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November/December 1989, Volume V, No. 6

AMERICAN WOODWORKER

Build a Nest of Shaker Boxes

Turning Basics: The Skew Chisel

Introduction to the Shaper

Candle-Stand Plans by Carlyle Lynch

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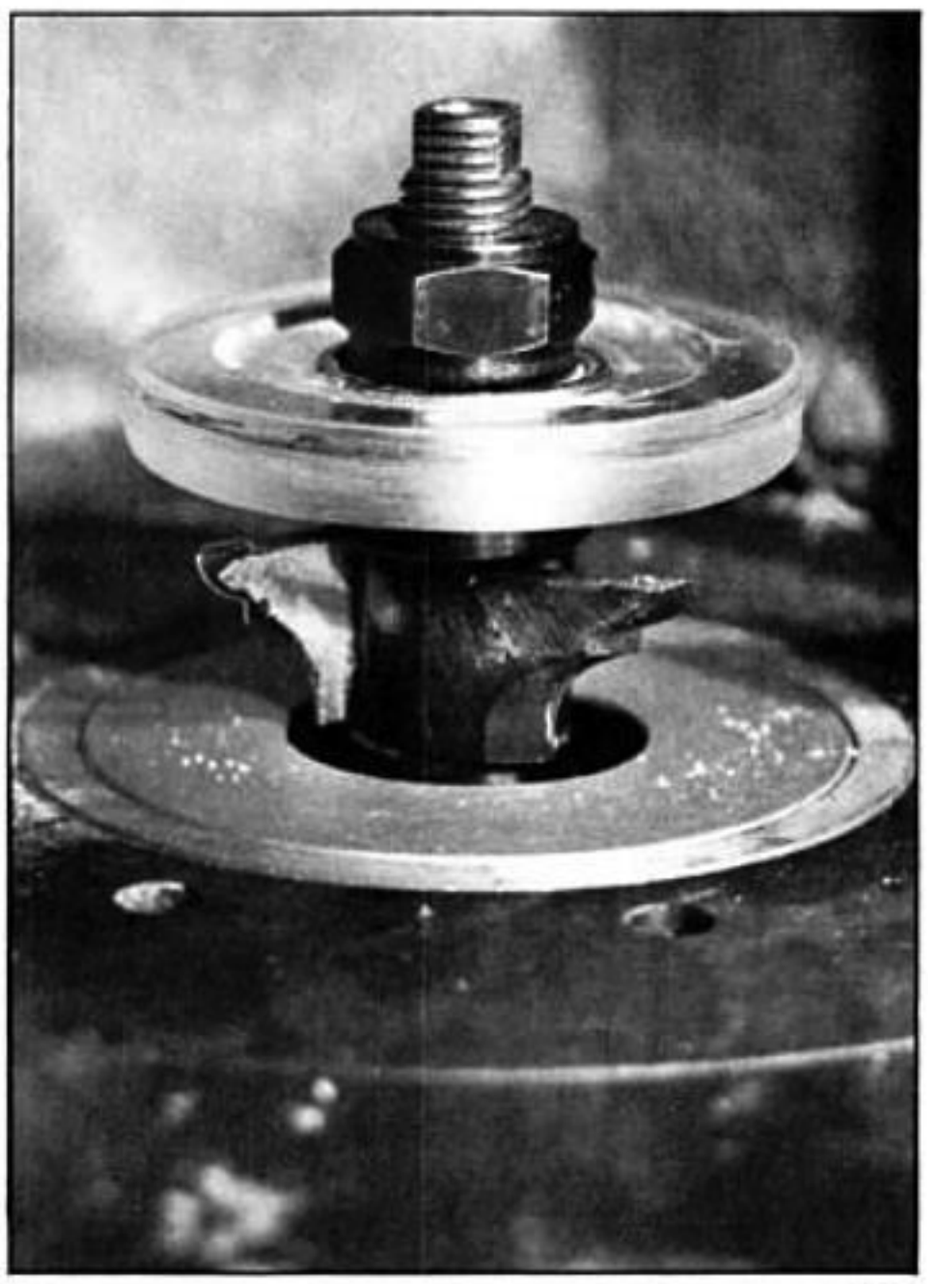

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ADVERTISING SALES OFFICES
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(213) 746-8800

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Missing from photo: Judy Peek, Renée James, JoyceAnn Dunkle, Jacqueline Neumeier

Happy Holidays from the staff of American Woodworker!

LETTERS

Sir:

I have a suggestion for Joel Lipsey as a result of his question about filling nail holes (Q&A, July/August, 1989 *AW*). I have had excellent results with mixing glazing compound, plaster, and the stain used on the wood.

Start with glazing compound about the size of a golf ball, and add a little plaster and stain. Then work it in your hands. Add more plaster and stain until you achieve the desired shade. If you get the mixture too dark just add more glazing compound. I like to punch holes in a piece of scrap and fill the holes to make sure I have an exact match. However, if you have a large enough hole to fill, it will take more than one application due to shrinkage.

WILLIAM BLADES
Laurel, DE

Sir:

I read Curtis Johnson's article on Woodworking Glues (September/October, 1989 *AW*) with great interest since glue is one of my favorite subjects. The article itself was one of the best I've seen, and the sidebar on "Glue Joint Mechanics" was easily the best short explanation of how glue works that I've ever seen. There was, I thought, only one weakness in the article. Since it concerned my specialty, hide glue, I thought I'd make some comments.

It doesn't matter how hot you heat hide glue. The old shops couldn't really control the temperature that closely in the double-boiler type glue pots. Higher temperatures will only cause the glue to deteriorate (cook like meat) faster. But it takes many days of cooking to destroy it. I often heat it up to just under boiling when I need more working time, such as when I'm hammer veneering.

I don't agree that hide glue is "unsuitable for complicated glue ups." More difficult, perhaps, but not unsuitable. Can you imagine anything more complicated, for instance, than an 18th-century Hepplewhite sideboard or a 1900 rolltop desk? Both were glued with hide glue.

Room temperature can make a bit of difference in how the glue works, but it's not necessary to maintain a temperature of 70°. Warm the wood, instead, by placing it near a heater or using an electric hair dryer.

Liquid hide glue is hide glue with enough gel depressant and preservative added so that it stays liquid at room temperature and lasts about a year before deteriorating. In spite of manufacturer's claims, I've found it softens on hot, humid days so that the joints can actually be pulled apart. Also, many museums use liquid hide glue expressly because it is weak, allowing joints to break down before the wood splits.

I agree with you, though, that hot hide glue is "impractical for the average woodworker." Other glues are just so much easier to use. But hide glue has the one great advantage of reversibility, a quality that I am convinced is the reason that so much of the old furniture survives.

BOB FLEXNER
Norman, OK

Sir:

I wish to compliment you on the handling of the "Elephant Puzzle" correction. It was prompt (just prior to my cutting some high-grade cherry), to the point, and the legs-up, dead elephant photo was great humor. I hope other readers spotted this subtle comedy.

I'm a long-time woodworker but a new subscriber, so I am elated to realize I'm dealing with people who can properly handle man's greatest shortfall—announcing and correcting a mistake.

JERRY JEWELL
Onsted, MI

Sir:

I found Raymond Levy's article "Wooden Mechanisms," in the September/October, 1989 issue of *AW* to be one of the most interesting that I have read in recent years. Perhaps, because my father was a research physicist, and I grew up with various demonstrative models around the house.

Thanks to Mr. Levy for his efforts in making the recent issue an enjoyable one.

LLOYD D. UBER
El Cajon, CA

Sir:

To add my 2 cents to the "fine furniture vs. short projects" [debate]—I am more likely to undertake short projects and would like to see more, but I enjoy reading and learning from the descriptions and illustrations of fine furniture. May I suggest a six-issue series of projects, beginning with a simple project requiring basic skills and adding one or two new skills in each succeeding project. The last project should be an interesting, but not overly complex, piece just short of fine furniture.

CARROLL J. BRANTLEY
Stone Mountain, GA

Sir:

I was going to cancel your magazine! In the past it had too many articles and projects for the beginner and hobbyist. I feel there are enough magazines that cater to this spoon-feeding approach to woodworking. I believe it is the responsibility of a "journal of the trade" to promote new ideas, as well as communicate events, and express and explain new ideas.

I consider your magazine informative with good potential. I liked your last issue (September/October, 1989 *AW*) especially the article on "A Woodworker's Tool Cabinet." Please continue feeding us higher-end woodworking. I know, when I was a beginner, it was the challenge and inspiration of the high-end articles and work that kept my interest in woodworking.

STEVEN L. GOEDERT
Central Valley, CA

Sir:

I loved your article on "Surfacing with a Scraper" (July/August, 1989 *AW*). I have a set of commercial scrapers, but the one I use most is a good-quality 1-in. putty knife.

Simply put the burr on the knife, and you can get right into those square corners with a scraper that even has a comfortable handle! It's super on panel doors and panel sides of antiques that have cross-grain sanding marks!

ED TIBKE
New Salem, ND

Send your comments, compliments, complaints and corrections to: Editor, AMERICAN WOODWORKER, *33 E. Minor St., Emmaus, PA 18098.*

Q&A

Big Circle Cutters

Q. *I'm planning to make some 6-in. dia. wheels for wooden toys on my 8-in. Delta drill press. The big circle cutters I've seen call for a maximum spindle speed of around 250 RPM, but the slowest speed on my drill press is 620 RPM. What do you suggest?*

DAVID OGDEN
Visalia, CA

A. The circle cutter you probably saw has a single, adjustable cutting bit that spins around the tool's axis. This type of cutter, called a "fly cutter," is inherently dangerous at high RPMs. The speed and unbalanced bit create an extreme tendency to chatter and throw the workpiece out of position.

The only safe way to use a large fly cutter is to reduce the drill-press spindle speed—100 RPM or less is good. You can slow down your single-speed drill press by adding an auxiliary jack shaft with step pulleys. Always clamp the stock tightly to the drill-press table.

If you're making just a few wheels, cut them out with a scroll saw. Otherwise, I suggest investing in a 6-in. dia. Lenox Hole Saw (available from Service Sales Corp., 2 Hinckley Rd., Hyannis, MA 02602) and a Quikijex Arbor (available from Parent Distributing Co., P.O. Box 5129, Essex Junction, VT 05453) to eject the cut-off hole centers.

DOUG KENNEY
Model maker
South Dennis, MA

Mitered Joints in Plywood

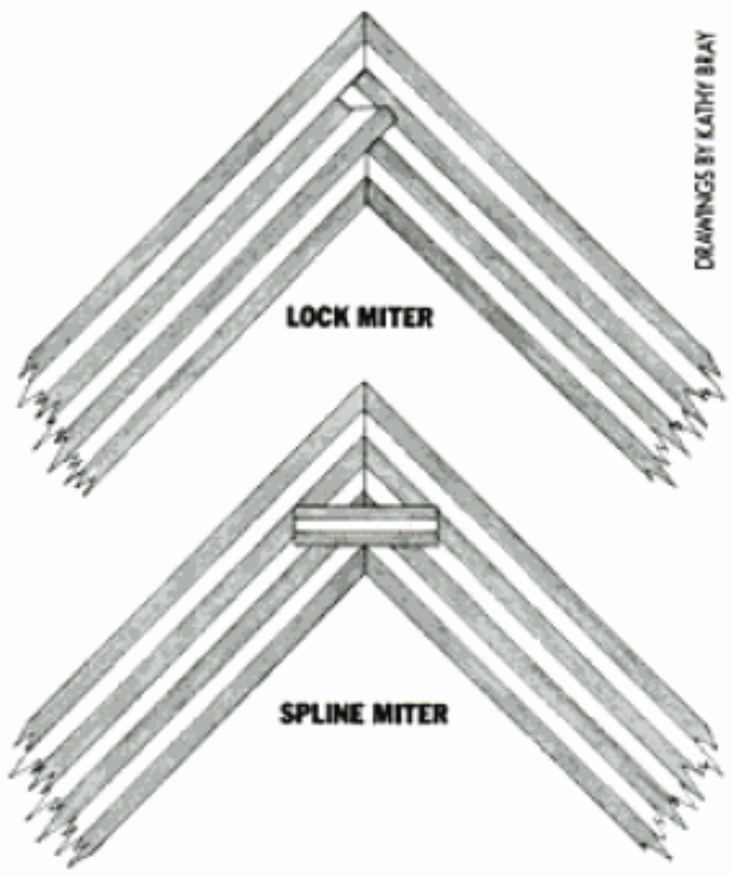
Q. *I'm working on a project that involves assembling a 3/4-in. plywood carcase with mitered corners. I'm having trouble getting the corners perfectly aligned, and I need some tips on gluing and clamping miter joints.*

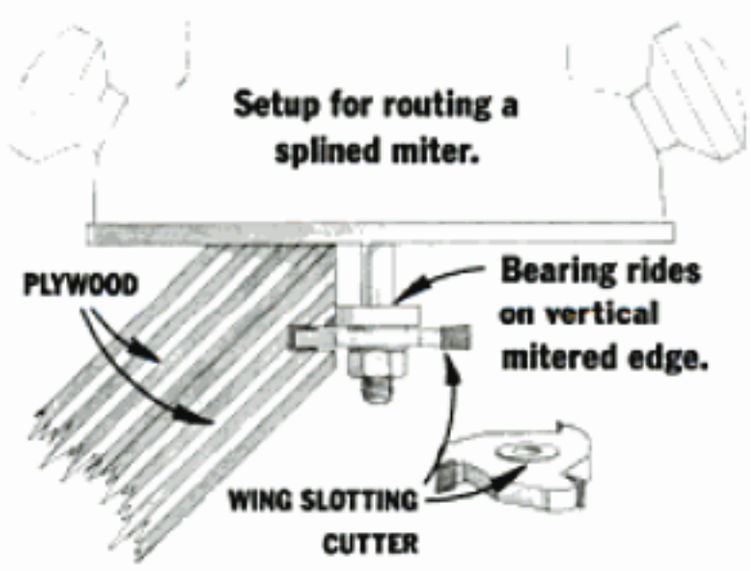
DAVID NIMBERGER
San Antonio, TX

A. Either a *lock-miter* or *splined-miter* joint is a natural for this application. If cut accurately, the corners will be in perfect alignment.

The lock miter is cut with a shaper or router using a special "lock-miter bit" (available from Cascade Tool Co., Box 3110, Bellingham, WA 98227). Registration (alignment) is usually excellent.

I make the splined miter with a router and a 3/16-in. or 1/4-in. wing slotting cutter, which comes in three parts—the shaft, cutter, and bearing. Mount the bearing on the shaft *above* the cutter. This way the bearing can ride against the stock.





After cutting your plywood to length and mitering the ends, clamp two pieces face to face as shown in the drawing. Run the router base over the face of one miter while grooving the face of the other. Flip the stock to make the other cut.

To assemble the joint, make a 1-in. wide plywood spline the same thickness as the slot and the length of the joint. The spline should be a snug fit.

PAUL LEVINE
Cabinetmaker
Sherman, CT

Microwave Wood Drying

Q. *I read an article recently about curing wood with a microwave oven. Do you have any information on this process? Is it safe?*

GEORGE L. VAUGHN JR.
Copemish, MI

A. Interest in using a microwave oven for drying wood has been growing recently. The only real advantage is speed—microwave drying is much faster than air drying, but it's probably not worth it to buy a microwave oven for drying wood.

My own experience is limited to drying green-turned bowls in a microwave oven. I've found that a thin bowl of 1/8-in. thickness can be dried in about 25 minutes instead of a day to dry in the air. An inch-thick bowl can be done in about three hours as opposed to up to three months in air. Thin green wood is very pliable when emerging hot from the microwave oven and can be bent or shaped easily.

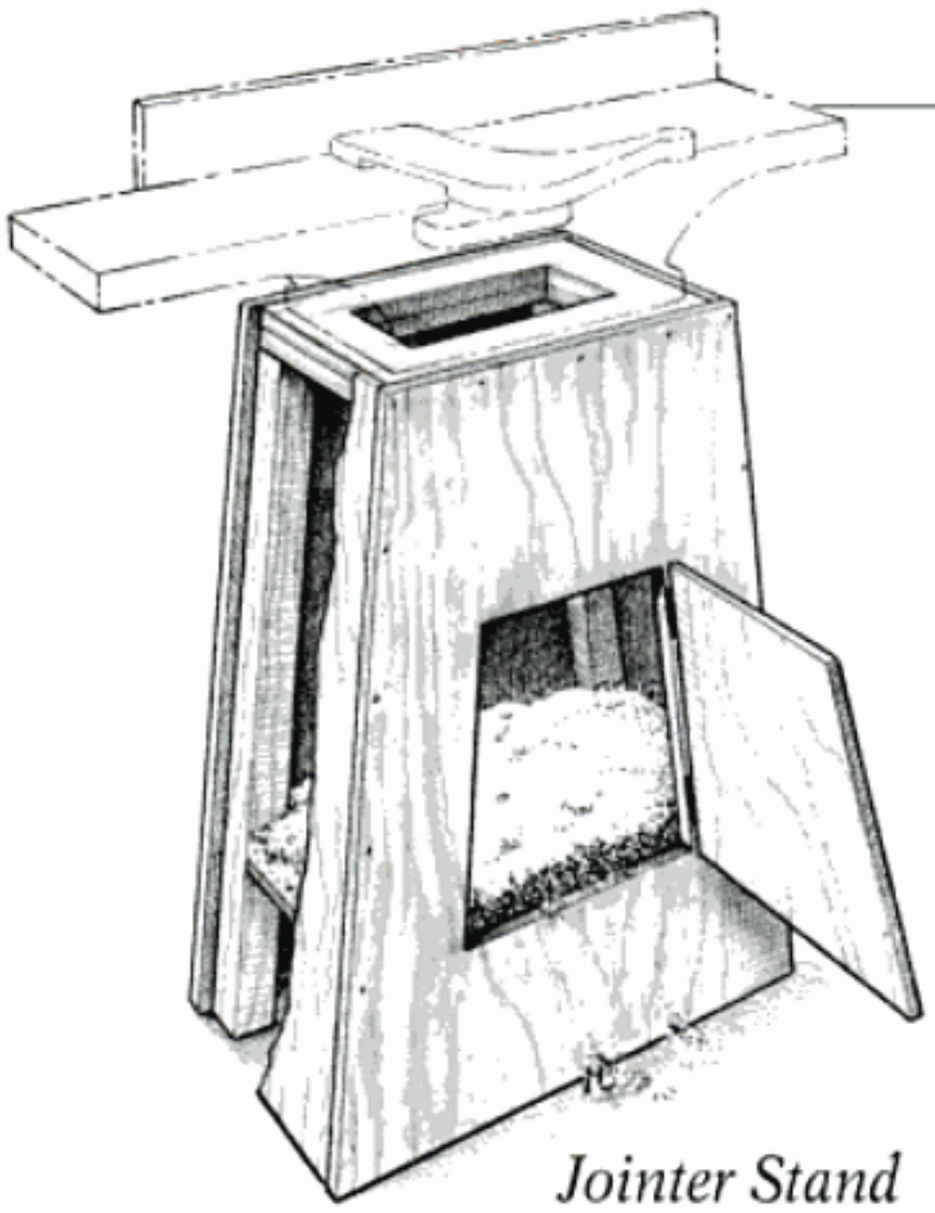
Not many guidelines have evolved yet for this new practice, so try it yourself to see what works for the wood species, shapes and sizes you're using. I would suggest the following tips:

- Use the defrost mode rather than full power.
- Take the wood out of the oven about every ten minutes before resuming microwave drying.
- Stick to objects with a maximum thickness of about an inch (though this can vary with species).
- Do a trial drying run with scrap before committing a valuable piece of wood to the oven.
- When running a trial, weigh the piece often to see how much water is lost, to get an idea of the drying rate and to tell when it's done.

MICHAEL O'DONNELL
Woodturner and Author
Caithness, Scotland

Got a woodworking question for the experts? Send it to Q&A, AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098.

TECH TIPS

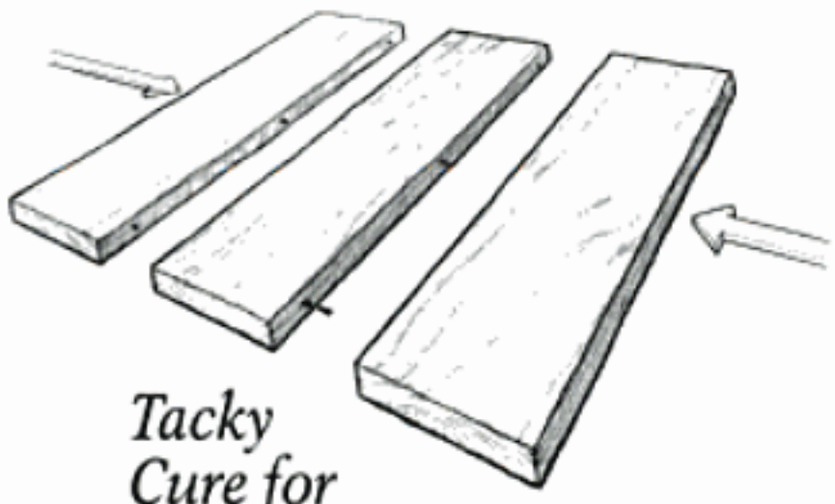


Jointer Stand

To keep the jointer shavings off the floor, we built an enclosed plywood stand for our 4-in. Delta jointer. The shavings fall into the stand, and at the end of the day, we open the door and vacuum them out.

The top of the stand is made of two layers of ¾-in. plywood and the sides are ⅜-in. ply joined at the corners with 2×2s.

ALICE & ROBERT TUPPER
Canton, S.D.



Tacky Cure for Edge-Glue Alignment

When edge-gluing boards, it's hard to keep the boards from shifting out of alignment when you put on the clamps. Dowels and biscuits solve the problem, but why go to all that trouble when an edge joint's plenty strong without them.

Instead of messing about with dowels or biscuits, I drive a couple of ¾-in. brass nails into one edge and nip off the head with a wire cutter. The ¼ in. or so that protrudes from the surface sticks into the mating board and the boards don't shift.

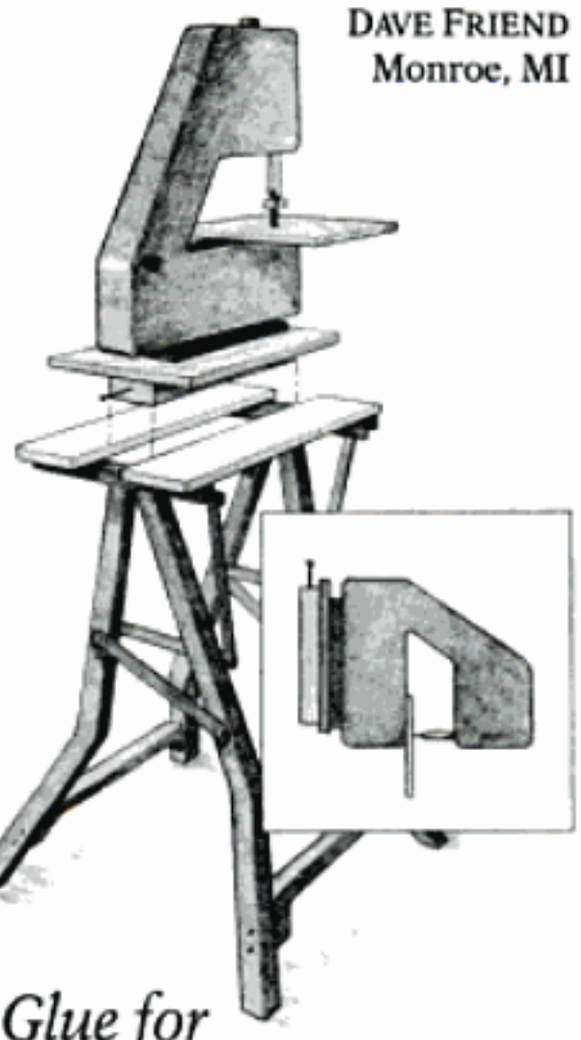
LAZLO SPECTRUM
Tucson, AZ

Handy Stands

I own several bench-top power tools, but I don't have the bench or floor space to set them all up at once. I devised a method to keep all my tools handy and ready to use in a matter of seconds.

I mounted each machine on a ¾-in. plywood base and fastened a length of 2×4 to the bottom of each base. When I need the machine, I lay the base across the tables of my Black & Decker Workmate bench and clamp the 2×4 between the jaws. I attached an eyehook to one end of the 2×4 so I can hang the machine on the wall when not in use.

DAVE FRIEND
Monroe, MI

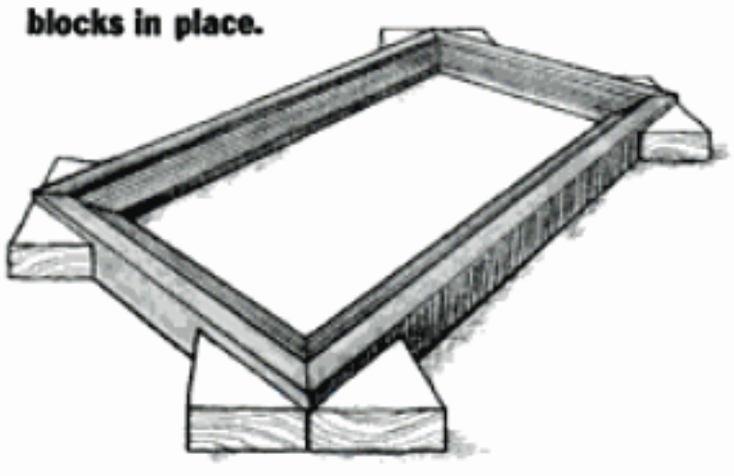


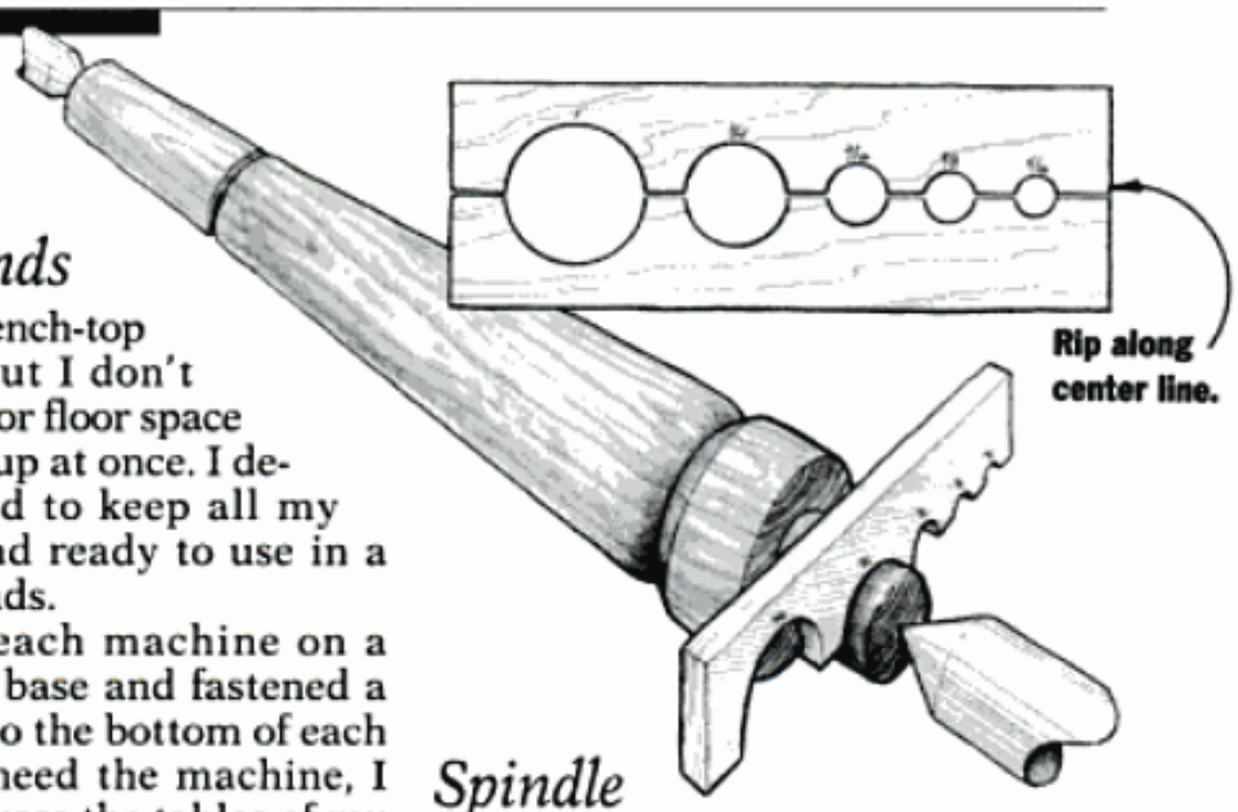
Hot Glue for Clamping Blocks

Whenever I need a temporary clamping block, such as in the assembly of picture frames, I attach the blocks with hot-melt glue. It works fast, attaches securely, and the blocks are easy to pare off with a sharp chisel.

LEE MAUGHAN
Panaca, NV

Hot glue clamping blocks in place.





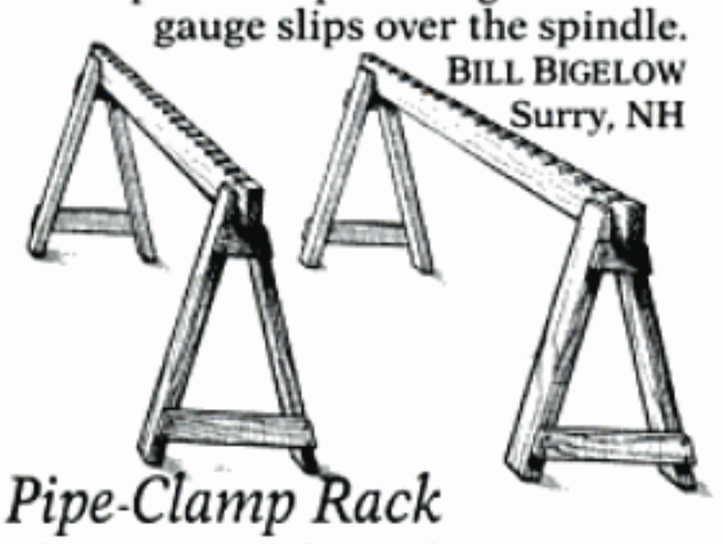
Spindle Sizing Gauge

Spindle turning goes a lot faster if you have a sizing gauge to measure different diameters.

You can make a gauge by drilling different-size holes in a piece of scrap wood, then ripping the stock along the center line of the holes.

Use the gauge as you would a pair of calipers—keep turning until the gauge slips over the spindle.

BILL BIGELOW
Surry, NH



Pipe-Clamp Rack

Gluing up can be a pleasant experience, or a nightmare. Clamp arrangement and planning ahead can mean the difference between success and failure.

I've developed a saw-horse type clamp rack that holds ¾-in. pipe clamps upright and at equal spacing during glue ups.

To make the tops of the racks, I edge-glue two 5-ft. lengths of 2×6, then drill equally spaced, 1-in. dia. holes down the center. Then I rip the piece down the middle.

LEE MAUGHAN
Panaca, NV

Know a better way of doing something? Designed a clever jig? Send your woodworking tips, along with a sketch or a snapshot to: Tech Tips, AMERICAN WOODWORKER, *33 E. Minor St., Emmaus, PA 18098. We'll pay you $25 if we publish your tip.*

DRAWINGS BY HEATHER BRINE LAMBERT

Water-Based Finish▼

If you're after a tough, clear finish try Varathane Elite "Diamond Finish" Transparent IPN Coating. It's an odorless, non-toxic, protective wood coating that dries in as little as an hour and meets all current VOC (volatile organic compond) regulations. This water-based coating is clear, and it won't yellow with age. Cleanup isn't a hassle—just use soap and water. (Price: half-pint, $7.99; pint, $12.49; gallon, $49.95)

■ *The Flecto Co., Inc., Dept. AWT, 1000 45th St., Oakland, CA 94608. (800) 6-FLECTO.*

Relief for Bearings▼

The pilot bearing on your router bit has to perform under extreme heat, dirt and friction. Eventually this wears out the bearing. Pilot Bearing Saver (PBS) is a new lubricant formulated exclusively for router-bit bearings. A couple of drops and your bearing will thumb its nose at heat and friction. If you use PBS regularly, your bearing will also last much longer. Available in either single tubes or packs of 6 or 12 tubes. (Price: 1 tube, $3.95; 6, $22.50; 12, $42.60)

■ *Success Engineering and Manufacturing, Dept. AWT, P.O. Box 25648, 9418 Dorothy Ave., Cleveland, OH 44125. (216) 883-1200.*

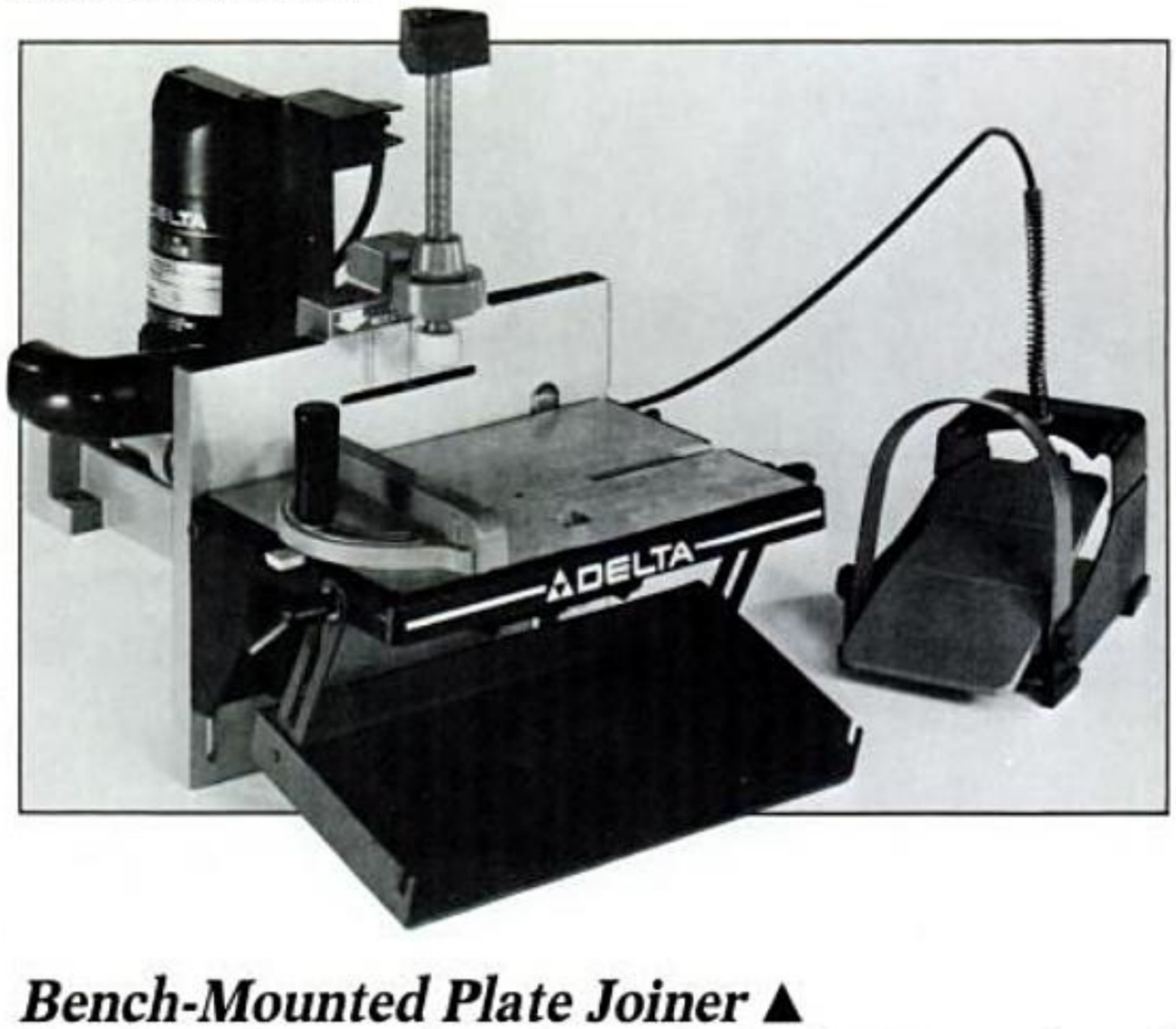
CIRCLE NO. 22 ON READER SERVICE CARD

Elegant Scraper

▲ Cabinet scrapers are great for smoothing, but their large size can be awkward on small jobs. This cabinetmaker's finishing scraper is just the right size for delicate pieces. You can get excellent control of the blade, even with one hand. The 6-in. long, figured maple body has a steel-sole plate. The $1^3/_8$-in. wide blade is mounted in the body with a stout wedge. Modeled after an antique scraper, this tool will please any craftsman. (Price: $72.50; extra blade, $17.95)

■ *Woodcraft Supply Corp., Dept. AWT, 210 Wood County Industrial Park, P.O. Box 1686, Parkersburg, WV 26102. (617) 935-3866.*

CIRCLE NO. 26 ON READER SERVICE CARD



Bench-Mounted Plate Joiner▲

Plate joiners have rewritten the book on basic joinery techniques, though manhandling the machines around the shop was sometimes awkward. Delta's new stationary plate joiner, Model 32-100, has changed that. The machine is a bench-mounted biscuit joiner with a small 8-in.×12-in. adjustable worktable. Your hands are free to hold the wood against the fence. A foot control feeds the cutter blade into the work. The plate joiner performs all types of biscuit-joinery cuts, as well as dadoing and T-moulding operations. It features a handy complement of adjustments, stops, and clamps to facilitate set up and production. A 115-volt, 10-amp motor provides the power. (Price: $645)

■ *Delta International Machinery Corp., Dept AWT, 246 Alpha Dr., Pittsburgh, PA 15238. (800) 438-2486.*

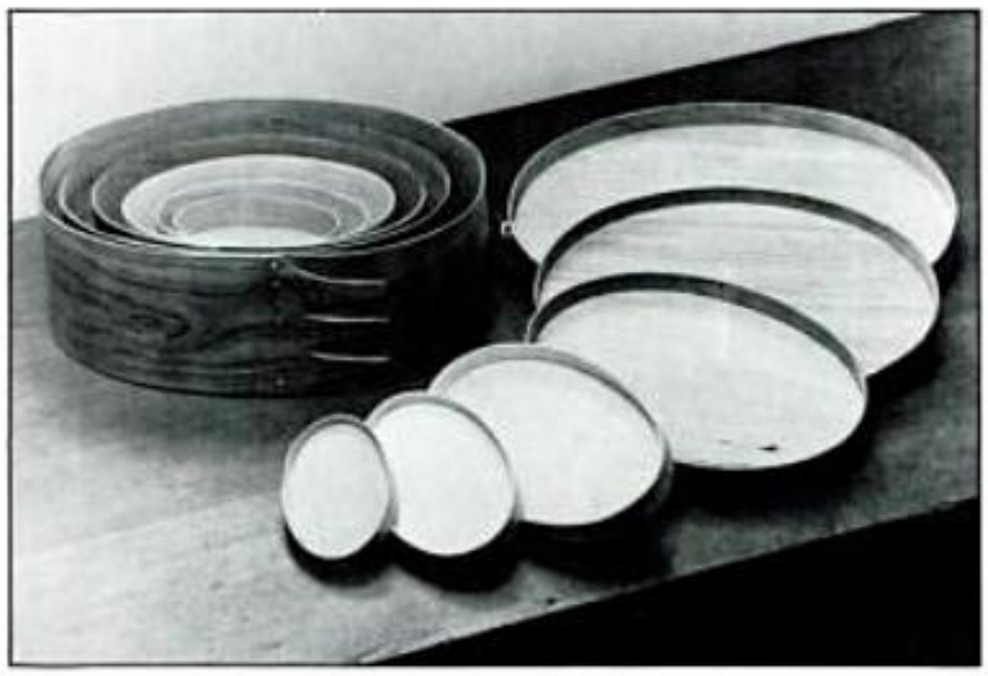
CIRCLE NO. 8 ON READER SERVICE CARD

A NEST OF SHAKER BOXES

A Box Within a Box Within a Box...

