

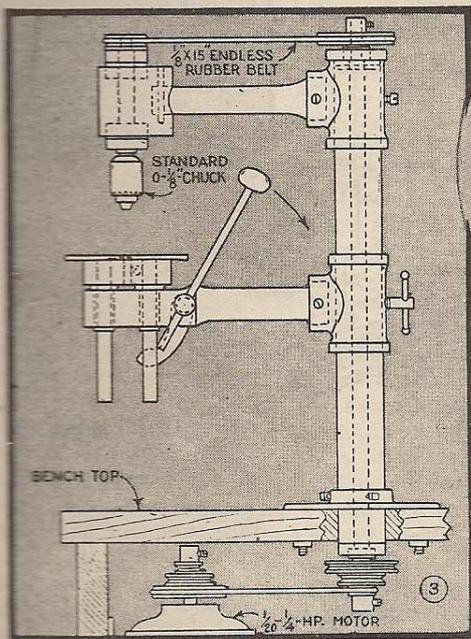
PRECISION DRILL PRESS

for the modelmaker

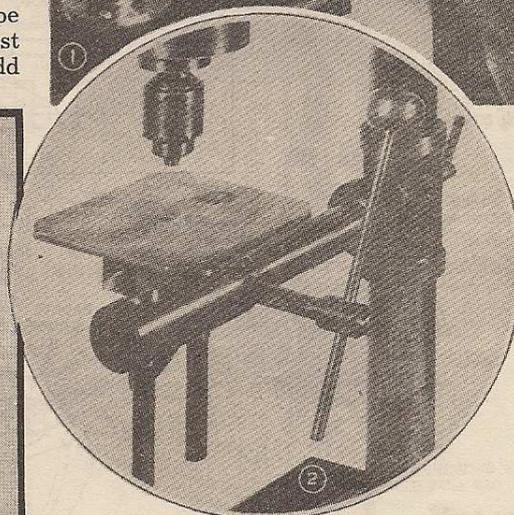
By Alexander Maxwell

Table is elevated with hand control to feed work against drill held in stationary chuck

BY HAVING the table travel up and down instead of the chuck, the construction of the little drill press, shown in Fig. 1, is simplified to the point where all the parts can be machined completely on any small screw-cutting lathe. Standard stock materials are used—namely, the pipe fittings, bearings and chuck, while the rest of the parts are turned to size from odd



