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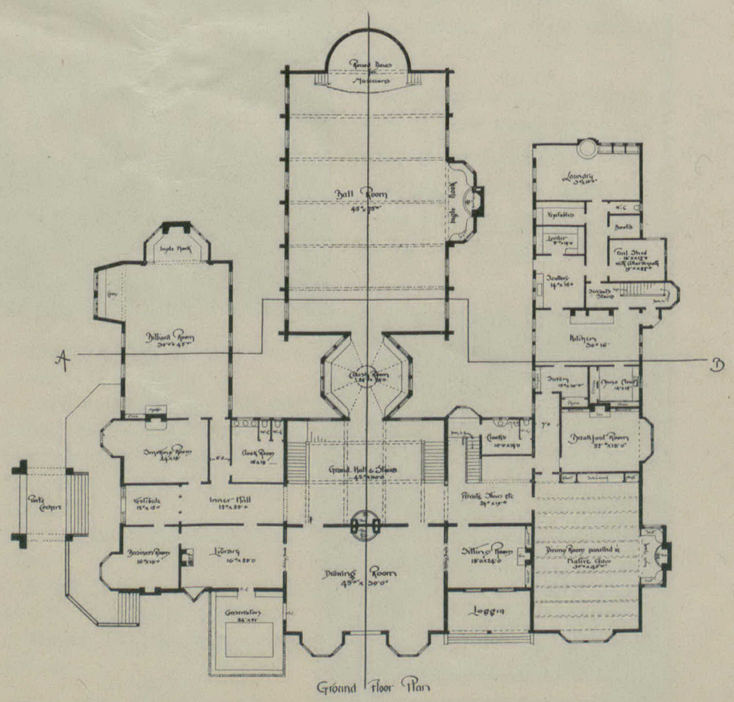

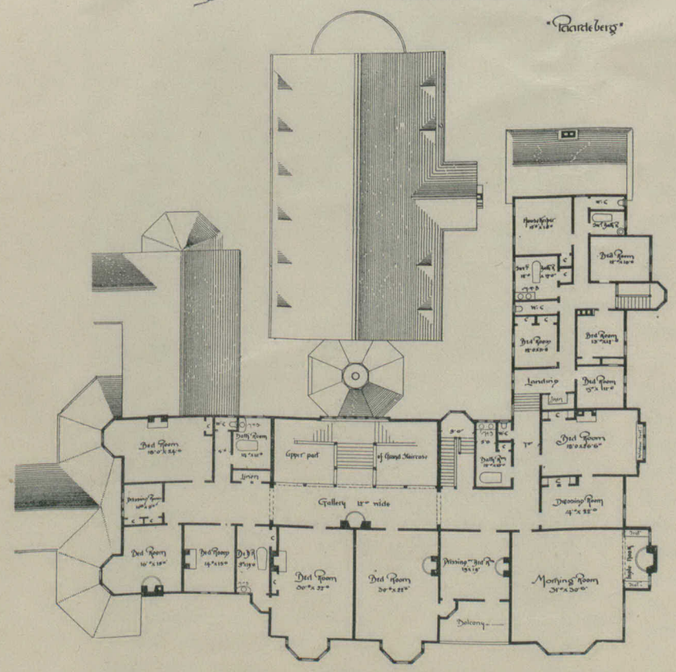

COMPETITIVE DESIGN FOR GOVERNMENT HOUSE, [illegible]CTORIA, B.C.—AWARDED SECOND PREMIUM.

R. M. FRIPP, F.R.I.B.[illegible] ARCHITECT.

The Canadian Architect and Builder

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ILLUSTRATIONS ON SHEETS.

Competitive Design for Government House, Victoria, B. C., Awarded Second Premium—R.M. Fripp, F.R.I.B.A., Architect.

ILLUSTRATIONS IN TEXT.

Details of a Conical Roof (from the London Building Record.)

ADDITIONAL ILLUSTRATIONS IN ARCHITECTS' EDITION.

Two Photogravure Plates—Interior Residence of Clarence C. McCuaig, Sherbrooke Street, Montreal—MacVicar & Heriot, Architects.

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A $10,000 Arch.

The Canadian tour of the Duke and Duchess of Cornwall and York will be a great occasion, and it is suitable that we should acclaim it with a lavish display of street decoration; but we cannot help feeling that there is a touch of extravagance about the $10,000 arch which the Manufacturers' Association of Toronto propose to erect as a temporary decoration. It is proposed to offer three prizes, handsome prizes too, for suitable designs for the purpose. The test of excellence in this case is certainly the greatest display for the least money; and it would be a good way of going about the matter, not to invite the outlay of this or any definite sum; but, having secured the location, to offer the prizes for its suitable decoration. There is a limit to reasonableness in temporary decoration, and good taste is within this limit, so that the designer who hits off the pleasing thing will very likely not be the most lavish. In other words, it ought to be understood that though the Manufacturers have voted enough money to cover all needs, the competition is not for the purpose of showing how to spend it all, but in order to establish sufficiency, "an elegant sufficiency." In order to encourage designers to incur the risk of self-restraint (which is notoriously bad policy in a competition) there should be an additional prize offered to the winner, in the form of a bonus, a percentage on the amount saved, given by the Museum Committee, who would of course get the balance. It is for just such a $10,000 gift as this that the Museum project has been waiting. If it were not for that, one would think of the Manufacturers' action only to admire their wealth and liberality. But the readiness with which the glory of the city is forwarded, in a matter of a two days' display, and the difficulty experienced in getting subscriptions for a project which is acknowledged to be necessary for her permanent advantage is remarkable; and one cannot help regretting that it is thought necessary to spend so large a sum upon the temporary erection, when half of it might perhaps do, and the other half go to help on the subscription for the permanent structure.

Toronto City Building By-laws.

For some years past a request for a copy of the building by-laws of Toronto has been met by a statement that there are none because the by-laws are being revised. The by-laws appear to have never existed, except in a fragmentary form, and if this revision, that has been under way so long, is ever completed, the result should be published in the form of a volume containing all the laws and directions which have to be observed in building operations. But they should, above all things, be published soon, or what was revised when the revision began will be out of date. Building operations are at present labouring under the difficulty of laws that are behind the time. Officials, whether as men they know anything or not, as officials know nothing but the law. The

law takes no cognizance of the fact that cement in the mortar of a brick wall is as good as a half brick in thickness; therefore officials are not open to reason upon this point. The law says that a steel beam over a small shop front is fire resisting. Experience points to the superiority of a wooden bressummer; but officials are not open to the argument from experience. The law requires the house trap to be set at such a distance from the house that to connect the weeping tile system beyond it adds extravagantly to the cost of drainage. The law appears to contemplate connecting the weeping tiles behind the house trap in such a way that if the trap is stopped, the whole system of surface drainage must be filled with the backed-up sewage before it can climb high enough to appear in the laundry tubs. It is strange that the plumbing by-law, which is the most modern part of the building law, should contemplate this; but it is stranger still that the officials should want to hold to the law. As a matter of fact the greatest danger is to the authority of the law and the officials; for, when architects know that they are right and the law is wrong, they simply ignore its interference. This state of affairs is unwholesome, and it is time we had a law which can command and enforce respect.

A Regular Size for Bricks.

Architects are complaining of the trouble caused by variations in the size of bricks. It is impossible to figure plans with certainty until the bricks are on the ground. It is not that there is not a standard size, or that the bricks are not made according to it; but simply that the makers use wooden moulds, and do not renew them often enough. A full sized brick is therefore seldom seen, and perhaps the greatest trouble of all is a lot of bricks from a new mould; for calculations based on a slim specimen are more impossible, when full sized bricks are delivered, than a full sized calculation would be for small sized bricks. It is more easy to gain in brick laying than to work down. As far as appearance is concerned, it is hard to err on the side of a fat joint in ordinary brickwork; and, up to likely limits of joint thickness in ordinary work, construction is improved by the necessity which arises for good beds of mortar. But to be obliged to batter down the bricks to meet the figures is something to which both bricklayer and architect object. There is nothing to be done, when a brickmaker has renewed his moulds, and unexpectedly delivers bricks up to the standard, but to re-figure the drawings; and that probably at the height of the season, when there is already too much drawing to do. The remedy is the adoption of a standard size, recognized as part of the building contract; so that brickmakers can only withhold the renewal of their moulds at a risk which would make such economy of doubtful advantage.

Roof Gardens

It seems a little odd that there has not yet been a serious attempt to make use of flat roofs for something more than the purpose of drying clothes. There would be nothing new in having upon one of these roofs, a garden with shrubs and even trees growing in it. The hanging gardens of Babylon may afford us little encouragement, knowing the probable bulk of walling and vault on which they rested; but in later days and nearer home there are examples. The Ducal Palace of Mantua has a dining hall, in the upper or principal storey, with windows opening down to the floor, and looking upon a garden at the same level in which there is a tree between twenty and thirty feet high. This green outlook must have been a beautiful addition to the dining hall in the days when the palace was inhabited. The garden is carried by the vaulting over a wine cellar on the ground floor; not more substantial probably, or more impervious to moisture than the flagged surface of the roof on the Bowling Green Building in New York. One might venture to predict that a restaurant in the comparatively fresh air of this roof, even if it went no further in gardening than orange trees in tubs, would be a formidable rival, for at least six months of the year, to the prosperous affair across the road, into which one decends two levels below the street. One objection to pioneering in this direction is that for a pioneer, surrounded by unimproved neighbours, the surroundings are apt to be squalid. But there are buildings in a favourable neighbourhood, and in a favourable state of isolation, in the case of which such an experiment would be worth trying.

The S.P.S. Building

Prof. Galbraith and his assistants have returned from their tours in search of information to apply to the new building for the School of Practical Science, and yet nothing has been heard from the government as to the appointment of an architect or the arrangement of a competition for this building. The inference is that the plans, upon which the provincial architect was understood to be working before he went on tour with Prof. Galbraith, are the plans of the school. There are two things to be said about this. The first is that the plans which were under way before the tour for information came off, cannot be profiited in any fundamental way by the tour. The second is that this is not work that can be so well done in the Provincial Architect's office as out of it. The best thing that can be done with the information the Provincial Architect has gained by his tour is to put it in form for the guidance of the participants in a competition. The sooner the Minister of Public Works understands that in forcing this work through the Public Works Department, he is mishandling the responsibilities of his office, the better. If he does not realize it now he will realize it later when the building is in a position for the public, and the students who will use it, to judge whether the best has been done that could be done. The Minister of Public Works of course knows no more about architecture than he does about ballooning. He is not expected to know anything about architecture; but he is expected to know that the ferment there has been about this building, at the mere suggestion that it should be done in the Public Works' Department, is not for nothing. It is not only architects, but the Guild of Civic Art (moved by persons who are neither artists nor architects) who have taken up the matter. The government have had a fair chance to take up this matter in a large way. The deputation of students was conclusive to show that this province is in competition with the United States to keep her students. It was no case for timidity, and the government seem to have realized that. They had better realize now that it is no case for small dealing in any respect. In the interest of a reputation, which in building matters requires careful handling, let them take steps to get this building done with one thought only—to get the best that is to be got.

Factories Outside of Cities

To any one watching the six o'clock rush out of a large city, the question must occur, is it necessary for all these people to do their work in the same part of the city? Why should all these factory operatives live on the outskirts of the city; coming in every morning in haste, only to go out again in haste in the evening; when their work could be done as well in the suburb where they live? Some factories are located on the railways on the edge of the city and there seems no reason why there should not be a district in each city (preferably eastward in this country, where the prevailing winds are westerly) in which facilities provided by railway concessions would invite the establishment of factories. With the worst disposition of space, such an arrangement would be more convenient than the present manner of concentrating every kind of work in the city. If properly managed, there would be opportunity offered for the growth of little factory settlements in which, after the manner of Messrs. Lever Bros.' village of Sunlight, the labourer would be near his toil and need waste no time in going to and from it. It is not work that is the labourer's curse, but want of leisure; and that he should waste what little time he has, that he can call his own, in going to and from home in the crowded street cars—a journey that will increase in distance continually—is an evil which is not necessary; and to take steps to get over this state of affairs is to do the best thing that can be done to ameliorate the labourer's lot. A couple of hours a day added to their time will with many men be devoted to pursuits producing continual self improvement. Much can result in a few years from a little done each day. There is at least opportunity for the advantage of positive recreation, and the profit of a little gardening. Where nearness to the centre is not all important, the expansion of a city may be considerable, and land not too valuable for a little to go with a workman's cottage.

To Straighten Niagara.

Mr. Joseph I. Keefer has, according to the Buffalo Courier, submitted to the Niagara Falls Commission a plan to cut away a portion of Goat island, build an abutment and "connect the American and Canadian Falls in one grand torrent of water." "My idea," says Mr. Keefer, "is to build a great giant wall or abutment, with a stone top or coping, that cannot be washed away, and let the water from both sides of the island gracefully glide over the dam or stone esplanade, thus making one continuous stream of pure white water from the jut of one shore to the jut of the other." Mr. Keefer explains how this great idea came to him. "I was standing over on the Canadian side where the old British Museum used to be, and, looking across, the thought struck me how much prettier the falls would be if they were not broken by Goat Island." It would be difficult to take this proposition seriously, if it were not that the Commissioners are reported to have already done so. The Commissioners are reported to have "seemed much taken with the idea, and wondered why no one had ever thought of it before." And they are going to have their engineer "figure on it," to ascertain the probable cost. It is a serious fact that public culture is far behind public wealth in the United States, and an atrocity, such as is here contemplated, is always within the possibilities. It would be difficult to persuade a jury of Mr. Keefer's peers that the intrusion of Goat Island is one of the distinguishing beauties of Niagara. His scheme might be attacked on the ground that the unfortunate break in the middle of the Canadian Fall will destroy the perfection of his line, and that the green water in the centre of the horseshoe will forever disturb the prettiness of the "continuous stream of pure white water from the jut of one shore to the jut of the other." Against this petty objection he can urge, as he does, that "the people ought to be interested in this improvement, for it will make a new falls at Niagara. It will stimulate the interest of those who have never seen the falls before, while those who have seen them will be anxious to come again to see what has been done to preserve and improve one of the greatest American wonders." In all this Mr. Keefer shows sound business instinct, and (always supposing that the state of New York can have any reasonable motive for organizing a one lively season of this kind at the Falls) he might add the rush of people both on this continent and from Europe who realize that it is their last chance to see Niagara Falls as the world has hitherto admired it.

