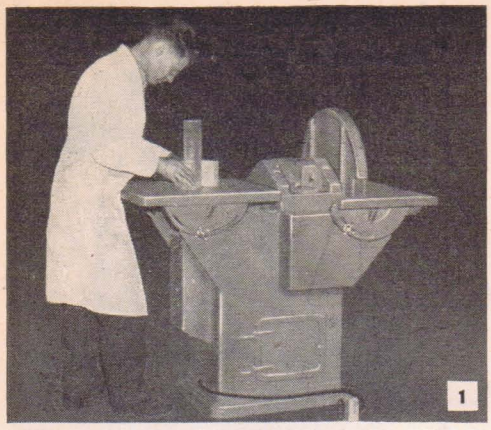
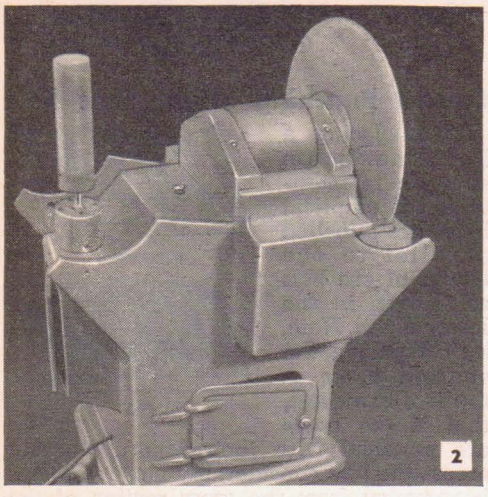
Disk and Spindle SANDER

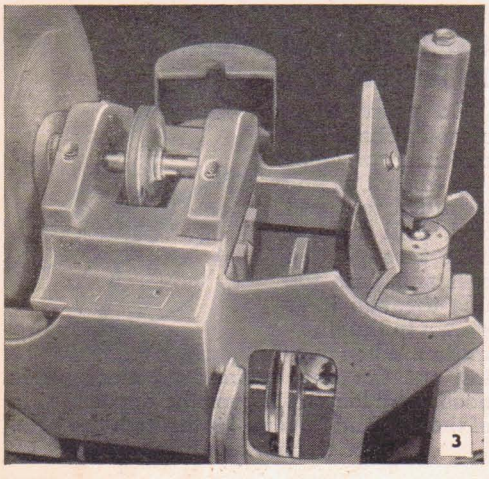
By R. Russell



Oscillating spindle sander plus large disk sander combine to form a versatile woodworking machine



Above, completed machine minus tilting tables. Note service doors for motor and oscillating mechanism. Below, removing dust covers and opening side door give access to both disk and spindle-sander pulleys

