hydraulic and (*c*) eminently hydraulic, according to the percentage of silica and alumina present.

(a) *Feebly Hydraulic Lime.*—This contains less than 15 per cent. of silica and alumina. The rate of slaking is slow (varying from five to sixty minutes) and the expansion on slaking is small. It produces a good mortar.

(b) *Moderately Hydraulic Lime.*—The silica and alumina content varies from 15 to 25 per cent. Slaking is very slow and the expansion is small. It makes an excellent mortar, is stronger than feebly hydraulic lime and is suitable for good-class brickwork and masonry.

(c) *Eminently or Very Hydraulic Lime.*—This contains from 25 to 30 per cent. of the important constituents of silica and alumina, and its chemical composition is very similar to that of ordinary Portland cement (see p. 23). It is also known as *blue Lias lime*, as it is found in the Lias formation which extends throughout part of Yorkshire and the Midlands. This lime is similar to, but stronger than, the moderately hydraulic variety. It must be very finely ground and must be screened before use to eliminate coarse unslaked particles. It closely resembles Portland cement (p. 22) and is used for similar purposes.

4. *Magnesian or Dolomitic Lime.*—The rocks from which such limes are produced are known as magnesian limestones or dolomites, as they contain up to 45 per cent. magnesium oxide.[1] The latter has similar characteristics to calcium oxide although it slakes much more slowly. This is an excellent lime and is generally used in the localities in which the magnesian limestones are found.

AIR SLAKING.—The burnt lime should be slaked as soon as possible after it arrives on the site, otherwise moisture and carbon dioxide from the atmosphere will, in course of time, reduce the lime to a powder, *i.e.*, it will become air slaked. This is undesirable, for, carbonation having taken place, the particles of carbonate of lime are incapable of setting, and thus adulterate any mortar with which they may be mixed. Hence the necessity of using only " freshly burnt " lime.

HYDRATED LIME.—As explained on p. 20, hydrated lime is that produced when just sufficient water is added to the burnt limestone to satisfy the chemical action of slaking, and is in a dry powder form. The slaking process must be thorough, as any unslaked particles may cause considerable damage.

In addition to ordinary quicklime, certain lime manufacturers now supply lime in hydrated form. There is an increasing demand for this dry hydrated lime on account of the saving of time and labour resulting to the builder or plasterer. This lime is hydrated by a special plant at the lime-works and is supplied in bags, ready for use, in the form of a dry, fine powder. This process must be carefully controlled and the amount of water added must be just sufficient for the purpose, as an inadequate supply would result in some of the lime being unslaked, whilst an excess of water would produce plastic lime or putty.

[1] The B.S.S. No. 890—1940, states that a lime which contains more than 5 per cent. of magnesium oxide shall be termed a magnesian lime.

At the Buxton works referred to on p. 19, hydrated lime, called " Limbux," is produced by the plant shown diagrammatically in Fig. 7. The burnt lime from the kiln is fed into the crusher A and reduced in size from 1-in. down, elevated to the hopper B and passed into the hydrator C. The latter consists of six steel tubes, each 2-ft. 6-in. diameter and 12-ft. long. A carefully regulated supply of water required to slake the lime enters the hydrator at D, the steam generated from the slaked lime rising to heat the water. The lime is pushed forward by means of an auger and traverses the hydrator as indicated by the arrows. It is now in the form of a powder and proceeds to the separator E, where the fan F separates the fine light powdered hydrated lime from the heavier coarser matter. The latter, consisting of clots of hydrated lime and small nodules of unslaked lime, falls to the bottom and the clots are broken up by the pulverizer G. Any unslaked particles of lime, because of their density, fall to the bottom of the pulverizer and are rejected. The hydrated lime extracted by the fan is blown to the cyclone H and hence to the bunker J. The greater part of the circulating air is returned by the pipe L to the separator system. The increased air pressure in the bunker which is created by the fan is relieved by a tube which is terminated by a canvas sieve called the " stockings " M. This allows the air to escape, any of the fine powder drawn up with it being retained and returned to the bunker by periodically striking the canvas on the outside. Finally, the hydrated lime in the bunker, like Portland cement (see p. 22), flows into paper bags and is automatically weighed. The usual size of bag contains 56-lb., but 1 and 2-cwt. bags can be obtained if required.

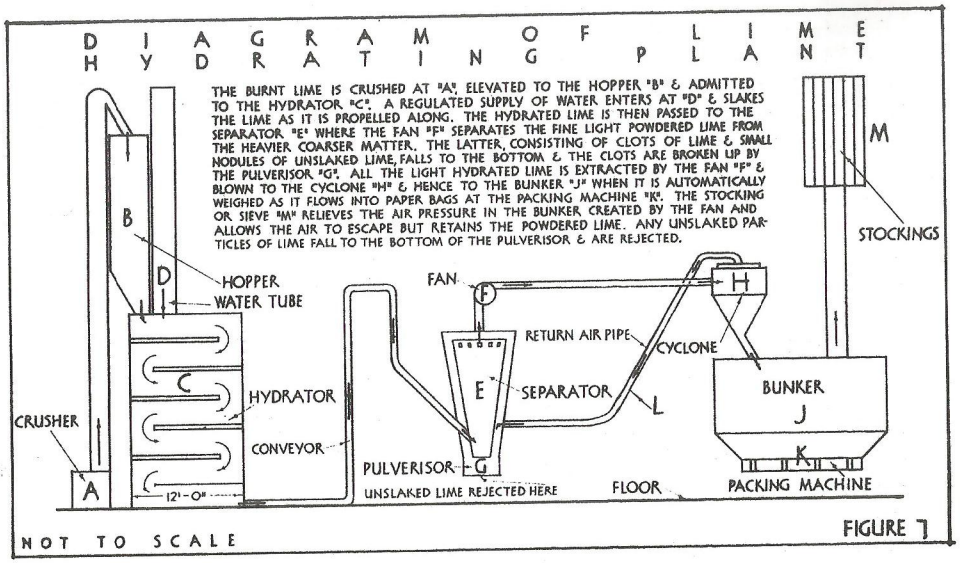

FIGURE 7

CEMENT

There are two groups of cement, *i.e.*, *natural* and *artificial*, but whilst the latter is one of the most important building materials, comparatively little natural cement is now produced. Natural cement is made from nodules consisting of lime (approximately 40 per cent.), clay (50 per cent.) and oxides of iron, etc. (10 per cent.); these lumps are burnt and crushed to a powder, which is a brown colour due to the iron content. Roman cement (produced near