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AUGUST 1997 #60

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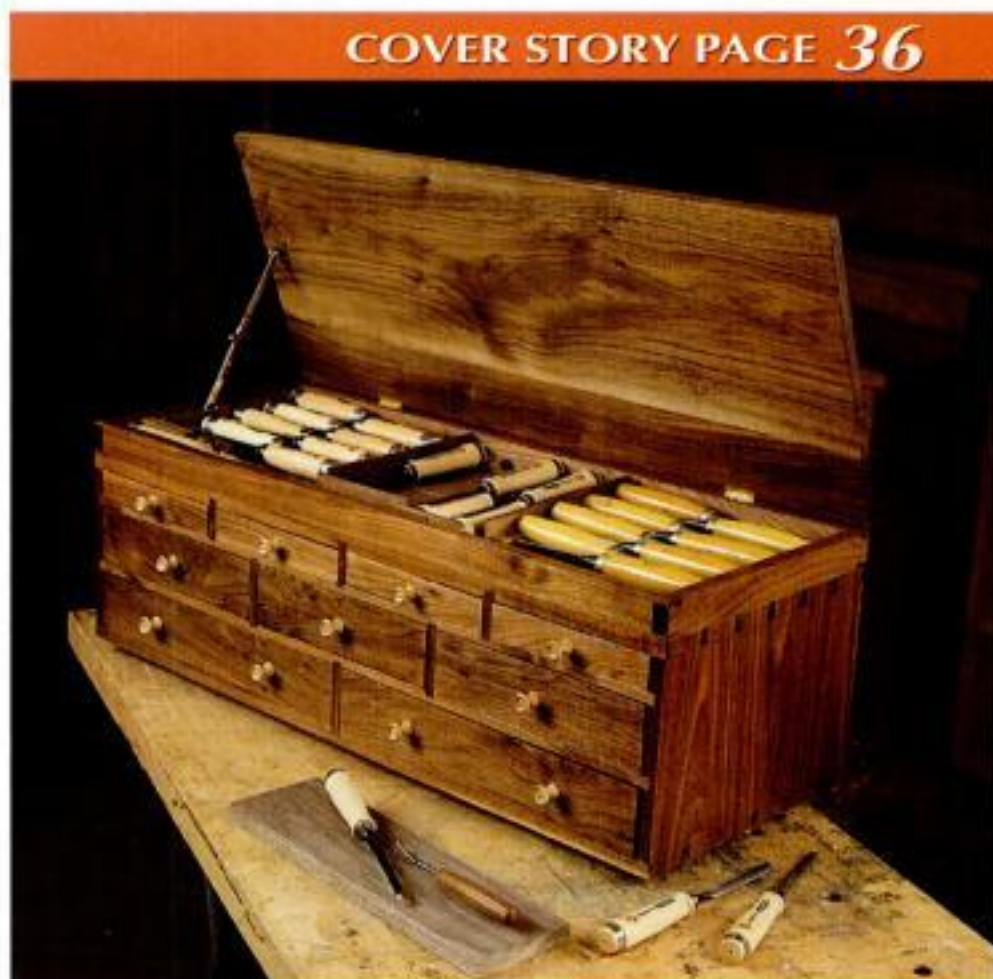
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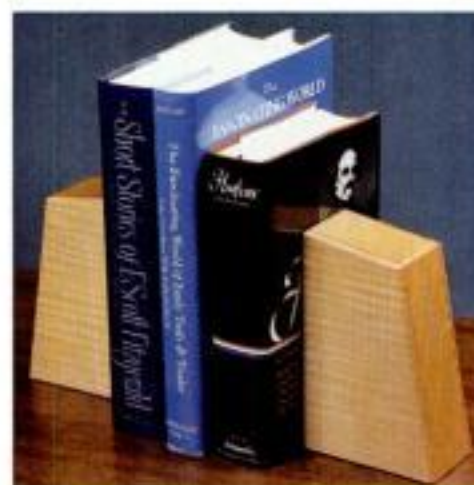
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Bodacious bookends

AMERICAN WOODWORKER™



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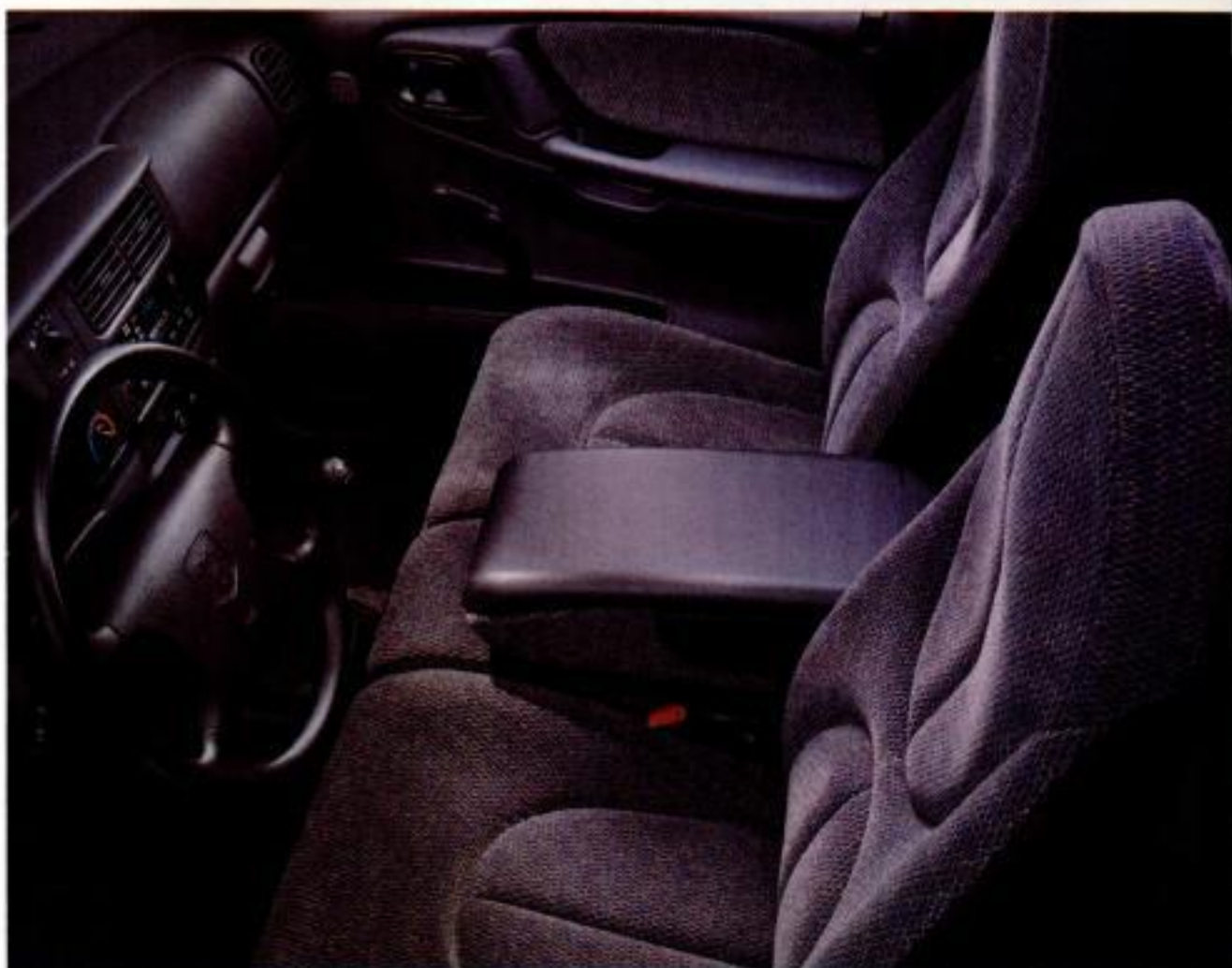


We started with an open mind. And proved how surprisingly responsive, roomy, capable and comfortable a truck can be.

One surprise you don't need is unwanted ventilation—in the form of doors and windows that don't seal properly. The all-new Dodge Dakota features a surprise of a far more



pleasant variety. Its doors are not single, not double, but triple-sealed against wind and road noise.



First we seal the then we seal the



Because the oscillating frequencies of Dakota's three powerful Magnum® engines are distinctly different, so are the finely tuned, vibration-absorbing bushings we use in mounting them to the frame.



You can opt for a premium Infinity® stereo system with cassette and CD player in the new Dodge Dakota. Eight speakers in six locations kick out some real concert-quality sound.

We put together a warranty package that's as solid as the new Dakota itself. You'll be backed by our Customer One Care™ 3-year or 36,000-mile bumper-to-bumper warranty and 3/36 Roadside Assistance. For more information, call 1-800-4-A-DODGE, or visit our Web site at <http://www.4adodge.com>*

Before we developed a look for the all-new Dakota, we developed some design software. It's an ingenious program, really, that helps us optimize the dent-resistant characteristics of a particular design before creating it in steel. Good news for Dakota. Bad news for evil-minded shopping carts.



High-strength steel door beams give you the feeling of being in a real secure place.



The new Dakota's tires



are larger, giving you a better grip on the road. And they're tuned to an independent front suspension. So you can really slice through the corners.

Its new frame has terrific torsional rigidity. The upshot: The new Dakota has the strength you demand from a truck, and the cornering predictability you might expect of a sports sedan.



doors, seals.

The all-new Dakota is the first truck in its class with standard dual airbags.[†] No surprise there. A dedication to safety is something you've come to expect from Dodge.



We wanted the sections of Dakota's instrument panel to marry together as seamlessly as possible, thus minimizing



squeaks and rattles. To make that kind of marriage work, we found less tolerance is better.

*See limited warranty & restrictions at dealer. Excludes normal maintenance & wear items. †Always wear your seat belt for a fully effective airbag. Rearward-facing child seats cannot be used in standard cab models.



Dakota Sport 4x2

The New Dodge Dakota
It's full of surprises.



This One



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EDITORIAL & ADVERTISING OFFICES

33 E. Minor St., Emmaus, PA 18098
Phone: (610) 967-5171 • FAX: (610) 967-7692

EDITOR & PUBLISHER David Sloan

EXECUTIVE EDITOR Ellis Valentine

MANAGING EDITOR Tim Snyder

ASSOCIATE EDITORS Paul Anthony, Andy Rae

ASSISTANT EDITOR Susannah Hogendorn

PRODUCTS COORDINATOR Dave Sellers

COPY EDITOR Kathy Dvorsky

WEST COAST EDITOR Simon Watts

CONTRIBUTING EDITORS Lonnie Bird,
Stephen Blenk, Jim Cummins, Michael Dresdner,
Mike Dunbar, Frank Klausz

ONLINE HOST Jim Cummins

ONLINE SYSTEMS PRODUCER Julie Miller

DESIGN SHOP Fred Matlack

ASSISTANT TO THE PUBLISHER Maureen Peters

OFFICE MANAGER LaVerne Walker

ART DIRECTOR Kitty Pierce Mace

ASSOCIATE ART DIRECTOR Melanie Powell

ADVERTISING DIRECTOR Don Schroder

NATIONAL ACCOUNTS MANAGERS

Robert F. Izard, Jay Ricci

MARKETPLACE/CLASSIFIED Ian Tauber

DETROIT SALES REPRESENTATIVE Donald Hollinger
Rodale Press, Inc., 901 Wilshire Drive, Suite 300,
Troy, MI 48064, (810) 269-8880

AMERICAN WOODWORKER SHOW™ MANAGER
Jonathan I. Frank

ADVERTISING PRODUCTION MANAGER &

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Right Tilt Unisaw shown here with Unifence Saw Guide.



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Left Tilt Unisaw shown here with Biesemeyer Fence.

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Day in and day out, we get more letters, e-mail, and phone calls about tools than any other subject. So it's no surprise that our aim here at AMERICAN WOODWORKER is to be the tool test leader among woodworking magazines. And your input has helped us establish this leadership position. Our "Editors' Choice" and "Best Buy" awards are backed up by the most thorough tool tests in the business.

Whenever we tackle a tool test, the main question is always the same: "What does a woodworker need to know to choose the right model for his or her shop and budget?"

It's a simple question, but answering it takes a lot of work. We unpack each tool, read the manual, and assemble as directed. If something doesn't work right, we alert the manufacturer or supplier and give them a chance to correct the problem. And of course, we make plenty of sawdust and shavings as we put each model through its paces.

When testing tools, we try to think like the typical woodworker, but we also take advantage of some special resources to make our tests more complete. Our team of testers includes hobbyists, professional woodworkers and tool experts. This ensures that we have plenty of

opinions and that different woodworking interests get represented. Special equipment figures in the equation too. Our shop is full of machinists' straightedges, dial indicators, surface gauges, and decibel meters that we use to check important tolerances.

It all comes back to that basic question: "What does the woodworker need to know to choose the right tool?" It's important for you to keep the feedback coming. Tell us how we can improve what we're doing. Your advice can only help make our tool reviews better.

David Sloan
Editor & publisher

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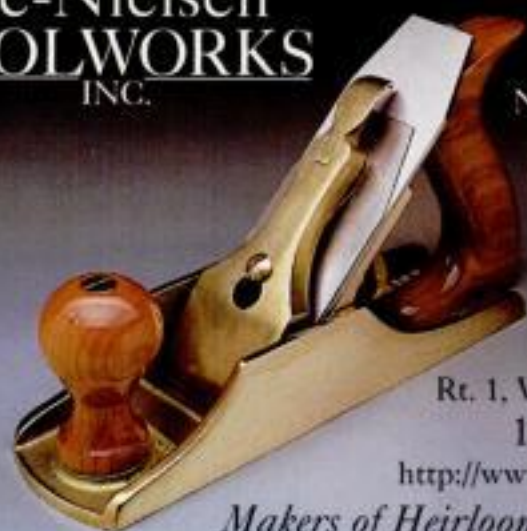
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CIRCLE NO. 14 ON PRODUCT INFORMATION FORM

Bungee Success

Last fall, my 13-year-old son, Kyle, and I read Don Weber's article on making a bungee lathe. Kyle decided this would be an excellent project for his Design & Technology class at school.

Armed with Mr. Weber's plans, Kyle constructed the lathe shown in the photo at right. Kyle made only two minor modifications to the plans: 1) Instead of using a knot to connect the drive cord to the bungee cord, he used a metal ring; and 2) to keep the lag bolts that hold the work from occasionally digging into the piece, he ground off a bit of the threads near the tip of each bolt.

This project has been a real hit at his school. Kyle has become quite a spindle turner and has given many hands-on demonstrations to other students and teachers, including the principal himself!

Please pass along our thanks to Mr. Weber for an excellent set of plans. We are looking forward to seeing more such interesting and unique plans in future issues of AMERICAN WOODWORKER.

Keith Adam
Stittsville, Ontario



Time-tested technology. Kyle Adam, a 13-year-old Ontario youth, shows off the bungee lathe he built for his school technology project. Good work, Kyle!

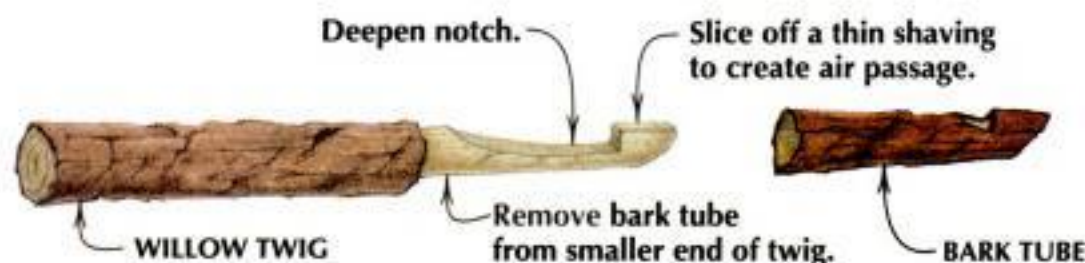
Whistling Willow

I read Owen Rein's twig whistle article in AW #52 and thought I'd suggest another whittling method that works for me. I make my whistles from willow—the stuff that grows in wet bottomland by springs and creeks. Striped maple, once referred to as “whistle wood” in the Catskill Mountains, is another good one.

The ideal time to make whistles is when the willow leaves are as big as a squirrel's ear. Cut the end of the twig at an angle (see drawing) and make a small notch near the end. Then cut around the twig and remove the bark tube. Make a deeper notch in the exposed wood and slice off a little piece from the end to create an air passage. Replace the tube and you're ready to whistle.

Keith Backlund
Clarksburg, MD

TWIG WHISTLE



Real Woodworking

Thanks for showing a shop that looks used (cover photo, AW #58), with sawdust and shavings on the floor! I'm so tired of seeing magazine displays of “perfect shops” with operating-room cleanliness, that don't look like shops I'd be comfortable in. I'm all for cleaning my shop between jobs, but let's get real: Cutting wood makes a mess.

Can't wait for each issue of AW!

Bob Dahlberg
Boulder, CO

Just Plane It

I long for the old days, before we started using machinists' language in woodworking—the days when phrases like “a very fine shaving” or “a slightly finer or heavier shaving” were used. Thinking of the shavings from your trusty No. 5 in thousandths of an inch overcomplicates the craft and forces

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

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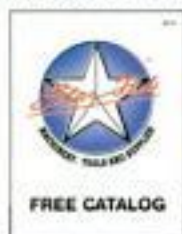
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LETTERS

beginning woodworkers to have very unrealistic expectations of what they might achieve. Kind of takes the fun out of woodworking, I think.

John McAlevey
Tenants Harbor, ME

We agree with you, John. But Ian Kirby's statements that have fueled this debate ("Top Drawer," AW #56; "Better Bench," AW #58) were intended to illustrate the precision possible with a sharp, well-tuned hand plane, not to suggest that we mike all our shavings. As you suggest, the important thing is to take an appropriate shaving—one suited to the task at hand. It's a skill, not a science.—Eds.

Dedicated Follower of Fashion



I'm always pleased to get my issue of AMERICAN WOODWORKER; April 1997 was no exception. I can't help commenting on Ian Kirby's attire. He very well may replace Michael Jordan as Nike's newest spokesperson. I

have to know whether those shoes are "Air Kirbys," or what?? It might establish a new woodworking technique: "Don't chop that mortise, slam dunk the darn thing!" I know I'm going to review my woodworking wardrobe first chance I get. With great respect for Ian and AW...

Tom Sashko

Here's to You, Mr. Robertson

You have a fine magazine, but I must point out a recurrent annoyance—your use of the term "square-drive" screws instead of "Robertson" screws. The Robertson screw was invented by P.L. Robertson in 1908 in Milton, Ontario. The handles of the screwdrivers are color-coded to match the screw selected.

Screws fall into three main categories: slotted, Phillips and Robertson. You already know the first one was invented by the devil himself and should never be allowed in any workshop. The Phillips is a slight improvement with its cruciform slot, but the cam-out problem [the tendency of the bit to ramp itself out of the

screw head] can still occur. The Robertson's four efficient mating surfaces allow the screwdriver to seize and hold the screw, nearly eliminating cam-out.

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Robert Shortt
Glencoe, Ontario

Another Grinder System

I was disappointed to note that my firm was not listed in the sources section of your recent grinding jig article. We carry both the Veritas and Wolverine systems, and demonstrate the proper use of these tools at woodworking shows from coast to coast.

Also, I think any discussion of power sharpening using jigs should at least mention the Tormek water-cooled sharpening system as an option. I know



Howard Packer, Newtown, CT, General Contractor

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CIRCLE NO. 28 ON PRODUCT INFORMATION FORM

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that this particular article was devoted to aftermarket add-ons, but I feel you would have done your readers a service by referencing your earlier article (AW #43), in which you praise the broad range of easy-to-use sharpening jigs designed around the Tormek 2000 water-cooled sharpening system. The Tormek jigs require no customer installation and cover a much broader range of edge tools than any of the systems reviewed in your article.

Jeff Farris
Farris Machinery
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Onward and Upward

I would like to compliment the staff of AMERICAN WOODWORKER for producing such an excellent magazine. I have always had an interest in woodworking, but reading your magazine has given me the desire and ambition to set up a shop and start taking woodworking more seriously. You cover all aspects of

the art well—tools and equipment, how-to articles, shop setup, etc. After buying AMERICAN WOODWORKER at the store for a year, I finally purchased a subscription. Keep up the good work.

Alan Bourgault
Lunenburg, MA

Question of Balance



In AW #57, Lonnie Bird claims that it is possible to hand-grind router bits to custom profiles. While I have never tried this, my gut instinct tells me not to. I'm worried that the angular momentum of a bit spinning at 15,000 rpm might cause bit failure if the two wings are not equally weighted. While I don't doubt that Lonnie has successfully hand-ground bits, I would not try to achieve the necessary tolerances for safe operation with hand grinding.

I don't feel that reproduction means zero deviation from the original. There are thousands of router bits available, and it's almost always possible to find a

stock bit, or combination of bits, that comes close to the profile you need. Then you can clean up the molding with hand planes, carving chisels and sandpaper to adjust the profile.

If I'm making a lot of molding, I spring for a custom-ground bit. Bit manufacturers have always been happy to help me find or create the profiles I want if I fax them a scale drawing. Custom bits are not that expensive, and they actually save me money when I factor in the cost of my time.

Kim Carleton Graves

Corrections

In "Dealing with Dust" (AW #58), the Craftsman shop vacuum shown on p. 73 is their 2-HP model, which sells for about \$40. Craftsman's \$100 model has a 5-HP motor and 16-gallon capacity.

In the article on building a bungee lathe (AW #54), the instruction in the "Leg Assembly Detail" should read, "Make leg 3 in. longer than upright."

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Sam B. Duluth, MN

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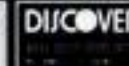
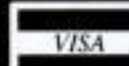
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CIRCLE NO. 21 ON PRODUCT INFORMATION FORM

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Flat, Rift and Quarter Sawing

Q I enjoyed the drawermaking article by Ian J. Kirby and John Kelsey in AW #56. But as a novice woodworker, I'm not familiar with the terms "flatsawn," "quartersawn," and "riftsawn." Could you explain these?

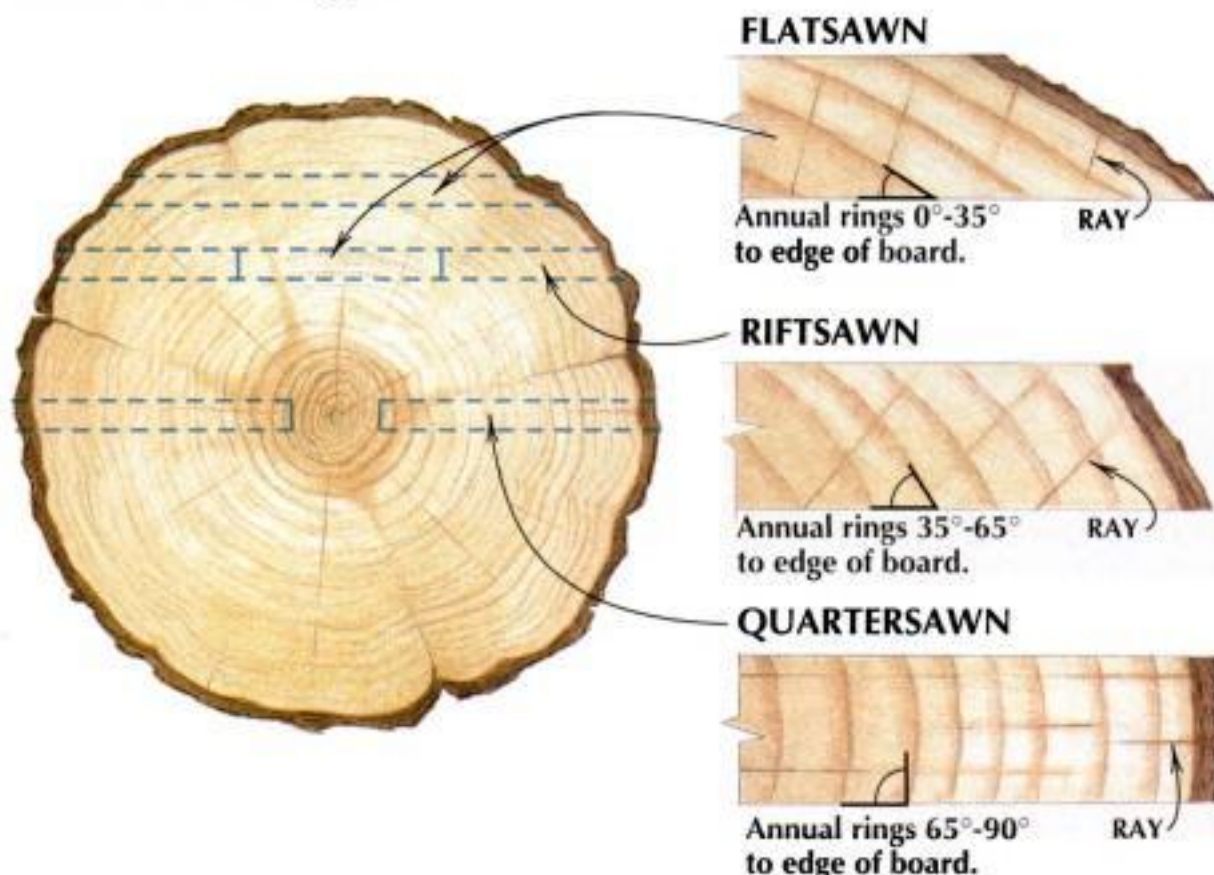


Chris Newton

A When a log is sliced into boards, as shown at right, the end grain of the annual rings crosses the board surfaces in different configurations. On the center boards, the end grain of the rings is mostly at right angles to the surface. On the outer boards, the annual rings are much more aligned with the surface. The center board is called quartersawn, the outer board is flatsawn. The boards in between these two are riftsawn.

When does quartersawn become rift, and when does rift become flat? At best, the distinction is imprecise. A board will be sold by how it looks on the face, where the ray tissue is visible. (*Rays* are the cells that radiate from the center of the log's cross section like the spokes in a wheel, and show on the face of the board as flashes, silver grain, or flakes.) But the end grain can provide a clue. In general, if most of the rings on the end

The way the rings run through the board determines the board's designation. If you saw a log "through and through," as shown below, you'll get boards of all three types.



grain are between 90° and 65° to the edge of the board, then the board is quartersawn. If between 65° and 35°, it's riftsawn. If they are less than 35°, the board is flatsawn.

However, even these definitions are

fairly subjective. A board may show good ray figure on one side and be called quartered, while its reverse face is not as good and is called rift.

Ian Kirby and John Kelsey
Newtown, CT

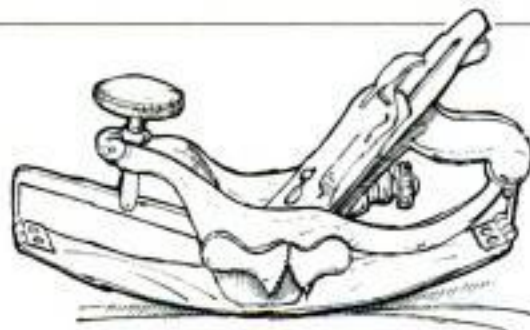
Compass Planes

Q I've heard of an old kind of hand plane called a compass plane. Can you give me some information on this tool?

Deb Miller
Berwick, PA

A The name "compass plane" comes from the archaic term for this hand tool: "encompassing plane"—or one that worked a circle. And these planes are still used to work curves. Originally, compass planes were made of wood. In the late 19th century Stanley developed a metal version. Both versions are shown here.

WOODEN COMPASS PLANE The most common



ADJUSTABLE COMPASS OR FILLISTER PLANE

type of wooden compass plane was radiused from toe to heel (front to back). It was used to smooth concave curves cut into the edges of boards. Because it worked edges, its cutting edge was ground straight across, as on a jointer plane.

Other wooden compass planes were radiused cheek to cheek (side to side) as well as toe to heel. The cutting edge was ground to match the cheek-to-cheek profile. These planes were used for smoothing concave surfaces such as

Windsor chair seats. In fact, I still use this type of compass plane.

The cast-iron compass plane had a flexible steel sole and a screw adjustment mechanism that could flex the sole through a range of both concave and convex curves, so you could work both types of profiles on the edges of boards. Its cutter was always ground straight across. Unless you have a lot of experience working with hand planes, these tools can be temperamental.

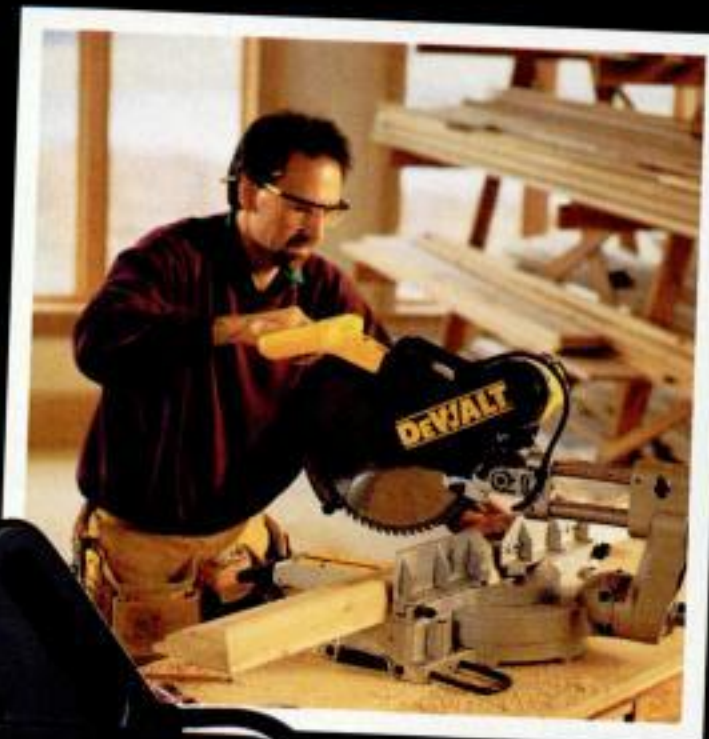
A wooden compass plane for working concave surfaces is sold by Crown Plane Co. of Bath, ME (207-443-4183). You can still buy new iron compass planes from many tool catalogs. Both types of wooden planes, and older models of iron planes, are available through antique tool dealers, many of whom offer to sell by mail.

Michael Dunbar
AW contributing editor

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CIRCLE NO. 11 ON PRODUCT INFORMATION FORM

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Gluing Up Biscuit Joints

Q I'm new to biscuit joinery, and I find the process very tricky. On a dry run it's easy to align the joints nicely. But when I add the glue, it grabs so quickly that I can't get good alignment.

The biscuits seem to be soaking up the glue and swelling so quickly that they bind in the slots. I'm using yellow glue, and I always leave room for about $\frac{3}{16}$ in. of movement in the joint. Help!



