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## Making Wooden Vises

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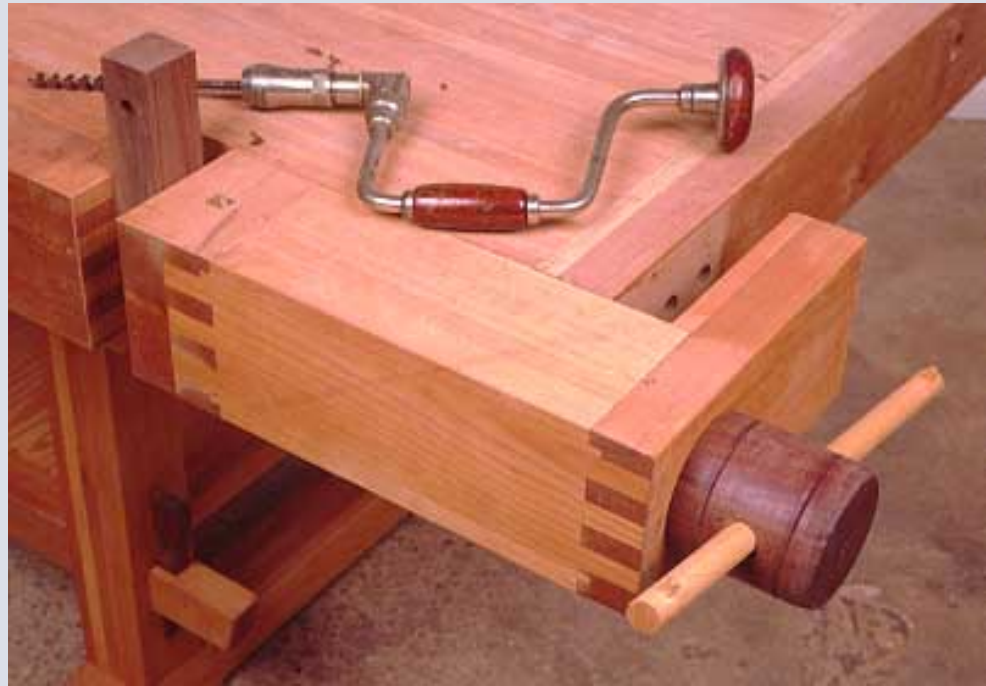


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There are two vises described in this article, first a tail vise and then at the end a front vise.

You'll find tail vises on many traditional benches because of their versatility. One advantage they have over front vises is that there are no support members directly below the jaws, so that a long board will fit vertically in the jaw center where holding pressure is best. Also, the vise jaw and bench top can be fitted with slots for bench dogs which let you hold long or short boards horizontally on the bench top.



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## Cut out list, Tail Vise

- 2- 1-3/4 x 5-1/2 x 5 jaws (fixed and moving)
- 1- 1-3/4 x 5-1/2 x 6-3/4 moving jaw
- 1- 1-3/4 x 5-1/2 x 12 rear jaw
- 1- 1-3/4 x 5-1/2 x 36 end cap
- 1- 1-3/4 x 2-1/2 end cap support
- 1- 1-3/4 x 5-1/2 x 70 front of bench front section
- 1- 1-1/8 x 1-3/4 x 32 guide bar
- 1- 3/4 x 3-3/4 x 15-3/4 front plate
- 2- 3/4 x 5 x 13 top and bottom plates



