

stone slabs (similar to slates but from $\frac{3}{8}$ to $\frac{3}{4}$ -in. thick), shingles (slabs of cedar or oak which are from 12 to 24-in. long, from $2\frac{1}{2}$ to 6-in. wide and $\frac{1}{4}$ to $\frac{1}{2}$ -in. thick), patent glazing (sheets of glass supported by lead covered wood, steel or reinforced concrete bars) and thatch (bundles of straw or reeds laid to a thickness of about 12-in.).

Spars or Common Rafters.—Similar to joists but inclined. The distance apart depends upon the covering material and is usually 15-in. centres for slates. The *head* of a spar is the upper end, and the *foot* is the lower end.

Span.—Usually taken to be the clear horizontal distance between the internal faces of the walls supporting the roof. The *effective span* is the horizontal distance between the centre of the supports. The span of spars is the inclined distance from support to support, thus in Fig. 37 the span is the distance from ridge to purlin, purlin to purlin, and purlin to wall plate.

Rise.—The vertical height measured from the lowest to the highest points (see B, Fig. 35).

Pitch.—The slope or inclination to the horizontal expressed either as $\frac{\text{rise}}{\text{span}}$ (see B, Fig. 35) or in degrees. It varies with the covering material in accordance with Table III. which gives the *minimum* pitch :—

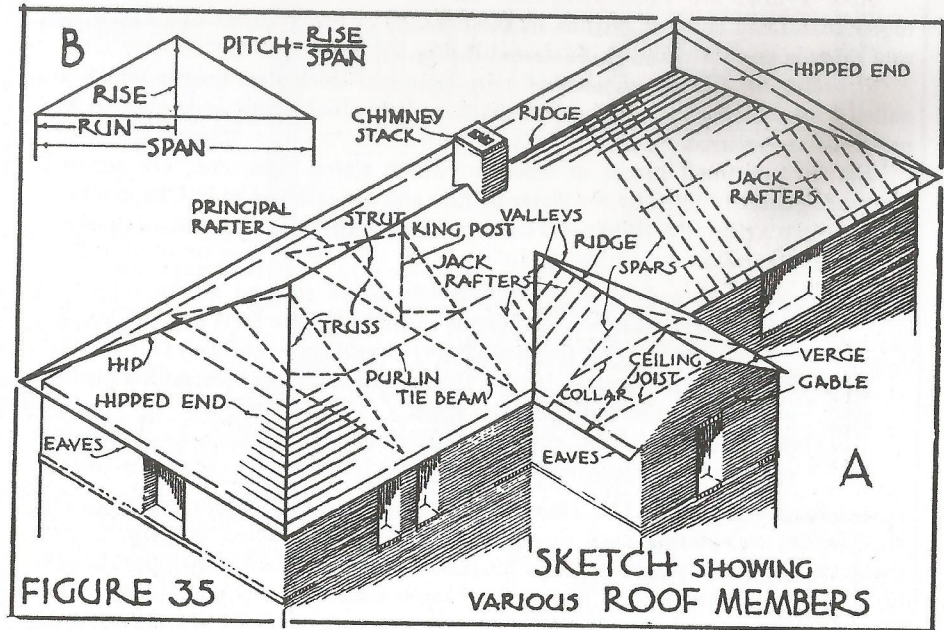
TABLE III

Covering material.	Rise (in 10-ft. run) (see B, Fig. 35).	Pitch.	Angle.
Asphalt and copper	1 $\frac{1}{2}$ in.	$\frac{1}{10}$	$5\frac{1}{2}^{\circ}$
Lead and zinc (excluding drips every 10-ft. run)	1 $\frac{1}{2}$ "	$\frac{1}{8}$	$7\frac{1}{2}^{\circ}$
Asphalt felt, corrugated asbestos and iron sheets	1 ft. 0 in.	$\frac{1}{4}$	14°
Slates, large	4 " 0 "	$\frac{1}{3}$	$18\frac{1}{2}^{\circ}$
Slates, ordinary	5 " 0 "	$\frac{1}{4}$	$22\frac{1}{2}^{\circ}$
Slates, small	6 " 8 "	$\frac{1}{3}$	$26\frac{1}{2}^{\circ}$
Pantiles	4 " 6 "	$\frac{1}{4}$	$33\frac{1}{2}^{\circ}$
Shingles, cedar	5 " 0 "	$\frac{1}{4}$	24°
Shingles, oak	10 " 0 "	$\frac{1}{2}$	$26\frac{1}{2}^{\circ}$
Patent glazing	5 " 0 "	$\frac{1}{4}$	45°
Stone slabs	6 " 8 "	$\frac{1}{3}$	$26\frac{1}{2}^{\circ}$
Plain tiles and thatch	10 " 0 "	$\frac{1}{2}$	$33\frac{1}{2}^{\circ}$
			45°

These angles are often departed from, thus, although lead is commonly used to cover flat roofs which have a minimum rise of $1\frac{1}{2}$ -in. for a 10-ft. run, it is occasionally used to cover steeply pitched roofs. The angle of 45° should not be adopted as roofs with this pitch have not a satisfactory appearance—compare the roof shown at v, Fig. 36 (which has a slope of 45°), with that in Fig. 37 (which has a 55° pitch). The ideal pitch is considered to be $54^{\circ} 45'$ and roofs pitched at any angle between 50° and 60° look well.

Wall Plates.—These receive the feet of the spars. They vary in size up to $4\frac{1}{2}$ -in. by 3-in. and are bedded and jointed as described on p. 61.

Eaves means "edge," and the eaves of a roof is its lower edge. The eaves may terminate flush with the outer face of the wall, when it is known as a *flush eaves* (see w, Fig. 36), or it may project as shown at x and y, Fig. 36. When the feet of the spars are exposed as indicated at x they form an *open eaves*, when the feet are covered as shown at y, a *closed eaves* results. A *fascia board* (or *fascia*) is the thin piece of wood fixed to the feet of spars (see w and y, Fig. 36). The under portion of an overhanging eaves is called the *soffit*. *Soffit boards* are shown at y, Fig. 36, and d, Fig. 38, and the cross-pieces of wood illustrated in the latter figure to which these boards are nailed are called *soffit bearers*. The



lower portion of a roof is sometimes tilted so as to improve its appearance; this is accomplished by nailing short pieces of wood, called *sprockets*, to the spars (see Figs. 37 and 38).

Ridge Piece or Ridge.—This is fixed at the highest point to receive the heads of the spars.

Hip is the line produced when two roof surfaces intersect to form an external angle which exceeds 180° . A *hipped end* is a portion of roof between two hips (see A, Fig. 35). The timber at the intersection is called a *hip rafter*, and the foot of this rafter is usually fixed to a horizontal cross-member called a *dragon beam* which is secured at one end to an *angle tie* (see Fig. 37). A hip rafter supports the upper ends of short spars and it may be required to carry the ends of purlins (see p. 70).