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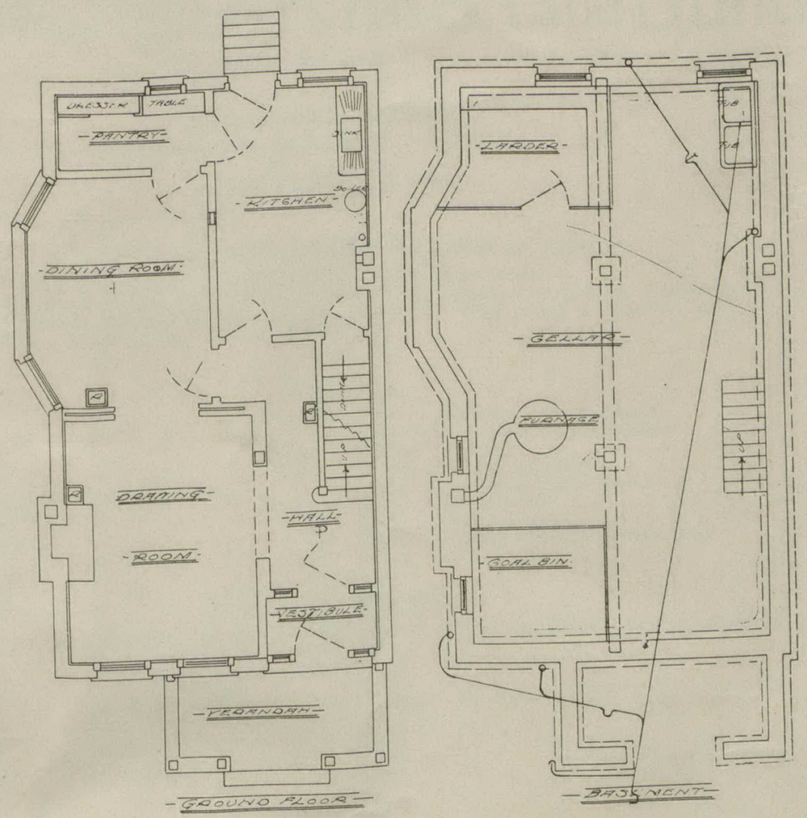

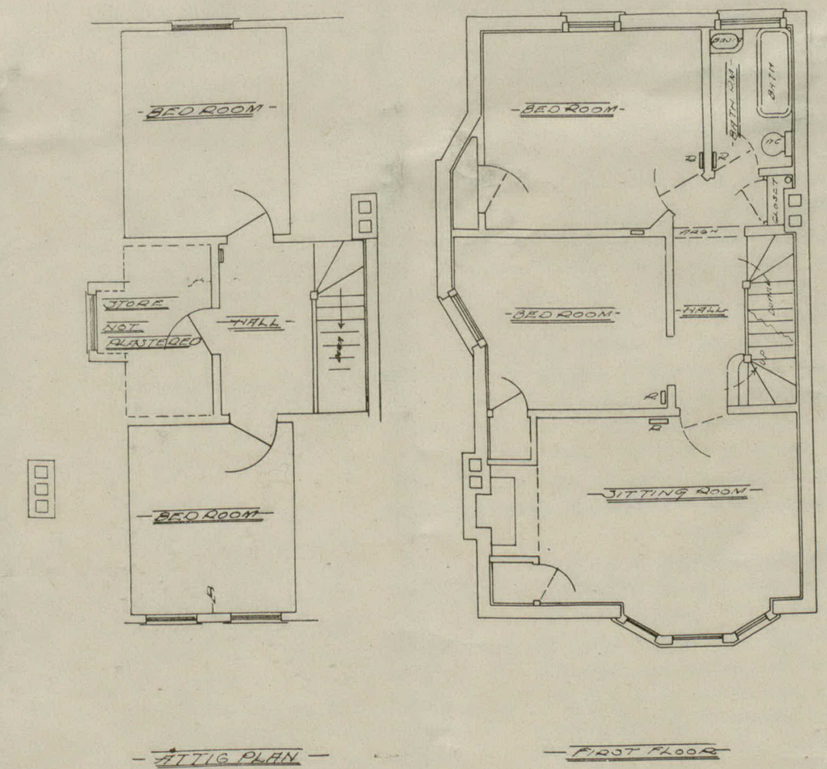

HOUSE ON ALBANY AVENUE, TORONTO.

CHADWICK & BECKETT, ARCHITECTS.

The Canadian Architect and Builder

VOL. XIV.—NO. 164. AUGUST, 1901.

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The Site of the Victorian Statute.

THE Ontario government has rejected the proposal of the city council of Toronto that the proposed statue of her late Majesty, Queen Victoria, should be placed on the main approach to the Legislative Buildings, midway between the statue of the late Sir John Macdonald and the buildings. The government claim that this statue should occupy the foremost and most prominent position. This view will be generally admitted to be a reasonable and proper one. While it is perhaps an unusual thing to remove a prominent statue and place it in a less commanding situation, yet it would have appeared a graceful and reasonable act on the part of the city council to have consented to allow the statue of the greatest and best ruler the empire has ever had to supplant that of a colonial statesman, however great were his abilities and public services. Pity it is that the proposed Victoria Square opposite the new municipal buildings has not been secured by the city and is not ready to receive the Victoria statue.

Capital and Labor.

THE great combinations of capital and the aggressiveness of the unions of workmen in the United States, is bringing to a focus sooner than was expected the settlement of the relations that shall in future prevail between employer and employee. The most gigantic strike in history is now in progress between the steel workers and what is known as the United States Steel Trust. The employers are said to be losing a third of a million dollars per day, and the employees about half that sum. Upon the outcome of this great struggle will largely depend the conditions which are to govern, at least for a time, the relations of the combatants in the future. It seems impossible at present to forsee what the ultimate and permanent solution of the difficulty will be. It would seem, however, that there must either come a better understanding between employers and employees, by which regard will be shown for the interests of both, or the government must step in and compel the settlement of disputes by arbitration. In New South Wales, a compulsory arbitration law now prevails, and is said to be working satisfactorily. In Canada we have what are called Conciliation Laws, which provide means for the adjustment of disputes where both parties are willing to submit their case to arbitration. These laws appear to be a dead letter. The statement is made that in the present strike of trackmen on the C.P.R., which is a hindrance to public traffic, no request for arbitration has been made by either of the parties to the dispute. If the law is to be invoked, it must, to be of any service, be compulsory. It is most unfortunate that these disputes regarding wages and hours of labors should be allowed to block the wheels of industry in prosperous times, and hasten the return of commercial depression.

Decadence of the Exhibition.

In point of attendance the Pan-American Exhibition at Buffalo has thus far proved a failure. The holiday season, during which the largest attendance might reasonably be looked for, will soon have passed, yet the expected thousands have not put in an appearance, and in consequence it is rumored that the Exhibition may close at an earlier date than was intended. The fact is apparent that the Exhibition business has been overdone. The original idea of these large Exhibitions was to bring together the most improved devices and methods in manu-

facturing, as well as specimens of the natural products of the nations of the earth. So long as this was the prominent feature, and an interval of at least ten years was allowed between the Exhibitions, they were reasonably successful. In recent years, however, projects of this kind have become too numerous, while their educational value has seriously declined. The Exhibition of to-day is a huge bazaar and circus combined, depending for success not upon its ability to instruct, but to amuse and excite wonder. It is not surprising that agriculturists, inventors, manufacturers and artisans no longer think it worth the cost to exhibit, or the earnest worker in any department to travel long distances to visit modern shows. The city of St. Louis, where arrangements have been in progress for a year or more for an Exhibition on a large scale next year, has wisely taken warning by the failure at Buffalo, and postponed the event for at least three years. It is perfectly safe to assume that if with all its advantages of situtaion, the Buffalo project has failed, St. Louis could not succeed in inducing northerners at least to exchange the cool breezes at the seaside, or by the great lakes, for her stifling atmosphere. She would do well to substitute for her proposed Exhibition a winter carnival. Canada's resources have only recently reached the point which would justify her in attempting to inaugurate a Dominion Exhibition. In view of the evident decline in public favor of such enterprises, the wisdom of embarking thereon now seems open to question.

Architectural Emotion.

ANY student of literature can tell that the essentially modern phases of architecture, whether he likes them or not, are artificial, by merely reading what is written about them—if he can. The architecture generated by the arts and crafts movement in particular is given away at once by the young men who write about it. They are doctrinnaires and seek to persuade with words. Their style is uneasy. They feel the sense of the world to be obdurate, difficult to convince; and they wheedle and use adjectives. They contort their sentences so that the adjective comes first, and a superlative at that—"very pretty" is this, "very charming too" is that. They cannot let a plain statement stand by its own merits but seek to bolster it up with suggestion. It is not enough to say that a thing is of oak; they seek to commend it with the suggestion that it is "oak of sturdy British growth." It is not enough to suggest that a certain space will be convenient for pictures; we are offered the contemplation of "a few well chosen pictures." There is ultra refinement in this fewness. In the hammer marks on iron on the other hand we are asked to observe the interesting suggestion of sweat, which is not at all refined. When we come to the women's rooms, the inhabitants figure of course as "fair ladies," and the suggestion, made in one book, that we may imagine them talking about the Euphuists is remarkable. It would stick most fair ladies to say much about the Euphuists; but it is certainly suggestive that the authors of the book should have this sneaking regard for the most affected of England's many affectations. One is inclined to suspect that writers of this school would find themselves most at home talking art with the fair ladies. They are fond of certain words which come strangely from the mouth of a male man. "Cosy" is a favourite word, and "dainty" too we are sorry to say. It is to be feared that when these young men marry they will get wenches, though what the king needs is men. In America the theme is larger. It is not finish but creation they deal with, but the talk is not straight talk. Mr. Louis H. Sullivan's eloquence about the young man in architecture, to take a salient instance, is quite unnecessary. Abe Lincoln would have put the case in five minutes or less. Indeed there would be no need to invoke so great a mind. The work of talking about the "organic" and "functional" nature of true architecture and the "logic" of its expression is done; what we have to do now is to produce it, and if any talk will help us to that, it must be of the dry and scientific kind. There is too much emotion over architecture in the forward schools of the United States for one to believe that these producers have got down to a scientific basis. In the meantime Mr. Flagg, who represents the Frenchiness which represents classic taste in the United States, is cool and businesslike, and Mr. Reginald Blomfield, who in virtue of the new, handy edition of his Renaissance in England, may be taken to represent the classic school in England, is manly and dignified. One is convinced in reading the utterances of these gentlemen and others of the same class that, whether we like it or not, those who follow on in the old paths are practising a real profession of architecture.

L'Art Nouveau.

IT is interesting to observe, as a corollary to the doctrine that "the old paths are the best," the divergence that is being made in France from the formalism that has hitherto been associated with French architecture. The newest minds are evidently tired of it, and are producing work which in feeling tends to the fantastic; though at present chiefly in detail. So far as that goes it is natural that freedom should begin with detail, as it is in the building up of design from fixed details that the formalism of the formal school arises. At present the new school of buildings ranges perfectly in general appearance with the prevailing Parisian type. It is only an inspection in detail that discovers the difference in feeling; but it gives an impression of wide difference, for the new detail is not only not formal but is formless. It has abandoned the Aristotelian basis of beginning, middle and end, and delights in forms that "grow" one from another, relying upon carving to get over difficulties of junction. This is nothing less, in its way, than a new French Revolution; a revulsion from one extreme to another. Unfortunately the opposite extreme from formalism is barbarism and L'Art Nouveau is nothing else; beautiful in refinement but unintellectual and promising nothing but reversion, because of disgust with itself. It seems to be the peculiarity of French logic that it can develop admirably, but cannot reform. The French idea of reform is reaction to the opposite extreme. It does not follow that the devotees of French architecture on this continent will follow the French in their reactionary vagaries, but it is decidedly worth while to observe these vagaries; and, before we accept the doctrine that French architecture is the only architecture, to note that there are some French architects who are tired of it.

A large deposit of clay has been discovered near Little Current, Ont., which is pronounced by a German expert to be suitable for fire-clay and vitrified brick.

BY THE WAY.

For the first time since its erection twenty years ago, the spire of St. James Cathedral in Toronto is undergoing repairs and is being repainted. The work is being done by Messrs. A. B. Ormsby & Co., the steeplejacks being James Plumb and Frank Scully. The job is a hazardous one, the spire being upwards of 350 feet in height.

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It is not only Mark Twain's heathen Chinee whose ways are peculiar. In every community may be found people for whose peculiarities it is difficult to account. As a case in point, I may mention the circumstances connected with the buildings and plot of ground known as St. Patrick's Market, on Queen Street in the city of Toronto. This property was deeded to the city years ago for the purposes of a public market by one of the most wealthy and prominent citizens of that day. For a number of years past two butchers have been the sole occupants of the building, which in reality has ceased to be a market, the business having been transferred to St. Andrews and St. Lawrence markets, situated respectively in the west and east ends of the city. Seeing that the property was no longer serving the purpose for which the donor intended it should be used, the city authorities proposed that it should be utilized as a public square, for which it is well adapted. Just here, however, the peculiarity of the administrators and assigns of the donor manifested itself. They declared that the property having been donated for a particular purpose, it must not be used for any other, and threatened that if it were so used, the rights of ownership would revert to the donor's estate.

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The interior of Osgoode Hall, Toronto, is being renovated aud re-decorated in view of the approaching visit of the Duke of York.

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I learn from a contemporary that Miss Josephine W. Chapman, of Boston, a successful woman architect, will be the only representative of her sex at the Pan-American Exhibition, in Buffalo. Miss Chapman has erected a number of churches, business buildings, and residences. She employs none but men in her office, as she declares that women fail to give their undivided attention to the work, and at the most critical moment want to go home to make their clothes.

