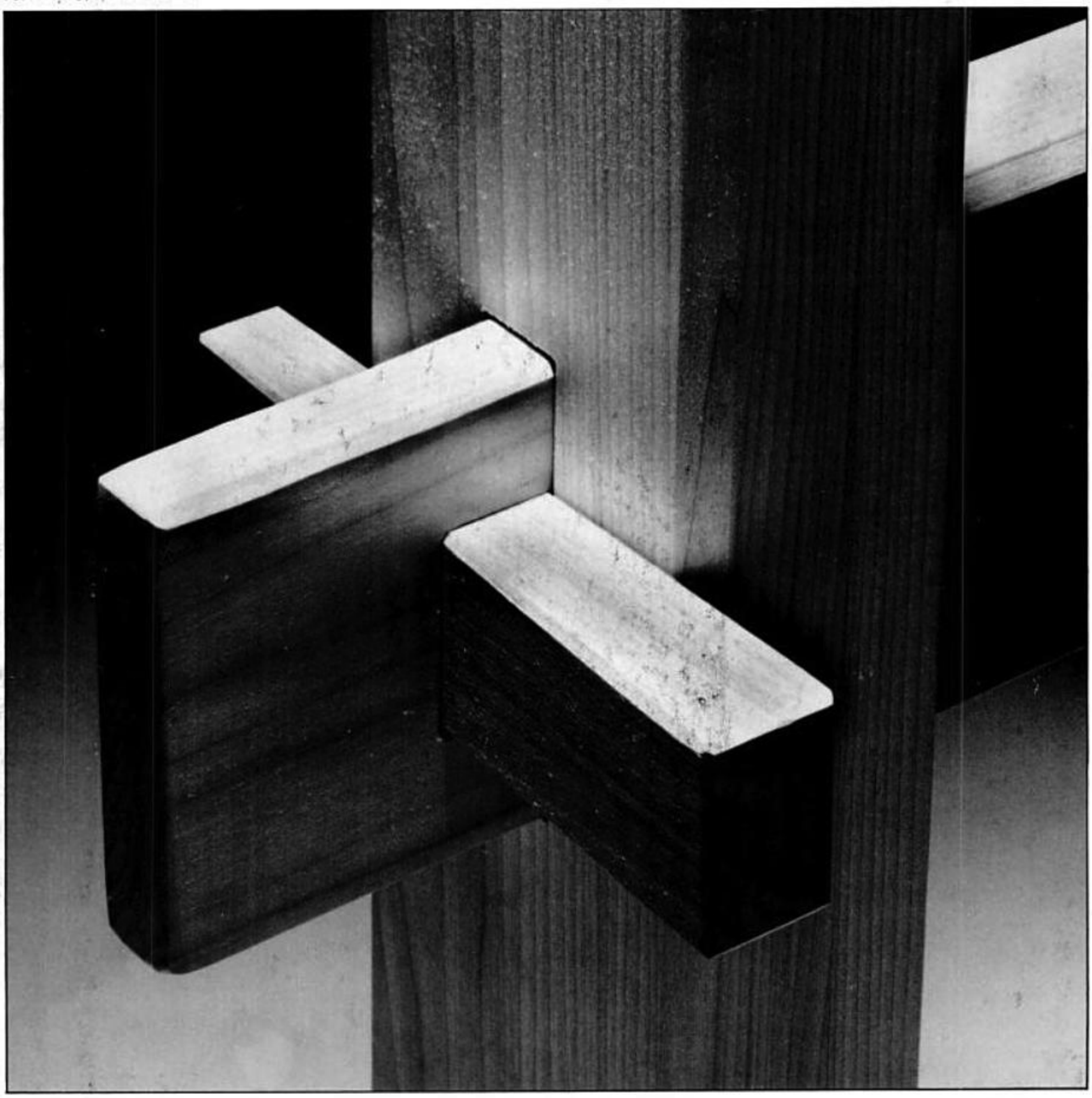
AMERICAN WOODWORKER

February 1991, Issue No. 18



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Master the Mortise & Tenon

For Turners Only: Child-Size Victorian Rocker

Go Cordless: Buyer's Guide to Rechargeable Drill-Drivers

Build a No-Bull Workbench

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January/February, 1991
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PETER HUTCHINSON

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AMERICAN WOODWORKER (ISSN 8750-9318) is published six times a year in January, March, May, July, September and November by Rodale Press Inc., 33 E. Minor St., Emmaus, PA 18098, (215) 967-5171. © 1990 by Rodale Press, Inc. Ardath Rodale, Chairman of the Board; Robert Teufel, President; Paul Wessel, Chief Financial Officer. **SUBSCRIPTION RATES:** U.S. one-year $27, two-year $54. Single-copy $4.50. Canada one-year $35, two-year $70 (Canadian funds). Foreign, one-year $35, two-year $70 (U.S. funds). U.S newsstand distribution by Eastern News Distributors, Inc., 1130 Cleveland Rd., Sandusky, OH 44870. **SECOND-CLASS POSTAGE:** paid at Emmaus, PA and additional mailing offices. POSTMASTER: Send address changes to AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. **CONTRIBUTOR GUIDELINES:** available upon request. We will treat unsolicited material with care, but cannot assume responsibility for loss or damage. Send a stamped, self-addressed envelope for return of material.

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A WORD FROM THE EDITOR

FAX US YOUR FEEDBACK: (215) 965-5670

Most of us make New Year's resolutions this time of year. We at *AW* made one we intend to keep: We pledge to satisfy our readers.

To keep our part of the bargain, we need feedback from you. What are your woodworking interests? What turns you on most? What kinds of articles do you want to see more of in the year to come?

We learn about some of you by mailing out surveys. Unfortunately, each survey can reach only a fraction of our 200,000 subscribers. We think it only fair that you *all* have a chance to vote—a chance to let us know if we're on the right track.

So take a moment to tell us your thoughts. To make it easy for you, we've come up with a "Comment Box" that's quick to fill out.

Please check off the answers to the questions below, then FAX us your completed form. Our FAX number is (215) 965-5670. If you don't have access to a FAX machine, just pop the Comment Box (or a copy) in an envelope and mail it to: Comment Box, *AMERICAN WOODWORKER*, 33 E. Minor St., Emmaus, PA 18098.

I look forward to hearing from you soon.

DAVID SLOAN
Editor

COMMENT BOX — AMERICAN WOODWORKER

1. *Here are some woodworking topics we plan to cover in future issues. Please check off the topics you'd like to learn more about. (Check as many as you like.) Then, go back and circle the* one *topic that interests you most.*

Hand Tools ___
Joinery ___
Finishing ___
Veneering ___
Furniture Design ___
Jigs & Fixtures ___
Carving ___
Furniture Projects ___
Small Projects ___
Selling Your Work ___
Wood: The Material ___
Toys ___
Machine Woodworking ___
Turning ___
Bending Wood ___
Musical Instruments ___
Tool & Machine Reviews ___
Basic Techniques ___
Woodworking History ___
Woodworker Profiles ___
Other (please specify) _____

2. *What is your woodworking skill level? (Please check one.)*

Beginner ___
Intermediate ___
Advanced ___
Expert ___

3. *In general, which* type *of article would you like to see* more *often in AMERICAN WOODWORKER? (Please check one.)*

Project Plans ___
Tool & Machine Reviews ___
Woodworking Techniques ___
Other (Please specify) _____

LETTERS

Watch Those Fingers

It always bothers me when I see craftsmen using tools without adequate concern for safety. The June, 1990 *AW* has several instances of this. The cutoff box could easily have been fitted with a Plexiglass blade guard. The box-building article could have utilized feather boards and hold-downs to position the work without compromising safety.

While I find your articles to be excellent, the techniques presented in them ought to deal with all aspects of woodworking—including operator safety. We only have ten fingers, they are easily damaged, and they don't grow back!

RALPH LIPELES
Monroe, CT

We recommend that you don't switch on a machine unless you're wearing safety glasses and ear protection, and we strongly recommend the use of safety devices such as guards, hold-downs, push sticks and feather boards when appropriate. We were comfortable without a guard on our tablesaw cutoff box, because our hands never got near the blade in the working area of the box. The real danger zone with this type of sliding table is behind *the fence on the operator's side, where the blade comes through. We felt that a Day-Glo warning stripe around this danger zone would remind us to keep our hands away from this entire area. If you feel more secure with a "guard," screw a stop block under the operator's fence that butts against the edge of the saw table and stops the forward movement of the cutoff box* before *the blade comes through the fence.*

If you feel safer with a guard across the top of your cutoff box, screw a 2-in. or 3-in. wide strip of clear 1/4-in. Plexiglass over the kerf across the two fences, or install a hinged Plexiglass cover over the entire box.

Happy Reader

I'm a recent subscriber and impressed with the meaty articles in *AW*. Hand-Plane Basics, Tablesaw Cutoff Box, Boxmaking, Reproducing a Mission Oak Chair, Hewing a Beam, Tapered Sliding Dovetails—all these are very useful and just what the inspired woodworker is looking for.

I'd like to add that I look forward to the next installments of the period furniture history, because I like knowing the history of the craft as I do my best to practice what the old (and new) masters have taken the time to work out.

The craft of woodworking is a venerable tradition. Thank you for your continuing acknowledgement of this.

A final request: that you ask Roger Holmes to update and write about any information that he has on the British Cotswald Shops run by Gimson and the Barnsleys. These men were among the finest and most prolific furniture makers in history, and it would be a treat to see a working drawing or two (or three) of their early Gothic revival pieces.

KENNETH J. HABEEB
Half Moon Bay, CA

More Mangled Mags

The condition in which your magazine arrived is almost humorous. It looks as if it was run through a mulcher. I don't know whether the damage was done before or after the mailman received it, but you should consider using some type of protective cover.

On a good note, I enjoy your magazine and look forward to each issue. I appreciate the articles on basic techniques and comparison tool guides. You also have a good balance between small and large projects.

MICHAEL HAERR
Scottsdale, AZ

We've had so many complaints about mangled magazines that we've decided to resume our previous practice of mailing AW *in a protective wrapper.*

Take Your Hobby to Market

Recently, a co-worker asked me if I could build a gun cabinet for him, and what it would cost. This caught me off guard. As a hobbyist with 2 years experience, I have fantasized about selling my work, but never confronted the realities. I was flattered and completely unnerved at the same time. Many questions and doubts came to mind as I realized that I was not sure whether I was ready for this. I gracefully declined the request and have been questioning my decision ever since. If you have not done so already, would you please do an article, or series, on common-sense strategies and down-to-earth advice for the hobbiest who would like to sell some of his/her work? Even some words of encouragement would be nice.

PERRY A. YOUNKER

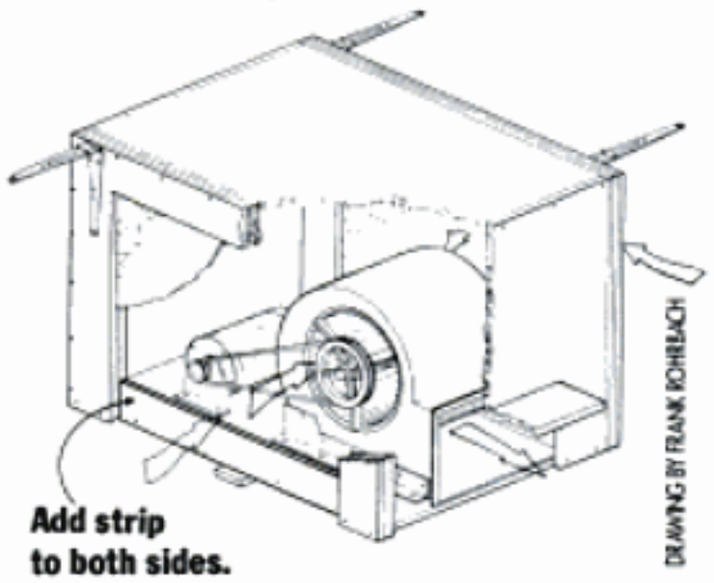
Plumb Fittin'

If you have several power tools and one dust collector that you move from tool to tool, you can find all kinds of quick-disconnect fittings at the local RV (recreational vehicle) supply. They even have shut-off valves that are nicer than any of the blast gates I have seen. Prices, locally, are $2 to $5 for fittings and $13 for the shut-off valves. These fittings are designed for waste water, so they have a real good seal.

CRAIG DEARING
Waynesboro, VA

Dust-Collector Corrector

K.G. Singleton alerted us to an error in the dust collector plans (June, 1990 AW*). The original plans leave a gap between each filter and the base of the dust collector. This would allow unfiltered air to pass through. The drawing you see here shows the addition of a wood strip (added to both sides) that will correct the problem.*



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

Chip in Smoothing Plane

Q. *My favorite plane is an old wooden smooth plane that works like a dream. The only problem is that the back edge of the mouth, behind the iron, has started to chip slightly from use. I'm worried that someday a big chunk will tear out and render the plane useless. Is there some way I can keep this from getting worse?*

BRETT SHAMINSKY
Roanoke, VA

A. Sitting on a shelf in my shop are some dozen wooden bench planes, so I understand your concern.

The chipped edge on your plane is the intersection of the bed (the surface on which the cutter rests) and the sole. These two surfaces meet at a sharp 45° (50° on some planes) corner. Although protected by the cutter, this corner still gets an occasional knock and may chip easily. The mouth's front edge forms an obtuse angle and is much stronger, and less subject to chipping.

Many of my planes have the same chipping as yours. But I've found that this doesn't affect their performance in any way. Also, none of my planes has chipped any worse since I've owned them, so this should put your mind at ease. I predict that the plane will give you good service for the rest of your life.

MIKE DUNBAR
Contributing Editor
Portsmouth, NH

Reflect on This

Q. *I made a cabinet with a frame-and-panel door. I glued up the panel from two pieces of walnut from the same board and was careful to match the grain so it looked good. But when I finished the door with tung oil and hung the cabinet on the wall, the two boards in the panel reflected light differently, making the glueup very obvious. One board looks much lighter than the other—even more so in daylight. How can I fix this problem and avoid it in the future.*

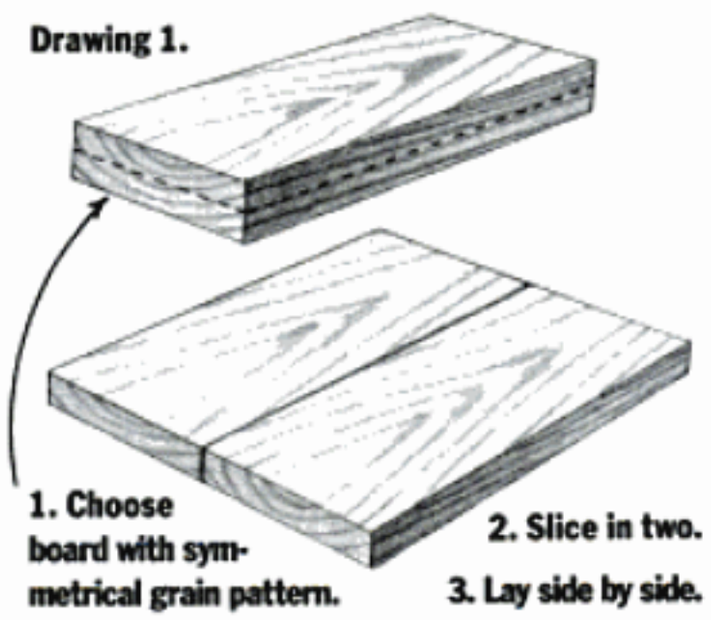
MARTIN O'ROURKE
Worcester, MA

A. This is often a problem when you're cutting bookmatched panels from woods such as walnut or mahogany. When you open the two halves out, the grain will run *out* at an angle on one piece and run *in* at the same angle on the other piece. It's only after you finish the surface that the different grain angles will reflect light differently.

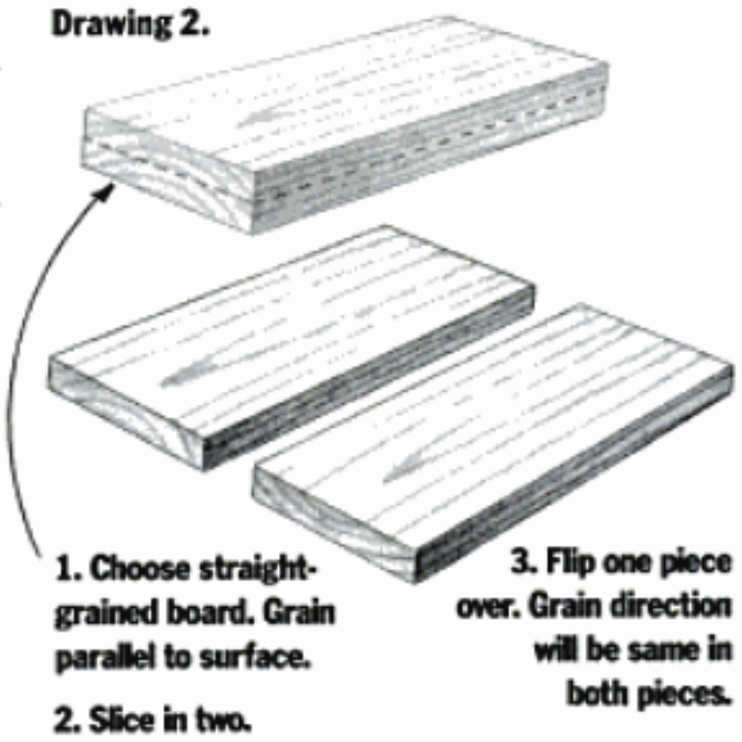
There are three ways to get around this. You could fill the open pores of the wood before finishing to minimize the differences in surface texture, though this deadens the appearance somewhat. Or, you could select a piece of wood with a *symmetrical* grain pattern across its face.

Avoiding grain reflectance problems

Drawing 1.



Drawing 2.



(See Drawing 1.) Then slice the board in two and lay the resultant pieces side by side instead of flipping one piece over, as when bookmatching. The grain will run into both sides at the same angle, but there'll be a slight difference in figure across the glue line.

You could also select a piece for your panel where the grain runs as closely as possible *parallel* to the surface—neither in nor out. (See Drawing 2.) When you cut and turn the slices for bookmatching, the two sides will have more or less the same grain direction across their surface. But pieces like this are hard to find and rather uninteresting.

For the panel you already made: Avoid direct light from windows or lights; and try to even the illumination by placing a light-colored rug in front of the piece, and a heavier lampshade on the nearest lamp. You can adjust the reflectance of nearby walls by covering them with different colored wallpaper.

CHRIS YONGE
Designer and woodworker
Englewood, NJ

Stripping Limed Oak Finish

Q. *I have a three-piece bedroom set that I bought new in the 1950s. I'd like to refinish the set, but it has a "limed oak" finish on it that I don't know how to strip off. Any suggestions?*

LYLE COWDEN
Hastings, NE

A. The "limed-oak look" is achieved by applying white paint to raw or sealed wood, and then wiping off the excess paint before it dries. The difficulty in removing it comes in getting all the paint out of the pores of the wood.

Begin by stripping off as much paint as possible with a paint and varnish remover that has a high percentage of methylene chloride. This is the strongest and (usually) the most expensive type of stripper (Warning: Don't use methylene chloride strippers if you have a heart problem!) If there's still paint in the pores, apply more stripper and use a brass wire bristle brush to scrub the wood in the direction of the grain. The brass-wires won't damage hardwoods such as oak. Clean off the sludge with paper towels and repeat until no more paint remains in the pores. If the paint was applied over a sealer coat, you're in luck—it'll come out of the pores easily.

BOB FLEXNER
Refinishing consultant
Norman, OK

Q&A

Low-Formaldehyde Plywood

Q. *Can you tell me a good source for plywood that's not made with formaldehyde? I'm a woodworker who is chemically sensitive to the formaldehyde vapors given off by plywood when it's used for indoor furniture.*

WILL BAKER
Tallahassee, FL

A. Nearly every man-made wood product, including plywood, contains some formaldehyde. The formaldehyde in wood products is in the glue. *Exterior*-grade plywoods are made with a type of glue called *phenol*-formaldehyde which emits much less formaldehyde than most *interior* grades of plywood and most *hardwood* plywoods which are made with *urea*-formaldehyde glues. Hardwood wall paneling, particleboard, flakeboard, and chipboard are also made with urea-formaldehyde glues.

For some applications you might try using exterior-grade plywood. To make sure you're getting an exterior grade, look for the American Plywood Association (APA) grade-stamp "EXT" on each panel. If core voids are a problem, choose *Marine*-grade exterior plywood which is made to a specification that minimizes voids and edge gaps. A very small percentage of hardwood plywood is made with phenol-formaldehyde glues, but it is a special order product that may be hard to get.

There's also a new paneling product called "Medex," which is an exterior-grade, waterproof, medium-density fiberboard. It's made of pressed wood fibers with smooth face surfaces and has *zero* formaldehyde. It's not quite as strong as plywood, but it's a good choice for interior cabinetry, fixtures and furniture. It comes in various thicknesses in 4-ft. or 5-ft. sheets up to 18 feet long. A ¾ ×4×8 sheet costs about $50. It accepts paint and laminates, machines easily and holds screws and nails. For the nearest dealer call Medite Corp., P.O. Box 4040, Medford, OR 97501, (503) 773-2522.

ROBERT G. FLOWER
Building Science Associates
Alburtis, PA

Where To Find It

Hour glasses and egg timers made of hand-blown glass with fine sand for setting in your own wooden mounting are available from Tool Mail (GMC) Ltd., 170 High St., Lewes, East Sussex BN7 1YE, England.

Synthetic polymer ivory in rounds, rectangles (and even whale teeth) for inlays, turnings or for carving ivory substitutes is available from Dixie Gun Works, Gunpowder Ln., Union City, TN 38261.

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

TECH TIPS

An Extra Clamp

When we need just one or two more small clamps

to finish a job, we use channel-lock pliers with stout rubber bands on the handles.

ALICE & ROBERT TUPPER
Canton, SD

Center Finder

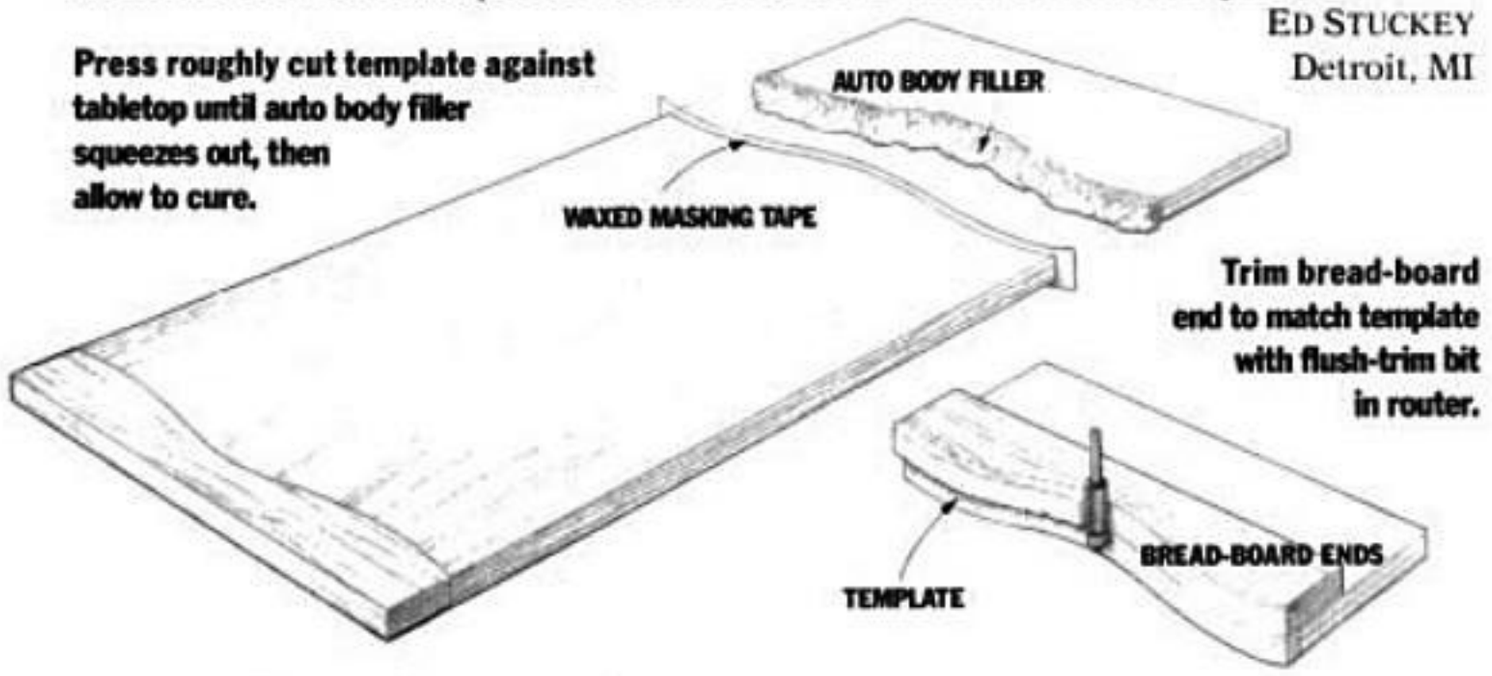
To find the center of a circle, I sometimes use a framing square together with a combination square, as shown in the drawing. Make sure the combination square's ruler bisects the framing square's right angle; make two intersecting lines to locate the center of the circle.

JOHN ROCCANOVA
Ancramdale, NY

The Perfect Match

I needed a perfect fit between bread-board ends and the curved end of a fancy tabletop. I cut a plywood template roughly to shape, spread auto body filler on the roughly cut edge, and pressed it against the curved end of the tabletop. Masking tape on the table edge and an application of paste wax over the tape prevented the filler from bonding to the tabletop. When the filler cured, I cleaned up the surfaces of the template and used a flush-trim bit in the router to shape the bread-board end to match the template.

ED STUCKEY
Detroit, MI

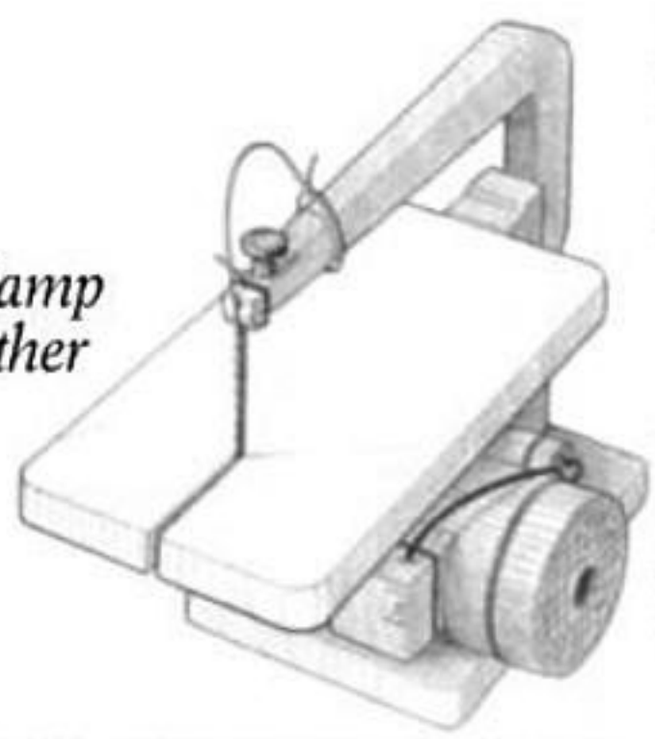


Bubble-Free Polyurethane Application

Discarded pantyhose or nylon stockings make an excellent applicator for urethane or polyurethane finishes, particularly on contoured surfaces or turnings. Just wad them up and begin to wipe the finish on. It goes on in a nice smooth, thin coat, dries fast, and has few or no bubbles.

BRENDA JOHNSON
Apple Valley, MN

Clamp Tether



When a blade snaps on my scroll saw, the blade clamps often go flying. When I got tired of chasing them all over the shop floor, I tethered them to the upper and lower saw arms with short pieces of monofilament fishline.

GEORGE WEBER
Brooklyn, NY

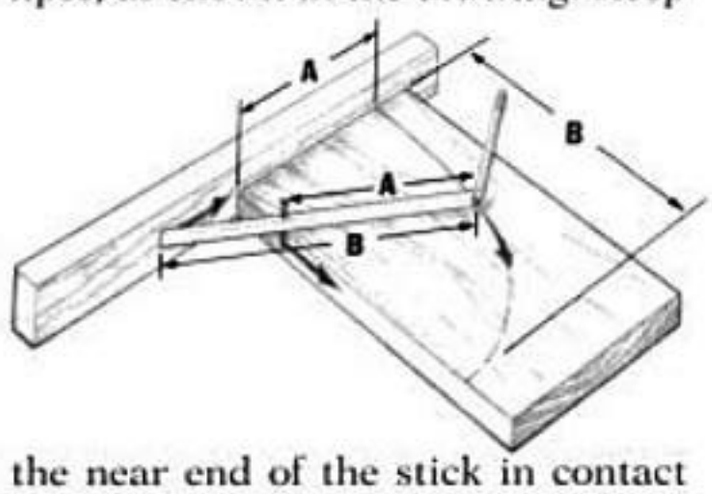
Inject-a-Dowel

I needed invisible support for the front edge of a stair tread in a modernistic staircase, but there was no way to assemble the structure with a dowel. So I bored matching holes plus a 1/8-in. injection hole and a vent hole, then injected epoxy to fill the cavity. When the epoxy cured, I had a hard plastic dowel right where I needed it.

TREBOR NAROM
Onaled, NM

A Perfect Oval

To draw a perfect oval (ellipse) of a given length and width, I make a template of one quarter of the ellipse, as shown in the drawing. Keep



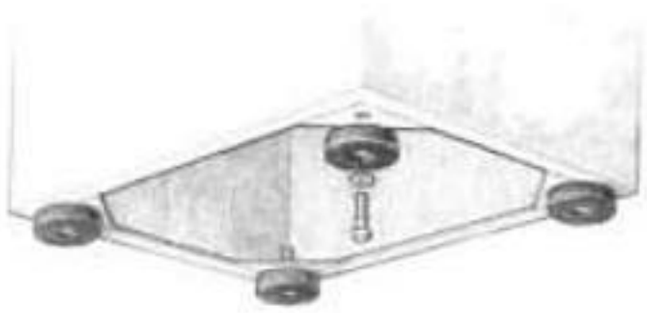
the near end of the stick in contact with the straightedge and the projecting nail in contact with the edge of the template stock while drawing the pencil-end of the stick through the elliptical arc.

JOHN WILSON
Lexington, MA

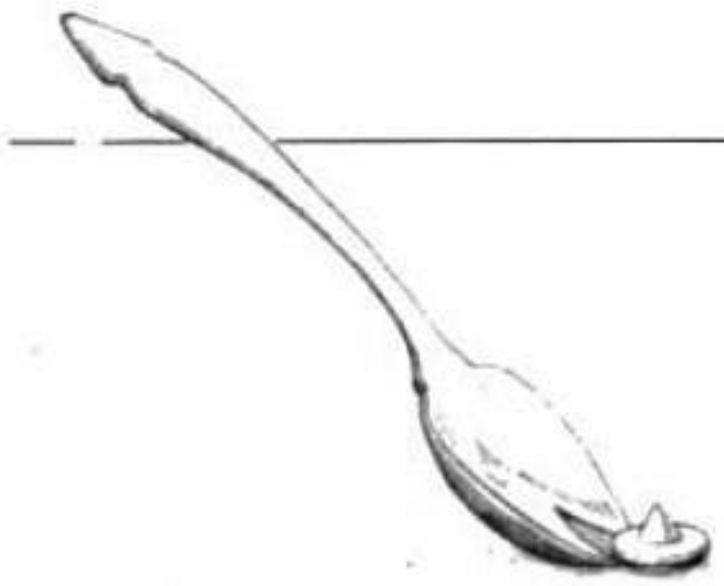
End Bad Vibes

To dampen machine vibrations, I drill and then countersink hockey pucks and bolt them to the feet of the machine.

BOB VAUGHAN
Roanoke, VA



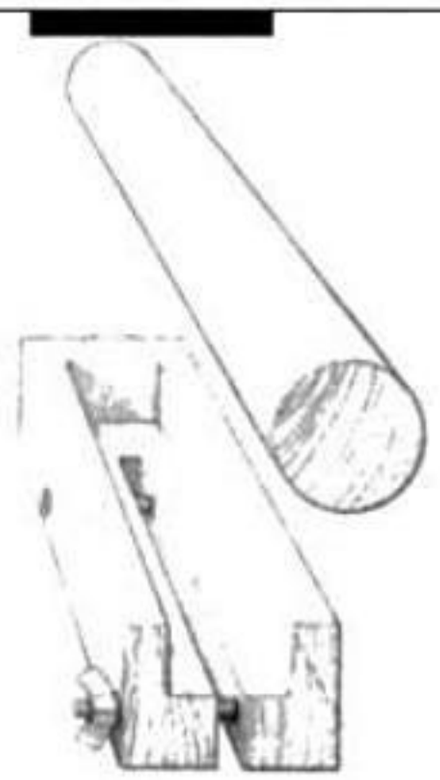
TECH TIPS



Dowel-Center Remover

I remove tight-fitting dowel centers by sharpening a V-notch in the end of a large, sturdy spoon and prying them out.

RICHARD DORN
Oelwein, IA



Taming Skittish Dowels

When I'm drilling or shaping round stock, like dowels, I get a good grip and a flat reference surface by clamping the round stock in a jig like the one in the drawing. I cut the width of the groove to the diameter of the dowel. The saw kerf provides just enough "give" for the wing-nut (or screw) to clamp the jig to the dowel.

JOHN ROCCANOVA
Ancramdale, NY

Glue Spreader

We often spread glue with an old credit card that we've notched along one edge with pinking shears. For a thinner layer of glue, we just nick the edge of the card with the pinking shears to make smaller Vs.

ALICE & ROBERT TUPPER
Canton, SD

Tender, Loving Care for Cast Iron

Baby powder (talc) rubbed into the cast-iron tops of your woodworking machines will displace the moisture that causes rust, reduce friction between the top and workpieces sliding across it, and will not leave a residue on the wood that could interfere with stains or finishes.

RONALD CAPODAGLI
The Colony, TX

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 $35 if we publish your tip.*

Pastel Stains

Many woodworkers these days are brightening up their furniture designs with subtle shades of color. Pastels Wood Stain from Minwax offers these softer colors in a penetrating stain that can be finished with a separate top coat. The colors have names like Summer Straw, Slate Blue, Country White, and Pale Gray. The stain is transparent, so it highlights wood grain rather than hides it. (Price: $4.69, half pt.; $9.99, qt.; $27.99, gal.)

■ *Minwax Co., Dept. AWT., 15 Mercedes Dr., Montvale, NJ 07645, (800) 526-0495.*

Cordless Rotary Tool

The Model 750 Mini-Mite is a smaller, cordless version of Dremel's popular 395 MotoTool. It will handle general-purpose sanding, grinding and drilling. The control is especially good on intricate projects. It has a 4.8-volt motor that runs for up to one hour on the Ni-Cad battery pack. The battery recharges in three hours in a plug-in charger. You can select from two speeds—5,000 or 10,000 RPM—and the knurled collet nut can be tightened or loosened with your fingers alone. The tool accepts standard Dremel collets, bits and accessories up to a 1/8-in. dia. shank. (Price: $39)

■ *Dremel, Dept. AWT, 4915 21st St., Racine, WI 53406, (414) 554-1390.*

CIRCLE NO. 43 ON PRODUCT LITERATURE CARD

SHOP TEST

Ryobi Woodcarver

Tested by Jeremy Singley

The Ryobi Woodcarver (formerly sold as "Arbortech") is a wood-hogging tool invented by an Australian wood sculptor who formerly roughed out his works with a chainsaw. He developed a cutting blade with chainsaw-like teeth on the edge of a 4-in. steel disk and mounted it in an angle grinder. This combination gave the aggressive speed of a chainsaw, but with much more safety and control for the operator. It's a neat idea.

The Woodcarver's carburized steel blade fits 4-in. and 4 1/2-in. portable angle grinders. This tool is a must for people who sculpt whole logs or large pieces of wood. But even on a smaller scale it's a great tool for removing a lot of stock quickly. The wood just seems to disappear under the blade. (Well, it doesn't actually disappear—it's redistributed as little shavings all over the shop.)

Keep in mind that we're talking grunt work here. This is not a raised-pinkie implement. I used it to rough-shape and chamfer the seat for a cherry Windsor chair, and it saved me a lot of time and effort. But after I had the seat's shape roughed out, I made the mistake of trying to fine-tune with the Woodcarver. When I tried to sneak just a little bit more wood out of a shallow cleft at the bottom, the Woodcarver snagged and buried its teeth clear through the seat in an eyeblink. (Don't ask. I used alot of epoxy.) Which brings up a point about technique.

Like a chainsaw, the Woodcarver cares nothing about grain direction. There's little tearing or change of speed when cutting end grain or cross grain. However, when it encounters a joint or a corner where different grain directions meet, the Woodcarver will grab and dig in unless you're very firm about who's boss. It's a good idea to practice on scrap until you get the hang of it.

I found that by lightly dragging the Woodcarver horizontally toward me with the blade nearly flat on the work, I could take fairly controllable planing cuts. The grinder's blade guard makes a convenient fulcrum for pivoting the grinder, as well as supporting the grinder's weight. By carefully tipping the machine forward I could control the blade's depth-of-cut, taking off 1/4 in. to 3/4 in. per pass. From now on, though, when I get within 3/8 in. of the finished dimension, I'll mount a roto file or sanding disk on the grinder and finish up with that. The Woodcarver sharpens easily and is also handy for doing notching, trenching or rough-out work in the building trades.

Overall, I believe the Woodcarver is a useful tool offering a new level of speed and flexibility in power carving. We've been waiting a long time for a tool like this. My only reservation is that many wood carvers could use a tool with just a little more finesse. I'd suggest that Ryobi offer the Woodcarver with a range of tooth sizes and configurations so we'll have a choice of cutting styles—from brutally aggressive to a lighter touch. (Price: $50; grinder not included)

■ *Ryobi America, Dept. AWT, 1424 Pearman Dairy Rd., Anderson, SC 29625, (800) 525-2579.*

CIRCLE NO. 44 ON PRODUCT LITERATURE CARD

TOOLBOX

Unisaw, Jr.