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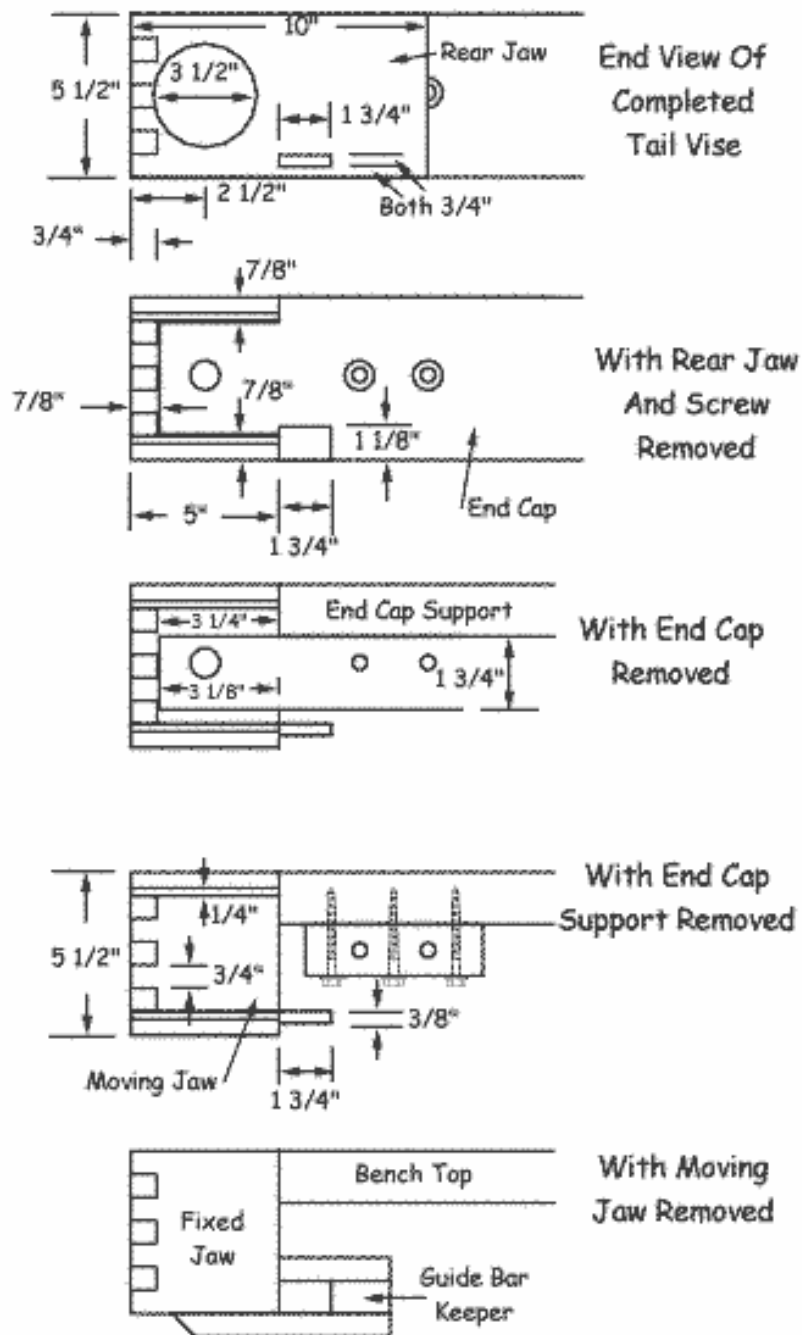
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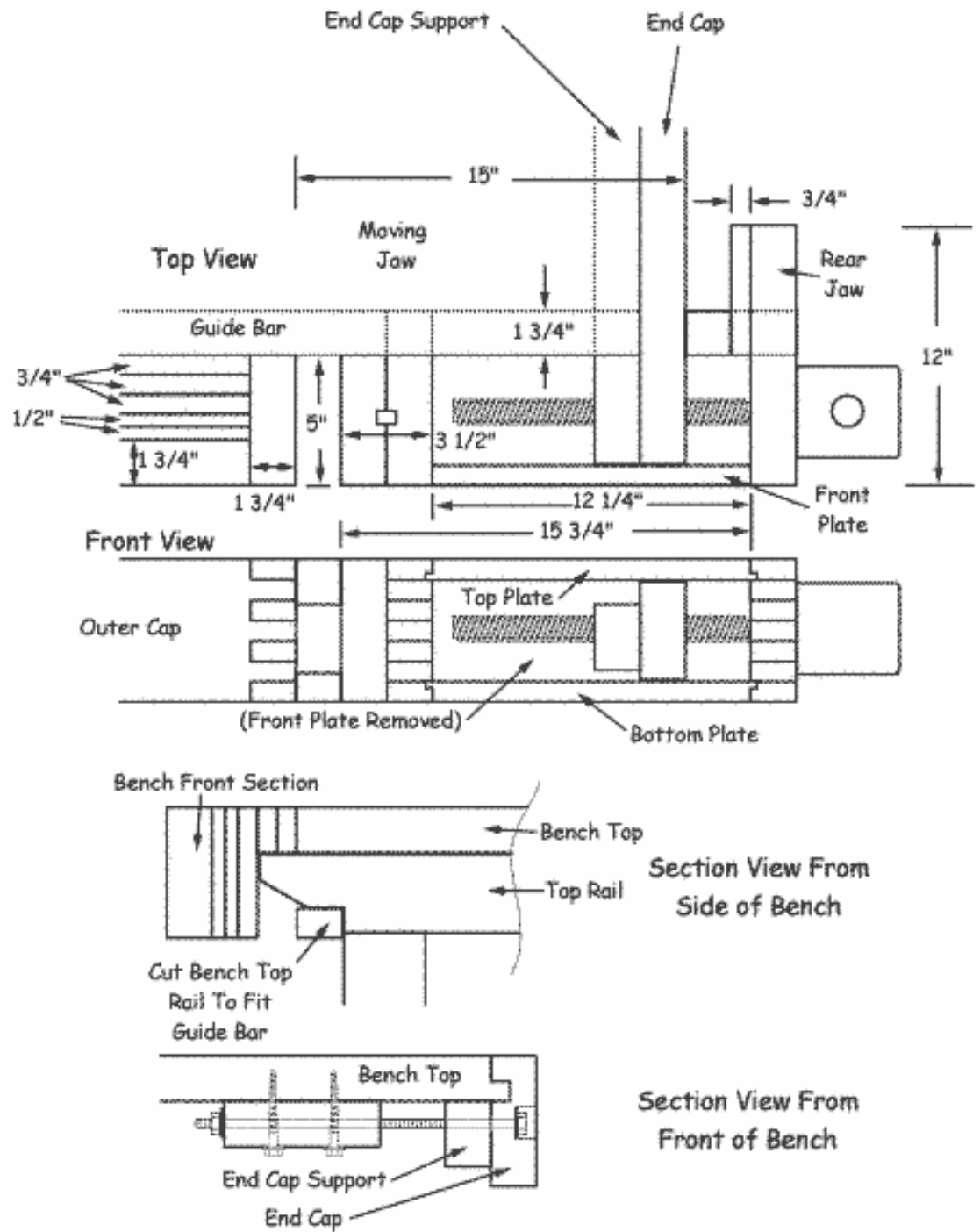
## Tail Vise

