construction and Combine Interest, Beauty and Comfort in Design and Plan.—Built-in Features an Integral Part of Scheme.

NO TIME IN THE PAST has the need for the highest and best efforts in domestic design been more urgent or imperative than it is to-day. Within the next twenty years. Canada will pass through an era of "house building" such as has never been experienced before, or in all probability will ever be experienced again. It will possibly be the greatest period of development in this respect. The press of even the secondary towns now boast of residential growth of from 200 to 500 houses annually, and, while it must be admitted that great progress is being made, a casual glance shows that in the main, it is a case of much "building," but little "architecture." This, however, is not to be taken as a reflection on the architects. What they have done needs no apology; and what they are doing, they are doing well. Their efforts are easily distinguishable from the products of the speculative builder. A condition is simply pointed out; one that demands attention and needs remedying; one that needs the interest of the architect as a stimulus. for the time is now at hand for the "planting of the seed," if a domestic architecture is tó be developed that is worthy of the name.

The great need is for economical, small and moderate sized houses that have the interest, beauty and comfort which every home should possess; houses such as will carry out the Ruskin idea—denoting truth and simplicity in their lines and construction, and designed to secure the greatest interest and harmony in proportions, structural features, sense of space in interior arrangement, and blending of colors in walls, woodwork and furnishings. The disinclination of many architects to give time and study to the design of small



Ground floor plan of Design No. 1, showing the location of the fireplaces and the positions of the built-in features.

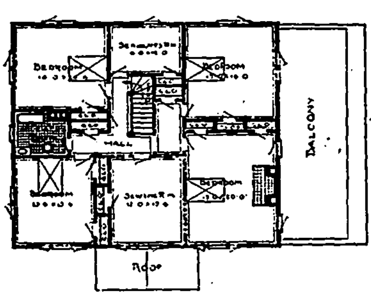


Section of dining room, Design No. 1, showing the large built-in sideboard with china closets an either side, and the high panelled wainscotting.

Design No. 2—A country house built with field stone. Note the ruggedness of its lines and the structural efficiency of walls. The design could be as effectively worked out in brick, concrete or terra cotta, and would be beautiful in weathered cedar or with half-timbered construction.

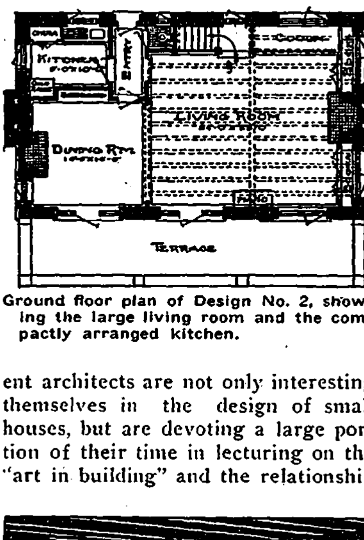
houses, regarding them as being less remunerative in proportion to the effort expended, than other classes of buildings, is indeed deplorable. This attitude, in many instances, has led the prospective owner to become a victim of the speculative builder, and is responsible in a large measure for the many architecturally distorted buildings, which, in both their lines and construction, reveal nothing more than a vagueness of character at the best.

Possibly the best idea as to what is required more than anything else is to be found in the type of building known as the "craftsman" house. There is at least truthfulness in its lines, and a sturdiness of character and simplicity of detail to recommend it. Such a type of house admits of unlimited possibilities in interior decorative work. Built-in bookcase, shelves and similar features become a very part of it, and as for economy and permanency it has a



First floor plan of Design No. 1, showing the well proportioned rooms and economically arranged closet space.

value that is hard to equal. England has done much in the development of this character of house, although the same may not be known as such, and yet the leading members of the profession there have come to realize that the best traditions in domestic design must be jealously guarded and preserved, if the simple charm and sincerity of the past is to be perpetuated. They, too, have begun to witness the desecration of architectural principles by speculative builders, and in order to check this unfortunate tendency, a number of promin-



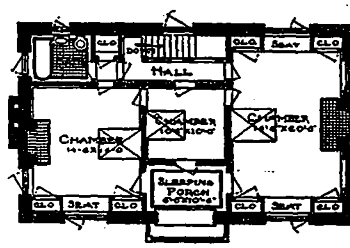
Ground floor plan of Design No. 2, showing the large living room and the compactly arranged kitchen.

ent architects are not only interesting themselves in the design of small houses, but are devoting a large portion of their time in lecturing on the "art in building" and the relationship of the various "crafts" to domestic structures.

In view of this fact, we are reproducing herewith a number of designs from the CRAFTSMAN, which we believe in design, plan and construction will prove to be of interest.

DESIGN NO. 1.

Design No. 1 is a large house especially adapted to a country site, and is seen at its best when built on a slight elevation and on grounds which afford a somewhat open space at its immediate site. The house is built entirely of wood, on a foundation of field stone. Everywhere is



First floor plan, Design No. 2, a feature of which is the sleeping porch, projecting slightly beyond the outside wall.

open construction with both purlins and rafters exposed. Cypress is the material used in the exterior of the house, being employed in various forms, but equally as good results could possibly be obtained from other species of wood. The weather-boarding and shingles are thick and broad so that the angle of their projection upon each other is deep enough to cast a shadow, and thus, even at a distance, the walls retain the rugged character of their construction.

The roof is of low pitch with a projection of four feet at the eaves. The lower story and part of the second is covered with eight-inch weather-boarding, seven-eighths of an inch thick. This surface is varied by two belt courses of four-inch boards, laid flat, and stained a darker color than the rest of the house. Between the upper belt course and the

Living room in Design No. 2. The chimney-piece is built of the same material as the outside wall, thus bringing the exterior into close harmony with the interior of the house. The fireplace is hooded with hammered copper, and the bookcase and couch are all built-in.

eaves, rived shingles are used. In the gable, narrow V-jointed boards

Rear view, Design No. 3, showing the roof lines and treatment of windows. The pergola having concrete posts, opens off the entrance of the porch, where the family dinner can be served during the summer months.

are laid vertically, with a flat band matching the belt courses in color, forming the finish between the vertical boards and the shingles, and running around the house at the line of the eaves. The effect of these three parallel courses of a darker color is to take away from the height of the house and give it a low, bungalow-like look in spite of its three stories.

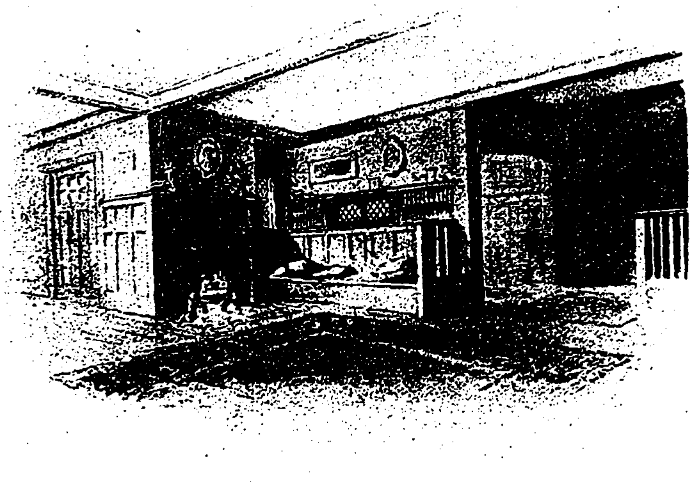
The windows all over the house are much the same, each one protected by a hood; the large windows are made with a stationary panel, on either side of which a single casement opens outward. The smaller windows have a casement placed beside a stationary panel of the same size. When the window is open it gives the effect of a double casement with one half closed. This arrangement is an economy in screening, as only half of the window needs to be covered. Since the casement opens outward, the screens may be fitted inside the window frame and thus, protected from rain and dampness, last four times as long. By the use of a casement adjuster, it is possible to open the window and keep it open at any distance desired without raising the screen.

The entrance door is paneled, with a group of square lights at the top, and opens upon a small porch built of stone, with stone posts at either side of the steps. Large wooden pillars stand upon these posts and support the roof which protects the porch. Instead of a parapet, two wooden seats are built along the sides. As it is always more advantageous to make a porch practically an outdoor room of the house, and not a public entrance, the large living porch is at the side of the house and opens with French doors from the dining room. This has a low parapet of stone with the same arrangement of post bearing the pillars that support the roof; the floor is of cement.

Design No. 3. A cottage suitable for town, village or suburban environments. The walls are of a soft, light grey plaster. The plain wood cornice under the eaves is stained a deep reddish brown, the tone fading into a dull grey-green in the windows, and merging into a light grey near the ground.

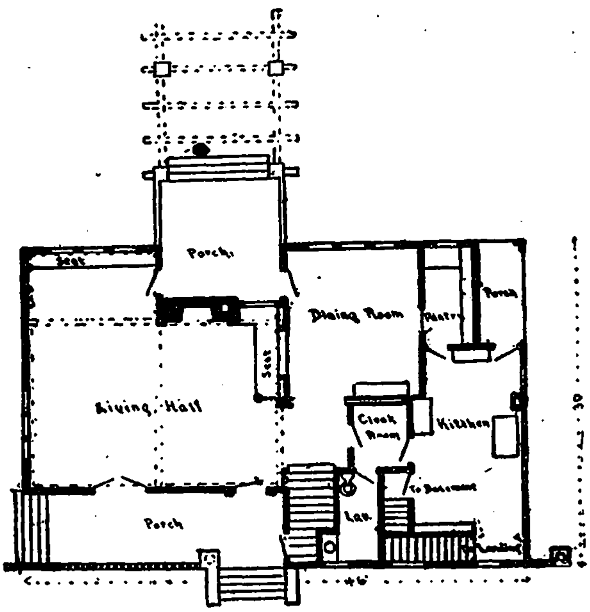
Flower-boxes run from post to post, outlining the parapet.

From the entrance door one enters through a small vestibule into a hall, the end of which is raised by two steps to form a daïs-like landing from which the stairs go up to the second story. The area of this landing is calculated for the greatest amount of use. A coat closet fills the space under the stairs and at the side a door leads into a small entry that connects with the kitchen. This gives the maid a direct passage to the front door and also does away with a second flight of stairs because the main stairs may be reached so easily from the kitchen without passing by or through any of the other rooms in the house. A second door placed between the kitchen and the entry does away with any possibility of the odor of cooking penetrating into the hall and the adjoining rooms. The lower hall is practically an open passage with the billiard room and the living room on either side of it. The



View of living room, Design No. 3, with its fireplace and cozy seat, topped with book shelves. The walls are done in soft grey-green and the ceiling in light tan, the two tones with the silver grey of woodwork producing an effect of quiet neutrality.

ceiling of the living room shows four of the great beams in the house. There is a fireplace with a deep inglenook on either side built below



Ground floor plan of Design No. 3.

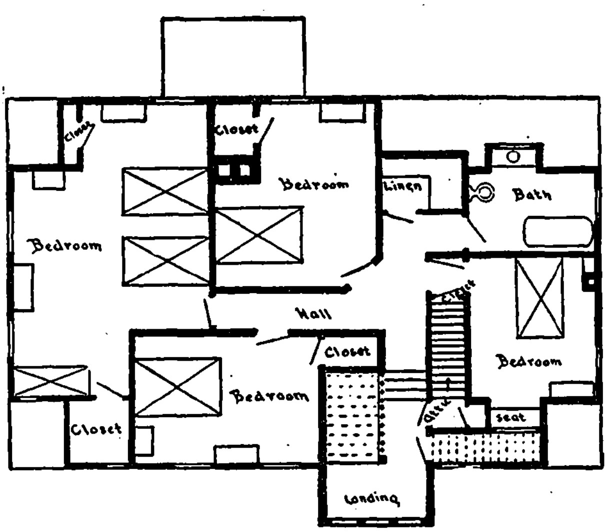
the windows which look out upon the porch. The dining room is separated from the living room by a narrow partition of spindles. A corner of this room is shown in the interior view. One of the interesting features of this room is the commodious built-in side-board, at either end of which is a china closet with cupboards below. This sideboard is planned to meet every need of serving in the dining room, as well as to afford places for keeping the dining room utensils. The room is wainscoted to the plate rail with V-jointed boards. A swing door, handsomely paneled and set with glass at the top to admit light, leads to the pantry. The billiard room has a big bay window with a seat below and a conveniently placed toilet closet. The arrangements of the kitchen are complete and well placed; there are big closets and also a cold closet containing the icebox, which may be filled from the outside of the house. The second story shows four bedrooms and a room for the servants, a sewing room and a bath. French doors open upon the roof of the side porch which, if desired, may be finished with a railing and used as a balcony.

DESIGN NO. 2.

Design No. 2 is also a structure which is strictly of the country-house type, and it is intended to be built where field stone is plentiful, as the degree to which this material is available is a big factor in influencing the cost. If the stone has to be quarried, the expense is relatively increased, and the cost will amount to quite a different sum. This fact, however, is no drawback to the use of the design, which in a simple and direct manner adequately meets the needs of home life in the country. It could be as effectively worked out in brick, or concrete, or terra cotta, and would be beautiful in weathered cedar or with a half-timber construction. The house illustrated is, however, of stone, with heavy lintels of hewn white oak. The roof is covered with a composition roofing, which comes in strips, thirty-six inches wide, and is, in this case, dark red in color, but also may be had in green and slate colors. At the junctures of these strips, over each rafter, a batten of chemically treated cypress is placed. This makes a very effective roofing and the exposed rafters and purlins, aside from the economy in repairs and actual durability that open construction always carries with it, add to the appearance of ruggedness and do much to emphasize the solid, permanent character of the architecture. Casement windows are used throughout the house, sometimes placed beside a stationary panel of the same size and sometimes with a fixed panel between two single casements. French doors lead from the dining room and the living room out upon a terrace built with a parapet and posts of stone. The floor is of cement, and cement flower boxes run from post to post. On the second story a sleeping balcony is finished with a beautiful railing supported from the exposed timbers of the house. This porch, and the two casements on either side, form what is really an exaggerated dormer construction broken through the roof. The rear of the building is shown in the illustration.