Delta's Unisaw has always set a high standard for performance. But its cost is often out of reach for a small shop. The new Delta 10-in. Tilting Arbor Saw offers a less costly alternative with many of the Unisaw's features—it's a step up from Delta's popular Contractor's Saw. It has a full cabinet, 2-HP, 230-volt motor and a standard Delta Jet Lock rip fence, with a Delta Unifence as an option. The saw cuts stock 3⅛-in. thick at 90° and 2⅛-in. thick at 45°. The ground, cast-iron table has T-slotted miter-gauge grooves and the trunnion system is made of cast iron and steel for maximum support. (Price: $1203; $1450 with 30-in. Unifence)

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

CIRCLE NO. 42 ON PRODUCT LITERATURE CARD

Edge-Trimming Knife

Here's a new knife for quick and easy hand trimming of PVC vinyl, melamine, and wood veneer edgebanding. The replaceable twin-edged steel blade cuts in the forward direction to trim the edge, then when you pull the knife back, putting a smooth finish on the edge. The blade is designed with a slot so the edge can't escape once the cut is started. The knife comes in two versions, for straight and for curved panels. (Price: $14.95 each)

■ *Adwood Corp., Dept. AWT, P.O. Box 1195, High Point, NC 27261, (919) 884-1846.*

CIRCLE NO. 41 ON PRODUCT LITERATURE CARD

Cooler Hot Melt

Hot-melt glue guns are great for a variety of adhesive tasks around the shop. But if you've used a glue gun much, you've probably burned yourself on the freshly extruded glue or the gun's nozzle. The Crafty Magic Melt Princess glue gun uses new formula slow-set, low-temperature glue sticks, so it operates about 150° cooler than regular guns. That means finger burns and damage to heat-sensitive materials like polystyrene are a thing of the past, and it's safer for children to use. The new low-temperature glue will bond just as strong as the old glue. The new glue sticks come in an oval shape to prevent accidental use in a conventional hot-melt gun. (Price: $13.95)

■ *Ad-Tech, Div. of Adhesive Technologies, Inc., Dept. AWT, 3 Merril Industrial Dr., Hampton, NH 03842, (603) 926-1616.*

MORTISE

BY ROGER HOLMES

The Basics on the Basic Joint

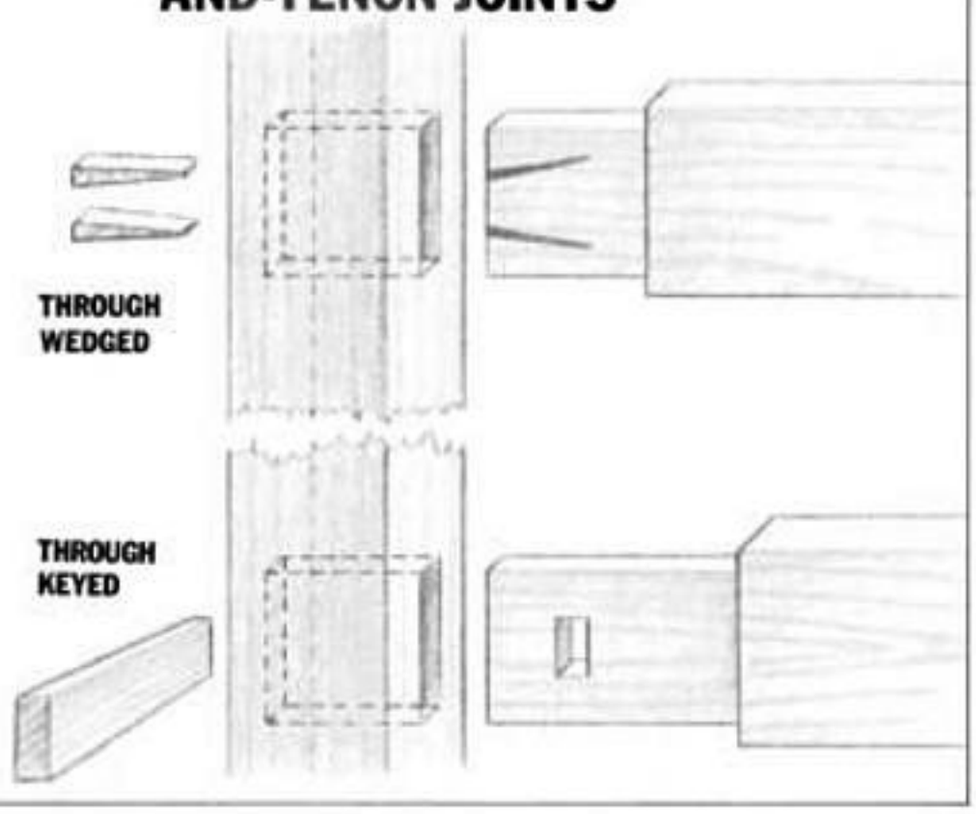
The mortise and tenon is probably *the* most important joint in the craft. If you learn how to cut only one kind of joint this year, this should be the one.

& TENON

It's hard to imagine a joint more basic to woodworking than the mortise and tenon. For centuries, woodworkers have used it in wooden frame construction, from massive post-and-beam structures to the delicate doors of glass-fronted display cases. Cultures as different as those of Europe and Japan developed remarkably similar systems of joinery based on the mortise and tenon, a heritage they share with numerous other cultures around the world.

It's not hard to understand why woodworkers in so many far-flung places would all arrive at the same method of constructing a frame. It's a simple and elegant solution—the end of one frame member (the tenon) fits snugly in a slot or hole cut in another member (the mortise). A well-made mortise-and-tenon joint has great shear strength, and it's as strong in

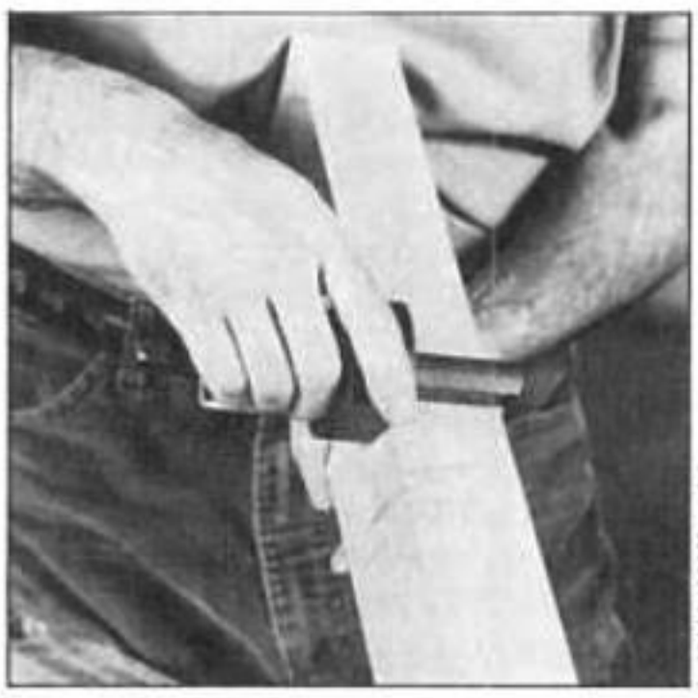
FIG. 1: TWO THROUGH MORTISE-AND-TENON JOINTS



DRAWINGS BY SALLY CINDRA

1. Mark mortise placement with a pencil and a try square. Be sure your stock is square or your joints will fit poorly.

2. Scribe the shoulders of a tenon by running a sharp knife against a try square.

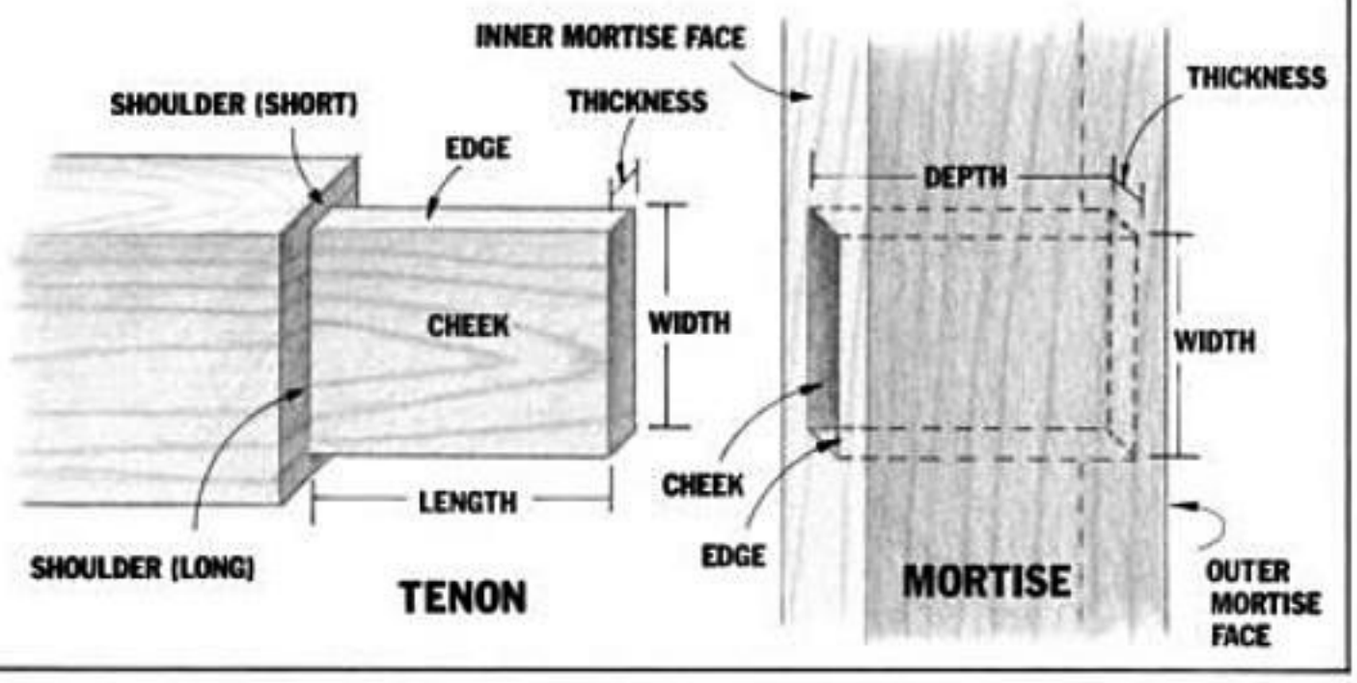


3. Scribe the cheeks of the mortise and tenon with a marking gauge or mortise gauge—this is simply a marking gauge with two pins, one adjustable and one fixed.

PHOTOS BY SCOTT LANDIS

MITCH MANDEL

FIG. 2: ANATOMY OF A MORTISE & TENON



4. Remove the mortise waste on the drill press. Drill from both sides for a clean mortise.

compression as the wood itself. Pinned, wedged or glued together, it's virtually impossible to pull apart. Although new materials, fasteners and glues have lessened our dependence on the joint, it's still indispensable to anyone making quality woodwork.

In this article, I'll explain how to make two basic types of mortise-and-tenon joints: a wedged, through tenon and a keyed tenon. (See Fig. 1.) There are many variations on the mortise-and-tenon joint, but the two I've chosen have a wide variety of uses. Each type has its merit: a wedged joint is decorative and strong—even without glue. A keyed joint is also strong, but easy to disassemble. It's useful for knockdown construction. If you're looking for a project to practice on, the trestle table accompanying this article features both of these joints; and I'll refer to the table in the following discussion.

Despite its simplicity, a mortise-and-tenon joint can be a maddening thing to talk about. There's no set terminology, but Fig. 2 shows the terms I've chosen to call the parts. Like many inherently simple things, mortise-and-tenon joints can take very complex forms. Some of the Japanese timber-framing joints are wondrous affairs, worth making just for the challenge, if nothing else. But beneath the complexity lies the same basic idea. If you learn to lay out and cut a simple version, you'll know much of what you need to make the more complex versions.

There are many ways to cut mortises and tenons, from chisels and handsaws to horizontal boring machines and double-end tenoners. Between these extremes come alternative methods involving the bandsaw, tablesaw, router, shaper, drill press and all sorts of ingenious (and sometimes wacky) jigs and fixtures.

I make mortises by clearing most of the waste on the drill press and finishing the job with paring chisels. I cut the tenons on the bandsaw and tablesaw, then fit them, if necessary, with a shoulder plane. The method is safe and serviceable.

No method, however, offers a better insight into the mortise-and-tenon joint than cutting it with hand tools. I encourage you, before you start to devise your own special machine jigs, to take some time and try cutting a few joints with a backsaw and chisels.

Proper Proportions

The proportions and placement of mortises and tenons vary according to the type of piece being built and where the joints are located. As a general rule, a tenon should be centered within the thickness of the stock and a bit thicker than one-third the stock thickness. However, if the mortised member is thicker than the tenoned member, as is the case with the upright and stretcher in the trestle table, the tenon can also be proportionally thicker.

If the location permits, tenons can also be the full width of the stock. Most of the time you'll want to cut shoulders on the edges. These short shoulders add a bit more racking resistance. They also hide any bruises created when chopping the mortise edges.

Step 1: Laying Out the Joint

Start by milling all the parts to size. Make sure that the faces and edges of the stock are flat and square. Mill a few scrap pieces to the same width and thickness as the tenoned pieces; you'll use these later when setting up the bandsaw for the cheek cuts.

Lay out the joints with a try square and marking gauge. To ensure that the layout marks are square and consistent, mark one face and an adjoining edge of each part in some way—I make a squiggle on the face and join it to a "V" on the edge, as shown in the photos—and always place the square or gauge against those surfaces. (The marking surfaces are often called the "working" face and "working" edge.) It's also good practice to lay out joints on identical pieces at the same time.

First, mark the mortise width with a pencil and try square, as shown in the photos on page 21. These are through mortises, so you have to mark them on the bottom as well as the top edge. As the trestle table drawing shows, wedged, through mortises taper, the outside face opening of the mortise being wider than the inside face opening; driving the wedges home at assembly spreads the tenon, making the joint impossible to pull apart.

Next, mark the tenon shoulders. A pencil line is too thick and imprecise for these, so I run a sharp, thin knife against the square, as shown in the photo.

To scribe the mortise and tenon cheeks, you can use a single-pin marking gauge or a mortising gauge—which has two pins, one fixed and one adjustable—that can be set to the thickness of the tenon. If the working faces on the mortised-and-tenoned piece are supposed to align (as with the members of the table's trestle leg), you can scribe both the mortise and the

5. Once you've removed the major portion of the waste from the mortise on the drill press, pare the excess away with a chisel.

6. Cut the cheeks of the tenon on the bandsaw. Keep one working face of the stock against the fence and adjust the fence for the second cut.

7. Cut the shoulders on a tablesaw, making sure your miter gauge is set accurately 90° to the blade.

tenon cheeks with the same gauge setting. Remember to scribe through mortises on both sides of the stack. Because I bore out the waste from the mortises, I also scribe centerlines to position the bit. (Hold off marking the tenon width, otherwise you'll cut the marks off with the waste from the cheeks.)

Step 2: Cutting the Mortises

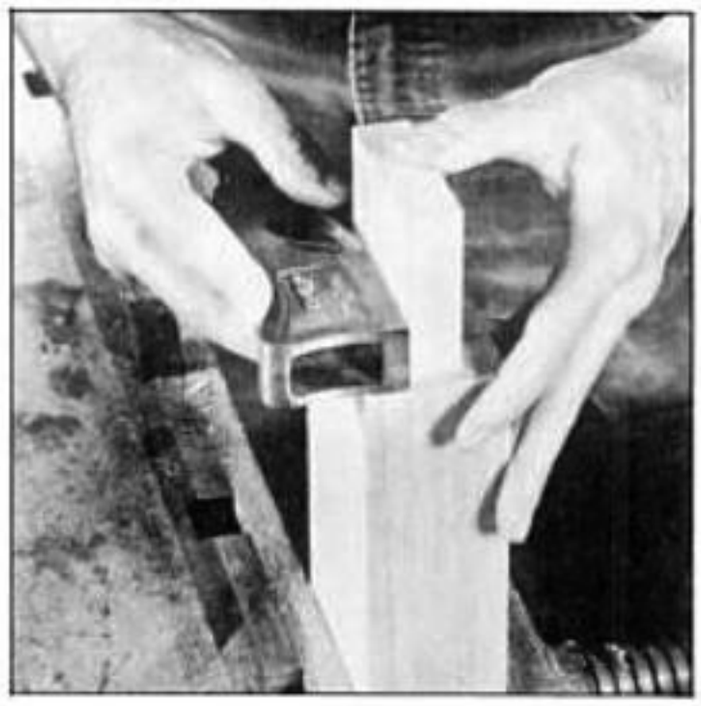
It's easier to fit a tenon to a mortise than the other way around, so cut the mortises first. I clear most of the waste on the drill press with a bit equal to or just slightly less than the thickness of the mortise. (See photo on page 22.) Bore the holes at each end of the mortise first, then clear the center as best you can. Don't worry about leaving thin bridges of wood here and there; they're easy to chop out. To avoid splintering the outside face of a through mortise, bore from both faces. If you're cutting a tapered mortise for a wedged tenon, drill out only to the smaller mortise width. If you don't have a drill press, a brace and bit will get the job done, but it will take a little longer.

With a wide, sharp chisel, pare the remaining waste off the mortise cheeks. Work from both edges, positioning the chisel in the scribe marks for the final cut. I guide the chisel with my left hand and power it with my right, as shown in the photo above. Strive for flat cheeks, parallel to the faces of the stack. Use a narrower chisel to pare the end grain and taper of the mortise edges in the same way. (A chisel that's the same size as the thickness of the mortise is ideal.)

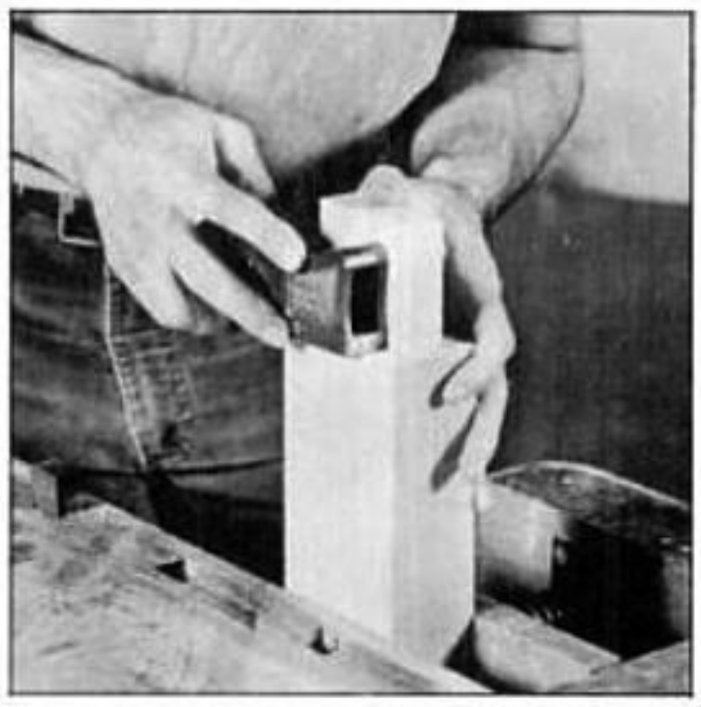
Step 3: Cutting the Tenons

I think cutting the tenon cheeks on the bandsaw is safer than cutting them on a tablesaw. It's easier to control the workpiece, and the thin blade creates a lot less resistance. A sharp, 1/2-in. wide blade in a well-tuned bandsaw is best, but a sharp 1/4-in. blade will do. Dull blades can wander or otherwise make a mess.

The technique is simple. Set the rip fence to cut one cheek of the tenons on all the pieces, working face against the fence. (See photo above.) Then reset the fence for the second cheek. *Don't* make the mistake of flipping the pieces over and cutting both cheeks with the same fence setting—any differences in stock thickness will make for variations in tenon thickness. By making trial cuts in one of the milled pieces of scrap, I fine-tune the fence settings. Make the tenon fit snugly, if possible. Otherwise, make it slightly oversize—



8. If the tenon's too tight, narrow it down carefully with a shoulder plane. Be sure to take material off both sides of the tenon.



9. Clean up the shoulders of a tenon with a shoulder plane. See that the blade is set evenly to get a sharp 90° cut.

10. To glue up the wedged tenon, insert the glue-covered tenon in the mortise, clamp the joint home and gently tap the wedges in. Stop tapping the wedges when the tenon is fully spread.

it's much easier to take wood off later than to put it back on. For keyed joints (such as the ones on the trestle table stretcher) cut the tenons slightly thick, so you can clean off the saw marks later.

Cut the tenon shoulders on a tablesaw, as the photo on page 23 shows. Set the miter gauge very accurately at 90° to the blade. Unfortunately, you can't place the working edge against the gauge fence for both shoulder cuts, so it pays to mill the stock carefully when you start. With the waste gone from the cheeks, mark the edges of the tenon and cut them on the bandsaw. It's easier to fit a joint if the tenon is just slightly narrower in width than the mortise. Then return to the tablesaw to cut the short shoulders.

Step 4: Fitting and Assembly

No matter how carefully you set up the machines, the joints are likely to need a little fiddling before they fit as well as they should. The ideal tool for this job is a shoulder plane. Mine is a compact steel rectangle, its blade extending all the way across the 1-in. wide sole, allowing me to plane right into the juncture of shoulder and cheek. Shoulder planes, sometimes called rabbet planes, are available from most mail-order tool suppliers. Unfortunately, they're expensive. If you can't afford a shoulder plane, you'll have to make do with paring chisels, but they're a poor substitute.

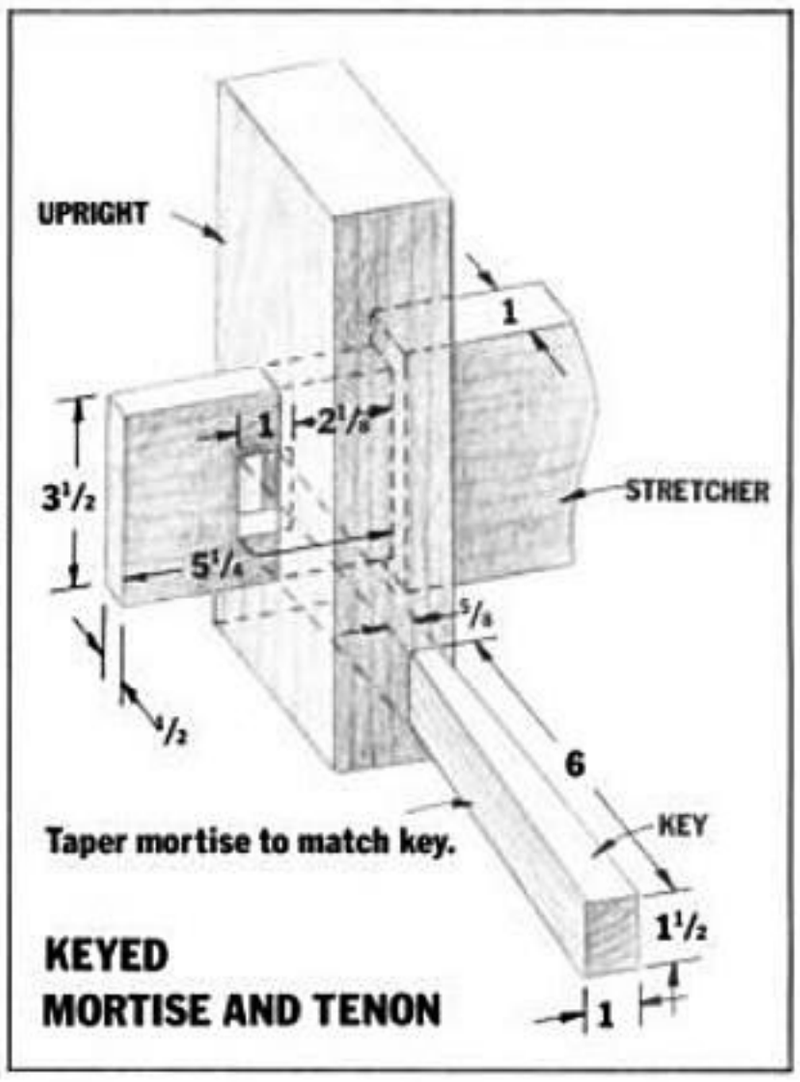
If a tenon is too thick, plane it down. Use a shoulder plane near the shoulder (so you can get into the corner). A block plane will do fine for the rest of the cheek. (See photo.) (As you fit the joint, check the mortise cheeks for high spots too, and pare them off with a chisel.) Check your progress frequently, and take equal amounts off both tenon cheeks, otherwise the faces of

TRESTLE TABLE

This simple trestle table is a great project for honing your mortise and tenon skills—it uses both the wedged tenon and the keyed tenon.

If you'd like to make something more than sample joints as you practice cutting mortises and tenons, you might try the trestle table shown here. The trestle legs are assembled with wedged, through tenons and are joined to the stretcher by a knock-down, keyed tenon. The slab top is merely screwed to the trestles. (Slots for the outer screws allow for it to expand and contract with changes in humidity.)

The design is loosely based on several Shaker tables I've seen. I tried to keep things simple and nicely proportioned. When I built the table shown in the drawings, I combined an oil-finished cherry tabletop with a poplar trestle painted deep green. As the top ages to a rich russet color it should nicely complement the base. The folks at AMERICAN WOODWORKER scaled up the drawings to make a larger version of the table (shown in the photo).—*R.H.*



the parts won't finish flush.

Tenons that are too thin are a pain. If the difference is slight, you can glue a thin veneer to one cheek and trim the other cheek until the joint fits. Greater errors require thicker packing pieces, glued to both cheeks to avoid misalignment, then fitted to the mortise. If a tenon is too thin, think seriously about starting over.

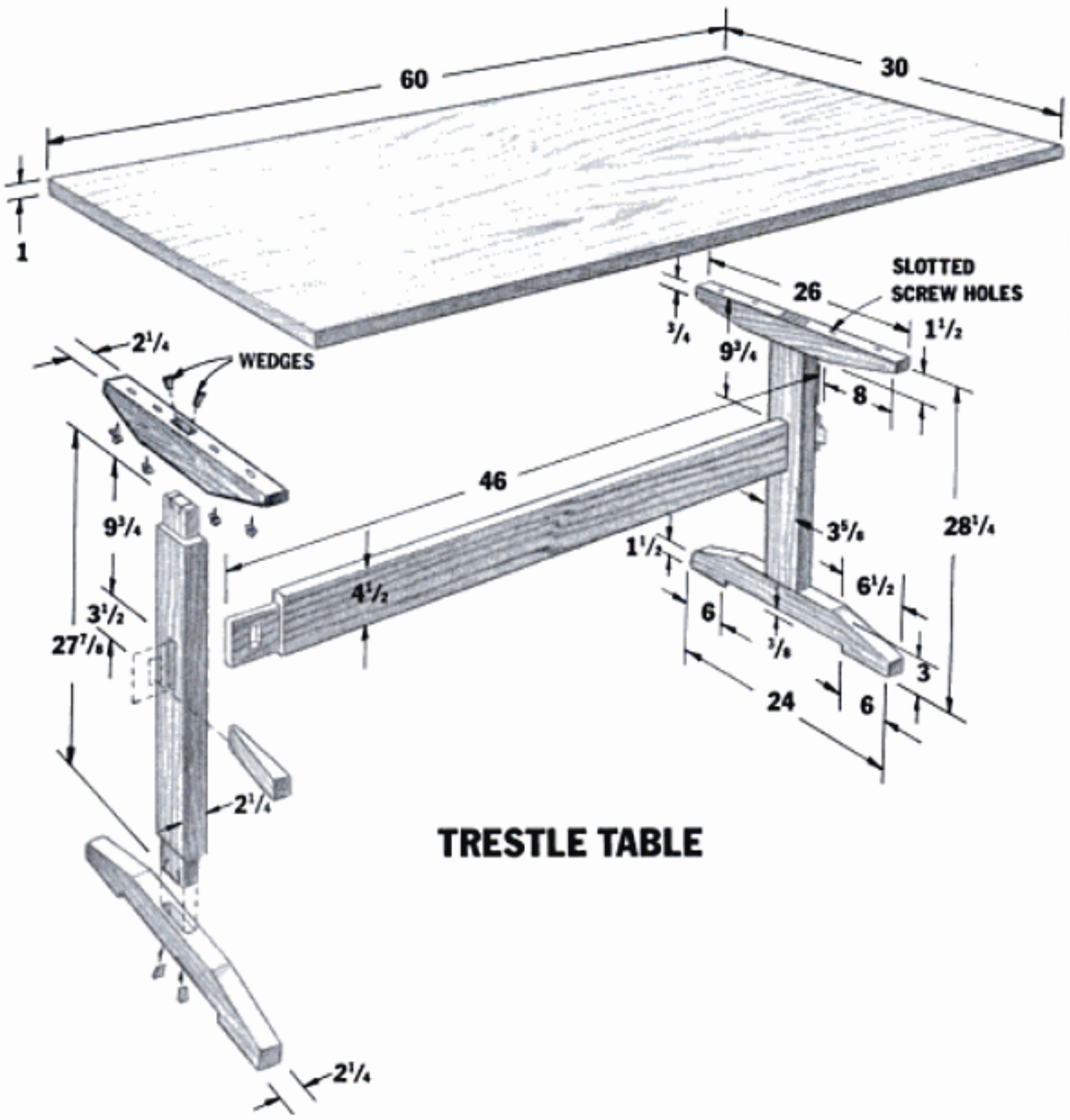
Once you get the hang of cutting mortise-and-tenon joints, you probably won't need to fool too much with the cheeks. But because even a tiny gap in the shoulders is noticeable, you'll regularly spend time fitting them. Fortunately, it's easy to do with a shoulder plane. If the knifed lines are still evident, plane down to them. (See photo.) If not, check to see if the shoulders are 90° to the working edge and, with the square against the working face, check to see if both long shoulders align. Plane to correct any faults, then try to push the joint home. Mark any remaining high spots with a pencil, disassemble the joint and plane them off. As you proceed, check matching parts, such as the trestle uprights or pairs of rails and stiles in a door frame, to make sure that the distance between shoulders is the same.

When the joints fit, cut the slanted kerfs for the wedges on the bandsaw. (See sidebar illustration.) By cutting diagonally across the grain of the tenon, the chances of a wedge splitting the tenon stock are decreased. (It's a slim chance anyway.) Also, the thin section of wood near the shoulder of the tenon forms a sort of hinge and makes it easier to drive the wedges. On keyed tenons, make the key first. Then scribe and drill the waste out of the key's mortise. Clean the mortise up with paring chisels, angling the outer cheek of each mortise to match the taper of the key.

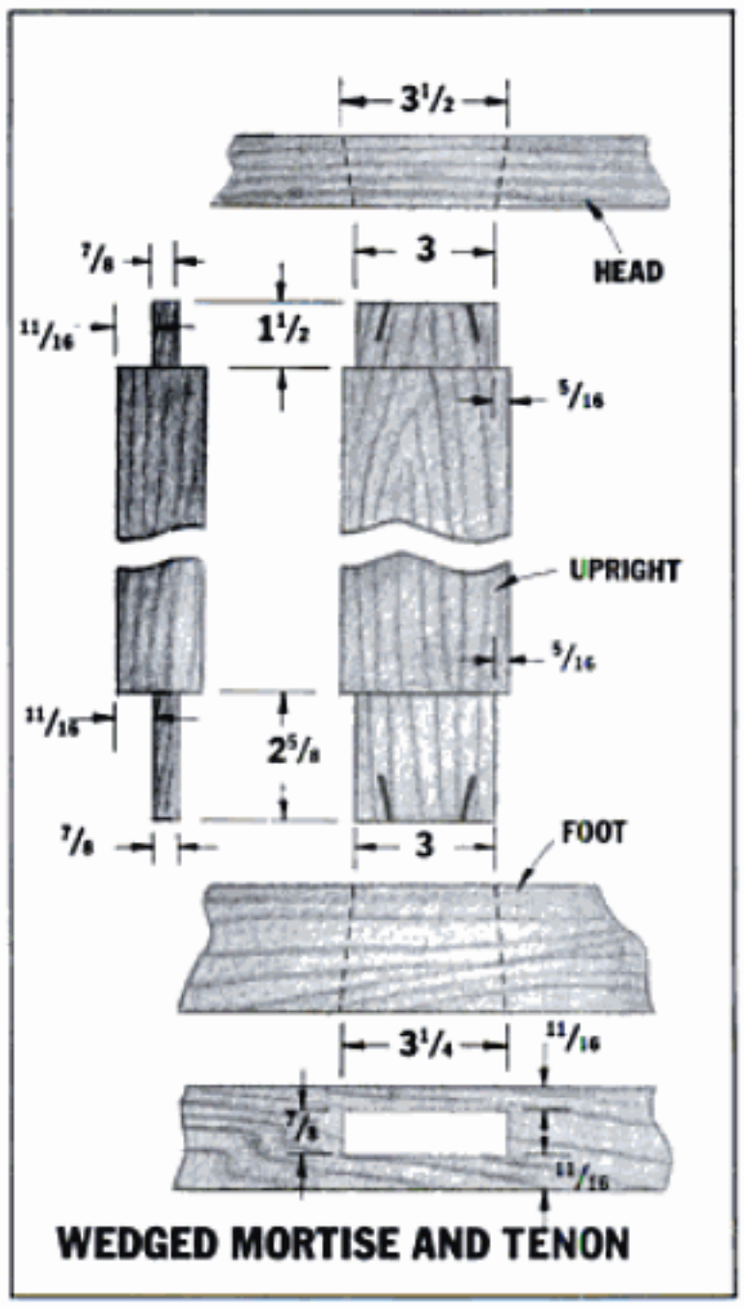
Assembly of these two joints is simple. The wedged tenon doesn't require glue, but I glue it anyway as extra insurance against gaps at the shoulders. Size the wedges according to the lengths of the kerfs cut in the tenon and the taper of the mortise. Make sure they aren't too long and thin or they'll bottom out in the kerfs before the tenon is fully expanded. Apply glue to the tenon and mortise cheeks and push the joint together. I draw the shoulders tightly against the inner mortise face with clamps before driving the wedges. Dab the end of the wedges in a little glue and drive them into their kerfs, alternating blows of the hammer. (See the photo on page 23.) When the glue has cured, remove the clamps and clean up the faces with a sharp hand plane.

Assembling the keyed mortise-and-tenon joint is as easy as a couple of solid raps on the key. ▲

Roger Holmes works wood in western Connecticut.



TRESTLE TABLE

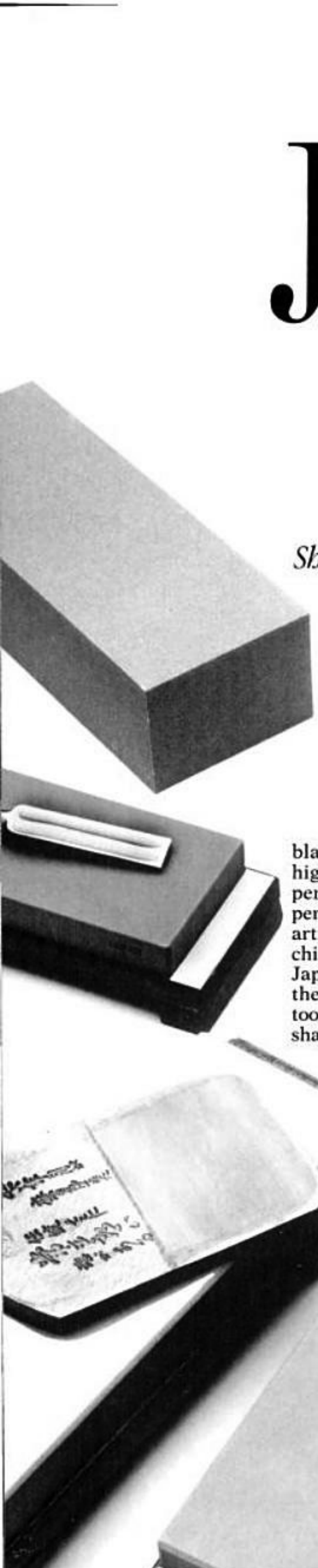


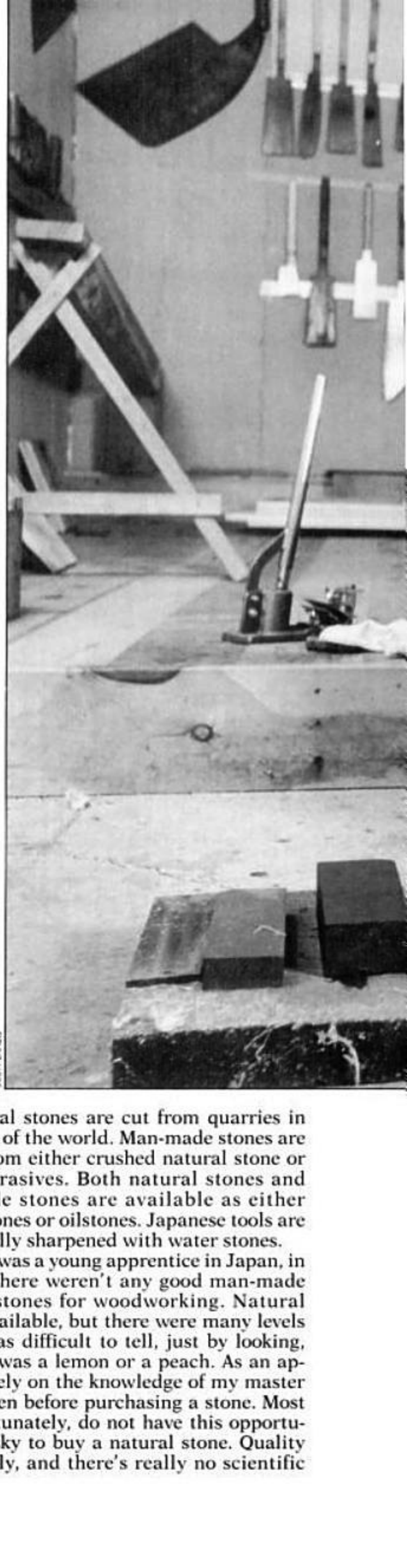
WEDGED MORTISE AND TENON

JAPANESE BLADES

Sharpening Plane Irons and Chisels: A Craftsman's Approach

BY TOSHIO ODATE





SCOTT LANDIS

Every craftsman who works with Japanese tools dreams of owning high-quality blades forged by a great blacksmith. It's important to remember that these high-quality tools need high-quality sharpening to perform at their best. Even lower-quality tools will perform well if they are sharpened correctly. In this article, I'll explain how to sharpen plane blades and chisels. I will talk mainly about Japanese tools, but Japanese and Western blades are sharpened basically the same way. Once you understand how Japanese tools are sharpened you will also understand how to sharpen Western tools. Let's begin with the sharpening stones themselves.

Sharpening Stones—There are two kinds of sharpening stones—natural and man-made. Natural stones are cut from quarries in Japan and other parts of the world. Man-made stones are manufactured from either crushed natural stone or synthetic abrasives. Both natural stones and man-made stones are available as either water stones or oilstones. Japanese tools are traditionally sharpened with water stones.

MITCH MANDEL

PLANE BLADE COURTESY OF GARRETT WADE CO.

When I was a young apprentice in Japan, in the 1940s, there weren't any good man-made sharpening stones for woodworking. Natural stones were available, but there were many levels of quality. It was difficult to tell, just by looking, whether a stone was a lemon or a peach. As an apprentice, I could rely on the knowledge of my master and other craftsmen before purchasing a stone. Most Westerners, unfortunately, do not have this opportunity, making it risky to buy a natural stone. Quality varies considerably, and there's really no scientific

Author Toshio Odate sharpens a plane blade on the floor of his shop in traditional Japanese fashion. The tools and techniques for sharpening Japanese blades apply to Western tools as well.

way to judge a natural stone until you use it.

Fortunately, there is an excellent selection of quality man-made water stones on the market today, and these are the stones I recommend. King- and Suehiro-brand waterstones are widely available in a range of grits from coarse 200X to 400X "green stones" for restoring a worn or damaged edge, to very fine 8000X finishing stones. I also use an Arashiyama brand 8000X finishing stone. It's made from crushed natural stone and is a little softer than the other brands.

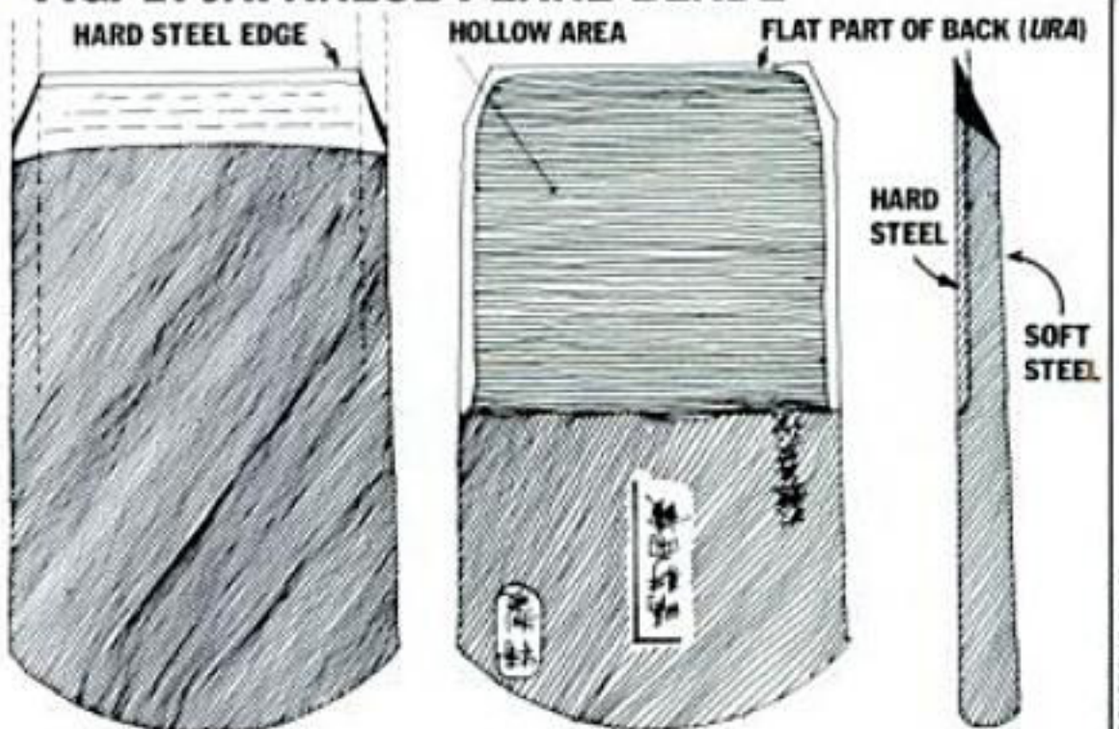
I like to use as many grits as possible when I sharpen my tools, but you can usually get away with a set of four water stones. A set could be 400X, 600X, 1000X and 6000X or 400X, 800X, 1200X and 8000X.

Japanese Blades—Japanese tools and Western tools are sharpened in basically the same way, but the methods to produce the blades are quite different.

