



Sander base is adaptable for mounting on various power machines or on own stand for direct V-pulley motor operation. Slight adjustment of turnbuckles on side rails controls belt tension, helps keep belt centered on pulleys.

## Build Your Own BELT SANDER

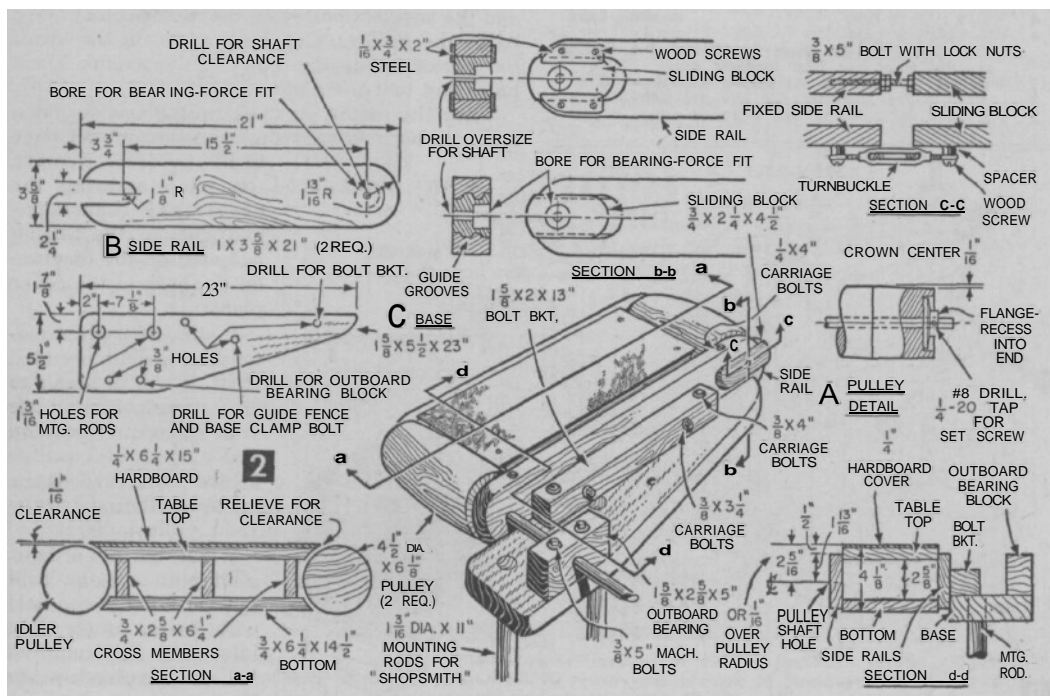
This wood-surfacing "smoothie" has two guide fences for end or side finishing at any angle

By RALPH G. HENDRICKSON

**S**ANDING of a professional caliber comes easy with a 6-in. belt sander you can make out of a few pieces of stock lumber from your local yard.

If your home workshop is like ours, chances are you can duplicate most of the unit we built (Fig. 1) at a saving of up to \$50 — by using the scrap material in your "junk bin." We needed only the cost of a 6 x 48-in. sanding belt and a few common hardware items.

While the unit in Fig. 1 was fitted to a *Shopsmith*, it can be adapted to other power equip-



ment by modifying the base. You can also drive it with a 1/4- or 1/2-hp motor by mounting it on a suitable stand and using V pulleys.

Most dimensions in the drawings may be freely altered to suit what lumber stock you have on hand. For that reason, several location dimensions for the various wood parts and bolts are omitted.

Make the Pulleys First, since belt size and pulley diameter determine the table length (section a-a in Fig. 2). Long-wearing maple or other hardwood is preferable, but pine can be used. If you do not have 4 1/2 x 4 1/2-in. or larger stock, glue up a block from two or three pieces of the hardwood; then cut off two 6 1/4-in. lengths.

