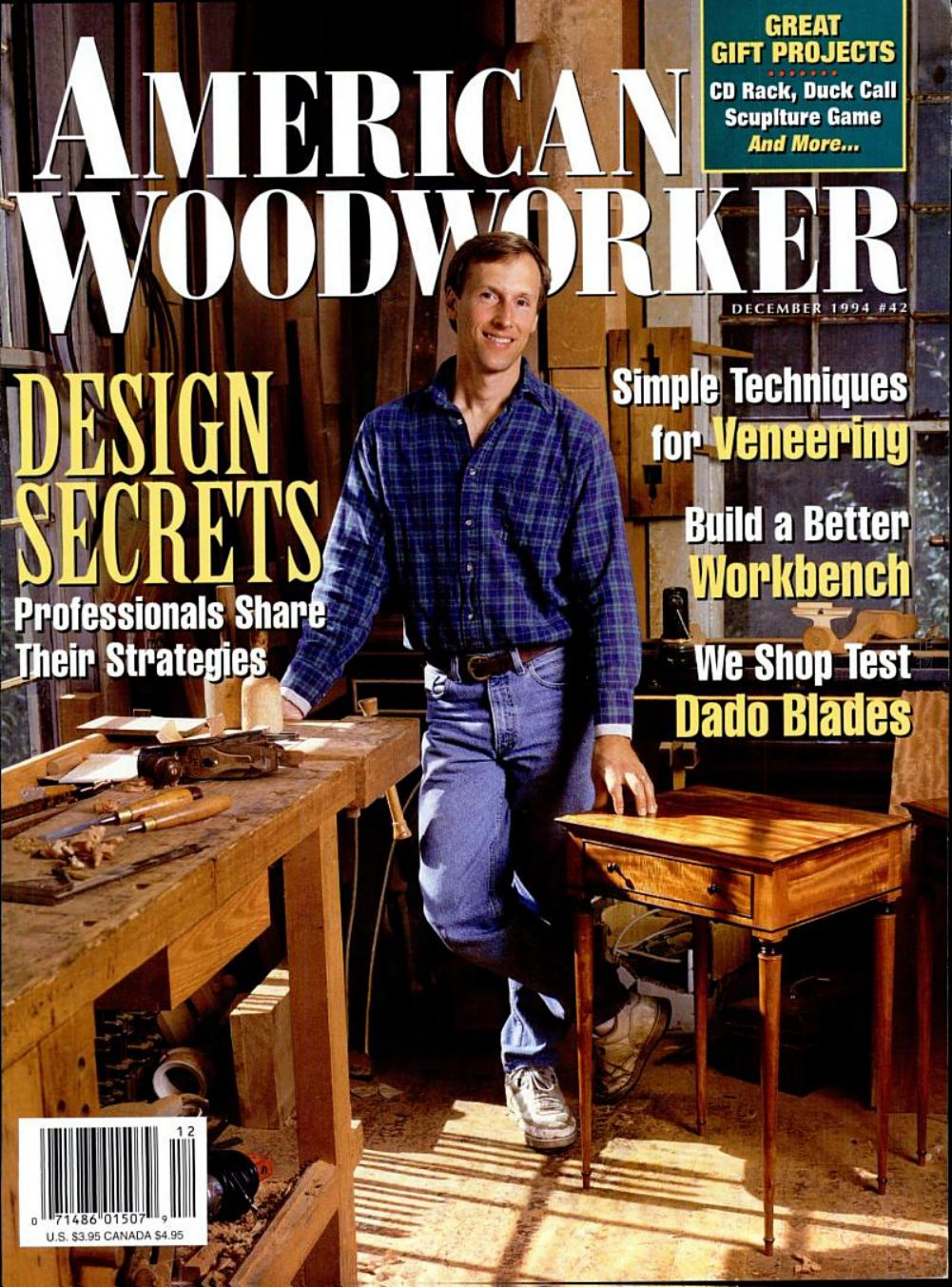


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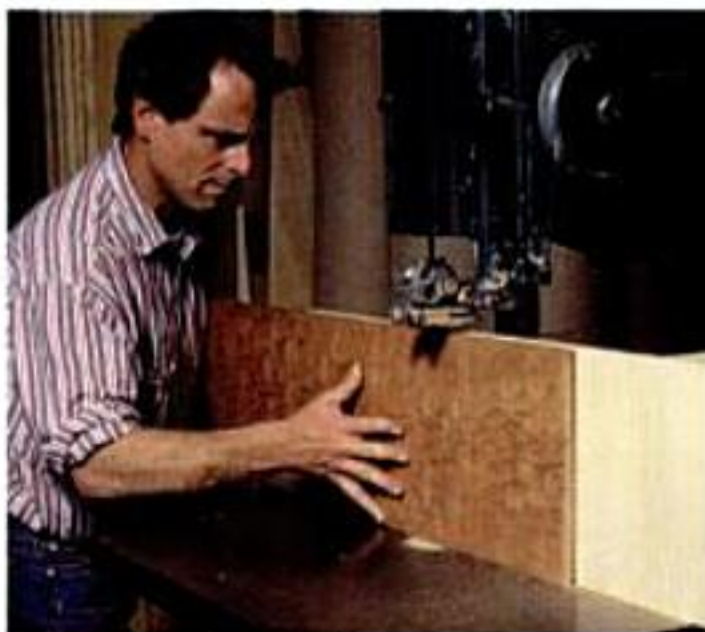
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A WORD FROM THE EDITOR

GIVING IS ITS OWN REWARD

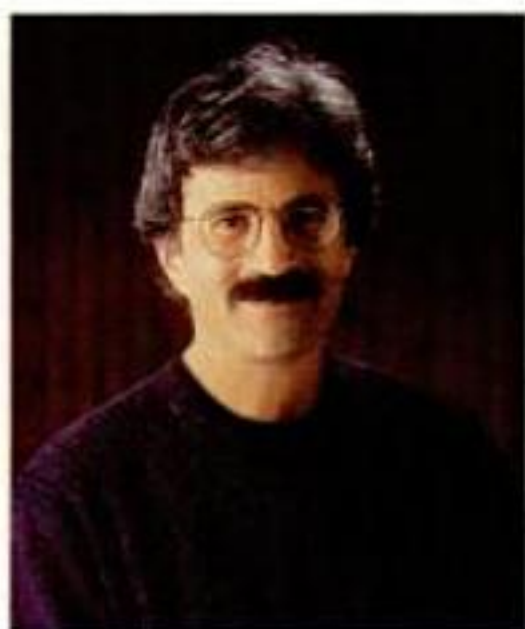
'Tis the holiday season again—time for all of us woodworking Santa Clauses to spend our every free minute in the shop, concocting gifts for the lucky people on our Christmas lists. It's worth it, though, when you think of the payoff—all those excited smiles your efforts will bring on Christmas morning.

For me, making gifts isn't a solitary process. Usually I get together with a couple woodworking friends to make production runs of simple projects like birdhouses or boxes or letter openers. It's amazing how much you can accomplish when you divide the labor with others. If all goes according to plan, Christmas Eve finds your shop brimming with finished gifts. The only thing that's left to do is to put them under the tree and savor the satisfaction of giving something of yourself to those you love.

Then, before you know it, the holidays are over and it's time to start the new woodworking year in earnest. If you're like me, you tackle something more ambitious—something to keep you occupied all those long winter nights, while the snow falls silently outside and the fire crackles in the woodstove. Times like these remind me why I'm so attracted to this craft.

In This Issue

Along with some nifty gift ideas, this issue is packed with our usual eclectic mix of woodworking topics, including



Craig Bentzley's article on woodgraining and Kam Ghaffari's feature on veneering, a technique that has gained in popularity in recent years as world supplies of exotic woods have declined. Kam dispels some of the entrenched myths about veneer and explains how to use it with confidence—and beautiful results.

In "What is Good Design?" we visit the shops of six of New England's top designer/craftsmen to find out what they're thinking about when designing furniture. Through their words and photos of their work, you'll see there's plenty of room for individuality in this important and rewarding process.

As usual, we're also keeping an eye out for innovative products to make your woodworking easier, safer and more enjoyable. In a special, expanded "Toolbox" department beginning on page 90, our editors pick their favorite new tools and accessories from this summer's National Hardware Show in Chicago and the International Woodworking Machinery and Furniture Supply Fair (IWF) in Atlanta. And, in our "Buyer's Guide To Carbide Stack Dado Heads," we rate sixteen 8-in., carbide-tipped stack dadoes—"essential" reading for anyone who is considering a new dado set.

So, sit back and enjoy. All of us at AMERICAN WOODWORKER wish the best to you and yours this holiday season and all year long.

—Ellis Valentine

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.

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LETTERS

Praise for Lohr

As a novice woodworker and an aficionado of the furniture of the Arts & Crafts period, I was immediately struck by the beauty of the settle, or couch, made by Jeff Lohr. Although the Stickley and Greene & Greene influences are both apparent, Mr. Lohr's interpretation has succeeded in bringing to the style a unique and fresh perspective.

I'm wondering—would AMERICAN WOODWORKER consider doing an article on this remarkable piece of furniture?

Jim Hatton
American Embassy, Fiji

Sounds like a good idea. Stay tuned to future issues. —Eds.

Splines of Walnut, not Ebony

I was very pleased to have one of my pieces pictured in your magazine (see AW #39). Tolpin's article on proud joinery was very good and I believe my love seat added some interest. However, the caption describing my piece contains a serious error that I'd like to correct. It referred to ebony splines used to accent certain joints. The splines are walnut, not ebony.

This correction may seem unimportant to some; but it's very important to me. Like most of the wood that goes into my furniture, the walnut splines came from trees that I cut myself and had milled locally. I use no tropical exotic woods of any kind, and especially would never use ebony as I believe it to be quite endangered. The focus of my work over the last 10 years has been on the exclusive use of local, sustained-yield hardwoods.

Jeffrey D. Lohr
Schwenksville, PA

Wider Stance for Clamp Rack

I am 78 years old (retired surgeon) and just completed the Roll Around Clamp Rack featured in your August issue (AW

#39, page 88). I found the rack to be top heavy, even with 6-in.-dia. casters. I increased the base width from 24 in. to 33 in. and moved the casters out for stability. This solved the problem. I enjoy your magazine very much.

George Martin
Vicksburg, MS

Kaleidoscope Comments

For readers who are interested in building kaleidoscopes (see AW #40), the following tips might be useful. I developed these techniques while building several kaleidoscopes. Keep up the good work!

- To avoid damage to the barrel during glue-up, use masking tape wound tightly instead of hose clamps. Glue that squeezes out can be sanded off easily.

- To turn the barrel, mount it on a slightly tapered mandrel made from a scrap 1x2 and mounted between the spur drive and cup center.

- Use plastic window glazing material instead of glass for discs in the objective chamber. These discs can be easily turned on the lathe using my "Tech Tip," which appears in this issue. (See page 26.) To get the frosted disc, just sand one surface.

- To improve the mirrors' edge-to-edge fit (and minimize the line seen), sand each mirror's edge with 400-grit wet-or-dry paper after cutting. Wet the sandpaper for best results.

- Hold the mirrors in place by pushing small pieces of plastic foam into the space between the mirror assembly and the barrel. The mirror assembly can be a very loose fit and still be held securely.

Bill Boyd
Salem, SC

More on Women Woodworkers

I really enjoyed the article in issue #39 about 80-year-old Judith Hughes, a furniture maker in England. It is good to see that a woman has been successful in the trade. I also enjoyed the included

pictures of her work. Her craftsmanship is beautiful. If you find any more women furniture makers, please include them in your magazine. We do exist!

Kristina McKeown
Laramie, WY

Glue Correction

We appreciate the review of our Elmer's Weather-Tite Wood Glue (AW #39, page 76); however, we'd like to request a correction due to recently obtained information.

Re-testing of Weather-Tite has shown that it is water-resistant; but the product does not meet the requirements of ANSI Type II standards. The water resistance of our product is supported by other tests including ongoing weather tests with uncoated birdhouses constructed with Weather-Tite.

Vincent Salerno
Borden Home & Professional Products
Group

Don't Break the Blade

In your article on turning stack-laminated bowls (AW #39), Rude Osolnik advises cutting the laminate rings on the bandsaw. To avoid cutting through each ring, he breaks the bandsaw blade, inserts it through a drilled hole along the cut line, makes the cut, and re-breaks the blade.

I have found it possible to cut rings using a portable jigsaw. The cut is started in a predrilled hole, as above. While the bandsaw cuts faster, both techniques probably take about the same time if you factor in the work of silver-soldering and re-mounting the bandsaw blade. I've cut mahogany rings up to 2 in. thick with my jigsaw.

Peter Schneider
Worcester, MA

Concern for Crabb's Fingers

On page 49 of your October issue, you show a picture of Tom Crabb rounding the edges of a yo-yo on a router table. I

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was wondering if Mr. Crabb has designed a yo-yo for future use that can be thrown and caught with nubs in place of fingers. I do like the three-point fence idea, but Mr. Crabb needs to devise a better way to hold the yo-yo than is shown in the picture.

Michael D. Schall
Midland, TX

Differences on Dimensioning

Your August edition of *AMERICAN WOODWORKER* has an article by Lonnie Bird entitled "Dimensioning Stock." I would have no quarrel with Mr. Bird if the title of the article was "How a Jointer-Planer Can be Utilized." I do however disagree with the article as it pertains particularly to edge jointing. The best, and, in my view, the only way to proceed in edge jointing the two boards shown on the bottom of page 61 is as follows:

Set the board in a vise and with a hand plane (jack size) plane down the high ends and then finish jointing with

a #6, #7 or #8 jointer plane. The board shown in the illustration can be jointed in just a few minutes. It can then be run across the jointer-planer to assure right-angle edges.

With the second board illustrated — use the same procedure but plane down the middle of the board and then use a jointer plane. Then, if necessary, run across the jointer-planer.

William Velich
Silver Spring, MD

As one who earns a living working wood, I strive for both excellence and efficiency in my woodworking. This involves a balanced approach between machinery and hand tools.

Machines allow me to dimension stock many times faster than could ever be accomplished by hand. This gives me time to produce fine details in my work with hand tools.

To quickly straighten the edge of a crooked board, I set my jointer to remove as much as 1/4 in.; then I plane down the

offending high spots. Once the edge is true, I take one light pass over the entire length of the board to produce a finished surface. This is a commonly used professional technique, but it definitely requires a large, powerful jointer like the one pictured in my article.

—Lonnie Bird

Second Take on Coffee Break

Thanks for the "Carved Coffee Table" article in October's issue. To say it is an elegant piece is an understatement in my mind. The pictures of the table jumped at me and said, "You can make this table! The drawings are clear, the templates drawn—just do it!"

The reason for my letter is that I have no formal woodworking training of any kind; in fact, what I've learned has come from reading books and magazines. In my four years of making small boxes, wood has taught me some harsh lessons by moving just a little bit in the wrong place.

I have two questions. Since I'm planning to use 1 3/4-in.-thick mahogany for the rails instead of 2-in. stock, should I

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LETTERS

make my loose tenons $\frac{1}{4}$ -in. thick instead of $\frac{3}{8}$ in.? Also, since I'm not at all comfortable or equipped for veneering the top, can I use solid wood?

Please accept my gratitude for any suggestions offered. I would hate to have this table push itself apart because I made one of those learn-the-hard-way mistakes.

Lawrence McLean
Huntington Beach, CA

In this case, you have some leeway in designing your loose tenons. $\frac{1}{4}$ -in.-thick tenons would be practically as strong but $\frac{5}{16}$ -in. tenons would be better proportioned. You can still use the recommended $\frac{3}{8}$ -in. tenons if you simply move the inner tenons $\frac{1}{8}$ in. closer to the outer ones, leaving $\frac{1}{4}$ in. of wood between them and a $\frac{1}{4}$ -in. shoulder on the inside of the rail. I don't recommend solid wood for the top, but you could use it if you were willing to live with gaps between the top and the rails to allow for the wood movement that is inevitable with solid wood. If you don't feel confident about veneering, you could

have a local cabinet shop lay up the veneer for you, then do the rest of the work yourself.
—Ellis Valentine

More on Cleaning Bandsaw Blades

In Jim Cummins' answer on cleaning bandsaw blades (AW #39, page 12), he leaves out an important step after drying the blade. Spray the blade with WD-40 or a similar light-bodied rust preventative. Wipe down again, and make a 6-in.-long cut in some scrap wood to remove residue. Without the WD-40 treatment, any trace of water that remains on the blade can cause rust.

Charles Self
Bedford, VA

New Name for Knockdowns

Jim Barrett did an excellent job in describing the different possibilities offered by knockdown fasteners. (See AW #40, page 50.) The photography and illustrations are great too.

Ease of use has made these fasteners

popular among small-scale woodworkers and for the woodworking industry as well. Because industrial users have objected to the term "knockdown," we have changed the name to PAS, which stands for Precision Assembly Systems. The reason for this change is that these fasteners are now often used to make permanent connections, as an alternative to the more time-consuming operation of gluing and clamping. In other words, knockdown fasteners are used increasingly to make permanent joints. This explains our name change.

Karl-Heinz Kraft
Häfele America Co.

WHAT'S ON YOUR MIND?

We value your comments, complaints and corrections. Send your letters to: "Editor," AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098, or telephone your message to us at (610) 967-7776. Fax: (610) 967-8956.

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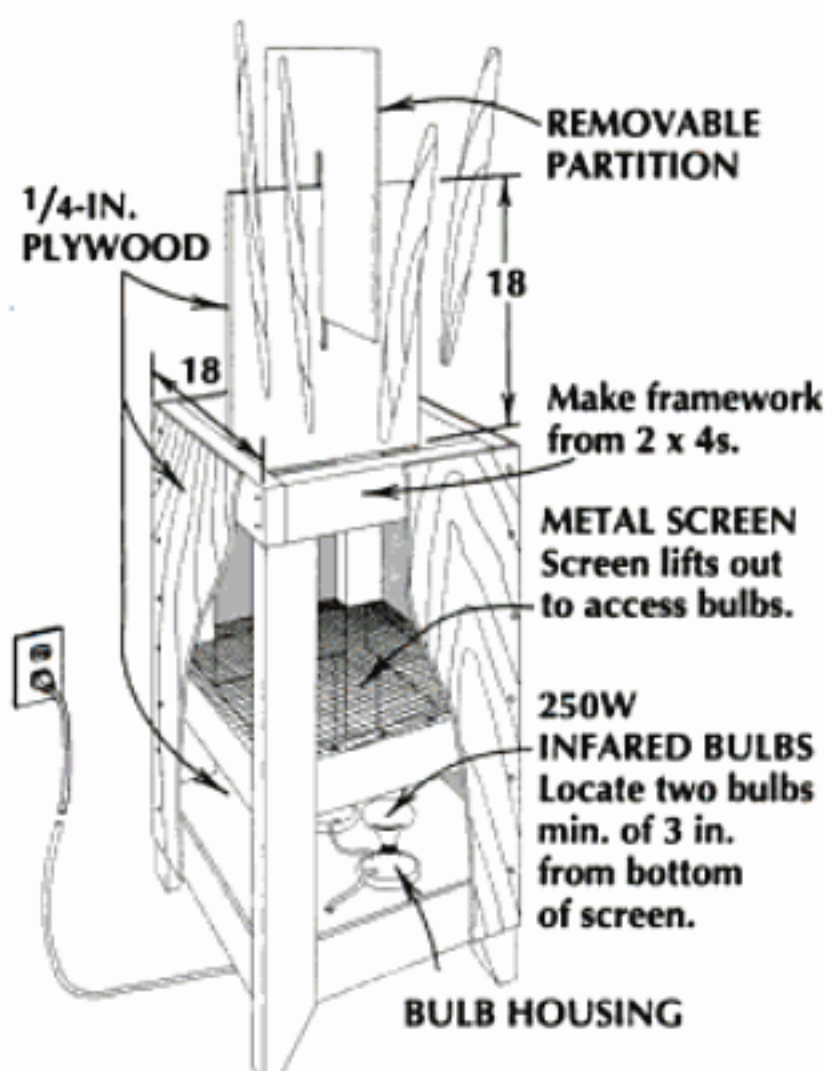
Heat Box for Chair Joints

Q After making several chairs, I'm still not happy with the fit between seat and spindles. The spindles require a blow with a mallet to drive them into the seat, but these joints still manage to become loose over time. Any tricks?

Drew Banner
Sterling, KS

A Chair joints are subject to heavy stresses that can loosen spindles that once fit tightly in their holes. But we have found a few ways to improve and prolong tight-fitting chair joints.

In our chair shop, we have a heat box where we place our spindles for a couple



of hours prior to final assembly in chair seats and crest rails. (See drawing.) After assembly, spindle tenons swell from the moisture in the glue, locking the joints tight.

To use a heat box like ours, heat both ends of the spindles by flipping them over occasionally; this ensures even shrinkage. Then scrape each spindle tenon to fit in its hole, keeping the tenon straight so it will bear fully on the sides of the hole. The spindle ends that fit in the chair seat can be a tight "drive fit" because of the thicker seat stock. Aim for a slip fit where the tenons go into thinner stock, such as the crest rail.

Once you remove the spindles from the box, glue up the chair straight away to avoid having the spindles swell as they adjust to your shop's ambient humidity.

Mira Nakashima-Yarnell
Nakashima Workshops
New Hope, PA

Glue for Wooden Soles

Q I plan to make some planes using a tropical hardwood for the soles. Should I use a special glue, and are there any books on plane making?

Grover Smith
San Antonio, TX

A Standard PVA glues (the yellow or white stuff) work fine on exotic woods. Wipe the glue surface with acetone or lacquer thinner just prior to gluing to remove any natural oils on the surface of the wood.

Be careful in your selection of woods for plane soles: Some exotics, like ebony or cocobolo, are so heavily pigmented that they can leave streaks on your work. Lignum vitae makes a good sole because of its natural lubricants. Tight-grained domestic hardwoods like hard maple or fruitwoods will work just as well as exotics, and their use poses no threat to tropical rain forests.

As for a good book on planemaking, James Krenov describes how to make a variety of cabinetmaker's planes in *The Fine Art of Cabinetmaking* (1987, Sterling Publishing Co., New York, NY 10016, 800-367-9692).

Ron Hock
Plane-iron maker
Fort Bragg, CA

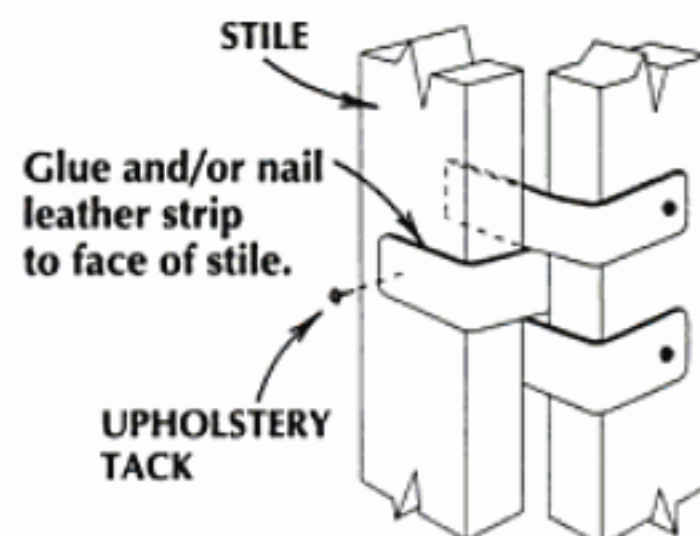
Hinging Screens

Q I recently constructed a folding screen with 1 7/8-in.-thick stiles. All the double-acting hinges I've seen are made for 1 3/8-thick stiles. Any suggestions?

Darrell La Venia
New Washington, OH

A I've hinged screens of all thicknesses using an ancient Chinese hinging method that permits a full 360° rotation. The hinge consists of alternat-

ing strips of leather, attached to opposite faces of the screen. (See drawing.) You can attach the strips with nails, or cut a



shallow mortise in the stiles and glue them in place. An even stronger method would be to screw small wooden plates over the ends of the strips and into the stiles. For stiles around 6 ft. high, I suggest installing three sets of hinge strips.

To prevent staining the leather, finish the screen first and then install the hinges.

Ellis Walentine
Editor

Drying Wood

Q Recently I bought some air-dried walnut that was stored in a barn for 12 years. Is it dry enough for use, and should I expect more wood movement from air-dried walnut than kiln-dried stock?

Tom Stears
Bucklin, KS

A For furniture making, wood should be dried to a moisture content that places it in equilibrium with the environment in which it will be used. For most areas of the U.S., 6% to 8% moisture content (MC) is ideal.

Your air-dried lumber probably won't be dry enough for indoor use because it is in equilibrium with the outside air. Chances are the wood is at 12% to 16% MC—too "wet" for furniture.

Use a moisture meter to get a reading on the moisture content of your boards. If the MC is too high, you can have the lumber dried at a local sawmill equipped with a kiln. It's also possible to air-dry the wood indoors, providing you have a space that can maintain a relative humidity of around 40% (typical of

WHERE TO FIND IT

A slide rule for calculating duct sizes for dust collection is available from Air Handling Systems, 5 Lunar Dr., Woodbridge, CT 06525, (800) 367-3828 for \$10.

A dry, rust-preventative coating in aerosol form, called Cosmolene Weathershed is available from Houghton Int., Madison and Van Buren Aves., Valley Forge, PA 19482, (610) 666-4000.

A pamphlet of sawblade angles for cutting coves on the tablesaw is available from KlauszTec, Box 78, Pluckemin, NJ 07978, (908) 658-4396 for \$11.95.

A magazine for wood carvers, called *Chip Chats*, is available with membership to the National Wood Carvers Association, P.O. Box 43218, Cincinnati, OH 45243, (513) 561-0627.

most homes). Sticker the boards to allow air to circulate and stack the pile on a flat surface. Use your moisture meter to monitor the MC of your boards. A few weeks is all it should take to get the wood down to 7%.

When it comes to walnut I prefer the air-dried variety for several reasons: It's usually less expensive, and the wood's rich color hasn't been muted due to steaming (a common kiln process used to color the sapwood). In addition, air-dried wood is free of drying stresses such as case-hardening, which can cause wood to warp or split unexpectedly.

About wood movement: Whether kiln-dried or air-dried, all wood moves in response to changes in temperature and humidity. You'll have to design your furniture to accommodate wood movement regardless. (See "Wood Movement," AW #34.)

Lonnie Bird
Furniture maker and teacher
Rio Grande, OH

Clean Spraying

Q I spray a lot of finishes on case-work, but I don't enjoy spraying inside cabinets because of the cloud of vapors that bounce back into my face. Would a HVLP spray system solve the problem?

Tony Viccaro
Gunnison, CO

A There's no question that a high volume, low pressure (HVLP) unit will reduce the amount of "blow back" you're experiencing. I've had excellent results since I replaced my conventional spray gun with a Binks Mach-1 HVLP gun connected to my 10hp compressor. If you have a small compressor (under 3hp), or no compressor at all, an alternative would be a turbine powered HVLP system, that has its own motor and blower. (For more on HVLP, see AW #28.)

To effectively eliminate blow back, I design my cabinets so the back panels are removable. I spray the insides of the

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cabinets and the panels separately, then secure the panels into rabbets in the rear of the cases with screws.

Andy Rae
Assistant editor

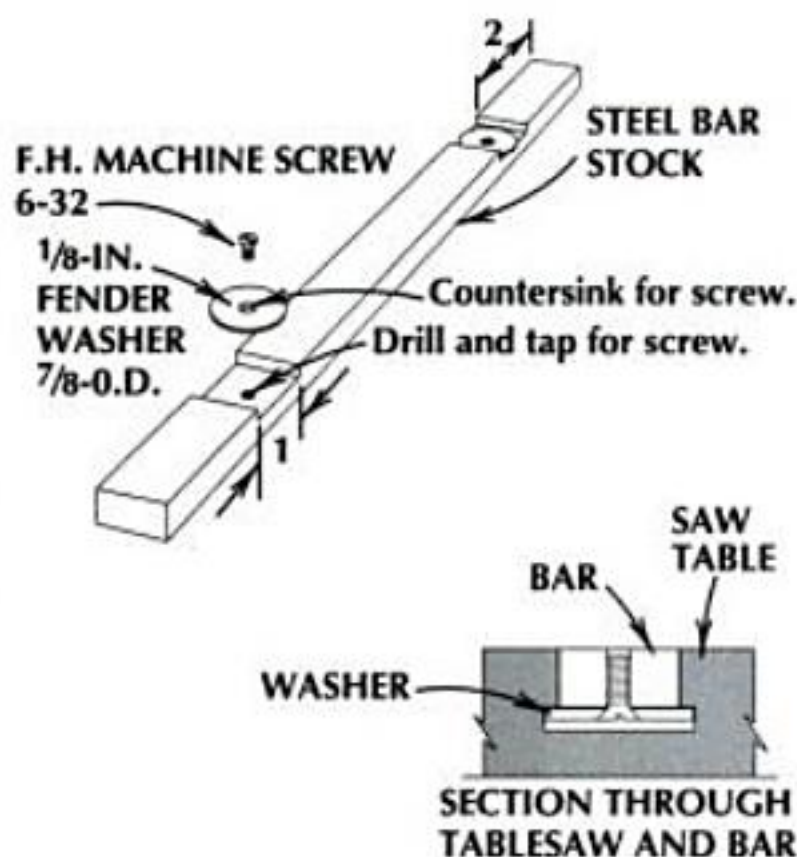
T-Slot Miter Gauge

Q I'm interested in building the bottomless cut-off box shown in AW #40. Where can I get steel bar stock to match the T-type miter grooves on my Delta tablesaw?

George Gumbert
Apollo, PA

A With a couple of fender washers, two machine screws, and some steel bar stock, you can make a bar that works just like the one on Delta's miter gauge. The drawing shows how a fender washer can be screwed in a slot milled in the bar stock so that the washer rides in the T-groove.

For bar stock, use cold-rolled steel, available from your local metal supplier,



or by mail from Small Parts, Inc. (13980 NW 58th Ct., Box 4650, Miami Lakes, FL 33014, 305-557-8222.) The width and thickness of the bar should match the width and depth of your miter grooves. Fender washers with a 7/8-in. O.D. will fit in the T-grooves of most American and Taiwanese saws.

Have a local machine shop mill two

slots across the bottom of the bar, as shown in the drawing. Make the slot depth equal to the height of the T-groove; slot length should be about 1/8-in. longer than the O.D. of the washers. Drill and tap holes for the machine screws, and install the washers. Try the bar in your miter slots. If it binds, shim the height of the washer down until the bar rides smoothly. A little thread-locking compound (available at bearing-supply houses and hardware stores), will prevent the screw from loosening.

Edward Schoen
Furniture maker
Harleysville, PA

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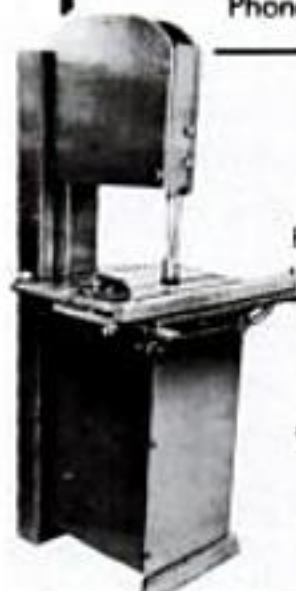
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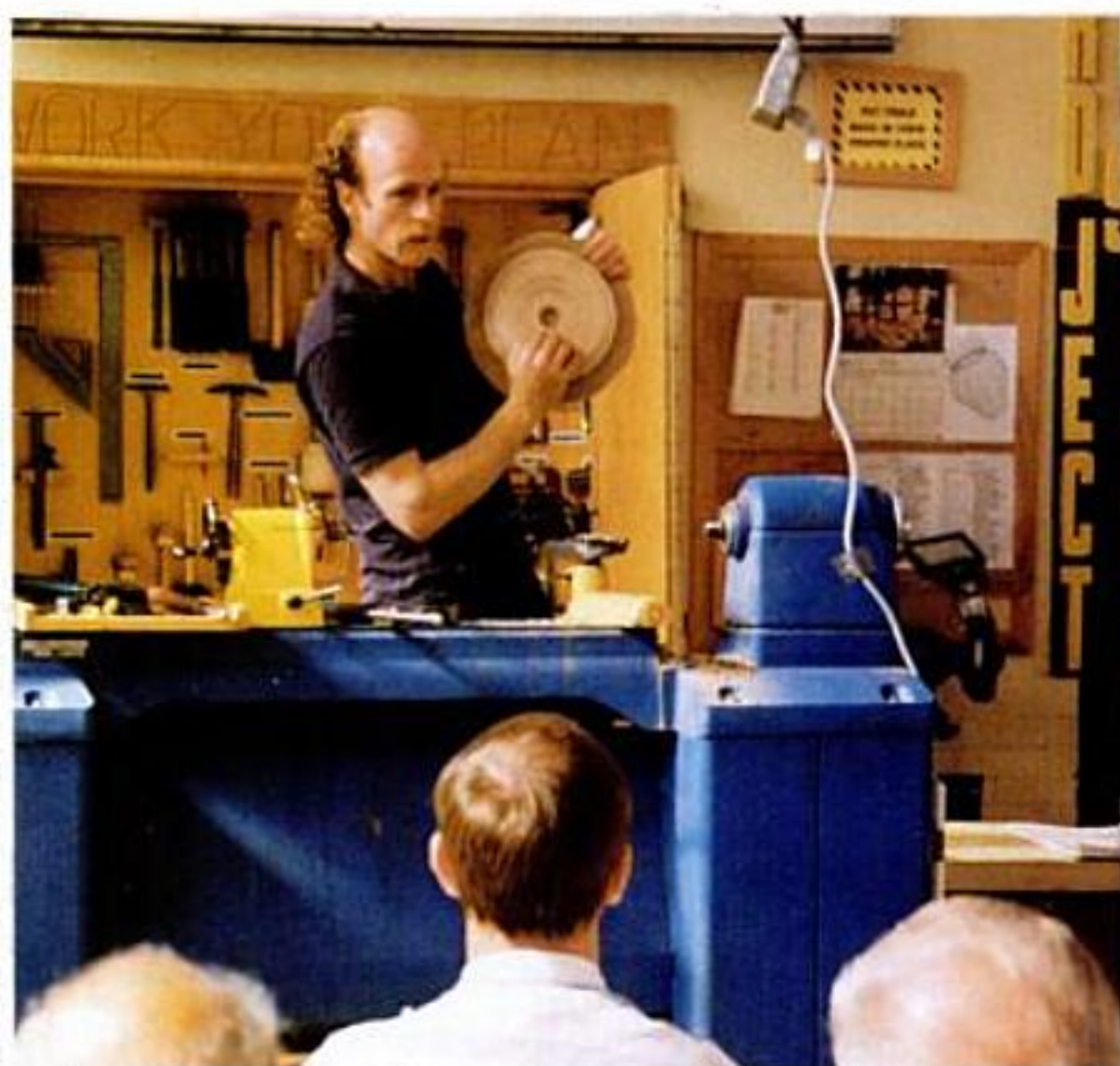
LARGEST WOODTURNING EVENT EVER

More than 540 woodturners from every state and 10 foreign countries gathered at Colorado State University this past June for the American Association of Woodturners' Eighth Annual Symposium. Attendees ran the gamut from preteens to octogenarians, and from beginners to award-winning professionals.

More than 120 demonstrations, slide shows, and panel discussions featuring many of the world's top turners, were squeezed into three action-packed days. Topics included everything from hands-on design and technical basics to

multi-axis turning, carved decoration, and oval turning. The "Instant Gallery," a perennial favorite, featured over 400 pieces by demonstrators and participants. The conference came to a close with a gala banquet and auction which raised more than \$10,000 for the AAW scholarship fund and for the new wood studio at Arrowmont School of Arts and Crafts.

The 1995 AAW symposium will take place in California in late June of next year. For more information, contact Mary Redig, 667 Harriet Ave., Shoreview, MN 55126, (612) 484-9094.



Christian Burchard discusses the sculptural effects of off-center turning at this year's AAW convention.

PHOTO COURTESY OF RICK MASTELLI, AMERICAN ASSOCIATION OF WOODTURNERS



The "miracle" spiral staircase graces the Sisters of Loretta convent chapel in Santa Fe, NM. It was built in the 1850s by a mysterious carpenter who arrived in answer to the sisters' prayers.

PHOTO COURTESY OF SARBO

STAIRWAY FROM HEAVEN

Do you believe in miracles? Here's a wood-working "miracle" you can still see today.

In 1852, the Sisters of Loretta arrived in Santa Fe, NM, to found a convent. In a few years, they had a school built and were working on a grand Gothic chapel, complete with 85-ft. ceilings.

When the chapel was almost finished, the sisters realized there was no way to get up to the choir loft—the builders had completely forgotten to erect a staircase! And the loft was so high that a conventional stairway would take up too much floor space. The sisters consulted many carpenters, but no one had a suitable solution.

The Sisters of Loretta were quite concerned. But they also had great faith, so they decided to pray about the situation. While they were pray-

ing, the legend goes, a gray-haired man with a donkey came to visit. He asked the Mother Superior if they had any need for a stairway. She told him about their problem, and the old man took out his meager tools and set to work.

All over the sanctuary, the old carpenter set up tubs of water filled with pieces of soaking wood. By one account he worked very quickly; by another he labored for months. Whatever the case, when the stairway was done and the sisters went to pay the stranger, he was nowhere to be found.

No one knew where the carpenter had come from, or knew where he went. He had purchased no lumber locally. Yet he left behind a magnificent staircase—a circular gem with no center support—that still stands today.

Many people are amazed

that the old stairway hasn't crashed down under the weight of the people who use it. Over the years architects and builders from around the world have come to inspect the stairway. It's been there for more than a century, in daily use.

The staircase has 33 steps and two 360° twists. Its curved stringers seem to be connected with great precision. The entire staircase contains no nails, only wooden pegs. Another wonderment is the origin of the wood itself—it doesn't appear to be native to New Mexico.

The "miracle staircase" still stands in the Loretto Chapel for anyone to see. Whether or not you believe in miracles, the beauty and exceptional craftsmanship are indisputable. Thousands of people have tried to explain this marvel of craftsmanship, but there seems to be no answer.

—Grover Brinkman

U.S. EXCHANGE PROMOTES RUSSIAN FREE ENTERPRISE



Greg Harkins and Russian intern Dmitri Golikov collaborated to build this rustic settee.

PHOTO BY GREG JENSON

At their April 1993 summit, President Clinton and Russian President Boris Yeltsin agreed to establish American internships to train Russians in free-market busi-

ness management. But who'd have thought it would reach the woodshop? Rustic chair-maker Greg Harkins was surprised when the U.S. Information Agency (USIA)

asked him to host an intern at his Vaughan, MS, shop. He obliged, and formed a lasting international friendship with Russian furniture maker Dmitri Golikov.

Harkins says the experience has changed his whole outlook on life. Language barriers aside, he and Golikov had different tastes and backgrounds, so it took time to find common ground.

Golikov makes the Baroque-style furniture, currently popular among monied Russians. Over the two weeks they spent working together, each woodworker came to appreciate the other's perspective. Harkins had no idea how precious his acres of forest would seem to Golikov, who comes from a country where almost

everything is state-owned. And though Russians today prefer furniture of fancier design, there is a rich tradition of Russian rustic furniture which Golikov now plans to explore.

Harkins and Golikov collaborated on a rustic hickory settee. (See photo.) They gave the finished piece to the USIA to be raffled off as a fundraiser.

"I'd do the exchange again at the drop of a hat," says Harkins. "I hope it's been half the experience for Dmitri that it's been for me."

If you are a professional craftsman interested in hosting a Russian exchangee in 1995, call Kathy Guroff at the USIA, (202) 401-6884, for more information.

BEST OF THE BOOTHS AT IWF

Hand tool tradition and hi-tech machinery shared the same stage at this summer's International Woodworking Machinery & Furniture Supply Fair. Held at the Georgia World Congress Center in Atlanta, this year's IWF show attracted over 44,000 participants.

Many folks stopped to watch, listen, and dodge shavings as Don Weber demonstrated the bodger's craft at the AMERICAN WOODWORKER booth. Weber, whose latest article (on crafting a hand-made hay rake) appeared in AW #40, began by splitting leg blanks out of a log. After drawshaving the blank to a rough cylinder, Weber "strung" the piece in his bowstring lathe and proceeded to turn out shapely chair parts while praising the simple ingenuity (not to mention the health



Bodger Don Weber demonstrates on his bowstring lathe at the AMERICAN WOODWORKER booth.

benefits) of foot-powered machinery.

Thousands of fairgoers stopped by to enjoy Weber's unique mix of humor and history, and to meet the AW staff. We gave out magazines and took in some helpful feedback and advice. We also combed the aisles for new products. To see some of the

latest products we came across, check out the reviews that begin on page 90.

If you have a news item, unusual story or opinion to share, send it to: "Offcuts," AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098.

Jim's Corner

Offbeat Answers to Common Woodworking Questions



Q: You say French polishing is any finish applied vigorously with the tongue. This is extremely tasteless.

A: We like lemon oil.

Q: What is the most expensive wood species?

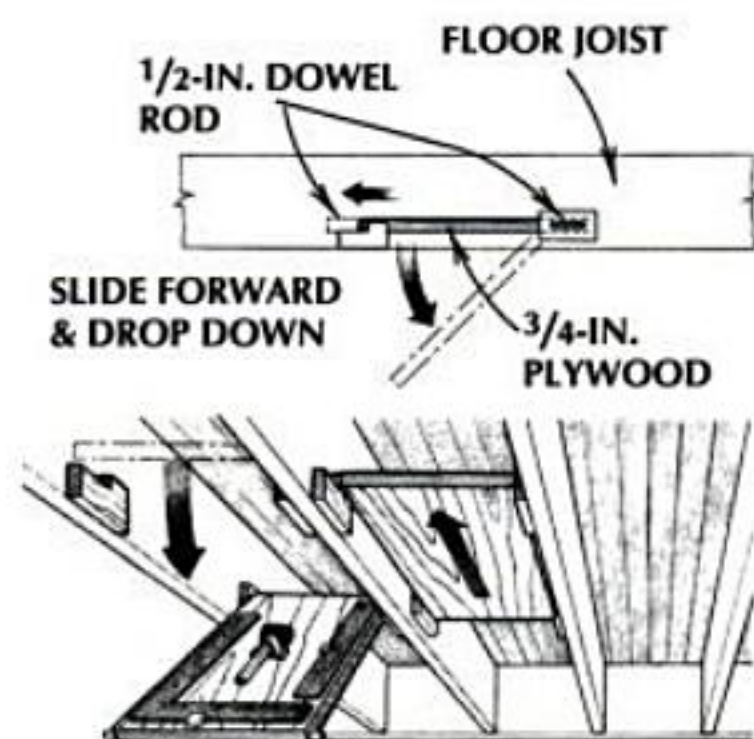
A: Pink ivory, which comes from pink elephants.

Jim Cummins is a contributing editor to AW.