BY NICK ENGLER

The country folk in both Europe and America used oval-shaped bentwood boxes for many purposes. Usually, they stored small household items in them. Sometimes a country handyman would add a handle to make a carrier. Old labels and business records show that these boxes were occasionally employed as shipping containers. Some were lined with fabric to make sewing boxes. Still others were filled with wood shavings to serve as spitoons.



Single or as a nest, these shaker oval boxes make an elegant and useful gift.

Whatever their use, many folks preferred oval boxes for their economy, durability, and design. The side of a bentwood box is very thin, and it has no corner joints. Because of this, it requires fewer materials and less time to make than a box with straight sides and square corners. Its oval shape makes the box deceptively strong; the elliptical curve keeps the thin sides from collapsing, even during rough use. The long side of the ellipse provides a good location for joinery. Distinctive swallowtail joints allow the parts of the box to expand and contract without distorting or causing the lid to bind. Finally, the oval shape fits the hand comfortably. You can grasp the lid and pull it off the box easily.

While many country craftsmen built oval boxes, perhaps the best remembered are the Shakers. They refined the form, making oval boxes lighter, better-fitting, and more uniform than most box makers did. Several Shaker communities manufactured these boxes in graduated sizes. The boxes fit or "nested" inside one another, saving storage space when not in use. A set of Shaker oval boxes—one of each size—was known as a nest of boxes. Early 19th-century nests had as many as 12 or as few as five oval boxes. By 1850, most Shaker communities were making nests with seven standard sizes. They numbered these from #0 (the smallest) to #6 (the largest.)

Many contemporary woodworkers continue to make boxes in the Shaker tradition. The information and methods used to produce the nest of boxes shown here are supplied by Larry Owrey of Franklin, Ohio. Owrey demonstrates box making at the site of the old South Union Shaker Community near Bowling Green, Kentucky. He also conducts box-making seminars throughout the Midwest. Owrey's nests consist of six boxes: He has little call for the #0 box, the smallest size, but he has provided us with plans for all seven standard sizes.

PHOTOS BY KAREN CALLAHAN

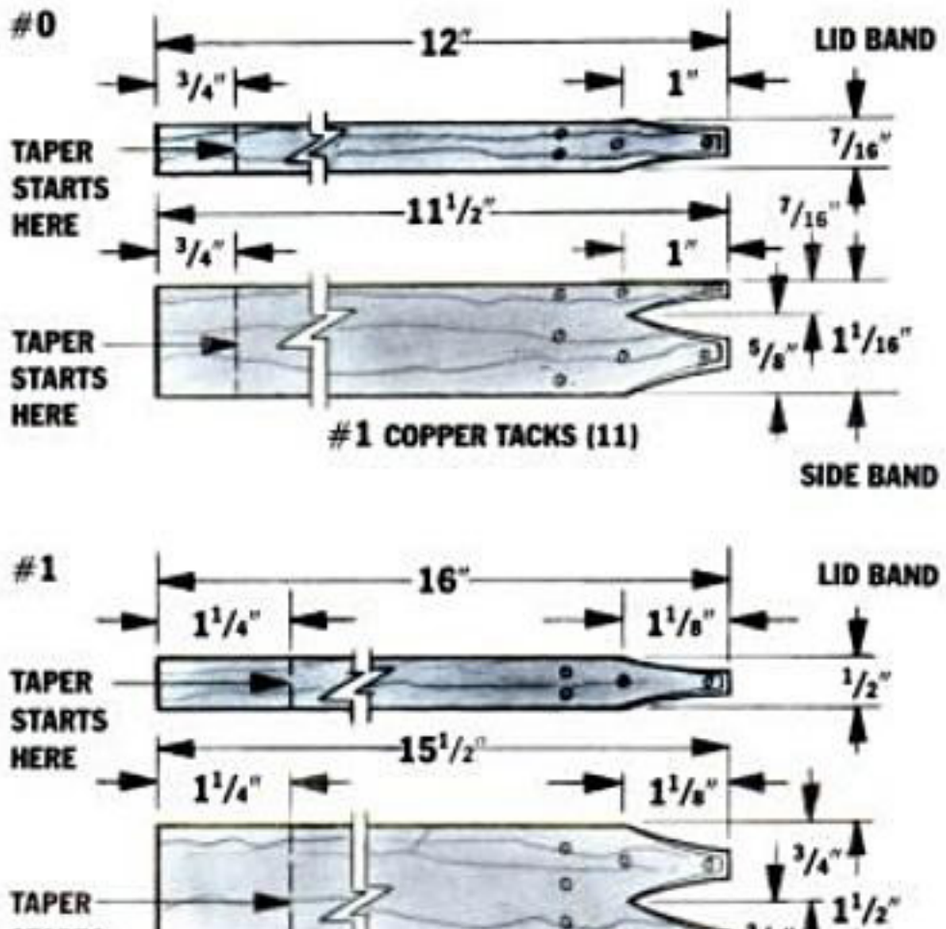
Choosing the Wood

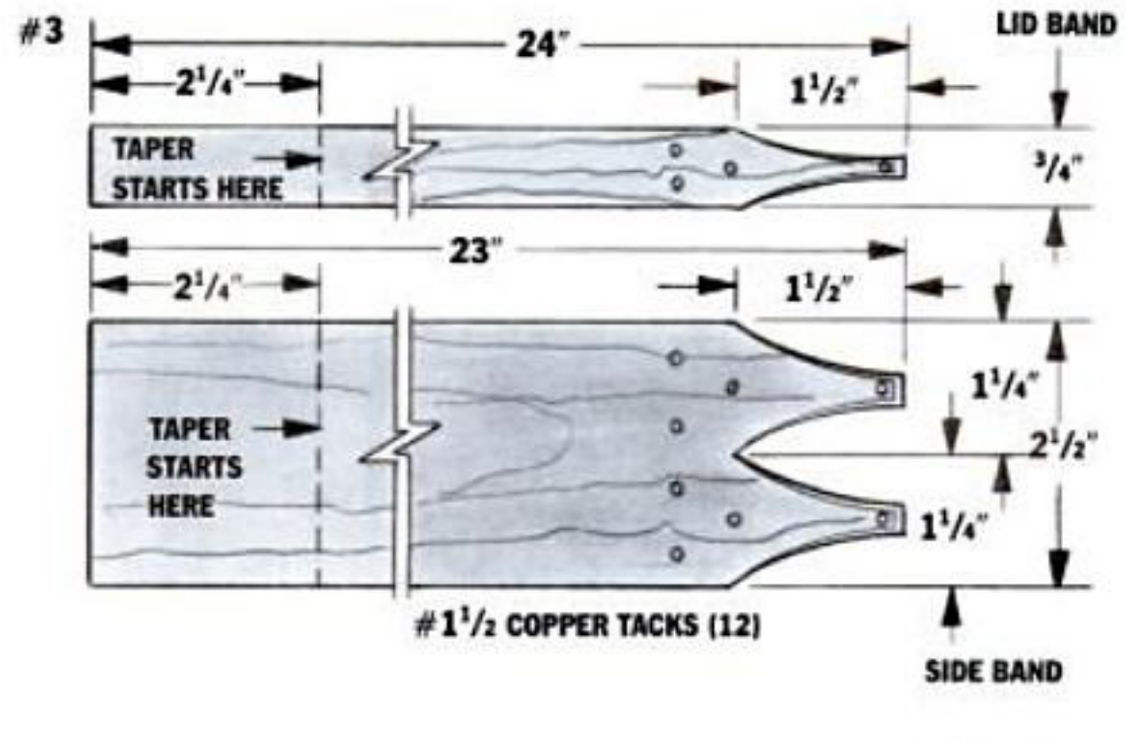
Traditionally, Shakers made the side and lid bands of oval boxes from straight-grained hard maple or birch for strength, and the lids and bottoms from white pine for its dimensional stability and workability. Both these woods are nearly white in color. This was very important, since the Shakers usually painted the boxes. Paint covers light-colored woods easily, and the colors remain vivid.

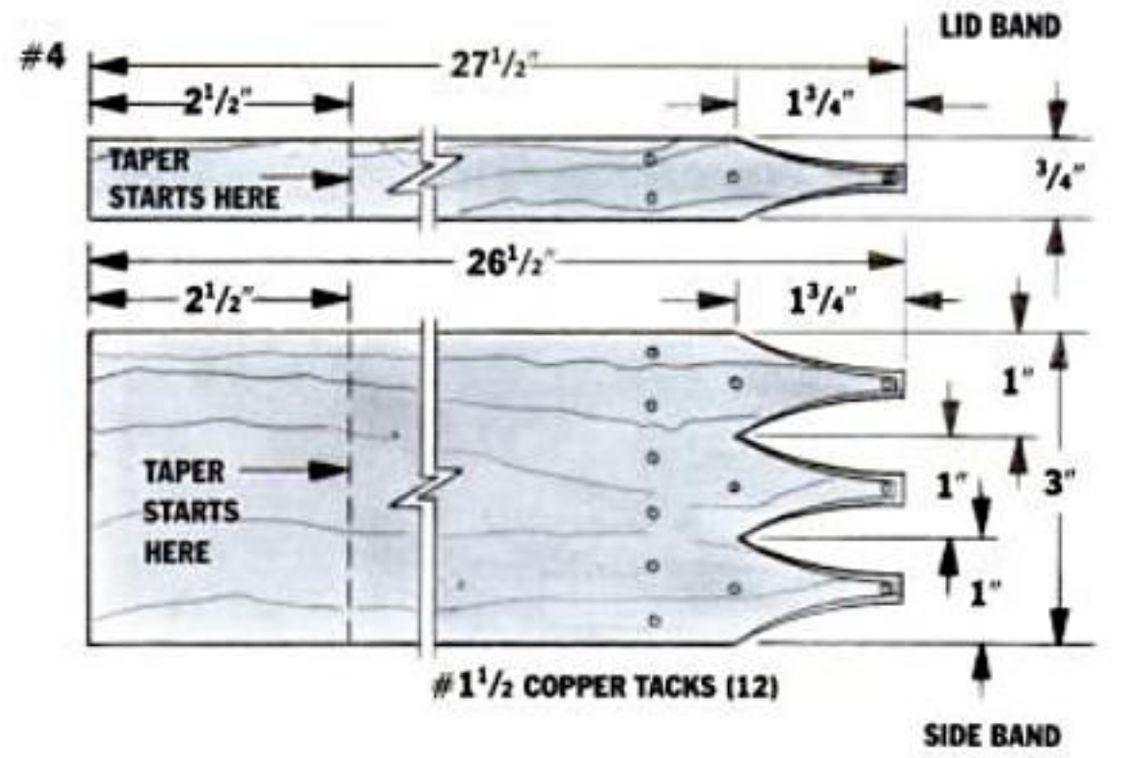
Cedar makes good bottoms and lids, especially if you want to store cloth goods or foodstuffs in the

FIG. 1: SHAKER BOXES

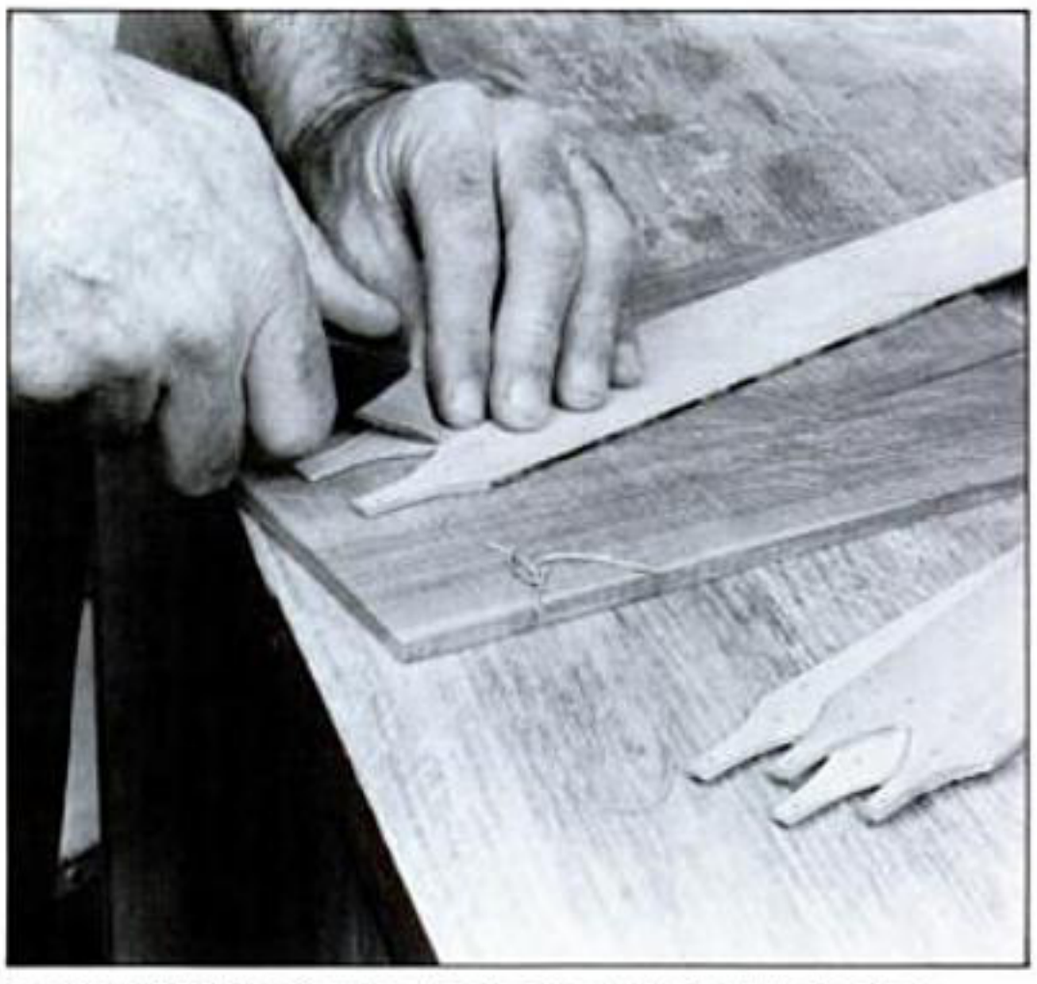
BAND LAYOUTS







NOTE: 1/16" BAND THICKNESS: BOXES #0, #1, #2
3/32" BAND THICKNESS: BOXES #3, #4, #5, #6



Swallowtail joints allow for wood movement. Bevel their edges with a knife, making them steeper at the beginning of the tail than they are at the end.

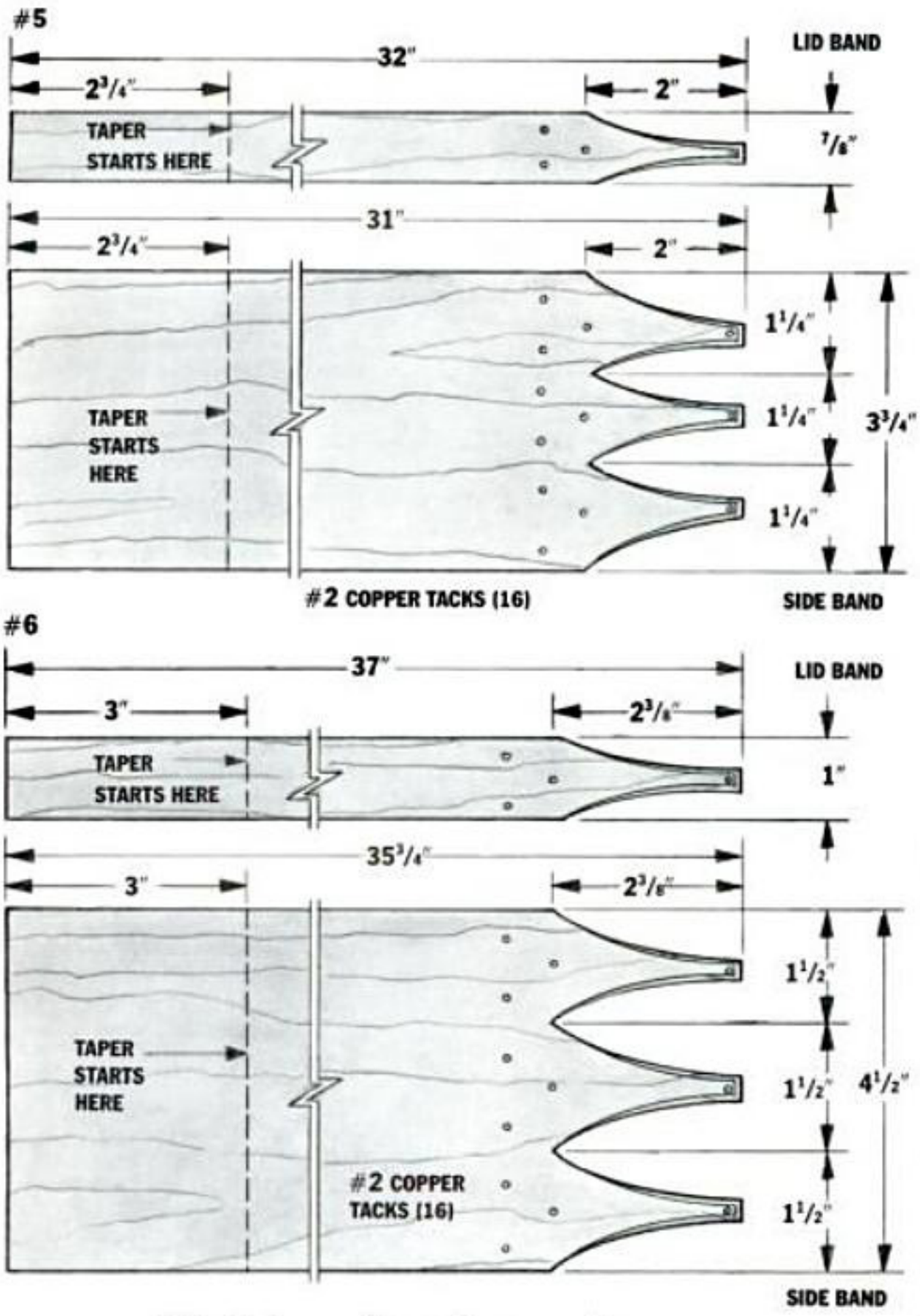
boxes. Avoid brittle woods like redwood, or woods that splinter easily such as oak.

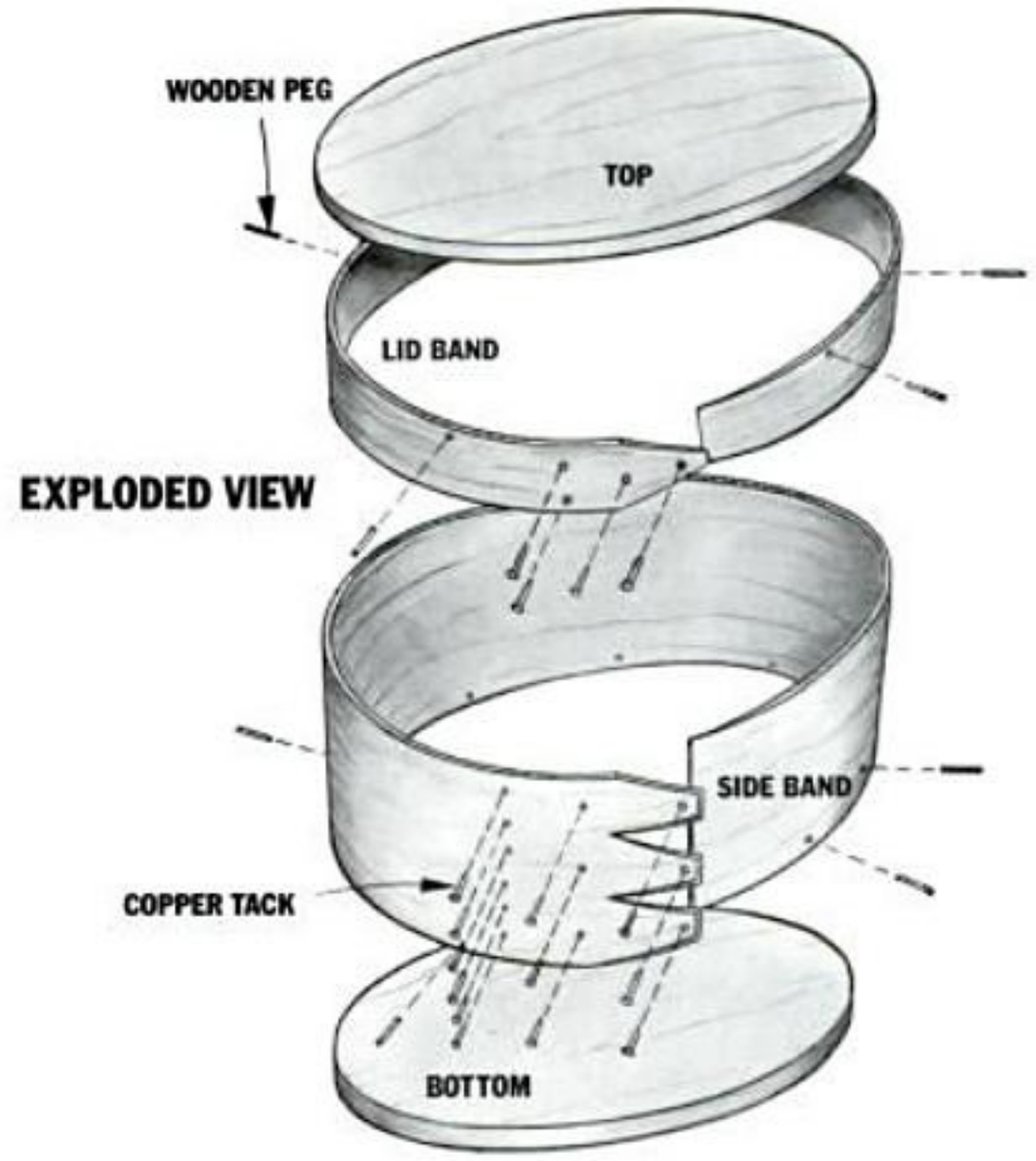
Cutting the Bands

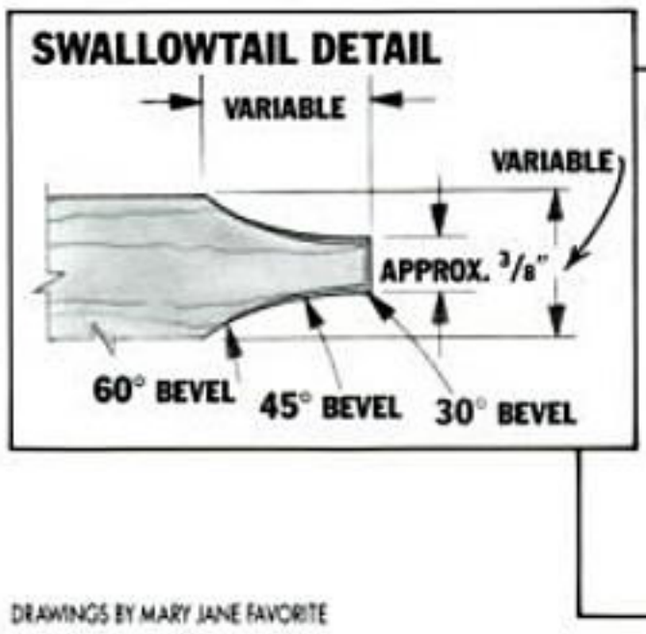
Once you've selected your stock, cut the bands. These must be very thin—just 1/16 in. for the three smaller boxes and 3/32 in. for the other four sizes. To make this thin stock, first rip the wood to the required band width, then resaw it on a bandsaw. Cut the wood slightly thicker than needed, then plane it or sand it to final thickness. Note: Make some extra band stock for each box. You may need it when it comes time to bend the wood.

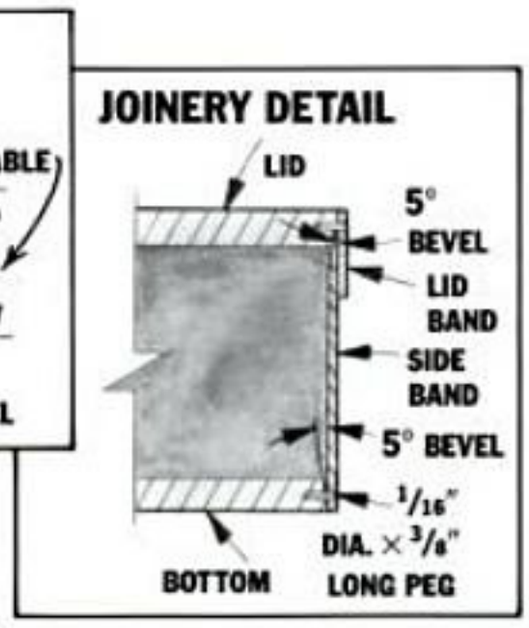
Cut the band stock to the lengths you need. (See Fig. 1.) Lay out swallowtail joints on one end of each band, as shown in the drawing, then cut them to shape with a bandsaw or a scroll saw. Drill 1/16-in. dia. pilot holes through the swallowtails where you will drive the copper tacks that hold the bands together (available from the W.W. Cross Nail Co., P.O. Box 365, Jeffery, NH 03452).

If you want to produce several boxes of the same size, tape the band stock together, one on top of the other. Lay out the joints on the top band, then saw and









DRAWINGS BY MARY JANE FAVORITE

drill all the swallowtails at one time.

Using a very sharp utility knife or carving knife, cut bevels in the outer edges of the swallowtails. Start cutting at the base of each swallowtail, making the bevel very steep—about 60°. As you cut, decrease the angle of your knife. By the time you get to the end of the tail, the angle of the bevel should be 30° as shown in the Swallowtail Detail. Cut a bevel on the very end of each swallowtail, too.

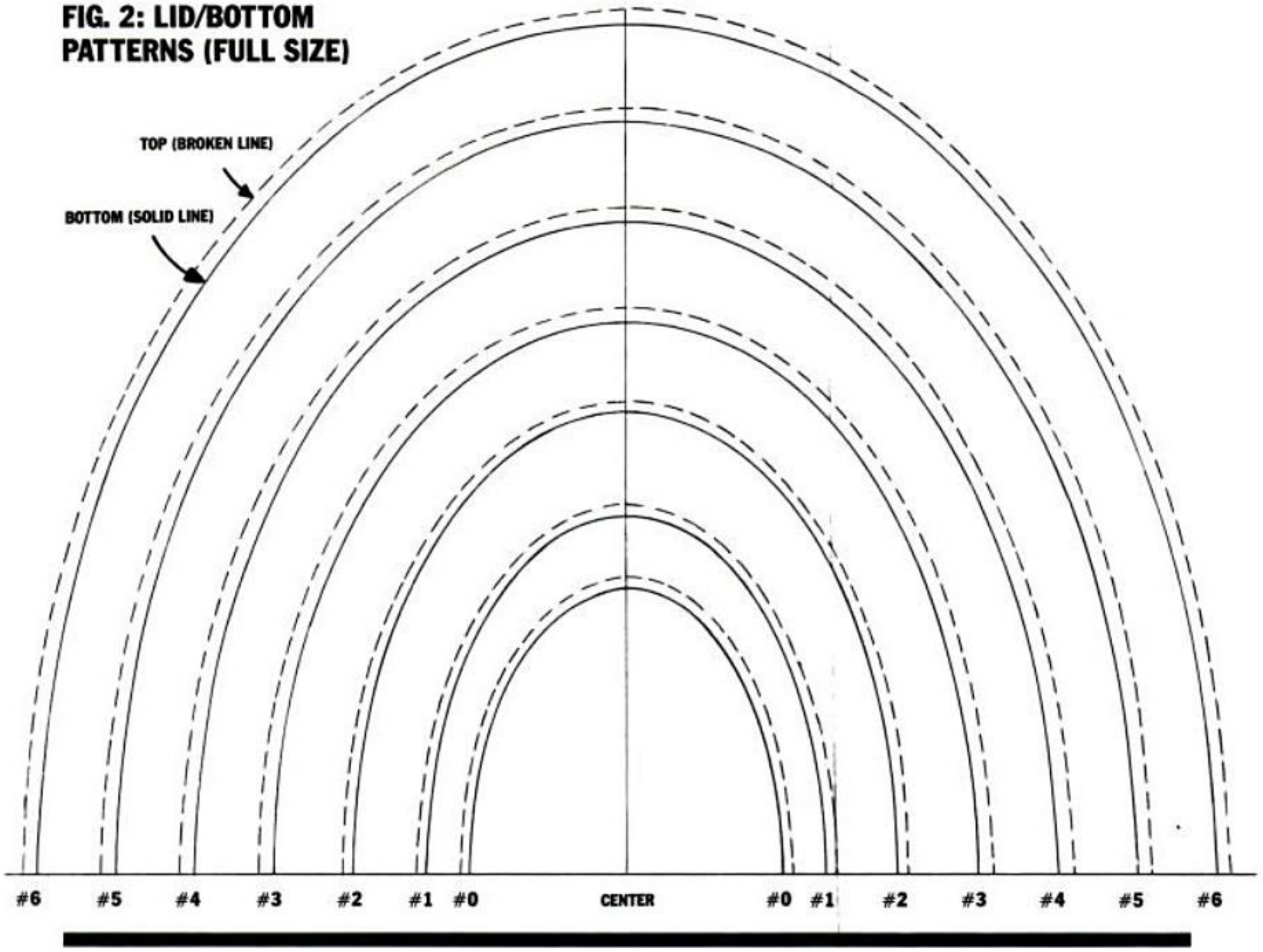
On a stationary belt sander with a 100-grit sanding belt, sand off the saw marks on each band. Grasp the band firmly so the sander doesn't pull it out of your hands. Keep the band moving as you work, and sand the entire band evenly. Sand the swallowtails slightly thinner than the rest of the band. Then sand a taper on the opposite end of the band as shown in the Band Layouts drawing. This process can also be done with a hand plane.

Bending the Bands

Before you begin the bending process you will need to have a few jigs on hand. Refer to the sidebar on Jigs For Oval Boxes for information on how to make these jigs. You will need a poacher with a heat source (or a

Smooth the box bands on a belt sander, sanding a taper in the end opposite the swallowtails. Use a thin scrap to press the wood against the belt as shown.

FIG. 2: LID/BOTTOM PATTERNS (FULL SIZE)



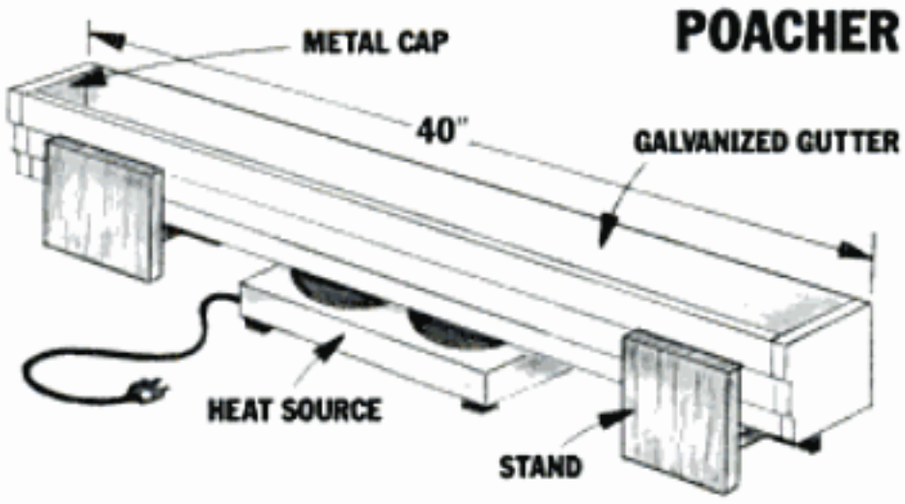
After soaking the bands, wrap the side band around the mold, taking care to position the swallowtail joints on one of the mold's long sides.

Mark the position of the swallowtail joints so you have reference marks to fasten it together once you take it off the mold.

JIGS FOR OVAL BOXES

You don't need a lot of special tools to make bentwood boxes. But you do need to make a few simple jigs—a poacher, box molds, dryers, and an anvil.

