The Canadian Architect and Builder

PUBLISHED MONTHLY IN THE INTERESTS OF

Architects, Civil and Sanitary Engineers, Plumbers, Decorators, Builders, Contractors, and Manufacturers of and Dealers in Building Materials and Appliances.

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A JOURNAL OF MODERN CONSTRUCTION METHODS,

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SUBSCRIPTIONS.

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EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited, and if found to be of sufficient merit, will be paid for. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

A JOINT committee composed of representatives of the American Institute of Architects, the Western Association of Architects and the National Association of Builders met in New York recently and agreed upon a uniform contract which will be submitted to architects and builders for general use throughout the United States. Should a form of contract be devised which will meet with the approbation of persons interested, a similar document should be agreed upon for use in this country.

THE Government analysts have performed a highly commendable act in securing and analyzing water used for drinking purposes in various parts of the Dominion. The analysis of these samples proves that only about one-third of the drinking water in use can be designated pure. Many of the most impure samples analyzed were obtained from wells situated near school houses, from which probably the school supply of drinking water is obtained. This fact ought to be sufficiently alarming to parents to compel them to adopt sanitary measures to preserve the lives of their children. Could they but know how many cases of typhoid among public school pupils have had their origin in polluted well water there would be less indifference manifested in this important subject.

WE observe with pleasure that it is proposed to erect a suitable memorial to mark the scene of the battle of Lundy's Lane. The Lundy Lane Historical Society has submitted to Col. Otter, of this city, the following suggestion for the proposed monument: That a space of at least 25 feet square be secured at or near the highest part of the hill, and that suitable access thereto be made from the doorway. 2. That a stone tower be erected at a height of not less than 80 feet square exclusive of flagstaff, and of a width of diameter at the base sufficient to afford a suitable room for the exhibit of relics or trophies of the battles fought in the neighborhood, the room to have an area of not less than 200 square feet. 3. The material to be of Queenston limestone, but other stone may be used in relief, if compact and durable. The erection of monuments of this kind to mark important events in the history of the country, will exert a powerful influence on the minds of future generations of Canadians, awakening in them a pride of country which is a necessary foundation to the greatness of any nation. It is surely fitting that the designing of these national monuments should be entrusted to Canadian artists, and we hope that the patriotism which prompts the erection of such a memorial will extend also to the designer.

CHARGES of unfairness are being preferred against the City Council of Brantford in connection with the awarding of the contract for the construction of the new waterworks system. Certain of the Brantford papers, as well as those of outside towns, are alleging that the Waterous Company were given the figures in the American Company's tender, and were allowed to take advantage of this information by putting in a lower tender after the time specified for receiving tenders had expired. We have no information which would warrant us in expressing an opinion as to the truth or falsity of these charges. The circumstance, however, recalls the disgraceful proceedings which characterized the purchase by the city of Toronto of a new pumping engine four or five years ago. The wire-pulling and trickery connected with that transaction was sufficient to show that the man who can bring the most "influence" to bear upon the aldermen almost invariably gets the advantage of the man who relies upon his reputation for honesty and the figures in his tender to secure him the contract. We hope that when the facts of the Brantford case come out, if they ever do, it will be seen that the contract was honestly awarded. If that should turn out to have been the case, everyone will be pleased that a local and not an American company received the contract.

WE desire to say a word or two on the subject of illustrations for publication in this journal. We have of late been compelled to decline to publish many of the illustrations sent to us for that purpose, on account of the lack of merit displayed in design and drawing. We confess that in two or three instances we have published drawings sent us that were by no means up to the standard, but we did so simply because we desired to give all parts of the Dominion fair representation. When we commenced the publication of the CANADIAN ARCHITECT AND BUILDER we determined to illustrate the best work of which we could procure drawings. Although, for the reason given, and from a desire to encourage our readers to send us drawings, we allowed ourselves to be led into publishing some that had but little merit, we shall in future avoid doing so. We have many Canadian architects who are capable of producing creditable designs and drawings, and is not fair to Canadian architecture to publish illustrations that are not fairly representative of the best work done in this country. Unfortunately the authors of some of the drawings sent to us appear to be unable to distinguish as between good work and bad, so far at least as their own productions are concerned. If they could thus judge, they certainly would not be so ready to send abroad over this continent and Europe specimens of third-class architecture and drawing with their names as authors attached. In thus declining to publish inferior drawings, we shall be doing a kindness to their authors, and shall feel that we are not guilty of misrepresenting to the outside world the preponderating quality of the work done in this country. We make this statement with no desire to discourage any one from sending us specimens of work for illustration. We simple reserve the right to publish or not, basing our decision in the matter entirely upon the merits of the designs and drawings. We invite those who are capable of good designing and drawing to send us specimens of their best work for publication.

OPINIONS *pro* and *con* are being expressed through the columns of the newspapers regarding the practicability of the scheme for the construction of the proposed Trent Valley Canal. Great differences of opinion exist also regarding the amount of traffic which would be likely to find its way through the canal, and the consequent amount of revenue which could be counted on to assist in recouping the Government for the vast outlay which would be required to carry out the undertaking. We hope the discussion of the question will continue until all the information possible has been obtained. The necessity for the canal should be established, and also the probability that it will pay the cost of maintenance and interest on the capital used in its construction before any steps are taken to carry out the scheme. It is quite natural that people living and owning property along the route of the proposed canal should be enthusiastic advocates of the carrying out of the work, but inasmuch as the people of the country at large will be asked to shoulder the burden of its cost, the question to be considered is—will the undertaking pay? We are already, for a young country, to lerably well supplied with railways and canals; we are paying a very large sum yearly in interest upon the money borrowed to construct them, and we should absolutely refuse to increase our burdens in this direction without being first satisfied that further expenditure is absolutely required and will make us profitable returns.

THE plumbers' strike in this city seems as far from being settled as ever. Indeed an adjustment of the difficulty now appears much more difficult than it would have been when the strike began. Both parties to the dispute have acted in a manner calculated to widen the breach rather than to promote a mutually satisfactory understanding. We have so far not seen any statement made as to the grounds upon which the journeymen ask for such a substantial increase of wages. It cannot be said that the plumbing business is in such a prosperous condition as to warrant the employers in increasing by one-fourth their wages bill. On the contrary, the outlook for the master plumbers of this city is by no means bright. The large amount of speculative building done during the last three or four years has greatly diminished this season, and is not at all likely to revive for some time to come. There are already houses enough erected to supply the wants of tenants for two or three years at least. Building operations in this line will consequently be on a very much smaller scale than heretofore. The large amount of speculative building done of late created a demand for a cheap kind of plumbing, and induced a considerable number of persons to embark in the plumbing business. As a consequence journeymen found their services in demand. If a continuance of that condition of affairs might be counted upon, there there might be some ground upon which to claim an increase of wages. Seeing that the amount of plumbing required during the next two years is likely to be at least twenty-five per cent. less than during the last two years, the action of the journeymen must be regarded as either very thoughtless or very unreasonable. On the other hand, the refusal of the employe s to consult with the strikers or to agree to an

arbitration was in our opinion not a wise procedure. Apart from the question of wages, the unions want to have a hand in regulating the employers' shops. The latter insist that so long as they pay the salaries they intend to manage their affairs in the way that seems to them best. This we think they have a perfect right to do. The members of the union may refuse to work for an employer who thus insists upon being the sole manager of his business, but they have no right to interfere as they are said to be doing with workmen who are satisfied to receive their wages and leave their employers to do the managing. A couple of the strikers have been heavily fined by the police magistrate for alleged intimidation of workmen brought from other cities to fill the positions which they had vacated. Our sympathies in this instance are with the strikers; as we cannot see from the evidence wherein the intimidation took place. Since the decision of the police magistrate, however, some of the strikers appear to have resorted to intimidation and even to violence in order to prevent the employers from carrying out their contracts. The fact that the workmen imported by the masters have had to be guarded by the police, does not reflect much credit upon the methods of the strikers, nor does it tend to arouse public sympathy in their behalf. In conflicts with the employers the unions should discard physical violence and the boycott as likely to defeat rather than promote the objects they have in view. Since the above was written the steam fitters have joined in the strike, and the situation is thus made worse than before.

THE Toronto Trades and Labor Council has resolutely set its face against the movement to instruct the pupils of the public schools in the rudiments of practical mechanics and in the use of tools. The Council recently appointed a deputation to wait on the Minister of Education to endeavor to persuade him not to carry out the proposal. The result of the interview is thus stated in the Committee's report to the Council:—

"Your committee, as per instruction of your body at a recent meeting, secured an interview with Hon. G. W. Ross, Minister of Education for the Province of Ontario, for the purpose of laying before him the views of your body respecting this proposed scheme for introducing manual training in the public school system, with a commencement in the Provincial Model School at Toronto. Your committee were received with that courtesy and urbanity characteristic of that honorable gentleman, and at his instance each member of the deputation, which included the president of your body, spoke his views on the subject, and in opposition thereto. During the two hours' discussion of the question in all its phases every feature of the proposed movement on the part of the Ontario Government received ample consideration, and during which the honorable the Minister of Education, while holding strongly to his contention that no injury to, or interference with mechanical interests was intended or possible through the intended innovation, affirmed his adherence, for the time being at least, to his own view of the subject. Your committee, failing to convince him of the soundness of the views of your body, or those of your committee, in opposition to the manual training feature already referred to, and, being still satisfied that, if inaugurated, a course of manual training, as outlined by the Minister of Education, will result in no good at all commensurate with the amount of certain harm in an aggravated form which must ultimately ensue to all who live by mechanical callings in Ontario, unhesitatingly recommend that every legitimate effort be put forth by your body, by seeking the active co-operation of all labor organizations throughout Ontario in petitioning the Government, and Parliament when in session, and the taking such other action as may be deemed advisable in opposition to the adoption by law of this scheme on the lines outlined."

We very much regret that we have not before us the arguments presented by the deputation to the Minister in support of their contention that manual training in the public schools would result in "certain harm in an aggravated form, to all who live by mechanical callings." Let us hope that they were more logical than the reason before given by the Council, viz., that such training would tend to swell the ranks of botch workmen. Experieace has demonstrated that youths who have had the advantage of technical instruction previous to entering the workshop, as a rule make more rapid progress and attain to a higher standard of skill than those without such training. This fact goes to prove that the tendency of the training is to increase the number of highly skilled mechanics rather than to create botches. But supposing the result should be the reverse of this, union men who are skilled mechanics would not suffer in consequence, for the simple reason that a botch can never do the work of a skilled mechanic.

Unfortunately, the labor organizations have devoted all their attention to securing for their members the largest possible remuneration for the least amount of work, regardless of whether they are botches or skilled workmen. No effort has been made to elevate the standard of workmanship. No standard of workmanship is required as the condition of membership in the organization. The declaration of American independence begins with the statement that all men are born free and equal. The trades organizations appear to work on the principle that all men—mechanics at least—are equal in their capabilities, and continue to be so during their lifetime. A standard of wages is fixed for all alike. No encouragement is offered to a man to strive to excel in the particular trade in which he may be engaged. For this reason we find about as many botch workmen in the membership of the labor organizations as out of it. Manual training in the schools might be expected to assist in developing a class of educated mechanics whose skill would entitle them to supplant many indifferent workmen of the present day who claim first-class remuneration for their services, not because of their ability to earn it, but because they are members of a labor organization which demands that they shall have it.

A representative body of workingmen is certainly the last quarter from which opposition should come to a movement which has as its object the imparting of a class of knowledge calculated to prove of practical benefit to the boys and girls whose circumstances in life or whose natural inclinations and adaptability destine that they shall engage in mechanical pursuits. As we pointed out in these columns recently, the class of instruction heretofore given to the pupils of our public schools has tended to overstock the ranks of the professions at the expense of mechanical pursuits. Yet the moment that an attempt is made to correct the error, the persons whose children would be most benefitted thereby are the first to throw obstacles in the way. We can only infer that they would rather see their children struggling to attain a bare livelihood as lawyers, doctors or some other "genteel" calling than earning a competency in the less crowded through humbler pursuits of life.

We are not surprised that the Minister of Education remains unconvinced by such short-sighted reasoning. We hope that he will persevere in his purpose, in which case no one will be less liable to suffer injury than the working mechanic.

WOOD FOR DECORATIVE PURPOSES.