The Japanese plane blade is laminated with a very

CONTINUED ON PAGE 31

FIG. 1: JAPANESE PLANE BLADE



Plane blades and chisels have thin, hard steel welded to soft steel.

DRAWINGS BY TOSHIO ODATE

JAPANESE PLANES & CHISELS:

HONING THE EDGE

Follow this sharpening procedure for a blade that is badly damaged, worn or chipped. If your blade is just dull, and the *ura*—the flat area at the cutting edge on the back side of the blade—remains (see Fig. 1), you can skip Steps 1 through 3 and go directly to Step 4.

1. Carefully flatten the back of the blade with carborundum powder and water on a flat steel lapping plate, (called *uraoshi* or *kanaban*) as explained on page 29.

2. When the back is flat, restore the bevel angle and remove any chips by honing the bevel on a coarse 200X to 400X "green stone." Hold plane blades as shown in the photo at top right. Hold chisels as shown in the photo at right. When the bevel angle is right and the chips are gone, wash the blade.

3. Hone the bevel on a 600X or 800X stone until the only burr that remains is small and even. Wash the blade well.

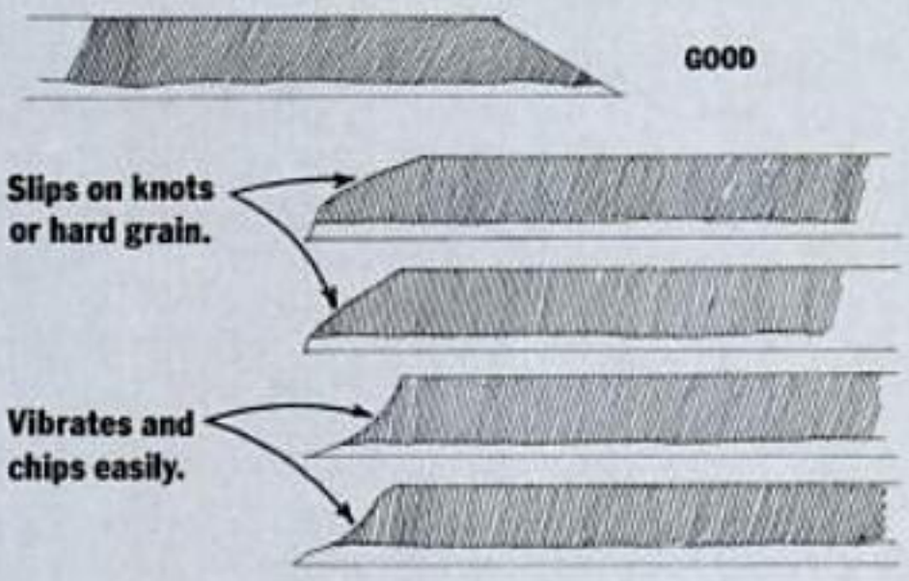
4. Hone the bevel on a 1000X to 1200X stone. When the bevel is flat, wash the blade well.

5. Hone the bevel on a 6000X stone until it is completely polished and flat.

6. Rub the flat back of the blade on the 6000X stone to remove the burr and straighten out the edge. Hold the blade as shown in the photos (at right) and press the bevel evenly. Rub 20 to 30 times with the back completely flat on the stone. Alternate between bevel and back until no burr remains and the cutting edge is straight.

7. For a sharper edge, repeat Steps 5 and 6 on an 8000X finishing stone.

BEVELS



PHOTOS BY DAVID SLOAN

Hold the plane blade in your right hand with the index finger extended. Place the first three or four fingers of your left hand in the space between the right thumb and index finger. Place the left thumb under the blade. The palm of your hand should not be touching the blade. Keep the bevel steady as you rub back and forth on the stone. ▼ ▶

▲ **Hold chisels at an angle to the length of the stone to keep the bevel from rocking. Apply pressure with the index and second finger of your left hand.**

◀ ▲ **Remove the burr by rubbing the back of the blade on the finishing stone. Hold the blade with your right-hand fingers around underneath and the thumb extended to press the top of the bevel. Bridge the thumb with the fingers and thumb of your left hand so you can apply even pressure on the bevel.**

JAPANESE PLANES & CHISELS:

FLATTENING THE BACK

As you use a blade, the edge becomes dull and sometimes chipped. After many sharpenings, the *ura*—the narrow flat area behind the edge—will be worn away. When this happens, you must re-create it.

Plane Blades—For plane blades, the flattening process has two steps: tapping out the hollow back of the blade with a hammer or a blade hammering tool and then reflattening the back of the blade on a steel lapping plate called a *kanaban*. Here's how Japanese craftsmen restore the *ura*.

Place the blade bevel up on the corner of an anvil or the end of a hardwood block, as shown in the photo and drawing. Strike near the top of the bevel with the corner of a small, 10-oz. to 12-oz. hammer. Make sure that when you strike the bevel with the hammer the point of impact and the anvil corner underneath are all in a line. (See drawing.) Make sure the blade rests solidly upon the anvil. If there is a slight space between the blade and the anvil, it creates a vibration that might crack the blade.

First, tap firmly across the width of the blade near the top of the bevel, as shown in the drawing. Move the blade between taps to reposition the anvil corner underneath the hammer. Do not strike too hard or too close to the hard steel. Many craftsmen, including myself, have made this mistake and ruined a beautiful blade.

After hammering the top of the bevel, strike a second row of lighter taps across the middle of the bevel. Finally, strike a row of light taps near the edge, as shown in the drawing. Be careful not to hit the hard steel at the edge.

After completing the third row, hold the blade up to reflect some light off the bevel. Your tap-

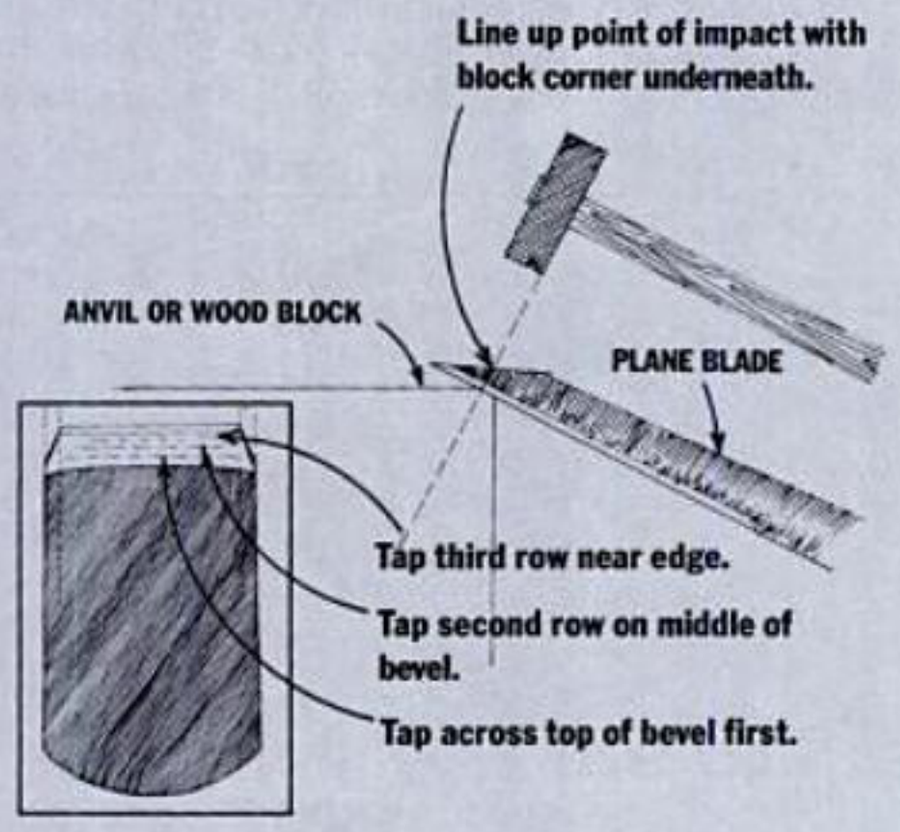
To re-create the flat spot on the back side of a plane blade, tap across the bevel with the corner of a hammer. The point of impact for each blow must line up with the corner of the block underneath.

◀ With a hammering tool, you don't have to worry about breaking the blade with a misdirected hammer blow. A clamp holds the blade steady while you tap with the bar.

▼ After tapping, flatten the back of the blade on a steel lapping plate with carborundum powder and water. For leverage, back up the blade with a piece of wood.

◀ When the flat spot is even, gather the carborundum paste in the center of the plate, add a few drops of water and continue rubbing as hard as you can until the plate is dry.

TAPPING OUT PLANE BLADES



JAPANESE PLANES & CHISELS:

FLATTENING THE BACK

ping should have produced a very delicate concave bevel—the curve is so slight that you can see it only in this reflected light. If you don't see this curve, repeat the tapping process.

About 10 years ago, I tried a new hammering tool that was introduced to the market. The results were terrific. Even though I had managed to hammer by hand all these years I always felt nervous each time I went to hammer. I have cracked two blades in my life, and I have many regrets about it. With the hammering tool, I have greater control and accuracy to hammer very close to the hard-steel edge. I can hammer gently or very hard and tap perfectly even rows across the bevel. I have used a couple of hammering tools, but I like the one in the photo the best (available from Garrett Wade, see SOURCES).

◀ **The flat back of the blade should shine like a mirror when you wipe off the carborundum paste.**

▲ ▼ **You don't need to tap out the backs of chisels. Rub the back flat on the lapping plate with a little more pressure toward the edge. On narrow chisels, you only need to apply pressure with your fingers. Hold narrow chisels at an angle so they don't rock.**

When the blade has been tapped out, the back of the blade will be slightly convex near the edge. The back must then be ground perfectly flat. To do this you must rub the back of the blade on a flat steel lapping plate (called *uraoshi* or *kanaban*) that's been sprinkled with carborundum powder and water. The *kanaban* is made out of a relatively soft steel. When the carborundum powder is rolled and pressed between the blade and the plate, the powder is embedded in the soft steel plate, making the *kanaban* a carborundum abrasive plate. The plate remains flat. You cannot use a regular sharpening stone to flatten the back of the blade. The stone is so soft it will not remain flat.

Sprinkle a pinch of 90X carborundum powder and a few drops of water on the plate. For leverage, back up the blade with a piece of wood, 1/2 in. to 3/4 in. thick, 2 to 2 1/2 in. wide and 10 to 12 in. long, holding the blade and the wood, as shown in the photos at left.

Start rubbing the back of the blade, using a little pressure at the beginning to try and mix the carborundum powder with the water so the powder sticks to the plate. When the abrasive becomes embedded in the plate, apply more pressure and continue rubbing for a few minutes.

Wipe the carborundum paste off the blade. The flat area between the cutting edge and the hollow should be even, but rough and dull. Gather up the carborundum paste on the plate and push it toward the middle. Add a few drops of water, and rub the back again. This time, press on the blade as hard as you can, and keep rubbing until the plate is dry.

Look at the back again. If it is as shiny as a mirror, you are finished. If not, repeat the process again. The shinier you can make the flat *ura*, the finer the cutting edge will be. Carborundum powder is available in grits ranging from 90X through 600X. 90X is okay for normal circumstances. For a roughly finished or uneven new blade and for the coarsely ground or rounded backs of Western blades, you need a very coarse powder like 50X. Be especially careful that you do not use this coarse 50X powder all the time; it is too rough on the blade back. It is also a good idea to save the dry paste from a 6000X or 8000X stone and use it as a finishing powder on the *kanaban*.

Chisels—When the flat back disappears on a chisel blade, you do not have to hammer it out. You simply rub it on the *kanaban* plate with carborundum powder. Keep the blade flat on the plate, but apply a little more pressure toward the edge. When a blacksmith makes a chisel blade more depth is put in the hollow of the back than is put in a plane blade. This helps to keep the hollow throughout the chisel's life.

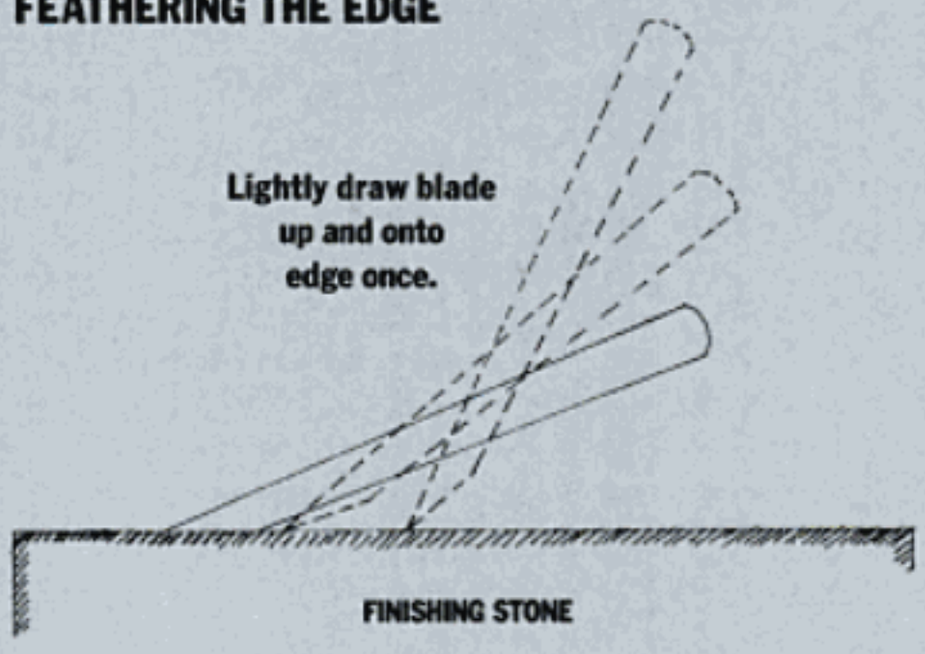
When you are flattening the backs of narrow chisels, you need only apply pressure with your fingers. Hold narrow chisels at a 45° to 60° angle to the length of the plate. This makes the chisel less likely to rock on the plate.

FEATHERING THE EDGE

New Japanese plane and chisel blades often come with a cutting edge that is a little too hard. This is a temporary condition. When you have sharpened such a blade, and used it once or twice, you may notice some very fine nicks or chips across the edge. When this happens, you must "feather" the edge next time you sharpen.

To do this, sharpen the blade as usual, finishing up on your finest finishing stone. Then, "feather" the edge very slightly by drawing the blade up and onto the edge once, as shown in the drawing. Then rub the back flat on the stone once. Feather the edge each time you sharpen the blade, then use the tool vigorously. After a week or so of regular use you should be able to sharpen the blade normally, without having to feather it. Since rounding the edge makes the blade a little less sensitive, you should only use the feathering technique when you have to.

FEATHERING THE EDGE



Chipping can also be caused by the wood. Common woods in Japan, such as pine, cedar, and Japanese cedar, often have particles of silica embedded in their fibers. This silica can cause blades to chip in a way that is similar to the chipping of the very hard edge of a new blade. The feathering technique can also prevent this kind of chipping. Also, before you decide to feather your blade think about what kind of wood you are using. Most Japanese blades have a bevel angle designed for soft woods such as pine and cedar. If you use them on hardwood you will often nick the blade. In this case you should make the bevel angle larger to prevent chipping.

SOURCES

Water stones, *kanaban* plates, carborundum powder and Japanese woodworking tools are available by mail from:

GARRETT WADE, 161 Ave. of the Americas, New York, NY 10013, (800) 221-2942.

HIDA TOOL & HARDWARE CO., 1333 San Pablo Ave., Berkeley, CA 94702, (415) 524-3700.

HIGHLAND HARDWARE, 1045 N. Highland Ave. NE, Atlanta, GA 30306, (800) 241-6748.

LEE VALLEY TOOLS LTD., 1080 Morrison Dr., Ottawa, Ontario, Canada K2H 8K7, (613) 596-0350.

WOODCRAFT, 210 Wood Country Park, P.O. Box 1686, Parkersburg, WV 26101, (800) 225-1153.

THE JAPAN WOODWORKER, 1731 Clement Ave., Suite 200, Alameda, CA 94501, (415) 521-1810.

CONTINUED FROM PAGE 27

hard steel on the back of the blade—the side that forms the cutting edge. A thick, soft steel makes up the rest of the blade. (See Fig. 1.) The Japanese blade is slightly hollow on the flat, backside of the blade. This lessens the amount of steel that must be removed to keep the back of the edge flat and true, but this construction requires some additional steps to maintain the flat back of the blade. (See page 29.) Flattening is the most difficult part of conditioning a Japanese blade.

Sharpening—If the edge is damaged or badly worn, you must first flatten the back of the blade before sharpening. When the edge is merely dull from regular use, sharpen by honing the bevel on a 1000X or 1200X stone, then proceed to a 6000X stone and an 8000X stone. The flat back of the blade is honed only on the 6000X and 8000X finishing stones to remove the fine burr. The sharpening procedure is shown on page 28.

A word about grinding; Don't grind Japanese blades on high-speed grinders—it's too easy to burn the edge. Coarse 200X to 400X "green stones" remove metal almost as quickly as a grinding wheel when you need to reshape a bevel. If you must grind a tool, use a slow-speed, water-cooled wheel.

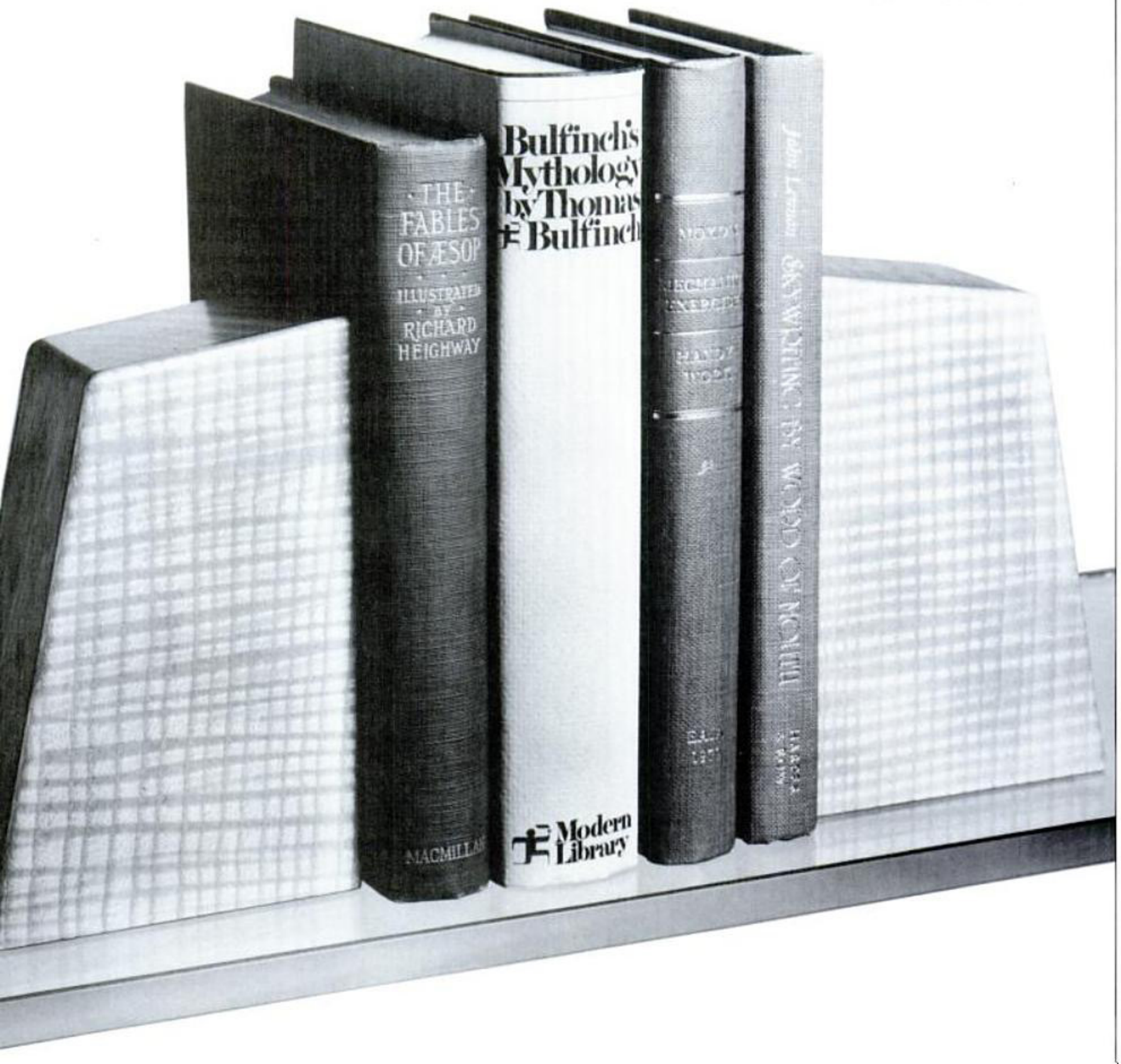
Once you have learned how to sharpen plane blades and chisel blades, you will understand the cutting edge well enough to sharpen most other types of woodworking blades as well. ▲

Toshio Odate is a noted sculptor and shoji *maker in Connecticut. He teaches sculpture at Pratt Institute in Brooklyn, New York and conducts workshops on Japanese tools. He is author of the book,* Japanese Woodworking Tools: Their Tradition, Spirit and Use *(1984, Taunton Press, 63 S. Main St., Newtown, CT 06470).*

LAMINATED BOOKENDS

A Novel Way to Support Your Favorite Books

BY ALAN PETERS



I designed these laminated bookends as a project for students when I was teaching woodworking back in 1962. They're weighted with lead, so they're heavy enough to support large books and to stay where you put them. Over the years, we've made many pairs of bookends in my shop, trying out different techniques and discovering what works best.

The bookends are layered like a sandwich. (See Fig. 1.) The middle or core piece is thick hardwood (chestnut for the bookends pictured here), and the face layers are a contrasting hardwood (rippled ash in the photo). Between the core and the faces are several thin layers of brightly colored, dyed veneer which form a decorative stripe. The bookends pictured here measure 6 in. high, 3¾ in. along the base, and 2 in. thick. The exact dimensions aren't important—you can vary the size and shape to suit your bookshelf and your eye.

There are a few construction tips to keep in mind. The bookends look best if you bookmatch the end grain of the tops of the two bookends by cutting them from the board as shown in Fig. 2. You can get a similar matching grain pattern on the face layers by resawing them from a piece of stock, as shown in the drawing.

The decorative stripe is made up of several layers of thin, dyed veneer (available from Constantine's, 2050 Eastchester Rd., Bronx, NY 10461). You can use any number of veneer layers to make the stripe as thick or thin as you like. In my shop, we use a veneer press to glue several layers of the veneer together into a large laminated sheet about 1/16-in. thick, then cut out as many pieces as we need in the shape of the bookends.

To weight the bookends, we drill in from each side of the core with a 2-in. dia. Forstner bit and fill the resulting cavities with lead. (See Fig. 1.) Years ago, when we first started making bookends, we poured in molten lead. Of course, the hot lead burned the wood. Today, we pour in a mixture of lead powder and a fast-setting epoxy resin which is much easier to work with. Lead shot is an alternative to lead powder. (Lead shot is available from gun shops that sell shotgun-reloading supplies, or by mail in 5-lb. bags—enough for at least two bookends—from: Target World, Inc., 529 W. Butler Ave., Chalfont, PA 18914, 215-822-3900.)

When you glue up the cores, veneers and faces, the slippery glue makes them hard to align. We've found it's easiest to cut all the pieces accurately to the same size first. Then apply the glue, stack the pieces together, and wrap some ¾-in. wide masking tape around the perimeter of the stack, stretching the tape to make it tight. This will keep the edges aligned as you apply the clamps.

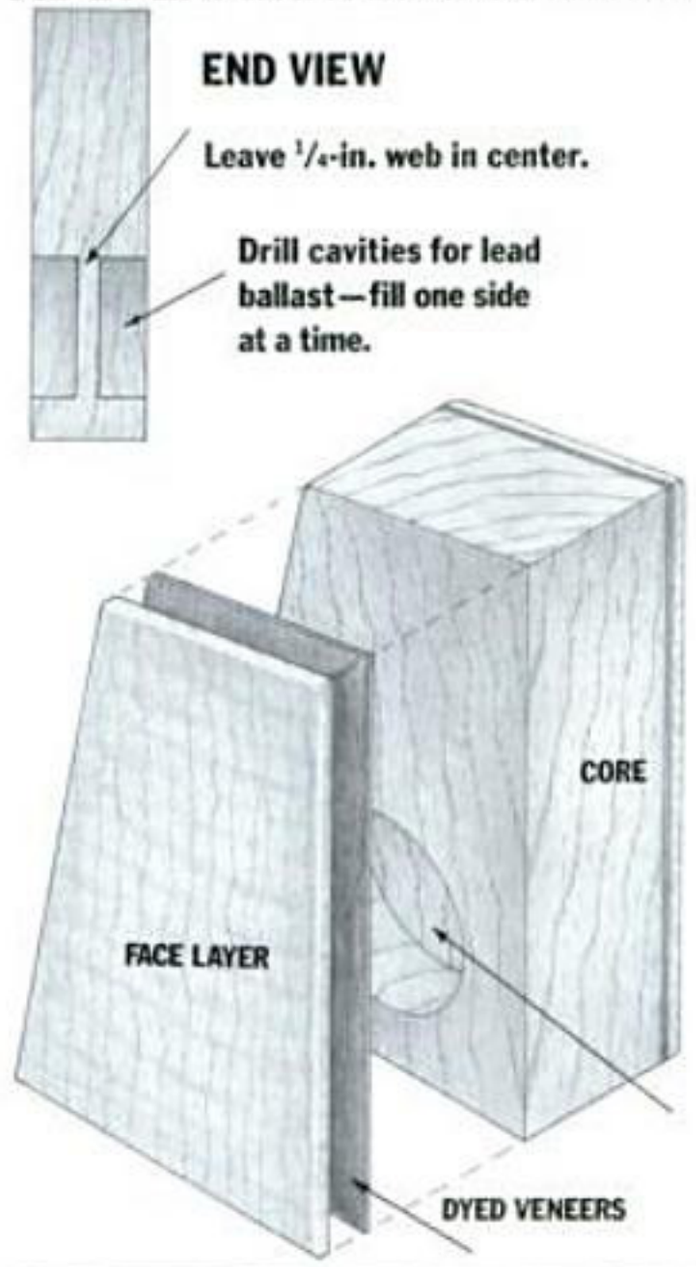
To distribute clamping pressure evenly, we use pieces of scrap stock, cut to the shape of the bookends, as clamping pads. I teach my students to round off the edges with a block plane. We finish most of our bookends with lacquer, but almost any finish would be appropriate. ▲

Alan Peters is a furniture designer and maker in England. In the summer of 1990 he was awarded the "Order of the British Empire" for his services to furniture design.

A pair of these laminated bookends will look nice on your bookshelf. They're weighted with lead, so they stay where you put them. Bright- red stripes of dyed veneer add a dash of color.

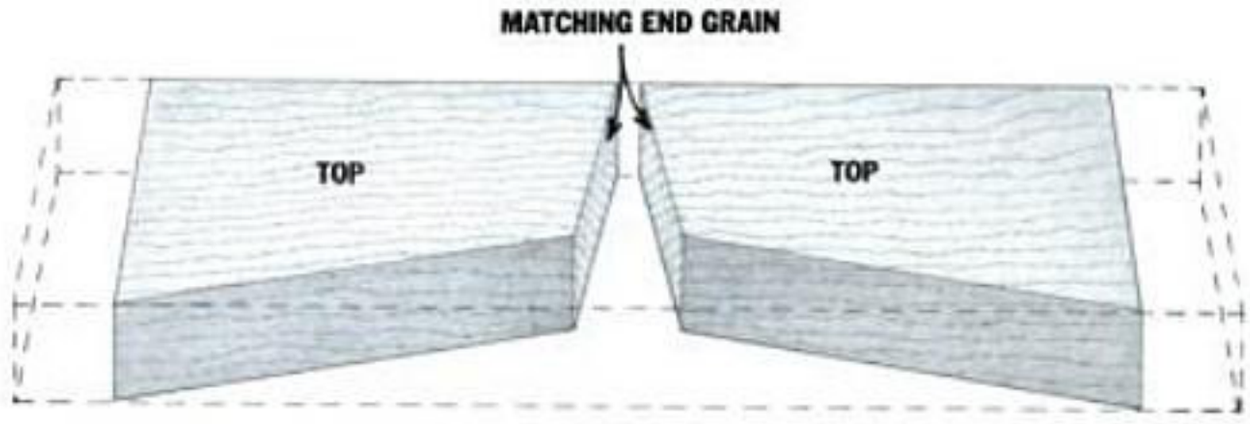
SALLY ULLMAN

FIG. 1: LAMINATED BOOKENDS



DRAWINGS BY KATHY IRBY

FIG. 2: MATCHING THE GRAIN



Cut bookend core pieces to bookmatch grain on tops.

Delight generations of children with this little rocker.

CHILD'S ROCKER

BY PETER HUTCHINSON

Recapture the Innocence of a Victorian Childhood

If you've avoided reproducing furniture classics because you feel your skills aren't up to it, here's a project that will open a new door for you. With only modest skills, you can build a *better* rocker than those built in Victorian times, when factories produced them by the thousands. This little rocking chair is more impressive than it is difficult.

Victorian factories developed designs that could be produced in quantity, and kept the price low by using duplicators, seat-dressing machines, boring and mortising machines. The designs were graceful but the quality was typical mass-production. With patience, your chair can be better than the Victorian original.

Making the Chair Parts

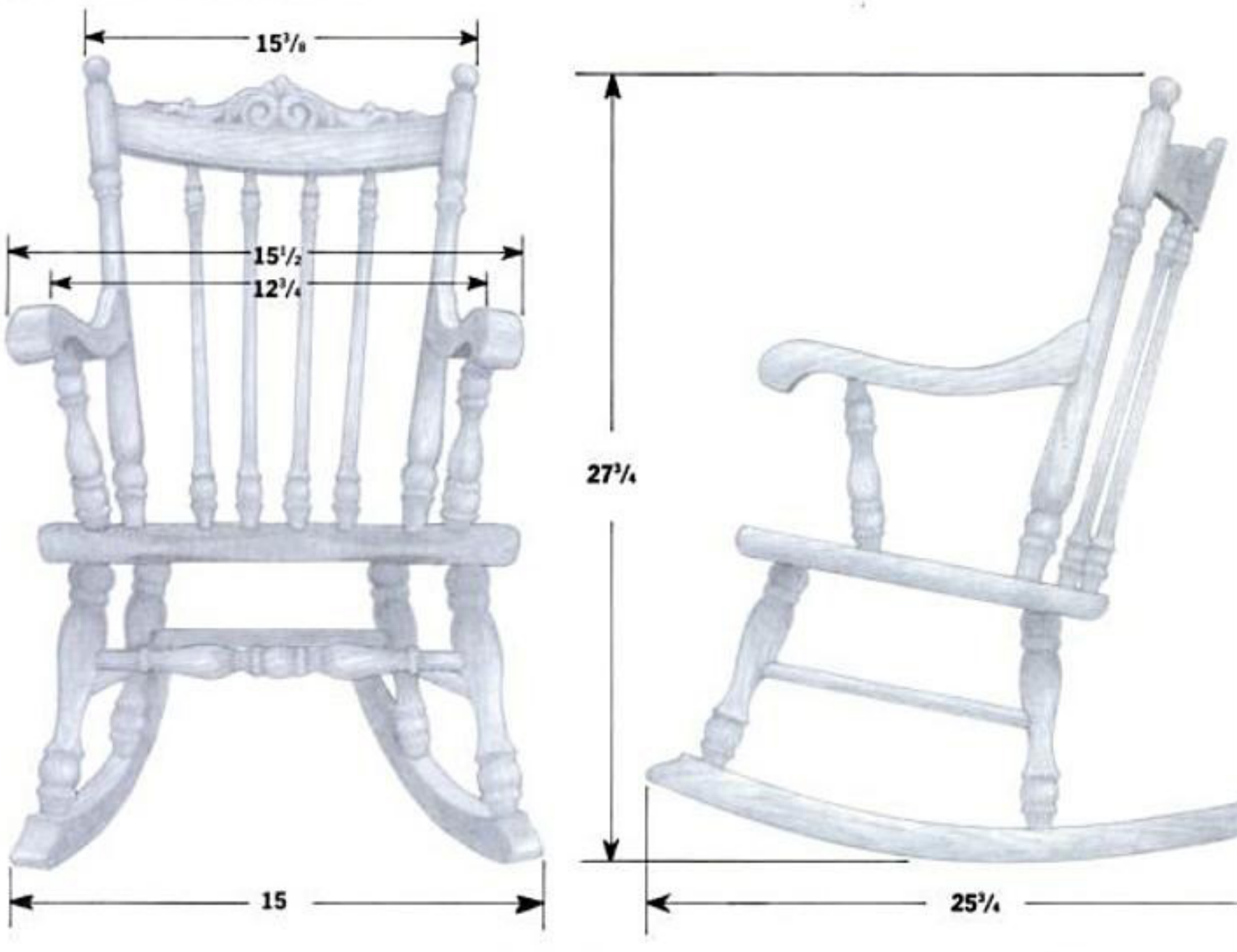
This rocker has 22 parts, 16 of which are turned spindles. The spindle turning is the quickest part of the project—boring the angled mortises for the spindles is the most challenging part. Most of the spindle turning is duplicate turning; there are only seven different spindle patterns. When making just one chair, the duplicates are best done freehand rather than with a duplicator lathe.

The Victorians chose beech, birch and other tight-grained woods for their chairs and then stained them a dark color. I made the entire chair out of walnut. Whatever wood you use, select only clear, straight-grained pieces.

Preparing the Spindles—Begin the project by squaring up turning blanks for the spindles. Leave them a bit thicker than the largest diameter of the spindle, so you'll be sure to get full diameter even if you mount them a bit off-center on the lathe. Bore all of the mortises in the legs before turning them: you'll need flat, square surfaces from which to measure angles. Since each of the four legs has a slightly different arrangement of mortises, boring them can be quite confusing. Begin by carefully studying Fig. 2, and lay out the mortises, as shown.

Using a 1/2-in. dia. bit, drill the four mortises for the

FIG. 1: CHILD'S ROCKER



DRAWINGS BY GLENN HUGHES

MITCH MANDEL

two side stretchers, as shown in Fig. 4. The mortises for the front and back stretchers are at compound angles. They can be tricky to cut, but a careful study of Fig. 4 should guide you through the process. You'll need to saw out a 9° wedge. (See drawing.) The table angle is the same 80° used for the side stretchers.

You'll also want to cut the mortises in the crest rail support spindles while the blanks are still square. Drill out the 1/2-in. wide mortises to a depth of 3/4 in. and clean up the sides of the mortises with a chisel, but leave the top and bottom of each mortise curved.

Turning the Spindles—The quickest method of turning the spindles is to use a wooden pattern, as shown in the photo below. Draw the profile of the spindle on paper and glue it to a strip of wood. File a pencil notch in the edge of this pattern at all of the high and low spots, as well as at transitions (fillets and beads). Mark the diameter of the spindle at each notch in the pattern. After roughing a blank to a cylinder, hold the pattern up to it and mark the cylinder at each notch in the pattern *while the cylinder is turning*. The pattern is a handy reference for turning to the appropriate depths with the parting tool and for shaping the spindle. You may want to postpone turning the top of the ball at the end of each crest-rail support. This will allow you to apply your finish while the spindles are still on the lathe.

Shape all of the duplicates of a pattern and check them for match before finishing them. Remember that the eye is very forgiving. If, for example, two of the backrest spindles have larger beads and are paired or separated equally in the rocker, most people won't detect the differences among the four. When you're satisfied, sand them and apply your favorite finish,as explained below.

Making the Seat—Assemble the seat from two pieces of 4/4 stock 8 in. wide. It should be straight-grained, clear stock that is surfaced to 7/8-in. thick. Be particular when selecting the wood. I find flatsawn boards more attractive than quartersawn. Book-matching is an attractive option if you can resaw 8/4 stock 8 in. wide. Joint the edges and glue the two halves together.

Make a pattern of the seat from the drawing in Fig. 3, and use it to lay out all of the outlines, mortise centers, angles, and sight lines on the glued-up seat. Remember that the leg mortises and the outline of the rasped underside need to be drawn on the bottom of the seat.

Use a pattern to mark the critical diameters for the duplicate spindles. Notches in the edge of the pattern help locate the pencil tip.

The angles of the holes in the seat specified in Fig. 3 are measured along the sight lines (straight, broken lines on the drawing). To drill each hole, tilt the drill-press table to the specified angle, and line up the sight line on the seat with a plumb bob arranged, as shown in Fig. 5. Then clamp the seat to the table. (See photo on page 38.) If you're reasonably careful in drilling the holes, the chair will go together successfully—the spindles will adjust to minor deviations.

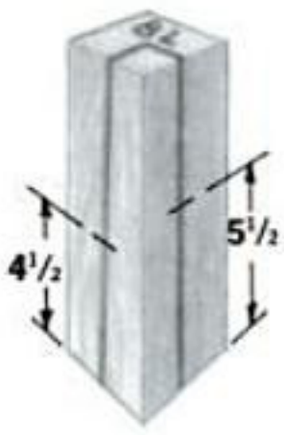
You can then saw out the outline of the seat and shape the surface. Fig. 3 shows the outline of the shaped area with a solid line and two shaded areas within the outline. Rout the lightly shaded area 1/4-in.

FIG. 2: MARKING THE LEG MORTISES

Put all four blanks together and label FR, FL, BR, BL (Front Right, Front Left, etc.)

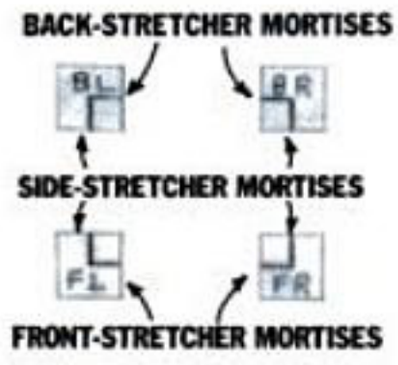
Mark center point of each blank and draw a square connecting these points.

Extend lines down the two sides of each blank (FR leg removed for clarity).



Mark centers for side stretcher mortises 4½ in. from bottom on centerline and label "side."

Mark centers for front and back mortises 5½ in. from bottom on centerline, and label.