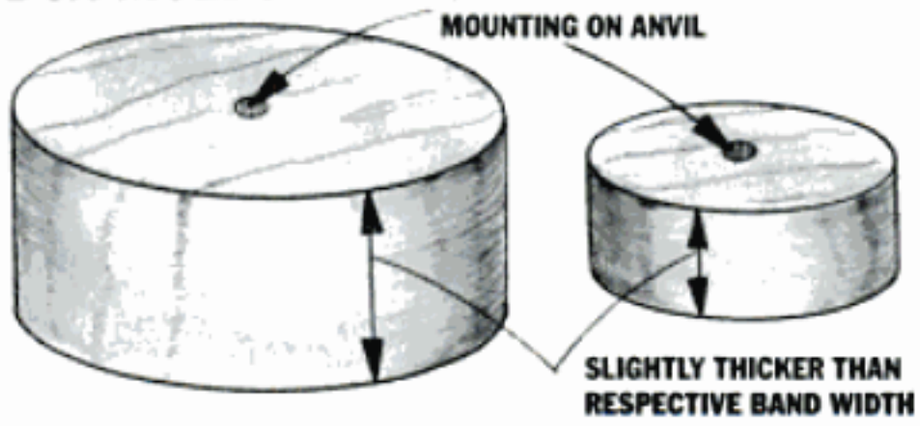
POACHER



POACHER—This is a long, water-tight trough, in which you soak the bands in hot water. Soaking makes them pliable. Owrey brazed together sheets of copper to make his poacher.

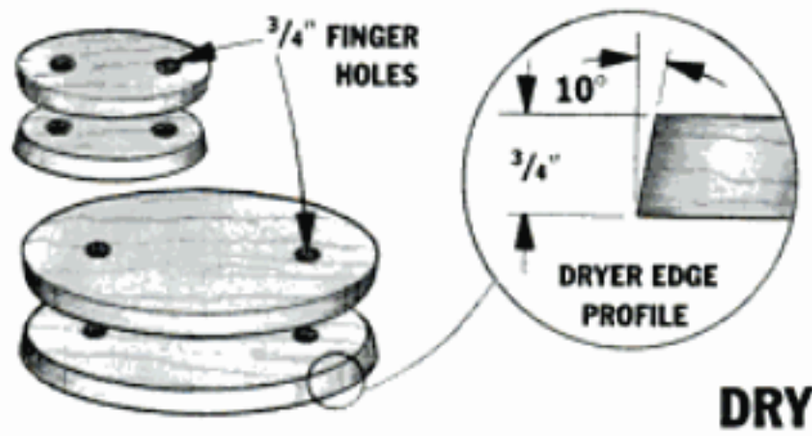
You don't have to go to this trouble or expense just to make a few boxes. Instead, cut a piece of galvanized rain gutter about 40 in. long—slightly longer than the bands for the largest (#6) box. Put metal caps on the ends and seal them with a heat-resistant epoxy putty. (You don't need to solder the ends in place as long as you heat the trough in the middle and don't get it hot enough to boil the water.) Set the trough on an electric hot plate, camp stove, or other compact heat source. If necessary, make wooden cradles for the ends to hold the trough and keep it from sagging.

BOX MOLDS



BOX MOLDS—After poaching the sides, you'll bend them around thick, oval-shaped blocks—molds—to shape them while they dry. You'll need to make a separate mold, from scrap wood, for each box size. Plane each mold a little thicker than the width of the corresponding side band. For example, plane the block for the #1 box about 1 3/4 in. thick, since the side is 1 1/2 in. wide. Cut the blocks to the same oval shapes as the bottoms of the boxes as shown in the Lid/Bottom Patterns.

Owrey has drilled a 3/4-in. dia. hole through each of his molds. This enables him to secure the molds on a 3/4-in. dia. post mounted in his anvil. The molds stay put while he works, yet he can turn them 360° as he bends the wood.

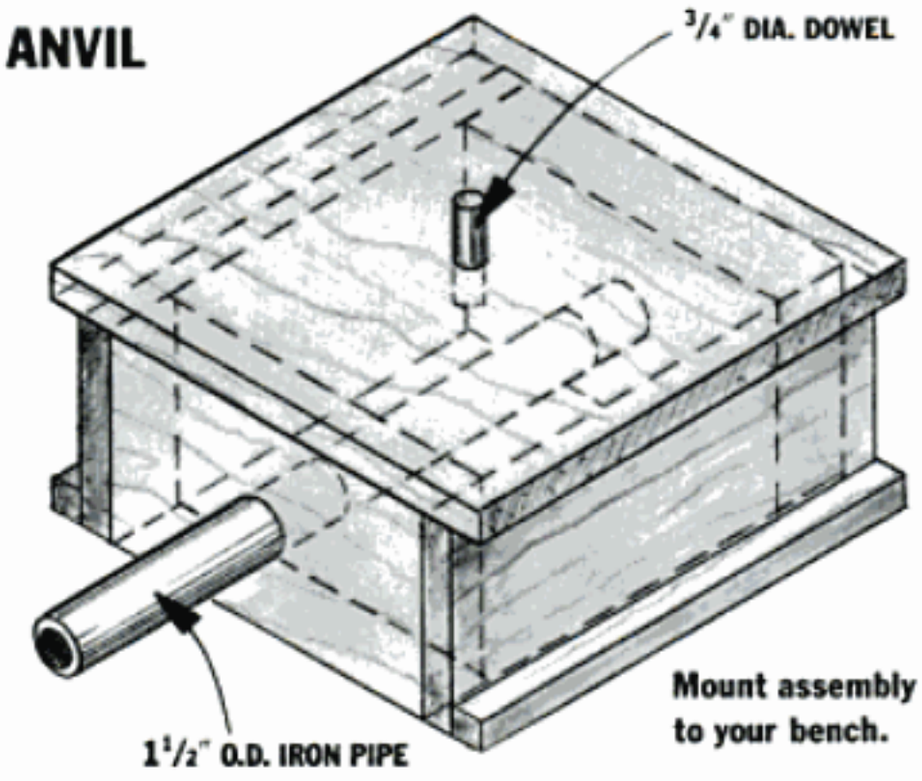


DRYERS

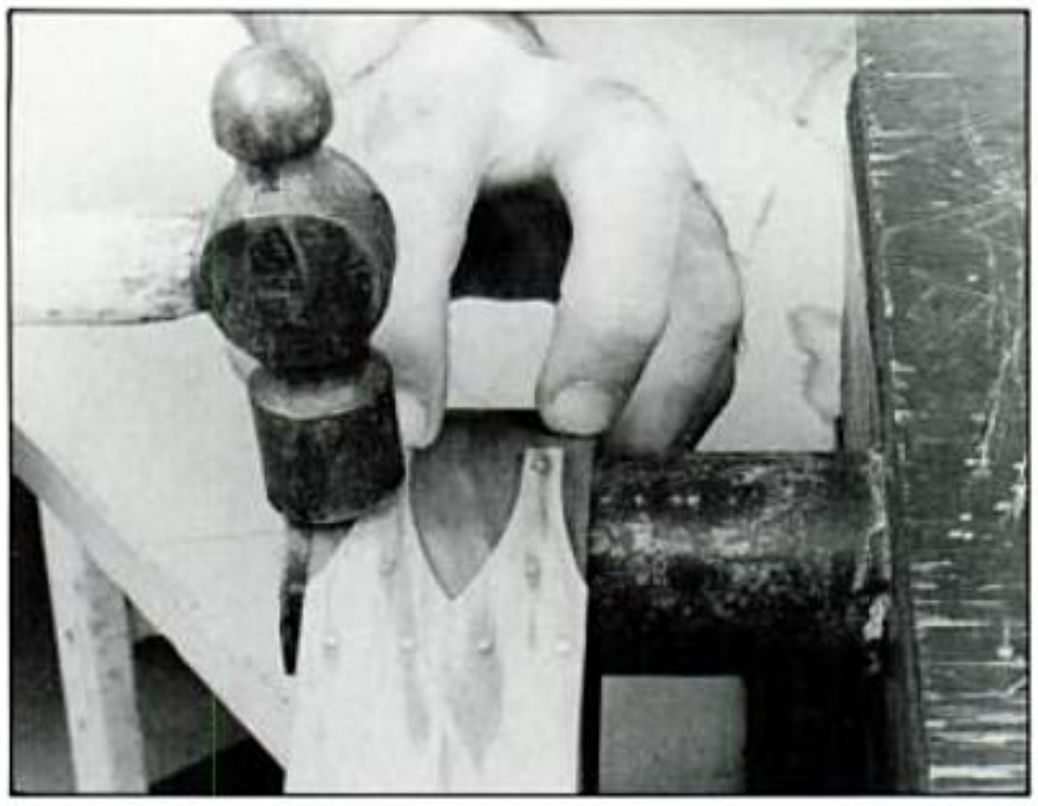
DRYERS—These are oval-shaped plugs with beveled edges. They set the shape of the box as the wet bands dry. Make two dryers for each box—to be placed at the top and bottom edges of the drying side band. Cut 3/4-in. thick scrap to the same oval shapes as the lids of the boxes. (This shape is also shown in the Lid/Bottom Patterns.) Saw each dryer 1/16 in.—1/8 in. wide of the line—making it slightly larger than needed. Then sand up to the line with a stationary disk sander or belt sander. Tilt the sander's work table 10° from the sanding surface. Bevel the edge of the dryer 10° as shown in the drawing.

Drill one or two 3/4-in. dia. finger holes through each dryer. As a band cools and dries, it shrinks and tightens around the dryers. The holes help you pull the dryer loose from the band.

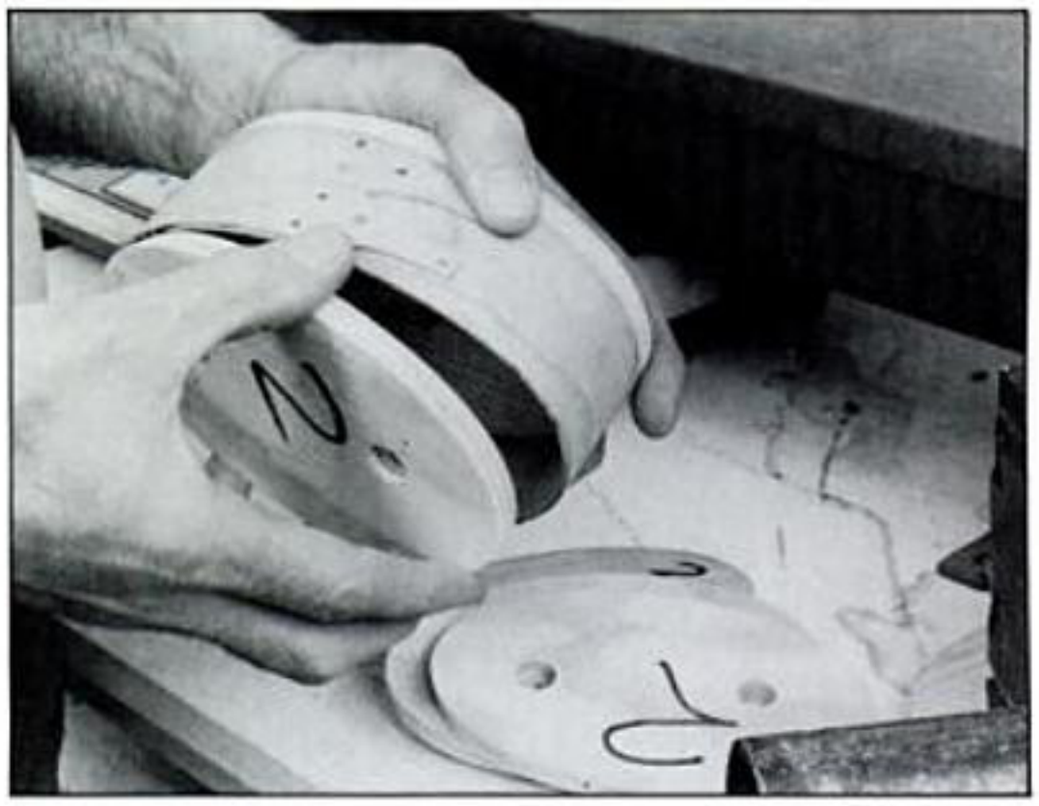
ANVIL



ANVIL—You need an anvil to clinch or bend over the tacks on the inside of the bands. Make an anvil from a length of 1 1/2-in. O.D. iron pipe. Mount the pipe in a wooden framework, so the pipe protrudes 6 in. from one end. Add a flat work surface to the top as shown in the drawing. In the center of this work surface, drill a 3/4-in. dia., 1/2-in. deep hole. Glue a 3/4-in. dia., 1 1/2- in. long dowel in the hole, and use it as a post to mount the molds. Then you can bend the bands and fasten them together on the same jig. To use the anvil, clamp it to your workbench with the pipe sticking out over the edge of the bench.—*N.E.*



Place the positioned band over your anvil and gently drive the tacks through the wet wood so the points clinch when they hit the metal.



After you've tacked the side band together, insert the dryers—one in each end. Don't force them in place. If you press too hard, the band may come apart.

steam box) to soften the bands for bending, and box molds around which to bend the bands. You'll also need to make an anvil to provide a hard surface when you nail each box band together. Finally, you'll need a pair of dryers for each size box you make, to hold the box in shape while it drys.

To begin, fill the poacher with water. Turn on the hot plate, and heat the water so it steams but doesn't boil (about 150° F to 175° F). Put the lid band and side band in the water, and let them soak for at least 15 minutes, preferably 25. (You can soak or steam them longer without harming them, but it will take them more time to dry.) When you take a band out of the water, it should be no stiffer than shoe leather.

Take the side band out first. Before it cools, quickly bend it around the box mold.

Place the tapered end against the long side of the elliptical mold, and wrap it as tightly as you can. Lap the swallowtails over the tapered end. The swallowtails must end up on the long side of the form, with the bevels facing out. Draw a line to mark the location of the swallowtails on the band beneath. Loosen the band just enough to take it off the mold, but don't let it come apart completely. Note: if the wood breaks or splits when you bend it, it may need to soak longer. However, sometimes the wood breaks no matter how long you soak it. This is one of the reasons you need to make extra band stock.

Lay the mold aside. Put the band back together, lapping the ends so the marks line up. Place the band over the end of the anvil. Insert a tack in one of the swallowtail holes and drive it home. As the tack goes through the band, the point will hit the metal anvil and clinch over. This keeps the tack from pulling loose. Repeat the process, driving tacks through all the holes.

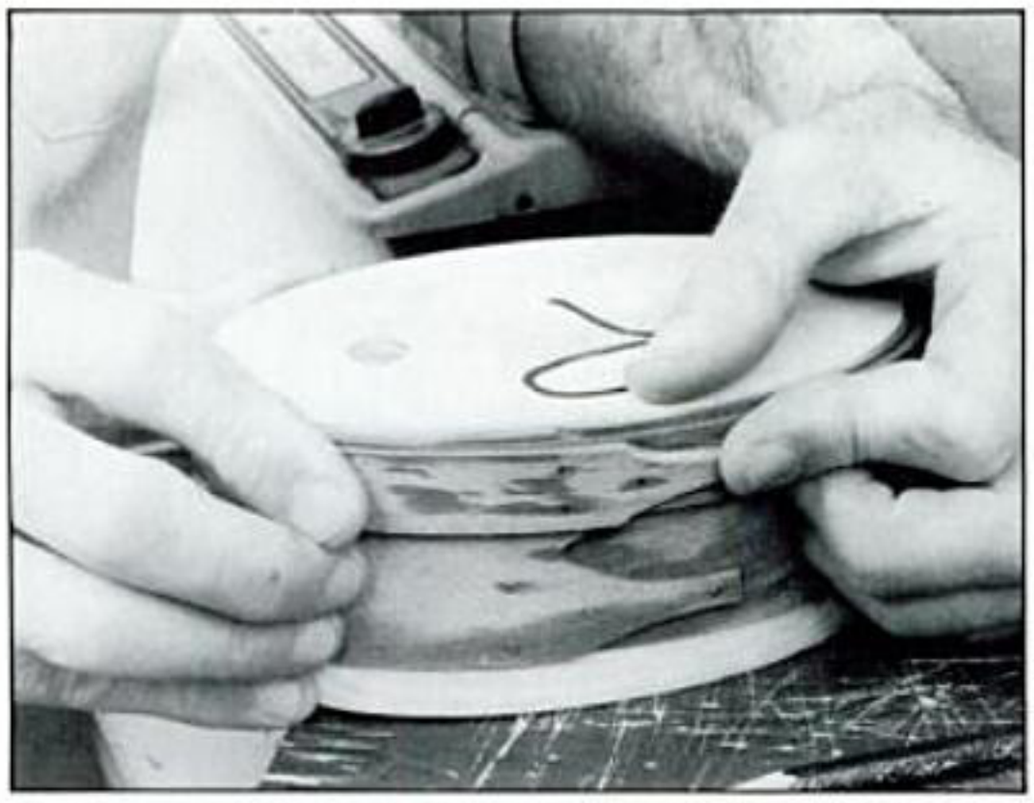
Press the dryers into the assembled band like you'd press a cork into a bottle. Use two dryers, one at the top of the band and the other at the bottom. The dryers hold the band in an elliptical shape as it drys. Take the lid band out of the poacher and wrap it around the assembled side band. Leave the dryers in place for this operation; they shouldn't be in the way. Mark the location of the swallowtail on the lid band, then remove it, and tack it together in the same manner as the side band. Put it back in place around the side band. Adjust the top edge flush with the top of the side band, and turn it so all the swallowtails and tacks line up. Let both bands dry for several days.

Assembling the Box and Lid

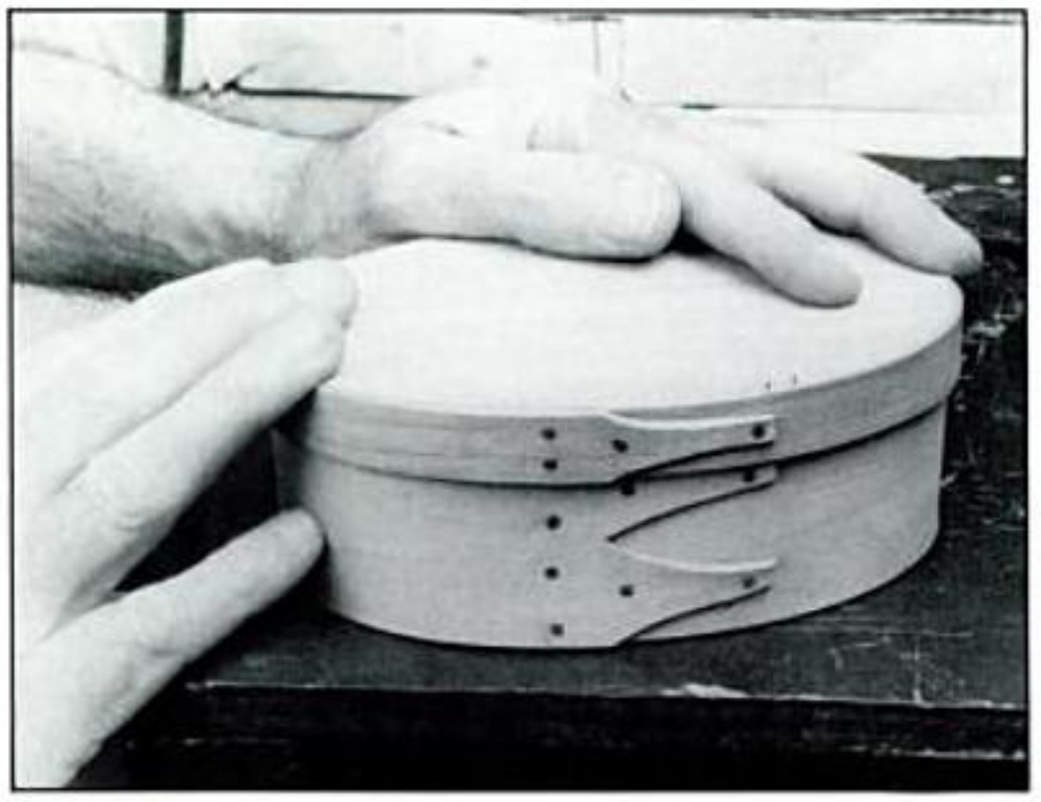
After the bands dry, make an oval-shaped bottom from $^1/_4$-in. thick stock, cutting it to the shape shown in Fig. 2. Cut $^1/_{16}$ in.—$^1/_8$ in. wide of the line—then sand a 5° bevel on the edge, as shown in the Joinery Detail in Fig. 1, the same way you sanded the 10° bevel on the edges of the dryers. (See sidebar on Jigs for Oval Boxes.) Don't sand up to the line yet; remain just wide of it. Note: This bevel is very important. You should wedge the bottoms and the lids in the bands, not just insert them. The 5° bevel on the edge stretches the band slightly, making the joint tight all around the circumference.

Remove the dryers from the bands, and test fit the bottom in the side band. To insert the bottom in the band, place one long side of the oval against the lapped ends of the band, and let the lid swing into place as if you were closing a door. This method puts a minimum of stress on the joints. The fit should be snug, but you shouldn't have to force it. The lid will make a small squeak when the parts fit properly. If the bottom is too tight, sand a little more stock from the edge, and try again. Repeat until the bottom fits just right. Press the bottom in place so the outside face is flush with the bottom edge of the band.

Remove the lid band from the side band. Cut an oval-shaped lid, and fit it into the band in the same manner as you fit the bottom. Place the lid assembly on the box, and check that the swallowtail joints and the tacks line up. If the joints are misaligned, don't panic. You can move the band on the lid up to $^1/_2$ in. clockwise or counterclockwise. When the parts are properly assembled, drill $^1/_{16}$-in. peg holes, $^3/_8$ in. deep, $^1/_8$ in. from the edge, all around the bottom of the box and the top of the lid. These holes must go through the band and into the bottom or lid. Space them every 1 in. to 2 in., but don't drill any holes at the points of the ellipse where the curve is most pronounced—the wood is highly stressed in these areas. If you drill a hole, you'll weaken the wood, and it may break.



Use the assembled side band as a mold for shaping the lid band. After you fasten the lid band together, let it dry in place on the side band to ensure a good fit.



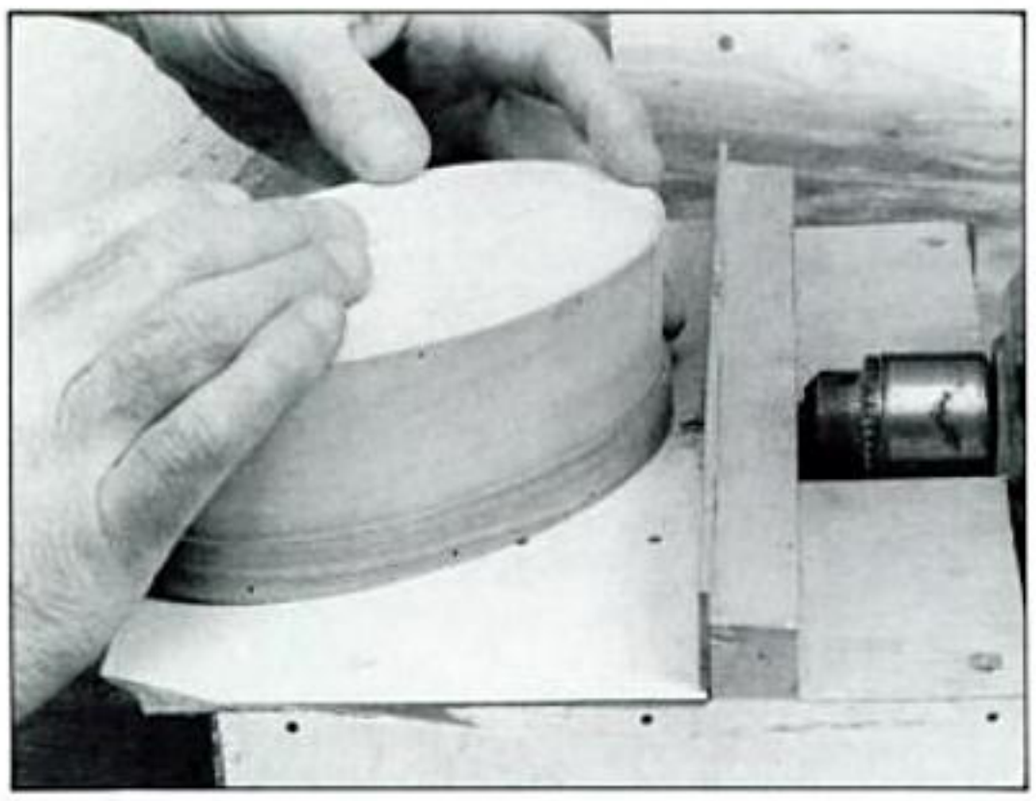
When you assemble the lid and the band, make sure the tacks and the edges of the swallowtails line up.

Use ordinary round toothpicks for the pegs. Cut them in two with a pair of wire cutters, making two pegs from each toothpick. You may have to trim 1/4 in. to 3/8 in. off the pointed ends so they aren't loose in the peg holes. Dip the smallest end of the peg in glue and insert it in a peg hole. Continue until you have filled all the holes. Let the glue dry, then use a utility knife to trim the pegs flush with the wood surface.

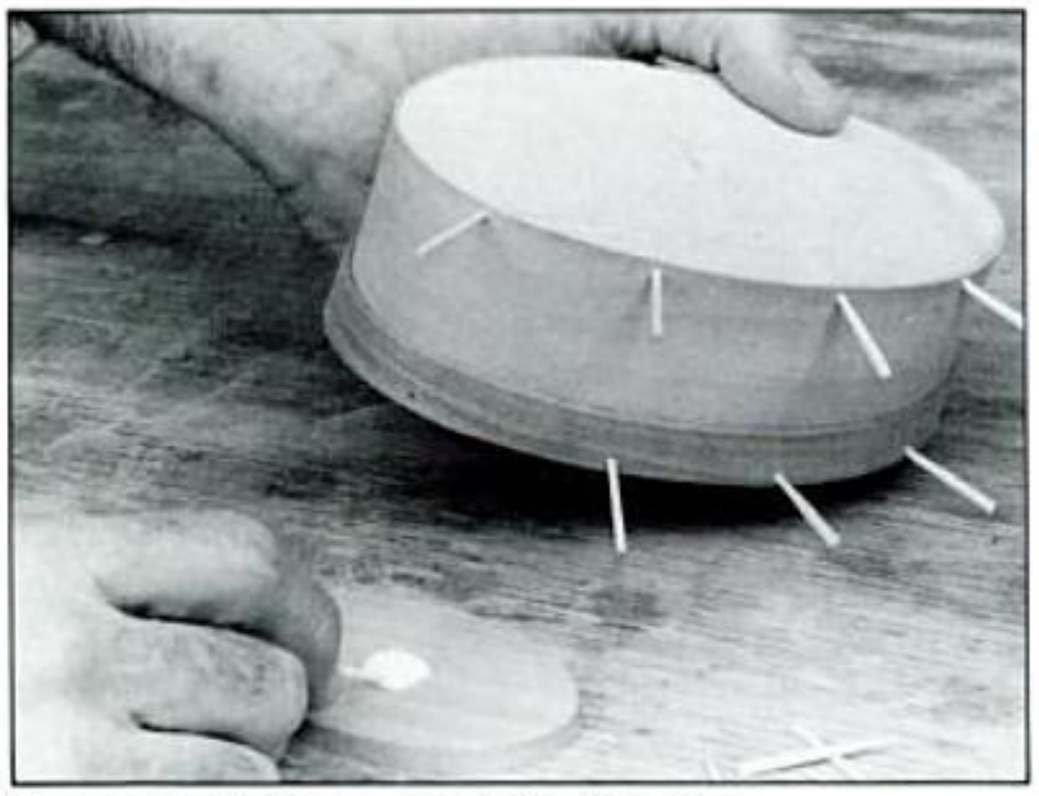
Applying a Finish

Sand all parts of the completed boxes and lids. Make sure the pegs are flush with the surface of the wood and the edges of the bands are flush with the lid or bottom. If you wish to paint the boxes, don't bother to finish sand them. Apply milk paint (available from: Old Fashioned Milk Paint Co., P.O. Box 222, Grotun, MA 01450), or latex paint to the rough-sanded surface.

If you want a clear finish, sand the surfaces on the outside of the box, paying special attention to the bands—poaching (or steaming) will have raised the wood grain. Apply a finish to the outside of the box only. Don't finish the inside. The inside of the boxes should be left raw so that the wood will absorb moisture before the contents do. This keeps the contents from mildewing. ▲



Drill holes through the bands and into the lid or bottom. The drilling jig, shown here, positions the holes and stops them at the proper depth.



Use round toothpicks as pegs to fasten the bottom and lid in place. Don't glue the bottom or lid, only the pegs.

SOURCES

Shaker oval box-making jigs and materials—bands, tops and bottoms, molds, dryers, poaching trays, anvils, etc., are available from: John Wilson, 500 E. Broadway Hwy., Charlotte, MI 48813. Write for price list.

Nick Engler is Contributing Editor of AW and owner of Bookworks in West Milton, Ohio. He has written 14 woodworking books. Engler has been working wood professionally for 17 years, getting his start making musical instruments.

PRODUCTION JIGS FOR SHAKER BOXES

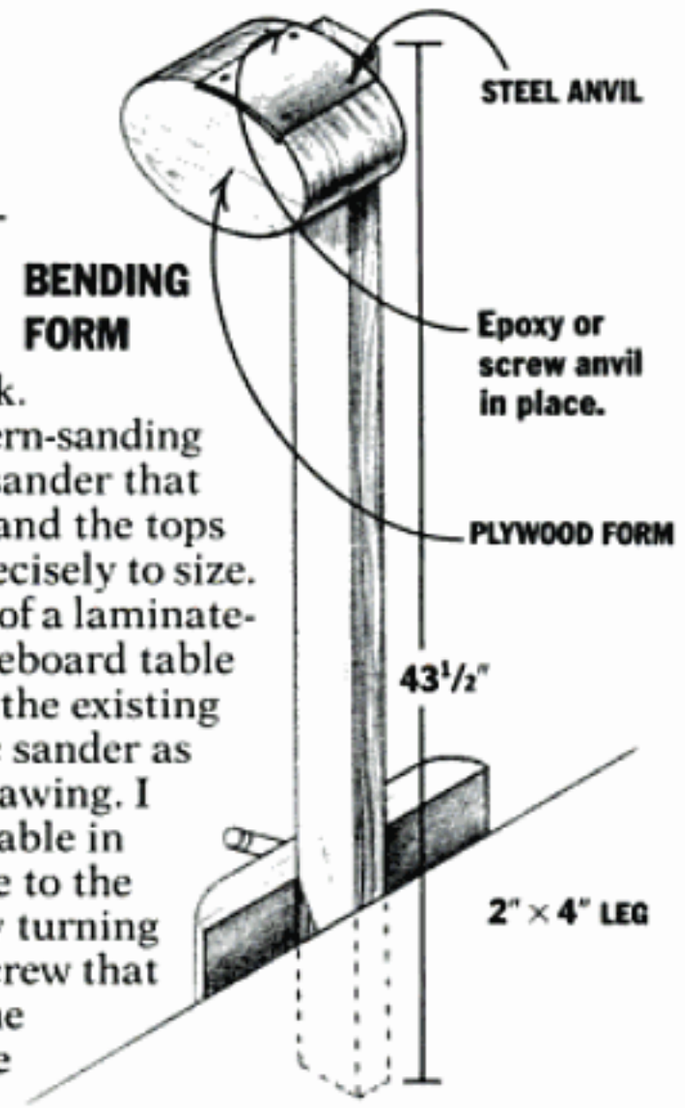
BY CHARLES HARVEY

I build Shaker boxes for a living, and I've developed a few jigs that speed the process along without compromising quality. I'll describe two of the most useful ones.

As Nick Engler explains in the article on page 16, some box makers bend and nail the side bands and lid bands in two separate steps—bending the band on one form, then switching to a separate anvil for nailing. I've combined the two steps (as did the Shakers)—and shortened the time it takes to do them—by inlaying steel "anvils" right into the sides of my bending forms. This allows me to bend the band around the form and tack it all in one motion. The nail points turn when they hit the anvil and bend over to clinch tightly into the wood. Once the bands are tacked together, I remove the form and put a 1/4-in. thick follower (what Engler calls a "dryer") into the band to hold the shape as the wood dries.

The anvils are simply 1/8-in. thick bands of steel set into the side of the form and epoxied or screwed into place. (I use stainless steel because iron reacts with the tannin in certain woods, causing a blue stain on the wood.) The forms themselves are made of plywood, so they don't warp or move. I mount the forms on legs which can be clamped into the tail vise of my workbench. (See drawing.)

Fitting the tops and bottoms into the bands is another time-consuming step, and it can easily be the most vexing. I've developed a way to considerably shorten this task.



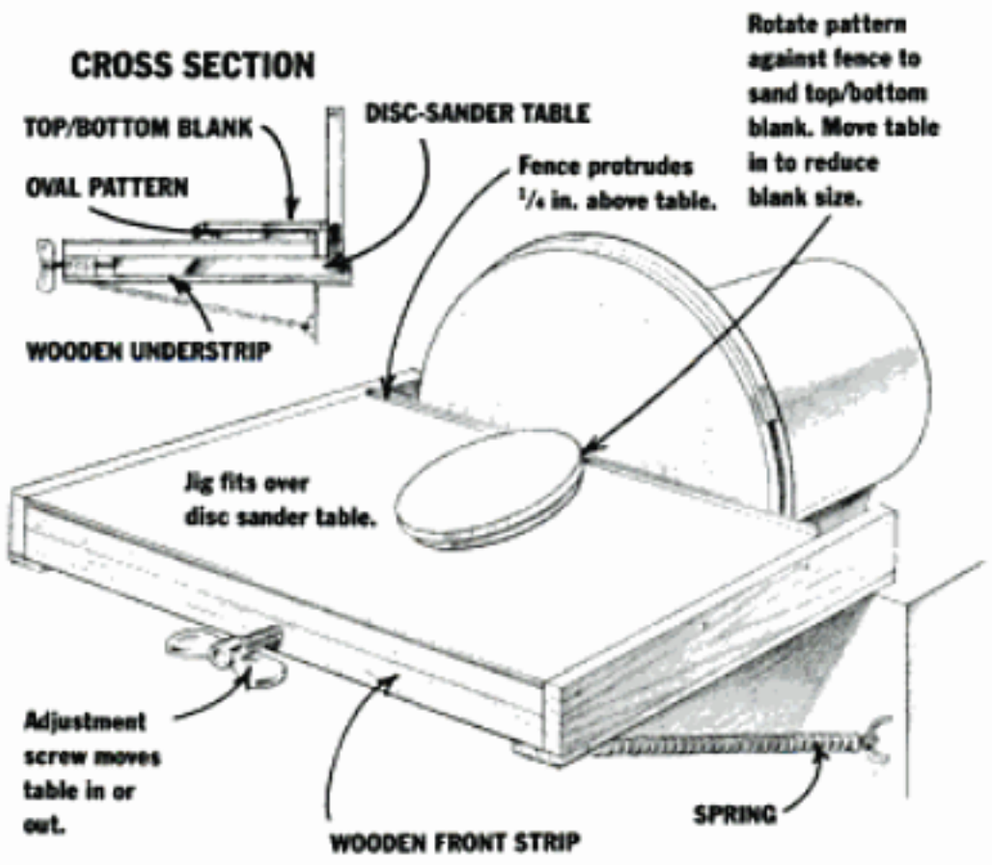
I've built a pattern-sanding jig for my disc sander that enables me to sand the tops and bottoms precisely to size. The jig consists of a laminate-covered, particleboard table that slides over the existing table of my disc sander as shown in the drawing. I can adjust the table in and out, relative to the sanding disc, by turning a large thumbscrew that bears against the front edge of the sander table.

Here's how the jig works. First, I bandsaw the top or bottom slightly oversize. Then, I place the bandsawn blank on top of a preshaped wooden pattern that's approximately 1/4-in. smaller all around than the finished top/bottom. The points of two nails, protruding from the top of the pattern, hold the blank in place. The pattern rides against an aluminum fence at the front of the jig, while the top/bottom blank is sanded by the sanding disc. The pattern ensures that the sanded top/bottom is uniformly oval, and I can adjust the table in small increments to slowly determine the right size for a perfect fit.

