# CANADIAN ARCHITECT & BUILDER

FINE & INDUSTRIAL ARTS: DECORATION FURNISHING: CONSTRUCTION SANITATION: ENGINEERING

VOL. XI.—No. 9. SEPTEMBER, 1898 PRICE 20 CENTS $2.00 PER YEAR.

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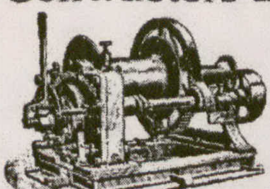

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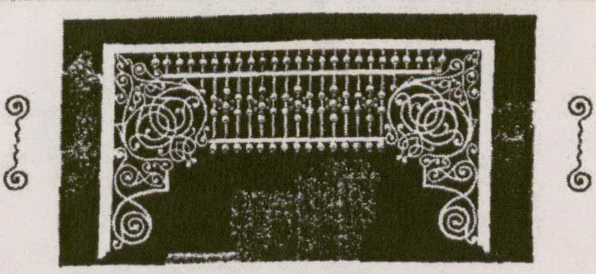

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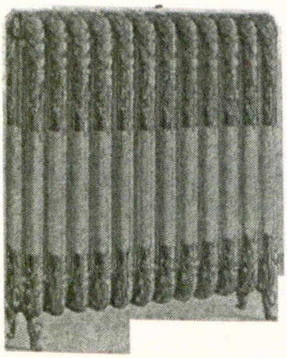
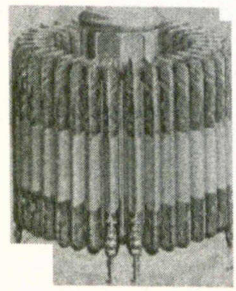


Two Loop—Hot Water.



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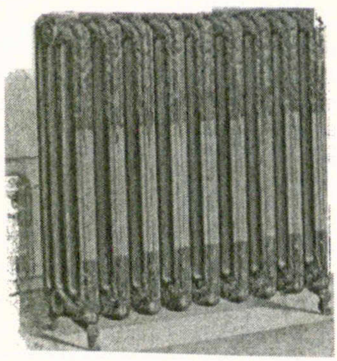

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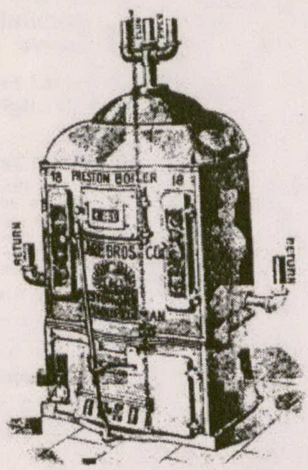


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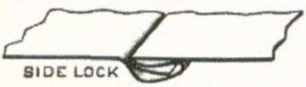


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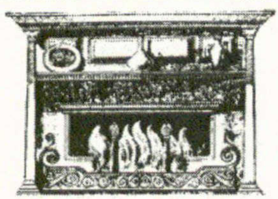

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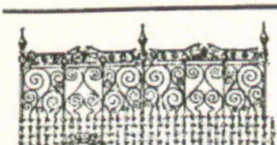

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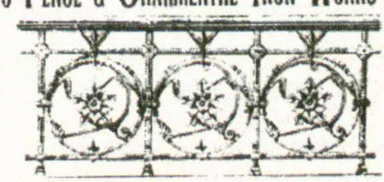

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# CANADIAN ARCHITECT AND BUILDER.

VOL. XI.—No. 9. SEPTEMBER, 1898 { PRICE 20 CENTS. $2.00 PER YEAR.

—THE—

## CANADIAN ARCHITECT AND BUILDER,

***A Monthly Journal of Modern Constructive Methods,***

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD WEDNESDAY IN EACH MONTH IN THE INTEREST OF

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***ADVERTISEMENTS.***

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th, and changes of advertisements not later than the 5th day of the month.

***EDITOR'S ANNOUNCEMENTS.***

Contributions of value to the persons in whose interest this journal is published are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

*Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery.*



**The British Employers' Liability Act.**

THE owners of stone quarries in Great Britain have set the example to employers in other lines affected by the Employers' Liability Act by increasing the stringency of regulations imposed on workmen for the avoidance of accidents. Aged workmen are especially warned, under threat of dismissal as a class, to shun every avoidable risk. It is explained that this extra precaution has been rendered compulsory by the enormous liability imposed by the act. The fear is expressed that the measure will result in depriving of employment a large number of the older workmen.

**Artizans' Dwellings.**

MR. A. F. Wickson, of Toronto, vice-president of the Ontario Association of Architects, has recently been honored by being invited by the Massachusetts Charitable Mechanic Association to take part with fourteen leading American architects in a limited competition for designs for artizans' dwellings. The fifteen competitors have elected by letter ballot the following well-known architects to comprise the jury who shall judge the merits of the drawings submitted and decide the competition :—Prof. Chandler, of the Massachusetts Institute of Technology; Prof. H. L. Warren, of the Lawrence Scientific School, Harvard University; and Mr. J. M. Carrera. These gentlemen will also decide the merits of the public competition for the same object, particulars of which were recently announced in our advertisement pages.

**Speculative Building in Montreal.**

A CORRESPONDENT writes that speculative building in Montreal has been carried on to an unwarranted extent of late. Purchasers and tenants have not kept pace with building operations, consequently there are numerous failures among this class of builders, who as a rule are not financially strong. The method usually pursued by these speculative builders is to secure a desirable site, pay cash for the land and borrow and get credit for the building. If purchasers or tenants cannot be found for the completed building, the builder is forced into bankruptcy, and the firms who supplied him with the materials necessary to enable him to carry on his operations are saddled with the bulk of the loss. Our correspondent states that the limited extent of building enterprises of a non-speculative character, and the consequent difficuly experienced by manufacturers and dealers in finding an outlet for their goods, has led them to assume large risks in the way of selling on credit to irresponsible persons. As a result of this laxity of credit, irresponsible parties are enabled to recklessly underbid and undersell responsible firms.

**The Brick Market.**

BRICK manufacturers in the neighborhood of Toronto are all operating their works at full capacity, and find difficulty in keeping pace with the demand. Many of them have orders ahead which will require the balance of the season to fill. At present it appears that little if any stock will be carried over, and builders who do not now succeed in buying sufficient material to meet their requirements until next year's stocks can be put on the market are likely to experience a time of enforced idleness when the season of 1899 opens. The unexpected extent to which building enterprise has revived in Toronto the present season, after several years of unexampled dullness, found the brick manufacturers with no surplus stock on hand.

**Students' Competition.**

ATTENTION is directed to the particulars of a students' competition appearing in the Students' Department of this number. The subject of the competition is four ornamental chimneys. It is hoped by this means to direct the attention of the rising generation of architects, as well, perhaps, as of architects already in practice, to the value of chimneys as features in building design. This subject, which has received so much attention in European countries, seems to have been to a considerable extent overlooked in connection with our native architecture. Fortunately, however, there are exceptions to this rule, and it is possible to point to buildings, the artistic and pleasing appearance of which is almost entirely due to a single well designed and located chimney. Architects are urged to bring this competition to the notice of their students, with a view to inducing them to take part.

**The New Westminster Disaster.**

IN spite of increased attention on the part of municipalities, the insurance companies and individuals, to the subject of fire protection, we are frequently reminded of the great risk from fire which still prevails. Last year the town of Windsor, Nova Scotia, was wiped out in a day; the sturdy young city of New Westminster, at the opposite end of the Dominion, is this year the victim. The loss, which, exclusive of insurance, is estimated at $2,000,000, must fall heavily on the shoulders of such a young community. Doubtless, however, the enterprising spirit so abundantly manifested by the people in the original development of the city, will be equal to the present emergency. Already the Dominion government and some of the corporations whose buildings were destroyed have announced their purpose to rebuild immediately. The mildness of the climate will permit of building operations being continued throughout the winter, while the same cause will greatly mitigate the discomfort of the homeless citizens. The substantial character of most of the buildings destroyed is to a large extent a guarantee that they will be replaced by structures at least equal if not superior as regards durability of character. In the light of the present experience, the municipal authorities will also doubtless insist on the employment of every reasonable precaution against fire.

**Mexican Federal Palace Competition.**

THIS competition, the principal conditions of which were printed in these columns, has recently been decided. As was anticipated, in view of the unsatisfactory character of the conditions, the competition has not proved successful. Only one or two architects of prominence submitted designs, and not more than seven or eight sets ot drawings out of all that were submitted were worthy of special notice. As none of the competitors complied with the published conditions, the jury, which by the way was entirely under the control of the government, decided to divide the first prize of 15,000 pesos among three competitors named for second place, viz., Pio Piocentini and Philippo Nataletti, Mexico; J. P. Weber, Chicago, and Adam Boori (place of residence not given). The third prize was awarded to Pietro Paolo Quaglia, Mexico; the 4th prize to Antonio Rivas Mercado. It is estimated that the cost of any of the the premiated designs would exceed by at least 50 per cent. the limit of 1,500,000 pesos.

**Windowless Buildings.**

MR. Howard Constable, who a few years ago was a successful competitor for the position of supervising architect of the United States, is the author of a scheme for the erection of windowless tall buildings on expensive sites. It is proposed to furnish such buildings with entirely artificial light, instead of a combination of natural with artificial light, as at present. Ventilation would be provided by a system whereby fresh air would be brought in from the roof in pipes and conducted in proper quantities to the various rooms throughout the building, while the impure air would also be expelled through pipes, which might be charged with chemicals so as to destroy disease germs with which it might be impregnated. The advantages claimed for this style of building are that the space now required in such buildings for a central court for lighting purposes would be available for use and would add considerably to the revenue; that the absence of window openings in the outer walls would greatly lessen the fire hazard; that all rooms in such a building would be equally desirable; that smoke and foul air which now enter through windows would be excluded, and that if the architect were relieved from the necessity of figuring out the problem of how to successfully light so many scores of rooms, he could make his facade much more beautiful. The author ot this ingenious if somewhat impractical theory of construction admits that the public is not likely to immediately fall in with his ideas, but proposes that his theory should at once be put in practice by reducing the number and size of window openings in buildings of this class to be erected in the future, and by glazing them with wire mesh glass, which would resist the action of fire.

**Ineffective Building Laws.**

BEYOND the fact that the Toronto building by-laws are sadly deficient in construction, there appears to be reason to question also the efficiency if not the impartiality of those whose duty it is to enforce them. A conspicuous violation of the law is now to be seen on Yonge street, where the owners of a departmental store have been permitted to erect a tower of wood and what is practically a wood front to their building, thereby increasing the fire hazard in a congested business district. It is said that the owners of this same store were also permitted to greatly exceed the maximum of undivided floor area fixed by the by-law, in consideration of having installed a system of overhead automatic sprinklers, but that no supervision was exercised by the city over the method of construction. As a result, the system is said to be very defective if not useless, owing to the fact that the piping is not arranged so as to equalize the pressure, and the overhead sprinklers are spaced ten instead of five feet apart. If these reports are correct, the owners of this and adjoining property are living in false security. It is not to the credit of the City Council that the building by-law so carefully drafted and submitted to the council by the Ontario Association of Architects several years ago should have been allowed to remain unconsidered, more particularly in view of the several disastrous fires which have occurred subsequent to its preparation. If no effort is to be made to improve the existing by-laws, it is at least the duty of the city's officials to see that present safeguards are not flagrantly violated.

## BY THE WAY.

The death is announced in Toronto of Mr. Robert Robertson, contractor, who is credited with having placed in position the weather vane of St. James' Cathedral, the height of which is upwards of 350 feet. The man who can do a job of that sort must be acknowledged to possess of level head.

× × ×

In connection with the Bushnell Oil Company's works at Sarnia, Ont., there is a steel tank capable of holding 30,000 barrels of oil. Being desirous of removing this tank to a new location, a short distance away, the novel expedient is to be tried of making an artificial lake, across which the tank will be floated to the required position.

× × ×

As illustrating how quickly a wide-a-wake business man sometimes takes quick advantage of suddenly presented opportunities, a writer in Brick, of Chicago, tells how Mr. W. Alsip, of Grand Forks, Dakota, hearing that an attempt was being made to "corner" the price of brick at Winnipeg, gave orders that a brick-making plant which he had loaded on a train for new works he was about to establish at Fargo, should immediately be shipped to Winnipeg. As a result of this hastily formed decision Mr. Alsip has now a large brick manufactory in the capital city of our Northwest, and is assisting by his energy to promote its growth and welfare.

× × ×

As illustrating the lack of sympathy and common sense which sometimes govern the actions of trade union leaders, the American Architect tells of the following incident :—"A certain workman, who had "gone out" with his fellows when a strike was declared, was being partly supported in his enforced idleness by his union and its sympathizers. Being a decent sort of a fellow, seemingly, he one day took a broom and swept off the pavement before the little tobacco shop of his sister, with whom he boarded, but alas! he was seen engaged in this—for a striker—degrading occupation by a walking delegate or other spy, and at once his strike money was cut off, because, forsooth, he had worked!"

## PREPARING TRACING PAPER FOR ARCHITECTURAL USE.

Tracing paper may be prepared for architectural use by taking common tissue or cap paper of any size, laying each sheet on a flat surface and sponging over one side with a solution composed of 2 parts of Canada balsam and 3 parts spirits of turpentine, to which a few drops of old nut oil has been added, taking care not to smear any part of the surface of the sheet. According to one of our foreign exchanges a sponge is the best instrument for applying the mixture, which should be used warm. As each sheet is prepared, it should be hung up to dry over two cords stretched tightly and parallel about 8 inches apart, to prevent the lower edges of the paper from coming in contact. As soon as dry the sheets should be carefully rolled on straight and smooth wooden rollers about 2 inches in diameter covered with paper. The sheets are dry when no stickiness can be felt.

In order to render tracing paper more translucent so as to allow the finest lines to be seen through it, soak it in benzine by means of a cotton pad so as to thoroughly permeate the fibre. For rendering opaque drawing paper translucent so as to permit of a photographic image of a drawing done on it to be depicted on some of the highly sensitized papers, there is nothing better than to saturate it with benzine. As this rapidly evaporates the paper will resume its normal opaque appearance without showing any trace of the treatment to which it has been subjected.

