AMERICAN WOODWORKER™

JUNE 1996 #52

Build the Best Adirondack Chair

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AMERICAN WOODWORKER

Issue No. 52 June 1996

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DEPARTMENTS

FEATURES

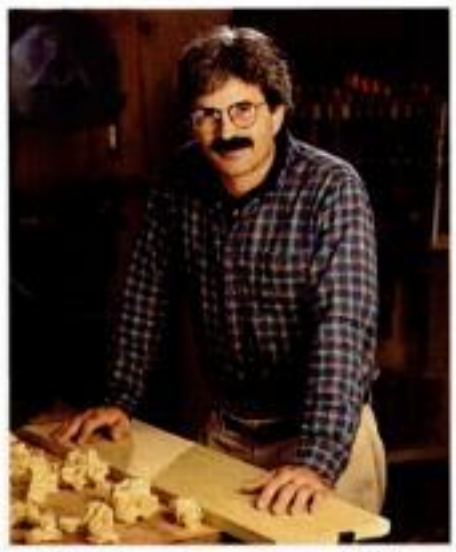
A RODALE PRESS PUBLICATION

On the cover: *This best-ever Adirondack has classic lines and weather-beating joinery. Find out how to build your own on page 26.*

PHOTO BY BILL RAY

A WORD FROM THE EDITOR

Projects Teach



As a kid, I used to watch my father make things in our basement shop. I looked on in awe as he transformed odd pieces of salvaged lumber into useful items for our home—a built-in desk for me, a cabinet for our kitchen, a footstool for the bathroom. No fancy joinery or exotic woods here—just humble, practical stuff, occasionally decorated with painted owls, distelfinks, twining vines and leaves.

Dad wasn't a cabinetmaker, but he could figure out how to build just about anything. He must have sensed that the acorn hadn't fallen far from the tree. In 1959, when I was just ten years old, he bought me a new lathe and a subscription to "The Deltagram and Flying Chips," a skinny bimonthly magazine published by Delta Machinery Corporation. It was the beginning of my long relationship with wood and tools.

I waited anxiously for each issue of the Deltagram—26 pages of modest projects, shops bristling with Delta machines, and snapshots of smiling, Eisenhower-era housewives appreciating the fruits of their husbands' labors. I was enthralled. I made key caddies, antelope wall plaques, siesta bookends, and too many bird feeders to mention. Every room in our house looked like a booth at the local craft show.

Since I was too young to use any of our power tools other than my scrollsaw and lathe, I had to grudgingly pass up the larger projects—kitschy '50s furniture, patio carts, kitchen organizers—but even so, I read the articles and studied the drawings carefully. I didn't always know what I was looking at, but in time I began to understand.

I've never lost my love for project articles, though nowadays I have a much different appreciation of them. Whenever I build a project from a magazine article or other published plans, I often change some dimensions or construction details to suit my needs or my tools. If I don't plan to build a particular project, I'll comb the article anyway, for procedures that I can use somewhere else.

I ran that comb through Andy Rae's Adirondack chair article in this issue (see page 26) and came away with a bunch of useful techniques—sliding dovetails, slot mortising, biscuit joinery, down-and-dirty template routing—and a sense of where to use them. You'll find nuggets like these in all our project articles, waiting to be put to use.

The bottom line is, projects are a win-win proposition. Whether you're building them in your shop or in your mind, you're adding to your repertoire of skills and to your understanding of construction methods. Practical, useful stuff that will help you figure out how to make almost anything.

Ellis Walentine
Executive editor

PLAY IT SAFE

Woodworking can be dangerous. Safety equipment such as guards, hold-downs, goggles, dust masks and hearing protection can greatly reduce your risk of injury. But even the best guard won't make up for poor judgment. Use common sense and caution in the workshop. If a procedure feels dangerous, don't try it, no matter how many other folks work that way. Figure out an alternative that feels safe. Your safety is your responsibility.

AMERICAN WOODWORKER

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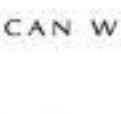
LETTERS

Kudos for Kirby

I appreciated the emphasis on visual design in "Designing Edge Joints," by Ian Kirby and John Kelsey (AW #50). I see too many pieces of custom-made furniture with mechanically sound joints that are unattractive. I look forward to more articles from these two.

Lloyd Otey
Carlsbad, CA

It was great seeing Ian Kirby on the cover of last month's issue. I studied under him for three years back in the late '70s. Today most of my woodworking has to do with the restoration of landmark buildings in New York City. I owe most of my talent and skills to this man. He taught many of us much more than a skill or a trade. If there are other former students out there, I'd like to hear from them. Thanks for bringing Kirby back.



Michael Riegler
MRiegler@aol.com

More on the Tea Table

I enjoyed Lonnie Bird's "Connecticut Tea Table" article (AW #49). Lonnie mentions that the design of his table was inspired by three different antique examples. My version, shown here, offers additional design possibilities. The most noticeable differences between my table and Lonnie's are the pull-out extensions and the carved corners. Making the carved corners is a lot more labor intensive, but well worth the extra effort.

R.S. Wilkinson
Baltic, CT

Design variations. *Wilkinson's traditional tea table has extension leaves and carved corners.*

Bevel or Bezel?

Looking through my December issue (AW #49), I was enjoying Mike Dunbar's piece on drawknives until I choked on the word "bezel." I'm sure that Mike meant to write about the top and bottom "bevels" on his drawknife. What's going on here?

Michael Horgan
Lughaid@aol.com

Mike Dunbar replies: For centuries, woodworkers who spoke the English language referred to the sloped surface on a cutting edge as the beZel. You're right—most people say "bevel" today, but I still like to use the original term whenever editors permit it, just as I like to call the "handle" of a hand plane by its proper name: tote. It's been about 20 years since I first had an editor turn every "bezel" into a "bevel" in the manuscript I submitted for my Windsor chair book. I remember calling him up to give him a hard time. "What's the matter with you guys down there?" I asked. "Don't you know the proper word is beZel?"

I still remember the reply: "We know, but since we started calling it the bevel, we can't change."

I'm grateful for the opportunity to put things right. There is a rich traditional language for woodworking, and I try to do what I can to see that it is preserved, rather than eroded. The next time someone says "bevel," remember to say "bezel."

Nothing Wrong with Plastic

I'd like to comment on the Buyer's Guide to Premium Dovetail Jigs in your February issue (AW #50). Significant research was conducted to enable Craftsman to bring to market a quality, durable, cost-effective deluxe dovetail fixture—a tool that for years has been out of reach of the average woodworker's budget.

Your review indicated the Craftsman 25450 is "made primarily of plastic." Please note that the plastics used in technology today are extremely strong and durable. (Most late-model automobiles incorporate a fair amount of plastic composites.) The Craftsman Deluxe Dovetail Fixture is constructed of high-impact structural foam, which is exceptionally strong. Once this material is molded, there is no need for further machining, unlike cast iron or cast aluminum. Eliminating this extra machining helps provide a real value to woodworkers without sacrificing quality or efficiency. The $120 Craftsman jig delivers accurate dovetail joints at less than half of the cost of other 16-in. and 24-in. jigs.

Our woodworker focus groups, as well as consumer letters we've received, give thumbs up to the instruction manual that comes with this jig. Sears is always

STAY IN TOUCH! ***If you have comments, corrections or news to share, we want to hear from you.***

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= Electronic Mail

LETTERS

interested in feedback; it helps us to keep improving our products and manuals. Whenever you or your readers have any suggestions, please let us know. Meanwhile, keep in mind that Craftsman's objective is to provide value—while not sacrificing quality.

Chuck Van Winkle
Buyer for Sears, Roebuck and Co.

Alternative to Lye-ing

In his "Just Finishing" column on strippers (AW #50), Michael Dresdner suggests lye as a stripper for milk paint. Unfortunately, lye is dangerous and a nuisance to use. A much safer product that does the same job is Lestoil™, manufactured by Procter & Gamble. Lestoil™ is promoted as a product that "gives no-wax floors a lift" and does other tough household cleaning jobs.

I've found that Lestoil™ also does a good job of removing old milk paint. I wear rubber gloves when I use it, and wash it off with water. Unlike lye, no neutralizing is required. Lestoil™ is sold in grocery stores and supermarkets, in the aisle with soaps and cleansers.

Erik Hemmingsen
Manlius, NY

Thanks for Women in Wood

Let me commend you on your December issue! It is my first-ever copy of AMERICAN WOODWORKER, and I now know why! "Women in Woodworking"! I've been a carpenter going on 12 years, and it's been my dream to have a custom furniture shop. The women in the article inspired me to continue chasing this dream. Thanks again.

Sue Ann Stokesberry
Evergreen, CO

More on Tablesaws

My take on the "Tablesaw Showdown" (AW #49) was that the Delta, Jet, General, and Powermatic saws are all well-built, world-class machines. Choosing between these premium tablesaws is like choosing between the San Francisco, Tokyo, or Chicago Symphony Orchestras. One or the other will be more to someone's taste, but they all can make beautiful music...

Steve Turadek
turadek@cisco.com

After a year of shopping for a cabinet saw, I finally made a purchase. I looked at the bargain copies, the industry leaders, and everything in between. Attending your trade show (last November) and reading the tablesaw buyer's guide article helped me so much. Thanks for your help.

Brian Kinney
Schenectady, NY

Correction

The hole-drilling angles for the legs of Robert Treanor's low-back Windsor chair were incorrect. (See Fig. 5, page 53, AW #50.) The leg-hole angles should be 102°, not 120°.

Q&A

Preserving the Shelf Life of a Finish

Q I like to use wiping varnish for my woodwork, but it keeps drying out in the cans. I've tried breaking quarts down into pints but, because I open and close the cans so many times, it doesn't seem to stop the finish from drying out. Any suggestions?

John Goodwin
Enfield, NH

A It's not how many times you open the can that causes the problem; it's how much air (called "head room") is left in the container when you put it back on the shelf.

There are a couple of ways to keep air from getting to the finish. If you are using a liquid wipe-on varnish, try decanting it into collapsible squeeze bottles, and be sure to squeeze all the air out before you seal the container. If you're using a gel varnish, lay a piece of cellophane kitchen wrap over the top surface of the varnish before you replace the lid.

Michael Dresdner
Finishing consultant
Tacoma, WA

Sawing Miter-Box Kerfs

Q I'm trying to make a miter box, but I'm having a hard time cutting the guide kerfs absolutely vertical. How can I do this?

Lawrence Wells
New Orleans, LA

A You can make straight cuts in your miter box by temporarily attaching wood strips on both sides of the cut lines to guide the saw. Make the guides higher than the walls of the miter box, as shown in the drawing. After laying out your cut lines, tack the guides to the miter-box sides, making sure the nails don't cross the path of the saw.

Before cutting the kerfs, make sure that your saw is sharp and that the teeth are set correctly. Because of the guides, you won't be able to use a backsaw for these initial cuts. If you plan on using a backsaw for mitering, make these initial cuts with a saw that creates the same width kerf as the backsaw you intend to use.

Frank Klausz
Cabinetmaker
Pluckemin, NJ

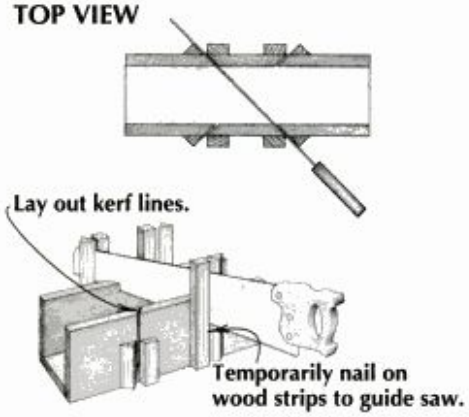


Table Routers: Take the Plunge?

Q Is a fixed-base router or a plunge router better for a router table? Is one type easier to adjust than the other when mounted in a table? Does play in the plunge mechanism cause any wobble?

Bill Carlisle
Bismarck, ND

A Each type of router has its pros and cons. When installed in a table, a fixed-base router generally adjusts more quickly and easily, usually with a twist of

Cedar Chest Lining

Q I want to make a walnut chest with a cedar interior. Is it OK to laminate ½-in.-thick cedar to ¾-in. walnut to make the sides, or will this create problems due to differences in the two woods?

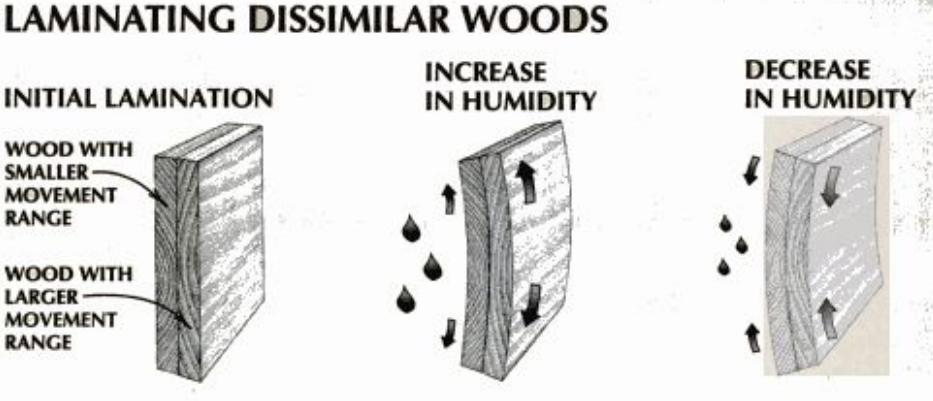
Jim Albright
Lavon, TX

A To insure that your chest will last for years, you should rethink the construction. Eastern red cedar's range of seasonal expansion and contraction is 60 percent that of walnut. This will cause a laminated panel to deform as the two woods expand and contract to different dimensions. (See drawing, right.) If you try to constrain the panel from deforming, the stresses will simply relieve themselves by cracking or delaminating the wood. (For more on wood movement, see AW #34.)

I suggest this: If you're building a six-board chest—four sides, a bottom and a top, all made of glued-up or single boards—let the walnut be the structural support. Install the cedar as a nonstructural liner, attaching it so it can expand and contract independent of the walnut. If the cedar is tongue-and-groove, blind nail it to the walnut through the tongue. If it's square-edged, screw or tack it on, making sure the cross-grain dimension between fasteners is no more than 3 in. to 4 in. for any one board.

If you're building a chest with frame-and-panel sides, glue up the cedar as a separate panel and float it in the same groove as the walnut panel.

Ric Hanisch
Furniture maker and designer
Quakertown, PA



the motor. With a plunge router, you need to reach under the table and turn a depth-adjustment knob. Some routers don't have a knob, and you have to overcome the spring tension manually—an awkward and inexact undertaking. (See "Revolutionary Router Table," AW #44, for one solution to this problem.)

A plunge router is more versatile than a fixed-base router for hand-held operations, so, if your budget permits only one large router, a plunge router is the way to go. You can use it in your router table and remove it for hand-held operations when you need to.

As for performance, a plunge router is theoretically not as tight as a fixed-base router, so the bit may tend to deflect more, especially in heavy cuts.That's because the plunge lock operates on only one post, leaving the other free to move ever so slightly. I've never found this to noticeably affect performance.

Ellis Walentine
AW executive editor

230-Volt vs. 115-Volt Motors

Q Most of the motors on my stationary equipment can be wired for either 230-volt or 115-volt operation. What are the advantages of running a motor at 230 volts over 115 volts? Is it worth the rewiring expense?

Ken Bauer
North Bend, OR

A In general, larger machines perform best on 230-volt circuits because there is less voltage sag (and thus, more power) when starting and operating under heavy loads. This applies to tablesaws 10 in. and up, and also to most commercial jointers, planers, sanders etc. A good rule of thumb is to use 115 volts for motors 1 HP and smaller and 230 volts for motors 1½ HP and larger.

The choice of voltage does not affect your operating costs. Electric companies charge you for the wattage used, not the volts, and any given motor draws the same wattage whether it is operating at 115 or 230 volts.

Installing 230-volt circuits allows you to use smaller-gauge (and less expensive) wire than that required for 115-volt

WHERE TO FIND IT

Tiny pliers, clamps and other tools for miniaturists and model makers are available from Micro Mark, 340 Snyder Ave., Berkeley Heights, NJ, 07922, (800) 225-1066.

Bands, molds, tacks and other supplies for Shaker boxes are available from Canterbury Woodworks, 113 High St., Boscawen, NH 03303, (800) 828-7776.

Reed, rush, rawhide and other caning and wicker supplies are available from The Caning Shop, 926 Gilman St., Berkeley, CA 94701, (800) 544-3373.

circuits. The double-pole circuit breakers required for 230-volt wiring are somewhat more expensive, however, than those for 115-volt wiring. Switching the wiring inside the motor itself is a simple job.

Perhaps the biggest disadvantage to 230-volt motors is that they make machines less portable, because 230-volt outlets are not as plentiful as 115-volt outlets in the shop or at a jobsite.

Ed Cowern
Electrical engineer and woodworker
North Haven, CT

Lighting for Finish Work

Q What are the best kind of lights to use for inspecting the surface and color of finish work?

Ralph Berghuis
Sequim, WA

A Inspecting the finish quality itself simply calls for a lot of lights—both stationary and portable—to provide good reflection. When you're inspecting for surface imperfections such as "orange peel" (a dimpled-looking finish) or dust nibs, position the light so you're viewing its reflection at about a 60° angle away from you. On the other hand, when you're inspecting for inclusions (junk suspended within the finish) the light should be coming from your direction, so that reflections don't obscure your view into the finish.

Inspecting for color correctness is not as easy. A color can appear quite different when viewed under different lights—a phenomenon that is called *metamerism*. The best solution to this dilemma is to outfit your finish area with incandescent, cool white fluorescent and 6500° color-corrected fluorescent lights. (The latter are available at better lighting dealers.)

Inspect a test sample in the room where the piece will reside. Note the type of lighting in the room, including daylight. (And, if you're matching an existing piece, bring one of its doors or drawers back to the shop for reference.) Match the sample in the shop, working under lighting similar to the piece's final home. (Use the 6500° fluorescent to simulate daylight.)

If you can get the sample and the finished piece to match under all three types of lighting separately, you won't have to worry about metamerism later on, if the piece is moved to different lighting conditions. When this isn't practical, just make sure that your work matches under the type of lighting in which it will be viewed.

Tom Brown
Finishing consultant and woodworker
Fort Myers, FL

WOODWORKING QUESTIONS?
Send them to: "Q&A," AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. Or e-mail them to: AWQA@aol.com

offcuts

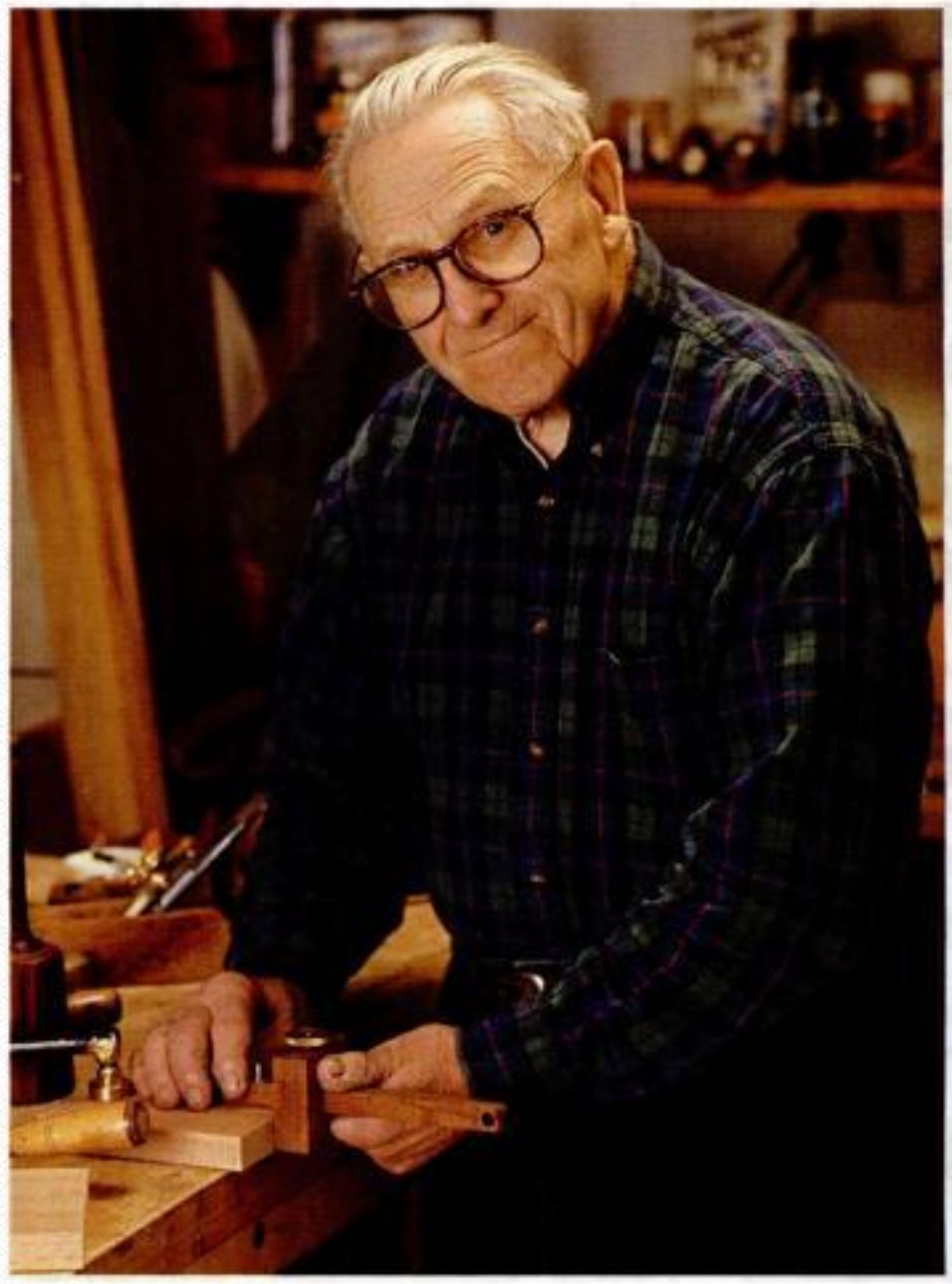
REMEMBERING CECIL PIERCE

"Do ya like fish chowdah?" The Maine accent was unmistakable; so was the aroma of homemade soup in Cecil Pierce's kitchen. We lunched at a handmade mahogany table, just a few steps away from the workbench where Cecil had spent the morning cutting dovetails. Outside, the tall pines surrounding our host's home swayed in a biting March wind. Cecil ordered his guests to stay seated as he scampered between the refrigerator and the woodstove, taking soda and salad from one and feeding offcuts into the other.

I'm sorry that Cecil won't be around to see his article on hand-cut dovetails appear in AW later this year. He passed away this January, in the house that he built himself, on the Maine island that his ancestors came to settle in 1760. Cecil had friends everywhere, as well as customers anxious to acquire a "Pierce" wooden hand plane. (See AW #43.) Cecil was also known for the exquisite fly rods he made from graphite and bamboo. News of his passing reached the magazine from numerous places.

Independent but never reclusive, open-minded but opinionated, soft-spoken but passionate, frugal with his own needs but generous to others, Cecil possessed all of the marvelously contradictory qualities found in a true Down East Yankee. And he was a jack of all trades. Over the course of his lifetime he worked as a boatbuilder, mechanic, furniture maker, lobsterman, author and historian. Cecil designed an escape vent for undersized lobsters that is now legally required on all lobster traps. He also wrote two great books: *Fifty Years a Planemaker and User,* and *The Precision Hand-Cutting of Dovetails* (Monmouth Press, 207-933-4922).

In his "spare" time, Cecil served as a selectman (27 years) and fire chief (20 years); he also helped found the Southport Historical Society, donating his time and skill to restore old buildings on the island. Cecil's skill and enthusiasm are bound to inspire woodworkers for many years to come, and he passes on a "can-do" legacy that goes far beyond the woodshop. —*Tim Snyder*



FROG TOOL MOVES

Frog Tool, a retailer of specialty woodworking hand tools, has moved to a new location. You'll find the retail store and mail-order operation in Dixon, IL, a suburb of Chicago.

If you mailed an order during Frog's move last fall but received no response, please write to the new address: Frog Tool Co. Ltd., 2169 State Rte. 26, Dixon, IL, 61021, or call: (800) 648-1270.

AW SPONSORS AWARD AT PHILLY FURNITURE SHOW

An important part of our charter is discovering talented new craftsmen who produce superior work. In keeping with this goal, AW will sponsor an award for the most promising new furniture maker at the second annual Philadelphia Furniture Show. The winner will receive $1,000 along with magazine coverage.

Founded on Philadelphia's long and rich furniture-making history, the show highlights a cross-section of studio-made furniture, including contemporary designs, classical adaptations and American rural interpretations. AW editors will staff our own booth at the show.

The second annual Philadelphia Furniture Show will run May 10-12, 1996 at the Pennsylvania Convention Center in Philadelphia. Call: (215) 440-0718.

NET NEWS

WHAT'S UP AT AW ONLINE

Curious about CAD?
Computer-aided design (CAD) is all the rage, but which program should you buy? To find out, go to the Computers In Woodworking message center on AW Online. There are two areas—one for PCs, one for Macs—and CAD users frequent both, so you can get answers from people who know.

AW Online is part of the America Online computer service. Call (800) 764-4400 for free software and 10 free hours of online time.

A "WOODY" FOR A FAST-PACED WORLD

The car shown at right may look like a classic, but with a top speed of 120 mph, it can handle life in the fast lane. Custom car maker Peter Portugal, of Eureka, CA, designed the car, which he calls the Dolphin.

Portugal made the prototype shown here from a Datsun 280 ZX and a 250-year-old redwood that fell in a windstorm. He cut the redwood into 3/16-in. by 2-in. strips that he tapered with custom-made hand planes and glued together over a laminated white oak frame. The body is sealed with epoxy, reinforced with fiberglass cloth and top-coated with clear urethane.

Portugal hand-laid the fiberglass fenders and trimmed the car with bronze, assorted hardwoods, leather, vinyl, brass and chrome. The dashboard is walnut burl, and the wooden steering wheel came out of an Austin-Healey. Portugal based the car's bow-back, Windsor style wicker and leather seats on seats in early racing airplanes.

Making a splash. *Peter Portugal's Dolphin combines the handling of a Datsun 280 ZX with the craftsmanship of an art deco masterpiece.*

Portugal builds three Dolphins a year; each one is tailored to the buyer's specifications. For more information on the Dolphin, send $5 to: Peter Portugal Design Co., 474 Redmond Rd., Eureka, CA 95503.

Jim's Corner

Offbeat Answers to Common Woodworking Questions

PHOTO BY PETER PORTUGAL

Q: Gardeners speak of a "green thumb." What's the equivalent in woodworking?

A: It's not "all thumbs." Can't be "one thumb." I vote for "two thumbs."

Jim Cummins is a contributing editor to AW.

SPIELMAN'S NEWSLETTER

Patrick Spielman fans take note: The prolific woodworking author has started his own bimonthly newsletter. The full-color, 16-page *Home Workshop News* emphasizes scroll-saw projects, patterns and techniques. Future issues will also include tips on using the router, lathe and bandsaw.

Spielman's newsletter targets the hobbyist and small-scale professional. It will feature his own ideas and tool recommendations, as well as contributions from other woodworking experts.

A one-year subscription (6 issues) costs $23.95. Write: Spielman Publishing Co., Box 867, Fish Creek, WI 54212, or call: (414) 868-1639.

NO SHOP SPACE? THIS CLUB CAN HELP

Whether you're just starting out in woodworking or eyeing a project too big for a small shop, here's a business that offers room to grow. The Woodworkers Club in Vienna, VA, sells health-club-style memberships for hobbyists to use shop space, tools and machinery. A second club opened in Boca Raton, FL, last December, and new locations are currently being considered across the country.

The Vienna club has almost 5,000 square ft. of shop space, plus a retail store selling tools, hardware, lumber and other supplies. "We supply pretty much everything from jointers and biscuit joiners to cabinet scrapers and shaving horses," says founder Mark Wirthlin. Each club is staffed by experienced woodworkers who are available to help members with their projects.

Ready for action. *The Woodworkers Club in Vienna, VA, is the first location in a chain of fully equipped workshops offering memberships to hobbyist woodworkers.*

Beginners are welcome. Several introductory-level classes are offered each month, and there are free demonstrations every Saturday.

Several membership plans are available to fit the amount of time you want to spend in the shop.

For more information, write: The Woodworkers Club, 216 Dominion Rd. NE, Vienna, VA 22180, or call: (703) 255-1044.

PHOTO COURTESY OF THE WOODWORKERS CLUB

TECH TIPS

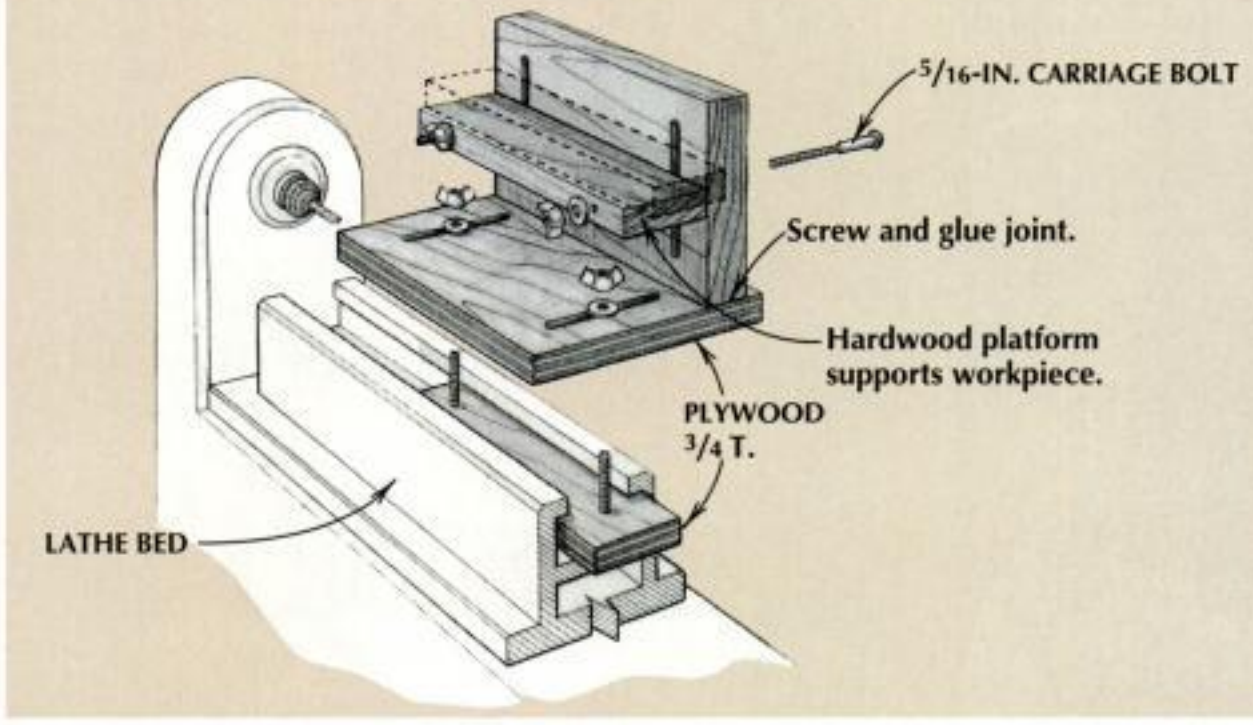
BEST TIP WINS $200

Know a better way of doing something? Designed a clever jig? Send your original woodworking tips, along with a sketch or a snapshot to: "Tech Tips," AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. We'll pay $50 for each tip we publish and $200 for the best tip of the issue.

Horizontal Boring Jig

This jig allows me to convert my lathe into a horizontal boring machine. I replace the drive center with a geared chuck and then feed the work by sliding it sideways toward the headstock. By removing the tailstock entirely from the lathe, I can drill stock of any length.

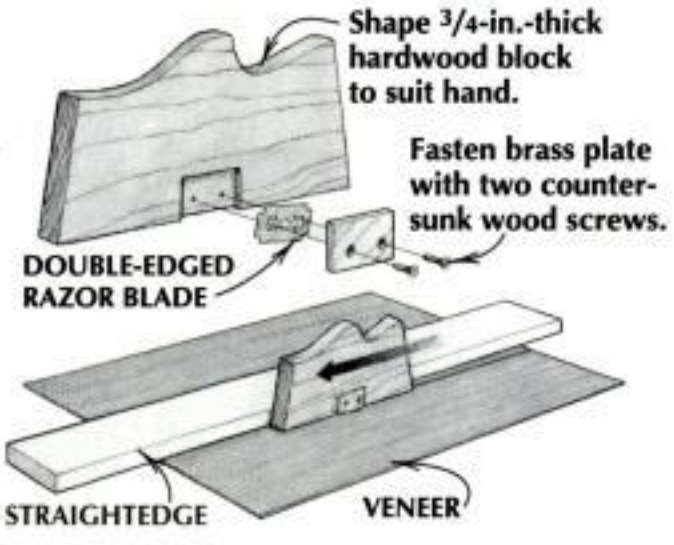
George Kyte
Sydney, Nova Scotia, Canada



Veneer Cutter

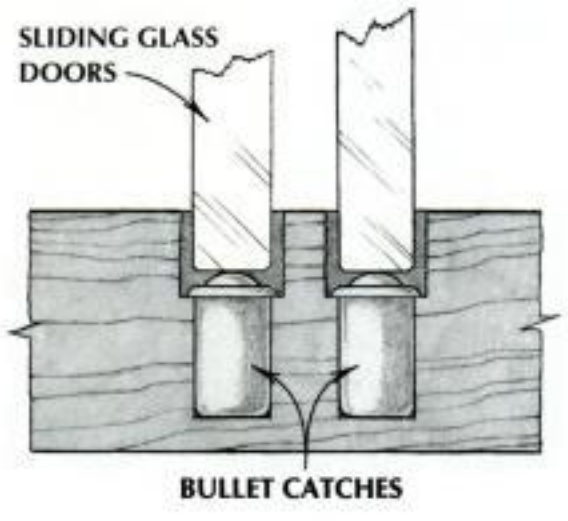
This simple tool is ideal for cutting veneer parallel to the grain direction. (Use a veneer saw for crosscutting.) The inset brass plate holds a double-edged razor blade with one corner dropped as shown. To use my tool, run the trimmer along a metal straightedge. You'll make a straight, clean cut in just one or two passes.

Mike Fortune
Toronto, Ontario, Canada



Bullet-Catch Glides

I recently made some display cabinets with sliding glass doors. To make the doors slide more easily, I set bullet

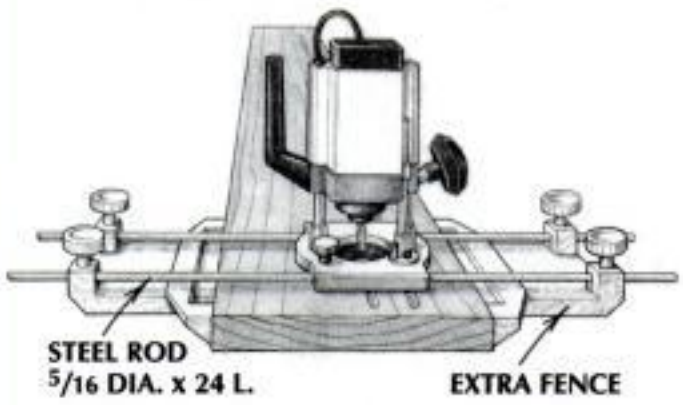


catches in the center of each bottom groove, spacing them every 3 in. The steel balls in the bullet catches produce much less friction than the bottom of a wooden groove.

Gregory Stoddard
Gansevoort, NY

Keeping Routers on Track

I had trouble cutting flutes and other straight cuts with my DeWalt router because it came with only a single fence.



