used to maintain the normal gauge at the ridge instead of the longer ($10\frac{1}{2}$-in.) tiles which had to be cut for this purpose. The *tile-and-a-half tiles*, as implied, are one and a half times wider than the normal tile and are therefore $10\frac{1}{2}$-in. long and $9\frac{3}{4}$-in. wide (see L). As explained later, they are employed at gable verges, bonnet hips, and swept and laced valleys.

Like slates, plain tiles are laid in regular bond (see J).

LAP, GAUGE AND PITCH.—In Vol. I it was stated that the lap for a slated roof should be 3-in. when the pitch was 30°. For smaller units, such as plain tiles, the lap usually employed is reduced to $2\frac{1}{2}$-in., and the gauge is therefore

$$\frac{\text{length of tile} - \text{lap}}{2} = \frac{10\frac{1}{2} - 2\frac{1}{2}\text{-in.}}{2} = 4\text{-in.}$$[1]

This reduced lap necessitates a corresponding increase in the *minimum* pitch of plain tiled roofs to 45°. This slope should, however, be avoided, as a 45° pitched roof presents a very unsatisfactory appearance, which is especially noticeable at gables. The draughtsman should therefore refrain from using the 45° set square when designing a roof, even if this causes inconvenience, especially when an adjustable set square is not available! Hence, for æsthetic reasons, the desired minimum pitch is considered to be $47\frac{1}{2}$°. A more pleasing effect is produced when the pitch is between 50° and 55°, and for narrow gables the roofs can, with advantage, be increased in pitch to 60°. The area of a roof, and therefore its cost, is increased as the pitch increases. If, for reasons of economy, a 45° pitch cannot be exceeded, it is recommended that, rather than adopt this angle, the pitch be reduced to $42\frac{1}{2}$° or even 40°, and the lap increased to at least $2\frac{3}{4}$-in. The pitch of plain tiled roofs, including sprocketed portions (see next column), should not be less than 40°, as the water does not get away quickly on flat pitched surfaces, and on north-east slopes especially the tiles are liable to lamination on account of slowness in drying. If roofs are likely to be exposed to exceptionally severe weather conditions, it may be necessary to increase the lap of the tiles to 3 and sometimes $3\frac{1}{2}$-in.

NAILING.—Copper or composition nails (see p. 134, Vol. I) should be used. Normally, $1\frac{1}{2}$-in. long nails are used, but for thick hand-made tiles the length should be increased to $1\frac{3}{4}$-in.

As plain tiles have nibs which enable them to be hung on battens, it is not necessary (except as stated below) to nail every tile. *For normal exposures, it is usual to specify that every tile in each fourth or even fifth course shall be twice nailed.* In fairly exposed situations every third course of tiles may be nailed. In very exposed positions, especially if the roofs are steeply pitched and hand-made tiles (the nibs of which are often misshapen and afford an insecure grip) are to be employed, it may be necessary to have every tile nailed. Further, *all* tiles must be twice (and sometimes thrice) nailed which comprise double eaves courses (both the under tiles and those immediately above them), verges, hips (including those adjacent to the hip tiles), valleys (including the tiles each side of purpose-made valley tiles, those adjacent to the tile-and-a-half tiles employed in laced valleys, and those required to form swept valleys—see Fig. 42) and ridge under tile courses.

[1] It will be noted that, unlike that for head-nailed slates, the gauge *includes* the portion of tile between the holes and the head.

BATTENS.—It is common to specify either 2 or $1\frac{1}{2}$-in. by 1 or $\frac{3}{4}$-in. sawn redwood battens at gauge centres secured with galvanized wire nails. Counter-battens are usually of 2-in. by 1 or $\frac{3}{4}$-in. redwood spaced at 15 to 16-in. centres and nailed. The length of nails should be twice the thickness of the battens, thus 2-in. nails are used for 1-in. thick battens and $1\frac{1}{2}$-in. nails for $\frac{3}{4}$-in. battens.

EAVES DETAILS.—A simple open eaves is detailed at C, Fig. 41. This shows the spars at a pitch of 50° overhanging an 11-in. cavity wall. The groundwork consists of battens only, and the underside of the tiles is torched. Alternatively, untearable felt (see p. 136, Vol. I) may be nailed direct to the spars, as shown at A. Counter-battens, as shown at D, may also be employed. In addition to the double eaves course the tiles are shown nailed at every fourth course, which, as explained in the preceding column, is the usual practice. The eaves under tiles are shown to be nibless and fixed with their backs lowermost to ensure a close contact between the tiles in this double course; the common practice is to fix the under tiles as shown at D.

The detail at D shows a sprocketed closed eaves having a minimum depth at the gutter which, in most cases, is a desirable feature. The spars are pitched at 55° and, for the reasons already stated, the sprockets are given a 40° pitch. The sprocket reduces the rate of flow of water which in a storm, and when the roof is steeply pitched, would tend to overshoot the gutter. The bell-shaped finish also enhances the appearance. Whilst a slightly flatter pitch of 35° (90° − 55°) may be preferred (see L, Fig. 37, Vol. I), it is emphasized that the normal minimum pitch of any part of a plain tiled roof is 40°, and if this is to be reduced (especially at the eaves where the water passing over it may be considerable) the materials and workmanship must be of the best quality and the lap should be increased beyond $2\frac{1}{2}$-in. The tiles are shown nailed at every fifth course, which agrees with the minimum requirements (see preceding column). The groundwork complies with that advocated for best work, namely, boarding (covered with bituminous felt), counter-battens and battens. The soffit is closed with 9-in. by $\frac{3}{4}$-in. boards nailed to 2-in. by $1\frac{1}{2}$-in. brackets fixed to the spars, and a narrow fascia (backed by a tilting fillet) finished flush at the soffit. A simple quadrant bead is scribed to the wall and nailed to the soffit boards. As an alternative to previous details, the wall plate is shown bedded on the outer leaf of the wall, and in order to immediately distribute part of the weight transmitted from the roof to the inner leaf, a header course is shown below the wall plate (see p. 42 and B, Fig. 13, Vol. II). The cast iron gutter would be supported in the usual manner either by straps screwed to the backs of the spars or brackets secured to the fascia (see M and N, Fig. 75, Vol. I).

The many alternative eaves details given in Vol. I, in addition to those in Fig. 13, Vol. II, and Figs. 15, 17 and 18 in this Vol. (modified to suit the pitch) may be adopted.