

Cutting a keyway in a piece of cold-rolled shafting is easy with the compound table. In this set-up, depth of the cut is controlled with the left hand lead-screw, while the work is advanced with the right hand lead-screw.

Compound Drilling and Milling Table

Space drilled holes accurately, and do milling, grinding, and keyway-cutting on your drill press with this compound table attachment

By WILLIAM H. GRUBB

WITH no power tool except your drill press, you can make this compound table at a cost of less than \$15.00, and with it do the work of compound attachments costing much more.

For instance, suppose you want to drill two holes in a piece of work exactly 2 in. center-to-center. Secure the compound base plate to the drill press table, clamp the work piece in the vise, and line up and drill the first hole. Then traverse the compound in the proper direction with one of the lead screws (40 turns for 2 in.), and drill the second hole. It will be 2000 thousandths-of-an-inch from the first, if your compound attachment is carefully made. This is accuracy you can't get by ordinary measuring means. You can also do key-seating, as shown in the photo, and other light milling operations in your drill press with this attachment, providing the run-out of your drill press spindle is not excessive. The design takes advantage of the precise dimensions to which cold rolled steel is manufactured, eliminating the need for any machine work other than drilling.

Get the steel parts (see Materials List)

sawn to correct length, if possible, when you buy them from your local steel supply house. This will leave only hand filing of the ends to finish the pieces. Note that only the two 3-in. long carriage plates (Figs. 3 and 5) require exact squareness of the ends, as only the ends of these two parts are used as mating surfaces with other parts. Use a machinist's try-square to check the trueness of the ends, and take care to get these pieces exactly the same length as well as square. Squareness and matching length is more important than that they be exactly 3 in. long—they could

be slightly longer or shorter than this without harm. Elsewhere in the structure, the ends of the cold rolled parts are in the open and need to be trued up only to the extent of producing a neat, workmanlike appearance. (The ends of the ways, although they are adjacent to the end plates, are not attached to them.)

File the ends of all the cold rolled pieces, then lay out the drilling pattern on two of the end plates (Fig. 3) and mark them for identification. Stack together one of these marked plates with two 4-in. carriage plates and an unmarked end plate, in the same relation to each other they will bear in the completed structure (Figs. 4A and 1). Line up their edges with a try-square, using the 3/8 x 1/2-in. gib stock to establish the 1/2-in. inset of the carriage plate edges from the end plate edges (Fig. 4).

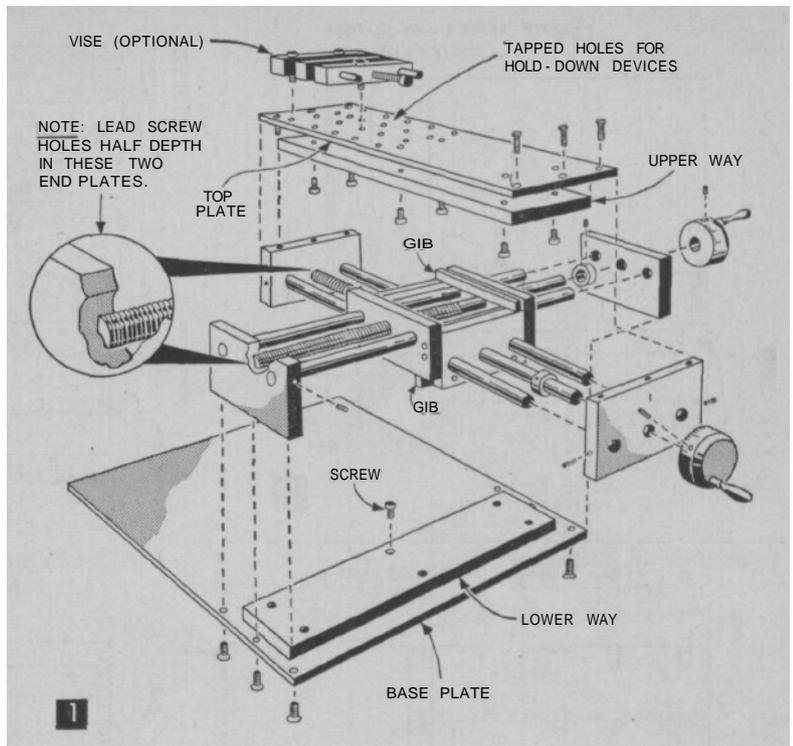
Clamp the four pieces solidly together, then drill the guide rod holes through all four plates, first with a small drill (about .188 in.), following up with a larger drill and finishing with the correct size drill. In drilling these holes, greater accuracy will be had if one of