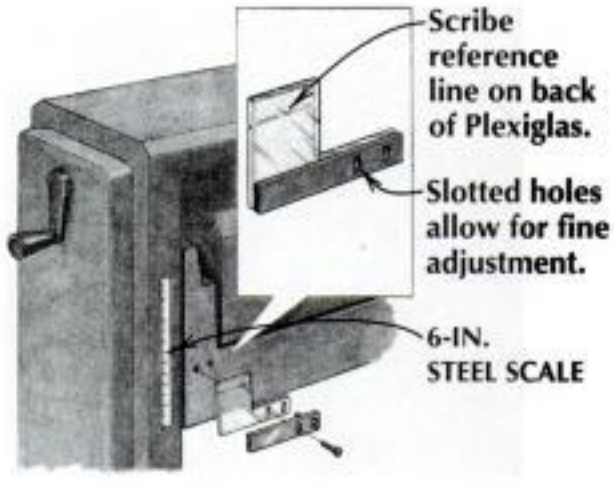
I ordered a second fence and bought two 24-in. by 5/16-in.-dia. steel rods at the local hardware store. With a fence on each side I can now safely rout stock up to 16 in. wide.

Chris Guozd
Dallas, TX

Planer Retrofit

I retrofitted this thickness scale on my portable planer; it's more accurate than the one that came with the machine. You can make your own version from a piece of clear acrylic, some 1/8-in.-thick aluminum and a short length of adhesive-backed steel tape. Epoxy the aluminum to the acrylic as shown. Then scribe a horizontal line on the acrylic and drill a pair of elongated installation holes, as shown in the drawing. Remove the original gauge (if necessary) and screw the new one to the planer as shown. Run a board through the planer, measure its thickness and position the steel tape. Fine-tune the setting by moving the aluminum arm up or down a fraction.

Michel Theriault
Ottawa, Ontario, Canada



ILLUSTRATIONS BY HEATHER BRINE LAMBERT

TECH TIPS

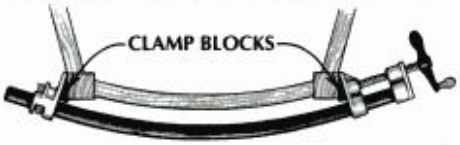
Shady Glue Guard

If glue squeeze-out is getting on your assembly table, try mounting a vinyl window shade at one end of the bench. When you're ready to glue, pull the shade across the whole length of the table and hold it with a spring-type clamp. It retracts quickly and neatly when you're done. Spills wipe right off and dried glue peels off the vinyl.

R.B. Hines
Vienna, OH

Pipe Clamps 'Round the Bend

Pipe clamps are more versatile than you think: When making some chairs with curved rails recently I found it con-



venient to bend a pipe to the required radius. If you can't bend the pipe yourself, try an electrical contractor who installs rigid conduit.

Michael Burton
Ogden, UT

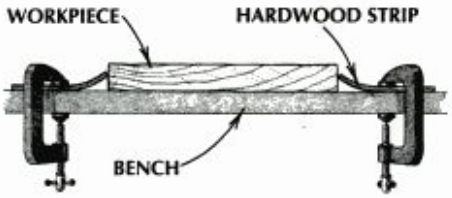
Disc-Aligning Jig

This jig speeds the changing of random-orbit sanding discs—and the holes line up every time. Trace the disc outline and hole pattern onto a piece of ½-in. scrap plywood. Drill out three of the holes and insert short pieces of dowel. To use, place a disc on the jig—abrasive side down—insert the dowels in the sander pad, press lightly and remove the jig.

Burt Mayotte
Dearborn Heights, MI

Scrapwood Hold-Downs

A quick, effective way to clamp a tabletop or another large workpiece to the bench is with flexible hardwood strips.

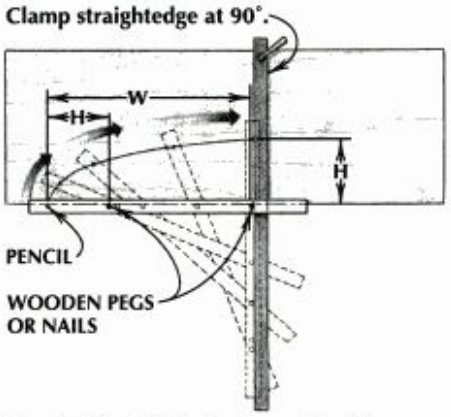


Spring these down, clamp them as shown, and the whole surface can be worked without shifting any clamps.

Cary Lowrance
Orland Hills, IL

Elegant Ellipses

With this simple guide you can make a smoothly flowing ellipse of any size. First, decide on the half-width (W) and

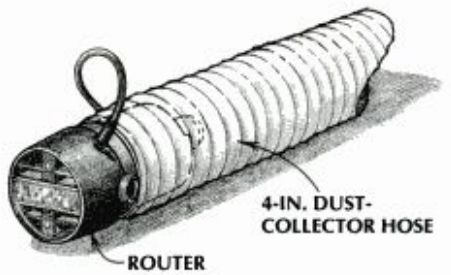


the height (H) of the arch. Clamp a straightedge at right angles to the edge of the stock and then slide the marking stick as shown. Mark the other side of the stock in the same way.

Doug Foster
Wallingford, CT

Dusting the Router

A quick way to extract dust from the inside of a Porter-Cable 690 router—or one of similar size—is to remove the base and place the motor housing into a standard 4-in. dust-collector hose. You'll find the housing fits inside the pipe and the wider top makes a good seal against the hose.

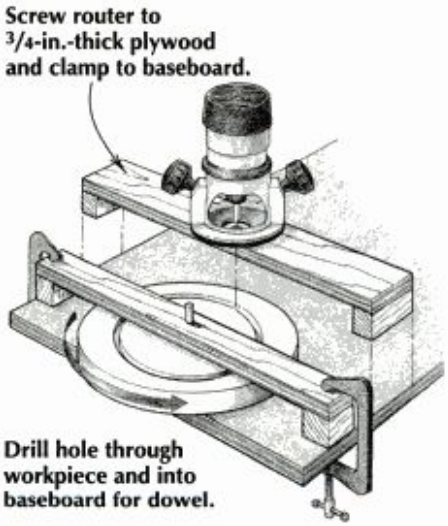


Mike Gregory
Levittown, PA

Rounding with a Router

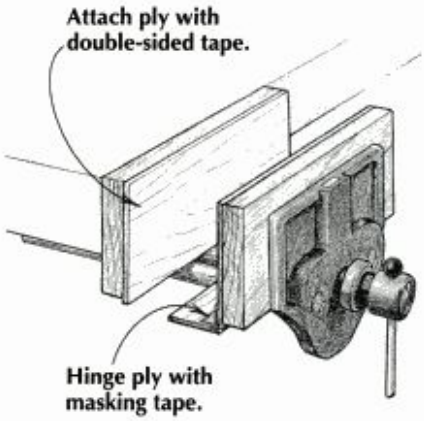
With this setup you can make a variety of circular cuts with your router. Once you've positioned the router and bit, turn on the router and rotate the workpiece to make the cut.

Yeung Chan
Millbrae, CA



Padding the Vise

Delicate or previously sanded parts are easily marred by hard maple vise jaws. To protect the work, I face my vise



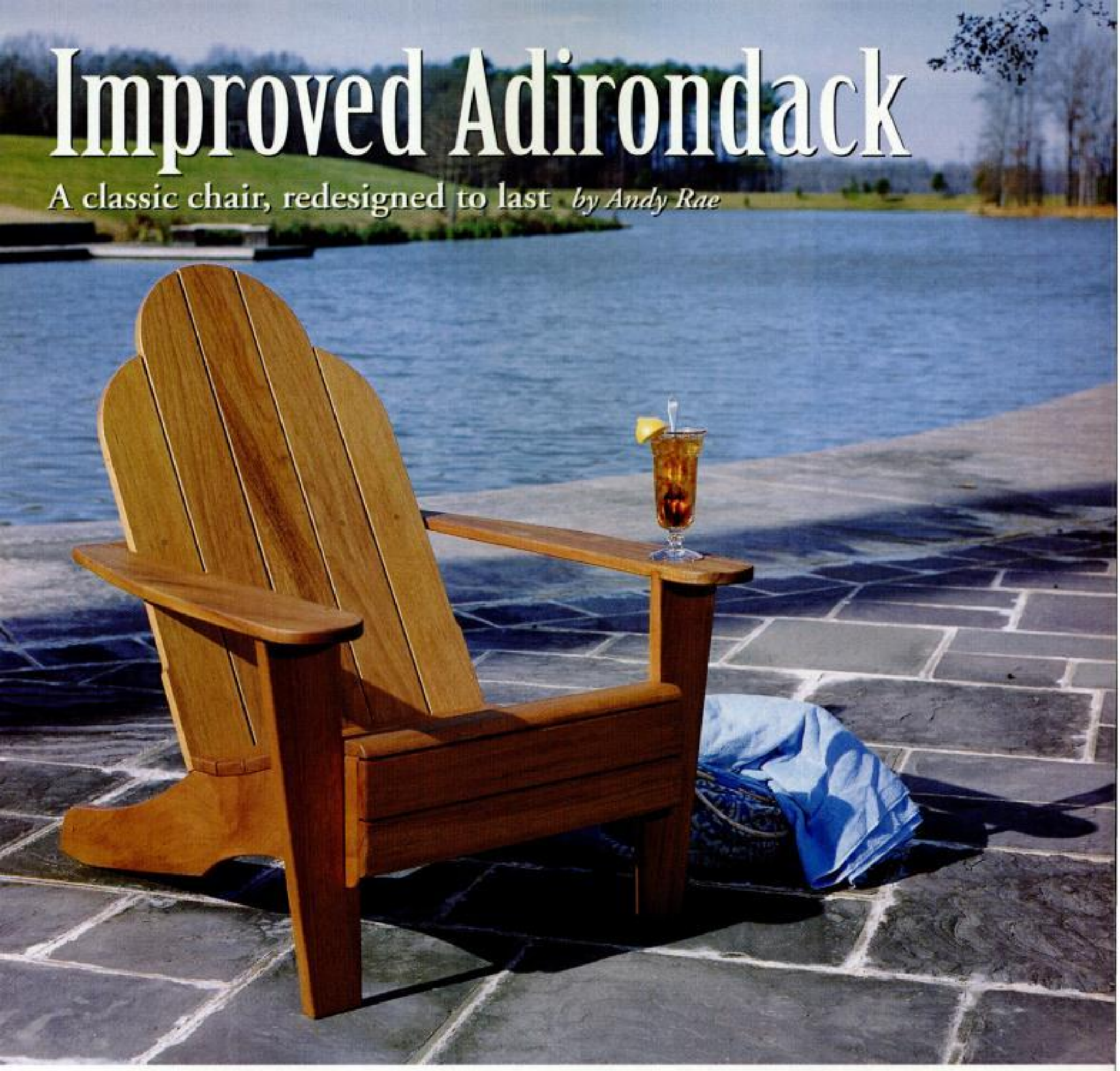
jaws with ⅛-in. or ¼-in. poplar plywood. A hinged flap covers the steel guide bars below.

Carolyn Grew-Sheridan
San Francisco, CA

Improved Adirondack

A classic chair, redesigned to last

by Andy Rae



Outdoor comfort. *Mortise-and-tenon and dovetail joinery keep this Adirondack chair sturdy in the elements.*

Upstate New York is famous for its rustic vacation homes, tucked away in the Adirondack mountains. Visit one of these getaway spots and you're likely to come across a familiar style of outdoor furniture named after the region. The "Adirondack chair" has a low seat, wide arms and a tall, sloping back. It's perfect for reading, visiting with friends or just idling away the hours.

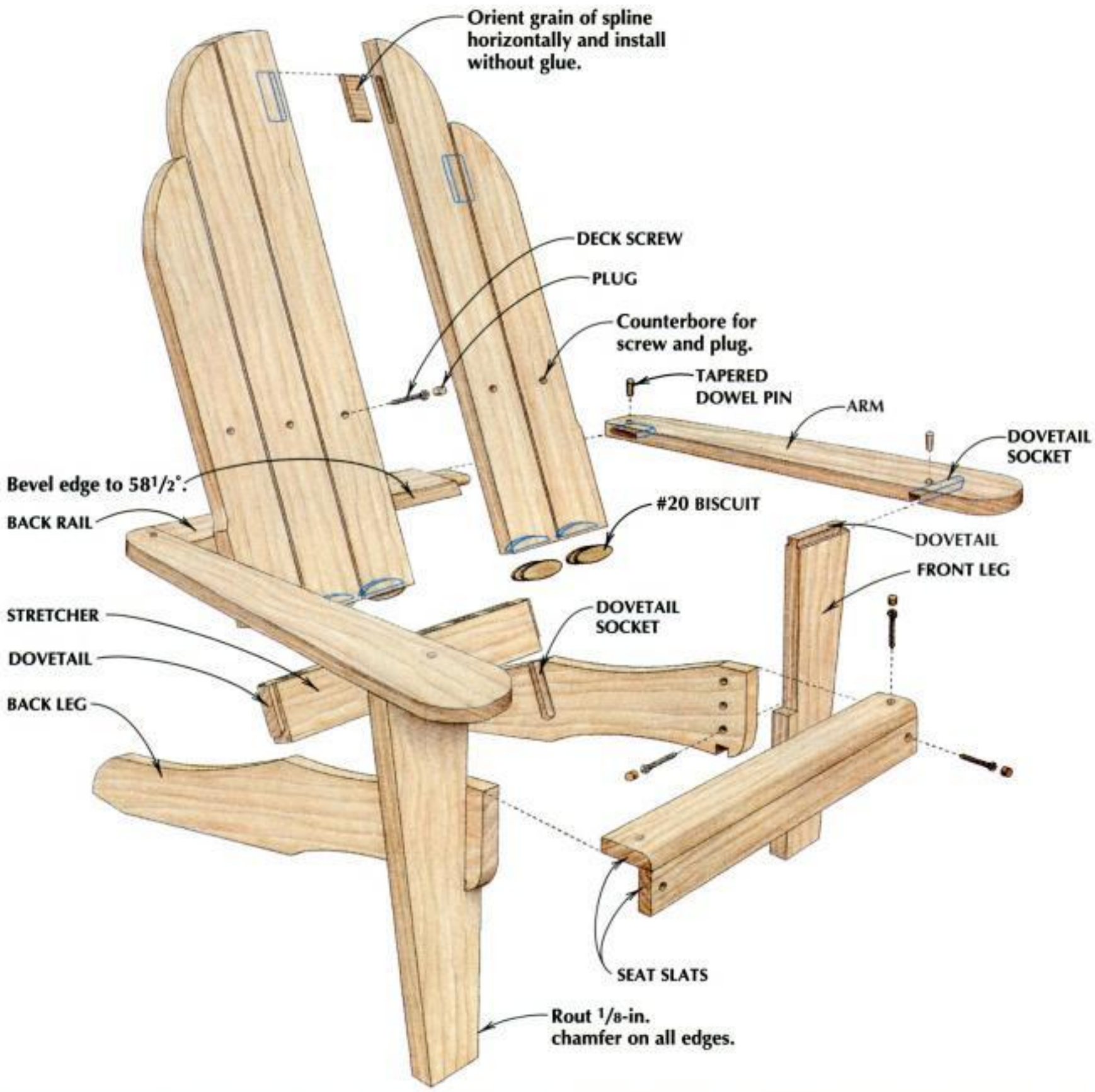
The average Adirondack is built from pine and protected by a layer or two of paint. Joinery is simple; butt joints and nails do the trick. But yearly repainting is necessary to keep the chairs from falling apart—and be prepared to get out your hammer to keep stray nails from snagging sitters.

I broke convention when I designed the "improved" Adirondack chair above. Mortise-and-tenon joints and sliding dovetails hold the main structural elements together, and the chair is made from mahogany, which holds up better in the weather than pine. (White cedar, white oak and teak are equally suitable.) The result is a comfortable, low-maintenance chair.

I usually make a run of at least two of these chairs so that the sitter can have a partner. To simplify production, I template rout all the irregular-shaped parts using shop-made templates. (See sidebar, page 30.) If you're making just one chair, it's faster if you skip the templates and simply bandsaw the parts to shape, then smooth and fair them by hand. In this article, I'll explain how I make the chair with templates.

PHOTO BY BILL RAY

FIG. 1: ADIRONDACK CHAIR



ILLUSTRATIONS BY FRANK ROHRBACH

Construction Notes

All the information you need to build this chair is shown in the drawings. Here are some notes that will help you on some of the trickier aspects.

Shaping the parts—I template rout the back legs, arms and back slats on the router table. (See sidebar.) To create the ledge on the front leg (see Fig. 3), I raise the blade on my tablesaw to full height and saw most of the waste, then finish up the cut on the bandsaw. I bandsaw the taper on the front leg, then clean up the saw marks on the jointer.

Routing the sliding dovetails—I also template rout 3/8-in.-deep dovetail sockets in the arms and back legs by following a notch in my templates with a dovetail bit and a guide bushing. (See top left photo, page 28.)

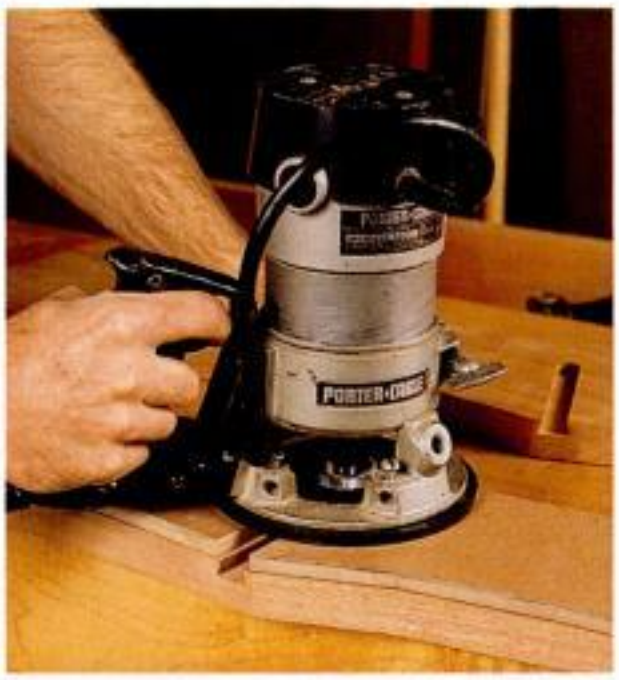
To determine the size of the notches in my templates, I measured the difference between the outside diameter of my guide bushing (5/8 in.) and the diameter of the bit (1/2 in.), then I added this measurement (1/8 in.) to the width and length of the finished socket. (See Arm and Back Leg, Fig. 3.)

I cut the template notch on the bandsaw and cleaned it up with a patternmaker's rasp. Then I set the bit to the depth of the socket, allowing for the thickness of the template. I routed the socket by riding the guide bushing in the notch. (See top left photo, page 28.)

An alternative to template routing the sockets is to rout with just the dovetail bit. Set the bit to the finished socket depth and clamp straightedges on the workpiece at each side of the joint to guide the router.

I cut the dovetails in the stretcher and front legs on the router table, using a tall fence and the same dovetail bit used to rout the sockets. I set the bit in the table 3/8 in. high, to correspond to the depth of the socket. Then I adjust the router fence to expose the correct amount of the bit and rout a dovetail in two passes by running each side of the stock against the fence. (See center photo, page 28.)

CUTTING THE SLIDING DOVETAIL JOINT



Routing the socket. *Cut the dovetail socket in the leg by riding a dovetail bit and guide bushing in a notch cut in the MDF template.*

Routing the dovetail. *Rout the dovetail in the stretcher with the same dovetail bit and a tall fence on the router table.*

Stopping the dovetail. *Round over the stopped dovetail in the front leg by making scoring cuts with a handsaw; then pare to shape with a chisel.*

PHOTOS BY ANDY RAE

Mortising the arms—I mortise the arms using a plunge router equipped with an edge guide and a 1/4-in. spiral up-cutting bit (available from CMT, Box 1518, Oldsmar, FL 34677, 800-531-5559). To steady the router, I clamp a scrap board to my bench, then clamp the work in my bench vise so its edge is flush with the top of the board. (See photo, below.)

Slotting back slats and stretcher—I use a biscuit joiner to cut the slots in the back slats and the stretcher. You could also groove the parts on the tablesaw and join the back slats to the stretcher with a 1/4-in.-thick spline.

Assembling the chair—I use West System Brand Epoxy (available from Gougeon Brothers, Box 908, Bay City, MI 48707, 517-684-7286) to glue up my chairs. To seal out moisture, I brush the epoxy on all parts of the joints, including the screws, pins and plugs. Other waterproof glues, such as the polyurethanes or the new breed of PVAs such as Titebond II, will also work fine. (For more on waterproof glues, see AW #34 and "Toolbox" in AW #40.)

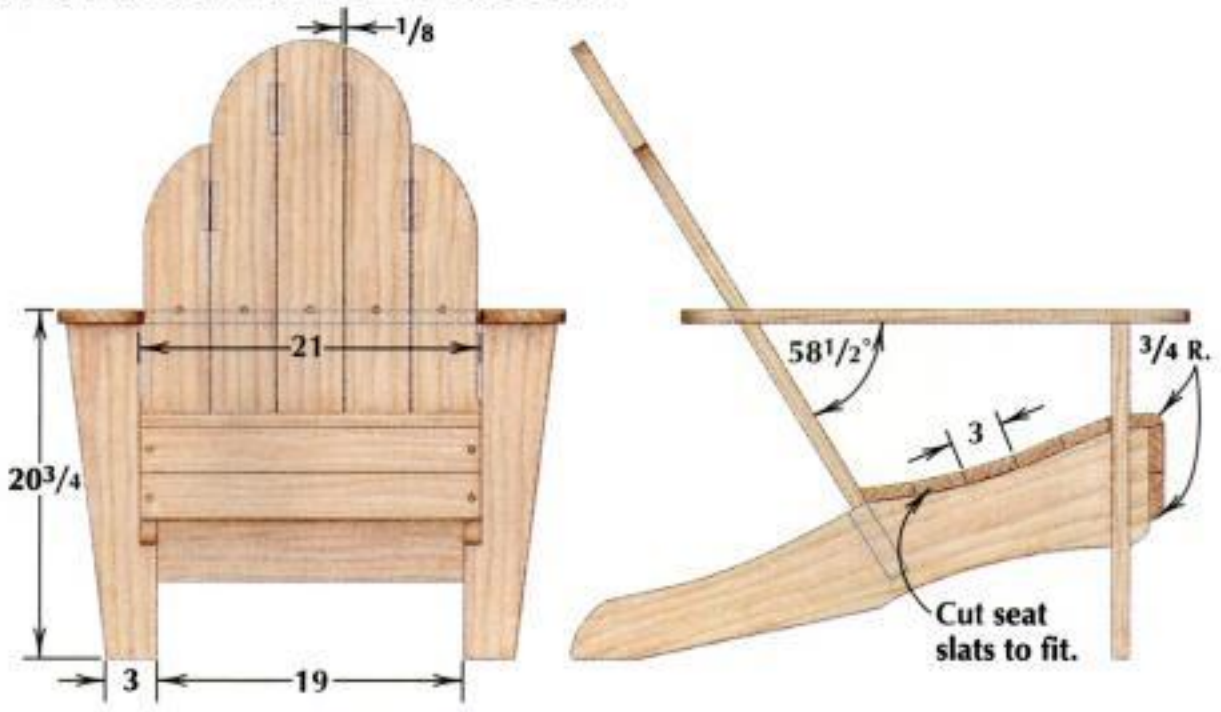
The chair goes together in stages. First, I join the front and back legs, stretcher, arms and back rail. I use scrap sticks to support the arm-and-back-rail assembly level with the fronts of the arms. (See top photo, page 30.) Then I pull the arms tight to the back rail with a pipe clamp and peg these joints.

With the back rail in position, I hold a back slat against the rail and mark it for the counterbored screw hole, as shown in the bottom left photo on page 30. Then I use this slat to lay out and drill the holes in the remaining slats.

Next, I glue the slats to the stretcher. To align the slats in the correct position, I install the dry splines in the slats, then I pull the slats together with a pipe clamp, using 1/8-in.-thick scrap spacers to create the correct gap between the slats. (See bottom right photo, page 30.) Once the slats are positioned in the stretcher, I screw them to the back rail. Installing the seat slats is simpler: I drill and counterbore all the holes in the slats, then I position them using 1/8-in. spacers as before and drive the screws home.

Pegging and plugging the joints—I use tapered dowel pins to peg the arm

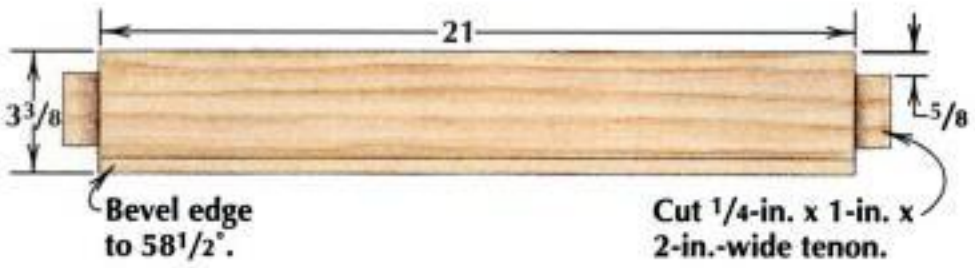
FIG. 2: CHAIR ELEVATIONS



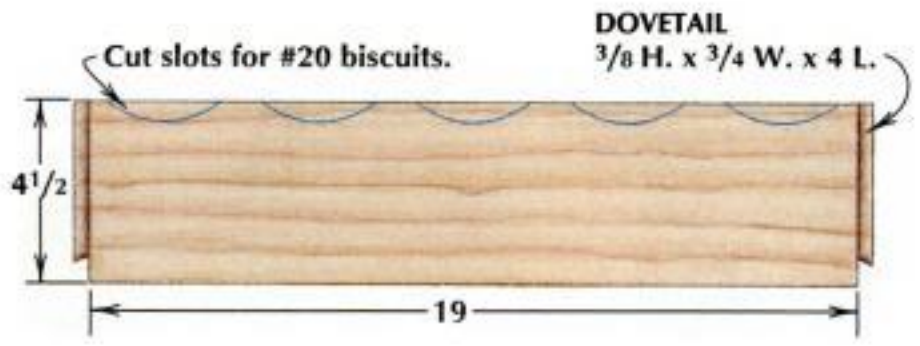
Mortising the arm. *Plunge rout the arm mortise by guiding the router with an edge guide. A scrap block clamped to the bench prevents the router from tipping.*

FIG. 3: CHAIR PARTS

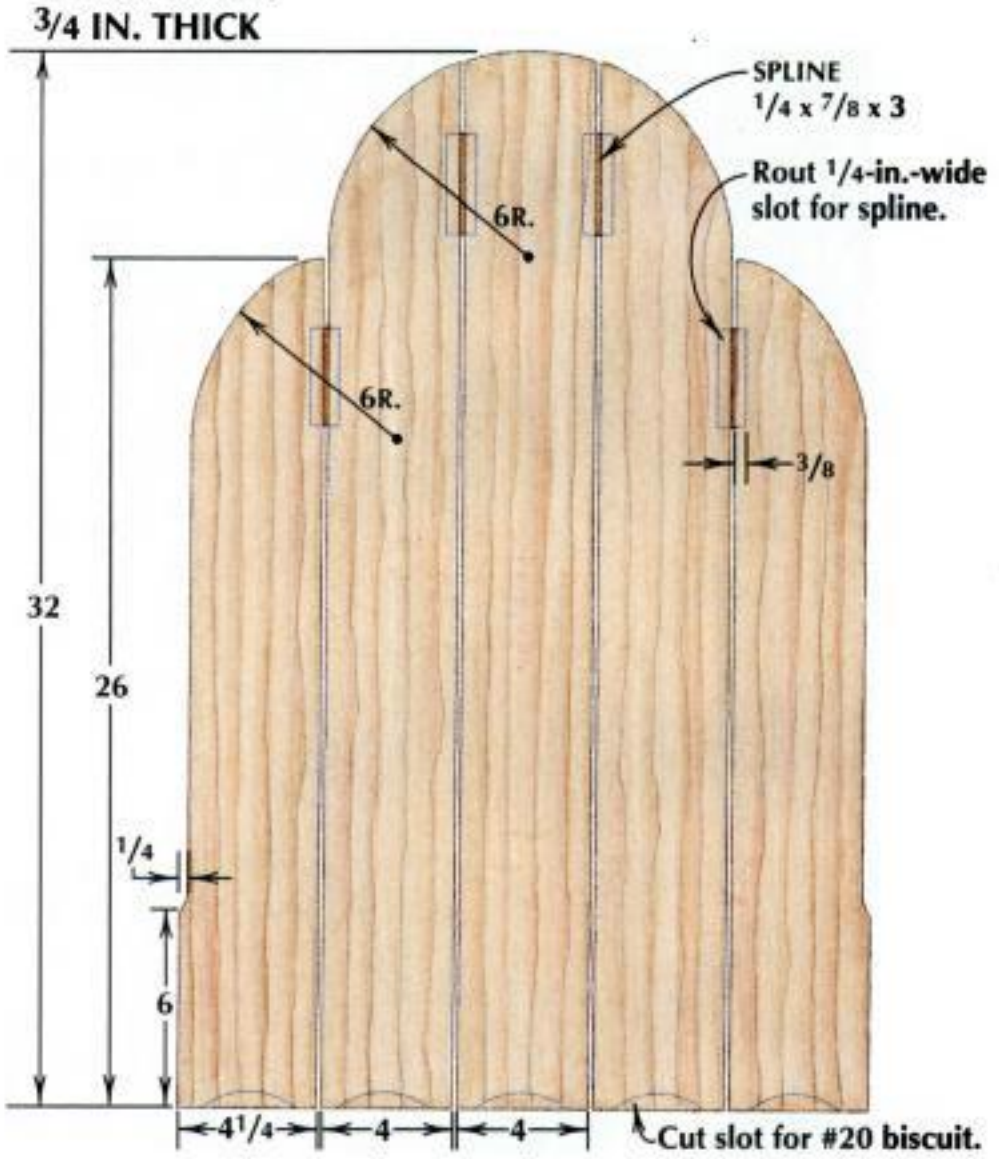
BACK RAIL
3/4 IN. THICK



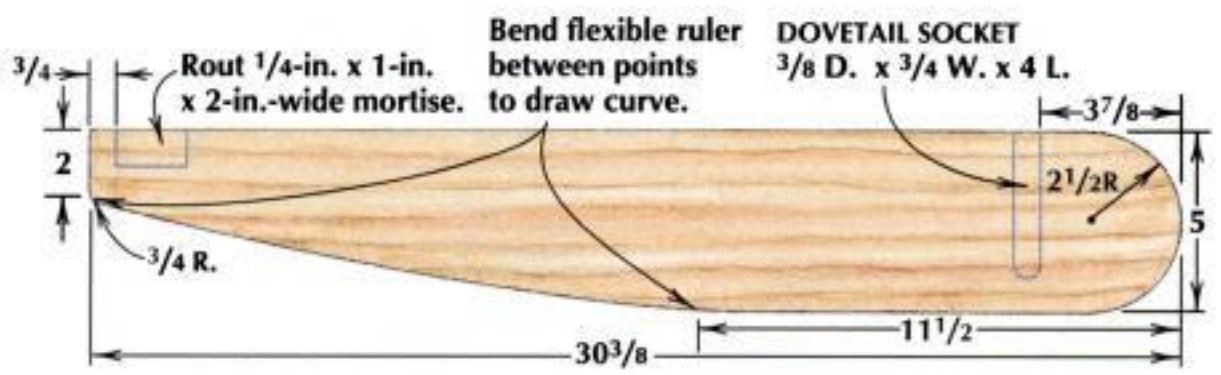
STRETCHER
1 IN. THICK



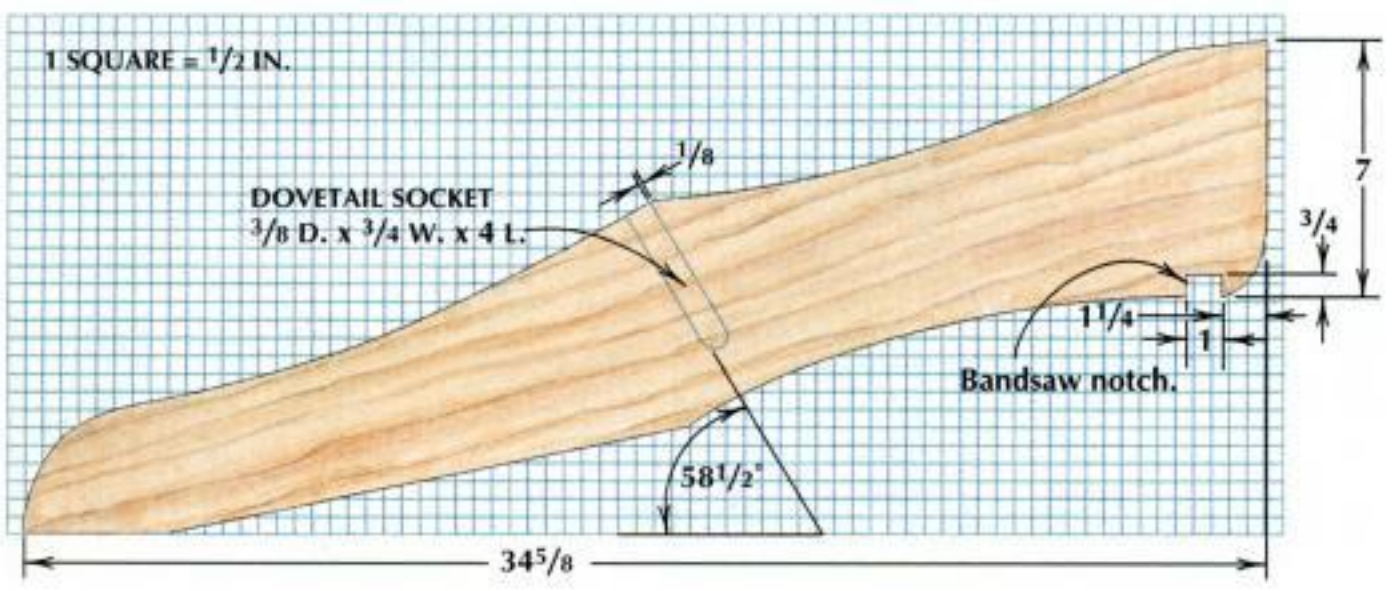
BACK SLATS
3/4 IN. THICK



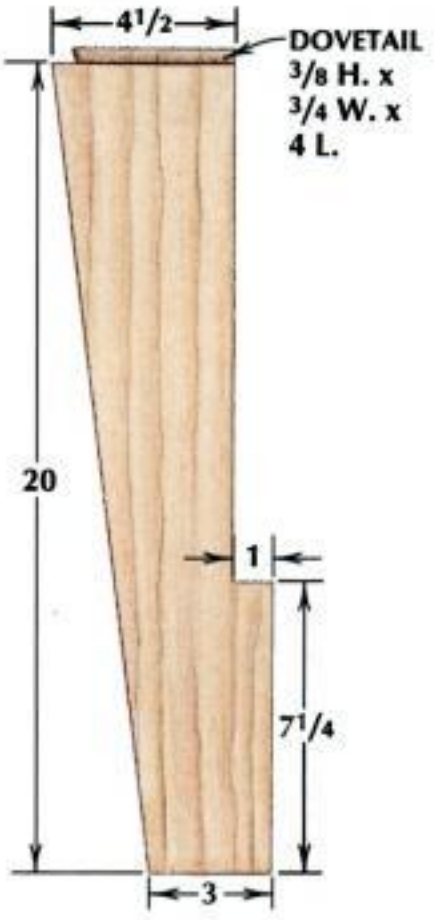
ARM
3/4 IN. THICK



BACK LEG
1 IN. THICK



FRONT LEG
1 IN. THICK



Supporting the assembly. *Bandsaw two scrap sticks to support the backs of the arms level with the fronts of the arms during assembly.*

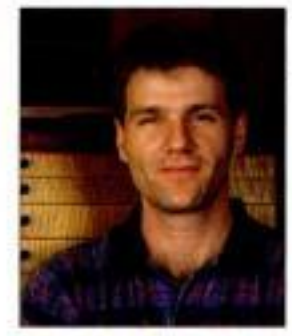
Marking for screw holes. *Determine the location of the screw hole in the back slat by holding an adjustable square against the back rail.*

Gluing the back slats. *Use a pipe clamp and spacers to hold the back slats in position while you join the slats to the stretcher.*

joints. The taper keeps the pins from falling out should the glue ever fail. I taper each pin by holding a length of dowel stock at about a 5° angle to my stationary belt sander while rolling the dowel; then I cut the pin to length. I cut tapered plugs on the drill press with a Veritas plug cutter (available from Garrett Wade, 161 Avenue of the Americas, New York, NY 10013, 800-221-2942). To visually blend in the plugs, I orient the face grain of the plugs with the grain of the chair and pare them flush to the surface.