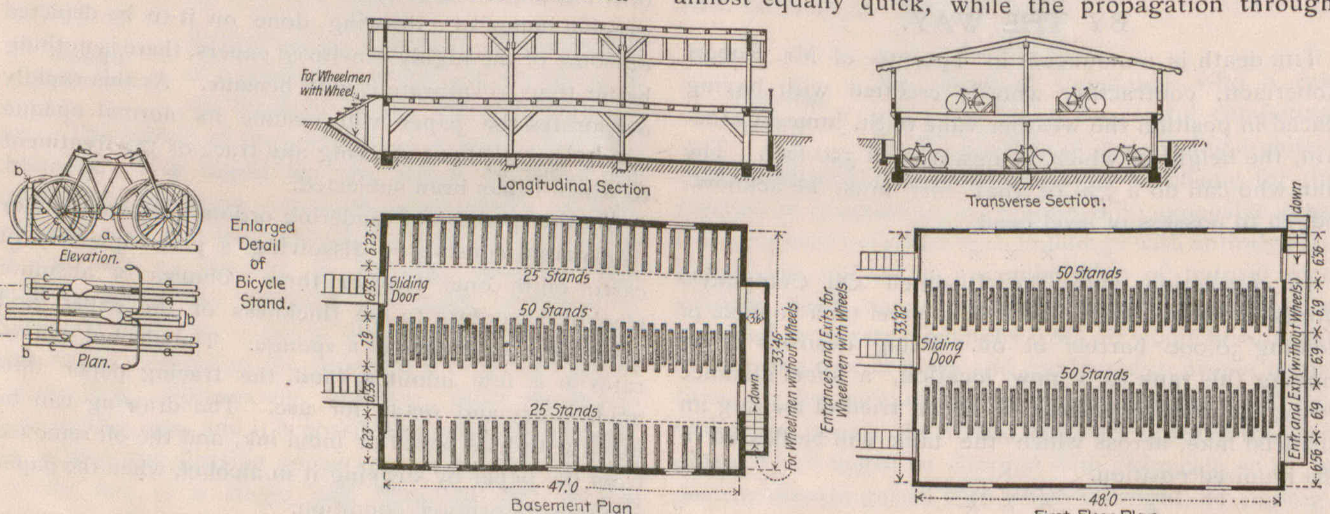
Another process of rendering ordinary drawing paper transparent consists in dissolving a given quantity of castor oil in one, two or three volumes of absolute alcohol, according to the thickness of the paper, and applying it by means of a sponge. The alcohol evaporates in a few minutes, and the tracing paper thus made is dry and ready for use. The drawing can be made with lead pencil or india ink, and the oil removed from the paper by steeping it in alcohol, when the paper assumes its original condition.

## COLOR IN HOUSE DECORATION.

A house decorator writes : The thermometer seems to fall about six degrees when you walk into a blue room. Yellow is an advancing color, therefore a room fitted up in yellow will appear smaller than it is. On the other hand, blue of a certain shade introduced generously into a room will give an idea of space. Red makes no difference in regard to size. Green makes very little. If a bright, sunny room gets its light from a space obtruded upon by russet colored or yellow painted houses, or else looks out upon a stretch of green grass, it should be decorated in a color very different from the shade chosen if the light comes from only an unbroken expanse of sky. Red brings out in a room whatever hint of green lurks in the composition of the other colors employed. Green needs sunlight to develop the yellow in it and make it seem cheerful. If olive or red brown be used in conjunction with mahogany furniture the effect is very different from what it would be if blue was used. Blue would develop the tawny orange lurking in the mahogany. If a ceiling is to be made higher, leave it light, that it may appear to recede. Deepening the color used on the ceiling would make it lower, an effect desirable if the room is small and the ceiling very high. Various tones of yellow are substitutes for sunlight.

## BICYCLE STORAGE HOUSE.

We reproduce from Engineering News the accepted plans of a bicycle storage warehouse, submitted in a competition recently instituted by the Prussian "Ingeneur und Architekten Verin." Those taking part in the competition were instructed to design a low building, occupying a minimum area and having a storage capacity for 200 bicycles; these latter to be so stored that they could be put into place and removed again with the least confusion and loss of time on the part of the workmen. As seen by the drawings, two parallel floor strips a, end posts b, and two inclined struts c, keep each bicycle in place; and these racks are so spaced as to take up the least room on the floor. The separate passageways, each with its own entrance door for wheelmen, permit access to the racks without confusion; and separate exits at the opposite end of the building further facilitate this ease of movement. It will be noted that the entrances are provided with steps for the men with an incline at the side for the bicycles. The exits have a common platform with but one stairway. The plan calls for a two-storied structure, with 100 wheels on each floor. The difference in the floor arrangement of the racks is made to facilitate the location of the entrances; three stairways giving access to the upper floor and two stairways, placed between the others, descending to the basement floor. The successful competitor was Mr. Carl Bernhard, engineer and architect.




Design for Bicycle Storage House of 200 Wheels Capacity.

## AIR INSULATION IN BUILDINGS.

We are told that nothing keeps cold and heat out better than a layer of air; hence the use of horizontal and vertical air passages and of hollow walls in our buildings. When Russner published an account of some experiments a year ago which contradicted this view, he found, says the "Zeitschrift fur Architectur und Ingenieurwesen," very few supporters besides men like Astfalck and Nussbaum, who had come to the same opinion from other considerations. Russner's experiments were not unobjectionable. He has now repeated his experiments, and he seems to have established his case. He fixed auxiliary walls more or less close to the outer walls of a room, heated the inside surface of the inner wall, and measured the temperature on the other face of that wall and of the air between the two walls. The partition walls were solid or hollow; they were heated by placing heated iron boxes against them, and the temperature of the other surface was determined with the aid of little pockets containing mercury and thermometers, and further of thermopiles. It resulted that the heat penetrated walls one or half a stone in thickness, whether they were solid or hollow, almost equally quick, while the propagation through hollow walls packed with sawdust and other insulating materials was much slower. The experiments continued for eleven hours. The propagation of the heat through the air was, of course, the work of radiation, and if the conditions were favorable for radiation, then insulation was not much good. Kieselguhr, slag wool, even peat and sawdust are much better than an air space, but the latter are too hygroscopis, and therefore unsuitable. Astfalck has rejected narrow air spaces because they favor sweating, which spoils the walls and woodwork, and makes them unhealthy. To keep your walls warm in winter, we may clothe them inside with cork, paper stuff, or kieselguhr, especially if the walls consist of hard burnt bricks or natural stones which are fair conductors of heat.

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## PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

The Quebec Architects' Act came into operation on the 1st inst., on which date the period allowed for registration under the act expired. It is understood that upwards of one hundred applications have been received from persons desiring to register and thereby be authorized to use the title "Architect." The Council of the Province of Quebec Association of Architects have been busily engaged of late with these and other matters pertaining to the operation of the new law. Arrangements are also in progress for the annual meeting of the Association, the exact date for which has not yet been fixed but which is expected to take place towards the close of October. More detailed information with regard to these matters will be printed in our October number.

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Mr. Wilmot Fitzsimons, of the Keith & Fitzsimons Company, Toronto, was recently married to Miss Clara Maud Deasse, of Port Rowan.

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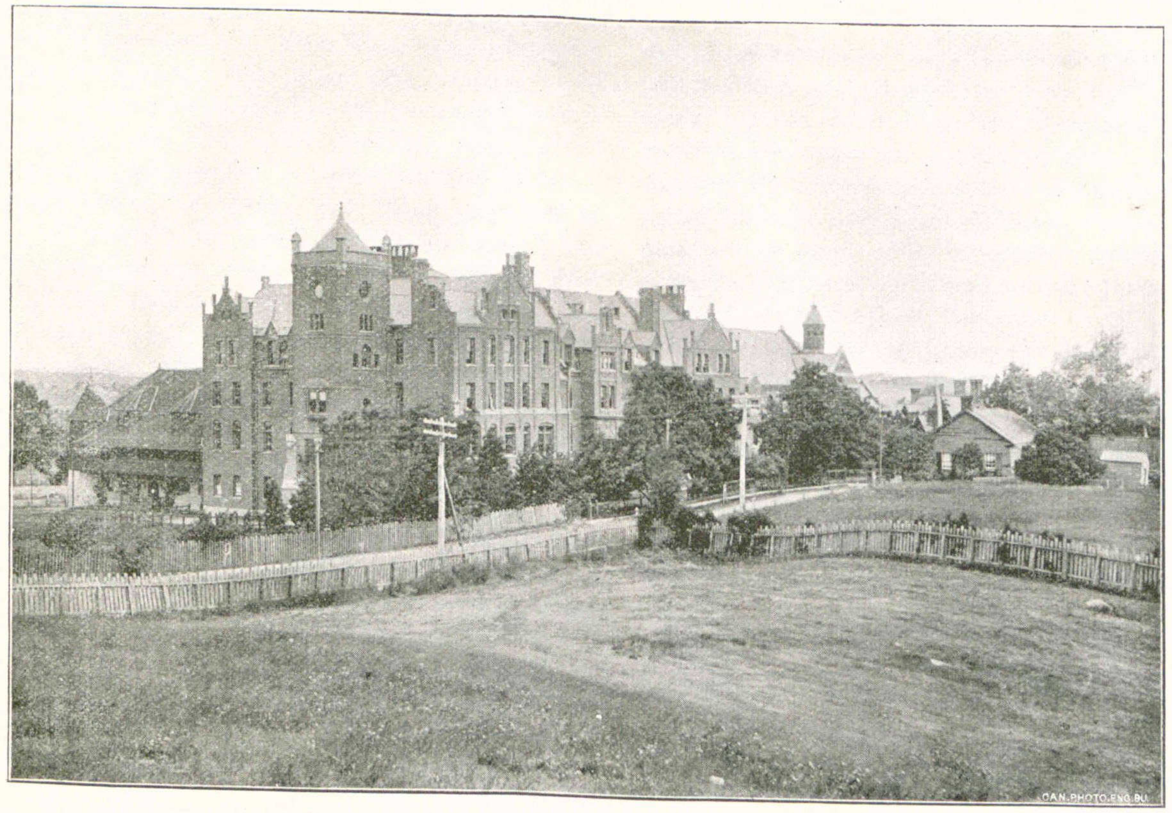
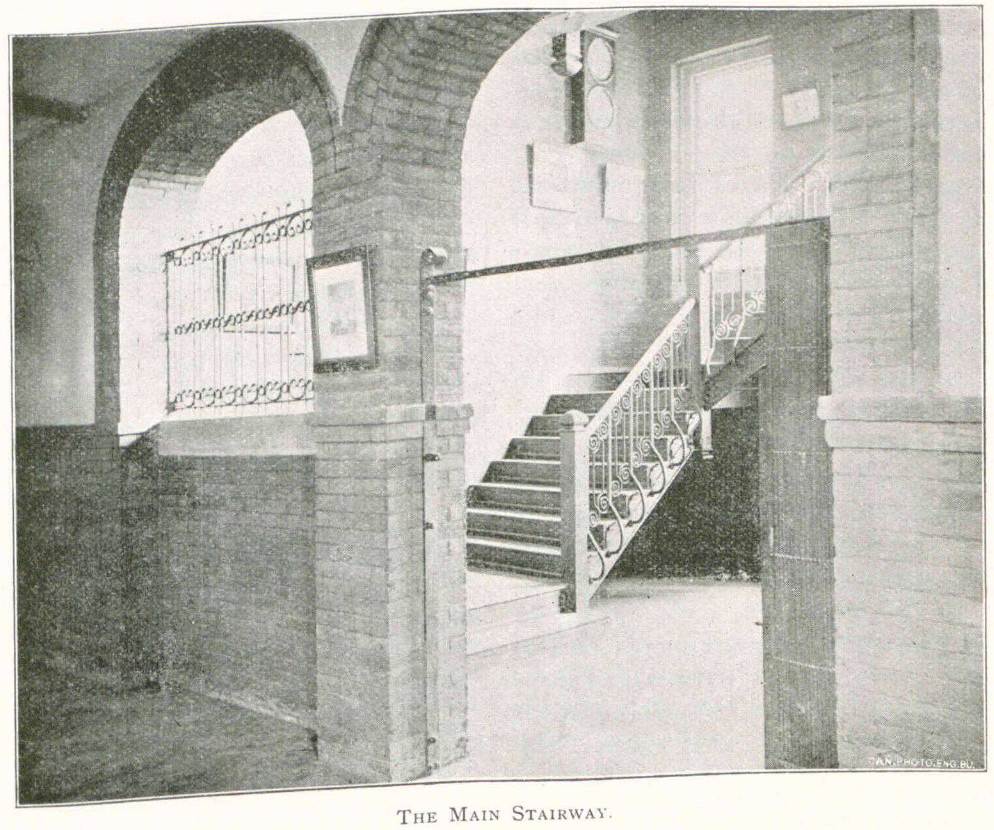
The medical officer of the Brantford, Ont., Board of Health in a recent report to the Board recommended that the owners of more than three hundred houses be required to connect same with the city sewerage system, sixty days being allowed for carrying out the order. The report was confirmed.

Shipments of plaster from the Cape Breton mines to Philadelphia have been on an extensive scale since the close of the Spanish-American war. This industry is an important one, and has been increasing for several years. The shipping facilities have been improved, and the company have now a locomotive in connection with the mine.



From the Park.



The Main Stairway.

From the Playing Fields.

Principal's Residence.

Trinity College School, Port Hope, Ont.

Darling & Pearson, Architects.

## CHURCH ARCHITECTURE.*

THE distinctive feature in the plan of mediaeval churches is the division of the building into a chancel crossing, transepts, nave and aisles. Whatever may have been the origin of the cruciform, this one thing is certain, that for all these peoples it signified the Cross which, except in the very earliest days, has always stood the foremost symbol of the Faith. The aisles signified the Trinity. Besides these more obvious symbolisms, the chancel represented the Church triumphant, the nave the Church militant, or the new and the old dispensation. The chancel was further divided into sanctuary and choir, the one for the celebration of the Holy Eucharist, the other for the due rendering of the service. The sanctuary was fitted with altar, credence, piscina and sedilia, and the choir, besides stalls for clergy and choir, had lecture and pulpit. Side aisles contained side chapels and chantries, for daily or special services, and in these latter and also in the chancel, or chancel aisles, there were tombs, some of which were in themselves objects of veneration, as the last resting-place of saints.

All of these things represented some distinct phase of faith—the altar, the real presence of the Lord's body—the choir, the need of orders and ritual—chantries, prayers for the repose of souls of those who had died in the Faith. In so far as these beliefs are represented by these forms to-day, just so far and no farther are they fit forms for us to use. To all Christian bodies the cross is still the great symbol and the cruciform is ecclesiastically admissable and architecturally a boon. To the great mass of Christians, the apostles' creed is the utterance of their faith, and to them an expression of this faith in three-fold nave and aisles is fit and right. The chancel, with all its appurtenances, altar, sanctuary, choir, stalls, desk, etc., unfortunately belongs only to those whose ritual required these things, but where they are absent there is at least no reason why the minister's platform should be fitted up like an hotel parlor. Such opportunity as there is for dignity and reverential treatment should certainly be seized. Side chapels in a church whose service is said daily to a comparatively small number are in place, and a most useful addition. Chantries are practically antiquated, for prayers for the dead, when used, are said in private by a priest paid for the purpose.

