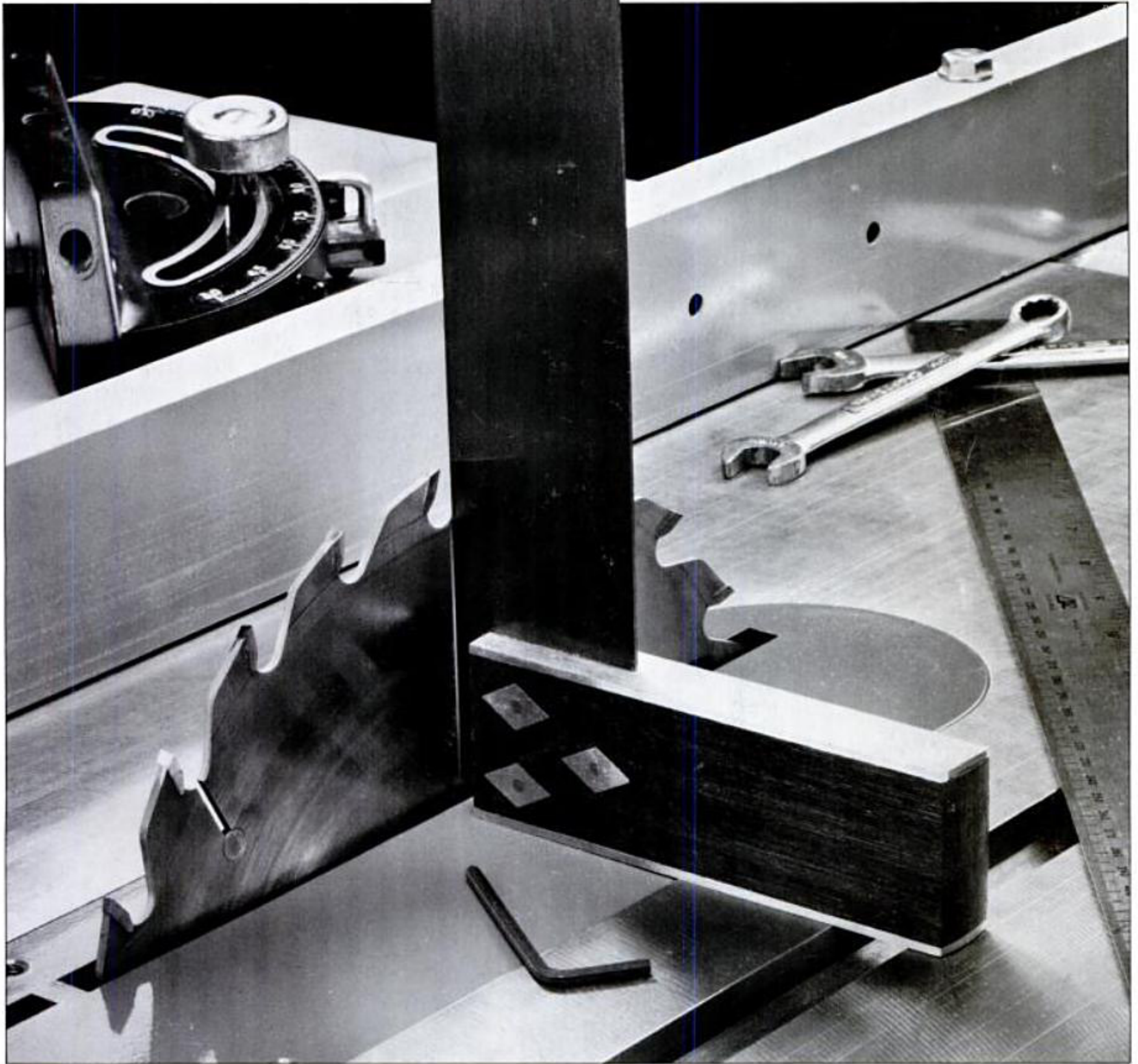


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July/August 1989, Volume V, No. 4

# AMERICAN WOODWORKER



## ***Tune Up Your Tablesaw***

*Buyer's Guide to Honing Guides*

*Build a Windsor Cradle*

*Computer Desk Plans*





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Volume V, No. 4  
July/August 1989  
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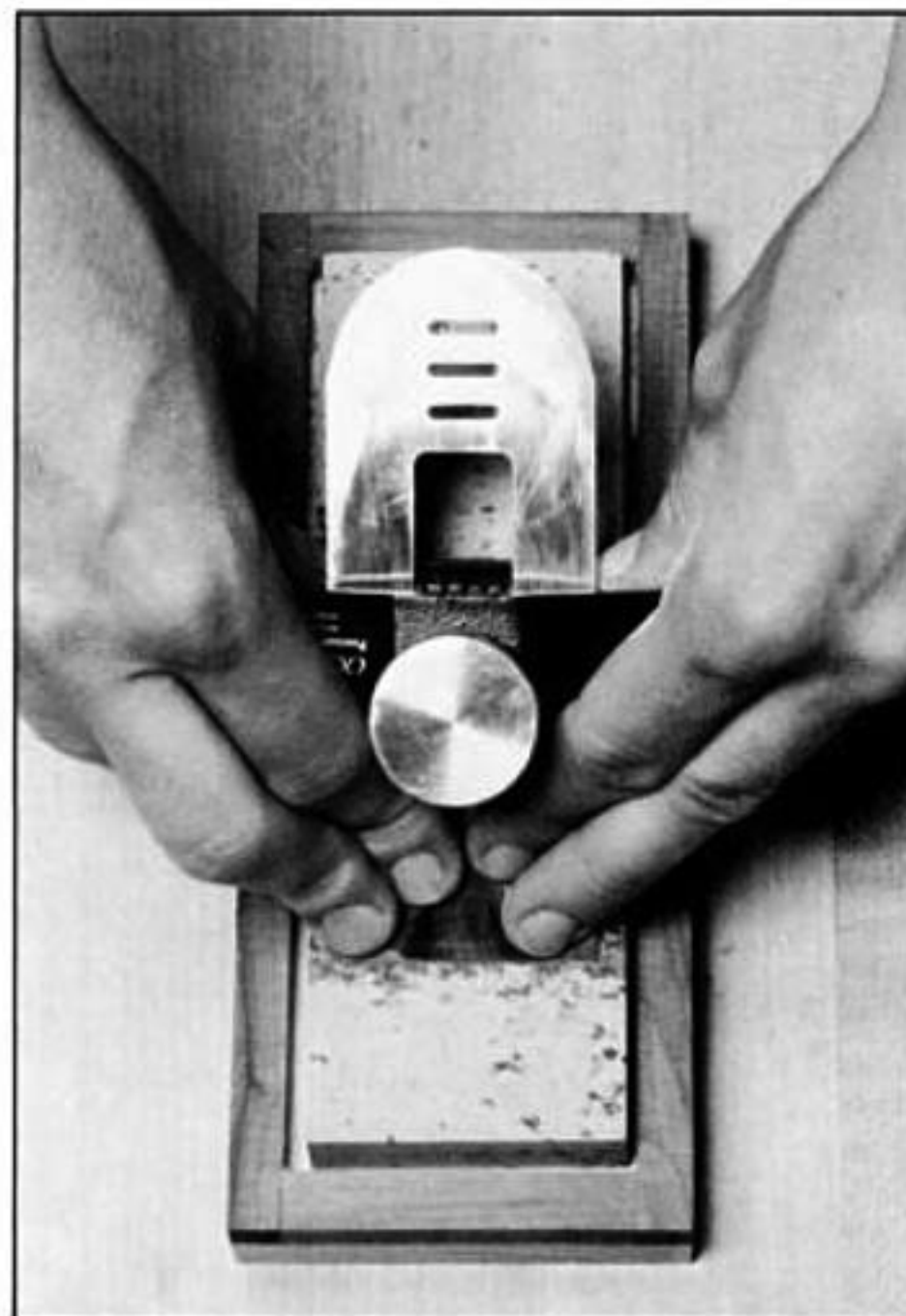
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EC6B-LUZ-R30C



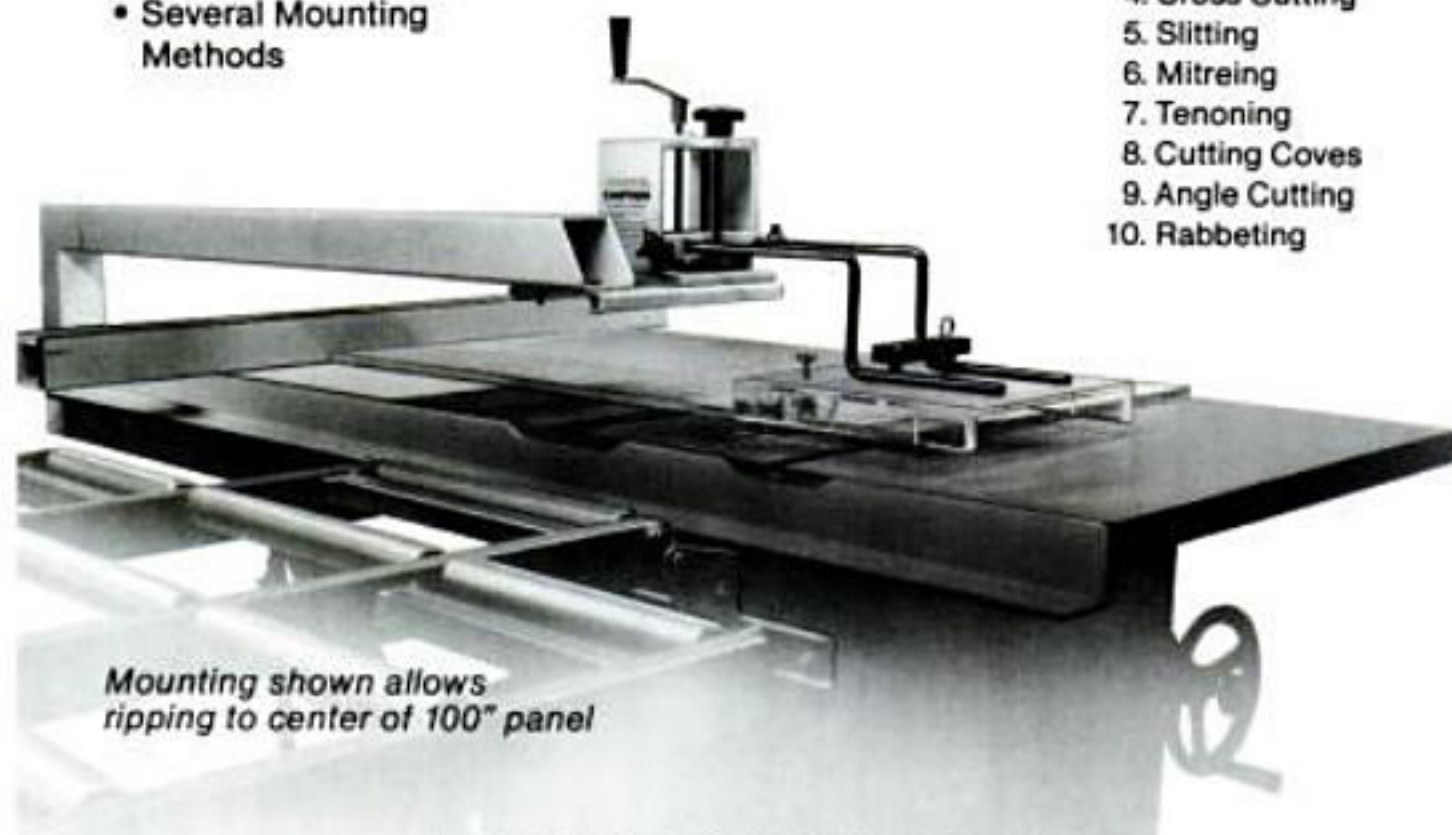
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# A WORD FROM THE EDITOR

## PASS IT ON



In Eastern Pennsylvania, where I live and work, you don't have to dig deep to strike a vein that's rich in history. The frugal, hard-working German and English settlers who cleared the land have left us a legacy in stone barns, iron tools, woven coverlets and wooden furniture. The barns now are stooped and bowed, but the artifacts are well cared for in museums and private collections.

But what of the skills that built these objects? Who's keeping that part of the legacy alive?

Historians and scholars are doing their part. Authors like Henry Kauffman, R.A. Salaman, Roy Underhill, Michael Dunbar and the late Eric Sloane have documented their studies in print. Living museums like Sturbridge Village and Colonial Williamsburg bring old crafts to life.

But the real responsibility rests with craftspeople like us. As woodworkers, we owe it to ourselves, our children and our grandchildren to hand down the skills

of our woodworking predecessors. To explain the uses of old tools, and tell about the quaint, old-fashioned ways our ancestors lived and worked.

Don't get me wrong, technology's great. I'm not about to trade my bandsaw for a bow saw or my router for a rabbet plane. But there's no better way to appreciate the power and accuracy of the machines we have today than to know what it's like to work wood without them.

This August I'll be pumping a 150-year-old wooden treadle lathe at the Goschenhoppen Folk Festival in East Greenville, Pennsylvania. Other folks will demonstrate cabinetry, rope making, weaving, ironwork and dozens of other old-time rural crafts. There may be a similar event near you this summer. If so, I urge you to take your kids, and encourage their questions. If you practice an old-time craft, get out there and share it.

When old ways are forgotten they're gone, leaving behind a tool whose purpose has been lost. When this happens, we're all a little bit poorer.

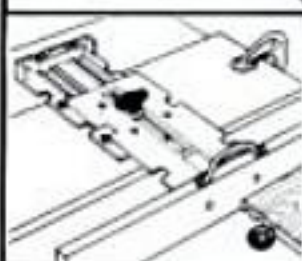
DAVID SLOAN  
Editor

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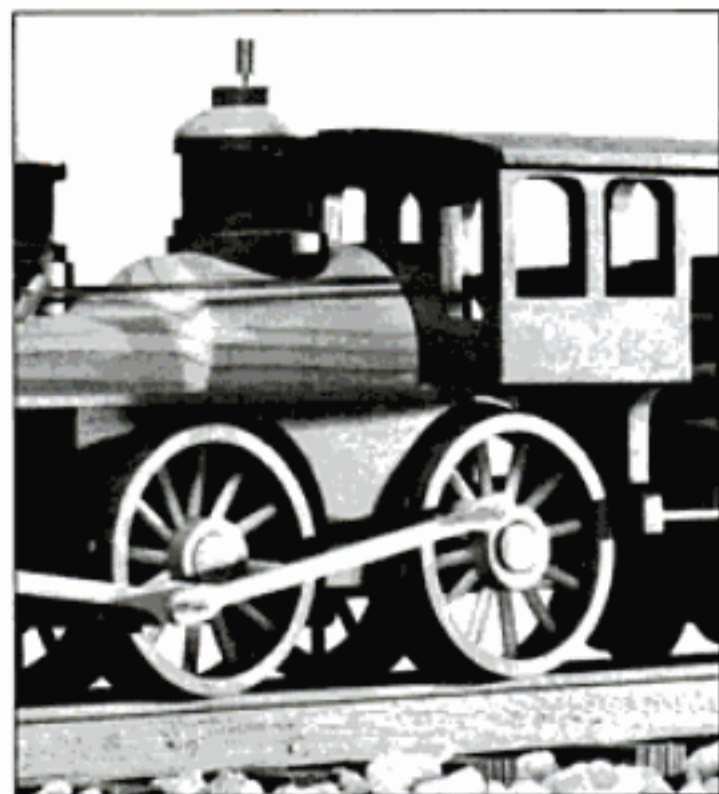
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**Sir:**

The manufacturers of the 1873 Grant locomotive would probably turn over in their respective graves if they were to see the picture of the model by Doug Kenney ("Spoked Wheels," May/June, 1989 AW).



Observe the connecting rod between the front and rear driving wheels of the locomotive. If the front drivers were to turn counter-clockwise the rear drivers would have to turn clockwise, and the locomotive would go exactly nowhere. This connecting rod must be parallel to the rail.

Aside from the above criticism, I was very impressed with the article. For a further touch of realism, I suggest installing counterweights on the driving wheels opposite the connecting-rod pins.

STEWART M. SULLIVAN  
Shawnee, KS

## EDITOR REPLIES:

*The mistake was ours, not the locomotive's builder, Doug Kenney. We positioned the wheels incorrectly when we set up the photo.*

**Sir:**

I just received the May/June, 1989 issue. I'm delighted! I can't wait to build the file cabinet to store all my paper clutter. However, two of my biggest interests are trains and wooden toys. The spoked wheels are just what I needed.

DICK GRIFFITH  
Southington, CT

**Sir:**

I was delighted to read the article in your May/June, 1989 issue on Spoked Wheels by Doug Kenney but saddened that he stopped at the wheels. This is a great looking train, and I would like to see a detailed diagram with measurements. Please keep the high-quality small-scale projects coming.

MICHAEL S. LACHINA  
Brooklyn, NY

**Sir:**

Your recent issue of AW arrived in its biodegradable plastic wrapper. I think it's wonderful! We appreciate your environmental concern and are especially happy to purchase your magazine.

JO ANN SHIELDS  
Ottawa, IL

**Sir:**

I just finished reading Mr. Robert M. Ressel's comments on Norm Abram in the May/June "Letters."

Mr. Ressel should understand that the vast majority of subscribers to woodworking magazines are the weekend-warrior type who enjoy woodworking as a hobby. Most of us have no interest in taking on a project that could be defined as "fine furniture." For example, just looking at the plans for a Bombe' chest is intimidating and beyond most of our capabilities. Norm Abram's *New Yankee Workshop* book and PBS show are targeted at people like me. We want projects that are attractive, functional and most importantly, "do-able." He serves us non-professionals very well.

THOMAS E. BEWLEY  
Bloomington, IL

**Sir:**

Not everyone who reads your magazine is a professional. In fact, I'm sure the opposite is true. Therefore, Mr. Robert M. Ressel has missed the point of AW and certainly *The New Yankee Workshop* book and TV series. Neither the book nor the series is geared toward professionals but rather for people who enjoy woodworking on a variety of levels and

who are interested in making something for themselves, not for profit.

I place myself among the above group and have enjoyed the entire *New Yankee Workshop* series. Mr. Abram has made some attractive projects requiring varying degrees of skill, and the show was far more entertaining than watching someone spend half-an-hour hand-cutting dovetails.

ROBERT A. DANA  
Richmond, VA

**Sir:**

My only serious criticism of AW is its odd size. Most people will want to keep all the issues, and the easiest, neatest way is to file them in standard three-ring binders. You might consider resizing the magazine, perforating it and offering printed binders.

DUNCAN A. FIELDS  
Piedmont, SC

## EDITOR REPLIES:

*We don't have any plans to down-size AMERICAN WOODWORKER, and the magazine's too thick to punch full of holes and stick in a three-ring binder. You can keep your back issues of AW neat and clean by storing them in "official" AW slipcases or binders (complete with logo). Each slipcase (\$8.95) or binder (\$10.95) holds 12 issues and may be ordered from: Jesse Jones Industries, Dept. RP-AW, 499 East Erie Ave., Philadelphia, PA 19134. Phone: 800-972-5858.*

**Sir:**

Just a word to tell you that I really enjoyed reading May/June, 1989 AW. It came today, and I have gone over it several times, each time with more appreciation. I like the mix of articles and the layout.

JESSE SKLARIN  
Marlboro, NJ

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



## Air-Dried Lumber

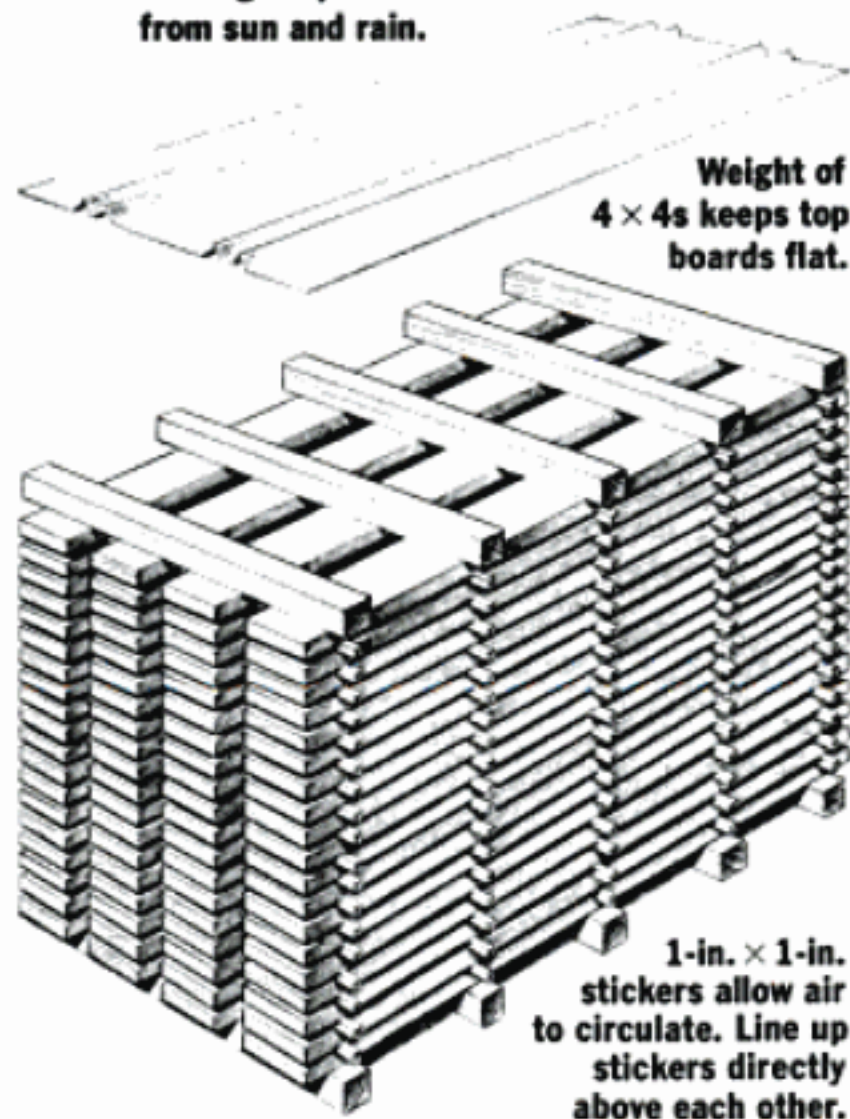
**Q.** I have access to maple, oak, walnut and pine logs. If I mill them into lumber, what would be the best way to dry the boards without a kiln?

JOHN BALLENGER  
Hilton Head, SC

**A.** Lumber can be air dried quite satisfactorily. In fact, air-dried lumber will be noticeably easier to work, and species such as walnut will retain more of their natural colors if air-dried.

Once you've sawn your logs, stack the boards with 1- $\times$ 1-in. wooden "stickers" between each layer of the boards. To avoid staining the wood, the stickers must be clean and dry.

Roofing tin protects wood from sun and rain.



Build stack on foundation of 4 $\times$ 4s.

DRAWING BY SALLY ONOFA

Put a sticker at each end and another every 18 to 24 in. along the length of the boards. To avoid distorting the boards, the stickers must line up vertically. The entire stack should rest on 4 $\times$ 4s, which must line up with the stickers.

The stacks can go as high as you like, but I limit the width of my stacks to 4 ft. To keep the top board from warping, weight it down with a couple of 4 $\times$ 4s. Keep the stack under a roof or in an outbuilding to

protect it from sun and rain. If the pile must be out in the weather, protect the top with roofing tin.

Paint the ends of the boards with paint or wax to keep the ends of the lumber from drying too quickly and checking. Common practice is to dry a board 1 year for every inch of thickness. On lumber 3 in. or thicker, add an extra year. At the end of this time, lumber that is going to be used indoors should be brought inside and stickered for an additional 2 to 4 weeks to adjust to the humidity level indoors.

SAM TALARICO  
Talarico Hardwoods  
Mohnton, PA

## Resilvering Mirrors

**Q.** I want to learn how to resilver mirrors. Anytime I try to question an expert he clams up. What's the trick?

LUTHER BENTON  
Greenville, TX

**A.** Resilvering is a complicated process you can't do at home. Even if you could, you should never resilver an antique mirror as it will reduce the mirror's value.

The best way to improve the shine of your mirror is to mount a new mirror in back of the original mirror. The new mirror will shine through the dark spots where the original reflective surface has deteriorated. If space or weight is a problem, you can back the original mirror with a sunlight-reflecting film such as those installed on storefront or car windows. These methods are completely reversible, so they won't reduce the mirror's value.

There are two common methods of "silvering" a mirror. Modern manufacturers spray silver, copper and then paint onto a sheet of glass when making a mirror.

On very old mirrors, a tin-mercury process was common. A thin tin foil was bonded to the glass with a layer of mercury in between. With time, the mercury can migrate from the tin and puddle along the bottom rail of the frame.

DAVID SLOAN  
Editor  
AMERICAN WOODWORKER

## Parts for Old Machinery

**Q.** I recently inherited several very old woodworking machines, which are in need of rebuilding. Where can I obtain information, manuals and parts for them?

KURT E. SCHMIDT  
Lindenhurst, IL

**A.** It can be real tough to track down parts for old woodworking machines. Many companies folded during the Depression and parts and manuals are simply not available. Your best bet in this case is to have a local machinist make the part you need.

For information on Delta or Rockwell equipment, write Robert Archer, Delta International, 4290 E. Raines Rd., Memphis TN 38118. Be sure to include the serial number and casting number. Delta may also be able to help with parts and information for machines made by Walker-Turner, Yates American, Crescent and Qualters & Smith.

For information on Powermatic machines, write Ken Langford, Sales Dept., Powermatic, Morrison Rd., McMinnville, TN 37110. Send the model and the serial number, if there is one. Parts are available for machines up to 15 to 20 years old, depending on the machine.

For information on Craftsman and other Sears tools, contact your nearest Sears Service Center. Sears says that parts for machines more than 7 to 10 years old are hard to come by, but an alternative part can often be recommended.

JEFF DAY  
Senior Editor  
AMERICAN WOODWORKER

## Filling Nail Holes

**Q.** I've just trimmed the inside of my house with bird's-eye maple, which I stained. I nailed the trim in place and have been trying unsuccessfully to fill the holes with something that matches the stain. What do you recommend?

JOEL LIPSEY  
Durham, NC

**A.** I've had a lot of success filling the nail holes with small

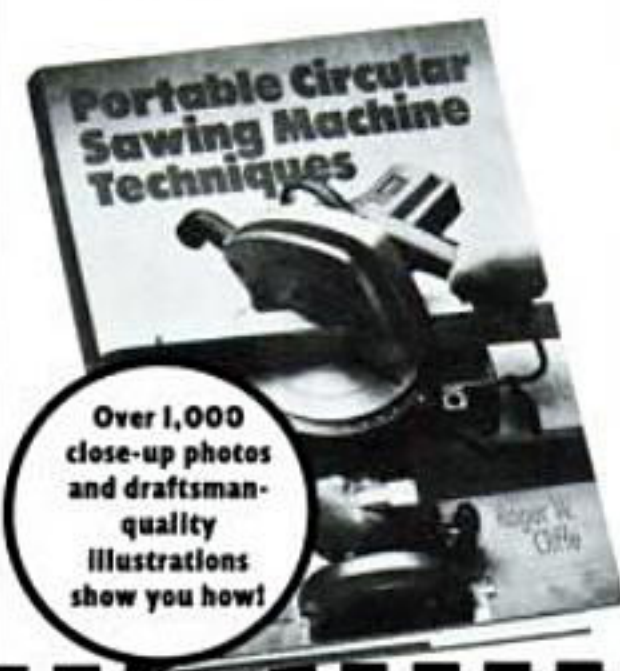




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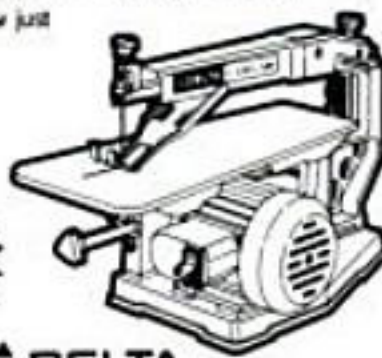
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## Q&A

wooden plugs. Standard plug cutters are much too big, so I cut plugs with a countersink, the type with a removable drill bit running through the center. Simply remove the drill bit, fasten the collar of the countersink in your drill press, and drill a plug from the end grain of some scrap wood. Stop before you've drilled all the way through the wood, so that the plug won't jam in the countersink. Bandsaw off the remaining wood to free the plugs.

The four-flute countersinks sold for use with tapered drills make perfect plug cutters. Woodcraft Supply, 41 Atlantic Ave., P.O. Box 4000, Woburn, MA 01888 sells the countersinks separately for about \$5 each. The #8 countersink (06J34) makes a 1/8-in. plug and the #10 (06J36) makes a 3/16-in. plug, which should match the holes left by 8d and 10d finishing nails.

A more common solution is the waxy touch-up sticks available at most paint stores. I occasionally borrow my children's crayons to match a particular color.

Stain and finish the wood before rubbing the stick across the nail hole. Rubbing the stick on unfinished wood may remove part of the stain and may prevent the finish from adhering. When you've rubbed on enough wax to fill the hole, buff the excess off the surrounding area with a cloth.

BEN ERICKSON  
Cabinetmaker  
Eutaw, AL

### Where to Find It

Parts for making your own lamps are available from Paxton Hardware Ltd., 7818 Bradshaw Road, Upper Falls, MD 21156.

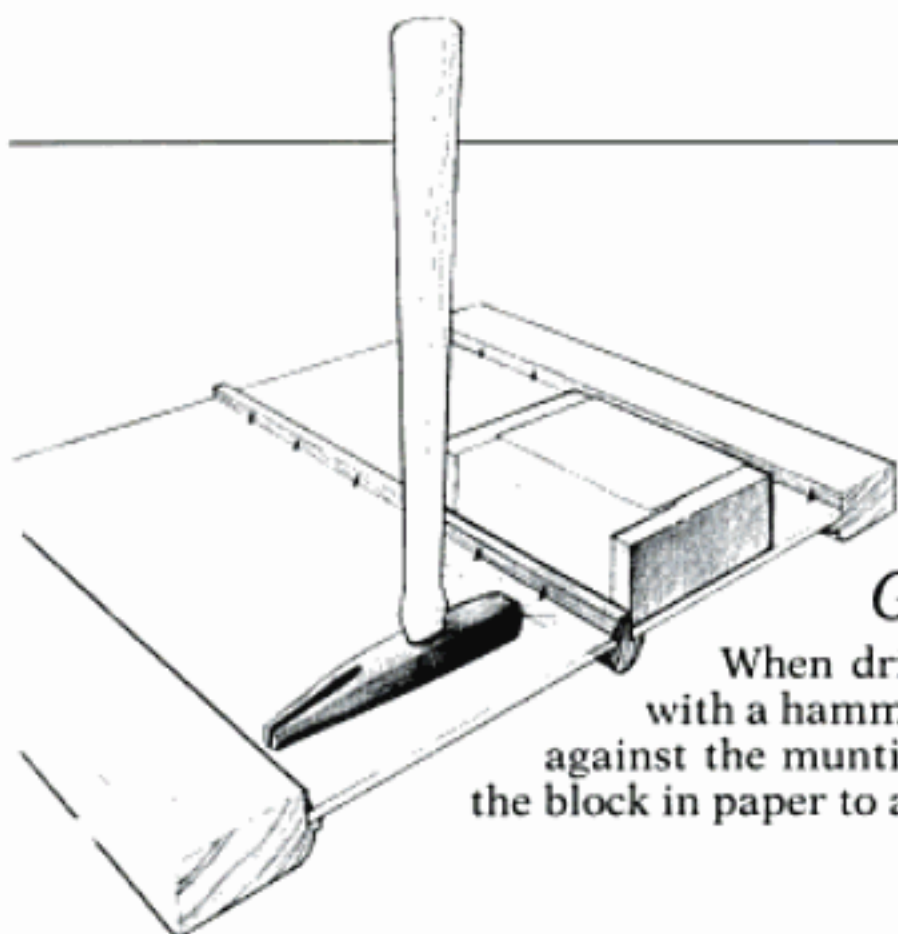
Violin varnish is available from McFeely Hardwoods and Lumber, P.O. Box 3, 712 12th St., Lynchburg, VA 24505.

Wooden tongue and groove planes are available from the Frog Tool Co., P.O. Box 8325, Chicago, IL 60680.