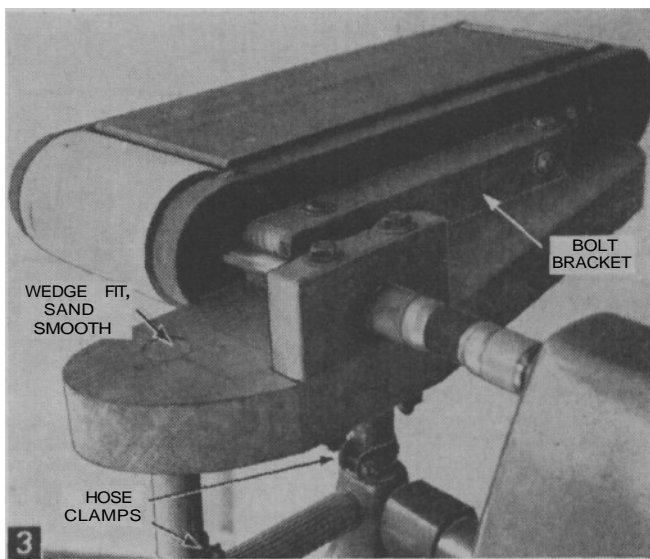
Before turning the wood, acquire shafts for the drive and idler pulleys, with bearings to fit. Diameters need not be exactly as specified in the Materials List—we chose them because they were on hand. Center drill through the length of each block for a tight fit with its shaft.

To reduce clearance between pulleys and side rails, recesses are bored into pulley ends to take mounting flanges as in Fig. 2A. You can obtain the flanges in many hardware stores or get pipe floor flanges from a plumbing shop. Buy the sizes that will just slip on your shafts, or you can ream them to fit. Drill and tap flange hubs for setscrews as in Fig. 2A.

Push a shaft through a block slide on a flange, attach it to an end of the block with screws and tighten setscrew on shaft. Mount in your lathe, using shaft to drive the block. Square off opposite end and bore recess for the flange. Remove from lathe, install flange in the recess with screws and lock onto shaft with setscrew. Mount this end of shaft in the lathe and remove other flange. Square off other end until block is 6.125 in. wide, then bore recess and replace flange.

Now you are ready to turn the pulley to approximate 4 1/2-in. dia., leaving a .063-in. crown in the middle to insure accurate tracking of the sanding belt. Make the other pulley the same way.

Side Rail Belt Adjustment. Next cut and shape the sanding table sides as in Fig. 2B and slightly bevel edges. For control of belt tension and tracking, cut sliding blocks with care to insure a smooth, sliding fit in the side



Hardwood rods to fit frame of power unit are wedged tightly into base and ends sanded smooth. Once sander is aligned with machine, mark position by attaching hose clamps tightly to rods against frame. This will ensure easy return of sander, after removal, to proper working height.

