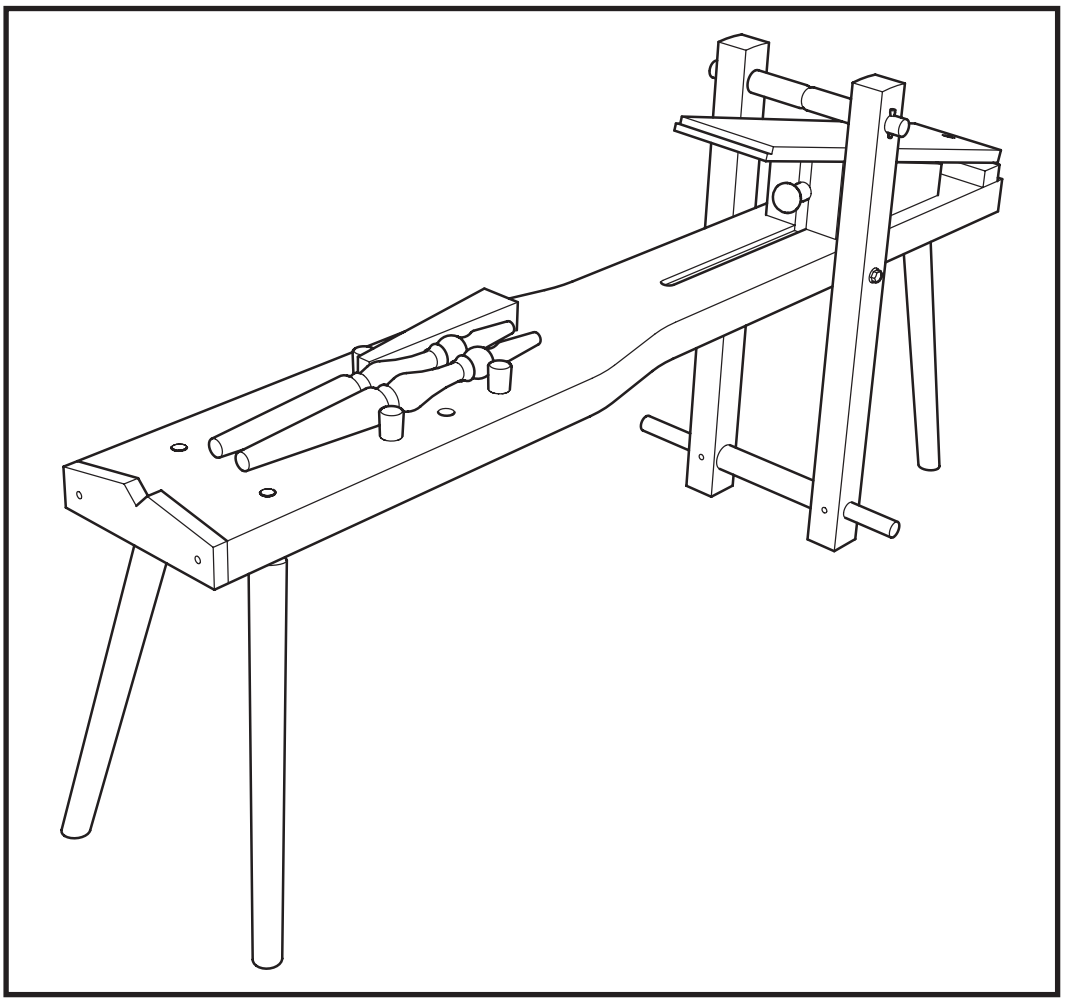
veritas®

Traditional English Shaving Horse

Plan



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Introduction

For hundreds of years, the shaving horse has been the basic workbench for working green wood. Used by coopers, chair makers, shingle makers and many other traditional trades, the shaving horse was once as common as any other kind of workbench. Traditional woodworking activities are probably more popular now than at any other time since the 1940s. People are using drawknives and spokeshaves to make chairs, paddles, snowshoes, splint basket parts, walking sticks, and many other projects. While the cutting tools required for these activities are generally available, information for woodworkers who want to build themselves a shaving horse is scarce. These plans and instructions may be used by anyone with intermediate woodworking skills to build a traditional English shaving horse.

The shaving horse described in the following plans and instructions incorporates the functions of a traditional chairmaker's low bench. Such a bench is used by chair makers when boring stretcher mortises in chair legs with a brace and when carving chair seats. Naturally, it can be used for much more than making chairs and is useful for any work involving a brace or any kind of carving in low relief. Many woodworkers have just one workbench, the height of which prevents using a brace in the most efficient orientation – vertical.

Optional Features

The material, tool and hardware lists as well as the main portion of the plans and instructions that follow describe how to make only one version of the design. The following alternative design features are described in the section entitled *Options*:

- Straight leg tenons
- Folding legs
- Without low bench features
- Customize the horse to your height
- You do not have a lathe
- Increase gripping power

Please review these options to determine the combination of features you want before starting to build your shaving horse.