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A novel and expensive but not overwise method is said to have been chosen to determine the quality of the bricks produced by a large yard in the Western States. The proprietor and a brick mason contractor got into a discussion, and as the result a bet of $10,000 was made. The builder maintained that the brick would not sustain a column of 300 feet. He is to undertake the construction of a stack, and after it reaches a height that ordinary workmen refuse to continue on the structure, he will himself continue it up until something gives way. If it fall before it reaches 300 feet he wins: otherwise he loses. It is to be six and one-half bricks square at the base, with a square one-foot flue, up which the bricks are to be conveyed. The builder agrees to continue the stack until it falls, to be at the top when it gives way, and bets an additional $5000 that he will not be hurt in the collapse. The loser is to pay for the bricks.

Canadian Pavilion, Glasgow Exhibition.

BUILDING CONTRACTS.

The term building contract may be applied to any legally binding agreement which has for its subject matter or principal subject matter the erection of buildings or the execution of works of the nature of buildings, and, as generally used, it may be more particularly defined as an agreement by which one person or body of persons undertakes for a consideration to erect or construct for another buildings or other works of that nature.

The first necessity, in the case of such a contract, is of course that a site for the proposed buildings or works is to be provided, and as the usual occasion for a building contract is where the owner of a site desires to have it built upon, the term "building contract" is usually understood to import that the proposed buildings are to be erected upon the land of another for his use and benefit.

As the terms contract and agreement, as commonly used, have essentially the same legal significance of a legally binding agreement, that is to say an agreement enforceable by law, so there is not strictly speaking, any inherent or essential difference legally or grammatically between the terms building contract and building agreement, but in fact the former term has come to be used so as to import that the works to be done are to be done for the use and benefit of the owner of the land, whereas the term building agreement is usually confined to agreements providing for a grant to the builder of a lease of or other interest in the land upon completion of the building.

Although therefore either term may be applied to any agreement which provides for the erection of buildings, the term building contract naturally suggests to the experienced that the buildings are to be for the use and benefit of the building owner or employer, and consequently that the consideration is to be a money payment or something of the like nature, e.g., payment in shares of a company, whereas the term building agreement suggests that the builder is to acquire in consideration of his building a lease of or other interest in the land built upon. As illustrations, a simple instance of a building contract would be where—

> A., a builder, agrees with B., a landowner, to build him a house upon his land, in consideration of a lump sum to be paid on completion of the work.

And a similar instance of a building agreement would be where—

> A., a builder, agrees with B., a landowner, to build upon B.'s land in a specified manner, in consideration of B. granting to him a lease of the land and buildings.

The rent of such a lease is of course fixed at a sum considerably below the rack rent of the property as built upon, and the amount expended in buildings is in fact equivalent to a premium paid for having the property as built upon at a rent below the rack rent thereof. Although a contract to pull down a house comes within the Statute of Frauds as relating to an interest in land, and must be in writing, a contract to build a house does not.

In the case either of a building contract or building agreement, as above defined or distinguished, provisions will be found (1) on behalf of the landowner, (2) on behalf of the builder, and these are usually followed by provisions for the prevention or settlement of disputes which should be on behalf of both parties, but are in most cases found to be framed rather in the interest of the building owner or employer. The general object of the provisions on behalf of the building owner or employer is, putting it quite generally—

> (a) That the buildings to be erected shall be of the desired nature and quality, and be completed within a specified time.
>
> (b) That the builder shall not be entitled to his remuneration or consideration unless and until he has fulfilled his part of the bargain.

And the object of the provisions on behalf of the builder is—

> To put him into a position to claim his remuneration as soon as he has earned it under the stipulated terms.

Although these objects may be stated thus simply and shortly in a general way, the complicated nature of building operations and the many unforeseen occurrences which may intervene render numerous and elaborate precautions necessary for the prevention of disputes during the progress of, or after the completion, or (it may be) the previous abandonment of the works. The provisions embodying these precautions have now settled down into a number of well recognized clauses, the more important of which are to be found in any well-drawn building contract or agreement. These more important clauses it is proposed presently to consider in detail with special reference to the legal bearing and effect thereof and to certain judicial decisions thereon.

The subject of the present paper is building contracts in the ordinary sense as above distinguished, i.e., contracts for the erection of buildings or construction of works on the land of another person for the use and benefit of that other person. It is in the case of building contracts in this sense particularly, that the elaborate provisions to be presently considered are necessary in order to secure that the work shall be done in exact accordance with detailed requirements.

In the case of a building agreement, as an immediate lease or grant of the property is intended to be made to the builder, it is, as a rule, only necessary to provide that the buildings shall be sufficient to secure the intended rent and, perhaps, also to preserve the character of the neighborhood. For these purposes it is generally sufficient to provide that the buildings shall be of not less than a certain value and shall have a more or less uniform character. The builder himself having, or being about to acquire, an interest or estate in the property, may be relied upon to build so as to give the property a marketable value. Consequently it is not usually found necessary in building agreements to go into any great details as to the buildings to be erected.

When, however, buildings are to be for the use and benefit of the building owner, his first and foremost care will be that the agreement shall be framed so as to secure his getting what he wants in every detail, and to secure this is consequently the main object of the provisions of the contract on behalf of the employer.

Now if the buildings contemplated were nothing more than what Mr. Ruskin somewhere says is all that the ordinary British householder requires, viz., four brick walls and a drain pipe, the employer might possibly be able to decide for himself whether that desideratum were supplied, and the services of an architect or surveyor might be dispensed with. Pace Mr. Ruskin, however, and fortunately for the profession of architects, our needs and aspirations in the matter of building are seldom so simple, and, moreover, it is not only the demands of increasing wealth and luxury but the elaborate requirements of modern building acts which have to be met. Consequently building contracts are frequently required to provide for the proper execution of most extensive and costly works in accordance with most minute and detailed particulars. Hence the introduction into the contract or transaction of a third party in the person of the architect or surveyor of the building owner, whose duty it is to bring his expert knowledge to the assistance of the building owner as a guarantee that the work to be done shall be done in the way in which an expert knows it ought to be done.

One of the most important things to be considered is therefore the position of the architect or surveyor, both as regards the owner and the builder, and the nature of the authority, duties, rights and liabilities involved in that position.

Before proceeding to details, it is to be observed that, as in the case of all instruments where the salient provisions have settled down into recognized form this has been the result of a gradual growth, faults and deficiencies being rectified and supplied as experience has shown such rectification and supplement to be necessary. The case of conditions of sale will readily occur as an example of this growth or development. In preparing these, particular provisions to meet such particular case are required,

and are inserted by the draftsman as his skill and experience dictate, but beyond these special provisions there will be found a number of general forms which experience and the results of judicial decisions have shown to be necessary or expedient in every case, if disputes are to be avoided.

We come now to consider the general form which a building contract for the purposes and in the circumstances aforesaid has come to assume. In contracts for elaborate works, and especially in the kindred contracts usually known as engineering contracts, the instrument frequently commences with a series of definitions—

(a) of persons, e.g., building owner or employer, surveyor, engineer, clerk of works, etc.; and

(b) things, e.g., works, plant, drawings, schedule of prices, etc.

These, however, are rather matters of convenience and not of necessity, and need not be here considered.

For the reasons before indicated, viz., that the employer not usually being an expert, and so not being competent of himself to specify precisely what he requires, or to see that what is supplied is such, he will in the first place have employed an architect to prepare the plans and specifications for the proposed buildings, and the builder or contractor will be required to undertake to build them in accordance with such plans and specifications, and under the direction and to the satisfaction of the architect. The contract thus sets out by defining the work to be done, viz., that shown by the plans and specifications, and by providing a guarantee that it shall be properly done by requiring it to be done to the satisfaction of the building owner's architect or surveyor.

The question which naturally arises next is that as to the time for completion, and consequently the clause or clauses indicating the nature and extent of the work to be done is usually associated with or followed by provisions for securing completion within due time, and fixing the damages or penalties in default.

Next will naturally follow the question of the consideration or remuneration for the work with provisions as to the time, manner, and conditions of its payment. Then in order to prevent undue rigidity will follow provisions as to alterations and deviations.

It will then be found convenient to provide as far as possible for all matters or contingencies which, or the consequences of which might if left unprovided for, give rise to dispute or doubt, and of these the following may be here mentioned, namely :—Rectification of defects subsequently appearing, property in materials and plant, assignment and sub-letting of contract, bankruptcy of contractor, and lastly, there will be provisions for the prevention and settlement of disputes.

A convenient form of contract is—1st, To define or indirate the work to be done, the time for its completion and the nature and conditions of the consideration or remuneration, and then to schedule or otherwise annex the General Conditions of the Contract. These General Conditions are as above indicated frequently very numerous and exhaustive, and it is not within the scope of this paper to consider them in detail, but it is proposed to select a few of the more important which have been the subject of judicial decision, and to consider them with reference to those decisions.

Before proceeding to consider the first group of clauses, viz., those relating to the work to be done, the time for its completion, the payment or remuneration therefor, we may here consider the position of the architect—

(a) As regards the employer.

(b) As regards the builder.

(a) As regards the employer. The bargain between the architect and the employer for the preparation of the plans, etc., and his remuneration therefor, is of course a separate contract not concerning the builder, and as to this bargain three points only need be here considered—

(1) The remuneration.

(2) The ownership of the plans.

(3) Personal nature of the contract.

As to (1) it has been held in a case of Whipham v. Everitt, "Times," March 22nd, 1900, that though not legally binding on a building owner the charges of architects sanctioned by the R.I.B.A. are evidence of the reasonable nature of the architect's charges if in accordance with the schedule.

As to (2) If there is no special agreement as to ownership the employer is entitled to the plans when he has paid the architect his reasonable remuneration. See Ebby v. McGowan, "Times," Nov. 17th, 1870.

As to (3) The contract being personal, i.e., the personal skill of the particular architect being deemed to be relied on, the contract is dissolved by the architect's death. This is not so in the case of the builder, although it may be made so by express contract. Apart from stipulation to the contrary, if the builder dies, his representatives are bound to carry out his contract. Further, and this concerns the position of the architect as regards the builder also, he is the general agent of the employer for the purposes of the work he has to superintend (see Kimberley v. Vick. L. R. 13 Ev. 1), and as a result of this position of agency all dealings between the architect and the builders must be free from any suspicion of collusion, and if any collusion or secret dealing between the architect and the builder can be established, it will amount to a fraud on the employer, and entitle him to damages, or rescission of the contract. See Panama & South Pacific Telegraph Company v. India Rubber Telegraph Works Company. L. R. 10, Ch. 515.

Following the clause or clauses defining the work to be done as the main object of the contract, there usually follow a number of ancillary or subsidiary clauses indicating various preliminary and other matters and things to be attended to or done by the contractor, e.g.—

Giving of requisite notices.
Fencing.
Compliance with statutes.
Paying compensation for damage.
Indemnifying employer against risk.

The number and extent of these obligations of course largely depend on the nature and importance of the main works to be done, and the object is to throw upon the contractor the expense of all the preliminary and subsidiary matters which may be necessary to be done, or settled, in order that the main work may proceed to completion without any further expense to the employer than the stipulated cost. It is sometimes stipulated in the contract, that all materials be provided by the contractor at his own cost, but apart from such stipulation, a person who contracts to build a house impliedly undertakes to provide all necessary materials.

Resuming the question of the contents of the contract, we proceed to deal with the first group of clauses. The architect or surveyor is as we have seen the agent of the employer to see to the work on his behalf. In this capacity he is empowered—

(a) To inspect it, and, if necessary, to uncover and look into work for inspection.

(b) To require any inferior materials to be taken out and replaced by good, and any inferior or unskilful work to be redone or rectified.

If the architect's supervision is thorough and his powers to cause bad work to be made good are unflinchingly exercised, the probability is that a proper compliance with the contract on the part of the builder will thus be secured. But however careful the architect may be, defects of material or work may possibly be overlooked, and to meet this, the clause known as the Defects and Maintenance clause is inserted, providing for the rectification by the contractor of defects subsequently appearing in the work. The contractor, however, cannot reasonably be expected to rectify defects appearing at any time—however long—after completion, and consequently his liability under the defects and maintenance clause is always limited in time.

The clause is in fact in the nature of a guarantee that the work is done so as not to give way through defect in material or workmanship, and may be compared to a guarantee given with, say, a watch or a bicycle, and like such a guarantee is limited to a period in which such de-

fects (if existing) might reasonably be expected to become apparent.

Such is the nature of the usual provisions for the prevention and rectification of defects. But even apart from such provisions in the contract, if the work is inefficiently done, the owner may deduct from the contract price a reasonable sum in respect of defective work, and if payment has been made he may obtain damages for such defective work. See Davis and Hedges L. R. 6 Q. B. 187. And if the work is so improperly done as to be useless, he may decline to pay altogether.

As to time for commencement and completion. The contract usually provides that upon execution or at some fixed date the builder shall be entitled to enter on the land for the purpose only of executing the works, and so as not to create any tenancy or confer any further interest.

If the buildings are contracted to be finished within a certain time and are not so completed, the owner of course will have an action for damages for such breach of the contract. It is, however, usually deemed inexpedient to rely upon this remedy only, and consequently it is usually provided that in the event of non-completion by the stipulated day, a penalty is fixed by the contract of so much for every day beyond, until actual completion. These, unless they are excessive or unless there is something in the contract to show them to be included as penalties in the legal sense, are construed as liquidated damages. See Law v. Local Board of Redditch, L.R. (1892), 1 Q.B. 127.

