

through a  $1\frac{1}{2}$ -in. square mesh sieve) for foundations and  $\frac{3}{4}$ -in. for reinforced concrete work. The aggregates must be carefully graded from a minimum to a maximum, so that when the materials are mixed together the space (or voids) between the particles shall be reduced to a minimum and a dense concrete ensured.

The mixing is done either by hand or by machinery. If mixed by hand, the materials in correct proportion are placed on a boarded platform and mixed twice (or thrice) dry and then twice (or thrice) wet. The amount of water added after the materials have been turned over dry (by using shovels) must be carefully regulated, as an excess of water considerably reduces the strength of the concrete. The mixing should always be done on a platform otherwise dirt would be shovelled into the mixture and its strength thereby reduced.

If a concrete-mixing machine is used, the materials in proper proportion are charged through a hopper into the mixer, when the correct amount of water (regulated by a measuring device) is added; the mixer is rotated at a specified speed for a definite period, usually a minute, after which the concrete is discharged from the machine.

The concrete should be carefully deposited where required on the building so as to ensure that the density of the material shall be uniform throughout.

### BONDING

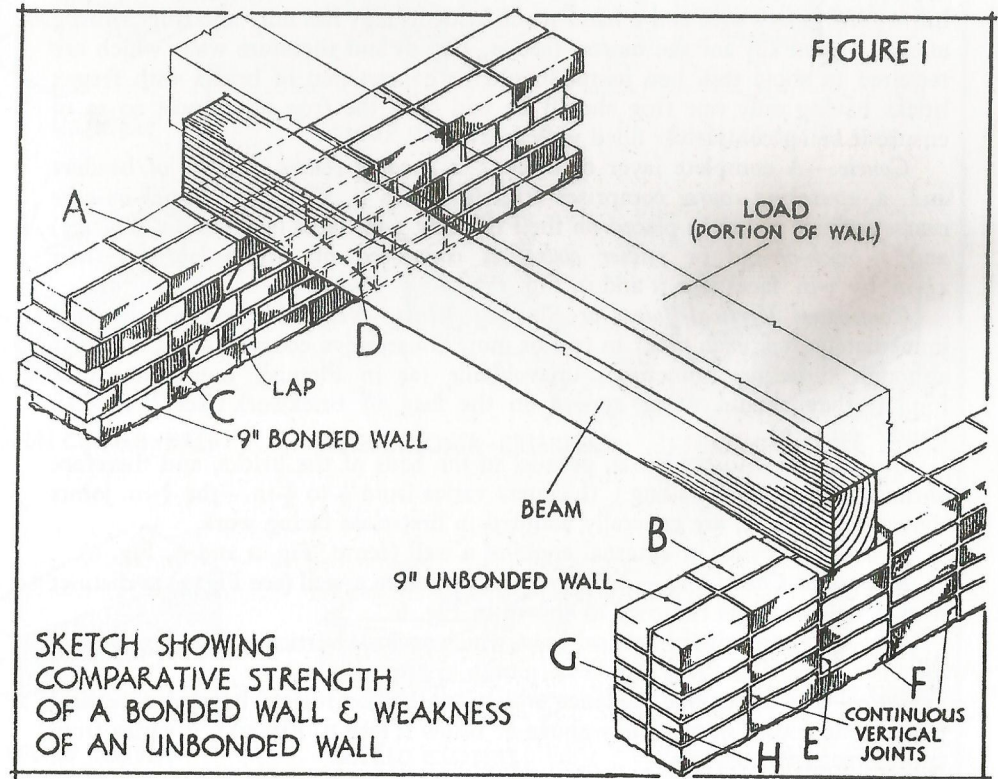
The craft of the bricklayer is concerned with embedding bricks in mortar and suitably arranging them so that the mass, called brickwork, conforms with certain requirements such as strength and appearance. Strength depends a good deal upon the bond.

*Bond* is the interlacement of bricks produced when they lap (project beyond) those immediately above and below them. An unbonded wall, with its *continuous vertical joints*, has little strength and stability and such joints must be avoided. Fig. 1 illustrates the comparative strength of a bonded wall A and weakness of an unbonded wall B which are shown supporting a load. The portion of the load transmitted to the wall A is distributed over a relatively large area, as indicated within the broken lines C and D, whereas that transmitted to the wall B is practically concentrated on the portion between the continuous vertical joints E and F, with the result that this portion would tend to drop as shown; in addition, the two vertical sections G and H would tend to separate because of the absence of bond. Various bonds are described on p. 7.

**SIZE OF BRICKS.**—Uniformity in the size of bricks is essential if the maintenance of correct bond is to be facilitated during the construction of a wall; time is wasted if a consignment contains bricks of varying sizes as the bricklayer is required to make a selection as the work proceeds.

Bricks in common use vary in size from  $8\frac{1}{2}$  to 9-in. long by  $4\frac{1}{8}$  to  $4\frac{3}{8}$ -in. wide by  $1\frac{1}{2}$  to 3-in. thick. The following sizes are recommended in the British Standard Specification (No. 657-1936) for Clay Facing and Backing Bricks:

minimum length,  $8\frac{5}{8}$ -in., maximum length,  $8\frac{7}{8}$ -in.; minimum width  $4\frac{1}{8}$ -in., maximum width  $4\frac{1}{2}$  in.; minimum depth or thickness  $1\frac{1}{8}$ -in., maximum thickness  $2\frac{1}{8}$ -in.<sup>1</sup> The length of a brick should be twice its width plus the thickness of one vertical joint in order that proper bond may be maintained (see A, Fig. 2).



**TERMS.**—The following defines those which have a general application to brickwork:—

*Arris.*—An edge of a brick (see A, Fig. 2).

*Bed.*—The lower 9-in. by  $4\frac{1}{2}$ -in. surface of a brick when placed in position (see A, Fig. 2).

*Header.*—The end or  $4\frac{1}{2}$ -in. by 3-in. surface of a brick (see A, Fig. 2).

*Stretcher.*—The side (usually referred to as the "edge") or 9-in. by 3-in. surface of a brick (see A, Fig. 2).

*Face.*—A surface of a brick such as the *header face* ( $4\frac{1}{2}$ -in. by 3-in.) and

<sup>1</sup> Included by permission of the British Standards Institution. Country houses, etc., have a more attractive appearance if the walls are faced with 2-in. thick bricks (with  $\frac{3}{8}$ -in. thick mortar joints) instead of the thicker standard bricks.