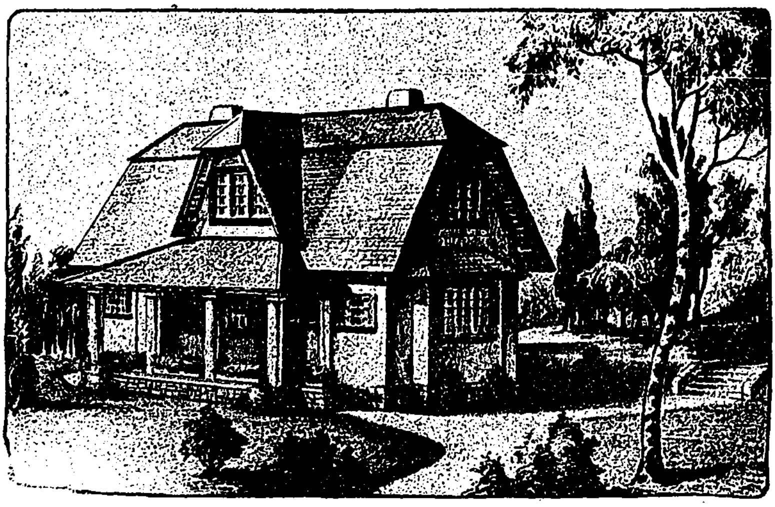
The house is entered from the front through a hallway in which three doors lead to the living room, dining room and kitchen, respectively. The interior view shows a corner of the living room. The chimneypiece is built of the same material as the outside walls, thus bringing the exterior into closer harmony with the interior of the house; the fireplace is hooded with a sheet of hammered copper for the purpose of radiating the heat from the open fire. Bookcases, with convenient drawers below, are built in beneath the windows on either side of the chimneypiece. The stairs to the second story go up from the living room, and beneath them a closet, containing toilet arrangements, opens into the hall. The ceiling of the living room is very interesting; all the beams of the construction are left exposed. In the chamber above, a foundation floor of chestnut, the finished surface down, rests upon these beams. This floor makes the ceiling of the living room, and another flooring is laid upon this, with a deafening quilt between, for benefit of the chamber above.

The dining room is separated from the living room only by a shallow grille running along the ceiling, and the sideboard is built into the room. The kitchen is connected with the dining room by the entry. Upstairs are a bathroom and two large chambers fitted with closets and window-seats; each chamber contains a fireplace. Indeed, in these rooms, as in the lower story, the house seems furnished and hospitably ready to be occupied before the owner has moved in any of his personal possessions. A smaller chamber is



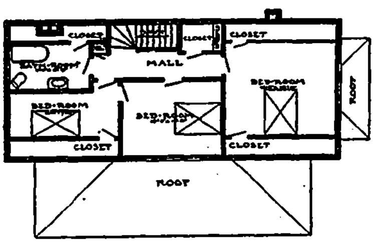
First floor plan of Design No. 3.

connected with the large one on either side of it, and all three open upon the sleeping balcony, half of which is sheltered by the roof—a welcome arrangement in severe weather,—while the other half is



Design No. 4. A six-room house which provides splendid accommodation for a small family. The walls are of cement plaster over metal lath, the plaster being left in its natural grey color, which contrasts pleasantly with the dull dark red of the roof, the brown stained rafters of the eaves and the white of the doors and windows.

open to the sky. This balcony will be a delightful sitting place both in the daytime and in the evening, and a cool and refreshing scene for bed-time rendezvous. The interior arrangements of this house throughout



First floor plan of Design No. 4.

are noticeably calculated to foster comfort and convenience.

DESIGN NO. 3.

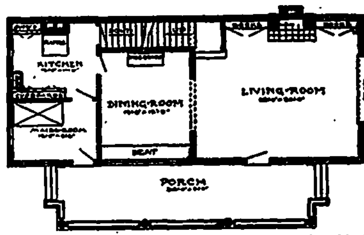
Design No. 3 is a cottage suitable for town, village or suburban environments. The first sight of its ample roof awakens an interest and a nearer approach reveals no repelling complacency in the broad, low facade and simple ornamentation. The walls are of soft, light gray plaster. The plain wood cornice under the eaves is stained a deep reddish brown, somewhat as Nature would tint it if we gave her time. This tone fades to a dull gray-green in the window and door trim, and loses its green to merge into the light gray of the wall near the ground. This treatment avoids the decided, liney effect which woodwork in solid color gives.

It is quite evident from without that the hanging window accommodates the landing of the stairs, and that it is supported by carrying the floor joists beyond the face of the main wall. Its peak is not allowed to break the long line of the main roof. The sweep of the roof on the opposite side and the extension of the walls make the gateway of the rear garden and the dividing fence a part of the harmonious whole.

The porch is within the area, only the steps projecting. The front door of matched oak planks has more decision of color than in the casing; its green is somewhat deeper and is mellowed attractively with brown.

Direct entrance into the living hall, which occupies about half of the house area, gives an effect of spaciousness much to be desired. The simple fireplace, with its accessories of seat, bookcases and high window, is the feature of the room, as it should be in every climate where "Winter comes, to rule the varied year." The leaded-glass window between sections of the bookcases gives a glimpse of the dining room. This living hall gains much in attractiveness from the situation of windows on three sides of the room, overlooking the garden; and the seat beneath them offers an ideal resting place.

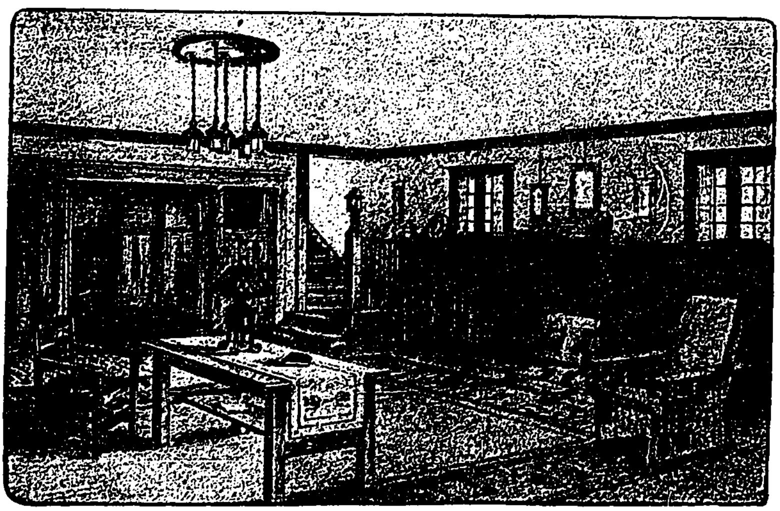
At the right of the entrance, in an alcove, the main stairs ascend to the landing, rendered pleasing by the three diamond-paned casements of the hanging window. Opposite the staircase, the open door to the dining room reveals a charming vista of the room and of the garden beyond, through the three windows at the end The closed door in the stair alcove (shown in illustration) opens into a cloak room, through which access may be had to the kitchen, an arrangement most convenient to a mis-



Ground floor plan of Design No. 4. Note the privacy of the maid's room and the connection of kitchen and dining room.

tress without a maid, or to the maid when it is necessary to admit a caller at meal time. And the situation of the lavatory makes an additional one on the first floor unnecessary.

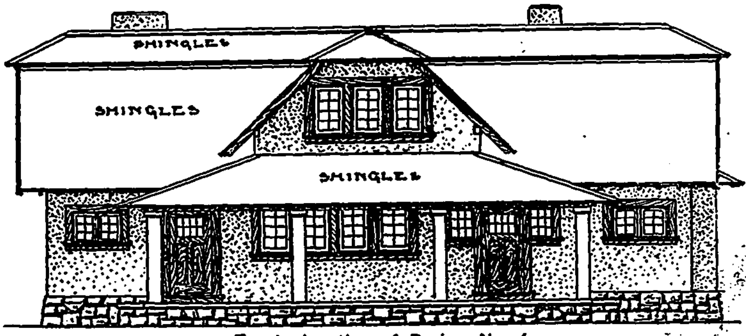
The rear porch lies partially within the area of the house, and, directly accessible from the living hall and dining room, contributes not a little to the charm of each. Protected by screen wire, it is the summer den of the master, the sewing room of the mistress, and, when August days grow oppressive, the family dinner



Living room in Design No. 4. The interest in this room centres in the fireplace of red brick, and the bookcases on either side, surmounted by square mullioned windows with the unbroken wall space between, which gives a beautiful balance to the whole.

can be served here in the shade of the vine-roofed pergola.

The columns of the pergola are of concrete, finished with one coat of plaster, the same as the final coat of the building. The soft, light gray is a pleasing contrast to the deep, warm brown of the beams above, and gives an intimate relation to the house. Of like construction are the bases and posts of the balustrade-like fence, but the balusters are wood, four inches square, painted to match base.



Front elevation of Design No. 4.

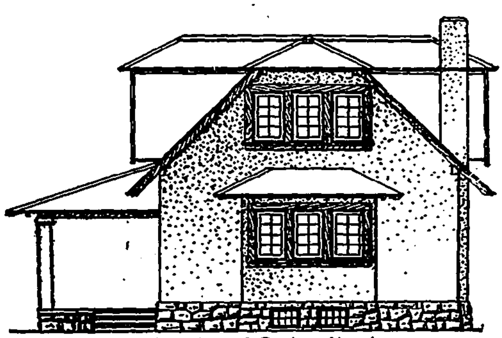
The living hall and dining-room have paneled wainscoting, and this, with the door and window casings and beam work of ceiling is stained silver-gray. The walls of both rooms are soft gray-green. The ceilings are light tan which show a suggestion of gray. The effect is one of quiet neutrality, into which considerable color in furnishings may be introduced without sense of discord.

The ceiling of the living hall is divided into three panels by one cross and one lengthwise beam, and a short beam separates it from the ceiling of the stair alcove. Half beams fill the cove between ceiling and wall, and these half beams continue around stair landing on a line with their position in living hall. The wall of the landing above this line and the walls of the upper hall are the light tan of the ceilings below.

The woodwork of the second story is silver-gray. The double bedroom at the end of the hall has a soft, yellow-brown wall. The front bedroom is in light terra cotta, while the room directly in evidence at the head of the stairs, carries forward the gray-green of the walls below. The remaining bedroom has the greenish blue tone known as Gobelin blue. In selecting the tint for each room, the effect of the whole has been considered.

Casement windows are used throughout the second story. The outward swinging casement must have been the early conception of what a window should be, and the wonder is that the modern window has departed from this form. No other sort is so simple and so charming in effect, no other so fully meets the requirements of ventilation; with the recent improvements in hardware, facilitating its operation, the casement window should come into more general use.

Diamond-mesh leaded glass has been used freely in this house, with most satisfactory result. The sash including glass is but a trifle more expensive than small-paned glazed sash. Where the view is to be considered, the lead lines are less objectionable than the wood bars, and the glass is much more easily cleaned, but the strongest argument in their favor is that, where not necessary to exclude the light, draperies may be omitted, for a leaded window never looks bare. Indeed, the effect is often better without than with curtains, and their absence is a material saving of time and labor to the housekeeper in cleansing and expense in replenishing the hangings, a consideration to the busy woman.


End elevation of Design No. 4.

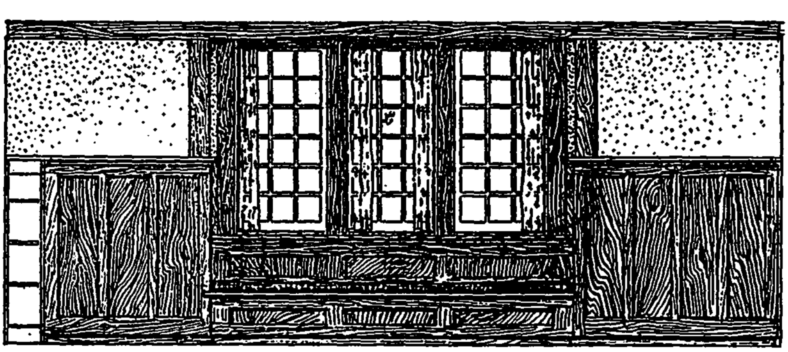
Not least among the conveniences is the ample provision of individual closets and a roomy linen closet from the passage to bathroom. In addition to these, there is an attic, which, though rather low (being about eight feet in the centre), furnishes considerable floor space. The clustered windows in front and rear gables give abundant light, and it can be either used as a playroom, or for storage purposes.

DESIGN NO. 4.

The cottage illustrated in design No. 4 provides a splendid accommodation for a small family, and can be built on either a town or village or a suburban lot. It is a house that is rather unusual in plan. The outside measurements of the cottage are fifty-one feet in width by thirty-two in depth, including the porch in front and the chimney in the rear. The walls, from the rough-stone foundation to the shingled roof, are of Portland cement plaster over metal lath, the plaster left in its natural gray color, which contrasts pleasantly with the dull dark red of the roof, the two harmonizing admirably with the greens and browns of the landscape.

The outside framing of the doors and windows and the rafters of the overhanging eaves are of cypress, stained a light brown, while the porch columns and the mullions of the windows are of pure white. The porch is floored with dark red cement, repeating the color of the room, and instead of a porch railing, long boxes of growing plants guard the edge. Mullioned casement windows are used throughout the house, both because their effect of quaintness is in keeping with the whole character of the cottage, and because they afford excellent ventilation.

