

given by a recent experience with St. Martin's-in-the-Fields. A portion of the stonework was decaying, and an examination brought out the curious fact that the whole of the faulty stones were stones that had been put there some twenty years before. At that time the mason had ascertained what stones were required, sent off the sizes to the quarry, and with the desire to get the scaffold down the stones had been put in full of quarry sap. The result was that they required renewal in twenty years. This term quarry sap is one that some people are startled at, but it is really no more than the natural sap in timber. It is simply water in the stone and a normal condition for all stone while in its natural bed. You may see when travelling in the west of England large quantities of stone drying where the quarries are near the railway. It is a rule at most quarries to send no stone to London from which the quarry sap has not been dried out. It is sometimes found more economical to have the stone cut and moulded at the quarry, because of the labor being cheaper. Against this has to be set the liability to damage in transit.

TIMBER should be got from the heart of a sound tree. The sap should be removed; it should be uniform in substance, free from large or dead knots or blemishes, sonorous when struck; the annular rings should be regular in form and color; the dust when freshly cut should smell sweet; the surface should not be woolly in texture nor clog the teeth of the saw, and it should be firm and bright with a silky texture when planed. A wood having a disagreeable smell and a dull chalky appearance, and which gives out a heavy sound when struck, is not a good wood. To mature wood it must be kept constantly dry and free from the influence of damp walls or damp earth. Remember, however good your timber may be, that the best can be destroyed. Allow air to pass all round it; it should be utterly free from resting on walls; all wall timbers should rest on corbels. If your timber does decay there is then no disturbance of the walls.

MORTAR, LIMES AND CEMENT.—You cannot have sanitary building if the mortar is bad. With bad mortar you get open and decaying joints, and water is allowed to pass through. It has been alleged that bad building is peculiarly a modern achievement, but it may be a cheering refutation of this to be reminded that very early in the Christian era Vitruvius was complaining of bad building.

Mortar is used to bind bricks or stones together, and to give an even bed. We have in ancient buildings, notably in Greek work, some fine examples where no cementing material is used. The stones are large and so nicely fitted that none is needed.

What is our mortar to be composed of? Well-slacked lime and clean sharp sand in the proportion of one to three. The sand must be free from salt; salt attracts and holds water, and if present in the mortar, water would pass from the outer to the inner surface, and you cannot keep it back.

Where you have to build in damp and wet soils, no doubt Portland cement is the best to use. Roman cement sets quicker, but has not the same power of sustaining weight.

BOND.—English bond should always be used unless you want prettiness of effect. English bond is alternate courses of headers and stretchers, and is invariably used for warehouses and all structures where strength

is necessary. Bond is of the utmost importance. The lowest course must be properly laid. The first course governs the whole building, even if it is 80 feet high. Bond is a breaking of joint on the face of the wall and in the thickness of the wall throughout. We break it by a smaller brick called a closer. Never put closer next stretcher; always put it next to header; the smaller size of the closer is not then so prominent.

Flemish bond is alternate header and stretcher, and is certainly prettier, but it is not so strong, and it lends itself to the abominable practice of using bats, which are not always half-bricks, but any part of a brick.

Bricks must be of such a size that two headers, with the joint, equal one stretcher. It sometimes occurs on a building that bricks become short; you may be sent to the center brick-fields to obtain more. If so, it is well to take one of the bricks used on the building with you, otherwise you may not get them exactly the same size, and your building may show an unpleasant break in its lines which will always be a source of worry. Take three bricks; lay one as stretcher; then see if two laid as headers just leave room for the mortar joint.

A perfect wall should be so thick as to prevent damp penetrating. Dampness may arise from the bottom. This is prevented by a damp-course. Various methods are employed—*asphalt, tar and lime, slate, or hollow stoneware blocks.* Asphalt is best. In the event of a settlement it is not easily broken.

Damp from above is prevented by brick on edge or in the form of a ridge, or in what is known as the saddle-back form (the best), or by a plain stone covering or a stone having a feather edge. Damp is prevented from passing through in some cases by means of hollow walls. It does not matter what quantity of water goes into the outer wall as long as you keep it from the inner. It is necessary to provide means for carrying off water at the bottom of the hollow part of a wall and ventilating openings at the top. Formerly the inner portion of a wall might be of less thickness; now the law requires the inner portion of a wall must be the same thickness as if there were no outer wall forming with it a hollow wall. This makes it improbable that many will use it. As an alternative, 1 inch of asphalt can be put against the wall.

After referring to diagram showing the pitch generally used for the various roofing materials and referring the students to the by-laws on plasterer's work, the lecturer said a roof is best described by a bow and a string. The tie beam is the string: the timbers form the bow. Set your lines out within this form. It is a mistake to think it is held up by the king post. The roof is really held up by the tie beam.

Lastly, in all construction, if you have two methods given you, take that which has the simplest parts. Test for yourselves everything you hear. Never rashly adopt new inventions. A new invention probably solves one special need, and in doing so gives you several others to solve. Take as example the old wash-out closet. Every sanitary authority praised and recommended it. Now, it is not permitted anywhere.

TORONTO BUILDERS' EXCHANGE.

THE annual excursion of the members of the Toronto Builders' Exchange and their friends will take place, as usual, to Wilson Park, N. Y., per steamer Tyron, on the 11th of July. This excursion has in past years proven to be a most enjoyable one, and, if the weather should prove favorable, those who may take part in the event this year are assured of a pleasant outing. As usual, an attractive list of athletic sports will be a feature of the programme.