Views In Progressive  
Dis-assembly



Wooden screws are not very hard to make with the screw boxes and taps available from tool suppliers, and you'll save some money since boxes and taps are cheaper than steel screws. Wooden screws will hold up well for a long time, and can apply more than enough pressure for your needs. However, you do need a lathe to make a round shaft for the threads, as well as a drill press to accurately align the threaded hole. If you prefer, steel screws can be fitted onto either of the two vises described here.

## Tail Vise Top And Side Views



## Resources For Building Wooden Vises

[Clamps](#) | [Glue](#) | [Routers](#) | [Table Saws](#) | [Lathes](#) | [Thread Boxes and Taps](#)



## Wood Tips

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**#3- TABLE SAW TENONING.** Build a table saw tenoning jig to make cuts on the ends of parts held vertically. The jig rides in a miter gauge slot on a tongue attached on the bottom. Construct the carrier portion of the jig so that it slides toward and away from the blade, while staying parallel to it. Secure the carrier to the base with T-nuts mounted in the base itself.



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## TAIL VISE

Before you build your tail vise, take a close look at how it's designed so you'll understand where the forces are transferred when the vise clamps down on work. You'll be better able to build a properly functioning vise when you understand the function of each of the parts.

The moving jaw pushes your work against the fixed jaw. The screw, however, does not directly push against the moving jaw. If it did, the end of the screw would bore a hole into the back of the moving jaw with time. So, the moving jaw gets pushed by the rear jaw, which gets pushed itself by the knuckle of the screw. Because the rear jaw pushes the moving jaw, it is very important to have a solid connection between the two. The outer plate, top and bottom plates, and guide bar all transfer force from the rear to the moving jaw, and must be joined with care for a tight fit.

The screw knuckle shoulder pushes the rear jaw by pulling against the screw threads. These threads pull against their corresponding threads within the end cap. Thus as the vise clamps down on work, it pulls the end cap away from the bench. Threaded rods hold the cap firmly against the end of the bench. A heavy block, lag screwed to the underside of the bench top, connects the threaded rods to the bench top.

But that doesn't complete the chain of force transfer on this particular bench design, which has the bench top in four sections so that it can be easily disassembled. The first of these sections contains the fixed jaw, but the threaded rods are attached to the second of the four. These two sections must be securely fixed together, else as the vise is tightened it will push the first away from the second, shearing along the edges where they join. A dozen or so 1/2" dowels installed along this joint hold the two together and complete the circle of forces between the two jaws.