So much for the circumstances under which these forms may be rightly used—one word about the use of the form where the belief does not justify it. The architect who takes forms which have an ecclesiastical significance and origin, and uses them as artistic accessories where they have no significance, and where the faiths they mutely express are not believed in, is acting the part of a charlatan and playing upon the ignorance or carelessness of his clients. Even if his clients are willing to accept these things, it is an injustice to those to whom the forms belong in their entirety. Truth is the basis of architectural right and wrong. When mediaeval buildings used nave and aisles, chancel, sanctuary, Lady chapels and chantries, they represented vital forms of faith or served actual uses. Let us be equally true to-day, and embody in our churches only what those churches profess, provide not for mediaeval uses, now abandoned, but for modern needs.

Such, in the main, are the chief features of the old churches, which, as they answered needs similar to ours, may be fitly followed to-day. There are other needs which are the outcome of growth and the advance of civilization, with which they were not called upon to grapple, and which we must solve for ourselves.

First, to finish with isolated or country churches before touching on the city problem, we need more or less ample accommodation for the clergy, for the choir, for the childrens' school, for the gathering of the various lay bodies who help in the great church work. For all these the old buildings give practically no precedent. Occasionally a vestry, a sacristy or an aumbrie was attached to the chancel. Even these were largely removed in Reformation days. There is, however, one rather apt lesson which the English ecclesiastical architects did most clearly teach, and that is, that if a need exists, the simplest and most direct solution is generally best, and if a place for a priest to vest was needed, they put a room of the necessary size where it was most conveniently placed for use, and this done, they found its architectural treatment practically settled.

The modern plan which one sees so often followed is to take some hard and fast well balanced scheme and let the morning chapel balance the vestry, the porch balance a lavatory and the Baptistry balance the rooms for mothers' meetings. This sort of thing may work well for large classic buildings, and sometimes seems the essential note in such plans, where the regular balance of the parts, and the relation of parts to the whole, are necessary to the design ; but with churches it is somewhat different, the width and length of chancel have never had any fixed relation, nor has any such existed between nave and aisles, and the meaning and use of the various parts of the building have been a gradual natural growth, responding to need and fulfilled by a skill which was steadily improving. Such a growth cannot be reduced to a system—such symmetry as exists is occult rather than obvious.

It may seem begging the question to thus pass over without comment churches built on classic lines, but I have for lack of time been obliged to confine myself to one country—the one from which I believe we can learn most—and notwithstanding Wren's prolific production of semi-classic work, I do not think that either Wren or his followers have left a lasting mark on ecclesiastical architecture. Not a church rises in England to-day on the line of his work, while hundreds are following the lines of thought so rudely interrupted by the troubles of the Reformation. Nor does it in any way follow that the bodies who date only from the Reformation should hold to the models of chapel and meeting houses which were erected by their ecclesiastical forefathers, for we see clearly enough now that these men in the overzeal of reformers, a zeal which we cannot but admire, overthrew much that was beautiful and lovely and of good repute, and which was fit to make the service of God more reverent and more worthy. The barren meeting houses, and despoiled and whitewashed churches are a warning, not a precedent.

When we turn from country to city churches we find ourselves confronted by wholly different problems. We have seen churches, built on the old plans, gradually surrounded by buildings which press in around them, crowd and overshadow them, until one must feel convinced that the solution has not been reached. Where in the country one can build low nave and aisles, and thus emphasize the height of spire and tower, of what use is this in a city where an office building, or even a

* Paper by Mr. R. Clipson Sturgis, Boston, read before the A. I. of A.

ten-story apartment, will throw the spire into the shade and make the nave seem but a hovel. Even where the church, long established, has grounds about it and is thus saved from absolute encroachment, it is fairly evident that the building is an anachronism.

The natural way in which the city church presents itself to my mind is that it must conform to a city lot, generally narrow and deep, and lighted on two ends only. With low naves and high towers and spires ruled out as already noted, we have still left our early distinguishing feature of length, and the question of lighting length with outside light is at once answered by adding aisles to nave and depending on a lofty clerestory. The necessity for the important clerestory naturally suggests that in length and heighth of nave we shall find the best solution of the city church. We have given up nothing of essential ecclesiastical precedent or character in the interior, and in the exterior we confine ourselves to a single fine facade (or perhaps two if the building runs from street to street).

This seems to me the most obvious way of meeting the requirements of a city building, and gives ample opportunity for beauty; a great west window with lofty rising lines may well seem to have the dignity and beauty of aspiring height, and yet not challenge comparison with even a twenty-story building.

For such buildings the continent, especially France and Belgium, furnish us the best precedent. French cathedrals and churches seem to one fresh from England immeasurably lofty and sublime; and the people of the Netherlands were fully alive to the value of narrow and lofty fenestration—often further emphasized by mullions so light as to seem scarce capable of sustaining their height.

A noted English architect once said to me, "If you have heighth, do all you can to emphasize it and make it tell, and if you have length let every line tell of length." This, to my mind, is the keynote in church building. If you have all the dimensions heroic like Amiens, well and good, but if you have opportunity for but one, make the most of that.

Finally, no notice of ecclesiastical architecture, however brief, would be justified in passing over without comment the work which has been done in the present century. In the early part of the century, church building was at its lowest ebb, hardly a building of any importance or merit was erected, but with the forties and fifties men began to inquire as to the wisdom of our forefathers in ruthlessly destroying or casting out what was beautiful. The church alone seemed to be separated from what was lovely. With the revival in England of the study of church doctrine came the revival of the study of church architecture. Cathedrals and parish churches were repaired and restored (sometimes we could almost wish these enthusiasts had not done this); engravings and measured drawings were published, a general interest awakened in the many arts which were crushed by the zealous reformers.

Out of these studies and enquiries came, in England and here, men who understood the old work and loved it—who loved what it meant, and who thus loving could put new life into it. Previous so-called Gothic revivals had been attempted with ghastly results, but with Pugin and Sedding the lost arts of the sixteenth century received new life, and now there are a number of vital designers in England, and not a few here, who have studied the old work with reverence and who can design and build in the spirit of the earlier days.

Do not run away with the idea that I am a mediævalist, I have no wish to return, even in thought, to days which were so far less full of opportunity than these, but I am fully persuaded that we in this country are so much accustomed to looking, to straining forward that we do not study sufficiently, and try to learn from what lies behind or even before us.

It is good sometimes to drop the rush and bustle of our hurrying life and just take at least a glance behind to assure ourselves that our progress is really forward, and that in our eagerness for novelty we are not wasting time in studying problems which have been solved and settled long ago.

## A PECULIAR HOUSE.

THE most peculiar house in the United Kingdom is said to be a small triangular building erected about 300 years ago at Rushton, in Northamptonshire, by Sir Thomas Tresham, a fervent Roman Catholic, who is supposed to have wished by his design to typify the Trinity.

The house is all threes, each of its three sides being exactly 33 feet 4 inches—that is, 33⅓ feet in length. There are three stories, each has three windows on each of the three sides, and each of the windows in two of the three stories is in the shape of a trefoil—the three-leaved shamrock. The panes of glass are all triangles, or three-sided. In each of the other windows there are twelve panes of glass, in three fours. There are three gables on each side rising from the eaves; and from the centre, where their roofs meet, rises a three-sided chimney, surmounted by a three-sided pyramid, terminating in a large trefoil. The smoke escapes from this chimney by three round holes on each of the three sides. On the top of each gable is a three-sided pyramid covered with a trefoil. The building is almost covered with inscriptions and carvings. Three Latin inscriptions, one on each of the three sides, have thirty-three letters in each. Three angels on each side bear shields. Over the door is a Latin inscription of three words, meaning "There are three that bear record." Inside the house each corner is cut off from each of the three main rooms, so that on each floor there are three three-sided apartments. The house is not inhabited.

## PAPER-HANGING MACHINE.

PAPER-HANGING by machine is a German invention. The arrangement used is provided with a rod, upon which the roll of paper is placed. A paste receptacle with a brush arrangement is attached in such a manner that the paste is applied automatically on the back of the paper. The end of the wallpaper is fixed at the bottom of the wall, and the implement rises on the wall and only needs to be set by one workman. While the wallpaper unrolls, and, provided with paste, is held against the wall, an elastic roller follows on the outside, which presses it firmly to the wall. When the wallpaper has reached the top, the workman pulls a cord, whereby it is cut off from the remainder of the roll.

The annual meeting of the Hamilton Art School took place on the evening of the 15th inst., when the medals, prizes and certificates won during the year were distributed, and the officers for the ensuing year elected. An exhibit of the work of the pupils was made on the 16th and 17th inst., and was inspected by a large number of visitors.

## THOUGHTS FOR ARCHITECTS.*

As architecture is pre-eminently a constructive art, construction should certainly be its foundation—the very last thing that would be thought of now, for the æsthetic architect would leave that to the builder and the engineer. It seems ludicrous not to insist on an architect who is to build having such knowledge of statics as to know the proper method of resisting the force of wind, of water and of earth, and the thrusts of arches, vaults and domes. Statics would give us, too, important lessons in æsthetics, for it gives us the proper proportions of each part of a building when we know the height, the weight to be carried, and the strength of the material to be used. When these particulars are known and provided for, we may roughly say that we have only to accentuate the important part by mouldings, or have them adorned by the sculptor to make it into architecture.

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IN my opinion we cannot do better than make students design in cast iron when they have succeeded in designing in the old world materials. It is too expensive a material to disregard its statical conditions. It is difficult to arrange a column or a stanchion so that its capital may securely carry a heavy superstructure with a large base. It is difficult to make the base of a thin column or stanchion wide enough to safely transmit the weight it bears on to a foundation of much softer material ; there are difficulties in the design of mouldings and floral ornament that can be cast, and there are absolutely no examples to imitate, so that the knowledge, care, skill and invention of the student are called into play. We cannot believe that the ingenious mediæval architects would have foregone the use of such valuable and powerful materials as wrought iron, cast iron and steel on account of Mr. Ruskin's objection that they were not mentioned as building materials in the Bible.

* * *

I AM rather surprised that architects do not see that degrees of excellence are possible in architecture, or, if they do see it, that they do not act on their convictions. The greatest living architects are contented with the same remuneration for their work as the apprentice just out of his time, and merely seek to get into a wholesale business. This greatly helps to degrade the profession in the eyes of the public, and gives a very wrong impression of the facts, as every architect well knows. Thousands of public monuments have been erected in Europe since the Golden Age of Greece, not to speak of important private buildings ; yet the Parthenon and the Caryatid Temple on the Erectheion have never been equalled since, nor the interior of the Pantheon, nor the west front of Notre Dame at Paris, nor the Cornaro-Spinelli Palace, nor the Scuola di San Marco, nor the Town Hall of Brescia.

* * *

RECOLLECT what an obtrusive art architecture is, and how strongly it forces itself on the attention ; how long it lasts and how it forces people to come to see it in its own country. If you would only think that it is the history of the present power and cultivation of the people, you would at least learn enough about architecture to be able to judge of its excellence as you do about the other fine arts you love, and be as proud of its excellence and as delighted with it as you are with the pictures, statues, poetry, romances and musical compositions of the day ; and when you do take the same interest in it you will certainly have your reward.

* Extracts from the address of Professor Aitchison, A.R.A. President, at the opening meeting of the R.I.B.A.

## ILLUSTRATIONS.

PROPOSED RESIDENCE, BLOOR STREET, TORONTO.—F. S. BAKER, A.R.I.B.A., ARCHITECT.

PASSENGER DEPOT, C. P. RAILWAY, VANCOUVER, B. C.—EDWARD MAXWELL, ARCHITECT.

OFFICE BUILDING FOR THE LONDON AND LANCASHIRE LIFE ASSURANCE COMPANY, MONTREAL.—EDWARD MAXWELL, ARCHITECT.

TRINITY COLLEGE SCHOOL, PORT HOPE.—DARLING & PEARSON, ARCHITECTS.

This school, which aims at providing a complete education for boys, was founded in 1865, and has achieved an excellent reputation. The building, which occupies a commanding site overlooking Lake Ontario, a mile distant from Port Hope, was rebuilt in 1895. It has been made as nearly as possible fire-proof, being divided into five sections by heavy fire walls, the only communication between these sections being on the line of the corridors. In addition the building is equipped with fire appliances for every floor.

The lighting, heating and ventilation of the class-rooms and dormitories has received the special attention of the architects. In connection with the system of ventilating and heating, a tunnel, ten feet wide and eight feet high, runs under the entire building. In this the fresh air is introduced and warmed before being conducted by ventilating shafts to the various rooms.

There are four stairways similar to the one shown in our illustrations, each running to the top of the building, and constructed throughout of stone and iron.

On the school premises, comprising upwards of twenty acres, are excellent cricket foot-ball and tennis grounds, and a skating rink ; there is also a large covered gymnasium, and a play-room for use in bad weather.

The head master's house is situated in the school grounds, to the east of the main building.

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According to a contemporary, in a recent house where a good deal of attention has been given to the ventilation there is a small ventilator in the ceiling and one in the base-board of each room. The latter is connected with a pipe which goes to the kitchen chimney. This method is considered a good one, because the heat of the chimney creates a continuous current, thus drawing out the stagnant air at the floor, and when the hot air register is open the ceiling one needs only to be slightly open to secure excellent ventilation.

A device that is being introduced into English schools and is of evident merit, says Architecture and Building, is heated hat and coat racks. It is made entirely of iron tubing, the horizontal bars supporting the hat and coat pegs, while the upright tubes are connected with a supply of hot air, which is allowed to circulate through the tubing. The advantages of this arrangement are very evident, both from the point of comfort and sanitation. Nothing can be worse than the damp, steamy condition of school cloak-rooms in wet weather, especially for young children, and in our modern steam heated schools this arrangement of hat and clothes' racks could be easily and inexpensively applied. When weather is fair and warm, the heat is not needed and would be cut off, but during the season of the year when most needed the heating plant of the building would be always in operation, ready to furnish the necessary heat

## LEGAL.

A Canadian appeal case which recently came before the Judicial Committee of the Privy Council reveals that disputes can easily arise between partners, says the Builders' Reporter. In 1877 the late Simon Peters obtained a contract amounting to $529,296 for the construction of a dock in Quebec. An extra work of $18,393 was afterwards ordered. Mr. Peters entered into an arrangement with Messrs. Moore & Wright to do part of the work on the understanding that, while appearing as partners, each would be paid at contract price for whatever was done. Instalments were duly received, and when the dock was completed the harbor commissioners offered $52,011 as the balance. The amount was considered insufficient, and the courts afterwards awarded $87,468 as the amount due. The partners could not agree about the proportion in which the money should be divided, and $68,972 were lodged in the bank. Litigation began and in 1896 the court held that as the agreement between the parties was not definite, the section of the civil code should be applied which affirms that when the shares of partners are not fixed, they must be considered to be of equal amount. On appeal it was decided that Mr. Peters' representatives should be paid $27,667, the remainder becoming the property of Messrs. Moore & Wright, who were dissatisfied with the arrangement, and appealed to the Judicial Committee of the Privy Council. The decision was given against the appellants on most of the points raised, and they were ordered to pay three-fourths of the costs. The result is another instance of the risks which are incurred by indefiniteness in the language of deeds, for in this case it was evidently intended that neither party in the partnership should earn a dollar through the labors of the other.