TECH TIPS

More on Overhead Storage

Like many amateur woodworkers I'm always on the lookout for extra storage that doesn't take up wall or floor space.

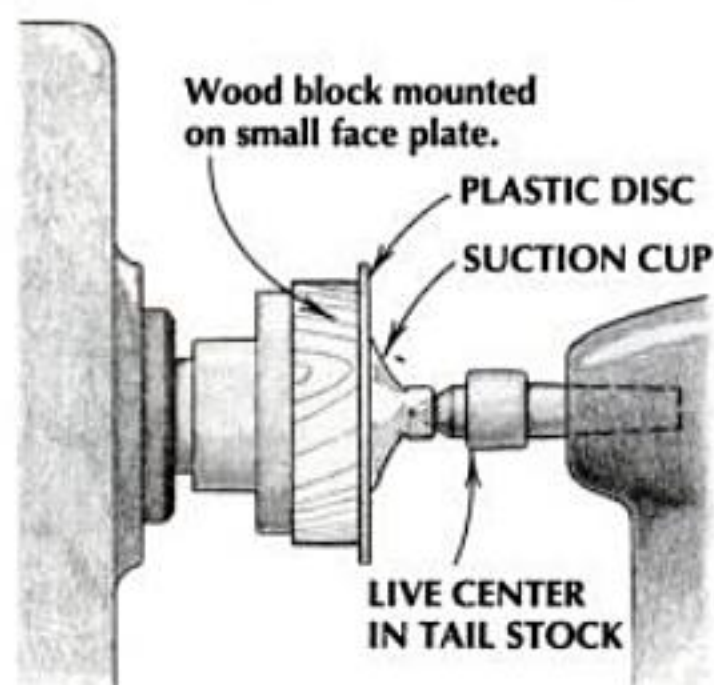


So I designed and made plywood "drawers" that fit between the exposed joists in my workshop. These swing down when needed but are up out of my way when not. I fill my overhead drawers with different tools and workshop items.

Kevin Bentley
Birmingham, MI

Lathe Suction

I needed to cut two clear plastic discs with smooth edges for a kaleidoscope. (See AW #40.) I cut them roughly to

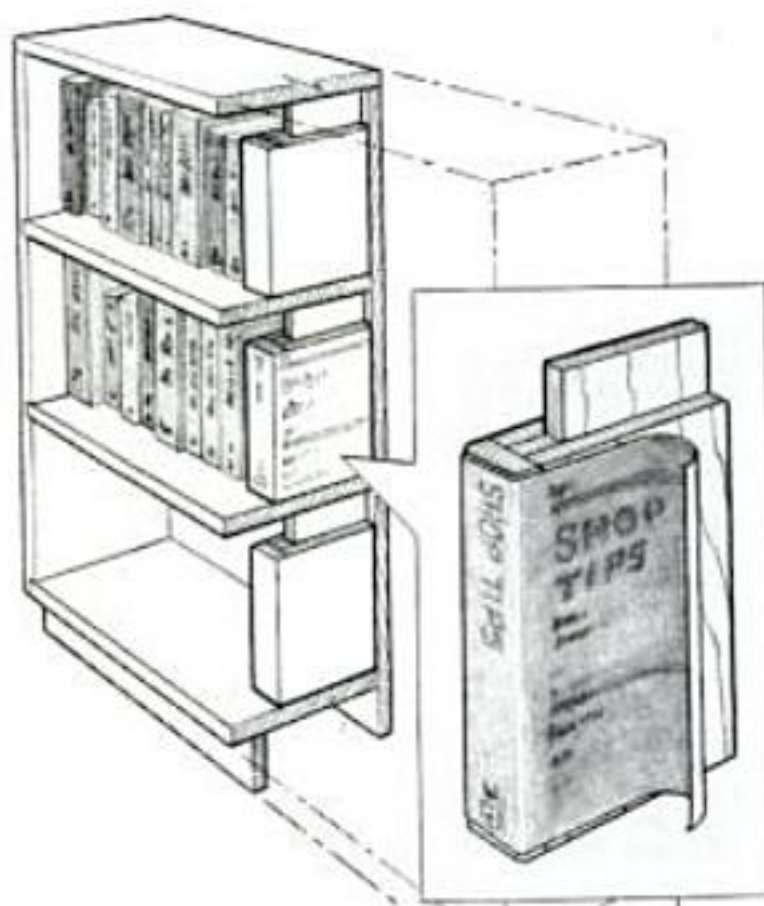


shape and then mounted them on the lathe using a small suction cup, as shown. Taking very light cuts with a sharp skew chisel, I found I could quickly turn a disc with a smooth, finished edge.

William Boyd
Bloomfield Hills, MI

Correcting Middle-Shelf Sag

How do you fix sagging bookshelves without adding visible bracing? My solution is to add disguised supports—which I call "faux" books—placed about the middle of each shelf. I start with a

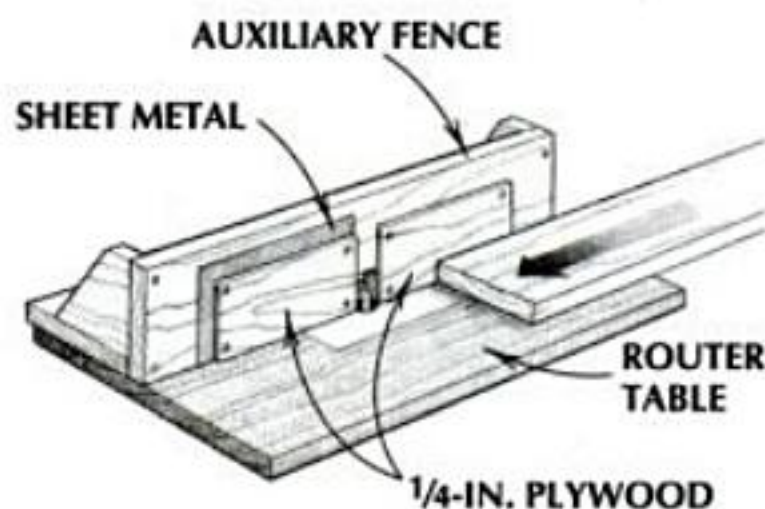


series of 3/4-in.-thick plywood supports cut to fit the space between each shelf. Then I build up the sides and front to match the size and shape of dust jackets salvaged from other books. After rounding all edges and corners, I paint the wood an inconspicuous color and glue on the jackets. Staggering the supports slightly adds to the deception.

Walt Morrison
Northport, NY

Router Jointing

This simple jig enables you to prepare boards for edge-gluing with only a router and a regular straight bit. First make an auxiliary fence for your router table then cut two pieces of plywood. Screw them both to the fence, on either side of the bit, but slip a piece of thin sheet metal (or shirt cardboard) behind



the one on the outfeed side. Adjust the fence so the cutting edge of the bit is flush with the outfeed surface of the fence. The depth of cut will be the thickness of the sheet metal. I've found this method actually produces a smoother cut than a jointer and works for boards up to 4 ft. long.

Kristian Eshelman
Highland Park, NJ

BEST TIP

Anthony Machiavelli, of Thomaston, ME wins \$200 for this tip, judged by our editors as the best of the issue. For details on how you can win cash for your favorite workshop tips, see the box on page 28.

LID SUPPORT BRACKETS



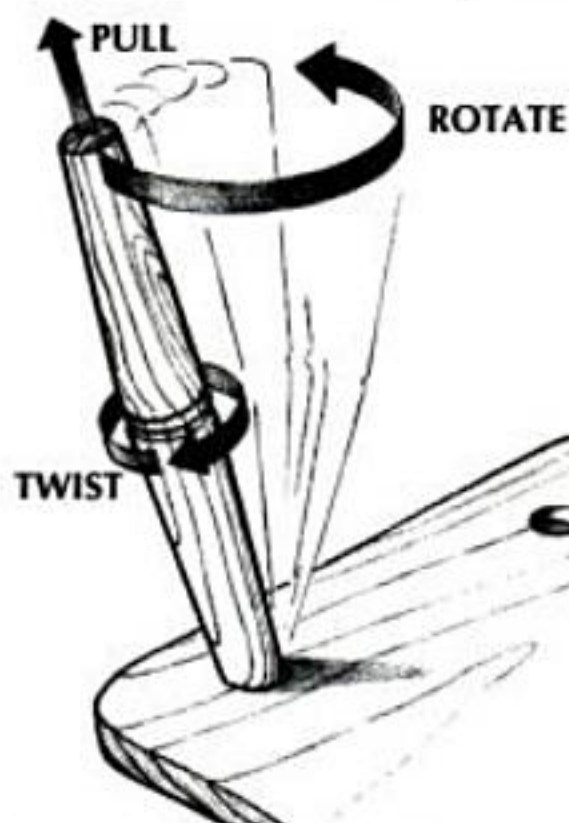
Drilling Compound Angles

I use this jig frequently when making chairs. Designed to be used on the drill press, it makes accurate work of boring holes at compound angles. I made the jig with three pieces of 3/4-in.-thick maple, hinging the pieces on adjacent edges as shown. I cut each one about an inch larger than the drill press table and then glued ledger strips around the perimeter of the bottom one. This keeps the jig firmly in place.

To adjust the angle I got a pair of sliding lid supports. For heavier duty applications you could use the hardware made for awning windows. By drilling a hole down through all three pieces to match the one in the cast iron table, the jig can be left permanently installed.

Turning the Leg Out

Repairing chairs usually involves some disassembly—pulling rungs out of legs and extracting legs from the wooden seat. My method is to clamp the seat in

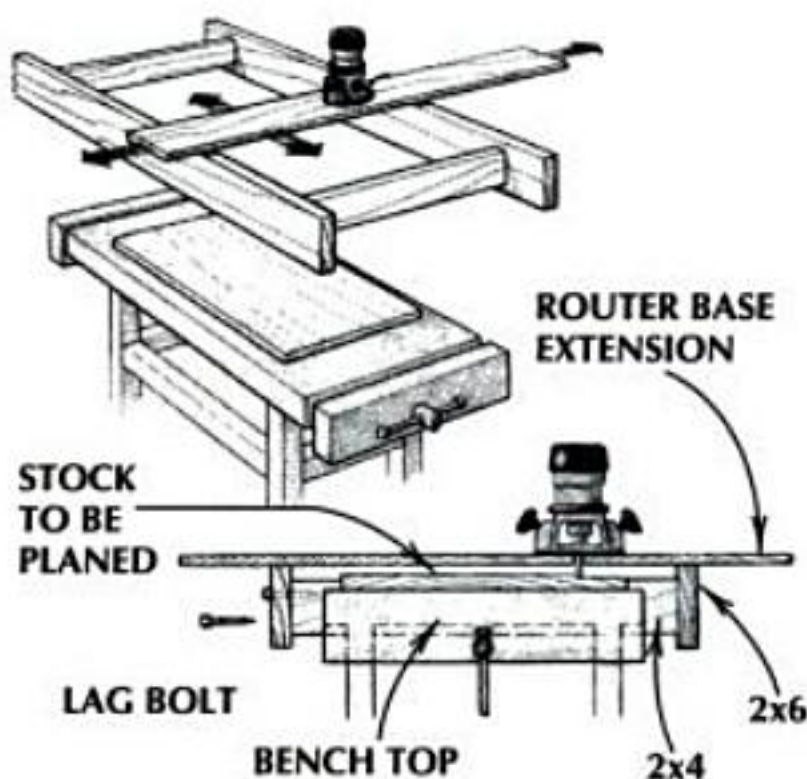


a vise, or, if the back is off, put it on the floor and kneel on it. Then I grasp the recalcitrant leg with both hands and simultaneously twist it counterclockwise while rotating it clockwise. At the same time I pull. Even wedged legs can be coaxed out in this way.

Jason Richardson
Binghamton, NY

Planing By Router

With the right jig you can do most anything with a router—even plane boards. My jig consists of a rectangular frame that guides a long auxiliary router base. I made the frame as shown, using 2x6s



and 2x4s. Before assembling the frame, I jointed one edge of each 2x6, then ripped the two boards to uniform width.

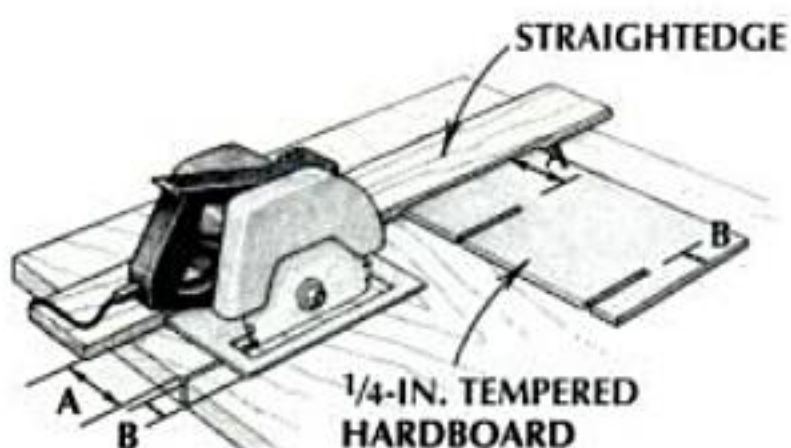
I made an auxiliary router base long enough to straddle the 2x6s and enable the bit to reach anywhere within the frame. Use a stiff piece of plywood or hardwood for the base because there mustn't be any give in this piece. (Depending on the length of your bits you may have to cut a recess for the router base.)

I set the frame on my bench, clamped the 2x4s in my two tail vises, and placed the tabletop to be planed inside. Setting the router bit to just skim the surface, I went to work.

Chuck LeDoux
Heppner, OR

Circular Saw Gauge

I often use a straightedge combined with a circular saw to make accurate cuts.

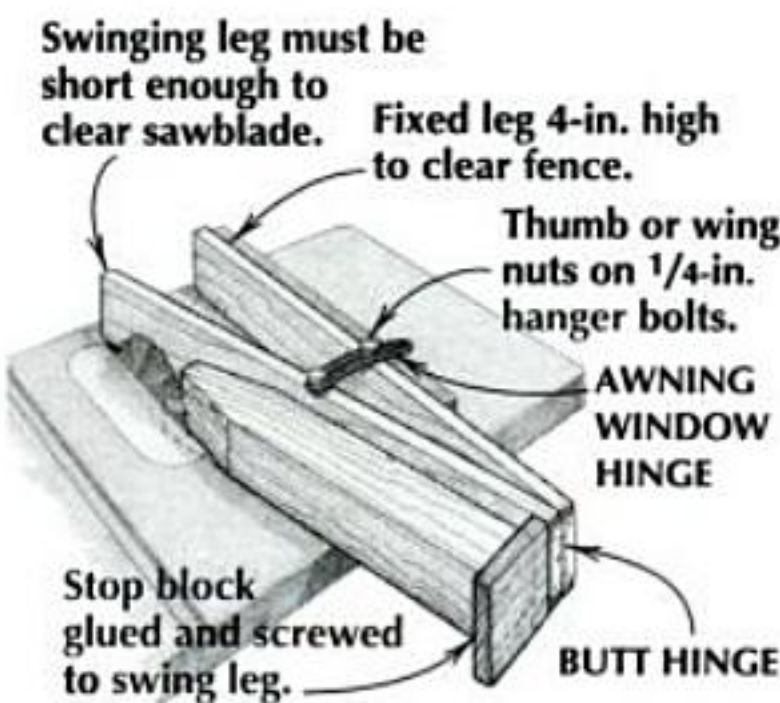


The set-up tool illustrated enables me to position the straightedge precisely before making the cut—whichever side I'm working from. I found this gauge so useful that I made another for use with various diameter router bits.

Edwin Perry
Albany, CA

Leg-Tapering Jig

This simple jig makes cutting consistent tapers on table legs easy—and safe. If the leg is tapered for one-third of its



length (or less), you can cut all four faces with one setting of the jig. For longer tapers, cut two adjacent tapers on each leg and then reset the angle to cut the remaining two.

Anthony Yackimowicz
Hazleton, PA

Let Them Eat Soup

An average can of soup has a dia. of 2 5/8 in. A roll of masking tape, with an internal dia. of 3 in., slips over the can very nicely. You can conveniently store several rolls on the outside, leaving the inside of the can available for smaller rolls of other types of tape. Enjoy the soup—I prefer asparagus—then nail the can to the wall near your bench.

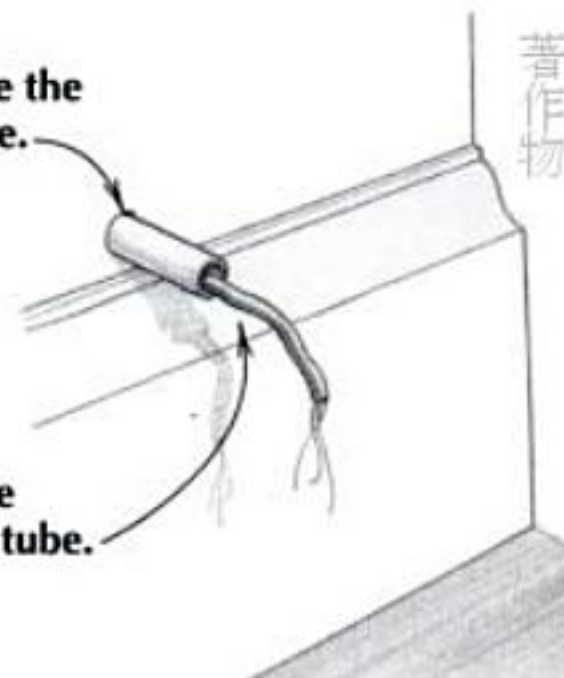
Ivor Pelikan
San Francisco, CA

Down the Tube

To poke a small wire through a hollow wall or cabinet space, first insert a small-diameter piece of conduit, PVC pipe or

Drill a hole the size of tube.

Pass wire through tube.



copper tube. This will guide the wire, which may be too limp to make the journey unaided. Be sure to remove the tube before connecting the wires.

Terry Wells
Ashland, OR

BEST TIP WINS \$200

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

Plywood-Top Workbench

*Supporting the Nontraditional Top
Is a Well-Crafted Base of Poplar and Walnut*

By Frank Perry



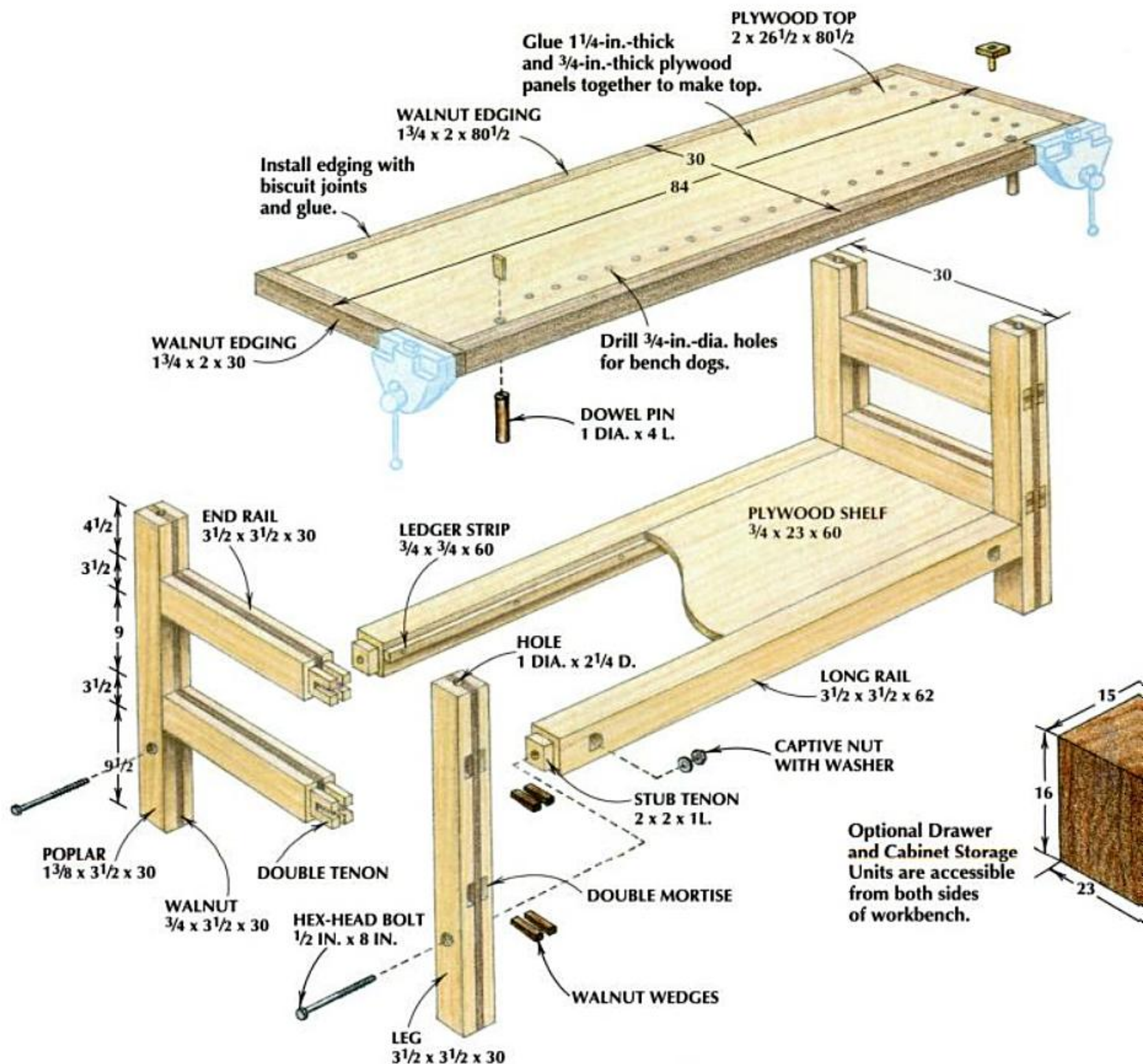
Walnut, poplar and plywood. Double through tenons distinguish the poplar and walnut base of Perry's workbench. The 2-in.-thick plywood top is edged with walnut. Under-bench storage is provided by a pair of drawer units that flank a central cabinet. Outlet strips are installed on each side of the bench.

I've driven a truck all my life but when I was 54, my back gave out and I had to do something different. I've always liked to work with wood, so I asked to be retrained as a woodworker. The company agreed and I got to spend six months in a professional shop, working on my own projects and improving my skills by watching more experienced woodworkers.

It wasn't long before I realized that if you like to work with hand tools, a good, solid bench is a necessity. During my last couple of months in the shop, I spent most of my time figuring out a workbench design that would fit my needs. The result—which I often refer to as my first and last workbench—combines a traditional-style hardwood base with an unconventional top made from two layers of plywood. (See photo, above.)

Tool storage was an important part of the workbench design. Beneath the top there's a set of three cabinets that I use to hold everything from chisels to drill bits to portable power tools. In the two drawer units, the drawers extend the full width of the cabinet so that they can be opened from both sides of the bench. Likewise, the center cabinet unit has two pairs of doors rather than one. This allows me to reach my tools no matter which side of the bench I'm on—a good feature if you like to keep your bench in the middle of the shop, like I do. The tops of the cabinets create a shelf where other tools or wood can be stored.

BENCH CONSTRUCTION DETAILS



Construction Details

I chose plywood rather than solid wood for the workbench top because I wanted a strong, flat work surface without first having to do a lot of gluing up, planing and sanding. I bought a sheet of 1¼-in.-thick fir plywood commonly used for subflooring. To this I glued a ¾-in.-thick piece of fir plywood, with its "A" side facing up. The resulting panel is just as stiff as many solid wood benchtops that I've worked on. I gave the top panel a solid edge treatment, using glue and biscuit joints to attach 1¾-in. by 2-in. walnut edging.

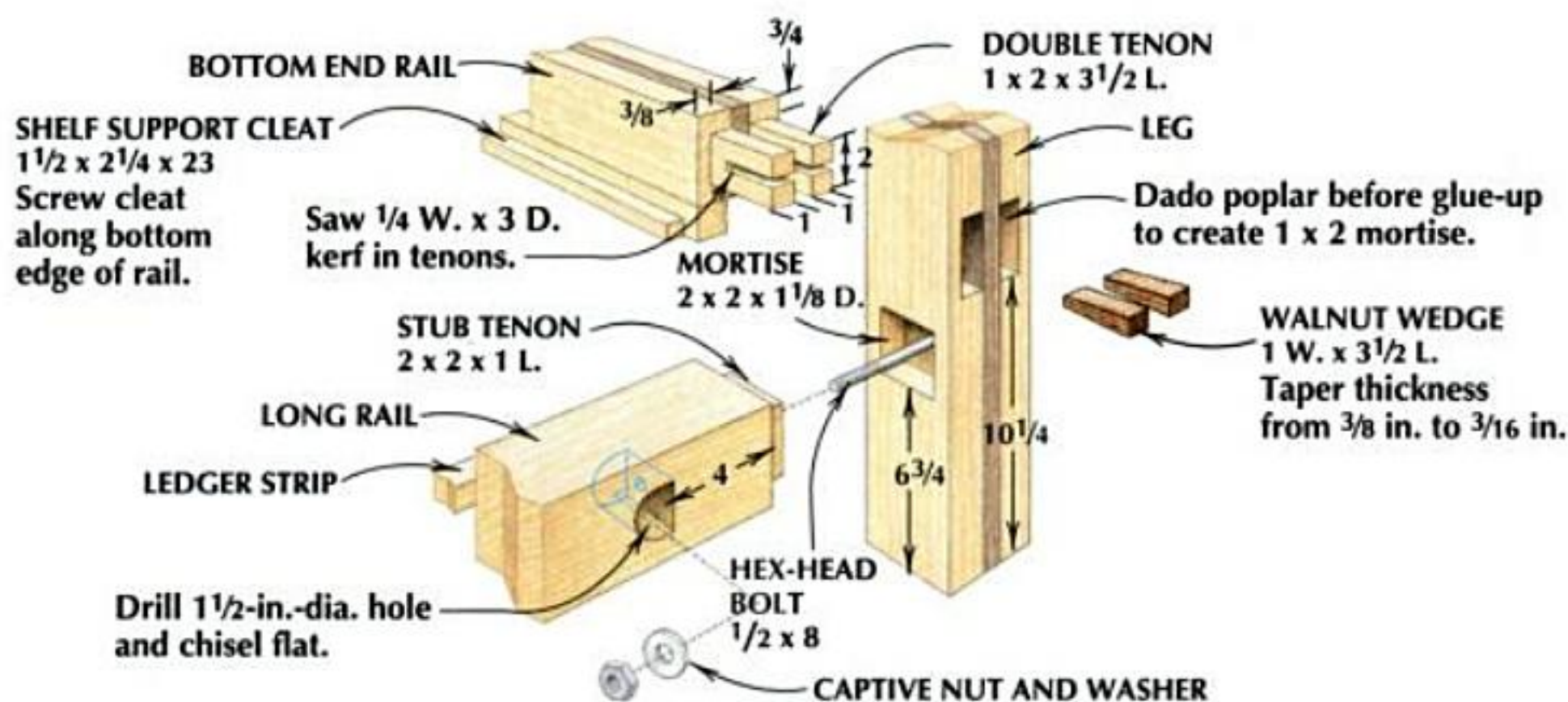
This is a heavy bench—about 350 pounds—so it was important to have a knockdown design. The cabinet and drawer units are removable, and the plywood top can simply be lifted free of the base. The top contains four dowel pins, wedged and glued in place, that fit in holes drilled in the tops of the legs. (See drawing, above.) Once the top is off, I

can disassemble the base by removing four bolts that connect the long rails to the leg-and-rail assemblies which comprise the ends of the base.

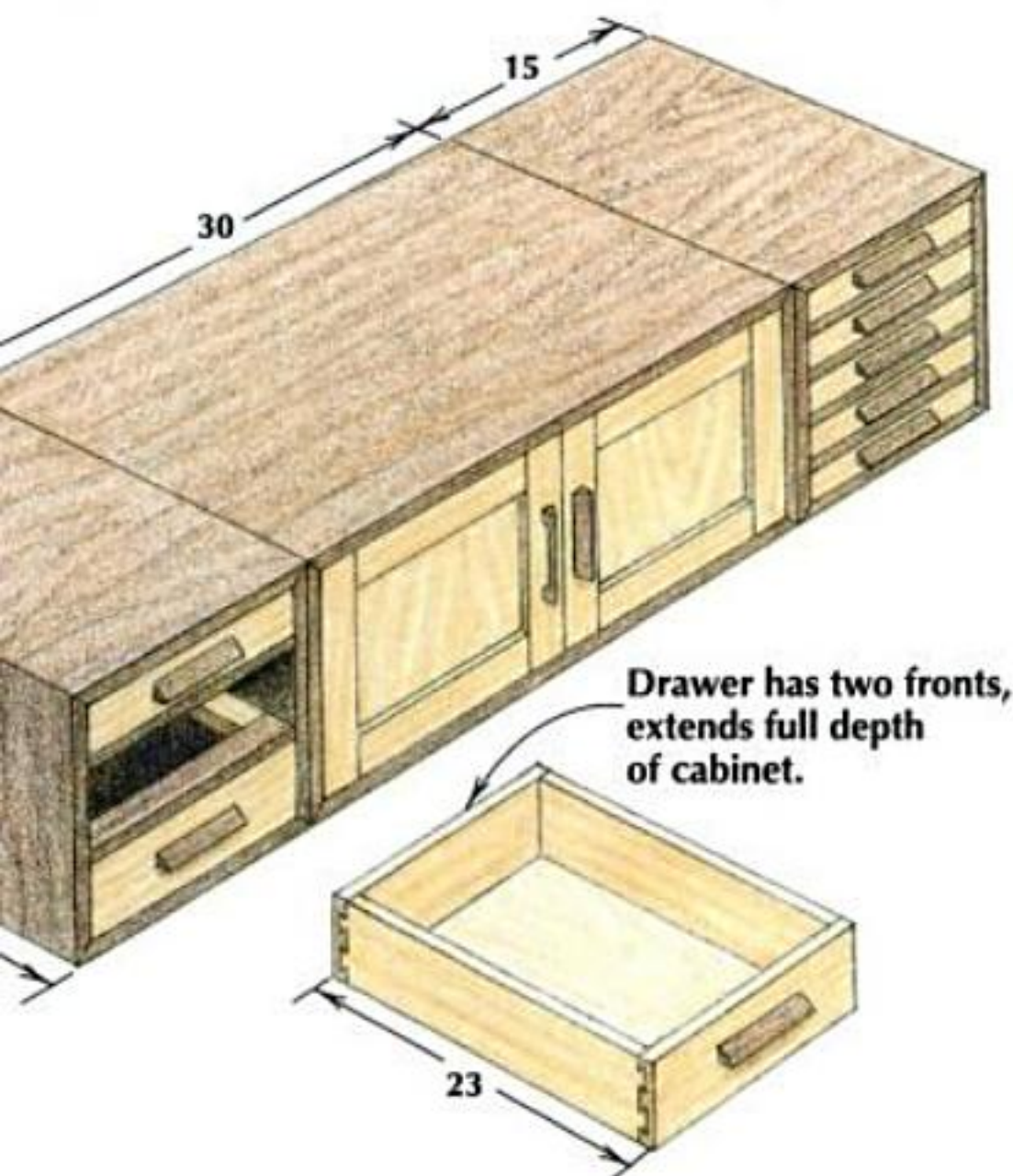
The long rails are solid poplar, 3½ in. square and 62 in. long. The two leg-and-rail assemblies that comprise the ends of the base are made from laminated stock that I glued up in the shop. Each leg or short rail has a "stripe" of ¾-in.-thick, 3½-in.-wide walnut sandwiched between a pair of poplar pieces that measure 1⅜ in. thick and 3½ in. wide.

I made the through mortises in the legs by dadoing the poplar leg pieces before gluing the poplar and walnut pieces together. Once glued up, each leg contains two double mortises that correspond to double tenons cut in the short rails. As shown in the "Leg and Rail Joinery Details," upper right, I cut a kerf in each tenon so that I could force it tight in its mortise by driving a walnut wedge. The resulting joint is exceptionally

LEG AND RAIL JOINERY DETAILS



OPTIONAL DRAWER AND CABINET STORAGE



Drawers and dogs; vise and tape. The drawers and cabinet are accessible from both sides of the bench. Visible in the top, a wedged walnut dowel extends through the plywood and into a hole in the top of the leg. Perry routed a shallow slot in each long walnut edge for an adhesive-backed tape measure. The shop-made bench dog consists of a wedged dowel glued in a hardwood square.

strong. And when the wedges are trimmed flush and sanded, the finished joints give the bench a nice look.

After cutting the mortise-and-tenon joints in the long rails and legs, I assembled the base so that I could drill the four bolt holes. Each hole is counterbored to a depth of 3/4 in. and extends about 7 in. into the leg. To make each "D"-shaped captive nut pocket, I first drilled a 1 1/2-in.-dia. hole to intersect with the bolt hole. Then I used a chisel, gouge and file to shape the flat side. I later made walnut plugs to fit the bolt counterbore holes and the D-holes.

The 3/4-in. plywood shelf fits flush with the top faces of the long rails. The shelf is supported by ledgers that are screwed to the long rails and by "L"-profile cleats that are screwed to the lower end rails.

To complete the bench, I installed a pair of vises and drilled holes in the top for bench dogs. Each vise is inset in the top's

walnut edging so that its inner wood liner is flush with the outside edge of the top. (See photo, above.) I made my bench dogs from square hardwood blocks and 3/4-in.-dia. dowels.

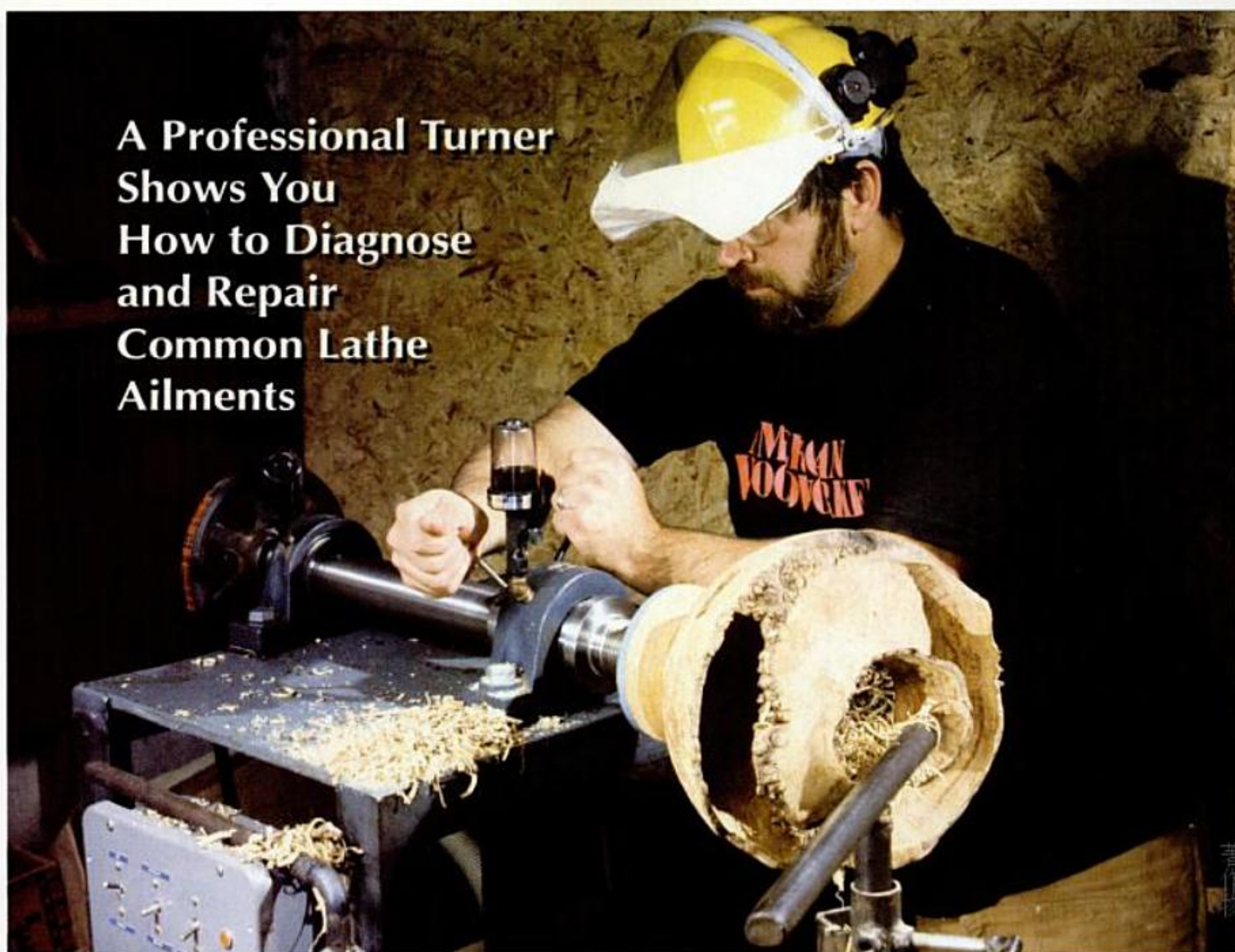
Along each of the top's long walnut edge pieces, I routed a shallow channel to hold an adhesive-backed tape measure (available from The Woodworker's Store, 800-279-4441). To



FRANK PERRY and his first and last workbench are located in northern California.

seal and protect the wood, I applied three coats of satin polyurethane, rubbing down the last coat with 000 steel wool. Finally, I screwed a pair of outlet strips to the underside of the top, centering each strip and keeping it about 2 in. back from the outer edge. ▲

A Professional Turner Shows You How to Diagnose and Repair Common Lathe Ailments



Spin doctor. Whether you have a shopmade lathe like Blenk's bowl-turning model shown above, or a standard machine, good diagnostic skills will enable you to correct problems before they become severe and costly.

A TROUBLESHOOTING LATHE

BY STEPHEN BLENK

The idea behind a wood lathe is pretty simple: Spin a piece of wood while holding a sharp tool against it, and you'll change its shape. However, lathes have become quite complex as they've evolved from the bow lathe and the springpole lathe to today's variable-speed DC-drive models. And the more you ask your lathe to do, the more important it is to be sure its components are in good working order.

This article will tell you how to find out if your lathe (or one you're looking to buy) is in good shape, and how to fix some of the problems you might discover.

A standard lathe has three main sections: headstock, bed, and tailstock. Most of the troubles happen in the headstock or tailstock. But many

times, a problem with the bed is the real cause of troubles on older machines. Since this is an easy area to check, let's start here.

Checking the Bed

Your lathe bed (ideally, made of cast iron) must be rigid, straight, and level from end to end. Any problems with the bed will translate to a misalignment between centers when the tailstock is locked down. This, in turn, causes problems with processes like boring accurately from the tailstock.

You can check a cast-iron bed visually for cracks, and sighting down the ways usually tells you if they're straight. Sometimes the beds of older machines will be worn down in one spot from constant repetition of a production process. Use a steel straightedge to check for suspected twists or low spots.

If the bed is worn or twisted, you have three options: You can learn to live with the problem, you can have the bed milled flat by a machine shop, or you can build up the damaged ways with a product called Multifil 426 Bearing Tape.

Multifil 426 Bearing Tape (available from Bearings, Inc.; see "Sources," page 39), is a sliding bearing material that comes in varying thicknesses from 0.015 in. to 0.125 in. and in standard widths of 12 in. and 24 in. It's used by machine-tool rebuilders to restore machine ways and gibs. You glue the bearing tape on with epoxy, and if necessary, the surface of the tape can then

be machined, ground or hand-scraped to the tolerances you need.

Don't forget to check the underside of the lathe bed. Cracks in the cast "webs" that give the bed strength can cause flexing under load. And take a look at the underpart of the bed, against which the tailstock locks down. Excessive wear here can cause a loose tailstock. If the tailstock is loose, you can adjust it by tightening a nut.

If you do find cracks in a cast-iron bed, they can be welded, but this is a job for a qualified machine shop. Welding cast iron can be tricky (and expensive).

Steel-bed lathes—whether pipe or angle—can be straightened. It's a good idea to replace the offending section with a new, straight piece. Some manufacturers of lathes with steel-pipe beds suggest filling the pipes with concrete to add rigidity and minimize vibration.

Checking the Headstock

The headstock (the powered end of the lathe) basically consists of a spinning shaft connected to a drive system. However, there's a lot going on here, especially on newer, more complex lathes.

The Bearings and Shaft—First there are the bearings. The bearings of a lathe are the heart of the machine. If the bear-



Wiggle the shaft. Play in the shaft is a sure sign of worn bearings. To check for play, grab the inboard and outboard ends and wiggle. If you detect play, or a "clunk," there's a problem.

ings are worn, the lathe will produce eccentric (oval) turnings instead of round ones. Lids won't fit, tenons will have play, and turning will be frustrating rather than enjoyable.

Play in the shaft is a sure sign of worn bearings. A quick way to check a shaft for play is to grab the inboard and outboard ends and wiggle. (See photo above.) If you detect play, or a "clunk," there is a problem. For a more scientific approach, you can measure runout by placing a dial indicator on a smooth portion of the spindle (not the threads). Runout of around 0.10 in. or greater is more than you want.

Modern lathes usually have tapered roller bearings that feature a load nut or screw for adjusting the load on the bearings. In many cases you can eliminate spindle-shaft play by tightening this load nut slightly (see photo, left), but don't over-tighten! If this bearing adjustment doesn't get rid of the play, you may have to replace the bearings.