BY THE WAY.

THE London Telegraph tells of a squeamish architect who in travelling from Dieppe to Paris, refused to surrender his railway ticket to the guard because the latter's hands were not immaculate, and he declined at the architect's suggestion to cover them with gloves. The case found its way into court, and the architect manfully defended his attitude, but was fined £4.

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IN Berlin there has been founded an institution exclusively reserved for young women desirous of learning the art of painting—not pictures—but buildings. The course of instruction in this school is complete. Not only do the young women learn to handle the brush, mix the colours, but a professor of gymnastics comes twice a day to give instruction in climbing ladders and maintaining one's equilibrium on planks and scaffoldings.

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Mr. Illsley, a member of the firm who have the contract for the erection of the large hotel in Toronto, is given as authority for the statement that the taking down of the old buildings on the site was the speediest bit of work he ever witnessed, either in Chicago or elsewhere. This testimony to Canadian skill and energy, from a contractor of long experience in the United States, where the speediest methods are sought to be employed, is very acceptable, as showing that our contractors are up-to-date.

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THERE is no need for an alien labor law in Budapest Public Sentiment is sufficient to keep out foreigners. In consequence of negotiations having been opened with a firm in Vienna to construct a new national theatre in that town, the majority of the leading actors and actresses have pledged themselves not to accept an engagement in a theatre on which any Austrian architect, builder, decorator, painter, mason, or any kind of labourer had been employed, and a theatre built by the hated foreigners will be rigidly boycotted by nine-tenths of the population of Budapest.

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WITH the incoming of the twentieth century, comes the announcement that the concentrated heat of the

sun's rays has been applied to the burning of bricks. The thing is so simple, says the British Claymaker. Take a mirror and throw a spot of sunlight on a green brick. It will warm it, say, 15 degrees. Take 1,600 mirrors and throw 1,600 spots of sunlight on a brick. Result, it will warm it 15x1,600 = 24,000 degrees. What could be simpler, and here we have ten times the temperature necessary to burn a firebrick, without any expenditure but a few bits of looking-glass, which won't wear out!

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I observe that an order has been given to a Montreal firm to decorate and refurnish the residence of the Governor General at Ottawa in view of the approaching visit of the Duke of York. Any money which may be spent in re-habilitating Rideau Hall, or at least the older portion of the building, will be to a large extent thrown away, as the building appears to be almost in a tumble-down condition. Canadians have no reason to feel proud, but rather ashamed, of the executive residence atOttawa, which does not even compare favorably with the residence provided for the Lieutenant Governor of Ontario. If the country is to continue to have a Governor General and to pay him a large salary, our self respect demands that we shall provide him with a residence in keeping with his position.

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No better indication is required of the change that has taken place within the last two or three years in building conditions in Toronto than the fact that architects are now said to be complaining of the difficulty of securing satisfactory tenders from contractors. The latter are so fully occupied that they are not disposed to go to much trouble to secure the less desirable class of contracts. Only a few years ago the situation was very different. There were then too few contracts going to keep the contractors even moderately well employed, and as a result the competition was far too keen to permit of fair profits being obtained. Another indication of the activity now prevailing is an advertisement in the daily press from the secretary of the Builders' Exchange for skilled mechanics.

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THE desirability of establishing one or more centra squares in Toronto is not open to question. It is one of the greatest needs of the city. To my way of thinking it is more essential than the clock and bells recently installed in the hall tower at a cost of about $30,000. If the city could not afford both, the money should have gone towards a lease of the land opposite the new municipal buildings, for the purpose of a public square. The opportunity of securing the land may at any time pass, hence the wisdom of prompt action. While on this subject, I would like to make the further suggestion that land for a public square should be purchased in the part formerly known as St. John's ward, in which the population is the poorest and most congested. As a means of improving the physical and moral status of the district, it should prove a profitable investment.

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WHAT is known as the Art Renean, which probably had its origin in France, is the dominating characteristic of decorative work in Europe to-day. Its chief feature is perhaps following lines. In wall papers, the new style, which combines grace in design with skilful color combinations, has displaced the gaudy patterns which were lately so much in vogue and which had so little in the way of true artistic merit. Some excellent examples of decoration in the new style—the work of Scotch and English firms—are to be seen at the Glasgow Exhibition. The chief feature of this Exhibition, however, is said to be the magnificent colletion of paintings in the new permanent Art gallery. The temporary Exhibition buildings, are heavy in appearance by comparison with those of the Pan-American Exhibition, and to a Canadian their effect is less pleasing, but considering the eminently practical and substantial character of the city and people, it was to be expected that these buildings would in some measure reflect their surroundings.

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IN a recent conversation with Mr. W. H. Elliott, of Toronto, who has lately returned from a three months European tour, I gathered some impressions concerning matters artistic abroad. Regarding Italy, the principal cities of which he visited, Mr. Elliott states that the land which was once the home of the greatest artists, would now be devoid of artistic interest but for the works of the old masters. Strange, is it not, that there are no great Italian artists of the present day, and Italy is making but feeble and unsuccessful attempts to keep pace with modern progress in art, so far at least as the fine arts are concerned? In applied art she is more successful, as witness her exhibit at the Paris Exhibition last year. The character of present day Italian Sculpture, of which the production is considerable, bears witness that the genius which inspired the Italian artists of a former period, no longer exists. The conception and spirit of the true artist are wanting. The work of the present day is mechanichal, commonplace and without interest.

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A storm of indignation was recently aroused in Hull by a new building by-law, which, with the view of preventing the recurrence of the disaster of last year, prohibits the erection of wooden dwellings. Several hundred citizens waited on the city council recently, demanded that the by-law be repealed, and hissed the mayor and aldermen. The mayor appointed a time to receive a deputation, representing the citizens, and to hear and consider their views. There can be no doubt that the restrictions imposed by the by-law will be burdensome upon the many owners of cheap properties, but that should not be allowed to stand in the way of enactments which are necessary to the preservation of property of vastly greater value. The proximity of Hull to the Dominiom capital should be considered. The council of Ottawa is probably powerless to protect itself against danger from an adjoining municipality, but in the event of such adjoining municipality neglecting or refusing to adopt regulations for its own protection and that of its neighbor, the provincial or federal government might not unreasonably be asked to pass special legislation dealing with the case. If the property owners of Hull cannot afford to put up buildings other than those of the most hazardous character, they should be prepared for the sake of general welfare to live outside city limits, which, in these days of rapid electric transit, is no hardship, but on the contrary, is by many city people counted a privilege.

MONTREAL PLUMBING BY-LAW.

Following are the full provisions of By-Law No. 215, of the City of Montreal, concerning plumbing and the drainage and ventilation of buildings, as adopted by the Council of that city on June 12th last :—

Sect. 1.—No person, firm or corporation shall, after the first of September, 1901, engage in or work at the business of plumbing, either as a master or employing plumber, unless such person, firm or corporation, has received a license or certificate therefor in accordance with the provisions of this By-law relating to these as hereinafter contained.

(1) The word "Master Plumber," as used in these regulations, shall be deemed to mean one who employs practical plumbers or journeymen plumbers, and who keeps a shop or place of business for which he is held to pay a business tax to the city.

(2) Any person engaged in or working at the business of plumbing, prior to the passing of this By-law, and desiring to engage in or work at said business, either as a master or employing plumber in the City of Montreal, shall on or before the first of September, 1901, apply to the Board of Examiners hereinafter provided for, to be examined as to his qualifications for such business.

(3) In case of a firm or corporation, the examining and licensing of and granting a certificate to any one member of the firm or the manager of the corporation, shall satisfy the requirements of this By-law.

(4) There shall be a Board of Examiners of plumbers, consisting of the Building Inspector or his assistant, the Sanitary Engineer (who shall be a member of the Board ex-officio), and a licensed master plumber of at least ten years practical experience, to be appointed by the City Council, for the term of two years at a time. Said third member to receive as compensation for his services a sum not exceeding five dollars a day of actual service.

(5) The said Board of Examiners shall then appoint a chairman, and designate the time and place for the examination of all applicants desiring to engage in the business of plumbing within the City of Montreal. Said Board shall examine said applicants as to their practical knowledge of plumbing, house drainage, and plumbing ventilation, and shall submit the applicant to some form of practical tests, and if satisfied of the competency of the applicant, shall so certify and issue a license, authorizing him to engage in the business of plumbing in Montreal, either as a master or employing plumber.

(6) The fee for a license shall be five dollars for a master or employing plumber, and said license shall be renewed yearly, on the payment of one dollar.

PLUMBING, DRAINAGE AND VENTILATION OF BUILDINGS.

Sect. 2.—Every master plumber shall be required to register his name and place of business at the office of the Board of Health, and to give notice at the said office in case of the removal of his place of business.

(1). An official list of such plumbers, recognized by the Board of Health, shall be posted, once a year during the month of May, and copies thereof shall be furnished to those who may ask for the same.

(2). It shall be unlawful for any person to carry on the trade of plumbing in the City of Montreal, unless licensed or registered as above.

(3). Every licensed master plumber shall be held responsible for all the acts of his agents or employees, and any licensed plumber who neglects or refuses to comply with the provisions of this By-law, may have his license suspended or cancelled by the Board of Health, in which case he shall be barred from obtaining a permit to do any work during such length of time as the said Board may deem proper.

Sect. 3.—All plumbing and house drainage, and ventilation in the City, shall be made and constructed in accordance with the following rules, which shall be binding on all parties concerned.

(1). No drains shall be made, or plumbing work done in any building, until a permit to do so has been obtained from the Sanitary Engineer.

(2). No alteration of drains or plumbing work in any building affecting its sanitary condition shall be undertaken before giving notice to the Sanitary Engineer. Forms of application, and specification for the drains and plumbing work of a new building and for alteration of the same in old buildings, will be supplied by the Health Department.

(3). Pipes, drains and plumbing work shall not be covered or concealed from view, until approved by the Inspector of the Board of Health, who shall examine the same within two legal working days, after notice that they are ready for inspection.

(4). The material used shall be of good quality and free from defects, and the work shall be executed in a thorough and workmanlike manner.

Sect. 4.—The arrangement of the soil, waste and ventilation pipes shall be as perpendicular and direct as possible.

(1). The soil, drain, waste and drain ventilation pipes shall be exposed to view, ready for inspection and for convenience in repairing.

(2). When necessarily placed within partitions or recesses of walls, soil, drain, waste or ventilation pipes shall be covered with woodwork, so fastened with hinges or round headed screws, as to be readily uncovered.

Sect. 5.—Every house or building shall be separately and independently connected with the street sewer, in front of such house or building, or with such other sewer as shall be designated by the Board of Health.

Sect. 6.—Interior house drains when above ground shall be of extra heavy cast iron pipe. When laid under ground, drains shall be of cast iron or vitrified clay pipe, and shall have a fall of at least 1-4 inch to the foot. Where water-closets discharge into them, the pipes shall be at least four inches and not more than six inches in diameter and be laid in a straight line if possible. All changes in direction shall be made with curved pipes when of cast iron, and with Y pipes when of vitrified clay; and at least one clean-out length shall be provided at each change of direction.

In all cases of soft ground, vitrified clay pipes must be laid upon at least four inches of concrete.

Sect. 7.—No bricks, sheet metal, earthenware, or chimney flue, shall be used as a sewer ventilator, or to ventilate any trap, drain, soil or waste pipe.

Sect. 8.—Soil pipes shall be of cast iron of the weights specified in section 15 and shall extend at least 2 feet above the highest part of the roof, or coping, undiminished in size, and in no case shall they be less than 4 inches in diameter; where the soil ventilating pipes come within 15 feet of any windows, open lauvres, or other openings, they muse be carried up 5 feet above top of such window or opening.

Soil, waste and vent pipes, in an extension, shall be carried above the roof of the main building when they are closer than 20 feet to the windows of the main building.

Sect. 9.—All traps shall be adequately protected from syphonage or air pressore, by vent pipes of a size not less than one and a half inch in diameter vented by the open air through the roof, unless where antisyphon traps or other approved devices are used.

Sect. 10.—Joints of sewers and soil pipes shall be gas and water tight.

Sect. 11.—When stacks of pipe are required for sinks only, they shall be carried through the roof and be not less than 2 inches for 4 sinks or 3 inches for over that number; but the portion above the roof, in all cases, must be 1 inch greater diameter than that below the roof.

Sect. 12.—When lead pipes are used to connect fixtures with vertical soil or waste pipes, or to connect traps with vertical vent pipes, they shall not be lighter than 6 lbs. sheet lead to the square foot. All such pipes shall be properly supported to prevent sagging.

Sect. 13.—There shall be no traps in connection with vertical soil or waste pipes.