Tim Hopmann

A Ideally, you should be able to adjust a biscuit joint $\frac{1}{8}$ in. to $\frac{3}{16}$ in. parallel to the seam, and about $\frac{1}{32}$ in. perpendicular to it. But even if you leave room for adjustment, your choice of glue can greatly affect the ease of joinery.

Three factors influence how easy a glue is to use for biscuit joinery: chemistry, viscosity, and working or "open" time. Water and some chemicals in the glue cause the wooden biscuits to swell—which can happen fast if the glue is thin

and soaks in easily. You'll also have less adjustment time if the glue cures quickly.

I ran a simple test with five popular glues: polyvinyl (white), aliphatic (yellow), polyurethane, liquid hide, and slow-set epoxy. After just one minute, the white glue joints were impossible to adjust. Yellow glue gave me just three minutes. But polyurethane glue joints were still adjustable after 15 minutes, and both liquid hide glue and slow-set epoxy lasted well past 30 minutes. Since different manufacturers use slightly different chemical formulas, you should do a similar experiment with scraps to find the best glue for your particular project.

Nick Engler
West Milton, OH

Aged Pine Finishes

Q I enjoyed Tom Brown's article on dye stains in AW #57. But I could really use some extra tips on Tom's aged pine finishes. Can you oblige?

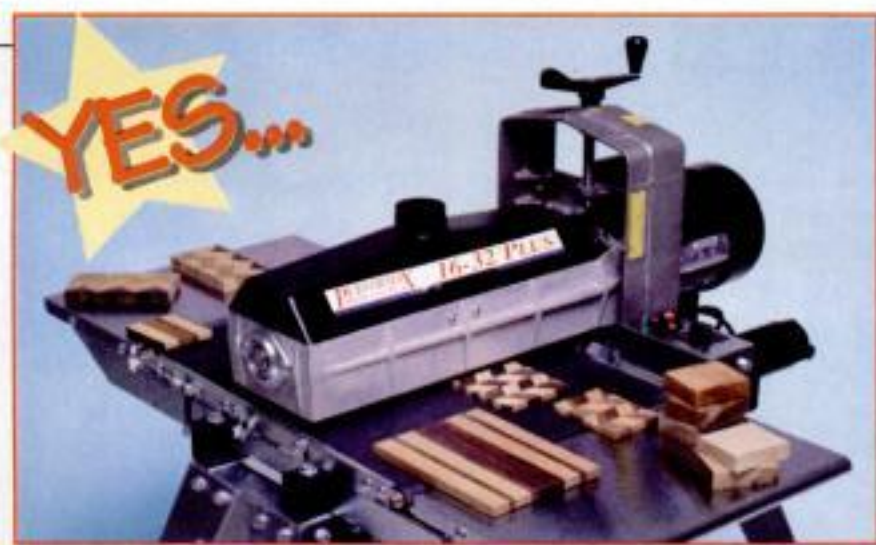
Jim Teixeira
Martha's Vineyard, MA

WHERE TO FIND IT

Motor arbors, buffing spindles and ball-bearing mandrels are available from Skates Belting and Supply Co., 321 Southwest Blvd., Kansas City, MO 64108, (800) 821-5041.

The *Good Wood Directory* is an annual listing of suppliers who sell certified and noncertified, sustainably harvested and salvaged wood from around the world. The directory is available from the Good Wood Alliance, 289 College St., Burlington, VT 05401, (802) 862-4448.

Tools, patterns, materials and other supplies for stained glass work are available from Whittemore-Durgin Glass Co., Box 2065-99, Hanover, MA 02339, (800) 262-1790.



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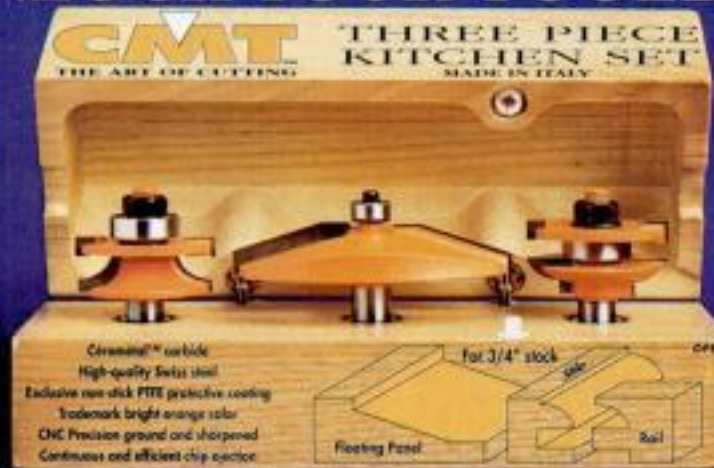
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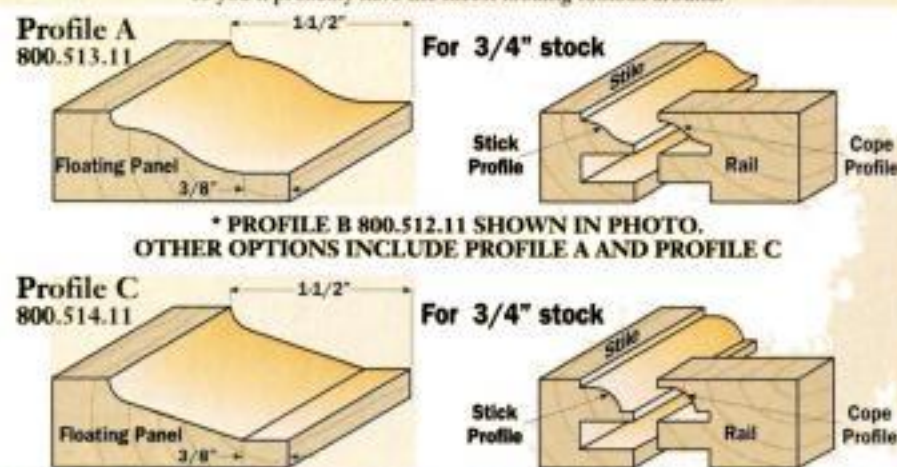
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CIRCLE NO. 12 ON PRODUCT INFORMATION FORM

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A There are a number of ways to "age" pine, depending on the look you want. To mimic 100 years of sitting in an attic, mix up a 1-ounce to 1-quart solution of amber or brown dye, then make a diluted solution using 1 ounce of this mixed-up solution and 5 to 10 ounces of the same solvent. Apply it with a brush and wipe off the excess.

For an "outdoor" weathered look, use a diluted silver gray or "weathered" dye such as Lockwood's No. 502 (call 212-966-4046). You can even use black, but you'll have to dilute it more—1:20 or so. To accent the grain, flow the solution onto the wood surface and wipe it off. For fewer highlights, spray it on.

I suggest buying a variety of dye colors. Try applying different colors in sequence. Or mix several colors together and apply the mixture to the wood. By experimenting, you can control the color, uniformity and intensity of the dye to meet your own personal preference.

Tom Brown
Ft. Myers, FL

Loose Motor Pulleys

Q I'm having trouble keeping my tablesaw's drive pulley mounted firmly on the motor shaft. The pulley is held onto the square-key shaft by a small Allen screw that's hard to grip with a conventional Allen wrench. When I tighten the screw, it just comes loose again. Any suggestions?



David Carson

A First, remove the drive belt and make sure it's clean. Then remove the pulley's setscrew, clean it with lacquer thinner or denatured alcohol, and check the threads for wear. If the threads are stripped, buy a new setscrew. Apply some Loctite® (available at auto supply stores) to the screw and tighten it up. If your regular L-shaped Allen wrench gives you trouble, try holding the end with a vise grip. If that doesn't work, switch to a T-handle Allen wrench. A good tightening and some Loctite® should hold the screw.

If the screw still comes loose, your pulley might be warped. Replace the belt with a notched V-belt. This type of belt has little notches on the inside that fit over small-diameter pulleys much better than a solid belt does. Notched belts come in matched sets from most local industrial supply houses; check your telephone directory. You could also use multiple-link V-belts (available from In-Line Industries, 800-533-6709) which help reduce motor vibration. If your saw has multiple belts (as most cabinet saws do), be sure to replace all the belts on your machine at the same time.

Bill McCarthy
Cabinetmaker
Riegelsville, PA

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THE NEW RYOBI DETAIL BISCUIT JOINER

THE DIFFERENCE BETWEEN WOODWORKING AND WOODNOTWORKING.

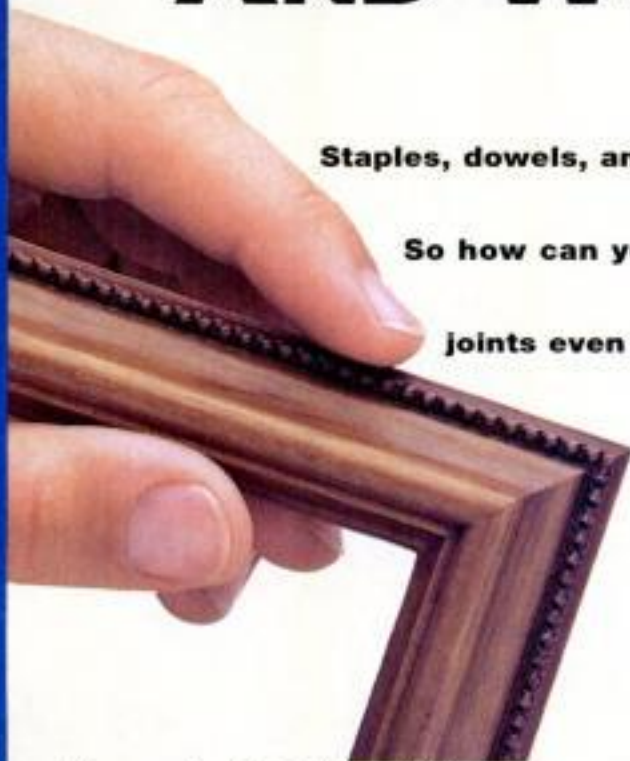
Staples, dowels, and glue won't do. Standard-size biscuits won't fit.

So how can you make neat, tight, professional joints even in small stock? With Ryobi's new

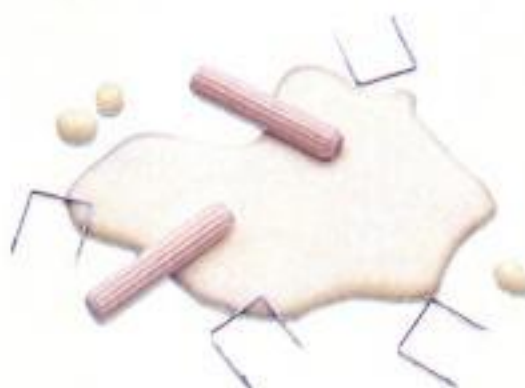
Detail Biscuit Joiner, that's how.



Standard biscuits stick out of small joints, and the mis-match shows, even after you trim the excess.



The new Ryobi Detail Biscuit Joiner uses miniature "Accu-biscuits" for neat, tight, professional joints.



This compact powerhouse cuts smaller slots and uses miniature "Accu-biscuits™" to fit where standard biscuits don't. And its price is as small as its biscuits. But the Detail Biscuit Joiner is big on performance, from its beefy motor to its die-cast

base and see-through fence. So see the

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local home center. It'll get

your wood working like

never before.



Ryobi "Accu-biscuits" (actual size).



The Ryobi Detail Biscuit Joiner does everything that a bigger tool does, and fits in small joints where a bigger tool won't.

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offcuts

Bits and pieces of woodworking news

New Wood Studio At Arrowmont School

Arrowmont School of Arts & Crafts, in Gatlinburg, TN, recently completed a fabulous new wood studio—9,000 square feet of dedicated woodworking space, with a huge lathe room, plus a bench/carving room, furniture-making studio, finishing room and gallery. The first floor is wheelchair accessible. And a second-floor “observation deck” allows visitors to watch workshops in progress. For class dates and times, write: Arrowmont School of Arts & Crafts, Box 567, 556 Parkway, Gatlinburg, TN 37738, or call: (423) 436-5860.



Turn and learn. With a state-of-the-art new wood studio, Arrowmont School of Arts & Crafts aims to be the premier woodturning school in the eastern U.S. Carving and furniture making are also offered.

PHOTO COURTESY OF ARROWMONT SCHOOL OF ARTS & CRAFTS

Pencil People

They peek out of his pocket with deepset eyes and wooden stares. These whimsical creatures are called “pencil people,” and they’re the offspring of Fred Kingwell’s fertile mind and frisky penknife.

Kingwell’s most intricate creations include a gnarled cowboy with a tiny hat brim and a good-natured caricature of his ex-wife clutching a pig—yet he does all his carving with only one knife. Kingwell says it keeps his hands busy, and anyway, the pencil people always seem to find their way into the pockets of friends.

—Michael Dresdner



JOHN RICKS ART COLLECTOR

FIRST FURNITURE CONFERENCE!

The Furniture Society is a new association for furniture makers, students and teachers, and friends of the craft. The Society will hold its first annual conference July 10-13, 1997, at Purchase College in Purchase, NY—with lectures by famous furniture makers, exhibitions, and an auction. For more conference info, call (914) 251-6763.

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Contest Rules

1. Send photos or slides and a brief description of your piece(s) by the deadline.
2. Anything made wholly or primarily of wood is eligible.
3. Photos and slides will not be returned.
4. If your entry is chosen, you agree to deliver it in person to the show and pick it up at the close of the show.
5. Send entries to: Gallery, The American Woodworker Show™, 33 E. Minor St., Emmaus, PA 18098.

See your work on display at America’s largest public woodworking show!

Deadline for Entries
Suburban Detroit Show
Novi Expo Center
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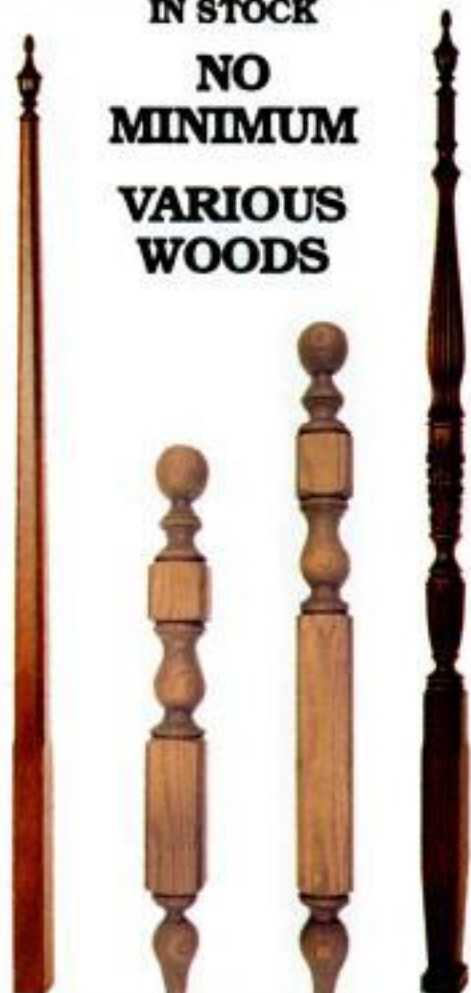
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Fort Washington Expo Center
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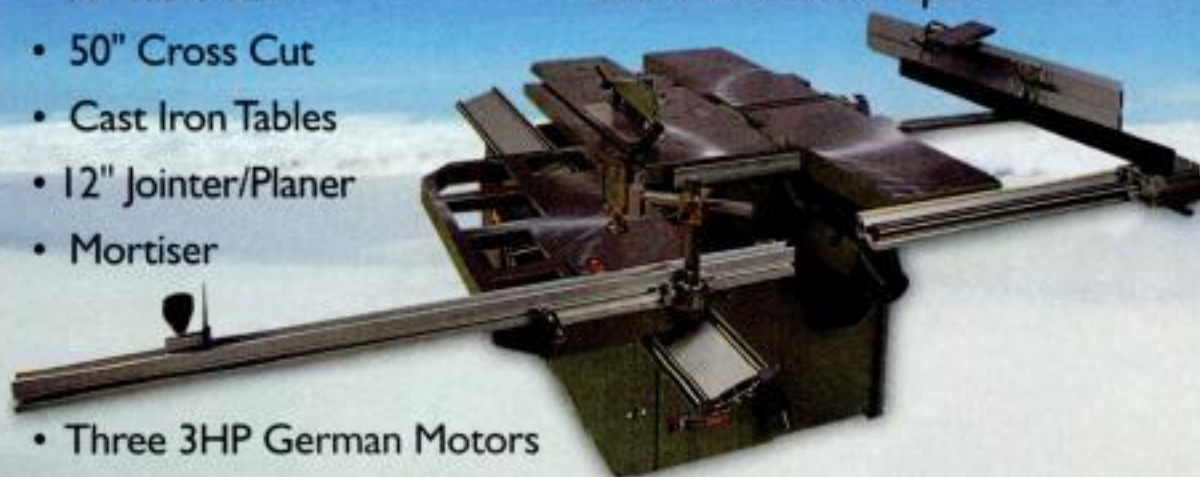
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Shakespeare's Timber-Framed Theater

London's Globe Theatre was William Shakespeare's favorite haunt; several of his plays premiered there. But the timber-framed structure burned to the ground in 1613, when an errant cannon blank set the thatch roof ablaze during a performance. Now an industrious group of philanthropists and craftsmen has completed a near-perfect replica, not far from the theater's original site.

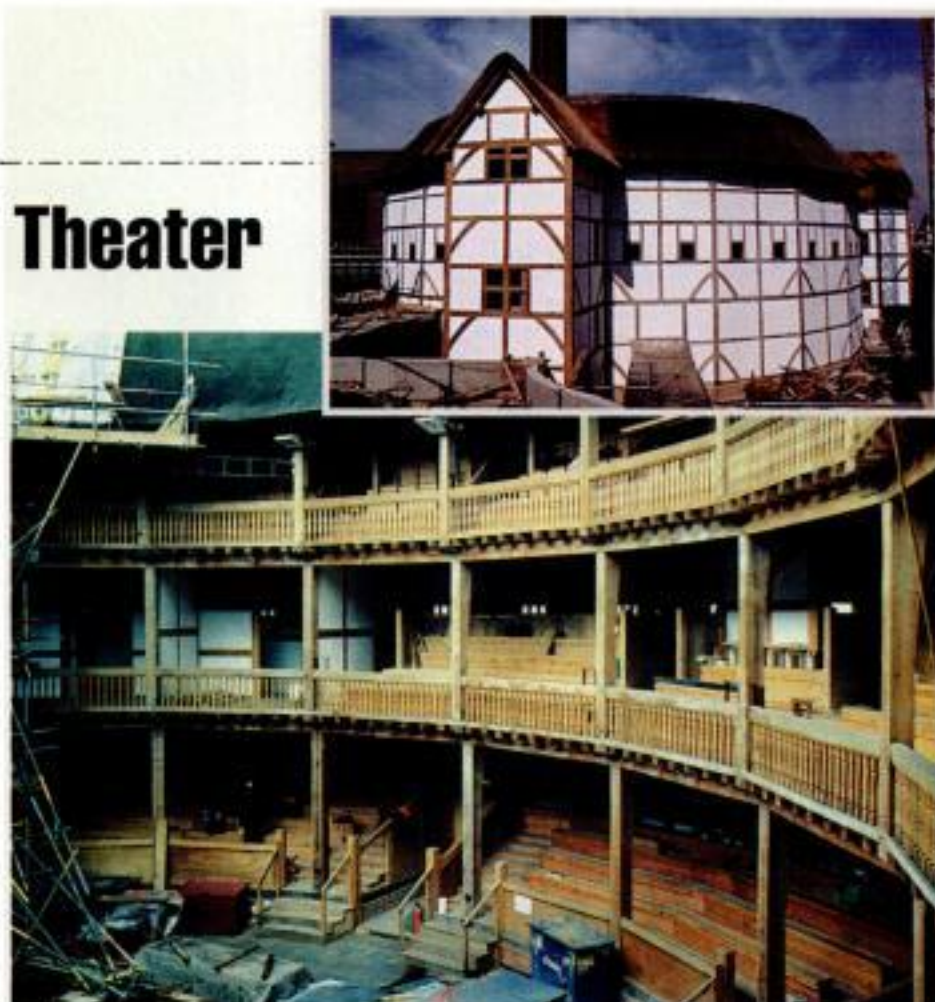
Most of the new theater's frame joinery is "drawbored" mortises and tenons. To make these joints, carpenters bore offset holes through each member, then drive in

tapered wooden pins to "draw" the joint tight.

More fancy woodwork is inside the theater. Over 300 oak balusters decorate the gallery railings, each one hand-turned on a pole lathe in Elizabethan style. (See main photo, right.) The galleries and floor-level standing room can accommodate 1,500 people per performance. And the architects have added fireproofing this time around.

For visitors' information, write: Shakespeare's Globe Box Office, Box 43, London, WC2H 7LD, England.

—Simon Watts



Elizabethan masterpiece reborn. A timber-framed replica of Shakespeare's Globe Theatre features handmade woodwork from railings to ridge beams.

EXTERIOR PHOTO BY RICHARD KALINA, COURTESY OF SHAKESPEARE'S GLOBE
INTERIOR PHOTO BY SIMON WATTS

MIKE AND NORM BEND WOOD!

"New Yankee Workshop" star Norm Abram paid a visit to another prominent Yankee woodworker—AW's contributing editor Mike Dunbar. Abram and Dunbar demonstrated steam bending and made a combination coat rack and shelf for a program that

aired this spring. Plans and a video are available from WGBH; call (800) 892-0110 and mention the 900 series. For a schedule of Dunbar's classes, held at his shop in Hampton, NH, call (603) 929-9801.

PHOTO COURTESY OF MIKE DUNBAR



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Top speed of the 1997 Chevy Corvette C5: about 172 mph
(Source: Road & Track magazine)

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Set
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5682 2hp router w/collets 169
6767-1 5amp hd screwshotr kt 139
3107-6 vs right angle drill kit 234
6142 4-1/2" angle grinder 124
5460 7" vs 0-1750 polisher 179

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1613EVS
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Microfine
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3725DVS 5" H&L vs sander 144
3727DVS 6" H&L vs sander 149
83915 10" slide compnd saw 579
1609KX laminate trimmer kit 229
B4050 in-line jigsaw 99
S3296K 3-1/4" planer kit 169

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Mitre Saw
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C10FS New 10" slide compound 739
P12RA 12" planer/6" jointer 1049
C10FC 10" compnd mitre saw 199
C7BD 7-1/4" circ. saw w/brk 139
DN100YK vs 9.6v R.A. drill 159
M12V 3-1/4 hp vs pl. router 229
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23-710 sharpening center 174
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37-350A 8" jointer w/stand 1649

22-675Y
15" Planer
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18 Volt Contractors
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DW935K-2 14.4 cdls saw kit 239
DW621 2hp vs plng router 219
DW625 3hp vs plunge router 279
DW673K laminate trimmer kit 189

DW321K
VS Jigsaw
With Case
\$164

DW705 12" compnd mitr saw 349
DW364 7-1/4" saw w/brake 164
DW675K 3-1/8" planer w/case 164
DW682K Plate Jointer Kit \$199

DW421K 5" h&l rand snr w/cs 74
DW423K5" vs rmdm sander w/cs 94
DW443 6" RA H&L rdm snr 144
DW431 3"x21" vs belt sander 189

DW995K
18 Volt 1/2"
VSR Drill Kit
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DW991K-22 14.4v3/8" dw/dr k 219
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CIRCLE NO. 59 ON PRODUCT INFORMATION FORM

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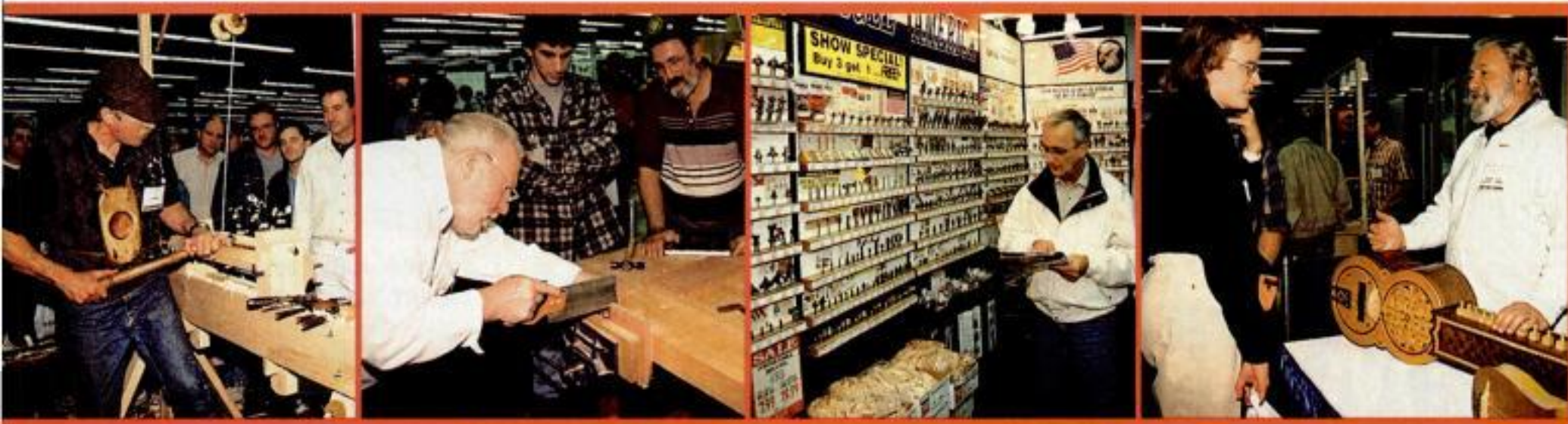
DEALS

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- **See the work** of master craftsmen and talk face-to-face with the experts.
- **Meet the editors** of AMERICAN WOODWORKER magazine.





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Sunday 10 am-5 pm

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Fort Washington, PA
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November 7, 8, 9, 1997

Friday & Saturday 10 am-6 pm
Sunday 10 am-5 pm

Ontario Convention Center

Ontario, California
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March 6, 7, 8, 1998

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SEMINAR SCHEDULE

GETTING THE MOST FROM YOUR ROUTER

Friday 1:00pm-3:00pm
Saturday 8:30am-10:30am

Ernie Conover

In this seminar, you'll learn how to:

- Select the right router for your needs •Choose and use router bits •Perform router table operations and joinery •Rout safely and efficiently •Work with router fences and dovetail jigs •Use template guide bushings

Who should attend: Beginning to intermediate woodworkers

About the presenter: Ernie Conover has been a woodworking teacher and demonstrator for 20 years. He and his wife Susan run Conover Workshops, a woodworking school in Parkman, OH.

GETTING THE MOST FROM YOUR TABLESAW

Friday 1:00pm-3:00pm
Saturday 4:00pm-6:00pm

Mark Duginske

In this seminar, you'll learn how to:

- Use the tablesaw for joinery—tenons, finger joints, variably-spaced dovetails •Make and use tablesaw jigs and fixtures •Work safely with the tablesaw •Align and troubleshoot your tablesaw for top performance •Choose the right blade for the job •Use dado heads and molding heads

Who should attend: All woodworkers

About the presenter: A fourth-generation Wisconsin woodworker, Mark Duginske is a prolific writer, designer and inventor. His work has appeared in numerous magazines and books, including *Cutting Shapes and Profiles* (Rodale Press, 1997).

SHARPENING SECRETS

Friday 4:00pm-6:00pm
Saturday 8:30am-10:30am

Leonard Lee

In this seminar, you'll learn how to: •Sharpen chisels and plane blades •Sharpen cabinet scrapers •Sharpen carving and turning gouges •Check an edge for sharpness •Choose the right grindstones, bench stones, microabrasives and polishing compounds

Who should attend: All woodworkers

About the presenter: Author of books and magazine articles on planemaking and sharpening, Leonard Lee has been a woodworker for over 35 years. He is president of Veritas Tools Ltd. and Lee Valley Tools.

DESIGN AND BUILD GREAT FURNITURE

Friday 4:00pm-6:00pm
Saturday 1:00pm-3:00pm

Ian Kirby

In this seminar, you'll learn how to: •Design and make joints—butt joints, mortise and tenon, dovetail •Make the best design decisions •Design to accommodate wood movement •Choose adhesives and clamping methods •Design with alternate surface treatments—veneer and leather •Integrate the key design elements—form, space, proportion and function

Who should attend: All woodworkers

About the presenter: Trained in England as a furniture maker, designer and wood technologist, Ian Kirby has taught and written extensively on woodworking in the United States and England for over 30 years.

FEARLESS FINISHING

Friday 8:30am-10:30am
Saturday 4:00pm-6:00pm

Michael Dresdner

In this seminar, you'll learn how to: •Select the best finish for the job •Get a professional-looking finish on your project—from surface preparation to final polish •Choose the right brush •Understand wood stains and use them correctly

Who should attend: All woodworkers

About the presenter: A contributing editor of *AMERICAN WOODWORKER* magazine, Michael Dresdner writes our "Just Finishing" column and hosts our finishing "chat room" on the America Online computer service every Sunday night. He is the author of *The Woodfinishing Book* (Taunton Press, 1993).

SETTING UP SHOP

Friday 8:30am-10:30am
Saturday 1:00pm-3:00pm

Sandor Nagyszalanczy

In this seminar, you'll learn how to:

- Decide which tools to buy, in which order •Buy the right quality tools and equipment •Stretch your tool budget •Lay out your shop for best results •Make the most efficient use of space •Get dust and chips under control

Who should attend: Beginning to intermediate woodworkers

About the presenter: Furniture designer and author of four books, with 18 years of woodworking experience and six years as an editor of *Fine Woodworking* magazine, Sandor Nagyszalanczy writes and lectures frequently on woodworking topics.

AMERICAN WOODWORKER Dodge Truck Giveaway Official Rules NO PURCHASE NECESSARY

1. To enter, obtain, complete and deposit an official entry form at The American Woodworker Show™ in Novi, MI, Fort Washington, PA or Ontario, CA; or print your full name, address, and daytime telephone number on a 3" x 5" piece of paper, place in a stamped envelope and mail to: The American Woodworker Dodge Truck Giveaway, 33 East Minor Street, Emmaus, PA 18098; or visit us on the internet at www.americanwoodworkershow.com and follow the instructions there.
2. Limit one entry per person. All entries must be deposited or postmarked by the Sweepstakes ending date of March 20, 1998. Mailed entries must be received no later than March 20, 1998. Mechanically reproduced, damaged, lost, late, postage due, misdirected, incomplete, or illegible entries are not eligible. All entrants agree to be bound by the official rules and the decisions of the judges.

3. Winner selected by random drawing from eligible entries on or about March 23, 1998. Odds of winning depend on the number of entries. Winner will be notified by phone and/or mail. Winner will be required to sign and return an Affidavit of Eligibility and Release within 14 days of receipt of notification. Noncompliance or return of any prize notification as undeliverable, will result in the disqualification of the entry and selection of an alternate winner. The winner must consent to the use of his or her name and/or likeness for promotional purposes without additional compensation, except where prohibited by law.