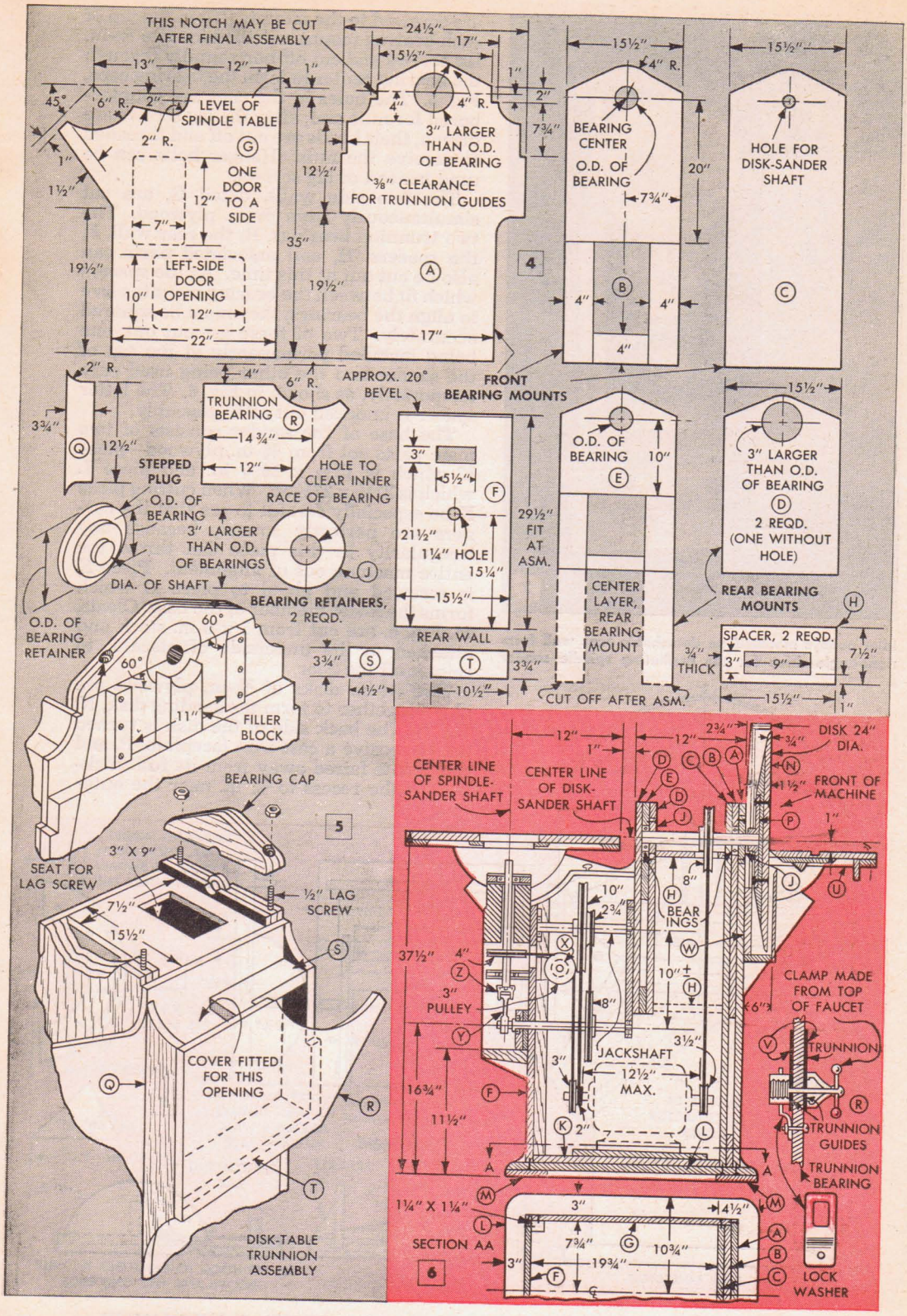


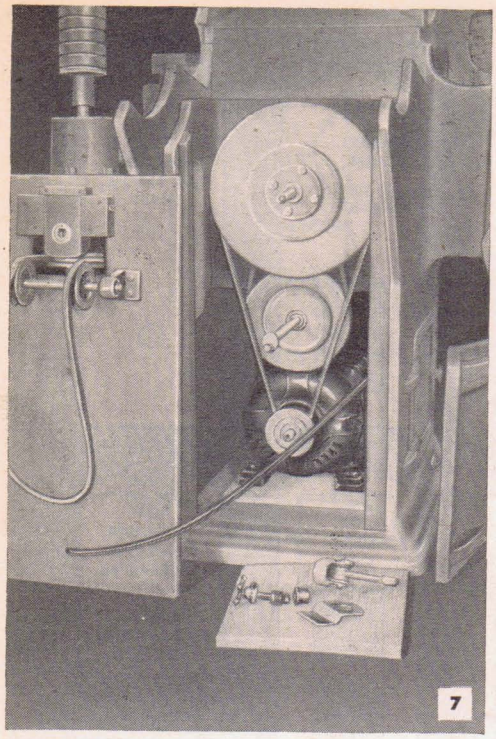
BUILT entirely of plywood, this combination disk and spindle sander provides a sturdy machine for the basement shop or small woodworking shop. The 24-in. disk with its tilting table will handle a wide variety of large work. The spindle sander, pictured in use in Fig. 1, oscillates, and this sander also is equipped with a tilting table. Both sanding units are driven by a 1-hp. double-shaft motor housed in the base of the sander.

