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MISSING

CANADIAN ARCHITECT AND BUILDER.

VOL. XII.—No. 9. SEPTEMBER, 1899 { 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

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

The C. H. MORTIMER PUBLISHING CO. of Toronto, Limited,

Publishers,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.

Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to foreign subscribers is $2.50. Subscriptions are payable in advance. The Journal will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrears of subscription paid.

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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.

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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.

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Method of Testing the Color of Building Stones.

IN order to ascertain the permanence of color of building stones, Prof. W. B. Clark, Chief of the Geological Survey of Maryland, tested rectangular specimens from 1 to 1½ inch in diameter, by first drying out all the contained moisture by means of a water bath at a temperature of 212° Fahr. After being allowed to cool the specimens were weighed. They were then placed upon a set of glass shelves standing in a porcelain pan containing strong hydrochloric acid. An open bottle containing nitric acid and one containing hydrochloric acid and black oxide of manganese were placed close by, and the whole covered by a bell glass, forming an air-tight chamber. After a period of seven weeks the stones were removed and washed, and the change in color, if any, was noted.

Architectural Excursion.

THE members of the Architectural Association of London make a yearly excursion in a body to places of architectural interest and bring home sketches and photographs of buildings, bits of detail and other objects which appear to them to possess merit and value. The idea has much to recommend it. Members of the profession meet each other in an informal way, talk over matters of mutual interest and compare notes. At the same time a record is being established of the most nteresting works of architecture existing in Great

Britain and contiguous countries. Such an annual outing tends to keep alive the interest of the members in the progress and welfare of the art, and to direct public attention to the subject. While the great distances which separate many of the cities of Canada and the United States would be somewhat of an obstacle to the adoption here of the architectural excursion idea, yet we believe the experiment might with advantage be tried of holding such an excursion at perhaps less frequent intervals. Everybody takes a pleasure excursion occasionally; why should not men who have interests in common arrange to do at least some of their sight-seeing in company?

The Architecture of Canadian Summer Resorts.

As the beauty and health-giving atmosphere of the Muskoka and Georgian Bay districts of Ontario have become more widely known, their popularity as a summer resort has rapidly increased. It is admitted by all who have visited the locality that no more beautiful or healthful spot can be found on this continent. The selection of Gravenhurst as a site for a consumptive sanitarium is a sufficient testimony to the health-giving properties of the air in these "highlands." It is subject of regret to the visitor to this region that the architecture of the majority of the hundreds of summer residences on these lakes of Muskoka, bears so slight relation to the beauty of their natural surroundings. This applies not only to the cheaper class of cottages, the expenditure on which would perhaps not permit of a more artistic treatment, but also to residences of a more costly and pretentious character. Where Nature has so well done her part, the architect and builder should strive to work in harmony with her. We hope to illustrate at an early date a house erected during last summer on Lake Joseph which is in pleasing contrast to many of its neighbors, and which we trust will prove an incentive to the erection of others of equally pleasing character. If the designing is placed in proper hands, it is possible to have a house that shall express character and charm at no greater cost than would be necessary for a commonplace structure. This statement is equally true whether the building be required for residence or other purposes and whether situated in city, town or country.

Technical and Art Education.

The communications printed in the correspondence department of this number anent the teaching of Industrial Art in Canada, form a valuable contribution to a subject which is now engaging public attention. The statement is boldly made by Miss Living, formerly a pupil and teacher in the Ottawa Art School, that the instruction given in that institution is a sham, and therefore of no value. An unqualified statement of this kind coming from such a source is deserving of careful consideration. The time has apparently arrived for a full inquiry and decision with regard to the value of the Ontario Government Art Schools. We hear complaint from the manufacturers that so far as the teaching of industrial art is concerned the schools are a failure. We have the further testimony of Miss Living, founded on a personal experience extending over eight years, that the instruction imparted to pupils in at least one of these schools is based upon false ideals and methods. The point has been reached in our industrial history, when we should be in a position to compete with the best products of every nation. To do this our products must not only be serviceable, but also artistic in appearance. To this end we require schools in which the teaching of technology and industrial art shall be carried on side by side. There is probably no difference of opinion on this point, but there seems to be a lack of definite information as to the plan on which these schools should be established in order that the results may equal if not surpass those achieved by similar institutions in other countries. This is the all important question, and too much care cannot be given to its solution. Meanwhile, it would be well to decide whether the existing Art Schools of Ontario have been a help or a hindrance to the furtherance of art education, and whether the money expended upon them for many years past has been worse than wasted.

Scarcity of Structural Steel.

THE sudden and extraordinary demand for all classes of metal goods, and corresponding advance in prices, has been one of the most marked features of trade conditions of the present year. The effect upon the building interests was first noticeable in the steady advance in cost of undertakings. An even more serious aspect, however, is the present hindrance to the progress of such enterprises caused by the scarcity of steel. Some of the largest building projects in Canada, as for example, the new Grand Trunk offices in Montreal and the St. Lawrence Market, Toronto, are blocked owing to the impossibility of securing structural steel. This circumstance will no doubt have the effect of reducing to a considerable degree the volume of building operations, which earlier in the season gave promise of exceeding those of 1898. The present extraordinary situation has served to direct attention to our entire dependence upon other countries for our supply of these materials, and the question is being asked—why should not Canada manufacture her own structural steel, steel rails, etc.? In view of the constantly increasing demand, there would seem to be no sufficient obstacle in the way of the establishment of this industry in Canada. The time is surely most opportune for making the experiment. Coupled with the unusual demand for these materials, which bids fair to continue for several years at least, is the fact that large iron smelting works are at present being established in different parts of the Dominion. Mr. William McMaster, managing director of the Montreal Rolling Mills, is reported to have said recently that the works of the Dominion Steel Co., now under construction at Sydney, Cape Breton, having available Newfoundland ore within ten hours' sail, and coal delivered at the furnaces at $1.20 per ton, will be able to compete with the steel makers of the world. Why should not the manufacture of structural steel be carried on side by side with the manufacture of the raw material?

Artizan Education.

The subject of technical education is at present engaging public attention in Canada, and we should be on the lookout for information which would enable us to profit by the experience of older countries. A special committee appointed by the London County Council to enquire into the existing facilities for providing artizans in the building trades with technical instruction in their craft, and to offer suggestions for the improvement of these facilities has recently submitted its report to the Technical Education Board. Some of the conclusions

will be briefly noted, as serving to show the effect of changing conditions and indicating methods of instruction which are most likely to satisfactorily meet the requirements of the future. First, the decline of the apprenticeship system is declared to be due to unwillingness of employers, especially in cities, to take apprentices, rather than to opposition on the part of the trades unions. It is further declared, and few will be disposed to question the statement, that the keenness of modern competition among contractors, will not permit time to be given to the instruction of apprentices. The building trades in London are recruited from the ranks of apprentices trained in the country, where time can be found for giving instruction, and where hand-work prevails to a much larger extent than in cities. Workmen in the building trades are found to be averse to attending technical classes, and to be unfitted by their employment to handle drawing materials ; the conclusion therefore is that attendance upon these classes should precede entrance upon practical work. On this point Mr. Barter, organizer of manual instruction under the London School Board, declares that boys who have entered for the Technical Education Boards' Competition in Science and Technology pick up trades quicker than others and work more accurately. They understand the meaning of drawings before they have learned to handle the materials. Bricklayers were found to be less intelligent and much less able than carpenters to understand drawings —consequently less qualified to rise to the position of foremen or to commence business on their own account. The system under which the trades unions seek to place all workmen on the same level so far as the standard of wages is concerned, is found to be a serious obstacle in the way of inducing the artizan classes to strive by means of better education and a higher standard of workmanship to improve their position.

WARM VENTILATION OF HOUSES.

A POLISH writer inveighs against the inconsistency of the people of Western Europe who he says have to be always making fires because they leave windows open. "We in Poland," he says, "make our fires only in the morning ; then we close the doors and windows tight, and the house remains warm all day."

The Poles seem to be more successful than we in the art of making doors and windows, but their system of heating leaves something to be desired. To put the matter briefly the art of heating a house consists not in warming the air that is in the house and keeping it from getting out, but in supplying new warm air to take the place of that which is in the house, as fast as it cools or escapes. We want the air to escape as fast as it is used, and as we cannot exactly accomplish that ideal—which would amount to breathing in air from the room and breathing it out up the chimney—we must aim at the next best thing, to keep up such a withdrawal of old air and introduction of new air as will in the course of any given time effect the introduction of fresh air sufficient to dilute that which has been vitiated by respiration so as to maintain a certain standard of purity.

The heating question is therefore really a problem of ventilation ; the introduction of warmed air. As in summer we ventilate our houses in order to cool them, so in winter we must ventilate our houses in order to warm them. This is scientific heating. Whether the system be steam, hot water or hot air is immaterial to the genera scheme, and will vary according to internal considerations of convenience and cost. But inasmuch as indirect radiation by steam or hot water costs more than is usually applied to the heating of an average house, it will be assumed, in this endeavor to consider the subject in a practical way, that the instrument for warming our air is a warm air furnace.

It would be well if in the matter of the heating instrument we could come closer to the conditions of the Polish peasant. The great stove, which is so prominent in pictures of the interior of a hut in that country, or in the northern part of Russia, is built of brick or some similar form of clay which gives a large heating surface of a moderate temperature and, when once heated, is slow to cool and easy to keep at a temperature nearly uniform all the time. It is mainly, no doubt, on account of the nature of their stoves that the poles find it necessary to make a fire only in the morning. It radiates all day a comfortable heat, and, if by night it is somewhat cooled, that is also a condition of comfort ; for the family bed is on top of it, and in bed though it is well to be warm it is not well to be too warm. In other parts of Europe, clay is the material affected for stoves. Soapstone furnaces have also been advertised in the United States, chiefly as a better means of retaining the carbonic oxide gas, which is said to be the source of our headaches, and which not only leaks through the joints of an iron furnace but will pass through red hot cast iron. This is an undoubted advantage, and if, in addition to it, we could obtain, by the use of clay material or soapstone, the soft and equable heat which is the great comfort of hot water heating, the furnace might once more be admitted into the better class of moderate sized houses which at present affect hot water. However, until some one makes the experiment and publishes results, we have no data for calculation as to the workings of a furnace of this kind, and must assume, for the purposes of this article, the ordinary cast iron furnace.

In order to make arrangements for supplying warmed air to a house, we must first find out how much air it is necessary to supply, then how to make sure that the amount supplied will approximate to the amount required, and finally the capacity of furnace to meet this requirement.

The quantity of air vitiated by an adult man in an hour is given by Kidder as 215 cubic feet, but this does not help us very much. It will not do to suppose that the introduction of an equal amount of fresh air in the hour will restore the air to its former freshness. The vitiated air is diffused evenly through the body of air contained in the room. This, in an ordinary sitting room, 16′ 0″ × 13′ 6″ × 10′ 0″, containing 2160 cubic feet, is ten times the quantity which a man vitiates in an hour. Each cubic foot of air is therefore one-tenth vitiated. If, then, 215 cubic feet of air be driven out to be replaced by fresh air, of the air driven out nine-tenths is fresh air and only one-tenth vitiated ; that is to say, nine-tenths of the original quantity of vitiated air still remains in the room. It is clear that in order to preserve absolute purity the quantity of air which it would be necessary to supply would be enormous. The utmost we can expect to do is to supply fresh air in sufficient quantities to dilute impurities until they are harmless. The question is how much dilution is sufficient ; or, in other words, how much impurity we can stand. The instrument used for making this test is the nose, which was given us by Nature for that purpose.

But the nose will not help us to arrange the air supply for an unbuilt house unless we find out what quality in the air is indicated by the faintly pungent, musty smell in a room which we call closeness, and which the nose rejects as unfit to breathe. The impurities which distress us are not themselves easily measured, but they are always accompanied by carbonic acid gas, and this is easily detected and measured by the readiness with which it combines with the lime in lime water, causing the precipitation of carbonate of lime. There are many instruments for effecting this combination, and measuring by its means the quantity of carbonic acid gas present in the air. One instrument, devised by Prof. Wolpert, and described on p. 25 of "Billings' Ventilation and Heating," seems to be simple enough to be used by architects to make their own tests. It consists of a measured tube to contain a given quantity of lime water, and an Indiarubber bulb injector of a measured size, by means of which air from the room may be blown into the lime water in measured quantities. On the bottom of the glass tube is a black mark. Air is blown into the lime water until it becomes so opaque from the formation of carbonate of lime that the black mark on the bottom is no longer visible. This result has been found by the inventor of the instrument to indicate a certain quantity of carbonic acid gas ; and the number of times it was found necessary to fill and empty the air bulb in order to produce this result shows the proportion of carbonic acid in the atmosphere of the room. The less number of charges of air delivered from the bulb, the greater the proportion of carbonic acid in the air.

By means of instruments of this nature it has been found that the normal quantity of carbonic acid present in the air is about 4 parts in 10,000, and that when as a product of respiration there is so much more carbonic acid added to the air in a room as to make it unpleasant to the nose, the proportion is from 7 to 8 parts in 10,000. The nose can stand without offence the addition of 2 parts in 10,000 to the normal, so that the air in a room may carry 6 parts in 10,000. Further experiment has shown that to keep the air in a living room diluted, so that the total proportion of carbonic acid shall not rise above 6 parts in 10,000, requires the introduction of one cubic foot per second per head, or 3,600 cubic feet per hour.

Accepting this standard as sufficiently established for practical purposes, it remains to find out how to introduce fresh air in such a measured quantity and how to provide for warming it. These points will be the subject of a second article.

THE FIRST TECHNICAL SCHOOL AT OTTAWA.

Under this title a school has recently been established at Ottawa, Ont., to provide instruction in art and handicraft. It is conducted on an independent basis by A. Marion Living, Werner E. H. Noffke, and Sydney B. Johnson. The courses of instruction include industrial Design, Architectural and Machine Drawing, Commercial and Pictorial Illustration.

In the Applied Design class students are taught how to make designs practicable for the printing of wall-papers, silk and cotton dress goods and draperies, oil-cloth and linoleum, the manufacture of stained glass, tiling, iron decorations, silverware and wood carving. In the Advanced Design class is taught carpet designing and interior decoration including clay modelling. Instruction is also given in architectural drawing and planning.

We observe by the prospectus that several well known architects and art workers of Ottawa have given their assistance to the undertaking by attending the Exhibitions and offering suggestions and criticisms upon the work of the students.