For the protection of the builder, provisions are also usually inserted to meet the case of delay through unforeseen or unavoidable circumstances, e.g., stress of weather, strikes, disputes with neighbors, etc. In these cases a reasonable extension of time is provided to be allowed by the architect or surveyor. Another cause for extension of time which is usually provided for, though no doubt it would be allowed without express provision, is in the case of extra work being found to be and in fact required.

As to the Consideration or Remuneration. The simplest case is that where a lump sum is to be paid upon completion. Usually, however, at any rate in large contracts, the builder requires money as the work proceeds, and he therefore stipulates to be paid certain sums at certain stages. In both cases it is usually provided that the certificate of the architect shall be required as a condition precedent for payment, and this provision has given rise to various questions as to the conclusiveness of and necessity for the certificate. It has been decided that it is final and conclusive as between the builder and building owner, even if given without reasonable care. Stevenson v. Watson, L.R. 4 C.P.D., 148, and Rogers v. James, 1891, 8 "Times" Law Reports, 67.

This evidently puts great power into the hands of the architect, and much reliance must be placed upon professional honor. The builder has no remedy against him in case of mere negligence or merely unreasonable conduct. In this, however, as in all other matters, actual fraud will give a right to relief, consequently, if the certificate is withheld fraudulently and in collusion with the employer, the builder will have a right of action both against the architect for the fraud and against the employer for work done, even though the certificate be withheld.

It is, however, to be remembered that where the contract provides for payments in advance upon the certificate of the architect that so much work, or work of such and such value, has been done, these interim certificates are not final, and when the time for final payment and settlement comes they may be revised and readjusted, Tharsis Sulphur Co. v. McElroy, 3 App. Cases 1040.

As to the form of certificate; the contract may provide that it must be in writing or in some particular form, but in the absence of such provision it need not be in writing, and may be by word of mouth, and in any form amounting to a certificate, but it must be so expressed as to be in fact a certificate, and not as it were a mere admission.

In the recent cases of Chambers v. Goldthorpe and Restell v. Nye, 84 L.T., p. 444, it was held that the architect in giving his certificate was in the position of an arbitrator, and so not liable for negligence in so doing. Lord Justice Romer, however, dissented from this view, and considered that on giving his certificate the architect was acting simply as the agent of the building owner, and was consequently liable to him for negligence.

Deviations and extra work. It probably but seldom happens that in carrying out works of any extent they are carried out exactly in accordance with, and without any deviations from, the original plans. As the works proceed, either unforeseen difficulties present themselves, or the works themselves suggest improvements in the original design, or the employer alters his mind as to some idea or detail, acting on the principle that it is the unforeseen which happens, the draftsman takes care to provide for such contingencies as are above mentioned.

The two things to be provided for are—

(a) The extra remuneration for the extra work.

(b) The further time to be allowed.

(a) May be fixed either by reference to schedule of prices, or by the surveyor; and as to (b) the contract may stipulate that no further time be allowed, or it may provide that the architect or surveyor may allow such further time as he may think reasonable.

If no such provision is contained in the contract, and extra work is ordered, no penalty can be recovered for delay. See Dodd v. Churton, 1897, 1 Q.B., 562.

It may here be observed that where the contract provides that the architect may order extra work to be done, this does not give him authority to require deviations or alterations amounting to an alteration of the general plan as originally proposed, but only alterations in matter of detail. See Rex v. Peto, Younge and Jervis, 37.

The question frequently arises, What is extra work? and to this the answer is that it is work outside the contract as originally entered into. It is necessary for the execution of that work, although not specified it is not extra and must be done for the price originally stipulated for. See Sharpe v. San Paulo Railway Co., L.R. 8, Ch. 597.

Assignment and subletting of contract. In order to secure the services of a particular builder in whom the employer has confidence, it is usual to provide against subletting or assignment, and also to give power to the employer to determine the contract on the bankruptcy of the builder. In this case, in order to terminate the contract, the employer must do some act indicating his clear intention to exercise the power.

Property in plant and materials. In order to give better security for payments in advance, it is usual to provide that all materials and plant brought on the land shall be the property of the landowner. It would be insufficient merely to give power of seizure upon bankruptcy, for that would not prevail against the claim of the trustee—for this purpose it is necessary to vest the ownership in the employer. Moreover, apart from the question of security, it would obviously be inconvenient to risk the intrusion of the trustee upon the works, and the delay which might be caused by uncertainty as to what he could claim.

Of course when materials are built in upon the land they form part of it and belong to the landowner ipso facto. It is only in the case of loose materials and plant that the provisions against claims by the trustee in bankruptcy are necessary.

Arbitration and prevention of disputes. The contract usually concludes with a clause or clauses, the objects of which are—

(a) To prevent disputes.

(b) To settle disputes.

For the prevention of disputes, the architect or surveyor is sometimes empowered to decide finally, and without being arbitrator. This prevents his decision in the absence of fraud being called in question. But it has been held that where the architect has given to the employer an assurance that the cost shall not exceed a certain sum, he is not considered to be in such a position of impartiality as to render his decision unassailable, and if such facts be proved the builder might claim a greater amount. See Kemp v. Rose, 1 Giff, 258 and Kimberley v. Dick, L.R. 13, Eq. 1.

For the settlement of disputes which may arise, notwithstanding provision for their prevention, an Arbitration Clause in the usual form is generally inserted. It is in the interest of all parties, employer, builder, and architect, that the work should proceed smoothly. Every possible question therefore that is likely to arise should be provided for; hence it is of the utmost importance that building contracts should be very carefully drawn, and architects, employers, and builders should endeavor to acquaint their legal advisers with any practical difficulty that may arise in a particular case, with a view to its being obviated in the future, whilst the lawyer's part is to carefully watch the course of judicial decisions bearing on the matter, and to frame his contracts from time to time in such a way that the dispute which gave rise to the case in question shall not arise in respect of the contract drawn by him.

Perfection in legal draftsmanship is, perhaps, not possible of attainment, but, if the course I have suggested be taken, we may hope in time and by experience to produce a form of building contract as nearly perfect as it is possible for such contract to be.—H. H. Richardson, solicitor, in the Architects' Magazine.

INTERCOMMUNICATION.

[Communications sent to this department must be addressed to the editor with the name and address of the sender attached not necessarily for publication. The editor does not hold himself responsible for the expressions or opinions of correspondents, but will, nevertheless, endeavor to secure correct replies to queries sent in. We do not guarantee answers to all queries, neither do we undertake to answer questons in the issue following their appearance.]

J. W. T.:—Answering H. N., I submit the enclosed sketch for trimming to a corner fire-place. I got this from a journal some time ago, and having a corner fire-place to trim, I adopted this method and found it work exceedingly well. Fig. 1 shows the lay-out of

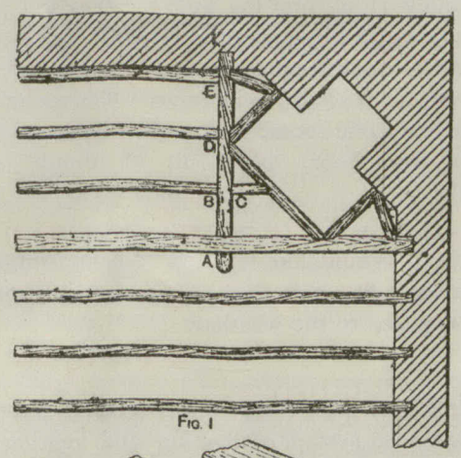

Fig. 1

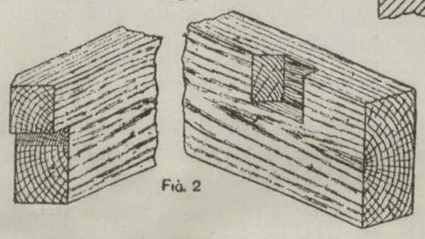
Fig. 2

Trimming a Corner Fire-Place.

the work, and Fig. 2 shows the manner in which the joints B, C, D and E were gained into one another. The main trimmer passes through the heavy joists and has a tuck tenon as seen at A.

R. G.:—A kalsomine that will answer J. D. G.'s purpose may be made of zinc white mixed with water and glue sizing. The surface to which it is applied must be clean and smooth. For ceilings mix half a pound of glue with fifteen pounds of zinc white. For walls one pound of glue with fifteen pounds of zinc white. The glue should be soaked in water all night then melted in the morning, and the whole mixed well before using.

P. J.:—I submit the following rule on the breaking stress of white pine timber and joists, for the benefit of W. J. D. Rule.—Multiply the square of the depth by the breadth in inches, and this product by the coefficient 10,840. Divide the last product by the length between bearings in feet, multiplied by the depth in inches. The quotient is the breaking weight in pounds. This will give the actual breaking weight, but architects and engineers never allow more than one-tenth of this quotient for the stress, which allowance is required to cover defects and accidental stresses to which all timber structures are subject. W. J. D. should get a copy of Kiddes' Building Construction, part 2, price $4.00, as it contains an excellent treatise on the strength of materials and other excellent matter.

Wm. Mc.:—In answer to M. M. C. regarding the making of a damp-proof 14" brick wall, I take the liberty of suggesting the following methods: A dry wall may be formed of two casings with a space between as shown at Fig. 3, where s shows the space. The bricks in each casing are laid in the ordinary manner, either in the usual running bond, or if preferred, in Flemish bond. The two casings should be connected together with galvanized iron or

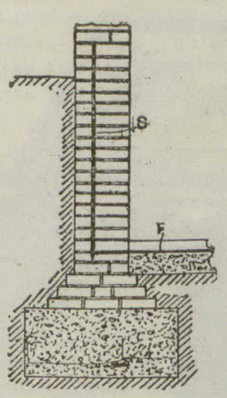

Fig. 3—Damp-Proof Wall.

japanned ties of some kind, which are laid in the wall as the work goes on. The bricks may run through the wall every four or five feet, thus tieing it well together. The foundation of the wall may be built as shown in the figure with a concrete floor at F. Another method of making a damp-proof 14" wall is shown at Fig. 4, when a course of sound slate is laid right through the wall as seen at A D, just above the ground grade B. There is an offset on the slate damp-course to the inside of the wall on which the

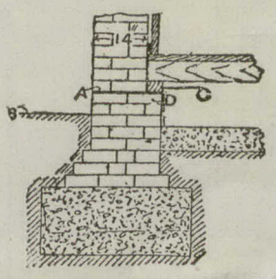

Fig. 4—Damp-Proof Wall.

bond timber G is laid to carry the ends of the joists. A wall built in this manner when carefully done, generally proves sufficient to prevent damp getting into the walls from the ground.

F. T. H.:—Bricklayer can make a good, durable black mortar by mixing a proper quantity of lamp-black in well worked up mortar. The lamp-black may be obtained from any painter's supply stores. In order to ascertain the amount of lamp-black required, a known quantity—say 4 ounces, should be mixed with a hod of mortar, and more mortar added until the mass begins to show a light tinge. Having ascertained the quantity of mortar for which four ounces of lamp-black will suffice, the necessary calculations for the entire job are easily made. For common work, ordinary soot may be employed, which will be considerable of a saving.

Wirer :—If L. W. S. will obtain a copy of "Cushing's Standard Wiring," price $1.00, he will find all the rules expressed in initial letters, with the signs of multiplication and division. These can be easily learned and are the simplest form for expressing the rules.

W. T. D.:—For the benefit of "Young Chip," I send you herewith what I consider a good design for a

tool chest, and one that is a little removed from the old style of chest, inasmuch as the tills run across the chest, instead of longitudinally. This arrangement prevents the necessity of partitioning off the tills, and also renders the sliding of the tills quite easy as they cannot well stick at the corners as is the fault with

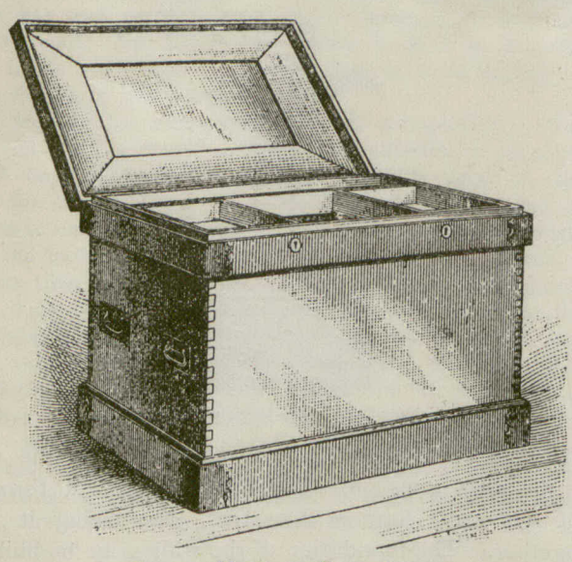

FIG. 5—VIEW OF TOOL CHEST.

tills made the length of the chest. Fig. 5 represents a perspective view of the chest with the lid partly raised. Fig. 6 shows a section of the chest across the end, while Fig. 7 represents a longitudinal vertical section. The lids or cover of the bottom space of the chest,

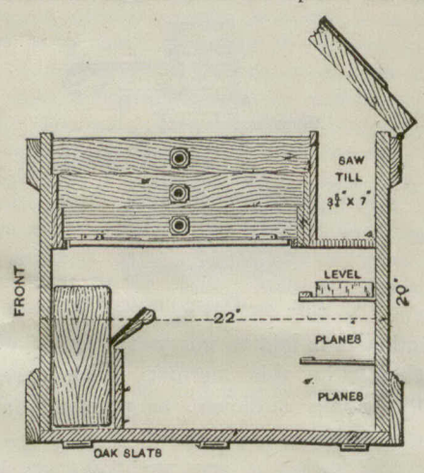

FIG. 6—CROSS SECTION OF TOOL CHEST.

which are hinged to the bottom of the lower tills, turn up and catch at the top as indicated. This permits of ready access to the bottom portion of the chest. When the lids are down the space between the tills forms a

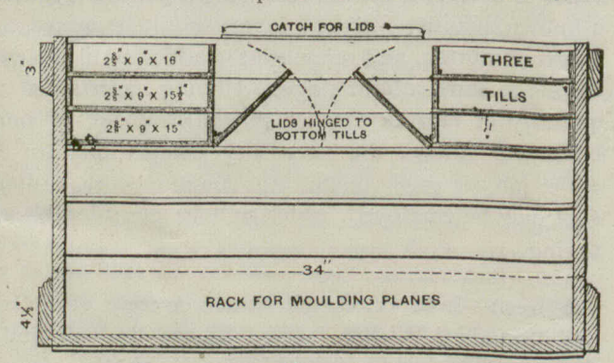

FIG. 7—LONG VERTICAL SECTION.

convenient receptacle for overalls or other things when work is not going on. The chest is handy and I am sure "Young Chip" will find it easy to make from the description given and the designs submitted.

