

type w, manufactured by the Marston Valley Brick Co. Ltd., has a single void, shaped as shown. These bricks are laid with their solid beds uppermost and are particularly effective in the construction of partition walls.

**HOLLOW BLOCKS.**—One of several types of walling blocks is shown at y. The thickness varies from  $1\frac{1}{2}$  to 9-in. Some have only two cells, whilst another type having a central web has ten cells. They are used for partitions; the fluted sides and beds provide a good key for the plaster, and the cells reduce the transmission of sound and heat, besides decreasing their weight (p. 17).

**GLASS BRICKS** (see x).—There are two types, *i.e.*, solid cast blocks of glass and hollow glass blocks, the latter being made in two halves before being joined and hermetically sealed. They are not capable of resisting heavy loads, but they can be built into panels to any practical height, and are being used to form semi-transparent walls and partitions to steel framed buildings, etc. (see p. 48, Vol. III). The bricks are bedded and jointed with lime mortar like clay bricks; they are not usually bonded, the vertical joints being continuous. The mortar recommended consists of 1 part lime, 1 part Portland cement and 4 parts sand. Panels exceeding 6-ft. in width should be reinforced with hoop iron or expanded metal (see p. 45) at every third to fifth course; vertical rod reinforcement is necessary if the panels exceed 20-ft. in width. Provision must also be made for expansion at the sides and tops of panels. The bricks are made in various sizes and patterns, the largest size being  $7\frac{3}{4}$ -in. by  $7\frac{3}{4}$ -in. by  $3\frac{3}{8}$ -in. (See p. 48 and Fig. 13, Vol. III)

## LIME

**MANUFACTURE.**—Lime is produced by burning chalk or limestone in a kiln. There are two types of kiln, *i.e.*, (1) intermittent and (2) continuous.

(1.) *Intermittent Kiln.*—This is the simplest form of kiln and is one which is in use in many parts of the country. That shown in Fig. 6 is one of several kilns in which lime used extensively in the North of England is produced. The

kiln is situated at the side of a cutting (often the face of the quarry); the four walls are tapered and are lined with firebrick; it is open at the top. A loosely built rough arch of pieces of the unburnt limestone is formed at the bottom, and this supports alternate 18-in. thick layers of limestone and 9-in. thick layers of fuel (1 to  $1\frac{1}{2}$ -in. coke nuts). Both the limestone and coke are charged into the kiln from side-tipping tubs which operate on a track on each side and at the top of the kiln. A coal fire is started in the fireplace below the arch and it gradually extends to the layers of fuel and limestone until the whole mass is brought to a bright red heat ( $900^{\circ}$  C.). The period of burning is about four days. The burnt lime is then removed through the *eyes*, after which the kiln is again charged. The cover provided by the arched portion at the front of the kiln affords an adequate protection to the freshly burnt lime as it is withdrawn, and the top is generally protected by an open roof. The capacity of this kiln is about 20-tons of limestone and 8-tons of coke.

Lime produced in this manner is used for mortar.

Sometimes this form of kiln is charged wholly with pieces of limestone, and the fire is maintained at the bottom for a few days until the whole of the limestone or chalk has been thoroughly burnt. This is commonly known as a *flare kiln* and produces a white lime, free from discoloration and especially suitable for plastering.

2. *Continuous Kiln.*—The simplest form of continuous kiln is the *draw* or *tunnel kiln*. This is a brick structure, firebrick lined, in the form of an inverted truncated cone, about 16-ft. high, 8-ft. diameter at the top and 4-ft. diameter at the base, having a fireplace with grating at the bottom. It is charged with alternate layers of limestone and coal or coke. The process is continuous, the burnt lime being withdrawn at the base, and raw limestone and fuel added at the top. Some tunnel kilns have the lower half below ground, from the draw hole at the base of which is an inclined shaft or tunnel. Such are known as *sunk draw* or *tunnel kilns*.

Another form of continuous kiln consists of a steel cylindrical shaft, firebrick lined, some 50-ft. high and 8-ft. diameter, with several furnaces at the base, and so designed that only the hot gases come into contact with the limestone. Such kilns are economical in fuel consumption, and the lime which is withdrawn at suitable intervals is free from discoloration.

The Hoffman kiln, described on p. 10, is another form of continuous kiln used for burning lime and is suitable for the production of large supplies. The following is a brief description of such a kiln which has been in continuous use for the past seventy years.<sup>1</sup>

It has twenty-eight firebrick lined chambers, each having a wicket and a damper controlled flue which is connected to the main horizontal flue leading to a central chimney stack. The kiln has no permanent partitions.

Two sections of the kiln, each of ten chambers, are drying, burning and cooling at the same time, and there is a gap of four chambers between each section to permit of stacking, unloading and the carrying out of repairs. A party of men is constantly

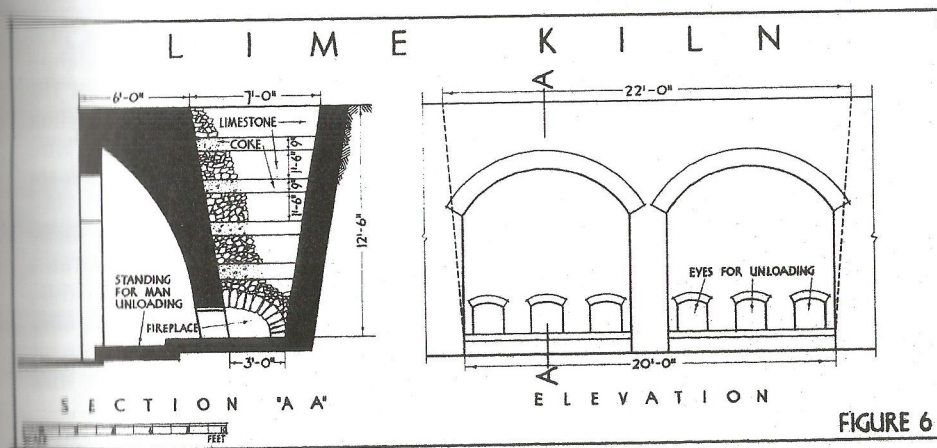


FIGURE 6

<sup>1</sup> At the Buxton Limeworks of Messrs Imperial Chemical Industries Ltd.