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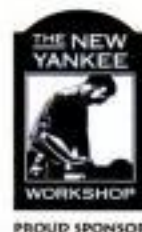
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12-in. Compound-Angle Miter Saws

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On the cover: AW Shop assistant Ron Snayberger constructs versatile cabinets

PHOTO BY DONNA CHIARELLI

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HOW TO REACH US

You're an important part of this magazine and we'd love to hear from you. We welcome comments, suggestions, or complaints. Write to us at: **American Woodworker**, 2915 Commers Drive, Suite 700, Eagan, MN 55121 Phone: (651) 454-9200 E-mail: amwood@concentric.net



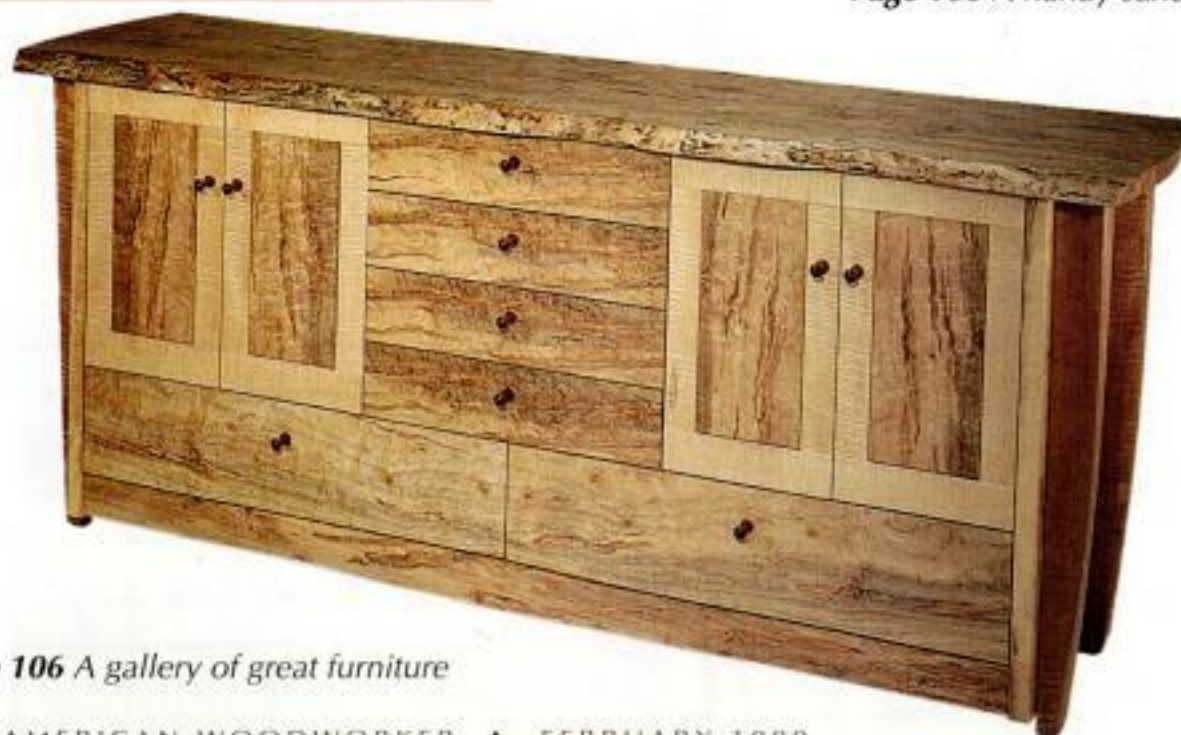
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AMERICAN WOODWORKER.

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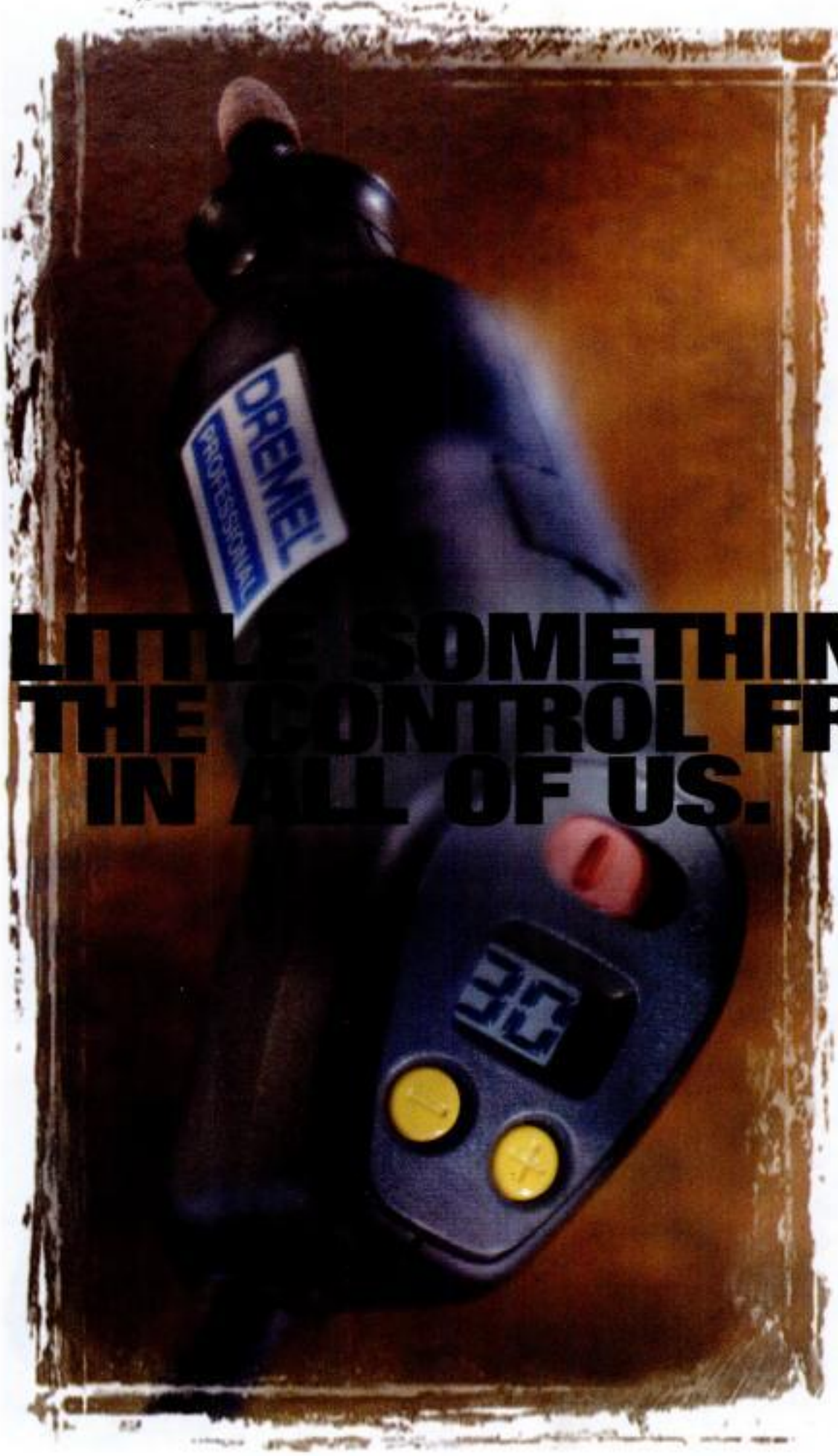
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As you may have noticed from the fine print on the cover, *American Woodworker* has been sold by Rodale Press to Reader's Digest Publications. That may raise a few eyebrows, and some of you may be thinking "Uh-oh, what's going to happen to my magazine?" If that's what you're wondering, don't worry.

American Woodworker will still be loaded with projects and techniques for the serious intermediate to advanced woodworker. It's still going to have great tool reviews and buying information—every issue. It's going to have useful shop tips, jigs, fixtures and product information. You'll still be hearing from many of the expert woodworkers whose advice you have come to expect. The American Woodworker Shows will go on.

Sure, there'll be changes down the road—there always have been, always

will be. Just as you're always improving your woodworking skills, your shop and your projects, we're constantly improving the magazine. For one thing, you'll notice that we've moved to St. Paul, Minnesota, where we are indulging in that rarest pleasure for woodworkers, designing a new and better shop. It's a joy—high ceilings, plenty of power, good lighting, the works. Of course, it won't be big enough, but whose shop is? But it'll give us an improved ability to tackle big projects and tool reviews. We've also got some great new editors: Tom Caspar, Rick Christopherson and Tim Johnson. Like me, they're all former professional cabinetmakers and furniture builders.

The most successful changes to *American Woodworker*, however, will spring from you, our subscribers. We're committed to giving you more of what you need and like, more that you find

useful, more that fits your shop, your home, your skills and your dreams. There's no better time than now to speak up and let us know how to make your magazine better.▲



Ken Collier
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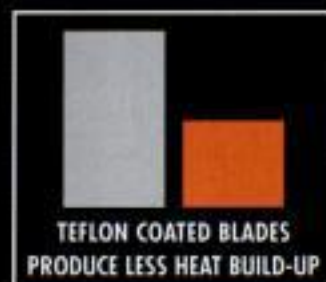
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Woodworker's Journal, January/February 1998



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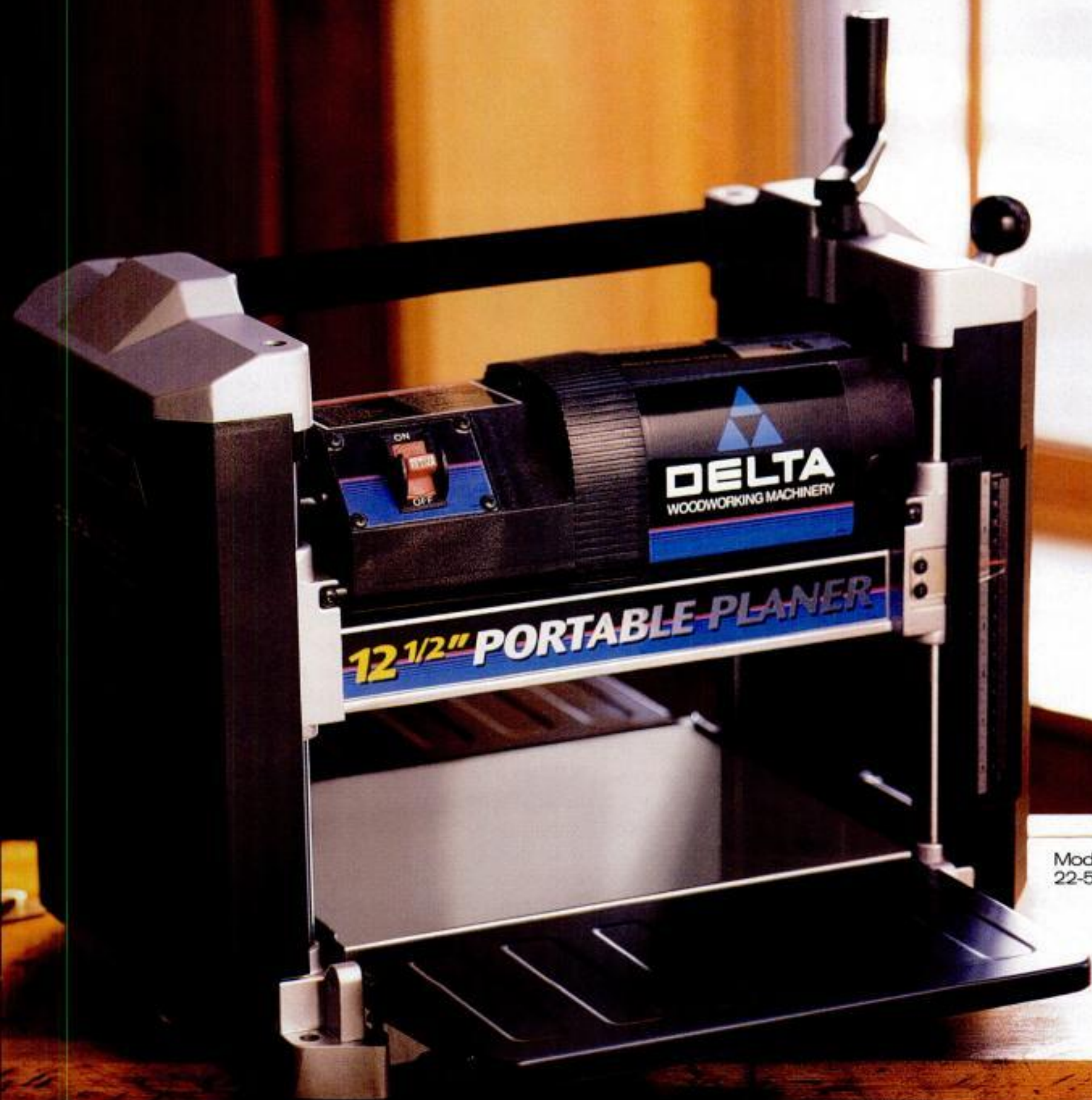
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Factory-Made vs. Shop-Made Featherboards

Fred Matlack's shop-made featherboards (AW #68) are helpful, but some readers might be interested in my alternative: plastic versions available at retail outlets and from mail-order suppliers. The featherboards shown here are available from Woodworker's Supply (800-853-9663) and cost about \$10 each.

Though I've used the wood variety, I prefer these featherboards because they're easier to adjust. Matlack doesn't mention that the ribbed underside of a tablesaw top can make it quite difficult to clamp featherboards to the table. I've found that it's tricky to hold and tighten the clamp while forcing the wooden feathers against the workpiece with just the right amount of pressure. Try the ready-made featherboards; you'll like them.

Herbert W. Akers
Rockville, MD



Factory-made featherboards. Inexpensive (about \$10) and easy to use, these plastic featherboards can work horizontally and vertically.

Good Show!

I had the good fortune to enjoy another of your fine woodworking shows in Novi, MI. You have something for every woodworker. I like seeing the variety of gifted woodworkers who give so freely of their talent in lectures and tips that help all wood butchers like me.

I will enjoy AMERICAN WOODWORKER magazine for as long as the good Lord lets me live. And may you folks continue to bring the latest in tools to your shows, where we can see them demonstrated and even buy them for our own shops.

Jack Ackerman
Detroit, MI

Good Words

 I am a new subscriber to AW and have received my first four issues. Never before have I got so much enjoyment or good information from a magazine on any topic. Your articles are very interesting and informative. I have found your tool reviews very helpful. You explain in detail what to look for when buying a tool. Your magazine continually challenges and inspires me to try new things. Keep up the good work and keep those issues coming.

Kenneth S. Johnson

Shellac: More Than One Coat

Shellac and wax is a fine traditional finish, and it was good to have a woodworker like Ian Kirby describe the advantages of this simple and inexpensive finishing technique. (See AW #66.) However, I disagree with Kirby's warning to use only one coat of shellac. Kirby's advice to "never apply a second coat because that would dissolve the first coat and make a sticky mess" is simply not true.

I have been using shellac as a topcoat on some high-end presentation cases that I build for a local artist. The cases have Carpathian elm burl veneer on the fronts of the doors. I apply a dozen coats of shellac to these doors and sand lightly after each fourth coat with 320-grit paper. After all the shellac has cured for a week or so, I polish it with steel wool starting with 00 and working down to 0000. Then I polish with pumice and rottenstone. After that, I apply paste wax—three coats—and buff to extremely high gloss. The elm burl is beautiful—my client just loves it. But I could never achieve this finish without all the coats of shellac.

Each coat must be applied quickly if you're brushing it on. I thin the shellac

down to 1.5- or 2-lb. cut and use a badger-hair brush. I wait an hour between coats, and overnight if I'm sanding.

Dave Skowron
Akron, OH

Kerfs of Combo Blades

In your test of combination blades for tablesaws (AW #65), you didn't give the kerf widths of the blades you tested. Are any of them thin-kerf blades?

Ray Martin
Tucson, AZ

All but one of the blades tested share the same standard kerf width of $\frac{1}{8}$ in. Oldham's 40-tooth combo blade was the exception, with a kerf width of $\frac{7}{64}$ in. A typical thin-kerf blade makes a cut $\frac{3}{32}$ in. wide.

—Eds.

Ripping With a Radial-Arm Saw

Much has been said about the radial-arm saw and its value (or lack of same) for woodworking operations. As Bernie Maas indicated in his offering on the subject (see AW #59, page 20), the teeth on a radial-arm saw blade are cutting upward in rip-cutting mode. This tends to lift the workpiece off the table, especially when you're ripping thick stock.

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Needless to say, the danger is real, but after years of dreading these rip cuts, I developed a very simple technique that makes it easy and safe. Instead of attempting to rip through a board in a single pass, I make at least two passes. While this approach takes a little longer, it produces much less tearout, and just about does away with serious kickback and lifting problems. Try it; you'll be amazed at how much easier radial-arm-saw ripping can be.

Bob Felch
Bethlehem, PA

It's a Lefty's Saw

In all the discussions about the radial-arm saw, no one has mentioned that it is a left-handed saw, and should be operated with the left hand for safety reasons.

I've noticed that television programs on woodworking always seem to show the radial-arm saw being used with the right hand. However, if you use your right hand, you'll be in line with the

blade if the saw kicks, increasing your chance of injury. But if you use your left hand, the blade will be on the left; in case of kickback, the saw will go harmlessly to your left.

William D. Perry Jr.
Sanbornville, NH

Jointer or Jointer/Planer?

In your recent issue, the 1999 Tool Buyer's Guide, you listed the new Ridgid JP0600 jointer with the jointer-planer combo units. I realize that Ridgid calls it a "jointer-planer," but it is not a jointer-planer at all in the sense that the Hitachi is, with its two different feed beds. In fact, it's nothing more than a traditional jointer, like a Jet or Delta. Yet you didn't even list the Ridgid unit in the jointer section.

I was just curious as to the reasoning behind this treatment of the Ridgid model. Is there something I don't know about the unit, or was it mishandled?

Dennis Walker
Park City, UT

You're right: Ridgid's new model JP0600 jointer doesn't belong in the "jointer-planer" section of the thickness planer chart. It's a conventional jointer, not a combination machine like the other jointer-planers listed in this section. —Eds.

Nailing Backward

I had to smile when I received my 1999 Tool Buyer's Guide. On page 46, there's a picture of an air nailer that was printed backward. Even with the letters turned around, I was able to recognize the familiar Senco name. Keep the great stuff coming.

Joel M. Skinner
Mesa, AZ

Good Guide

Just picked up your 1999 Tool Buyer's Guide. WOW! What a great job putting all that information in one magazine. Your explanations on the "types" of tools and the "features to consider" are right on target. I'm shopping for a lathe and a tablesaw this weekend at a wood-



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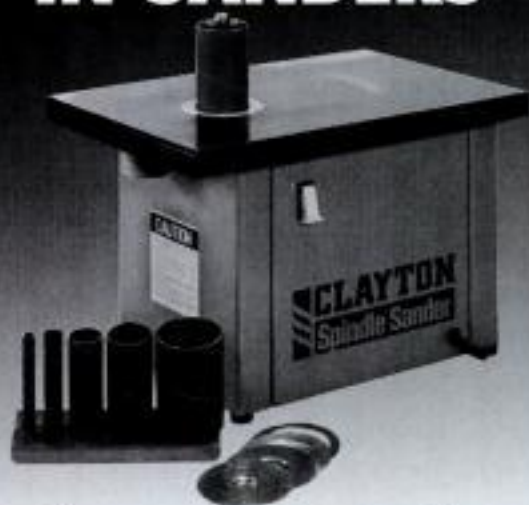
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CIRCLE NO. 5 ON PRODUCT INFORMATION FORM

working trade show, so the timing is perfect. This is going to save me a lot of time and questions at the show. Great job; thanks very much.

John Miller
Little Britain, Ontario

Another Broken Spindle Trick

I read with interest Mike Dunbar's advice on repairing broken spindles. (See AW #65, page 20.) His method is workable, but I believe the way I've been doing it for years is simpler and faster. Also, it doesn't call for cutting into the rails.

The approach I use is the same whether the broken spindle is contoured or straight. First I remove the broken spindle and drill out the tenons in the rails, so there are fresh holes ready for the replacement part. After turning the new spindle, including the tenoned ends that will extend into the rails, I cut the spindle in two on a long diagonal. Apply glue to each tenon and on the long diagonal cut, then insert each half into its

rail. Make sure that the spindle halves are aligned so you can join them along the diagonal cut. A spring clamp or two will hold the joint together until the glue sets. If you wipe off the squeeze-out with a damp rag after clamping, the glue line is almost invisible.

William F. Dent
Newton, AL

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Brian Condran
Martinez, CA

Tool Innovation

I just bought my first issue of AW, so I don't know the whole story behind the "altering tools" discussion. (See "Letters," AW #70.) But I have insights on tool modification based on my experience as a tool and die maker. We only modify equipment if the modification would be used often and save time and money. I would never consider modifying an antique, but I would consider improving my equipment. Manufacturers are catching on all the time—where do you think their great ideas come from?

Byford Barnard Jr.
West Frankfort, IL

A Shared Interest

I enjoyed AW's "Best of 10" feature in the October issue, and was flattered to have my likeness paired with that of a young Fidel Castro. But you should have shown photos of us with cigars! We're both aficionados.

Michael Dresdner
Puyallup, WA

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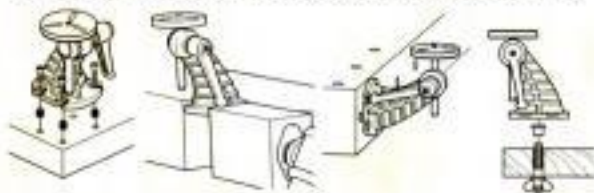


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A. Veritas® Carver's Vise

A good carver's vise should be adjustable in all three axes. This one has full rotation in two axes and 3" of height adjustment in the third axis. It also has controlled release; when you relieve the clamping pressure, the internal springs and O-rings provide residual resistance so that work does not suddenly fall or rotate. Work can be adjusted without needing three hands.

The vise can be bolted to a bench, clamped in a vise (it has side flats), side or top mounted in



a 3/4" dia. dog hole with the optional dog-hole mount assembly.

The body is arched to let work overhang the edge of a bench when top mounted, giving maximum flexibility of use. The body is made from ZA-12 (the same alloy as used in our Tucker Vise) with a solid brass hub and a repositionable gyratory locking lever. The

included 3 1/2" dia. by 1/2" thick mounting plate is fastened to a 1/2" dia. steel rod. A 2" dia. mounting plate with rod is available for mounting smaller pieces. Patent pending.

AW630 Veritas® Carver's Vise	\$78.00
B. AW631 Dog-Hole Mount Assembly	\$ 7.95
C. AW633 Spare 2" Plate with Rod	\$ 9.95
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D. AW653 Round Rasp - 6 1/2"	\$ 7.25
E. AW652 Round Rasp - 8"	\$ 8.75
AW651 Round Rasp - 13"	\$10.50
F. AW650 Square Rasp - 13"	\$10.50
AW654 Square Rasp - 6 1/2"	\$ 7.25

G. Veritas® Carver's Knife

This versatile knife has an oval handle for a comfortable fit and fine grooves for a good grip in your hand. Designed to use standard disposable scalpel blades, it comes with 12 razor-sharp high-carbon blades (four of each style shown) that are easy to hone for repeated use. The solid brass collet on an anodized aluminum body makes blade change quick and easy. About 6" long. The magnetic end cap is removable to store up to six blades in the handle and keeps blades from rattling around inside. Although offered as a carver's knife for fine detail work, it is equally effective as a multi-purpose shop knife.

AW605 Veritas® Carver's Knife	\$14.95
-------------------------------	---------

Replacement Blades:

AW602 Pkg. of 10, Spear	\$ 2.50
AW603 Pkg. of 10, Curved	\$ 2.50
AW604 Pkg. of 10, Classic	\$ 2.50

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J. AW676 4" Leather Case	\$ 7.95
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K. Veritas® Carver's Screw

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AW660 Veritas® Carver's Screw \$12.95

L. Veritas® Carver's Bench

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Hinged Cap for a Fly Rod Case

Q I'd like to make an octagonal case to hold my fly rod. What's the best way to make the lid?

Pete Vogel
Seattle, WA

A I make fly rod cases each year in an octagonal shape. Each case consists of eight $\frac{1}{4}$ by $\frac{7}{8}$ by 60-in. boards, each beveled at $22\frac{1}{2}^\circ$ along both edges, to form an octagonal "tube." I plug the

ends with solid wood cut to fit, which keeps the contents more secure than gluing a flat cap onto each end.

I cut an inch off one end of the "tube" for the cap, and plug it with a $1\frac{3}{8}$ -in.-long octagonal piece of solid wood, so the protruding end of the plug can be inserted into the case. (See right photo.) Use the cutoff piece as a template to mark out the plug, and shape so it fits without major gaps and glues well to the cap sides. I use contrasting wood for the plugs, for visual interest.

Cut $\frac{1}{4}$ in. off the other end of the case and use that cutoff as a template to trace a $\frac{3}{4}$ - to 1-in.-long plug for that end. Glue the plugs in place and sand the ends flush.

For a hinge, I use a $\frac{5}{8}$ -in.-wide leather strap and a brass snap. I attach the free end of the strap to the case with pop rivets. I also screw the strap to the end of the plug with flathead screws. (See left photo.) Then install the two-part brass snap—the male part rivets to the case. Drill small holes in the case for the rivets.

Jack Steinhorst
woodworking teacher
Sheridan, WY

HINGED CAP

Plug the cap. Cut off an inch at one end of the octagonal case for the cap. Then plug it with solid wood. The protruding end of the plug fits neatly into the case.

Leather strap hinge. Fix one end of the strap to the case side with a rivet. Screw the middle of the strap to the plug, and install a snap at the other end.



Ceramic Stones Unplugged

Q I bought a fine-grit ceramic stone for final honing on my chisels, plane irons, etc. At first it did a great job of putting a mirror-like polish on my tools. As I use it more, however, it seems to retain the ground-off steel in the stone's surface, resulting in scratches on the tools after I've achieved a high polish.

The manufacturer states the stone can be used wet or dry. I've tried both, and it seems that the only way to keep the surface from getting plugged up quickly is to constantly wash the stone off with water. Even then, the buildup seems to appear.

How can you unclog the surface of a ceramic stone, and then how do you keep it in good condition?

Tom Carroll
Chicago, IL

A The appearance of scratches on your tools could be a result of inconsistent particle size in the ceramic stone, as well as plugging of the stone.

All stones are more easily maintained if used with a flushing agent. For oilstones the flushing agent is usually a light oil or kerosene. For waterstones, use water. In the absence of anything else, it's better to spit on the stone than use it dry.

With a ceramic stone, use a very light oil. This not only flushes away the swarf, but it makes it nearly impossible for metal particles to adhere to the stone.

Since you've already plugged the ceramic surface, the easiest way to clear it is to lap the stone on plate glass or cast iron using loose silicon carbide particles in the 90- to 150-grit range. Or lap the stone on silicon carbide sandpaper glued down to the glass or cast-iron lap.