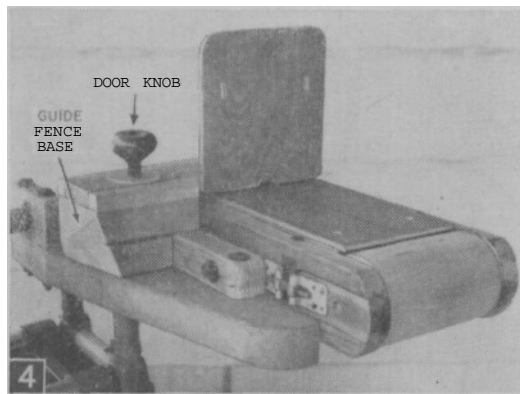
#### MATERIALS LIST—BELT SANDER

| No. Req. | Size and Description   |
|----------|--|
| 1 pc     | 1.625 x 5.625 x 32" pine (base, glued-up fence base block)   |
| 1 pc     | 3/4 x 7 1/2 x 30" pine (table top and bottom, guide strips)  |
| 1 pc     | 3/4 x 3.625 x 43" pine (side rails)  |
| 1 pc     | 3/4 x 2.625 x 72" pine (cross members, sliding blocks, panel baseboard, fence support)   |
| 1 pc     | 1.625 x 2.625 x 20" pine (bolt bracket, outboard bearing block)  |
| 1 pc     | 1.625 x 5.625 x 40" hardwood (glued-up pulleys, mounting rods) (if not available, substitute white pine)   |
| 1 pc     | 3/4 x 6 1/4 x 15" hardboard (table cover)  |
| 1 pc     | .375 x 12 x 15" plywood (fences)   |
| 1        | .625" dia x 15" steel rod (driving shaft)  |
| 1        | .437" dia x 8" steel rod (idler shaft)   |
| 4        | 2 1/2" dia steel flanges (for pulleys—2 bored .625", 2 bored .437")  |
| 3        | .625" I.D. ball bearings (for drive shaft) (try local garage, machine shop)  |
| 2        | .437" I.D. ball bearings (for idler shaft)   |
| 2        | 3 1/2" common turnbuckles (for sliding blocks)   |
| 2        | 1.188" hose clamps (for mounting rods)   |
| 2 pcs    | .063 x 1/2 x 8" strap iron (clamp strips on mounting rods)   |
| Misc.    | 2 pr 2" butt hinges, 1 pr 1" butt hinges, 2 #8 wire, 2 1/2"-dia x 2" binding posts, 1.375 x 6" machine bolt, 2.375 x 5" machine bolts with nuts, 2 .375 x 4" carriage bolts with nuts, 2.375 x 3 1/4" carriage bolts with nuts, 4 1/4 x 4" carriage bolts with nuts, 12.375" I.D. washers, 8 1 1/4" I.D. washers, small piece 1/2" steel plate, 2 doz #10 x 1 1/2" fh wood screws, 4 #8 x .875" fh wood screws, 6 #5 x 1/2" fh wood screws, glue |

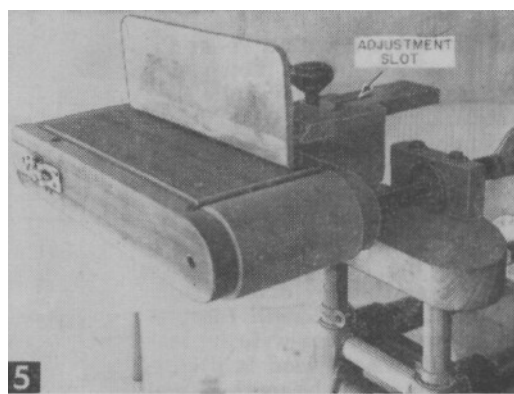
rail recess as in b-b of Fig. 2. Drill hole for idler pulley shaft slightly oversize and bore on inside edge so bearing fits with force fit. Install bearings.

To retain sliding blocks in their recesses, cut grooves on a shaper with a 3-wing cutter, using either the glue-joint groove as in b-b of Fig. 2 or a matched tongue and groove cutter set. If you do not have a shaper, you can hold the blocks in place with small .063-in. steel guide plates attached to each side of the side rails as in b-b of Fig. 2.

For tension on the belt, hook up the sliding blocks to side rails with small turnbuckles as



Left, across-belt fence speeds sanding against grain, helps to smooth or bevel end edges. Fence tilts backward only, to prevent work being wedged between belt and fence. Right, parallel guide has adjustment slot, clamps at any point best suited to sand with the grain or handle side edge work. Fence can tilt up to 45° in either direction. Belt is removed to show construction detail.



Right, parallel guide has adjustment slot, clamps at any point best suited to sand with the grain or handle side edge work. Fence can tilt up to 45° in either direction. Belt is removed to show construction detail. Note "streamlined" back of fence base.

in Fig. 1 and in section c-c of Fig. 2. You may need spacers under each turnbuckle eye for clearance. As an alternate, try a long bolt with locknuts as in section c-c of Fig. 2. Bolt-head bears against end of the sliding block and locknuts maintain the tension.

You can eliminate the likelihood of a side rail splitting by installing 1/4-in. dia. x 4-in. carriage bolts through its width near each end.

