described as being *single-lapped*, as distinct from plain tiles which are *double-lapped*.

Pantiling is detailed in Figs. 44 and 45. A cross-section through two adjacent pantiles at C, Fig. 44, shows the side lap which varies from 1½ to 2-in. A plan, to a reduced scale, of these tiles is shown at D.

The head or longitudinal lap varies from 3 to 4-in., according to the pitch of the roof and the degree of exposure. The gauge equals the length of tile – lap ; thus, that of 14-in. long pantiles, having a 3-in. lap, equals 14-in. – 3-in. = 11-in. The pitch varies from 30° to 47½° ; if the latter is exceeded there is a tendency in a storm for the water streaming down the shallow channels to overshoot the eaves gutter.

The comparative gauges being 4-in. for plain tiles (see p. 106) and 11-in. for pantiles, the covering capacity of the latter is greatly in excess of that of plain tiles. Thus, the approximate number of pantiles required per square (100-sq. ft.) is 170, whereas approximately 550 plain tiles are required to cover the same area. The average weight of pantiles, when fixed, is about 7½-lb. per sq. ft., and is therefore much lighter than a plain tile covering which may reach 14½-lb. per sq. ft. Hence smaller roof timbers may be used for pantiles (or the distance between purlins may be increased) than those required for plain tiling, and therefore the employment of pantiling results in an economy in roof timber.

The two diagonally opposite corners or *shoulders* are splayed off to the depth of the lap, as shown at D, Fig. 44, to permit of a reasonably close fit being maintained between the tiles ; otherwise four thicknesses of tile would occur at the corners, resulting in open joints due to the tilting or overriding of the tiles. The joining of the bottom left-hand bottom corner of a tile with the top right-hand corner of the tile below and to the left is called *shouldering* and is illustrated at H.

Pantiles are nailed as required and as specified for plain tiling (see p. 106). The greater the exposure, the more frequent the nailing. The groundwork for both types of tile is also similar ; 1½-in. by ¾-in. tiling battens are commonly employed, although 2-in. by 1-in. battens are also used.

Eaves Details.—Two details are shown at J and L, Fig. 44. That at J shows a simple closed eaves. Untearable felt is nailed to the backs of the spars and 1½-in. by ¾-in. tiling battens are fixed at the gauge apart—11-in. Although an under-eaves course is not absolutely necessary, a more satisfactory finish is obtained if one is provided. That shown consists of a course of eaves under tiles ; a course of ordinary plain tiles is sometimes adopted. The bottom course of pantiles is bedded on mortar on the plain tiles.

The alternative eaves detail at L shows the external leaf of the cavity wall finished with six projecting courses of uncambered plain tiles. The groundwork conforms to the best practice, namely, tongued and grooved boarding covered with felt, counter-battens at 15 to 16-in. centres and tiling battens at gauge centres. The spars are slightly sprocketed and the bottom course of pantiles is bedded on a course of nibless eaves under tiles. A part elevation of this eaves is shown at K. The eaves gutter has been omitted. Small plain tile insets (see p. 108) provide a relief to the mortar bedding.

Occasionally three or four courses of plain tiling are provided at the gauge (4-in.) apart in the usual manner at the eaves of a pantiled roof. This treatment is traditional, and its object is to distribute the flow of water from the channels of the pantiles above and so prevent it from overshooting the gutter.

An alternative eaves detail is shown in Fig. 18.

Ridge Details.—Two are shown at F, Fig. 44, the groundwork on the left being similar to that at J, and the timbering and felting on the right are as shown at L. *Galleting* is shown in both, namely, two small pieces of plain tile are bedded in each channel and finished level with the top of the corrugations (see also G, Fig. 44, and E, Fig. 45). Besides providing an interesting feature and reducing the amount of bedding mortar, this packing up to the ridge ensures a level bed throughout for the latter.

Three traditional methods for ensuring a " drop-dry " roof were : (1) Pointing the tail and side joints, (2) lathing and bedding under the side joints and (3) reeding and bedding. None of the three methods is now recommended. Regarding :

1. Whilst the pointing of the joints can be done effectively, as the mortar is applied from the outside, there is evidence to show that tiles on old roofs which have been treated in this manner were defective where they contacted the mortar, although the remainder of each tile may have been perfectly sound. This decay was probably due to the slow drying out of absorbed water or that driven through cracks, etc., in the pointing. Frost action would accelerate the decay. In course of time the pointing becomes defective and re-pointing is necessary. Pointing detracts from the appearance of a roof.

2. Lathing and bedding the side joints, known as *strip lathing*, is effected by nailing two or three plasterers' laths (⅞-in. by ¼-in. by 2½ to 4½-ft. long) at " finger spacing " (⅜-in. apart) to the tiling battens at 8-in. centres (or side joints apart) and running from eaves to ridge. Lime mortar is then spread on the laths as the tiles are fixed and bedded on the fillets at the side joints. A fillet and laths are indicated by broken lines at L, Fig. 45. Whilst this gives a firm bedding to the tiles, the application of this method is deprecated because of the tendency for the tiles to decay where they contact the mortar and for this decay to spread to the roof timbers.

3. This somewhat primitive method consisted of packing reeds (marsh grasses) over the spars between the tiling battens and parallel to the latter. The reeds were kept in place by short laths placed over them at 2-ft. intervals with their ends tucked under the tiling battens. The tiles were then bedded on mortar fillets at their side joints. Any water driven in was soaked up by the reeds, and the latter was effective in preventing the pantiles covering roofs of barns, sheds, etc., from being lifted up and dislodged by gusts of wind.

Now that roofing felt is available, it is difficult to justify the continuance of any of the above three methods, even if their initial cost is less.

Verge Details (see G and H, Fig. 45).—That at H shows the usual treatment of a right-hand verge when the groundwork consists of boarding, felt, counter-battens and tiling battens, an undercloak consisting of three courses of plain or flat tiles providing a suitable finish to the verge pantiles which are bedded on and pointed with cement mortar or compo consisting of 1 part cement, 1 part lime and 4 parts sand. The undercloak projects 2 to 3-in., depending upon the height of the building. The width of the upper course of plain tiles is reduced, as shown, to permit of the hanging and nailing of the verge tiles to the tiling battens.