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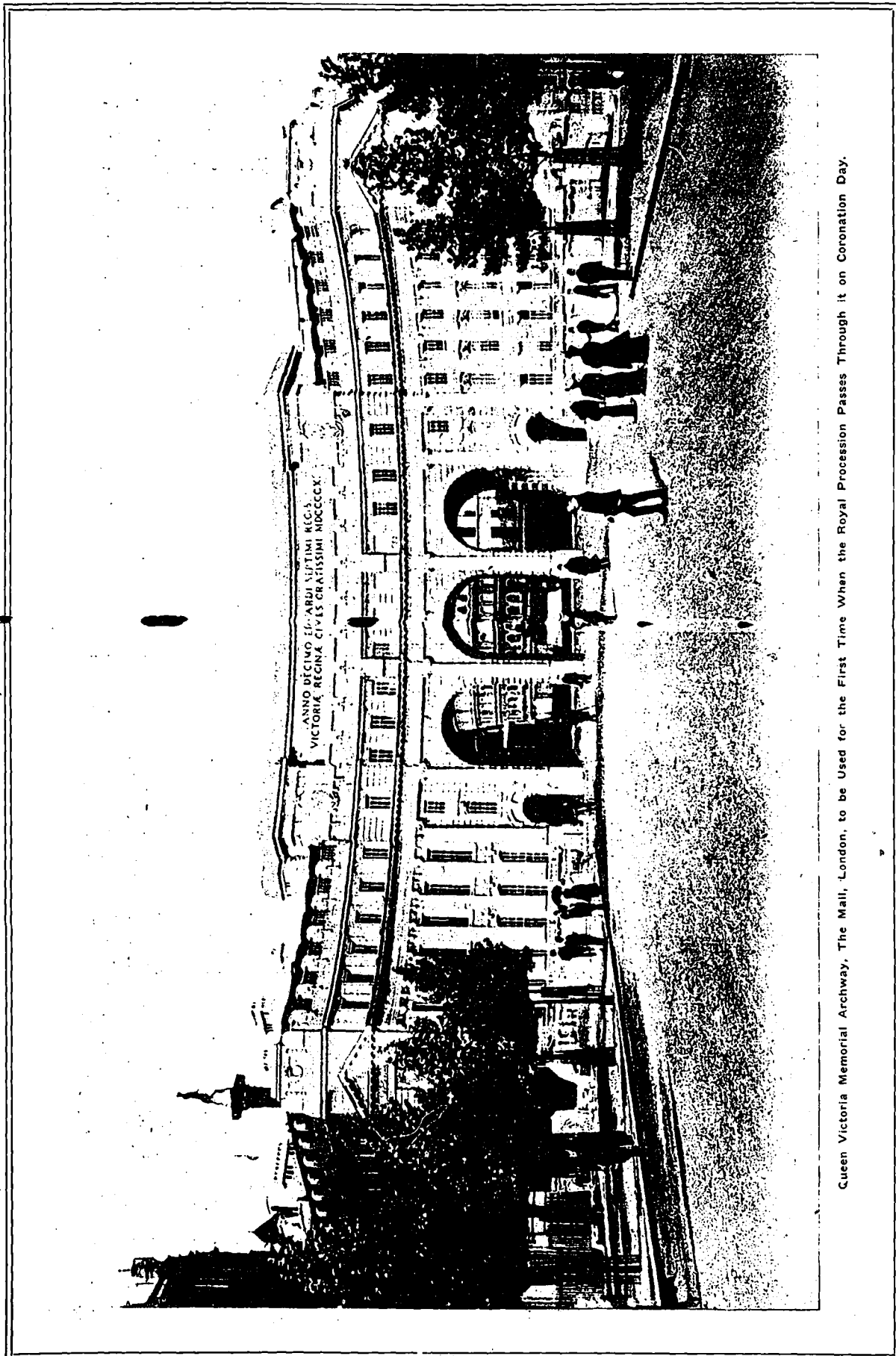
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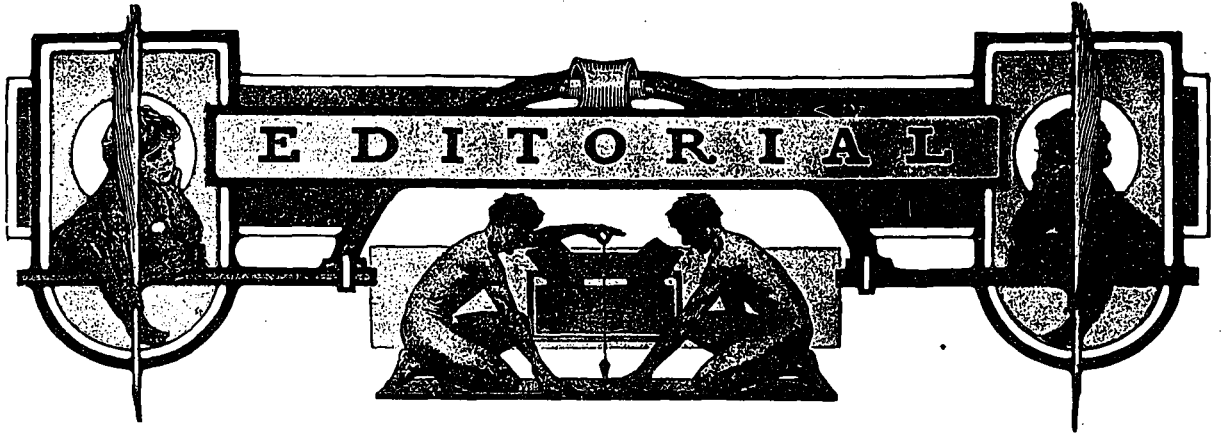
TORONTO CANADA

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Queen Victoria Memorial Archway, The Mall, London, to be used for the First Time When the Royal Procession Passes Through it on Coronation Day.



Q *Building Statistics for April—Month notes a number of substantial improvements over corresponding period—Toronto's big total a feature.*

ALTHOUGH MORE DECREASES occurred than has been noted in any previous month during the past year, the total investment for building work undertaken in thirty cities reporting to CONSTRUCTION for April, amounted to \$13,792,239, as against \$11,846,496 in the corresponding period of last year. Such losses as were sustained in the less fortunate localities were more than offset by the substantial totals piled up in the more successful centres. Considering the high state of development in the period immediately preceding, and the fact that labor disturbances and a somewhat late spring interfered with contemplated work in several sections, the headway made in general was all that could be expected.

Toronto's magnificent total of \$3,272,818, which was by far the outstanding feature of the month, in particular is most attractive. Not only is this amount far in excess of the corresponding figures, but is over \$1,500,000 greater than is noted in any other city in the list.

Ontario in all reports six losses and seven gains, the former approximating one-half the decreases included in the accompanying table. Fort William, where a marked advance was made in the previous month, suffered a decline of 19 per cent. Peterboro' fell behind 35 per cent. Ottawa and Port Arthur were both in the rear 35 per cent., and Brantford and Stratford experienced set-backs of 23 and 63 per cent. in order named. Apart from these places, however, the Province witnessed some very substantial improvements. Besides Toronto's marvellous showing, Hamilton issued permits aggregating in value \$624,150, as against \$382,175 for the same month in the previous year. London also, as indicated in her amount of \$132,334, representing a gain of 26 per cent., experienced a busy time of it, and as much can be said for Preston, where the volume of work amounted to \$110,300. Other substantial gains

noted are, Berlin, 38 per cent.; St. Thomas, 31 per cent., and Windsor, 354 per cent.

In this connection it might be said that there are numerous secondary towns and cities throughout the Province that are prospering to an unusual degree, but in many cases as no permits are required and hence no system of record kept, the totals for these places are unavailable.

As regards the West, operations were exceedingly brisk in many centers. Winnipeg, however, by a loss of 17 per cent., again sustains a decrease, and Vancouver, whose tremendous activities have so far this season attracted widespread attention, meets its first reversal in a loss of 18 per cent. Brandon, on the other hand, extended its stride and registered a gain of 58 per cent.; while most places in Saskatchewan, judging from the returns to hand, forged ahead in a striking manner. Saskatoon's investment amounted to \$808,040, as compared with \$292,956 in April of last year; Regina registered a total of \$562,490, representing an increase of 83 per cent.; and Prince Albert has an amount of \$162,355, netting a gain of 825 per cent., the highest percentage increase noted for the month. An advance of 59 per cent. is also announced from Moose Jaw, where permits amounted to \$244,524, which is \$170,424 in excess of the amount registered in the previous month.

In Alberta, Calgary surpasses the high-total of the previous month by a slight margin, the exact figures being \$1,127,256, which is a gain of 86 per cent. over the corresponding period. Edmonton, also with an increase of 42 per cent., moved well ahead, permits being issued for new work amounting to \$359,027; although Lethbridge, in the same Province, is 6 per cent. behind her former figures. This decrease, however, is due to the miner's strike, which is responsible for a number of projects being laid over for the present time. In British Columbia, aside from Vancouver's decrease previously mentioned, a slight falling off is noted at Nelson, which is 10 per cent. behind. Victoria, on the other hand, is to the front with a gain of 45 per cent., the value of permits issued amounting to \$280,110.

Of the Eastern cities reporting, St. John is the only one on the "upside," the investments there aggregat-

ing \$78,900, which represents an advance of 51 per cent. Halifax and Sydney were both behind with respective decreases of 62 and 63 per cent., although in these two places developments have been somewhat retarded by weather conditions. Montreal also suffered a slight loss, having failed to equal her former amount by 3 per cent., while Quebec City sends in an amount of \$13,000 without comparative figures. Montreal's total was \$1,711,971, the second largest amount registered for the month. While the prosperity of the month was perhaps less evenly distributed than in the period immediately preceding, the general expenditure nevertheless showed a marked improvement.

Conditions throughout the country give every promise of a busy summer. Montreal has sufficient work ahead to more than offset her present deficit; Vancouver reports that the pace so far established will be fully kept up, while as for Winnipeg it is safe to predict that on the whole the volume of work this year will be equally as great as that of 1910.

	Permits for April 1911.	Permits for April 1910.	In- crease Per Ct.	De- crease Per Ct.
Berlin, Ont.	\$ 121,733	\$ 87,881	38.52	.....
Brandon, Man.	63,140	39,720	58.86	.....
Brantford, Ont.	61,565	79,230	.....	22.83
Calgary, Alta.	1,127,256	603,930	86.65	.....
Edmonton, Alta.	359,027	252,196	42.36	.....
Fort William, Ont.	211,135	261,625	.....	19.30
Halifax, N.S.	11,100	29,650	.....	62.57
Hamilton, Ont.	624,150	382,175	63.31	.....
Lethbridge, Alta.	94,125	100,425	.....	6.28
London, Ont.	132,334	104,883	26.17	.....
Montreal, Que.	1,711,971	1,775,880	.....	3.60
Moose Jaw, Sask.	244,525	153,250	59.56	.....
Nelson, B.C.	46,980	52,715	.....	10.88
Ottawa, Ont.	221,075	340,675	.....	35.11
Peterboro, Ont.	82,245	121,201	.....	32.06
Port Arthur, Ont.	69,300	107,750	.....	35.68
Preston, Ont.	110,300	.....	.....	.....
Prince Albert, Sask.	162,355	17,850	825.09	.....
Quebec, Que.	13,000	.....	.....	.....
Regina, Sask.	562,480	307,205	83.09	.....
Saskatoon, Sask.	808,040	292,956	175.82	.....
Stratford, Ont.	18,868	52,168	.....	63.84
Sydney, N.S.	39,465	88,025	.....	55.17
St. John, N.B.	78,900	52,000	51.73	.....
St. Thomas, Ont.	70,650	28,050	151.87	.....
Toronto, Ont.	3,272,818	2,522,058	29.77	.....
Vancouver, B.C.	1,186,320	1,460,508	.....	18.78
Victoria, B.C.	280,110	192,440	45.55	.....
Windsor, Ont.	85,750	18,850	354.90	.....
Winnipeg, Man.	1,922,150	2,320,900	.....	17.18
	\$13,792,937	\$11,846,496	15.39	.....

Proposed Revision of Toronto Building By-law—Mayor and Board of Control memorialized to make changes in existing code.

THE BUSINESS and professional interests connected with building construction in Toronto want a revision of the existing building code, which has been in operation for something more than twenty years. As to what success their efforts will meet with, is difficult to presage. It may be said, however, on behalf of the efforts of the organizations and their representatives, who memorialized the Mayor and Board of Control, that the work has been most thorough in every detail. The compilation of a building code is by no means a small task and the men who have given up their time to this work deserve great credit from the citizens of

Toronto. The present building code of the city of Toronto is antiquated, incomplete, very slack and loose in some instances, and unreasonably exacting in some others. The present code was never compiled for the city of Toronto by a competent commission of scientific men. The building inspector, Mr. MacCallum, was obliged to compile the code from parts, excerpts and regulations draughted from codes in use in other cities. For instance, a very large part of Toronto's code has been adapted from the New York building code, which is conceded to have been out of date ten years ago.

We are not altogether just sure as to the position Mr. MacCallum will take in reporting on the suggestions made in this memorial, but assume that he will undoubtedly follow the usual course of civic officials when their department is under the fire of severe criticism. He will undoubtedly undertake to discredit the views of these men by trying to show that they have an ax to grind. This would be most unreasonable. The men's names that appear on these several committees stand high in their respective occupations and professions. Mr. MacCallum, either from education or training, should not assume that he would be justified in criticizing or making light of the combined opinions of representative engineers and architects who are responsible for the designing and erection of some of our larger buildings in Canada. Of course, there is always one element that has to be taken into consideration, one that seems most unfortunate, and that is the lack of knowledge with regard to matters pertaining to building construction, architectural and engineering, on the part of the average municipal politician. It very often results in important matters of this nature being set aside, upon the recommendation of their supposedly competent official who has charge of the building department. The memorial takes the form of a general review of the weaknesses and incompleteness of the existing building code and of the disadvantages incurred thereby. A second part deals with a detailed criticism of the present building by-law which points out many gross inconsistencies that would be hard for any conscientious architect or engineer to defend. Considerable space is devoted to that portion of the code regulating reinforced concrete construction. The former part of the memorial is of interest, in that it outlines just what the architectural and engineering professions think of the present building code and their reasons for holding such views. It says in part:

Your Worship and Gentlemen,—For some time past there has been a growing dissatisfaction among architects, engineers, contractors and business men with the Building By-Law of this city, and there is now a general conviction on the part of those best qualified to judge, that, however well the present by-law may have conformed to the conditions existing at the time of its enactment, it is no longer suitable. Indeed, it must be admitted that the present ordinance is prejudicial to the best interests of the city, constituting in many respects an obstacle to permanent and high-class fireproof construction.

From time to time objections have been made to the City Architect's Department by those having to do with building construction, and in at least one instance representations have been made directly to the Mayor and the Board of Control. Thus far little or no improvement has been effected by these criticisms, due in part, no doubt, to the diverse opinions often expressed by different persons with respect to the same portion of the by-law. The City Architect has therefore quite properly taken the stand that until architects, engineers, contractors and builders could come to some agreement among themselves as to the manner in which they wished the by-law modified, he could take no action in the matter.

With the belief that those financially and professionally interested in building construction could reach such a desirable understanding, a meeting was held on October 18th, 1910, on the invitation of the Engineers' Club of Toronto, at which representatives of the following business and technical organizations were present: The Toronto branch of the Canadian Manufacturers' Association, the Ontario Association of Architects, the Toronto Society of Architects, the Engineers' Club of Toronto, the Toronto branch of the Canadian Society of Civil Engineers, the Canadian Cement and Concrete Association, the Builders' Exchange of Toronto.

The attitude taken throughout has not been one of antagonism to the City Architect, but the aim has been to assist rather than to embarrass a department which by reason of the duties it has to perform must always be subjected to much adverse criticism. Consequently every effort has been made to render the labors of this committee constructive in character, and, where it has been necessary to criticize the by-law, at the same time recommendations have been made for its improvement.

The objectionable features of the by-law upon which the committee bases its request for revision may be stated briefly as follows: 1. The exacting and unreasonable demands of many of its provisions; 2. Undue laxity in certain other provisions; 3. Incompleteness; 4. Faulty editing.

Exacting and unreasonable demands are met with in many sections of the written by-law. In the interests of brevity only the most important of these will be indicated here, the remainder being cited and discussed in Part II. It should be noted in passing that the objectionable requirements enumerated below are those of the written code only, and that the faulty interpretation of the by-law constitutes an additional grievance. The features to which most objection is raised on the ground of undue severity are as follows:

(a) Ten inches of fireproofing (nine inches of brick work and one inch of Portland cement grout) *all around* external iron and steel columns, and the compulsory use of fireproofing for iron and steel columns in timber construction buildings.

(b) The requirement of curtain walls fourteen inches or more in thickness for all materials, parapet walls fourteen inches thick, and the fixing of the thickness of basement bearing walls, however lightly loaded, at not less than fourteen inches.

(c) Ridiculously low allowable bearing pressures on brick work, necessitating 50 per cent. excess material in piers, pilasters or walls in which the compressive resistance of the brick work is the determining factor of the design.

(d) Unduly exacting rules respecting the number of piles in certain pile foundations.

(e) An allowable bending stress on encased grillage beams much less than is commonly adopted; excessive thickness of the encasing concrete, and the requirement of unnecessary asphalt and plaster coatings.

(f) Impossible assumptions as to the amount of live load on columns, involving in the case of tall office buildings a load in some instances as much as 50 per cent. greater than the maximum probable load.

(g) Lower allowable stresses and severer assumptions of design for plate girders than are customary in good practice; low permissible stresses on shop rivets; the requirement of excessive material for steel columns in the lower storeys of buildings.

(h) Exceptionally low allowable stresses on timber columns.

(i) Specification of impossible floor loads in a number of classes of buildings.

(j) The provision that the *horizontal* wind pressure on sloping roofs shall be considered as acting with the full specified intensity of 30 pounds per square foot on the sloping area of the roof.

(k) Excessively low allowable stresses on plain and reinforced concrete; untenable assumptions respecting the design of reinforced concrete structures; the impossible requirement that the deflection of a slab loaded beyond the elastic limit shall be proportional to the load.

This committee wishes it to be clearly understood that the primary object of its labors was not to cheapen building construction in Toronto, but to secure the enactment of a reasonable, safe and workable by-law. Consequently, wherever certain provisions were, in the opinion of the committee, such as to permit questionable construction, more stringent requirements have been recommended. The more important instances of undue laxity in the written by-law are as follows:

(a) The allowing of the use of inferior grades of Portland cement.

(b) The limitation of the use of fireproof shutters, wired glass or outside sprinklers, to warehouses and factories over two storeys in height.

(c) The permission of non-fireproof public schools up to 55 feet in height.

(d) The allowing of woodwork within four feet of cupolas of foundries, and the requirement of only four inches of brick work on a 3-16 inch sheet of metal under boilers or furnaces resting on wooden floors.

(e) Insufficient strength in steel columns in the upper storeys of buildings.

(f) Higher allowable stresses on wind bracing than are usually permitted.

(g) Insufficient protection against corrosion of steel towers supporting water tanks.

(h) The omission of special stair protection in fac-

tories, warehouses and retail stores equipped with automatic sprinkler systems.

(i) The fixing of the required strength of concrete blocks at too low a limit.

(j) Inadequate provision for the fire protection of lumber and wood yards in congested districts; insufficient restrictions respecting the storage of hay, straw, ashes and highly corrosive acids.

(k) The permission of wood framing construction for buildings of any size in Fire Limit D (south of the Esplanade).

A critical examination of the present by-law discloses the fact that little or no reference is made to a number of new materials and forms of construction which are now taking an important place in building operations. It is true that some of these are used by special permission of the City Architect, but for the sake of convenience and definiteness the conditions under which their employment is permitted should be inserted in the written code at the earliest possible opportunity. Again, important considerations materially affecting the design are in many instances not mentioned. While under ordinary conditions this would not prove a serious matter, so frequently has the City Architect's Department placed interpretations on the present by-law entirely at variance with generally accepted engineering theory and practice, that it is considered desirable to have all important assumptions of design clearly stated in the code. In this way the inconvenience and loss of time consequent upon learning the unusual methods of calculation adopted by the City Architect's Department would be avoided.

The following are some of the important matters which receive no consideration in the by-law:

(a) Provision for the use of reinforced concrete footings, piles, lintels, pads, retaining walls and chimneys.

(b) The use of cement stucco veneer, as well as brick veneer for frame buildings.

(c) The use of metal lath and cement plaster for the enclosing walls of light and elevator shafts.

(d) The use of hollow concrete walls.

(e) Specification of the requirements of terra cotta or hollow tile, with respect to strength and absorption and permission for its use as an independent material in residences and similar buildings.

(f) The use of radial firebrick chimneys.

(g) Provisions for light forms of construction commercially practicable for greenhouses.

(h) The number of stairs required for given floor areas.

(i) Necessary dimensions of fire escapes.

(j) The relative transverse and longitudinal bending moments on concrete floor slabs; the distribution of loading along beams carrying slabs reinforced in both directions.

(k) Requirements concerning bridges between buildings.

Some of the subjects which are imperfectly or indefinitely treated in the code are as follows:

(a) The classification of buildings.

(b) The reduction of live loads on columns and footings.

(e) Proportioning of column footings to obviate unequal settlement.

(d) Wind pressure on sloping roofs.

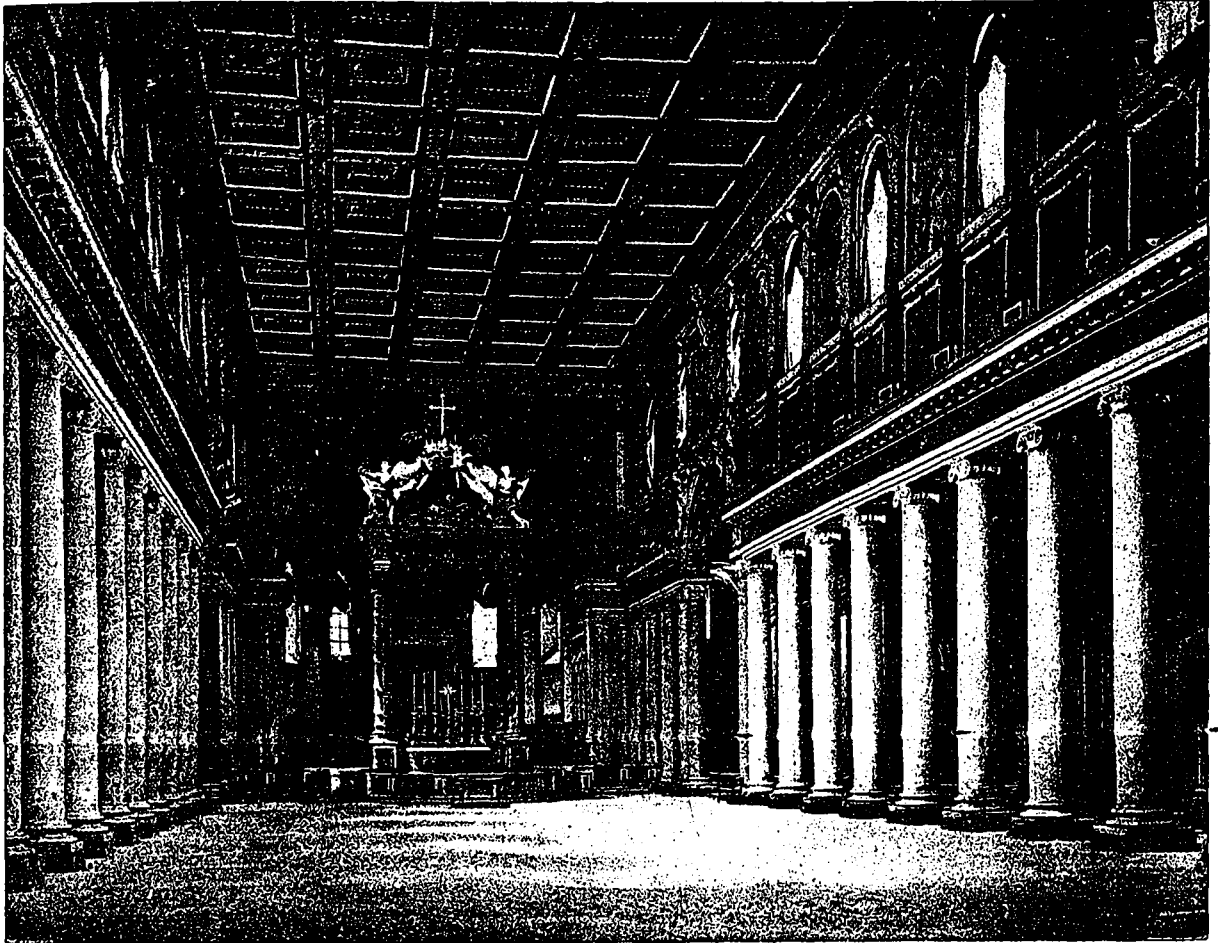
(e) Workmanship in reinforced concrete construction.

The above is a fair resume of the chief objections set forth in the memorial presented by the general committee, consisting of architects, engineers, contractors and business men.