Sect. 14.—All pipes shall be sound and free from holes or cracks.

Sect. 15.—The following weights per lineal foot, for cast iron and lead pipes, are the minimum weights :

IRON PIPES.

(Interior measurement)

For Plumbing Work.

2 inch 4 pounds per lineal foot.
3 inch 6 1-2 pounds per lineal foot.
4 inch 9 pounds per lineal foot.
5 inch 12 1-2 pounds per lineal foot.
6 inch 17 pounds per lineal foot.

For Drain Work.

4 inch 13 1-2 pounds per lineal foot.
5 inch 17 pounds per lineal foot.
6 inch 20 pounds per lineal foot.

Lead Pipes.

1 1-4 inch 1 1-2 pound per lineal foot.
1 1-2 inch 2 pounds per lineal foot.
2 inch 2 1-2 pounds per lineal foot.
2 1-2 inch 4 1-2 pounds per lineal foot.
3 inch 5 1-2 pounds per lineal foot.
4 inch 7 pounds per lineal foot.

For Waste Sink Pipes.

2 inch 10 pounds per lineal foot.
3 inch 15 pounds per lineal foot.

(1). Iron pipes shall have their weight stamped upon them.

(2). Leadwaste pipes, bends or cess-pools, shall be equal to not less than 6 lbs. per square foot of sheet lead.

(3). The fittings used in connection with such pipes shall correspond with them in weight and quality.

Sect. 16.—Plumbing work shall not be used unless the same has first been tested in the presence of the Sanitary Inspector, or his representative, with the water test, or if that is not practicable, with the peppermint, smoke or other reliable test, and if said test is satisfactory, he shall issue a certificate to that effect.

(1). The Water Department, for the purpose of such test, shall temporarily turn on the water, and shall only permanently turn on the water. when the certificate of the Inspector is produced.

(2). When defective pipes are discovered, they shall be removed and replaced by sound pipes ; defective joints shall be made tight, and every part of the work in which defects are found, shall be made to conform to the present rules.

Sect. 17.—Joints in iron drain, soil and waste pipes, shall be filled with oakum and lead, and hand caulked so as to make them gas tight, anh they shall not be painted, varnished, tarred or puttied ; the said joints may also be screw joints ; should the work prove to be satisfactorily executed, the Sanitary Inspector shall grant a certificate to that effect to the person concerned.

Sect. 18.—All connections of lead with iron pipes, shall be made with a brass sleeve or ferrule of the same size as lead pipes, which shall be carried inside the ferrule, put in the hub of the branch of the iron pipe and caulked with lead ; and the lead pipe shall be attached to the ferrule by a wiped joint.

All connections of lead pipe shall be by wiped joints.

Sect. 19.—No tile pipe shall be connected with the soil or waste pipe, unless the same be provided with a flange to admit of a proper connection being made.

Sect. 20.—Every water-closet, urinal, sink, basin, wash-tray, bath, and every tub shall be separately and effectively trapped. This rule shall apply to a set of tubs, but only one trap shall be required for the set.

(1). Traps shall be placed immediately next to the fixtures, and in no case shall they be distant more than two feet from the fixtures.

(2). There shall be only one trap under the water-closet and that immediately beneath the same.

Sect. 21.—The connection between iron and tile pipes shall be made with the best cement, or by any other means approved by the Inspector.

Sect. 22.—Sinks shall be provided at the inlet of such fixtures, with strong metallic strainers to exclude from such waste pipes all substances likely to obstruct them.

Sect. 23.—In no case shall the waste pipe from a bath, tub or other fixture be connected with a water-closet trap.

Sect. 24.—Overflow pipes from fixtures shall in every case be connected with the inlet side of the trap, and above the water.

Drip or overflow pipes from the safety pan under water-closets and other fixtures, or refrigerators, or from tanks, other than those of water-closets, shall be made to run into some place open to sight ; and in no case shall any such pipe be connected directly with the drain, waste or soil pipe.

Sect. 25.—Each water-closet apartment shall be ventilated by means of a shaft or air duct which shall start with not less than 4" diameter and increase one inch as it passes each successive flat and extend at least three feet above the roof and have a suitable cap.

(1). Each water-closet apartment shall be ventilated by means of a shaft or air duct, which shall be at least two inches in diameter in rising from the lowest flat, increasing one inch through each successive storey, but must not be less than four inches, in going through the roof, beyond which it must project at least three feet, and be insulated.

(2). Ventilation may be made through a flue, provided there be no openings in such flue to rooms above, other than for ventilation of water-closet apartments.

Sect. 26.—Every water-closet shall have a cistern supply and in no case be supplied directly from the city reservoir supply pipes.

Sect. 27.—In houses containing one, or more than one tenement, there shall be one water-closet for each family, and a separate cistern for each closet ; in other buildings, however, a group of closets may be supplied from one tank ; and there shall be at least one water-closet to every fifteen inmates.

In buildings where operatives of both sexes are employed, proper separate accommodation shall be furnished for men and women.

Sect. 28.—The overflow pipes from water-closet cisterns shall dischatge into an open sink, or the basin of the water-closet, or where its discharge will attract attention, and indicate whether waste of water is occurring, but not into the soil or waste pipe, or into the drain direct.

Sect.29.—Valves must be so fitted and adjusted as to prevent wasting of water.

Sect. 30.—No privy pit or cesspool for sewage shall hereafter be constructed within the city or any premises situated within 200 feet of any street wherein there is a sewer and wherein the city water is laid ; nor shall privy pits or cesspools for sewage, presently existing, be henceforth permitted, after May 1st, 1902, to remain in any part of the city where water-closets can be connected with a public sewer in the streets.

Proviso. The Health Department may, however, in exceptional cases, issue written permits for the toleration (during a period not exceeding twelve consecutive months renewable) of privy pits and cesspools for sewage where the nature of the case would make the rigid enforcement of this By-law a detriment to the public health. In all such cases, the following shall be the method of procedure :

1. The owner or agent of any premises, whereon it is desired to tolerate for a limited period a privy pit or cesspool for sewage, shall fyle, during the month of April each year, a demand in writing upon the Health Department for a temporary permit, alleging therein the grounds whereon exception is demanded.

2. The premises in question shall forthwith be inspected by an officer of the Health Department, who shall make a written report concerning the same, to the Medical Health officer upon the following matters :

a. As to the validity of the reasons advanced by the applicant for the exemption from the general law ;

b. As to the construction and condition of the privy pit or cesspool for sewage for which the permit is asked.

3. Upon the receipt of the aforesaid report, the Medical Health Officer, if, in his opinion, the strict enforcement of this law would be detrimental to the health, and

it the condition of the privy pit or cesspool for sewage, for which toleration is demanded, is in conformity with the following article, may issue the temporary permit hereinabove mentioned.

Sect. 31.—Every new privy pit shall be water-tight, of a capacity of 45 cubic feet ; the sides and bottom shall be constructed of cemented brick twelve inches in thickness and well cemented inside with hydraulic cement ; such vault may be constructed of cast iron, the shape or form of which shall be either circular or oblong without angles, and with a concave bottom ; it shall be provided with a ventilation pipe at least 4 inches in diameter, extending from the pit through the roof sufficiently high as to prevent inconvenience to occupants of neighboring houses ; the seats shall have a tight-fitting cover; it shall have an aperture opening exteriorly to allow of cleaning by pneumatic process, such aperture to be two feet by one and a half feet in size ; or else the flooring shall be air-tight and shall have a tightly fitting trap-door comminicating with the pit ; the top of the vault shall be one foot above the level of the ground ; nothing shall be put into such pit, excepting human excreta ; privies shall be located at a distance of 20 feet or more, should the Board of Health deem it necessary, from any house or street ; they shall be emptied when the contents reach within eighteen inches of the top of the vault or whenever the Board of Health deem it necessary ; no offensive smell or gases shall be allowed to escape therefrom. But, in no case shall a privy be allowed within a dwelling-house.

(1). In the case of privy vaults now drained into a common sewer, they shall be isolated by means of suitable traps placed below frost and according to instructions from the Board of Health.

(2). In the case of a new house being built, or one already existing being repaired, wherever there is a public sewer in the street, a water-closet shall be put in, to the exclusion of privy pits.

(3). When a house is occupied by but one family, if there is already a water-closet in the house, no privy pit shall be tolerated on the premises.

Sect. 32.—No steam exhaust blow off pipe shall connect with a sewer directly, or any house drain, soil pipe, or waste pipe ; such pipe must first discharge into a tank or condenser.

Sect. 33.—Cellars shall not be connected with the house drain, unless by a branch pipe, and by special permission of the Department, and according to plans approved of by the Department.

Sect. 34.—A sub soil drain shall be provided when absolutely necessary, and shall be constructed and trapped to the satisfaction of the Department .

Sect. 35.—No trap shall be permitted between the house drain and the public sewer, unless such trap shall have a hand hole for cleaning purposes, and a fresh air inlet pipe, the whole as may be decided upon by the Department.

Sect. 36.—Drains in yards shall, in all cases, be trapped below frost, that is to say : four feet at least under ground.

Sect. 37.—The inspection of drains on private property shall be under the exclusive control of the Department.

Sect. 38.—Gas companies are obliged to place a stop cock to every main pipe.

Sect. 39.—Any person contravening any of the provisions of this By-law, shall be liable to a fine with or without costs, and in default of immediate payment of the said fine with or without costs, to an imprisonment ; the amount of said fine, and the term of said imprisonment to be determined by the Recorder's Court, at its discretion ; but the said fine shall not exceed forty dollars, and the term of imprisonment shall not exceed two calendar months ; the said imprisonment, however, to cease at any time before the expiration of the period fixed by the Recorder's Court, on payment of said fine or fine and costs ; and where the infraction is continuous, such infraction during each day shall constitute a separate offence.

This By-law will go into operation on the first of September next.

NATIONAL ASSOCIATION OF MASTER PLUMBERS AND STEAMFITTERS OF CANADA.

The sixth annual convention of the above Association was held in the Temple Building, Toronto, on June 26th, 27th and 28th. The chair was occupied by the President, Mr. W. H. Meredith, of Toronto. The following persons were in attendance at the meeting :—Thomas Moll, Ald. Lamarche, Capt. Joseph A. Giroux, Thomas Christie, John Watson, Montreal ; H. Hogarth, W. Mansell, W. H. Meredith, J. B. Fitzsimons, K. J. Allison, W. J. McGuire, George Cooper, Alex. Fiddes, J. H. Wilson, R. Ross, Alex. Purdy, J. J. McKittridge, Toronto ; F. G. Johnston, John McKinley, H. A. Knox, Ottawa ; H. Mahoney, Guelph, Ont.; John H. Neelands, Barrie, Ont.; Frank Powers, Lunenburg, N.S.; James Boxall, Lindsay, Ont.; Adam Clark, J. Wallace, A. Rogers, Hamilton ; Peter Shiells, Kincardine, Ont.; George Ross, Brockville, Ont.; S. King, Ingersoll, Ont.; James Pennington, Windsor, Ont.; W. Sievewright, Petrolia, Ont.; Charles T. Bull, James Williams, St. Thomas, Ont.; M. B. Squires, Windsor, Ont.

On behalf of the City Council the delegates to the convention were welcomed to the city by Aldermen Cox and Loudon, of the reception committee of the City Council. Mr. James Wilson, President of the Toronto Association, also extended a welcome to the visiting delegates. Mr. Hogarth, Chairman of the Reception Committee of the National Association, introduced the following gentlemen representing the supply interests : Messrs. Fred. Somerville, W. C. Allen, Chas. W. Chandler, Alexander Fleming, Ontario Lead & Wire Company ; Charles J. Britain, James Morrison Brass Mfg. Co.; A. A. McMichael, Andrew Mann, E. A. Rogers, The James Robertson Company ; W. L. Helliwell, T. B. Alcock, E. J. Brewer, Gurney Foundry Company ; Andrew Taylor and W. Taylor, Dominion Radiator Company ; H. W. Anthes, Toronto Foundry Company.

In response to the request of the President several of these gentlemen addressed the convention, wishing the Association success in its work and expressing the hope that its deliberations would result to the advantage of the trade as well as of the supply houses. Mr. J. J. McKittrick made the suggestion that the Association should draw up a model plumbing by-law for the guidance of the municipalities throughout the country.

The President in his report referred to the good feeling existing between members of the Association and the manufacturers and jobbers. He pointed out the necessity for systematic organization and the appointment of a permanent secretary who should devote special attention to this work. The difficulty in the way of carrying out this suggestion was to secure the necessary funds. The necessity of educating the members of the Association to do first-class work at a fair price and to avoid underbidding each other was also touched upon. The President expressed the opinion that the greatest evil in the plumbing trade to-day is over-keen competition among bidders, resulting in scamp work.

The Vice-President, Mr. John McKinley, in his report drew attention to the neglect on the part of city councils throughout Ontario to adopt proper plumbing and sanitary by-laws. This neglect, he claimed, was due to defects in the provincial laws. He suggested the appointment of committees to see that these defects are remedied, so that it will not be possible as at present for unskilled persons to engage in plumbing work.

Mr. Frank Powers, Vice-President for New Brunswick and Nova Scotia, reported that the past year had been a prosperous one for the plumbers in the Maritime Provinces, and that the present outlook was promising. He stated that well-founded complaints had been made against the supply houses for selling to consumers, and suggested that the Association devise means for dealing promptly with cases of this kind. To this end the formation of Provincial Associations was recommended. The benefits which would accrue from the formation of such Associations would be an increase in the membership of the National Association, the privilege to members of attending quarterly meetings, the securing of sanitary

legislation applicable to the towns as well as the cities, and the removal of any jealousy which may exist between the master plumbers in the city and country. The report stated that a Local Association of Master Plumbers would probably be formed at an early date at Sydney, C. B.