W. J.:—Isn't there some method of coping and mitreing base or other mouldings besides that of scribing them? It looks to me that scribing one moulding over another is an awful clumsy way of doing the business, and if there is any other way of doing the work, I would like to know it, if any fellow workman will show me how.

T. R.:—Will some reader publish in these columns the proper proportions to give to windows when the size of the rooms are known, also the right height of the window-stool from the floor? Where I am there are no rules for these matters; every builder making the size of window openings to suit himself, and the result is that we find, sometimes, windows of different sizes in the same room, and with regard to height of window from floor, the "rule of thumb" seems to prevail.

H. G.:—Would like to know of some simple method of treating a flag pole cord to prevent it from rotting while exposed to the weather.

"Brandon" asks:—What is the latest improved and best equipped system of heating and ventilating water closets for public schools?

W. J. P.:—Wishes to know if there is any way to give bricks a red color by mixing a mineral in the clay? Would it be too expensive to mix ground uncalcined oxide with the clay? Mixing ordinary black loam with clay affects the color to some extent, but is apt to injure the strength of the brick. Putting salt in the fire near the close of the burning to a limited extent gives a dark red to the brick but this is apt to take place only when the bricks are subject to a great heat. What is the chemical action of this last?

TRADE UNION METHODS.

A sample of trade union tyranny was recently made the subject of an enquiry by Mr. N. Clarke Wallace in the Dominion Parliament. A Mr. Robert W. Saul, of Camden East, Ont., in a letter to Mr. Bell, member of parliament for Addington, stated that he went to work on the Royal Military College, Kingston, to build an addition, but was stopped by the International Union unless he paid $25 to join the union. He offered to join if the union would accept the regular price, but refused to pay $25. Because of such refusal he was deprived of his employment and his family of their means of support. A foreigner could, however, come in here from the United States if he was a member of the union and go to work. Mr. Wallace urged the government to see that justice was done Mr. Saul, who was a Canadian citizen, and that safeguards were placed by the government in the contracts, so that any Canadian citizen, whether a member of the union or not, would be placed on even terms with any other Canadian, and on better terms than any American citizen. Mr. Sutherland, on behalf of the government, promised that the case would be investigated and justice done. The public will look for the speedy fulfilment of his promise. It is time that one should know how far the tyranny of the unions is to be permitted to go.

TABLES FOR ESTIMATING AMOUNT AND COST OF MATERIALS AND LABOR FOR BUILDINGS.

By Louis F. Brayton.

The following is an abstract from a thesis presented by the author for the degree of Bachelor of Science in Architectural Engineering. It is hoped that the method of presentation may be useful to architects.

QUANTITIES FOR BRICK WALLS.

Plate I gives the quantities of brick, mortar and labor required in the construction of 100 square feet of brick wall varying from 4 inches to 24 inches, for different sizes of brick, various thickness of joints, several proportions of mortar, different quality of work, various prices of materials and labor, etc. The chart is based on data from Baker's Masonry Construction, Trautwine's Pocket-book, and contractor's notes. One quarter of an inch mortar joint has been included for each 4 inches of thickness of wall. Five per cent has been allowed for breakage of brick. Prices for material delivered; and no allowance has been made for scaffolding or profit.

DIRECTIONS FOR USING THE CHART.

BRICK.—To find the number and cost of brick, start with the thickness of the wall to be estimated (see the upper left-hand corner of chart), follow upward along a vertical line to its intersection with the diagonal line giving the thickness of the joint, then follow the horizontal line to the right to the intersection with the line giving the contents of one brick in cubic inches, then follow down the vertical line to the horizontal scale giving the number of brick required for 100 superficial feet of wall. Write this number in the proposed bill of materials. Continue down the vertical line to its intersection with the line giving the cost of the brick per thousand, and then follow a horizontal line to the left and read on the vertical scale the cost of the required number of brick.

LABOR.—To find the labor required, return to the point on the horizontal scale corresponding to the number of brick required, and follow a vertical line down to the number of brick a mason will lay in an hour, and from thence follow a horizontal line to the left and read from the vertical scale the number of hours of labor required in laying the wall. One tender will conveniently make mortar and tend two masons; consequently the total price per hour for labor is equal to one half the price paid for the tender plus the price paid for one mason. Thus to find the cost of the above labor, continue the horizontal line to the left from the hours of labor required, to the price of the mason and tender, and from thence proceed vertically upward and read the amount of the cost of the labor.

MORTAR.—To determine the amount of mortar required, start at the upper part of the center of the chart with the thickness of the wall; proceed vertically to the diagonal line giving the thickness of the joint to be used, and thence horizontally to the right and read on the vertical scale the amount of mortar.

SAND.—If lime mortar is to be used, continue the horizontal line through the point on the scale giving the amount of mortar required to the diagonal line marked "lime," and thence proceed vertically down to the horizontal scale and read the number of cubic yards of sand required; continue the vertical line through the number of yards of sand just found, down to the diagonal line giving the cost of sand per yard, and thence follow a horizontal line to the left and read on the vertical scale the cost of the sand. If cement mortar is to be used, the sand is found in the same way, except the "cement" diagonal is used in place of the "lime" diagonal.

LIME.—To determine the amount of lime required, follow the horizontal line from the quantity of mortar required, to the "diagonal for lime," and then proceed in the same way as in determining the amount and cost of the sand.

CEMENT.—To determine the amount and cost of the cement, follow the horizontal line from the amount of mortar required to the right to its intersection with the line giving kind and proportion of cement to be used (at the extreme right hand edge of the chart), and then proceed in the same way as in determining the quantity and cost of sand.

WEIGHT.—The weight of 100 superficial feet of wall of different thicknesses and different kind of brick, is given in the small table near the upper left-hand corner of the chart. This table is calculated on the basis of pressed brick masonry weighing 150 lbs. per cubic foot, common brick 125 lbs. per cubic foot, and soft brick 100 lbs.

DATA FOR LATH AND PLASTER.

Table I gives the quantities of materials and the amount of labor required for different coats of different kinds of

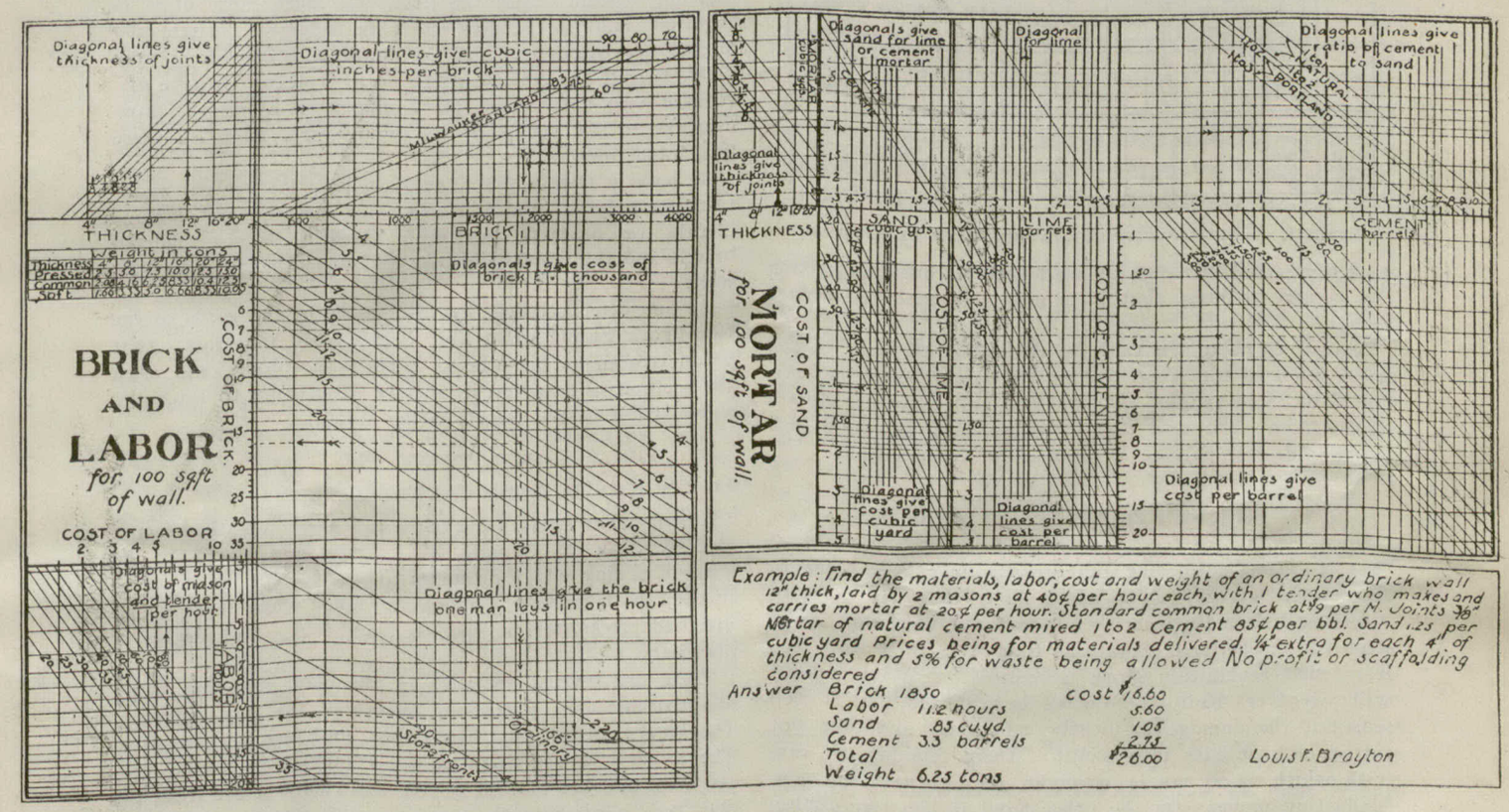

Plate I.—Data Concerning Labor and Materials for Brick Masonry

plaster with different lath. With this table it is easy to prepare an estimate for any kind of plastering except that involving patent plasters. The data for this table were obtained directly from plastering contractors.

No explanation is needed as to the method of using the table itself, but the following remarks may be useful in this connection. More plaster is required for metal lath than for wood, because of the heavier clinches and the greater waste ; and the greater material requires a corresponding increase in the labor. In determining the quantity of materials required for plastering on brick, use the data for the brown and white coats, and double the sand in the former, as is explained in the note in the table. In determining the quantities for back plastering, use the data for scratch coat for "drawn" work.

In measuring areas, to determine materials and labor, one eighth is added to all circular work and the calculated areas of domes are doubled. Columns and pillars are measured double, whether circular or square ; chimney breasts are added to the gross area of the walls. No surface (reveal, chimney breast, or panel) is to be considered less than one foot wide. Plasterers at one time meas-

Coat			Sand Cu.yds.	Lime Barrels	Mortar Cu.yds.	Hair	Plasterers Hours	Tender Hours	Remarks
Scratch	On Expanded Metal	Drawn	2/3	1 1/3		15#	6	4	
		Dry	2/3	1 1/3		15#	6	4	
	On Lath	Drawn	1/2	1		10#	3	2	
		Dry	1/2	1 1/4		12#	3	2	
Brown	3/8" Coat	Drawn	1	5/6			7	4	If plastering on brick, double the amount of sand here given and use this for the first coat.
		Dry	5/8	5/8			10	7	
	7/8" Coat	Drawn	1 1/8	2/3			7	4	
		Dry	3/4	3/4			10	7	
White	Sand finish for Frescoing		1/4	1/4			9	1 1/2	Fresco finish used in the Champeigi & Co. court house.
	Putty finish	1		2/3	100#		9	1 1/2	Putty finishes differ very much. Two good finishes are given here.
		2		1	50#		9	1 1/2	

Lath	Lath. Nails	Labor Hours	Labor Per Sq. Yd.	Furring Strips	Laborer Furring	Furring Nails	Remarks
Walls 1400 Ceilings 1500	16 Sq. Inch 3# 12 Sq. Inch 3#	7.5	18	62.5 Ft. B.M.	1 1/2 to 2 hours	13# 8d. or 12# 10d.	Estimates for furring strips, are on the basis of 1 1/2" x 1" strips, spaced 16" o.c. Lewis F. Crowley & Co.

TABLE I.—DATA CONCERNING LATHING AND PLASTERING.

ured doors and windows as wall surface, but competition has become so close that it is now customary to deduct them.

Instead of using the table to determine the cost of the labor required for wood lathing, it would better be estimated at from two to two and one half cents per square yard. Metal lath will cost twice as much as wood lath for the labor of putting in place.—The Technograph.

THE FIREPROOFING OF WOOD.