Finishing and care—I like the look and feel of weathered wood, so I avoid film finishes such as varnish on my Adirondack chairs. To prevent end grain checks, I fill all the end grain with thinned epoxy, particularly where the chair will come in contact with the ground. Thinning the epoxy 50 percent with denatured alcohol allows the mixture to soak more deeply into the pores. Once the epoxy dries, I give the chair one coat of an oil-varnish blend to even out the color.

That's it. If the chair accumulates dirt or mildew over the years, give it a good scrubbing with warm, soapy water and a stiff brush. Then get back to lounging with the best of 'em. ▲



ANDY RAE *is a furniture maker and an associate editor of AW.*

TEMPLATE ROUTING

Template routing allows you to rout curved or irregular-shaped parts quickly, precisely and in multiples. All you need is a router, a flush-cutting bit and some shop-made templates. I cut my parts on a router table, but you'll get the same results with a hand-held router or a pin router.

The technique is simple. Bandsaw a pattern, or template, from MDF or hardboard to the exact shape of your desired workpiece. Fair and smooth the edges with a rasp or some sandpaper wrapped around a curved block. Use the template to trace the shape of your workpiece onto the wood, and bandsaw the stock slightly oversize. Now attach the template to the workpiece with small squares of double-faced tape, and rout the work by riding the template against the bearing of a flush-cutting bit. (See photo, right.) When you've finished routing, pop off the template with the dull edge of a putty knife. The tape can be reused a number of times before it loses its stickiness. —*A.R.*

Routing a shape. *Template rout an irregular shape by riding the template against the ball bearing of a flush-cutting bit. A starting pin in the router table allows the author to begin the cut safely.*

Kerf-Bent Jewelry Box

Ingenious notches and some steam let you fold a plank

by Ray Levine

Folded sides and carved figures. *The author's jewelry box has a killer whale handle and sides made from a single piece of birch. Abalone inlays add color.*

I've always been fascinated by the connection between craft and culture. A great deal of my interest has been focused on Native American carving—from ceremonial masks to simple bowls and vessels. Initially, I was satisfied to just collect these carved pieces. But the more I studied, the more curious I became about actual carving processes. By using authentic tools and techniques to recreate tribal carvings, I gained a familiarity with carvers past and present that no academic study could offer.

Kerf-Bent Beginnings

The tribes of the Pacific Northwest developed the most impressive carving heritage of all the Native American peoples. Today these tribal groups are known as the Tlingit, Haida, Tsimshian, Bella Coola, Kwakiutl, Nootka and Coast Salish.

Blessed with an abundance of fish, wildlife and timber, the natives of the Northwest Coast were not troubled with problems of sustenance. As a result, they developed an elaborate social and ceremonial life. From artifacts and oral tradition, we know that carving was both necessary and revered.

Of all the carving done by Native Americans in the Pacific Northwest, none rivals the kerf-bent box in its degree of difficulty. The four sides of the box are actually a single piece of wood—usually a clear, straight-grained piece of red or yellow cedar. Three of the four corner joints in this continuous construction are made by steam bending precisely contoured kerfs made at each corner. In the completed box, you can see the profile of this ingenious right-angle fold. (See bottom photo, page 32.) The fourth corner, where the ends of the board join one another, is a simple rabbet joint held fast with wooden pegs.

The original craftsmen would have used a larger version of my kerf-bent container as a "grease" box, for storing the oil or fat that was rendered from fish and used as a dipping condiment. Though smaller in size (7 in. wide by 7½ in. deep by 5 in. high), my box was built using the same tools and techniques that a Northwest Coast master carver would have used.

The construction and ornamentation of my box are also authentic. On the top of the box, a coiled killer whale handle emerges from an engraved ocean. The incised carving on the top and around the sides of the box are consistent with Northwest Coast styles in that they depict scenes or elements from the natural environment. The box sides are carved to show a beaver, its form disembodied and abstracted but presented in typical symmetrical fashion. (See photo, above.) The accented eyes and top corners are inlaid abalone.

Kerfing and Bending

I made my box from birch, a wood with reasonably good bending characteristics, nice figure and the ability to take carving detail.

Northwest Coast carvers traditionally made their own tools, first using jade or obsidian for cutting edges, then switching to iron and steel when metals became available. Today, tools are often fabricated from discarded files and from old automobile leaf springs. These tools

are used with a pulling motion, and they typically have long handles to accommodate a two-handed grip. (See photos, right.)

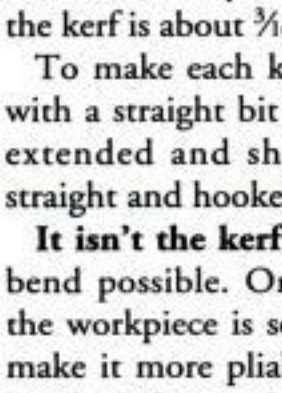
Because of the reduced scale of the jewelry box and the fact that I hadn't made kerfed bends in birch before, I decided to experiment on scrap pieces of birch before touching the actual workpiece. In these samples, I was able to perfect the actual profile of the kerf and also determine how much soaking and steaming would be required to bend the sides.

Each kerf has one square corner and a facing corner that curves in, approximating a quarter-round. For flexibility, the strip of wood that will be bent needs to be thin. On my box, this section behind the kerf is about 3/16 in. thick.

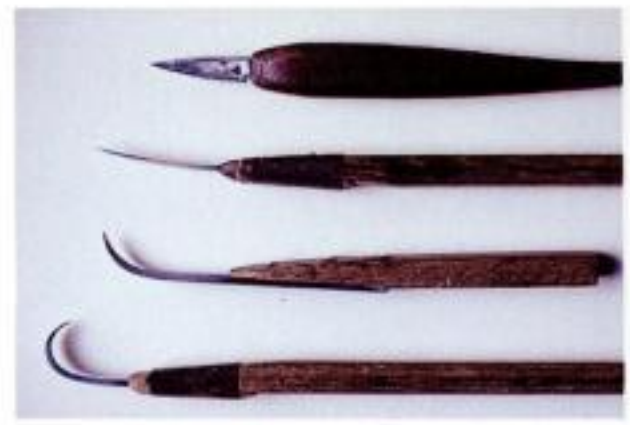
To make each kerf, I first cut a dado with a straight bit in the router. Then I extended and shaped the kerf using straight and hooked knives.

It isn't the kerf alone that makes the bend possible. Once the kerfs are cut, the workpiece is soaked and steamed to make it more pliable. Based on my test bends, I first soaked my side board for two hours in a hot solution of one part fabric softener to 12 parts water. The fabric softener contains ammonia and surfactants (used in laundry detergents to loosen dirt from clothes) that make the wood fibers more pliable. After soaking the board, I steamed it in a steam box. Then I removed it and quickly clamped it around a square form, forming the corner joints one at a time. I pegged the rabbeted corner with handmade wooden pegs, and I secured the sides with band clamps.

To complete my box, I carved the sides and installed the bottom, which is rabbeted on all four edges to fit against the sides. Wooden pegs hold it in place. The whale handle began as a clay model. Working in this more malleable medium enabled me to try different shapes before settling on the final coiled form that I used in the wooden version. It's anchored to the top of the box with a wedged through tenon. ▲



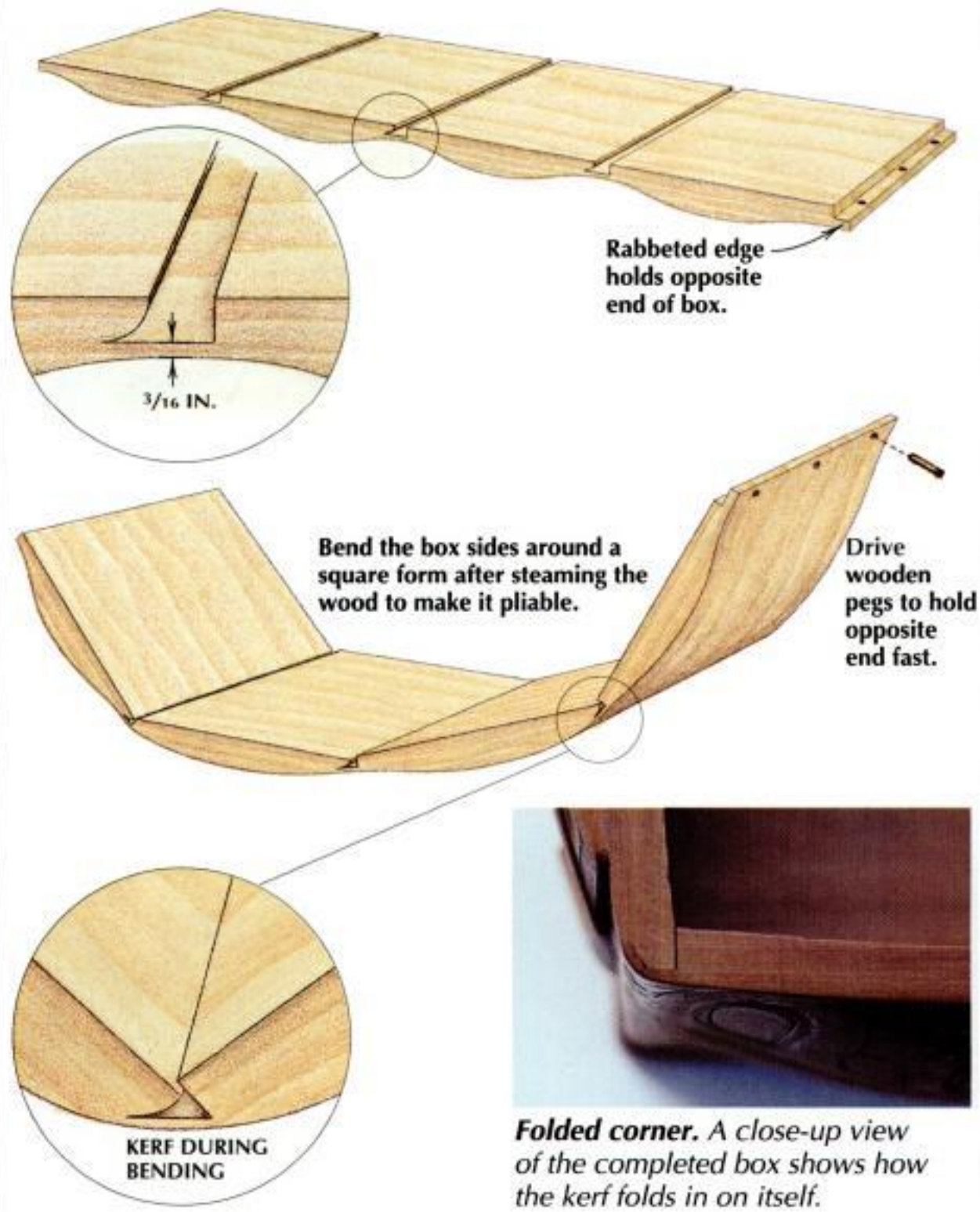
RAY LEVINE *is a retired engineer and geologist living in northern California.*



Handmade knives. *Straight and curved blades are used for kerfing and decorative carving. Long handles allow for two-handed use.*

Practicing the profile. *Levine worked on scrap stock to perfect the kerfed corner profile. The kerf's square edge is separated from its curved edge by the 3/16-in.-thick strip of wood to be bent.*

KERF-BENDING DETAILS



Folded corner. *A close-up view of the completed box shows how the kerf folds in on itself.*

ILLUSTRATION BY FRANK ROHRBACH

Getting the Edge

Sharp chisels and plane irons cut faster, safer and cleaner. Four experts share their sharpening solutions

Sharpening is a bit like exercise: You feel a lot better when you're finished. And when it comes to sharpening, most of us would like to get finished with less sweat and more certainty. In this article, we'll cover four approaches to sharpening, focusing on the components, costs and techniques used on chisels and plane irons. But first let's look at a few basic sharpening terms and truisms.

Lapping the Back

There's no way around it—the back of a chisel or plane iron has to be flat if you want to get the edge sharp. To test for flatness, rub the back on a very fine, flat sharpening stone. If the back is flat, the small scratches left by the stone will show evenly across the surface. Breaks in the scratch pattern indicate low spots that you'll have to remove by *lapping*. (See top photo, page 36.) You may need to lap again lightly after honing the bevel, to remove the tiny wire edge that has formed.

Bevel Basics

The first bevel question most people ask is "Hollow-ground or flat?" The hollow-ground bevel, formed on a motorized grinding wheel, leaves less metal to remove by honing. (See drawing.)

A primary bevel angle of 30° is common for plane irons. For bench chisels, most woodworkers prefer a 25° bevel. Mortising and other chisels used for heavy chopping need steeper bevels that put more metal behind the edge—30° or thereabouts. Some sharpeners like to add a microbevel, honing at an angle that's just a degree or so steeper than the primary bevel. ▶

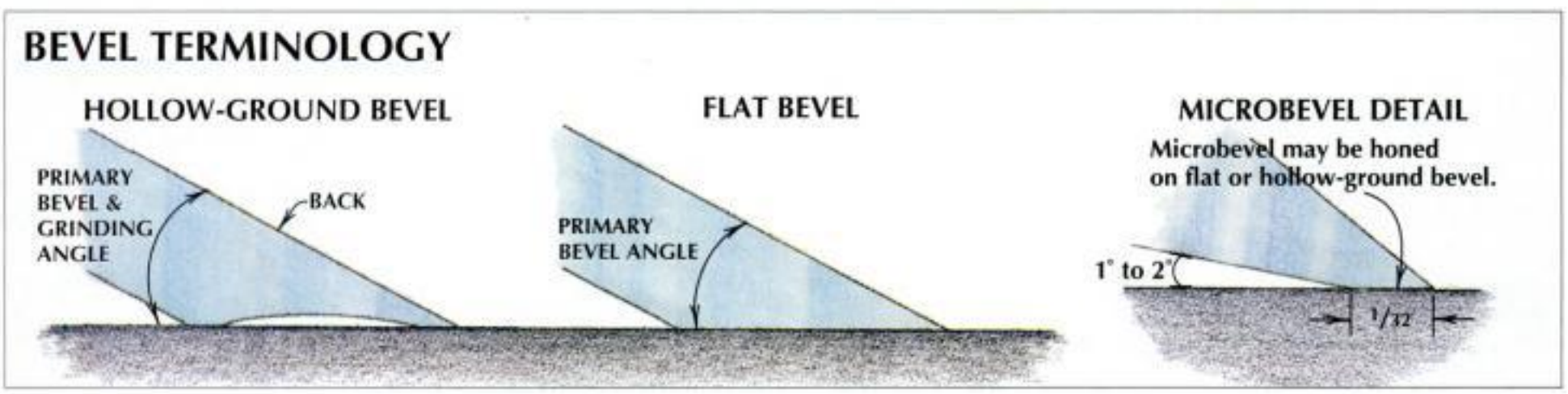


ILLUSTRATION BY FRANK ROHRBACH. PHOTO BY JOHN HAMEL

Honing with Waterstones

by Leonard Lee

Leonard Lee is the author of The Complete Guide to Sharpening (1995, Taunton Press, Newtown, CT 06470).

When it comes to sharpening, my philosophy is to get a good edge in the least time at the lowest cost. The main components in my system are a motorized grinder, a honing guide and two Japanese waterstones: an 800 grit and a 6,000 grit.

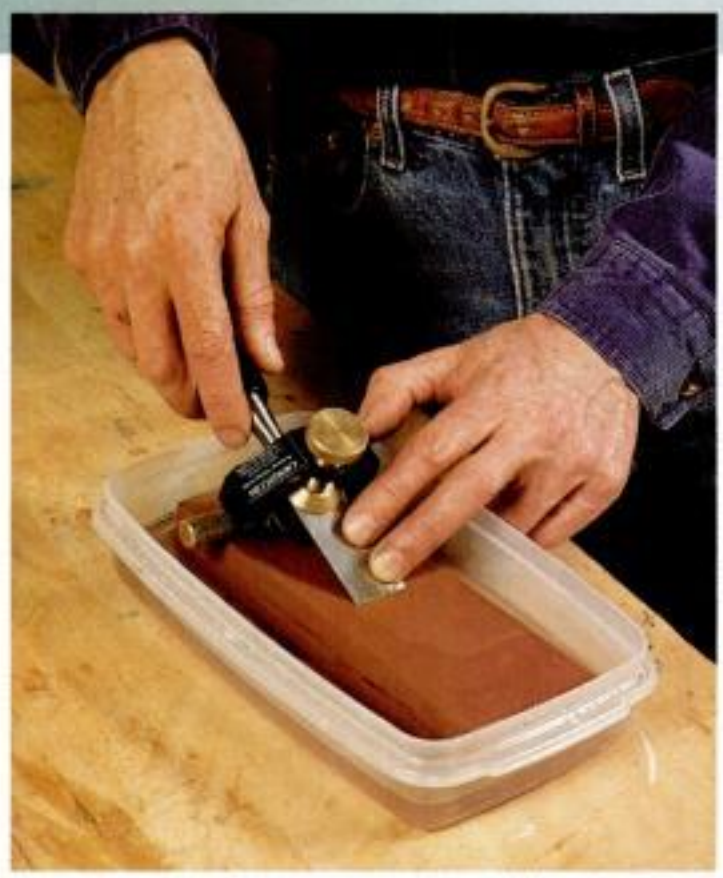
I usually start lapping chisels and plane irons on my 800-grit waterstone; then I go directly to the 6,000-grit stone. The smoother, shinier finish left by the 6,000-grit stone will show up clearly against the duller, more deeply scratched surface produced by the 800-grit stone. When you have a continuous shiny band next to the edge, stop. There may yet be a few slightly hollow areas back of the edge that are not shiny. They will not affect the chisel's function as long as the surface is basically flat.

If a blade needs grinding (e.g., if it is nicked), a 1/4-HP double-spindle grinder is a good choice. A 1,725-rpm grinder is best, but a 3,500-rpm grinder is fine if you have the right stone for it. I use a Norton aluminum oxide wheel with the code 38A80H-8VBE. This is a cool-cutting, aggressive stone because it has an open structure and a soft bond, unlike the dark gray, silicon carbide tool-burners that come with most new grinders. You can find a serviceable grinder for well under $100. As well as a new stone, you should also get a good aftermarket tool rest to replace the one that comes with the grinder.

If I intend to hone at 25°—a good angle for utility chisels—I grind the bevel 1° or 2° below that. Then when I come to hone the edge, I am honing only the front part of the bevel. I use a honing guide and an angle-setting jig. I set the chisel in the honing guide at 25° and hone a primary bevel 1/16 in. to 1/8 in. wide, using the 800-grit stone. Then I lap the face (a couple of strokes) on the 6,000-grit stone to remove any burr.

I click the cam on my honing guide up a notch and hone a very narrow microbevel (1/64 in. wide is fine) 1° above the primary bevel. Again, I quickly lap the face to remove any burr.

Resharpening is easy with this system because I know the exact geometry of the edge. I set the honing guide to the primary bevel angle, go back to the 800-grit stone and strip away just enough steel to remove the rounded edge. Then I lap on the 6,000-grit stone and hone the microbevel just as before.



Guiding the edge. *Using a honing guide, you can set and hold exact angles for honing both the bevel and microbevel.*

Three-stone system. *Lee uses an 80-grit Norton wheel to hollow-grind the bevel. For flattening and honing, he relies on 800- and 6,000-grit waterstones.*

Flattening a Dished Stone

Waterstones wear quickly, but it's not difficult to restore them to flatness. Sprinkle about half a teaspoon of 80- or 120-grit silicon carbide powder on a piece of plate glass. Add just enough water to make a slurry and then lap the 800-grit stone. Once the 800-grit stone is flat, wash it free of loose abrasive and then rub it against the 6,000-grit stone (using water as a lubricant) to flatten the finer stone. ▲

Pros

Only two stones are needed; honing guide allows for precise, repeatable honing of primary bevel and microbevel.

Cons

Waterstones need regular conditioning to maintain flatness.

Components and costs*

- 6-in. low-speed grinder *$75*
- Norton 6-in. x 1-in., 80-grit grinding wheel, code 38A80H-8VBE *$25*
- 800-grit waterstone, 1 3/8 in. x 2 5/8 in. x 8 1/4 in. *$22*
- 6,000-grit waterstone, 1/2 in. x 2 1/2 in. x 7 in. *$23*
- Grinding jig and tool rest *$50*
- Veritas honing guide and angle setter *$33*

Total cost $228

Optional equipment

- Sharpening station for waterstones *$45*

**Approximate costs, based on current mail-order prices.*

BOTTOM PHOTO BY LEONARD LEE

Sharpening with India and Arkansas Stones

by William Neptune

Will Neptune makes furniture and teaches woodworking at Boston's well-known North Bennet St. School.

When I sharpen chisels and plane irons, I rely primarily on a bench grinder and on several oilstones and strops. While I've experimented with waterstones, ceramic stones and even diamond abrasives, I keep coming back to oilstones to hone the bevel. It's true that oilstones don't cut as quickly as waterstones, but this isn't a problem when you're honing a hollow-ground bevel because there's much less metal to remove.

I used to begin lapping the back on the coarse (100-grit) side of my combination coarse/fine India stone. Now I like to do my initial lapping on a coarse diamond stone. The 12-in. precision diamond stones from DMT are great for lapping. I still finish flattening the back on the fine side of my combination India stone.

Once the back is flat, I go to the bench grinder and hollow-grind the bevel. (See photo, right.) I use the hollow-ground bevel to register the honing angle on my oilstones. Honing at the same angle as the grind will leave two narrow bands of shinier, smoother steel—one along the top of the bevel and one along the bottom.

I start honing the bevel on the fine India stone. I dribble a couple of drops of Marvel Mystery Oil (other machine oil will also work well) on the stone and spread it out with my fingers. The oil keeps the abraded steel dust in suspension, so that it can be wiped clean periodically, before it clogs the stone.

Initially, I move the chisel or plane iron in small circles, keeping near the edges of the stone to avoid hollowing out the middle. After a couple of minutes, I finish up with several straight strokes on the bevel and back. I've found that "straightening out the scratches" like this yields a more durable edge.

After the fine India, I go to my hard white Arkansas stone and repeat the same sequence: circular motion first, then a few straight strokes on bevel and back. If you're new to sharpening, it will take some time to gain the steadiness and feel required for freehand honing. But with practice, this freehand proficiency will come in handy when you have to sharpen gouges, carving tools and other edge tools that can't be held in a honing guide.

Though it's possible to finish the edge by honing on even finer oilstones, at this stage I usually choose to strop the bevel and back for that extra measure of sharpness. To make a strop, I simply glue a length of smooth, flat leather to a base of 3/4-in.-thick MDF. I charge the strop with abrasive compound, spreading the compound over and into the leather surface.

When stropping, I keep the bevel's "flats" in contact with the strop, and use a straight pull stroke. Tipping the edge into the abrasive tends to depress the leather slightly; this will create a curved or "dubbed" microbevel, which you don't want. ▲

Wheel work. *Hollow-grinding creates a concave bevel that minimizes the amount of metal you need to remove when honing.*

Strops, stones and wheels. *Neptune's sharpening system begins with a Baldor grinder and ends with super-fine oilstones and leather strops.*

Pros

Oilstones wear slowly and evenly; hollow-grinding removes nicks quickly and minimizes honing time.

Cons

It takes practice to hone freehand, without a honing guide; oilstones don't cut aggressively.

Components and costs*

- Baldor 7-in. low-speed (1,750-rpm) grinder with 80- and 120-grit wheels *$280*
- Norton India combination coarse/fine oilstone *$20*
- Norton hard white Arkansas "select" stone *$60*
- Honing oil *$3*
- Leather strop *$2 to $5*
  Available from shoe repair shops or leather crafters.
- White rouge abrasive compound for strop *$5*

Total cost:. $370

Optional equipment

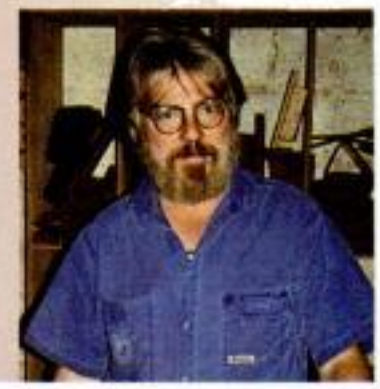
- 325-grit DMT precision diamond stone, 12 in. *$80*

**Approximate costs, based on current mail-order prices.*

TOP AND BOTTOM PHOTOS BY LANCE PATTERSON. CENTER PHOTO BY JOHN HAMEL

Lapping and Sharpening Plates

by Barry Biesanz



Barry Biesanz runs a professional woodshop in Belo Horizonte, Costa Rica.

The system of lapping plates and abrasive compounds from Harris Tools has worked very well in our shop. After nearly two years of constant use, the lapping plates are still flat, and we've only had to replace one 1.5-ounce bottle of silicon carbide abrasive.

The basic sharpening system consists of two 3-in. by 8-in. cast-iron plates (one grooved and one smooth), an aluminum holding tray and four different abrasive compounds. Each plate is ground flat on both sides—to a tolerance of 0.0002 in. The steel used to make the plates is just soft enough so that abrasive particles will embed themselves in the lapping surface. When you lap or sharpen, the tool bears on the embedded particles, not on the plate itself. When properly "charged" with abrasive, the plates cut quickly and don't wear. Only one abrasive grade can be used on each lapping surface, but the two plates provide a total of four surfaces on which to sharpen. Additional plates are available.

With a new chisel or plane iron, I first flatten the back on the grooved plate, working on the coarsest side—the one charged with 280-grit silicon carbide. The grooves on this plate help to carry away the extra swarf (abraded metal) made by the coarser particles. I move from the 280-grit side to the 600-grit side, and finish lapping the back on the smooth plate charged with 10-micron diamonds. I don't look for a polish on the back, just for a uniform gray color that indicates a flat surface.

To sharpen the bevel, I can go all the way back to 280 grit if the edge is extremely dull. I still use our motorized grinder to grind out nicks, but I don't like to hollow-grind chisels or plane irons because it leaves less metal behind the cutting edge. We often need the extra strength of a flat bevel when chopping into tropical hardwoods.

Honing the edge on the 10-micron plate will give me an edge that's sharp enough for most work. For a sharper edge, I hone and back off the blade on the 5-micron side of the smooth lapping plate. Harris also offers an even finer diamond paste, but I haven't had the need to use it yet. (See Optional Equipment, right.)

The Harris system does require some special treatment to perform perfectly. Periodically it's necessary to "recharge" a lapping plate, when abrasive particles work free of the surface or become worn.

Lapping the back. *Working on the coarse grooved plate, Biesanz applies even pressure over the back of the chisel to make it flat.*

Plates, powder and diamond paste. *Charging the flat iron plates with abrasives makes them work like sharpening stones. The syringes hold diamond paste; silicon carbide powder comes in vials.*

It's important to protect each lapping surface from being contaminated with other grits. When you switch from one grit lapping surface to another, you have to wipe the blade clean so you don't carry a coarser grit onto a finer abrasive surface. And the plates should be stored so lapping surfaces don't contact each other. These precautions haven't caused any problems in our shop. ▲

Pros

No motorized grinder required; lapping plates will stay flat indefinitely.

Cons

Initial expense is high; plates must be stored carefully to avoid contamination.

Components and costs*

Harris Lapping System:

◆ Two 3-in. x 8-in. lapping plates—
Grooved *$79*
Smooth *$61*

◆ Aluminum holding tray *$39*

◆ Silicon carbide abrasive—
280 grit, 1.5 oz. *$3*
600 grit, 1.5 oz. *$3*

◆ Diamond abrasive—
10 micron, 1/6 oz. *$21*
3 micron, 1/6 oz. *$18*

◆ Sharpening oil for use with silicon carbide, 4 oz. *$3*

Special system cost . . $190

Optional equipment

◆ Silicon carbide abrasive, 80 grit, 1.5 oz. *$3*

◆ Diamond abrasive, 1 micron, 1/6 oz. *$15*

**Approximate costs, based on current mail-order prices. For U.S. distributors of Harris Tool products, call: (800) 449-7747.*

TOP AND CENTER PHOTOS BY HARRY FRIEDLANDER. BOTTOM PHOTO BY DAVE SILLERS

Sharpening with Diamonds

by Patrick Spielman

Patrick Spielman's latest book is The Art of the Lathe (1995, Sterling Publishing Co. Inc., 387 Park Ave. S., New York, NY 10016).

I've been using diamond sharpening stones for about eight years now. I use them for sharpening everything, including carbide router bits. Even when I get an occasional nick in a chisel edge, I can "grind" it out manually on my extra-coarse diamond stone. The diamond abrasive particles embedded in these stones cut remarkably fast and there's no danger of overheating a thin edge, which is easy to do on a powered grinding wheel.

You can use diamond stones without any lubricant, but I prefer to add a little water. Never dry-sharpen carbide because this can produce cobalt dust, which is toxic. (Cobalt is a binder used in carbide.) Because these stones cut aggressively, I wipe them clean frequently to remove abraded metal. Squirt on a fresh bead of water and you're ready to continue sharpening. Avoid using tools covered in oil or resin on diamond surfaces, because this will clog up the stone. Diamond stones can be cleaned with household scouring powder; you can even scrub them clean with a fine wire brush.

Avoid sharpening on coarse diamond stones if you can. Diamonds are sharper and harder than other abrasive particles, so they tend to make deeper scratches. If you start with a coarse stone—a 220 or 325 grit—you'll need to move through each successively finer grit to remove scratches and refine the edge. With practice, you'll get a feel for what grit to use when.

With a new chisel, I usually start to flatten the back on the 325-grit stone. Then I move up to the 600-grit stone, followed by the 1,200-grit stone.

To sharpen the bevel, I use a simple honing guide—an inexpensive, adjustable guide designed to roll on the sharpening stone while maintaining a constant bevel angle. A simple shop-made jig enables me to quickly position the guide on the chisel or plane iron and obtain the proper bevel angle.

With a new chisel or plane iron, I'll often start sharpening the bevel on the 600-grit stone, and then move to the 1,200-grit stone after a couple of minutes. Taking long, straight, moderately light strokes is the best way to remove material quickly and evenly on these stones. After honing the bevel on each stone, I rub the back flat on the stone to remove any wire edge that may have resulted from honing the bevel.

My extra-fine green stone (1,200 grit) will give me a very good edge that's functionally sharp. To get that extra level of sharpness, I turn from diamonds to dust—or, more exactly, jeweler's rouge that's spread on a leather strop. I'm still using a chunk of the super-fine rouge that I bought a number of years ago. Today, you can buy it in tubes, sticks or chunks. I rub the rouge onto a length of thick, flat leather and use this charged surface to hone the final mirror finish on the bevel. I also rub the back flat, just as I did on the stones. ▲

Leather work. *A few strokes on a leather strop gets Spielman the final edge when he's done with diamonds.*

Four stones and a strop. *Diamond stones are color coded by grit. A water bottle, paper towels and a bevel-setting jig complete the kit.*

Pros

Diamond stones stay flat and sharp longer than other stones and cut more aggressively; they'll also sharpen carbide.

Cons

Diamond stones are expensive; the finest diamond stone won't get you to the final edge.

Components and costs*

◆ Four DMT diamond stones, 2 5/8 in. x 8 in., wooden box included—
220 grit, extra coarse (black)
325 grit, coarse (blue)
600 grit, fine (red)
1,200 grit, extra fine (green)

Individual price:** *$62.50*
Set of all four: *$250*

◆ Honing guide *$8.50*

◆ Red jeweler's rouge, 3.5-oz. tube *$6*

◆ Leather strop *$2 to $5*
Available from shoe repair shops or leather crafters.

Total cost. $266.50

**Approximate costs, based on current mail-order prices.*

***2-in. x 6-in. stones are available for about $40 ea.*

TOP PHOTO BY JOHN HAMEL. CENTER AND BOTTOM PHOTOS BY MOONLIGHT PHOTOGRAPHY LTD

Designing Solid-Wood Corner Joints

The main issues are scale and economy, not strength

by Ian J. Kirby and John Kelsey

Case joints or corner joints make boxes and containers. Whereas edge joints make a flat plane of wood, and rail joints make a square frame, case joints enclose a volume of space. Thus a solid-wood case joint is fundamentally unique, from both a visual point of view and a technical one.

With rail joints (see AW #51) strength is the key issue, because the table, chair or bed will have to support the weight of people sitting on it and leaning against it. We struggle to avoid weakness by balancing the amount of wood between the two parts of the joint.

With case joints, strength usually is not the main issue: The typical piece of case furniture spends its working life standing still, supporting its own weight plus whatever you store inside it. Such common corner joints as dovetails and box joints have more than enough interlocking wood and gluing area to resist static loads. Racking stress can become a problem in large cases, but interior dividers will add stiffness, as will a frame-and-panel or plywood back.

The universe of corner joints can be organized into three broad families: transom joints, through joints, and overlapped joints, as shown in Fig. 1.

Transom joints make flush corners, with the end grain of one piece showing as an unbroken rectangle of wood. The actual connection—biscuits, blind dowels or a stopped tongue—is hidden from view.

Through joints also make flush corners, but the parts penetrate one another, like dovetails and box joints. The visible connection creates a strong pattern of end grain on both faces. As shown at left and in Fig. 7, the through joint may also be made with inserted fingers of wood.

Overlapped joints make a T, with one piece offset from the end of the other. The offset, which can be arranged horizontally or vertically, introduces new structural and visual possibilities, such as housed-and-wedged through twin tenons, shown in Fig. 6.

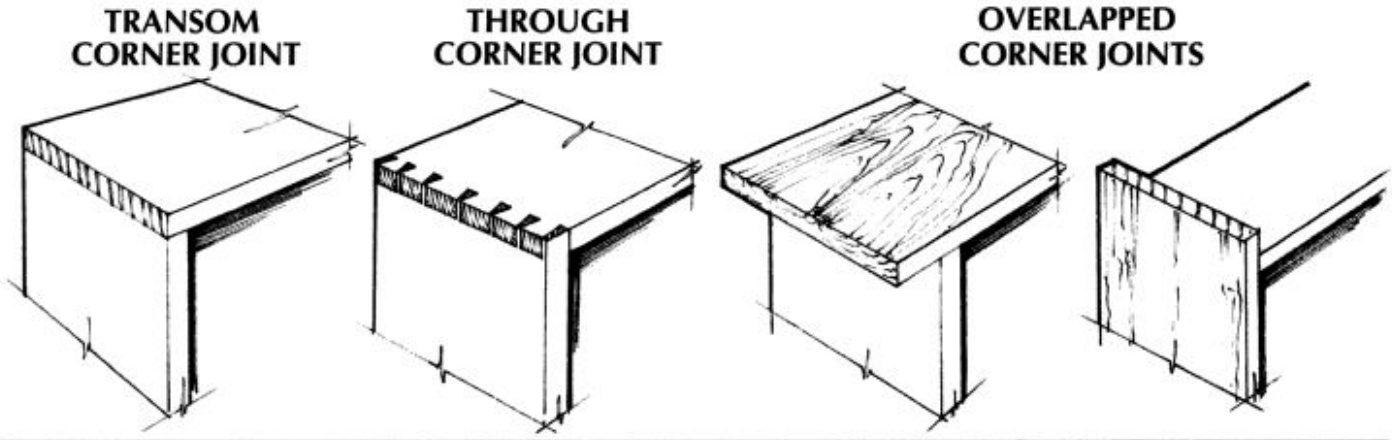
Stitched together. *Loose fingers of Gabon ebony build a strong pattern into the corner joint of this wall-hung jewelry case.*

PHOTO BY JOHN HAMEL

EDITOR'S NOTE

This article is the third in a series on joint design. The fourth article will discuss joints in man-made materials.