IT is evident that much as we know about woods there yet remains much to learn that may be of value in the arts, says an exchange. The secret of making good veneers which will not warp is only now becoming known, and until lately it was considered impossible to emboss wood; but now beautiful embossed panels, whose work resembles carving and whose richness compares favorably with the most costly art, are found in many places. In these the original patterns are carved by hand, and from these molds are made on which the wood is placed after being properly softened. The wood in these molds is then submitted to 250 degrees of heat and subjected to great pressure. Such a pressure effectually prevents all shrinkage. Wood may be cut as thin as the 300th part of an inch, but in this state is not useful. That which is cut to the thickness of the 100th or the 150th part of an inch and lined with paper is used for the decoration of walls and ceilings. This neither shrinks nor swells, there not being enough of it for the atmosphere to lay hold of. If it is desired to place such a veneer upon a wall, all holes and cracks must be filled with plaster of Paris, and being glue sized, the wall is ready for the wood in panels. The veneers are made damp with a preparation of glycerine and water which softens them, and when dried leaves them pliable. A checkerboard pattern of curled maple is about as thick as a piece of cardboard. To produce this, strips of wood are first woven in and out and then subjected to heat and pressure, which makes a smooth body, varied in hue as if it were made of two kinds of wood.

Prof. J. B. Johnson, of Washington University, St. Louis, stated that in the physical laboratory of that institution it is proposed to make exhaustive tests on the transverse strength of various timbers. It is intended to make these tests standard authority for all engineering structures and for this purpose efforts are being made to raise from $2,500 to $5,000.

TORONTO BOARD OF TRADE BUILDING COMPETITION.

WE have received from the Secretary of the Toronto Board of Trade a circular in regard to the competition which reads as follows:

The Committee, by and with the advice of their professional adviser, have decided, in accordance with suggestions or requests of competitors, to amend the conditions of competition in the following respects:

1. The party wall on the *eastern* side of the lot to be disregarded, and a new wall built entirely independent of it.

2. The point of sight indicated on the plan already furnished to be changed, and to be taken at a distance of 200 feet from the angle of the lot, near the western corner of the custom house.

3. The perspective to be set up from a *one-eighth scale* instead of from a *one-quarter scale* plan, as asked for in the conditions.

4. The Committee's professional adviser reports as follows: "It seems to me that paper 18 inches by 26, as required in the programme (not 36 as your correspondents erroneously quote it), is amply large for all these purposes. It allows a tower 200 feet high; if a higher tower is to be shown the upper part can be drawn on a flap. Moreover, all the plans, except perhaps those of the basement and first storey, can be shown two on a sheet, if desired. I should not recommend larger paper. It is essential to the convenient handling and examination of the drawings that they shall be made on as small sheets as possible. Moreover if all the plans are on one sheet, as suggested, it is an inconvenience to the architects, as only one or two men can work on them at a time. Besides, it is a bad plan to change the conditions at this time without necessity."

OFFICE EXERCISE.

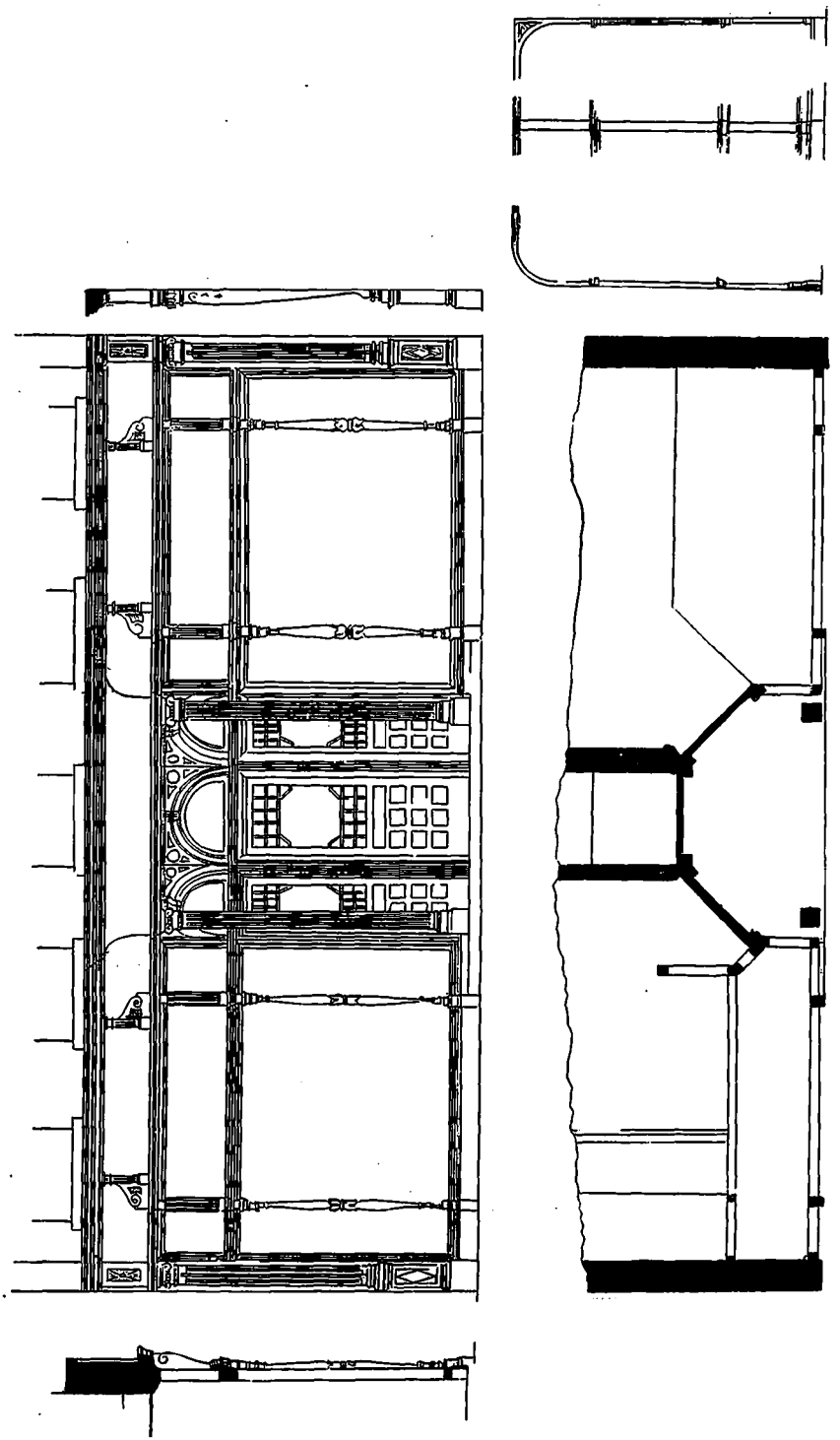
WHILE a pair of dumb-bells or clubs or some form of gymnastic apparatus is occasionally to be found in a business office they are usually provided by some one for his private use, and though doubtless efficient in promoting health and vigor as far as used, the office at large profits but little by them, and the valuable stimulus of emulation is almost wholly lost. As a rule if gymnastic exercises are permitted at all they are rather tolerated than encouraged, and for an employer to provide anything of the kind for those in his office is very rare indeed. So rare that we do not remember to have heard of it.

We are, therefore, much gratified to learn that Burnham & Root, architects, of Chicago, have set a most commendable example in this respect by fitting up a large room in their suite of offices as a sort of gymnasium. In response to an inquiry, they say: "It is used as a lavatory and exercise room, and is furnished with wardrobes Indian clubs, dumb-bells, pulling machine, foils, etc. It has a good effect on the health and spirits of our boys," and they add, "who are exceptionally good fellows and deserve all one can do for them." We have no doubt the "boys" reciprocate the feeling, and whether Burnham & Root in fitting up this room were influenced by pure disinterested benevolence or an intelligent self-interest, or a wise combination of the two, we believe they will find it merely from a business point of view a very profitable investment.

The restless discomfort which comes from long stooping over a desk or compressing one's liver for hours on the edge of a drawing board, is apt to seek relief in skylarking or idleness, or if the conscious clerk or draughtsman still sticks to his work it is with reluctant fingers and beclouded bram, and the "output" deteriorates both in quality and quanlity.

In such a case five or ten minutes' brisk use of the clubs or chest weights will accomplish more than an hour's skylarking or any amount of loafing. It has a wonderfully good effect in quickening the stagnant circulation, and a clear head and strong hand take up the work with renewed vigor.

It is surprising what a little vigorous exercise will accomplish if systematically taken. A few minutes once



STORE FRONTS FOR JOS. McCAUSLAND & SON, TORONTO.
DARLING & CURRY, ARCHITECTS.

or twice a day, at most three times, will soon give most satisfactory results in health and efficiency.

We commend this matter of office exercise to the careful consideration of all employers of sedentary employes, and hope the example set by our Chicago friends will be speedily and generally followed.—*Engineering and Building Record.*

THE PROPOSED CHAIR OF ARCHITECTURE.

Editor Canadian Architect and Builder.

CANADIAN architects are pleased to be informed that it is the intention of the Minister of Education to appoint a Professor of Architecture. The reasons given are not very intelligible nor are they sufficient. That the acoustics of a hall are bad can hardly be laid to the fault of the architect, except in very rare instances. I have never heard anyone but those entirely ignorant of architecture speak as if the laws governing them were laid down on scientific principles, and could be worked to with absolute certainty. I was under the impression that beyond certain primitive rules the science of acoustics was yet in its infancy, and that it was almost impossible to determine what would be the result of certain forms and outlines in a large hall on the properties of good hearing.

However, it matters little on what ground the step toward teaching architecture is made. That it is to be taught is the main thing, and we are glad to learn it. With a better trained body of men in the profession, the really able men will have some chance of obtaining the position to which they are entitled. The general ignorance of the majority of the men who call themselves architects has done much to retard the profession and make it more difficult for the good men to do good work. The inferior men are more capable of doing work satisfactory to the average public than the better educated men, as their work being done by men nearly on the same level in art with the public is comprehensible to them; while the work of the thoroughly educated men is to them like Greek to the public school scholar, far beyond their intelligence.

Let us hope that Mr. Ross will not hurry the architectural branch too rapidly. He will be able to gain much information on the subject if he will consult those who have more knowledge of the matter than himself. It would also be well to have some understanding with the members of the profession in this country about receiving the pupils of the school in their offices after their course. That the students of the school will require to enter an architect's office for several years to gain practical knowledge will be as much a fact as it is now. No school can turn out trained men in the profession of architecture any more than a school could turn out a competent seaman and navigator.

ARCHITECT.

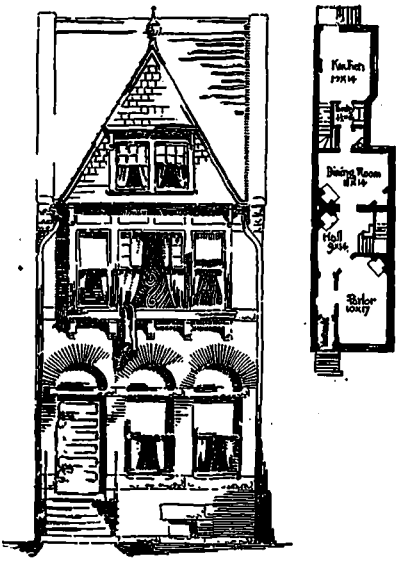
HOUSE DRAINAGE.

THE following instructive paper formed the subject of an address delivered by Mr. Phillips, of this city, to the members of the Toronto Architectural Draughtsmen's Association:

In taking up the subject of house drainage I do not intend to go into it with any degree of elaborateness from a scientific point of view, but merely to touch on its most salient points, and more especially on the construction part, and to give you some practical hints that may be useful to you in commencing your career as architects, and which will perhaps help you in your further study of the question, a question I need hardly say of the greatest importance to the architectural profession of the present day. Until recent years an architect in planning a building considered he had performed his duty to the drainage part of the plan if he put in a pipe of some shape, and usually as large possible, to carry off the water and soil from the house, and carried the pipe to a pit dug in the ground somewhere or anywhere. All he cared was to get the water and solid matter away. As to the gases, he would have laughed at any one bringing the question up. What did he know or care about the gases? But a change has taken place. An architect in the present day who does not pay special attention to the drainage part of his plan would I think be looked upon as an oddity. It behooves you therefore to make yourselves, as far as possible, thorough masters of this subject.