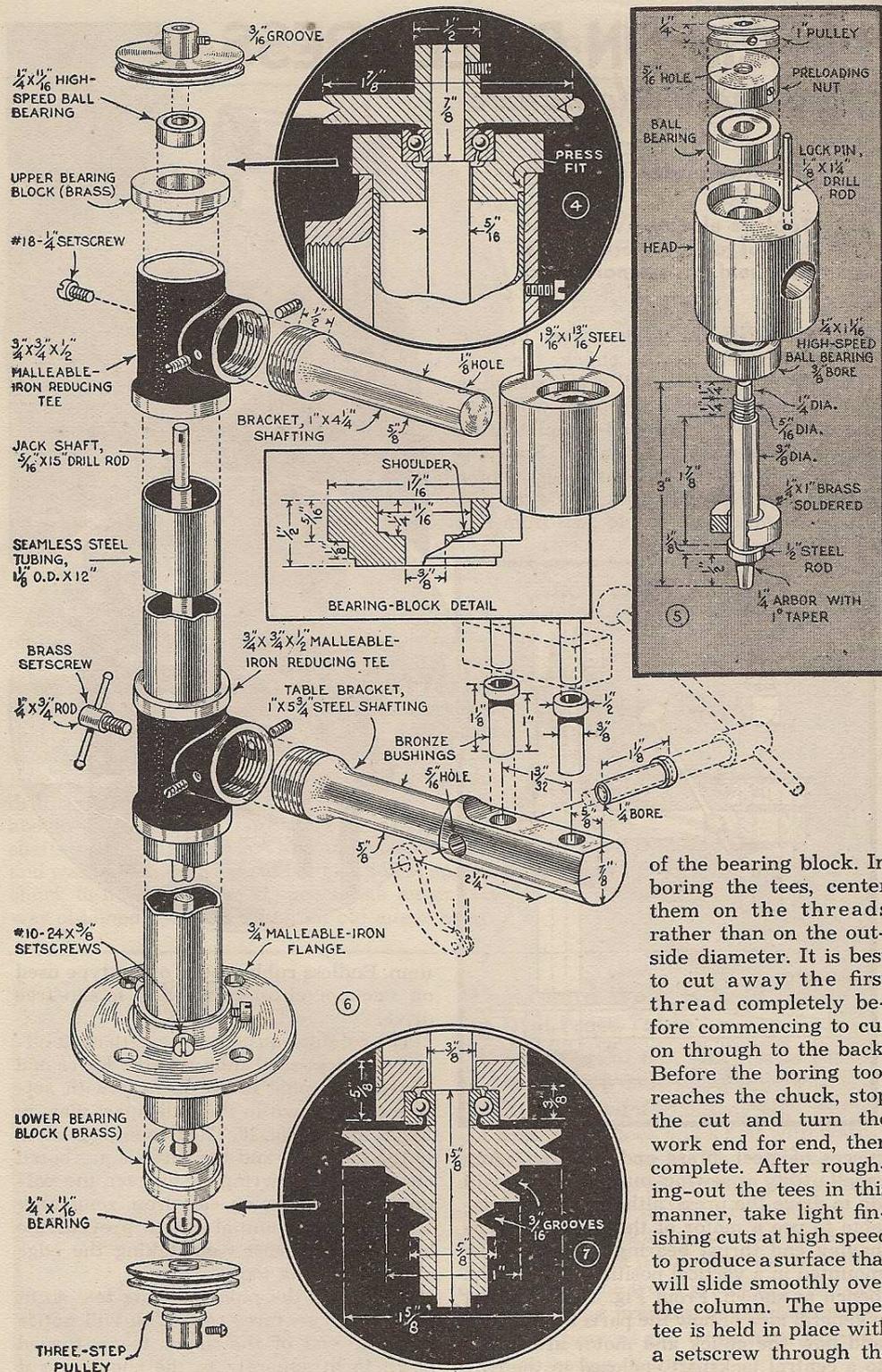
pieces of steel, brass and flat iron. Any small utility or sewing-machine motor will do to drive the press, although it is advisable to use a motor of the induction type having end thrust bearings, if it is to be mounted in a vertical position beneath the bench as shown. From Fig. 3 you can get a general idea of how the parts fit together, and how the chuck and motor are belted to a central jackshaft enclosed in the col-



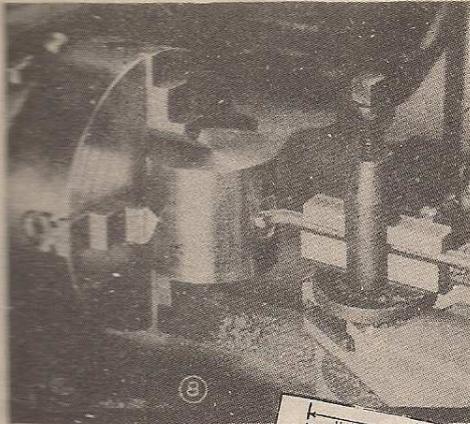
umn. Endless rubber belts of the type used on vacuum cleaners provide a slip-free drive.

The column consists of a length of standard seamless-steel tubing at the lower end of which a pipe flange is held with set-screws as shown in the pull-apart view in Fig. 6, and in Fig. 10. The flange is chucked to the faceplate and the threads are bored out to make a wringing fit over the column. When turning cast iron, remember to take a deep initial cut to prevent the hard surface crust from taking the edge off your cutting tool.