**Assembling the Table.** To determine length, fit pulleys inside sanding belt, extend belt to full length and measure the clear distance between pulleys. Allow about 1/2-in. clearance for variations in belt length. Width should equal overall pulley length from flange ends, plus thickness of any washers used between flange hubs and bearings. Make the table depth at least .375 in. less than pulley diameter.

Cut the table pieces, then assemble top and bottom to the three cross members as in a-a of Fig. 2, using glue and #10 x 1 1/2-in. *fh* (flat-head) screws. Bevel or round off ends to clear pulleys.

Clamp side rails to table so that the tops are about .312 in. below table top and so that table end will just clear the drive pulley. If bearing holes were bored accurately, the drive shaft will parallel the table top and be at right angles to table centerline. If not, loosen clamps and reposition side rails to line up shaft. Reclamp and mark all pieces for reassembly later.

Now cut out and shape the base, outboard bearing block and bolt bracket as in Fig. 2 and 2C, but do not drill any holes yet. Fit the clamped assembly to the base as in d-d of Fig. 2 and position the bearing block so that table top is slightly higher than the block.

Position bolt bracket on base next to the assembly as in Figs. 2 and 3. Mark location of bolts through bracket, base and side rail

on all parts. Remove side rails from assembly, drill all holes marked and fasten bracket to base with carriage bolts. Next, insert carriage bolts from inside edge of rail, making sure the heads fit tightly since they will not be accessible during assembly.

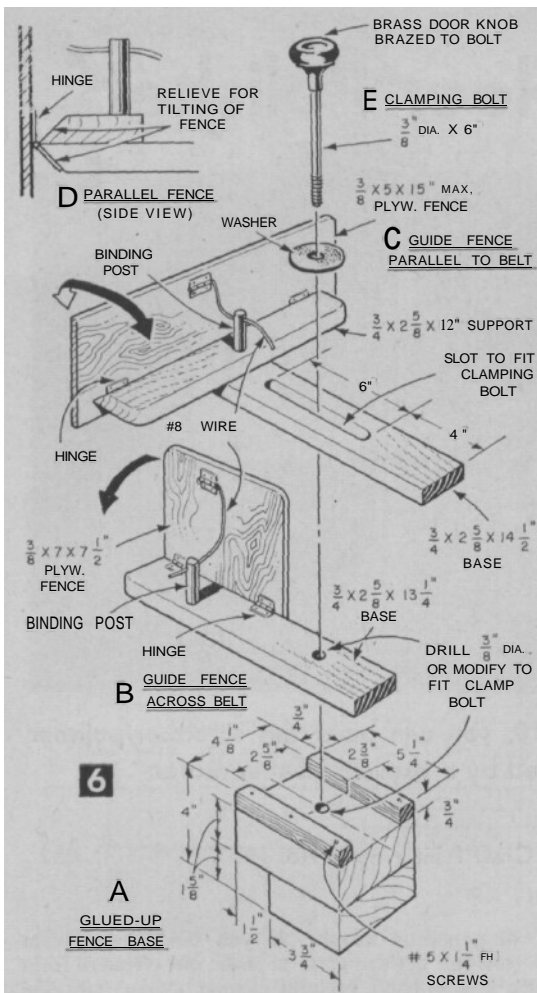
Align side rails with your marks on table, then attach with glue and #10 x 1 1/2-in. *fh* screws. Assemble the drive shaft and pulley into the table, then insert the side rail carriage bolts in the bolt bracket and clamp tightly to the base. Drill shaft hole and install bearing in outboard bearing block, position it to align with shaft, drill base holes and clamp in place with 5-in. machine bolts.

Complete the sander construction by assembling the idler pulley, shaft and sliding blocks and fitting the unit into the side rail recesses. Tighten pulley setscrews on both shafts. Cover the table top with 1/4-in. hardboard of the same width and about 1/4 in. longer on each end. For firm, flat sanding surface, board should be about .063 in. higher than pulleys. Attach the board with four #8 x .875-in. *fh* screws, one near each corner, and countersink each head well.