With both ceramic and natural Arkansas oilstones, occasional lapping with silicon carbide grit will restore the aggressiveness of the stone. While these stones have the advantage of not wearing quickly, their particles eventually become rounded and the stone does more burnishing than cutting. Lapping

restores their original cutting action by exposing fresh, sharp particles.

Leonard G. Lee
President, Lee Valley/Veritas Tools
Ottawa, Ontario

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CIRCLE NO. 34 ON PRODUCT INFORMATION FORM

Corner Cupboard Techniques

We've been getting a steady stream of queries from readers who are building Lonnie Bird's colonial corner cupboard (AW #67). The questions and answers here relate to Lonnie's cupboard and to other furniture-making work.

Clamping at Odd Angles

Q The hutch is built by attaching the front panels at a 135° angle to the face frame stiles. I want to glue the joint together without nails or screws. Can you suggest a way to line these pieces up, maintain the 135° angle, and clamp them together with a tight seam?

Howard Steier
Virginia Beach, VA

A You're right to avoid using nails or screws to pull this joint tight. Instead, fashion clamping fixtures like the one shown in Fig. 1, below. The "hook" on the fixture pulls the canted side snug against the face frame to close the joint. I use 3/4-in. plywood for the fixture; it's stiff and strong in all directions. On the corner cupboard, I spaced the fixtures about 12 in. apart. I always dry-clamp the joint first to check the fit.

Carving a Fluted Pilaster Arch

Q The fluted pilasters on the hutch each have an arch at the bottom of the flute. How is this arch made?

Blaine M. Haines
Quarryville, PA

A The arch at the base of the flute was a popular detail in 18th-century American furniture and architecture in Virginia and Pennsylvania.

You can make the arch with a carving tool once you've routed the flute. When you rout the flute, stop the cut at the top of the arch. (See Fig. 2, below.) Then use a 1/2-in.-wide gouge with a #8 sweep.

This sweep matches the curve created by the 1/2-in.-dia. router bit. I like to grind the corners of my gouge slightly round for this work. This makes it easier to cut the arch. Incise the edge of the arch first; then use the same gouge (or a skew chisel) to remove the excess wood around it.

A Beautiful Finish for Walnut

Q I am interested in the finish that Lonnie used for his cupboard. I've tried shellac and wax but had problems with visible wax buildup in the pores of walnut. Could Lonnie go into detail?

Austin English
York, PA

A Walnut is a beautiful, rich wood with dramatic figure, and it's easy to finish. Here's a list of steps I use to bring out walnut's natural color and figure:

1. Sand to 180 grit. If you see scratches on highly figured areas like crotch wood, sand these areas to 240 or 400 grit.

2. Flood the surface with tung oil finish or Danish oil. No finish adds depth to wood and makes the grain pop like oil. After a few minutes wipe off any excess. Let it dry for at least 24 hours.

3. Apply several coats of 2-lb.-cut shellac. The cut refers to the number of pounds of shellac flakes per gallon of alcohol. Walnut has "cooler" tones, and the amber color of shellac warms it up. I rub between coats with 0000 steel wool.

4. Apply a coat of paste wax. Wax gives the finish a soft luster. To prevent visible buildup in the pores, use a dark brown paste wax, apply a thin coat, and buff it

vigorously with a clean cloth—the slight residue goes unnoticed. Here's the secret to applying a thin coat: Place a lump of wax in the center of a soft cotton cloth and fold up the corners. The heat from your hand softens the wax, and it oozes through the weave of the cloth.

Routing Period Moldings

Q Since it is impractical for many of us to have custom shaper knives ground, could you offer ideas on how to shape the moldings for the corner cupboard on the router table?

Ralph L. Hardison
Asheboro, NC

A One of the challenges of building period furniture is reproducing moldings. The original moldings were based on segments of ellipses, while router bit profiles are based on segments of true circles. Moldings based on elliptical shapes look more elongated and somewhat more refined. Even so, I'm sure you'll be happy with the results.

To make complex moldings with your router, you'll have to shape simple profiles like beads and coves on separate strips, then glue the strips together. For this molding, shape four individual pieces of stock as shown in Fig. 3, below. When milling the individual strips, match the grain and color so the completed molding looks like one piece of stock.

Lonnie Bird teaches furniture making at Ohio's University of Rio Grande and is a frequent contributor to AW.

FIG. 1: CLAMP

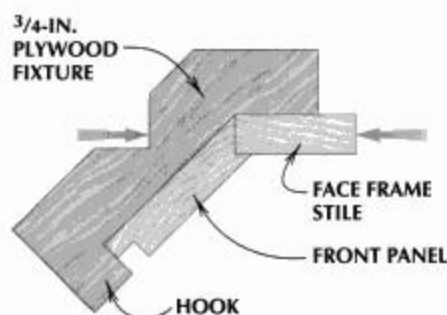


FIG. 2: ARCH

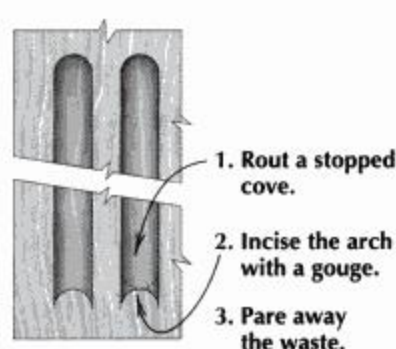
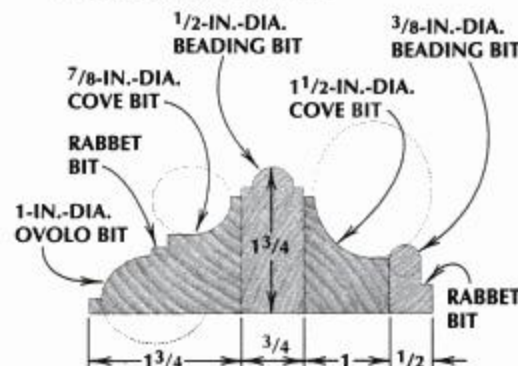


FIG. 3: MOLDING



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Removing Antique Veneer

Q I inherited a bedroom set that was made in the late 1920s. The dressers are in beautiful condition, but the bed-frame headboard and footboard have had it. The veneer on these two pieces is book-matched burl mahogany and walnut. I'd like to remove the veneer and use it to make a matching dresser tray and jewelry box. Can you offer any tips on removing the veneer? It is glued down in strips that are about 8 to 12 in. wide and 3 ft. long, and it's thicker than any veneer I've seen commercially available today. I'm not sure what kind of glue was used.

Matt Seiler
Tinley Park, IL

A The majority of furniture in the early part of the century was made with hide glue (sometimes called hot glue). You can usually remove and reuse veneer that was glued down with hide glue, especially if it's thicker than 1/16 in. If it's any thinner, or if the veneer is highly figured, it's very difficult. If any

other glue was used, salvaging the veneer would be almost impossible.

If it's hide glue, here's how to remove the veneer. Soak a rag in hot water and fold it into a long, 1-in.-wide strip. Place it at the edge where you want to start removing the veneer, and leave the rag there 15 minutes. Pass a heat lamp along the length of the rag—or run a hot clothes iron along the rag for a few minutes.

Remove the rag and insert a thin artist's spatula (the kitchen variety works too) along the edge between the veneer and substrate. As you work the veneer loose, inject a little hot water with a syringe along the glue line—a kitchen baster will do in a pinch. Clamping or holding the piece vertically will make this easier. Pass your heat lamp along the surface, alternately working the spatula and injecting hot water. Work slowly and carefully.

After you remove all the veneer, clean the remaining glue from the back by scrubbing with the hot rag. To dry the veneer and keep it flat while it's drying, sandwich it between sheets of kraft paper,

waxed paper, and plywood. It should be dry in one day. If not, change the kraft paper and wait another day.

In your case, since the veneer is glued in narrow sections, you might consider slicing it off with a saw—if your bandsaw has resawing capacity of 8 to 12 in. I've accomplished this many times. Rip the headboard and footboard into narrow sections first. On the tablesaw, with the fence set about 1/8 in. from the blade and the blade set as high as it'll go, cut into each edge. Finish resawing on the bandsaw. You can leave a thin layer of the substrate bonded to the veneer, but plane it smooth with a very sharp, finely set plane.

Robert C. Whitley
Antique restorer and furniture maker
Solebury, PA

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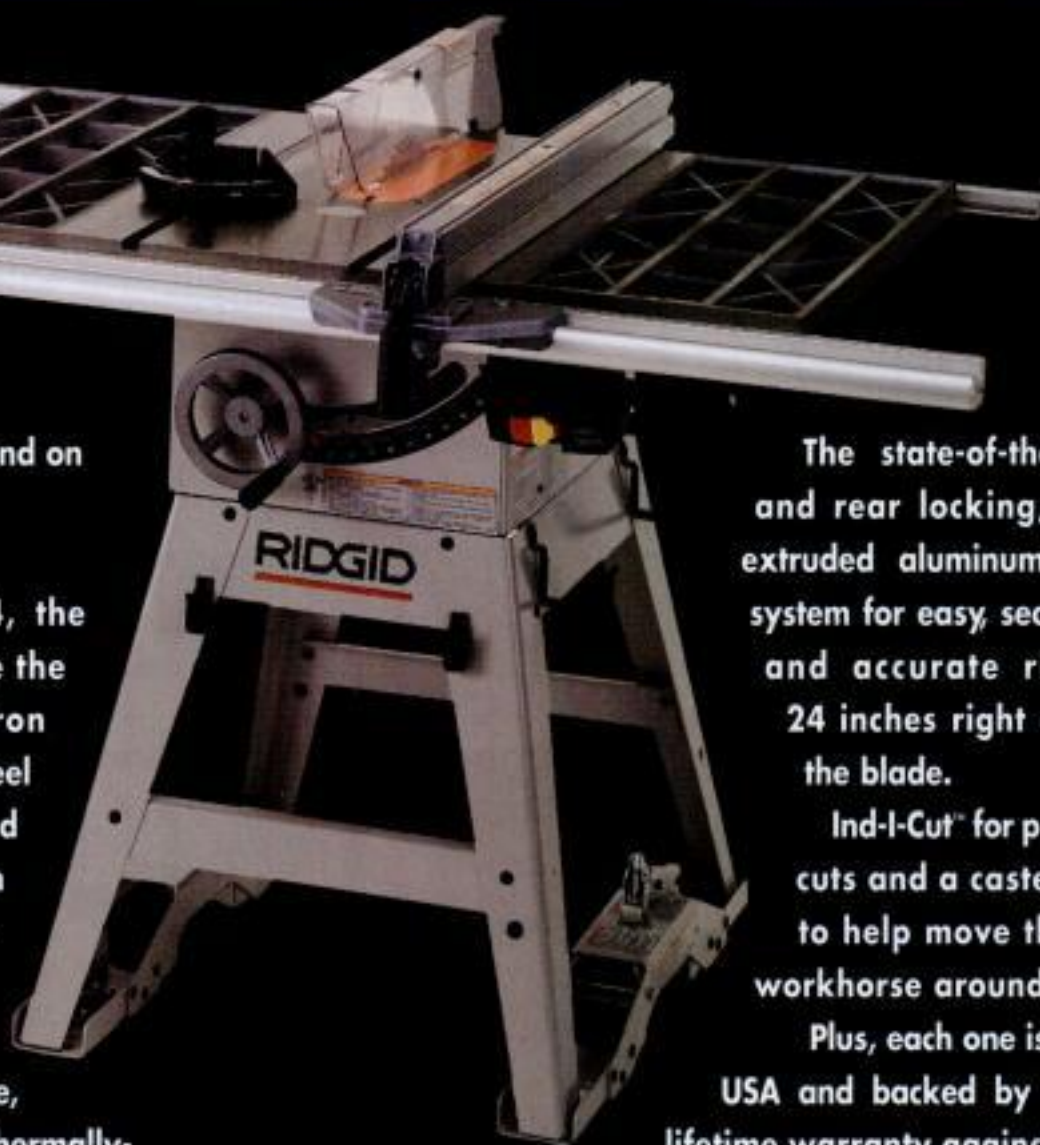
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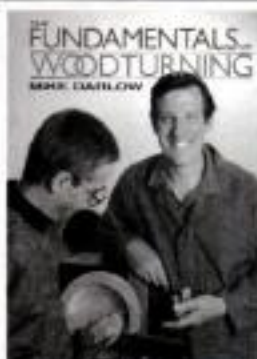
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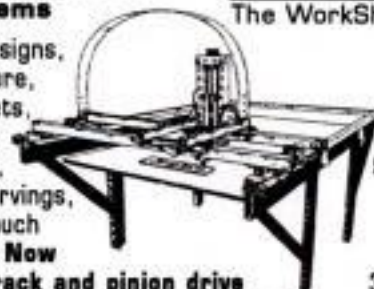
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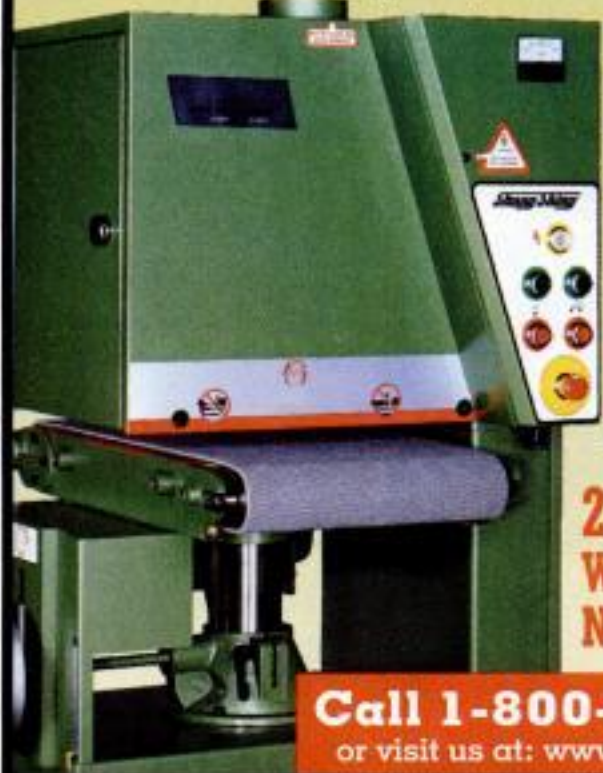
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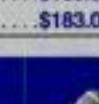
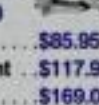
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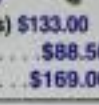
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NEW! 950001N 1/2-1 1/2" (1/4" crown) Stapler\$144.50
SLP20 Brad Nailer\$198.00
SFN1+ 1-2" Finish Gun\$269.00
SFN401-2 1/2" Finish Gun w/case \$317.90
SKS Med. Duty Stapler\$247.00
NEW! PRO600 Framing Nailer.\$362.90
SCN40R Roofing Nailer\$387.90
SN60 Full Round Head Nailer \$388.90
PC0701 A9 Palm Nailer.....\$159.00

**STANLEY BOSTITCH**

RN45B-1 1/2-1 1/2" Coil Roofing Nailer\$367.90
N80SB-1 2"-3 1/2" Framing Stick Nailer\$348.00

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FEIN Turbo II Dust-Free Vac. Powered by 2-stage motor w/ bypass cooling to assure motor runs cool even if the hose or filter is blocked. Excellent Quality!
FIN 9-55-13 \$244.95
FIN MSXE-636-2
NEW! Multi-Master VS Triangle Sander Kit with Case\$169.00

**PORTER-CABLE**

NEW! 557 Plate Joiner Kit •Does mini size biscuits & standard size •7.5 amp motor. •Tilt-fence does not have to be removed for flush cuts. •7-position depth stop •Fence let's you position your cut from outside face •Includes case, dust bag, 2" & 4" blades & extra biscuits.

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5554 1000 Pc. Asst. Biscuits \$22.50

Brad, Finish & Framing Nailer Kits

All kits include case

NEW! CDA250 15G Cordless

Angle Finish Nailer\$277.00

BN125 18G 1 1/2"-1 1/2" Brad\$87.90

BN200 18G Brad Nailer Kit\$124.00

DA250A 15G 1 1/2"-2 1/2" Finish\$214.90

FN 250A 16G 1 1/2"-2 1/2" Finish\$181.50

NS150 18G 1 1/2" Crown Stapler \$136.90

FC350 Clipped Head 2"-3 1/2" Framing Nailer Kit\$287.00

FR350 Full Round Head 2"-3 1/2" Framing Nailer Kit\$287.00

693PK 1-1/2 HP Plunge Router Kit

Includes 690 w/ fixed base & plunge base w/ case\$188.00

690 1 1/2 HP Router\$142.00

691 1 1/2 HP HDL Router \$159.00

6931 Plunge Base Only \$82.00

6911 D-Handle Base Only\$72.00

7530 3-1/4 HP Plunge Router

Plus Free Fine Depth Adjuster (\$26.50 Value)\$294.90

7518 3-1/4 HP SSP FB Router \$274.00

42000 8 pc. Template Guide Kit \$29.95

97310 Laminate Trim Kit\$192.50

697 Router Table w/ 1 1/2 H.P. Router \$233.00

698 Router Table w/out motor \$133.50

9862F 12V Cordless Drill Kit

w/ Free Flashlight.....\$158.90

9872 14.4V Cordless Drill

Kit w/two batteries, case & charger\$178.90

9872R 14.4V Recon Kit.\$158.90

9444 Sander Kit\$103.50

330 Speed Block Sander\$68.00

332 5" QS Palm Sander\$59.90

333 5" QS R/O Dst Sdr H&L\$63.90

333VS VS R/O Palm Sander \$77.00

334 5" QS R/O Dustless Sdr \$64.90

352VS VS Belt Sander\$177.00

9352VS VS Belt Sander w/ case \$188.90

7335 5" VS R/O Sander\$139.00

97355 5" VS R/O Sander with Dust

Collection & Case\$149.00

552 Prod. Pocket Cutter\$598.00

7800 Drywall Sander\$348.80

362 4x24 Belt Sander w/ Bag \$227.90

362VS 4x24 VS Belt Sander & Bag \$235.00

360 3x24 Belt Sander w/ Bag \$224.00

360VS 3x24 VS Belt Sander & Bag \$227.00

347K 7-1/4 Circular Saw w/Case \$127.90

743K LH 7-1/4 Circular Saw w/ case \$127.90

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FLG-622-322 HVLP Suction Gun \$159.95
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CIRCLE NO. 1 ON PRODUCT INFORMATION FORM

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offcuts

Bits and pieces of woodworking news

A Turn Toward Self-Reliance

A group of Pennsylvania woodturners is empowering an enthusiastic group of new students. The Special Athletes Outreach Program is teaching woodturning to young and middle-aged adults with physical or mental disabilities. The fledgling program intends to foster not only skill, but also a sense of pride, self-reliance, and contribution to the family and community. Participants learn to produce small, marketable, turned items like pens, yo-yos, and other toys. They also demonstrate their skills at Rotary Club meetings and other events.

The Special Athletes Outreach Program is a joint effort of the Wood Turning Center of Philadelphia, the Bucks Turners, and the Keystone Turners.

Turned on. Elizabeth Daft learns the fine points of woodturning from instructor Rob Malinowski.



ROUTER NEWS LAUNCHES PREMIERE ISSUE

The router is nearly a century old. And now the wildly popular and versatile tool has its own publication. *Router News*, a new quarterly newsletter, is the first and only American periodical devoted exclusively to the router. It features router tips, techniques, jigs, and product and book reviews for an annual subscription rate of \$18. For more information, call *Router News* at (203) 775-9290.



A TURNING TREAT

Akron, Ohio was the center of the woodturning universe this past June as some 960 woodturners gathered for the 1998 American Association of Woodturners (AAW) symposium. Participants enjoyed intensive instruction, a trade show, and some good, old-fashioned fellowship. Top-notch turners from around the world shared their techniques for spindle, bowl, and box turning, surface carving, sharpening and toolmaking, and finishing.

The 12th annual symposium—the largest to date—also featured an “Instant Gallery” of over 600 pieces brought by attendees. In addition, local AAW chapters competed in a “Chapter Collaborative Challenge,” with each group cooperatively producing its own project. The Chicago Woodturners swept the awards with their reproduction of an old-fashioned, high-wheel bicycle. The 1999 symposium will be held in Tacoma, WA. For more info, contact the AAW at (612) 484-9094. —Dick Burrows

Group project. This award-winning wooden bicycle was created by more than 30 Chicago woodturners.

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Ready-to-use paintable, sandable one-part polyurethane glue for wood, foam, concrete, marble, and most rigid surfaces.

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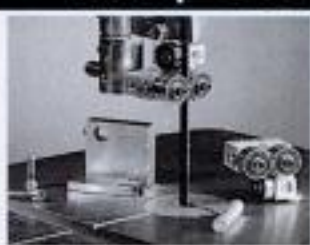
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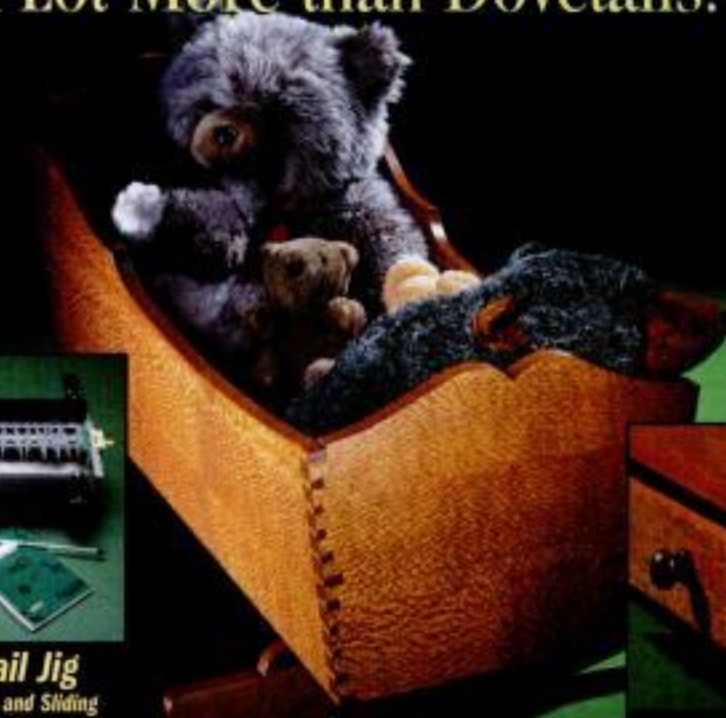
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LEIGH ROUTER JOINERY JIGS

When You Own The World's Most Versatile Dovetail Jig System, You'll Create A Lot More than Dovetails.



The D4 Dovetail Jig
Create Through, Half-blind and Sliding Dovetail Joints with the D4 Jig

Create Square and Rounded Finger Joints with the F1 Template

Create Multiple Mortise and Tenons with the M2 Attachment

Create 6 Isoloc Joints with the I1 Joint Templates

At the center of the Leigh Router Jig System is the amazing 24" D4 Dovetail Jig. Create through, half-blind and sliding dovetails with *infinite adjustment* of joint spacing and tightness of fit in wood up to 1 1/2" thick. Add the F1 Finger Joint Template for an incredible range of square or unique *rounded* finger joints from 1/2" down to a tiny 1/16". All infinitely adjustable for fit with the Leigh Variable Guidebush System (VGS).

With the Multiple Mortise and Tenon Attachment you'll rout perfectly snug rows of multiple mortises and tenons, in virtually any layout you can imagine, and in material from 5/16" to 1 1/2" in thickness. And finally, the *world's first* organically-shaped *interlocking* joints are easy to cut with our Isoloc™ Templates. Three different Isoloc templates create six unprecedented joints that are *impossible* to cut by hand. And again, you have complete control of joint tightness with the VGS.

Precision, strength and beauty are the hallmarks of every Leigh joint. Create them all, from the dovetail and beyond with the world's best router jig system.

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Available in five diameters, 2" to 8". Operator-regulated inflated drum conforms abrasive sleeve to contoured work.

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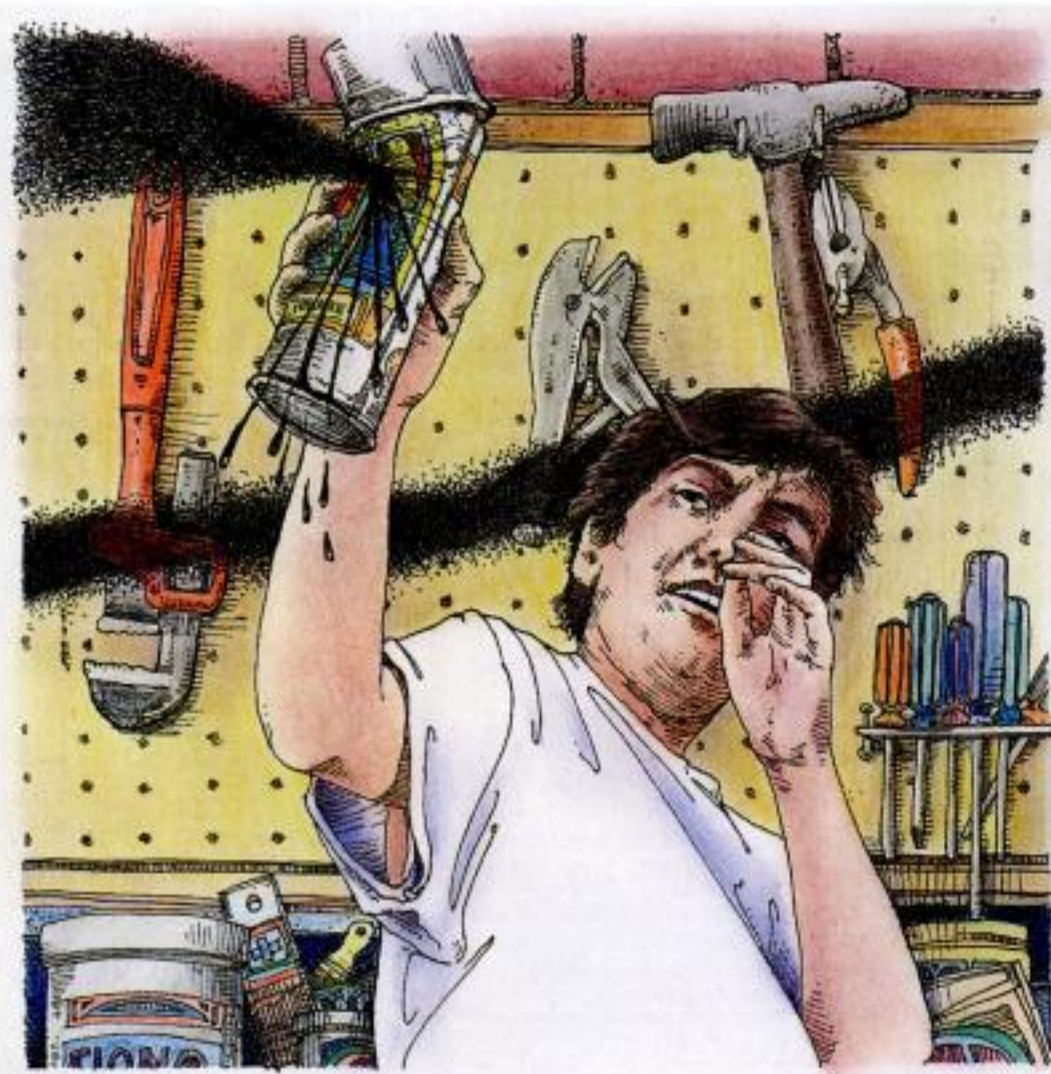
A cautionary tale

Out of frustration with the plastic childproof caps on cans of spray paint, I've gotten into the bad habit of slamming the lid against the edge of a counter to remove it. My 12-year-old son imitated this technique when preparing to paint some toy parts. He swung the lid at the jaw of my vise, missed, and punctured the metal can.