The report of the Secretary, Mr. W. L. Mansell, contained the following list of places where Master Plumbers' Associations exist, together with the membership in each case :—Halifax, 21 members ; Sydney, C.B., St. John, Fredericton, Quebec, Ottawa, Kingston, Hamilton, St. Catharines, 12 members ; Montreal, 34 members ; Toronto, 23 members ; Windsor, London, 9 members ; St. Thomas, 2 members ; Guelph, in affiliation with Toronto, 1 member ; Sarnia and Chatham in affiliation with Windsor, 1 member each ; Winnipeg, 8 members ; Vancouver, 11 members ; Barrie, in affiliation with General, 1 member.

The report stated that the local Associations were in a prosperous condition, and that good feeling prevailed between the Associations and the manufacturers.

Mr. Jas. Pennington, as Vice-President for Ontario, expressed regret that it had been found necessary to discontinue the publication of the "Bulletin," and asked whether it would not be possible to charge a subscription of $1.00 per year. It was suggested also that the travellers representing the supply houses should be furnished with literature by the Association for distribution to the plumbers throughout the country, urging them to become members.

The various reports were referred to the Committee on Resolutions.

Messrs. F. Powers, Joseph Pennington, F. G. Johnston, John Watson, W. Mansell and John McKinley were appointed a committee to consider and report regarding the advisability of forming Provincial Associations.

At the evening session the Committee on Resolutions reported recommending that the question of appointing a permanent secretary be referred to a select committee ; approving of the suggestion of Vice-president McKinley for the appointment of a committee to consider grievances, as well as his recommendation regarding Provincial Associations and sanitary laws, and suggesting the appointment of a select committee to consider and report on the first of these recommendations. It was recommended that the report of the Vice-President for Nova Scotia be adopted, also the report of the Legislation Committee, and that the report of the Vice-President for Ontario be referred to a select committee.

The Apprenticeship Committee's report recommended that an apprentice should serve five years before being recognized by the Association as a journeyman ; that all present and future apprentices shall receive at the end of their apprenticeship term a certificate of the Association from their employer as a proof of their ability, and that the matter of their wages be referred to the Local Association for adjustment. After some discussion the report was adopted.

A motion by Mr. Powers that a committee be appointed, consisting of three members from each province, to consider the question of sanitary laws and endeavor to secure the enactment of such laws, was adopted.

Mestrs. Allison, Fitzsimmons and Mahoney were appointed a committee to report with regard to the advisability of appointing a paid secretary.

At the morning session on the second day, Alderman Lamarche, of Montreal, addressed the convention and explained the leading features of the new plumbing by-law, which has recently passed the Council of that city and will go into operation on September 1st.

The Committee re the appointment of a permanent secretary reported recommending that the appointment be made at a salary of $200 for the first year. After some discussion action upon the report was deferred until the following day.

On the adjournment of this session at 1.40 p.m., the delegates were given a carriage drive to points of interest in the city as the guests of the City Council.

In the evening the Annual Association Banquet took place at McConkey's restaurant, and notwithstanding that the weather was uncomfortably warm, was largely attended. The chair was occupied by Mr. J. H. Wilson, President of the Local Association, having on his right the President of the National Association, Mr. W. H. Meredith, Alderman Wood, Alderman Lamarche and Mr. H. W. Anthes, and on his left Mr. A. E. Kemp, M.P.; Mayor Howland, Mr. Edward Gurney, Mr. J. H. Patterson, Mr. Andrew Mann and Mr. Alex. Saunders. Messrs. Kemp and Gurney responded to the toast, "Our Country and its Manufacturing Industries." Mr. Meredith, Alderman Lamarche and Mr. Frank Powers replied in suitable terms to the toast, "Our Guest—the National Association," proposed in a humorous speech by Mr. Anthes. "The Mayor and Corporation," brought a response in French and English from Mayor Howland. "The Manufacturers and Supply Trade" brought responses from Messrs. J. H. Patterson, Adam Taylor, H. W. Anthes, Alexander Saunders, Alexander Fleming, T. B. Alcock, Charles Morrison and Andrew Mann. Mr. Grant Helliwell, President of the Ontario Association of Architects, and Mr. Robert Harrison, President of the Journeymen Plumbers' Association, replied on behalf of "Sister Associations." The "Local Master Plumbers," proposed by Mr. Frank Powers, of Lunenburg, N.S., was responded to by Messrs. J. J. McKittrick, J. H. Wilson, and K. J. Allison, of the Toronto Association. Captain Giroux replied on behalf of "The Ladies." A pleasing feature of the evening's proceedings was the presentation of a gold ring set with diamonds and bearing the masonic emblem to Mr. Fiddes, in recognition of the many valuable services which he has rendered for years past to the Local as well as the National Association.

At the Friday morning session Messrs. John Watson, Montreal ; Frank Powers, Lunenburg ; and J. G. Johnston, Ottawa ; were appointed a Nominating Committee.

After some discussion it was unanimously resolved, on motion by Mr. Powers, that the convention next year should be held in Halifax.

It was resolved to organize Provincial Associations on the basis of a constitution recommended by the special committee appointed to consider this question, such constitution being an alteration of that of the National Association in such a manner as to make it applicable to the provincial organizations.

After discussion it was resolved to leave with the Executive Committee the question of the advisability of appointing a permanent secretary.

The report of the Treasurer, Alderman Lamarche, was presented, showing receipts $303.21 ; expenditures $226.61 ; balance in hand, including previous balances, $293.22. The Auditing Committee reported the Treasurer's books correct, and a vote of thanks was tendered to that official.

A vote of thanks was also tendered to the Local Association and to the City Council, to the retiring President, Mr. Meredith, and to the retiring Secretary, Mr. Mansell.

The election of officers resulted as follows :—Past-President, W. H. Meredith, Toronto ; President, John McKinley, Ottawa ; Vice-President, Frank Powers, Lunenburg, N.S.; Secretary, H. A. Knox, Ottawa ; Treasurer, Ald. Lamarche, Montreal ; Vice-President for Ontario, W. Mansell, Toronto ; Vice-President for Quebec, John Watson ; Vice-President for Nova Scotia, G. A. Perrier, Halifax ; Vice-President for New Brunswick, James Walker, St. John ; Vice-President for British Columbia, J. H. Wilson, Toronto ; Vice-President for Manitoba, Capt. J. A. Giroux, Montreal ; Chairmen of Committees—Apprenticeship, R. Ross, Toronto ; Legislative, E. B. Butterworth, Ottawa ; Sanitary, J. W. Hughes, Montreal ; Essay, George Morton, Yarmouth, N.S.; Sub-Executive—President McKinley, Ald. Lamarche, H. A. Knox, John Watson, F. G. Johnston.

After the close of the last business session a visit was paid to Government House, where a group photograph was taken, after which the members and visitors proceeded by electric car to Long Branch and gave themselves up to an afternoon of enjoyment.

INTERCOMMUNICATION.

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

From Jas. P. :—In addition to the excellent and practical reply sent you by W. T. to "P. McF.'s" query, I beg to offer the following, whereby the degrees may be laid off with a steel square in another way. If P. McF. possesses a table of natural tangents he can get his angles as follows : From the table take the tangent of the angle required, using the first three figures from the left, and calling them so many 64ths of an inch. Reduce them to

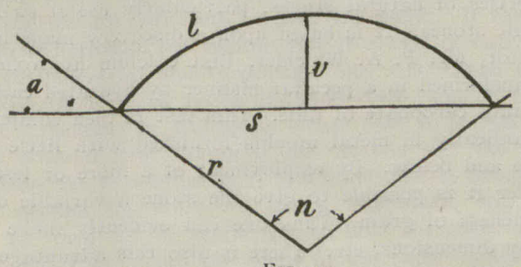


FIG. 1.

inches, and then, with this quantity on one side of the square and 15 5-8 inches on the other side, he will have the figures for laying off the angle. Tables of natural tangents are usually calculated to the radius unit, and are therefore decimal fractions. My method is simply to multiply each by 1000, thereby obtaining whole numbers. For example, let it be required to lay off an angle of 10 degrees, the natural tangent of which is 0.176327, multiplying this by 1000 makes 176,327. Discarding the decimals, we have 176, and calling the figures 64ths of an inch, we have 176 64ths, or 2 3-4 inches. The radius 1 treated in like manner makes 1000 64ths, or 15 5-8 inches. Now taking 2 3-4 inches on the tongue and 15 5-8 inches on the blade of the square, the blade gives the angle of 10 degrees, and consequently the tongue gives 90 degrees, less 10 degrees, or 80 degrees. This, I think, is simple enough, and is perfectly correct, as may be proved by example.

P. W.:—Perhaps, if V. W. will string wires or wire netting closely to the ceilings and walls, he may remedy the defect. This method has been adopted in many places and has proved quite effective in a majority of cases, though in some instances, from some unknown cause, the scheme has failed. Fine wire netting may be made invisible if put up in panels with a moulding around it and rosettes nailed to it through the ceiling and then painted the same color as the ceiling. The finer the wire the more effective will be the work.

Jno. B.:—It is somewhat difficult to answer a question like the one asked by Jas. N, as he does not say what

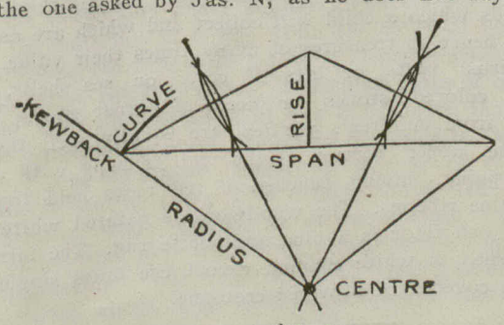


FIG. 2.

kind of a house or building he is to estimate on. In cubing a building he should measure from the bottom of the footings to half way up the roof, getting the solid contents of the buildings ; he can then multiply this sum by the rate per cubic foot, whatever that may be. If the building is a frame building he may figure about 8 cents per cubic foot ; for an ordinary frame structure of 8 rooms, finished in pine in the regular way. For a frame house, with 9 to 12 rooms, finished with hardwood in 4 or 5 rooms, he should charge from 9 to 9 1-2 cents per cubic foot.

For a city dwelling, first class, in wood.....		11 cents
" " " in brick.....	16 to 20	"
" " " in stone	25	"
Brick house with modern improvements.....	14	"
Cheap brick house with 8 rooms	10	"
Veneered houses, 2 stories.....	9	"
Rough-cast cottages, first class	6½	"
" " second class	5¾	"

Rough wooden sheds, barns, stables, etc., from 2½ to 4 cents. If this does not satisfy Jas. N, I will be pleased to enlarge the answer as I am sure the subject is an interesting one to many of your readers.

F. T. H. writes in answer to P. N. S. that redwood is actually better than pine for inside finish, and in many parts of the U. S. is fast displacing white oak and other expensive hardwoods for finishing purposes, and it costs less at first, and is not so troublesome to finish. It does not change color as some hardwoods do, nor does it shrink or swell after being seasoned. Redwood turned into veranda or porch posts does not crack or chip like other woods. It finishes up beautifully, and will resist fire better than any wood known. It takes stain or paint well, and holds them better than any other wood as it is an alkali and not a resinous or acid wood, like most other woods used for finish. When filled, stained and properly rubbed, it has a strong resemblance to mahogany.

T. R. answering R. S. T.:—I should say use a dry bronze powder and then cover with a coat of transparent

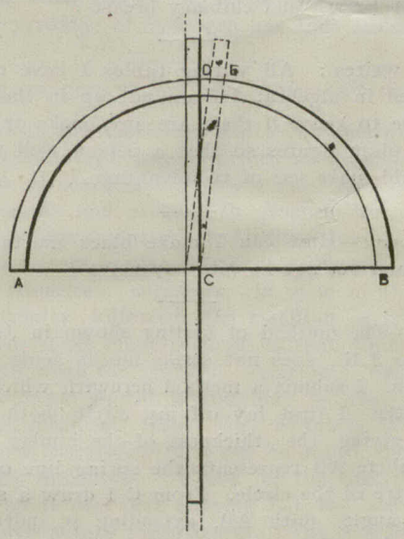


FIG. 3.

colorless varnish. This will be found more satisfactory than any mixture.

Thos. O. B., replying to the question asked by W. P.:—The relationship of the various parts of a segment arch is expressed by the following formula (see Fig. 1.)

r = radius of curve ; v = vrise ; s = span ; a = angle of skewback from horizontal ; l = length of arc or soffit ; n = number of degrees in centre angle ; d = whole diameter of circle of which curve forms part ; c = whole circumference of circle ; $n = 3.1416 = \frac{22}{7}$ = ratio of circumference to diameter ;

$l = \frac{n\,n\,r}{180} = \frac{1}{3}\,(8\sqrt{\frac{8_2}{4}} + v2 - 8)$, $\sqrt{} = \frac{8_2}{8v} + \cdot\,\frac{v\,.}{2,}$ $\frac{8 = r\,s\,i\,n\,n}{\frac{1}{2}(180 - sinn)}$ $n = 360\,\frac{l}{2\,w}$ $a = 90\frac{n}{2}$, $d = 2r$, $c = n\,ol$.

Example :—Span 6 feet, rise 18 inches, radius $= \frac{6^2}{8 \times 1.5} + \frac{1.5}{2} = 3.75 = 3$ feet, 9 inches.