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



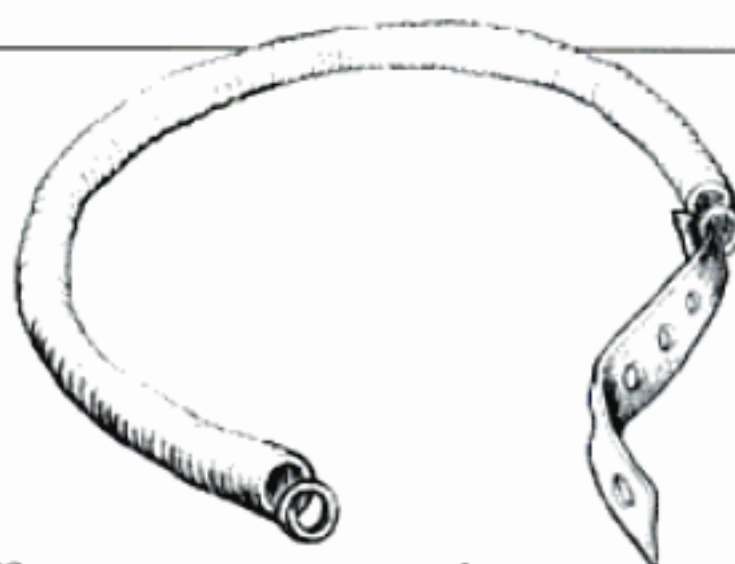
## TECH TIPS



### Low-Impact Glazing Points

When driving glazing points in place with a hammer, place a steel or lead block against the muntin to absorb the shock. Wrap the block in paper to avoid scratching the glass.

BILL BIGELOW  
Surry, NH



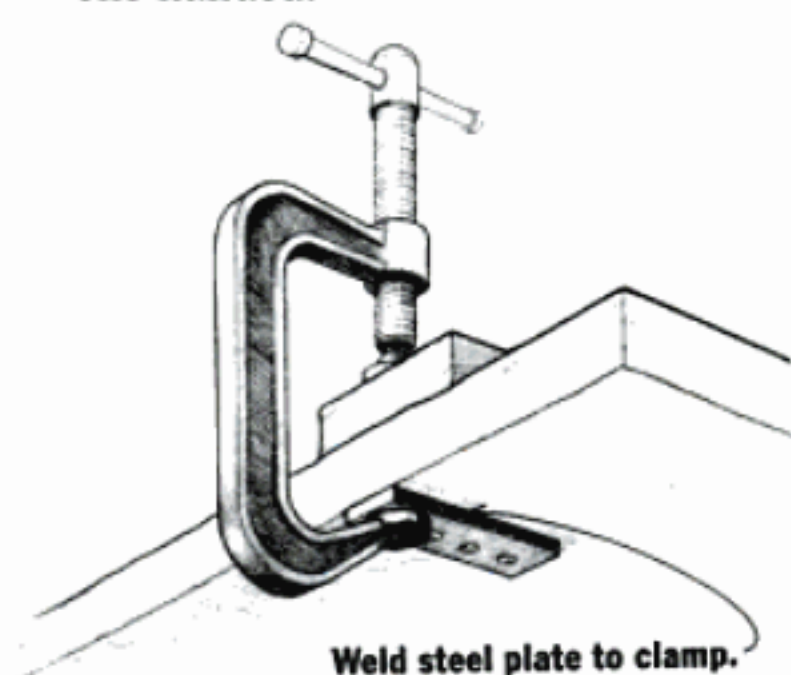
### Door-Spring Clamps

Long door springs with cloth straps attached to one end make good clamps for chairs, frames and cylinders.

BILL BIGELOW  
Surry, NH

### Bench-Mounted C Clamp

I use a fixed C clamp mounted to my work table to hold parts in jigs and fixtures. It takes the place of expensive toggle clamps and is easy to use one-handed.



Weld steel plate to clamp.

I weld a 1- $\times$ 5-in. length of  $\frac{1}{4}$ -in. thick steel plate on the fixed end of the clamp. I usually locate the centerline of the plate on the centerline of the clamp. I predrill and counter-sink the plate for three or four #12 flat head screws, which fasten the plate to the underside of the table.

A 5-in. or 6-in. C clamp such as Jorgenson #175 or #176 offers plenty of throat depth. A battery of these clamps along one edge of the bench, is great for laminating.

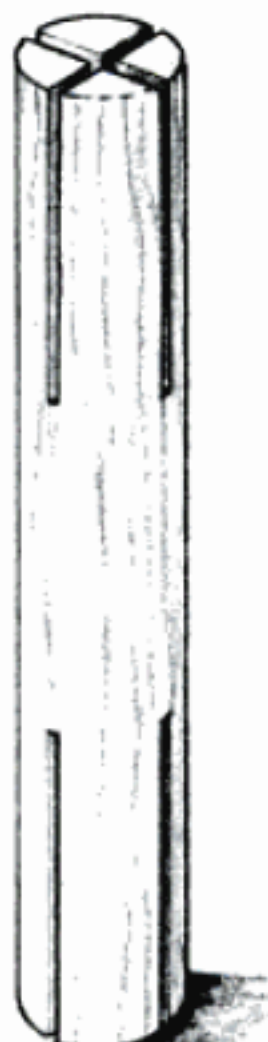
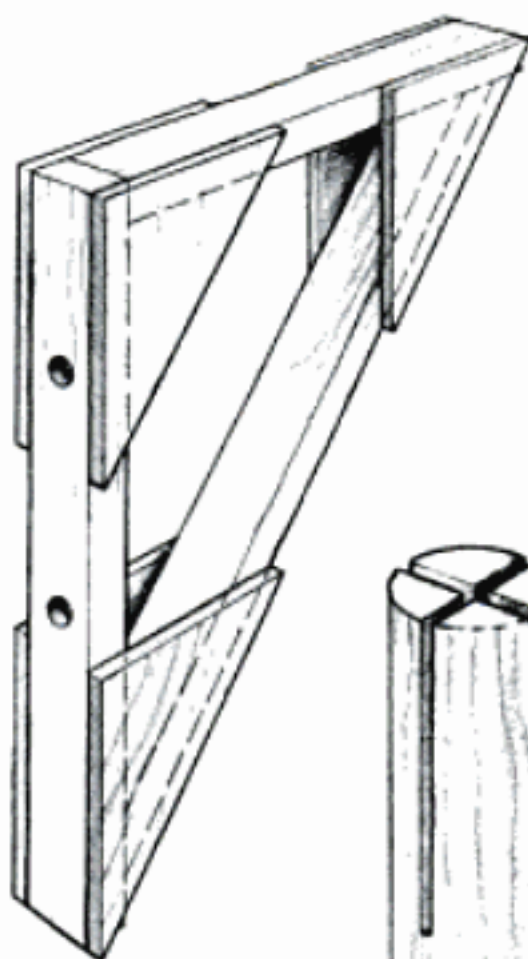
PATRICK WARNER  
Escondido, CA

### Lumber-Storage Brackets

Storing lumber is always a problem. I made wall brackets a couple of years ago and have been using them for some very heavy lumber storage ever since. They're inexpensive and easy to make.

I bolted the brackets to the wall studs with  $\frac{1}{4} \times 2\frac{1}{4}$ -in. lag bolts and washers. I installed the brackets on 32-in. centers. For light loads, 48-in. centers might be adequate.

J.P. REICHLING  
Oswego, IL



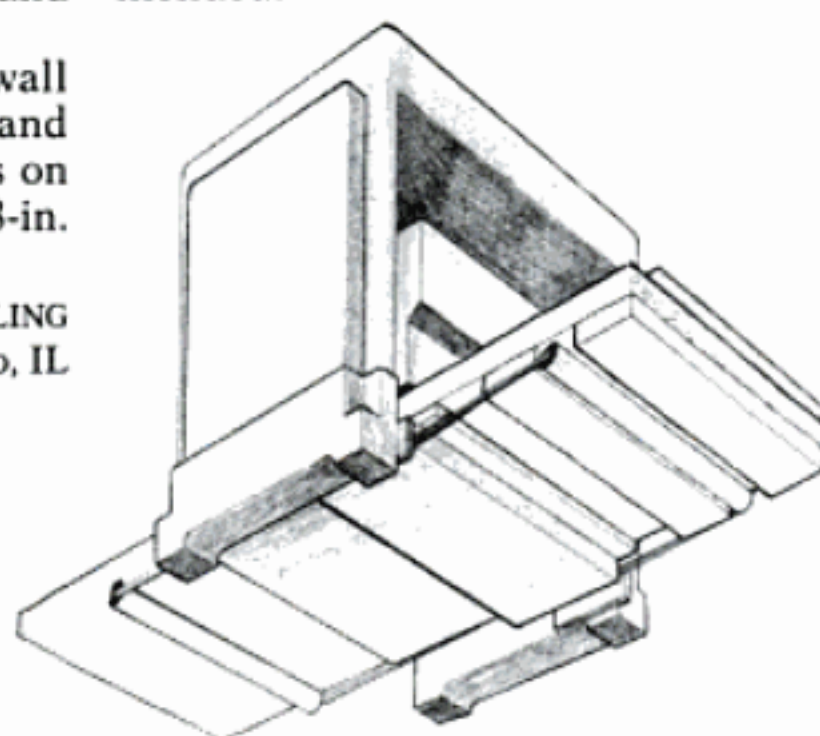
### Dry-Fit Dowels

Here's a little tip for those who make things with dowels. On the bandsaw, rip the dowel down the center about  $\frac{1}{3}$  the length of the dowel. Rotate the dowel 90° and make another cut. Flip the dowel over and do the same thing on the other end. Use these dowels to dry fit a project together. They'll hold and still be easy to remove when you take the piece apart.

CHARLES DEMAINE  
Red Oak, TX

### Planing Thin Stock

The instructions on my Ryobi/Sears 10-in. planer say that planing stock less than  $\frac{1}{2}$ -in. thick is not recommended.



I need a lot of lumber that is thinner than  $\frac{1}{2}$  in., so I made a jig that inserts in the planer and allows me to plane stock as thin as  $\frac{1}{8}$  in.

The jig is 10 in. wide and 26 in. long. I made mine from  $\frac{3}{4}$ -in. medium density fiberboard (MDF), which I varnished to make a smooth surface. Hardwood plywood would work, too. I fastened two wooden cleats across one end of the jig to fit over the roller on the input side of the planer.

JOHN NEUMANN  
Sauk Centre, MN

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.





## A Touch of Brass ▲

When you've worked long and hard on an elegant cabinet, it's a shame to set your shelves on clunky plastic supports, especially if your shelves are glass. Now, there's an alternative—solid-brass shelf supports with turned details. Each fancy support has a milled face to hold the shelf and a  $\frac{3}{8}$ -in. long pin which fits into a  $\frac{1}{4}$ -in. hole. (Price: Bag of four, \$4.90)

■ Woodcraft Supply Corp., Dept. AWT, 41 Atlantic Ave., P.O. Box 4000, Woburn, MA 01888.

CIRCLE NO. 16 ON READER SERVICE CARD



## Lightweight Bandsaw Mill ▲

The RIPSAN "Mini Mill" makes milling your own lumber a one person job. Weighing only 38 lbs., the "Mini Mill" can saw boards from  $\frac{1}{16}$  in. to 9 in. thick and  $10\frac{1}{2}$  in. wide. It comes with either a 2.5-HP electric motor or a 2.4-HP gas engine and can handle logs up to 14 in. in diameter. Carbide guides and ball-bearing rollers guide the saw blade across the log at a feed rate of 6 ft. per minute. The "Mini Mill" comes with a  $10\frac{1}{2}$ -ft. guide beam and clamp system for the initial squaring cuts. (Price: electric, \$950; gas, \$999)

■ Better Built Corp., Dept. AWT, 845 Woburn St., Wilmington, MA 01887

CIRCLE NO. 2 ON READER SERVICE CARD

## Handy Sander ▼

Sanding, like it or not, is part of woodworking. The Hand Ease Sander makes the task of sanding a bit more comfortable. Its ample grip cuts down on hand cramps and fatigue, while the padded surface backing up the sandpaper makes for a smooth stroke. When you need a change of paper, just tear off the

used portion and roll out a new section. The sandpaper is coated with a sticky backing so it adheres firmly to the sander's underside. (Price: \$5.99; replacement rolls, \$3.49)

■ DIY, 3M Center, Dept. AWT, Building 223-4S, St. Paul, MN 55144.

CIRCLE NO. 14 ON READER SERVICE CARD



## To Your Health ▼

Livos PlantChemistry is a company that believes finishing up a project shouldn't finish you off. Made from organic raw materials, Livos products are lead-free, and do not contain chemical dryers or toxic petroleum distillates. You won't have to sacrifice selection for safety—Livos

offers a full line of non-toxic products from oil finishes to paints, lacquers and even soap. Best of all, you won't have to hold your nose while you apply them.

■ Livos PlantChemistry, Dept. AWT, 614 Agua Fria Street, Santa Fe, NM 87501.

CIRCLE NO. 17 ON READER SERVICE CARD



MITCH MANDEL



*Simple Adjustments  
to Get Your Saw  
Running Right*

# TABLESAW TUNE-UP

BY KELLY MEHLER

**T**he tablesaw is such a basic, simple machine that we take it for granted most of the time. A tablesaw doesn't need constant maintenance, but even the best saw needs occasional adjustments for alignment and square. If your crosscuts are crooked, your rips a bit ragged, and your blade sometimes binds in the cut, your tablesaw needs a tune-up. The entire procedure takes less than an hour and pays off in safer operation and more accurate cuts.

I currently use a 10-in., 3-HP Delta Unisaw in my shop, and the photos in this article show adjustments being made on that machine. The same principles apply to all tablesaws, although the actual nuts and bolts of your saw's adjustment mechanisms may be different from my Unisaw. Before making any adjustments to your own tablesaw, study the owner's manual carefully and follow the manufacturer's instructions for making the adjustments I describe below. Above all, *be sure to disconnect the power* before making any adjustments.

If you've never set up or adjusted a tablesaw before, look over the drawing in Fig. 1 to familiarize yourself with the names of the working parts. Refer to your saw owner's manual for more specific information.

## *Step One: Align Blade to Miter Slot*

Ideally, the saw blade should be perfectly parallel to the miter-gauge slots when the tablesaw comes from the factory. Mine wasn't, and I would hazard a guess that for one reason or another your blade is out of alignment, too. Since all other adjustments use this alignment as a reference, start your tablesaw tune-up procedure here.

To check the blade/miter slot alignment, unplug the

saw and elevate the blade to its maximum height. Mark a tooth with a piece of chalk or tape, and rotate the marked tooth until it's about even with the table surface. Measure from the edge of the tooth to either miter-gauge slot. (I find I can get a more accurate measurement by fitting a piece of wood in the slot and measuring from the blade to the wood.) Now rotate the marked tooth 180° to the other side of the table, and measure again. The two measurements should be the same. Try the measurement again with several different teeth to be sure the saw blade is running true.

CONTINUED

**The blade must be parallel to the miter slot. Mark a tooth and measure from the tooth to the slot. Rotate the tooth to the back of the blade and measure again. A board in the slot makes measuring easier.**



PHOTOS BY DAVID SLOAN





**Don't  
take your  
tablesaw for  
granted.  
Even the best  
saw needs an  
occasional  
tune-up  
for safe  
operation  
and square,  
accurate  
cuts.**





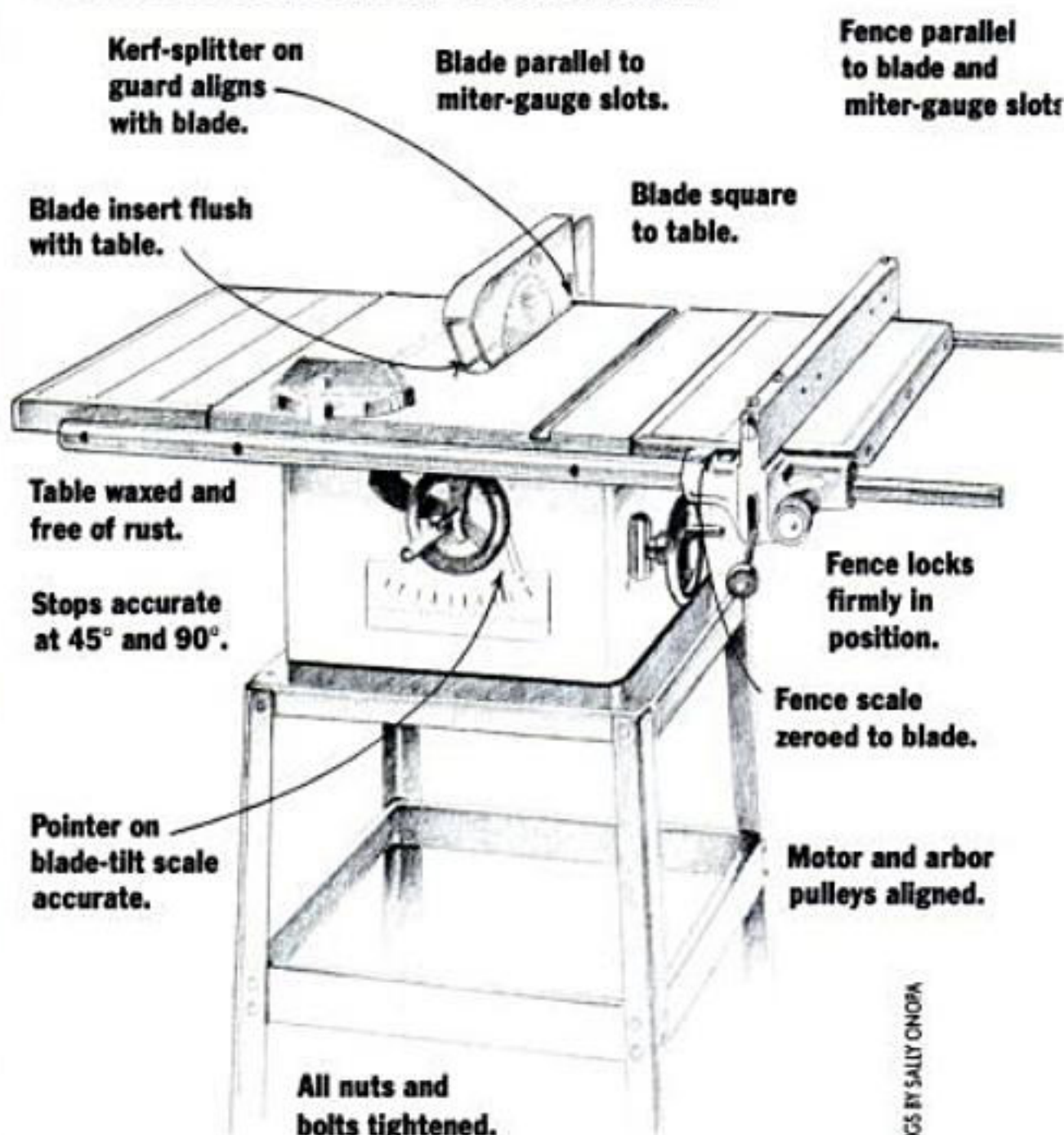
If the blade and miter slot aren't parallel, loosen the bolts that hold the table, and tap the corner with a mallet to adjust the table.



Check blade to table alignment with blade at full height. Lay a square against the blade or crosscut a scrap, flip one piece, and place the two sawn ends together. Any error of angle will show up doubled.



## FIG. 1: A WELL-TUNED TABLESAW



DRAWINGS BY SALLY ONORA

If both measurements are not the same, the table is out of alignment and will need to be adjusted relative to the blade. Slightly loosen the bolts that hold the table in place to the saw base (on my Unisaw) or the trunnions (check your manual). Shift the table in the desired direction with a tap from a mallet on the table corner. Recheck the measurements between taps, and tighten the bolts when they're right. Check the measurements after tightening the bolts.

### Step Two: Set Blade Tilt Stops

While the blade is fully elevated, check to see that the blade is square to the table. First, make sure that the blade-tilt mechanism is turned as far as it will go. Next, place a large square on the table and check for square against the flat plate of the blade between the teeth.

Here's an alternative method that will show if the blade is even the slightest bit out of square. You'll need a scrap of wood 12 to 18 in. long and about 2 in. wide. Thickness isn't important, but the piece must have parallel edges.

Stand the piece on edge, and crosscut using the miter gauge. Flip the cutoff over, and place the two cut ends together as shown in the photo. Any error in angle will now be doubled and easy to see.

If the blade is out of square, I usually check the tilt mechanism first, and clean out any sawdust accumulated there. Sawdust can keep the mechanism from traveling all the way to the 90° stop.

If sawdust isn't the problem, you have to adjust the 90° stop. Your owner's manual will tell you how to adjust the stops on your table saw. On my Unisaw, I have





**An easy way to align the fence with the miter-gauge slot is to insert two pieces of wood in the slot, and lock the fence against the wood.**

to loosen a lock nut and adjust a bolt until the blade is square. When your blade is square, set the tilt-gauge pointer to the 0° mark on the tilt scale. The pointer is usually adjusted by loosening a screw.

Once you've got the 90° stop set, tilt the blade as far as it will go to check the 45° stop. You can measure the angle with a combination square against both the table and the blade. A more accurate method is to crosscut two scrap pieces of wood, and put the sawn ends together as if you were making a miter joint. The two 45° angles add up to 90°. You can check them with a square.

If your blade goes out of square repeatedly, the saw arbor may be out of line or loose, in which case your saw will need more than a tune up. If your arbor seems to be loose or bent, check with an authorized dealer for your saw. You may need machine-shop work or a replacement part.

### *Step Three: Align Rip Fence to Blade*

When it comes to accuracy, most standard rip fences leave much to be desired. They're often flimsy and don't lock up parallel to the blade. Nonetheless, with a few adjustments, you can still get the fence on your saw working to its potential.

The rip fence should be parallel to the blade. A fence that skews *out*, away from the rear of the saw blade, will cause the work to crawl away from the fence. This may result in a tapered cut and burn marks on the stock from the left side of the blade. A fence that skews *in*, toward the rear of the blade, will cause the work to bind and may result in burn marks from the right side

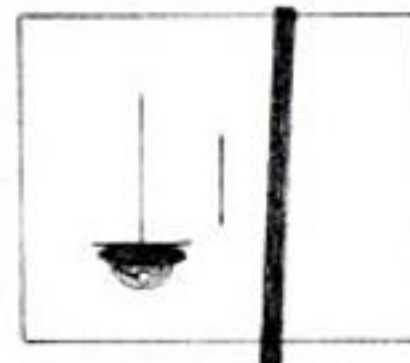
of the blade. With the fence skewed in, there is also the chance of your wood catching on the teeth at the back of the blade and being whipped around toward you. This happened to me once and that was enough! (The splitter on many blade guards helps prevent the wood from being caught on the rear of the saw blade).

To check the fence setting, lock the fence in position and measure from the fence to the miter-gauge slot at each end of the fence. As an alternative to measuring, put a straight board into the miter-gauge slot and lock the fence against the board. Two pieces of wood in the slot will also work as shown in the photo.

To adjust the fence, loosen the proper bolts (see your manual), and adjust the fence parallel to the miter-gauge slot. (You already trued up the blade with the slot. Right?)



**Fence skewed in.**



**Fence skewed out.**

After I lock my fence in position to make a cut, I tap the back end of the fence out a mere 1/32 in. away from the blade so that the teeth at the back of the blade just miss touching the stock. I find that this minimizes the risk of burn marks and kickback. If you try this trick, remember that if the fence is out even a little too much

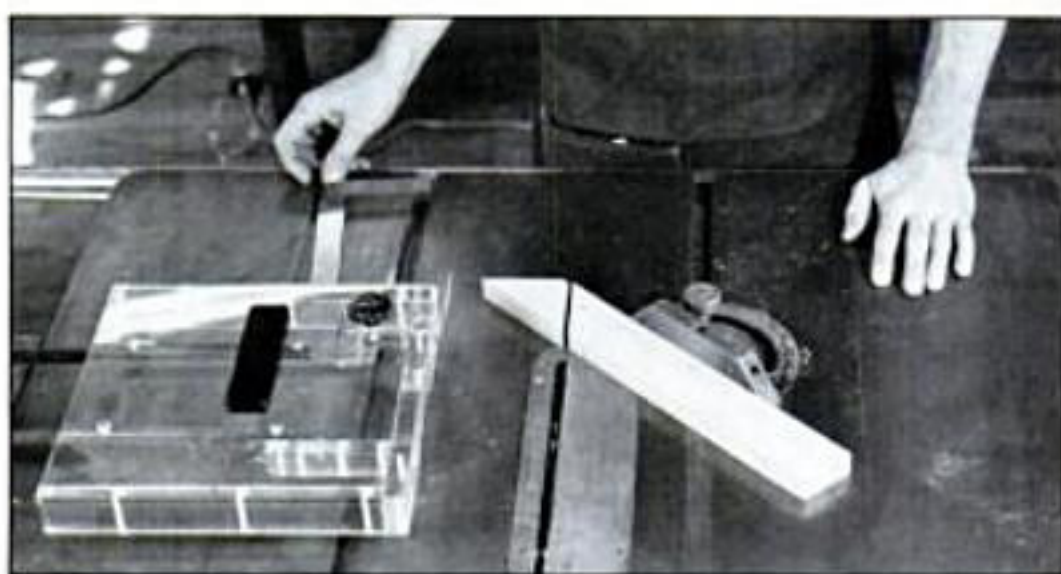




A tap with a center punch on the edge of the miter-gauge bar will tighten up excess side-to-side play.



Set the miter-gauge stops with a wrench and a screwdriver.



To test the 45° miter-gauge stop, make an angled crosscut, flip the piece, and make a second cut. The two 45° add up to 90°, and you can check the setting with a square. Any error will show up doubled.



you may end up with tapered cuts and burn marks.

There is an additional adjustment screw on many rip fences that adjusts the holding power of the fence-lock mechanism on the back rail. If your saw has this screw, adjust it so that the rip fence is held tightly at the rear of your saw. If your fence locks only at the front, and is not staying parallel when locked, you may need a C clamp to hold the back end in place.

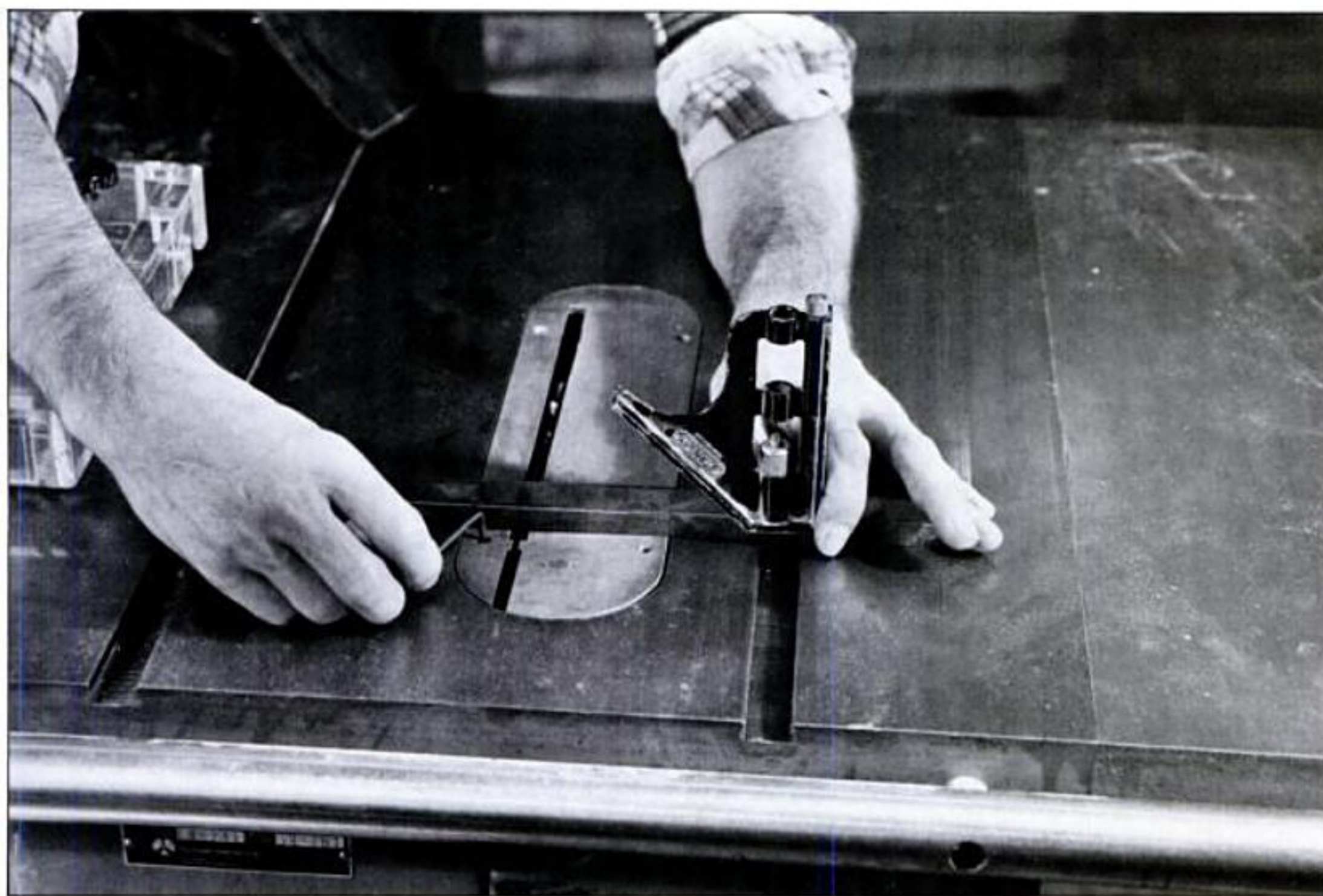
### *Step Four: Adjusting the Miter Gauge*

The main use for the miter gauge is for making square crosscuts and miter cuts. Before checking the gauge for accuracy, make sure that the miter gauge glides smoothly in the slot without excess side-to-side play. Play can be removed by tapping the top edges of the miter-gauge bar with a hammer and center punch. This spreads the metal of the bar slightly for a tighter fit. If your bar is too tight in the slot, remove any burrs by running a smooth file along the sides of the bar.

The next step is to set the gauge to 90°. There are a number of ways to get close. One is the degree scale on most gauges. A quick way is to turn the gauge over, slide it into its slots, and align the face of the miter-gauge head against the front edge of the saw table or rail. Another method is to use a large square placed against the face of the gauge head and the saw blade.

With the miter-gauge set at 90°, crosscut a piece of wood with parallel edges that measures roughly  $\frac{3}{4}$  in.  $\times$   $1\frac{1}{2}$  in.  $\times$  18 in. Turn over one of the cut pieces and put the sawn edges together against a flat surface. Any error will be doubled. Continue to make cuts and adjustments until you get the two pieces to match ex-





Adjust the leveling screws so the throat plate is level with the table surface.

actly. When they do, set the 90° index-stop on the miter-gauge head.

To set the 45° miter-gauge stop, you'll need another scrap of wood with parallel edges. Use either the scale on the gauge or a sliding-bevel gauge to get close to 45°. Cut the scrap wood, then flip the piece and make a second cut to form a 90° corner. Check this corner with your square. Once more, any error will be doubled. Set the 45° stop when you get it right.

### *Other Maintenance & Lubrication*

Look over the saw and tighten all nuts, bolts and screws. Sawdust has an abrasive effect on moving parts, so clean out the base and moving parts regularly using a whisk broom, a stiff brush, or a blast of compressed air.

Lay a straightedge across the throat plate to make sure the plate is flush with the table. If it's too high, lift it out, and blow out any sawdust that may have accumulated in the throat-plate recess. Most throat plates have leveling screws that allow you to adjust the height.

Check your V belts for wear and fit. If the belts seem to be wearing on the edges, your motor and arbor pulleys may be out of alignment. Lay a straightedge across the face of both pulleys. The pulleys should line up.

Lubricate the internal sliding ways and trunnions under the saw with powdered graphite since oil and grease collect dust as well as ruin the rubber in the belts. The bearings on modern saws don't need any lubrication because they are permanently sealed.

Moisture can leave permanent marks on a cast-iron

table so keep drinks and green wood off the table. Rust, pitch and wood gum should be removed from the surface with mineral spirits and a cloth, steel wool or 600-grit wet-or-dry sandpaper. Apply a coat of paste wax to the top, slots and rails, and buff when it's dry. The wax prevents rust and makes the tabletop smooth and slick. It will make an exciting difference in the performance of your saw once it is tuned up.

Safety guards differ from one table saw to the next. Some guards have a kerf-splitter that prevents the kerf from closing and binding on the blade. The kerf splitter should be lined up with the blade. Your owner's manual will explain how to adjust your guard. I replaced the standard blade guard on my Unisaw with an aftermarket guard called the Brett Guard (available from HTC Products Inc., 120 E. Hudson, Royal Oak, MI 48067).

I've found that saw-blade "stiffeners" or "stabilizers" reduce blade vibration and give me a smoother cut. These steel or aluminum disks mount on the saw arbor up against the blade. Depending on your saw, you may have to make a new slot in the throat plate when using a stiffener between the blade and the fixed collar on the saw's arbor.

While I'm on the subject of blades, it's important to keep your saw blades clean. Small amounts of pitch can be removed with mineral spirits, oven cleaner or by soaking the blade in warm water. Any 600-grit wet-or-dry paper will take off minor rust spots. ▲

*Kelly Mehler is a professional furniture maker and the owner of "TreeFinery," a furniture-making shop and gallery in Berea, Kentucky.*



# WINDSOR CRADLE

*Rock-A-Bye Your Baby in  
a Windsor Rarity*

BY MIKE DUNBAR

Most woodworkers are familiar with Windsor chairs and their unique construction. However, few know that Windsor construction was also used to make many other types of furniture. Cradles are one of the rarest forms of Windsor furniture.

