

# Building A Shaving Mule

This versatile holding device combines elements of a traditional English shaving horse and a Swiss-German "Zug stuhl" with several contemporary innovations. Construction time: approximately two days.



## Technical support:

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3/8-inch Jaw Bolt

3/8-inch Fulcrum Bolt

1/2-inch Front Leg Bolt  
(2 required)

Back-Up Cheek

5/8-inch Dowels

Back-Up (2)

Pivot  
Dowel

Right Lever

Rotating Jaw

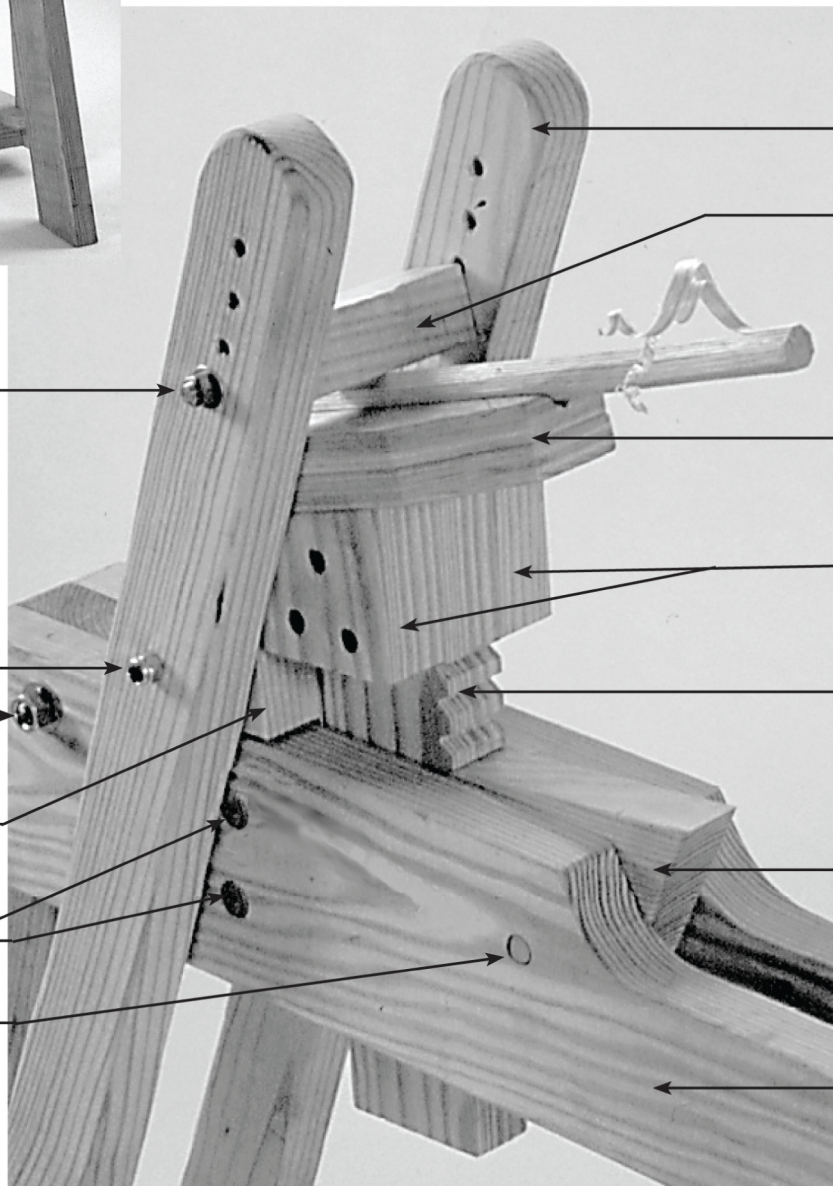
Work Support

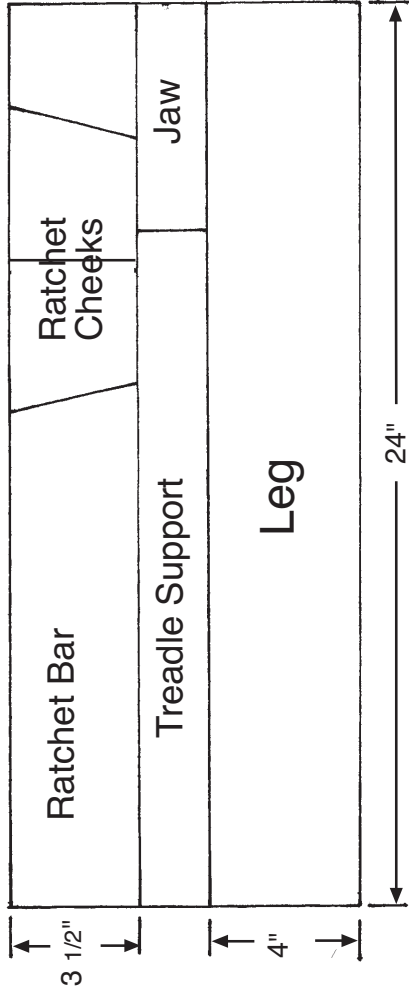
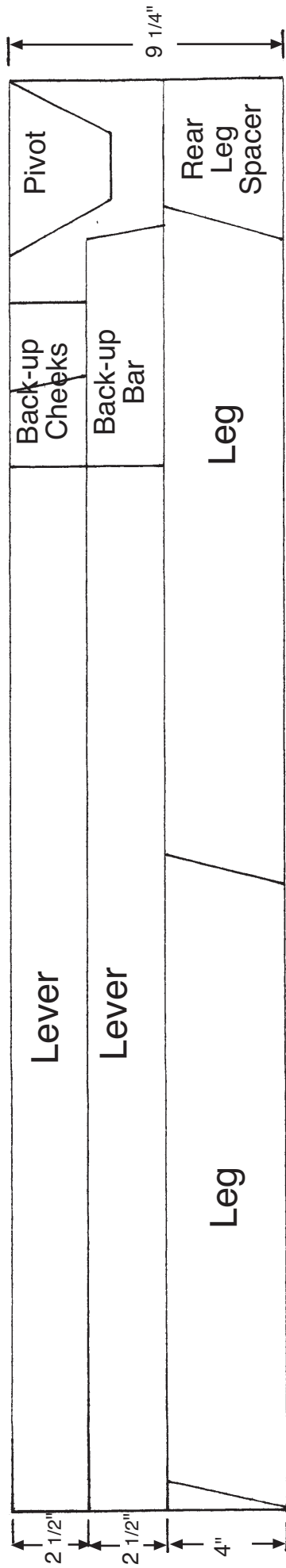
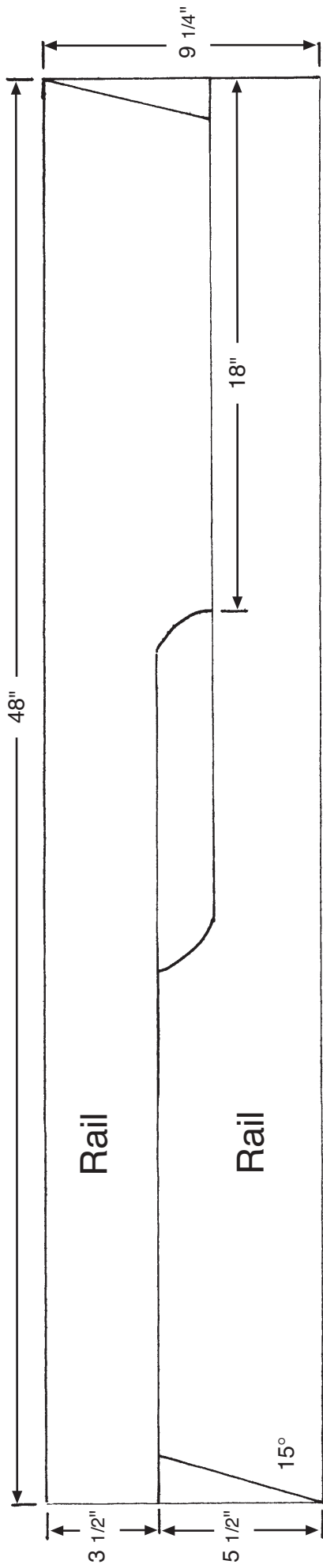
Ratchet Cheeks