BY THE WAY.

Responding on behalf of the R. C. A. to a toast proposed at a luncheon given by the Directors during the recent Toronto Industrial Fair, Messrs. F. McGillivray Knowles, Wylie Grier and Gagen referred to the necessity for a proper fine-arts building, to take the place of the present art gallery at the Fair, which is altogether unsuitable. These gentlemen are doubtless correct in their opinion that the providing of proper accommodation would result in a much finer exhibit, not alone of pictorial subjects, but of the work of architects and designers. In reply the President said that the Exhibition Association were dependent upon the city council for funds with which to erect new buildings.

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Contrary to the opinion which one hears expressed by the majority, an experienced builder of my acquaintance states that he has found it possible to do more substantial brickwork in winter than in summer. He asserts that in frosty weather the mortar becomes as hard as stone, while in the heat of summer it retains to a certain extent its plasticity. The fact is recognized however that the character of mortar is seriously injured by alternate freezing and thawing.

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A pair of houses recently changed owners on one of the principal residential streets of Toronto. Not long after the new owners had taken possession, one of them set to work to built a heavy stone and wood piazza almost across the entire front of his house and extending right out to the sidewalk, thereby shutting out the view of the street which his neighbour formerly might have enjoyed from his front windows, and depreciating the value of his property by at least five hundred dollars. The Toronto Building by-law should contain a provision which would protect property owners from loss and deprivation of their privileges through the whim or selfishness of their neighbours.

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One of our largest builders some time since amused himself says The Brickbuilder, by making calculations as to how much time he would require with modern machinery and appliances to construct the great Pyramid. Our recollection is that the time was something like sixteen months. This is on the assumption that it was to be constructed of block granite, but if it were to be constructed of brick throughout, he estimated that he could contract to complete the whole inside of nine months. This would be at the rate of something less than one hundred million bricks a month.

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From The Chronicle Fire tables for 1899 it is learned that out of the many thousands of fires which occurred in the United States and Canada, 95,240 in all, during last year, sparks lighted 5,296; lightning, 3,479; spontaneous combustion caused 1,179, and there were 6,981 attributed to incendiaries. But more than 10,000 causes were referable to defective flues, which appears to rank highest in the list of causes.

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W. P. WITTON, ARCHITECT.

AUXILIARY DINING ROOM, NEW ROYAL HOTEL, HAMILTON, ONT.
W. P. WITTON, ARCHITECT.

CORRESPONDENCE.

TECHNOLOGY AND INDUSTRIAL ART.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—As a manufacturer I am pleased to observe the attention given in your columns to the above subject. The various resolutions recently adopted by some of our important bodies, having been published and different criticisms advanced, perhaps a few more comments may be of use in helping to establish in our midst institutions which will prove of material value in furthering the interests of our manufacturing industries, opening up new fields for the talent of our youth, and bringing greater reputation to our country.

For years we have had our universities to turn out clergymen, doctors, lawyers, etc., colleges of music, model farms to educate the husbandman and schools for mining and engineering. At last we have awakened to the fact that we can be something more than an agricultural country, and it is to the enterprise and foresight of our manufacturers, whose interests have been the shuttlecock of governments, that a new feature in our commercial standing is to be given to the world.

We are now to have schools for the advancement of our manufacturing industries, and the value of these schools will depend on the understanding of what is required. So far they are spoken of as "Technical Schools." Looking into the term, it seems to wrongly designate the schools, or it is intended to establish the wrong kind of schools. "Technology" being the "science of arts," does not necessarily bring into use "applied art." What therefore is it, which is required? Certainly something more than a school only for the purpose of teaching plain construction of an article. Modern education and taste demand something ornamented. This is evidenced every day of our lives. To have ornament so applied as to be in keeping with the article, then, would be an important feature of the teaching in such a school. Ornament is the application of beautiful forms or colours to enrich an object. Inappropriate enrichment is not ornament.

A School of Industrial Art and Applied Design would appear to be what is wanted. Why? Because the manufactured commerce of Canada has grown to such an important position in the progress of the Dominion that it is necessary we should be able to supply from our own people the expert artisans and decorators needed in all branches of industry.

Instruction in the proper putting together of the necessary parts of an article and the tasteful finishing of it, has for some years past occupied the attention of governments in all countries. The commerce of the country is the ward of the government, and should not have it's interests relegated to legislatures or municipalities. The government, then, should have the supreme charge over all that interests so important a part of the national welfare. The buildings and lands should be owned by the government, and the supervision of the schools be in it's charge—the legislatures and municipalities taking the responsibility of equipment and teachers.

These schools should be supplied with such plant as to educate the students in the bringing of raw material to a finished article, and should encompass every branch of manufacturing industry.

So far reference is made to what is supposed to be the object of the proposed mis-named schools. But have we at present schools properly equipped for this purpose? We have art schools, understood by many and defended by others as all that are needed, but requiring only further monetary support. Manufacturers are also being blamed because they have not contributed to the support and purchased the product of the existing schools, and evidence is offered that prize-winning pupils have been obliged to leave the country and seek positions in other climes. Many of the present schools are devoting some attention to industrial design, but in many cases the result is not a practical working design, though as a specimen of close attention, graceful drawing and artistic coloring it may have taken the prize in the competition at the annual showing of all the schools' works.

Industrial drawing is one thing, decorative painting and designing is another, but applied design transcends them all. To produce a wall paper design of proper commercial value requires a knowledge of execution, including the cutting of patterns and stencils and a knowledge of blending. Interior decoration requires the production of schemes in different mediums, including treatment of walls, floors, ceilings and windows, hangings and furniture. Designs for carpets, rugs, curtains, upholstery goods, oil cloths, etc., requires a knowledge of the processes of manufacture. Designers in textiles require knowledge of the various fibres and animal products used, a knowledge of spinning them, and processes of dyeing and weaving. For wood carving and wood working, a knowledge of woods and their grains is necessary; and so on, throughout the whole category of materials used in the construction of an article.

The demand by manufacturers for certificated pupils from competent schools would very soon prove a raison d'etre for the schools, and, instead of the present want of recognition, the schools would be in need of extension.

In connection with such schools should be a museum of art, which is as necessary to their complete success as teachers.

Many other branches which should be included in the course of instruction might have been referred to here, such as modelling, architecture, chasing, etching and engraving on metals, damascening and filigree, enamelling, stone carving, embroidery, casting, leather work, fresco, lithography, etc., machine construction, steam engines, applied mechanics, etc.

"MANUFACTURER."

THE NEW YORK FIRE-PROOFING SCANDALS.

MONTREAL. 8th September, 1899.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—The Roebling Construction Company, in a letter published in your issue of August, take exception to my remarks anent the New York Fire-proofing Scandal (vide June number of the CANADIAN ARCHITECT AND BUILDER) but evading every statement made therein seek by publishing two newspaper items of questionable taste and doubtful authenticity, to lead the general public (for whom they are so solicitous) astray. What bearing these can have on the New York Fire-proofing Scandal and the actions of the Building Commissioners, etc., I leave your readers to judge.

Nor are they content with this, but undertake to inform the general public I am a manufacturer of terra cotta (hard tile). Surely the advertisement of the company I represent is explicit enough "Manufacturer of Porous Terra Cotta," a material entirely different, and in its fire-proof qualities superior to either terra cotta (hard tile), or concrete.

The following extracts (not unknown, I think, to the Roebling Co.) and taken from correspondence and reports will give the general public a clear conception of the straight forward and disinterested interest of this firm on their behalf.

"Henry Maurer & Son deeming the fire-proof period, 5 to 6 hours of Mr. Constable's fourteen tests inadequate to determine the resistance to intense heat of fire-proofing material, threw down a challenge to all for a joint test of 24 hours continuous duration."

"The John A. Roebling Sons Company, in a letter to Mr. Constable purported to accept their challenge, but instead of a fire-test of 24 hours, continuous duration, proposed one of 4 hours only. This proposition was declined, and settled the whole matter as far as H. Maurer & Son were concerned."

"But, the John A. Roebling Company, under conditions imposed by themselves, and presumably the most favorable for their method, and with material procured at considerable trouble and expense, with additional tile from othe manufacturers, proceeded to erect (themselves) an end construction arch of 5 feet span in a structure adjoining a concrete arch superintended and constructed by them.

Mr. Julius Franke, architect, of New York, in his report of this test, says: "When I made my first inspection the hollow tile arch had been built, and as no concrete had then been put on top of the same, I noticed that the key of the arch was not in the centre; that tiles of different patterns, not made to be built in the same arch were used, and that some of the cement mortar which I took off the top was very poor, the same crumbling between my fingers." It did not require deep penetration to discern the result which followed. He continues: "After the fire test I examined the arch again and found that the middle third, including skew backs, had fallen, and that the two-thirds remaining had joints open at the bottom, but that most of the mortar with which the bottom of the tiles had been plastered had remained on the tiles. The concrete filling on top of the arch was very poor, not being strong enough to resist any strains. I came to the conclusion that the arch failed because it was improperly built."

A study of the results of independent tests, vide Denver tests, 1893; S. Constable's N. Y. tests, 1896; the report of S. Albert Reed to the New York Tariff Association, etc., will convincingly show that the test of which the Roebling letter treats was simply a farce.

I am, yours truly,

N. T. GAGNON.

[As no benefit seems likely to accrue to our readers from a continuance of this correspondence, it must now close.—EDITOR C. A. &. B.]

Branch Office of the CANADIAN ARCHITECT AND BUILDER,
New York Life Building, Montreal,

SEPTEMBER 14th, 1899.

BUILDING ENTERPRISE.

The city Building Inspector's opinion regarding the volume of building enterprise in this city the present season is, that the expenditure is larger this year than last. A less number of buildings are being constructed, but they are of a more costly and important character. The value of the new structures is estimated at about $3,000,000. The Inspector declares that too many dwellings are being built, and that they are of too expensive a character. Sufficient provision is not made in the way of providing detached houses suitable for persons of moderate means, hence this class of persons are obliged to resort to boarding houses, flats and tenements.

DEATH OF MR. GEORGE ROBERTS.

One of the oldest and most highly respected builders of Montreal, in the person of Mr. George Roberts, passed out of life recently at the advanced age of 74 years. Owing to enfeebled health he retired several years ago from active business life, leaving as his successors his three sons.

The late Mr. Roberts, who was a native of England, took up his residence in Montreal in 1854, and thereafter resided constantly in this city, where he constructed many important buildings, including McGill University Library and the Bank of Montreal.

THE LATE MR. GEORGE ROBERTS.

The late Mr. Roberts was a member of St. George's church, a life member of St. George's Society, of the Mechanics' Institute, a life governor of the Protestant House of Industry and Refuge, and of the Montreal General Hospital.

TEST OF A FIRE-PROOF SKY-SCRAPER.

In a communication under the above heading to the London Building News, Mr. J. Rawson Gardiner, architect, of this city, refers to the effects of the recent fire in the Home Life Insurance Company's building in New York, and sums up the lessons to be drawn therefrom as follows: "(1). That one of the chief dangers a fire-proof building has to contend against is a severe fire in an adjoining non-fire-proofed structure; (2) that marble is useless to contend against fire, as demonstrated by the front of the Home Life Insurance building; (3) that the space above the terra cotta arches between the steel beams should have been filled with terra blocks, concrete, or some incombustible material; (4) that wire lathing and mortar is not to be recommended as a covering for steel construction, and, if used, should be very carefully fastened with an air space of 1 in. between the iron and lathing, so as to allow space for a good key in the mortar."

TEST OF A FIRE-RESISTING BUILDING.

About 5 o'clock on the morning of the 12th inst., fire was discovered in the office of the American Watch Co., on the 6th floor of the Canada Life Building on St. James street. The fire, presumably caused by an electric wire, was in the wood-work behind a large safe, and had gained considerable headway before the firemen arrived on the scene. The fire was so closely confined to the one room, that, although burning fiercely, it was easily extinguished with Babcocks. The heat did not penetrate through the terra cotta partitions and ceilings, and the occupants of the adjoining offices—as well as those overhead—had no idea that a serious fire had taken place in such close proximity. So intense was the heat that the wood lining in the big safe was charred and some of the papers burned.

This test is most satisfactory to the Canada Life people and their tenants, as it proves beyond the shadow of a doubt that the building is a fire-resisting structure of the highest class.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

The Council of the Province of Quebec Association of Architects have granted the Library Committee the sum of $1,000 for the purchase of new books. Mr. Venne, the secretary, has also donated $100 for this object. A catalogue is being prepared of all the architectural books in the several public libraries of the city, and it has been arranged that students shall have access to them all. The committee will not duplicate any book that is in any of the libraries at present. It is the intention of the Association to make further grants for this purpose until they shall possess the best architectural library in Canada.

Following is the agenda for the ninth annual meeting of the Association, to be held in Quebec on Saturday, the 23rd inst.:

Forenoon session to open at 10 o'clock punctually, in the rooms of the Association, city hall, Quebec. 1. Reading of the minutes; 2. Presentation of annual report of Council; 3. Statement of the Treasurer; 4. Election of officers.

Afternoon session to open at 3 o'clock sharp. 1. Motions by members; 2. Routine and other business.

A banquet will be held at the Hotel Frontenac in the evening. An enjoyable time is anticipated.

FIRE TESTING.

St. Petersburg now boasts of a Pan-Russian Fire Protection Society, organized on lines not dissimilar from those of the British Fire Prevention Committee, although fire brigade matters perhaps receive more attention there than with the English institution which deals primarily with the prevention of fire from the constructive and technical point of view.

The Russian society is, however, also now to follow the London example of creating a fire testing station, and Prince Alexander Levoff, its president, has already gone so far as to present the necessary site and building.

The scheme for this station is the result of Mr. E. O. Sachs' visit to St. Petersburg last month, and its organization is part of his project for a series of stations in the continental capitals, to be worked on lines identical with those adopted in London, but whilst the foreign stations will attend solely to matters of local interest, the station at Regent's Park will deal with matters of international importance and serve as the centre. At St. Petersburg, for instance, attention will almost entirely have to be given to improved methods of construction in the villages, where safer materials will have to take the place of thatch and matching, etc., a subject which would of course be of no moment elsewhere. The annual destruction of villages in Russia, it should be remembered, is very serious, and the national fire loss, according to Mr. Sachs, is about seven millions sterling.