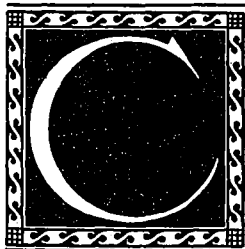
Paragraphs follow dealing with the "high cost of building especially in fireproof construction" that is necessitated by what is termed "overly exacting regulations." Another paragraph, an attempt is made to show that through the high cost of building, in addition to unreasonable requirements of the by-law, industries are forced to locate outside of Toronto. Some space is also given under the caption of "limitations or restriction of building projects." It is further claimed that the present building code encourages non-fireproof construction. Another paragraph which may be said is not of exceptional interest to the general public deals with the inconvenience to which architects, engineers and contractors are subjected owing to a faulty arrangement of the by-law and unreasonable regulations. Considerable space has been given to reinforced concrete and the paragraphs devoted to this particular type of construction complains of overly exacting regulations. It may be said in this connection that while a safe and sane code governing work of this character should obtain, it is also of paramount importance that restrictions should not be imposed that would incur an unnecessary expense on the part of the owner. On the other hand, every precaution should be taken, and regulations should not be approved of, or adopted, that would permit of the indiscriminate use of this new type of construction by inexperienced or unscrupulous contractors or engineers.

Mr. MacCullum has been Building Inspector in the city of Toronto for many years, and during his tenureship he has always demonstrated an attitude of caution and careful interest in the type of building construction permitted in the city of Toronto. We might say furthermore that in Toronto, despite some of the inconsistencies in its building code it is generally conceded that this city has a better class of buildings than the average city of its size on the continent. It is to be hoped that Building Inspector MacCallum will give the recommendations in this Memorial full consideration and that he may take advantage of this opportunity to secure a commission of experts to revise the by-law.

CORRECTION.—On page 105 of the March issue, in connection with the advertisement of the Cement Products Company, the name of the architect of the Carling Brewing Company, 47 Simcoe street, Toronto, is erroneously given as Victor Moore. The design for this building should have been credited to Mr. V. L. Morgan, 28 Sparkhill avenue, Toronto. CONSTRUCTION regrets the occurrence of this mistake, which was due solely to a typographical error.



Basilica of St. Mary the Greater, Rome. A Hall in the Liberian Palace Granted by Constantine to the Christians.



HURCH ARCHITECTURE

By EDEN SMITH, R.S.A.
F.R.A.I.C.

The development of the aesthetic in ecclesiastical buildings—an essential which is too generally overlooked in the work of modern designers.

THE ANNOUNCEMENT that Mr. Ralph Adams Cram, of Boston, would give a lecture on Cathedrals, caused many who knew him and his work to look forward to the event with a great amount of pleasure. Probably many of us imagined that though the Gothic revival of the last century in England might have thoroughly thrashed out the ideas involved in ritualistic church building, yet a mind trained in an environment quite free from the traditions and conventions which pervade all ecclesiastical life in England would give us, perhaps not some new thought about these things, but possibly some new view points that would enable us to get fresh vistas through the old church aisles.

We were disappointed that we obtained no new vistas. We were told that a cathedral was an expensive building. I forget just how much one should cost, but cathedrals were something to which we ought to contribute liberally. This was not quite new to us, we have many men in Toronto who could most eloquently impart such information as that.

We were also told, of course, quite modestly, of the very great success Messrs. Cram, Goodhue and Ferguson had made of church building, how they had built parish churches which looked like cathedrals, and of cathedrals they had built which quite rightly might never be mistaken for parish

churches, and how that huge collections of buildings they were now erecting for a War School at West Point, New York State, was dominated so appropriately by a medieval chapel with a tower which has a family resemblance to that of Gloucester Cathedral in England.

We were shown some excellent slides of the most familiar of the great cathedrals, such as Notre Dame, Paris; Exeter, York and Canterbury in England; with some other churches and cathedrals by Cram, Goodhue and Ferguson, all of which drew from the audience enthusiastic expressions of intelligent approval, as did also an interior view of St. Paul's, London, before Mr. Cram had time to explain that, he exhibited that as an example of what to avoid in church building.

As we sat in darkness looking at the lantern slides one could not help thinking how strange it was that we, the descendants of those who had endeavored to preserve the traditions of the old church, some of us members of families who could trace an unbroken allegiance to it through the last three centuries of disruption, should find it necessary to send to a foreign country for some one to teach us veneration for what we had always considered the most important institution of our own land, especially to send to a country which, more than any other, was peopled by the very men who did their utmost not to destroy alone that institution sacred to us, but even the buildings that housed it.

What environment better than our own could there be in such a State that might produce teachers better qualified to instruct us about such things?

It was the hope of having some fresh thought on the underlying motives of medieval church building that attracted us to the lecture. The hope of hearing something different to the usual archaeological arranging into periods and styles of the great church buildings, which is the gist of most disquisitions on Ecclesiastical Architecture.

As long as our study of church building of the ancients produces no other result in us than the ability to distinguish the peculiarities of the buildings erected by them during a certain period of years, and a taste for imitating in our new buildings such of the minor effects of the old as we can by any means engraft on our entirely different architectural compositions, so long we may consider architecture a dead art and our building something analogous to writing Latin odes in imitation of Horace, or medieval verse in the manner and with the archaisms of Chaucer.

To study architecture we must remember that it is not a matter of esthetic perception alone, or a matter of science alone, but a combination of both going side by side, the one quite as important as the other and one depending upon the other. It is a matter of science and sentiment appealing to our reasoning and emotional faculties. Its scientific side includes most of the mechanical or useful arts, and through its emotional quality it is included among the fine arts, and it is probably more capable of exciting emotion than any other art, except, perhaps that of music.

In this peculiar study, Church Architecture, probably sentiment is more important than science. Naturally, we may rely more on modern than upon ancient science, but as modern sentiment fails to produce the beauty we appreciate, it is natural that we should desire to understand the sentiment which created it in the old work.

The scientific side of Architecture, the solving of engineering or constructional problems, peculiarities of plan and design caused by differences of custom or ritual, or of considerations of comfort and convenience, are things which affect our rational perception, things which any reasoning being may see and discuss. These engineering feats of the ancients do not as a rule excite in us such an affection as would cause us to put aside the comforts of modern inventions for the sake of perpetuating them, except perhaps as monuments of the work of our ancestors, or as records of traditions we reverence. We might wish to retain them but not to imitate them.

This part of architecture appeals to almost every one, but it is only half of the message of architectural design. That which excites emotion is the part which we perceive by means of something in us that is almost that intuition, which the Greek philosophers considered an ecstasy, possessed only by a few favored persons.

There were two supreme periods in the history of architecture, or of art, in which were produced masterpieces which we acknowledge have not since been excelled or equaled. The first was marked by the production of the Grecian Doric temple, and the second by the creation of the medieval cathedral.

All previous architectural art culminated in this temple of the Greeks, their later ones were but an elaboration of the idea developed in it.

The Romans developed no new aesthetic architectural idea, they simply applied to the new kind of construction they introduced, a decorative surface of Greek detail evolved by the Greeks in designing buildings on quite a different architectural principle. Architecture as a fine art is beautiful construction. It is not a raiment applied to cover any kind of construction. That is really decoration and corresponds in human beings to the tailoring or millinery we hide under, as compared with the nude figures exhibited in Grecian sculpture. It is a fine art, because by means of it the artist can express something to the beholder. It appeals to intellect and reason through the emotions as do painting, poetry and music.

To do this it must have something analogous to a language. Not a language like our language of words, in which certain noises, we make with our mouths or perhaps noses we agree shall stand as signs for things, but a language like the language of music, in which certain forms of harmony, tone, melody, etc., produce certain impressions. All those conventional arrangements of tone, form and color which persistence of usage through the ages has made for each of the arts its language. This language in the case of architecture became established through man's selecting and retaining, even though utility did not always dictate their use, such forms

as produced satisfactory impressions upon his senses, whether his reason approved of their use or not. Forms which were sometimes repeated by him because they excited in him feelings nature had suggested or reminded him of themes announced by nature, not because they were his imitations of natural forms.

We know an artist does not set out to imitate nature in the way popular opinion suspects, an opinion which I think is largely responsible for popular art; his business is to rekindle emotions similar to those nature has excited in him, to produce impressions. It is customary to trace the growth of the Christian

of architecture should come from Greece as well? The Romans, unlike the Greeks, did not take as serious a view of the fine arts as they did of literature. Cicero, in ordering some Grecian statuary to be obtained for his new villa, much in the manner of a modern millionaire, seems to be more interested in getting it well packed, so that it might arrive without damage than he was of obtaining work of any particular merit. Plutarch speaks of the absurd magnificence of the palaces and Imperial Buildings of Domitian. This seems so modern.

It seems strange to make any connection between a Greek temple and a Gothic Cathedral, but that



Basilica of St. Paul, Rome, Built by Theodosius, A.D. 380, and Re-erected 1821.

Church building from the Roman Basilica and on through the Romanesque churches of France to the English and French Cathedrals of the middle ages. This gives satisfactory results as far as plan and construction go. Of course, plan is a most important part of any building, and there is no doubt that the plan of the Roman Basilica affected not only the plan of the Christian Church, but to some extent its ritual. And it is evident that considerations of construction affected the development of the plan. But all these things belong mainly to the scientific side of architecture. We do not seem to care to trace the development of its other side. All our modern fine art and poetry come from Greece. Is it not likely that all that poetical side

is because we will only look for the scientific development of these buildings and not for the sentimental.

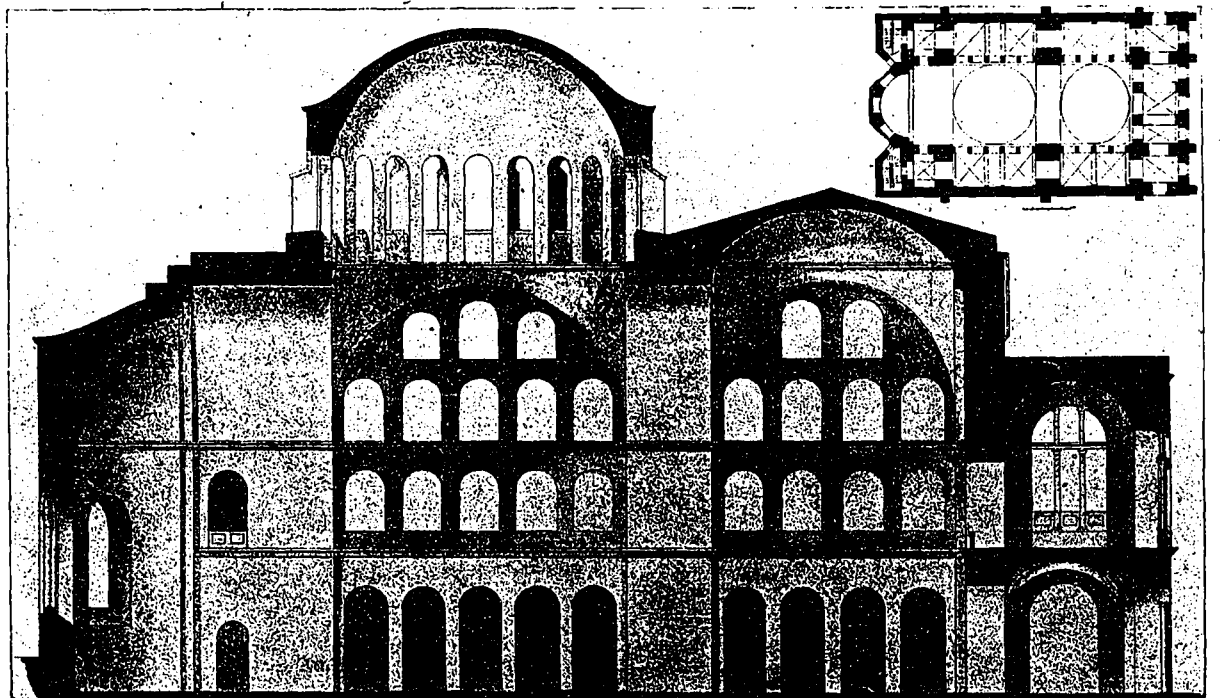
The aesthetic connection is quite complete, but did not come by way of Rome. That is why when we travel backwards the Roman Basilica seems to be a kind of jumping off place, leading nowhere. We do not bother to look for anything more, because we, like the ancient Romans, rather affect to scorn the emotional. This Roman characteristic the really emotional Anglo-Saxon has adopted is well expressed in Addison's Cato as:

"Rank pride and haughtiness of Soul,
I think the Romans call it stoicism."

The pseudo classic age that the revival of learning



Interior View of St. Peter's, Rome.



Longitudinal Section, St. Irene, Constantinople.

the Renaissance brought was for a long time merely an imitation Roman one. For a long time Roman poetry and art was more popular than Greek. And architecture does not yet seem to have passed this stage.

The difference between a Gothic Cathedral and a Grecian temple exists mainly in its scientific side, the aesthetic principles expressed are the same in each.

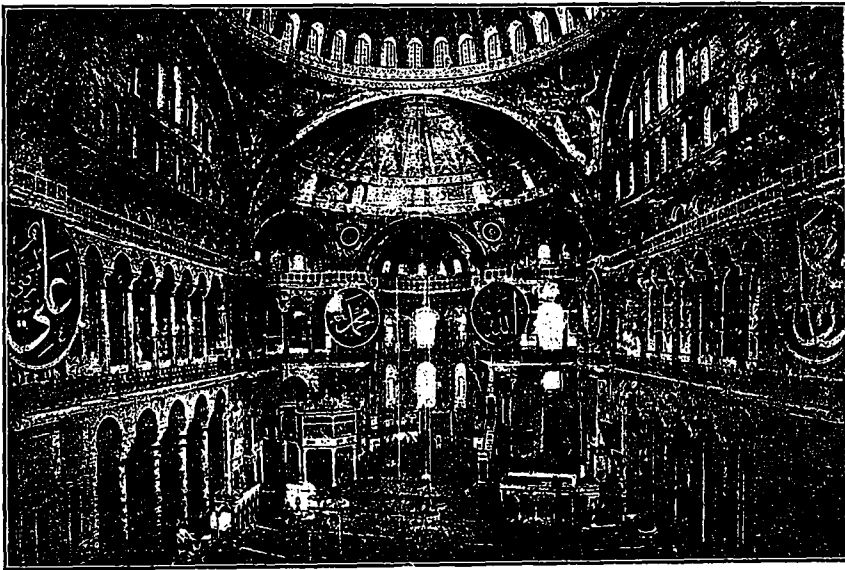
The Grecian Temple is the most perfect example of beam construction, a construction of columns and beams designed to resist only vertical forces.

The Gothic Cathedral is the most perfect example of arch and column construction, designed to resist forces from all directions.

The Roman Basilica as St. Maria Maggiore is still

It is strange that this appeal of the column in its likeness to the forest trees could be almost taken as a motive in design to mark the difference between the Gothic and the Latin building and connect the Gothic with the Greek. And it is strange to see the attraction the column has for men seeking to establish a religious environment.

We remember that the original Basilica was the *Stoa Basileios* or Royal Porch, at Athens, among whose columns religious discussions were heard. The name Basilica came from this to Rome to be used for the open piazza enclosing a central open court in which the merchants used to congregate to discuss business. In time this central court was roofed in and side walls were built to the colonnade, making the court a large oblong room with



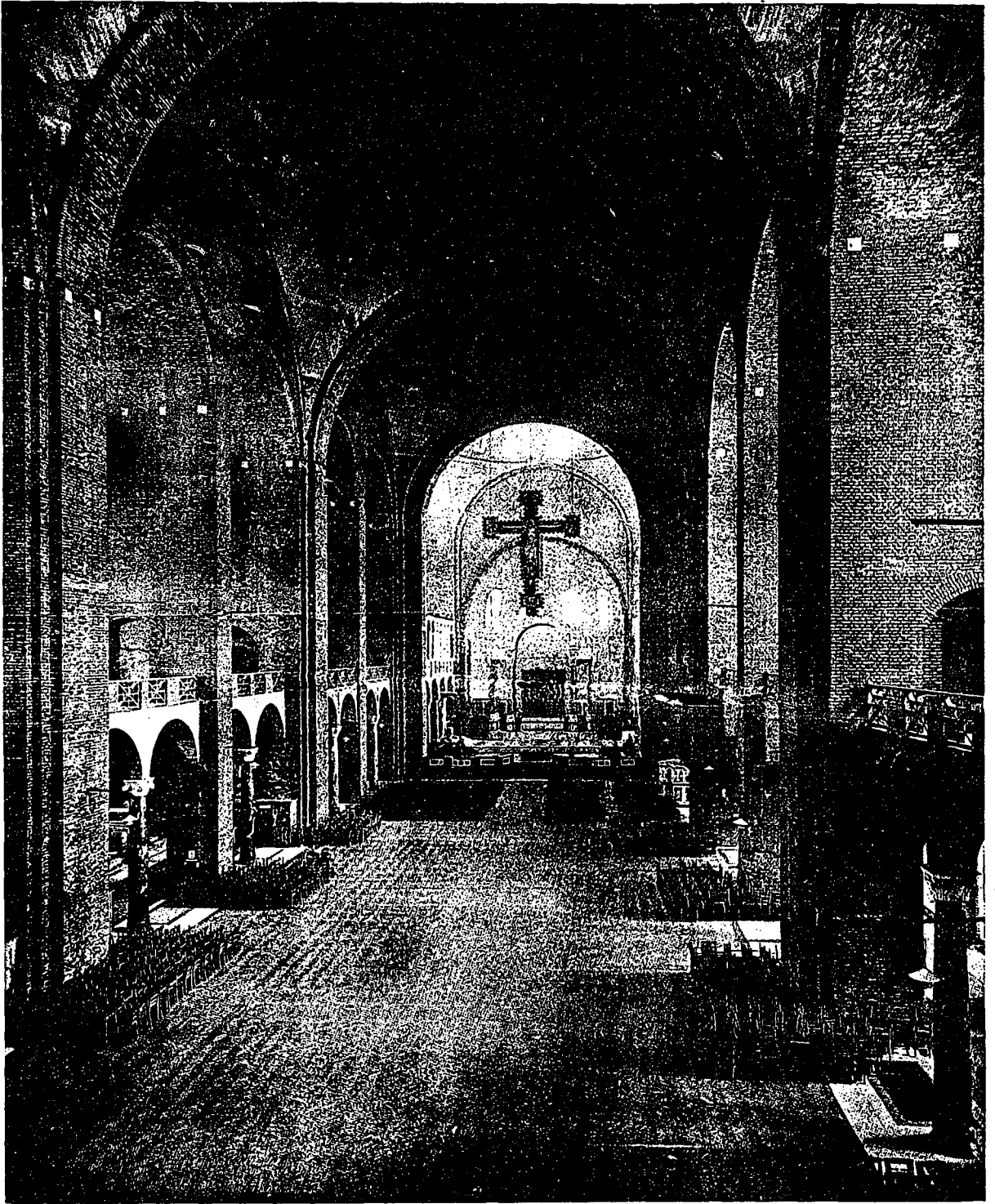
Interior of St. Sophia, Constantinople.

an example of column and beam construction like a Greek Temple. But the Romans became familiar with the use of the arch and found a means of setting their columns farther apart than a lintel would allow, as shown in the Basilica of St. Paul, they discovered a new scientific principle in building, but they did not discover how to use it aesthetically. They still tried to make it look like beam and column construction. Till in the ultimate idea of Roman Church architecture developed from the Basilica, which we see expressed centuries after in St. Peter's at Rome, the poor column becomes a mere hanger on, and the arch, which is really an extension of the column, is not of so much importance as the frieze and cornice, which are really purely ornamental and do no more constructional work than if they were painted on.

The Greeks attached so much importance to expressing the constructional principles of their buildings that the columns, the principal constructional feature, obtained a beautiful identity, so almost super-human that one could not help but feel some such reverence and awe when amongst them as when among the giant tree trunks of a primeval forest.

side aisles, about like St. Maria Maggiore at Rome. This, with the addition of a semi-circular apse at one end, or sometimes at both ends, became the civic hall of the Romans. The floor of the apse was raised above the floor of the main hall or nave, and on concentric seats around it sat the judge and his assessors, the altar on which he took his oath to impartially administer justice being placed at the centre of the semi-circle. A screen was placed between the apse and the nave to prevent the noisy litigants, who crowded the nave, from interfering with the judge and assessors. There was very little religious sentiment about such buildings as these. They were used by the early Christians when they were permitted to hold public meetings, because they were convenient, and because in the beginning they were too poor to build for themselves, and when they were able to build, Roman art had so declined that they no one with genius enough to design buildings better than in imitation of these old halls of justice and commerce.

In the Basilica of Maxentius or Constantine at Rome, in the beginning of the fourth century, was built a church that was a complete departure from the Basilica plan. The great nave 260 ft. long



Interior of Westminster Cathedral, London. The Late Mr. J. F. Bentley, Architect.

was separated from the side aisle by three large arches of over 70 ft. span each. The arches of the roofs of the nave and of the nave walls were collected on two high piers. In this building was announced the new principal of construction to be perfected in the medieval buildings about 800 years later, but no new aesthetic discovery was made to keep pace with this construction. The arches were supported by high piers of masonry, just pieces of wall left between the voids made by the arches.

The column of the Greeks was retained, but practically only as an ornament stuck on with a portion of entablature to the face of the great piers.

After this the seat of the Empire was moved to Byzantium, and through the centuries of the barbarian occupation the buildings erected in Rome were made of fragments of older work, ignorantly put together, and architectural development in Italy ceases.

So far Christianity had but made use of pagan art

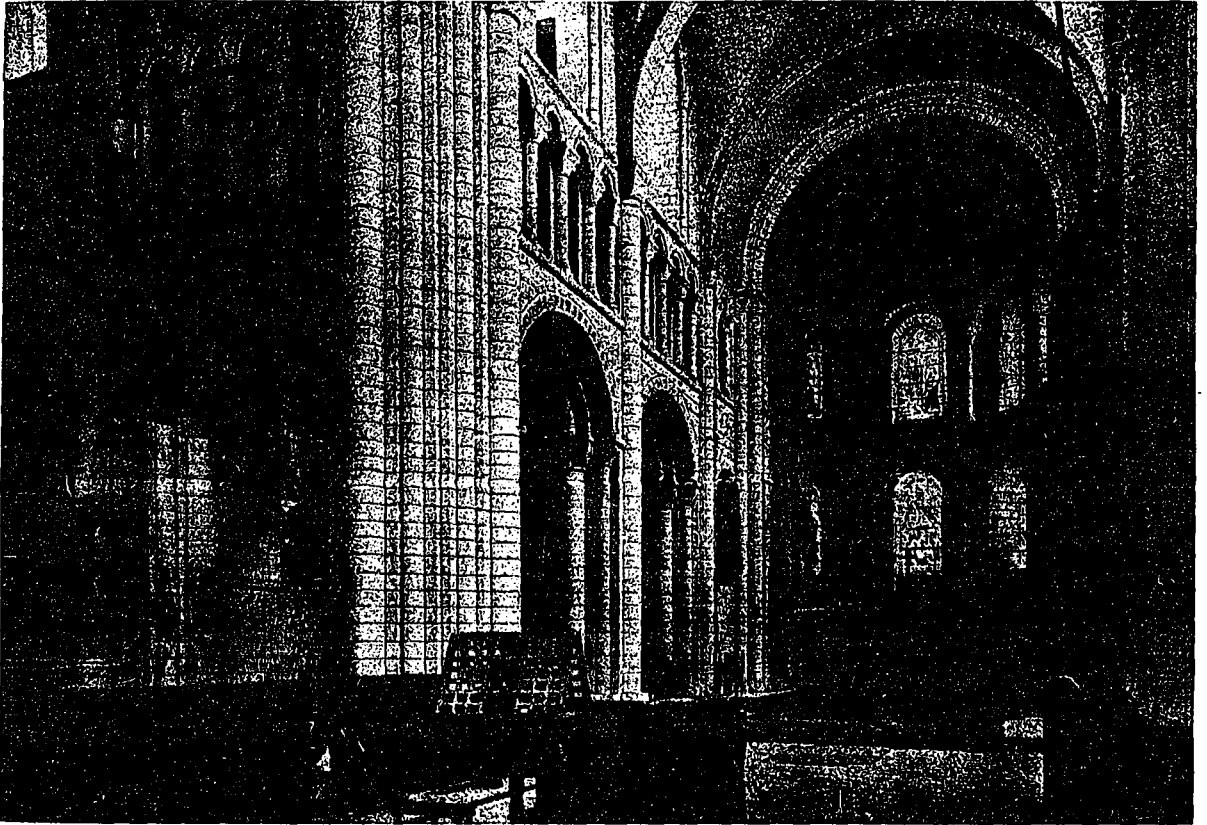
and particularly of the Roman School of pagan art. The art of a people not seriously enough interested in such things to demand that it should be an embodiment of their ideas, but contented to let their own scientific building be covered with a veneer of an entirely foreign form.

When Byzantium of the Greeks became the centre of the Empire, the controlling thought became Greek; the thought of a people who preferred to take religion and art seriously.

Even if they took one of these things more seriously than the other, we should still expect to find in their

not in ignorance, for they were the same Greeks the Romans had employed as artists, the same Greeks as were employed by Charlemagne centuries after, and they were surrounded on all sides by specimens of Greek and Roman masterpieces, which they preferred to ignore.

When in about 200 years after this Justinian built for the third time the Church of St. Sophia at Byzantium, or Constantinople, as it was now named, we see practically the same arched and vaulted construction elaborately ornamented, but the beam and column motive of Greece is entirely gone. The co-



View of Choir, St. Georges De Boscherville.

religious buildings the best of their art, or else in their art the best of their religious feeling.