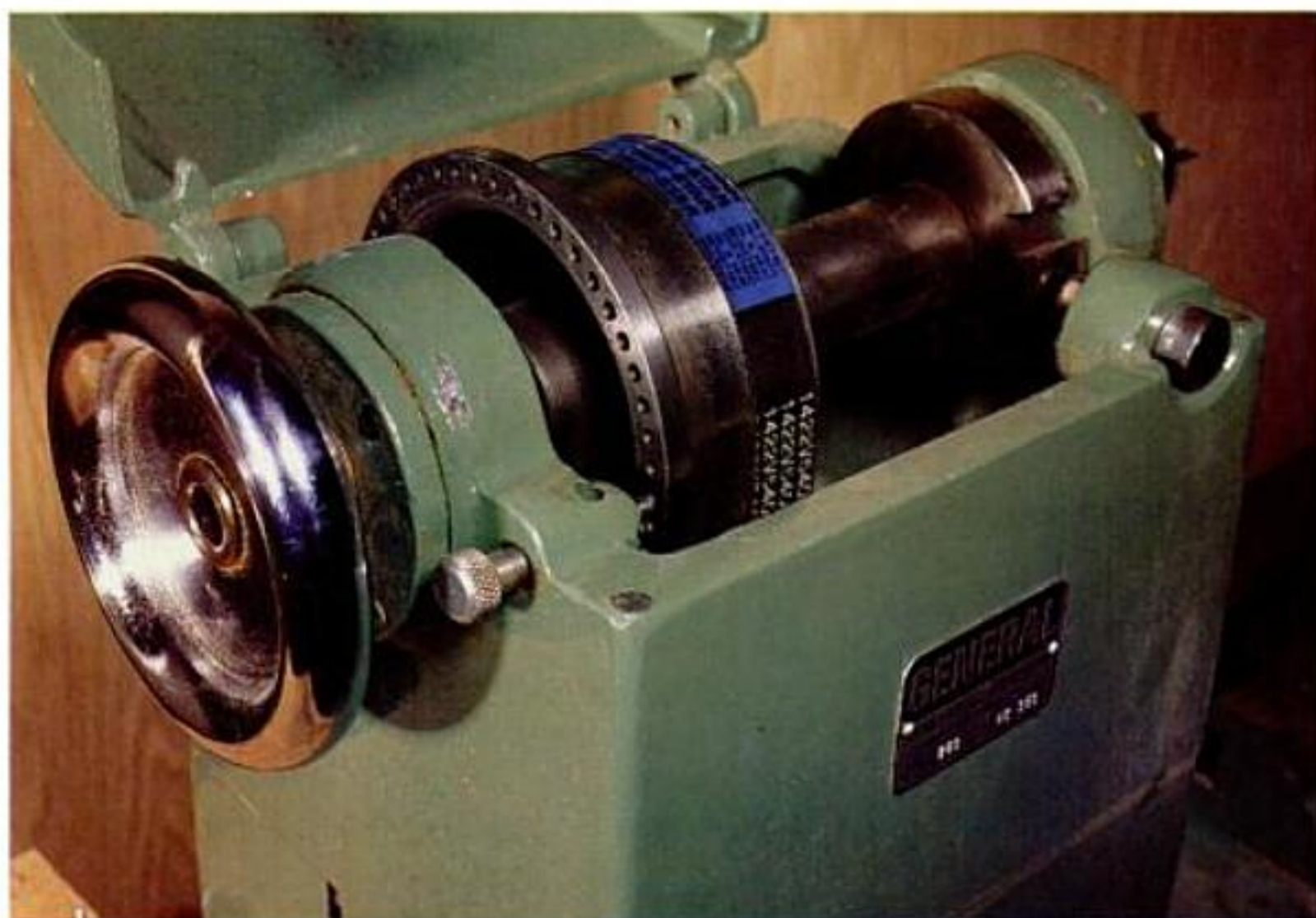
Older lathes, with oil-impregnated bronze or babbitt-metal bearings, aren't so adaptable. Spindle play on these machines generally means worn bearings and a trip to the machinist for (expensive) replacement.

If you need to replace oil-bronze or babbitt bearings, also be sure to have your machinist check the shaft for true. A bent or out-of-round shaft will "eat" new bearings quickly. If the shaft isn't true, you will need to have it re-machined before replacing the bearings. If the shaft is too far out, it will have to be replaced.

To sum up, play of any sort on the



Taking the play out. On lathes with tapered bearings, spindle-shaft play can often be eliminated by tightening the load nut slightly.



Indexing only. The indexing pin (on left end of housing) allows you to lay out turnings in quadrants for decorative work. The pin is fragile and should never be used as a spindle lock.

lathe's shaft is a serious problem, and should be eliminated. Bearings are relatively easy to replace but replacement shafts are expensive, often costing more than \$200.

While we're still on the shaft, take a look at the business end (the inboard end). Damaged threads can be freshened out with a die that matches your thread size. If your center wobbles around in the spindle, the morse taper may be worn or damaged (first make sure the taper on your spindle and center are the same size). A damaged taper can often be remachined.

The Drive System—A well-adjusted drive system should produce minimal vibration at all speeds. To check your lathe, let it run free, and place your hand on the headstock cover (not the belts). If you find yourself getting a free massage, it's time for adjustments.

The problem here is usually excessive vibration from some part of the drive that's out of balance or alignment. Since most lathes are belt-driven, start by checking that all pulley sheaves are properly aligned and that belt tension is correctly adjusted.

Simple step-pulley systems work much like a bicycle's gears, except that you have to stop the lathe to change speeds. First, visually inspect your pulley sheaves: Most stepped pulleys are made of aluminum and can crack or separate with long use. Make sure your pulley

sheaves are tight on their shafts. Then check them for alignment (by laying a straightedge across the pulley faces).

If you have a mechanical variable-speed system, adjustment is not so simple. Variable-pitch sheaves move when speeds are adjusted, making simple eyeballing difficult. I suggest you consult the owner's manual or call the manufacturer for specific instructions.

On rare occasions a pulley sheave will be out of balance. Suspect this only when you have exhausted other possibilities. You can check the pulley by mounting it on a separate motor to see if

it vibrates.

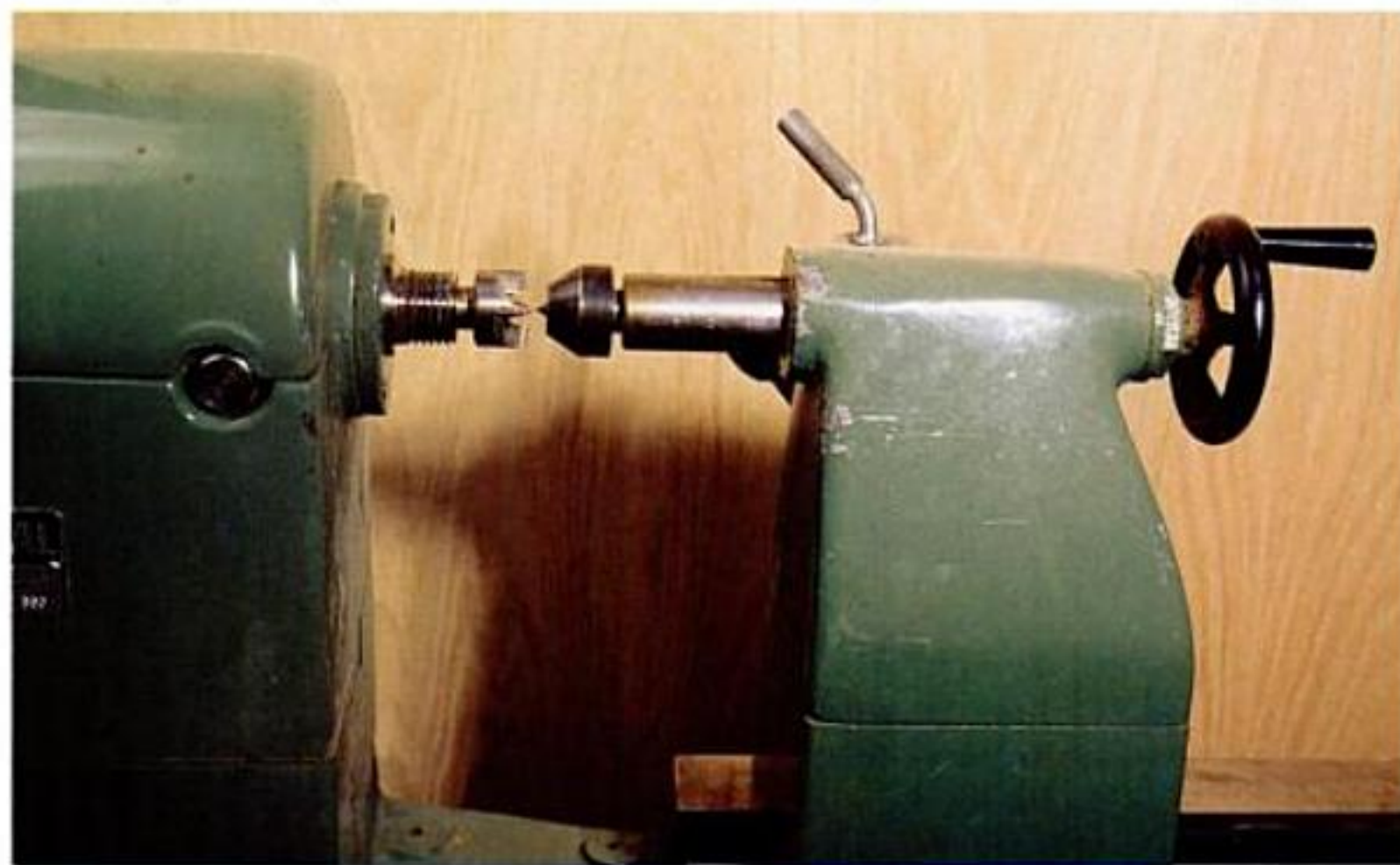
Sometimes you'll need to view the system while it's running to help pinpoint the source of vibrations. Caution: Be exceedingly careful not to catch your hair, clothing, rags, tools or body parts in the belts.

A vibration can often be traced to a motor-mounting problem. Bolts tend to loosen, allowing the motor to vibrate against the belt. This can set up a sort of harmonic "thrumming" that can make you crazy. Check the bolts, and also the hinge on the motor plate if your lathe is so equipped. If your system has an idler shaft, check it for play and alignment as well. Be sure to lubricate the pillow blocks on such an assembly regularly.

Don't forget to check the belts themselves. Worn, frayed belts should be replaced immediately. On older lathes, belts may have been replaced with the wrong size. Drive sheaves have a certain pitch angle, and improper belts won't fit correctly. Belt lengths can also be critical, especially on mechanical variable-speed systems. Check your manual, or ask the manufacturer for the proper replacement belt. Variable-speed systems often have matched belt sets, much like a table saw. If you must replace one belt, replace them all at the same time to avoid problems.

With older machines you're often on your own when it comes to finding parts or information. Ask the advice of a machinist or a good drive-system specialist (Washington Drive Systems, 2755 Airport Way South, Seattle, WA 98134).

Finally there's the indexing system,



Center to center. The headstock and tailstock spindles should meet point-to-point. Poor alignment will mean limited accuracy in operations such as boring.

LATHE LONGEVITY

Tips on Taking Care of Your Lathe

There are a number of little habits you can get into that will make a lathe last just about forever.

First of all, take good care of the machine itself. This means clean it up when you are done turning, especially when you're working green wood. Cast iron rusts in what seems like seconds, and each time you sand off that rust, you're removing part of the lathe bed. Do it enough times, and you'll lower the bed level, affecting the alignment of headstock to tailstock. Spray some light oil on the lathe bed after cleaning up, and wipe it down. This will also help lubricate the movement of the tailstock on the ways the next time you use it.

If your lathe has bearings that require lubrication, keep to an appropriate schedule. Running a bearing dry means a trip to the machine shop (and the bank).

When removing centers, use a wooden or brass-tipped knockout bar; a steel knockout bar can damage the taper. Also, keep your morse-tapered centers clean

and undamaged, and never place a damaged center in the lathe. I like to wipe my centers with a slightly oily rag before and after use, which helps prevent sticking. I also blow out the spindle taper with my compressor before putting in a taper. Resist the temptation to blow it out with your mouth; your breath carries too much moisture. And keep the threads on the headstock clean and free of finish and dirt. Never allow abrasives to run against these threads when sanding.

When mounting or removing faceplates, don't use the indexing pin to lock the lathe spindle. If you don't have a separate spindle lock, use two wrenches. The indexing pin was not made to withstand that sort of abuse, and it will break.

Finally, listen to your lathe. New, recurring sounds can indicate trouble. If you suspect a problem, track it down and correct it immediately. Most problems only get worse with time and will often increase geometrically in expense if you procrastinate. —S.B.

which is usually located in the headstock. This system controls some of the lathe's more intricate processes. Usually it consists of a pin which fits one or several sets of holes, and the whole thing allows you to lay out your turning in quadrants for options like spirals or flutes, stacked lamination, or even clock faces. The indexing pin is a fragile item, and it's often broken on older machines. The holes in the system may be worn or plugged, or missing altogether if pulley sheaves have been replaced. Some of the better indexing systems—like the one on Delta's DL-40 lathe—work on a gear-and-cog assembly. Check your indexing system for positive fit and good lock-up in the indexed positions.

Checking the Tailstock

Now let's go to the tailstock. Start by taking it off the lathe bed and looking at the bottom. Check for excessive wear on the locking assembly, and for any visible cracks and repair spots. After you've done this, put the tailstock back on the lathe bed, and without locking it down, check to see that it rests flat without rocking. Then lock it in place slowly, while watching to see if it tilts or moves.

Now move the tailstock up to the headstock and place centers in both spindles, making sure the centers are properly seated. Lock the tailstock down, move its quill forward until the centers touch, and lock the quill. With luck, the centers meet point-to-point.

(See photo, page 38.) If not, try to determine the problem. Poor alignment will mean limited accuracy in operations such as boring.

If alignment is off, it's possible to shim the headstock on many lathes, as they are attached by bolts to the bed, but it's not fun or easy. But more often the alignment problem is caused by excessive wear on the tailstock or bed. Sometimes, careful filing on the tail-

stock base can solve the problem, but this is pretty drastic.

Next, check the condition of the tailstock taper. If possible, remove the quill completely and check it for signs of wear. Then replace it and check the quill lock. The quill lock should prevent all movement of the quill when locked down. If it doesn't, the quill may "back off" during turning, allowing a turning to fly off the lathe and hit you. Some quill locks can be adjusted, but more often this is a sign of excessive wear, and either quill or tailstock (or both) will need replacement or machining. Either proposition is expensive.

Other Things to Check Out

Finally, check all locks, handles, nuts, and any visible parts of the lathe for signs of wear and abuse. Replace all worn and broken items. Check the tool rest for wear and damage. File out minor nicks in the rest with a mill bastard file.

Once you get your lathe in good condition, it will remain that way with a

minimum of maintenance (see sidebar), and will provide you with years of service. A sweet-running lathe is well worth the time invested. ▲



STEPHEN BLENK is a professional turner in Washington state and a contributing editor to *AW*.

SOURCES

Drive centers, tail centers, chucks, morse taper adapters and other turning supplies are available from:

Craft Supplies USA

1287 E. 1120 S.

Provo, UT 84601

(801) 373-0917 Circle #630

Replacement levers, knobs and handwheels are available from:

Reid Tool Supply Co.

2265 Black Creek Rd.

Muskegon, MI 49444

(616) 777-3951 Circle #631

Replacement bearings for out-of-production lathes, and Multifil 426 Bearing Tape, are available from:

Bearings, Inc.

3600 Euclid Ave.

Cleveland, OH 44115

(216) 881-2838 Circle #632

the toys of



Turned out for the ark. In spite of their distinctive markings, most of these critters were created in multiples, from turned profiles. Careful shaping and coloring make each piece unique.

Rings of Animals are a Turning Tradition in the Mountain Villages of Eastern Germany



By Christa Pandey

Who would think that a deftly turned wooden hoop would split to reveal the profile of an animal? This unique form of lathe work has been practiced in the German Erzgebirge (Ore Mountains) for centuries. While it is not a quick way to earn an income from a craft, it might appeal to the accomplished hobbyist.

Working on a heavy lathe, the turner starts out with a knot-free, 1-ft.-long blank of wet spruce, centering it on a special ring chuck. (See upper left photo, facing page.) After roughing out a cylinder, the turner works on the face of the log, resting his long-handled tools on an angled wooden rest. An accomplished turner may have anywhere from 20 to 30 different piercing, hooking, spear-point or spoon-bit tools. Used in combination, these custom-made implements allow the crafter to make the most intricate cuts.

Animals take shape feet-first, as the turner gently reveals hoofs, haunches, necks, bellies and ears. To form the backs, he parts the ring with the finished underside off the remaining log and fits it onto a friction or jam chuck. He can now work on the perimeter of the piece using a standard rest for his tools. (See upper right photo, facing page.) Depending on the curves used, the animals can stand tall, prowl or graze.

erzgebirge

When the finished ring is split with a sharp knife and a hammer it will reveal the animal profile. (See photo at lower right.) Seeing the finished animal outline in a whole ring takes a great deal of imagination and sense of form. Mistakes are often difficult to discern and impossible to rectify.

Each ring yields about 40 to 60 animal pieces. Once cut, the pieces are usually whittled into more rounded shapes, then tails and horns are attached as necessary. As a final step, the animals are painted. Simpler ones gain their coats by just dipping them in paint; finer, more intricate miniatures are painted by hand with loving attention to detail. (See photo, facing page.)

An Enduring Tradition

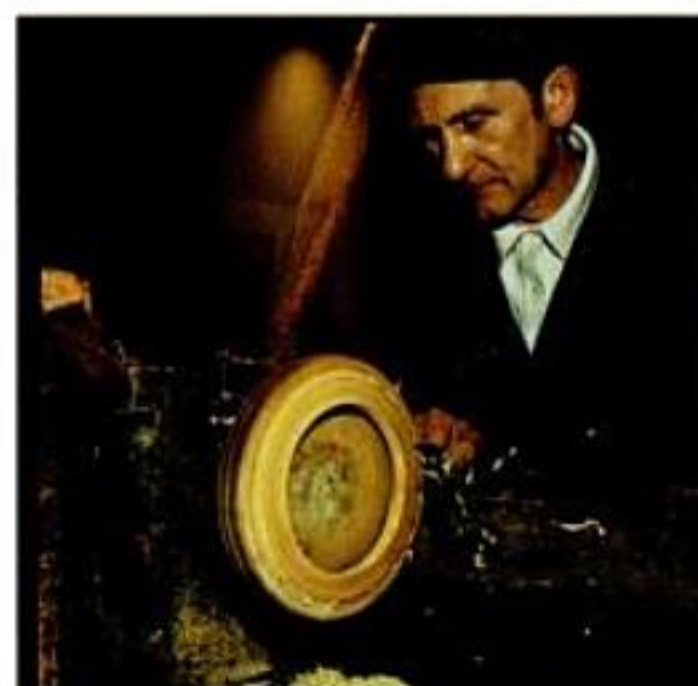
For centuries the small towns in the Erzgebirge have been famous for their remarkable cottage industry of wooden toys. Nutcrackers vied with nativity scenes, angels and village scenes for the attention of children and their parents. Internationally known are the Christmas pyramids of two or more tiers, in which the beveled blades of the top wheel are driven slowly by the rising heat from four candles, thereby revealing a nativity scene in the round.

In the past forty years much of what these small towns produced was sent abroad to earn foreign exchange. Today, tourists interested in woodworking can again freely visit these historic towns in the lovely Erzgebirge highlands that form part of the border between Germany and Czechoslovakia. Visitors can buy distinctive Erzgebirge wares on the spot or—better yet—watch them being made.

Like the miners who sought their fortune during the American gold rush, early inhabitants of the Erzgebirge were lured to these mountains by the ore (Erz) that has been mined there since the Middle Ages. In a process translated as “soaping” (seifen), Erzgebirgers initially extracted tin from various creeks. Over time, tin and other ores such as sil-



Starting with a tree. The blank is a knot-free wet spruce log, about 1 ft. long, mounted in a special ring chuck. The turner first shapes the delicate contours of the animal's legs and underside.



Shaping the profile. A jam chuck holds the carefully contoured ring, which is parted from the blank and repositioned for shaping the head and upper body.



Horses in a ring. Split with a sharp knife, the finished profile reveals the turner's skill. This ring will yield 40 to 60 animals.

ver and tungsten were extracted, but as mining diminished the people had to find other means of existence. Forests that existed throughout numerous villages provided the raw material for the new economic base.

At first, lathe-operating entrepreneurs provided the local population with wooden plates, buttons and other household goods. But gradually toy-making came to flourish. Today, it's still the mainstay of many communities in the

Erzgebirge region. And while the American hobbyist may not want to



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compete with their expertise, skill and intricate details, making even a simple ring of animals might be a challenge worth trying. ▲

WOODGRAINING

An Introduction To Fine Fakery



***Pine in disguise.** The author applies a coat of varnish to protect the faux maple and mahogany woodgrain on his pine cupboard.*

By Craig Bentzley

Woodgraining (also simply called graining) has been around for centuries. This faux finish is used not only to enhance inferior woods but also to provide a uniformity of color and grain pattern to interior paneling and trim. Previously painted furniture can be woodgrained rather than stripped down to the bare wood. Metal or plastic doors can be woodgrained to match wood trim and furnishings.

Woodgraining evolved from the early, simplistic attempts of Colonial painters into the incredibly realistic

work produced when the art was at its zenith in the late 19th century. Eventually, readily available tools, materials, and texts on the subject put the art form within the reach of amateur finishers. As the quality of workmanship diminished, so did public acceptance.

I developed an enthusiasm for woodgraining on a visit to the Pennsylvania Farm Museum of Landis Valley (in Lancaster). I spied a charming cupboard there, woodgrained to simulate curly maple. I decided to build a cupboard of my own design to try my hand at graining. (See photo above.) For a brief

description of how to build my cupboard, see page 45.

Woodgraining can be simple or complicated, depending on the type of wood being mimicked and the degree of realism desired. The painting process itself involves four basic steps: priming, grounding, glazing, and varnishing. In this article, I'll describe these steps as they apply to all types of woodgraining. Then, I'll take you through the specific step-by-step procedure for the maple and mahogany woodgraining used on my cupboard. These two finishes are a nice introduction to the art; they're fair-

MAPLE & MAHOGANY WOODGRAINING

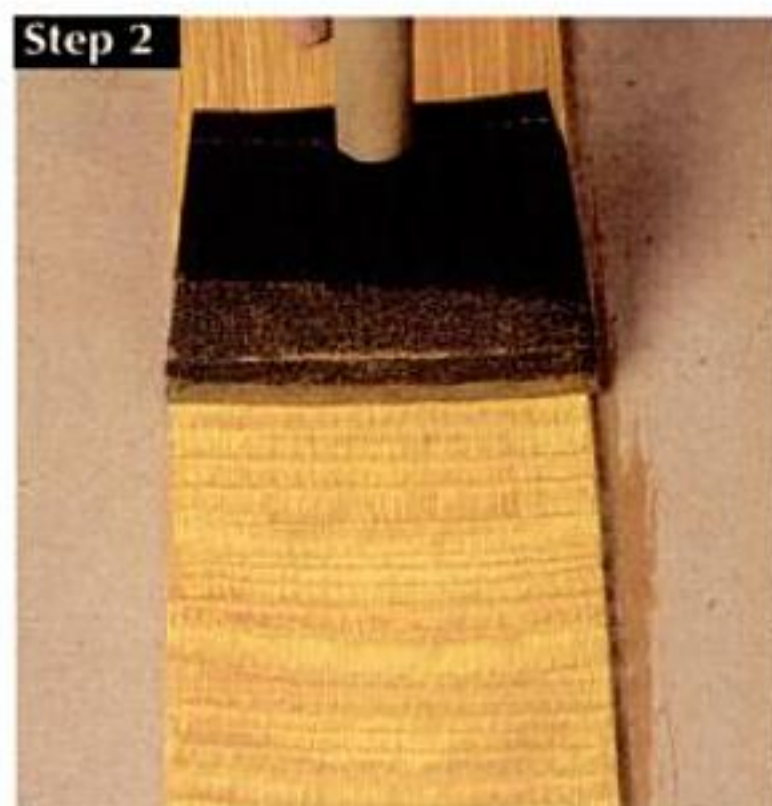
Here's how I did the woodgraining on the cupboard shown on page 45. First, I removed the cupboard door and all hardware, including the wooden handle. Then I prepared the wood surfaces and applied primer and ground coats as explained on the following pages. I did the glazing and graining selectively. For example, I masked off the stiles to grain the rails, then when the glaze was dry I masked off the rails and grained the stiles.

CURLY MAPLE GRAINING

Ground coat: Pratt & Lambert
"Cellu-tone" alkyd satin enamel
#2121 ("Mission")
Glaze tinting: Raw sienna

Step 1: With a fairly wet, good quality brush, apply the glaze in the direction of the grain. Use uninterrupted, overlapping strokes.

Step 2: Load a foam brush with glaze. Using a "drag and dab" technique, push some glaze ahead of the brush and pull some behind it. It goes fast once you get the feel for it.

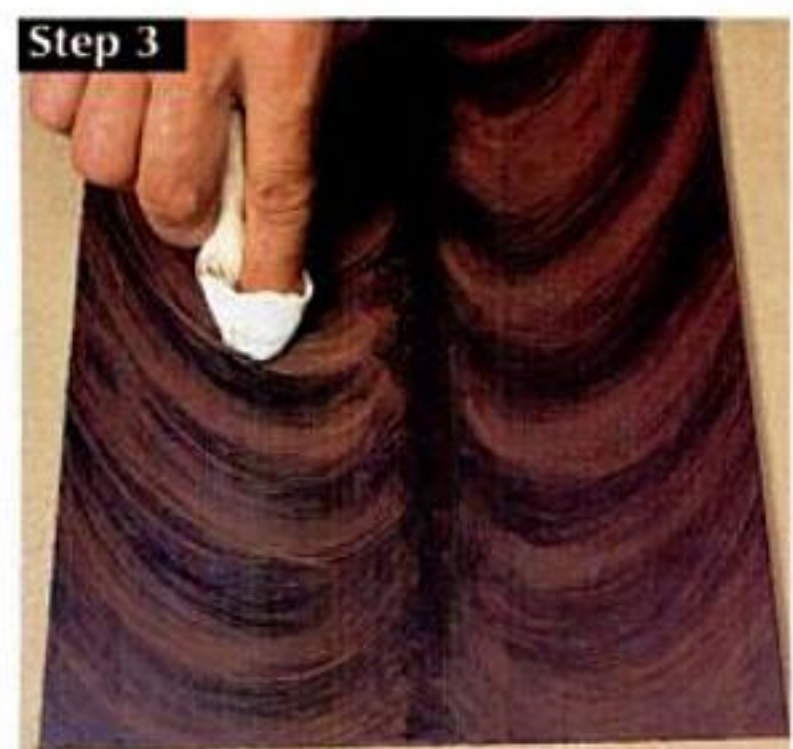
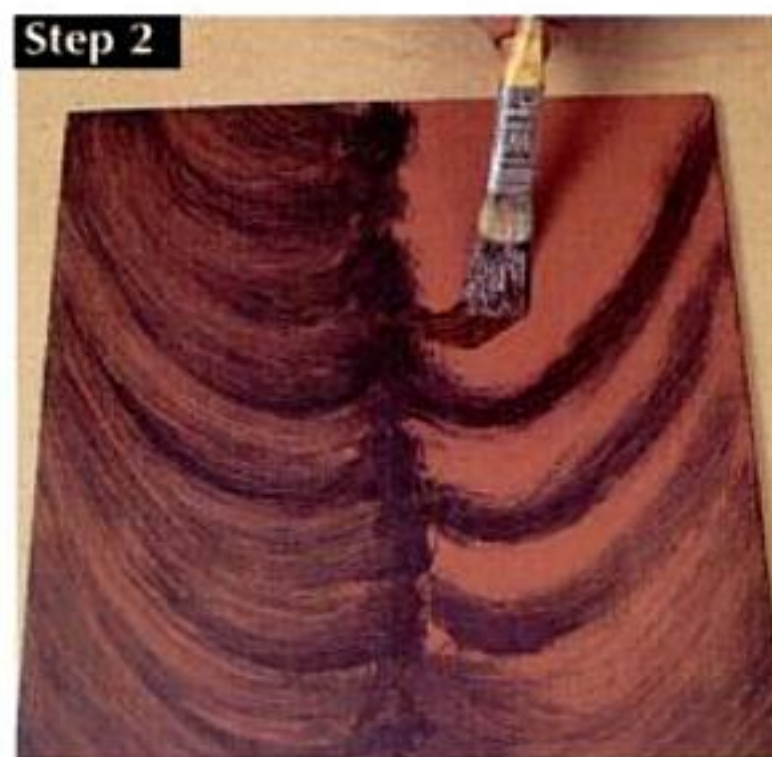


CROTCH MAHOGANY GRAINING

Ground coat: Pratt & Lambert
"Cellu-tone" alkyd satin enamel
#2008 (Cinnabark)
Glaze tinting: A 50/50 mixture of
burnt umber and raw sienna.

Step 1: Apply a darkly tinted glaze mixture using a 1/2-in. stiff-bristled brush to lay in the main vein.

Step 2: With the same brush, make arcing brush strokes out from the main vein until the panel is filled.



Step 3: Use a rag or paper towel to create highlights by wiping out some of the glaze mixture to expose some of the ground coat.



Step 4: Working with a stiff-bristle brush, introduce some burnt sienna and raw umber color to the graining.



Step 5: Before the glaze becomes too tacky, soften and blend sharp edges of veins with a soft 2-in. brush.



Implements of deception. The author's woodgraining kit includes different glazes and pigments, feathers, proprietary graining tools, and make-up brushes pilfered from his wife.

ly simple to do and they don't involve many tools or supplies.

Before you start, though, I highly recommend looking at some examples of woodgraining. The number of styles and variations is astounding. Examine an authentic piece or look at some examples in one of the books listed in the box below. You'll see that woodgraining is more than a technique for hiding a shabby material; it's a remarkably different type of wood finish.

Woodgraining Tools

Over the years, many imaginatively named tools have been developed for the woodgrainer. Some are highly specialized, some are patented. However, you don't necessarily need an enormous complement of these proprietary floggers, stipplers, mottlers, and draggers to complete the job.

My own graining kit (see photo above) consists of the following items: inexpensive natural bristle brushes, soft

blender brushes, fan blenders, poly foam brushes, rubber and metal graining combs, rubber graining rollers, heart grainer, check roller, turkey feathers, sponges, corn cobs, painter's putty, pencil erasers, and even some make-up brushes scavenged from my wife. Of all these tools, I only needed about \$10 worth of brushes to paint my cupboard.

Sample Boards

Choose or create a warm, clean and dust-free area to work in. Before beginning woodgraining on a good piece of furniture, I suggest experimenting on some sample boards. For reference, have on hand some finished pieces of the actual wood you are duplicating. To practice woodgraining brush strokes, you can do your painting on a piece of glass placed on an 8x10 sample board primed and painted with base coat. This "slate" can be wiped clean repeatedly until the desired effect is achieved. When you're satisfied with your grain-

ing technique, complete a sample board or two. Sample boards prove invaluable for checking finish compatibility, technique, and final appearance. I record all pertinent data on the back of my samples and use them for future reference.

Surface and Painting Preparation

As with any other type of finish, quality woodgraining depends upon a well-prepared surface. Close-grained woods like white pine and yellow poplar work well for graining. Don't use woods with knots or sap pockets that could bleed through the top coats. Fill all pores, nail holes, and imperfections. (I use Durham's "Rock-Hard" Water Putty or Elmer's Carpenter's Wood Filler.) Sand or scrape the wood until all machine and tool marks are completely eliminated and the surface is smooth, clean and dry. After sanding, I brush and vacuum until I can run my hands across the piece without picking up any dust.

Priming

The surface to be grained should be primed before the colored ground coat is applied. The primer (which will provide good adhesion for the paint layers that follow), can be water-based or oil-based; I generally use the latter. For better coverage, I tint the primer to match the ground coat color. Tinting also prevents exposure of white primer if the finish is scratched or nicked. I purchase my primer and ground color paint at the same time and have the paint store do the tinting. Stick with the same manufacturer for both products to ensure compatibility. I like Pratt & Lambert and Benjamin Moore paints, but any high quality paint from a reputable manufacturer is fine. Avoid cheap products: They produce a poor job.

Apply your primer with a good natural bristle brush, always working in the direction of the grain. When the prime coat is completely dry (wait at least 24

BOOKS ON WOODGRAINING

For more information on woodgraining and the processes involved, refer to specific woodgraining sections in the following books:

The Art of the Painted Finish for Furniture and Decoration

by Isabel O'Neil (1971, Wm. Morrow & Co., 800-843-9389)

New Paint Magic by Jocasta Innes (1981, Pantheon Books, 800-733-3000)

Paint Finishes by Charles Hemming (1985, Castle Books Inc., contact: Edward R. Hamilton, Box 5001, Falls Village, CT 06031-5001)

American Painted Furniture 1660-1880

by Dean A. Fales Jr. (1986, Chatham River Press) An excellent book, but out of print. Check your library.

CUPBOARD CONSTRUCTION

This cupboard design is based loosely on cupboards built in the mid-Atlantic region from 1800 to 1840. I built the entire project from pine, which takes a great finish.

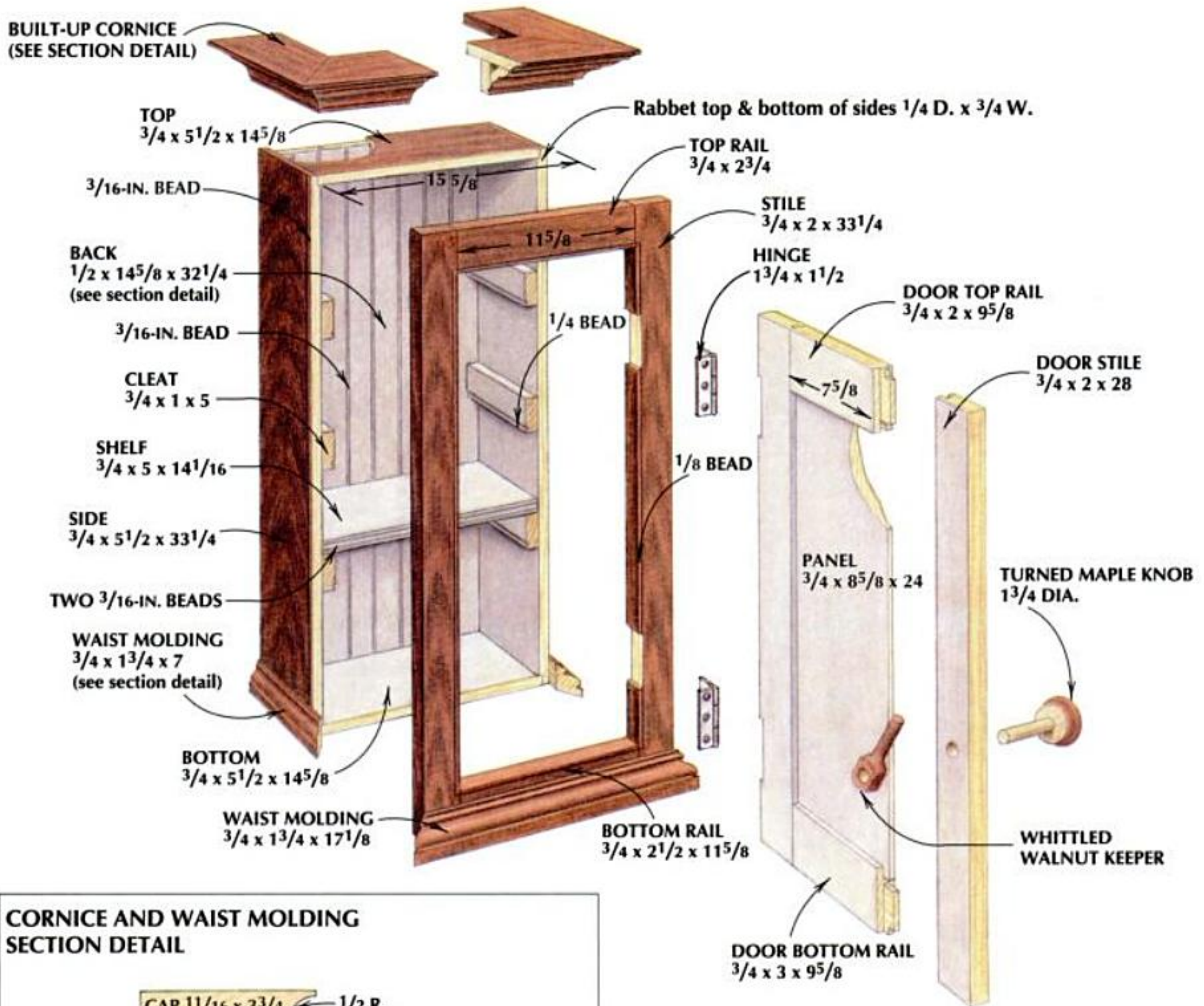
I joined the face frame and door frame with mortise and tenon joints, but you could join the face frame with biscuits. All other joints are simply glued and nailed. If you don't have a Stanley #45 plane for cutting the

beading details, you can use a router.

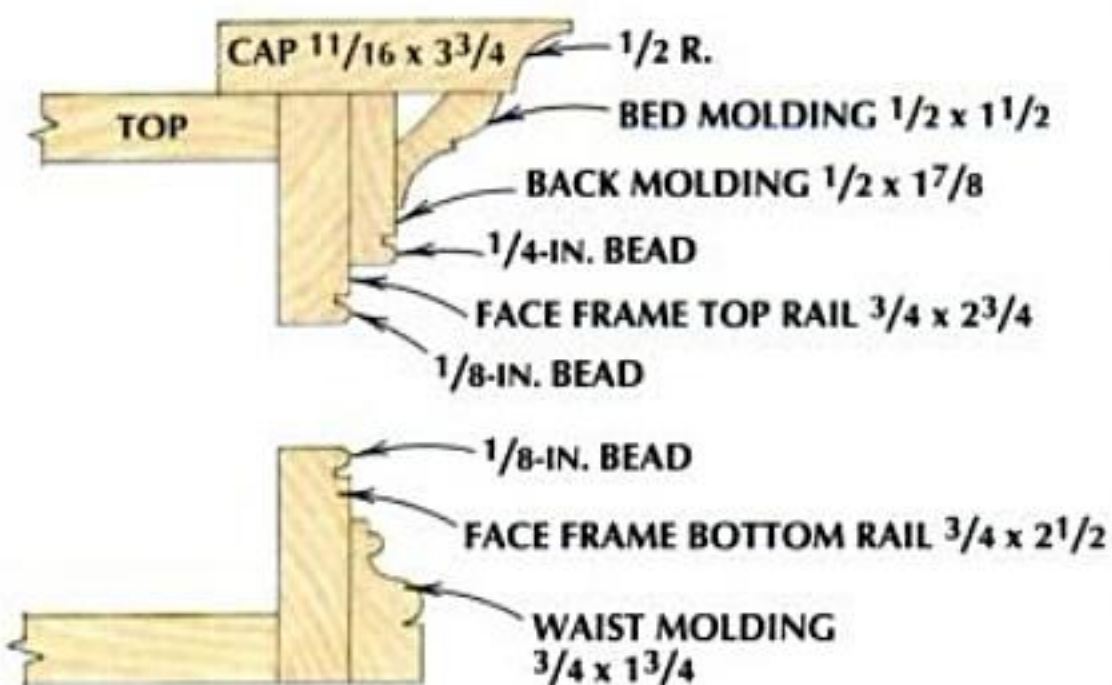
I made up the cap and back pieces of the built-up cornice molding, but purchased the bed molding and waist molding from the lumberyard.

It's easier to paint the cupboard's interior and back pieces before installing the back.

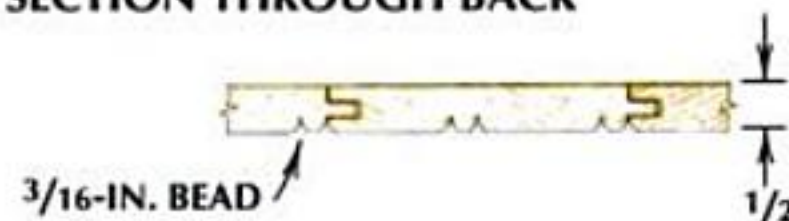
For details on how I painted the mahogany and curly maple wood grains, [see the sidebar, page 43](#). —C.B.



CORNICE AND WAIST MOLDING SECTION DETAIL



SECTION THROUGH BACK





Made to grain. This elegant, easy-to-make cupboard is an excellent project to woodgrain. For construction details, see page 45.

hours), sand with 220-grit paper and remove all sanding dust by brushing and vacuuming.

Grounding

For the ground coat, which will provide the background color for graining, I use a satin alkyd enamel paint tinted to

match the lightest shade of the wood being copied. You've got some leeway with this color, but it's better to err on the light side because it's easier to darken a light color than to lighten a dark one.

Using a good quality brush, apply the ground coat in the same manner as the primer, brushing along the grain. Level out the paint with long flowing strokes, using the tip of the brush, then allow the coat to dry completely. If the coverage is thorough, one coat may be sufficient. I usually put on two, applying them thinly by brushing them out well. Between coats, I dry sand with 400-grit wet-or-dry paper. After the second coat is dry, I wet sand with the same grit paper lubricated with a couple of drops of dish detergent in water. Be careful not to sand through the paint, especially along edges. When finished, wipe the paint with a dampened cloth and buff dry. When the surface is totally dry, you're ready to apply the glaze.

Glazing

Now it's time to apply the glaze and create the actual graining patterns. The glaze itself is a thick, pigmented stain.

You manipulate the glaze while it's still wet, using various tools to produce the desired mock wood grain. The glaze coat needs to be thick so it won't flow out or level itself. That way, details will stay crisp until the glaze dries completely. The glaze should be translucent enough to allow the base coat to show through.

Specific glaze formulations were closely guarded secrets of period grainers, but today there are two basic media. One is a "distemper" glaze made by mixing dry powder pigments with either vinegar or beer. The other, which is more commonly used, is an oil-based glaze. I usually use a pre-mixed glazing liquid such as Pratt & Lambert's "Lyt-all" Glazing Liquid or McCloskey's "Glaze Coat." I tint the glaze to the desired color by adding pigment—using Japan colors for quicker drying or artist's oil colors for slower drying. You can also use dry powder pigment, which will not affect the drying rate of the glaze. (See "Sources," at left.)

You can also make your own glaze using the following formula:

- 4 oz. boiled linseed oil
- 8 oz. alkyd satin varnish
- 12 oz. mineral spirits
- 1/8 tsp. Japan drier
- 2 oz. of artist's oil color

If your project has any hard edges (ie: intersections of door stiles and rails), mask these areas off with low-tack painter's masking tape. See page 43 for the specific techniques I used on my cupboard.

You can adjust the final color of the glaze after it's dry by top coating with a varnish stain such as Minwax "Polychades" or by brushing on a thin wash of a transparent oil stain.

Varnishing

After a thorough drying period, apply a couple of thin coats of an alkyd satin varnish. This will enhance the illusion of depth and provide some protection for the fragile glazed surfaces. Finally, rub

out your final varnish coat with 4/0 steel wool, then follow up with an application of paste wax, and the job is complete. ▲



CRAIG BENTZLEY restores antique furniture and builds period reproductions in his Chalfont, PA shop.