Mr. Sachs expects that by a systematic organization of this kind, and a systematic international mode of procedure, with due regard to special local requirements, combined action in fire prevention will be arrived at on the same lines as we have international movements in sanitary and hygenic matters, which though they have one recognized centre (in the case of fire prevention this will be in London) yet allow independent treatment of purely local questions in the particular countries to which they refer.

ILLUSTRATIONS.

HISTORICAL PANELS IN STEAMER "TORONTO."—MESSRS. BOND & SMITH, ARCHITECTS: EXECUTED BY MESSRS. BAILEY & OBEN.

These panels are in the main entrance hall of the R. & O. steamer "Toronto," and form part of a Canadian historical frieze in old ivory finish low relief. This frieze surmounts a high mahogany dado, and is combined with it by double mahogany Ionic pilasters. The frieze was designed as part of the decorative scheme by Messrs. Bond & Smith, architects, who also designed the entire interior decorations and furniture on the steamer.

The panels were modelled by Mr. Geo. Bailey, of Bailey & Oben. Much credit is due to Mr. Bailey for the clever way in which he has handled the work, the first of its kind in Canada.

INTERIOR OF NEW ROYAL HOTEL, HAMILTON, ONT.—W.P. WITTON, ARCHITECT.

The interior of the hotel has recently been completely remodelled. All plumbing has been replaced, numerous bath rooms put in in connection with bed rooms, and every room decorated. The whole hoase has been refurnished, steam heating and electric light have been installed, and in main hall, bar, reading room and dining room, all plaster work and finish have been replaced. The floors of ground floor, bar and lavatory are mosaic, the wainscot of main hall Mycenian marble, and bar is furnished in mahogany. The main entrance on James street opens into a spacious rotunda with mosiac floor, marble pillars and wainscot and mirrors of plate glass. On the left hand side is the office, with the main entrance and elevator immediately in rear. The staircase is in marble and elaborate open brass work. The elevator is enclosed in elegant grill work. To the right of the rotunda is the reading room Mycenian marble. By the reading room are the news and telegraph office, cigar stand and barber shop. The crowning feature of the rotunda is the palm house with its panelled and arched ceiling, extending into the second or third storey, and enriched by ornamental plaster work.

Directly in rear of the rotunda are the entrances to the main and auxiliary dining halls and the hallway to bar. The dining hall is finished in quartered white oak with parquetry floor of same material, and has a high vaulted ceiling, in panels. The panels are deeply set in enriched borders, and all combine to make an elaborate arch from end to end of the room. Marble columns support the vaulted ceiling, and the walls are set in plate glass. The lighting is done by means of incandescent lights at the base of the arch and hidden from view from the floor of the hall by rich plaster work, all executed by a well-known local firm, Messrs. John Clapham & Son. Against the wall all round the room are pilasters, corresponding to the enriched columns, and the spaces between the pilasters are wainscoted. The woodwork throughout is selected and quartered oak. Adjoining the main dining hall and connected with it by four large, double doors is the auxiliary dining hall finished in quartered sycamore.

STAINED GLASS WINDOWS IN NEW MUNICIPAL BUILDINGS, TORONTO—DESIGNED BY MR. ROBT. MCCAUSLAND.

An illustration of the large stained glass window, which occurs opposite the principal entrance to Toronto's new municipal buildings, appears for the first time in this issue. About three years ago, in response to a request, a number of designs were submitted for the work, from among which Mr. Robt. McCausland's design was selected, to whom also was intrusted the execution of the glass. In the provision for stained glass, under the specifications, it was the intention to have all of the windows in the main entrance of equal quality, but the architect wisely decided to simplify the others and have a special feature made of the great central window which occupies so commanding a position as seen from the main doorways—hence, without additional outlay a window of consummate beauty is the result. The colour scheme of the glass has been handled with evident fore-knowledge of the requirements, for where accentuation is needed it is happily managed, as for example the brilliant colouring of the Dominion flag, which is placed in the immediate centre of the composition and defines the line of demarcation between the civic and county sides of the building. Numerous lifesize figures, illustrating "The Union of Commerce and Industry," forms the principal theme of the design. In the central panel are two figures, one a female, typifying "Commerce," wearing a civic crown, the Canadian ensign occupying her left hand, while her right is clasped in that of "Industry," which is symbolized by a stone-carver who stands on the steps of a dais. Behind him are his co-workers, the carpenter, ironworker, labourer, &c. The figures in the left panel represent Europe, Asia, Africa and Australia, each bearing a distinguishing trophy, and further exemplifying the extent of Toronto's commercial intercourse.

Building and shipping industries are shown by views of the old and new City Halls, and distant vessels; while across a broad expanse of sea the sun bursts forth with far-reaching rays of prosperity. The city arms occupy the upper central panel, on either side of which are seated figures indicative of "Peace" and "Honour."

The Romanesque ornamental details of the glass are conspicuously well designed, and being executed in monotone, the more salient features of the design are thus brought into forceful prominence.

The window is of colossal dimensions, each of the three panels measuring about five feet across, its total height being about twenty-four feet. This work marks an epoch in the history of stained glass in Canada and cannot fail to be regarded as one of the most important windows on the continent.

The attention of our readers is directed to the advertisement in another column referring to a newly published work on plumbiug and heating, for which Mr. Thos. Henry, Toronto, is the Canadian agent.

WALL PAPER PASTE.—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, eight and a half grammes of good linseed oil varnish and eight and a half grammes of turpentine to every 500 grammes.

CLEANING OLD BRICKS.—A correspondent of one of the London architectural papers, in describing his method for cleaning old brickwork, states that after the joints were raked out he had a mason tool the whole face of the brickwork. This, he states, was not costly, but was effectual, as mere scraping would not answer the purpose. Afterward, the brickwork was rubbed down and pointed. Another correspondent discussing the same question stated that he had employed a liquid paint remover, called "Lithicum," which he diluted with water, and after using was washed off with hot water, the work being finally gone over with a wash of vinegar and water.

THE TEACHING OF INDUSTRIAL ART.

The following correspondence took place recently between a former student and teacher of the Ottawa Art School who is now the principal of the First Technical School of Ottawa, and the manager of a well known manufacturing company, who has manifested a deep interest in the development of industrial art in Canada :

193 Sparks St., OTTAWA, August 31st, 1899.

DEAR SIR,—Your letter of the 28th makes me wish to write a careful and perhaps lengthy reply, as it touches on a subject in which I am deeply interested and about which I am at this moment in some doubt. I answer your last paragraph and question first—I do consider you have reason for objecting to the Canadian schools, and had you been educated in an Art School expecting the teaching there to fit you for using an artistic talent for the profit (financial) or pleasure of those who worked hard to give you this education, you would be still more decided in your objections. My experience has been of such a nature that I think I am right in saying that I have the proper evidence for considering that the Art School system of Ontario is so wrong that every school is a stumbling block in the path of art and unconsciously dishonest when it undertakes to teach any child or adult submitted to its care. This may be too strong—I wish I had the opinions of others who have had my experience, but I shall give a proof in the effect of a system of work as nearly opposite as I could make it to that prevalent in other schools. Last October I start- a school here with the aid of two young men who were almost as interested as myself in this idea. I had been educated in the Ottawa Art School, spent all the time I could in studying there during eight years, worked harder and more steadily than any other student, being the prize winner in all the different branches at different times. The last few years I was pupil teacher.

I had grown to be so fond of the institution that it was not easy to awake to the fact that it was a sham, and that my success there was no evidence of real success, but I had to awake through the means of reading and a visit to New York, and the effort to support myself. I tried hard the last two years to make the Ottawa Art School a success, but at the end of May, 1898, I decided to leave for many reasons, chiefly because I could do nothing there to avoid the same result on other lives as I had experienced. I knew where the mistakes were and knew the remedies.

In October we (the three teachers) opened our School with no aid of any kind. Our students were, with three exceptions, quite unused to drawing except by themselves "for fun" —those three exceptions had had a few months' lessons from me in the old school. Some had hardly ever touched pencil or brush even. The result of our teaching was that in Toronto our school work was given more room than any other, and when we told some art teachers present that it was the work of first year pupils, they—well I think they don't really believe even yet that we didn't do most of the work ourselves (as teachers sometimes do). The fact is that there was hardly a line of teachers' work in the whole collection, and none in those they were most surprised by. I hope this is not too much writing about seemingly personal matters. It is necessary for you to know of this work before I answer your other questions.

To return to your letter.

Here is this school—successful in every way beyond what I expected, started to avoid the dishonesty of teaching under false pretences. We have tried to find out if our students can expect to get work in Canada—all summer we have written and visited different manufacturers. The reply is, "Designing should not be undertaken except by those who positively can't keep themselves away from it because they love it so much—and then they must expect to go the 'States' to earn their living." That was the kindest and most interested answer we received. What shall we do? I cannot educate clever Canadians to go over to the United States, nor can I lead them to think it worth while to study industrial art for Canada in the face of the replies received.

I have made time to do two ingrain carpet designs for the purpose of showing them to you, so that I may know whether they are technically correct, and if there would be any chance of doing such work in our school. At least this one opening I know of should be tried before I give up the central idea of our school. The classes for mechanics are all right, and for amusement and financially, the school could get along with those perhaps—but that does not satisfy us, and always those who really work are those who wish to support themselves. I shall send the ingrains for criticism, and as you ask can we "meet the case by showing really desirable things not only to enable you to show original good designs, but bring credit to ourselves, our school, and Canada?" all I can answer is—I wish we honestly could. To do it myself I would need to give up the school, and I have nothing to support me while I would be trying to get to the point. To teach beginners might be cruel and unjust, for the answer might have to be, as it has been from so many manufacturers, after they had worked hard—"Our designs must come from Paris, Vienna, Dresden or London." Is this true? Does a manufacturer need to use only Paris designs, etc., simply for the name, or could a Canadian designer ten years hence expect to sell equally good designs, even if he were "only a Canadian?"

I send last year's prospectus; this year's is not yet ready. Wood-carving classes were added after the school started, and this year we hope to add others of somewhat similar industrial nature. You are the first to whom we could state this point about the school work, and it will be very helpful perhaps if your interest in the schools of Canada is sufficient to make you think it worth while giving our difficulty further consideration from your practical standpoint. For any hints or information, we shall be very grateful, as our aim is to arrive at something of real value in the conducting of an Art School, or else to give up trying if that be impossible, and to do something which is of real value. The material is here, bright, earnest boys and girls; the machinery is here, the school room and books and Nature. We are ready to set all in motion to bring out a good result—but is there a market for the product? That is our position.

Respectfully yours,
MARION LIVING

TORONTO, August, 1899.

DEAR MISS LIVING,—Your letter of yesterday to hand, with prospectus. The designs, I have no doubt, will arrive later.

Will you permit me to say "you are after my own heart" in your opinion of the Canadian Art Schools (?) and I fancy have much the same opinion as I have of the methods, so far shown, as to the proposed "Technical Schools."

Now, I wish to get to the core of the trouble about selling designs in Canada. Taken for granted that the schools were not capable, then is it possible to turn out capable designers? This kind of art training has been going on for years as manufacturers have been aware. As it was in past years with many Canadian manufacturers, so it is with designs. "Anything that will do, is good enough" no longer will suit the Canadian market. As Canadian manufactures are advanced to rank with the best, so is the demand for them increased, and so it will be in designs. At Grand Rapids, furniture designers are mostly Canadians, whose designs are detailed and made technically correct by other draughtsmen. This is made possible by the factories there being large and wealthy. The Canadian manufacturers could not buy the design because they could not afford to keep draughtsmen to do detail work.

Let a designer produce something of merit, and the world is his market. Such names as Cram, Whistler, Rattray and Morris do not require to look for a market, but when they do bring out something, it can be used, as it is correct in detail. Take the well known designer of Kidderminster, Mayer. It is not difficult for him to sell his designs, and even if they were sometimes short in drawing, still they are "Mayer's" and so command a price in any part of the world where designs are used.

You know also that there is always a certain vein in which the general taste of the time runs, and almost anything with any show of merit in the popular thing of the day, will be acceptable. A few years ago there was a mad craze for "Japanese," then to "Louis XIV"—now the tendency is to "Old English."

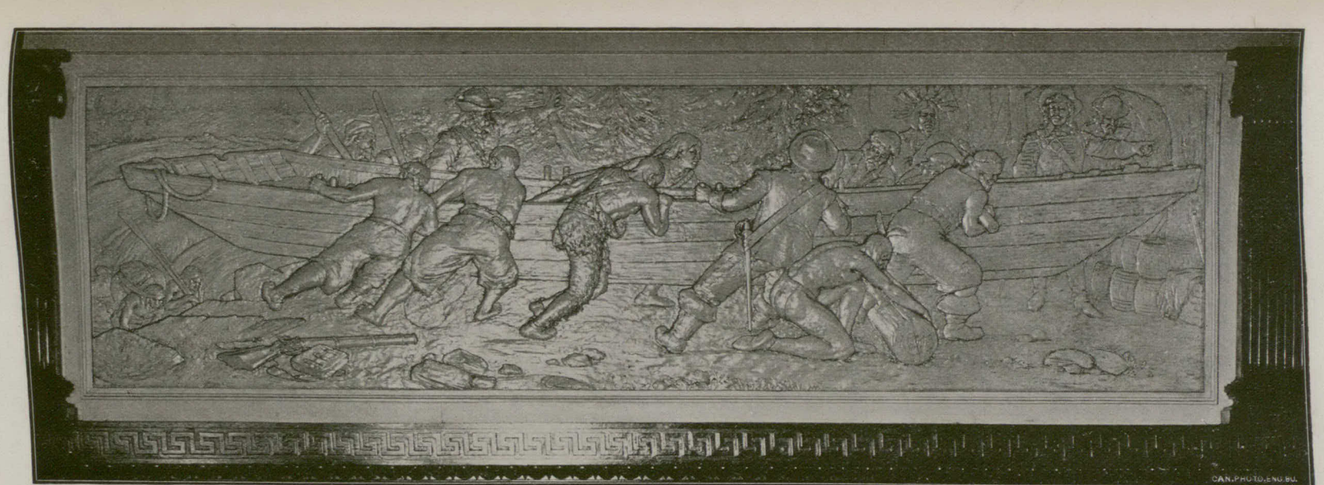
Now should a pupil worry out a design in, say a piece of furniture of either of the former styles to-day, it is very likely they would not be accepted by a dealer, even though they are, both in art and technique, correct.

