

Live End Boring Bar and Lathe Swivel

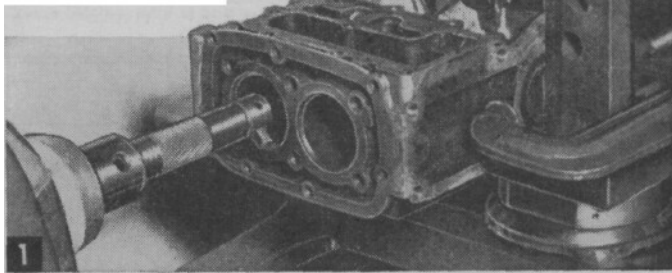
By JOEL B. LONG

MATERIALS LIST—BORING BAR

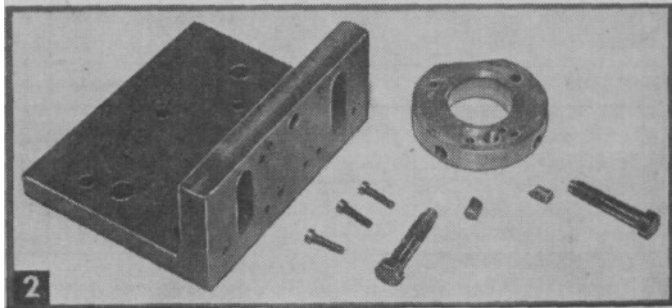
- 1—6" x 3/4" C. R. steel stock
- 1—1/4" tool bit of desired length
- 1—1/4" - 20 Allen set screw

LATHE SWIVEL

- 1— 6" angle plate
- 2— .375" - 24 " x 2" cap screws
- 3— 10 - 32 x 3/4" Machine Screws
- Drill rod for pins
- Round stock, 3/2" O. D. (brass, aluminum or steel)



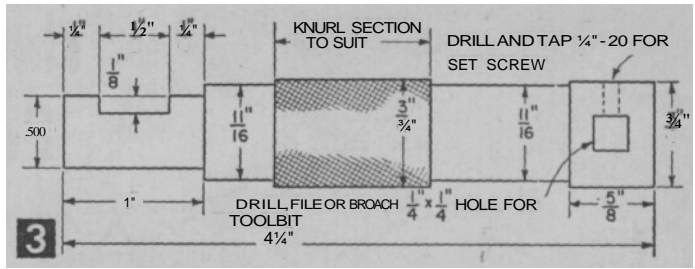
WORK that's too big to clamp to a face plate can often be bored by clamping to an angle attachment on the cross-slide and using a tool holding bar mounted in an end mill arbor in the lathe's live-center. You can also bore two or more holes in line and accurately located from the micrometer ring on the cross-slide, like re boring



the cylinders of an outboard engine (Fig. 1). While the boring bar does not have the adjustability of a micrometer head, it can handle many of the same jobs at only a fraction of the cost.

To make the boring bar, cut a 6 in. length of $\frac{3}{4}$ in. cold rolled steel rod, grasp it in a 3-jaw chuck and center drill one end. Shift the rod's position in the chuck to allow you to machine the $4\frac{1}{2}$ in. length while supporting the end in the tail center. Knurling the section indicated in Fig. 3 adds to the appearance but isn't necessary. Turn the rest of the body to .687 in. dia. and the end to exactly .500 in. for a snug fit in the end mill arbor that attaches the boring bar to the lathe's live-center. With the diameters machined, remove the tail stock and cut the rod off with a cut-off tool. Re-chuck the cut-off rod and finish the end.

At the end of the body, drill a $\frac{1}{4}$ in. hole for the tool bit and either file it square for regular cutter



bits or make round bits from drill rod stock, hardened by heating to a cherry red and quenching in water. Drill and tap the hole for the Allen set screw to hold the tool bit. Mill or file the flat slot on the $\frac{1}{2}$ in. shank for the set screw on the end mill arbor as shown in Fig. 3.

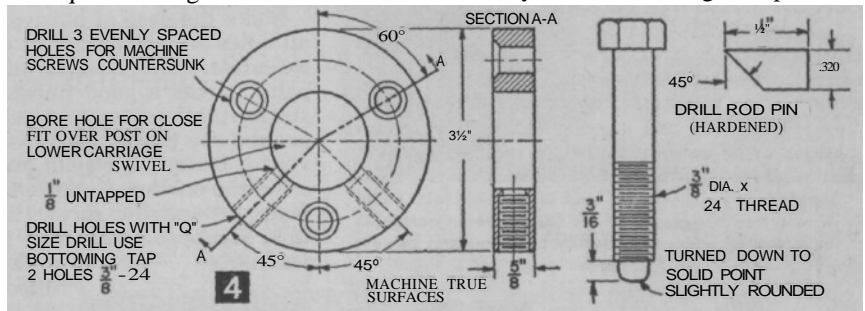
The boring bar makes a rigid tool and should not chatter or spring if used correctly. You'll need care and patience to readjust the cutter bit after each cut. Loosen the set screw that holds the bit slightly and, by "feel" or gently tapping it from the rear, advance it a few thousandths. Take light cuts except the first cut on a casting to get under the scale. As the hole nears the desired diameter, check after each cut with a telescope gage and micrometer. For the final light finishing cuts, hone the bit to a sharp edge and you'll find you can work to a .001 in. tolerance. Retract the tool from the bore using power carriage feed on finishing cuts to clean up the surface and leave a smooth finish.

The holding fixture for lathe's carriage is made from an inexpensive 6 or 8 in. angle plate and can save you much time and trouble when boring, milling or drilling odd-shaped pieces that would be difficult or impossible to fasten on the face plate. Make sure the faces of the angle plate are smooth, flat and exactly at a 90° angle. Turn the tool post ring to size and drill (size Q) and tap the two .375 - 24 holes with a bottom-tap, stopping the threads about .125 in. before going through. Make up two pins from drill rod (Fig. 4) and turn down end of .375 - 24 bolt to fit in the hole. If

the outside of the ring extends beyond the front edge of angle plate, saw it off so that it is even with the edge.

The ring is positioned and fastened to the bottom of the plate with three 10-32 machine screws. Three sets of holes for fastening the angle plate to the ring permit greater flexibility and more working surface. Counterbore for screw heads.

Fig. 1 shows how an engine block, clamped to the plate, can use the micrometer collar on the carriage feed to locate and evenly space the cylinders. Holes may be drilled through the plate at



any convenient location for hold-down bolts or machinist's clamps.