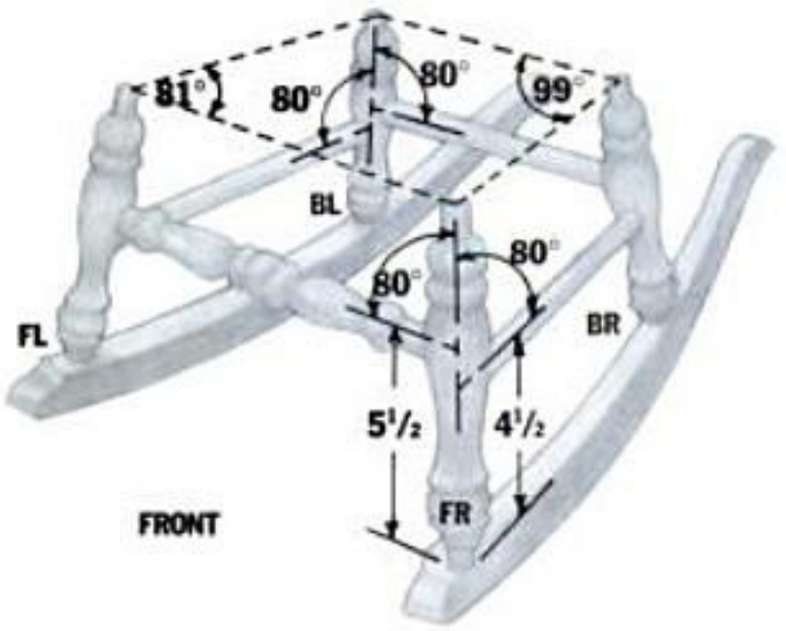


FIG. 3: ROCKING CHAIR PARTS

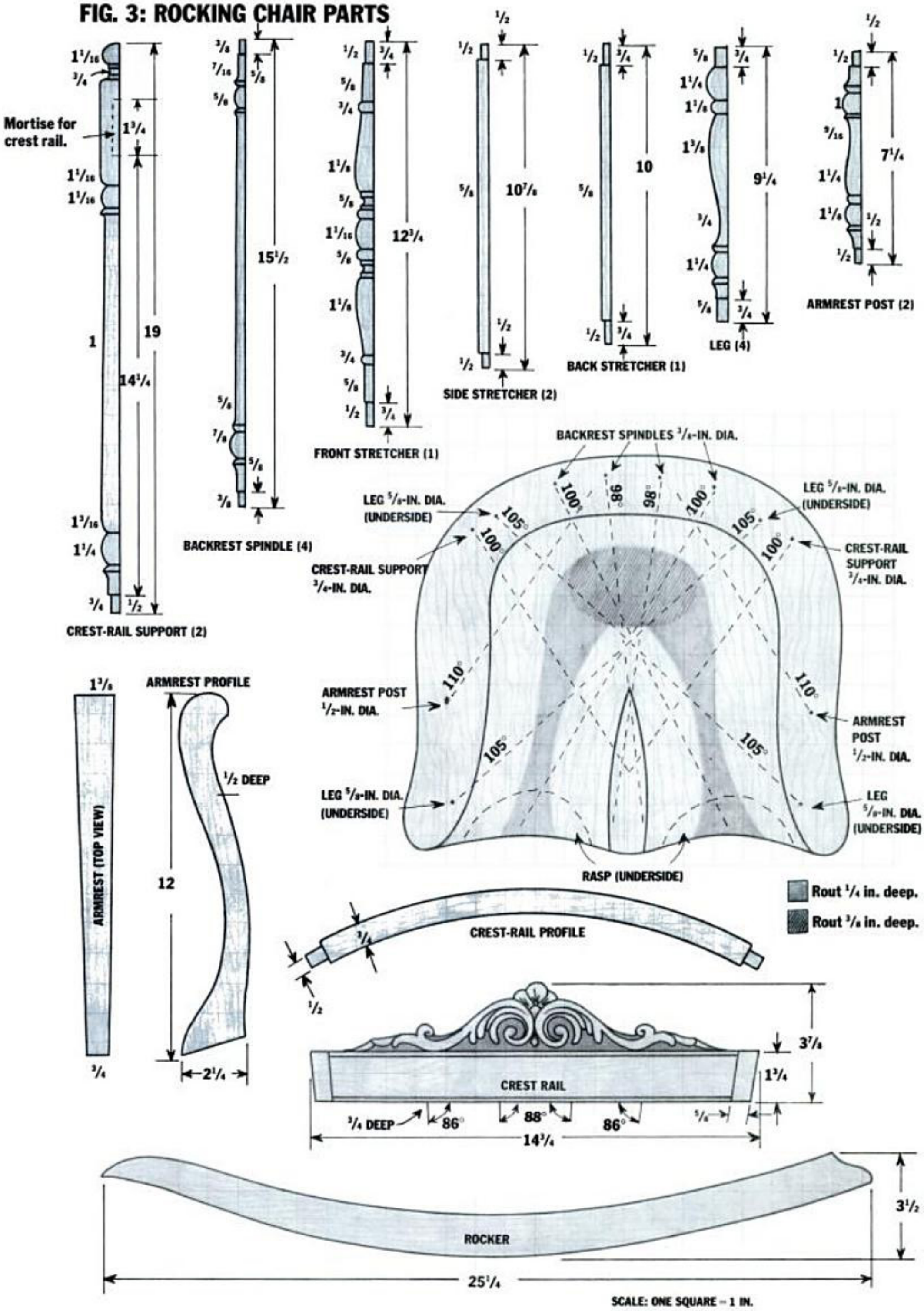
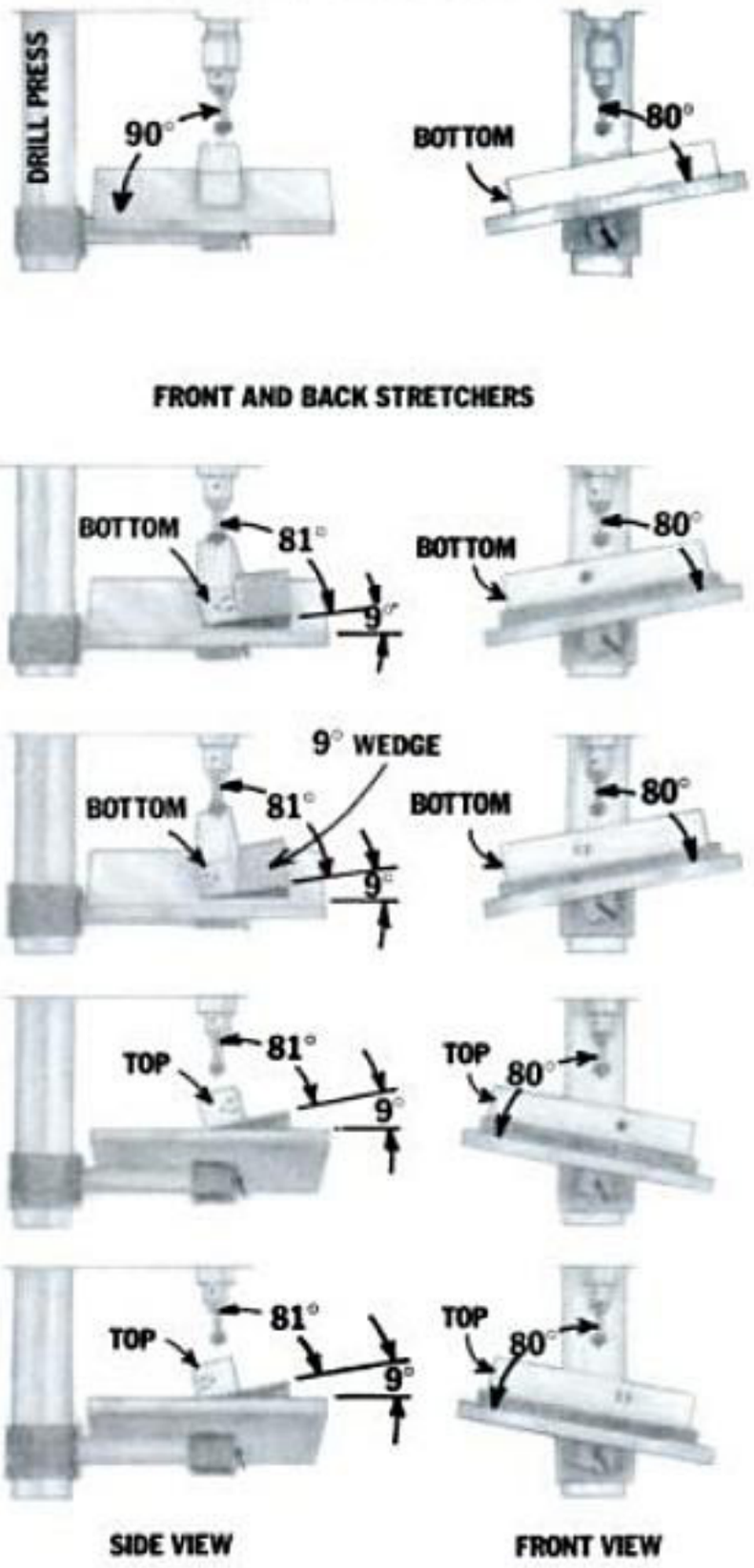


FIG. 4: DRILLING THE LEG MORTISES



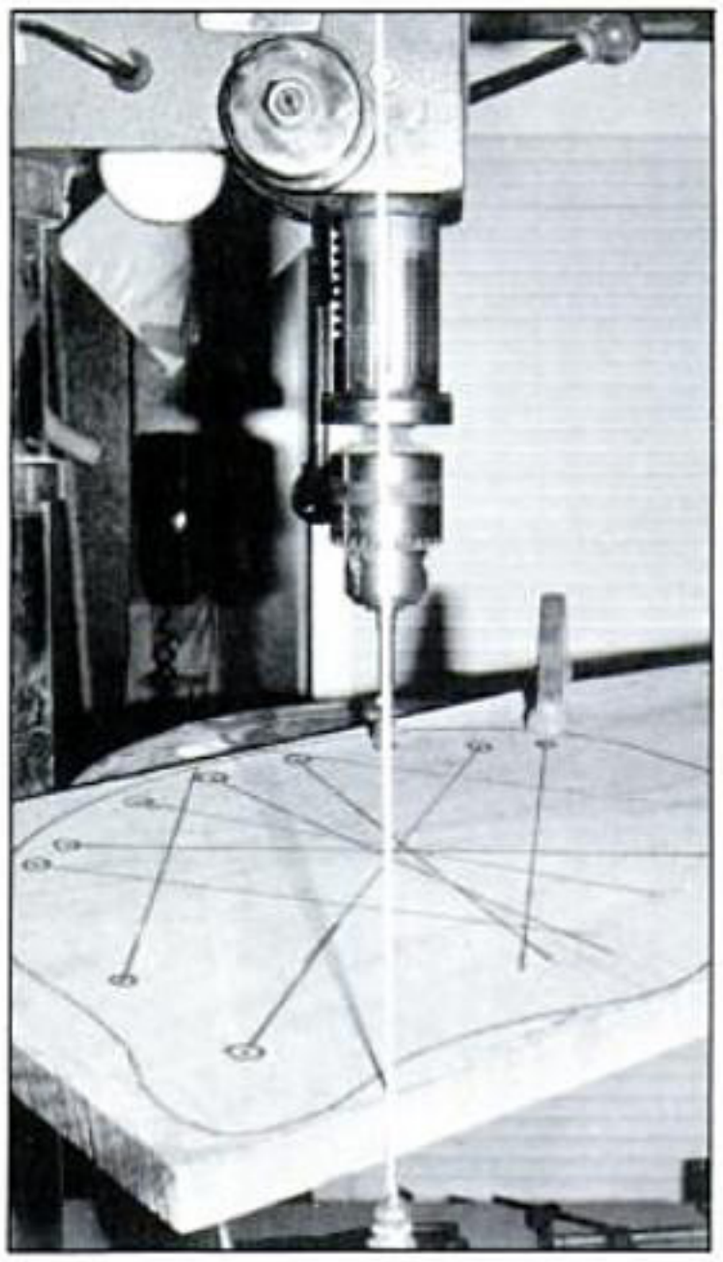
BEFORE DRILLING EACH HOLE:

1. Check the leg label.
2. Check the mortise label.
3. Check top/bottom orientation.
4. Check whether existing hole is toward or away from you.
5. Check which way the table is angled.

deep and the dark-shaded area 3/8-in. deep. Routing out these areas not only reduces the amount of wood that must be removed by hand, but also serves as a guide to help keep the shaping of the two sides symmetrical. Finish by carving the seat from the outline to the routed area with a large, broad gouge and a flat chisel. Although you could disc-sand the seat to the required depth, it's more work than using the gouge.

Fig. 3 shows an area to be rasped on the underside of the seat. The purpose is to give the front edge of the seat a well-defined sweep as seen in the photo on page 34. Rasp so that the front edge gently slopes back from the top surface. You may want to postpone this shaping until you are balancing the rocker (explained at the end of this article).

The Rockers—Bandsaw the rockers from 4/4 stock



To drill the angled holes in the seat, line up the sight line on the seat with the plumb line and the drill bit. (In this photo the sight line that is being used is hidden behind the plumb line.)

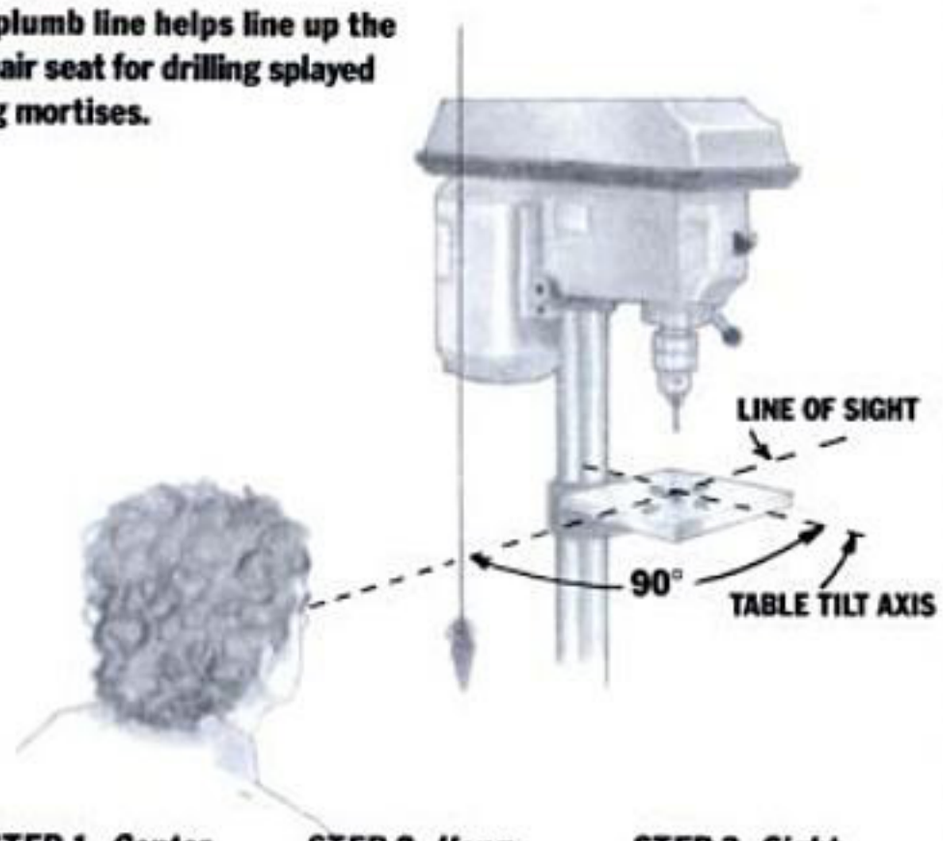
that has been surfaced to 7/8 in. Perform all of the cleanup while the two rockers are clamped together, since you want to keep the rockers identical. Clean up the tops of the rockers with a straight spokeshave, then put a slight curve across the bottoms of the rockers with a concave spokeshave. Mark the location of the front leg mortises with a pencil, but wait until the assembly of the rocker to drill them.

The Crest Rail—Transfer the profile of the crest rail from Fig. 3 to the top edge of a piece of 10/4 stock and saw it out. Bandsaw to the waste side of the line and save the two waste pieces to support the crest rail

Shape the beads on the crest rail with a scraper shaped to a point with a chainsaw file.

FIG. 5: SETUP FOR ANGLED HOLES

A plumb line helps line up the chair seat for drilling splayed leg mortises.



STEP 1. *Center drill bit on table.*

STEP 2. *Hang plumb line perpendicular to table tilt axis.*

STEP 3. *Sight through plumb line to drill bit. (Sight line on chair seat must lie in this line of sight.)*

when drilling the backrest spindle mortises. Don't cut out the outline of the crest until later. Scrape and spokeshave both faces until the rail is 5/8-in. thick, then transfer the location of the spindles and the pattern of the carving onto the crest. Carve the crest and name.

When you cut the tenons on the ends of the crest rail, shape the shoulders to fit the round support spindles. You'll need to trim the tenons to fit the mortises during dry assembly.

Tape the crest rail between the front and back waste pieces that you saved when sawing out the profile, then drill the mortises for the spindles at the angles given in Fig. 3. Drill them parallel to the face of the rail. With the waste pieces still supporting the rail, bandsaw out the top of the crest and scrape smooth.

The Armrests—The armrests are 1 3/8-in. thick at the front, but because they taper to 3/4 in. at the rear, you can cut both armrests from one piece of 10/4 stock. After cutting the profile and the taper, and smoothing the surfaces, round over both edges of the top surface to about a 1/2-in. radius. During dry assembly, you'll need to cove the back ends of the armrests to fit the crest-rail support spindles and mortise the bottom for the armrest post.

Finishing and Assembling the Chair

The Victorians applied their finish after assembly, and the appearance suffered for it. If you're careful to keep finishing materials off of the tenons and out of the mortises, you'll get better results finishing the parts before assembling them. I prefer an oil finish such as tung oil, linseed oil or Danish oil. For spindles, finishing on the lathe is easiest. Apply oil liberally, allow it to soak in, and apply more. Then wipe off the excess and burnish the oil into the wood using either your hand or a rag, applying pressure while the spindle is turning at low speed. Finish all the spindles, then repeat the process 6 or 8 times to build a beautiful patina. Rubbing oil into the other parts of the rocker is more work, but worth the effort. If you wax the parts after the oil has dried—but before assembly—you'll find it easier to remove glue squeeze-out.

When the parts are finished, it's time to assemble the rocking chair. The first step is to construct the carriage (legs, stretchers, rockers and seat) and the second is to assemble the back and armrests to the seat. The second step includes balancing the rocker. The seat and back of a balanced rocker tip back, inviting use. If it's not balanced, the chair appears awkward, as though it would spill the occupant forward and out.

To assemble the carriage, begin with a dry run. Put all the legs in their correct locations in the seat, but do not drive them in. Insert the front stretcher into the front legs, then fit the side and back stretchers. Since these rails are little more than dowels, they can be trimmed if they fit poorly.

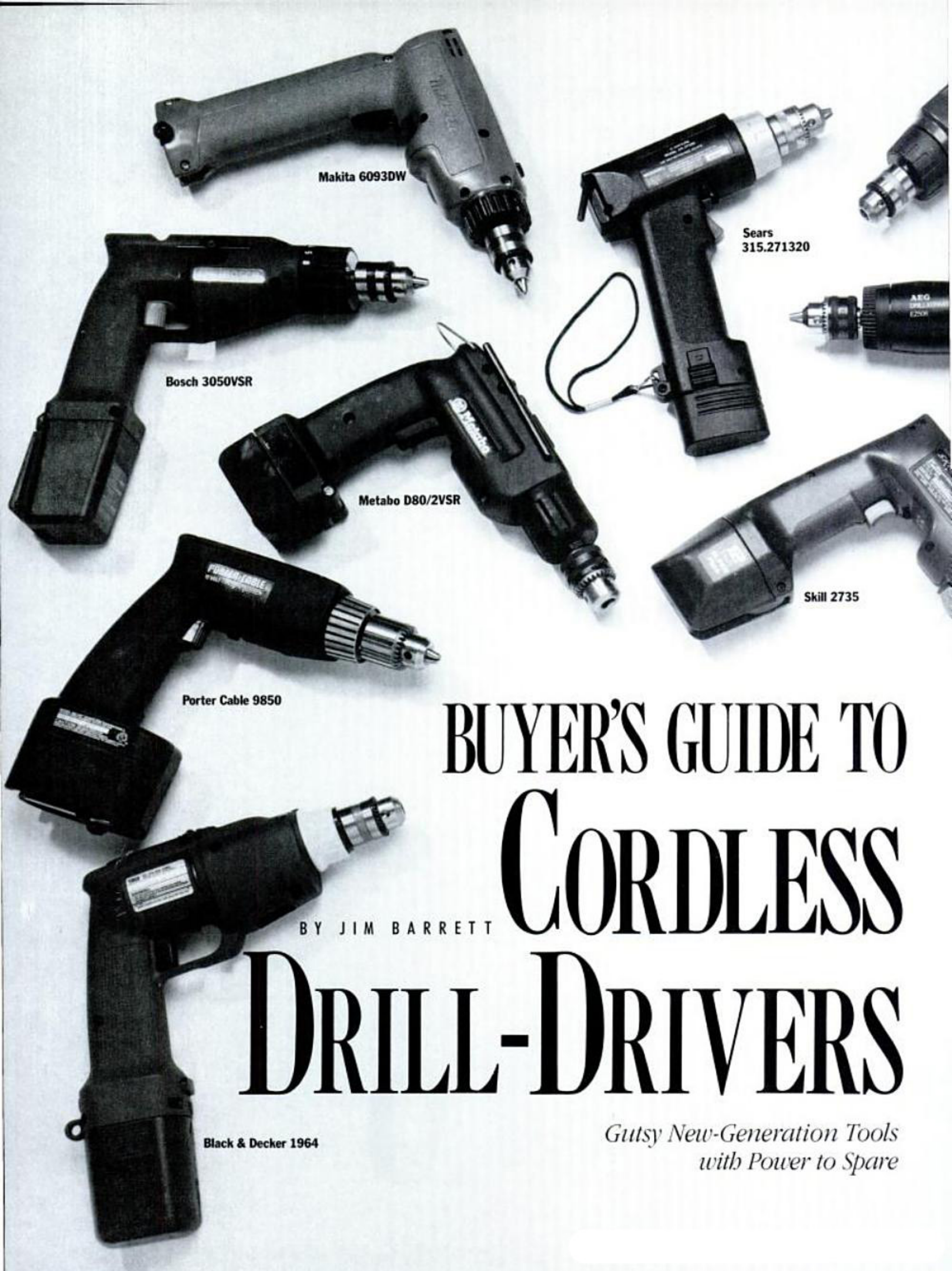
When the stretchers are in place, drive the legs in gently but firmly. With the assembly upright, it should appear symmetrical, and the legs should rest evenly on a flat surface. If it isn't right, check that the spindles are all the way in. Then turn the assembly upside down again and line up the front leg mortise marks on the rockers with the front legs. Mark the position of the back legs on the rockers and drill all four 5/8-in. dia. mortises. If everything is assembled as shown in the drawings, these holes should be perpendicular to the rocker.

It's necessary to attach the legs to the seat in order to mark the rockers accurately for the leg mortises, as just described. But to assemble the rockers, the legs must go into the rockers *before* going into the seat. Gently remove the legs from the seat; insert the legs into the rockers, then the stretchers into the legs, and finally the seat onto the legs. When you're happy that all fits properly, disassemble. Now glue it together, rockers first.

When the glue has set, try a dry-assembly run on the upper portion. Insert the backrest spindles into the seat and the crest rail. Then insert the crest-rail support spindles into the seat and insert the crest-rail tenons into their mortises, trimming them as necessary. Put a cove in the armrests where they join the crest-rail support spindles. (I used a 3/4-in. dia. drum sander for this step.) When they fit nicely, mark and then drill the mortises for the armrest posts, dry fit the parts, and drill for the screws that hold the armrest to the crest-rail spindle).

Now check the balance of the rocker; it should tilt back slightly. If it doesn't, there are a few ways to remedy it. The easiest way to make it tilt further is to remove wood from the underside of the hand-grip part of the armrest or the rasped underside of the seat. Another option is to drill holes in the ends of the rockers, the underside of the seat or the underside of the crest rail, fill them with lead weights, and plug the holes. Experiment with the weights before drilling holes in your chair! When it balances properly, glue it all together. Your rocker is ready to stand the test of time. ▲

Peter Hutchinson is a professional geologist and the former editor of American Woodturner, *the Journal of The American Association of Woodturners.*



BUYER'S GUIDE TO CORDLESS DRILL-DRIVERS

BY JIM BARRETT

Gutsy New-Generation Tools with Power to Spare

More and more woodworkers I know have been switching to cordless tools in the shop—even when there's an electrical outlet within spittin' distance of the workbench. Why? Because cordless tools are a lot handier than their corded brothers. Cords can be a real nuisance, and the more of them you get rid of, the better.

Thanks to competition among manufacturers and newer technology, you now get a lot more power for a buck than you did a few years ago. One-hour chargers and detachable battery packs are standard on professional-use models. In most shop situations a battery will recharge in less time than the woodworker takes to run it down. So if you start with two battery packs and rotate them on the charger, you will seldom run out of juice.

Cordless drill-drivers (also called driver-drills or drill-screwdrivers) are just cordless drills with the addition of an adjustable clutch. They come with either two speeds or variable-speed control. Instead of the hex-collet found on cordless screwdrivers, they sport a three-jaw chuck to hold either drill bits or driver bits.

I'll focus here on drill-drivers because I consider them the most versatile in the woodshop. Whether you're a first-time cordless buyer or are upgrading your present tools, these new drill-drivers are worth a look. The ones I tested represent the top of each manufacturer's line in terms of performance and features. In the case of Metabo and AEG, I tried models that had variable-speed control rather than more powerful ones with only two speeds.

BRIAN KOSOFF

CONTINUED

MAKE	MODEL	LIST PRICE TOOL	LIST PRICE BATT.	VOLT.	NO-LOAD SPEED	MAXIMUM TORQUE	CHUCK CAPACITY	CHARGING TIME	LENGTH	NET WT.	ACCESSORIES
AEG	ABSE-15*	399.00	78.75	12	0-370/0-1100	160	1/16-1/2	1 HR	11 5/8	4.4	SC,W,h,ac
	ABSE-13	280.00	59.00	9.6	0-370/0-1000	130	1/16-1/2	1 HR	10 1/4	3.75	SC,h,ac,w
	ABS-13	260.00	59.00	9.6	370/1000	130	1/16-1/2	1 HR	10 1/4	3.75	SC,h,ac,w
	ABSE-10	260.00	46.00	7.2	0-280/0-770	110	1/32-3/8	1 HR	9 3/4	3.2	SC,h,ac,w
	EZ-1380	229.00	58.00	9.6	350/1000	143	1/16-1/2	1 HR	8.1	3.5	pc,h,ac
	EZ-506*	224.00	53.00	7.2	100-600	57	1/16-3/8	1 HR	11 3/4	3	2SB,pc,h,ac
	EZ-560	199.00	53.00	7.2	300/900	104	1/16-3/8	1 HR	12	3.25	2SB,pc,h,ac
BLACK & DECKER	1965	270.00	71.00	12	0-400/0-1300	178	1/16-3/8	1 HR	9 1/4	4.4	SB,h,sc
	1964*	240.00	67.00	9.6	0-350/0-1200	115	1/16-3/8	1 HR	9 1/4	4.1	SB,EBP,h,sc
	2682K*	245.00	67.00	9.6	0-800	60	1/16-3/8	1 HR	8 5/8	3.5	SC,h,ac
BOSCH	3050VSR*	147.00	49.00	9.6	0-400/0-900	70.8	1/16-3/8	1 HR	9.6	4	PC,SB,sc,ac
HITACHI	D10DF*	267.00	48.40	9.6	0-400/0-1100	156	1/16-3/8	1 HR	9 7/32	3.7	SB,KC,pc
	D10DH	216.00	48.40	9.6	400/1100	156	1/16-3/8	1 HR	9 7/32	3.5	SB,KC,pc
	D10D	207.00	48.40	9.6	300/1000	129	1/16-3/8	1 HR	10 13/32	3.5	SB,pc
	D10DC	185.00	44.00	7.2	0-300/0-650	86	1/16-3/8	1 HR	10 5/8	3.3	SB,pc,ac
	DRC10	170.00	44.00	7.2	300/650	86	1/16-3/8	1 HR	10 5/8	3.3	SB,pc,ac
MAKITA	6093DW*	254.00	48.00	9.6	0-400/0-1100	91.1	1/16-3/8	1 HR	10 3/8	3.8	SB,SC,h,ac
METABO	D100/2	273.00	67.00	9.6	300/850	121.4	1/64-3/8	1 HR	10	4.25	pc,ac
	D80/2VSR*	284.00	58.15	7.2	0-250/0-700	104	1/64-3/8	1 HR	10	4	pc,ac
MILWAUKEE	0398-1*	275.00	76.00	12	0-350/0-1000	156	1/16-3/8	.5 HR	9	3.75	sc,ac,h,kc
	0394-1	255.00	72.00	9.6	0-350/0-1000	143	1/16-3/8	.5 HR	9	3.25	pc,ac,h,kc
	0391-1	230.00	72.00	9.6	350/1000	143	1/16-3/8	.5 HR	9	3.252	pc,ac,h,kc
	0218-1	275.00	72.00	9.6	50-350/150-1000	143	1/16-3/8	1 HR	9 1/2	3.5	pc,ac,h,kc
	0216-1	245.00	72.00	9.6	350/1000	143	1/16-3/8	1 HR	8 1/8	3.5	pc,ac,h,kc
	0214-1	200.00	67.00	7.2	100/600	42.8	1/16-3/8	1 HR	12 1/4	2.25	2SB,pc,ac,h,kc
PANASONIC	EY6205B*	390.00	89.00	12	50-350/150-1000	156	0-3/8	15 min	9 5/8	4.1	2SB,KC,h,sc
	EY6200B	342.00	89.00	12	350/1300	173	0-1/2	15 min	13 25/32	4.3	2SB,h,sc
	EY6281B	347.00	80.00	9.6	50-350/150-1000	143	0-3/8	15 min	9 5/8	3.65	2SB,KC,h,sc
	EY570B	220.00	80.00	9.6	350/1000	143	0-3/8	1 HR	8 21/32	3.5	KC,h,sc
	EY561B	148.00	42.80	7.2	300-880	104	0-3/8	1 HR	8 1/32	3	h,sc
PORTER-CABLE	9850*	240.00	48.00	12	0-400	210	0-3/8	1 HR	9	4	SB,SC,h,kc
RYOBI	TFD220VR	303.00	75.00	12	0-400/0-1300	220	0-3/8	1 HR	10	4.1	2SB,KC,pc,h
	TFD170VR*	270.00	70.00	9.6	0-400/0-1200	170	0-3/8	1 HR	10	3.8	2SB,KC,pc,h
	TFD150VR	212.00	60.00	7.2	0-300/0-1100	150	0-3/8	1 HR	9 1/2	3.4	2SB,KC,pc,h
	BD1025CVR*	227.00	68.14	9.6	0-350/0-1100	87	1/32-3/8	1 HR	8 3/4	4.25	SB,h,sc
	BD1025CR	204.00	68.14	9.6	350/600	87	1/32-3/8	1 HR	8 3/4	4.25	SB,h,sc
	BD1020CVR	181.00	53.04	7.2	0-300/0-600	70	1/32-3/8	1 HR	8 1/2	3.5	SB,h,pc
	BD1020CR	159.00	53.04	7.2	300/600	70	1/32-3/8	1 HR	8 1/2	3.5	SB,h,pc
SEARS	27132*	144.70	29.99	9.6	0-600	106	1/16-3/8	1 HR	8	3	PC,EBP,h
	11132	96.07	29.99	9.6	0-600	106	1/16-3/8	1 HR	8	3	h,pc
	11128	72.13	28.99	7.2	0-600	80	1/16-3/8	1 HR	8	2.8	h,pc
SKIL	2735:02*	205.00	64.48	12	0-500/0-1650	n/a	1/16-3/8	1 HR	10 1/8	4	PC,h,ac
	2535:02	160.00	56.68	7.2	0-600	n/a	1/16-3/8	1 HR	9 3/16	4	PC,h,ac
	2503:02	98.00	56.68	7.2	300/600	n/a	1/16-3/8	1 HR	10 5/16	3.5	PC,h,ac

KEYS TO CHART

Model: * = tested and pictured.

Prices: Manufacturer's suggested list price for tool, battery pack, charger and accessories listed as "included in price" in the accessories column. Price in BATT. column is for backup battery pack. Tools are often discounted 10-40%.

Speed: "-" indicates range of variable speeds; "/" separates two speeds or ranges. All tools listed have reverse.

Torque: Numbers are inch-pounds of torque when in direct drive, low speed or range. Specifications provided by the manufacturers.

Charging Times: Figures indicate recharge time.

Accessories: All models listed come standard with a battery pack, charger, and chuck key (except for those with keyless chucks, designated KC). Extra battery packs (EBP) are listed when they come standard.

Capital letters = included in list price
Small letters = available at extra cost
SB = screwdriver bit (2SB = two screwdriver bits)
PC = plastic carrying case
SC = steel carrying case
H = holster
W = clip-on worklight
AC = 12V automotive charger with cigarette lighter adapter

Tool Capacity

When buying a cordless drill-driver, the first consideration should be finding one with enough power, torque and speed to handle your requirements without too much excess capacity. There is no need to pay for—and then carry around—twice as much tool as you need.

Power: Cordless tools are powered by battery packs containing two or more 1.2 volt nickel-cadmium (NiCad) cells in a plastic housing. Professional tools have removable battery packs that operate on 7.2, 9.6, or 12 volts (6, 8 or 10 cells). Generally, the higher the battery voltage, the more powerful the tool and the more work you can do on a single charge.

Torque and speed: The drill-driver's maximum torque determines the largest-sized hole you can drill or the biggest screw you can drive. Maximum speed determines how fast you can drill smaller holes. Tools with higher gearing operate at higher speeds but lower torque. (For better control, most screws are driven at 400 rpm or less.)

If you'll be using a drill-driver mostly for drilling, go for speed; if you'll use it for driving screws or boring very large holes, go for torque. If you want the tool to perform equally well at both jobs, get one that has dual range and variable speed. Specs for torque (in inch-pounds) and speed (in RPM) are listed in the chart on the previous page. But note that the torque specifications are those provided by the manufacturers and that there is no standard procedure in the industry for measuring torque. Use these numbers only as a general guide.

Performance Features

Power is only one factor that determines the versatility and overall usefulness of a drill-driver. Other features to consider include number of clutch settings, speed control, and battery recharge time.

Adjustable clutch: A clutch disengages the bit at a preselected torque so you don't overdrive the screw, chew up the screwhead, or break it off. On most drill-drivers, the clutch has four or five torque settings for driving screws of various sizes and a direct-drive (clutch-lock) position for drilling.

Most clutches are adjusted by rotating a collar located behind the chuck. The Ryobi BD-1025CVR and Skil 2735 have a clutch adjustment knob mounted on the underside of the body, as shown in the photo

PHOTOS BY MITCH MANDEL

Collars (left) or knobs (right) adjust the torque limit of clutches on drill-drivers. Numbers on the collar are easily visible in operating position.

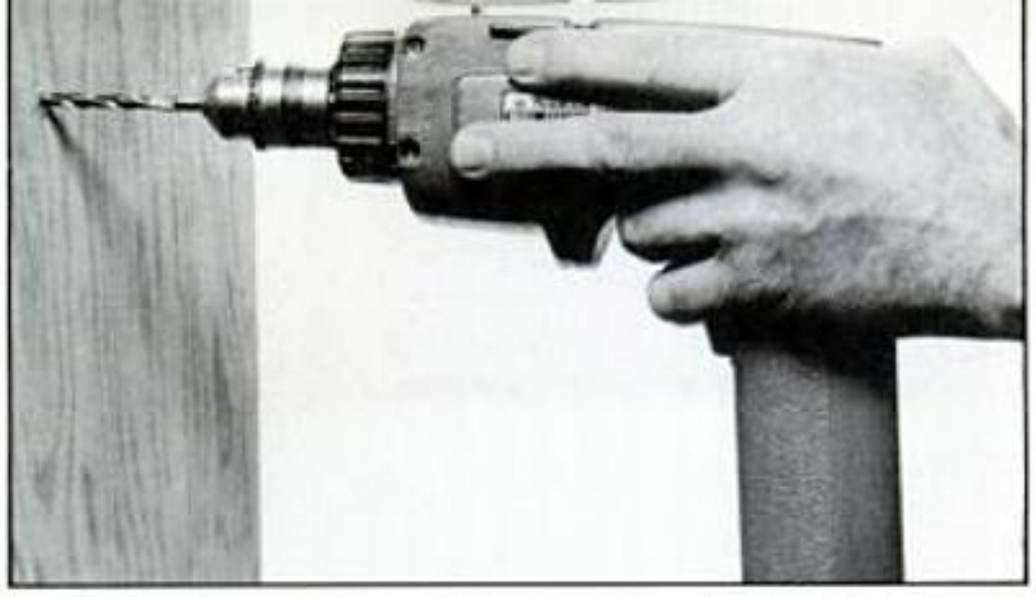
above. I prefer the collar adjustment because you don't have to flip the drill over to see what setting you're on.

Properly adjusted, the clutch is great when driving a lot of screws. But I had to drive two or three test screws to determine the correct setting. If you only have a few screws to drive, adjusting the clutch is a pain.

Variable speed: One feature I consider especially useful is variable-speed control. Drill-drivers come in two-speed, variable speed, and dual-range variable-speed models (see the "no-load speed" column in the

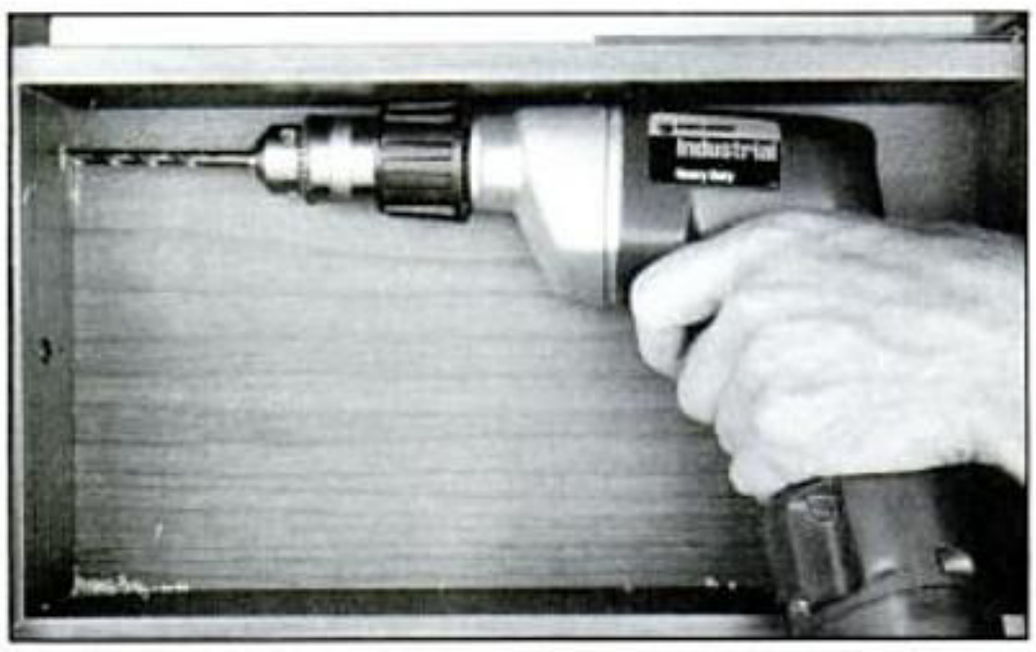
The Panasonic battery charger is one of the most sophisticated on the market: one LED indicates charging, another indicates if the battery is too hot to charge (standby) or if there's a malfunction in the battery or charger.

Three different chuck arrangements: keyless (Hitachi, left); a drill chuck that interchanges with a hex collet (Metabo, center); and a chuck that will hold the tiniest bit made (Porter Cable, right).



Good body design allows a comfortable in-line grip as an alternative to the conventional handle grip. Switching grips can reduce wrist fatigue and provide better control for fine work.

T-handle designs with the battery below the handle provide good balance and weight distribution. This Panasonic (the author's favorite) also has a convenient sliding forward-reverse switch above the trigger.



The short body length and chuck position near the top of the body allow this Black & Decker 2682K to get into tighter spots and closer to corners than any other tool tested.

chart). All have forward and reverse drive. Variable-speed models offer precise control for starting and driving screws and starting holes. Dual-range variable speed gives you even more control—low range provides high torque while high range provides faster speeds for drilling.

Several variable-speed models (AEG, Milwaukee, Panasonic) have an electronic feedback feature that keeps the drill running at a constant speed under varying loads, much like cruise control on a car.

Electric brake: The Makita 6093D, Panasonic EY6205, and Ryobi TFD models have electric brakes. The brake stops the chuck immediately when you release the trigger, providing exceptionally good control. It's especially useful with small screws or drilling small holes in rapid succession—you don't have to wait for the drill to wind down to a stop before starting the next screw or hole.

Chargers: Most new battery chargers will recharge a fully depleted battery in one hour. If that's not fast enough, Milwaukee offers a ½-hour charger and the Panasonic comes with a 15-minute charger. Others will soon be introducing 10- to 15-minute chargers.

Battery chargers have several features built into them to protect both the battery and the charger. All chargers prevent overcharging by shutting off automatically when the battery is fully charged. Most also have a trickle charge feature that keeps the battery topped up as long as it remains in the charger. Another safeguard common to all chargers is a built-in temperature sensor which prevents charging if the battery is too hot from continuous use. With some chargers, inserting a hot battery will trip a breaker in the charger that must be manually reset after the battery has cooled. Others, such as the Panasonic charger shown on page 43 have a "standby" feature that automatically starts charging once the battery has cooled. The latter type is more convenient: you can pull a "hot" discharged battery from the tool immediately after use, stick it on the charger, and forget about it.

Chucks: All drill-drivers use three-jaw chucks. The Metabo and the AEG ABSE models can also be fitted with a hex collet. The only drill-drivers with a ½-in. chuck capacity are the newly introduced AEG ABSE models and the Panasonic EY6200B; the rest are ⅜-in. tools. While most of the tools have a minimum chuck capacity of about 1/16 in., some accept smaller bits. (See chart.)

The Panasonic EY6205, Hitachi D10DF, and Ryobi TFD models come with keyless chucks; Milwaukee and Porter Cable offer them as an optional accessory. The keyed tools have a provision for storing the chuck key on the drill body or battery pack. While convenient, my experience with cordless drills has been that the spring clip holding the key eventually wears out and the key falls off. Then the key gets lost, since there's no power cord to tie it to! AEG provides a storage compartment inside the handle of the tool for the key and extra bits.