In planning your drainage system, four objects should be sought: 1st. All matter placed in any of the sanitary appliances in the house must be carried with the greatest possible expedition clear of the premises, leaving behind it if possible no deposits of any kind. 2nd. All sewer air must be prevented from entering the house by the channels which serve to carry away the sewerage. 3rd. As it is well nigh impossible to have house drains absolutely clean, that is devoid of all decomposing matter, all air from house drains, sink, bath, w. c. and other waste pipes, must be kept from entering the rooms. 4th. A constant current of fresh air must be established along every pipe in the drainage system, so that all gases that may be in the pipes will be rapidly diluted and carried to the outer air.

As it is not my intention, as stated before, to go into the subject too elaborately, I will take up first the pipes outside of the house; these may be of fire clay. In your specification you should call for them to be of the best, to be thoroughly salt glazed inside and out, thoroughly sound and free from all blows or other obstruction inside. In inspecting them be particular that the salt glazing is thoroughly done over all the pipe, more especially in the inside, as it is in the inside the glazing is most required, and it is there that very often the glazing is poorest done. Moreover, the contractor will be sure to try and "bluff" you on this point. Carefully pass your hand round all the inside to see if there are any obstructions or anything that will cause sediment to deposit no matter how small it may be. See that it is thoroughly sound, and upon no account pass an unsound pipe. The contractor will likely persuade you that if he turns the crack to the top side it will not do any harm. Do not believe him, as the crack will be a vent for the sewer gas, which will travel through the disturbed ground



House at 99 Wellesley St.
Knox & Elliot, Architects.

along the course of the drain, and enter the building where the drain enters the house. If you cannot be bluffed this way, he will perhaps say that he will cement it up. Do not allow this either, but throw it out. In laying the pipes see that the bottom of the trench is cut to the run of the drain, leaving only the holes for the hubs to be cut out. The failure to do this is a great cause of unequal settling, and consequent breaking of pipes after the soil has been filled in over them. In jointing them some recommend clay joints, but I would strongly recommend you always to use cement as the clay, unless the pipes are laid in a continuously damp soil, will dry and crack, leaving numerous air holes for the escape of gas. If the trench must of necessity be filled in shortly after pipes are laid, use a quick setting, but if you can leave it open for a length of time, use a slow setting cement; but whether you use quick or slow setting cement, do not on any account allow the pipes to be covered over until the cement is set with sufficient hardness to bear the gradual filling in of the earth. See that the hub joint is thoroughly filled up with the cement, and more especially on the underpart, as that is where the scamping will be tried. Also see that no cement is left projecting in the inside of the pipe. Have this taken away by the hand if you are using two feet American pipes, but if the three feet Scotch pipes are used, they are too long to use the arm, so the best plan is to use a small wooden disc cut to the diameter of the pipe. Do not under any consideration allow the pipes to be covered up till you have inspected every joint and satisfied yourself that each and every one is thoroughly made and tight. I have always made it a point myself when the drains are being laid to see every pipe laid, I consider this point so important. Of course you in your occasional inspection of a job cannot see every pipe laid, but you can inspect the outside of all the joints before giving your permission to have the trench filled in. In filling in see that all around the sides and bottom of the pipes are well and solidly packed with small stuff so that there will be the least possible chance of the pipes being disturbed from their position. In making a junction always use a Y pipe, never a square junction, and also let the junction be as near the upper side of main pipe as possible so that by the Y branch the flow of water from the branch to main pipe will be deflected as little as possible from a straight course, and by keeping it to the upper side of pipe there will be no chance of the branch pipe being air bound if the main pipe should be pretty well filled up with water. Where the pipe is taken through the wall into the building, see that the opening is made thoroughly good and tight so that no gas that may find its way along the course of the drain will enter the house. I have known where the pipes inside of a house were tested repeatedly for a leakage, but found to be all tight, and the smell was ultimately found to come in from the outside through the opening made in the wall for pipes to enter.

As to the size of fire clay drain pipes, a very prevalent mistake is to make them too large. I saw recently the plans of a block of stores which came out of an office in Toronto, and the main drain going into the street was figured at 9 inches. This pipe was intended to take the drainage of four water closets, four sinks, I think, and the rain water from the roof. The block consisted, I think, of five small stores, so you may judge of the roof surface. On calling the attention of the gentleman who showed me the plans to the large size of the drain pipes, he remarked: "Well, it will require it." I showed him that if these four water closets, etc., required a nine inch pipe, what a tremendous size the trunk sewer for such a city as Toronto would require to be.

Speaking of trunk sewers, let me give you the result of the difference found in experiments between the old time practice and the generally adopted present day practice. An old sewer with a superficial area of 17 feet was tested as to the rapidity of its flow, and its consequent ability to carry away all impurities and obstructions, and in a 100 feet portion of it was laid a 12 inch diameter pipe. All the water in sewer was deflected. Well, on a brick being laid in bed of sewer, no impression was made on it by the force of water, but immediately on its being laid in the 12 inch pipe the force of water whisked it away, and not only carried it through the whole length of the pipe, but a number of feet beyond, proving conclusively that the more you can compress the water, the more certainly will impurities be carried off.

But it may be said that pipes that would ordinarily be large enough to carry away drainage of buildings, will not be large enough to carry the water away say at the time of a heavy rain storm. There is a percentage of truth in this, but an exceedingly small percentage. To show this, let me give you the case of a 12 inch street pipe sewer with a large number of branch drains delivering into it, the sum of their cross sections being equal to a circle 30 feet in diameter. This 12 inch pipe on ordinary occasions ran about a third full, but during a heavy rain storm covering the whole area of ground drained by these branches, in creased the bulk to only two thirds full, but increased enormously in the rapidity of its flow. An experiment was made with a 6 inch pipe 100 feet long, the upper end of which was laid in a creek with its mouth entirely covered with the water, so that the water at the commencement of its flow entirely filled the bore of the pipe. On examining the outlet of the pipe, one would fancy that as the water on entering was always keeping the pipe full, the same head of water would come out at the lower end, but instead of that it filled only 2 inches of the diameter of the pipe. Another case was that of a public building with something over 100 sinks, closets, water spouts, &c., and having a large drain 2'-6" diameter which was repeatedly examined, and its largest flow at its outlet was only equal to a sectional area of 5 inches showing that a 3 inch pipe would have been more than large enough to carry the sewage. It has been calculated that a 6 inch pipe will carry the ordinary drainage of a district with 1000 inhabitants.

Taking these facts into consideration, I would advocate that where you can have a good fall, say a half to a foot, that a four inch pipe should be used, and on no account should a larger pipe than 6 inches be used for almost any ordinary building.

Coming to the soil pipes inside a house, do not on any account have anything else but iron. They are all the better of being coated with some solution, though there is an objection to this, in that any blows that may be in the iron are very difficult to discover. Inspect all the pipes closely to see that they are sound and have the joints well made with oakum and lead. As in the fire clay drains, do not if it possibly can be avoided, use square branches. Inspect the inside of the branches to see that no ridge is there, a ridge sometimes occurring in the casting at the junction of the cones. Another point to be particular about is where a pipe is to be cut to make a short length. Do not allow a jagged edge to be used, as the consequence will be that when the oakum is put in some of it will be almost sure to get into the pipe thus, and form an obstruction. At the junction of lead and iron pipes I would advise you to use copper flanges, as brass is more liable to corrosive action than copper.

ARCHITECTURAL GUILD.

THE Architectural Guild held its monthly meeting at Long Branch on Thursday afternoon, the 9th of August. There was a very good attendance and the afternoon was spent in a very pleasant and profitable manner.

ARCHITECTURAL EDUCATION IN THE STATES.

UNDER the above heading the *American Architect* has a lengthy article on the architectural instruction given in the Massachusetts Institute of Technology. As it is the expressed purpose of the Minister of Education for Ontario to establish a Chair of Architecture in Toronto shortly, the course of study prescribed in the Massachusetts Institute published herewith will be of interest to those who may intend to study architecture in our own country. The regular course, as we mentioned last month, extends over four years, but a special course of two years has been planned for students who cannot devote the longer period to this branch of study. The special course is as follows :

FIRST YEAR.

FIRST TERM.	SECOND TERM.
The Orders and Elements of Architecture.	Original Design.
Sketching and Water-Coloring	Sketching and Water-Coloring
Mechanical and Free-Hand Drawing.	Mechanical and Free-Hand Drawing.
Materials.	Shades, Shadows, and Perspective.
Elementary Mechanics.	Common Construction.
Architectural History.	Graphical Statics.
	Architectural History.

SECOND YEAR.

FIRST TERM.	SECOND TERM.
Original Design.	Original Design.
Sketching and Water-Coloring	Sketching and Water-Coloring
Specifications.	Specifications and Contracts.
History of Ornament.	History of Ornament.
Problems in Construction.	Planning.
Ventilation and Heating.	Iron construction.
Working-Drawings and Framing.	Schools, Theatres, Churches.
	Ventilation and Heating
	Surveying.
	Stereotomy.
	Problems in Construction.

The regular course is the same for all departments of the Institute during the first year, and is confined to general studies, with the single exception of a large amount of mechanical and free-hand drawing. No one is allowed to continue in the department who does not have credits in mechanical drawing, including geometrical drawing, shades and shadows and descriptive geometry.

The regular course is as follows :

FIRST YEAR.

FIRST TERM.	SECOND TERM.
Algebra.	Algebra.
Solid Geometry.	Plane Trigonometry.
General Chemistry.	General Chemistry.
Chemical Laboratory.	Chemical Laboratory.
History of the English Language.	Political history since 1815.
English Composition.	French (or German).
French (or German).	Mechanical and Free-Hand Drawing.
Mechanical and Free-Hand Drawing.	Military Drill.
Military Drill.	

SECOND YEAR.

FIRST TERM.	SECOND TERM.
Materials.	Original Design.
Architectural History.	Common Constructions.
Drawing.	Architectural History.
The Orders and Elements of Architecture.	Shades, Shadows and Perspective.
Analytic Geometry.	Sketching.
Physics.	Differential Calculus
Descriptive Geometry.	Physics.
Political Economy.	English Rose.
German.	German.

THIRD YEAR.

FIRST TERM.	SECOND TERM.
Original Design.	Original Design.
Sketching and Water-Coloring	Sketching and Water-Coloring
Working Drawings and Framing.	Iron Construction.
Lecture on Fine Art.	Kinematics and Dynamics.
Integral Calculus.	Strength of Materials.
German Statics.	Stereotomy.
Structural Geology.	Physical Laboratory.
Physics : Lecture and Laboratory.	European History.
German.	German.
	Acoustics.

FOURTH YEAR.

FIRST TERM.	SECOND TERM.
Advanced Original Design.	Advanced Original Design.
History of Ornament.	Sketching and Water-Coloring
Sketching and Water-Coloring	Planning.
Problems in Construction.	Schools, theatres and churches.
Specifications.	Problems in Construction.
Strength of Materials.	Specifications and Contracts.
Lecture on Fine Art.	Constitutional History.
Heating and Ventilation.	Heating and Ventilation.
Advanced French.	Advanced French.
	Thesis Work.

The two-year special course thus includes the mechanical and free-hand drawing of the first year of the regular course, the drawing and design of the regular second and third years, and the more strictly professional lectures of the second, third and fourth years, with a practical course of its own in trigonometry and graphical statics, without the higher mathematics, which are pursued quite extensively during the four years' course.

OUR ILLUSTRATIONS.

CHURCH AT ALMONTE, ONT.

STORE FRONTS FOR MESSRS. JOSEPH MCCAUSLAND & SON, TORONTO—DARLING & CURRY, ARCHITECTS.

DETAIL FOR VERANDAH.

HOUSE AT 399 WELLESLEY STREET, TORONTO.—KNOX & ELLIOTT, ARCHITECTS.

W. T. Whitepay, architect, late of Vancouver, B. C., has moved to San Diego, California, and opened an office.

Mr. James Wright, architect, of Montreal, has taken a partner in the person of Mr. Findlay. The firm name is now Wright & Findlay.

PERSONAL.

Mr. C. Schreiber, Chief Engineer of Government railways, is at present on the Pacific Coast.

Mr. Gobeil, secretary of the Public Works Department, has returned to Ottawa from the Isle of Orleans, where he spent some weeks recruiting his health.

It is rumoured that Mr. Collingwood Schreiber, Chief Engineer of Government Railways, will shortly resign his position, and that Mr. Walter Shanly, M. P., will be asked to become his successor. It is not considered probable that Mr. Shanly will accept.