Length of soffit $= \frac{1}{3}\,(8\sqrt{\frac{6^2}{4}} + 1.5 - 5) = \frac{1}{3}(8 \times \sqrt{11\frac{1}{4}} - 6) = (\frac{8 \times 3.35)}{3}$ $- 6 = 26.8 - 6 - 6.93$, say 7 feet.

Thus, centre angle $= \frac{360 \times 7}{r \times 3.1416 \times 3.75} = \frac{2520}{23.56} = 107$ degrees.

Angle of skewback $= 90 - \frac{107}{2} = 36\frac{1}{2}$ degrees. Generally the span

and the rise are given, and the simplest method of finding any other particulars is to put the span and rise down to scale, and find by practical geometry the centre of a curve to pass through the three points, as shown at Fig. 2.

M.M.C. would like to know how to keep out damp from a brick wall 14 inches thick. A detail showing the method or methods would be appreciated.

W.J.D., who is a young carpenter, wishes to know how to find the breaking stress of white pine timber and joists ?

J.D.G. would like to know how to make kalsomine that can be put on in successive coats that will not wash up, without mixing with alum or any size ?

Young Chip would like if some reader would send a design or two for a handy tool chest. He writes, "I am

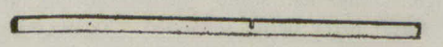


FIG. 4.

going to the North-West shortly, near Edmonton, and I want to make a good tool chest—and fill it—before going, and will be thankful for advice or suggestion ?

H.N.:—I have a fire-place to put in the corner of a house, with the hearth built down to the foundation, and I wish to know of some good method to trim the joists around the hearth and chimney breast ?

J.W.S. writes : All wiring tables I have come across are figured in algebra. I am not up in the study and would like to know if there are any books or tables published in plain figures so that a person well up in arithmetic could make use of to advantage ?

Bricklayer :—How can I make black mortar that will not fade and yet not be very expensive ?

J.B.:—The method of kerfing shown in June issue in answer to J.N., does not strike me as being the best by any means. I submit a method herewith which I think is much better. I first lay off my circle, both inside and outside, giving the thickness of the lumber bent, as at Fig. 3, where AB represents the spring line of the arch, C the centre of the circle. From C I draw a straight line at right angles with AB, extending it indefinitely and bisecting the circle at D. I then take a strip of the same thickness as that I desire to kerf and saw in a kerf as indicated in Fig. 4, using the same saw that I expect to use in kerfing. I then lay the strip on as shown by the dotted lines of Fig. 3, and bend the strip until the kerf closes. I then mark the circle at E, which gives the desired distance. After this I set my compasses from E to D of Fig. 3, and step off the same number of spaces to be bent and proceed to kerf. If in stepping off the kerfs the latter do not come out all right at the spring line, I usually close the compasses up and make an extra cut, rather than leave one out. Of course the stuff must be gauged to show how deep the saw must go.

THE EFFECT OF THE PREFERENTIAL TARIFF ON IMPORTS OF CEMENT.

The annual report of the Ontario Bureau of Mines shows that the preference accorded to British goods entering Canada has operated favorably to the interests of British cement manufacturers. The imports of cement from Great Britain have largely increased, while those from Germany and Belgium have fallen off in like proportion. The total value of cement imports into Canada during the fiscal year ending June 30th, 1900, was $520,593, of which Great Britain contributed $249,280, as against $125,778 in 1899.

TESTING A WIRE ROPE

Testing of a wire elevator rope with flattened strands to give it increased bearing area on the pulleys, was made in Chicago recently. The rope had been in service for five and a half years. The outer strands were found to have parted, but the inner ones were unimpaired. This test corroborates the theory that disintegration of a wire rope begins at the centre. This fact makes necessary frequent examination to prevent accidents.

CARBONATE OF LIME STONE.

By a new process, says the Moniteur de la Céramique, carbonate of lime stones can be made which have all the properties of natural stones, particularly useful as lithographic stones. It is based upon a discovery made by the inventor, Mr. P. A. Winckler, that calcium hydroxid dry is transformed in a peculiar manner by hydrated carbonic acid into carbonate of lime. This last is then compressed hydraulically in metal moulds furnished with little holes above and below. By employment of a more or less fine powder it is possible to give the stone a variable degree of fineness of grain. Thus one can evidently make flags of any dimensions, etc. There is also this advantage that the stones can be colored any tint in manufacture.

STONEWORKING IN ATHENS.

It appears that the Athenians worked the marble to an even, but not a very smooth, face with a toothed chisel before they placed the blocks in the work, and that they afterwards went over the whole exposed surface and finished it to the gteatest smoothness and nicety, but without polish, taking off in this operation about one-fifth inch ; and this has been the practice on the horizontal as well as on the upright surfaces, for the columns of Propylaea are sunk in to about that depth below the general level. The place intended for their reception was sunk before the lower cylinders were placed, and lest any inconvenience should arise from the wet remaining there before the building was completed, a small channel has been cut from the recess to carry off the water. In the steps the adjoining faces are carefully finished at the internal angles, but both are left rough at the external angles, by which means the accidents and wear which take place during the execution would rarely be of any consequence.

SUGGESTIONS FOR DECORATORS.

A little girl's room has a dado of blue denim, about three feet high. Above this is a narrow molding, that serves as the bottom of a sort of continuous picture frame, containing a series of the well-known Perry pictures, reproductions of famous paintings, that have been protected by glass, with narrow moldings covering the glass joints, or at every third or fourth picture. Above these photographs is a wider folding, and then a narrow shelf, which serves as a resting place for all those odds and ends which a child will collect and which are as dear to her heart as treasures of many times their value. Here are birds' nests or bits of coral or sea shells, with bright colored stones or pieces of garnet goods, while favors from children's parties are equally well thought of. The upper portion of the wall is hung with a cretonne paper, having bunches of red roses held together with blue ribbons. The woodwork is painted white, and on the oak floor is a blue and white rug. The furniture is finished in white enamel, except the brass single bed, with a coverlet of flowered cretonne.

Wire glass is now the subject of a monopoly. The five companies which own all the patents for the manufacture of this lire-retardent glass have been consolidated into the Mississippi Wire Glass Company, incorporated at Trenton, N.J., with a capital of $1,500,000. The ruling price for wire glass in stock sheets is fifteen cents a foot for quarter-inch thickness, and it is declared that the consolidation will not be followed by an advance in the present price schedule.

SOME PRACTICAL WALL PAPER HINTS.

To paper over kalsomine a great deal of trouble is experienced in having the paper adhere uniformly to the wall, says the Wall Paper Bulletin. This annoyance can readily be overcome by treating the wall before commencing to hang paper. Much depends upon the condition of the kalsomine, whether hard or sound, cracked and scaling, or soft and chalky. These several conditions call for different treatment. As a rule, however, it is best to carefully remove the old kalsomine, either by scraping or sponging. If it is soft and shows no signs of scaling, a coat of glue and alum size, made two parts glue and one part alum by weight, mixed rather thin and flowed on plentifully and well brushed into the surface, will likely bind the surface sufficient to hold the paper. If the kalsomine is hard and not scaling give it a coat of two parts each of linseed oil and turpentine, one part Japan and 4 oz. glycerine for each gallon of the mixture ; put on warm. If the kalsomine is scaling in either case it is risky to paper without first taking it off. If you size the walls and leave the kalsomine on it is a good idea to scrape the edges around the windows, doors, baseboard, etc., for half an inch or so while wet to hold the edges of the paper and also to lap the edges of the paper instead of butting them.

It is not generally known that oil and grease spots can be removed from the most delicately tinted wall paper without seriously marring it. Some French chalk powdered in cold water should be applied to the spots and permitted to remain for at least twelve hours. The chalk can then be brushed off. If the grease spots still are visible put on more chalk, place a piece of brown paper on this and press for a few moments with a warm flatiron.

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

PERMEABILITY OF MATERIALS.

The action of humidity upon building materials with respect to the permeation of gases has been carefully studied and is an important question for architects. It has been conclusively proved that this permeation is in the inverse ratio of the degree of humidity affecting the material and in some instances may be reduced almost to zero. It will be both interesting and instructive to sum up some of the separate items of valuable information which have been furnished by the results of experiments and tests. If a thin wall be well soaked with water externally the quantity of air which will traverse it is only 0.4 of that which would pass through it if it were dry. For a thick wall the proportion under similar circumstances will be 0.5. In materials of a fine grain the effect of humidity in nullifying the permeable action is strongly accentuated. For instance, calcareous tufa, containing pores of comparatively large dimensions, will lose much more than half of its permeability under the action of humidity, whereas bricks of slag are almost completely deprived of it.

Ordinary mortar parts with a large proportion of its permeability when exposed to excessive damp, but concrete and cement after a prolonged immersion become nearly impermeable. The common brick, which greedily absorbs water, yields it up with equal celerity, but returns to its normal permeable condition ; but mortar, on the contrary, dries gradually and slowly. Cold damp air, so frightful a source of evil, does not easily traverse dry materials, and when wet materials are exposed to frost their permeability is greatly reduced in proportion to the degree of their hardness and compactness. Another point is worth bearing in mind respecting the passage of air through building materials. If dry air be caused to traverse a porous body in a state of congelation it increases its permeability, but if moist air be substituted the effect is exactly the contrary.

EGYPTIAN STONE WORKERS.

In a recent speech, Lord Cromer alluded to the lack of skilled artisans amongst the Egyptians. In illustration of this point he mentioned that during his recent visit to Assuan he was struck by the fact that the contractors for the barrage had been obliged to import several hundred Italian workmen, as no Egyptian stonemasons were to be found who were capable of cutting hard granite. This is somewhat remarkable in a country so famous for its ancient granite obelisks, many of which are of huge size, and could only have been extracted from the quarry and worked by native skill. The obelisks remain, but the lapse of centuries has seen the decay of the industry which produced them.

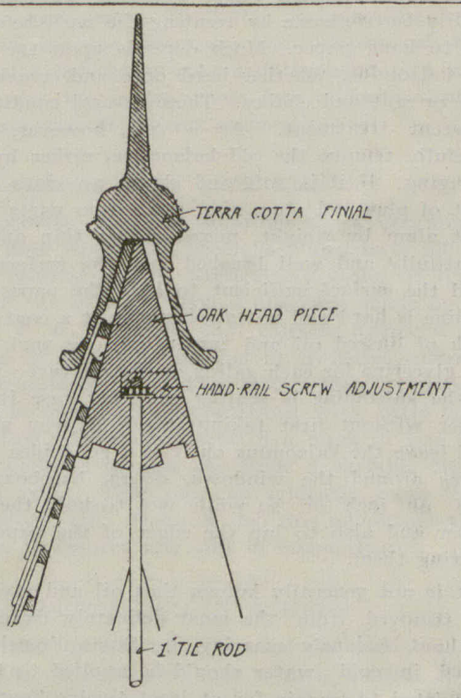
TO INTENSIFY BLUE PRINTS.

In a recent issue of the Photographisches Wochenblatt is an article advocating the use of peroxide of hydrogen for giving greater intensity of color to blue prints. It will be remembered that a blue print is not as intense on leaving the washing water as it is after some 24 hours' exposure to air, an effect assigned to oxidation. To remedy this, it is suggested that a few drops of peroxide of hydrogen be added to the water, to increase the rate of oxidation. The scheme is also useful when the paper is old and gives veiled prints. In case the sensitized paper has turned a greenish blue, it should be over printed until a decided image is visible. Then a little washing soda solution should be added to the washing water, but it should be used sparingly. The washing should be repeated until the whites are clear, and then the prints should be given a final wash in water to which a small quantity of peroxide of hydrogen has been added.

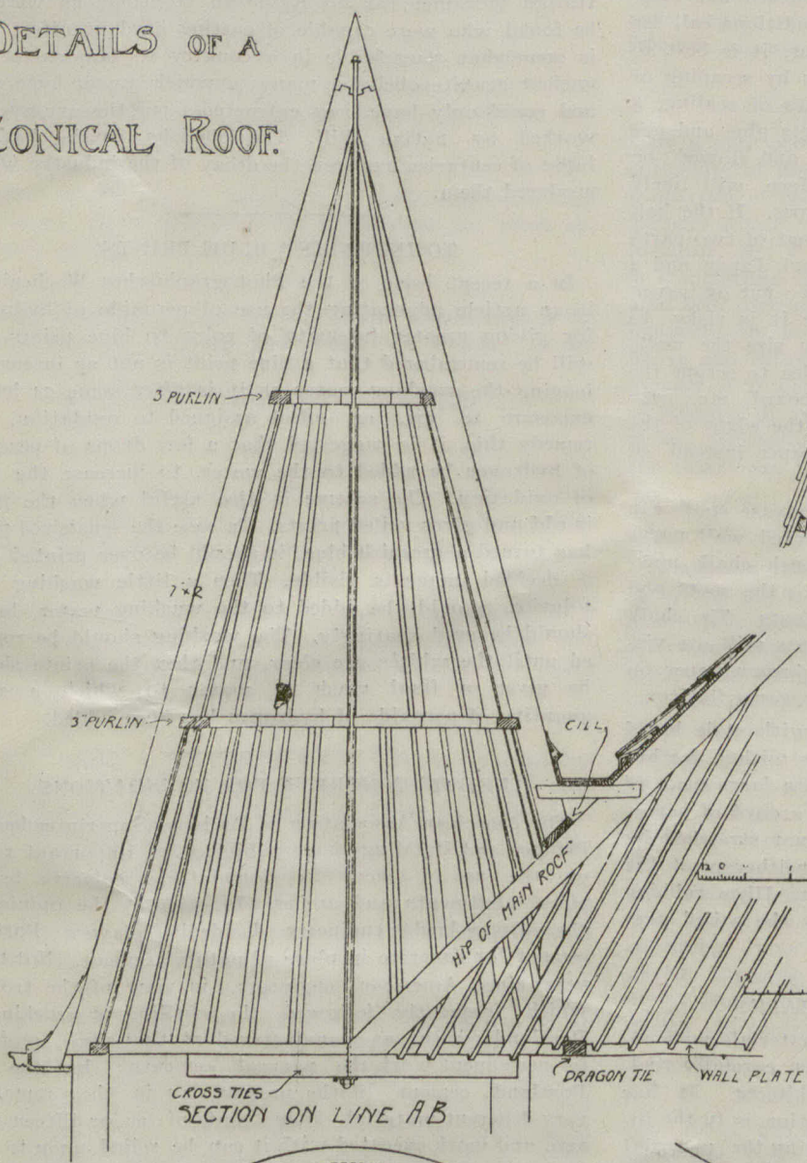
USE OF CONCRETE FOR FOUNDATIONS.

