

awarded for new Indian Institute buildings at this place. They will be of brick, with stone foundation, and will have accommodation for 100 resident pupils. The estimated cost is \$18,500.

PELKE ISLAND, ONT.—The contract for the marsh drain has been awarded to Allister McKay, of Chatham, who has commenced the work of dredging. This drain when completed will be the largest in Canada, and will have eleven miles of canals.

GENERAL PRINCIPLES OF CONSTRUCTION.

The objects of construction is to adapt and combine fit materials in such a manner that they shall retain in use the forms and dispositions assigned to them. If an upright wall be properly constructed upon a sufficient foundation the combined mass will retain its position, and bear pressure acting in the direction of gravity, to any extent that the ground on which it stands and the component materials of the wall can sustain. But pressure acting laterally has a necessary tendency to overturn a wall, and therefore it will be the aim of the constructor to compel, as far as possible, all forces that act upon an upright wall to act in the direction of gravity, or else to give it permanent means of resistance in the direction opposite to that to which a disturbing force may act. Thus when an arch is built to bear against an upright wall, a buttress or other counterfort is applied in a direction opposed to the pressure of the arch. In like manner the inclined roof of a building, spanning from wall to wall, tends to thrust out the walls; and hence a tie is applied to hold the opposite sides of the roof together at its base, where alone a tie can be fully efficient, and thus the roof is made to act upon the walls wholly in the direction of gravity; or where an efficient tie is inapplicable, buttresses or counterforts are added to the walls, to enable them to resist the pressure outward.

A beam laid horizontally from wall to wall, as a girder to carry a floor and its load, may sag or bend downward, and tend thereby to force out the walls; or the beam itself may break. Both these contingencies are obviated by trussing, which renders the beam stiff enough to place its load on the walls in the direction of gravity, and strong enough to carry it safely. Or if the beam be rigid in its nature, or uncertain in its structure, or both (as cast iron is) and will break without bending, the constructor, by the smith's art, will supply a check and insure it against the possible contingency.

Perfect stability, however, is not to be attained with materials which are subject to influences of that nature. The influences mostly to be contended against are heat and humidity, the former of which produces movement of some kind or to some extent in all bodies; the latter, movement of all kinds of matter; whilst the two acting together contribute to the disintegration of materials available for the purpose of construction. These pervading influences the constructor seeks to counteract, by the selection and disposition of his materials accordingly.

From the tenacity of wrought iron and its almost plastic character in the hands of the smith, it is employed to tie together other more bulky but less costly and more rigid materials, but on account of its exceeding susceptibility to heat, and its consequent expansion and contraction, wrought iron must be used in short lengths only, unless where protected from great heat and cold.

The rapid decay, too, of wrought iron when exposed to humidity, and especially when it is alternately wet and dry will teach the constructor not to expect enduring stability in his works if he makes them dependent upon wrought iron. Cast iron is brittle, and may not be exposed with impunity to transverse strain, especially if such strain be attended by action tending to induce vibration. It expands and contracts under the influence of heat, but it resists compression in every direction, and if used in small bodies, is valuable as a means of connecting other

materials. Timber, being particularly unchangeable in the direction of its length from the mere absorption of either heat or humidity, and at the same time practically both inextensible and incompressible in that direction, and being also readily wrought and easily combined alike with other timber and iron, is a valuable material in the hands of the constructor. But it shrinks and swells in the direction of its thickness, and in consequence is subject to rapid decay when exposed to alteration of moisture and dryness; and although in many varieties timber is perfectly durable and unchangeable in form it it be kept either altogether free from moisture or always wholly wet, its quality of intensionality is greatly diminished in value to the constructor on account of the comparatively slight resistance it offers to compressing power, and the comparative ease with which its fibrous structure is torn asunder. From this cause it cannot be otherwise held so that its power of resisting extension may be made available in any degree proportioned to its strength; whilst its quality of incompressibility in the opposite direction is of less value to the constructor for many purposes which require that quality in the material, because it absorbs moisture by the ends of the fibre more readily, and with a far more mischievous effect, than it does in the direction in which it is compressible. Hence timber rots more rapidly by the ends than by the sides.—*Eastern Contractor.*

IRONWORK IN SPECIFICATIONS.