HAMILTON.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

SINCE my last report, I regret to have to say that building prospects in Hamilton have not improved. There have been no contracts let for the number of private residences that were in contemplation in the spring, and very few tenement buildings have been erected this year—so different to previous years when whole blocks were built by those enterprising contractors, the Patterson Bros., of this city. In fact it is understood that they don't intend building any more for instalment speculation, as a number of dwelling houses built by them in this place remain undisposed of and to let; in fact, they have concluded that the procedure did not pay. It is quite apparent that the bad result of the strikes is having its effect, and there is little or no work for the building trades, who will have to face a long winter after a comparatively idle summer, and without the usual provision being made for the time when there is never work to do. I understand that the same state of things exists in Toronto and elsewhere. One would think that the unions would seriously consider the position, and change their programme.

The work on our new City Hall is progressing favorably now that the stone, which is brought from Nova Scotia, is coming to hand, and a number of stonecutters and masons have steady employment on the job. The contractor, Mr. Pigott, deserves great credit for his indomitable energy and perseverance, having had to contend with the most determined opposition of the labor unions, who made every effort to prevent the work from being carried on in opposition to their absurd regulations.

I am glad to see that the action of the Provincial Government in engaging a foreign architect to prepare plans for the new Parliament Buildings in preference to Canadian talent, is being condemned, and as the adopted designs are inferior to those prepared by the Toronto architects, and will cost vastly more for the building, there must be a very unpleasant reflection for the responsible parties. But when Canadian architects become incorporated and united as a body they will not be treated thus unfairly.

I am glad to say that our Building Inspector's book is ordered to be accurately kept in future, proper entries being made by the proprietors or their architects, so that hereafter I can forward you a correct statement of all new buildings to be erected in Hamilton.

The strength of fire-clay as a building material says one who ought to know can hardly be estimated. Recently a piece of beam filling, containing about three square feet, designed simply to be used as a ceiling and not intended to carry the weight of the floor above, was placed on supports and loaded with a weight of 5,000 pounds, which it carried without any sign of giving. That was about 1666 pounds to the square foot, and the strongest floors now made are only designed to carry about 300 pounds to the foot. I didn't see the use of making the test, as the article in question carried no weight but its own, but the architect made it and the clay stood it. Fire-clay is now subjected to a heat of 2000° in baking, is said to be a greater heat than is raised in the blast furnaces in which it is placed to reduce ore. The uses to which fire-clay brick, tiling and tubing are being put in modern fireproof buildings are now almost innumerable, and the end is not yet,

Architects, Engineers Builders, Contractors and others are invited to contribute to this department of their experience regarding methods of construction. Also particulars—such as location, character, cost and name of owner, etc.—of any works of construction in progress.

PROPORTIONS OF THE PARTS OF THE STAIRS.

THE breadth of the steps of common stairs is from 9 to 12 inches in the best staircases in private and public buildings. In such buildings the breadth ought never to be less than 12 inches nor more than 15 inches.

A step of greater breadth requires less height than those of less breadth. The first person who attempted to fix the relation between the height of the riser and width of the steps was Mons. Blondel, in his "Cours d'Architecture," if a person walking on a level plane over P space, at each step and the height which the same person could ascend vertically at one step, with equal ease was H ; then, if *h* be the height of the step, and *p* the width, the relation between *p* and *h* must be such that when $p = P$, $h = 0$, and when $h = H$, we must have $p = 0$.

The conditions are satisfied by an equation of this form ;

$$h = H - \frac{p}{P}$$

Blondel assumes 24 inches for P, or the step a person can make with ease on a level plane 12 inches for H, or the height a vertical step can be made with equal ease ; and putting these numbers for P and H, in our equation, it becomes $h = \frac{1}{2}(24 - p$, which is precisely Blondel's rule. We do not think that the rise, which is equal to a level step of 24 inches is more than 11 inches, but it would be difficult to ascertain the ratio exactly, and the above are so near and agree so well with our observations on stairs of easy ascent, when the breadth of tread includes the nosing, that they may be taken from the elements of a practical rule.

Hence, according as the tread *p*, or the rise *h*, is given we have

$$h = \frac{24 - P}{2} \text{ ; or } p = 24 - 2h.$$

Thus, if the height of a step be 6 inches, then $p = 12$, and $\frac{24 - 12}{2} = 6$, the rise for a step that has a tread of 12 inches, including the nosing, ought not to exceed an inch, we have these general rules :

TO FIND THE PROPER RISE FOR THE STEPS WHEN THE TREAD IS GIVEN.

From 24 take 1=23; from the remainder, 23, subtract the breadth of the tread in inches, and half the difference will be the rise.

Thus, if the tread be 12 inches, then

23
12
—
2)11
—

5½ inches, the tread required.

TO FIND THE PROPER TREAD WHEN THE RISE FOR A STEP IS GIVEN.

Subtract twice the rise from 23 and the remainder will be the proper width of the tead.

Thus, if the rise be 5 inches,

23
2 × 5 = 10
—
13 inches, the tread required.

Again, if the rise be 7 inches, then

23
2 × 7 = 14
—
9 inches, the tread for a step with a rise of 7 inches.

Before we set out the stairs in a building we must consider the height of the story and determine upon the height or rise of the steps, which being done we must take the height of the story in inches and divide the number of inches in the height of the story by the least rise proposed for a step ; if the result be fractional, divide the height of the story by the number, neglecting the fraction, and the result will be the exact number of steps. For example, if the height of a story is to be 10 feet 4 inches, and the height of a step is to be not less than 7 inches, how many steps will be required in order to ascend to the given height ?

Here (10 feet 4 inches) X 12—124 inches.

Now $\frac{124}{7} = 17$ 5-7, which neglecting the fraction, is the number of steps required ; and $\frac{124}{17} = 7$ 5-17 inches, the height of the rise.

But if there be no winders in the stairs, an even number of steps will be more convenient than an odd number. Therefore either 18 or 16 may be adopted ; if we must have 16, $\frac{124}{16} = 7\frac{3}{4}$ inches, which may answer very well ; but if we are still confined for room on the plan we must have recourse to winders.

The breadth of a staircase may be from 5 to 20 feet, according to the destination of the building ; but if the steps be less than 2 feet 4 inches in length, they become inconvenient for the passing of furniture, and such narrow stairs should be avoided, even in small houses.

When the height of a story is very considerable, resting places become necessary. In very high stories that admit a sufficient

head room, and where the plan or area for the stairs is confined, the stairs may make two revolutions in the height of the story—that is, in ascending or descending we may go twice round the newel or well hole; and this becomes necessary, otherwise the steps would be enormously high, or extravagant floor-room must be allowed for the stairs.

As grand and principal staircases require broad and low steps, they therefore require to be numerous, and admit of only one revolution in the height of the story, the plan being always proportioned to the height of the buildings.

It may not be amiss to give an example here for a principal building, in order to show the number of steps both in the grand and in the common staircase.

For this purpose, suppose the story of a house to be 16 feet high from floor to floor, the height of the steps of the servants' staircase to be not less than 7 inches, and that of the grand staircase to be not more than 6 inches.

Now the height of the story reduced to inches is 192, and first dividing by 7, thus:

$$\frac{7)192}{27\frac{1}{7}} \quad \text{Therefore,} \quad \frac{192}{27\frac{1}{7}} = 7\,1\text{-}9 \text{ rise.}$$

Then, for the principal stairs, dividing by 6, thus:

$$\frac{6)192}{32} \text{ steps.} \quad 6 \text{ inches the rise.}$$

So that the servants' stairs require 27 steps and the grand staircase 32; but the space or area required to execute the common stairs must therefore have two revolutions in the height.

This being allowed, will reduce the area to half of what it otherwise would have required.

We must, however, observe that when the height of the story is less than 14 feet the stairs will not admit of two revolutions.

In planning a large edifice particular attention must be paid to the situation of the stairs, so as to give the most convenient and easy access to the several rooms.

With regard to the lighting of a grand staircase, a lantern-light or a sky-light with a horizontal light under it is the most appropriate.

By introducing these more effect is produced and the light admitted is more powerful, but, indeed, where one side of the stair-case is not a portion of the exterior wall a lantern or skylight is the only way in which the light can be admitted.

In stairs constructed of stone the steps are made of single blocks; quarter-spaces and half-spaces are, however, often made in two or more pieces and jogged together; but when the material is wood, the risers and treads must be made of boards, which are fastened together with glue, brackets and screws; and these, though done with the utmost care, can never be made so firm as not to yield a little to the passenger.

To prevent the stairs from becoming rickety, in length of time, the steps must have an additional support under them, and, that the appearance may be both light and pleasant, the whole must be confined to as small a space as possible.

This additional woodwork, which is necessary to the firmness and durability of the construction, is called the *carriage of the stair*.

The carriage of the stair usually consists of several pieces framed together, and each flight of steps is generally supported by two pieces of timber, placed under the steps, and parallel to the wall, being fastened at one or both ends to pieces perpendicular to the walls.

The pieces of timber which are thus placed under the steps are called *rough strings*.

The subject of hand railing is too intricate and would require more space than is allotted to us to discuss it here.

NOTE.—A portion of the notes on the proportions on the steps and risers are the substance of that given by an anonymous writer in a English work on carpentry and joinery.—D. W. King, in *Building*.

BOWMANVILLE.

(Correspondence of THE CANADIAN ARCHITECT AND BUILDER.)

THE private tender of Messrs. Munson & Bunney for the rebuilding of the Congregational church and vestry has been accepted by the building committee. Before its recent destruction by fire this was one of the finest churches of its size in the Dominion, and a view of the plans which have been prepared by Mr. Bunney warrants the opinion that it will undoubtedly retain its reputation. The church is to be finished and ready for occupation by January next.

Our School Board has not decided on any plans yet. During the year there has been nothing but wrangling over them, and two or three architects have been discharged. Messrs. Power & Son, architects, of Kingston, are now engaged preparing plans, and it is hoped the Board will adopt them and proceed at once to erect the building.

WINNIPEG.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

THE building trade in Winnipeg has not been very brisk this season, but the prospects are very encouraging. There are a few small private residences being erected, but except the Herdler block which is now almost completed, there have not been any business blocks built this year. Bricklayers and masons have very little to do.

Painters and plumbers are busy. Carpenters are well employed, there being several working outside the city on the stations for the Red River Valley railroad, and also on several elevators that Messrs. Timewell & Son are architects for. C. F. Stevens, is erecting a fine residence in Fort Rouge. Mr. Wheeler is the architect.

Messrs. O'Connor & Brown, proprietors of the Queen's hotel, are advertising for tenders for alterations and improvements.

The Winnipeg waterworks are putting down several miles of water service and the city is adding to its drainage system, Mr. Doidge, contractor, has about finished his block pavement contract.

The new buildings for the General Hospital are nearly finished.

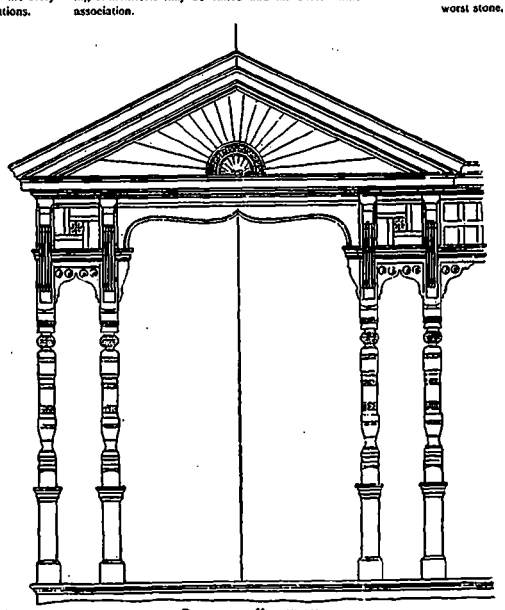
OTTAWA.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

BUILDING operations here have been much brisker this summer than for the past ten years. A large number of private residences, schools, churches and business blocks are being erected. It is estimated that the building operations for the present season will amount to $300,000.

The competitive designs, under motto, for the new police station for which $15,000 has been voted, have been before the Property Committee of the City Council for the past three weeks, but up to the present time they have not been able to decide upon the most appropriate plan. Four designs were sent in, and although under motto, one of the competitors signed his specification, and in place of ruling him out for irregularities, his plan is still before the committee. This is one of the beauties of competitions.

The want of an architectural association is seriously felt here. An effort has been made at different times to form an architects' guild in this city, but the trouble appears to be to define who ar qualified to become members. It is to be hoped that through the CANADIAN ARCHITECT AND BUILDER the architects of the different cities and towns will give their views on the necessity of a national association, and that during the coming winter a meeting of architects may be called and an effort made to form an association.