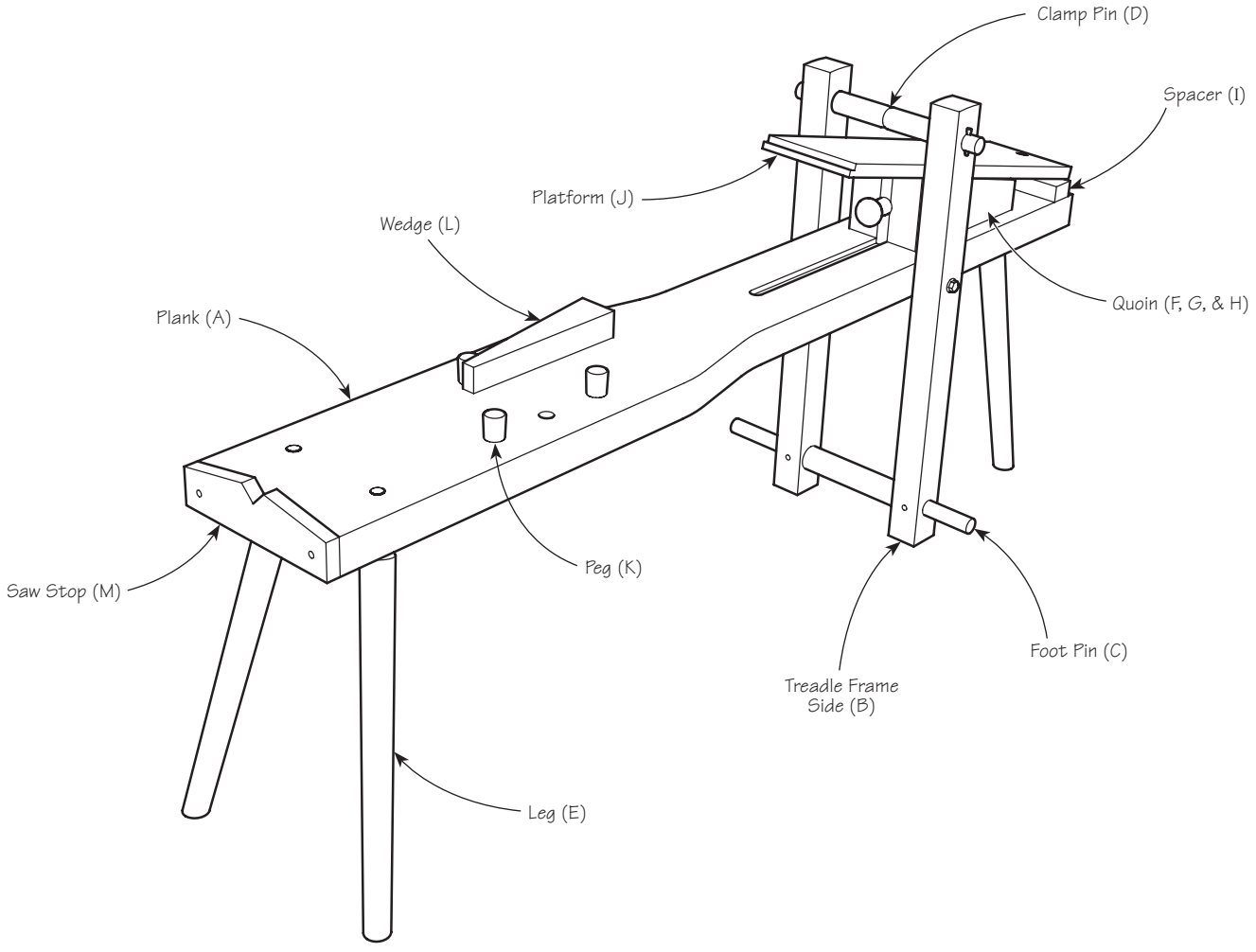

Figure 1: Shaving horse/low bench components.

General Notes

Required skills and tools

These plans and instructions assume an intermediate level of woodworking skills. You must be able to accurately follow orthographic drawings, cut and dress material flat, straight and square by machine or hand, drill holes with accurate diameter and location square to a reference surface and shape or lathe-turn parts accurately.

While it is possible to follow these plans using only hand tools, a table saw and lathe are recommended. A jointer and planer may also be used, depending on the kind of stock you are starting with. A bandsaw may also be useful, but is not necessary. You may use either a router fitted with a 3/4″ (or smaller) straight bit or hand tool methods to make the plank groove.

These plans assume possession of basic layout, drilling (Ø 1/2″ and smaller) and shaping tools. Other hand tools required:

- protractor
- sliding bevel
- tapered reamer, 12° included angle, min. 1 1/8″ diameter at large end
- 1″ bit, any type
- 3/4″ forstner bit
- 5/8″ forstner bit (optional, see *step 2*)
- 7/8″ bit, any type
- 9/16″ open-end wrench or adjustable wrench
- hand planes as desired for dressing rough stock (required if you do not have access to a 10″ wide jointer)
- bit brace (if desired)
- framing square (optional)
- flush-cutting saw (optional)

Hardware

All required hardware is commonly available at any well-stocked hardware store:

Item	Qty.
Lag Screw, 3/8″ × 5″	2
Washer, 3/8″	4
Screw, #14 × 2 1/2″ flat head, steel	1
Screw, #8 × 2″ flat head, steel	2
Screw, #8 × 1 1/4″ flat head, steel or brass	4

Material

General – For the most part, this shaving horse is best made using durable hardwood such as oak, although other species may be substituted or desired in some cases. To simplify material selection, woods are grouped into broad categories:

Durable hardwoods:
Oak, ash, elm, hickory, hard maple, birch, beech.

Less durable hardwoods:
Cherry, soft maple, walnut, poplar, tulip, butternut, basswood, alder.

Durable softwoods:
Douglas fir, tamarack, hard pine (southern yellow or red).

Less durable softwoods:
White pine, fir, spruce, cedar, hemlock.

Woods are listed in order of preference in the "Material" column. If shown as either "hardwood" or "softwood", both durable and less durable material are suitable.

All wood species named are native to North America; if you are building your project elsewhere, feel free to substitute local species. When working with any of the ring-porous hardwoods, particularly oak and ash, avoid material from slow-growth trees. Check the annual ring spacing; if it appears to be very crowded with little solid wood between the porous rings, the material may still be used but will not have the strength you would ordinarily expect.

All parts can be made from scraps or material that is unsuitable for other purposes for cosmetic reasons. Salvaged wood from pallets, crates or construction can be an excellent source of wood in a wide variety of thicknesses, lengths and species. With planning and careful material selection, the occasional nail hole in the completed shaving horse should not affect performance. Moisture content is generally unimportant for most components so long as the material is not actually soaking wet.

Cutting List

All dimensions shown with an asterisk (*) in the cutting list include a final cutting allowance. Refer to the part drawing for each for the exact size required.

Part	Part Name	T″	W″	L″	Qty.	Material
A	Plank	2	10 *	62 *	1	durable hardwood, durable softwood
B	Treadle Frame Side	2 *	2	28 *	2	durable hardwood, durable softwood
C	Foot Pin	1 1/2	1 1/2	19 1/2 *	1	durable hardwood
D	Clamp Pin	1 1/4	1 1/4	13 *	1	durable hardwood
E	Leg	1 3/4	1 3/4	24	3	durable hardwood
F	Quoin Key	3/4	5 *	10 *	1	hardwood
G	Quoin Slab	2	4 3/4 *	10 *	2	softwood
H	Quoin Knob	1 5/8	1 5/8	3	1	hardwood, durable softwood
I	Spacer	1	1 1/2	7 1/2 *	1	hardwood, softwood
J	Platform	3/4	6	24 *	1	durable hardwood (rough sawn)
K	Peg	1 1/8 *	1 1/8 *	4	3	durable hardwood
L	Wedge	1 1/2	3 *	10	2	less durable softwood
M	Saw Stop	3/4	3 *	10 *	1	less durable softwood

Instructions

Plank

1. Prepare the plank material. Cut the plank (**A**) to the length noted in **Diagram A**, within 1/4″. Plane the best face smooth, flat and clean, by hand or on a jointer.

This part may be hard to find in one piece. If you are unsuccessful with your usual source of lumber, inquire with other woodworkers or woodworking clubs about alternative suppliers. Sometimes, small sawmill operators will take an interest in this kind of project and may go out of their way to find just the right piece for you, although this can mean a little bit of waiting for the right log to come along. If you do find such a source, a single 2″ × 10″ hardwood plank with good straight grain, eight feet long should yield almost all the main components required for the project, including the plank, two legs and all the treadle frame components.

The plank may also be made by laminating two or more pieces together. Be sure to prepare the glue joint(s) carefully and use a strong adhesive; epoxy is not absolutely necessary, but would be the best choice in this instance. The bottom surface of the plank may be left rough sawn, so you will lose less thickness during stock preparation than you may otherwise expect. If the thickness is uneven from one end to the other, performance will not be affected if the thick end is used as the seat/low bench area.

If you tackle smoothing the plank by hand, be sure to finish up with a long plane, at least the length of a jack plane (#5) and preferably a fore (#6) or jointer (#7) to get the best results on a workpiece of this length.

If your plank is wider than 9 3/4″, clean up the edges, but leave it as wide as possible until you have made the complete horse and used it for a while. It's easier to cut material away to get the right size than to glue it on. Sitting on the horse for a couple of minutes as a quick test for comfort will not necessarily reflect what it's like to sit on it for several hours.