4. Grand Prize: One 1998 Dodge Ram 1500 Laramie SLT 135" WB truck with an estimated MSRP value based on 1997 pricing of \$23,270 (including destination) or less, to be delivered to the authorized Dodge dealer nearest the winner's residence in the United States. If the winner is from Massachusetts, New York or California, add \$102 to the MSRP for a state-mandated emissions package. No transfer or substitution of prize is permitted except by sponsor due to prize unavailability. All taxes, insurance, licensing and other associated fees are the responsibility of the winner.

5. Sweepstakes open to legal residents of the 50 United States, only, who, as of March 23, 1998, are 18 years or older. Winners must reside in the United States at time of prize delivery. Employees (and members of their immediate families) of Rodale Press, Inc., the Chrysler Corporation, their subsidiaries and dealers are not eligible. The winner agrees to hold harmless the Chrysler Corporation and Rodale Press, Inc., and each of their respective affiliates, officers, directors, employees, representatives, agents, successors and assigns from any and all loss, liability, damage, cost and expense arising out of the Giveaway. Void where prohibited, and subject to all federal, state and local laws.

6. For the prize winner's name, available after April 30, 1998, send a self-addressed, stamped envelope to The American Woodworker Show™, Show Management Division, 33 East Minor Street, Emmaus, PA, 18098. Requests received after May 15, 1998, will not be honored.

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WOODSMITH MAGAZINE

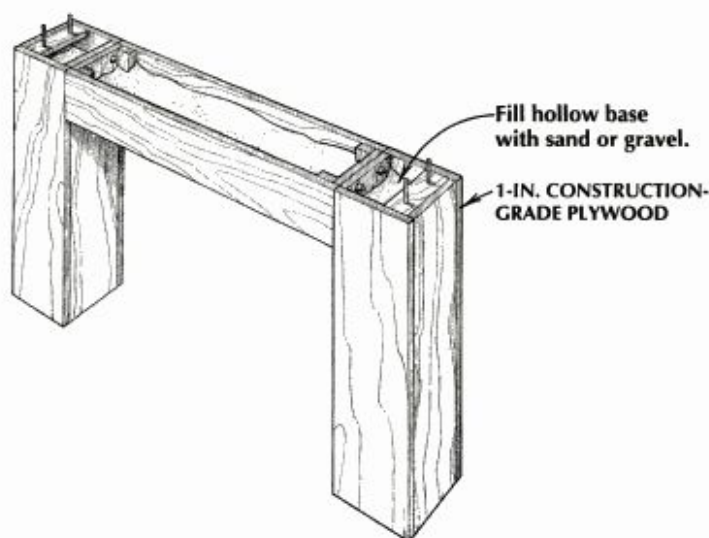
CIRCLE NO. 33 ON PRODUCT INFORMATION FORM

Ballasting the Lathe

Best tip of the issue

I recently made a plywood base for my wood lathe. To dampen the inevitable vibration I made the base in three hollow sections, each one bolted together, as shown in the sketch. I then filled the units with coarse beach sand. If you're not so lucky as to live near the sea, gravel or even masonry rubble would also serve. Similar bases can be built for other machines.

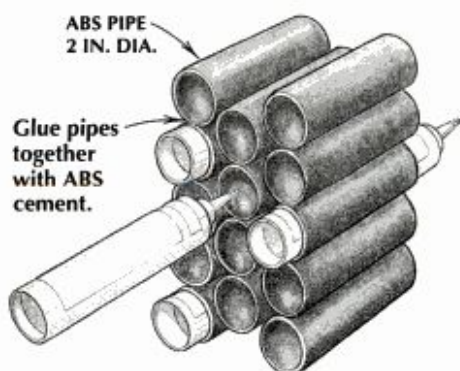
Sandor Nagyszalanczy
Santa Cruz, CA



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

Tube Holder

Tired of having tubes of glue, caulk, etc. rolling around, I made a storage unit out of ABS pipe, available at home cen-



ters. I glued 6-in. lengths of 2-in.-dia. pipe in a staggered pattern with ABS cement. A glance at the bottom of each cartridge tells me its contents.

John Kindseth
Lodi, CA

High-Tech Letter Templates

I recently had to carve an inscription on a sign. Having no letter templates, I selected an appropriate font on my computer and printed out the text. I stuck this to the workpiece with flour-and-water paste, and began carving. A bonus: The letters were perfectly aligned and spaced.

Martha Dawson
Squaw Valley, CA

Smoothing the Platen

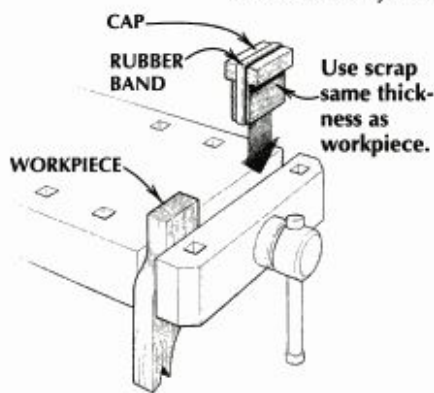
The platen on my floor-model belt sander was rough, with conspicuous machining marks. To smooth it, I turned the 100-grit sanding belt inside out so the abrasive faced the platen. Then I ran the machine while pressing down on the smooth side of the belt with a flat block of wood. In a few minutes the platen was as smooth as I could have wished.

Steve Lavalle
Lubec, ME

Bench Helper

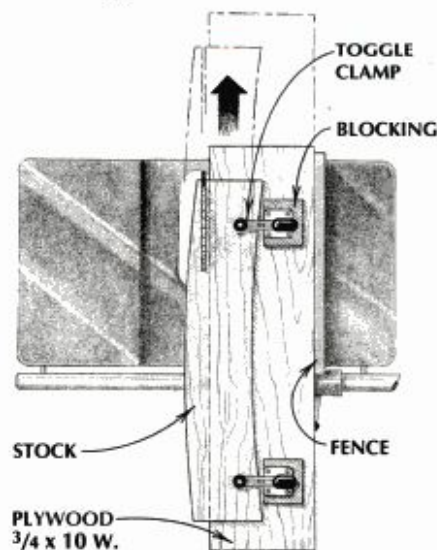
When clamping stock asymmetrically in a bench vise, I use an offcut the same thickness as the workpiece to balance the forces on the vise. Attach a cap with a rubber band so the filler doesn't fall to the floor when you release the pressure.

Ping Sing Li
Redwood City, CA



Straight-Line Ripping Jig

I use this simple jig to get a straight cut on the edges of a bowed board. To make the jig, first decide on the maximum length of stock you want to handle, then cut a piece of 3/4-in. plywood to that length and about 10 in. wide. Make sure the edge that bears against the fence is dead straight.



Screw two or more toggle clamps (available from Woodworker's Supply, 800-645-9292) to the jig as shown in the drawing. Set the fence and clamp the stock, bowed side out, so each end of the board just grazes the saw blade.

Warren Harris
Brethren, MI

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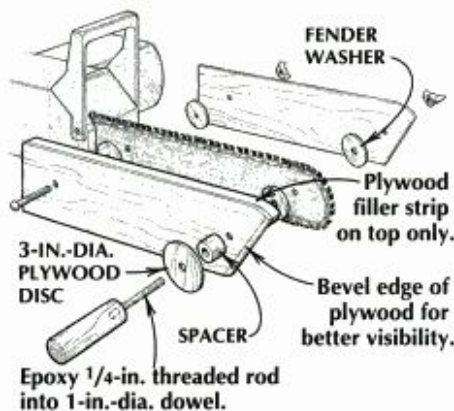
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CIRCLE NO. 50 ON PRODUCT INFORMATION FORM



Chainsaw Guard

I do most of my chainsaw carving with the tip of the saw, the part most prone to kick back and cause serious injury. I've minimized this risk by making a special guard and handle.



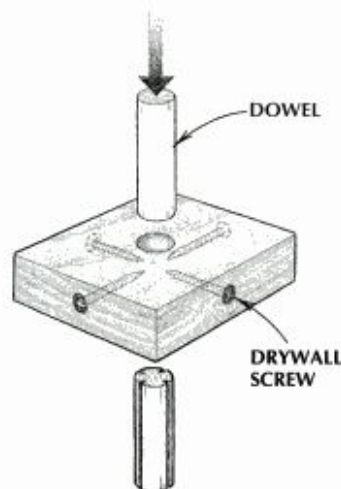
Lay the blade of your saw on a piece of cardboard and draw an outline of the guard about 3/4 in. above the chain and 1/2 in. below it. Cut the two guard pieces from 1/4-in. plywood and assemble them as shown. You may need to drill holes through the saw guide if none exist.

Chuck Malven
Bremerton, WA

Groovy Dowel Jig

I devised this simple jig for cutting grooved dowels. First I drill a hole the same size as the dowel in the center of a square block of scrap. Then I insert four drywall screws so the points project into the hole a fraction. By pushing the dowel through the hole I can cut four grooves at once.

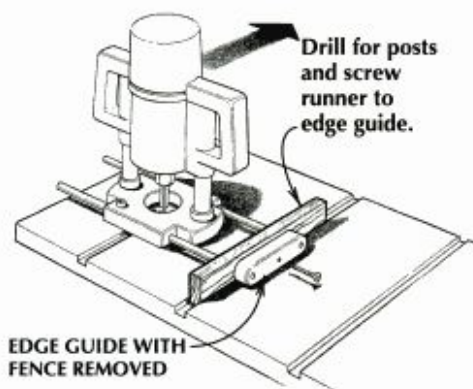
Kevin McMillan
Dubach, LA



Spacing Dadoes

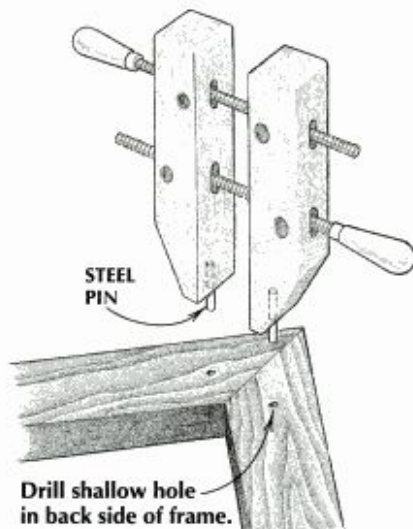
My last project was a wine rack requiring equally spaced dadoes over long spans. I routed these by removing the fence on my router's edge guide and attaching a hardwood runner as shown. The runner's thickness matched the router bit's diameter and fit the groove with a smooth, sliding fit. All I had to do then was set the posts to the required spacing.

Michael Karafa
West Mifflin, PA



Putting the Squeeze on Miter

Here's a simple way to clamp picture-frame miters. Drill holes in the tips of a wooden handscrew and insert steel dowel pins. Then drill shallow holes in the back of the frame, insert the pins, and squeeze the miter closed with the clamp.

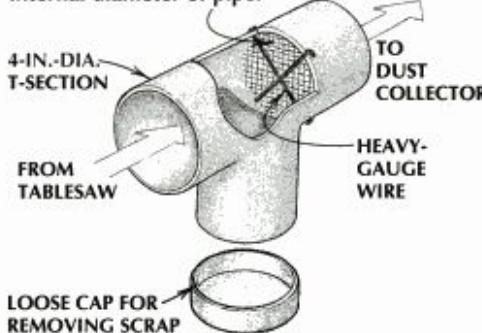


You can either make your own pins or buy them. Known as "adaptor tips," they are available from Tools on Sale, (800) 328-0457.

Audrey Osprey
Hawksville, ID

Save the Impeller

Cut disc of 1/2-in. steel mesh slightly larger than internal diameter of pipe.



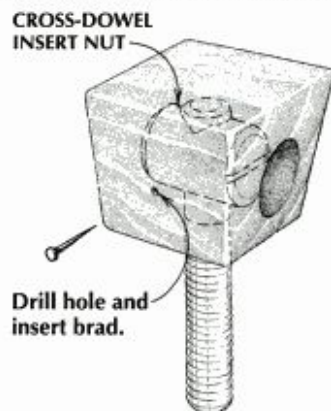
Our 1,200-cubic-ft.-per-minute dust collector is hitched directly to a 10-in. Jet tablesaw. Small offcuts frequently slip down through the table insert and get sucked into the impeller. Since the blade tips are moving at approximately 180 ft. per second—more than 120 miles per hour—even a small block can cause serious damage.

Our solution was to install a trap combined with a circular piece of steel mesh. When suction is cut off, any scrap falls to the bottom of the trap where it accumulates harmlessly until removed.

Will Foxx
Little Rock, AK

Shop-Made Knobs Revisited

Karl Palme's method of fastening wooden knobs (AW #54) is fine for light torque. For heavier-duty applications I



suggest using a "cross-dowel insert nut." (See drawing.) After assembly I pin the insert by drilling a second hole and inserting a brad. This method is amply secure and leaves the face of the knob unblemished.

Norbert Tagge
Burke, VA

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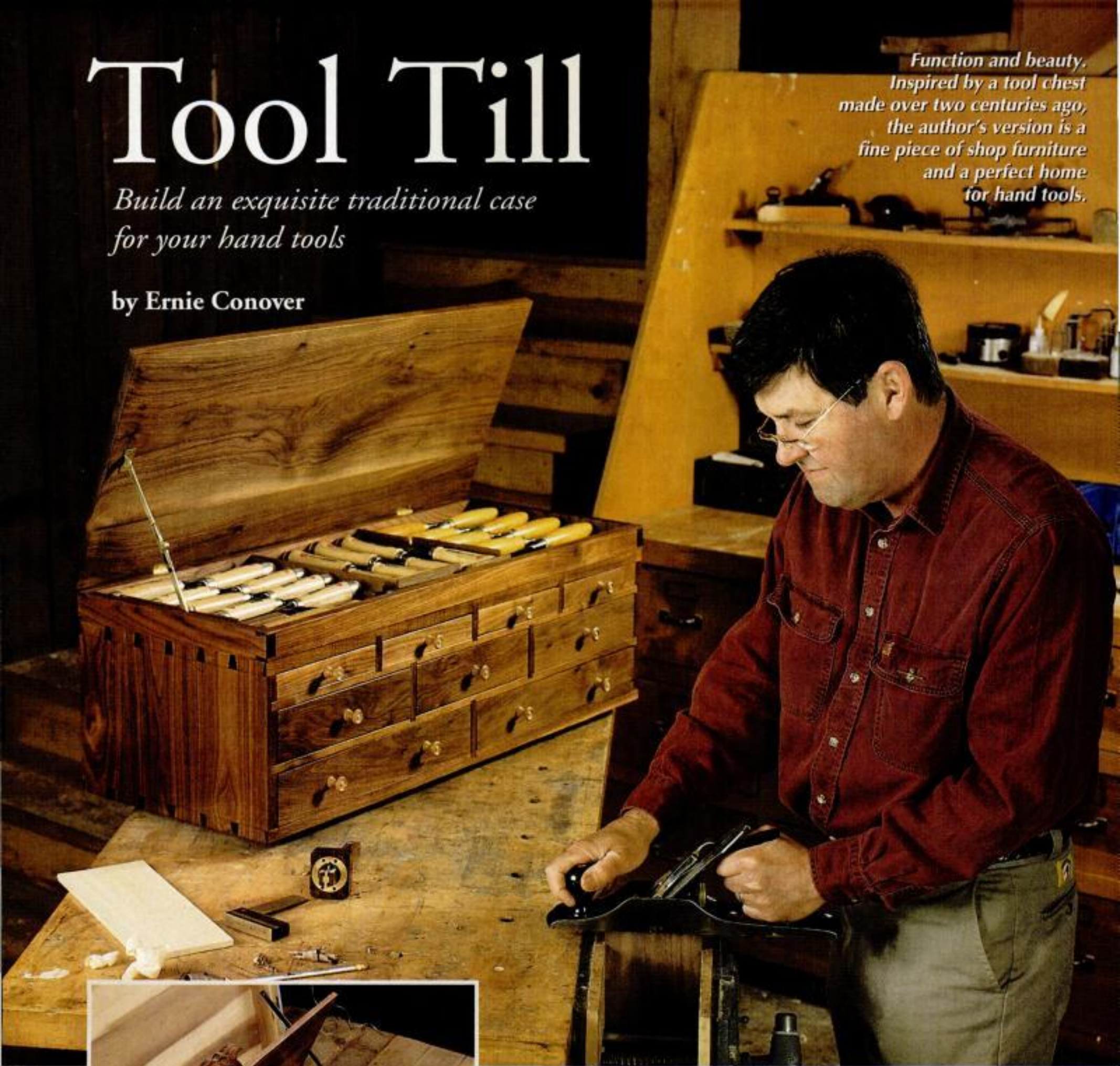


Tool Till

Build an exquisite traditional case for your hand tools

by Ernie Conover

Function and beauty. Inspired by a tool chest made over two centuries ago, the author's version is a fine piece of shop furniture and a perfect home for hand tools.



Chest in a chest. The walnut tool till sits inside a larger poplar chest that also holds saws, planes and other large tools.

In the 18th and 19th centuries, a woodworker completed his apprenticeship by building his own tool chest. This "master's thesis" included making many of the planes, saws and chisels that the journeyman would need to ply his trade. An important part of the chest was its "tool till," a smaller, multidrawer toolbox that rested on cleats within the main chest. A beautiful and functional toolbox in its own right, the till held smaller tools such as chisels, spokeshaves, marking gauges and shoulder planes.

The tool till shown here is my adaptation of an 18th-century till made by Benjamin Seaton of Rochester, England. The case is black walnut and the drawers are poplar, with walnut fronts and turned maple knobs. I sized the till and its drawers to house my collection of hand tools. You can alter the dimensions, if necessary, to suit your own.

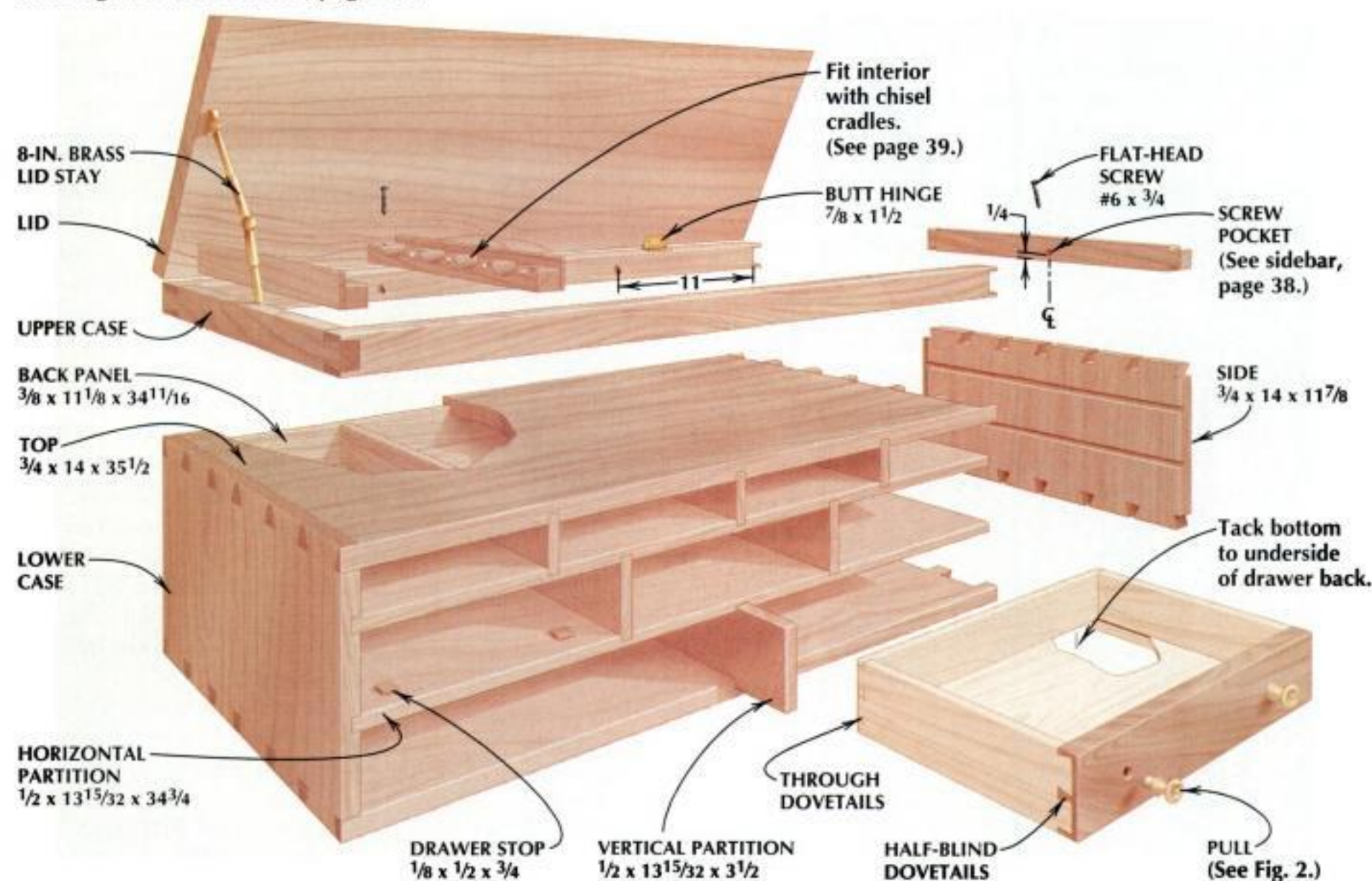
Building a tool till can be a good lesson in solid wood construction. It includes skills such as through dovetails and traditional drawer construc-

PHOTOS BY ERNIE CONOVER. LEAD PHOTO BY JOHN HAMEL

FIG. 1: TOOL TILL

The tool till has an upper and a lower case. Cradles in the upper case hold chisels. (See sidebar, page 39.)

Custom-sized drawers in the lower case accommodate small files, screwdrivers, wrenches, etc. Pocket screws hold the cases together. (See sidebar, page 38.)



tion. And since all the parts are solid wood, you'll need to make the necessary allowances for seasonal wood movement, such as orienting the grain of the case parts in the same direction and allowing room for parts to expand and contract at different rates. The reward is a chest that will look and work great in your shop and that you can proudly hand down to future generations.

Making the Cases

Although it might appear to be a solid box, the till is actually two cases screwed together. (See Fig. 1.) The top case has four sides and a hinged lid, but no bottom. Inside this shallow case are cradles that organize your chisels and protect their edges. (See sidebar, page 39.) The lower case contains nine drawers, carefully sized to accommodate a broad range of small tools. I seem to be a magnet for hand tools, so I sized my till to allow for a few future acquisitions.

The lower case, as shown in Fig. 1, consists of four $\frac{3}{4}$ -in.-thick boards

joined with through dovetails. The back is $\frac{3}{8}$ -in.-thick solid wood, rabbeted to fit into $\frac{1}{4}$ -in.-wide grooves in the case sides, top and bottom. The case is divided by $\frac{1}{2}$ -in.-thick horizontal and vertical partitions glued into dados. The upper case is much simpler: just four sides joined together with through dovetails and topped with a hinged lid. Here are an overview of the construction sequence and a few tips to help you build the cases.

Start by cutting the top, bottom and sides to their finished dimensions. Lay out the dovetails for the corner joints and the dados for the partitions, then cut the joints. (See Fig. 2.) I cut the dovetails by hand, sawing the pins first and using them to lay out the tails. I routed the dados for the partitions using a $\frac{1}{2}$ -in.-dia. spiral upcut bit, guiding the router with a fence clamped to the workpiece. Last, groove all four case pieces for the back panel. I made this groove $\frac{1}{4}$ in. wide and $\frac{3}{8}$ in. deep. (See Fig. 2.)

Next, thickness plane your partition stock for a snug fit in the dados. Rip it to finished width, but don't cut it to length yet. You'll do that after you assemble the rest of the case. Note that the grain of all the partitions, including the short vertical ones, runs parallel to the length of the case.

The last case piece to make is the back panel. Be sure to allow enough headroom in the top and bottom grooves for the panel to expand across its width. I made mine in summer, when the relative humidity—and the moisture content of the wood—was high, so I allowed only about $\frac{1}{16}$ in. for expansion. If your wood is very dry, allow about $\frac{3}{16}$ in. for expansion. Quartersawn or riftsawn material will move less than flatsawn wood. (See AW #34 for more on wood movement.)

Now you're ready to assemble the case. First, glue and clamp the top, bottom and sides together around the back, which needs to float unglued in its grooves. I use bar clamps for this. To

EASY POCKET-SCREW JOINTS WITHOUT A JIG

Pocket-screw joinery was around long before commercial pocket-hole jigs were available. Tabletops were routinely attached this way, and it's the method I used to fasten the upper case to my tool till. An oversized screw hole allows for considerable cross-grain wood movement. All it takes to make the joint is a drill and an in-cannel gouge (available from Garrett Wade, 800-221-2942), which produces a clean wall in the pocket.

To create a pockethole, first scribe a centerline on the underside edge of the piece to be drilled. Then select a drill bit that's halfway between the diameter of the screw head and the screw shank. Drill through the underside edge of the piece, entering a little to the inside of your scribe line and angling the drill about 70° toward the inside face of the piece. (See drawing at right.)

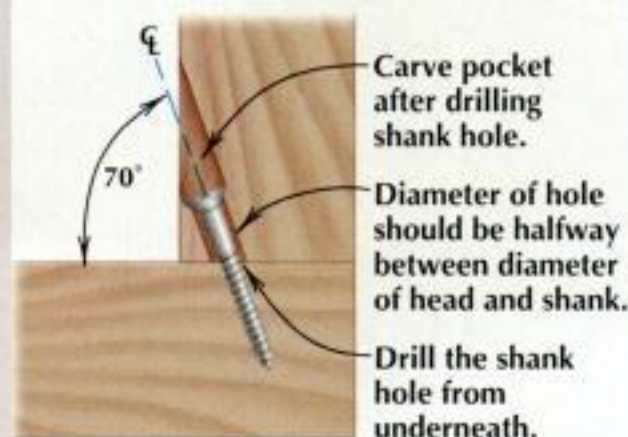
Next, carve out the wall of the pocket using an in-cannel gouge as shown in the photo, above right. I used a 3/8-in.-wide gouge for the #6 screws in this chisel tray. Clean up the floor of the pocket with a narrow flat chisel.

—E.C.



Carving the pocket. Use an in-cannel gouge to carve the wall of the screw pocket. Clean up the bottom of the pocket with a straight-edged chisel.

SECTION THROUGH POCKET-SCREW JOINT



assure that the sides clamp tightly to the top and bottom. I make up notched cauls to use as clamping blocks at the four corners of the case. I saw the notches in the cauls so the pins can protrude through the tails as pressure is applied. It's critical that the cases are square when you clamp them up. Otherwise you'll have trouble fitting the partitions and drawers.

With the case glued up, you can now cut the partitions to exact finished length. It's important to fit them exactly between the dados. Cut the horizontal partitions to length first, then cut the dados for the vertical partitions into them. I slipped the partitions most of the way into their dados, then applied a dab of glue to the bottom of each partition before sliding it home. This allows any dissimilar expansion and contraction between the partitions and the case to work itself out at the back of the box.

Attach the upper case to the lower case with pocket screws. (See sidebar, left.) To attach the case, I clamped it in place, drilled pilot holes into the lower case through the pocket holes, then drove in the screws.

Last, make the lid as shown in Fig. 2. To minimize the possibility of warping, use quartersawn or riftsawn material.

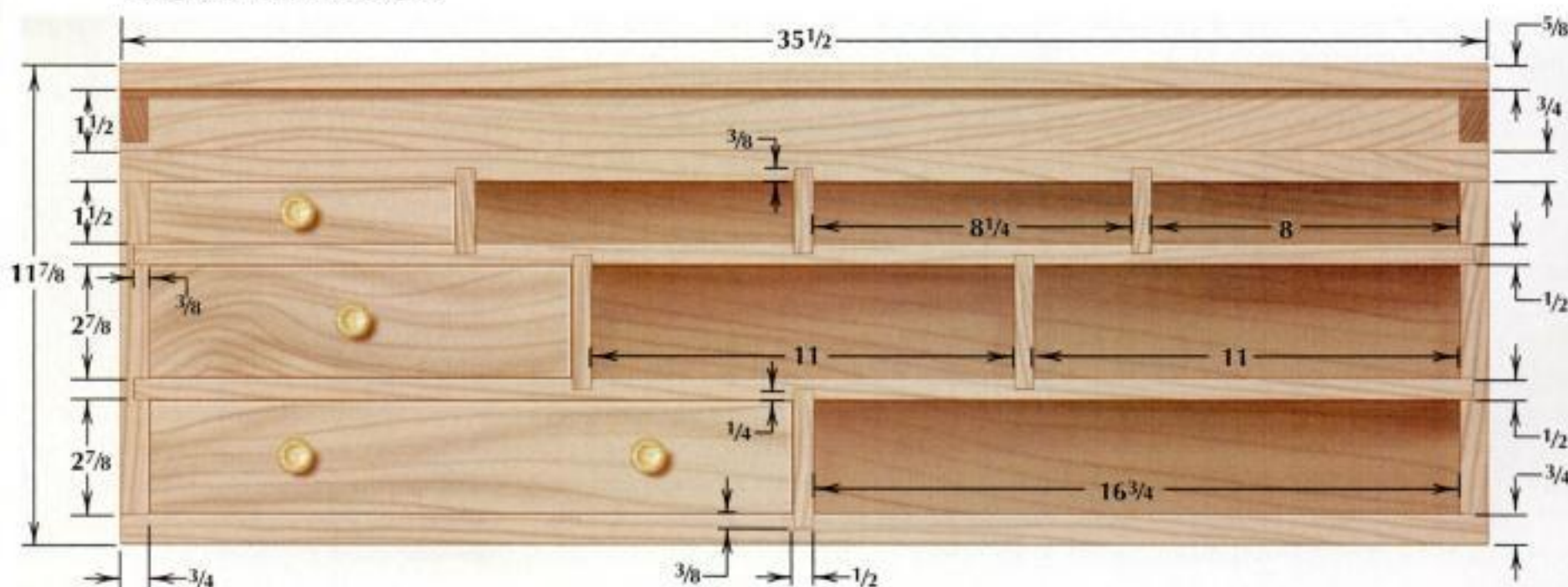
Making and Fitting the Drawers

Many woodworkers tend to overbuild drawers. I kept the thickness of the drawer fronts, sides and backs to a minimum, and made the small drawers in

FIG. 2: TOOL TILL DIMENSIONS

This tool till has a variety of drawer sizes to accommodate most common hand tools and layout devices. You can modify these sizes to suit your own tools.