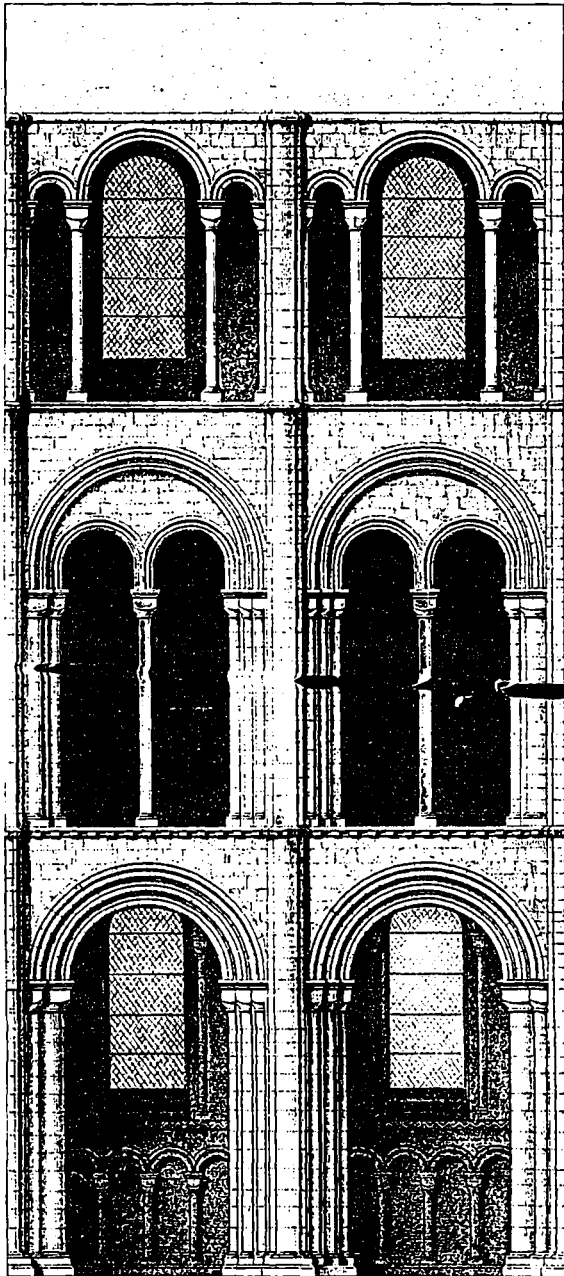
With the Romans the best of their art was magnificent self-indulgence. The Greeks could live in mean houses and build grand temples. They could be stoics and cultivate the aesthetic. The Romans, like ourselves, were imitation stoics for the sake of their morals.

That the Greeks at Byzantium did take both their religion and their art seriously is well exhibited in one of the first churches Constantine built at Byzantium, St. Irene. Here we have but little advance on the arch and vault construction of the Basilica, Constantine built in Rome; but a great advance on the aesthetic or sentimental side in leaving out every bit of the Græco-Roman architectural decoration, preferring to frankly expose their bare construction till they could thoughtfully beautify it. This must have been done intentionally and

column itself comes back again, but this time it is frankly a column carrying the minor arches; the great piers, which do the major work, are left as piers.

This Church of St. Sophia at Constantinople marks the high tide of architectural development in the East, for soon after this time those disputes in the church as to the propriety of representing divine beings in decoration arrested the development of sculpture, but not so much the development of pictured representation in mosaics, and the Greek artists were practically driven from the country. The Iconoclasts seem to have done for Byzantine pretty much what the puritans did for English art. Their movement to suppress images failed, and instead of getting divine subjects presented to them intellectually as the Greeks would have eventually been able to do, they preferred to use for their worship pictures of the crudest type.

Yet there are people who say that this arrested and afterwards stunted and orientalized buildings, represents the ideal of Christian church building. These buildings, with their heavy depressing domes, like caves, well symbolized, and possibly that is why they find such favor with the Semitic or Asiatic races, apathy and fatalism, places for sleep, refuge



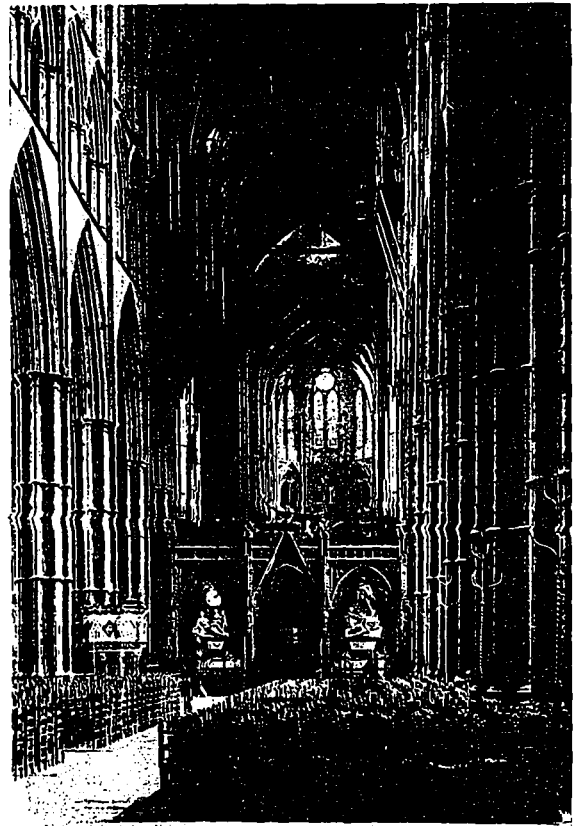
Interior of Nave, Ely Cathedral.

or burial, well shown in the new Cathedral at Westminster.

In a discussion in England on style of church architecture one disputant calls the "Basilica Church the product of Christianity." All that Christianity ever used of this hall of commerce of the Romans was its plan; a big effort was made to change this in the Basilica of Maxentius at Rome, practically in the time of Constantine. What might have develop-

ed in Rome from this start in a new direction was arrested by the move of the Imperial seat by Byzantium. But in St. Irene at Byzantium the same idea is picked up again and carried a little farther. At St. Sophia we see the idea carried a little farther still, all this the work of Greek artists. There is very little resemblance now between this grouping of domes, and the oblong hall with a row of columns down each side and a flat ceiling over (see St. Maria Maggiore of St. Paul's Rome), which was what Ausonius called the "halls once so full of business, now full of prayer."

The Basilica plan was revived again, but far



View of Nave, Westminster Abbey.

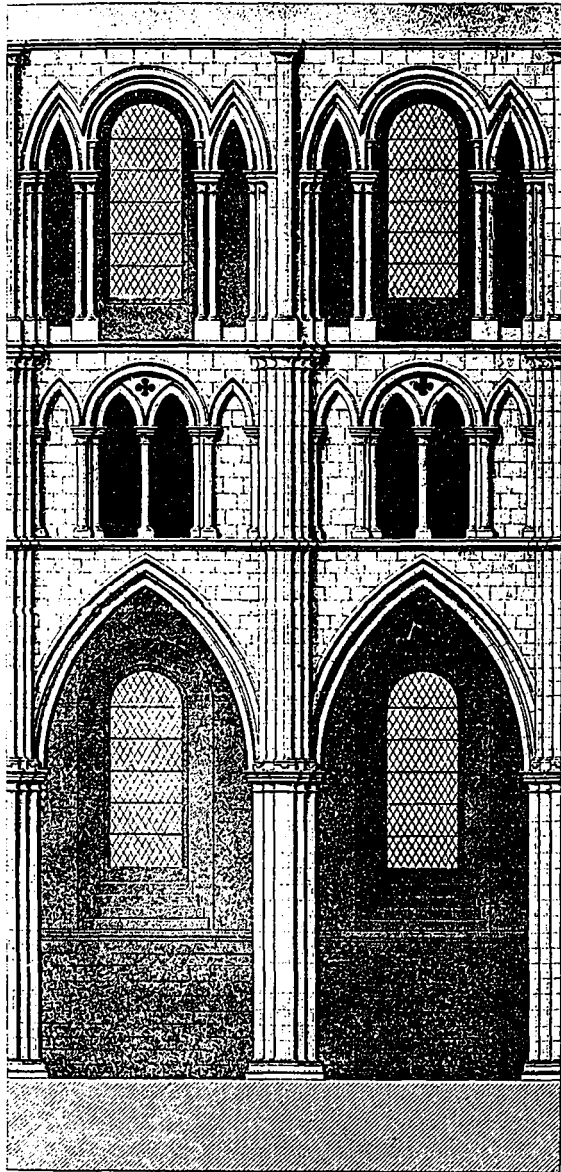
away from Byzantium. The Greek artists banished from there found a refuge in France, where Charlemagne was restoring order and establishing schools. In devising new church buildings they found all round them remains of the Roman occupation, among these remains, of course, Roman Basilicas; but they changed them so that the new ones really had no more connection with the old than any two buildings might have because they were oblong in plan.

The Roman Basilicas sometimes had a semi-circular apse at one end, sometimes at both ends, sometimes the apse or judges court was square. The Christian churches in France sometimes had three apses.

But there is something very much more vital by

means of which we can trace the best architectural development through the ages. It is not the mere scientific arrangement of plan for convenience of construction or use. But it is the expression of sentiment, the appeal to the emotion, the endeavor to express intellectual or spiritual values.

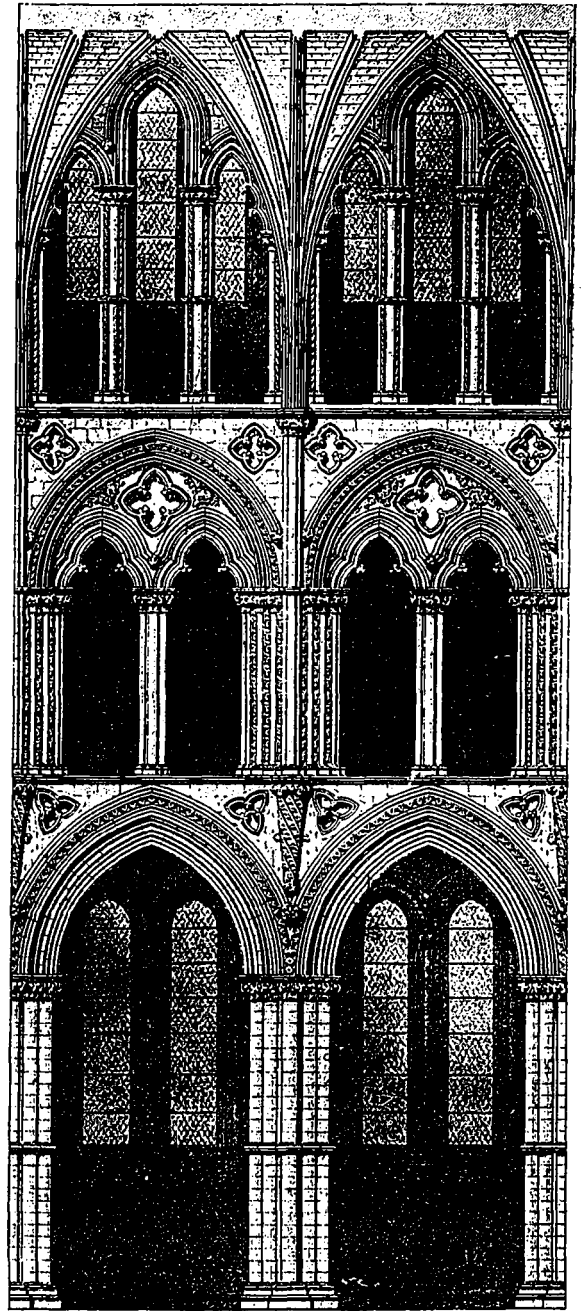
Charlemagne, as he conquered and reduced to order Western Europe, built castles or fortresses to maintain order with, and churches to teach order; he had not the tyrant's distrust of scholars and men



Interior of Choir, Ripon Cathedral.

of intellect, and drew round him the most learned he knew. One of them, Alcuin, said once to the Emperor, "If your zeal were imitated perchance one might see in France arise a new Athens, more glorious than the ancient, the Athens of Christ." Is it likely these men who knew their Greek would try to revive any such thing as the Roman art that Plutarch derided?

This spirit came right from Greece, it failed to grow in Rome, and it failed to grow in Byzantium; the



Interior of Presbytery, Ely Cathedral.

work it did there stayed just as it was, when this spirit was driven out. Greece had succumbed to Asiatic influence, and had gone to sleep in its caves. But in the West the new life dawned like daylight after the darkness of barbarian night on almost a new race of men, men of great physical and mental virility, men of Northern Western Europe who contrasted sharply with those of the South East who were by now almost Asiatic. Such men were a rich, fertile ground to receive such seed as the religion of Christianity and the art and philosophy of the Greeks, cultivated in the schools founded by Charlemagne. Schools liberal and enlightened, for he gave instructions that no difference should be made between the sons of serfs and the sons of free men, but that they might sit on the same benches and

study the same subjects. He it was who made a temperate decision between the bigotry and infatuation of the image breakers and the image makers of the East.

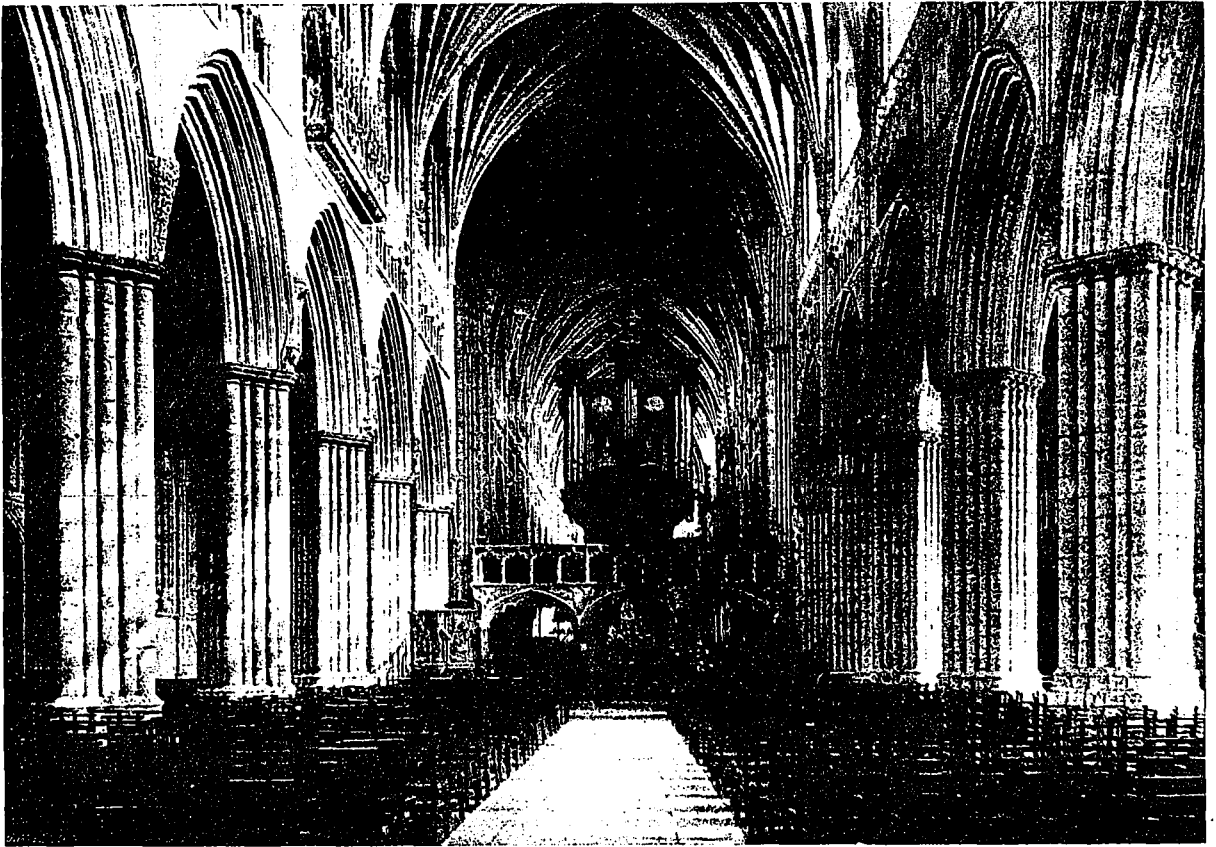
The fruit of this cultivation, the art and architecture it brought forth, was the freshest, most vigorous and daring the world had ever seen. Churches that to this day recall the glorious forest their builders must have known. Their minds had been trained before they received Christianity to seek in the forest or in the grove what superhuman beings they imagined might exist. Probably the purest emotion man ever felt was when the beauty of some natural scene impressed him with the sense of the presence of an invisible benign being or a God.

Abraham "planted a grove in Beer-Sheba and call-

same feeling that I have experienced in those vast and venerable piles." And in those vast and venerable piles we experience the same emotion as the forest excites. The power to excite emotion is the vital principal of art.

The conventionalities of art, all that system of form and color our ancestors evolved by selecting and retaining in their buildings or work from the forms originated by necessity, such as revived in their minds emotions they appreciated. These emotional appeals are the motive themes or plots of his work, and they are not a vast array of almost incomprehensible ideas, but like the great things of life that really matter, a few simple facts.

We need not go into every detail of every one of these old buildings to find the aesthetic motive of the



Interior of Exeter Cathedral as It is Seen from the West.

ed there upon the name of the Lord." Yet this seeking of a holy place among the trees is an Aryan characteristic rather than a Semitic. It is so much a race instinct that we at the present time are still sensitive to it.

Washington Irving, writing of an American forest, says: "We were shadowed by lofty trees, with straight and smooth trunks like stately columns, and as the glancing rays of the sun shone through the transparent leaves, tinted with the many colored hues of Autumn, I was reminded of the effect of sunshine among the stained windows and clustering columns of a Gothic Cathedral, indeed there is a great grandeur and solemnity in some of our spacious forests of the West that awakens in me the

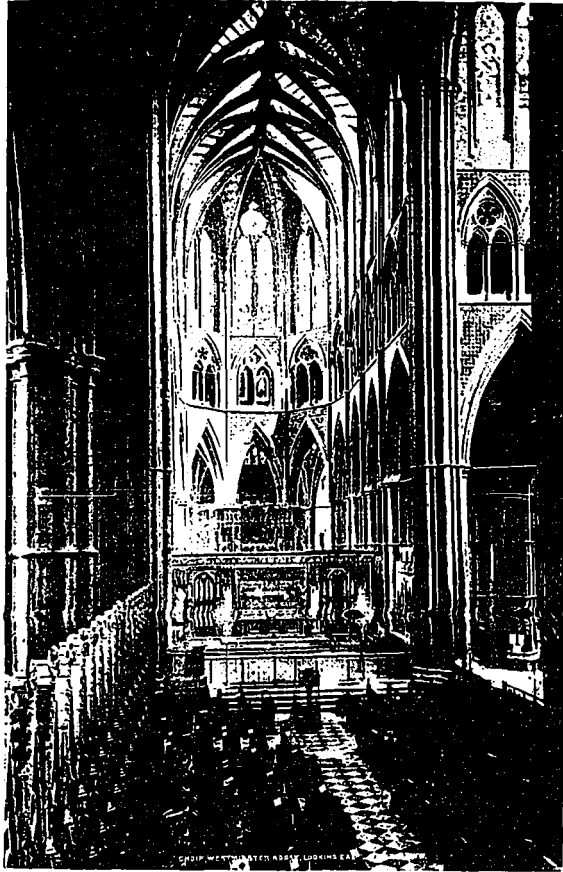
great masters. Because the message is not written all over all of them in every detail, we need not think that there is no message, because the message is not evident in every copy of a masterpiece or in the work of every pupil of the masters. The message or appeal is often as minute and inconspicuous as is the faint fluttering called soul in that conglomeration called man.

The schools Charlemagne founded attained their perfection in the Abbey of Cluny in the twelfth century, from there went out the Gothic message, their best expression. Sincerity and such conscious or sub-conscious re-rendering of the emotions nature had taught them.

But many of the medieval buildings failed to carry

the message. Some builders broke every traditional rule, some built on bad foundations, some did bad work, some built with insincerity. Some buildings are experiments, merely records of flights in untried directions.

Unlike our clergy of to-day the monks of Cluny taught their artizans their art. They did not go about looking for artists who could build good churches, they taught the artists what good churches



View of Choir, Westminster Abbey, Looking East.

now rekindles in us, an emotion they must have felt conscientiously or sub-consciously, and in their buildings sought and preserved, the motive of the forest or sacred grove, the upward soaring impression left on the mind by the Gothic Cathedral caused by making the details of the work lighter by sub-dividing the forces and providing for each one separately, as from column to groin rib like from tree trunk to branches.

We should consider their expression of the dignity of work in exalting to the most honorable position, with beauty of form and perfect expression of functions, the working members of their buildings, the column and arch, how under their direction the co-



Interior of Nave, Lichfield Cathedral.

should be. How much they were in advance of their times may be gathered from the reproof St. Peter the Venerable of Cluny administered to St. Bernard of Clairvaux for his intolerance of the advanced ideas of the Clunians. He said "new things may irritate a mind rooted in habit, it may find it difficult to approve of the strange, but the eye of the mind comprehends diversity of usage, but this intellectual sight is given to few." Abelard, with whom most of us now would sympathize, also fell foul of St. Bernard and sought refuge with St. Peter of Cluny.

The new things these French monks endeavored to teach their artists to express are what we must consider the best expression of arch architecture. We have seen the best expression of beam architecture at Athens. We know they dreamed of a new Athens, but they could comprehend a new usage and they would not have an intellectual sight if they could see nothing but the old clothing for the new usage.

If we take one motive in their buildings that even

column again became a venerable thing like the column of the Greeks, but recognizing that it, unlike the Greek column, instead of one had many functions to perform, which they expressed in their columns as do the muscles in the human body.

We should naturally expect from such spiritual enthusiasts symbolic expression of the great virtues in their work, such as of truth or faithfulness as opposed to deceit. Of the sacrifice of the sensually beautiful to obtain the intellectually beautiful of valuing human work above the value of gold and precious stones, a lesson not yet learned in the East,

As well as such criteria as these we may see how they solved such purely aesthetic problems as that of satisfying the eye as to the disposition of the lines of strength and the lines of force or weight and their proper massing, separation or resolution.

In studying the manners and thought of the ancients we are apt to forget how little the impulses of the men of two or three thousand years ago differ from ours of to-day. We forget that as in most matters then as now, the majority as a rule has the wrong idea of what is progress, and that what was popular or fashionable really presents the habits of the feeble minded as truly then as now. Fortunately there is nothing so ephemeral as fashion, what remains is the not always popular opinion of the few. Popular opinion in Athens did not approve of Socrates.

most perfectly in the great churches built nearest to the influence of Cluny, but this is not invariably the case, owing to the frequency of changes at different periods. The Cathedral of Amiens possibly best represents most completely the perfection of their ideas in France.

If we take an example from France, such as St. Georges de Boscherville, and compare it with one built in England at the same time in Ely Cathedral Nave. With this starting point we can follow the development of the ideas, of the architectural philosophers of the school Charlemagne, founded in our own church building in England from the 11th to the 15th century.

This detail of a couple of the bays of the Nave of Ely Cathedral, which with corresponding bays of



Nave of Lincoln Cathedral as It Appears Looking West.

Often the enthusiastic followers of a teacher from lack of perception reverse his doctrine. The message as soon as announced seems to be hidden from the many, but like the protoplasm, its insignificance in bulk, as compared with the inanimate matter around it, may mislead one as to its power. We must not expect that the idea of the great teachers penetrated the brain of every medieval monk engaged in building that multitude of churches which in England and France sprang up in the 10th and 11th centuries.

In the arts of ages more remote than the middle ages, the artists succeeding have had time to remove the failures of the pioneers, but in medieval art, the changes were so abrupt and the time relatively so near our own, that we see nearly all the old work in the making, with its unfinished experiments. One would expect naturally to see their ideas carried out

Ripon Ely presbytery, Litchfield, Ely Choir and Winchester, I have taken from Sharpes' parallels, as they are probably the most intelligible analysis of English Medieval Church Building I know of. The Nave of Ely sufficiently shows us the connection between the work of England and France on comparing it with St. George de Boscherville. From then on the English work becomes, with few exceptions, quite different, though the philosophy may and should be the same, the detail of its decoration changes more and more.

The cluster of shafts is not yet a column, it still retains some of its Byzantine character of a pier, although the column was much more distinct in Gloucester, Durham, Tewkesbury; it was really a column supporting a wall like the column of the Basilica, as in the Basilica of St. Paul, Rome.