Furthermore, designers must think out what line they are best able to work in, and make that line their principal one. The present century is one of condensed individual effort, so we find in every line of life, specialists. There are, for example, dyers who confine their abilities to dyeing nothing but black cotton yarn for hosiery, but that would not mean that they are not general dyers. The public are looking for the nearest thing to perfection they can get, and sloppy work is not only refused, but is bad for both the workman and the consumer.

To continue the theme, let us take it for granted (though I

"DISCOVERY OF FORT FRONTENAC BY FRONTENAC IN 1672."

"TRADING AT FORT ROUILLE."



"PORTAGING UP THE ST. LAWRENCE IN THE EARLY PART OF THE 17TH CENTURY."

"HIAWATHA ADVOCATING THE LEAGUE OF THE IROQUOIS."

HISTORICAL PANELS IN STEAMER "TORONTO."—MESSRS. BOND & SMITH, ARCHITECTS.—EXECUTED BY MESSRS BAILEY & OBEN.

would be glad to have your criticism) that all I have so far said is correct, then how is a Canadian to become known so that his studies will bring him wealth and renown?

In all branches of manufactured commerce, there are journals devoting themselves to particular lines. Contributed designs and articles on styles are always gladly accepted, frequently paid for, and soon sought for when the contributor's fame is growing broad.

Years of experience have shown that Canadians entering any field, soon, by their ability, go to the top, and no reason presents itself to me that would make "industrial art" an exception.

Finally answering your question, should you undertake to teach designing for industrial art, and can designers expect to be able to gain a living by it in, say, ten years? My answer is, providing designs are technically correct, in line with the taste of the times, not exceeding regular charges.

It is my opinion that in ten years an extensive demand could be created for Canadian designs in all branches of industrial art.

Yours truly,

COLOR.*

By H. C. Corlette.

There are three questions with which we are confronted when we wish, as architects, to have color associated with the buildings we design. The first of these requires an answer which shall tell us how we shall satisfy this desire. The next asks us where may we legitimately introduce whatever we may decide to employ. But, perhaps, the most difficult of all is to decide upon the manner or method of treatment by which the decoration shall be done. This last consideration involves many things which each one must ultimately settle for himself. It asks what are the methods we shall follow, what media may be employed, how our decoration shall be introduced, the nature of drawing and design, and the qualities of color that should be adopted as likely to be the most valuable in producing the effects we wish to see. And these are some of the leading points only which a lover of color must consider if he would attempt to do good work. And in the work he may do it is to be hoped, for his own sake, and that of others, that he will never satisfy his own ideals though he may possibly perhaps sometimes please his critics. But let us begin by saying that his aim should never be to seek applause but to do his best, whatever that may lead him to, with the faculties he possesses and the opportunities which arise.

In asking ourselves how we shall introduce color in works of architecture we have, broadly, to consider and decide whether it shall be done by using colored materials as integral parts of the structure we wish to decorate, or by applying to the building such materials as will introduce the necessary color. The two methods combined are in fact necessary for a completely satisfactory result.

Of colored materials used structurally there are many old examples to be found, as is well known, in many parts of England. In Norfolk and Suffolk we may see how stone and flints have been used for this purpose, as in the parish church at Worstead, and the old Guildhall at King's Lynn. Essex gives us some instances where brick, stone and flint are associated in one building with very beautiful results. But in adopting the structural method we need be careful that we do not weaken the building by allowing our desire to introduce color to interfere with sound principles of construction. There may often be some temptation to do this by allowing the design of decoration to interfere with the proper bonding of walls, whether in stone, brick or flint, or any other combinations of several materials. Much decoration has been done, and beautifully too, with building materials, but not all of it is structural. But where we may seek for freshness in the methods of design is surely to be found in an endeavor to use some of the very many durable stones which have fine qualities of color. We have no doubt some time or other heard of a material called red brick. This has of course been used, but there seems no reason on grounds of expediency, or taste, why the white brick, so common in some counties, should not be adopted too. It is sound, strong and lasting, it possesses a good ring, and it has a modern virtue which none may despise, for it is cheap but not necessarily nasty if it is handled discreetly and with good taste. The yellow or dun-colored stock brick is also a good color. If it is used well, and, with some of those silver-grey bricks introduced into a wall of it, many excellent effects may be obtained. I say "if" such and such a material is used properly, because this small word implies the necessity of care in selection, care in the association of materials, and, above all, care in the design, the grouping together of the several elements that help to make architecture out of mere building. We need not limit our ideas by clinging to the no doubt safe custom of painting external woodwork in greens or some tone of white or cream. Tiles for roofing are too often red, but there is no reason why we should not resort to white ones sometimes, and we certainly should do well to decline to use so frequently the dead, textureless, purple-red ones, so much beloved by careful, but ignorant and untutored committees.

The subject of structural color is one to which we all as architects might especially devote more attention than it has been given in the past. For it is in this province that we depend upon our own resources. In the case of applied color we may call in others to assist us in realizing our ideals in the field of decoration. But in regard to decoration which is of the structure we stand very much alone, and there is little to hamper us in giving some rein to our fancy, except money. But it is, perhaps, really better that it should place some limit upon idealism, for without this we might be led to riot in extravagances, which would end in the destruction of all true principles of design. Byzantine and Italian art provide us with many examples of what was done during the centuries that are past, but we have some examples of a more recent date which should encourage us. Mr. Street has given us in the north and east fronts of the Law Courts, one of the most thoughtful and effective instances of this class of decoration that is to be found in London. In this, red brick and a grey-white stone have been used. And though terra-cotta is nearly always a hard and most unsympathetic material, yet, in conjunction with brick of a very beautiful red, it has been used with great success in the Exhibition Road front of the South Kensington Museum. N. Norman Shaw has shown us in the new Police Offices with what advantage to building, as architecture, grey granite, red brick, and white-grey stone may be used.

These instances indicate how some few of the ordinary materials may be made to serve us in our wish to introduce color in building. There are of course, others, but given the opportunity, much might be done by resorting to the use of glaced facing bricks in Lon-

* Paper read at the discussion section, London Architectural Association, March 10th, 1899.

don, where, in spite of their smooth surface, they would in time become toned down so as to be at least inoffensive.

We all know well that the Egyptians used color on everything to which they could apply it, whether on the exteriors or interiors of their buildings. But they were favored, like the other southern artists, by conditions of climate which allowed this freedom within certain limits.

They used color to cloth and express form, and to emphasize those features they thought called for such a treatment. And the methods they had introduced were those also which the Greeks developed at a later period. They colored the designs in relief or those which were cut back from the surface as incised work, leaving much of the native grey or red of the actual building material to play its part as a ground for the whole of the more brilliant decorations provided by the details.

We may, then, use color either structurally or by application to a material not possessing sufficient color of its own to satisfy our need.

Structural color seems the best method of providing what we require externally. For it is better able to resist a climatic opposition to its existence than applied methods, except those by which sound and durable colored materials are required as the medium of expression. We have, however, nothing to fear when we take up the question of internal decoration. For in this case we may adopt any method and any media we choose. And it is here we find the best opportunities for exercising our faculties or providing the necessary field for those who possess capacities which can satisfy our aspirations. The grounds or surfaces upon which we may begin our operations call for consideration under two heads. First, the material and texture of the ground and its own inherent qualities and capacities for producing, sustaining and showing color ; and then the color and method of treating the ground upon which any work is to be done. I am not prepared to discuss these points in detail. But it will not be presuming too far, perhaps, to merely recall to your minds some materials which ordinarily are the ground upon which we may ask colorists to provide us with design. The staple material in Egypt apparently was granite, but they also used brick, as did also the Assyrians and Babylonians, with diversely colored glazed surfaces.

Burnt clay, from the days of Sennacherib to the days in which we live, has always been found an excellent foundation for color, whether plain, or dealt with as were those tiles and bricks which were covered each with its piece of design, or formed a portion of one treatment, covering some large expanse of wall or floor. The ordinary red brick of the building was used with little or no preparation as the ground upon which to work in the case of a large painting in Albi Cathedral, in the south of Franch, near Toulouse. This work, executed during the first ten years of the 15th century, was done directly upon the brick snrface of the great circular tower piers within the nave. It has stood all these centuries without decay, and the lines of the brick jointing, which are clearly visible, are a decided help to the texture and general effect of the whole scheme. Plaster, whether prepared for fresco methods or for tempera or oil, has also been proved a most valuable material. The Greeks had used it in some of the temples in their Sicilian colonies, in the form of what we call a fine stucco. It was upon this material as well as upon marble that they applied so carefully the brilliant colors they used. A thin coat of plaster over brick or stone was a favorite ground in the middle and later ages for both tempera and oil, as at St. Anastasia, Verona, Albi, and Chichester Cathedrals, and in some churches in Liege, to mention only some examples that I have studied. During the same period much color was applied directly upon stone with but a coat of paint as a foundation. Of this there are many instances in churches in various parts of England. Wood in every form has been painted at all times.

The other and second standpoint from which a ground is to be considered is that of the color it shall take as a foundation upon which decorative designs in color may be worked out. In deciding upon this we have an important point to consider, for it necessarily will affect the scale and tones of all other colors that may be associated with it. With the gold ground, so much favored by the Byzantine Mosiacists, we are familiar, but at Ravenna and in Sicily they had used a blue ground with the same medium. The Egyptians, the Greeks and the Mediævals had used white for the same purpose very largely. At Albi there is one of the finest decorated vaults I have seen, with a beautiful deep sky-blue ground uson which a great deal of white has been used in the conventional patterns which cover so much of it. The figure work is separated from conflict with the blue by being, as it were, panelled and painted upon a gold ground. The vault of the sanctuary at St. Alban's Abbey is a very faint blue grey with the patterns upon it treated in red and green and the larger emplems in gold. This last is also an instance of the value of heraldic color in a scheme of decoration. The vault itself showing us that we need not hesitate to work immediately upon the wooden planking which forms the filling between the ribs, even though the boards should open and show a line of junction. At the same time it may be remarked that the painters of this roof—or else some who tried to improve it—were hypocrites enough to try and mask the true material of which it is made by painting "stone" joints in white upon the ground. A practice which should always be censured without hesitation.

Those parts of the work which are at some distance from the eye of a spectator require to be very differently dealt with from those that are nearer to him. And in a situation such as this idea supposes the best results can be obtained by a good use of simple line and broad incomplex treatment. Firm, strong outline drawing is most valuable under these conditions, for it reduces the risk of confusion in design by requiring that each part shall be clearly brought out and simply expressed by methods that call for conventional, rather than any approach to realistic methods. The same principles that effect drawing in such cases also apply to design and color. And in regard to color it is essential that this also should be simple, conventional and flat ; that is, without modelling or shading. It need not be necessarily a dead color, without any variation of hue or tone, but it must be broad and quiet in feeling. And this result is best attained by limiting ourselves to the use of only a very restricted pallette, say with two, three or four colors. Of figure work I do not speak so much now as of simple decorative pattern designs. But to figure work the same principles for guidance may be applied, unless it is close to the floor ; in which case there are other methods that may be legitimately

used, more approaching what might, perhaps, be called those of a pictorial nature.

Generally the most fortunate results may be attained by selecting colors, those called the primaries, to play the most important part in the whole harmony, with the assistance of white and black. One primary with its complementary secondary, or two primaries and a uniting secondary helped with white or with black should be quite sufficient to produce very beautiful combinations. By advocating the use of primaries to a very large extent I am merely suggesting that we should adhere to a practice which the best work of the past has proved to be the most satisfactory.

To adopt the primaries as possessing the best qualities of color, need not mean that we should confine our use of them to those particular lines of the spectrum.

We are, on the contrary, free to use every shade and every line of all the primaries into which they may be converted by a mixture with black or white, or by the addition of another primary in such subjection of proportion as will not resolve the combination into a secondary color. In the same manner may we deal with the secondaries, provided we do not lose sight of the fact that our first aim must be to have color, not sombre shades of mingled ugliness. No one should be of so much force, in opposition to its companions, as to make it press forward out of the same plane in which the rest are held by due relation of tones; nor should others be allowed unduly to hide themselves by receding from the association in which they should either play a dirtinct and necessary part, or else be omitted altogether.

Realism in very clever hands becomes almost deception, which we have to avoid as much as that conventionality, based upon ignorance and bad taste, which becomes distortion. But generally decorative work should interpret by a conventional use of the suggestions to be found in natural forms, while it is to pictorial design in color that we must leave the representation of these forms as they are.

The use of glass, stained or clear, as a method of adding color to architecture is such a common one that it is to be feared that many of us do not give it the careful consideration it deserves.

Where the light of day is very strong we can afford to dispense with some of it, and indulge in more color —color, too, of deeper hues and greater screening power. But where we want light there is no sensible canon of æsthetics that will permit us to discard what becomes a primary necessity; and, above all, we can plead no excuse for the extravagance and unwisdom that would insert deep-toned glass in windows which, at the best, if entirely clear, would barely be sufficient to admit light enough to enable persons within a building to see its architectural proportions and its decorated grandeur of colored vaulting dome whose glittering gold shines unseen in the prevailing depths of gloom. Yet this is done with an object that is not self-evident, unless it be a love of mystery which, though it may show us vaguely the beautiful lines of imposing masses, may also blind the eyes which might otherwise look full with keen and interested intelligence.

It may be that my previous statements sufficiently imply what I feel should be the relation between an architect and those craftsmen who work with him. I say with advisedly, because they should not be expected to act merely for him. He has no right to consider any man who helps him to execute his purpose as a convenient tool. He must invite him to try and enter into the spirit of his own work, if it has any, and though such a man may be an interpreter he should be allowed also the privilege of exercising his mind as helping inventor. And since no body of men can possibly act together without the recognition of a guiding principle, there must be subordination of the many to the leading and oversight of one. But subjection is not, and never should be, interpreted to mean slavery. As in any constitution for larger purposes there must be rule from a centre if the action of law and government is to carry a purpose into effect, so it is in the things of art. A head of a State should not be too proud to seek the opinion and counsel of those who are qualified to be his advisers in special matters, and though it may be, and is, his duty to rule, it is also his privilege to confer with those he is bound to guide.

THE ARCHITECTS' EIGHTEEN CLUB.