Wood is so extremely convenient a building material that it is not surprising that efforts have been made to correct the few objections which do exist to its extended use, says Indian Engineering. It is easier to protect wood from rot in sheltered situations than it is to protect iron from rust—ventilation alone is required. Wood exposed will weather badly if painting is neglected, but if well seasoned the damage is mostly superficial and does not eat in as rust eats into metal. There remains the ease with which wood can be wrought, its lightness and non-conducting power. On the other hand it has two faults. The first—a minor drawback—is its weakness across the grain. Although few are the cases in which joinery is not adequate to overcome this, nevertheless it has naturally given rise to several attempts being made to invent a good homogeneous substitute, and such would undoubtedly be of great value if it could cheaply be produced. A far more serious objection to the use of wood is its inflammability. If all the wood-work in a house, and its furniture were really incombustible, destructive and dangerous fires in any building, other than a warehouse used for storing inflammable goods, would simply be impossible. With such advantage, as inestimable as this, in view, it is small wonder that repeated efforts have been made to satisfactorily fireproof timber. In America alone, during the last century no less than 400 patents have been issued in this connection, but they are all—almost without exception—wholly impracticable in their nature. There are two difficulties to be overcome : first we must discover an unobjectionable, efficient and cheap fireproofing substance, and secondly we must impregnate the wood with this substance when we have got it. The old processes for impregnating wood with any liquid were altogether vicious. The lumber on trucks was run into huge iron cylinders, the ends of which were closed by externally bolted doors. The wood was then steamed—a partial vacuum being afterwards created. Subsequently the liquid was forced in under pressure. The steaming greatly damaged the wood : the suction drew out the resinous matters and sap-like substances which bind the fibres together, so that the surface of the wood—or as far as the action did penetrate—was rendered soft, wooly and worthless. The outside seated end of the cylinder could not stand more than a few pounds pressure on the square inch, so that to impregnate a plank of moderate thickness 20 to 25 hours was wanted : the time alone made such a process far too costly.

Now wood is impregnated with any liquid in a much more sensible manner—by applying the liquid under high pressure to the ends of the timber in log.

There remains, however, the first difficulty—an efficient, unobjectionable and cheap chemical with which to saturate the wood.

The Russian chemist, Peter Lochtin, after what appeared to be an exhaustive investigation, came to the conclusion that the best substance for this purpose was ammonium phosphate, and the next best ammonium sulphate. These certainly do render wood really fireproof, but their cost is prohibitive. The second substance named is considerably cheaper than the first, but much more of it is required and it renders the fibre inflexible, brittle and slightly hygroscopic : both substances also corrode metals.

Mr. Ferrell—an American engineer—professes to have discovered two substances, the composition of which, however, he is not yet ready to divulge—free from all these fatal objections.

He asserts that wood impregnated by his process maintains its original freshness and color : it does not corrode metals or attract moisture : the fibre is not rendered brittle and the wood will take and retain paint or varnish well.

He has demonstrated, by tests made in the yards of the New York Shipbuilding Co., Camden, in June last, that wood treated by his process is really fireproof ; and when the method is patented it will be interesting to learn the composition of the impregnating liquid.

A GOOD CANADIAN CLAY.

A somewhat remarkable clay has been recently discovered by C. V. M. Temple, of Toronto, and placed on the market, a clay which promises to produce the finest wares in the line of pottery, earthen and fancy ware, terra cotta, vitrified bricks, sewer pipe, etc., and has a high degree of plasticity.

There are several varieties in the clay, each one being adapted for some particular branch of the clay industry. The blue varieties part with their moisture very readily. The silica and the alumina are combined in varied proportions and the skillful potter can easily select from the clay face before him the material with which to manufacture the class of wares which he requires. The silica is present in an extremely fine state and free from stones or iron pyrites.

Mr. Temple has had the clay analyzed with the most gratifying results. In the abrasion test with a brick of the size 2x3 3-4x8 in. and the original weight of 16 lb., after 2,000 revolutions the weight was 14.96, after 4,000 revolutions 14.70 lb. The loss by weight after 4,000 revolutions was 8.06 per cent. and the per cent. of loss per sq. in. of surface .0454. This test was made on three bricks. Comparative tests made with Canton shale and Burlington brick show a considerable percentage in favor of the Canadian. The brick showed no absorption whatever. Samples have already been made for every class of product with the best results by many different first-class firms, and all are unstinted in their praise as to the value of the deposit. The location of the clay is good also. Lumber, generally spruce, is close at hand in large quantities at about $1 per cord delivered. Samples have been sent to England and have been made into pottery articles there and returned glazed, bearing all the evidences of a highly finished product.

FIXING ELECTRIC BELLS IN HOUSES.

BY H. E. NEALE.

At the present time electric bells are fitted in almost every house or place of business, and the telephone is superseding the old system of speaking tubes, so that a few words about their construction and application may be of interest.

The first thing that we must direct our attention to is the battery, the Léclanché form, or a modification of it, being that most used for bell and indicator work. This cell consists of a glass outer jar in which is placed an amalgamated zinc forming the positive element, the negative element consisting of a carbon plate placed inside a porous pot closely packed with a mixture of carbon and peroxide of manganese, the top of the porous pot being run in with melted pitch. The Léclanché is a single-fluid cell, the porous pot not serving to keep the fluids separate but merely to contain the broken carbon and manganese and keep it in immediate contact with the carbon plate. The exciting fluid is a solution of sal-ammoniac (chloride of ammonia). On closing a circuit the sal-ammoniac is decomposed and the chloride attacking the zinc forms chloride of zinc, which is soluble in the surrounding liquid, while the ammonia developing at the surface of the carbon forms a soluble compound with the oxygen, which it extracts from the manganese. While the cell is at work the zinc is consumed, and the chloride of zinc accumulates in the solution, the carbon remaining unaltered. The peroxide of manganese loses some of its oxygen; but after a time the supply of oxygen becomes reduced, and the hydrogen accumulates on the surface of the carbon plate, producing polarization. Now if the circuit is broken and the cell left to rest for a time it will depolarize, the peroxide of manganese absorbing oxygen from the air.

The next cell most common in use is the dry cell. I will give a short description of an E.C.C. cell, made by the Electrical Construction Company. It consists of a carbon plate, which forms the positive pole, surrounded by manganese dioxide; outside this is a coat of lime and sal-ammoniac, and the whole is contained within a zinc case which forms the negative pole of the battery. At the bottom of the zinc case is another case of insulating material. A small piece of cotton is placed on the top of the manganese dioxide, and a piece of glass tube fixed in the top as a waste tube; the whole is run in with pitch. The advantage of the dry cell over the ordinary wet cell is that it is much cleaner, does not freeze, takes up less room, can be placed in any position, and has no solution to evaporate; it, however, has not such a long life, and the E.M.F. is not so great as in the various types of the Léclanché.

Next we have the bell, which may be either single stroke, trembling, or continuous action. The construction is much the same in all three, with the exception of the connections.

The trembling bell is that most used. It consists of an electro-magnet firmly fixed to an iron frame and provided with a soft-iron vibrating armature, one end of which is fitted with a hammer, while the other is fixed to the iron frame by a spring having a platinum contact-piece; insulated from the frame is a contact post fitted with an adjustable platinum-pointed screw and a tightening screw.

The action of the bell is as follows:—The current entering at the terminal flows through the coils of the electro-magnets into the frame, through the spring and armature to the platinum-pointed screw, to the contact post, and thence through to the other terminal, but in flowing through the electro-magnets the current has magnetized the core, which now attracts the armature, causing it to move up against the poles and bringing the hammer against the gong; at the same time contact is broken with the contact post, and as the cores of the electro-magnets are made of soft iron they at once lose practically all their magnetism, so that the armature in obedience to the spring moves back to its former position. This action is repeated as long as the button of the push is kept in.

Of pushes there are many forms, but the principle is the same in all, the object being to join the circuit, which is kept apart by some form of spring.

Last, but not least, comes the wire. That used for bells should never be less than No. 20 gauge (No. 18 is preferable), and it should be tinned to prevent corrosion, insulated by at least one coat of pure rubber, and double cotton-covered and served with paraffin wax.

In wiring a building or bells it is first necessary to ascertain where they are to be fixed, the position of the pushes, and the situation of the battery.

In an ordinary house the most usual place for the bell is in the kitchen. An indicator is placed in the circuit, and shows at a glance which push has been used. There are several forms of indicators—the swinging pendulum, the mechanical replacement, and the electrical replacement. In good work all bell wires are drawn through zinc tubing to protect them from the effects of the acids in mortar and cement. While we are at this stage, mention may be made of one or two important things that a clerk of works should insist on—namely, the whole of the wire to have a coating of pure rubber underneath the cotton covering, the wires to be fixed in such places that they cannot become injured or damp, and every wire to be so fixed that it can be drawn out, and another drawn in to replace it if necessary, without disturbing the decorations or structure.

Returning to the batteries, the E.M.F. or pressure is termed voltage, the quantity of current is expressed in amperes, and the resistance through which the current passes is measured in ohms: therefore, $C = \frac{E}{R}$ which means that if we divide the resistance of the circuit in ohms into the E.M.F. in volts at which the current is supplied, the product will give the current's strength in amperes. Similarly, if we know the value of any two of the three quantities by the application of the formula, the third can at once be found, for it is obvious that the equation $C = \frac{E}{R}$ may be written $R = \frac{C}{E}$, or $E = C \times R$. Thus from Ohm's law we see that 1 ampere of the current in a circuit having 1 ohm resistance requires an E.M.F. of 1 volt. If we increase the E.M.F. to 2 volts without altering the resistance of the circuit we get 2 amperes. If we still further increase the E.M.F. to 4 volts we get 4 amperes of current. Similarly, if keeping the E.M.F. to 1 volt, as in the first instance, we reduce the resistance to ½ ohm, we get a current of 2 amperes, and if we still reduce the resistance to ¼ ohm we get 4 amperes.

If we wish to know what current we shall get in a circuit we proceed thus:—We first find the resistance of our circuit, which we will presnme to be 4 ohms, and our batteries to produce 6 volts. Now, with the formula $C = \frac{E}{R}$ we get $C = \frac{6}{4}$; therefore, $\frac{4)6}{1\frac{1}{2}}$ amperes. Again, if we know that our current flowing is 1½ amperes, and the E.M.F. is 6 volts, what is the resistance of the circuit? Now, $R = \frac{E}{C}$, i.e., $R = \frac{6}{1\frac{1}{2}} = \frac{1\frac{1}{2})6}{4} = 4$ ohms.

Again, we know the current and resistance, we want to find the E.M.F. or voltage: $E = C \times R$; C is 1½; R is 4; therefore, $E = \frac{1}{2} \times 4 = 6$ volts.

PROPER CONSTRUCTION OF STONE HOUSES.

There is no more prolific source of trouble, both to builders and owners of stone houses, than that caused by water penetrating the walls and getting in over the windows after a heavy rain.

The causes producing this trouble being well known, it would seem an easy matter to overcome them, and all sorts of suggestions to that end have been made, but so far without effect, says a writer in The National Builder.

The present time, therefore, would seem an opportune one in which to offer a practical solution of this trouble, and that is the purpose of this article. The underlying cause of all this trouble is haste to finish the building; hence, the first thing to be done, and without which all else is practically useless, is to "make haste slowly." Time should be given the mortar to harden, the building to settle and the cracks to show before the pointing is done. No stone house should be pointed the same year it is built, for two reasons: First, the cement used in pointing forms a barrier to the evaporation of the moisture in the mortar in which the stone is laid, and prevents

it from drying. The pointing, while keeping the moisture from coming out, will not prevent the frost from going in and freezing the mortar ; this will produce an expansion, which causes the pointing to lose its grip on the mortar and creates innumerable crevices through which the water easily finds its way. Secondly, all stone buildings, even when built in the most careful manner, have a tendency to settle. This settlement cracks the pointing. In many cases these cracks are so fine as to be scarcely visible, especially if some distance from the ground. But no cracks are too small for water to penetrate, driven by the force given it by the wind from an open sweep of miles, as it has in many parts of this country. It is absolutely essential, therefore, that the mortar should have time to evaporate all its moisture and become thoroughly dry, and the building time to settle, before pointing.

Houses built with stone, and having all the windows arched solidly through the entire thickness of the wall with brick, seldom have water dropping from the soffit of the frames ; for if any water should beat through the stonework or cracks in the same, the bricks, having power to absorb so much of the water, hold it while the rain lasts, and after it is over evaporate it to the outer air.

When impracticable to use brick over the windows, from architectural or other reasons, a piece of sheet lead, going through the entire thickness of the wall, and extending about one foot each side of the window, and turned up two inches on the inside, will hold the water until it evaporates.

A style of architecture much in use at this time necessitates exposed gables. These gables are usually finished so late in the season that the mortar has not time to dry before the frost sets in, and in consequence the mortar freezes. Mortar once frozen loses its adhesiveness, and therefore has no life in it. The proper and only safe plan is to use Portland cement and sand (no lime) in all gables. This will set in one tenth the time of lime mortar, and will be hard and dry before frost comes.

Stone gables that rise above the roof, and are only protected by stone coping, should have a sheet of lead to cover the entire wall put on under the coping. This lead should project over the inside of the wall, and be turned down over the flashing of the roof. By this means, all water that gets through the joints of the coping will be carried off. In conclusion, with care and a proper observance of the natural laws governing the materials used in its construction, a stone building can be built in the present day just as tight as years ago, when people did not expect to excavate the cellar in the spring and move into the finished house in the fall.

SUGGESTIONS FOR USING PORTLAND CEMENT.

Keep the cement perfectly dry until ready to use it in mortar.

Use dry, clean, sharp sand, and use the least amount that will fill the voids. Increasing the percentage of sand reduces the strength and slows the setting. Wet up only so much mortar at one time as can be used before setting commences.