If the plank is thicker than 2″, leave it. You will most likely be grateful for the extra stiffness and mass, unless you plan to be moving the horse around a great deal. Also, as mentioned previously, it is not necessary to dress the bottom surface of the plank, so you may be able to retain some material thickness that would otherwise be lost.

2. Lay out and cut the plank to size and shape. If you have left the bottom undressed until now, clean up the surface just enough to mark with a pencil and draw the shape of the part on this side. Lay out all the features as shown on **Drawing A**. If the thickness of your stock varies from one end to the other, orient the wide end at the thickest portion of the stock. Start by drilling the 3/4″ through-hole shown in the middle of the plank, then cut the 3/4″ × 5/16″ groove so it is aligned with and the same width as the through-hole.

Note: *The diameter of the through-hole specified here allows you to use Veritas® Bench Pups® or a Hold-Down. If you make or use a different style of bench dog and hold-down, confirm hole diameter requirements before drilling.*

After making the groove, your first cuts should be made to define the 6 7/8″ width of the narrow end of the plank. Since the offcuts may be used to make other components, cut as close to the line as you can to save material. Round and clean up the plank edges with a spokeshave or belt sander as desired.

If you use a router for the groove, clamp a guide to the plank. It would be best to use a 3/4″ straight bit so the groove may be made in one set-up.

To make the groove by hand, drill a series of 5/8″ overlapping holes 1/4″ deep (using a forstner bit). Cut the groove back to the layout lines with a paring chisel and level the bottom of the groove to a depth of 5/16″.

If you own a router plane (or have access to one), a 1/2″ chisel-shaped blade is ideal for final shaping and clean-up of the groove. Work down to the final depth by taking a series of light cuts. A Veritas® Chisel Plane (05P21.01) set up with a 5/8″ chisel can also provide good results.

The plank may be most accurately shaped by making a stopped cut on the table saw. Remember that the cut extends about 2″ or more on the bottom (and therefore unseen) side of the workpiece, so be sure to stop the cut well before the point where the plank widens to its full width. You can complete each cut on a bandsaw or with a handsaw. If you do it by hand, be sure to keep the saw perpendicular to the face of the plank.

3. Drill the leg sockets. On the top surface of the plank, lay out the holes for the legs (**E**) as shown on **Drawing A**. For the two rear legs, first locate the holes, then draw the triangle from their centers. Drill three 1/2″ diameter holes as pilots for the reamer, starting with the front leg (see **Figure 2**) for practice before drilling the more complex and important holes for the rear legs. For each of the rear holes, align the sliding bevel (set to 75°) with the appropriate side of the layout triangle, as shown on **Drawing A**. When all the holes are drilled, **turn the plank over and taper/ream the holes from the *bottom* side.**

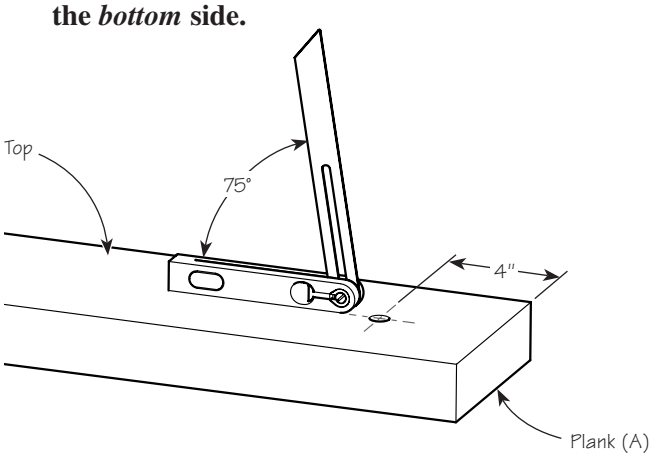

Figure 2: Drill front leg socket.

Firmly clamp a scrap on the bottom surface to prevent splintering. Set your sliding bevel to 75°. For the front leg only, draw a line down the center of the plank, intersecting the layout point center of the hole. Position the plank on a pair of low sawhorses or some other low support that permits good control when drilling. Set the sliding bevel as shown in **Figure 2**. Start the hole right on the mark, with the bit more or less vertical. After the pilot screw or spur has engaged, tilt the drill or brace over to match the angle shown by the sliding bevel. Sight along the drill bit to align it with the center line. Periodically stop drilling to check the angle against the sliding bevel.

4. Drill the treadle frame pivots. Lay out the hole locations for the treadle frame (**B**) pivot points on each edge of the plank, as shown on **Drawing A**. The vertical location (shown as 1″ from the top of the plank) assumes the plank is 2″ thick. If this is not the case, lay out the hole in the center of the plank. Drill 1/4″ diameter holes square to each edge, 3″ deep.

Legs

5. Make the legs. Dress the blanks for the legs (**E**) to the size shown in the cutting list. Lay out according to **Drawing E**. Ensure that the blanks are square and straight, and free of any large knots, splits, checks, or other irregularities. You might find it useful to darken the inside of each socket with a soft pencil before test fitting the legs. Push the leg firmly into place and rotate it a bit each way. Remove the leg from the socket and check where the pencil marks have transferred to the leg. Any area with a pencil smudge represents a high spot. The legs should fit snugly into the sockets with no wobble and should not fall out of the plank when seated firmly with a tap of a mallet. Since it is possible to split the plank by overdriving the legs, take care not to strike too hard. Remove the legs from the plank and put them aside.

To lathe-turn the legs, mark the center accurately at both ends of each blank. Turn the overall shape between centers, as shown on **Drawing E**. Leave the tenon oversize and then use a parting tool with calipers to cut the tenon by establishing the diameter at each end of the taper and cut a straight profile from one diameter to the other. Leave them slightly oversize and use a sheet of coarse sandpaper to carefully work down to the desired shape. Stop to check the fit often. Remove the leg each time to try the leg in the socket, then remount. The ideal fit will be snug, but should not wobble or require heavy mallet blows to drive home.

Treadle Frame

6. Make the treadle frame sides. The cross-sectional dimensions of the treadle frame sides (**B**) could differ from those shown on **Drawing B**, depending on material availability. In hardwood, the dimension shown as 2″ could be reduced to 1 7/8″, but this would require the holes drilled for the foot pin to be reduced to 7/8″. The foot pin would, naturally, also have to be similarly modified. The 1 7/8″ dimension could be reduced to 1 5/8″, but only in hardwood. This thickness (but not the other one shown as 2″) could be achieved by laminating two or more thinner pieces together.

7. Make the foot pin and clamp pin. As shown on **Drawings C** and **D**, the length of the middle portion of the foot pin (**C**) and the clamp pin (**D**) should be identical to each other and should be about 1/8″ larger than the width of the narrow, front part of the plank (shown as 6 7/8″ on **Drawing A**). The exact size is not important so long as all three parts match up properly. If you have cut undersized treadle frame sides and drilled the pin holes 7/8″, turn the outer portion of the foot pin to match. Aim for a fit that allows assembly without use of a mallet but with minimum free play. You may leave the middle portion of the clamp pin square if desired, but make sure the pin can be rotated by hand in the assembled treadle frame.

> The foot pin, clamp pin and legs must be made from straight-grained hardwood. To prevent grain run-out, the material could be prepared by splitting or riving green stock slightly oversize. Use a drawknife to roughly shape the blanks octagonal, and allow to dry to about 12% or less moisture content and shape or turn to final size.