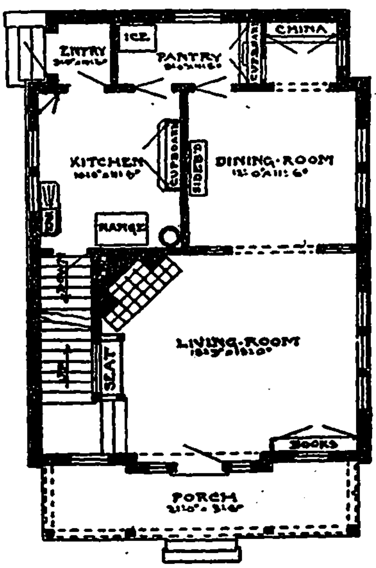
The kitchen and maid's room are placed at one end of the house, and are arranged so that they may be completely cut off from the living-rooms. One of the doors leading


Detail of window seat in living room, Design No. 4.

from the entrance porch opens directly into the maid's room, which is meant to be fitted with a couch-bed, so that it is a bedroom only when

Design No. 5. A small house with shingle covered wall. The simplicity of its lines is relieved by the overhanging eaves and rafter, the well balanced porch, grouping of windows and heavy beams which extend around wall. This design will admit, in a limited way, of the substitution of other materials.

needed and a pleasant sitting room the rest of the time. In case this arrangement is not considered desirable, it can be changed, with no alteration of the general plan, simply by omitting the door leading to the kitchen and cutting a door between the living room and the little front room, which could then be used for a library, den, sewing room, or study as desired.



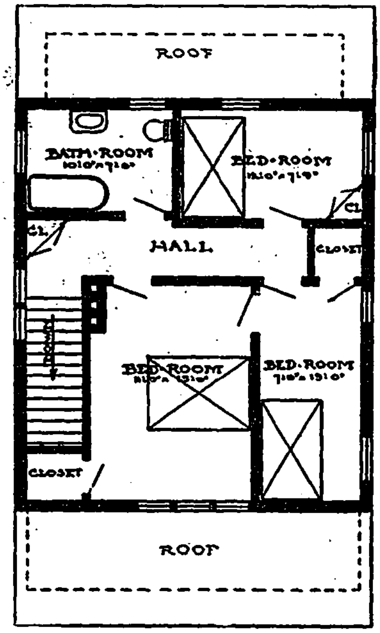
Ground floor plan of Design No. 5.

Aside from the kitchen and maid's room, the whole first floor of the house is given to the living room and dining room. The second floor is divided into a hall, three bedrooms, and a bath. The cellar is large and well lighted by high windows, and contains a laundry, storeroom, toilet, and lavatory, and a place for the furnace and coal bins.

The entrance doors are of oak and made rather broad in proportion to their height, with mullioned lights of antique glass above and two long panels below. Two high mullioned windows of the same antique glass, and made a little broader than they are high, are built into a frame, giving an attractive group of lights. On the same wall is a double casement window, mullioned like the others, but with panes of clear glass. The living room is full of light, as it has nine windows in addition to the borrowed light from the dining room.

The living room and dining room are practically one room, the dividing line between them being little more than suggested by the slight partitions of wood which serve more as a decorative structural feature than as a division between two separate rooms. These wood partitions on each side of the wide opening are merely panels of the five-foot wainscoting that runs around both rooms and terminates in posts that reach to the ceiling beams.

The living room proper is twenty-three feet long by twenty wide, and the accompanying sketch shows it as



First floor plan of Design No. 5.

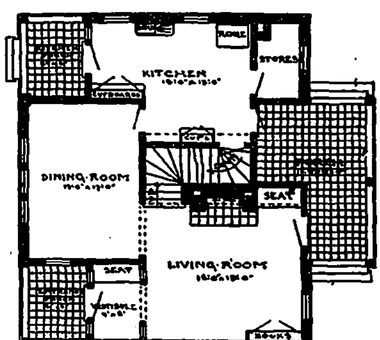
seen from the window seat. The structural interest of the room centres in the fireplace with its flanking bookcases and in the staircase which completes the group. The fireplace is of red brick, and the bookcases on either side, surmounted by the square, mullioned windows with the unbroken wall-space between, give a

Fireplace and stairway in living room of Design No. 5. The fireplace is built of red brick, being thrown diagonally across the corner and carried up to the height of the wainscot, wnere a stone lintel forms a projecting shelf.

beautiful balance to the whole. The stair-landing in the corner is entirely inconspicuous, and yet it is important to the structural completeness of

Design No. 6. A cottage which will readily adjust itself to any locality where an ample site and a few natural advantages are provided. It is built of concrete brick, being shaped like a cross, which gives opportunity for the maximum allowance of light and air and for large, well-placed rooms.

the room, as the rail is just the height of the bookcase beside it, and is connected with it in construction, while the bookcases in turn establish the line, at the height of five feet, which is carried around the room by the oak wainscoting. A five-inch beam in

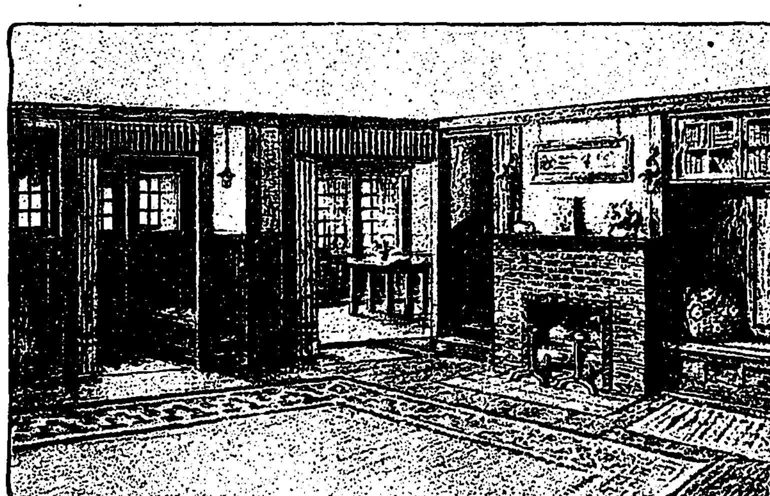


Ground floor plan of Design No. 6. Note the roomy arrangement, the convenient porches, and summer kitchen.

the ceiling angle projects an inch from the side walls and serves as a finish at the top. Looking from the dining-room the window seat comes into view, set into a recess which forms a bay from the outside, and surmounted by a triple casement window, mullioned, with clear glass lights.

The dining-room is twelve and one-half feet wide by nineteen feet and nine inches long, and is lighted by a group of triple casement windows, beneath which a seat extends the entire length of the room. As this room is practically a part of the living-room, it is given the same treatment in structure as well as in color, with the exception of the top of the walls, where the five-inch beam is omitted and the ceiling is dropped to the depth of twelve inches on the side walls, a narrow strip of wood, placed at the height of the cap of the door frame, running around the room with the effect of a small freize. The five-foot oak wainscoting is continued from the living-room around the walls of the dining-room.

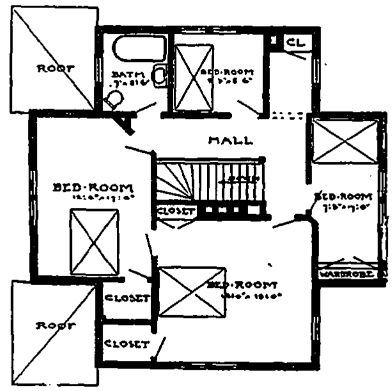
The color scheme of both rooms is naturally the same to preserve the effect of space as well as harmony. The oak woodwork is finished in a rich nut-brown; the sand-finished plaster walls in a shade of light golden brown with a tone in it of grayish green, something like the color seen in the skin of a russet apple; and the ceiling in ivory white with a suggestion of green.



Fireplace and nook with high placed bookcase, in living room, Design No. 6. This view shows the room, looking toward the vestibule, dining room and stairway.

DESIGN NO. 5.

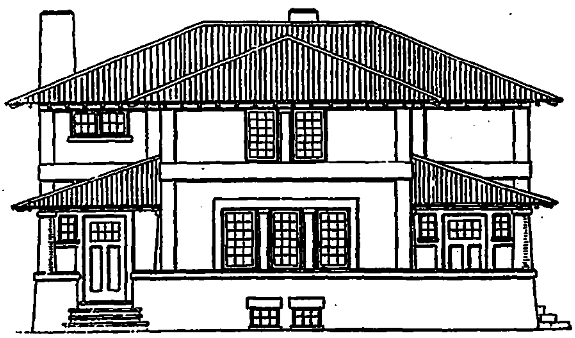
Design No. 5 is a small house built entirely of shingles, although its design will admit, in a limited way, of the substitution of other materials. The simplicity of its structural lines is relieved by the overhanging eaves and rafters of the roof, the well-proportioned porch, which is balanced by the extension at the rear, the heavy beams which run entirely around the walls, with a slight turn of the shingles above, and the effective grouping of the windows. The shingles on the walls are laid in double course, the top



First floor plan of Design No. 6.

ones being well exposed and the under ones showing not much over an inch below. This not only adds to the warmth of the house, but gives an interesting effect of irregularity to the wall-surface.

The house, although of frame construction, is built to stand weather, and its sturdiness in this respect is the direct cause of its wealth of attractive structural features. The roof of the porch projects two and one-half feet, which affords protection even in a driving storm. Also for



Front elevation of Design No. 6.

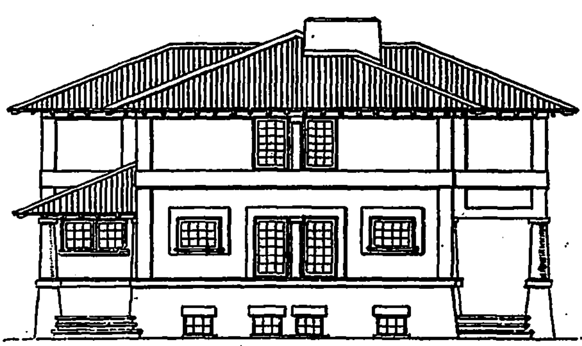
protection, all the exposed windows are capped by little shingled hoods which grow out from the walls, and which, in addition to their usefulness, form one of the most charming features in the whole construction. The eaves of the main roof project over the front for two and one-half feet, and the weight is supported by purlins placed at the peak of the roof and at its connection with each of the side walls. This widely projecting roof gives a most comfortable effect of shelter and homelikeness, an effect which is heightened by the way in which the quaint little casement windows on the second story seem to hide under its wing.

The living-room (shown in accompanying sketch) is entered directly from the porch and has three casement windows in the side wall. The fireplace is thrown diagonally across the corner, with a small built-in seat between it and the landing of the staircase, which turns and runs up back of the seat. The fireplace is built of rough red brick, with a stone lintel placed just at the height of the wainscot, and is built out from the wall three inches, with little projecting brackets to support the shelf. Above this the sand-finished wall recedes to its proper distance, making an unbroken space. The seat beside the fireplace is meant to be built so that the top can be raised and the inside used for a storage place. The back is raised one and one-half feet above the wainscot for protection on the stair, but the line of the wainscot is continued by the dividing strips between the long panels below and the square ones above. An interesting structural feature is the continuation of the same line from the five-foot wainscot of the living-room to the first landing of the stair, where it sinks to a height of three feet and continues up the stair. The front door, with its mullioned windows, is recessed eighteen inches, and the bookcase is built into the wall, affording relief from the continued surface of the wainscot.

The dining-room is twelve feet wide by eleven and one-half feet long, and is amply lighted by a double casement window mullioned into eighteen small lights. These mullioned casements are used throughout the house. The walls of this room show a continuation of the wainscot in the living-room, and the only partition is posts and panels, the latter extending only to the height of the wainscot and leaving an opening above.

The extension at the back of the house is partly utilized for a pantry, with a sink in it for washing dishes, and a shelf and door for convenience in passing them through to the dining-room. The corner space is used as a rear entry-way, and the opposite corner as a recess in the dining-room for a dish closet.

The kitchen is well lighted by a double window, and is amply fitted with cupboards. Except for the entrance through the pantry, it is entirely unconnected with the dining-room. The stairway from the kitchen leads down to the cellar, which extends the whole length of the house and is well lighted by high windows. It contains a large laundry and storeroom, and a chimney which gives opportunity for a heating apparatus to be installed if desired.



Side elevation of Design No. 6.

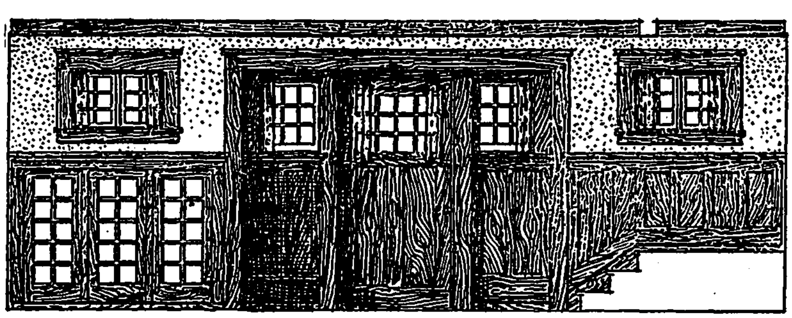
The second story is divided into a hall, one large bedroom well lighted by a triple window and having a good-sized closet, two smaller bedrooms, well ventilated and lighted, and supplied with closets and a bath.

The cost of this house is estimated at two thousand dollars without decorations.

DESIGN NO. 6.