Do not permit the finished work to dry out quickly ; after it has commenced to harden cover with wet sand or burlaps and keep wet for a fortnight. Concrete ditches, flumes and reservoirs should be washed over with a thin cement, grouting fast as built. After the martar has set a day or two it is well to flood it and keep the water standing stagnant a fortnight.

If the finished work cannot be kept covered as above, keep wetting it by daily sprinkling. Water is the life of Portland cement mortar.

When concrete is laid in large bodies it is allowable to imbed irregularly throughout its mass as many large stones as is consistent with their being well bonded together by the mortar.

In concrete it is desirable that the aggregates should be graduated in size, then they pack closer and require less cement mortar to fill the voids. The stone should be hard, angular and free from dust.

Do not mix lime with cement, it tends to make the mortar crack.

In masonry the stone or brick should be thoroughly wet before laying.

In sidewalks, as fast as the concrete is tamped to a surface the top coat should be spread on in order to bond the two layers together.

Ordinary lampblack injures cement mortar, mineral colors do not ; sienna, Prince's metallic, Venetian red, Prussian blue, ground coal or oxide of manganese are good.

Before laying concrete the ground should be saturated with water and rammed to prevent absorption of moisture from the mortar or settling.

The longer a Portland cement is kept the slower setting it becomes, provided it is not kept in an air-tight package.

Portland cement factories can usually furnish either a slow or quick setting cement if allowed sufficient time to meet the requirement.

The better the ultimate quality of concrete the slower it is in hardening.

The aggregate used in making concrete, whether it be crushed stone or gravel, should be clean, hard, angular and durable. If crushed stone be used it must be freed from the dust that adheres to it in passing from the crusher. This can be done by turning water on it. The stone should also be screened, not to secure a material of uniform size but to keep the sizes between maximum and minimum limits.

No parts smaller than coffee beans or larger than one and a half inches in any direction should be used. All dust should be screened or washed out.

The amount of mortar needed will depend upon the percentage of voids between the particles and should be sufficient to completely fill the spaces and bond the stones together.

Good gravel affords a cheap and durable material for concrete, the difficulties are that it is liable to be dirty, the pebbles are not angular, and as used, it often contains an excess of sand.—From "Hand-Book of Useful Information for Cement Users."

GLASS HOUSES.

When the supply of lumber has been exhausted and the brick makers have struck bottom in their clay beds, glass is said to be "next." In fact an enthusiastic Frenchman, Jules Henrivaux, is not disposed to wait for the lumber and brick supply to be exhausted. He thinks the superior claims of glass will bring it to the front much sooner. The points in its favor are figured out this way : Inexhaustible supply of the materials from which glass is made, its adaptability to all shapes and forms, its durability, and its cleanliness.

Imagine, with Mr. Henrivaux, the construction of a glass house. The foundations and walls should be constructed of a variety of glass, recently invented, called "stone glass," which has already successfully withstood the severest tests. When crushed it gives a resistance three times as great as granite. When subjected to heat or cold it is found less sensitive than steel. When submitted to friction it shows less wear than porphyry. Shock, as of a hammer blow, it resists to a degree twenty-two times as severe as that which would fracture marble. The test of tension has practically no effect on it whatever.

The walls, then, would be built of glass held together by angle-iron so as to permit a hollow space through which pipes could pass (the pipes themselves being glass work) conveying the hot air, hot and cold water, gas, electric wires, drains and every thing needed for the health and comfort of the inhabitants. Stairs and balustrades, ceilings and wall decorations, mantelpieces and fireplaces, would all be constructed of glass.

The new glass house will be absolutely clean and practically indestructible. The whole of its surface can be washed from the top storey to the basement, without a trace of humidity being left. Dust cannot collect on its polished face, and the spider will find no place on which to hang its cobwebs.

MESSRS. JAMES REID & SONS.

Few contractors are as widely known in the eastern provinces as Mr. Jas. Reid, and the firm of James Reid & Sons probably do more business to-day in that line than, with exception of Rhodes, Cutry & Co., Limited, any other firm in the Maritimes.

Mr. Reid is a native of Pictou, but lived in Dorchester for upwards of 20 years. He was foreman at the time of the construction of Dorchester penetentiary 21 years ago. After that he removed to St. John, just after the big fire, and was foreman under Contractor McDonald in the construction of Trinity church there, one of the best edifices in the Maritime Provinces. After this he began to contract himself. With R. C. Donald of Moncton he built Memorial Hall in Sackville, and the Y.M.C.A. building in Moncton.

The partnership was then dissolved, after which Mr. Reid continued in the capacity of foreman for some time.

His first contract was for the court house in Lunenburg. He then went to Newfoundland alter the great fire in St. John, where he did business for three years, building a large number of stone and brick buildings.

For a time he was in partnership with another contractor doing business under the name of Reid & Boehner.

The big bank failures caused Mr. Reid serious loss and he again broke partnership and returned to Nova Scotia. His first contract thereafter was for the Bank of Halifax in Truro. After the Windsor fire he and his sons took a prominent part in the town's reconstruction. The academy, court house, Commercial Bank building, Halifax Banking Co.'s building, a residence for Mr. Dimock, all of which were brick and stone, were done by them that summer. At the same time they constructed the Merchants' Bank of Halifax in Moncton.

Last year the firm erected the Presbyterian church in Amherst, the post office in Kentville, N.S., Bank of Montreal in Sydney, Science building in Truro, and the new post offices in Springhill and Digby. These buildings are all handsome structures and contain a class of work which Mr. Reid particularly likes to do.

Mr. Reid's sons are practical men and know their line of business. Mr. J. K. Reid, about 26 years of age, now takes charge of the business of the firm. Mr. C. A. Reid is a practical bricklayer. A younger son, D. Lorne Reid, not yet in the firm, is often placed in charge of work under construction.

Mr. Reid removed from Dorchester about three years ago and is now living in North Sydney, where he is near to what is now a large field of operation for him in that rapidly growing section.

POLISHING GRANITE AND LIMESTONE.

Granite is polished in many different ways, depending upon the nature and quality of the granite, the varieties of which are very numerous, writes Mr. W. R. Purchase in the Quarry. The method here described is the one generally adopted. The surface left by the axe presents a succession of ridges and furrows. These ridges must be rubbed down with iron rubbers and sharp coarse sand and water. When all the tool-marks are removed, and an even face has been produced, the rubbing is continued with emery powder of varying degrees of fineness, commencing first with the coarse, the same iron rubbers being used. Lastly, the face is rubbed with a woollen or linen boss, on which fine flour-emery is sprinkled and moistened with water; the final polish being given with putty-powder (oxide of tin) and a felt block. A good polish, which can only be obtained by persistent rubbing, will keep its lustre undimmed for at least half a century.

Limestones are composed of carbonate of lime, having more or less of a granular and crystalline texture, and are of such a varied nature that one method of polishing cannot be adopted for all. The following method, however, will suffice for the stones in general use:—The wrought surface is rubbed with fine sharp sand and water until all the marks of the chisel or saw are removed, and an even face is produced. The surface is then grounded—that is, rubbed with grit-stones of varying degrees of fineness, commencing with the coarse or first grit, Harehill or Robin Hood stone; next is used the second grit, which is a little finer; and, finally, snake or Water of Ayr stone. Particular care must be taken that in each process of gritting the marks or scratches made at the preceding stage of the process are removed, so that when the surface is snaked no scratches whatever are visible, as upon the careful gritting depends the success of the ultimate polish. The polishing is lastly effected by rubbing with a linen boss, on which fine flour-emery is sprinkled, moistened with water; the final gloss being given with a felt block and putty-powder (oxide of tin), also slightly moistened with water until the natural polish is obtained.

The polishing of marble adds greatly to its beauty, bringing out the delicate figuring and the gradations of rich coloring, which make it so valuable as a decorative material.

It may be perhaps stated that the polishing of granites and marbles is a trade in itself, and takes years to learn, so that it would be very difficult for a person not accustomed to the work to make much headway. It would therefore, be advisable for a beginner to practice on odd pieces before trying his hand on more important work.

NEW METHOD OF DEPOSITING CONCRETE.

Heretofore, says Cement and Engineering News, specifications for concrete work have usually contained a clause restricting the casting of concrete from a shovel or otherwise not to exceed three feet fall, in order to prevent the separation of the crushed stone from the mortar, under the belief that good work could not be produced where a greater fall was permitted. In order to conform with this particular clause buckets were used for depositing the concrete in place.

In constructing the concrete pier foundations for the new Chicago Tribune building and the new Marshall Field building, the concrete is deposited directly from the shovel with a fall into the bottom of the shaft of fully 80 feet. The concrete so deposited is entirely satisfactory. The method pursued is very simple. The workman thrusts his shovel into the mixed concrete, swings the load over the opening and with a sudden jerk withdraws the shovel from under the load when it is permitted to fall into the shaft. The mass falls to the bottom of the shaft without separating or scattering in the least. A dull muffled report issues from the shaft after each shovel of concrete has been cast, showing that it has preserved its cohesion throughout its descent.

This method is found more economical and rapid than where buckets are used to lower the concrete, and should be adopted by contractors who desire to keep up with the times.

SOME PRACTICAL WALLPAPER HINTS.

To paper over whitewash a great deal of trouble is experienced in having the paper adhere uniformly to the wall, says the Wall Paper Bulletin. This annoyance can readily be overcome by treating the wall before commencing to hang paper. Much depends upon the condition of the whitewash, whether hard or sound, cracked and scaling, or soft and chalky. These several conditions call for different treatment. As a rule, however, it is best to carefully remove the old whitewash, either by scraping or sponging. If it is soft and shows no signs of scaling, a coat of glue and alum size, made two parts glue and one part alum, by weight, mixed rather thin and flowed on plentifully and brushed into the surface, will likely bind the surface sufficient to hold the paper. If the whitewash is hard and not scaling, give it a coat of two parts each of linseed oil and turpentine, one part japan and four ounces glycerine for each gallon of mixture, put on warm. If the whitewash is scaling in either case it is risky to paper without first taking it off. If you size the walls and leave the whitewash on, it is a good idea to scrape the edges around the windows, doors, paste-board, etc., for half an inch or so while wet to hold the edges of the paper instead of butting them.

It is not generally known that oil and grease spots can be removed from the most delicately tinted wallpaper

without seriously marring it. Some French chalk powdered in cold water should be applied to the spots and permitted to remain for at least twelve hours. The chalk can then be brushed off. If the grease spots still are visible put on more chalk, place a piece of brown paper on this and press for a few moments with a warm flat-iron.

Wallpaper can be fairly well cleaned with stale bread crumbs. Remove all dust from the paper with a feather duster and rub the paper downward with a large piece of bread, touching at each stroke about half a yard of paper. Care must be taken that the paper is not stretched by contact with the crust of the bread, neither must the stroke be made in a horizontal direction. When rubbing down, care should be taken to cut away the soiled part of the bread as often as necessary.

ARTIFICIAL BUILDING STONE.

A rough sketch of the way this stone is produced in Germany may be of interest. Hydraulic or quick-lime is used and any kind of building sand, but the cleanest is preferable, in the proportion of 4 to 6 parts of lime to 94 to 95 parts of sand, the variation depending on the quality. After pulverizing the lime, both substances are measured and mixed by machinery. The mixture is then pressed into bricks, which are afterwards piled on flat cars and pushed into a cylindrical boiler. The latter is then hermetically closed, and steam turned on at from 8 to 9 atm. pressure. In about ten hours the process of hardening is finished, and the stones are ready for use. The hardening in the boiler is explained by the operation of high pressure steam on the freshly pressed stones. Through the influence of calcium hydro-oxides on the silicic acid of the sand, different kinds of calcium silicates are formed as the accepted standard in the hardening process. The time required for hardening is determined by the quantity of the silicic acid in the sand. It is stated that the cost of production is lower, the stone can be made all the year through, and has a compressive strength of 550 lbs. per square cm. It may be colored, pressed into any shape, and ornamented. There is no loss from breakages, and no drying sheds are needed. Instead of sand, granulated cinder from blast furnaces may be utilized, as well as waste of all kinds of sand and building stone containing silicic acid.

SAFE LOADS FOR FOUNDATIONS.

Some writers try to calculate from the natural slope, or "angle of repose" of different kinds of grounds, how much pressure per square foot each kind will safely bear. Assuming the safe load in this case to be one-third of the ultimate strength, they arrive at the result that hard, dry clay will safely bear about 3 tons to the square foot, and soft, wet clay scarcely half a ton. Gravel, by the same rule, is inferior in strength to hard, dry clay, and can only be trusted to about 2 tons ; while compact earth, in theory, is superior to it, and would carry safely 4 tons or more to the foot. These results are hardly in conformity with experience. The trustiness of a foundation depends on many things beside the "angle of repose of its constituents, says the Irish Builder. Practice shows that firm, compact clay, not dry, but kept evenly moist and unaffected by atmospheric changes, will safely bear, for many years, at least 2 tons to the square foot. Compact gravel, according to the general belief, will support more; but earth, whether "firm" or not, would not usually be trusted with more than a ton, or, at the utmost, a ton and a half on the same area.

The highest chimney in the United States has recently been completed for the Oxford Copper Works at New Brighton, Staten Island. It is 365 feet above the ground level.

The Sun Portland Cement Co., Limited, has been organized at Owen Sound, with a capital of $500,000, to manufacture cement from deposits of marl at McNab Lake, near Owen Sound. The works are to have a capacity of 600 barrels per day, and are to be ready to begin operations six months hence. Messrs. McKenzie & Mann and F. H. Clergue are interested.

NOTES.