Next thing I know, he's yelling, "Dad! Dad!" while directing

the paint away from his face and spraying everything in sight. By the time we tossed the thing in the garbage can, the fast-dry black paint was all over the wall, tools, countertop and cabinets. Although we washed everything with solvent, black traces linger here and there to kid him about his painting misadventure.

*Denis Roy
Winnipeg, Manitoba*



JOHN SAINSBURY DIES

Woodturner, teacher, and author John Sainsbury died in England at the age of 82.

Sainsbury, a past contributor to *AMERICAN WOODWORKER*, authored numerous woodworking books and magazine articles.

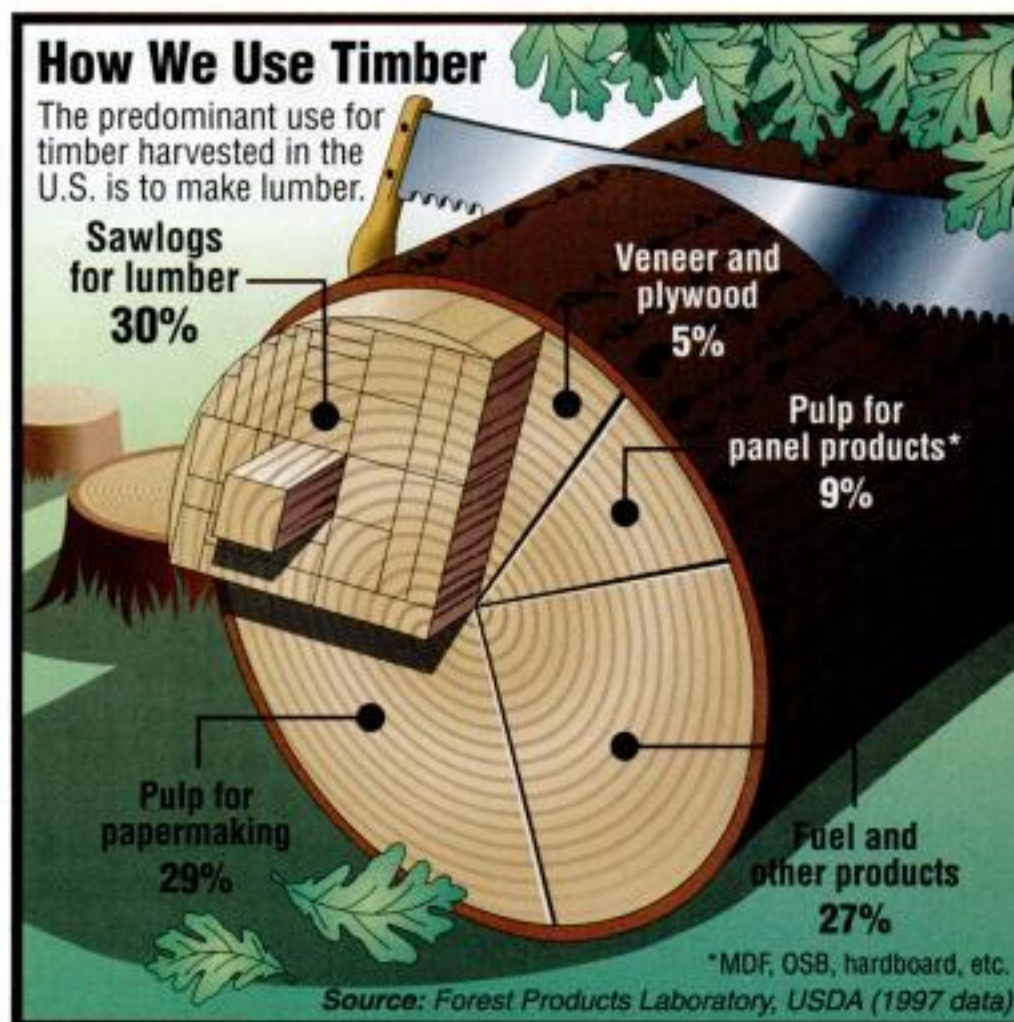
Sainsbury taught himself woodworking while teaching math and crafts in Peterborough, Cambridgeshire, England. In the early 1960s, he became an educational technical advisor to Record Ridgeway Tool Co. of Sheffield. He retired in 1980 to Brixham, Devon, to write about woodworking and run Creative Woodcraft Studio.



FACTOID

How We Use Timber

The predominant use for timber harvested in the U.S. is to make lumber.



GET MORE

The new MultiMaster is three tools in one: detail sander, scraper and flush-cut saw.

Detail Sander

The MultiMaster's patented oscillating motion and special triangle sanding pad permit aggressive sanding along delicate edges and in tight corners.



Flush Cut Saw Blade

Smoothly undercuts door jams for floor coverings. Plunge cuts into wall board. Cuts wood, plaster and PVC. But because it oscillates, it won't cut you.



Rigid Scraper

Easily removes old putty, caulking and flooring adhesives. Great for scraping paint and varnish or lifting linoleum.



Oscillation

Only the MultiMaster oscillates at a rate of 21,000 strokes per minute in a 3.2 degree arc.



GET MORE

Detail sander, power scraper
and oscillating saw all in one tool.

DO MORE

Scrape. Sand. Saw.

SPEND LESS

The new MultiMaster. Best pricing ever.

Until now, a Fein detail sander plus scraper and flush-cut saw would have cost you over \$300. Now, while supplies last, the MultiMaster package includes all of these accessories, and the price

is under \$200*. It's the best Fein value ever. Want a MultiMaster now? Simply call for immediate delivery from a participating Fein dealer near you. To learn more about the MultiMaster, ask for our free brochure and poster.

CALL 1-800-441-9878

*Participating Fein dealers only

OPTIONAL ACCESSORIES

Get even more. The optional Professional Kit includes a carbide rasp, a grout-cutting saw blade, and a segment knife.

Carbide Rasp

Quickly grinds paint, mastic, stone and concrete. Won't load up.



Grout-Cutting Saw

Blade cuts grout to remove damaged tile without breaking surrounding tiles or creating excessive dust.



Segment Knife

Easily slices rigid materials like floor tiles, linoleum, carpet, plastic and leather.



The Fein MultiMaster is a true multi-purpose tool that saves hours of time. With the MultiMaster, finishing is just the beginning.



*Finishing
is just
the
beginning.*



CIRCLE NO. 21 ON PRODUCT INFORMATION FORM

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Model	Description	List	Sale
31-750	NEW Bench Random Orbit Sander		
26-150	NEW 9" Bench Band Saw	155	
50-850	NEW 850 CFM Air Cleaner	239	
31-695	6" Belt/9" Disc Sander	441	299
23-710	Sharpening Center	217	145
31-460	4" Belt/3" Disc Sander	198	119
40-560	2" speed Scroll Saw	230	129
40-540	16" variable Speed Scroll Saw	249	165
11-990	12" Bench Drill Press	255	184
11-090	32" Radial Bench Drill Press	405	279
43-055	1/2" Bench Router/Shaper	399	269
22-540	12" Bench Top Planer	359	239
28-195	10" Band Saw	390	309
22-550	12-1/2" Planer w/ extra knives	329	
36-855	Versa Feeder Stock Feeder	249	
36-220	10" Compound Miter Saw	294	199
28-185	Bench Band Saw	213	168
36-240	10" Sliding Miter Saw	589	439
37-070	6" wisp/ Bench Jointer	351	265
14-550	Hollow Chisel Mortiser	380	249
17-900	16-1/2" Floor Drill Press	490	329
17-920	NEW Mortise Chisel Kit	359	259
36-285	8-1/4" Builders Saw w/ stand	568	419
34-555	Sliding Table	487	289
36-250	10" Slide Compound Saw	825	449
31-780	Oscillating Spindle Sander	253	194
31-790K31-790	w/ 31-781 spindle set	209	
46-700	12" Wood Lathe	575	465
40-550	G3 18" Scroll Saw	389	269
36-905	30" Unifence	346	255
36-905	50" Unifence	444	299
36-444	10" Contractors Table Saw	579	

The following tools have a \$50.00 rebate!
Price shown is before rebate.

36-455	10" Contractors Table Saw w/ 30" unifence, cast iron wing, 34-914 table board, & carbide blade	549	
22-675	DC380 15" Planer	5175	
28-275	14" Band Saw 3/4 HP	595	
28-280	14" Band Saw 1 HP motor with enclosed stand	739	
28-270	14" Band Saw 1 HP w/ 50-274 mobile base, 28-855 rip fence, & 28-266 cool blocks	539	
31-280	Sanding Center w/ stand	549	
37-190	6" Deluxe Jointer	603	445

Model	Description	List	Sale
50-850	1-1/2 HP, 1200 CFM	285	
50-851	2 HP, 1500 CFM	489	

Model	Description	List	Sale
55LWKEE	NEW Sawzall with case	343	169
6537-225527	w/quick lock blade change	224	175
6537-2212V	Drill w/quick lock 2 bat	380	175
0224-1	3/8" Drill 4.5 amp magnum	235	132
0234-6	1/2" Drill 4.5A mag 0-850 rpm	255	134
0235-1	1/2" Drill w/keyless chuck	255	139
0244-1	1/2" Drill 4.5A mag 0-800 rpm	255	134
0222-1	3/8" Drill 3.5 amp 0-1000 rpm	213	119
0228-6	3/8" Drill 3.5 amp 0-1000 rpm	207	109
0375-1	3/8" close quarter Drill	255	148
0379-1	1/2" close quarter Drill	288	165
6546-6	Screwdriver 200 & 400 rpm	150	89
6547-6	6546-6 w/bits, 1/4" chuck & cs185	106	
5399	1/2" D-handle Hammer Drill Kit	356	219
5397-1	3/8" w/ spd Hammer Drill Kit	275	145
5371-6	1/2" w/ spd Hammer Drill Kit	360	194
3107-6	1/2" wisp/ right angle Drill Kit	224	139
6142	4-1/2" Grinder w/acc. & acc.	224	124
6490-6	10" Miter Saw	496	265
6491	6490 w/ carbide blade & bag	594	345
6494-6	10" Compound Miter Saw	585	319
6266-6	Top Hammer Jig Saw	315	159
6496-6	10" Slide Compound Saw	1050	569

Item	Description	Teeth	List	Sale
LUT2M010	Gen Pur. A.T.B. 10"	40	69	42
LUB2M010	Cut-off 10"	60	93	29
LUB4M011	Comb 10"	50	78	45
LUB5R010	Super Cut-off 10"	80	115	64
LM72M010	Ripping 10"	24	69	38
LUT3M010	Cut off 10"	60	84	49
LUB7M010	Thin Kerf 10"	24	72	45
LUB8M010	Thin Kerf 10"	60	88	49
LUB9M010	Ultimate 10"	60	128	68
LUB1M010	Compound Miter 10"	60	88	54
F410	Quiet Blade 10"	40	95	49
SD306	8" Dado - Carbide		230	119
SD508	8" carbide w/case & shims		344	172
FB100	16 piece Forstner Bit Set		338	194
94-100	5 pc. Router Bit Door System		320	169
FT2000E	Plunge Router		349	189

Model	Description	List	Sale
CIFB2	8-1/2" Slide Compound Saw	1169	449
C10FS	10" Slide Compound Saw	1627	579
C15FB	15" Miter Saw	1346	645
NT43AE	Coll Roofing Nailer	935	379
NT32AE	NEW Pinner 5/8" - 1-1/4"	85	
NT50AE	NEW Pinner 3/4" - 2"	129	
C16RA	NEW 10" Table Saw	632	319

Model	Description	List	Sale
5090DW	3-3/8" Saw Kit 9.6 volt	280	155
DA391D	3/8" angle Drill Kit 9.6V	166	114
DA391DW	3/8" angle Drill Kit 9.6V	341	175
ML902	Incandescent Flashlight 9.6V	14.95	

6095DWE9	6 volt Drill Kit w/2 batt	125	
6095DWLE2	6095DWE w/flashlight	139	
632007-4	9.6 volt Battery	47	30
632002-4	7.2 volt Battery	39	28

Model	Description	List	Sale
6343DWA6	1/2" Drill Kit	249	
5620DWA	6-1/2" Circular Saw Kit	259	

Model	Description	List	Sale
9900B	3"x21" Belt Sander w/bag	347	165
9924DB	3"x24" Belt Sander w/bag	360	169
N1500B	3-1/4" Planer with case	263	142
N1512B	4-3/8" Planer	352	205
N1514B	4" Disc Grinder 4.8 amp	118	65
DA3000R3/8"	Angle Drill	355	185
2708W	8-1/4" Table Saw	637	295

6405	3/8" Drill Rev. 0-2100 rpm	115	65
6013BR	1/2" Drill Rev. 6 amp	270	159
9401	4" x 24" Belt Sander w/bag	458	215
5007NBK7-1/4"	Circ Saw w/ case	250	129
LS1011	10" Slide Compound Saw	995	429
LS1211	12" Slide Compound Saw	1620	695
3901	Plate Joiner Kit	376	159
3612C	3 HP Plunge Router	492	249
LS1040	10" Compound Miter Saw	460	259
LS1013	10" Dual Compound Slide Miter Saw	1068	599

BO5010	5" Random Orbit Sander	142	72
LS1220	NEW 12" Compound Miter Saw	379	
9227C	NEW 7/9" Polisher	350	195
SJ401	NEW 16" Bench Scroll Saw	300	175
2702	NEW 8-1/4" Table Saw	350	299
2703	NEW 10" Table Saw	319	

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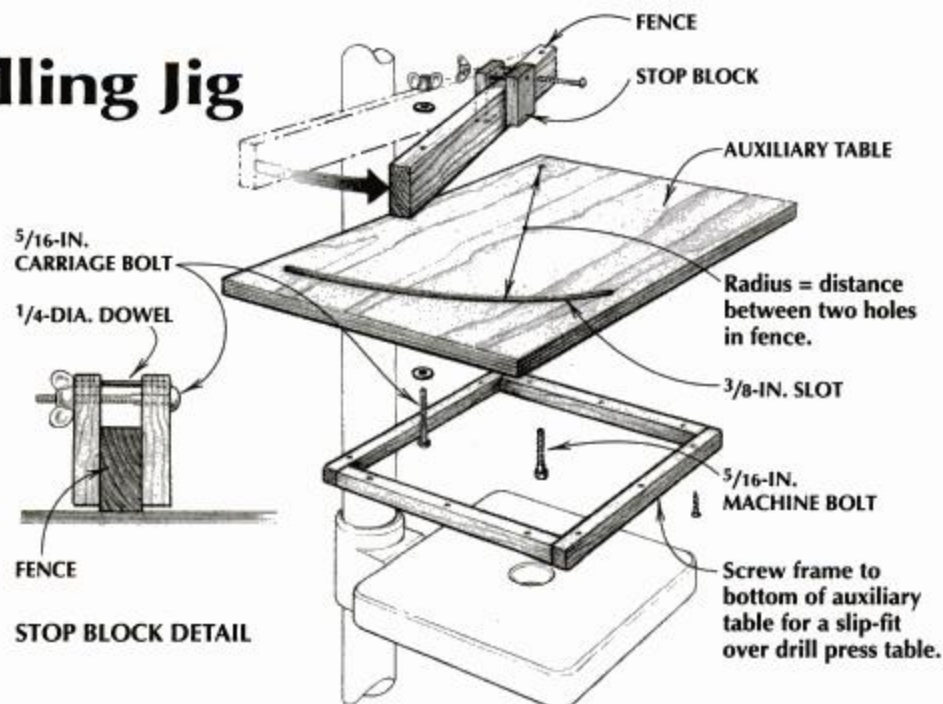
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Production Drilling Jig

Best tip of the issue

I made this simple jig to speed the drilling of multiple parts. The plywood auxiliary table drops over the drill press table and secures by a friction fit—no clamps, no bolts. I mark and drill the first workpiece and then, before removing it, set the pivoting fence and the stop block. Subsequent holes will all be identically positioned.

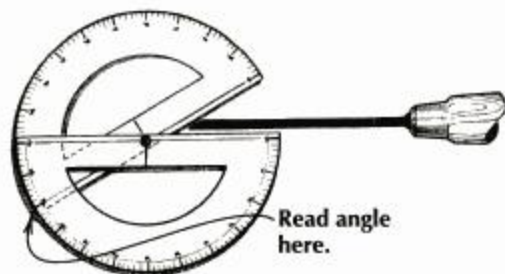
Cliff Sommers
Jackson, MS



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, 2915 Commers Drive, Suite 700, Eagan, MN 55121. We'll pay \$50 for each tip we publish and \$200 for the best tip of the issue.

Setting Precise Angles

This is a simple, accurate way to measure angles—the bevel on a chisel or plane iron, for example. All you need is two identical protractors, plastic or

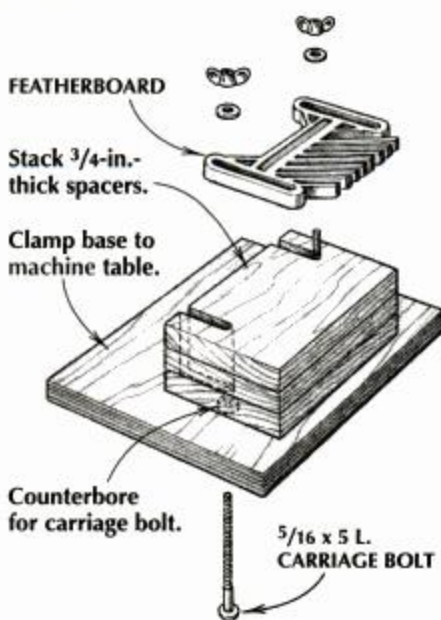


metal. Pin or bolt them through the centers as shown. The larger the protractors, the greater the accuracy.

Kelly Mehler
Berea, KY

Multiple Featherboards

One featherboard clamped to a tabletop often isn't enough support when working boards vertically on a router table or tablesaw. My solution is to cut three 3/4-in.-thick spacers so I can either raise one featherboard a couple of inches, as shown in the sketch, or make a sandwich of two. Clamp the plywood base to the table so the featherboards press the work against the fence. (Featherboards



are available from Woodworker's Supply, 800-444-7002; for more on making your own, see AW #68.)

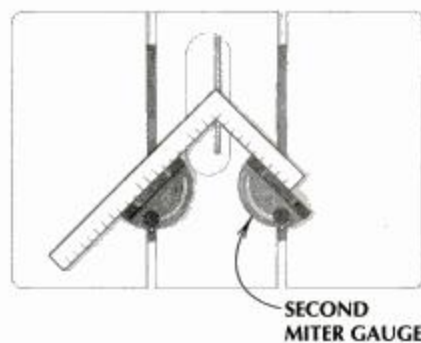
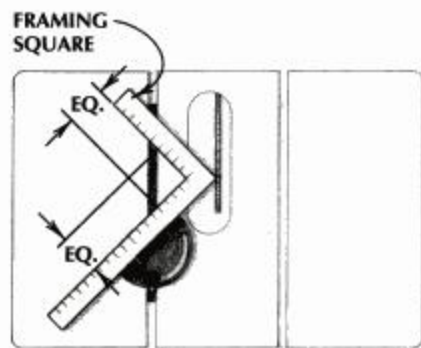
Jim Porterfield
Park Ridge, IL

Miter Gauge Magic

A carpenter showed me a trick he uses to set miter gauges at 45°. Lay a framing square against the face of the miter gauge as shown in the top sketch, and read the

distance to the edge of the tablesaw slot on both arms. Adjust the gauge until both measurements read the same; the angle must be 45°. You can also use a framing square to set a second miter gauge from the first (see bottom sketch).

Joe Wajszczuk
Jersey City, NJ



THE BEST TOOL IN THE JOINT.



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Integral, one-piece fence is adjustable and tilts from 0° to 90° requiring no extra parts

6.5 amp, 10,000 rpm motor provides power for the hardest woods

Preset depth stops for all common biscuit sizes

45° locating notch in fence allows indexing off the outside surface of a mitered joint

Non-marring, heavy-duty aluminum shoe allows joiner to be clamped for stationary work

Retractable, anti-slip pins help hold work in place

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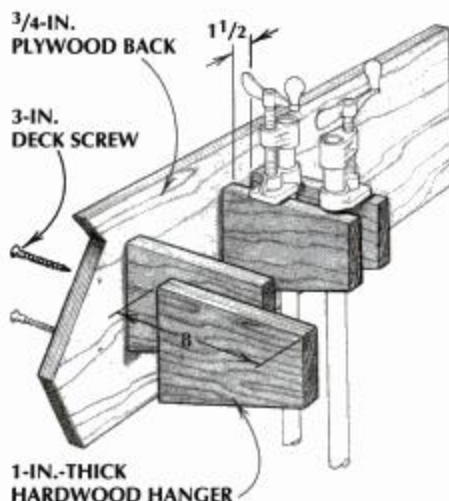
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More on Hanging Pipe Clamps

Bill Boyd's method of hanging pipe clamps (AW #70) is fine if you have plenty of wall space. I don't, so I came up with the racks shown in the sketch.

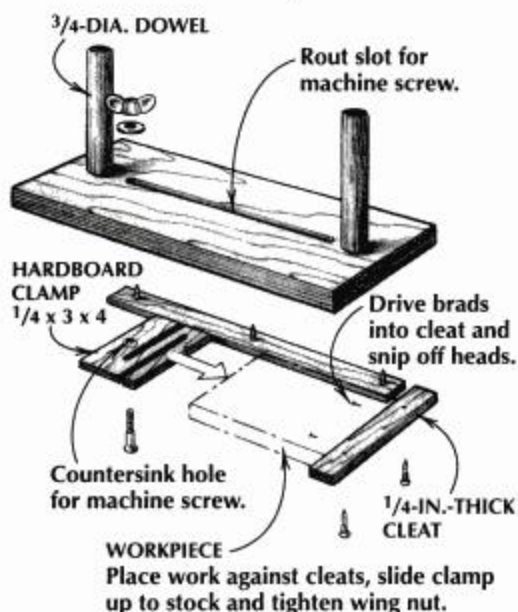


Each unit holds up to six clamps. This means considerable weight, so be sure to anchor the unit securely to the wall.

Randy Sorenson
Sandy, UT

Belt-Sanding Holder

I use a lot of small, highly figured offcuts to make lids for jewelry boxes, typically 3/8-in. to 1/2-in. thick. I can't plane the surfaces without tearout, so I smooth them with a stationary belt sander. To



hold the thin stock while sanding, I made this jig. I sunk a couple of brads in the end cleat, and snipped off their heads

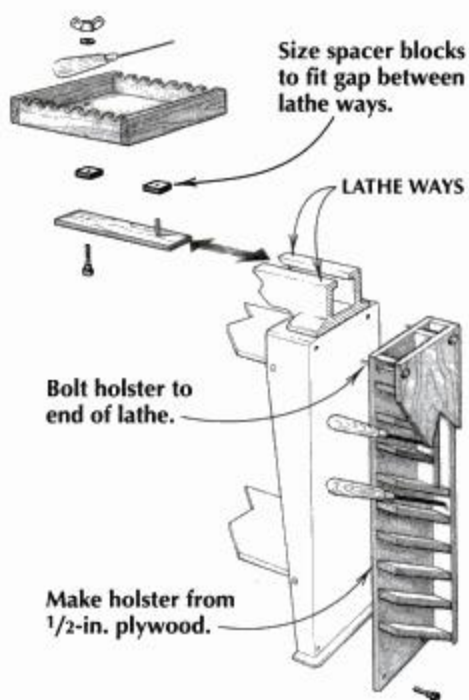
to hold the stock securely. The dowel handles ensure that my fingers never get close to the sanding belt.

Dave Freedman
Coopersburg, PA

Lathe Tool Holders

I store all my lathe tools in a wooden "holster" except the half-dozen or so I am using: These I keep in a sliding tray attached to the lathe bed. The slanting pigeonholes in the holster vary in depth to accommodate longer or shorter tools.

Bill Boyd
Salem, SC



No-Mar Nailing

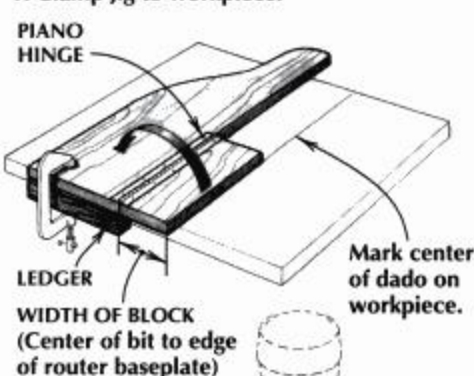
Filling nail holes in prefinished trim or molding can make unsightly blemishes. My solution is to apply a short strip of masking tape where I am going to nail. I hammer and set the finish nail right through the tape and apply wood filler. Only then remove the tape and you'll find the surrounding finish unmarred.

James Vasi
Williamsville, NY

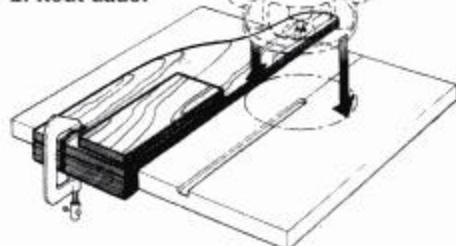
Flip-Up Dado Jig

Use this simple jig to cut rabbets and dados centered exactly on a line. Align the edge of the hinged gauge block with a line marked on the center of the dado and clamp. Then flip the block out of the way and rout. The only dimension

1. Clamp jig to workpiece.



2. Rout dado.



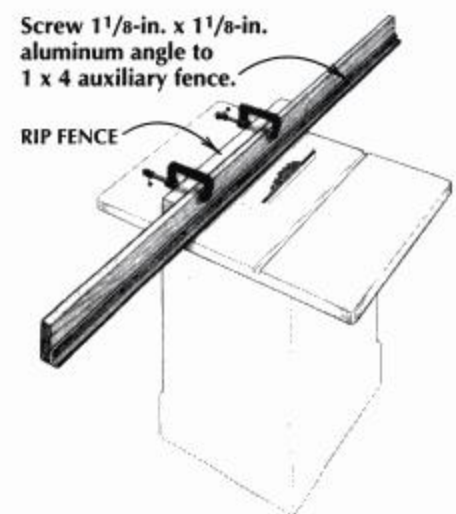
that matters is the width of the gauge block, which must be exactly the distance from the bit's center to the edge of the router's baseplate.