Begin building the tail vise by cutting out all your parts to size as shown on the list. Choose very straight pieces for these parts. Set up a finger joint jig at the table saw, using a dado set stacked out to 3/4" wide. Use this setup to cut finger joints in the fixed, moving, and rear jaws, as well as the outer cap that joins the fixed jaw, and the front plate that joins the moving and rear jaws.

Note that this front plate is 3/4" thick, whereas the jaws it joins are both 1-3/4" thick. This means you must alter the height of the dado to accommodate the thickness of the joining part. Also note that the front plate does not come flush to the top or bottom of the jaws, but is inset 3/4" both at top and bottom. The top and bottom plates, both 3/4" thick, slide in above and below the front plate to take this up. Thus, make the front plate with fingers on its outer edges as shown (rather than slots), and make the jaws with fingers on the outer edges too. Make the moving jaw out of two pieces of 1-3/4" stock. Put finger joints into only one of the two. Cut a bench dog dado along the inside face of each of these on the table saw with multiple cuts. The exact dimensions of the dado will depend on the size of the dogs you use, get them first so that you can make test dados in scrap to determine the exact size. Fit the dado so that the dog will



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slide easily within but will stay up by itself without dropping in by gravity. Don't glue the two jaw pieces together yet.

Cut 1/4" by 1/4" dadoes along the inside faces of the moving and rear jaws for the tongues of the top and bottom plates. Locate the inner edges of these dadoes at 3/4" from the outer edges of the jaws. Stop the dadoes on the rear jaw so that they are no longer than 5". Make these stopped cuts on the table saw by measuring 5" from the front of the blade toward the back of the table, and draw a line on the table. Make multiple cuts with the saw, adjusting the fence to establish the width of the dadoes. During each cut, push the rear jaw only as far as the 5" line, then pull it back. Use the same setups for the moving jaw, stopping the cut at 5" along the bottom of the jaw, but going through at the top. Use a 1/4" chisel to complete the stopped dadoes, which will be rounded on the ends from the blade.

Cut 3/8" by 1-3/4" mortises on the rear jaw to fit the guide bar, and on the guide bar itself for the moving jaw. Use a mortising chisel on the drill press to cut the mortises, or bore holes with the drill press or dowel jig and chisel the mortises square.

Cut tenons on the guide bar and moving jaw to fit the mortises. Cut the tenon on the jaw using a table saw cutoff box as a guide. Place the box on the table saw, and raise the blade to 1-3/4" above the box plywood. Mark out the inside end of the jaw to show where the tenon will go. Place the jaw on end against the fence of the box, and cut the waste away from either side of the tenon. Then make more cuts toward the top of the jaw to remove the waste from that area, but don't remove all of the waste. You need some of it to support the part as it is cut. Leave 1/4" or so at the end, then cut that off with a hand saw. Cut a tenon on the end of the guide bar with a table saw tenoning jig.



[Bessey Tradesman Bar Clamps](#)

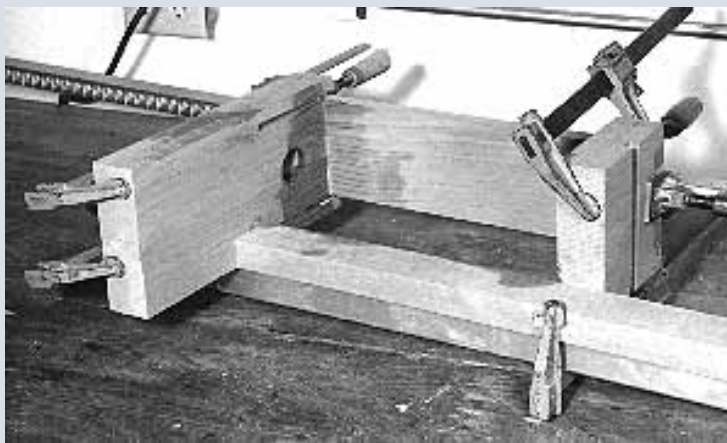


Photo 1- Glue together the moving jaw, rear jaw, guide bar and front plate of the tail vise. Ensure that the four pieces are square to each other.