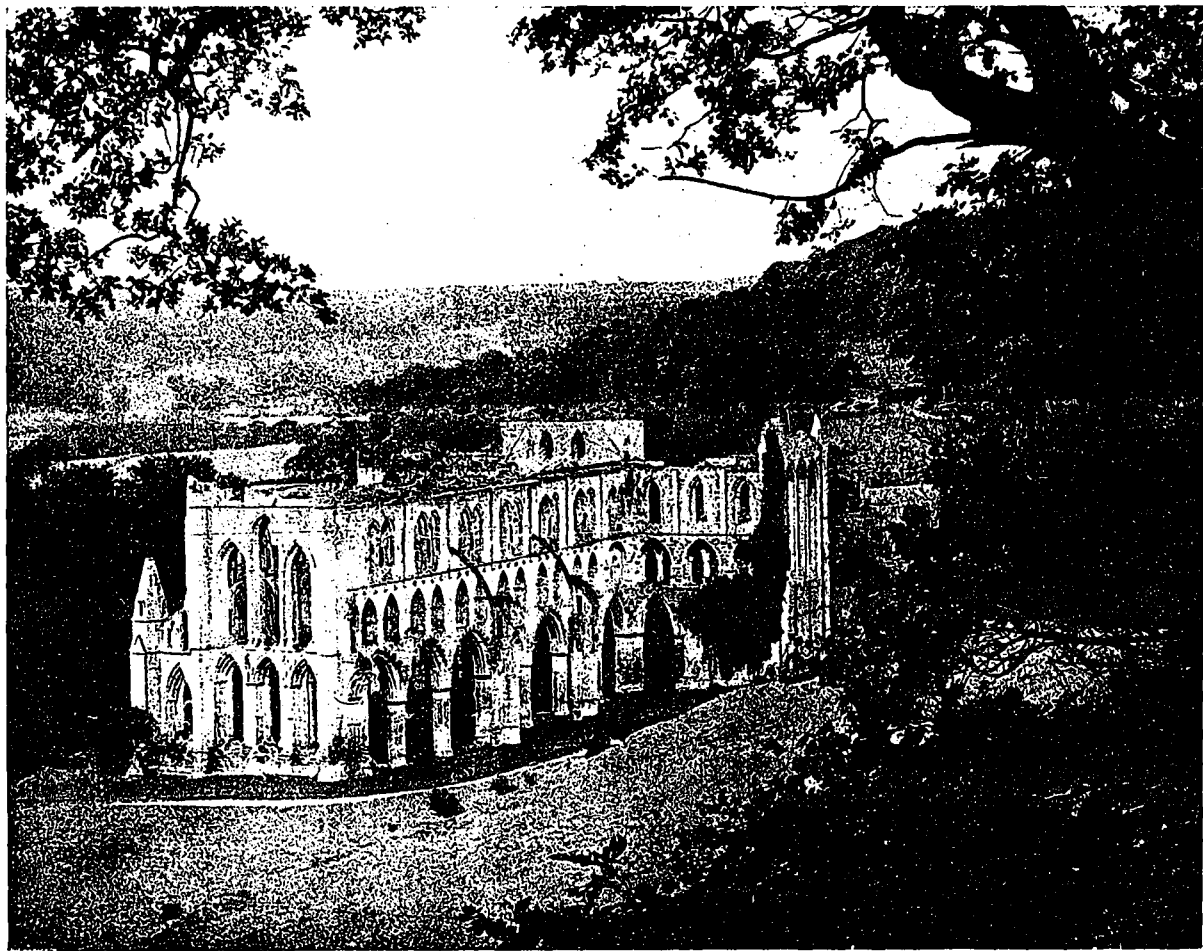
In these shafts of Ely we see the first attempts to

magnify the function of the column and make it the one great feature of the church, as in the Grecian Temple, the trunk of the tree. For although this nave of Ely was not vaulted, there is now no doubt but that it was intended to be, as St. Georges de Boscherville, but if no other consideration caused it, the builder probably found the walls too weak for the weight of a stone vault.

Although this glorification of the column persisted in English Churches, to its best period, as in the Nave of Exeter, in England, more than in France, its connection as a roof support grows more indistinct. Its best expression is probably in the Nave of Westminster, a Church practically French in its plan and proportions, but most English in its detail.

we can see how in Ripon, although the pointed arch had just come into use, how little the lines of weights and strength were understood, and how well they were in the presbytery at Ely, almost an example of the perfection of English Gothic. Although the weak point of the non-continuation of the shaft lines to the roof is exhibited here, it is not so obvious in perspective as may be seen in distance of the Nave of Exeter, the vertical lines of the columns practically carry through the triforium to blend with the groin ribs.

In this period of Ely Presbytery, English work reached its perfection, and although it may have continued long enough to have included such churches of the next period as shown in the example



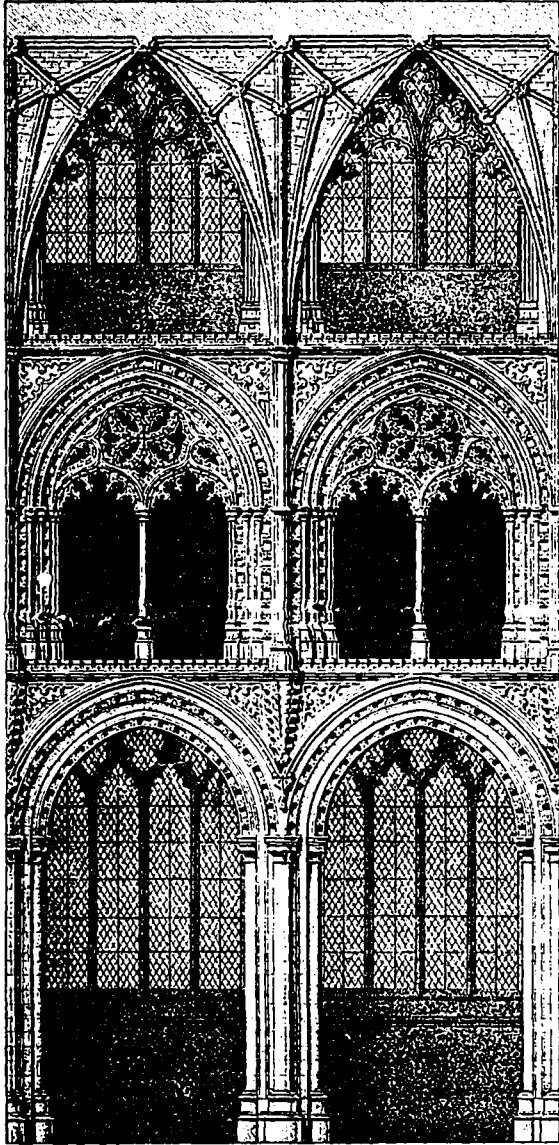
The Cistercian Abbey of Rievaulx, England.

A little later, as in the Choir of Ripon, we have an example of the total misunderstanding of the column, although all resemblance of a pier is gone and it is a column proper, but instead of carrying its lines of strength up till they melt in the ceiling, like the resolution of a musical chord or as a tree's branches dissolve in the sky, its three abrupt columns are interrupted with heavy caps and bases at each stage as completely as superimposed orders in a renaissance building. This Choir of Ripon was evidently intended for vaulting, but it remains another example of an experiment which failed. If we compare it with the next stage, Ely Presbytery,

taken from Westminster Abbey, Lincoln and Litchfield Cathedral, yet the elaboration of tracery and repetition of geometrical motives began a mechanical kind of over decoration which marks among other things its decline.

The Nave and triforium of Litchfield probably marked the greatest advance of this geometrical period laid out by the Cistercians, who in England were most insistent upon good building, but in this example the clerestory window seem to be another example of an experiment which failed, not so much because of their unusual form, but because of the change to an altogether different scale of detail.

If we look at the Choir of Ely Cathedral for our forest tree, we see creeping in again the Romanesque pier, a piece of walling with shafts attached to its four faces. For the last three centuries we had been turning these piers into columns. Now, for some reason, we turn our faces back again to piers. For the last three centuries we have been getting rid



Interior of Choir, Ely Cathedral.

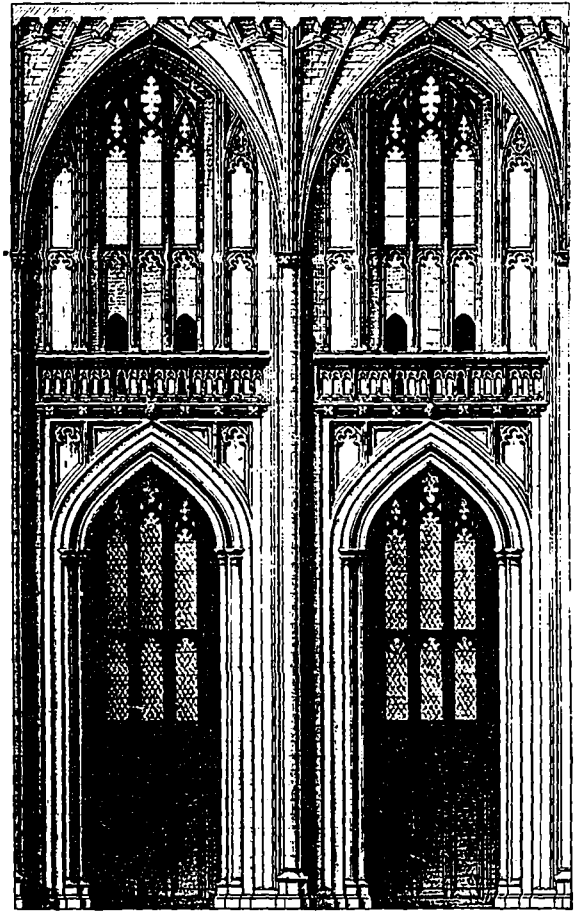
of wall, see Lincoln, Westminster and Exeter, to obtain the tree-like effect of columns and arches. I say back, because this is the first evidence of a series of changes which lead from a building in which the column and arch is as completely expressed as the whole structure of the building, as was the column and beam of the Greeks—to a kind of building in which, although columns and arches may be the constructive element, columns and beams are the misfitting aesthetic element. A series of changes culminating in the revival in the Renaissance, as exemplified in St. Peter's at Rome, of those Roman ideals of building developed from the Basilica which the Greeks at Byzantium put aside as being

unfit to philosophically express the new arched construction they had adopted.

In this 14th century work at Ely Choir, although not very much more elaborately decorated, than the bay of the presbytery, hardly two centuries older, the accents come in the wrong place, and the columns, arches and roof lose their connected simplicity and broad dignity.

About a century later, as in Winchester, the dignity of the column and arch is nearly gone, the arch has almost turned to a beam, it did so practically a little later, and the lines of weight crossed transversely what should have been the lines of strength. The horizontal lines above the arch became more important, the mouldings heavier and heavier, till the Roman cornice and frieze comes back. The shafts turn to paneled piers and the columns to a flattened pilaster, pretending to carry a lintel and cornice which have no constructional function.

Even before the 15th century work went so far as



Interior of Nave, Winchester Cathedral.

this, there seemed to be a desire to get rid of the column as the constructional motive to lose the effect of strength and breadth made by the massing and distribution and strength of lines, and to call attention to wall only by paneling it all over with paneling so much like the window tracery of that period that when one considers the painted and gilded wall and stained windows the effect inside must have been as if it was all wall, but some of it transparent. (Concluded on page 69.)

CONSTRUCTION

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INTERESTS OF CANADA



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Vol. 4 Toronto, June, 1911 No. 7

CURRENT TOPICS

PROJECTED IMPROVEMENTS at Victoria this year include the asphaltting of over fifty streets. Some 600,000 square yards of pavement, equivalent to 36 miles in all, will be laid.

* * *

THE LARGEST CRANE in the world, has just been tested at the Imperial Japanese Navy Dockyards, Yokosuka. It is of the cantilever type, and is capable of handling a working load of 200 tons at a radius of 95 feet. The crane was built by Messrs. Cowans, Sheldon and Company, an English concern, who at the present time are erecting one with a working capacity of 200 tons at a 105 feet radius for the Japanese Navy at Kure.

* * *

ELEVEN MILLION FEET of lumber constitute an order for a single item of material, recently placed with a mill at Revelstoke by an Edmonton building corporation engaged in the erection of residential structures. Judging from the extent of this one purchase by an individual concern, and the fact that lumber is only one of the large number of materials required for work of the character, Edmonton offers a field to which supply firms can well direct their attention. In a rough way, it is estimated that it will require 400 cars to transport the shipment in question.

THE WORK OF PIERCING the Lotschberg Tunnel on the new Alpine route which is being constructed from Switzerland to Italy, was accomplished March 31. This new route, which will be completed in about two years, is of special importance to both countries in that it will result in the re-adjustment of transit traffic owing to the great contraction in distances it will effect.

* * *

A POWER SCHEME contemplating a series of gigantic chutes over the Coteau and Cedar Rapids at a point twenty-five miles above Montreal, is reported as being projected by the Canadian Light and Power Company of that City. A half million horsepower will be developed for generating electrical energy. The undertaking, it is estimated, will necessitate an outlay of between \$15,000,000 and \$20,000,000.

* * *

PLANS FOR NEW TERMINAL facilities at Montreal have been filed by the Grand Trunk management with the Board of Railway Commissioners at Ottawa. The proposed scheme of improvement calls for an outlay of at least \$10,000,000. Of this sum two and a half million will be used for the erection of a new passenger station, and the balance will be expended on track elevations, interlocking towers, freight houses, power plant and outlying depots. The work is to go ahead as soon as the plans have been approved.

* * *

MOST OF THE OLD MACHINERY and rails acquired by the United States Government when it purchased the Panama Canal, is now being converted into structural steel by a mill located in Eastern Pennsylvania. This scrap, which also includes car wheels and axles, was disposed of by auction to the highest bidder, M. Samuels & Sons, of Brooklyn, who pays for it on delivery at a price of \$11 a ton. There is something like 220,000 tons in all, on which the Government will realize about \$2,000,000.

* * *

BRICK AND STONE are so invariably the accepted material for exterior construction of ecclesiastical buildings on this continent, that the adoption of white marble for the outside wall scheme of a Gothic cathedral at present being erected in Buffalo, comes as somewhat of an innovation. The edifice in question is being built from designs by Aristides Leonori, the church architect of Rome. It is to be 100 feet in height, exclusive of its two towers which will rise 150 feet above the roof of the structure. In length, the cathedral will be 250 feet, with the width of the nave and transept 100 and 150 feet respectively. The marble walls of the exterior will be tooled, while the interior walls and pillars will be polished. Seven marble altars are to be installed, and these, together with the other furnishings, are to be in character with the architectural scheme. The estimated cost of the structure is \$500,000, exclusive of the furnishings.

AN ARCHITECTURAL PARTNERSHIP at Windsor, Ont., has been entered into by James C. Pennington and C. Howard Crane, a well-known architect, formerly of Detroit. Mr. Pennington, who is a graduate of the Architectural School of the University of Pennsylvania, and who also has had considerable experience in the Detroit field, is a native of Windsor. The new firm will be known as Crane and Pennington, with offices in the Bouk Building.

* * *

REFERENCE IS MADE in negotiations now being carried on by the city government of Amsterdam, to the fact that the imposing palace occupied by the royal family, was originally the municipal building or town hall. This is not generally known. The city is now desirous of resuming possession of the property as a structure for local governmental purposes, and has made a proposition to build a palace for the royal family in one of the new residential sections. The present palace was converted to domestic uses in 1808, when it was given by the people to King Louis Bonaparte, as a residence. In that it is agreed on all sides that improved quarters must be found for the municipal offices and archives, the probability is the property will revert to the city and a new palace be erected.

* * *

TESTS CONDUCTED at the Prussian Royal Testing Laboratory of Gross-Lichterfelde under the direction of Professor Martens, says the "Builder," show conclusively that structural iron is not prejudicially affected by innumerable repetitions of stress during long periods of actual service. In the report for last year it is stated that tensile tests of specimens taken from old wrought-iron railway and highway bridges showed ultimate strength and elongation almost exactly equal to those for specimens which had been under different stress, while comparative tests on annealed test bars showed only a slight decrease of strength. Professor Martens considers that the results justify the conclusion that the mechanical properties of the iron were not appreciably impaired by service during about fifty years.

* * *

GETTING A STRUCTURE OUT by the roots, as a contemporary aptly puts it, forms a unique spectacle now being witnessed at Baltimore, (U.S.A.), where wreckers are at work demolishing The Baltimore News Building, a nine storey reinforced concrete structure which was erected at the corner of Calvert and Fayette streets, shortly after the great fire in 1904. The work is being done with the aid of pneumatic drills, chisels and sledge hammers, and while the task of cutting and breaking away the concrete from the reinforcing rods of the framework is a difficult and tedious one, very excellent progress is reported as being made. The corner, which is a valuable one, will serve as a site for a 16 storey office building to be built as soon as the present structure is removed. It is estimated that the cost of razing the present building will be \$35,000, less the salvage of steel which has been purchased by a local wrecking concern.

THE NEW GRAVING DOCK at Belfast, Ireland, which was recently completed, after seven years of uninterrupted labor, is excavated entirely on ground reclaimed from the sea by the staff of the Harbor Commissioners. One of its most striking features is a travelling caisson gate of rectangular form. This is operated by means of a couple of endless chains, which haul the gate into its track across the entrance and withdraw it again into the recess made for it. Hydraulic machinery supplies the power for hauling the caisson, which can be opened or closed in from four to five minutes. The dock was built at a cost of \$1,750,000 and its principal dimensions are as follows:— length of floor, 850 feet; length with caisson, 887 feet; width of floor, 100 feet; width of coping, 129 feet; thickness of concrete floor, 17½ feet; depth at ordinary high-water spring tides, 33 feet; height of keel blocks above floor, 4¼ feet. When a vessel is set she will rest on 334 sets of heavy keel blocks. Like the machinery which operates the gate, that used in the pumping station, which contains three engines with a total horsepower of 3,000, is also of a special type. The whole dock can be cleared of its water, 23,000,000 gallons, in one hundred minutes. A special contrivance is provided to permit of its operation by manual labor in case the hydraulic machine fails.

* * *

AN INTERESTING FEATURE of German life is the fact that, in spite of the tremendous progress of the country, mediæval customs are still in evidence here and there, side by side with all the adaptations to the necessities of modern life. Especially is this true as regards locksmithing, which to-day is as important a trade as plumbing or blacksmithing. The first lock and key was introduced into Prussia in the fourteenth century, and caused a considerable sensation at the palace of the Elector of Brandenburg. He found that by this device he could do away with the guard at his private doors and thus materially reduce his household expenses. Since that day the "schlosser," or locksmith, has been a most essential factor in German life. The present German house key could be used as a weapon of attack and defence, besides serving its original purpose. It weighs on an average, about one-eighth of a pound; and, as each person entitled to carry a house and corridor key has nearly a quarter of a pound of soft iron in his pocket, it is conservatively estimated that the amount of iron in circulation in Germany in the pockets of the men and the handbags of the women amounts to 2,695 tons, besides an additional 2,560 tons for the keys to the interior of German homes. Thus, something over 5,000 tons of iron are put into keys of a size to be found nowhere in America. However large the house or numerous the apartments, the outer door is locked promptly at 10 o'clock; and, as the German spends many of his evenings out, every person carries at least one of these massive keys to affect an entrance. Bells at the outer doors are uncommon except at the homes of doctors.



SEVENTEENTH CENTURY BUILDING METHODS IN ENGLAND

Some interesting facts gathered from an old text dealing with quantity estimates, cost of material and labor, and certain regulations regarding the erection of structures.

SOME INTERESTING LIGHT is shed on the methods of building construction employed in England during the 16th century, in "Mortimer's Husbandry," an old book published in 1712. The text deals with quantity estimates, cost of materials and labor, and certain regulations regarding the erection of structures, and is valuable as affording a comparison in this respect with work undertaken in the present day.

According to this authority, the cost of constructing a barn that had a single stud, or one heighth of studs to the roof, was 2 shillings (50c) per square foot. For a double stud and girth it was 2 shillings 6 pence per foot. In measuring the structure the dimensions of one side and one end were taken. If, for instance, a barn was to be 60 ft. long and 20 ft. wide, making 80 ft., the cost of hewing the timber, sawing it out, framing it, and setting it together, was 2 shillings 6 pence (62½c.) per foot; 10 pounds (\$50) if the carpenter furnished the timber.

The House of 1712.

Referring to the construction of houses of that period, the volume states, "Upon a good foundation, two bricks or 18 inches thick for the heading course is sufficient for the ground work of a common structure, and six or seven courses above grade to the water table, where the thickness of wall is cropped off the thickness of a brick, or 2½ ins. on each side. For houses of three to five stories, the walls of such from foundation to water table should be three courses of heading brick, or 28 inches in thickness, and at every story a water table and off-set on inside for joist to rest on; the joist to extend in wall one-quarter part for the better bond. For partition wall 1½ brick thick, and upper stories one brick or 9 inches thick."

To dig foundations one brick wide and one foot deep, the price was one penny per foot. Where it was 2½ ft., it was 2 pence per foot, and so on.

Brick Work.

Bricklayers' work was measured by the pole square of 16½ ft. square, taking out the door and window openings. A bricklayer received 2 shillings 6 pence per day, and a laborer 20 pence; while the price of brick was 14 shillings per M, lime 4½ pence per bushel, and roofing tile 2 shillings 6 pence per 100. The average price for bricklayers, who furnished everything, was 5 pounds a pole square of 272¼ square ft., that is, for house work. For the construction of walls, alone, where the bricklayer furnished the materials, the cost was 4 pounds 10 shillings. For laborers only, it was 1 pound 2 shillings

per pole square for 272¼ square ft. 1½ brick thick. "If a wall is more or less than 1½ brick thick, it must be reduced to a brick and a half by multiplying the length and height by the number of half bricks the wall is in thickness, and divide the product by 3 and that by 272¼ inches."

In size, the bricks were 9 ins by 4½ ins. by 2½ ins. and 4,500 were required for a pole square, together with 25 bushels of lime.

Brick Making.

Regarding the manufacture of brick, 7 tons of coal (2,000 lbs. to the ton) were allowed in burning a clamp of 16,000, or 10 bushels of coal per thousand of brick, while the workman received 6 shillings per thousand for making them; "a square yard of clay being required for 7 to 8 thousand bricks."

Roofing tile was measured by a square of 10 by 10 ft., and 3 shillings 6 pence was allowed per square for the labor. To provide all but the tile, the price was 12 shillings; while to furnish everything, it was one pound 6 shillings per square. Roofing tile was laid in mortar or cement on lath, and 3 bushels of lime were required per square. The cement was laid on the first course of tile near the middle, and the next course bedded in it and joined on the underside; 100 lath and 500 nails being required per square. The nails were hand made and courted.

Thatching roofs with straw was done at a price ranging from 2 shillings 6 pence, to 3 shillings per square of 10 by 10 ft., and with reeds at 4 shillings per square; 1,000 reeds costing about 15 shillings, covered 3 squares of the roof. Two good loads of straw were sufficient to cover 5 squares. The thatch was tied on with ropes or writhes.

Carpenter Work.

All sawing of lumber was done by hand in the saw piles. The price was 2 shillings 8 pence to 3 shillings per 100 square feet, measured at the middle length of the log.

Heart lath of oak were 1 shilling 10 pence per 100. Sap lath of oak were 1 shilling 8 pence per 100, and fir lath were 12 pence per 100. The carpenter work was done by the square of 10 by 10 feet or 100 square feet. At London, the book states, "they will build a house four stories high for 40 pounds (\$200) per square, if built of oak, and 30 pounds if built of fir. This includes mason work, etc."

ARTESIAN WATER SUPPLY.

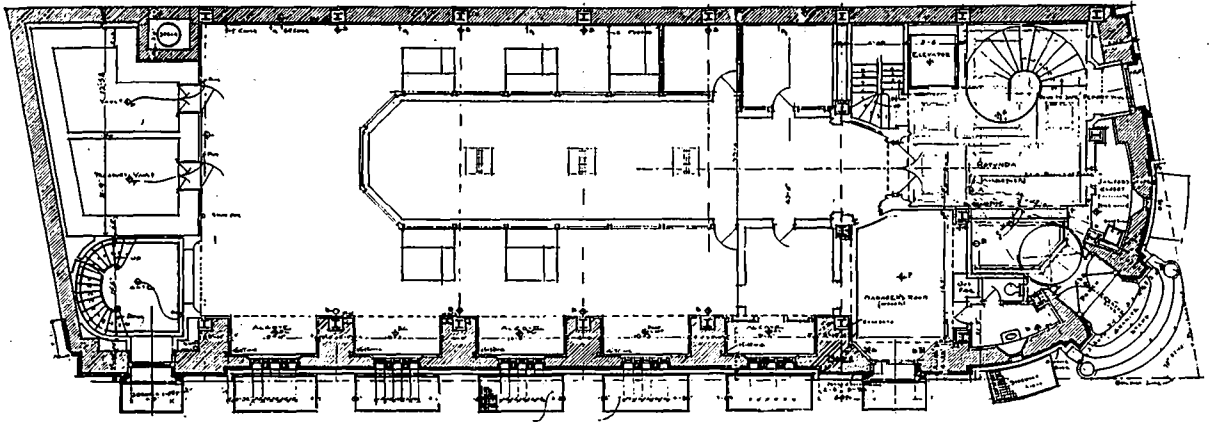
SIX HUNDRED WELLS are being drilled in the vicinity of Altbunzlau, Bohemia, which is near the junction of the Rivers Elbe and Iser, to obtain an abundant supply of pure drinking water for Prague and its suburbs. The water from these wells will be collected into four large basins, from which it will be conducted to Prague through mains 3 feet 6 inches in diameter, the total length of the mains being 15 miles from the reservoirs to the city limits. The capacity of the wells is placed at 18,491,900 gallons daily.



Recently Completed Building of the Bank of Nova Scotia, Portage Avenue and Garry Street, Winnipeg. Darling & Pearson, Architects.



Main Entrance, New Premises, Bank of Nova Scotia, Winnipeg. Showing Detail of Terra Cotta Work. Darling & Pearson, Architects.



Ground Floor Plan, New Premises, Bank of Nova Scotia, Winnipeg. Darling & Pearson, Architects.