David Holzberger
Rancho Cucamonga, CA

Sawing Thin Sheets

I use this simple jig when cutting thin sheets of plastic laminate without help. The aluminum angle supports the edge of the sheet and prevents it from slipping under the fence. I find a 7-ft. length of angle enables me to handle 8-ft. sheets.

J.E. Kalkbrenner
East McKeesport, PA



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Heavy-Duty 1/4 Sheet
Palm Grip Sander



DW423

Heavy-Duty 5" Random Orbit Sander
With Electronic Variable Speed



DW431

Heavy-Duty 3" X 21" Electronic
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DW421

Heavy-Duty 5" Random Orbit Sander

Dust-sealed switch
provides increased
durability

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maximum sanding speed
for smooth finishes

Sealed, 100% ball-bearing
construction delivers
longer life

Dual-plane, counter-
balanced fan reduces
vibration and user fatigue

3/32 orbit diameter
provides a tight orbital
pattern for smooth finishes

The Controlled Finishing
System™ maintains a
controllable pad speed
and minimizes gouging
during startup

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THE PERFECT EDGE.



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Heavy-Duty 3 HP
VS Electronic Plunge Router



DW610

Heavy-Duty 1-1/2 HP Router



DW621

Heavy-Duty 2 HP
Electronic Plunge Router

Exclusive, built-in dust-extraction column attaches to standard shop vacuum to remove 95% of dust

8' rubber cordset

100% ball-bearing construction

2 HP motor provides the power to make the most challenging cuts

Electronic, variable-speed motor runs at 8,000-24,000 rpm with constant speed under load to ensure a quality finish in all materials

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Spindle lock button allows one-wrench bit changes

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Converts from a fixed-base to a plunge router without extra parts or tools

Precision-machined, 3-position turret stop

The family of **DeWALT HEAVY-DUTY ROUTERS** is the industry standard. These routers provide the highest degrees of accuracy, durability and power you can buy, along with the most innovative features available. For example, the DW621 includes the industry's only built-in dust-collection system. It also can convert from a fixed-base to a plunge router without additional parts or tools. And, its 2-horsepower motor provides the power needed to cut a variety of materials. The DeWALT line also includes the DW625, which boasts 15 amps and a 3-horsepower motor. And our fixed-base router, the DW610, was a 1998 *Wood Magazine* Editors' Choice. So get the best of all worlds, and get a DeWALT heavy-duty router. Guaranteed Tough.™

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BUILD YOUR OWN

Shop Cabinets

From raw plywood to finished cabinets in 10 steps

by Paul Anthony

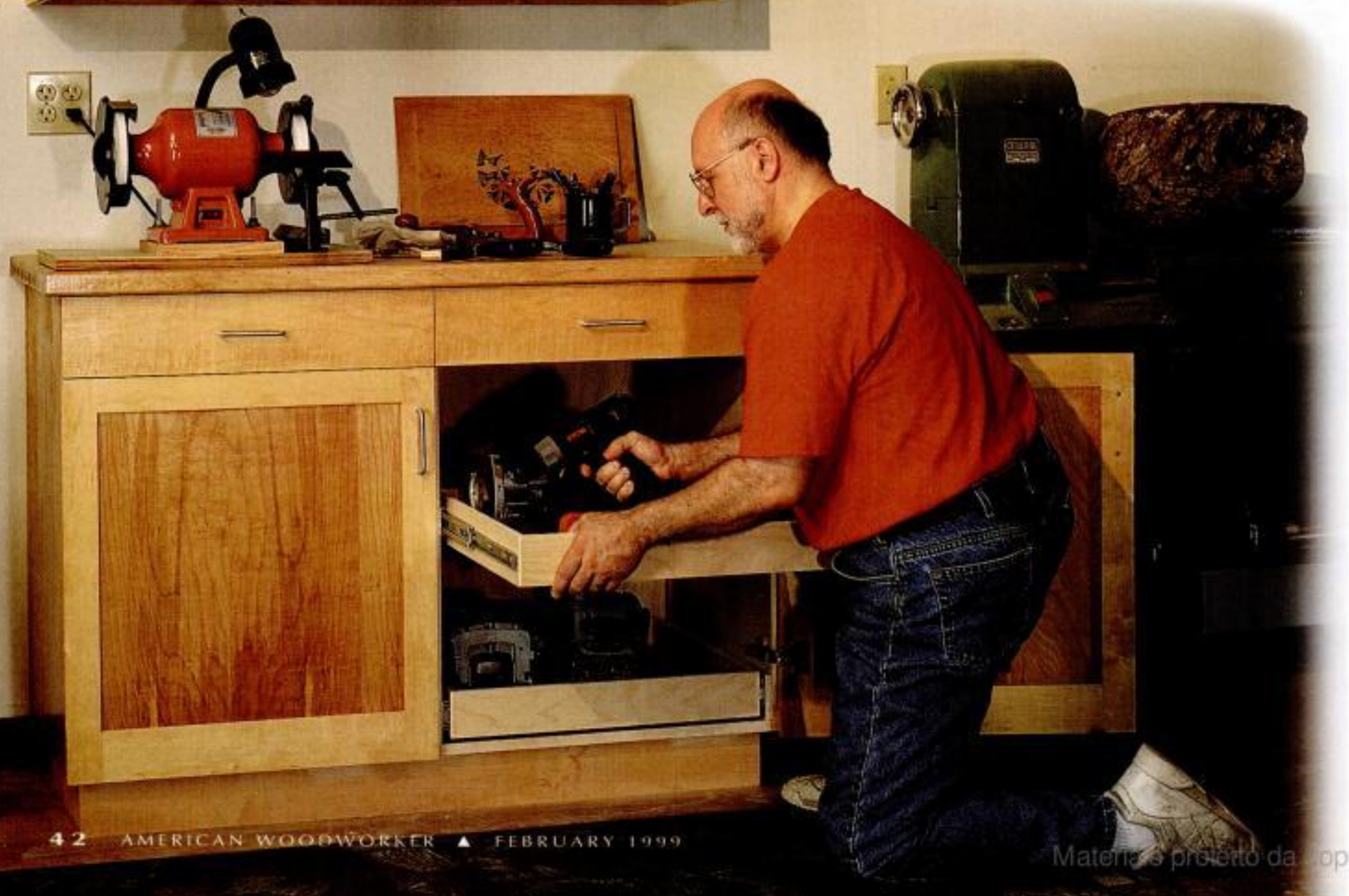


Workshops and kitchens have a common need for cabinets. And though the items you're storing are different, they're similar in size: from small stuff such as silverware and drill bits to larger fare such as pots, pans, and portable power tools. But no woodworker wants to spend a lot of money on cabinets destined for the workshop. A good workshop cabinet has to stand up to heavy-duty use, offer storage that's convenient and flexible, and be reasonably easy and inexpensive to build. The cabinets we built for the AMERICAN WOODWORKER shop score well in these areas, and they look good, too.

In this article, I'll take you through a 10-step cabinet-construction process that begins with cutting sheets of plywood and finishes up with installation details. The techniques aren't just for shop cabinets; they'll work for cabinetry used anywhere.

I've made plenty of cabinets by myself, but the work is faster and more fun if you have a partner. (Ron Snayberger helped me with the cabinets featured in this article, and is a frequent

***Rugged, attractive, and useful.** Solid construction and thoughtful design make this base and wall cabinet combination a valuable asset in any workshop.*



assistant in the AW shop.) The times when you'll most appreciate assistance are in handling full-size sheet goods, assembling cases, and installing cabinets.

A Task for the Tablesaw

Outfitted with a few key accessories, the tablesaw excels as a cabinetmaking machine. An outfeed table and portable support rollers enable you to cut sheet goods down to size with safety and precision. (See photo below.) A high-quality combination blade gives you smooth cuts in solid wood and sheet goods. And a dado cutter takes care of the joinery work, which consists of rabbets, dadoses, tongues, and grooves.

For crosscutting large panels on the tablesaw, I like to use a shop-made cut-off box that slides in the tablesaw's miter gauge grooves. (See AW #40.) Or you can guide a circular saw against a straightedge clamped to the workpiece.

Frameless Cabinetry

Although some people prefer the look of face-frame cabinets (see AW #59), "frameless" cabinets save time and materials because there are no face frames to make. Instead, 1/4-in.-thick wood strips cover the plywood case edges. And the European "cup" hinges used on frameless cabinet doors are a cinch to install and adjust.

It's the doors and drawer fronts that really dress up frameless cabinetry, so select this material carefully. We used soft maple for the door frames and drawer fronts, and took some extra time to arrange the grain on the plywood door panels in attractive patterns.

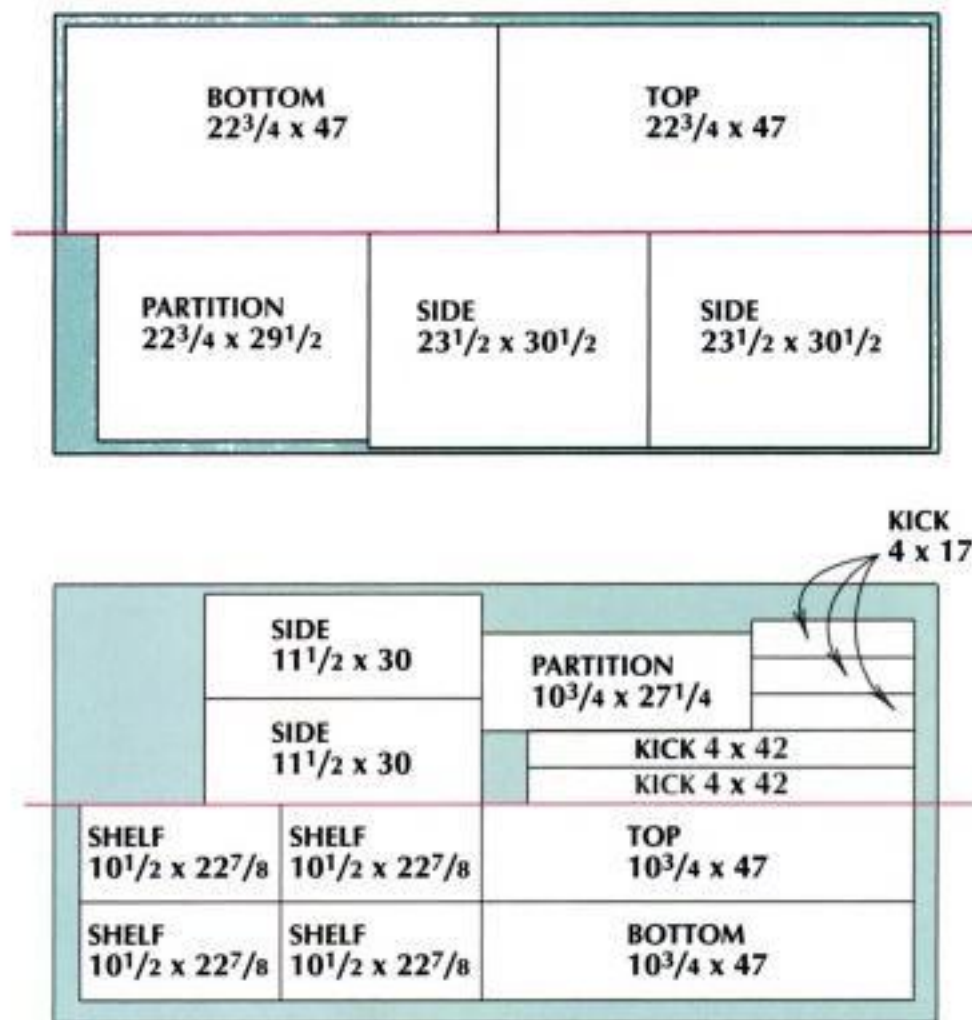
The base and wall cabinet featured here comprise a modular unit that you can combine with other cabinets to fill an entire wall if you like. (See photo, page 47.) For any cabinet over 24 in. wide, use a vertical partition to add strength and avoid drawers and shelves that are too wide. (See Fig. 2.) And if you're making a wall cabinet over 36 in. high, incorporate a fixed horizontal shelf about two-thirds up from the bottom to prevent the sides from bowing.

Step 1: Lay out and cut your sheet goods. To get the most from your sheet goods, lay out all case parts to minimize wasted material. As shown in Fig. 1, all the sides and shelves for this 4-ft.-wide base cabinet and a 30-in.-high wall cabinet can be cut from two sheets of 3/4-in. plywood.

For easier handling, first cut each sheet of plywood in half lengthwise. Then trim

FIG. 1: PLYWOOD LAYOUT

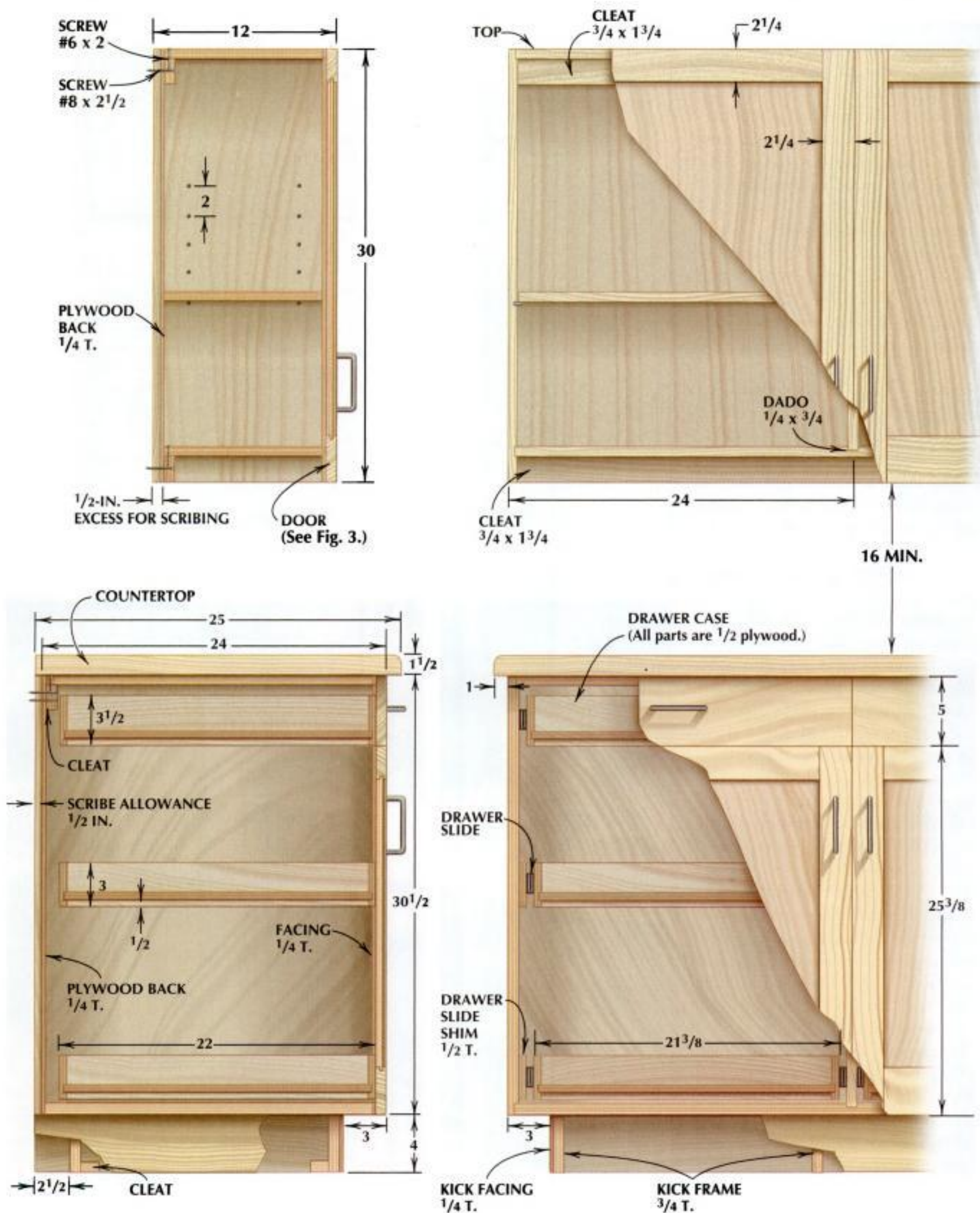
This cutting diagram provides all of the case sides and shelves for a 4-ft.-wide by 36-in.-high base cabinet and 4-ft.-wide by 30-in.-high wall cabinet.



Easy sheet cutting. For easy handling, rip sheet goods in half first, using portable support rollers. The crosscut box, sitting under the outfeed table, runs in the miter gauge grooves for safe crosscutting.

FIG. 2: SHOP CABINET ELEVATIONS

Without altering the construction details of these cabinets, you can adjust their height and depth to suit your needs. The wall cabinet shown on page 42 is 47 in. high, unlike the more typical 30-in.-high cabinet illustrated below. Notable details: The cabinet sides shown here extend $\frac{1}{2}$ in. beyond the back to provide clearance for scribe-fitting the case sides to the wall surface. The base cabinet rests on a 4-in.-high kick base frame that is made and installed separately. (See main text for details.)





Cut the case joints. When rabbeting case pieces, use a notched, wooden auxiliary fence to protect your rip fence.



Assemble the case. Pipe clamps and a rubber mallet coax glued joints snug. The clamps can be removed after nailing.

off the "factory" edges so you have clean, straight, square edges to work with. Finally, cut everything to final size except for the adjustable shelves, and make the $\frac{3}{4}$ in. by $1\frac{3}{4}$ in. solid wood cleats.

Step 2: Cut the case joints. Lay out the rabbets and dados as shown in Fig. 2. These joints can be cut with a router, a straight bit, and an edge guide. But I like to do the work on the tablesaw, using a stack-type dado that's shimmed to the exact thickness of my plywood.

To cut the rabbets, attach a wood auxiliary fence to your rip fence and raise the blade into the fence as necessary to get the right depth of cut and expose the rabbet width you need. (See photo, above left.) The rip fence (with or without its auxil-

iary fence) also guides the workpiece for cutting dados. This technique will work for all dado and rabbet joints except the two dados in the upper cabinet's top and bottom. To cut these dados, guide the top and bottom pieces against a straight auxiliary fence (at least 24 in. long) that's attached to your saw's miter gauge.

Last, cut a $\frac{3}{4}$ -in. by 2-in. notch in the top rear edge of each vertical partition to accept the cleats.

Step 3: Assemble the cases. Working on a flat surface, join the cases with glue and 6d finish nails. If you have a pneumatic nailer, you'll really appreciate how air-powered nailing speeds the assembly process. It's also fine to use screws where they won't show.

The assembly sequence is the same for upper and lower cases: Attach the partition to the top and bottom pieces, then attach the sides. I like to pull the joints snug with pipe clamps and smack them flush with a rubber mallet before nailing. (See photo, above right.) The clamps can be removed right after nailing. After each case is assembled, screw and glue its cleat to the partition and case top.

Finally, square up the case by comparing diagonal measurements across the back. Then use glue and staples or 4d box nails to attach the back, which will hold the cabinet square while the glue dries.

Step 4: Install the edging. To cover the plywood edges on the cases and shelves, glue and nail on $\frac{1}{4}$ -in.-thick hardwood strips that you've milled a bit wider than your plywood thickness.

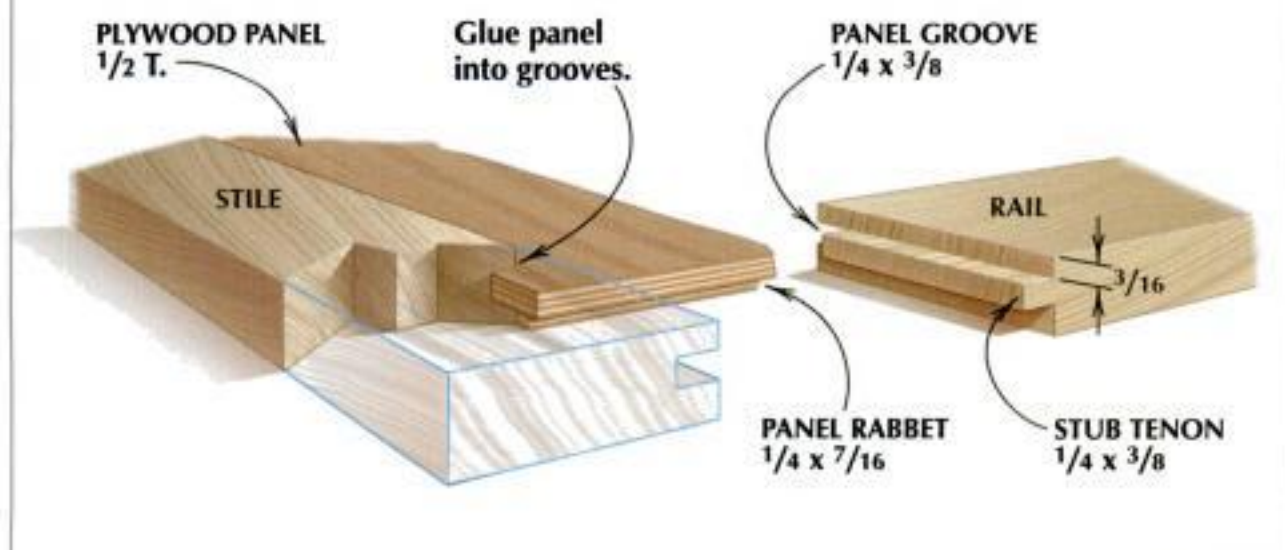
After the glue dries, rout the strips flush to the plywood with a flush-trim bit. (See top photo, page 46.) Then square the inside corners with a chisel. Countersink the nails and putty the holes.

Step 5: Bore shelf-pin holes. With a shop-made jig, it's easy to bore the $\frac{1}{4}$ -in.-dia. holes for the shelf-support pins. As shown in the center photo on page 42, my jig consists of a $\frac{3}{4}$ -in.-thick template and a wooden stop that fits right over the bit. Register the template against the bottom of the case to ensure hole alignment. Use a brad-point drill to prevent tearout.

Step 6: Make the kick base. The kick base is a simple, $\frac{3}{4}$ -in.-thick plywood frame that holds the base cabinet off the

FIG. 3: DOOR CORNER DETAIL

The stub tenon and groove joints make these doors easy to build. Gluing the rabbeted panel in its grooves makes a very strong construction.





Flush-trim the edging. Strips of hardwood milled slightly thicker than the case sides are glued and nailed to the plywood edges, then routed flush.



Drill the shelf pin holes. A shop-made jig simplifies drilling the holes. A 1/2-in.-dia. dowel serves as a drill depth stop.



Install the base. After shimming the base level and screwing it to the floor, scribe and attach 1/4-in.-thick facing to the exposed faces of the base.

floor and level. It's recessed from the front of the cabinet to provide a "kick space," and covered with a 1/4-in.-thick plywood facing that's scribe-fit to the floor.

Butt joints are fine for the frame. Glue and nail frame members together, then anchor the completed frame to the floor through cleats fastened to the frame interior. Level the top edge of the frame, inserting shims between the frame and the floor as necessary. Any open areas will be covered by the scribe-fit facing.

When the frame is level, scribe-fit the facing to match any irregularities in the floor surface. As shown in the bottom left photo, I clamp the facing level against the frame, and use a compass to transfer the floor topography to the facing. Keep the compass points vertically aligned for accurate scribing. Cut to your scribe line with a jigsaw, test-fit the facing and trim as necessary, then install the facing for good.

Step 7: Install the cases. It's wise to install your cabinet cases as soon as possible, since this will free up valuable shop space for the work that remains—door and drawer construction.

Apply your finish of choice to the cases before installing them. We applied a few coats of wiping varnish to ours.

I like to install base cabinets first because they can serve as platforms for installing the wall cabinets. Set the base cabinet case on the kick base and scribe the back edge of each cabinet side to fit any wall irregularities. Then screw the cabinet to the base and to the wall, filling any space behind the cleats with shims.

To position a wall cabinet for hanging, you can rest it on a shop-made crutch that's supported by the base cabinet. (See left photo, opposite page.) Drive screws through the upper and lower cleats and into wall studs to anchor each cabinet to the wall. If necessary, shim the cabinet out from the wall to keep the front face of the case plumb. This will ensure that cabinet doors close flat against the case.

Step 8: Make and install the drawers. As shown in Fig. 2, the drawer cases are made from 1/2-in.-thick hardwood plywood. I rabbeted each drawer side to hold the front and back, and assembled the joints with glue and air-driven staples, after gluing the bottom into its grooves.

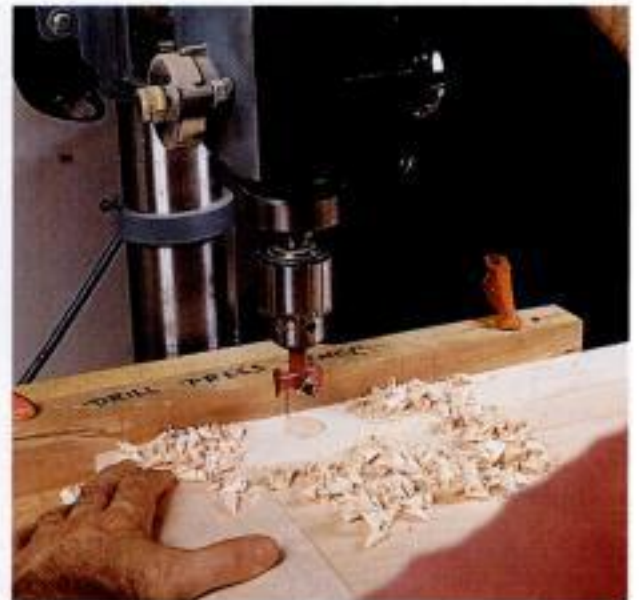
Accurate cutting of your parts will aid smooth installation and operation of the drawers. (Full-extension drawer slides are available from many mail-order suppliers.) Remember that each metal drawer slide requires 1/2 in. of clearance between the drawer side and the case side. And



Installing cabinets. Use a crutch to support a wall cabinet while you screw it to the wall studs and to any adjacent cabinet.



Attaching the drawer slides. Shop-made spacers help align drawer slides during installation.



Drilling for cup hinges. For accurate drilling of cup hinges, align the hinge's centerline with a drill bit centerline marked on your drill press fence.

each lower drawer needs a 1/2-in.-thick shim (installed between the hinged case side and the drawer slide) so it can easily clear the cabinet door as it slides out.

To install each drawer, screw the case-halves of each set of drawer slides to the case or to its shim. Then screw the other half of each slide to the drawer. (See photo, above right.) Check for alignment and smooth operation and adjust, if necessary, by either shimming out the slides or by belt sanding the drawer sides a bit. Attach a solid wood drawer front to each top drawer by screwing through the back of the drawer box front.

Step 9: Make and install the doors. Using a flat plywood panel that can be glued to its frame means that strong doors can be made quickly and easily. The door stiles can simply be grooved; no mortises are necessary. The rails join to the stiles with short "stub" tenons. (See Fig. 3.)