FIG. 1: CORNER JOINTS



Rather than strength, the design issues are the scale of the case, how you want it to appear, and how much time it's worth to make—that is, economy.

How big is the box? Boxes and cases come in every conceivable size: wardrobes and armoires, chests, bedside cupboards, desks, drawers, and jewelry boxes. What looks good on one size of box does not necessarily scale up or down to another size. Very small boxes seem to come off best with splines or some other minimally visible joint. Medium-sized boxes often need the visual interest of through joinery. But the same visual detail gets lost on a very large box, which looks best with hidden joints or overlapped joints.

How valuable is the box, and how much time do you intend to spend making it? If you want the rich visual pattern of through dovetails, you've got to invest time. Every economic decision has visual consequences.

Transom Joints

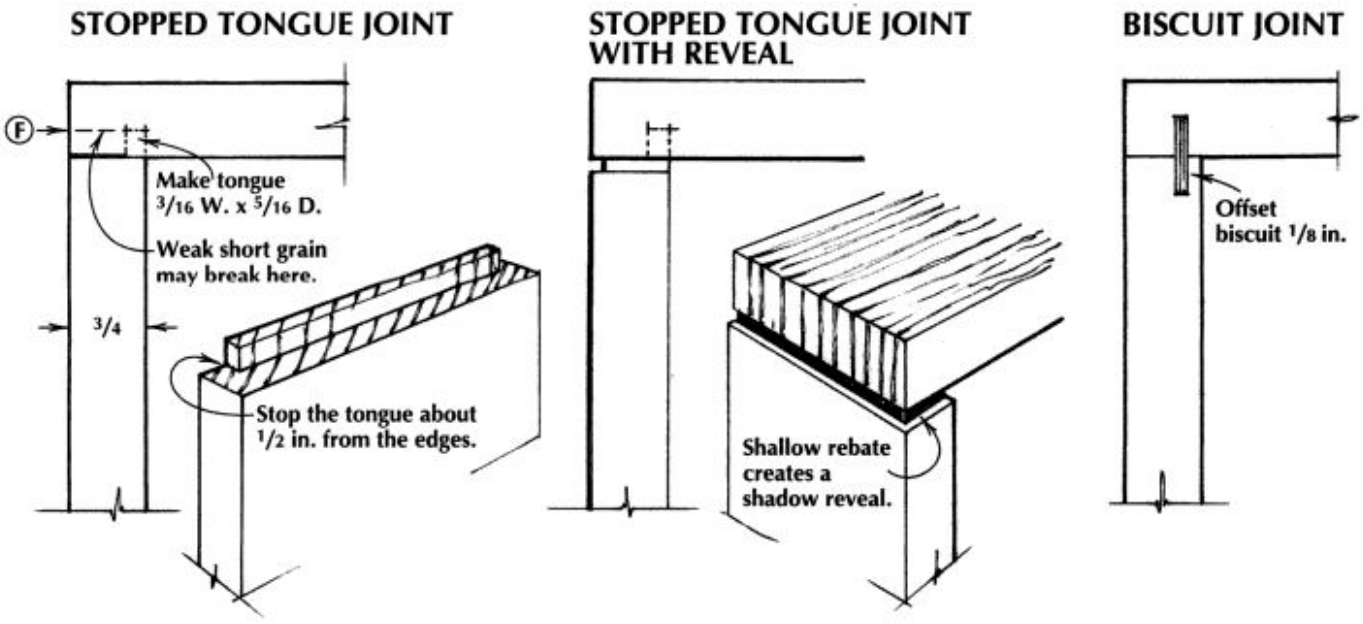
In the transom form of the joint, one piece of wood appears to butt neatly onto the other. The name comes from the transom created by door and window openings, where a horizontal rail sits atop two posts. In furniture, the end grain of the horizontal piece shows as a neat rectangle. The design relies on the simple architecture of the boards—that is, proportion—plus the color and quality of the wood itself. As you look closely at the corner, the wood's end-grain structure comes into view, adding detail to the composition. You can enrich it by choosing the orderly end grain of quartersawn material.

You can enhance the transom's rectangle by cutting a small rabbet around the end of the vertical part of the joint, as shown in Fig. 2. The rabbet creates a shadow reveal that separates the end-grain rectangle from the plane of the case side. This opens the door to experimentation with the whole world of moldings as devices for manipulating light and shadow. You could add a spot of color by painting the inside of the rabbet, or you could insert a slip of another wood, or perhaps a little molded bead.

One common way to make a transom is with a tongue-and-groove joint. The joint may be stopped or through, but either way it is the proportion of tongue to groove which needs your attention. In theory there is no useful gluing surface—the whole joint is face grain to end grain. In practice, you'll get

FIG. 2: TRANSOM CORNER JOINT

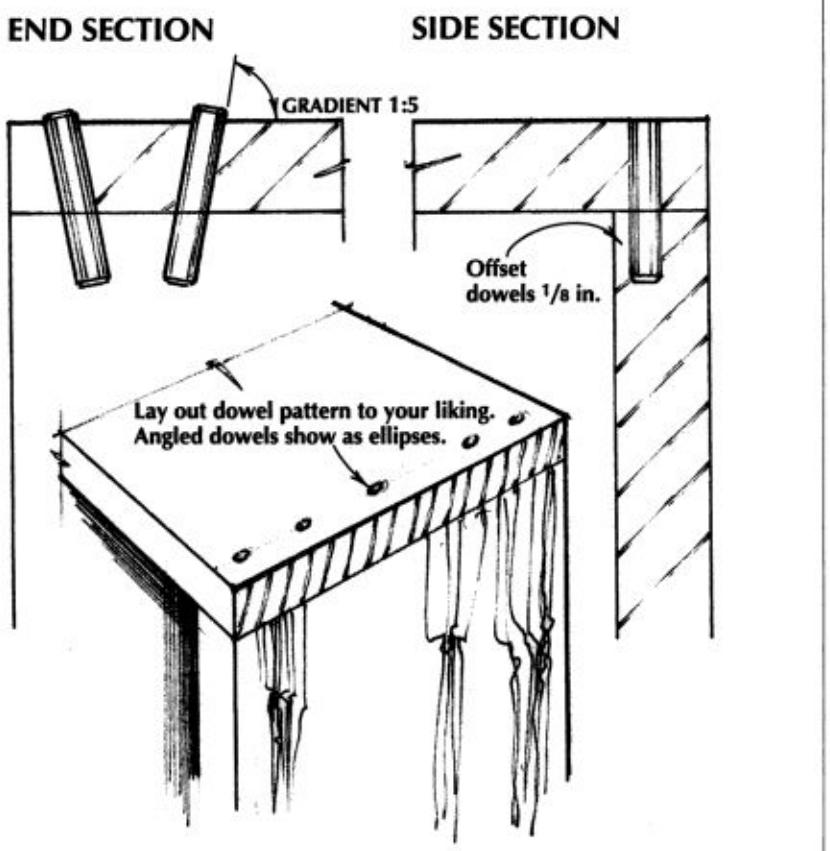
Make a transom joint with a stopped tongue or a row of biscuits.



ILLUSTRATIONS BY IAN J. KIRBY

FIG. 3: DOWELED TRANSOM JOINT

Through dowels can be straight or angled like dovetails.



a workable glue connection if you make parts that fit nicely together.

Proportion the joint as shown in Fig. 2. In 3/4-in. wood, make the tongue about 3/16 in. thick by 5/16 in. long. I always stop the joint 1/2 in. inside the edges of the wood, because I don't want to introduce a disruptive edge detail.

There's no risk of breaking a tongue of these proportions. The resulting groove depth, 5/16 in., is not going to weaken the board in thickness, though in thinner stock you might reduce the groove depth to about a third of the total thickness. The weak link is the 9/16-in. run of short grain between the groove and the end of the wood, shown at point F in Fig. 2. A thinner tongue improves the situation, but the lower limit is 1/8 in., the thickness of the saw kerf. Oddly enough, if the wood grain were to fail at point F, gluing it back together would make a stronger joint than you started with.

The tongue and groove is relatively weak and may seem most suitable for small boxes. However, a frame-and-panel back glued into a groove in the case sides, or a glued plywood back, gives the tongue-and-groove joint excellent resistance to racking and makes it appropriate at any scale. Large cases generally have interior dividers, which contribute stiffness and stability.

A plate, or biscuit, joint behaves like a tongue-and-groove joint, but the biscuits must be set back about 1/8 in. from the inside edge of the wood. Use the largest biscuits the wood thickness will allow, and set them almost end-to-end across the width of the wood. A double row won't help; it makes the short-grain problem worse.

Doweled transom joints are another option. (See Fig. 3.) To drill accurate holes in both pieces of wood, clamp them together and drill through both at once. The ends of the dowels contribute a pattern of circles to your design. You can angle the dowels like dovetails, creating a line of ellipses instead of circles.

In 3/4-in. stock, use 1/4-in. or 5/16-in. dowels. Set them inside the centerline of the end-grain piece, leaving a bare 1/8 in. from the dowel to the inside face. Put two dowels close together near the edges of the wood, then space them about 1 1/2 in. apart. Splined dowels grip better than the spiral-fluted variety, but don't use lengths of dowel rod, which is neither round nor uniform in size. While it's possible to install blind dowels, it's extremely difficult, and a stopped tongue produces an equivalent joint for a lot less trouble.

Through Joints

Through dovetails make the strongest possible corner joint, but the real reason for making them is visual interest. Dovetails leave no doubt that the two pieces of wood are, in fact, joined and not just sitting there. They create a detail that comes into focus as you approach the furniture, and they lead your eye across the corner.

Dovetail design has two parts to it, the *gradient* (angle) of the tail, and the layout of the pins and tails. The joint gets its strength from the mechanical interlock, as well as from total glue area. When designing with dovetails, it's easy to focus on the interesting pattern created by the faces of the tails and the ends of the pins. But as shown in Fig. 4, you're simultaneously working with the pattern of rectangles on the adjacent surface. Change one and you change the other.

The traditional joint has narrow pins and broad tails, with the tails cut in the horizontal piece of wood. There's no technical reason why this is so. You can design a joint with tails larger than the pins, with both elements the same size, or with pins larger than the tails. However, as you experiment with these proportions, there's one fatal condition, and that's when the base of the tail becomes extremely narrow and fragile. The opposite is *not* true—a fine pin nevertheless widens to a relatively broad base. In the best English work, the pins taper to the thickness of a dovetail saw kerf. They're elegant, and strong enough.

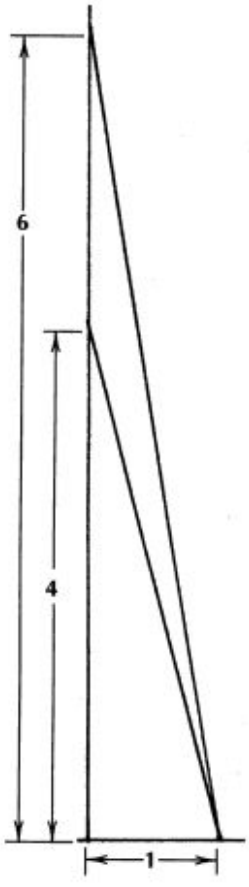
If the gradient, or slope, is too shallow, you'll have short grain in the tails, which is liable to split off during assembly. On the other hand, the slope can be as steep or quick as you like, right up to a slope of zero, which is a box joint. For each of us there is a slope that looks right; for me it between 4:1 and 6:1, as shown in Fig. 4. Despite a lot of waffle in old books about different angles for hardwood and softwood, it really doesn't make any difference.

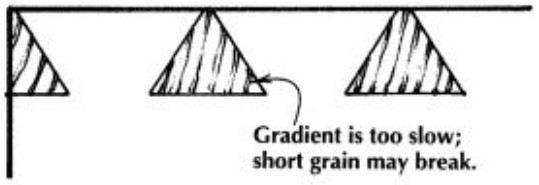
The spacing between the pins and tails is entirely visual, except at the edges of the wood. It's usual to lay out with several narrow tails toward the edges. This creates extra glue area, the better to resist both racking stress and the wood's

FIG. 4: THROUGH-DOVETAIL CORNER JOINT

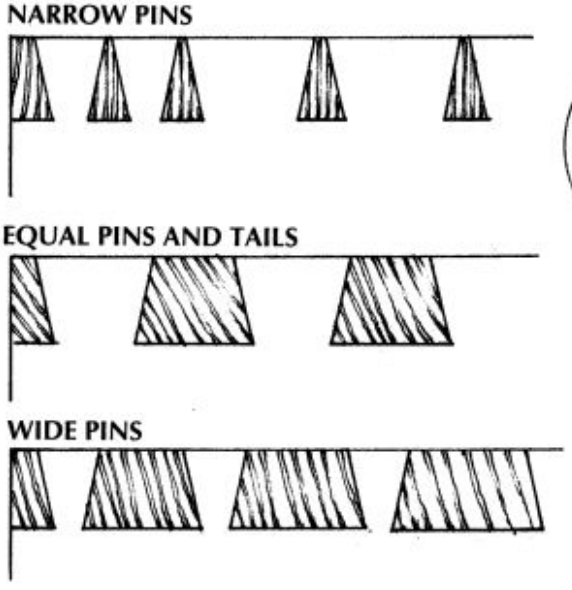
When making through dovetails, you can vary the gradient, pin and tail size, edge detail and spacing.

GRADIENT

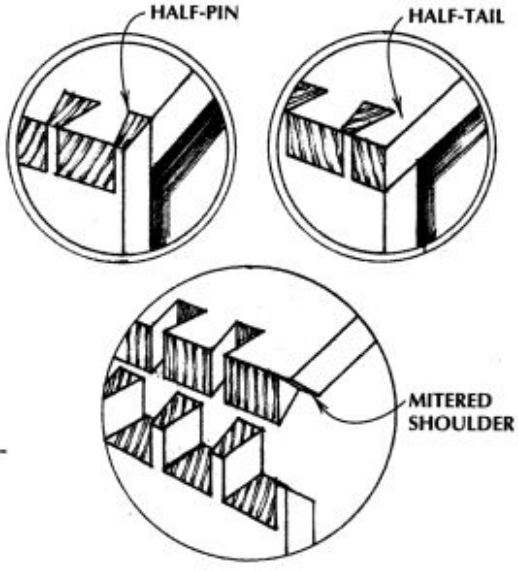




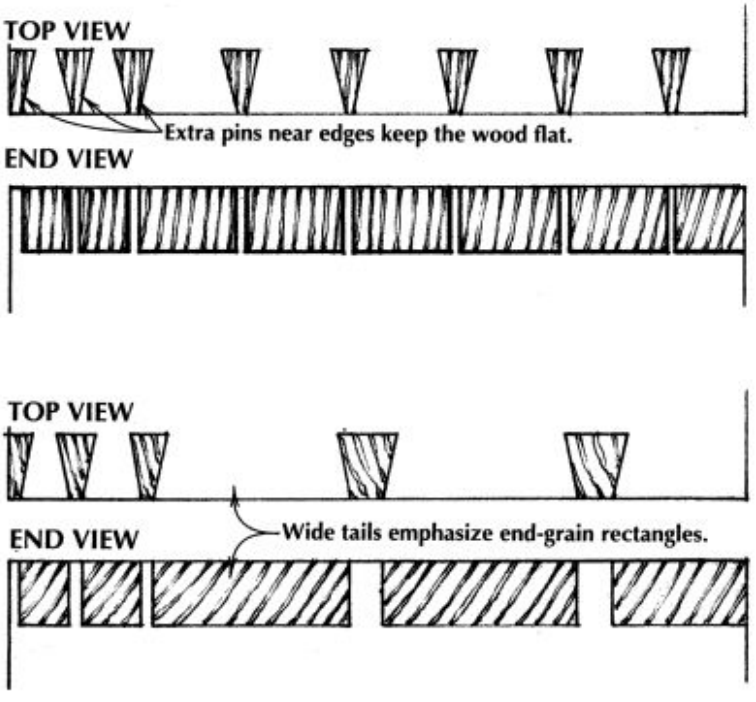
PIN AND TAIL SIZE



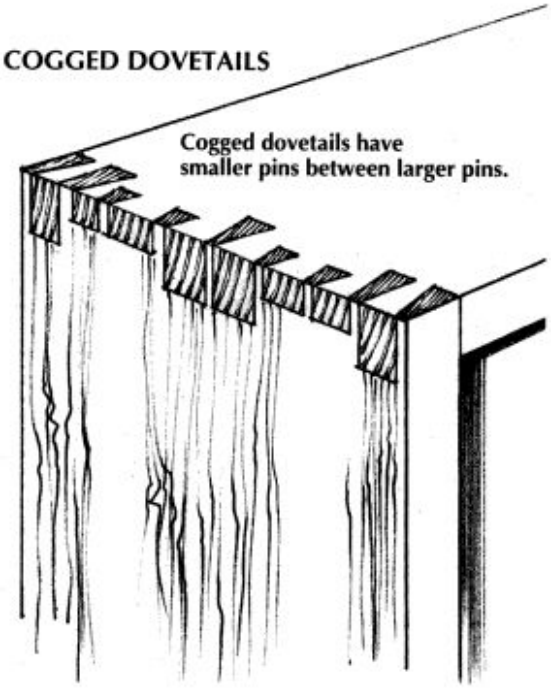
EDGE DETAILS



SPACING



COGGED DOVETAILS



tendency to cup. The joint usually begins with a half-pin, though you could make a half-tail if you thought it looked better, as shown in Fig. 4. Either way, that first bit of wood tends to bend outward when you glue up, so put a clamp across the width to retain it. If you really want to call attention to the corner joint, try cogged dovetails, where smaller pins fill the tails between larger pins, also shown in Fig. 4. Once you start down this path, there's no end to the variations you can try.

Most of what's been said about the dovetail joint applies to the box joint. (See Fig. 5.) You must pay attention to all the same factors of size, spacing, proportion and detailing. The box joint doesn't benefit from the wedging effect of dovetails, but it has so much good gluing area that strength is not an issue. Visually, the box joint is quite different from the dovetail. It speaks of machine production, whereas the dovetail suggests hand work even though it may have been routed. A box joint with equally spaced fingers has a certain spare elegance. You can soften the joint's severity by varying proportions and spacing.

Overlapped Joints

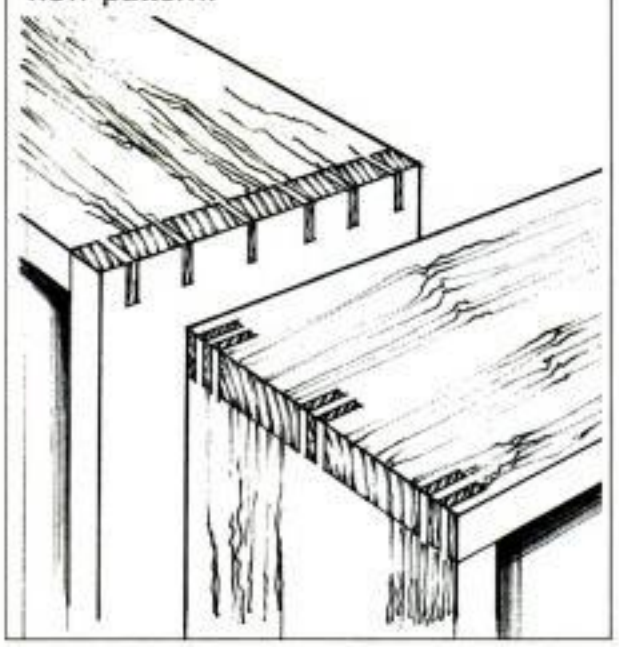
When you overlap one piece with the other, making a T configuration, you eliminate the short-grain problem of the transom joint. You get a design element, the overhang, to exploit. And you get the technical opportunity to design a very strong mortise-and-tenon joint. This construction was characteristic of Arts and Crafts furniture.

You can make this joint with a tongue, with biscuits, or with dowels. But the best method uses pairs of twin tenons. (See Fig. 6.) The tenons don't need shoulders, but for maximum strength they should be made through and wedged, and there should be a shallow housing between each pair of tenons. The housing helps the construction resist racking and takes all downward loading off those little tenons. This design is strong enough to support art books, LP records, or engine parts.

To stay in control of dimensions and proportions, make a full-size drawing. Locate the first tenon at least 1/2 in. from the edge of the wood. After that the spacing is up to you. In 3/4-in. and 7/8-in. wood, I generally make pairs of 3/8-in. tenons with a 3/8-in. space. You can make sets of more than two tenons if you like, and you can space two, three

FIG. 5: BOX JOINT

Box-joint fingers can be uniformly spaced or they can create a new pattern.



or more sets of tenons across the width of the wood. If there's any risk of cupping, a set of tenons in the center of the joint will pull the wood flat.

Make the housing 1/8 in. to 3/16 in. deep, with no shoulder. If you stop the tenons, take them to within 3/16 in. of the outside face. Through tenons show as an elegant row of end-grain rectangles. Proportion and space the rectangles for the visual effect you want. Don't forget to include the wedges in your design.

The slope of the wedges should be about 1:8 and they should be set 1/8 in. down from the narrow face of the tenon. Cut the corresponding slope in the end grain of the mortises, so the tenon has a place to go—there's no crushed wood in a correctly made joint. There are actually very few choices: The wedges have to exert pressure on the end grain of the mortises, not on their sides; the wedges have to be close to the faces of the tenons, or the wood will split instead of bending. A single wedge on center, or set diagonally into the tenon, will not make a strong joint. The wedges can be sawn from the same wood as the tenons, which makes them disappear from view, or from a contrasting species, which makes a visual feature out of them.

A case built with overlapped sides or ends is not only strong, it's also rich with visual opportunities. To avoid short-grain weakness, the overlap shouldn't be less than an inch, and it can be as large as you like. When the overlap runs vertically, it makes an enclosure, or gallery, atop the case, a common feature on vanities, desks and bookcases. The Arts and Crafts designers were fond of tables and bureaus with a horizontal overlap. They typically cut a broad chamfer on the underside of the top, making it seem to lift off the case and float. The edges of the overlap can be molded, inlaid, or carved.

Loose Finger Joint

Just as you can use a loose tenon to make a rail joint, you can use loose fingers to make a through carcase joint, as shown in Fig. 7. The joint is equivalent to a box joint, except you cut matching slots in both pieces, then glue up the joint with inserted fingers of wood. The loose-finger joint is strong, you can make it on the tablesaw, and it gives you a large and flexible pattern vocabulary.

To make the joint, you need a crosscut fixture on your saw, which can be as simple as a square plywood sled with a tall fence to hold the wood up on end. Rip finger stock off the edge of a board, but experiment to get exactly the right thickness. The inserted fingers should slide home with hand pressure. Glue the fingers into the long-grain side of the joint and plane the surfaces flush before you assemble the other piece.

Loose fingers offer infinite visual possibilities. You can vary their length, thickness and spacing. They can be terminated by other inlaid shapes, such as squares, diamonds or circles. To make a circle, for example, drill a hole and insert a plug into the case side at the end of the finger slot. (See Fig. 7.) Fingers can be made of the same wood as the case, or they can be a contrasting color. They can go as far as you like into the wood, and you can extend the pattern around the corner by making a decorative set of fingers and slots in the second piece of wood. You owe it to yourself to try this joint; you'll soon see its enormous potential for expressive design. ▲

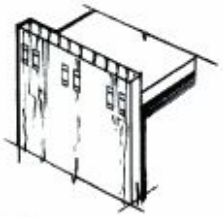
IAN J. KIRBY *is a furniture designer, woodworker and teacher with studios in Connecticut.*

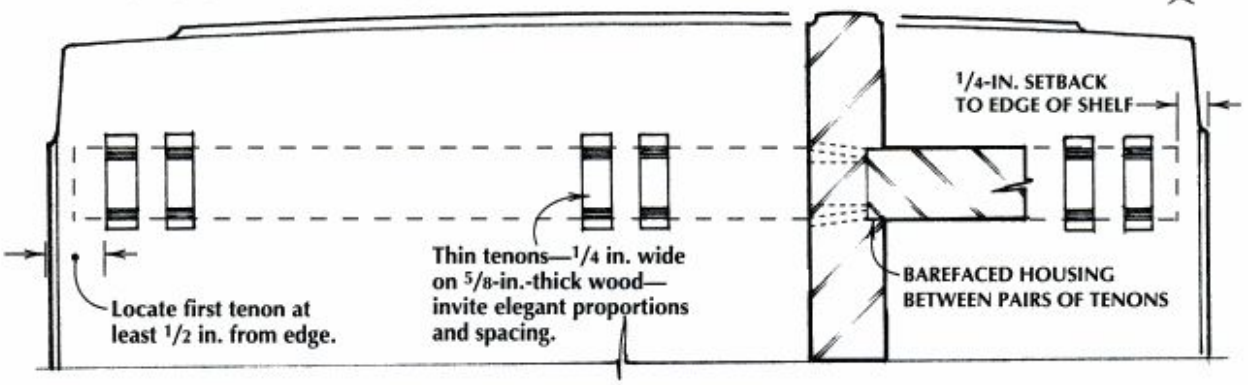
JOHN KELSEY *is a writer and occasional woodworker in Connecticut.*

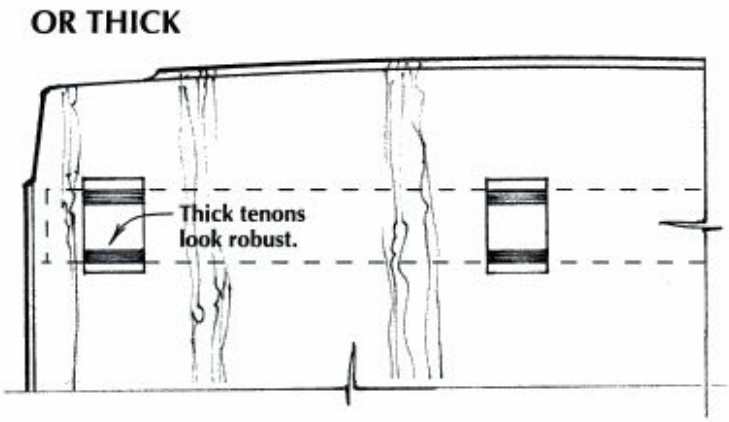
Their new book, Making Joints, will be published by Rodale Press this year.

FIG. 6: OVERLAPPED CORNER JOINT

Through-wedged tenons connect the parts of the overlapped joint.
To add visual impact, the overlap can be molded, chamfered and shaped.







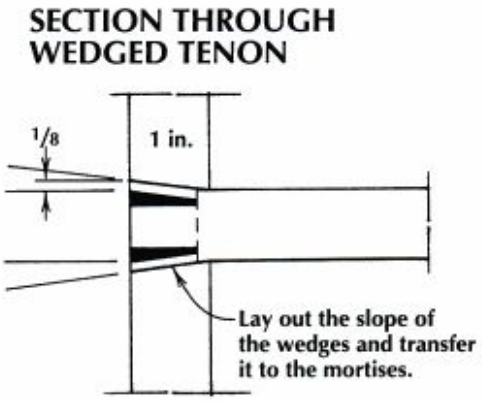
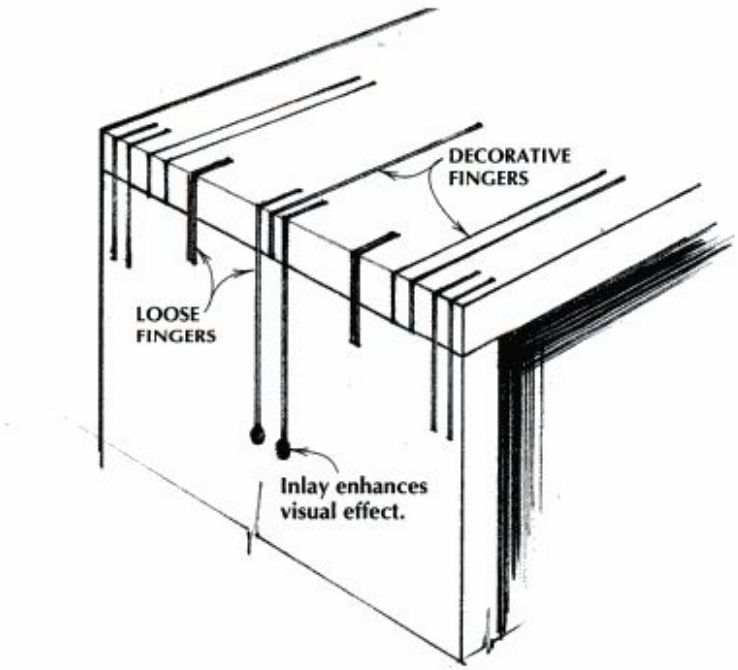


FIG. 7: LOOSE-FINGER CORNER JOINT

Make loose fingers from a contrasting wood, and glue them into mating sets of slots.
Create patterns and manipulate proportions by varying the length, width and spacing of the fingers.



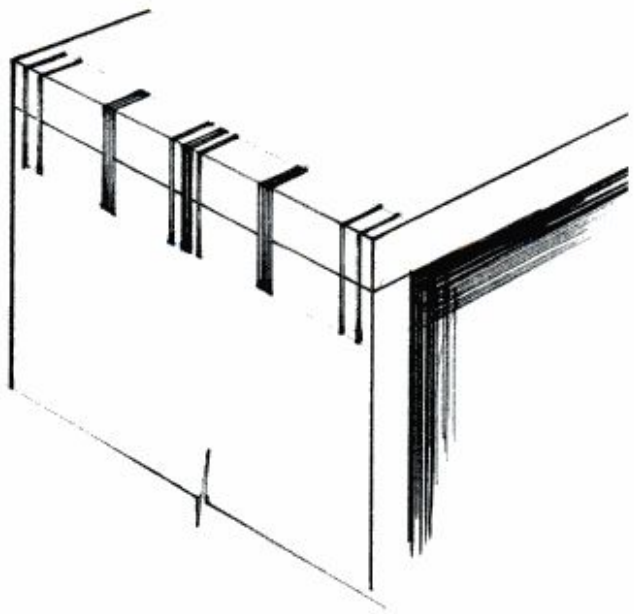


PHOTO BY BILL TIERNAN

Rocking Rabbit

Carve a toy your child will never forget

by Voicu Marian

When our boy Johnny was born, I started entertaining the idea of carving a rocking horse for him. As he grew, though, I changed my mind. Johnny's personality began to remind me more and more of a certain Beatrix Potter character who—driven by curiosity—was always up to something and often in trouble: Peter Rabbit. So I decided to make a rocking rabbit that would look as if it were fleeing from Mr. McGregor's garden.

I carved the rabbit from catalpa wood, dyed and painted some details, and mounted the body with iron pipes and flanges to an ash rocker assembly. (See Fig. 1.) Pipes welded to a metal ball create the handlebars. This piece was fun to make and should last for generations. In this article I'll tell you how I did it, so you can build one for your own little mischief-maker.

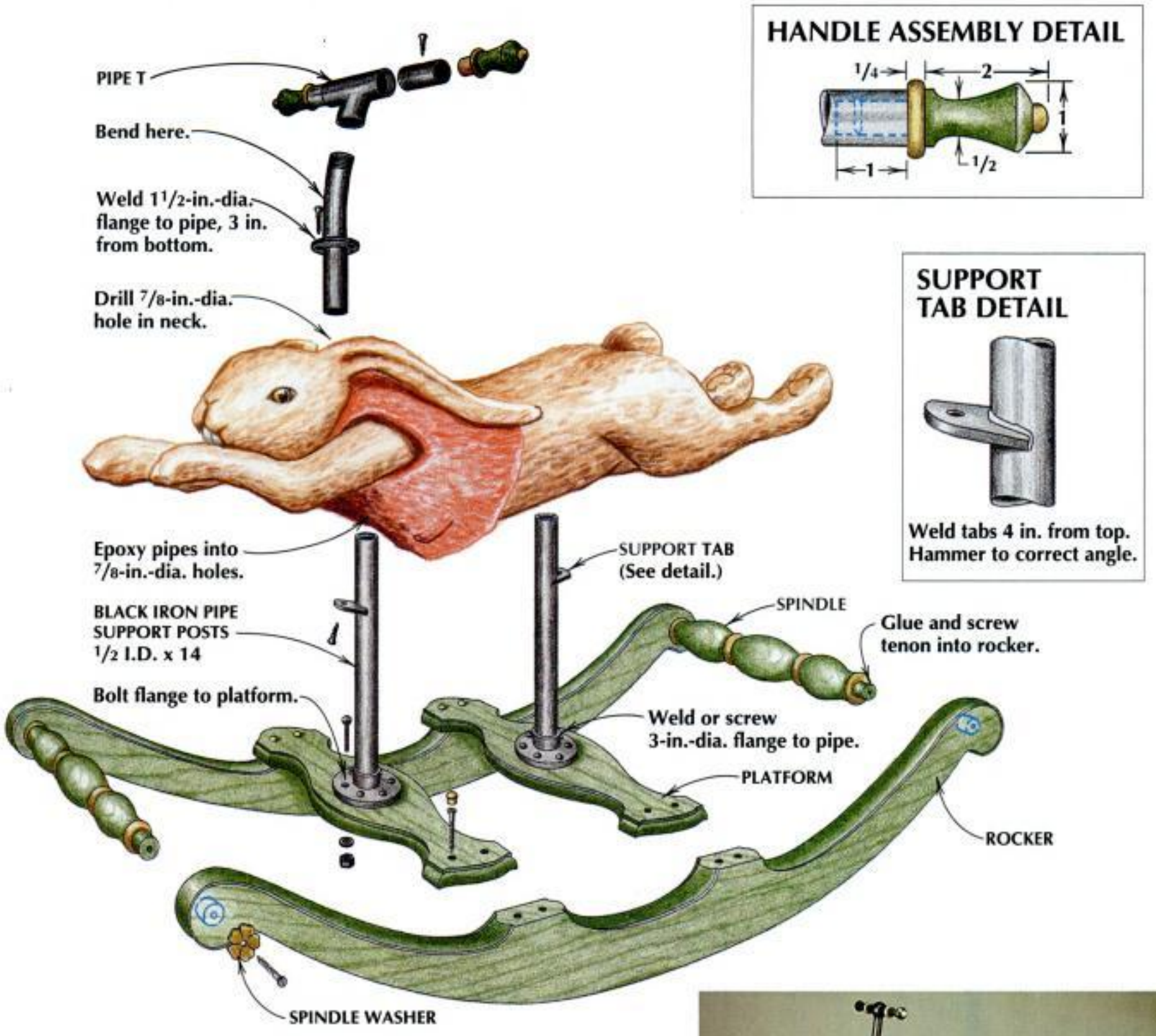
Making the Carving Blank

After drawing the full-size rabbit on paper, complete with details, I set about making the carving blank.

I wanted to use a wood with a nice grain, since I didn't want to paint the entire rabbit. Although butternut would have been my first choice, I settled for catalpa because I had it on hand. Except for a greenish-gray tint, it resembles butternut fairly closely. If I had wanted to paint the entire piece, I probably would have opted for basswood, a traditional carving wood that is easy to work and almost devoid of visible grain.

To get the thickness I needed for the rabbit, I glued up two pieces of 16/4 stock that I had on hand. Laminating the blank from only two pieces results in a single glue line, minimizing the breaks in grain pattern.

FIG. 1: ROCKING RABBIT



HANDLE ASSEMBLY DETAIL

SUPPORT TAB DETAIL

Weld tabs 4 in. from top. Hammer to correct angle.