## PERSONAL.

The death is reported of Mr. Alexander McKinnon, a prominent contractor at Picton, Ont.

Mr. William Cooper, a well known contractor, of Clinton, Ont., was killed by falling from a scaffold on August 17th.

Mr. Thos. A. Harvey, late of London, Ont., has recently graduated in civil engineering at Rennsselaer Polytechnic Institute, Troy, N. Y., has secured a position with the Pennsylvania Steel Co., of Harrisburg, Pa.

Mr. R. W. G. Bousfield has recently opened an office for the practice of architecture in the Spectator building, Hamilton, Ont. Mr. Bousfield is well known in the profession, having while a resident in Toronto taken an active part in the affairs of the Ontario Association of Architects. We trust that he may meet with success.

Mr. G. H. Fellowes Pyrnne, who was recently elected president of the London Architectural Association, was in the early '70's a draughtsman in the office of Mr. R. C. Windeyer, architect, at Toronto, Ont. In 1875 he returned to England and entered the office of the late Mr. G. E. Street, R.A., subsequently working with Mr. Swinfen Harris, the late Mr. R. J. Withers, and Mr. A. Waterhouse, R. A. He commenced practice in London in 1880, and has since designed many churches, schools and vicarages.

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It is reported that a company is in process of formation at Alvinston, Ont., to manufacture vitrified bricks.

The new city directory of Montreal, recently published, gives the number of contractors as 560; carpenters and joiners, 90; plumbers and gas fitters, 160; painters, 90. The total population, inclusive of the suburbs, is 325,000.

The Dominion Government has expropriated the quarry belonging to Mr. Archibald Stewart, late contractor for sections 1 and 2 of the Soulanges canal. The stone is required for use in the completion of the canal by the present contractors, Messrs. Ryan & McDonnell.

In enclosing his subscription to the ARCHITECT AND BUILDER, Mr. Geo. Schofield, of Fairview, B. C., writes: "I like your paper more and more, it is getting more beneficial and interesting all the time. I pass it over to the men and many valuable hints have they taken from it."

The assets of the Moir Granite Co., of Stanstead, Que., were recently purchased at auction for a nominal sum by the Eastern Townships Bank. The stockholders, having lost what money they had invested, refused to redeem the property. The sale will in no way interrupt the operation of the quarries, which has for some time been conducted by Mr. David Moir upon a royalty.

# MANUFACTURES AND MATERIALS

## WINNIPEG CLAY.

THOSE who have visited Winnipeg in the spring or autumn know something of the adhesive qualities of the clay in that locality. Until the present soft mud bricks of a light cream color are the only product of the local brick yards, but it is believed by some that clay adapted to make a better class of building brick exists at no great distance from the city. An American journal suggests that an opening exists for paving brick and sewer pipe manufactories, but does not indicate where the raw material is to come from. It is a well-known fact to those acquainted with the subject that the manufacturers of these materials in the eastern provinces had many and serious obstacles to overcome before they attained to the degree of perfection which has now been achieved. The difficulty of obtaining raw material embodying the exact constituents necessary to give to the manufactured product the durability and finish required, has been found to be one of the greatest obstacles to be overcome. The manufacturing apparatus to be employed, and the successful manipulation of the material so as to secure uniformly satisfactory results have only been determined as the result of long years of arduous experiment. In view therefore of the apparent lack of suitable raw material, and the limited local demand, it does not seem to us that our contemporary's advice in this matter could be profitably acted upon at the present time.

## A NEW ARTIFICIAL STONE.

A SCOTCH firm is manufacturing an artificial stone which is said to stand every test, and to be impervious to all vagaries of the weather. The process is a simple one, and the ingredients of the stone, chiefly lime and sand, are not expensive commodities, so that it is believed that the artificial product will be able to compete with the real. The lime and sand having been thoroughly incorporated, are passed into moulding boxes, which may be of any convenient size or shape, and these are placed within the converter. Water at high pressure, and having a high temperature, is then pumped into the converter to cause the necessary chemical union between the lime and sand, and the moulding boxes are also submitted to a temperature of about 400 degrees Fahrenheit by the action of superheated steam. In about thirty hours the surplus water is run off, but the heat is continued, in order to remove moisture from the moulding boxes, for another fifteen hours. The boxes are then removed from the converter, and the stone within them is practically ready for use. Experiments are now in progress from which it is hoped that other products of nature's laboratory, such as slate and marble, will presently be successfully imitated.

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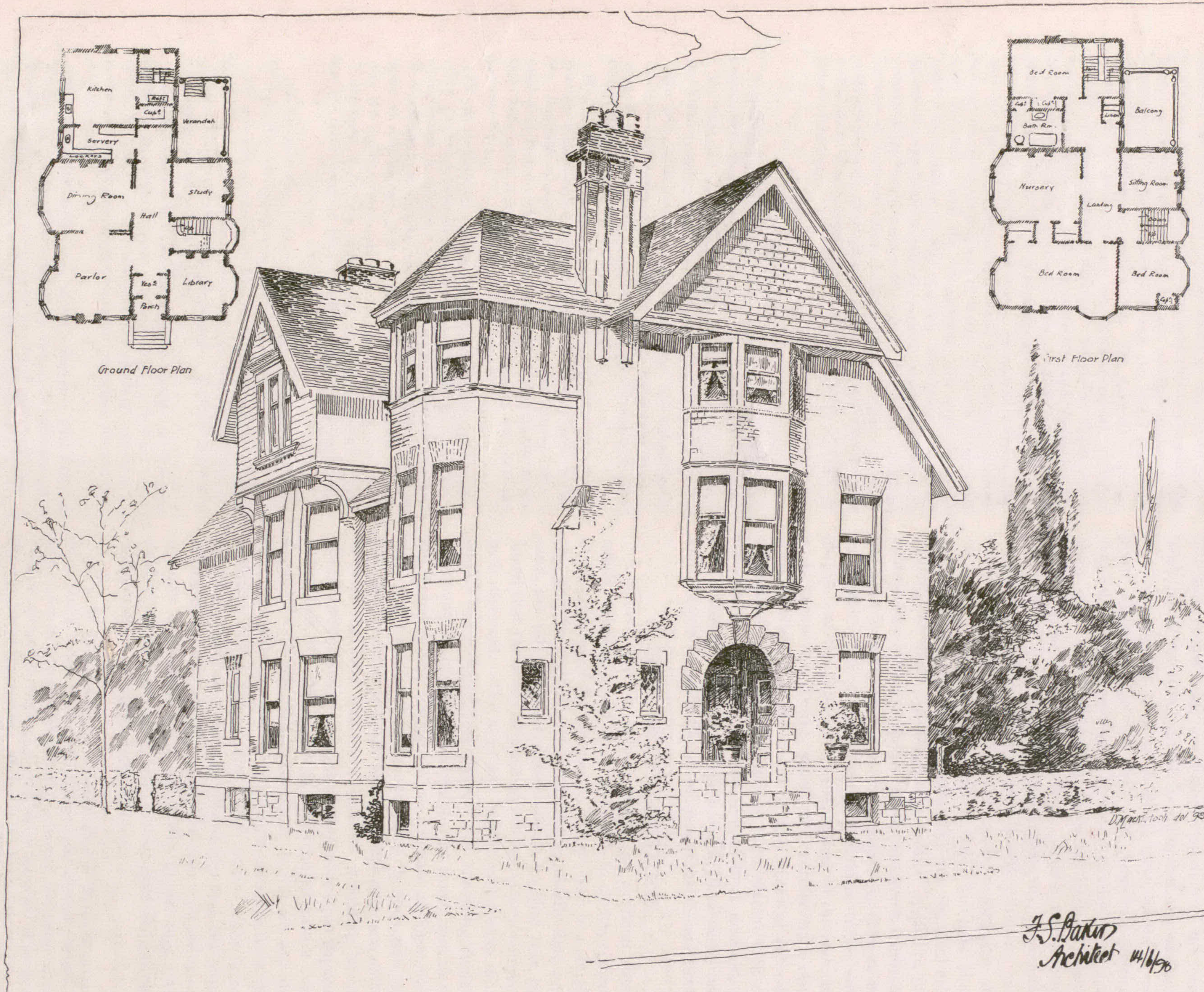
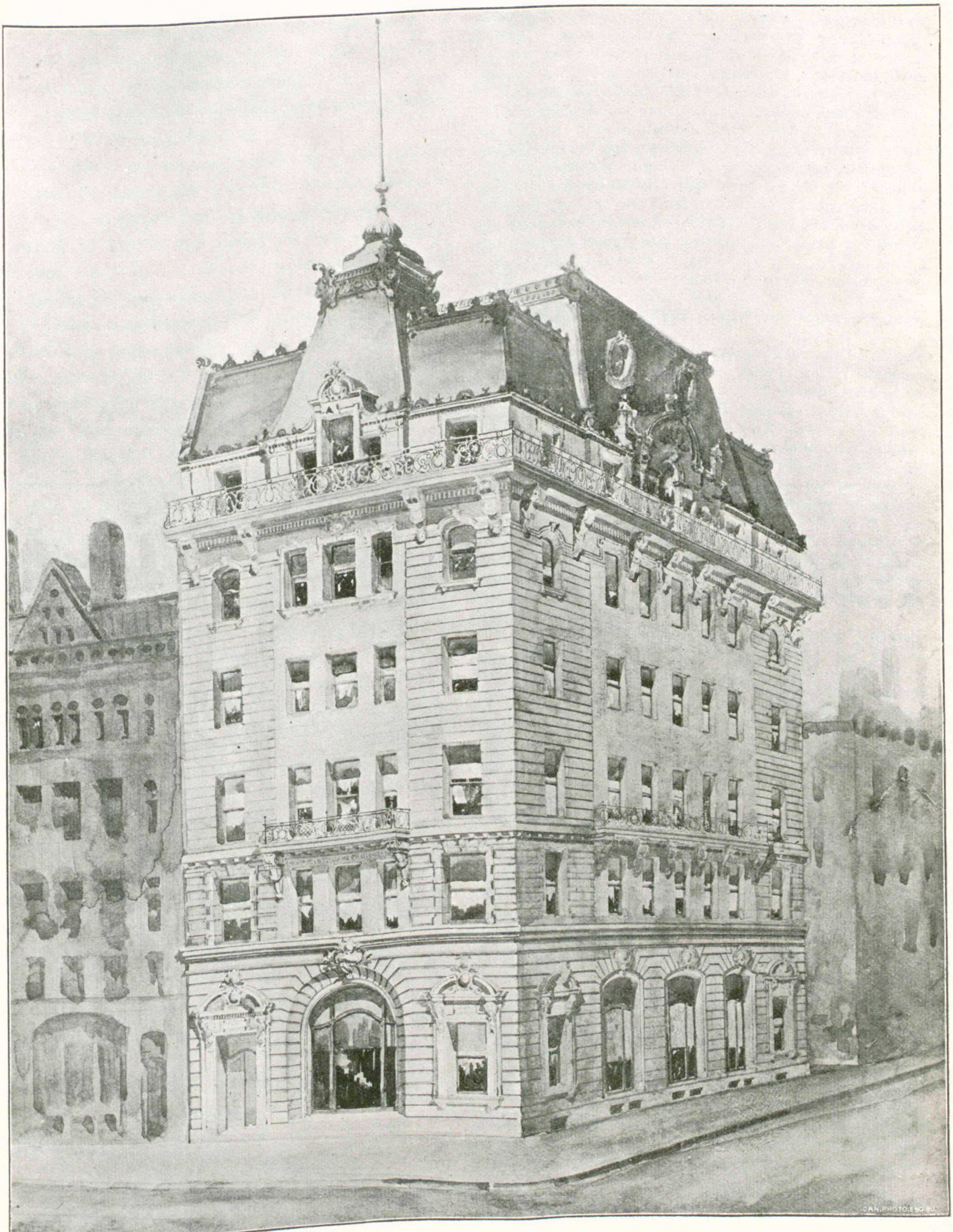
Mr. C. B. Stowe, referring to the grinding of Portland cement at a recent meeting of the Civil Engineers' Club of Cleveland, said he found, in testing some foreign cements, that about 60 per cent. would pass through a 200-mesh sieve, and about 80 per cent. through one of 100 meshes. He had made some tests recently to ascertain the point of fineness at which cement ceases to be cement and becomes practically sand, and found it to lie between the 200 and 400-mesh sizes. It was also found that much depends upon the mixture of materials before burning, the strength being about in proportion to the amount of mixing where the fineness is 200. He had some clinkers from which a sand test would go higher than a neat one, and had found that a cement might be so fine that it will crystallize in a neat test in such a way as not to carry the strength.




PROPOSED RESIDENCE, BLOOR STREET, TORONTO.

F. S. BAKER, A.R.I.B.A., ARCHITECT.



OFFICE BUILDING FOR THE LONDON & LANCASHIRE ASSURANCE CO., ST. JAMES STREET, MONTREAL.
EDWARD MAXWELL, ARCHITECT.

# STUDENTS' DEPARTMENT.

## C. A. & B. STUDENTS' COMPETITION.

THE publisher of the CANADIAN ARCHITECT AND BUILDER invites architectural students to submit drawings in competition for designs for four ornamental chimneys, for which first, second and third prizes of $15, $5 and one year's subscription to the ARCHITECT AND BUILDER, respectively, are offered.

The chimneys may be of brick, stone or terra cotta, or any or all of these combined.

Competitors are required to show by plans, perspective sketches and details, with or without elevations, the chimneys and sufficient of the plan and arrangement of building to explain the reason for form and position adopted, and to show roofing and other adjacent features if affecting the treatment of the chimneys.

Drawings must be made with pen and perfectly black ink ONLY, on white drawing paper, bristol, or tracing linen, to the size of 15 × 21 inches, and must be so drawn as to give their proper effect when reduced to one-half this size. No brush or color work is permitted.