After cutting your stiles, rails, and pan-

els to their finished sizes, plow the panel groove in each frame member, using the dado cutter in your tablesaw. Then cut your stub tenons to fit in the groove. Finish up your joinery work by rabbeting the panels for a snug fit in the groove.

Finish-sand the panels, dry-assemble each door to check the joint fits, then glue and clamp up, checking each door assembly for square by comparing its diagonal measurements.

When the clamps come off, sand the door frames smooth. Then mark the hinge centerlines and drill the 35-mm holes in the doors to accept the cup hinges. (See bottom right photo, above.) Extend the hinge centerlines onto the case and attach the hinge plates to the cabinets. Screw the cup hinges into their door holes, then slide the hinges onto their plates. Adjust the hinges to create even gaps between the doors, trimming with a hand plane if necessary. When the

fit is right, you're ready to mount handles and apply finish.

Step 10: Install the countertop. The countertops on our cabinets are made up from 1 1/2-in.-thick maple boards. You can order factory-made wood countertops (contact a local cabinet shop for a supplier), or fabricate your own. Another alternative is to build or buy a plastic laminate countertop.

To install your countertop, align it on the case, scribe-fit it to the wall, and screw it to the cabinet through the plywood case top. ▲



PAUL ANTHONY is a cabinetmaker and former editor at AW.

wild WOOD!

*A visual guide
to wood figure*

by Paul L. McClure

Figured wood has been prized by carpenters, cabinetmakers, architects, and mankind in general since we started building furniture for aesthetic as well as practical purposes.

Highly figured wood reveals nature at its most imaginative and artistic, and that's the basis for our deep attraction to it. The unique distortions that you find in burls and feather crotches are among nature's most spectacular creations.

Wood figure results from the way cells are arranged and fibers are oriented, as the tree adds growth layers each year. Three factors determine figure: the kind of tree a board comes from, the part of the tree from which it's cut, and the method used to cut the log—usually flatsawn or quartersawn. (See Fig. 1.)

Beauty always has its price, and with figured boards, woodworkers pay twice. Extra expense comes first, followed by difficulty in working the material. Figured boards need

***Curly oak.** Figured red oak creates excitement in this sideboard by Robbi Staples of Massachusetts.*

CROTCH-RELATED FIGURE

FEATHER CROTCH

Crotch figure comes from the trunk of a tree just below where the tree forks into two large branches. (See Fig. 2.) This figure is most attractive when the two stems are of nearly equal diameter. The actual crotch figure, also called horsetail or feather crotch, is sawn from the center of the log, just below the crotch.

Depending on the diameters of the log and forks, up to three or four boards with excellent crotch figure can be produced from one log.

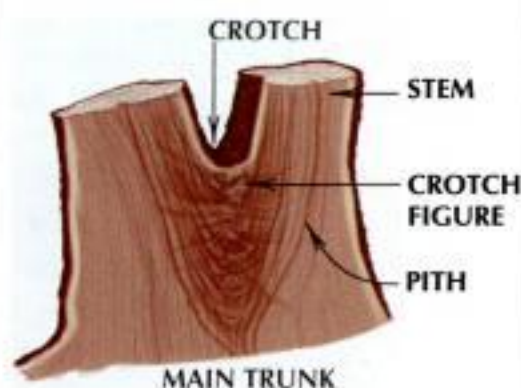
Any tree that forms a fork with equal-size stems will produce a crotch figure. But those that produce exceptional feather crotches include walnut, mahogany, cherry, ash, and oak.

SWIRL, MOONSHINE SWIRL, OR MOONCROTCH

This wonderful figure is produced as the saw moves outward from the center of the fork. The feather crotch gives way to arching swirls. These swirling patterns often have beautiful highlights caused by light refracting off the wood.

This type of figure is available in veneer and in lumber just as feather crotches are. If a tree can produce a crotch, it will also produce a swirl figure.

**FIG. 2:
CROTCH FIGURE**



feather crotch
walnut



moonshine swirl
walnut

slow, careful drying to avoid cracks and splits. And power planing can gouge or shatter highly figured boards. For smoothing work, you'll need finely tuned hand planes and scrapers, sandpaper, and lots of elbow grease.

Given the high cost and increasing rarity of some kinds of figured wood, they're sometimes easier to find in the form of veneer than in solid boards.

To identify different kinds of wood figure, I divide them into four categories: crotch-related, stripe-related, curly, and other kinds. ▲

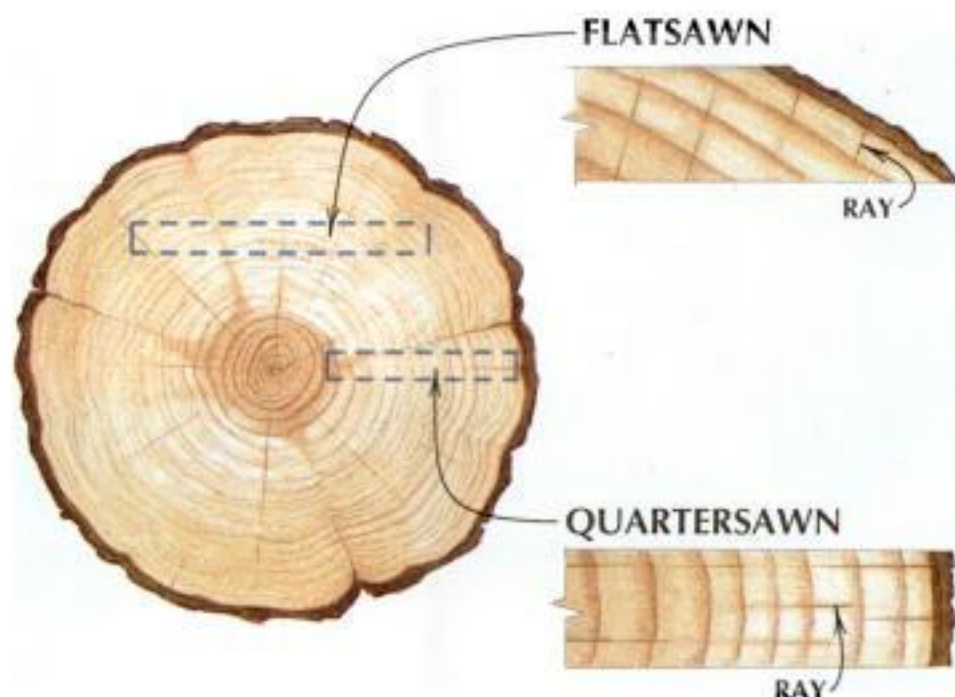
Paul L. McClure is a wood technologist, author, and part-time woodworker. He writes AW's "Wood Facts" column.

The author wishes to thank the following companies for providing samples:

The Burl Tree, Certainly Wood, Gilmer Wood Company, Goby Walnut Products, Groff & Groff Lumber, The Hardwood Store, Hearne Hardwoods, Northern Hardwoods, Northwest Timber, Randle Woods, and Sandy Pond Hardwoods.

FIG. 1: FLATSAWN VS. QUARTERSAWN

The way a board is sawn from the log helps determine the intensity of the figure you see. Some wood figure, including feather crotch and quilted, is more pronounced in flatsawn boards. Other kinds of figure, such as stripe and curly, show up better in boards that are quartersawn.



STRIPE-RELATED FIGURE

RIBBON, RIBBON STRIPE, OR STRIPE

Some trees have cells that orient themselves in a spiral for a few years, then reverse their spiral direction for a few years, and then repeat the cycle. The spiral grain is called interlocked grain. Wood that has interlocked grain is almost impossible to split.

When a log with interlocked grain is quartersawn, it will produce boards with a straight grain that appears as stripes. Light bouncing off the cells of one stripe will make it shine while light on the adjacent stripe will be absorbed, making it appear darker. The stripe pattern will change as the angle of vision and light change, creating undulating light and dark ribbons. When the stripes are short—not running the length of the board—the figure is called *roey*. Woods that produce ribbon stripe figure include walnut, mahogany, sapele, Ceylonese satinwood, pear, and bubinga (African rosewood).

BROKEN STRIPE AND MOTTLE

A combination of stripe figure and curly figure (see opposite page) creates broken stripe and mottle figure. Broken stripe is created when the stripe, or interlocked grain, predominates over the curly (or wrinkled) cross figure. Mottle is the result of curly or wrinkled figure dominating the interlocked grain.

Logs that contain these combinations of interlocked grain and curl are quartersawn to highlight these wonderful figures. Some of the woods that produce these figures are walnut, mahogany, sapele, Ceylonese satinwood, and bubinga.

FINE MOTTLE OR BEE'S WING

Some of the most beautiful wood I have ever worked is fine mottle or bee's-wing figure. As the name implies, the mottling on the surface of the wood resembles the pattern found on a bee's wing. Bee's-wing figure is created when the stripes are very narrow and the cross figure (curly or cross wrinkles) is very close. This delicate figure is found in satinwood and sometimes, but rarely, mahogany.

FIDDLEBACK

Wood with a very shallow interlocked grain has a relatively inconspicuous stripe pattern. Any cross figure (curly or cross wrinkles) will strongly dominate the surface. In the case of fiddleback figure, the curly figure is very fine, evenly spaced, and very close together. Often fiddleback figure is strongest toward the outside of the log.

The name is derived from the fact that the backs of old violins often have this figure. Fiddleback figure lends itself to smaller projects, whereas mottles work better on large surfaces. Woods that produce fiddleback figure include walnut, hard and soft maple, purpleheart, and mahogany.



**ribbon
stripe**
sapele



roey
swiss pear



**broken
stripe**
bubinga



mottle
*honduras
mahogany*



bee's wing
east indian satinwood



fiddleback
hard maple

CURLY FIGURE

CURLY

Curly figure is one of the more common patterns in wood. It is created when the cells are arranged to form a rippling of the longitudinal grain pattern. Some curly figure is very soft and undulating, while some is tight and more pronounced. Quartersawn wood usually produces the most pronounced curls. Woods that produce a curly figure are very numerous, but some of the best examples are birch, cherry, walnut, oak, maple, ash, and mahogany.

QUILTED

A distinct variation of curly figure occurs where very large, rolling curls form a quilt-like pattern. If the rolls are short in length with narrow depressions between them, blister figure results. Quilted and blister figure are best revealed on flatsawn surfaces. When the surface of the wood is smoothed and finished, the quilted and blister figures "pop," taking on a strongly three-dimensional look. Woods that produce quilted figure include big-leaf (soft) maple and mahogany.

OTHER KINDS OF FIGURE

BIRD'S EYE

Small swirls of grain distortion form what is called bird's-eye figure, because the figure resembles the eye of a bird. It is very rare to find an entire tree full of bird's-eye figured wood. It is usually localized to a specific area of the tree.

The logs producing the best bird's eye are usually made into veneer. I still run across boards that missed the veneer mill and have excellent bird's-eye figure. I have actually purchased boards with swirls so large they resemble fish eyes.

BURL

Burls are created when a tree forms a bulge, or wart-like protrusion, on its trunk (or sometimes on its branches or roots). The cell orientation in these anomalies is very confused, swirling in different directions. At the same time, buds are forming, but not developing, inside the protrusion.

Burls are unstable, so they are best used in veneer form to minimize expansion and contraction. It is difficult to successfully dry a solid burl because of its wild structure, though it can be done.

Most trees can form burls. The most prevalent on the market today are poplar, maple, oak, walnut, ash, carpathian elm, amboyna, thuya, and redwood.

QUARTERSAWN FLECK AND TIGERSTRIPE

The most requested wood figure these days, according to specialty wood suppliers, is quartersawn red oak, white oak, sycamore, and lacewood. These woods have relatively large medullary rays (cells radiating outward from the center of the tree). When they're quartersawn, the rays are prominent and known as ray fleck or tigerstripe.

Other woods that produce an interesting ray fleck pattern, only on a smaller scale, include cherry, hard maple, beech, and mahogany.



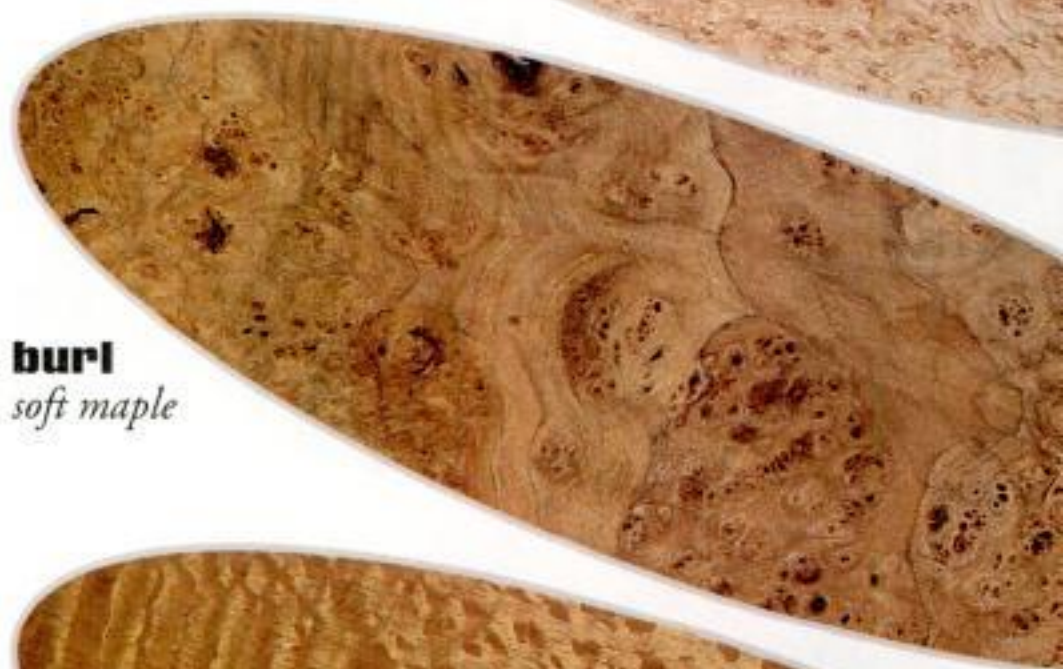
curly
hard maple



quilted
soft maple



bird's eye
hard maple



burl
soft maple



**quartersawn
fleck**
lacewood

Spice Rack

An ingenious way to display and dispense your seasonings

by Sandor Nagyszalanczy

I love to cook using exotic spices. But when I'm up to my elbows in teriyaki sauce, it's a two-handed hassle to dig a spice jar out of its rack and screw off the lid. So I designed a mahogany spice rack that provides instant access to my arsenal of herbs and spices. The jars pivot out while I twist them away from their lids, which stay in the rack. The lids then stay out, so jars can be easily replaced. (See photo, opposite page.) I can pepper my poultry, curry a casserole, or add basil to a bouillabaisse—all singlehandedly!

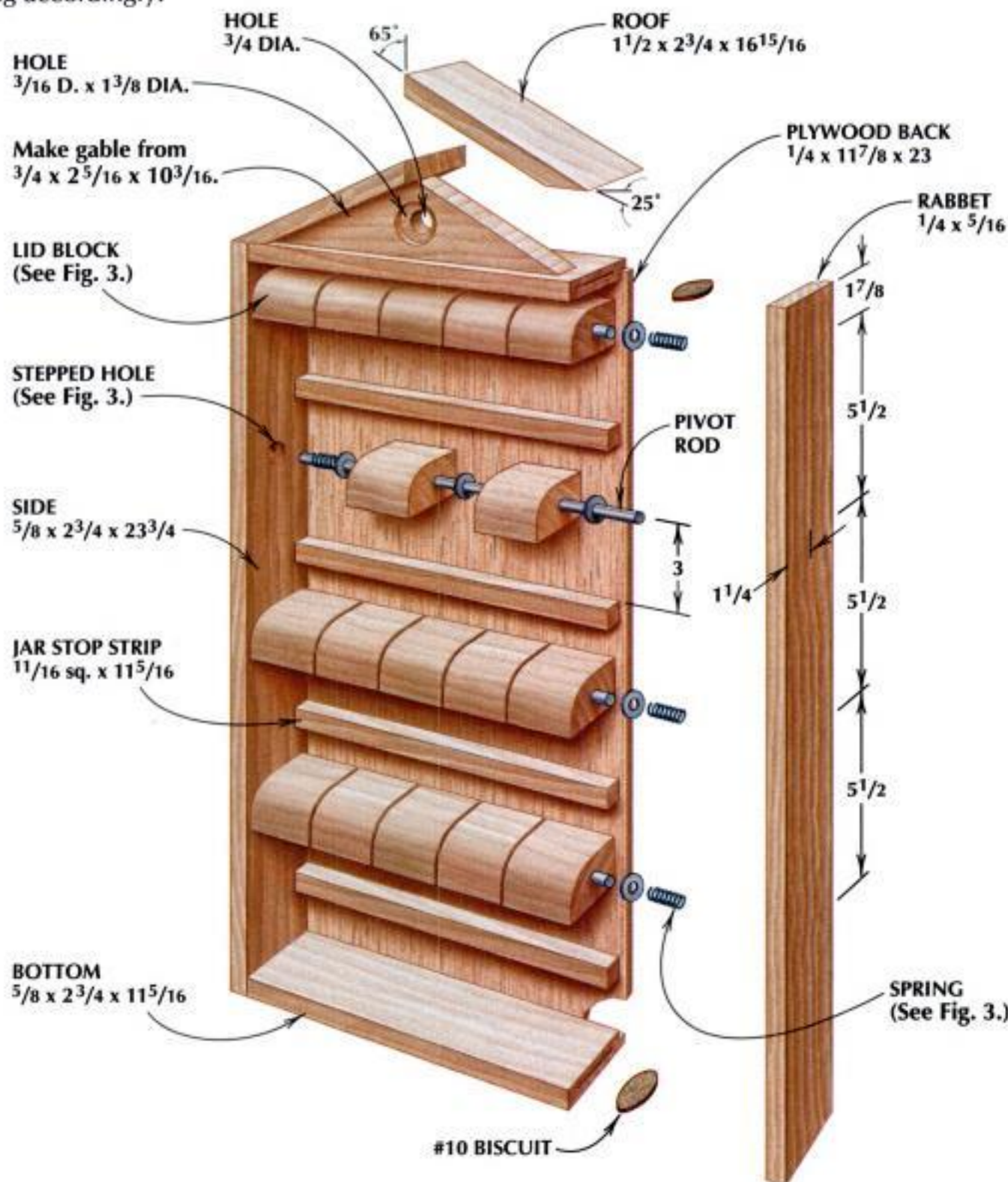
To outfit the rack, I bought empty spice jars (1 $\frac{3}{4}$ -in. dia. by 3 $\frac{11}{16}$ in.) from Lechter's, a national-chain houseware store. Alternatively, you can use grocery-store spice jars (Spice Island brand is good), but you may need to adjust the length of the rack. (See Fig. 1.) The rods, springs, and washers for the pivoting mechanisms are common hardware store items.

House o' flavor. The author's spice rack, with its gable roof and accessible jars, adds distinction and efficiency to any kitchen.



FIG. 1: SPICE RACK

The author's spice rack is designed to hold twenty 1 $\frac{3}{4}$ -in.-dia. by 3 $\frac{1}{16}$ -in. jars. To suit jars of a different length, adjust the pivot rod spacing accordingly.



Building the Case

Make the parts as shown in Fig. 1. Notice that the case is simply a rectangular box capped with a decorative gable roof. Cutting the roof miters can be a bit tricky because the 25° gable angles can be difficult to cut on a radial-arm or compound-miter saw. To solve this problem, I made a simple jig to cut the angles safely on my tablesaw. The jig is simply a 4-in. by 6-in. by 16-in. block that's dressed square and screwed to a bar that slides in the miter slot. (See top left photo, page 54.) Position the block at 25° to the blade.

To make the 25° miter on each roof piece, clamp the workpiece to the block's long face. To cut the opposite, 65° miter, clamp the workpiece to the

short face of the block. Make sure the clamp is out of the path of the blade. Last, use the jig to cut the 25° angles on the gable. Use double-stick tape to hold the workpiece to the jig's block.

When all the case pieces are cut, rout the rabbet to accept the plywood back. Stop the rabbets on the case side 5/16 in. short of the case bottom. You'll chisel their ends square after assembly. Cut the biscuit joints, sand all the parts, then use a drill press to bore the blind, stepped holes in the case sides to accept the pivot rods and springs. (See Figs. 1 and 3.)

Making the Lid Blocks

Set aside the case parts while you make the lid blocks for the pivoting mechanisms. (See Fig. 3.) You can make all 20



Quick pick. A twist of the wrist removes a jar. The lid block stays pivoted out for easy jar replacement.



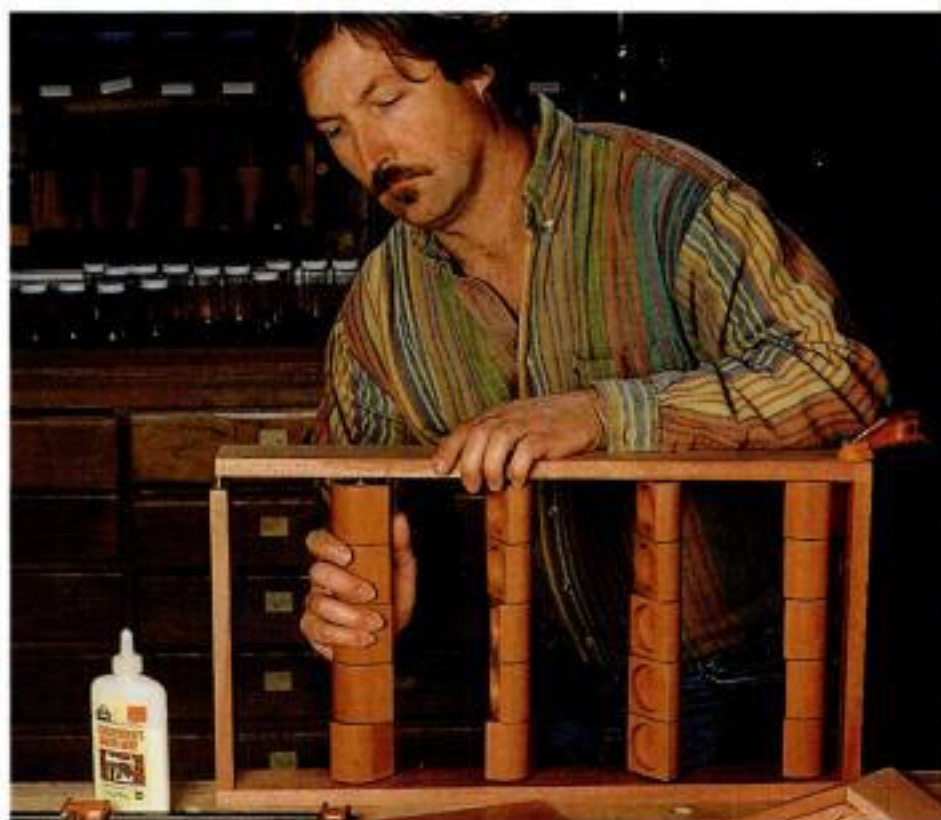
Cutting the roof miters. To cut an angled roof piece, the author clamps it to either the side or the end of a right-angled block that slides in his table saw's miter gauge slot.



Drill the pivot holes. The author's jig ensures accurately positioned pivot holes. A clamping arm presses the workpiece against the jig's fence.



Rout the lid mortises. A shop-made template clamped in a vise makes routing the lid mortises fast and accurate.



Assemble the case. Slip the second case side onto the pivot rods by working from one end of the case to the other.

lid blocks from two strips of stock dressed to 1 $\frac{3}{8}$ in. by 2 in. by 27 in. Shape one edge of each strip on the router table, using a 1-in. radius round-over bit. Before routing, saw away most of the waste on a table saw set for a 45° bevel cut. Sand the rounded edges smooth, then crosscut the lid blocks to final length.

Drilling the 1 $\frac{7}{64}$ -in.-dia. holes for the pivot rods is next. I like to use a brad-point drill bit for this because it won't wander. However, I don't have a 1 $\frac{7}{64}$ -in.-dia. brad-point bit, so I bore each hole first with a 1/4-in.-dia. brad-

point bit, then I enlarge it with a 1 $\frac{7}{64}$ -in.-dia. standard twist drill bit. Make a drill-press-fence jig like the one shown in the top right photo above to position and hold the blocks for boring.

Next, on the underside of each block, cut a round mortise that will tightly hold a jar lid without glue. I prefer not to glue the lids into their mortises on the finished spice rack because unglued lids make for easier "label-forward" jar switching later on.

I created perfectly fitting mortises by template-routing them. The process is

simple: You make a template with a hole the exact size of the mortise, then rout the mortise with a flush-cutting router bit. (See bottom left photo, above.)

Make your template from 3/4-in.-thick medium-density fiberboard (MDF). Cut the template hole on the drill press using an adjustable circle cutter, which allows for fine adjustment of hole size. When the lid fits tightly into the template hole, attach a pair of side rails and an end block to the underside of the template to position each lid block securely when routing it. (See Fig. 2.)

Before routing the mortises, I drilled out most of the waste on the drill press, using a 1-in.-dia. Forstner bit.

To set up for routing, clamp the lid block against the template's end stop, then clamp the template and block in a workbench vise as shown in the lower left photo on the opposite page. For this type of template routing, I use a mortising bit with a top-mounted bearing (#116-1215, available from Eagle America, 800-872-2511), which will cut flush to the walls of a template. Cut the mortises just a bit shallower than the jar lid height.

Assembly

When all the lid blocks are mortised, you're almost ready for assembly. But first, apply finish to the lid blocks and the inside surfaces of the case. I spray on a few coats of lacquer, but any finish is fine.

Dry-assemble the case and pivoting mechanisms to be sure everything fits well before glue-up. Begin by pre-assembling the pivoting mechanisms, inserting $\frac{1}{4}$ -in. washers between the lid blocks and a washer and spring at each end of the rod.

Next, clamp one case side to your benchtop and insert that end of each pivot rod into its hole. Then attach the opposite case side, working from one end to the other, jiggling each of the pivot rods into its opposite hole. (See bottom right photo, opposite page.) When everything fits well, glue the joints, clamp up the assembly, and check the case for square by measuring its diagonals. Don't attach the back or stop strips yet.

Assemble the gable roof, gluing it to the top of the case. Use a couple of 25° wedge scraps as clamping blocks, gluing sandpaper to their edges so they won't slip off the roof during clamping.

When the glue is dry, sand the unfinished surfaces of the case and finish them. Attach the stop strips by nailing them on through the case back. Then nail the back into its case rabbets.

Press the jar lids into their mortises, making sure the label on each jar faces forward when screwed fully into the lid. Glue the lids in the mortises with a dab of silicone glue only if necessary. ▲



SANDOR NAGYSZALANCZY, a frequent contributor to AW, also cooks a mean goulash.

FIG. 2: LID BLOCK MORTISING TEMPLATE

To use this template, clamp the lid block to the stop, then clamp the rails in a vise. Rout the lid mortise using a mortising bit with a top-mounted bearing.