The British Clayworker calls attention to the enormous waste of cement resulting from neglect in the past of contractors to keep the material dry. The cement, in bags, is shot anywhere near the work and is then covered over after a fashion with a tarpaulin. No care seems to be taken to select such a spot for pitching the bags as shall be dry in the event of continuous rain, and the result is that much of the cement is ruined.

The effect of temperature changes on a masonry arch bridge has been reported upon by Mr. F. P. Stearns, chief engineer of the Metropolitan Waterworks, New York. Echo bridge, on the Sudbury aqueduct, is 500 ft. long, 18 ft. wide, and provided with a central arch span of 129 ft. On July 3rd, when the temperature at 5 p.m. was 79 degrees Fahr., the amount of leakage at a point where measurements were easily made was at the rate of 3 gallons per minute. On July 20th, with a temperature of 63 degrees, the leakage was 1.5 gallons, while on several days, when the temperature reached 93 degrees to 101 degrees, the leakage rose to about 8 gallons per minute. The expansion of the masonry is stated to cause longitudinal cracks, which close as the temperature falls.

A correspondent of the Toronto Globe in writing of the Canadian exhibits at the Pan-American Exhibition says : The quality of building stone shown is remarkably high. One of the surprises of the exhibit is the fine appearance of syenite specimens from the north shore of Lake Superior. It has been proved to take a polish pronounced by an American monument worker to be equal to that of the finest Norwegian syenite, which is now imported for special purposes. The Ontario marbles also show well, and one circumstance worthy of note is the fact that a Montreal architect was surprised to find that his country contained marble of such quality, and asked where it could be got.

The American architect expresses the opinion that a drop in prices of structural iron, glass, paints, and other building materials may be looked for at an early date. The basis for this opinion is that the United States Government will probably reduce the import duties on these materials, thus bringing into competition materials of like character manufactured abroad. It is expected that the Government will take this action for the purpose of avoiding retaliation in tariffs on the part of European countries under which large importers of American-manufactured materials are depriving the home manufacturer of his market, and the artizan of employment.

Many novel methods of moving buildings have been adopted in various parts of the country in order to meet local conditions and circumstances, but among the most curious ways of doing work of this kind is that of utilizing barges or flatboats to float buildings across stretches of water. One case of this kind occurred not long ago in Pittsburg, and a later one is that at San Francisco, where a man having constructed a small hotel, desired to move it to a lot which he had secured at Benicia. The house was first moved to the wharf and when the tide was right was pulled on to a barge by means of a horse windlass, after which the barge was towed to Benicia by a river steamer.

A novel process of manufacturing glazed bricks, which it is said is simpler and more economical than the processes generally in use, has recently been discovered by an English maker. He employs marl as the body of his bricks : this is placed in the mould or die along with finely divided clay, and then strong pressure is brought into play. The bricks are then taken from the mould and fired at a moderately high temperature in an ordinary kiln. The glaze is then applied to the surfaces of the bricks and the firing is repeated, this time at the fusion point of the glaze mixture. Generally speaking the glaze mixture is applied in the usual wet condition to the surface, but it may also be applied in the form of a powder before the bricks are burnt, so that the marl, the clay, and the glaze can all be worked into bricks in the same mould and then fired simultaneously.

BRITISH COLUMBIA LETTERS.

No. VII.

The Second Annual Exhibition of the Arts and Crafts Association was held in the Fairfield Block, from June 28th to July 5th, and though the collection of works of art was probably the best ever brought together in the province, so little interest was taken in the show by the public that it was, financially, a complete failure. In a town of 25,000 inhabitants a collection of paintings, including examples by George Moreland, Gerard Dow, George Fripp, Albert Hartland, Knowles, Ferrier and others of greater and lesser note, such a collection remaining open to the public for seven days, attracted an average attendance of 30 per diem. A nigger minstrel show would have drawn five hundred.

However, if one cannot congratulate the people of Vancouver on their powers of discernment in matters of taste, the officers of the Association must feel that the want of success of the exhibition was certainly not due to any lack of energy or enthusiasm on their part.

The numbers of and the interest in the works by local members was not equal to the last year's exhibition. Mrs. Marcus Lucas, whose clever painting and well chosen subjects were a notable feature in the show of 1900, was represented by but a few oil paintings surrounded by a draping of black and violet, the Association having been robbed by the Destroyer of this admirable artist and enthusiastic supporter but a short while ago. Mrs. Marcus Lucas will long be remembered and her loss deeply regretted by all lovers of art in this city. Mrs. Ellis' charming work on china was this year represented by but half a dozen pieces, of which we most admired two plates designed by Mr. Jas. Bloomfield. The Misses McLung having left Vancouver just before the opening of the exhibition, were both unrepresented, as also was Miss Marstrand, whose work in black and white was greatly missed, as well as her quiet but effective assistance on committee. Others who contributed last season have withdrawn, and consequently the Asscciation has had some difficulty in maintaining the local character of the exhibition. Still, Mrs. Balfour Kerr and Mrs. Lionel Williams were well represented in oil colors, and Messrs. DeForest and Ferris each sent a number of characteristic works in the same medium. Mr. Tom Fripp's "Venetians Threading Beads" is a new departure for him. In water colors, Mr. Ferris showed but four small drawings, while in this class the only other exhibitor was Mr. Tom Fripp, whose large drawing "Chill October" is the most important work that artist has shown here. His sketches "Venice" and "Burrard's Inlet," are full of light and atmosphere. In black and white, the same artist was the sole contributor, principally portrait studios in chalk or pencil. In china Mrs. Ellis, Mrs. Harry Burrows, Miss Ede (who gained Mrs. R. B. Ellis' special prize), and Miss Drainie showed some beautiful work. Miss Drainie's fish set, accompanied by the clever designs prepared for this set by Mr. Jas. Bloomfield, is an exceptionally charming piece of keramic ware. It is good to see that conventional design is receiving much greater attention, though there is still far too much of the mere representation of fruit and flowers with little if any attempt at decorative treatment.

A screen of water colour sketches by Mr. Francis Caulfield was of very great interest, comprising a wonderfully wide range of subject: "Richmond on Thames" is a distinctly clever piece of difficult perspective; "Hampton Court" is scarcely less so; "The Chestnut Avenue, Bushy Park," is well contrasted with "An Orange Grove, California." Mr. Caulfield again showed his delightful piece of carving in oak, a panel entitled "Dolphins Plunging Through Water," which is full of movement and vigor.

Mrs. Balfour Kerr and Mrs. Lionel Williams had a screen of embroidery, some of it extremely well designed and executed. It seems somewhat strange that there should be so very few contributors in this most interesting class of work.

Mr. Harry Burrows chip carving and burnt work was most favorably commented upon, his cabinet and an occasional table being the most excellent examples of his skill. Mrs. Burrows also showed some pretty calfskin cushions with pyrographic decoration. Messrs. Henry Bloomfield & Sons were represented by a couple of stained glass windows, one, of which the motif is gold fish and kelp, being as fine a piece of color and drawing in lead and glass as we have seen for a long time. Mr. Jas. Bloomfield also showed some cartoons and a folio of delightful schemes in leaded glass; judging from some of these it would appear that this artist is finding more and more to interest him in mosaic treatment, some of the designs being for absolute mosaic in glass and lead without painting.

The only architectural drawings on the walls were by Mr. R. M. Fripp, F.R.I.B.A., Vice-president of the Association, among them being three drawings lately exhibited in the Royal Canadian Academy or Arts Exhibition at Toronto: a design for oak sedilia to be built for St. James' Church; a fumigated oak sideboard and drawing room fitments also in fumigated oak, designed and executed for Mrs. D. G. Marshall, also designed by Mr. Fripp, were the only designs for furniture in this exhibition of arts and crafts.

The newly constituted Manual School had an interesting exhibit kindly loaned and arranged by Mr. T. Northrop, the principal.

The school children's competition did not show any decided advance over last year's form. Many of the drawings were obviously not from Nature, and in some classes there were no entries and some of these classes will probably be dropped next year. The following is the list of prize winners:—

Class A.—Sec. 1.—Edith Wright; Sec. 2.—Vivian Garvey; Sec. 3.—Rhoda Macrae.

Class B.—Sec. 1.—Maude Tregent; Sec. 2.—Erma Hurst; Sec. 3.—Violet Henderson; Sec. 4.—Hester Barker; Sec. 5.—Mabel Tregent; Sec. 6.—Harold Ferguson.

Class No. 5.—Ross Fraser.

For pupils of the MacDonald Manual Training School:—No. 1.—Gordon Johnson; No. 2.—Ernest Macready; No. 3.—C. M. Braden.

A special prize for landscape drawing in pencil was awarded to Jessie MacDonald and Mrs. R. R. Ellis' prize for painted china, open to students only, was won by Miss Ede, with some particularly well drawn conventional designs in extremely pleasing color.

The loan exhibition was a very varied and interesting collection of oil and water color paintings, pastels, engravings, Sevres china, curios from every quarter of the globe, and a few but excellent examples of ancient and modern printing. "Pigs Feeding," by Geo. Moreland, "The Poultry Vendor," by Gerrard Dow, "The Whist Party," a reputed G. Dow, and "Tam O'Shanter" by David Ferrier, were a singularly fine group of oils. A very slight portrait sketch by John Ruskin was kindly lent by the subject of the sketch, Mrs. G. Edwards. A pair of very beautiful seascapes in pastel by Holden (lent by Dr. Mostyn Hoops), were greatly admired, the broken water and driven clouds showing vigor in their handling, impression of wind and sunshine, cloud and shadow being rendered with fine skill. A large water color drawing by Albert Hartland (lent by W. E. Chapman) was a good example of this painter's later work; the subject "Lake Killarney," is world famous and the soft atmospheric effects were charmingly rendered. Two very early examples of Hartland's were interesting, but did not show much of the breadth and skill of the larger work. Three lovely little drawings by the late Geo. A. Fripp, R. W. S., were lent by his son and pupil, Mr. Tom Fripp; of these "Norfolk Broads" was the most finished and characteristic of this master of the grand old school of water color painting, but the others were also so delightfully warm and luminous it is hard to dogmatise as to their relative value. Colonel Falk Warren lent a collection of prints, one of them, an undoubted Al Trecht Drer. A number of Wouverman's and other Dutch draughtsmen, together with some excellent steel engravings (most unfortunately robbed of their margins), made up a deeply interesting and highly instructive set. The association was also indehted to Mrs. Marstrand for a capital pen and ink drawing by Prof. Marstrand and several oil paintings by Danish artists, of which we preferred "Mentone' by Prof. Zacho.

A gothic blackletter Bible (Portuguese) dated Lisbon, 1526, and printed by Huysman, (lent by Mrs. MacLagan), and some good Roycroft and Mosher books formed a small but select company in a glass case.

Seypores, Binares, Moorish and Japanese metal work, Fijian clubs and Karu bowls; Cloisonne placques and vases: Tibetan, Korean, Indian, Afghan, Samoan weapons; Lucknow silverware, Chinese embroidery, Zulu bangles, Japanese armor; Kaffir pipes, girdles, necklets and Australian Blacks boomerangs and spears; paddles from the Solomon Islands, New Guinea drums, Suivash basket work, elk teeth girdlers, mud pieces and many other odd, quaint and curious things, each and every one of which betrayed skill in their production, art in their decoration, often amounting to art of high rank, all these things carefully marked and catalogued, displayed on walls, benches and screens, wanted but one thing to make the exhibition a complete success and that one thing, intelligent appreciation, the public of Vancouver did not give, probably because they have it not to spare.

STUDENTS' DEPARTMENT.

ARCHITECTURAL EDUCATION.

At the recent convention of the Architectural League of America, short papers were presented by representatives of the various clubs composing the league, treating of different phases of the subject of the proper education of architects, which had previously been assigned to each club for consideration. For the Toronto Architectural Eighteen Club, Mr. Wm. Rae contributed the following as the views of the club on the questions submitted to it, which were :

"How much mathematical and engineering training should an architect have ?"

"Should design and construction be separated so as to train specialists in each of these lines ?"

(A). An architect should have as much mathematical and engineering training as will enable him to solve, by means of formulas derived from the experimental research of scientific experts, every problem the erection of a modern building may involve in the safe and economical use of the materials of its construction, including steel construction, heating, lighting, ventilation and sanitation.

In considering this question we have borne in mind the difference between education and merely a knowledge of the expedients of modern practice, for these expedients vary so much in different localities and change so from time to time, so many men devising their own, and ever learning fresh ones, that we think no rule may be laid down concerning them.

The use of formulas and tables thus derived we think one of the most justifiable expedients of modern practice.

The architect's work is the harmonious association of all the crafts, which harmony can only be considered complete when the possibilities of each craft in relation to the whole are perfectly developed, and to do this a knowledge of the nature and functions of every material used is necessary.

(B). Design and construction should not be separated, so as to train specialists in each of these lines, because a specialist is one who, in addition to the ordinary knowledge of his craft, acquires a special knowledge of one line, not one who has acquired a knowledge of one line only of the general knowledge of his craft.

Design in architecture is surely, as seen in the study of the highest design—the human figure—constructing beautifully. Certainly, the most intellectual part of the æsthetic satisfaction derived from the contemplation of the human figure comes from the perception of the harmonious grace of its constructional requirements.

Could we imagine a figure built up of compression members covered with tension-members and concealed beneath a coat of ornament ?

What we understand by architectural design has to be based upon the use of some material ; to what material shall we limit it ? Stone and wood only ? We do not know what the material of the future may be ; there may be no stone or wood. Times change, and we must change with them.

EXAMINATIONS AT THE ECOLE DES BEAUX-ARTS.