The cradle I reproduced for this article was made in New England sometime in the early 19th century. An identical piece, unquestionably made by the same craftsman, is owned by Greenfield Village and Henry Ford Museum in Dearborn, Michigan. It is illustrated in Charles Santore's book, *The Windsor Style in America 1730-1830* (1987, Running Press, 125 S. 22nd St., Philadelphia, PA 19103).

Most cradles are low to the floor, but this one is high enough to be rocked by someone sitting in a chair. The curved bottom-edges of the rockers on the original cradle are worn flat, a sign that the cradle's seen regular use by generations of mothers and babies.

For woodworkers, this cradle is a good introduction to Windsor construction in that it is less complicated than a chair. In addition to the turned spindles, stretchers and legs, the cradle has only five other parts; the two rockers, the bottom and the two bent sections that make up the rail.

The drawings show the dimensions of the original cradle. As drawn, the cradle is fine for decorative uses. My wife keeps three large, potted plants in the original, and friends have observed that it would make a good magazine rack.

If you are making yours for a baby, however, you'll have to modify the spacing of the spindles so that an infant's head can't become caught between them. U.S. Consumer Product Safety Commission regulations require that the spindles on a cradle or crib be no more than  $2\frac{3}{8}$  in. apart. To conform to these safety regulations you will have to add spindles. However, this won't change the way you make the cradle. CONTINUED

COURTESY ASH MILL FARM, BUCKS COUNTY, PA. SALLY SPENK ILLMAN



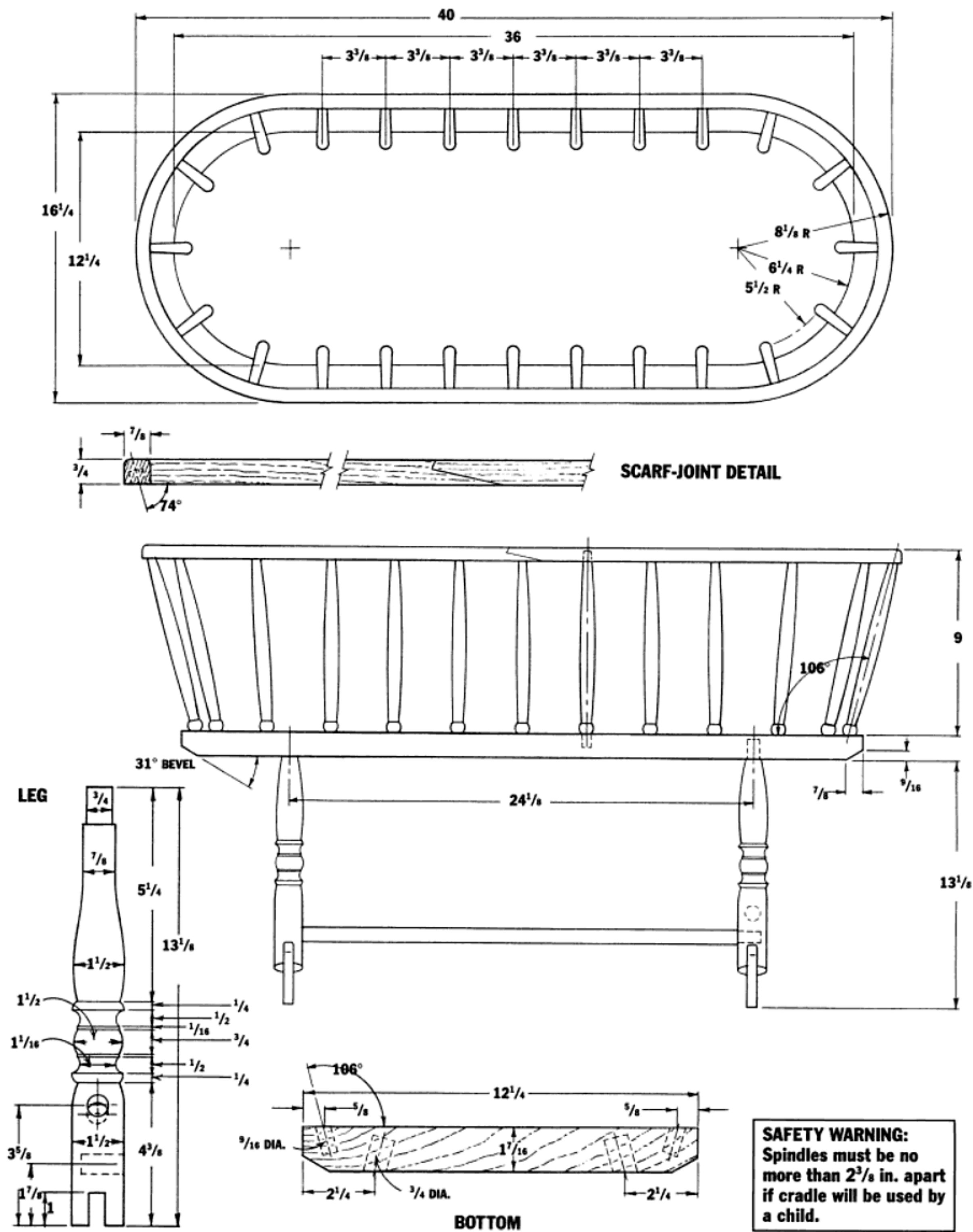
This open-top Windsor cradle is a faithful reproduction of a rare original cradle from the author's collection.







**FIG. 1: WINDSOR CRADLE**





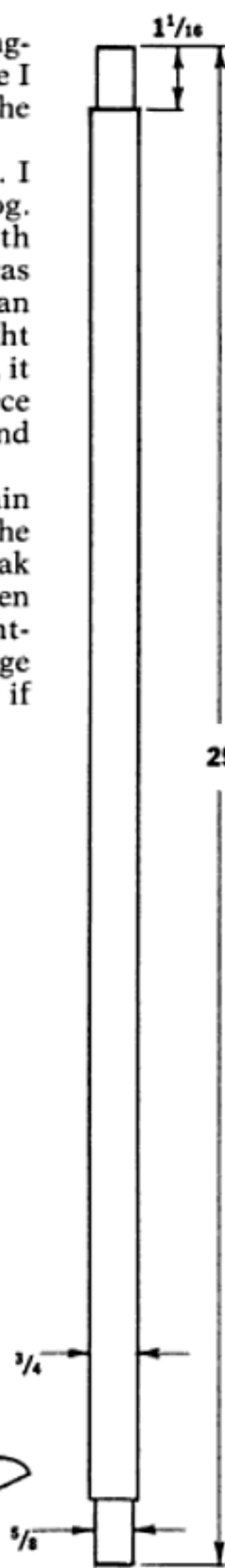
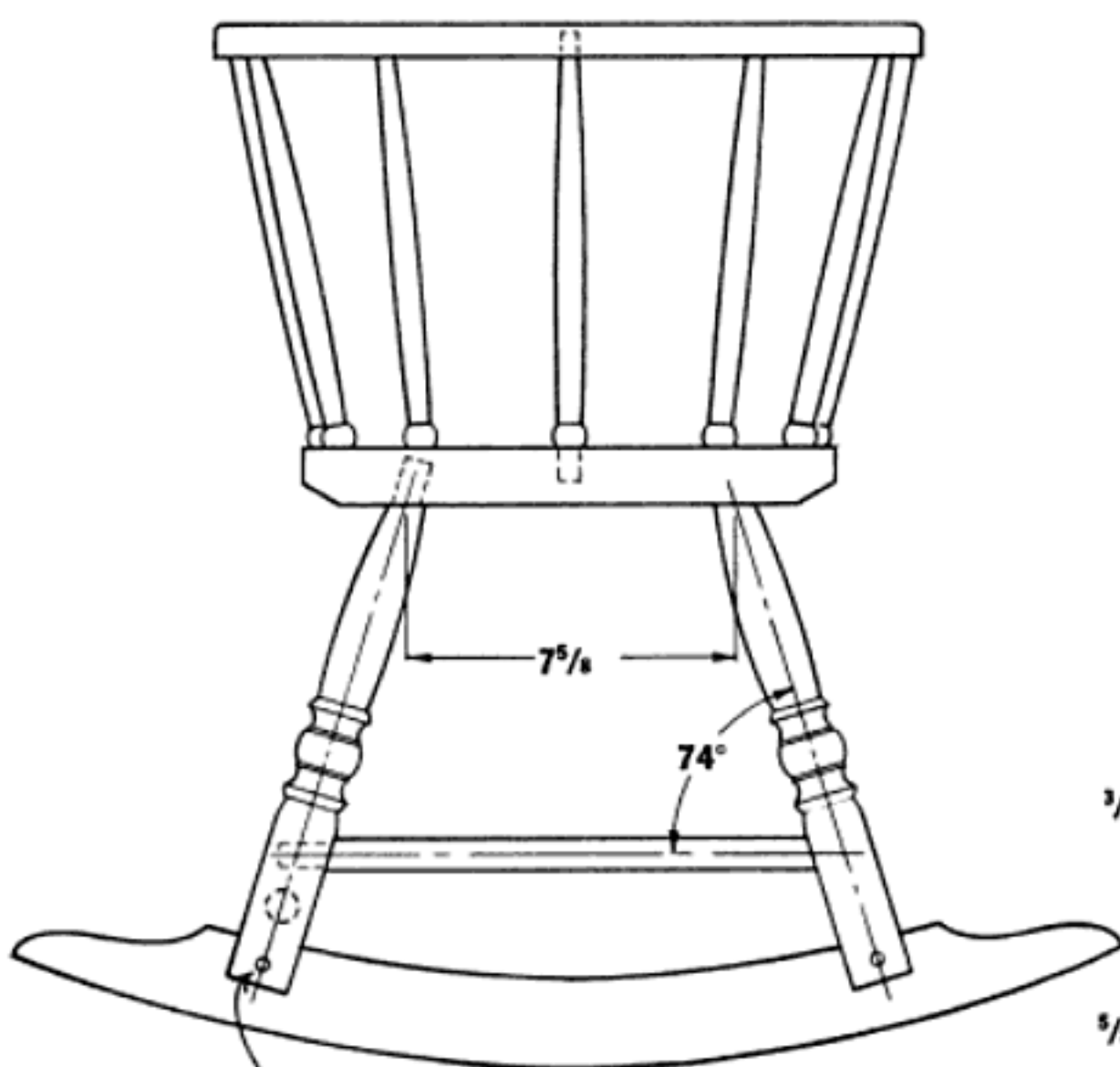
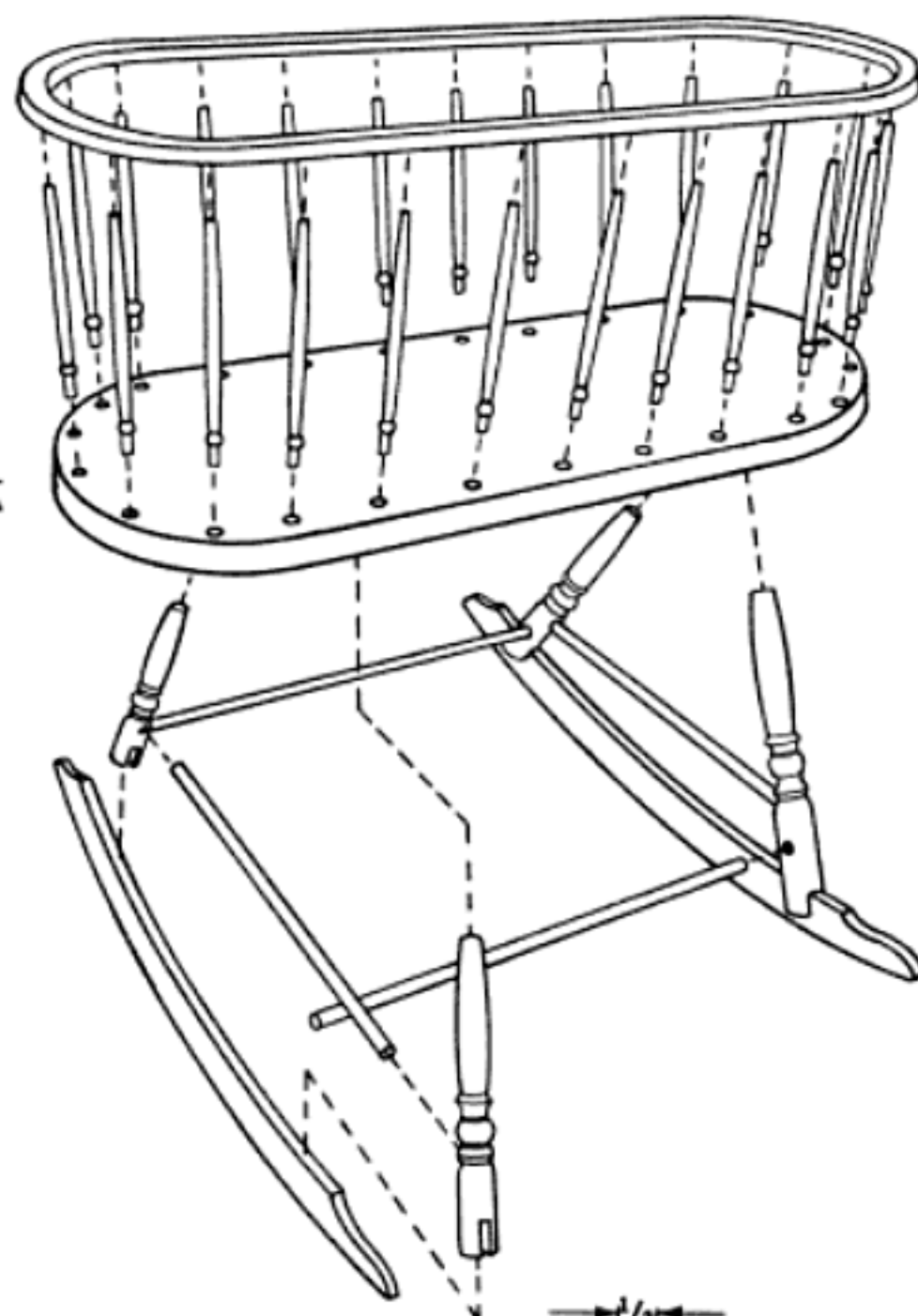
## Bending the Rail

The rail is made of two pieces of wood joined together with scarf joints on either side of the cradle. You can make the rail by laminating, but having made Windsor chairs for many years, I know that it is much easier to steam bend. Both processes require time for the bends to dry. Meanwhile, you can be making the other parts, so I suggest starting with the rail.

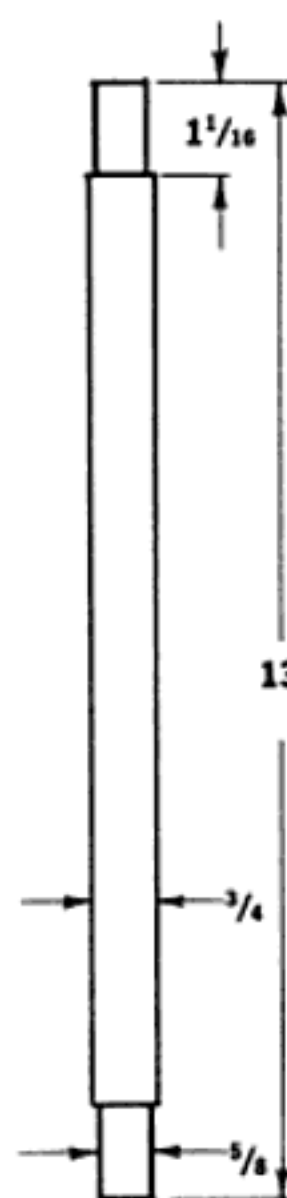
Certain woods steam bend better than others. Ring-porous woods are best; ash, oak or hickory. Because I work by hand, I prefer red oak as it never develops the almost metallic hardness of ash or hickory.

When steam bending, stock selection is critical. I "rive," that is split, my wood directly from the log. Riving is an ancient process. In fact, until the 17th century much of the wood used to make furniture was riven instead of sawn. Although more wasteful than sawing and less exact, riving guarantees a straight grain along the length of the piece. More important, it ensures that the layers of annual growth in the piece (the tree's annual rings) are continuous from one end to the other.

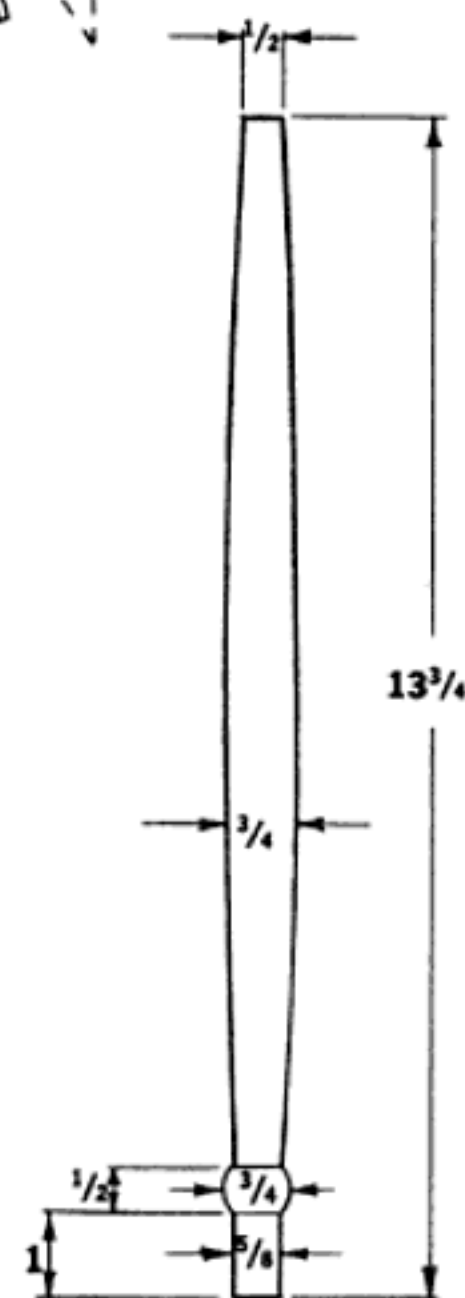
I can't overstress the importance of straight grain and continuous annual layers for bending stock. If the layers run out at the edge of the stock they create weak spots, and the piece will usually break at that spot when you bend it. You can try sawing pieces of straight-grained air-dried oak (not kiln dried), but on average you will have considerably more breakage than if



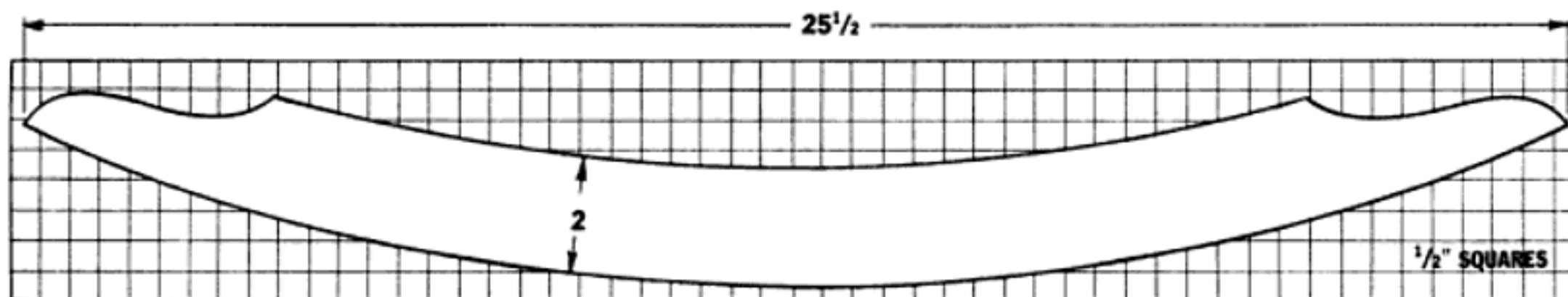
**SIDE  
STRETCHER**



**END  
STRETCHER**



**SPINDLE**

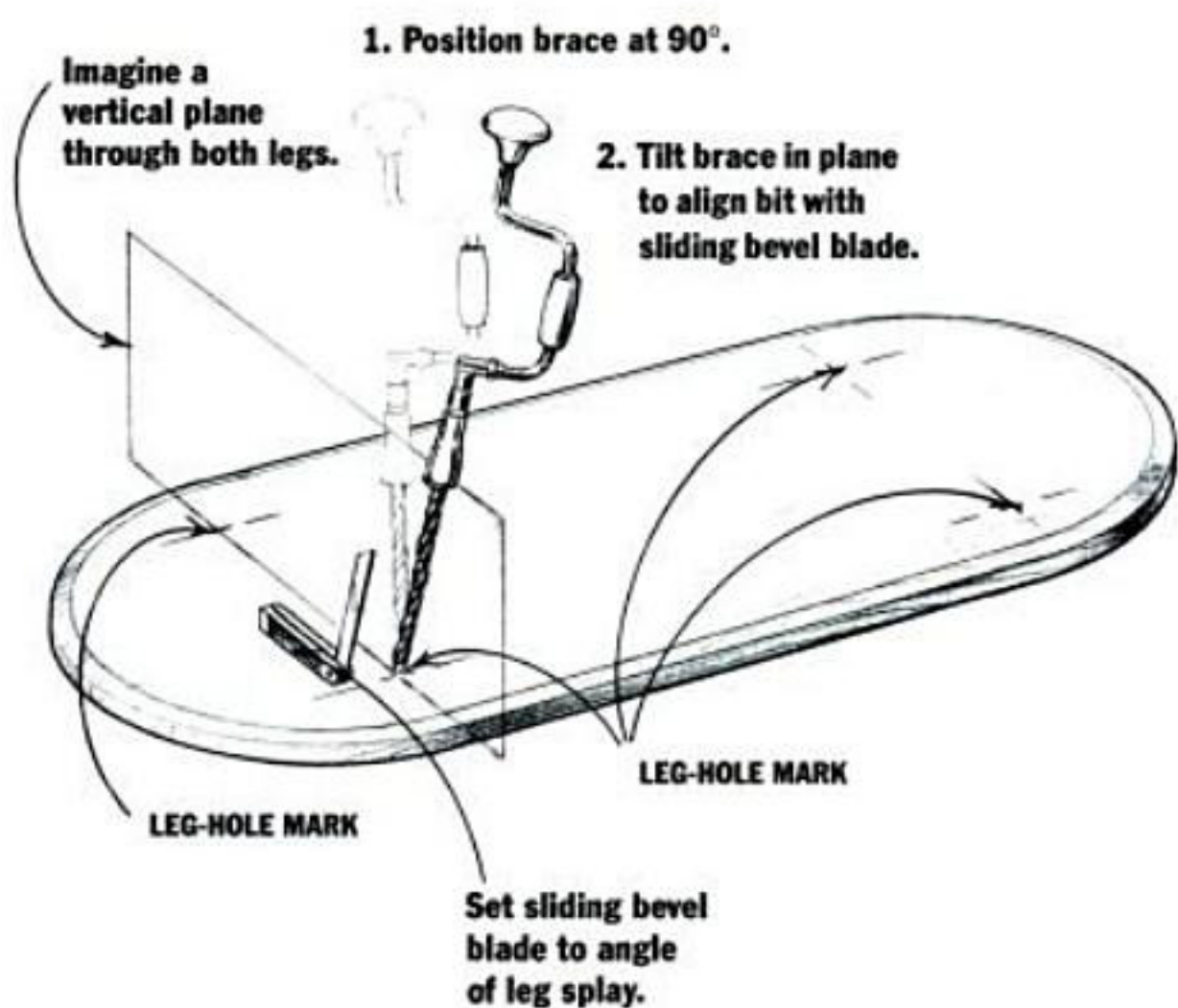


**ROCKERS**

DRAWINGS BY FRANK ROHRBACH



## FIG. 2: DRILLING THE LEG HOLES



you use riven wood. If you can't obtain a log, Conover Woodcraft Specialties, 18125 Madison Road, Parkman, Ohio 44080 sells riven red oak for Windsor chair backs. These pieces are also suitable for making the cradle rail.

The two parts of the rail are  $7/8 \times 3/4$  in. in section and 54 in. long. Notice that this is slightly longer than the finished length. Because each side does not bend exactly the same, I compensate by making the pieces slightly longer than necessary. I square up the rough, riven wood with hand planes, as it is easier to observe the annual layers to ensure that I don't cut across them. The top surface of the rail needs to be rounded, but do that later after bending.

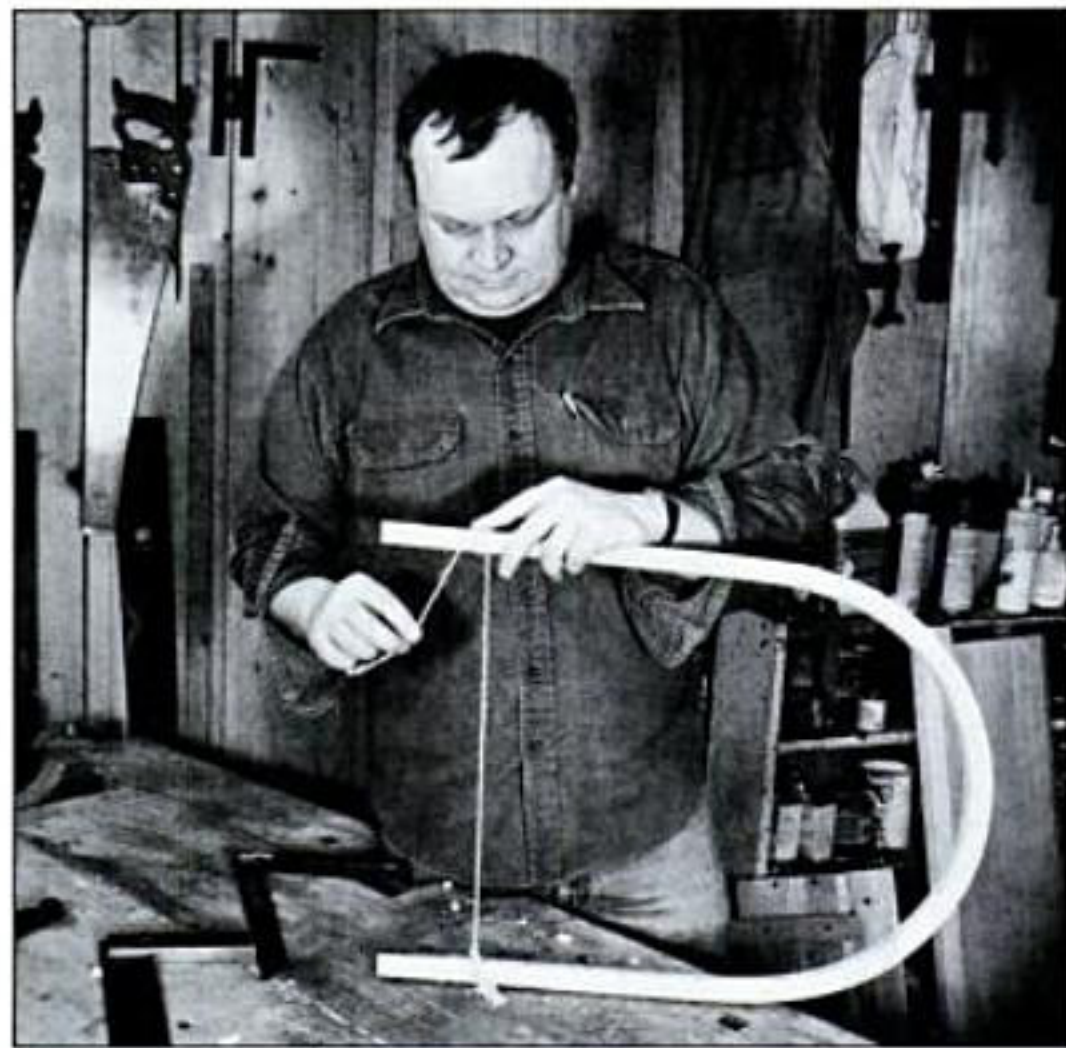
You'll have to make a bending form as shown in the photo. Mine has a plywood backboard and a 2-in. thick pine bending block fastened to the backboard with drywall screws. Dowels drop into holes in the backboard to hold the bent piece in place. Before bending, clamp the form securely to the bench top and have some dowels and wedges within easy reach.

Before steaming, make a heavy, clear center mark with a soft, #2 pencil on the side of the stock that will go against the bending form. You'll need this mark to align the piece in the form.

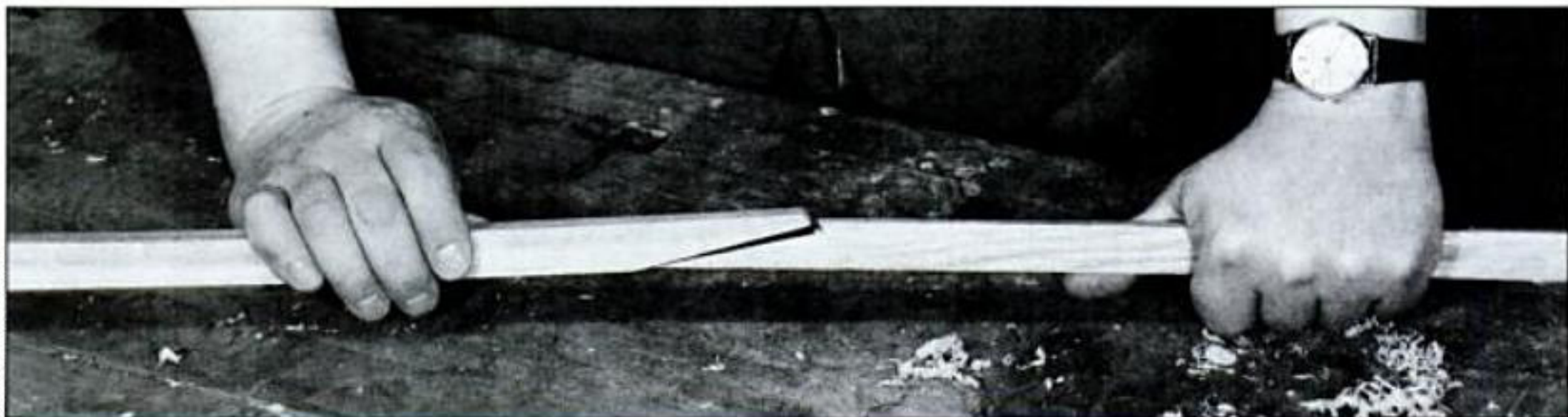
Place the shaped stock in the steam box (see sidebar on page 27), and bring the kettles to a rolling boil. The



Hot stuff. Bend the steam-softened rail around the bending form, and clamp it in place with wedges between the dowels and the rail.



Keep the sides of the rail piece parallel by tying the ends of the bend with string.



The cradle rail is made of two steam-bent sections joined with scarf joints on either side of the cradle.





Lay out a radius on each end of the bottom, and saw to the line with a bow saw or bandsaw.

amount of time needed to plasticize, or soften, the wood depends on its moisture content. To be safe, steam the wood for 30 to 45 minutes.

When a piece comes out of the box it should be so hot that you can barely hold it. I bend without gloves because my sense of touch, as much as sight, tells me how well the wood is bending. Once you take the wood out of the steam box you have, perhaps, 45 seconds before the wood cools. You will need to move quickly. To eliminate mistakes, do a trial run in your mind. I even suggest acting out the procedure so you don't have to stop and think in the middle of the bend.

When ready, take the piece out of the box, and align the center mark with the mark on the form. Secure the piece at the center mark by inserting a wedge between the piece and the center block on the form. Tap the wedge with a hammer to secure it. Grasp one side with both hands, and bend with a slow, steady motion. *Don't jerk it.* The wood will feel like hard rubber and will require some effort to bend.

When the first side is bent around flush with the form, insert the dowels, and slide wedges between the dowels and the piece. The dowels hold the piece in place, and the wedges prevent the dowels from creating dimples in the hot, soft wood. Bend the other side in the same manner.

Leave the rail on the form until it is cool to the touch. Next, remove the bent wood from the form and tie the two ends with string to keep them parallel. Hang it where it can dry. Depending on the time of year and the weather, this can take several days. Bend the second piece the same way.

### Making the Bottom

The bottom of the cradle is very easy to make, because its upper surface is flat, rather than "saddled," or shaped, as on a Windsor chair. The bottom is  $1\frac{7}{16}$  in. thick,  $12\frac{1}{4}$  in. wide and 36 in. long. The bottom of



Mark off a bevel around the underside of the cradle bottom, and remove the bulk of the wood with a drawknife.



With the legs and stretchers assembled, mark off the slot for the rocker, and extend the marks down the legs with a square.

the original cradle is made from a single board, but you'll have to edge-glue two pieces if you can't find a board that's wide enough. The bottom on the original is Eastern white pine, but you can use any other wood that is soft and stable such as sugar pine, ponderosa pine, bass, yellow poplar, or even mahogany.