After I sand close to the line, I test the fit of the top/bottom in the band. If it doesn't fit, I turn the thumbscrew a bit to bring the fence closer to the sanding disc, then have another go (the final fit may require a mere hundredth-of-an-inch sanded off all around). It's important to sand the entire perimeter of the oval each time you move the fence—this way you will get a uniform oval.

I don't bevel the edges of the top or bottom. My sanding disc is set up to grind at 90° to the table. I find that a bevel tends to flare the box slightly at the top and bottom, which can distort the box.

PATTERN-SANDING JIG



This sanding jig enables you to uniformly sand the perimeter of the oval box tops and bottoms on the disc sander.

DRAWINGS BY SALLY ONOPA

Charles Harvey makes Shaker furniture and boxes in his shop, "Simple Gifts," in Berea, Kentucky. His boxes have been sold by four Shaker museums, and he builds a complete line of Shaker chairs and other furniture to order.

SKEW-CHISEL BASICS

Cutting Is the Key to Professional Results

BY RON ROSKIEWICZ
AND PHYLLIS STRAW

PHOTOS BY DAVID SLOAN

Many amateur turners don't really know how to use the skew chisel. That was true of me, too, until I had a chance —some 15 years ago—to watch professional turners in a traditional chair-parts factory in London. They roughed out chair legs, sheared away tapers and rounded over beads, all with the skew chisel. The skew-cut surface was so smooth it practically shined. I realized that, until then, I'd never seen a spindle cut correctly by human hands. All along, I'd been comparing my own turning efforts to the turnings I'd seen on mass-produced furniture—surfaces *scraped* by the cutter of an automatic lathe.

Instead of *cutting* with the skew, as these professional turners did, many hobbyists use the skew as a general-purpose scraper. It seems safer to scrape with the skew than to cut, and it feels more natural, too. But scraping long grain tears up the fibers and leaves a fuzzy surface that requires lots of sanding. Sanding takes time, and it rounds off the fine, crisp details that distinguish good hand-turned work.

Don't get me wrong, scrapers are perfectly acceptable tools, especially for smoothing up end grain at the bottom of bowls and other hollow vessels. But the skew chisel isn't designed for scraping. Scrapers and skews are sharpened differently. Scrapers cut with a burr that's been raised on the edge by the grinding wheel. The skew is honed to a knife-sharp edge so it can shear off shavings like a plane or a chisel. (See sidebar on sharpening.)

Learning to cut with the skew takes practice, but it's worth your while to learn. Cutting is the most economical and efficient technique for spindle turning. If you learn to cut, instead of scrape, you'll get a lot more pleasure from your turning. You'll turn faster, more efficiently, and the details will be crisp and sharp.

Chisel Talk

The skew chisel has a bevel on each side of the cutting edge, like a knife. The edge is angled, or "skewed," with respect to the handle, which distinguishes the skew from the square chisel—the other type of turning chisel.

Skews come in a variety of widths and lengths. In general, small skews are better for smaller work and wide ones for large-diameter work. I use a 1/2-in. wide skew for turning small details, and I like a 1 or a 1 1/2-in. wide skew for planing a 2-in. diameter cylinder.

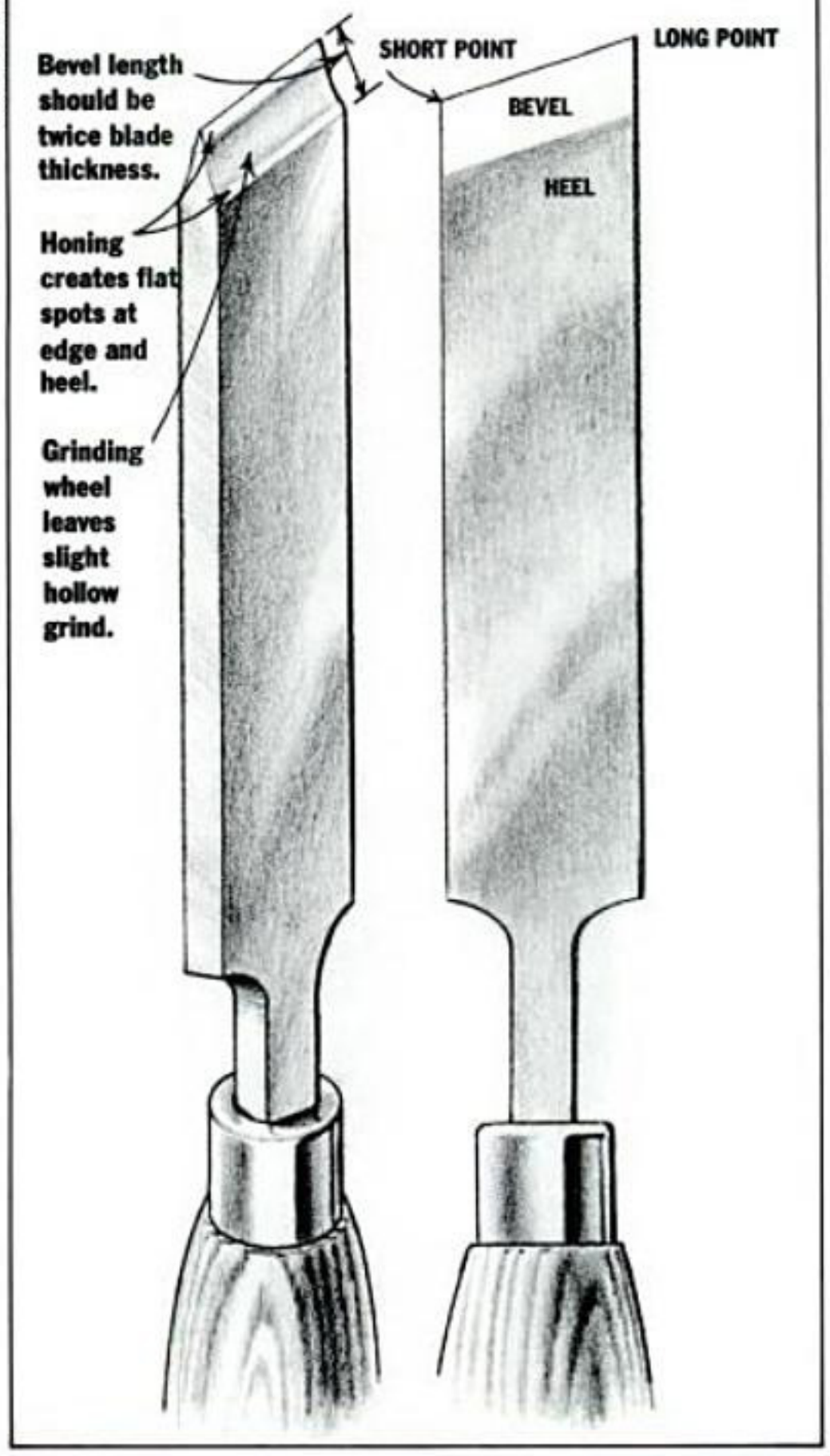
The length of the blade and handle combined are also important size considerations. For planing cuts, I prefer a handle that's long enough to rest against the side of my body. I find that this adds to my control and reduces fatigue on my shoulders. For detail work, I prefer a much shorter skew—closer to the size of a carving chisel.

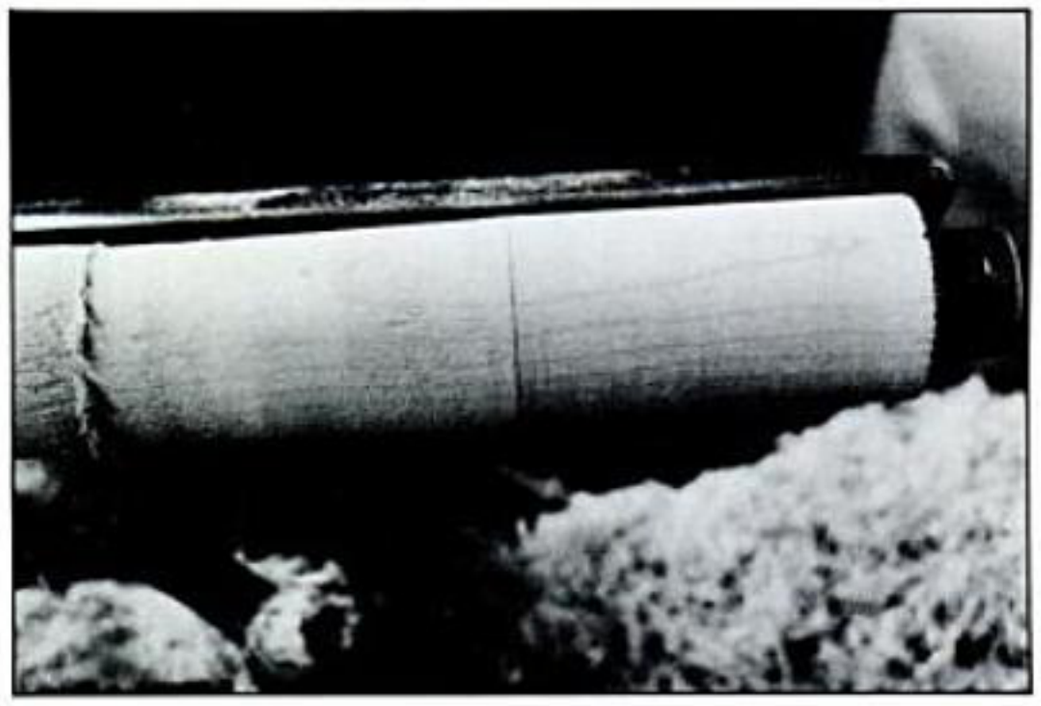
If your spindle turnings range from very small to very large, it would be good to have several different-size skews. If you avoid extremes of size in your work, you can get by with two skew chisels, a 1/2-in. wide skew with a short blade and handle for detail work, and a 1- or 1 1/2-in. wide skew with a long blade and handle for larger work. If you don't like the handle that comes with a tool, turn a new one for it.

The grinding is the first thing I check on a turning chisel before I buy it. When viewed from the end of the

FIG. 1: SKEW-CHISEL ANATOMY

DRAWINGS BY SALLY ONOPA





The left side of this cylinder was scraped. Scraping long grain tears up the fibers and leaves a fuzzy surface that requires sanding. The skew is designed to shear off shavings like a plane, leaving the smooth surface on the right.

blade, the two wide, flat surfaces of the blade should be parallel. In our age of machine-ground tools, it is rare to find a poorly ground chisel, but if you tend to pick up old tools at yard sales, check the grinding. The cutting edge should be centered between the two parallel surfaces. The blade should be straight when viewed from the end and from the side.

I try not to buy turning chisels with blades thicker than $^{5}/_{16}$ in.—$^{1}/_{4}$ in. is pushing it. A thinner blade requires a shorter bevel for a good edge. This means less grinding and easier honing.

High-speed steel is the best steel alloy to handle the friction and heat generated in turning. It's more expensive than carbon steel, but it keeps its edge ten times longer. High-speed steel is also less touchy to grind, since it tolerates more heat before you "burn the edge" and draw the temper. Though I never buy new carbon-steel turning tools, I still include in my basic kit a few particularly "sweet" carbon-steel tools, a skew chisel among them.

I like to tune a new skew chisel in a couple of ways. First I round over the corners along the sides of the

THREE STEPS TO A SHARP EDGE

As with other turning tools, sharpening the skew is a three-step process: grinding, honing and buffing.

Grinding—The bevel length should be about twice the thickness of the blade, which usually means an angle of about 30° to 35°, depending on the thickness of your skew. Grind each bevel on a fine-grit grinding wheel or belt grinder. The curve of the grinding wheel will produce a slight hollow grind.

Regrind when you've honed the edge so many times on the bench stone that there is no longer any hollow between the two flats produced by honing—the flat at the edge and the flat at the heel. You'll also need to regrind if you've nicked or damaged the edge.

Honing—After grinding the bevels, hone them on a flat bench stone,such as a fine India or a soft Arkansas stone. Place a bevel flat on the stone so both the edge and the heel of the bevel contact the stone. With one hand holding the blade or handle to maintain the angle, place two fingers of the other hand on the heel of the upward-facing bevel. Push the skew forward and backward over the stone. Alternate between the bevels frequently to keep the cutting edge in the center of the blade. Rehone whenever you can see any bright spots along the cutting edge. You should

blade with a fine-grit sharpening stone so that the tool can glide along the tool rest easily. A sharp irregularity or burr can catch on the softer steel of the tool rest.

Practicing the Cuts

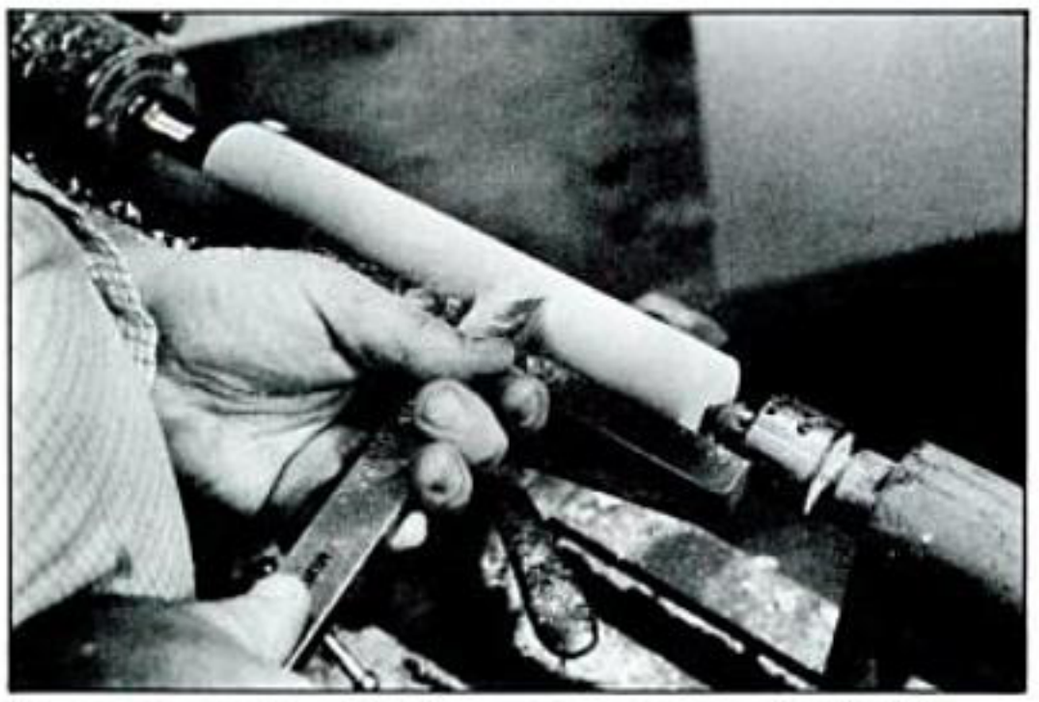
There are three basic cuts you can make with the skew chisel: the *planing cut*, for smoothing the long grain of cylinders and cones; the *facing-off cut* for squaring up end grain on shoulders; and the *rounding-over cut* for rounding shoulders and turning beads.

To practice these cuts, mount a blank of clear, straight-grained wood (I recommend poplar because it's cheap and easy to turn) about 10 in. long and 2 in. square between centers. Round the blank with a roughing gouge to make a cylinder. Adjust the tool rest height so that the top of the rest is in line with the axis of the cylinder.

A note about lathe height: Proper lathe height is important to controlled cutting. It is especially important for the planing cut, because to get it right, you must maintain a consistent body position through the cut. To do this,you must be comfortable, not hunched over. The rule of thumb is to position the headstock spindle at your elbow height, and then adjust up or down from there for comfort. Most lathes are too low. I'm 6 ft., 6 in. tall, and I needed to raise my lathe 4 in. to feel comfortable when cutting. I bolted a 2-in. thick maple plank between the lathe and the stand and then bolted 2×4s under the legs to make the 4-in. increase.

Planing Cut—The planing cut shaves the long-grain surface of the spindle smooth, much like a cabinetmaker's plane shaves a board. It is useful for truing up cylinders, and it works best on clear, straight-grained wood.

For this cut, position the tool rest high, about 1/4 in. to 3/8 in. below the top of the cylinder, and about 3/16 in. from the wood. The speed of the lathe depends on the size of the blank and your confidence with turning tools. For planing a 2-in. diameter cylinder, I prefer a speed of about 2200-2400 RPM for planing cuts, but if you're just learning, I suggest starting with a speed of about 1700 RPM. To get a feel for the cut, you might want to have someone turn the spindle for you by hand while you practice making the cut.



The planing cut shaves the long-grain surface smooth. Hold the skew long point up and angle the tool slightly in relation to the wood's axis. Cut between the center part of the edge and the short point, and keep the bevel rubbing as you cut.

Begin the planing cut a couple of inches in from either end of the blank. Right-handed people usually start from the right end and left-handed people from the left end. If you're right-handed, hold the skew handle in your right hand, and hold the blade between the thumb and index finger of your left hand, with the long point up as shown in the photo. Reverse hand positions for left-hand turning. You can grip the blade with the thumb on top or bottom; I prefer it on top. You want the tool to feel balanced in your hands, and this is controlled by the position of the hand on the handle. If I'm using a 1-in. or 1 1/2-in. wide skew, I'll hold the handle in about the middle, along its length. If the skew is smaller than 1-in. wide, I find I need to position my hand closer to the blade to feel good control.

Once you're comfortable, support one corner of the blade on the top of the tool rest, and rest the heel of the bevel on the revolving wood. The tool should be angled slightly in relation to the axis of the wood as shown in the photo.

With the heel of the bevel rubbing the wood, lift the handle of the skew very slowly, using the tool rest as a fulcrum. The object here is to lift the handle just enough so that the edge of the tool begins to engage the wood. Cut between the center part of the edge and the short point of the skew, but don't cut too close to the short point. At first the cut will produce only powder. Lift the handle a little more and fine shavings will

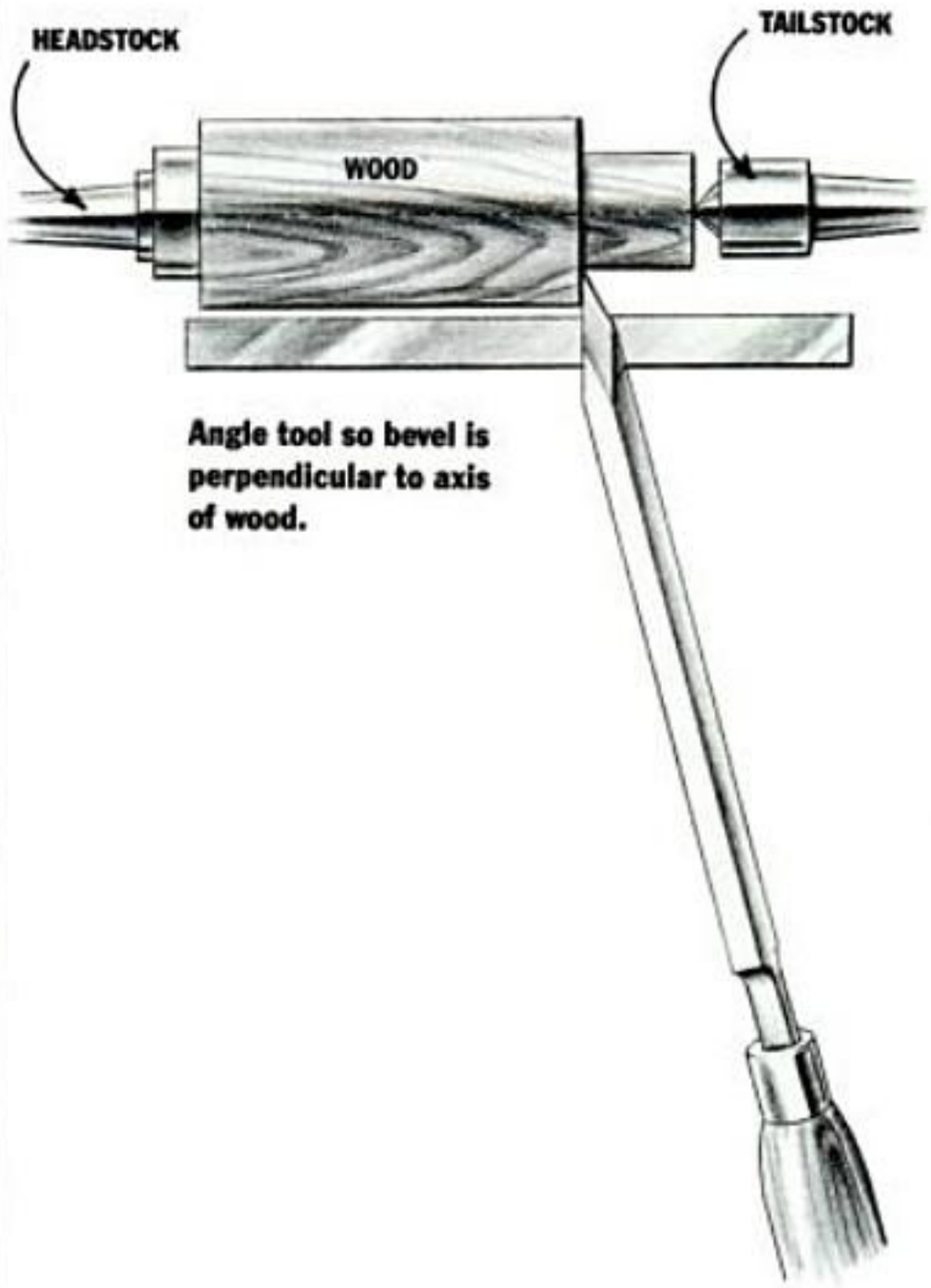
not be able to see light on the edge at all.

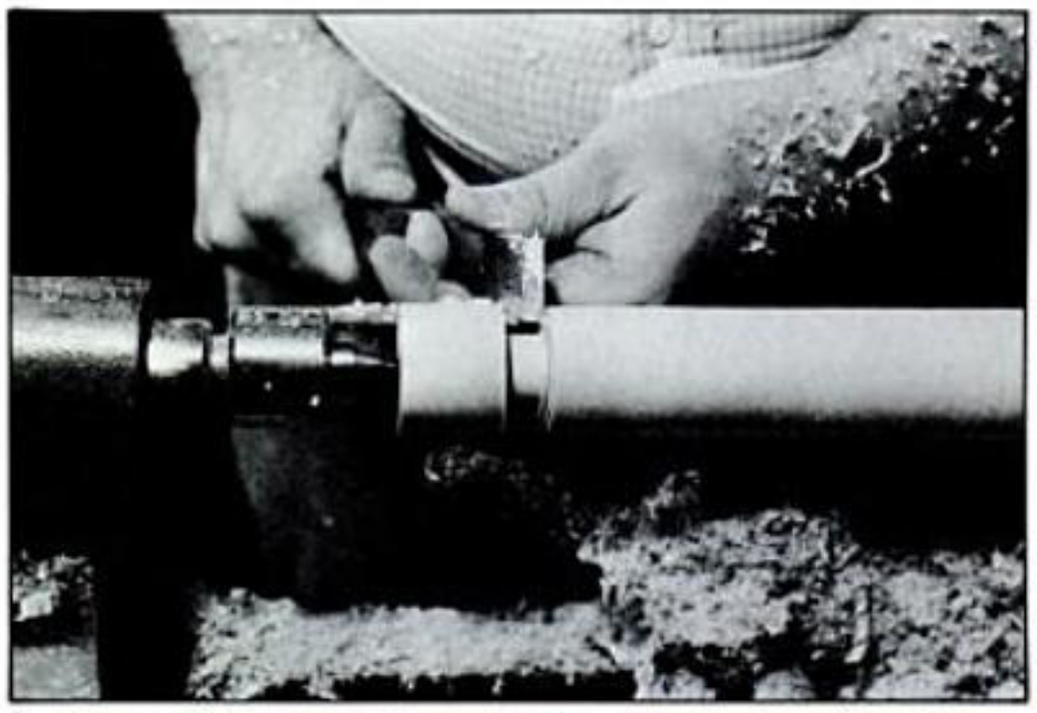
Buffing—Buffing the edge on a muslin or felt buffing wheel removes the burr created by honing. I charge the wheel with a stick of gray, emery buffing compound (available from Woodcraft, 210 Wood County Industrial Park, P.O. Box 1686, Parkersburg, WV 26102). If you don't have a buffing wheel, you can use a hard Arkansas stone or a strop to remove the burr.

Lightly press each bevel against the wheel. If you're too heavy-handed you'll round over the edge you just honed on the stone. If you're using a stone or a strop, place the bevel in the same position as for honing, and drag it backward along the abrasive surface. Do this on each bevel until the burr is broken off. If a very fine burr remains, remove it by making a cut across the grain in a piece of soft wood.

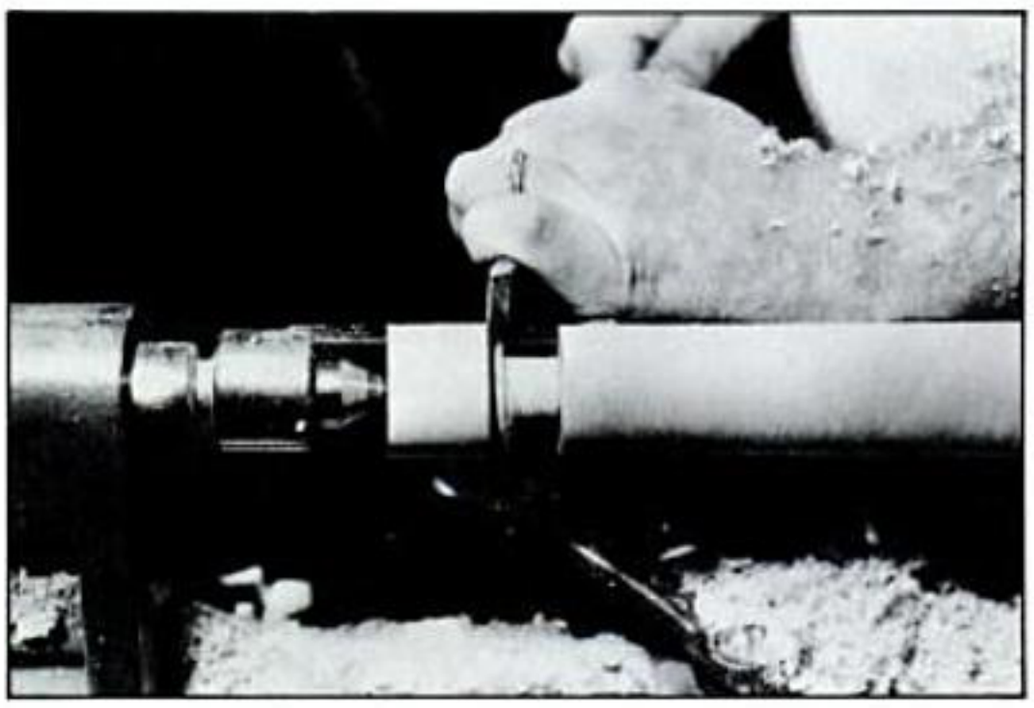
I like to rebuff before I make the final finishing cut for a shape so that I can get the smoothest possible surface.—*R.R.*

FIG. 2: FACING-OFF CUT





The facing-off cut is used for smoothing end grain. Lower the point in an arc into the wood. To face off the opposite shoulders, switch hands and cut with the opposite bevel.



appear. Once you get a shaving, it's important to keep the bevel rubbing against the wood as you cut. If the tool starts to chatter, you're probably lifting the handle too high, engaging the edge without rubbing the bevel. Lower the handle a little and make sure the bevel is rubbing the wood. Experiment with different angles to see the results you get.

When you get a good shaving, move the skew along the cylinder, keeping the blade firmly supported against the tool rest. Try to keep your body in the same position relative to the lathe as you move through the cut. If you need to plane only a short length of the cylinder, just shift your weight from one foot to the other. To plane the length of the entire cylinder, you need to do a sort of waltz-like movement to the side—what I call the woodturner's box step.

When you're learning, you'll occasionally catch the edge of the skew in the wood. A catch makes the blade of the tool slam down violently onto the rest and leaves a nasty scar on your work. It will startle you, but the tool can't recoil back at you. You're less likely to lose control if you keep the tool firmly supported on the tool rest, keep the bevel rubbing during the cut, and avoid cutting above the center point of the edge. If a catch happens, take a break. Come back in a minute and turn away any scars on your work with a gouge before trying the skew again.

You can also make the planing cut with the long point of the skew down. This requires you to hold the tool at a much more acute angle to the axis of the work. Try to cut between the center of the edge and the long point.

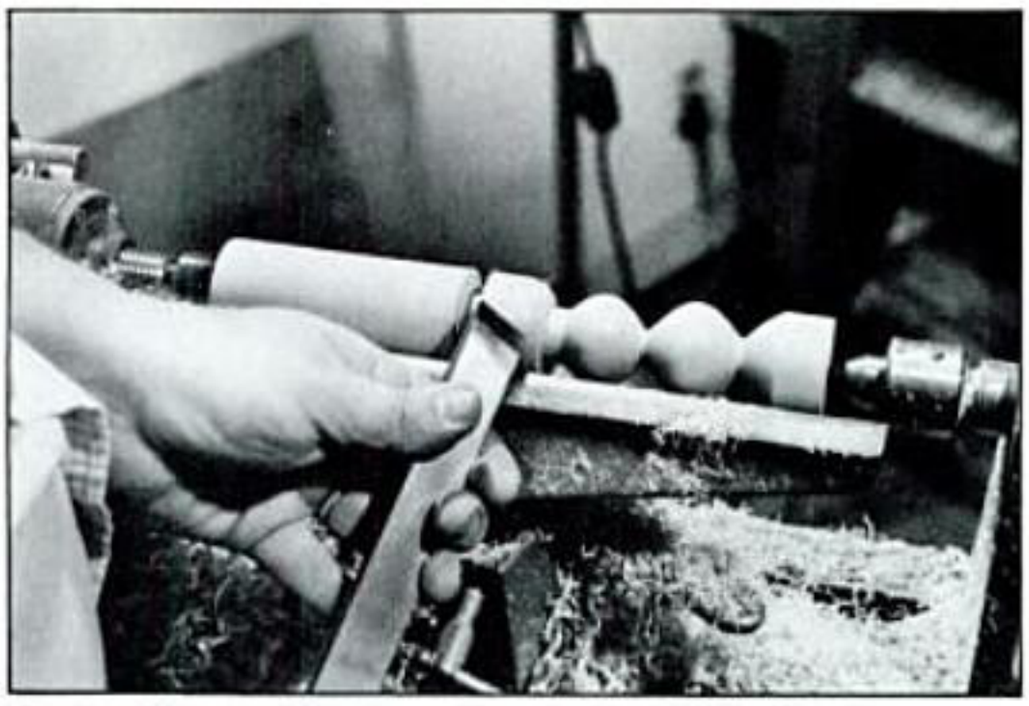
Facing-Off Cut—The facing-off cut is used for smoothing end grain, either on a shoulder, or for facing off the ends of a spindle. Sanding end grain on the lathe is torture, and this cut smooths end grain so cleanly that you only need to use fine-grit sandpaper to finish.

To prepare for practicing this cut, make a series of parting-tool cuts on the cylinder to expose end-grain surface. Position the tool rest at, or slightly below, the centerline of the cylinder and as close to the wood as possible. Revolve the cylinder by hand to make sure it isn't touching the rest.

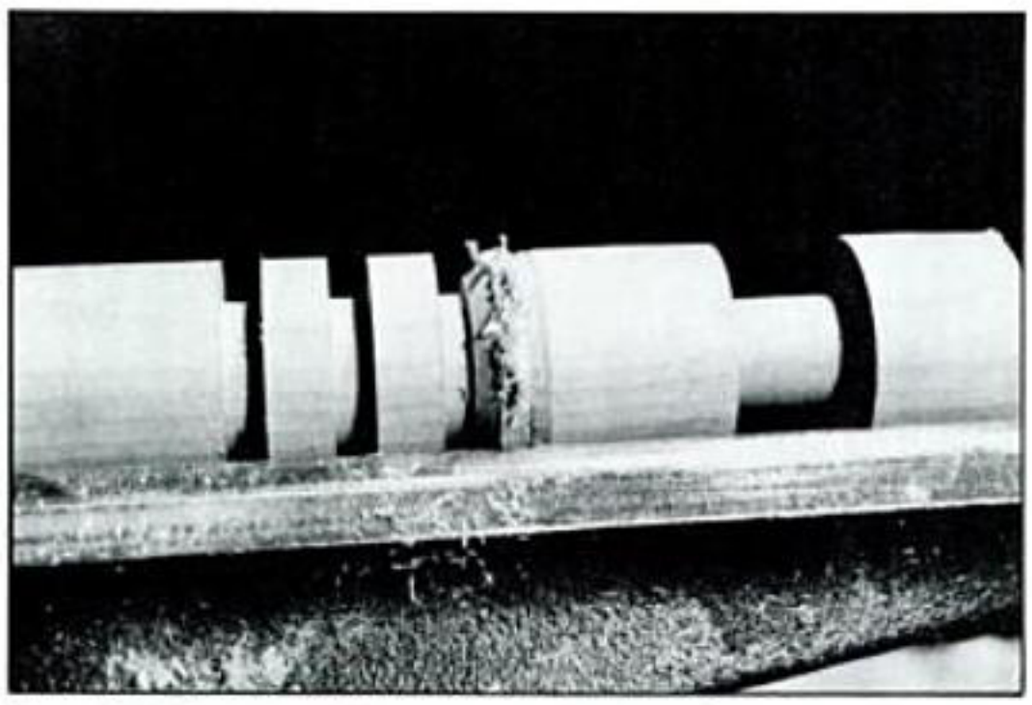
Start with a left-hand shoulder formed by one of the parting-tool cuts. Place the skew on the rest, long point down, with the handle angled slightly to the right so the left-hand bevel is perpendicular to the axis of the wood, and in the same plane as the shoulder you plan to cut. (Use the right-hand bevel for facing off a right-hand shoulder.)

Begin the cut with the long point of the skew slightly high, raising the handle of the skew slightly to pivot the point in a smooth arcing cut that removes only about 1/64 in. of wood. Keep the bevel rubbing on the shoulder throughout the entire cut, and cut with the bottom section of the edge, at the long point. When you reach the smaller diameter made by the parting-tool cut, pull the edge out of the cut.

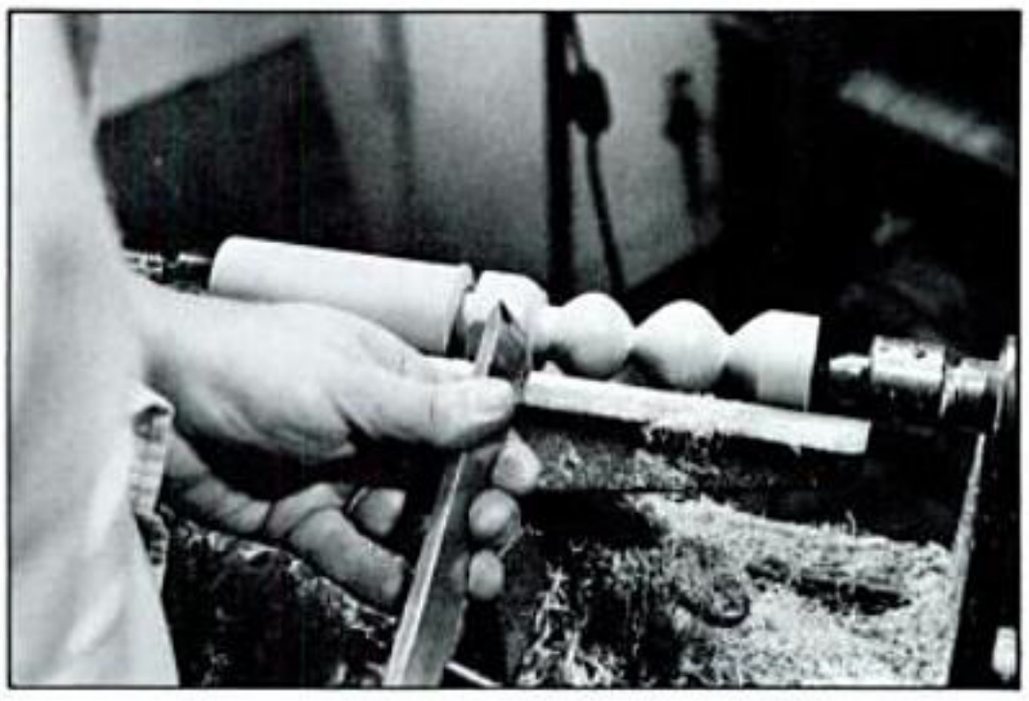
The surface left by the facing-off cut should be flat



Round off the shoulders to produce beads. Roll the skew in the direction of cut in a smooth, flowing motion by twisting the handle. The skew starts flat on its side and ends up on edge at the end of the cut.



