

CHISELS are tools with forged steel blades in wood (ash, boxwood or beech) handles; each blade is bevelled on the back and has a fine cutting edge. They are used to remove thin layers or shavings of wood in shaping surfaces, forming mortices, grooves, etc. The finer the edge, the smoother the surface, and it is essential that the cutting edge be kept sharpened by rubbing the back down on an oilstone. Various kinds include the paring, firmer and mortise chisels and gouges.

Paring Chisel (see 35).—The tang (pointed end) of the thin blade is fitted into the handle, and the brass ferrule prevents the tang from splitting the handle; is used for paring (shaving) plane surfaces both in the direction of the grain and on the end grain of the wood; the blade may be either square or bevelled, the latter type (shown in the figure) being useful in forming grooves; obtainable in lengths varying from 9 to 21-in. and in widths of from $\frac{1}{4}$ to 2-in.

Firmer Chisel (see 36).—Is a stronger or "firmer" chisel than the last mentioned as it has to withstand the mallet (see 23) which is used to propel the tool; is useful for general work and in removing wood in thin chips; the length varies from 4-in. upwards and the width from $\frac{1}{8}$ to 2-in.

Mortise Chisel.—Used for forming mortices, and is much stronger than the firmer chisel as it has to withstand the action of the mallet and the strain resulting in loosening the wood core when making the mortice; that shown at 37 is known as a *socket mortise chisel* because the wood handle is fitted into the socket of the cast steel blade; the metal ferrule protects the handle from damage by the mallet; the ordinary mortise chisels are $\frac{1}{8}$ to $\frac{3}{8}$ -in. wide and the maximum width of the socket type is $1\frac{1}{2}$ -in.

Plugging Chisel (see 38).—Made entirely of forged steel and used for preparing holes in brickwork, etc., for wood plugs.

Pocket Chisel.—Is a very fine chisel, sharpened both sides, which is used for forming pockets in boxed window frames (see p. 114) and obtainable in widths varying from $2\frac{1}{2}$ -in.

GOUGES are curved chisels which produce circular cuts. Paring, firmer, socket, etc., gouges are obtainable; that shown at 39 is known as an outside ground gouge and is useful for heavy work; those ground on the inside are used for paring; widths vary from $\frac{1}{8}$ to $1\frac{1}{2}$ -in.

PLANES are so called as they are chiefly used for shaving or smoothing plane surfaces after the timber has been sawn; they are of (a) wood (beech) and (b) metal (cast steel, gunmetal and malleable iron).

(a) WOOD PLANES.—Of the many different sorts, the jack plane, trying plane and smoothing plane (known as *bench planes*) are essential items of a kit; some of the other planes are not so important and may only be used on rare occasions.

Jack Plane (see 21).—This is the first plane used on a piece of wood after it has left the saw; it eliminates the saw marks and leaves the surface sufficiently smooth for the subsequent finishing with the trying and smoothing planes (see later); it is also useful for quickly planing off large quantities of wood to reduce the scantlings. This plane consists of a stock, double irons, wedge and handle.

The standard beechwood *stock* (or body) is 17-in. long by 3-in. by 3-in.; it should be carefully selected with the annual rings parallel with the face or sole (see sketch) otherwise unequal shrinkage will take place, the face will wear unevenly and so affect its accuracy; the handle is glued into a slot and a hole is formed to receive the irons and wedge; the width of the *mouth* (see j) is about $\frac{1}{8}$ -in. and a space is left between the irons and the front of the mouth to allow the shavings to escape at the *throat*; a $\frac{3}{4}$ -in. hardwood stud (or button) is fitted on top near to the front or *nose* of the plane and prevents disfigurement as it receives the blows from the hammer when the irons are being adjusted.

The irons consist of a *cutting iron* (E) and a *back or top iron* (F) which are made of crucible cast steel; they are made in 2, $2\frac{1}{8}$, $2\frac{1}{4}$, $2\frac{3}{8}$ and $2\frac{1}{2}$ -in. widths, the $2\frac{1}{4}$ -in. size being popular. The bottom edge of the cutting iron is rounded as it is required to remove shavings which should be thickest in the centre and finer at the edge; this edge is double-bevelled (see enlarged section through the edge at G), the *grinding bevel* being slightly hollow ground and approximately 25° , whilst the *sharpening angle* is about 32° ; the thickness of the iron increases from $\frac{1}{8}$ -in. at the top to about $\frac{1}{4}$ -in. at the top of the grinding bevel; the iron is slotted to allow movement of the screw which attaches it to the back iron. The *back iron* (F) is of uniform thickness of about $\frac{1}{8}$ down to about $\frac{1}{4}$ -in. from the bottom, when it