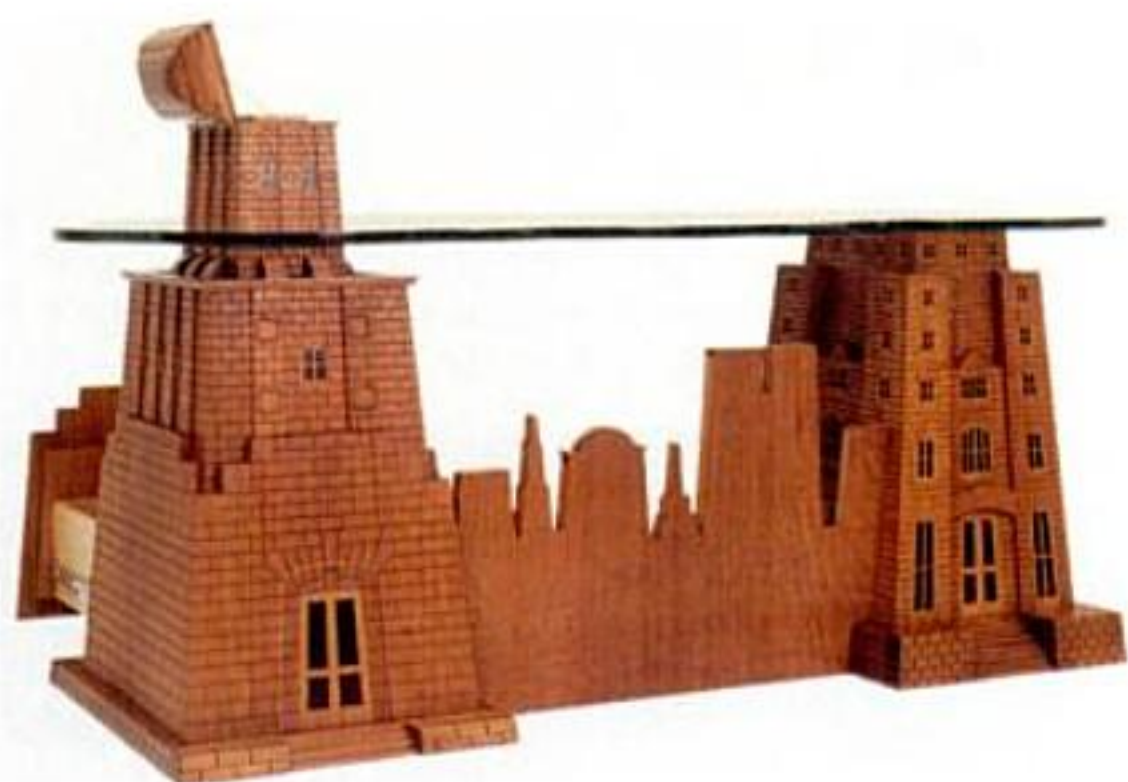
SOURCES

Woodgraining supplies and tools are available from the following mail-order suppliers:

Janovic/Plaza Inc.
800-772-4381
Circle # 612

Woodworker's Supply Inc.
800-645-9292
(Request the "Wood Finishing Supply Catalog")
Circle # 613

Old Mill Cabinet Shoppe
1660 Camp Betty Washington
Rd., York, PA 17402
717-755-8884
Circle # 614



What Is Good Design?

Six Viewpoints
from the Granite State

by Ellis Walentine



Ebony desk, by Jere Osgood
50 H. x 69 W. x 41 D.
Ebony, laminated ash, lacewood,
pearwood, red mirror leather

"Design" is one of those fuzzy terms that means something different to almost everyone. Yet design is at the foundation of everything we make in the workshop, by intention or by default. Technically speaking, design is the process of conceiving and specifying something for production, whether we plan to make one or a thousand. But, more than that, it's an opportunity to express ourselves, which can be one of the most satisfying aspects of woodworking.

When we design furniture, we are deciding how it will look and function. Since we all have different tastes and abilities, our design solutions will almost certainly be different. Fortunately, there's no single "best" solution to a particular design problem. Some pieces may function better than others, but, when it comes to appearance, the differences are mostly subjective—beauty is in the eye of the beholder. How then can we hope to devise guidelines for "good design?"

This perennial question was the topic of a panel discussion held by the Guild of New Hampshire Woodworkers at a recent guild meeting. Before an audience of about 80 guild members, the six panelists—all professional woodworkers chosen from the guild's ranks—showed slides of their work and talked about their approaches to design. Their styles ranged from traditional to eclectic, from understated to exuberant. Some were rooted in the past, like David Lamb's beautifully derivative casework (see page 52); others seemed to be based on specific techniques, such as Jere Osgood's graceful laminations. And while all could be considered good design, no two visions were the same.

By the end of the discussion, it was clear that good design can take many forms. No matter where your creative juices lead you, you can produce good design as long as you address all the functional requirements of the piece. But designing isn't automatic or necessarily intuitive—it takes practice. The panelists had built their design careers on strong foundations of craftsmanship, observation and experience. I asked them to choose some pieces that illustrate their design philosophies, and to offer some advice to new designers. Here's what they had to say...



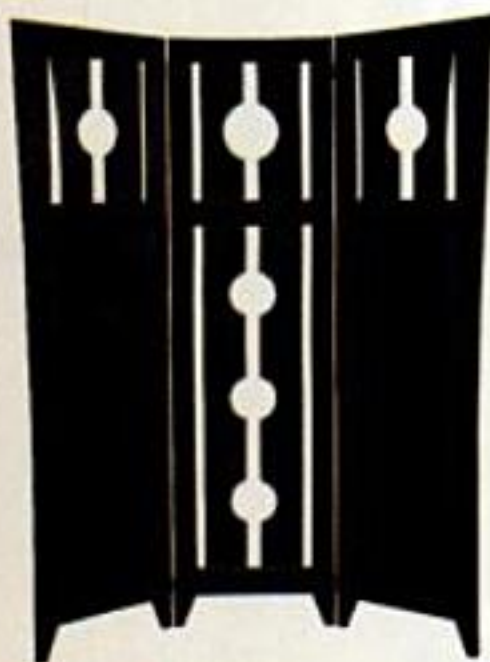
Desk, by Terry Moore
45 H. x 36 W. x 14 D.
Ceylon ebony veneer, curly maple

Shared destinations, different journeys. These desks by three New Hampshire craftsmen are all examples of "good design," yet the designers' approaches are completely different.

JOHN MCALEVEY

Tenants Harbor, ME

A professional woodworker for 30 years, John specializes in custom, commissioned work for private clients. He teaches woodworking at Peter Korn's Center for Furniture Craftsmanship in Rockland, ME.



Folding screen

56 W. x 66 H.

Ebonized mahogany

Flanked by solid panels, the center section of this screen has a "keyhole" motif cut into the upright splats. It was inspired by the work of British designer Charles Rennie McIntosh.

PHOTO BY TIM SAVARD



Blanket chest

24 H. x 48 L. x 20 D.

Cherry, curly maple

To minimize wood movement problems, all the frame pieces are made of quartersawn lumber. The flatsawn end panels are glued and splined to the faceted legs.

PHOTO BY WILLIAM THUSS



Dining table

60 W. x 29 H. x 36 D.

Cherry

The support system for this table consists of four leg assemblies spline-joined to a center frame at 120° angles.

PHOTO BY TIM SAVARD



"I have always worked toward having a personal and individual contemporary architectural style in my furniture designs. I have never been interested in rehashing the past by reinterpreting bygone furniture styles. I believe my work has been influenced by Scandinavian design and some modern American designers, particularly Walker Weed (another New Hampshire craftsman), whose attitude and approach to woodworking and design really got me going.

"For a furniture design to succeed it is important that all the parts relate to the whole. The piece must have good proportions and pleasing lines that complement each other, and it must function accordingly. To work these things out, I find it very important to draw the details accurately on paper. I also take the material into consideration, using construction techniques and joinery that is appropriate. Attention to detail, high standards of overall craftsmanship and a suitable finish all contribute to the successfully designed piece of furniture."

PAUL TULLER

Dublin, NH

Paul designs and builds Japanese style furniture and architectural details. He specializes in applying traditional construction techniques to contemporary furniture forms.



"My goal in designing furniture and architectural details is to create a feeling of harmony in each piece and the room. If I am successful the finished product will have 'shibui,' a Japanese word meaning 'a profound, unassuming, quiet feeling.'

"My work tries to have a Japanese sense of proportion and strong joinery as well as reflect my own appreciation of wood. I often improvise on traditional Japanese motifs, especially when I'm building furniture that doesn't exist in Japanese tradition, such as a bed.

"The process is very hard to quantify. As I make a project, I analyze each piece of wood as to its relationship to all the others. Then I adjust every part until the feeling is right."



Night tables

26 H. x 22 W. x 17³/₄ D.

Cherry, Port Orford cedar

Handmade pivot hinges allow doors to fold flat against cabinet sides. Iron drawer pulls were hand forged in Japan.

PHOTO BY MARK CORLISS



Kotatsu table

13 H. x 35 W. x 35 D.

Cherry, Alaskan yellow cedar

This traditional form is based on dimensions of tatami (floor mats). Tuller cuts the tricky mitered double through-tenons at corners with a Japanese saw and pares them to fit with chisels.

PHOTO BY MARK CORLISS

TERRY MOORE

Newport, NH

Terry is a self-taught furniture maker who specializes in one-of-a-kind pieces. He sells his work through private commissions and in galleries throughout the Northeast.



Writing desk and chair

Desk: 54 W. x 30 H. x 26 D.

Chair: 18 W. x 40 H. x 20 D.

Bubinga, maple

This desk, which won Third Prize in AW's 1992 Excellence in Craftsmanship competition features bookmatched, sawn veneers, maple stringing and fluted "torpedo" legs. The chair seat is a traditionally upholstered frame covered with embossed leather.

PHOTO BY TERRY MOORE



"In these days of conveyor-belt production furniture, with its designs based on what factory machines can do, it is very important that we, as designers and wood craftsmen, are able to justify our existence. Our work should be a statement of our commitment to excellence in our craft.

"Well-designed furniture should have a design intent that is consistent throughout the piece. That means all the elements should complement each other and the piece should function as intended.

"Careful attention to detail and craftsmanship are essential—especially the fitting of drawers and finishing on the backs and underside of a piece—showing overall the successful interplay of skilled hands and beautiful materials.

"In my view, we are all inspired by influences in our lives, and everyone is a different and unique individual. We express ourselves in a personal way by what we wear, our hairstyles, the cars we drive, and how our homes are decorated. Furniture design is no different; we absorb different influences and reinterpret or express them from our unique perspectives. The desk I design will differ greatly from other designs because of my own personal vision and perspective—my own sense of proportion, my own sense of style. It will be an expression of who I am."



Cabinet desk

45 H. x 36 W. x 16 D.

Brazilian rosewood, curly maple

The subdued elegance of Brazilian rosewood veneer, purchased at a WARP (Woodworkers' Alliance for Rainforest Protection) sale, contrasts with the highly figured maple interior. Moore installed the butt hinges for the lower doors in line with the rosewood cock beads.

PHOTO BY TERRY MOORE

LEE SCHUETTE

Kittery Point, ME

Lee is a teacher and craftsman who has been working wood for 23 years. His emphasis is on teaching—he taught at the Wendell Castle Workshop and currently at the University of New Hampshire. He still occasionally makes furniture on commission.



"I make two kinds of furniture: Funny and not-so-funny.

"I have worked in speculative vein before, but now I mostly make commissioned furniture for individual clients. I enjoy coming up with a solution that is based on the particular needs and wants of a person or family. I also like having contact with the people I make things for. That way the making of the work becomes as important as the finished product.

"How do I approach design? I hope for a bright idea. Sometimes that comes from something I see, a conversation or a dream, or from some part of my experience. My 'funny' designs are connected more closely to my emotions. They come unsolicited, like when I'm driving my car or just waking up. For me, capturing these ideas is the design process.

"Once I've had an idea, I start to think about the form of the piece—the volume and shape. Full-size models are very important. Computers are also beginning to be useful in three-dimensional design.

"'Art furniture' is such a loaded expression. I prefer to think in terms of 'artfully created' furniture, and I feel there's room in the world for all of the artful objects that we make. Take my 'Big City Desk,' for example. (See photo, page 47.) For most people this wouldn't be an appropriate desk. But it's not strictly art either. It functions visually first, but it also has a top for writing and drawers for storage."



Tanzu media center
48 H. x 44 W. x 23 D.
Mahogany, maple

Based on the traditional Japanese kimono cabinet, this design serves a more Western purpose. Schuette revised the scale of the cabinet to accommodate a stereo system as well as CDs and cassettes.

PHOTO BY GARY SAMPSON



High-tech Shaker chair
46 H. x 17 W. x 20 D.
Purpleheart, black aluminum, Delrin,
tennis-racquet string

Faithful to Shaker originals in style and proportions, this chair is a study in modern materials. It was designed in 1982 as part of a series of chairs for Sears Roebuck.

PHOTO BY GARY SAMPSON

DAVID LAMB

Canterbury, NH

David apprenticed with a Spanish master furniture maker and attended Boston University's Program in Artisanry before opening his own custom furniture business in 1980. His style shows clearly the influences of classical and Shaker design.



Chest of drawers

36 1/2 H. x 42 W. x 20 D.

Cherry

Designed as a sideboard, this chest has a top slide to increase the serving area and a top drawer fitted for silverware. Its style shows Hepplewhite and Chippendale influences.

PHOTO BY BILL FINNEY



"Many new woodworkers have the impression that to be a good furniture designer one must always develop fresh and new designs, the likes of which have never been seen before. While I believe that designs should be bold and fresh, I also believe in a continuum and evolution of traditions and classical designs. Our work should be informed by elements of traditional furniture—its proportion, choice of materials, selective use of detailing, light and shadow, contrast, texture, finish and so on. In traditional furniture, things were done a certain way because the established methods had been proven to work, both aesthetically and mechanically. By studying the work of old masters, we can begin to understand and utilize successful traditional elements in our new creations.

"Every design is an end product of the designer's accumulated experience. It is imperative to learn the fundamentals of craftsmanship before starting to design. Only then can the designing process become a means of personal expression. Based on my apprenticeship, I feel the best way to gain this experience is to try to duplicate the work of a master—to build a reproduction. This will help you understand what the original maker was thinking and why he or she chose certain solutions, methods and techniques, while at the same time you develop your wood working skills. But, reproduction work is best used as a building block and as a basis for understanding design."



Bookcase

36 W. x 80 H. x 14 D.

Mahogany, curly maple, rosewood

This bookcase makes extensive use of wood color and figure. The coved crown molding, arched bracket feet and rosewood cock beading add to the Federal period flavor of this original design.

PHOTO BY CHARLEY FREIBERG

JERE OSGOOD

Wilton, NH

Jere is a full-time studio craftsman whose work has appeared in many major museums. He has been designing and building furniture since 1957 and taught furniture making at Boston University's Program in Artisanry and at Rochester Institute of Technology's School for American Craftsmen. He is best known for his pioneering work in bent lamination.



"A good design is one that has a balance—of shapes, forms, volumes, color—even sound. The proportions of a completed piece of furniture are only an elaboration of the principle of balance. A good design will also hold your interest—you'll like it again each time you see it. In fact, you'll probably see something new in it each time.

"The other aspect of design is communication. If you have something interesting to say, you can get it across through your design. You can give a piece of furniture life and spirit—a part of yourself. I don't regard it as personal expression when you merely assemble parts from pieces others have made. But I also like traditional furniture. It's familiar and has strong associative values.

"It's important not to confuse design with technique. Techniques deal with logic and traditional assembly systems—with joints, glues, and woods. Designing has to do with the spirit of a piece. It's rushing up to a corner, looking around it and seeing a new form for the first time.

"If you want to design, I recommend you keep a sketchbook. It's very important to train yourself to *see*—patterns, images, light, dark, positive and negative forms.

"Furniture design reveals itself to us in three stages. The first stage—your first impression of the piece when you see it from a distance—is very important. You see the silhouette and the positive and negative areas of the form. In the second stage, as you move closer, you see the color, texture, and surface quality. You see more of the form and get an understanding of the volume. Finally, in the third stage, you are too close to see the form. Instead, you see the fine details—carving, inlay, joinery—and how they add up to the finished piece."



Ellipse II desk

53 W. x 48 H. x 38 D.

Bubinga, wenge, curly maple

The solid, elliptical shell of this desk consists of $\frac{3}{8}$ -in.-thick, coopered staves of laminated bubinga. The tapered, laminated legs are intended to resemble the roots of a tree. The pigeonholes inside the desk are curly maple.

PHOTO BY DEAN POWELL



Desk

72 W. x 32 H. x 26 D.

White ash, leather

Osgood considers this desk to be one of his cleanest "pure lamination" designs. All the wooden parts were made with laminating techniques he developed.

PHOTO BY DEAN POWELL

Sculpture Game

Make a Conversation Piece That's Challenging and Fun

By Steve Paulsen



"C'mon, Dad, let me play with those blocks." It was the voice of my 7-year-old son, Martin. I had been experimenting with an idea for a sculpture made of blocks of wood that could fit together in different combinations to create varying visual effects. But Martin immediately saw another use for all those irregularly shaped blocks. He wanted to stack them as high as possible without having them fall over.

When Martin went to bed that night, I started playing with the blocks myself. I became totally absorbed. At about three o'clock in the morning I realized that this unlikely puzzle could be fun for kids of all ages, both as a puzzle and as a game of skill. After making a few refinements to the concept, I christened my creation "Brock Picasso's Sculpture Game" and started producing it for sale in gift shops and craft galleries.

The game consists of several groups of puzzle pieces that can be arranged in a V-shaped tray to form a patchwork column of wood. A mathematician friend calculated that there are more than two million ways to recombine the pieces in the tray. However you arrange the pieces, the assembled game will be an interesting conversation piece.

To play the sculpture game, divide the pieces equally among the players and take turns stacking them on top of each other. In one vari-

ation of the game, players race the clock to see who can stack all the pieces fastest. The angled surfaces keep the game challenging, and no matter how you stack the pieces, the result is a unique sculpture.

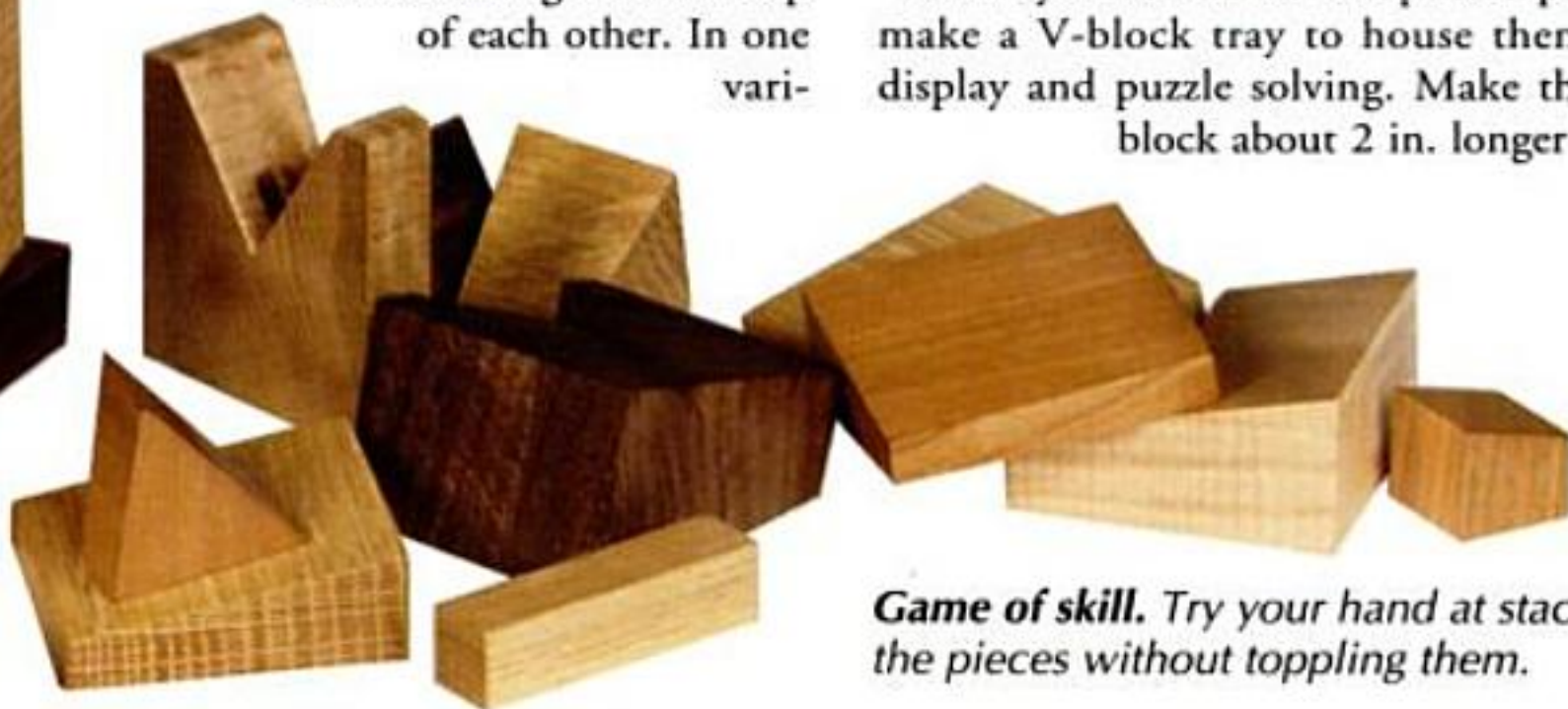
Making the Pieces

The game can consist of as many pieces as you like. The sculpture game shown here has 28 pieces—five fewer than my original version. Beware of making too many pieces, though—you won't be able to stack them without toppling.

I suggest you make the game in multiples of two, using contrasting woods. That way, you can swap pieces between them for a more varied appearance. Mixing and matching also makes the puzzle a bit more puzzling.

To make this puzzle, I started by ripping a few 2-in. by 2-in. square lengths of four woods—cherry, curly maple, walnut, and white oak. To make module styles #2, #3, #4, and #5 (see drawing), saw rabbets or triangular notches in different blanks, and fill them with mating pieces ripped from contrasting stock. Then bandsaw these sub-assemblies at an angle as shown in the drawing. Make module styles #1 and #6 from the remaining scraps. I found it helps to leave the bandsaw marks on the angled faces to provide some friction when stacking the pieces later.

Once you've cut all the puzzle pieces, make a V-block tray to house them for display and puzzle solving. Make the V-block about 2 in. longer than



Game of skill. Try your hand at stacking the pieces without toppling them.



Patchwork puzzle.

Contrasting pieces may be displayed in more than two million eye-catching combinations.

the total length of your puzzle column. Wrap the ends of the column with waxed paper, center it in the tray and glue triangular stop blocks into the V-block alongside the waxed-papered ends. When the glue dries, trim the ends of the tray square and finish-sand it.

Now, arrange the modules in the tray in any order and tape them together with a single piece of wide masking tape. Take the taped column out of the tray and disc-sand the sides adjacent to the taped side to even up any irregularities. Then, switch the tape to one of the sanded faces and sand the other two sides. Turn a few of the modules 90° and repeat this sanding

process if necessary.

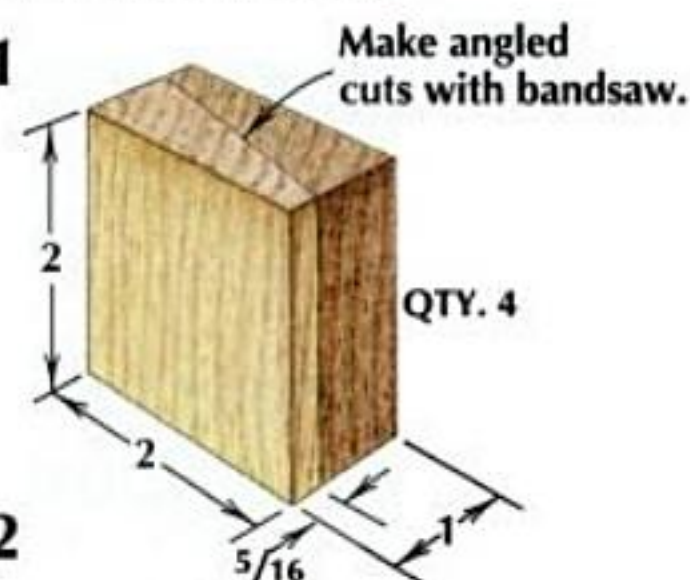
Finally, I finished the tray with a couple coats of lacquer. I decided to leave the puzzle pieces natural because applying a finish would have reduced the friction needed for stacking. But, if appearance is important to you, you can probably get away with a very thin coat of a penetrating finish that doesn't leave a build up on the surface. ▲



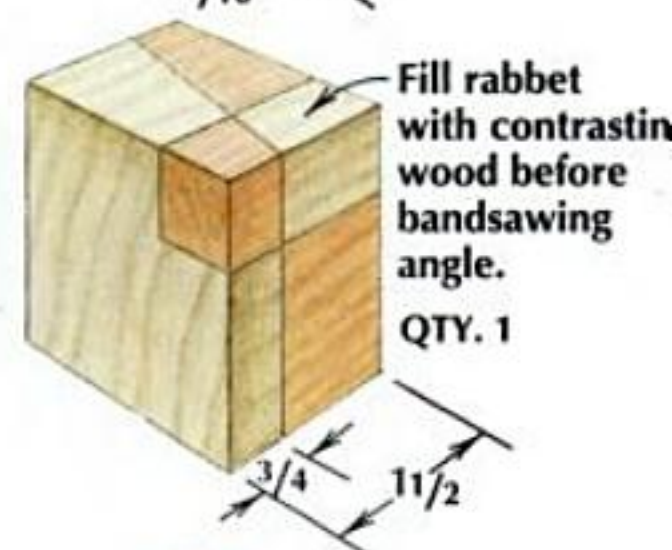
STEVE PAULSEN is an artist/woodworker in California.

PUZZLE PIECES

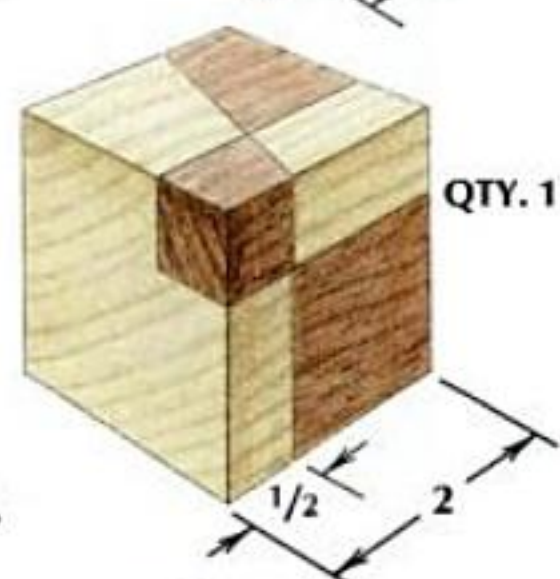
#1



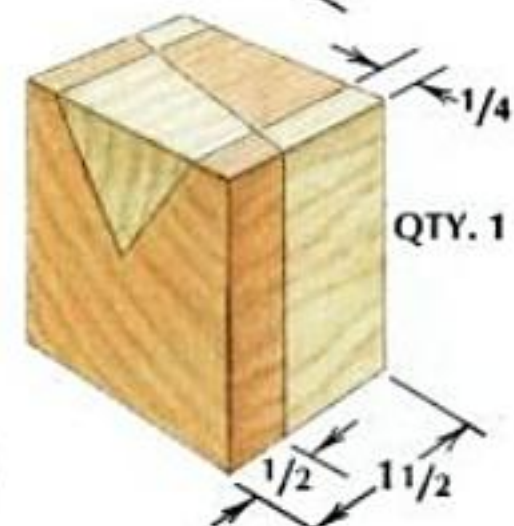
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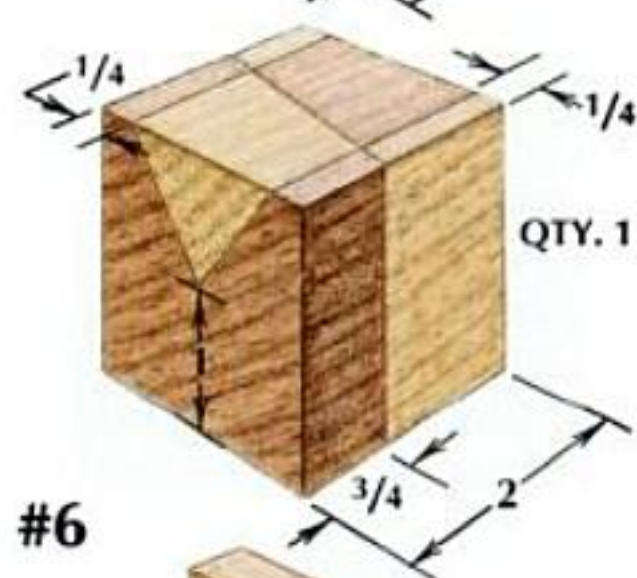
#3



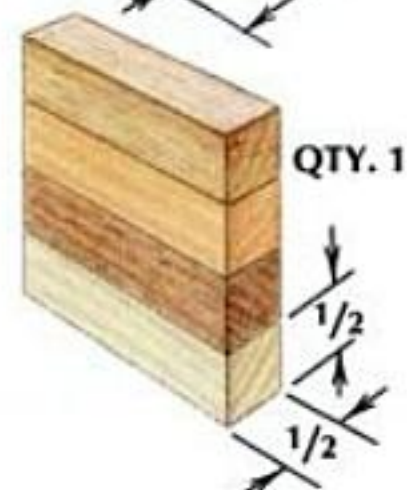
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#5

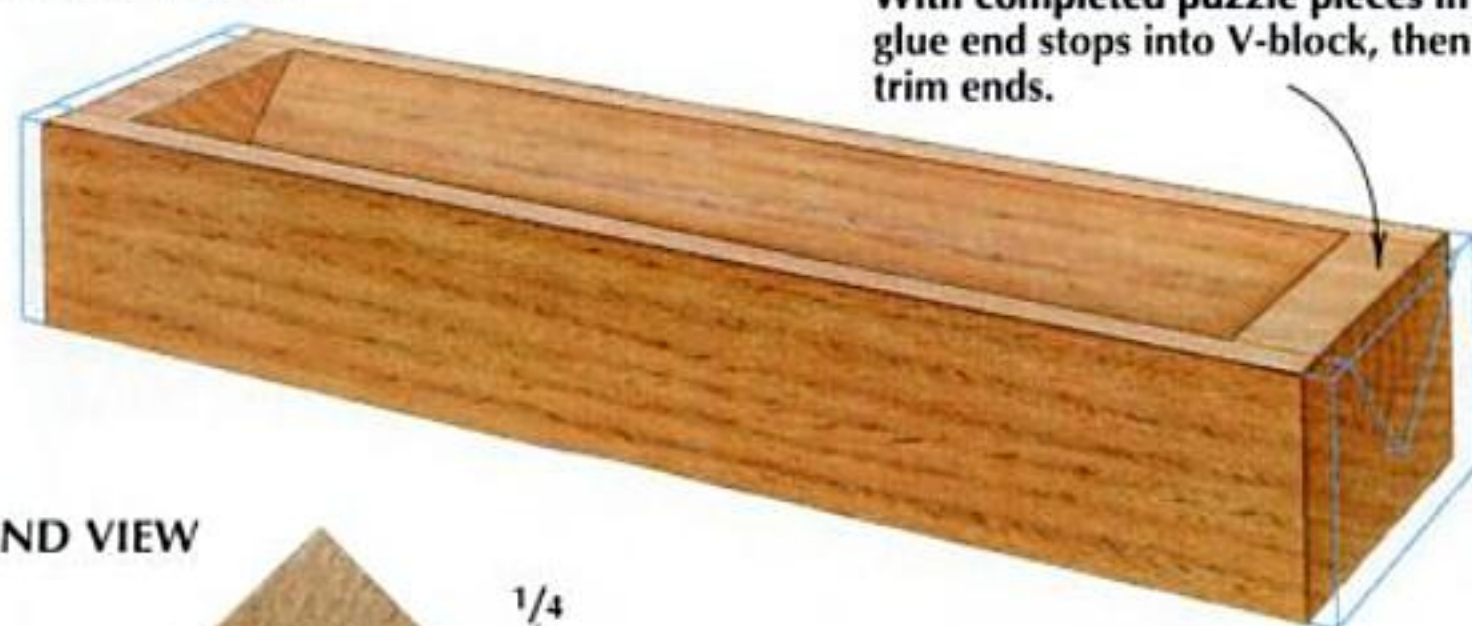


#6

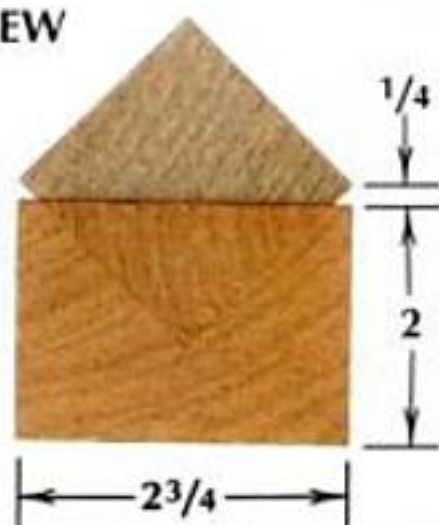


SCULPTURE GAME

V-BLOCK TRAY

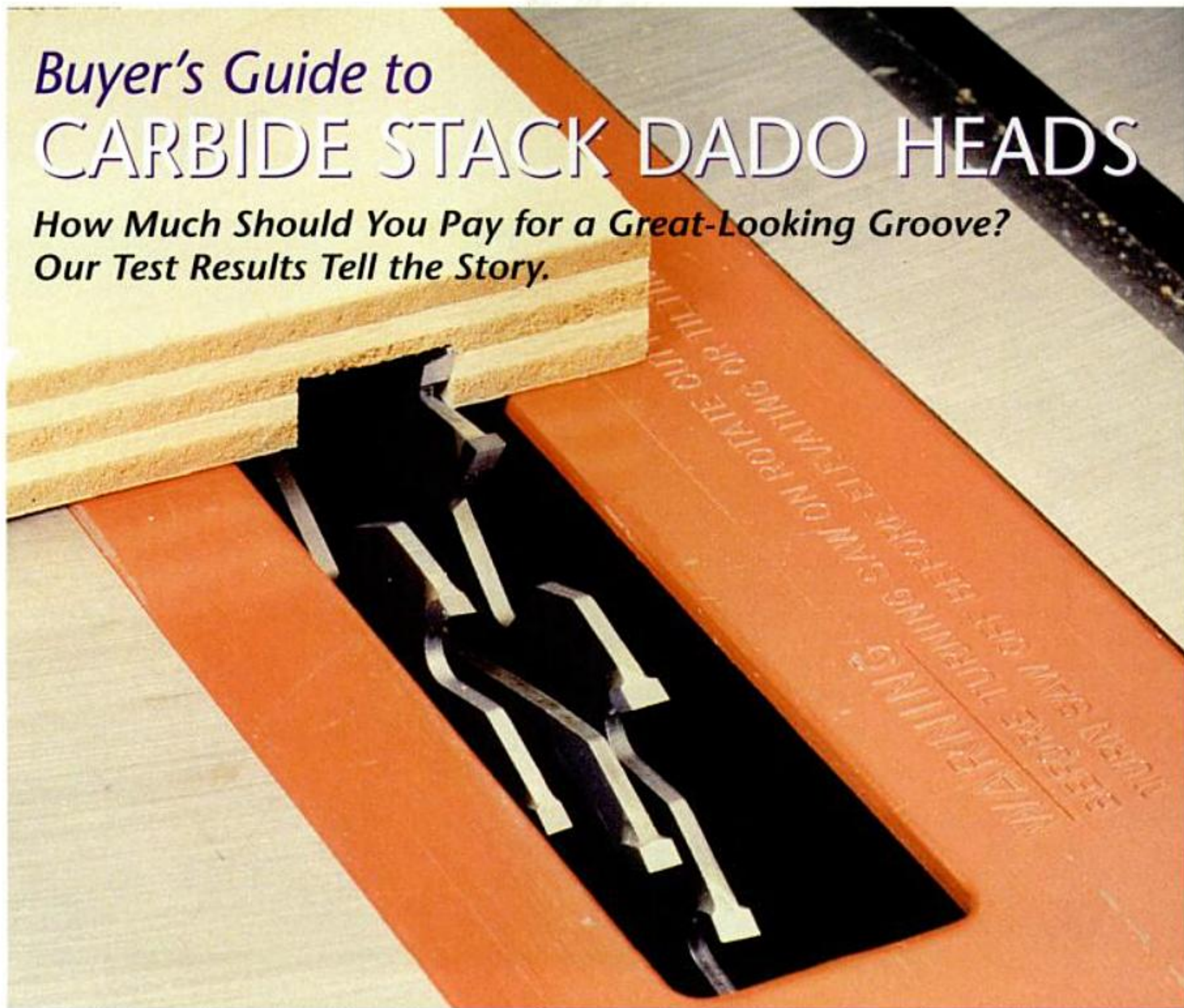


END VIEW



Buyer's Guide to CARBIDE STACK DADO HEADS

*How Much Should You Pay for a Great-Looking Groove?
Our Test Results Tell the Story.*



Joint-making versatility. Mounted in a tablesaw or radial arm saw, the dado head can be used to cut rabbets, dados, grooves, tenons, and lap joints. A stack dado consists of two outer blades and a selection of chippers that are sandwiched between them.

There are a number of ways to cut grooves and rabbets in wood, but dado blades are universally preferred for this type of joinery work. It's no surprise dado blades are a shop favorite. Unlike router bits, dado cutters are adjustable—you can set just about any cutting width between $\frac{1}{4}$ in. and $\frac{13}{16}$ in. (up to $\frac{29}{32}$ in. with some dado sets). Depth-of-cut adjustments are just as easy as setting the blade height on your tablesaw. And you can even tilt a dado cutter to mill an angled dado or rabbet.

Dado blade sets, also called dado heads, come in two basic styles: wobble and stack (see AW #19). A wobble dado head is simply a blade adjusted at an

angle to the saw's arbor; it cuts different widths by "wobbling" back and forth across what would normally be a straight cutting line. A stack dado head consists of two outer blades that resemble conventional saw blades, and a number of "chippers" of different thicknesses that you "stack" between the outer blades. Different chipper combinations yield different cutting widths. Most stack-type dados have 8-in.-dia. blades and chippers.

The dado heads in this Buyer's Guide represent the cream of the crop: stack dados with carbide-tipped blades and chippers. If you're working mainly in solid wood and a perfectly flat-bottomed groove isn't crucial, a wobble

dado or an inexpensive steel stack dado may be all you need. But if precise, flat-bottomed grooves are important, or if your joinery is done primarily in veneer plywood or melamine-covered particleboard, a carbide-tipped stack dado is a better choice.

Premium performance costs quite a bit extra, however. While carbide-tipped wobble dados cost around \$50 or less, the 16 carbide-tipped dado sets we tested (from 11 different manufacturers), sell for about \$70 to \$300.

Are these higher-priced dados all they're stacked up to be? To find out, we grooved our way through hundreds of boards. (See "How We Tested," page 58.) But even before the sawdust started



Packaging matters: Plastic carrying cases from Freud, CMT and Amana keep cutting edges separated and protected. DML's ID800 set (second from right) comes in a wooden box.

to fly, we discovered some important differences between the dado sets in our test group.

Straight Out of the Box

The dado sets we looked at come packaged in everything from simple cardboard boxes to carrying cases with protective storage provisions for the blades and chippers. Our favorites were the plastic cases from Amana, CMT and Freud, all of which hold the blades and chippers in such a way so their teeth don't touch. We also liked the hinged wooden box that houses DML's dado set. (See photo, above.) Other brands use cardboard or foam inserts to separate the dado head parts.

Each Freud, CMT, Systimatic, and Oldham dado set included a selection of dado shims. Shaped like large washers, these shims range in thickness from 0.004-in. to 0.020-in. By adding shims to the stack of blades and chippers, you can fine-tune the width of the groove you're cutting within a few thousandths of an inch which will enable you to get a perfect fit in a dado or groove.

Blades, Bevels and Hook Angles

The blades and chippers in a stack dado set have benefited from the same advances in technology that have improved conventional carbide blades. (See "Carbide Saw Blades," AW #32.) But there are differences unique to dado heads. In our tests, we discovered that certain factors affect cutting quality more than others.

The teeth on a dado heads' outer blades are sharpened with a bevel on their top surface. But unlike a conventional blade, these bevels all point in the

same direction—toward the outside of the stack. This way the teeth score the wood fibers along the edges of the groove to help prevent tearout. Most manufacturers mark their outer blades with a "This Side Out" label so it's easy to mount them correctly. While the best performing dados in our tests have tooth bevel angles of 15° to 25°, ultimately the bevel angles didn't seem to affect the quality of cut as much as some other factors.

Manufacturers place a flat top "raker" tooth between one or more beveled teeth to clean out and flatten the bottom of the groove. The cleanest cutting dado heads in our test have a "one bevel—one raker" tooth sequence. Other brands varied the sequence from two bevels—one raker, to 12 bevels—one raker. (See chart, page 58-59.)

The hook angle—the cutting angle of each tooth relative to the radius of the blade—is another consideration for blade manufacturers. (See photos, page 59.) Blades with a positive hook angle of 10° or more will demand less feed pressure than blades with low and negative hook angles (0° to -10°). The advantage of a low hook angle is that it's less likely to tearout splinters or chips at the edges of the cut. This capability is especially important when cutting difficult materials such as veneer plywood and melamine-coated particle-board (MCP). Low hook dado sets are less likely to climb-cut, or jerk towards you, when used in a radial arm saw.

Chippers

While a dado's two outer blades make the shoulder cuts, the chippers hog out most of the wood and flatten the bottom of the cut with flat-top raker teeth.



AMANA 658030



AMANA 658040



AMANA 658030-AK



CMT 108-240X



CARBIDE-TIPPED STACK DADOES

PERFORMANCE RATINGS

BRAND & MODEL	Street Price	Oak Veneer Plywood Cross Grain	Melamine Faced P.B.	Solid Oak Cross Grain	Solid Pine Cross Grain	No. Of Teeth
Amana 658030 (800-445-0077) Circle #601	\$140	●●+	●●	●●●●+	●●●●+	24
Amana 658040 (800-445-0077) Circle #601	\$200	●●●●	●●●●●	●●●●●	●●●●●	46
Amana 658030-AK (800-445-0077) Circle #601	\$140	●●	●●●●	●●●●+	●●●●●	24
 CMT 108-240X (800-531-5559) Circle #602	\$179	●●●●●	●●●●●	●●●●●	●●●●●	24
Delta 35-535 (800-438-2486) Circle #604	\$99.95	●●	●●●	●●●●+	●●●●+	24
DML DC800 (800-233-7297) Circle #605	\$165	●●●	●●●	●●●●	●●●	20
DML ID800 (800-233-7297) Circle #605	\$190	●	●●●+	●●●●	●●●●●	24
Everlast D58 (800-828-7297) Circle #606	\$150	●+	●●●●	●●●●+	●●●●●	18
Everlast DS840 (800-828-7297) Circle #606	\$240	●+	●●●●●	●●●●+	●●●●+	40
 Forrest Dado King (800-733-7111) Circle #607	\$289	●●●●●	●●●●●	●●●●●	●●●●●	24
 Freud Super Dado SD508 (800-472-7307) Circle #611	\$180	●●●●●	●●●●●	●●●●●	●●●●●	24
General DS803 (800-772-3691) Circle #608	\$263	●+	●●●●+	●●●●●	●●●●●	18
General DS803N (800-772-3691) Circle #608	\$220	●●	●●●●+	●●●●●	●●●●	18
Oldham 800-5818 (800-828-9000) Circle #609	\$69	●	●●+	●●●	●●●+	18
 Systimatic 1740 Fine Dado (800-426-0000) Circle #610	\$130	●●+	●●●●	●●●●+	●●●●●	22
Systimatic 1755 Super Fine Dado (800-426-0000) Circle #610	\$240	●●●+	●●●●+	●●●●+	●●●●●	42

Key to ratings score: ● = Unacceptable; ●● = Poor; ●●● = Fair; ●●●● = Good; ●●●●● = Excellent; + = 1/2;  = Editors' Choice.