The American Association of Railway Superintendents of Bridges and Buildings have published an important report on the use of concrete for foundations, culverts, bridge-piers, abutments and arches. In general, the opinion of the railway-bridge engineers decidedly favors Portland cement for concrete in place of natural cement. Not many years since, American engineers, in view of the troubles which frequently followed the swelling or cracking of Portland cement as manufactured at that time, preferred for permanent work the natural cements ; but the best Portland cement of the present day is, they remark, a very different material from that of ten or fifteen years ago, and work executed with it can be relied upon to a degree formerly unknown. Some of the contributors to the report point out that nothing but the best imported cement is satisfactory for concrete. The cost of Portland cement concrete for railway work, seems to be now about the same everywhere in the United States, making allowance for local variations in cost of stone and sand, ranging from 28s. 6d. to 35s. sterling per cubic yard, with an average, perhaps, of about 32s. 6d., and there seems to be little difference in cost between hand and machine mixing, the former being cheaper for small work, and the latter for large on a large scale. In regard to quality, the railroad engineers find no practical difference between the hand-mixed and machine-mixed concrete, the machine-mixing being, perhaps, a little more regular, but any carelessness in machine-mixing involves worse consequences than in hand-mixing. As between wet and dry concrete, meaning by the latter a concrete on which water can be brought to the surface only by heavy ramming, the railway engineers prefer a moderately dry material, such as will not quake under the rammer, but on which water will show after a few minutes' tramping. Concerning concrete work in freezing weather, again, the practice of the engineers does not quite support the theories. It is often averred that freezing does not injure Portland cement concrete ; but nearly all the railway engineers prefer not to do concrete work when the thermometer is below 20 degrees Fahr. In any case, they find it much more expensive in cold weather, and even when the sand and water are heated the concrete is unsatisfactory, inclining to crumble on the surface.

DETAILS OF A CONICAL ROOF.



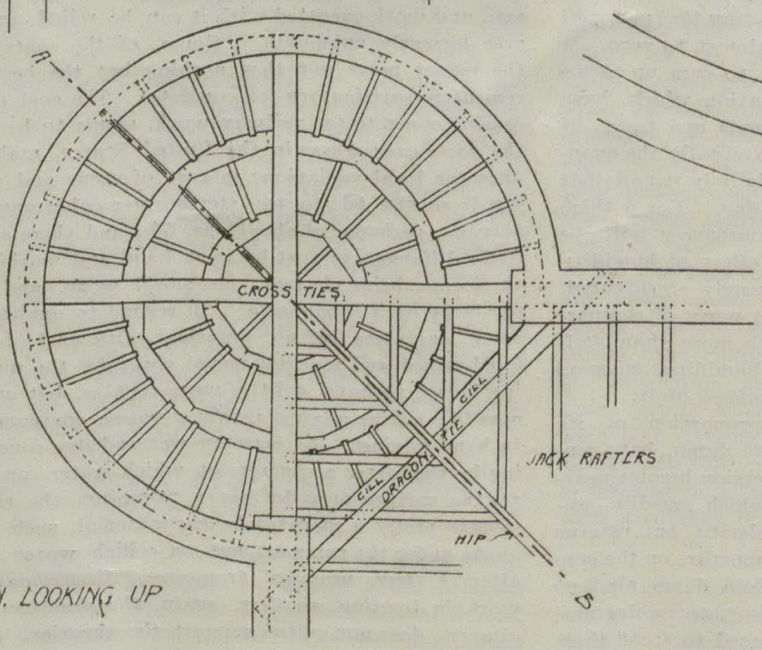
DETAIL AT APEX



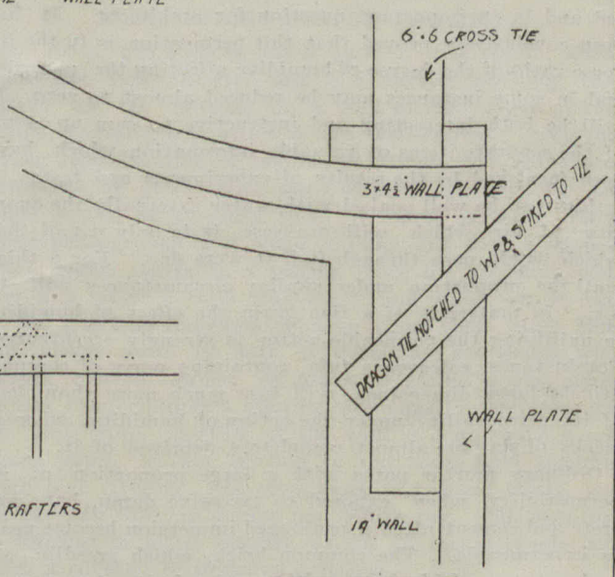
SECTION ON LINE AB

SCALE OF FEET

SCALE FOR DETAILS



PLAN, LOOKING UP



DETAIL AT ANGLES

DETAILS OF A CONICAL ROOF.

The following description and accompanying illustration were prepared by R. W. Carden, A.R.I.B.A., and published recently in the London Building Record :—This turret is taken as occurring at the angle of a large hip-roofed building in such a way that the foot of the hip has to be carried independently of the walls. Two 6in. by 6in. cross-ties are placed diagonally across the turret and the hip is carried by these, the cross-ties resting upon stone templates. The wallplate (dotted on plan) is carried round above the cross-ties, properly halved at the two angles, and the outward thrust is counteracted by the dragon-tie, which is notched to both wall-plates and spiked securely to the cross-ties in order to keep them in position as well. An angle piece to the hip has not been shown, but it could easily, and perhaps with advantage, be added. The main difficulty is reached when dealing with the rafters, as the framing at the apex is complex, and when done, if there are many rafters, most unstable. In this example they are carefully reduced in number until only eight run up the whole height, half the total number being stopped at the first purlin and half those remaining being stopped at the second one. The head-piece is of oak, mortised to receive the heads of the rafters, drilled for the head of tie-rod, and mortised again for the insertion of the nut. This tie-rod (of 1in. diameter) is carried down through the intersection of the cross-ties and can be easily tightened up from the underside so as to keep the whole of the roof rigid. It will be noticed that the shorter jack rafters of the main roof where they do not butt down to the wall-plate are notched on to the cross-ties. At the intersection of the two roofs a 2in. sill-piece has been fixed to the jack rafters of the main roof and the rafters of the turret brought down upon and notched into it. The covering may be of tile, slate or metal, but in the last case boarding would of course be indispensable.

LEGAL.

When Lord Justice Collins, in his judgment in Whitehead v. Reader, in the British Courts, said that "It was clearly competent to the master to define and limit the sphere of his servant's employment, and if the servant acting within that sphere violated the order of the master, the latter would be responsible. If, however, the servant went out of the sphere of his employment as so defined and limited, and acted in the other sphere, which was outside his employment, the act of the servant in that other sphere could not render the master liable either to the servant under the Workmen's Compensation Act, 1897, or to third parties at common law," he expressed a belief, says the Builders' Reporter, which is general among employers. Mr. Reader, the defendant in the case, who is a builder, had issued orders that ordinary workmen were not to meddle with machinery. But one of the carpenters who was sharpening his tools at a grindstone worked by a gas-engine, seeing that a leather band had slipped, tried to replace it and was injured. He sought compensation, and the county court judge awarded him 12s. 6d. a week on the ground that the accident arose out of the man's employment. The defendant appealed, but without success, and a stay of execution pending an appeal to the House of Lords was refused. The Master of the Rolls, Lord Justice Collins and Lord Justice Romer agreed that an order had been given prohibiting the meddling with machinery in the yard. But it was considered that, on the impulse of the moment, the order was forgotten, and that could be regarded as no more than a venial act. Those who are familiar with the ways of modern building workmen are aware that impulses which drive a man, in his employer's interest, to do anything risky are unknown. A workman, as a rule, is too glad to have an excuse for ceasing to labor. If he appears to depart from his jog-trot course it is owing to the conclusion that to have to resume his work under different conditions is more troublesome than to accept the remote possibility of an accident. From the decision given by the Court of Appeal it is evidently of little use to pue up notices, for indifference to them, no matter what loss arises to the builder, can be described as a venial fault and the result of a generous impulsiveness to save an employer's time.

THE CHARACTERISTICS OF PORTLAND CEMENT.

The new German rules for testing Portland cement call for cement so finely ground that not more than 10 per cent. residue remains upon a sieve of 900 meshes per square centimetre (a little finer than a No. 75 sieve), and made of wire, the thickness of which is one-half the width of the mesh. For this test it is recommended that 100 grams (approximately one-fifth of a pound) of cement be used.

The importance of the test for fineness has at times been questioned, but while it may not give any proof of the strength or weakness of cement, says Cement and Slate, its economic value is shown by the fact that a finely ground cement will carry a larger quantity of sand than one of an equal grade and will therefore make a cheaper concrete. It has been determined by numerous tests that the impalpable powder is the only really valuable part of the cement, while the coarser particles are present only as inert material and act like so much sand, decreasing thereby the sand carrying power besides being themselves inactive.

Prof. LeChatelier in making his microscopic examination of cement mortar found that, after setting, no trace of the grain of cement is left in the finer particles, while in the case of the larger, the central part of the grain remained unchanged. It has been affirmed that the part of the cement powder that will not pass a No. 100 sieve does no work as a binding material in the mortar or concrete that is made from it.

It is also a settled fact that coarse grinding increases the tendency of the free lime and magnesia to expand and crack, causing disintegration, when possibly if more finely ground it would be unaffected.

In burning cement the clinker obtained is generally very hard and is consequently not easy to grind. In coarse grinding this is the part that usually escapes pulverizing, and, because it is thoroughly burned it is the most valuable, so that by imperfect grinding we are apt to leave the most useful part of the cement in an innocuous condition.

The rate of setting of a cement increases rapidly as the fineness to which it is ground increases. This is caused by the fact that the necessary chemical reactions take place more readily between fine particles than between those that are coarser.

The hardening of finely ground cement is affected in a peculiar manner by fine grinding. When mixed neat it hardens more rapidly than coarse ground but attains less final tensile strength. As cement, however, is seldom used neat but is generally mixed with sand, the effect of fine grinding on the strength of the mortar is of more importance than the neat test.

It is found that when finely ground cement is mixed with sand it will attain its ultimate strength sooner and will show greater initial and final strength than would a coarser cement under the same conditions. This effect of fine grinding is the more pronounced the greater the proportion of sand that is used.

While it is true that some good cements although coarse and granular are able to pass all tests satisfactorily, it is also true that some poor cements have been vastly improved by fine grinding. The test of fineness standing by itself would never be sufficient to determine the quality of a cement, but other things being equal, the cheapest and best cement is the one that has the greatest percentage of impalpable powder. While itself not conclusive, this test, combined with others, gives an idea of the value of the cement tested which could not be gained without its use.

Some suggestions as to the manner in which this test should be made are here given. The amount usually taken in the United States is 100 grains, in Europe 100 grams. This amount should be well dried at a temperature approximating 100 degrees C. to drive off all hygroscopic moisture. The sieves should be from six to eight inches in diameter and should be jarred or shaken until no more passes through. Stirring the powder while on the sieve should be avoided as it is liable to injure the screen or to force through particles which would otherwise have remained on the screen.

GERMAN PUMICE STONE BRICKS.

One of the most interesting among the many ndustries located along the River Rhine and one which is unique, writes Mr. C. E. Carpenter, is the manufacture of brick from pumice stone, which is carried on in what is known as the Neuwied district. This district takes in the country on both sides of the Rhine between Coblenz and Andernach, a distance of between thirty and forty miles as the crow flies. On the left banks of the historic river, and right in the heart of Neuwied, are the Eifelberg, a low range of gray, rock-clad mountains, which in former days, many centuries ago, spread their volcanic eruptions periodically over the entire surrounding district.

To these long-silenced volcanoes the people of the so-called Bimssand district owe their present unique industry and consequent industrial prosperity. It seems that the huge volumes of sand belched forth by the ancient craters had, with the passage of centuries, gradually disappeared beneath the soil, forming a sub-strata several feet below the surface. In many places, however, the layer of strata refused to disappear, and yet not until quite recently did the scheme of utilizing the valuable deposits present itself to the inhabitants of Neuwied. Even the practical Romans, whose régime along the left banks of the Rhine dates back scarcely more than four centuries, somehow failed to recognize the value of the stone for building purposes. It is also strange, but true, that Caesar and his successors, who threw up at this point on the river vast breastworks and other fortifications, did not realize the unlimited quantities of building material at their very doors. In fact, the deposits have remained intact down to the present day.