The club established early in the present year by some of the younger architects of Toronto, has now been more fully organized under the above title, and has adopted the following as its Constitution :

1. This club shall be known as The Architects' Eighteen Club.
2. Its objects shall be as follows: The promotion of good fellowship amongst its members, mutual help in professional matters, and progress in architectural design.
3. The membership of this club shall at no time exceed eighteen, and shall be made up of architects whose names are subscribed hereto, who shall be known as "Charter Members," and such other architects as may prove eligible, and secure election with the unanimous assent of the then members of the club, attested by a vote by ballot from every member. And the proper election of candidates shall be vouched for by the president before admission to the club.
4. The officers of this club shall be as follows: President, first vice-president, second vice-president, third vice-president, and secretary-treasurer. All officers shall be elected by ballot, hold office for one year, and be eligible for re-election.
5. There shall be an annual meeting of this club for the election of officers, and amendments to this constitution may be made only at this annual meeting. A copy of any proposed amendment to this constitution, together with the name of proposer must be sent by the secretary to every member of this club at least two weeks before annual meeting, and no amendment to this constitution shall be declared carried unless the voters in the affirmative number two-thirds of the total membership of this club.

The following gentlemen have been elected to fill the offices for the ensuing year: Eden Smith, president; J. C. B. Horwood, 1st vice-president; Henry Sproatt, 2nd vice-president; C. H. Acton Bond, 3rd vice-president; Arthur E. Wells, sec.-treas. It will be seen that the social feature is the dominating characteristic of the club at present, and in order that this may be preserved it has been thought advisable to restrict the membership. The club is in affiliation with the recently organized Architectural League of America, and an effort will be made to secure for Toronto one of the series of architectural exhibitions which it is proposed to hold under the auspices of the League in the principal American cities.

PERSONAL.

Mr. Eustace G. Bird, of the firm of Smith & Bird, architects, Toronto and Barrie, is about to leave Canada for the Orient.

Mr. Geo. A. Mitchell, of Barrie, has been appointed Superintendent of Bridges and Buildings on the middle division of the G.T.R.

Mr. G. W. Gouinlock, architect, of Toronto, has just returned from a visit to Winnipeg, British Columbia, San Francisco and other cities.

A large number of relatives and friends assembled recently at the residence of ex-Ald. Wm. Carlyle, Toronto, to extend congratulations and good wishes to that gentleman and his estimable wife on the 50th anniversary of their wedding day. Mr. Carlyle is a well known pioneer builder of Toronto. He was also for twelve years a member of the City Council, and for six years Chairman of the Board of Works.

STUDENTS' DEPARTMENT.

ON SKETCHING.

"Only the best artists," said Hamerton, "can sketch really well. The vulgar notion about the facility of sketching is a delusion. A sketch differs from what is commonly considered finished work, in always acknowledging that there is much beyond what it has recorded, in avowing this quite frankly in the manner of the work." His felicitous description of etching as "highly concentrated drawing" may, I think, equally well apply to sketching, writes Mr. Walter Millard, in Architectural Association Notes. Confining ourselves, for the occasion, to the consideration of what we generally understand as architectural sketching, and not including exercises of the imagination, we may say that a sketch brings before us in a concentrated form the essentials of its subject as they impress themselves on the mind of the sketcher, non-essentials, and what seem to him points of secondary importance, being eliminated; and this it does as much by means of suggestion as by direct statement of fact. The art of happy suggestion is the handmaid of good sketching, determining alike how much is to be put in and what is to be left out. Spaces in a sketch left quite blank to our visual organs, may in the mind's eye be filled with detail if the suggestion of this be but rightly given; whilst, on the other hand, the covering of the entire surface with touches may fail utterly to convey any true idea of the subject, either as a whole or in detail, if the suggestion be not there of that "much beyond what is recorded," which Hamerton speaks of.

At the same time, though there is usually a great deal that may well be left out in making a sketch, and much that needs be omitted, no statement directly contrary to fact can be excused in the work on the mere plea that it is only a sketch. Architectural sketching, certainly, whether slight or finished, carries with it no privilege to tell or suggest the thing that is not; in it the whole truth may not be told—by a long way—nor need always be told, nevertheless, what is told or suggested must be nothing but the truth, if we are to say that the artist sketches well. His work may not go far but, so far as it does go, we expect it to be faithful.

The sketcher, who is also a student of architecture, makes his sketch of any object for the sake of something in it—that he wants. What this may be is for him to decide, in each instance, and the sketch will surely bear on its face evidence of what it is in his subject that he has cared for sufficiently to delineate it. To go and sketch what you do not care for or require for some definite purpose—to sketch just for the sake of producing sketches—is not the way to ever sketch well. More than that, the really vital question for students of architecture is, not so much how to sketch as, what you sketch and why you sketch it, a question which opens up a wider field of enquiry than is covered by the matter of Sketching only. On the student's choice of subjects to sketch may largely depend not alone the manner of his sketching but also, perhaps, the whole bent of his mind towards architecture, for life—not merely how he is to pursue the study of architecture but, ultimately, what sort of man he is to turn out as an architect.

A deputation from the Society of Architects lately waited on the Lord Chancellor and petitioned for a parliamentary committee to inquire into the present law with regard to ancient lights, with a view to saving the large amount of money being expended in determining the rights of owners in regard to the same.

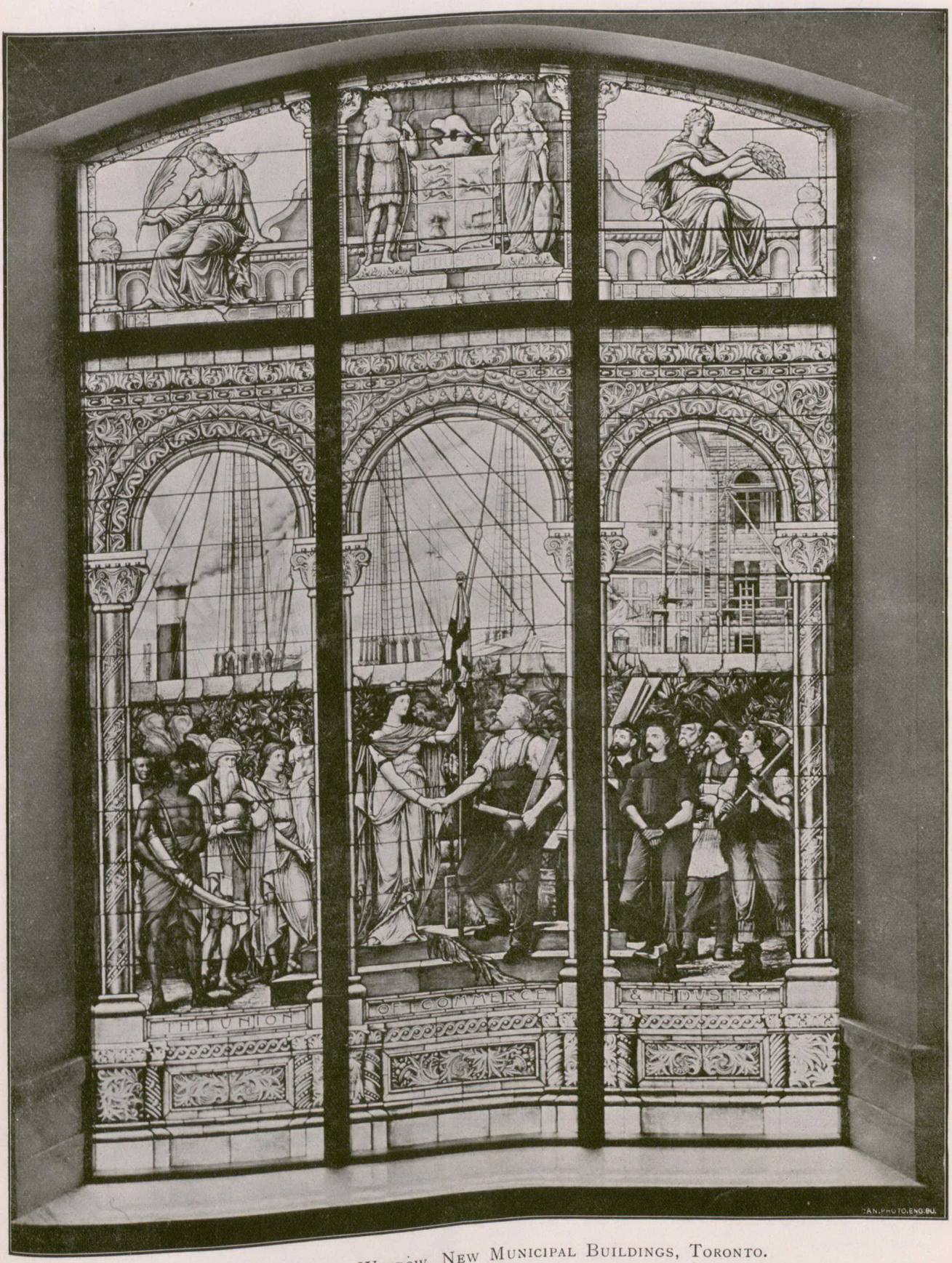
INTERSECTING ARCHES.

INTERSECTING arches were most likely an early, and certainly a very widely-spread mode of embellishing Norman buildings, and some of them were constructed in places and with stones requiring centres to turn them on, and the construction of these centres must have been by something equivalent to compasses. Thus, even supposing (which could hardly have been the case) that the arches were constructed without a previous delineation, the centres would have led to the construction of the pointed arch; and when once formed its superior lightness and applicability would be easily observed. To this remark it may be added that the arches necessarily arising in some parts from Norman groining would be pointed. A careful examination of a great number of Roman buildings will also lead to this conclusion, that the style was constantly assuming a lighter character, and that the gradation is so gentle into early English that it is difficult in some buildings to class them, so much have they of both styles. The same may be said of every advance, and this seems to be a convincing proof that the styles were the product of the gradual operation of a general improvement guided by the hand of genius, and not a foreign importation.—Builders' Reporter.

LIQUID AIR.

PRIOR to 1887, says the Engineer, air was thought to be a permanent or incondensable gas, but it was liquefied simultaneously by Messrs. Pictet and Caillete at that time, though at an enormous expense. About 200 years ago the lowest temperature thought to be obtainable was produced by a mixture of snow and ice, and was used by Fahrenheit in establishing a zero for his thermometric scale. Since that time scientists have reached a temperature some 400 degrees below the lowest point ever reached by Fahrenheit. Of the three known methods for producing cold, the first, i.e., by the rapid solution of a solid was used entirely up to 1820 and yielded a temperature of 50 degrees below zero centrigrade. The other two methods are the rapid evaporation of a volatile liquid and the rapid expansion of a cooled and compressed gas. By a combination of pressure and refrigeration, Faraday in 1823 liquefied all except six of the existing gases, but it was not until 1869 that it was discovered that these gases must first be cooled to a critical temperature. By subjecting hydrogen to an enormous pressure and at the same time lowering its temperature it was found possible to liquefy it. Hydrogen has a critical temperature only 33 degrees C. above the absolute zero of temperature. From the experiments performed, the conclusion was drawn that solids, liquids, and gases were but different forms of matter through which any substance could be made to pass by the addition or withdrawal of heat and pressure. The liquefaction of air economically and in large quantity has only recently been accomplished.

The dwelling of Sir Christopher Wren is now a national school in Botolph Lane, London. The house still contains a finely carved wooden staircase, but his private chapel has become a warehouse, with a window over the ceiling. Near by stands the church said to have been designed by his daughter, and which is peculiar in that the stone of which it is built remains white to some extent in spite of all the city smoke.



STAINED GLASS WINDOW, NEW MUNICIPAL BUILDINGS, TORONTO.

DESIGN BY ROBERT MCCAUSLAND.

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.]

Hints on Estimating.

There is no question connected with contracting for the erection of buildings, that appeals with such force to the mind of the contractor, as that of estimating ; for on the correctness of the estimate, depends the measure of success. The contractor who can figure close, on the labor and the material required to complete any given work, has, not only a decided advantage over his competitors who figure in a hap-hazard way, but he also possesses the knowledge of knowing he holds the correct figures ; and can pursue his work to completion, with a confidence born of such knowledge, and which is an important factor in faciliating the work and insuring a fair profit, where the careless or incorrect estimator would always be working under doubts, which would tend to considerably lessen the profits. There are some methods of estimating known to architects, builders and contractors for obtaining an approximate estimate of buildings by cubing the quantities ; but such methods are of very little service to beginners, or to the man who desires a thorough and correct estimate, for, to arrive at an approximate cost of any given work, by cubing requires an intimate knowledge of the different classes of buildings and their values, and a readiness in making a proper allowance for costly materials and enrichments, qualities that few men possess in an eminent degree. Even for an off-hand "probable cost," the method of cubing is not to be recommended. It is always safer to take time and trouble in fully preparing an estimate, detailing in brief both work and material and by putting on paper each detail in some sort of order, then omission, will most likely be noted and adjusted before it is too late. It must always be borne in mind that it is not the mere walls, rough wood-work, plastering and roofing that make the great bulk of the cost of a building, unless one of a very plain description. It is the decorative part and interior finish and numerous small, but expensive items, that fill up the bill. One of the first things the estimator should do is to make a thorough study of the building, the elevations, plans, details, and location, and where plans and specifications are to be returned, it will be well to make a rough sketch, or sketches of them first, and to dot down in a small book the doubtful or not clearly understood portions of the latter, as these will be found serviceable when completing the estimate. All quantities should be carefully computed and written down under some system, and the prices current for material and labor in each particular added—the prices being for the finished work ; for instance, the price of a door should mean the cost of a door with its frame, casings, mouldings, locks, hinges, fixing, hanging and painting. By adopting a method of this kind, the estimator will know that each item is complete, and it will be almost impossible to err in the final result. When all the items are written up, and everything is known to be entered, the totals should be made up and at least 10 per cent. added to cover profits and contingencies. In many cases, as much as 20 per cent is added to cover the last items mentioned, and this, is sometimes found not to be enough, particularly in buildings where hand labor is largely employed in carvings and decoration, as skilled labor of these kinds is an uncertain factor. On the rough sketches of plans made by the estimator, it will prove quite a help if the quantities of plastering, flooring, wainscoting, cornice, windows, doors, blinds, and other matters, are figured out in each room on the sketch as the estimating progresses ; then, on a separate sheet of paper, when the estimate is complete, the items as shown in the plan may be put down and the totals summed up. This will be found an excellent way for new beginners.

How to Make a Chimney Draw.

