Jig boring principles

WORKSHOP HINTS and TIPS

BY GEOMETER

USED to its full extent with accessory equipment, the lathe is undoubtedly the most versatile of machine tools, and all types with rotating spindles owe something to it. Certainly each may perform some particular operation or group of operations faster and with greater facility than the lathe,. as is the case with bench and pillar drills, milling machines, and universal and surface grinders. Various operations special to these machines can be performed reasonably efficiently on the lathe, given time, moderate dimensions in the work and some ingenuity in the set-up.

The same is true to a considerable extent of the jig-borer, which operates in the reverse way to a lathe, working with a single-point boring tool-and with special emphasis on accuracy.

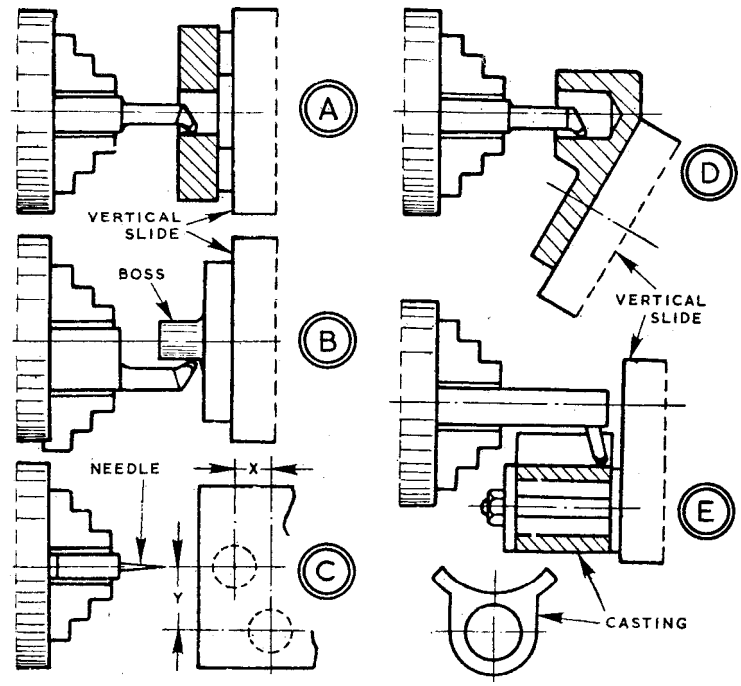
For a normal boring operation on a lathe, the work revolves mounted in the chuck or on the faceplate, and the single-point boring tool is set to cut and feed. For the corresponding operation on a jig-borer, the work is stationary on the machine table, while the single-point boring tool revolves and is fed,

The reason for this reversal is the nature of the work. In the main a jig consists of a built-up plate or cast box structure in which components can be placed, for drills, reamers, etc., to be applied to them through accurately positioned bushed holes- thus speeding production by obviating marking off and numerous different settings for each component. In constructing the jig, all holes (some of them perhaps not very large) must be accurately placed and bored- and it is easier to do this spinning a boring tool than swinging a massive casting or a long piece of plate material.

The table of the jig-borer can be moved by accurate feed screws in two directions at right angles; and having picked up the position of a hole on the feed screw micrometer collars, the positions of others can be obtained from appropriate readings-or by using end gauges against stops. On a lathe, however, it would mean loosening and resetting the work, a longer and more difficult job. The boring tool of the jig-borer must be adjustable for sizing holes, and this arrives from a form of radial feed to the tool or its tip.

Turning now to the lathe, the jig-boring principle is obtained, as at A, with a boring tool in the independent chuck and the work mounted on the vertical slide,, set to face the chuck and fixed, hke the crossilide, by tightening the gib-piece screws. Without a special tool or holder, tool feed can be given by manipulating the chuck jaws, and testing results with a gauge or callipers in the bore. Positions of different holes can be obtained from cross-slide and vertical slide screws when these have micrometer collars. Slides may have to be loosened for moving; and while accuracy may not compare with a jig-borer, it should be equal to that from ordinary marking off.

Ordinary cutting feed follows from traversing the saddle; and using a tool of reverse shape, a boss can be machined if required, as at B. Hole centres in plate material or castings may be located by marking off in the ordinary way; then the scribed lines can be set vertically and laterally to a needle point spinning truly in the chuck, as at C-the same as on a jig-borer-and noting the feedscrew readings. For the lathe setting, a needle can be soldered into a piece of brass rod. Having obtained the position of one hole (top left), the centre of another (bottom right) follows from a lateral feed X and a vertical feed Y. Holes may be centre drilled, drilled, then bored from the chuck.



On a jig-borer, holes at right angles and other angles require the work to be mounted on fixed and adjustable angle plates. This principle may follow on the lathe, though some settings can be obtamed by turning the slide, as at ***D,*** much easier than by the normal lathe principle. Radius machining, too, may sometimes be simpler as at ***E,*** on a saddle casting, if large.