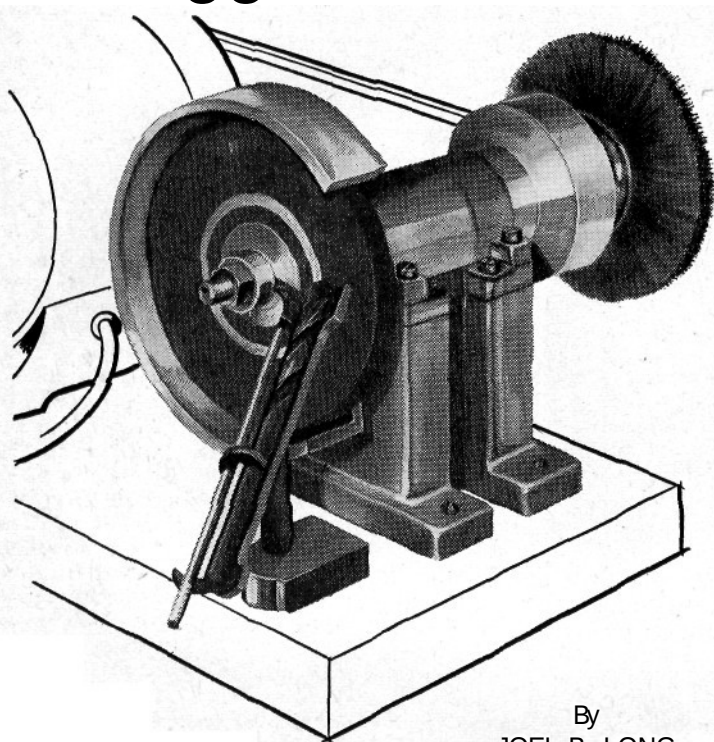


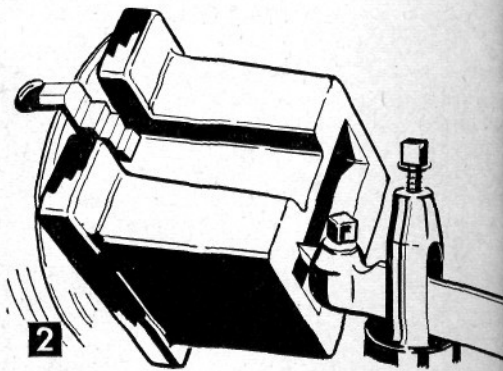
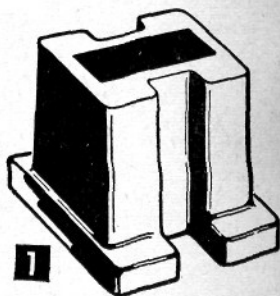
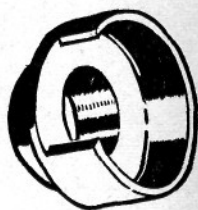
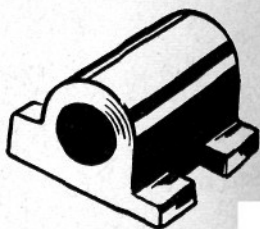
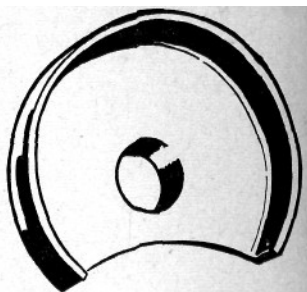
Rugged BENCH GRINDER