Before beginning construction of the sander, it is a good idea to lay out the sectional detail, Fig. 6, full-size on heavy paper. All members are keyed to this detail. Proceed by roughing out the bearing mounts from ¾-in. plywood, 7 ply, making them about 1 in. larger over-all than the finished dimensions, Fig. 4. Note part B is sandwiched between parts A and C to form the front bearing mount and part E is placed between two pieces cut from pattern D to form the rear bearing mount. Mark off the bearing centers and cut holes for the bearings in parts B and E. Standard ball bearings are used and should be a press fit in the holes. Holes 3 in. larger than the bearings are cut in part A and one of the parts D, the other member being left solid. Bearing retainers to fit into the holes in parts A and D are bandsawed from ¾-in. plywood, and a stepped plug is turned to facilitate aligning the bearing mounts for gluing. Only B and C layers of the front bearing mount are glued together at this time. By cutting off the shaft projection from the stepped plug, the latter can now be used to align the sections of the rear bearing mount for gluing. All three layers of this mount are glued and clamped together and allowed to dry.

The two glued sections are placed one on top of the other and aligned with a stepped plug. Then the actual over-all dimensions are laid out from the bearing centers and the work cut to finished size, both front and rear sections being cut simultaneously. The outer layer of the front bearing wall, detail A, is then laid out and sawed separately. Note that the dimension at the base is 1½ in. greater than the widths of the other layers so that a ¾-in. rabbet is formed for the side panels when the three layers are glued together.

After section A has been aligned and glued to section B, the bearing retainers


THIS NOTCH MAY BE CUT AFTER FINAL ASSEMBLY
LEVEL OF SPINDLE TABLE
ONE DOOR TO A SIDE
LEFT-SIDE DOOR OPENING
3" LARGER THAN O.D. OF BEARING
3/8" CLEARANCE FOR TRUNNION GUIDES
BEARING CENTER
O.D. OF BEARING
HOLE FOR DISK-SANDER SHAFT
FRONT BEARING MOUNTS
APPROX. 20° BEVEL
TRUNNION BEARING
STEPPED PLUG
HOLE TO CLEAR INNER RACE OF BEARING
O.D. OF BEARING
3" LARGER THAN O.D. OF BEARINGS
DIA. OF SHAFT
BEARING RETAINERS, 2 REQD.
O.D. OF BEARING RETAINER
FILLER BLOCK
REAR WALL
CENTER LAYER, REAR BEARING MOUNT
REAR BEARING MOUNTS
SPACER, 2 REQD.
CUT OFF AFTER ASM.
BEARING CAP
SEAT FOR LAG SCREW
1/2" LAG SCREW
COVER FITTED FOR THIS OPENING
DISK-TABLE TRUNNION ASSEMBLY
CENTER LINE OF SPINDLE-SANDER SHAFT
CENTER LINE OF DISK-SANDER SHAFT
DISK 24" DIA.
FRONT OF MACHINE
BEARINGS
JACKSHAFT
3" PULLEY
CLAMP MADE FROM TOP OF FAUCET
TRUNNION
TRUNNION GUIDES
TRUNNION BEARING
SECTION AA
LOCK WASHER



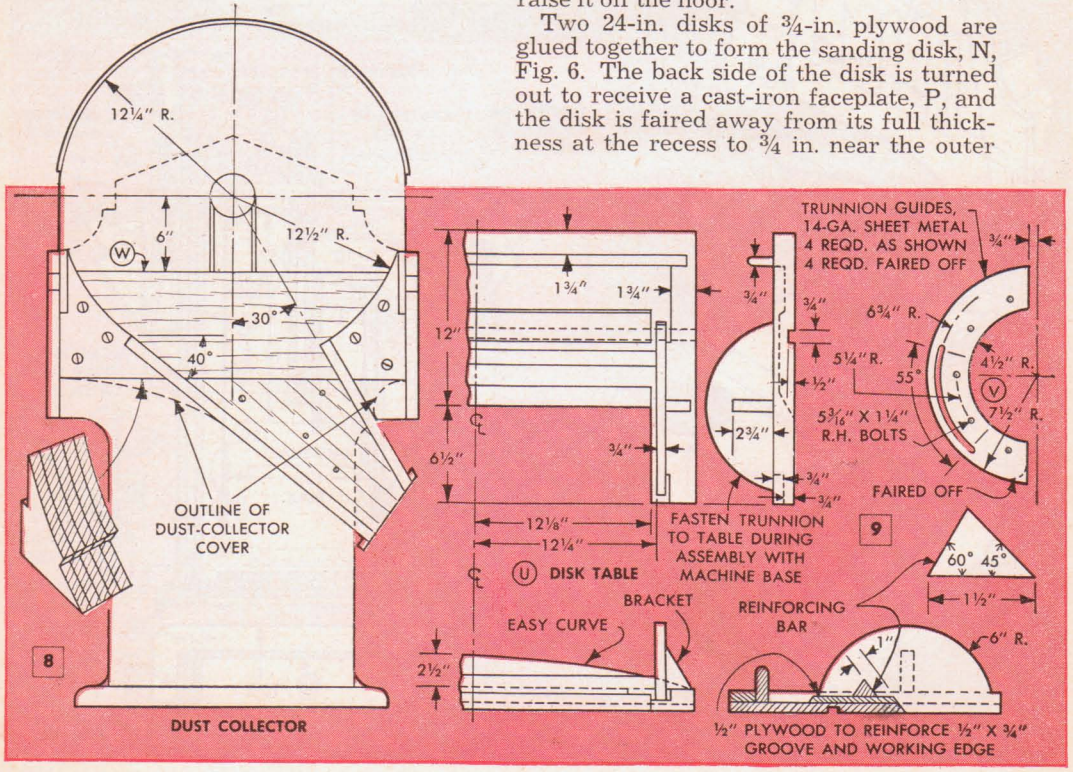
Idler pulleys mounted on detachable rear wall form right-angle drive for the oscillating spindle sander