The competition will close at 5 o'clock p.m. on Thursday, December 1st, 1898. No consideration will be given to drawings which may be received subsequent to that date and hour.

Drawings should be sent by mail or express, addressed to the editor of the CANADIAN ARCHITECT AND BUILDER, Confederation Life Building, Toronto, and marked on the outside "C. A. & B. Competition." All postage and express charges are to be paid by the competitors. Each drawing should be marked only with the non de plume of the author, and should be accompanied by a sealed envelope marked with the same non de plume and enclosing the full name and address of the competitor. This envelope will remain sealed until the competition is decided.

The merits of the designs which may be submitted in this competition will be decided by a joint committee, composed of officers of the Ontario Association of Architects and the Province of Quebec Association of Architects, whose decision will be final.

The right is reserved to withold one or all of the prizes if, in the opinion of the judges, the designs submitted should be so inferior as to warrant such a proceeding.

Students are requested to read carefully the above conditions, absolute compliance with which will be required of each competitor.

## ADDRESS TO STUDENTS.*

ARCHITECTURE is a structural art; and therefore the art of construction is the most necessary thing to be known. The science of construction is statics; consequently the elements of statics must be known. A knowledge of statics, too, gives us a true ratio between every part of the structure, and it gives the real shape that each part must take; if we were as clever as Nature, it would in all probability give us a beautiful shape. Unfortunately, we are far from being so clever, and consequently we have to learn by other means how a beautiful shape can be made out of the necessary shape. For this purpose we must study deceased architecture and Nature. Every piece of deceased architecture that we admire can be made to show us the æsthetic laws that govern it and produce its excellence, and these laws are as capable of being employed now as then. Every important portion of an ancient building may have the reason extorted from it as to why it pleased at its creation, and pleases us now; but from our greater knowledge, and from the necessity of using other materials, we may see that the proportions then used are not now applicable; for instance, a Greek Doric column showed the statical knowledge of its day, but it certainly does not now. Our materials and climate are different, and the æsthetic sentiment of our day is probably different too; so we must get some of our hints and solutions from Nature's works. There are in the first place human beings and animals, and there are thousands of different sorts of trees, of leaves, of grasses, of buds and fruits, which have beauty in different degrees, and we should learn from these how the beauty we want can be attained by various shapes and various proportions.

Without the gifts of the mathematical and the artistic capacities no man should become an architect; but there is another requirement which we call planning—that is, how to make each room, hall, passage, and staircase answer its purpose, and how to pack them in the most convenient way. This may be called common planning; but there is artistic planning as well, which is the choice of forms which are not only appropriate for use but are agreeable to the eye. I would by no means discourage any one who loves architecture and will study it from being an architect, for there are various degrees of power and excellence in architectural works, all of which make up the realm of architecture. We do not despise the violet because it is not so grand or so lasting as the oak.

The smallest cottage, if perfectly arranged, perfectly constructed, and perfectly proportioned, may be as delightful to contemplate as the mansion, the palace, the town hall, or the cathedral, though it does not require the same knowledge, the same daring, the same invention. You must bear in mind that nothing great is reached in the fine arts without simplicity, but lovely simplicity is reached by great labor, and takes about ten times as long to arrive at as ornateness. "Oh! what a power has white simplicity!" Just now there is a great inclination to get effects by exaggeration, or by ways that involve little thought or trouble, such as by the distortion of the orders, the sticking on of bits of rustication all over a building, or by putting water-gates into the attics of buildings.

We must not forget the proverb that "the human mind is greedy of novelty," so much deplored by William Morris and by Mr. Ruskin, though the desire for novelty is natural to man, and cannot be overlooked or overcome; for each generation has not the same knowledge nor desires as the preceding one. In eating, the most delicious food soon palls, hence the proverb of "Nothing but eel-pie." Let us, instead of deploring the taste for novelty, echo Tennyson's words: "Let the great world spin for ever down the ringing grooves of change." True novelty is obtained by development. We see how Nature develops her types; and if we had lived in the palmy days of Greece, we should have seen how the young clodhopper was developed into grace and beauty by training.

It is rather nauseous and rather ridiculous to hear so much talked of a new style, particularly when it is supposed that a clever man can invent it. The real new style is to be attained by the improvements that come about by the altering of proportions through our greater knowledge of statics and the strength of materials; by making our buildings perfectly suitable to the new requirements of our age; by the suiting of our mouldings to the climate, by the greater cultivation of outline, and by a deeper knowledge of our own light and shade.

* Extracted from an address by Prof. Aitchison, R.A., President R.I.B.A., and reprinted from the Journal of the Institute.

# THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

**Some Constructional Features.**

In the building of sheds or temporary buildings for agricultural fairs or for other specific purposes, the country contractor is often called upon to display a constructional ability that taxes his resources to the utmost. For a temporary shed, suitable for exhibition purposes, for stabling or for the display of farm products, the design shown at Fig. 1 might be adopted, as the con-

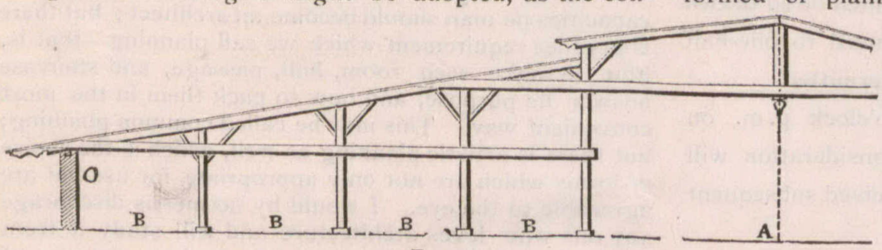



FIG. 1.

structional features are simple, and it may be built altogether of planks, ninety per cent. of which may be employed for other purposes after having served in the building, if not required to remain. The posts might be made of 2″ x 10″ stuff, girts 2″ x 8″, roof timbers of 2″ x 6″, braces 2″ x 4″, cut flat footed, and the whole either spiked together with heavy spikes or bolted together with ⅜″ carriage bolts. The latter would be the better and the cheaper in the end, as less lumber would be destroyed, and the bolts would not be in the least impaired. The bays, B B B B, might be devoted to cattle or poultry, and the centre bay, A, could be used for exhibiting roots, fruits or other similar products. No other foundation than 3″ x 12″ plank blocks resting under each post would be required, and the outside wall, O, might be formed of 2″ x 4″ scantling, and boarded with planed or rough lumber. The roof would answer very well if covered with sound one inch boards,

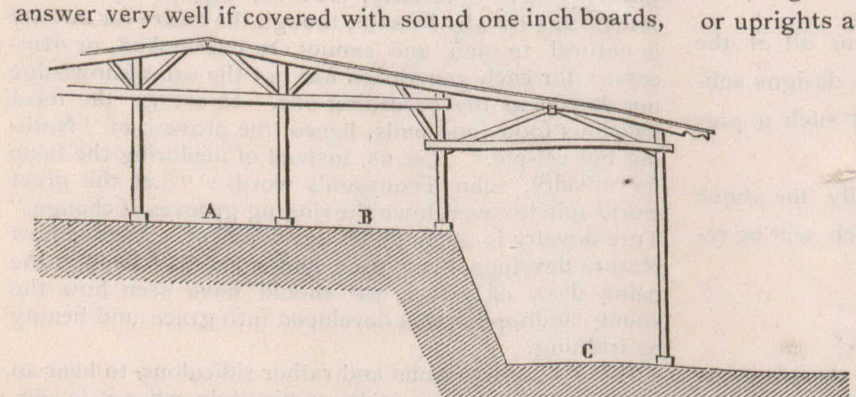



FIG. 2.

doubled, and laid with their lengths running parallel with the incline of the roof, and well lapped over at the top joints. Fig. 2 shows another style of shed, suited to a position where the ground dips. In this case, A and B would make the exhibition flat for farm products, while the lower bay, C, would answer for live stock. The method of construction may be the same as the the previous design. Fig. 3 exhibits a more complicated design, but one possessing the same constructional features as the previous examples. The braces are formed of planks, single and double, and the posts may be either round unwrought timber, or square, or formed of planks in one or two thicknesses. The whole is bolted together with suitable carriage bolts, which makes the structure strong and firm.

**Round Timber Construction.**

When round and straight timber is plentiful, it may sometimes be deemed necessary to erect sheds and other outbuildings with frames of timber the most available. In order to meet this condition we offer a few designs in which round timber forms the structural base. Fig. 4

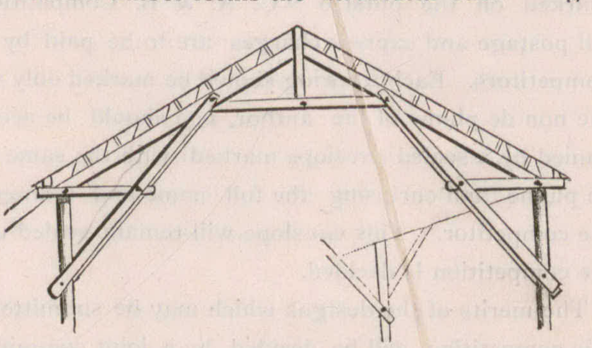


FIG. 3.

is designed merely as a sun and rain shed, with feed boxes against each supporting post. The central posts or uprights are let into the ground and have their ends resting on a log, as shown by the dotted lines, and the ends are either tenoned or spiked into this log, and braces are then run up from the log to a point just above the ground line, and are secured firmly to both log and post. The cross timber is scarfed into the post at O, and is well fastened with bolts or other sufficient device. The main braces are cut flat footed at X X, and fit on a prepared surface made on the cross timber, and the junction is well secured. The lower ends of the braces may be bolted to the upright post, or they may be tenoned or secured by any other method. The ridge pole and plates are shown, and the rafters may be of round balsam poles covered with rough sheeting boards, and shingled. Fig. 5 shows an end bent of a building formed with round timbers ;

a a show the portion for stalls, and if used for a barn or other similar purpose, the opening, b, may answer for a threshing-floor, while the loft, c, and the span-drils may be made to serve the purpose of a hay or grain loft. The methods ot construction are quite ap-

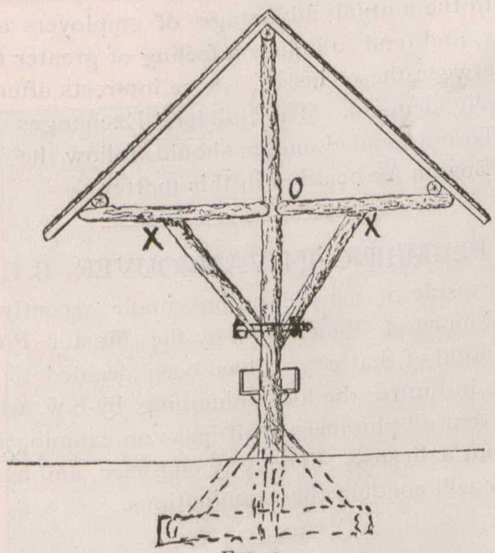


FIG. 4.

parent, the long braces being lashed to the central posts and cross girts. While this diagram is supposed to represent a combined barn and stable, it may be made to answer many other purposes. Fig. 6 shows a

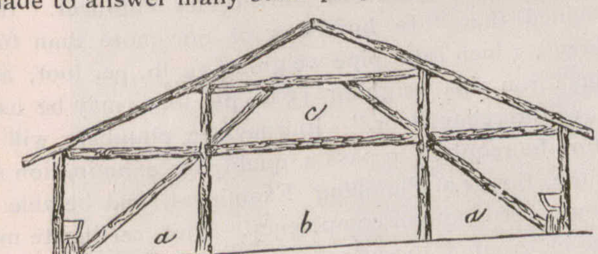



FIG. 5.

larger building, and is intended for a driving shed, suited for a country tavern, or even for a country church, where farmers drive some distance to reach the place of worship, and where accommodation for teams

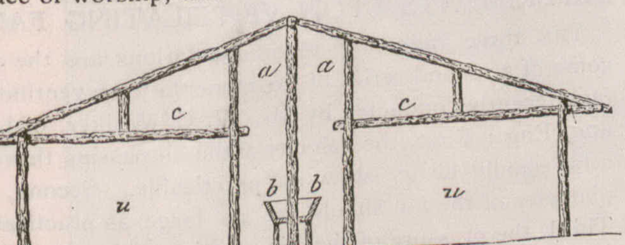



FIG. 6.

is imperative. The centre post, a a, b b, shows the dividing line, and may be boarded up to the ridge, or only part of the way. The spaces, u u, are left large enough to accommodate horses and buggy. The lofts,

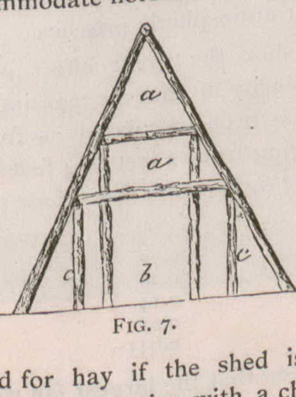



FIG. 7.

c c, are intended for hay if the shed is in connection with a tavern ; if in connection with a church, the lofts will require no flooring on the girts. Fig. 7 exhibits a structure that is very strong, and rather odd in shape. It may be divided into three stories, a, a, b, if desired. The posts, c, c, are let into the ground four feet, and the other timbers are framed, bolted or lashed to them. The structure should be lighted and entered from the ends. A building of this sort makes an unique and pleasant summer house, and it may be used for many purposes.

