

## PATTERNS with FINS and FLANGES

BY  
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**P**ARTICULARLY in the case of providing cooling fins is the method of making patterns and obtaining castings often superior to the alternative of machining parts from the solid. AU-over machining of fins is possible for the cylinder barrels of small air compressors and four-stroke engines, and those of two-stroke engines above the ports. Similarly, in the case of cylinder heads, turning fins from the solid is practicable for simple types as may be used on compressors and some two-stroke engines.

The method of turning from the solid, however, does not cover cases of cooling fins round two-stroke exhaust ports, angular fins on barrels (when these may be inclined and a straight-line flow of air is desired), and where fins on cylinder heads may be disposed vertically or radiating from a centre line. Then pattern and casting provide straightforward means of overcoming the problem—the only other solution to which would be some awkward milling operations. Cast fins may also be much improved by work on them with files, burrs and emerycloth, and are certainly better than none at all.

For small engines and compressors fins may be provided on cylinder barrels, either by turning simple patterns from solid wood, or by building up and using separate pieces of flat wood for the fins. For the process of turning from the solid, the wood must be hard, close and uniform in the grain. Boxwood is probably best, though good beech can be used. The pattern should be turned as at A, with the fins, the plain portion of the barrel and a core print each end, Q and R, for the bore.

Spacing of the fins, S, should not be less than about 9/32 in. or 5/16 in., their depth not more than about fin., and their outside diameter not more than about 2-1/2 in. These dimensions can, however, be modified somewhat. Less deep fins could be spaced slightly closer while wider spacing would admit of their being somewhat deeper. Their thickness at the bottom should be 3/32 in. to 1/8 in., joining to the barrel by a 1/16 in. radius while the tip thickness should be about 1/16 in. rounded.

For a two-stroke engine cylinder, pieces can be fitted into the fins for the ports, keeping always to the principle of avoiding undercuts which would prevent clean moulding. For the exhaust ports, blocks can be fitted, glued and tacked, as at T, and another block, U, for the inlet port. On the further side of the pattern, the block for the transfer passage would extend from the base flange up to the level of the exhaust ports. Radii may be provided at the joins with plastic wood.

For securing the cylinder head, lugs are required at the top of the barrel to tap to accept studs. Similar lugs are, therefore, required on the pattern in the space V. These can be provided either by turning the space only to a depth to give the dimensions over the comers, then sawing and filing away the material along the flats; or the space can be turned to normal depth, then separate lugs fitted in as at B—a sectional view. The base flange W can be made by turning to the corner dimension, then cutting away along the flats. The

flange must be in square alignment with the top lugs.

Construction of a built-up, angular fin pattern can be as at C, the ends carrying core prints X, XI. The base flange Y can be a separate piece from flat wood. The plain barrel Z can be turned as a short length joined to the top carrying the core print XI then cut through at the fin angle. The fins and spacing pieces can then be from flat wood, the spacing pieces clamped up and turned before the fins are fitted. Fin spacing will thus be uniform and precise.

Similar accuracy obtains when making cylinder head patterns, as at D, by cutting the fins from thin flat wood (beech or oak), and gluing and tacking together with spacing blocks between 1 to 6.