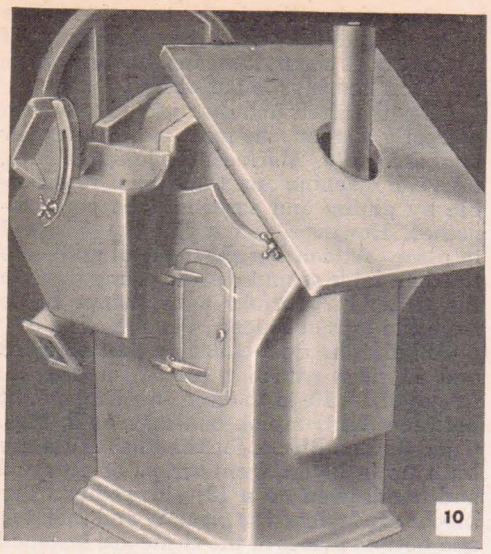
are screwed to the mounts. Then the top of each bearing mount is drilled for two ½-in. lag screws and cut off horizontally through the bearing center to form the bearing caps, Fig. 5. The holes in the caps are counterbored for nuts and, after the lag screws are driven, their heads are cut off and threaded to receive the nuts. Hanger bolts can be used instead of lag screws.

The two side walls, detail G, are cut simultaneously from ¾-in. plywood. The two trunnion bearings, R, the rear wall, F, the spacers, H, and associated parts can also be cut out at this time. As the spacers which fit between the bearing mounts serve to align the bearings, they must be squared accurately. Two of these are cut out, one being installed permanently at the top of the sander and the other being used only temporarily, as shown in Fig. 6. The latter spacer is knocked out after assembly.

The base of the sander consists of two main parts cut from ¾-in. plywood—piece K which is 15½ x 19¾ in. and piece L which is 21½ x 27¼ in. When cutting piece K be especially careful to see that the corners are perfectly square, because any irregularity in this piece can throw the entire machine out of alignment. Piece K is screwed and glued to piece L which forms the lower member of the base. Cleats, M, Fig. 6, are cut from 1 x 6-in. stock and attached to the underside of piece L to raise it off the floor.

Two 24-in. disks of ¾-in. plywood are glued together to form the sanding disk, N, Fig. 6. The back side of the disk is turned out to receive a cast-iron faceplate, P, and the disk is faired away from its full thickness at the recess to ¾ in. near the outer





Tables of spindle and disk sanders are shown tilted to maximum angle of 45 deg. Note trunnion clamps

