

thus, for a long drawing-room, the breast may be at least 6-ft. wide in order that it may be of suitable proportions.

The *head* of a fireplace opening is finished with either a stone or concrete lintel or a brick arch, the latter usually being segmental in two rough rings. Where a breast projects more than  $4\frac{1}{2}$ -in. and the jambs are less than 13-in. wide, a brick arch must be built on a wrought iron or steel bar, 9-in. longer than the opening at each end, with ends turned up and down; the ends may be split and turned as shown in Fig. 26, or turned either up or down without being split; the object of this *cambered chimney bar* is to tie in the narrow abutments.

The *back* of a fireplace opening in an *external* wall (see B and Q) or between two openings built *back-to-back* (see R) in a wall, *other than a party wall*, shall be at least 4-in. thick. A party wall is a division wall between two buildings occupied by different tenants or belonging to different owners. The back of every other opening (thus including a single opening in an *internal* wall as at S, and back-to-back openings in a party wall) shall be not less than  $8\frac{1}{2}$ -in. thick. The backs shall be continued at the thickness stated for a height of at least 12-in. above the top of the opening, unless the opening is in a party wall and is for a kitchen range when the thickness ( $8\frac{1}{2}$ -in.) must be continued for a height of 9-ft. above the level of the hearth.

**FLUES.**—The size of a flue is usually 9-in. by 9-in. and this should be uniform through its length, except at its outlet, where it may be slightly restricted. The brickwork above the fireplace opening is corbelled or *gathered over* in order to reduce the opening to the size of the flue and avoid a large space which may produce eddies and reduce the upward current (draught) of the flue (see A, Figs. 25 and 26). This reduced opening is known as a *throat*. The two flues at A, Fig. 25, are indicated by broken lines (see also C). That from the lower fireplace must be bent in order to negotiate the upper fireplace. The gathering over should be arranged to bring the narrowest part of the throat centrally over the fire, not as shown at C, Fig. 26. It is generally agreed that, whereas a flue should be as straight as possible for most of its height, it should have at least one bend in order to reduce down-draught and the admission of rain; hence the reason for not continuing the upper flue in a straight line to the chimney pot; if this flue was straight throughout, it would undoubtedly produce a smoky chimney because of its short length. Any bends must be gradual and should not be less than  $45^\circ$  to the horizontal. The brickwork enclosing flues shall be at least 4-in. thickness (see J, W and X); if the angle of an oblique flue is unavoidably less than  $45^\circ$ , this thickness must be increased to a minimum of  $8\frac{1}{2}$ -in. on its upper side; the minimum thickness of the back of a flue in a party wall (not back-to-back with another flue) must be  $8\frac{1}{2}$ -in. up to its intersection with the roof. The minimum thickness of chimney breast walls is 4-in. (see C). The inside of a flue must be rendered with mortar to prevent the escape of flame and smoke through any cracks or open joints; this is known as *pargeting* or *paring*, and should be at least  $\frac{1}{2}$ -in. thick.

A good mixture for parging is composed of 1 part lime to 3 parts sand, together with ox hair (1-lb. of hair to 3 cub. ft. of mortar) well raked in; another recommended mixture consists of 1 part cement, 3 parts lime and 10 parts sand; an old specification, still adopted in country districts and which produces a very adhesive non-cracking coat, is 1 part lime, 2 parts sand and 1 part cow dung.

This parging is applied in course of construction, and in order to keep the flue clear of mortar droppings, pieces of brick, etc., it is advisable for it to be *cored*. A "core" is a sack, stuffed with shavings, with a rope attached; it is placed within the flue at its commencement, drawn up in stages as the work proceeds and any droppings removed. This precaution is often omitted and hence the somewhat frequent cause of smoky chimneys, the accumulation of mortar, brick bats, etc., at the bottom of a bend being such that the passage of smoke is impeded and sometimes completely stopped. An additional precaution to ensure a clear flue is to leave an opening in the face of the chimney breast at the bottom of a bend which is unavoidably sharp, and this is made good after any accumulation has been removed.

Flues in chimneys constructed of stone (which is occasionally used where stone is readily available) are lined with either cylindrical or rectangular fireclay tubes which are  $\frac{1}{2}$ -in. thick, 8-in. internal diameter (or square) and 2-ft. long. These tubes are butt jointed and solidly backed with mortar; any bends are blocked out with mortar to avoid cutting and mitring the edges of the tubes. Such linings are now rarely used, as most chimneys are built of brickwork.

**CHIMNEY STACKS.**—A chimney breast which is to penetrate the ridge of a roof is gradually reduced in width above the ceiling until that of the chimney stack is obtained, which should occur just below the penetration (see A). The minimum height of the stack is 3-ft. above the ridge, as shown. If the stack does not pass through at the ridge but penetrates one slope only, this 3-ft. height is measured from the highest point of intersection, such as at the back gutter. For reasons of stability, the maximum height of a stack is six times its least width (unless otherwise secured) measured from the highest point of intersection (see T). The minimum thickness of the walls of a stack is 4-in. If the stack only accommodates one flue, the appearance is considerably improved if this thickness is increased to 9-in. The  $4\frac{1}{2}$ -in. thick *withes* (or divisions) should be well bonded into the external walls. Plans showing typical bonding are shown at J and X. Chimney stacks should be built in waterproofed cement mortar from 12-in. below the lowest point of intersection of the roof; the parging of the flue above this level should also be of this material. Rain is thus prevented from soaking down the walls, and, provided the joints are well filled with mortar, cold air is excluded which would otherwise cause chimneys to smoke as the rising warm air is cooled.

It is usual to terminate a flue with a fireclay pot, although this is not always necessary and its omission is sometimes preferred. Chimney pots are of various shapes and sizes, a simple type being cylindrical, of 8-in. (or 9-in.) internal diameter,  $\frac{1}{2}$  to  $\frac{3}{4}$ -in. thick, and with a flange at the base; its height varies, 12-in. being common; it is often tapered to about  $7\frac{1}{2}$ -in. (internal) at the top to give a restricted outlet which is considered to have the effect of increasing the velocity of the ascending current. The pot should be supported on the brickwork (see W) and securely built in cement mortar between two or three courses of brickwork (or a stone cap or several courses of tiles); the top of the stack is *flaunched*, i.e., covered with cement mortar, which is weathered to throw off the water.