8. Assemble the treadle frame. Fit and clamp the treadle components together. Drill and countersink the frame sides for #8 × 1 1/4″ flat-head screws, where shown in **Figure 3**, to intersect the foot pin and hold it in place. Drill a 3/16″ hole through the clamp pin at each end, as shown in **Figure 3**. Avoid marring the outer faces of the treadle frame sides. Make and install two tapered wooden pins as shown. A light tap with a block of wood or small hammer should be all that is needed to set them in place and also to remove them.

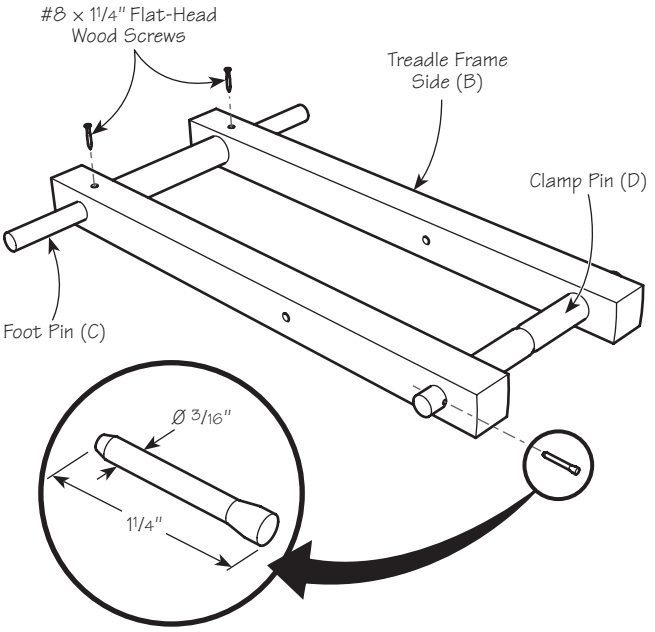

Figure 3: Treadle frame assembly.

Quoin

9. Make the quoin key and slabs. Lay out and cut the quoin pieces (**F** and **G**), as shown on **Drawings F** and **G**, but do not drill the 1/2″ hole in the key at this time. Since the pieces are almost triangular, you may be able to make two slabs from a single piece of stock that is a few inches longer or wider than the size shown on the cutting list.

10. Assemble the quoin. After the parts are cut to size, glue them together as shown in **Figure 4**. The key should project from the bottom face by slightly less than the depth of the plank groove. This may best be achieved by checking the plank groove depth and drawing a line on both sides of the key parallel to the bottom edge to correspond to the groove depth. Clamp a couple of blocks or use hand screws to create stops that will determine the position of the slabs during glue-up. Assemble the key and slabs with glue (white or yellow carpenter's glue is adequate). Ensure the slabs are in contact with the stops you have clamped in place on the key and that all three pieces are aligned as close to flush as possible on both front and back. Allow the glue to set. Use a plane (a block plane is well suited) to shave the three different parts flush on the front, back and top of the assembly. Clean up any glue squeeze out on the bottom of the assembled quoin. Lay out and drill the 1/2″ hole shown on **Drawing F**.

> Alternatively, you can lay a sheet of wax paper across the top of the plank over the groove. Push the quoin key down into the groove, apply glue to the quoin slabs and clamp in place right on the plank.

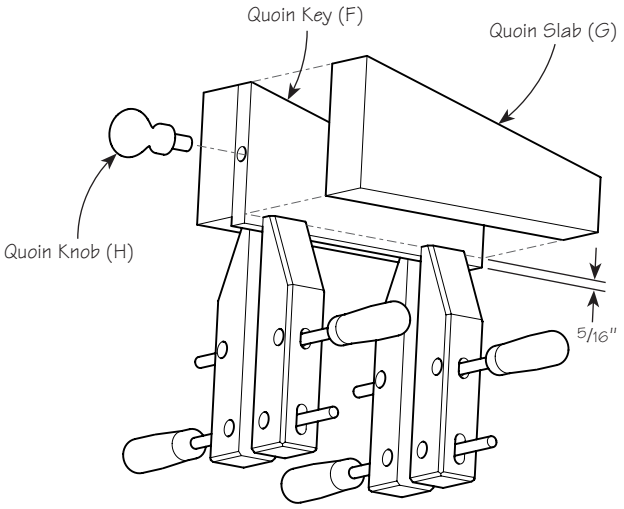

Figure 4: Quoin assembly.

11. Make and install the knob. Turn the quoin knob (**H**) according to **Drawing H** or your own preference. The only important feature is the 1/2" diameter tenon that must be sized for a snug fit into the hole drilled into the quoin key. When you are satisfied with the knob, glue it into the quoin key.

Platform

12. Make and install the spacer. Cut the spacer (**I**) to the size shown on **Drawing I**. It should be a bit longer than the width of the plank at the narrow end as measured to make the treadle frame. Install with two #8 × 2" flat-head wood screws. Trim the ends flush with the plank.

13. Drill for the platform screw. In the middle of the spacer, drill as required to install a #14 wood screw, 2 1/4" deep. As shown in **Figure 5**, the screw should be angled 105°. Ensure it is vertical when viewed from the front.

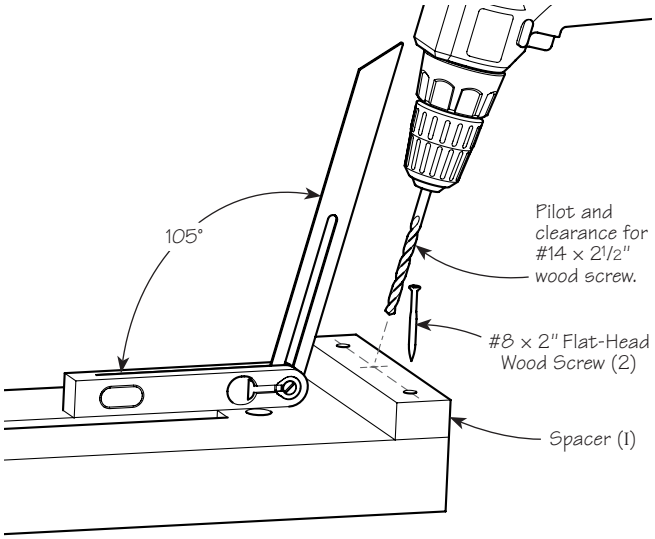

Figure 5: Drill for spacer and platform.

14. Make the platform. Lay out and cut the platform (**J**) as shown on **Drawing J**. To help grip a workpiece when the horse is in use, the platform should be rough sawn on the top surface, but dressed smoothly on the bottom and edges.

> If you have only dressed material, you can roughen up the top surface by running a rasp, or a belt sander with a 40x belt or even a plane with a heavily skewed blade, across the board.

15. Fit and assemble the platform. With the quoin in place on the plank, secure the platform to the spacer with a #14 × 2 1/2" flat-head wood screw. Be sure to leave the screw head up enough so the platform remains free to pivot. However, the screw head should remain below flush as the quoin is moved through its range of motion from all the way forward to all the way back. At all times, when the quoin is being moved, the platform should be free to rest on it. If this is not possible to achieve, the hole and countersink may have to be enlarged. Instead of drilling the hole larger, elongate the hole using the same bit (5/16") and work it from front to back with the drill running. Stop to test fit the platform often to avoid removing more material than necessary.