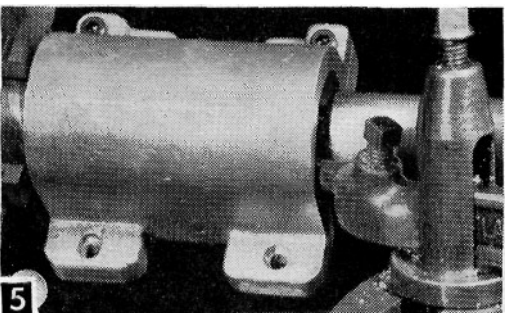
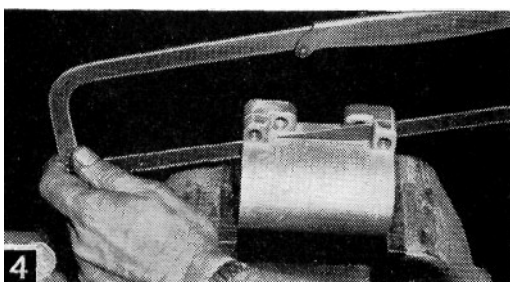
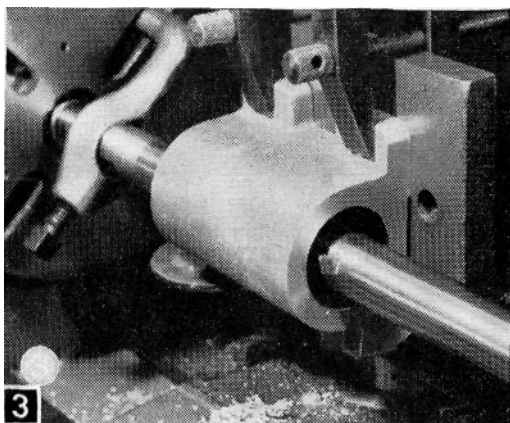


By
JOEL B. LONG

WITH this bench grinder you can keep your cutting tools sharp and do general offhand grinding, and can, with the aid of various attachments, perform such other operations as wire brushing, buffing, polishing, sanding, and drilling. Anyone having a bench lathe and drill press should have no trouble in building it. First, study drawings especially those showing the spindle assembly of the shaft and housing drawings (Parts #3 and 7).

Make up the patterns for the castings required, using measurements given on the prints. Cast base solid if you wish. Add about 1/16 in. for machining where facing is indicated on the print. Make frame and base of aluminum. The castings are shown in Fig. 1. Chuck the base (#8), in the 4-jaw chuck (Fig. 2) and take a facing cut across the top until smooth. Reverse casting and face the bottom. To bore out the frame (#1), that holds the spindle housing mount the casting on a home made angle plate fixture that fits on the tool post (Fig. 3). Note that the lower lathe swivel is turned around on the carriage to provide room to mount casting. Use a boring bar supported between centers and having an adjustable cutter; make, if one is not available. Bring hole to size (1.625) by taking light cuts and fine feeds and by adjusting the cutter bit after each cut is made. Remove from fixture and, holding casting in vise, carefully saw through its entire length with a hacksaw (Fig. 4). Drill the 2 holes shown with a

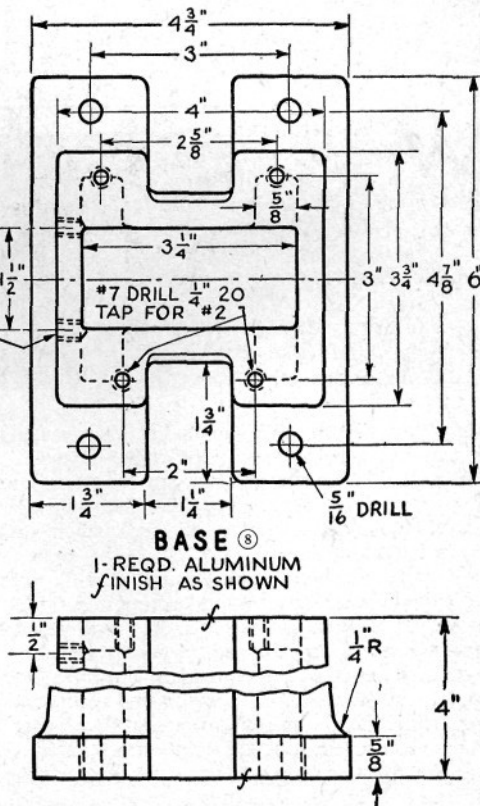
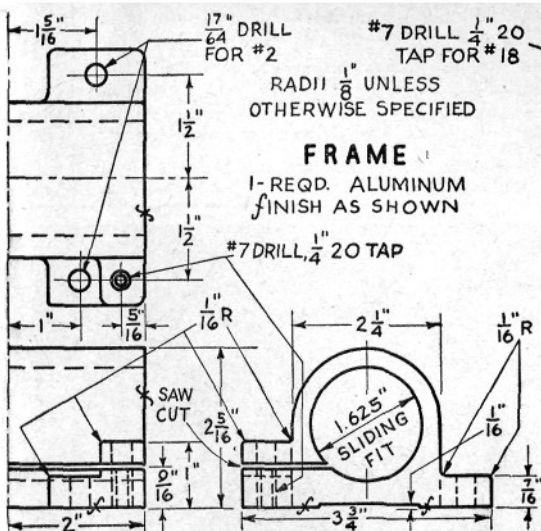




