

throat is gradually brought out; the bending stick (c) is then applied to each side of the pipe at the bend in turn, working from the throat to the *heel* until the circular section has been roughly regained. The bobbin (F) and weight (see p. 157) are inserted, the former being of the proper size to suit the pipe and the latter slightly less; a piece of rope is attached to the weight and passed through the bobbin and pipe; when the rope is given a series of sharp pulls, the weight gradually drives the bobbin through the bend, and as it does so the interior is brought to a uniformly circular bore. The pipe is again heated and the same operations are repeated, care being taken in working the bend with the bending stick that a uniform thickness is maintained. As the radius of the bend increases, head D' of the dummy is used to bring the throat back. The lower bend is formed on the pipe in a similar manner. The heel hand dummy (P) is useful for shaping the heels of large pipes and the hand dummy (R) is used for small pipes. The end of the pipe is slightly enlarged by driving the tanpin (E) partly into the mouth of the pipe. Finally the pipe is prepared for soldering (or lead burning) it to the lead lining the hole formed in the base of the cesspool.

RIDGES (see B, H and J, Fig. 73).—Lead-covered ridges are suitable for slated roofs, although lead is apt to discolour green slates.

The detail at H shows one method. A 2-in. wood roll is nailed to the wood ridge; a pair of 2-in. wide lead tacks is nailed to the side of the ridge (see B) at 2 to 4-ft. intervals; the lead covering consists of strips which are from 18 to 20-in. wide and 7-ft. long; it is passed over the roll, well worked into the angles, and dressed over the slates for 6 to 7-in. on each side; the free ends of the tacks are then turned over the edges of the lead for about 1-in. to prevent the lead from being lifted by the wind. The horizontal joints are generally lapped 6-in. (a pair of tacks being provided at each), although in best work they may be welted as shown at D.

An alternative method is shown at J where the tacks (which pass over the top of the ridge) are nailed to the wood ridge before the wood roll is fixed. The treatment at the end of the ridge abutting against the chimney stack is shown at B and described on p. 150.

HIPS.—Lead may be used at the hips in the following manner: (1) wood roll with continuous lead covering as shown for ridges, (2) cut and mitred slates with lead soakers, and (3) wood roll with lead soakers.

(1) *Wood Roll with Continuous Lead Covering*.—This is similar to the ridge detail excepting that the dihedral angle is wider. The strips of lead are nailed at the heads under the laps and are also secured by the lead tacks.

(2) *Cut and Mitred Slates with Lead Soakers*.—There are two methods of using soakers, *i.e.*, (a) single-course soakers and (b) double-course soakers.

(a) This is the arrangement which is shown at Q and R, Fig. 69, and described on p. 137. It provides an excellent finish to a slated roof and is adopted in the best work.

(b) In this method, the *length of the soakers is 1-in. longer than that of the slates*; the horizontal width of each wing should be slightly more than the slate below in order to cover the joint, and it tapers to about 2-in. at the head, which is nailed. A soaker is placed at every *alternate* course, and therefore at every other course the lower portion (margin) of each soaker is exposed to view. It is not often adopted.

(3) *Wood Roll with Lead Soakers*.—Soakers are provided at every course, and they are shaped to pass over the roll and between the slates at the wings. The length of soaker equals the gauge plus lap plus 1-in. for centre-nailed slates and 1-in. longer for head-nailed slates; the width is as stated at (b) above. They are nailed at the head. This is a sound method and one which is suitable for exposed roofs.

VALLEYS.—These include (1) open valley gutters, (2) secret valley gutters and (3) cut and mitred slates with soakers.

(1) *Open Valley Gutters* (see P, Fig. 73).—This is generally employed and provides a sound but unattractive looking finish. The lead is in 7-ft. lengths with 6-in. laps, and the width is about 18-in., being dressed over the boarding and tilting fillets as shown; it is secured by close copper nailing up each side along the edge, and the ends are left free. The clear width between the edges of the slates (which are cut to the rake) should not be less than 8-in. to provide adequate foot room, as a less width often results in the slates being damaged by anyone proceeding up the valley when carrying out repairs, etc. If the roof is battened and not boarded, it is necessary to fix a 9-in. wide board (called a *lier board*) on each side of the intersection, and for the full extent of the valley, in order to receive the lead. The ends of the slating battens are cut to the edges of these boards.

(2) *Secret Valley Gutters* (see Q).—The width of the 7-ft. strips of lead are only about 10-in. as the cut edges of the slates are only about 1-in. apart. Whilst the appearance is an improvement on the open valley gutter, it is objected to for the reason that it is liable to become choked by leaves and rubbish which may accumulate and choke the valley, causing water to back up and pass over the lead.

(3) *Cut and Mitred Slates with Soakers*.—The construction somewhat resembles that for cut and mitred hips with single-course soakers (described on p. 137) in that wide slates (slate and a half) are cut and closely mitred and a soaker is placed between the slates at each course. This gives a satisfactory finish both in regard to soundness and appearance.

LEADWORK AT CHIMNEYS.—Details of the requisite leadwork to two chimney stacks are shown in Fig. 73. One stack is shown intercepting one of the slopes of a roof and the other penetrates at the ridge. Sketches of these are shown at A and B in which 2-in. bricks are employed as these improve the appearance; for economy, the brickwork below the roof is constructed of 3-in. bricks (see E, F and G). The lead details at (1) the front, (2) the sides and (3) the back are explained below.

(1) *Front*.—The lead at the front is in one piece (except as stated on p. 150); this is the apron flashing (see p. 143) and is shown detached at L. It is bossed (or lead-burned) to this shape from dimensions taken from the stack. As the internal angles forming the returns of the upturn are being bossed, the lower corners of the lead gradually work upwards to an irregular curve, and it is the practice to neatly trim the ends as shown when the bossing has been completed.