DETAIL FOR VERANDAH.

The contract for the new Roman Catholic church for this city has been awarded to O. J. Lyons for $74,500. It is expected that the foundations will be laid this fall, and the work completed in two years.

For seventy yards of surface provide 1,000 pieces of lath, and eleven pounds of lath nails.

For 100 square feet of roof, 2,000 shingles, laid four inches to the weather, and five pounds of shingle-nails, will be necessary.

Mr. Sylvester J. Campbell, builder and contractor, Galt, Ont., has disappeared, leaving a large number of sorrowing creditors.

Mr. John Purdon has been given the contract to build an additional wing to the asylum at London, Ont., at a cost of $20,000.

Messrs. Harding & Leathorn, of London are laying the new waterworks mains of Goderich. There will be 35,000 feet all told and 47 hydrants.

In estimating amounts of siding and flooring, allow one-fifth more than the surfaces to be covered for the lap in siding and the matching in the flooring.

The contract for the construction of a new water-works system at Brantford has been given to the Waterous Company, of that city at the price of $106,278.

There are in Canada 84 loan and building societies, of which 66 have their headquarters in Ontario. The subscribed capital of the Ontario companies amounts to $72,878,215.

A Brantford paper makes the statement that the members of the London School Board have had their portraits carved in stone and placed over the windows in a new building, and are now quarreling with the artist because he didn't make them appear better looking.

For some time past builders in Germany have resorted to the use of a composition of cork, sand, and lime, molded into bricks, for the construction of light partition walls. This is said to exclude sound better than ordinary brickwork, while being light and a good non-conductor of heat and cold.

We learn from the Victoria, B. C., papers that building operations are very brisk in that city at present. Architects have never been so busy before, the brick and lumber yards have all they can do to supply the demand for materials, and carpenters and bricklayers are fully employed. Over half a million dollars worth of new buildings are in course of erection.

The Canadian correspondent of the *Liverpool Journal of Commerce* says that "in all parts of Nova Scotia there is great activity in building, and there is scarcely a town or village that does not show material improvement. A considerable number of Nova Scotians have recently returned from the United States with a large stock of experience, which they intend to utilize for the benefit of themselves and their own country.

A brick dwelling with a shingle roof is estimated to last 75 years, and depreciates 1½ per cent. per year. The plastering therein 20 years, 3½ per cent.; painting, 7 years, 14 per cent.; shingles and outside blinds, 6 per cent.; cornice and base, 48 years, 2½ per cent.; sheathing, 50 years, 2 per cent.; flooring, 20 years, 5 per cent.; doors, windows inside blinds, stairs and newel, 30 years, 3½ per cent.; building hardware, 20 years, 6 per cent.; sills and floor joists, 40 years, 2½ per cent.; dimension lumber, 75 years, 1½ per cent.

Captain Shaw, Chief of the London Fire Brigade, in a magazine article on the protection of dwelling houses from fire, says: "there is a great deal of faulty construction in houses in consequence of architects being seldom employed. Cracked walls are almost sure to give way in case of fire. 'Party' walls should be carried at least three feet above the highest part of the roof. All roofs should be provided with windows or openings by which the inmates of a house could escape in the event of the stairs becoming impassable. The best material for stairs is wrought iron and the worst stone, since the latter yields to an amount of heat which does not affect ordinary respiration. Whenever a house has both wooden and stone stairs the inmates should, in case of fire invariably make for the wooden stairs, as affording the only hope to escape.

In joinery, as in all systems of construction, says Viollet-le-Duc, the material used must regulate the mode of joining and determine the form, wood being a material possessing special properties, that must be considered in arranging works in joinery as well as those in carpentry; mediæval artisans never abandoned this correct principle. A knowledge of wood is one of the conditions required of the joiner; after acquiring with its texture and strength. The best wood for joinery is oak, on account of its stiffness, the delicacy of its fibres, its uniform hardness, its durability and its beauty. Hence, at least in France during the middle ages, oak was exclusively employed in the joinery of buildings.

The subject of masonwork in freezing weather continues to occupy a good deal of attention in the technical journals. The stories of the excellence of stonework laid with hot mortar in Stockholm and other Northern cities in winter, and then allowed to freeze, have multiplied, while, on the other hand, a recent report by an American engineer, Mr. Emil Kuichling, appears to show conclusively that mortar, particularly if made with cement, and used hot, lost a large part of its strength; the resistance, as determined by actual experiment, of briquettes of neat cement, mixed hot and then exposed for seven days to the air, being, on an average, only one-eighth that of briquettes of the same cement, mixed at the same time, with water having the temperature of the air, and then exposed in the same way. Curiously enough, briquettes made with Portland cement and cold water would not freeze, even at a temperature of thirteen degrees Fahrenheit, unless exposed to the wind, and the setting process appeared to go on undisturbed even at this temperature; while briquettes made of the same cement, mixed with hot water, invariably froze. With natural cements the resistance to freezing was much less than with the Portland, but no details are mentioned on the subject. The addition of salt to water, sometimes made to prevent freezing, is found to injure native cements, while Portland is not affected.—*American Architect and Building News.*

INTERIOR DECORATION.

THE instances in which rooms are painted in oil or distemper mainly free hand with elaborate ornaments, says the *Painters' Magazine*, is increasing. The difference between the undeviating regularity of pounced figures and those executed otherwise is apparent. Free hand treatment may, of course, be advantageously combined with the use of the stencil, particularly where scrolls form part of the design, as scrolls demand exact repetition of form.

A somewhat elaborately painted apartment, the scheme being very felicitous, has the wall space in distemper; the tone or tint of color, which is neutral and of a slightly green hue, is made from lime blue and raw umber mixed with white, the umber being of a golden tint. The color of this wall space is fitted to contrast well with engravings, water colors or oil paintings, as well as with the warm colors presented in the room. The wall is paneled, the stiles being painted in a slightly darker shade of the same color with a touch of Indian red added. This with the perpendicular lines gives sufficient distinction to make the stiles appear of an entirely different color without being too strong. The dado is painted with a darker tone of color made with raw umber, Brunswick green, Indian red and white in oil colors. Had the dado been in distemper, lime blue instead of green would have been best introduced into the mixture. The corners of the panels are stenciled with dark brown made from umber, Indian red and black, and the pattern on the panels in a slightly lighter shade of the same color as the panels themselves, sufficiently strong to show the pattern clearly. The lines round panels are done with a strong dark, dull gold color made with ochre and umber alone. The skirting is done with the same color as the corners of the pattern are stenciled with. Underneath the frieze is a picture moulding painted black. The whole of the breadth of frieze is painted the same color as the wall space, but with a little ochre and Indian red added; the figures are leafage in gold lines bordered with fine black lines.

She parlor of a house recently finished has the wall space between skirting and frieze painted without ornament in lavender of a delicate shade. The frieze is a light buff with leaf design *in gilt*, veins being outlined in dark brown; a broad line of guilt runs below. The moulded cornice is a lavender tint with upper section a soft light shade of sea green with light blue edge, the moulding picked out with gilt. The grounding of outer stiling of ceiling is of great breadth, painted in with a beautiful shade of lavender bordered by light blue lines and is studded with medallions on a ground of black that presents a beautiful combination of brilliant colors so selected and toned as to have a rich subdued effect. The inner edging has border in leaf on a delicate blue ground in gilt and cherry red. As each end of the ceiling, which is of oblong shape, is a large medallion in bronze colors, the figures constituting a vase with flowers and foliage, griffins *forming* the handles. The stucco centre piece shows gilt, sea green and soft pink beneath the open work, the projecting portions showing a brilliant combination of colors, harmonized and pleasantly contrasted.

The dining room, as well as the library, has always provided suggestive symbolical designs for painters and decorators. The pursuit of game, the netting of fish, the husbandman's labors, the vintage and the orchard have formed the subjects of friezes, sometimes in processional form, and are occasionally now introduced, but general taste would seem to incline against these too direct allusions to the purposes of the room. We have met in the free-hand decoration of a sleeping room a symbol as an ornament for the walls eminently appropriate, namely, the poppy, the emblem of sleep. The flower itself is well suited for ornament, particularly, as in this case, with a varied disposition of leaves and stalks. The design is admirably treated in blue and red on an ecru ground. Although there are no blue poppies the use of other colors than the natural ones is conventionally correct. The frieze is of sulphur yellow with gilt, and the ceiling, there being no cornice, is of a light bluish tone, with border consisting of band of series of narrow lines in red.

We lately saw a hall the chief wall space of which was a pale old red, the matting dado also red but of deeper tone; the frieze too was red with an all-over interlacing pattern in paler gold red, outlined heavily with red gold; the ceiling was a warm drab with red gold and pale red interlacing pattern over it, the drab by the contrast giving a distance effect. The hall floor was painted in an antique red color, and had a central Smyrna rug in old reds and ecrus with touches of olive and dull blue. Two portieres, one at the entrance of the staircase hall and the other of the library, were of Indian red cotton canvas. The abundance of red was not displeasing.

A north room with antique oak has a wall paper in two shades of light shrimp of foliage pattern with a frieze of light olive green of the same style paper, separate from each other by an oak picture rail; the ceiling is a lighter shrimp pink ground with golden olive figures.

The best time to paint the outside of a house is early in the winter, or in the spring, when the air is cold and no dust is flying.

The first, second and third coats of paint, on the outsides of buildings, should be prepared by mixing the white lead with boiled linseed oil, and allowing each coat to dry hard before applying the next.

A firm in Brooklyn is manufacturing a species of metallic relief for wall decoration, consisting of thin sheets of tin, brass, copper, steel, aluminum or other metal embossed in beautiful patterns, which are simply decorated in colors and nailed on wall or ceiling.

Parts of wood to be painted which are soiled by smoke or grease are to be washed with a solution of saltpetre in water, or with very thin lime whitewash. If soap-suds are used to wash off the smoke or grease, they should be thoroughly rinsed with clean water or the paint will not harden.

White or plain ceilings no longer make even a pretence of existing. To paper the ceiling is as absolutely necessary as to conceal the white monotony of the wall. Papers with harmonizing accessories, as stilings, extensions, corners and centres, etc., are now made expressly for the appropriate aspect of the ceiling. The sides once settled in character the ceiling arrangement will follow with competent choice, without difficulty or dilemma. The color, tone and harmony of the ceiling establishes the art and beauty temperament of the entire room—just as sunshine or shadow supplies the comfort or cheerlessness of the day.

We learn from the *Builder and Wood Worker* that Lee Yoing, a skillful Chinese carpenter and joiner, has arrived from San Francisco to take charge of the interior beautifying of the new Chinese town hall, at No. 16 Mott street, New York, which is now in process of erection. Lee is said to be the most skillful woodworker in the United States. He can build a box, a table or an entire house without the use of a nail, and can carve any figures on wood as easily as a Chinaman writes firecracker letters. His stock of tools is a curiosity shop to the ordinary American eye. They are of all sizes and shapes, and mostly of roughly wrought iron or steel.

Frequently it is found undesirable to paint stone trimmings of a house which have been discolored; or a stone basement of a wood or brick house may be in the same condition. Monsieur Diebhabert, of Paris, has adopted successfully the method of cleaning the stone on the walls of the quays of the Seine where it flows through that city. To a paste composed of a solution of soda and lime is added a little chloride of lime; this is mixed to the consistency of honey and spread over the surface and allowed to remain two or three hours. After this treatment a mixture called sulpho-chlorhydric is passed over the surface with a large gutta percha brush, which forms a kind of glue on the stone; afterwards the surface is syringed with the same liquid. This forms an adherent paste, which is afterwards scrubbed off. The sulpho-chlorhydric mixture is composed of sulphuric and hydrochloric acids mixed empyrically according to the necessities of the case. The most besmirched stone regains under this treatment its pristine appearance. It often happens that discolored stonework detracts from the effect of the painter's work on the rest of the facade; sometimes the stone is begrimed with a slimp deposit which resists the application of a color coating.

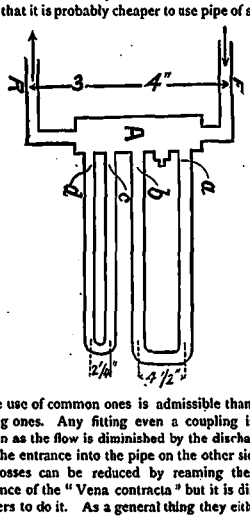
The moths have taken wildly to the electric light, and, in fact, love it not wisely but too well, says a Brantford paper. Every morning the linemen throw out thousands of these insects from the globes where they have been attracted by the light and killed by the current. Lineman Harvey Tombinson has selected the most perfect and rarest specimens on his usual morning round, and has now got one of the most complete collections of Canadian moths in the city.