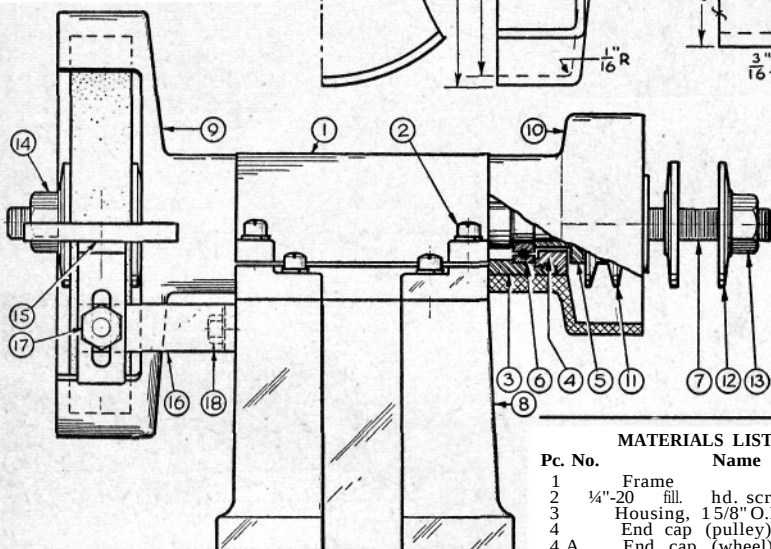
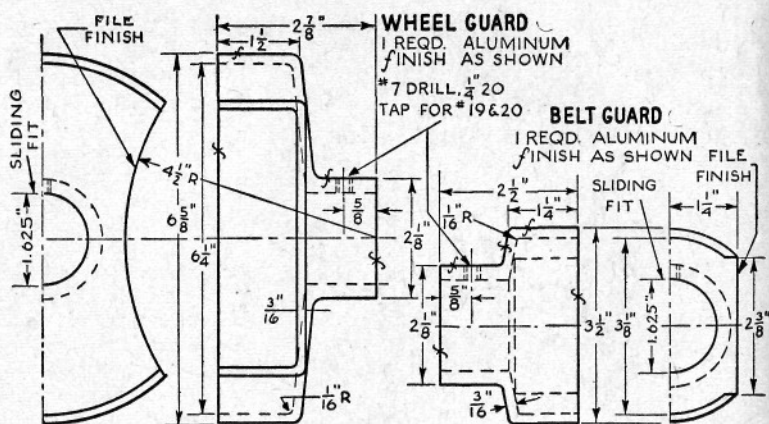
No. 7 drill and tap them $\frac{1}{4}$ -20 NC. Turn a stub mandrel by chucking up a piece of scrap rod. Without removing from chuck, mount the frame on this and tighten the two screws which will hold it securely by closing the slot. Support outer end of mandrel with tail stock center. Now true up the ends and bring casting to 4 in. length (Fig. 5). Use the 3-jaw chuck to hold the belt guard casting (#10), with large part in. Take a light truing cut on the extension. Reverse the casting and chuck it by the extension. Face it to length ($2\frac{1}{2}$ in.) then bore out the hole (Fig. 6) to within .020. Use finished housing for a gage for a snug fit. Finish guard, bringing it to size. Machine the large wheel guard (#9), boring the hole to within .020 of the dia. After the inside of the large section is machined, mount the guard on a mandrel and true it up by taking a cut (Fig. 7). Drill holes with #7 drill and tap $\frac{1}{4}$ -20 NC. for the set screws in both guards.