PHOTOS BY VOICU MARIAN. ILLUSTRATIONS BY MELANIE POWELL

I normally glue up a carving blank before bandsawing out the design. In this case, however, because of my bandsaw's limited 6-in. capacity, I had to saw the design from the two pieces before laminating them together. Before cutting the rabbit's shape in each piece, though, I oriented the grain direction for proper glue-up.

Before gluing up boards for carving, it's important to match them carefully for consistent color and grain orientation. Otherwise, you'll create a distracting appearance and, while carving, you'll have to change the direction of your cut along glue lines. To determine grain direction, I shave the edge of each piece with a hand plane.

I transferred the side pattern of the rabbit (see Fig. 2) to each piece using a pounce wheel (available from Lee Valley Tools, 12 E. River St., Ogdensburg, NY 13669, 800-871-8158). This star-shaped wheel transfers an outline by poking through the drawing right into the wood.

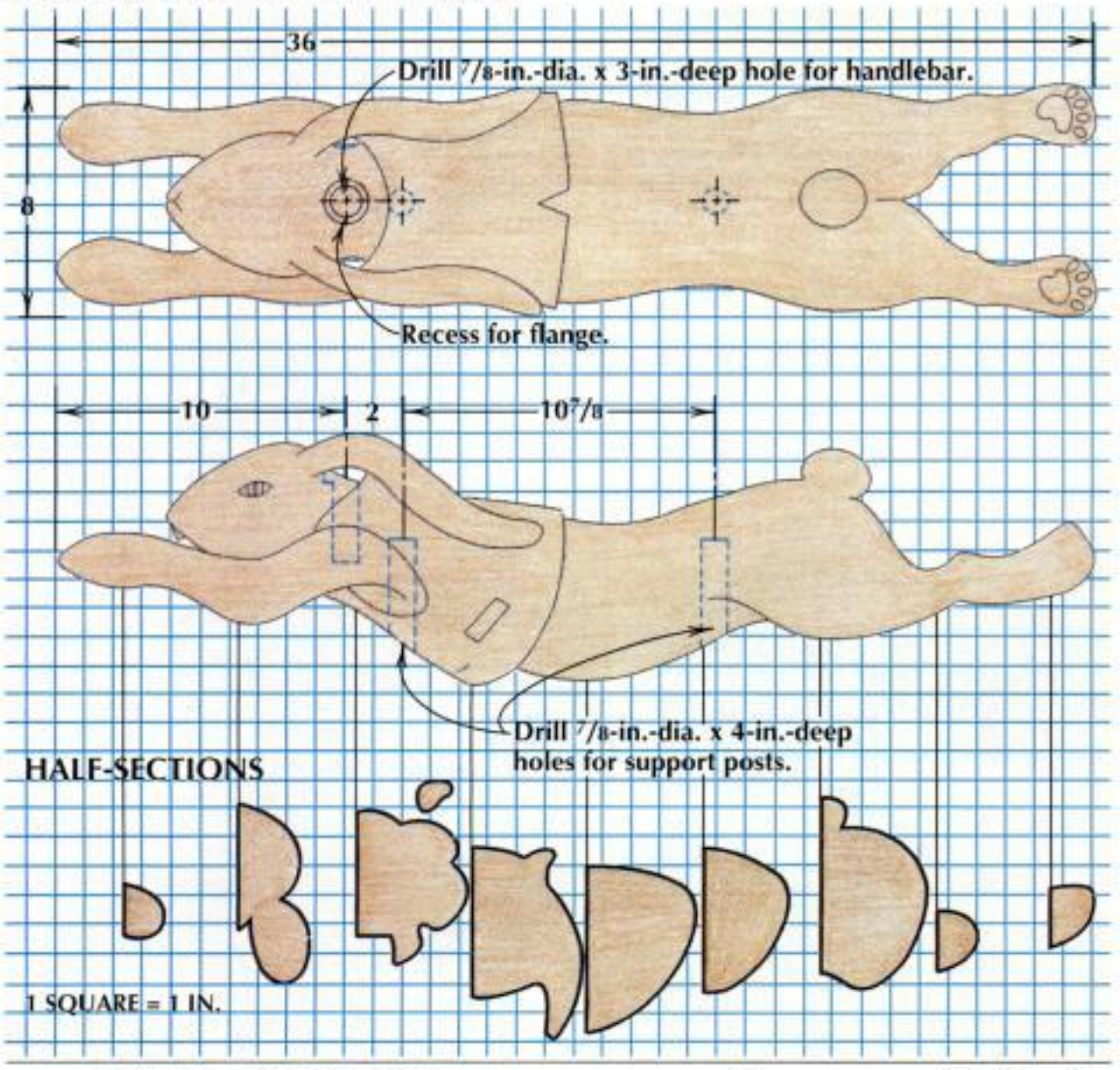
After bandsawing the two side profiles (see left photo, page 46), I laminated them together with yellow glue and plenty of clamps. I used large, deep-throat bar clamps to reach to the center of the blank, and I let the glue dry overnight.

A hare-racing adventure. *Inspired by a fleet-footed storybook character, Marian made a rocking rabbit from catalpa, ash and iron pipe.*

After the glue was dry, I bandsawed the waste between the rabbit's legs. To lay out this cut, I made a top-view pattern of the legs (see Fig. 2) and transferred it onto the blank, positioning the pattern along a centerline. I also reattached the offcuts to the bottom of the carving blank with tape, to steady it and level it for sawing.

Before carving, I drilled the holes for the handlebar and support posts on a drill press. (See Fig. 2 for hole spacing.) Here again, I reattached the offcuts to level the blank for drilling.

FIG 2: RABBIT PATTERNS



Carving the Rabbit

I still carve the traditional way: with a drawknife, gouges and a mallet. While this method is slower than using power tools, it does have advantages. Because the finished shape is only in my imagination, I'm dealing with what I call "mushy" contours. As the carving progresses, I reestablish and refine these contours as I become more familiar with the grain direction and how it responds to my tools. I doubt a chainsaw or grinder would allow that.

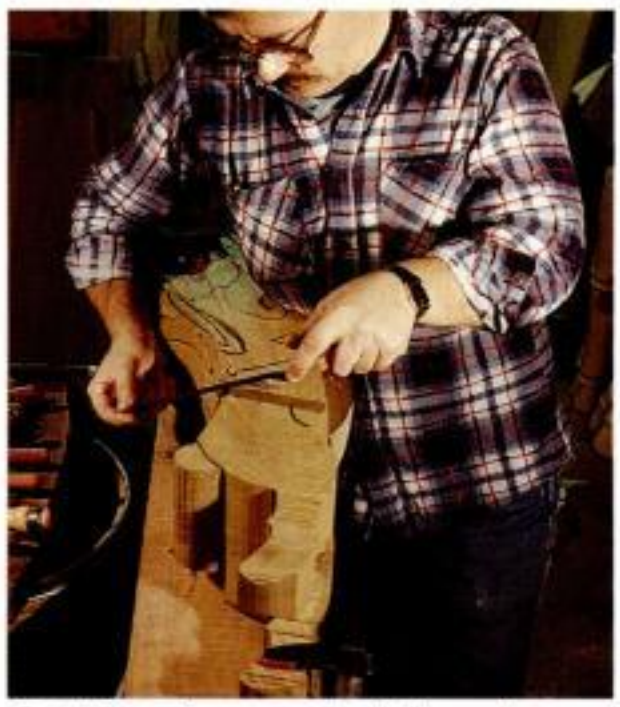
My carving bench consists of a heavy plank laid across a couple of sawhorses. Initially, I use bar clamps to fasten the work to the plank. Once I have carved away all the flat clamping surfaces on a workpiece, I put it on carpet scraps in a pair of V-notched "saddles" and web-clamp it to the plank. (See bottom right photo, opposite page.) Each saddle is made from a couple of 2x4s glued together. The carpet protects the wood from getting marred.

To remove waste from the rabbit quickly, I began with a drawknife (see center photo, below) and an adze to bring the wood down to within about 1/2 in. of my intended finished surface. Then I switched to a mallet and a 30mm #8 gouge to start defining the features. (See right photo, below.) I judged the symmetry of the carving by eye, but you can use templates to help you. Just make negative patterns of stiff mat board from the half-sections in Fig. 2 and hold them against the carving as you progress.

I worked at an even pace over the entire surface, which enabled me to develop the piece as a whole. As the rabbit approached its finished shape, I switched to smaller gouges, using a 10mm #8 and a 10mm #7 to create the finished texture. At this point, I carved by hand without the mallet, with my right hand applying the pressure on the chisel while my left hand directed it. (See left photo, opposite page.) Because these gouge marks were left as surface treatment, I made each cut carefully, paying close attention to the direction of the grain. I used a small carving knife for shaping such details as the eyes, nose and mouth. (See right photo, opposite page.) A V-shaped parting tool comes in handy for undercutting the areas around

Shaping the Rabbit

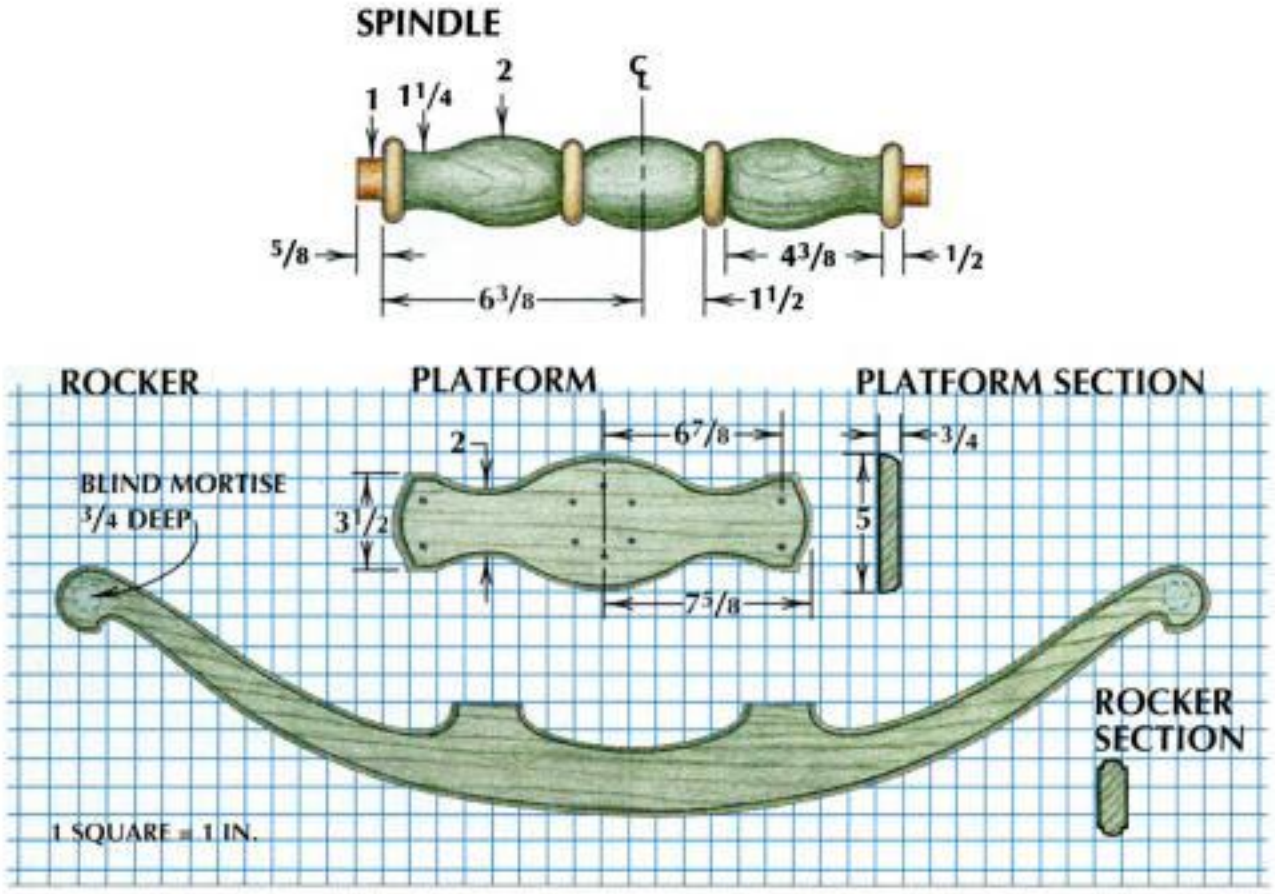
Cutting the profile. *After transferring the side pattern to two blocks of 16/4 stock, the author cuts each piece out, then glues them together.*



Quick stock removal. *Using a drawknife, Marian rounds over corners and starts to define the general shape of the rabbit.*

Roughing out. *With the work clamped to a heavy plank, Marian begins to rough out the rabbit's features, using a mallet and a 30mm #8 gouge.*

FIG. 3: ROCKER PATTERNS



the ears, shoulders and vest armholes.

I can't emphasize enough the importance of sharp carving tools. A properly sharpened and honed tool will lift up shavings almost effortlessly, leaving behind a clean, shiny surface that requires no sanding. (For more on sharpening carving tools, see AW #8.)

Making the Rocker Assembly

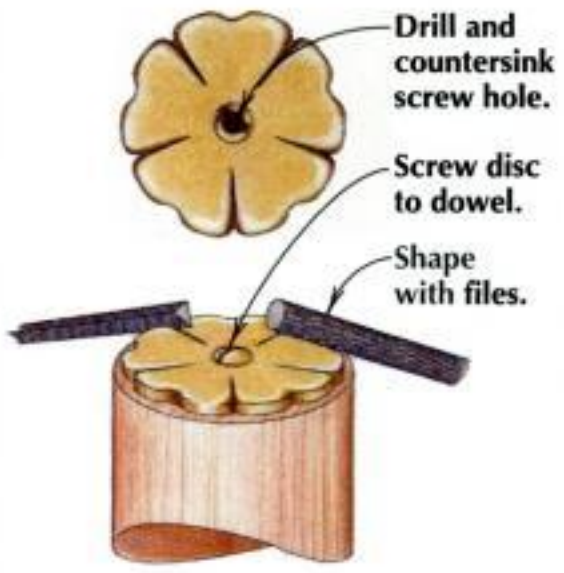
The rocker assembly consists of two rockers connected by two platforms and two spindles. (See Fig. 1.) The "nose" on the ends of each rocker acts as a brake, preventing the rabbit from tipping over should a child ride it too hard. I used ash for the rocker assembly—a tough wood that displays distinct grain even after painting.

I laid out the rocker parts as shown in Fig. 3. I cut them out on the bandsaw, sanded the saw marks, then routed both edges of the rockers and the top edges of the platforms.

I made decorative brass washers to attach the spindles to the rockers. (See Figs. 1 and 4.) I laid out the pattern with dividers, cut out a disc and screwed it to a 1¼-in.-dia. dowel clamped in a vise. I shaped the petals with round and triangular files, then gave the washers a coat of lacquer.

FIG. 4: MAKING THE SPINDLE WASHERS

Lay out rosette with dividers and cut from 1/8-in.-thick brass.



Handlebar and Supports

I made the handlebar and support posts as shown in Fig. 1. Black iron pipe is available at most hardware stores. My handlebar was made by welding three pipes to a metal ball, but you can use pipe sections and a standard T-fitting available at hardware stores. If you can't find flat flanges, you can get threaded flanges at any hardware store. I had a local welder do the welding for me.

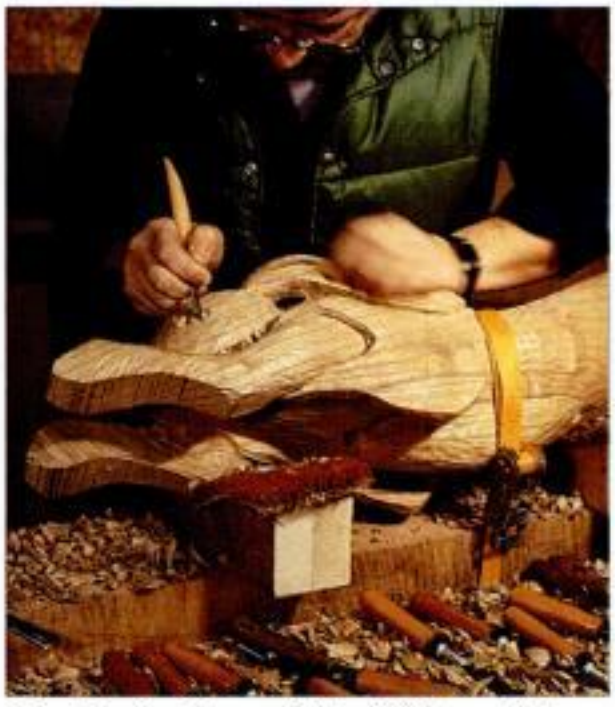
The metal support tabs act as stops and, along with epoxy, secure the rabbit to the pipe. I carved a recess in the bottom of the rabbit to inset the tabs.

Finishing Up

I colored the vest with "Fire Truck Red" water-based aniline dye (available from Garrett Wade, 800-221-2942), then finished the whole rabbit with three coats of satin polyurethane. I painted the eyes and teeth over the polyurethane with artists' acrylics, then topped them with a coat of high-gloss polyurethane.

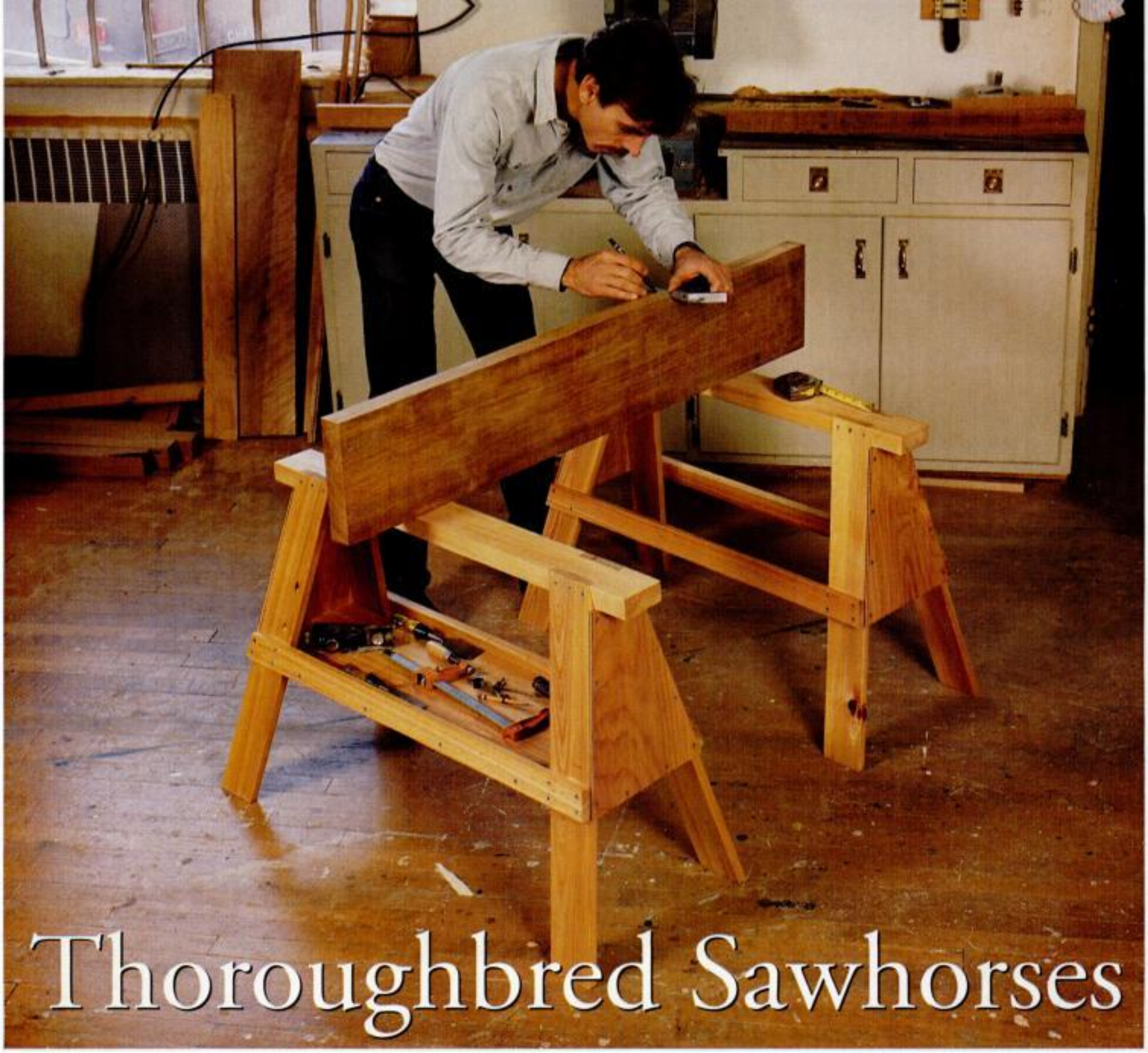
The rocker and the turned wooden handles have two coats of low-sheen latex paint. I used gold-colored model paint (available at hobby stores) for the accents. I painted the metal flat black. ▲

A hand-tooled finish. *As the rabbit approaches its final shape, the author cuts the details by hand, leaving the tool marks as the final finish.*



Carving in the saddle. *With no flat clamping surfaces left, Marian places the work on V-notched "saddles" and web-clamps it to a plank.*

VOICU MARIAN
is an artist and woodworker in Ohio.



Thoroughbred Sawhorses

A stable of champion shop helpers

Beasts of burden. *Sawhorses do much more than just provide support for sawing. They can also serve as layout platforms, assembly racks, workbench supports, table extensions and gluing racks.*

Sawhorses are among the oldest and most useful woodworking fixtures. For as long as carpenters and cabinetmakers have been working wood, they have needed something portable to mark, saw, assemble and store their work on. Although these fixtures are often used to hold work for sawing, calling them "sawhorses" sells short their versatility. To have a couple of sawhorses and a plank is to have a bench at the ready. Horses at the proper height will serve as a bench extension or infeed table for power tools. They'll support cabinets for assembly. You can use them as staging platforms when jointing and planing or as storage for lumber. If outfitted with an auxiliary board notched for bar clamps, they'll serve as panel-clamping racks.

On the following pages, we have rounded up a few of the finest sawhorses we could find—all with their feet planted firmly in tradition. These are not roughshod animals quickly cobbled together from on-site construction materials. They are shop companions likely to last a craftsman's lifetime. Some are relatively lightweight for easy mobility. Some are cleverly designed to fold up or knock down for easy transportation. There are even some Japanese-style low horses that you can use for working either on the floor or at a bench.

Many shops have a variety of horses in different sizes to serve various purposes. The dimensions shown in the drawings are provided as guidelines only. Feel free to tailor the designs to suit your own needs. And whatever wood you use for these horses, it should be clear, straight, seasoned lumber.

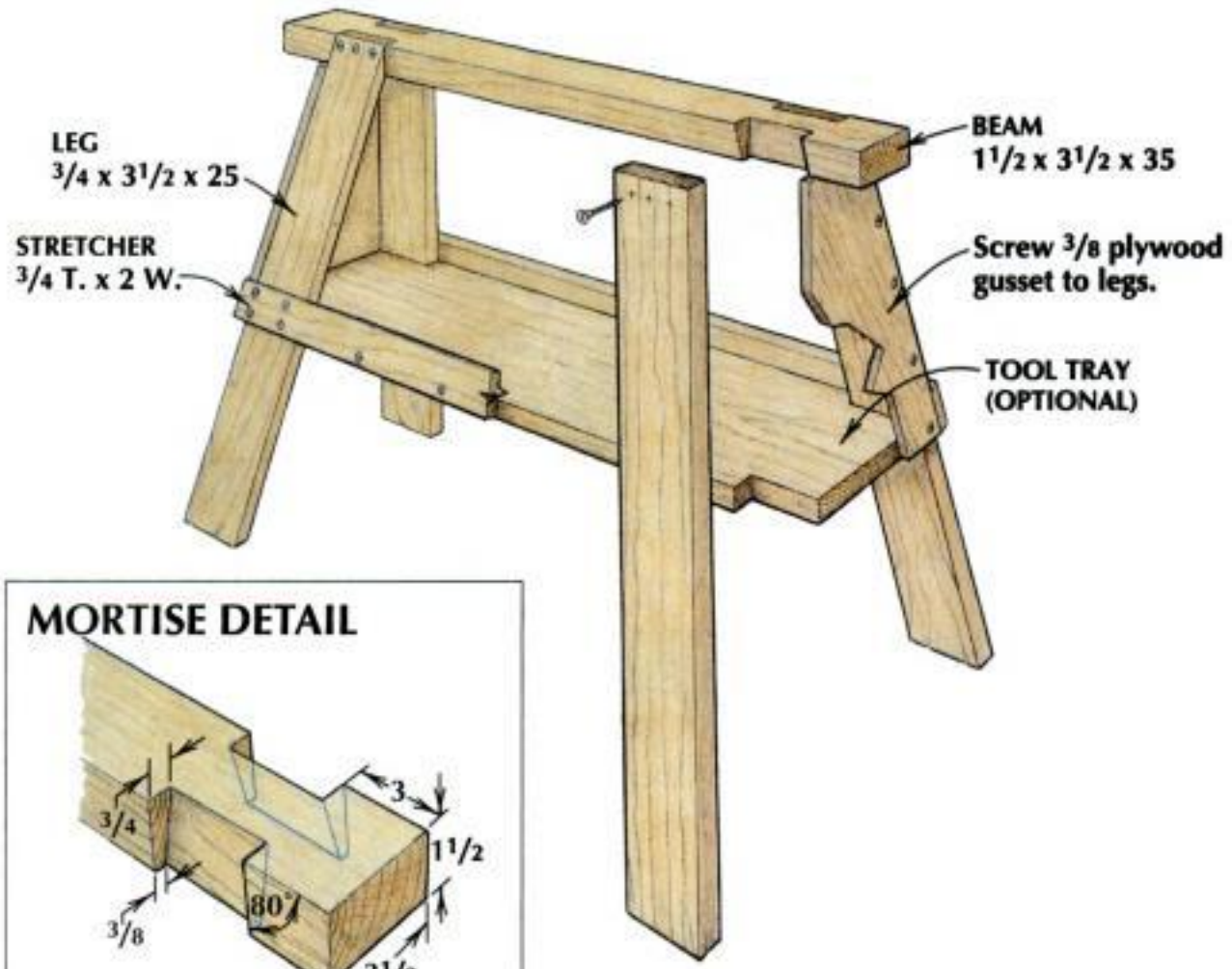
PHOTO BY JOHN HAMEL

Advanced A-Frame *by Paul Anthony*

This horse is the classic A-frame design at its finest. (See photo, opposite page.) Because the legs are splayed in both directions, recessed into mortises in the beam and tied together by stretchers and gussets, the horse has unbeatable footing and resistance to racking. Most of the wood is 3/4 in. thick, so the horse weighs much less than one made entirely with 2x material. I used kiln-dried cypress—a strong, fairly light wood—so my horses are easy to move around. All joints are glued and screwed.

You don't have to know trigonometry to make this horse. Simply make and assemble the legs and beam first, leaving the legs a few inches long. Then, make the tool tray to fit between the legs at a convenient height, and attach the side stretchers. Next, cut the end gussets to fit, and finish up by cutting the legs to the desired length. ▲

PAUL ANTHONY *is an associate editor of AW.*

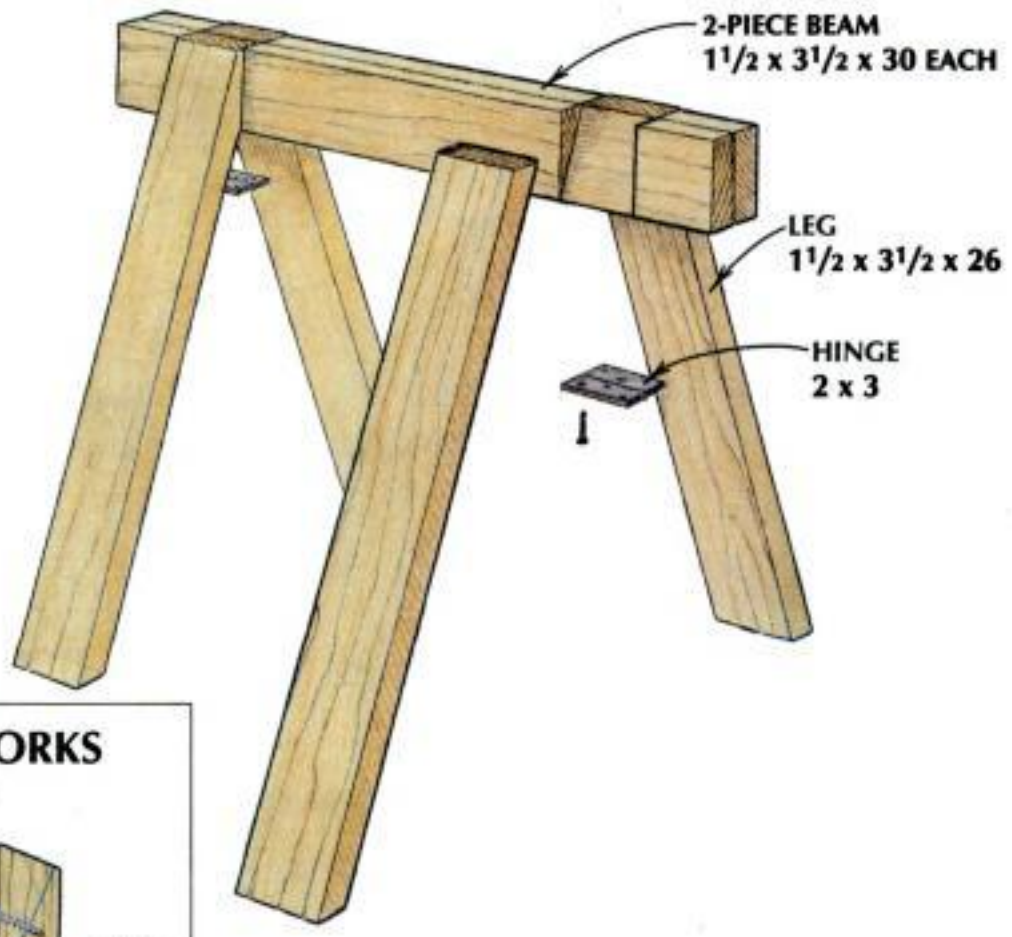


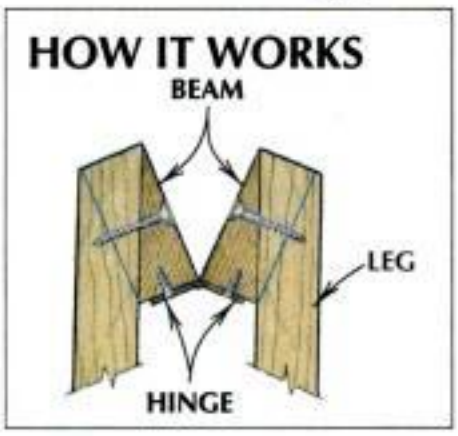
Folding A-Frame *by Fred Matlack*

The inspiration for this design came when I realized I needed a set of sawhorses that could fit in the back of my VW beetle. The car is history, but I still use these fold-up horses in the workshop. All you need to make them are some 2x4s and a pair of butt hinges. The design is such that the more weight you put on the two-piece beam, the more solidly the horse stands. (See drawing detail.) If you like, you can clamp the beam together when working with lighter stock.

Notch out each beam by cutting kerfs to connect opposite corners of the beam; this creates a leg angle of about 23°. Cut the legs to length, screw and glue them in their notches, then hinge the beam/leg assemblies together. ▲

FRED MATLACK *heads the AW design shop.*





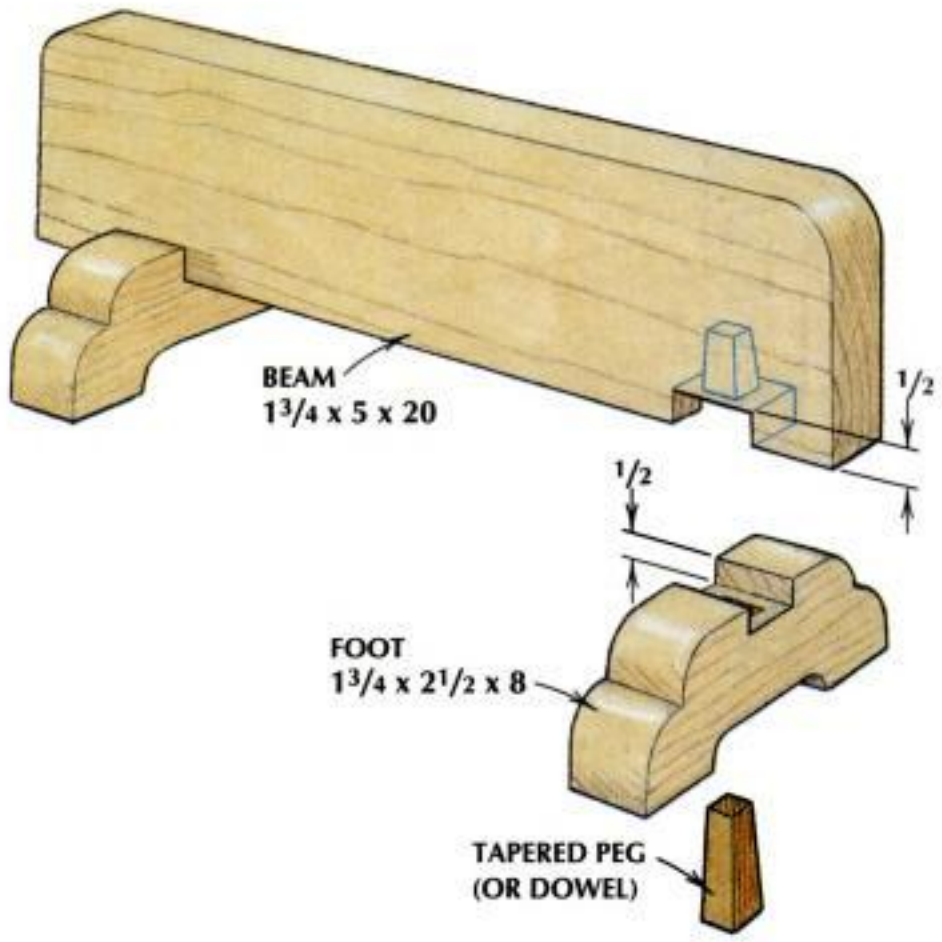
ILLUSTRATIONS BY HEATHER BRINE LAMBERT

Japanese Low Horse *by Toshio Odate*

Japanese woodworkers traditionally do most of their work on the floor. These low horses are used to support work for marking, clamping and cutting, or simply to elevate materials for more comfortable working.

For working on the floor, I use horses about 7 in. high, as shown in the drawing. To support my work on my benchtop, I use smaller ones—about 3 in. high. Size yours to suit yourself.