HOW WE TESTED

There's no way around it. To get a real-world feel for how dado heads perform, you have to make some significant sawdust. When you're done exploring the technical data supplied by manufacturers on carbide type, hook angle, tooth profile, etc., the real question remains: Just how good of a cut can you expect from these premium dado sets?

To find out, we designed a simple but labor-intensive test involving four different materials: oak-veneer plywood, melamine-coated particleboard (MCP), solid oak, and solid pine. We mounted each dado set in a Delta Unisaw, adding chippers as required to make a 3/4-in.-wide cut. We set the depth of cut to 3/8 in. Cuts in the plywood, pine and oak were all made across the grain to better challenge the smooth-cutting ability of the 16 dado sets.

Hundreds of cuts later (see photo at right) we had a sufficient collection of samples to judge cutting quality. For the specifics on dado performance, see the chart above.

Stacked up. Testing 16 stack dado sets created a stack of another sort in the AW workshop. Assistant editor David Sellers takes his turn at the Unisaw.

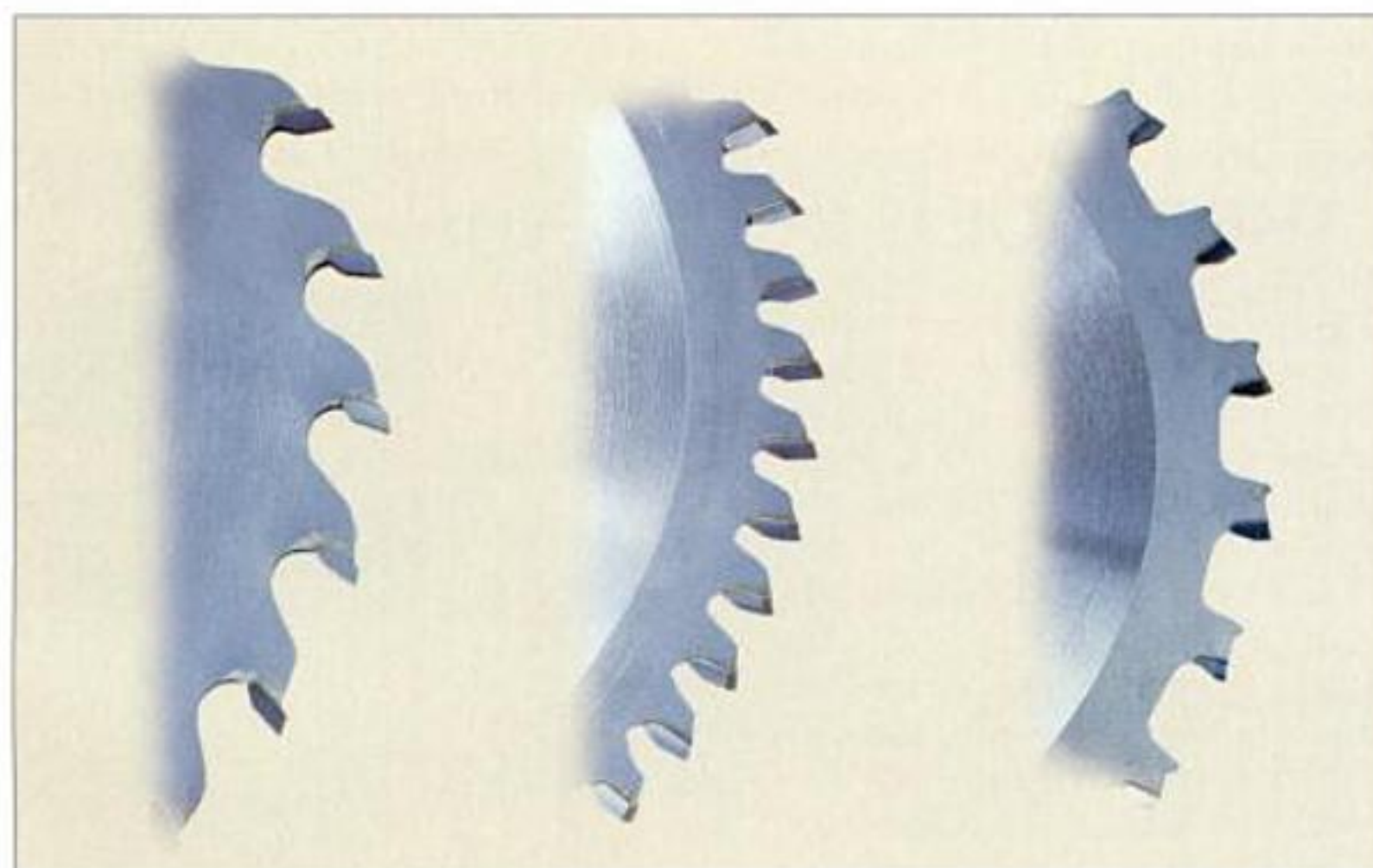


PHOTO BY TIM SNYDER

SPECIFICATIONS

OUTSIDE BLADES		CHIPPERS		Comments
Tooth Pattern*	Tooth Hook Angle	No. Of Chippers	Teeth Per Chipper	
5TB/1FT	+10°	4	2	Plastic case
5TB/1FT	-5°	4	2	Plastic case
5TB/1FT	+10°	4	2	Anti-kickback, plastic case
1TB/1FT	-5°	4	2	3/32-in. chipper, plastic case, Anti-kickback
5TB/1FT	+15°	5	2	Anti-kickback, blister pack
9TB/1FT	+15°	4	2	Cardboard box
11TB/1FT	+15°	4	2	Wood box
5TB/1FT	+7°	4	2	Cardboard box
4TB/1FT	+0°	4	2	Cardboard box
1TB/1FT	-5°	6	4	Cardboard box, 3/32 in. chipper
1TB/1FT	-10°	6	4	Anti-kickback, 3/32-in. chipper, plastic case
TB	+12°	5	2	Face of teeth beveled 25° to the side
8TB/1FT	-5°	5	2	Cardboard box
ATB/1FT	+12°	5	2	Plastic, blister pack
10TB/1FT	+15°	5	2	Cardboard box, foam inserts in box
6TB/1FT	+15°	5	6	Cardboard box, foam inserts in box

 =Best Buy; *TB=top bevel, outside only; ATB=alternate top bevel; FT=flat-topraker tooth



Different profiles. The DML DC800 blade (left) has a conventional tooth profile with a positive hook angle. On Amana's 658040 dado (center), teeth have a -5° hook angle to reduce tearout in chip-prone material. Freud's SD508 blades (right) have a negative hook, and each tooth is followed by a cut-limiting shoulder.



DELTA 35-535



DML DC800



DML ID 800



EVERLAST DS8



EVERLAST DS840



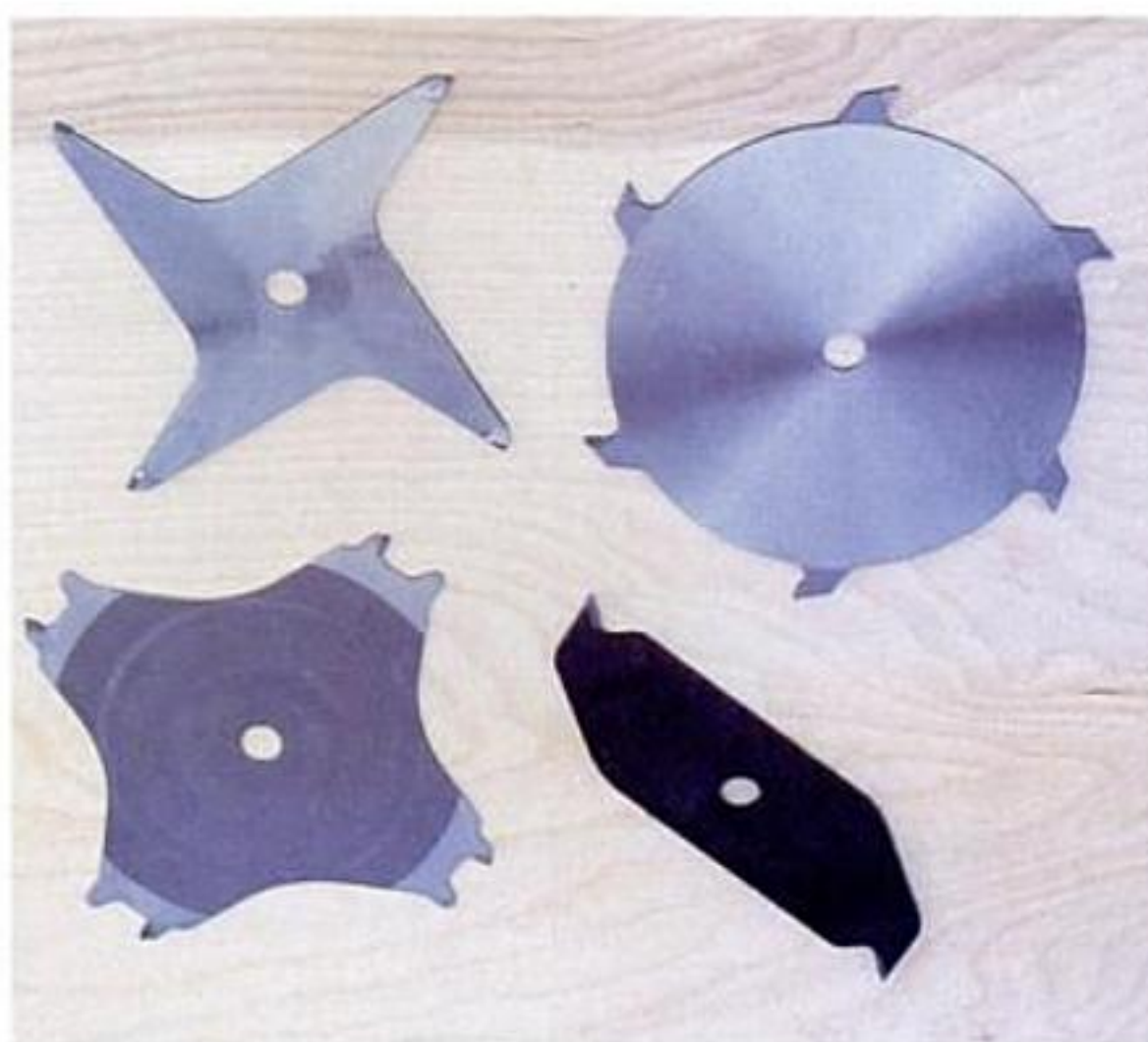
FREUD SUPER DADO



FORREST DADO KING



GENERAL DS803



Different chippers. In our tests, dado sets with four and six-wing chippers performed better than sets with two-wing chippers.

Chippers generally have only two "wings" with teeth at their tips. But recently a few manufacturers have come out with four and six-wing chippers. (See photo, above.) In our tests, these sets made some of the cleanest cuts, both on the bottom and at the shoulders. Interestingly, a higher number of teeth on the outer blades didn't always result in the cleanest cut.

A recent advancement in dado heads is the addition of a $\frac{3}{32}$ -in. chipper—included in the CMT, Freud, and Forrest sets. The $\frac{3}{32}$ -in. chipper lets you conveniently adjust a dado's width to compensate for plywood that's slightly undersized in thickness. (For example: nominal $\frac{1}{2}$ -in. plywood that's actually $\frac{15}{32}$ -in. thick, or $\frac{3}{4}$ -in. panels that measure $\frac{23}{32}$ -in. thick.) This feature is a def-

inite advantage if you frequently work with sheet goods.

Safety Dado Heads

Four of the dado heads we tested feature an "anti-kickback" design consisting of a high shoulder behind each tooth. This shoulder limits the depth of cut on each revolution. (See bottom photo, page 59.) In our tests, all of these "safety" dado sets (from CMT, Amana, Freud and Delta), showed less tendency to kick back on the tablesaw. They were also easier to control when used on the radial arm saw.

Test Results

While it helps to understand about tooth profiles and hook angles, the real proof is in the cutting. The chart on

THE PROOF IS IN THE CUT.

To evaluate cutting smoothness, test-cuts were made in (left to right) pine, oak, melamine-coated particleboard, and oak veneer plywood. The Oldham dado (bottom-most cuts) produced the roughest joints. Cuts made by the DML DC800 dado (center) represent average performance. Forrest dado cuts (top) show no tearout and excellent quality in all materials. Freud's SD508 dado and the CMT dado also produced flawless cuts.



page 58 and 59 summarizes the results of our cutting tests. The highest rating (5 dots) indicates no tearout while a single dot indicates so much tearout that you'd have to reject the piece for use in most furniture projects. (See photos, below.)

All the dado sets handled rip cuts in oak veneer plywood with excellent results, and most made good to excellent cross-grain cuts in solid pine and oak boards. Making cross-grain cuts in oak veneer plywood was the toughest test: Three dado sets (CMT, Forrest and Freud) produced excellent ratings on this splintery material. Amana's 658040 rated nearly as well followed by Systimatic's Superfine Dado.

Cutting melamine-coated particleboard (MCP) also challenged these dado sets. Amana's 658040, CMT, Everlast's DS840, and the Forrest and Freud dados made excellent cuts with no appreciable chipout along the edges. Systimatic's Superfine Dado and both General sets had very minor chipout, while Amana's Safety Dado, the Everlast DS8, and Systimatic's Fine Dado set all received "good" ratings.

As we put these sets through their paces on the tablesaw and radial arm saw, we found that there were minor differences in the feed pressure required from one set to the next. Freud's Super Dado (with 6 chippers and a -10° hook angle), and Systimatic's Superfine Dado (with 5 chippers and 6 teeth on each chipper), required the most feed pressure. Among the best performers in terms of cutting quality, the Forrest dado was also the easiest to feed.

Best Bets in Dado Sets

Should you move up to a carbide-tipped stack dado head? The answer really depends on what you're aiming for. A less-expensive, carbide-tipped wobble dado will serve you well if a flat-bottomed joint isn't crucial. But if you're after flat-bottomed joints and if you want low or no chip-out in solid stock and man-made panels, one of these high-end dado heads will be a good investment.

If you work with solid wood and can tolerate some tearout when cutting veneers, the lower-cost dado sets by General, Everlast and Amana do well.

In terms of top performers, CMT, Forrest and Freud get our Editors' Choice Awards for making excellent cuts in all four test categories. Even in splinter-prone oak veneer plywood, these three dado sets produced flawless grooves. Amana's 658030 also came through with high ratings.

Six of these high-scoring dado sets have an important feature in common: negative hook angles on blades and chippers. Of all the characteristics to look for in a carbide-tipped stack dado, low or negative hook angle is one of the most important if you work with hardwood veneer plywood or laminate-covered sheet goods.

And our Best Buy award goes to Systimatic's 1740 dado set. With a retail price of around \$130, this set came away with good overall ratings in every category except oak plywood. ▲

This report was prepared by DAVE SELLERS, Assistant Editor of AW.



GENERAL DS803N



OLDHAM 800-5818



SYSTIMATIC 1740 FINE DADO



SYSTIMATIC 1755 SUPER FINE DADO



SAHARA CANDLE BOX

A Unique Way to Hold Candles

By Glenn Hughes

When I'm feeling romantic, I like soft music, some wine, and of course, candlelight. What better way to make the night glow than by lighting a few candles? Candleholders, though, are a nuisance. Half the time they don't fit the candles you just bought, and they don't always catch the dripping wax. This candle box, with its bed of sand, lets you fire up as many kinds of candles as you want, while providing storage for your backup candle supply.

Designing the Box

I like the spotted appearance of leopard wood, so I used this for the "show" faces of my candle box. To avoid detracting from the continuous grain pattern of the sides, I splined-mitered the corner joints, leaving the ends of the splines exposed at the top of the box as a simple detail. The small drawer holds about twenty candles, and the box sits on ball feet (available from The Woodworkers' Store, 21801 Industrial Blvd., Rogers, MN 55374, 800-279-4441).

Box Notes

All the information you need to build the candle box is shown in the drawing. All the joinery—miters, grooves, rabbets and finger joints—can be cut on the tablesaw. Here are some notes on the construction:

Harmonizing the grain—To conserve wood and create a balanced look, I resawed the sides from a thick board. You could also cut your stock from a single long board so the grain will run continuously around the sides of the box. Whatever method you choose, be sure to make your pieces slightly over-size in length and width to allow for the miter cuts and for separating the drawer front from the fixed panel above it. (See drawing.)

Making miters—Precision is the key here. Regardless of how you saw the miters—with a tablesaw or a miter saw—make your miters exactly 45° and make all the pieces precisely the same



One size fits all. The author's candle box, made from leopard wood, uses sand to hold candles of any size.

length to ensure tight joints. I make test cuts on scrap first to make sure the saw blade is angled correctly.

Miter the ends of the front blank before you rip the drawer front from the front panel. That way, these parts will line up when the drawer is in place. Then rip the drawer front on the band-saw to keep the kerf as thin as possible, allowing for a close grain match between the drawer and the panel above it.

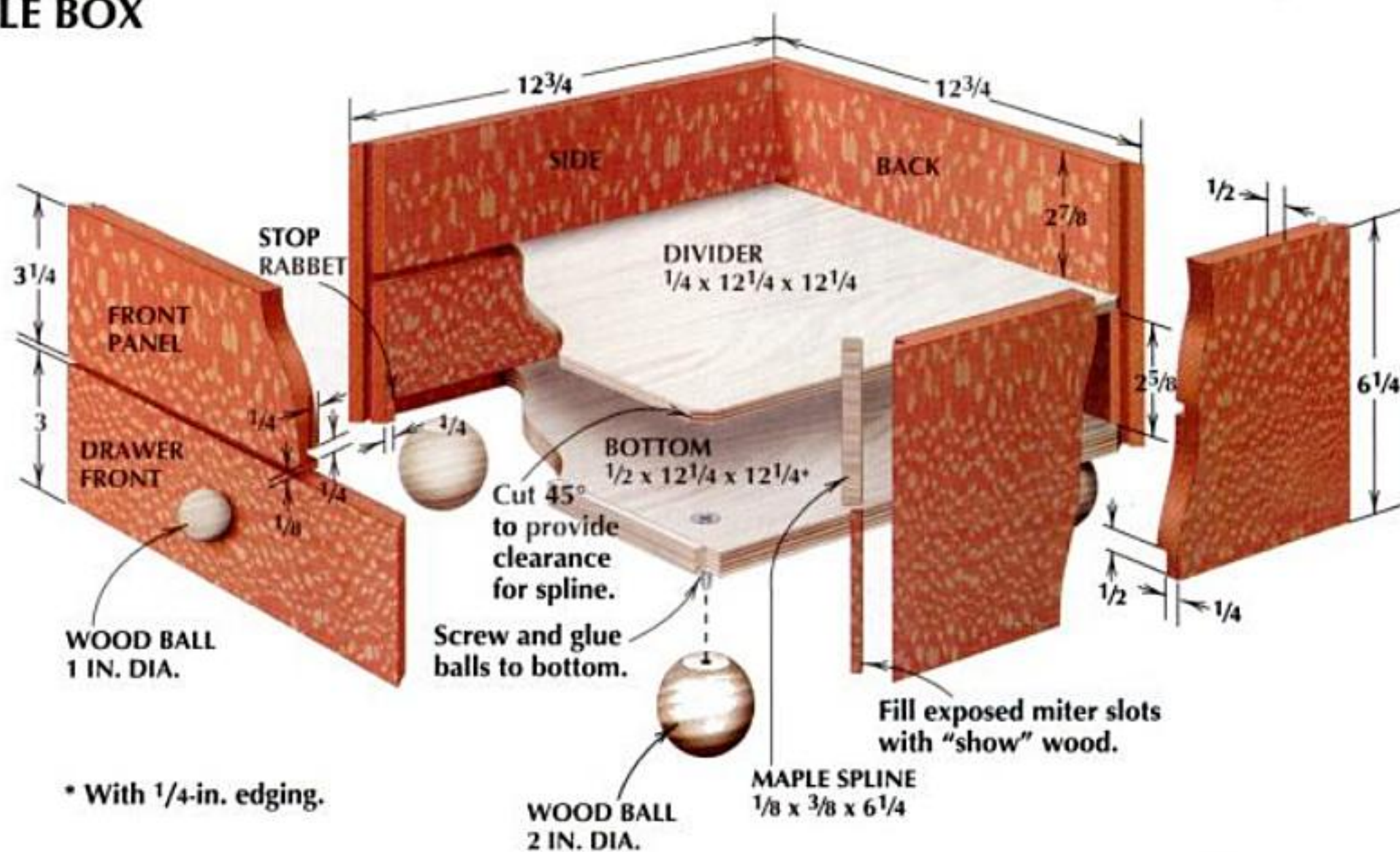
Sawing spline grooves—I cut the grooves for the splines on the tablesaw by positioning the rip fence to the left of the saw blade, tilting the blade 45° to the right, and pushing the stock with the miter gauge. Cut the spline grooves the entire width of the sides. Later, you can fill the exposed parts of the grooves



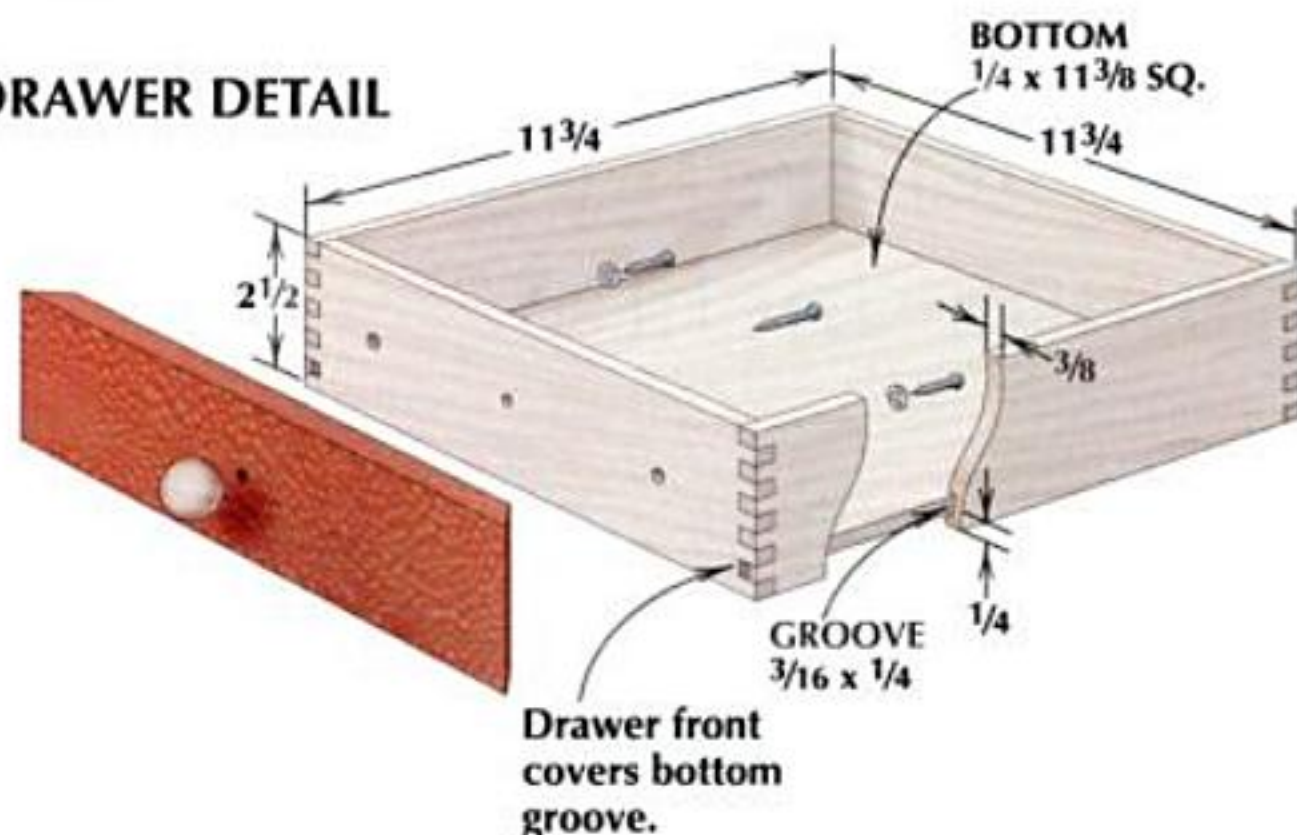
Slick storage. Open the drawer to reveal a mitered front and a ready supply of candles.

PHOTO BY JOHN HAMEL

CANDLE BOX



DRAWER DETAIL



(at the drawer opening) with short-grain slips of your show wood.

Making strong splines—To produce a strong, “short-grain” spline, the grain should run perpendicular to the length of the spline. (See drawing.)

Stopping the bottom rabbets—When rabbeting the sides to receive the bottom, make sure to stop the cuts so the rabbets won’t be visible when the drawer is opened. I used a dado blade for this operation, clamping a stop block to the rip fence. To avoid having to pivot one of the sides into the blade, I made one of the stopped cuts with the fence to the left of the blade.

Joining the drawer—I chose finger joints for the drawer’s corner joints because they’re strong, yet quicker to make than dovetails. I cut the joints on the tablesaw with a simple indexing jig attached to the miter gauge. (For more on finger joints, see AW #5, November/December 1988, page 48.) I relied on the drawer front to conceal the bottom grooves where they show at the front of the drawer box. (See drawing.)

Adding the feet—Before installing the ball feet, I brushed them with gold enamel and lightly sanded the flat parts to remove any dried paint. (See drawing.) I screwed and glued the feet to the underside of the bottom before assembling the case.

Gluing up—Glue up the sides, the divider, and the bottom of the box at the same time. Since the divider and bottom are made from plywood, you can glue them into the grooves in the box sides without worrying about wood movement. The bottom also adds stability to the corner joints. I used three band clamps to pull the miters in tight.

Edging the bottom—Once you’ve glued up the box, glue a strip of wood onto the front edge of the bottom to conceal the plywood edge.

Attaching the drawer front and ball pull—I drilled two 3/16-in. holes in the drawer box, plus a smaller hole for the pull, then secured the drawer front to the drawer with washers and two #8 screws. The oversized holes allowed me to position the drawer front precisely in

the opening. With the drawer front in place, I attached the ball pull to the drawer face with a dab of glue and a screw from inside the drawer.

Once the box is completed, apply a couple coats of your favorite finish. Then fill the top compartment to a depth of about 2 in. with fine white sand. Get yourself some candles, a chilled bottle of cabernet or champagne,



GLENN HUGHES is a graphic artist and woodworker living in Pennsylvania.

play some music, and turn out the lights. I find the box works best with two people. Of course, that’s just personal preference. ▲

Clamping With Wedges

There's Plenty of Power in a Simple Incline

By Percy Blandford

Boatbuilding presents some very challenging clamping problems. There never seems to be enough clamps; and even when there are, they usually don't have sufficient capacity for the job at hand. As a result, boatbuilders are always improvising different ways to apply pressure with what's at hand, using a combination of wedges, struts, and ropes. I've found that many of these improvised solutions are also useful for woodworking.

By a long margin, wedges are my most valuable clamping tools. In my workshop, I use them most often in edge-gluing operations, but they're also handy for making other types of clamps. Before describing how to make these tools, however, let's take a closer look at the wedges themselves.

Wedge Theory

Wedges can be any size, depending on the scale of the project, but it's important not to make clamping wedges too steep. Steep wedges are difficult to drive and prone to slipping. As a rule, I don't use wedges any steeper than 1-in-4 (1-

Shop-made solution. Working side-by-side with its metal equivalent, this simple but effective wooden beam clamp relies on wedges to exert clamping pressure.

普作物



PHOTO BY PERCY BLANDFORD

in. rise over 4 in. of length). Wedges with a 1-in-5 pitch are good for general purpose clamping. (See Fig. 1.)

Single wedges are good, but double wedges are better. A pair of shallow opposing wedges driven against each other—I call them “folding wedges”—will exert substantial pressure with less risk of shifting the workpiece. (See Fig. 2.) I use folding wedges when gluing a narrow wood lip to a wider board, and in other situations where it’s important to prevent parts from shifting.

If you elect to use wedges singly, resist the temptation to drive the wedge against a dowel or bolt. Instead, let the wedge work against a scrap block that pivots on a screw or bolt. (See Fig. 2.) The block can pivot to bear against a broader area of the wedge, helping to distribute clamping pressure more evenly. As with any clamping operation, it’s important to cushion the workpiece with a scrap of wood at each wedge (or folding wedge) location.

Wedge-Based Clamps

Apart from the low-cost appeal, the nice thing about clamping with wedges is the flexibility you have. All you need are boards long enough to hold the work, wedges, pads, and stops for the wedges to work against. Using these ingredients, you can assemble a shop-made clamp that will do the same work as a store-bought pipe or bar clamp. In situations where you need to keep edge-glued boards from buckling, use a double-beam clamp as shown in Fig. 3. Narrow wedges can be driven between the workpiece and the clamp boards to keep the glue-up flat.

In situations where clamping pressure needs to be applied near the middle of a wide workpiece, you can construct your own deep-throat clamp. (See Fig. 4.) This clamp consists of a machine bolt, a large wedge, and two stout clamp arms, each with a foot or caul at either end. Pressure can be applied in two ways: by driving the wedge in against the outer feet, or by tightening the bolt. Locate the bolt near the centers of the arms to get the best balance between clamping force and throat capacity. ▲



PERCY W. BLANDFORD is a woodworker and writer; he lives in central England.

A WAY WITH WEDGES

FIG. 1: WEDGE PITCH

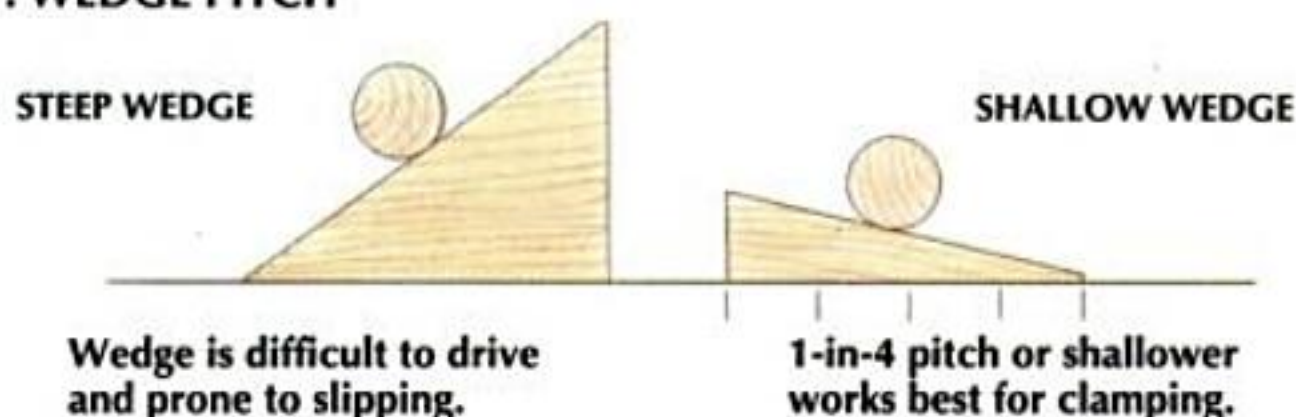


FIG. 2: WEDGE-BASED CLAMPS

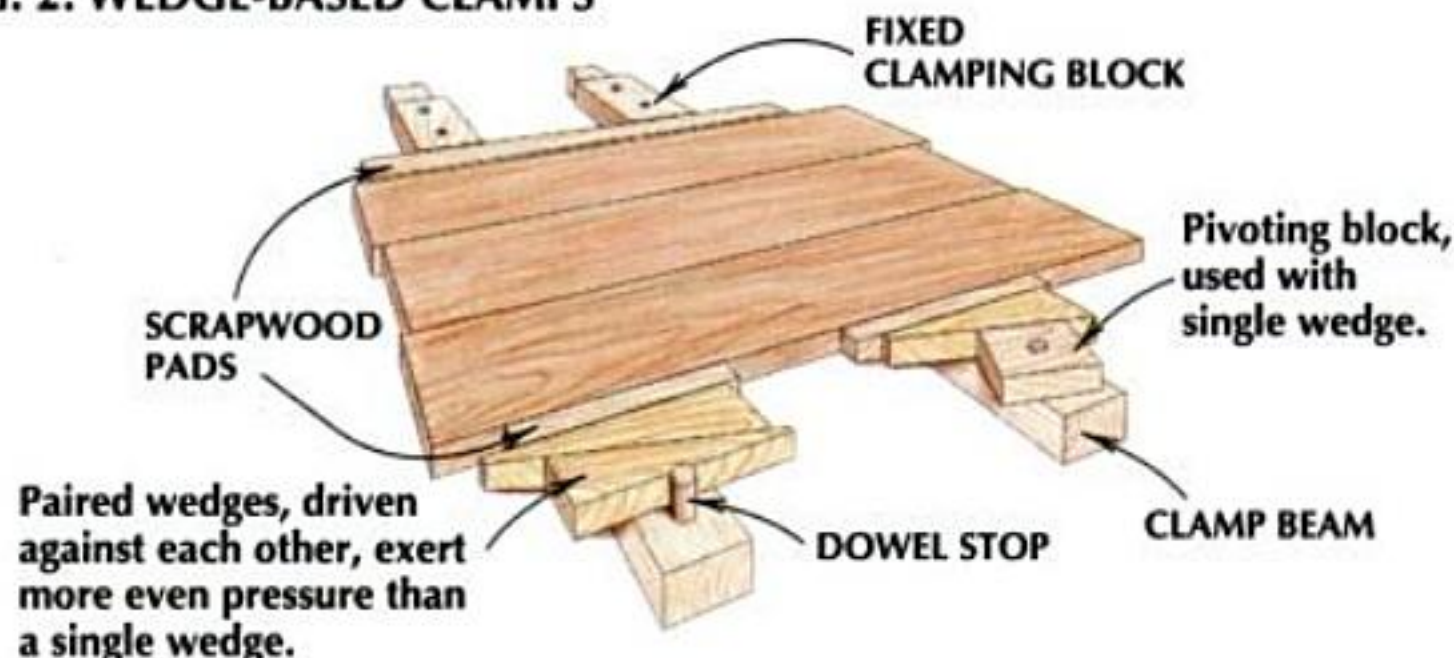


FIG. 3: DOUBLE BEAM CLAMP

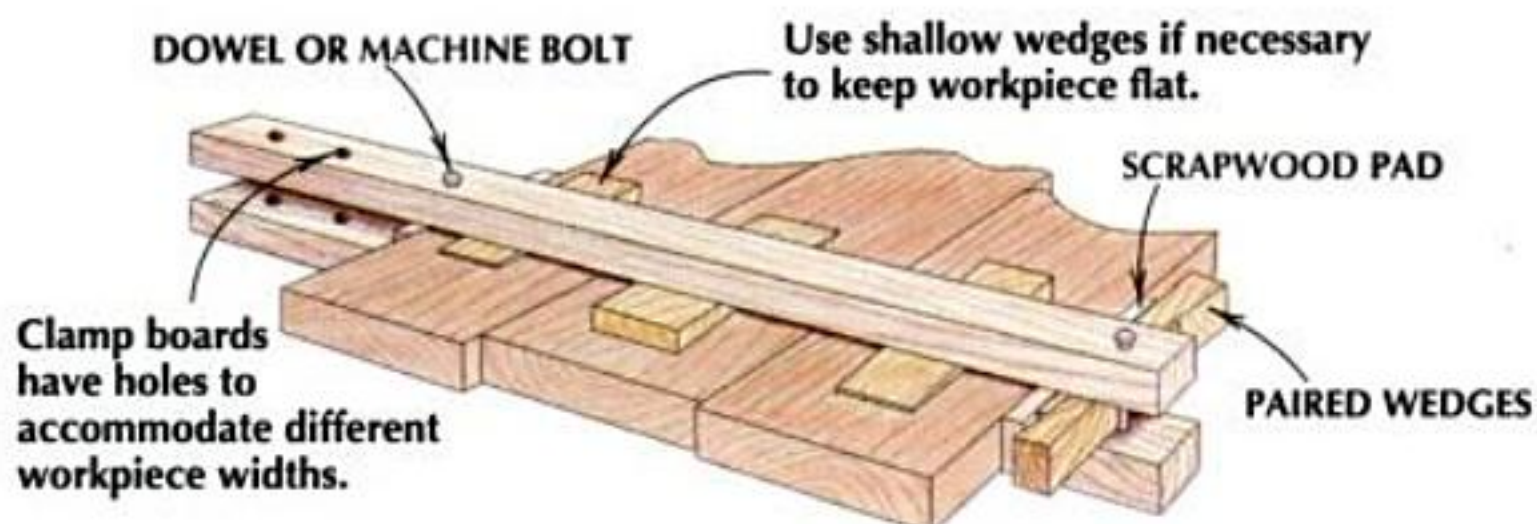
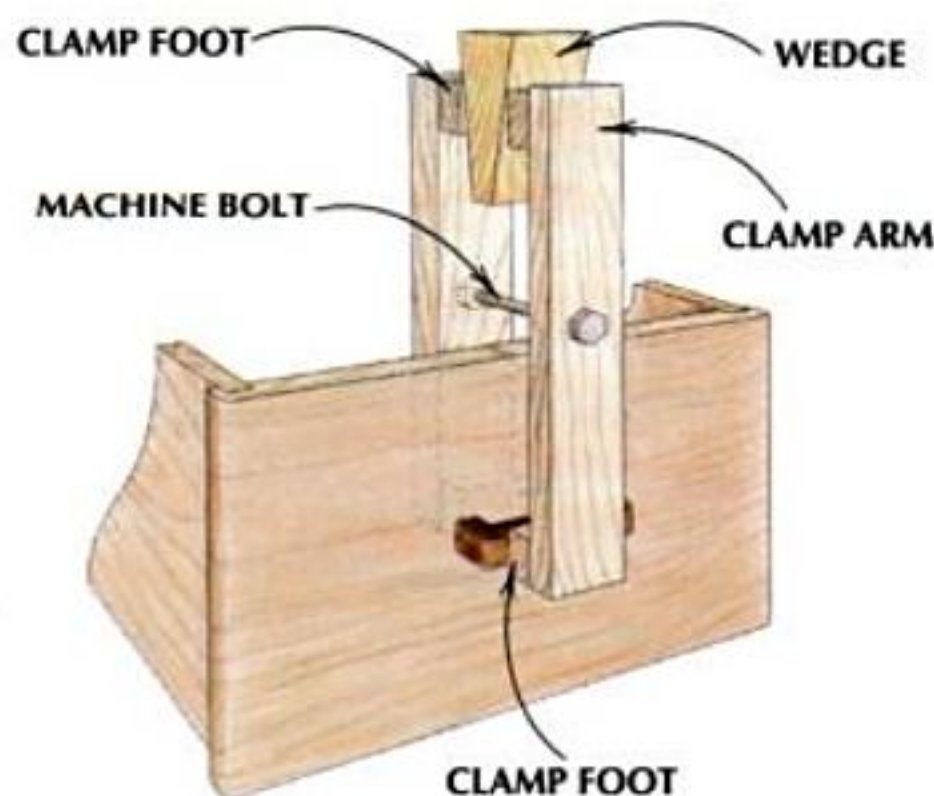


FIG. 4: DEEP THROAT CLAMP



VENEERING

How to get Dazzling Results
with Basic Techniques and Simple Tools



A world of possibilities. The excitement of choosing a wood species, discovering a well-figured flitch, and composing a unique grain pattern is what draws many woodworkers to veneering.

Veneering dates as far back as the cultures of ancient Egypt and Rome. As technical advances grew, and artisans improved their skills, veneering reached its first major creative climax with the exceptionally fine furniture crafted in 18th-century Europe.

Why Veneer?

For decades, veneering has been much maligned. This was mostly due to crude veneer slicing techniques and old fashioned glues. Today, veneering is a much more viable option for woodworkers

looking to make enduring heirlooms. With modern glues, high-tech slicing equipment, innumerable clamping options and more veneers than ever before, woodworkers are enjoying a resurgence in veneering.

Veneering, or adhering thin sheets of wood to a thicker substrate or "ground," offers many advantages over solid-wood construction. A veneered panel is dimensionally stable, permitting a freedom of design when it comes to construction methods. With veneer, you can achieve unique decorative effects, and you can choose from a wider selection of veneers than can easily be found in solid wood. Plus, a fragile wood such as a crotch or burl can be veneered to a substrate to

give it strength. Also, using veneer can save you money and it's a responsible alternative for rare wood species, since you get a far greater yield per cubic foot.

Today, furniture-grade veneer is typically sliced by knife in thin sheets, usually $\frac{1}{28}$ to $\frac{1}{40}$ in. thick. Originally, veneers were sawn and were thicker. To view methods on making your own veneer, see the sidebar on page 71.

In this article, I'll cover the basics of using today's thin veneers on flat surfaces which, is the simplest form of veneering. I'll also show you what to look for when preparing veneers and core materials or substrates, and how to press your veneers flat. First, let's look at some of the core materials used in veneering.

by Kam Ghaffari

Substrates and Crossbanding

While it's possible to apply veneer over solid wood, the best substrates for veneer include medium-density fiberboard (MDF), particleboard, high-quality plywood and other man-made boards. These composites have the stability, flatness and uniformity that are crucial for veneering.

If you're veneering over solid wood, orient the grain of the veneer so it's parallel to the grain of the wood. With plywood, lay the veneer at 90° to the grain of the plywood's face veneer whenever possible to prevent small cracks in your show veneer.

Particleboard and MDF are often the cores of choice for many woodworkers, especially for free-hanging doors where plywood might warp. These materials are very stable, and have no grain orientation so the veneer can be laid in any direction. Only high-quality particleboard with fine chips and a smooth, dense surface is suitable for veneering. MDF is quite dense and has smooth edges when cut.

Whichever substrate you choose, be sure to make it a little oversize ($\frac{1}{4}$ in. to $\frac{1}{2}$ in. all around) to allow for final trimming and possible veneer shifting while pressing.

Sometimes you'll want the grain of the substrate and face veneer to run parallel with each other. Here, you'll need to place crossbanding between the substrate and your face veneer. This is usually an inexpensive sheet of wide veneer. Crossbanding is also useful to protect against telegraphing when using a substrate that is not perfectly smooth and is laid at an angle, usually 90°, to the face and substrate.

Buying Veneer

Sliced veneers are stacked and bundled together in sequence and sold as a *flitch*, or separated into smaller parcels called *books*. As soon as you receive a book or a flitch, be sure to store your veneer flat, and keep it away from sunlight to avoid discoloring. It's a good idea to number both sides of each sheet in the stack consecutively to keep the sheets in order.