the guide rod holes is finished through all four plates, and then plugged with a piece of the 1/2-in. guide rod stock while the next hole is being drilled. Drill the lead screw hole through three plates, but only half-way through the fourth, to 1/2-20 tap drill size (.453 in.). Then unclamp and drill this hole to 1/2 in. in the first, second, and fourth plates. Tap the .453-in. hole 1/2-20 in the third plate (the second carriage plate), then lay out, drill, and tap the gib screw holes in the other carriage plate. Stack, clamp up, and drill the second set of end plates and carriage plates in the same manner as the first set (Fig. 4B). Next, lay out, drill, and tap the guide rod set screw holes in the four end plates (Fig. 3).

Smooth up the edges of the base plate and clamp one of the ways to it, spacing it from the edges according to Fig. 2. Lay out the six screw holes on the way, and drill through the way and base plate to tap drill size (#8). Then remove the way and drill and counterbore the holes to finished size, to receive the 1/4-in. *sh* (socket head) capscrews. Be sure to recess these screw heads fully into the way so the carriage plates will not touch them when the table is traversed. Tap the screw holes in the base plate, then attach the way to it with six capscrews.

Make the top plate next (Figs. 2 and 2A), noting the hole layout in its surface which provides for the attachment of the fixed and moveable vise jaws and other work-holding devices. Drill and tap these holes first, then clamp the way to the top plate and drill and tap the six screw holes for the attaching holes, following the same procedure as for the lower way.

Next, clamp up the four plates comprising the carriage, taking care to get the 1/2-in. offset of the plates exact (Fig. 5) and the plates at 90° to each other. Insert the 1/2-in. guide rods to aid in holding opposite plates in line. If you got the ends of the 3-in. carriage plates perfectly square when you filed them, you will have no trouble with this line-up; if not, it will be necessary now to true them up. Then drill and tap for the eight 1/4-20 sh, cap-