Ratchet Bar

Pivot

Left Rail

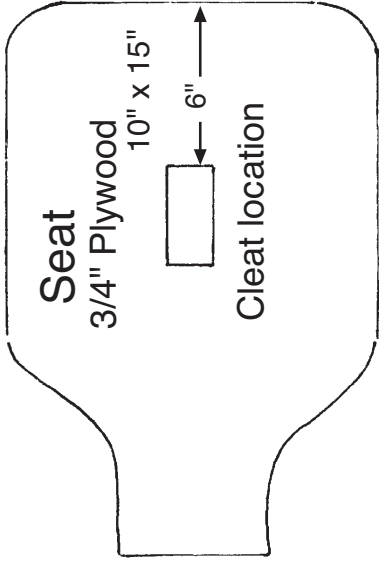




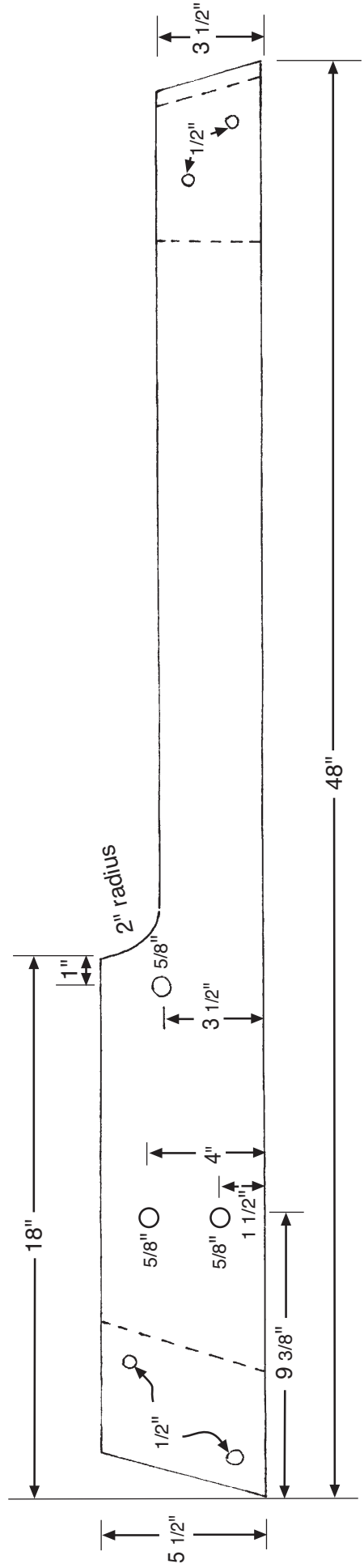
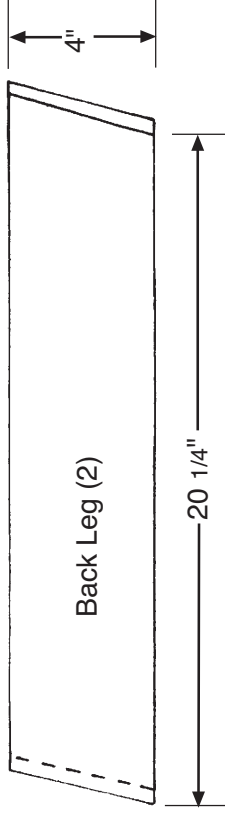
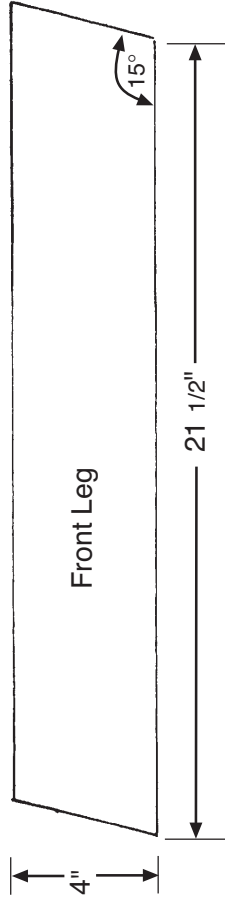
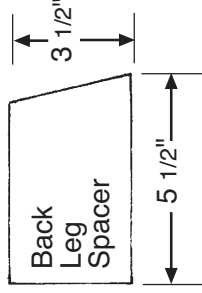
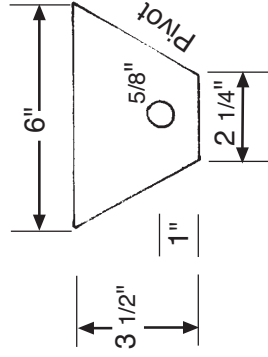
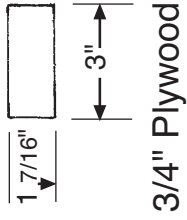
Layout on 2 x 10 x 10