FRONT ELEVATION



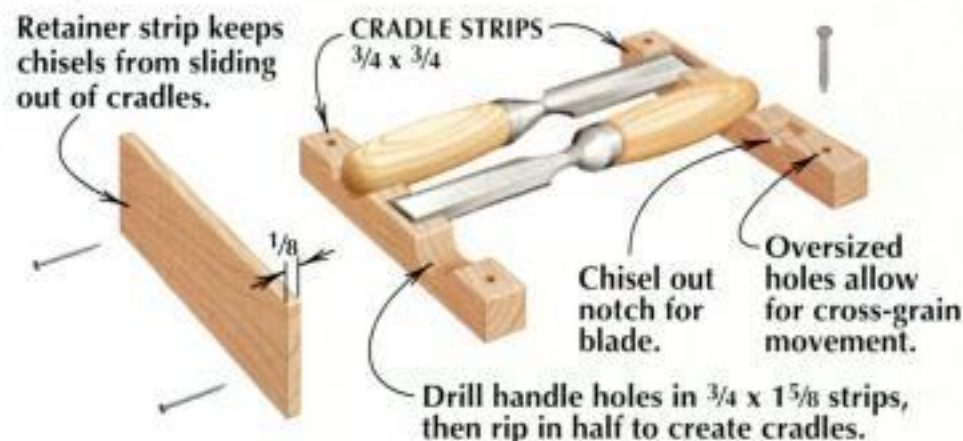
MAKING THE CRADLES

These easy-to-make cradles organize and protect sets of chisels. To cradle a flat blade, just chisel a notch in the strip. To cradle the cutting ends of gouges, drill curved notches with the appropriate Forstner bit.



Chisel cradles. Wooden cradles keep chisels organized and protected from each other.

CRADLE CONSTRUCTION



the top row of even thinner material than the others. (See Fig. 2.) I cut all the drawer fronts from a single walnut board, arranging them in sequence on the face of the till. The drawer sides, backs and bottoms are poplar.

I made my drawers the traditional way. The sides are joined to the fronts with half-blind dovetails (see AW #29) and to the backs with through dovetails. The bottoms are solid wood.

Here's how I make the drawers: I rip the fronts, sides and backs about $\frac{1}{32}$ in. narrower than the height of the openings. Then I crosscut each front and back to finished length—about $\frac{1}{32}$ in. less than the width of the opening—and rip each drawer back to its finished width.

Years ago, I learned that if you taper a drawer to make it slightly narrower at the back, it will slide very easily into its opening even if the drawer front is snug across its width.

To taper the drawer, make the dovetail pins of the drawer backs slightly long, so they project about $\frac{1}{64}$ in. through the sides. Then, after gluing up the drawer, pare the pins flush to the drawer side.

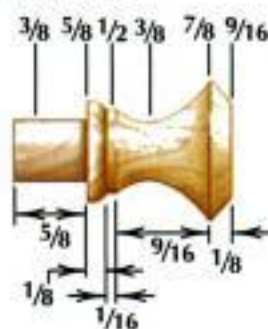
Now install the drawer bottom. Because its grain runs parallel to the

drawer front, the bottom will only expand and contract front to back in the drawer. So size it to fit exactly between the grooves in the drawer sides. I use quartersawn wood to minimize back-to-front movement. Slide the bottom into the grooves in the sides and tack it into the drawer back. (See Fig. 1.) Allow a little room for expansion in the groove at the front of the drawer.

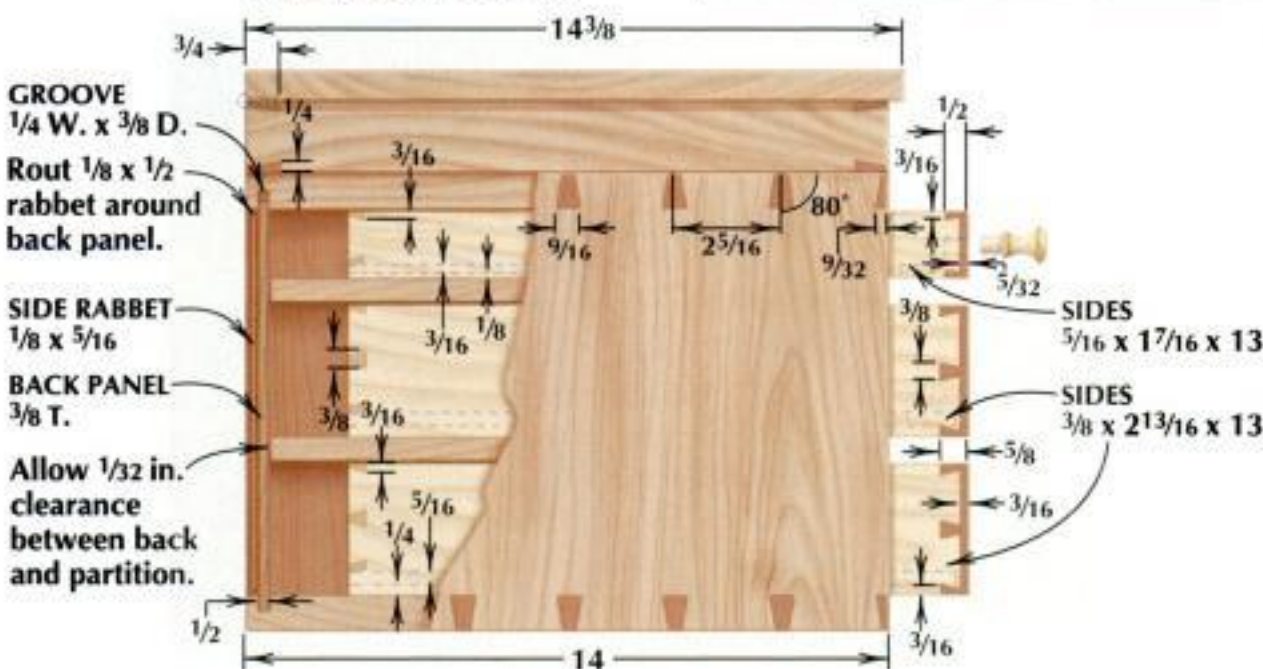
Fit each drawer into its opening, planing the top edges of the back and sides if necessary to create about $\frac{1}{16}$ in. clearance in the opening and sides, and a little less than that at the top of the drawer front. I made drawer stops as shown in Fig. 1, and glued them in place with hide glue.

I turned my own pulls for this project (see Pull Detail, Fig. 2), but you could just as easily use store-bought versions.

PULL DETAIL



SIDE ELEVATION



Finishing Up

After planing all of the surfaces, I gave my box a final hand-sanding with 220-grit paper. Then my wife, Susan, finished it with four coats of Minwax Antique Oil finish. She wet-sanded the first coat with 320-grit, the second coat with 400-grit, and the last two with 600-grit. The final step was to install the lid stay and the butt hinges (available from Whitechapel, 800-468-5534). ▲



ERNIE CONOVER
teaches woodworking
in 20th-century Ohio.

Tablesaw Molding Heads

This affordable accessory can make your tablesaw work like a shaper

by Mark Duginske

SIMPLE COVE



COVED CROWN



CROWN



CAP



CASING



3 BEAD



COMPLEX CROWN



Tablesaw shaping. A tablesaw molding head can cut an enormous variety of molding shapes, from a simple bead (above) to complex chair-rail and crown moldings.

Before the rise of the router table, much small-shop shaping was done on the tablesaw using a molding head. A close cousin to early shaper heads, a molding head converts your tablesaw into a shaper of sorts. It works much like a dado head, except that a molding head is designed to hold a wide selection of knives for cutting different profiles.

By using different knives, adjusting the position of the fence and workpiece, and even tilting the saw arbor, you can create an infinite variety of shapes.

What's more, the molding head can quickly and easily produce cove cuts. (See page 42.) Not bad for an accessory that costs less than many carbide-tipped saw blades.

Living up to its name, the molding head excels at making moldings of all types. (See photos at left.) In this article, I'll show you how to get the most from this versatile accessory. Whether you're new to the molding head or a veteran user, be sure to follow the safety advice on the facing page.

PHOTO BY PAUL ANTHONY

HEADS AND KNIVES



Delta offers 34 different knife profiles for its molding head, which costs \$65. Knives run about \$20 per set.



The Sears molding head will accept about 25 different knife profiles and costs about \$30. Each set of knives costs about \$10.



Heads and Knives

A molding head is a heavy metal plate with three slots cut into its rim. (See photos above.) An Allen screw securely locks a high-speed steel knife into each slot. The molding head fits on the saw arbor like a dado head.

The two most popular molding heads—shown above—are sold by Delta (800-438-2486) and Sears (800-377-7414). They both work well. The Delta model bolts directly against your table-saw arbor's inner flange while the thinner Sears model requires placing a spacer (included with set) between the flange and the molding head.

Delta and Sears knives are not interchangeable, but both companies offer a good selection, including quarter-rounds, beads and flutes. You can even get matched knife sets for making tongue-and-groove joints, as well as knives for cutting drawer-lock joints and raised panels.

Preparing Your Cutters, Saw and Stock

Before you can start using your molding head, you'll need to attend to a few preliminary details, which I'll explain below.

Sharpness counts. Like all edge tools, molding head knives cut much more smoothly and easily when they're extremely sharp. I hone the back of the knife flat on a diamond sharpening stone, but an oilstone or waterstone will work as well. Hone the bevel only enough to remove any grinding burr. Excessive honing here could change the profile of a knife, creating a mismatch in the set. Inspect the knives before installing them. If cutters are nicked, it may be less expensive to buy a new set

than to have them reground. Check with your local sharpener. Discard badly chipped or cracked knives.

Use a table insert. You'll need a dedicated table insert to use with your molding head. Some factory-made inserts (available from different tablesaw manufacturers) will work, while others won't have wide enough openings. It's also easy to make your own molding insert from plywood. But don't try to cut the slot in a wooden insert by raising the cutters into it. Instead, cut the opening with a saber saw or router.

Add an auxiliary fence. For many molding operations, you'll need a wood auxiliary fence with a cutout to accommodate the molding head. The wood fence allows you to cover or "bury" part of the knife profile, exposing only the

section of the knife you plan to use. (See lead photo.) It's easier and safer to band-saw the cutout instead of raising the knives into the fence. Make the auxiliary fence tall so it will support wide workpieces standing on edge.

Prepare your stock. Molding stock needs to be straight and square. Although we all like interesting grain and color, moldings usually look best when these variables are more uniform. Straight-grained wood will yield the best moldings, with minimal tearout. Make sure to prepare extra material so that you can test your setups.

Making the Molding

The simplest moldings can be cut using a single set of cutters. For more complex profiles, you can use all or part of differ-

MOLDING HEAD SAFETY

Here are some important precautions to observe when using a molding head:

- **Never run a three-knife cutterhead with only one or two knives in place,** or it will be dangerously off-balance.
- **To make narrow moldings, mill the profile in wider stock** where possible, then rip to finished width. If you must mold narrow pieces, use one or more featherboards to keep the workpiece running firmly against the fence and saw table.
- **The molding head exerts considerable upward and rearward pressure** on the workpiece. It's safer to "creep" up on the profile, raising the cutter a little after each pass. Feed at a slower rate than you'd use when ripping or crosscutting. Support rollers, fingerboards, and other hold-downs will all improve safety and quality of cut.
- **Don't use molding-head cutters on plywood.** The glue will cause the steel knives to dull in no time.
- **Run the workpiece flat on the table whenever possible.** If you have to run the stock on edge, use a high fence to guide it, and always place the cutter in or adjacent to the fence. Never cut with the workpiece between the knife and the fence.
- **Plan a safe cutting sequence.** Each cut should leave sufficient material to bear against the table and fence when making the next cut.

CREATING A COVE

Many woodworkers have learned the trick of clamping a fence at an angle to the tablesaw blade so they can hollow out a workpiece and create a cove. The trouble with this technique is that it takes a long time—the sawblade can only remove a little with each pass. And the finish is rough because of the sharp corners of the saw teeth. But using a roundnose cutter in a molding head allows you to take much bigger bites. And it produces a smoother cut.



Smooth results. You can quickly cut a cove with a relatively smooth finish using a set of roundnose knives in a molding head.



Making the cut. Using a straight board clamped to the saw table for a fence, feed your workpiece steadily over the cutterhead.

end grain of the setup block. (See top left photo, opposite.)

You can use all or part of a profile; and you can orient profiles at an angle, provided you will be able to duplicate the cut by tilting the saw arbor. For straight cuts and rabbets, you'll need to remove the cutter and replace it with a regular saw blade.

Mill a test piece. This is an important step, because it will enable you to establish the safest, most efficient cutting sequence. Use your setup block to adjust fence position and cutter height. (See top center photo, opposite.) Mill your test piece from the same stock you'll be using to make your finished molding. In many cases, you'll want to begin by ripping away any large areas of waste with your tablesaw blade. This practice will save time and minimize wear on your knives.

During this trial run, you can also determine how deep a cut to take. Don't try to remove too much in a single pass, especially if you're working with hard, dense woods. Always make the final pass a light one and slow down your feed rate. These two strategies will produce the cleanest surface possible.

Cut your molding. If your test piece comes out to your liking, you've got a working prototype and the cutting sequence you can repeat to produce your molding. Empty out your dust collector, prepare your molding stock, and enjoy the benefits of a tablesaw that works like a shaper. ▲



MARK DUGINSKE'S latest book, *Cutting Shapes and Profiles*, is available from Rodale Press (33 E. Minor St., Emmaus, PA 18098).

ent knife sets and you can also vary the fence position and cutter height. (See "Getting the Most From Your Molding Head," below.) In either case, you can avoid confusion and false starts if you follow an orderly method of defining and setting up your cuts.

First, make a catalog of profile samples. Cut a sample molding with each set of knives in your collection. The extra time this takes will pay off in layout accuracy. You can use short sections of these samples for tracing the actual molding contours, whether on paper or on a setup block. (See next paragraph.)

Tracing against the knives themselves won't yield accurate results, since the knives are mounted in the cutterhead at an angle to the work.

Use your profiles to make a setup block. The setup block is a portrait of the finished profile; it will contain all the information you need to set up the saw to cut the moldings. To make a setup block, prepare a short piece of wood the same width and thickness as the rectangular blanks you plan to use when making the actual moldings. Using sample pieces from your profile catalog, trace the desired profile on the

GETTING THE MOST FROM YOUR MOLDING HEAD

The variety of knife profiles for molding heads is scant compared to the variety of router-bit profiles. But if you gain some experience in using a molding head, you'll soon realize that this tablesaw accessory is remarkably versatile when it comes to making moldings. Here's how you can exploit the full potential of your molding head:

- **Use all of the knife profile, or just part of it.** Covering part of the knife profile with a wood auxiliary fence enables you to maximize the molding potential of each knife set.
- **Run the workpiece vertically or horizontally.** Changing the workpiece orientation will create different contours from the same profile. Remember to use a tall auxiliary fence when guiding stock on edge through the cutter.
- **Vary fence position and cutter height.** You can position the fence on either side of the cutter to make use of different parts of the knife profile. Adjusting cutter height is another way to isolate certain parts of the knife profile.
- **Tilt the cutter to vary the effect.** It's just as easy to tilt the molding head as it is to tilt the saw blade, and this enables you to do more with any given knife profile.

MAKING A SIMPLE CROWN MOLDING

Many moldings require two or more cutter sets to produce them. The process for making the crown molding at right is typical of the procedure for making other complex moldings. In each case, you need to plan your cutting sequence carefully in advance.



STEP 1

Make a setup block. Lay out the molding profile on a setup block, using sample profiles made by the knives you plan to use.



STEP 2

Set up the cut. Use your setup block to set the fence position and cutter height. The X's mark the waste material to be ripped away prior to molding.

Custom-made crown. Two sets of knives, a bead cutter and a cove cutter, were used to create this simple crown molding.



STEP 3

Cut the bead profile. Mold the profile on both edges of a wide blank for safety and easy stock handling. A featherboard helps produce a smooth cut.



STEP 4

Cut the cove profile. Install the cove cutters, move the fence to the opposite side of the molding head, and orient the workpiece vertically.



STEP 5

Separate the moldings. Replace the molding head with a saw blade and rip the two moldings apart. (Tablesaw guard removed for clarity.)



STEP 6

Angle the back. Tilt the saw blade to 45° and cut away the back of the blank to complete the molding.

Finishing Disasters

What to do when trouble strikes

by
**Sandor
Nagyszalanczy**

Unless you like the look of bare wood, finishing is a necessary evil. I say "evil" because very few woodworkers I know actually enjoy it. In fact, many of us who have been stung by disaster at finishing time come to dread this crucial step in the wood-working process.

But we can't let finishing demons spoil our projects—or our enjoyment of wood-working. As a woodworker and journalist, I have had the opportunity to hear about all kinds of finishing disasters. And (I must confess) I've certainly made a few myself. In this article, I'll share some of the most common ones, along with some helpful advice that might help you fix similar errors, or—better yet—avoid them entirely. ▶



**SANDOR
NAGYSZALANCZY**
*lives in California and
is the author of Fixing and
Avoiding Woodworking
Mistakes, (1995, Taunton
Press, Newtown, CT 06470).*



TAKING YOUR LUMPS AT LACQUER TIME

Okay, so maybe your spray gun technique isn't the best. But that doesn't mean that the spray-lacquered top on your newly completed walnut desk has to feel like a relief map of the moon! What's called "orange peel" in finishing vernacular is basically the inability of the lacquer to "flow out" or level itself. When thousands of tiny atomized droplets fail to coalesce into a continuous film of finish, it's not uncommon to create a mini-mooncape.

The fix: Thanks to lacquer's forgiving nature, you can un-lump your bumpy surface faster than you can say "aromatic hydrocar-

bons." Lacquer is solvent-borne finish, and each new coat dissolves the last one, rather than merely bonding to it.

To level a lumpy coat, simply spray another coat of lacquer on top of it, only this time, slow down the lacquer's drying time. There are two ways you can do this: If you're mixing up a new cup of finish, thin with a "slower" thinner (thinners come in slow, medium and fast varieties). Or try this alternative method: add a little "lacquer retarder" to the mixture already in your gun's cup. Thinners and retarders are both available from finishing suppliers.

ILLUSTRATIONS BY LEN EPSTEIN

BLOTCHY STAIN BOTCH JOB

You've planed, sanded and scraped to get the wood surface perfectly prepared for the stain that will really bring out its character. But oh, what results! Instead of character, you've got skin disease—blotchiness that comes as a rude surprise. Don't feel alone. Uneven stain penetration can occur with surprising frequency, especially on woods like pine, poplar, alder, soft maple, cherry and birch. Flatsawn stock is especially prone.

The fix: If you've chosen a dye-type stain to color the wood, you're in luck. Wiping the stained area with common household bleach will remove the stain. *Caution: Chlorine bleach is toxic and should never be used without adequate ventilation.* (See AW #57.)

If you've goofed with a pigmented stain, you're in trouble. Bleach treatment won't work. One option is to sand the surface down

to expose unstained wood. Another is to apply a coat or two of toner, which you can make by adding dye or pigment to a clear finish. (See AW #54, page 88.) The resulting formulation should be slightly darker than the darkest-stained areas on your workpiece. Spray a thin layer of toner where needed to even up the appearance. Toning enables you to rescue a blotchy finish but in the bargain the overall look will be darker.

The best way to avoid this finishing disaster is to apply a few ounces of pre-staining prevention in the form of a wood conditioner. Conditioners are available from finishing suppliers, but you can also make your own by mixing one part boiled linseed oil with eight parts mineral spirits. (See AW #42.) Treating a "risky" piece of wood with conditioner prior to staining will cause the wood to absorb stain more evenly.

BLEEDING DANISH OIL

Danish oil finishes are supposed to be foolproof to apply: Just flood the surface with the oil, wait for it to penetrate, then wipe off the excess. You can "de-whisker" raised grain by rubbing the finished surface down with 220-grit wet-or-dry sandpaper before wiping down the surface.

But the dream of foolproof finishing can quickly become a nightmare when using open-pore woods like ash, oak, walnut and mahogany. Here's the scene: A short while after wiping the surface dry, you notice fresh oil oozing from the wood's pores. Even after rewiping, the pores continue to bleed fresh oil, sometimes for hours.

The fix: The best way to control bleeding is to apply your finish early in the day and wipe it dry every 15 minutes or so until the bleeding stops. If the oil puddles harden, you'll have to resand and refinish the surface.

Another strategy is to thin your oil finish about 20% with naphtha and add a few drops of cobalt dryer (available from finish suppliers). This doctored oil finish is much less prone to bleeding.

DEPARTMENT OF DERMATOLOGY





UNTIMELY CRACK-UP

'Tis a winter's evening and you've just finished lacquering a number of wooden clocks that will make fine presents. The timepieces-to-be are spread out all over the shop when you leave, their lacquer drying. When you return the next morning, you find the finish on two clocks terribly cracked—an antique effect that was anything but intentional. The remaining clocks are fine.

Much headscratching follows, but consultation with a friend finally clears up the mystery. The two cracked clocks were located next to a partially open window where cold air was able to enter. The cold draft hit the fresh lacquer and caused it to shrink suddenly, a condition known as "cold checking."

The fix: Fortunately, this finishing flaw is one of the easiest to remedy, thanks to a product called *amalgamator*. Available from finish suppliers, amalgamator can be applied by spray or brush. It temporarily dissolves the finish, and the plasticizers in it help the finish to flow back into a continuous film. It's a good idea to top-coat the repaired surface with another coat of lacquer afterward.

PAINT THAT HIGHLIGHTS RATHER THAN HIDES

Painting is supposed to be an easy way to finish wood. Just sand the surface to reasonable smoothness, prime and paint. You can use inexpensive wood, too.

Or so you think until you build a large display stand for a friend's sculpture. After building the stand from shop-grade birch plywood, you spray on a quick coat of sanding sealer. Following a light sanding, you spray on several coats of black acrylic enamel, aiming for a sleek, smooth finish. The results look good in your shop. But under the intense lighting of the gallery where the sculpture is displayed, the truth is revealed: Wood grain from the birch ply has telegraphed through the finish in numerous places. One of the show-goers asks, "How did you get that paint to look so much like wood grain?"

The fix: What you should have done is apply and sand a second coat of sanding sealer beneath the enamel finish. To hide the wood grain at this stage, use a different product: Zissner's B-I-N, a shellac-based primer with a high solids content. A two-coat application will cover any remaining grain.

Sanding with 150- or 180-grit sandpaper will create the super-smooth base for another application of enamel. When sanding, it's best to wrap the sandpaper around a hard block to leave a smooth, level surface. A coat of clear finish applied over the enamel will add protection and increase sheen if that's what you're after.



PUTTY LEOPARD SPOTS



The surface of an antique dresser shows all the little gouges, dings, dents and cracks that have befallen it since its creation. Wood putty offers a quick way to correct these mishaps and restore a scarred surface. But when you apply stain or clear finish over a putty patch, these repair sites absorb finish differently than the surrounding wood. When this happens, you end up with leopard skin, an unintentional “faux” finish that looks much worse than the scarred wood you were trying to repair.

The fix: Grain-painting a putty patch will add the camouflage necessary to blend this fake wood in with the real stuff. (See AW #59, page 57.) One grain-painting shortcut is to use felt-tipped touch-up pens made specifically for this purpose. Available from

Lee Valley Tools (800-871-8158), these

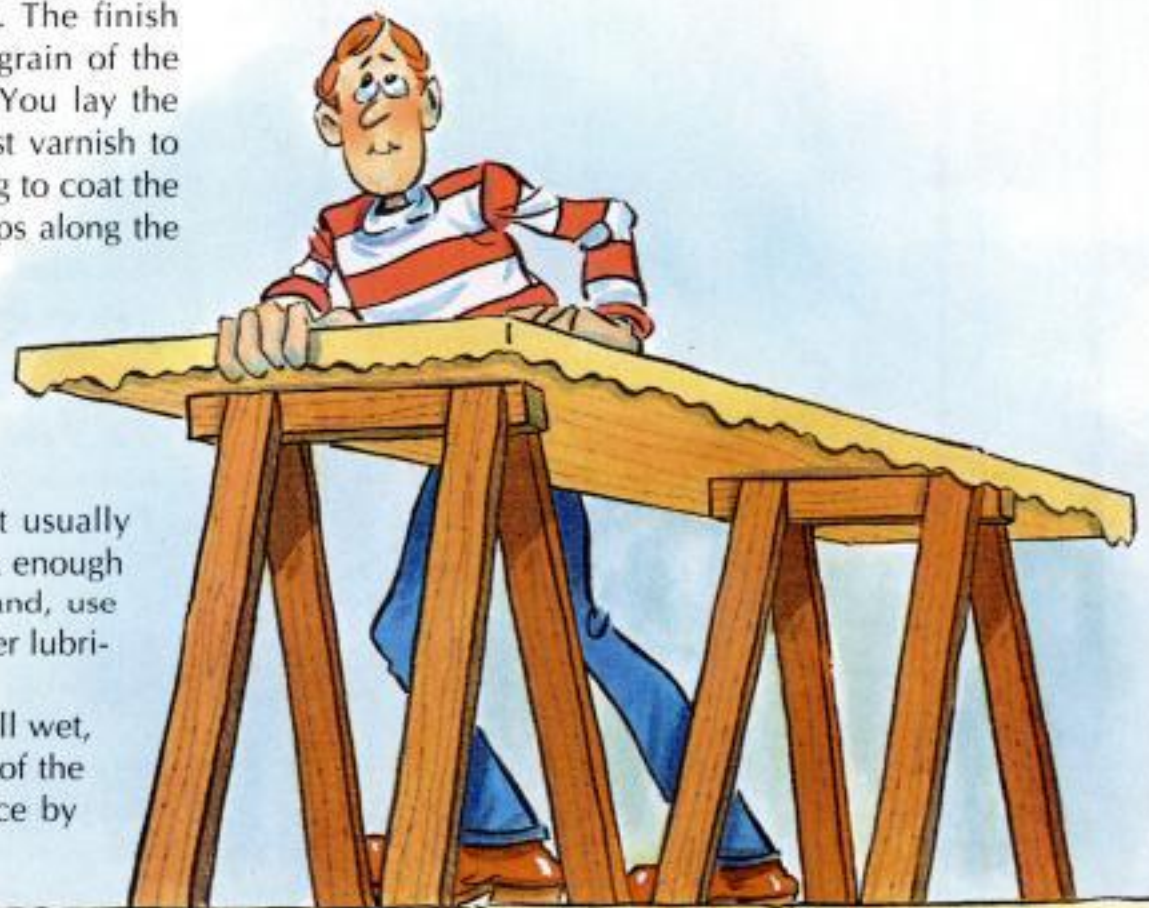
wood-tone pens have a special ink that’s translucent, so you can use more than one color on a repair. And if your initial color choices are off the mark, wipe the ink off before it dries and start again. Once you’re happy with the touch-up, let the ink dry, then topcoat with a final coat of finish.

DRIP AND DRY PROBLEMS

Stripping and refinishing doors is a terrible job, but you’ve agreed to do several for a good friend. When the first door is stripped and sanded, you breathe a sigh of relief. The finish you’re about to apply will highlight the beautiful grain of the wood and renew your enthusiasm for the project. You lay the door flat on a pair of sawhorses and apply your first varnish to the top and edges. When you return the next morning to coat the opposite side, you find a disturbing collection of drips along the bottom edges of the door. Oops!

The fix: Drips that harden at the bottom edges of parts can be sliced off cleanly with a sharp knife or chisel. If the drip or sag is in the middle of a panel, try scraping it off, using a sharp scraper with little or no burr. Sanding is a last resort because it usually results in minute scratches that dull the repaired area enough to require recoating with fresh varnish. If you do sand, use 280- or 320-grit silicone carbide wet-or-dry sandpaper lubricated with mineral oil.

If you discover drips and sags while the finish is still wet, wipe them off with your brush after squeezing most of the finish from its bristles. Then level the finished surface by dragging the tips of the bristles across it—a technique known as “tipping off.”



Choices for Cabinet Doors

Five basic constructions fit any style of case

by Ian J. Kirby and John Kelsey



Four of a kind. Patterns created by groups of doors can add striking visual impact to any cabinet.

No matter how complicated the cabinet, its doors are what people see. Though the doors go on last, the impression they create depends upon design decisions made before starting to build. These decisions include:

Cabinet layout—Doors usually come in groups. Each one contributes to the composition. The three-dimensional depth of the doors translates into patterns of light and shadow as the light changes, as your point of view changes, and as the door opens.

Cabinet style—The choices are face-frame or frameless. Some amount of the face frame always shows between and behind the individual doors, giving depth to the installation. With frameless or “Euro-style” cabinets, the doors are about all that anybody sees.

Handles and hinges—The handle can be an interesting element in the visual composition, or it can be incorporated in moldings and edgings, but either way it has to be considered from the outset. Likewise the hinges, which can be visible or concealed. (See sidebar, page 54.)

Door type—From a woodworking point of view, there are five types of cabinet door, each of which will be discussed in this article. The five types are:

1. Solid wood frame with solid wood panel. The traditional solution, this door relies on the frame for strength and stability. The panel is a free-floating infill. (See page 49.)

2. Solid wood frame with thin panel of plywood, fiberboard or glass. This door also relies on the frame for strength, though the panel may be glued in and therefore structural as well. (See page 50.)

3. Flat door of medium-density fiberboard (MDF) or particleboard. The sheet is its own structure and it need make no concession to the traditional frame and panel. (See page 51.)

4. Flat panel with solid wood frame, made of particleboard or medium-density fiberboard. Here the panel is the structural element, and the frame is the decorative add-on. (See page 51.)

5. Board-and-batten door. Both elements contribute to the structure of the door. Though usually rustic in appearance, a board-and-batten door can be quite sophisticated. (See page 52.)

SOLID WOOD FRAME WITH SOLID WOOD PANEL

In the age-old solution to the problem of wood movement, the grooves must be deep enough and the panel loose enough for seasonal expansion and contraction. The traditional panel is raised and fielded, but the maker proportions the parts to suit the eye. A panel-raising router bit gives you speed, but the cost is giving up control over dimensions and proportions.

There is no limit to the variations you can create. (See Figs. 1 and 2.) You can vary the proportions of the raise to echo the proportions of the door. To emphasize the field, make a double rabbet or a small bead. To create a vertical impression, raise the sides of the panel but not the top and bottom. Raising both front

and back of the panel creates a pleasant surprise when someone opens the door. The overlay panel is one way to get the most out of beautifully figured wood.

Molding the inside edges of the frame affects the joint between horizontal rails and vertical stiles. The rail can be coped to fit over the molded stile, or the stile molding can be pared flat and mitered where it meets the rail.

Period and ethnic decorating themes give rise to arch-top panels, to multiple panels divided by muntins, and to center medallion panels. In solid wood many of these variations generally can't come straight off the saw or router, but require hand-detailing. Alternatives to traditional panels are shown in Fig. 4.



A twist on tradition. This red oak frame-and-panel door has a double-fielded panel with a molded frame.