Ergonomic Features

In my book, ergonomic features—balance, switch locations, and comfort in my hand—are almost as important as performance.

Handle position: Generally, I found the T-shaped tools (handles located near the center of the body) had better balance and weight distribution than the rear-handle designs. But there were two exceptions: The small, hollow T-handle on the AEG EZ506 and its rear-mounted battery pack give it a top-heavy feel. Conversely, the rear-handle Makita 6093D has a recess in the body above the trigger switch so you can comfortably grasp the drill by the body (in line with the chuck) for better control and less wrist fatigue. Three other rear-handled tools (Ryobi 9011, Metabo D80/2 VSR and Bosch 3050 VSR) have a similar recess, but I found that their forward-reverse switches chafed my ring finger when holding the tools this way.

Switches: Like other drills, all drill-drivers have trigger-type OFF/ON switches. On variable-speed models, the speed is controlled by the amount of pressure you exert on the trigger. Dual-range variable-speed tools have a two-position HI/LOW switch for "shifting gears" located on the top of the drill body behind the chuck.

All drill-drivers have a forward-reverse switch. On most, it's a lever-type switch located above the trig-

The quick-draw holster, available for several models, will help settle arguments about the convenience of cordless drill-drivers.

ger. Usually there is a trigger-lock position on the switch, which prevents the tool from turning on accidentally when jostled in a tool box. This location seems the best for the reverse switch when you're operating the tool's trigger with your index finger. Long levers (Bosch, Hitachi, Milwaukee, and Metabo) were easier to use than short levers (Ryobi, Sears, Skil). The AEG EZ506 has a rocker-type reversing switch that is easily thumb-operated—if you're right-handed. The switch on the Black & Decker 2682K is smaller; I found it harder to work. The Makita has a two-position slide switch mounted on the back of the body that's easily operated by the thumb of either hand. The Panasonic has the best arrangement—a large, easily operated sliding switch built into the body above the trigger.

Size and shape: The size and shape of a tool can limit what you can do with it. Tools with shorter bodies will fit into tighter places. Those with chucks positioned close to the top of the body, like the Black & Decker 2682K, enable you to drill closer to inside corners.

For balance, comfort, and overall ease of use, the Panasonic and Makita topped my list. But user comfort is subjective; not all hands are created equal.

Accessories

Drill-drivers come with a battery pack and charger. While a few also include a spare battery pack and/or a carrying case, these usually cost extra. Several manufacturers offer battery chargers that plug into a car's cigarette lighter receptacle.

A holster can be useful while working in the shop as well as on a job site. It keeps the drill handy and frees up bench space. Surprisingly, none of the cordless drill-drivers I tested have belt clips.

My first investment in accessories was a magnetic screwdriver bit adapter that fits into the Jacobs chuck. It's handy for quickly switching hex-shank bits. The second was a nut-driver adapter that accepts $^3/_8$-in. sockets.

The chart lists the standard and optional accessories. The prices include the tool, battery pack and charger. Prices for spare battery packs are listed separately. Remember, these are list prices; check your dealer for what you'll actually have to pay.

My Choices

Of all the drills I tried, my favorite was the Panasonic EY6205B. It has practically all of the features that I find desirable, including some Panasonic exclusives. I wish I could afford it. It is very nearly the most expensive of the lot.

If I were spending my own money, I'd go for the Black & Decker 1964. Its 9.6-volt rare-earth magnet motor gives it as much power as most of the 12-volt tools I tested, with a price comparable to other 9.6-volt tools. Its other features include the ones most important to me.

I didn't find a single loser among the drill-drivers that I tried out. There's a place for each of them. Check them out in the chart and then handle them at a tool store when you get a chance. ▲

Jim Barrett writes about woodworking tools and finishes. He has written about doweling jigs, honing guides, carbide saw blades and belt sanders in previous issues of AW.

SUPER-DRILLS:
A HOLE NEW TECHNOLOGY

During my initial tests for this article, two of the 12-volt drill-drivers were clearly more powerful than the rest—the Porter Cable 9850 and the Panasonic EY6205B. Then, just about the time I thought I had this story wrapped up, AEG, Black & Decker and Ryobi introduced new lines of killer drill-drivers. So I quickly requested the 12-volt AEG ABSE 15, the 9.6-volt Black & Decker 1964, and the 9.6-volt Ryobi TFD170VR. All five of these gutsy drill-drivers easily outgunned conventional models of the same voltage.

I found two explanations for the extra pep. Black & Decker, Porter Cable and Ryobi attribute the increased performance to NIB motors, a new technology that employs neodi*mnium/iron boron ("rare-earth") magnets instead of the ferrite magnets used in conventional motors. The manufacturers say these motors kick out 20% to 40% more power than a standard motor of the same size, enabling the tool to pack a big punch in a small motor housing. (Detractors of NIB motors say they also drain the battery faster.)

The other explanation came from Panasonic and AEG. Doug Bock at Panasonic attributes the performance of their tools to highly efficient planetary gearing systems and to the design and manufacture of their own motors "to match the tool". Dave Tatem at AEG says the ABSE drills have a precision-made planetary gear system, a more powerful motor, and better overall attention to detail in engineering and manufacture.

I'm waiting to see who will be the first with a drill-driver that uses *both* an NIB motor *and* a planetary gearing system. —*J.B.*

No-Bull Bench

Store-Bought Top Cuts Time in the Shop

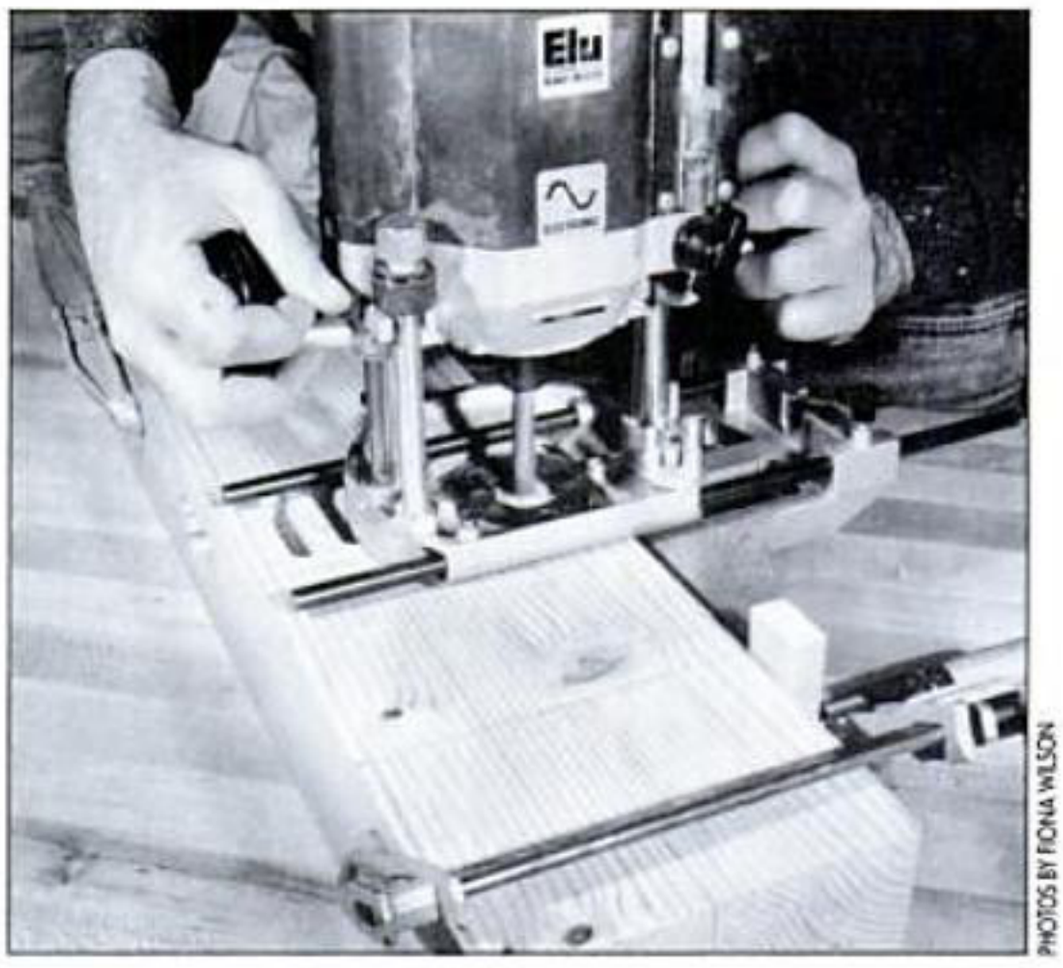
Build your own bench! Start with a fir 4 × 4 base, add a store-bought maple top and some off-the-shelf vises and you've got a bench designed to fit *you*.

MITCH MANDEL

BY DAVID SLOAN

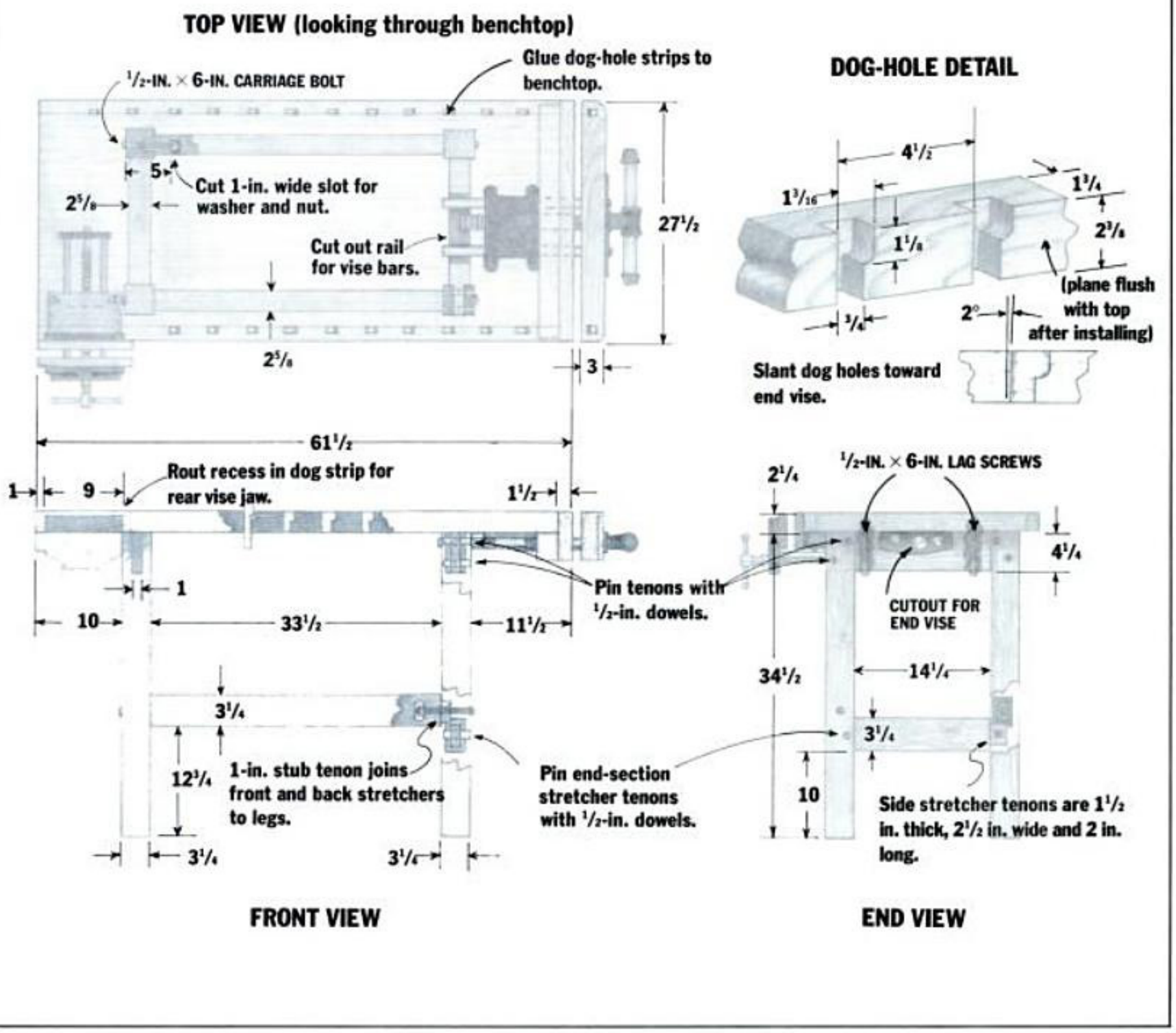
Call me a traditionalist, but I think a woodworker should make his or her own workbench. You can buy some real nice ready-made benches, true, but they're designed for someone elses body and work habits, not necessarily yours. A workbench is a personal thing, and it ought to fit you like a tailor-made suit. Woodworking's better when the height, size and setup of your bench are designed around you and your work. If that's not reason enough to build your own bench, here's another. Building your bench is a ritual—a rite of passage for woodworkers. Once you've done it, you'll look at the craft with a whole new perspective.

I wanted a simple bench, without bells and whistles, that wouldn't shake, shimmy or slide across the floor. The idea was to start with a base built of fir 4×4s—cheap, massive, and easy to get. Then I'd buy a preglued maple top to save time, add two dog-hole

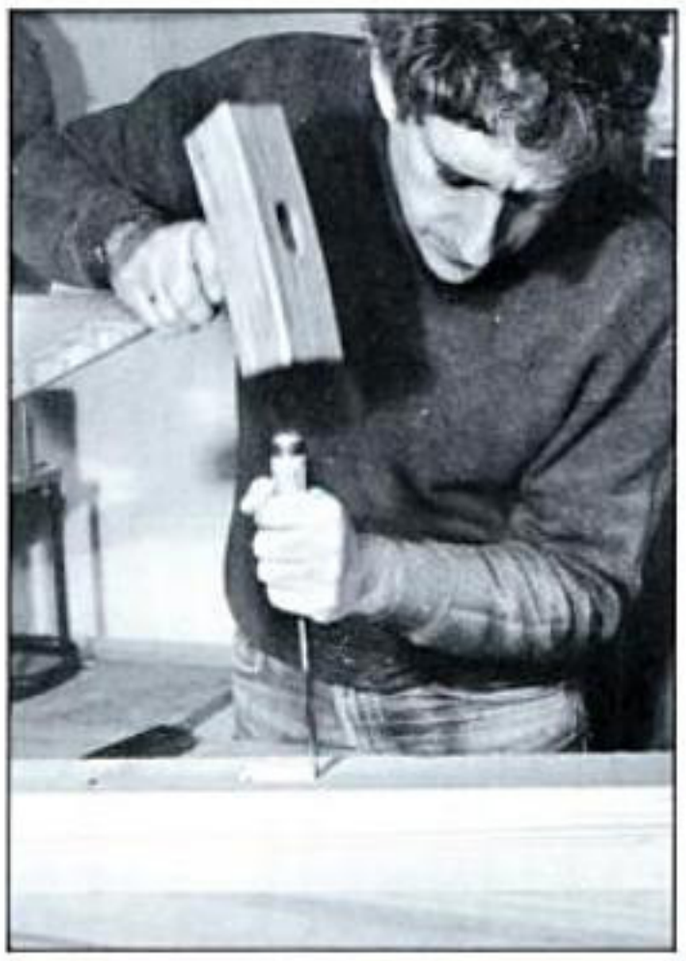


PHOTOS BY FIONA WILSON

FIG. 1: WORKBENCH



DRAWINGS BY GLENN HUGHES



A plunge router and a long 1/2-in. bit speed the job of mortising the legs. Clamp two legs together to support the router and clamp stop blocks to limit the length of the cut. Make three cuts to hog out the waste, then clean up the ends with a chisel.

strips and hang a couple of vises on the basic structure. It all seemed pretty easy.

My bench is higher than most-36 3/4 inches from bench top to floor. I'm only 5 ft. 10 in., but the height is ideal for me. It's high enough that it's easy to see close-up work such as dovetails or routing without bending or sitting. It's low enough that I can hand plane comfortably. Because each person's different, you may want to make your bench lower or higher than mine, depending on your height and the type of work you do.

The store-bought components—bench top, vises and bench dogs—did save me time, but the bench took me longer than I expected—especially the end vise. All told, it took about 45 hours from start to finish. Lots of this was head-scratching time trying to figure things out. The total cost of hardware and materials came to roughly $650. When you figure that a comparable commercially made bench costs more than a grand, that's not a bad deal. You could cut costs by using a smaller face vise than the one I bought and substituting a small, end-mounted face vise with a pop-up dog

for the end vise. You could cut construction time by eliminating the rear dog-hole strip, the end vise—all sorts of ways.

Buy your vises before you start to build. A lot of the measurements for the base and top are determined by the vises. The face vise on my bench is a 9-in. British-made Paramo No. 151 with a quick-release lever (The Record 52½ D vise is very similar.) The end vise is built around a German-made shoulder-vise assembly with a 1 3/16-in. dia. screw. (See SOURCES.)

When I built the bench, my shop was equipped with a 6-in. jointer, a radial arm saw, a 10-in. tablesaw, a 12-in. portable planer, a 14-in. bandsaw, a drill press and a couple of big, ½-in. routers. You can build a bench with hand tools, but I personally wouldn't tackle the dog-hole strips and end vise without a jointer and planer to dimension the stock.

Build the base first. The base consists of two end sections connected by two long stretchers, front and back. The end sections are mortised, glued and pinned together. The front and back stretchers join the end sections with 1-in. long stub tenons. A ½-in. carriage bolt holds the joint together so the bench can be knocked down for moving. The legs and stretchers were cut from fir 4×4s, cleaned up on the jointer and dimensioned, as shown in the drawing. I made the two wide top rails from poplar because I had some lying around the shop. The top rail of one end section is cut out for the end-vise hardware, as shown in Fig. 1.

I cut all the mortises with a plunge router, as shown in the photo. Two legs clamped together provide solid support for the router base. I cut all the tenon cheeks on the bandsaw and the tenon shoulders on the radial arm saw. (See article page 20.) I also cut the slots in the legs for the top-rail slip joints on the bandsaw.

Once the base is complete, work on the top. I bought a 2¼-in. × 24-in. × 60-in. prelaminated maple top from Woodcraft Supply. (See SOURCES.) I went with a laminated top for two reasons: First, the machines in my shop are too small to comfortably handle the surfacing of a big maple bench top. Second, I saved time (and money too, I think) by going with a preglued top. Woodcraft also sells a 7-ft. top, but I just don't have room in my shop for a bench that long.

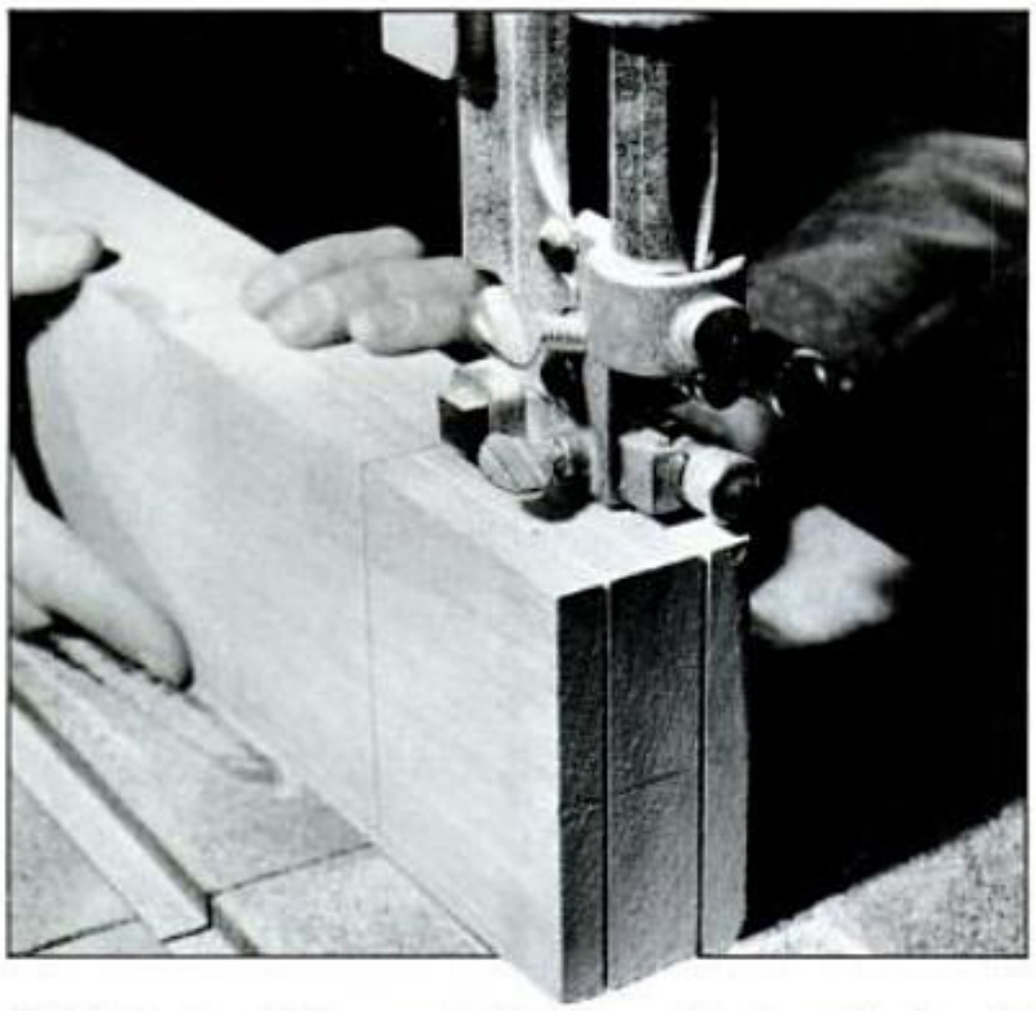
First, make the maple dog-hole strips. (See Fig. 1). To minimize the chance of short-grain breakage from pressure on the bench dogs, I glued up each dog-hole strip from two pieces—top and bottom. I suggest you do the same.

I cut the dog-hole slots with a dado head on the radial arm saw. To do this, pivot the saw's arm 2° to slant the dog holes toward the tail-vise end of the bench, as shown in Fig. 1. Don't try to hog out the entire slot in one pass. The dado blade tends to climb up onto the stock, and you may not be strong enough or fast enough to keep the saw carriage from coming right at you—fast. Be cautious. Cut a little at a time, lowering the blade for the next cut until you've reached the full depth of the slot. I clamped the dog-hole strip to the saw table for each cut, so I could keep my hands well away from the blade.

Each dog hole has a recess for the head of the bench dog. This allows you to push the dog below the surface of the bench when it's not being used and keeps the dog from falling out the bottom of the hole. To cut this recess, I cobbled up a router jig that seemed pretty slick until I came across a better version in *The Workbench Book*, by Scott Landis (1987, Taunton Press, 63 S. Main St., Newtown, CT 06470). Michael Fortune, a one-time professional benchmaker, gets credit for the idea. (See Fig. 3.)

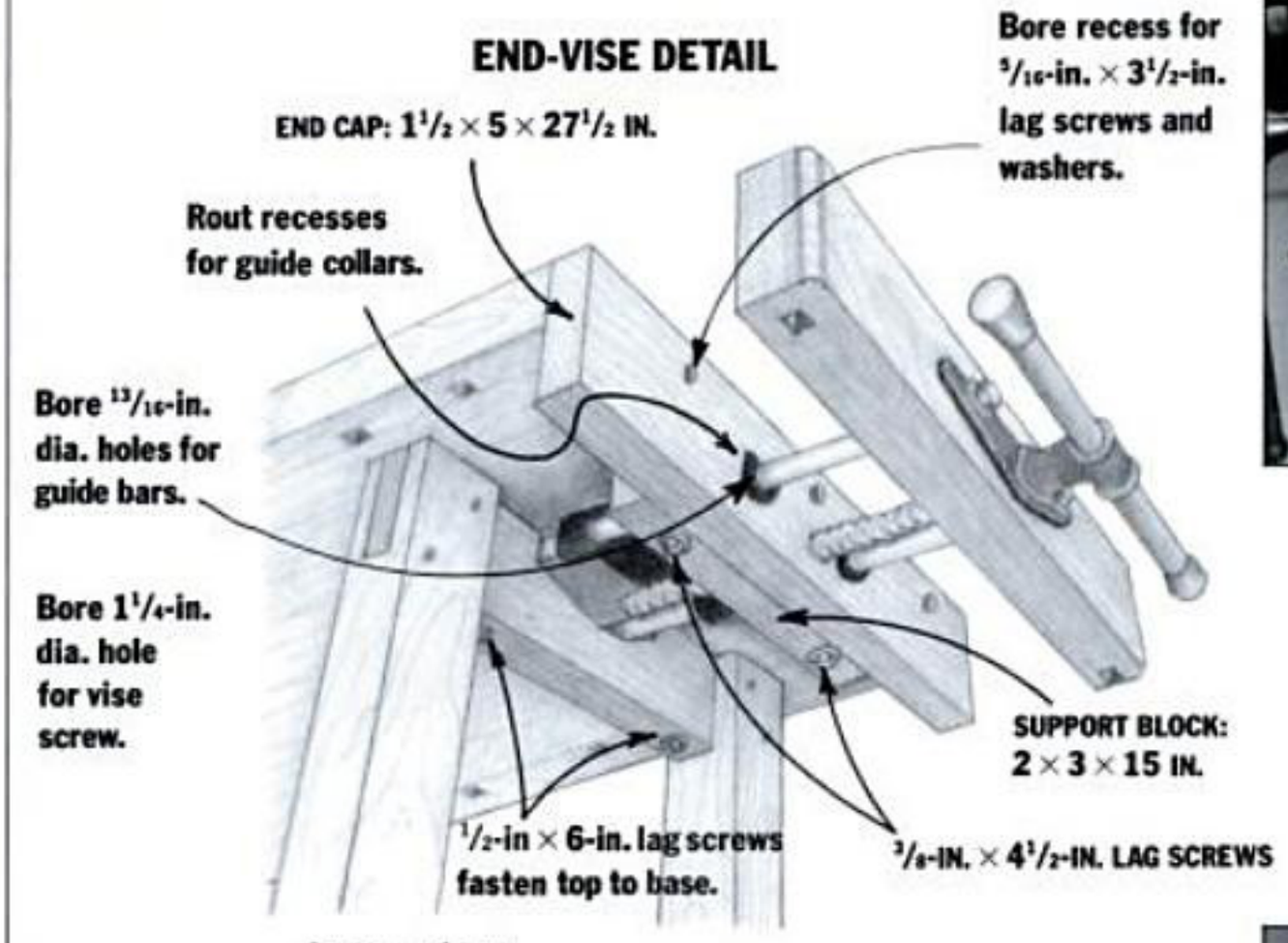
The maple benchtop came from the factory with a lacquer finish. Before I could glue on the dog-hole strips, I had to scrape the lacquer off the bench-top edges with a hand scraper. Glue on one dog-hole strip at a time.

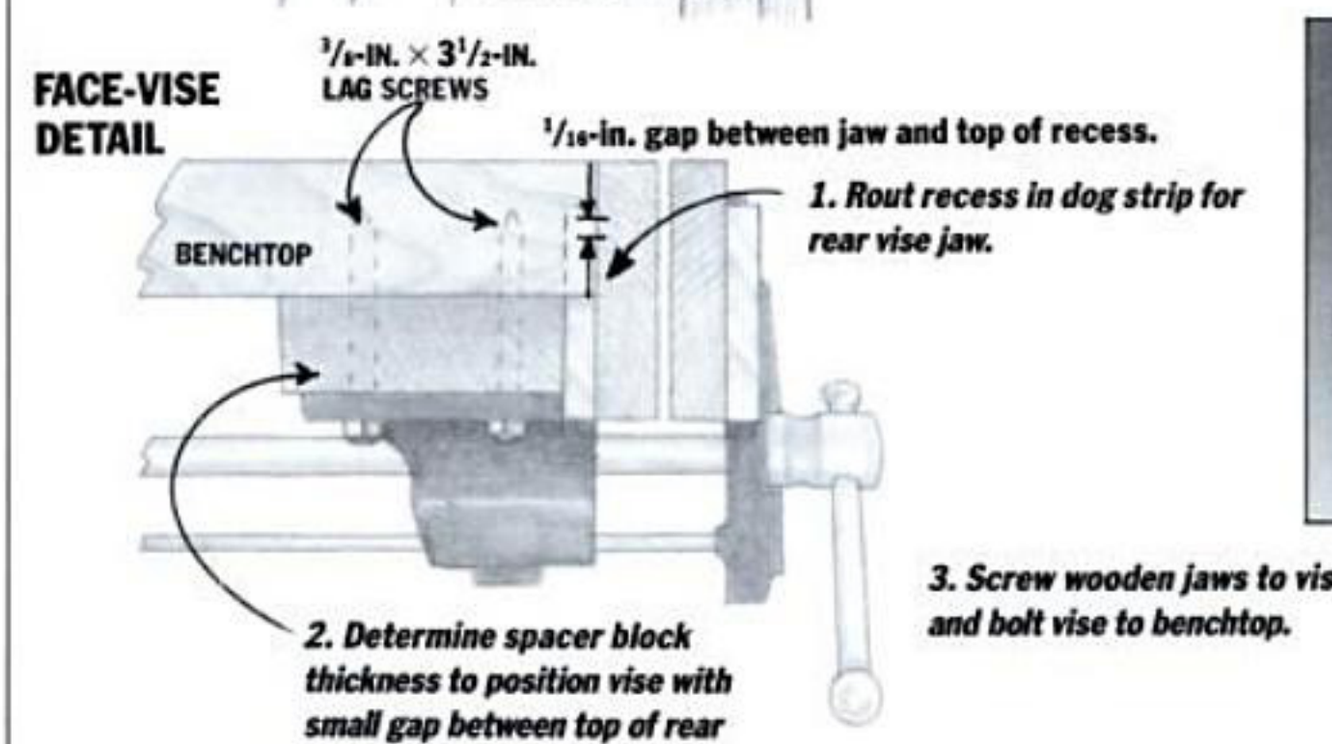
Hanging the face vise involves routing a recess for the rear jaw in the dog-hole strip, as shown in Fig. 2. Then you have to determine the thickness of the wooden spacer under the bench that positions the vise in the recess. You want a very slight gap between the top of the rear jaw and the top of the recess—about

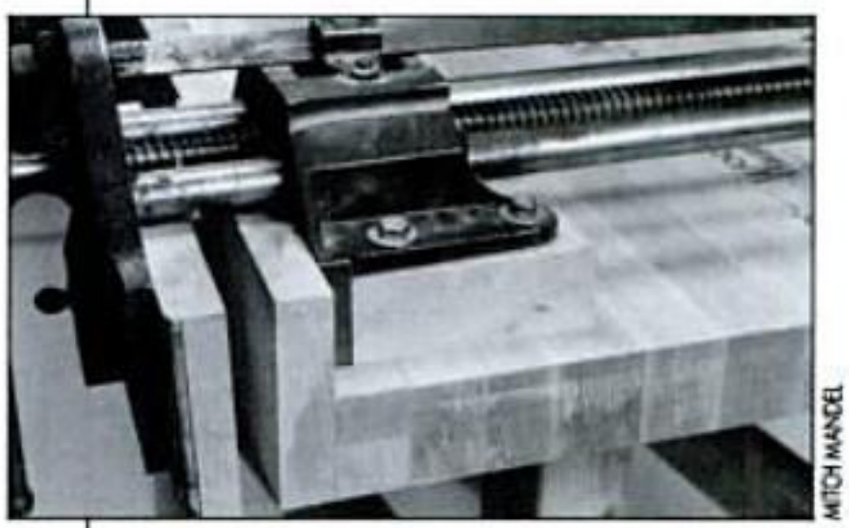


A ½-in. bandsaw blade comes in handy for cutting tenon cheeks and the slot for the slip joint at the top of the legs. Cut both sides of the slot, then make rough cuts in between, like the teeth of a comb. Clean out the waste with a chisel.

FIG. 2: MOUNTING THE VISES

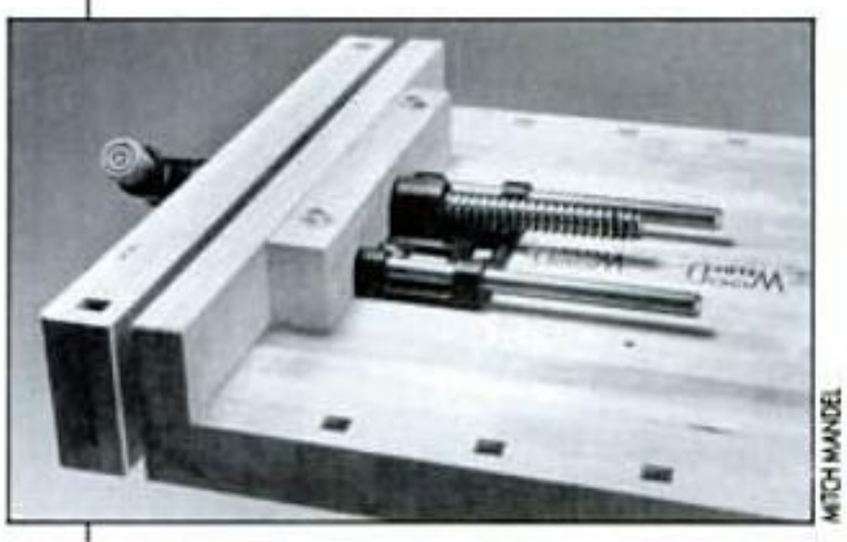






MITCH MANDEL

To hang the face vise, rout a recess in the dog-hole strip for the rear jaw. A wooden spacer under the bench positions the vise in the recess. Lag screws through the spacer fasten the vise to the bench. Note that the vise jaws aren't parallel. They're designed to close at the top first.



MITCH MANDEL

The end-vise screw and guide bars run through a support block, an end cap and the vise jaw, itself. The support block and end cap are screwed to the benchtop. The vise jaw is glued up from three ¾-in. boards.

Cut the dog-hole slots with a dado head on the radial arm saw. Tilt the arm 2° to slant the slots toward the end vise. Be sure to clamp the stock to the table for each cut.

1/16 in. Once you get the spacer thickness right, you can make wooden vise jaws and hang the vise on the bench with lag screws or bolts.

The end vise is a bit more work to install. Look at the drawing and photo to see how it goes together. The support block, end cap and vise jaw all must be drilled for the vise screw and the two guide bars. The vise screw gets a 1¼-in. dia. hole and the guide bars slide into 13/16-in. dia. holes. It's extremely important that the holes in the support block, end cap and vise jaw all line up or the vise won't work smoothly. I accomplished this by drilling holes in the end cap first. Then I clamped the end cap over the other parts and used it as a template to position the bit. I urge you to drill a test set of holes in a scrap piece first—you may need to adjust the hole spacing slightly so the vise can move freely.

The jaw of the vise is glued up from three ¾-in. maple boards. I cut a dog-hole slot on the radial arm saw and cut the head recess with a chisel. Make sure when you glue up the jaw, that the dogs will still slide in their slots.

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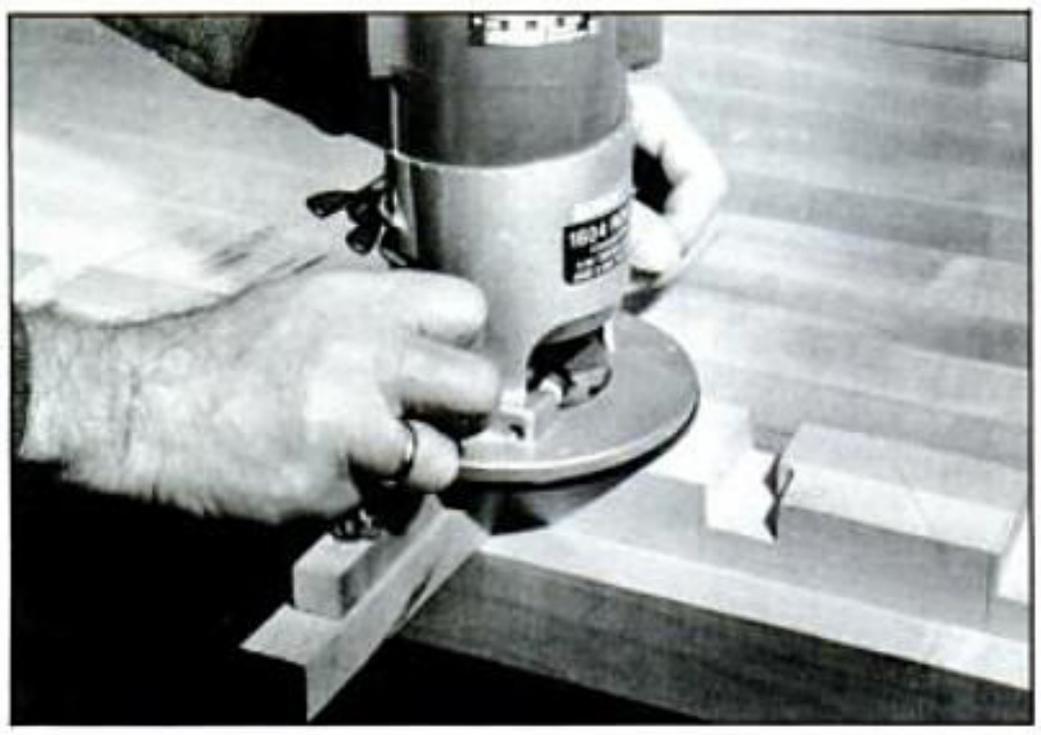
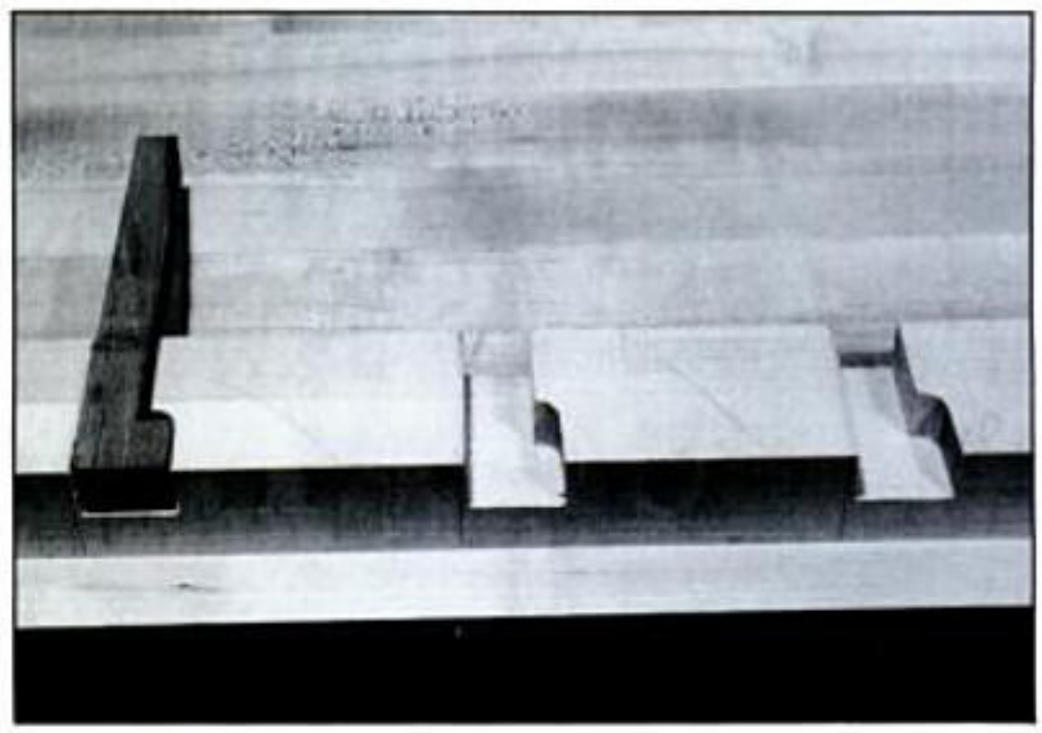
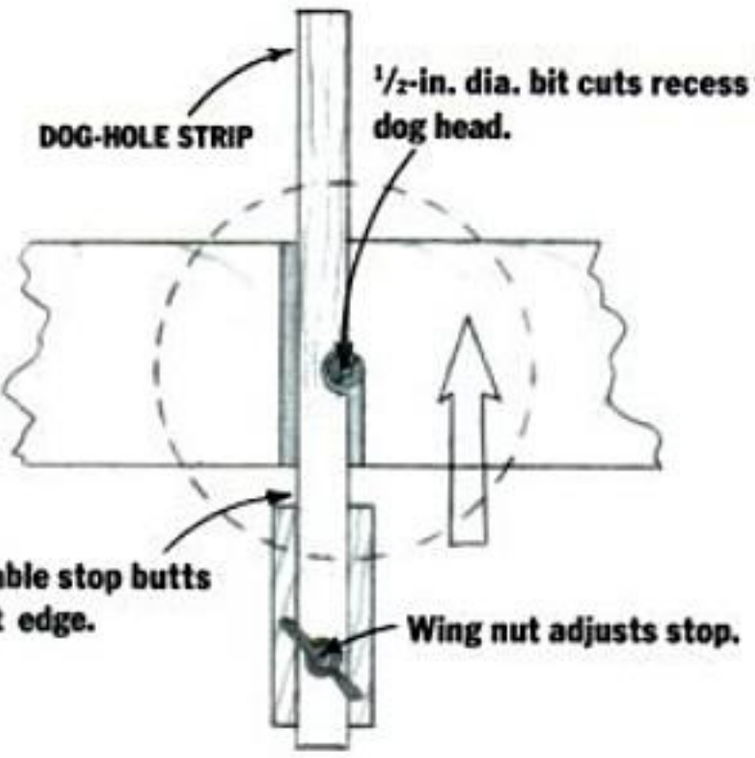




After cutting the slots, rout recesses for the bench-dog heads. A strip of wood screwed to the router base rides in the slot to guide the router. A stop on the strip stops the cut at the right spot.