When buying veneer, you have a choice of flat-cut, rift, or quartered depending on the look you're after. Before purchasing your wood, consider [some of the patterns you can create](#). (See [sidebar, page 69](#).) Your choice of pattern may affect which cut of veneer you buy.

There is one golden rule to remember

in veneering: Do unto one side as you do unto the other. You must veneer a panel with the same or a similar wood of the same thickness on the side opposite your show veneer. This balances the construction, preventing the panel from absorbing and releasing moisture at different rates and warping your panel. If your work has a less visible face (for example, the underside of a table), you can use a backer veneer, which is simply a more common-looking (and cheaper) piece of veneer.

In the past, woodworkers selected the "tight" side of the veneer for the show face. This is because the equipment and the thicker veneers being used at the time resulted in small cracks on one side of the veneer, called the "loose" side. With today's thin veneers and modern machinery, there are little or no cracks to worry about with most woods, so you can pick the most pleasing side of the veneer for your show face.

Keeping it Flat

Sometimes veneer is severely buckled, particularly if the wood is figured. Severely buckled sheets can be difficult to joint, and the veneer may crack and split when pressed flat.

To avoid possible splitting, a problem veneer should be flattened prior to pressing. Water alone can be used (a flower mister works well)—just enough to render the veneer flexible. The most commonly used approach is a thin glue size (roughly one part glue to five parts water). Another method is a mixture of water and glycerin (available at pharmacies), starting with two teaspoons of glycerin per quart of water up to a 50-50 mix for the really gnarly stuff. A former teacher of mine had his own spe-



Sawing to size. A veneer saw will rip and crosscut veneer to size quickly and cleanly.

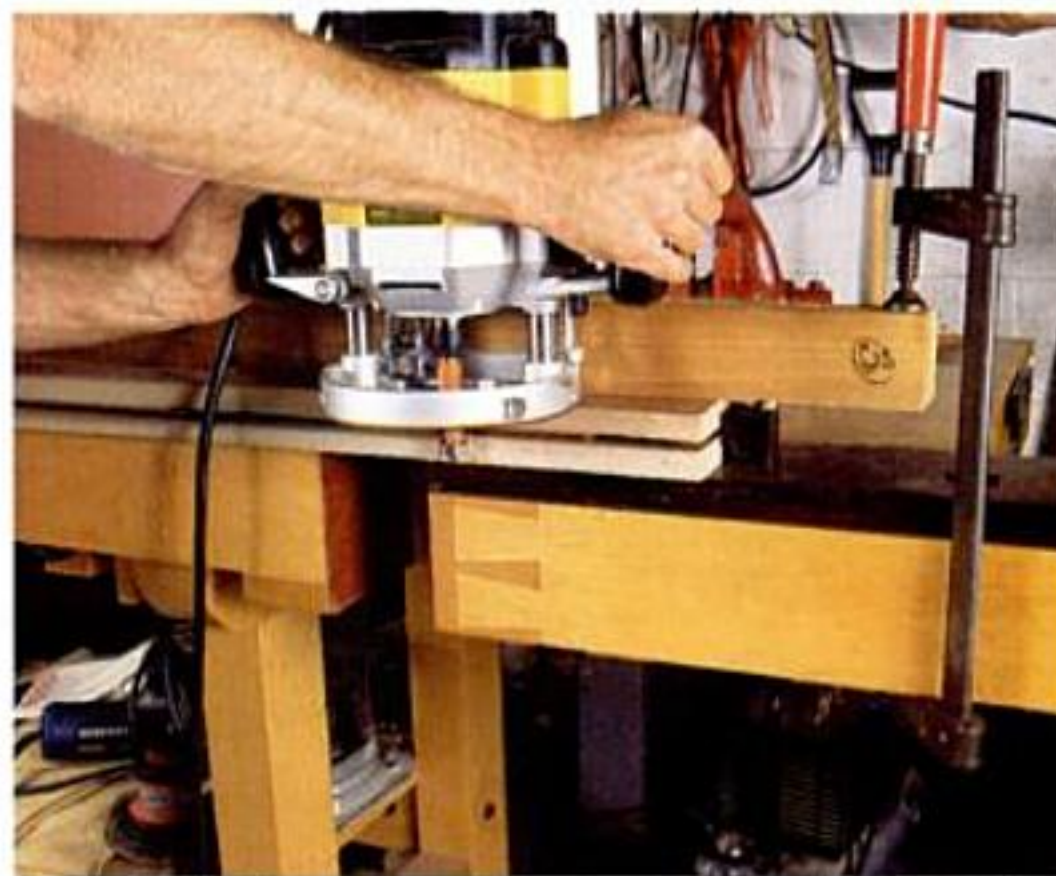
cial sauce: 12 parts water to one part Downy fabric softener.

Whatever the concoction used, the application is the same: Brush, spray or sponge the mixture liberally to both sides of the veneer and clamp or weight the veneer between flat boards. Wait until the veneer is thoroughly dry. If you're stacking multiple veneers, layer newsprint between the sheets of veneer and change the paper every couple of hours till the paper comes out dry. Keep the stack flat under pressure until you're ready to use the veneers.

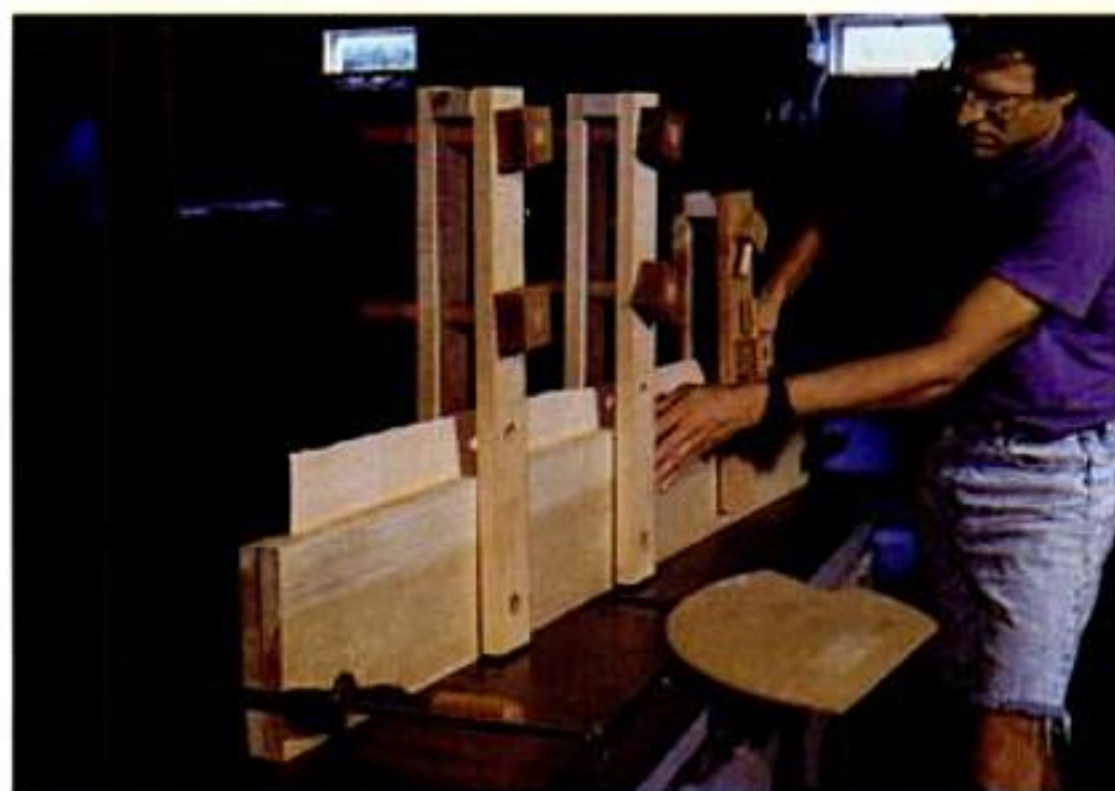
Cutting and Jointing

When piecing up a pattern of veneers to fit a given panel size, you'll need to cut the desired sections out of the sheets to rough size.

A sharp utility knife can be used to cut the veneer, but care must be taken to



Jointing with a router. Running a router backwards with a flush-trim bit will produce clean edges in difficult veneer.



Jointed edges. Shop-made deep-throat clamps keep the sheets sandwiched tight as veneer and boards are run over the jointer.

avoid splitting when cutting parallel to the grain. A veneer saw is a better tool; it saws and slices at the same time. Use a straightedge to guide the cut, and place a backing board underneath the veneer. (See top photo, page 67.) Size your veneer so it will overhang the substrate by about $\frac{1}{4}$ in. all around.

Once you've rough-cut your veneer, the next step is creating straight edges on the sheets that will join together. I start by ripping lengths of veneer with a jig on the tablesaw, using a carbide-tipped combination saw blade. (See drawing below.) For backer veneers and crossbanding, this jig often gives a good enough cut to use without further jointing. However, your show veneers must have their edges "shot" perfectly straight and square. Here, there are several

clamped stack over the jointer. (See photo above.) For really ornery veneer, clamp the veneer sheets between boards and rout backwards (called climb cutting) with a flush-trimming bit. (See photo below.)

Taping and Glues

Once you've jointed your veneer edges, the next step is to assemble all the pieces into a single sheet that will go into the press.

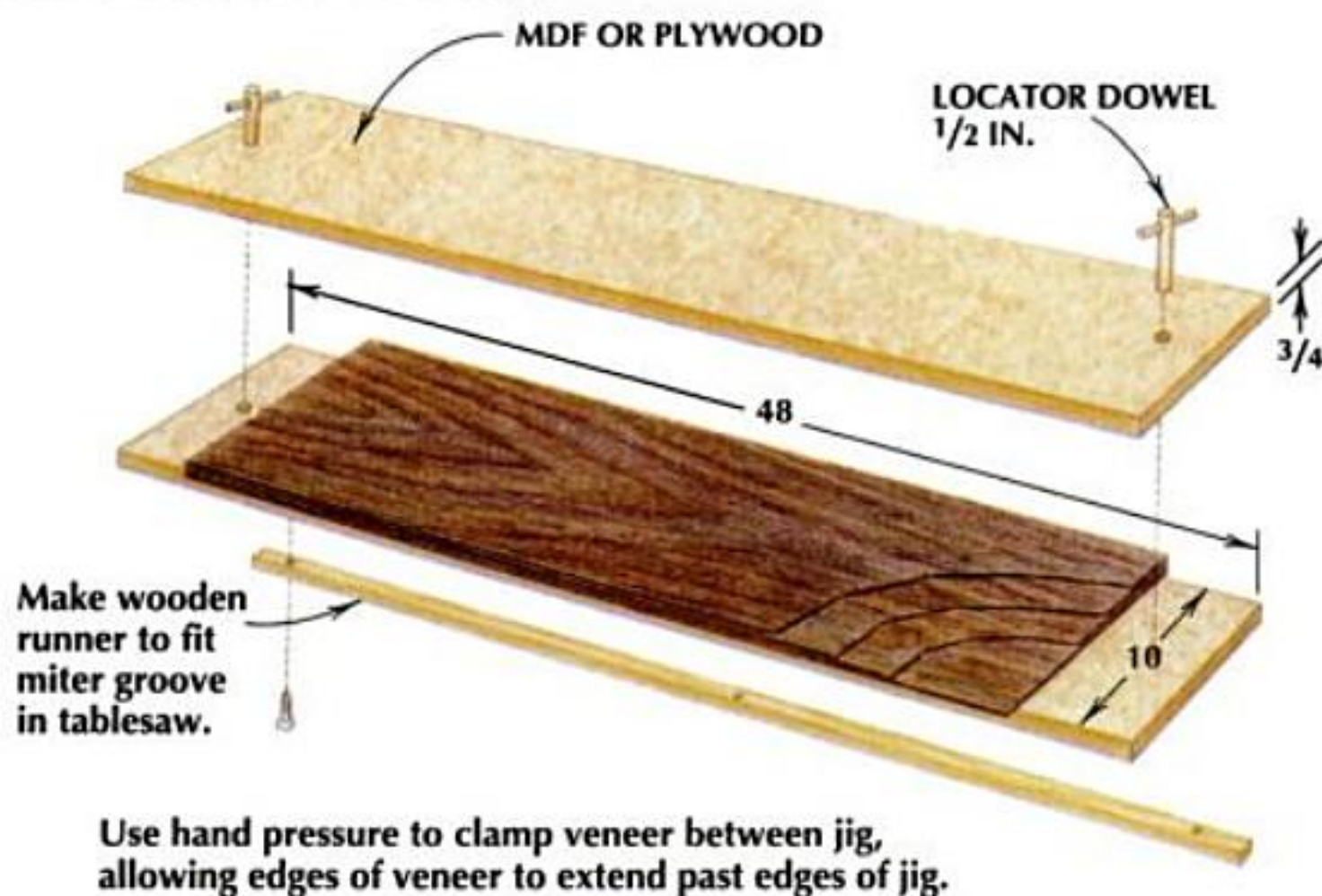
Large manufacturing operations that require rapid production stitch together sheets of veneer with a machine that runs a zigzag bead of hot glue across the joints. For the small shop, veneer tape is the answer (see "Sources"). This tape is thin, so it doesn't indent the wood when pressed. Although some woodworkers

use veneer tape alone, I start by laying a few strips of masking tape across the joints on the show side of the veneer. I stick one end of the tape down on one piece of veneer and then stretch it slightly across the joint before pressing it down on the mating piece, pulling the joint tight. Next, I thoroughly moisten strips of veneer tape and place them every few inches along the joint, again on the show side of the veneer. Then I remove the masking tape and run a final strip of the veneer tape down the entire length of the joint, making sure to tape any cracks together as well.

There are several glues suitable for veneering. Yellow glue is easy to use and works well for projects that can be clamped up pretty quickly. Most white glues will provide a little more open time. For longer open time, plastic resin (urea formaldehyde) glue can be used, which is often the glue of choice for many woodworkers. Plastic resin glue resists "creep" (a result of moisture entering the glue and softening it) and is heat and moisture resistant. One type of plastic resin glue is the powder/resin variety. (See "Sources.") This type of glue doesn't contain water, so it won't swell the veneer as it's being applied, plus it has better gap-filling properties than standard UF glues. (For more on glues, see AW #34.)

Another glue that's useful for veneering is hot hide glue, and while you don't need a press, its application with flat veneering is time-consuming. The glue is spread while hot, and a "hammer" (actually the rounded edge of a metal

VENEER JOINTING JIG



Ripping it straight. The author's jig rips straight edges on stacked sheets of veneer. A wood runner on the bottom of the jig rides in the tablesaw's miter groove.



Glue-up. The author uses a foam roller to coat the substrate. In the background, Ghaffari's press awaits the veneered panel.

plate) is drawn across the veneer.

Spread a thin, even layer of glue on the substrate only. (If you apply glue on the veneer, it will immediately curl up into a roll.) A notched piece of plastic laminate or a foam paint roller makes a great applicator. I pour glue directly onto the substrate, then spread it with one of the tools mentioned. Be careful to avoid leaving any puddles of glue, or you'll get hard pockets under the veneer. However, don't starve the joint: Too little glue will result in loose spots of veneer. On porous woods, glue can sometimes get pressed up through the veneer and glaze the surface. To overcome this, apply a thin coat of shellac on the glue side of the veneer, before gluing. Wipe oily woods such as teak and rosewood with alcohol or lacquer thinner prior to gluing.

The Veneer Press

In industry, veneer panels are glued up in big hydraulic, multi-platen hot presses that apply heat and pressure together to cure the glue in a few minutes. Until recently, the standard press for the small to medium-sized shop has been the hand-operated **screw press**. The veneered panel is sandwiched between two platens. Rows of screw clamps, held in bars across the top of the press, are screwed down

evenly across battens and cauls to exert clamping pressure.

While not at all a new invention, the **vacuum press** has only recently been adapted and marketed for the small shop. With this type of press, the work is placed inside a bag, then the air in the bag is pumped out. Atmospheric pressure forces the veneer onto the substrate. (See AW #38, page 32.) A vacuum setup is generally less expensive than a screw press and easier to use (especially for curved parts) and stores easily when not in use.

The **caul-and-platen press** is a simple, low-cost way to get started for the beginner or for a shop that doesn't expect to do a large amount of veneering. (See photo below.) All you need are two platens, several cauls and some bar or pipe clamps. I use melamine-coated

particleboard for my platens because the plastic surface is smooth and resists glue. Plywood will also work if you lay plastic-coated freezer wrap between the platens and the veneer. Make your platens at least 1 in. thick, and dimension them to the size of work you expect to handle.

The cauls are stout oak or maple boards, about 1 $\frac{3}{4}$ in. by 2 $\frac{1}{2}$ in. and as long as the width of your platens. Plane a slight, even curve along the edge of each caul that will bear against the platen. "Crowned" cauls will flatten out when clamped, providing even pressure across the entire width of the platen. (For more on a caul-and-platen press, see AW #40, page 37.)

Gluings Up with Cauls and Platens

Have everything close at hand before starting the glue-up. The panel faces and corresponding veneer sheets should be clearly marked to avoid confusion at zero hour. Place a pair of long 2x4s across two sawhorses and lay out the bottom cauls, curved edge up, about 6

MATCHING THE GRAIN

A host of patterns can be made when you have a flitch of veneer. When jointing the edges, be careful to remove the same amount of material along the edge from sheet to sheet to ensure the grain patterns will match when the veneers are taped together. K.G.

BOOKMATCH



SLIPMATCHED



BUTT MATCHED



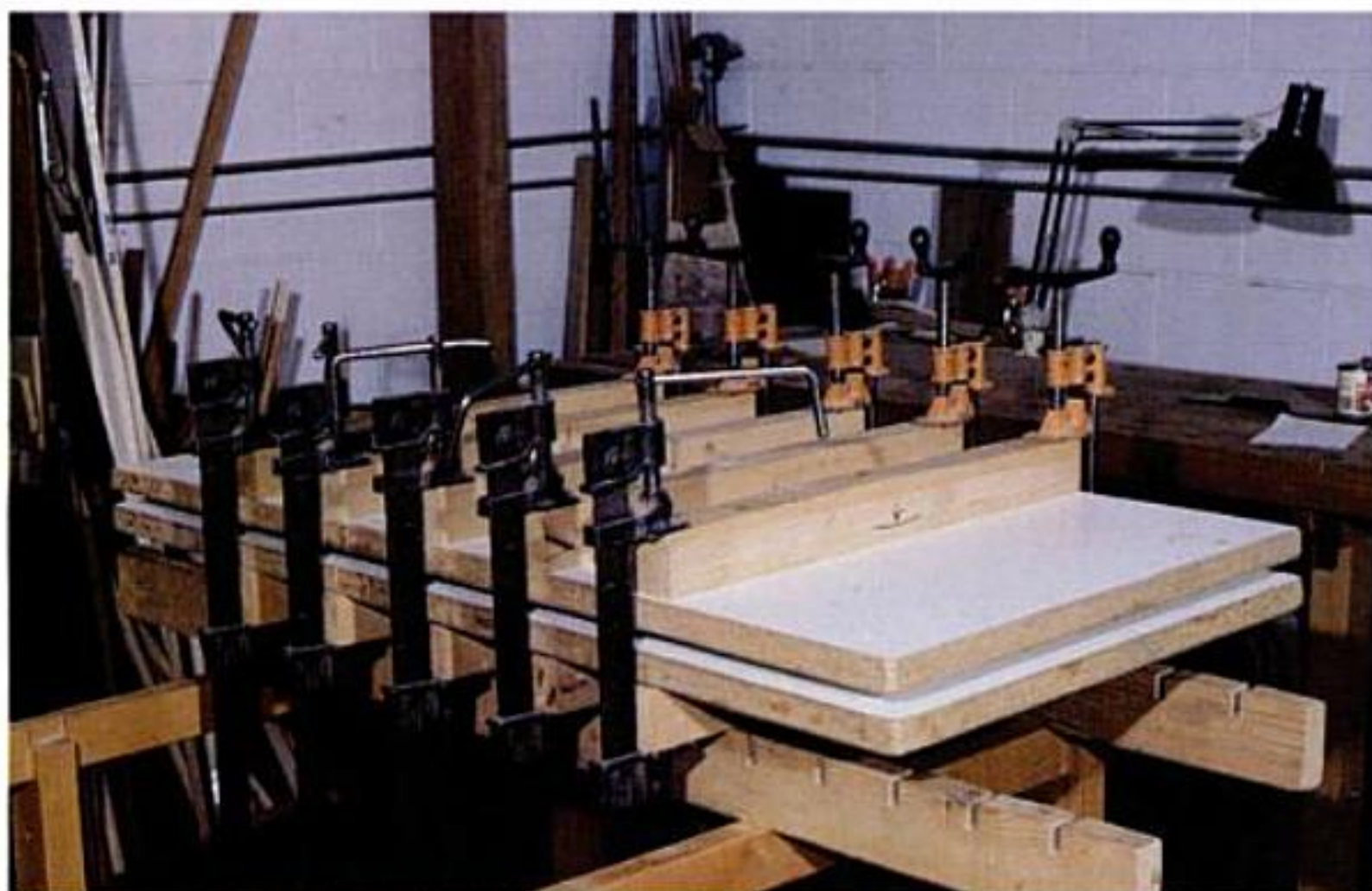
HERRINGBONE



QUARTERED



DIAMOND QUARTERED



Pressing with cauls and platens. Wood cauls bear upon two 1-in.-thick melamine-coated platens to press a veneered panel flat.

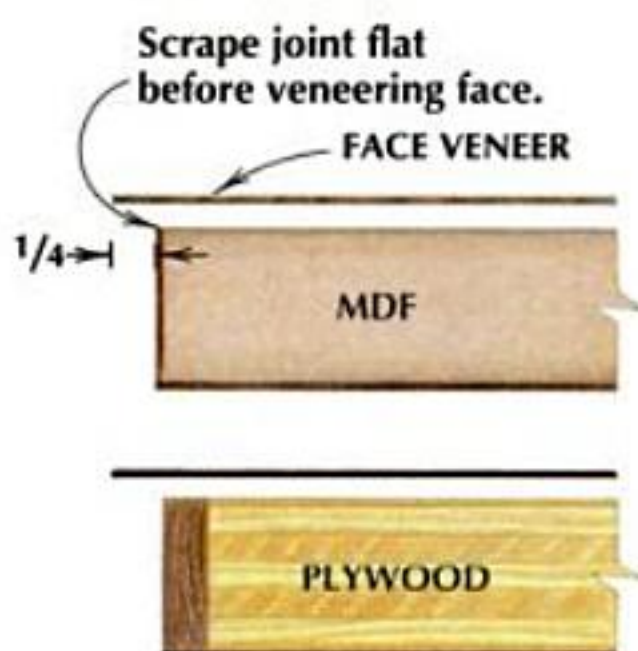
EDGING VENEERED WORK

If you are veneering man-made boards such as MDF or plywood (see main article), you'll need to band the edges of the substrate to conceal them and to protect the fragile face veneer where it meets the edge of the panel. There are several design choices when covering the edge. (See drawing.) You can apply veneer or solid banding to an edge before you lay the face veneers to hide the seam at the joint. For edges that will see hard use, apply a solid wood strip after veneering the faces.

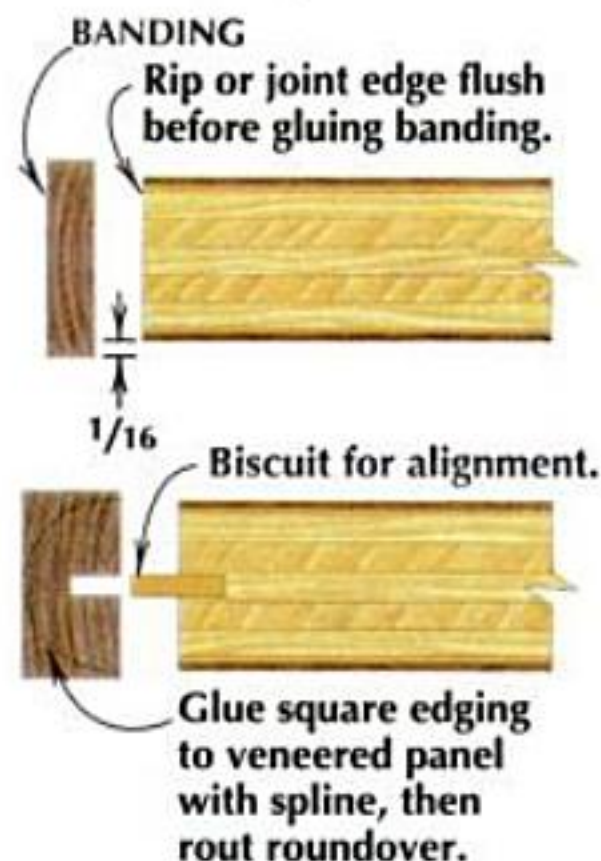
K.G.

EDGING OPTIONS

To hide the glue seam, band the edge first, then apply face veneers.



To best protect the fragile veneer edge, glue the face veneers, then apply solid-wood banding.



in. apart. Put the bottom platen on next, and you have an open press, ready to use. Set the panel to be veneered on the platen temporarily and adjust caul spacing so that the two outside cauls extend beyond the ends of the veneer panel by $\frac{1}{4}$ in. or so.

Working on your bench, spread the glue on one side of the substrate and lay the appropriate veneer on top, tape side up. Then flip the package over and repeat the procedure. Next, put a piece of masking tape or a tiny brad at the center of each end to keep the veneers from shifting during pressing. Caution: Don't try to fasten the long grain edges of the veneer or it will buckle when it expands from the glue. With the veneer in place, position the panel on the press and lay the top platen over the panel.

Next, add the top cauls, placing them curved side down in line with the bottom cauls. Begin applying clamping pressure from the center of the panel out to the ends. This allows the glue to spread out and not get trapped. Clamp the cauls evenly from each side but don't use too much force yet.

After all the clamps are on, allow a minute or two for the glue to squeeze out, then go back and tighten all the clamps. Leave the panel in the press for at least four hours if using yellow glue—overnight is usually ideal—longer for other adhesives. (Check the manufacturer's recommendations.)

Finishing Up

After removing the panel from the press, trim any overhanging veneer with a chisel or a router equipped with a flush-trimming bit. For more difficult woods, run the router backwards for the cleanest possible cut. The panels should be stood as vertically as possible on edge with enough space all around for air to circulate so the panels can finish drying without warping.

Once the panel is dry, the veneer tape can be removed by wetting it with a sponge and peeling it off. If it resists peeling by hand, a scraper will complete the job.

Run your fingertips over the whole panel to check for air pockets, or dry patches where the veneer isn't glued down. If air bubbles are ignored they will often expand later, and their fragility makes them prone to cracking. You can find loose pockets by listening for a whispering sound as your fingers pass over the panel. Tap the veneer to find

the spot, then mark its outline with a pencil. Slit the bubble with the grain using a razor blade or an artists' knife such as an X-acto. Pry up the veneer with the knife and inject fresh glue under the veneer with a small artist's palette knife or a glue syringe (available from Woodworker's Supply, 800-645-9292). After you've spread the glue, place a piece of waxed paper over the pocket and clamp a wood block to the surface until the glue sets.

Once you've inspected and repaired any and all surface flaws, you'll need to smooth the surface of the veneer before finish sanding. You can use either a hand or cabinet scraper to level the tape joints and bumps quickly and easily, as well as remove the roughness that can usually be found on many commercial types of veneers. In my shop I use a



stroke sander to do the job. A random-orbit sander will also work nicely if you use a light touch while keeping the sanding pad flat. ▲

KAM GHAFFARI designs, builds and writes about furniture at his studio in Rhode Island.

SOURCES

Veneer, veneer tape, and crossbanding are available from:

Certainly Wood

11753 Big Tree Rd.,
East Aurora, NY 14052
716-655-0206 Circle #633

Constantine's

2050 Eastchester Rd.
Bronx, NY 10461
800-223-8087 Circle #634

Wood Shed

1807 Elmwood Ave.,
Buffalo, NY 14207
716-876-4719 Circle #635

The Woodworker's Store

21801 Industrial Blvd.,
Rogers, MN 55374
(800) 279-4441 Circle #638

Plastic-resin glue (powder/resin type) is available from:

Garrett Wade

161 Avenue of the Americas
New York, NY 10013
800-221-2942 Circle #636

Vacuum Pressing Systems, Inc.

553 River Rd.
Brunswick, ME 04011
207-725-0935 Circle #637

SAWN VENEERS

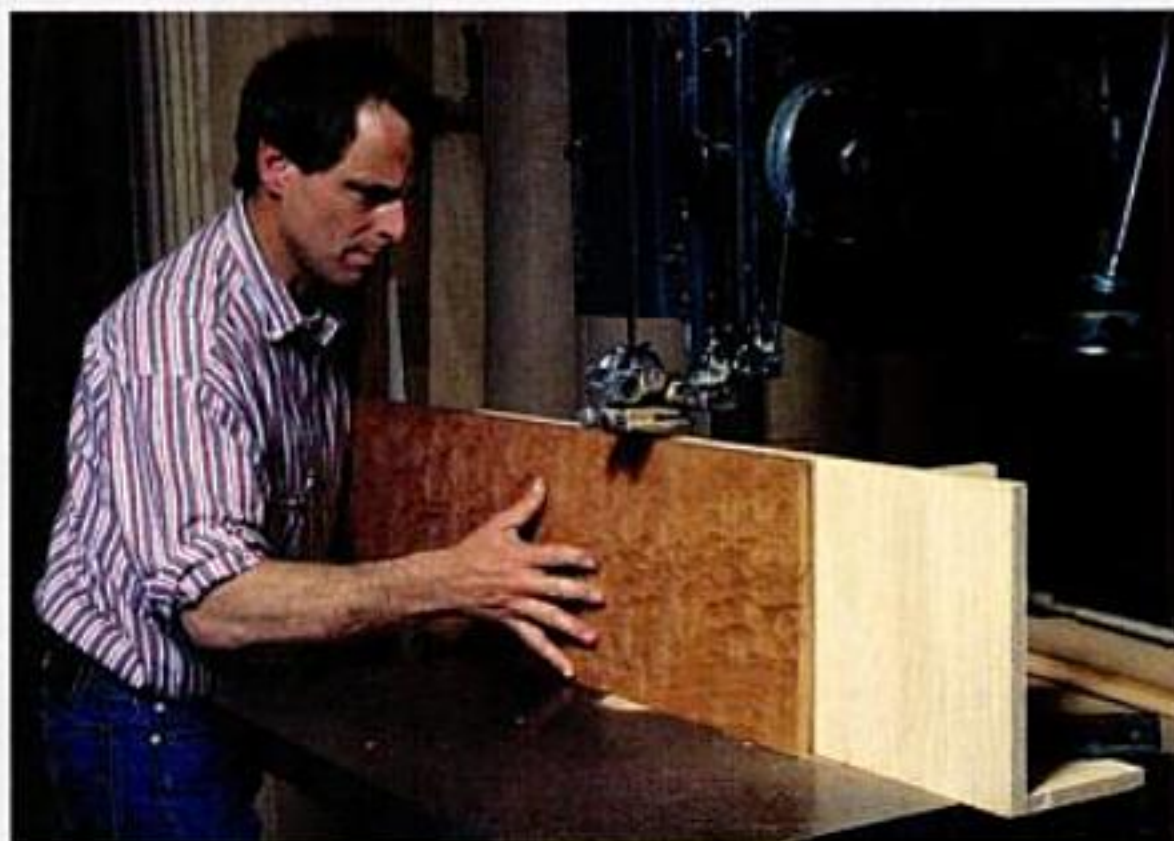
By Seth Janofsky

Sawn veneers have some distinct advantages over today's sliced veneers; they're thicker, so handling and working with them is essentially the same as with solid wood. Plus you can achieve a perfect match in color and texture between your veneer and edgings because both elements can be made from the same board.

To make your own veneer, all you need is a finely adjusted bandsaw, a sharp blade and a resaw fence. (For more on resawing and selecting a blade, see AW #38.) My resaw fence, a simple right-angled affair built from plywood and screwed together (see photo, above), is as high as the board I'm resawing is wide.

I aim for a finish that's no thicker than $\frac{3}{32}$ in. Any thicker, and your veneer is likely to split or crack once it's glued to the substrate, or even distort the panel. I set the fence to the exact thickness I want. If I suspect the wood will be especially difficult to saw, I make a slightly heavier cut. Be sure to make a triangle on the end of the board so you can reassemble the veneer later. As I'm sawing I concentrate on keeping pressure on the board just in front of the blade so the board bears fully against the fence. If the board is difficult to hold against the fence, either from bowing or from ridges or bumps from previous cuts, I'll flatten the face of the board on the jointer between cuts. However, keep jointing to a minimum to avoid mismatching the grain on subsequent sheets of veneer.

After resawing, stack the veneers in the order they came off the saw. Store them either stacked tightly



Sawing it thin. A bandsaw with a sharp blade and a tall fence are all you need to make your own veneer.

in squareness will be self-compensating once the veneers are laid side by side.

Once the veneers are jointed, glue them together, one pair at a time. A simple system using folding wedges (see the article on [Wedges](#), page 64), works well. Light

pressure is all it takes. (See photo, right.) If the panel bows upward, place some waxed paper and a weight (a metal jointer plane is ideal) on the glue seam.

When all the glued seams have dried, scrape both sides of the sheets. I usually clamp one end down to the bench or butt an end up against a bench stop; then I scrape any high spots on the glue line with a cabinet scraper and remove any glue spots or ridges elsewhere. Concentrate on getting the surface flat and even, not smooth. In fact, a slightly rough surface will improve adhesion to the core.



Wedging it together. Tapping pairs of wedges together creates enough pressure to glue veneers edge-to-edge.

Gluing sawn veneer to a substrate is in most respects similar to working with commercial veneers. (See main article.) However, be sure to take the thickness of the veneer into account so your finished panel comes out at the desired size.



SETH JANOFSKY is a photographer and furniture maker in northern California; he studied at the College of the Redwoods.



Shootin' straight. Janofsky straightens and squares the edges of his veneer with a homemade plane and a simple shooting board.



普作切

PHOTO BY BETTMANN

Duck Call!

A Well-Crafted Way to Attract Mallards or Dispel Quackery

by Stephen Blenk



Not so long ago, if you weren't a duck hunter yourself, you knew someone who was. Today things have changed, and shooting ducks has for the most part given way to protecting them. But there is an enjoyable side to this venerable field sport that both hunters and non-hunters alike can share: calling ducks. With a lathe and a little imagination, you can create a beautiful model of the call grandpa used. (In specialty catalogs, premium-quality duck calls can cost \$75 or more.) And with practice, you'll be able to fool the birds and gain a rare view of waterfowl in their natural environment.

The duck call might well be considered a wind instrument. (I can see musicians around the world gathering into a lynch mob!) The call consists of two hollow turnings that fit together around a reed and sounding block. When air passes over the reed in the correct manner, the resulting vibrations can imitate various sounds in duck vocabulary. Once you make your call, you'll discover that there's a good deal of humor in learning different duck calls. (See sidebar, page 75.)

None of the individual turnings for the duck call are particularly difficult, and the process of fitting and "tuning" a call is a trial-and-error affair. My

research on early calls has yielded one truth: No two call-makers did it exactly the same way. So don't take my word as law on any of the dimensions for the call shown here. Don't be afraid to experiment.

To make the call shown here, I used rosewood for the call body and tapered the tube. Any clear, dense hardwood will work well for these parts. The sounding block and wedge are aromatic eastern cedar. The cedar stands up well to the moist conditions that prevail inside a well-used call; it also keeps the call smelling nice!

Making the Call Body

The body of the call is a hollow tube. I usually turn this part to a maximum diameter of 1½ in. and to a length of around 4 in. The shape can vary from a fairly even diameter like the one shown here to a gently tapered form with the mouthpiece at the narrower end. Regardless of shape, the call body needs some detailing to make it look attractive and handle well. (See photo, above.) This detailing usually includes a groove for a lanyard. (See drawing, page 74.)

I start with a blank that's square in section and about 5 in. long. Turn the blank down to round between centers, or rip it octagonal on the tablesaw. Then

mount it in a lathe chuck of some sort, such as a Nova chuck. Square the tailstock end with a parting tool or skew.

Next, bore out the center of the blank with a 7/8-in. bit mounted in a chuck in your tailstock. Bore slightly deeper than the finished length of the call body. Caution: Avoid overheating the bit and the workpiece when drilling out the call body! I use a twist bit and keep speed down to 400 rpm. I've found that I can bore straighter and with less heat if I grind the combined angle of the bit back from 120° to about 100°.

Part off the call body to its finished length; then turn a piece of stock to a taper that will fit the bore. Mount the call body between centers, using the tapered piece and a live center with a [tapered point in the tailstock \(see top photo, page 74\)](#). Re-true the turning and square both shoulders. Then turn the outside dimensions to create the shape and detailing you want. As a final shaping step, I like to flare the opening of the mouthpiece end just slightly.

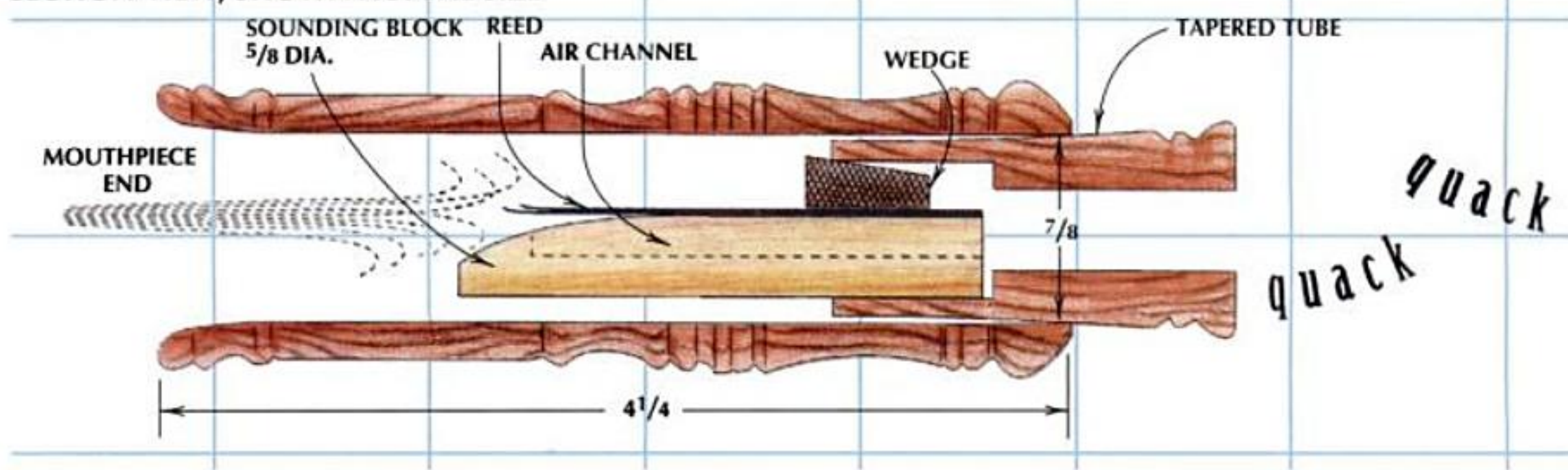
Now you can sand and finish the call body. I recommend a good gunstock finish like Birchwood Casey "Tru-Oil," available from the Dixie Gun Works, Inc. (800-238-6785). This is a polymerizing oil finish that offers good protection from the elements. I find that it

Fowl play. The duck call was once known only among hunters. Today, the love and lure of this traditional turning project has a far broader appeal.

著作物

DUCK CALL

SECTION VIEW, SHOWN ACTUAL SIZE



generally needs thinning out before use—follow the directions on the can. Apply two or three coats on the outside of the call body. The interior of the call is usually left raw.

The Tapered Tube

The tapered tube holds the reed, block, and wedge. I make this part the same way I make the call body. Start with a blank about 3 in. long with a rough diameter of $\frac{1}{8}$ in. Bore a $\frac{5}{8}$ -in.-dia. hole in one end of the blank, to a depth of $\frac{3}{4}$ in. Then replace the $\frac{5}{8}$ -in.-dia. bit with a $\frac{3}{8}$ -in.-dia. bit and bore to a depth of about $2\frac{1}{4}$ in. This will create the small and large hole configuration shown in the drawing above.

Part off the blank at about 2 in. and remount on tapers, as done earlier with the call body. Taper the tube as shown in the drawing, so that the end with the $\frac{5}{8}$ -in.-dia. hole is small enough to extend at least $\frac{1}{2}$ in. into the body of the call. The fit here is critical: The tube must stay snug for use, but be removable for reed tuning and replacement. Remove material gradually to arrive at a good fit. I give the large end of the taper a diameter between $\frac{7}{8}$ -in. and 1 in. Then I turn a couple of grooves on the outside diameter of the large end to keep the call from slipping through cold-numbered fingers.

The Sounding Block

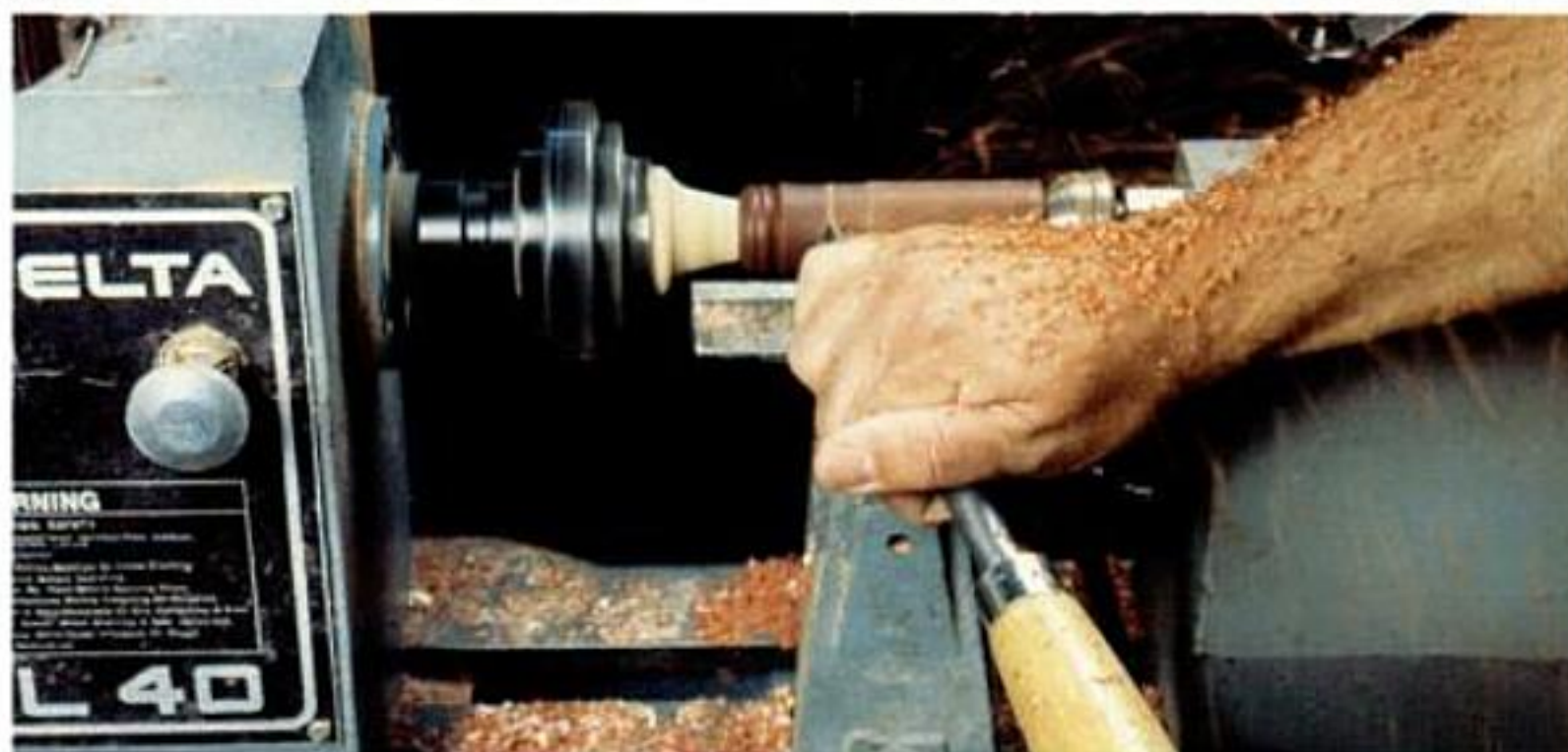
This part is a bit more complicated. Since slight variations in block shape can account for tonal differences in the finished call, it's a good idea to turn a couple of sounding blocks, rather than just one.