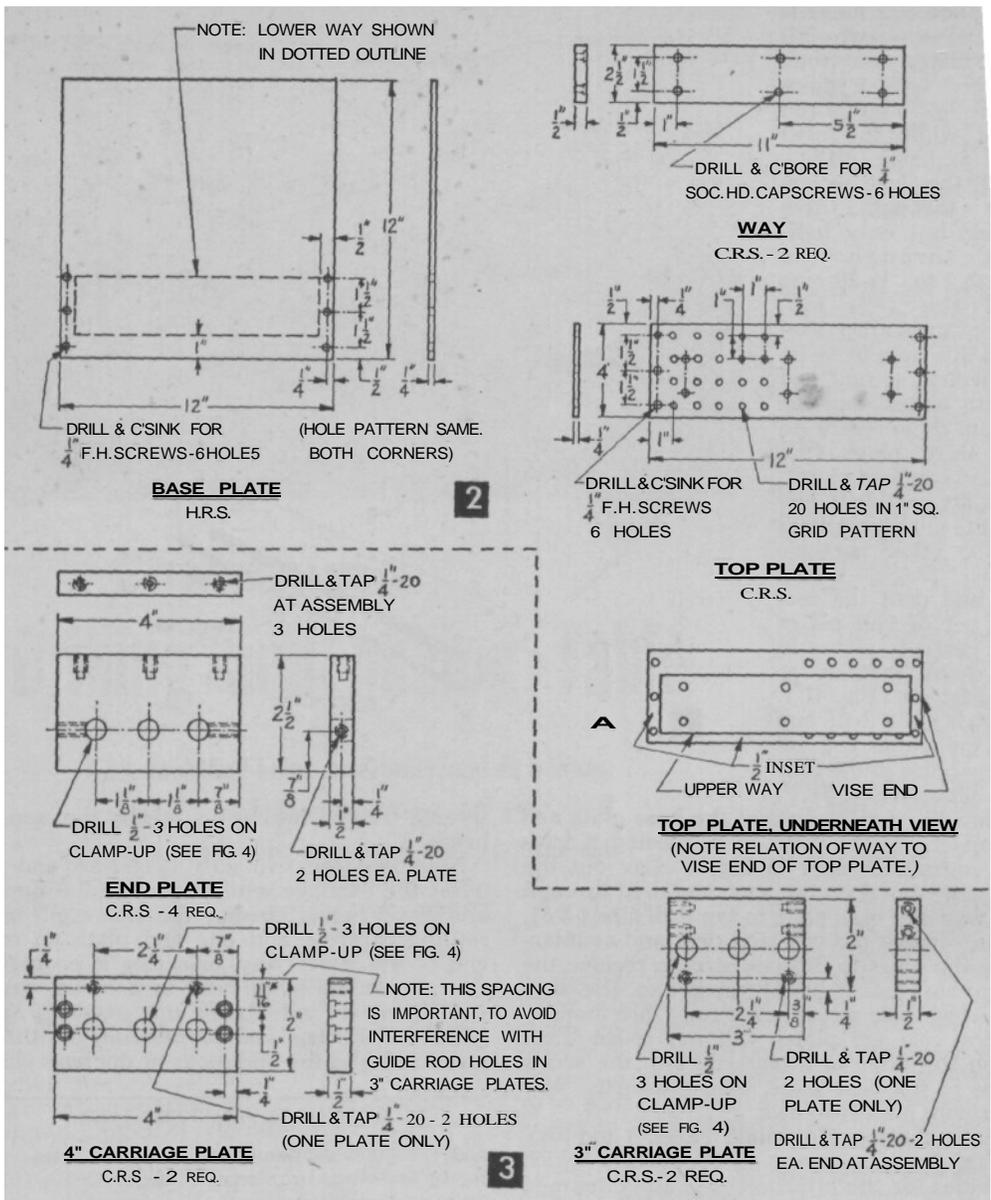


screws, counterboring to recess the screw heads.

Note that the two gibs (Figs. 5A and 1) offset the carriage with respect to the upper and lower ways. Install the lower gib and set the carriage and one end plate on one end of the lower way, orienting it properly, then insert the guide rods to hold the parts in alignment and clamp the assembly together. Drill, tap, and countersink the three screw holes in the underside of the base plate

MATERIALS LIST—COMPOUND TABLE

| No. Req. | Size and Description | Use |
|-------------------|---|-----------------------------|
| STEEL | | |
| 1 | 1/4 x 4 x 12" long CRS (cold rolled steel) | top plate ways |
| 2 | 1/2 x 2 1/2 x 11" long CRS | end plates |
| 4 | 1/2 x 2 1/2 x 4" long CRS | carriage plates |
| 2 | 1/2 x 2 x 4" long CRS | carriage plates |
| 2 | 1/2 x 2 x 3" long CRS | carriage plates |
| 3 | 3/4 x 3/4 x 4" long CRS | vise |
| 2 | 3/8 x 14 x 4" long CRS | gibs |
| 4 | 1/2" dia. x 12" long CRS | guide rods |
| 2 | 1/2" dia. x 12 1/2" long CRS | lead screws |
| 2 | 1.937" dia. x 1 1/2" long CRS | handwheels |
| 2 | 3/8" dia. x 2 1/2" long CRS | spinning handles |
| 2 | 1/4" dia. x 2" long CRS | vise |
| 2 | 1/2" I.D. x 1/2" long collars | lead screws |
| 1 | 1/4 x 12 x 12" HRS (hot rolled steel) | base plate |
| FASTENINGS | | |
| 23 | 1/4-20 x 3/4" sh (socket head) capscrews | carriage, ways, vise |
| 12 | 1/4 - 20 x 1" fh (flat head) machine screws | end plates |
| 14 | 1/4 - 20 x 1/2" sh setscrews | guide rods, (gibs, handles) |
| 2 | 6 - 32 x 1/4" sh setscrews | spinning handles |
| 1 | 1/4 - 20 x 2" sh setscrews | vise |

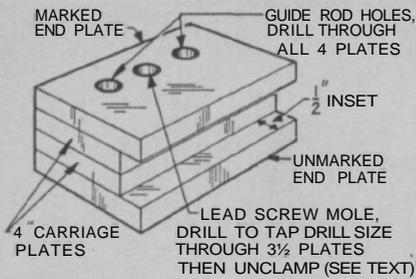


and insert the screws. Slide the carriage to the opposite end of the way and repeat the procedure to secure the other end plate.

Then install the end plates on the top plate, following this same method. As the ends of the ways are not attached to the end plates, squareness of these ends is not a factor in controlling the trueness of these assemblies. After all four end plates are installed, slide the carriage back and forth on the lower way, and slide the top plate back and forth on the carriage. If there is any binding, correct it by bringing the out-of-square parts into true

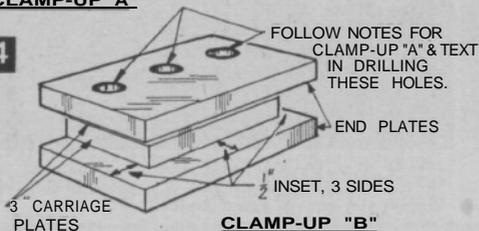
with paper or brass shims (Fig. 5), or if the binding is very slight, by applying fine automotive valve-grinding compound to the guide rods and sliding the parts back and forth.