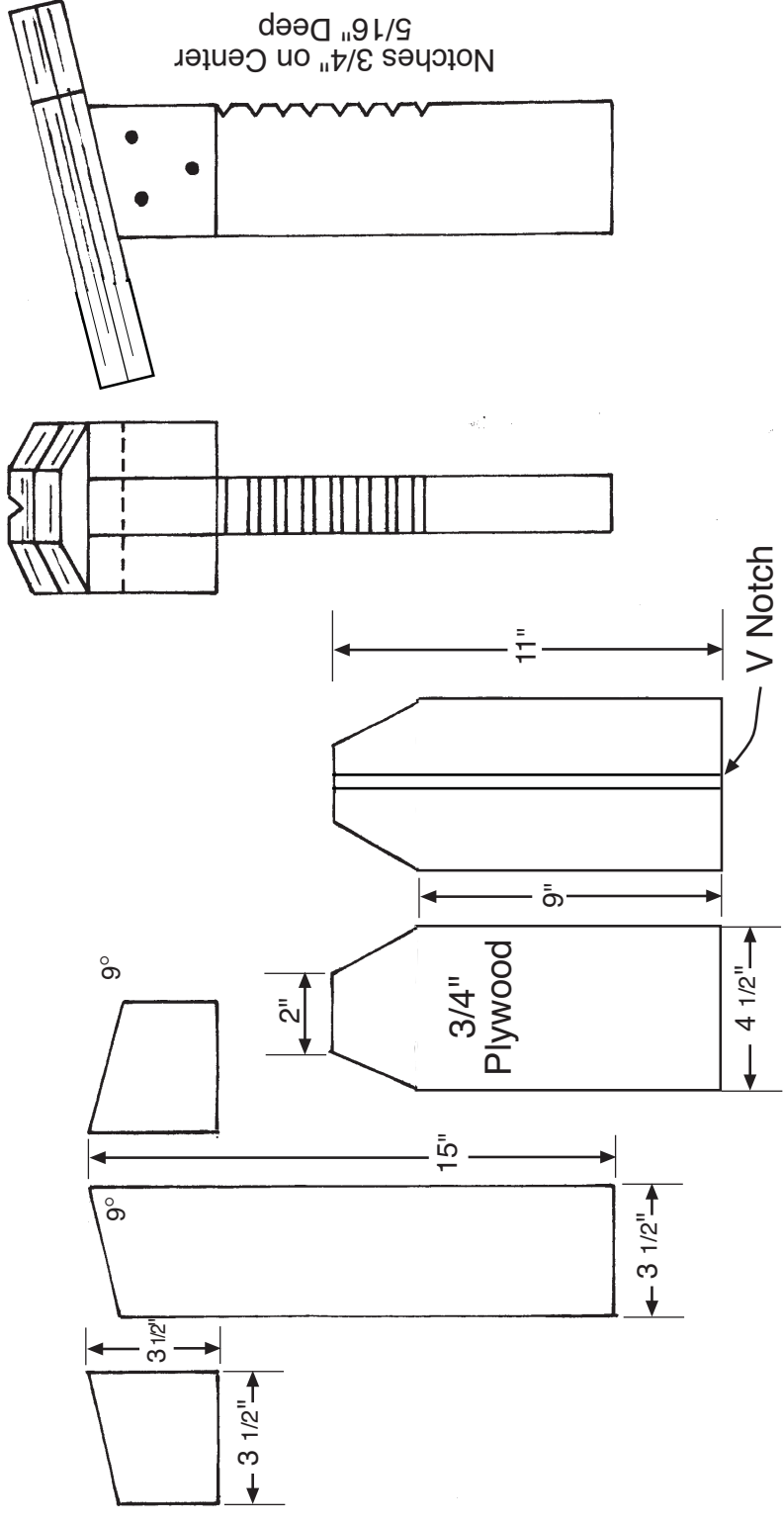
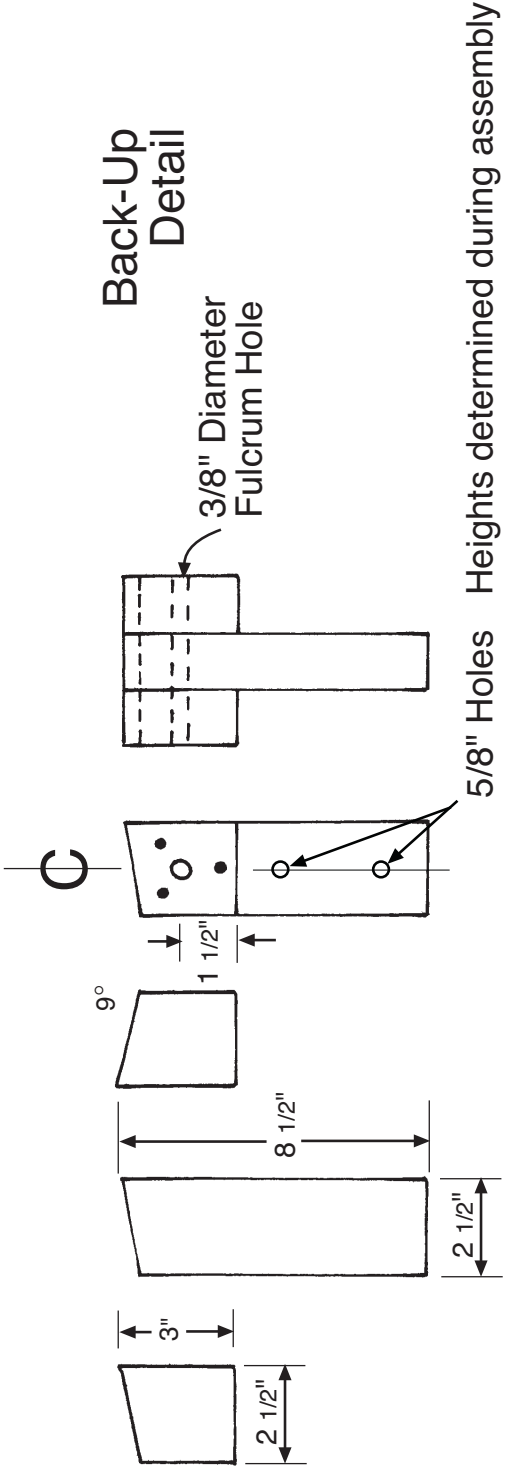
Do not saw these parts until you read the text