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**Dormer Windows.** WE present herewith a design for a dormer window, which possesses the twofold quality of quaintness and economy. The windows are composed of two sashes, each containing 20 lights, of 10 x 12 glass. The sashes are hung and fit snugly in their frames, and are held closed by small shot-bolts top and bottom. Fig. 8 shows

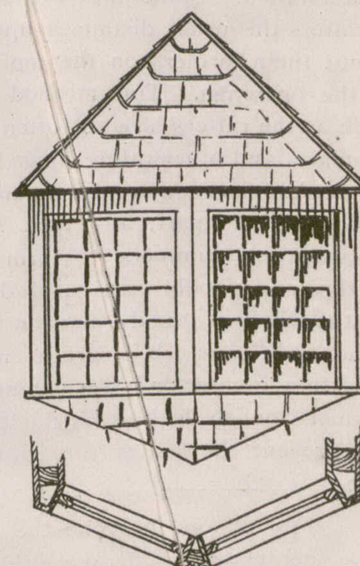

FIG. 8.—DORMER WINDOW, FRONT ELEVATION.

front elevation and plan, with details of mullion and jambs. The finish is quite plain, there being neither rolls on the angles or mouldings on the cornice. The gable is finished, and the finishing shingles on each course are rounded on their butts, which gives the work a good appearance. The angle occasioned by the sashes facing in different directions give a piquancy to the whole work that is very pleasing. The angle formsd under the sill, at its junction with the roof, may

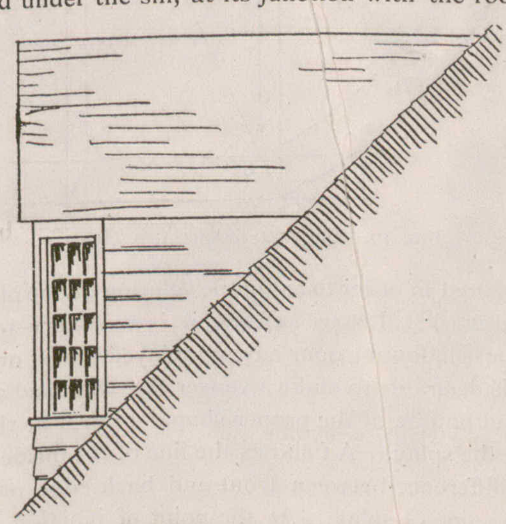

FIG. 9.—SIDE ELEVATION—DORMER WINDOW.

be sided or shingled, the latter preferred—the horizontal lines being made to confirm with the same lines as the roof. Fig. 9 shows the side elevation of dormer with the line of roof. It will be observed that the roof of the dormer continues beyond the face of the mullion making the gable over the sashes parallel with the wall plate ; this necessitates a deep soffit over the sashes, which may be ceiled with matched and beaded stuff. In preparing a roof for dormer windows it is always best to have the rafters set so that the frame of the dormer may set directly over them, and if the dormer is a wide one fill in the space between the bearing rafters with a sufficient number of rafters to make the work secure; then cut out such as are in the way and spike trimmers to the cut ends, and have trimmers fitted in snugly between the bearing rafters, to which they must be securely fastened. If the opening is more than ordinarily large the bearing rafters should be heavier than the common rafter, or they might be formed of two rafters spiked together. This precaution may prevent the roof from sagging, a fault that frequently occurs in roofs bearing large dormers when preventative measures have not been adopted. Sometimes the workmen will put on thin rafters the usual distances apart, shut the roof and lay out their dormers on the roof boards and then cut out the openings. This method is objectionable, inasmuch as the rafters are not often found to be in the proper place, and other rafters must be cut in between the ridge and plate or trimmers are cut in between rafters too wide apart, and then short rafters framed in between the trimmers to form the wall, a method that throws a goodly portion of the weight of the roof and the whole of the dormer on the two outlying rafters, a condition which is sure to end in causing the roof to sag to a greater or lesser extent, which may cause the dormer roof to leak at its junction with the main roof and prevent the sashes from working freely.

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**Splayed Work.**

FEW things provoke the village carpenter and builder more than work that is to be built with a splay, be it door, window or hopper, and the diagram shown at Fig. 10

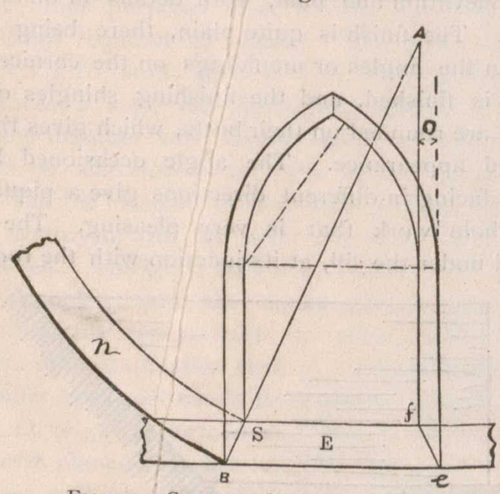


FIG. 10.—SPLAYED JAMBS AND HEAD.

is presented in order to aid in the solution of one phase of splayed work. Let us suppose it is necessary to build a gothic window or door having splayed jambs or head, and it is desirable to make a veneer that will bend around the head and be of the proper shape. Let E be the side and f e the splay. A f shows the line of the inside jamb, O the difference between front and back edge of jamb, B A the line of splay. At the point of junction of the lines B A and a, set one point of the compass, and with the radius A B draw the outside curve of n, then with the radius A S draw the inside curve, and n will be the shape of the veneer required. The curve will answer either side of the head.

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The wages of bricklayers in Vancouver early in the present season were increased to $4 per day, or within a fraction of 45 cents per hour.

## A GOOD IDEA.

THE Boston Master Builders' Association have recently opened a bureau where workmen seeking employment may register their names, and where employers may find required help. The idea is one which should result to the mutual advantage of employers and employees, and tend to induce a feeling of greater friendliness between these classes, whose interests after all are so largely identical. The Builders' Exchanges of Montreal, Toronto and London should follow the example of the Boston Association in this matter.

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## PLUMBING IN VANCOUVER, B.C.

As a result of representations made recently to the City Council of Vancouver by the Master Plumbers' Association of that city, it has been decided to strictly enforce in future the local plumbing by-law, which requires that all plumbers shall pass an examination and take out a license. The city engineer and health inspector will conduct the examinations.

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## PLUMBING IN HALIFAX.

SOME amendments have recently been made by the governor-in-council to the regulations governing plumbing work in the city of Halifax. A board of plumbing examiners is substituted for the city engineer. It is provided that "In buildings of not more than four storeys, 5 inch iron pipe weighing 12 lb. per foot, and 6 inch iron pipe weighing 15 lb. per foot, may be used above the cellar floor." Journeymen plumbers will in future be required to pass a qualifying examination set by the Board of Plumbing Examiners, and be able to show a certificate of competency. This certificate may also be granted to any master or journeyman plumber who shall furnish satisfactory evidence that he has practiced as such in Halifax for four years previous to the passing of the new rules and regulations.

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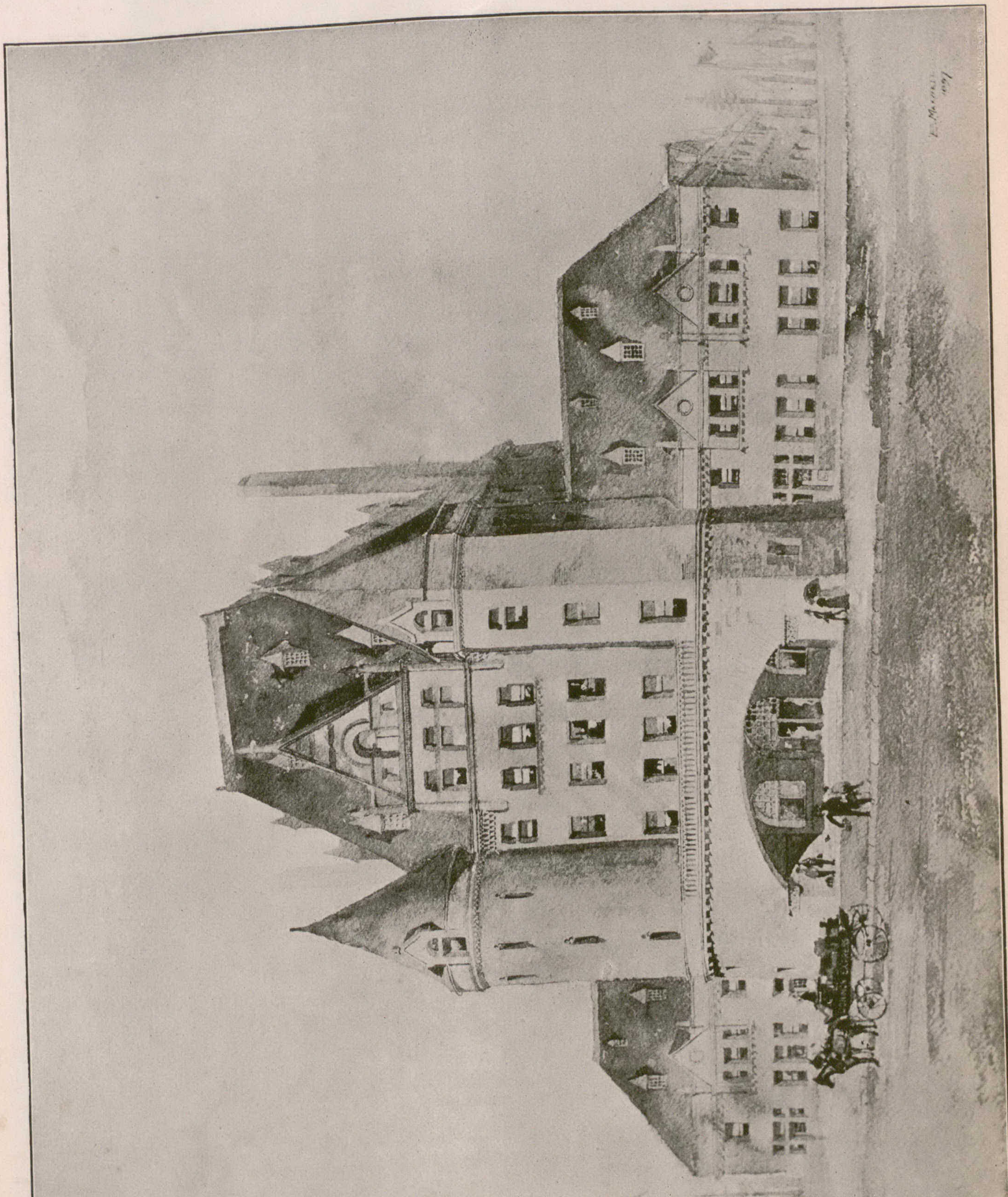
## EXPERIMENTS UPON VENTILATING FANS.

THE three following recommendations are the outcome of a second series of experiments upon ventilating fans recently conducted by Mr. W. G. Walker, of London, Eng.: First, the velocity of the air passing through a fan should be as slow as practicable. Second, the diameter of the fan should be as large as practicable. Third, the pressure of the air passing through the fan should be as small as practicable. The great feature of propeller ventilating fans is that they may be made to comply with these conditions as nearly as possible. This kind of fan is essentially a ventilator, and its principal object is to move a large volume of air at a slow velocity and at atmospheric pressure.

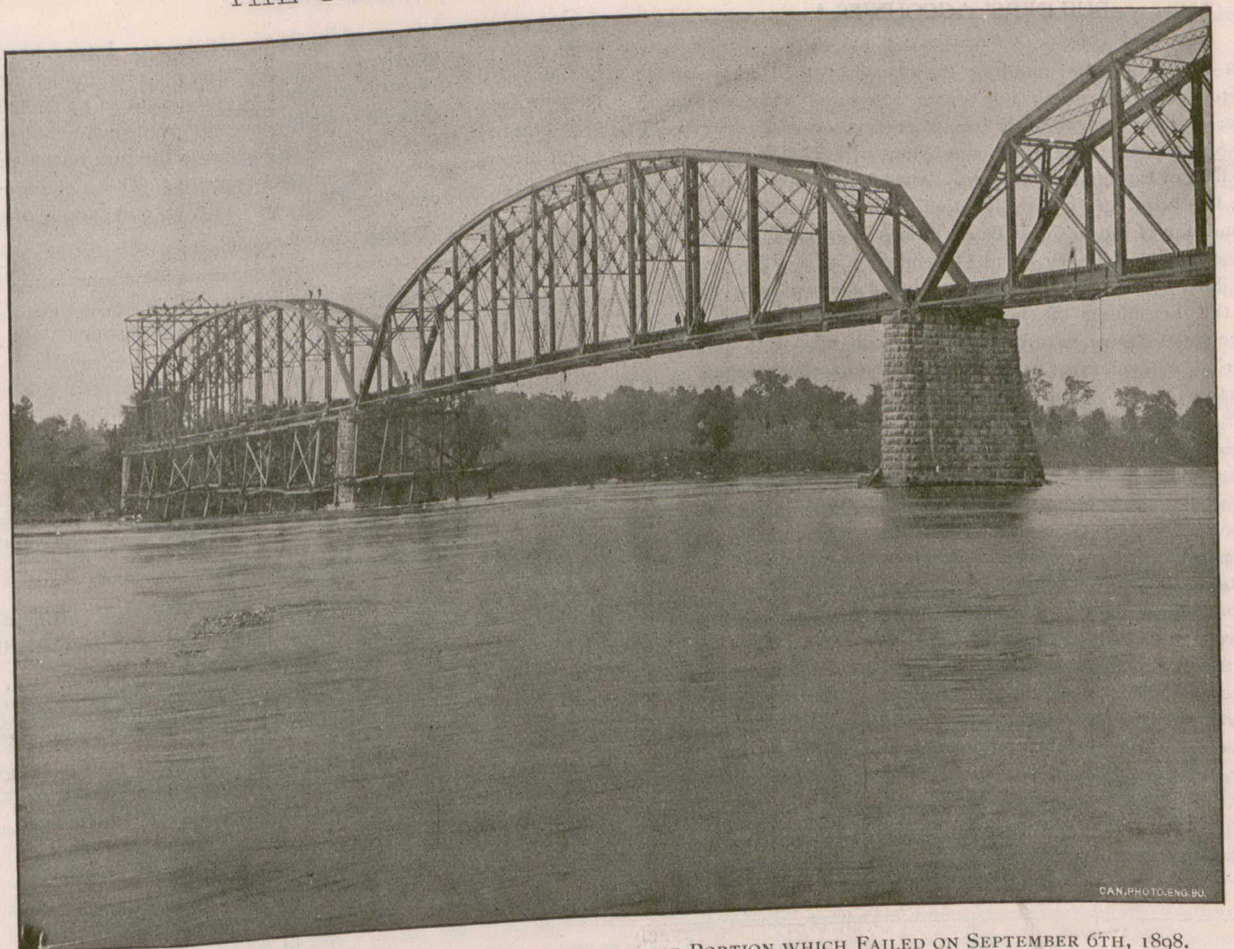
In order to show the great effect of the area of the fan and the velocity of the air passing through it, the horse power has been calculated as follows for driving five fans, ranging from 2 feet to 4 feet in diameter, and each propelling 6,000 cubic feet of air per minute:

| Diameter—Feet. | Horse Power. | Velocity of Air—Feet per min. |
|---|---|---|
| 2 | 0.72 | 1,910 |
| 2½ | 0.29 | 1,224 |
| 3 | 0.14 | 848 |
| 3½ | 0.071 | 623 |
| 4 | 0.045 | 477 |

Here it is seen that the largest fan would require only 6¼ per cent. of the horse power required by the smallest for propelling the same volume of air.



Passenger Depot Canadian Pacific Railway, Vancouver, B. C.