FIG. 3: ROUTER JIG FOR BENCH-DOG HOLES



A word about wood movement. The laminates on my bench top are oriented so the growth rings are vertical. This means that my top will expand and contract more in thickness than in width. Because of this orientation, I simply lag-screwed the top to the base and lag screwed the end cap in place. If the grain orientation on your top is different, you should cut slotted holes for the lag screws in the rails and end cap so the top's free to expand and contract in width.

Once everything is together, plane the dog-hole strips and the vise jaws flat with the top. A hand scraper and a belt sander come in handy for spots where the plane would tear out.

I never did get around to turning the fancy handle I planned for the end vise. The one in the photo is a 1-in. dia. dowel with (are you ready for this?) rubber crutch tips on the ends. *AW* editor Bob Moran suggested the idea. It may not be art, but it sure does work well. ▲

David Sloan is editor of AMERICAN WOODWORKER.

SOURCES

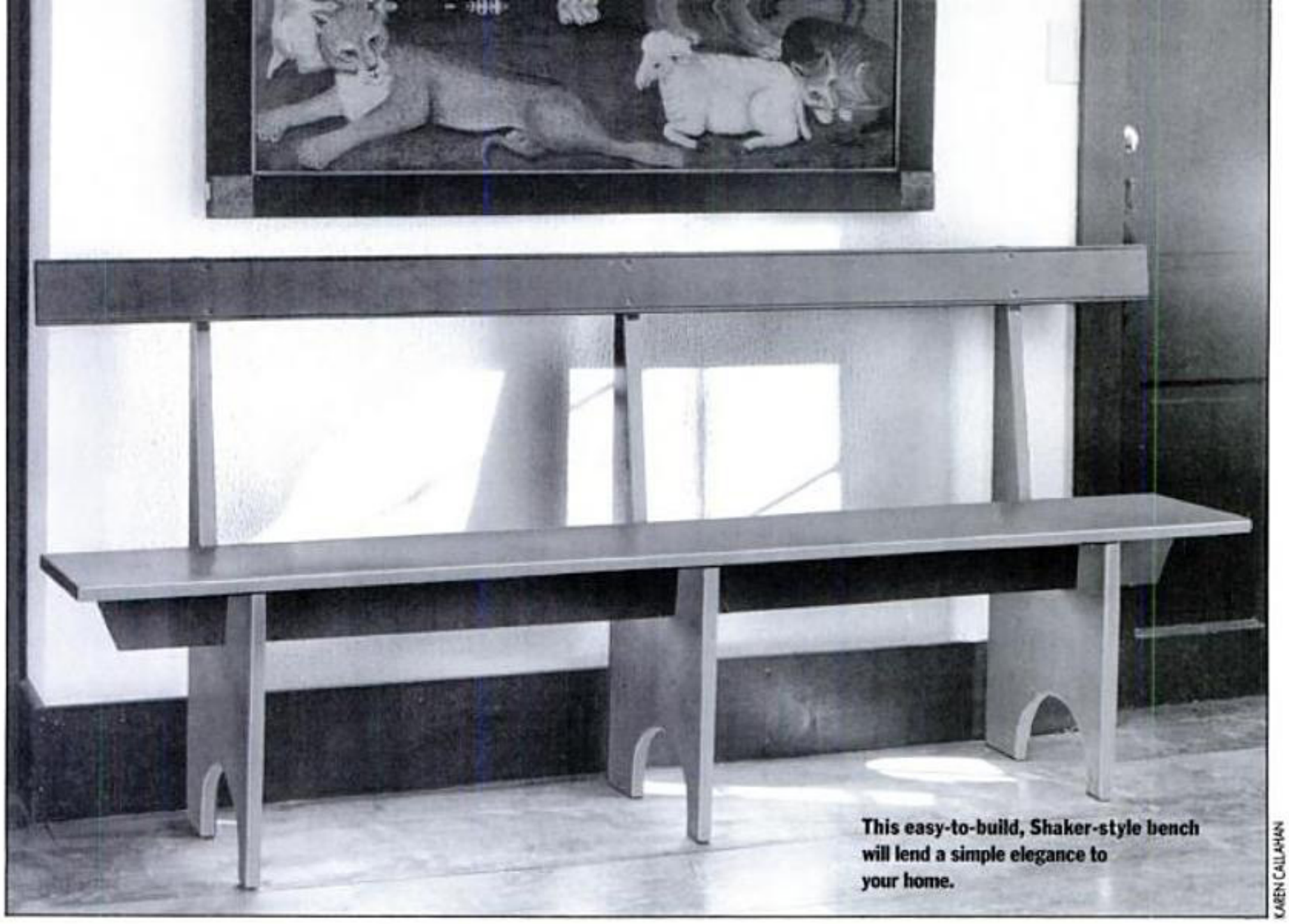
Workbench hardware is available from most major mail-order tool suppliers. The components for the bench in the photograph came from the following sources:

Laminated Maple Benchtop 2¼ × 24 × 60 in. ($175 plus freight): Woodcraft, 210 Wood County Industrial Park, P.O. Box 1686, Parkersburg, WV 26102 (800-225-1153).

Shoulder-Vise Assembly with 1³/₁₆-dia. screw and ¾-in. dia. guide bars for end vise ($149.90 plus freight): Garrett Wade, 161 Ave. of the Americas, New York, NY 10013 (800-221-2942).

9-in. Paramo No. 151 Quick-Release Face Vise ($169.95): Robert Larson Co., Inc., 33 Dorman Ave., San Francisco, CA 94124 (415-821-1021).

Laminated Wooden Bench Dogs ($21.50 per pair): Garrett Wade (800-221-2942).



This easy-to-build, Shaker-style bench will lend a simple elegance to your home.

KAREN CALLAHAN

A Reproduction from the Workshops of David T. Smith

SHAKER DINING BENCH

BY NICK ENGLER

There were more than 100 religious experiments in communal ownership and living in eighteenth- and nineteenth-century America. One of the most successful was the United Society of Believers in Christ's Second Appearing, better known as the *Shakers*. From just eleven followers, newly arrived from England in 1774, the sect had over a thousand members in eleven separate communities by 1800 and six thousand in eighteen communities by 1850.

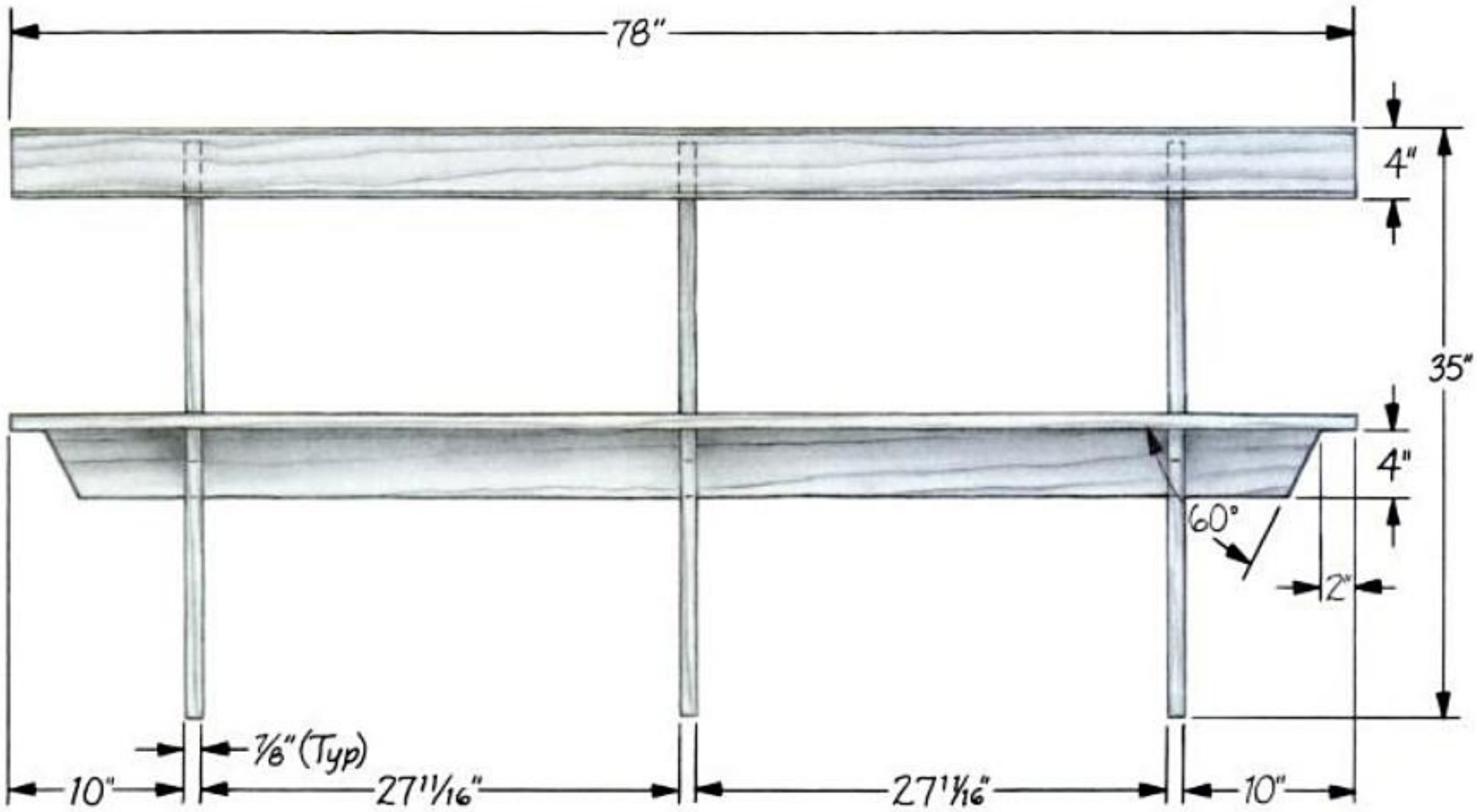
Because Shaker life was communal, they designed and built many pieces of furniture for group activities. Among them was this dining bench, used by several communities in their dining halls and schoolrooms. It was an original invention, a variation on a traditional five-board bench. The Shaker craftsmen extended the legs to support a slender backrest. The result was a piece that was more comfortable—and more elegant—than an ordinary bench.

The design for this dining bench was inspired by a similar bench built at the Shaker community in Hancock, Connecticut, and used in their dining room. It's now on display at the Metropolitan Museum of Art in New York City.

CONTINUED

Excerpted from the new book, American Country Furniture—Projects from the Workshops of David T. Smith, *by Nick Engler and Mary Jane Favorite. (1990, Rodale Press, 33 E. Minor St., Emmaus, PA 18098.)*

FIG. 1: SHAKER DINING BENCH



FRONT VIEW

PROCEDURE:

1. If necessary, glue up wide stock for the legs and seat. Plane, rip, and cut the parts to the sizes shown in the Bill of Materials.

2. Lay out and cut the shape of the legs, as shown in the *End View*. Sand the sawed edges.

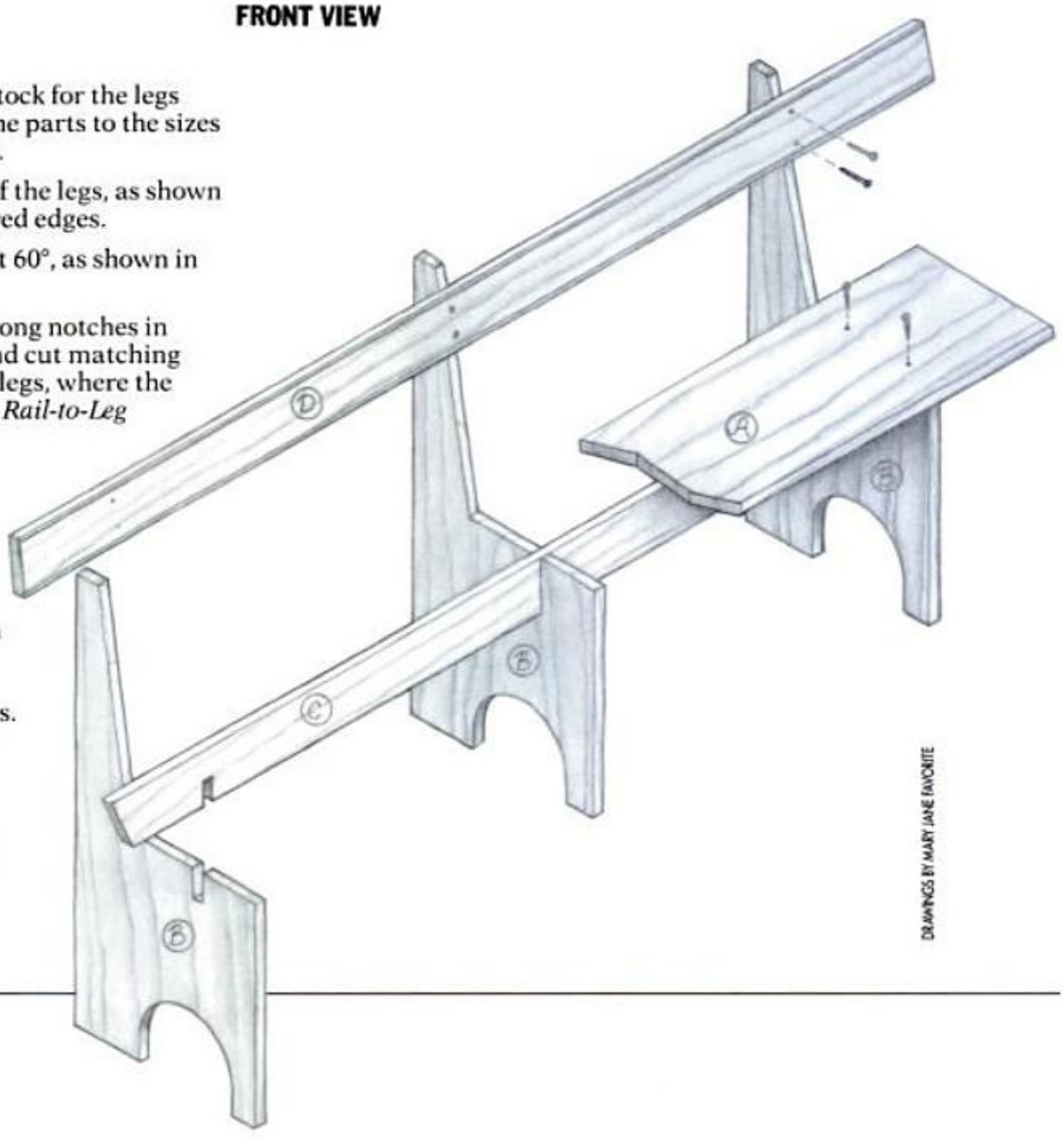
3. Miter the ends of the rails at 60°, as shown in the *Front View*.

4. Cut three 7/8-in. wide, 2-in. long notches in the bottom edge of the rail, and cut matching notches in the top ends of the legs, where the seat attaches, as shown in the *Rail-to-Leg Joinery Detail*.

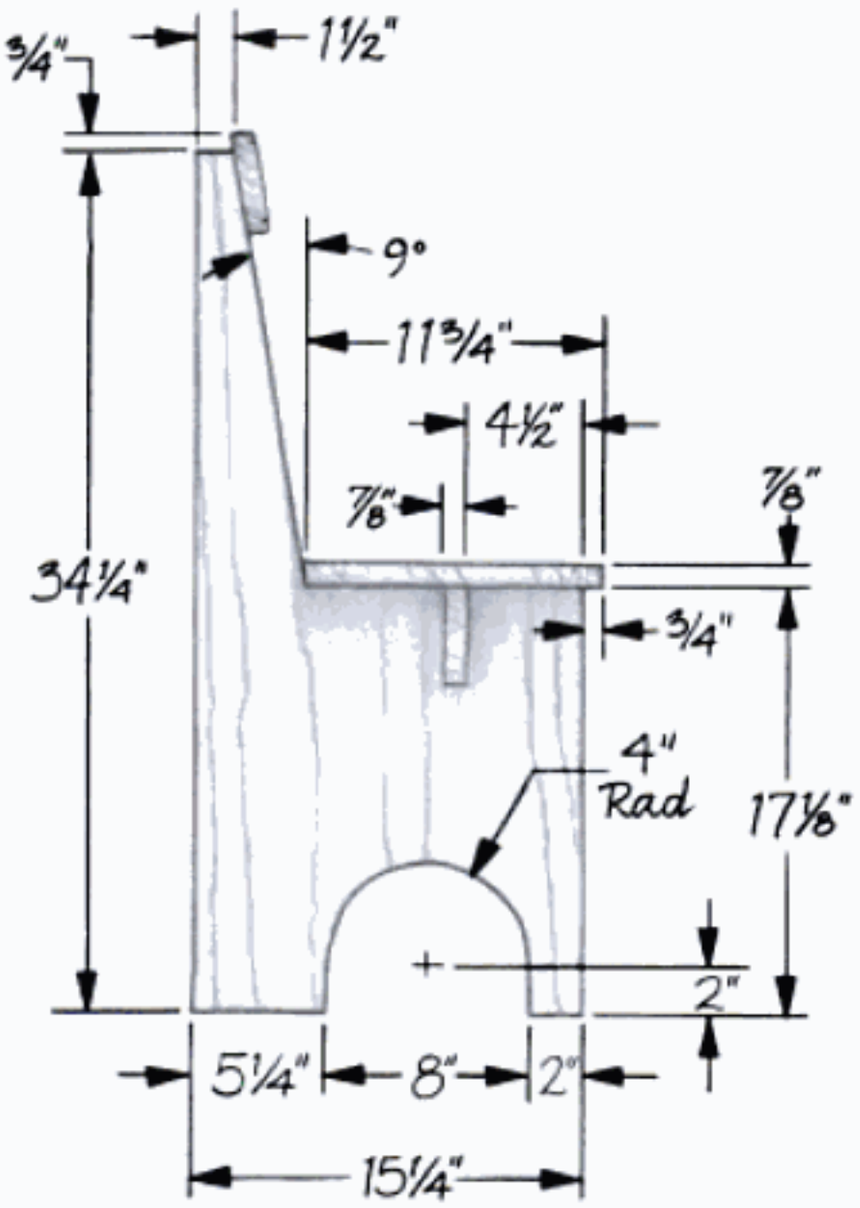
5. Rout or cut beads in the front face of the backrest, near the edges, as shown in the *Backrest Profile*.

6. Finish sand the parts of the bench and dry assemble them to check the fit of the joints. Reassemble the parts with glue and flathead wood screws. Counterbore and countersink the screws, then cover their heads with putty.

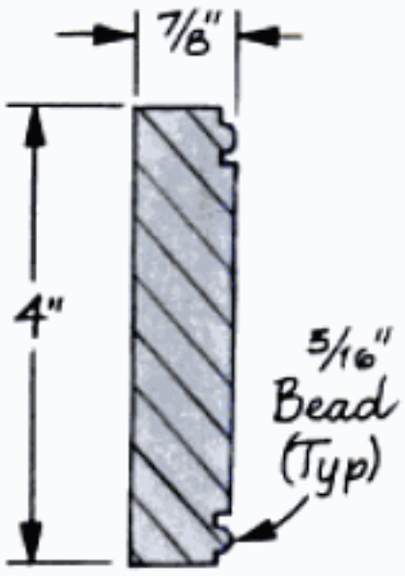
7. Do any necessary touch-up sanding and apply a finish to the completed project.



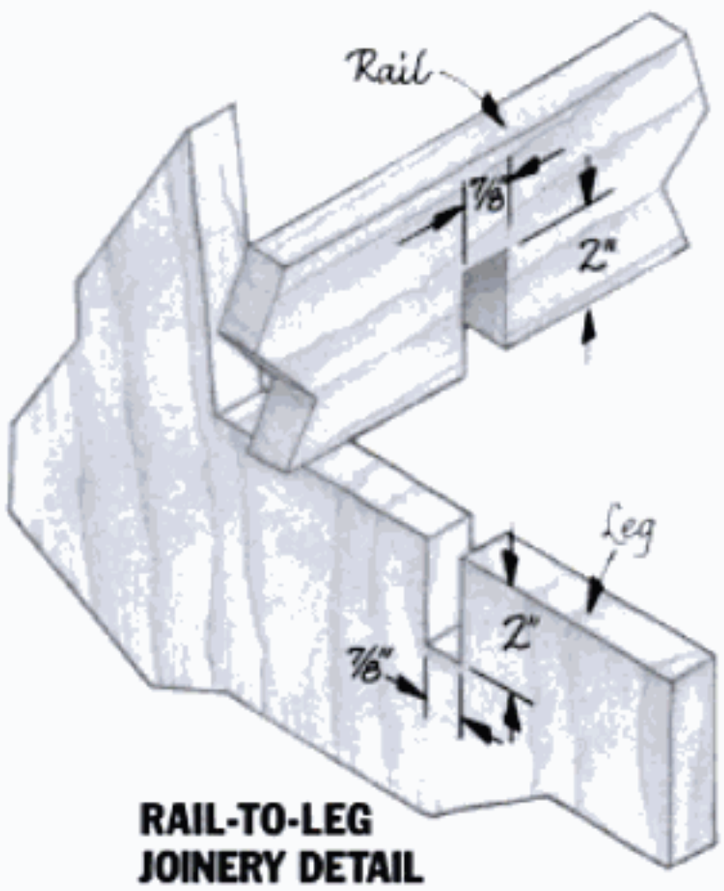
DRAWINGS BY MARY JANE FAVORITE



END VIEW



BACKREST PROFILE



RAIL-TO-LEG JOINERY DETAIL

THE WORKSHOPS OF DAVID T. SMITH

The workshops of David T. Smith are a unique business, perhaps the only one like it in America. The craftsmen and craftswomen at the Workshops make reproductions of historic furniture, pottery, ironware and other household items that were used by our pioneer ancestors during the 18th and 19th centuries—what we now call American country artifacts.

David T. Smith is the founder, chief designer, and driving force behind the Workshops. He began building furniture in the 1960s, which led to a part-time business repairing and restoring antiques. As he gained more experience, he experimented with finishing techniques until he could match the old finishes perfectly. He also devised methods of treating new hardware to make it look old and worn. He became so adept that his customers couldn't tell what part of an antique was original and what had been replaced.

As the demand for David's furniture grew, he became a full-time cabinetmaker. He hired additional craftsmen and expanded his interests into antique redware, pottery, ironware and other household artifacts. Today the Workshops employ almost three dozen people. Together these folks have gained a countrywide reputation for highly accurate reproductions of early American artifacts.—*N.E.*

BILL OF MATERIALS

WOODEN PARTS (finished dimensions)

A. Seat	⅞" × 11¾" × 78"
B. Legs (3)	⅞" × 15¼" × 34¼"
C. Rail	⅞" × 4" × 74"
D. Backrest	⅞" × 4" × 78"

HARDWARE

#12 × 1¾" flathead wood screws (12)

CONTINUED

MUSEUM-QUALITY FINISHES

In a "museum-quality" finish, the effect—the antique look—is more important than the materials you use. The final finish must protect the surface of the wood, but you can use any material, traditional or modern, that correctly simulates the effects of age.

To achieve the right effect, you must first understand the natural aging process. The wood, finish, and hardware all show their age in different ways. The wood's surface changes color and collects chips and dings. Traditional finishes dry out, shrink, and become discolored and scratched. Hardware rusts or tarnishes.

Think about each detail of your project. If it *had* been built long ago, what would have happened to it over the centuries? If you want, make up a history—to whom it belonged, how it was used, where it was kept. Create 150 to 200 years of fictional use and abuse. This fantasy will help you build a believable "surface history."

Although there are a lot of processes that age a piece of furniture, none of them is complex. They can all be duplicated simply, using a few special techniques and a lot of horse sense. There are only two tricks: First, come up with a finishing plan that includes all the details. Second, arrange the various steps of this plan in the *proper chronological order*.

This chronology is extremely important! For the aging to appear authentic, you must carry out the simulation just as it might have happened in history. For instance, when you distress the wood, do so *after* you have applied a finish. If you're applying several layers of finish to build up a paint history, do a little distressing after each layer. This is the way it would have happened in real life.

There are many different processes that affect the appearance of every antique. For each process, there are one or more ways to simulate its effects on a reproduction. These include rounding, distressing, chipping and other stresses applied by hand to simulate the accumulated wear and tear that a piece of furniture experiences over many years.

Accumulated layers of finish—Many antiques are finished several times during their lifetimes. A typical early nineteenth-century Windsor chair, for example, might have been finished with a green paint when it was first made. Later in the century, it could have been covered with the black lacquer that was so popular in Victorian decor. In the 1920s or 1930s, it might have been painted once more with colored enamel. Each of these layers would have worn away partially, revealing bare wood or the colors underneath them.

To simulate this history, you must apply successive layers of paint. Sand and chip away a layer in the areas prone to wear, then wipe with a glaze (a thick, dark stain) to discolor it. Repeat for each layer. This is a painstaking process, but there are no good short cuts for simulating this type of aging. You can simulate an old, cracked finish by applying a base coat of ordinary lacquer, then spraying this with special "crackle lacquer" (mfd. by Mohawk Finishing Products, Amsterdam, NY 12012; minimum order $40). The crackle lacquer is a chemical agent which cracks the lacquer coat directly underneath it, showing the wood, stain or paint beneath that. **Note:** Crackle lacquer must be applied over a coat of clear lacquer, tinted lacquer or colored lacquer.

The following procedure is an outline of a finishing plan that is commonly used at the Workshops to produce a painted finish. The steps are arranged so the work flows easily, but they add the effects of age in the same order that history would have done so.

Museum-quality painted finish—This finish is best suited for informal projects made from utilitarian woods such as poplar or for folk designs that are meant to be painted. You can also use it to disguise the grain of projects made from several different wood species.

1. Carefully remove all mill marks and evidence of power tools. Finish sand the surface to 150 grit.

2. Apply a base coat of latex paint or milk paint. If you desire a crackle finish, apply a base coat of colored lacquer instead. (Crackle lacquer can only be applied over a lacquer base.)

3. Seal the base coat with clear shellac, varnish or lacquer. Use lacquer as the sealer coat if you're going to make a crackle finish.

4. For a crackle finish, apply a second coat of colored lacquer that contrasts with the base coat. Then spray crackle lacquer over that. This second coat will crack, letting the base coat show through the cracks. Be sure to follow the instructions on the can of crackle lacquer; these may vary slightly from brand to brand.

5. If you want artificial grain on the project, apply the graining at this time. Let the graining dry thoroughly and seal it with a clear finish. (If you want to crack the grain painting, do the graining with colored lacquer, apply a clear lacquer coat, then apply crackle lacquer.)

6. Allow the previous finish or sealer to dry completely. Then do the rounding and distressing, and re-create any other wear and tear that might have happened to the wood or paint over time. Be careful not to overdo.

7. If you want to build up multiple layers of paint, repeat steps 2 through 6 as desired (except in the case of crackle finish.)

8. Apply glazing (a thick, dark stain) to the surface, allow it to set for a few minutes, then wipe it off. Let it dry for at least 6 hours.

9. Apply a final coat of clear lacquer, shellac or varnish.

10. Fasten the hardware in place, then rub out the finish with #0000 steel wool and oil soap. Substitute dark paste wax for the soap, if desired. Buff the surface. —*N.E.*

SAWMILL

A Family-Run Outfit That Sows What It Reaps

BY SIMON WATTS

PHOTOS BY SIMON WATTS

On a cool, rainy day last spring, I was out scouting for boat-building lumber. Each person I talked to suggested another mill further up California's Route 101. Finally someone mentioned Tosten brothers in Miranda. I got directions at the post office and drove up a steep, narrow road until I came to a fork and a small metal arrow saying simply "Mill."

The Tosten business is mostly local: custom sawing lumber for furniture and construction. The logs all come from the ranch owned by Gordon, Everett and Meredith Tosten. With a small work force they produce up to 2000 board feet of lumber a day. The mill is a "Mighty Mite" traveling circular saw powered by a 50-HP Perkins diesel.

"In 1947 we borrowed $5000 from an uncle, bought a tractor and started logging," recalls Gordon Tosten. "First job was to clear-cut 40 acres." There were few restrictions on logging in those days. With payments to meet, the brothers dragged logs through the rain and mud all winter long. "Now the state would close us right down," he allows. "Nobody planted in those days. You just cut and ran. If loggers had planted trees back in the 1940s they'd be ready to harvest now, and the country wouldn't be running out of timber."

Since their early days, the Tostens have changed their logging practices. They don't clear-cut as they once did; they log selectively. They use a rubber-tired skidder to minimize damage to the forest environment. They also have scaled the operation down to the point where each year they grow more wood than they cut. "I still believe in cutting trees, but I believe in planting them too," says Gordon. When winter rain makes logging impossible, the logging crew slips into reverse and plants seedlings. Gordon points out a variety of young trees growing right around the mill; pine, fir, redwood, cedar. I get the impression he knows them all by name, like a flock of sheep. In fact, he admits that he can't bring himself to cut one down for Christmas.

This part of the Tosten ranch has never been clear-cut, so there are still some old-growth trees left. The sawyer, Jobey Tritchler, and his brother Charlie are getting ready to saw one; 16 ft. long, 5 ft. in diameter.

I watch with fascination as the teeth of the saw bite into the bark of this 300-year-old trunk, laying it open to the air century by century. I don't see this as an act of destruction, but as liberating the wood for another career; in this case,small boats. With all the boat lumber sawn, more than 500 board feet, half the log is still left. Jobey puts it back in the pile to await the next person needing such high-grade lumber.

Gordon invited me down to his house for supper, and inevitably, we got on to the politics of logging, a hot topic in this area. I'd already seen the bumper stickers in neighboring Garberville; "Stop Clear-cutting" and "Wilderness—Land of No Use." The fate of the remaining stands of old-growth trees in private hands has stirred passionate debate. "I'm not a complete redneck," Gordon says disarmingly. But he admits to getting incensed at the people who are dead set against logging. When he finds himself in a heated discussion he reminds his antagonists that they all like to live in wooden homes and use wood products.

The Tosten mill has always operated with a low overhead. There is no front office, no loan to repay. They can sell their wood, green, straight from the mill, at prices that range from 35 cents to a couple dollars a board foot, depending on grade. To custom saw quality lumber at these prices and to be operating in an environmentally sound manner, taking less than is grown, is no mean feat. As Gordon says, "We can go on logging this way until I die. Then my grandson can take it up and go on for his lifetime. That's a good feeling." ▲

Simon Watts is a contributing editor of AMERICAN WOODWORKER *and teaches courses in wooden boatbuilding. When not traveling, he lives in California.*

MITCH MANDEL

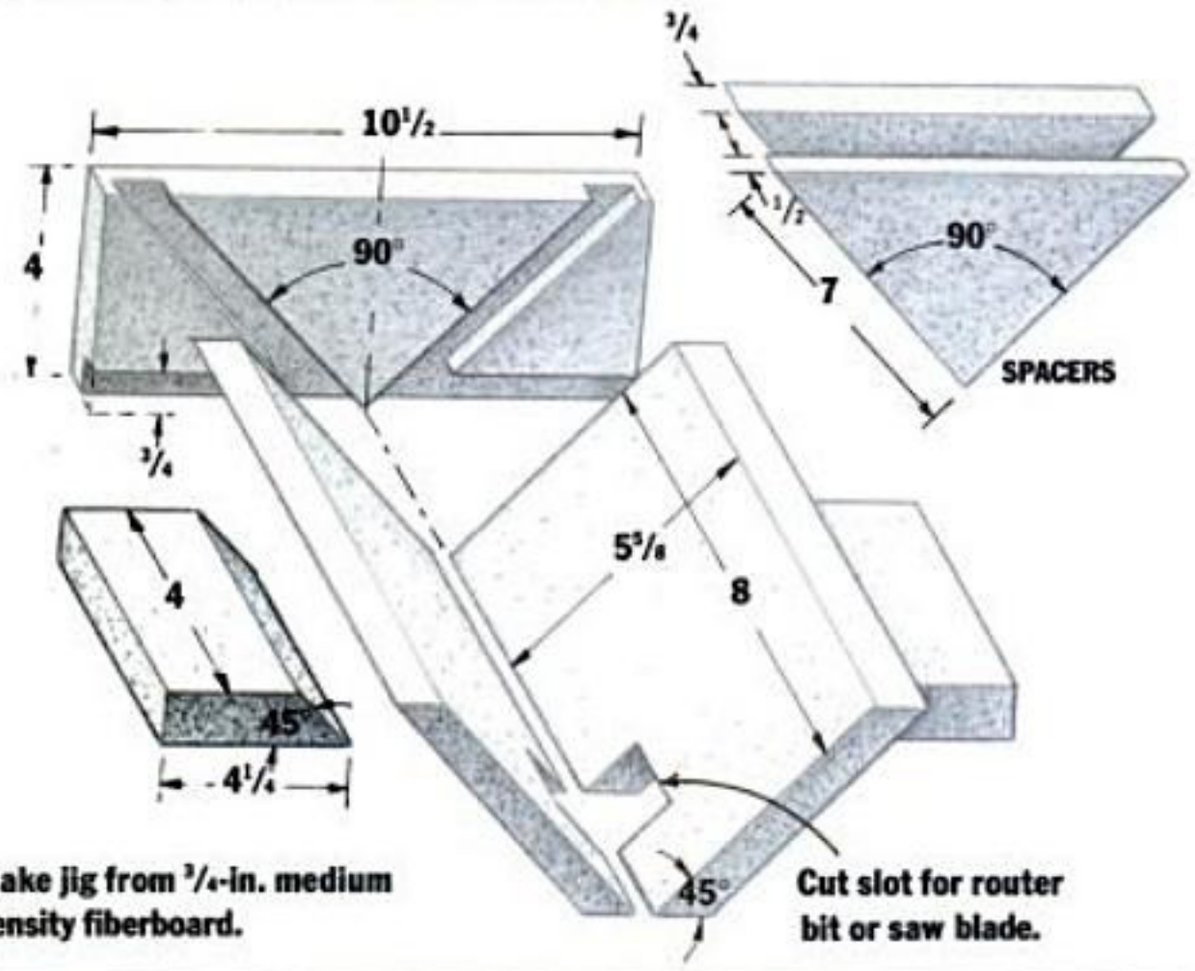
Dovetailed splines make mitered corner joints stronger and fancier.

DECORATIVE SPLINED MITERS

Sliding Jig Makes It Easy to Cut the Grooves

BY HUGH WILLIAMSON

FIG. 1: JIG FOR SPLINED MITERS



Make jig from ¾-in. medium density fiberboard.

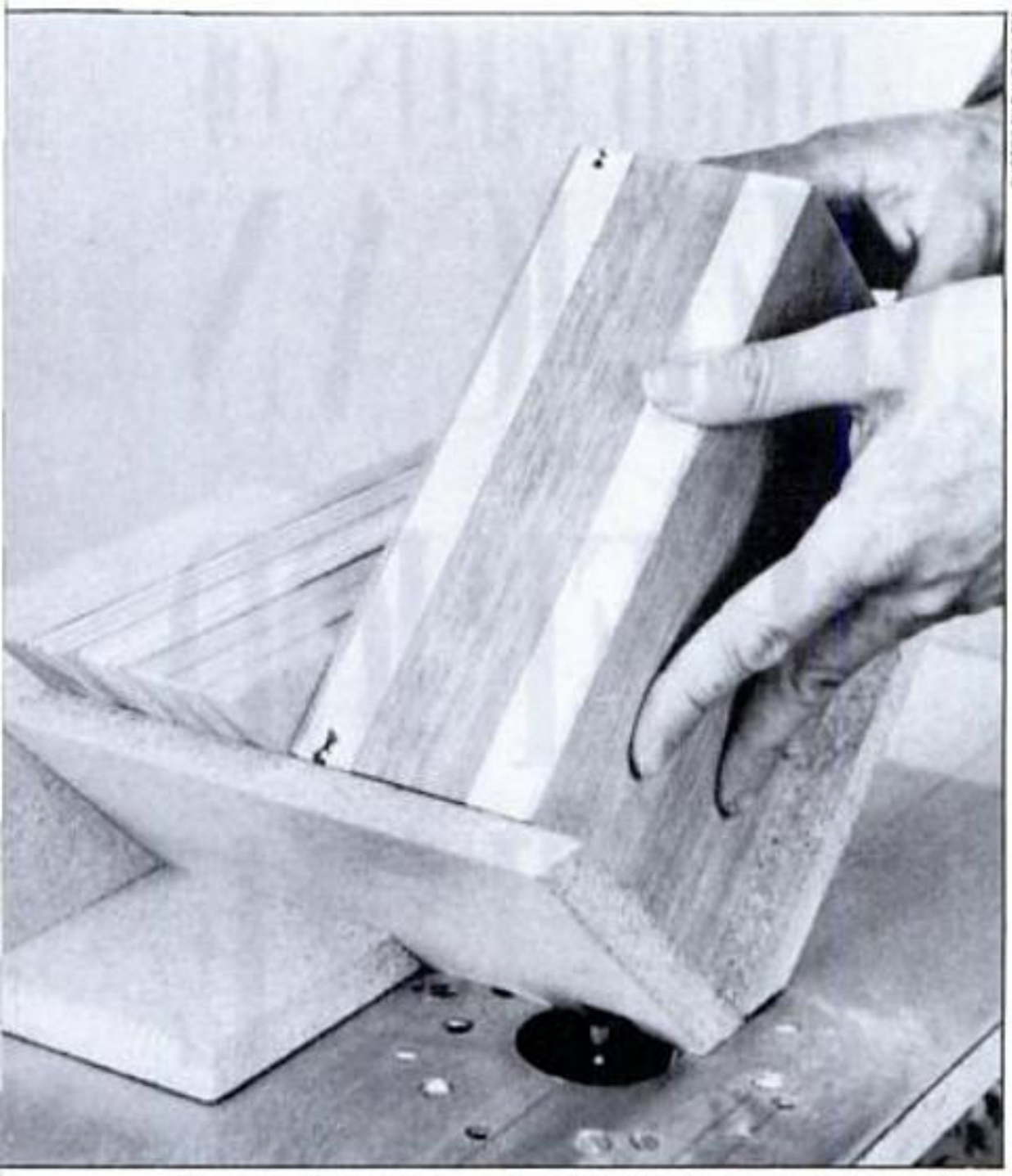
Cut slot for router bit or saw blade.

Crisp, clean, mitered corners on small boxes and cabinets look great—and they're easy to make. Trouble is, without some kind of reinforcement miter joints are weak, because mitered end grain provides a poor gluing surface. Hidden splines, dowels or plate joiner biscuits can beef up the joint if the wood is thick enough to accommodate them. On small boxes, however, the stock is too thin for hidden reinforcements.