# Legs, Rails, and Seat Detail



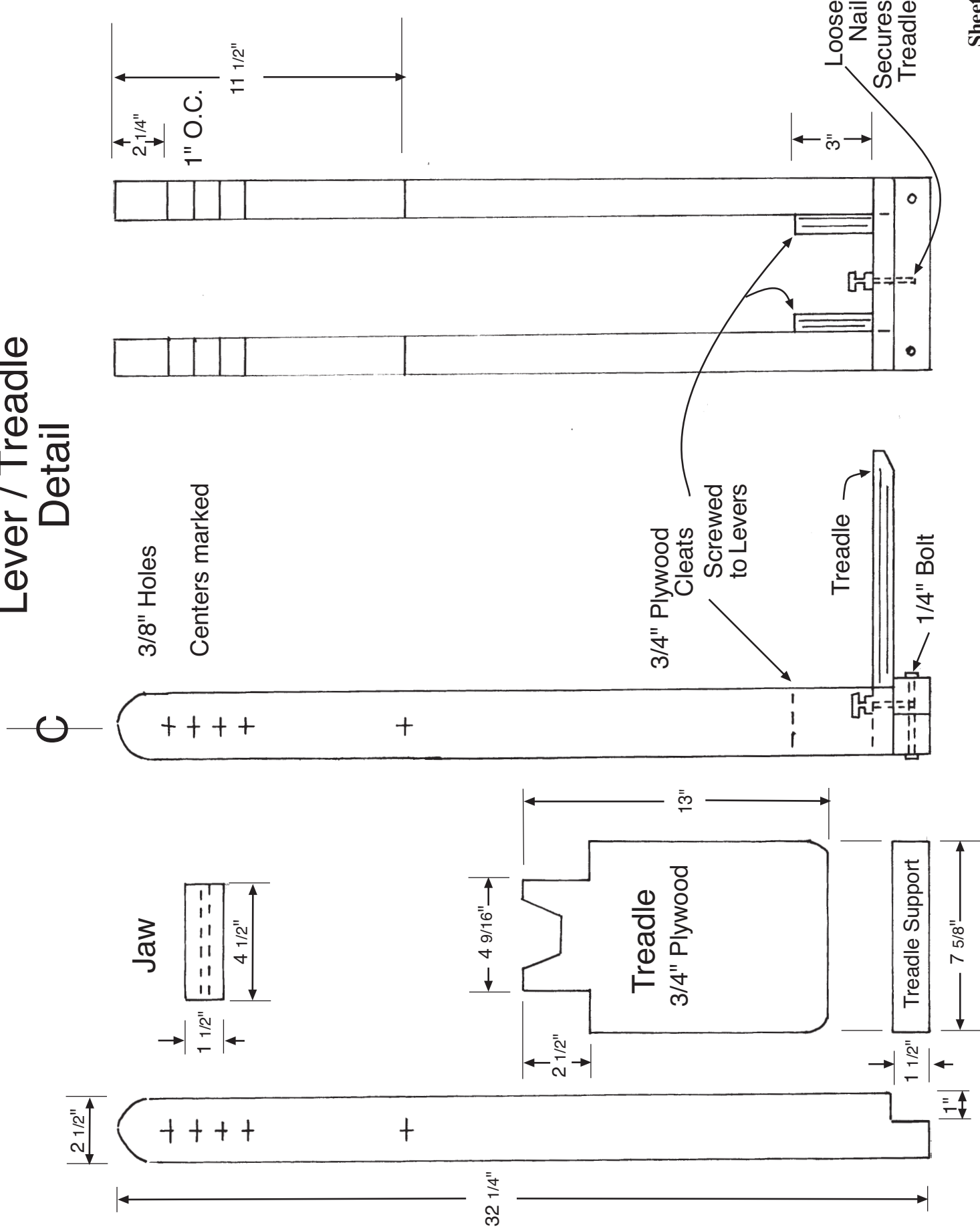
(2) Seat Cleft

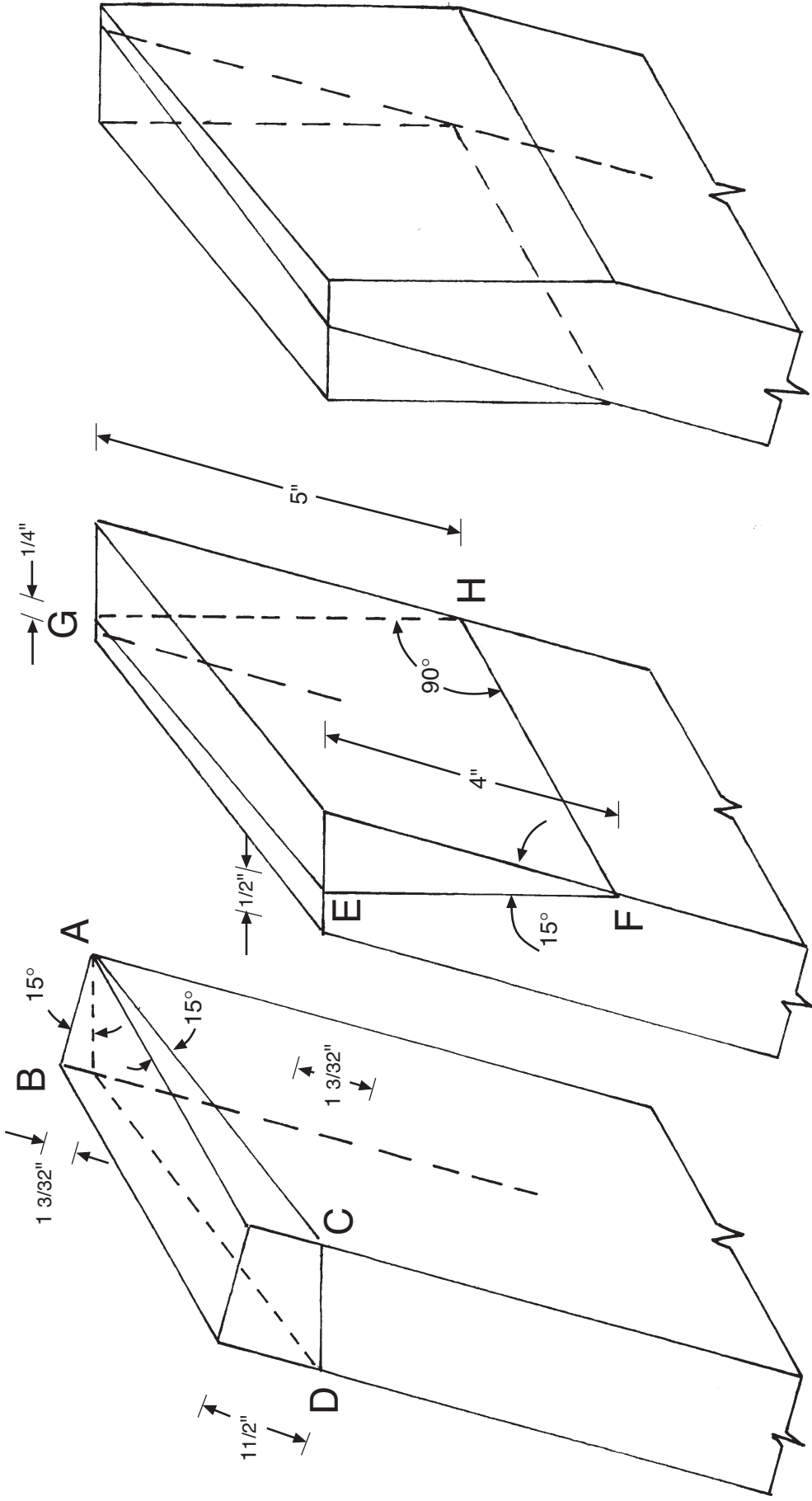




# Ratchet Bar / Work Support Detail

# Lever / Treadle Detail





### End Cut and Angled Wedge For Left Rear Leg

Isometric #1

Layout For End Cut

Isometric #2

Layout For Sawed  
Off Wedge

Isometric #3

The Sawed Off Wedge  
Glued to the Left Side  
of the Leg

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Tom Donahey and Drew Langsner

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## Scantlings and Hardware

(Due to saw kerfs, the widths of some pieces are approximate.)

### Lumber

rails	2	1-1/2 x 5-1/2 x 48
front leg	1	1-1/2 x 4 x 22-1/2
back legs	2	1-1/2 x 4 x 21-3/4
levers	2	1-1/2 x 2-1/2 x 32-1/4
ratchet bar*	1	1-1/2 x 3-1/2 x 15
ratchet cheeks	2	1-1/2 x 3-1/2 x 3-1/2
back-up bar	1	1-1/2 x 2-1/2 x 8-1/2
back-up cheeks	2	1-1/2 x 2-1/2 x 3
pivot*	1	1-1/2 x 3-1/2 x 6
rotating jaw	1	1-1/2 x 1-1/2 x 4 1/2
rear spacer	1	1-1/2 x 3-1/2 x 5-1/2
treadle support	1	1-1/2 x 1-1/2 x 7-5/8