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Bore a hole in the rear jaw for the screw shank. The diameter you use will depend on the screw box you use (or size of steel screw), since the box will work only with one diameter shaft. Glue together the rear and moving jaws with the guide bar and front plate as in photo 1.



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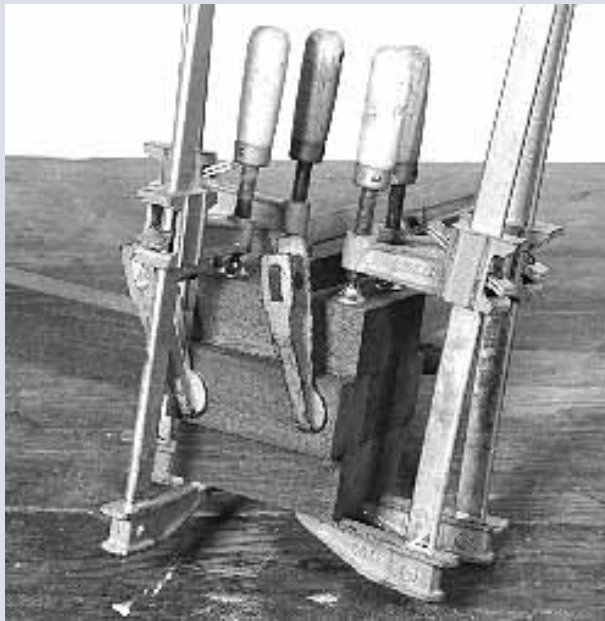


Photo 2- Glue up a turning blank out of hardwood for the vise screw. Be sure all parts are of equal thicknesses, and are square, so that all surfaces contact for a solid glue bond.

Make a turning blank for the screw by gluing together blocks for the knuckle as in photo 2. Let dry thoroughly, then turn the shaft down to the exact diameter specified by the instructions that come with the screw box. Use the box to cut the threads as in photo 3.

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Photo 3- Turn the blank on a lathe to the exact diameter specified in the instructions with your thread cutting tool. Make a test blank and make sample threads, then cut your vise screw threads.



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[12 oz. Trim Hammer](#)

Make the end cap out of two pieces as shown in the drawings. Cut a groove along the inside edge of the outer piece, to fit a tongue on the edge of the bench top itself. Make this tongue along the bench top edge with a router and a straight flute bit. Clamp a fence to the top to guide the router and limit its cut. Bore a hole in the end cap on the drill press for the screw to fit. Take extra care that this hole is bored at 90°. Tap the hole for threads as in photo 8.

Laminate together pieces for the front bench section, as described in the project in this site on making a Traditional Workbench. However, this front section differs from the other bench slabs in several respects, it is much thicker, not as wide, and has the fixed jaw with its finger joint. Bore holes into the layers for threaded rods that will hold all the top sections together, as described in the Traditional Workbench project on this site.



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Photo 4- Laminate together a front section for the bench, incorporating within this section slots for bench dogs. Nail the short parts between slots in place during the glue up to hold them steady while clamped.

Incorporate into these laminations bench dog slots by spacing short pieces closely together as in photo 4. Ensure that the pieces are uniformly spaced by making a spacer that you place between them as they are located on the lamination. Nail down each section in its proper location during the glue up, then proceed with gluing and clamping the remainder of the pieces.

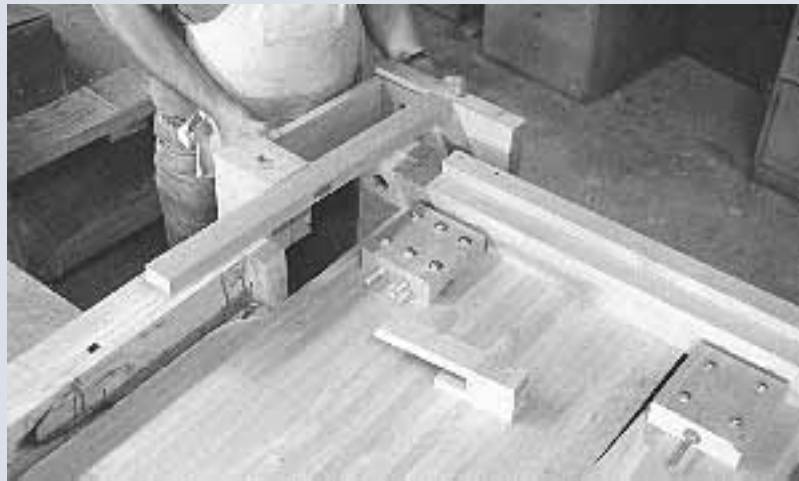


Photo 5- Fit the tail vise to the bench top with the all the top pieces bolted together, and the whole top placed upside down. Check that the guide bar slides easily in its notch in the end cap.