If you hold the skew at the wrong angle, the edge can catch, slamming the tool against the rest and leaving a nasty scar on your work.



and smooth with no noticeable ridges. If there are ridges, it's because you rocked the tool to the side and the bevel stopped rubbing on the shoulder.

Again, the worst thing that can happen during this cut is a sudden catch. The problem is usually caused by cutting above the center point of the edge. If this unsupported edge, near the short point of the skew, touches the wood, the skew can flip over onto the flat of the blade and slam down hard against the tool rest. Cut below center, near the long point, keeping the tool firmly against the rest,and you won't have a problem.

V-Groove Cut—This cut is a simple variation of the facing-off cut that's used for cutting grooves. This is the only way to make a clean V-shape on a spindle, because you can't scrape and sand a V-shape without losing the sharp definition.

The technique is the same as the facing-off cut except that the bevel enters the wood at an angle, instead of perpendicular to the axis, to account for the angled shoulder of the groove.

First, make a very fine line on the wood with a pencil to mark the center of the groove. Start the first cut slightly to the left of your mark, and make a shallow arcing cut with the long point of the skew to the desired depth of the groove. Then make a mirror cut on the right side of the mark to complete the V-shape.

Rounding-Over Cut—Rounding-over cuts are useful for turning beads or rounding off shoulders. These cuts can also be made with a gouge, but the skew is very efficient, especially if you already happen to have the skew in your hand.

For practice, you can start by rounding over the corners of the shoulders you already faced off on your practice cylinder, to make a row of beads. You round a bead in two steps—first rounding one shoulder, then the other.

Position the tool rest slightly below the axis of the cylinder and as close as possible without actually touching the wood. Hold the skew on the rest with the long point up. You'll be cutting with the section of the edge near the short point.

With the tool handle held low, rest the bevel on the wood near the center of the bead. Decide which shoulder you want to round first—right or left. In one smooth motion, raise the handle slightly to engage the edge, then roll the skew in the direction of the cut by twisting the wrist of the hand holding the handle. At the same time, move the tool forward slightly with the fingers of your right hand, keeping the skew firmly against the rest at the same time. It's a smooth flowing motion that takes only a second. The skew starts out flat on it's side and ends up nearly on edge at the end of the cut.

The key to a successful cut is to keep the bevel rubbing as you roll the tool (Only a small portion of the bevel is actually in contact with the wood.) and to make the cut in a single smooth, decisive movement. Don't cut above the center point of the edge, or it will catch and slam the tool down on the rest.

Repeat the cut to round the other side of the bead, using the opposite bevel and rolling the skew to the opposite side. On a large bead, you may have to round each side in two or more cuts. Start near the shoulders, and begin each successive cut closer to the center of the bead. Your last cut, on either side, should start at the center of the bead. By varying the amount of twist and depth-of-cut, this technique can also be used to turn cone shapes.

Ron Roszkiewicz and Phyllis Straw are co-authors of the books, The Woodturner's Companion *(1984, Sterling Publishing Co.) and* The Woodturner's Art *(1986,Macmillan Publishing Co.) They wrote about the spindle gouge in the January/ February, 1989* AW.

TWO-SIDED EASEL

A Simple Project to Please Those Budding Artists

BY DAVID DONNELLY

CHUCK SCHEER

The delighted faces of your children as they work on their masterpieces make this easel a worthwhile project.

This two-sided easel will bring your children hours of pleasure as they hone their artistic talents. It's a simple project that can be built in a weekend. Metal clips hold standard pads of 24-in. × 18-in. drawing paper, and there's a recessed shelf on each side to hold crayons and pencils. The legs are hinged, so the easel can be folded up for storage.

The joinery consists of screws, nuts and bolts —no glue is needed at all. To add a bit of challenge to this simple project, the crayon shelves are designed with a cove cut, which you can do on your tablesaw. But, you may choose to simplify this design feature—the cove can be replaced with a wide dado to hold crayons and paints, or you can eliminate the cove altogether. Likewise, the height of the legs can easily be altered depending upon the height of your children.

As with any simple project, you can greatly enhance its appearance through your selection of wood and finish. I elected to use oak and oak plywood with a reddish mahogany stain and a polyurethane finish.

Start With the Legs

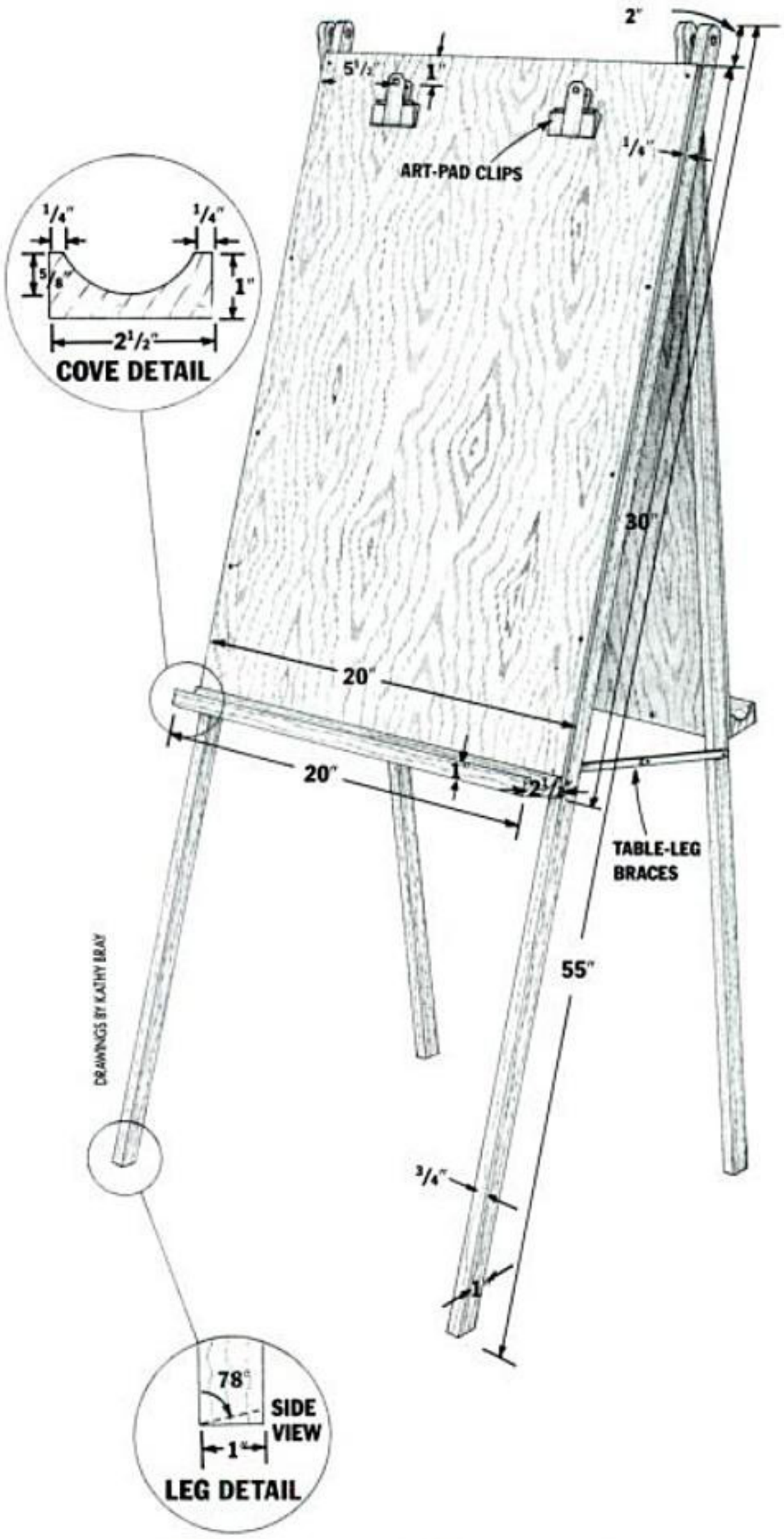
Begin by ripping and crosscutting the legs to size on your tablesaw. The bottom of each leg needs to be cut at an angle. Set your sliding T-bevel to 78° with a protractor, and mark the bottom of each leg as shown in the drawing. Cut the legs with a handsaw, or set the miter gauge on your tablesaw to 78° to make the cuts.

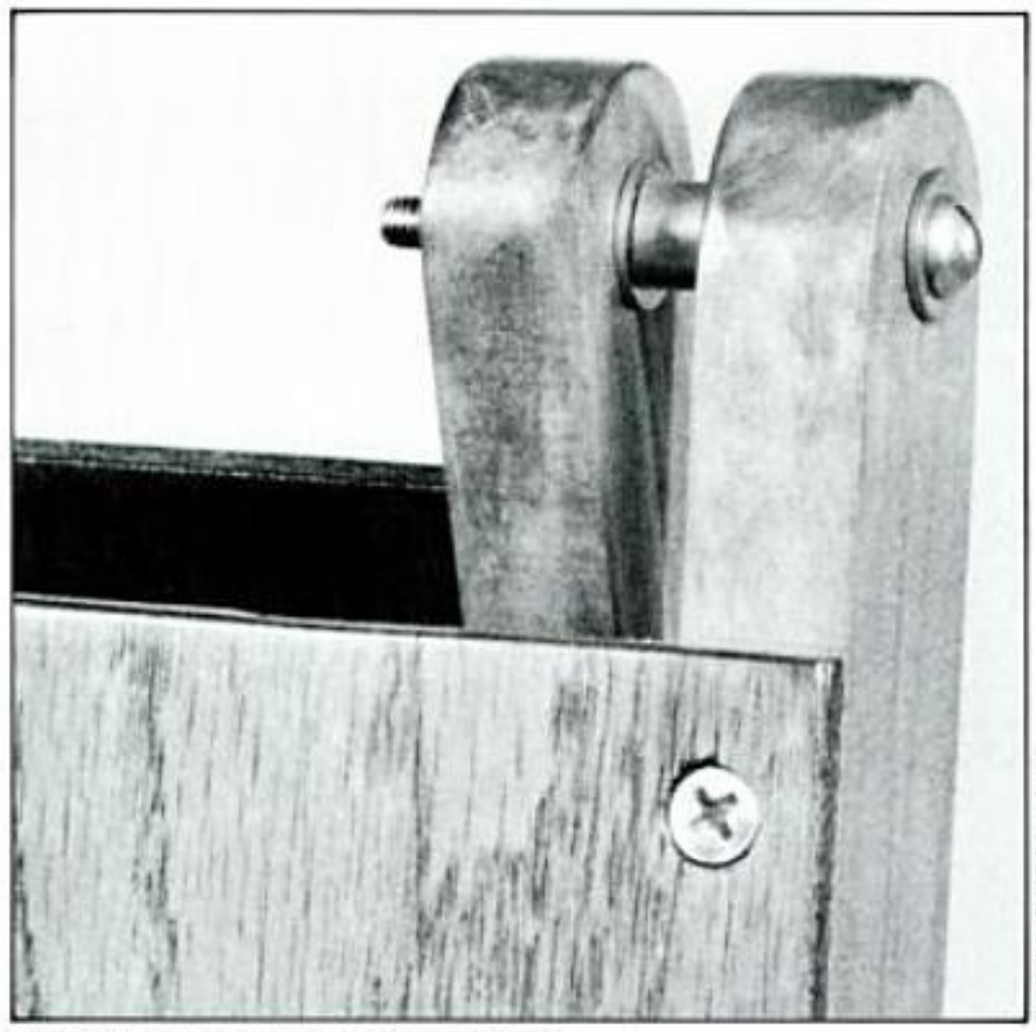
The tops of the legs are rounded over. Adjust your compass for a 1/2-in. radius, and scribe an arc on top of each leg. You can cut the arc with a jigsaw, scroll saw, or bandsaw. I found it quickest to knock off the corners with a handsaw, and then rotate the ends against a disc sander. This method sizes the arcs and sands them in one step.

At the center point of each arc, drill a 3/16-in. hole through each leg. Later, you will use these holes to bolt both sides of the easel together.

The drawing surfaces of the easel are made of 1/4-in. oak plywood. If you choose to cut the plywood to size on your tablesaw, remember that a normal circular blade will cause the plywood to tear out. Switch to a fine-toothed plywood blade, and the edges will come

FIG. 1: TWO-SIDED EASEL





PHOTOS BY DAVID DONNELLY

Attach the legs with machine screws, nuts and washers, placing a ⅝-in. spacer between the legs to allow for the thickness of the leg braces when closed.

out looking great. Sand the edges smooth since they will remain exposed on the easel.

Build a Cove Jig

Now you're ready to make the crayon shelves with their eye-catching coves. Before you tackle the cove cut, make a simple jig as shown in Fig. 2. This handy jig can be used for a multitude of other purposes, including making tapered legs.

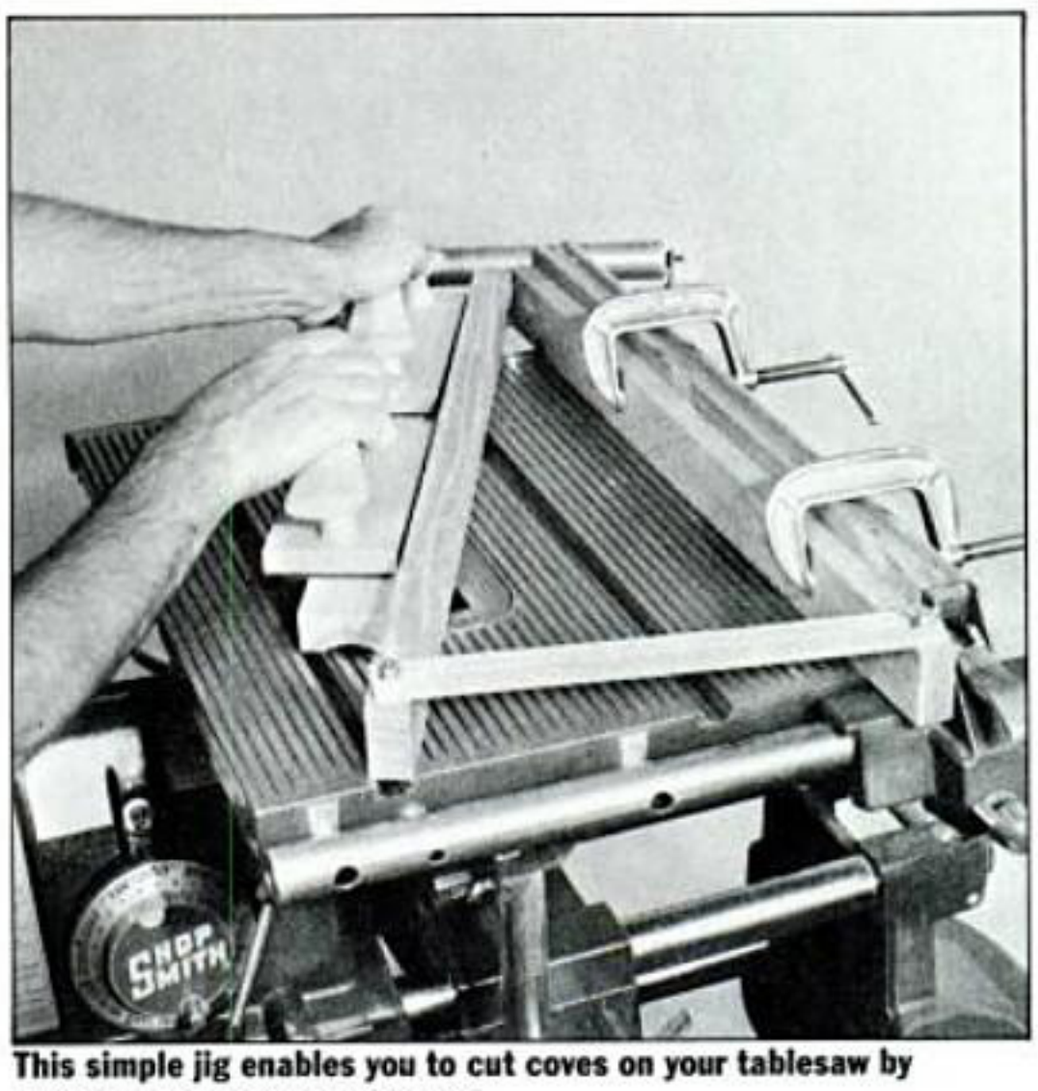
The jig consists of two boards—approximately the same length and height as your tablesaw fence—hinged together at one end. On the opposite end from the hinge, fasten a 15-in. long, slotted strip of ¼-in. plywood with wing nuts, washers, and bolts (Be sure to countersink the bolt heads). The slotted piece allows you to adjust the angle of the hinged boards. I made the slot with a ¼-in. straight router bit.

To set up your jig, clamp one side against the tablesaw fence with C clamps. The hinged end should face away from you as shown. The left side of the jig functions as a rip fence, and you pass the wood over the blade at an angle, making a wide, arched cut. The tricky part comes in adjusting your jig for the right angle, taking care to cut your cove by making several light passes instead of one deep one. It's safest to raise your blade incrementally (1/16 to ⅛ in.) for each pass until you reach the final depth of ⅝ in. Practice this cut on scrap wood until you feel comfortable.

Here's how to proceed. Cut your shelves to size, and draw the cove profile on the end of the stock as shown in the drawing. This profile will show the arc of the curve a 10-in. blade will make, its center point, and the ends of the arc ¼ in. from each edge. With your tablesaw *off*, raise the blade to ⅝ in. Place the wood against the jig and the blade. Sight down the wood from behind. Adjust the position of your rip fence, and open or close the jig until the arc on the wood lines up with the blade.

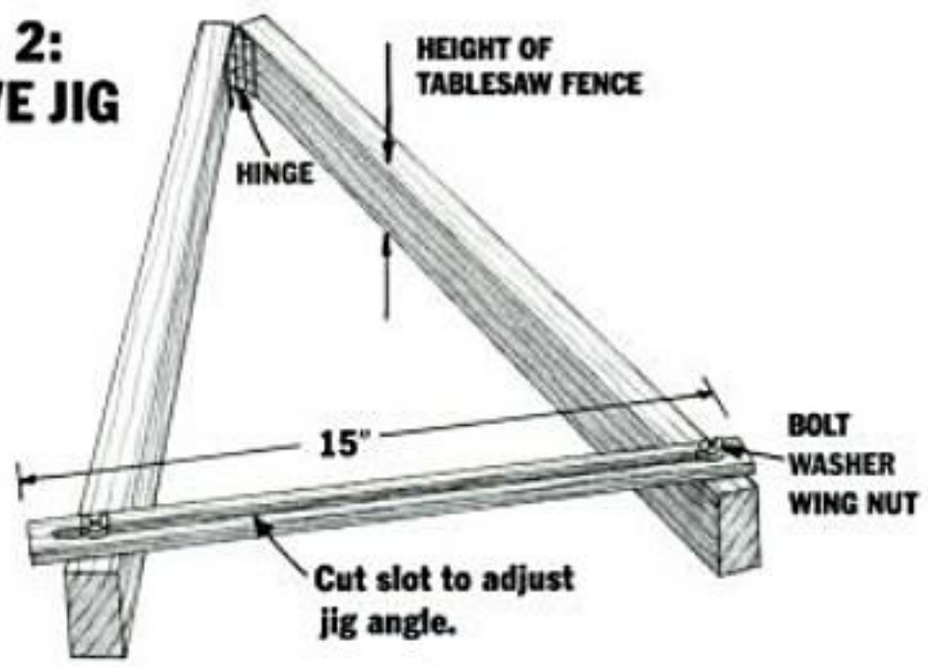
Once your angle is set, lower the blade until it extends only ⅛ in. above the table. Now turn on the saw, and slowly run the wood through. Since the blade does not stick up above the top of the wood, you will not be able to use a saw guard, so be sure to use a push stick. Look at the small arc you cut. Does the center line drawn on the end of your stock cross through the middle of this arc as the photo shows? If not, readjust the fence.

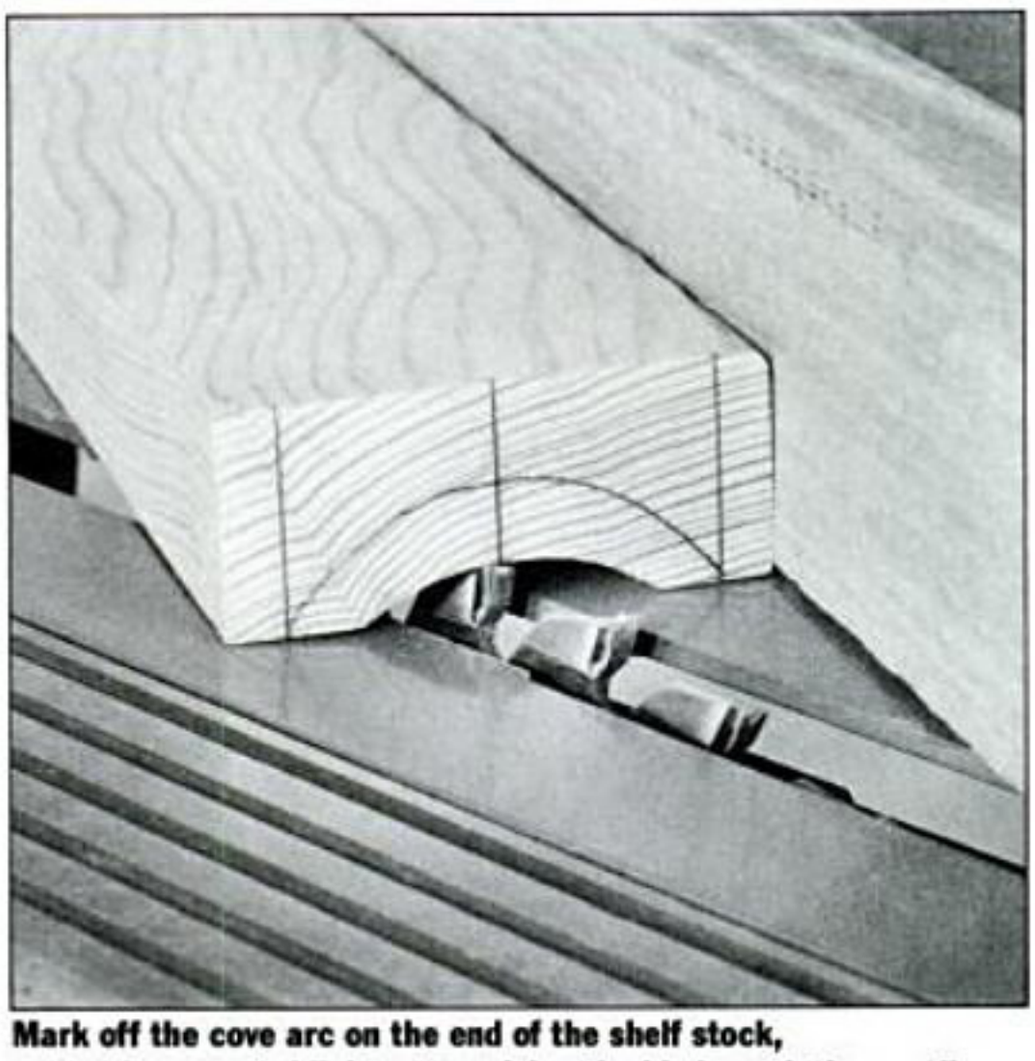
When you've centered the cut, continue to make slow, small cuts until you reach the full ⅝-in. depth of the cove. It's very important to listen to the sound that



This simple jig enables you to cut coves on your tablesaw by angling stock across the blade.

FIG. 2: COVE JIG





Mark off the cove arc on the end of the shelf stock, and make repeated light cuts, raising the blade each time until you reach the 5/8-in. cove depth.

your saw is making, and don't strain it. The angle and width of the cut put extra stress on your motor, which can be minimized by making shallow cuts. When you're finished, sand the cove smooth.

Assemble the Pieces

At this point, you're ready to assemble the easel. I suggest staining and finishing all the pieces before assembly. This allows you to finish the plywood backs while they are lying flat, thus avoiding drip marks.

To assemble the backs to their respective legs, line up the plywood backs 2 in. below the tops of the legs. Remember to keep the long edge of each leg facing the outside (against the backs). Beginning 1/2 in. from the top of each side, mark a screw position every 6 in. down the sides for a total of five screws on each side. Drill pilot holes and countersink for the heads, then screw the backs to the legs with 1-in. #8 brass, flat head wood screws.

To attach the shelves, position the shelves along the bottom edge of each plywood back, and drill pilot holes through the legs from behind, through the backs and into the shelves—one per leg. Take care that the holes go into the shelves *below* the coves. Each shelf gets two 3-in. #10 brass, flat head wood screws. Add two more 1-in. screws through the plywood back into each shelf.

Next, attach the clips that hold the art pads. I used four 3-in. ball-bearing clips (available from All About Offices, 1312 W. Idaho St., Boise, ID 83702), but you can use standard (bulldog) art-pad clips from any local office-supply store. Drill two 1/4-in. holes through the top of each back, 1 in. from the top and 5 1/2 in. from each side edge. Secure a clip to each hole with a 1/4-in. dia. × 1/2-in. brass, round head machine screw, washer and nut.

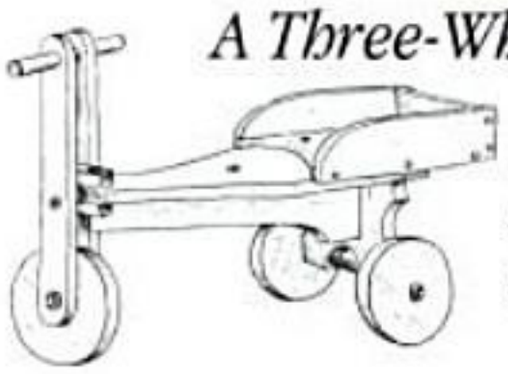
Now you can stand the two sides up and join them together at the top with 2 1/2-in. #8 brass, round head machine screws and nuts. Because the leg braces are 5/8 in. thick when closed, you'll need to place a 5/8-in. spacer between the legs on each side where they meet at the top as shown. I chose to cut two pieces of 3/8-in. dia. copper tubing to size, since it matches the color of the brass fairly well. If you prefer, you could stack up brass washers and accomplish the same thing.

Screw the leg braces (Stanley #49-6640 table-leg braces, available from Hardware Sales & Service, Inc., 1961 Commerce Ave., Boise, ID 83705) onto the legs at the approximate height of the shelves. Mark the screw positions while the easel and braces are in the closed position. The two halves of the brace are different lengths. Because of this difference in lengths, the braces will not be perfectly horizontal when the easel is open.

That's it. You're ready to give it to your children. Their happy chatter as they draw and paint on this easel will betray how grateful they are. Your only problem will be finding enough space on your refrigerator to hold all their masterpieces! ▲

David Donnelly is a professional writer and video producer. He has been working with wood for five years. He is the president of the Boise Metro Woodworker's Guild and has a cockatoo named Peaches.

PINT-SIZE PICKUP



A Three-Wheeled Cruiser for the Rug-Racer Set

BY JACK FISHER

Picture this pickup under your tree this Christmas.

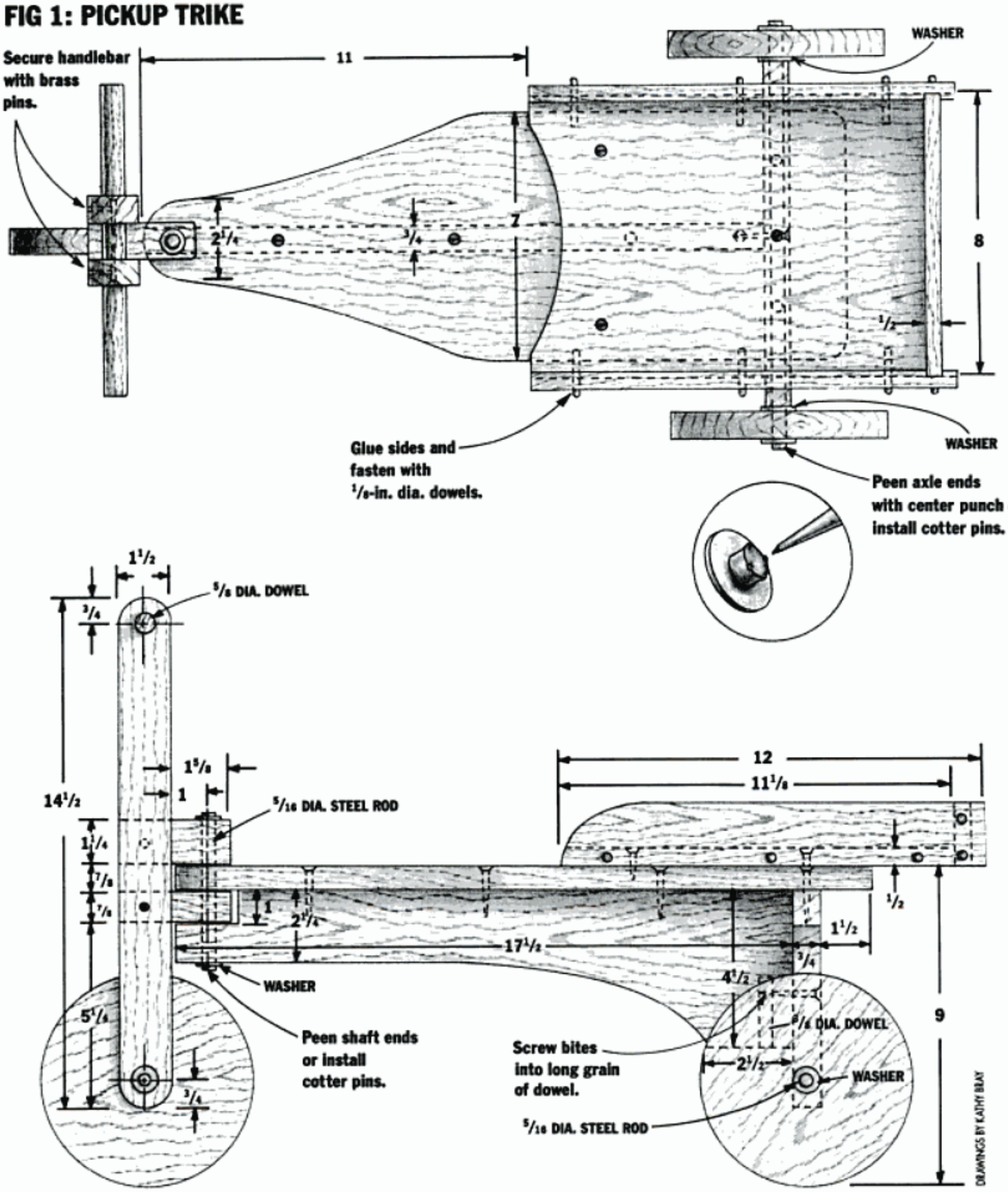
About the time my grandson was beginning to walk, I got to thinking it was also time to build that kiddie car I'd been remembering from 'way back in my childhood. Remember that solid-wood beauty you cruised around on when you were a two-year-old? If I close my eyes, I can still picture it. And, if I try very hard, I can faintly recall what it felt like to zoom off the dining room carpet, wheel her through the door and onto the kitchen linoleum, flat out. Wow!

But I couldn't make one like that. That one had a turned front steering assembly, together with nicely turned wooden handles; and I had no lathe.

While I tried to think my way around the no-lathe problem, I also thought of some other changes that might improve a new model over the one from my youth, if that's possible. Two ideas came to mind. First was the concept of the pickup truck, which has grabbed the imagination of automobiling in America

PHOTOS BY MITCH MANDEL

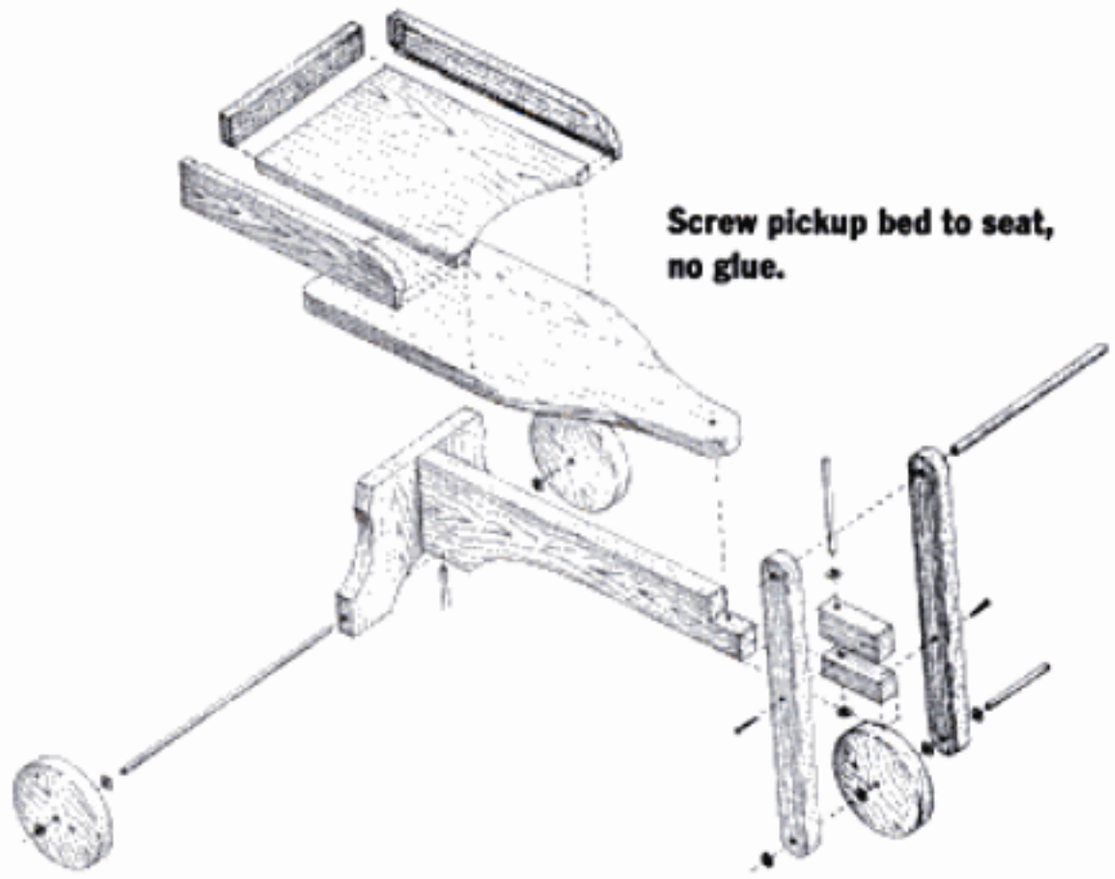
FIG 1: PICKUP TRIKE

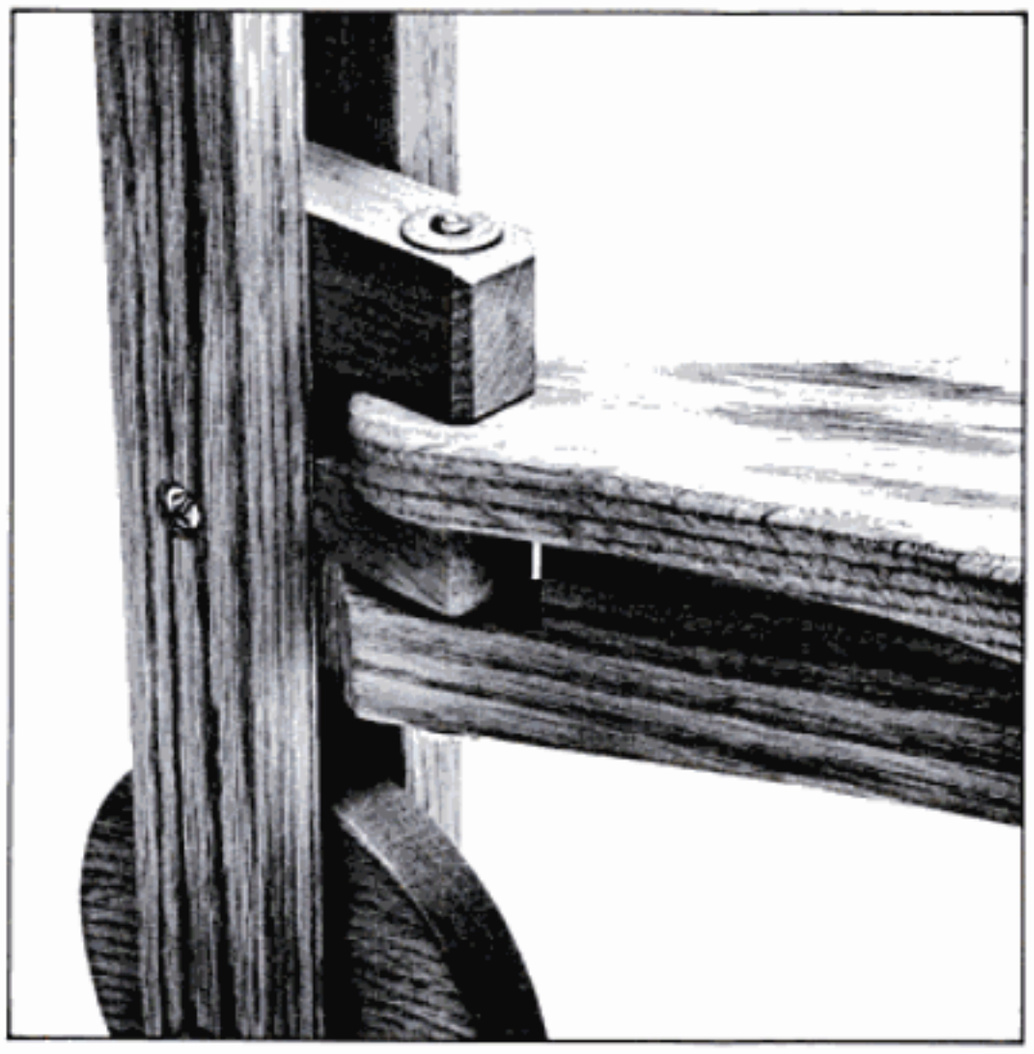


today—pickups are in. The other idea? I've heard more than one mother complain about her kids leaving toys spread all over the place. Was it possible a youngster could get excited enough about having a "pickup" that, at the end of the day, the kid would really *enjoy* driving around, picking up all those stray toys? Why not try it?