Assembly

16. Cut the legs to final height. To trim the legs, place the horse upside down on a flat surface with the legs installed. Measure 18 1/2" from the top surface of the plank (now facing down) and mark each leg. Do not measure in line with the axis of the leg, but rather straight up and perpendicular to the plank. A framing square is handy for this step.

    When all three legs are marked and still installed in the plank, cut them to final height. Take care to make the cut on each leg parallel to the plank. Keep the offcuts to make the pegs (**K**). Chamfer the bottom edges of the legs to prevent splintering. Place the horse upright on the floor and trim the leg tenons where they protrude from the top surface of the plank.

> Sometimes, in spite of achieving a close fit between the tapered leg tenons and the corresponding sockets in the plank, you find the legs tend to fall out. Usually caused by using a very hard wood for the legs or the plank or both, this is easily remedied. Mask the main portion of the leg and apply a light mist of rubber-based spray adhesive (such as Super 77 made by 3M) on the tenons. Let it dry and reassemble the legs. The legs will still come unseated with a sharp rap from a mallet, but shouldn't inadvertently fall out.

17. Treadle Frame. Use two 3/8″ × 5″ lag screws to install the assembled treadle frame on the plank. There should be a washer on both sides between the treadle frame and the plank, as well as under the head of each lag screw.

18. Drill the peg holes. Lay out and drill the peg/dog holes for the low bench function shown on **Drawing A**. The three 1″ holes are meant to receive the pegs (**K**), which are made to fit the holes.

> The 3/4″ hole straddled between the 1″ diameter holes allows you to use Veritas® Bench Pups® or a Hold-Down. If you make or use a different style of bench dog and hold-down, confirm hole diameter requirements before drilling.

19. Make the pegs. Turn the pegs (**K**) to the size shown on **Drawing K**. When you are close to final size, frequently test the fit. A close fit is preferred, but not absolutely necessary for the straight part of the shank; however, when fully seated with a light tap from a small hammer or a firm push by hand, the slightly flared top portion of the peg must protrude at least 1″.

> The legs are intended to be made about 4″ to 5″ longer than required for levelling and to accommodate a taller user if desired. Unless you build the horse more than 19 1/2″ tall, the offcuts should be long enough to use as raw material to make the pegs.

20. Make the wedges. Cut the wedges (**L**) to the size shown on **Drawing L**. Chamfer or round all edges and smooth all surfaces. The exact size is not critical.

21. Make and install the saw stop. Make the saw stop (**M**) as shown on **Drawing M**. Tape or clamp the stop in place on the end of the plank. Drill pilot holes for #8 wood screws. Install with #8 × 1 1/4″ flat-head wood screws.

22. Final treatment. Smooth, trim and shape all remaining rough surfaces as desired. Chamfer or round all edges according to preference. Sit on the horse as if using it for shaving. Take note of where your legs contact the edges of the plank. Round these areas as required for comfort.

23. Apply finish as desired. Avoid any kind of paint in general and especially on the platform or treadle to avoid color transfer to your workpieces. Shellac is a good choice in this case since it will not mar a workpiece. While it is an ineffective finish for liquid water, shellac is an excellent barrier for water vapor; about on par with oil-based paint. If you apply at least two coats of shellac (2 lb cut), moisture content fluctuation will be greatly slowed down in the finished piece, preventing a great deal of seasonal movement.

Using the Shaving Horse/Low Bench

The following diagrams show the various ways you might use your combination shaving horse/low bench.

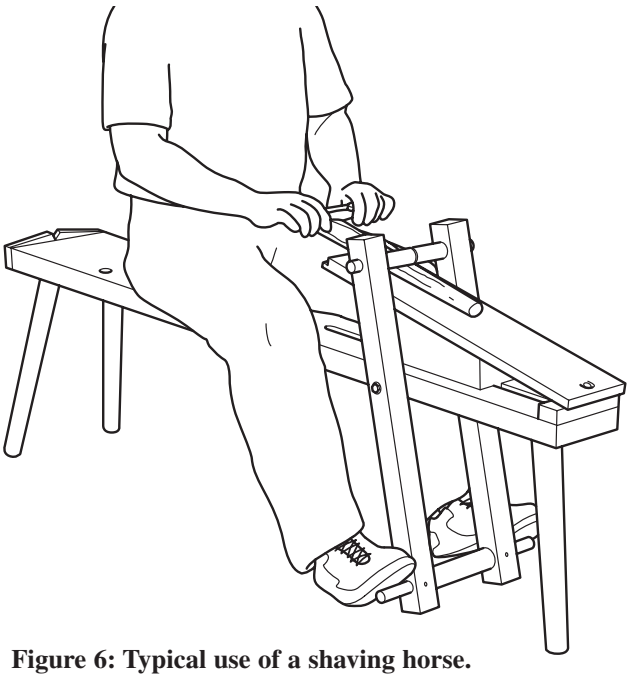

Figure 6: Typical use of a shaving horse.

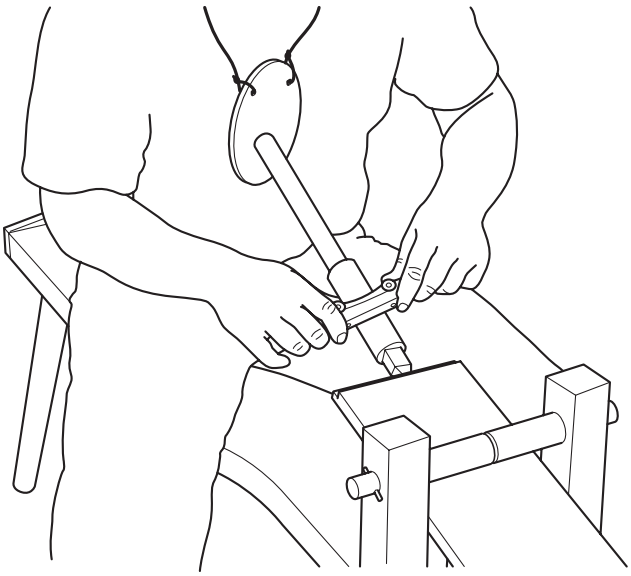

Figure 7: Holding a short workpiece.