Each end of the bottom is sawn to a  $6\frac{1}{4}$ -in. radius. I cut the bottom to length and hand planed both surfaces. Next, I drew a center line on the top and bottom. Setting a pair of dividers to  $6\frac{1}{4}$  in., I made a mark on the line that far back from each end. I placed one of the divider legs on the mark and traced the curve. Although most woodworkers would use a bandsaw to





**Drilling angled holes like those for the spindles and legs is easy if you line up the bit with the blade of a sliding bevel placed next to the hole.**



**Drill the holes for the side stretchers at 90° to the axis of the leg.**

cut the round ends, I used a 26-in. bow saw. I removed the saw marks with a circular plane, creating a smooth edge that was square to the upper surface.

The edge's lower corner is beveled at 31° uniformly around the entire perimeter. I did this by first setting a marking gauge to  $\frac{7}{8}$  in. and tracing a light scribe line on the bottom surface. I then reset the marking gauge to  $\frac{9}{16}$  in., and holding the fence against the bottom surface, scribed a line around the side of the bottom. My bevel extended between these two scribed lines.

I removed the bulk of the waste with a drawknife. I finished the bevel with a bench plane along the straight sides and a spokeshave on the curved ends.

### *Spindles, Legs, Stretchers and Rockers*

All the turned parts of the cradle are made of white birch. You could use any other even-grained hardwood, such as maple, cherry or mahogany.

Turn the legs and spindles to match the drawings but don't turn the stretchers just yet. Depending on the accuracy of your angles when drilling the leg holes in the bottom, you can't be sure of their finished length. Wait and turn the stretchers after you have drilled the leg holes. With the legs fitted into their holes, you will be able to determine how long to make the stretchers.

Saw out the rockers with a bandsaw or bow saw. I cleaned up the edges with my circular plane and a spokeshave. Although it is hard to tell through the paint, the original rockers appear to be maple, and that is what I used.

### *Drilling the Leg Holes*

Start by drilling the four leg holes in the bottom. When making a Windsor chair, boring these holes is a challenging operation because each hole is a com-

pound angle (angled in two directions). However, on the cradle, the legs splay only in one direction.

To bore the leg holes I used a  $\frac{3}{4}$ -in. brad-point drill. I prefer to drill by hand. Using a brace is slow, allowing me enough time to detect and correct a potential problem. If you prefer an electric hand drill, use one that has variable speed so you can bore slowly. The hole-drilling procedure is surprisingly easy. Still, you may feel more confident if you try it once or twice in a piece of scrap wood.

Secure the cradle bottom to your bench top and locate the four leg holes. To establish the leg angle, set a sliding bevel to 106°. Place the bit's point on the mark and hold the bit perpendicular to the cradle bottom.

Imagine a geometric plane passing vertically through each pair of legs. Hold the sliding bevel next to the mark for the hole, with the handle of the bevel parallel to the imaginary vertical plane. The bevel's blade should point outward in the direction you want the leg to splay. Moving only within the imaginary plane, tilt the brace in the direction of splay, until the bit lines up with the bevel blade. When everything lines up, drill the hole, being careful not to break through the other side.

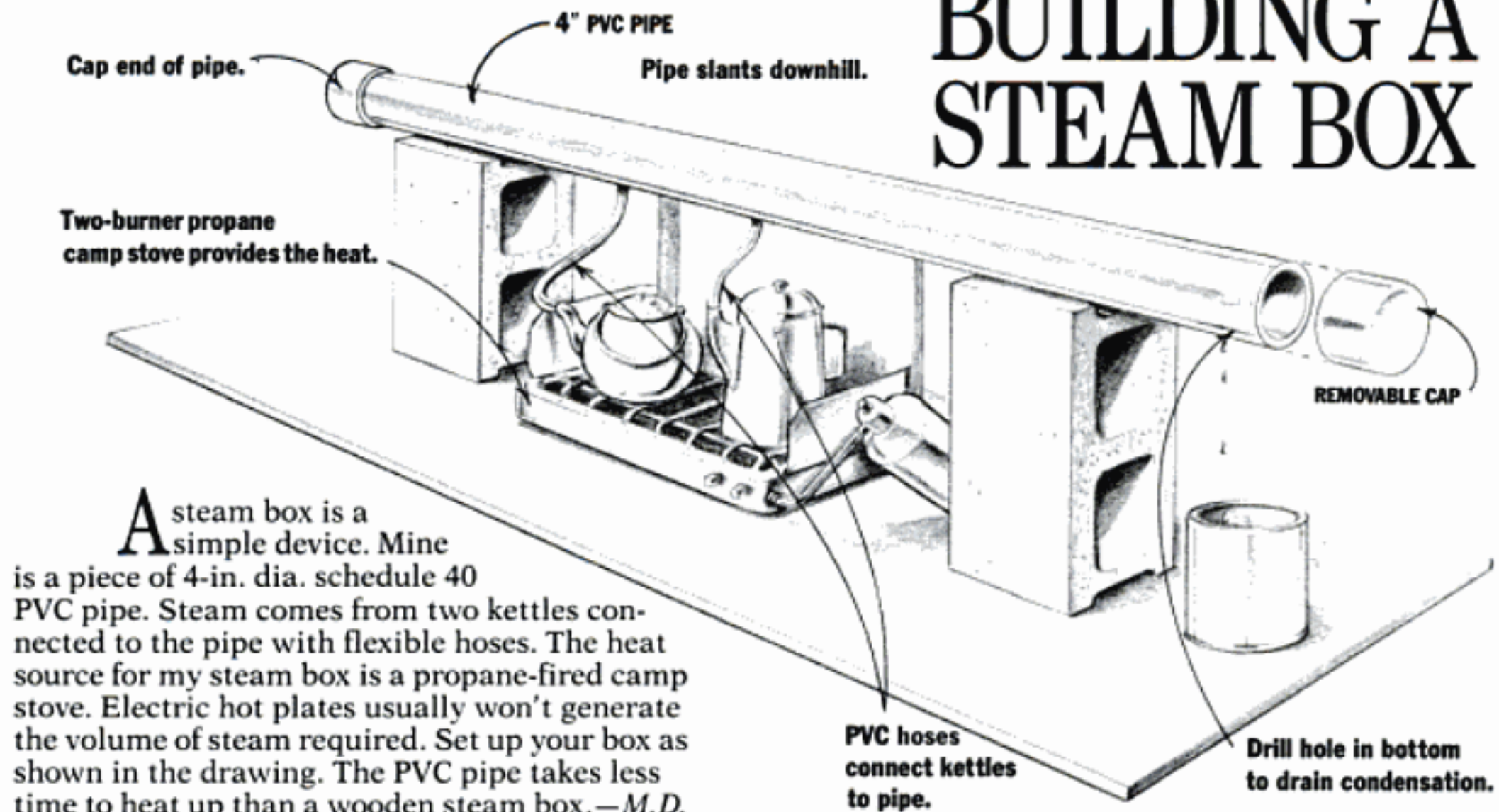
Place the leg tenon in its hole and check the accuracy of your angle. Now, bore the opposite leg hole in the same manner. This time it is easier as you have the first leg to help you visualize the vertical plane between the two legs. Do the second pair of legs in the same manner. Place all four legs in their holes. Measure the lengths of the four stretchers and turn them.

### *Stretcher Holes and Spindle Holes*

Each leg has a pair of stretcher holes. Drilling the first two pairs of holes for the stretchers is easy. The second two pairs are more difficult as they have to relate to the first.



# BUILDING A STEAM BOX



A steam box is a simple device. Mine is a piece of 4-in. dia. schedule 40 PVC pipe. Steam comes from two kettles connected to the pipe with flexible hoses. The heat source for my steam box is a propane-fired camp stove. Electric hot plates usually won't generate the volume of steam required. Set up your box as shown in the drawing. The PVC pipe takes less time to heat up than a wooden steam box. —M.D.

I chose to start with those for the end stretchers. These end-stretcher holes are drilled at an angle. Set the sliding bevel to 76° and again use it as a guide to eyeball the angle of the drill.

The side-stretcher holes are drilled at 90° to the leg's axis, and enter the legs at a right angle to the end stretchers. The easiest way to locate these holes is to assemble the two end pairs of legs on their stretchers, and fit them into the bottom. Now, you can easily mark the four side-stretcher holes. When drilling them, use a square (rather than the sliding bevel) as a guide for your drill.

Dry assemble the four legs and four stretchers. Lay a rocker across the ends of the legs, and trace the rocker slots onto the ends of the legs. With a square, continue the slots 1 in. down the leg. Cut the sides of the rocker slots with a backsaw and the bottom with a coping saw. Square the corners with a chisel and test fit the rockers.

The finished overall length of the rail is 40 in. To locate and mark the scarf joints, overlap the ends of the two bent parts and slide them back and forth until you get the 40-in. length. Trim the ends and saw the lap joint as shown in the drawing.

After gluing up the rail, drill the spindle holes in the bottom. I used a 9/16 brad point. All the spindles splay outward at the same angle. These holes are eyeballed in the same manner as the legs, with a sliding bevel set

dle, I drilled the holes for the two end spindles first. Next, I did the center spindle hole on each side of the cradle. I inserted spindles in these four holes and laid the rail on them to ensure that it would fit. I was then able to finish the rest of the spindle holes.

To drill the spindle holes in the rail, turn the rail upside down and clamp it to your bench top. Locate the two end spindle holes and the center side-spindle holes. Walk off the remaining spindle holes with a pair of dividers. Set the sliding bevel to the complementary angle (74°), and drill these holes in the same manner as the holes in the cradle bottom.

## Assembling the Cradle

Dry fit the rail on the spindles. If satisfied, disassemble everything and round the upper surface of the rail with a spokeshave and scraper. Swab glue in each spindle hole in the bottom and in the rail, and assemble for the final time. The glue should dry under pressure. You can use short bar clamps, or simply invert the cradle and place a couple of buckets of water on top of it.

When the rail is dry, assemble the base, gluing the stretchers into the legs. Don't glue the rockers. Drill a 1/8-inch hole through the joint, and insert a hardwood pin to fasten the rocker to the legs.

Scrape and sand the piece, and finish it. If the cra-



scoff at the idea of using these sharpening aids, but now I'm sold on them. I'll start by describing the different types of guides and how they work, followed by comments on the ones I tested.

## How Honing Guides Work

The guides themselves are simple. A clamping device holds the blade at a preset angle, while an attached roller rides either on the stone or, as in the case of two General guides I tested, on the bench. To adjust the bevel angle on the "on-stone" guides, slide the guide along the blade. The closer you clamp the guide to the blade end, the steeper the bevel. On the guides with "off-stone" rollers, change the bevel angle by adjusting the height of their roller "outrigger."

Generally, I prefer the on-stone roller guides to the outrigger type. Unless your stone is dished, the on-stone guides are more likely to hone the blade at the bevel you set. The outrigger types assume the top of the stone is perfectly parallel to the bench top. These guides hone a bevel in relationship to the bench surface, not the stone. If the stone is at a slight angle to the bench, the bevel you set won't be the bevel you get. (Admittedly, this might be splitting hairs for most of us—if you set the guide at 25° and end up with a 23° or 27° bevel, the effect on tool performance probably won't be noticed.) Also, the bench top must be perfectly flat and smooth. If your workbench is as beat up as mine, you'll be better off using this type of guide on the kitchen table, a plastic laminate countertop or other smooth surface. On the advantageous side, because the roller is off the stone, you can use more of the stone surface, distributing wear evenly along the length of the stone. (This is more critical on water stones, which are softer than oilstones.)

Each guide requires a bit different method to determine the bevel angle for the tool you're sharpening. I'll describe this later. With all of them, you can use an inexpensive magnetic angle-finder to set a fairly pre-



Magnetic angle-finders can help you set the proper bevel angle when you use a honing guide.

cise bevel angle. I recommend either the General No. 845 Magnetic Bevel Finder, or the Risen Multi-Function Level and Angle Finder (available from Garrett Wade, 161 Ave. of the Americas, New York, NY 10013). Both devices have lots of other uses.

You don't always have to set a precise bevel angle each time you touch up the blade. If the existing bevel is still correct and reasonably flat, you can simply put the beveled edge flush on the stone, and adjust the guide to hold it in that position. After a few strokes, raise the blade angle by one or two degrees to hone the secondary bevel.

While experimenting with the various honing guides on several of my "stubby" butt chisels, I found none that would hone angles less than about 20° on 3-in. blades. I don't consider this a serious drawback, because you'd rarely put an angle of less than 25° on a butt chisel unless you were going to use it exclusively as a paring chisel. Similarly, most plane blades have bevels between 25° and 30°. (For more on bevel angles, see the sidebar, Honing Tips.)

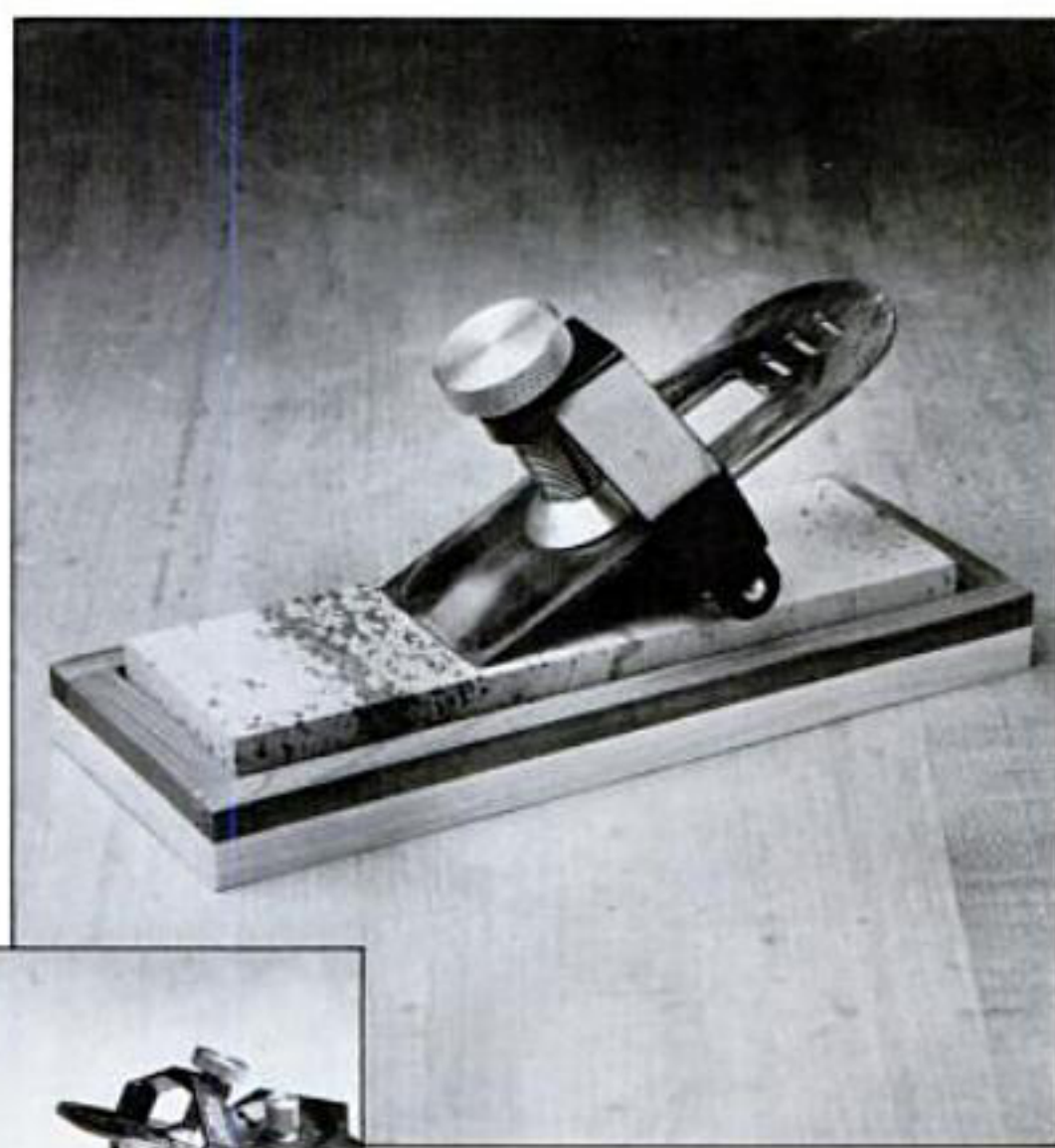
In addition to the honing guides for plane irons and chisels, I tried two "mini" honing guides called graver sharpeners. Originally designed for honing jewelry-engraving tools, these two mites also work well on small carving tools.

## The Guides

### VERITAS HONING GUIDE AND ANGLE JIG

Made by Lee Valley Tools in Canada, this well-machined, precision guide has an exceptionally useful feature—you can hone a precise secondary bevel on the blade without removing it from the guide. (As mentioned in the Honing Tips sidebar, a secondary bevel lets you sharpen a blade quickly by removing only a small amount of metal.) A spring-actuated cam raises or lowers the guide roller slightly, giving you a choice of two secondary bevels. For example, if you hone the basic bevel at 25°, you can set a secondary bevel of 26° or 27°. The angle-setting jig itself has five basic settings—15°, 20°, 25°, 30°, and 35°. The optional Veritas Angle-Setting Jig (see inset photo) helps to quickly set and square the guide to one of 25 precise angles ranging from 13½° to 38°. That pretty much covers all the bevel angles you'd ever need.

The Veritas honing guide accepts chisel, plane and spokeshave blades up to 2½ in. wide and 5/8 in. thick. In combination with the angle jig, I found it to be the easiest guide to set up for precise angles, even on skew blades. You can hone skew blades with the other guides, but they require considerably more tinkering



PHOTOS BY SALLY SHENK ULLMAN



to align the blade properly.

If you don't buy the optional angle-setting guide, you'll need to square the blade in the guide by eye. The base plate of the guide has index lines to help square narrow blades in it. To sharpen, position the blade in the guide so the existing basic bevel is flat against the stone. After honing the basic bevel flat (not always necessary), rotate the cam knob to hone the secondary bevel. When using the guide on several of my longer chisels, I found that the hold-down clamp didn't work as well. The manufacturer compensates for this problem by including a self-adhesive, high-friction pad that sticks to the base plate. After sticking the pad on the guide, it held the tool fine. Unfortunately, the pad

covers the index lines used to align narrow blades, so you'll need the angle jig or a small square to do this, or align the blade by eye.

The beauty of the Veritas guide and angle jig combination is that once you've put the initial bevel on the tool, you can return to precisely the same angle each time you sharpen. The angle jig also will work with other on-stone guides. The guide comes with excellent instructions, including recommended bevel angles for various blades, proper stone grits and other helpful sharpening tips. The guide and angle-setting jig are sold individually, but most catalog suppliers knock off a few dollars if you buy them as a set.

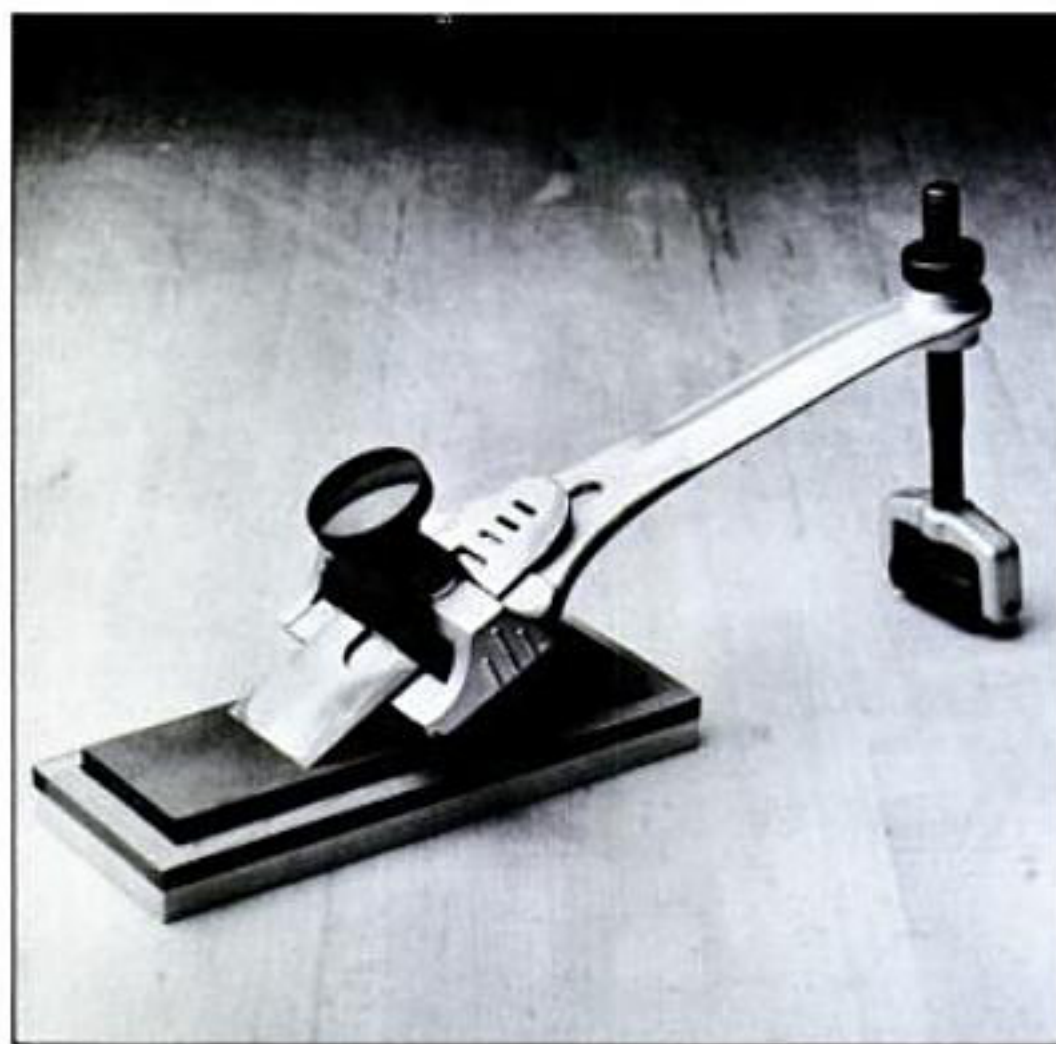
Price: Guide, \$22.75; Angle jig, \$10.75.

## GENERAL NO. 810 CHISEL AND PLANE-BLADE SHARPENER

This is one of the two "outrigger-type" guides made by General Hardware Manufacturing. To adjust the bevel angle, rotate a threaded rod at the back of the guide to raise or lower the roller, which rides on the bench. Like several of the other guides tested, there's no provision for setting specific bevel angles unless you use a magnetic angle-finder or other protracting device. (The Veritas angle jig won't work with this particular guide.) The guide will accept blades up to  $2\frac{5}{8}$  in. wide and  $\frac{1}{2}$  in. thick.

Despite my initial reservations about outrigger-type guides, this one put a good, sharp edge on the blades I sharpened. I like the clamping device, which holds tools of all widths securely in position. On the "con" side, you might not be able to use this guide on your very long-handled tools, because the threaded outrigger assembly interferes with the tool handle.

Price: \$19.95.

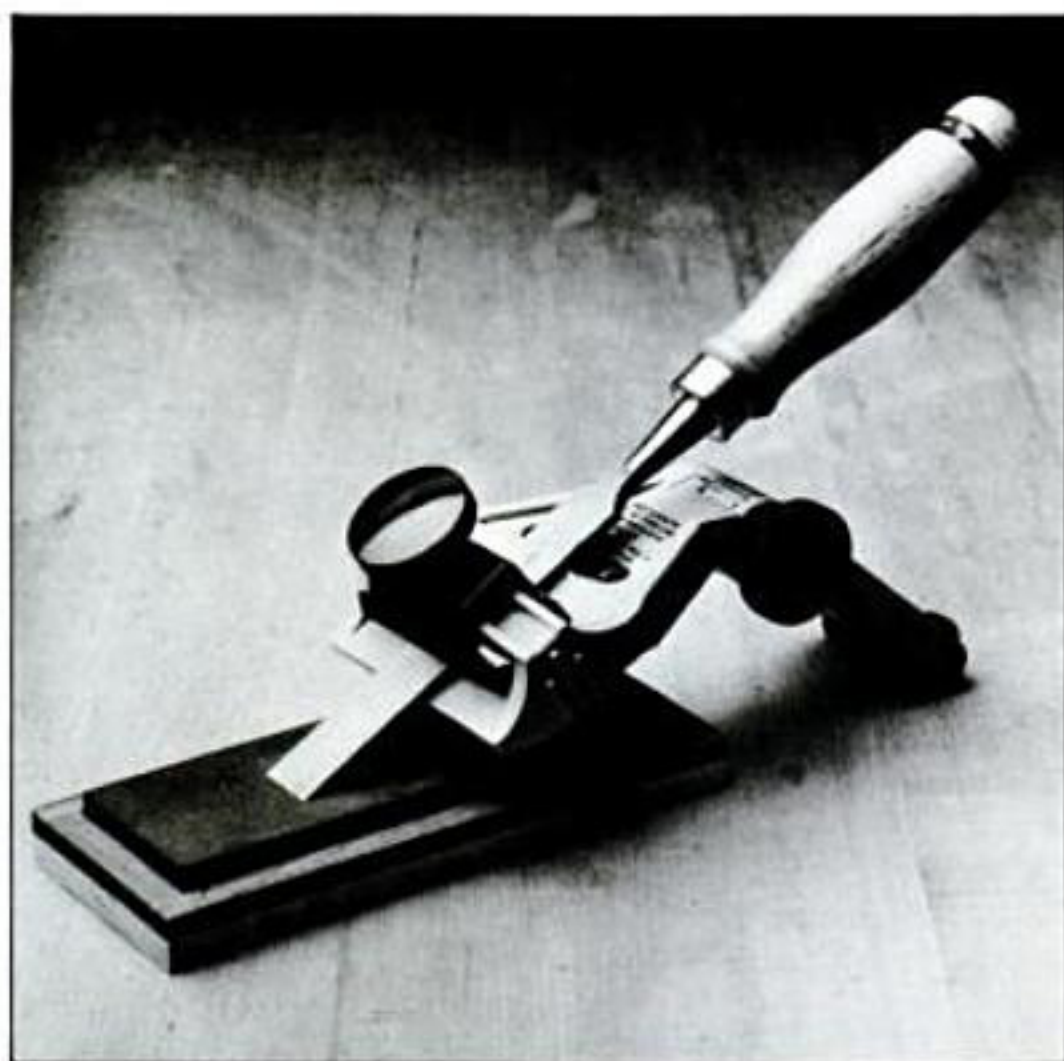


## GENERAL NO. 809 FOLDING SHARPENER

Although considerably lower priced, I found the newer 809 model to be an improvement over the 810. First, it's more compact—the roller outrigger folds neatly against the guide body for storage. Set the bevel by adjusting the angle of the roller outrigger in relation to the guide body. A calibrated scale on the guide enables you to set a 30° bevel, based on the thickness of the stone you're using. For example, if you're sharpening on emery cloth or sandpaper, you set the scale to 0; if the stone is 1-in. thick, you set the scale to 1, and so forth. Unfortunately, the scale can't be used to determine bevels other than 30°, though the guide itself will adjust to other angles. I think the guide would be more useful if it (or the instructions) included scale settings for other common bevel angles, such as 20°, 25°, and 35°.

Another improvement over the No. 810—the outrigger on the No. 809 doesn't interfere with the handle on long-handled tools. Like the 810, the clamp on the No. 809 holds the tool securely in place while honing. The guide body is made of high-quality, impact-resistant Lexan plastic, which appears to be as durable as the metal guides.

Price: \$15.95.





## ECLIPSE HONING GUIDE

Made by James Neil Tools in England, this guide looks and works like a small vise, gripping the blade from the sides. Of all the guides I tested, this one had the most positive gripping action, especially on narrow chisel blades. A knurled, slotted knob tightens the self-centering clamp jaws. First, hand-tighten the knob, then snug it gently with a flat-blade screwdriver. The guide jaws are stepped. Use the inside set of jaws for narrow blades ( $\frac{1}{4}$  in. to  $1\frac{5}{8}$  in. wide); the outside set is for wide blades ( $1\frac{1}{2}$  in. to  $2\frac{7}{8}$  in. wide).

The instructions that come with the guide give blade-tip-to-guide measurements for setting  $25^\circ$  and  $30^\circ$  bevels on chisels and plane irons. For example, to set a  $25^\circ$  bevel on a chisel, the distance between the blade tip and front edge of the jaws would be  $1\frac{5}{8}$  in. If you want to hone the blade at an angle other than  $25^\circ$  or  $30^\circ$  you'll need a magnetic angle-finder, the Veritas angle jig (see Veritas Honing Guide section) or other protracting device.

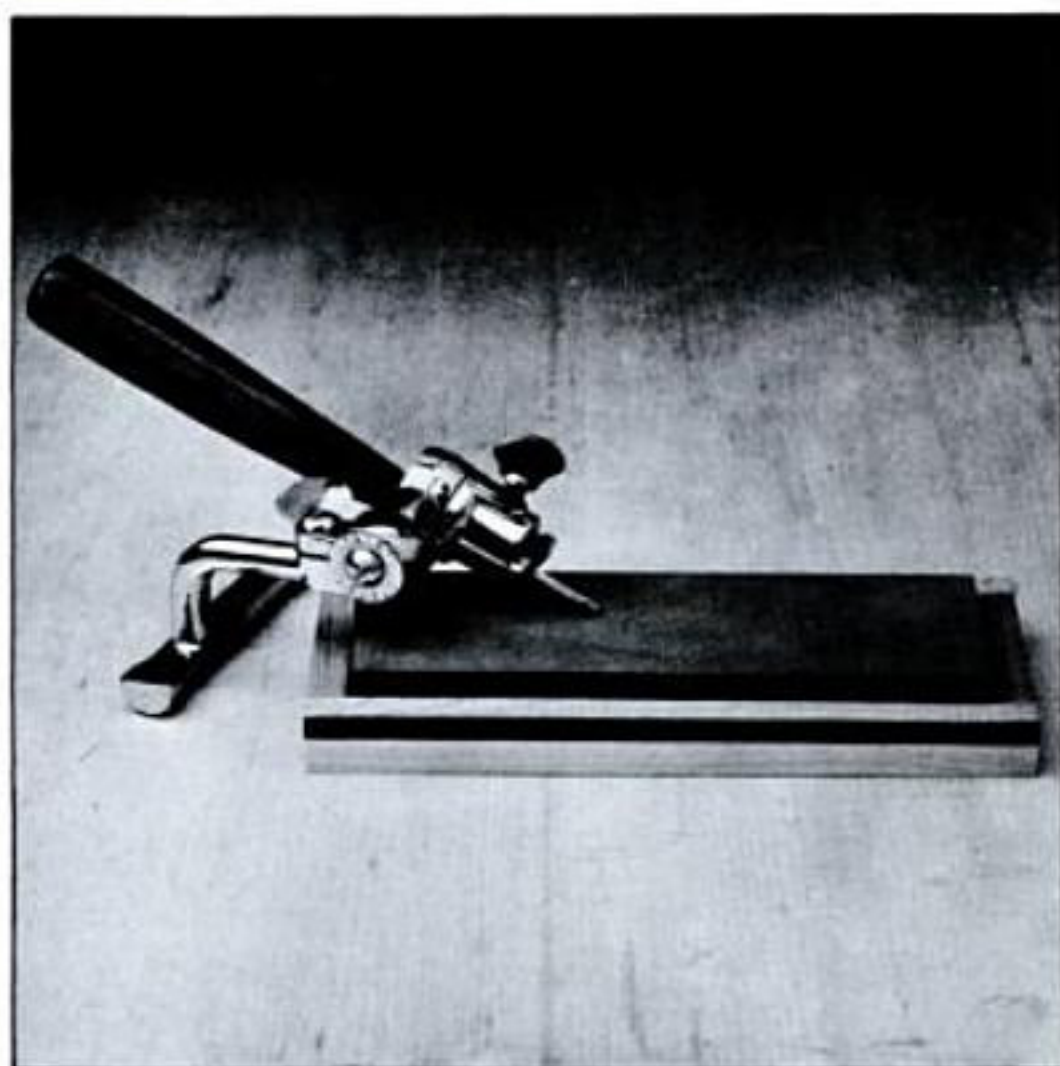
Price: \$15.95.

**Note:** In recent years, the Eclipse design has been imitated by several overseas manufacturers. One Taiwanese-made version that I tested (imported by Boyne Industries for Leichtung Tools) has a wider blade capacity than the original Eclipse (up to  $3\frac{1}{2}$  in.). The original is noticeably better machined, but the spin-offs cost somewhat less (about \$9.95).



## GROBET CROCKER PATTERN-GRAVER SHARPENER

If you enjoy carving with small tools, this versatile guide will hone a precise, even bevel on both curved and straightedged tools. You can also use the guide for miniature turning tools, tiny screwdrivers, and other edge tools up to  $\frac{1}{2}$  in. wide.

