

bricks may be obtained if rubbers or similar coloured voussoirs are used for the arches, and points of interest provided if tiles or stone are used for key blocks.

Several arches having tiled keys are shown in Vol. I and in Fig. 19 of this volume; additional examples are illustrated in Fig. 24. That shown at P.10 shows a lintel or soldier arch with several projecting voussoirs. P.11 shows a segmental arch constructed entirely of tiles.

The mortar joints at the tiled soffit (and sometimes on the face) are usually recessed (see P.11). This effect is obtained by spreading a $\frac{3}{4}$ -in. layer of sand on the wood centre; each tile is forced down until it touches the lagging, and mortar is spread on the bed of the tile above the sand. Pointing is applied on removal of the centre. This ensures clean exposed edges of the tiles, which are otherwise liable to become stained with the mortar and rendered inconspicuous.

The semi-hexagonal arch at P.12 embodies tiles at the corners. The semi-circular arch P.13 consists of a tiled key block and purpose-made long voussoirs alternating with shorter ones; this toothed arrangement is continued down the jambs; owing to the difficulty in accurately cutting to the required shape the bricks adjacent to the extrados, this form of arch is usually associated with rough-casted walls, and rough cutting is therefore only necessary. A semi-circular arch, with stepped rings, over a door opening is shown at P.14; the core or tympanum is filled with bricks arranged in basketweave pattern; an equally effective treatment is to arrange the bricks forming the core in herringbone formation. This core is supported on a stout oak frame, and one or more courses of tiles (with $\frac{1}{2}$ -in. projection) are often introduced between the top of the frame and the brickwork.

DIAPER WORK.—Variegated coloured or diaper work in which dark coloured bricks, arranged in pattern form, are associated with lighter coloured brickwork (or light coloured brick patterns contrasting with general walling of dark bricks) is less prevalent in modern construction than formerly. The present tendency, when multi-coloured bricks are employed, is to lay the "darks" in haphazard fashion, no attempt being made to arrange them to any mechanical pattern.

A few examples of diapers or chequer work are shown at Q.15, 16 and 17. In each case the general wall bond is adjusted to suit the particular design of the diapers.

PIERS.—These have been referred to on p. 40. The detached octagonal pier shown in plan and part elevation at R.18, with a simple brick-on-edge plinth having a $\frac{1}{2}$ -in. projection, has a pleasing appearance. Indented courses, set back about $\frac{3}{4}$ -in. and at six to eight course intervals, are sometimes provided in this form of structure. An alternative design (occasionally employed in modern churches) is shown in plan and part elevation at R.19. Steel pillars (which support the steel roof trusses and any steel beams) are encased in concrete and finished with brickwork. The plinth is four courses high above the floor and has a $\frac{1}{2}$ -in. projection. The bricks forming the two longer faces of the pillar shaft are arranged diagonally (those in alternate courses being laid in the opposite direction) to give a serrated effect. As shown, these bricks are not purpose-

made; special bricks, shaped somewhat like those indicated at M.3, are sometimes used. The concrete is placed in position as the brickwork proceeds. Although this brickwork does not support any load, other than its own weight, it is advisable to tie the shorter faces into the concrete by placing 1-in. by $\frac{1}{2}$ -in. by 6-in. long copper strips in the bed joints at sixth course intervals.

FIREPLACES, FLUES, CHIMNEY BREASTS AND STACKS¹

As a means of heating a living-room of a house the open fire is still the most popular in this country, despite the fact that it is very largely responsible for the pollution of the atmosphere by the smoke and other products of combustion emitted from it. It also serves as one of the most effective aids to natural ventilation. Incidentally, a convenient and cheap supply of hot water for domestic purposes is obtained if the fireplace accommodates a copper boiler associated with a range, the more modern of which is economical in fuel consumption. In districts where cheap supplies of electricity (or gas) are available, the present tendency is to use radiators as a sole means of heating bedrooms and dining-rooms, and thus the provision of open fireplaces in such rooms is not necessary.

Each open fireplace must be provided with a *flue* or duct for the removal of smoke. If the chimney in which the fireplace opening and flue are formed projects (and it generally does) it is known as a *chimney breast* until it penetrates the roof, when it is called a *chimney stack*.

Fireplace, etc., construction must comply with the bye-laws. The requirements of the Model Bye-laws, reprinted in 1939, have been briefly incorporated in the following description, and most of them are illustrated in Fig. 25. This shows the plan B, vertical section C and elevation A of a two-storied chimney breast (which accommodates two fireplaces and flues), together with enlarged details.

FOUNDATIONS.—The foundations of a chimney must be similar to those of the adjacent wall, *i.e.*, they must comply with either of those shown at A, B or C, Fig. 10, Vol. I (see A, C and Z, Fig. 25). The chimney must be well bonded to the adjacent wall (see plan at Z) and be provided with a proper damp proof course (see A and section at Z).

CHIMNEY BREAST.—The *jambs* (attached piers at the sides of a fireplace opening) must be not less than 8 $\frac{1}{2}$ -in. wide. Their projection varies according to the type of range to be accommodated, thus a greater projection is required for a kitchen range than for most bedroom fireplaces. The size of fireplace opening also varies, thus a modern kitchen range (with oven) of medium size will require an opening 3-ft. 6-in. wide by 4-ft. high, whilst the smallest bedroom fireplace opening need only be 1-ft. 6-in. wide and 2-ft. high. The width of a chimney breast may be varied according to the size and importance of a room,

¹ The introduction to fireplace construction is sometimes deferred until the third year of the course.