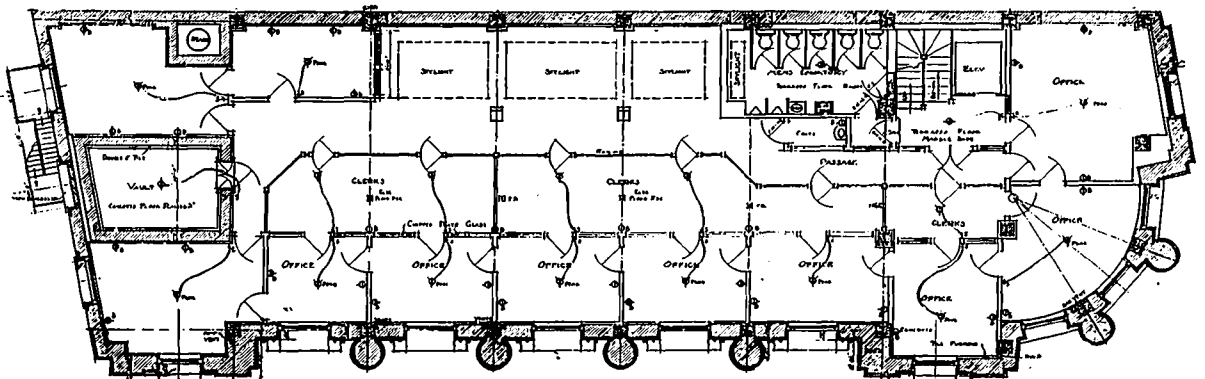
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ODERN WINNIPEG PREMISES OF THE BANK OF NOVA SCOTIA

Brief description of architectural features of important structure occupying frontages of 140 and 44 feet at the corner of Portage Ave. and Garry St.

THE NEW BUILDING of the Bank of Nova Scotia, illustrated herewith, is one of the more noteworthy commercial structures recently erected in Winnipeg. It is of steel and hollow tile construction, fireproof in character, and enclosed in walls of semi-glazed terra cotta. The design, which is an adaptation of free Renaissance, is admirably suited to give due prominence to an important structure occupying frontages of 130 and 44 ft. at a point where the confluence of traffic is heavy. Viewed from the corner the building, with its massive colonnade, and terra cotta dome accentuating the curvilinear intersection of walls, presents an appearance which well typifies the combined quality of dignity and stability such as a structure designed primarily for banking purposes should essentially possess. As indicated by the accompanying drawings, the plans meet in a most successful way the modern day requirements of a joint bank and office building. The entrance with its chaste detail and four stone steps of easy gradient, leads into the rotunda, through which the banking room

is reached. Here the wall scheme is executed principally in Caen stone, the ceiling elaborately panelled in plaster, and the floor laid in grey Missisquoi marble with a border of light Tennessee and verde antique. Opposite the doorway is the elevator enclosed in a grille work of iron, while more towards the centre of the rotunda is a circular staircase of marble leading down to the safety deposit vault in the basement. In the banking room the general scheme is treated to be consistently in character with the exterior of the building. This interior occupies an area of 73 by 34 ft. clear space, and is 29 ft. high. Caen stone is employed in the doorway and walls up to a height of 11 ft., and above this the space is divided into a series of panels finished in plaster. The woodwork is of mahogany, and the counters, which are surmounted by grilles of solid bronze, are executed in a combination of light and dark grey Missisquoi marble with an inlay of verde antique. Missisquoi marble is also used for the floor scheme and the three cheque desks placed at regular intervals in the public space. An interesting feature of the plan is a series of alcoves in the wall forming the Garry Street elevation. These provide additional space for the banking staff, and assist materially to make the working arrangement most complete. The vault equipment, as might be assumed, is of the approved modern type. This applies both to the vaults in the banking room and the safety deposit vaults in the basement. The upper floors are occupied by offices, the arrangement



First Floor Plan, New Premises, Bank of Nova Scotia, Winnipeg. Darling & Pearson, Architects.



Banking Room, New Premises, Bank of Nova Scotia, Winnipeg. Showing Detail of Counter Work and Wall Treatment. Darling & Pearson, Architects.



Banking Room, Looking Towards the Entrance, New Premises, Bank of Nova Scotia, Winnipeg. Darling & Pearson, Architects.

of the suites being indicated in the accompanying plan. Messrs. Darling and Pearson were the designing and supervising architects, and Thos. Kelly and Son, Winnipeg, the general contractors. The terra cotta used was furnished by Eadie-Douglas, Ltd., Montreal, and this firm also supplied the marble work with the exception of the counters. Other contractors were:— Bronze counter work,

interested at the present time in the Church of any particular sect as in the expression of worship in building.

REINFORCING RODS OF RE-ROLLED STEEL

A PREJUDICE which has long been entertained says the "Iron Trade Review," is that against reinforcing bars, which are rolled from old material. These bars, commonly rolled from old rails, have a high carbon content. A finding of interest to makers and users of such bars is that of the committee which was appointed in Cleveland recently to examine into and report on the collapse of the Henke building in that city on November 22, 1910. The main cause for the collapse of this building, a four-story and basement reinforced concrete structure, was given as the condition of the concrete, which had not been given sufficient time to set before being subjected to the weight of the building. Although not included in the official report, members of the committee, when interviewed, stated that the reinforcing bars used in the building, while bent and greatly distorted as a result of the collapse,

showed only a minimum amount of breakage. The bars which were used in this building were high carbon re-rolled from old rails. These high carbon, re-rolled bars are hot-twisted, and not cold-twisted, as is usually the case. Numerous tests made by inspection bureaus show that re-rolled high carbon bars of average size develop a tensile strength of from 80,000 to 95,000 lb. and an elastic limit of 50,000 to 65,000 lb. per sq. in., combined with a ductility which will permit bending through 180 degrees to the arc of a circle of which the diameter is equal to three times the diameter of the specimen tested. These figures exceed those generally required by engineers for concrete reinforcing purposes.

SEVENTY-NINE BUILDINGS in Victoria, B.C., were recently condemned at one sitting of the City Council. From this sweeping action it would seem as though the city authorities at that place are determined to rid their municipality of all dangerous and unsanitary structures, and thereby set up an example which many other municipalities can follow with profit. Dilapidated and disease-breeding buildings are always a serious menace to any community, and while the danger of their presence is usually understood, yet little, as a rule, is ever done in the way of an organized effort to bring about their summary removal. Too often condemnatory proceedings are never carried into effect, but it is to be hoped that this will not prove so in the case of Victoria.

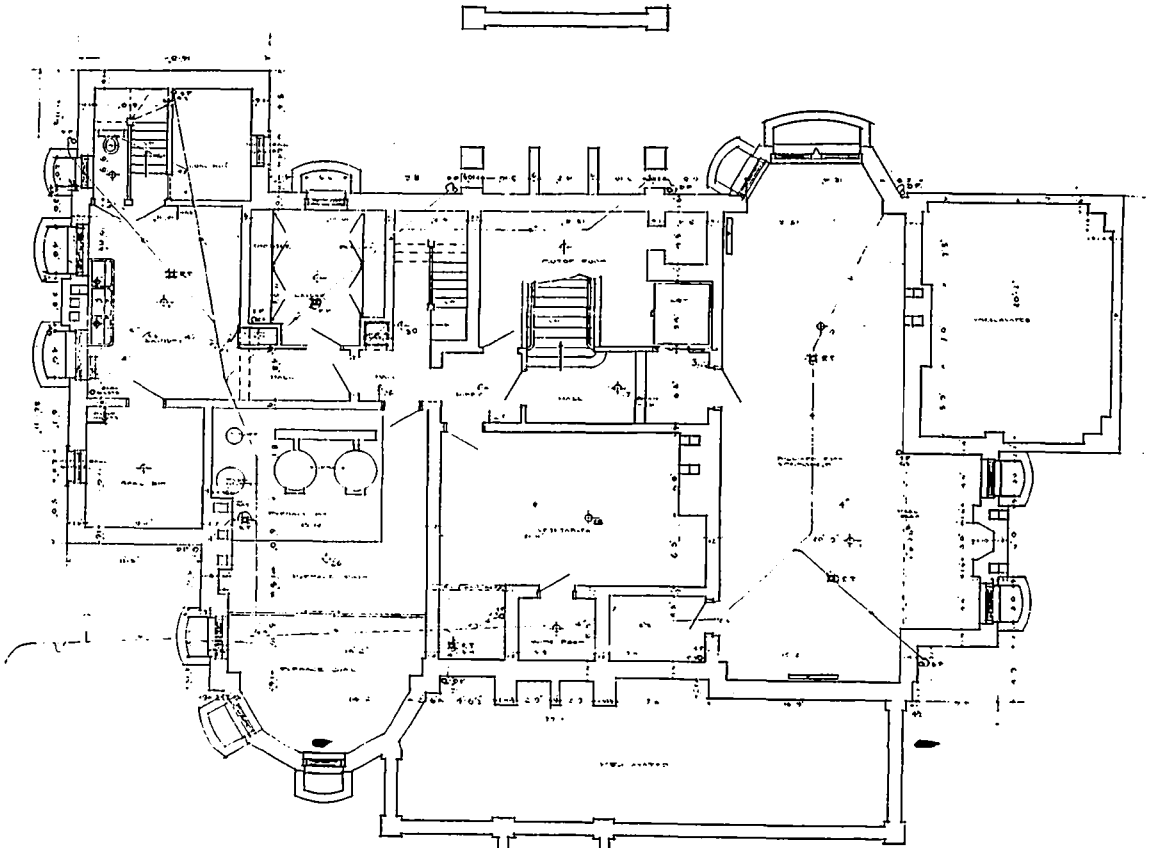


Approach to Banking Room through Rotunda, New Premises, Bank of Nova Scotia, Winnipeg. Darling & Pearson, Architects.

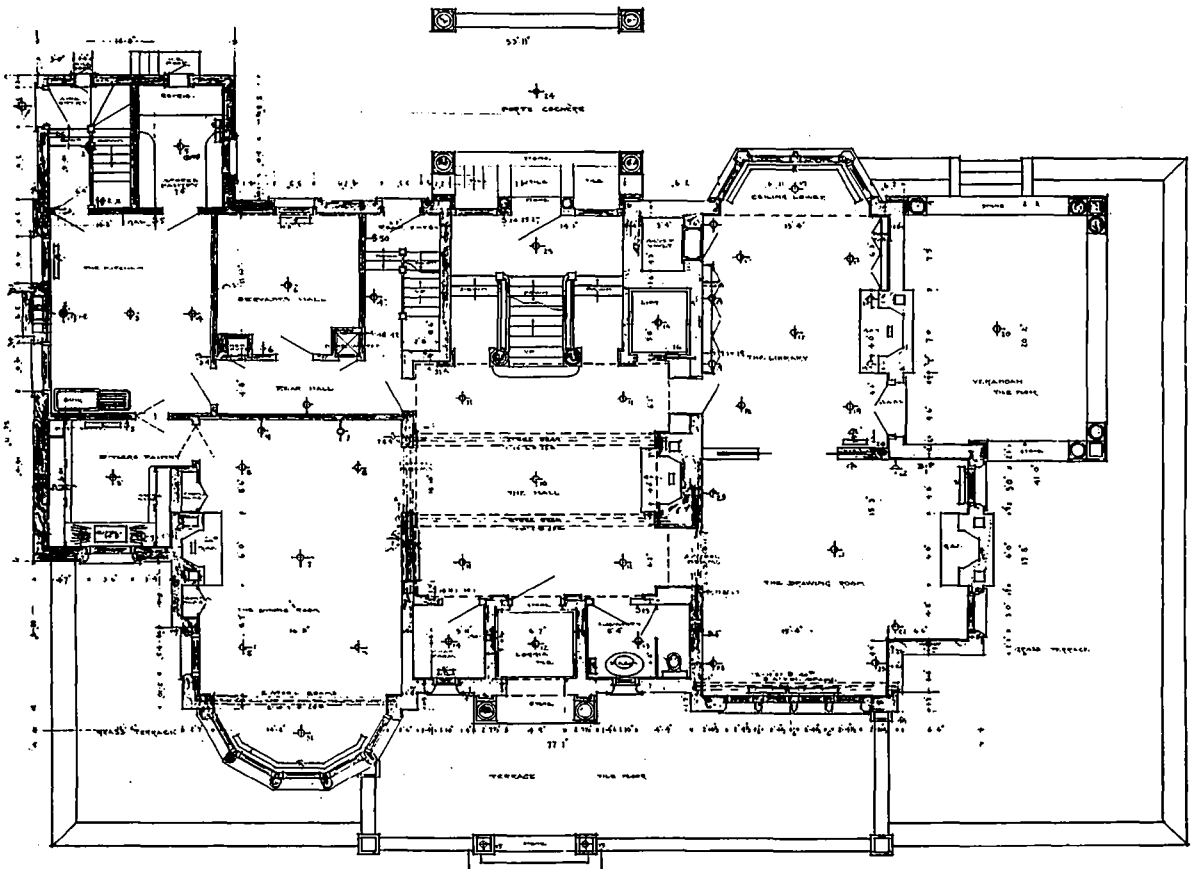
Canada Foundry Company; elevator grilles, Western Iron Works; elevators, Otis-Fensom Elevator Company; vaults, Goldie & McCullough.

CHURCH ARCHITECTURE—Continued from Page 62

This secularization of architecture, which commenced before the end of the 13th century after the last Crusade, as the influence of the monastery declined and the new learning and the new development of commerce and art in Italy occupied the minds of the people instead of religion and fighting, developed in England our most characteristic building, our domestic and collegiate buildings of the Tudors, from the time of Henry Seventh to that of James 1st, England's greatest time, the Elizabethan days. But they were purely buildings for domestic comfort and convenience, and properly that was their chief expression. There was nothing of religion or philosophy in them, nothing that could suggest the temple. They all seem to reduce the great to the little, and to suggest content and material satisfaction rather than spiritual aspirations, that is what makes them look so comfortable. And it is so evidently what the people were after that the churches built after the Renaissance—were comfortable, partitioned off with cushioned seats for those who patronized them. Man had become of so much more importance as a spectator than the insignificant worshipper, who knelt on the stone floor behind some great column. Yet, it is of the worshipper we wish to hear. We are not so much in-



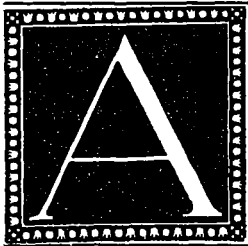
Basement Plan, Residence of C. S. Boone, Crescent Road, Toronto. Chadwick & Beckett, Architects.



Ground Floor Plan, Residence of C. S. Boone, Crescent Road, Toronto. Chadwick & Beckett, Architects.



Residence of C. S. Boone, 142 Crescent Road, Toronto—Built of Dark Red Stock Brick with Indiana Limestone Trimming, and Noteworthy as an Adaptation of the Tudor Style to Modern Domestic Design. Chadwick and Beckett, Architects.



AN ATTRACTIVE TORONTO HOME IN TUDOR DESIGN

Interestingly considered Rosedale Home, which is reminiscent of some of the more notable work of the domestic architecture of this particular period.

NEW RESIDENTIAL WORK possessed of any degree of architectural merit, while always of more or less general interest, is doubly noteworthy as a rule if the scheme employed embodies in its treatment features which reflect the spirit and homelike charm characteristic of certain recognized types of domestic buildings developed in England. In this connection it might be said that the character of domestic work to-day divides itself into two general classes, one the ultra-modern in which novelty of effect is extensively and often successfully introduced, and the other that which incorporates in its architectural treatment essentials of design adopted from the work of some particular period.

Of the latter class a very excellent example is the residence of C. S. Boone, Crescent Road, Toronto, which was recently erected from designs by Messrs.

Chadwick and Beckett. The exterior, which is executed in red stock brick with Indiana limestone trimmings, is in the Tudor style, and in certain respects is reminiscent of some of the more interesting individual features which this period produced. Especially is this true of the entrance scheme with its upper balustrade, which is reproduced in motif from Blickering Hall, built at Norfolk in 1620, and also as regards the balustrade enclosing the terrace along the front, which is modelled after a similar feature at Bramshill House, built in 1603. The terrace is paved with red quarry tiles, and the lamps surmounting the balustrade at either side of the doorway are of special designs in bronze.

Entrance to the interior is through an open loggia, having cut stone walls and a tiled floor. The main hall with its spacious dimensions taking up the entire central portion of the ground floor, is finished in



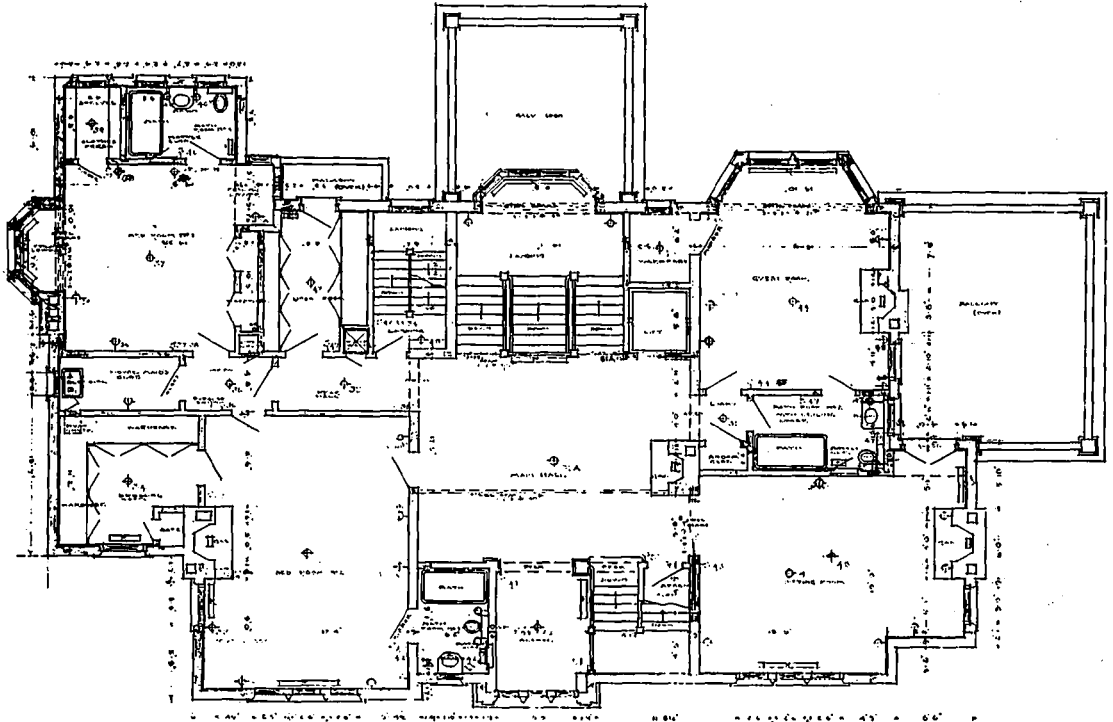
View from the South-East, Residence of C. S. Boone, 142 Crescent Road, Toronto. Chadwick & Beckett, Architects.



Reception Hall, Residence of C. S. Boone, Crescent Road, Toronto—The Panelling and Woodwork is in Mahogany, and the Fireplace is Faced with Pompeian Brick. An Interesting Decorative Feature is the Inset Panel of Florentine Bronze Above the Mantel Shelf. Chadwick & Beckett, Architects.

mahogany with beamed ceiling and panelled walls, an interesting feature of the scheme being a Pompeian brick fireplace with an inset panel of Floren-

1602. A noble feature, indeed, is the combined mantel and china closet, which is twelve feet wide and reaches to a cornice of the old English grape-

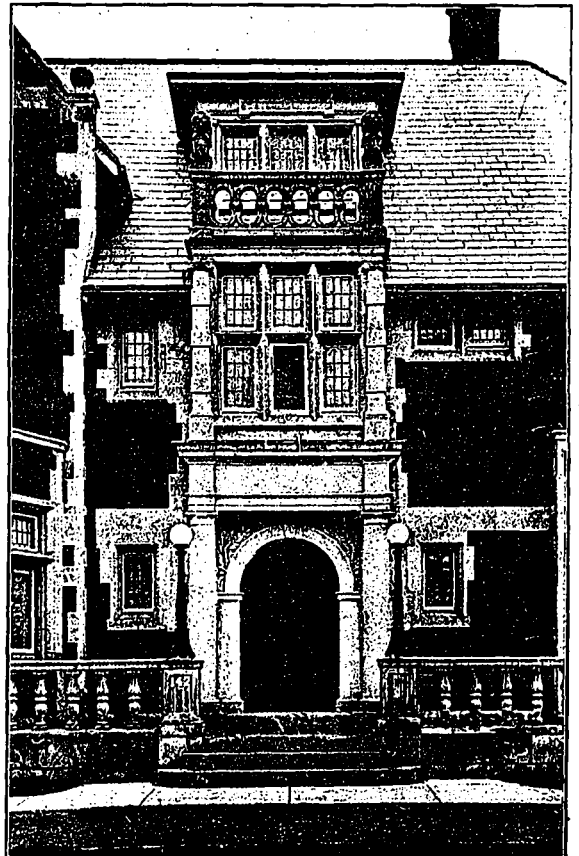


First Floor Plan, Residence of C. S. Boone, Crescent Road, Toronto. Chadwick & Beckett, Architects.

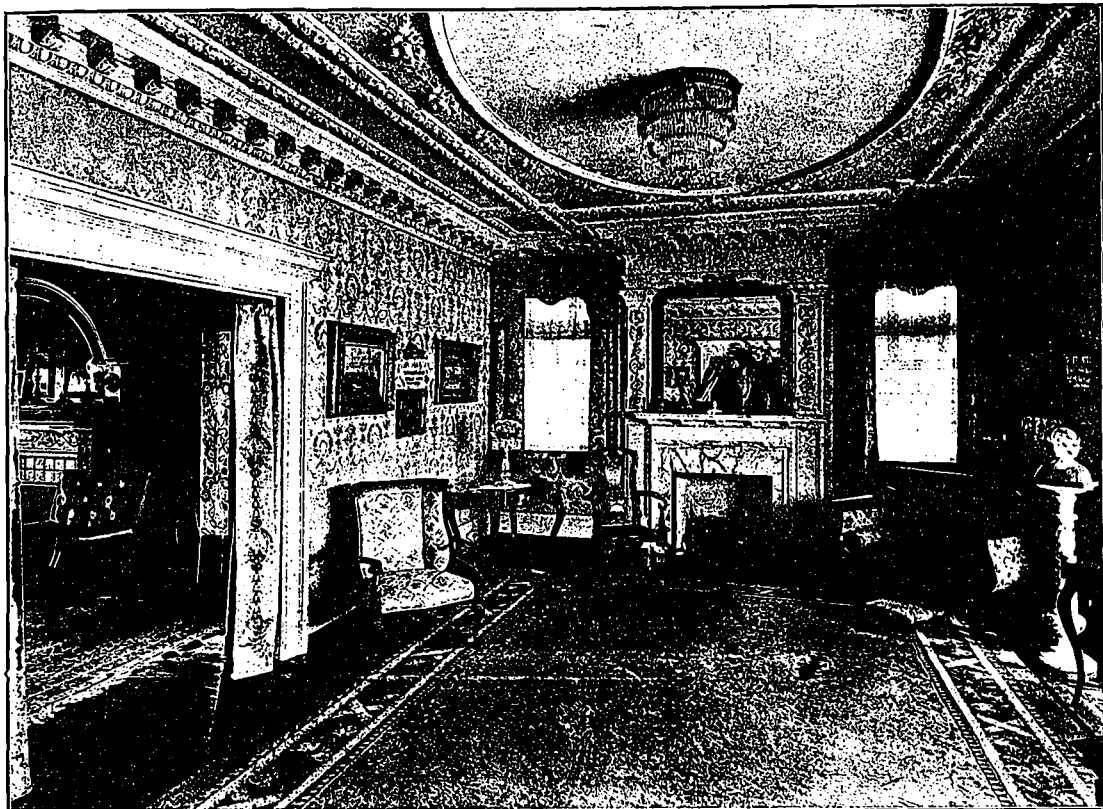
tine bronze above the mantel shelf. At the rear is the staircase and an automatic electric elevator serving all floors. Behind the staircase, which branches both ways from the first floor landing, is a lower hall, situated down two steps from the main floor, which opens on to a *porte cochere* at the rear.

Throughout the entire house the architectural scheme is beautifully in harmony, the general arrangements of the rooms being explained in the accompanying plans. The drawing room, which is placed in a south-east position, is finished in white enamel with an enriched plaster ceiling and cornice of Renaissance design. The fireplace of this interior has a molded base of Pavonazzo marble, and the motif for the carving of the mantel is taken from a fireplace in Hampton Court. In the library, which adjoins, the scheme of woodwork is carried out in exquisitely matched Circassian walnut, the veneer for the entire room, including the wainscotting, doors, mantel and beamed ceiling, being taken from a single log. Near the fireplace is a double door of glass opening to a spacious verandah paved with red quarry tile; while immediately off the rear of the room, at the left of the bay window, is a concealed silver closet forming an interesting part of the plan.

The dining-room, situated on the opposite side of the hall, and which has a large bay window at the front, is panelled in San Domingo mahogany finished in light natural tone. Here, also, the veneer for the entire woodwork is taken from a single log, while the panelling and fireplace is reproduced in motif from Knole House, Seven Oaks, England, built in



Detail of Entrance and Upper Balustrade, Residence of C. S. Boone, Crescent Road, Toronto, which is Reproduced in Motif from Blickering Hall, Norfolk, built in 1620. Chadwick & Beckett, Architects.