THE INTERNATIONAL BRIDGE AT CORNWALL, ONT., SHOWING THE PORTION WHICH FAILED ON SEPTEMBER 6TH, 1898.


VIEW OF THE CORNWALL BRIDGE DISASTER.

## THE CORNWALL BRIDGE DISASTER.

THE accompanying illustrations show the character of the international bridge at Cornwall, two spans and one pier of which suddenly failed on the 6th inst., resulting in the death of fourteen workmen and injury to many others. The pier successfully resisted during last winter the current and ice shoves, and the false work was being removed from the superstructure when the accident occurred, so that the whole structure appears to have been practically completed, though not taken off the contractors' hands. Several theories are advanced regarding to the cause of the failure, but we prefer not to speculate on this important feature of the case, but to await the result of the investigation which is now being made by Mr. Schrieber, by direction of the government. The contractors for the masonry were the well-known firm of Sooysmith & Co., of New York, who have had an extensive experience in this kind of work. The Phoenix Bridge Company, of Phoenixville, Pa., are the contractors for the iron work.

## BUILDERS' ACCOUNTS.*

By A. O. Kittredge, F. I. A.

The object of all accounting may be described as twofold: First, to keep track of what is owing to us and what we owe to others; and, second, to show just where we are making or losing in our operations. The usual conception of bookkeeping limits it to the first of these two functions. The second, which is the real result, has been very generally supplied in the past by comparing the condition of the business man's affairs at two different periods, as, for example, January 1 and December 31 of a given year.

For illustration, the case may be stated somewhat as follows: If at the beginning of the business period, or January 1, our balance sheet shows us to be worth $10,000, and if at the end of the period, or December 31, a similar balance sheet shows us to be worth $12,500, then it must be that during the year we have made $2,500. This is very satisfactory in a way, and is seldom objected to as a method so long as a gain is shown by these periodical comparisons. But as soon as the comparisons between the two balance sheets show that there has been a loss the case becomes different. We then demand to know where the loss has been made, although we were apparently indifferent where we made the gain while our business was profitable.

Unfortunately the question where the loss occurred is not readily answered by books as ordinarily kept. Therefore a reexamination of the transactions of the whole year must be instituted in order to discover the real reason of the lack of profit or to single out the particular operation upon which the loss was made. Before we have discovered by this tedious operation what we are searching for, the thought no doubt occurs, that if we had only known during the months that have transpired since our last balance sheet, that we were passing over dangerous ground, we could have saved at least a portion of the loss. Therefore our desire is

| Dr. — ANY CONTRACT. | Cr. |
|---|---|
| Labor.<br>Materials.<br>All specific outlays.<br>Pro rata of gene al expenses. | Corrections.<br>Materials left over. |
| Dr. Balance = Net cost.<br>To be closed into Selling Account. | |

to have our books so arranged for the future that we shall know at all times whether we are making or losing, and further that we shall know at the close of every operation just how much has been made or lost upon that transaction alone.

So much by way of introducing to the reader's mind the thought

| Dr. — SELLING ACCOUNT. | Cr. |
|---|---|
| Net cost of each of the contracts. | Selling price of the same contracts. |
| Dr. Balance = Loss on the operations. | Cr. Bala ce = Gain from the operations. |

that the business man of the period, whether he be a builder or engaged in some other branch of trade or industry, is not satisfactorily served by anything in the way of bookkeeping and accounting that falls short of affording him at all times a statement of his exact position and the rate of progress that he is making forward or backward. This brings us face to face with the need of accurate and properly arranged cost records. The builder's cost records should be so designed that a proper comparison shall ever be presented, not only in gross, but also in detail, between what it really costs to execute the work upon which he is engaged and what he obtains for it. Assuming that the selling price is the same as the estimated price, then properly arranged records of what it costs to execute a piece of work become actual verifications or corrections of the system of estimates and the prices that are made. Whoever estimates upon building work should be in such close touch with the records of actual cost that he is thereby informed of just what each given part is worth.

* Reprinted from The Bulletin.

One object to be served by these articles, as I apprehend the case, is to point out the changes necessary to be made in bookkeeping as it is ordinarily understood and practiced by such bookkeepers as are available to builders to hire, and such bookkeeping as is taught in the schools and explained in the text books as will adapt it to the builder's actual requirements. These changes are not in principles at all. They are only in new applications of

| Dr. — GENERAL EXPENSES. | Cr. |
|---|---|
| Costs of office rent, general superintendent, clerks, and all other expenses that cannot be specifically charged. | Amounts prorated to the several contracts. |
| Dr. Balance = Amounts not prorated. | Cr. Balance = Excess of actual cost that has been charged to contracts. |

This account should balance at the end of the year.

universally recognized principles. A few moments' attention to the Merchandise Account will not be out of place, since in what it represents is involved the whole question.

In the majority of cases builders fail to see their costs in proper relationship to their selling prices, simply because the so-called

| Dr. — MATERIALS ACCOUNT. | Cr. |
|---|---|
| All purchases of materials that cannot be specifically charged to contracts.<br>Amounts returned from contracts. | Amounts delivered to contracts (taken at cost). |
| Dr. Balance = Cost value of materials on hand. | |

Merchandise Account is made the general dumping ground for everything that is done. It is an overworked account. Materials, labor, expenses, and all costs whatsoever are charged on the one side, while the selling prices form the amounts on the other side. The common argument is that all the costs by being grouped together on the one hand and all the credits of sales being grouped together on the other, the difference between the two amounts, taking into account, of course, any materials remaining on hand or work in progress which has not been charged up, will be the profit or loss made on the operations. This is all very true, but it does not present the facts in the best shape to serve the builder's purpose. What he wants to know is the result of each operation. Did he make or lose on it, and how much? Instead of learning at the end of the year that he has made a small profit on the aggregate of his business, or perhaps even made a loss, when he feels morally certain that on some contracts he made a very large profit, he wants to know, for example, that on the public school building recently completed he made $6,000, and on the street-car barns he lost $8,000, on the row of dwellings in the suburbs he was able to make $6,000, on the church he came out even, and on the factory building he lost $4,000. In this statement the gains, it will be seen, are wiped out by the losses. A general showing, therefore, would indicate nothing save that the business was without profit.

The stumbling-block in the Merchandise Account, whether we look at it from the standpoint of the builder's bookkeeping or the bookkeeping of any other branch of business, is that it is made up with two sets of values. First, there are costs such as labor, materials, and expenses in general on the one side, and selling prices of these same elements combined on the other, the latter of course including whatever profit is being made. It is practically impossible to have all the materials consumed. There is always more or less of materials left on hand to be inventoried at the time the account is made up. Accordingly, the balance in this account never shows either the profit made or the loss sustained, as the case may be, nor yet the net amount of materials on hand. Instead, the balance is a combination of these two items.

Without extending this argument any further the reader will readily perceive the point that is in mind by comparing the Merchandise Account which, as stated, involves two sets of values with some other account wherein only one set of values is employed, as, for example the Cash Account. Values being the same on both sides of the Cash Account, the balance must represent the amount of money on hand. But suppose, for purposes of comparison, that the values on one side of the Cash Account were represented by various issues of a depreciated currency, worth all the way from sixty-five cents to ninety cents on the dollar, and that the values on the other side were gold, or, in other words, at par: required, in the light of the balance shown between the two sides of the account, the value of the currency on hand. This may be regarded as a ridiculous illustration, and yet it is no more ridiculous than the way in which the Merchandise Account is ordinarily made up.

With two sets of values in use in our transactions, a very rational proposition is to divide the Merchandise Account into two parts, so that each part of the account shall have its own set of values. Let one part be called "Buying Account" and the other "Selling Account." The Buying Account is made up of cost values or articles taken at cost prices, while the Selling Account takes the same articles at selling prices. The Buying Account is charged with all costs, such as materials, labor and expenses. In turn, as the jobs are finished up, it is credited with what they have actually cost. Then the balance in this account at all times will represent the materials remaining on hand or work in progress taken at cost prices. At the time that we credit this Buying Account with the cost of a job we debit the Selling Account with the same cost. In turn we credit Selling Account with the price we get for the job. Then the balance in Selling Account will always represent our profit or loss, as the case may be.

This fairly illustrates the theory that is at the bottom of the recommendations with respect to builders' accounts which follow. The two parts of the Merchandise Account here described may be called on the builder's books Buying Account and Selling Account as above mentioned, or other names may be given to the two parts, if other names are preferred. The first might be called "Building Account" or "Contract Account" or "Costs of Operation." Either of these terms perhaps better expresses the idea that is in mind than Buying Account, which name is more appropriate in a mercantile business, and yet it represents just what the builder buys, namely, materials, labor, etc.

The second account might be called "Results of Operations." But inasmuch as the first represents costs, called by whatever name it may be, and the second represents the sales of the articles produced by those costs, perhaps Selling Account for the second is as good a name as could be found for it, irrespective of the style of the term that may be applied to the first. However, the names that are employed for these accounts do not make the slightest difference. It is the distinction between them that is vital.

In what has preceded we have treated the Buying Account, as we will continue to call it, as though a single account was to include the cost of all operations. Our argument has been that we should know what each particular operation produces, and therefore there is the necessity of opening up a cost account or buying account with each operation. We should debit the school-house, for example, with everything that goes into it, taken at cost price, including both labor and materials, expert service and special expenses, and, further, it should be debited with its pro rata share of our general expenses, such as office rent, salaries of general superintendent, draftsman, estimator, bookkeeper, and all other items of a similar nature which require to be spread over the entire amount of business we transact.

The plan, therefore that is recommended for use is indicated in the accompanying formulæ, and in general terms may be put as follows: Open an account with each and every contract, job, or piece of work. Debit it with all costs of labor, materials, and expenses that belong to it, and in addition with its pro rata of general expenses. When the contract is finished close this account (costs) into the general selling account. Selling Account receiving all the costs of work on the debit side, and the contract prices on the credit side, will then show by its balance the loss or gain of the business as a whole. Knowing by the plan the cost of each job we execute, and having before us the contract price, we can at once determine our profit (or loss) on any piece of work that we may desire to inquire into.

It is impossible in an article of this kind, if held to reasonable dimensions, to explain every detail, or to provide answers to all the questions which the builder's bookkeeper will be prompted to ask. A few words, however, about the prorating of general expenses, and the management of those materials which the builder buys in quantities and portions out to the different jobs and contracts as necessary. I will limit myself for the present to these alone, proposing to explain other points, and these as well in further detail, through correspondence, if the reader is minded to address me.

First with respect to general expenses: An account with general expenses, by which is meant all those expenditures which are of such a character as to make it impossible to charge them specifically to the jobs and contracts, is to be opened up. It is to receive the charges as they occur. Instead of waiting to the close of the year to deduct the amount of this account from the gross profit, the expenses are to be prorated or distributed as the work proceeds.

For this several plans may be suggested, to only two of which will we give attention. Both of these anticipate at the outset an estimate of what the gross amount of the general expenses will be for the year. This is to be made out in the light of the experience of the past. If general expenses amounted to $10,000 last year, and we expect our rate of expenditure will be about the same this year, then $10,000 very possibly is the figure we will fix upon as the basis of our calculations. If we estimate that our contracts for the year will cost us in labor and materials $200,000, then by way of distributing this amount we should put into the costs of each operation an amount for general expenses equal to five per cent. of the cost of materials and labor.

When we charge up this amount to the job, we of course credit the general expense account. Then the accuracy of our estimate of expenses, etc., and the correctness of the basis of our distribution will be demonstrated by the expense account balancing at the close of the year. If it does not balance, the discrepancy must be adjusted through the loss and gain account.

As the transactions of the year proceed, we watch the indications very carefully. If it becomes evident that our percentage allowance is too large or too small, we vary it accordingly.

The above represents one plan of prorating expenses. The objection to it is that, comparing contracts one with another, materials and labor vary in their respective proportions, and also in relative cost. Some jobs are more in materials and less in labor; others are almost all labor. Sometimes the materials are relatively very expensive, and in other cases they are very cheap. Occasionally all the labor is of a common grade, and then on another job the labor is all of high skill. One year's business may run to one extreme and the succeeding year's business to the other. Is there then a better basis for distribution of general expenses than a per cent. on general costs?

Manufacturers in various lines, for a long time past, have used the labor part alone and have based the percentage for distribution purposes upon it. Lately they seem disposed to go a step further, using as the unit or basis the "man-hour," that is, the hours of labor irrespective of price paid. The application of this plan would be as follows: Ascertain the number of hours' labor expended upon all your contracts last year by employees of all grades and kind. Divide your total general expenses for last year by this number. The quotient will be the price per man-hour that your expenses have been costing you. Keep careful track of your labor on each job the present year in the same general way, and in closing up the account of the cost of each contract, charge it with an amount equal to this price per man-hour, multiplied by the number of hours' labor expended upon it. Credit this amount to the general expense account in the same way as explained in connection with the first method.

Now as to materials carried in stock: Open up an account, to be called by some such term as "Materials," to which charge everything in the shape of material that cannot be charged direct to the contracts. When materials are taken from this general stock for use on special jobs, charge the jobs with them (always at cost) and credit materials. The balance in Materials Account then at all times will represent the amount on hand at cost prices. Any materials which have been charged to a contract that are left over on completing it are to be changed back to Materials Account, when they are put in stock and the account with the contract credited in like amount.

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It is advisable not to use chrome greens on new walls as there is danger of their being turned in color by the presence of the caustic lime in the wall. The steady glare of gaslight, too, has been known to have a yellowing effect upon these colors.

Tar spots on woodwork are difficult to remove, and always show through subsequent oil paint coatings which become dirty and do not dry. To prevent this the tar should be scraped off as much as possible, and the spots coated twice with a strong glue water, which will insulate the tar completely.

## CABLE SYSTEM VS. DERRICKS FOR QUARRIES.

Mr. J. B. Gordon writes to Stone on this subject, as follows: One cable stretched over a quarry, say only a distance of 400 feet, and 400 feet additional over yard room, making 800 feet between towers, controlling a space 800 feet by 60 feet: This would require at least eight ordinary derricks to cover the same and eight double drum engines, eight engineers and at least three men for each derrick, tugging and hauling booms around, say a force of twenty-four derrick men. Then they will not accomplish any more work than one twelve or fifteen ton capacity cable plant. For the cable plant only one engineer is required and four or five men to attend to the chaining and dogging of stone. There is no forced work, but a clean lift and rapid travel to any part of yard. All refuse is put in large skips, taken up and carried to dump pile at one handling; no guys in the way or to be made taut every few days; no jerking and breaking down masts or booms, only the towers to be kept painted at regular intervals.

