

prepared clay or shale sufficient to fill the mould is now taken, roughly shaped, and dashed by the moulder into the mould. The clay is pressed with the fingers to fill the mould completely and the slab is levelled off by means of a wood fillet or a piece of wire which is drawn across the top; the slab is then removed and placed on a slip of wood from which it is transferred to a barrow. The slabs are finally taken to the kiln, dried and burnt. Sometimes the drying process takes place in a heated "drying shed."

*Characteristics.*—Good bricks should be thoroughly burnt; this makes them hard and durable (the quality of lasting for a long period without perishing) and enables them to withstand pressure. A hard ringing sound emitted when two bricks are struck together indicates that they have been burnt satisfactorily. Generally the bricks should be true to size and shape, with straight edges and even surfaces, so as to facilitate laying them in position.<sup>1</sup> They should be free from cracks, chips and large particles of lime. Unless desired, uniformity of colour is not now specified.<sup>2</sup>

Inferior bricks are generally underburnt and as a consequence are easily broken and are very porous; these are neither hard nor durable and are incapable of withstanding heavy loads. If they contain coarse grains of uncombined lime, any water absorbed causes the lime to expand, resulting in the partial disintegration of the bricks. They are invariably of poor appearance.

The weight of bricks varies considerably; approximately, wire-cuts are between 5 and 6-lb. and pressed bricks weigh from 7 to 8-lb. each.

**LIME.**—Of the several varieties of lime, that used chiefly for brickwork and masonry is known as hydraulic lime.<sup>3</sup> It is produced from limestone or chalk which is burnt in a kiln for three or four days, when it is ready to be made into mortar.

**CEMENT.**—That generally used is known as Portland cement because of its resemblance to the colour of the stone of that name. It is manufactured from chalk and clay. The former is crushed and the clay is liquefied by the addition of water, when it is called *slip*. These two materials are mixed together in correct proportions and very finely ground; the mixture, known as *slurry*, is conveyed to tanks and then to a kiln where it is gradually subjected to a high temperature and converted into a hard dark-looking clinker; the latter is passed to a mill where it is ground to an exceedingly fine powder to complete the process. The cement is automatically packed into paper or jute sacks, each full sack weighing 1-cwt.

**SAND.**—That obtained from pits or quarries is the best for mortar because of its angularity (called "sharp"); failing this, that from river banks or beds

is used. Sea sand is unsuitable for mortar as it contains salts which attract and retain moisture, in addition to producing a whitish powder or efflorescence which discolours the brickwork or masonry. Sand should be well graded, *clean*, sharp and free from loam, clay or other impurity. Dirty sand should never be used as it may reduce the adhesive value of the mortar considerably, and in order to ensure a clean sand it is frequently specified that it shall be washed.

**LIME MORTAR.**—This is a mixture of quicklime (burnt limestone—see above) and sand in the proportion of 1 part lime to 2 or 3 parts sand, in addition to water. It is the principal material used for bedding and jointing bricks, stones etc. It should be thoroughly mixed either by hand or in a mortar mill. If mixed by hand, the lime is placed in a heap, sprinkled with water and completely covered with the measured proportion of sand; the lime expands and breaks into small particles owing to the heat which is generated; this is known as *slaking* or *slacking* the lime and the heap should be left undisturbed for at least twenty-four hours so as to ensure thorough disintegration of the lime. As unslaked particles of lime in mortar may cause damage to walling, it is necessary to pass the lime through a screen which eliminates unslaked lumps; after slaking, the material is turned over with a shovel on a boarded platform, more water is added and the mixing operation continued until the mortar is of the right consistency, neither too stiff nor too plastic. If mixed in a pug mill, the lime and sand are thoroughly incorporated after about twenty minutes' application of the rotating and grinding rollers. The mortar should be used fresh and just sufficient should be mixed for each day's use.

**CEMENT MORTAR.**—This is a mixture of 1 part cement to 2, 2½ or 3 parts sand. The sand is placed on a platform, the correct amount of cement is added to it, both are thoroughly mixed dry before water is added and the mass gradually worked up into a plastic condition. As cement mortar sets comparatively quickly, it should only be mixed in small amounts and used at once; it should not be used after it has commenced to set.

Cement mortar is sometimes referred to as *compo*, and in some districts this term is also applied to a mixture of sand, lime and cement.

*Cement Grout* is cement mortar which has been reduced to a thick liquid consistency by the addition of sufficient water.

Cement mortar is used in the construction of piers (see p. 12), walling below ground level, chimney stacks, etc., as brickwork built in cement mortar is much stronger than that built in lime mortar. Cement mortar is also used for general walling, especially if constructed during cold weather, as it sets more quickly than lime mortar and the work is therefore less liable to damage from frost.

**CONCRETE** consists of a fine aggregate (or body), a coarse aggregate and a matrix (binding material). The fine aggregate is usually sand, common coarse aggregates are broken brick or stone (or gravel) and the matrix is usually cement. The proportions vary, but a common mix is composed of 1 part cement, 2 parts sand and 4 parts broken brick or stone; the maximum size of the latter depends upon the use to which the concrete is to be put and may be 1½-in. (that passed

<sup>1</sup> Bricks having rough surfaces (termed texture) and slightly irregular edges are selected purposely for certain first-class work. Thus the external walls of country houses are frequently faced with such bricks.

<sup>2</sup> Bricks of a variety of colours in tones of red, purple, grey, brown, etc., are now available, and, provided the colours have been carefully selected, brickwork when faced with bricks of mixed shades has a very satisfactory appearance.

<sup>3</sup> This has the property of setting under water.