Every contractor meets with instances of ill-drawn specifications, which are regrettable if only on the ground that they show either ignorance or want of care on the part of those in authority, for whom there should be well founded respect. An instance that came before us during the past few days will suffice. The architect for new work at the General Post Office has issued a specification in which the clauses relating to the ironwork are in some parts inapplicable and not up to date. The rolled girders and joints are very wisely stipulated to be of English steel, but the tests that are to be applied to ascertain the quality of the material are not at all well defined in extent. The clause is rendered impracticable by reason of a stipulation that on fracture the steel shall only show a certain moderate percentage of crystalline or granular fracture. How a crystalline appearance can be avoided in fractures of mild-steel manufactures we should like the architect to explain. In laying down conditions to govern the supply of wrought-iron, various people have endeavoured to avoid the risk of receiving or using "cold-short" material by specifying that the iron shall be "fibrous," and in large sizes and sections, that the wrought-iron when broken shall only show 15 per cent. or 20 per cent. of crystalline structure in its fracture. We have no concern to question the wisdom or unwisdom of such a stipulation when applied to wrought iron. But when such a clause is tacked on to a steel specification, it is clear that the draughtsman is either careless or ill informed. Stipulations that are impracticable, or that are inapplicable, have invariably one result—they render the cost of material dearer than would be the case if specifications were well drawn or carefully compiled on an intelligent practical basis. Competition is limited, for the best class of manufacturers, who, from superior production have a good repute, will not look at impracticable specifications. Conditions that are peculiar, unusual, or unfair, or all three combined, cause work to get into the hands of those less reputable, or possessing less scruple than the average. Architects' specifications for ironwork, we are assured by contractors, show only too frequently a want of care in getting accurate information. So far as concerns architects, it is clear that there is necessity for them to take counsel with a brother in the engineering profession when matters involving the use of iron or steel, cast or wrought,

or of engine work are concerned. Such an alliance in the preparation of specifications and in the superintendence of work done would not only avoid errors, but would have the effect of raising the standard. In a general way, the ironwork used in buildings is of a low average in quality and workmanship. Amongst iron founders and iron manufacturers "builders' castings" and "builders' ironwork" are expressions employed to indicate contempt for an inferior type of work. There is no valid reason why the riveted girders and cast iron-columns used in the building of a factory built to the specification of an architect should be inferior in quality and workmanship to similar articles used in the construction of an engine shops. But these are matters of agreement on the part of all who have an opinion on the subject; the only difficulty is in the commencement of reform.—*Contract Journal.*

USEFUL HINTS.

A fine cement for stonework is made of equal parts of resin, yellow wax, and Venetian red, mixed up together while in a melted condition.

You will find it a good thing to paint iron with its own oxide, and zinc with its own, also. Iron, lead, and zinc paints all stuck well on wood, but iron paint will not do well on zinc, nor zinc on iron.

To join broken fire-brick, use powdered soapstone, which may be procured of a druggist, mixed with an even quantity of common salt and wet to a paste with water. This hardens very rapidly after it is put on, and, as the soapstone is fire-proof, it is lasting. Do not substitute powdered pumice stone or rottenstone for it, as they will not last as long as soapstone, though various things, even sifted ashes, may be mixed with salt in this way, to form a temporary cement in case of emergency.

J. J. Blaine, contractor, Ontario street, Toronto, has assigned to E. R. C. Clarkson.

Messrs. Archibald and Foster give notice of application for the incorporation by letters patent of the Bostwick Metal Lath Company, limited, to manufacture and sell laths composed of metal, as well as plaster and other materials for building purposes. The applicants are Messrs. Walter Whitfield Bostwick, manufacturer, of New York, and Messrs. John W. Allison, Thomas A. Morrison, George Hiram Kendall and Rienzi A. Manwaring, of Montreal. The capital of the company is to be \$50,000.