Drawing Room, Residence of C. S. Boone, Crescent Road, Toronto—Finished in White Enamel with a Renaissance Enrichment for Plaster Ceiling and Cornice. The Motif for the Carving on Mantel, which has a Molded Base of Pavonazzo Marble, was Taken from a Fireplace in Hampton Court. Chadwick & Beckett, Architects.



Library, Residence of C. S. Boone, Crescent Road, Toronto—Carried Out in Circassian Walnut with a Hand Decorated Frieze. Chadwick & Beckett, Architects.



Dining Room, Residence of C. S. Boone, Crescent Road, Toronto—Panelled in San Domingo Mahogany, Finished in a Light Natural Tone. Chadwick & Beckett, Architects.



View Showing General Wall Scheme of Dining Room, Residence of C. S. Boone, Crescent Road, Toronto. The Motif for the Panelling and Fireplace is Similar to that of Knoie House, Seven Oaks, England, Built in 1602. Chadwick and Beckett, Architects.



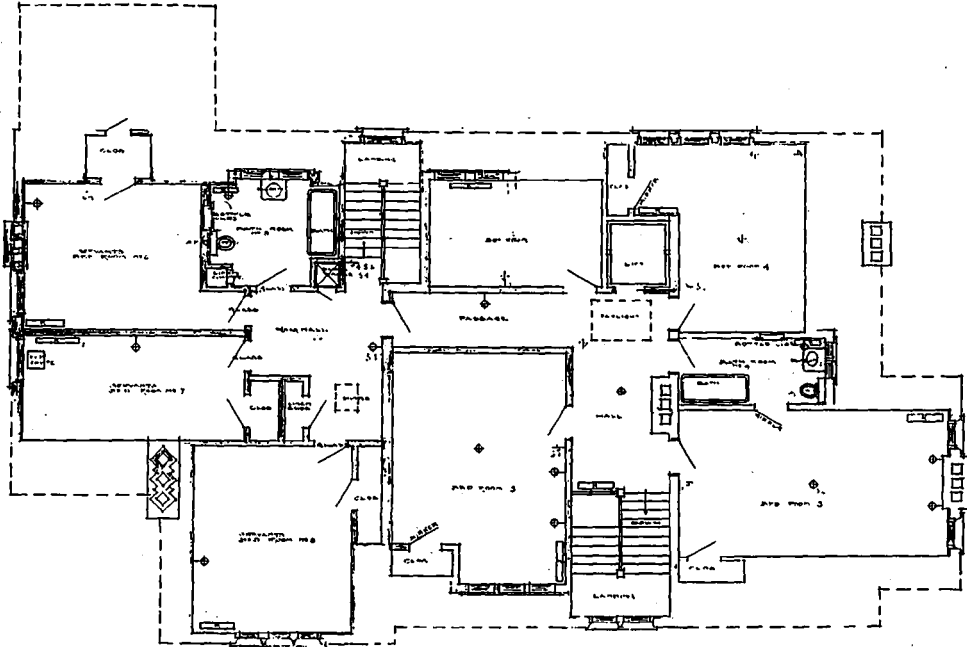
Sitting Room, Residence of C. S. Boone, Crescent Road, Toronto—Finished in Dark Stained Georgia Pine with Strapped Wainscotting and Built-in Ingle Seats. Chadwick & Beckett, Architects.



Owner's Room, Residence of C. S. Boone, Crescent Road, Toronto, which Denotes in Decorative Character the Wall Treatment and Furnishing in the Bed Rooms Throughout. Chadwick & Beckett, Architects.

vine pattern, forming the base of a moulded and enriched ceiling of Elizabethan geometrical design. Connecting the dining-room with the kitchen is a

standing and three box stalls, harness room and coachman's suite comprising living-room, dining-room, kitchen, three bedrooms and bathroom.



Second Floor Plan, Residence of C. S. Boone, Crescent Road, Toronto. Chadwick & Beckett, Architects.

large butler's pantry equipped with built-in work tables, cup-boards and shelves. The kitchen walls are tiled and the service section, which includes a large pantry and storage and spacious servants' hall, is compactly arranged. In addition to the passenger lift, the house contains a dumb waiter, linen chute and dust chute, as well as two sets of vacuum cleaners running from basement to attic, the vacuum plant being installed in the motor room in the basement.

The billiard room occupies the whole of the east side of the basement and is equipped with a large fireplace with built-in seats on either side.

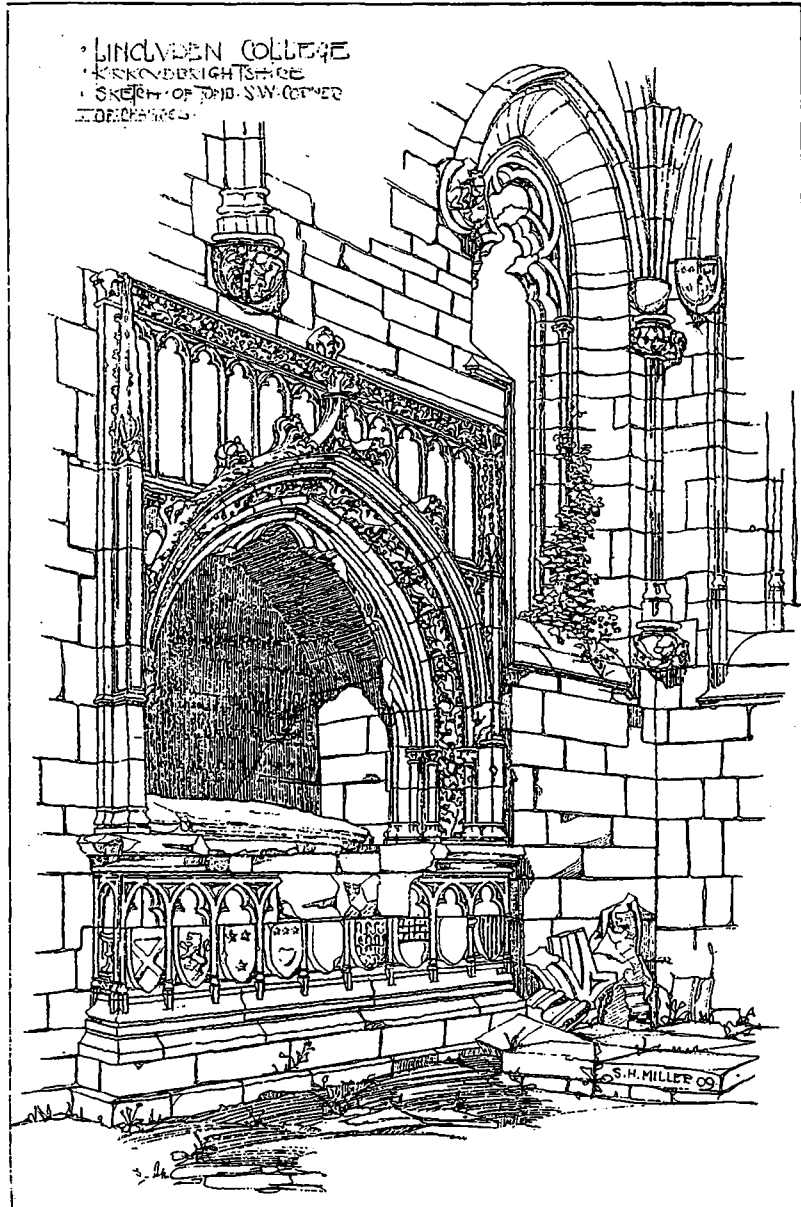
On the first floor, the central feature is the hall, which is twenty-two feet square with a bay situated over front entrance. This is finished in mahogany. The sitting-room is finished in dark stained Georgian pine with strapped wainscoting and built-in seats on either side of the fireplace. In addition to these interiors, this floor contains three large bedrooms with adjoining baths. These are finished in white enamel with delicate wall hangings, an excellent idea of the general appointments being obtained in the accompanying view. The second floor contains three guest rooms, guests' bathrooms, three maids' rooms, servants' bathroom and box room.

The house and stables are equipped with a system of eleven intercommunicating telephones, and a complete burglar circuit of one light in each room and hall.

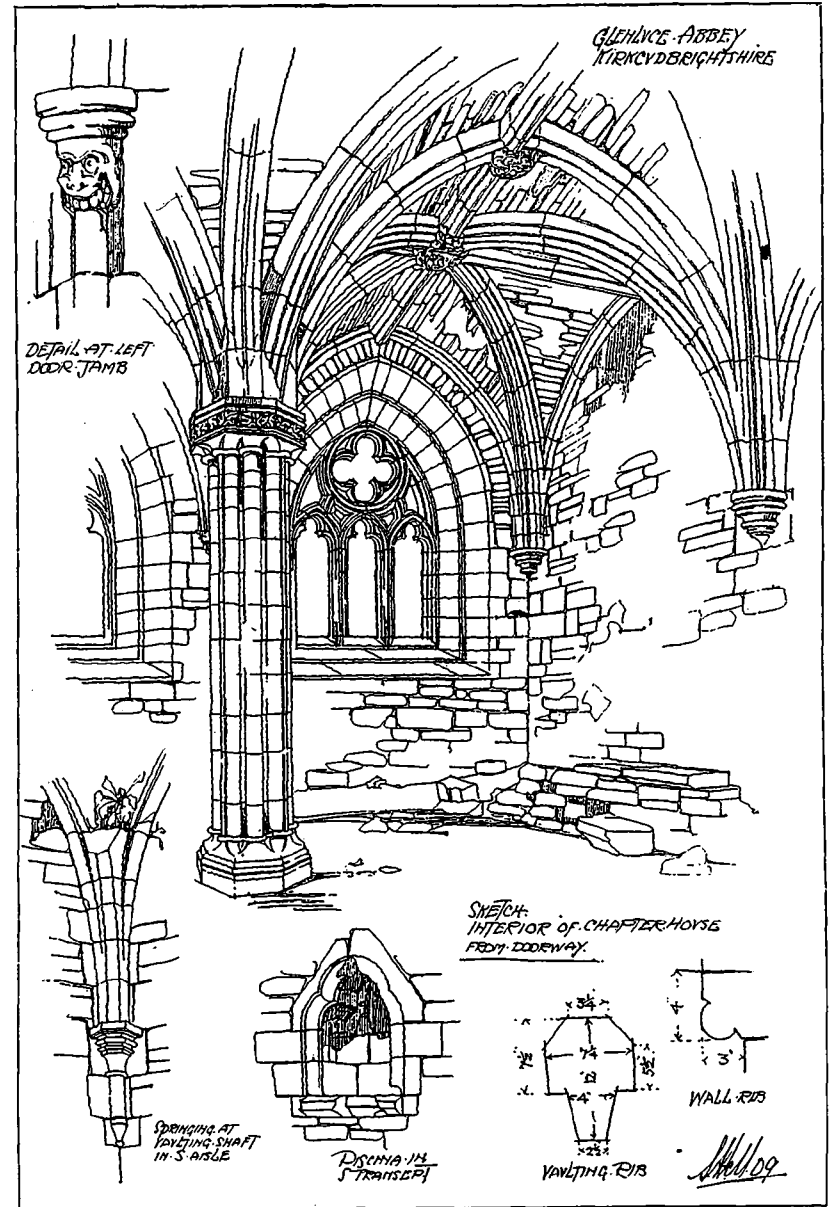
The stable which is shown at the end of driveway in general view contains a carriage room 30 x 38 feet for eight carriages and two motors, besides two

FIREPROOF CONFUSION

COMMENTING ON THE HAVOC recently wrought to the State Capitol Building at Albany, N. Y., a contemporary states that the event adds one more to the considerable list of disastrous fires in "fireproof" buildings. After such events the public is puzzled to understand how so much damage can be done by fire if the building was actually fireproof, and so the opinion has grown, among many, that fireproof construction is a fraud, that there is no such thing, and that one building of stone is about as likely to be consumed as another. The lesson, on that point, is, not to upset the protection offered by fireproof construction, by filling the building with inflammable fittings and contents left exposed. It was the contents of this capitol which burned. Books and pamphlets were piled high on the wooden shelves in the State library. They fed the flames quickly. Other inflammable fittings and papers added to the force of the flames. Even fireproof construction was menaced by the terrific heat. So, altogether, it will cost \$4,000,000 to renovate. It should be clear by this time that fireproof construction loses much of its effectiveness as a safeguard to property when a building so constructed is filled with inflammable material left exposed. The fireproof capitol at Albany was like a stove, filled with fuel. The stove would not catch fire; the contents would. Too hot a fire will warp and crack any stove. The simile here is probably far-fetched, but it emphasizes, nevertheless, the point in question.



Detail of Tomb, Southwest Corner of Chancel, Lincluden College, Kirkcudbrightshire.
CONSTRUCTION, JUNE, 1911.



Interior Detail, Chapter House, Glenluce Abbey, Kirkcudbrightshire.

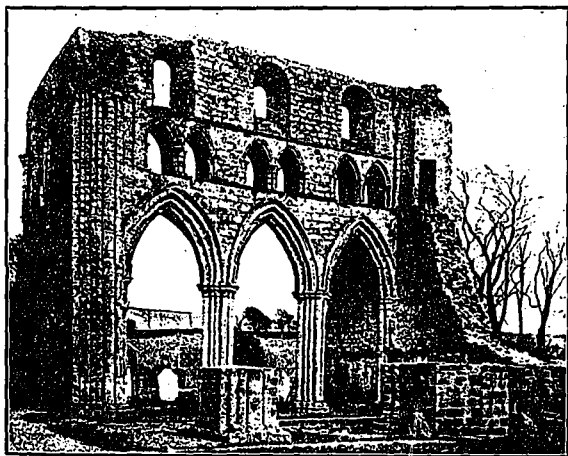
THE CISTERCIAN ABBEYS OF SOUTHWEST SCOTLAND

Interesting old edifices which time has reduced to a fragmentary state. Description of their architectural plan by Sydney H. Miller.

FEW ON THIS CONTINENT, not excepting many who claim a fair degree of familiarity concerning the architectural history of the British Isles, are acquainted in even a remote way with the Abbeys of the Cistercian Order in the southwest portion of Scotland. These old buildings, whose erection antedates the present by a number of centuries, are gradually disappearing; and it is only by such papers as that read by Mr. Sydney H. Miller, a short time back, before the Edinburgh Architectural Society, and which is reproduced here-with from the "Builder," of London, that knowledge of their architectural character and plan is brought to attention. The author in question takes up his subject briefly, yet with considerable detail, giving such historical facts as are available; and his description of several of the buildings as follows will be found to be of more than ordinary interest.

Glenluce Abbey.

The Abbey of Glenluce is situated about one and a half miles west of the village of Glenluce, in the valley of the Luce. Historically very little is known, and few of the names of what must have been a long list of abbots are to be found. It was founded in 1190 by Roland, Lord of Galloway, and was



Remaining Portion of South Transept, Dundrennan Abbey.

colonized by the Cistercian monks, being the seventh in order of foundation in Scotland. It may be stated here that there were altogether in Scotland twenty-eight establishments of the Cistercian Order—i.e., eleven abbeys, three priories, and fourteen nunneries. (The abbeys were Balmerino, Culross, Cupar, Deer, Dundrennan, Glenluce, Kinloss, Newbattle, Melrose, Sweetheart, and Sandal. The priories Friars Carse, Hassingdean, and Mauchline.) It might also be interesting to mention that

this Roland's grandfather, Fergus, was a great patron of learning and religion, and founded several monasteries in Scotland. It was his granddaughter, Devorgilla, who founded Balliol College, in Oxford, and the Abbey of Sweetheart, the last of our old religious houses.

There is some doubt whether Glenluce was colonized from Melrose or Dundrennan, but most authorities seem inclined to the latter belief. The buildings must at one time have been extensive and magnificent, but what remains now with the exception of the chapter-house is very dilapidated indeed.

The plan corresponds very closely to those of Dundrennan and Sweetheart. The south transept and part of the choir are the best preserved portions of the actual church building. Symson, writing in 1684, says: "The steeple and part of the walls of the church, together with the chapter-house, the



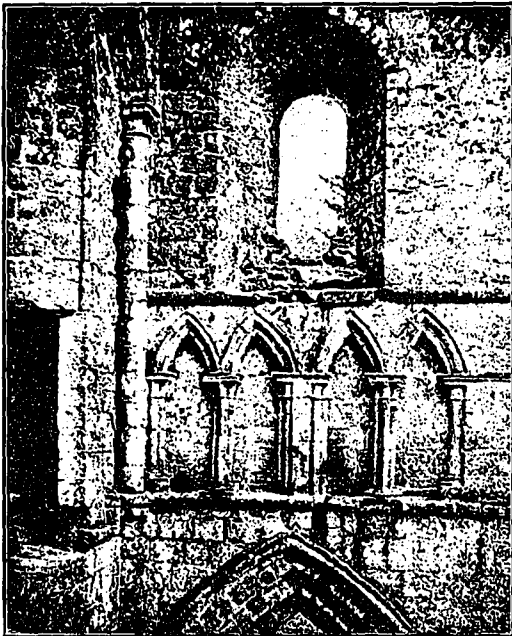
Dundrennan Abbey: North Transept from South Nave Aisle.

walls of the cloister, the gatehouse, and the walls of the precincts, are for the most part yet standing." The nave has entirely disappeared, except for the south wall and the mounds, which are hardly definable, and portions of the west end and door are still visible. In the south transept are still to be found the bases of the arcade piers and their responds, which are E. E. in character. There seems to have been no triforium, but portions of jambs and sills still exist to indicate the aisle windows and clearstory. The aisle has been screened and divided into chapels, and has been vaulted, the ribs being simple splayed stones 7 ins. across. There were two piscinas in the aisle, though one had been replaced very recently—in fact, all over were indications of the restoration which took place in 1884. The cloister square is still bounded on the north-west and south by the original wall, in which are still remaining portions of the doors to the con-

ventual buildings. The portions of the church still remaining are in all probability those of the original structure, finished before 1240, and indicate E. E. of the best period. The chapter-house must be as late as the end of the XVth century. It is 24 ft. square and has a central column. The vaulting is quadripartite, the ribs springing from the column in the centre, and at the walls and angles from carved and moulded corbels. At their intersections are bosses of bold and good design. The apartment is lighted with traceried windows, which seem to have undergone restoration. Above the chapter-house would be the scriptorium, the tiled floor and fireplace of which were exposed in 1884. South-east of the cloisters at some distance are mounds, which may indicate the position of some of the conventual buildings.

Dundrennan Abbey.

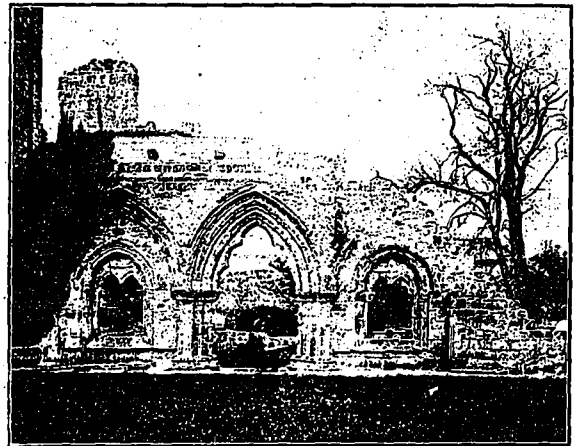
This Abbey, one of the most beautiful specimens of monastic antiquity to be found in Scotland, is sit-



Clearstory and Triforium Arcade, Dundrennan Abbey.

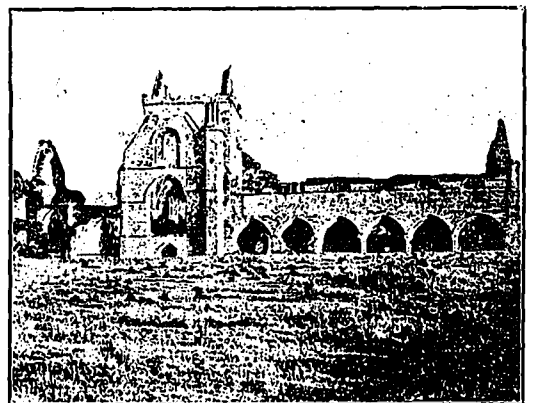
uated on a level plateau, about seven miles from the town of Kircudbright, and is believed to have been the institution from which the abbey just described was colonized. The building is greatly dilapidated, but what remains, with a closer investigation of the more fragmentary parts, gives one a very complete idea of the splendor and stateliness of the whole original structure. Very little of its history is preserved beyond the names of some of its abbots, and even the name of its founder is somewhat obscure. It was founded in 1142. Some authorities say David I., in whose reign it was built, was its founder. Some ascribe it to Fergus, Lord of Galloway. The abbey was colonized by monks sent from the Cistercian abbey of Rievaulx, in Yorks. The ill-fated Queen Mary took shelter in the monastery after her flight from Langside and before she sailed

for England to throw herself on the mercy of Queen Elizabeth. In 1605, the abbey was suppressed, and the monks emigrated to France. Tradition has it that the abbey was burned, but it is more probable that time and neglect brought about its ultimate ruin. Part of the abbey was used as a parish church till 1742, after which it was allowed to fall into decay, and for about one hundred years served as a very convenient quarry for the building of the neighboring village. It was partly repaired by Lord Selkirk in 1838, and in 1841 passed into the hands of the Government, and is now well protected and cared for. The arrangement of the buildings followed in



Entrance to Chapter House, Dundrennan Abbey.

almost all respects the normal Cistercian plan, and resembles very much the plan of Kirkstall in Yorks, which is also of Cistercian foundation. It comprised a church and a cloister garth, with the conventual buildings on its east, south, and north walls. Of the latter buildings very little remains but the entrance front to the chapter-house, which is fairly well preserved. On the west are a series of vaulted chambers and on the south there are only a few indications



Sweetheart Abbey—View from North.

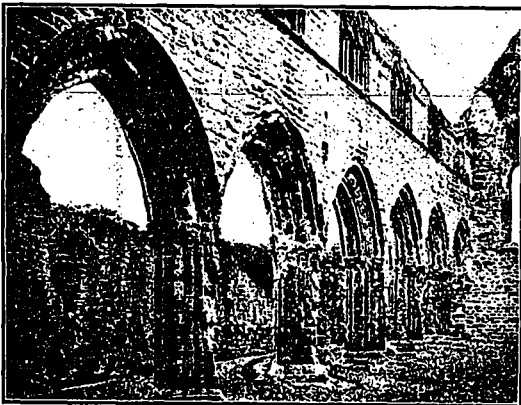
remaining of the domestic premises and a doorway. The church, however, is almost complete as regards arrangement of plan, and the north transept, part of the south transept, and the walls of the choir exist in their original form as high as the wall-head. The choir, of which the east wall is gone, is 26 ft.

wide and without aisles. It has a clearstory of three round-headed windows in each side, and between them triple vaulting shafts carried on corbels. There are here the remains of a triple sedilia and a piscina. The nave, about 130 ft. in length, had north and south aisles. The piers are all gone except the south-westmost one, and the responds on the west wall, the bases of which are still preserved. They are of an early first pointed section. The west



Sweetheart Abbey, from South-East Viewpoint.

door remains complete, though it appears partially restored. The details are transitional in style, the shafts being detached, abaci round, and the small nail-head ornament is used. The transepts are the best preserved portions of the structure. They have three bays and eastern aisles, and the details are, as in the nave, transitional. The aisle windows are of high proportion with semicircular heads, and have very simple mouldings. In both transepts there is a blind triforium and a clearstory. The clearstory windows have deep splays, and are semi-circular headed. The central tower has entirely disappeared, and only the north-east and south-east piers remain. Of the arcading of the cloister (measuring



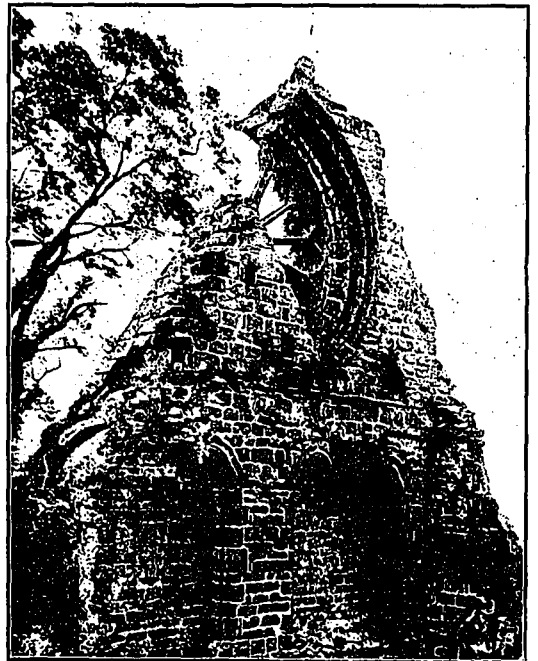
Nave Arcade, Sweetheart Abbey.

103 ft. square) there remain only several of the corbels which supported the vaulting on the north wall, and all of these are of different detail and richly moulded. A number of fragments belonging to it, principally trefoil arches, are found lying in the nave.