HOT WATER HEATING.

THE motive power gravity which causes circulation in a hot water heating plant is brought into action not by the expansion of the water, but by its contraction. To make this clear, says a writer in the *Northwestern Architect*, consider that the normal condition of the plant when in operation is with the hottest water in the place and that what takes place in the actual starting of the apparatus is a *changing condition*. Let us then imagine the apparatus to be filled with hot water and just enough fire to keep the temperature at the top of the boiler constant to be maintained.

In the marginal sketch B represents the boiler, R, a radiator, C a coil, T a tank, F, a flow or supply pipe and d d return pipes. On account of the greater amount of surface exposed, the water in the pipes d d, soon becomes colder than that in F and contracts, the loss in bulk is "made good," from the tank, and consequently the water in d d is heavier than an equal horizontal section of water in F and B and falls down forcing up an equal bulk not equal weight of warmer water. This would be the case even if d d entered the top instead of the bottom of the boiler and if the surfaces exposed were exactly equal it would be impossible to make all other conditions approach equality near enough to maintain a perfect balance and prevent a circulation up one pipe and down another. A single pipe standing up will have a slight circulation up the centre and down the outside so long as the water in the boiler is hotter than that in the pipe.

It should be constantly borne in mind that more motive power in a hot water plant is only to be obtained by an increase of the difference in the temperature of the supply and return pipes and that the increase will either lower the average temperature of the radiators thereby decreasing the amount of heat obtained from them, or will raise the temperature of the boiler and lessen its efficiency by which we mean the ratio between the heat theoretically obtainable from a given quantity of fuel and that actually obtained. Therefore we should look well to the resistances to be overcome and see that the piping is so arranged as to make as little as possible. This end is best obtained by directness, using but few fittings and especially avoiding elbows. Those in common use have been shortened by competitive manufactures until many of them are on a radius of less than one diameter. Longer ones can be procured but so few of them are used that no dealer carries any stock of them and the price is so high that it is probably cheaper to use pipe of such size



that the use of common ones is admissible than it is to buy long ones. Any fitting even a coupling is an obstruction as the flow is diminished by the discharge into it and the entrance into the pipe on the other side of it, these losses can be reduced by reaming the pipe to semblance of the "Vena contracta" but it is difficult to get fitters to do it. As a general thing they either think

it a "useless refinement" or forget it. To give some idea of the relation between the resistances and the difference of temperature necessary to overcome them the following experiment is reported, it was, however, made for another purpose.

A represents a one inch branch tee with one and one-fourth inch inlet and outlet, distance from center to center of branches two and one-fourth inches, the one inch pipes were three feet long the two upper ones connected at their ends with two elbows and a nipple the two lower ones with a return bend. The pipes F and R are the flow and return pipes one and a half inch to the elbows which were directly connected to the upper and lower drums of the Walker Pratt boiler. Thermometers were inserted at a, b, c and d, and in a pipe connecting the front end of the drums to give the temperature in the boiler. The temperature of the room was 74 degrees at boiler 183 degrees.

$$\left.\begin{matrix} a=180^\circ \\ b=173\tfrac{1}{2}^\circ \end{matrix}\right\} \text{loss } 6\tfrac{1}{2}^\circ$$

$$\left.\begin{matrix} c=180 \\ d=172 \end{matrix}\right\} \text{loss } 8^\circ$$

The difference between "a" and the boiler was in part caused by the obstruction of two and one and one-half inch globe valves which are not fit for any use whatever on a heating plant and should never be put on good work, they were used in this case because they were on and the boiler filled and fired when it was determined to make the experiment, of course the "head" in the case of the one inch pipes is small being only that due to the contraction of a column two and one-fourth inches high cooled four degrees in one case and one four and a half inches high cooled three and a fourth degree in the other. If we assume that the losses of heat in the upper and lower circuits are equal it follows that the quantity of water flowing through them varies inversely as the losses in temperature or as sixteen to thirteen. The effective head in each circuit is practically proportional to the height multiplied by the loss in temperature or as twenty-six to sixteen, the velocities are as the square root of the heads and the sections being the same the flows are in the same proportion, this gives a theoretical proportion of fifty-one to forty. The circulation through the body of the branch tee with the head due to the contraction of a column three feet and four inches high was so rapid that the slow stream of water of 173½ degrees temperature flowing in at "b" produced no appreciable effect on the thermometer at "c" although it must have made some difference. The thermometers used were only graduated to degrees and were read to half degrees with difficulty. There are many variations in the manner of "piping" houses. The manufacturers of "heaters" all show in their catalogues a large number of small pipes leading from the top and returning to the bottom of the heater and advise their customers to do their work in this way. It is not considered the best way by men of large experience however. It is quite probable that the manufacturers take this course because it requires less skill and judgment to make a plant work this way than it does to proportion the pipes for a "branch" system, and they sell their goods to many dealers who are not experienced in the business. It is more expensive in pipe as a rule and makes the cellar hotter to have many small pipes than to have one large one. The carrying capacity of pipe having considerable length increases as the square root of the fifth power of their diameter. Their radiating surface practically as their diameter and the price somewhat faster but nothing near to their capacity ratio.

Moncton, N. B., will discard gas in favor of the electric light.

Mr. Peter English is negotiating for the sale of the Galt gas works.

The city of London wants a competent assistant water works engineer.

The City Engineer of Halifax, N. S., has recommended the City Council to discourage the use of hopper water closets.

The Brantford, Ont., Electric Light Company have put in a new thirty-five lamp machine which enables them to supply ninety-five lights in the city.

The secretary of the Provincial Board of Health, Dr. P. H. Bryce, states that the Province of Ontario is at present freer from contagious diseases than it has been for years past.

The drainage of buildings requires to be carefully looked after in the interests of the health of the occupants. A serious attack of typhoid fever was the result of a stoppage of a drain connected with the Carmelite Convent, Montreal.

L. Pasteur, the celebrated French physician has expressed the opinion that the proposed Victoria hospital at Montreal may be erected at a distance of 230 metres from the city reservoir without danger of contamination of the water supply.

The Stratford, Ont., Gas Co. are putting in what is claimed to be the largest gas engine on this continent as an auxiliary to the water wheel in their electric light station. Ordinary illuminating gas is used as fuel.

It has been estimated that a modern brick dwelling of medium size requires about 10,000 gallons of water in its construction, much of which is still present when the workmen withdraw. Heat is of less use in getting rid of this moisture than free ventilation.

Mr. Kirk, plumbing inspector, Toronto, makes the suggestion in the columns of a couple of our American centemporaries that the plumbing inspectors should form an association and meet annually to discuss matters of interest. The surgestion appears to have been favorably received, and will doubtless bear fruit.

The New York board of health will endeavor to deodorize the foul earth thrown up in digging trenches for gas and water-pipes by using bromine. A few years ago says the *Sanitary News*, the health officer of Detroit, Dr. O. W. Wight, determined to try the effect of disinfecting the sewers during an epidemic of scarlet fever and diphtheria. Seventy-five thousand pounds of dissolved copperas were poured into the sewers. Three tons roll sulphur were burned in iron pails and lowered in the sewers and the sulphur smoke and sulphurous acid gas filled every drain and sewer pipe. The result was a great abatement of diphtheria and an almost entire cessation of scarlet fever. It is believed bromine will disinfect sewers quite as effectually and much more pleasantly.

Factory owners at Carlisle, says an English paper, have made no objection to the utilization of the tall chimneys as ventilators for the sewer of the town. Already twenty-nine are in operation. From experiments made it was found the amount of air passing up the chimney was 16,596 cubic feet, and the velocity was 1,202 lineal feet per minute, or more than a mile in five minutes. On windy days the motion would be quicker. The difference between the air of the sewers and atmospheric air is suggested when it is said that the latter has occasionally three times the velocity of the former—or, in other words, the air from sewers is heavy. No harm can arise to the workers in the factories from the extra employment of the chimneys, and such powerful ventilators must remove the danger attending sewers.

Mr. Allen Pringle in a letter to a Toronto daily paper on the subject of impure water, urges as the best preventative of sickness from this cause, the use of water filters. He further advises his readers to place no dependence on the doctor, as "his interests unfortunately run exactly parallel with the impure stream." The latter statement thus generally applied is a very rash one indeed. There may be unprincipled doctors who fill their pockets at the expense of the health and lives of their patients, but it is a slander to include all, or even a majority of physicians in this category. The Local and Provincial Boards of Health, which have labored so energetically and successfully to combat disease and to educate the public in the department of sanitary knowledge, are composed largely of medical men. The unwillingness of the public to learn what precautions are necessary against disease, or having this knowledge, the carelessness displayed in making the application of it, are the greatest hindrances in the way of lessening the extent of disease.

HOW TO SEASON TIMBER.

HOW to season timber so as to prevent the ravages of dry rot is something in which builders generally are interested. According to R. F. Francius, to preserve oak timber from dry rot it should be laid in large piles in salt water for a whole year, and so as to be completely covered with the water. By this means the salt penetrates the wood and the consequence is that it remains always free from dry rot and lasts twice as long as it would do without this preparation. If the wood can be put into sea water perfectly pure and free from all earth deposit it is so much the better, and on the coast it may be best kept in basins dug for the purpose. Care must of course be taken to lay it so that it cannot drift away. Where salt is very abundant, wood may be seasoned by covering it with a thick layer of that material, when the air is damp and foggy, without heavy rain. The salt also destroys dry rot in building, as may be proved by washing the wood infected repeatedly with strong brine made hot. New wood may be prepared for use in the some manner.—*Metal Worker.*

The Geneva, N. Y., *Courier* contains the following reference to the Dunning boiler, of which the Waterous Company, of Brantford, Ont., are the Canadian manufacturers:—"The *Courier* is pleased to refer to the incomparable Dunning boiler, the sales of which are almost phenomenally large and are constantly increasing. The industry has been closely watched by many Geneva citizens who have noted the steady and firm increase of plant, machinery, etc. The number of boilers now in use of this manufacture is probably larger than that of any other steam heating device.

Architects, Engineers, Builders, Owners and others are invited to send particulars of all kinds of constructionwork in contmplation, for publication in this department. Please state location, character and cost, and names of person or persons controlling the work.

LINDSAY, ONT.—A large opera house is to be built here.

SARNIA, ONT.—It is proposed to build a new separate school here.

STRATHROY, ONT.—The Baptists will build a new church to cost $5,000

GEORGETOWN, ONT.—There is talk of putting in the electric light here.

BELLEVILLE, ONT.—Improvements to St. Thomas' church are contemplated.

BOWMANVILLE, ONT.—The congregation of Trinity church will rebuild at once.

PETERBOROUGH, ONT.—An addition 90x30 feet will be made to the bridge works.

MADOC, ONT.—A by-law granting $8,000 for a high school has been carried.

PORT ARTHUR.—There is a proposal to spend $175,000 on a system of waterworks.

OTTAWA, ONT.—A new iron bridge is to be built over the Chaudiere River, P. Q.

PENETANGUISHENE, ONT.—A company has been formed to build a large hotel at Shean's Point.

REGINA, N. W. T.—About $60,000 worth of brick buildings will be erected here before the cold weather sets in.

ST. MARY'S, ONT.—The Town Council is visiting and inspecting the waterworks systems of other municipalities with the view of establishing a system here.

LONDON, ONT.—The Board of Works contemplates an expenditure of $20,000 on street improvements the present season.—The erection of a Normal school is being agitated here.

AYLMER, ONT.—Subscriptions are being taken to raise money for a memorial window to be erected in the new Presbyterian church in memory of the late P. M. Nairn, M. P. P.

STRATFORD, ONT.—Having got the electric light, an agitation is on foot for a system of sewerage.—The Council wants tenders for an iron bridge with stone abutments to cover a span of fifty feet.

KINGSTON, ONT.—St. James' church is to be improved at a cost of $8,500. The seating capacity will be doubled.—Tenders for the construction of a dry dock at Kingston will shortly be asked for, at an estimated cost of $300,000.

INGERSOLL, ONT.—Mr. Ed. Wassell, C. E., of this place, is prospecting and surveying the country around Ingersoll for the purpose of finding suitable water and site for a system of water works for that place.