The formation of the alluvial strata, several feet below the surface, is decidedly curious. Mineralogically it is a foamy porous substance, reaching in many places a depth of 17 feet, while in other localities its thickness is not more than a handbreadth. Equally simple as its formation is the method of removing it adopted by the miners. This consists of nothing more than clearing away the soil and piling the sand in long hills, from which it is shovelled direct into the mixing bed of water and lime close at hand. The pumice comes out of the earth in pieces, varying in size from mere grains to lumps some 4in. across. It occurs in layers, but is frequently interrupted by small cuticular patchès of more solid fragments of lava.

Before moulding the pumice is screened, the larger pieces being brokrn to pass through a sieve having half inch meshes. These screened pieces are then covered by a thin coating of cement, and the brick is moulded. The cement is not mixed with the pumice so as to form solid cement blocks, but by the fragments being coated first. The brick is then obtained by these coatings adhering to one another.

An idea of the quantity of ingredients necessary in the mixture may be gathered from the fact that for the manufacture of 20,000 bricks about four and a half tons of lime are required. After the mixing process the substance is poured into iron moulds provided with bottoms of dètachable boards, which, after the removal of the moulds, act as driers. When the brick has been exposed to the air for a very short time they are ready for shipment.

As may be seen, the process of manufacture is simplicity in itself. No modern machinery whatever is needed and, therefore, none is used. An industrious workman averages from 800 to 1,800 bricks per diem, for which he receives the "magnificent" remuneration of five marks (about 5s.), and the working days are confined to the months between April and October.

The total production of Neuwied amounts to about 250,000,000 bricks. It gives employment to a small army of laborers, the most of whom are natives of the small villages of the "Westerwald" and the "Eifel." During the "campaign" these people practically live at their employment, in quarters furnished by their employers. The strictest sanitary precautions being required by the authorities, the season's work is in reality one long outing in the open air. In addition thrift is encouraged, prosperity is everywhere noticeable, and, altogether, the natives of the "land of pumice stone" are a happy and contented lot.

METHOD OF MAKING LIMESTONE BRICK.

According to the British Clayworker, burnt-clay bricks have recently found a formidable rival in the sandstone brick. This brick is the product of quartziferous sand, with which a proportionately small amount of lime is mixed, the whole mass being subjected to a high pressure of steam. The result is an extremely hard water-tight product, impervious to frost or weather, and unaffected by all acids. Like every new industry, sandstone brick-making has had many technical difficulties to overcome, the principal one being caused by changes in the weather. In cold, wet weather many poorer results have been obtained than in warm, fine weather. Chemists and experts have tried to find a way by which a uniform degree of excellence would be insured; but all failed, until the Zurich chemist, William Schwartz, invented a process by which good results could be obtained under all circumstances.

Mr. Schwartz found that it was necessary to give the mixture an exact quantity of moisture, as well as to prepare and mix it at a certain temperature, so that the combination of the silicic acid in the sand and lime should begin to take place before the mixture is pressed into brick forms. In this way, all deleterious aeration of the lime is avoided during the manufacturing process. Mr. Schwartz has invented a process by which the amount of moisture can be regulated—namely, mixing dry sand with lime in a vacuum, so that any aeration of the lime by the carbonic acid of the atmosphere is impossible. At the same time the temperature is raised to and kept at a certain degree by steam heat, and then a certain quantity of moisture in the form of steam is admitted. By this means the preparatory process is safely finished, the action of the steam causing the condensation of the silicic acid in the sand and lime, and so giving the proper proportion of cementing particles to the mixture.

For employing this process a machine has been built in which the preparatory and working process can be carried out—a mixing machine provided with revolving arms for mixing the sand and lime, steam tight, with an air pump attached to exhaust the air and also to draw out any excessive quantity of moisture. Inside is a tube for admitting the exact quantity of necessary steam. By properly managing three valves, the limestone raw product can be made of uniform quality, while formerly several machines and apparatus, which needed constant attention, were necessary for making this product, and then the results were never entirely satisfactory.

With the Schwartz invention begins a new era in the limestone-brick industry that will be of great importance in all countries, and particularly in regions where there is neither clay nor stone, but where there is plenty of sand.

RED LEAD AND THE ANCIENTS.

Minium, or red lead, appears to have been well known to the ancients, and according to Pliny was discovered very early indeed by an Athenian, who submitted the red part of a silver mine to the action of fire, expecting to obtain gold. This fine color was held in great estimation, and it would seem that in Homeric times ships of war were painted with minium. It was imported into Rome at one period to the amount of about 2,000 lbs. per annum. It seems to have been adulterated. What is curious is that Pliny remarks in Book XXXIII. of his Natural History that painters when hired for a job in coloring walls, pilfered by washing their brushes when filled with minium, much too often. The minium, he remarks, falls to the bottom, and is so much gained by the thief. It seems an idea prevailed that the action of sunshine and moonlight was injurious to minium. To remedy this, Pliny says, dry the wall and apply with a hair brush hot wax melted with oil. After this, put on a varnish, then smooth down with rollers and polish with clean cloths. It is added that in the paint maufactories where minium was prepared, the faces of the operatives were protected by masks of loose bladder skin in order to avoid inhaling the dust, "which is highly pernicious." Thus we see that more than two thousand years ago lead-poisoning was guarded against in Pagan factories.

WHY SOME HOUSES ARE GOOD.

The most important qualities that enter into the design of a house are care and fitness. Care means thorough attention to everything; fitness signifies suitability and adaptability. The building of a house is a complicated process, requiring the services of many men, and utilizing the products of many industries. It is a work that no one goes about thoughtlessly; and yet all the world knows many houses are designed and built in a careless manner, and without that thorough attention to every detail that the importance of the undertaking should command as a matter of course. For carelessness in building is very far from meaning indifference in construction; that, indeed, is a special carelessness that is punishable by law; but there is a vast quantity of carelessness in house-building which the law does not reach, which builders and owners are indifferent to, and which is illustrated on almost every street and road.

This carelessness is due to a failure to realize the real importance of the art of building. It is a serious thing to build a house. It means the expenditure of a sum of money, often large in amount, in a permanent work that is so seldom altered as to be practically unchangeable. The house builder, therefore, assumes, whether he fully realizes or not, a responsibility to the public that may view his structure, willingly or unwillingly, as well as to himself. And this responsibility extends not only to his own occupancy or ownership of the building, but so long as it may last. One may not build for all time, but one at least builds for some time.

No method has yet been devised for punishing those who build ugly buildings, and probably there never will be. The Philistine who builds an ugly house can, perhaps, content himself with it or find someone else who will be equally happy in an indifference to appearances. And yet the whole tendency of American practice in house-building is toward betterment in appearances. Our houses are not better built than they were twenty-five or fifty years ago, and yet the average house is better to look upon. This betterment, however, still leaves so much to be desired that it may be profitable to consider some of the reasons why some houses are good and others bad.

There is, unquestionably, an advance and an improvement in design compared with the results achieved twenty years since. People are waking up, more and more, to the value of houses that not only are good, but which look to be good. Good-looking houses are quite as much in demand as good-looking carriages or handsome horses, and the market for them is much greater than for fine paintings or other high-grade works of art. Here is an economic fact that apart from any question of art, is helping in the bettering of the appearance of our cities and towns; and this, possibly more than the spread of a real architectural taste, will hasten and develop good building and good design.

The speculative builder, the man who builds houses to sell, is the most powerful as well as the most dangerous factor in the development of house architecture. He is the most powerful because the larger number of houses are built to sell; the individual builder, owner and occupier is as yet in the majority. Miles and miles of streets in New York are lined by the creations of the speculative builder; and the most gratifying evidence of his progress in the last ten or twenty years is shown by the continued betterment in the appearance of the buildings he erects.

It is quite the same in country and suburban districts, many lesser towns and new settlements without end having been opened up and developed by the real estate agent who looks upon houses as articles of merchandise rather than as things of beauty. He has been forced to recognize the fact that beauty in a house will help him to sell his wares; but it is obvious a vast difference exists between him and the man who seeks to make his home beautiful for the love of the beautiful. And it is because of this that the speculative builder is a dangerous factor in artistic development. True beauty, true art in building, can only come with a real and personal appreciation of what this quality is. It is hard to believe that real progress will be accomplished when those chiefly responsible for what progress may be made do not thoroughly realize their responsibilities.

The case of the man who builds his own house and intends to live in it is very different. He, at least, may be expected to exercise care in the design of his dwelling, and see that it is fit and appropriate to its use and its surroundings. His house should, in the first place, be individual. Not necessarily representing the foibles and hobbies of its builder, but showing that he thought enough of his dwelling to make it a good house to live in and a good house to look at. And it is well to remember that more people will look at his house than will live in it. He cannot ignore his responsibility to the public at large any more than he would neglect the convenience of his family, who must content themselves with what he provides them with.

And so the careful man will see that his design is a pleasing one to begin with. If he has no taste of his own, he should consult those who have; and the trained worker in building—the architect—is the one best fitted to advise and direct the whole undertaking. He will make his design as beautiful as he can, and if he seeks the proper advice he will speedily discover that great beauty does not mean, necessarily, great cost. A simple little house, well designed, carefully treated, detailed in a refined manner, built without ostentation and designed for a specific end, will give greater joy to its creator, to its owner, to the people who will live in it, and to those who can't help seeing it, than the most lavish display. No part of a house is too small or too unimportant to receive attention, and every part, if carefully treated, will amply repay the care lavished upon it.

It is most important to remember, however, that the mere bringing together of good things in a design will not, of itself, produce a good result. Every part must bear a relationship to every other part. The windows, the doors, the cornices, the porch, the chimneys, must not only each be good in itself, but they must form part of a harmonious design, united and complete. The most beautiful window will appear out of place if it adjoins a doorway that is not harmonious with it. A misshapen chimney may spoil a design otherwise of the utmost merit.

It is care in such matters that makes one house better than another, and which is the distinguishing mark between houses that are good and those that are bad. A house is an expression of an idea. If it is well expressed, it will be good; if it is badly expressed, it will be a failure. Behind the idea is the man who is responsible for it. If he fails to realize his responsibility, if he is careless and indifferent, if, above all, he does not know, and, more than that, does not wish to know, the result is certain to have every quality of badness and failure.

Houses are good in proportion to the care taken in their design. Nothing pays better in the long run. Nothing of any value has yet been produced in the world that has not entailed thought to bring it to realization. A house is no exception to this rule. A house cannot be successful from an artistic standpoint that is not the result of much thought, carefully pondered, and expressed in the most intelligible fashion.

The question of fitness covers certain other qualities in building that are indispensable to success. Just as an evening coat is unsuited to a morning devoted to business, so every design, every combination, is not adaptable to every condition.

A house must be fitted to its use, its surroundings, its cost. It is a mistake to model a parish church after a great cathedral, or a modest dwelling after a sumptuous palace. These are extreme illustrations, but they point the lesson. It is difficult, at times, to admit the influence of the adjoining dwelling—and if it is bad, that should, of course, never be done—but it is not always possible to get away from it.

A very grave error is often made in borrowing some favorite feature from another house because it has proved attractive under the conditions that may have brought it into use. Yet its very attractiveness may have been occasioned by the combination and the circumstances that are wanting in its new application. Good features need

not be avoided because they have already had use; but their proper use is not to transplant them bodily as one would a plant, but to re-combine them, develop them, adapt them; not put them into a design, but make them part of it. In a word, study their fitness.

The most successful buildings, on the whole, ever built in this country were those erected in the last century and the early part of the present, and which are called "Old Colonial." They were carefully designed and magnificently built. With all our more abundant resources and greater knowledge, our builders of to-day do not equal the construction of that earlier period. They were carefully built, because the erection of a house was a serious undertaking, more serious than it is to-day, when expensive city buildings are pulled down to make way for more modern edifices. And not only were they carefully built, but they were thoroughly fit for their purposes. The great house was a splendid mansion; the simple house was an unpretentious affair, with slight ornament, and simple treatment that even to-day wins our admiration amid more gorgeous neighbors.

The chief lesson to be derived from these buildings by the modern builder is not that that particular style is the one to be followed, but that its methods contain all the secrets of why some houses are good. Unfortunately, the modern method is to borrow styles rather than methods; to copy forms rather than ideas. But we cannot hope for a genuine architecture, even in a problem so simple as an ordinary house, until the thought that underlies the form has been discovered and understood. The first step in building a successful house is to think. Too often the house is built, and then thought taken in making it inhabitable and good to look at.—(From the "Scientific American.")

NOTES.

The Capital Sand & Brick Co., Limited, have been incorporated at Ottawa with a capital of $50,000.

The Ontario Portland Cement Company is being organized at Brantford, Ont. Many of the leading citizens of that city are signing for stock.

The City of Ottawa boasts among its citizens an octogenarian bricklayer, Mr. Richard Lester, who has been laying bricks since he was ten years of age, and has been a subject of three British rulers.

The Montreal City Council has appointed Mr. J. W. Hughes, the well-known plumber, as one of the examiners of applicants for plumbers' licenses, under the new plumbing by-law. The appointment will meet with general approval.

A joint stock company is to be formed at Amherst, N.S., to manufacture a new kind of flooring tile, the invention of the late Joseph Cove and his son George Cove, of Amherst. The flooring is designed in colors, is about half an inch in thickness and in appearance resembles an expensive carpet.

It is learned from the Cleveland press that the building contractors of that city will probably again pay a friendly visit to the builders of London, Ont., during the present season. The visit will probably take place early in August, when the Cleveland builders will be accompanied by former residents of London now living in Cleveland.

