CHAPTER ONE

BRICKWORK

Syllabus.—Extended description of the manufacture and characteristics of bricks, cements and limes; lime and cement mortars; concrete. Squint quoins and junctions, and rebated and splayed jambs in English and Flemish bonds; piers; cavity walls; circular work; reinforced brickwork; raking bonds; garden, cross, Dutch, brick-on-edge and facing bonds; recessed, elliptical, pointed and rere arches. Damp proofing of basements; dry areas. Stepped foundations. Concrete floor construction. Decorated brickwork. Fireplaces, flues, chimney breasts and stacks; bye-laws. Setting out.

MATERIALS[1]

A BRIEF description of certain building materials is given in Vol. I. These will now be considered in greater detail.

BRICKS

Bricks are chiefly made from clay and shale, and are moulded either by hand or machinery. The principal elements of clay suitable for brick-making are alumina and silica. Alumina renders the clay plastic, and thus facilitates the moulding process; if incorrectly proportioned it will cause the bricks to crack, twist and shrink excessively when being burnt. The silica may be combined with the alumina or it may be free in the form of sand; if combined, it has a tendency to produce shrinking and warping, but if free it counteracts this tendency and assists in the production of hard, durable and uniformly shaped bricks; brittle bricks will result if the sand content is excessive.

Brick clays may also contain varying proportions of limestone, iron, magnesia, salts such as magnesium sulphate, sodium sulphate, potassium sulphate and calcium sulphate, in addition to organic matter and water.

Limestone or chalk has the effect of reducing shrinkage and acting as a flux during the burning process, causing melting and binding of the mass. It influences the colour of bricks. The limestone should be present only in a fine state of division (the size of the particles not exceeding " pin-heads "), otherwise the pieces of quicklime (see p. 20) will slake and expand if the bricks absorb moisture. Such expansion will crack or shatter the bricks. Fine grinding of the clay will prevent damage from this cause. An excess of chalk will produce mis-shaped bricks when being burnt.

Iron oxides and magnesia also influence the colour of bricks (see p. 12). Salts may cause efflorescence (see p. 13). Organic matter, if in excessive quantity, may contain compounds which discolour plaster. Certain salts, particularly magnesium, may cause the bricks to decay.

Suitable clays for brick-making include " reds," " marls," " gaults," " loams," " Knotts " and " plastics."

RED CLAYS are found in many parts of the country and are extensively used for producing high-class bricks. As is implied, the colour of these bricks is red in various shades, depending upon the proportion of iron oxide present. Red bricks which are particularly noteworthy are those from Berkshire, Durham, Hampshire, Lancashire, Leicester, Yorkshire and the vicinity of Peterborough.

MARLY OR LIMY OR CALCAREOUS CLAYS have a large chalk or limestone content and are commonly used. Sand is sometimes added to such clays to prevent the bricks fusing during the burning process. Marly clays are converted into *malm* by the addition of chalk in correct proportion. In producing malm, the clay and chalk are separately reduced to a slurry or slip in wash mills. The clay *wash mill* is a cylindrical tank in which harrows of vertical metal teeth, attached to horizontal arms, are rotated to churn up the contents. The mill is stopped at intervals to allow stones and larger grains of sand to settle to the bottom, leaving the liquid with the clay in suspension. The chalk is washed in a similar mill, but a spiked roller instead of the harrows is used to break up the lumps to a fine state of division. The washed clay and chalk are now mixed together in exact proportions and passed through a screen to a *wash-bank* or shallow settling tank where the surplus water is run off, leaving the malm. Marl and malm bricks are almost white in colour. The approximate analysis of marl includes 33 per cent. silica, 10 per cent. alumina, 30 per cent. chalk and 5 per cent. oxide of iron. Well-known white bricks are obtainable from Cambridgeshire, Lincolnshire and Suffolk.

GAULT CLAYS are heavy, tough and of a bluish colour, but with sufficient chalk content to render the bricks of a pale yellow or white colour when burnt. Bricks, called *gaults*, made from such clays are often perforated (see p. 18) or have a large frog to reduce the weight; they are very satisfactory for general building purposes.

LOAMY OR MILD CLAYS have a high silica content, and the addition of a flux, such as chalk, is often necessary. Shrinkage of these clays during burning is relatively small, and they produce bricks of excellent quality. Compared with marls, a loamy clay may consist of approximately 65 per cent. silica, 27 per cent. alumina, 0·5 per cent. chalk and 1 per cent. iron.

KNOTTS CLAY is found in deep seams in the neighbourhood of Peterborough, and as it contains a relatively large proportion of finely distributed combustible matter, an economy in fuel for burning results. Fletton bricks (see p. 10) are produced from

[1] Consideration of much of this description of materials can be deferred until the Third Year of the Course. It is given here in somewhat extended detail for the purpose of reference.