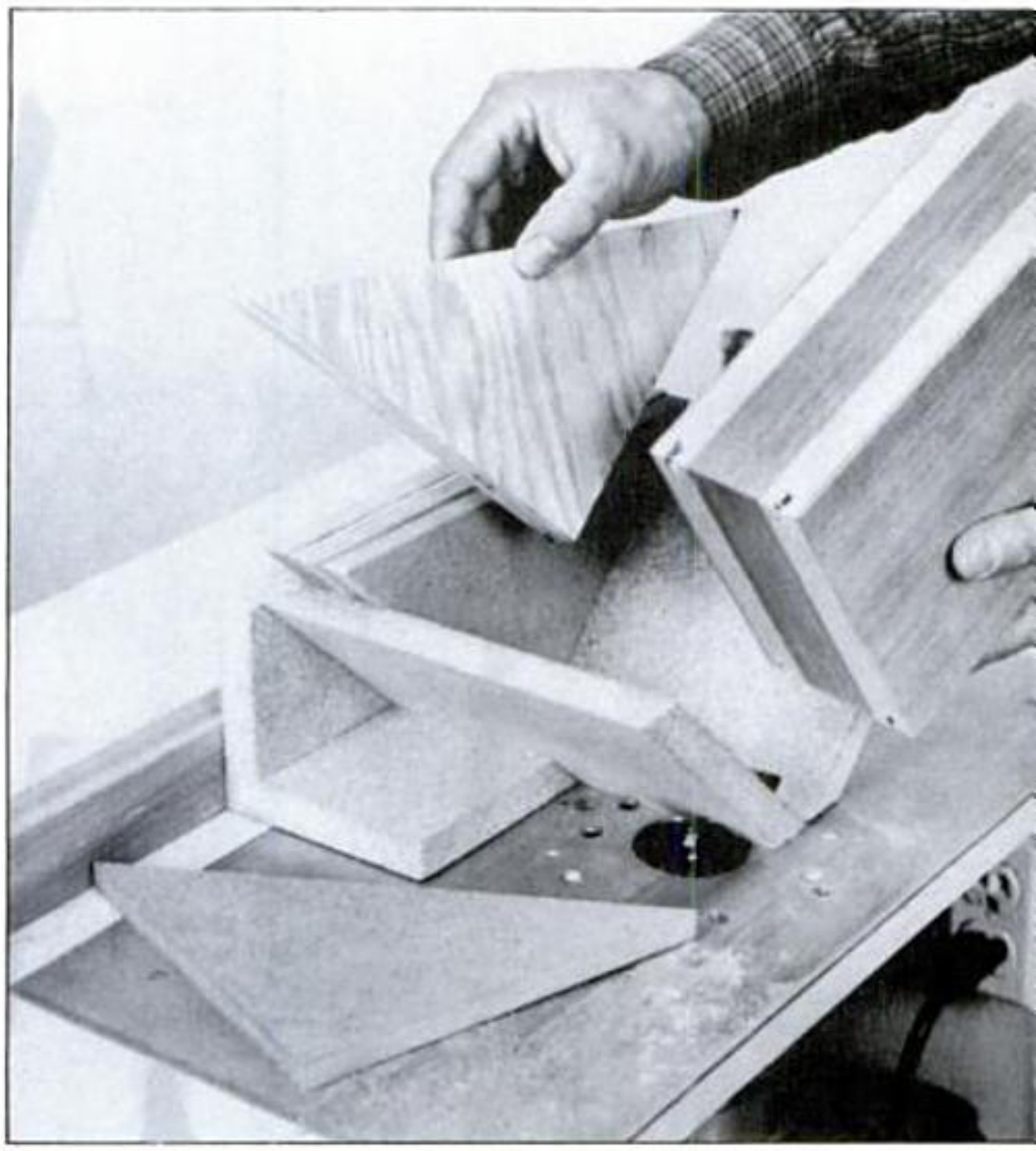
Decorative splines are the perfect solution to this problem. They're easy to install. You glue and clamp the miters first, then cut the spline grooves on the four corners of the box and glue in the splines. The splines can be straight, or dovetailed for a more decorative look.

I've made a simple jig that helps me cut the spline grooves on the tablesaw or router table—it works the same on either machine. It's simply a sliding cradle that holds the box at a 45° angle so you can pass the corners of the box over the cutter.

I made the jig from ¾-in. medium-density fiberboard (MDF), although plywood will work well, too. Fig. 1 shows how the parts go together. Of course, you can vary the dimensions to suit your needs. Finish the jig with a coat of tung oil, shellac, varnish or whatever clear finish is handy and follow with a buffed coat of



PHOTOS BY DAVE SELLERS



It's a snap to cut spline grooves with this jig on a router table. Slide the jig along the fence so the bit cuts a groove in the corner of the box (above left). "V"-shaped spacer blocks position the box in the jig to determine the spacing betweeen grooves (above right).

paste wax on the sliding surfaces.

To space multiple spline grooves in each box corner, one option would be to reposition the fence for each cut. But instead of moving the fence, I find it's easier to make up a number of "V"-shaped spacer blocks from MDF to reposition the box in the jig.(See Fig. 1.) An assortment of spacer blocks in 1/4-in., 1/2-in. and 3/4-in. thicknesses gives me all the variation I need to adjust the slot spacing any way I want. One tip: Before cutting the grooves, wrap masking tape around the corners of the box where the grooves will be cut—this prevents tearout.

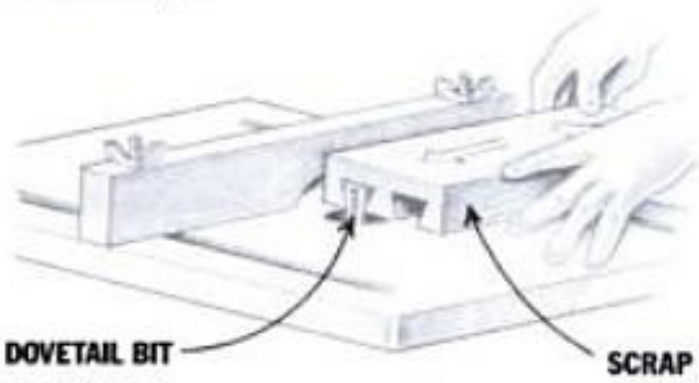
I make the splines on my router table (see Fig. 2), but you could also use a tablesaw. To make dovetailed splines, use the same dovetail bit and height setting you used to cut the grooves in the box. Make parallel dovetail cuts in a long piece of scrap wood, then resaw the scrap with a bandsaw, freeing the long dovetail splines. Finally, crosscut the splines to length and glue them in the grooves. When they're dry, trim the projecting ends of the splines with a bandsaw or back saw, and sand them flush with the box sides. ▲

Hugh Williamson is a retired doctor in Tucson, Arizona. He has been working with wood—and writing about it—for over 30 years.

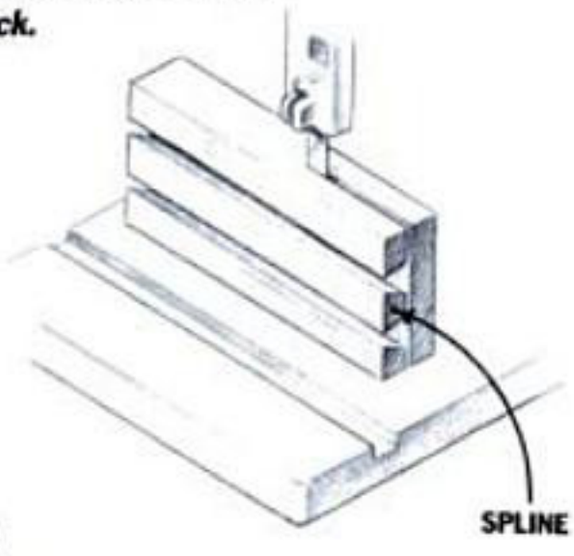
DRAWINGS BY SALLY ONORA

FIG. 2: MAKING DOVETAIL SPLINES

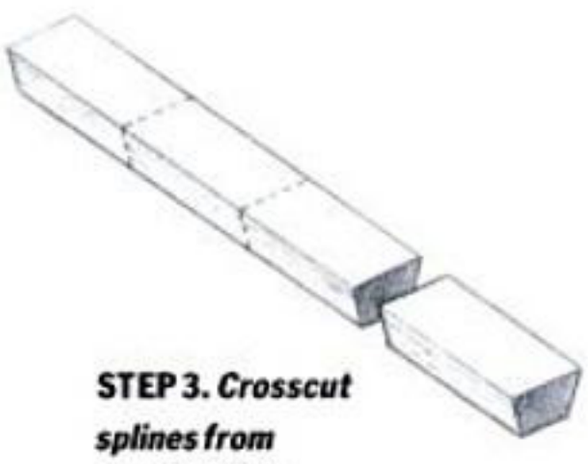
STEP 1. ***After routing grooves in box, keep bit adjusted to same height and rout parallel grooves in scrap stock to form dovetail strips.***



STEP 2. ***Cut dovetail strips from stock.***



STEP 3. ***Crosscut splines from dovetail strip.***



HIGHLIGHTS OF AMERICAN PERIOD FURNITURE

Part III: Late Baroque (Queen Anne)

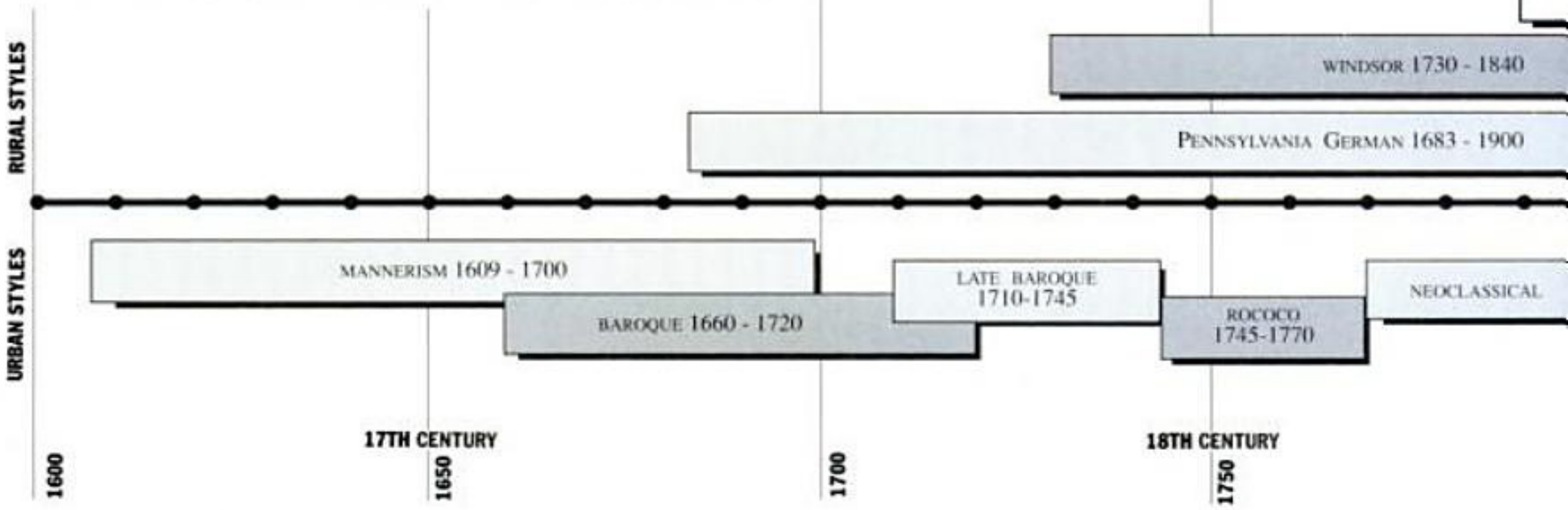
BY DAVID DONNELLY

In Part II of this series (October, 1990 AW) we looked at the Baroque period (commonly known as William and Mary). This time we'll focus on the Late-Baroque period —a style we're accustomed to calling Queen Anne. The Late-Baroque style spans the period from about 1710 to 1745. During this time, curved, fluid furniture forms predominated—in marked contrast to the linear effect of the earlier Baroque style.

PHOTO COURTESY OF COLONIAL WILLIAMSBURG FOUNDATION, WILLIAMSBURG, VA

The side chairs of the Late-Baroque style, perhaps the best known form for this period, typically had the curved crest rail, the cabriole legs and the vase-shaped back splat. This mahogany side chair comes from Newport, Rhode Island.

TIME LINE OF AMERICAN FURNITURE STYLES



18th-Century Furniture

The 18th century is known as *The Golden Age of American Furniture,* a title that includes several of the most masterful styles in furniture history. The Late-Baroque style, also known as Queen Anne or Early Georgian, represents a radical departure from the styles that preceded it.

As we discovered in the earlier articles in this series, it is often difficult to categorize styles into neat little descriptions with clearly defined dates. The difference between Late Baroque and the following Rococo style is often just a matter of degree, such as the amount of decorative carving or detail.

International influences contributed to a revolution in furniture design, while other cultural strides were being made in music, philosophy and art around the world. The Colonies were no longer in their infancy and a wealthy class of merchants, ship owners, and plantation owners were eager to patronize the growing cabinetmaking industry.

American craftsmen were becoming more confident with their own skills at this time. A guild system that was less rigid than that of the Continent allowed for personal expression. And patrons began to appreciate the decorative arts on more than a purely functional basis. European themes blended together to become regional and personal interpretations throughout the Colonies.

A New England desk-on-frame, made of curly maple, white pine and tulip poplar, displays a drawer pull common to this period.

PHOTO COURTESY OF COLONIAL WILLIAMSBURG FOUNDATION, WILLIAMSBURG, VA.

DAVID DONNELLY

At Colonial Williamsburg's reconstructed Anthony Hay Cabinet Shop, an apprentice powers a great-wheel lathe, while master craftsman Mack Headley turns a spindle for an 18th-century reproduction.

The elegance of the Italian Baroque was introduced to the American furniture scene through William Kent, an English architect who incorporated lavish shell carvings, cornucopia and masks. The Rococo style of Louis XV was introduced in France, but its influence was not felt in the colonies for many years to come. Craftsmen on these shores continued to express themes based on their religious and national backgrounds. We tend to label periods by the high-style fashion of the time, but vernacular, rural and ethnic styles, such as Pennsylvania German, also played an important role in our history.

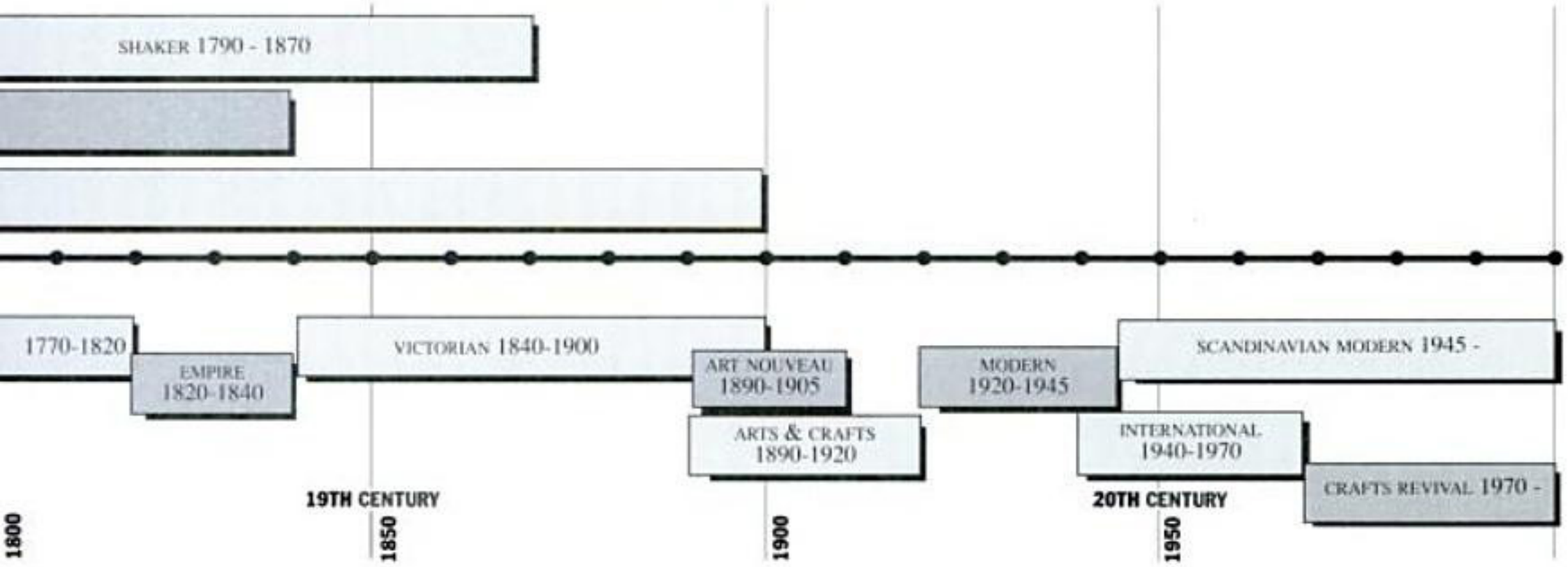


PHOTO COURTESY OF COLONIAL WILLIAMSBURG FOUNDATION, WILLIAMSBURG, VA.

This simple, New England low-post bed shows the common use of curved and straight members together. The front legs are the typical cabriole style, but the back legs are straight turnings. This bed is made of maple with a white pine headboard.

The Line of Beauty

Of all the influences that shaped Late-Baroque furniture, perhaps nothing has ever had as profound an effect on furniture styles as the S-shaped *cyma* curve. This curve appeared frequently at this time as cabriole legs, carvings, chair splats, and serpentine skirts. English author and artist William Hogarth called the cyma curve "The Line of Beauty." Its lineage stretches back to China, where it is seen on vases, and ancient Rome where it appeared on sarcophagi.

This simple curve had a profound impact on the role and function that furniture was to serve. It surpassed the aesthetic realm of decoration and became structurally integrated into pieces. The cabriole leg became the unofficial "trademark" of Queen Anne. Norman Vandal, author of the new woodworking book *Queen Anne Furniture* says, "The cabriole leg represents the ultimate expression of form and gentle animation over decoration." Carvings with the cyma curve, though more restrained than the later Rococo carvings, depicted shells, acanthus, cupid's bows and scrolls, as well as the ball-and-claw foot.

Prior to this period, American-made chairs had hard straight lines. High fashion typically dictated that straight posture required a straight chairback. But chairs imported from China—with their curvilinear lines and yoke-shaped top rails—challenged this notion. Splats on these Chinese chairs conformed to the shape of the spine and the seats were upholstered. This early attempt at comfort and ergonomics was revolutionary for its time and greatly affected chairmakers of this period. Incidentally, the Chinese influence is also seen in the claw-footed cabriole leg, which originated from Chinese carvings of a dragon clutching a pearl.

Cabinetmaking Centers

With the growing population, cabinetmaking centers were springing up in Boston, Newport, New York, and Philadelphia in the North, as well as Williamsburg and Charleston in the South. Until recently, it was assumed that there were no major cabinetmaking centers in the South. But research and publications from The Colonial Williamsburg Foundation, the Museum of Early Southern Decorative Arts and others have done much to correct this misconception. Colonial Williamsburg's reconstruction of the Anthony Hay Cabinet Shop has helped restore Southern cabinetmaking to its rightful place in history. The range of colonial Southern styles is quite varied, although as a broad generalization they tended to reproduce English styles more faithfully than their Northern counterparts.

Age of Mahogony

The *Age of Mahogony* began around 1720, though walnut continued to be prized. In fact, some cabinetmakers offered pieces in either wood. Cherry, chestnut, ash, white pine, maple, and tulip poplar were also popular local woods.

Styles and construction techniques varied from col-

This high chest, made by William Parkman, is a fine example of the broken-arch pediment with corkscrew finials. Note also the fan and star motif.

PHOTO COURTESY OF THE HENRY FRANCIS DU PONT WINTERTHUR MUSEUM

ony to colony, and between urban and rural shops. Regional characteristics became identified with cabinetmaking centers as they developed their own style. Urban shops employed journeymen and apprentices to help meet the demand for furniture commissions by wealthy citizens. Rural cabinetmakers, however, often worked alone, bartering for their merchandise. These rural craftsmen emphasized function over style, and made their livelihood from various endeavors, including farming and carpentry.

In contrast to the Late-Baroque style, country-style furniture of the time tended to be more spare. For example, the rural-style Windsor chair made its first American appearance about 1725 in Philadelphia. This English classic with bentwood and turned spindles was originally made by wheelwrights and turners, rather than cabinetmakers. Though not actually a Late-Baroque piece, the Windsor gradually became a highly popular chair for common use throughout the 18th and 19th centuries, and so deserves historical recognition.

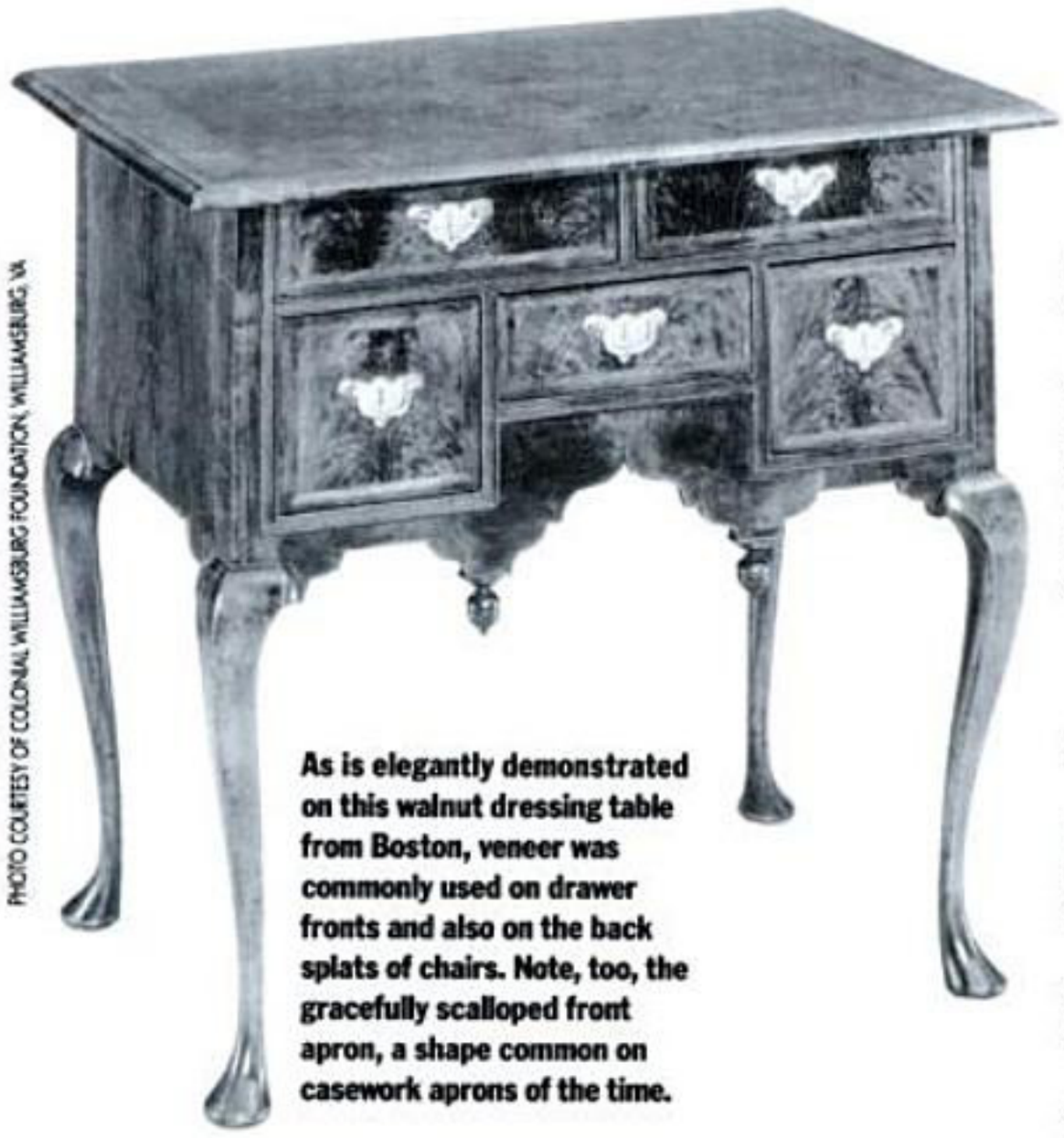


PHOTO COURTESY OF COLONIAL WILLIAMSBURG FOUNDATION, WILLIAMSBURG, VA

As is elegantly demonstrated on this walnut dressing table from Boston, veneer was commonly used on drawer fronts and also on the back splats of chairs. Note, too, the gracefully scalloped front apron, a shape common on casework aprons of the time.

Although we think of fine furniture as being made by cabinetmakers, we cannot overlook the impact of the upholstery trade. It first appeared in the colonies in the 18th century and quickly became a prestigious and prosperous craft. Most chairs had rush or upholstered leather or fabric seats. An easy chair, however, would be entirely upholstered and sold by an upholsterer rather than a cabinetmaker.

PHOTO COURTESY OF THE HENRY FRANCIS DU PONT WINTERTHUR MUSEUM

Tea tables were a popular furniture form at this time. This walnut and cherry tea table from New Hampshire has a tray top with a wide concave rim, cabriole legs and a shaped drop that repeats along the periphery of the apron.

As 18th-century styles became more lavish, new skills were required in dovetailing, veneering, japanning, and turning, which required even more specialization on the part of furniture makers. Many traditional joiners, including rural joiners, turned their efforts exclusively to housewrighting where they could put their skills to good use.

Qualities of Late-Baroque Furniture

Here's a summary of the common themes of Late-Baroque furniture:

Cabriole legs: The S-shaped cabriole leg could almost serve as a "trademark" for this style since it is the most visible and common expression of the cyma curve.

Carving: Shells, rosettes, and acanthus adorn chairs and case furniture. Carved claw feet or pad feet highlight cabriole legs.

Pediments and Finials: S-shaped broken pediments appear on tops of chests and clocks. Carved finials of flames or urns often accompany them.

Veneer: Bookmatched patterns of crotch wood and stringings appeared on chests and drawers, while stars or sunbursts served as focal points of attention on drop-front desks. ▲

David Donnelly is a teleproductions manager at Boise State University in Idaho. He's an amateur woodworker.

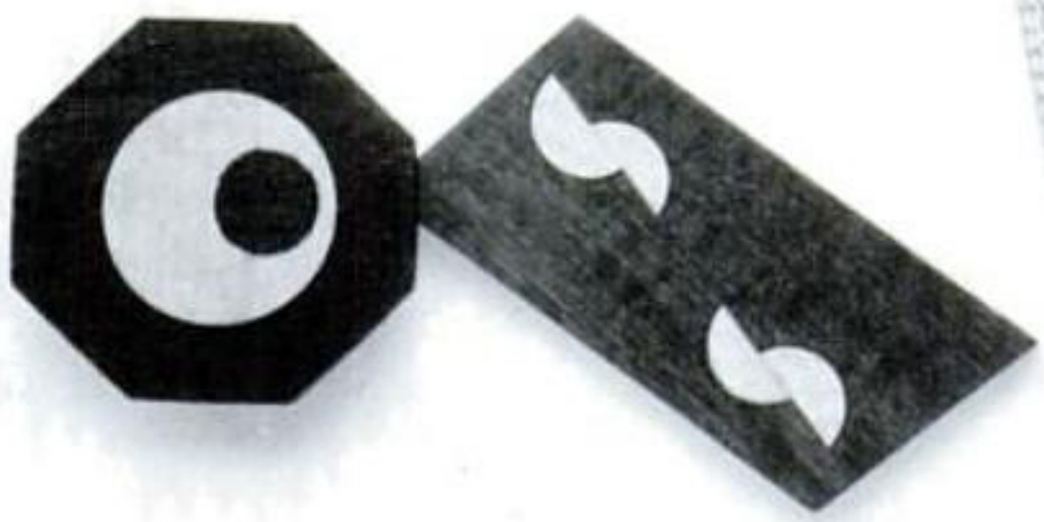
PHOTO COURTESY OF WADSWORTH ATHENEUM, HARTFORD, CT
WALLACE NUTTING COLLECTION
GIFT OF J. PIERPONT MORGAN

The backrest on this walnut day bed illustrates Late-Baroque features: curved crest rail and vase-shaped back splat. The turned-spindle base harkens back to the earlier Baroque period.

TWO TURNED TRINKETS

Little Treasures You Can Make from Scrap

Here are a couple of simple turning projects that can easily be made from shop scraps. If you're a novice turner you can learn a few tricks; and if you're an old pro, these projects will make good "tune up" exercises to sharpen your lathe skills before tackling a more complicated turning project.



DENNY GILLETTE

TURNED TOP

BY PETER HUTCHINSON

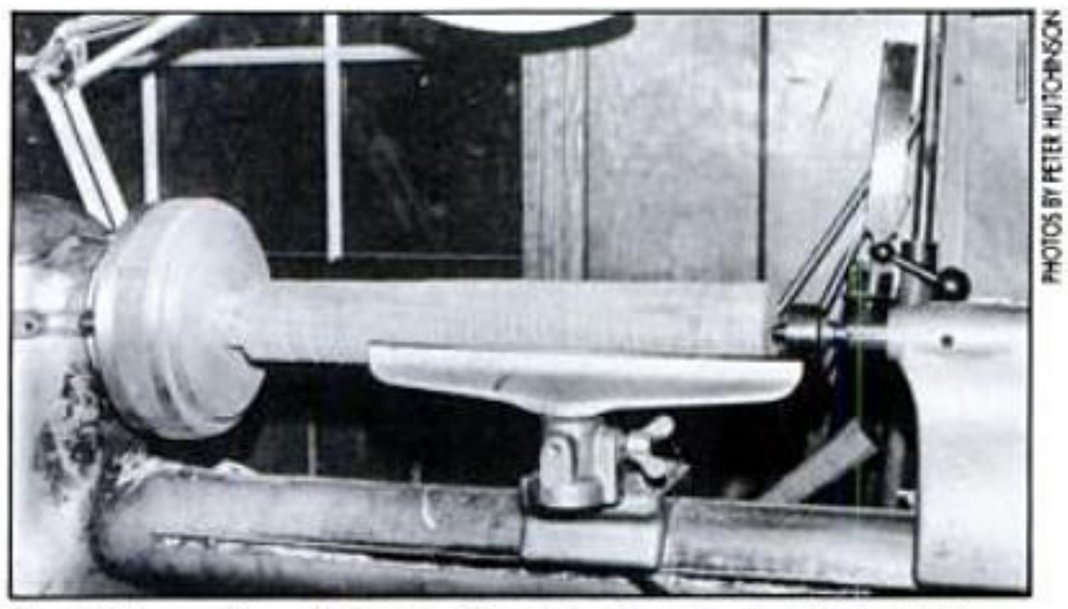
Tops are fun to make and play with and can be made from almost any kind of wood. This method will let you make one top or several from the same piece of wood.

Start by mounting a 12-in. long piece of wood between centers and roughing out a cylindrical shape with a roughing gouge. The diameter of the cylinder will determine the diameter of the finished top. The cylinder should be at least 1 in. in diameter, but can be larger: the top shown here is about 2 in. in diameter. Then mount one end of the cylinder in a three-jaw chuck or a homemade jamb-chuck (see photo) which attaches to a faceplate at the headstock. This is necessary because you'll later need to do some turning with the tailstock removed. Make sure the cylinder extends at least two or three inches into the jamb chuck. You can make the fit tighter by wetting the cylinder just before inserting it in the chuck.

Now proceed to shape the top, following the sequence in the photos. First I use a skew chisel to turn down the top's stem with a peeling cut. I continue with the skew until the stem is about 1 1/2 in. long and 3/8 in. in diameter. Clean the endgrain to the left of the stem with the long point of the skew. This face will become the upper side of the top, and it'll look better if you make it slightly concave. Then use a fingernail gouge to turn a hollow that will form the underside of the top. Turn the hollow until the cylinder is about 3/8 in. thick at this point. This begins to shape the bottom of the top, which should be a smooth, slightly concave curve.

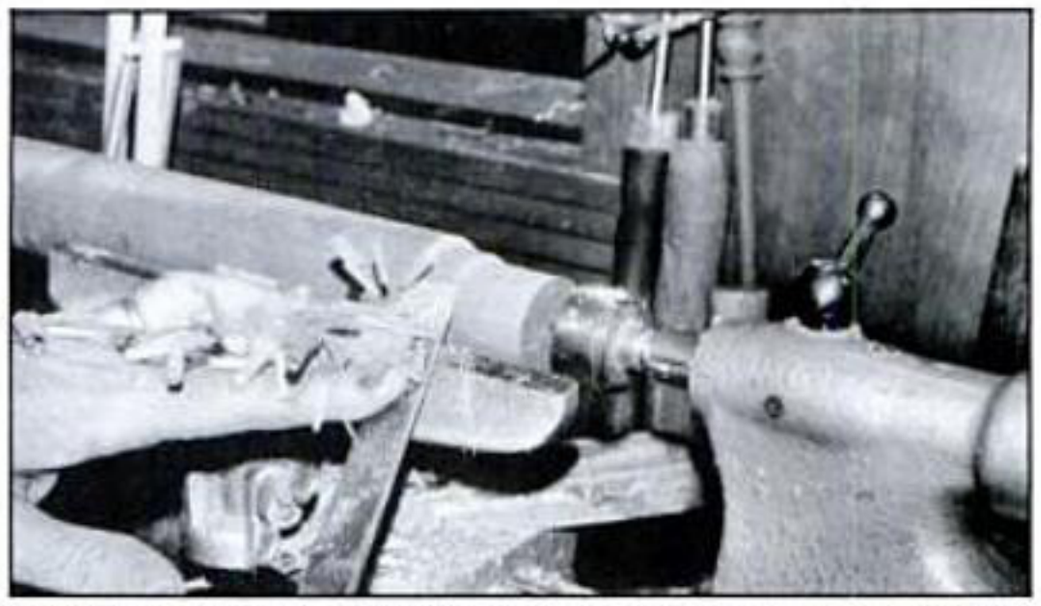
After shaping the underside of the top, turn down the diameter of the stem as small as possible using the gouge. Then remove the tailstock and continue to turn down the stem until it's about 1/8 in. in diameter. This is a delicate operation, but the secret lies in how you use the skew chisel. Wrap your index finger around the back side of the stem and pinch the skew gently but firmly against the wood to keep the stem from flexing. Finish the tiny stem by trimming the end to a point.

Next, cut the top free of the cylinder by turning away the remainder of the hollow with the fingernail gouge. You can prevent the gouge's tip from catching

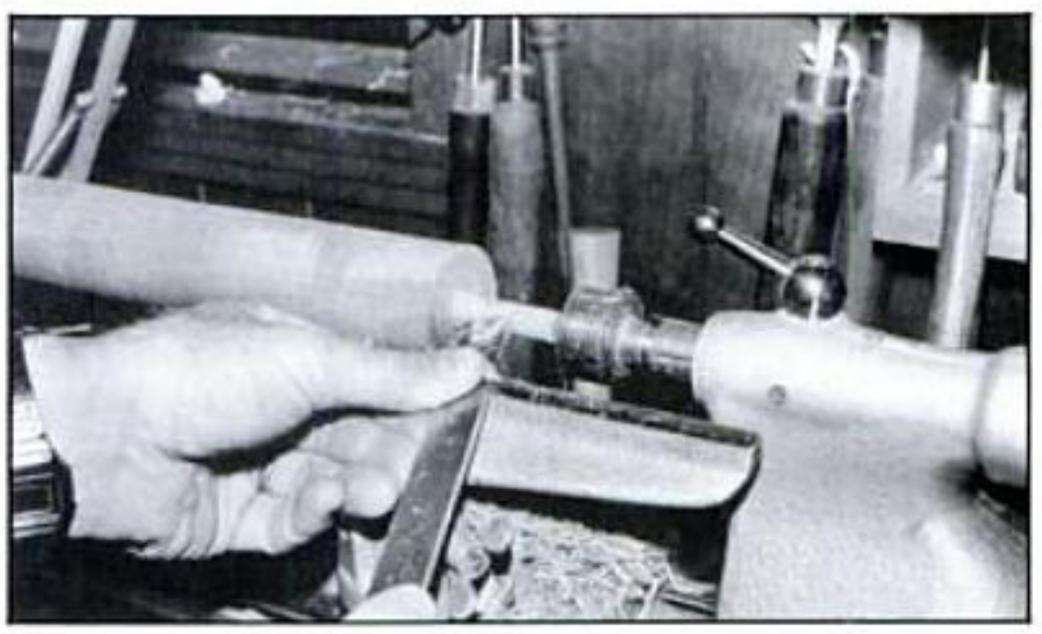


PHOTOS BY PETER HUTCHINSON

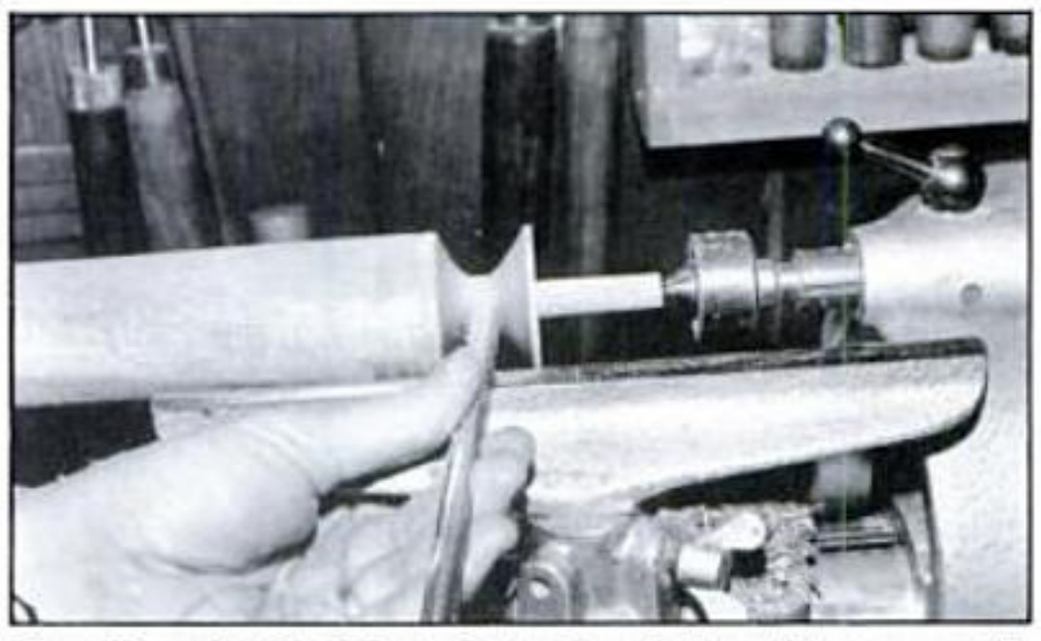
Mount the wooden cylinder in a three-jaw chuck or jamb chuck (shown here). You can turn down a section of the cylinder so you won't have to drill such a big hole in the chuck to receive the cylinder.



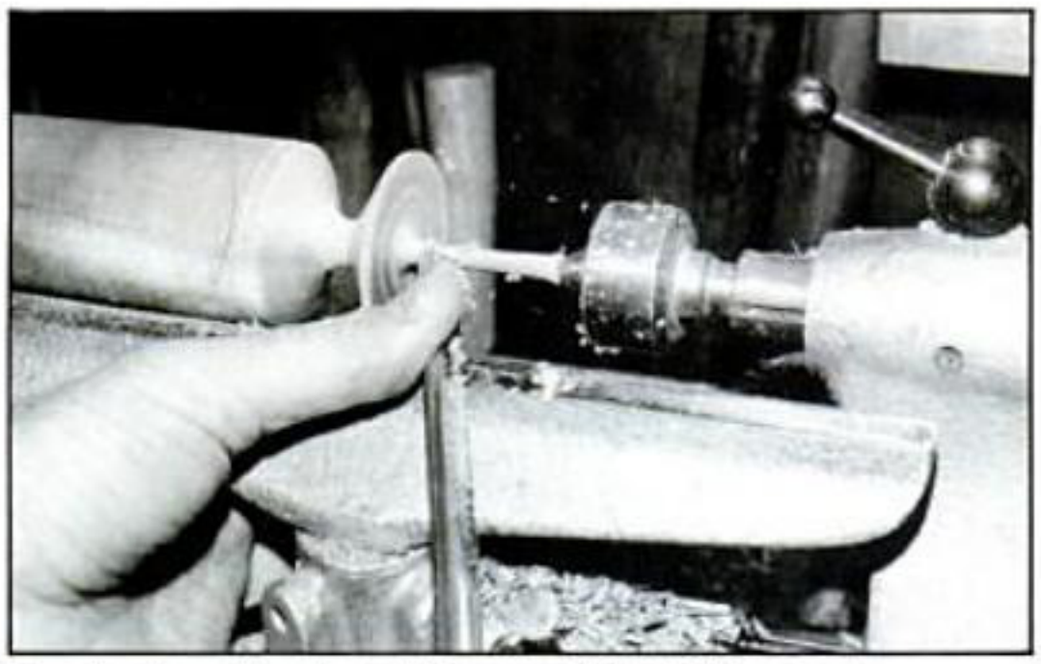
Rough-turn the top's stem at the tailstock end using a peel cut with the skew chisel.



Continue to turn down the stem until it's about 1 1/2 in. long and 3/8 in. in diameter.