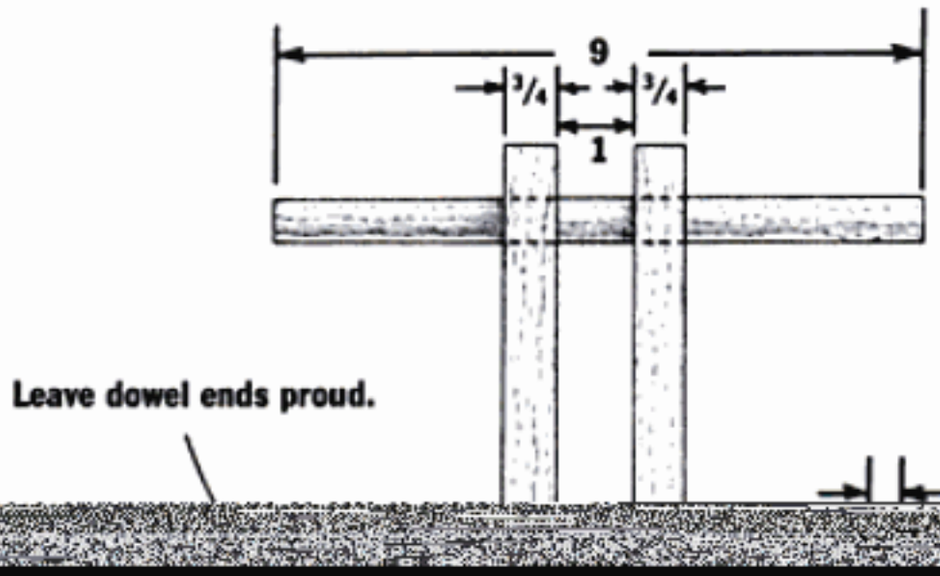
Designing the Pickup

To help visualize the toy, I made a sketch. (See page 33.) I usually do that. It helps me clear up the design and often leads to a better way of doing something. For instance, I've got this thing about making do with what I've got. I've carried this philosophy around with





The steering assembly pivots on a 5/16-in. dia steel rod through the seat.



can of large bolts turned up none the right size for those jobs. That's when my sketch led to the idea of another way of doing it. I had a piece of 5/16-in. steel rod left over from another job. And a can of assorted flat washers produced six which fit snugly on the 5/16-in. rod. I knew that I could peen the ends with a hammer to hold the wheels on, but I came up with the idea of doing it with a center punch near the edge of the rod, instead, as shown in the detail on the drawing. (See Fig. 1.) I tried it on a sample and, by gosh, it worked!

TWO FINISHES

These Traditional Finishing Materials

LEXNER

it helpful to divide finishes into two types—Type 1 and Type 2—according to the way they cure. Type 1 finishes are *evaporative finishes*. They cure when the solvent evaporates. Type 2 finishes are *reactive finishes*. They cure by reacting with the oxygen they absorb from the atmosphere. I've gone into more detail about Type 1 and Type 2 finishes in the sidebar below.

Shellac and varnish—two of the oldest finishing materials—are good examples to illustrate the basic differences between these two finish types. Shellac is an evaporative, or Type 1 finish. Varnish is a reactive, or Type 2 finish.

OF FINISHES

vent to a cured Type 2 finish won't have any effect. It takes a very strong solvent, such as methylene chloride (the active ingredient in many paint and varnish removers) to break down a Type 2 finish.

It takes a number of coats of either type of finish to build a sufficient film thickness. Too thick an application at one time will cause runs or sags and trap the solvents, which will slow the drying considerably. Multiple coats of a Type 1 finish fuse together as each coat dissolves into the one below, to make one unified film. There's no reason to sand between coats of a Type 1 finish except to level brush marks, remove dust, or cut the finish back to level the pores.

Each coat of a Type 2 finish, on the other hand, remains as a distinct layer within the cured film. It's a good idea to sand or steel wool between coats to create scratches, or "tooth," to help each coat bond to the one below. As an additional benefit, sanding also removes imbedded dust and levels brush marks.—*B.F.*

PHOTOS BY MITCH MANDEL

VARNISH

Varnish has changed a lot over the past several decades, and it will more than likely continue to change in the coming years. This changing nature makes varnish somewhat difficult to define precisely.

What it was, for centuries, was a combination of resins, oils, driers and solvents. (Add colored pigments and you have enamel paint.) The resins—solidified gums from plants and trees—imparted body, hardness, gloss, and water resistance to the finish. The oils, usually linseed or tung, imparted toughness and flexibility. The driers—salts of lead, cobalt or manganese—accelerated the drying rate. And the solvents—turpentine or mineral spirits—reduced the viscosity.

The quality of varnish was determined by how these ingredients were combined. For example, the less oil used, the harder the film. These so-called "short oil" varnishes were used on pianos and quality furniture that required rubbing with fine abrasives to

CONTINUED ON PAGE 39

term universally used to indicate the ratio of shellac to alcohol. It means that 3, 4, or 5 lbs. of shellac flakes are dissolved in 1 gal. of alcohol. The higher the number of the cut, the more concentrated the shellac and the "thicker" or more viscous the solution. For example, you are getting twice as much actual shellac in a quart of 4-lb. cut solution than you are in a quart of 2-lb. cut solution.

About 6 months after it's dissolved, shellac loses its capacity to dry hard. Old shellac will remain gummy forever. The only recourse, if you apply shellac that won't dry, is to strip it off with alcohol and start over. Store-bought premixed shellac should carry a date of manufacture, or an expiration date, just like milk does. If in doubt about the freshness, open the can and test the shellac on a scrap piece of wood.

Shellac is orange in color, and it will add a warm tone to the wood. This can be used to advantage on dark woods such as walnut, which has a rather cold charcoal-gray color. But adding this orange color to blonde or bleached woods could be self-defeating, so shellac is also sold in bleached form, which is sometimes called "white" or "blonde" shellac. There is no difference in the way orange and white shellac are used, but white shellac generally has a shorter shelf life.

Refined shellac is orange in color and will add a warm tone to wood. White shellac is bleached for use on blonde, or bleached wood.

To make your own shellac solution, dissolve shellac flakes in alcohol using any type of container except metal. (I use quart jars.) It's not critical what type of alcohol you use, but I prefer denatured alcohol (grain alcohol) because it's not as toxic as methyl alcohol (wood alcohol), and it dries slower, giving you a little more time to brush the shellac out. Figure the proportion of shellac flakes to alcohol by what pound cut you want. For instance, 1 lb. of flakes dissolved in 1 qt. of alcohol will give you a 4-lb. cut—not a bad solution to begin with. A quart of 4-lb. cut shellac is enough to coat a large piece of furniture several times over.

There's no need to weigh out the shellac flakes on a scale—measuring by eye is close enough. Half of a 1-lb. container is about ½ lb., etc. Once you've added the shellac flakes to the alcohol, or vice versa, be sure to stir or shake the container regularly so that the flakes don't solidify into a lump at the bottom. Keep the container closed as much as possible because alcohol will absorb moisture from the air, which could cause your shellac to appear cloudy when applied.

When mixing your own shellac, there's no need to weigh the flakes on a scale. Just eyeball the amount you need from the container.

When the flakes are completely dissolved (this may take an hour or two), strain the solution through a paint strainer or cheese cloth to remove any impurities and undissolved residue.

To apply a brushed shellac finish, begin by brushing a diluted sealer coat (about ½- to 1-lb. cut) onto new or stripped wood. For the sealer coat, thin your 4-lb. cut shellac solution at the ratio of five to eight parts alcohol to one part of 4-lb. cut shellac. (The actual amounts are not critical—this is only a guide.) This diluted solution is thin enough to give good penetration but thick enough to totally clog the pores of the wood, which is the purpose of the sealer coat.

Strain the shellac solution to remove any impurities and undissolved shellac.

This sealer coat will also lock in place all the raised wood fibers left from sanding or machining. After the sealer coat dries, a light scuff sanding with 280-grit or finer sandpaper will cut off these fibers. Sand in the grain direction just enough to make the surface feel smooth to the touch. Any more does no good and risks sanding through the coating. Worn sandpaper is safest.

Within an hour or two you should be able to begin brushing on the top coats. For these, you'll want to use a thicker solution. What cut you use is a matter of personal preference, but the thinner the shellac, the easier it will be to apply without leaving heavy brush marks. The thicker the shellac, the faster the finish will build. I know finishers who use the 1-lb. cut for

CONTINUED ON PAGE 40

achieve a high gloss. (See sidebar on page 40.) Outdoors, varnishes needed to be more elastic to survive greater wood movement, so outdoor varnishes contained a higher percentage of oil and were called "long oil" or "spar" varnish. Some of these natural-resin varnishes are still available, especially spar varnish.

In most varnish today, the natural resins of old have been replaced with synthetic alkyd or phenolic resins. Phenolics tend to be harder and more durable, which make them the best choice for projects that are to be rubbed to a high gloss, or used outdoors. But phenolics are more expensive and tend to yellow more than alkyds, so alkyd varnish is more popular.

Polyurethane is another synthetic resin-type varnish. Polyurethanes are formulated in different ways for different uses. Some types cure by contact with moisture or heat. Some are two-part finishes that cure by chemical reaction when the parts are mixed. These types of polyurethane are used mostly by industrial and commercial finishers. They're tricky to work with and virtually impossible to repair or remove with chemical removers.

The polyurethane we buy at the hardware store is a more user-friendly blend of polyurethane and alkyd resins, sometimes called uralkyd. This uralkyd polyurethane is tougher and more resistant to heat and solvents than conventional alkyd varnish, but it has some drawbacks. It does not adhere well over other finishes, or on some stains and paste fillers. Polyurethane is difficult to repair, difficult to strip, difficult to rub out (due to its elasticity) and has a difficult-to-describe plastic look. But polyurethane is very popular, because consumers accept these difficulties in return for polyurethane's durability.

So when should you choose polyurethane over alkyd varnish? Polyurethane is appropriate when toughness is a prime consideration. For example, a bar top that sees heavy wear-and-tear is a sensible candidate for polyurethane. For furniture that won't be exposed to physical abuse, alkyd varnish or phenolic varnish—rubbed to a beautiful satin or gloss—is a more appropriate choice.

All of these varnishes are solvent based, that is, they are thinned with hydrocarbon solvents. Recently, we've become aware of the toxicity of these solvents—they're bad for our health and our atmosphere. So there's a great push in industry to replace solvent-based varnishes with water-based formulas. Some have already appeared on the market. I don't think they equal the solvent-based varnishes for toughness, ease of application, and especially appearance, but it's an area to watch for rapid change in the near future.

Varnish can be bought in a number of sheens, from gloss to dead flat. Flat formulas contain finely powdered silica. The silica settles to the bottom of the can and needs to be stirred before using. Stir varnish slowly, and avoid using a whipping motion,which could result in bubbles, which pop during the oxidation process, leaving small pin holes in your finish.

Instead of dipping my brush into the varnish can, I transfer the varnish into a wide-mouth quart jar or plastic container, which I fill only ⅓ to ½ full. I like to tap the brush against the side to remove excess var-

CONTINUED ON PAGE 41

Transfer varnish into a wide-mouth quart jar or plastic container filled ⅓ full. To avoid getting air bubbles in the varnish, remove excess varnish by tapping the brush against the side of the container instead of wiping the brush against the lip.

When brushing varnish, begin slightly in from the edges, and brush back toward them to avoid runs down the sides. Then, work in towards the center and across the surface. After covering the entire surface, "tip off" by brushing very lightly, holding the brush at a 75° angle and brushing from side to side with the grain.

SHELLAC

A sealer coat of dilute shellac locks the wood fibers in place. A light scuff sanding with fine sandpaper cuts the fibers off smoothly.

the top coats, while others prefer a 3- or 4-lb. cut. I feel most comfortable with a 2-lb. cut at this point. Depending on the cut you use for the top coats, you'll need to apply anywhere from three to ten coats to build up a sufficient finish.

Depending on the weather, you should be able to apply an additional coat every few hours. If the weather is dry enough, you might be able to apply three or four coats each day. Shellac dries more slowly in cold temperatures and high humidity and faster when it's hot and dry. Each new coat of shellac will begin dissolving the previous coat, so it's important to avoid working the brush back and forth over the same area too much, or you'll remove as much as you're putting on. Because of the rapid drying, wait until the next coat to cover missed spots. Otherwise, you risk "dragging" the already tacky film, like pulling the skin that forms on a cup of hot chocolate.

For a high-class, mirror-flat finish, you'll want to dry sand the shellac very lightly with 320-grit sandpaper after every two or three coats. Use an open coat, light-gray, silicon carbide paper, like 3M Tri-M-ite or Norton No-Fil Adalox. This sandpaper has a zinc-stearate coating, which acts as a lubricant. (See May/June, 1988 *AW*.)

Shellac is reversible, which makes a shellac finish easy to repair. Gaps in the finish or damage caused by spilled alcoholic drinks can be filled in with more shellac and leveled flat by sanding. No line will show where the new shellac meets the old. Runs or sags can be sanded or scraped flat. Gouges can be filled by melting solid shellac sticks—sometimes called burn-in sticks—into the gash, or by dripping in liquified shellac a layer at a time.

An old shellac finish can always be renewed by French polishing—a technique of applying shellac with a cotton pad. (See March/April, 1989 *AW*.) French polishing gives superior results, because it leaves no brush marks or rubbing-out scratches on the surface.

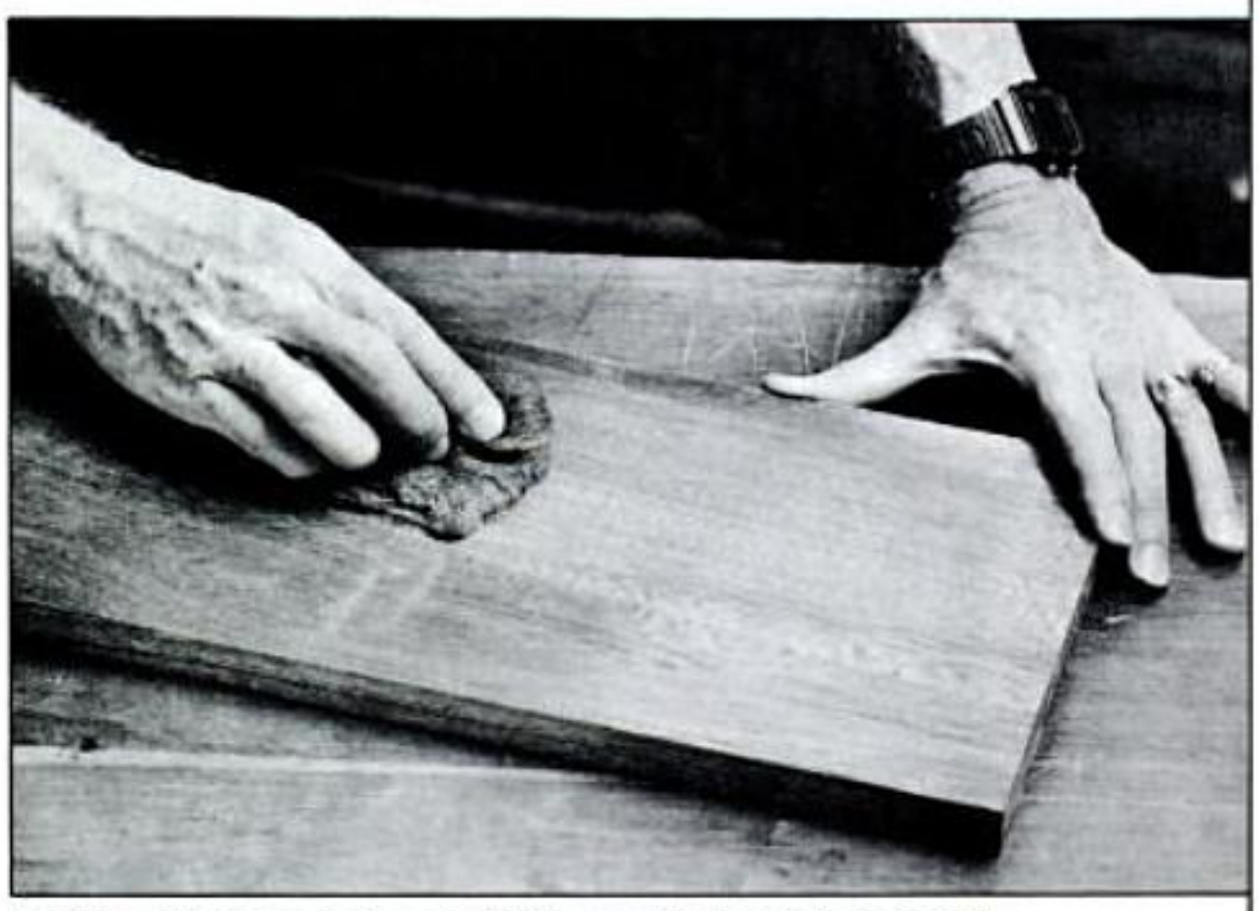
Old shellacked surfaces can also be revived by respreading the surface with alcohol and/or recoating with fresh shellac. Another alternative is to strip off the old finish with alcohol—a clear advantage over the noxious fumes of the methylene-chloride based strippers necessary for Type 2 (reactive) finishes. You can tell if an old finish is shellac by dabbing alcohol on a small spot—shellac will turn sticky within seconds.▲

RUBBING OUT A FINISH

The only way to achieve a perfectly flat, smooth, defect-free, film surface, other than by the technique of French polishing, is to level and rub the finish with fine abrasives. The process is extremely simple in principle and is usually worth the effort. It can be done on all newly applied film finishes (as opposed to penetrating oil finishes) after they've dried hard. Rubbing will also renew old, dull, even slightly crazed finishes.

It's important to remember that finishes can take a month or more to dry completely. You'll get best results by allowing a finish to dry for at least a month before rubbing.

Begin by leveling the dust nibs, brush lines, orange-peel spray, or other irregularities by sanding the finish with very fine sandpaper—320-grit



Rubbing with 0000 steel wool will give a rubbed satin look. Switch to pumice with water or oil for greater gloss. For maximum gloss, finish up with rottenstone.

nish rather than drag it over the lip of the can or bail wire, which creates air bubbles in the varnish.

The first coat of varnish is called a "sealer" coat. This may cause confusion for inexperienced finishers, but it means nothing more than clogging the pores in the wood so subsequent coats, dirt, liquids, etc., can't enter the wood. The first coat of any finish usually accomplishes this, but you get a better seal by thinning the first coat,so it penetrates smaller openings.

The sealer coat also hardens the wood fibers in an upright position,so they can be sanded smooth with very fine sandpaper. With varnish, a separate product called a "sanding sealer" is often recommended as a sealer coat, because it sands easily without a lubricant (like water or oil), which would be risky to use on such a thin coating.

Following the first sealer coat and a light sanding with 320-grit or finer sandpaper, you can begin applying the top coats. Varnish builds fast, so only two or three coats are usually necessary. But you'll find that varnish is easier to apply and cures more quickly to a very hard surface if you thin it with 10% to 20% mineral spirits (unless another solvent is specified on the can). The thinning may mean you'll need to apply additional coats.

Dust is the biggest single problem with varnish. Airborne dust settles on the surface and sticks to it. Instead of blowing or brushing sanding dust into the air, clean off the sanding dust with a vacuum or, better, with a tack cloth.

Now begin flowing on the varnish. You have a lot of time, so there's no need to rush. You want a good, smooth coat of even thickness. Varnish goes on much thicker than shellac but tends to level out better on horizontal surfaces because of its longer drying time.

Begin slightly in from the edges of your piece and work back toward the edges to avoid runs down the sides. Next, brush in towards the center and across the surface. For now, don't worry whether you're going with or against the grain, just get the varnish on. When you have it fairly smooth across an entire surface, "tip off" by brushing very lightly, holding your brush at about a 75° angle, moving from side to side, with the grain if possible. Begin each stroke slightly in from the edge, and pick up the gap near the edge on the return stroke.

It's always harder to varnish vertical surfaces because of the tendency of the slow-drying varnish to sag and run, so remove drawers and doors and finish them horizontally. When I have to varnish a vertical surface, I usually begin at the top of a piece and work down, so I can pick up any drips on the way. The tendency of varnish to sag on vertical surfaces can be lessened by "tipping off" sides and legs from the bottom up, after you've brushed on the varnish. If these strokes run against the grain, and you don't intend to rub out the finish (which will remove the brush strokes), go with the grain instead. It's usually easier to brush around turnings than to brush lengthwise. ▲

Bob Flexner restores furniture at The Workbench, in Norman, Oklahoma. He wrote about aniline dyes in the November/December, 1988 AW *and has produced two videotapes,* Repairing Furniture, *and* Refinishing Furniture, *(available from, Taunton Press, Box 355, Newtown, CT 06470).*

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or finer depending on how much you need to cut the finish back. A lubricant, such as water, lemon oil or kerosene, will reduce clogging in the sandpaper. Don't skimp on the lubricant. Sanding will be smoother and faster if the surface is good and wet. Though shellac will usually withstand a water-lubricated sanding, it is wiser to use oil. If the surface is perfectly flat, you can back your sandpaper with a felt or cork sanding block. Otherwise, use your hand. Sand with the grain.

When the finish film is smooth and level (look for an even scratch pattern across the surface), switch to a finer abrasive. Continue switching to progressively finer abrasives until you achieve the sheen you want. You can get a rubbed satin look with 0000 steel wool or a gray 3M Scotch Brite pad. For more gloss, follow the steel wool or Scotch Brite pad with pumice mixed with water or light oil. You could also use a commercial rubbing compound, which is simply fine abrasives in a paste or liquid. If you want the sheen still glossier, follow with rottenstone mixed with water or oil, or use a finer-grit commercial rubbing compound. With abrasives this fine, I rub in circles instead of with the grain, because the scratches are so fine, you can hardly see them, and the circular lines look better to my eye when light reflects off them.

You can use a felt block, blackboard eraser or simply a wadded piece of cheesecloth to rub the pumice or rottenstone. Use a clean pad each time you change grits. Rub more carefully near corners and edges to avoid cutting through the film. If you've never rubbed a finish before, you'll probably be scared of rubbing through the film. To gain confidence, finish a scrap piece of wood or veneered plywood the same as the project you're working on, and run through the procedure I've outlined above.

Rubbing is useful for correcting defects, whether in your newly finished project or your store-bought furniture. You can even change your mind and take the newly rubbed gloss surface back down to a satin, or visa versa, back and forth until you're satisfied. If the film gets too thin, clean it with water or mineral spirits and a tack cloth, let it dry, and add another coat or two of finish.

The key to working with finishes is learning to relax and understand how simple they really are. They're nothing but an evaporative or reactive film that can be added to for greater thickness, or cut back by polishing.—*B.F.*

This candle stand is a reproduction of an 1815 piece from the Old Salem Museum. The top tilts to a vertical position so the stand could be stored up against a wall when not in use.

Moravian Candle Stand

A Graceful Little Table With a Top That Tilts

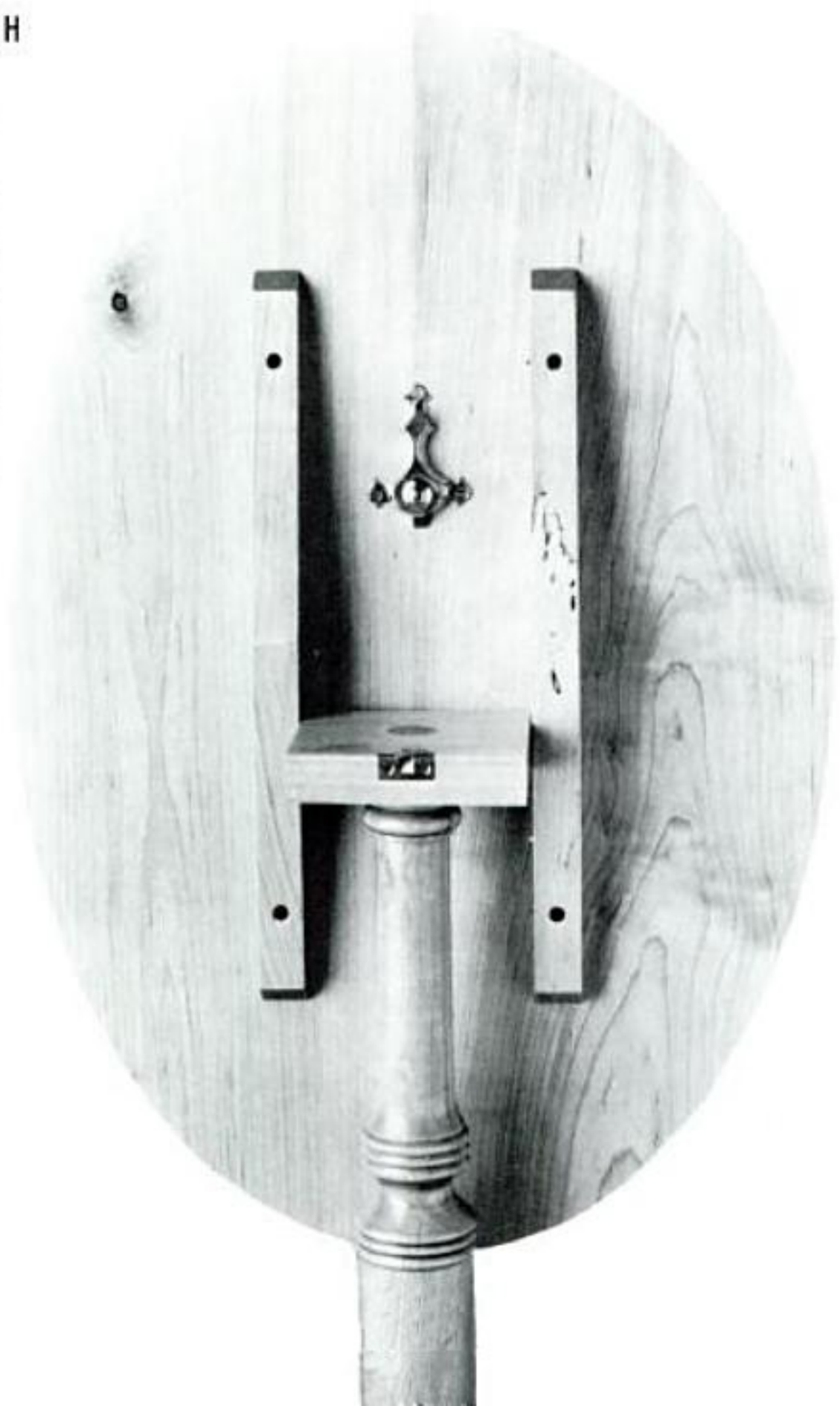
BY CARLYLE LYNCH

This candle stand comes from the Old Salem Museum's collection in Winston-Salem, North Carolina. It dates from around 1815 and was probably built by a Moravian craftsman. The Moravians—followers of the Protestant sect of the same name—emigrated from Germany and settled in North Carolina, Pennsylvania and Georgia. They were industrious people with their own ideas about furniture. For example, they often used pegs where other furniture makers used screws.

Homes back then were lighted with candles, so the

PHOTOS BY JOHN HAMEL

A brass catch fastens down the tabletop when horizontal and ornaments it when vertical.



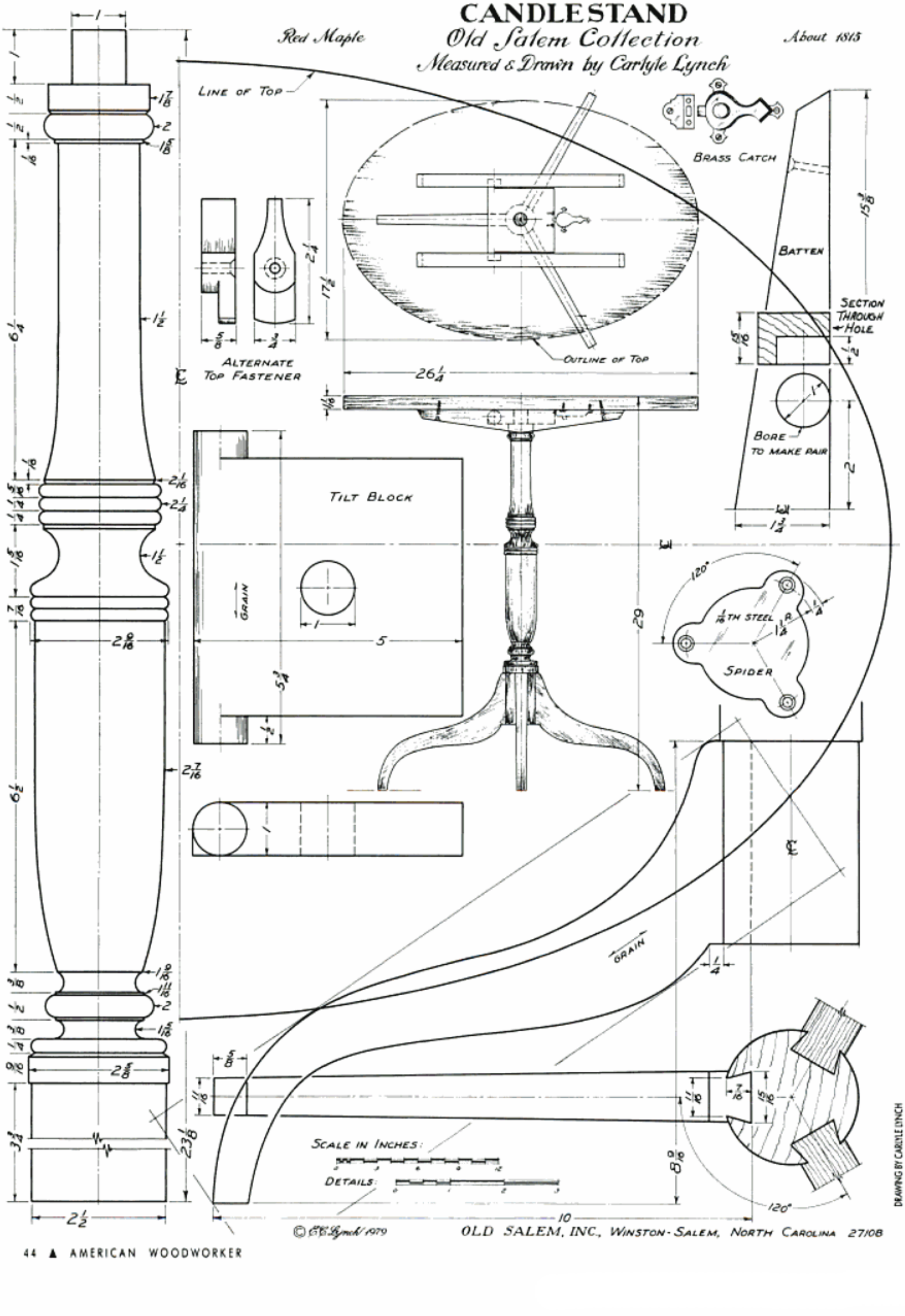
CANDLESTAND

Old Salem Collection

Measured & Drawn by Carlyle Lynch

Red Maple

About 1815



OLD SALEM, INC., WINSTON-SALEM, NORTH CAROLINA 27108

DRAWING BY CARLYLE LYNCH

candle stand was a common item. It wasn't often that you'd find two alike—there was plenty of variety in design. This particular candle stand reminds me of those made by the Shakers, only it's a little bit fancier than the Shaker pieces.

The top on this candle stand tilts up. Back when it was made, space was at a premium. Often, a room had many functions. With the top in a vertical position, the candle stand took up much less space and was easily pushed against a wall to make room for some other activity. Then, when it was needed again, the top tilted horizonally and was held in place by a metal catch. The catch on the original table is brass, and a reproduction catch is available from Horton Brasses, Nooks Hill Rd., P.O. Box 120AW, Cromwell, CT 06416. For those who don't have the budget for brass hardware, I've included an alternate top fastener in my drawing which can be made out of a piece of scrap wood. Of course, the top doesn't have to tilt—if you have no intention of storing it against a wall, you can fix the top permanently to the column.