Glue the front of the moving jaw to the inside moving jaw, taking care to align the two dados for the dog slot. Join the front bench section to the other sections with a dozen dowels as discussed above, then bolt together all the bench top sections and turn them upside down. Fix the end cap onto the end with short threaded rod sections as in photo 5. Put the tail vise in place as shown in that photo.



[Bunk Bed](#)

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#12- TABLE SAW  
SAFETY TIP. Roll up  
your sleeves at the table  
saw. If cloth touches the  
blade it will grab it, and  
pull your arm into the  
blade.

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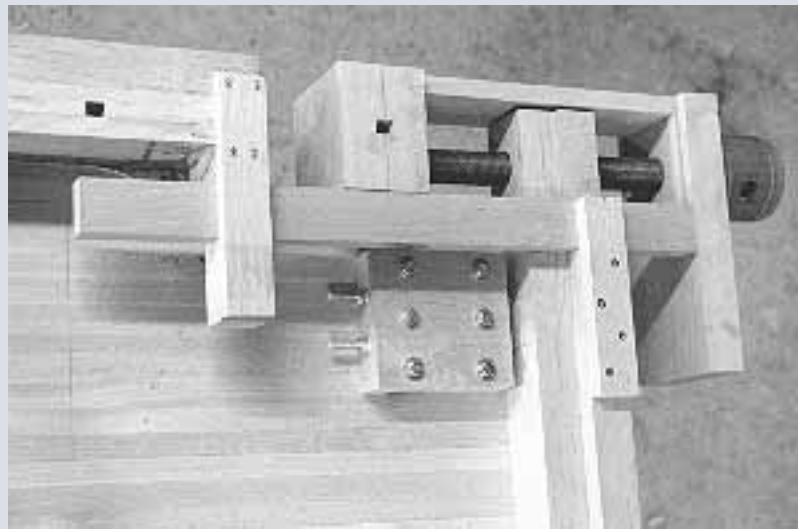


Photo 6- Install the screw in the vise, check that the jaws slide easily as the screw is turned, and install keepers as shown to hold the vise in place.

The tail vise is held in place by two keepers on the guide bar, as well as by the screw itself. Install the screw and keepers as shown in photo 6. Cut tongues on the ends of the top and bottom plates at the table saw, and slide them into place within their dadoes on the moving and rear jaws. Hold the plates in place with one small screw at each end, which comes from the top or bottom of the jaw and contacts the plate tenon within its groove.

Mount the bench top onto the leg assembly with the right top rail just to the left of the fixed jaw. Let the guide bar come close to the front edge of the front right post. You will have to cut off about 3/4" from the bottom of the front end of the top rail to make way for the guide rail, as shown in the drawing.