Design No. 6 is a structure of the type which will readily adjust itself to any locality where an ample site and a few natural advantages are provided. It is built of concrete or hollow cement block construction, being shaped like a cross, which gives opportunity for the maximum allowance of light and air and for large, well-placed rooms. The side walls are broken into panels by raised bands of concrete that bind the corners, and also run around the entire structure at the connection of the roof and again between the first and second stories. These bands are smooth surfaced, but the walls are made very rough by a simple process of washing off the surface before it is quite hard. The face of the concrete is completely flushed against the form, and when the form is removed, after the material has set, but while it is still friable, the surface is washed with a brush and plenty of water, and well rinsed, so that the film of cement which formed against the mold is removed, and the particles of sand and stone are exposed. The appearance of the surface is largely controlled by the extent of the washing. If this is done at exactly the right time, the washing brush can be so plied as to remove the mortar to a considerable depth between the stones, leaving them in decided relief and producing a rough, coarse texture that is very interesting. Although this process apparently is intended only for the regular concrete construction, it would seem equally practicable to roughen the outside surface of concrete blocks in this way, if it is done as they are made.

The foundation of this house is also of concrete, and is continued upward on a gentle slant to a line at the base of the windows on the first floor,



Interior elevation of living room in Design No. 6. Facing the front of the house.

which gives a continuous horizontal line on a level with the parapets of the porches on either side of the front wing. The roof is covered with Spanish tiles of red terra-cotta, and is broken into an attractive form by the intersection at right angles of the two sections of the roof, one of which is a little smaller than the other. The eaves overhang about two and one-half feet, and are supported by rafters placed twelve inches apart. The same tile is used on the small roofs covering the front porches, and the support to these little porch roofs is furnished by round cement columns that are slightly tapered.

The main entrance porch is at the right of the house, while the kitchen is entered from the porch on the left. The window frames, with the exception of the small windows that are so built as to be included in the framework of the entrance door, are of cement with capped pilasters. The wings on the side elevations are a little larger than those of the front and rear, and the rear porch is recessed and extends the whole width of the wing, being large enough to serve as a very comfortable summer dining-room. This porch is floored with square tiles of red cement, which are especially adapted for outdoor use.

The first floor is arranged with only wood partitions separating the rooms. In the vestibule, which is just sufficiently large to prevent a too abrupt entrance into the living-room, is a box seat, useful for the storing away of various articles. The back of this seat is a continuation of the five-foot wainscot on the walls of the living-room, and opposite to it is space beneath the high windows for a hat and coat rack. Suspended from a five-inch ceiling-beam, between the two supporting columns of the partitions separating the vestibule from the living-room, are two lanterns of opalescent glass, framed in hammered copper, which serve to light the vestibule, and also add to the lighting of the living-room. A grille of slender spindles is run across the entrance from the vestibule, and also across the opening from the living-room into the dining-room.

The fireplace is built out into the room about two and one-half feet. To a height of five feet and to a depth of six inches—which is wide enough to support the ten-inch shelf —it is of red brick. A square post on either side of the chimney breast supports the beam, which runs the entire width of the room, establishing the entrance to the stairway on one side, and making a nook two feet deep on the other, in which a seat is placed. The back of this seat is paneled to the height of six feet from the floor, at which height a bookcase is built across the whole width. This is recessed six inches farther back than the edge of the seat so that it may be within easy reach of anyone standing on the seat, and also because one rising suddenly will be less likely to strike the head than if the bookcase were the full depth. On each of the posts of the mantel breast a copper-framed lantern is hung from a bracket, one to light the seat and the other the entrance to the stair. The stairway, winding as it does around the chimney breast, shows an unusual and very interesting arrangement as to its entrance, and is so placed that it is convenient to both the living-room and the dining-room. A door with a panel of small mullioned lights at the top opens upon the back porch. In all, the living-room is lighted by five windows in addition to the light borrowed from the four windows in the vestibule and from the dining-room. The windows in this cottage are all casement and mullioned. They all open in and are so placed as to be well sheltered from the weather, so that there is no danger of leakage. These windows are especially suited to small and homelike cottages on account of their quaintness and indescribably friendly look, as well as their desirability on practical grounds.

The dining-room is seventeen feet long by twelve feet wide, and is lighted by a triple window on the side wall. Here the wainscot is dropped to a height of three feet, affording a pleasant contrast to the high wainscot of the living-room. The kitchen and pantry are combined in one large room with built-in cupboards and all conveniences. A storeroom with a window connects with the kitchen. The cellar, which is unusually large and lighted by high windows, is entered from the kitchen. It contains a laundry, lavatory and toilet, large storerooms, and place for a heating apparatus and coal-bins.

The second floor is divided into an upper hall, four bedrooms and a bath; two of the bedrooms are large, and two are of medium size. All are excellently lighted, ventilated, and supplied with closets, and all are accessible to the hall and bath.

The cost of this cottage, it is estimated, will be in the neighborhood of $3.500, if located where the materials required are fairly easy to obtain.

POTTERY SECRET OF ANCIENT ROMANS.

As a result of archæological studies pursued during many years, J. Prestel claims to have discovered the essence of the method employed in the manufacture of ancient Roman pottery and its homogeneous glaze. According to Herr Prestel, the secret lies, not in the chemical composition of the paste, but in the treatment applied to it and to the colored glaze. The clay was prepared by ageing, followed by washing, kneading and stamping. Before firing, the ware was exposed to the sun and air, but sheltered from rain, until it appeared quite dry. The frequent changes of temperature and humidity and the alteration of sunlight and darkness which occurred during this slow process of drying insured uniform shrinkage in firing and durability of the finished ware. When a glaze was used it was applied to the moist ware immediately after the latter was shaped, so that the glaze became intimately united with the body of the ware during the slow drying process. Firing then produced a brilliant gloss and imperishable colors.—New York "Scientific American."

THE DISCOVERY OF GLASS.

Pliny gives a well-known account of the discovery of glass by Phœnician sailors who built a fire on the sand with which soda was mixed.

Now, this account is untenable, says The National Jeweler and Optician, and we note that Pliny does not give it other than a story he had heard. On the other hand, it is not to be wondered at that such a story should become current, considering that Egypt was not a timber-producing country, there being no occasion there for furnace fires, or fires other than for the most necessary domestic use; while Phœnicia was heavily timbered, and its people, the great traders of the world at that period, were accustomed to the use of fires and became the glass makers of the world after the Egyptians.

From the copper glaze of the tombs of Beni Hasson to the making of a true glass occupied what to us would be a very long time, that is, about 1,000 years. The mixture of the alkali from the Natron lakes (in the vicinity of Alexandria), with a substance like copper slag, developed into nearly what we know as glass, the first piece being altogether opaque, showing the insufficient heat and insufficient alkali or flux. The decomposition of pieces found is exactly what would happen to glass made this way.

GAS ENGINE PUMPING VS. HIGH DUTY STEAM PUMPS.—By L. G. Read, M.E., A., Mem. C.S.C.E.

IT IS NOW very generally conceded by the engineering fraternity that gas engines have come to stay: indeed, in no branch of applied science has anything like a corresponding advance been made during so short a space of time as in the design and efficiency of the prime mover.

A few years ago the internal combustion engine occupied a small field consisting of small units—doing work of small importance, and was not even considered eligible to take the place of an ordinary non-condensing simple steam engine in driving an ordinary ten-hour-per-day factory load. To-day the ten-hour factory load is among the least of its marvellous accomplishments. To-day there is no kind of duty so sensitive, so irregular, or so large that it does not successfully perform.

In paper mills, textile mills, flour mills, cement mills and central generating stations it has not only proved its own reliability, but has maintained its unchallenged superiority over the best performances of steam engines in points of fuel consumption per b.h.p. hour, and now it has entered the field of pumping—the field in which steam engines have attained their most brilliant results. It enters this important field too, not to compete for honors merely against the direct-acting non-fly-wheel type of steam pump, but against the steam pump's "Champion" unit—the *high duty type*.

With perhaps less than a dozen exceptions, there is not a pumping unit on this continent which is averaging, under ordinary daily working conditions, more than one hundred millions of foot pounds duty per hundred pounds of coal, and it is safe to say that the *average* foot pound duty—among the municipal pumping plants: that is to say, taking the *best* average—will fall far below *seventy-five* millions.

Without going into the reasons—the inherent inefficiencies of a steam plant, whether it be pumping or any other duty, the universally conceded difficulty of maintaining the efficiency of a steam plant under ordinary daily working conditions, etc.—let us compare the showing which a suction gas engine pump is prepared to make, against a high-duty steam pump.

To begin with—it must be remembered that the results obtained with the steam pump under *expert test* and the results shown under *daily working conditions* are vastly different—for the reason that its overall economy depends mainly upon its boiler evaporative efficiency and it is needless to dwell upon the fact that whereas, under expert handling, with all surfaces clean and with proper draft pressure, an evaporation of ten pounds of water per pound of coal may be obtained, this evaporation falls off rapidly under ordinary daily working conditions, and as against which the suction gas engine—having no surfaces to become foul, no varying draft pressure, not depending upon evaporative efficiency, stoking or any of the many other separated elements of the steam plant, maintains its expert results automatically and continuously. And it must be particularly borne in mind that guarantees obtainable on high-duty steam pumps are invariably based upon a given foot pound duty *"per thousand pounds of dry steam"*—without regard to the amount of coal which *may* have to be burned in order to supply the "thousand pounds of dry steam," and that the actual yearly coal economy is 35 to 50 per cent. below the usually advertised results. As against this a guarantee is given on the gas engine based upon a given foot pound duty *per hundred pounds of coal* and covering a period of an entire year's run, thus leaving no doubt as to over-all results or as to its continued economy.

The Hornsby-Stockport gas engine has demonstrated—in many installations in Canada—that, under continuous ordinary daily working conditions, a fuel economy of less than one pound of Pennsylvania anthracite pea coal per b.h.p. hour is obtained; that is to say, it delivers on the engine shaft 33,000 foot pounds x 60 minutes=1,980,000 foot pounds per hour per pound of coal, or 198,000,000 foot pounds per hour 100 *pounds* of coal.

Should this engine, therefore, be direct coupled to a multiple-throw pump with an overall efficiency of say 80 per cent., then the combined efficiency would be 198,000,000 x 80 per cent. or a foot pound duty of 158,400,000 per 100 pounds of coal. Using a clean anthracite pea coal (such as is easily obtainable in the Canadian market) at a cost of say $5.00 per ton and pumping against a head of 100 feet—including suction lift—this gas engine has to its credit the phenomenal economy of 22.5 cents fuel cost per 158,400,000 foot pounds duty—net! or, expressed in terms representing daily working conditions, would pump *one hundred and fifty eight thousand four hundred Imperial gallons per hour, against 100 feet head, for a total fuel cost of only 22½ cents*, or 3,800,000 gallons per 24 hours for a total fuel cost of only $5.40—enough water to supply a city of 30,000 population and with 800,000 gallons per day as a margin. 3,800,000 gallons of water per day for a fuel cost of only $5.40 being equal to only $1.42 per million gallons per day!

It is perfectly safe to say that—with two, possibly three—exceptions, there is not a town in the entire Dominion but what its fuel cost for pumping is from three to ten times this cost. And the above figures represent, by no means, the *best* this gas engine can do. They represent an economy which is easily obtainable with small units—say down to 50 b.h.p.

As a matter of fact, in the larger units, say from 250 to 1,000 b.h.p.—a fuel consumption is easily shown of .8 of a pound of coal per b.h.p. hour. Taking, then, the pump efficiency still at 80 per cent., the result would be $\frac{158,400,000}{8\%}$ =198,000,000 foot pounds per 100 lbs. of coal or a fuel cost of only $1.14 per million gallons against 100 feet head.

No steam pumping unit—though it be of the best design, equipped with the most refined auxiliaries, and operated under the most ideal conditions, can approach such results! Furthermore, this gas engine can be attached to a turbine pump—a pump which is the acme of simplicity—by means of the famous Wuest Double Helical Speed Increasing Gear—a gear which, like the gas engine, has recently forced its own merit upon a doubting public—and show results which, under ordinary daily working conditions, are rarely equalled even by the best modern high-duty steam pumps.

Taking one pound of five dollar coal for the gas engine per b.h.p. hour, 97 per cent. efficiency for the gear and a turbine pump efficiency of say 68 per cent., the result (with ample margin of safety) is 33,000 x 60 x 100 x 97 per cent. x 68 per cent=*over* 130,000,000 *foot pounds duty per* 100 *pounds of coal.*

How many high-duty pumping sets—in the United States and Canada combined—will average a daily working result of even one hundred million foot pounds duty per 100 pounds of coal? Not a dozen!

And yet here is a gas engine, with self-contained enclosed gear and turbine pump—with capital cost, space occupied, cost of maintenance, attendance with maximum simplicity, fewness of parts, ease of accessibility—all in its favor—which, almost without attention, will develop 130,000,000 foot pounds per 100 pounds of coal every day in the year, and with the crowning feature of automatic regulation of its own economy—since not a pound of coal *can be* consumed except in direct proportion to the actual horse power required on the engine shaft.

In other words the efficiency of the steam plant depends directly upon boiler evaporative economy, and the

(*Concluded on Page* 82).

UNIQUE METHOD OF CONCRETE WALL CONSTRUCTION. — Invention of Graduate of School of Practical Science.

TO BUILD IN CONCRETE without the use of forms has long been the problem that has presented itself to the constructing engineer and contractor.

Until quite recently no satisfactory method had been devised, though many devices for reducing the cost and labor of erecting forms have been brought on to the market.

Concrete blocks may be said to achieve this result, but the cost of this form of construction is comparatively high and the dry tamp method, necessary to make one machine turn out a large number of blocks, has not been very satisfactory as dry concrete has not the full strength of a wet mixture; and is porous causing the block to soak up moisture in wet weather.

The Wagner system as illustrated in the accompanying cuts is an invention of W. E. Wagner, B.A.Sc., of Toronto, for which patents have just been granted.