\*Note. The ratchet bar and pivot must be a little thinner than 1-1/2" so they are free to move.

### 3/4 Inch Plywood

work support	2	3/4 x 4-1/2 x 11
seat	1	3/4 x 10 x 15
treadle	1	3/4 x 8 x 13
seat cleats	2	3/4 x 1-7/16 x 3
treadle cleats	2	3/4 x 2-1/2 x 3

### Hardware

front leg bolts	2	1/2 x 5-1/2 with 2 washers, nut
rear leg bolts	2	1/2 x 8-1/2 with 2 washers, nut (1/2 x 9 if using all-thread)
fulcrum, jaw bolts	2	3/8 x 8-1/2 with 4 washers, nut (3/8 x 9 if using all-thread)
treadle support bolts	2	1/4 x 3-1/2 with 2 washers, nut
back-up and pivot dowels	3	5/8 x 4-7/16
screws for attaching work support, rear leg wedges, treadle cleats, ratchet cheeks, back-up cheeks, seat cleats		
6" piece of approx. 3/8" shock cord (bungee ) and 2 electrician's staples (romex type)		

## Construction

This hybrid design combines elements from a traditional English bodger's shaving horse and the dumb-head *Zug Stuhl* of alpine Europe. The result is a hard working mule that many woodworkers like better than either thoroughbred style.