The first cost of a cable plant is not any more than derricks and engines to do the same amount of work, with a saving of more than half the expense running the cable system, and yet it is very strange that quarry owners will keep on in the old rut.

## MATERIALS FOR A SKYSCRAPER.

An idea of the amount of material required in the construction of a modern office building can be gotten from the following figures furnished by Mr. McCaul, who has charge of the construction of a sixteen-story skyscraper in Philadelphia:

About 8,000 cubic yards of excavations; 4,000 yards of concrete and stone masonry; 4,371,555 pounds of steel; 300,000 pounds of ornamental iron; 36,000 pounds of ornamental bronze; 10,000 cubic feet of granite, weighing 900 tons; 260,000 square feet of fire-proofing, weighing about 3,600 tons; 1,360 tons of patent mortar used in plastering, to cover 42,000 square yards of plastering; about the same amount of cement mortar used in brick and stone masonry; 40,000 square feet of Pevonizza, Numidian and Italian marble; 15,000 pounds of nails; 10,000 cubic feet of terra cotta, weighing about 290 tons; 325,000 face brick; 1,500,000 common brick; 24,000 square feet of glass, weighing about 73,660 pounds; about thirty miles of electric piping to encase the electric wiring throughout the building, and about ten miles of plumber and steam fitters' piping. There were on an average 200 men working on this structure from the start until the finish.

## THE MARKET FOR BUILDING SUPPLIES IN SOUTH AFRICA.

A steadily increasing demand for various classes of building materials is reported from South Africa. The demand includes such materials as doors, blinds, flooring, metal ceilings, car material, iron pipe, and contractors' supplies, as for example, road scrapers, wheel barrows, shovels, picks, etc. There is to be held at Grahamstown, in December, the South African Exhibition. The Canadian government has appropriated $5,000 to defray the cost of a Canadian exhibit, and has also chartered a sailing vessed to convey exhibits to the Cape. This vessel will leave Quebec a few days hence, and will carry freight at the nominal charge of $6.85 per ton. If sufficient cargo is forthcoming, a second vessel will be despatched at a later date. Canadian manufacturers of materials and articles above mentioned should look closely after the South African trade, much of which now goes to the United States.

## USEFUL HINTS.

Carmine is readily affected by heat, turning to dull brown, and metallic salts have an injurious effect upon it. Exposed to strong light it is not permanent, fading away completely in less than six months, unless well protected.

Cement for Cracks in Hot Water Pipes.—Mix 1 oz. of powdered salammoniac with 100 ozs. of iron borings, and ram them well into the crack or joint; or else mix 12 lb. of iron filings, 2 ozs. of salammoniac, and 1 oz. of sulphur, worked up in water.

A paste with which wall paper can be attached to wood or masonry, adhering to it firmly in spite of dampness, is prepared as usual, of rye flour, to which, however, are added, after the boiling, 8½ grams of good linseed oil varnish and 8½ grams of turpentine to every 500 grams.

To Protect Iron Structures from Rusting.—Mix 1 part of quicklime with 5 parts of water, stir it up to allow the lime to settle; then pour off the clear water, and mix the lime with sufficient olive oil to make a thick cream, and paint this over the iron surfaces to be protected.

To Cement Iron Railings, Girders, etc.—Mix together six parts of sulphur, six parts of whitelead and one part of borax; then, when wanted for use moisten it with strong sulphuric acid, and place a thin layer of it between the pieces of iron which are to be joined. In five or six days the cemented pieces will be firmly attached.

In French hospitals the floors have been painted for hygienic reasons with a solution of paraffine in petroleum, which gives them a brown color and renders them entirely impervious. A single application is said to suffice for two years. Such floors may be wiped daily with a cloth saturated with an antiseptic solution. This device is of great importance to schools, hospitals and private houses.

There is no better way to clean a new pressed brick wall than with muriatic acid and water. All projecting stone sills and caps must be carefully covered up, especially if the trimmings are limestone or marble, as acid falling on the stone would discolor it. To clean an old brick wall scrub the wall with soap and water, and give it a coat of linseed oil with just sufficient Venetian red or other suitable staining color in it to hide the discolorations in the brick.

Lichen on Stone Buildings.—The green or black covering which forms on light colored stone after some time, has been found by Dr. Fruhling to be a lichen, and if once developed is hard to remove. Its formation, however, may be prevented by painting the stones with a diluted sulphide of potassium solution at intervals of one year. Leitzmann has attempted to wash off the houses with hydrochloric acid and found that this was effective for three to six years.

Cements and Putties for Masons' Use.—Dissolve alum in water until the fluid will not dissolve any more, then mix in this sufficient plaster of Paris to make a stiff dough and bake it; when baked hard and dry grind it to powder, and for use mix with water as wanted, and apply it like plaster. Various pigments may be mixed with it (while in the dry state, after baking and grinding) to make the cement imitiate the color of any kind of marble it is required to cement or join. Joints made with this compound can be polished as smooth as glass, and thus the joint in the marble work may be rendered imperceptible.

Cement Coating for Iron Water Tanks.—Every good oil paint and red lead coating will protect the water reservoir from rust, and when it is perfectly dry will not give the water any noticeable side taste. The only drawback is that the oil coating does not last long. For this reason a cement coating is considered superior to oil paint. Cement dries perfectly in a few hours, and if it is made right, lasts at least as long as oil paint, while its cost is next to nothing. In the Experimental Brewery at Berlin, says the "Nordd Bangew Anzeiger," the lime and warm water receptacles are painted with cement, and after four years' use the coating has not yet required renewal.

## TORONTO CHAPTER OF ARCHITECTS.

THE Toronto Chapter of the Ontario Association of Architects will resume its monthly meetings in October. The committee will endeavor to provide an attractive programme, and hope to see a large attendance at the opening as well as at subsequent meetings. Through the kindness of the Education Department, the spacious lecture rooms of the School of Practical Science are freely given for the meetings of the Chapter. The splendid collection of photographs, illustrations, books, papers, etc., are all accessible to those who attend. Mr. C. H. C. Wright and his assistants are most courteous in giving any needed help, and frequently treat the visitors to an exhibition of the fine lantern slides for which the school is noted. While all local architects are most earnestly invited to become members of the Chapter, the meetings are entirely open, and all persons interested in architecture are heartily welcome.

## HINGED MASONRY ARCHES.

A PAPER was lately read before the American Society of Civil Engineers by Mr. David A. Molitor, in which he explained the advantages of masonry arches over iron and steel bridges, and presented a mathematical analysis of strains and loading in a three-hinged arch, from which he calculated the deformation and determined the thickness of masonry. Mr. Molitor illustrated his methods by a practical design and estimate for a three-hinged concrete arch of 236·23 feet span, 46·57 feet wide, proportioned to carry a 44,000 lbs. electric motor car, besides a uniformly distributed live load of 82 lbs. per square foot. The allowed working strains are 568·8 lbs. compression and 28·4 lbs. tension per square inch on concrete composed of one part Portland cement, two parts sand and three parts crushed limestone. He gave detail tables of loads, strains and dimensions, and of quantities in the finished structure, which he assumed would cost about $96,000. The purpose of the paper was to demonstrate that masonry arches may be constructed on any good foundation as accurately and simply as iron or steel structures, and sometimes more cheaply. He considered that the Austrian tests of 1890 to 1895 and the recent construction of a few long-span three-hinged masonry and concrete arches inaugurate a new era in masonry bridge construction. According to Mr. Molitor, all the harassing features of fixed masonry arches are overcome by the introduction of hinges at the crown and abutments, and by basing the design on the theory of elasticity, and that it is practicable to strain the material one-sixth of the ultimate strength of test samples.

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The square of numbers ending in 5 can be obtained quickly mentally by multiplying the number to the left of the 5 by the next higher number, and suffixing 25 to the result. The square of 485, for example, is found thus: $48 \times 49 = 48 \times 7 \times 7 = 2,352$; suffix 25 and the square, 235225, is obtained. This rule is taken from a note by Herr Edler in the Zeitschrift of the Austrian Society of Engineers and Architects.

The holding power of wood screws was investigated as a thesis subject by Mr. Norris M. Works at Cornell University. His experiments were made with white pine only, and the most important results were the following: The maximum holding strength of a screw inserted at right angles to the direction of the grain is obtained when no hole is bored to receive it or the hole is about eight-tenths of the diameter of the screw at the base of the thread. In the case of screws inserted parallel with the grain, the maximum holding strength is obtained when sunk in a hole about four-tenths their diameter.

## QUICKSAND.

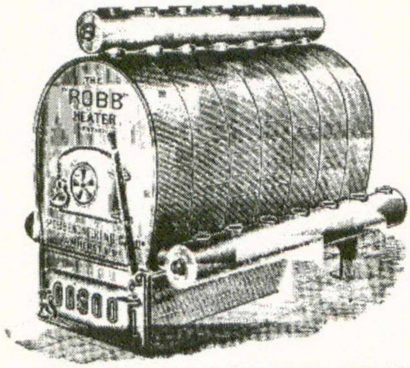
VERY little is known by the general public about quicksand, and that little is usually obtained from novels. Such information is usually wrong, being composed of a pinch of truth and a handful of fiction. The sensational novel goes so far as to give to quicksand some attributes that belong only to living creatures. No ordinary observer could distinguish quicksand from any other if it were dried ; and if he wished to restore its fatal property artificially, he would, in all probability, fail. Suppose he fills a bucket with it in the dry state, and soaks it with water ; it does not in consequence become mobile. If he drains the water off from the bottom, the sand will be found wedged firmly in place, and if the water be measured it will be found to equal thirty per cent. of the bulk of the sand, or about twenty per cent. of its weight. From this we may infer that a cubic foot of dry sand weighs nearly 94 lbs. This, for sand, is very light weight, for there are other qualities of sand which weigh as much as 171 lbs. Quicksand, when examined under the microscope, will be seen to have rounded corners like river sand, as distinguished from angular or "sharp" sand, which will pack more solidly than the other. It is quicksand that is used in the hour-glass and in the smaller egg-boiler, partly because of its fineness and partly because it does not obscure the inner surface of the glass by scratching. The lightness of quicksand is the quality which will lead us most surely to the cause of its reputation, and to illustrate this, the bucketful of sand must be loaded with water from below, and made to overflow very slowly. The upward current will be found to loosen the sand and to raise the surface very slightly, separating and lubricating the particles so that they are easily displaced. The bucket now contains quicksand, and this sand, from the support it receives from the water, has its weight or supporting power reduced. In the dry state it weighed nearly 94 lbs., but if weighed in the water it is reduced to 32½ lbs., and its mobility prevents any animal from walking on it. The mixture of sand and water weighs quite 112 lbs. per cubic foot, or nearly twice the weight of water, and bulk for bulk nearly twice the weight of a man, but it is too thick to swim in, and the person engulfed would soon be too exhausted to escape. He would probably die of suffocation if not drowned by an advancing tide, for quicksands are found mostly within the influence of tides. He would not be swallowed by the quicksand, because it is so much heavier than his body. Quicksands require in all cases an upward current which is not quick enough to form what is called a spring or fountain. It may be formed in two ways—in tidal rivers and on the shores of tidal seas the rising tide may saturate a porous stratum of ground below high-water mark, and when the tide falls a return current is established through the same porous (sandy) ground with a sufficient velocity to loosen the sand, as above described. This sand, as soon as the rising tide reverses the current, ceases to be "quick." The other case is that when a slow current of fresh water finds an exit through a surface of sand above or below water. This is a permanent quicksand. Any sand and almost any material might have the quality of quicksand imparted to it by means of a suitable current. Coal is separated from shale in an upward current of water, so regulated that the coal is made to float while the shale falls to the bottom, and heavy iron tools have been carried to the surface by the sudden discharge of artesian wells. Quicksands (says Invention) that are encountered during the sinking of wells and foundations are all due to the influx of water when the work gets below "spring level" or the level of water in the ground. The sand, being deprived of the support of the excavated part, is pushed from behind by the water current flowing in from all sides.

## ACTION OF FROST ON BUILDING MATERIALS.

One of the most important features in structural materials of all kinds is their permanence under the influence of atmospheric influences. Of all these perhaps the one that exercises the greatest mechanical effect is frost, which tends to disintegrate bricks and stone by the expansion in the act of freezing of the water enclosed in the pores, with a consequent separation of particles of flakes when thawing ensues. Few readers have ever thought of testing the permanency of their goods under such conditions; the winter time provides a seasonable opportunity and there is no reason why every manufacturer should not, if we have frost enough, be able to ascertain to what extent his goods will stand frost. This can be determined by a very simple test – namely, by direct freezing. Let typical samples of the goods be chosen during frosty weather, and saturated with water, and then alternately frozen and thawed a dozen times or more. Now, if the samples to be tested are weighed dry and the loss of weight by exfoliation determined also on the dry samples, the thing is accomplished. It would be possible to create a standard of permanency by counting a given percentage of loss as unity (this would have to be chosen arbitrarily) and then referring other percentages of loss to it. Thus might be created a scale of permanency, and when about to enter into a contract this might be referred to just in the same way as the resistance to crushing strain is now quoted.

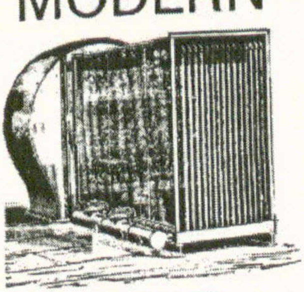
A cement for repairing cast iron tanks is prepared by melting at a low heat (so as to prevent the brimstone catching fire) 5 parts of brimstone, 2 parts of blacklead and 2 parts of sifted cast iron filings. Before applying the cement warm the metal by laying a red hot iron over it. The metal must be perfectly dry, so as not to generate steam, and then stop up the damaged part with the cement applied in a soft state by gently heating it in an iron ladle.









Mr. F. F. Skinner, who spent the greater part of the past summer in Montreal, in the interests of the Gurney Foundry Co., reports a recent improvement in business conditions in that city.

A valuable polishing stone quarry has been discovered and is about to be developed at Rockport, N.B. There are five seams in red, brown and slate color, and differing slightly in quality. These stones have been tested by practical marble workers in Canada and the United States, and have been highly recommended, rivalling pumice stone, and where there are hard spots in marble proving much better. Some of these stones also make good whet and oil stones. There is also in this property a fine quality of brown building stone, but not as yet developed enough to show its value.

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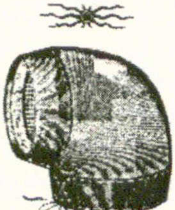

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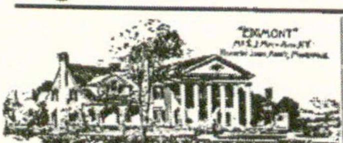


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