The spring entrance examinations of the Ecole des Beaux-Arts are unlike any others outside of Paris. For six months previously, says the London Architectural Record, the ateliers or studios are filled with men preparing for these examinations. Early on the chosen day the streets in the Quarter are filled with men carrying drawing boards and other utensils, and when at eight o'clock the gates of the Ecole are thrown open hundreds of young men file in, shouting at the top of their voices. As his name is called each goes past the guard and up the stairs to the little rooms, or loges, to secure a place in which to do his work. These loges are about 10 feet by 12 feet each, and hold six men comfortably. They are by no means ideal working-rooms, being dirty and ill-lighted, and opening off a long narrow passage; altogether they are about as uninspiring as one can imagine.

To the average person the idea of an examination suggests an ordinary room, presided over by a dignified professor with the utmost quiet prevailing, so that one can almost hear the scratch of the pencil. Who can picture an examination held while hundreds of men are singing, whistling or yelling and running up and down a passage ? Yet this is just what happens at the Beaux-Arts when the men are making the sketches of a given subject (required to be completed in twelve hours) which determine whether or not they shall enter the greatest architectural school in the world.

The uproar is constant, the noise deafening. From the moment the men assemble in the court till the last one leaves the school at night this noise is constant. First one set and then another takes it up. One wonders that any work can be done.

At the last examination there were no professors in sight, only guardians, whose principal occupation seemed to be to sell food and drink to the students and afterwards to dispose of the beer and wine that were left. As a result, at about four o'clock the guardians, who were supposed to see that the men did not make use of books or photographs, were assembled in one of the vacant rooms discussing politics and drinking and adding to the noise made by the students.

But notwithstanding all the apparent drawbacks the drawings were being made. After studying all the morning on the schemes, most of the men would eat and then start on the finished sketches. As time went on and darkness set in out came candles, for there is no gas or electric light in the rooms ; and about six o'clock some of the men handed in their finished work. Others, a little pressed for time, would be working with a will to finish before it was too late. When a party of visitors make their appearance at the door of this loge the busy one would call out "Charette !" And this would be respected, for it means, "I am in a hurry ; need all my time. Don't bother me." At eight the guardians collected the drawings, most of which were completed. Then the men went out, still shouting.

On Sunday the professors went over all the drawings and marked them. On Monday afternoon the results were announced. As early as 4 p.m. hundreds of men assembled in the court of the Ecole to wait until the doors were opened at seven. If noise prevailed before, it was nothing compared with that which now was heard. With nothing to do but wait, and with every nerve strained in expectation, it is perhaps excusable if the 500 young men let themselves loose.

Finally the doors of the great hall were thrown open and the men crowded in. The noise was stilled in an instant, and one could almost have heard a pin drop as the names of the men and the marks they received were called out. Thus the examination was conducted.

Salisbury Cathedral has the same number of windows as there are days in the year, is built in the early English style. They are triple windows, formed from an elegant combination of three lancets :

"As many days as in one year there be,
So many windows in this church we see ;
As many marble pillars here appear,
As there are hours throughout the fleeting year ;
As many gates as moons one year does view—
Strange tale to tell ! yet not more strange than true."

In the United States and also in Europe efforts are being put forth to secure the enactment of laws to provide for the examination and licensing of architects. The Council of the Society of Architects of London, in view of the Bill for the Registration of Architects now before the British Parliament, have held a series of meetings of architects in various towns throughout Scotland. Similar meetings have been held throughout England to ascertain the attitude of the architects on this important subject. The meetings were open to the public. With the growth and success of the movement for registration in other countries, should eventually come the amendments which are required to make the Ontario Architects' Act a workable and useful measure.

METHODS OF CONSTRUCTION IN RELATION TO COST OF INSURANCE.

The Underwriters' Association of Canada at a recent meeting decided to extend to the towns and smaller cities throughout the country the rule under which buildings are classified for insurance purposes according to the character and surroundings of the building. This system has been employed for some time in Toronto and is generally acknowledged to be the most equitable one. It is obviously unfair that the owner of a building belonging to a certain class who takes precautions to guard against its destruction by fire should be obliged to pay insurance at the same rate as another owner in the same class who takes no such precautions. The situation and surroundings of a building also have much to do with its desirability, or otherwise, as a fire risk. These circumstances ought to be taken into account by the insurance authorities when fixing the rate of insurance to be paid. The more strictly this system is applied the more general will become the construction of fire resisting and fire-proof buildings. It is said, on the authority of prominent insurance firms, that, during the last five years, the rate of insurance on this class of building in Toronto has been reduced by 50 per cent., which should certainly offer a strong inducement to persons proposing to build to employ fire-proofing methods and materials. Care should be taken, however, to see that when these materials are employed, the system of fire-proofing is carried far enough to place the building in the favored class. Prominent buildings have been erected in Toronto within the last three years in which the ceiling and floors have been fire-proofed while the stairways have been left open to act as flues and cause the destruction of the building in case of fire. A partial system of fire-proofing like this which disregards essential features, such as those mentioned, is valueless, and the money expended on expensive materials wasted. The record of fires in Toronto last year is very gratifying. The total number of fires was 686. For 328 no losses occurred, and for 221 the loss in each case was less than $100. The losses above insurance totalled only $13,289, and the losses without insurance to only $9,434. Only one fire extended beyond the building in which it started, which would seem to point to a high standard of efficiency of the fire department. To what extent improved methods of building construction contributed to this excellent showing is not known, but it may reasonably be presumed that some credit is due in this direction. The record of fire losses in the United States for the first six months of the present year shows the total losses to have been $88,935,000, as compared with $103,299,000 for the corresponding period of last year.

—THE—

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THE DANGER OF PUTTING STRUCTURES TO NEW USES.

The partial failure of the Brooklyn bridge recently is another evidence of the danger which attends the imposing upon structures of duties which they were not originally designed to fulfill. The designer of this bridge had no thought that electric and cable cars would be run over it, and made no provision for such a contingency. Consequently, as the result of the extra strain imposed by the street car traffic, some of the rods have snapped, causing a sinking of the roadway, and necessitating the closing of the bridge to traffic. Many accidents from the same cause have happened, causing the collapse of bridges and buildings. It is quite a usual practice to put buildings to uses differing entirely from those for which they were designed, and to impose loads upon the floors many times in excess of those which they were intended to carry. The wonder is that in so many instances they manage to stand the strain. In view of this practice of overloading, architects should be careful in designing buildings for business uses to employ a factor of safety sufficient to cover all ordinary contingencies of this kind which are likely to arise.

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Will bell be above or below clock floor?.....

Fall of weights.....

Name of building in which clock is to be placed.....

.....

.....

WHO SHOULD LAY THE DRAINS.

For many years the custom prevailed among Toronto architects of placing in the mason's specification the construction of house drains. Since the enactment of plumbing by-laws, which compel the plumber to furnish to the owner a certificate that the drainage system has been inspected by the Health Department and found to be tight, some architects have thought it advisable to place all drainage work in the plumber's specification, so that they would have but one contractor to deal with. Other architects continue to follow the old plan, believing that it is to their advantage and that of their clients to do so. It is argued that the mason who has the putting in of the foundation of the building is more likely to carry out the drainage work in a more satisfactory manner than is the plumber who comes along after the foundation work is completed and is obliged to break away part of the foundation in order to make his connections. In a majority of the large cities on this continent, it is now the practice of architects to include the drainage work in the plumber's specications, for the reasons mentioned.

There is believed to be a good opening for brick manufacturers at Dawson City, where brick is now replacing wood for building purposes. Valuable clay deposits suitable for brick making have recently been discovered in the locality.

PROPOSED PUBLIC LIBRARY FOR MONTREAL.

Considerable comment has been aroused by the action of the Mayor of Montreal in making a request to Mr. Andrew Carnegie for money with which to erect a Public Library in that city. In reponse to the request, Mr. Carnegie has offered to give $150,000 for the erection of a building on condition that the city shall provide a site and expend $15,000 per year for maintenance. The consensus of opinion in Ontario at least appears to be that it is not becoming to the dignity of a wealthy community like Montreal to ask outside assistance towards carrying out a public undertaking of this kind. If Montreal feels its need of a Public Library its citizens are abundantly able to supply the necessary unds for its erection, and by doing so they would better mainain the self-respect and dignity of the chief commercial city of Canada.

ANCIENT MEASURES.

The measures of length used in the Bible, with their equivalents in our modern use, are given by an English contemporary as follows: The great cubit was 21·888 in., or 1·824 ft., and the lesser cubit 18in. A span (the long), half a cubic, or 10·944in., 0·912 ft. A span (the less), one-third of a cubit, or 7·296in., or 0·608ft. A hand's breath, 1·6 of a cubit, or 3·684in., or 0·304 ft. A finger's breadth, 1·24 of a cubit, or 0·912 in., or 0·076ft. A fathom, four cubits, or 7.296 ft. Ezekiel's reed, six cubits, or 10·944ft. The mile 4,000 cubits, or 7,296 ft. The stadium, one-tenth of their mile, or 400 cubits, or 729·6 ft. The parasang, three of their miles, or 12,000 cubits, or four English miles and 580 ft. A day's journey was 33·164 miles, some say twenty-four miles. A Sabbath day's journey, 3,500 ft., or, as some authorities contend, 3,648 ft.

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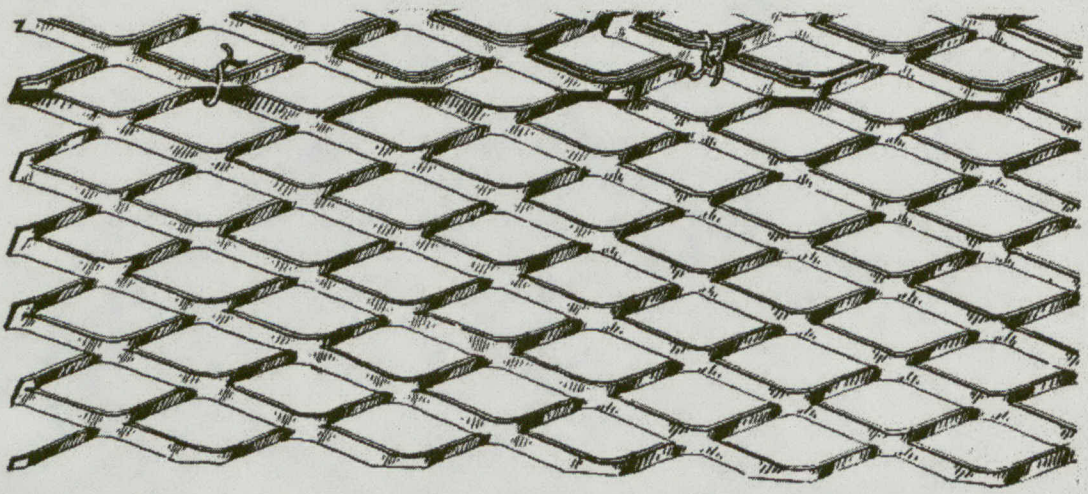

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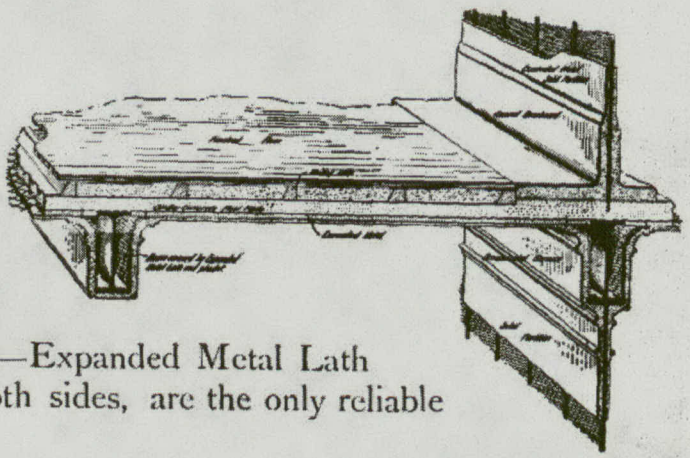

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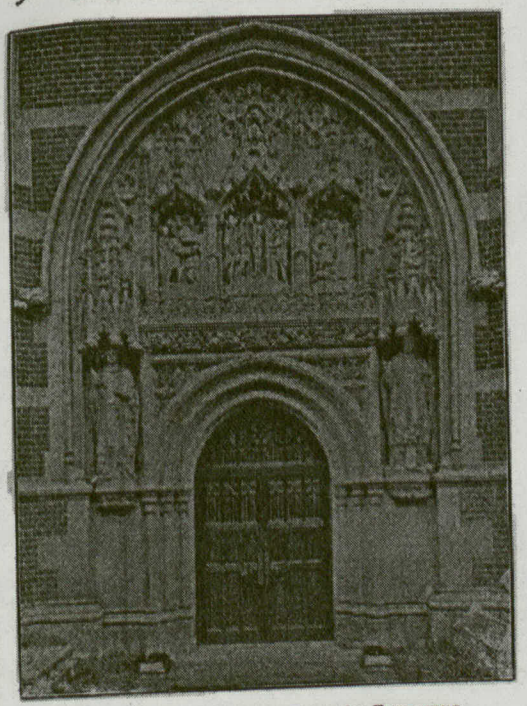
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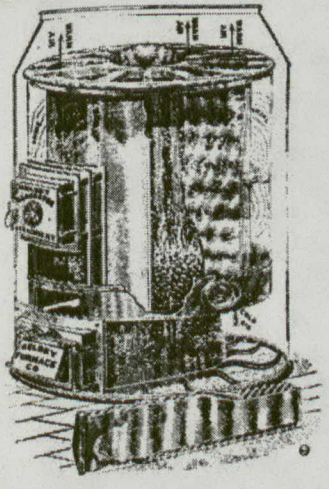

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