**Mounting Tips.** If you own a Mark 2 or Mark 5 Shopsmith—or a Model 10ER equipped with power mount adapter—you can mount and drive the sander in the same way as other accessories for these units.

Turn two hardwood rods approximately 11 in. long to 1.188-in. dia. to fit mounting holes in end of frame. You can relieve the pressure of clamping screws against these rods by rabbeting a groove 1/2 in. wide and .063 in. deep in the side of each rod parallel to the centerline. Insert strap iron strips in the grooves and secure with countersunk *fh* screws.

Locate base holes for these rods at right angles to centerline of the sander drive shaft, while this shaft is in line with the Shopsmith driving shaft. Drill the holes to take rods in a tight fit, then glue and wedge the rods into



position with the strap iron inserts facing each other.

To load your sander, close up turnbuckles enough to slip belt around pulleys and table, then expand the buckles until belt is tight. Connect drive shaft to the power unit, switch on the motor and adjust turnbuckles as necessary to keep belt running smoothly in its path around the pulleys. Try sanding a piece of scrap briefly to check the movement, make any additional minor adjustments and your newest shop tool is ready for use.

**Fence Attachments.** The basic unit is adequate for handling flat wood surfaces but you can do a neater job smoothing sides and edges by making the two simple guide fence attachments in Figs. 4 and 5. Since each fence is hinged, they can be clamped to hold work at almost any angle for beveling and some shaping operations.

You can build a common base for these guides by gluing and nailing together two pieces of 1.625 x 5.625-in. scrap (nominal 2 x 6) as in Fig. 6A. The bottom piece is cut back

just enough to fit around the bolt bracket and allow top pieces to butt against table side rail. In this position, drill through block and sander base for long bolt to hold fence in place. Install strips along top edges to guide the fence baseboards.

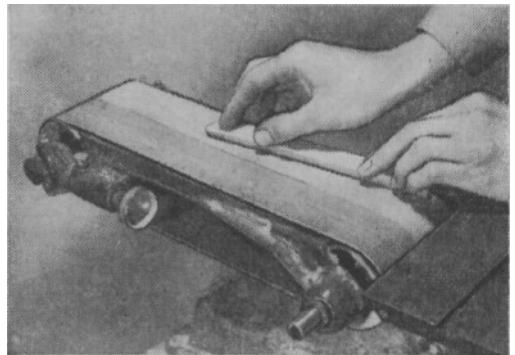
Make the across-belt and parallel-to-belt guide fences as in Fig. 6B, C and D, using plywood pieces for the fences and some 3/4 x 2.625-in. pieces (nominal 1 x 3) for other parts. To control the fence angle, install both sides of a 1-in. butt hinge near the top of the fence and knock the pin out. Thread fairly stiff wire such as #8 through the hinge and bend over the slightly protruding end to keep it from pulling out. Bend back other end of wire and run it through a clamp post on the fence support, then slightly curve wire until it will permit free movement through the post as the fence is moved into any position within its range.

**Eliminating Loose Tools.** If you have an old brass knob handy, braze it to the head of the 6-in. machine bolt used to clamp fence assembly to sander base. It makes a convenient handle as in Fig. 4, and does away with the need for a wrench. For another time-saver, drill and tap a small piece of 1/4-in. steel and attach it in position under bolt hole on bottom of the base. Thus, there is no loose nut to fumble with every time you shift, change or remove fence guides.

Where you use a loose tool such as a small wrench for the turnbuckles, shape a small holder for it out of wire or metal sheet and attach it to the edge of the base near the idler pulley. The tool will be out of the way but always handy when wanted.

## Combination Sanding Belt

- When a sanding belt becomes worn, cut it down the middle and use a piece of it to cover half the width of a belt of a different grit so as



to form a combination for both coarse and fine sanding without belt changing. A drop or two of glue will hold the narrow piece in line and will prevent its shifting.—R. HANSCOM.