Flues, into which two stove-pipes enter, frequently enter into fits of perverseness and refuse to draw, and in consequence there is much discomfort in the house. Sometimes this disagreeable state of affairs is caused because the draft through one of the openings is so much stronger than the draft from the other, that the smoke is prevented from working its way into the flue. This condition may often be remedied by adopting the scheme shown in Fig. 1. Let A be the lowest pipe in the flue, then if the fire is first lighted below, the current of air passing the upper pipe B, would ascend so rapidly, that it would cut off the draft entirely. To remedy this, run into the flue above, a stove-pipe cut the same as shown at B, with the long end facing the hole below. This will prevent the current of air or smoke from spoiling the draft, and will not close up the flue enough to interfere with the draft of A. The shape of the pipe at B can be determined by the size of the flue ; if it is narrow or small, the pipe B can be trimmed to suit. If there should be any back-draft at A a slight projection of the pipe at its top will do a great deal towards preventing smoke from entering the house. Where a fire-place is attached, the problem of good draft becomes more difficult, but, in many cases the back-draft is caused by having the throat too small, too large, or else built at the wrong angle. Where the fire-place opening is very

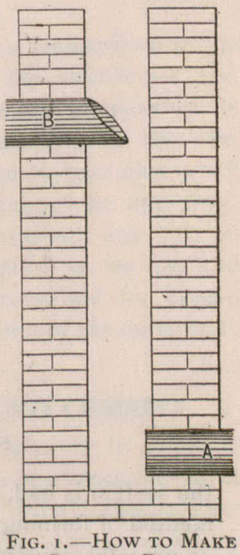


FIG. 1.—HOW TO MAKE A CHIMNEY DRAW.

large, and it is found that the chimney smokes, it may be sometimes cured by having a hood put over the opening, dropping down anywhere between five and ten inches, and projecting four or more inches from the breast of the fire-place. If a fire-place smokes when the wind is only from one direction, and draws well otherwise, one of two things is the trouble, either the chimney is not high enough, or some tree or some other building is the cause of the down draft. In a high chimney it may be necessary when starting a fire, to drive out the long columns of cold air, by burning loose paper or by setting fire to a rag that has been saturated with coal oil, which will force the body of heavy cold air up the flue and thus permit the passage of the lighter warm air from the fire, and when once the warm air takes possession of the flue, the draft will generally be all that is desired.

Defects in Some Eaves.

It was a common practice some twenty-five years ago, to finish off the edge of the roofs of cottages with a slight curve upwards in the manner shown in Fig. 2, and it must be confessed, this curving of the ends of rafters and hips gave to the roof quite a graceful appearance, but, if the projection of the eave happened to be a foot or more over the wall, this curving became a very serious matter , as the sudden retarding of the flow of water from the upper portion of the roof, would most assuredly, in freezing weather, increase the tendency for ice to accumulate on the edge of the roof, a condition that would cause the water to "back up" under the shingles or slating causing leakages on the wall, or on to the ceilings of the buildings. In warm countries, the adoption of the method of curving the roof at the eaves, may do very well but in this "Canada of ours"

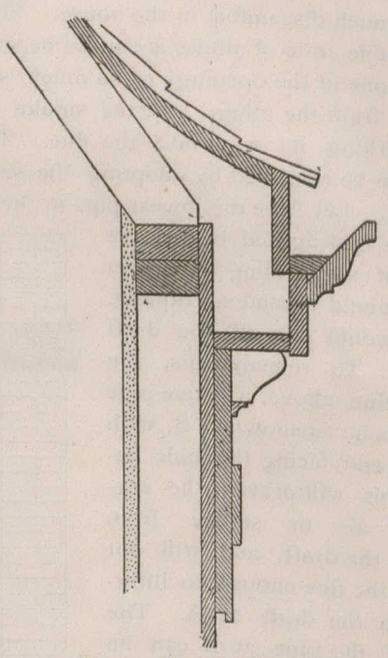


FIG. 2.—CURVED EAVE.

the system is bad, and should not be practised. The method of forming an eave, shown at Fig. 3, while not so graceful, is sure to give better satisfaction in the end. The curving feature might be used with success perhaps, in mansard roofs, or on roofs having but little inclination from the perpendicular, but for the ordinary pitches, such as are generally employed in this country, the curving as shown in Fig. 2 were better avoided. Many of the old roofs that were so curved years ago, have either rotted out at the eaves long since, or have had the curving removed when re-shingling, for few of the older cottages so treated when first built, are to be found now showing this style of finish. Recently, there seems to be a desire among country carpenters, to revive the custom—likely because of its graceful effect—but, if we were asked our advice on the matter,

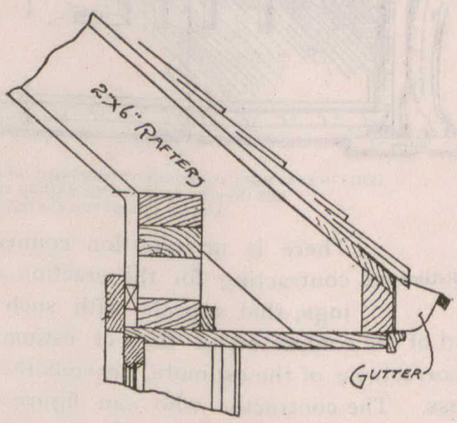


FIG. 3.—STRAIGHT EAVE.

we should be strongly inclined to give it up in the same manner, and with the same emphasis, that Punch replied to a correspondent who was about to get married —namely, "Don't."

Form for Estimating.

The following makes a good form for making up an estimate ; the columns may be ruled off as given, on ordinary foolscap paper. The estimator will find great assistance by making use of a little work entitled THE CONTRACTORS HAND-BOOK, as it contains many things he will find useful, in the way of quick methods of determining quantities of brick, stone, flooring, roofing, plastering, and many other things ; and if handy on the desk or table it may be referred to at a moment's notice.

FORM FOR ESTIMATING.

QUANTITY	DESCRIPTION OF WORK	PRICE, $ cts.
500	yards cubic, excavating for cellar, walls, &c.....	
65	cords rubble masonry, and all materials.....	
96	thousand bricks laid in wall, at.....	
18	squares 1½ inch flooring, laid, at.....	
24	doors, 3 x 7 ft., 1¾ inches thick, including frames, mouldings and hardware, at.....	
28	windows, frames, sashes, locks, weights, pulleys and all complete, at.....	
28	pairs inside blinds, in two flaps, hung and finished, at.	
3	double windows, complete, at.....	
11	summer blinds, complete and fitted, at.....	
90	yards of stucco cornice, at.....	
1206	yards of plastering, including lathing and all materials, at.....	
4	centre piecs, at.....	
2	stucco brackets in hall, at.....	
2	flights of stairs, including rails, newels, balusters, &c.	
28	squares of shingling, including roofing boards, nails, etc., at.....	

The foregoing description will be a guide for all other items. After making use of these forms they should be carefully laid aside for future reference. While there is no royal road to estimating, the labor may be very materially minimized if well directed methods be adopted.

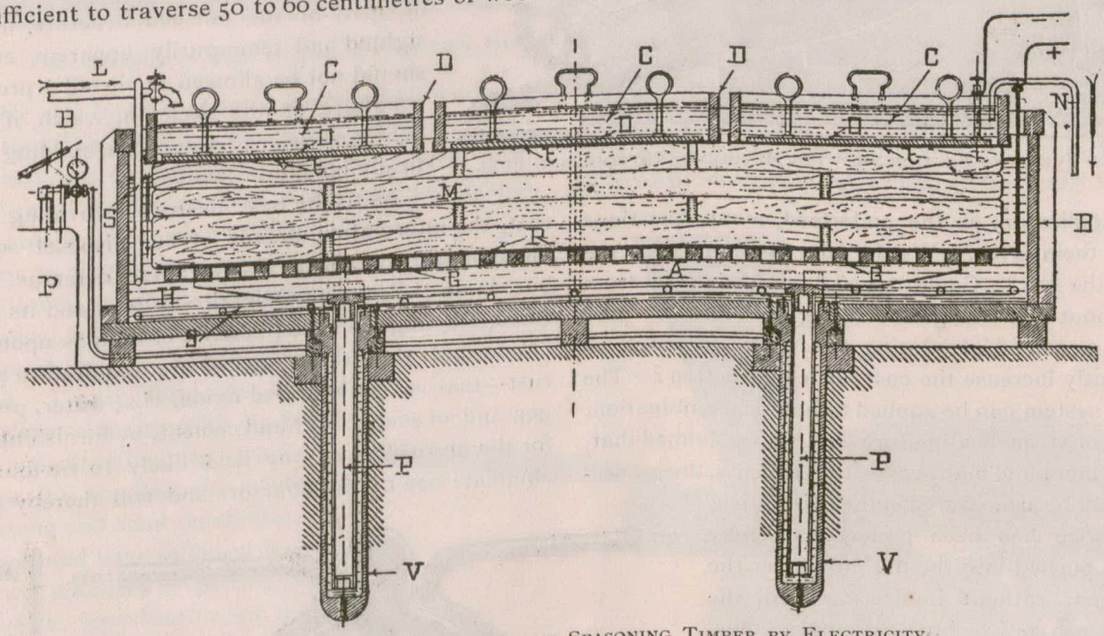
The Trent Valley Peat Fuel Co., of Peterboro', Ont., has placed an order with the F. D. Cummer & Son Co., of Cleveland, Ohio, for one of the world-renowned Cummer dryers. The dryer will be used for drying peat preparatory for pressing into briquettes. The dryer will have capacity for evaporating two and a half tons of water hourly from the wet peat, which would give about sixty tons of dried peat per day of 24 hours.

MANUFACTURES AND MATERIALS

SEASONING OF TIMBER BY ELECTRICITY.

A METHOD of seasoning timber by electricity, patented by Messrs. A. L. C. Nodon and C. A. Bretonneau, of Paris, France, has been adopted quite largely in Europe. The patentees have recently made some further improvements in their apparatus, which are shown by the accompanying illustration.

The apparatus used remain essentially the same, the modifications being improvements of detail, including the employment of a stronger current of electricity, and in modifications of the apparatus to make it more efficient, lighter and easier to handle. The improved bath is composed of a solution of 10 per cent. of neutral borate of soda and 5 per cent. of resinate of soda maintained at a temperature of about 35 degs. C. during the process. The electric current which causes the electro-capillary changes, and causes the sap of the wood to be extracted by the borate, has an electromotive force of 50 volts, sufficient to traverse 50 to 60 centimetres of wood



THE NODON-BRETONNEAU PROCESS OF SEASONING TIMBER BY ELECTRICITY.

and complete the operation in five hours. The solution of borate and resinate of soda penetrates by reason of the electro-capillary action, into the whole mass of wood, and produces a thorough extraction of the sap, which is carried towards the anode and remains mixed in the bath. To facilitate the manipulation of the woods, and to obtain a controllable immersion, according to the progress of the treatment, the patentees have devised the arrangement represented in the illustration, in which H indicates the bath, S the heating coil, L the water supply pipe, O the negative pole (cathode). The frame of double lower bottom rests on the support, A, upheld by the pistons, P, of an hydraulic jack, V. This latter is manipulated by a pump, p, and the pistons, P, can either be raised or lowered as desired. When the latter is raised, the wood can be placed on the frame, and then be plunged in the vat, B, by lowering the pistons. The same action reversed serves to withdraw the wood after treatment. The upper porous partition C has also undergone a modification in its construction to make it lighter and less expensive; it is now composed of a number of sashes or frames, D, the bottom of which is formed of strong sail-cloth, t, fixed with brass nails. These frames are lighter and more convenient to handle, and are conductively connected together.

THE MARKET FOR CEMENT IN AUSTRALIA.

MR. J. S. Larke, Canadian commercial agent at Sydney, N.S.W., writes that there is a market in that colony for nearly 200,000 barrels of Portland cement per annum, and a proportionate demand in the other colonies. There is a revival in building operations. It is understood to be the purpose of the proprietors of the British Columbia Portland Cement Works at Vancouver to seek an outlet in Australia for their material, and the extent of the demand, as indicated by Mr. Larke, would show that an extensive trade is likely to be the result.

GLASS MADE BY ELECTRICITY.

AT an experimental plant at Cologne the electric furnace has recently been employed in making glass, and the process is said to work most satisfactorily. The apparatus is much similar to the ordinary form of furnace, and the glass obtained is free from impurities. The chief saving effected is in the retention of the heat, which in the usual type of furnace is transmitted to the ground. The heat is supplied by the electric arc, and the charge can be raised to the melting temperature in fifteen minutes, instead of thirty hours, as is the case with the ordinary furnace. A large furnace also is not required, and the work can be stopped at any time, such as holidays and Sundays, without any loss of energy. A saving in coal consumption of as much as three-fifths is claimed for the process, and for experimental work it allows small quantities of the material to be used.

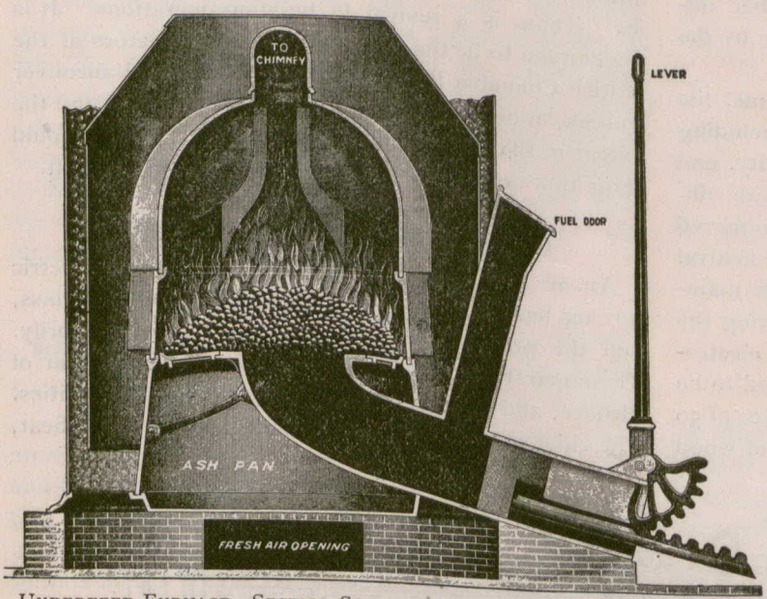
THE PRICE OF PORTLAND CEMENT.

IN sympathy with the general advance in prices of materials in other lines, and in face of a strong demand, the European manufacturers of Portland cement have recently increased the price, and the American manufacturers are being urged to do likewise. The cost of production is declared to have been enhanced of late from 8 to 12 cents per barrel.