FIG. 1: PANEL PROFILES

Raising, fielding and molding all create bands of light and shadow.

RAISED



RAISED AND FIELDED



RAISED AND DOUBLE FIELDED



OVERLAY



MOLDED FRAME WITH RAISED AND FIELDED



FIG. 2: DOOR ELEVATIONS

The same basic construction delivers a wide variety of effects. The overlay panel, often overlooked, showcases extravagantly figured wood.

RAISED AND FIELDED



RAISED TWO SIDES



OVERLAY



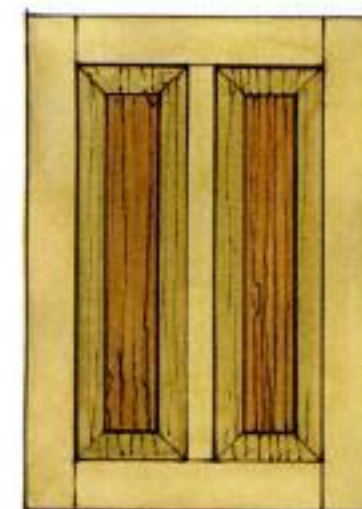
ARCH-TOP



MEDALLION



TWO-PANEL DOOR WITH MUNTIN



SOLID WOOD FRAME WITH THIN PANEL

Thin panels of plywood or MDF, up to about 1/4 in. thick, can be trapped in a groove, same as solid wood, or retained by various combinations of moldings and rabbets. Glass panels can be handled in the same way.

Since plywood and MDF panels don't move, they can be structural components. A glued panel greatly strengthens the whole door. It's the best insurance for those shallow frame joints cut with matched sets of cope-and-stick bits. The groove for a thin panel does not have to be centered. Placing it closer to the inside of the door enhances the illusion of thickness and depth. Another way to create depth is to glue a second panel, or centerpiece, to the first one, as shown in Fig. 4.

Retaining the panel with moldings has technical and aesthetic advantages. The rabbeted or square-edged frame is easy to cut and join. The molding can be a rich hardwood or painted wood. Rectangular profiles can fit square at the corners, though most shapes must be mitered. A strong molding has the unusual effect of drawing attention to the inside of the frame. It is good on small doors or small panels in a larger door. It is often used to enrich contemporary doors.

Thin plywood panels, common on manufactured cabinets, often look cheesy



Cowhide panel. Leather dresses up a thin plywood panel, making it look rich and elegant.

because there's no logic to the rotary-cut grain patterns. You can improve the look by veneering or by surfacing the panel with plastic laminate or leather. Or, you can introduce color by painting the panels. All these surface treatments are best done before assembly.

FIG. 3: THIN PANELS

Moldings not only retain the panel in the frame; they also contribute visual interest. The molding can be part of the door frame ("stuck") or attached as a separate piece of wood ("planted on").

FRAME MOLDED ON TWO EDGES



RABBETED FRAME WITH PROUD MOLDING



SQUARE FRAME WITH RABBETED MOLDING



SQUARE FRAME WITH TWO NARROW MOLDINGS AND GLASS PANEL



FIG. 4: APPLIED MOLDINGS AND CENTERPIECES

Large moldings and applied centerpieces dress up plain doors with thin panels.

BIG MOLDING



SECTION A-A



CENTERPIECE RETAINED BY MOLDING



SECTION B-B



MOLDED CENTERPIECE



SECTION C-C



FLAT DOOR

A flat panel of plywood, particleboard or MDF is bare and lacking in depth. But it can be enriched with paint, plastic laminate, leather, or wood veneer.

There are two basic approaches to veneer. You can apply a highly figured show veneer of inherent beauty, such as rosewood or walnut burl, in a simple bookmatch pattern. Or you can create a complex pattern with a plain veneer such as maple or pear. However, cutting a highly figured veneer into a complex pattern doesn't often work—it's too busy.

Whether you choose veneers or laminates, man-made sheet materials require an edge of veneer or solid wood, which also creates decorative possibilities. Fig. 5 shows a range of edge treatments. The drawings on this spread also suggest ways of adding depth to a flush door by applying moldings and by routing into the surface. Don't neglect the interesting effects you can create by painting the moldings or the routed channels. It's easy to mask part of the pattern with tape if you want to apply more than one color.

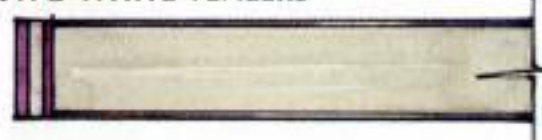
FIG. 5: EDGE TREATMENTS

Man-made sheet materials have rough edges, which must be covered with solid wood or veneers—an opportunity to invent interesting details.

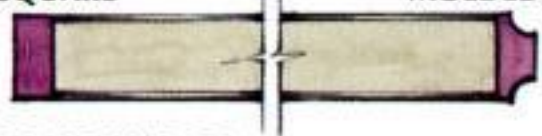
SINGLE VENEER



MULTIPLE VENEERS TWO WHITE VENEERS



SOLID WOOD SQUARE



MOLDED

SOLID WOOD COCK BEAD

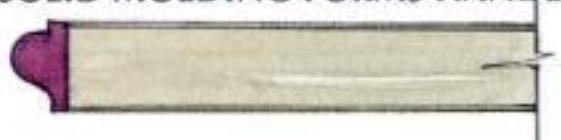


PROUD

SOLID MOLDING, VENEERED OVER



SOLID MOLDING FORMS HANDLE



PLAIN VENEER, PATTERNED



All dressed up. Koa veneer makes this flat door visually interesting.

FLAT PANEL WITH SOLID WOOD FRAME

Thick panels, from 1/2 in. up to the thickness of the frame, essentially are flat doors with oversized edge banding. Thick panels of plywood or MDF generally are glued into their frames with loose tongues or wooden biscuits. Despite the solid wood frame, the panel is the structural element.

The flat panel can be routed or dressed up with moldings, or it can be painted. With this approach, you could even make a close imitation of a traditional frame and panel. It's almost always simpler to finish the panels before assembling them to the frames.

MITERED NARROW FRAME, PANEL SPLINED AND REVEALED



MOLDED FRAME AND PANEL WITH GLUED TONGUE AND GROOVE

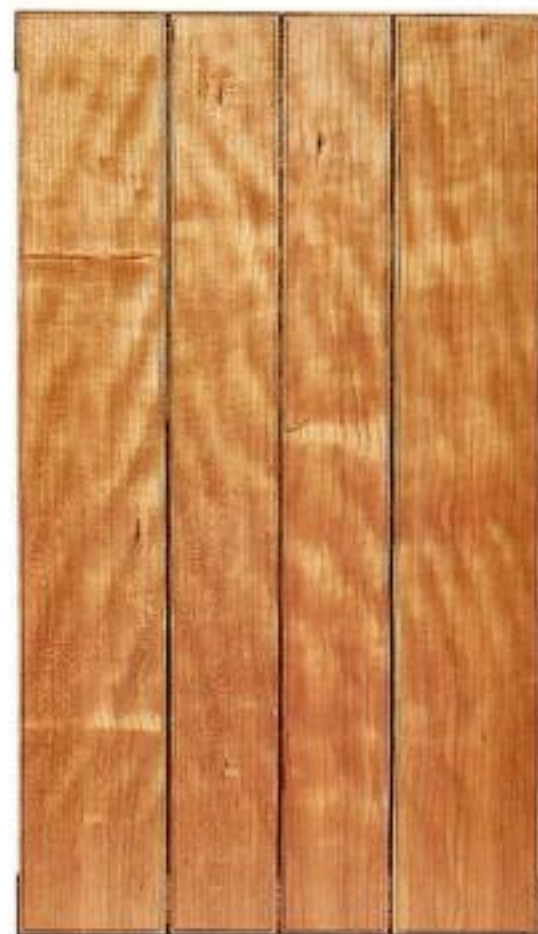


BOARD-AND-BATTEN DOOR

In a solid wood board-and-batten door, the boards are screwed or clenched-nailed to the battens, so both elements contribute equally to the structure. The diagonal brace is what stops the door from sagging into a parallelogram. (See Fig. 6.) The boards can be any width or mixture of widths, and they can be left square-edged, chamfered, beaded, or simply sanded to a small radius. The boards can be shiplapped or joined with a tongue and groove, or with a loose tongue to block light and maintain alignment. Don't, however, glue the boards together. If you do, the door is liable to crack or curl as the boards expand and contract with changes in humidity and try to move against the battens.

The Z-brace and exposed screws or clenched-nails give the door a rustic feeling, which you can emphasize by shaping the ends of the boards.

For a more sophisticated look, you can convert the exterior batten into a pair of splines set in grooves in the ends of the boards, as shown in Fig. 7 and the photo at right. Choose the wood with care so the figure makes a pleasing composition across the door. You can cut the spline grooves on the tablesaw, using a tenoning setup. Mill the splines to a precise fit, and assemble the door with care as shown in Fig. 7. Trim the splines to length after assembly; if you leave the lower spline proud on one edge, it'll serve as a subtle handle.



Hidden structure. A concealed spline holds this board door together. The boards are quartersawn cherry with a narrow rabbet on each long edge.

FIG. 6: RUSTIC DOOR, FRONT AND BACK, WITH SHELF ON BATTEN

The board-and-batten door can be carpenter-built on the job site; attach the boards with screws or clenched nails. The Z-brace keeps the batten door from sagging. In a kitchen, glue a small shelf to the bottom of the brace, for cans or spices.

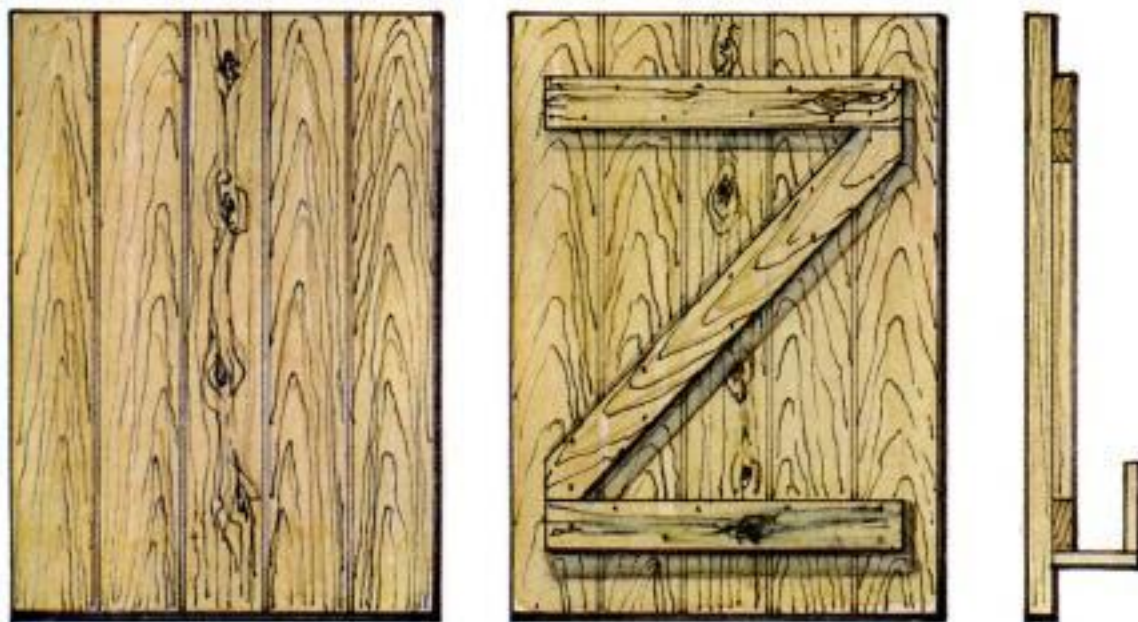


FIG. 7: GLUE-UP SEQUENCE FOR SPLINE-BATTEN DOOR

To look good, the spline-batten door requires careful assembly. Begin by gluing one spline into one of the edge boards, and square it carefully while the glue sets. Glue the remainder of the boards to this first spline, maintaining spacing with thin wooden inserts. Finally, glue the second spline to the boards.



MARRYING DOORS TO CABINETS

Of the numerous ways to make a case out of plywood or MDF, practicing cabinetmakers have settled on just two basic constructions: face-frame and frameless, or Euro-style. Both methods are efficient and effective, and there is no structural reason to prefer one over the other—but there is a design difference.

Face-frame cabinets allow more space between the doors, with the frame itself creating a background field on which the doors “float,” as shown in Fig. 8. This means you have more flexibility with the overall pattern of the doors.

Frameless cabinets reveal little or nothing beneath or behind the doors, which must be quite close together. Either style can accept doors of any of the five types discussed so far, and they can be full overlay, rabbeted or flush.

How the door lies on the case and how it opens governs your choice of hinges; this decision must be made early in the design process. Nearly any configuration can be hinged somehow, but not all hinge styles can be made to work in all situations. ([See sidebar, page 54.](#)) Some hinge problems can only be solved by gluing hinge-mounting blocks onto the door or case.

A single door is a rectangle. More than one door creates a pattern of rectangles. Design the single door to be part of the pattern, and always draw the repeating pattern on paper before you commit to it. Sometimes a door that looks terrific on its own just doesn't work in multiples.

This means you must begin with the design of the wall: how will you break it up into individual doors? Multiple doors can be lined up horizontally, vertically, or in a formation. Will the case show through between the doors? How much of the frame shows? Is the frame flush with the door, or does it recede? How will the divisions within the door

relate to the overall pattern of the wall?

There's no shining path and there's no perfect door design, but if you take a systematic approach your efforts will pay off. Begin by drawing the overall space to be occupied by the cabinet or cabinets to scale, then divide it into doors. Do this by working back and forth between what you know about door openings and reach, and what you think looks comfortable. The next set of decisions determines how the door itself will look.

First decision—Is the door a flat rectangle or is it a framed panel? Dimension the door rectangle and the frame within it.

Second decision—Dimension the panel itself, its raised center field, its beveled edge, and any molding profiles, relative to the overall proportions of the door frame.

Third decision—Divide wide panels with a vertical muntin, or don't. Decide whether to detail the joint lines and consider further divisions into still smaller rectangles with additional rails and stiles.

Fourth decision—Study the visual composition and consider the width and thickness of the parts. Think about creating depth in order to manipulate light and shadow.

At this point you'll probably find it valuable to make up a sample door and see how it works. Consider the direction of the light and look at the door from various angles, as if you were approaching the cabinets and opening them up. The transition from designing on paper to designing in three dimensions is startling and powerful. It can lead you to break out of the box and discover new solutions. For example, you can turn the frame pieces on edge, instead of leaving them flat. Structurally the door is sound, but the difference in visual depth is, well, eye-popping. ▲

FIG. 8: CABINET TYPES

The type of cabinet construction—face-frame or frameless—affects the design of the doors. On face-frame cabinets, the doors reveal the underlying face frame, making it part of the overall appearance of the cabinet. On frameless cabinets, the doors hide the face of the cabinet completely.

FACE-FRAME CABINET



FULL-OVERLAY DOORS



RABBIT OR HALF-OVERLAY DOORS



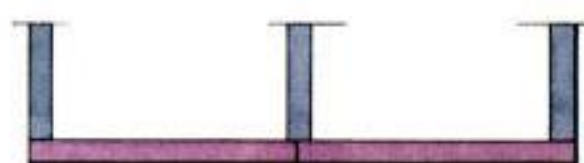
INSET DOORS



FRAMELESS CABINET



FULL-OVERLAY DOORS



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



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

A Guide to Cabinet

I was hoping the high-tech revolution would have swept through the hinge industry by now. I had envisioned a kind of cellular tele-hinge that could be downloaded from the Internet and installed with a few clicks of the mouse. Alas, I despair of this happening in our lifetime; but meanwhile, we can be sure of having a huge variety of cabinet-door hinges from which to choose.

The basic types of cabinet hinges are briefly described in the box at far right, on the opposite page. Many are available in different sizes and finishes (polished brass, statuary bronze, nickel plated, antique brass, etc.). You can choose hinges that open to only 100° or to as wide as 270°. Many of the styles offer self-closing versions that snap shut when they're open less than 35°. Butt hinges may come with or without decorative finials or ball tips.

You'll probably base your selection first on the type of cabinet (face-frame or frameless) and the way the doors hang on it (overlaid, inset or lipped). Then you'll consider the style of your cabinet. If your cabinet design is traditional or classical, you'll want a hinge that is compatible with that style—such as one whose barrel (or “knuckle”) peeks out from between the door and the case—or maybe a decorative hinge that shows in its entirety and contributes to the overall look of the cabinet.

On the other hand, if your cabinet design is contemporary, you might lean toward a totally concealed European hinge, or toward one that has just a pivot point showing, such as a knife hinge.

The drawings on the following pages show how the common hinge types are used with the various styles of cabinets and doors. If you're building your cabinets and doors from scratch, it's a good idea to select your hinges before you finalize plans.



DAVE FREEDMAN
is an associate editor
of *AMERICAN*
WOODWORKER.

HINGES FOR FACE-FRAME CABINET



WRAPAROUND

DECORATIVE



BUTT



TRADITIONAL

SOSSTM



BARREL



SOSSTM



CONTEMPORARY

ILLUSTRATIONS BY FRANK ROHRBACH

Hinges

by Dave Freedman

LIPPED OVERLAID



FACE FRAME



DECORATIVE



OVERLAID



FACE FRAME



FACE FRAME



FACE FRAME



PIN



EUROPEAN FACE FRAME



COMMON TYPES OF CABINET HINGES

Butt hinge: Screw into mating mortises in door and case; "no-mortise" butt hinges also available. Price: \$3 to \$30 per pair.

Wraparound hinge: Surface mounted. Price: \$2 to \$11 per pair.

Barrel (or "cylinder") hinge: Drill mating holes in the edges of door and face frame with metric brad-point bit; lock cylinders into holes with small screw or setscrew. Price: \$7 to \$13 per pair.

Decorative hinge: Surface mounted. Price: \$3 to \$35 per pair and up.

European hinge: Install hinge cup in 35 mm (1 3/8-in.) hole in back of door; attach to mounting plate screwed to inside of cabinet. Surface-mounted models available. Price: \$4 to \$20 per pair.

Face-frame hinge: Surface mounted. Price: \$1.75 to \$10 per pair.

Knife hinge: Screw into mortises in top and bottom edges of door. Price: \$3 to \$30 per pair.

Pin hinge: Usually surface mounted; may require saw kerf on back of door. Price: \$2.55 to \$5.50 per pair.

Soss™ hinge: Screw into routed mortises in door and face frame. Price: \$11.25 to \$14 per pair.

"Easy-on" hinge: Totally concealed; surface mounted. Price: \$2.20 to \$6 per pair.

(Continued on next page.)

HINGES FOR FRAMELESS CABINETS

TRADITIONAL

INSET



OVERLAID



WRAPAROUND



WRAPAROUND



BUTT



CONTEMPORARY

EASY-ON



EUROPEAN



KNIFE



EUROPEAN



EASY-ON



SOURCES

Cabinet hinges are available in a wide variety of sizes, styles and finishes from:

Ball and Ball

463 W. Lincoln Hwy.
Exton, PA 19341
(800) 257-3711 *Circle #610*

Crown City Hardware

1047 N. Allen Ave.
Pasadena, CA 91104
(818) 794-1188 *Circle #611*

Garrett Wade

161 Ave. of the Americas
New York, NY 10013
(800) 221-2942 *Circle #612*

Grizzly Imports, Inc.

Box 2069
Bellingham, WA 98227
(800) 541-5537 *Circle #613*

Horton Brasses

Nooks Hill Rd.
Box 95
Cromwell, CT 06416
(860) 635-4400 *Circle #614*

Imported European Hardware

4320 W. Bell Dr.
Las Vegas, NV 89118
(800) 779-7458 *Circle #615*

Lee Valley Tools Ltd.

Box 1780
Ogdensburg, NY 13669
(800) 871-8158 *Circle #616*

Paxton Hardware

7818 Bradshaw Rd.
Upper Falls, MD 21156
(410) 592-8505 *Circle #617*

Whitechapel Ltd.

Box 136
3650 West Highway 22
Wilson, WY 83014
(800) 468-5534 *Circle #618*

The Woodworkers' Store

4365 Willow Dr.
Medina, MN 55340
(800) 279-4441 *Circle #619*

Woodworker's Hardware

Box 180
Sauk Rapids, MN 56379
(800) 383-0130 *Circle #620*

Woodworker's Supply

5604 Alameda Pl. N.E.
Albuquerque, NM 87113
(800) 645-9292 *Circle #621*

Woodcraft

Box 1686
Parkersburg, WV 26102
(800) 225-1153 *Circle #622*

Build a FOLDING SCREEN

Divide a room and delight the eye in Japanese style

by Cliff Nathan

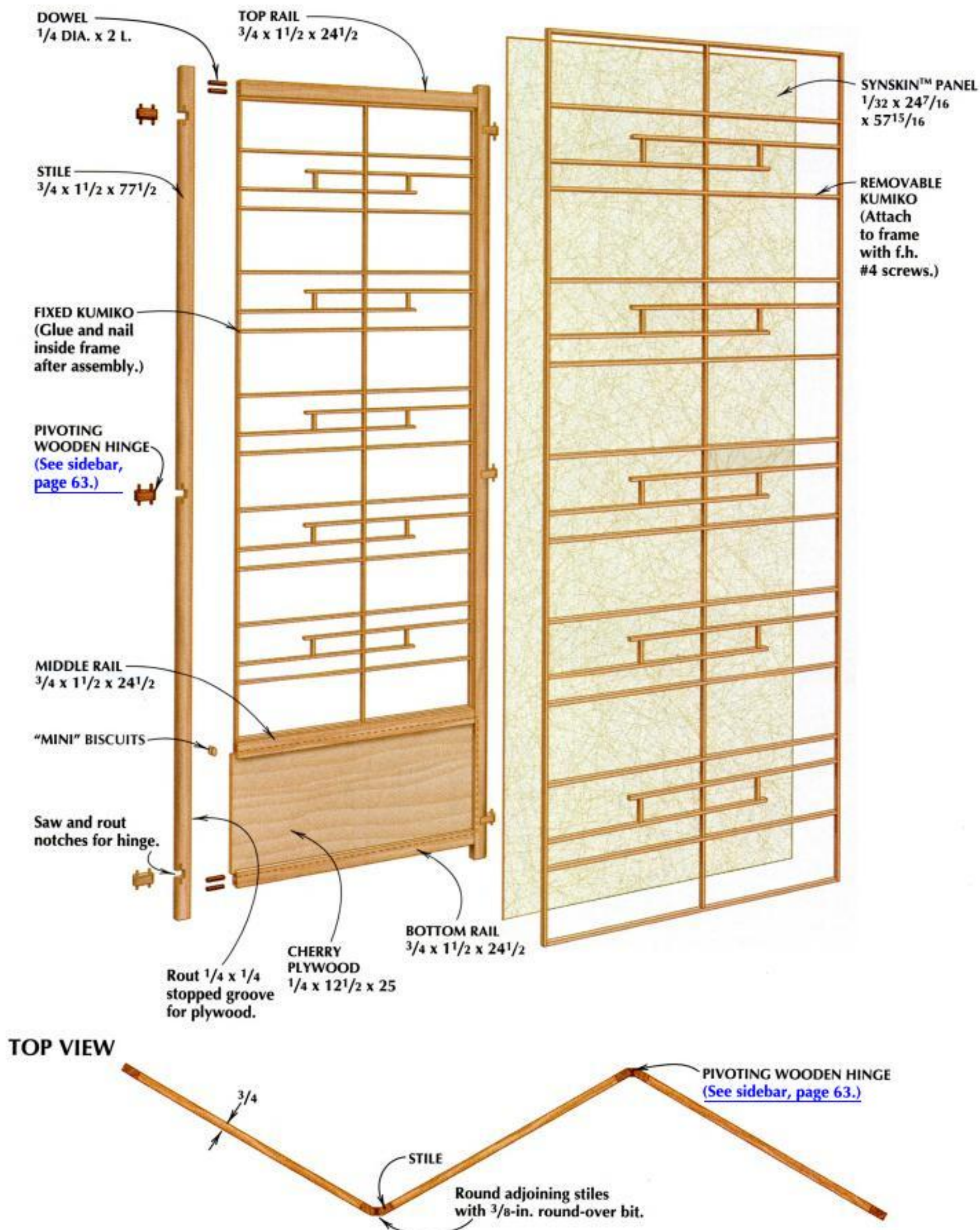


A few years ago, when we decided to redecorate our home, we added some Japanese touches to mix with our Western furnishings. This gave me the chance to try my hand at making *shoji*, a traditional Japanese furnishing consisting of wooden frames that hold a delicate wooden latticework and translucent paper. When light plays over and through the surface of the *shoji*, the effect is wonderful. I ended up making several window and door treatments and discovered that I could

Function and beauty. This folding screen allows light to play on and through its surface, and can be placed anywhere that privacy or a division between spaces is needed.

FIG. 1: FOLDING SCREEN

This free-standing screen is made up of three identical frames connected by special hinges. (See sidebar, pages 62-63.) In each frame, two identical *kumiko* latticework assemblies sandwich a layer of fiberglass Synskin™. One kumiko is fixed to the frame with glue and nails; the other kumiko is attached with screws after the Synskin™ sheet is installed.



use power tools and a few jigs to speed up the process. When a client asked for a folding screen in the shoji style, I built the screen shown here using the techniques I had learned.

My folding screen can be used anywhere you want to create privacy or divide a room. Each section of the three-piece screen consists of a frame, a kick panel to withstand possible damage by pets, children or an errant foot, and two identical inset frames of latticework. (See Fig. 1.) The Japanese call this latticework *kumiko*. Between the two *kumiko* is a sheet of Synskin™, a translucent material made from fiberglass. (See Sources.) Rice paper would be used in an authentic shoji screen, but Synskin™ is more durable and easier to work with. Each frame is connected to an adjoining frame via pivoting wooden hinges that allow the frames to rotate 360°. (See sidebar, page 63.)

When designing the screen, I took a minimalist approach: I wanted the elements of the screen as thin as possible for weight considerations, without sacrificing strength and visual interest. I chose cherry for the screen because of its durability, relatively light weight and warm color. To determine the size of the rectangles for the latticework, I referred to books on Japanese style. (See Sources.) I discovered that size was determined by the designer's sense of proportion, the finished size of the screen, and by the compatibility with the room it was intended for.

Making the Kumiko

The first order of construction is making the *kumiko*. The individual pieces fit together with half-lap joints.

To ensure that all joints line up accurately when the *kumiko* is assembled, I dado wide boards that are thicknessed to finished dimension, then rip individual members from the board. I resaw 6-in.-wide stock for this, thickness-planing it to $\frac{3}{8}$ in. thick. I also make sure the boards are about 2 in. longer than the finished dimensions of the *kumiko*.

To cut the dado joints for the half-laps shown in Fig. 2, I equip my radial-arm saw with a $\frac{1}{4}$ -in.-wide dado blade. I make an auxiliary fence for my radial-arm saw with four dados corresponding to the various *kumiko* spacings. To index the dado cuts so that the spacings are exact, I place a $\frac{1}{4}$ -in.-thick indexing stick in the appropriate fence dado and make the cut. (See top photo, above.)



Indexing jig for dados.
Cut dados in a wide board, using an indexing jig on the radial-arm saw to accurately space the joints. Then rip individual *kumiko* pieces from the board.



Quick clamping.
Assemble the *kumiko*, then clamp the joints at the sides and corners.

On the longer vertical *kumiko* pieces, I make a $\frac{1}{2}$ -in.-wide dado on the end of each board. This extra dado width makes it easier to fit all the pieces together during assembly. Then I place the indexing stick in the appropriate slot in the fence, position it against the previous dado, and cut the next dado. I repeat this process for the remaining dados, remembering to move the indexing stick into the appropriate slot in the fence when necessary. When I reach the last dado on the board, I make a second pass to widen it to $\frac{1}{2}$ in.

I use the same indexing method on the long horizontal *kumiko* parts, again with $\frac{1}{2}$ -in.-wide dados on the ends of the boards. When dadoing the horizontal parts, don't forget to flip the board

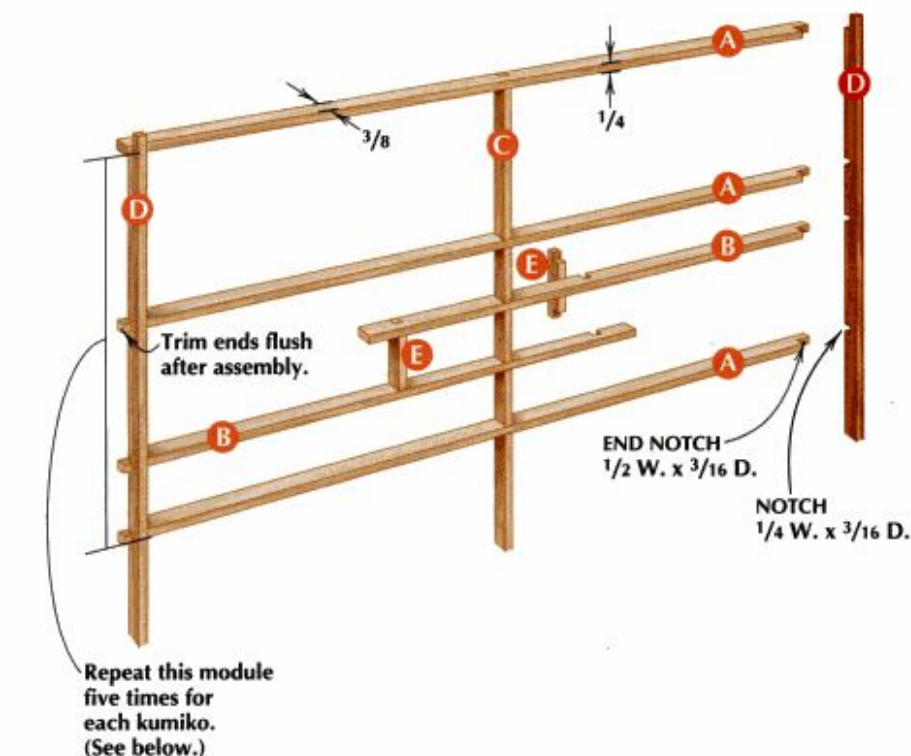
over after the first dado, then flip it again for the final dado. (See Fig. 2.)

Dadoing the short horizontal *kumiko* parts is similar to dadoing the longer pieces: Use the same indexing method, but cut a $\frac{1}{2}$ -in.-wide dado only on one end; leave the opposite end square. On the short vertical *kumiko* parts, I lay out the dados and cut them freehand on the saw.

Once you've cut the joints, rip the *kumiko* parts into individual strips. I use a bandsaw to rip the strips slightly oversize, then I thickness-plane the *kumiko* parts to final width, taking light cuts and orienting the grain of each strip to minimize tearout. Check that the strips are the correct width by fitting two *kumiko* parts together with hand pressure.