HAMILTON, ONT.—A $5,000 addition is to be made to the Barton street school.—The congregation of St. James Reformed Episcopal church will build a fine new church at once.—A movement has been started with the object of erecting in this city an asylum for inebriates. Rev. Dr. Sexton can give particulars.

WINNIPEG, MAN.—Tenders are invited for the erection of station houses on the C.P. R., Pembina and South-western branches. On the Pembina branch stations will be built at Deloraine, Boissevain, Killarney, Thornhill, Pilot Mound, LaRiviere, Crystal City, Clearwater, Cartwright and Little Pembina. On the Southwestern branch stations will be put up at Treherne, Holland and Glenboro.

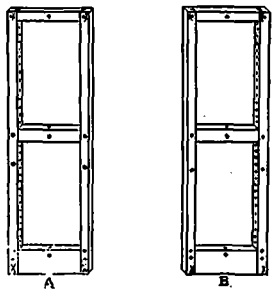
TORONTO, ONT.—Plans have been prepared for a new building for the Toronto Conservatory of music, designed to accommodate 2,000 pupils.—The following permits for the erection of new buildings have been issued from the office of the city commissioner during the last month: John Kidd, 2 storey and attic r. c. dwelling, Seaton st., cost $2,000; B. Hancroft, pr. detached 2 storey and attic brick dwellings, Bloor st., near Huntley, cost $10,000; Thomas Skippen, pr. s. d. r. c. dwelling, Baldwin st., cost $2,500; Ald. W. Hill, pr. s. d. 2 storey and attic bk. dwellings, Maitland st., cost $4,000; W. G. Holcombe, 2 prs. s. d. 2 storey and attic bk. dwellings, Spadina Ave., cost $12,000; Industrial Loan and Investment Co., 3 storey bk. factory, Lombard street; Mr. Foland, pr. s. d. 2 storey and attic r. c. dwellings, William st., cost $3,000; Consumers' Gas Co., 2 storey bk. boiler house, Berkeley st., cost $50,000; E. M. Moore, pr. s. d. 2 storey and attic r. c. dwellings, Bleeker st., cost $2,700; Consumers' Gas Co., 2 storey bk. meter house, Front st., cost $20,000; Mr. Muir, pr. s. d. 2 storey and attic bk. dwellings, Mutual & Maitland sts., cost $6,000; Mrs. Lawson, 5 att. 2 storey and attic bk. dwellings, Albert st., cost $6,000; J. J. Blain, pr. s. d. 2 storey and attic bk. dwellings, Rose Ave., cost $6,000; J. Waly, four att. 2 storey bk. dwellings, Sherbourne st., cost $7,000; C. R. Rundle & Co., five attached 2 storey and attic bk. dwelling, Moss Park Grove, cost $20,000; T. V. Gearing, pr. att. 2 storey and attic bk. dwellings and one 3 storey att. bk store, Gerrard street, east, cost $10,000; Mr. O'Rielly, pr. att. 2 storey r. c. dwellings, Agnes and Chesinut sts., cost $3,000; G. Noble, 3 storey bk. store, Ontario st. and Wilton Ave., cost $1,400; Mr. Black, 5 att. 2 storey and attic bk. dwellings, Gerrard st., west, cost $6,000; J. H. McKinnon, 2 storey and attic bk. dwelling, Jarvis st., cost $6,500; Thomas Thomasson & Sons, alterations and additions, King street, east, cost $2,000; Mr. Sharpe, pr. s. d. bk. houses, Maitland st., cost $7,5000.—Toronto University is to have a $45,000 building added to it for biological study.—The Toronto Normal School will have $20,000 improvements added to it.

MAKING BLINDS.

By Owen B. Maginnis.

As there are few mechanics outside of sash and blind shops who know how to properly make a pair of outside blinds, the following description showing how to commence and carry through a job of this kind may prove useful to any one who may have a pair to make:

Having the frame stuff (generally 1¼ inches thick in ordinary work,) sawn to the necessary lengths and widths, the first operation is to wind the stiles in this way: Take a pair, and having marked the face, sides and edges of each, lay one—which we will call the left stile—on the bench with the face edge from you and proceed to take a fore plane shaving off each top and bottom



corner on the stile as shown on the left hand side of the blind A. Do the same with the right hand stile keeping the face edge to you instead of from you like the last. When the rails are turned into these stiles the blinds will be in wind about a ¼ inch or the top right hand corner will hang in when the blind is hung on its hinges.

The stiles for the right hand blind are similar, or in other words, the stiles are all faced alike and can be turned end for end without altering the face marks or wind.

The reason for winding the stiles is this: When the blinds are closed the left hand blind B from the inside touches the window frame at the bottom outside corner, and the top stick out as the frame winds, and when the right hand blind (from the outside) is pulled to, the top outside corner presses the top outside corner of the left hand blind and draws it in against the frame and the catch at the bottom holds the joint tightly together, making the blinds level close against the frame and a tight joint on the rebate.

When laying out the stiles for mortising make the mortise the same width both edges, as the tenon fills it entirely, and there are no wedges used as they are liable to work loose with the constant wetting and drying of the weather. The shoulders of the rails are held to the edges of the stiles by pins driven through the mortise and tenon when the frame is in the clamps.

Cutting the slats should be very carefully done, and one or two of them should be tried in the frame, bringing the shoulders up with a couple of handscrews to see they work freely in the holes before pinning, and they should be placed oval and the edges properly rounded. The rods should next be cut and worked to the usual shape and the ends rounded to the same shape as the edges.

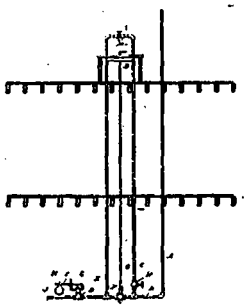
Before wiring the slats place them all together and with a try square mark the position of the staples (both points) on the poorest edges, and then drive them in. The slats can then be fastened on the rod which is marked from the stile, and the slats placed in the frame which is primed and cleared off.

This is the simplest method of making blinds by hand. They are, however, usually made in factories by a much quicker process, but if there be any builder stuck for one or even a pair of blinds, the above will aid him in making a sure job.

RECENT CANADIAN PATENTS.

System of Water Supply.

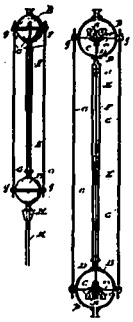
No. 28,952. William G. Russell, Millbrook, Ont., dated 18th April, 1888.



Claim.—1st. The pipes A, B, C and E, connected together, as described, in combination, with the globe-valve F, arranged substantially as and for the purpose specified. 2nd. The pipes A, B, C and E, connected together, as described, in combination with the globe valve F and rod G, arranged substantially as and for the he purpose specified. 3rd. The pipes A, B, C and E, connected together, as described, in combination with the globe valve F, rod G, and relief valve H provided with a lever I and adjustable weight J, substantially as and for the purpose specified. 4th. The pipes A, B, C and E, connected together, as described, in combination with the globe valve F, rod G, relief valve H provided with a lever I and adjustable weight J, and set-screws K and L, substantially as and for the purpose specified.

Water Leakage Detector.

No. 28,899. Thomas Houlgrave, Toronto, Ont., dated 14th April, 1888.



Claim. 1st. The combination of two diaphragms A, A, each consisting of two sub-diaphragms *a* and *a1* connected by a wire E, substantially as and for the purpose set forth. 2nd. The combination of the diaphragms A, A, the connecting wire E, the tightening rod D and the centre-pin C, substantially as and for the purpose set forth. 3rd. The combination of the diaphragms A, A, the connecting wire E and the telescope pipes F, substantially as and for the purpose set forth. 4th. The combination of the leakage detector, the slot *h* of the cap H, the sound uniting chamber *i*, the casting I, the key rod K and the cock J of the water main, substantially as and for the purpose set forth. 5th. The combination of the cap H, the casting I, the key rod K and the cock J, substantially as and for the purpose set forth. 6th. The combination of the cock J, a box L filled with sawdust, and the iron rod K, substantially as and for the purpose set forth.

The pillars used in the St. Clair tunnel will be made from the old G. T. R. car wheels.

The Marble Dealers' Association of Rutland, Vt., at a recent meeting elected as a director Mr. G. A. Sanford, of Halifax, N.S., who has been dead for several years.

At the Cincinnati Exposition Canada makes a fine display of terra cotta, tiles, bricks, building stone, black and colored marbles, etc.

A corresponden of the Montreal *Gazette* writes concerning the depreciation and in some cases total loss of plant used in the construction of the Panama Canal, owing to neglect and carelessness on the part of those in charge of the work. Quite recently, says this writer, a new 4,000 kilo. *grue*, or moveable crane, went off the line near the Culebra cut. They cost $2,500 each. Down the slight embankment it went. The intelligent foreman of that section, instead of making an effort to recover it, simply buried it by ordering in a train of dumping cars. The crane was buried and remains buried. Its burial simplified the whole matter. It was not his, and the company had dozens idle. Words fail to convey any idea of how machinery has been used there. An engineer told me that three-fourths of the $30,000,000 worth of machineryon the Isthmus is rusting and much of it is useless, valueless even as old metal, owing to its location. The Canal company takes credit for $30,000,000 worth of machinery on the Isthmus.

UNVENTILATED BATH-ROOMS.

AN unfortunate occurrence, which was lately the subject of a coroner's inquest, may now serve to introduce some remarks on the hygiene of the bath-room, with special reference to its frequent abuse when warm water is the means of ablution. About a fortnight since a gentleman aged seventy-four years was found sitting dead in a warm bath, which he had entered a short time previously. According to the medical evidence death was due to syncope, induced in all probability by the heat of the room. Here, doubtless, a predisposing cause was also at work—namely, the advanced age of the deceased, which would render him the more susceptibility to the always rather depressing influence of warm bathing. Add to these unfavorable, if unavoidable conditions, the presence of a stifling, steam-laden atmosphere, and we need not feel surprised at a statement by the coroner that deaths in similar circumstances are not uncommon. Now that almost every house of moderate rental has its bath-room, the size and ventilation of the apartments are matters of some importance. There is too great a tendency to think that any odd corner may be used for this purpose, and that the first and only necessity is to have the required water-supply laid on, and for the short time during which the bath is used the quality of atmosphere is quite a secondary matter. It should not need the teaching of a series of fatal accidents to impress an opposite principle. Clearly a room which, in course of use, becomes rapidly charged with water vapor should exceed rather than come short of the minimum cubic space (say 800 cubic feet) required for each inmate of a normally constructed house. With regard to ventilation, ancient prejudices in favor of closed doors and windows and solid walls have to be combated. These have, however, been pretty generally overcome in the case of sitting-rooms and bed-rooms, and should not prove insuperable in the case of the bath-room. There is no necessity for the introduction of cold air from without, for a sufficiently pure atmosphere can usually be obtained from the interior of the house, and an outlet funnel with revolving cowl is all that is required for extraction of the old air and excess of water vapor. Seeing therefore, that the remedies are apparent, we may hope that in future builders and householders will agree to employ them against the now too evident risks of a warm bath at home.—*Lancet.*

BUILDING MATERIALS.

LUMBER.

CAR OR CARGO LOTS.

1¼ and thicker clear picks, Am. ins..	$34 00@35 00
1¼ and thicker, three uppers, Am ins.	40 00
1¼ and thicker, pickings, Am ins.....	30 00
1 x 10 and 12 dressing and better.....	20 00 22 00
1 x 10 and 12 mill run.....	15 00 16 00
1 x 10 and 12 dressing.....	15 00 16 00
1 x 10 and 12 common.....	12 00 13 00
1 x 10 and 12 spruce culls.....	10 00 11 00
1 x 10 and 12 maple culls.....	9 00
1 inch clear and picks.....	24 00 26 00
1 inch dressing and better.....	18 00 20 00
1 inch siding, mill run.....	13 00 15 00
1 inch siding, common.....	12 00 13 00
1 inch siding, shop culls.....	10 00 11 00
1 inch siding, mill culls.....	8 00 9 00
Cull scantling.....	8 00 9 00
1¼ and thicker cutting up plank.....	22 00 25 00
1 inch strips, 4 in. to 8 in. mill run....	14 00 16 00
1 inch strips, common.....	11 00 12 00
1¼ inch flooring.....	15 00
1½ inch flooring.....	15 00
XXX shingles, sawn.....	$2 40@3 00
XX shingles, sawn.....	1 30 1 50
Eastlake painted iron shingles, per square, (10 feet)	4 50
Eastlake painted tin shingles, per square.....	4 50
Eastlake genuine galvanized iron shingles, per square.....	7 00
Imitation brick siding, per square.....	2 50
Special siding, per square.....	3 50
Lath, sawn.....	1 60

YARD QUOTATIONS.