The Dominion Bridge Co., Montreal, whose works are at Lachine Lock, Quebec, near that city, are making important additions to their plant which will enable them to increase their output of iron and steel products to the extent of about 8,000 tons per year.

THE UNDERFEED FURNACE.

THE accompanying illustrations show the method of construction and operation of an underfeed furnace for use in heating public and domestic buildings. This device is the invention of Prof. Colton, of Hiram, Ohio, to whom patents were granted in 1893. The furnace is manufactured in Canada by the General Engineering Company, Canada Life Building, Toronto. In the



UNDERFEED FURNACE—SECTION SHOWING METHOD OF INTRODUCING FUEL.

practical application of the underfeed, many questions suggested themselves. Would the fire burn into the coal from the top? Could the coal be introduced from below without interfering with the grate and ash pit? Could the means of introducing the fuel be so simple as not to greatly increase the cost of construction? The underfeed system can be applied to hot air, combination, hot water, or steam heating furnaces. It is claimed that, after much labor and many costly experiments, those questions have all been answered in the affirmative, and the device has been perfected whereby the coal is pushed into the fire pot under the burning coal without interfering with the grates or ash pit, or involving extra labor. It is claimed that with this system all gases liberated from the fresh fuel, on passing through the fire above, are ignited and consumed, thereby rendering it an impossibility for same to permeate the air, regardless of the position of the dampers.

In applying the underfeed to existing hot water furnaces, all that is necessary is to raise the fire pot section, together with the sections above, high enough so that the ash pit section may be removed. If there is enough "spring" in the pipes this can be done in a very short time.

The purpose of this method of firing is to bring the hottest part of the fire uppermost next to the heating surfaces where it is required, and to utilize in a useful way all the heat in the coal—also to prevent the admittance of cold air to the furnace during firing or at any other time.

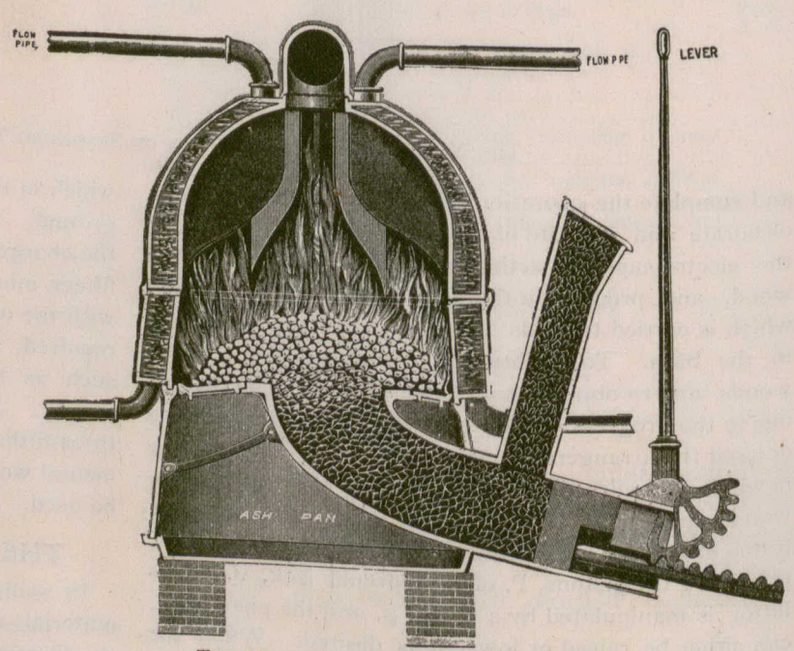
In the matter of cleaning stone and brickwork, a writer in one of the English journals suggests using a scrubbing brush and a solution of water mixed with 8 ounces of spirits of salts to 1 gallon. He states that this will bring out the work as bright as new.

IRON CONSTRUCTION.

THE following remarks were expressed in the course of a discussion at the Franklin Institute, Washington, on the structural design of buildings, by Mr. William Copeland Furber:

On the question of rust protection I may be taking advanced ground when I say I believe that entirely too little attention has been paid to this matter by designers, yet the liability of corrosion is so great, through exposure and improper covering and the lack of preparation of the metal to receive and hold the covering, that I think the use of the sand-blast or some equally efficient means to remove the mill scale and permit the direct application of the protective covering to the actual surface of the metal is not only justifiable but imperative. When the skeleton is once enclosed, examination is difficult and repair practically impossible, and as the life of the building is coincident with the life of the framework, and the value of the investment is determined primarily by the integrity of the finished structure, a short-sighted and temporarily apparent economy should not be allowed to curtail a proper expenditure on the skeleton, which, if intelligently made, will assure the building a practically indefinite existence.

As to the best means of providing against rust, the information already at our disposal seems to me sufficient to indicate a safe course to pursue. Ledebur, in an "Essay on Oxidation of Iron and its Admixtures, Rusting, and the Influence of Liquids upon Iron," points out that three factors are required to produce rust—that is, the hydrated oxide, viz., water, pure oxygen and an acid. Portland cement, by furnishing a base for the absorption of any acid likely to be found, will eliminate one of these factors and will thereby prevent

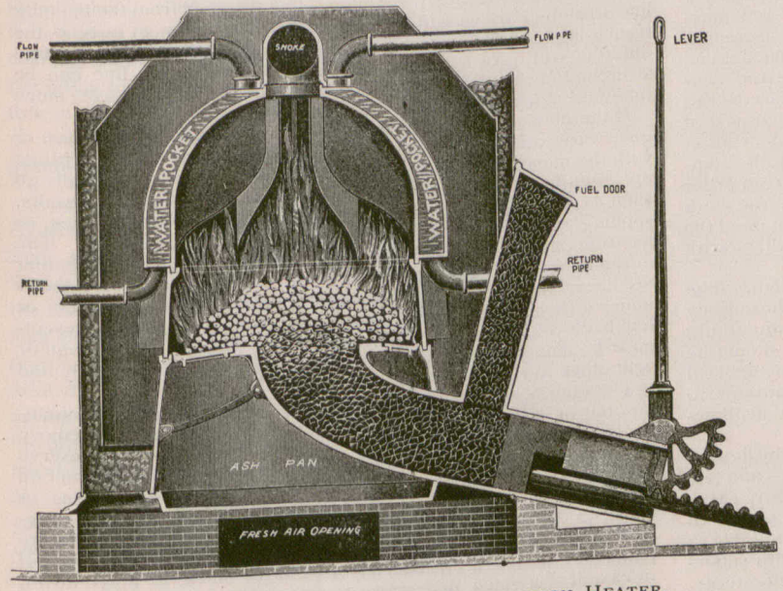


THE UNDERFEED HOT WATER HEATER.

rust. So that, with the other valuable qualities it possesses, it forms a protective covering of great value. But while this is true if the cement is in direct contact with the metal, we know that as the shapes come from the shops they are covered with mill scale, and that any covering applied to them adheres to the scale, and that a mechanical separation of the scale is easily possible.

Should water penetrate the cement or other covering,

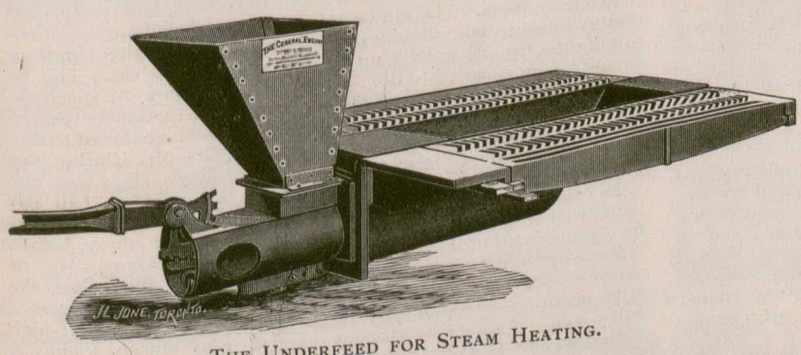
through cracks, and find its way between the scale and the actual surface of the metal, the scale being electro-negative to the body of the metal, the elements of a battery exist, and the degree of corrosion is a matter of time. We also know that as concrete is frequently put in place the voids are not filled up, and spaces are left for the accumulation of water, which may be present, forming, with the scale already there, rust-producing factors.



THE UNDERFEED HOT WATER COMBINATION HEATER.

It is not an uncommon thing, where iron footings are placed below the water level, to find that the water has dissolved and washed out all the cement which the concrete originally contained. I have seen more than one building standing with its feet wet, the cement having been washed out before the concrete set, leaving but the stone and sand remaining.

I believe, and have followed it out in my own practice, in placing all iron above the line of saturation if at all possible, and in the Harrison building, which has been referred to here to-night, and for which I was the designing engineer, the grillage of I-beams in the footings is above the water level, the foundations below this being entirely of concrete; but when for any reason the grillage or underground metal work has to be placed below the water level, most extraordinary care should be used to see that the metal work is free from scale and unpainted, that the trenches or pits are so lined that no part of the excavation comes in contact with the beams, that the concrete contains a large proportion of cement, with the aggregate or filler in small particles, so as to allow being rammed easily into a dense mass without voids. In the placing of long girders underground it is not an uncommon thing to see the earth fall in around the girders, and to see the concrete filled in without the earth being removed. It is needless, perhaps, to say that whenever this occurs a fault is formed in the concrete, and rust must inevitably follow.

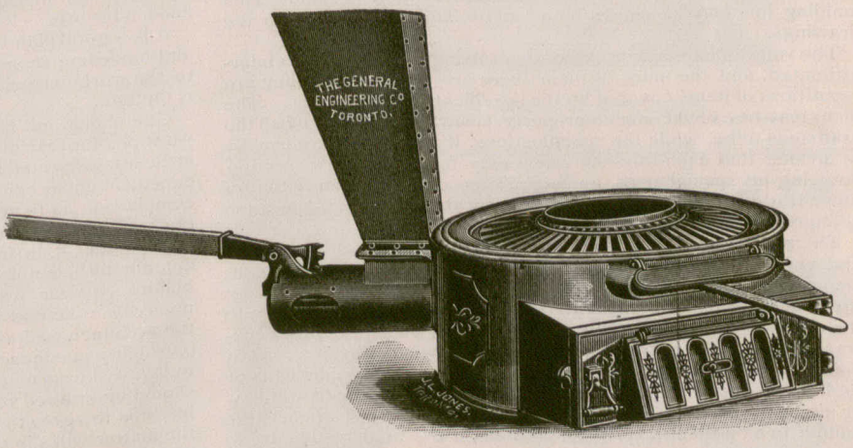


THE UNDERFEED FOR STEAM HEATING.

On the structural work above ground the danger of corrosion is not so great, but is sufficient, I think, to warrant the use of a concrete envelope around the columns and external girders, for the masonry covering is not always thick enough or tight enough to exclude moisture. If concrete is used the metal work should be temporarily protected by a coat of oil, which will be worn away by the time the building is ready for closing in.

TESTING DOORS.

A TEST of the comparative merits of an iron door and of a wooden door sheathed with tin-plate, in stopping the spread of fire through an opening, was recently made by the British Fire Prevention Committee. Both doors were obtained on the open market, but whilst the iron door was hung in a rebated frame, the sheathed door, as fixed by its maker, was hung to fit closely to the face of the wall, with a 3-inch overlap around the opening. The doors were exposed for one hour to a fierce fire, the temperature attained being 2,000° Fah., which was followed by the application for five minutes of a stream of water. Both doors remained in position, but were buckled and warped. The first spurt of flame passed the sheathed door five minutes after experiment commenced, whilst with the iron door the flame was kept back four times as long.



THE UNDERFEED FOR EXISTING FURNACES.

THE LONDON BUILDERS' EXCHANGE.

ON August 17th a large number of the members and friends of the Cleveland Builders' Exchange visited London, and were entertained and shown the places of interest in the city by the officers and members of the London Exchange. Luncheon was served at the Tecumseth House. The members of the London Exchange afterwards accompanied the visitors to Port Stanley, where they in turn were royally entertained by the Cleveland builders.

THE AMERICAN SUPERINTENDENT.*

THE art of superintending is not only the art of fault finding, but the art of fault remedying and fault preventing. If building operations were not attended by mistakes, misinterpretations and disagreements, it is evident there would be no need for the genus superintendent; hence it is with the difficulties that beset him, and their remedies, that this article will chiefly concern itself.

The faulty plan is the first source of annoyance. Frequently a set of drawings is so hastily finished that omissions and inaccuracies are almost unavoidable. Contradictions and discrepancies occur between the general drawing, scale and full-size details, and the specifications, resulting not only in annoyance and controversy, but also in no little expense and delay if not discovered before the ordering of material, or the performance of that part of the work affected by them. It should be the superintendent's first care to make a thorough examination of all plans and details, comparing them with the specifications and with each other, in order that all errors may be discovered and eliminated before the work is begun. This examination will also aid in fixing in the mind the peculiarities which differentiate the new work from others with which he has previously been connected.

The plans furnished the contractors should be complete. The drawings should be provided in sufficient number to thoroughly cover the work, and show plainly how it is to be done, so nothing will be left to the imagination of the builder. There should be numerous sectional drawings, which shall clearly show any unusual or special features or finish, and a sufficiency of dimensions to permit the execution of the work with the fewest possible arithmetical calculations by the workmen at the building.

Draughtsmen are usually reluctant to bind themselves by figures on a drawing, but unless the workmen are mind readers—and few of them are—it is hardly to be expected they will properly carry out the artist's idea when he himself declines to define it. In figuring dimensions, it is of advantage to give, where possible, a string of distances between centres of main features, with subordinate lines of dimension for the separate parts of those features, and also to note on each plan the bays or dormers which are to centre with some other feature of the building above or below them. This method will materially decrease the liability of the builder to make mistakes in laying out his work, and an error, when made, may be quickly found and easily rectified without affecting more than a single feature. It will also be found useful to adopt a "building" line (usually the line of the first storey above the water table) as a base line from which to figure dimensions, as well on the basement and foundation-plans as on the first floor plan. This building line may be shown by a red or black dotted line on the drawings.

The value of explanatory notes on drawings should not be underestimated, and the more of them there are even though they are repetitions of items covered by the specifications, the better. The plans may be called common property, since they are used by all the craftsmen alike, while the specifications, if accessible, are usually so divided that each foreman refers only to the particular section covering his special work, and is ignorant of its relation to that of other trades. In such cases it is evident that proper co-operation is improbable, if not impossible.