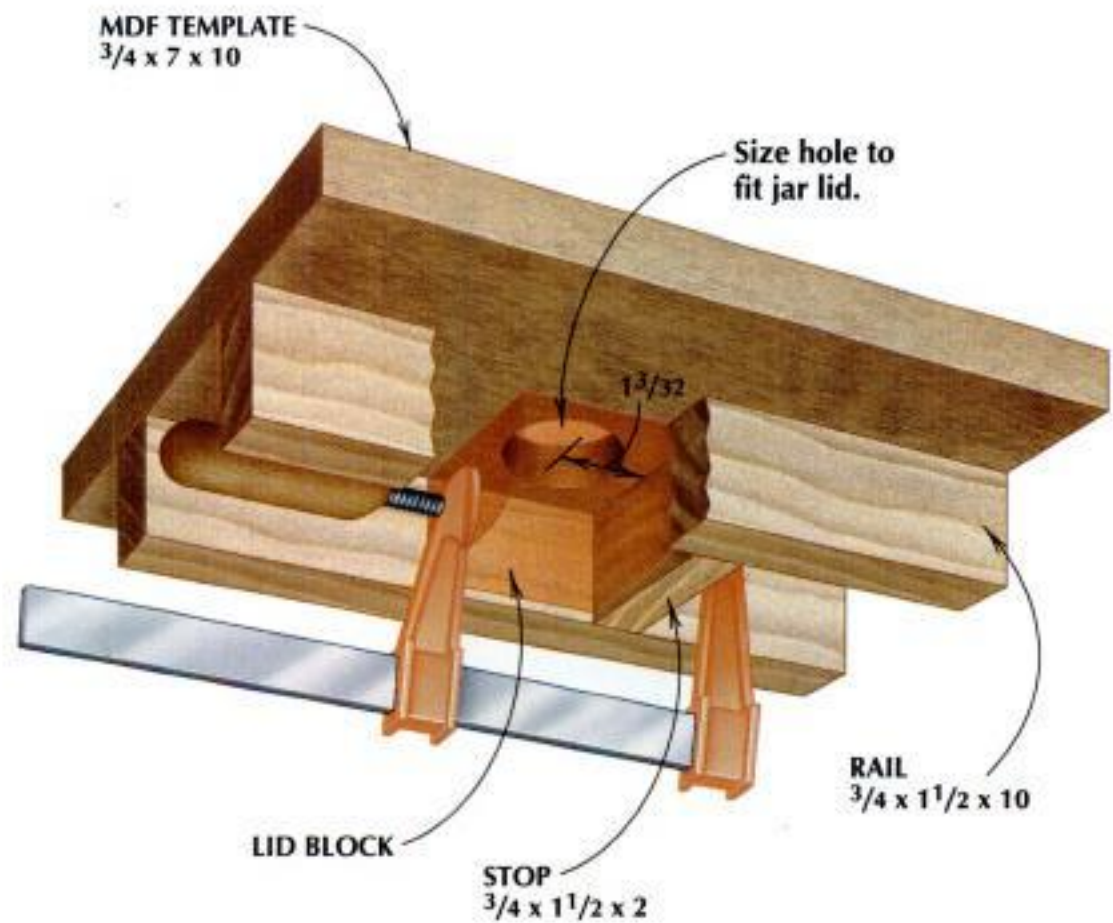
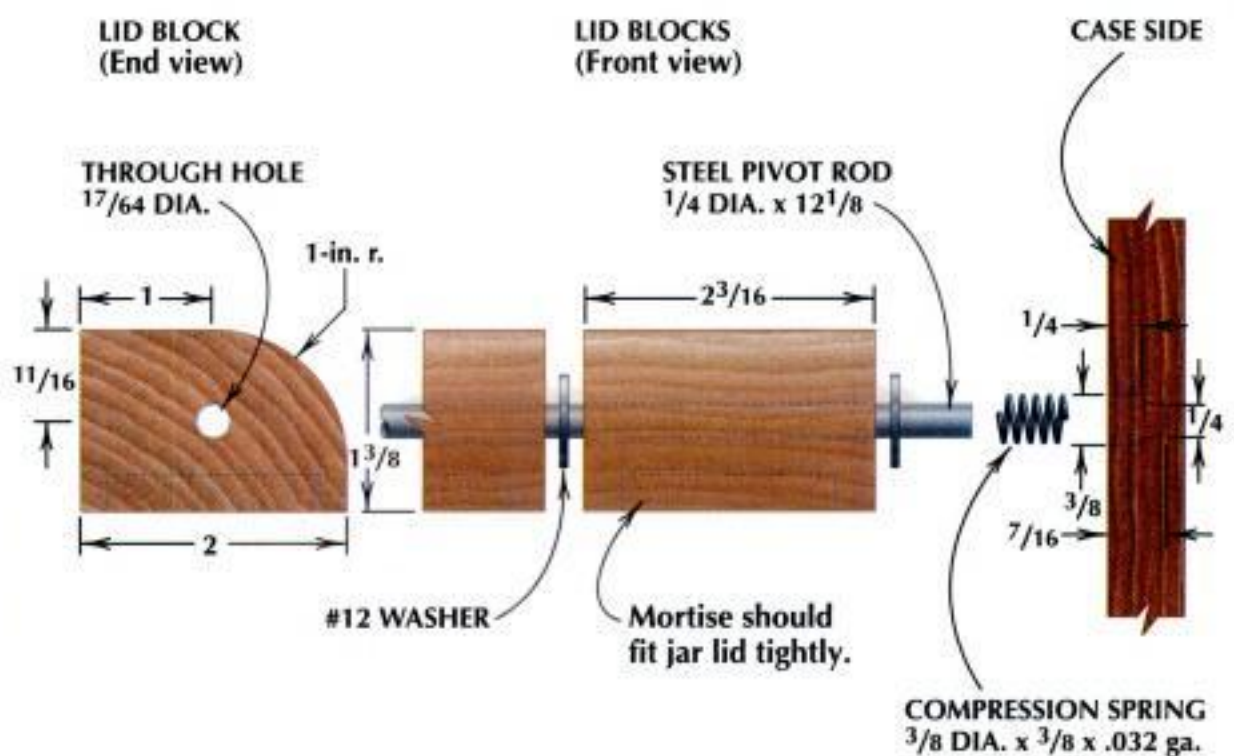


FIG. 3: PIVOTING MECHANISM

Springs at the ends of a pivot rod press the lid blocks together, so they will stay pivoted out for easy jar replacement.





Using Pre-woven Cane

Restore seats and surfaces with ready-made sheets

by Pinchas Wasserman

Out with the old, in with the new. The author installs a fresh sheet of cane to bring an old chair back to life.

As a woodworker, you've probably come across one or two caned chairs in need of repair, but you thought that fixing old cane was better left to professionals. The good news: Restoring old, broken cane is a lot easier than it looks, and it won't cost you a big investment in materials or tools.

Both rustic and elegant, cane is a great choice for chairs. This tough, enduring material, made from the outer bark of the rattan palm, has been used for centuries. Before the 20th century, all cane was woven by hand, strand by strand, through holes drilled in the frames of the chair. Today, the same durable material is available as machine woven, or pre-woven cane, and comes in ready-to-install sheets or rolls. Modern chair frames have narrow grooves, and you simply insert the new cane sheet and some spline material into the groove to hold everything in place.

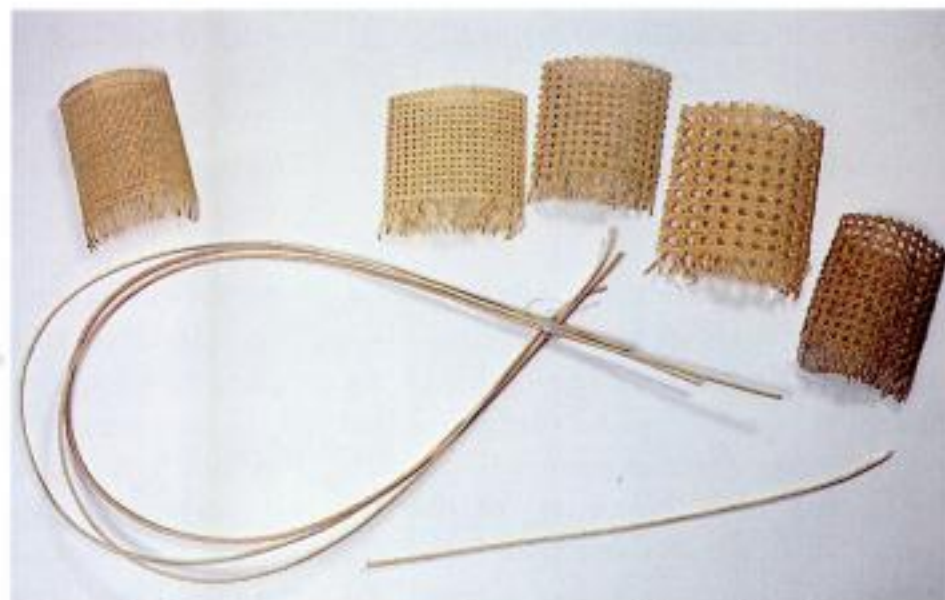
If you're restoring an older chair and you want to match the new cane with the old, take heart. There's an easy way to make new cane look old—almost instantly. ([See sidebar, page 59.](#)) Let's begin by talking about some of the materials you'll need.



Ready for rescue. Broken and badly worn cane is easy to restore to like-new condition.



Ready for rest. The new cane on the author's chair matches the look and feel of the original.



Cane choices. Cane comes in many styles and colors, including traditional open weave (right) and darker, unbleached cane (far right). Radio-net cane (left) is more delicate and is best used for modern chair backs.

Choose Your Materials

You can buy pre-woven cane by the sheet or by the roll. (See Sources.) Cane comes in many weave patterns, sizes, and colors (see lower right photo, above); the most common are open weave and radio net.

On most chairs I use 1/2-in. open weave, shown on the chair in this article. The size refers to the opening between the vertical and horizontal strands. I recommend 1/2-in. weave for your first caning project. With its diagonal strands, open weave has great strength, making it suitable for seats and areas of hard wear. Keep in mind that as the pattern size gets smaller, the cane is generally thinner, more delicate, and prone to breaking. I reserve anything smaller than 1/2-in. weave for chair backs.

Net, or radio net, gets its name from the cane netting found on early radios. Its purely horizontal and vertical pattern is less rustic and more appropriate on

modern chair backs, but in my opinion it's too fragile to be used for seating.

Spline, made from the core of the rattan palm, is sold in 10-ft. or 1,000-ft. lengths (see Sources) and is shaped like a wedge to press and hold the cane securely into the groove in the chair. The top of the spline is rounded, or crowned, to provide a finished appearance. Spline comes in a range of widths from 3/32 in. (#6 1/2) up to 19/64 in. (#12). It's best to use the old spline from the chair to determine the size of the new spline. If the original spline is missing, measure the chair's groove. The spline should be 1/32 in. smaller than the width of the groove.

Caning wedges, available from most cane suppliers (see Sources), are perfect for holding the new cane into the chair's groove during installation. For a typical chair, you'll need about 20 wedges. You can make your own wedges if you prefer from a hardwood such as maple or birch.

Removing Old Cane

The first step in removing old cane is to remove the spline. I once lost a prospective employee by demonstrating spline removal as one of the easy tasks in my shop. But the truth is, getting old spline out is not as fearsome as it looks if you have the right tools.

An important tool is a hooked spline chisel. (See Sources.) The hook at the end of the chisel provides great leverage for prying up old spline. I have two chisels: a 1/8 in. and 3/16 in. To make spline removal easier, I modify each chisel by grinding about 1/32 in. off the width of the tip. If you prefer, you can substitute a narrow mortising chisel for this work.

It's important to secure the chair firmly to a work surface when caning. I use two homemade L-brackets that hold the chair in place, as shown in the lead photo. Position some wooden blocks under the chair so the frame has firm

REMOVING THE CANE AND SPLINE



Chisel out the spline. Pry out the old spline with a caner's hooked chisel. Work "downhill" or with the grain to prevent chipping the groove.



Rout it out. For stubborn spots, Wasserman uses a rotary tool to rout into the spline. A narrow baseplate lets you follow chair contours.



Pare away the excess. After slicing away the center sheet of cane, clean up the walls of the groove by slicing vertically with a chisel.

support at key points around the groove.

Before you chisel out the spline, use a utility knife to score the edges of the groove where the spline meets finished wood to minimize chipping. Then start by slicing into the center of the old spline with the hooked chisel and pry upward. Some spline has a tenacious grip in its groove. A solution of $\frac{1}{2}$ water and $\frac{1}{2}$ white vinegar in the crevices around the spline will help release it.

As you chisel, move in the direction of the grain of the surrounding wood, especially at short-grain corners where the

danger of chipping is greatest. If you accidentally chip an area, save the chipped piece for later. (See left photo, above.)

If your attempts with the chisel turn to tedium, you can remove spline faster with a rotary drywall cutter. (See Sources.) These tradesman tools are available with wood-cutting bits that are very effective for routing out difficult spline. (See center photo, above.)

Once the spline is removed, use a utility knife to cut through the old cane about 2 in. from the groove. Remove the old cane and set it aside for color-

matching to the new cane later. (See sidebar, opposite page.)

After you've removed the bulk of the cane, pare down the walls of the groove with a sharp chisel to clean up any remaining debris. (See right photo, above.) Blow compressed air into the groove or use a stiff brush to remove any loose particles. Now inspect the groove. Any chipped or broken areas on the side of the groove facing the inside of the frame can be repaired easily with some polyester resin, like auto-body filler sold at automotive stores. Don't worry about

INSTALLING A NEW SHEET



Align the cane with wedges. Position the cane sheet so the weave pattern aligns with the chair frame. Secure it with a few wedges on opposite ends.



Push it into the groove. Use a wedge to tap the cane into the groove around the entire frame. A narrow, $\frac{1}{2}$ -in.-wide wedge handles tight corners.



Trim it to size. Use a razor-sharp utility knife to cut the cane flush with the top of the frame's groove. For thicker cane, a chisel and mallet work best.

how the filler looks, since you won't see these areas once the cane is installed.

If there are any large, chipped areas on the outside of the groove, patch these with your saved pieces of wood so the grain is continuous. You can use regular white or yellow glue and spring clamps to clamp the missing pieces in place, or simply spread some cyanoacrylate (CA) glue into the area to be patched and hold the repair in place for a few seconds. Smaller voids can be fixed after finishing with shellac or wax sticks.

Installing New Cane

With the old cane removed and the groove cleaned, the first order of business is to cut the new cane and the spline to size. New cane has a "good" side and a "bad" side. You'll install the good side facing up (for seats) or facing the front (for backs). It's easy to discern the two sides: The good side is smooth and has a burnished feel; the opposite side is much rougher in texture. I generally cut my sheets about 1 in. beyond the groove on all sides. Measure the length of the groove and cut the spline about a foot longer than your measurement.

Next, soak the cane and spline for several hours in room-temperature water to soften it. I use my bathtub for soaking, and I lay a bathroom towel over the cane and the spline to keep everything submerged. Keep the cane wet until it's pliable, but don't oversoak it. Soaking cane longer than about 10 hours will weaken the fibers and make them prone to snapping.

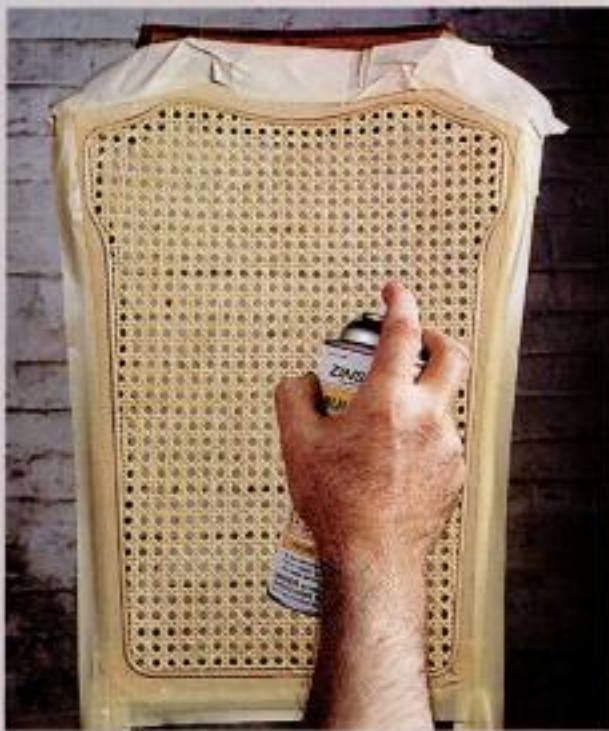
Once the cane is pliable, pull it out of the tub and carefully align it on the chair frame, good side up. Now is a good time to take the phone off the hook, since the cane and spline must be installed while wet. Just in case, keep a sponge and some water nearby to re-soften the cane should it begin to dry out.

Check that the weave pattern of the cane is even with the frame. I usually eyeball two symmetrical points on the frame, such as two corners, then align the cane to these points so the pattern is straight and even.

Hold the cane in position and secure the center of one end with a caning wedge. On rectangular sheets, always start by wedging the short side. Use a mallet to tap the wedge over the cane and into the groove until the wedge holds firm in the groove. Don't try to bottom-out the wedge; stiffer or thinner cane will break if you tap too far.

MAKING NEW CANE LOOK OLD

Although newly installed cane has a wonderful, fresh look on its own, I find that most of my customers want their new cane to look just like the old, darker cane that came off the chair. So I've developed a four-step finishing process shown in the photos below that "ages" cane, giving it an authentic look without the wait. —P.W.



Step 1: Start with shellac. Mask the frame with tape, then spray a thin coat on the raw cane to give the color coat something to bite into.



Step 2: Brush on color. Apply Japan color on the front, back, and again on the front to catch any drips. Brush rapidly before the paint dries.



Step 3: Imitate wear. Drag a dry, soft-bristle brush over the wet color coat to highlight areas of normal wear, such as around edges and high points. Seal with two coats of spray shellac.



Step 4: Add flecks of dirt. Use a narrow straw and a tip from a can of WD-40 to spurt flecks of black or dark brown paint on the cane. Finish up with a coat of shellac.

FINISHING MATERIALS

- Spray shellac, 1-lb. cut
- Japan colors, including raw and burnt umber, raw and burnt sienna, white, black, and yellow ochre. (See Sources.) Mix colors together to get an exact match to the old cane, then thin with mineral spirits to a brushable consistency
- China bristle brush, 2 in. wide for applying the color
- Clean, soft-bristle brush, 3 in. wide for "dry brushing"
- Can of spray paint; spray tip and straw from can of WD-40

ADDING THE SPLINE



Tap the spline into the groove. Work the spline into the groove around the frame with a mallet or hammer.



Seat it with a wedge. A leather-tipped piece of wood protects the spline as the author hits it fully into the groove.

SOURCES

Pre-woven cane sheets, spline, hooked spline chisels, and other caning supplies are available from:

- Connecticut Cane & Reed Co.
(860) 646-6586
- Constantine's
(800) 223-8087
- Rockler
(800) 279-4441
- The Caning Store
(800) 544-3373

Pre-woven cane in 50-ft. rolls and spline in 1,000-ft. lengths are available from:

- Inter-Mares Trading Co.
(800) 229-2263
- P.L. Butte, Inc.
(800) 289-1049

Rotary drywall cutters are available from:

- Porter-Cable
(800) 487-8665
- RotoZip Tool Corp.
(800) 521-1817

Japan colors are available from:

- Constantine's
(800) 223-8087
- Woodworker's Supply
(800) 645-9292

For more information on caning, read *The Caner's Handbook*, by Bruce W. Miller & Jim Widess (1991, Lark Books)

Now tap a second wedge into the groove at the center opposite side of the frame. Go back and tap a third and fourth wedge next to the first; do the same with two more wedges at the opposite side. (See bottom left photo, page 58.) Don't worry about pulling the cane sheet tight at this point. More importantly, keep a sharp eye on weave alignment, and make any adjustments to keep the pattern straight and even.

At this point I trim the cane with shears so it extends no more than $\frac{1}{2}$ in. beyond the groove. Then I install a single wedge in the center of the two remaining sides. Now go back to the first two sides and finish driving wedges up to the corners. As you install the wedges, alternate back and forth between opposite sides to prevent pulling the weave out of alignment, similar to changing the lug nuts on a wheel.

Next, drive the entire sheet of cane into the groove by tapping all around the frame with a single wedge and a mallet. Start at the corners and work toward the center of each side. Use the same technique as before, tapping alternately from side to side. (See bottom center photo, page 58.) Tap the cane down as far it will go, but don't worry if the cane doesn't reach the bottom of the groove. As you tap, your previously installed wedges will likely pop out of the groove and you can set them aside. The cane should be taut to the frame at this point.

Once you've tapped all around the frame, trim the excess cane. On most

jobs, I use a utility knife to slice off excess cane by cutting against the outside wall of the groove. Make sure the blade is razor sharp to avoid pulling the cane out of the groove. For thicker cane, use a sharp chisel and light mallet taps. Aim high on the wall if you haven't wedged the cane very far down in the groove. (See bottom right photo, page 58.)

Add the Spline

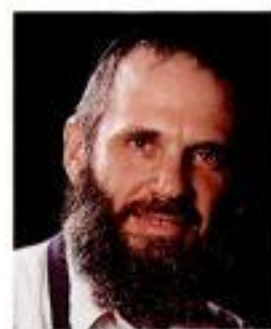
Once the cane is in place, remove the soaking spline from the tub. Use a sharp knife to cut one end of the spline square across with a slight back-bevel angle. Then lay a healthy bead of glue all along the groove atop the cane. I prefer yellow glue to thinner white glue.

Start installing the spline by laying the cut end in the groove with the beveled side facing down. I start the spline at the center of the bottom groove on chair backs, and at the center of the rear groove on seats. Tap the spline into the groove with a mallet, and work around the frame. On corners, use your free hand to bend the spline as you tap. (See left photo, above.)

Sometimes the spline won't stay in place along certain spots in the groove. When this happens, I use a spring clamp or a pneumatic staple to secure the spline until the glue dries. When you've gone around the entire frame and are near the starting point, lay the free end of the spline over the installed end, and mark it. Then cut the free end square across the mark with a slight back bevel, and tap the remaining spline into the groove.

Finish up by tapping along the entire spline with a piece of wood tipped with leather to fully seat the spline. (See right photo, above.) Clean up any glue squeeze-out with a moist rag.

To prevent glue from running out of the groove while it dries, position the chair so the new cane and spline are on a level surface. In about a day, the cane will shrink and be dry to the touch, and your new seat or chair back will be taut as a drum. If you notice a few broken strands of cane, repair them with a few drops of CA glue. Apply a finish, if you want one, and the job is done. ▲



PINCHAS WASSERMAN
is a full-time restorer of fine furniture. He lives and works in New Jersey.

BUILD A *Shop Stool*

*Put chairmaking techniques
to work on a smaller scale*

by Mike Dunbar



One seat begets another. The author's stool provides a comfortable perch as he works on a Windsor chair.

One of the most popular projects in the chair classes I teach is my "shop" stool. At 19 in., the stool is just the right height for working on a chair or other projects that rest on the floor or on a low bench. And it's easy to change the stool's height if you want to by altering the length of the legs. The seat, with an ample diameter of 14 in., is deeply dished in the center for hours of comfortable support.

It's also rugged. My stool incorporates joinery used in traditional Windsor chairs, which makes it far more durable than modern, factory-made chairs. I'll discuss these joints as they occur in the building of the stool. To make them, you'll need two essential chairmaking tools: a spoon bit and a tapered reamer. ([See sidebar, page 65.](#))

Turn the Seat First

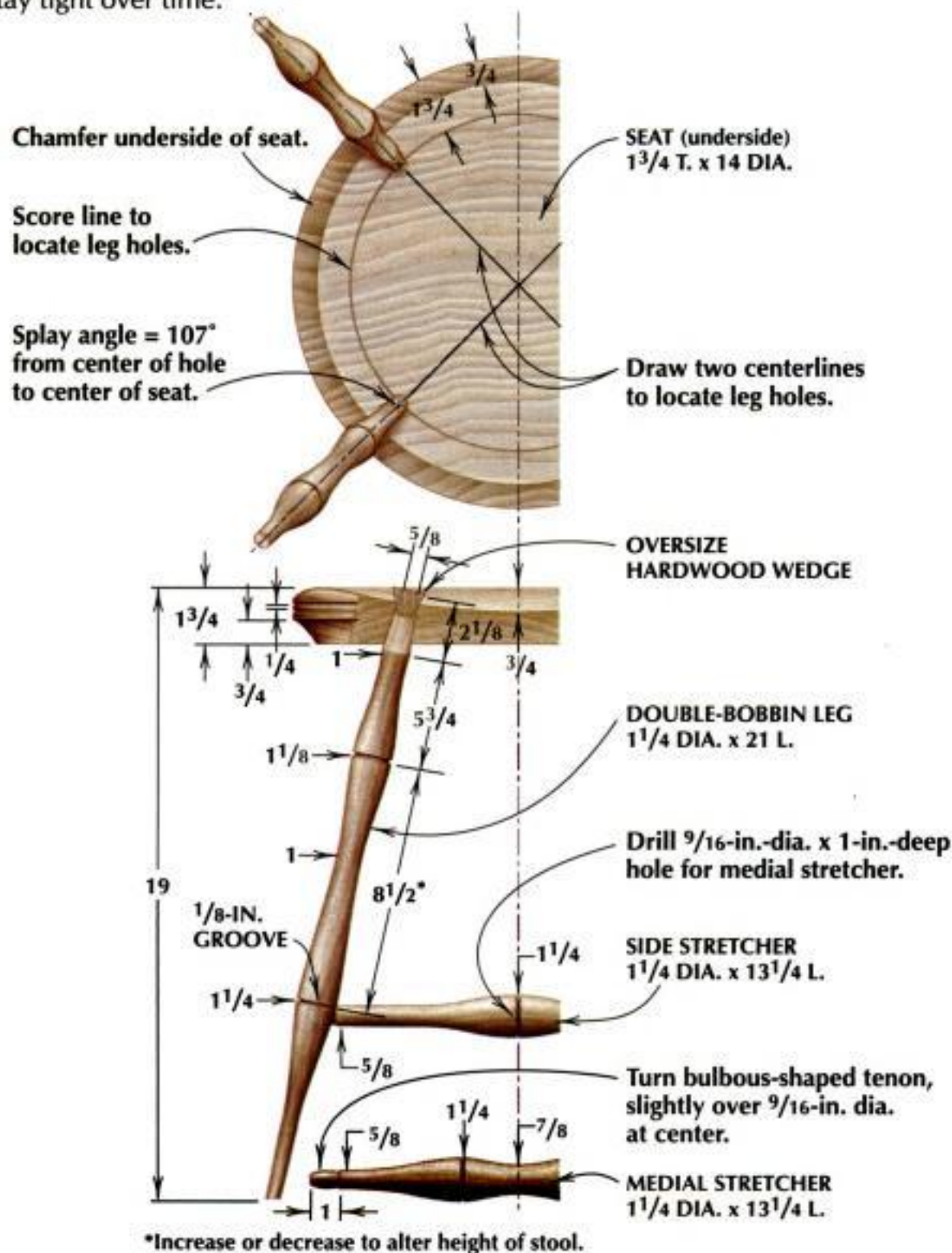
Shaping the parts for the stool is mostly lathe work, and you begin with the seat. I use yellow, or tulip, poplar for the seat blank because it turns cleanly and has the right



Turn the seat. After dishing the seat and chamfering the underside, Dunbar uses the long point of a skew to cut a decorative bead on the edge.