Machining the pipe reducing tees to fit the column requires care. You will notice that one end of the upper tee is turned down to fit squarely in the shoulder cut



of the bearing block. In boring the tees, center them on the threads rather than on the outside diameter. It is best to cut away the first thread completely before commencing to cut on through to the back. Before the boring tool reaches the chuck, stop the cut and turn the work end for end, then complete. After roughing-out the tees in this manner, take light finishing cuts at high speed to produce a surface that will slide smoothly over the column. The upper tee is held in place with a setscrew through the

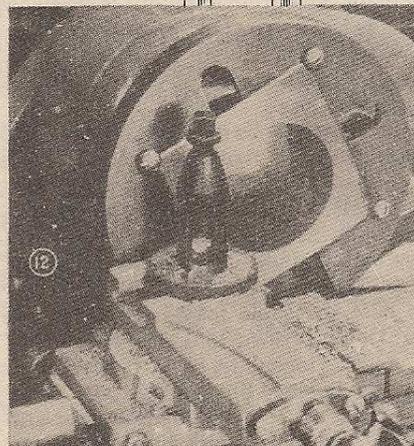
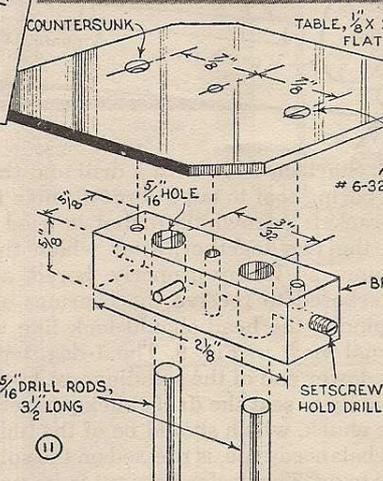
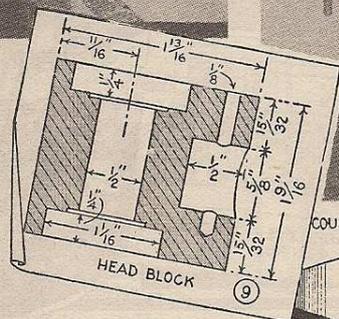


back, while a larger one of brass is fitted in the other tee for adjusting the table.

The jackshaft must be machined from a perfectly straight length of drill rod. As you will see in Figs. 4

and 7, each end is turned down to $\frac{1}{4}$ in. in diameter. Fit the shaft by first turning down the upper end for the distance indicated, then turn the bearing block to size and press it in the top of the tee. After this, the bearing is inserted in the counterbore of the block and the pulley is fastened temporarily to the shaft. The bearings should be of the high-speed, ball-bearing thrust type. The lower end of the column is similarly capped with a bearing block. In turning down the shaft, the exact length of the shoulder cut must be found by a cut-and-try method. The $1\frac{5}{8}$ -in. dimension given is only approximate. You will have to cut back the shoulder a little at a time until the point is reached where the shaft seats perfectly and runs freely without end play. Every 100 hrs. or so of operation, the bearings should be removed, washed in kerosene and repacked with grease.

The threads on the head and the table bracket should be lathe-cut to make a wringing fit in the tee fittings. Setscrews through the sides of the tees lock the brackets in place. The head, detailed in Figs. 5 and 9, may be turned from a mill end of mild-steel rod, or from a piece of 2-in. shafting. Chucking the head for boring the bracket hole is done best with a four-jaw independent chuck as shown in