*Note the "bib" worn by the user in **Figure 7**. To avoid discomfort while holding a workpiece against your chest in the manner shown, an old trick is to use a small piece of wood shaped as shown and smoothed for comfort. Hang it on a length of cord around your neck to keep it in place.*

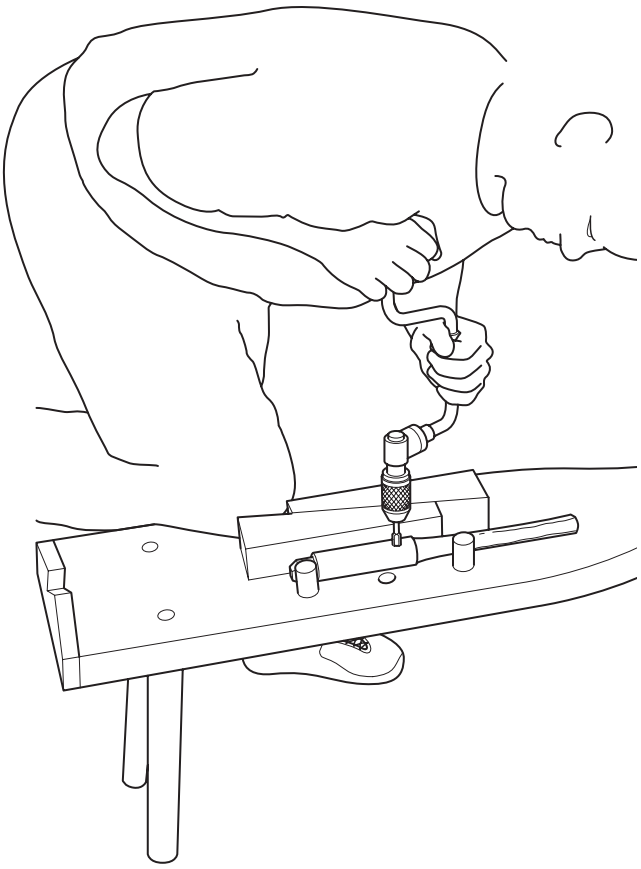

Figure 8: Using a brace on the low bench.

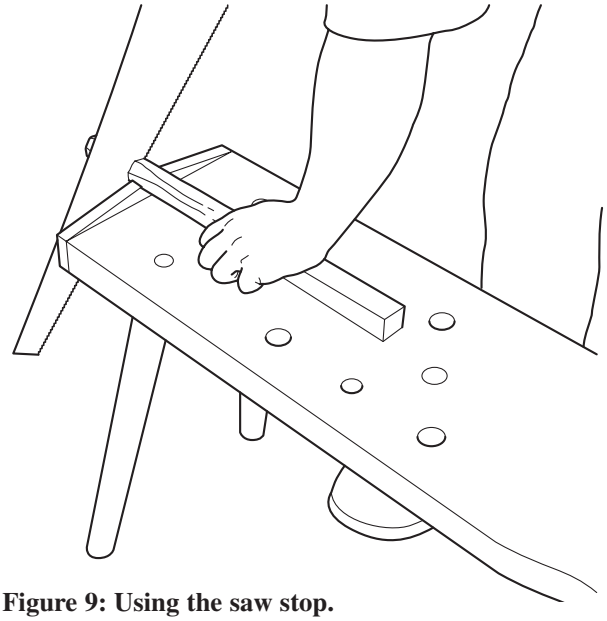

Figure 9: Using the saw stop.

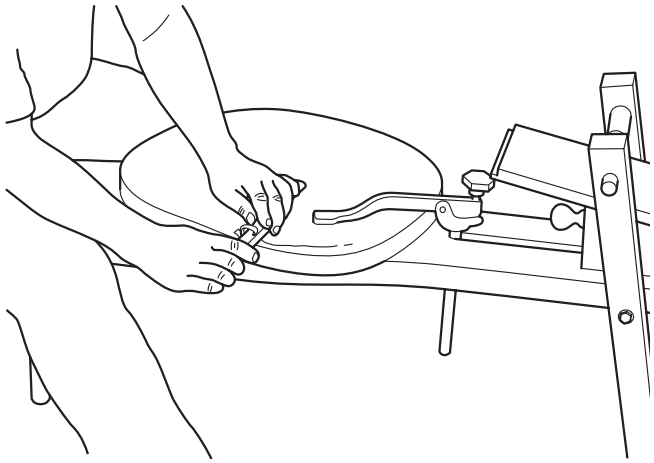

Figure 10: Using a hold-down on the low bench.

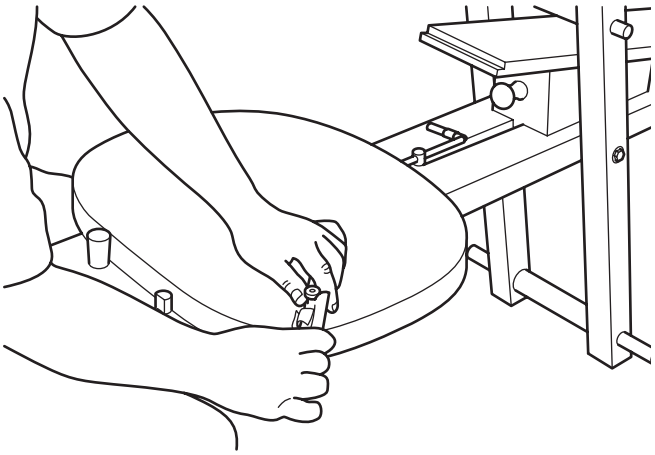

Figure 11: Using dogs on the low bench.

Options

Straight Leg Tenons

The legs may be made to fit the plank with either a tapered tenon or a 1″ straight tenon. The tapered tenon is preferred since it ensures that the fit is always tight in use; the legs are pushed into the sockets by the user's weight. Tapered tenons are also easy to disassemble with a single sharp tap from a mallet for storage or transport. If you do not have a tapered reamer, you can make straight tenons with either a 1″ tenon cutter (such as Veritas® 05J41.03) or a lathe.

1. To ensure a tight fit, you may decide to forgo the ease of disassembly and wedge the tenons on the top side of the plank. Drill a couple of test holes in a piece of scrap material and make a couple of test tenons to check the fit before you make any holes or tenons in your workpieces.

2. If you are turning the tenons on a lathe, first drill the 1″ holes in the plank, then turn the tenons to fit.

Folding Legs

If you prefer folding instead of removable legs, or if you do not have access to a tapered reamer, a tenon cutter or a lathe, you may want to make folding legs.

Material:

Part	Part Name	T″	W″	L″	Qty.	Material
N	Back Leg	1 1/2	3	18 1/2 *	2	softwood
O	Gusset	3/4	5	11 1/2 *	1	plywood
P	Brace	3/4	2 1/2	10 3/4 *	2	durable hardwood
Q	Block	1 1/2	1 1/2	4	2	hardwood, durable softwood
R	Front Leg	1 1/2	3	18	1	softwood

Tools Required:

- 1/4-20 UNC tap
- 1/4-20 tap drill; #7 or 5mm or 13/64″

Hardware:

Item	Qty.
Screw, #14 × 2 1/2″, flat head, steel	4
Screw, #8 × 1 1/2″, flat head, steel or brass	6
Thumbscrew, 1/4-20 UNC (1 1/2″ min. shank length)	2
Hinges (complete with required screws)	5**

***Note:** Hinges may be strap, butt or tee style. If using butt or tee hinges, the knuckle length should not be greater than 3". Do not use hinges that require screws smaller than #8.*

1. Make the leg sub-assembly. Make the alternative legs according to **Drawings N** and **R**. The back legs (**N**) will eventually require a compound angle on each end but, to start, just cut to the length shown on **Drawing N**. Make the gusset (**O**) according to **Drawing O**. Lay out the back legs as shown in **Figure 12**. Place the gusset as shown and transfer screw hole locations. Trace the gusset location onto each leg. Place the gusset aside and drill pilot holes 3/4″ deep for #8 wood screws where marked on the legs. Apply adhesive (white or yellow carpenter's glue) and secure gusset with six #8 × 1 1/2″ flat-head wood screws.