Make the handwheels next (Fig. 6). Turn these on a lathe if you have one, but if not you can make them on the drill press if the pieces have been sawn fairly square. Drill the 1/2-in. center hole and the 1/2-20 set screw hole in the handwheel blanks first (Fig. 6). Then chuck a piece of 1/2-in. cold-rolled rod in the drill press, put a handwheel blank on it, and use a file to form the chamfer and fin-

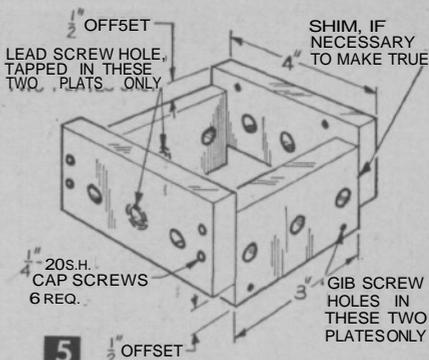


CLAMP-UP "A"

4

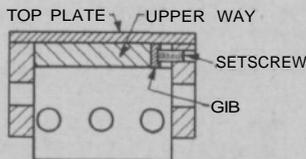


CLAMP-UP "B"



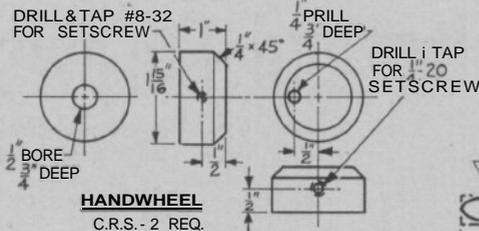
CARRIAGE ASSEMBLY

NOTE- OPPOSITE PLATES MUST BE PARALLEL, ADJACENT PLATES 90° TO EACH OTHER.



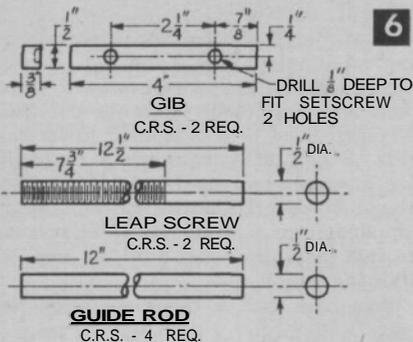
CARRIAGE

NOTE OFFSET OF WAY & CARRIAGE. OFFSET OF LOWER WAY SIMILAR.

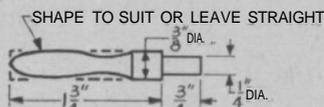


HANDWHEEL
C.R.S. - 2 REQ.

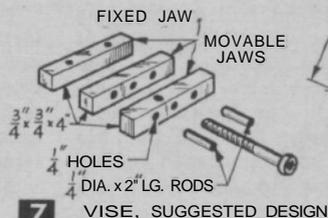
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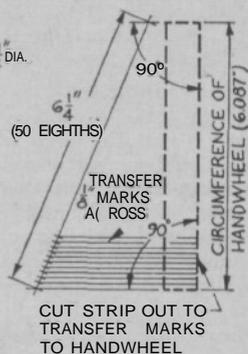
GUIDE ROD
C.R.S. - 4 REQ.



HANDLE
C.R.S. - 2 REQ.



7



8

ish the ends. The spinning handles (Fig. 6) can be machined as shown, or can be left straight with the ends filed round in the drill press. Secure the handles solidly in the handwheels with 8-32 set screws (Fig. 6).

To calibrate the handwheels, measure their exact circumference (this will be 6.087-in. if the blank is 1.938-in. diameter) with a strip of paper and make a drawing with this dimension divided into fifty equal parts by laying out fifty eighths-of-an-inch (6 1/4 in.) between two lines drawn 90° to the handwheel circumference line (Fig. 8). Transfer the

eighth-inch marks across, then cut a strip out of the layout, and wrap this around the handwheel, holding it with scotch tape. With a sharp cold-chisel, cut .125-in. long graduation marks into the edge of the handwheel. Make every 5th and 10th graduation 1/4-in. long, and identify every 10th graduation with the proper number stamp (0, 10, 20, etc.). Each graduation will represent 1/1000th-in.

Complete the assembly of your compound table by installing the lead screws, with their handwheels and retaining collars, and by attaching the vise parts on the top plate.