I join the beam to the legs in the traditional way, cutting a lap joint and securing it with either a square, tapered pin or a dowel. As an alternative, you could simply glue and nail or screw each joint together. ▲

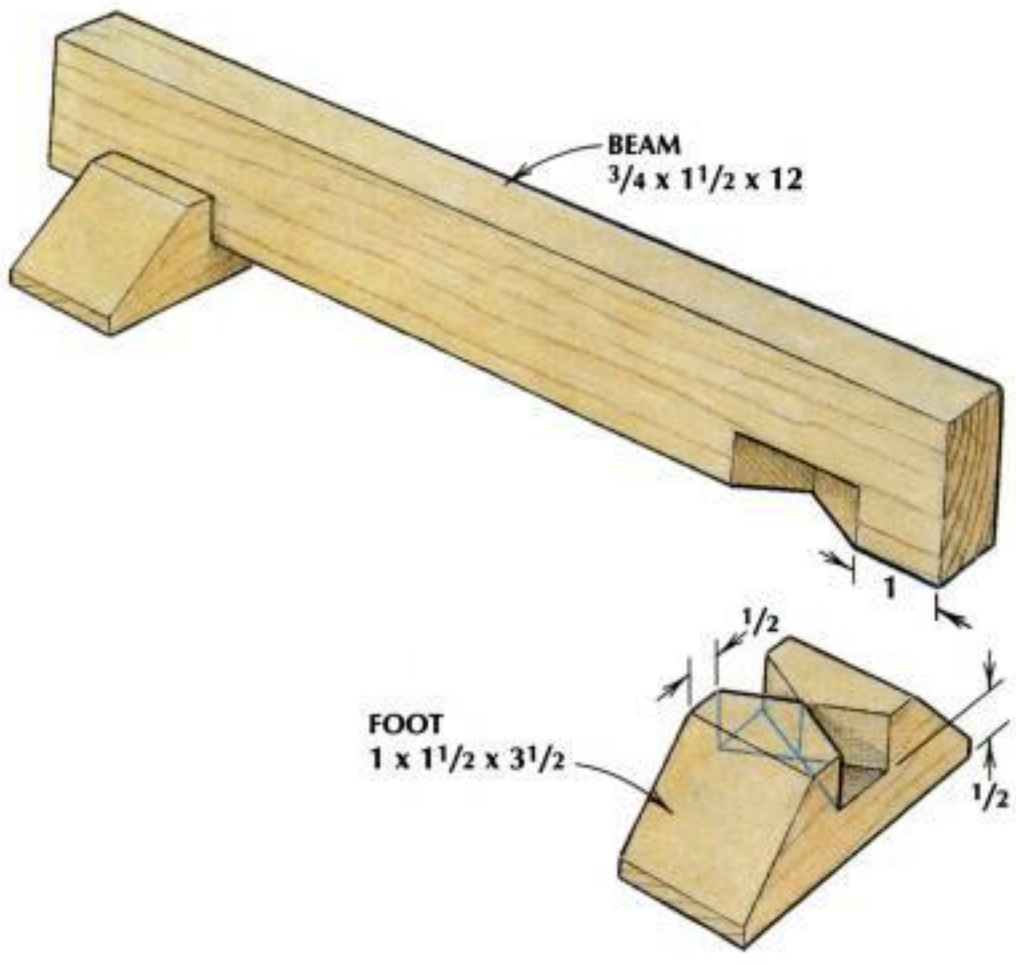


TOSHIO ODATE *is a shoji maker and author of Japanese Woodworking Tools: Their Tradition, Spirit and Use (1984, Taunton Press, Box 355, Newtown, CT 06470).*

Japanese Benchtop Horse *by Jay Van Arsdale*

I often clamp together bundles of small frame parts for marking and cutting. It can be awkward to work with these bundles because of the clamps, so I place the work on small 12-in.-long by 2-in.-high benchtop horses. This type of horse provides enough clearance for clamps underneath the work. Raising the workpiece also prevents dents and other damage to the work from debris on the bench.

I join the beam to the feet with triangular half-laps. This is a good opportunity to use this particular Japanese joint, although you could cut a straight half-lap if you prefer. The joints look simple but require accurate layout and execution. Saw and chisel out the two opposing Vs individually, rather than sawing an X across the foot. If your joint is cut accurately, you won't need glue, but there is no harm in using it. ▲



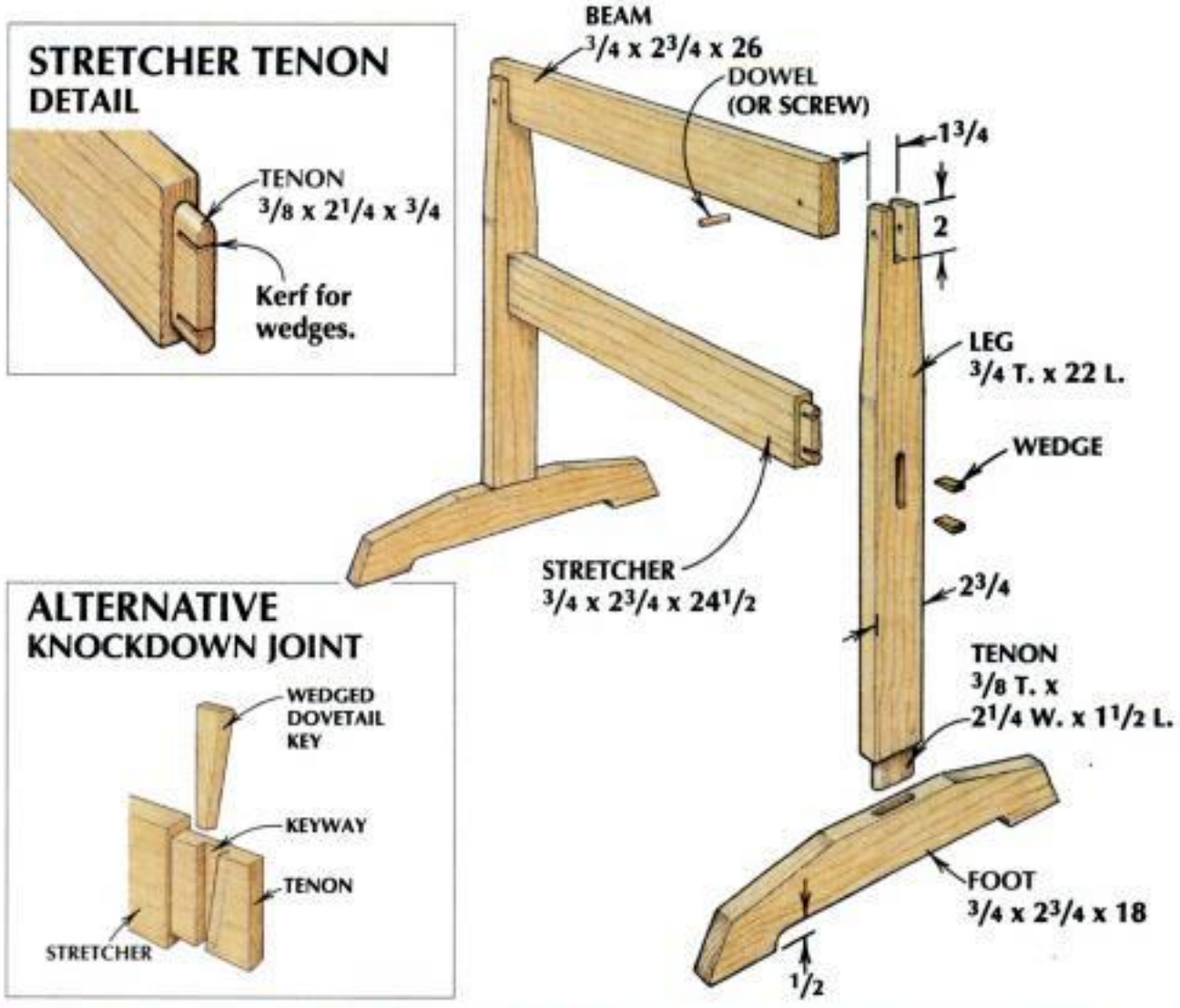
JAY VAN ARSDALE *practices and teaches Japanese woodworking in northern California.*

Trestle Horse *by David Welter*

The sawhorses we use at The College of the Redwoods are of a type that Jim Krenov used at his home in Sweden. These horses are capable of supporting hundreds of pounds of dead weight, yet they're very light. Best of all, they nest together in use and storage. The lower rail gives the horse stability and also serves as an additional platform.

Any good hardwood, such as maple or hickory, will serve. The height and width of a horse is entirely up to the maker. The bottom of each foot is relieved to straddle the inevitable bump in the floor. The beam may be pinned with a dowel but is most often screwed in place for easy replacement. Although the horses may be shaped to suit individual tastes, the top and bottom edges of the beam should be kept parallel to allow for clamping. ▲

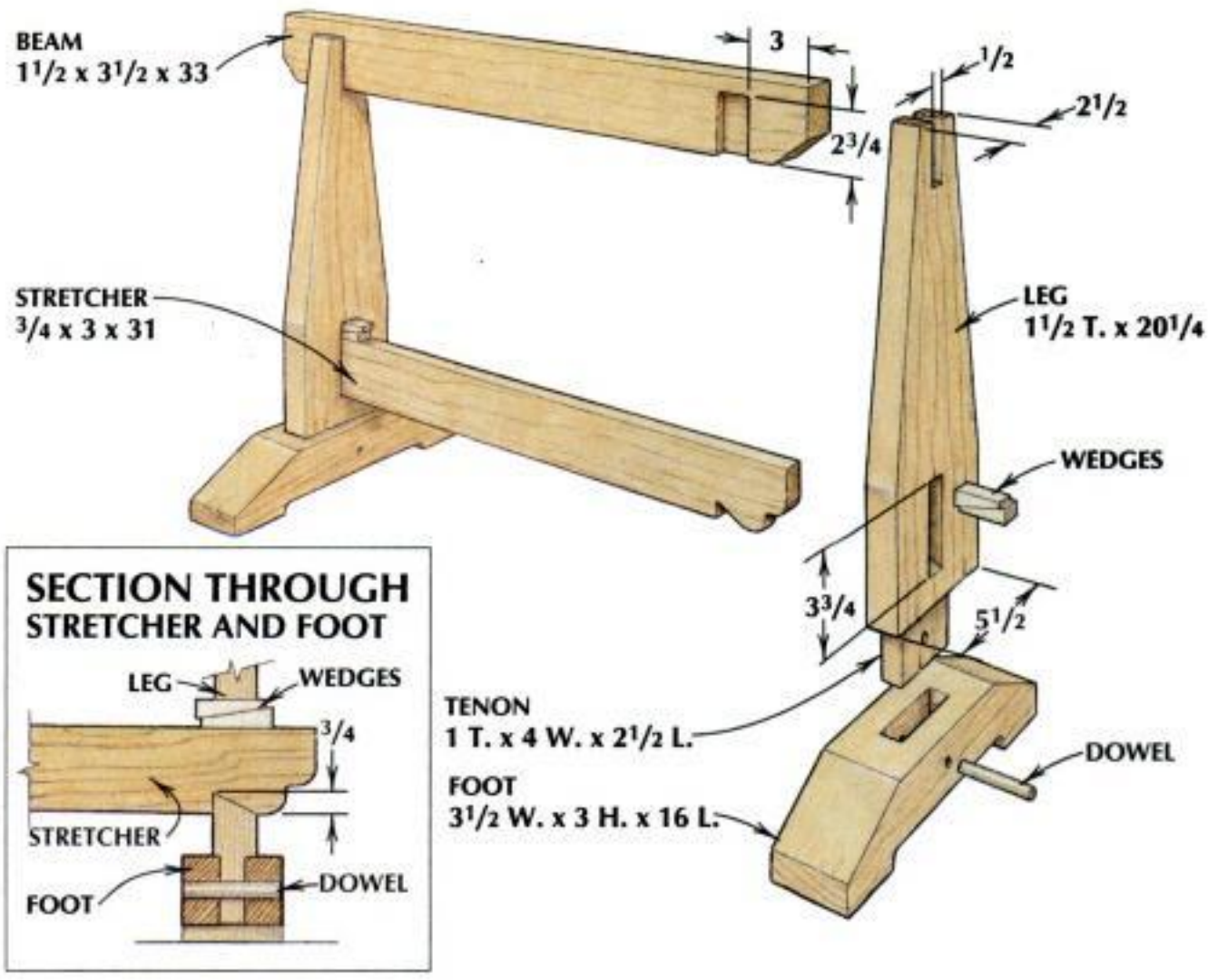
DAVID WELTER *is an assistant woodworking instructor at The College of the Redwoods in Fort Bragg, CA.*



Knockdown Trestle Horse *by Jay Van Arsdale*

Traditional Japanese carpenters use knockdown sawhorses like these because they are strong, convenient and portable for use in the shop and on jobsites. I use four different sizes of sawhorses, which gives me the flexibility I need for different types of work. Some horses are designed to create a good workbench height when spanned with planks. I use the trestle horse shown here for mortising: When I place a 4-in.-thick plank on top of it, it yields a working height of about 22 in. This height allows me to clamp the work for mortising simply by sitting on it. Feel free to vary the dimensions to suit your own height. You can use many different types of wood to make horses. Although I prefer to use Port Orford cedar, I have also used alder, poplar and fir. ▲

JAY VAN ARSDALE *practices and teaches Japanese woodworking in northern California.*



Panel Raising Bits

Two styles of router bits that produce professional-looking panels without a shaper

PHOTO BY DAVE SELLERS

Profile possibilities. *Panel-raising bits let you cut a variety of dramatic profiles on your router table. Learn which type of bit best meets your needs.*

HORIZONTAL BIT

VERTICAL BIT

Not too long ago, if you didn't own a shaper, your only options were to raise panels on your tablesaw or with a hand plane. Today, it's easier and cheaper than ever to raise panels of many sizes and profiles. All you need is a router, a router table, and the right bit. But here's the rub: How do you choose the correct bit from today's lineup of panel-raising cutters? This panel-raising primer will provide you with the basics to help you choose—and use—the right bit for your job and your budget.

Horizontal or Vertical?

Panel-raising bits fall into two distinct categories—horizontal and vertical. Horizontal bits resemble large-diameter shaper cutters. Vertical bits are a newer invention designed specifically for smaller-horsepower routers. Selecting the right bit is largely dependent upon two things: the size of your router and the shape of the panels you intend to raise.

Horizontal bits work much like shaper cutters. You can use this type of bit with a fence to raise straight-edged panels, or you can use the bit's built-in ball-bearing guide to raise arched or serpentine panels. (See bottom left and center photos, opposite page.)

Raising horizontally is a little easier than raising vertically. With a horizontal panel-raising bit, the panel runs flat on the table. Horizontal bits produce a cut

PHOTOS BY PAUL PEARSON

PHOTO BY PAUL PEARSON

Raised-panel bit list. *Left to right: standard horizontal, anti-kickback horizontal, standard vertical, anti-kickback vertical, three-wing horizontal, horizontal with back cutter.*

that requires little or no sanding or cleanup prior to finishing.

On the downside, horizontal bits are more expensive than vertical bits and require more power to make the cut. Although a 2¼-HP router can run a 3½-in.-dia. bit, invest in at least a 3-HP model if you plan to do a lot of panel raising. Also, make sure your router has some means of throttling down—either built-in variable speed control or an aftermarket variable speed control unit. Large-diameter bits should be run between 8,000 and 12,000 rpm.

Vertical panel-raising bits make it possible to raise panels with smaller routers. With an average diameter of only about 1¼ in., these bits require much less router power. You can do the job with a single-speed, 1½-HP router. Safety is another plus: Many woodworkers feel safer with the vertical design because less spinning metal is exposed during the cut.

Vertical bits have some drawbacks. Due in part to their smaller diameter, they tend to leave more pronounced mill marks that require light scraping or sanding. Even when you're working with a high auxiliary fence, raising large panels can be awkward. Panels must be fed on edge (vertically) past the bit. (See right photo, below.) Vertical bits are also less versatile than horizontal bits. You can't feed a curved panel across a vertical bit as you can with its horizontal counterpart.

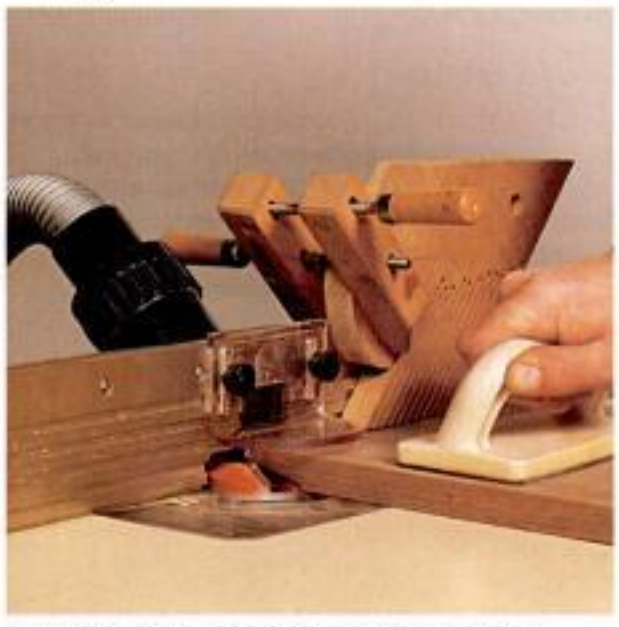
Features Worth Considering

Anti-kickback design—Also known as "safety bits" or "chip-limiting bits," anti-kickback bits have solid bodies with just a narrow throat in front of each cutting tip for chip clearance. The full-body design on both the vertical and horizontal bits limits how deeply they can cut, thereby reducing the possibility of kickback. (See drawing, page 54.) In addition to safety, the anti-kickback design lessens vibration to produce a noticeably smoother cut. The greater mass also dissipates heat more efficiently. According to the manufacturers, this can prolong the edge life of the carbide tips.

Anti-kickback bits cost slightly more than conventional bits, but they are a worthwhile investment—and good insurance—especially with the larger-diameter cutters.

Three-wing cutters—Three-wingers are designed to make more cuts per inch while limiting chip size, producing a smoother finish cut with less tearout than two-wingers. But in our trials, it was tough to decide on a clear winner: Both types produced a first-rate finish. We did observe that the three-wing cutters required a slower feed rate and more pressure to feed the stock. Three-wing bits cost 20 to 25 percent more than comparable two-wingers.

Back cutters—Relatively new on the market, these horizontal bits are

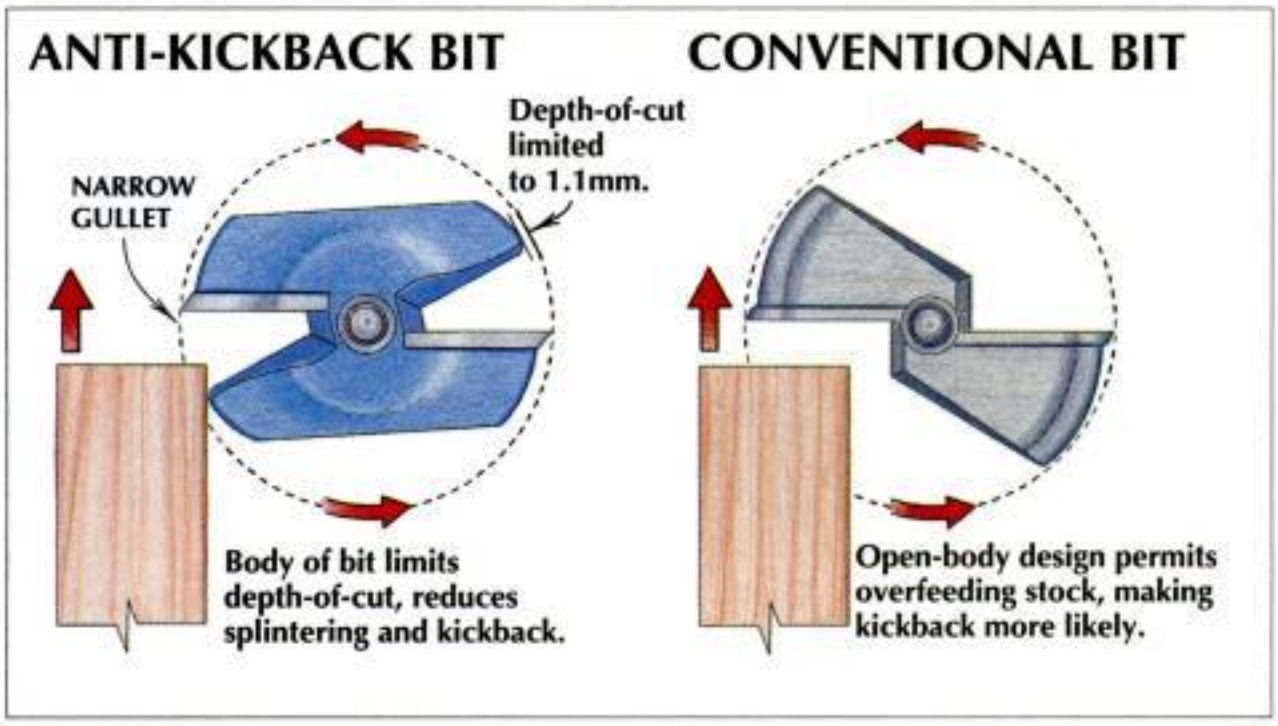


On the flat. *Horizontal bits allow the panel to lie flat on the table. The panel edge runs against the fence or the bit's bearing. A feather board helps to hold the panel down.*

Around the curve. *Horizontal bits can also raise curved panels. The stock pivots on the pin to control the cut. A back cutter relieves the panel back in the same pass.*

Raising on edge. *Vertical bits enable small routers to make wide reveals. A feather board positioned above the bit holds the panel flat against the fence.*

PHOTOS BY DAVE SELLERS



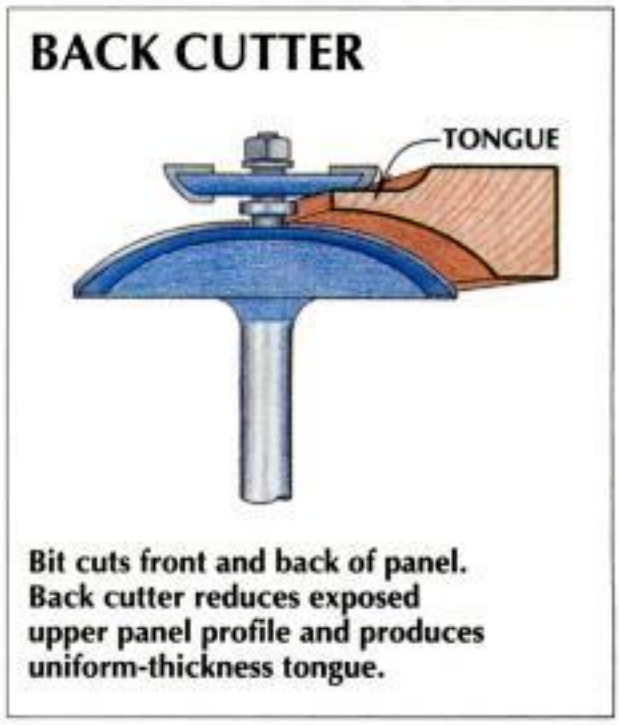


ILLUSTRATION BY MELANIE POWELL

designed to cut from both sides of the panel. The back cutters are positioned on the other side of the ball bearing, opposite the raising profile. (See top photo, page 53.) This configuration ensures a specific edge thickness (usually 1/4 in.) on the finished panel, regardless of overall panel thickness. Although this saves the additional work of making a separate back cut, some woodworkers contend that sandwiching the work between two cutters increases the danger of kickback. We found that kickback wasn't a problem if we crept up on the cut by adjusting the fence. Fred Matlack, AW's shop chief, has a different strategy. He removes the back cutter for the first few passes and then replaces it to make the final cut.

Recommendations

For the small shop, vertical bits are an excellent way to get into panel raising. Besides being less expensive than horizontal cutters, they don't require the power and variable speed control of a big, expensive router.

Horizontal panel raisers cost a little more and need a larger router (at least 2 1/2 HP) with variable speed control—but they're more versatile. In the long run you'll make up the cost difference with smooth profiles that require less cleanup. A horizontal bit's ability to handle large stock and curves makes it a more versatile investment. ▲

RAISE IT RIGHT

Follow these guidelines for safety and accuracy when routing raised panels.

- **Use flat stock.** Panels that aren't flat simply aren't good candidates for raising.
- **Use the right router.** To power a horizontal panel raiser, use a 3-HP router equipped with variable speed control. If you're raising with a vertical bit, you can use a single-speed router with less muscle—1 1/2 HP or more.
- **Stay at the table.** Panel-raising bits should only be used on a router table.
- **Open wide.** Some horizontal bits may be too large for the standard opening in your router table insert plate, so you may need to buy or make a new plate.
- **Check your collet.** Bits should be completely inserted into the collet and backed off by about 1/16 in. Make sure to tighten the collet securely.
- **Set up safely.** When using a vertical bit, guide the stock against a high fence and use a feather board that's secured to the table. When using a horizontal bit, secure the feather board to the fence. To rout panels with curved profiles, use push blocks and start the workpiece against a pin in the router insert plate, tipping it slowly into the bit's pilot bearing.
- **Watch your speed.** Vertical panel-raising bits can run safely at the higher rpm of single-speed routers. With horizontal bits, use a variable-speed router or an aftermarket variable speed control, and set the rpm within the bit manufacturer's recommended speed range.
- **Take small bites.** Don't try to cut the complete panel profile in a single pass. Manufacturers recommend three to five passes. To make incremental cuts with vertical bits, move the fence back to reveal more of the bit's profile. With horizontal bits (except for back-cutting bits), raise the cutter. Make cross-grain cuts first, then cut with the grain. For clean, burn-free results, remove no more than 1/16 in. on the final pass.
- **Take a test run.** Besides checking your ideal depth-of-cut, routing a practice piece will let you set up your fence and feather board(s) and figure out the best speed to feed the panel past the bit. Watch for excessive vibration or chatter during your test—it may indicate an out-of-balance bit.

SOURCES

Panel-raising bits are available from:

CMT Tools
(800) 531-5559 *Circle #624*

Eagle America
(800) 872-2511 *Circle #625*

Grizzly Imports
(800) 541-5537 (W of the Mississippi)
(800) 523-4777 (E of the Mississippi)
Circle #626

Highland Hardware
(800) 241-6748 *Circle #627*

Kreg Tool Co.
(515) 597-2234 *Circle #628*

Lee Valley Tools Ltd.
(800) 267-8767 *Circle #629*

McFeely's
(800) 443-7937 *Circle #630*

MLCS
(800) 533-9298 *Circle #631*

Nordic Inc.
(800) 345-3535 *Circle #632*

Woodcraft
(800) 225-1153 *Circle #633*

Woodhaven
(800) 344-6657 *Circle #634*

Woodworker's Supply
(800) 231-2748 *Circle #635*

SHOP TEST

Mini Lathes

Big fun on a little machine

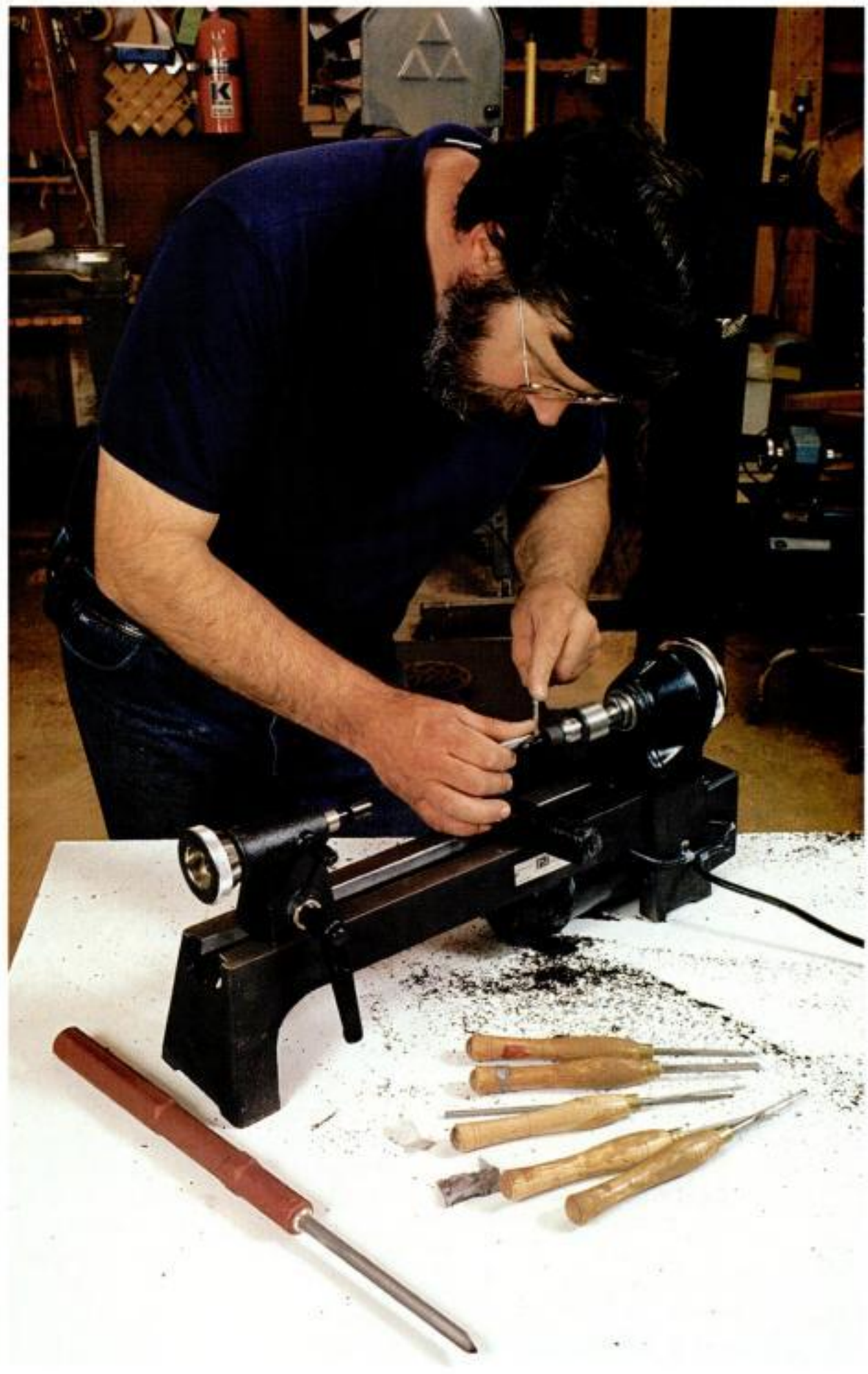
by Stephen H. Blenk

Are you on the lookout for a wood lathe but feeling "turned off" by the high price of a full-size machine? Perhaps you'd like to specialize in small turning projects or you just don't have room in your shop for another big machine. Whatever your reason for thinking small, there's a new breed of "mini lathe" on the market that can meet these special needs.

What makes a mini lathe? There's no set definition, but I think of one as simply a scaled-down version of a full-sized machine. Typically, a mini lathe has a *swing* (the maximum diameter of work it can handle) of 9 in. or less over the bed, and it can hold a workpiece up to about 12 in. long between centers. The motors that power a mini lathe are only a fraction of a horsepower and the drive system, whether step pulley or electronic variable speed, is designed to produce high spindle speeds suited to small-diameter work. But keep in mind that a smaller size doesn't mean mini lathes are "toys." I know many serious turners who create exceptional work on these little machines.

For this buyer's guide I tested all six of the miniature woodworking lathes currently sold in the U.S.: the Klein, Carba-Tec and Carba-Tec II, Record RPML 300C, Ryobi ML618 and Vicmarc VL100. The Carba-Tec, Klein and Vicmarc came without motors; I powered these three lathes with a 1/4-HP, 1,725-rpm motor. I used

PHOTOS BY ALAN CRAFT



Take a spin. *Even with a linebacker's build, 6-ft., 5-in. turner Steve Blenk loves the precision and delicacy possible with these small machines. At left, Blenk completes the profile of a tiny ebony goblet.*

MINI LATHES

Brand & Model	Carba-Tec	Carba-Tec Mark II	Klein	Record RPML 300C	Ryobi ML618	Vicmarc VL100
Street Price	$229.95**	$279.95	$349**	$399	$249	$399**
SPECIFICATIONS						
Swing x Length (in.)	6 x 12	6 x 12	5 x 12	9 x 12	6 1/4 x 18	9 x 12
Bed Material	Cast iron	Cast iron	Aluminum	Cast iron	Steel tubes	Cast iron
Spindle Dia. (in.) x tpi*	3/4 x 16 #1 MT	3/4 x 16 #1 MT	3/4 x 16 3/8 x 24 arbor	3/4 x 16 #1 MT	3/4 x 16 #1 MT	1 x 8 #2 MT
Drive Type & Rpm	SP-4 800 - 3,475	EVS 300 - 3,500	SP-6 500 - 5,200	SP-3 540 - 2,440	EVS 500 - 2,500	SP-6 500 - 3,600
HP	—	1/6	—	1/3	1/3	—
Weight (lbs.)	28**	34	8**	90	49	57**

KEY: — = Not applicable. SP-# = Step pulleys - number of speeds. EVS = Electronic variable speed. * Tpi = Threads per inch. ** = Without motor.

SOURCES

Mini lathes are available from the following suppliers:

Craft Supplies USA
(800) 551-8876
Circle #601
Carba-Tec

Garrett Wade
(800) 221-2942
Circle #602
Record

Klein Design Inc.
(206) 226-5937
Circle #603
Klein

Packard Woodworks
(704) 859-6762
Circle #604
Carba-Tec, Klein

Willow Creek Tool Sales
(800) 592-8501
(800) 592-8500 in MT
Circle #605
Vicmarc

Woodcraft Supply Inc.
(800) 225-1153
Circle #606
Carba-Tec

Woodworker's Supply
(800) 645-9292
Circle #623
Klein, Ryobi

each lathe to turn small projects such as pens and bottle stoppers, and I turned a delicate 3/4-in.-long goblet on each lathe to check for steadiness. I also tried a faceplate turning at or near each lathe's maximum swing capacity.

What's Important?

When testing the "minis," I looked for the key features that make a lathe precise and pleasurable to use, while also considering qualities unique to mini lathes. Specifications are listed in the chart. Here's a rundown of important features.

Power—With a smaller workpiece, a mini lathe requires less power than a full-size lathe, but the motor should still be gutsy enough to not bog down. And since high rpm is a must for smaller work, the drive system should deliver the power in speeds of 3,000 rpm or higher.

Portability vs. stability—As a turning demonstrator, I find that mini lathes are great for traveling to shows, fairs, schools, or anywhere there's 110-volt power. But portability has a downside, since too little weight usually means less stability. A lathe with solid, heavy construction (I prefer cast iron) provides a stable platform for turning, and translates into cleaner cuts by reducing vibration and chattering.

Fit and finish—The precision of castings and machine work, and the fit of parts, are good indicators of overall quality. In general, I found that quality in fit and finish is correlated with better performance.

A good tool rest—I look for a tool rest that operates smoothly with cam-lock handles that don't get in your way. An offset tool-rest socket that lets me get the tool rest closer to the work is a plus.

Convenient controls—Well-designed controls can spell the difference between joy and frustration with any turning operation. Features like cam locks on tool-rest supports and tailstocks, indexing handle positions, and tailstock quills that operate smoothly, are important.

Another convenient feature is a spindle with standard-size Morse tapers (MT) and spindle threads. Standard size means the lathe can mount chucks, drive centers and other accessories commonly available for big lathes. The Vicmarc is the only mini lathe with the #2 MT found on most full-size machines. The #2 MT spindles will fit more accessories and are larger and more vibration-resistant than the common #1 MT spindles.

Winners Among Spinners

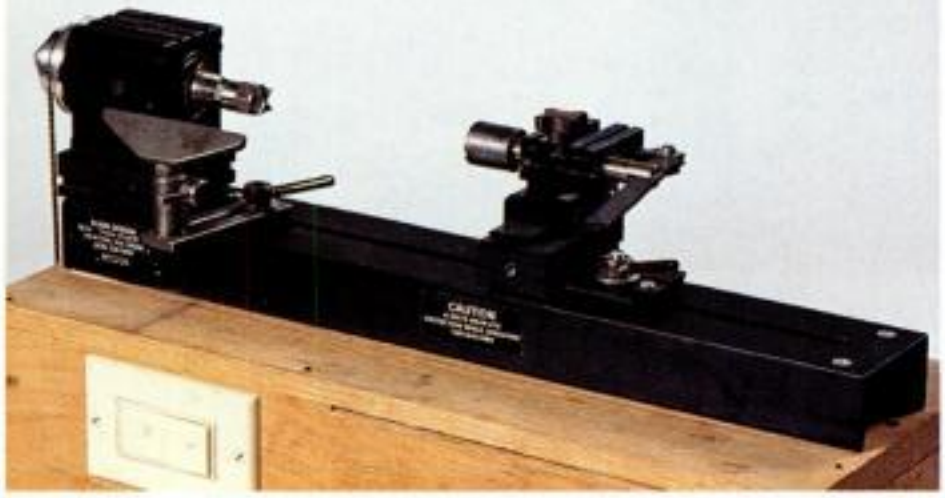
After turning on all the minis, it was easy to pick the Vicmarc VL100 as my favorite. It's the overall winner in performance and construction and the only lathe with a #2 MT spindle. It's heavy for a portable machine, but the stability is great—it really makes a difference when doing precise work at high rpm.