is slightly curved back and reduced in thickness to a fine edge; a brass nut is attached to the iron and receives the screw which connects both plates together (see j); the distance that the edge of the cutting iron projects beyond that of the back iron is called the *set* of the iron, and this depends upon the character of the wood to be planed and the thickness of the desired shaving; the set is approximately $\frac{1}{8}$ -in. for softwoods and $\frac{1}{16}$ -in. for hardwoods; the object of the back iron is to break the shaving and bend it as it proceeds through the mouth.

The irons are secured in the stock by means of a wood *wedge* (see 21 and H); the wedge is knocked down by a hammer when fitting the irons, and as it passes down the back iron the fine tapered legs proceed down the two side grooves in the hole in the stock until they are rigidly fixed.

Trying Plane (see 26).—This is used for precise work, such as removing irregularities left on the surface of the wood by the jack plane; it is also used for forming long straight edges as for joints and nosings; it is the largest bench plane (the sizes being 22, 24 and 26-in.) and closely resembles the jack plane but for the closed handle; the set of the irons is usually $\frac{1}{8}$ -in. for softwoods and $\frac{1}{16}$ -in. for hardwoods.

Smoothing Plane (see 29).—This is known as the finishing plane as it is used to smooth the surface of the wood after the jack and trying planes have been operated; the stock is only 8-in. long and is provided with double irons set as for the trying plane.

Rebate Plane (see 28).—Used for forming rebates and has only a single iron; this cutting iron is fixed by a wedge and is the full width of the stock; the iron, which varies from $\frac{1}{4}$ to 2-in. in width, is placed either on the skew ("skew mouth") or square ("square mouth"), the former being preferred as it is considered to work easier.

Hollow and Round Planes (see 30).—The hollow plane is used for producing convex surfaces on the timber (see enlarged section through the sole at K) and the edge of the single iron or cutter conforms to the curve; concave surfaces on timber are formed by the round plane (see enlarged section L).

Formerly, a joiner had as part of his kit at least a half set of "hollows and rounds," and many possessed complete sets consisting of eighteen pairs varying from $\frac{1}{8}$ to $1\frac{1}{2}$ -in. in width for the purpose of making mouldings; nowadays, most of this work is done by machinery and these hand tools are used only on rare occasions.

Bead Plane (see 33).—This moulding plane is still required, and two or three of different sizes should form part of a kit; it is used for forming a half-round moulding with a *quirk* (sinking) on edges of members; the strip let into the sole of the stock is of boxwood to resist wear; a sketch showing the application is given at M.

Note.—A number of moulding planes, such as ogee, torus, reed, astragal, ovolo, etc., have practically fallen into disuse, since mouldings can be produced much more cheaply by machinery.

Plough Plane (see 31) is used for forming grooves with the grain, varying in width from $\frac{1}{8}$ to $\frac{3}{8}$ -in., and to any depth up to about $1\frac{1}{4}$ -in.; the single iron, secured by a wedge, passes down to a narrow mouth formed in the metal runner or guide screwed to the stock; the depth of the groove is regulated by the metal thumb-screw which passes through the stock and depresses or raises a metal solepiece (about $\frac{3}{8}$ -in. wide) which operates between the runner and wood fence; the wood nuts which negotiate the wood screw bars are manipulated to adjust the width between the fence and the runner as required; the plough is provided with six or eight irons of different widths.

Router or Old Woman's Tooth (see 32).—This plane is used for increasing the depth of grooves (an operation known as *trenching*) formed previously by another tool; the strong iron is from $\frac{1}{8}$ to $\frac{1}{2}$ -in. wide.

Spokeshave (see 34).—Used for planing circular work having quick curves; the iron (see O) is fixed by passing the two tapered tongs through the stock and should be well sharpened; it is adjusted by lightly tapping either the projecting ends of the tongs or the blade as required (see section at N).

Compass Plane.—This is a smoothing plane with a convex sole and 2-in. wide double irons for planing curved surfaces; it is not much used.

Moving and Sash Fillister Planes.—Both are used for forming rebates or grooves; the moving or side fillister is a rebate plane with a movable fence, a single cutting iron and a small side iron for marking out the rebate; is adopted for making rebates on the near side of the stuff. The sash fillister resembles the plough and may be used for forming sinkings on the back edge of the wood. These planes are now seldom used.