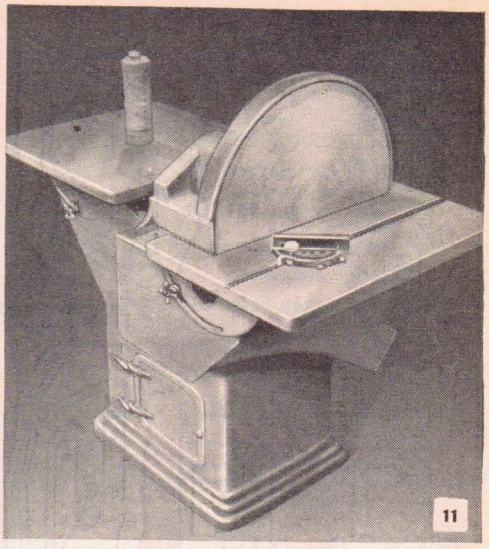
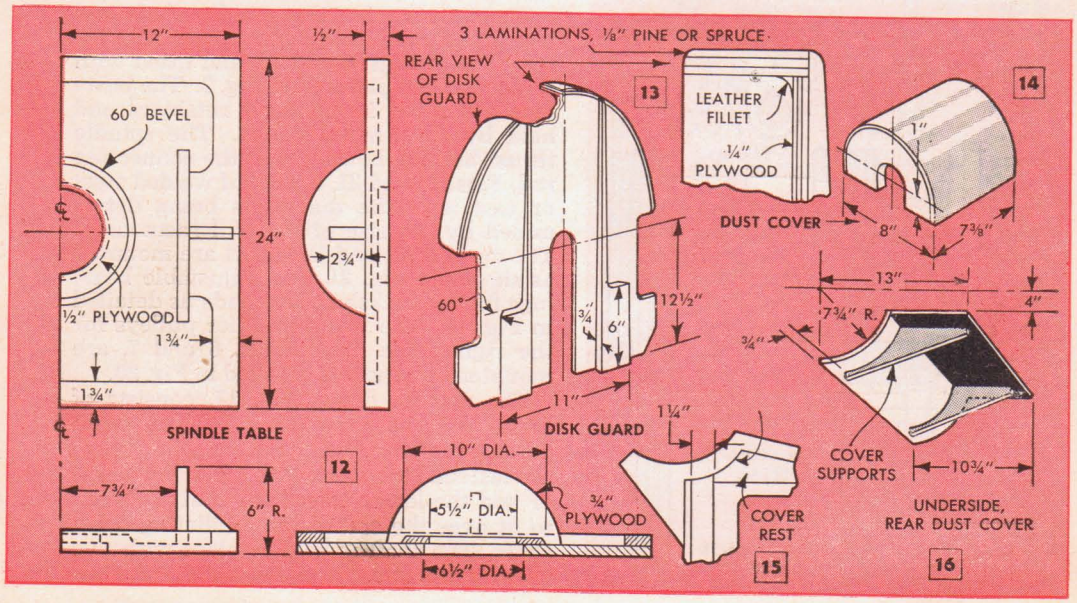


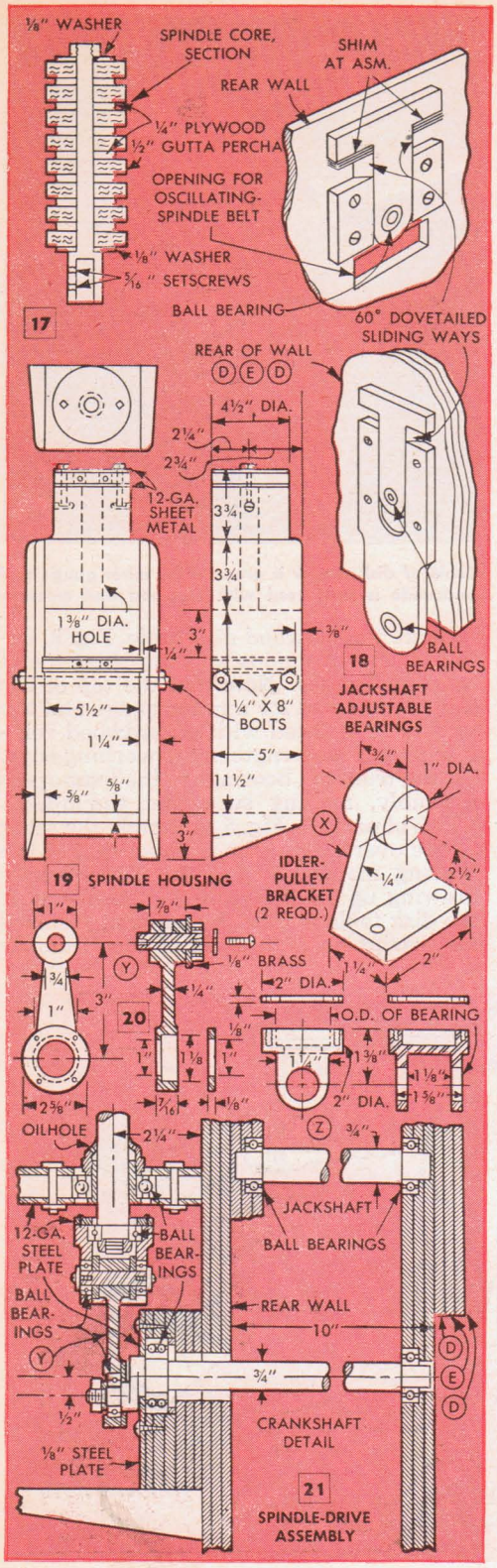
Table of disk sander is grooved for miter gauge and underside is reinforced with plywood and crossbar