This method of construction is entirely new, and, while it presents all the advantages of ordinary concrete work, the cost of erection is considerably less than half.

The large air spaces are of special advantage as an insulator against heat and cold, and the surface, being trowelled wet, is very dense, and this together with the air spaces, prevents any penetration of moisture, making it perfectly safe to white plaster directly on the slabs. In many cases the smooth finish of the slabs is quite sufficient without any extra plaster coat.

The procedure in construction is to make, in a factory or on the building site, a number of slabs reinforced with poultry netting and containing two or more projecting bond wires.

The slabs are made in a multiple bottomless mould, consisting only of side pieces of the same thickness as is required in the slab, and the surface is struck off with a straight edge. It is convenient and economical to build the slabs one on top of the other with a sheet of building paper between, as this minimizes the amount of floor space necessary and keeps the slabs from setting too fast, which might result in hair cracks.

Only a few forms are necessary, as they are built with projecting steel plates set in flush with the bottom of the boards, and these plates rest on the finished slabs, thus supporting the form. The forms are made detachable at the corners so that they can be easily removed from the lower slabs, and put in place on top for another set.

The surface of the slabs can be trowelled or floated off, and will closely resemble marble if faced with a coat of marble dust and white cement. A very attractive wall is made by selecting colored stones for the surface, and washing and scrubbing the slab, before it has set very hard, to remove the mortar from around the stones and cause them to stand out.

Form boards marked D are used to gauge the thickness of the wall and hold the slabs in line until the studs have been poured.

These form boards are made in two pieces, wedge shaped, so as to be easily removed and are clamped by struts D3 and wedges D4, to the finished stud in the course below. The tops are held in place by separating blocks D5 and clamps F.

The horizontal joint is spread with mortar and slabs are set in place against the form boards, and the projecting wires are inter-locked as shown, to hold the slabs rigid; then the space between the form boards is poured with concrete to form a stud, embracing the bond wires and holding the slabs permanently in place.

After the studs are sufficiently set, the form boards are loosened and raised, ready to receive the slabs in the course above.

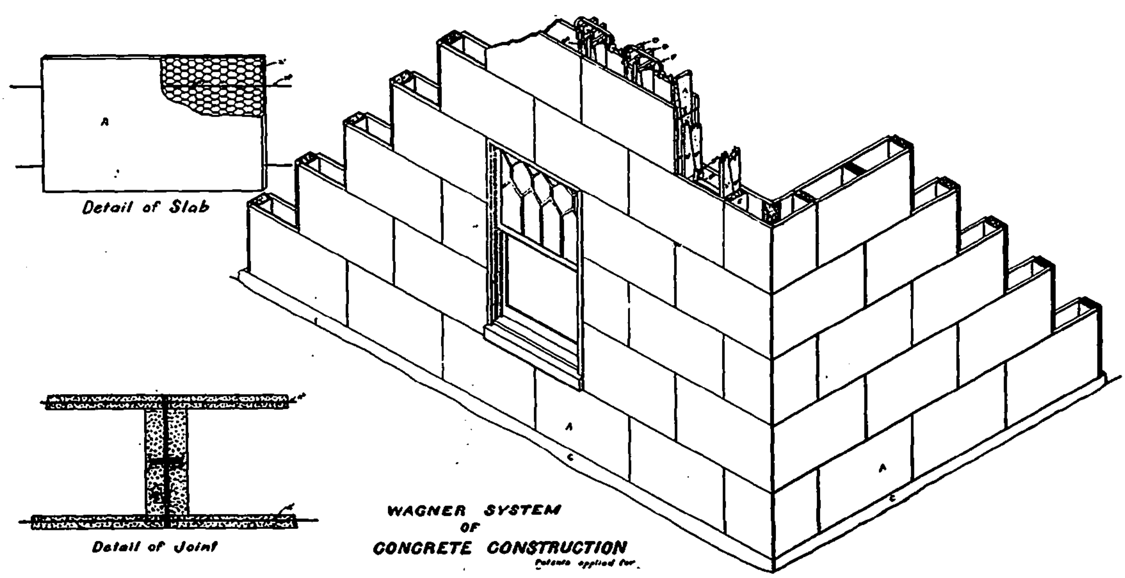


Diagram of wall section showing the Wagner method of concrete construction.

To obtain horizontal bond between the courses, the studs are not jointed at the same level as the slabs, but are made to extend down and catch the top bond wires in the course below.

The slabs are not intended to carry any load; the weight of the joists being transmitted directly to the studs. This is done by reducing the thickness of the wall at each story and thus forming an offset. The top of the studs are joined together level with the offset forming a concrete beam, on which the joists rest. The studs may be any width and the wall any thickness, depending on the load.

The Wagner system is used in the same manner for building solid walls. After the slabs are in place, the greater part of the wall space is filled with concrete, leaving only the space occupied by the form boards, and this space is filled when pouring the course above; thus a solid wall is built with a hard and close grained surface, requiring no finishing work, and without the use of any exterior form work.

Canadian National Exhibition.

WHILE THE CANADIAN National Exhibition is of invaluable assistance to the Canadian manufacturer in general, affording him an opportunity of displaying to hundreds of thousands of his countrymen the product of his craftsmanship, there is perhaps no branch of trade more directly benefited by this important annual affair than the building material interests. In almost every other line of business the travelling salesman carries samples of the product of his house. The building material salesman cannot do this, and in some instances his prospective customer has never actually seen the wares he offers. Thus the bringing together in one place, of a comprehensive array of materials, affords a distinctive class—architects, contractors and builders—a most excellent opportunity of informing themselves of what may be obtained along these lines from the Canadian manufacturer.

This is a most gratifying condition of affairs, for it is too often supposed by those who have the power to purchase, that in order to obtain materials and equipment in keeping with the structure they may have in view, that it is necessary for them to look beyond the borders of Canada and obtain the product of the foreign manufacturer. This should not be, for the good and simple reason that at this present day, Canadian manufacturing houses can supply materials and equipment for buildings quite in keeping with the most exacting demands of the builder. Why this custom should obtain is the fault, perhaps, of the manufacturer as much as anything else. He has not, as a rule, realized the necessity of educating the purchaser to the nature of the goods he produces. He has been slow to exploit his wares in the market place and demand attention. But a change has been affe.ted by a fuller realization of the tendency of some Canadian buyers to go abroad, and one of the steps, by no means the least, which has been taken with a view to securing to ourselves our own trade, is the growing practice of annually displaying at the National Exhibition, for the inspection and consideration of the Canadian purchaser, the successful achievements of the Canadian artisan. Now that the Exhibition is being so well patronized by the building inter-

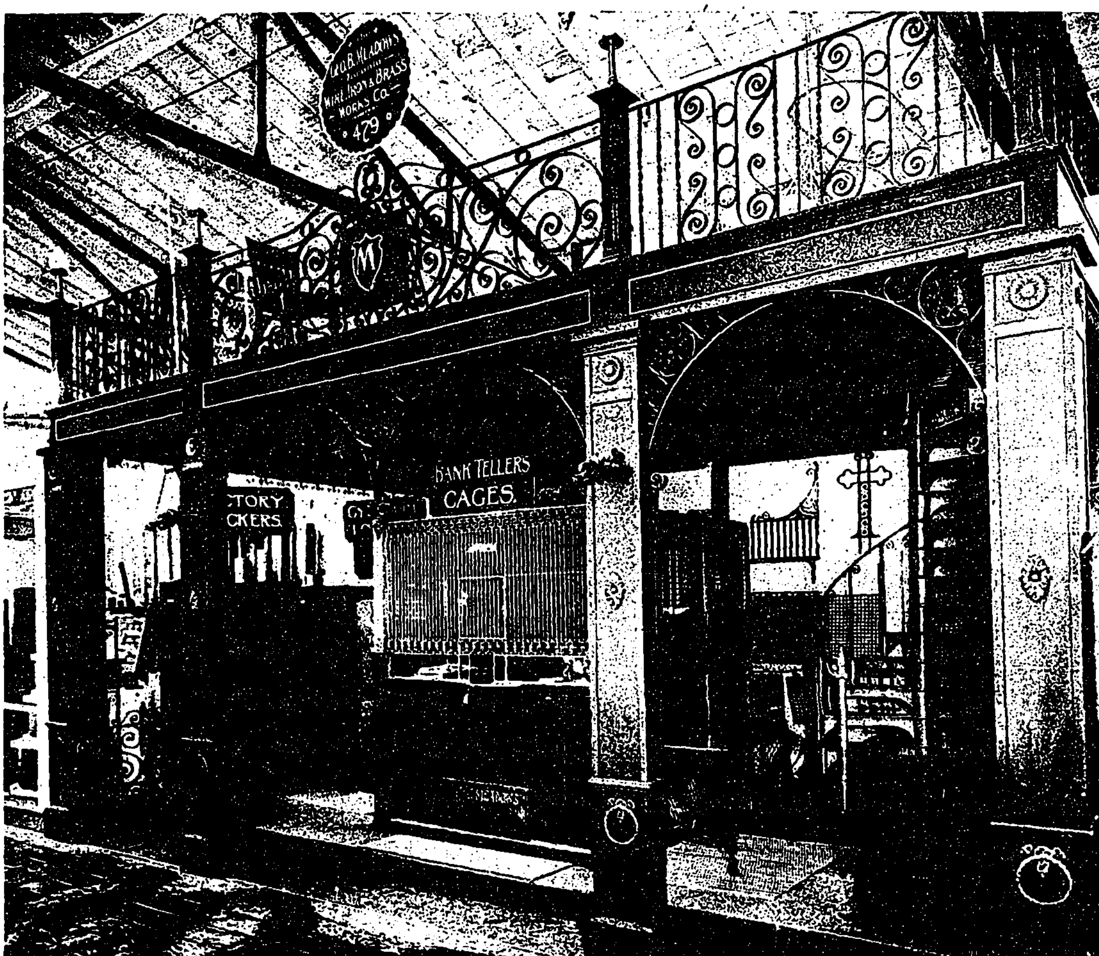


Exhibit of the Geo. B. Meadows Toronto Wire, Iron and Brass Works Company, Ltd., at the Canadian National Exhibition.

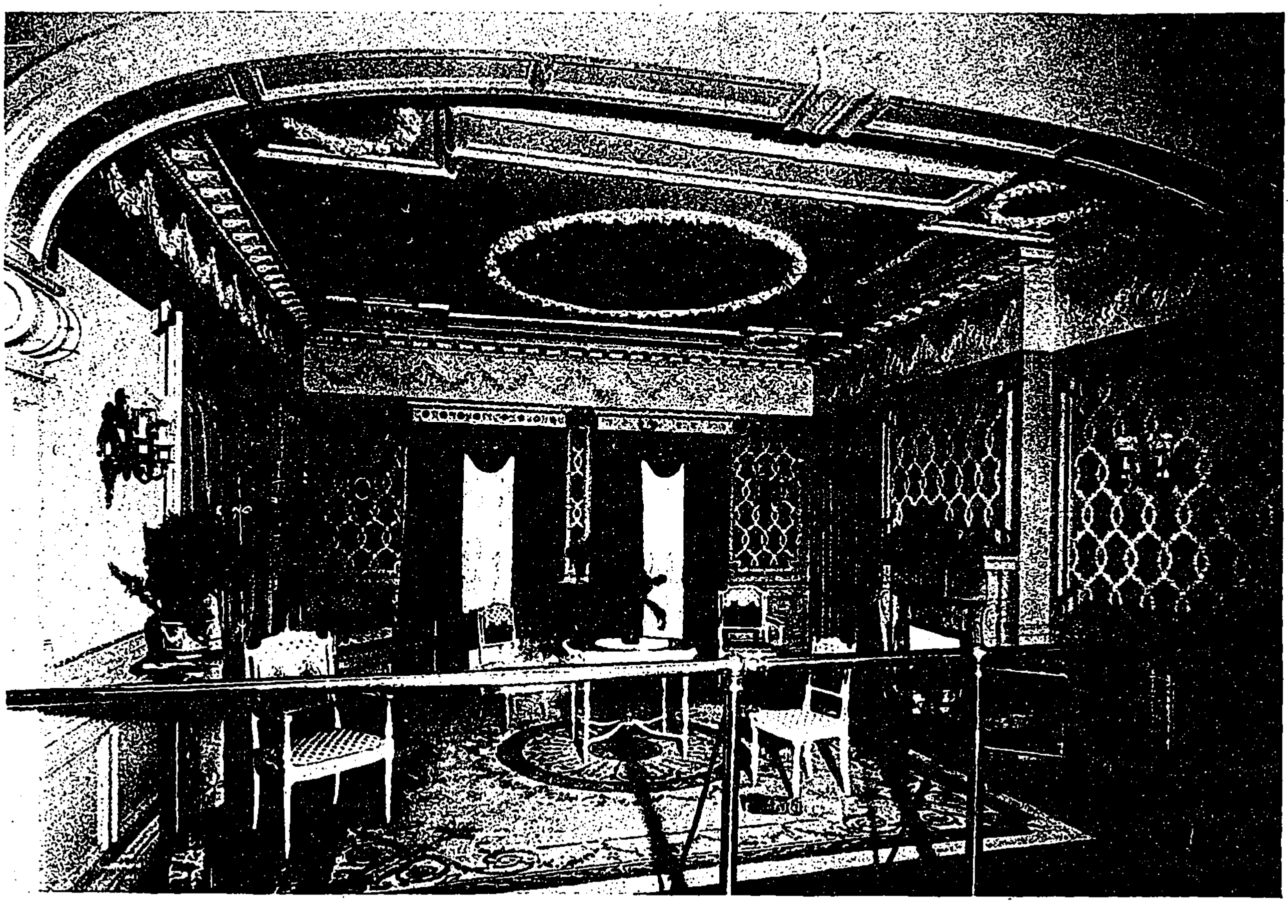
ests, it would be well if arrangements were made whereby a building would be set apart to contain all exhibits of this character.