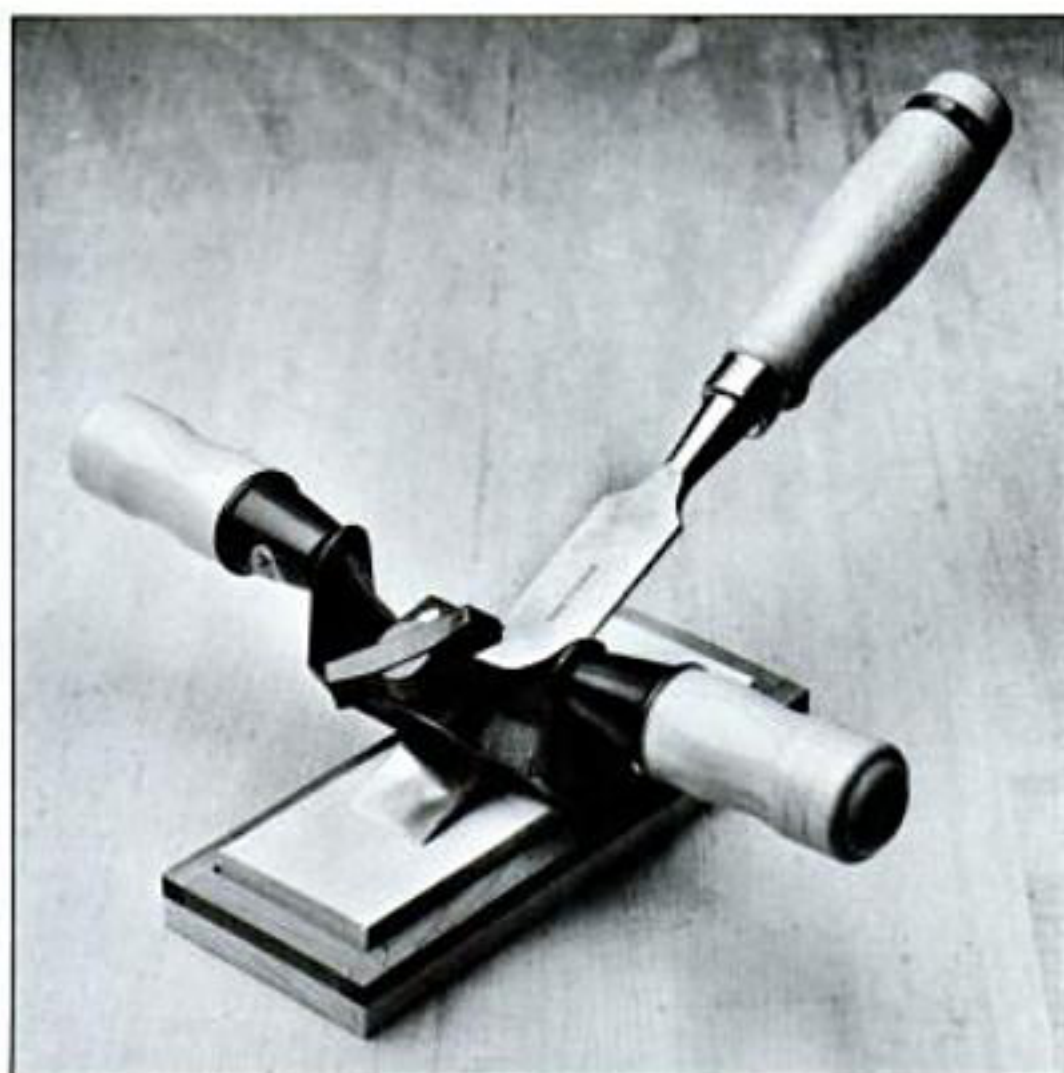


Not having any chisels small enough to fit the tool, I used it to sharpen a dull, old set of Millers Falls carving tools—and it did an admirable job on them all. The guide has a head that rotates a full  $360^\circ$  on its axis allowing you to hone curved tools such as gouges while keeping the bevel angle constant. Once you've clamped the tool in the guide and set the bevel angle, slowly rotate the carving-tool handle while stroking the edge back and forth along the stone. (You can also lock the rotating head at any angle to hone straight-edged tools.) This is the only guide I tested that doesn't have a roller. Instead, a smooth, curved base slides on the bench. (Don't try sliding the base on your stones, or you'll quickly wear a flat in it.)

Setting a particular bevel angle (in degrees) is pretty much a "by-guess and by-golly" proposition, because the guide and tools you use them on are so small. The guide does have reference marks on both the bevel adjustment and the rotating head, but I found these next to useless. In some cases, use a magnetic angle-finder with the guide, provided your tool handles are parallel to their blades (which mine weren't). Rather than choosing a specific bevel angle for my carving tools, I sharpened them to the existing bevels and still ended up with much sharper tools than if I'd honed them by hand.

Made by Grobet File Co., this chrome-steel guide was originally designed for sharpening jewelry-engraving tools. Woodcraft Supply Corp. sells the guide as their Deluxe Micro Sharpening Guide (04S41). You might also find the guide at a local jewelry-supply store. Price: \$37.50.





## SHOKUNIN HONING GUIDE

This honing guide is designed specifically for sharpening thicker Japanese plane blades, but you can also use it for honing Western-style chisels and plane blades. I like it for honing an initial bevel on large chisels and plane blades with my coarse stones. Because it has two handles like a spokeshave, I was able to bear down on the tool with both hands to remove a lot of metal in a hurry. (With the other on-stone roller guides, you position your hands to exert pressure directly on the blade, not the guide.) However, I found this guide to be too large to accurately hone small, narrow chisels.

The Shokunin accepts chisel and plane blades up to  $2\frac{7}{8}$  in. wide and  $\frac{3}{8}$  in. thick. The  $2\frac{3}{4}$ -in. wide stainless-steel roller is wider than most bench stones, so the bevel angle is less apt to be affected by hollows in the stone.

Another nice feature about this guide: it comes with a small, metal scale that hooks over the roller to determine the bevel angle. With it, you can set fairly precise bevels from  $16^\circ$  to  $45^\circ$ .

Price: \$22.00.

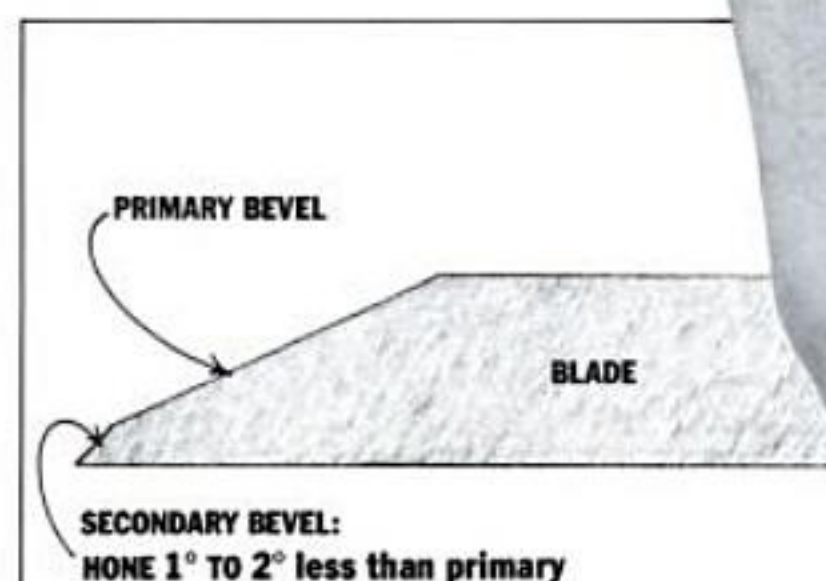
## HONING TIPS

Sharpening chisels and plane blades is a subject in itself (see March/April, 1988 AW). The following tips will help you get better results when sharpening with honing guides.

Many woodworkers like to put a slight secondary bevel on their tools. The basic (primary) bevel is the one that's on the tool when you buy it. A secondary bevel of  $1^\circ$  or  $2^\circ$  on the blade makes resharpener faster and easier because you're removing less metal to get a sharp edge (see drawing). When resharpener the tool, try to maintain the same initial and secondary bevel. The goal is to remove as little metal as possible each time you sharpen. You can touch up a blade by sharpening the secondary bevel only, but don't allow the width of the secondary bevel to exceed  $\frac{1}{16}$  in.

Only a very slight adjustment of the guide is necessary to hone the secondary bevel. Also, when honing the secondary bevel, don't bear down hard—about 15 to 20 long, light strokes on your fine-grit finishing stone should do it.

Operating the guide with both hands will give you more control, resulting in greater accuracy. (You'll probably need to use a non-skid stone holder to keep the stone from sliding around on the bench while honing.) With the exception of the Shokunin guide, I like to position my hands to apply most of the downward pressure directly on the blade, rather than bearing down on the guide itself. By keeping pressure off the guide, you're less likely to force the blade out of alignment, especially if it's not securely clamped in the guide. With the on-stone guides, I position my thumbs on the back side of the guide, with index and middle fingers exerting most of my downward pressure on the front of the blade.



### PROFILE OF THE BEVEL

Contrary to what you might think, the roller on the on-stone guides will not wear a hollow in your stones, although the blade eventually will if you run it over the same spot long enough. While sharpening, I try to cover as much of the stone surface as possible, using both ends and sides.

The bevel angle you select depends on the type of tool and the way you use it. For example, skew chisels and chisels exclusively for paring softwoods are generally ground at a  $15^\circ$  to  $20^\circ$  bevel. A bevel of  $20^\circ$  to  $25^\circ$  is suitable for paring chisels used with hardwoods. Chisels used for both paring and light mortising (striking with a mallet) should have a  $25^\circ$  to  $30^\circ$  bevel;  $30^\circ$  to  $35^\circ$  is suitable for mortise chisels. Most plane blades have a bevel of  $25^\circ$  to  $30^\circ$ , depending on the blade angle and type of wood you're planing. With any tool, try to attain the lowest possible bevel consistent with the strength of the steel and the use of the tool. If the blade tip chips during use, the angle is too low.—J.B.





## GROBET ROLLER-STYLE GRAVER SHARPENER

Though not as versatile as the Crocker Pattern sharpener, this thumb-size roller-style guide does a good job on small, straightedged carving tools, chisels, and the like. It looks and works much like the larger on-stone honing guides but only accepts blades up to  $\frac{5}{16}$  in. wide. This precision aluminum guide has a steel roller and knurled brass clamp screws that hold the tool in one of two slots in the guide. One slot is for a range of low-bevel angles; the other is for steeper angles. Neither Grobet sharpener comes with instructions, but they're both easy enough to figure out. The roller-style graver sharpener is also available from Woodcraft. (Ask for their Micro Sharpening Guide, No. 03Z51.)

Price: \$7.50. ▲

*Jim Barrett is a woodworking and home-improvement writer in Pacific Grove, California. He wrote about dowsing jigs in the July/August, 1988 AW.*



When sharpening with a honing guide, apply pressure on the front of the blade not on the guide.

## SOURCES You can order honing guides by mail from the following companies:

### BOYNE BLADE HONING GUIDE

Leichtung Dri Workshops  
4944 Commerce Parkway  
Cleveland, OH 44128

### ECLIPSE HONING GUIDE

The Source  
7305 Boudinot Drive  
Springfield, VA 22150

The Woodworker's Store  
21801 Industrial Blvd.  
Rogers, MN 55374

### GENERAL MODEL 809

Garrett Wade  
161 Ave. of the Americas  
New York, NY 10013

The Source  
Woodcraft Supply Corp.  
41 Atlantic Ave.  
Box 4000  
Woburn, MA 01888

The Woodworker's Store

### GENERAL MODEL 810

Highland Hardware  
1045 N. Highland Ave., NE  
Atlanta, GA 30306

Trend-Lines  
375 Beecham St.  
Chelsea, MA 02150

### GROBET GRAVER SHARPENERS

Woodcraft Supply Corp.

### SHOKUNIN HONING GUIDE

Garrett Wade  
Highland Hardware

### SOMAX MODEL 22 HONING GUIDE

Garrett Wade  
Highland Hardware  
The Source  
Woodcraft Supply  
Woodworker's Supply of  
New Mexico  
5604 Alameda Place, NE  
Albuquerque, NM 87113  
Trend-Lines

### VERITAS HONING GUIDE/ANGLE JIG

Garrett Wade  
Lee Valley Tools Ltd.  
2680 Queensview Dr.  
Ottawa, Ontario K2B 8H6  
Canada  
Woodcraft Supply  
Woodworker's Supply of  
New Mexico



# COMPUTER

**A**s a maker of custom-built furniture, I almost always build to someone else's expectations. It isn't often that I get a chance to make a piece totally of my own design and to my own liking. So when my wife asked me to build a desk for her new computer, I was thrilled.

Function was primary, but not at the expense of design. I decided to create a wrap-around effect with smooth-flowing surfaces. I also decided to let the piece evolve as it went along. I made only a few initial sketches and made the rest of the design decisions on the developing piece.

I built the desk from black locust I had saved from the yard of an ax-happy neighbor. It was gloriously yellow-orange, and in 8 years of looking for the right project, this was my first chance to use it.



PHOTOS BY JAMES MCGILVER

To lay out a curve, drive nails at the center point and end points of the curve, and flex a thin strip of wood between them. Trace the curve with a pencil.

I began construction by gluing up all the wide panels necessary to build the desk. Before edge-gluing the  $\frac{3}{4}$ -in. boards, I cut tongue-and-groove glue joints on the shaper. Glue joints make aligning the joint a breeze during glue-up. You may substitute splines, biscuits, or simply rely on butt joints.

To make the  $\frac{1}{4}$ -in. panels for the frame-and-panel assemblies, I resaw pieces from thicker stock. I left the resaw marks on the panels when I glued them up. When the glue was dry, I packed both the  $\frac{3}{4}$ -in. and  $\frac{1}{4}$ -in. panels off to a local cabinet shop that rents time on its wide-belt sanding machine. For the princely sum of \$15, the sander removed the resaw marks on the  $\frac{1}{4}$ -in. panels and sanded everything up to 180-grit. Some hand sanding was still necessary, but the sander gave me a very flat, smooth surface.

## *Building the Console*

**The console** is the curved top section of the desk that contains the cubby holes. I thought of a race car as I designed it, with its dashboard wrapped around the driver and everything within easy reach. The console is dovetailed together.

There is no magic formula for laying out the curves on the top and sides. I drove a couple of finishing nails into the desktop at what would be the end of the curves. Then I located the center of the curve using the dimensions in Fig. 1. I drove a nail into this point, too and flexed a thin piece of wood between the nails, as shown, to generate the curve. I marked the curve on the console with a pencil and bandsawed it to shape.

I usually cut dovetails with a router and jig, but for this project I decided to cut them by hand. There aren't that many dovetails, and they're not hard to cut. Once you've cut the dovetails, sand what will be the inside of the console—it's much easier to do while it's disassembled. Glue up the console taking care to keep it square.

When the glue dries, blend the side and top curves together with a belt sander. The idea is to create a sweeping wrap-around effect with the help of the sander. Use a light touch and keep the sander moving. The top edge of the console remains square; the side edges flare gently outward. Follow the belt sanding with hand sanding to remove the cross grain sanding marks. When I finished sanding, I rounded the dovetails and the back edges of the console with a  $\frac{3}{8}$ -in. round-over bit but left the front edges square.

**The cubby-hole unit** is made from  $\frac{1}{4}$ -in. stock. The shelves are dadoed in place and the back is glued into



# DESK

*Give Your Hardware  
a Handmade Home*

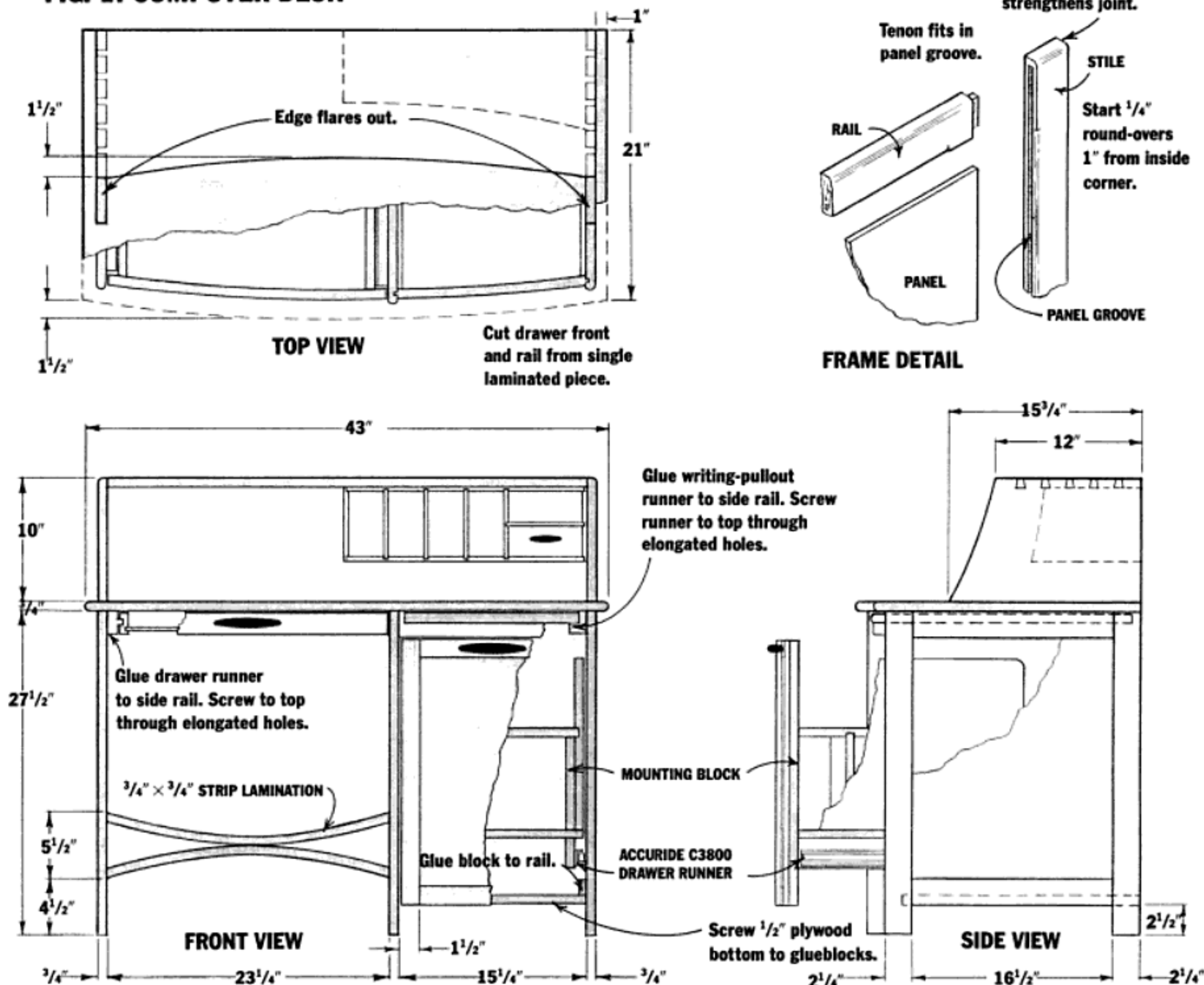
BY WILLIAM STORCH

This contemporary  
computer desk  
holds all your  
hardware. The  
drawer hides a  
printer and supply  
of paper.





**FIG. 1: COMPUTER DESK**



a rabbet. The cubby hole follows the curves of the rest of the console—it curves from both top to bottom and side to side. The sides of the cubby-hole assembly are not identical as shown in the cubby-hole detail of Fig. 1. This means that the curves on the front of the assembly are not symmetrical—each vertical piece has a slightly different curve.

To plot the curves, I traced the shape of the console onto the right side and the top of the cubby-hole unit. After I bandsawed these two pieces to shape, I temporarily assembled the cubby-hole assembly and laid out a curve on the cubby-hole bottom. I then made pencil marks on the vertical dividers and on the left side of the assembly where these vertical parts intersect the curve of the top and bottom. Finally, I took the assembly apart and bandsawed all the parts to shape.

The front of the cubby-hole drawer is also an asymmetrical curve: It reminds me of the belly of a wind-filled sail. There are a number of ways to create this shape, but I took the easy route. I built the drawer with an extra-thick front and bandsawed it to shape. Before bandsawing the drawer front, dovetail and assemble the drawer as shown in Fig. 2. Assembling the

drawer lets you put the drawer in place and trace the curves of the cubby-hole frame directly onto the edge of the drawer front. Because the drawer front is a compound curve, a bandsaw can only approximate the shape. I tilted the bandsaw table to approximate the slope of the drawer front and sawed to the line drawn along the bottom of the drawer. Then I formed the final shape with a belt sander.

Screw the cubby-hole unit to the console with four 3/4-in. #4 screws—two through the top, and two through the side. Because space is tight, you may have to run the screws into the console at an angle.

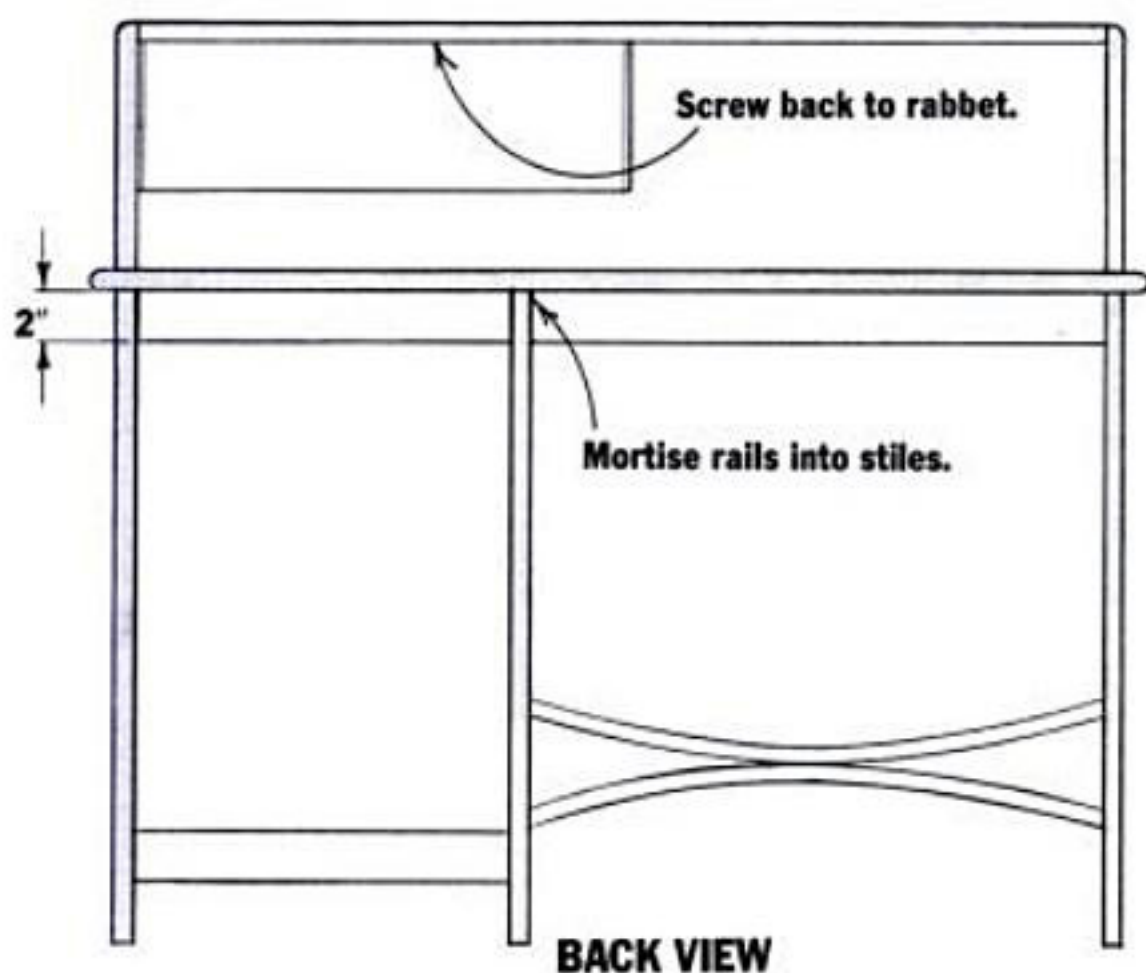
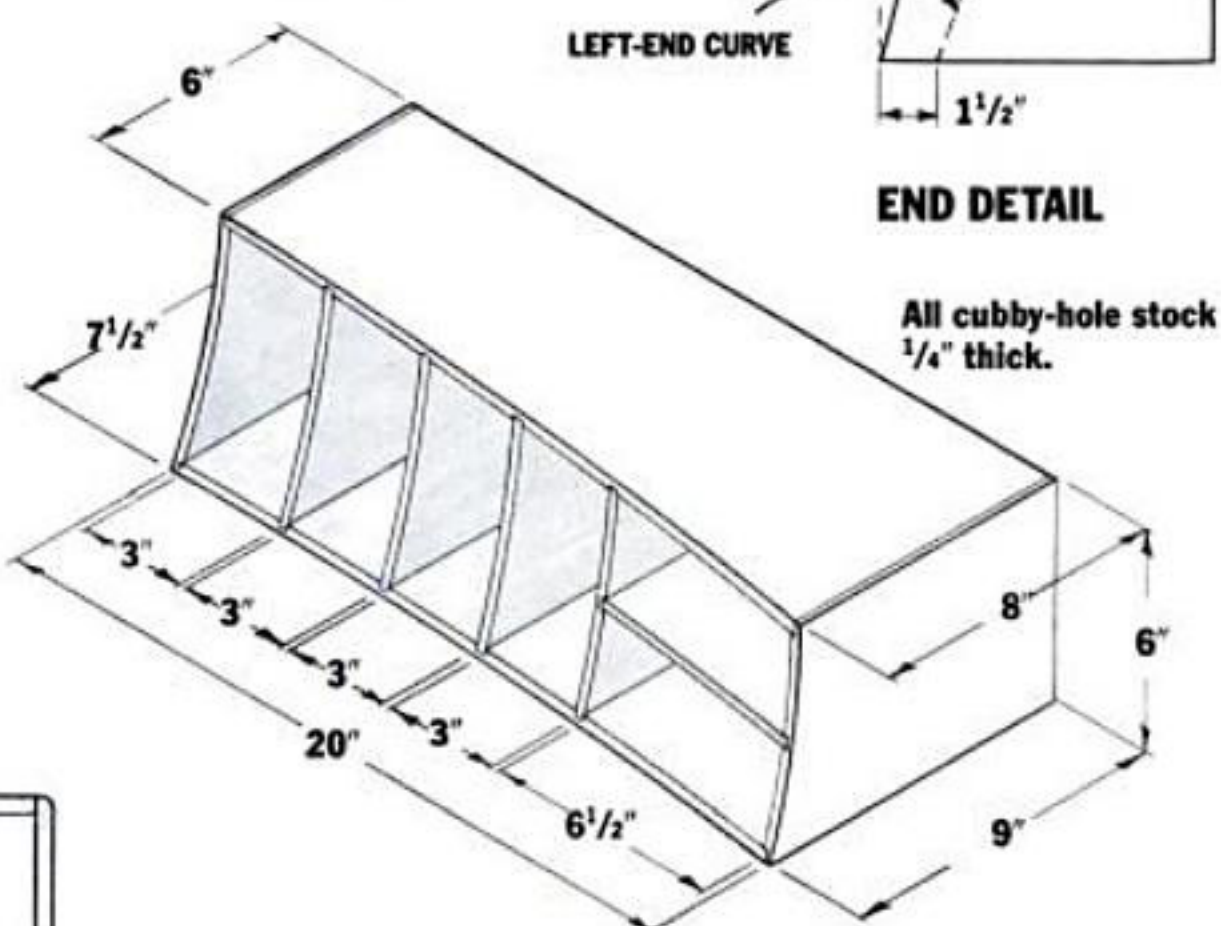
## Building the Carcase

The desktop is 3/4-in. solid wood. Saber saw the top to shape, and belt sand the curve smooth. You've probably noticed by now that I belt sand quite a bit. I think of the belt sander as a sculpting tool, ideal for shaping. A lot of people are uncomfortable with this approach. If you're one of them, consider trimming the top with a flush-trim router bit running against a pattern. After you've shaped the edge, round it to a





## CUBBY-HOLE DETAIL



## BACK VIEW

bull nose with a  $\frac{3}{8}$ -in. round-over bit.

When possible, I sand and oil individual pieces or subassemblies as I complete them. It slows moisture changes and lets me preview the color and figure of the wood. I sanded and oiled the top and console at this point. When the finish is dry, attach the console to the desktop with 2-in. #8 drywall screws. Run two screws from underneath the top into each console side.

The desktop and console are supported by three frame-and-panel assemblies. Two of them form the sides of the printer cabinet; the third supports the left end of the desk. The frame-and-panels are mortised and tenoned together. I didn't actually cut a mortise—I just cut the groove for the panel a little long and housed the tenon in the groove. Because this makes for a shallow mortise, I reinforced the joint with a 3-in. drywall screw which I ran through the edge of the stile as shown in the frame detail. I counterbored for the screws and plugged the holes with matching wood. The holes are barely noticeable.

Note that both the inside and the outside of the frame are rounded over as shown in the frame detail. Round over the inside edges before glue-up and the

outside edges after glue-up. When gluing, glue only the mortise and tenons. Don't glue the panels in their grooves or they're likely to crack. The panels must be free to expand and contract with changes in humidity. Once you've finished the frame-and-panel assemblies, build the printer cabinet.

Simply put, the printer cabinet is a box that houses the printer drawer. The sides are two of the frame-and-panel assemblies. The back is a panel that fits into a groove in the side panel as shown in the back view of Fig. 1. Most of the front is open to accommodate the large printer drawer, but a curved rail across the top stabilizes the opening. I make both the rail and the pencil-drawer front from the same strip lamination so that the grain flows from one into another. If you don't want to laminate, you can bandsaw the curved rail. Cut a slot in the rail for the writing pull-out. The printer cabinet bottom is simply  $\frac{1}{2}$ -in. plywood screwed to glueblocks as shown.

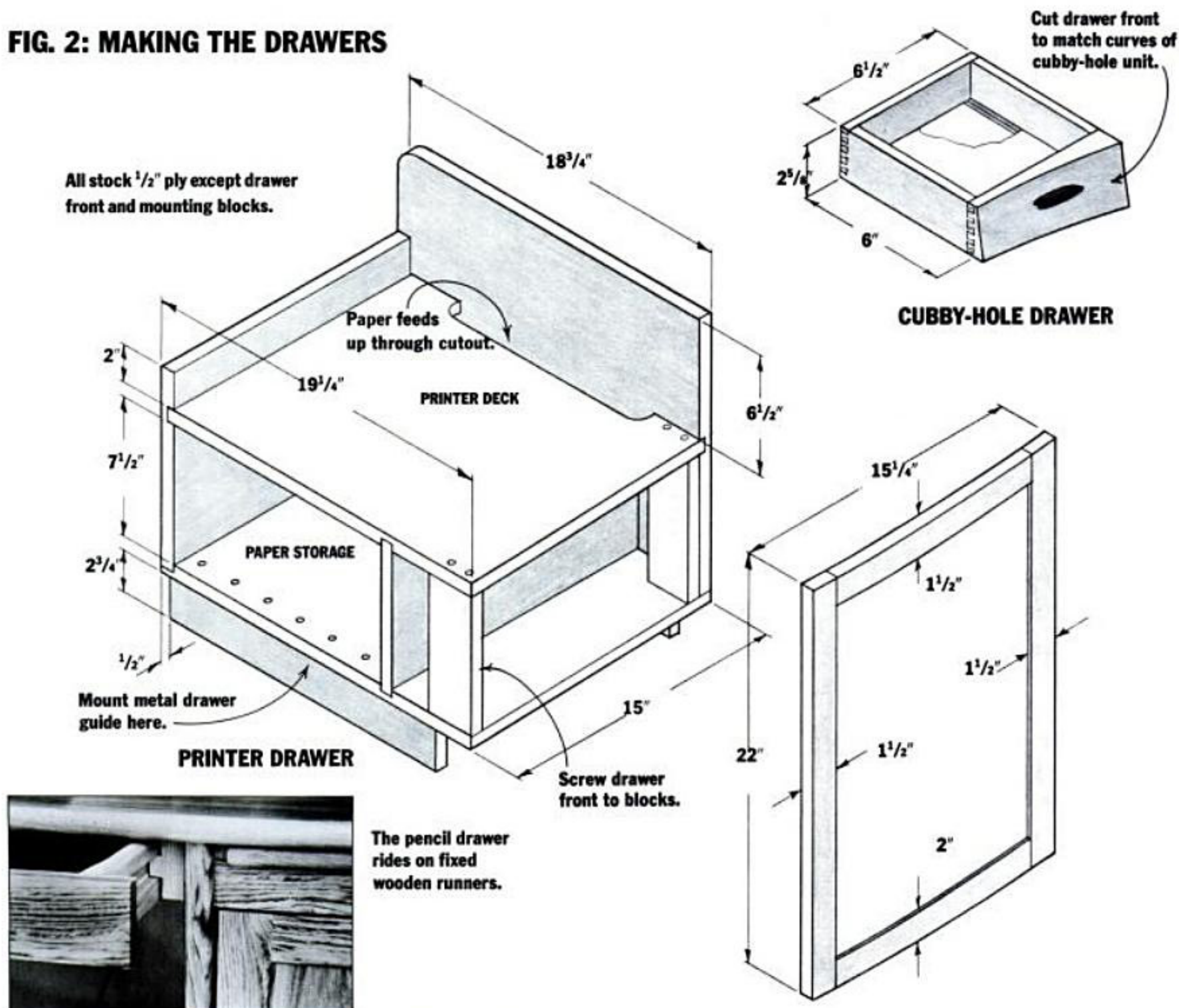
For stability, a 2-in. wide rail runs across the back of the desk between the printer cabinet and the desk's left side as shown in the back detail.