Build the tool rest (#15), and the bracket (#16). Mill clean slots in the bracket by holding it in the milling attachment and using a $\frac{5}{16}$ in. mill end having 4 flutes, as shown in Fig. 8. Position frame on the base and drill and tap holes where shown for the 4 screws. Clean the frame and base with a file and fine emery cloth.

On the shaft (#7), be careful to get the exact measurements. Your finished job will be no better than the accuracy of the shaft assembly (Figs. 9 and 10). Use 1 in. dia. drill rod $12\frac{1}{4}$



long for the spindle or a piece of cold rolled steel. Cut to length, center drill each end and mount between centers. Bring shaft to exact dimensions, getting an exact fit on the bearing surfaces. Use very light finishing cuts with a freshly honed cutter with slow feed. Use the bearing itself as a gage,

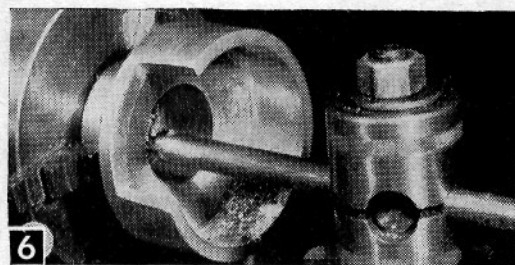


The finished shaft assembly is shown in Fig. 10.

Next, make the shaft housing (#3), to hold the sealed bearings. Chuck the tube in the 4-jaw chuck and center it dead true. Use a dial indicator if one is available, or center it by

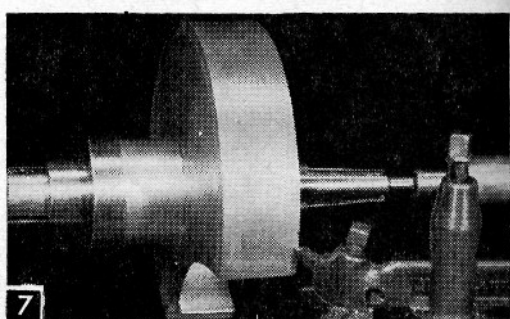
MATERIALS LIST—6" BENCH GRINDER

Pc. No.	Name	Material	No. Reqd.
1	Frame	Alum.	1
2	1/4"-20 fill. hd. screws, 1" lg.	Steel	6
3	Housing, 1 5/8" O.D., 1 1/8" I.D.	"	1
4	End cap (pulley)	"	1
4 A	End cap (wheel)	"	1
5	End bushings	"	2
6	Ball bearings (77-3L02 N.D)	"	2
7	Shaft	"	1
8	Base	Alum.	1
9	Wheel guard	"	1
10	Belt guard	"	1
11	Pulley	Steel	1
12	Washers	"	4
13	1/2"-20 R. H. nut	"	1
14	1/2"-20 L.H. nut	"	1
15	Tool rest	"	1
16	Tool rest bracket	"	1
17	5/16" nut, bolt & washer (for #16 & #15)	"	1
18	1/4" 20 hex. hd. screws 3/4" lg. (for #8 & #16)	"	2
19	1/4" 20 headless set screw (for #10)	"	1
20	1/4" 20 headless set screw (for #9)	"	1
21	1/4" 20 headless set screw (for #11)	"	1