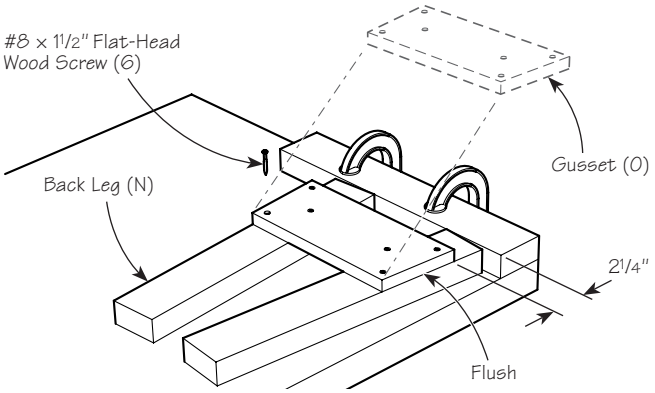

Figure 12: Optional folding legs layout.

2. Trim the legs to the correct angle. Use a bandsaw or table saw to cut the top and bottom of the back leg assembly. Set the miter gauge to a 5° angle and tilt the table saw blade 15° (or the table, if you are using a bandsaw), as shown in **Figure 13**. The miter gauge must be set as accurately as possible. To double check its setting when the legs are in position as pictured, the distance from the bottom of each leg to a reference plane (such as the rip fence or a miter gauge slot) must be equal. Trim the top and bottom of the legs. Keep in mind that the cuts at each end of the leg assembly must be parallel. When cutting as shown in **Figure 14**, you should screw or nail a temporary brace across the legs to steady the forward leg.

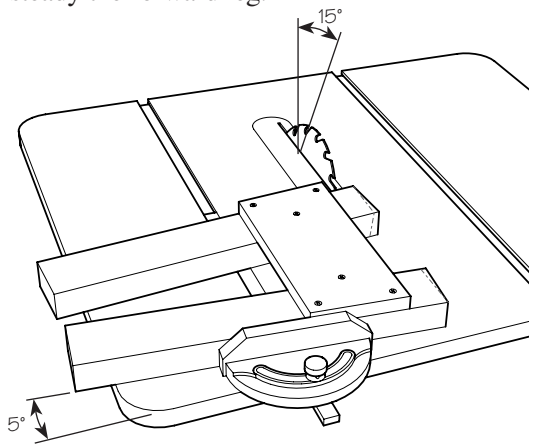

Figure 13: Trim the bottom of the legs.

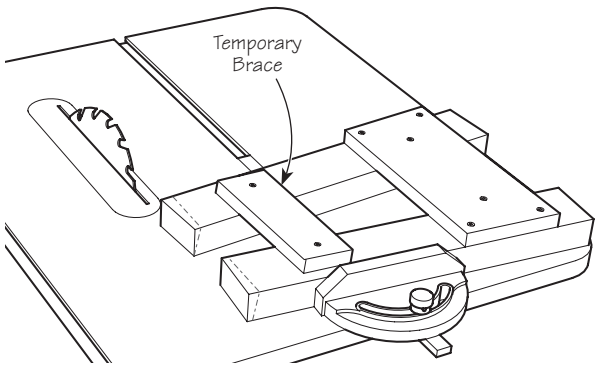

Figure 14: Trim the top of the legs.

3. Lay out leg location on the bottom of the plank (**A**) as shown in **Figure 15**. Prop or clamp the legs in place. Hold the hinges in place and mark screw locations on the bottom of the plank and the legs. Drill pilot holes as required. Install the hinges.

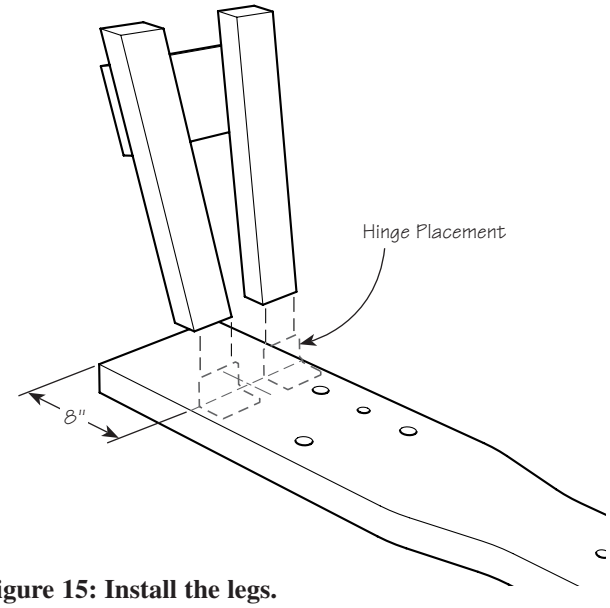

Figure 15: Install the legs.

4. Make two leg braces (**P**) as shown in **Drawing P**. The drawing shows the length about 1″ longer than necessary. Select one of the braces and hold it in place as pictured in **Figure 16**. Check the length and cut to length as required to fit to the edge of the gusset as pictured. Fold the back leg assembly flat against the bottom of the plank and hold the brace as shown in **Figure 17**. Place the hinge as pictured. Transfer screw locations to the gusset and brace. Drill pilot holes as required. Install the hinge. Use a block plane if needed to trim the free end of the brace to sit flat against the bottom of the plank.

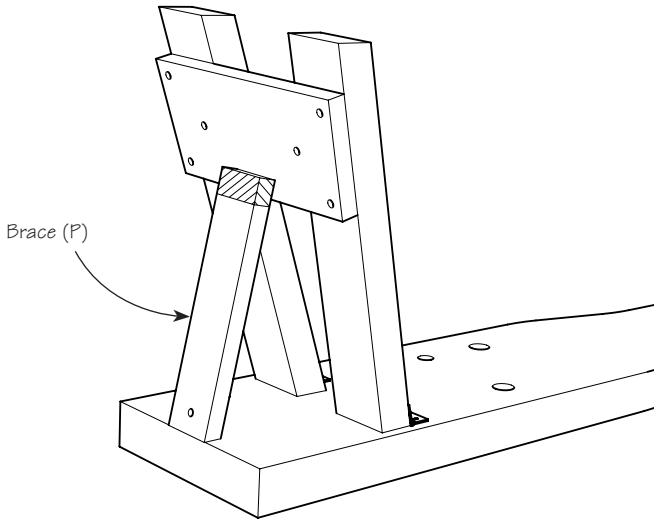

Figure 16: Fit the brace.

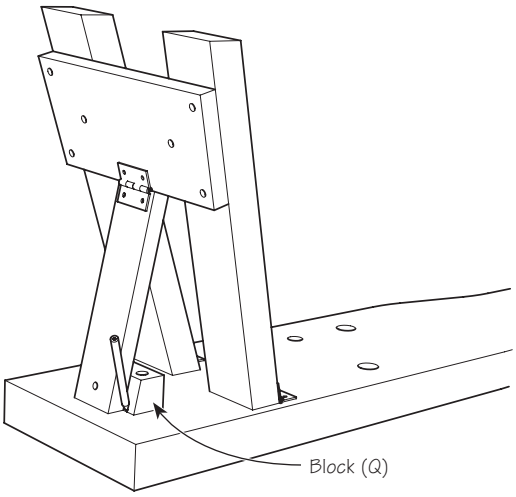

Figure 17: With brace installed, fit the block.