Mill cull boards and scantling.....	10 00
Shipping cull boards, promiscuous widths.....	12 00
Shipping cull boards, stocks.....	13 00
Scantling and joist, up to 16 ft.....	14 00
" " 18 ft.....	15 00
" " 20 ft.....	16 00
" " 22 ft.....	17 00
" " 24 ft.....	19 00
" " 26 ft.....	20 00
" " 28 ft.....	22 00
" " 30 ft.....	24 00
" " 32 ft.....	26 00
" " 34 ft.....	28 50
" " 36 ft.....	30 00
" " 38 ft.....	32 00
" " 40 to 44 ft..	35 00
Cutting up planks, 1¼ and thicker, dry	25 00 26 00
" board,	18 00 20 00
Dressing stocks.....	16 00 18 00
Picks, American inspection.....	40 00
Three uppers, American inspection....	50 00
Cedar for block paving, per cord.....	5 00
Cedar for Kerbing, 4 x 14, per M....	12 00

B. M.

1½ inch flooring, pressed.....	25 00 30 00
1¼ " rough.....	14 00 15 00
1¼ " dressed.....	23 00 25 00
" undressed.....	14 00
" dressed.....	16 00 20 00
" undressed.....	12 00 14 00
Beaded sheeting, dressed.....	18 00 20 00
Clapboarding, dressed.....	12 00
XXX sawn shingles, per M.....	2 75 2 90
Sawn lath.....	2 85
Red oak.....	20 00 25 00
White.....	25 00 30 00
Basswood, No. 1 and 2.....	18 00 20 00
Cherry, No. 1 and 2.....	30 00 35 00
White ash, No. 1 and 2.....	25 00 30 00
Black ash, No. 1 and 2.....	20 00 25 00

BRICK.—₩ M.

Common Walling.....	$ 7 50
Good Facing.....	10 00
Sewer.....	9 50

Stone:

Common Rubble, Per Toise, delivered	14 00
Farge flat " " "	18 00
Foundation Blocks, " Cubic Foot..	35

Slate: Roofing (₩ *square*).

" green.....	5 00 6 00
" " unfading.....	5 00 6 00
" purple.....	5 00 6 00
" red.....	10 00
" black, Lehigh.....	3 50 4 00
" " Chapmans.....	
" unfading black, Monson, Me..	5 50 8 00
" black slate.....	7 50
Tiles, American, ₩ M.....	
N. Peach Bottom, warranted unfading	

Sand:

Per Load of 1½ Cubic Yards.....	1 25

PAINTS. (*In oil, ₩ lb.*)

White lead, Can.....	6 6 50
" zinc, Can.....	6½ 8 50
Red lead, Eng.....	5½ 6½
" venetian.....	6½ 7½
" vermilion.....	90 1 00
" Indian, Eng.....	10 12
Yellow ochre.....	6½ 12
Yellow chrome.....	15 25
Green, chrome.....	7 20
" Paris.....	30 40
Black, lamp.....	17 25
Blue, ultramarine.....	15 25
Oil, linseed, raw (₩ *Imp. gal.*).....	35½
" " boiled, "	39
" " refined, "	60
Turpentine, "	55 59
Varnish, coach, "	
Shellac, "	
Putty.....	2¼ 3
Whiting, dry.....	75 1 00
Paris white, Eng., dry.....	1 25 1 50
Litharge, Am., "	6½ 8
Cleaning, burnt.....	15 20
Umber, "	8 12½

CEMENT, LIME, etc.

Lime, Per Barrel of 2 bushels, Grey..	40
" " White	60
Plaster, Calcined, New Brunswick..	2 20
" " Nova Scotia.....	2 10
Hair, Plasterers', per bag.....	1 00
Cement, Portland, per bbl.....	3 00
" Thorold, "	1 50
" Queenston, "	1 50

HARDWARE.

Cut Nails:

American Pattern, 1¼ inch, per keg....	4 40
" " 1¼ to 1¾ inch, per keg	3 65
Canadian Pattern, 1¼ inch, per keg...	3 90
" " 1¼ to 1½ inch, per keg	3 40
" " 2 to 2½ inch, "	3 40
" " 2½ to 2¾ inch, "	3 15
" " 3 inch and larger....	2 90
Steel 50c. per keg extra.	
Finishing nails, 1 inch, per keg.....	6 05
" " 1¼ inch, "	5 30
" " 1½ " "	5 05
" " 1¾ " "	5 05
" " 2 inch and larger.....	4 90

Iron, etc.

Refined, ₩ 100 lb. or ordinary size....	2 25 2 35
Common, ₩ 100 flat.....	2 00 2 10
Patent metals, ₩ lb.....	0 09 0 11
Anchors, ₩ lb.....	0 05½ 0 06
Chain cables, ₩ lb.....	0 03 0 06
Chain traces, per lb.....	0 03 0 3½
Galvanized Iron Roofing, per square..	5 00

MONTREAL PRICES.

Lumber, Etc.

Ash, 1 to 4 in., M.....	$13 00@20 00
Birch, 1 to 4 inch, M.....	16 00 25 00
Basswood.....	13 00 30 00
Walnut, per M.....	35 00 95 00
Butternut, per M.....	25 00 40 00
Cedar, flat.....	00 04 00 06
Cherry, per M.....	65 00 90 00
Elm, soft, rot.....	15 00 17 00
Elm, Rock.....	25 00 30 00
Maple, hard, M.....	20 00 25 00
Maple, Soft.....	16 00 24 00
Oak, M.....	40 00 80 00
Pine, select, M.....	35 00 40 00
Pine, and quality, M.....	22 00 27 00
Shipping Culls.....	14 00 16 00
Mill Culls.....	8 00 10 00
Lath, M.....	1 70 1 85
Spruce, 1 to 2 inch, M.....	10 00 13 00
" Culls.....	4 50 6 00
Shingles, 1st quality	2 00 3 00
and "	1 25 2 00

Cement, etc.

Portland Cement, per barrel.....	$ 2 45@ 2 75
Roman "	2 70 3 00
Fire Bricks, per M.....	22 50 25 00

Cut Nails:

Hot-cut Am. or Can. pattern, 3 inch and above.....	$2 60
Hot-cut Am. or Can. pattern, 2½ inch and above.....	2 85
Hot-Cut Am. or Can. pattern, 2¼ and 2 inch.....	3 10
Am. pattern, 1¾ and 1¾ inch hot-cut	3 25
" 1¼ inch " "	4 10
Can. Pattern, cold-cut, 1¾ and 1¾ inch	3 90
" " 1¼ inch.....	3 90
Finishing Nails, per 100 lb. keg, 1¾	
Finishing Nails, per 100 lb. keg 1¾ to 1¼ inch.....	$ 4 25 4 40
and 1¼ inch.....	$ 4 25 4 70
Finishing Nails, per 100 lb. keg, 2 inch and up.....	3 70

Paints, etc.

White Lead, pure, 25 to 100 lb. kegs.	6 00 6 25
" No. 1.....	5 25 5 50
" No. 2.....	4 75 5 00
" No. 3.....	4 50 4 75
" dry.....	5 25 5 75
Venetian Red, English.....	1 50 1 75
Yellow Ochre, French.....	1 25 2 00
Whiting, London, washed.....	0 50 0 60
" Paris, "	1 15 1 25

Oils:

Linseed, raw.....	0 53 0 57
" boiled.....	0 57 0 60
Olive, pure.....	1 00 1 10
" machinery.....	0 95 1 00
" extra, qt., per case.....	3 00 3 25
" pts., "	3 40 3 60
" ½ pts., "	1 70 1 80
Spirits turpentine.....	0 55 0 60

ST. JOHN, N. B.

Lumber.

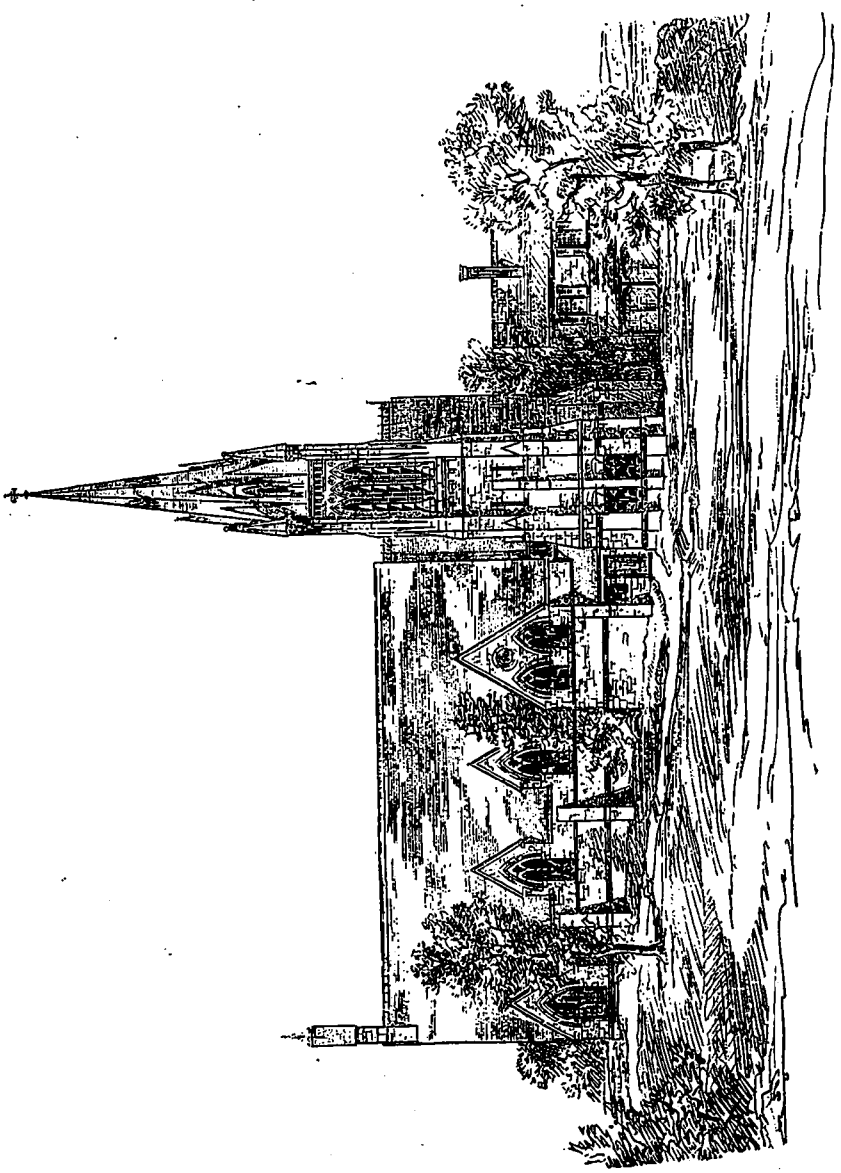
Spruce deals, Bay Fundy Mills.....	8 00 8 25
Spruce deals, City Mills.....	8 50 9 50
Aristook P. B., Nos. 1 and 2.....	40 00 45 00
No. 3.....	30 00 35 00
No. 4.....	25 00 27 00
Aristook P. B. shipping.....	15 00 16 00
Common.....	12 00 13 00
Spruce boards.....	7 00 8 00
Spruce scantling (sent'd).....	7 50 8 00
Spruce, dimensions.....	11 00 14 00
Pine clapboards, extra.....	5 00 60 00
No. 1.....	0 00 30 00
No. 2.....	30 00 00 00
No. 3.....	11 00 12 00
Laths, spruce.....	1 25 1 35
Laths, pine.....	1 50 2 00
Palings, spruce.....	5 50 8 00

Iron, etc.

Refined, ₩ 100 lb or ordinary size.....	2 25 0 00
Pommon, 100lb.....	2 10 0 00
Antient metals, ₩ lb.....	0 00 0 11
Cachors, ₩ lb.....	0 00 0 00
Chain cables, ₩ lb.....	0 03 0 06
Rigging chains, ₩ lb.....	0 03 0 3½

Nails.

Cut, 30y, ₩100lb	3 75 4 00
Cut, other sizes.....	3 74 3 50
Ship Spikes.....	3 70 3 90
Galvanized.....	5 25 6 50



CHURCH AT ALMONTE, ONT.