The entrance to the chapter-house forms one of the most beautiful portions of the abbey. It has a centre doorway, with a two-light window at either side. The caps and bases to the shafts are E.E., while the nail-head is much in evidence. The carving on the windows is composed of incised crosses

and conventional forms of lilies and Scots thistles. Of the six piers which originally carried the vaulting of this apartment only the lower portions with the bases remain well preserved. Portions of the windows to the library or scriptorium are still remaining over the chapter-house.

The remaining foundations and walls along the south side are hardly complete enough to allow one to assign them to any particular portion of the monastic building. A doorway of fine proportion and good detail exists in this wall towards the west end. Generally, the main structure seems to be of the Transition period. The features of the choir and north transept, *i.e.* the doors, windows, buttresses,



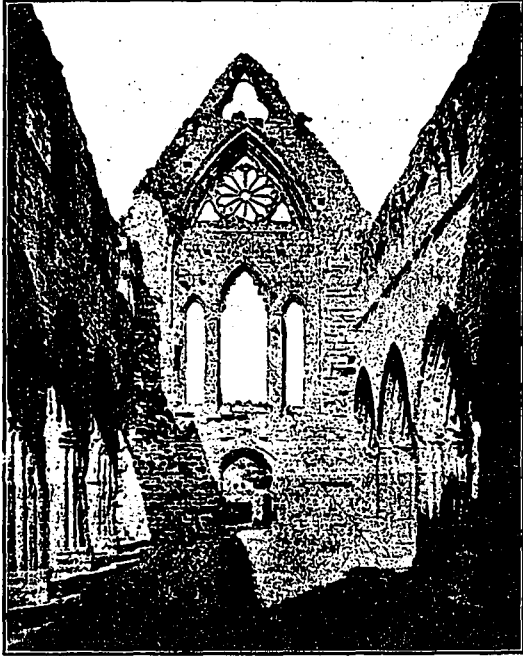
Sweetheart Abbey: Rose Window in South Transept.

etc., seem almost Norman in style, while the main arcade and triforium of the transepts are more advanced.

Sweetheart Abbey.

Sweetheart Abbey derives its name from the fact that the founder, Devorgilla, daughter of Alan, Lord of Galloway, caused the heart of her husband, John Baliol, who died in 1296, to be preserved in an ivory casket, to be buried with her upon her breast when she died. Even the abbots shared in this mellifluous title, and bore the name of Dominies Dulcis. The date of the foundation of the abbey is 1275. The names of many of the abbots are preserved, but none seem to have been specially distinguished, except perhaps Gilbert Brown, a man of exceptional ability, energy and tact, the last abbot of all who held his ground against the efforts of the Reformers, but who finally was exiled and went to Paris, where he died at Scotch College in 1612. The abbey fell into poverty during the War of Independence, and in 1331 we read that the charter of the Church of Crossmichael was granted to the abbey "on account of the well-known poverty

of the said abbey," and again that in 1381 the charter of the Church of St. Colmanell "was granted to the Abbey of Sweetheart and their successors for ever on account of their pressing necessity and known poverty and smallness of income, and the demolition of that monastery by lightning, and its being situated on the borders of Scotland and Eng-



Interior of Sweetheart Abbey—Showing West End of Nave.

land, where great depredations were frequently perpetrated." It is known that the abbey was extensively repaired about the end of the XIVth century by Douglas the Grim," Lord of Galloway, and this, together with the fact that the vigor and influence of Abbot Brown, allowed him to attempt certain improvements, might to some degree explain the style of several features, which unmistakably belong to the end of the XVth century, a period

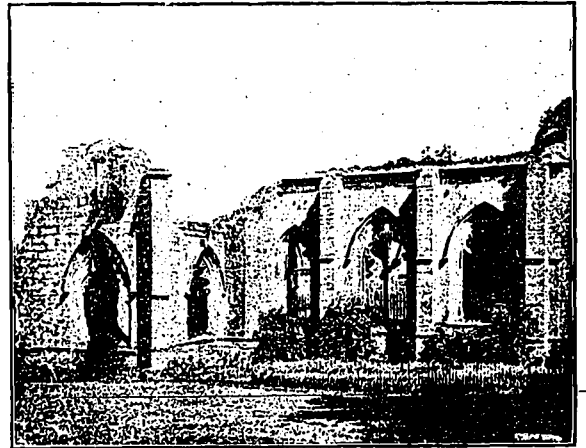


Door in Chancel to Sacristy, Lincluden Abbey.

much later than the rest of the structure of which the character corresponds to the work of the XIIIth century. During the last century the buildings suffered great dilapidation at the hands of those in the neighborhood, who used the stone, which was a soft and easily-worked material, to build their cottages. The abbey is built of red sandstone brought from a quarry on

the opposite side of the Nith, below Dumfries. Granite, the natural stone of the neighborhood, is used greatly in the body of the walls.

Few of our ancient churches are so complete as regards all the divisions of the plan, and it adheres faithfully as regards arrangement and style, both in its secular buildings and the place of worship, to the rules of the Cistercian Order. Of the buildings still preserved, little remains but the church itself and a few of the foundations of some of the more immediate conventual buildings. The former is almost complete as far as its principal features are concerned, and comprises a choir, nave, north and south transept, with their aisles or side chapels, and a central tower over the crossing. The building, however, is entirely roofless, but in its now ruinous condition this fortunately rather adds to its appearance, giving it an air of loftiness and unusual charm. The choir, which is without aisles, measures roughly 28 ft. by 49 ft. It is lit by a large five-light tracered window at the east end, at the north by two three-light windows, and at the south by a two-light and a three-light window. They are all of similar detail. These

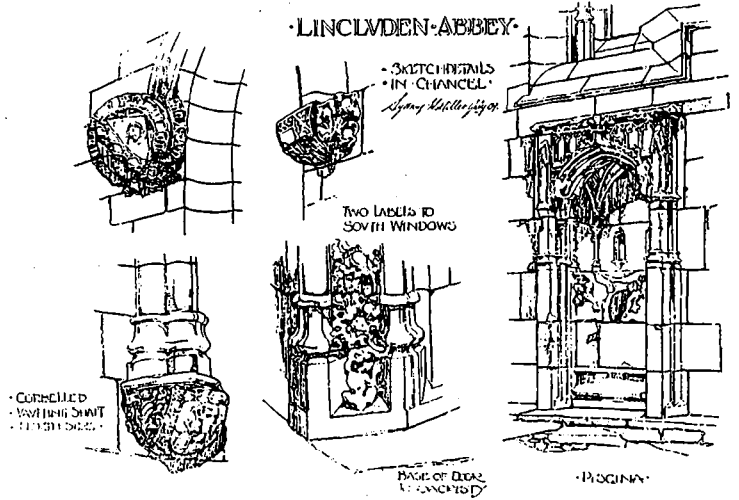


Lincluden Abbey—View from the South.

windows are all in good preservation. It is a peculiarity of this building that nearly all its arches are depressed, the centres being below the springings, and this is especially apparent in the windows of the choir and in the nave arcade. The north and south transepts have each eastern aisles of two bays. In the latter exists the only remaining and complete piece of vaulting, and in both aisles are the remains of wall piscinas. In the north wall of the north transept is a doorway, a large window, of which the tracery is all broken away, and above it a window of somewhat unusual and not altogether happy form. At the north-west angle of this transept is a turret stair which led to the clearstory, and by it to the central tower. In the south transept is to be seen the door which was reached by a flight of steps and led into the scriptorium over the sacristy and chapter-house. In both transepts was a clearstory similar to that in nave and choir, but little remains of it. In the top of the south transept gable is a curious and what, I believe, must have been an ingenious and beautiful piece of design. It is a cir-

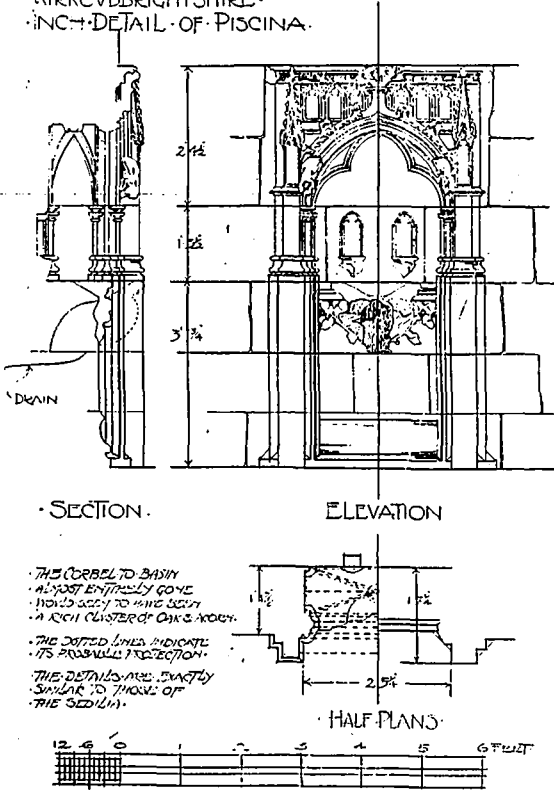
cular or rose window, encroached upon by the gable of the adjoining scriptorium, the apex of which reaches a little beyond the centre of the rose, and which receives the shafts—a curious though happy compromise between beauty and utility. The nave, 114 ft. long, is divided from its aisles by arcades of six bays each. The details of the arch mould, caps, and bases are of simple, bold form and very effective. The responds are still existing on the south wall as high as the caps. There are no vaulting shafts in the nave, and the roof must have been of wood construction. The west door is small and rather plain, and indications are seen of a parvise or porch entrance. The window above it is something of a puzzle. It seems at one time to have been filled with tracery, but this seems to have been broken out and the void filled with solid masonry, carried on two solid buttresses like mullions. The clearstory is undoubtedly the finest feature of the whole building. It consists of a series of triple-arched openings, one in each bay, and on the outer thickness of the wall are triple lancet lights of which the sills are at a considerably higher level than the string inside. In the four eastern bays on both sides

simply moulded) are finely carved, some of first pointed character, and some copied from natural foliage. The central tower over the crossing still stands on its four piers. The tower itself is plain,



Detail in Chancel, Lincluden Abbey, Kirkcudbrightshire.

•LINCLUDEN ABBEY.
•KIRKCUDBRIGHTSHIRE.
•INCH-DETAIL OF PISCINA.



Detail of Piscina, Lincluden Abbey, Kirkcudbrightshire.

and rises to a height of 72 ft. 4 in., measuring to the underside of the parapet corbel table, which is carved with a series of grotesque heads and animal forms. Above the parapet rise the crow stepped gables of what was a saddle-back roof. The water tables and raggles of the high-pitched roofs of the choir, transepts, and nave are all evident on the faces of the tower. The abbey precincts, about thirty acres in area, are enclosed on the north, south, and east sides by a great cyclopean wall about 4 ft. to 5 ft. thick, and built of huge granite boulders. Its height in parts is almost 12 ft. The south side was defended by a broad deep ditch filled with water.

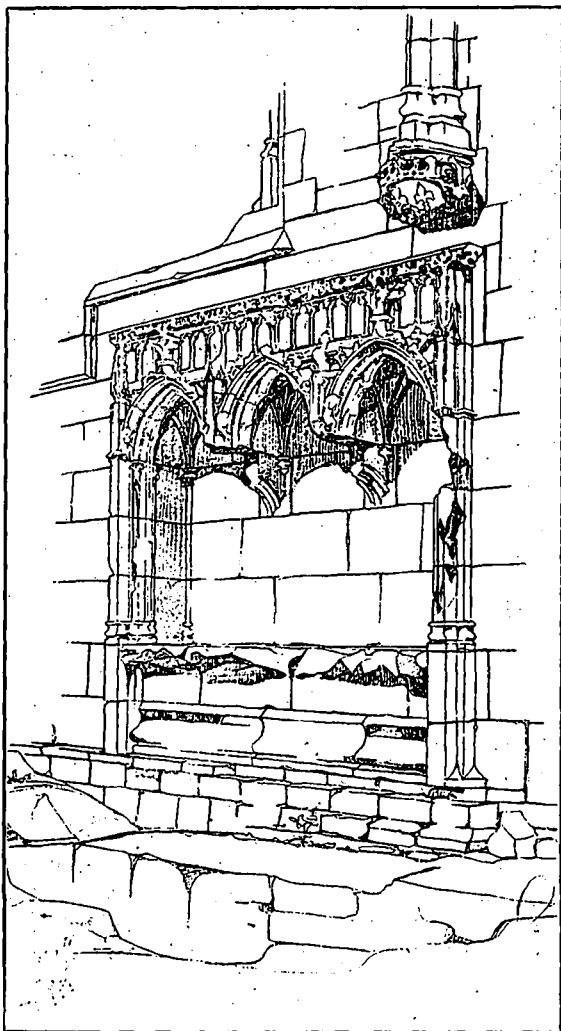
Lincluden Abbey.

The Abbey of Lincluden is smaller and more get-at-able in many ways than those previously mentioned. It is dedicated to St. Mary, and is situated in a most picturesque spot on the river Cluden, just at its junction with the Nith, which stream flows through one of the most beautiful pieces of Scottish country to the Solway. The abbey was formerly a Benedictine nunnery, and was founded by Uchtred, son of Fergus. Very little of the earlier history is preserved, and only one of the abbesses, Lady Alianora, in 1294, is known. At that time it was quite a small establishment, having a household of twenty-five sisters. Of the buildings belonging to this period no portion, with the exception of a few traces of the nave of the church and some moulded stones, now exist. As a nunnery it was suppressed before 1400 in order to form a collegiate church for a provost and twelve canons to make provisions for those dependent on the family of the founder, Archibald the Grim, Earl of Douglas, and Chief Butler in Scotland, who is buried in the sacristy. Archibald was succeeded by his son, the renowned Douglas of Shakespeare's King Henry IV. He was slain in a battle against the French in 1424,

of the church the outside windows of this clearstory are in the form of a semicircle divided by mullions into five lancets. In these same bays the inside caps (unlike those of the two western bays, which are

and his widow, Margaret, daughter of King Robert III., who died in 1449, was buried in the splendid tomb still standing in the chancel. The new foundation consisted of a church with the necessary conventual and domestic apartments, and it is the remains of this latter edifice which are left to us. It escaped the hatchet of the church purifiers long after many of the other abbeys in Scotland. We read that twenty-five years after the lords of the Council were ordering the abbeys to be "kest doon" that Lord Maxwell openly withstood them, and ordered Mass to be sung on three successive days at Christ-

a nave, of which only a portion of the south aisle wall remains; the two vaulted chambers to the north of the sacristy also belong to this period. The church itself is small, but holds its place amongst remaining Scots Gothic relics as one of the finest for boldness, richness, and purity of design. Considering it from without, the first feature that strikes one is the range of projecting buttresses, broken only by small drip mouldings, and having no reduction by intakes. They rise from a strong double base, running round the whole building to the top of the wall, which is finished by a rich foliated and deeply-cut cornice. Between the buttresses are well-proportioned windows which were originally mullioned and filled with elaborate tracery of the flamboyant style. The deep cavetto arch is surrounded by a bold hood mould. One feature of Scottish architecture which became universally characteristic of the later phase in its development is especially remarkable at Lincluden, where it was introduced for the first time. The roof was designed as a double one, the lower roof over the choir being groined and vaulted in the usual manner; above this there was a pointed barrel vault with strengthening ribs at intervals $12\frac{1}{4}$ in. by $7\frac{1}{2}$ in. wide, on which rested a roof composed of dressed overlapping stones. this formed an upper room lit doubtless by the square-headed window seen in the top of the east gable, and reached by the turret or wheel stair adjoining the chancel. It is evident from corbels still remaining at the level of the wall-head that there was a timber floor immediately above the vaulting. The chancel is the most interesting part left, and here are seen several features of beautiful design, although most of them are terribly mutilated. The magnificent tomb of Princess Margaret is perhaps to be noticed first. It is about 9 ft. square. Above a rich panelled base, which formed the sarcophagus, is a curved arch, which originally was elaborately cusped and crocketed. Above the arch is a florid carved cornice, the spaces being relieved with panels similar to the base. At the back of the recess is an incised Latin inscription. The whole work has a wealth of heraldry worked into it; in fact, all over the chancel are found heraldic forms—on the bosses, label terminals, corbels, and other enrichments. The doorway to the sacristy is richly decorated with carving. In the arched head, as is also seen in the tomb, is the Douglas heart with the three winecups surrounding it, the cups indicating his office of Chief Butler. On the south side are the three sedilia and the piscina. They are of similar design and well proportioned, and must have been admirable pieces of workmanship. Corbels below the east window seem to indicate the altar, or perhaps a reredos. The work of the nave is of the same date. The vaulting shafts are carried on corbels carved with figures of angels, and the caps also are of the same strong design, but very little of this portion remains. The eastern range of buildings, the provost's lodging, contains five apartments and extends about 88 ft. northwards measuring from the north side of the nave. These buildings are, however, in a very ruinous condition, except for the ground floor apart-



Lincluden Abbey, Kirkcudbrightshire—Sketch of Sedilia

mastide and other holy days. The last Mass was celebrated in 1585. After this it was occupied as a mansion house far into the XVIIth century. In the present arrangement of buildings the church seems to occupy the same site as the early Norman church, which consisted of a nave and a choir of the same width, the former having a north aisle. These later particulars were ascertained during excavations in 1896, and are given in McGibbon & Ross's "Ecclesiastical Architecture of Scotland." The church, as it exists now, one of the earliest of the Revival period, embraces a chancel with sacristy, a south transept, or a transeptal chapel, and

ments. Most of these have still the complete barrel vault, and in some of the walls are presses or ambrices. Over these apartments between the sacristy and the tower would be the dormitory. There is nothing left to indicate the buildings on the north and south sides of what must have been the cloister garth.



CULPTURE AND ITS RELATION TO ARCHITECTURE

The interdependence of the two branches of art affecting carved ornament and building design. Interesting discussion on subject by W. S. Frith.

THE DISCUSSION of the relation of sculpture and carved ornament to architecture is necessarily directed mainly to that interesting series of instances, where the art of form finds its fullest expression through the harmonious co-operation of both its branches; for though sculpture and architecture may each have their own definite sphere, and are in that sense independent of the other, it is when acting together in harmony that each is recognized as attaining to its highest achievements.

The Egyptian, the Assyrian, the Greek, the Roman, the Gothic, the Renaissance periods are all distinguished by the presence of an adequate sculpture, in sympathy with the æsthetic theme of the architecture much in the same way as a song and its accompaniment. These periods illustrate that architecture and sculpture being phases of one art, their excellence is largely interchangeable and that when working in entire sympathy and understanding, the art of form is effectively presented, because it is then presented in its entirety.

It is suggested that all art is one, and therefore the architect, sculptor, and painter should be united in one person. There are so few instances, however, of this being done with success, that these instances constitute exceptions rather than rules, and judging by the amount a sculptor has positively to learn, and the difference of standpoint his phase of art demands, there is little probability of the artist in either branch really possessing more than a smattering of knowledge in the allied arts.

The early use of sculpture would appear not to differ essentially from the present, viz., assisting to realize an object, or event, a person or an abstract idea; and it still appeals as having qualities which give it predominance as a nucleus around which the associations and memories of a person or event may congregate. Ruskin states that to make things in real volume is a primary human instinct, and cites the case of a child making a cat and kittens in dough in support of this theory.

The subjects of the Egyptian sculpture were historical records of the Kings and their achievements, the representations of their various Deities; and there are some very interesting and realistic portraits of priests and other people of importance, most of these minor works are in wood but their treatment is simi-

lar in character to the granite work, and perhaps for this reason suggests their being thought out in granite.

The Assyrian works are much the same in subject, the records and doings of the Kings, their Deities, and their sports. Those depicting lion hunting are of exceptional vigor in treatment, and expression, as might be expected of a sport loving people.

Of the Greek, the sculpture was mainly devoted to the service of religion, and as the worship of beauty formed a not inconsiderable part, we find this reflected in the humanizing of their Deities, and the effort to represent these of the highest physical development, beauty, and dignity; an effort which eventually developed that magnificent school of sculpture which is still the wonder and admiration of the world. Although Rome continued much the same theology: the impulse of the people being different, the real seems to have had more charm than the ideal; and we find a development of portraiture, and a careful rendering of detail: the things which are, matter rather than the things which might be. We get an actual Hadrian in his statue, and it is a fine statue. We find also a development of the minor forms of sculpture, foliated ornament especially gained in importance.

Greek carved ornament was much more restrained and seems designed rather for effects of light, and of conveying through its texture, the effect of lace-like enrichment on a solid structure; while the Roman is distinguished by vigor and boldness of design, the capitals of the Pantheon which is typical of Roman ornament has remained the dominant type in use for palatial buildings to the present day. Generally, Roman sculpture conveys the impression of being used rather for its decorative value as an adjunct to luxury rather than, as in the Greek, for the love of art and delight found in seeking for its higher development.

The break up of the Roman Empire coinciding with the change of faith, and that faith one in which the ancient sculpture was considered idolatrous; together with vast social disturbances, brought about the disappearance of the architecture and sculpture identified with ancient Rome. After an interval came the rise of the Byzantine order in which sculpture served to record the persons and the incidents of the Faith, although this was affected in a way rather symbolical than personal, while in architecture its principal use was to assist to produce pattern, texture and rhythm, of the general composition. The statues from Chartres Cathedral are a good instance of this, as also is the Portal of Rheims which though of later date carries on the same traditions, and as an example of design must be considered a masterpiece.

This system of using sculpture affords considerable opportunity for the introduction of a variety of scales in the figures, a device not exclusive Gothic but of which considerable use is made in all its varieties. The harmonious contrast of broad surface with broken surface, of lines with fret; and curved, with straight line, while preserving the gen-

eral structural idea, is one which provided the artists with material for some centuries.

The many examples the various cathedrals afford, are well worthy of long and continued study, and it is the conviction of all who have been interested in the Gothic phase of the art, that it is not only what has been done, that is of interest; but they feel that there is here a mine of knowledge and suggestion capable of immense future development.

The Percy Tomb is a fine example of English work under this general influence; the way in which the whole weaves together, the arrangement whereby the structural idea carries through, and is borne out by the foliated and moulded enrichment and the way in which the composition is varied and completed by the figures, together with the grand treatment of the foliated enrichment is worthy of all praise.

The revival of classic learning in Italy, and the revival of classic art which followed it, cut short the independent development of Gothic, but not without there being effort to blend the two; as in the art of Northern France, and in that called the style of Francis I., the Jube de Limoges must be taken as a sufficient example.

With reference to the art of Italy, I think it may be said that Italian artists never took kindly to the Gothic idea of the human figure represented merely as a symbol as it were a letter in the alphabet); but in even their early work felt and represented the strivings of the individualistic spirit within; although, the work of Nicola Pisano and his school approximated to the texture scheme of the Gothic sculptures, there is yet a feeling for form and movement which differs from these and in the work of Ghiberti, Donatello, Verrocchio, Lucca della Robbia, Rossellino, and many more, and above all Michael Angelo the details become lost in the grand effort to realize to the fullest the conception of the mighty spirit moving in the divinely formed body; the work arriving at a stage when it is its emotional aspect, rather than its architectural that enforces attention.

As our subject is, however, Sculpture in relation to Architecture, it may be well to consider the question of general principles; for in reviewing these various works, we seem to need a guide to consecutive thought, other than that supplied by the purely historical aspect.

Yet, in approaching this, the question at once arises as to who shall define art, for the spirit or art is an intangible as any dream—may be it is a dream—of which may be said in the words of Shelly:—

“On an unimagined shore,
Under the grey beak of some promontory,
She met me in such exceeding glory
That I saw her not.”

(*Epipsychidion.*)

Though the spirit of art is indefinable and may be considered as a vision apprehended not by any means by the eye alone, the efforts to realize this vision, which result in works of art, are found to conform to certain general rules: with reference to

which in reading a musical book lately, I found a definition of the qualities a work in that form of art should possess, which seem to me to the point. It commenced by saying Form, Expression, Feeling and variety were essential. Form, the shape presented to the mind; expression, the prominence given to some sounds and the subordination of others; feeling, the character of the effect produced; and variety, to prevent the work becoming mechanical and so lifeless. It further states a melody should display amidst all its features, and phases, an all-pervading unity and relationship among its several parts. The text then preceeds in criticism of a certain arrangement, as wanting in design in its form, regularity in its expression, stability, or clearness in its feeling, and method in its variety.

These directions seem so admirably adapted to the art of the sculptor and carver, that they might well have been written expressly for him, except that being written about musical composition they make no mention of the artists' hand.

Lord Bacon, in one of his essays remarks: “There is no beauty but hath some quality of strangeness in it.” I think it may also be said that we do not recognize beauty in that which is altogether strange, and it is the just proportion of strangeness harmonized with that which is familiar, which constitutes the charm. How is this charm of the familiar and the new to be obtained? By a search through the realms of nature by developing a helpful imagination, and by acquiring the power to imitate, together with the power to invent, and to express or rather to reveal your discoveries with a skilful hand. Imitation alone is not sufficient, it must be balanced and controlled; in the Gothic period the direct imitation of leaves as in early decorated, soon cease to satisfy, and developed into the more rhythmical perpendicular.

In the Renaissance period, the most satisfactory arrangement or ornament was found to be (where direct imitation was used at all) in obtaining the necessary architectural quality by a considerable dominance of conventional form, and this occurs even in the extremely free treatment of Grinling Gibbons.

The principles applying to the figure are not identical with those of ornament, but in the Greek work I think the contention that the earlier and less realistic work is the best fitted for architectural purposes can well be maintained. In the Gothic period the unity of the whole could not have been preserved except the sculptors' convention permitted the lights and shadows to be of the right size and shape and to occur in the right place, three things of which imitation can take no heed.