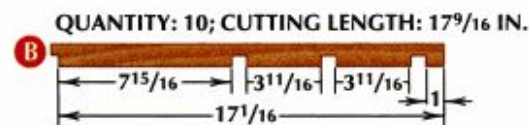
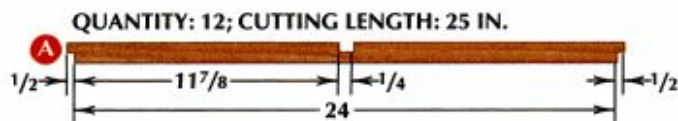
FIG. 2: KUMIKO LAYOUT

Each kumiko assembly consists of a repeating pattern, or module, of 1/4-in. by 3/8-in. vertical and horizontal members connected at glued half-lap joints. Cutting lengths shown below include extra material at the ends for trimming after assembly.

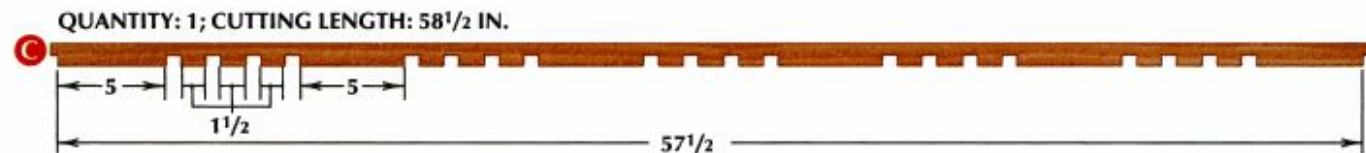


HORIZONTAL PARTS FOR ONE KUMIKO

Note: Parts not drawn to scale.



VERTICAL PARTS FOR ONE KUMIKO



Assembling the Kumiko

With the joinery done, you can assemble the kumiko. Use a large, flat surface for this. Each dado gets a BB-sized dab of glue. Use a 1/4-in.-wide brush to spread the glue in each dado, then press the horizontal kumiko into the vertical kumiko. A light tap with a mallet at each joint will ensure the pieces are fully interlocked.

Once the joints are assembled, you'll need to clamp them at the corners and along the sides of the frame. (See bottom photo, previous page.) When the glue has dried, I trim the protruding ends with a Japanese *dozuki* saw, but any fine-toothed saw will work. Then I plane a slight bevel on the inside edge of the kumiko with a block plane. This bevel allows easier installation when it comes time to install the kumiko in the screen frame.

Making the Frames

I use the finished kumiko to determine the exact length of the screen's stiles and rails. This is important because slight discrepancies in joint spacings will affect the overall height and width of the kumiko when it's assembled.

Cut the rails and stiles to length, then consider your hinging options. (See sidebar, pages 62-63.) I use wooden hinges for this screen, so my next step is to round over the edges of the stiles and notch them for the hinge bodies.

At this point I prepare the 1/4-in.-thick cherry-plywood panels for the lower frame openings. I cut sequential panels from a single sheet of plywood so the grain pattern is continuous from frame to frame.

Since most 1/4-in.-thick hardwood plywood comes with only one good face, I cover each non-show face with cherry veneer. You can use regular veneer and



Drilling for dowels. The author uses a pair of homemade jigs to drill pairs of dowel holes in the stiles and rails. Metal drill bushings guide the bit.



Tiny biscuits. Ryobi's "mini" biscuit joiner is handy for joining the narrow middle rail. Cut double slots in the rail and the stiles.

glue it to the panels using a conventional veneer press or a vacuum bag. (For more on these techniques, see AW #42.) Or you can do as I do: I buy paper-backed veneer, available from Constantine's (800-223-8087) and use contact cement to glue it to the panels.

Next, rout the stopped grooves in the stiles and the rails for the plywood panels. I do this work on the router table with a 1/4-in. straight bit. If your panel is thicker than 1/4 in., you'll have to rout the grooves wider by adjusting the fence and taking a second pass. Draw stop marks on the workpiece and the router-table fence as a guide when routing the grooves. (See Fig. 1.)



Shim and sand. Use strips of Synskin™ as spacers when installing the removable kumiko. Then sand the kumiko flush to the frame.

Joinery for the frame comes next. I use dowel joints to join the top and bottom rails to the stiles, and I use biscuits to join the middle rail.

A couple of homemade doweling jigs enhance both speed and accuracy when drilling the dowel joints. (See left photo, above.) Each jig holds a pair of 1/4-in.-dia. metal drill bushings, available from Woodworker's Supply (800-645-9292). I mark the exact frame locations on my stock, align these marks with marks on the jigs, and clamp the two together for drilling.

My choice of biscuits to join the middle rail to the stiles gives me some vertical leeway when installing the rail, because

biscuits have some lengthwise "slop" in their slots. This adjustment is critical for the rail to fit tightly against the kumiko. Since the middle rail is only 1 1/2 in. wide, standard biscuits would be too large to use here. Instead, I use Ryobi's new "mini" biscuit joiner and tiny 1-in.-long biscuits. (See photo, left.)

Once you've cut the joints in the frame, dry-assemble each frame with the lower panel and both kumiko. Make any necessary adjustments; then spread glue in the panel grooves and on the joints, and glue up the frame and panel on a flat surface.

Installing the Kumiko

Once the glued-up frames come out of their clamps, you're ready to install the two kumiko. I glue and brad one of the kumiko to each frame, then I screw the second kumiko in place. This feature allows me to replace the Synskin™ panel if it becomes soiled or damaged.

I use an air-powered brad nailer to secure the permanent kumiko flush with one side of the frame. Brads driven by hand through pre-drilled holes will also work. When the glue has dried, I use 120-grit sandpaper in a random-orbit sander to level the stile-and-rail joints and even up the kumiko with the frame.

To drill for the screws that secure the removable kumiko, I set it into the frame with some 1-in.-wide strips of Synskin™, separating it from the fixed kumiko. Then I drill and countersink holes every 10 in. around the perimeter and attach the kumiko with #4 flat-head brass screws. This kumiko protrudes slightly above the frame's surface, so I



Attaching the skin. Secure the Synskin™ to the fixed kumiko, using staples every 10 in. around the perimeter.

HINGES FOR SCREENS

Folding screens present a unique hinging problem. They must be able to pivot in both directions and fold flat when not in use. Here are three solutions:

LACED HINGE



Swing on a string. Ordinary shoelace runs through a series of holes, allowing adjacent stiles to pivot 360°.

This simple laced hinge is my version of a traditional Japanese screen hinge. It consists of a single length of shoelace, nylon cord or leather strip woven through a series of six holes drilled in the adjacent stiles. (See drawings, right.) I prefer 1/4-in.-wide tennis shoelace, which I color with vegetable dye to match the wood I'm using. For a full-height screen, I usually use three hinges at each panel joint.

There's an important consideration with this type of hinge: To allow access to the hinges after the screens are assembled, you'll have to make all the kumiko removable and install any solid panels by means of moldings screwed onto each side. That way, you can glue up the outer frames, hinge them together and install the panels last.

sand it flush to the frame with a random-orbit sander, again using 120-grit sandpaper. (See bottom left photo, previous page.)

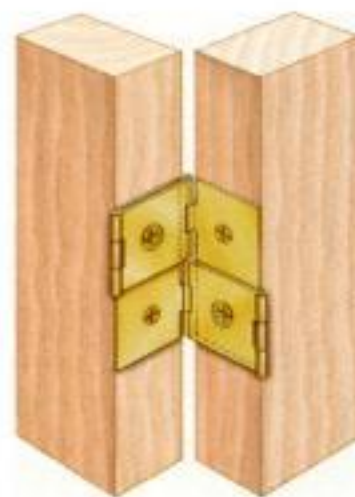
Finishing Up

With all the parts made, it's time to apply a finish to the screen. I spray on a water-white sanding sealer and flat lacquer to finish the screen, but any finish will suffice.

When the finish is thoroughly dry,

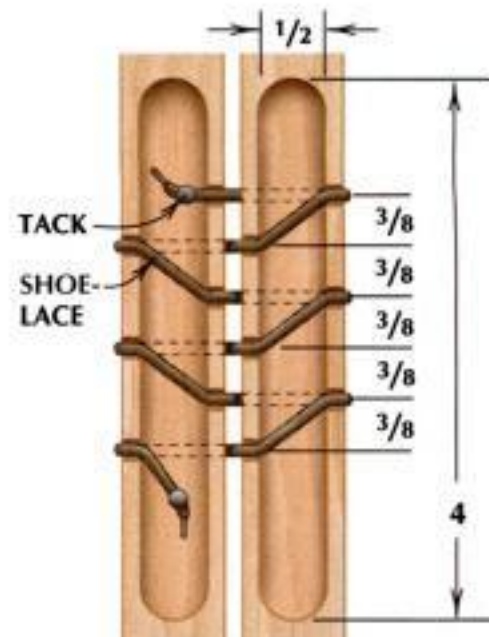
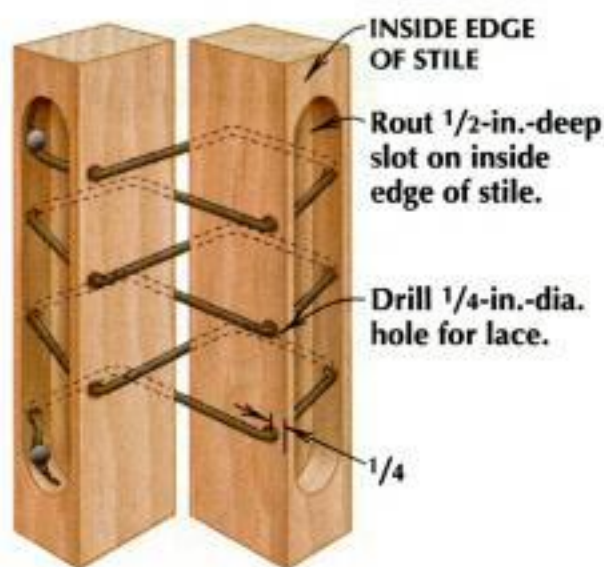
METAL DOUBLE-ACTION HINGE

The simplest hinging solution is the stock screen hinge. Available at hardware stores, these brass-plated metal hinges fit stiles up to 1 in. thick. They allow the screen panels to fold flat in either direction. Hinges may be surface mounted (shown) or mortised flush with the edges of the stiles.



HOW TO LACE THE HINGE

The laced hinge is easier to make than it looks. First you rout 1/2-in.-wide slots in the adjacent stiles, then drill holes into the slots from the faces of the stiles as shown in the drawings. Thread the lace from top to bottom, inserting one end through the top hole in the left stile, then running it through the adjacent hole in the other stile. Once you've laced the holes, pull out any slack and tack the ends in the slot. The tacked ends are concealed within the stile of the screen.



you're ready to install the cloth or paper. Traditional shoji makers use *washi*, a fragile Japanese rice paper. (See Sources.) I prefer the Synskin™ because it closely resembles washi yet is strong, unaffected by the sun, and easy to clean. *Caution: Because Synskin™ is made from fiberglass, be sure to wear gloves when handling it.* Other materials such as silk or cloth would work well for this screen; but like rice paper, they require stretching and gluing to the kumiko.

Installing the Synskin™ is simple. I cut a piece about 1/16 in. smaller than the outside dimension of the kumiko and use an upholsterer's air stapler to attach it to the glued-on kumiko. The fiberglass cloth is stiff, so it only takes a few staples to attach it—one in each corner and one every 10 in. or so along the outside edge of the kumiko. A hand-operated staple gun would work, or a few dabs of epoxy would do in place of staples. (See photo, page 61.) Once the

WOODEN HINGE

I like this hinge best. It can be made to fit any frame thickness, and it adds a subtle, organic touch.

To make the hinges operate properly, you need to round over the stiles where the hinges will go. (See Fig. 1, page 58.) I use the router table and a $\frac{3}{8}$ -in. round-over bit for this, making passes on both sides of the stock.

Next, I cut notches in the edges of the stiles on the radial-arm saw with a $\frac{1}{2}$ -in. dado blade. (See drawing, below.) Then I rout the slots for the dowels using a laminate trimmer equipped with an edge guide. Clamps on each side of the router act as stops as I cut the slots. (See photo, right.)

To make the blocks, I start with 5-in.-wide stock and round over the edges on the router table with a $\frac{3}{8}$ -in. round-over



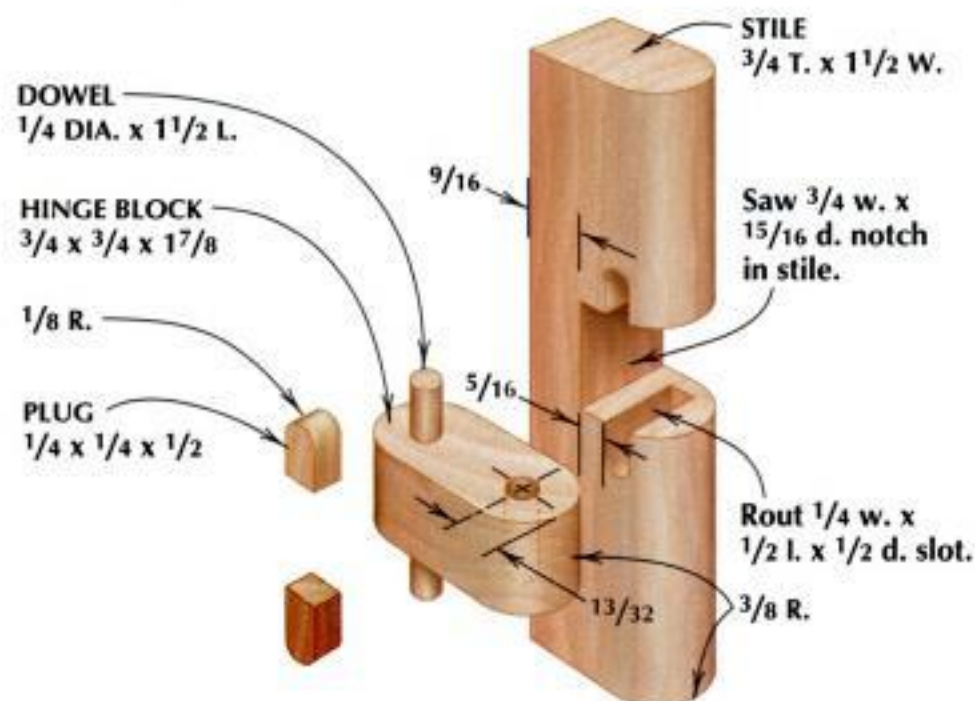
The finished hinge. This wooden block hinge pivots on dowels captured in slots routed in the adjacent stiles.

Routing a slot. Use a router equipped with an edge guide and a straight bit to rout the slot for the hinge pin.

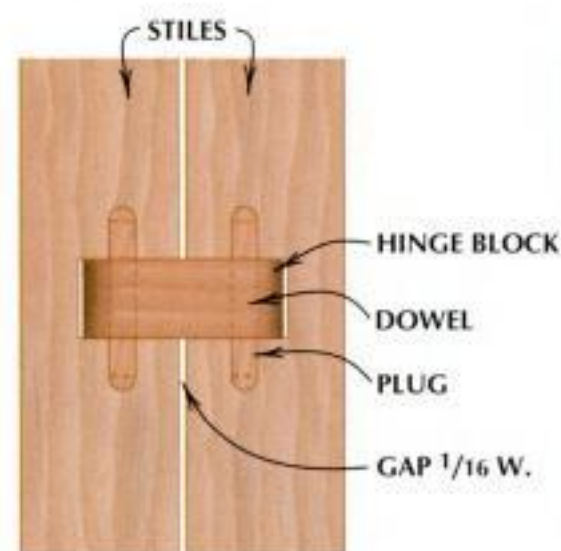


WOODEN HINGE ANATOMY

This wooden hinge consists of a hinge block drilled to hold two dowels. The block fits in notches cut in adjoining stiles, and the dowels fit in slots routed perpendicular to the notches. The block pivots on the dowels, allowing the stiles to rotate 360°. Glue wooden plugs in the slots to keep the dowels in place.



THE ASSEMBLED HINGE



Synskin™ is attached, screw the remaining kumiko to the frame and you're done. ▲



CLIFF NATHAN
is a woodworker and aficionado of Japanese style. He lives in southern California.

SOURCES

Synskin™ translucent fiberglass cloth is available from Abe Schuster Fiberglass, (510) 653-3588. Circle #601

Rice paper, or washi, is available from Highland Hardware, (800) 241-6748. Circle #602

The following books have more information on Japanese design:

The Japanese House by Heinrich Engel (1964, Charles E. Tuttle, Rutland, VT)

A Japanese Touch for Your Home by Koji Yagi (1982, Harper and Row, East 53rd St., New York, NY 10022)

Japanese Style by Suzanne Slesin, Stafford Cliff and Daniel Rozensztroch (1987, Clarkson N. Potter, Inc., 201 East 50th St., New York, NY 10022)

Elements of Style

Definitive forms from furniture history

The Shaker Round Stand

by Susannah Hogendorn

Solid wood top.

Chamfered rectangular cleat holds top to base.

Federal-style urn-shaped pedestal, but no decorative beads or grooves.

Grain runs diagonally for strength.

Legs dovetailed into post and fastened with iron plate.

"Spider" leg is simpler version of reverse S-shaped leg.

ROUND STAND c. 1820-1830

Cherry with red stain, iron.
25 $\frac{1}{4}$ in. x 17 in. x 17 $\frac{5}{8}$ in.

Round stands were a common furniture form in the 1700s and 1800s. Shakers lightened and simplified the design.

From the late 1700s to the early 1900s, the people called Shakers built some of the finest furniture in America. Strong, time-tested joinery methods allowed them to experiment with lightweight forms. And a prohibition on ornament encouraged them to decorate with natural wood figure. The resulting furniture is extremely sturdy but elegant—a fine example for woodworkers even today.

Shaker Life

In 1774, "Mother" Ann Lee and a handful of followers brought the Shaker faith to America from England. In the giddy early years of the Republic, Lee's radical message—the second coming of Christ, heaven on earth, and equality between the sexes—won many adherents. By 1787, the first self-sufficient Shaker community was established in New Lebanon, NY. Others soon popped up across New England, and in Ohio and Kentucky.

Shaker men and women lived in celibate "Families" of up to 100 people. Simplicity and hard work were the rule. Family members toiled in the fields or workshops during the day, and gathered for meals and worship before retiring to separate dormitories.

Special thanks to John Kassay, and to Sally Morse Majewski at Hancock Shaker Village

Furniture Developments

According to expert John Kassay, Shaker furniture falls into three periods.

"Primitive" furniture was produced from 1790 to 1820, a time of rapid growth. Most furniture was built out of necessity: beds, storage cabinets and long, communal benches and tables. It was plain and often crude, even nailed together. These pieces were most often made of pine or maple and painted shades of blue, red or yellow.

The second or "classic" period stretched from 1820 to 1860. Especially in the Eastern settlements, Shaker craftsmen developed a rigorous emphasis on quality design and construction. They strove to build furniture good enough (and simple enough) for heaven, borrowing only the best and simplest elements from worldly styles.

For instance, they borrowed cabriole-type legs from Queen Anne and Chippendale furniture but lightened them, forsaking fancy carvings. (See drawing, right.) The tripod candlestand—or "round stand," as Shakers called it—is an excellent example of the classic Shaker style. (See photo, opposite).

Religious rules relaxed slightly during this period, and the Shakers started to experiment with figured woods. Flame cherry and bird's-eye and tiger maple were favorites. Shakers accentuated the wood's natural beauty with colored stains made from thinned paint, as found on the stand opposite, or with clear varnishes, which they rubbed out with pumice to avoid a "fancy" gloss.

Toward the end of the classic period the Shakers built their first factory at

New Lebanon, where they produced their famously sturdy, lightweight chairs. Shakers had no quarrel with mechanization—in fact, a Shaker woman pioneered the circular saw—and their state-of-the-art factories helped spread the Shaker style to the outside world. Many of these mass-produced chairs still survive today.

But despite (or perhaps because of) their worldly success, the Shakers faced a decline of membership and values after the Civil War. Thus began the third period. Many craftsmen seemed to lose their sense of simplicity. They built more customized pieces—such as sewing desks for individual Shaker sisters. Sometimes they even decorated these pieces with moldings, raised panels, and arches—a style called "Victorian Shaker." They also used darker woods such as walnut, or finished their work with darker stains and varnishes.

Though the Shakers continued to make some classic-style furniture until the 1940s, they never regained the greatness of that earlier period. Fortunately, the Shakers cared for their furniture as carefully as they built it, and many fine examples still survive in museums and restored communities. (See the list below.) ▲



SUSANNAH HOGENDORN
*is assistant editor
of AW.*

FOR MORE INFORMATION

BOOKS TO READ:

The Book of Shaker Furniture,
by John Kassay (1980, UMass Press)

Religion in Wood,

by Edward Deming Andrews and Faith Andrews (1966, Indiana University Press)

Shaker Design,

by June Sprigg (1986, Whitney Museum of American Art)

PLACES TO VISIT:

Canterbury Shaker Village,
288 Shaker Rd., Canterbury, NH 03224,
(603) 783-9511

Hancock Shaker Village, Box 927,
Pittsfield, MA 01202, (800) 817-1137

Shaker Historical Society,
16740 S. Park Blvd., Shaker Heights,
OH 44120, (216) 921-1201

Shaker Museum, 88 Shaker Museum Rd.,
Old Chatham, NY 12136, (518) 794-9100

Sabbathday Lake Shaker Museum,
707 Shaker Rd., New Gloucester,
ME 04260, (207) 926-4597

Shaker Museum, Box 30, South Union, KY
42283, (502) 542-4167

EVOLVING LEGS

The Shakers borrowed from earlier, fancier period-furniture styles but simplified them greatly. Tripod table legs are a good example.

CHIPPENDALE (1760-1790)



FEDERAL (1795-1810)



CLASSIC SHAKER (1820-1860)



Shopping for CAD

Advice from experts on choosing a computer-aided design program

by Susannah Hogendorn

No more paper trail. With a computer-aided design or "CAD" program, you can refine and redesign as often as you like, without tedious redrawing. When you're done, just print the drawing and voilà—you're ready to build.



Not so long ago, designing a project meant a major time investment. Either you spent hours hunched over the drafting table and wasted reams of paper, or you spent weekends cobbling up scrap prototypes out in the garage. Many woodworkers still operate somewhere in the middle.

But now there's another option: CAD, or computer-aided design. CAD programs let you design and dimension a project with no mess and no tedious redrawing. Once you take the time to learn a CAD program, you can produce neat-looking drawings quickly—with accurate dimensions virtually guaranteed. The best news of all: While high-end CAD programs can cost thousands of dollars, there are quite a few mid-range programs priced from around \$100 to \$900 that are plenty powerful for woodworkers.

For this article we talked to amateur and professional woodworkers who use these mid-range programs. Here we'll look at what CAD veterans like about their programs; the features commonly found in mid-range CAD software; and how to pick a program that meets your needs. We've also included a chart with information on 15 popular CAD programs priced from \$80 to \$895. (See page 69.)

ILLUSTRATIONS BY LEN EPSTEIN

The Power of CAD

If you've never designed your own project, CAD is a great way to start. "I learned woodworking from my father. But one skill I *didn't* inherit from him was his ability to build things without a good measured drawing," admits Vincent Centanni, an amateur woodworker who uses AutoSketch. "Now that I use CAD, I can turn my own ideas into detailed plans, complete with dimensions. The end result is much more rewarding than merely following someone else's 'recipe.'" (See drawing and photo at right.)

Three-dimensional CAD programs are especially useful for beginners—they let you view a project from any side. This way, you can take your project for a test run before you prepare a single piece of wood.

And even if you're a seasoned designer, you can spend less time doing math, making changes and fixing errors—and more time in the shop. "The highly accurate dimensioning tools have helped me a lot," comments Richard Farwell, a custom furniture maker who uses MiniCad. "I recently built a display cabinet with a curved glass front. To bend the glass, the glass company needed measurements I didn't know. My CAD program gave me all the measurements I needed."

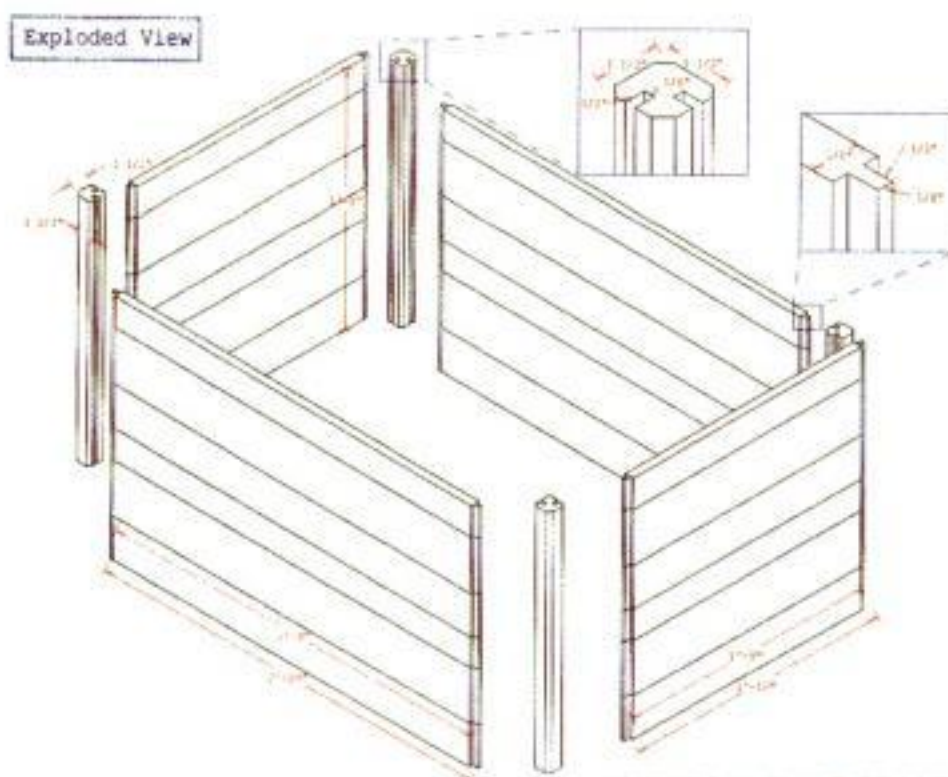
"The computer doesn't make addition errors," adds Rick Caldwell, an amateur woodworker who uses both TurboCAD and CAD/Draw. And mistakes are easy to correct.

CAD can also eliminate some tedious aspects of shop work. "In my business," says Tom Brown, a DataCad user, "we frequently produce pieces with complex curves. Before CAD, this was a major hassle. Now I can generate the templates I need in CAD, print them out at full scale and use them to make the wooden ones."

CAD can also help pros impress clients with neat, accurate presentation drawings. And you can modify designs on a whim in a matter of minutes.

Using CAD

CAD borrows some lingo from traditional drafting, but the experience is radically different. To draw a picture in CAD, you open a new document—your "paper"—and get out your onscreen "toolbox," or "palette," of tools. By selecting different tools and moving your mouse around, you can



Design it yourself. Amateur woodworker Vincent Centanni designed this toybox himself, using the CAD program AutoSketch.

draw all kinds of lines and shapes on the screen automatically—including ellipses, which are difficult to draw by hand. And there's a nearly infinite variety of ways to edit your work. Below are a few common features of mid-priced CAD programs.

Different ways to draw—You can draw with a mouse or enter dimensions, angles, etc., using the keyboard. "When I'm just beginning to design a project, I draw claylike blocks, or 'extrusions.' I join, tug and pull these with the mouse until they reach the size I want," explains John Kelsey, who uses the 3D program TriSpectives. The keyboard comes in handy for the later stages of design. "Entering the numbers guarantees accuracy on small details," explains Steve Rietfors, who uses MacDraft. CAD programs also let you "zoom in" on small details.

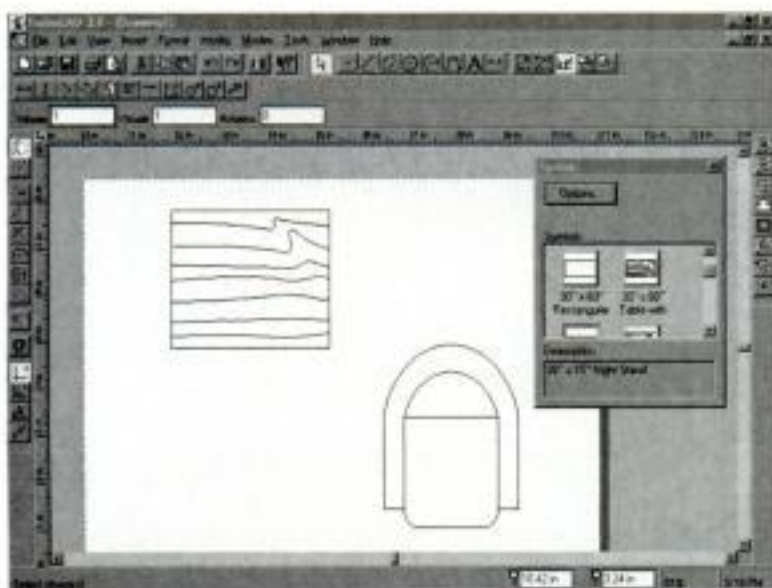
Working to scale—All the programs shown on page 69 have "grids" you can choose to scale a project, much like graph paper. You can "snap" lines or objects exactly to the grid, so their measurements are super-accurate. Or you can temporarily override the grid for in-between measurements.

Basic editing tasks—Common computer editing tools, such as cutting and pasting, eliminate the need to draw the same thing twice. With the "mirroring" tool you only draw half of a symmetrical object—the computer "mirrors" the



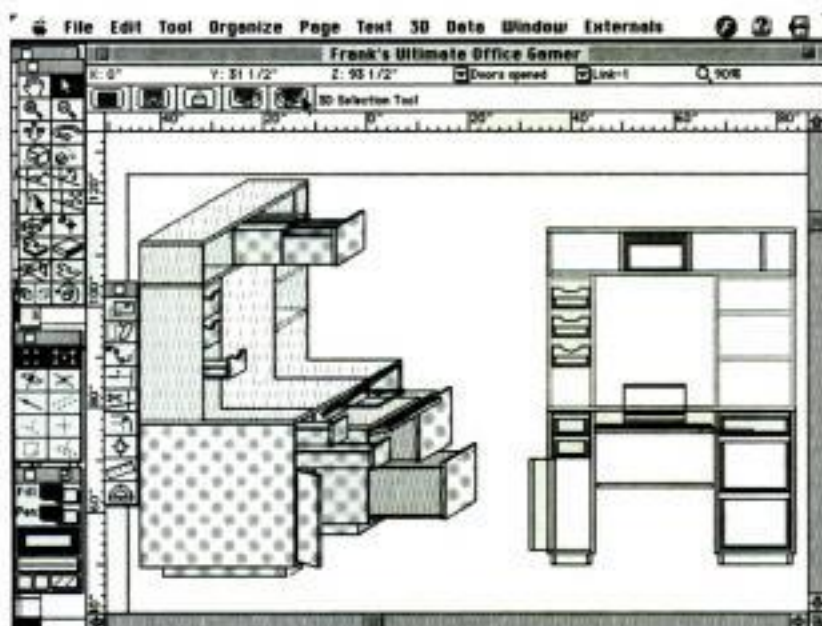
other. Other editing tools let you automatically add fillets and chamfers. And the "undo" function is a real lifesaver anytime you make a mistake onscreen.