Exhibit of Geo. B. Meadows Company.

WITHOUT DOUBT the exhibit of the Geo. B. Meadows Toronto Wire, Iron and Brass Works Co., Limited, in the Process Building, was one of the most excellent on the grounds. The accompanying illustration may give the reader some idea of the character of display made by this firm—but, unfortunately, a photograph does not reproduce the beautifully rich color effect of the bronze, the iron and the brass in their various shades of finish. This firm is to be highly complimented on their enterprise—and it is rumored that the Exhibition Management are inclined to reward their endeavors by some special recognition. The display embraced almost every line of goods manufactured by the Meadows Co., and the range of their products is an extensive one. Almost everything imaginable in the way of highly artistic, ornamental iron had its place, and was very cleverly arranged to meet the eye of the visitor without clashing with the surroundings. A teller's cage had a most business-like appearance, and a sheaf of valuable looking checks rested on the paying board. These were most generously distributed to the firm's thousands of friends and informed the recipient that "Our Old Sand Bank will pay all sorts of Dollars to every Canadian who will invest brains and honest toil in the development of the natural resources of the Dominion," with the very promising prospect that "Dividends for old age are positively assured." These checks created considerable interest, looking very genuine, being printed on official blue paper in handsome and business-like script. And the Geo. B. Meadows Co., in giving these checks, gave value indeed—for the sentiment expressed is good—and it shall never be known to what value some of them will be cashed in the future.

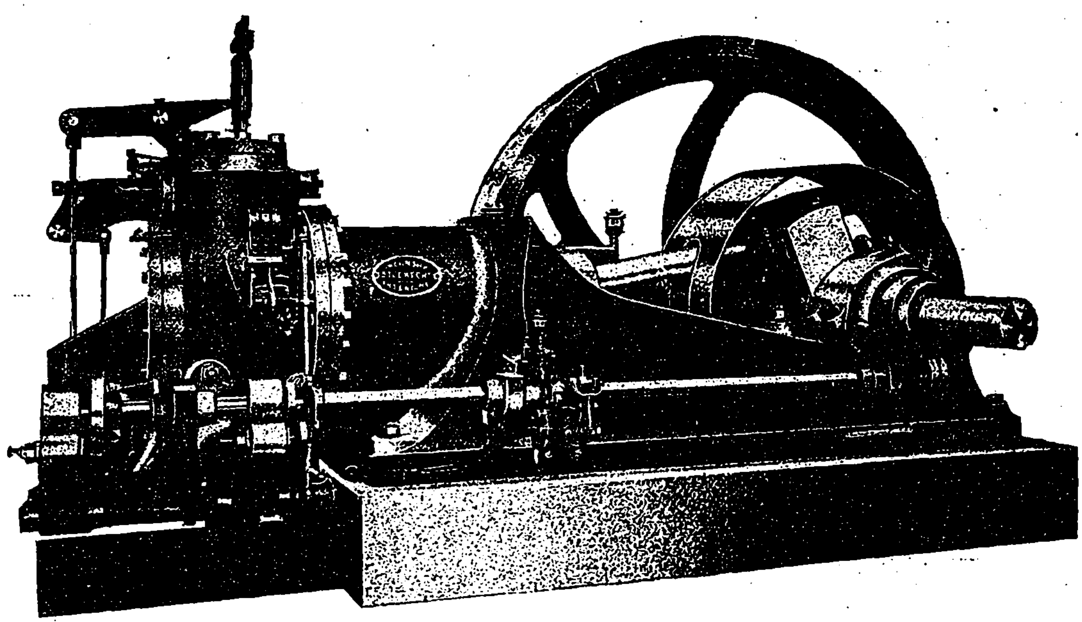
Eaton's Model Furnished Rooms.

DECORATIVE ART as applied to the interior of the home, so as to produce absolute harmony between the architectural scheme and furnishing, was beautifully exemplified at the National Exhibition in the "Model Furnished Rooms" of the T. Eaton Company. This splendid exhibit, which proved an irresistible attraction to the thousands of visitors who thronged the Manufacturers Building, comprised four handsome interiors, each carried out in a distinct decorative style. In each room, the absolute absence of conflict, the minute consideration of detail and the discrimination displayed in the selection of each essential, bore eloquent testimony as to how thoroughly equipped and capable this firm is to serve the architect and owner in carrying out work of this character.



Louis XVI. Dining-room, at the T. Eaton Company Exhibit of "Model Furnished Rooms."

A strikingly rich interior was the Louis XVI. drawing room. The walls of the room were divided off into silk panels and the wood work and ceiling characterized by the decorative features of this "period." In keeping with the whole were the silk rep hangings, the hand embroidered curtain and lambrequin of Brussels lace, and the hand tufted Austrian rug, designed especially for this particular scheme. Adjoining this, was the Flanders Living Room, a quiet and restful interior, equally as carefully considered in its every detail. Here the color scheme was carried out in soft tones of green and brown;



the furniture being in oak upholstered in green damask, and the floor covered with an oriental hand tufted rug. A pleasing feature was a Flemish brick fireplace, affecting in its design, the delightful simplictiy so evident in the decorations and furnishings.

Differing essentially from the others, but none the less interesting, was the dining room carried out according to the decorative style of the Flemish Renaissance. A feature of this interior was a magnificent suite of old oak finished furniture, an exact copy of the set used by William III., Prince of Orange. The walls of the room were done in a delicate blue, being panelled, and set off effectively by a freize of wool tapestry; this tone being further carried out in the curtain of plain tapestry and the Austrian hand tufted floor rug. A pleasingly designed mantel added effectively to the whole, while over the table was a large inverted ceiling dome in colors and enriched by six pendants.

Another most inviting interior was the Bed-Room, with its furniture of inlaid satin wood, designed in the Adam style of the 18th Century. This set consisted of a wardrobe, ladies' dresser, secretary, bed, small table, somno, two chairs and a rocker; and as in the other rooms, the wall hangings, decoration and carpets, were selected so as to produce a perfect harmony in the general scheme.

"Alexandra Ware"

THE EXHIBIT of the Standard Sanitary Company of Port Hope, displayed to advantage, a most complete line of bath tubs, wash stands, bidets, foot baths, shower receptors, manicure tables, and other toilet room necessities. The company are the largest exclusive manufacturers of cast iron porcelain enameled sanitary ware in the British Empire. Included in the display, which took in an entire section in the Process Building, was a full line of the well-known "Alexandra Ware," which, owing to its superior quality, design and finish, is meeting with universal favor among architects and owners throughout the Dominion. "Alexandra Ware," is free from the many defects found in so-called "solid enamelled porcelain ware," made from clay products. It is heavily enamelled both on the exterior and interior and has a "pure air space," instead of a porous clay body. Besides this, it is made in two parts, being more convenient to handle and install, and, as for style, the company has forty-eight exclusive designs fully protected by patent right. In addition to the foregoing lines, the company also manufactures drinking fountains, laundry trays, kitchen sinks, factory sinks and lavatories, and a large variety of similar appliances, designed to meet the requirements of every class of building where the most approved methods of sanitation are desired.

Francis Hyde Company

THE FRANCIS HYDE COMPANY, Montreal, had an extensive exhibit in the Machinery Hall, consisting of foundry supplies and equipments, contractors' materials, fire brick, clays, etc., and full oil furnaces for all shop purposes. The bending of the piston rod on the large engine, used to drive the shafting in Machinery Hall, during the early part of the first week, gave the company a most excellent opportunity to demonstrate the capabilities of the King Portable Heater, one of the attractive features of their display. This mishap promised to place a large number of exhibitors at no little inconvenience, and it was only after the Board of Management had learned that no shop in Toronto was prepared to make the repair in less than two days' time, that the company undertook the work. The rod was then placed over the furnace in question, and subjected to a temperature of 2,200 Fahrenheit, the time required to heat it through and bend it back to shape, occupying but a space of thirty-five minutes. The quick and thorough manner in which this work was performed leaves no doubt as to the practical value of the King Portable Heater, and the important part it is destined to play in the modernly equipped shop and plant. It is capable of generating as high as 4,200 degrees of heat, the fuel used being common crude oil with compressed air.

Hygienic Flooring

THERE HAS RECENTLY been placed on the Canadian market a new chemical composition floor known as the "Hygienic Floor," which comes well recommended. It is the product of the Chemical Floor and Tile Co., 25 Toronto street, Toronto, R. M. Houser manager and treasurer, and already some large contracts have been placed for its installation.

The new 12-story factory building of The T. Eaton Co., Limited, will contain nearly 200,000 square feet of hygienic flooring. It has been installed and successfully tested by this firm in other parts of their Toronto premises, and this magnificent order speaks well for it.

While it is new in Canada, it has been used with marked success in Germany and other European countries. Slight changes were made in the chemical composition to meet the climatic conditions of this country, and it is now claimed by the manufacturers to be a floor of excellent merit, absolutely impervious to fire and water, and of lasting quality.

Field-Made Concrete.-Cont'd from Page 61

the work may be cheapened very much and be made more satisfactory all around.

Let me repeat the formula for concrete—Portland cement, sand, stone, water and brains. And let me say again, mix it thoroughly. When you have mixed it enough give it another turn. After it has been pounded, pound it again. When you have puddled it well, puddle it some more.

Gas Engine Pumping vs. High Duty Steam Pumps.—Continued from Page 75.

boiler economy depends directly upon the intelligence with which every pound of coal is fired.

As against these varying and uncertain elements the gas plant eliminates all consideration of evaporative economy, draft pressure or intelligence of firing—by the substitution of a device through which and by no other means, the consumption of fuel is regulated by the movement of the engine piston itself and, since variation of piston resistance is instantly met by the action of a sensitive governor, it follows that no fuel *can* be converted except in direct proportion to the variation of load.

It would be of great interest—did space permit—to go more fully into plotted data covering direct comparisons with actual results. May it suffice, however, for the moment, to say that very shortly a demonstration gas engine pumping set will be installed in Montreal, consisting of a small (55 h.p.) gas engine with Wuest Double Helical gear and a turbine pump, for the purpose of permanent exhibition—that Canadian engineers may see for themselves, not merely *expert* results; but results obtainable by a continuous 24-hour-per-day performance. This exhibition unit will be equipped with all necessary instruments for pumping under a variety of quantities and heads and any competent engineer will be permitted to make his own tests and satisfy himself as to results.

In a later issue of this journal the writer will deal with the mechanical questions of gears, belt and rope drive of turbine pumps.

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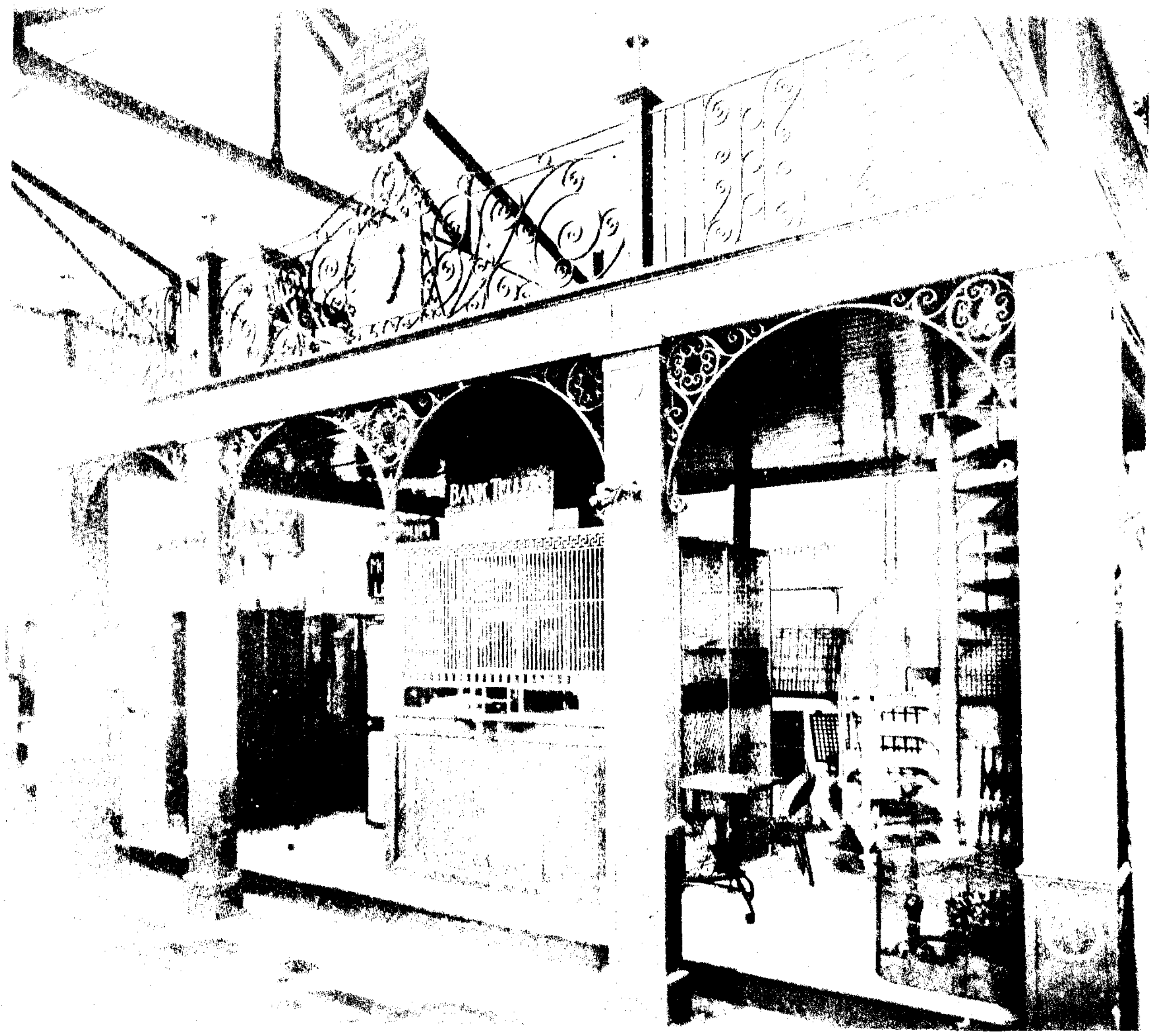