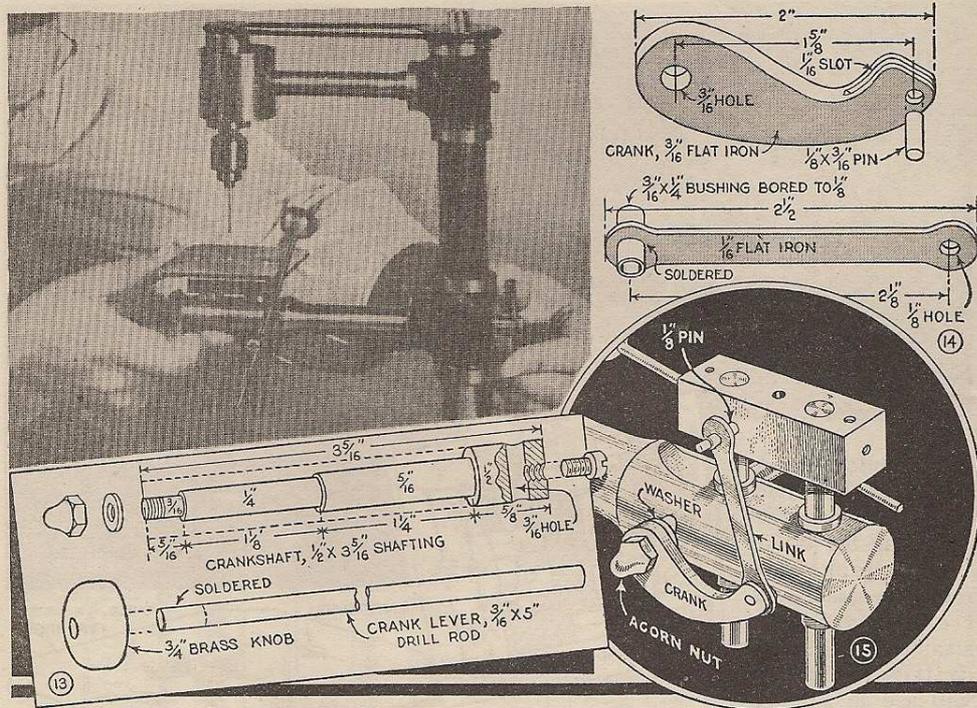


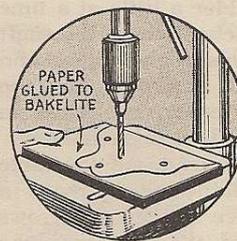
Fig. 8. Start the hole with a drill and then use a boring tool to cut a forcé-fit hole for the bracket. A rawhide mallet is used to drive the two together, after which they are pinned. When properly bored and counterbored to receive the bearings and the spindle, the head should look like the sectional view in Fig. 9. The 1-deg. taper on the lower end of the spindle must be cut accurately to seat the drill chuck perfectly.

The chuck, which should be of the high-speed balanced type, is pressed on the spindle by hand. The preloading nut is screwed down to provide constant pressure on the bearings. Tighten it until the bearings bind, then loosen it slowly until they will just turn freely.

If your lathe is large enough to swing the table bracket, drill the holes for the bronze sleeve bushings with a drill held in the tailstock chuck. The front bushing is a press fit in the bracket, while the other one can be left slightly loose to compensate for any slight offset in drilling. Fig. 12 shows how the table may be held at the corners with screws and surfaced, both sides, on the faceplate. The best way to register the holes in the carriage with those in the bracket is to bore one hole first and insert the rod. Then with one end of the

other rod pointed slightly, pass it through the bushing and center-punch the underside of the carriage. The parts for the table-raising mechanism are detailed in Figs. 6, 13 and 14, while Figs. 2 and 15 show how they will look when assembled. The drill-rod washer should bear against the shoulder of the crankshaft and not the end of the bushing, so that the acorn nut when tightened will hold the crank in place.

Pattern Is Fastened to Plastic With Rubber Cement



Instead of scratching a design in the surface of hard plastics like Bakelite for a guide in cutting, glue paper over the work, using rubber cement, and sketch the design or pattern on it. Then, if necessary, a correction can be made in the design without marring the surface of the work. The paper can be removed without any trouble after the cutting or drilling has been done.