### FRONT VISE





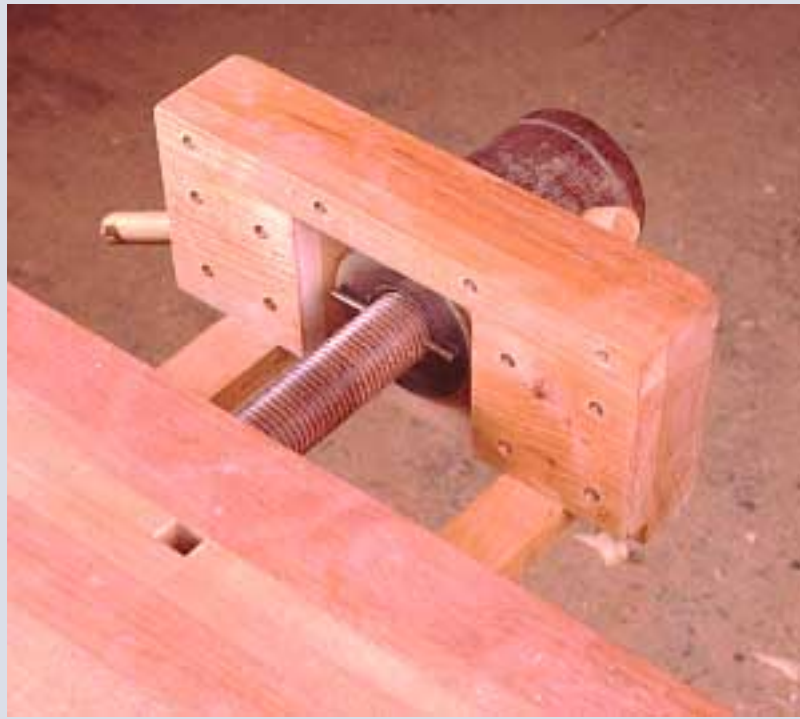
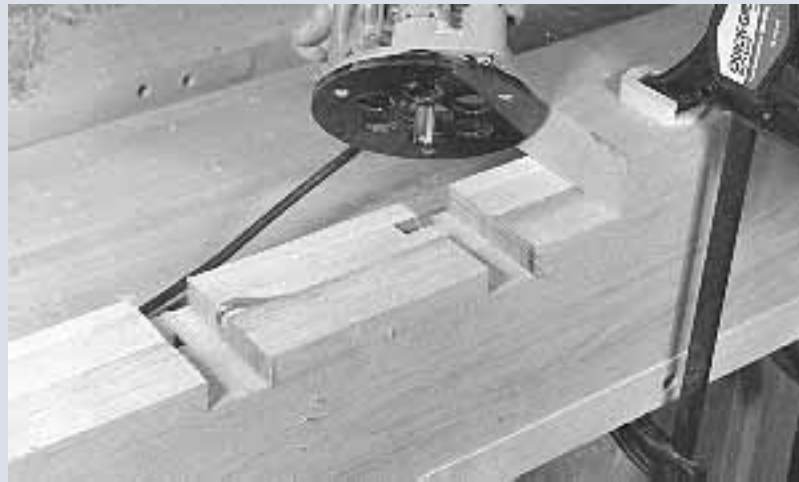


Photo 7- Cut slots for front vise guides on the bottom of the front section of the bench. Use a straight bit in the router, guide the cut with a fence clamped to the piece upon which the router base rubs.



**Porter Cable 1-3/4  
HP Lever Release 690  
Router**  
The PC 690 line  
routers are standard  
woodshop workhorses.



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After the tail vise, a front vise is very simple. Remove the front bench top section, and cut grooves in the bottom of it for guides with a router and straight flute bit. Clamp a fence to the underside of the work to guide the router during the cut. Rub the router base against the edge of the fence as shown in photo 7. Bore a hole for the screw, and tap it as in photo 8. Join the guides to the jaw with mortise and tenon joints, much as you joined the guide bar for the tail vise. When the guides are in place, screw a keeper over them to hold them in place.



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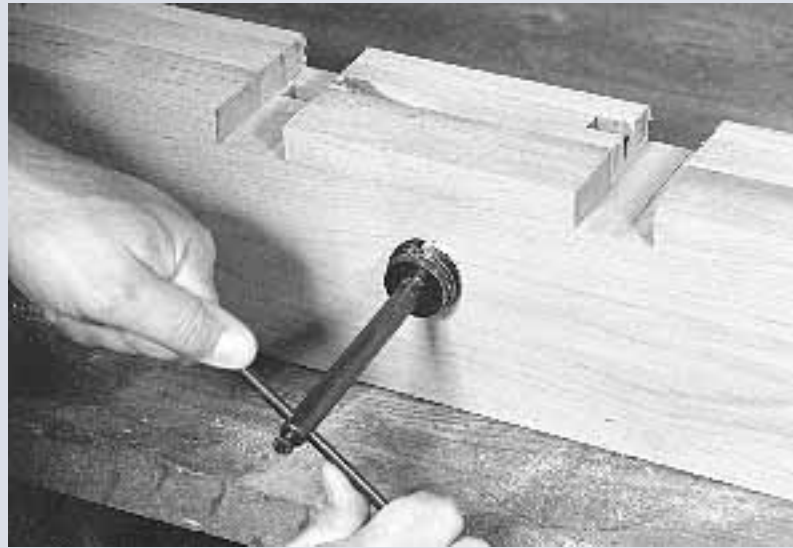


Photo 8- Cut  
internal threads for  
the screw in the  
front section of the  
bench top.

## Resources For Building Wooden Vises

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