The curved stretcher that runs across the bottom of the kneehole is made of two  $\frac{3}{4} \times \frac{3}{4}$ -in. bent-laminated arches connected back-to-back. Round over the edges with a  $\frac{1}{4}$ -in. round-over bit. Sand a flat spot on top of each arch, and glue and screw the two arches together with a single screw. Trim the stretchers to length after you've screwed them together. The assembled stretcher is simply screwed to the desk. Counterbore and plug the holes. When you screw the stretcher in place, pay attention to the screw that holds the two arches together: Mount it so the screw faces the floor.

Except for the pencil drawer and the printer drawer, the understructure is complete, and you can now attach it to the desktop. Attach the back of the printer cabinet to the desktop with a glueblock as shown in Fig. 1. The L-shape runners for the writing pullout also act as supports for the desktop. Glue the runners to the top rails of the side frames. When the glue dries, screw the runners to the desktop through oversized holes that allow for expansion and contraction of the



**FIG. 2: MAKING THE DRAWERS**



Bandsaw the cubby-hole drawer front from thicker material.



top. Screw the pencil-drawer runners to the top as well.

Once the top is mounted, the project is beginning to look like a desk. Completing it is a matter of building the pencil drawer, the printer drawer, and the pullout writing surface.

**The printer drawer** holds the printer and paper. The paper comes up through a slot. I made mine out of  $\frac{1}{2}$ -in. cabinet-grade plywood, glued and screwed together as shown in Fig. 2.

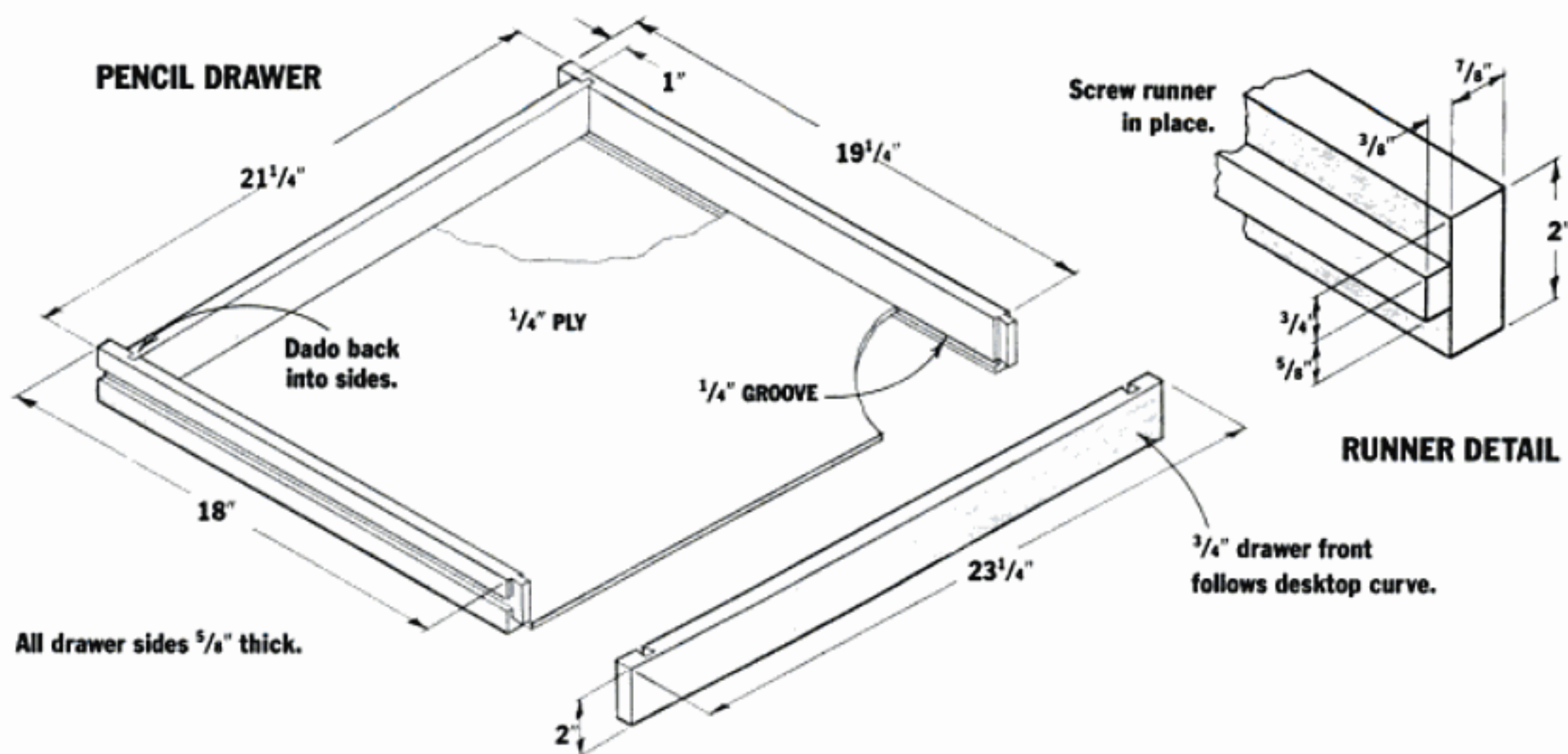
The front of the printer drawer is a frame-and-panel that follows the curve of the desktop. The top and bottom rails are curved. The curve is gentle enough that I could flex a flat panel into a curved groove in the top

and bottom rails of the drawer front.

Bent laminations would make an excellent frame, but because joinery on curved pieces is tricky, I've once again chosen the easy way out. I milled up a flat door with  $\frac{8}{4}$  rails, then bandsawed the rails to shape. First, mill up a frame, with  $\frac{8}{4}$  rails centered on  $\frac{4}{4}$  stiles as shown in the printer-drawer detail. Be sure to bevel the edge of the left stile so that it will fit against the cabinet side without leaving a gap. Do not cut the groove for the panel yet. To lay out the curve on the rails, put the frame in its place on the desk. Trace the curve of the desktop onto the top rail. Disassemble the frame; bandsaw the curve, and transfer the same curve to the bottom rail. Cut a line parallel to the curve to form the back of each rail. Reassemble the drawer; belt sand the rails smooth and continue the curve into the stiles.

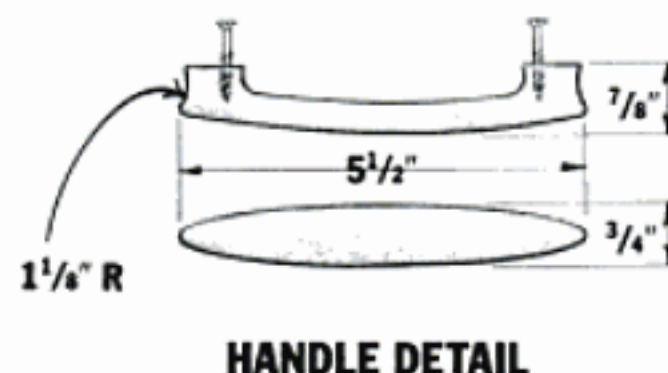
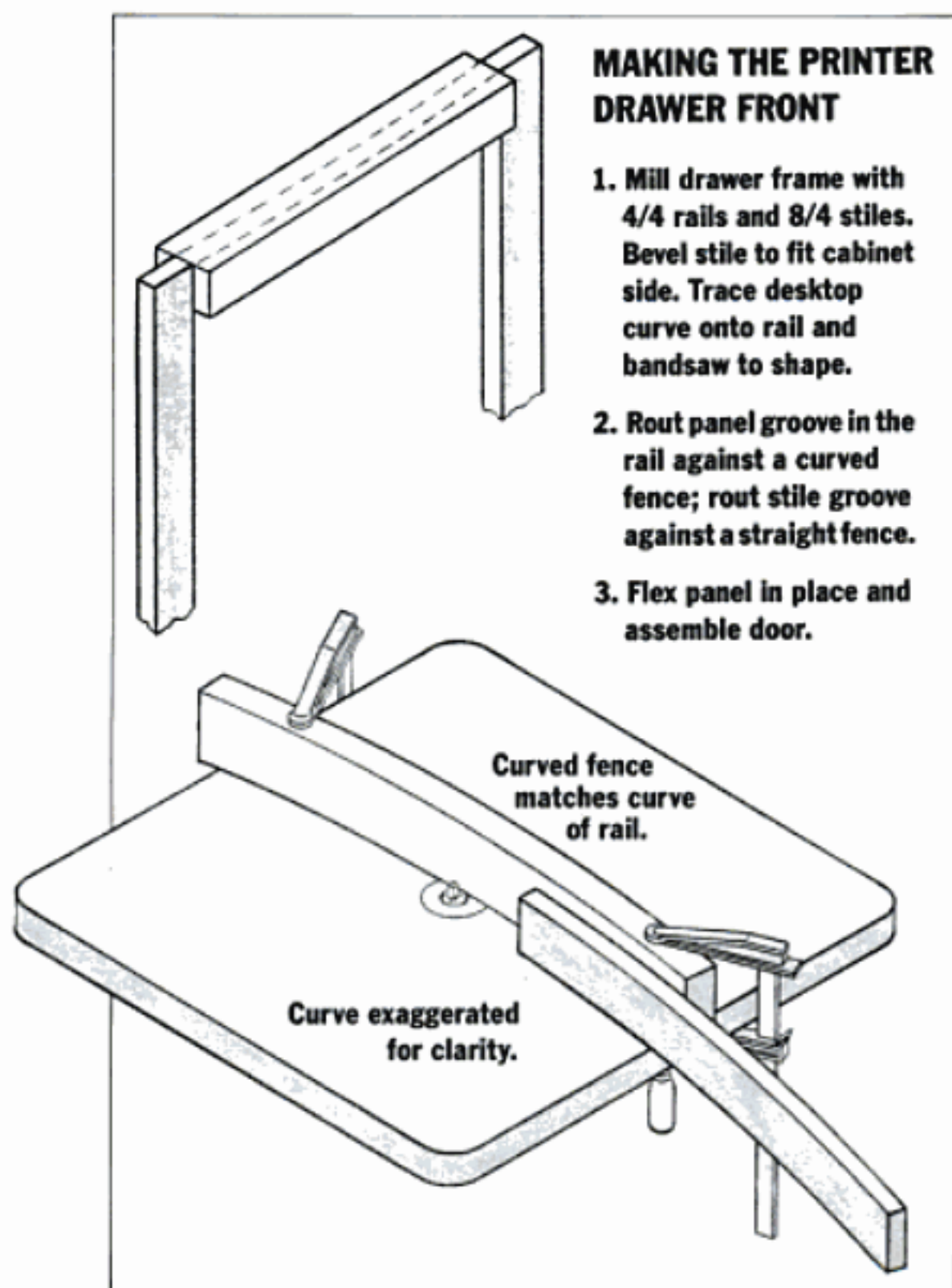
Once the frame is shaped, you can rout the grooves for the panel. I do this with a straight bit on a router table, routing the stiles against a flat fence. I rout the curved rails against a matching curved fence that I made myself as shown in Fig. 2. Flex the panel into the groove to assemble the drawer front. Screw the drawer front to the printer drawer with glueblocks as shown in the printer-drawer detail.





### MAKING THE PRINTER DRAWER FRONT

1. Mill drawer frame with 4/4 rails and 8/4 stiles. Bevel stile to fit cabinet side. Trace desktop curve onto rail and bandsaw to shape.
2. Rout panel groove in the rail against a curved fence; rout stile groove against a straight fence.
3. Flex panel in place and assemble door.



DRAWINGS BY FRANK ROEBACH

tails, assemble the drawer back and sides. Put the dovetailed drawer front in position over the drawer sides. Slide an awl into the dovetailed grooves, and trace its outline on the drawer sides. Cut the dovetails with a sharp backsaw.

This is a side-hung drawer: Grooves in the drawer sides mate with tongues in the runners. Rout the groove for the runner before you assemble the drawer. Glue and screw a runner to the glueblocks holding the top to the frame-and-panels as shown.

The pullout writing surface is simply a piece of wood with a 3 in. breadboard front. Attach the breadboard with a sliding dovetail, and bandsaw and sand it to match the curve of the top.

I made the drawer pulls from ebony to create a stark visual contrast with the locust. I made them individually from blocks 5/8- x 1- x 6-in. long. I routed the curves on the bandsaw, shaped them on the sander and hand sanded them. Each handle is mounted with two 1 1/4-in. #6 screws from inside the drawer. Drill a clearance hole in the drawer and a pilot hole in the handle. The handle is guaranteed to break if you don't drill a pilot hole.

If you've been following my practice of oiling the subassemblies as you build them, there is very little finishing left to do. Get an initial coat of oil on all finished surfaces. When dry, rub the surfaces with 0000 steel wool. Apply successive coats, rubbing between each, until you have the gloss you desire. I prefer Minwax Antique Oil Finish because it dries quickly and builds up with only a few coats. ▲

**Build the pencil drawer next.** The drawer back is dadoed into the sides. The drawer front follows the curve of the top. As a result, the drawer sides are different lengths and meet the curved drawer front at an angle. This makes life interesting.

I decided to fasten the sides to the drawer front with sliding dovetails. I routed the dovetailed grooves into the drawer front with a router table and fence. I cut the matching dovetails by hand. To lay out the dove-

*William Storch makes furniture in Corvallis, Oregon. His bentwood music stand appeared in the September/October, 1988 issue of AMERICAN WOODWORKER.*





# SURFACING WITH A SCRAPER

*Kick the 80-Grit Habit*

BY SIMON WATTS

I'll never forget that church basement where we held our meetings. Sanders Anonymous—a small group, mostly men, telling it like it was. "I was a slave to the stuff," one said. "Seven, eight sheets a day. . . . It was ruining me." Another joined in, "I couldn't walk by the hardware store. I was down to 60-grit and ready for 40. My life just revolved around the orbital, and I was spoiling every piece of wood I touched. . . ."

Most woodworkers regard sanding as unavoidable—like death and taxes. So it may sound a bit uppity to question the use of abrasives in woodworking or to suggest some alternatives. "Waitamminute," I hear someone say. "What's so bad about sandpaper?"

Nothing. Modern sandpaper is a tremendous improvement over the flint and glass papers of 50 years ago. Stuck on with hide glue, the abrasives of old tended to fall off in damp weather, which was most of the time in England where I grew up.

However, sanding wood with the widely used orbital sander is inherently inefficient. The circular scratch marks left by one grit must be removed by a finer grit. These in turn, must be removed by a still finer grit, and another and so on. This all takes time, as well as being excessively boring. In fact, a recent sander ad claims 35 to 65 percent of total project time is spent sanding.

Furthermore, the dust thrown up by sanding is a serious health hazard and is difficult to completely collect. The dust from some woods is toxic, other dusts merely irritate, but none does a body any good.

When you figure in the initial price of the sander, add the cost of dust masks and sandpaper, you'll realize that sanding is expensive and mostly unnecessary.

Look at an old piece of furniture, and you can still

see the tool marks that tell how it was made. Scrub planes, spokeshaves and bow saws all left individual signatures that added textural richness to the piece. Sand these away, and much of the character is lost.

I think we've gone overboard in our attempts to eliminate all tool marks—even when they don't show. So next time you reach for the sander, stop and think for a minute. Consider taking the direct route and skipping the sandpaper detour altogether. It can save you time as well as aggravation.

## *Alternatives to Sandpaper*

Instead of sanding, I prefer to smooth wood with either a scraper, a block plane or a spokeshave. Long before the advent of modern abrasives, cabinetmakers were preparing wood with such tools. You can still buy old-time, heavy-duty planes for finishing. Most of them are costly, and while some woodworkers swear by them, I find them finicky. The scraper, spokeshave and the block plane, on the other hand, are inexpensive, simple, and do an excellent job.

The spokeshave is useful when working on small, flat areas or curved surfaces (see September/October, 1988 AW). It's especially good for removing a deep gouge, a stain or a patch of glue. The spokeshave works best if you skew it to the line of travel so it slices through the fibers like a bread knife through bread. If it chatters and leaves parallel ridges, try reversing the direction of cut or skew the tool the other way.

A block plane will give you a flatter surface than a spokeshave because the area of the sole is larger. I'll spare you the joke about a psychiatrist and the well-adjusted block plane, but I do recommend a block plane with an adjustable throat. The size of the opening is crucial: The narrower the better—as long as it



Scrapers produce a surface that requires little or no sanding. Hand scrapers and cabinet scrapers are good for flat surfaces. Glass scrapers work well on curves.



doesn't choke on its own shavings (see November/December, 1988 AW). When planing, maintain even pressure on the plane, and frequently touch up the blade with an oilstone. A dab of candle wax on the sole greatly reduces friction.

A clean, hand-planed surface is pleasing to the eye. Sanding will not improve it. You can apply finish directly—oil, wax, varnish, or whatever. If you must sand, use 220-grit paper, and back the paper with a cork block (available from Frog Tool Co., Ltd., 700 W. Jackson Blvd., Chicago, IL 60606). Sand parallel to the grain. Wipe the dust off with a tack cloth or a rag dampened with turpentine before applying the finish.

Hand planing, however, doesn't always make sense. Many people start their projects with kiln-dried lumber that has already been milled to thickness. Some kiln-dried hardwoods, such as maple, are brutally hard and tough to plane. Instead of planing, you are often better off surfacing with a scraper.

## Surfacing With Scrapers

Scrapers may not eliminate *all* sanding, but they will eliminate the need for sandpaper coarser than 180-grit. For flat surfaces, I use either a hand scraper or a cabinet scraper. The hand scraper is a flexible piece of steel sprung into a curve with the thumb and fingers. A cabinet scraper has handles and looks like a large spokeshave. For curved surfaces, I like to use a scraper made from a piece of glass.

Scrapers skim a thin shaving off the surface of the wood, and the resulting surface is quite smooth. Scrapers are especially useful when finishing paper-thin veneers and the tangled grain of burls and crotches. They're also useful for cleaning up glue lines, stains, burns, watermarks and the like.

**The hand scraper** is a flat piece of steel, usually rectangular, although curved profiles are available. It is the most versatile scraper, and works in almost all situations. A small hook or burr on the edge of the scraper removes a thin shaving as you move it across the surface. The sidebar explains how to form this burr.

The quality of steel in a scraper blade is crucial: It has to be hard enough to keep an edge, but ductile enough to allow you to create the burr. Sandvik makes an excellent scraper which costs only a couple of dollars more than others (available from Highland Hardware, 1045 N. Highland Ave. NE, Atlanta, GA 30306).

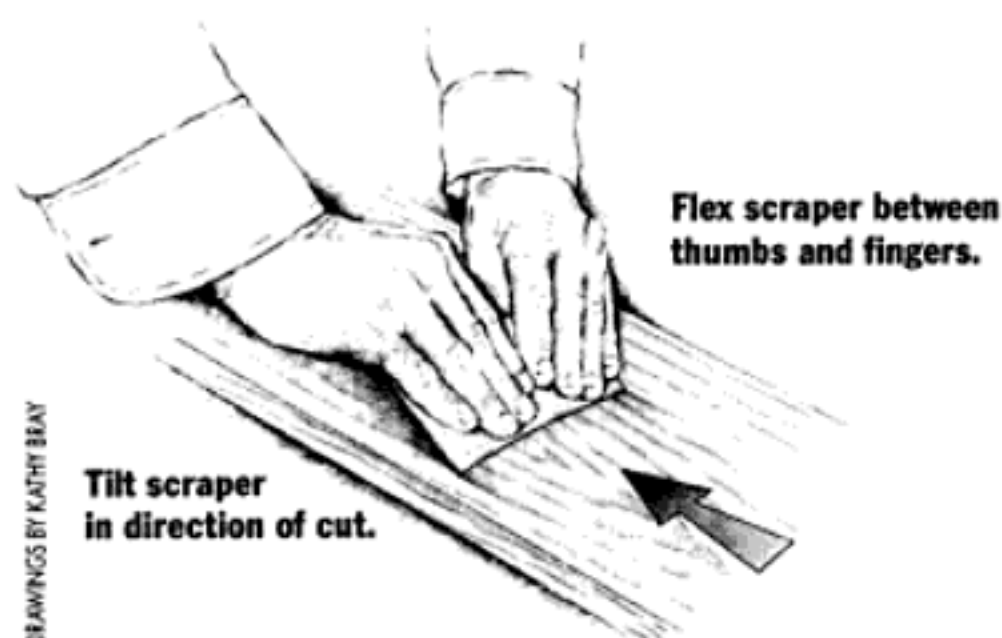
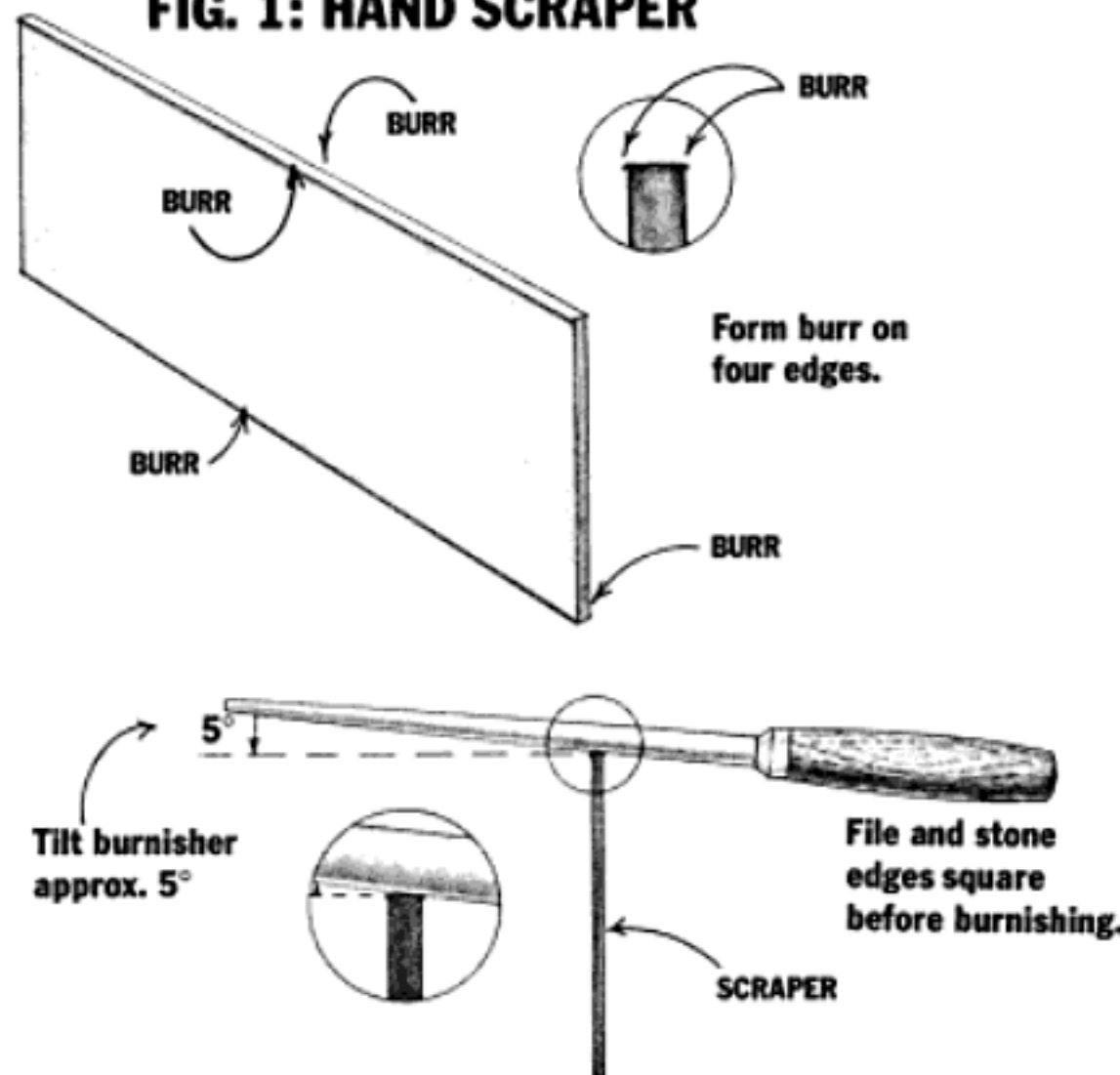
When scraping, spring the sharpened scraper into a slight curve with your thumbs. Because I put a fairly large burr on my scraper, I hold it at about 20° to the wood when I scrape. If the burr on your scraper is smaller (i.e., fewer strokes with the burnisher), it may work better if you hold the scraper a bit more vertically. Experiment to find the best angle. You can either push or pull the scraper as long as you scrape in the direction of the grain. A well-sharpened scraper takes a light cut producing thin, feathery shavings. You'll find the blade gets hot as you scrape. This won't affect the metal, but the heat can be hard on the fingers. Wrap your fingers with tape to protect them.

**The cabinet scraper** has a cast body, which holds the scraper blade at a constant angle to the wood. Because it has a sole, the cabinet scraper works best on large, flat areas such as tabletops. The blade itself is smaller and thicker than that of a hand scraper and is sprung into a curve with the aid of a thumbscrew in the casting. Tightening the screw bows the blade and increases the depth-of-cut. Like the hand scraper, a burr on the edge of the blade does the actual cutting. Unlike the hand scraper, the cabinet scraper has a bevel. Sharpening is explained in the sidebar.

MITCH MANDEL



**FIG. 1: HAND SCRAPER**



Insert the blade so the bevel faces the thumbscrew. Hold it so the thumbscrew faces you, and push the scraper away from you as shown in the drawing. Scrape in the direction of the grain. If it produces dust rather than shavings, double check to make sure the blade isn't in backwards. If it is positioned correctly and still produces dust, it isn't properly sharpened.

**Glass scrapers are useful** for curved surfaces. There is no better tool for finishing a twisted, curved surface such as a handrail or for scraping a spar on a boat. They're quick to make and require no burnishing.

When I need a glass scraper, I just cut one out free-hand with a glass cutter from regular window glass. I try to roughly match the profile of the scraper to the shape of the surface I'm scraping. Small, tight radii are hard to cut, so make scrapers with sweeping curves, and scrape your smaller curves a section at a time.

When cutting glass, be sure to cut the pieces large

15°. Scribe a line with a single, smooth motion, applying moderate, downward pressure. For greater consistency, I cut a hardboard template to guide the cutter.

Once you've scribed the line, hold the glass in your hands, and snap it along the line. If the glass is double thickness, you may want to start the cut by tapping along the waste side of the line with the ball at the end of the glass-cutter handle.

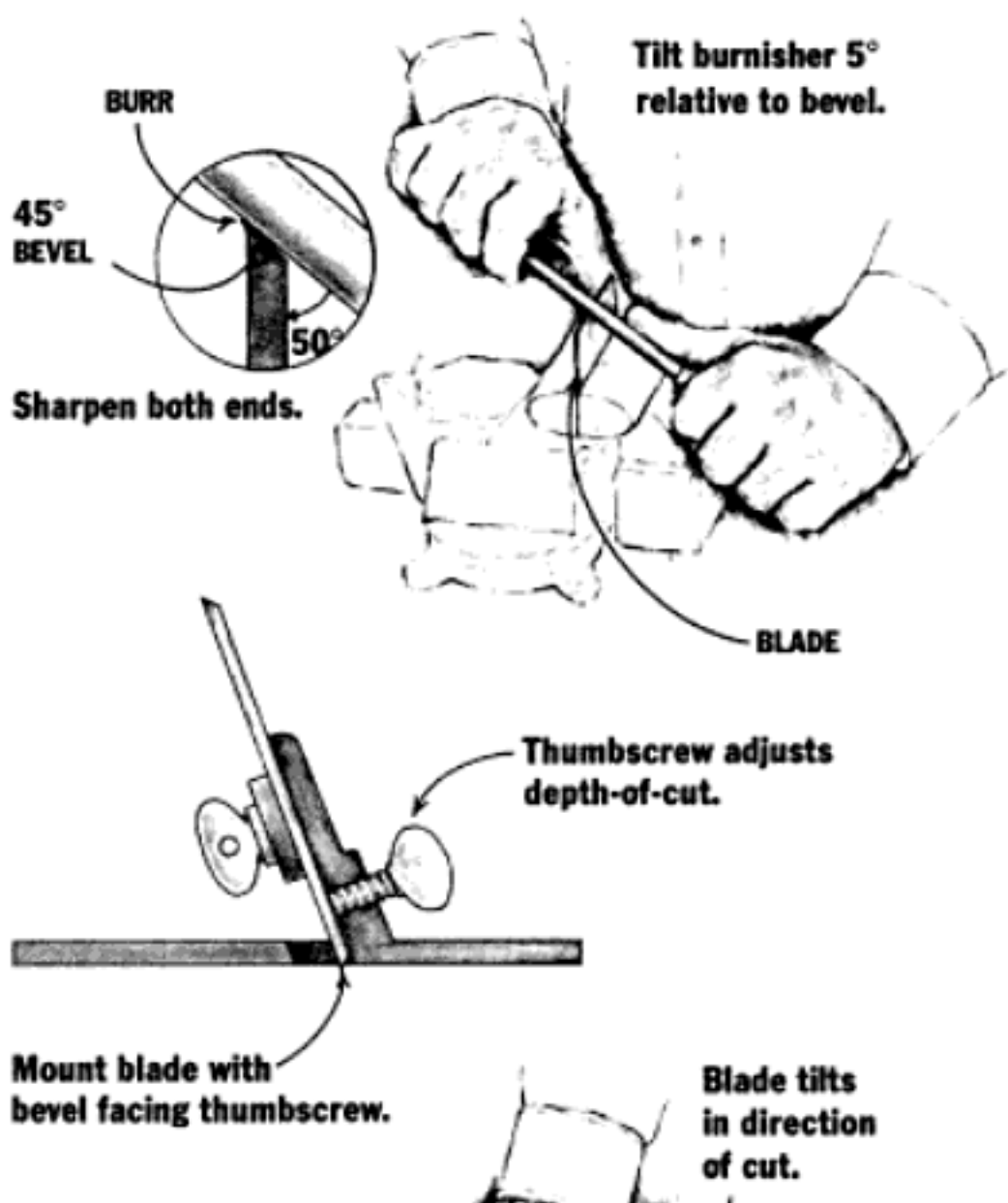
If I need a lot of small-radius scrapers, I break several bottles to get them. Wear safety glasses, and be sure to wrap the bottle in burlap before hitting with a hammer.

To use a glass scraper, hold the scraper at a slight angle to the vertical. Push or pull the scraper in the direction of the grain. When sharp, a glass scraper leaves a clean surface needing little or no sanding. You'll find a glass scraper dulls rapidly, especially on abrasive woods. Since you can't sharpen it, make a new one, or recut the old one to expose a new edge.