Common bodger's shaving horses tend to be uncomfortable, with their narrow seat and foot cross-bar that requires the user to fully extend a leg in order to get a good grip on a work-piece. The addition of a treadle -- borrowed from the dumb-head design -- takes care of this problem. The rotating cross bar from the bodgers horse grips a work-piece much better than the dumb-head design. Our shaving mule also features an instantly adjustable, variable height work support, designed by Berea, Kentucky chairmaker Brian Boggs.

At roughly 4 feet in length, the shaving mule is convenient to store and easy to transport. The blunt front end combined with the swinging lever design makes shaving in front of the cross bar feasible when it becomes necessary to shave into grain that would be descending if the work-piece is gripped in the conventional position, on the work support behind the cross-bar.

For purposes of utility and economy the production shaving mule is constructed mostly with yellow pine. Hard maple (or a similar species) can be used for the pivot and the rotating jaw. Use plywood for the seat, work support, and treadle. The shaving mule can be made from most strong woods -- oak, hard maple, and douglas fir are all excellent. Air-dried or kiln-dried wood is suitable.

With careful utilization, most parts of the mule can be made from a single 10 foot 2 x 10. For adequate strength, you must select clear, straight grained stock. The dimensions of the mule can easily be modified for individual preferences. You can expect construction to take two days.

From a 10 foot plank, cut off two pieces 48 inches long. Lay out the two rails on one 48 inch piece. They will nest together 3-1/2 inches from one edge and 5-1/2 inches from the other edge. The 2 inch radius on the upper edge of the rails starts 18 inches from the 5-1/2 inch wide end.

Rip a piece 4 inches wide off the second 48 inch board. Use this piece for the two rear legs and the rear leg spacer. Cut the pivot off the remaining 48 inch board (now approx. 5-1/8 inches wide). Rip the remaining piece into two equal widths. Cut a 32-1/4 inch lever from each piece. The two small 2-1/2 inch pieces that are left over are used for the three parts of the back-up assembly.

Rip a 3-1/2 inch piece off the remaining 24 inch board. This is used for the adjustable ratchet bar. You can also rip a 1-1/2 inch square piece for the rotating jaw and the treadle support, although these will be better quality if they are made from a denser wood than yellow pine. The remaining board, now approximately 4 inches wide, is used for the front leg.

There are two construction options: You can use bolts, so that the mule can be taken apart, for storage, transportation, modifications or maintenance. You can also use screws and glue, a bit classier, but with the sacrifice of not being able to repair or modify the mule after assembly. The shaving mules that we sell are assembled with the bolts.

Accuracy in drilling the holes through the rails is important. Take the two rails and screw them together using two 2-1/2 inch dry wall screws. Place the screws so they will not interfere with the bolt and dowel holes. Cut the ends off the rails at 15 degrees. Clean up the rail edges, so that they match one another.

The angles at the ends of the legs can be laid out using a bevel gauge or from measurements. If you use our measurements, your stock must be the same size as specified in the list of scantlings; otherwise, the angles will come out differently.

Saw the front leg to length with 15 degree angles at both end. If your front leg is 4 inches wide, your layout line will drop 1-1/16 inch below a line that is perpendicular to the length.

The back legs are cut to length at both ends with a compound angle of 15 degrees across the width and 15 degrees across the edges. Refer to Isometric #1, showing the left back leg from a rear view. To lay out this compound angle begin at the inner forward leg corner marked *A*. Mark *B* on the outer forward arris is located 13/32 inch below the corner. Mark *C* on the inner rear arris is 1-3/32 inch below the corner. Draw lines connecting *AB* and *AC*. Use a hand saw tilted at an angle to make a flat cut across the end of leg.

Use the same layout at the lower end of the leg, locating the inner forward point 20-1/4 inches below mark *A* at the upper end. You can use a bevel gauge to transfer the angles from the top of the leg to the bottom.

The combined rake and splay angle of the back legs is created by sawing and then moving a wedge from the inside of the legs to the outside. The relocated wedges create a flat bearing surface for the bolts and washers that connect the back legs.

Isometric #2 shows the layout for the wedge saw cuts for the back legs from the rear view. Locate *E* 1/2 inch in from the outer rear corner. *F* is 4 inches down the arris on the inner rear corner. *G* is 1/4 inch in from the outer forward corner. Draw lines connecting *EF* and *EG*. Angle your hand saw so that it is in line with *EF* and *EG* in one position. Carefully saw off and save this wedge shaped piece.