On this question of harmonistic treatment which really embraces the question of distance effect also, M. Camille Mauclair writes in his work on Rodin: “This theory to which Rodin approved of my giving the name of ‘deliberate amplification of surfaces’ is simply the critical principle of Greek sculpture, which has been entirely misunderstood by the Academic School. That school which is supposed to

honor the Greeks, is really false to their spirit, and their teaching. Moreover, this principle which belongs to all primitive statuary that was made for the open air is to be found among the Egyptian and the Assyrian. It calls in question the Academic Tradition, whereby exactitude is confounded with truth." This deliberate arrangement of surfaces is well borne out by a number of examples including the Wellington Memorial, probably the finest monument in existence, all of which show a care devoted to the arrangement, design, and treatment of light and shade bearing surfaces, practically coinciding with the Rodin view.

In examples of Michael Angelo's work, it will also be found that the dominant feature is the light bearing surface finely defined by the broad groupings, and design of the shadows; and indeed, this may be accepted as one of the most important elements in the means of expression of the art.

This may be considered as rather appertaining to the craftsmanship; of course, craftsmanship is after all only the servant, something more is required in a work of art, something on which the human mind can work; for in all real art it is essential that underlying the mere representation of the working of the directing mind and the touch of the executing hand should be evident. In certain work the skill of the hand is alone sufficient to justify the work; in the Roman stucco, for instance, how great a charm is imparted by the hand traces left upon them.

In the work of Rodin, how much does it owe to the same cause; and in the work of Michael Angelo, how do those parts so called unfinished yield traces of his consumately skilful hand moving as directed by his mighty brain—it brings the thing home to us and seems to place us in immediate touch with the artist working at those grand conceptions, which for four hundred years have filled so large a space in the history and development of art; and to use a hackneyed phrase which expresses nevertheless a profound truth, supplies the "touch of nature that makes the whole world kin."

TENSILE STRENGTH OF CEMENT MORTAR BONDS

THE STRENGTH of the bond between layers of mortar deposited after different time intervals has been investigated by tensile tests by Prof. B. Kirsch, of Vienna, and because the method has proved satisfactory it was described by him in a paper presented to the Copenhagen Congress of the International Association for Testing Materials. The specimens resemble roughly in shape the ordinary tensile test specimen, the joint being at the smallest section, which has an area of 100 x 200 mm. The moulds were of wood, lined with zinc to prevent absorption of water by the wood, and when the first half of the specimen was molded the other half of the mold was closed with a removable filler block. This was removed when the first half had set; the contact surface roughened a little and the

second half molded against it. The clamps were a modification of those used in tensile tests in the United States.

Two mixtures of Portland cement were experimented with, a 1:2 and 1:4 mortar. The intervals of rest between pouring the two layers in contact were 0, ½, 2, 6, and 14 hours, corresponding to uninterrupted work, work interrupted by short intervals, as by the dinner hour, and by half and finally a full day or night. The charge was pressed into the mould with a pestle, but not rammed. The 1:2 mixtures were taken from the moulds after two or three days, the 1:4 mixtures after eight days. After completion the specimens were allowed to harden for three months in a damp cellar.

The Portland cement used showed a textile strength in neat tests of 269 lb. per square inch after one week, and 346 lb. after four weeks. It was of constant volume, took initial set in 4½ hours and hard set in 15 hours. A quartz sand was used.

The adhesion values found are given in the following table in pounds per square inch:—

Intervals in hours..	0	½	2	6	14
1:2 mortar	54	17½	20½	15	14½
1:4 mortar	56½	17	16	22½	17

From these and further tests, Prof. Kirsch concludes that an interval of half an hour is sufficient to reduce the adhesion strength to about one-third of the concrete strength, and that with longer intervals the adhesion diminishes still further but more slowly than during the first half hour. Tests with slag cement show that its adhesion diminishes much more rapidly than that of Portland cement.

JUDGING FROM AN ACCOUNT of the formal opening of the first Chinese sand-lime brick plant which occurred the early part of March at Mut Li Sha, a village situated on an estuary of the West River, about midway between Canton and Fatshan, the event was attended by considerable ceremony. The guests on the first day were Chinese officials, on the second day Chinese merchants and gentry, and the third day foreign merchants and officials from Hongkong and Canton. The invitations were issued by His Excellency, Cheung Pat Sze, a wealthy Chinese merchant, whose fortune was made in the Straits Settlements and who controls a large share of the stock and is a prominent factor in the business world of Canton. The foreign guests were taken from Shameen by flower boats to the factory, there shown over the plant, and entertained at luncheon by his excellency, and returned by boat to Canton. A sum of \$200,000 has so far been expended on the plant. It is owned by the Yve Yick Sand-Lime Brick Company, and has a working staff of one British engineer and 100 native hands. The scheme of buildings includes, besides the plant, residences for the entire staff. The factory is equipped with crushers, mixers, four ordinary dressing machines, one rotating presser for fancy bricks, and four drying ovens.



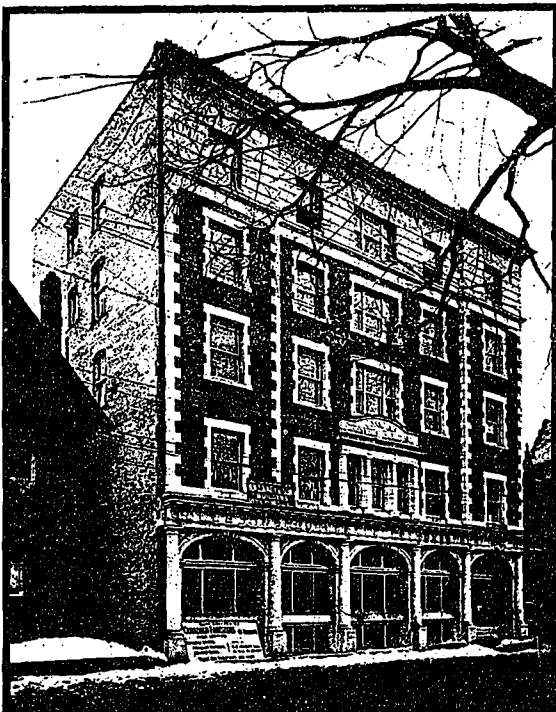
ANADIAN

FORESTERS' BLDG.

TORONTO

A successfully designed lodge and office structure recently erected to meet the requirements of prominent fraternal organization

AS A RESULT of the consistent expansion that has taken place in representative fraternal circles, and the attending need for better and more improved accommodations for lodge work and the transaction of business, considerable activity is being witnessed in the erection of buildings designed especially for this purpose at the present time. The new buildings that have so far been erected are vastly superior in design to the older

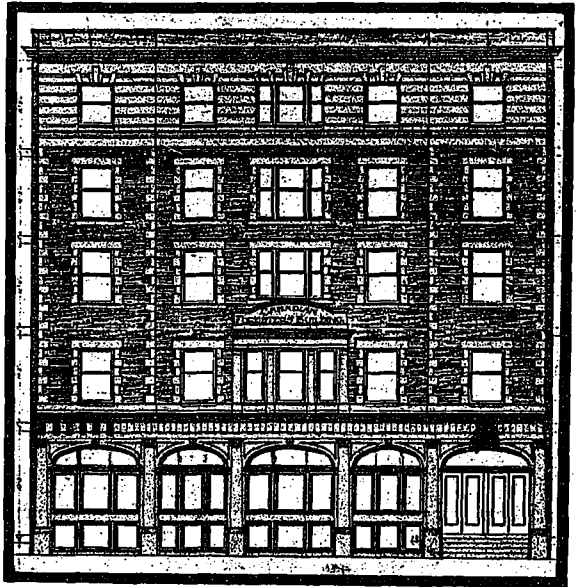


Recently Completed Lodge and Office Building of the Canadian Foresters, College Street, Toronto. W. R. Gregg, Architect.

buildings of this type, and are better considered in every way from the standpoint of accommodation and arrangement.

One of the more notable structures of this character recently dedicated is the new Canadian Foresters Building, Toronto, designed by Architect W. R. Gregg. This building has a frontage on the north side of College street of 65 feet 6 inches, and a depth of 100 feet to the lane, and is divided by a firewall into a five story office building in front and a two story building containing an assembly hall, with lodge rooms above, in the rear. The first story of the facade, which is designed in the Doric order, is executed in light gray manufactured stone; and this stone is also used as a trimming on the russet iron clay brick background of the wall scheme above, the whole forming a pleasing combination of outline

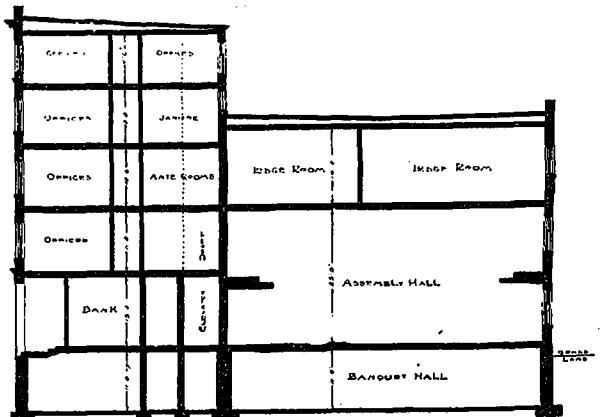
and color. The assembly room, as shown by the accompanying plan, is entered directly from the street through a wide hall, and is provided with two emergency exits to the rear on the north. This room is 52 x 55 feet, with a large stage or platform 26 x 10 feet, and together with the gallery will comfort-



Front Elevation, Canadian Foresters' Building, College Street, Toronto. W. R. Gregg, Architect.

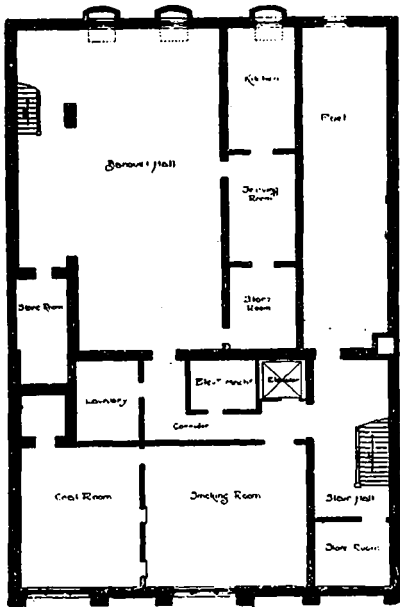
ably seat 700 people. The gallery is approached by a wide iron staircase, and has additional exit facilities leading to the lower floor between the northern emergency exits. It is supported from above in such a way that the centre floor of the assembly room is free from columns.

The entrance hall, which is fireproof, has a tiled floor, while a striking feature of the architectural

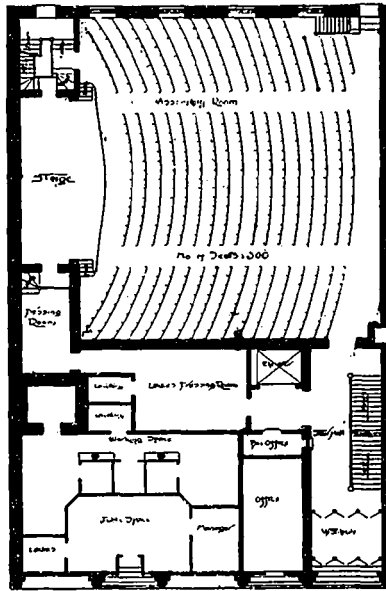


Longitudinal Section, Canadian Foresters' Building, College Street, Toronto. W. R. Gregg, Architect.

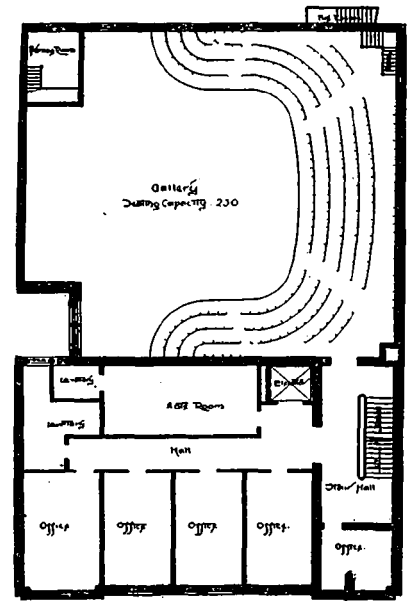
scheme is a handsome dado of marble from the newly opened quarries at Bancroft, Ontario. The elevator, which runs from the basement to the upper floor of the building, is placed in a central position convenient to the gallery, lodge rooms and offices. Immediately adjoining this on the ground floor are the ladies' dressing rooms, which are of large size and



Basement Plan.



Ground Floor.



Second Floor..

Scheme of Interior Arrangement, Canadian Foresters' Building, College Street, Toronto. W. R. Gregg, Architect.

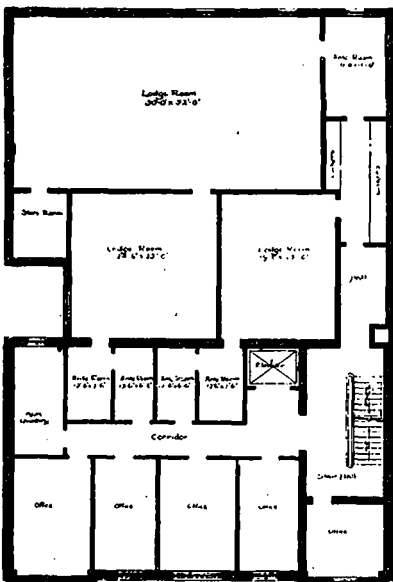
adequately equipped with toilet accommodations and wardrobe facilities. The basement, as seen in the accompanying plan, contains a smoking room and coat room for men, as well as a large banquet room below the assembly hall, which is approached by two stairways and provided with a completely equipped kitchen and serving rooms. The arrangement for society functions leave little to be desired, the plan being compact and the appointments complete in every respect.

The building is heated by steam and ventilated by a system of indirect heating and electric fans. The lighting is by both electricity and gas.

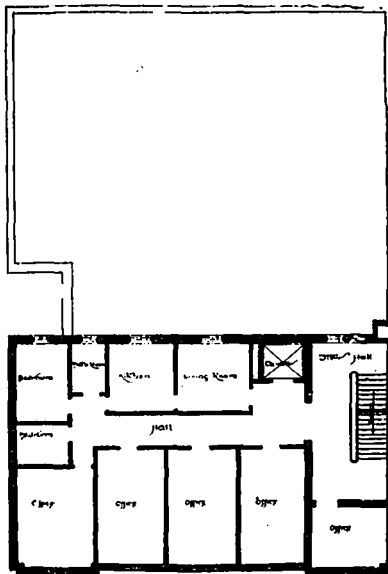
In addition to the assembly hall with its subsidiary

rooms, the ground floor contains a large modern office suite having a separate entrance from the street. This suite is divided into a public and a working space, with the manager's office and ladies' room on either side of the entrance.

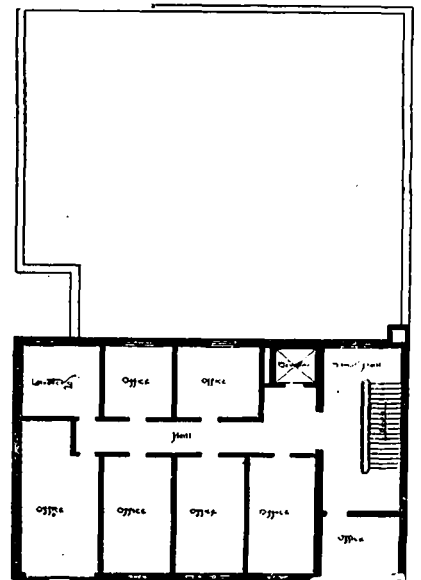
The three lodge rooms above the assembly hall are divided by sound-proof partitions and each room is approached through two or three more ante-rooms. The largest of the lodge rooms is 30 x 52 feet, and is 14 feet in height; the lodge furnishings throughout being of fumed oak, upholstered in leather, and the floors carpeted. H. N. Dancy & Son were the general contractors, while the manufactured stone used for the exterior decorations was furnished by the Canadian Art Stone Company.



Third Floor.



Fourth Floor.



Fifth Floor.

Scheme of Interior Arrangement, Canadian Foresters' Building, College Street, Toronto. W. R. Gregg, Architect.

THE HOUSE OF VANISHING ROOMS

ECONOMY IN SPACE and cost, together with convenient equipment and perfect arrangement, are without question the considerations of greatest importance to the architect of the apartment and small city dwelling designed for a small lot. The latest example of the extremes to which architects and builders in their endeavors to produce cheap dwellings that possess all the conveniences and comfort afforded by a more expensive type of structure, was recently illustrated in "Country Life in America." The "freak" house, as it is termed, has been erected at Evanston, a suburb of Chicago. It is built of stucco and costs about \$1,500. It measures 25 ft. by 26 ft. in plan, and contains, by an ingenious arrangement, five rooms and a bath. The ground floor has a living room 19½ ft. by 12 ft.; bedroom, 13 ft. by 10½ ft.; bathroom, 8½ ft. by 5½ ft.; kitchen, 3 ft. by 9 ft.; closet, just outside the bathroom, 5 ft. by 3 ft.; and guest room, 7½ ft. x 5½ ft. Even the most careful figuring will not succeed in compressing all those measurements within the space of 25 ft. by 26 ft. That is because of certain arrangements which led it to be called "The House of Vanishing Rooms."

Exactly in the middle of the ground floor is a base-burner stove, which, upon a supply of four tons of coal, warms the entire house all winter. Over the main floor is a large attic, now used for storage; but two rooms can be finished off there if the downstairs supply proves inadequate. There is a curious closet between the bathroom and the sitting-room. One-half is a clothes closet, the other a stairway leading to the attic. When shut up these stairs are a tier of boxes serving as clothes hamper, hat boxes, and so on. Pull the lower ones forward and they form a first-rate flight of steps. Under this closet a door leads to a fair-sized compartment built below the floor—there is no cellar—and giving additional storage room. The roomy bookcase, if approached from the rear—that is, via the clothes closet—is a linen chest. There is an automatic gas heater in the attic which supplies hot water to kitchen and bathroom.

The visitor staying to dinner wonders where the dining-room is, and whether he is expected to eat in the kitchen. His youthful hostess has disappeared some time since, and he hears sounds in the kitchen that tell him that a meal is in process of preparation. The kitchen is attractive enough for anyone to mistake it for a dining-room, but when the critical moment arrives the host presses a button in the hospitable mantel-piece of the living room, the burlapped wall beneath the mantel slowly rises and disappears, and the dining table, in all its splendor of china and glass and snowy napery, appears through the opening, and when well on the living-room side the partition silently resumes its wonted place again; then chairs are drawn up, and you sit down to enjoy the repast. At the end of the meal the table is gently pushed back into the other room, the way it came, awaiting the pleasure and leisure of the mistress of the house to clear up.

Perhaps the greatest marvel is when the guest room appears out of an empty wall. A large, roomy couch is rolled over to the windows, and the panel behind it adjoining the bookcase, by the touch of a button, again swings out into the room. It may be swung out at right angles to make a larger room, but is usually left at a three-quarter angle, turning in slightly, and there you behold the guest chamber. It is a pretty room, with its fresh muslin curtains at the window, snowy counterpane on the bed, low, comfortable chair, and high, built-in dresser, which is in weathered oak to match the rest of the furnishings. When this panel is closed, the space is only large enough to hold the bed, chair, and dresser (which is built into the panel), but when opened out it gives a guest room of very fair dimensions, and a screen placed across the 3 ft. opening made by the folding out of the wall allows plenty of privacy. In the morning the wall is pushed back into place and the living-room resumes its normal size again.

INADEQUATE SPECIFICATIONS

THE FOLLOWING SENTENCE is copied from a set of specifications covering many different classes of work, the job for which they were used having a large amount of concrete construction:

"Concrete shall be mixed in the manner prescribed by the engineer, and of such proportions as the engineer may direct."

It is needless to say that nothing could be more indefinite than this clause, yet even by following it injustices can be inflicted. It would seem that when specifications are so indefinite, that it would be better not to have any specifications to govern the work. But few would agree with this statement owing to the fact that although some classes of work might be poorly covered, yet others may be described in great detail. In considering this clause we must first look into its origin.

No doubt such a clause was inserted in the specifications when concrete was but little used, and the amount of that class of work was always insignificant. In those days there were few, if any, mechanical mixers on the market, so that nearly all concrete was mixed by hand. Thus the contractor was to consult the engineer as to the method of mixing, that is, was sand and cement to be first mixed then water added, or was the concrete to be mixed dry, and then made wet, and how much water was to be used.

But with the introduction of many makes of mixers such questions were forgotten and the interpretation of the clause changed. The question to be decided was whether or not the concrete was to be mixed by hand or by machine, and if by the latter, what style of machine would be permitted. Here is where an injustice can be done the contractor. Under the specifications the engineer could prevent a mixer being used, compelling the contractor to mix all the concrete by hand, or if a mixer is allowed, the engineer could refuse to have on the job certain makes and styles of machines. These are not suppositions, but the editors of this journal have known of actual

cases of these kinds, and contractors have been compelled to use methods and machines that made his work much more expensive. This shows the necessary cutting out of specifications where the clauses have outlived their usefulness.

The second part of the provision quoted relates to the proportion of the materials to be incorporated in the concrete. Nothing affects the cost of concrete more than when the ingredients vary, and it is an easy matter to set forth the various proportions to be used. Even if the kind of structure to be built is not known, it is still possible to make the specifications definite. When it is not done, the contractor is very apt to suffer. If he bids on a 1:3:5 mixture, it may be changed to a 1:2½:5 or even 1:2:4, and the cost will be increased. On the other hand the owner may be made to pay an excessive amount for the work, owing to this element of doubt.

A method in this connection, that is to be commended, is the dividing of the concrete work into classes, as Class A, Class B, and so on. Thus the specifications can be definite as to each class, although on some work there may not be used concrete of certain classes, while if there is work to be done the specifications are explicit and the contractor has named a price for the work.

Some specifications go a step farther by providing for the different classes of concrete and obtaining a price on each class with forms and without forms. This is done to obtain more economical construction, and should be welcomed by contractors.

From these remarks, it is evident that there should be no need of writing specifications as indefinite as those from which we have quoted.—The Contractor.

REPAIRING CONCRETE FLOORS

THERE IS A POPULAR and widespread fallacy to the effect that a concrete floor once chipped or cracked is practically at the end of its usefulness. This is undoubtedly due to the results of unskilled workmen attempting to repair a damaged floor. Unless proper care is taken and the workman engaged on the job has sufficient knowledge of concrete, a repair job is most unsatisfactory.

In this connection, says "Concrete," the practice of a Boston firm is worth noting. In certain of the concrete buildings erected by this firm floors have been chipped in particular places because of some phase of the industry which gave rise to dropping heavy materials in one place, as, for example, the winding rolls in a paper mill. When a floor has become chipped out in some such manner as this, the proper method of repairing is to chip out with mallet and chisel a recess usually square, of sufficient depth to reach to the bottom of the deepest break in the concrete surface. The rough surface resulting from this process is then treated with acid to bring out the solid aggregate, or else a stiff brush is used to remove all the loose dust, and the recess washed out by sluicing out with a hose. When all the dust particles have been removed the recess is grouted with

cement and before this has set the granolithic finish is applied and leveled up with the rest of the floor. Repairs made in this manner are just as permanent as the remainder of the floor, as the bond between the new and the old concrete will be perfect if all the loose material has been carefully removed.

NEW BRICK PLANT

EXCELLENT PROGRESS is reported as being made on the buildings comprising the plant which the Sandstone Brick and Sewer Pipe Company, a new concern, with head offices in Calgary, is establishing at Sandstone, a point twenty miles south. The new plant, in fact, will be in operation by July 1. It is the intention of the company to erect temporary kilns this year, and on this account the output will be limited to 500,000 brick per week. Next year, however, when continuous or permanent kilns will be built, the output will be between 900,000 and 1,000,000 brick per week. For this season the energies of the company will be directed towards getting out brick only, but next year sewer pipe, terra cotta, hollow ware, etc., will be manufactured. Mr. F. Prendergast, formerly connected with the Alberta Portland Cement Company, and the Blairmore Brick Works, has been appointed manager of the plant. The company is capitalized at \$75,000, all of which is paid up.

REMOVES TO NEW QUARTERS

A CARD IS TO HAND announcing the removal of the show rooms and offices of E. F. Dartnell, the well known building material dealer, of Montreal, from 157 St. James Street, to 8 Beaver Hall Square. The new quarters are much more commodious and better arranged for display purposes than the premises just vacated. The extensive line which Mr. Dartnell carries includes among other products, high-grade face bricks, tapestry brick, enamelled and glass brick, terra cotta fireproofing, glass tile, hollow brick, floor quarries and roofing tiles. One of the important orders for supplies received so far this season, calls for 160,000 white porcelain to be used in the exterior of the Dominion Express Building now being erected in that city from plans by Messrs. E. & W. S. Maxwell. Montreal patrons can avail themselves of quick service by 'phoning "Uptown 2975."

WANTED

DRAUGHTSMAN — One thoroughly competent in designing and perspective rendering to take charge of general architectural work. Apply immediately, stating experience, references and salary required. W. W. LACHANCE, Architect, Saskatoon, Sask.