A View of our Exhibit at the Canadian National Exhibition, Toronto, 1909

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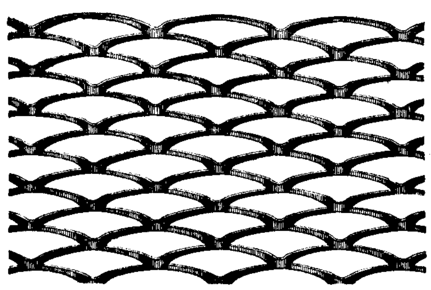

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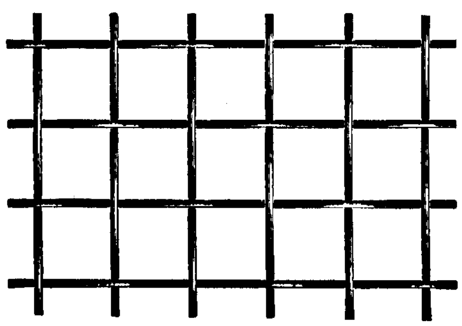

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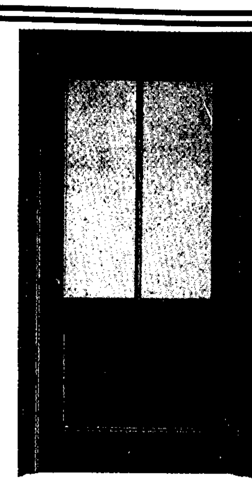

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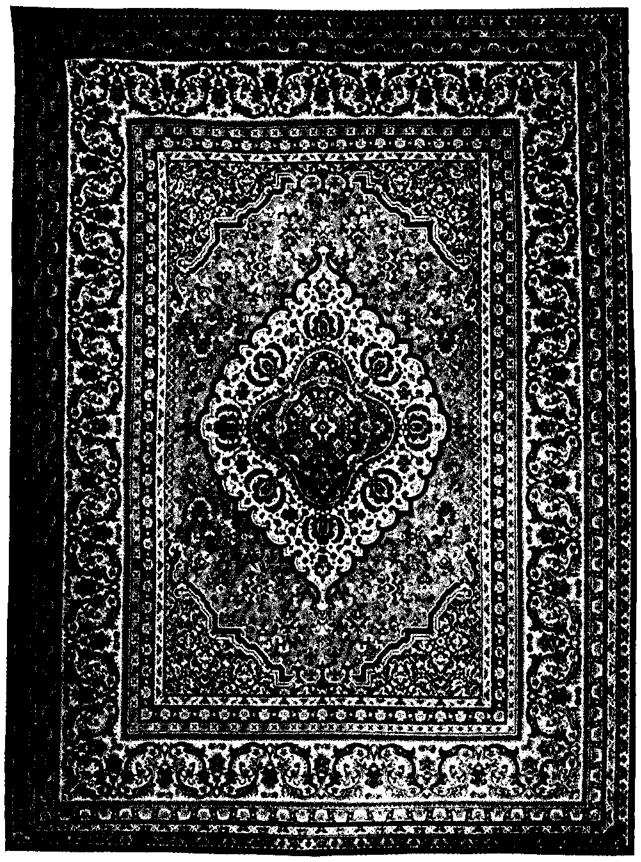

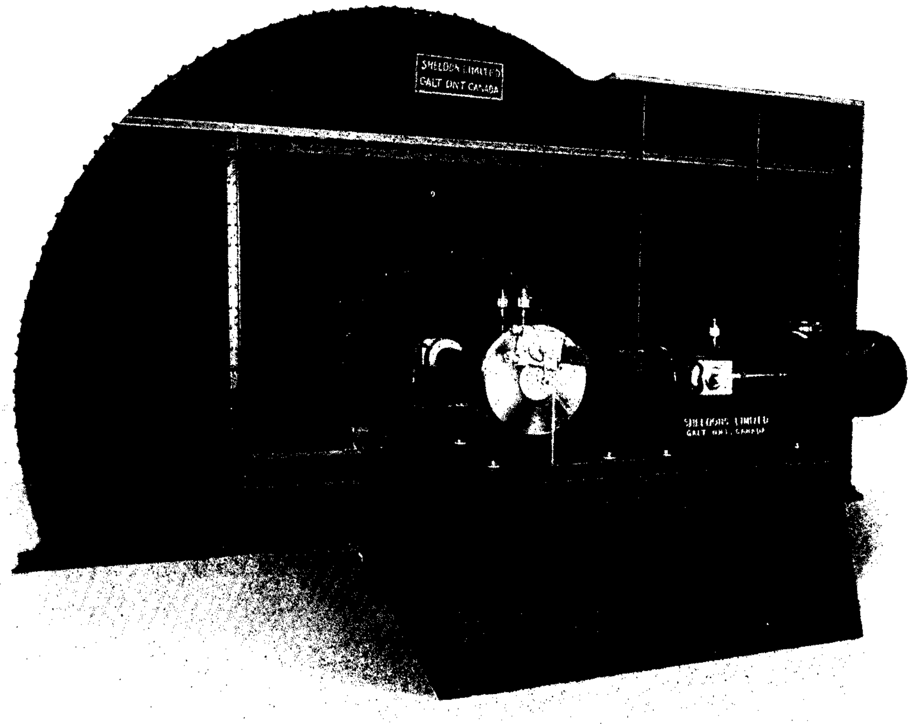

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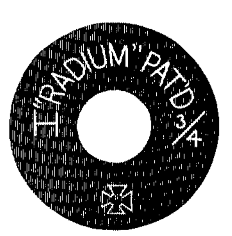

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·A·DIRECTORY·FOR· ·CONTRACTORS'·SUPPLIES & MACHINERY·

ADAMANT PLASTER.
Francis Hyde and Co.
Stinson-Reeb Builders' Supply Co.

ARTIFICIAL STONE.
Canadian Art Stone Co.
Roman Stone Co.

ASBESTOS PRODUCTS.
A. B. Ormsby, Limited.

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

BLOWERS.
Sheldons, Limited.

BLOW AND VENT PIPING.
Metal Roofing Co., Limited.
Metal Shingle & Siding Co.
A. B. Ormsby, Limited.

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Gurney Foundry Company, Ltd.
Warden King, Limited.
Dominion Radiator Co., Limited.
Berg Machinery Mfg. Co., Limited.
Somerville, Limited.
Taylor-Forbes Co.
Goldie and McCulloch Co., Limited.

BRASS WORKS.
Somerville, Limited.
James Robertson, Limited.
Kerr Engine Co.

SEE INDEX TO ADVERTISEMENTS FOR ADDRESSES OF FIRMS IN THE ABOVE DIREC

BRICK AND TERRA COTTA.
E. F. Dartnell.
Don Valley Brick Works.
Eadie-Douglas Co.
David McGill.
The Terra Cotta Pressed Brick Co.
Port Credit Brick Co.
Stinson-Reeb Builders' Supply Co.

BUILDING SUPPLIES.
Christie, Henderson & Co., Ltd.
E. F. Dartnell.
Eadie-Douglas Co.
Gold Medal Furniture Mfg. Co.
Francis Hyde & Co.
Lockerby & McCoomb.
David McGill.
The Pedlar People.
Stinson-Reeb Building Supply Co., Limited.
Roger Supply Co.

BRICK MACHINERY.
Berg Machinery Mfg. Co., Limited.

CAST IRON COLUMNS.
Gaudry & Co., L. H.
The Pedlar People.

CAPS FOR COLUMNS AND PILASTERS.
W. J. Hynes.
The Pedlar People.

CARS (Factory and Dump).
Sheldons, Limited.

CEMENT.
Canadian Portland Cement Co., Limited.
E. F. Dartnell.
The Lakefield Portland Cement Co., Limited.
Owen Sound Portland Cement Co.
David McGill.
Vulcan Portland Cement Co., Limited.
Francis Hyde & Co.
Leigh Portland Cement Co.
Thorn Cement Company.
Rogers Supply Co.
Stinson-Reeb Builders' Supply Co.
Western Canada Cement & Coal Co.

CEMENT BLOCK MACHINERY.
Ideal Concrete Machinery Co., Limited.
Mussons, Limited.

CEMENT BRICK MACHINERY.
Ideal Concrete Machinery Co.

CEMENT MACHINERY.
Berg Machinery Co., Limited.
Ideal Concrete Machinery Co.

CEMENT TILE MACHINERY.
Ideal Concrete Machinery Co.

CONCRETE MIXERS.
Canada Foundry Company, Ltd.
E. F. Dartnell.
Mussons, Limited.
Ideal Concrete Machinery Co.

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

CONDUITS.
Conduits Co., Limited.
Francis Hyde & Co.
The Pedlar People.

CONTRACTORS' MACHINERY.
Mussons, Limited.

CONTRACTORS' SUPPLIES.
Eadie-Douglas Co.
E. F. Dartnell.
Francis Hyde & Co.
Kent Company, Limited.
David McGill.
Miller Bros. & Toms.
Mussons, Limited.
Stinson-Reeb Builders' Supply Co.
Rogers Supply Co.

CRUSHED STONE.
Christie, Henderson & Co., Ltd.
Rogers Supply Co.
Stinson-Reeb Builders' Supply Co.

CUT STONE CONTRACTORS.
Roman Stone Co., Limited.
Canadian Art Stone Co., Limited.
Fred Holmes & Sons.
E. F. Dartnell.

DOORS.
Gold Medal Furniture Mfg. Co.
L. A. De La Plante.

DRILLS (Brick and Stone).
Mussons, Limited.

ELECTRICAL CONTRACTORS.
Goold Electric Co.

ELECTRO-PLATING.
Somerville, Limited.
Dennis Wire and Iron Works Co.

ELECTRIC WIRE AND CABLES.
B. Greening Wire Co., Limited.
Jas. Robertson Co., Limited.

ELEVATOR PROTECTIVE DEVICES.
Jas. Ruddick.

ENGINES.
Berg Machinery Mfg. Co., Limited.
Goldie and McCulloch Co., Limited.
Sheldons, Limited.

ENGINEERS' SUPPLIES.
Somerville, Limited.
Kerr Engine Co.
Mussons, Limited.

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Sheldons, Limited.

EXPANDED METAL.
Expanded Metal and Fireproofing Co.
Galt Art Metal Co.
Gaudry & Co., L. H.
Clarence W. Noble.
Metal Shingle & Siding Co.
The Pedlar People.
Stinson-Reeb Builders' Supply Co.
Trussed Concrete Steel Co.

FIRE BRICK.
E. F. Dartnell.
David McGill.
Stinson-Reeb Builders' Supply Co.

FIREPROOFING.
Don Valley Brick Works.
E. F. Dartnell.
Eadie-Douglas Co.
Clarence W. Noble.
Expanded Metal and Fireproofing Co.
David McGill.
The Pedlar People.
Port Credit Brick Co.
Trussed Concrete Steel Co.

FIREPROOF STEEL DOORS.
A. B. Ormsby, Limited.
Gaudry & Co., L. H.
The Pedlar People.
Stinson-Reeb Builders' Supply Co.

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

FLOORING.
Eadie-Douglas Co.
The Seamen Kent Co., Limited.

FURNACES AND RANGES.
Gurney Foundry Company, Ltd.
Gurney, Tilden Co., Ltd.
Warden King, Limited.
Pease Foundry Co.
Dominion Radiator Co., Limited.
Taylor-Forbes Co., Limited.

GALVANIZED IRON WORKS.
Galt Art Metal Co.
A. B. Ormsby, Limited.
The Pedlar People.
Metal Shingle & Siding Co.

HARDWARE.
Taylor-Forbes Co.
L. A. De Laplante, Limited.

HEATING APPARATUS.
Gurney Foundry Company, Ltd.
Gurney, Tilden Co., Limited
Warden King, Limited.
Pease Foundry Co.
Dominion Radiator Co., Limited.
Taylor-Forbes Co., Limited.
Sheldons, Limited.
Goldie and McCulloch Co., Limited.

HYDRANTS.
Kerr Engine Co.

HOISTING MACHINERY.
Otis-Fensom Elevator Co., Limited.
Mussons, Limited.

INSULATION.
Kent Company, Limited.

IRON STAIRS.
Canada Foundry Co.
Gaudry & Co., L. H.
Geo. B. Meadows Co., Limited.
Francis Hyde & Company

JOIST HANGERS.
David McGill.
Taylor-Forbes Co.
Francis Hyde & Co.

LATH (Metal).
Clarence W. Noble.
Expanded Metal & Fireproofing Co.
Galt Art Metal Co.
Gaudry & Co., L. H.
B. Greening Wire Co., Limited.
Metal Shingle & Siding Co.
The Pedlar People.
Trussed Concrete Steel Co.
Stinson-Reeb Builders' Supply Co.

LOCOMOTIVE SUPPLIES.
Somerville, Limited.
Mussons, Limited.

LUMBER.
Gold Medal Furniture Mfg. Co.
L. A. De Laplante, Limited.