Beyond cutting and pasting—Some CAD programs include "libraries" of symbols commonly used in architecture and other fields—though not woodworking. Even more useful is the option of making your own symbol libraries. This lets you save any drawing or part of a drawing as a symbol in a convenient, pop-up toolbox. When you want to reuse the symbol, just open the toolbox and drag-and-drop the symbol into your new drawing. (See top screen, page 68.) "I've developed a library of molding profiles for which we have knives, as well as for door styles and details we use frequently. Many of my drawings are now cut-and-paste, using predrawn symbols," explains Brown. All the programs in the chart let you make your own symbol libraries.



A library at your fingertips. Symbol libraries are a special kind of toolbox—click on a library symbol, “drag” it to your drawing, and the drawing element “drops” into place. Shown: TurboCAD.

The layered look. With a mid-priced CAD system you can display your drawing in layers—so you can view the inside of a cabinet while you’re working on the outside. Shown: MiniCAD.



Grouping objects together—CAD programs offer different ways to group objects in a drawing together. *Layering* is the most common. (See lower screen, above.) “It’s like drawing with onion-skin paper: You can put different parts of your drawings in different layers, and you can see the drawings on the paper below the sheet you’re working on now,” explains Farwell. All the programs in the chart have at least 256 layers—more than enough for wood-working uses.

Dimensions—Good CAD programs have *associative dimensioning*—if you change the length of a line, its dimension label will automatically change to match it. You’re free to think about design, not about re-entering dimension numbers whenever you make a minor change. All the programs in the chart have associative dimensioning. *Implicit dimensioning* means you can display the exact dimensions of a line by simply clicking on it.

With any of the programs shown opposite, you can also add dimension type to your drawings—as on the illustrations in *AMERICAN WOODWORKER*. Print your masterpiece and you’re ready to make some sawdust.

Printing—You can size your drawing sheet to match your printer paper, or use *autotiling*, which allows you to print a big drawing on several sheets of paper. Tape the sheets together and you have a full-size drawing that you can use as a template.

All the programs in the chart except TriSpectives have autotiling. If you want to print an entire full-scale drawing on a single, large sheet of paper, you’ll have to invest in a *plotter*, a specialized printer that costs \$500 and up.

Choosing a Program

How do you find the right program for you? Look for the features discussed above. And consider the following:

Price—Beware of so-called CAD software that retails for \$50 or less. These low-end programs are generally adequate for arranging your living-room furniture—but don’t expect them to do detailed drawing and dimensioning easily.

On the other hand, buying a mid-range CAD program—like the ones shown opposite—is a lot like buying a car. You can get a 2D package fully loaded with features for the same price as a stripped-down 3D program.

A TECHNOPHOBE’S COMMENTS ON CAD

Drawing on a computer isn’t my cup of tea. I’ve been fiddling with CAD programs on and off for a year now and still don’t have a finished drawing. It’s not for lack of trying. I’ve spent hour after hour in front of the tube with only bleary, bloodshot eyes to show for my time. The simple truths of the matter are:

- **CAD programs are complex** and take a LONG time to learn.
- **CAD programs are not intuitive.** You have to learn to think the way the computer wants you to think.
- **CAD programs are expensive.** You can buy some pretty slick drafting tools for the same price or less. Throw in the cost of the computer, printer, additional memory (the list goes on) and you just may require a mortgage.
- **Drafting tools are friendlier** (please pass the eraser) and faster for most drawing tasks.

But they tell me that CAD is the wave of the future so I keep trying to learn. Some day I’ll get it—I’m determined to win. But until then, I’ll keep my drawing board handy.

—Amir Fahzahd

System requirements—Check the system requirements listed in the chart to make sure that your planned computer setup will be adequate.

2D or 3D? You can draw an object to “look” three-dimensional in a 2D program, but you can only view it from one side—the side you drew. In a 3D program, you can view an object from any angle.

Importing and exporting—Different CAD programs can import, or “read,” and export, or “write,” different file types. If you do cooperative projects with other woodworkers or suppliers, make sure your program can support their file types.

For instance, if you will be exchanging drawings with a business that uses the high-end program AutoCAD, your own CAD program should be able to read and write AutoCAD’s DWG or DXF file types. (See the specifications in the chart.) Some manufacturers offer “translator” packages at extra cost to do this.

Mid-Range CAD Programs

	Name, Publisher & Phone Website	Suggested Retail Price	2D or 3D	AutoCAD File Type Support*	Free Tech Support	System Requirements
DOS OR WINDOWS COMPATIBLE	AutoCAD LT Autodesk, (800) 964-6432 http://www.autodesk.com	\$495	2D	DXF, DWG	30 days	386 or better; WIN or WIN 95; 8 to 16 MB RAM; color VGA monitor.
	AutoSketch v.2.x Autodesk, (800) 598-0119 http://www.autodesk.com	\$129	2D	DXF, writes DWG	30 days	386 or better; WIN or WIN 95; 4 MB RAM.
	CorelCAD Corel (800) 772-6735 http://www.corel.com	\$895	3D	DXF, DWG	30 days	Pentium; WIN 95 or WIN NT; 24 MB RAM; CD-ROM; color monitor.
	Corel VisualCADD Corel (800) 772-6735 http://www.corel.com	\$495	2D	DXF, DWG	30 days	486 or better; WIN 95 or WIN NT; 16 MB RAM; CD-ROM drive; color monitor.
	DataCAD 7 DATA CAD LLC (800) 394-2231 http://www.datacad.com	\$250	3D	DXF, DWG	30 days	386 or better; math coprocessor; DOS; 4 to 8 MB RAM; color monitor.
	DesignCAD 2D v.8.0 ViaGrafix Corp. (800) 233-3223 http://www.viagrafix.com	\$350	2D**	DXF, reads DWG	Unlimited	486 or better; WIN 95; 4 MB RAM; color monitor.
	Drafix CAD Pro v.4 Softdesk Retail Products (800) 231-8574 http://www.softdesk.com	\$695	2D	DXF, DWG	Unlimited	486-DX 50 or better; math coprocessor; WIN 95; 8 MB RAM; color VGA monitor. Also available for WIN 3.1.
	TommySoftware CAD/Draw 4 Level 1 TommySoftware (800) 275-9406 http://www.tommysoftware.com	\$80	2D***	DXF	Unlimited	386 or better; WIN 95 or WIN NT; 4MB RAM; CD-ROM drive.
WIN OR MAC COMPATIBLE	TriSpectives Technical 2.0 3D/EYE, Inc. (800) WIN953D http://www.eye.com	\$500	3D	DXF	30 days	486 or better; WIN, WIN 95, WIN NT; 16 MB RAM; CD-ROM drive; color monitor.
	Ashlar DrawingBoard Ashlar (800) 206-4075 http://www.ashlar.com	\$175	2D	DXF	Unlimited	Mac II or better, PowerPC; math coprocessor; System 7; 8 MB RAM. 386 or better; math coprocessor; WIN 3.1, WIN 95 or WIN NT; 8 MB RAM.
	MiniCad 7 Diehl Graphsoft (800) 873-5085 http://www.diehlgraphsoft.com	\$795	Both	DXF, DWG	18 months	Mac or PowerPC; System 7; 16 MB RAM. Pentium; WIN 95 or WIN NT; 16 MB RAM.
MAC COMPATIBLE	TurboCAD 2D/3D v.4.0 IMSI (800) 833-8082 http://www.imsisoft.com	\$100	Both	DXF, DWG	Unlimited	486 or better; WIN 95; WIN NT 2.0; 8 MB RAM; color monitor. Version 3.0 also available for Mac.
	MacDraft 4.22 Microspot USA, Inc. (800) 622-7568 http://www.microspot.com	\$249	2D	Writes DXF	Unlimited for current version	Mac or PowerPC; System 7; 2 MB RAM.
	PowerCADD v.3.0 Engineered Software (910) 299-4843 http://www.engsw.com	\$795	2D	DXF	Unlimited	PowerPC; System 7; 4 to 8 MB RAM.
	PowerDraw v.6.0 Engineered Software (910) 299-4843 http://www.engsw.com	\$595	2D	Neither	Unlimited	Mac or PowerPC; System 7; 2 to 4 MB RAM.

*Check with the manufacturer about the specific version, or "release," of AutoCAD supported. Some information may be lost when reading files created in a newer version of AutoCAD.

Also available in 3D for \$500. *Available in 3D this summer. Price not yet available.

Help to learn—The learning curve for CAD varies depending on your prior computer experience. On average, our computer-literate experts say it took them about 12 hours to figure out how their program worked—and that was just to get comfortable navigating. Mastery takes much longer. (See sidebar, opposite page.)

The good news is, all the programs in the chart, except TommySoftware CAD/Draw, come with manuals. On-screen tutorials and on-screen help also come in handy, even after you've mastered the program.

Shop online—The hottest discussions of CAD software take place online. To

see what other woodworkers are saying about CAD, check the AW Online message boards on America Online. (See page 26 for AOL information.) To download "shareware" or "demos"—special try-it-first versions of CAD software—check the website addresses in the chart. Or look for more CAD info through search services such as Yahoo!™ (<http://www.yahoo.com>) or Infoseek (<http://www.infoseek.com>).

Should you trash your drafting table?

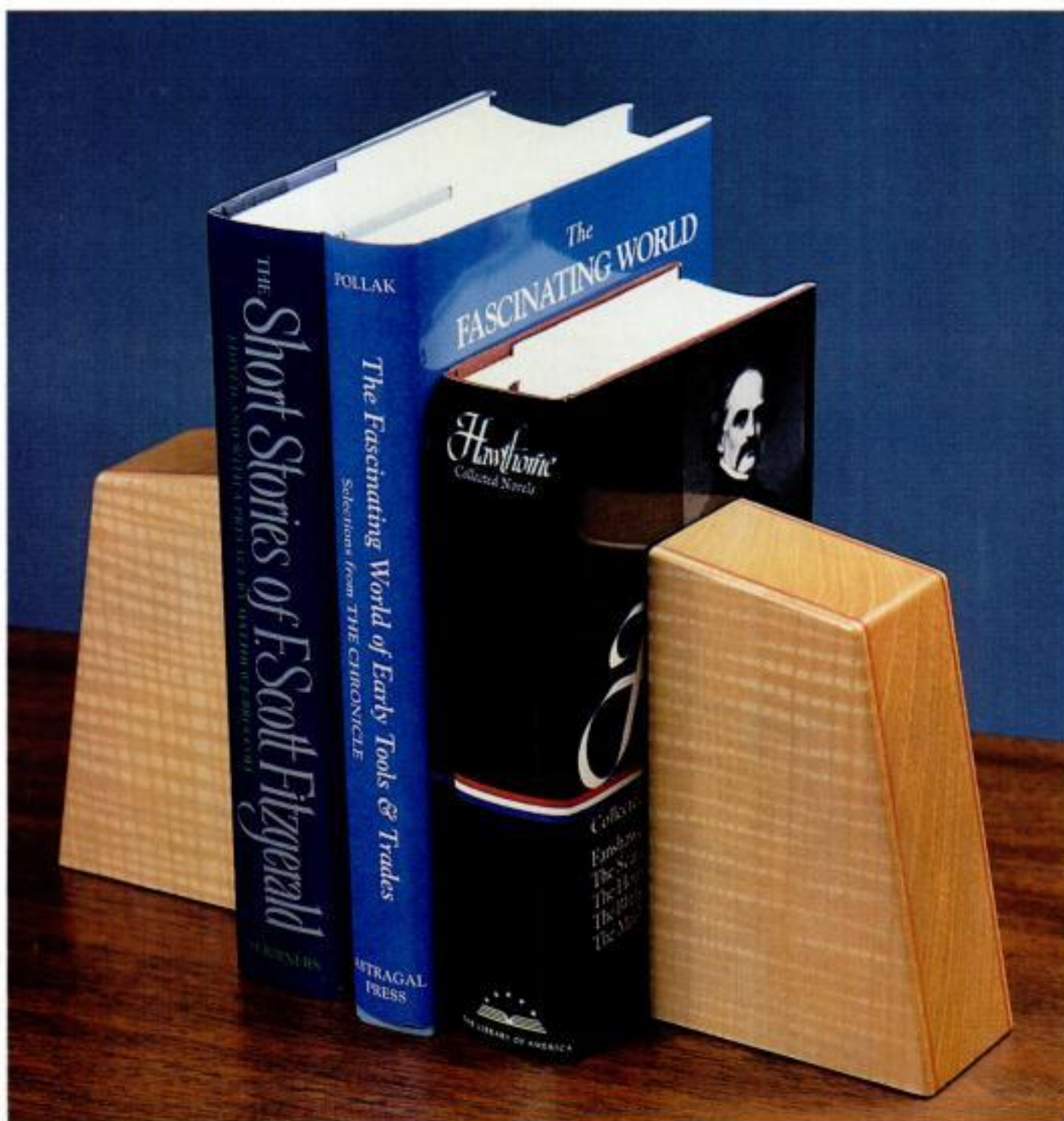
If you currently struggle with drafting, mid-range CAD programs can make your life easier. But to get the full bene-

fits of a CAD program, you'll need patience and a determination to learn—not to mention a basic level of computer literacy.

Russell Turner, an amateur who uses Ashlar Drawing Board, offers this solid parting advice: "If you don't already have or want a computer, you're probably better off buying a drafting table and instruments," he advises. "But if you have a computer and want to design your own projects, CAD may be one of the most useful things you can add to your tool cabinet." ▲

SUSANNAH HOGENDORN
is assistant editor of AW.

Novel support. These bookends show off matching veneers. Lead-filled centers lend heft to the simple laminated blocks.



LAMINATED BOOKENDS

**Contrasting veneers
hide a ballast of lead shot**

by Alan Peters

I designed these bookends as a beginning project for my students many years ago, and they're still as useful as ever. Though the bookends look lightweight, they are weighted with lead, so they will support large books and stay where you put them.

Size and Structure

My bookends are 6 in. high, 3³/₄ in. along the base, and just over 2 in. thick. But you can vary the size and shape to suit your bookshelf and your eye.

You can make the middle, or "core," of your bookends from any clear hardwood. I used 1⁵/₈-in.-thick chestnut for the bookends shown in the photo above. The core is drilled on both sides to accept a mixture of lead shot and epoxy. This ballast makes the bookends less likely to slide on the shelf.

You can use any contrasting hardwood for the face layers; here, I chose 1/8-in.-thick, rippled ash. Colored veneer sandwiched between the core and the face creates an elegant decorative stripe.

Construction Notes

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

The colored veneer stripe can be as thick or as thin as you like—just vary the number of layers. (Colored veneer is available from Constantine's, 2050 Eastchester Rd., Bronx, NY 10461, 800-223-8087.) I use a veneer press to glue the layers into a 1/16-in.-thick sheet before I assemble the bookends. Then I cut out enough pieces for all the bookends I plan to make.

To weight the bookends, first drill in from each side of the core with a 2-in.-dia. Forstner bit. Be sure to leave a 1/4-in. "web" of wood between the two holes. (See Fig. 1.) Premeasure your lead shot by pouring dry shot into the cavity. (Lead shot is available at gun and ammo shops or Army-Navy stores.) Then mix the lead with a two-part epoxy resin until you get a mixture resembling caviar, and spoon it into the hole. (See photo, below.) If you overfill the hole, you can scrape—not sand—the surface flush. Let one side cure before filling the other side.

When you laminate the veneers and faces to the core, the slippery glue makes them hard to align. It's easiest to cut all the pieces accurately to the same size first. Then apply the glue, stack the pieces together, and wrap some masking tape around the perimeter of the stack, stretching the tape to make it tight. This will keep the edges aligned as you apply the clamps.

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



ALAN PETERS is a furniture designer and maker in England. He was awarded the Order of the British Empire for his services to furniture design.

FIG. 1: LAMINATED BOOKEND

The bookend shown here is 6 in. high and 3 3/4 in. across the base, but you can make yours any size or shape. Just be sure to leave room for the lead and epoxy mixture in the center—it adds the necessary weight.

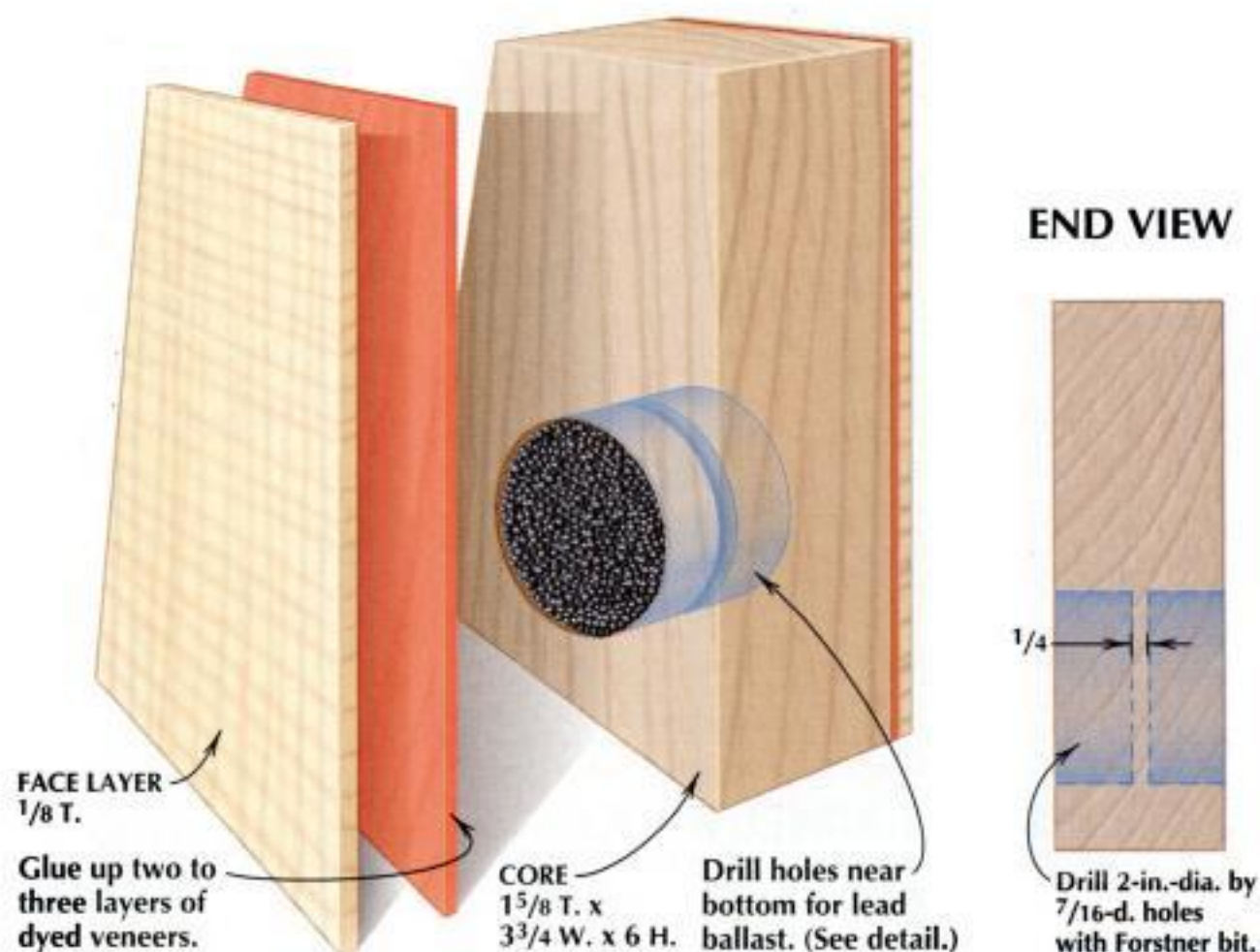


FIG. 2: MATCHING THE GRAIN

A pair of bookends looks best if the end grain is bookmatched. To do this, lay out both core pieces on a single piece of wood, as shown below.



Lead ballast. Fill the cavities in the core pieces with a mixture of lead shot and epoxy resin. Be careful not to overfill the holes.

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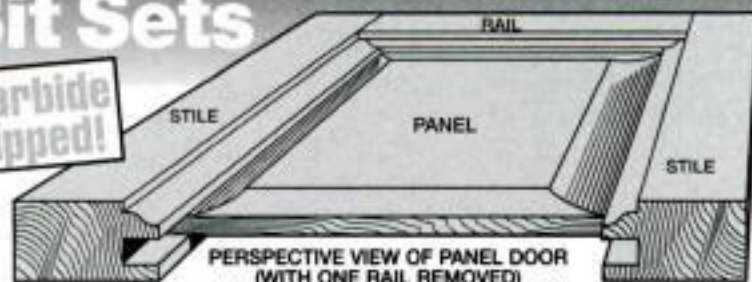


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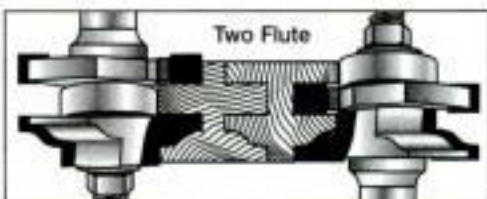


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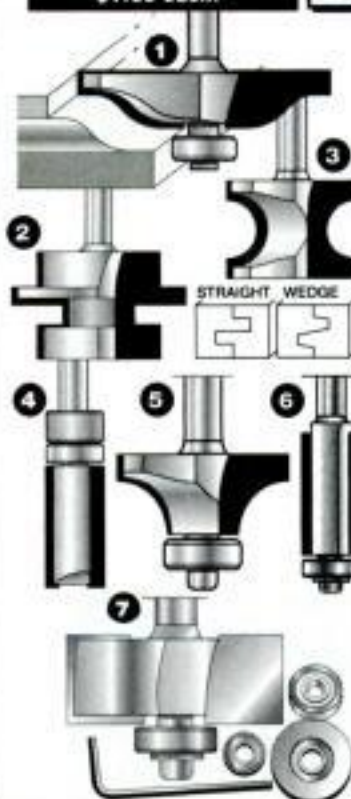
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Alder

by Paul L. McClure



Some trees are truly medicine trees. Alder is one of them. Herbalists throughout the centuries have used brews made from its bark and leaves as an astringent, a quinine substitute and an anti-inflammatory. The Cherokee Indians used alder concoctions to treat birth pains, sprains, skin eruptions, coughs, colds and even heart trouble.

About thirty species of alder exist worldwide. Of these, only red alder (*Alnus rubra*) is used for cabinetmaking. Red alder is one of a few alder species found in the U.S. and Canada and is the most commercially exploited hardwood on the North Pacific coast.

The tree, which seldom lives more than 80 years, typically reaches a height of 90 ft. and a diameter of less than 36 in. It often grows along watercourses where its expansive root system helps keep erosion in check.

Appearance

Alder wood is pale yellow to light pinkish-tan, with the color darkening just a bit over time. The heartwood and sapwood are indistinguishable from each other. The wood has a fine, even texture and small pores. The grain is straight, sometimes interlocked and subdued in appearance. The seasoned wood has no odor. Because of its lack of color and figure, alder is almost always stained.

Workability

Alder is a soft hardwood, but it's strong for its weight and very stable. It cuts easily with hand and power tools, but the wood is so fibrous that even a very sharp plane iron can leave a fuzzy surface. To crosscut alder, I use a 60-tooth crosscut blade; combination blades tend to munch the fibers. To drill clean holes, use a brad-point drill and a backup board to prevent

tearout. Belt sanding this soft wood can turn a whole board to dust before you know it; I recommend sanding by hand or with a random-orbit sander.

Alder holds fasteners fairly well for a soft wood, but you should pre-bore for screws to prevent splitting the wood. The wood glues well, but it tends to blotch when stained. Before staining, I condition the wood with a wash coat of three parts denatured alcohol and one part 3-pound-cut shellac. Then I sand with 220-grit paper and apply the stain.

Uses

Alder is used for doors, sash, millwork, plywood core veneers, furniture, turning and just about any other woodworking application you can think of. And it's weather-resistant, so you can use it outside as long as it isn't left in contact with the ground. ▲

ALDER



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Radial (quartersawn): very small (less than 1/8 in. per ft.)

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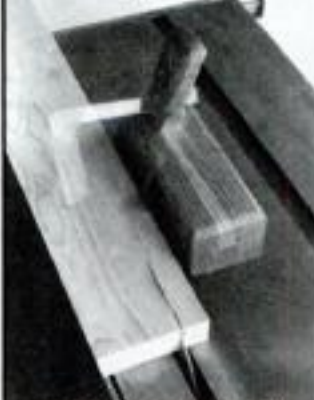
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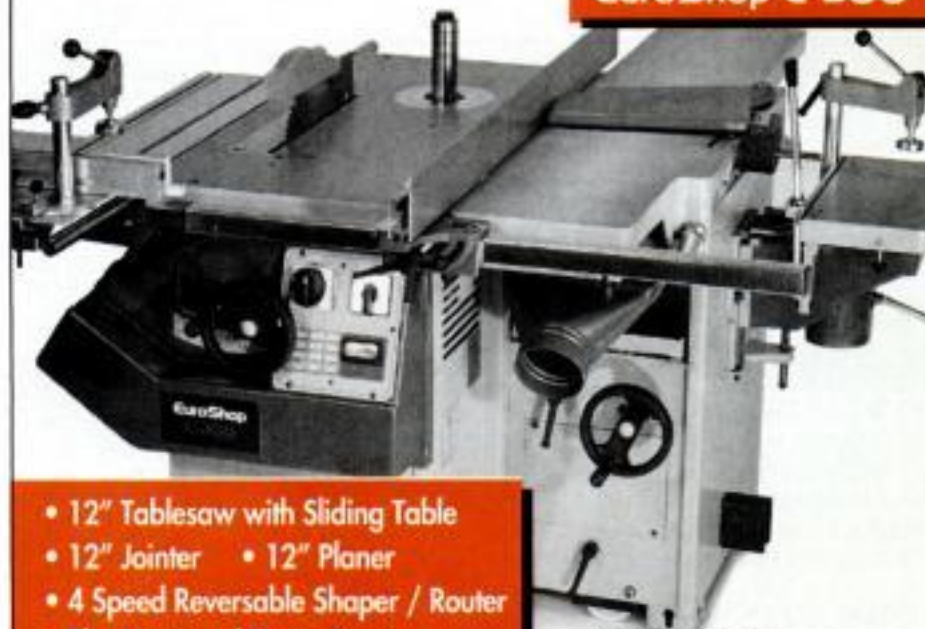
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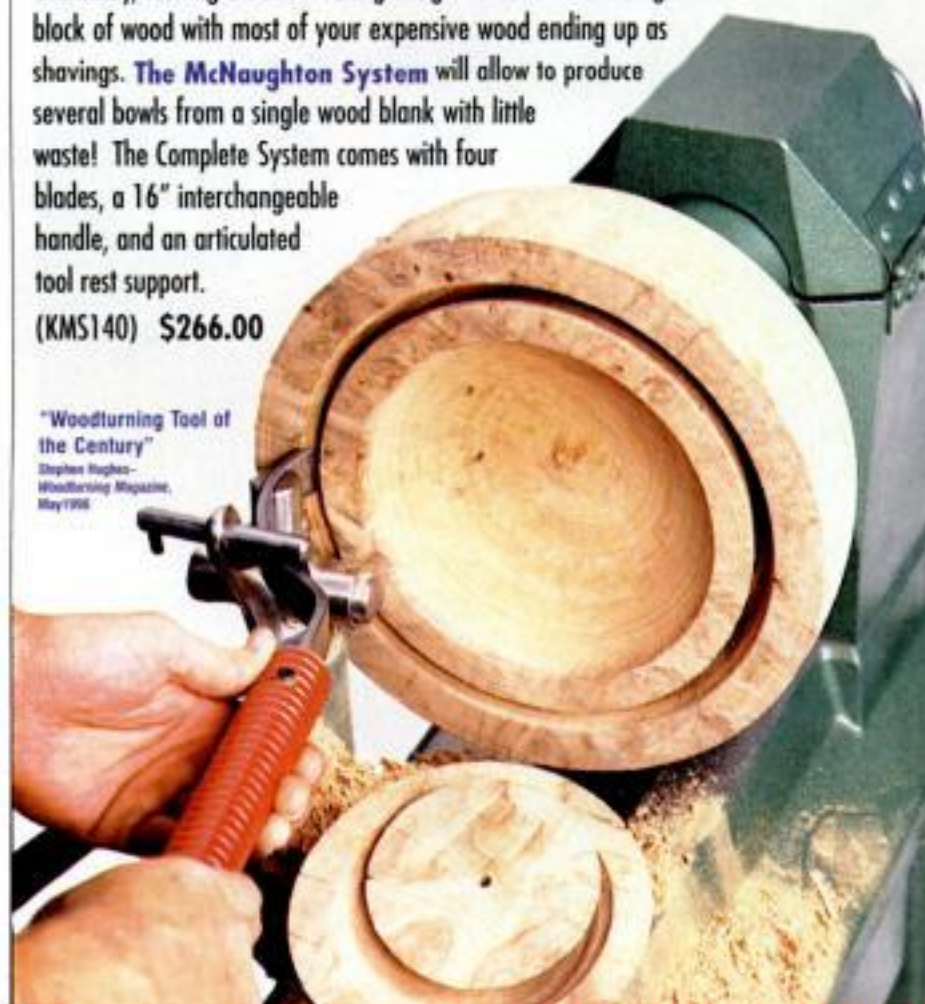
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Shellac

A tradition of beauty and versatility

by Michael Dresdner



Hand-made shellac. Many cottage industries still produce raw shellac. Here, workers scrape shellac resin from tree branches in India and Thailand.

Shellac is without a doubt my favorite finish. There's no other finish as versatile: It is fast-drying, imparts a beautiful clarity and depth to wood, and applies easily with a brush, rag or gun. It has good resistance to abrasion, acids and stains, and, if dewaxed, good resistance to water. Shellac is nontoxic when dry, making it the perfect finish for toys, cribs and kitchenware items as well as furniture. And because it redissolves itself in alcohol, repairing a damaged shellac finish is a snap compared to repairing other finishes.

Shellac's sealing properties are legendary. It will seal in everything from stains, grease, soot and sap to silicone, and it's compatible with almost all finishes. And a coat of shellac applied under water-based finishes will bring out richness in the wood that the water-based finish won't.