5. Make two blocks (**Q**) as shown in **Drawing Q**. With the legs unfolded and the brace in place against the bottom of the plank, hold the block as shown in **Figure 17**. Trace its position onto the plank. Fold the legs into the storage position. Holding the block in place, transfer hole locations to the underside of the plank. Install the block with two #14 × 2½″ flat-head wood screws.

6. Unfold the legs and clamp or hold the brace against the block with the end flat against the plank. Transfer the brace hole location to the block. Use a #7 or 5mm or 13/64″ twist drill bit to drill into the block where marked. Ensure that you drill in line with the hole through the brace. Tap the hole with machine threads using a ¼-20 UNC tap. Alternatively, you may drill through and install a ¼-20 T-nut from the back side. You may have to remove the block from the plank to install the T-nut, which you may need to grind to avoid interference with the plank when re-installing the block. Use a ¼-20 thumbscrew with a 1½″ shank (1¼″ min.) to hold the brace in position.

7. Follow the procedure outlined in *steps 3* through *6* to install the front leg as shown in **Figure 18**.

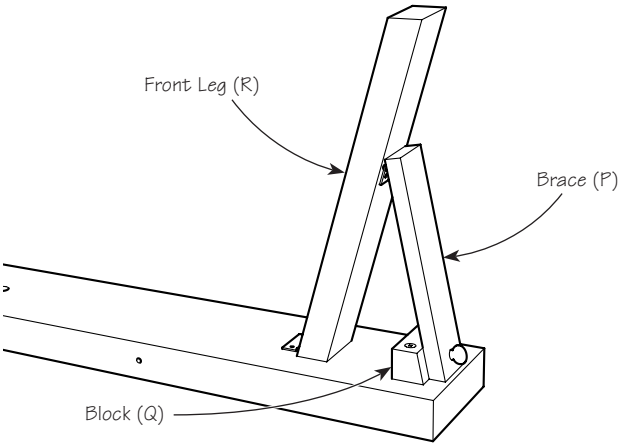

Figure 18: Front leg, folding.

Without Low Bench Features

If you already have a low bench or do not have the space or material to make the shaving horse long enough to accommodate the low bench features, you can alter the design slightly to make just a shaving horse. Substitute plank **S** for plank **A**, and lay out all the features as shown on **Drawing S**.

Material:

Part	Part Name	T″	W″	L″	Qty.	Material
S	Plank	2	10 *	54 *	1	hardwood, durable softwood

Parts NOT Required:

Part	Part Name
A	Plank
K	Peg
L	Wedge
M	Saw Stop

Hardware NOT Required:

Item	Qty.
Screw, #8 × 1¼″, flat head, steel or brass	2

Customize the Horse to Your Height

These plans and instructions describe a horse that is 18½″ from the top of the plank to the floor to accommodate a user whose height is between 5′ 5″ and 6′ 1″. If your height is outside this range, you may wish to modify the horse to suit your height.

- For users shorter than 5′ 5″: It would be unwise to shorten the distance from the foot pin to the pivot since it would decrease the mechanical advantage of the clamp. However, the overall length (shown as 27″ on **Drawing B**) and the distance from the foot pin to the lower end of the frame side (shown as 2¼″) could both be made ¾″ smaller. This change would allow the legs to be shortened so the horse could be made as low as 17½″.

- For taller users: The legs could be left long enough to create a finished height of 20″ (or more). In this case, the treadle frame sides could be made larger by increasing the overall length (shown as 27″ on **Drawing B**) and distance from the foot pin to the pivot point (shown as 14¼″) an equal amount to the increase in the height of the horse. For example, if you build a horse with the finished height of 19½″, the treadle frame side would need to be 28″ long and the distance from the foot pin to the pivot would become 15¼″.

You Do Not Have a Lathe

These plans call for the use of a lathe to make the legs, foot pin, clamp pin, and the pegs. Although preferred, it is not absolutely necessary that these parts be turned.

- Legs: These may be cut to size and shape with a bandsaw or table saw. They do not need to be either tapered or round in cross section, except for the tenons. For a rustic look, you can even use 2″ diameter saplings. Cutting the tenons accurately is quite important, but can be done without a lathe, using a drawknife to rough out the shape then finished with a spokeshave. It is imperative to work carefully with frequent test fitting. Many chair makers have dedicated tools for cutting tapered tenons. If you own or have access to one of these tools, try making at least one tenon from a piece of scrap before using it on your workpieces.

- Foot Pin: This part could depart dramatically from the form shown and still work well. A few alternatives are shown in **Figure 19**.

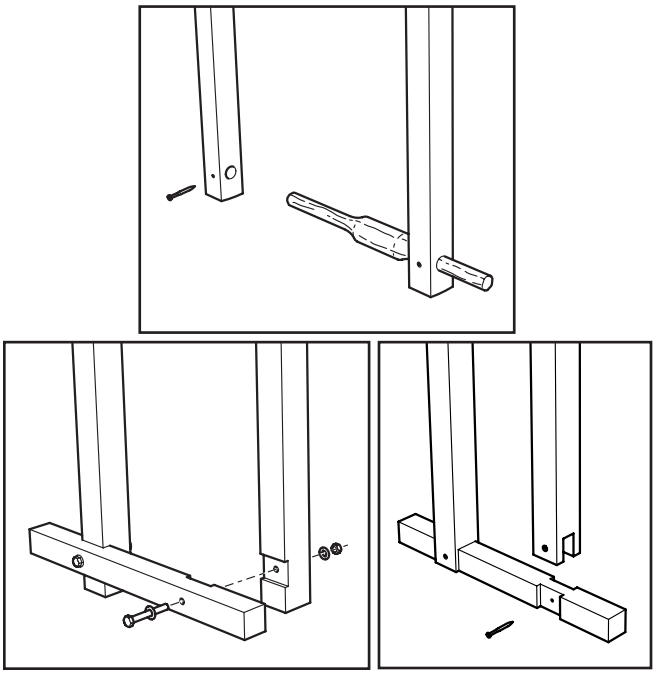

Figure 19: Foot pin alternatives.

- Clamp Pin: The clamp pin should be able to rotate but, as shown for the foot pin in **Figure 19**, it could be shaped by hand with a drawknife and spokeshave. You could start with a round piece (such as a sapling if you are making a rustic-style horse) or square. Some users prefer a square pin with a "V" groove cut into one or more of the clamping faces to help grip round workpieces.

- Pegs: These are perhaps the simplest to make without a lathe. With a drawknife and spokeshave, round and taper your stock to fit the 1″ holes.

Increase Gripping Power

For work with green wood, it is unlikely you will experience slippage; however, when shaving dry hardwood, the workpiece can sometimes slip out of the clamp. This will not harm the workpiece since your abdomen will stop it from going too far. If this does happen, a simple method for adding friction is to use an inner tube on the clamp pin. Since inner tubes are still used by tractors and some types of trucks, any automotive service business that works on these types of vehicles should have one or more old inner tubes they would be happy to give away. Simply wrap a single layer of inner tube around the clamp pin and use staples or cable ties to hold it in place. Although thinner and less durable, bicycle inner tube would be a practical alternative. In this case, cut a section of mountain bike inner tube to length and slip over the clamp pin prior to assembling the treadle frame.

Notes

Notes

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