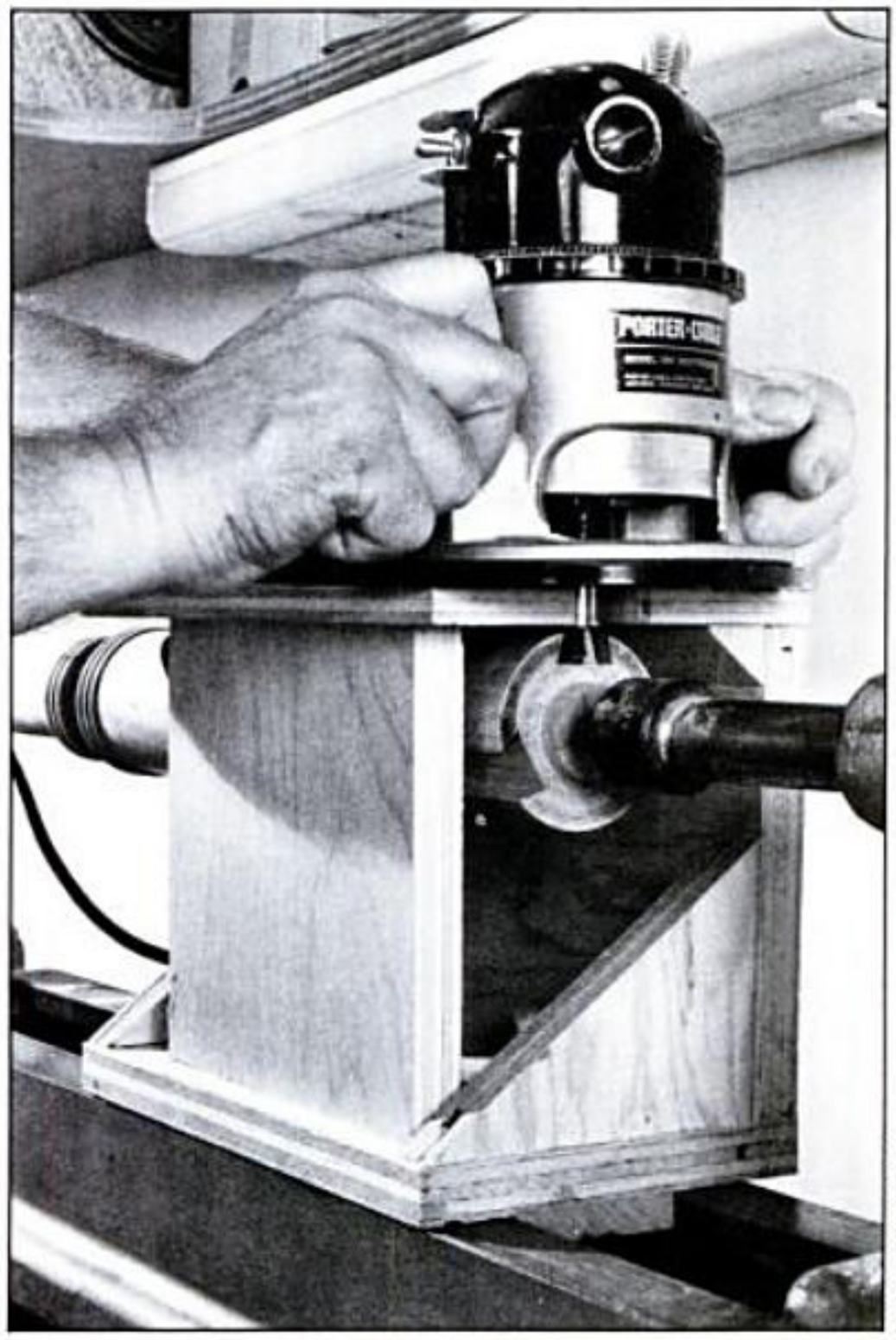
The candle stand has three legs, fastened to the column with sliding dovetail joints. There is an advantage to having three legs instead of four—the table never wobbles.

The original candle stand is made out of red maple, but walnut, cherry or mahogany would do as well for a reproduction. I think the table is too sophisticated-looking to be made out of pine, though.

It's a nice little piece as it is, but you may prefer a thinner top. Use the drawing as a guide and modify the table as you see fit. (A large-size drawing is available for $10 from Carlyle Lynch, 196 Holly Hill, Broadway, VA 22815.) Early-American furniture builders often took liberties with the elaborate designs that were published in pattern books from England and France. Many of us, then and now, believe we have much prettier furniture as a result. However, don't misunderstand me. Some pieces of early furniture are so well-proportioned and beautiful that I would not think of changing a dimension.

Building the Candle Stand

Start by turning the column. Take care to make the cylindrical section at the bottom of the column one uniform diameter so the legs fit properly. Turn a 1-in. dia. tenon on the top of the column (make sure it's a snug fit in the tilt-block hole). Don't turn away the center marks at the ends of the column just yet. You'll need to remount the column on the lathe to cut the grooves for the dovetailed legs.

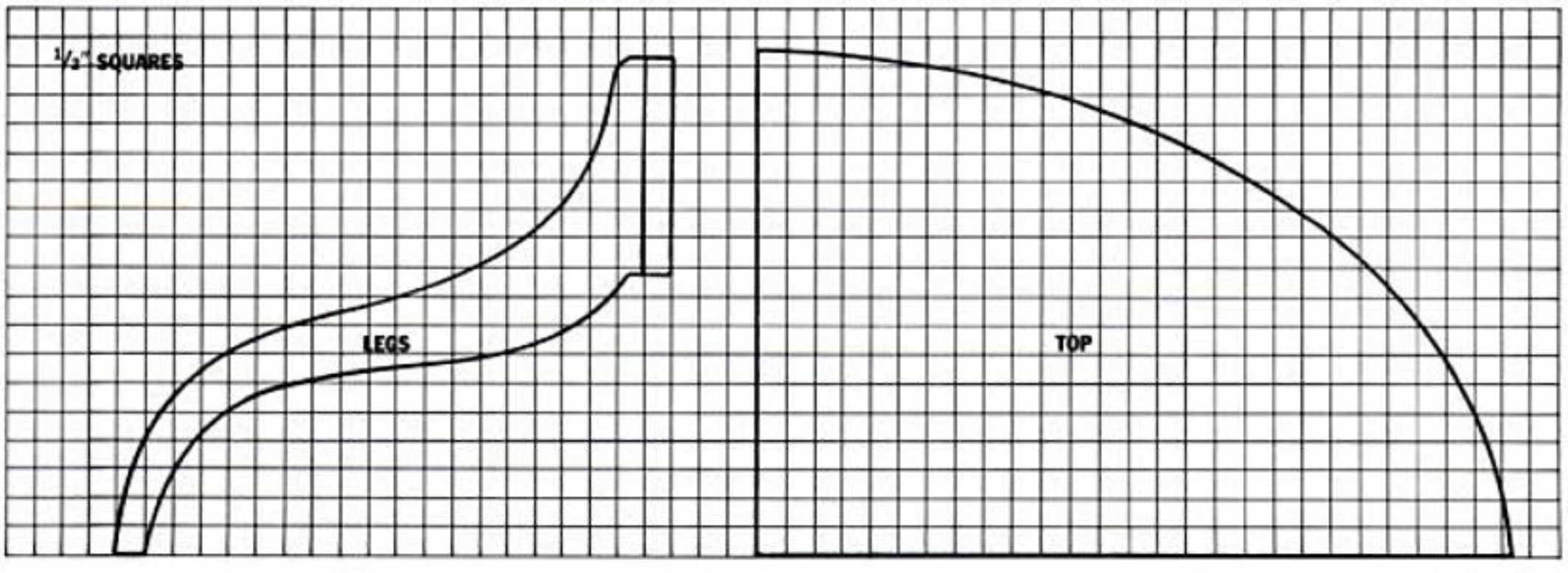


PHOTOS BY MITCH MANDEL

A simple shop-made dovetailing jig enables you to rout the dovetail grooves with the column mounted on the lathe.

Cutting the dovetailed grooves is a simple operation with a router, a ½-in. dovetail bit, and the shop-made dovetailing jig shown in Fig. 2 and the photo above. This plywood jig fastens securely to the bed of

FIG. 1: FOR TOP & LEG PATTERNS



Cut the dovetails on the legs on a router table before you cut out the shape of the legs.

your lathe, providing a horizontal bearing surface for your router. A slot cut in the top of the jig guides the router and stops the bit at the proper distance.

Lay out the location of the grooves on the bottom of the column. With a pair of dividers, divide the bottom into three equal sections, and mark out the depth and width of the dovetails on the end of the column. Your dovetail bit will determine the angle of the dovetails.

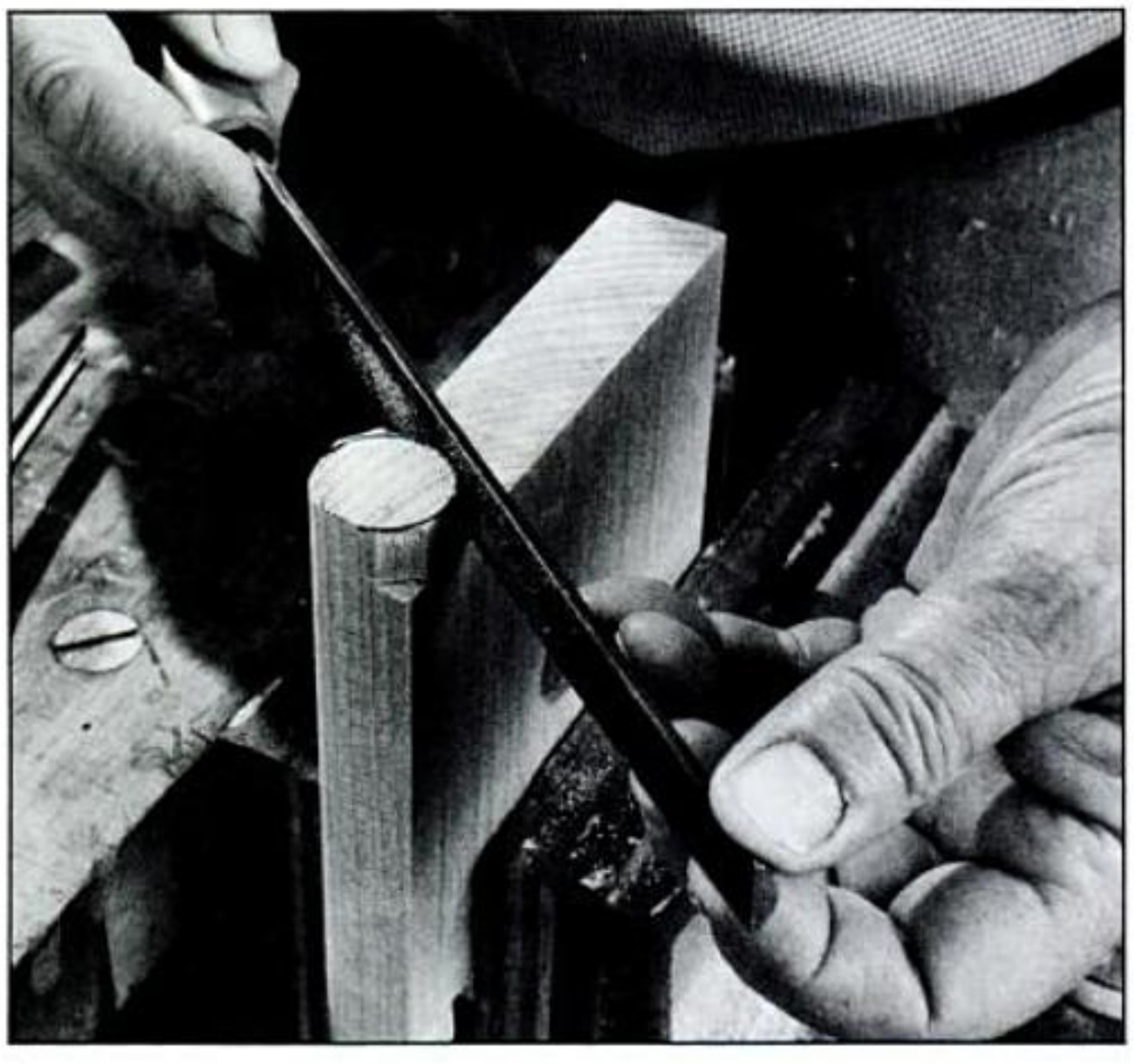
Remount the column on the lathe. Holding a straightedge parallel to the bed, draw lines on the side of the column to mark the length of the dovetail grooves. Fasten the dovetail jig to the bed of your lathe so the slot in the top of the jig lines up with the lines you've made on the column. Secure the leg so it can't turn. Install a guide-bushing in your router base. With a 1/2-in. dovetail bit, cut each groove in two passes—first cutting one side of the groove, then the other. (See photo.)

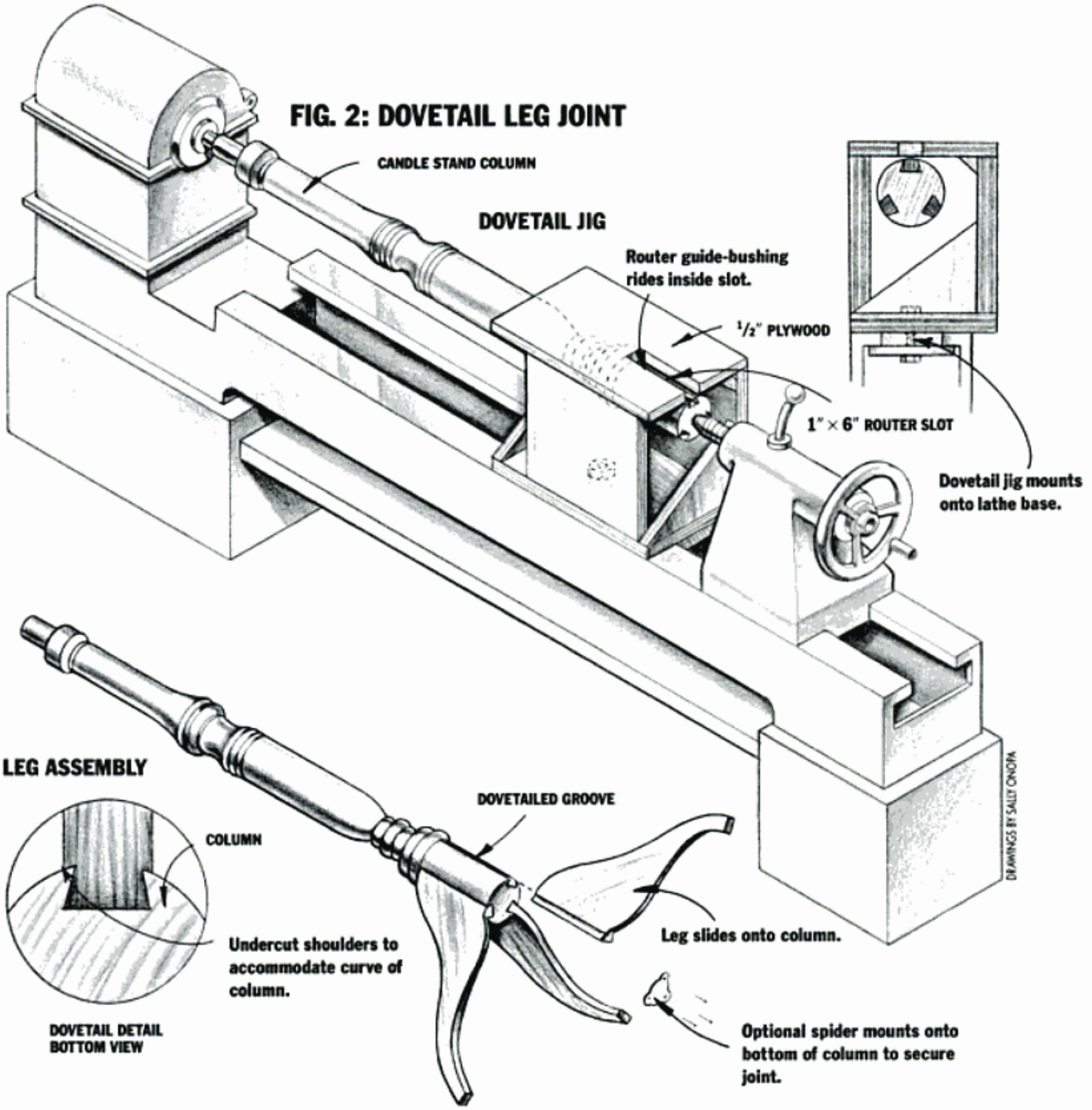
Make a leg template from the pattern in the drawing, and use it to lay out the three legs. Be careful to orient the grain as shown in the drawing. Saw out the upper end of each leg—the end that gets the dovetail—but don't saw out the rest of the leg just yet.

Cut the dovetails on your router table with the 1/2-in. dovetail bit as shown in the photo. It's a good idea to make a trial joint and test the fit in the dovetail grooves in the column. You'll need to undercut the shoulders of the joint with a chisel to allow for the curve of the column as shown in Fig. 2. Once you achieve a good fit on your trial run, cut the dovetails on the actual legs, and undercut the shoulders accordingly.

If you look at the main drawing, you'll notice the legs taper in thickness from 15/16 in. at the column, to 11/16 in. at the foot. The taper isn't essential, but it makes the legs more graceful. After you've cut the dovetails, taper the legs with a plane, or on the jointer. Plane the taper evenly on both sides of each leg. This will, of course, remove the layout lines. Once you've tapered each leg, redraw the leg shape and bandsaw the leg to

To make the tilt-block dowels, after sawing the corners, chop them off with a chisel, then round the dowels with a file.





shape. Sand the legs and column, and glue the legs in place.

You'll notice that I include in my drawing an item of hardware called a "spider." This is a metal plate that screws onto the bottom of the column as extra insurance that the column won't split at the bottom from hard use. The original candle stand has no spider, but if you want to install one, you can cut out a spider from 1/16-in. steel or brass.

The battens and tilt block are next. Cut the battens out first, then drill a 1-in. hole approximately halfway through each batten for the tilt-block "dowels." Cut out the tilt block, leaving two projections at one end to form the dowels. Pay attention to the grain direction as shown in the drawing. With a compass, lay out the 1-in. dia. dowels, and round off the dowels with a saw, then a chisel and finally a file, checking their fit in the batten holes from time to time.

When you finish the batten and tilt-block assembly, you're ready to glue the tilt block onto the column, so that the edge with the dowels runs 90° to the centerline of one leg (See main drawing). Pare off the tenon flush with the surface of the tilt block.

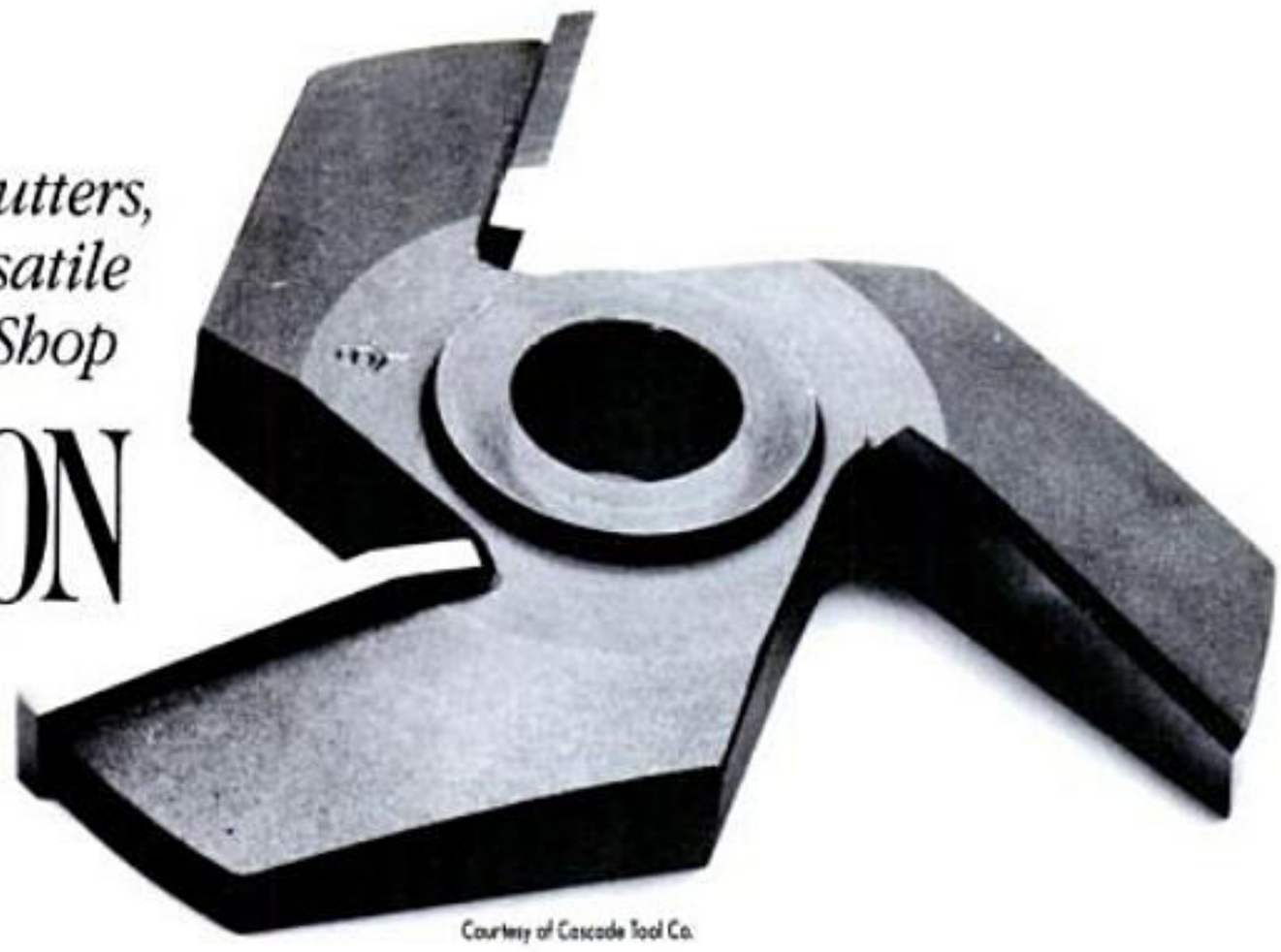
Make the top out of nicely figured stock, and bandsaw the curve according to the dimensions given in the drawing. Place the tabletop upside down on your bench, and turn the column assembly upside down so the tilt block rests on the top. Slide the battens onto the tilt-block dowels, and screw the battens to the top (two screws in each batten). Finally, inlay the catch strike plate into the tilt block and screw the other part of the catch to the top. (See photo.)

The original candle stand was probably finished with varnish or shellac. Unlike the Shakers, the Moravians rarely painted their furniture. ▲

Carlyle Lynch has measured and drawn over 100 pieces of antique furniture. He has taught on the secondary and college levels and has worked as a furniture designer. Cabinetmaking has been a life-long avocation. He lives in Broadway, Virginia.

With the Right Cutters, It's the Most Versatile Machine in the Shop

AN INTRODUCTION TO THE SHAPER



Courtesy of Cascade Tool Co.

Courtesy of MLCS Ltd.

BY DAVID SLOAN

If I close my eyes I can still see it. That ancient gray shaper just sat there in the corner of the school shop, half-hidden under wood scraps and a thick layer of dust. We students had been ordered not to touch it upon pain of a pummeling with the fearsome "Board of Education" that hung in the shop teacher's office. Come to think of it, the teacher never touched the shaper either, and as far as I could tell, that machine hadn't done a lick of work since the day it was moved into the shop.

Like my shop teacher, lots of woodworkers avoid the shaper simply because they never learned how to use one. The shaper itself is stone simple—just a rotating arbor mounted beneath a table with a hole, through which you raise and lower a spindle. But throw in all the cutters, collars, hold-downs, guards and jigs that a well-equipped shaper is likely to have, and you've got a complicated system that can be hard to figure out on your own.

The shaper is an amazingly versatile machine. It can make edge cuts on straight or curved stock. It's also useful for all sorts of grooving and molding operations, both decorative, such as an ogee molding around the edge of a tabletop, and functional, such as the "rule joint" for the hinged leaves of a drop-leaf table. It's ideal for making moldings, window sash, door frames and for raising panels. It's also great at making joints such as lock miters, tenons, tongue-and-groove, and cope-and-stick joints (sometimes called cope-and-pattern) commonly used in sash and door construction. In addition, a shaper can be used for template shaping—producing identical parts in multiples with the help of a pattern.

"I can do all that on my router table," I hear you say. To some extent, that's true. But your average shaper has more power than a router and a wider range of cutters. These cutters, when used singly or stacked on the spindle in combination with other cutters and spacer collars, form just about any shape you could imagine. A shaper also spins more slowly than a

Courtesy of Grizzly Imports

Shaper cutters come in all shapes and sizes. Shown here, panel-raising cutter (top), reversible rail-and-stile set (bottom), ogee-molding cutter (bottom left).

MITCH MANDEL

router, allowing you to use large-diameter cutters that would be unsafe at the high speeds a router operates.

Shaper Features

Shapers are sized according to the diameter of the spindle. Small, light-duty shapers have a 1/2-in. dia. spindle. The next step up is a medium-size unit with a 3/4-in. dia. spindle. Larger production machines have 1-in. or 1 1/4-in. dia. spindles. The size and weight of the shaper itself, as well as the power of the motor, increase along with spindle size.

Some shapers have interchangeable spindles. The Delta shaper, shown in the photographs, can handle 1/2-, 3/4- and 1-in. dia. spindles, giving you a much wider selection of cutters from which to choose. Some shapers even have router collets that allow you to make use of router bits.

Low-priced, light-duty shapers are often single speed, but more expensive machines are two-speed affairs—a higher speed for small cutters (typically 10,000 RPM) and a slower speed for large-diameter cutters (typically 7,000 or 8,000 RPM).

A reversible spindle is a handy feature to have on a shaper. This enables you to invert a cutter and reverse the direction of cut—a capability that really improves the versatility of the machine.

The fence is used for shaping the edges of straight stock. Instead of the continuous type of fence found on your tablesaw, shaper fences have two halves as shown in the photo. These two halves adjust independently, both forward and backward (I'll explain why in the section on Basic Operations), as well as in and out relative to the spindles. Since the diameters of the cutters vary, fences are made to move in and out so that you can set them as close to the cutter as possible. This way,the stock doesn't have to span a large gap as you feed it across the two halves of the fence. Adjusting the end play of the two fence halves is tedious on some shapers, and it's often more convenient to make an auxiliary fence from plywood when you need fence support close to the cutter.

That's a rundown on the basic features common to most shapers. Since everybody's needs and budgets are different, there's no such thing as an "ideal" shaper. Whether you go with a low-priced 1/2-in. shaper or a heavy-duty, 1-in. machine, look for an adjustable two-part fence, a spindle that adjusts up and down, a miter-gauge slot, a reversing switch, holes in the table for fulcrum pins, and good, solid bearings on the spindle.

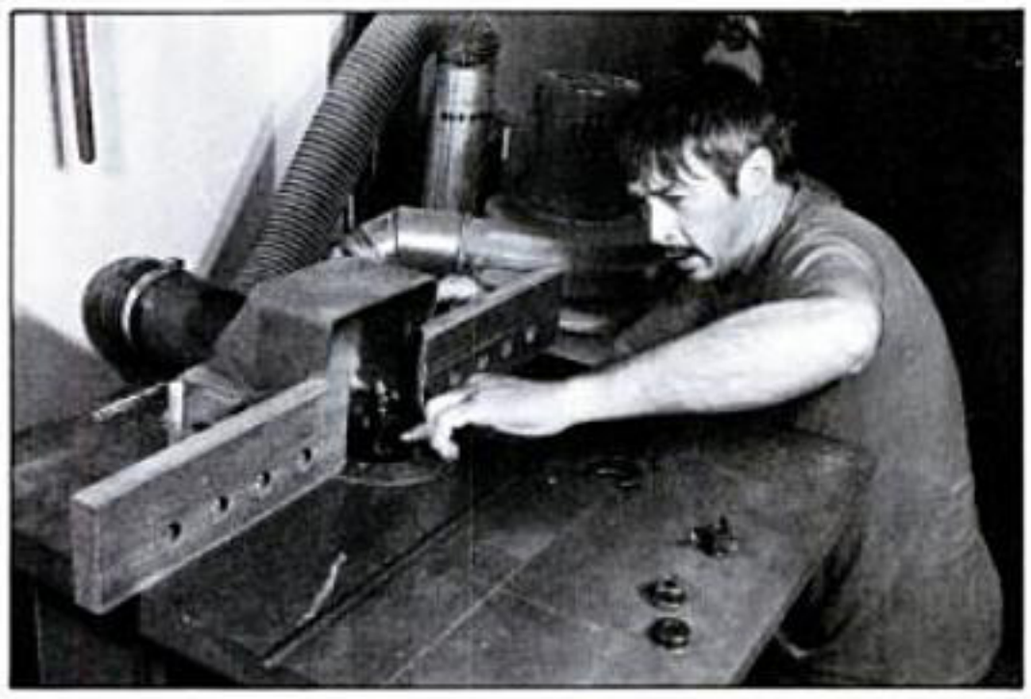
Shaper Cutters

Shaper cutters are expensive, and it's not uncommon for a production shop to have far more money invested in cutters than they do in the shaper itself. Unless they're lucky enough to buy a collection of cutters secondhand, most woodworkers simply buy cutters individually as needed for a particular job.

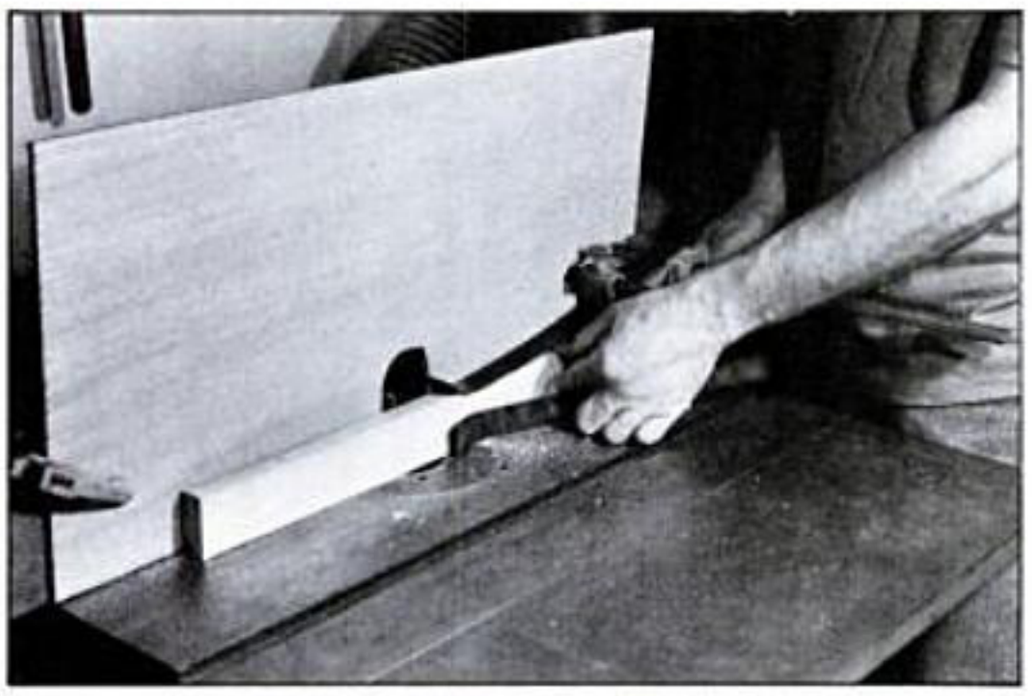
Not long ago, most shaper cutters consisted of two flat knives, ground to the desired profile and clamped between two slotted collars that mount on the spindle. This type of cutter is still in use today but is mostly limited to situations that require custom-ground knife profiles or industrial applications.

In the small shop, most flat-knife cutters have been replaced by one-piece three-wing cutters. The least expensive type of three-wing cutter is made from high-speed steel with the profile ground on the wing tips of the cutter. Carbide-tipped cutters cost more, but they rarely, if ever, need sharpening, and are especially useful for cutting plywood, particleboard or plastic.

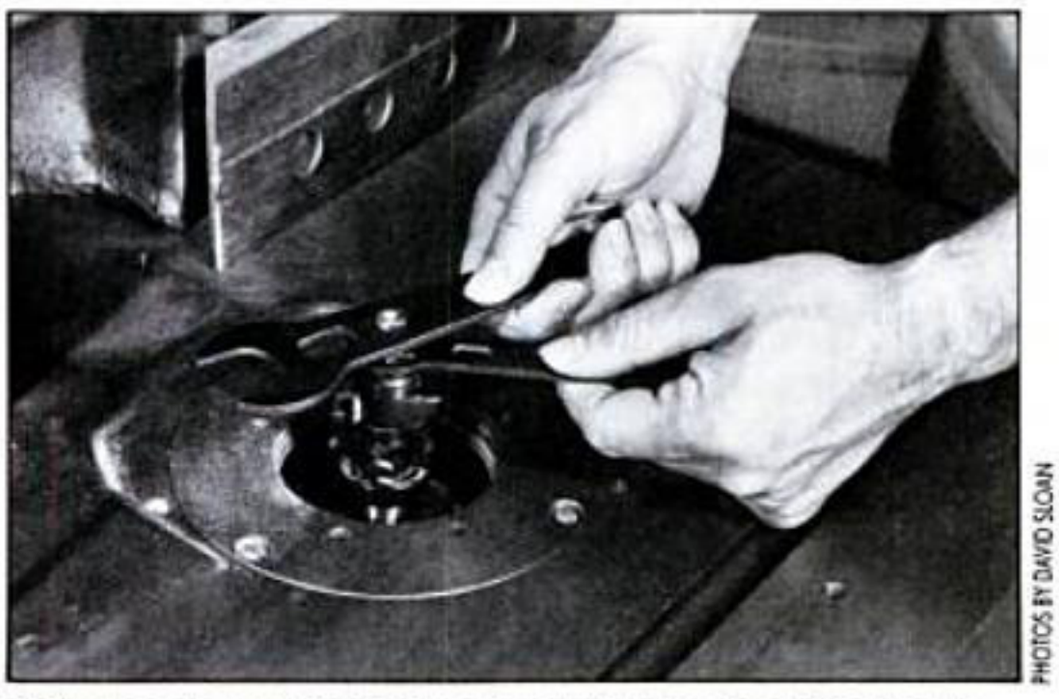
Wing cutters come in all shapes and sizes, from small, 2-in. dia. cutters up to 6-in. dia. panel raisers.



Each half of a shaper fence adjusts independently. Align the halves for cuts that shape only part of the edge; advance the outfeed fence slightly for cuts that remove the original edge.

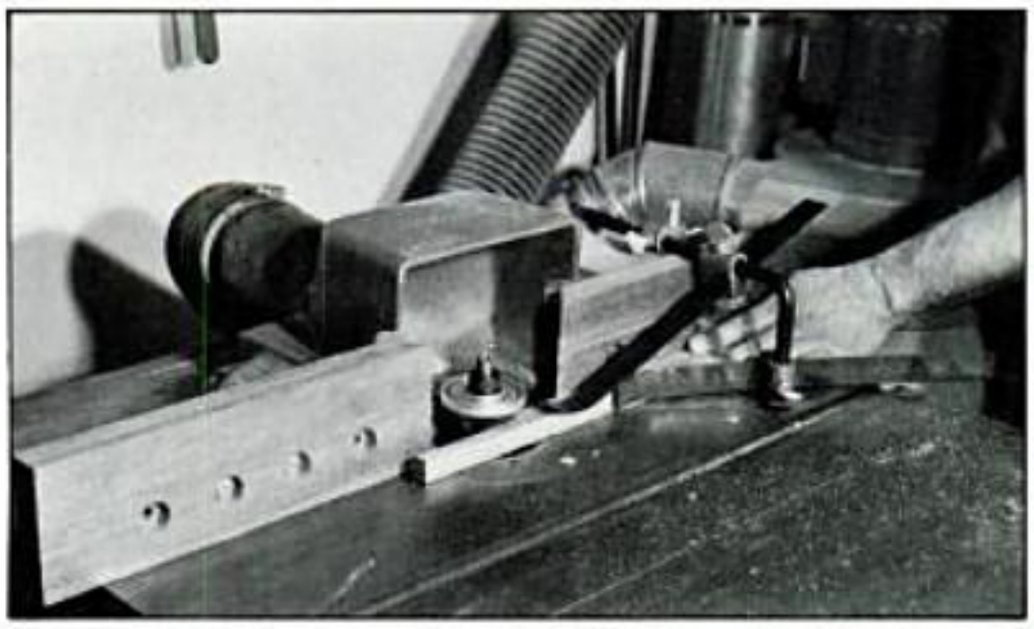


Here, a narrow opening in a plywood fence provides support close to the cutter for shaping narrow stock. Spring hold-downs hold stock tight against the fence and table.



PHOTOS BY DAVID SLOAN

Cutters can be mounted singly, or in combinations to make all sorts of moldings, grooves and joints. Collars vary the spacing between cutters and take up excess space on the spindle.



It's safest to cut underneath the stock, but some jobs, like the molding shown here, require you to cut "on top" of the work. For this setup, an acrylic plastic disk with a ball-bearing arbor serves as a safety guard.

