

# SETTING and SUPPORTING LATHE TOOLS

By GEOMETER

**M**ANY factors influence success in a turning or boring operation; and a knowledge of the characteristics of the lathe, its response to adjustments, its reactions to certain handling, must always constitute a large part of a turner's skill.

It is knowledge that comes gradually of course, in the beginning often growing out of mistakes and mishaps. Deplorable as these may seem at the time, they often teach a delayed lesson when they indicate what should not be done on future occasions; or they may be positively beneficial in stimulating an analysis of factors by which those that are unfavourable can be eliminated.

Among unfavourable factors are inappropriate shape and setting of tools, and their inadequate support when they must take the thrust of broad or heavy cutting, or when a feature of the work calls for their considerable overhang, as in deep parting-off operations, or in machining the crankpin on a balanced crankshaft.

For heavy cutting, as in roughing out, a square or straight advancing edge on the tool gives the shortest length and the freest cutting. Tough material like steel can be stripped smoothly off in a cool flat ribbon, whereas, using a round-nosed tool for a correspondingly heavy cut, the metal is compressed as it is torn off, and is then broken into short rough lengths, or at times into hot blue fragments. This is hard on the job, the tool, and the lathe.

On the other hand, for finishing with light shallow cuts, a round-nosed tool, or one slightly flattened behind its rounded nose, gives an improved finish, as the length of its cutting edge equals or exceeds the advance per revolution. You thus avoid a markedly spiral finish—a shallow thread on the work.

For either operation, a combined lubricant and coolant is usually recommended; and various cutting oils and suds are to be obtained. A good home brew is made by flaking soap thinly from a bar, dissolving in boiling water and then mixing with car engine oil. Sufficient soap and

oil give a mixture with plenty of finish-improving, lubricating body—but it is advisable to clean down the lathe after use.

For roughing and finishing cuts, height setting of a turning tool is an important factor. For heavy roughing cuts, endwise to the material, the tool edge can be fractionally above centre **A-S**, so that slight spring will tip the tool approximately to centre height. This is all right, but too high a setting, too much spring, deepens the cut; and by increasing unfavourable factors, the diameter of the work can be unexpectedly reduced—riskily so, if roughing is near to finished size.

Other hazards occur with a low tool-setting, **B-T**, which may be exaggerated through the inherent down-spring. There is a reduction in effective rake on the cutting edge, and the pushing of the tool below centre tends to lift the work. It is particularly marked with a parting-off tool which is not cutting freely. Resistance of the chip **U**, combined with spring in the work, can move the centre of this **Y** from that of the spindle **W**, upwards and towards the tool, with components **X** and **Y**. Jamming and tool breakage can speedily follow.

For most turning operations, then, a tool is advisedly set at centre height, or slightly above. For roughing cuts, its shape can be as **C**, left, and for finishing cuts as **C**, right, with a small honed flat **Z**.

Height setting can be expedited with a surface gauge **D**, its pointer adjusted to a rod or block which has been machined to centre height. This initial adjustment can be performed optionally on lathe bed or surface plate.

For setting boring tools, a drilled sheet iron plate, **E**, can be used. As it can be moved along their shanks, it indicates clearance, and packing required, which is particularly useful for tools with forged shanks.

Support for a turning tool can often be arranged through packing, **F**, left; while a narrow tool can be supported by a steel strut studded to a block on the cross-slide, its top face veed to engage a ground vee on the