Reminder: You must work using angles instead of measurements if your stock isn't sized exactly.

Hold the wedge in the same position that it was cut from the leg. Without twisting or turning the wedge, move it to the other side of the leg. Isometric #3. Glue the leg and wedge together with the ends and sides in plane with each other. Brads can be used to keep this glue joint from sliding apart while it is being clamped.

Be sure to make the right rear leg a mirror image of the left rear leg.

To construct the back-up, glue and screw the cheeks to the central bar. It is important that the 3/8 inch fulcrum hole is bored perpendicular to the back-up cheeks.

With the rails still screwed together, layout the holes on the rails. The 5/8 inch holes need to be accurately located. The leg hole locations are not critical, just not too close to any edge. Note that the back legs are located 1/2 inch in from the end of the rails.

These bolt holes should be bored with a drill press, if available. These holes must be perpendicular to the surface of the rails. If you can't make the holes perpendicular, you could ream them a bit larger, using a rat tail rasp. An option is to screw or clamp the rails and legs together, and then bore through the entire assembly with a long drill.

Take the rails apart. Screw or clamp the front leg and the rear spacer to the middle side of one rail. Drill through these pieces using the holes in the rail as a guide. Disassemble. Screw or clamp each back leg to the outside of its rail. Again, drill through the legs using the rail holes as guides. Disassemble.

Assemble the rails, legs, and rear spacer using 1/2 inch bolts or all-thread. Center the back-up assembly around its peg holes; clamp in place. Drill through the back-up. Insert 5/8 inch dowels.

Fit the pivot and pivot dowel. The pivot must also be free to rotate between the rails and around the dowel. Adjust the hole or dowel diameter as needed. Adjust the pivot corner to engage the notches on the ratchet bar.

Staple the piece of shock cord half-way up the front of the pivot. Staple the other end of the shock cord to the inside of the rail, near the bottom. This tension should pull the pivot into the engaged position with the ratchet bar.

Bore 3/8 inch holes in the levers and rotating jaw. The hole locations in the plans can be modified, but remember that as the levers go forward, the back of the treadle lowers and will drag on the floor if there is not adequate clearance.

Saw notches in the bottoms of the levers 1-1/2 inches high and 1 inch deep. Clamp the treadle support into the notches and drill 1/4 inch holes. Bolt the treadle support to the levers. . It is OK if the levers can move a little from side to side.

Option: The treadle support can be made longer than shown in the plans, so that it extends past the levers. (16-18 inches total length.) It then becomes a cross-wise foot pedal, like you see on conventional English-style shaving horses.

Saw notches in the treadle so that it fits between the levers and also where it hits the front leg when the levers are fully extended.

Screw the plywood cleats to the inside of the levers. The treadle fits on top of the treadle support and below the cleats. This is a tight fit, but the treadle should be removable.

Option. You can glue a piece of leather to one face of the jaw. This is useful for fine work, when you don't want to mar the surface of your work. You can also glue a piece of coarse sandpaper on another surface, used as a gripper for holding slippery (wet) wood.

Install the fulcrum bolt through the levers and back-up assembly. The four washers act as spacers between the bolt ends and levers, and the inner side of the levers and the back-up. If clearance is tight, use a piece of masking tape as a handle to position the washers in line with the bolt.

Install the pivoting jaw before tightening the fulcrum bolt. Use four washers, as with the fulcrum assembly. Tighten the fulcrum and pivot nuts. These should not be too tight as the jaw and levers

need to rotate during use. Nylon insert nuts will stay in any position without working loose. You could also use double nuts jammed together.

Saw the three pieces that make up the ratchet assembly with a 9 degree angle at one end. Plane the side of the ratchet bar so that it fits between the rails; it needs to move up and down freely.

Use a fine tooth saw (or a bandsaw, if available) to cut the V-notches in the ratchet bar. The notches are  $\frac{5}{16}$  inch deep and  $\frac{5}{16}$  inch in height, spaced  $\frac{3}{4}$  inch on center. The top of the first notch is located at the bottom of the side cheeks. Make 8 notches. Screw and glue the cheeks to the center ratchet bar, making sure that the angled ends are flush with one another.

The work support is assembled from two pieces of  $\frac{3}{4}$  inch plywood. Saw a V-groove  $\frac{1}{2}$  inch wide down the center of one piece. This will be the upper surface of the top piece of plywood. Glue and screw the plain piece of plywood to the top of the ratchet assembly. The square end of the plywood should overhang the lower side by  $4\text{-}\frac{7}{8}$  inch. Attach the upper plywood piece of the work support with glue and screws driven from the under side of the lower piece of plywood.

Saw out the plywood seat. The doubled plywood seat cleats are screwed onto the bottom of the seat, located on the center line. The seat cleats slide between the rails. The seat floats on top of the rails, moving freely to any location. The wide seat makes the mule comfortable to sit on.