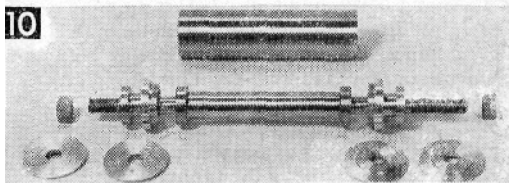
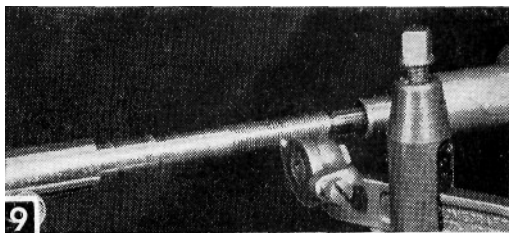
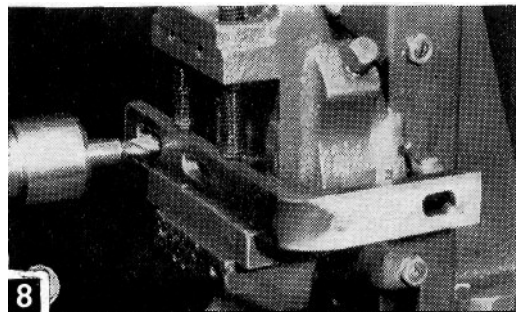
trying it for fit until you bring the bearing surfaces to exact size for a push fit.

Now, thread the ends. Be sure centers are true before you start. Cut right hand threads with carriage feed toward the headstock and compound set at an angle of 29° to the right as you face the lathe. Cut left hand threads with feed away from headstock and compound set 29° to the left. If your experience in screw thread cutting is limited, first consult your lathe manual on this operation and practice cutting some threads on a piece of scrap. In cutting the threads, grind a cutter bit to 60° angle or use a formed cutter (Fig. 9). Try the nuts for correct fit as you proceed. If you have a tool post grinder, grind the shaft all over and do a beautiful job.



adjusting the jaws individually. After centering you will have a run out of a few thousandths on the free end, so with a very sharp cutter take a light cut and true up housing for about one in. (about .005 will be removed). This will give a true surface for your center rest to seat against. Now set up the center rest and then bore out the housing to dimensions given. As bearing recess must be an exact fit for the bearing use bearing as a gage until you get a push fit into recess. Next, face housing end true and smooth. Now thread the tube for the end cap. Transpose the gears to cut the internal threads 40 threads per inch and set the 60° cutter point on exact center. Use a heavy boring bar, then, to hold the cutter bit. Cut the threads to the correct depth given on thread gage or chart. Do not cut the threads without first making the undercut or groove as shown. This enables you to stop the cut without trouble. After threading one end, reverse the tube in chuck, take the truing-up cut as before and adjust center rest. Face end, bring tube to exact length, and then bore out tube or housing. Cut threads as outlined above.

Turn the end caps, Pt. 4, from solid bar stock or aluminum while held in the 3-jaw chuck.



Finish to measurements shown, bore the hole and thread the end, bringing threads to proper depth. Use screw thread gage on threaded housing to try for fit as you go along. Complete the job, then cut off with the cut-off tool to exact length. Turn the end bushings (#5), the pulley (#11), and the washers (#12), from aluminum, steel or brass. With the shaft housing completed, re-chuck the large and small guards and finish boring the holes to correct size for a slide fit over the shaft housing. Use the housing as a gage for the hole diameter. Set screws will hold the guards securely on the housing.

Now for assembly. If you have followed the measurements closely, the shaft, when installed, should have no play or bind and should be free running. Drill 5/16 in. holes in base for the hold down screws or bolts. Also, drill and tap holes for screws that hold the tool rest bracket. Clean and polish base and frame and apply a coat or two of machinery enamel.