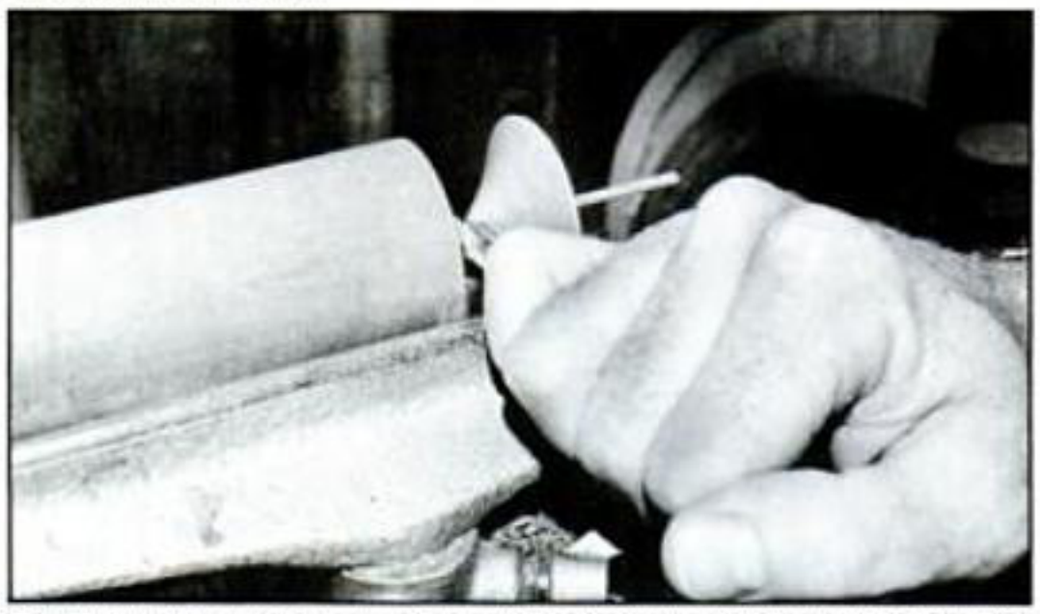


Shape the underside of the top by turning a hollow with a gouge until the cylinder is about 3/8 in. in diameter at this point.



Turn the stem diameter as thin as possible with the gouge.

Remove the tailstock and finish the stem with a freshly sharpened skew chisel. Wrap your index finger around the stem and pinch the skew against it lightly.



Carefully cut away the remainder of the hollow and then cut the top off with the tip of the gouge.

by cutting with the side of the gouge until the wood is thin enough for the top to break free. Then bring the tip of the gouge into the tiny bridge of wood remaining and the top will lean to one side and fall free into your hand.

Clean up the end of the cylinder with the skew, bring up the tailstock, and you're ready to shape the next top. A one-foot cylinder should make three or four tops. ▲

Peter Hutchinson is a semi-professional woodworker and woodturner living in Pennsylvania. He is the former editor and publisher of "American Woodturner," the journal of The American Association of Woodturners.

TURNED STRING TIES

BY JOHN SAINSBURY

DENNY GILLETTE

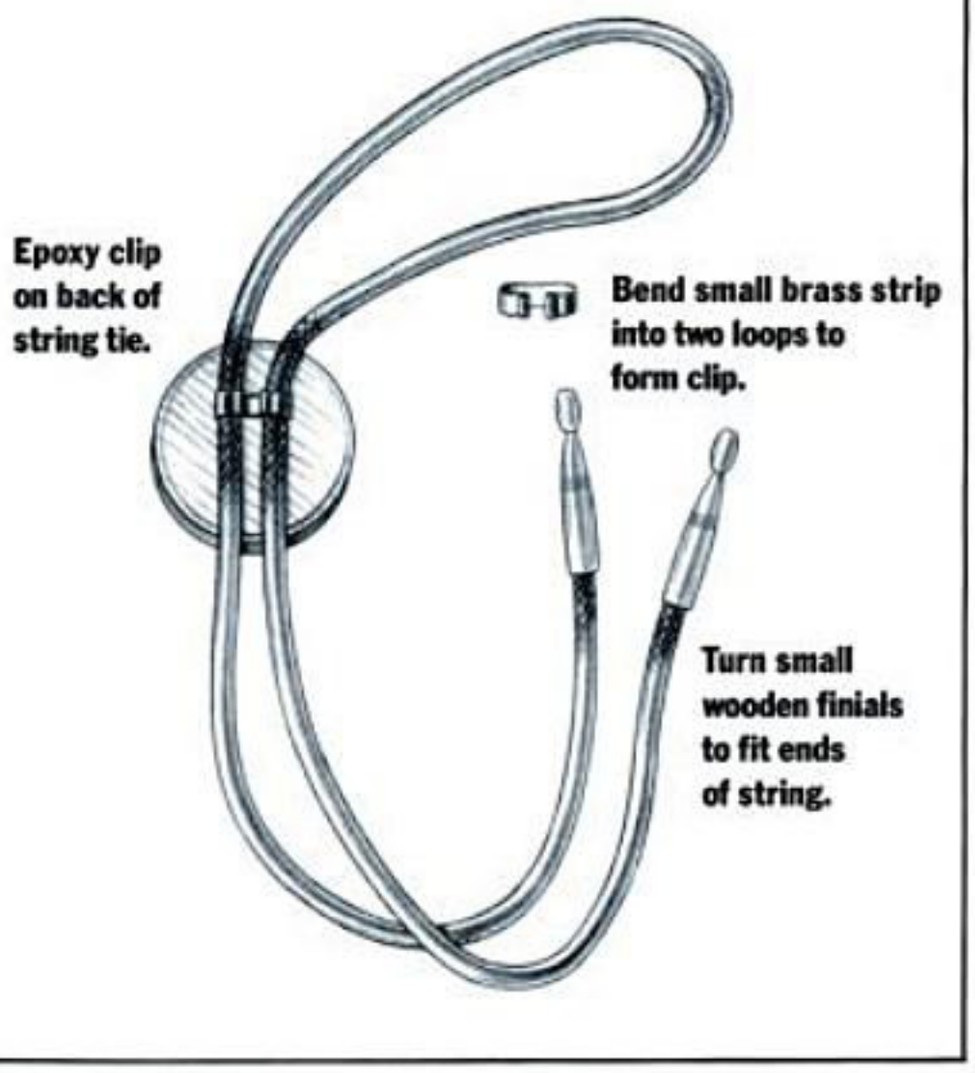
All you need are some wood scraps to make these unusual string ties. Both the wooden neck piece and the finials on the ends of the string are easily turned on the lathe.

Making small wooden string ties is a lathe project where you can let your imagination run wild. The idea is simple, yet the variations can be endless. Just cut out small blanks of scrap wood, then inlay one or more circles of a contrasting wood into the scrap blanks in a random pattern. It's a good opportunity to use up odd bits of exotic wood that you might have on hand. I've used rosewood, sycamore, ebony, bog oak, and Mexican rosewood cut from scrap pieces rarely more than $^{3}/_{8}$ in. thick.

I mount the scrap wood blank with its inlay on a small lathe faceplate and turn it to a smooth and attractive contour. The finished pieces could also be used as brooches, cufflinks, earrings or other costume jewelry.

To put an inlay in a scrap blank, I first make a hole in the blank with a forstner bit. Then I use a plug-cutter to cut a circular inlay piece the same size as the hole. I use a hard, quick setting glue like fast-curing epoxy to glue the circular inlay in the blank. Since

FIG. 1: FASTENING STRING TO TIE

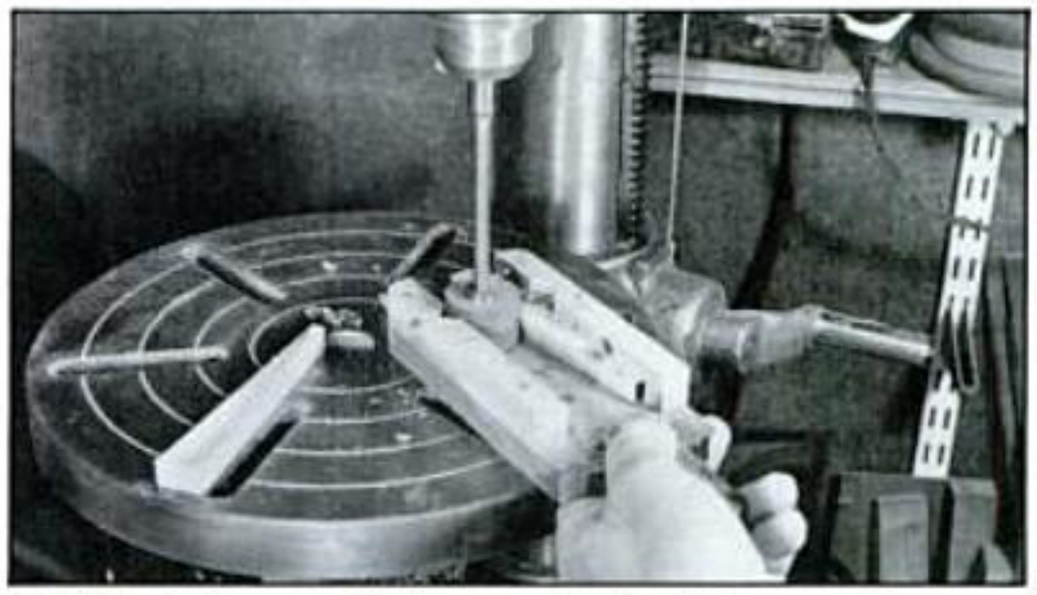


forstner bits don't need a center spur to bore straight holes, you can make off-the-edge or overlapped holes in the blank to allow overlaping inlays. This really opens up a lot of creative possibilities. Drilling small pieces can be tricky, so I made a small, hand-held wood vise that uses wooden wedges to hold the pieces on the drill press table (see photo).

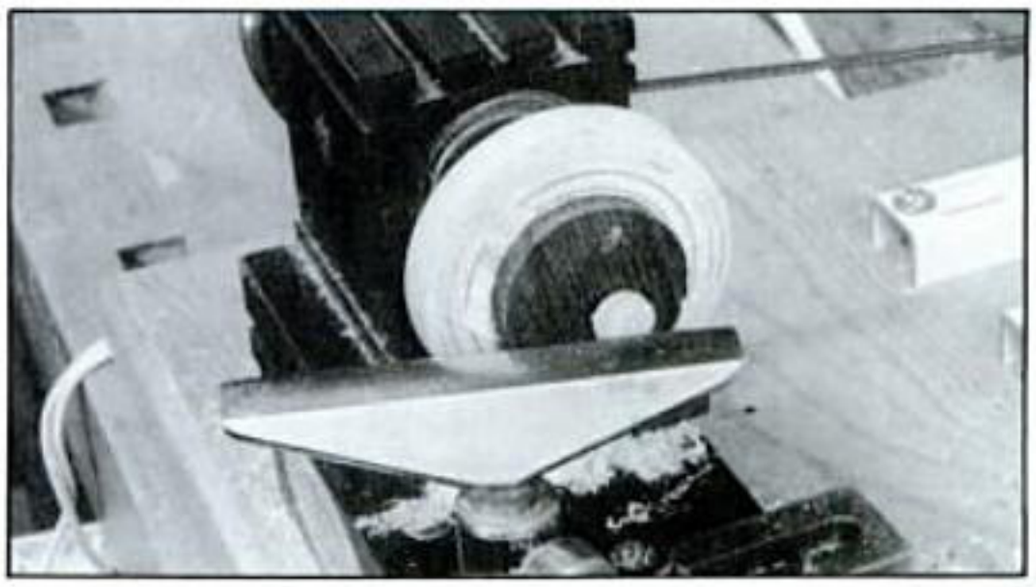
After gluing up each piece, I flatten the back on a belt sander. Then I mount a flat waste block to the lathe faceplate and mount the piece on the waste block with double-sided tape or hot-melt glue. I found the little Klein Lathe to be just the right size for this job (Klein Design, Inc., 6514 115th Place S.E., Renton, WA 98056). I do the turning with tiny gouges—which must be very sharp—from the Sorby Micro set (available from Woodcraft Supply, P.O. Box 1686, Parkersburg, WV 26102, 800-225-1153). I try to get as fine a cut as possible right off the tool by keeping the bevel rubbing as I cut. It's best to mimimize sanding because sanding dust from a darker wood can become embedded in the pores of lighter wood and spoil the color. I polish the piece with #0000 steel wool followed by a piece of burlap, then apply an oil finish.

I buy the thick string, called "bolo cord," at craft supply stores. I bend a small strip of brass to act as a clip to hold the string. This gets epoxied to the back of the wooden tie (see Fig. 1). (Bolo cord and brass clip available from T.B. Hagstoz & Son, Inc., 709 Sansom St., Philadelphia, PA 19106, 215-922-1627.) I also turn two little decorative finials from ebony to finish the ends of the string. That's all there is to it. See what designs your imagination can dream up. ▲

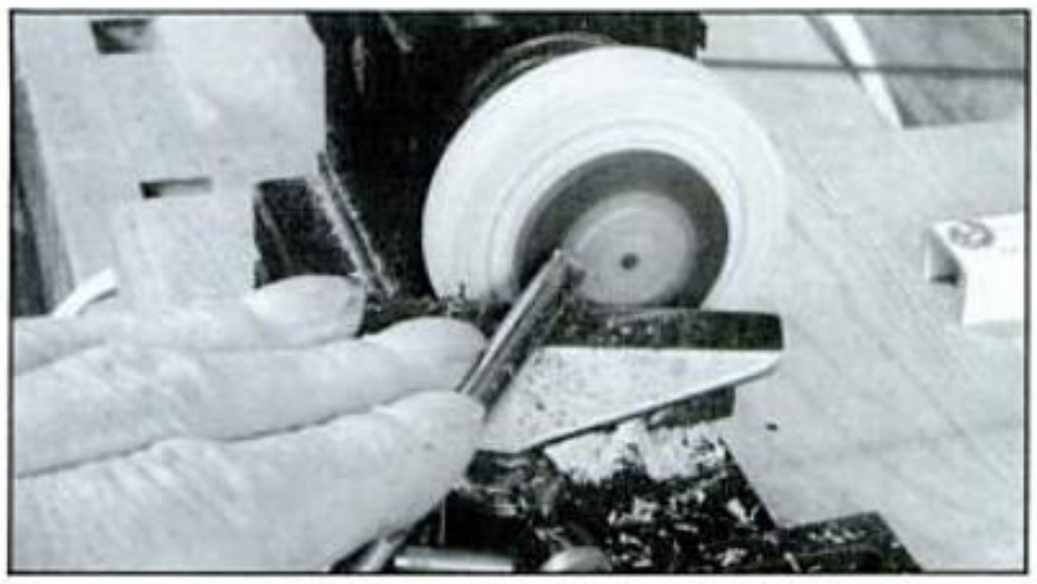
John Sainsbury runs Creative Woodcraft studio in England, and acts as an educational technical advisor to Record Ridgway Tool Co. of Sheffield. He has written a number of woodworking books published in England and the U.S.



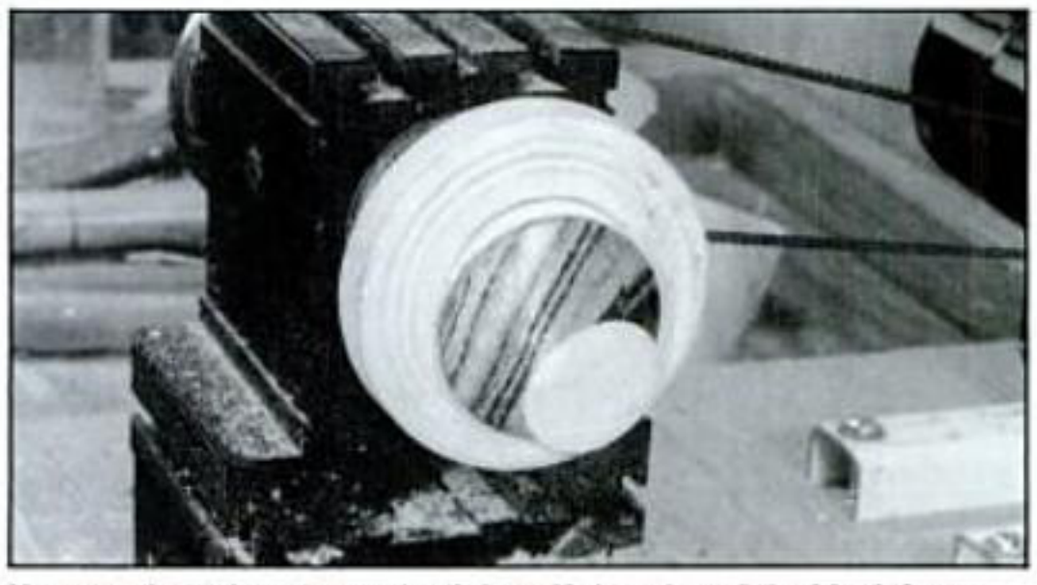
Drill holes in the scrap blanks with a forstner bit to accept the contrasting inlays. A small, hand-held wooden vise with wedges holds the blanks for drilling on the drill press.



After the little circular inlay is glued into the blank, mount it on a waste block with double-sided tape for shaping on the lathe. This piece is made from bog oak with a holly insert.



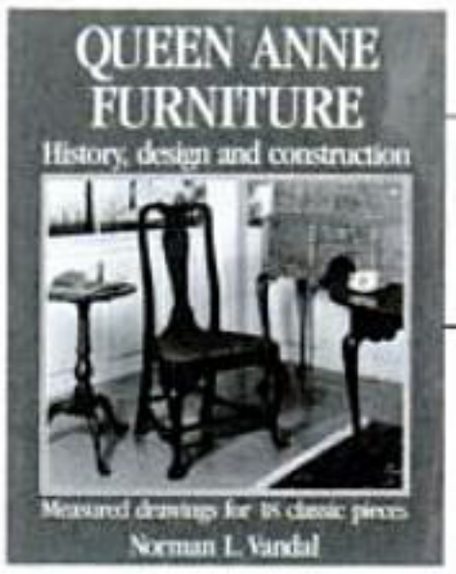
Use a small fingernail gouge and keep the bevel rubbing to get as smooth a cut as possible right off the tool. For a final polish, use fine steel wool.



You can place the contrasting inlay off the edge of the blank for a different effect. This one's made of Mexican rosewood and sycamore.

BOOKS & VIDEOS

BOOKS



Queen Anne Furniture

by Norman Vandal
(1990, Taunton Press, 63 S. Main St., Newtown, CT 06470) 248 pp.; hardcover, $34.95

Queen Anne furniture is characterized by its graceful curves and symmetry, carved fans and shells, serpentine skirts, and cabriole legs. Historical and how-to books have long acknowledged the special relationship that Queen Anne holds with antique lovers and woodworkers, but they have always left us wanting more. For example, what are the features that distinguish Queen Anne from Chippendale? This is the first time such a rich tapestry of history and construction details have been combined in a book with easy-to-follow plans for so many Queen Anne furniture classics.

Author Norman Vandal has spent 15 years building reproductions of classic furniture, and he shares his wealth of insights with us. He poses the question of how accurately reproductions should be copies of the originals. Should all joinery, tools used and proportions match the originals? While pondering these issues he concludes that the ultimate decision is the individual cabinetmaker's. With his guidance toward design criteria and accurate period motifs, original pieces could be designed in the Queen Anne style.

The book is organized into a chapter that explains the historical development of the style, followed by chapters that discuss each type of furniture—chairs, tables, and case furniture. In recognition of the unifying role that the cabriole leg plays, he devotes an entire chapter to its background and construction.

Many times when we read woodworking books, we'll skip the how-to articles until we're ready to make those pieces. Vandal keeps us hooked throughout with eye-catching photos and illustrations, historical engravings, and interesting trivia. He shows us, for example, how round chair stretchers are often made with rectangular tenons. With his keen attention to detail, we learn how to make hinged cross-shaped frame joints, turned cabriole legs, butterfly keys, and spiral-fluted flame finials.

Carving plays an important role in Queen Anne, so a chapter on carving designs and techniques would have been useful. Also I would have enjoyed more color photos and some large exploded-view isometric drawings. Aside from that, the full-page color photos of Vandal's reproductions, detailed construction drawings, and the technical quality of the book are excellent.

DAVID DONNELLY

The Practical Woodturner

by F. Pain
(1990, Sterling Publishing Co., Inc., 387 Park Ave. South, New York, NY 10016) 160 pp.; paperback, $12.95

When Frank Pain wrote *Practical Woodturner* in 1956 it was about the only book on the subject. More than 30 years later the book has withstood the test of time. Today, it is a classic in a field of Johnny-come-latelys. Probably more than any other author, Pain instructed and inspired today's finest turners, including some who have written their own books.

Pain's book has been enlarged and includes revisions by James Jacobson. Mercifully, it remains remarkably unchanged. The qualities which elevated Pain's original work above a mere how-to book are still there. His expertise, kindness, and above all, his humor, still shine through. Having Pain's book is like having a grandfather who knows all about woodturning, and has just the right joke to lighten the inevitable moments of despair.

Jacobson showed admirable restraint in his revisions. However, in the area of safety, it would have made more sense to include the most up-to-date information available. Today we recognize the hazards of some wood dusts and have ways of dealing with them.

A good part of Pain's original message to hold the tools lightly and cut the wood as it prefers to be cut remains. No book tells how to accomplish this better than *Practical Woodturner*. (A few of the updated photographs show an iron grip on the tool that might have poor Mr. Pain "turning" in his grave.

My only objection to the original book was its small size. But after being enlarged and revised, the book retains its original character. So if you'd like to read a classic, have a laugh, and learn to turn all at once, get *Practical Woodturner.*

ANDY BARNUM

VIDEOS

Introduction to Japanese Woodworking

with Jay van Arsdale
(1989, A/Zo Productions, P.O. Box 7997, Berkeley, CA 94707) 70 min.; VHS, $29.95

Jay van Arsdale's video *Introduction to Japanese Woodworking* does an excellent job of presenting the basic uses of Japanese tools.

He begins in Japan with the blacksmiths who forge the tools, and then covers chisel types, sharpening with water stones, mortise and tenon layout, and chopping and sawing techniques. A quick look at planes and other joinery possibilities conclude the video.

Although the pace seemed somewhat hurried and a closer camera view would have been helpful a few times, the basic tools are clearly presented and the demonstrations of sharpening and mortise-and-tenon technique are very thorough. The sawhorse plan included with the tape is a good beginning project. I was left hoping van Arsdale would continue with plane adjustment and more intricate Japanese joinery in another video.

PAUL TULLER

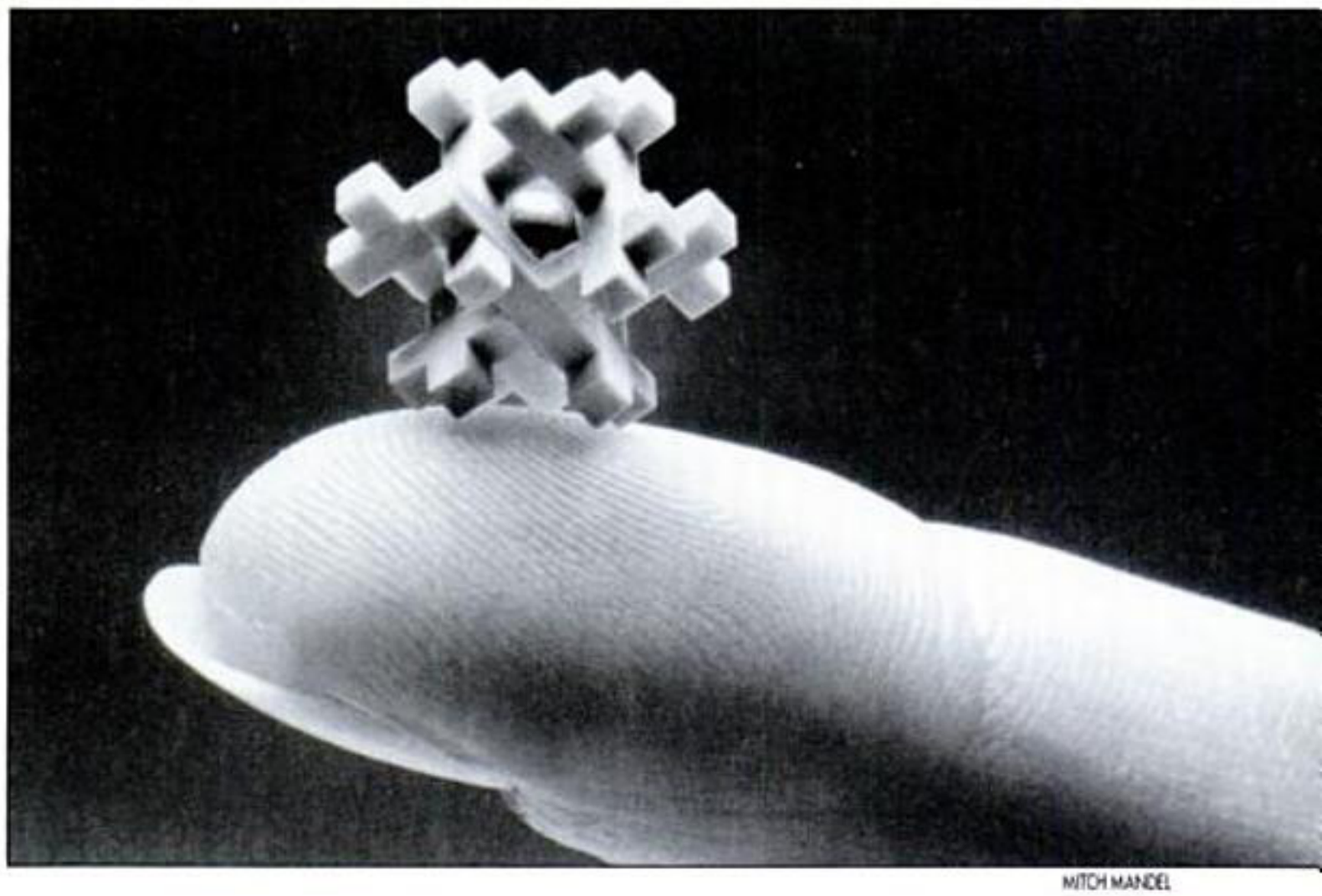
GALLERY

When we pull Gallery photos together for an issue, we first sort through the mountains of photos our readers have sent. We mix and match until we have a collection that fits a theme. But sometimes we get items that just can't be pigeonholed within a theme. Rather than let these pieces gather cobwebs, we're offering them to you as a mixed bag. Sometimes we gotta break the rules.

FIONA A. WILSON

"The Pow-Wow Pony," by Dennis Bryce Finn, Arboles, Colorado. Spruce, birch, pine, mahogany, maple, ebony. Dimensions: H: 12 in., L: 20 in.

Puzzle by Allan Boardman, Woodland Hills, California. Boxwood, ball bearing. Dimensions: 3/8 cu. in.



MITCH MANDEL

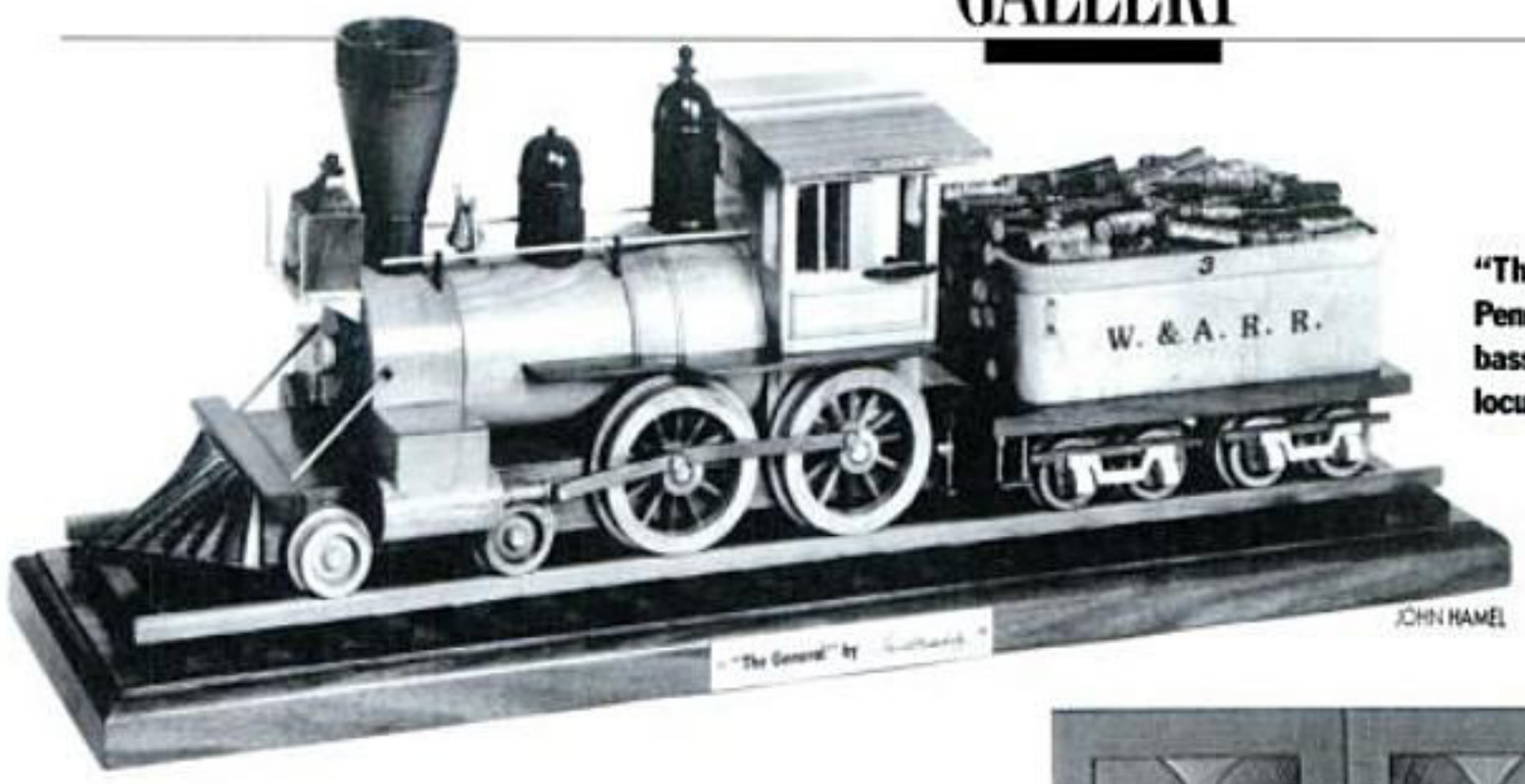
BRUCE E. WOODWORTH

"Tomorrow's Myths," by Pamela Silva Woodworth, Port Orange, Florida. Pine, stained glass. Dimensions: H: 59 in., W: 36 in., D: 34 in.

SALLY SHENK ULLMAN

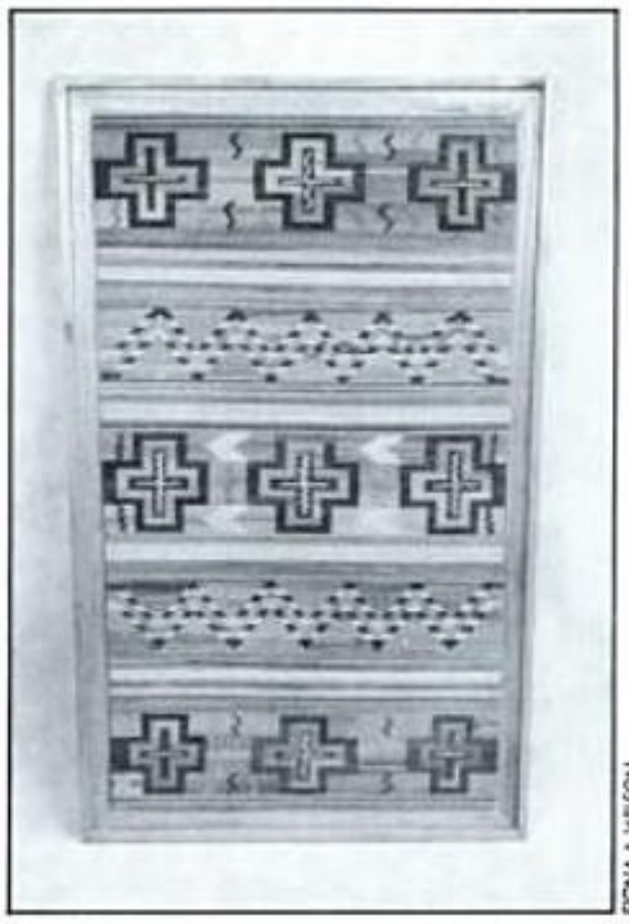
Whale by William Stokes, Pittstown, New Jersey. Walnut. Dimensions: H: 3 1/4 in., L: 8 3/8 in., W: 3 1/2 in.

GALLERY



JOHN HAMEL

"The General," by Leo Godelesky, Whitehall, Pennsylvania. Poplar, maple, mimosa, padauk, basswood, mahogany, cherry, walnut, rosewood, locust. Dimensions: H: 9 in., W: 5 in., L: 25 in.



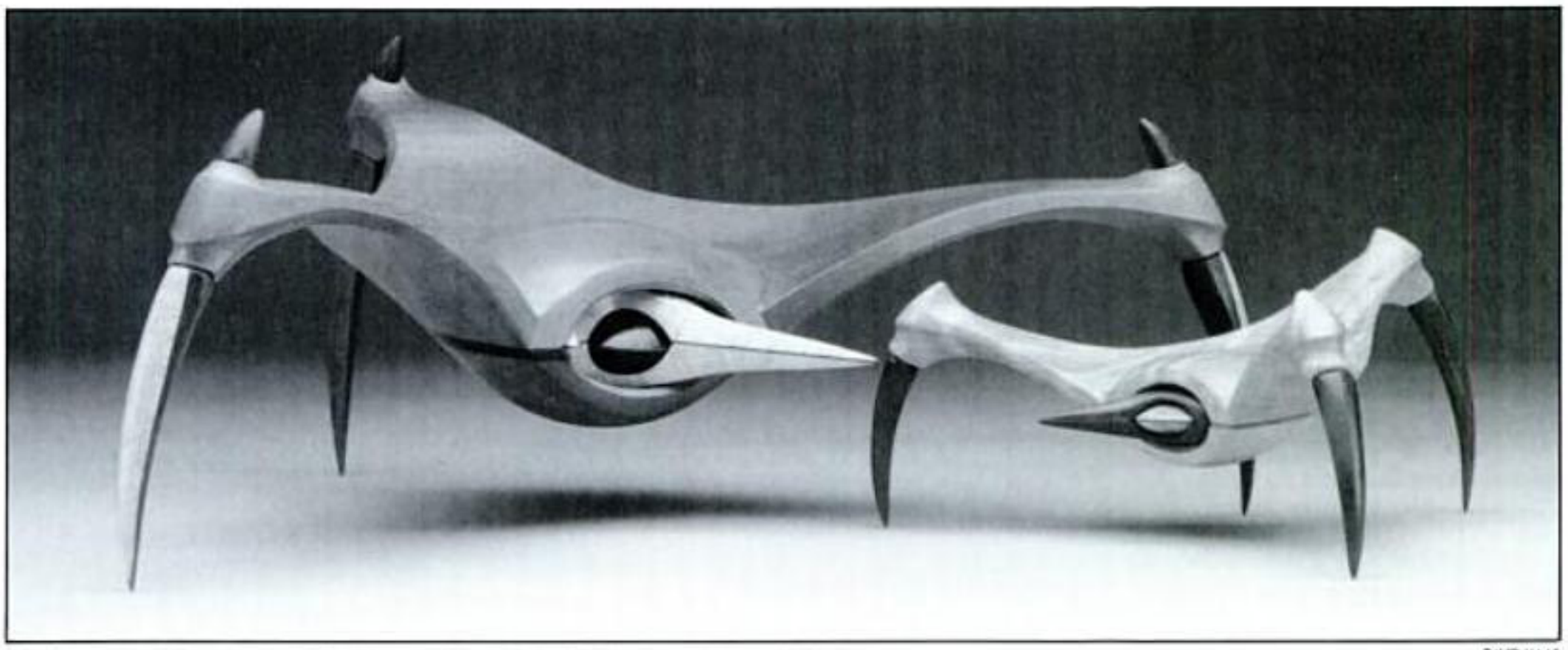
FIONA A. WILSON

"Child's Blanket," (copy of a classic Navaho child's blanket, woven 1860) by Dennis Bryce Finn, Arboles, Colorado. Redwood. Dimensions: H: 42 in., W: 30 in., D: 1⅛ in.

GLENN H. BOSTOCK

Cabinet Doors by Glenn H. Bostock, Doylestown, Pennsylvania. Red oak, ash, maple. Dimensions: H: 85¼ in., W: 21¼ in.

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



DAVID HAAS

"Mother/Daughter; Hunter/Prey," by Michael J. Brolly, Hamburg, Pennsylvania. Mahogany, maple, bubinga, purpleheart, ebony, dyed veneer. Dimensions: Mother, H: 6 in., W: 13 in., L: 14 in.

FINAL PASS

PHOTOS BY DAVE SELLERS

These towering totems are assembled from 18-in. high sections, each turned by members of a different regional chapter of the American Association of Woodturners.

Turned Totem

What better way to celebrate the 4th-annual American Association of Woodturners (AAW) symposium than to have a pole raising ... totem pole, that is. Representatives from 22 regional AAW chapters each created a segment for this joint project. The sections combined to form two 18-foot tall totem poles, that took shape on the grounds of the Arrowmont School of Arts and Crafts in Gatlinburg, Tennessee.

The whole was indeed greater than the sum of the parts. Each segment was a unique turning or theme. "A lot of fantastic work went into the individual segments and they showed a distinct regional flavor from different parts of the country," noted Mary Redig, the association's new administrator. "Seeing the totem poles go up gave a real feeling of unity among the members that came from all over the country."

The symposium, which ran from October 25 to 28, drew more than 300 turners. The activities included demonstrations by nationally famous turners, a gallery of turned works, a trade show, banquet and picnic. An auction of turnings, tools and supplies raised $7300 for the AAW's scholarship fund, which helps send members to turning workshops around the country.

Within the last five years, the AAW has grown from a core group of 13 turners to more than 3000 members in 35 regional chapters. For more information about AAW, contact Mary Redig, 667 Harriet Ave., Shoreview, MN 55126.

So Sue Me!

You may consider woodworking "just a hobby." But that's not a good enough excuse for the person who's taking you to court over the wooden plant stand you sold him for 10 bucks at the Christmas craft fair. The stand gave way just as he placed his most precious 3000-year-old porcelain vase on it. Bye bye, precious vase. Hello, law suit. Lest you think your homeowners insurance will protect you, think again.

Like it or not, as craftspeople, we are liable for damage or injury caused by any item we've made. This is true for items we sell *and* items we give as gifts. This is the sad reality of living in a sue-happy society.

If this news has you biting your nails, you might be interested to know that there are insurance policies tailored to the craftsperson. Bollinger Insurance and the Montclair Craft Guild of New Jersey have assembled a Crafter's Insurance Program that is available nationwide. This package offers product liability and theft insurance.

Whether you are purely a hobbiest or a professional, this policy has been designed to cover a full spectrum of the craftperson's insurance needs. For more information call the Craft Insurance Hotline at 1-800-526-1379 (in New Jersey 1-800-772-2252).

Zoom Zoom

Remember the other side of 16? You couldn't wait to get behind the wheel of your dream car. To make the wait more bearable, you'd assemble your own versions—hammering away afternoons in the side lot until that proud moment when you and your wooden wheels made off for the soap box derby.

Some of us never grow out of that stage. Such is the case with Larry Andersen of Portland, Oregon who backed his myrtlewood beauty down the drive after 2000 hours of labor. A true labor of love. The car is a replica of a 1932 Ford Roadster. The body is made entirely of wood,

PHOTO COURTESY OF DALE MOREAU, WEST LINN, OREGON

It took Larry Andersen of Portland, Oregon more than 2000 hours to build this myrtlewood replica of a 1932 Ford Roadster.

which Andersen carved to exact dimensions. The grill and headlight buckets, engine-valve covers and air cleaner are all wood, too. A special epoxy undercoating on the wooden parts ensures that the engine's heat won't burn them. Though the car is twice as heavy as the original, it drives smoothly and can move at highway speeds.

You'd think after all that work, you'd kick back and enjoy the breeze in your hair. Not Larry Andersen. He's got his sights on replicating a 1984 Corvette next, this time in black walnut.

Delta Lathe Winner

The winner of *AMERICAN WOODWORKER'S* Delta lathe drawing at the September "Worlds Fair of Woodworking" in Des Moines, Iowa was Milton Chapman of Creston, Iowa. Congratulations Mr. Chapman.