Shape irregular curves by using a fulcrum pin to pivot the stock into the cutter. For the curve shown here, start with the pin to the right of the cutter. Cut the first few inches, moving right to left.

Pivot the stock away. Move the fulcrum pin to the left of the cutter. Turn the machine back on, and slowly pivot your stock back into the cutter.

Once stock contacts the rub collar, it no longer needs to touch the pin. Continue cutting right to left to the end of the curve.

With most cutters, you can cut with the entire edge or simply a part of the edge, depending on the shape you want. You can work with a single cutter,or stack cutters on the spindle in combination with collars, to make all sorts of shapes. You can also cut shapes in multiple passes, switching cutters and/or raising or lowering the cutter height between passes. The combinations and possibilities are nearly limitless.

Cutters come in different bore sizes to fit different spindle diameters. In general, the larger-bore cutters cost considerably more than the same profile in a smaller bore size. Some large-diameter cutters, like a few monster panel-raising cutters, aren't available in 1/2-in. bore because the 1/2-in. spindle just isn't heavy enough to withstand the forces involved. Many cutters come with a bushing that allows them to be used on the next smallest-size spindle. For example, 1-in. bore cutters come with a 3/4-in. bushing; 3/4-in. cutters have a 1/2-in. bushing.

The least expensive cutters are the small 1/2-in. three-wing cutters. If you have a shaper with interchangeable spindles, you can buy 1/2-in. cutters for most of your shaping needs and move up to 3/4-in. or 1-in. bore cutters for the few times when you can't find the cutter you need in 1/2-in. bore.

Most cutters are sold individually, but some cutters, like tongue-and-groove cutters, come in matched pairs—one cutter to make the tongue and one to cut the groove. You can also buy sets of cutters known as *cabinet sets*. These are six-piece sets consisting of four profile cutters and two straight cutters designed to stack up for cope-and-stick work on doors or other stile-and-rail construction.

Some cutters are referred to as *reversible cutters*. They're designed to cut interlocking shapes by inverting the cutter and reversing the spindle rotation. Reversible stile and rail cutters and reversible finger-joint cutters are two common examples.

In addition to the cutters themselves, you need a collection of collars. Collars fill two functions. They space cutters apart, and they're also used to take up extra space on the spindle between the cutter and the threaded portion at the top of the spindle, so the lock nut can hold the assembly firm. One specific kind of collar, the rub collar, is a ball-bearing mounted collar that is mounted on the spindle and used to limit the

SHAPER SAFETY

The shaper is a dangerous machine, especially on curved work. It can kick back like a tablesaw and throw stock with great force. A kickback can pull your hands into the cutterhead with frightening speed. Here are a few rules to follow for safe shaper operation. Study your shaper's owner's manual for additional safety rules.

- Unplug the shaper before changing cutters.
- Protect your hands when removing cutters.
- Always wear eye and ear protection.
- Keep hands away from the cutterhead.
- Never exceed the rated cutter speed.
- Use guards for all setups.

depth-of-cut, much like the pilot bearing on a router bit. Collars and rub collars come in different diameters and widths for different applications.

Plastic shims are also handy for spacing cutters just the right distance apart. Some sets are color coded, so that you know which thickness is which.

Mount the cutter close to the bottom of the spindle, not the top. If you mount the cutter high on the spindle, the leverage is increased and the bearings take a beating. Fill up the empty space above the cutter with collars, leaving room on the spindle for the lock nut and keyed lock washer. (Some shapers have two lock nuts instead.) After the nut is tight, you should still be able to see some spindle thread above the nut.

Whenever possible, mount the cutter so that it cuts on the underside of the stock. This setup is safer than cutting on top of the stock since the cutter isn't exposed. Sometimes you have to cut on top as shown in the photo on Page 50. When stacking cutters, stagger the tips so they don't all contact the stock at once.

Basic Operations

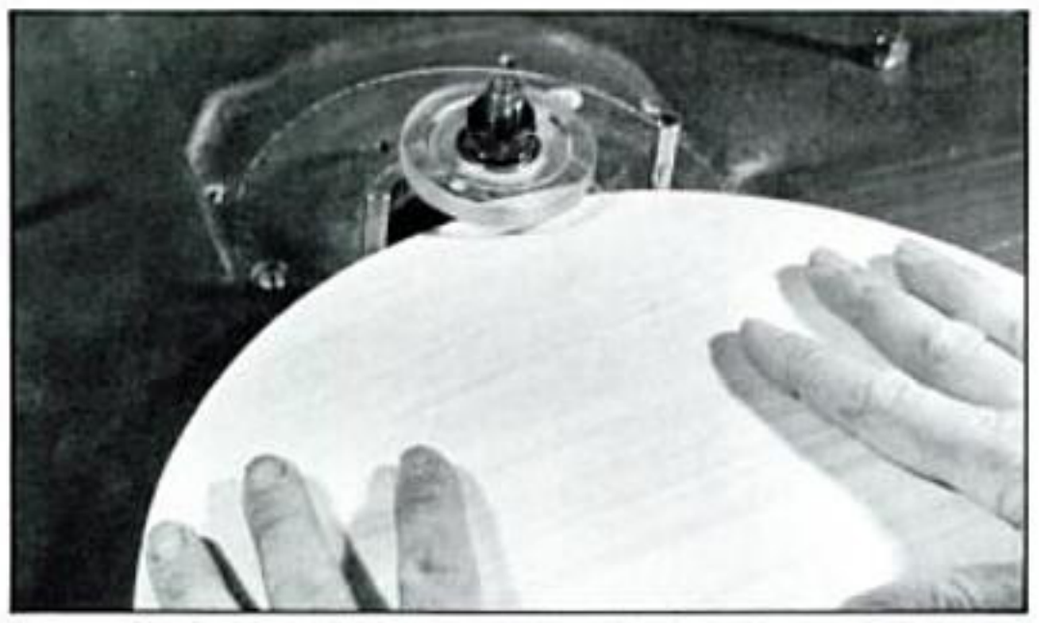
Shaper operations can be divided into two broad categories: straight work and curved work.

Straight work is done with the fence in place as I mentioned above. The shaper fence can be used in two ways, depending on the type of cutting being done. When cutting a groove or a molding that leaves part of the original edge intact, the fence halves stay in line, and you feed the stock along the fence much like the rip fence on a tablesaw. When making a cut that removes the original edge of the stock, move the outfeed fence forward just enough to support the newly cut edge. You'll find this easy to visualize if you think of the fence halves as jointer tables turned on their sides.

When shaping multiple short pieces it's a good idea to push the stock through the cut with the following piece rather than feed each piece individually. Feed the last piece with a push stick.

Curved work is done with the fence removed from the shaper. Instead of a fence, curved work is guided against a ball-bearing rub collar mounted on the spindle. The rub collar can be mounted above or below the cutter, depending on the shape being cut. Curved work requires a spindle-mounted guard, like Delta's Safe Guard II Spindle Guard (available from Woodworker's Supply of New Mexico, 5604 Alameda Place NE, Albuquerque, NM 87113).

- Use hold-downs whenever possible.
- Cut on the underside of the stock when possible.
- Stand to one side in case of kickback.
- Always feed stock *against* the rotation of the cutter.
- Don't wear jewelry or loose clothing.
- Wait for the spindle to stop before walking away.
- Mount cutters near the base of the spindle, not the top.
- Lock spindle-elevating mechanism before cutting.
- Make sure spindle nut is securely tightened.
- Never cut curves "freehand." Use fulcrum pins and rub collars.
- Use a miter gauge for end cuts on long stock.
- Support stock firmly against the table.



One way to shape outside curves is to guide the edge against two pins. This method will work only with circular shapes. A plexiglass disk serves as a guard.

Instead of just putting work into the cutter freehand, curved work is pivoted into the cutter on a steel *fulcrum pin* set into one of the holes in the shaper table. As shown in the photos on Page 50, the pin is used as a pivot point to swing the work into the cutter. Once the work is firmly against the rub collar, it no longer has to contact the pin. A second pin on the outfeed side supports the stock as you end the cut.

Circular shapes can be guided against two pins instead of against a rub collar as shown in the photo. This setup is limited by the pin-hole spacing in your shaper table.

Curved work is more dangerous than straight work, because you can't use hold-downs and you don't have the support of a fence. The trickiest part of curved work is making the initial contact with the cutter. Don't go too fast, or the cutter can jerk the stock from your hands.

Pattern shaping is also done with rub collars. A plywood or hardwood template rides against a rub collar to shape the stock. The stock can be mounted above or below the template, depending on the setup. A couple of nail points protruding from the template will keep the stock from shifting on the template.

Most shapers come with a miter gauge that incorporates some type of clamping device. When shaping the ends of narrow stock—cutting tenons, or coping the end of a door rail—clamp the stock in the miter gauge. Never attempt to make the cut freehand.

Whether you're doing straight or curved work, spindle speed and feed speed determine surface quality. Shaper cutters leave ridges like the knives of a planer, so you'll get a poor-quality finish if you feed too fast and/or the spindle speed is too slow.

Always feed the stock against the rotation of the cutter. If the cutter turns clockwise, feed the stock from left to right. If the cutter turns counterclockwise, feed the stock from right to left. Never *climb cut*, that is, feed in the direction of rotation. Climb cutting is dangerous and simply asking for trouble.

The trick to understanding this versatile machine is to start simple. Start with a basic one-cutter setup, and stay away from complicated setups until you get used to the machine. Get some hands-on instruction if you can—it makes things much easier. ▲

David Sloan is Editor of AMERICAN WOODWORKER.

RUSTIC FRAME

Routed Details Create a Rough-Hewn Look

BY RALPH WILKES

This rustic picture frame will make a wonderful gift. It's simple enough to make in a single day or unhurried weekend, and most of the machining can be done with a tablesaw and a router table. It's also a good opportunity to try your hand at some elementary wood carving. What's more, material costs will be easy on your wallet. (If you've framed any pictures lately, you know that nice wooden frames are expensive.)

This type of frame was common in the late 1800s. Its decorative grooves, chamfers and applied leaves are typical of "Eastlake" furniture, a style that became popular in the 1870s. Antique frames of this type were often made of walnut, although old frames were occasionally made of oak or other hardwood.

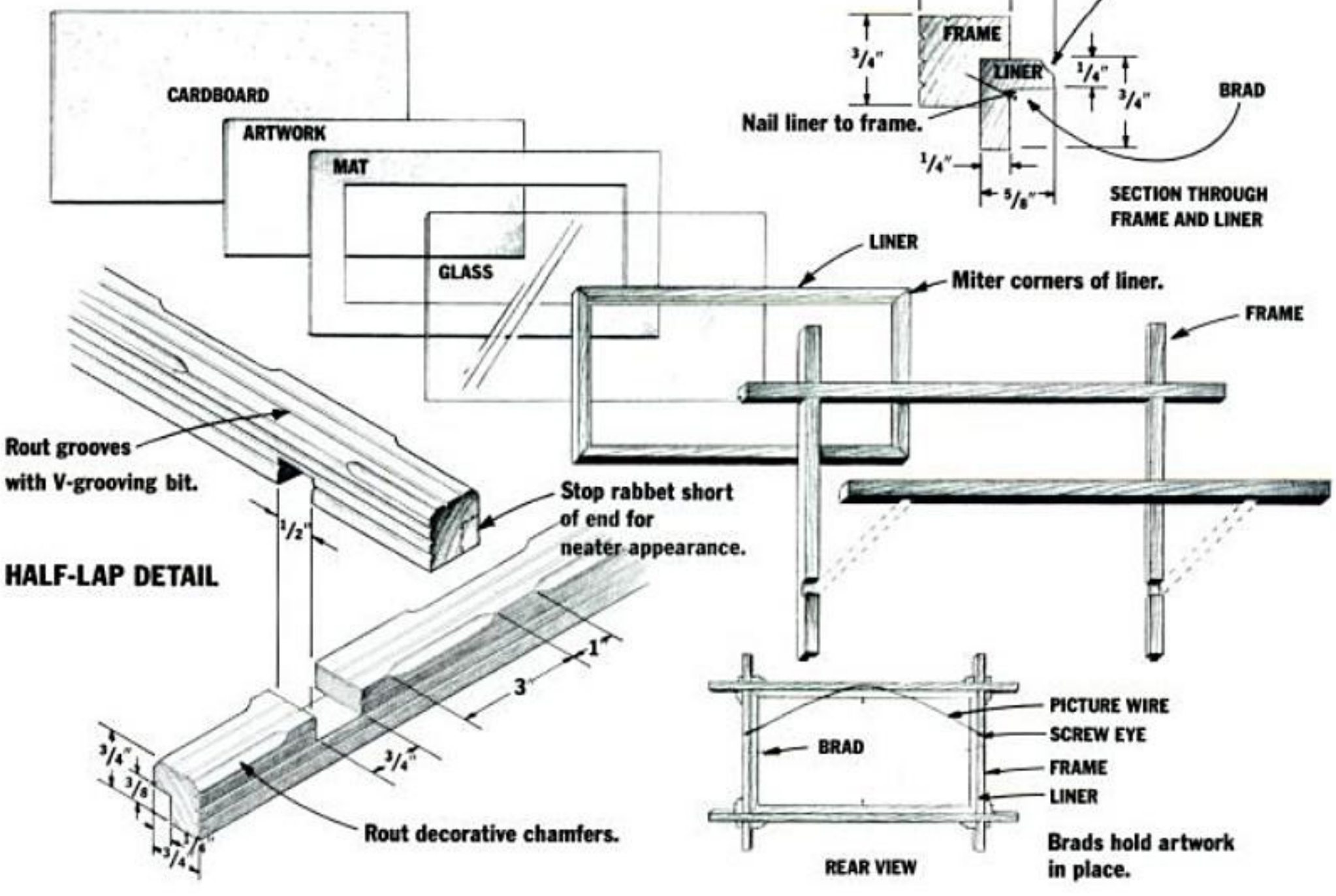
The frame really consists of two separate parts; an outer hardwood frame and a softwood liner—a kind of inner frame that forms a border between the picture and the outer frame. (See Fig. 1.) The liner fits into a rabbet in the back of the outer frame.

Size the frame to fit the mat that will surround your picture. The opening in the mat should overlap the picture about $\frac{1}{4}$ in. all around, so subtract $\frac{1}{2}$ in. from the length and the width of your picture to determine the size of the opening. Once you've got the opening dimensions, determine the width of the mat border. The border can be any width, as long as it looks good with your picture. As shown in Fig. 1, about $\frac{5}{16}$ in. of the border will be concealed by the liner frame, so don't forget to take this into consideration.

Once you know the size of the mat, make the frame and liner to fit. I made the frame first, then made the liner to fit inside the frame.

PHOTOS BY ANGELO CAGGIANO

FIG. 1: RUSTIC FRAME



Making the Frame

Cut enough 3/4-in. square stock to make the four sides of the frame, plus an extra foot or so for making trial cuts with the router. Plane or sand the stock smooth, while it's still in one piece, then cut the frame pieces to length.

Next, with a 1/2-in. straight bit mounted in your router, rout the 1/4-in. rabbet in the back of the frame stock to accept the liner as shown in Fig. 1. Make the cut in two passes. I run the rabbet to the ends of each frame piece, which means the rabbets are visible on the ends of the finished frame. If you prefer, you can stop the rabbets short of the ends for a more tidy appearance. You could also use a tablesaw to cut the rabbets, instead of a router.

Switch to a V-grooving bit to rout the three decorative grooves on the outer edge of each frame piece. Try the cuts on a piece of scrap first, then cut the grooves in the frame stock. Set up the router-table fence to make the center groove first. Reset the fence to cut one outside groove, then flip the stock around to cut the other outside groove.

Next, cut two grooves on the front of each frame piece. I prefer to make these grooves a little deeper than the grooves around the outside of the frame. Position the fence to cut one groove, then flip the stock to cut the second groove.

Join the frame pieces together with half-lap joints. Lay one pair of frame pieces across the other, just as the frame will be when completed. Carefully mark where the pieces intersect, and cut out the half-laps as shown in the drawing. You can cut the joints on the tablesaw or radial arm saw if you prefer, or by hand

Cut the rabbet in the back of the frame pieces on a router table.

PHOTOS BY RALPH WILKES

Cut the decorative grooves with a V-grooving bit.

with a backsaw and chisel. Note that the half-lap cut will be narrower on the backs of the top pieces than on the fronts of the bottom pieces because of the rabbet. (See Half-Lap Detail of Fig. 1.) Check the joints for a nice tight fit, and check the corners with a T-square.

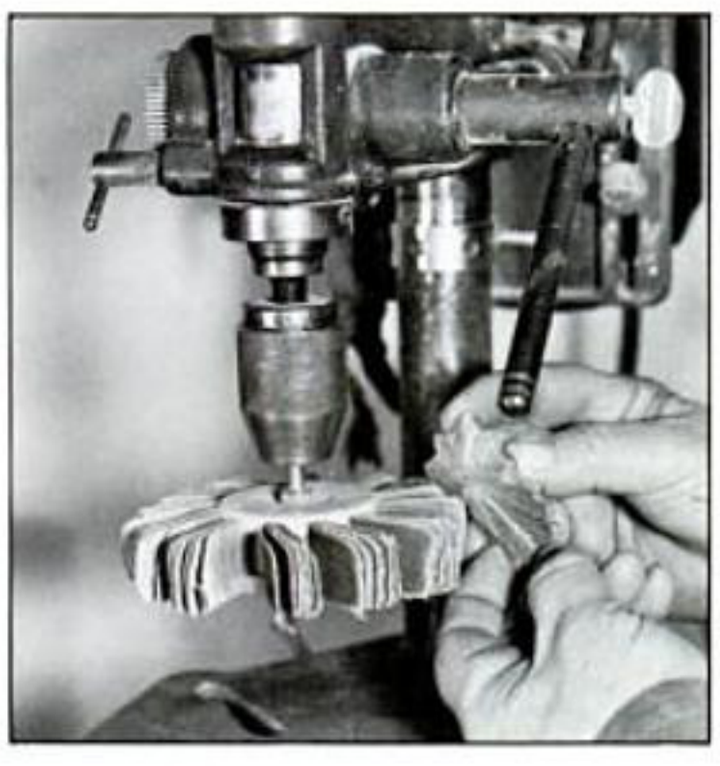
For a rustic appearance, rout a series of 3-in. long chamfers along the inner and outer top edges of the frame pieces. Space the chamfers about an inch apart, as shown in the drawing, and stagger their location from side to side. Don't cut chamfers at the joints. Use a chamfer bit set to a depth of about 1/8 in. Exact measurements are not important here, so experiment with the depth of the cut on a piece of scrap for a rustic look that appeals to you.

After routing the chamfers, assemble the frame pieces and reinforce the joints with 5/8-in. wire brads and glue.

Make the liner frame from 3/4-in. pine. Rip enough 5/8-in. × 3/4-in. stock to make the frame, and add an extra foot or so. With a core box bit in your router table, make a concave cut along one edge of the stock. This forms a decorative cove around the inside perimeter of the liner.

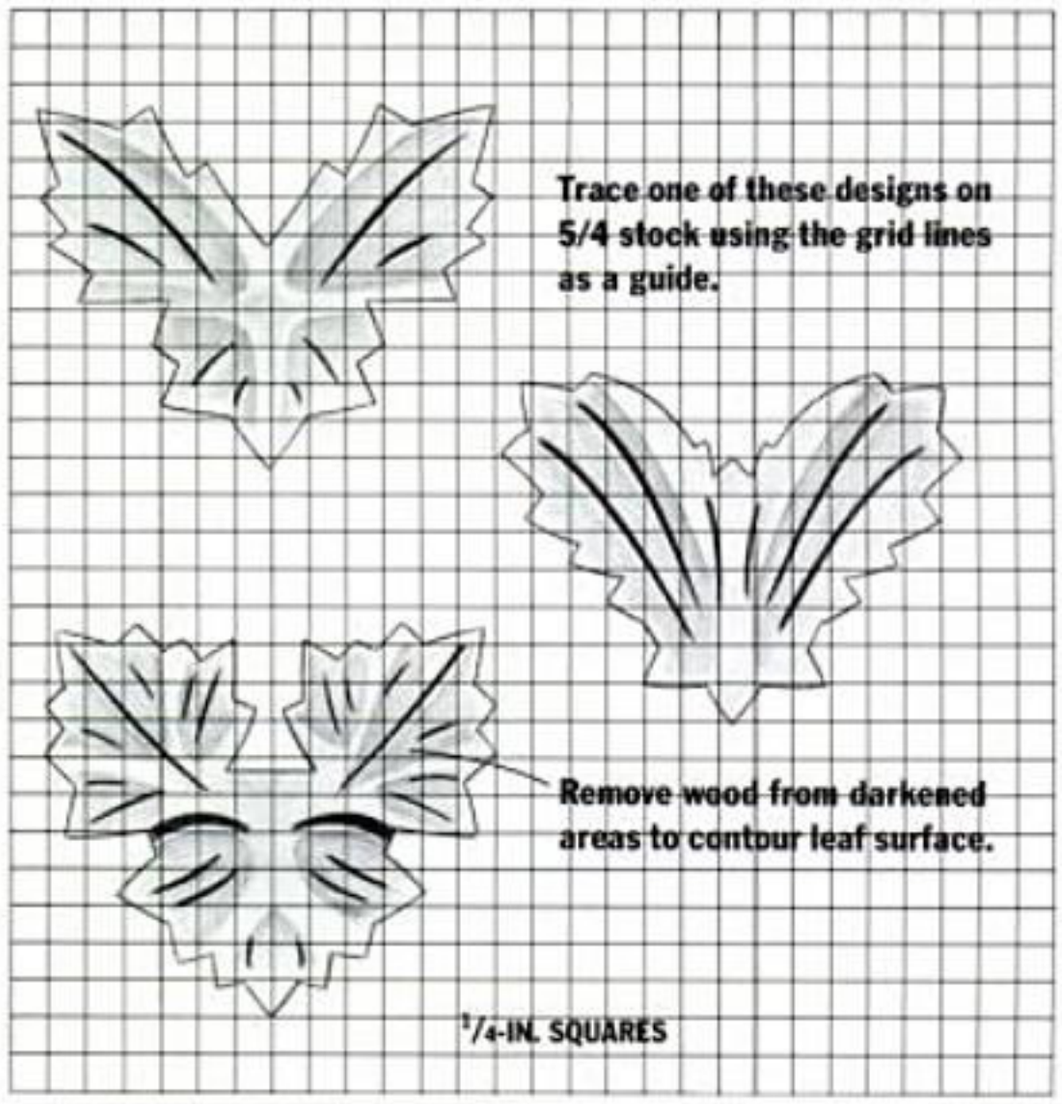
Next, rout a 3/8-in. × 1/2-in. rabbet on the backside of the stock as shown in the drawing. You can rout the rabbets in the liner frame and main frame at the same time to avoid changing router bits. Miter the corners for a good fit into the outer frame, and assemble the liner with glue and brads at the corners. Apply two or three coats of gold enamel (available at most hobby shops), sanding lightly between coats.

Saw out the basic leaf shape in 5/4 stock, then bandsaw the blank into four leaves about 1/4 in. thick.



Sanding the leaves is faster with a flap sander chucked in a drill press.

FIG. 2: LEAF DESIGNS



Trace the leaf design onto a piece of 5/4 walnut (1 1/4-in. thick), and saw out the shape with a bandsaw or scroll saw. Bandsaw the blank into four leaves, each approximately 1/4 in. thick. Clean up the edges with sandpaper backed with a strip of wood, or with an emery board (the kind you use on fingernails).

Next, contour the top surface of the leaves by removing wood from the areas shaded in the drawing. Carving tools will do the job, but I opted for a high-speed rotary tool with a rounded cutter. I smoothed the surface of the leaves with a flap-sander tool chucked in a drill press and finished with hand sanding. After you've sanded the leaves, carve thin grooves in the leaf surfaces with a V-shaped carving tool called a veiner, or a pointed cutter in a high-speed rotary tool, to represent the natural veins in real leaves.

Finishing is easier if done before attaching the liner and the leaves. I finished my frame with two coats of satin polyurethane. I left a small, bare spot on the back of each leaf and along the frame joints for gluing the leaves to the frame.

After the finish has dried, fasten the liner in the walnut frame with 1/2-in. wire brads. Glue the leaves in place and clamp until dry.

Cut a piece of window glass, mat board (available at art supply stores), and a cardboard back to fit in the rabbet around the inside of the liner. These parts, along with your picture, are held in the frame with brads sunk partway into the side of the liner as shown in the drawing. Attach a small screw eye to the back of each vertical frame piece, and string picture wire from one screw eye to the other. Now mount the picture frame on that bare wall, stand back and admire the view—you've earned it. ▲

Ralph Wilkes is a retired business manager of Keuka College in Keuka Park, NY. Woodworking is his hobby, and he's currently interested in making antique reproductions.

BOOKS & VIDEOS

BOOKS

Marionette Magic: From Concept to Curtain Call

by Bruce Taylor
(1989, TAB BOOKS Inc., Blue Ridge Summit, PA 17294) 198 pp; paperback; $12.95.

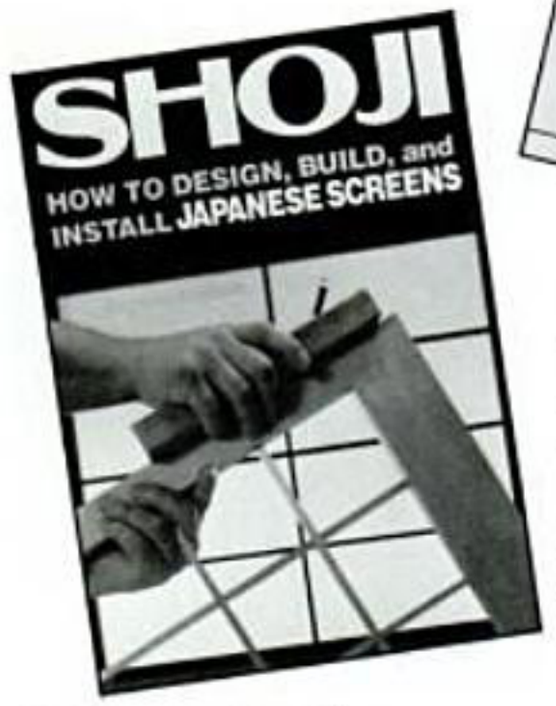
Marionettes appeal to children, making them the perfect small project for a child's Christmas gift. But, trying to make one can be frustrating—unless you know a few secrets. This book reveals the commonsense basics behind the construction of wood and *papier mâché* marionettes. The presentation is so straightforward that, as long as you keep your first puppet very simple, you can't miss.

The basic marionette body is made of wood and can be built with simple, inexpensive hand tools such as a backsaw, carving knife, chisel and drill. You could certainly speed things along with a bandsaw or other power tools. Taylor prefers to make puppet heads from *papier mâché*, but he outlines the process of carving a head of wood. If you have no experience in carving, however, this book isn't the place to look for specifics.

Taylor goes beyond construction, as the book's subtitle suggests. He discusses story, character, design, scenery, stages, lighting, and history of puppet theater. Even if you have no intention of mounting a full-scale production, you ought to browse through these sections for character and clothing ideas.

The projects outlined in this book require more than woodworking skills; but with a few scraps of fabric, glue, and imagination added to your woodworking basics, you'll be well on your way to crafting the latest addition to Pinnochio's tribe.

ANN MICHAEL



Shoji; How to Design, Build and Install Japanese Screens

by Jay van Arsdale
(1988, Kodansha International USA Ltd., through Harper and Row, Inc., 10 East 53rd St., New York, NY 10022) 96 pp; paperback; $15.95.

Shoji is a beautiful, refined book that delivers on all that its title claims. Van Arsdale, presents an engaging mix of old and new, East and West, how-to and intellectual/aesthetic, and written vs. visual. The book opens with a concise but inspirational introduction to the moods and spaces that shoji screens can create through the modulation of light and shadow.

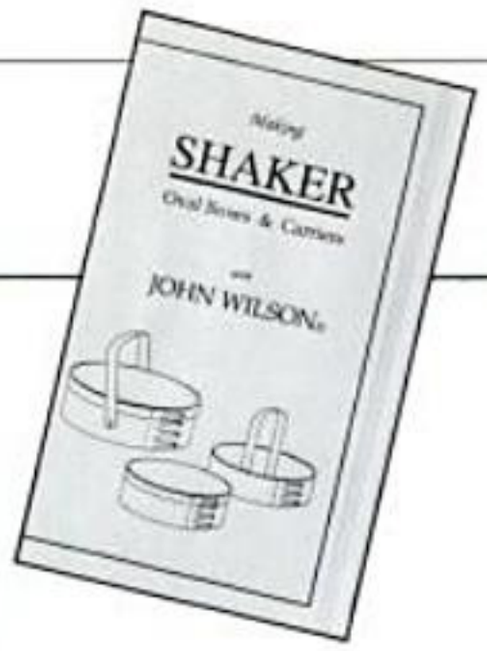
The bulk of the book covers the materials and tools necessary to create Japanese screens. It illustrates the actual construction of one and gives generous samplings of finished installations, possible applications, and a wide variety of designs and compositions.

An attitude of sensitivity toward the materials, tools and work permeates this book and separates it from the standard how-to texts. The illustrations and samples are profuse, and the line drawings are exceptionally clear. There is a consistent concern for balance; the need to show the overall effect, along with the significance of the detail.

The written and visual information in *Shoji* is so well-crafted that learning about it is made into quite a pleasant experience.

STEVE LOAR

VIDEOS



Making Shaker Oval Boxes & Carriers

with John Wilson
(1989, The Home Shop, 500 E. Broadway Hwy., Charlotte, MI 48813) VHS; length: 90 min.; $29.95.

With help from some friends, John Wilson shot his video *Making Shaker Oval Boxes & Carriers* in his workshop. The tape's quality is about that of a well-done home movie, but having known this unpretentious, down-to-earth craftsman for many years, I was not offended. In fact, it would have been out of character for the mild-mannered and modest Wilson to appear in an expensive, slick production. And, he shares the savings with you, selling his tape for $29.95—about half the price of other woodworking videos.

Wilson's production is a must for anyone who wants to make these handsome and useful boxes, for which Shakers are so well-known. Once understood, the process is uncomplicated, and (minus drying time) a nesting stack can be made in a day. The equipment, too, is neither elaborate nor expensive. In fact, Wilson, who teaches dozens of workshops each year in both America and England, carries everything in his truck.

The video's arrangement would have been better if another woodworker (who did not know how to make boxes) had done the producing. That person would have, perhaps, included more close-ups showing the viewer what Wilson himself sees as he works, or what the result of each step looks like.

When Wilson works, there is no wasted movement. He handles his tools and materials with the assuredness and self-confidence possible only through practice. When you watch the tape a second time, turn off the sound and just enjoy watching Wilson work.

MIKE DUNBAR

GALLERY

Ladder-back Rocker. By Doug Haley, Berea, Kentucky. Walnut, cornshuck seat. Dimensions: H: 44 in., W: 23 in., D: 19 in.

The little town of Berea, Kentucky is fast developing a big reputation as the arts and crafts center of the state. Among Berea's many craftspeople, are five woodworkers whose chairs are featured here. Each of the five makes his living building furniture, and each has his own specialty. Two of them are exclusively chairmakers: David Wright builds Windsor chairs, Brian Boggs makes chairs from his own designs. The other three have a more varied output —chairs, furniture, small items: Charles Harvey and Kelly Mehler both specialize in Shaker furniture and crafts, while Doug Haley does mostly custom furniture. For more information contact: Berea Tourism Commission, P.O. Box 556, Berea, KY 40403. Telephone: (606) 986 2540.

PHOTOS BY ALBERT R. MOONEY

Bannister-back Side Chair. By Brian Boggs, Berea, Kentucky. Oak, woven hickory seat. Dimensions: H: 42 in., W: 19 in., D: 17½ in.

VAUGHN BRUNNER

Shaker-inspired Settee. By Charles Harvey, Berea, Kentucky. Cherry, hickory spindles. Dimensions: H: 33 in., W: 61¼ in., D: 17½ in.

GALLERY

Continuous-arm Windsor,
By David Wright, Berea, Kentucky.
Maple, basswood, white oak, hickory.
Dimensions: H: 38½ in., W: 18½ in., D: 17 in.

Shaker Sewing Rocker.
By Kelly Mehler, Berea, Kentucky.
Cherry, fiber-filled cotton-tape seat.
Dimensions: H: 45 in., W: 23½ in., D: 20 in.

Woven-back Rocker. By Brian Boggs, Berea, Kentucky. Oak, woven hickory seat. Dimensions: H: 40 in., W: 24 in., D: 15½ in.

Want to see your work in Gallery? Send photographs and a description of the piece to: AMERICAN WOODWORKER, *33 E. Minor St., Emmaus, PA 18098. Only black-and-white prints (4 in. × 5 in. or larger) or color slides will be accepted. Please do not send color prints or snapshots. Enclose a self-addressed envelope for return of photos.*

Humongous Honker

Talk about tooting your own horn, well Peter Wutherich of Boise, Idaho, decided to stretch the point. He'd always been proud of his Swiss heritage, so in his golden years, at the urging of neighbors, he took up making alphenhorns, a Swiss instrument.

You know, alpenhorns are those long, slender affairs with an elegant bowl at the end, not unlike a smoking pipe, except much larger. They're made of wood and typically range anywhere from 5 to 14 feet. These horns were chiefly used by Swiss herdsmen and mountaineers to communicate from mountaintop to mountaintop. The horns produce a singular, rather fat sound.

Wutherich's alpine adventure began in 1982. After making three traditional-size hooters, Wutherich got the word that some fellow in Switzerland had made the World's largest alpenhorn. It was at this point that Wutherich "horned in," so to speak, and set out to beat that record. And beat it he did.

After nearly 2 years and 784 hours of labor, Wutherich had completed his horn of plenty. The 154-ft. horn is made of 706 board ft. of spruce, wrapped with 13,425 ft. of rattan and weighs in at 227 lbs. To celebrate his Swiss background, he had three alpine flowers, Enzian, Edelweiss and Alpenrose, hand painted on the bell of the horn. Wutherich's huge endeavor appears in the Guinness Book of World Records.

NANCY WALLACE HUMES

This record-breaking Swiss alpenhorn is so large even Gabriel would have trouble blowing it.

A Delta Unisaw was used to build dog sleds for the Trans-Antarctica Expedition. From left are site manager Dave Shield and expedition leader Will Steiger.

Delta's Dog Days

What do Delta International and dog sleds have in common? Answer: A trip to the South Pole. In fact, for the second time in the last 50 years, Delta has played a role in the exploration of the Antarctic.

The first time around, Delta donated 75 tools for Admiral Byrd's historic "Little America" Expedition to the South Pole in 1933. In 1989, Delta again played a part in another Antarctic adventure—the Trans-Antarctica Expedition. On Aug. 15, an international team of explorers set off on a 3,700 mile journey, traversing the continent on dog sleds. The group is expected to end its odyssey March 1, 1990 at a Soviet coastal base at the South Pole.

So what does Delta have to do with all that? Well, it was a donated Delta Unisaw that was used to build the custom-designed dog sleds, aiding the preparation for yet another expedition. Sometimes history does, indeed, repeat itself.

Safety Standards for Toy Chests

If you're going to build a toy box for a favorite child, first make sure you're not jeopardizing a life by making an unsafe chest. The American Society for Testing & Materials, an independent consumer-safety organization, recently established voluntary safety standards to avoid serious injuries caused when children are hit by falling toy-chest lids.

A federal product-safety report found that from 1973 to 1985, 34 fatalities and three cases of brain damage to children where the result of falling lids. To counter this, the ASTM has recommended a left-side mounted, counterbalanced lid support for toy-box lids. This type of support holds the lid open at any position and, with a little pressure, allows it to close slowly and gently.

The correct lid support is available from mail order companies, including Constantine's (2050 Eastchester Rd., Bronx, NY 10461); Woodworker's Supply of New Mexico (5604 Alameda Place NE, Albuquerque, NM 87113) and The Woodworker's Store (21801 Industrial Blvd., Rogers, MN 55374).

DAVID SLOAN

Building a toy chest for a special child? Make sure it's safe. This type of lid support meets safety standards to guard against injuries.