Start off by turning a cylinder about 4 in. long to an O.D. of $\frac{5}{8}$ in. Grasp this cylinder in a 3-jaw chuck, and bore the

cylinder to a depth of $2\frac{3}{16}$ in. with a $\frac{7}{32}$ -in.-dia. bit. Then part off the cylinder at a length of $2\frac{1}{2}$ in. Save the offcut; you'll need a piece of it later to make the wedge.

Your sounding block blank is now a cylinder with a blind bore. (The hole doesn't extend all the way through the cylinder.) The next step is to split this

cylinder approximately in half along its length. I make this cut on the bandsaw, with the aid of a V-block. I tape the blank to the V-block and set up the rip fence to guide one edge of the jig. (See photos, below.) Note: You can vary the sound of your call somewhat at this point by making this lengthwise rip slightly off the center of the cylinder. A



Shaping the call body. Mount the bored-out call body between live centers, on a tapered point and on a piece turned to fit the hole.



Halving the sounding block. Left, secure the blank to a V-block with tape, and guide the block's edge against the bandsaw's rip fence to make the cut. Above, the finished sounding block has a stopped groove and a slightly rounded end.

block with a deeper groove usually produces a lower tone. For more on varying call tone, read the section on "Tuning Up."

You now have a half-round piece that exposes the blind bore as a stopped groove. The groove is the air channel for the reed. Sand the bandsawn surface smooth and flat. Then, carefully round the ungrooved end of the sounding block. (See bottom right photo, opposite page.) I do this shaping on the belt sander, using a fine-grit belt.

The Reed

This is the thin piece of material which vibrates to produce the call's sound. As you might suspect, the reed has the largest effect on the tone of the call. Anyone who has ever played a reed instrument will tell you how important (and temporary) the reed can be. Duck call reeds come in a lot of different flavors. I have seen reeds made from metal, bamboo, plastic, and—in occasional emergencies—shotshell hulls (the only suitable material available in most duck blinds!). Reeds may be single or double, like the one shown here. I even remember seeing one old call with a triple reed!

The reed's width should match the width of the sounding block's flat area. Length can match that of the sounding block, or be up to $\frac{1}{4}$ in. less than block length. The "free" end of the reed needs to be rounded on one end, as shown in the photo above. Reeds are available from the P.S. Olt Co. (P.O. Box 550,



Assembling the call. The reed covers the sounding block's groove and is sandwiched between the block and the wedge. All three parts fit snugly in the tapered tube.

Pekin, IL 61554, 309-348-3633). These reeds are made to fit specific styles of Olt calls, so they may require trimming to fit other styles of calls.

If you decide to strike out on your own, try cutting reeds from polyethylene plastic that's between 0.010 in. and 0.020 in. thick (available from plastic suppliers). I've also had good results cutting reeds from soda bottles.

Assembly of the call is simple. The reed is held in place by the wedge, a small section of the same cylinder from which the sounding block was cut. (See drawing.) I sand the flat side of the wedge to a slight taper in order to produce a snug fit. Place the square (open) end of the sounding block into the tapered tube until it bottoms out in the $\frac{5}{8}$ -in.-dia. hole. Lay the reed—rounded end out—atop the flat area of the

sounding block, covering the groove. Slide the wedge into the space above the reed, small end first. The wedge should hold the reed snug to the sounding block, allowing the exposed length of the reed to "play" when air passes across it. (See photo, left.) Once the reed is secured in the tube with the wedge, slide the whole assembly, reed end first, into the call body. Now let the quacking begin!

Tuning Up

For some tips on duck calls, see the sidebar below. If you've tried these techniques and aren't getting the tone you're after, your call might need some tuning.

Reed number and thickness, combined with reed position—how far the reed extends over the sounding block groove—will do the most to determine the tone of your call. Generally, tone grows lower as reed length or thickness increases. A double reed will produce a louder, raspier call than a single reed.

The condition of the sounding block is another factor in call performance. The rounded profile at the end of the sound-

ing block will affect auditory quality. To fine-tune your call, you may need to experiment with these variables. ▲



STEPHEN BLENK is a contributing editor to *AW* when he isn't fending off ducks in Washington state.

JUST SAY "KAK" AND "TICKET"

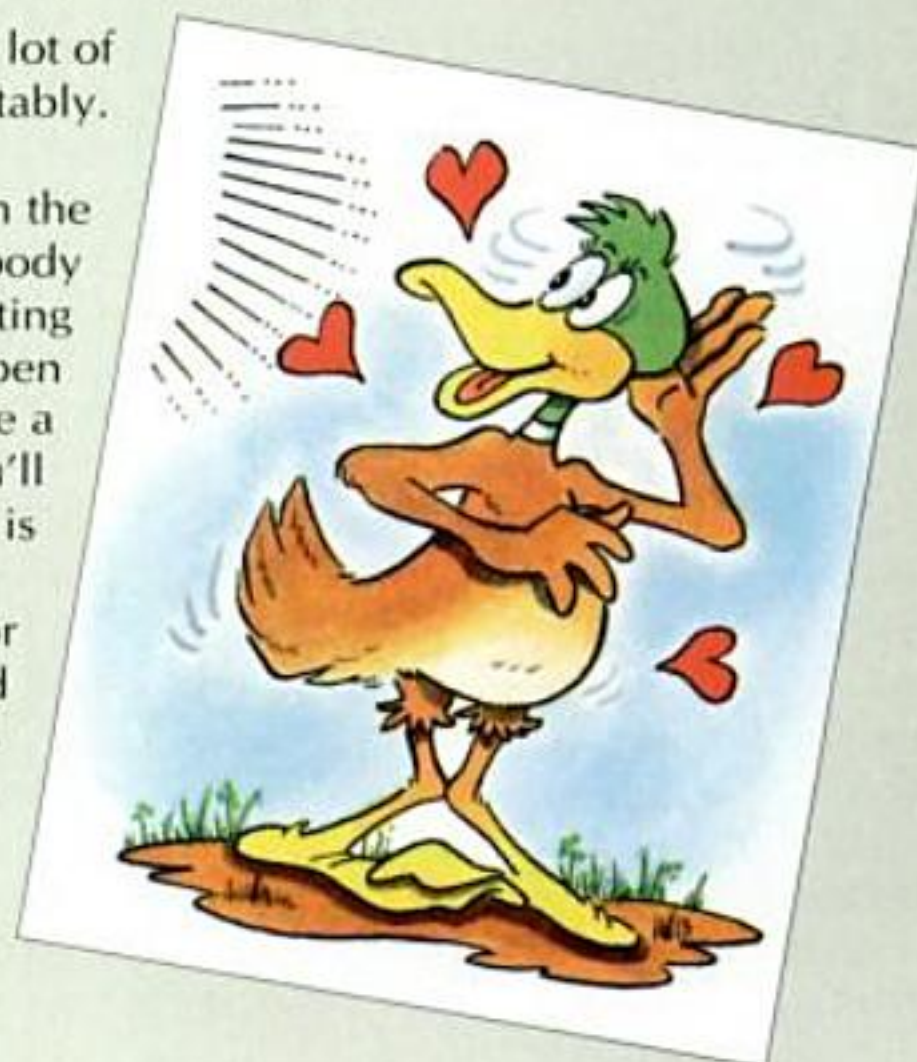
It takes practice and a sense of humor to fool a duck

Calling ducks takes practice, but the trial-and-error process can be a lot of fun. Ducks are social critters, and respond to certain calls predictably. Most calling is based on the calls of the mallard species.

To use a duck call, try holding the exposed end of the tapered tube in the web of your thumb and forefinger, and place the other end of the call body to your lips. With your fingers closed over the back of the call, try grunting the sound "kak" explosively into the mouthpiece. As you do this, open your fingers as the pressure builds up behind them. This should produce a pretty fair "quack," similar to a hen mallard. If you blow too hard, you'll get a squeal that sounds more like an adolescent drake whose voice is cracking!

Try to get an experienced caller to work with you, and be prepared for lots of laughs in the learning process. All the sounds made on a mallard call are combinations of the "kak" noise and a "wick" noise, in addition to a chuckle (feeding call) which is made by saying the word "ticket" into the call while opening and closing your hand.

For more information on calling ducks, try your library or a sporting goods store. Don't miss this opportunity to laugh at yourself, or to get some great views of waterfowl!





Marking with a twist. This unusual marking gauge is a snap to make and easy to adjust with just a flick of the wrist.

PHOTOS BY JOHN HAMMILL

Twist-Lock Marking Gauge

Twist the Beam to Set This Gauge for Marking

By Frank Klausz

A marking gauge is useful for all sorts of layout tasks, from marking mortises to laying out dovetails. I rely on a gauge more often than a pencil when marking because I like the precise line width a gauge pin leaves and the ease with which it can be set to any distance from the edge of a workpiece.

I own several types of gauges, but the gauge shown here (see photo above left), is my favorite because it's simple to make and even simpler to use. Like a traditional gauge, this one consists of a beam with a marking pin and a fence with a hole in it that slides along the beam. But instead of a screw-type locking device, this gauge relies on the eccentric shapes of both beam and hole to lock the fence in position. To set the

fence for marking, you give the beam a twist, and the fence locks tight and square to the beam.

This cam-type action isn't new to marking gauges. You can sometimes find old twist gauges at auctions, or you can buy a modern gauge with this twist-lock feature from Harris Tools (76 Quentin Rd., Brooklyn, NY 11223, 800-449-7747; price \$22.50).

The gauge shown here has a single marking pin. I use it for general chores such as laying out dovetails or marking the center of a board for resawing. To make a mortising gauge for laying out hand-cut mortises and tenons, you can use a pair of pins, spacing them to match the width of a particular mortising chisel.

Putting It Together

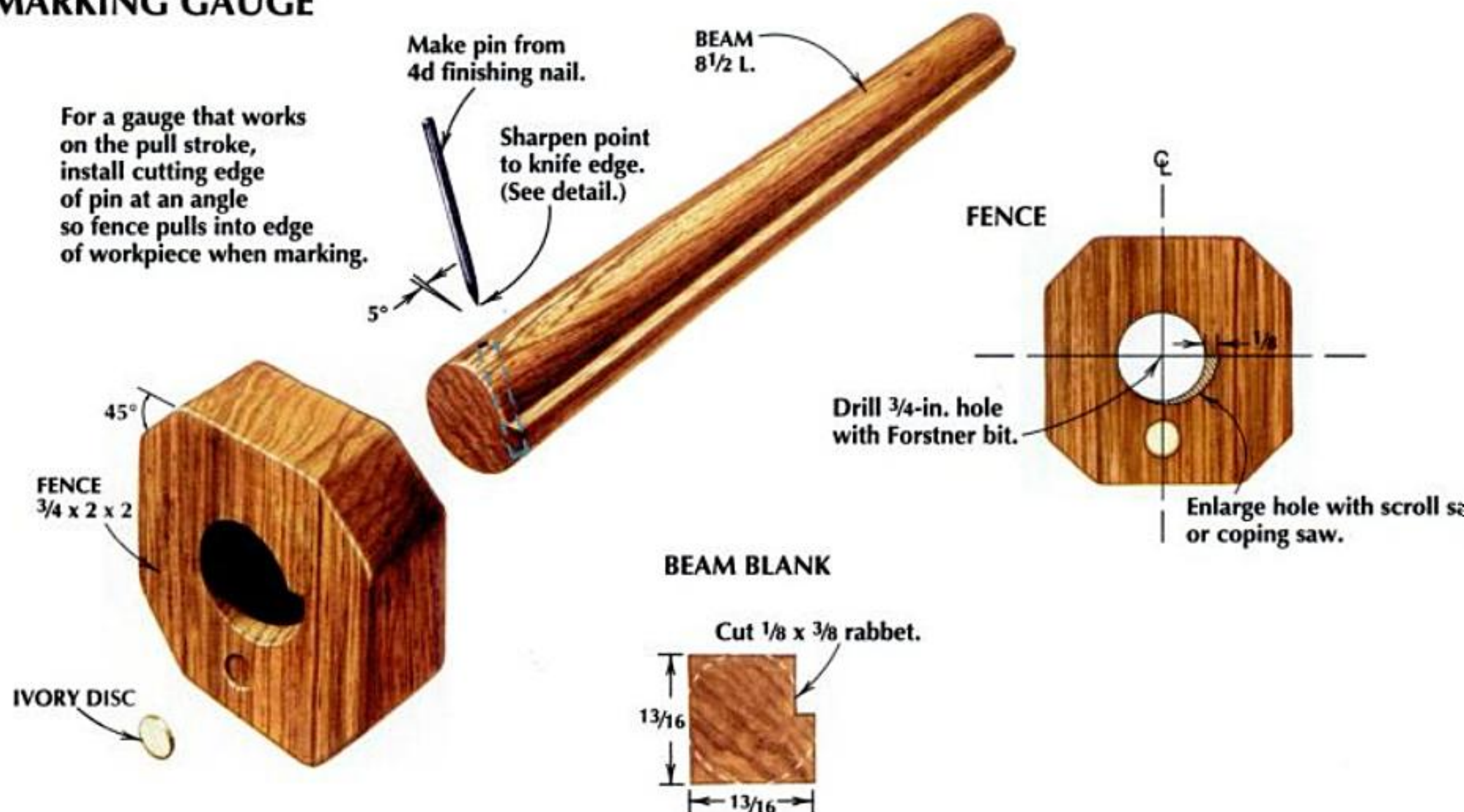
Use a dense hardwood for the fence and the beam so these parts will wear well. Here are some things to keep in mind when putting the gauge together:

Make the fence first. After shaping the outside contours of the fence, drill the hole in the center with a $\frac{3}{4}$ -in. Forstner bit. Use the drill press to ensure that the hole is square to the face of the fence. That way, the fence will lock square to the beam. Then use a scroll saw or coping saw to enlarge the hole as shown, orienting the shoulder cut across the grain for strength. (See drawing.) Smooth any bumps with a half-round file so the sweep of the curve is fair.

I like to glue one or more ivory discs into the bottom face of the fence. The ivory, which I get from old piano keys, provides some wear resistance, but its main function is to tell me at a glance which direction my pin is facing. This way, I can quickly grab the gauge off the bench and start marking out.

Make the beam to fit the hole. The width of the beam blank should be about $\frac{1}{16}$ less than the long diameter of the hole. (See drawing.) To shape the beam eccentrically, saw a rabbet into the

MARKING GAUGE



ROUNDING THE BEAM

First, set bit height to depth of rabbet and rout edge.

Then lower bit flush to router table and rout remaining three edges.

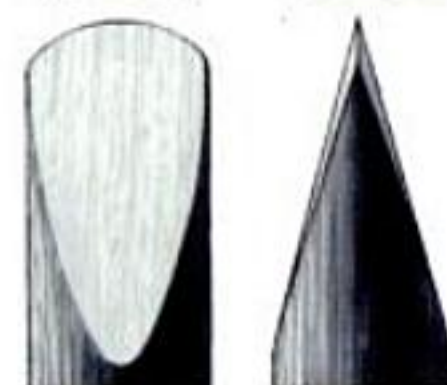


SHARPENING DETAIL

Grind or file tip of nail to knife edge, then buff smooth.

END VIEW

SIDE VIEW



Gauge parts. After drilling through the fence block, the hole is enlarged to the pencil line. Then the edges of the rabbeted beam are rounded to fit the fence hole.

beam blank, then chuck a $\frac{3}{8}$ -in. round-over bit in the router table, and round all four edges of the beam as shown in the drawing. Routing the beam leaves flat spots, which I feather out by pulling a strip of cloth-backed sandpaper around the beam while it's clamped in my bench vise. A 10° to 20° twist of the beam should lock it tightly against the walls of the hole. When you're happy with the fit, finish sand your gauge and give it a couple coats of paste wax.

Install the pin. To make the marking pin, nip off the head of a 4d nail, then sharpen the point to a knife edge on a grinder or with a file (see drawing), and buff the ground surface with a cloth wheel. To drill the hole for the pin, first lock the fence onto the beam, then drill

through the beam so the hole is vertical. I'm careful not to make the fit too snug since I remove the pin with pliers occasionally for resharping.

When installing the pin, tap the pin through the hole so approximately $\frac{1}{16}$ in. of the cutting edge protrudes. For a gauge that cuts on the pull stroke, turn the knife edge about 5° away from the face of the fence. (See drawing.) The angled cutter will then pull the gauge's fence into the edge of the workpiece, keeping your marks accurate. ▲



FRANK KLAUSZ is a master cabinet-maker in New Jersey.



Elegant CD storage. Bookmatched veneer and carved pulls highlight the doors of this hideaway CD cabinet. Inexpensive mail-order racks pop out your discs at the touch of a finger.

Built-In CD Cabinet

Stow Up to 40 CDs Behind
Gorgeous Veneered Doors

by Ellis Valentine

The compact-disc revolution, like most sweeping technological changes, took me by surprise. I grudgingly accepted the fact that my old, vinyl records were passé, but I still had a problem: My entertainment cabinet was already jam-packed with records, tapes and gear. Where would I store all the new CDs I'd be buying?

I didn't want the clutter of a free-standing CD cabinet, so I designed one that I could tuck away in a nearby book-

case with doors to hide the CD boxes from view until needed. (See photos above.) And though this unit holds only 40 CDs, I can make additional cabinets as my collection grows.

I tend to be a cheapskate when designing for myself, which is another reason I decided to build the CD cabinet into a bookcase—only the doors and the edging above and below them would be visible. That meant I could make the hidden parts of the box from scrap wood,

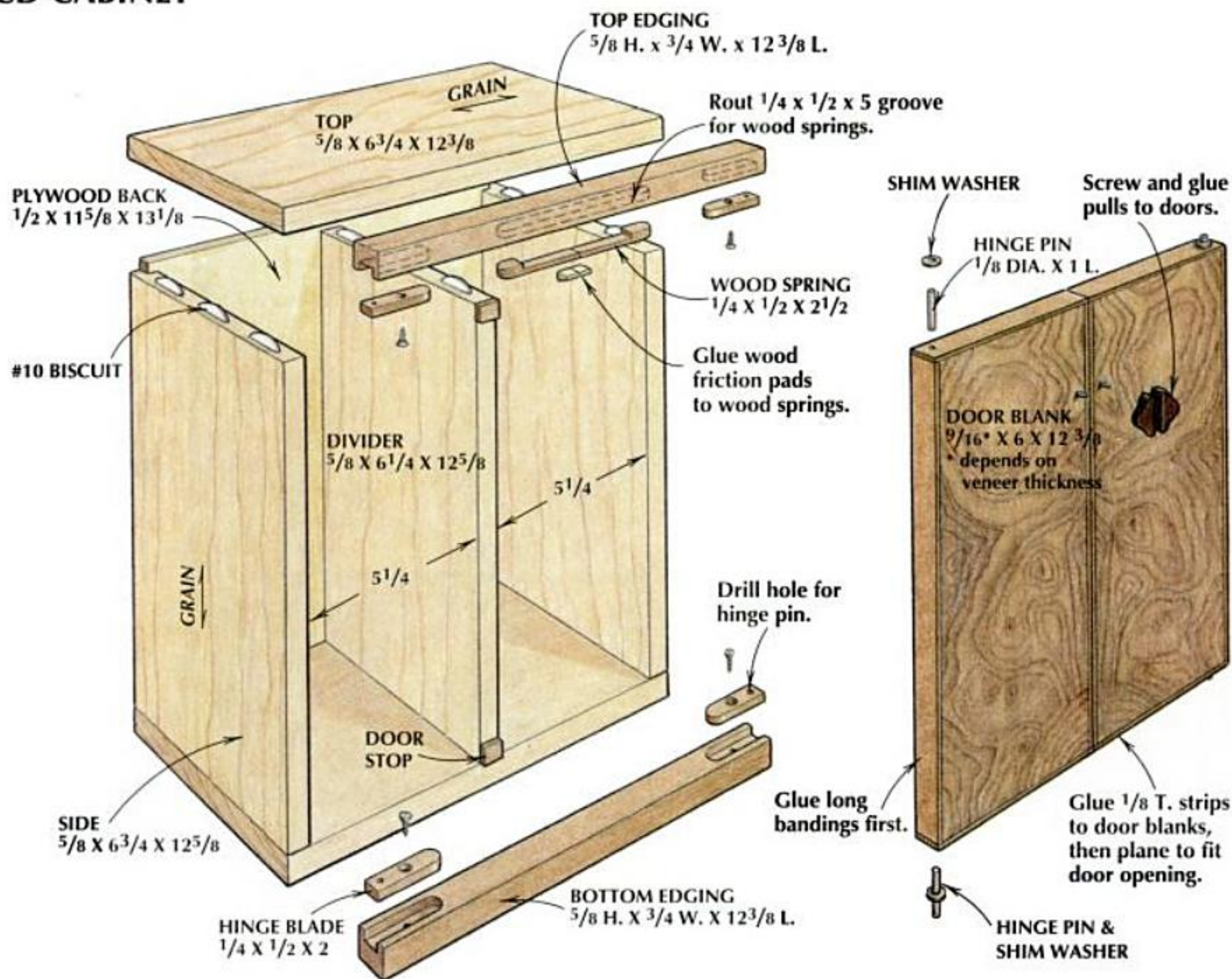
and skip the showy joinery. For a free-standing cabinet, I'd have used one wood throughout, and I'd probably have dovetailed the corners. I also saved plenty of labor by installing ready-made plastic CD racks (available from Woodworker's Supply, 5604 Alameda Place NE, Albuquerque, NM 87113, 800-645-9292) instead of building a system of dividers.

Simple as this cabinet is to make with a tablesaw, router and biscuit joiner, it



PHOTOS BY ELLIS VALENTINE

CD CABINET

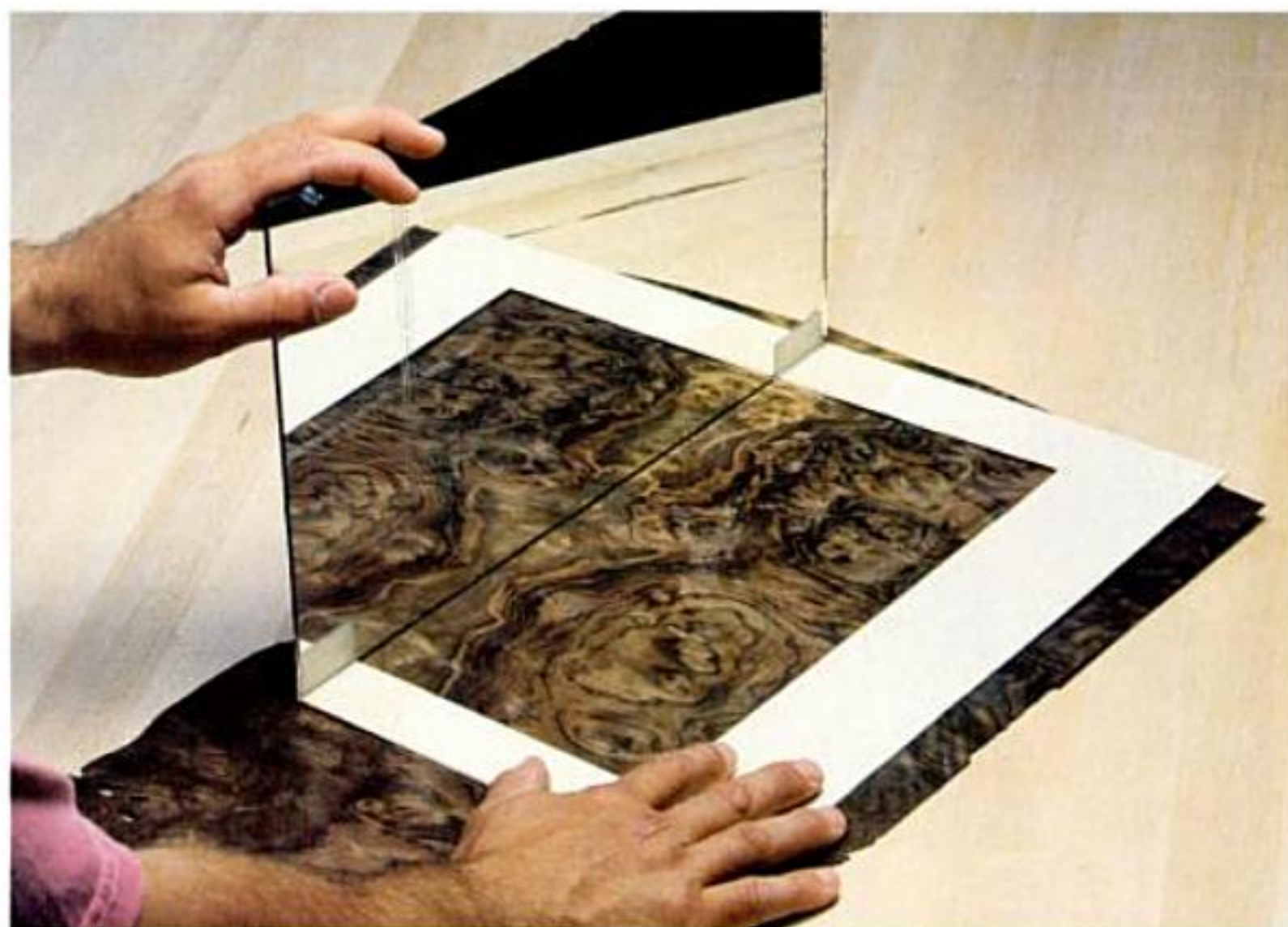


has a couple nifty features: The book-matched, veneered doors are the most obvious, but look closer and you'll find shop-made wooden knife hinges and friction catches—two ideas you might want to use on other projects. (See side-bars, pages 80 and 81.)

Making the Box

The basic box, made of white oak, is a simple exercise in biscuit joinery. The plywood back keeps the carcass square. (See drawing above.) Most of the work went into the doors, which are mounted between walnut edgings glued to the top and bottom of the box. I machined the hinges and catches into the edgings before I glued the edging onto the box.

For the doors, I chose a dramatic walnut burl veneer (available from Certainly Wood, 11753 Big Tree Road, Rt. 20A, East Aurora, NY 14052, 716-655-0206). I made sure to specify sequential sheets of veneer so the book-



Got a match? Find your best bookmatch with a mat-board mask taped to a scrap of mirror.

match would be perfect. I also ordered some extra sheets of veneer for making identical cabinets in the future.

To make the doors, I started with two 1/2-in.-thick plywood blanks about 1/2 in. taller and wider than the finished door size. Next, I selected the exact bookmatch pattern I wanted. It isn't easy to find the best-looking bookmatch unless you can see both halves of the match at the same time. So I made a little previewing contraption from a scrap of mirror and a piece of mat board cut out to the size of the plywood door blanks. (See photo, page 79.) By moving the mask around on one of the sheets of veneer while holding the mirror at right angles to the surface, I was able to find several appealing bookmatches, which I noted by tracing the inside corners of the mask with a pencil.

I selected the one I liked best (actually, my wife liked it best) and traced its outline on the veneer. Using an aluminum level as a straightedge, I cut out the first piece with a veneer saw. I used this piece to find the match on the second piece of veneer, then traced and cut that, too. I also cut two backer sheets from some scrap mahogany veneer to balance the construction. (See "Veneering," page 66.)

Laying up veneer on parts this small is quick and easy. You don't need a complicated arrangement of clamps and cauls—just a few quick clamps and several scraps of plywood will do. I do advise putting a layer of waxed paper between the veneer and cauls; otherwise, glue bleeding through the pores of the veneer will stick it permanently to the cauls. To keep the veneers from shifting during glue-up, I taped the ends to the edge of the plywood core.

Next, I cut the veneered blanks to fit in the door opening, allowing 1/8 in. all around for edgebanding. Plan for an exact fit; you can open up the necessary gaps between doors and frame by planing the edgebanding after gluing.

For an accurate bookmatch when cutting the blanks, I suggest this procedure: Joint the edge of one blank, then rip it to width and crosscut it to length. Joint the mating edge of the second blank until it exactly matches the first, then rip and crosscut to the same size.

To edgeband the doors, I started with 1/8-in.-thick walnut strips about 1/16-in. wider than the thickness of the door blanks. Glue the strips on the long edges of the blanks first, then trim the ends flush with the ends of the blanks. Carefully block-plane the protruding

edges flush with the front and back faces, then glue up the short edgebandings and repeat the process. Now, plane the edgebandings until the doors fit the frame with about 1/16-in. clearance.

Pulls, Hinges and Catches

I carved door pulls of ebony to complement the grain patterns of the face veneer. Your veneer might suggest another style. In any case, attach the finished pulls with screws and glue.

Hinges and catches are also up to you. I decided to make mine of wood, (see sidebars, below and opposite), but other hinges and catches would work just as well. Whichever hinging arrangement you use, be sure the doors swing out of the way of the CDs when opened.

Finishing the CD cabinet was quick and painless. I brushed two coats of shellac on the box itself and oiled the

doors with a wiping varnish. Since burl veneer tends to be unevenly porous, I sealed the doors with blond shellac before oiling. ▲



ELLIS VALENTINE is executive editor of *AMERICAN WOODWORKER*.

WOODEN SPRING CATCHES

When I first designed this CD box, I planned to use small magnetic touch latches to hold the doors shut. But the design didn't allow room for the bulky barrels of this type of catch. So I challenged Fred Matlack, our Design Shop chief, to come up with a simple wooden catch, preferably with spring action,

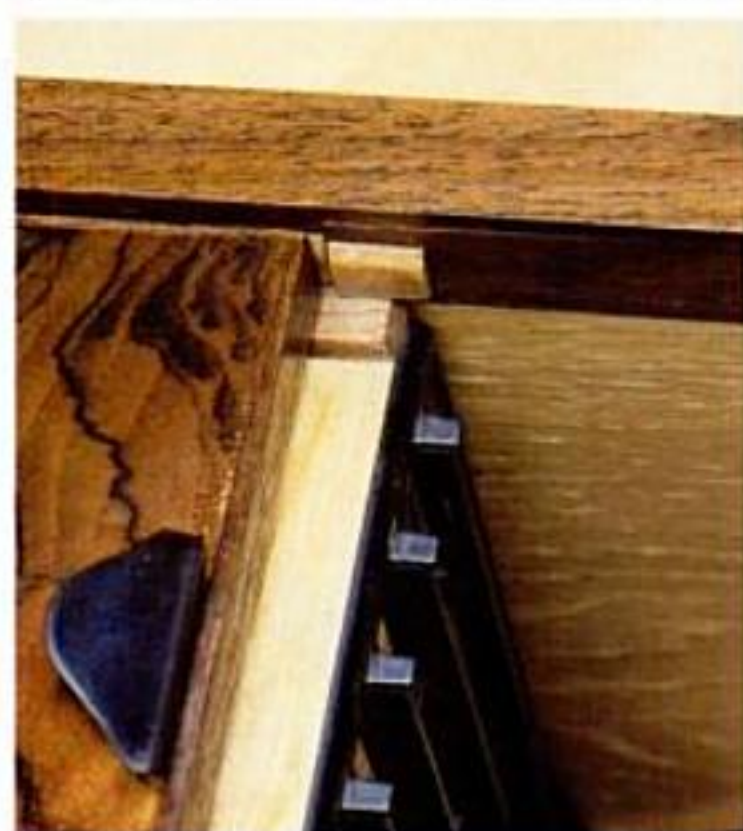
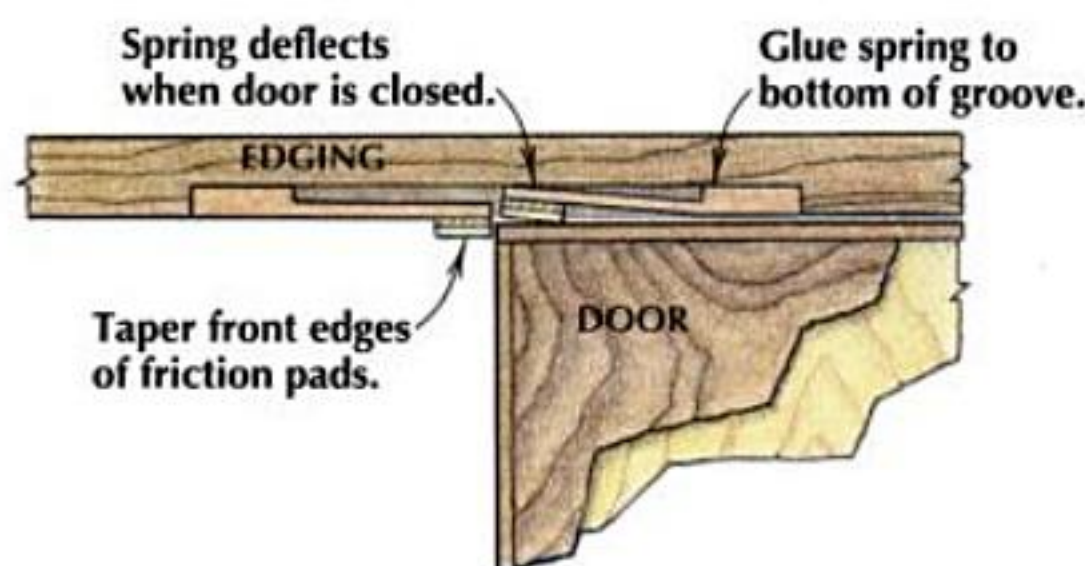
and he produced the ingenious one shown here.

Fred's catch consists of two 1/4-in.-thick slips of wood like those used for the knife hinges. (See drawing.) To produce the spring action, Fred bandsawed each slip to 1/8-in. thickness over two-thirds of its length and glued the remaining third to the bot-

tom of a groove in the edging strip. Each spring has a small wooden pad glued to the free end to engage the door. The wooden springs deflect into the groove when the doors are closed and spring back when they are opened.

It's best to wait until you hang the doors to make the pads because they need to be a bit thicker than the gap above the door. Sand or file a taper on the leading edges of the pads so the doors will ramp smoothly onto them. **E.W.**

SECTION THROUGH FRICTION CATCH



Wooden springs. A maple friction pad is glued to each spring, which holds its door closed.

WOODEN KNIFE HINGES

Here's a curiously simple way to hinge cabinet doors that have frame members above and below, as they do on this CD rack. Each knife hinge consists of a wooden blade that you screw into a routed notch in the frame, a short section of brass rod, and a shim washer, as shown in the drawing. By slotting the counter-sunk screw hole, you can build some side-to-side adjustability into the design. I held each of the walnut blades of this CD rack in place with a #6 flat-head wood screw.

The only tricky step in making these hinges is matching the pin-hole locations in the door to the holes in the hinge blades. I used a horizontal boring machine, but here's a way to do it on a drill press: First, mark and center-punch the pin locations on the top and bottom edges of the door. Clamp the door to a high fence perpendicular to the table of your drill press and align the drill with your mark. Then, hold the hinge blade in place on the edge of the door and drill through the blade and into the door.

To hang a door, install the hinge pins in the ends and slip the hinge blades over the pins, with shim washers that match the gap between the door and the frame. Slide the hinges into their routed slots, then secure each hinge with a screw.

Hinge geometry is important. When you design with this type of hinge, leave enough clearance between the door and the front edge of the side panel so the back edge of the door doesn't bind on the front edge of the cabinet when you open the door.

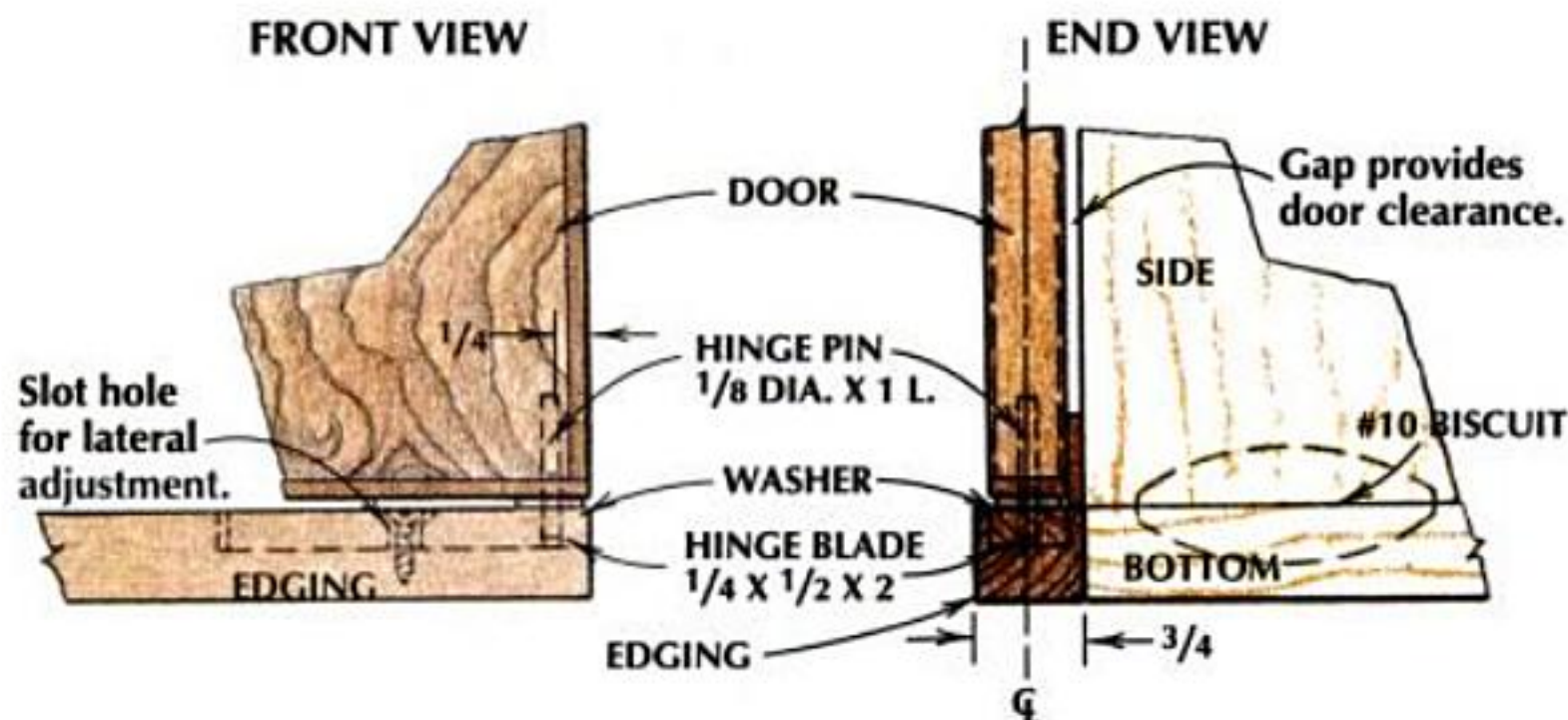
To lessen the gap between the door and side panel reduce the clearance by rounding the door edge or coving the front edge as shown in the drawing.

—E.W.

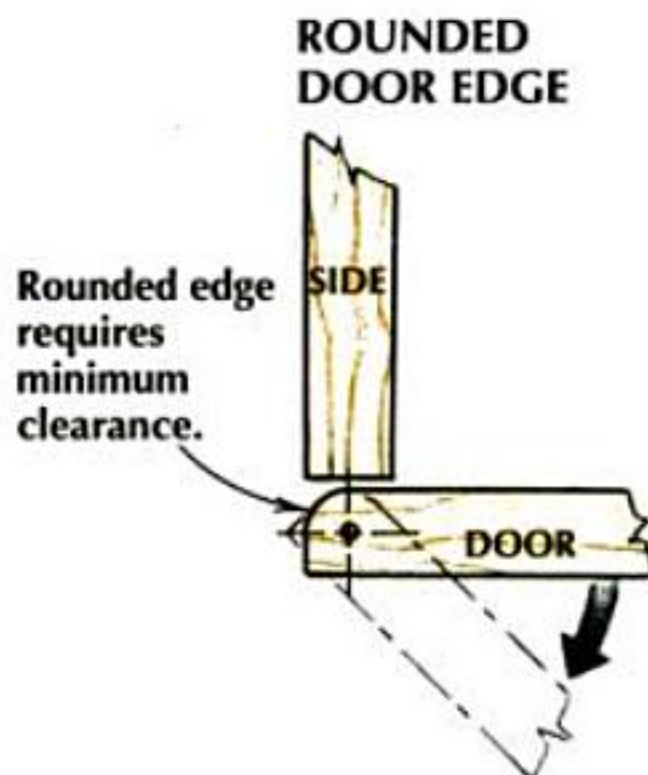


Shop-made knife hinges. A single screw secures the walnut blade of this unobtrusive hinge to a routed slot in the bottom edge piece.

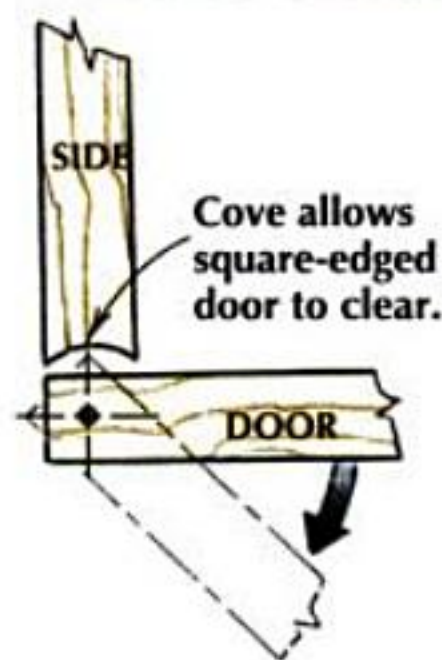
CD CABINET HINGE DETAILS



TWO WAYS TO CLOSE THE GAP



COVED SIDE PANEL



WOOD FACTS

HOLLY

By Paul McClure



"Deck the Halls With Boughs of Holly" is heard often during the holiday season. Everyone knows the song but few realize

that the practice harks back to the Roman celebration of Saturnalia, a winter-solstice feast celebrated with lascivious abandon.