It is a noticeable fact that the best success has been attained in the construction of ground floors for machine shops when good practice in street paving has been imitated. The Straight Line Engine shops, above referred to, are floored with what is practically a Telford paving of extra thickness, on which a two-course wooden floor is laid. Wood block paving and asphalt paving, both sheet and block, laid exactly as in street work, are all in successful use. The foundation of concrete which is now a recognized essential to good street paving work, is being largely used as the base of shop floors, and if laid on well rolled earth properly drained allows ordinary machines to be located wherever convenient without special foundations. Where wooden floors must be laid, trouble is generally experienced from decay. Moisture is apt to accumulate to some extent on the underside of the floor; and if it does not and the wood is not perfectly dry, dry rot will occur, the air being excluded. In this connection Mr. C. J. H. Woodbury calls attention to the value of slaked lime as a preservative of such floors. Its antiseptic qualities are well-known, and experience shows that wood when laid in contact with dry lime will last indefinitely.—*Engineering News.*

MUNICIPAL DEPARTMENT.

LEGAL DECISIONS AFFECTING MUNICIPALITIES.

NEWSOM & CO. v. COUNTY OF OXFORD.—Osler, Q.C., for the defendants, moved for an order removing this action from a Division Court of the County of Oxford to the High Court. The action is brought by a firm of law stationers to recover the value of certain blank forms and other stationery supplied for the use of the judge and registrar of the Surrogate Court of the County of Oxford. The defendants contend that they are not liable for the forms, as the judge and clerk should supply forms themselves. The present motion is made on the ground that the action cannot be properly tried by any of the county judges, they being all interested in this or other possible claims. Order to go removing case upon the defendants undertaking to save the plaintiffs harmless from all costs over and above Division Court costs. If the defendants do not elect within a week to give the undertaking, the motion to be dismissed with costs.

VILLAGE OF NEW HAMBURG v. COUNTY OF WATERLOO.—Judgment on appeal by the plaintiffs from the judgment of the Queen's Bench Divisional Court (22 O.R. 193) reversing the judgment of Ferguson, J., which was in favor of the plaintiffs, and dismissing the action unless the plaintiffs elected to have a new trial. The action was brought for a mandamus to compel the defendants to repair a bridge over the River Nith in the village of New Hamburg. The plaintiffs contended that it was a bridge which the county corporation were bound to build and repair as the river was over 100 feet in width. The court below held that the place at which the width of a stream is to be ascertained is the place at which the bridge crosses, and the width is to be determined by the width of the natural channel of the stream, taking it at its highest ordinary state. This court was equally divided in opinion. Hagarty, C.J.O., and Burton, J.A., agreed with the opinion of the Divisional Court. Osler, J.A., agreed with the opinion of the trial judge. MacLennan, J.A., held that the stream should be measured at flood water. In the result the appeal was dismissed with costs.

BASKERVILLE v. CITY OF OTTAWA AND CANADA ATLANTIC R. W. CO.; BASKERVILLE v. CANADA R. W. CO.—Judgment on appeal by the defendants the railway company from the judgment of MacMahon, J., in the first action in favour of the plaintiff as against the defendants the city corporation with relief over for the city corporation against the railway company; and upon appeal by the defendants the city corporation from the judgment against them in the first action; and upon appeal by the plaintiff from the judgment of MacMahon, J., dismissing the second action. The actions were brought to obtain damages for injuries to the property of the plaintiffs by reason of a grading and embankment erected near Britannia terrace, in the City of Ottawa, in front of the plaintiffs' lands. Separate actions were at first brought against the city and the company, but on the application of the city the company were added as defendants in the first action. The majority of the court held that the city corporation were not liable as tortfeasors, but that the railway company, who actually did the work, were liable. Appeals of both defendants in the first action allowed with costs. Appeal of the plaintiff in the second action allowed with costs. MacLennan, J.A., dissenting, held that both defendants were liable, the city corporation for negligence in not removing