In my opinion, the Carba-Tec Mark II offers the best value. Despite being a bit light on power, its variable-speed DC motor and solid construction make the Mark II a great value for the turner on a budget. ▶

STEPHEN H. BLENK *is a professional woodturner and a contributing editor to AW.*

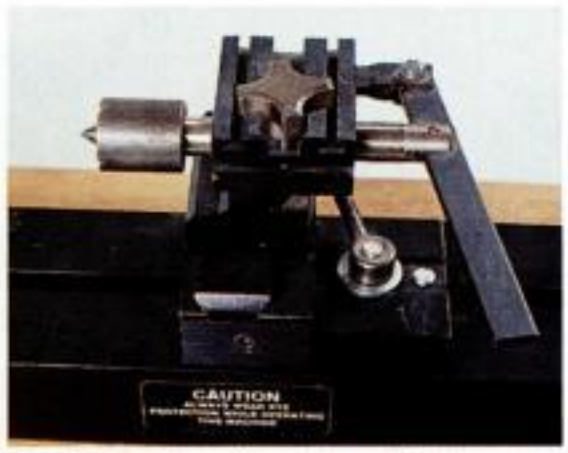
Klein

Street Price: $349 (without motor)



The Klein lathe is Blenk's pick for demonstrating because its light weight makes it easy to travel with.

One of the first mini lathes on the market, the Klein lathe was designed by expert small-scale woodturner Bonnie Klein and still bears her name. The Klein packs a good range of features including several optional accessory chucks, six speeds, easy belt changes, and an optional accessory jig for cutting threaded box lids. (This jig also adapts to the Carba-Tec lathes.)



The Klein's tailstock quill adjusts with a lever and lock knob.

The Klein's exceptional portability is a big plus (at 8 lbs., it's the lightest lathe I tested), as is its standard 3/4-in. by 16-tpi spindle thread for mounting optional accessory chucks.

Unlike other mini lathes, which use a Morse taper in the spindle for mounting drive centers, the Klein has a special arbor that fits in the headstock spindle. This arbor has a 3/8-in. by 24-tpi thread for mounting the screw-on spur center (supplied) and a Jacobs chuck (not supplied). The Klein's aluminum frame is plenty stable for most work, but a heavy workpiece at full size capacity may produce some vibration. Drawbacks include a lack of Morse tapers and a tailstock quill that moves by lever rather than by a threaded handwheel (which I prefer).

Pros

The most portable mini lathe; standard headstock arbor accepts Jacobs chuck; good fit and finish; nice tool rest.

Cons

Lacks Morse-taper spindles; heavy workpieces may cause vibration with lightweight design.

Final Turn

This is a good lathe for finesse work, and it's well suited to detailed small-scale turning.

Ryobi ML618

Street Price: $249

The Ryobi's headstock mounts to the tubular steel bed for spindle turning or can be turned 90° for larger bowls.

The Ryobi ML618 has the longest bed of all the mini lathes, with an 18-in. capacity between centers. The bed is made from two steel tubes, and I found that they transmitted some vibration during my tests. I liked the Ryobi's electronic variable-speed drive, but it had a one- to two-second lag between "switch-on" and start-up. This isn't a problem, but you must remember to keep your hands and tools off the work until the lathe comes up to speed. The motor seemed more prone to bogging down under heavy load than those on the other mini lathes, especially at lower speeds.

Electronic variable-speed drive lets you dial in the rpm to match the size of your work.

I found the handles for locking the tool-rest support and the tailstock a bit difficult to reach—they're located below the bed. Also, the tool-rest lock knob can get in the way of holding a cutting tool at the proper angle for some cuts.

For turning oversized pieces up to 10 in. dia., you can detach the headstock from the bed tubes and remount it at 90° to the bed for outboard turning. This is a handy feature, although it took me about 20 minutes to make the switch.

Pros

Longest capacity between centers of any mini lathe; can mount headstock to turn outboard up to 10 in. dia.; convenient variable speed.

Cons

Poor placement of handles and tool-rest knob; steel-tube bed rails can transmit vibration.

Final Turn

This lathe is better suited to beginners on a budget than to experienced turners who might want to push a mini lathe to the limit.

Carba-Tec

Street Price: $229.95 (without motor)

The Carba-Tec's gap bed lets you turn shallow work (like a plate) of larger diameters—up to 8 in.

A New Zealand import, the cast iron Carba-Tec lathe sports quite a number of useful features: Morse-taper headstock and tailstock, indexing control handles, standard spindle threads, a gap bed and a cam-lock tool rest.

You can mount a motor below the lathe or behind it. With the 1/4-HP motor I used (I'd recommend against a smaller motor), the lathe performed flawlessly and with minimal vibration. A 1,725-rpm motor gives you spindle speeds of approximately 850 to 3,400 rpm.

Both Carba-Tec lathes include a live tail center with interchangeable point and cup centers.

A couple of drawbacks: To replace the thin drive belt (a spare is included), you have to remove the lathe spindle completely. The plastic locking handles seemed flimsy, though they worked fine. The live tailstock center's #1 MT shaft protruded 2 in. from the tailstock quill, reducing between-center capacity to 11 1/4 in. On the plus side, the tail center has two interchangeable points—a single 60° point and a cup with a point. The tool rest and tailstock both operated smoothly, and the machining was clean. The built-in handwheel is a nice touch.

Pros

Solid construction minimizes vibration; gap bed; indexing control handles; cam-lock tool rest.

Cons

Drive belt replacement difficult; usable length capacity only 11 1/4 in.

Final Turn

With beefy construction and a good array of practical features, this well-designed lathe is easy to use.

Carba-Tec Mark II

Street Price: $279.95

The Carba-Tec Mark II comes with an electronic variable-speed motor, but lacks the original Carba-Tec's gap bed.

The Carba-Tec Mark II is a "plug and play" update of the original Carba-Tec, adding an electronic variable-speed motor but deleting the gap bed. It runs just as smoothly as the original Carba-Tec, but the bed also gained 3/4 in. in length, so the Mark II will hold a full 12 in. between centers. The moderate weight of this lathe makes it easy to move around. The power was adequate for small-scale turning but was marginal on the 5-in.-dia. faceplate work I tried. The electronic variable speed works well, but to get the full speed range, you need to switch the drive belt between two pulleys. I found it nearly impossible to reach the belt at the bottom of the lathe when it was bolted down, so be sure to include an access hole when designing a lathe stand.

A cam-lock tool rest and indexing control handles make adjustments easy on the Carba-Tec lathes.

Despite the lack of a gap bed, the Mark II was my favorite of the two Carba-Tec lathes. Most turners won't miss a gap bed, and the variable-speed drive adds a lot of convenience.

Pros

Indexing control handles; cam-lock tool rest; convenient variable speed; nice fit and finish; good portability.

Cons

Access to drive belt difficult.

Final Turn

At 37 1/2 lbs. including the motor, this model is a good choice if you need a portable lathe. It offers excellent value for the price.

Record RPML 300C

Street Price: $399

At 90 lbs., the Record RPML 300C is the heaviest machine among the mini lathes.

With cast-iron construction, a 1/3-HP motor and a poly-V drive belt, the Record lathe ran well with minimal vibration. (It should, as it weighs 90 lbs., which limits its portability.) With the supplied drive center and tailstock center, the lathe holds 9 in. between centers. It has three speeds—540, 1,140, and 2,440 rpm—which limits options for clean cutting speed in some diameters. The Record's headstock swivels outward 90° to the bed, allowing you to turn larger bowl stock. But it's almost impossible to reach the swivel lock bolt under the headstock without an access hole in the base on which you mount the lathe. There are no swivel stops between the bed and headstock, so realigning the spindle to the tailstock takes some time. My biggest beef is the lack of control handles: The locked adjustments on this machine require a separate wrench or Allen key (supplied), and these are not standardized—the Record uses two different wrench sizes and three different Allen keys.

Despite solid construction, the Record lacks convenient adjustments—you have to use separate wrenches for fore-aft and up-down settings of the tool rest.

Pros

Heaviest mini lathe with massive construction that eliminates most vibration; headstock swivels for outboard turning larger-diameter stock.

Cons

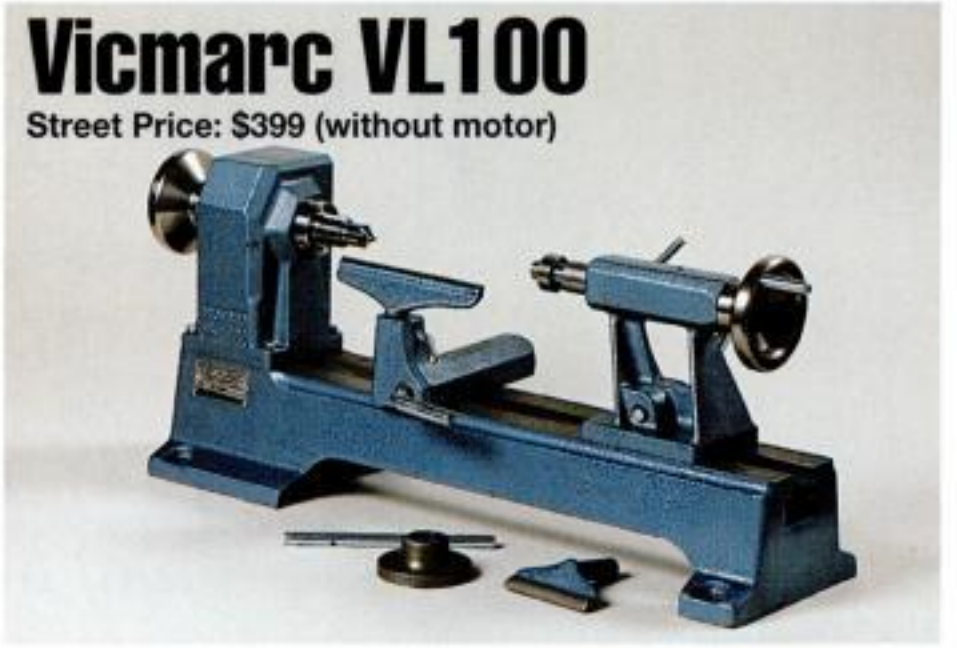
Separate wrenches needed to make adjustments; weight makes it a chore to move around; only three fixed speeds limits versatility.

Final Turn

This is a very solid lathe with excellent fit and finish, but cumbersome to use with no built-in control handles.

Vicmarc VL100

Street Price: $399 (without motor)



The robust Vicmarc is built with the sturdiness and convenience of a full-size lathe.

The Australian-made Vicmarc VL100 is the newest mini lathe I tested. With features including six speeds, 24-point spindle indexing, cam locks on the tool-rest support and tailstock, and more than 2 in. of quill travel in the tailstock, the Vicmarc has the right stuff. Another important plus: With its 1-in. by 8-tpi spindle with #2 Morse taper, the Vicmarc will accommodate most of the accessories that fit a full-size lathe.

When I was using the Vicmarc, I didn't feel like I was working on a miniature lathe. Taking its smaller scale into account, it was as solid and steady as my full-size lathes and it was a joy to use. The fit and finish were excellent. I had no problems taking heavy cuts when I turned some 7-in.-dia. bowls. There was no vibration at all, but I did max out my 1/4-HP test motor. The Vicmarc's U.S. distributor recommends a 1/2-HP motor for this machine and I agree. However, the additional weight of a larger motor will limit the Vicmarc's portability. With either motor, this is a very nice machine.

Vicmarc's spindle indexing pin is located on the outside of the headstock for easy access (under the author's thumb).

Pros

Great stability; excellent fit and finish; no vibration; includes spindle indexing; cam-lock controls; #2 Morse-taper spindles.

Cons

Weight limits portability.

Final Turn

At 57 lbs. without a motor, the Vicmarc VL100 is a bit heavy to be portable—but it's also the cream of the mini-lathe crop.

Hickory Stick Whistle

Make a few quick cuts and blow a tune on a twig

by Owen Rein

Late spring is the time for hickory stick whistles. To make one, you just need a pocketknife, a hammer or mallet, and a young shoot as big around as your little finger.

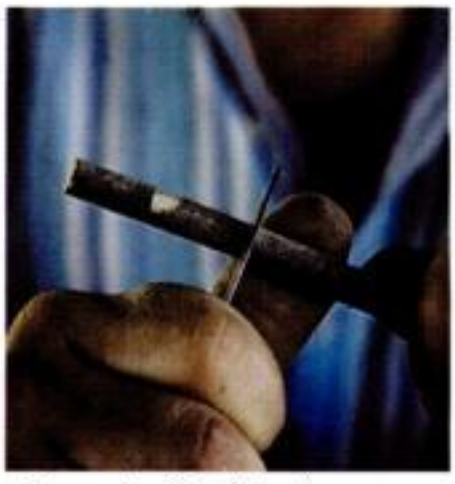
My whistles have three parts. (See drawing, opposite page.) The first is a hollow bark mouthpiece. Then there's a small plug that fits in the mouthpiece to form the air passage. The third section, or endpiece, completes the whistle's air chamber.

Green woodwind. *The author whistles on a hickory stick he whittled with simple tools.*

Pick a Stick

Hickory, which grows abundantly here in the Ozarks, is an ideal whistle wood because its bark easily slips free of the sapwood. If you can't find hickory, try ash. The sap must be running in the tree, and your wood must be freshly cut. On a related note, the music disappears as the stick dries out.

Choose a stick that has 2 or 3 in. of straight bark for the mouthpiece—no knots or leaf scars—so you can slip the bark off in one piece.



Ring cut. *To detach the bark mouthpiece, cut through the bark all the way around the stick.*

Cut and Twist

Start the mouthpiece by trimming the good end straight across. Next, about 1 in. from this end, cut the "whistle notch." (See drawing, opposite page.) First, cut straight down about one-third of the way through the stick. Then make a sloping cut to meet the straight cut. Start this cut a little less than 1/2 in. "downwind" of the straight cut, as shown in Step 2.

Make the "ring" cut about an inch farther down. It's easiest to lay your stick on a flat surface and push the knife back and forth in a "rolling pin" motion, cutting all the way around the stick. Cut all the way through the bark—but *not* through the stick. (See Step 3.)

Gently pound all the bark between the good end and the ring cut with a hammer or mallet. Keep pounding until the sap starts to ooze out of the ring cut. Now pull the loosened bark section off the good end. (See Step 4.) Work carefully, twisting as you pull. The bark needs to come off in a single, unbroken piece. Save this piece.

At this point you have two parts: the hollow bark mouthpiece and an endpiece with an exposed section of sapwood. All that's left are a few cuts in the exposed stick, and reassembly.

First, pare a narrow flat on the top of the sapwood between the end and the whistle notch. Cut parallel to the grain, one-third to one-half as deep as the notch. (See Step 5.) Next, cut off the section you just pared, along the line of the first whistle notch. (See Step 6.) Save this little plug. Finish the endpiece by whittling the exposed sapwood end to create an air chamber. (See Steps 7 and 8.)

Put It Together

Slide the small plug you saved into the end of the hollow mouthpiece. Then slip the mouthpiece back onto the endpiece, in the same position it was originally. Now just give a whistle!

Variations

Larger sticks—up to 3/4 in. dia.—make a louder whistle with a lower pitch. Smaller sticks—down to 3/8 in. dia.—have a higher pitch. You can achieve a "trombone" effect by sliding the bark mouthpiece up and down the whistle as you blow. ▲

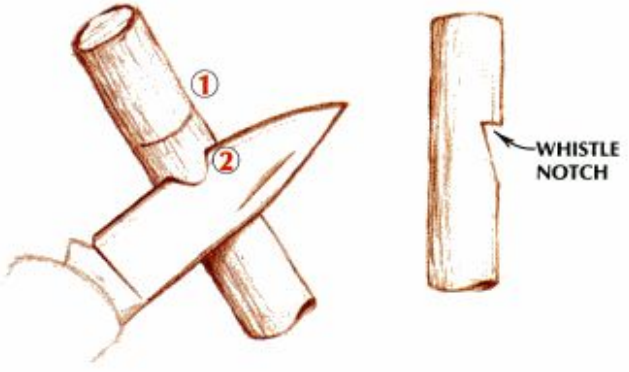
OWEN REIN *is a chairmaker in the Ozark mountains of Arkansas.*

STICK PHOTO BY JOHN HAMEL. OTHER PHOTOS BY DUANE YESSAK

WHITTLE A WHISTLE

This greenwood whistle goes together with a series of simple knife cuts. Follow the steps below.

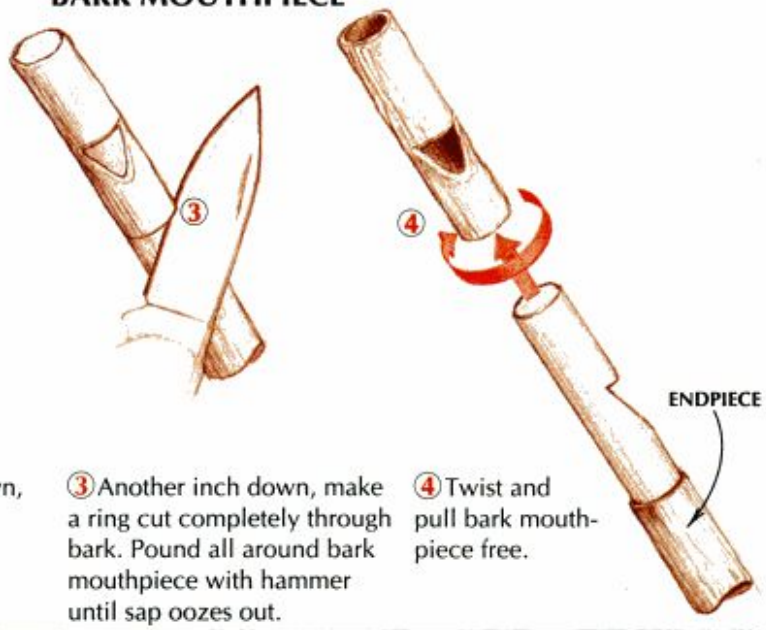
WHISTLE NOTCH



1 Make perpendicular cut about 1 in. from end, going only one-third of the way through stick.

2 Next, 1/2 in. farther down, make angled cut to meet bottom of first cut.

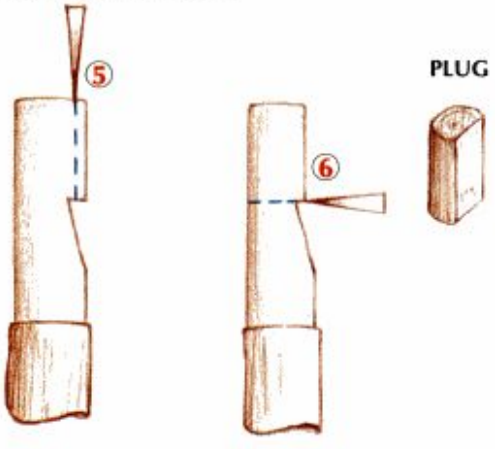
BARK MOUTHPIECE



3 Another inch down, make a ring cut completely through bark. Pound all around bark mouthpiece with hammer until sap oozes out.

4 Twist and pull bark mouthpiece free.

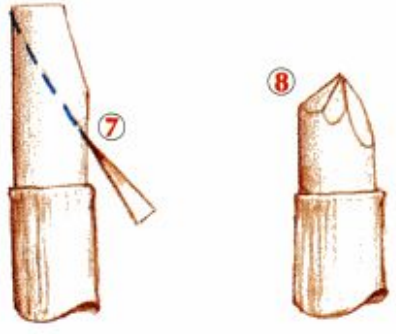
AIR-PASSAGE PLUG



5 Pare off top half of whistle notch depth, from notch to mouthpiece end.

6 Then cut down through whistle notch and slice off plug. Save plug.

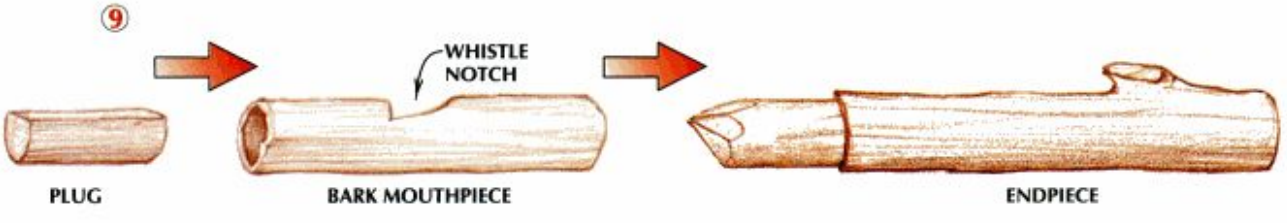
AIR CHAMBER



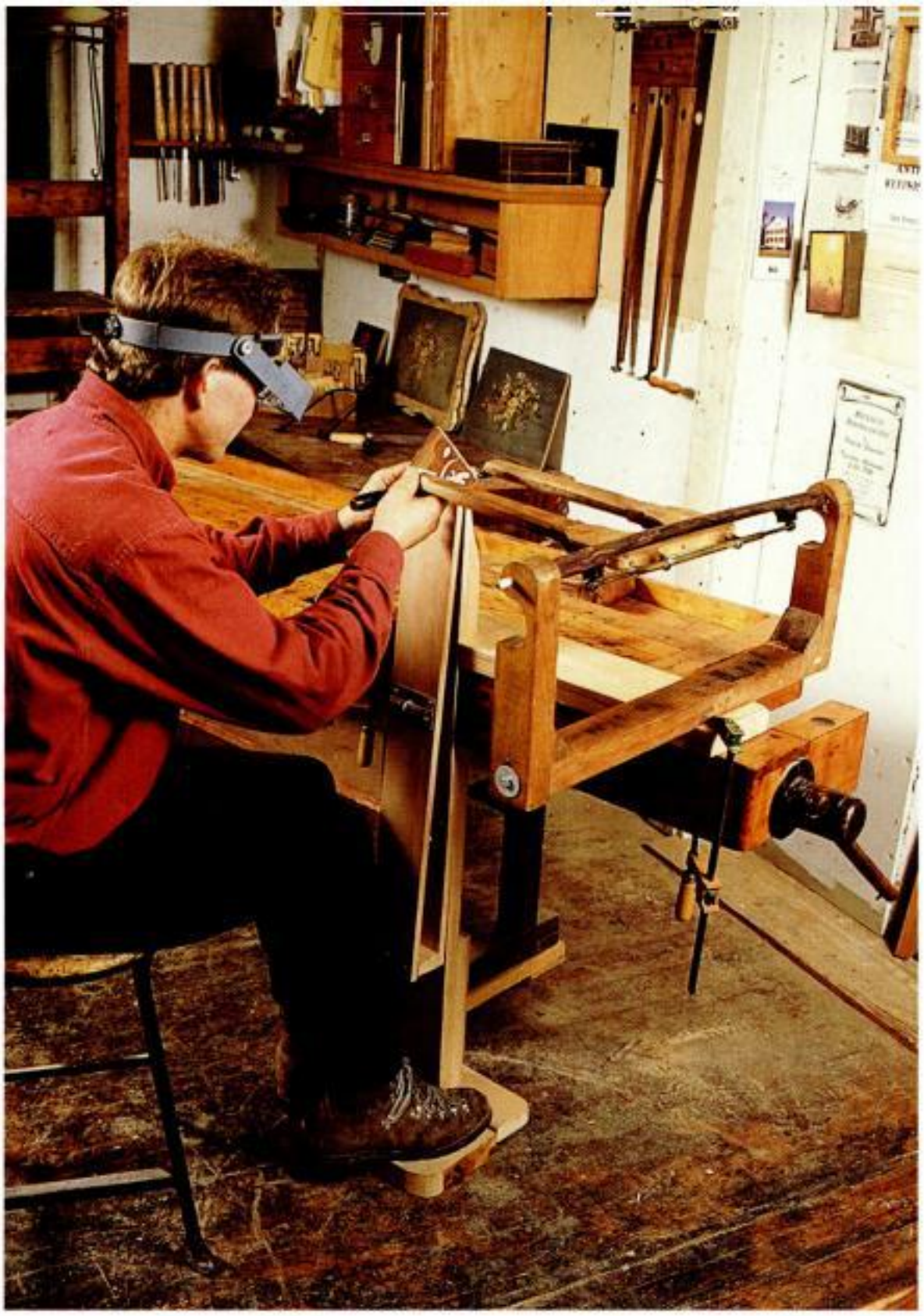
7 Take concave slice off endpiece below whistle notch.

8 Then, roughly whittle underside to form tapered air chamber.

REASSEMBLY



9 Reassemble whistle parts by inserting plug in mouthpiece, then sliding mouthpiece back onto endpiece.



Sawing station. *The author uses his chevalet to saw delicate veneers into small, intricate pieces (left). Then he assembles the pieces to create a dazzling array of wooden "pictures" (below).*

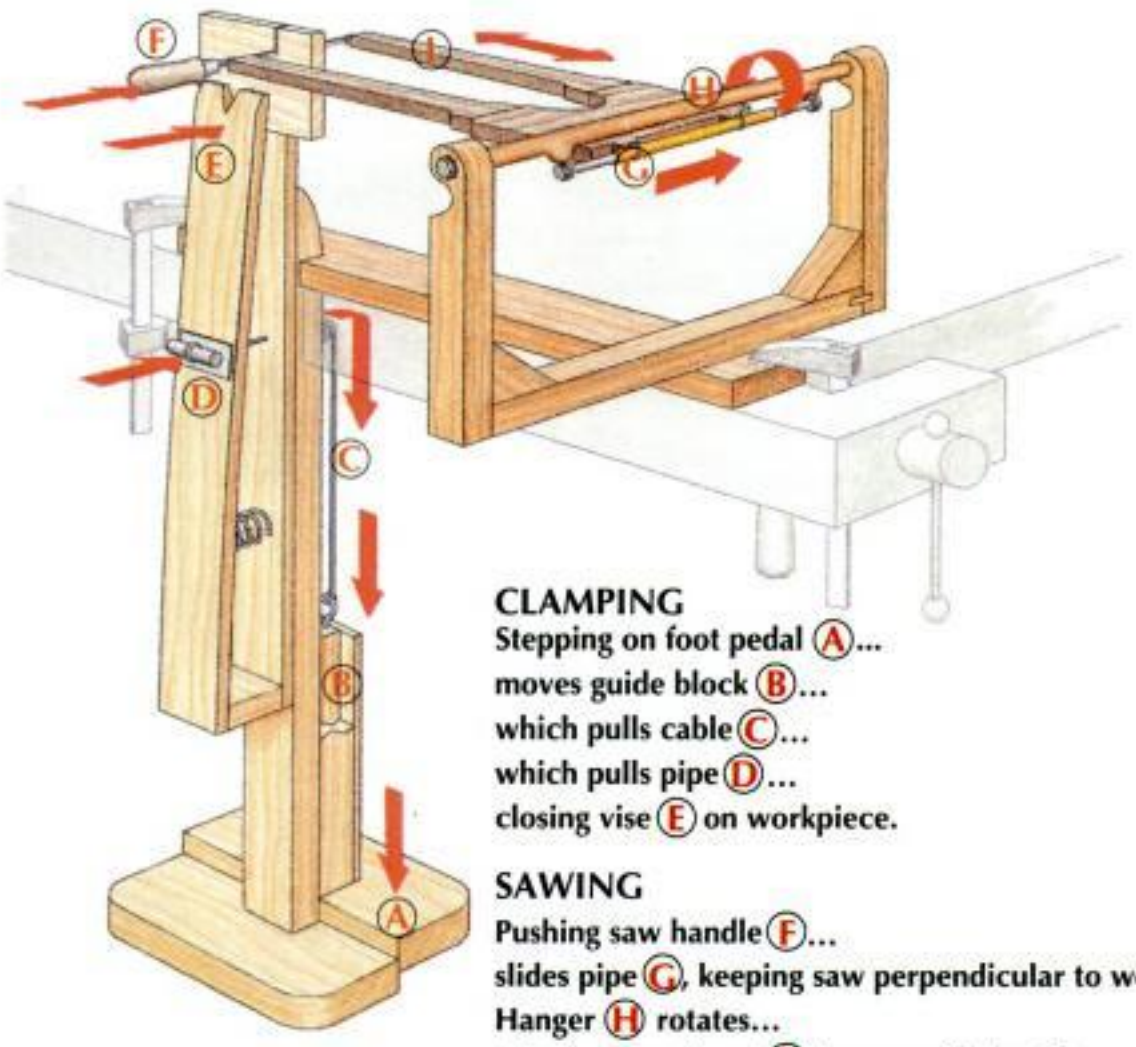
Marquetry Chevalet

Create beautiful pictures in wood with this jig for clamping and cutting

by Patrick Edwards

PHOTOS BY ANDY RAE

FIG. 1: HOW IT WORKS



Imagine fashioning an intricate wooden puzzle whose pieces are no thicker than a credit card. After tracing the delicate shapes on different wood veneers, you must make smooth, precise cuts, so that edges can meet perfectly in the finished work.

The craft I've just described is called marquetry, and in many ways it reached its zenith in the mid-18th century. During this period, French furniture makers became known for the beautiful decorative effects they achieved by combining precisely cut veneers from a variety of woods to create multihued patterns and images.

How did the French marquetry master cut such small, intricate shapes? He used a special tool called a *chevalet*. The chevalet shown here is a simplified version of a traditional chevalet I made about 10 years ago, which in turn was patterned after one I saw in the Getty museum in Los Angeles. Like its antique predecessor, mine is essentially a jig with a foot-actuated clamp and a special saw frame that keeps the fine jeweler's blade taut and perpendicular to the work. (See Fig. 1.) It's critical that your cuts are perpendicular in two planes (horizontal and vertical)—especially when you're cutting a "stack" of veneers to a uniform shape.

You might think a power scrollsaw would work, but cutting delicate veneer pieces requires a fine saw blade, not the coarser blades typical of scrollsaws. A scrollsaw also lacks the fine speed control available with hand power—a must when cutting delicate pieces such as flower stems. Also, some scrollsaws move up and down in an arc, which means the blade is not perfectly perpendicular to the table at a given moment. The results are unsightly glue lines when the pieces are assembled.

My simplified chevalet is easy to build: Common hardware and scrap hardwood are all you'll need in the way of materials. You'll also need a fretsaw with a solid metal frame. Use a 6-in.-long 3/0 or 4/0 jeweler's blade, which typically has about 75 teeth per in. (Fretsaws and blades are available from Constantine's, 2050 Eastchester Rd., Bronx, NY 10461, 800-223-8087.)

The jig consists of three separate assemblies: the foot vise, the saw frame and the saw support. (See Fig. 2.) Here are some tips for building the three parts.

The Foot Vise

The height of your foot vise will depend on the height of your stool and on the sawing height you find comfortable. I find that having the top of my vise about level with my chin works best for me.

Assembling the jaws—Screw the spacer block to the bottom of the fixed jaw and post, then secure the pivoting jaw to the block with 1½-in. pan-head screws through oversized holes. (See Fig. 2.) Make the screws tight, then back them off a half-turn so the jaw is slightly loose. This allows the jaw to pivot as it clamps.

Making the sliding foot pedal—The guide box houses the guide bar, allowing the bar to move up and down as the cable is tensioned or released. Leave about 1/16 in. side-to-side clearance inside the guide box for the bar, to ensure that the bar will slide easily.

Running the wire cable—The wire cable is fixed to the pivoting jaw and the foot pedal. Pushing down on the pedal pulls the jaw against its mate. To make the jaws clamp securely, secure the cable to a length of copper pipe with a cable crimp as shown in Fig. 2. Then pass the cable through the outlet cover and both jaws and over the nylon wheel. With the jaws open about 1¼ in., hold the foot pedal up against the bottom of the guide box, and temporarily clamp the cable onto the eye bolt at the top of the guide bar. Place the spring between the jaws (see Fig. 2) and try the vise. The jaws should close firmly before the foot pedal bottoms out on the floor. If the vise doesn't grab securely, shorten the cable slightly. When the vise is working, secure the cable permanently to the eye bolt.

The Saw Frame and Support

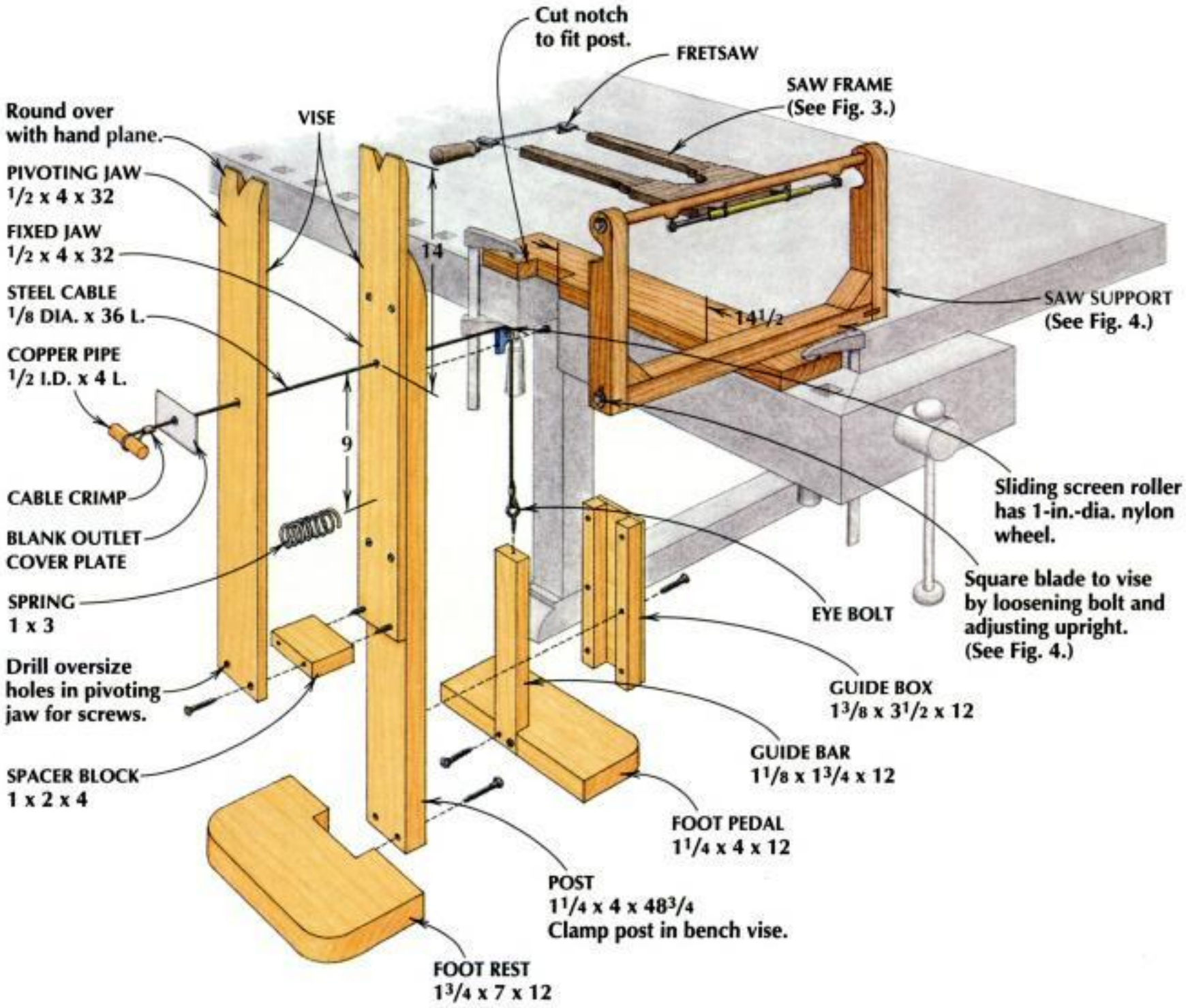
Once assembled, the saw frame and its support become one unit that can be positioned and clamped quickly to your workbench. A notch in the base positions the vise post at the correct distance from the saw support. (See Fig. 2.)