edge. The hub of the faceplate is pinned to the shaft and the disk is attached with four elevator bolts in countersunk holes. The shaft size is determined by the bearings.

The machine is now ready for temporary assembly. To do this, fasten the front bearing wall against part K of the base with screws driven up from the underside as in Fig. 6. Install the 1¼-in.-square corner posts and set up the rear wall. Then the spacers, the side walls and the rear bearing wall are installed. When assembled, check the disk-sander shaft for alignment and make any necessary adjustments.

Make the plywood disk table, Fig. 9, detail U, the trunnions and the sheet-metal trunnion guides. Note that the top of the table is grooved for a miter gauge and the underside is fitted with a hardwood reinforcing bar to strengthen the working edge. Fit the trunnion bearings to the temporary assembly, making sure that the 3¾-in. width of parts Q, Fig. 5, is exactly the same as the overhang of the front section of the bearing mount, A, Fig. 4. After tightly drawing up all the joints of the machine, the disk table is fitted by fastening temporary strips on both sides of the trunnion





bearings and setting in the trunnions. The table should tilt without rocking but, if rocking does occur, it means that one of the trunnion bearings is out of line.

After the shaft and disk table have been perfectly aligned, the machine is ready for final assembly. Mark all the joint outlines, take the machine apart and then reassemble by gluing and screwing the parts together. However, do not glue the rear wall in place. Attach the sheet-metal guides to the disk-table trunnions and clamp them to the trunnion bearings with clamps made from the tops of faucets, detail R, Fig. 6.

To build the dust-collector chute, Figs. 8 and 11, first attach piece W, a 24½-in. length of 1 x 10, to the front bearing mount between the trunnion bearings, as in Figs. 6 and 8. End blocks for the dust chute are built up in layers from scraps of plywood and bandsawed on a 12½-in. radius. The blocks are fastened to piece W and then top and bottom pieces of the chute are fastened to them. The face side of the chute is covered with ¼-in. plywood, fastened with screws to permit removal.

The disk guard is made as shown in Fig. 13 and is fitted with beveled mounting brackets to slide between the cleats shown in Fig. 5. Installation of the pulleys, belt and motor, as in Fig. 6, completes the disk-sander portion of the machine.

The spindle table, Figs. 10 and 12, is built similarly to the disk table. Sheet-metal guides and clamps are installed in the same way as for the disk-table trunnion. Fig. 14 shows construction of the disk-shaft dust cover, Fig. 16 construction of the rear dust cover and Fig. 15 the cover rest. Figs. 2 and 3 picture these covers in both the closed and open positions.

The housing for the spindle shaft and bearings shown in Fig. 10 is made of hardwood, as in Figs. 6 and 19, and fitted with an access door pictured in Fig. 2. The bearings are fitted in plywood retainers and held by sheet-metal plates. The spindle thrust-bearing housing and the connecting rod, Figs. 20 and 21, can be of welded steel or cast iron, the diameters being determined by the size of the ball races used. The crankshaft and jackshaft are mounted as shown in Fig. 21, and adjustable bearings for the jackshaft are made as detailed in Fig. 18. The two 3-in. idler pulleys for the right-angle drive, Figs. 6 and 7, are mounted on brackets detailed in Fig. 20.

The spindle drum, Fig. 17, consists of disks of ¼-in. plywood and ½-in. gutta percha, the latter being a sliding fit. These are fastened to a shaft with a nut and washer and the lower end of the shaft is bored to fit over the end of the oscillating drive shaft. The shaft is held in place with two 5/16-in. setscrews.