In the Middle Ages, holly's leaves and berries were cooked into a witches' brew which was believed to bring good luck, heal sprains and broken bones and even cure smallpox. The berries were also used to make a tea which was taken as a general curative.

Although holly provides us with the whitest wood in the world, it is valued more today for the decorative quality of its glossy, spiny, dark green leaves and scarlet berries. The harvesting of holly

branches is an important seasonal industry on the Maryland coast.

Worldwide, there are about 175 species of holly, ranging from small bushes to trees 60 ft. high and 3 ft. in diameter. The largest specimens of holly grow in southern Arkansas and eastern Texas. Holly found in the New England states is invariably small. Guiana and Brazil host the largest number of species.

Appearance

Holly's uniformly white heartwood and sapwood are not sharply demarcated and have very little figure. The grain has a very fine texture; pores are too small to see with the unaided eye. If the lumber is not cut during winter and dried before summer, the wood is subject to "blue stain," particularly undesirable in holly, which is valued for its whiteness. The stain is caused by a fungus which is thoroughly arrested by kiln-drying.

Workability

Holly is strong and tough, but it has a tendency to warp. Like hard maple, it is best machined with carbide cutters because of its dulling effect on steel cutting edges. It can be carved, though, and will hold sharp detail. The wood glues easily, polishes beautifully, and accepts stains and finishes well.

Uses

Used in inlay and marquetry, holly provides beautiful white or dyed accents. It serves as a carving and engraving material and is excellent for small turnings. Manufacturers use it as a substitute for ivory in the production of piano keys and as a material for fine brush backs. Available only in small boards, it is not used in steambending. ▲

PAUL MCCLURE is a wood technologist living in Colorado.

HOLLY

SPECIES

Ilex opaca

GROWING REGIONS

Southern New England, southeastern U.S., Texas, Europe, Asia, South America

SPECIFIC GRAVITY

0.80

DENSITY

50 lbs./cubic ft.

WOOD MOVEMENT*

(FROM 12% TO 6% MC)

Large (more than 1/2 in./ft.)

DURABILITY

Subject to decay and insect attack

SUSTAINABILITY

Sustainable at current production levels

AVAILABILITY

THICKNESSES
WIDTHS
LENGTHS

Specialty lumber dealers
4/4 (8/4 degrade is high)
4 to 6 in.
2 to 4 ft.

COST

LUMBER
VENEER

\$8 per bd. ft.
\$1.50 per sq. ft.

*Indicates wood movement across grain

Holly is the whitest wood in the world.

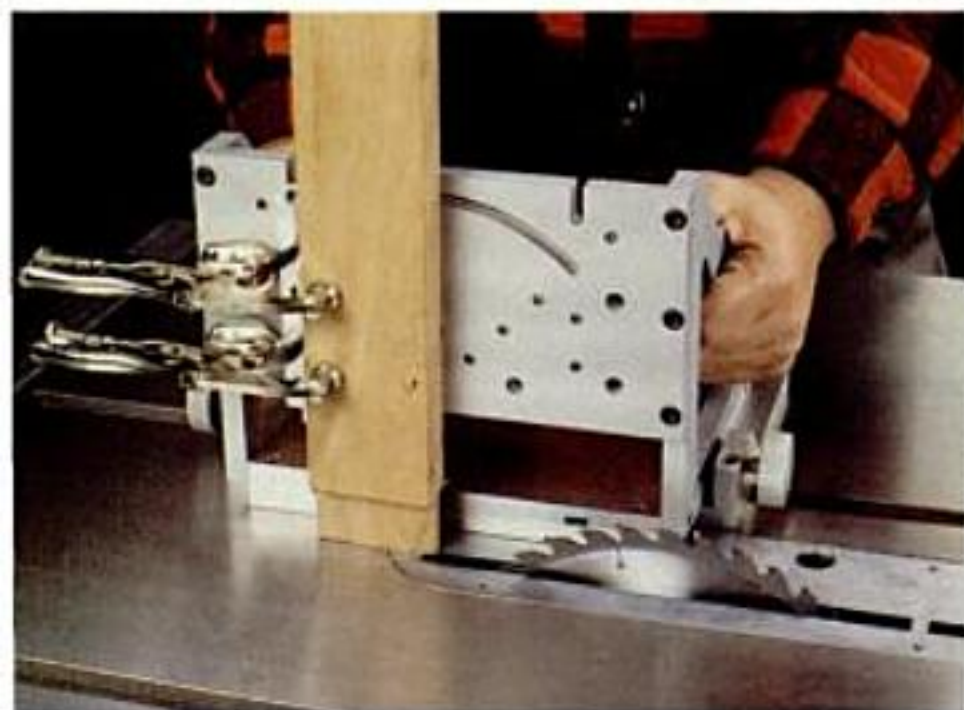
TOOL BOX

Hot New Tools From Two Big Shows

In August, AW editors spent days walking miles of aisles at this country's two biggest tool shows—the National Hardware Show in Chicago and the International Woodworking Fair in Atlanta—in search of new tools and products. Here's what we liked best. Note: Prices shown are list, no street prices were available as this issue went to press.

A Jig For All Reasons

The Shop Fox right angle jig combines the capabilities of several joint-cutting jigs into one. With a bar that tracks in the miter slot of a tablesaw, shaper, or router table, the jig is designed to hold stock for cutting tenons, grooves, dados, finger joints, dovetails and even coped rail ends quickly and accurately. The jig comes with one toggle clamp; you can also use locking-plier clamps



and bar clamps to position stock at various angles for different cuts. The Shop Fox's aluminum body is sturdily built for accuracy, but it's light enough to maneuver easily when you're making a cut. (Price: \$150) Available in early 1995 in woodworking stores and mail order catalogs.

A Clean Sweep

Dust collection is a big concern in today's woodshops and Porter Cable's new Power-Tool-Triggered Wet/Dry Vacuum (model #7810) provides features that make it a standout in performance. With its 9-amp motor, the unit generates suction typical of industrial utility vacuums. Yet unlike many shop vacuums, it runs quietly, and it's very efficient at trapping the smallest dust particles that research has shown

are the most harmful to your health. This efficiency comes from a dual-filter system consisting of a replaceable filter bag to capture the bulk of the dust, plus a pleated cassette filter for the tiny (0.2 to 2 micron) particles.

Another convenience is the switch—it turns on automatically when you turn on a power tool. When you stop the tool, the vac turns off after a 15-second delay to flush dust from the 13-ft. hose. The #7810 has a dry capacity of 5 gallons, a 25 ft. cord and a foot-actuated brake to lock its wheels. (Price: \$448) Porter-Cable Corp., Dept. AWT., P.O. Box 2468, Jackson, TN 38302, (901) 668-8600. Circle #615

"See" Saw

Porter Cable has introduced a heavy-duty 7 1/4-in. circular saw which features the blade on the left side of the motor where it's much easier to see the line of cut. The



model #743 "Frame Saw" is really a mirror image of Porter Cable's popular #347 saw. It packs 15 amps of power and has a base and gear chamber made of magnesium for light weight (10 1/4 lbs.), and strength (the

manufacturer claims it won't break in a six foot fall). A spindle lock, on-board wrench storage, dust collection port and positive stops at 45° and 90° on the bevel adjustment are standard. An optional electric brake and steel carrying case are available. (Price: \$225) Porter-Cable Corp., Dept. AWT., P.O. Box 2468, Jackson, TN 38302, (901) 668-8600.

High-Tech Spray gun

If you've avoided buying an HVLP (high-volume, low-pressure) spray gun until manufacturers work all the kinks out of this new technology, it's time to check out Mattson's Atom-miser IQ Spray System

that rivals the best high-pressure guns and adds some user-friendly innovations. This gun includes three tip sizes, fluid adjustment and a separate control to pressurize the cup. A large dial lets you choose among four spray patterns by adjusting both the air and fluid simultaneously from a small, fine pattern to a large full one. Turn the dial one more stop and the entire cup assembly (including the fluid tip) separates from the gun handle. The IQ "B" system (shown in photo), includes an extra cup assembly so you can change colors or coatings instantly without having to stop to clean the gun. There's one catch—like most HVLP "conversion guns," the Atom-miser requires a hefty



compressor (at least 5hp) to deliver the 18 CFM at 80 psi air supply it needs to operate. (Price: \$590 for IQ "B" System.) *Mattson Spray Equipment, Inc., Dept. AWT, 230 W. Coleman St., Rice Lake, WI 54868, (715) 234-1617. Circle #617*

More Than a Jig Saw



Imagine a cross between a reciprocating saw and a portable jig saw, and you'll get an idea of the versatility of Bosch's new Model B4050 Sabre-Plus in-line jigsaw. This barrel-grip tool not only lets you make most of the cuts you'd ordinarily make with a jigsaw, but you can also mount a rasp for shaping wood, a wire brush for removing rust, or a bristle brush for cleaning tasks in tight spaces. For fast blade changing, the Sabre-Plus accepts Bosch-type "Clic" jigsaw blades and accessories. The 3.6 amp motor will power through 2 $\frac{3}{8}$ -in.-thick wood or $\frac{5}{16}$ -in.-thick steel. Like other top-of-the-line jigsaws, it features three-position orbital action for faster cuts. (Price: \$199) *S.B. Power Tool Co., Dept. AWT, 4300 W. Peterson Ave., Chicago, IL 60646, (312) 286-7330. Circle #616*

Details...Details...

Carving by hand can be very rewarding, but it can also be tiring when done for prolonged periods. Ryobi's new DC500 Detail Carver gives you the control and finesse of hand carving with the speed and endurance of a power tool, with surprisingly little vibration—and it costs much less than other power carvers. It



includes 5 chisel bits in various profiles from 3mm to 6mm wide. The bit cuts with a vibrating chisel action that's pressure activated—it won't begin cutting until you push it into solid wood (saving your fingers from unintentional carving). The 2 lb. tool features two speeds—high speed for quick roughing work, and low speed for carving finer details. (Price: \$70) *Ryobi America Corp., Dept. AWT, 1501 Pearman Dairy RD., Anderson, SC 29625, (800) 525-2579. Circle #618*

Cordless Trim Saw

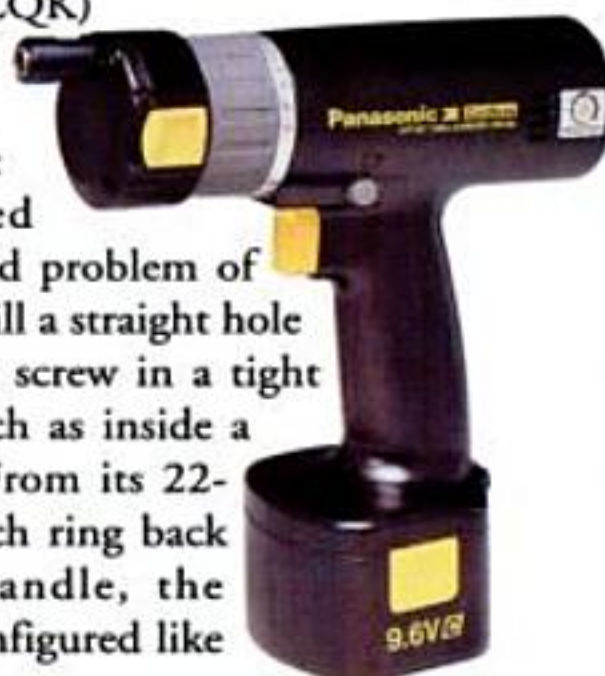
Though it won't replace our tablesaw, we'll often reach for DeWalt's new cordless trim saw to make fast cuts in moulding, plywood and other light trim materials. Available as model DW 935K with a 14.4 volt battery, or DW 930K with a 12 volt battery, the saw's 5 $\frac{3}{8}$ -in. dia. thin-kerf carbide blade has the capacity and power to cut "2 by" dimension lumber in one pass. The blade is mounted on the left side for better visibility, and can make bevel cuts up to 50°. DeWalt



claims the 14.4 volt model will cut 25 ft. of $\frac{1}{2}$ -in. plywood in a minute, or make 75 cross cuts in a 2x4 on one charge. Power comes from DeWalt's new XR PACK Extended-Run-Time batteries, which are compatible with other new DeWalt cordless tools. Both cordless saws come with a one-hour charger. (Price: DW935K, \$444) *DeWalt Industrial Tool Co., Dept. AWT, 701 E. Joppa Rd., Towson, MD 21286, (800) 433-9258. Circle #619*

Close-Quarter Drill/Driver

With their new "Corner Master" (model EY 6780CQK) cordless drill, Panasonic has solved the age-old problem of how to drill a straight hole or drive a screw in a tight corner such as inside a cabinet. From its 22-stage clutch ring back to the handle, the drill is configured like



other Panasonic T-handle drills. But up front, Panasonic has placed a revolving mechanism that offsets the $\frac{1}{4}$ -in. quick-connect hex socket for mounting hex-shank drills or driver bits. The offset lets you drill as close as $\frac{5}{16}$ -in. from a wall or panel, and you can rotate the offset to 8 different positions. The Corner Master has reversible variable speed, an electric brake, and includes a 15 minute battery recharger. (Price: \$370) *Panasonic, Dept. AWT, One Panasonic Way 4A-3, Secaucus, NJ 07094, (201)-392-6655. Circle #620*

Double-Duty Clamp

Until now you needed two separate tools to clamp stock together or to spread parts apart for disassembly, but Jorgensen's E-Z Hold II Bar Clamp quickly converts from a clamp to a spreader. For either task, you slide the



clamping heads against the work, then squeeze the in-line handle to apply clamping pressure. The E-Z Hold has soft plastic pads to protect the work and they come in 4 lengths from 10-in. to 28-in. (Price: \$15 to \$21 depending on size.) *Adjustable Clamp Co., Dept. AWT, 417 N. Ashland Ave., Chicago, IL 60622, (312) 666-0640. Circle #621*

Iron Art

If you've been looking for tasteful hardware to put the finishing touches on your best cabinet and furniture pieces, you should know about Iron Art. The company imports hand-forged hardware from Chile and then applies custom finishes. The line includes knobs, pulls, hinges, knockers and latch sets. In



TOOL BOX

design and finish, these items are reminiscent of antique European hardware. They'd go nicely with many traditional furniture projects. Custom color finishes include natural iron, rust, verdigris, antique copper, and black. Iron Art also carries a complete line of iron hardware for architectural entry and passage doors. (Prices range from \$12 for a simple knob to \$30 for an elaborate pull.) *Iron Art, Inc., Dept. AWT, The Showplace Design Center, P.O. Box 471258, San Francisco, CA 94147, (415) 441-4633. Circle #622*

Two Aftermarket Miter Gauges

The AngleWright Precision Miter Gauge (below) lets you quickly lock-in the three most common angles used on your table saw: 90°, 45° left, and 45° right. To change angles, you unscrew the brass lock knob and swivel the aluminum head on the ground steel miter bar. You don't have to fine-tune the adjustment, since steel



dowel pins seat precisely in bronze bushings to guarantee accuracy within 1/15°. To get a perfect fit in your miter slot, the Precision Miter Gauge has three Teflon dowels in the miter bar that you adjust with an Allen wrench to take up any clearance. Two holes in the gauge's head let you add an extension, or for odd angles, you can bolt on AngleWright's Adjustable Triangle. (See Toolbox, AW #25.) (Price: \$79) *AngleWright Tool Co., Dept. AWT, P.O. Box 25632, Los Angeles, CA 90025, (310) 471-7432. Circle #624*

Micro-Miter (above right) has a heavy-duty, and finely-machined construction that makes it the most solid, rigid miter gauge we've ever seen—it weighs 7 lbs., and its aluminum protractor and fence are 1-in.-thick. Yet you



can set miter angles to the nearest 1/10° using the gauge's protractor scale in conjunction with an easy-to-read vernier scale engraved in a solid block of brass attached to the miter bar. Allen screws in the miter bar let you take up any clearance to get a perfect sliding fit in your miter gauge slot. A hard, black aluminum oxide coating protects the tool from scratches and wear. From its machined brass lock-knob to the perfectly true miter bar, the Micro-Miter will delight your eye and enhance the accuracy of your work. (Price: \$225) *MicroMiter, Inc., Dept. AWT, 7314 Cortez Lane, Boulder, CO 80303, (303) 494-2884. Circle #625*

For Oil Finish Lovers

Amity Aqua-Oil is a new water-based wipe-on finish that's easy-to-apply like conventional oil finishes such as tung oil based products. But since it contains no

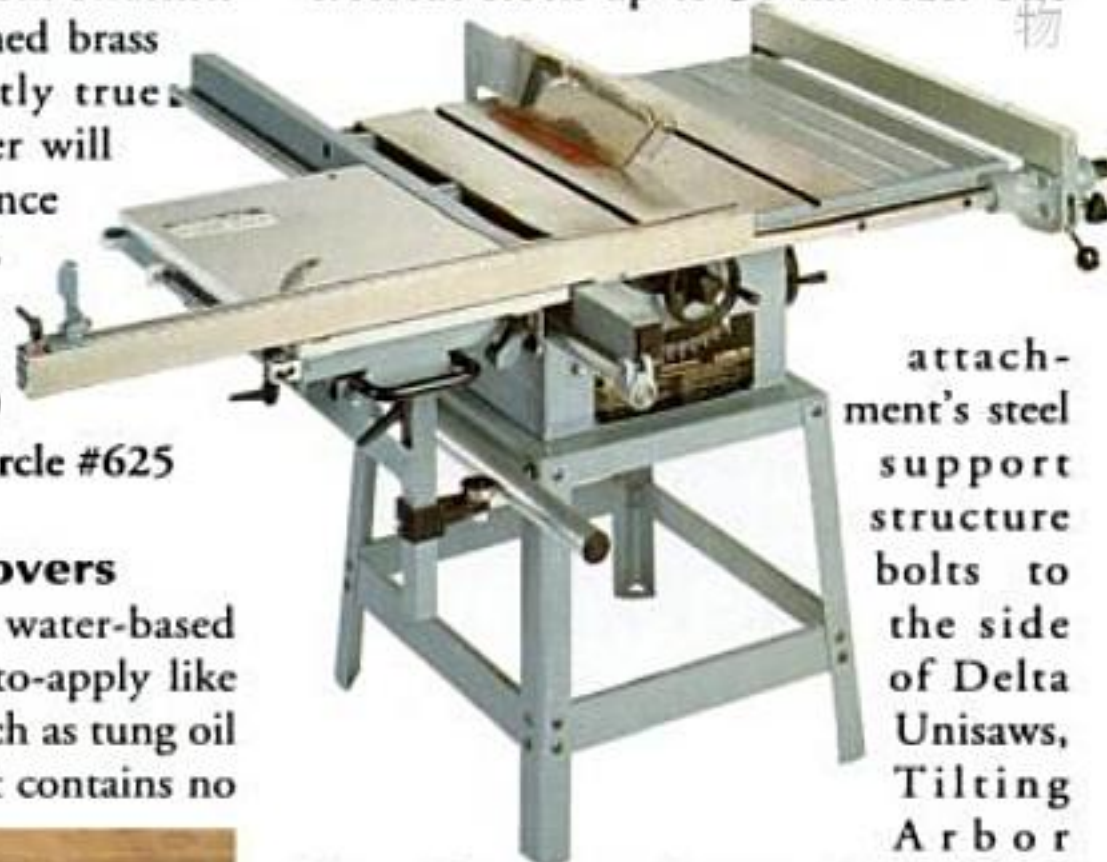


petroleum solvents as ordinary oil finishes do, it meets all environmental standards, has no objectionable odor, and is non-flammable. Aqua Oil lets you work faster too—you wipe it, dip it or brush it on, wipe off the excess with a clean cloth, and it's ready for recoating in 30 minutes.

The finish comes in 4 colors (clear, natural, red oak, and walnut). You can also use universal tinting colors to create a custom color of your choice. Aqua-Oil finish dries with good clarity and depth, but it's not intended for surfaces subjected to a lot of wear—for a more durable finish, Aqua-Oil can be topcoated with most water-based clear finishes. (Price: \$7.95/pt., \$12.95/qt., \$29.95/gal.) *Amity Industrial Water-Based Finishes, Inc., Dept. AWT, 113 S. Monroe St., Waterloo, WI 53594, (414) 478-9633. Circle #623*

Let It Slide

With Delta's new Sliding Table Attachment (Model 34-555) you can crosscut stock up to 36-in.-wide. The



attachment's steel support structure bolts to the side of Delta Unisaws, Tilting Arbor Saws, Contractor Saws and HD Wood Shapers. (It can mount to some other brands with modifications.) Its laminated table gets a smooth ride from seven sealed ball bearings that are easily aligned. The 42-in.-long aluminum fence swivels up to 45° for mitering, and it includes an adjustable stock stop for making repeat cut-offs and an optional stock clamp. (Price: \$459) *Delta International Machinery Corp., Dept. AWT, 246 Alpha Dr., Pittsburgh, PA 15238, (800) 438-2486.*

Heirloom Square

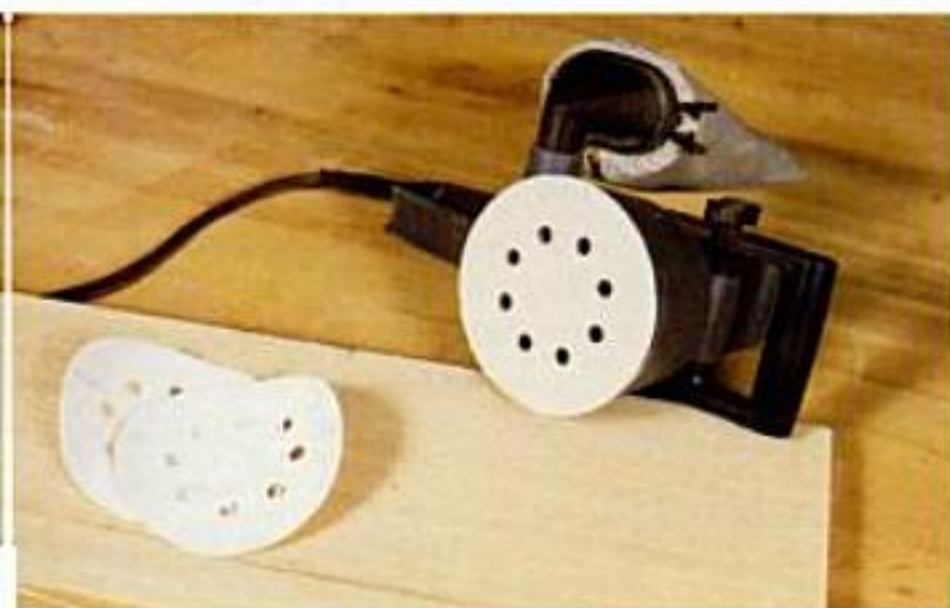
The latest offering from Bridge City Tool is this Adjustable Try-Square that's factory calibrated to be square plus or minus 0.001-in. over the length of its blade. Should the square become inaccurate due to mishandling, you can recalibrate it to original specs by turning a pair of Allen



screws. (No other square we know of gives you this option.) The easy-to-see graduations are aligned perfectly with the handle, so you can confidently use the square as a height gauge with the outside graduations and as a hook rule with the inside graduations. The Try-square comes with a 3-in. blade (Model AS-3) or a 14-in. blade (Model AS-14). The 14-in. model has a small stop that slides out of the handle to support the handle on the edge of a board. Each square is made from brass, satin-chromed-steel and Juara wood—a man-made rosewood look-alike. (Price: 3-in. square \$52, 14-in. square \$129) *Bridge City Tool Works, Dept. AWT, 1104 NE 28th Ave., Portland, OR 97232, (800) 253-3332. Circle #626*

Non-Loading Discs

If your sanding discs load-up long before they're worn out, give Klingspor's new steared aluminum oxide sanding discs a try for longer sanding life. They're coated with a zinc-stearate lubricant to resist loading with resin, wood dust, paints or finishes. The discs are available in PSA or hook-and-loop styles with a medium C-weight



backing paper and they come in 4½, 5, and 6-in. sizes with hole patterns to fit any dust collecting sander pad. (Price range: \$1.05 to \$2.50 for package of 5 discs.) *Klingspor's Sanding Catalog, Dept. AWT, P.O. Box 3737, Hickory, NC 28603, (800) 228-0000. Circle #627*

Abrasive-on-a-Sponge

Klingspor's Foam Hand Sanders are like firm but flexible sponges with sandpaper wrapped around them. They come in six grits (from 60 to 220) and two sizes: a 1¼ by 3 by 4-in. block for sanding flat or gently curved parts, and a ½ by 4 by 5-in. hand pad for sanding more sharply curved parts like turnings



or moldings. Unlike similar products, these foam sanders are overcoated with resin to keep the aluminum oxide grit particles in place for longer life. If the abrasive clogs, you can restore it by simply washing the pad. You can also use the pads for wet sanding a finish. (Price: \$1.49 each or 3 for \$2.99) *See address and phone number above.*

Compact Planer/Jointer

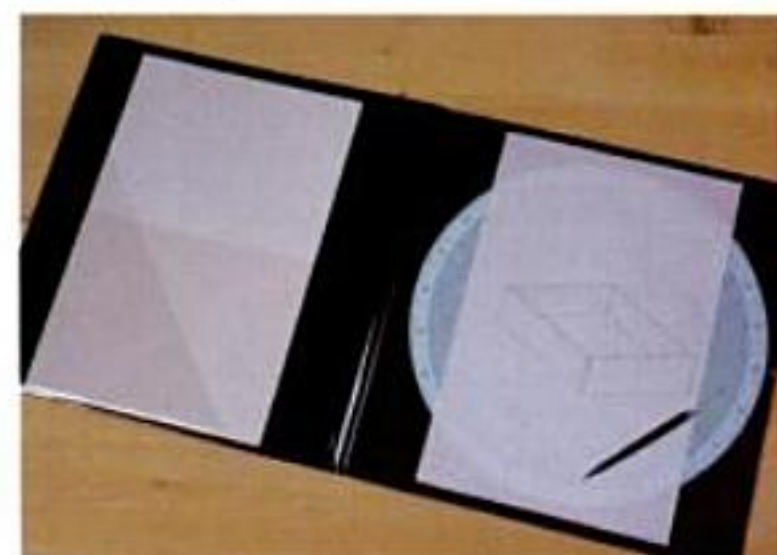
This new Planer/Jointer combo from Makita is loaded with features that will make stock preparation a breeze. The model 2030SC weighs only 100 lbs., so it can be moved easily. The jointer handles boards up to 6½ in. wide. Maximum planer capacity is 6½ in. by 12¼ in. The jointer table has a folding extension that brings its total length to 49-in. for accurate cuts. The fence tilts to 45° and the jointer is easily detachable for portability. The planer bed is supported by four posts for greater stability than most portable planers. You can adjust the planer's depth-of-cut manually with a large crank handle, or



use an optional pocket-sized remote control, a feature that comes in handy when planing long stock. Magnetic holders make blade changes easy and a pair of top rollers helps you return the work to the infeed side of the planer during operation. Availability is planned for early 1995. (Price: Under \$3000) *Makita USA Inc., Dept. AWT, 14930 Northam St., La Mirada, CA 90638, (714) 522-8088. Circle #628*

Instant Architect

The best-planned projects begin with a good detail drawing, but those of us without the artistic gift can use some help at the drawing stage. With the Free Hand Design System you can quickly create drawings that look like they came off a drafting table using only a sharp pencil (0.5mm lead recommended) or pen. The key is a rotating plastic disk with hundreds of tiny embossed grid lines over which you place a piece of paper. When you draw a freehand line on the paper, the gridlines automatically guide the pencil point in a straight line. Angled lines are easy to draw by simply rotating the disk, and a degree scale at the disk's rim lets you replicate angles precisely. The Free Hand Design System comes in two sizes to accommodate 11 x 17-in. paper or 8½ x 11-in. paper. (Price: \$70 for 11 x 17-in. size, \$50 for 8½ x 11-in. size.) *Signet Marketing, Inc., Dept. AWT, 620 Dick Rd., Suite #150, Buffalo, NY 14043, (905) 836-0277. Circle #629*



JUST FINISHING

BLOTCH-FREE STAINING

Foolproof Ways To Stain Problem Woods Evenly

By Michael Dresdner



Possibly the most frequently asked question about wood finishing is, "How can I stain such-and-such wood evenly, without blotchiness?" The simple answer is

to use a wood conditioner.

Wood conditioner is a liquid wash coat designed to go onto raw wood prior to staining. Conditioning the wood ensures that the stain will color evenly. This precautionary step is often unnecessary, since most stains go on most woods evenly. When you get uneven, blotchy coloring (see photos, below right), it's usually because of two specific conditions occurring simultaneously: 1) You're staining woods that have random areas of resin or sap pockets, such as cherry and most softwoods (fir, pine, etc.); and 2) you're using a stain that contains an oil-soluble dye. Many commercial oil stains (or "solvent stains") contain oil-soluble dyes either alone or in combination with pigments.

Putting an oil stain on a non-sappy hardwood such as oak will yield a perfectly even staining job. Likewise, a water-soluble dye or a stain that contains only pigment will usually result in consistent coloration, even on notoriously problematic woods like cherry. (There are some exceptions that I'll discuss later in this article.) Both conditions—sappy wood and oil-soluble dye—must be present for splotching to occur. Here's why:

Oil-soluble dye stains contain a solvent that can also dissolve wood sap. When you apply the stain, the solvent mingles with the sap, causing it to suck up more dye than the surrounding wood. Darker splotches show up wherever there's an area with extra sap.

Wood conditioner works because it contains a resin that acts like the sap in wood. Once applied, it makes the whole

piece of wood act the same as the pockets of sap, so the stain penetrates evenly.

Using Wood Conditioner

If you aren't sure whether your wood is likely to splotch, first wash it down with some mineral spirits. If the solvent caus-

es subtle darker and lighter patches to appear, play it safe and use conditioner. It isn't always possible to tell if your stain contains an oil-soluble dye, but if the listed ingredients include naphtha, xylene, toluene, "Stoddard solvent" or mineral spirits, there's a chance that it



Banish those blotches. A wood conditioner is the first line of defense against patchy, irregular staining as shown in the photos at left below. If that fails, a weak solution of hide glue should do the trick.

Without Conditioner



With Conditioner



JUST FINISHING

does. In any case, using a conditioner under an oil stain won't cause any harm, so if you are in doubt, it's better to be safe than sorry.

Both McCloskey and Minwax offer commercially prepared wood conditioners that work quite well, or you can make your own by mixing one part boiled linseed oil to eight parts mineral spirits.

To get the best results, start with wood that is sanded—with the grain—to at least 180 grit. Flood the surface liberally with wood conditioner, then wipe off any excess. While the wood still looks wet, flood the surface with your chosen stain, and wipe off any excess stain. Don't wait until the wood conditioner dries completely or it won't work as well.

Exceptions

On rare occasions, blotching occurs with stains that don't contain oil-soluble dyes, such as pigment stains (oil- or

water-based) or water-soluble dyes. The problem wood in these cases is usually highly figured (such as curly or quilted maple) with exposed end grain that sucks up extra stain. Extremely dense resinous areas can also cause blotchiness, since concentrations of resin can actually repel water dyes. And it's possible to have blotchy results when staining flat-sawn boards or veneers that show alternate bands of earlywood and latewood with vastly different absorption rates (a condition that occurs frequently on Douglas fir plywood).

If you suspect your wood falls into one of these categories, it's a good idea to test your stain or finish on a small piece of similar scrap before finishing your project.

In these exceptional situations, wood conditioner won't do the job. It will have little effect on pigmented stains, and it will make a water-soluble dye behave even worse than if you used nothing at all. Instead, your best bet is

to pre-seal the wood with glue size.

To make glue size, mix one part prepared hide glue with five parts water, or mix 1 ounce of dry hide glue granules to 1 pint of warm water. Heat the mixture in a double boiler or glue pot until the glue dissolves completely, then apply the size while it's warm. Brush a thin, even coat onto the wood and let it dry completely before staining. Unlike white or yellow glues which tend to repel stains, hide glue provides an even base for pigments and allows water-soluble dyes to "bite" into the wood. Mix only as much as you need, since hide glue doesn't keep well once mixed with water. If you need to store a batch for several days, add a few drops of iodine as a preservative.

The glue size will raise the grain of the wood, leaving the surface rough and furry. Scuff it lightly with 220-grit sandpaper before you stain. In addition to evening up the stain, the glue size will help seal the wood, and it may even save you one coat of finish. ▲

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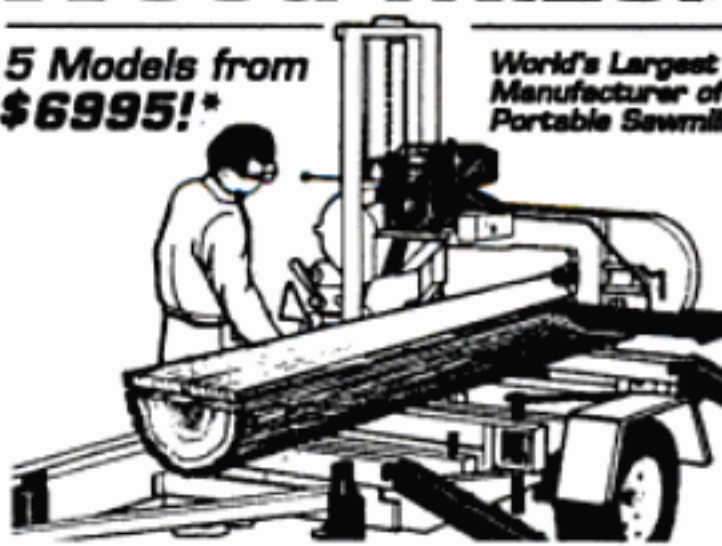
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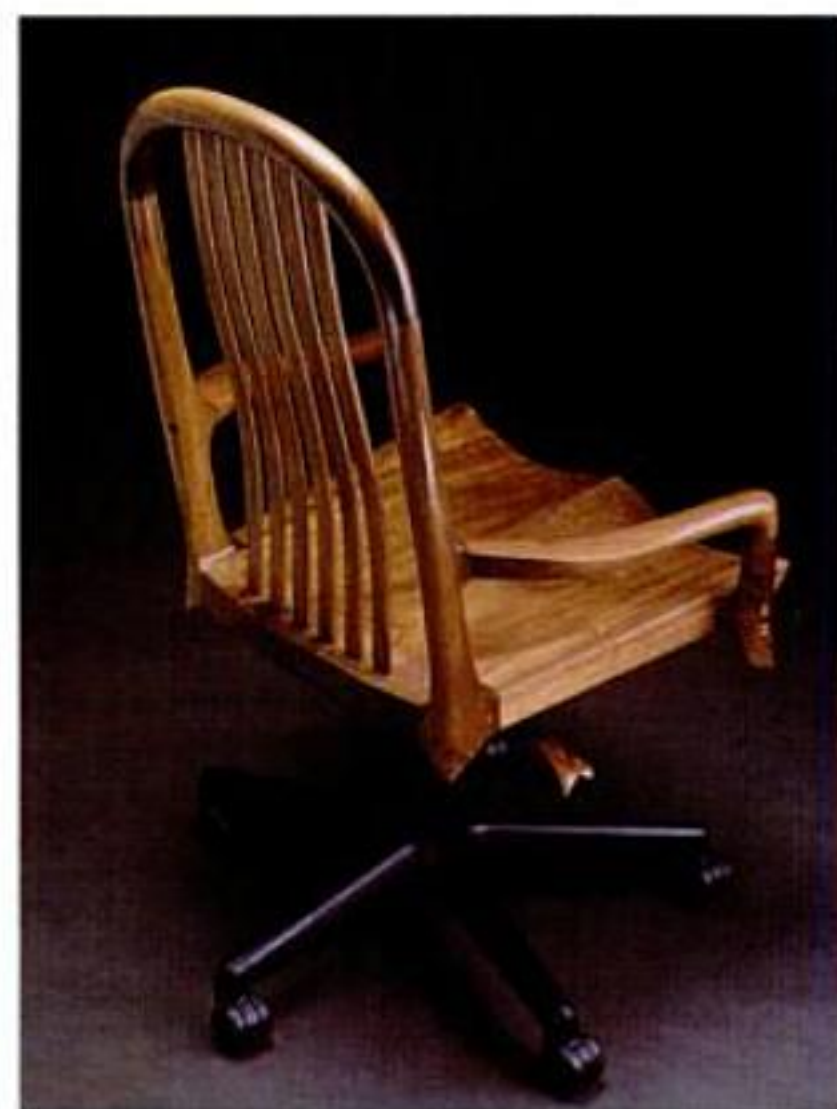
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Sensational Seating

Like a master carpenter who embellishes a stairway with deftly made balusters and railing details, chairmakers strive to integrate the requirements of function (strength and comfort) with those of artistic appeal. Here are some examples of the chairmaker's art.

Twig arm chair
by Greg Harkins, Vaughan, MS.
Peeled hickory, hickory bark.
19 W. x 16 D. x 42 H.

PHOTO BY KENT STOCKER



"West Desk Chair"
by Robert Erickson, Nevada City, CA.
Walnut, plastic, stainless steel.
24 W. x 24 D. x 32 H.

PHOTO BY JAMES MARKS

One-slat counter stool by
Lyle Wheeler, Millers Creek, NC.
Red oak, woven cotton.
17½ W. x 15 D. x 32 H.

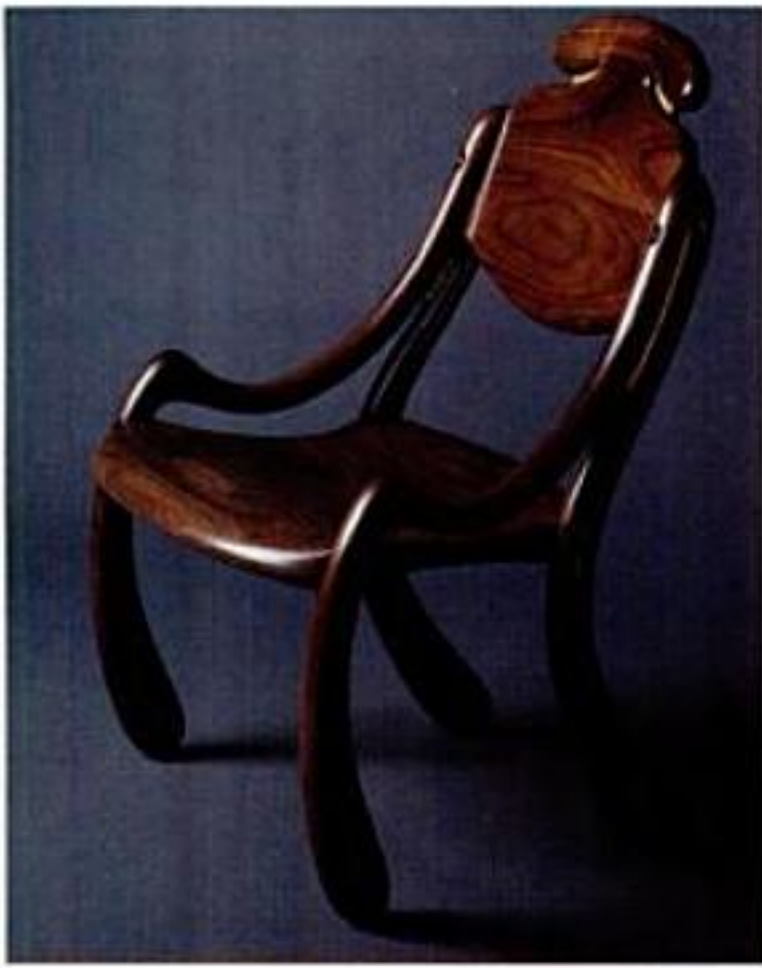
PHOTO BY LYLE WHEELER



Adjustable rocking chair by
Robert Erickson, Nevada City, CA.
Maple, chakte kok, leather.
28 W. x 41 D. x 42 H.

PHOTO BY STEVE SOLINSKY





◀ "Continuum Side Chair"
by Robert Whitley, New Hope, PA.
Walnut, maple, ebony, dogwood.
24½ W. x 25½ D. x 37 H.

PHOTO BY MICHAEL FURMAN



▲ "Joshua Humphreys' Queen Anne Arm Chair" by Robert Whitley, New Hope, PA.
Walnut, pine.
31½ W. x 23 D. x 45½ H.

PHOTO BY ROBERT WHITLEY



▲ "Kanji Chair"
by Bayley Wharton, Raleigh, NC.
Curly maple, purpleheart, ebony.
20 W. x 19 D. x 44 H.

PHOTO BY STAN EINZIG

▼ "Arched-Top Chair" by Geoffry Noden, Trenton, NJ.
Walnut, pan amirillo, poplar, moose antler. 23 W. x 20 D. x 54 H.

PHOTO BY JAY TURKEL



Greene and Greene-style chair ▶
by Thomas Starbuck Stockton, Petaluma, CA.
Mahogany, ebony, oak, pear, mother-of-pearl, abalone, silver.
19 W. x 20 D. x 41 H.

PHOTOS BY THOMAS S. STOCKTON



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SHOP SOLUTIONS

Light-Up Miter Gauge

Check Your Angles By Light

By Jim Cummins

When mitering, I used to set my table-saw's blade tilt by sighting the blade against a 45° drafting triangle. But as my bifocal prescription got stronger, my ability to see that sliver of light between blade and triangle went downhill. So I devised the gadget shown here to light the way. Holding the triangle against bare metal completes an electric circuit that lights a miniature bulb and confirms the angle. No more bending and peering.

Any small flashlight bulb can provide the light. I chose a light-emitting diode (LED) because LEDs draw very little current, and I already had some salvaged from an old VCR. LEDs are available at Radio Shack stores or at appliance-repair shops.

The power source is a 3-volt lithium battery. (Regular 1.5-volt watch-type batteries won't light LEDs.) I chose a Duracell #2430, simply because it fits into a 1-in.-dia. hole.

An LED will light only when hooked up with the correct polarity. (See drawing.) Test yours by touching its leads to opposite sides of the battery. If it doesn't shine, reverse the leads.

Brass shim stock for the "wiring" is available at local hardware stores; likewise the wide tape. With a little scrounging, my total cost for this gizmo was under five bucks. ▲

JIM CUMMINS is a contributing editor to *AW*.

Do you have a favorite shop fixture you'd like to share? Send a drawing or sketch with a full explanation to: AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. If we publish your "Shop Solution" we'll send you this Freud biscuit joiner, worth \$355.



Bright idea. This electronically enhanced angle gauge is inexpensive to make and foolproof to use. When the light goes on, it indicates either a perfect 45° angle (above left) or an exact 90° angle (above right).

ANGLE GAUGE