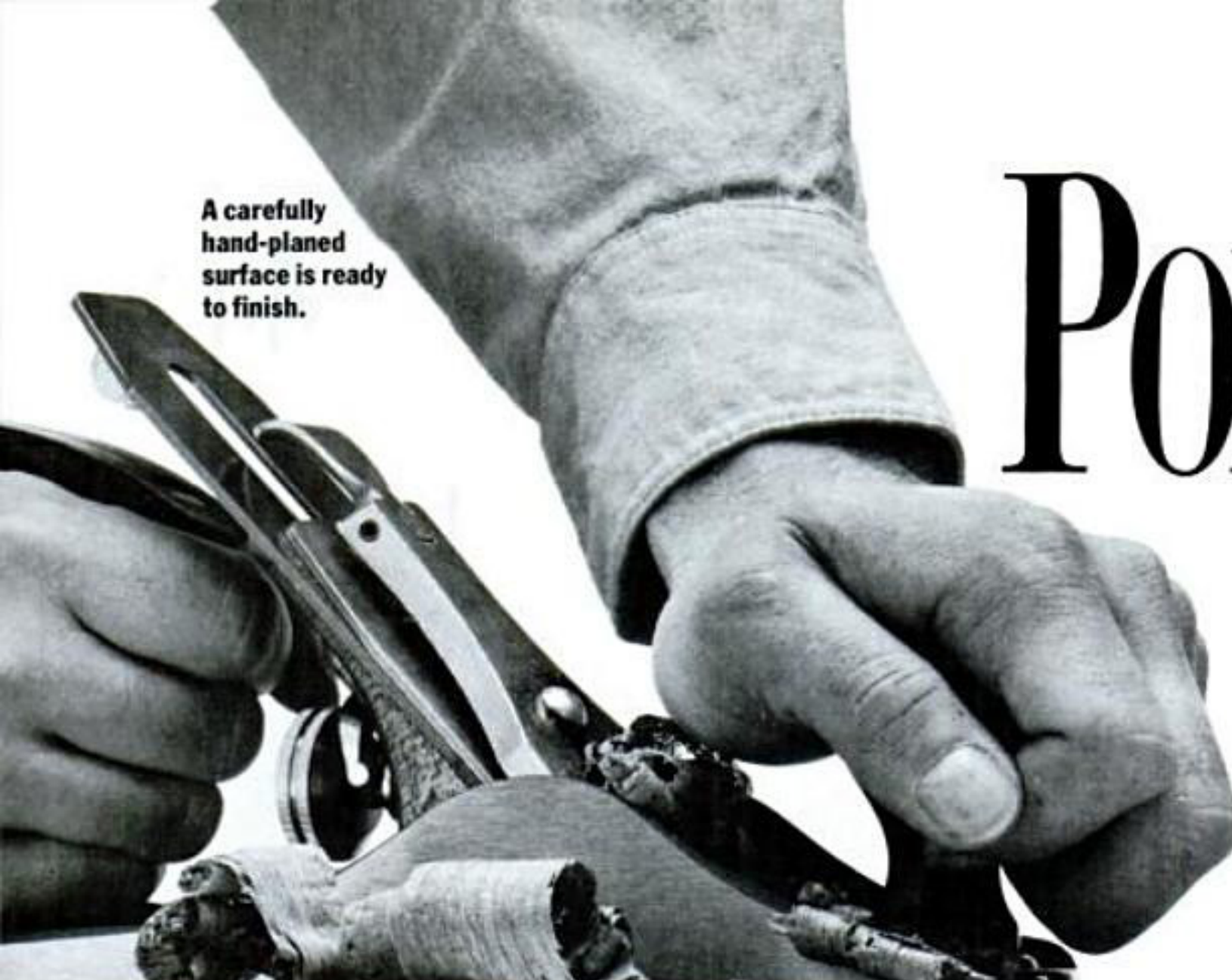
If any scratches remain in the finished surface, give it a light sanding by hand backing the sandpaper with a cork block. Start with 180-grit and move up through the grits to 320 if necessary. Brush the surface frequently to remove sanding dust and loose grit. ▲

*Simon Watts lives in San Francisco and teaches classes in wooden boatbuilding around the country and in Canada.*

**FIG. 2: CABINET SCRAPER**







A carefully  
hand-planed  
surface is ready  
to finish.

# POLISHING WITH A PLANE

*Get a Finished Surface  
Straight From the Tool*

BY DAVID WELTER

To start at the *end* of the story, a hand-planed board looks different. It feels different. Where a sanded board is smooth, a hand-planed board is crisp. The surface shines. As you run your hand across a hand-planed board, you get a tactile sense of the tool; it leaves almost imperceptible ridges along a clean, hard surface. Most people, once they've seen the difference, prefer the look of a hand-planed board to a sanded one. This is why we teach our students at the College of the Redwoods in California to plane rather than sand wood to a final smoothness.

Despite everyone's first encounter with a plane, planing is easier than you think. If there is any secret to hand planing, it is this: Take extremely light cuts in the direction of the grain with a *sharp* blade. Plan on taking shavings so light that it will take several passes over an area to complete the job.

Actually, much of what makes for good hand planing happens before you put the plane to the wood. To begin with, not all woods are planable. Alder, ash, butternut, cedar, chestnut, gum, maple, white oak, clear pine, poplar, walnut and willow all plane well. Cherry and beech also plane well but usually require sanding with 220 through 320-grit for a smooth finish. Tropical woods that plane well are as scarce as the woods themselves. Rosewoods and Honduran mahogany are planable, as is teak, but teak is hard on tool edges. In general, avoid knotty lumber and stay away from highly figured wood at first.

No matter which wood you choose, it is more efficient to cut and mill it with machinery than it is to hand plane stock to thickness. So, unlike days of old, when woodworkers dimensioned stock with planes,

the wood we are planing is already flat, square and true. Think of modern hand planing as polishing. It removes the machine marks, reveals the beauty of the wood and leaves a surface ready for finishing.

Your plane must be well-tuned, whether it's a wooden one you make yourself (see January/February, 1989 AW) or a metal-bodied plane from the local hardware store. Whichever type you decide upon, the sole must be truly flat (see November/December, 1988 AW).

If you have selected a good metal-bodied plane, it will have an adjustable frog to set the throat opening. Set the frog so the throat is just big enough to allow your thickest shaving to pass—about the thickness of a piece of tissue paper, in this case. The chip breaker should fit against the blade with no gaps, permitting shavings to glide over it as shown in the drawing. Set the end of the chip breaker about  $\frac{1}{32}$  in. from the cutting edge of the blade to give the blade maximum support.

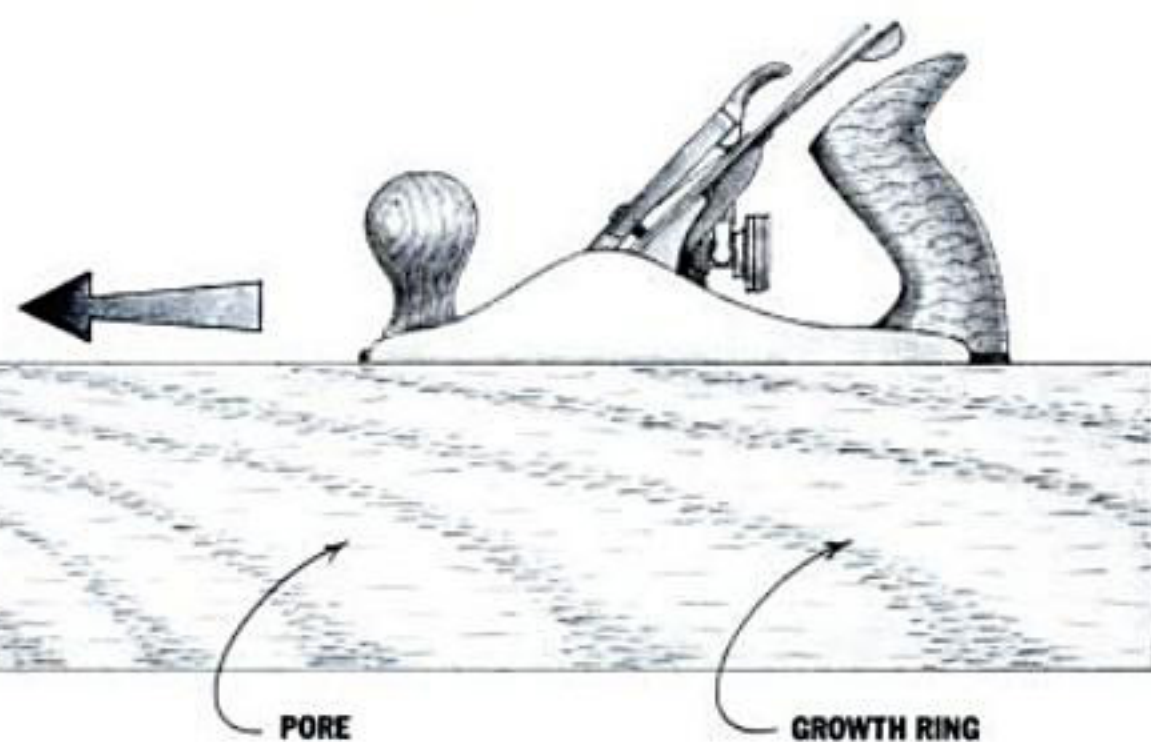
The blade should be *sharp, sharp, sharp*. Many people prefer blades that are thicker and harder than those that come with the plane. These thicker blades stay sharp longer, but don't feel obligated to buy one. Many of my planes still have the standard blade, which works fine.

Whichever blade you choose, round the corners *very slightly*, as shown in the drawing, to keep them from digging in. I round the corners while honing by applying extra finger pressure at one corner. The cutting edge should still be straight.

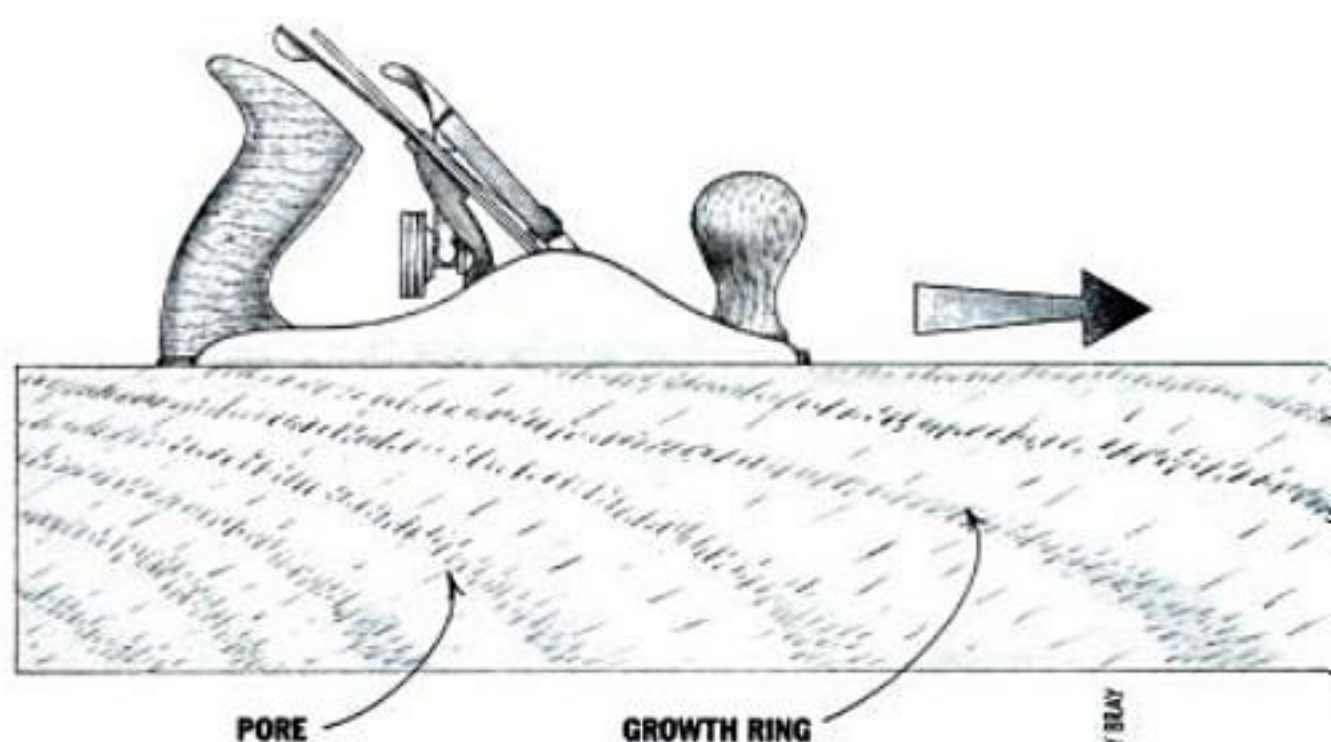
The workbench should be as flat and true as the surface you hope to attain. Hollows in the bench will allow the work to flex away from the plane, making it difficult to plane. The bench top should be roughly at hip level so you can work with your whole body. Bench dogs, if you have them, are the best way to se-



## FIG. 1: PLANING WITH THE GRAIN



1. In most cases, pores and growth rings slope the same way. Plane in the direction of slope.



2. In some cases, pores and growth rings slope in different directions. Plane with slope of pores.

DRAWINGS BY KATHY BEAT

cure a piece of wood. If you don't have bench dogs, tack a 1/4-in. wood strip to one end of the bench. Snug the board against the strip, and plane in the direction of the strip.

Before you secure the board, take a look at it to see which way the wood fibers lie. Planing in a sense is like petting a cat; rub the fur in one direction, and it will lie flat. Rub it in the other direction, and it roughs the fur up. To make sure I'm planing in the direction of the fibers, I look closely at the grain on the edge of the board. Experience has taught me that the large growth rings are sometimes misleading, so I look carefully at the individual pores. As you look at the edge of the board, you'll see that in milling the wood, you sliced through some of the pores as shown in Fig. 2. The pores will be elongated, and they won't necessarily be parallel to the face of the board. Notice their slope, and plane from the slope's low end to its high end.

When planing a finished surface, I generally reach for a plane 9 or 10 in. long. If you're using a metal-bodied plane, this translates to what most manufacturers call a #4 smoothing plane. Make sure the plane is sharp, and set it to take thin, translucent shavings. When the setting is correct, it should take about three passes to completely remove planer marks; the shaving should be paper thin.

After you've set the blade height, sight along the bottom of the plane. Does one corner of the blade extend further than the other? If so, adjust it with the lever on a metal-bodied plane, or tap the side of the blade on a wooden plane until the cutting edge is exactly parallel to the sole. Sometimes I gently feel the cutting edge to make doubly sure of the alignment—the hand can actually feel differences of .002 in.

At last, you can start planing. With the board se-

cured, plane in the direction of the grain with deliberate, continuous strokes. Make a single pass along the entire length of the board, lift the plane off the wood, and bring it back to the end of the board nearest you. Plane the strip of wood next to the first strip, overlapping the first pass by a fraction of an inch. Continue, strip by strip, until you have planed the entire surface.

My strategy for long boards is a little different. On a long board, I start at one end, and make one pass along the board as far as I can comfortably reach without stepping forward. Then I plane a strip to the side of the first strip, again planing only as far as I can reach. When I've planed the entire width of the section I can reach, I step forward and begin on the next section of the board. I continue this until I've planed the entire surface.

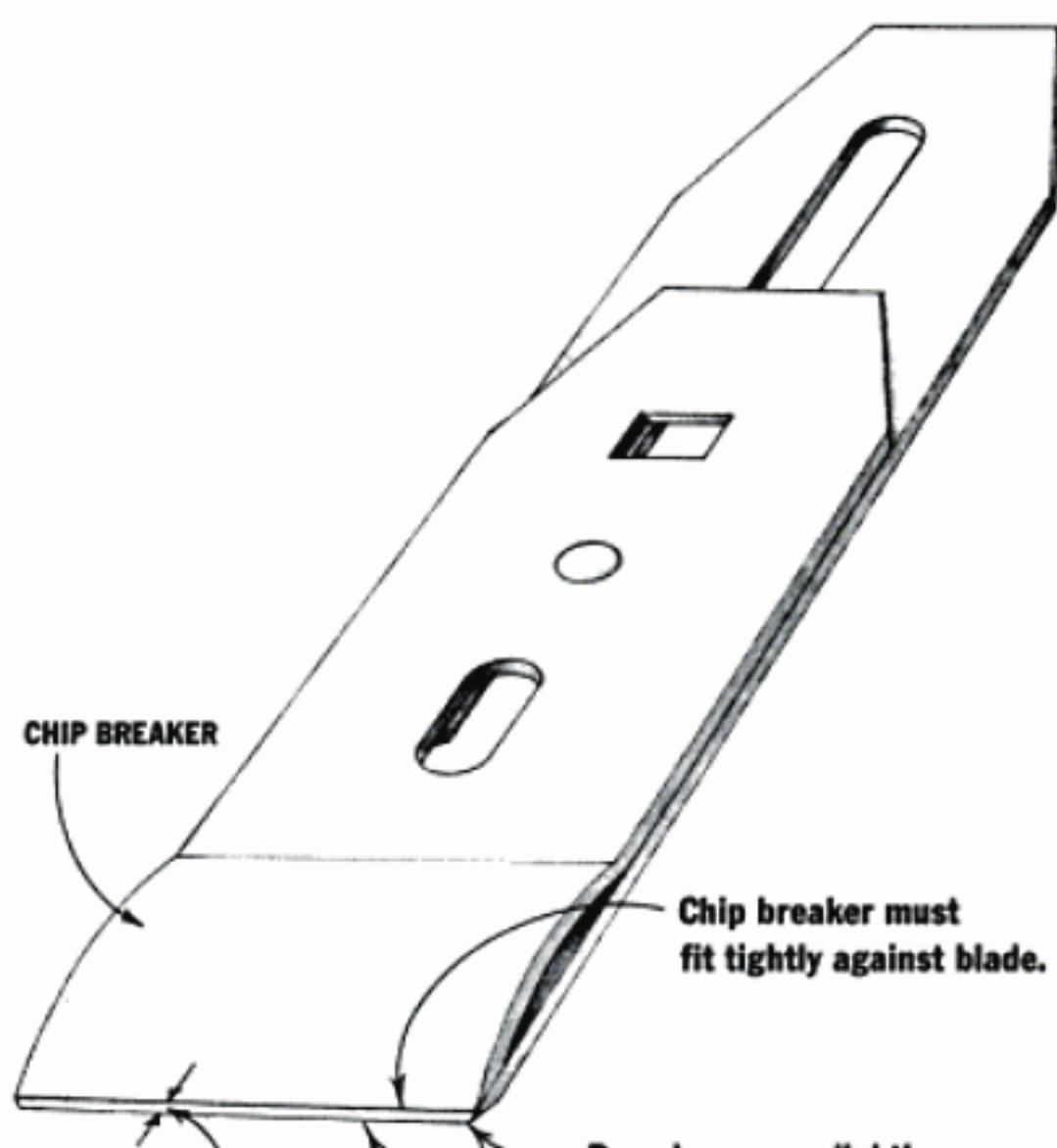
Whether the board is long or short, pay particular attention to the plane at the beginning and end of the board. Because the back of the plane is unsupported at the beginning of the board, the rear of the plane tends to drop down. At the end of the board, the toe is unsupported, and it tends to drop down. This action rounds over each end of the board a little more each time, resulting in a board that is thicker in the middle. To avoid this, concentrate your weight on the front of the plane when you start the cut. When the entire plane is on the work surface, distribute the pressure evenly. When the stroke is finishing at the far end of the board, shift your weight to the back of the plane.

Since most of the wood I plane has already been machine planed, I can gauge my progress by the chatter marks left by the planer. The first pass of the plane flattens the ridges of the chatter marks. They start looking shiny in comparison to the rest of the wood. A second pass widens the ridges, and if my iron is set

MITCH MANDEL



**FIG. 2: A WELL-TUNED BLADE**



continue working when one iron gets dull.

Your hand may be able to feel slight parallel lines along the path the plane cuts. If they are not the result of the iron digging in, they are acceptable and the mark of a hand-planed surface. If there is a *sharp* step between two adjoining strips, however, the iron is digging in and should be adjusted. Sight along the bottom of the plane to make sure the iron is evenly exposed. If it isn't, correct it as before. If the blade is evenly exposed, and you're still getting ridges, the fault lies in the way you handle the plane. You are inadvertently pushing one side of the plane deeper into the wood. Keep your weight centered.

Watch the board as you work. Areas that need more work will look dull. For best results, get down close to the board, and look across it under a nearby light source. Fluorescent light doesn't reveal as much as natural or incandescent light.

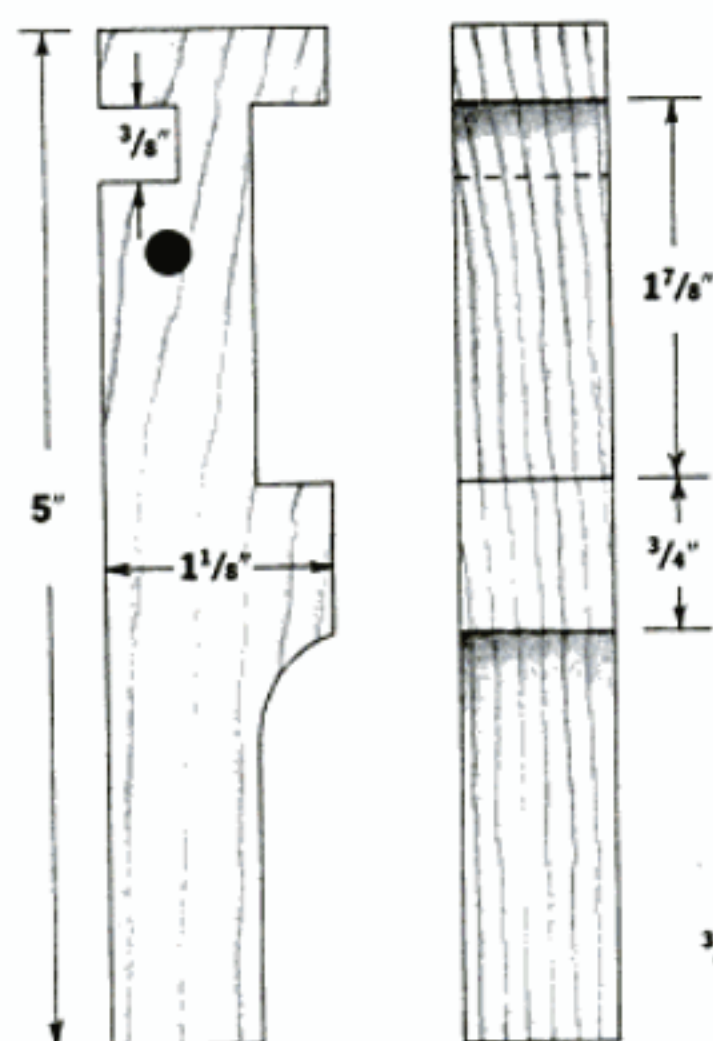
When you're done planing, the entire surface should look shiny. I prefer to finish such a surface without sanding. If you can see dull spots from little grain swirls along the whole board, however, you may have to sand to create a consistent surface. This is a step backwards—sanding tears the grain you so carefully planed clean—but sometimes you have to do it. The coarsest paper we have in the shop is 220-grit. If you have to sand, start with 220 and go through the grits step-by-step to 320 or 400 to remove imperfections. ▲



**FIG. 1: ELEPHANT PUZZLE PARTS**



**LEGS (CUT 4)**

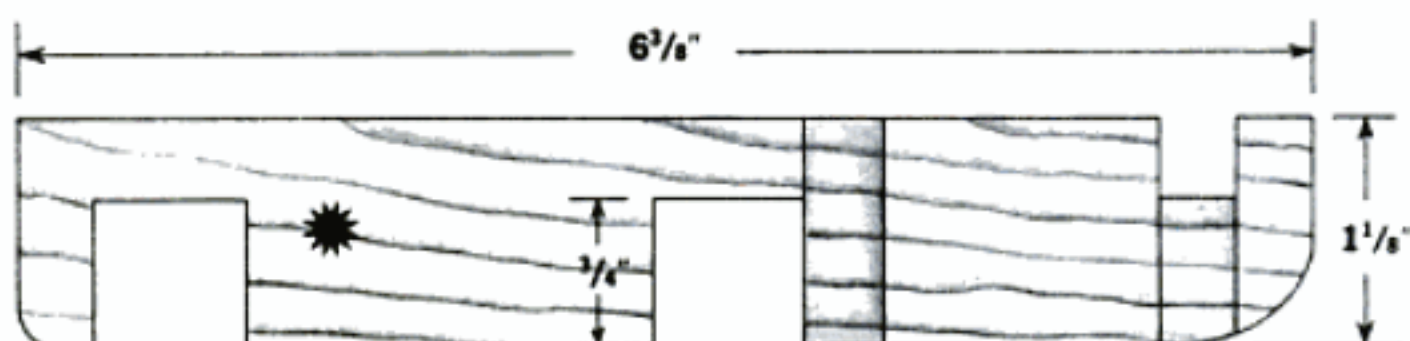
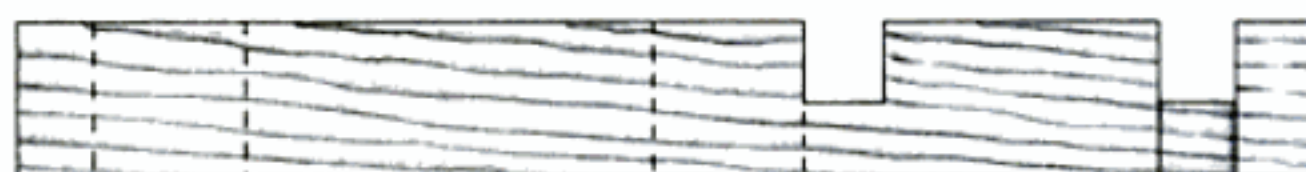


☼ = TOP VIEW

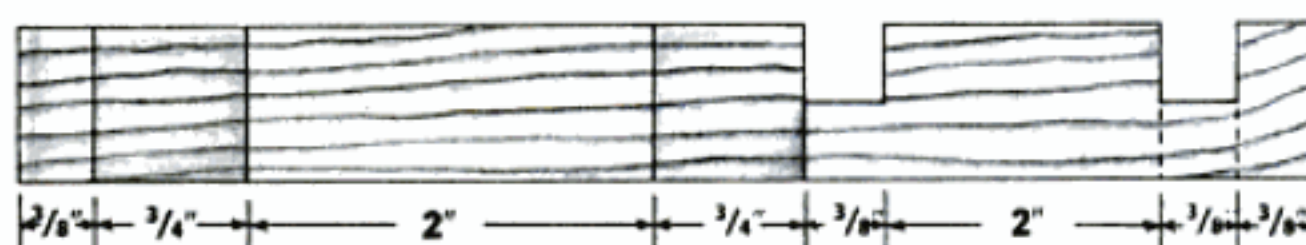
**MIDDLE**



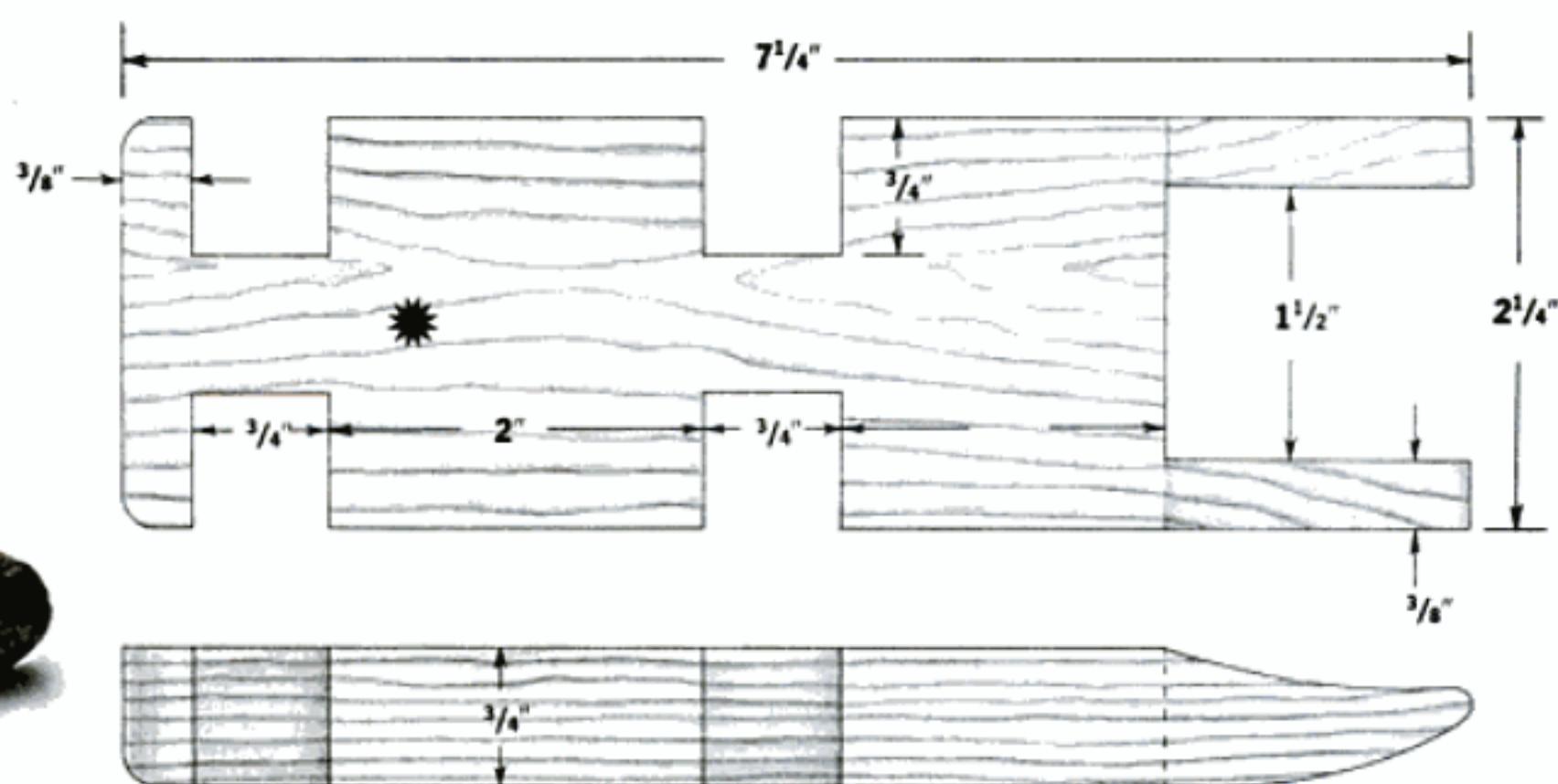
**LEFT MIDDLE PIECE**



**RIGHT MIDDLE PIECE**



**BELLY**



DADOES ARE EITHER 3/4" OR 3/8" DEEP



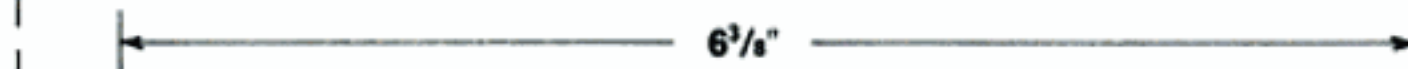
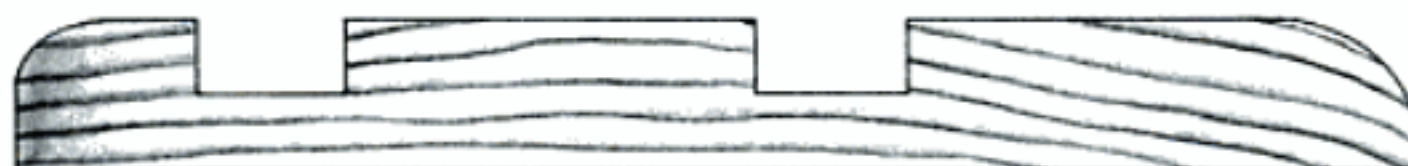
## BACK



LEFT BACK PIECE



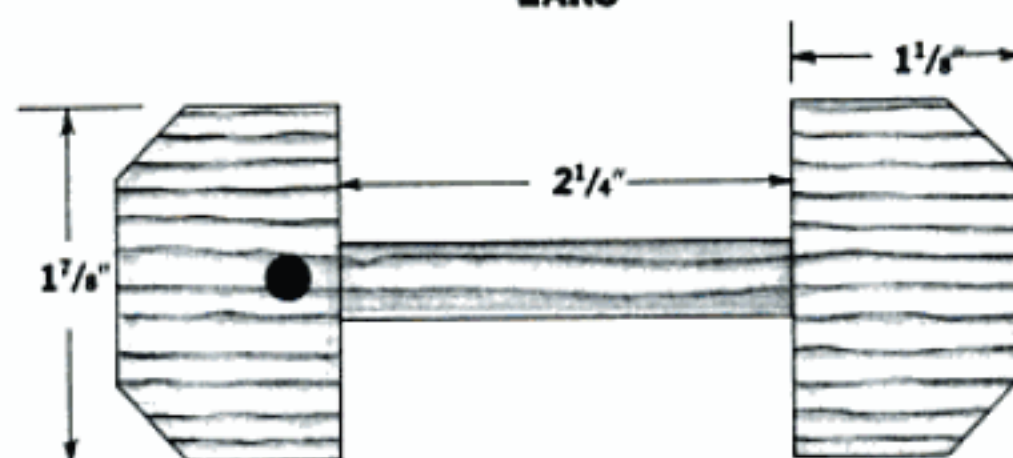
CENTER BACK PIECE



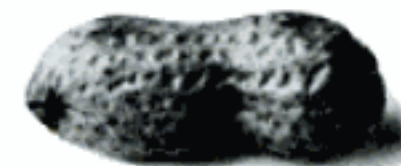
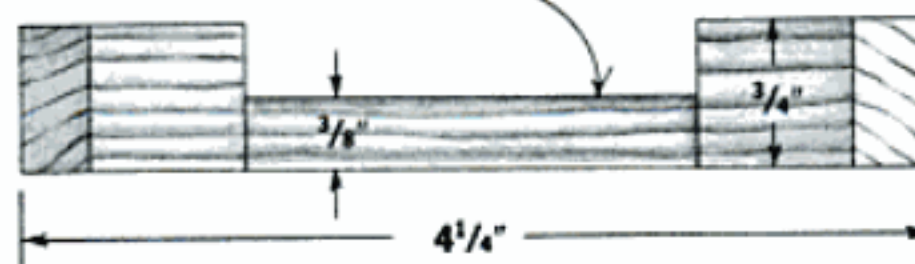
RIGHT BACK PIECE



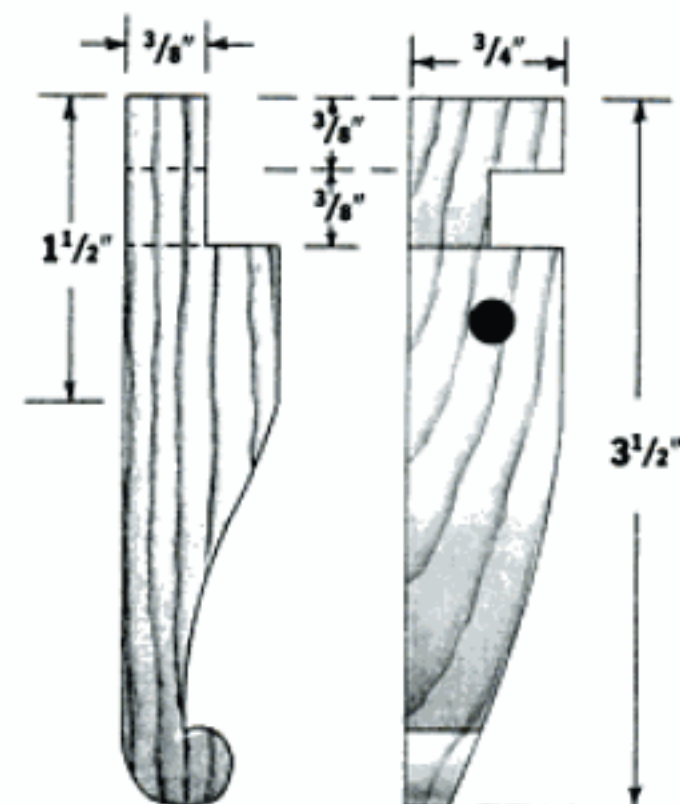
## EARS



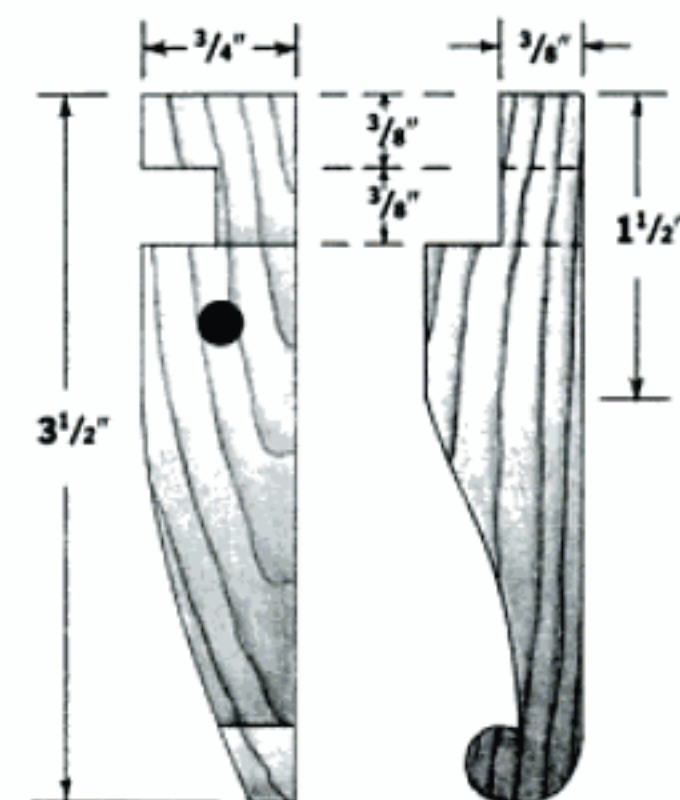
Round off corners.



