The thickness of a wall is either expressed in inches or in terms of the length of a brick, thus: 4½-in. or ½-brick, 9-in. or 1-brick, 13½-in. (often specified 14-in.) or 1½-brick, 18-in. or 2-brick, etc.[1]

A bond is usually identified by the appearance of the external face of the wall, and it is this face appearance which is referred to in the following description of bonds. Thus the expression " alternate courses of headers " refers to the arrangement of the bricks on the face, even if the headers in each course are backed by stretchers.

Note that the joints in most of the details are indicated by single lines, the thickness not being shown. Students are not recommended to show the joints by double lines, for, unless they are very accurately drawn, accumulative errors are likely to occur resulting in the bond being shown incorrectly. Drawing is further facilitated if, as shown in the examples, the dimensions of a brick are assumed to be 9-in. by 4½-in. by 3-in.

HEADING BOND.—*Each* course of a wall consists of headers only. It is used chiefly in the construction of footings (see Fig. 10) and walls which are sharply curved, where the long faces of stretchers would unduly break the line of the curve.

STRETCHING BOND.—*Each* course consists of stretchers, with exception of a half bat which must be placed at the stopped end of a wall at each alternate course so that the work will break joint. Note that at H, Fig. 3, the break joint is formed by the first or quoin stretcher appearing as a header on the return face.[2] This bond is suitable for 4½-in. thick walls, such as are required for cavity walls, chimney stacks, sleeper walls and division walls.

ENGLISH BOND.—This consists of *alternate courses* of headers and stretchers (see Fig. 3). Observe: (1) in each *heading course a queen closer is placed next to the quoin header*[3] and the remaining bricks are headers, (2) every alternate header in a course comes centrally over the joint between two stretchers in the course below, giving an approximate lap of 2¼-in., and (3) there are no continuous vertical joints, excepting at certain stopped ends and particularly where queen closers of the form K (Fig. 2) and not J are used. It is this comparative lack of straight joints which gives to English bond its characteristic strength.

Square Stopped Ends.—Fig. 3 shows details of stopped ends to a 1-brick wall (J), a 1½-brick wall (K), a 2-brick wall (L), a 2½-brick wall (M) and a 3-brick wall (N). A key plan of a portion of a building is shown at A, and the treatment of the stopped end of the doorway opening at C (which is called a *square jamb* see p. 13) would be in accordance with one or other of these details, depending upon the thickness of the wall.

[1] Large modern buildings are usually of steel-framed or reinforced concrete construction which provide for the support of heavy loads by the use of either steelwork or reinforced concrete, and therefore walls which exceed 2 bricks in thickness are rarely required.

[2] Low division walls which are not required to support loads may be built with the bricks placed on edge and in stretching bond; the thickness is thus reduced to 3-in.

[3] A heading course should never *commence* with a queen closer, for, in this position it would be liable to displacement.

The external walls of a house if built of solid brickwork are usually 13½-in. thick, and the division walls are either 4½ or 9-in. thick; other types of buildings may have thicker walls, but, as already explained, walls exceeding 2 bricks in thickness are now rarely required.

Special attention should be taken in the construction of stopped ends of walls as these are often required to take concentrated loads from lintels, etc. (see Fig. 12).

The following should be noted :—

1. At least every alternate transverse joint is continuous from face to face; a 1½-brick wall consists of units comprising a stretcher backed with two headers, or vice versa (see broken lines at K, Fig. 3); a stretcher course of a 2-brick wall is formed of units having a stretcher on each face with two headers in the middle (see L, Fig. 3).

Students at examinations frequently make the mistake of showing non-continuous transverse joints.

2. Walls of an *even* number of *half* bricks in thickness present the same appearance on both faces, *i.e.*, a course consisting of stretchers on the front elevation will show stretchers on the back elevation (see J, L and N, Fig. 3).

3. Walls of an *odd* number of *half* bricks in thickness will show *each* course consisting of headers on one face and stretchers on the other (see K and M, Fig. 3).

4. The middle portion of each of the thicker walls consists entirely of headers (see L, M and N, Fig. 3).[1]

FLEMISH BOND.—This comprises *alternate* headers and stretchers in *each* course. There are two kinds of Flemish bond, *i.e.*, (1) Double Flemish and (2) Single Flemish.

(1) *Double Flemish Bond* (see D, E, F and G, Fig. 4) shows the characteristic appearance of Flemish on *both* external and internal faces. As shown at D, each header comes centrally over a stretcher and, unlike English bond, no header comes over a vertical face joint. It is not so strong as English bond because of the large number of short continuous vertical joints (indicated by thick lines) which occur in the longitudinal joints. Some consider that double Flemish bond has a more pleasing appearance and is more economical than English bond.

Whilst there is a difference of opinion regarding the superiority or otherwise of the appearance of Flemish bond (some favouring the design produced by a series of units of cross formation which appear on the face—see D, Fig. 4), it is accepted that where a fair or uniform face is required on *both* sides of a 9-in. wall this is more readily obtained if Flemish and not English bond is used. The reason for this is that the stretcher faces of bricks often vary in length on account of the unequal shrinkage which may occur during the burning process and thus the combined length of two headers together with the thickness of a vertical joint exceeds the length of a stretcher. Consequently when a 9-in. wall is built in English bond one face is fair but the opposite face shows

[1] A scale of 1-in. to 1-ft. is generally used when detailing brick bonding; students are recommended to commence with the heading course followed by the stretching course immediately below it; a tracing of the latter course transposed over the heading course will emphasize the fact that there are no continuous vertical joints (see L, Fig. 3).