# HOW TO CARVE WOOD PROPELLERS

Propeller carving is something of a lost art in these days of plastic mouldings —but for the best performance from a rubber-powered model there's nothing to compare with a carved prop. These step-by-step instructions show the basic technique for conventional carving of a two-bladed prop. You can use it for single- or two-blade folding props. as well, in any size.

For freewheeling props, choose a medium hard to hard grade of balsa so that you can carve the blades quite thin and still retain adequate strength. For folding props, use a lighter grade of balsa, leave the hub 'square' and fit the hinge before cutting the blades free of the hub at the hinge line.

Exactly the same technique can be used for carving props in other woods, but choose a wood which is reasonably light, easy to carve and has a good straight grain. For flying models, always carve propellers from balsa as hardwood props are too heavy.

**1** For any given diameter, block *width* should be about $\frac{1}{8}$th of the *diameter*. Mark off in quarters, as shown, with pencil or ball point pen

**2** Complete marking out as shown in this diagram. As an additional guide for accurate cutting it is recommended that all four faces of the block be marked out

**3** Use a stiffback saw to cut the ends of the block to taper, as shown. These cuts must be made accurately and a fretsaw is likely to 'wobble'

**4** Now make vertical saw cuts down to the hub position and then chisel out the three parts shown, using a very sharp knife or rigid carving blade

**5** Turn the block on edge and make vertical sawcuts down to the plan width of the hub. Chisel out the three portions marked on each side very carefully

**6** This completes the *propeller blank* ready for carving. The accuracy of your final propeller depends on how accurately and squarely you have made the cuts to this stage

**7** Start by carving the *back* face of one blade, aiming for a slightly undercambered (concave) surface from hub to tip. Note which *way* to carve for a conventional (tractor) propeller

**8** Turn the blank round and carve the back face of the other blade. Check that the amount of undercamber on each blade is the same by using a straightedge laid from LE to TE

**9** Now turn the blank over and carve the front face of one blade, aiming to end up with a good aerofoil section. Blade thickness should taper from a maximum at the hub to quite thin at the tip

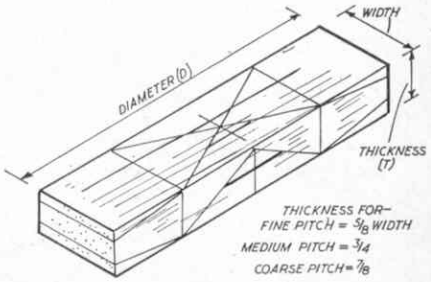
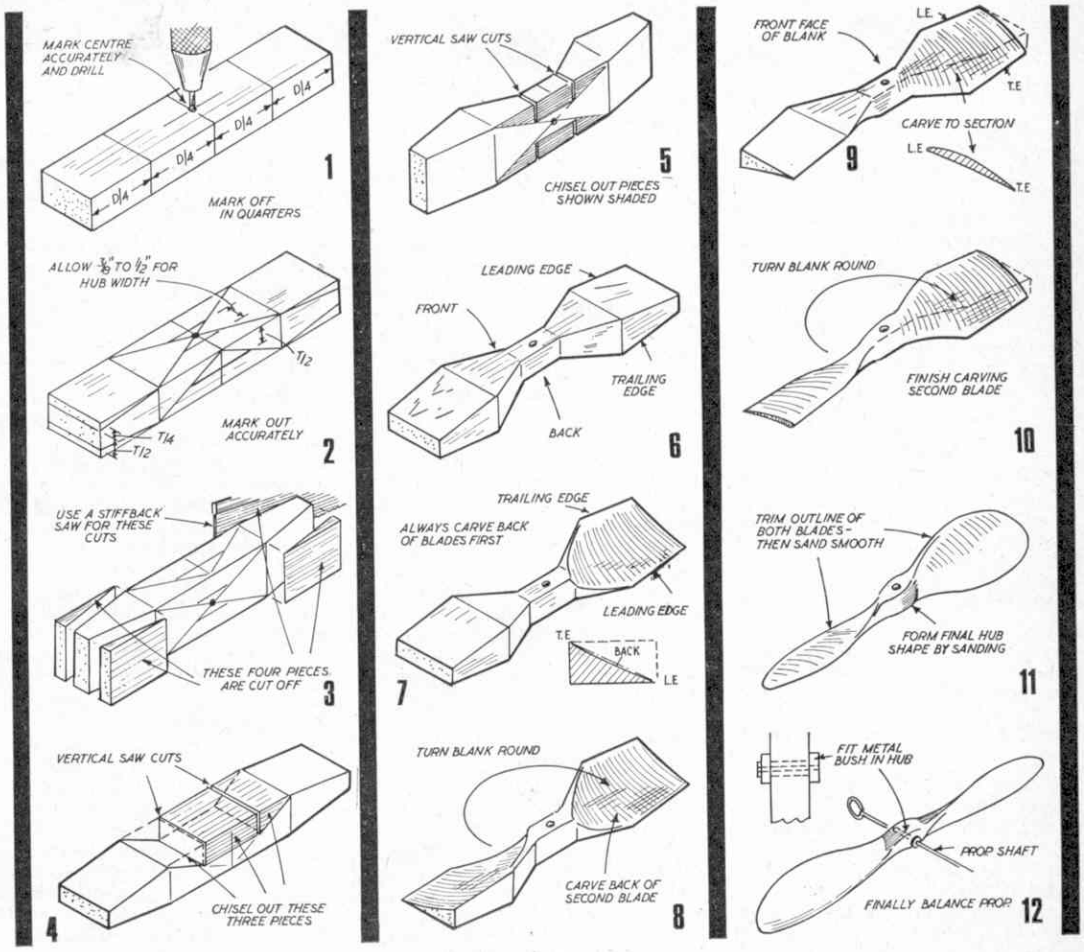
**10** Turn the blank round and carve the front face of the second blade. At this stage you can rough sand down with fairly coarse sandpaper, middle 2 grade.

**11** Trim the outline of the blades to a suitable shape, making sure to get each blade the same. Work all over the propeller with sandpaper to finish the blade and form the hub

**12** Fix a bush in the hub, then balance the prop on a piece of wire. Sand down the heaviest blade until the prop balances horizontally. Finish by clear doping (4 coats)

The actual width of a propeller blank is not critical, but the ratio of the thickness to the width governs the propeller pitch. As an approximate guide, width should be about equal to diameter/8, but it is usually more convenient to work to standard balsa block widths to save unnecessary cutting. Suitable widths are:

10 in.—width $1\frac{1}{4}$ in.
12 in.—width $1\frac{1}{4}$ in.
14 in.—width $1\frac{3}{4}$ in.
16 in.—width 2 in.
18 in.—width 2 in.
propeller diameter:
6 in—8in.—width $1\frac{1}{4}$ in.

If you want to calculate the pitch of your propeller instead to using approximate guide above, then

$$\text{pitch} = \frac{1 \cdot 57 \times \text{diameter} \times \text{thickness}}{\text{width}}$$