The repetition of the common lines of height on all elevations and vertical sections is to be recommended. It is quite a convenience to the superintendent, and saves mistakes arising from the builder's inclination to trust to memory rather than to turn to the plan on which the heights occur. It may be said that the contractor should be made to suffer for his own negligence, but it must be remembered that the drawings are really implements or tools as necessary for the prosecution of the work as the trowel, saw or hammer, and it is the duty of the architect to furnish them to the builder in as perfect a state as possible, if the final results are to be satisfactory.

Any improvements tending to convenience in handling will amply repay any extra time consumed in preparing them in the draughting-room, and a day or two, or in unusual cases even a week, devoted to figuring and checking up dimensions on the working plans will avoid expensive misakes, and time-wasting delays, with the resulting disputes and controversies, and at the same time will give the plans a definiteness that will enable the estimator to make a closer proposal for the work before the contract is awarded. For the same reason it is desirable to fully indicate by framing plans or diagrams the kind and size of materials to be used and the methods to be employed.

It is a decided advantage to the superintendent if he has been employed in the production of the plans whose execution he is to supervise. His familiarity with the drawings will enable him to see more readily the effect that a change at one point will have on others of the work, and will be especially valuable to him when it is necessary to give an order without a chance for study or leisurely consideration.

The superintendent should secure a complete set of all drawings to be used in the work, including general plan, scale and full-size details and diagrams outside of the sets furnished the contractors. He should also have his own copy of the specifications, and all agreements and contracts to which to refer in case of dispute between contractors concerning the scope of their respective contracts. The above applies only to the superintendent in charge of large work not in the same city with the architect, who cannot therefore have access to the office sets.

The first duty of the superintendent on the ground is to check up the dimensions and laying out of the building. For this a steel tape should preferably be used, and for a long series of measurements the ring end held at a single point while the different required dimensions are marked off in order along the length of the tape from a memorandum slip previously prepared. This prevents accumulative errors, which with the average mason reaches 4 or 5 inches in 100 feet before it is considered worth noticing. In order to keep the work in hand the superintendent should require that he shall have approved all work laid out before building is proceeded with. To measure the width of footing trenches a stick cut to the width of the footing, with a notch for the building line, will be found convenient. A plumb line dropped from the building line stretched above will pass the notch, and show at once if the trench is properly located and of the required size. With several different widths of footings, and for places where no line can be stretched in the excavation itself, this method should save much time and many mistakes.

If the plans show no chases or slots for soil and waste pipes, or gas, water and electric mains, the superintendent should arrange with the mason to build them in the proper places as the walls go up. Neglect to consider this frequently leads to unsightly results, such as a group of pipes cutting through a handsome cornice, or spoiling the appearance of an otherwise attractive room. The location of the horizontal pipes should also be considered, whether in the floor, that is, between the joists or cut in over them; under the floor, hung to the ceiling below and exposed to sight; or under a raised floor; also, whether the marble or other wainscoting back of toilet-room fixtures can set flat against the wall or must be moved far enough forward to allow the waste, supply and vent pipes to run behind it.

The note book should be the superintendent's constant companion, not only for jotting down ordinary items to jog the memory for the daily details of the work, but to be used as well to preserve a record of orders to and agreements with contractors, instruction to foremen and alterations or changes sanctioned in plans or specifications. In fact, the entries should include everything relating to the building which may possibly be needed for future reference. Especially should dates of orders, and delivery of plans and details (if no record is kept in the office) be noted down, in case it becomes necessary to refer to them in settlement of claims for enforced delay in completing a time contract.

The superintendent should notice from time to time if all the workmen who can be advantageously employed are on the different branches of the work. He should enquire concerning the ordering of material and the progress of the work of the sub-contractors, in order that no delay be caused by their failure to come to time. More time is thus lost than from all other causes together.

The superintendent should see that application is made for detail drawings in such season that they will be on hand before needed for use.

It is a good plan to occasionally visit the mills, foundry, pattern and modelling shops, to nspect the work in progress, and explain to the workmen points that are vague or misunderstood before it is too late.

One should not be above accepting advice from contractor or workmen for fear of loss of prestige, since frequently their experience suggests methods or facts, either of merit in themselves or expedient under existing circumstances. Neither should one be so complaisant as to adopt these suggestions without careful consideration. If they are rejected it should be done so as to leave no doubt about it in the mind of the workman, nor as to method actually to be employed. Frequently it is necessary to say to the builder, "Your way may be as good, but the specifications prescribe a method which I know will give results satisfactory to the architect, and as I am answerable to him after your responsibility in connection with the work ceases, I must require you to follow the specified directions." Material or work condemned should be ordered removed at once. It is a common trick among foremen to agree to see to that later, with the expectation that the matter will slip the superintendent's mind until the defective material or work can be hidden or covered up.

Structural iron is usually required to have several coats of paint after delivery. In order to insure its receiving the required number of coats and proper care in their application, and also to prevent a delay for painting and drying when the material is wanted for use, it is well to insist that this work be done as soon as the metal is on the ground.

The superintendent himself should cultivate the following characteristics: Tact, force, decision and gentlemanliness. He will be called upon to listen to endless complaints of interference by one contractor's men with the work of the others, and is expected to arbitrate them. He will be referred to as a walking specification by foremen who find it more convenient to question him than to take the trouble to look up requirements themselves. This he should be encouraged to do. Some foremen ignore the specifications entirely, depending on the superintendent to assume responsibility for anything opposed to them which he has failed to discover, but "which it is his duty to find out," as Mr. Clarke was once informed by a foreman. The same brilliant fellow was one day very much put out with him, because his attention had not been called to a note in one of the plans. He had shored up a 17-inch brick wall, and cut an opening in it in the first storey, before he discovered that it should have been torn out above also, to make way for a stud partition to take its place. Of course, the single I-beam which the note called for, while ample to support a stud partition, would hardly do the same service for a 17-inch brick wall. Another nuisance is the man who always knows a better way to do everything than the way he is called on to do it (simply for the sake of change), and who is positively unhappy if his suggestions are unheeded. Of course, the superintendent ought never to lose his temper. He may lose his patience and express his opinions, but he should let the other fellow put himself at a disadvantage by getting mad. As a general rule, however, flattery builds quicker than friction, and the greater the superintendent's skill in overcoming difficulties, expediting work and settling differences, the better superintendent he is.

* From an article by Mr. Edwin B. Clarke published in the Technograph, the annual published at the University of Illinois.

LEGAL.

The Public School Board of Toronto has appealed to have set aside the decision of Judge McDougall, under which the Board were fined for alleged violation of the city plumbing by-law in permitting the use of a dry earth closet system in the Church street school. The rule was asked for on the grounds that there is no appeal from the dismissal of an information, that the proceeding should have been by indictment, that by-law 2478 should not apply to defendants as to the form of a system installed before it was passed and approved by the Medical Health Officer of the City of Toronto, and on other grounds. Rule nisi granted.

ROSEDALE PRESSED BRICK & TERRA COTTA CO. v. FOSTER.—Aylesworth, Q. C., for the liquidator of the company, appealed from order of Master in Ordinary dismissing application by liquidator to settle the name of Major Edward H. Foster upon the list of contributories of the company in respect of ten shares. The alleged contributory signed the stock book before the incorporation of the company, and the shares were allotted to him after the incoporation. There was, however, no proof of formal notice of allotment, though there was a correspondence between the alleged contributory and the secretary of the company in which the latter insisted that the former was a shareholder. The Master held (following Tilsonburg Mfg. Co. v. Goodrich, 8 O. R. 565) that subscription before incorporation was of no avail unless there was a subsequent ratification, and there was none such here, and the alleged contributory was not a shareholder by estoppel. The appellant contended that the subscription was a continuing offer to take shares, and when it was accepted after incorporation it became a contract. The court was unable to distinguish this case from the Tilsonburg case, and also pointed out that the alleged contributory had a valid excuse for taking advantage of the absence of a binding contract to take the shares. Appeal dismissed with costs. Leave to appeal granted.

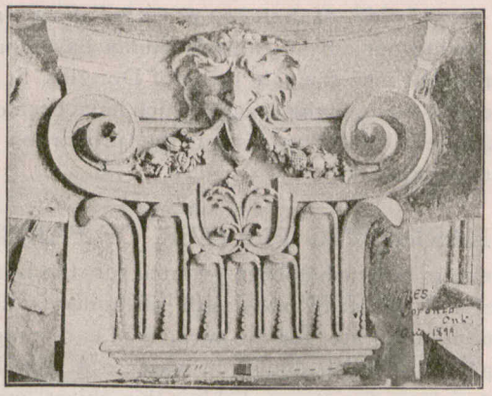
USEFUL HINTS.

TO CLEAN SOILED WALL PAPER.—First thoroughly dust off the walls and ceilings wherever the paper to be cleaned may be. Tie up two quarts of wheat bran in a coarse flannel cloth or bag made of flannel and rub it over the paper briskly, taking care to miss none of the space.

A quick-drying, weather-resisting paint of dark colour for zinc sheets is made by mixing 6 lbs. of graphite (plumbago) with 1 gallon of vinegar. The oxidized surface of the zinc, previously well brushed, is painted with the above, one coat giving a sufficiently dark colour. New sheet zinc, however, requires two coats, and must first be oxidized by the following application, which is not strong enough to cause any deterioration of the metal: One part each of chloride of copper, nitrate of copper, and sal ammoniac, dissolved in 64 parts of water, and 1 part of hydrochloric acid added to the solution.

IRON SCREWS IN STONE WALLS.—An ingenious and simple method of fixing metal screws into stone walls has been devised. Wooden dowels, beside the tendency to weaken the walls, do not afford security and permanence. A wire of suitable thickness is coiled on the screws so as to follow the threads of the same, ane form a kind of screw nut. The coiling may commence near the head of the bolts and proceed towards the point by laying the wire into the grooves. After arriving at the point of the screw the wire may be wound backward over the helix already wound on, but with a steeper pitch, so as to leave wider interstices between consecutive convolutions of the wire. This wire coil or nut is introduced into the hole formed in the wall for this purpose, being slightly wider in diameter than the outer layers of wire, after which the surrounding spaces are filled up with plaster of paris, cement, or similar binding material in a plastic condition.

A NEW PAINT REMOVER.—The most popular mediums for removing oil paint coating are almost all mixed with caustic alkalis, and consequently, if the article to be cleaned is of wood or similar material, have a destructive action on its organic composition. Such mediums can, therefore, only be employed sparingly and with great care. Moreover, they do not only decompose the wood fibre, but also prove dangerous to the skin of the operator, owing to their caustic quality. But if a mineral oil is employed in the solution of the caustic alkalis, it will be found that all the drawbacks named will disappear, while at the same time the dissolving qualities of the medium are considerably increased. In order to keep the mineral oil continuously in emulsion, the resulting mass is mixed with a corresponding quantity of an indifferent body, such as powdered pumice stone, sawdust, etc., until a paste is obtained, which constitutes a powerful and lastingly effective paint dissolvent. Same can be applied with great ease on any surface, and has no injurious action, neither on the fibres of the wood nor on the skin of the workman. The following mixture is given by a foreign exchange as a recipe: Dissolve 20 kilos of caustic soda of very great concentration in 100 liters of water; mix the solution with 20 kilos of mineral oil and emulge in a kettle with a stirring contrivance. Add 20 kilos of sawdust, with further stirring, and run the product obtained through a paint mill until the paste is ready.



Shea's Theatre, Yonge Street, Staff Capital.
By W. J. HYNES, Toronto. G. M. MILLER & Co., Architects.

THE PROPERTIES OF DOUGLAS FIR.

It is learned from the Engineering Record that the properties of Douglas fir have recently been studied by Mr. Edward Mohun, M. Am. Soc. C. E., who has compiled the results of a number of earlier studies and deduced constants for use in the various formulas for beams and pillars of this material. For timber of the best quality, such as would be accepted by an inspector for bridge or trestle work, he adopts an ultimate tensile stress of 14,000 pounds with a factor of safety of ten for obtaining the safe working stress, 5,000 pounds for the ultimate crushing strength endwise with a factor of five, 500 pounds for the ultimate crushing stress sidewise with a factor of three, 6,000 pounds for the ultimate skin stress with a factor of three, 1,400,000 for the modulas of elasticity, 400 pounds for the ultimate shearing stress wilh the grain, wlth the factor of four, and 40 pounds as the weight per foot. The ordinary life of a structure of such material designed with the factors of safety mentioned is believed to be about twelve years. Mr. Mohun has prepared some valuable tables, giving not only various formulas based on these constants, but also the safe loads of Douglas fir beams and a comparison of the results which have been obtained by different investigators of the properties of this important material.

HARDENING PLATSER OF PARIS.

A German patent has been granted for the treatment of articles of plaster of paris with an aqueous solution of ammonium borate, for the purpose of hardening them and rendering them insoluble in water. A simple and efficient process for accomplishing this object would be highly desirable, as it would serve to greatly prolong the life of plaster paris casts, which, being quite soft and not entirely soluble, sooner or later become superficially defaced, and washing specially wears down the outlines of the object. The process above referred to is said to give results decidedly superior to anything that has heretofore been proposed. The hardening liquid may be either mingled with the plaster in the act of moulding, or may be applied on the surface of the finished casts with a brush. The solution is prepared by dissolving boracic acid in warm water and adding thereto sufficient ammonia to form the borate which remains in the solution. The manner of using the solution is thus described : The saturation of the gypsum or painting of the plaster of paris is carried out in the cold. The objects are subsequently rinsed off and dried. The surface becomes very hard after two days and insoluble in water, while the induration in the interior advances more slowly. By means of the fluid described, gypsum floors can be hardened and rendered more durable and impervious to the influence of the weather. Saturating with ammonium borate is said to be especially useful on exterior walls of buildings, barracks, &c ; on the latter, because experiments have proved an antiseptic action of the liquid.

Messrs. Baker & Co., 38 Cathcart street, Montreal, have lately issued an attractive catalogue in which are illustrated the many styles of architectural and decorative relief ornaments which they manufacture as well as ratchet joint plaster board and patent plaster partition blocks.

The Luxfer Prism Co., Toronto, has been reorganized with increased capital, the officers being as follows : President, Mr. Thos. W. Horn ; vice-president, Mr. E. B. Osler, and secretary-treasurer, Mr. F. W. Barrett. Work is already well forward in the erection of a new and extensive factory in rear of Nos. 98 and 100 King street west.

PAGES

MISSING