SHOP STOOL

Built for use and abuse, this durable stool uses traditional Windsor-chair joinery for strength. Wedged, locking-tapered legs join to the seat. The stretchers are cut oversize in length, then fit into holes in the legs to create compression joints that stay tight over time.



density for the wedged leg joints that I'll talk about later. Other medium-hard woods such as walnut or mahogany will also work. Unless you can find a 14-in.-wide board, you'll need to glue up the seat stock from narrower boards. Once you have the necessary width, bandsaw the blank round and mount it on a faceplate.

Begin by trueing the edge of the blank on the lathe with a shallow gouge. Then turn the top and bottom faces flat, working the face grain from the edge to the center. On the bottom side of the seat, score a line 1 3/4 in. from the rim with the point of a skew or a parting tool. You'll use this mark later for locating the legs. (See drawing.) Dish the seat as shown in the drawing, again with the gouge. Then cut the chamfer under the seat with a scraper, and turn the decorative bead on the edge with a skew chisel. (See photo, left.) The bead creates visual interest and the chamfer makes the 1 3/4-in.-thick seat appear more delicate.

Once you've shaped the seat, remove the faceplate and hand-plane the bottom to remove any protrusions where the faceplate was attached. Sand the top surface by hand in the direction of the grain with 180-grit paper.

Turn the Legs Next

You can use any hardwood you like for the legs and the stretchers. Here, I've used white birch. This particular style of leg, often touted as a "bamboo" leg, is more accurately known as a "double bobbin" for its twin bulges.

Mount each leg blank on the lathe between centers, and rough-turn the shape with a shallow gouge. I use a narrow gouge with a lady-finger grind for the 1/8-in.-wide grooves. Then I finish up with a 3/4-in. skew to leave a super-smooth surface.

Now turn a tapered tenon on the end of each leg. (See drawing.) The tenon fits into a corresponding tapered hole drilled in the seat. In chairs, the advantage of the locking taper is that it always self-tightens each time someone sits down. Later, you'll wedge the joint into the seat to form a "locking taper joint."

I use a simple gauge to check my progress as I turn the tenon to its sloping profile. (See photo 1, opposite page.) Make the gauge by drilling a 1/2-in. hole in some scrap with a spade bit. Then enlarge the hole and taper it from 1 in. to 5/8 in. using a reamer held in a brace. (See

MAKING A LOCKING TAPER JOINT



1 Gauge an accurate tenon. Use a gauge block made from scrap pine to check the tenon's diameter and taper.



2 Drill the leg holes in the seat. Set the bevel gauge to 107° and place its handle on a centerline. Align the spade bit to the gauge as you drill.



3 Then ream to a taper. With the seat held vertically, Dunbar turns a tapered reamer in a brace to enlarge and taper the holes in the seat.

sidebar, page 65.) I bandsaw the scrap down the middle and use one half to gauge the slope of the taper as I turn.

Drill the Seat for the Legs

With the legs turned, you're ready to fit them to the seat. Place the seat upside down on the bench and draw two centerlines at right angles. The lines will intersect the scored circle that you cut on the lathe, providing the locations for the four leg joints.

Now place a pair of scrap boards under the seat and clamp the arrangement to the bench. Drill through the seat and into the boards with a 1/2-in. spade bit, using a bevel gauge set at 107° to align the bit. (See photo 2, above.)

Next, clamp the seat blank vertically in a bench vise and enlarge the first hole while tapering it at the same time with the reamer. (See photo 3, above.) Periodically insert the tapered tenon into the hole, and check the hole angle by aligning the leg with the previously-

set bevel square. You're finished reaming when the leg protrudes about 1/4 in. beyond the seat.

Finish drilling the other leg holes in the same fashion, marking each leg to its respective hole. Check that the legs are equal in length by measuring down from the bottom of the seat to the first groove in each leg. If one leg is long, simply ream the corresponding seat hole some more until all the legs measure equally from their respective grooves.

Insert the four legs into the holes and stand the stool on the bench. At this point, don't worry if the stool rocks. You'll trim the legs later.

Add the Stretchers

You can now determine the length for the two side stretchers and the medial stretcher. Although the drawing shows a finished length of 13 1/4 in., the actual length may vary. Like boats and barrels, chairs give their makers important dimensions as they are being made.

With the stool upright on the bench, measure the distance between each pair of legs at the height of the lower groove, where the side stretcher will join. The shoulder-to-shoulder measurements for each of the side stretchers should be nearly equal, and the medial stretcher should also be about the same length. Small variations in length are insignificant.

Now comes the second mechanical "secret" to ensure the joints stay tight over time. Instead of relying on glue to hold the stretchers in the leg holes, you use the stretchers to push the legs apart, keeping the joints in compression. The trick is to make the stretchers' shoulder-to-shoulder dimension about 1/4 in. longer than the distance between the legs. To this measurement add another 2 in., to account for the length of the 1-in.-long tenons.

Now turn all three stretchers—side and medial—to the profiles shown in the drawing. As I did on the legs, I use

DRILLING AN ANGLED HOLE



Find the angle for the stretcher. Clamp a straightedge across the legs at the height of the grooves, then place a bevel gauge on the straightedge. Align the gauge's blade with the centerline of the leg.



Drill the leg for the stretcher. Clamp the leg in the vise, and find the correct angle of the spoon bit by sighting along the bevel gauge.

gouges for the rough turning and finish up the surface with a skew. Turn the tenons to the slightly bulbous shape shown in the drawing.

Drilling the holes for the stretchers comes next. I use a $\frac{9}{16}$ -in.-dia. spoon bit in a brace to drill the holes for the stretchers. (See sidebar.) The spoon bit leaves a round bottom, which allows for a longer tenon in round stock than a conventional flat-bottomed hole would allow.

The holes in the side stretchers are at right angles, but the leg holes are angled. You can find the exact angle by clamping a straightedge to the legs at the height of the lower grooves. Set a bevel gauge on the straightedge and adjust its blade to the centerline of the leg. (See photo, above left.)

Now place each leg in a bench vise and drill the stretcher holes. (See photo, above right.) Make sure the axis of the leg is parallel to the vise jaw. Set the bevel gauge on the vise jaw, and use it to align the bit to the correct angle. File a mark or use a piece of masking tape on the bit to mark the correct depth. Make sure the straight walls of the holes are at least 1 in. deep.

Finish cutting the joints by drilling the holes in the side stretcher, this time using a square instead of the bevel gauge for aligning the bit. As before, mark each tenon on the stretchers to its corresponding hole.

Assemble the Stool

Assembly is easy, but it's important to follow the correct sequence for a successful glue-up. Begin by joining the medial stretcher to the two side stretchers to form the letter "H."



Level the stool. Shim the legs until the stool sits level with the benchtop, then trace around each leg with a compass. Saw to the compass lines with a backsaw.

I find that it's less messy to brush an even coat of glue in each hole, rather than on the tenon. You'll need to give each joint a solid rap with a hammer or a mallet to ensure that the slightly oversize tenon slips into its hole. Complete the undercarriage by gluing the stretcher assembly to the legs in the same manner. Then brush glue in the seat holes and coax the legs into the seat with a mallet.

For increased strength, I add oversize wedges into the ends of the tenons where they protrude through the seat. (See drawing.) Each wedge serves two purposes: Being wider than the tenon's diameter, the wedge keys into the seat, completing the locking taper. This helps the leg resist the torque caused by a sitter's shifting weight. Also, the wedge spreads the tenon, making it conform to the hole. I whittle my wedges from scrap oak, tapering them in width as well as in thickness with a sharp knife.

To install the wedges, simply split the protruding end of each leg with a sharp blow from a 1/2-in. chisel, making sure each split runs at right angles to the grain of the seat. Brush some glue on each wedge and drive it into the tenon and the seat. Then use a gouge to chisel the wedged tenons flush with the seat, and sand the joints smooth with 180-grit paper.

Finally, position the stool on a level surface and place a level on the stool's seat. Insert shims under the legs until the stool sits without rocking and the seat reads level. Now measure the height of the stool. Set a compass to the amount you need to trim to reach your desired height, then scribe around each leg with the compass. (See bottom photo, opposite page.)

Use a backsaw to cut to the marks. The stool should sit firmly on the floor, and you're ready to apply the finish of your choice. In our shop, we like cheerful colors, so we use milk paints. Now that you have a comfortable stool to sit on, it's time to think about using it to make a chair. ▲



MIKE DUNBAR
teaches chairmaking,
stoolmaking, and
other aspects of wood-
working in his
Hampton, NH shop.



Chair tools. Spoon bits, shown here in sizes ranging from 3/8 in. to 5/8 in. (right), let you cut angled, round-bottomed holes. A tapered reamer (at left) cuts a tapered hole for a snug fit to a tapered tenon.

TOOLS FOR THE CHAIRMAKER

There are two indispensable tools for the modern chairmaker: the spoon bit and the tapered reamer. (See photo, above.) Both tools are designed to work in a hand-held brace, and both are just as useful now as they were centuries ago.

The reamer, sometimes erroneously called a tapered chair bit, costs \$45 or \$85, depending on the maker. It's the ideal tool for tapering a straight-sided hole to fit a round, tapered tenon. The reamer cuts with a scraping action and is easy to control. Simply place the reamer into the hole and apply light pressure as you turn the brace. As you ream, make sure to align the crank of the brace to the same angle, or centerline, of the hole. I like the more expensive reamer made by Precision Tools, which is designed to self-center. (See Sources, below.) I haven't had to sharpen my reamer in over five years of constant use, but if the cutting edge ever dulls, I can send it back to the manufacturer for this service.

Spoon bits are probably the second-oldest tool—after the awl—for drilling into wood, and they're perfect for cutting holes in chair parts. They come in sizes from 3/8 in. to 3/4 in., and cost from \$26 to \$45 depending on size and maker. Spoon bits cut fast, drill cleanly at any angle, and let you correct or adjust an angle during mid-drilling. Spoon bits also have the advantage of cutting a round-bottomed hole, allowing for a deeper, stronger joint in a round part such as a chair leg.

Unlike most bits, spoon bits cut from the center out. Always start the cut by holding the bit perpendicular to the surface—even when drilling an angled hole. Turn the brace in an even, clockwise motion. Once the bit reaches its full diameter, tilt the brace to the desired angle, keeping the bit turning as you tilt. To extract the bit, keep turning clockwise and pull upward on the brace. As with the reamer, I prefer Precision Tools' bits, which are particularly easy to use.

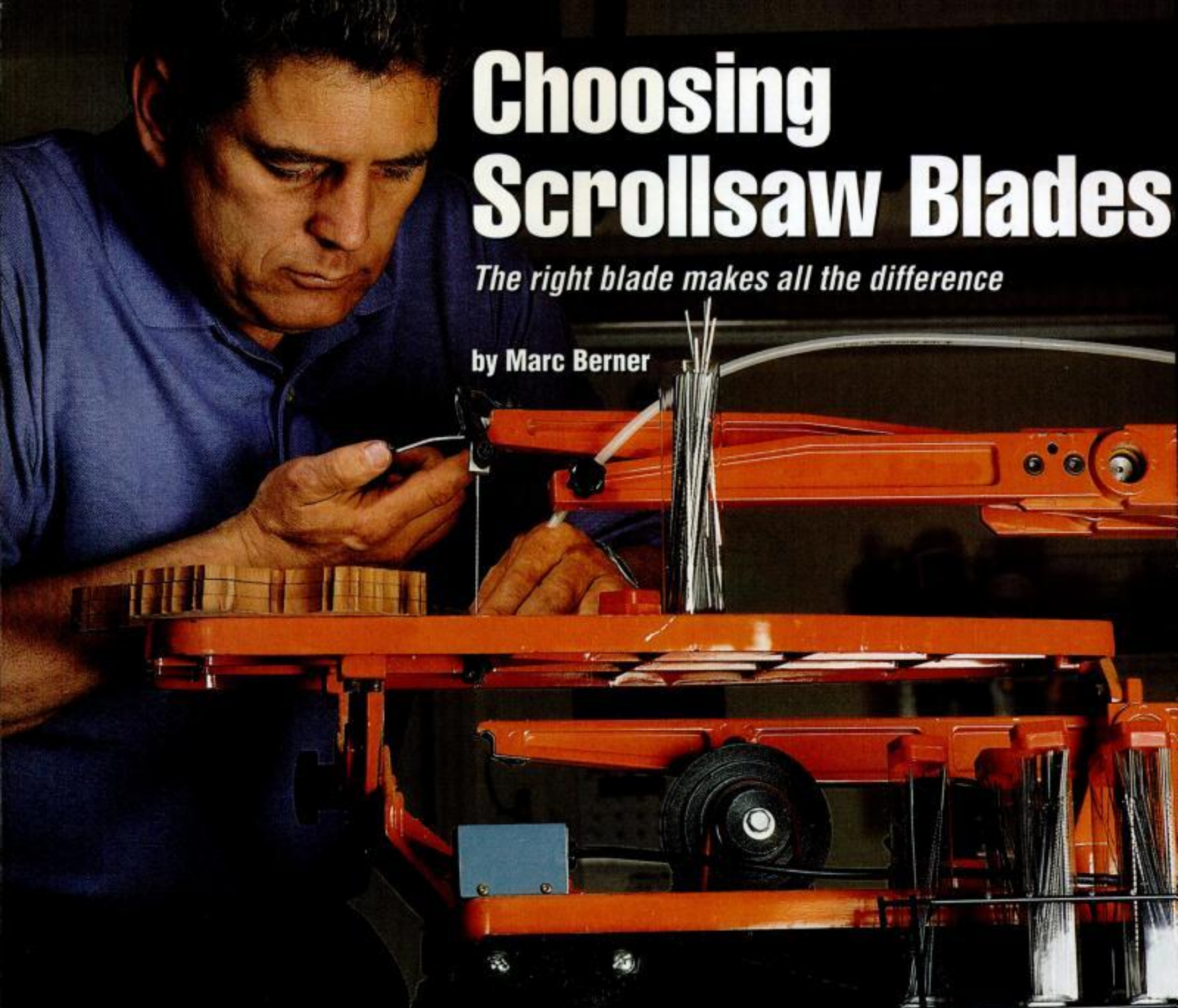
Sharpen only the bit's round nose. I use a sheet of 800-grit wet/dry sandpaper on glass. Lay the bit almost flat on its side and draw it toward you. As you pull, rotate the bit on its cutting edge. Then buff the inside surface on a buffing wheel. —M.D.

SOURCES

Tapered reamers and spoon bits are available from:

Garrett Wade (800) 221-2942

Precision Tools (607) 965-8420



Choosing Scrollsaw Blades

The right blade makes all the difference

by Marc Berner

Great scrollsawing starts here. Choosing the right blade size and tooth style for the material is the key to fast, smooth, and accurate scrolling.

What is the secret of scrollsawing success? A decent saw is only part of the story. The most important factor in precision, speed, and smooth cutting is the blade itself. With the right blade in your saw, you'll not only work quickly and accurately, but you can also reduce or eliminate the biggest hassle of scrollsaw work—sanding.

To get the best results, you have to pick the right size and type of blade for the material you're cutting, and then make sure it is properly tensioned. In this article, I'll tell you which blades work best for different materials. I'll also recommend the basic sizes you need and give you some rules of thumb for improving your results when your blade isn't cutting like you want it to.

Types of Blades

There are five major types of scrollsaw blades. (See drawings, opposite page.) Each is available in a variety of sizes.

Standard skip-tooth blades are good for most solid wood applications, although they tend to tear out wood fibers on the bottom surface of the work.

Reverse-tooth blades have several teeth pointing upward at the bottom of the blade to reduce tearout and splintering on the underside of plywood.

Crown-tooth blades have double-ended teeth that cut on both the downstroke and the upstroke, an advantage when working with thin plywood and plastics.

TROUBLESHOOTING GUIDE



Burning. Burned edges (left) mean the blade is too fine for the material. A coarser blade clears sawdust better, reducing friction and burning (right).



Tearout or splintering. Torn fibers on the bottom surface of your work (left) can usually be avoided (right) by using a reverse-tooth blade.



Meltdown. Standard blades and fine-tooth blades tend to melt acrylic (bottom), but coarser "crown-tooth" blades produce a smooth edge (top).

PGT blades are reverse-tooth blades whose teeth are precision-ground rather than milled, so they produce straighter, smoother cuts than standard blades in many materials.

Spiral-tooth blades cut in every direction, but they leave a ragged edge. They're best for work that is too long to swing through the throat of your saw.

Size Comes First

Blades come in numerical sizes ranging from #2/0 to #12 and coarser. Lower-numbered blades are thinner and narrow-

er and have more teeth per inch (tpi).

The most important factor influencing your choice of blade size is the hardness, or density, of the material you're cutting. Hardwoods and other dense materials generally cut better with coarser blades. Very thin materials such as veneers and thin plywood require fine-tooth blades.

The chart below shows the blades that I've found work best for many common materials. If you don't get the results you want, a few rules of thumb will help you select a better blade for the job. (See "Troubleshooting Guide," above.)

THE RIGHT BLADE

MATERIAL	BLADE SIZE	BLADE TYPE
Solid Wood		
Pine	5	Standard
Poplar	7	Standard
Walnut	7	Standard
Oak	9	Standard
Cherry	9	PGT
Plywood		
Less than 1/4 in.	2	Reverse or crown tooth
1/4 in. to 1/2 in.	7	Reverse
Over 1/2 in.	9	Reverse
Other man-made boards		
MDF	9	Standard
Particleboard	9	Standard
Veneer	2/0	Standard
Plastic		
Less than 1/4 in.	5	Crown tooth
1/4 in. to 3/8 in.	7	Crown tooth
Over 3/8 in.	9	Crown tooth
Soft metals	7	PGT

STANDARD SKIP TOOTH



REVERSE TOOTH



CROWN TOOTH



PGT



SPIRAL TOOTH



Tension It Correctly

Many woodworkers just starting out on the scrollsaw don't tension their blades enough. Insufficient tension will make the blade tend to drift when sawing and will cause premature blade breakage, usually near the center of the blade. Breakage at the ends of the blade usually means your blade holders are not pivoting freely, causing metal fatigue near the holders.

I've heard of people gauging blade tension by the pitch of the blade when it's plucked, but I prefer to use the "1/8-in. rule"—the blade shouldn't deflect more than 1/8 in. when you press your work against it. Blades stretch slightly in use, so it helps to periodically re-tension your blade as you work. ▲

MARC BERNER is a woodworker and scrollsaw expert based in northern California.

SOURCES

Scrollsaw blades are available from:

Woodworker's Supply
(800) 645-9292

Woodcraft
(800) 225-1153

Highland Hardware
(800) 241-6748

Trend-lines
(800) 767-9999

The Woodworkers' Store
(800) 279-4441

F O O L P R O O F GRINDING SYSTEM

Put a perfect bevel on a tool in less than a minute

BY IAN J. KIRBY



Grinding made easy. You can produce perfect bevels fast with this simple, shop-made fixture. With a slow-speed grinder, a soft wheel, and a light touch, you won't burn the steel.

The first stage in putting a sharp edge on woodworking tools is shaping the "grinding bevel" (see drawing, opposite page) with an abrasive wheel. This makes the second stage—creating and polishing the "sharpening bevel" on bench stones—quick and easy. In fact, without this concave grinding bevel, it would take 10 to 12 times longer to create the sharpening bevel, and your bench stones would wear out that much faster.

Woodworking catalogs offer a variety of expensive grinding systems to help you grind your tools without overheating the steel, but this shop-made setup will do the job for less than \$100. All you need is an inexpensive, slow-speed grinder; a soft, coarse-grit grinding wheel; a tool rest made from a steel rod; and two or three tool holders you can make of wood or angle iron.

Grinders and Wheels

Grinding generates heat. Too much heat draws the temper from the metal, making it too soft to hold an edge. You can see the effect of heat as the oxidation colors appear on the steel and change as it gets hotter. The instant the steel's color changes from silver to straw or blue or purple, it's too late. By the time you see the colors, the steel's temper has been drawn.

The best way to deal with heat is to avoid overheating in the first place. This requires three things: a slow-speed grinder; a soft, coarse wheel; and a light touch.

For general grinding of woodworking tools, get a 6-in. grinder that runs at 1,800 rpm. Most grinders run at around 3,450 rpm, but for woodworking tools, a slower machine is the way to go. The speed is marked on the motor plate.

Slow-speed grinders are available from Garrett Wade and other mail-order suppliers for around \$80.

The grinding wheel you need is one that has coarse grit held in place by a soft bond. As the wheel grinds the tool, the bond wears away, exposing new and sharp grit to cut the metal. Such a wheel removes the steel quickly, without overheating. Finer grits grind too slowly, and harder bonds generate too much heat.

Only a few grinding wheels are right for woodworking tools. I recommend a 60-grit aluminum oxide wheel, with a medium to soft bond. 60 grit is not too coarse; it cuts the steel faster than finer grits and generates less heat.

Shop-Made Tool Rest

The problem with most bench grinders is the tool rest. It's small, flimsy, and inaccurate. Aftermarket tool rests are expensive, complicated, small, and built around sliding parts that trap grit. All you need is a round steel bar mounted on two posts that are attached to the grinder baseplate, as shown in Fig. 1. All the components are available at the hardware store or home center.

The center of the tool rest is at the same height as the center of the grinding wheel, with a gap of about $\frac{1}{8}$ in. between rest and wheel. There is no need to make a science of the height—a bit up or down makes no difference.

Here's a tip for making the posts: Drill a $\frac{3}{4}$ -in. hole in the middle of a piece of wood twice as long as the height of the posts, then crosscut it to leave a $\frac{1}{8}$ -in. cutout in the top of each post to locate the tool rest itself. Attach the tool rest to the posts with $\frac{1}{2}$ -in. electrical conduit straps.

Attach the posts to the grinder base with three $2\frac{1}{2}$ -in. or 3-in. steel screws. You can increase the strength by angling the screws slightly. While it's not vital, there's no harm in adding a glue block.

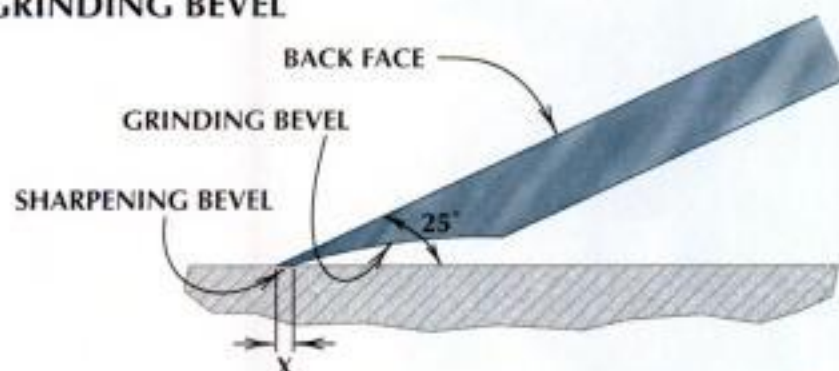
Shop-Made Tool Holders

Tool holders that ride on the tool rest are the other main ingredient in this grinding system. They establish the grinding angle and ensure a square and straight edge as you grind. You adjust the grinding angle by changing the

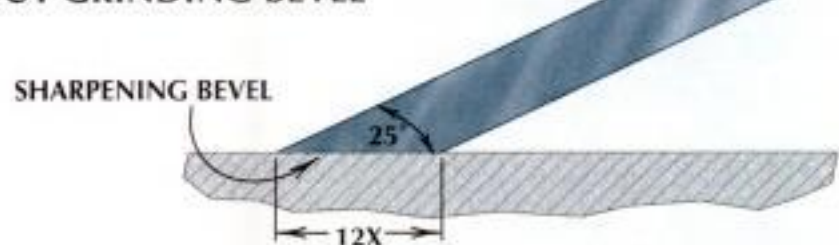
GRINDING MAKES THE DIFFERENCE

A grinding bevel greatly reduces the time and effort needed to sharpen an edge tool because there's less steel to remove. It also saves wear on your bench stones.

WITH GRINDING BEVEL



WITHOUT GRINDING BEVEL



The perfect edge. A clean, straight and square grinding bevel makes short work of creating and polishing the sharpening bevel.

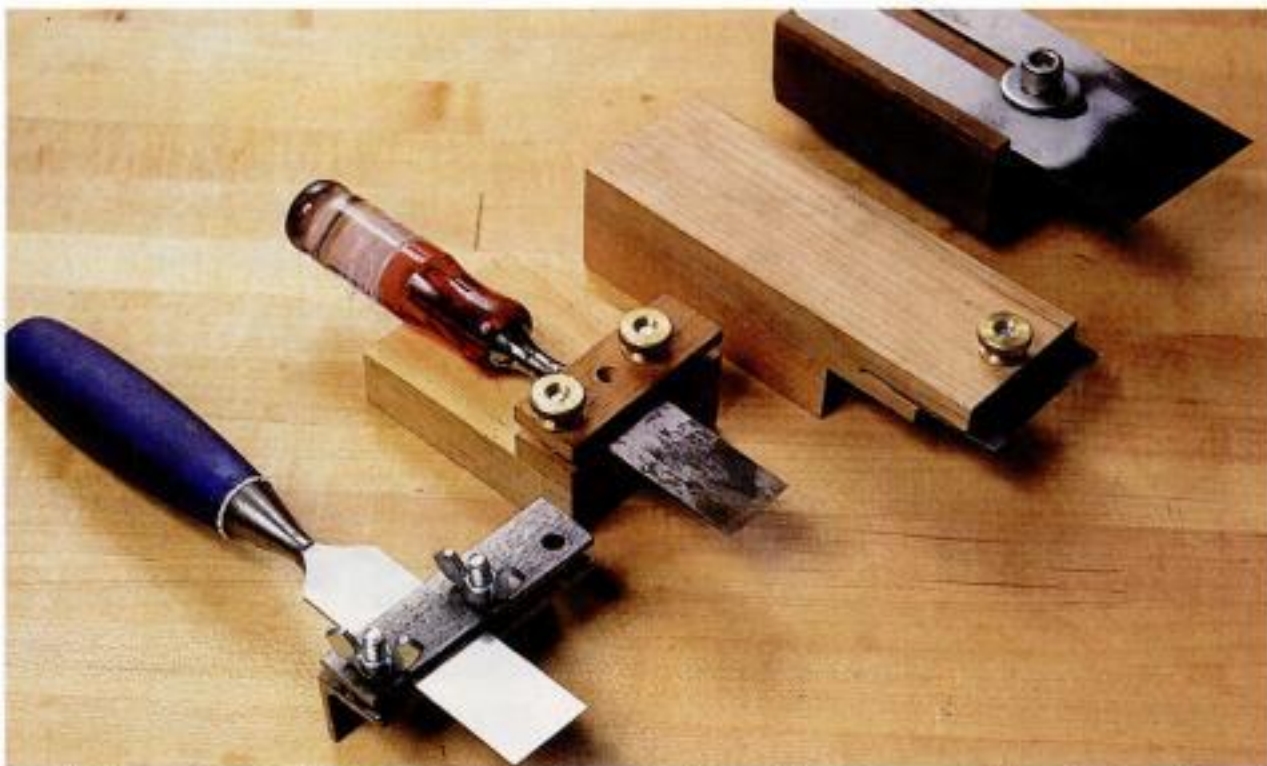
THREE GRINDER SETUPS

While it's essential to be able to grind tools, it's not something you have to do every day. In fact, once you've correctly prepared your plane blades and chisels, you'll be able to sharpen often but grind seldom. When it is time to grind, there'll be no big hassle, once you devise a setup that works for you. Here are three good choices:

- Clamp the grinder base to the bench when you need to grind tools, then unclamp it and stow it away. As a furniture maker who works alone, this is what I prefer. I like to set up and attend to all the tools that need grinding in one session. Grinding makes a mess, but the loose grit is easy to vacuum up before getting back to work.
- Mount the grinder base on a wall-hung shelf. Locate the grinder well away from the workbench and finishing areas of the shop, because otherwise the grit can be a nuisance.
- Make a roll-away stand. In a shop where several people share common equipment, this may be the best alternative. The stand should have a low shelf with a rail all around it, to trap various tool holders and other gear. Make it so the wheels lock.