Modifying the fretsaw—Cut off the "U" part of your fretsaw with a hacksaw, leaving a 2-in.-long stem beyond each blade holder. (See Fig. 3.) Then clamp each holder in a metal vise and bend the stems 90° with a hammer so that the teeth of the blade will face down into the work when installed.

Making the saw frame—The saw frame is held together by long tenons on the arms to resist the tension that the saw blade will exert when it is installed. (See Fig. 3.) I cut the mortises by drilling a series of holes and squaring up the mortises with chisels. Another method is to rout from both sides of the stock to make these deep mortises.

Once you've assembled the frame, drill a hole in each arm for your cut-off saw stems, then glue the stems into the holes with epoxy.

FIG. 2: CHEVALET



FOR MORE INFORMATION

Information on the art of marquetry is available in a book:

Marquetry, by Pierre Ramond
1989, Taunton Press
Newtown, CT 06470

Or, contact:

Marquetry Society of America
Box 224
Lindenhurst, NY 11757

International Creative Marquetry Society
Box 11205
Englewood, CO 80151

Making the slide mechanism—Make the hanger from a durable hardwood like rosewood. (See Fig. 4.) Solder the brass pipe to the frame's eye bolts, then slide the steel rod inside the pipe and secure the rod to the hanger on the saw support with nuts and washers. Make sure the brass pipe slides smoothly along the rod.

Making the adjustable uprights—To ensure that the blade is square to the workpiece while sawing, the center of the steel rod which hangs from the uprights must be the same height from the benchtop as the blade. To find the correct height, clamp the foot vise into your bench and measure from the surface of your benchtop to the center of the "V" in the jaws. Then add 1 1/4 in. to get the height of the lag-bolt hole in each upright.

The two uprights are adjustable via sliding joints: one vertical and the other horizontal. (See Fig. 4.) This allows you to adjust the saw frame and the blade perpendicular to the vise in both directions. Cut the slots for the splines with a straight bit chucked in the router table, or simply saw them by hand and clean out the waste with a 1/4-in. chisel.

Setting Up and Using the Chevalet

To set up the chevalet for sawing, clamp the vise to your bench and position and clamp the saw support. (See Fig. 2.) Install a blade by squeezing the arms of the saw frame together with your right hand and shoulder and tightening the blade holders with your left hand. Make sure to orient the teeth of the blade facing forward (for cutting on the push stroke) and down.

It's important to adjust the chevalet so that your cuts will be perfectly square to

Fine cutting. *Edwards saws a pattern in a stack of veneers. The blade stays precisely 90° to the workpiece as he pushes and pulls the saw.*

the workpiece. To do this, clamp a ½-in.-thick scrap in the foot vise, then hold a small machinist's square against the scrap and the blade to make sure the stock is square to the blade in both planes. If the blade is out of square, loosen the bolt in the appropriate upright of the saw support, tap the upright, then retighten the bolt.

In France, traditional marquetry is cut one sheet at a time, a technique known as "piece-by-piece" cutting. I cut my marquetry using the "stack" method, sawing out all the pieces of the picture I want at the same time. This method often yields several marquetry panels from one stack. The chevalet works well for both techniques.

To prepare a stack of veneers for sawing, I select my veneers and hold them together in a pack with veneer tape. Then I drill a tiny hole through the pack near the center, insert my saw blade through the hole, and install the blade in the frame.

Sawing marquetry on a chevalet is a dance involving both feet and hands: Your feet release the vise slightly as you rotate the pack, all the while following your design with the saw blade. Cut from the center of the design, keeping the blade in the center of the vise's "V" cut. As you separate the tiny pieces from the pack, store them in a tray so they won't get lost in the sawdust. ▲

PATRICK EDWARDS
studied marquetry at École Boulle in Paris. He lives and teaches in southern California.

FIG. 3: SAW FRAME
TOP VIEW

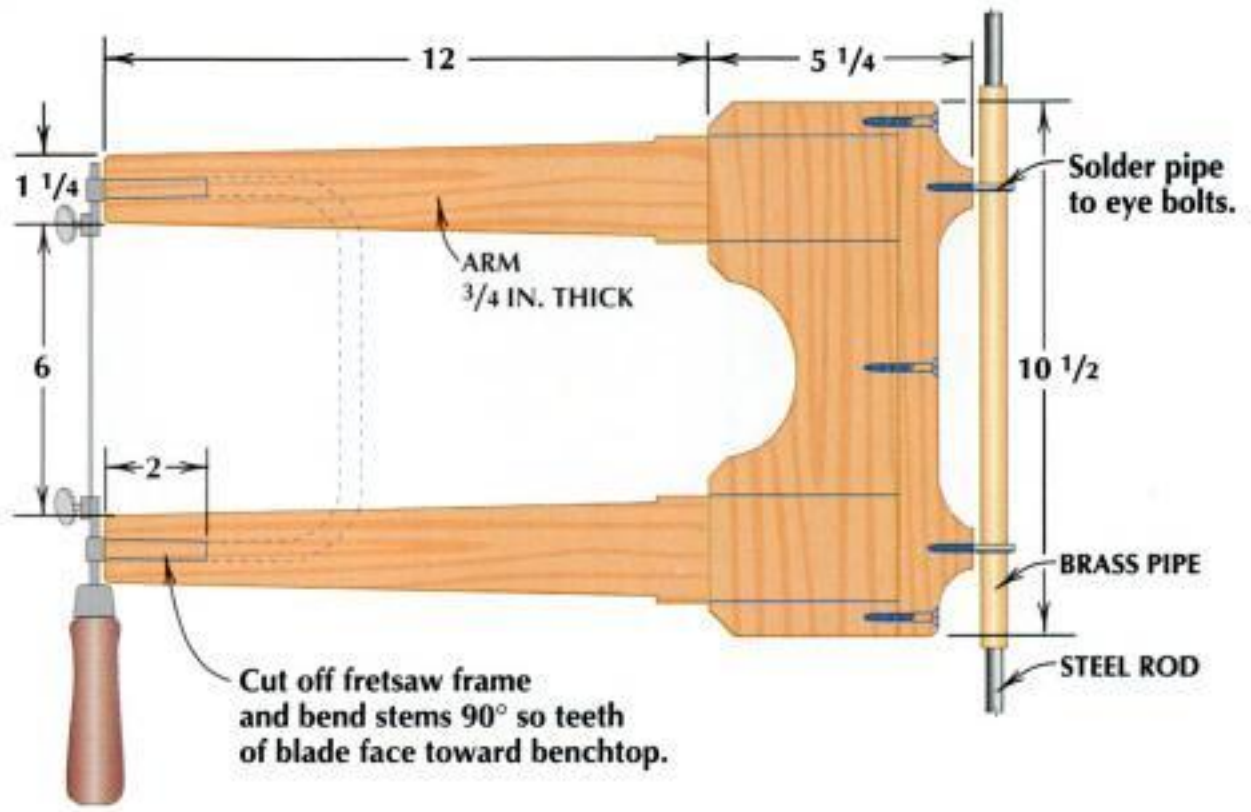
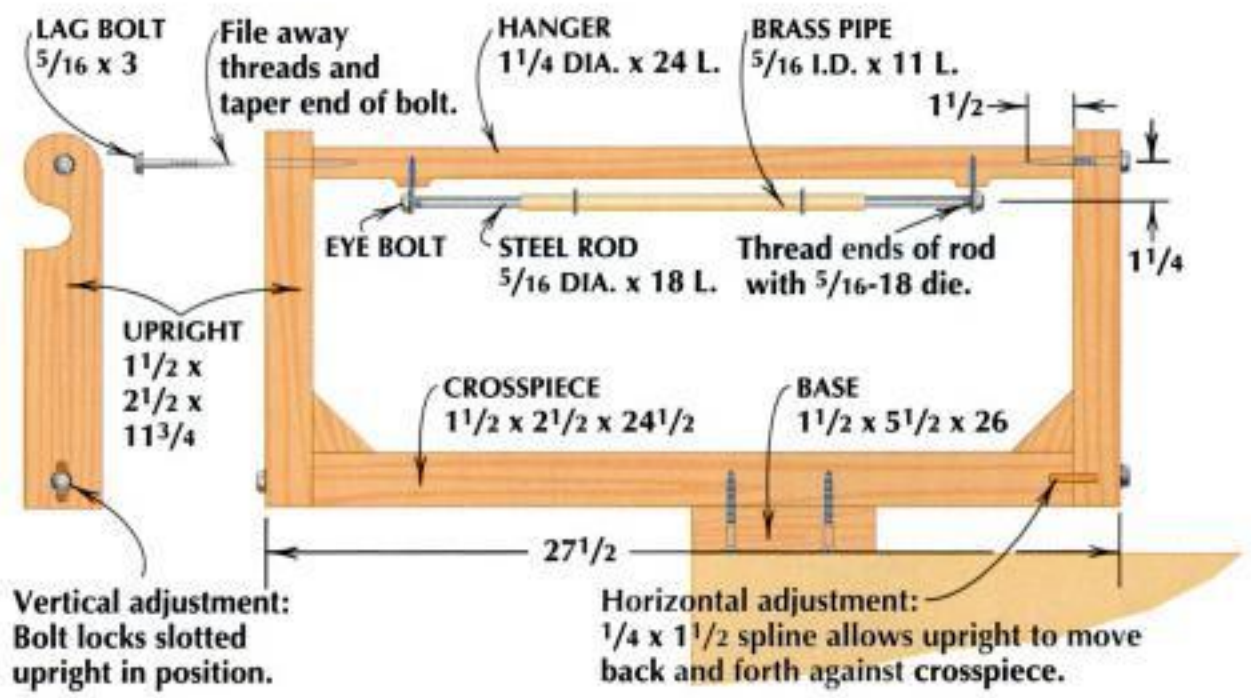
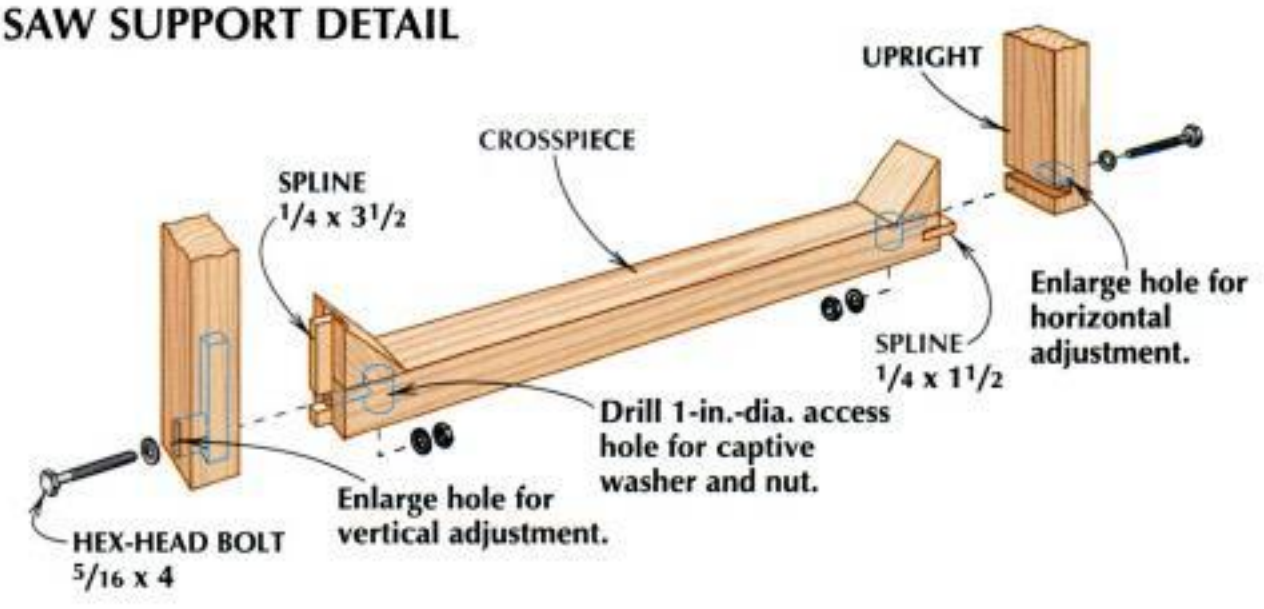


FIG. 4: SAW SUPPORT
ELEVATION



SAW SUPPORT DETAIL



WOOD FACTS

Zebrawood

by Paul L. McClure

In a remote region of western Africa, a group of loggers slash through the sweltering equatorial rain forest. Their trek is fraught with poisonous plants and deadly snakes. Gorillas watch from a distance. At last, the workers reach their destination. They stand dwarfed alongside their prey: 150-ft.-high trees that yield the striped, golden lumber called zebrawood. As the saws bite in, the trees give off a tremendous stench, as if trying to protect themselves...

Zebrawood grows in pure stands along river banks in southern Cameroon and Gabon. The tree can reach diameters of 4 to 5 ft. just above its low supporting buttresses. The trunk is often clear of limbs for 50 ft.

Although a number of species of trees worldwide are sold under the name zebrawood, the term generally applies to certain members of the *Leguminosae* family: *Microberlinia brazzavillensis, M. bisulcata,* and *Brachystegia fleuryana.*

Appearance

Zebrawood is named for its heartwood, which exhibits clearly delineated dark brown stripes running through a creamy yellowish background. Alternating grain can give the wood a wonderful ribbon stripe. The pinkish to golden sapwood is usually removed before export. The heartwood retains its color and figure well, turning slightly tan over time. The wood's bands of thin, open pores somewhat resemble those found in walnut.

Workability

Zebrawood is only moderately dense and works well with hand or power tools. Avoid delicate joints, though; the wood tends to split off. Flatsawn zebrawood is *very* unstable and will warp and split. Use rift or quartersawn only, checking it carefully for cracks. To avoid tearout, sand or scrape instead of planing. Some people develop respiratory allergies to this stinky wood, so wear a good mask.

The wood glues up very well. Prebore for screws and blunt the tips of nails to prevent splitting. Zebrawood readily accepts a finish, but to prevent dimpling, first seal the pores with paste filler or a good sanding sealer.

Uses

The exported lumber is used for furniture and cabinets, boxes and turned objects. In Africa, the wood is sometimes used for flooring and construction.

The veneer is used in marquetry and on tabletops and cabinet doors, where it is often laid out as a diamond or reverse-diamond match. ▲

ZEBRAWOOD

Species and Common Names		*Microberlinia brazzavillensis, M. bisulcata, Brachystegia fleuryana*—zebrawood, African zebrawood, zebrano
Growing Region		*West Africa, principally Gabon and Cameroon*
Specific Gravity		*0.74*
Density		*46 lbs. per cubic ft.*
Wood Movement[1]		*Tangential (flatsawn): small (less than 1/4 in. per ft.)* *Radial (quartersawn): very small (less than 1/8 in. per ft.)*
Durability		*Susceptible to fungal and insect attack*
Sustainability		*Sustainable at current harvest levels*
Availability		*Hardwood and specialty lumber dealers*
Size:	**Thicknesses**	*4/4 through 16/4*
	Widths	*6 to 18 in.*
	Lengths	*6 to 16 ft.*
Cost:	**Lumber**	*$13 per bd. ft.*
	Veneer	*$1.70 per sq. ft.*

[1] *Indicates wood movement across the grain from 6 to 12 percent moisture content.*

ZEBRAWOOD

JUST FINISHING

Wax: Finish or Finale?

A traditional sheen that's inexpensive and easy to apply

by Michael Dresdner

There is a long-standing debate in the woodworking world about the status of wax in the finishing room. Is it a credible finish in its own right, or should it be used only to protect a more "serious" finish? For me, the answer is an unequivocal "both."

Types of Wax and How to Apply Them

Most furniture and floor waxes contain a mixture of hard plant waxes and softer beeswax. The harder plant waxes—such as carnauba from Brazil and candelilla from Texas and New Mexico—will buff to a higher shine than softer waxes. Beeswax makes the product easier to manipulate.

Although wax is solid at room temperature, it will flow easily if it is either heated or mixed with solvents. Manufacturers add varying amounts of solvents to turn wax into a usable "paste" or liquid, thus making it easier to apply. Simply wipe on a very thin coat of wax, wait five or 10 minutes for the solvents to "flash off" (evaporate), then buff the wax to a nice shine. Some manufacturers put wax into an emulsion—tiny particles of wax suspended in water—to make a low-solvent liquid or semi-paste for easier application.

Because wax lacks clarity, it is always used in very thin coats, lest it obscure the wood's beauty. But don't worry: The dreaded "wax buildup" of TV-commercial fame is unlikely to occur. The solvents in successive coats of wax and the heat of rubbing will redissolve old coats of wax, preventing buildup.

Maintaining Finishes with Wax

We have long used wax to both beautify and protect our fine furniture finishes. A buffed coat of wax adds shine to a dulling surface, hiding fine scratches in the process. And shoe polish or paste wax with color or rottenstone added to it can add age and character to intricate carvings. But does wax really offer protection, or is that an advertisers' myth? After all, isn't the finish underneath harder than the wax we put on top?

One theory is that, since wax is slippery by nature, hard objects tend to slide or glance off the surface instead of digging in and leaving a visible scratch. Wax won't protect against an exposed staple in a box that's slid across the tabletop, but it will help with minor assaults that furniture suffers every day—like foods that stain and chemicals that dull.

PHOTO BY ANDY RAE

Rub it on, buff it off. *Wax formulations provide a uniform sheen while offering minimal protection from food and water spills, but they require periodic maintenance.*

While most waxes dissolve easily in petroleum solvents, they do stand up well to many acids and food stains. Their ability to shed water lets them add a bit of waterproofing to many traditional finishes. In some cases waxes become the sacrificial first line of defense, protecting the finish while they themselves become cloudy or ruined. But the beauty of waxes is that they are easy to remove, repair and replace.

Using Wax as a Finish

Although wax is too soft to offer much physical protection to wood, its ability to resist some stains and shed water make it a legitimate finish when used by itself. It's commonly used on turnings, *treen* (small ornamental or functional wooden objects) and other low-wear surfaces. A coat or two of wax brings out the true color of wood and lends a soft sheen and a delightful feel to its surface. Many turners apply wax directly to pieces spinning on the lathe, taking advantage of the heat generated during application to flow out even raw, solvent-free wax. One turner I know uses buffing compound sticks—blocks of wax heavily impregnated with sanding grit—to polish and finish his turnings in one operation.

Far more common is the combination of wax and oils to make an easy-to-apply, wipe-on finish. Combining the workability and toughness of oil and the body and sheen of wax, such mixtures provide minimal protection for low-wear surfaces and will rejuvenate with a dry cloth. While the result is not much different from waxing over an oil finish, it saves you one application step.

There are several commercial blends of wax, oil and solvent on the market, but you can also mix your own concoctions, beginning with beeswax and plant waxes in their solid forms. Here's an old beeswax finish formula that I learned from an employer early in my career: Mix equal amounts of beeswax, linseed oil and turpentine. Heat the ingredients in a double boiler until the wax is completely melted, and stir until thoroughly mixed. Apply the mixture while it is still warm, wiping it on with a soft cotton cloth. Then buff off the excess.

Warning: Melted waxes and solvents are extremely flammable. Do not expose to open flame. Work only outdoors, using a double boiler and an electric hot plate. Wear long sleeves, gloves, and eye protection. Remove the mixture from the heat source as soon as the wax has melted. ▲

Join Michael Dresdner live on America Online Sunday nights from 9:30 pm to 10:30 pm eastern time for answers to your finishing questions. Keyword "wood" takes you to AMERICAN WOODWORKER Magazine Online. Click the "Shop Talk" icon to enter the chat room.

TOOLBOX

Fast Lap

Flattening the backs of plane irons and the bottoms of hand planes just got easier. Lee Valley's new collection of lapping supplies includes a tempered-glass lapping plate, a lapping kit with five different grits (90, 180, 280, 400 and 600) of silicon carbide abrasive powder, and adhesive-backed mylar film to stick to the glass plate. The abrasive particles bed easily in the mylar, so they cut faster. (Price: #05M20.12 tempered-glass lapping plate, $7.95; #05M01.01 lapping kit, $13.95; #05M20.11 four sheets of mylar film, $6.95) *Lee Valley Tools, Dept. AWT, 12 E. River St., Ogdensburg, NY 13669, (800) 871-8158.* **Circle #607**

Stack Dado Adjusts on the Arbor

DML's new Thoroughbred 8-in. dado set produces the flat-bottomed kerf and clean sides of a stack dado, while it's as easy to adjust as a wobble dado. The dado set consists of three blades and a unique cam mechanism that lets you adjust dado width from 1/4 in. to slightly over 13/16 in. With the blades still on the arbor, you "dial in" the width using a special wrench (included). The set comes configured for use on tablesaws but is easy to convert for use on a radial-arm saw. (Price: $260) *Primark Tool Group, Dept. AWT, 1350 S. 15th St., Louisville, KY 40210, (800) 242-7003.* **Circle #608**

New Air Nailers

Porter-Cable's new line of pneumatic nailers offers premium features at very affordable prices. Choose from an 18-gauge crown stapler, two 18-gauge brad nailers, two 16-gauge finish nailers and a 15-gauge angled finish nailer. Each nailer comes in a plastic carrying case that contains a quick air line coupler, safety glasses, oil, wrenches, owner's manual and a pack of 1,000 nails. (Price: $95 to $250) Porter-Cable Corp., Dept. AWT, Box 2468, Jackson, TN 38302, (901) 668-8600. **Circle #610**

Precise All-Purpose Gauge

With Oneway's new Multigauge, you can do all kinds of alignment and setup work: setting jointer and planer knives, checking runout, adjusting fences and measuring router bit or saw blade heights, to name a few. The gauge's flat probe lets you find exact top dead center on a jointer's cutterhead. (Price: $74.80) *Oneway Manufacturing, Dept. AWT, 241 Monteith Avenue, Stratford, Ontario, Canada, N5A 2P6, (800) 565-7288.* **Circle #609**

Turn Hollow Vessels

Ellsworth Hollow Form Turning Tools let you cut inside a narrow opening to hollow out shapes with very thin walls—a job that's impossible with ordinary turning tools. Developed by noted woodturner David Ellsworth, who pioneered the technique, the set includes a straight tool for rough boring and a bent tool for making finishing cuts inside your vessels. The set of unhandled tools will hollow vessels up to 9 in. deep and 12 in. dia. through an opening as small as 3/4 in. (Price: Set of two tools, $64.95) Woodcraft Supply Co., Dept. AWT, Box 1686, Parkersburg, WV 26102, (800) 225-1153. **Circle #611**

New Keller Dovetail Jig

Keller dovetail jigs are well-known for durability and ease of use. (See AW #50.) Now Keller has introduced a more affordable dovetail jig made of black phenolic resin. The new model 1500 Keller Journeyman Dovetail System works like the original machined aluminum Keller jigs, using two carbide router bits with shank-mounted ball bearings (included) that follow the jig's template fingers. Unlike the original Keller jig, which has separate pin and tail templates, the 1500 combines both templates into a single, 16-in.-long template. (Price: $139) Keller & Co., Dept. AWT, 1327 I St., Petaluma, CA 94952, (800) 995-2456. **Circle #612**

GRIZZLY 1066 DUAL-DRUM SANDER by Fred Matlack

SHOP TESTED

A drum sander makes quick work of sanding glued-up panels, cabinet door frames and other flat work. And it earns its keep by sanding curly maple and other wild-grained woods that would suffer noticeable tearout if you ran them through a thickness planer. A drum sander can even smooth end grain and parquet-type panels.

The lowest-priced drum sanders (around $600) are single-drum models. Dual-drum sanders, like the Grizzly model featured in this shop test, have even greater time-saving potential than the single drum units. With the same grit on both drums, you can remove twice as much material in one pass. Or, with coarse grit on the first drum and fine grit on the second, you can rough- and finish-sand in one pass.

Many dual-drum sanders carry price tags of $2,000 or more. Grizzly's model 1066 dual-drum sander is notable for its lower price—around $1,100. To make this price point, Grizzly stuck to the essentials, producing a basic machine that works well but lacks the refinements found on costlier models. For example, the 1066 has a single feed rate (11 ft. per min.), as opposed to variable speed control. And the sheet metal chain guards and covers are flimsy. But we didn't find that these compromises affected overall performance.

Our drum sander came bolted to a metal base that you can remove. Or, if you prefer, you can add a few caster wheels to convert it to a mobile base. The 1066 can handle stock up to 4 1/2 in. thick and 22 1/2 in. wide. You can sand stock as thin as 5/16 in. and as short as 9 in. This range is good news for shops that handle small work as well as large work.

Thickness sanding takes a lot of power, and the Grizzly provides it with a 5-HP, 230-volt motor that turns the main sanding drums via double V-belts. A separate 1/4-HP motor powers the stock conveyor belt with a chain drive.

Drum sanders require periodic adjustments to work well, and those on the Grizzly were easy to make; it's just a matter of tightening or loosening Allen screws and lock nuts on pillow blocks.

Abrasive planing. *Grizzly's new sander handles stock up to 4 1/2 in. thick and is priced around $1,100.*

You can adjust the drums to ensure that they're parallel to the table; you can also adjust the alignment and tension of the three pressure rollers and the tracking of the rubber conveyor belt.

One revolution of the height-setting crank raises or lowers the conveyor belt 1/16 in. On narrow pine stock, you can take off as much as 1/8 in. per pass, using coarse-grit paper. To sand a wide (12-in.-plus) hardwood board, we got the best results when removing much smaller amounts (about 1/64 in.) per pass. With 100 grit on one drum and 150 grit on the other, the sander produced a smooth surface ready for finishing.

Changing the sandpaper on the drums is a necessary and frequent task which proved to be fairly easy on the Grizzly. Just like other drum sanders, the Grizzly's drums take 6-in.-wide sandpaper strips that are wrapped around in spiral fashion. Papering a drum takes about 10 minutes if you're working alone. With a helper, you'll be done a few minutes sooner.

The Grizzly 1066 is a no-frills machine for budget-conscious woodworkers anxious to cut down on sanding time. (Price: $1,095) *Grizzly Imports Inc., Dept. AWT, Box 2069, Bellingham, WA 96227. Call: (800) 541-5537 west of the Mississippi; (800) 523-4777 east of the Mississippi.* **Circle #613**

Peculiar Possibilities

Among furniture makers, there are some who like to add a new "wrinkle" to their work from time to time. It may take the form of an architectural façade, an unusual material, a surprising color or inlay—or even a real wrinkle or two carved in an unexpected place. Here's a sampling of some inspiring possibilities.

"Tablecloth Table" by the Meier brothers, Robert and Christian, Half Moon Bay, CA. Quilted maple and black walnut. Laminated and carved. L: 20 in. W: 20 in. H: 29 in.

PHOTO BY SAM SARGENT

"Inlaid Dining Table" by David J. Marks, Santa Rosa, CA. Quilted maple sawn veneer, wenge and ebony inlay. Coopered base; veneered and inlaid top. L: 72 in. W: 48 in. H: 31 in.

PHOTOS BY DON RUSSEL

"Bull's-Eye Drop-Leaf Table and Chairs"
by Alphonse Mattia, Westport, MA. Wenge and pau ferro lumber and veneer, suede seats and back insets, birch plywood. Mortise-and-tenon joints; veneered top.
Table: L: 46 in. W: 16 in. H: 29 1/2 in.
Chairs: W: 20 in. D: 24 in. H: 36 in.

PHOTO BY DEAN POWELL

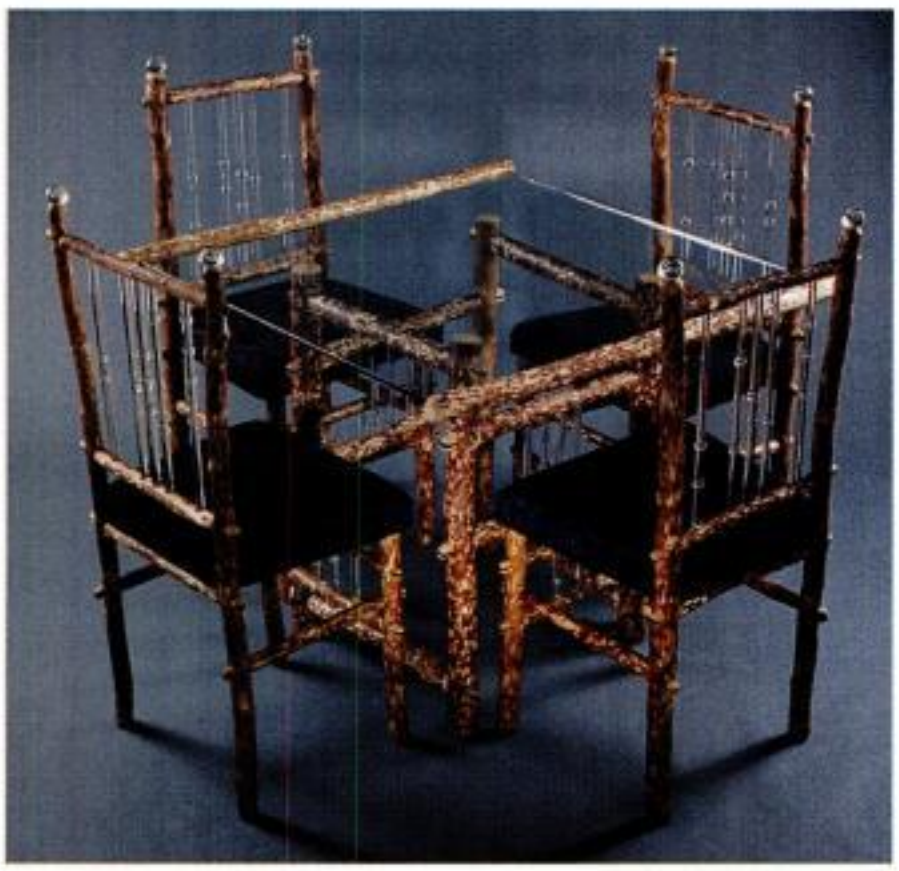


Table and chair set by Jill Henrietta Davis, Seattle, WA. Alder, glass (blown, plate and Pyrex) and upholstery. Wedged-tenon joints.
Table: L: 36 in. W: 36 in. H: 30 in.
Chairs: W: 16 in. D: 18 in. H: 42 in.

PHOTO BY JILL HENRIETTA DAVIS

Want to see your work in "Gallery"? Send color slides or larger transparencies to: "Gallery," AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. Please include a title, a brief description of techniques used, materials, dimensions, name of photographer, your name, address, and phone number. We'll pay you $35 per entry published. If you want your photos returned, enclose a self-addressed stamped envelope.

"The Brownstone" liquor cabinet by Robert Kron, Port Washington, NY. Satinwood, purpleheart, hickory, zebrawood, maple, maple plywood, aniline-dyed veneers. Veneered, inlaid and hand-carved.
W: 27 in. D: 22 1/2 in. H: 57 in.

PHOTO BY OLEG MARCH

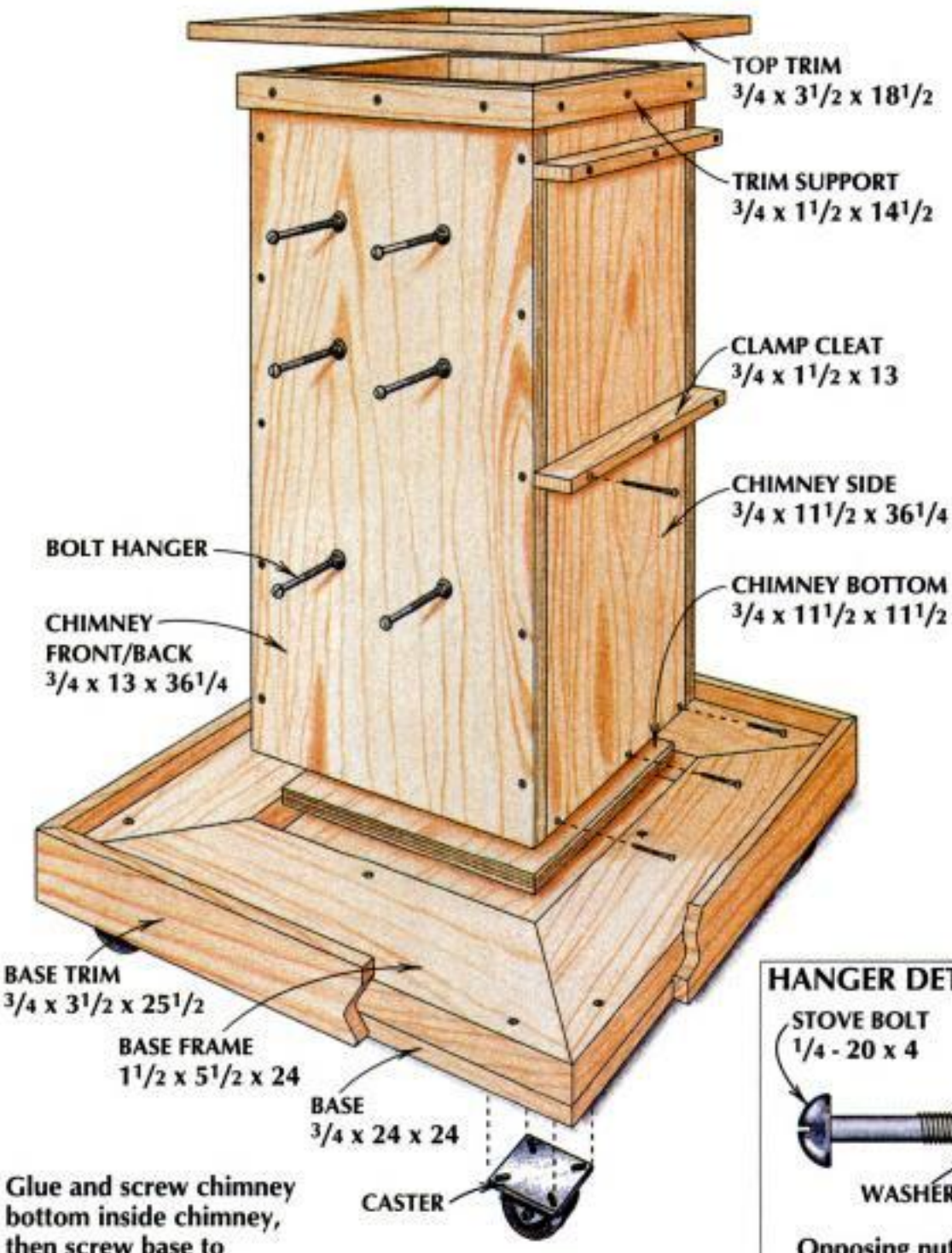
SHOP SOLUTIONS

Chimney Clamp Rack

Store 100 clamps in 4 square feet

by C. Roy Scammell

Clamps to go. *There's plenty of storage space inside and outside the plywood "chimney" at the heart of this roll-around cart.*



Glue and screw chimney bottom inside chimney, then screw base to bottom of chimney.

Despite what they say, you *can* have too many clamps—if you don't have the room to store them. I designed the rolling rack shown here to keep all my clamps close at hand, no matter where I am in the workshop.

The tall center box, or "chimney," is the key to this rack's versatility. Inside the chimney, you can easily store more than a dozen long pipe clamps. Outside, you have four walls to hang everything else. Tailor this space to hold your clamp collection, screwing additional cleats or attaching bolt hangers as necessary. (See detail.) The wide trim pieces around the top of the chimney and the base provide places to hang other kinds of clamps, while the wide trough on the bottom is for related items such as band clamps, picture-frame clamps, glue and other supplies.

I built this rack from shop-grade 3/4-in. plywood and dimensional lumber, using glue, screws and finishing nails. Screw and glue the chimney onto the base so that it can't tip off.

Heavy-duty casters for shop equipment are available from The Woodworkers' Store, (800) 279-4441. ▲

BEST SOLUTION WINS!

Send photos, sketches and an explanation of your fixture to: AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. Next issue's contributor will receive this Hitachi 5-in. random-orbit sander, list price $195