## TRUNK



LEFT PIECE



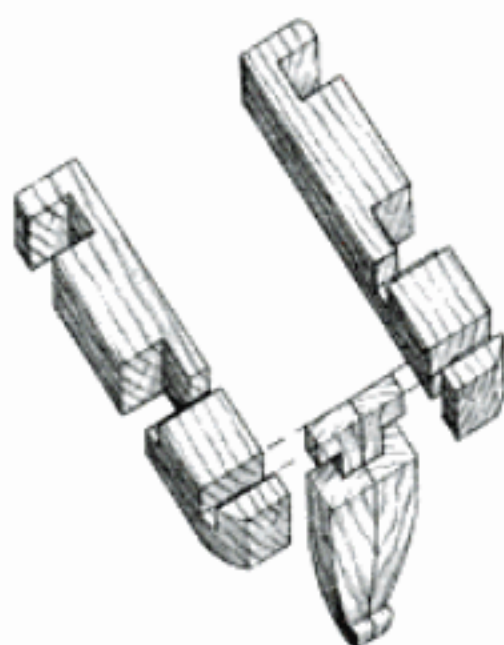
RIGHT PIECE

ALL STOCK IS 3/4" THICK

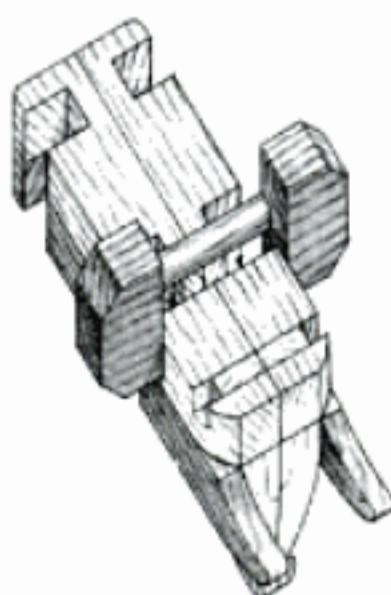
● = FRONT VIEW

DRAWINGS BY FRANK BOHESACH

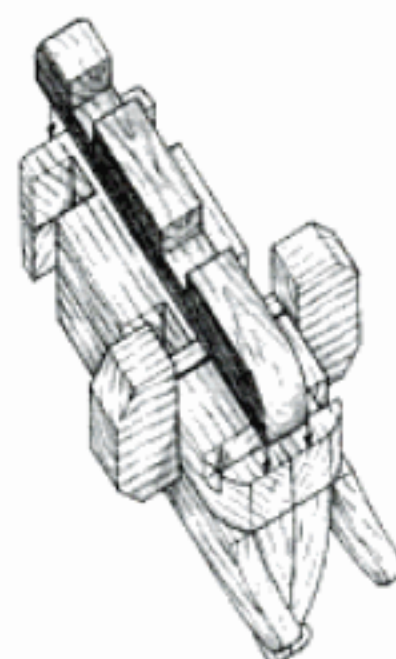


**FIG. 2: THE SOLUTION**

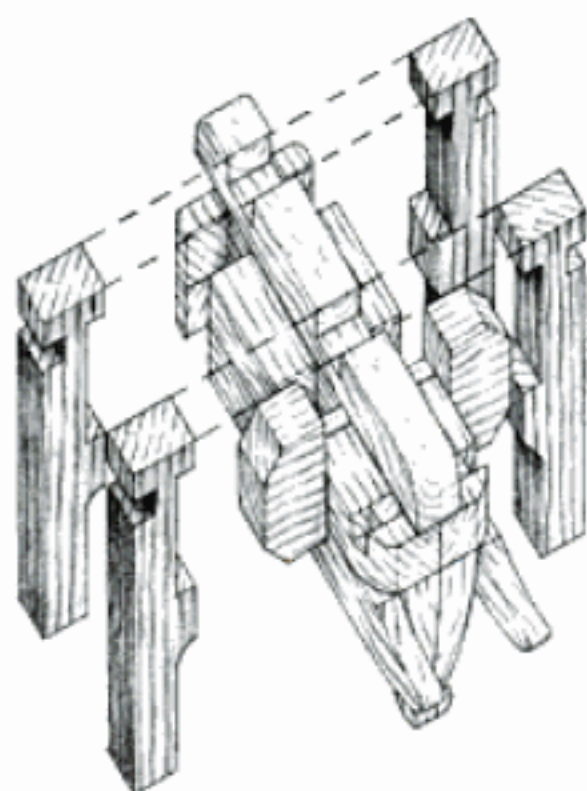
**1. Locate two halves of trunk between middle sections.**



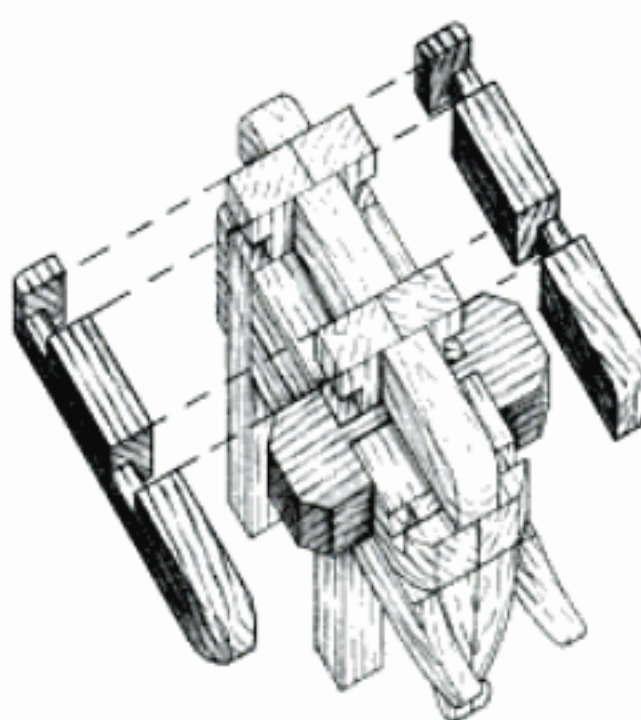
**2. Slide belly on underneath and ears on above.**



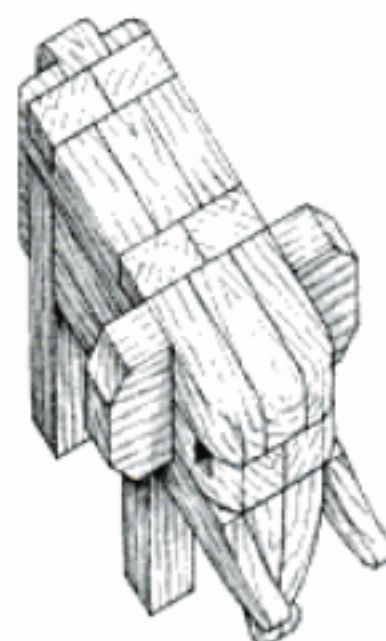
**3. Place center piece of back on top.**



**4. Turn ears vertically and slide legs onto body.**



**5. Turn ears horizontally so their top surface is flush with top of middle section and attach outside pieces of back.**



**6. Turn ears vertically to lock puzzle together.**

DRAWINGS BY KATHY BEAY

For ease of construction, I found it helpful to break down the puzzle into six sets of parts: the belly, the middle, the back, the legs, the ears and the trunk. I cut all the dados out on three consecutive settings:  $\frac{3}{4}$  in. deep  $\times$   $\frac{3}{4}$  in. wide,  $\frac{3}{8}$  in. deep  $\times$   $\frac{3}{4}$  in. wide, and  $\frac{3}{8}$  in. deep  $\times$   $\frac{3}{8}$  in. wide. You'll notice that some of the dados are wider than the  $\frac{3}{4}$ -in. width setting. You'll need to cut these out with multiple passes.

Begin by setting your dado head to cut  $\frac{3}{4}$  in. wide and  $\frac{3}{4}$  in. deep and try the cut on scrap wood. A piece of  $\frac{3}{4}$ -in. stock should slip easily but snugly into the dado. If not, adjust the blade.

Refer to the drawing and cut all the  $\frac{3}{4}$ -in. deep dados. These are on the belly, the middle section, the ears and the trunk. Because the belly is the main piece of the puzzle, I recommend completing it before you move on to the rest of the dados. Cut out the gap between the two tusks on the bandsaw.

Next, set the dado blade so it cuts a dado  $\frac{3}{8}$  in. deep and  $\frac{3}{4}$  in. wide. Cut the dados on all similar parts at one time. A note about the three parts that make up the back: if you cut the two dados on a single, wide piece, then rip the piece into three, your dados will be more accurate. Just remember, the middle back

piece is a little longer than the outer two—this is supposed to suggest a tail.

Once you've got all the  $\frac{3}{4}$ -in. wide dados cut, set your dado head for the  $\frac{3}{8}$ -in. wide dados and cut those next. All the  $\frac{3}{8}$ -in. dados are  $\frac{3}{8}$  in. deep as well.

Once you have all the dados cut, you're ready to spiff up the elephant's form. The trunk is the main part that will need shaping, but you'll need to cut some basic curves on each piece as shown in the drawing. Saw the curves with a bandsaw, coping saw or scroll saw and then, if you want to get fancy, finish up the trunk with a carving knife. The "bar" between the ears also needs to be rounded with a file or a knife. This  $\frac{3}{8}$ -in. bar should fit into a  $\frac{3}{8}$ -in. dado and be able to turn freely.

Sand the pieces a little to soften the corners. After you put the puzzle together you'll have some smoothing to do to get the body curves cleaned up. Except for a finish, which you don't really need, you're done. Turn the elephant over to your family and watch your handiwork confuse and amuse. ▲

*David Sloan is Editor of AMERICAN WOODWORKER.*



## BOOKS

### *I Can Build it Myself: A Home and School Course in Hand Tools for Young Children*

by Sheila Rose Dawson  
(1984, Children's Woodshop Publications, P.O. Box 178451, San Diego, CA 92117) paperback; 300 pp.; \$19.50.

"There are no mistakes, only learning here." With that motto to guide her, teacher Sheila Rose Dawson took her act on the road. For more than a decade, Dawson's been traveling around the San Diego area, teaching woodworking to kids ages 3 to 8. Her classroom? An ancient school bus converted into a rolling woodshop, complete with ten tiny, adjustable-height workbenches.

In *I Can Build it Myself*, Dawson sets down her teaching program for others to follow. If you've got young children or grandchildren, pay attention.

*I Can Build it Myself* is a supervised program designed to teach young children the "safe and effective use of hand tools." Dawson's found that kids as young as 1½ years can start and drive a nail. Toddlers 3 or 4 years old can learn how to use basic hand tools to make simple wood projects. The key is motivation—in order to learn, a child must first want to learn.

Dawson tells you how to get started, how to tell if your kids are motivated enough to learn, how to foster cooperation between child and teacher, and how to be supportive in your role as parent and/or teacher. She talks a lot about safety and lays down basic rules such as "No fooling around" in the shop.

From there, she lays down the basics of her course—tools, techniques, appropriate skills and lots and lots of things to make. Helpful notes to the parent/teacher are scattered throughout the text. Projects are illustrated with line drawings and step-by-step black and white photos. The book is bound in spiral-notebook fashion, so it can lie flat on the bench.

DAVID SLOAN



### *Butcher Block Projects*

by Ken Oberrecht  
(1987, Creative Homeowner Press, 24 Park Way, Upper Saddle River, NJ 07458) hardback; 160 pp.; \$7.95.

Here's a good beginner-level book offering 25 projects with laminated butcher-block construction. The projects range in complexity from a simple serving tray and candle holders to a full-size oak knee-hole desk. Large, full-color photographs of the completed projects show what you'll end up with.

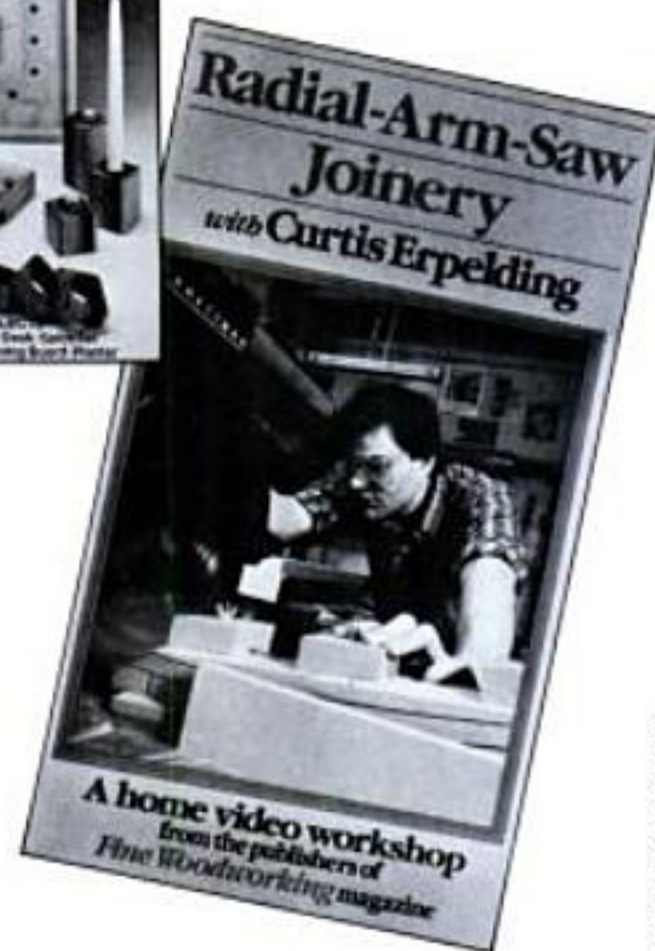
The first part of the book is a brief guide to the tools, materials and techniques encountered in the projects. Drilling, sawing, clamping, finishing and shop-safety tips are covered. Many of the projects can be made with common, portable power tools and a few basic clamps, though a drill press and tablesaw would be a big help on the more ambitious projects.

The step-by-step instructions are easy to follow, and there are many clear, two-color illustrations explaining the details of construction. A symbol rating system indicates the level of difficulty and the estimated time required for each project. A list of necessary tools and a bill of materials is also included.

The book offers an interesting technique to assist in gluing up laminated strips to form wide, flat surfaces. Instead of using costly bar clamps, holes are drilled through each wooden strip for homemade threaded rod clamps that pass through the laminated stack. This works well but requires lots of wood plugs to fill the holes. Depending on your taste, this can add visual interest or merely looks tacky.

DAVE SELLERS

## VIDEOS



### *Radial Arm Saw Joinery*

with Curtis Erpelding  
(1985, The Taunton Press, Box 355 Newtown, CT 06470) Length: 110 min.; VHS and BETA; \$39.95.

Despite some opinions to the contrary, the radial arm saw is versatile, precise, and capable of high-quality work. Curtis Erpelding proves this deftly, showing how easily the radial arm saw produces clean, accurate joints.

Erpelding discusses some common joinery and design problems and shows how the radial arm saw can provide elegant solutions. He explains how to adjust the saw and how to take maximum advantage of design characteristics that other people may view as disadvantages. The core of the video is a detailed explanation of the use of the saw in conjunction with some cleverly designed jigs for cutting everything from simple mortise and tenons to a dovetailed mortise-and-tenon joint in curved stock.

The presentation is straightforward, thorough and includes a number of helpful tips and techniques. Erpelding's approach is conversational and unpretentious. He is an articulate and effective advocate for an often-underestimated tool.

MITCH MANDEL

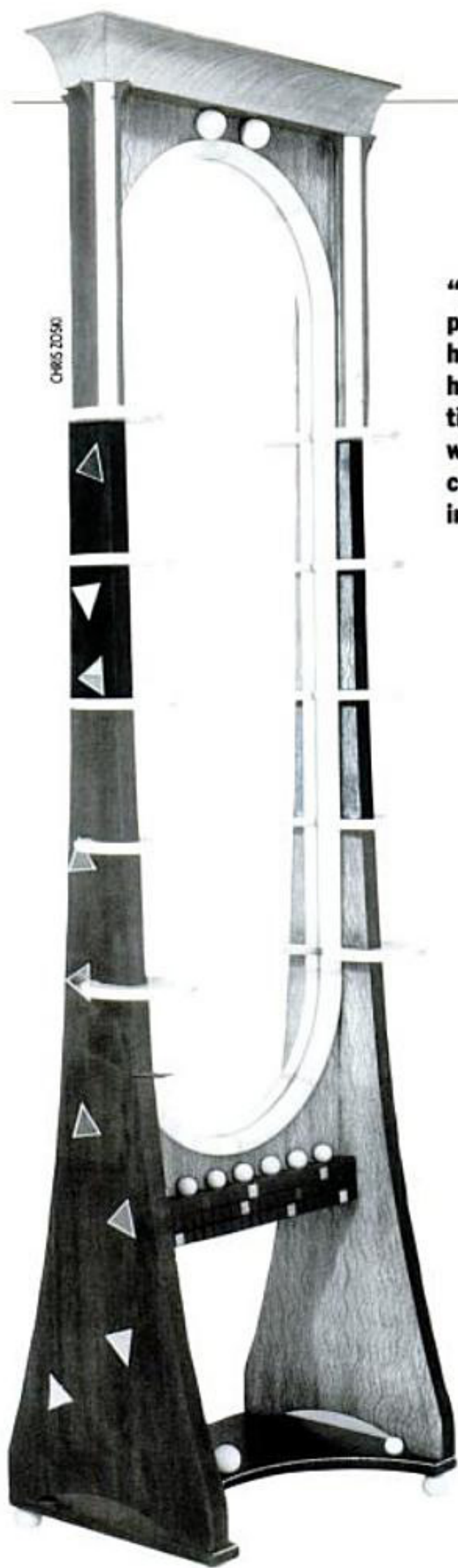
PHOTOS BY ROBERT WALSH



# GALLERY

CURRENT WORK BY OUR READERS

**T**hese mirrors give a new meaning to the phrase "looking good." By using a variety of playful forms and colors, their makers have proven that a mirror needn't just hang there naked on a wall. So next time you gaze into your mirror and wonder why you don't look so hot, consider . . . maybe it's your *mirror's* image that needs sprucing up.



**"Vienna 2000."** By Doug Jones, Perkasio, Pennsylvania. Maple, ebonized walnut, paint. Dimensions: H: 74 in., W: 15 in., D: 12 in.



**"Always Gazing at the Moon."** By Kenneth S. Burton, Jr., Penland, North Carolina. Wenge, curly maple, purple heart. Dimensions: H: 26 in., W: 8 in., D: 3 in.



**"Snowshoe."** By Kenneth S. Burton Jr., Penland, North Carolina. Mahogany, maple, curly maple veneer. Dimensions: H: 52 in., W: 17 in., D: 10 in.



**"Hopi."** By Kenneth S. Burton Jr., Penland, North Carolina. Dyed, sandblasted maple. Dimensions: H: 30 in., W: 10 in., D: 2 in.

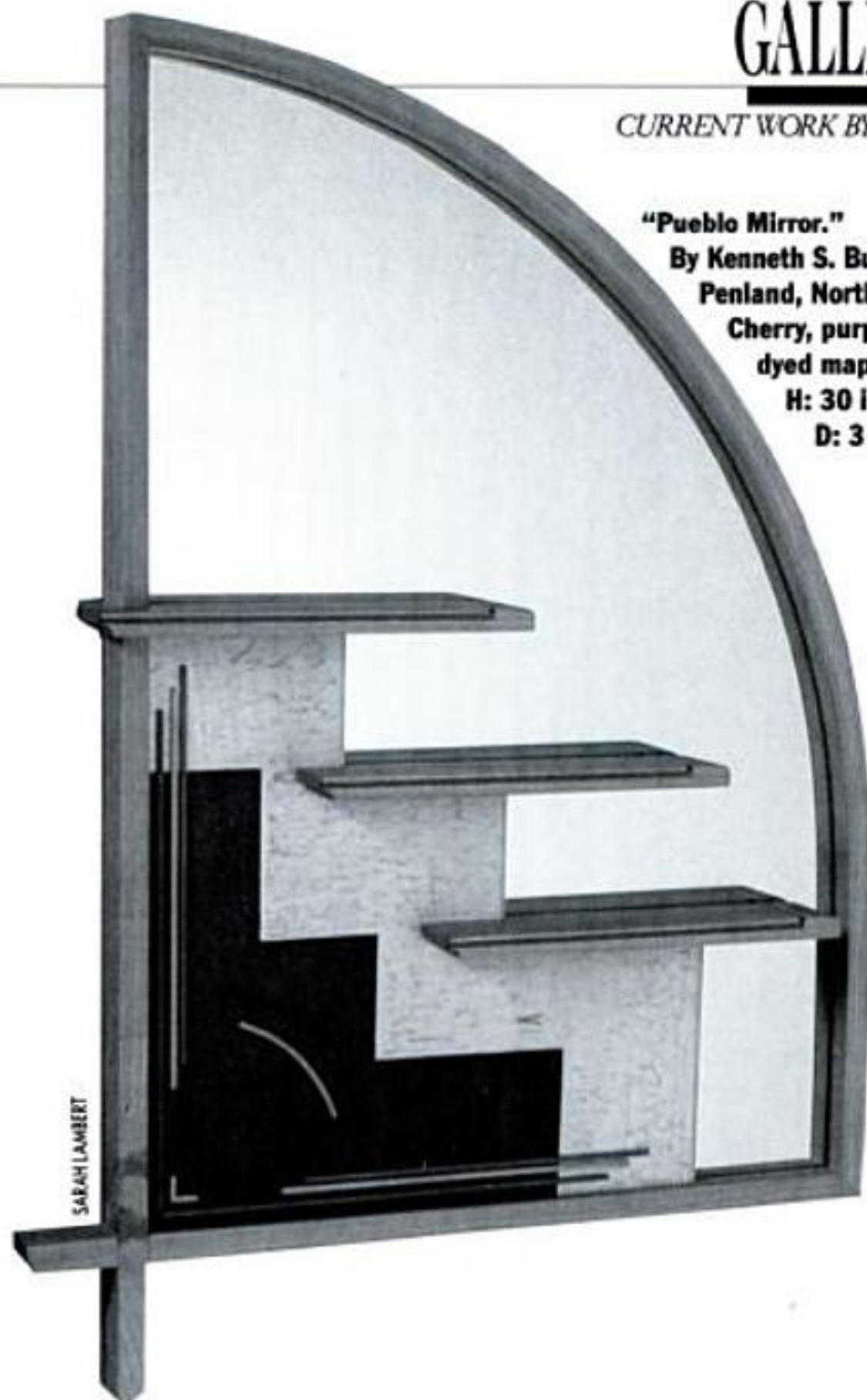


# GALLERY

CURRENT WORK BY OUR READERS

## "Pueblo Mirror."

By Kenneth S. Burton Jr.,  
Penland, North Carolina.  
Cherry, purple heart,  
dyed maple. Dimensions:  
H: 30 in., W: 21 in.,  
D: 3 in.



SARAH LAMBERT



DEAN POWELL

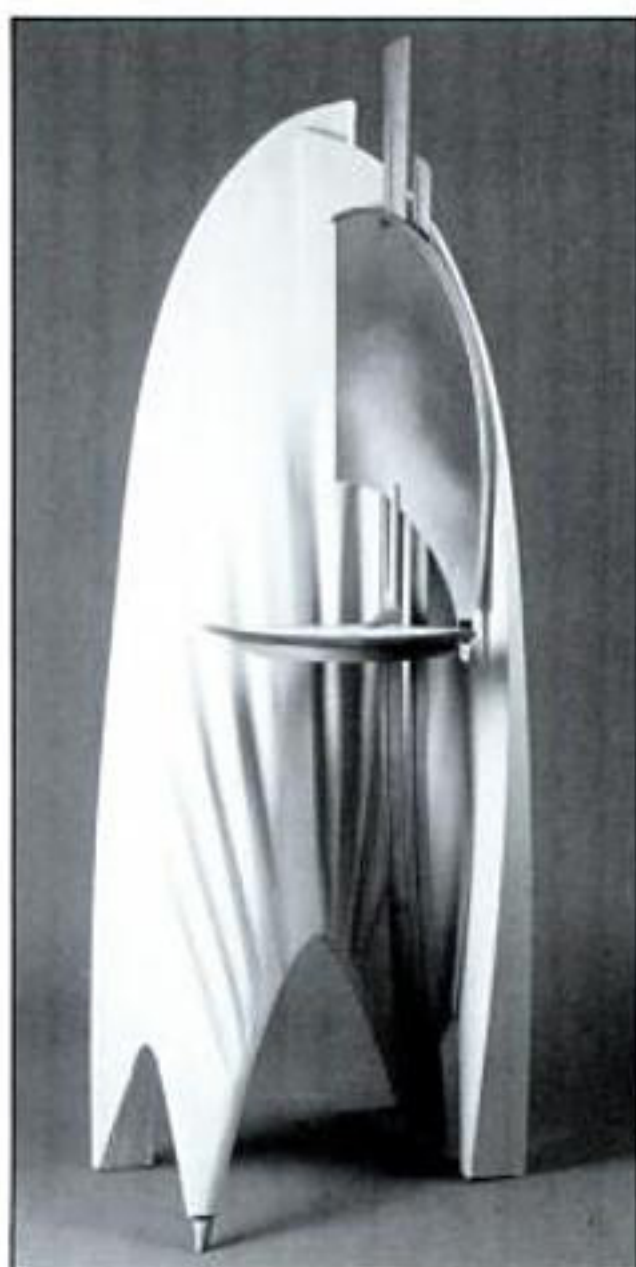
"Bluegrass Mirror." By Jamie Robertson,  
Cambridge, Massachusetts. Harewood, dyed  
blue veneer, ebony, epoxy-resin inlay,  
lacquer. Dimensions: H: 36 in.,  
W: 30 in., D: 1 in.



MARK STROB

## "Wall Mirror."

By Joanne Shima,  
Langhorne,  
Pennsylvania.  
Mahogany, lacquer,  
acrylic. Dimensions: H: 36 in.,  
W: 16 in., D: 3 in.



SARAH LAMBERT

## "Reflection."

By Kenneth S. Burton  
Jr., Penland, North  
Carolina. Walnut, maple,  
anigre, canvas, acrylic.  
Dimensions: H: 74 in.,  
W: 30 in., D: 30 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 x 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.



## Make Your Own Monster

Lions and tigers and bears? Oh my, no. It's more like purple people eaters, jabberwockies and pencil-necked geeks. A new-wave zoo? you ask. Actually it's "Zolo," a curious collection of 55 hand-painted, hand-carved wooden pieces that can be arranged in thousands of ways.

The parts consist of body forms, arms, legs, antennae, tails and any number of appendages appropriate for assembling make-believe creatures. Add a child's imagination and you've got infinite possibilities. All parts are individually painted in whimsical color combinations, range in size from 1 in. to 6 in. and come in a pine storage box.

This award-winning plaything was created by New York graphic designers Sandra Higashi and Byron Glaser. Their philosophy appears on each box: "Zolo is dedicated to the idea that all things wiggly, straight, skinny, blobby, square and round, plain or spotty can come together

AARON REZNY



**Quite a menagerie of make-believe creatures. All it takes to make them is "Zolo" and a little imagination.**

as one. And the results can be very extraordinary."

Though "Zolo" is intended for children 5 years and up, the toy seems to catch the fancy of kids and kids at heart. This fun doesn't come cheap. The play sculpture is \$165 a set and available by mail from The Museum of Modern Art in New York City. (Write: The Museum Store, 11 W. 53rd St., New York, NY 10019 or call 212-708-9700).



SIMON WATTS

## Angle of the Dangle

No piece of furniture is as individual to the user as a chair. A seat that one person finds heavenly can be hell on legs to another. The heights, angles and slopes of the various parts are crucial to comfort. Factory-made chairs are, for the most part, an amalgam of compromises.

To take some of the guesswork out of chair design, San Francisco woodworkers John and Carolyn Grew-Sheridan developed a gadget I've dubbed the Chair-O-Matic. This device, which looks vaguely orthopedic, enables the Grew-Sheridans to tailor a chair to suit any individual. With the client seated in the

**No, not an instrument of torture. On the contrary. It's a gadget that measures an individual for the most comfortable-fitting chair.**

Chair-O-Matic, the contraption can be adjusted to find the right slope and height of the seat, curve of the back, height of the arm rests, even the best location for a head rest.

"We encourage the client to slouch, get up, walk around and use the chair in whatever way they will use the real chair." When asked if a chair had ever been returned because it was uncomfortable, Carolyn shot back, "No, after this, nobody would dare."

SIMON WATTS

## A Bend Here, a Wiggle There

To the manufacturer it's "bendable luan," but users of the material have fondly dubbed it "flex wood," "wacky wood" or "wiggle wood." And from its sales volume, woodworkers seem to love the 3/8-in. luan-faced bendable plywood.

According to Brian Wilkes of the plywood division of Atlantic Veneer Corp. in Beaufort, N.C., they just can't make enough of the stuff. The plywood can be bent without tearing and is primarily used for making columns or other curved surfaces. Wilkes said the actual flexibility varies with each piece.

Bendable luan is made with 1/16-in. luan veneers covering a mahogany core. It's sold in 4-x-8-ft. sheets in two styles; one with the luan grain running the length of the sheet and one with the grain going across the

sheet. A sheet sells for about \$25. Supplies are available from Atlantic Veneer Corp., P.O. Box 660, Beaufort, NC 27815.

Woodworkers no longer need go crazy when making bends, instead they can get wacky.

**Yes, you can believe your eyes. This piece of bendable luan is perfect for curved construction.**



MITCH MANDEL