Liquid air is being used in Germany as a blasting agent. Under the name of oxyliquit, liquid air is absorbed by some suitable material, and introduced into paper cartridges filled with an oily mass. They are fired by the electric spark or by a Bickford fuse. The effect is said to be equal to that of dynamite. If a cartridge misses fire it becomes harmless in a quarter of an hour, owing to the rapid evaporation of the gas.

Much regret is felt at the failure of the old-established firm of Taylor Bros., of Toronto, proprietors of the Don Valley Brick Works. The firm had also other extensive interests, and at one time were financially strong. Their failure is believed to be due in a large measure to the possession of too much unsaleable real estate. It is understood that the brick business will be continued under the direction of Mr. Robert Davies, who was one of the largest creditors of the estate.

VARNISH AT RIGHT TEMPERATURE.

The finest varnish is easily affected by cold and changes of weather. The rule is, a cool place in summer and a warm place in winter, and an even temperature of about 70 degrees all the time. Much of the trouble from varnish comes from not observing these simple rules.

It is a good rule, also, in cool and cold weather, to do the varnishing in the morning, so that it will have the benefit of the day's drying, and escape the cooler and less favorable action of the night air. Still another important matter is to have the varnish and work of the same temperature when applying the varnish. To effect this, have the varnish in the room long enough beforehand to reach the temperature of the work. When varnish is cooler than the surface to which it is applied it works very hard, and to secure an even coat is almost, if not quite, an impossibility.

It is sometimes impossible to keep varnish at an even, warm temperature in winter. This is especially true of small shops. But the can of varnish may be warmed before using, and this is readily done by placing the can near the stove, care being observed not to let it get too hot for fear of explosion or ignition.

It is likewise a good plan to wipe the cup before pouring varnish into it, and if the varnish is still too cool, set the cup on the stove until sufficiently warm. Stir the varnish while it is warming in the cup. Should it get too hot, pour part of it back into the can and pour out from the can, stirring again. Varnish is very combustible, of course, and there is need of care when having it too near a fire.

There is always danger when we attempt to hasten the drying of varnish by adding driers to it, and especially does this apply to a high-grade varnish. Little or no trouble may come to the lower grades by adding driers, but the finer grades will hardly escape being injured, while at the same time the object sought will likely not be accomplished; for if we examine the job the next day it will most probably be found not dry, and as likely be filled with pin holes, caused by the driers and varnish not amalgamating. So we advise against the use of driers in at least the finishing varnish.

This subject is frequently touched upon by writers, and if it was a settled question there would now be no need for further argument. But it isn't settled. Some believe that no harm, but a positive advantage, follows the admixture of different varnishes when desired for a certain purpose, which a single varnish is considered incapable of accomplishing. Others, again, hold to a contrary opinion. Which is right?

It would seem to be the better plan to secure a line of varnishes, each of which is fully adapted for a specific purpose, than take a haphazard chance of producing what you want by mixing two different brands together. For it surely is true that there are varnishes for every purpose which you may desire to serve. It may be that you will have to get one varnish from this maker, another from that, and so on, just as is done in most shops (for a shop). Some advise using the various grades of a single maker, but this is seldom done. It is urged for the practice that successive coats of one maker's varnish are more likely to assimilate and make a homogeneous mass than if different makes are used. But this is merely the theory of the matter. It may or may not be practically correct.

At any rate, we advise against mixing a poor with a good varnish, for it does not pay to degrade a varnish, no matter how much money may apparently be saved by the operation.

A good bronze paint can be made from a mixture of chrome green, ivory black, and chrome yellow.

Never try to make one coat of paint do duty for two, the result is never satisfactory. It may look it, but sooner or later the deception will be found out and your reputation as an honest man gone.

NON-INFLAMMABLE WOOD.

The degree of excellence to which the fireproofing of modern buildings has been carried, is evidenced by the severe tests which have recently been made in the United States and other countries with wood treated by the electric process of fireproofing. This process is the latest development in the science of rendering wood non-inflammable, and has been adopted by the British and United States naval authorities after a series of the most exhaustive comparative tests with every known method of fireproof construction in the line of material that could be utilized as wood in the building of warships. It has been endorsed by leading architects and chemists in this and other countries and has been used in some of the most modern buildings recently constructed.

When the lumber is received at the fireproofing works it is piled in conical shape on iron cars with 3-8 lath between each layer of boards. After the load has been made up 105 ft. long, it is drawn into a cylinder by a one inch cable, after which the door is closed and locked. Then a steaming process takes place inside the cylinder, thus opening the pores of the wood. The sap is extracted from the wood and drawn from the cylinder by vacuum. While this is taking place inside the cylinder the chemicals in the large tanks overhead are going through a heat ng process. After the lumber has been softened to a certain degree and the pores thoroughly opened, the heated chemical is allowed to pass by gravity into the cylinder until it is filled, after which the pressure pumps are set to work and are kept working until the pressure has gained 150 pounds to the square inch. The chemicals in the cylinder are then forced back into the overhead tanks by means of air pumps, the doors are opened and the lumber drawn out of the cylinder and transferred to dry kilns, where the process is completed.

This electric process of fireproofing is at present carried on by three companies in the United States, one in London, Eng., and the Electric Fireproofing Company, of Canada, Limited, with office and works at Cote St. Paul, Montreal. A representative of the Canadian Architect and Builder recently visited the works of this company, which are situated at Cote St. Paul, on the Lachine Canal. The Grand Trunk Railway Company have siding into the premises, so that every facility for snipping by water or rail is available. The property covers an area of 7 1-2 acres, and the factory is built of solid brick with roof supported on steel columns and girders. The building is divided up into a cylinder-room, engine and pumping room, boiler room, coal room, chemical-room, storeroom, office, two dry kilns and transfer table. The building is so laid out that double the plant can be added as the business increases. The cylinder-room is 123 feet long by 32 feet wide, and contains two cylinders 105 feet long by 7 feet in diameter, capable of holding 15,000 feet B. M. of lumber each at one charge. Above the cylinders are three large feed tanks, each having a capacity of 26,330 gallons. The tanks contain the fireproofing solution, which is pumped into the cylinders under pressure. The doors of the cylinders are fastened by radial steel bolts weighing about ten tons, and are operated by two men in a few seconds ; these doors have to stand at times an internal pressure of from 200 to 300 pounds per square inch. The boiler-room is 37 feet by 24 feet and contains two Babcock & Wilcox high pressure 75 horsepower boilers. These boilers supply steam to the cylinders, pumps, dry kilns, etc.

The engine-room is 39 feet by 37 feet, and contains a 75 horsepower Corliss engine ; steam winch, 40 horsepower, for operating yard and lifting 8,000 pounds ; one vacuum and pressure pump, 16 x 20 x 24 in.; duplex water pump, 8 x 7 x 12 in., connected to canal by an 8 inch water main ; two duplex pressure pumps, 5 1-2 x 3 1-2 x 5 in., high pressure to cylinder ; one pump for suction service to feed tanks, 5 1-2 x 3 1-2 x 5 ft.

The chemical mixing room is 37 feet by 34 feet, and a storeroom above of the same size. In this room is placed two setting tanks 12 x 8 x 6 in.; directly above is one circular tank, 5 feet diameter by 3 feet 6 inches deep, used for mixing the chemicals ; two dry kilns two-storey high, 123 feet by 16 feet 6 inches wide, each heated by the "Common-Sense" system of radiation. The lower storey is filled with the lumber, placed on cars, and is fed by a fan 110 inches in diameter, connected to a condenser, 21 x 5 ft. 2 in. x 4 ft. 6 in. high ; this condenser is filled with cold water radiators, which purify the air as t passes through same into heater 12 ft. 3 in. x 5 ft., 2 x 7 ft. 2 in. high ; this heater contains 8,000 feet of 1 inch steam pipe, which heats the air to a given temperature, after which it is blown into the dry kiln at the extreme end and sucked out at the rear end by means of the fan, which makes a continuous circulation of air. Above the dry kilns is a room for storage of lumber, 125 feet by 33 feet. The office is 32 feet by 48 feet, and includes a test-room, in which the chemicals and solutions are tested for strength and impurities. A traverse table 35 feet wide by 10 feet traverses 137 feet and is worked by a steam winch. It is used for transferring the cars of lumber from the yard to the cylinder and from there to the dry kilns, this giving access to all tracks in the yard. The railway track from the Grand Trunk Railway enters the grounds about midway and passes through the centre of the building, connecting with the various rooms, so that the least amount of handling of lumber is avoided, ensuring economy and the smallest amount of damage to the material.

Mr. Percival W. St. George, Men. Inst., C.E., is at the head of the Electric Fireproofing Company, of Canada, Limited, and under his able management the electric process will no doubt soon receive in Canada the same degree of recognition that it has already received in the United States and England.

—THE—

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RELATING TO PRESSURE OF AIR AND WATER.

It appears that the relations of pressure to distance in the forcing of water do not apply in the case of air, especially for long distances, although for short distances they may be taken as similar. Thus, if a certain head pressure be required to maintain an air current of a given volume and force through 1,000 feet, twice the head would not be sufficient for 2,000 feet. This is because of the increase in volume due to reduction in pressure, or loss of head, by the time the end of the first 1,000 feet has been reached. Consequently a greater pressure must be used to counteract this increased volume, in addition to the extra head required to maintain the force of the current beyond. The bulk of the pressure, however, is lost by leakage and by the bands and elbows of the tube, especially when the latter have too small a radius, the resistance or retarding effect increasing in some at present unknown proportion as the radius of the curve diminishes. In one case the loss of pressure, including leakage, was only two pounds of the initial 60 pounds required to transmit 875 cubic feet of air per minute through an eight inch pipe, 150 feet long. In another case, the driving of the Jeddo tunnel, at Ebervale, Pa., the loss was only 0.002 pound in transmitting air through a six inch tube a maximum distance of 10,800 feet, to drive two 3 1-4 inch drills. The volume of air required, however, for this purpose, 230 cubic feet per minute, was in small proportion to the size of the tube used. By careful consideration the transmission losses may be reduced to a minimum.—(R. Peel, Mine and Minerals, Pennsylvania, Vol. XX.)

MACHINE-CUT vs. HAND-CUT STONE.

In the United States much controversy is now taking place as to the respective merits of machine-cut as against hand-cut stone. The advocates of hand-cutting declare that machine-cut stone when used for building purposes will not weather well. The surface is said to be shaken and stunned by the pressure of the heavy planing machine used. The very life and nature itself, it is said, is taken out of the stone by the planer. Small fillets are ground so that the fingers are almost able to press the edges off, and beads and other undercut members are stunned the whole length of the stone. It is urged also that there is yet another evil connected with the use of machinery for stone cutting, and that is the degeneration of the practical workman. If the use of machinery is further extended, it is urged that the new generation of artisans in the art of stone-cutting will know very little of the fundamental principles of their trade. All they will know is how to set in a mould for the planer, and how to joint the stone when finished. The advocates of machinery, on the other hand, declare that the use of machinery, if only by lessening the cost of production, has made the employment of stone possible where otherwise brick and cement, or some other substitute, would have been used. A planing machine will, it is contended, cut finer mouldings in true lines, either straight or circular, and leave the stone in a much better state to stand the effects of time than is possible by hand labor. Instances are cited in which stone of a kind easily split into thin slabs "bed way" has been so strained during hand labor as to be practically unsaleable; the same stone when machine-cut turning out excellent work. Be this as it may, it is certain that the use of machinery for stone cutting is largely on the increase in the United States, and is gradually spreading to this country. The cost of labor is the most important factor in the matter. It is the economic pressure thus brought along which will effect a revolution in older methods of doing work.

THE TORONTO INDUSTRIAL EXHIBITION.

The refusal of the property owners of Toronto to vote the money required for the erection of new Exhibition buildings, is a clear proof of their dissatisfaction with the management. That new buildings are necessary, few will deny, but new buildings alone are not sufficient to ensure the future development and success of the Exhibition. The management must also be improved. The Board of Directors should be re-organized, and the representation of the various interests made to properly correspond to their magnitude. As now constituted the larger representation is given to the bodies whose interest in and value to the Exhibition are the least. The Board is unwieldy and might with advantage be reduced in size. Some change seems also to be required in the personnel and methods of the immediate management if the Exhibition is to develop along broad lines and be successful. It has apparently reached its limit, if indeed it has not begun to retrograde, under the direction of the present managers. It must either go forward and increase in importance, or meet a speedy death. Forward should be the motto, and to that end everything that would stand in the way of progress be removed and the management brought thoroughly up to date. That should be the first step. When that is accomplished public confidence will be restored and the money for new buildings and other improvements will be forthcoming.

FIRE ESCAPES.

The manufacturers of fire escapes are enjoying a harvest of prosperity in consequence of the amendments to the Factory Act passed at the last session of the Ontario Legislature compelling all factory buildings to be equipped with proper escapes. The inspector estimates that in Toronto alone there are 300 factories requiring to be so equipped.

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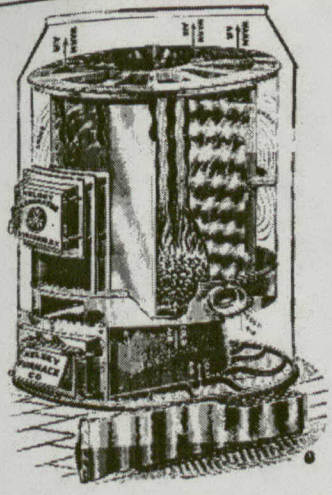

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