MARBLE.
E. F. Dartnell.
Hoidge Marble Co.
Missisquoi Marble Co.
Smith Marble and Construction Co., Limited.

METAL SHINGLES.
Galt Art Metal Co.
Metallic Roofing Co. of Canada.

METAL WALLS AND CEILINGS.
Galt Art Metal Co.
Metal Shingle & Siding Co.
A. B. Ormsby, Limited.
The Pedlar People.

METAL WEATHER STRIPS.
Chamberlain Metal Weather Strip Co.

MUNICIPAL SUPPLIES.
Francis Hyde & Co.
Mussons, Limited.

ORNAMENTAL IRON.
Canada Foundry Company, Ltd.

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

PIPE.
Gaudry & Co., L. H.
Somerville, Limited.
Francis Hyde & Co.

PLATE AND WINDOW GLASS.
Pilkington Brothers, Ltd.
Canada Glass, Mantel and Tile Co., Limited.

PLASTER BOARD.
Francis Hyde & Co.
Stinson-Reeb Builders' Supply Co.

PLUMBERS' BRASS GOODS.
Somerville, Limited.
James Robertson Co., Limited.

PLUMBING FIXTURES.
Somerville, Limited.
Standard Ideal Co., Limited.

PLUMBER AND STEAM FITTER SUPPLIES.
L. H. Gaudry & Co.
General Brass Co., Limited.
Somerville, Limited.
Standard Ideal Co., Limited.
Taylor-Forbes Co.
Dominion Radiator Company.

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Somerville, Limited.
Standard Ideal Co., Limited.

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Mussons, Limited.
Otis-Fensom Elevator Co., Limited.

RADIATORS.
King Radiator Co.
Dominion Radiator Co., Limited.
Gurney, Tilden Co., Limited.
Warden King, Limited.
Taylor-Forbes Co., Limited.
Somerville, Limited.

RADIATOR VALVES.
Kerr Engine Co.

REFRIGERATING MACHINERY.
Linde British Refrigeration Co., Limited.

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

ROOFING PAPER.
The Pedlar People.

ROOFING TILE.
E. F. Dartnell.
Francis Hyde & Co.
David McGill.
The Pedlar People.

RUBBER TILING.
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Gutta Percha & Rubber Mfg. Co., Limited.

SAND.
Sand and Dredging Company.

SAND AND GRAVEL SCREENS.
B. Greening Wire Co., Limited.

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SHAFTING PULLEYS AND HANGERS.
Goldie & McCulloch Co., Limited.

SANITARY PLUMBING APPLIANCES.
Somerville, Limited.
Standard Ideal Co., Limited.

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L. H. Gaudry & Co.
David McGill.

STRUCTURAL STEEL.
Gaudry & Co., L. H.
Dominion Bridge Co.
Hamilton Bridge Co.
Jenks-Dresser Co., Limited.
Dennis Wire & Iron Works Co., Limited.
Reid & Brown.
Stratford Bridge Co.

TERRA COTTA FIREPROOFING.
Eadie-Douglas Co.
Don Valley Brick Works.
E. F. Dartnell.
Francis Hyde & Co.
David McGill.

VALVES.
Gurney Foundry Company, Ltd.
Kerr Engine Co.
Somerville, Limited.
Taylor-Forbes Co.
Dominion Radiator Co.

VENTILATORS.
Sheldons, Limited.

WALL HANGERS.
Taylor-Forbes Co.

WATER HEATERS.
Somerville, Limited.

WATERWORKS SUPPLIES.
Somerville, Limited.
Kerr Engine Co.
Mussons, Limited.
Dominion Radiator Co.

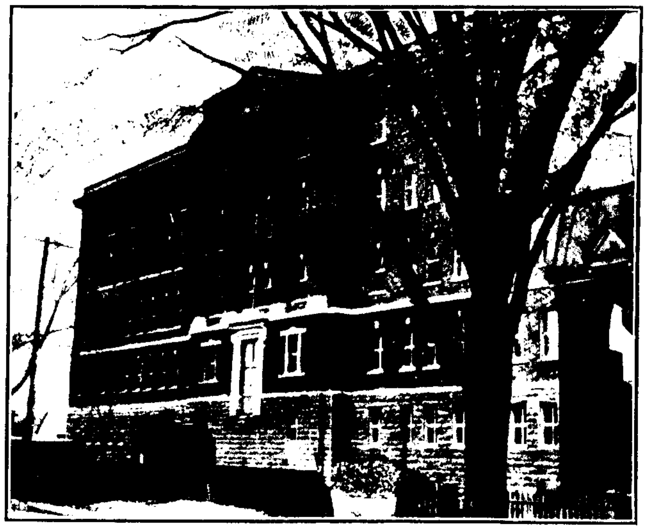
WHEELBARROWS.
Mussons, Limited.

WIRE ROPE AND FITTINGS.
B. Greening Wire Co., Limited.
Otis-Fensom Elevator Co., Limited.
Mussons, Limited.

An Index to the Advertisements

SACKETT PLASTER BOARD

INSTEAD OF LATH



Christian Bros.' School, Longueuil, P.Q., recently completed. 18,000 square yards of SACKETT PLASTER BOARD were used in this building.

Architects in Canada are rapidly realizing the unequalled advantages of SACKETT PLASTER BOARD over both wood and metal lath, for various reasons:—

First—Walls and ceilings of SACKETT PLASTER BOARDS will be dry and ready in half the time required when lath is used, as less than half the quantity of water is needed.

The superior insulating qualities of SACKETT PLASTER BOARD makes a house warmer in winter and cooler in summer.

The first cost is no more than for good work on wood lath, and less than on metal lath. SACKETT PLASTER BOARD is an efficient and economical fireproofing.

Among the recent buildings in which SACKETT PLASTER BOARD has been used, might be mentioned the Christian Bros.' School, Longueuil, P.Q., in which 18,000 square yards of SACKETT PLASTER BOARD were applied, and the Orphanage Building at Kingston, Ont., H. P. Smith, Architect, and Wm. McCartney, Contractor, in which 10,000 square yards of SACKETT PLASTER BOARD were used.

SACKETT PLASTER BOARD comes in sheets or slabs, 32 by 36 inches, ready to be nailed to studdings, furring or beams.

For all kinds of buildings, its use is ideal. It speeds construction; it lessens building cost; it reduces fixed charges for insurance; it makes fire resisting walls and ceilings, and gives absolute satisfaction.

BOOKLET SHOWING BUILDINGS ALL OVER THE COUNTRY WHERE THESE BOARDS HAVE BEEN SUCCESSFULLY USED, WITH SAMPLES, FURNISHED ON APPLICATION.

FLAWLESS PLASTER

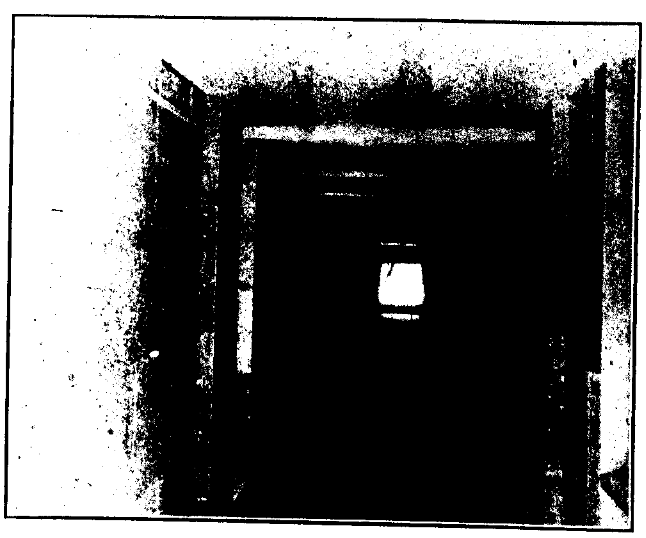
In prepared "FLAWLESS HARD" WALL PLASTER you have the ideal combination of a perfect plaster and a perfect sand. In its manufacture, true silica sand is used, washed, cleaned, screened, and made thoroughly dry. In fact, "FLAWLESS" HARD WALL PLASTER is made under ideal conditions, in a plant especially equipped for cleaning, mixing and testing plaster.

Nothing but water is required on the job, in mixing prepared "FLAWLESS." It requires only one-third the water that lime does. You can dispense with a "mixer man," which saving offsets the slightly extra cost of "FLAWLESS."

Architects who have specified "FLAWLESS" HARD WALL PLASTER will permit nothing else to be used on their work.

One ton of "FLAWLESS" HARD WALL PLASTER, when applied to "STANDARD" SACKETT PLASTER BOARD, will cover 120 square yards, while one ton will only cover 60 yards on wood lath, and 45 yards on metal lath.

For a perfect wall, there is no combination that can compare with SACKETT PLASTER BOARD and "FLAWLESS" HARD WALL PLASTER.

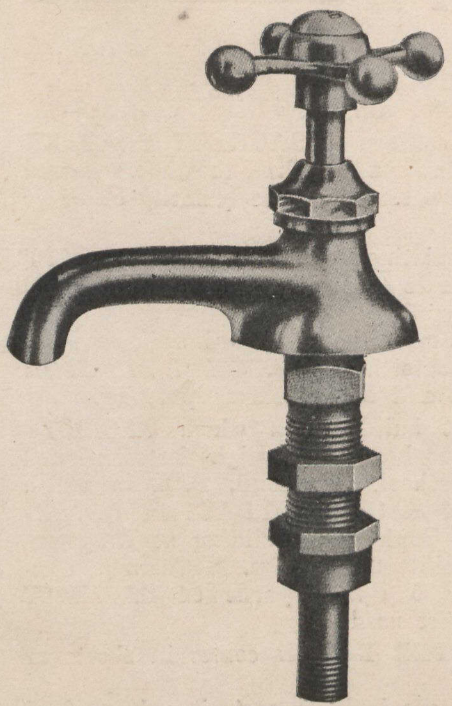


Corridor in Christian Bros.' School, Longueuil, P.Q., showing SACKETT PLASTER BOARD before "FLAWLESS" HARD WALL PLASTER was applied.

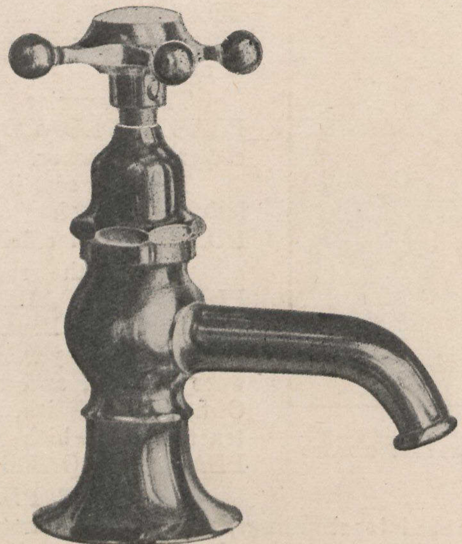
Stinson-Reeb Builders' Supply Co., Limited

9th Floor Eastern Townships Bank Building - - - MONTREAL

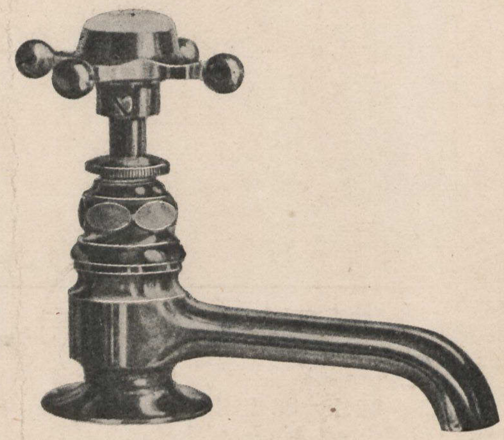
"Goods of Quality"



"MIDGET" BASIN COCK.

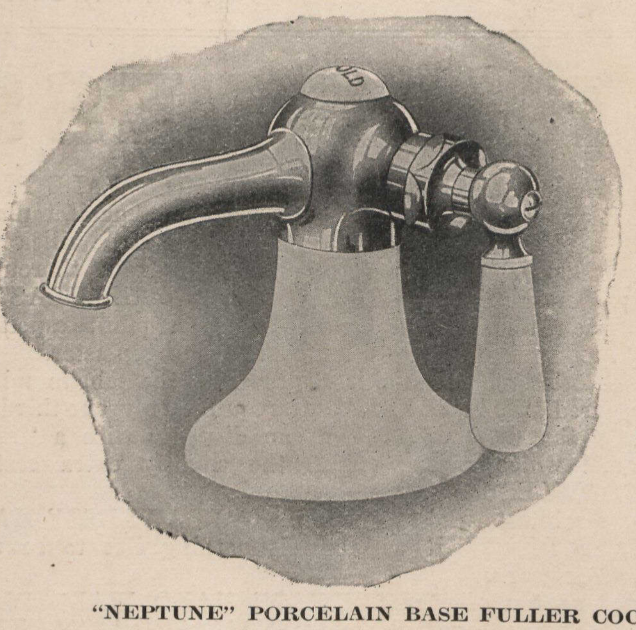


"NEPTUNE," SELF CLOSING COCK.



LOW DOWN COMP BASIN COCK.

"NEPTUNE" SOLID BASE FULLER COCK.



"NEPTUNE" PORCELAIN BASE FULLER COCK.

SOMERVILLE LIMITED

Brass and Lead Plant and General Office, 284 St. Helens Ave., Toronto

Sales Offices and Show Rooms:

Fred Somerville	Stanley Block	Arthur Somerville	W. A. Maclauchlin,
Saturday Night Building	**156 Lombard St.**	**27 Nordheimer Building**	**26 Union St.**
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