Like any finish, shellac has its drawbacks. It has poor resistance to heat above 180°F, and poor alcohol resistance. Although it will protect against weak alcohol mixtures such as wine or beer (as long as they're mopped up quickly), avoid using shellac on bartops or other drink-serving surfaces.

Varieties of Shellac

Shellac is made from a resin secreted onto branches by the tiny lac bugs of India and Thailand. The material scraped from the tree branches, called "seedlac," is a mix of shellac, dye, wax, bits of bark and insect parts. To make shellac, the seedlac is melted, strained, stretched into sheets, then broken up into flakes.

You can get shellac in various colors. "Buttonlac" is dark brown and "garnetlac" is almost as dark. "Orange" shellac has a warm honey color. "Blond" or "superblond" shellac is nearly colorless and will darken the wood no more than a coat of clear lacquer. Bleached shellac, also called "white" or "clear" shellac, is the clearest of all.

Seedlac is sometimes used by furniture conservators to recreate a truly authentic finishing process, although the appearance is the same as that created with refined shellac. Buttonlac and garnetlac are often used to mimic rich, aged wood finishes. Orange shellac is the most popular general-purpose variety. Blond, superblond or bleached shellac is used to maintain the natural color of the wood as much as possible.

BLOND SHELLAC



ORANGE SHELLAC



GARNET SHELLAC



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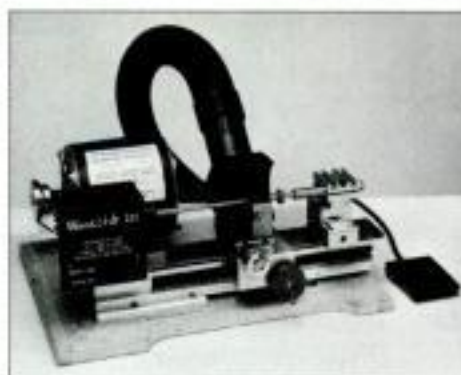
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CIRCLE NO. 16 ON PRODUCT INFORMATION FORM

I avoid bleached shellac because it has less durability, a shorter shelf life, and less water resistance than any of the other types.

Waxed or Dewaxed

In its natural state, shellac contains about 3% to 5% wax. This wax creates a more satiny finish and makes the shellac easier to sand. For most furniture and other items, natural shellac is fine.

But as a matter of habit, I always buy dewaxed shellac. Although it costs more, it's harder, clearer, glossier and more water resistant. It is the best choice for items that must endure water, such as kitchenware, table tops and chairs. It's also best for French polishing or for sealing under other finishes that may not tolerate wax contamination—especially water-based coatings.

Mixing Shellac

You can buy any variety of shellac as flakes, mixing them with denatured alcohol for application.

You can mix shellac to any "cut" that you like. The cut refers to the number of pounds of flakes per gallon of alcohol. I prefer to work with a 2-lb. cut, which flows nicely off a brush or rag, sprays well, and dries faster than a thicker consistency will.

To make a 2-lb. cut, you can weigh and measure out the relative proportions of flakes and alcohol for any amount you like, but I use a simpler method: Mark a line on a glass jar indicating the amount of shellac you want. Fill the jar halfway to the line with shellac flakes, then pour in denatured alcohol to the line. Shake or stir the mixture frequently. Once it dissolves, usually overnight, it will be close to a 2-lb. cut. The nice thing about shellac is that you can always add more alcohol or flakes later to thin or thicken the mixture. You really don't have to fuss with exact proportions. Use whatever consistency works for you.

To ensure its freshness, I mix just what I plan to use within a couple of

months. As soon as alcohol is added to shellac, the mixture begins to change. The liquid starts taking longer to dry, forms a softer film and becomes more water sensitive.

You can also buy premixed shellac, which usually comes as a 3-, 4-, or 5-lb. cut. This means that 3, 4, or 5 lbs. of shellac flakes were added to a full gallon



Hand stretching. The shellac resin is melted down, then stretched into sheets before being broken into flakes.

of alcohol. To convert a 3-lb. cut to a thinner 2-lb. cut, I add 5 ounces of denatured alcohol per pint of the premixed solution.

Storing Shellac

Although premixed shellac is convenient to use, it can cause problems if it's not fresh. Because of this, most manufacturers print the date of manufacture on the bottom of the can to ensure freshness. Keeping it cold will prolong its life, but it is best to buy only what you will need within a few months and use it as soon as possible. Some formulations claim a shelf life of over a year.

Shellac flakes can be damaged by light, moisture and metal containers, so store them in opaque plastic or glass in a cool place. Avoid storing premixed shel-

lac in metal containers as well since it will corrode them. (Premixed shellac comes in stainless steel- or epoxy-lined cans.) To prolong its shelf life, store mixed liquid shellac in the refrigerator or freezer in well-marked containers. (After all, you don't want the family using it for chicken broth.) The liquid shellac will thicken but it won't freeze, and it will thin out again when it warms up.

Applying Shellac

Shellac is usually brushed on, but you can also apply it with a rag or spray it. To brush it, use a soft, natural-bristle brush and work quickly. Don't try to rebrush; shellac dries too fast. Whenever possible, apply shellac when the temperature is cool. It will flow on more smoothly because the alcohol evaporates slowly. Wait at least two hours before recoating and only scuff sand if you need to level the finish. I sand with 220- or 320-grit paper. Clean brushes with a mixture of water and ammonia.

Wiping shellac on is a great way to apply a very thin sealer coat. Make a pad from a clean cotton rag and dip it in your 2-lb. cut of shellac. Flood a small area of the wood, then immediately wipe off the excess with another cotton rag.

Shellac is friendly to spray, but you need to apply more coats to get the same coverage you'd get by brushing it. Try using a 50-50 mix of 2- or 3-lb. cut and alcohol. If you want more flow, add alcohol. If you want more body, mix in more flakes. Spray four coats at least one hour apart. ▲



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

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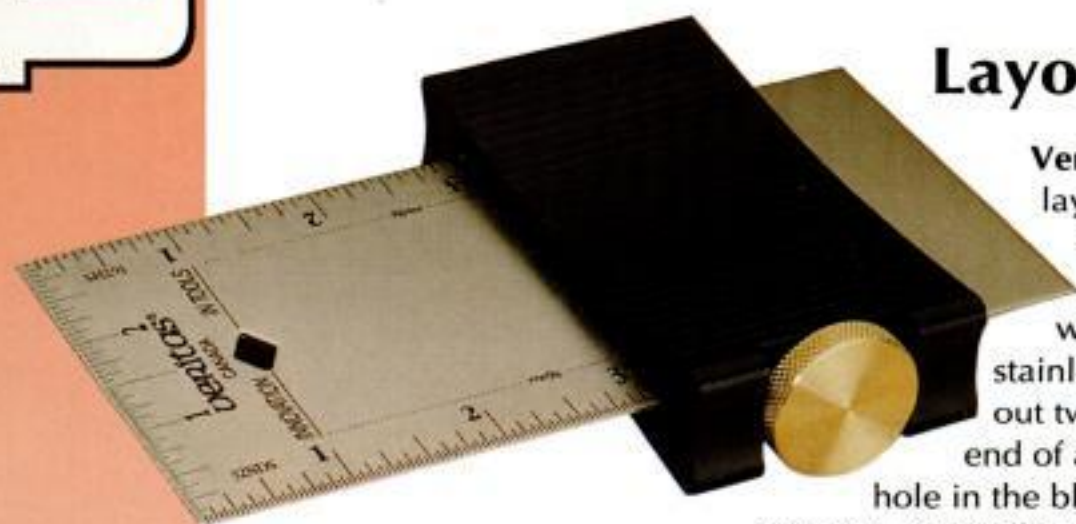
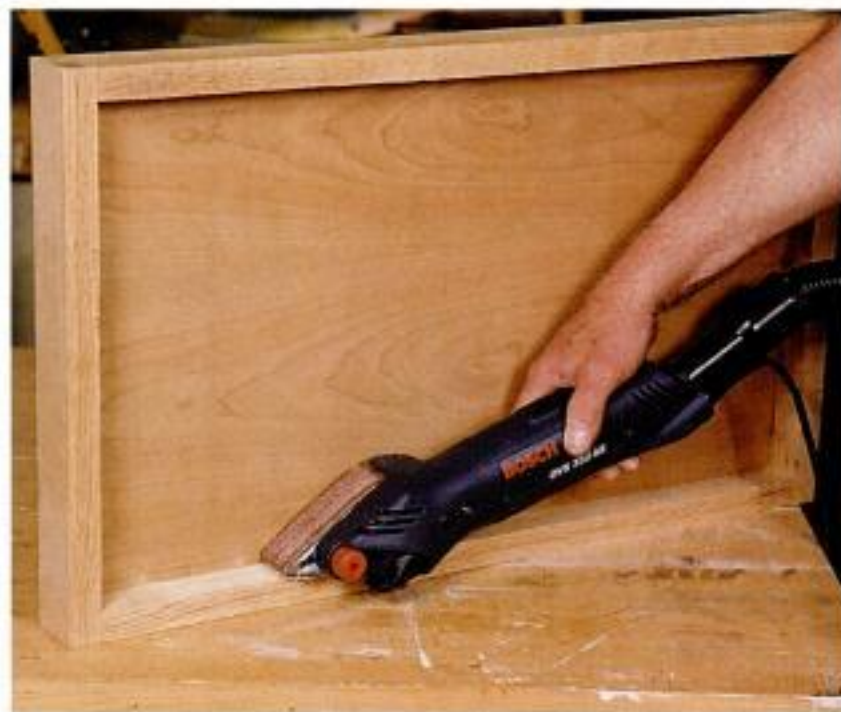


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Mini Belt Sander

One of the hottest new tools we spotted this spring at the International Hardware Show in Cologne, Germany, is the "Variosander," a "mini" belt sander from Bosch. (It will have a different name for the U.S. market.) The tool's small sanding belt (1⁹/₁₆ in. by 12 in.) is designed for sanding in small, difficult-to-reach areas like a detail sander, yet it removes material quickly, like a belt sander. We found it great for flush sanding into tight corners, and its tiny front roller lets you sand intricate curves. A stationary sanding stand turns the tool into a mini edge sander. Bosch plans to introduce the sander in the U.S. sometime this fall (price to be announced). *S.B. Power Tool Co., Dept. AWT, 4300 W. Peterson Ave., Chicago, IL 60646, (800) 815-8665. Circle #604*



Layout Square for Cabinetmakers

Veritas' new Sliding Square works great for marking precise layout lines for mortises, tenons and hinges. Its wide aluminum body provides a long reference face to register against your work, so you don't have to flip it over frequently as you would with an ordinary square. The oversize (3-in. by 6-in.) stainless steel blade is graduated along three edges to let you mark out two perpendicular lines at once (for example, the side and end of a tenon) with less chance for error. The diamond-shaped hole in the blade is perfect for marking lines parallel to an edge. (Price: \$18.95) *Lee Valley Tools, Ltd., Dept. AWT, Box 1708, Ogdensburg, NY 13669, (800) 871-8158. Circle #605*

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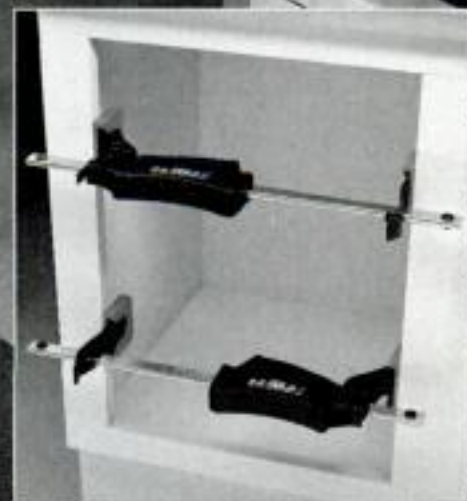
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Finish Preservative

Tired of throwing away half-full cans of finish that have hardened? Next time, spray a blast of Bloxygen in your open finish container before refitting the lid. This mixture of inert gases displaces the air to block oxygen, which prevents skinning over. Each container of Bloxygen has enough gas for about 75 uses in quart cans. (Price: \$8.95) *Ironwood Designs, Dept. AWT, 460 Graves Ave., San Luis Obispo, CA 93405-2022, (805) 542-9219. Circle #608*



SHOP TEST



DeWalt DW788 Scrollsaw

by Marc Berner

DeWalt's new 20-in. benchtop scrollsaw (model DW788) looked good on paper: premium scrollsaw features at a price under \$500. (See the buyer's guide in AW #54.) When I got a chance to put one through extensive trials in my shop, I wasn't disappointed.

Thanks to a double parallel-link arm, the blade remains straight up and down throughout its 3/4-in. stroke. This cutting action gives you square edges and a very thin kerf on curves. Vibration is minimal over the entire speed range (400 to 1,750 strokes per minute).

But what first caught my attention was the convenient up-front placement of all the controls: The variable speed switch, on-off button, and a combination blade-tension/quick-release knob are right on top of the arm for super accessibility.

Installing blades is a snap thanks to the tool-free blade holders—you simply tighten thumbscrews to securely clamp the blade. With the top blade holder loosened, the saw's top arm lifts up several inches, making it easy to feed the blade through the workpiece for piercing cuts—a great feature for inlay and marquetry work. On the downside, I found the lower blade guard makes it awkward to hold the blade under the table while tightening the lower blade holder. Also, I'd like to see DeWalt add a "stop" on the lower blade holder to help you quickly position the blade before clamping. (I fashioned a stop from a piece of duct tape that works fine.)

From the first cut, I appreciated the saw's rugged cast-iron table. Its large teardrop shape provides plenty of space around the front and sides of the blade for workpiece support. The table tilts smoothly 45° left or right and locks tightly in place.

Under power, the saw had plenty of guts for cutting any material I tried. And I really like the powerful dust blower with its long flexible hose that you can adjust to blow air in any direction. Optional accessories for the benchtop saw include a stand, light and foot switch.

I'm not exaggerating when I say the saw is a dream for cutting. With its user-friendly features and attractive price, it'll be hard to beat. (Street price: \$489) *DeWalt Industrial Power Tools, Dept. AWT, Box 158, Hampstead, MD 21074, (800) 433-9258. Circle #609*

Marc Berner is a professional scrollsawyer who lives in California and teaches scrollsaw techniques.

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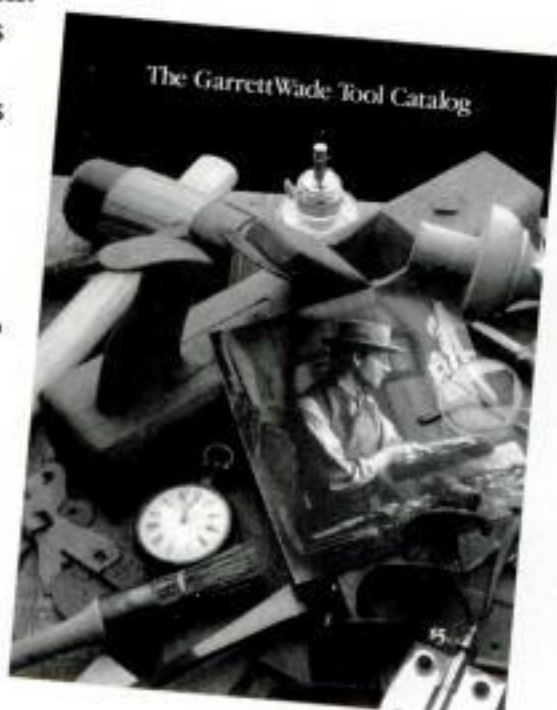
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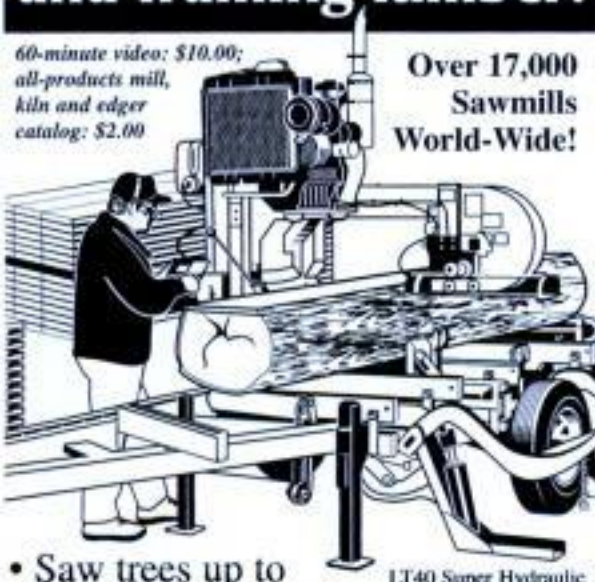
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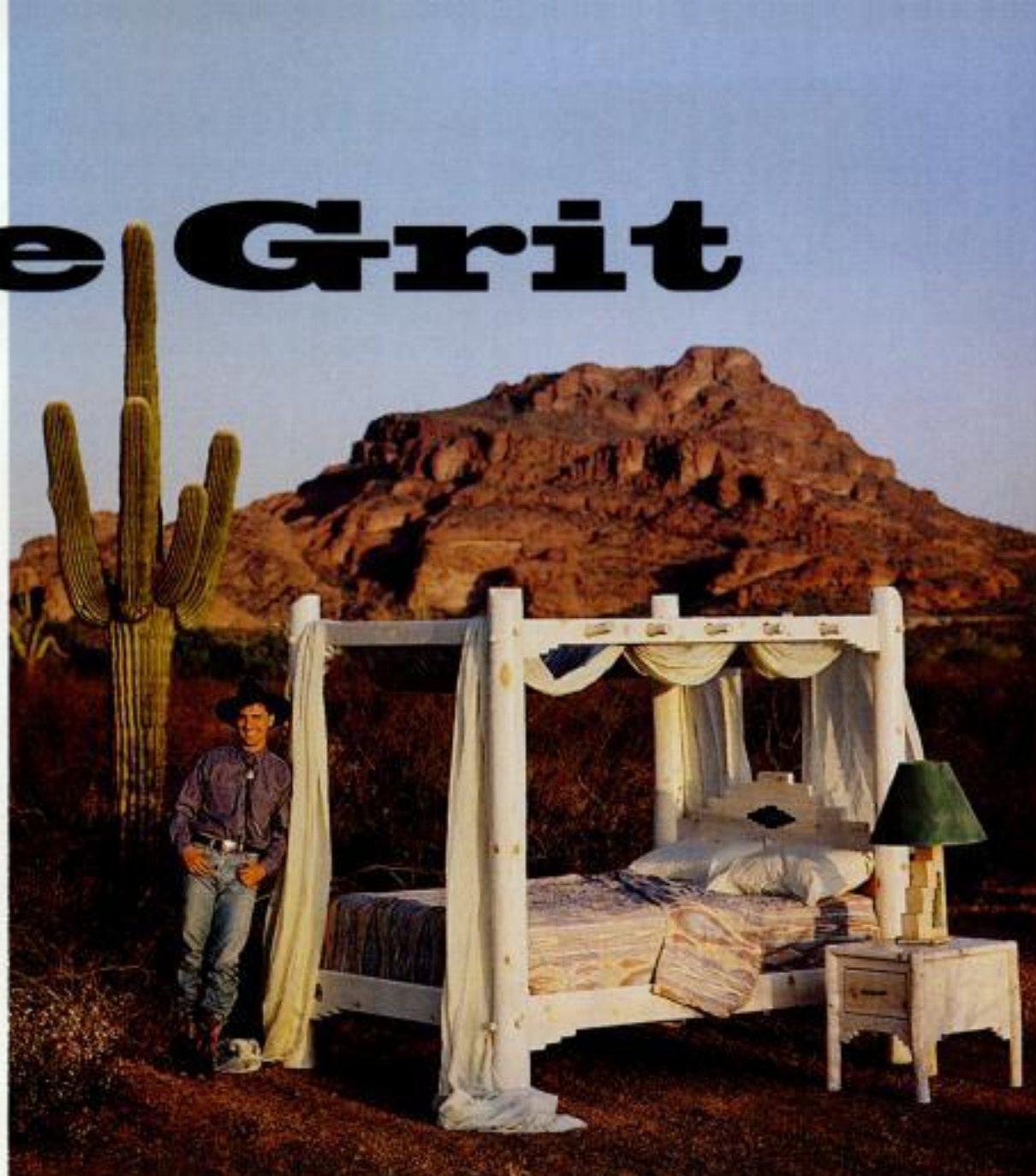
The furniture on these pages comes from woodworkers who celebrate the American West in their work. Each year in September, the foremost practitioners of this genre gather in Cody, Wyoming, to attend the Western Design Conference. Here, you can see an inspiring array of furniture and related crafts that reflect the culture of the West. Wyoming Governor Jim Geringer summarized the spirit of cowboy design at the 1995 conference: "The designs of the West are representative of our people and the landscapes: bold and colorful, sometimes weathered, but always solid." We think the pioneering pieces shown here reflect that sentiment.

This year's Western Design Conference is being held September 24-28. For more info call (888) 685-0574.

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

▶ **"Nez Perce" chest**
by Don Rawlings,
Stage West, Cody, WY.
Suede leather, cedar,
traditional hair pipes,
silver, elk antler and
horsehair. W: 19 in.
D: 14½ in. H: 35 in.

PHOTO BY MARK PAYLER



▶ **"Thunderbird canopy bed" and bedside chest**
by Gerry Lemanski, Arizona Ranch®, Tempe, AZ.
Ponderosa pine and patinated copper.
Bed: W: 70 in. D: 90 in. H: 84 in.
Chest: W: 24 in. D: 24 in. H: 30 in.

PHOTO BY RICHARD EMBERY PHOTOGRAPHY

▼ **"Six Horse Cabinet"**
by Mike Livingston, Hutchinson, KS.
Ponderosa pine and cast bronze.
W: 37 in. D: 16 in. H: 47 in.

PHOTO BY MONTY DAVIS



▲
 "Inlaid Hitched-Horsehair Credenza"
 by Rocky Wilson,
 Red Bird Furniture, Dubois, WY.
 Lodgepole pine, leather, brass,
 horsehair and deer horn.
 W: 32 in. D: 18 in. H: 30 in.

PHOTO BY BUFFALO BILL HISTORICAL CENTER



▲
 "Highboy" by Mike Patrick,
 New West Furniture, Cody, WY.
 Oil painting by Lana Perotti.
 Southern yellow pine, beetle-tracked ponderosa pine,
 burled lodgepole pine and deer antler.
 W: 48 in. D: 18 in. H: 72 in.

PHOTO BY RON MAIER



▲ ▲
 "Wild Absaroka Desk"
 by Lester Santos,
 Arcadia WoodWorks,
 Cody, WY.
 Cherry, juniper
 and walnut. W: 46 in.
 D: 36 in. H: 52 in.

PHOTO BY ELIJAH COBB



▲
 "Red Ryder" cabinet
 by Mike Livingston,
 Hutchinson, KS.
 Sugar pine, tin and
 cast bronze.
 W: 26 in. D: 20 in.
 H: 50 in.

PHOTO BY MONTY DAVIS



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Sliding Crosscut Table

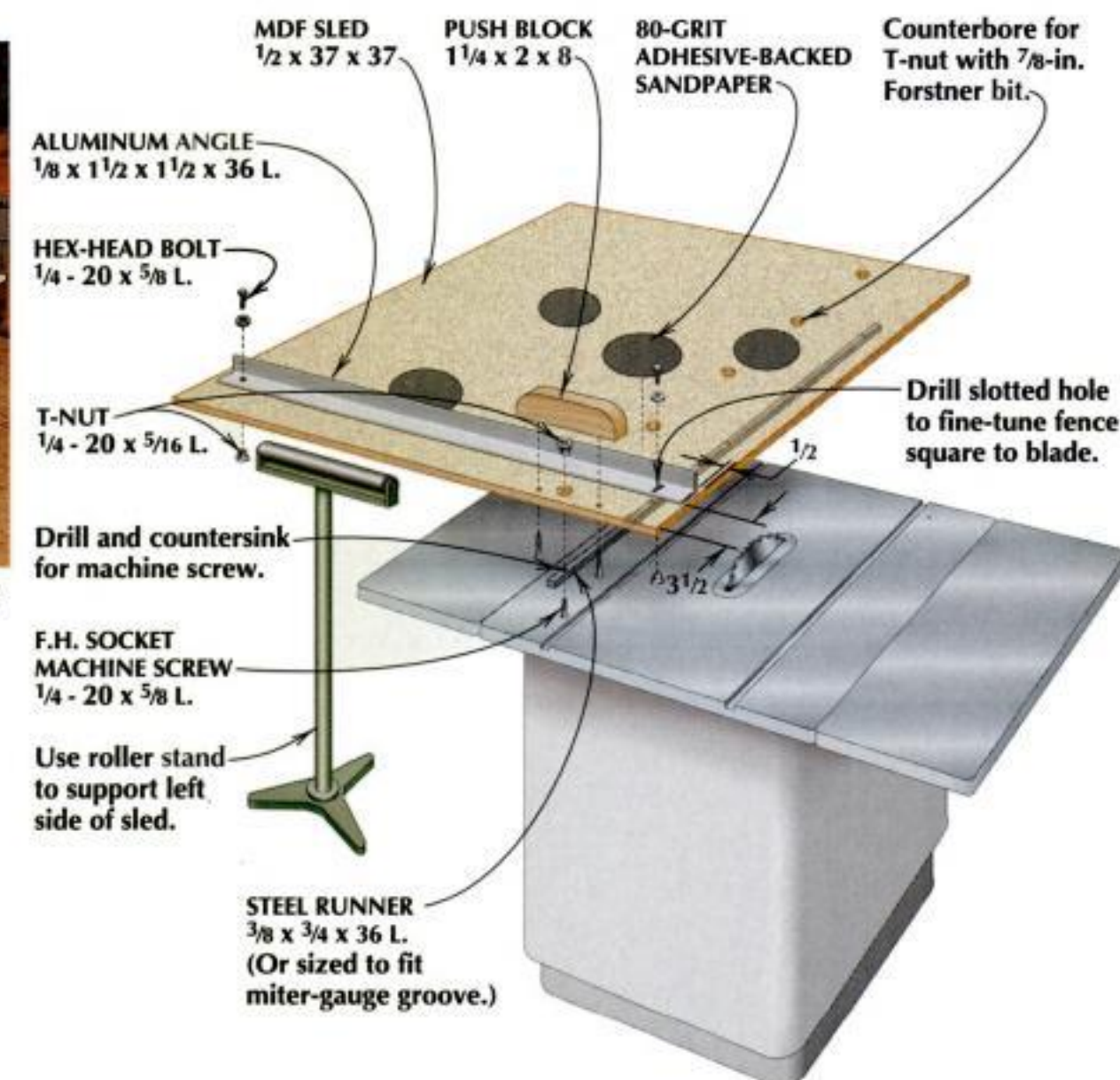
by Robbi Staples



Crosscut control. The author's jig makes precise 90° crosscuts in wide panels or small parts. Make angled cuts by tilting workpieces away from the fence.

Commercial sliding tables for the tablesaw are great for making precise crosscuts in wide panels or long boards, but they're expensive. My shop-made crosscut table can crosscut stock just as precisely as commercial models, but you can make it for less than \$50. I use my table to make dead-square cuts in stock up to 32 in. wide. You can even make angled cuts, thanks to sandpaper disc "friction pads" adhered to the sliding table, or sled. (See photo, above.)

A single runner screwed to the sled fits in the left miter-gauge slot, allowing the sled to slide parallel to the blade. Set up to the left of the tablesaw, a roller stand supports the left side of the sliding platform. A fence attached to the sled holds the workpiece square to the blade, giving you dead-square cuts. For durability and accuracy, I recommend using cold-rolled steel bar stock for the runner (available



from your local metal supplier or from Small Parts Inc., 800-220-4242). Use socket-type machine screws to attach the runner to the sled; they're harder than standard machine screws. I chose medium-density fiberboard (MDF) for the sled because it's dependably flat. (For more on MDF, see AW #43.)

I use the right edge of the sled to gauge the cutline on my workpieces, since the edge lines up with the left side of the saw blade. To accurately line up the edge when making the jig, cut the sled about 1 in. over length and attach

the runner so the sled is about 1 in. to the right of the saw blade. Then run the jig past the spinning saw blade to cut off the extra material.

Bolt the fence to the sled and square it to the blade by making test cuts in scrap. If your cuts aren't square, loosen the right fence bolt and tap the fence forward or aft until the jig cuts a perfect 90° angle. ▲

ROBBI STAPLES is a professional woodworker; he designs and builds furniture in Massachusetts.

BEST SOLUTION WINS!

Have a shop jig or fixture you'd like to share? Send a photo or sketch with an explanation to "Shop Solutions," AMERICAN WOODWORKER, 33 E. Minor Street, Emmaus, PA 18098. Next issue's contributor will receive this Ryobi ML618 mini lathe, list price \$250.



WARNING HIGH POWER

14.4V
2.0 Ah

18 Torque
Settings

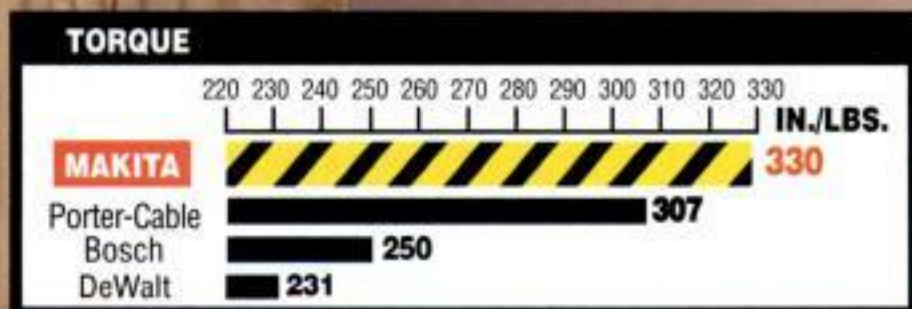
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Competitive models tested: Bosch 3610/3610R, DeWalt DW991/DW991K, Porter Cable 872-9872.



In a durability test, the competitor's hammer lasted 60 seconds. If you happen to need one for longer than that, buy a Stanley hammer.

This picture tells the story better than any words can. In our overstrike tests, the Stanley hammer outlasted the competitor's brand by a 4 to 1 ratio.*

You see, after years of research (and a whole lot of sleepless nights) our engineering department concluded that jacketed, solid-core fiberglass is more durable than the compression-

molded variety some of our competitors use to make their hammers.

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with steel planks instead of wire so it doesn't wrinkle your clothes.

It's innovative thinking like this that's kept us ahead of the competition for more than 150 years. At Stanley we're not happy simply churning out products. We're only happy when our products are better than anyone else's.

STANLEY
helps you do things right.

*Overstrike test conducted by striking hammer handle against metal object. ©1994 The Stanley Works

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