Check the angle. Load the chisel into the holder and pivot it onto the grinding wheel. Adjust the grinding angle by changing the chisel's position in the holder.



Hold that tool. Angle-iron and hardwood holders fit any size of chisel. The plane-blade holder, right, has a fence to keep the blade square. The spokeshave holder is similar: the deep rabbet slides on tool rest, nut locks blade in place.



Set the angle. How far the plane blade projects from the holder determines the grinding angle. Find the angle by trial and error, then lock it in with a stop block on the grinder baseplate.

distance the tool blade projects beyond the end of the holder. (See middle photo, left.)

The **universal chisel holder** may be made out of hard wood or mild steel as shown in Fig. 2. The holder doesn't have to be fancy or elaborate—it just has to hold the chisel at a consistent and reproducible angle.

The **plane-blade holder** consists of a hardwood block with a fence glued to one side. (See Fig. 3.) A bolt holds the blade in place, and the fence keeps it square. By drilling more than one bolt hole, you can use the same holder for different-width blades. For block-plane blades, make a similar but smaller holder, or make a cutout for them at the other end of the regular holder.

Setting the Grinding Angle

There is no "correct" grinding angle. For plane blades, 25° is usual, but it can vary by 5° either way. For chisels, many woodworkers use the same 25° angle, though I prefer a steeper angle of 18° to 20°.

To calibrate either of these holders, snug the bolt on the tool and let it project about 2½ in. Set the holder on the tool rest and test-grind. (See top photo, left.) You'll be able to see whether or not the angle is the same one you started with. Check the newly ground metal with a protractor, and extend the blade a bit more to lower the angle, or retract it a bit to increase the angle. You'll find that it's very sensitive to small adjustments, but trial and error will produce the angle you want.

Measure the projection and remember it, or write it on the grinder baseplate. Another way to record the setting is to butt the holder against the grinder base, mark how far the tool projects, and draw a line or put a stop block there. (See bottom photo, left.) This setting will be good as long as the grinding wheel remains the same diameter. As the wheel wears down, it will get smaller, and the tool will have to project farther.

How to Grind

To grind, plant the blade holder on the tool rest with its back end low, so the bevel doesn't contact the wheel. Use your right hand to keep the tool holder in contact with the rest, and your left hand to move the holder from side to side.

Now pivot the tool into contact with the wheel. Don't press too hard, but do pay attention to the feel of the steel on the wheel. Slowly move the tool from

FIG. 1: TOOL REST

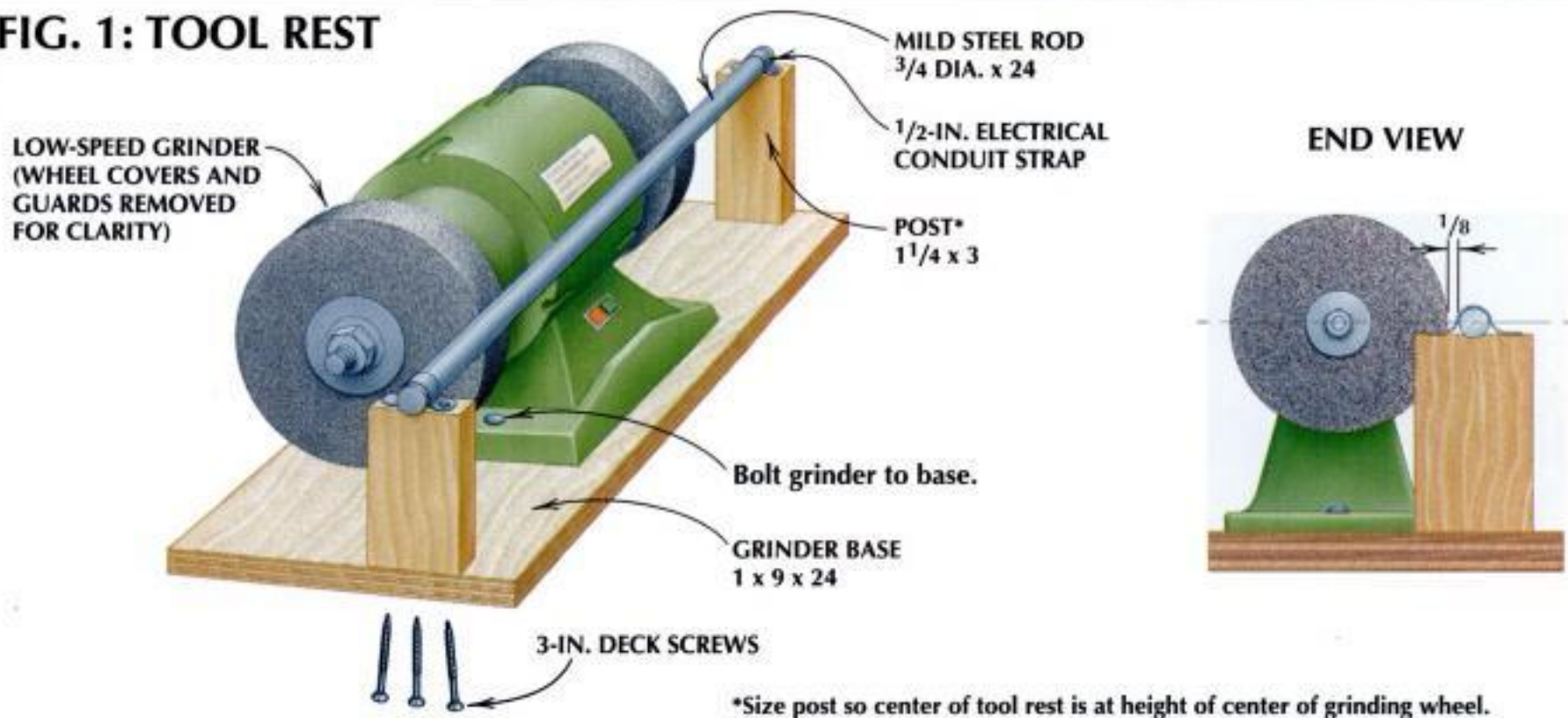
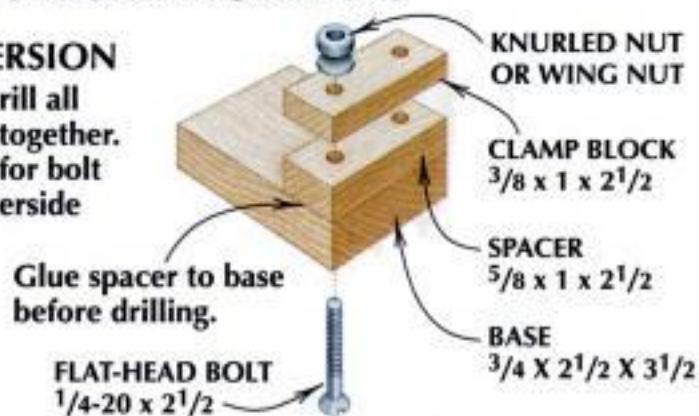


FIG. 2: CHISEL HOLDERS

WOOD VERSION

Clamp and drill all three pieces together. Countersink for bolt heads in underside of base.



METAL VERSION

Clamp and drill both pieces together. Countersink for bolt heads.

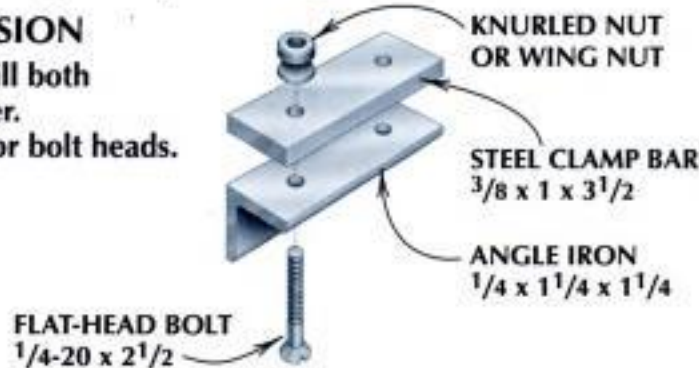
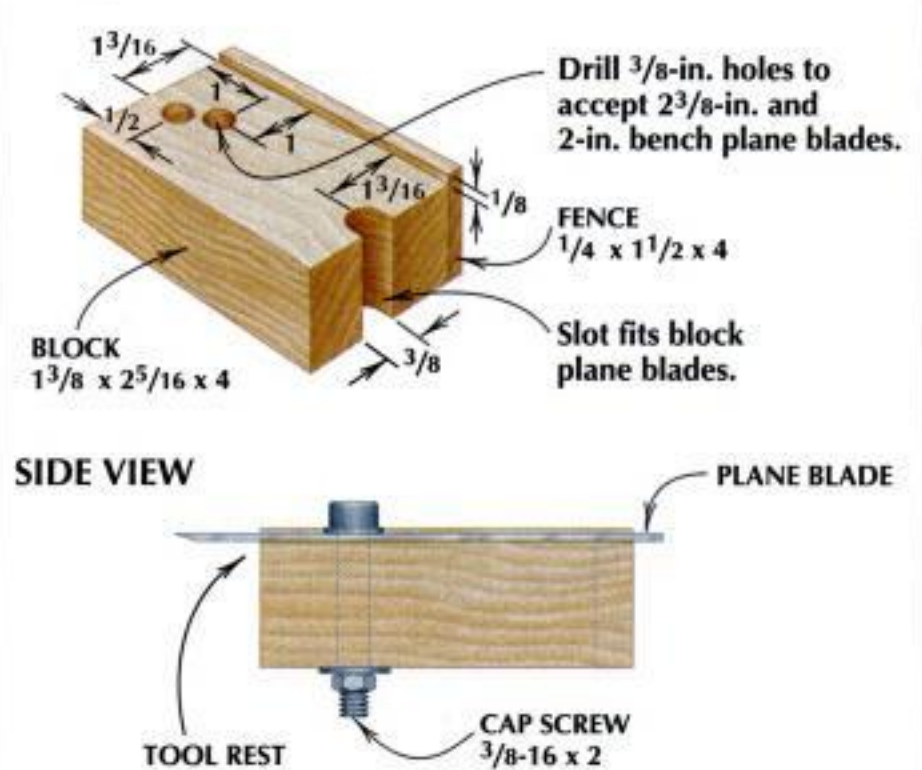


FIG. 3: PLANE-BLADE HOLDER



side to side, maintaining light and even pressure. With wide chisels and plane blades, reverse direction when the trailing edge just moves onto the wheel. With narrow chisels, pivot the tool holder to dab the metal gently onto the wheel. Grind slowly and stop before you create a feather edge at the very tip of the tool. Then go to your bench stones to create the sharpening bevel.

Grinding Damaged Tools

Edge tools such as chisels, plane blades, and spokeshaves should be sharpened straight across and square to the tool's long axis. Repeated sharpening is likely to distort the shape of the edge, by dubbing off the corners, dishing the center, or going out of square. Cutting into metal

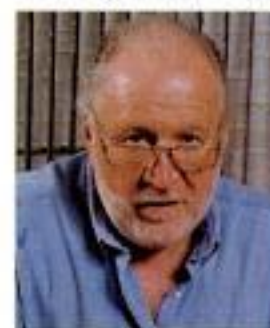
in the wood, or dropping the tool onto cement, is liable to nick the edge; zealous grinding is liable to burn the steel. From the repair point of view, an out-of-square edge, a nicked edge, and a burned edge all require the same treatment.

The first step is to grind the edge back beyond the damage by pushing it straight into the grinding wheel. There's no point in trying to maintain the bevel during this maneuver—you'll only increase the risk of overheating the steel. Instead, grind straight across by pushing straight into the wheel. Continue to grind until no trace of damage remains.

The technique of pushing the edge straight into the wheel shocks people when they see it for the first time. They want to remove the defect and maintain

the bevel at the same time. This has two problems: you'll be grinding to a feather edge, which increases the risk of burning the steel, and you can't see where you are going. Squaring the edge removes the defect immediately and establishes the location of the new bevel. It looks frightening, but it really is the best method. ▲

IAN J. KIRBY is a designer and wood-working teacher. This article is excerpted from his book *Sharpening with Waterstones* (Cambium Press, 203-426-6481).





Turned on two axes, Verchot's lidded boxes combine soft curves and crisp lines. As you rotate the lid on the body, the overall form changes.

Eccentric Lidded Boxes

Shift the axis to turn fascinating shapes

by Remi Verchot

Many woodturners spend years producing work on a single axis, and there's certainly enough variety and joy in that to last a lifetime. But if you've never tried multi-axis turning, there's a whole new realm of design possibilities waiting for you to explore.

In this article, I'll introduce you to the joys and challenges of multi-axis turning with a simple project—a lidded box.

Unexpected Delights

In single-axis turning, the workpiece's axis never shifts, and the entire profile is evident whether the lathe is on or off.

In multi-axis work, you turn a preliminary form on the first axis. Then you remove the piece from the lathe and remount it so that the first axis is offset

from the lathe's axis, and turn the final form on the second axis. While you're turning on a second axis, the profile isn't evident—you have to turn the machine off to see what you've got, scratch your head, decide what you should do next, and go exploring. It is difficult to sketch the form, or even visualize it, beforehand. The forms that emerge are often surprising and delightful!

I like to make multi-axis boxes with organic forms. There are no flat bottoms. How a box rests on a flat surface depends on how you orient the lid on the body.

Standard Equipment

You'll start by turning between centers, but you'll need a self-centering scroll chuck to make a lidded box like mine. I

like the Oneway Stronghold chuck, which accepts a wide range of wood diameters and has a very positive grip.

Prepare the Stock

My first step in making a lidded box is choosing wood that has a moisture content of no more than 8%. If you use green wood, its shape will distort as it dries out after turning, making it difficult to achieve a precise fit for the lid.

I recommend that you avoid the pith (the center of the tree); it is, as we say in France, the most nervous part of the tree. Orient the grain direction parallel to the lathe's axis. That way you'll be hollowing end grain, which makes the piece more stable than if you hollow side grain.

I've made boxes that range from 1½ in. to 4 in. in diameter. I always start with a blank that's longer than it is wide. (See drawing.) I usually choose "friendly" woods like maple, ash, mahogany, elm, and pear, which cut cleanly and finish easily.

Rough Out a Cylinder

Once you've selected your stock, mount the blank between centers, and rough it into a cylinder. Use a bowl gouge or a roughing gouge, whichever you're more comfortable with. As shown in the drawing, turn a tenon at each end of the blank to fit your chuck.

Separate the Two Parts

I remove the roughed-out cylinder from the lathe and cut it into two parts on the bandsaw. I usually make the body about twice the length of the lid.

The safest way to cut the cylinder on the bandsaw is to clamp it securely with a quick-action clamp. Keep the bar of the clamp flat on the bandsaw table during the cut. (See photo, above right.) This prevents the cylinder from spinning out of control during the start and finish of the cut, and it keeps your fingers a safe distance from the blade.

You could also separate the two blanks with a parting tool while it's still on the lathe, but doing it on the bandsaw removes less wood and preserves a better grain match.

Turn the Lid

Chuck the lid—the smaller part—on the lathe. Reduce the diameter to make it smaller than the body. Then turn a large bead with a bowl gouge or a ½-in. detail gouge (a small spindle gouge).

Next, hollow out the end grain to a half-round shape using a shallow gouge. Whenever you hollow into end grain remember to cut from the center to the outside, to prevent catches and tearout. You must turn the first ⅝ to ⅜ in. of the wall straight in, or parallel to the axis, for the proper fit to the body.

I then scrape the interior with a spindle gouge, tilted to the left to avoid catching. I finish turning the interior surface with a round-nose scraper, also tilted left. To create a wider cutting edge, I have given my round-nose scraper a more rounded edge. I also formed a burr on its edge with a burnishing tool.

Sand the piece with 150- through 320-grit sandpaper. On very hard, close-grained woods like boxwood or cocobolo,

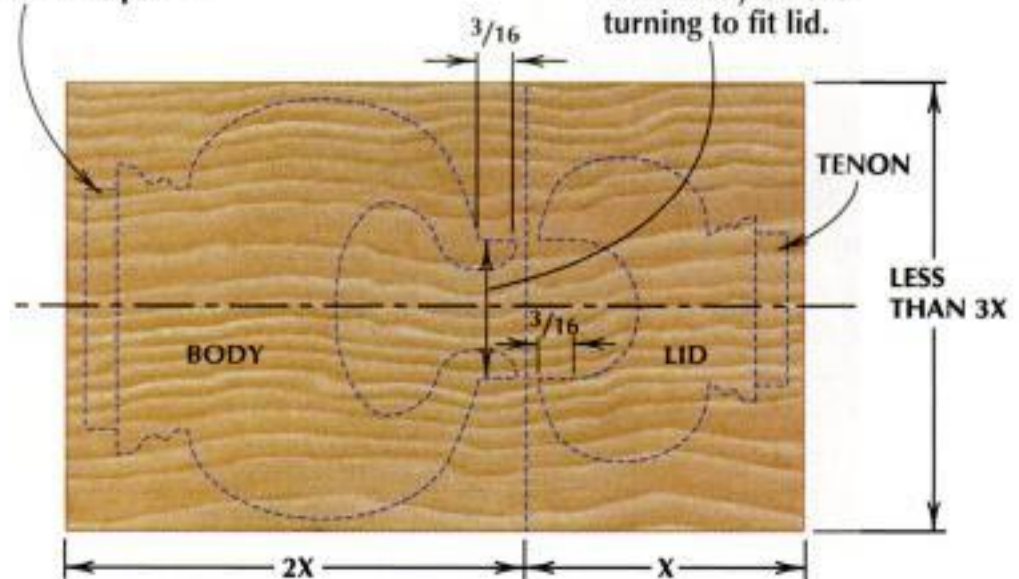


Safe separation. After you turn a cylinder, cut the lid and body blanks apart on the bandsaw. A quick-action clamp helps to hold the cylinder safely—be sure the clamp rests on the table.

FIRST AXIS

Turn tenon more than ½ the total diameter of the piece.

Turn rim oversize by ⅛-in. dia. Wait a day before turning to fit lid.

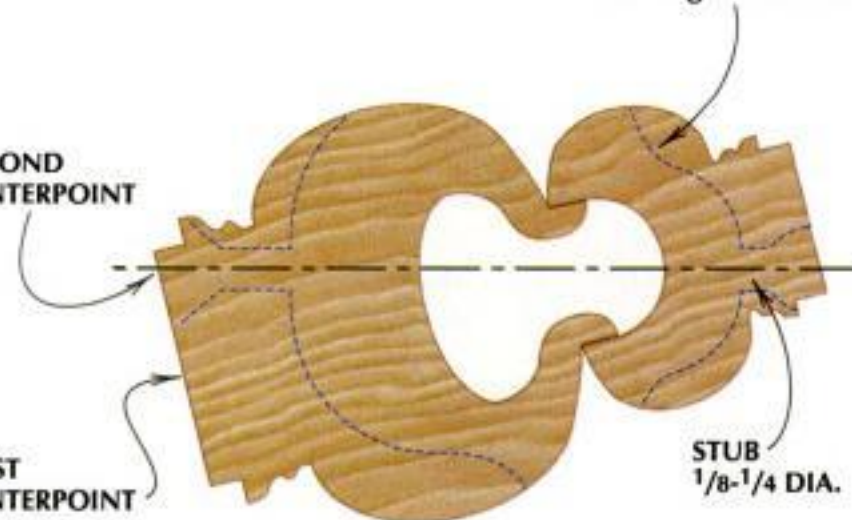


SECOND AXIS

Turn a gentle S-curve.

SECOND CENTERPOINT

FIRST CENTERPOINT





◀ **Turn the lid.** Shape the lid's exterior first, then hollow the end grain. The first $\frac{3}{16}$ in. of the interior wall must be parallel to the lathe's axis, to fit the box body.



▲ **Shaping the body.** Using the lid as a gauge, turn the rim slightly larger than the lid's opening. The author uses a *bedan*, a traditional French tool. You could use a square-nose scraper or skew.

▶ **Hollowing the body.** After turning a large bead, start hollowing with a shallow gouge. Finish with a bent scraper to cut the inside shoulders.



I sand to 600 or 800 grit to eliminate all scratches. After sanding, remove the lid from the lathe and chuck the body blank.

Turn the Body

To shape the body, first I turn a $\frac{3}{16}$ -in.-long rim that fits into the opening of the lid, using the lid as a gauge. (See middle

photo, above.) At this point, the rim should be about $\frac{1}{16}$ in. larger in diameter than the lid opening. I form the rim with a *bedan*, a traditional French turning tool (available from Packard Woodworks, 800-683-8876, or Woodcrafters of Oklahoma, 888-333-7513). You can also use a square-nose scraper or a skew.

Then turn a large bead on the rest of the body, using the same gouge you used to shape the outside of the lid.

To hollow out the body, start with a shallow gouge—I use Oneway's $\frac{1}{2}$ -in. detail gouge. But because the opening is smaller than the cavity, you must finish hollowing with a bent, or hooked, scraper. (See bottom photo.) You can make your own bent hollowing tools, or buy them through specialty woodturning catalogs. (For more on using bent tools, see "Adventures in Hollow Turning," AW #61.)

Before turning the rim to its final size, I wait at least a day for the wood to stabilize. This is the secret to a perfect fit on a fine lidded box.

Begin the final fit by reducing the rim's diameter until it almost fits the lid. Then taper the rim slightly so that the lid just fits onto the end of the rim. I jam-fit the lid while the lathe is turning, which produces a burnished line on the rim. Using this line as a guide, turn the rest of the rim level with the burnished line—so that the entire rim is parallel to the lathe's axis. You want the lid to fit as tightly as possible now, so take light cuts with a sharp tool, and stop the lathe often to check the fit, again using the lid as your gauge. You'll hand-sand the rim for a smoother fit later.

And Now: Axis #2

Now for the fun part: turning on the second axis. Close the box and mark a new centerpoint on each end, so that an imaginary line through the new centerpoints becomes the second axis. The second axis should intersect the first axis, so that the whole box is in the same vertical plane as the original cylindrical blank.

The more you offset the box, the more dramatic the final off-center turning will be. The magnitude of the offset is limited only by the stability of your lathe. A bigger, heavier lathe can usually handle more offset, while a smaller lathe will vibrate too much when the offset is great. If you want to start out cautiously, here's a good rule of thumb: Mark the new centerpoint about halfway between the original centerpoint and the largest radius of the piece. (See drawing.) Precision isn't important here—just eyeball the centerpoint locations. You can experiment to find the offset distances you like best.

Mount the closed box between centers, using the new centerpoints. The

THE SECOND AXIS

body, or larger part, should contact the live center. (See top photo, right.) For this project I used a drive center with four spurs, and made sure two spurs contacted the wood. I used a cup center at the other end, where half the rim should contact the wood. (Two cup centers will work just as well.)

Before turning the lathe on, reduce the speed to around 1,200 to 2,000 rpm, depending on the lathe's size and the magnitude of the offset (slower speed for smaller lathes and bigger offsets). Turn on the machine and speed it up to where the machine just starts to vibrate, then back off the speed until it doesn't vibrate any more.

Control the Tool's Bevel

In single-axis turning, you ordinarily keep the bevel of the gouge rubbing the wood as the tool is cutting, to prevent the gouge from digging in. This is possible because the tool is in continuous contact with the wood.

When turning on the second axis, your tool makes an intermittent cut. It's not touching the wood during the entire revolution of the piece. So you can't rely on the bevel for support—if you do, your tool will vibrate or even create a nasty ding. What you have to do is let the bevel barely touch the wood, while making a slow but deliberate cut. Exert downward pressure on the tool against the toolrest to keep it stable.

Shaping on the New Axis

To make a box that's shaped like mine, turn a gentle S-shaped form at both ends. (See bottom photo.) While the box is spinning, it will appear that the cove of the S meets the previously turned large bead at a crisp ridge line all the way around the piece. This is a "ghost image" created by the off-center spinning. When you turn the lathe off, the cove of the S will actually appear only partway around the piece—but the crisp line will continue all the way around.

Once I've turned a pleasing form, I turn the ends down to thin stubs with a small spindle gouge—first the tailstock end, then the headstock end. Experienced turners can turn these stubs to diameters as small as $\frac{1}{8}$ in.

I stop the lathe and remove the box from the lathe with a handsaw; a parting tool might tear out the grain. Then I carve off the stubs with a sharp chisel.



◀ **A little off-center.** Assemble the lid and body, and remount the box between centers on the second axis.



▲ **Eccentric shaping.** Slow down the lathe and cut gentle S-curves on both lid and body, keeping the tool securely against the rest.

Sanding and Finishing

I advise against sanding the box on the lathe because sandpaper can easily blur the crisp lines. I usually remove the box from the lathe and sand with an adhesive-backed sandpaper disc mounted on the lathe or on a drill press. Progress from 120 to 320 grit. The final sanding should be done by hand, following the grain.

For these boxes I often use a wiping varnish such as Formby's low-gloss Tung Oil. I wipe a thin coat onto the entire box, including the insides, and let it dry 24 hours before applying another coat. Between the first two coats I rub down

the surface with 000 steel wool or 400-grit sandpaper. I finish with two to five coats, depending on how porous the wood is. After the finish has dried a few days, I polish the outside of the box with a lathe-mounted cotton buffing wheel. ▲



REMI VERCHOT turns wood at his home in southeastern France. **Mark Sfirri**, a professional wood-turner, also contributed to this article.

SPRAY BOOTH



The author's cardboard booth sets up in minutes in front of a window, and is ideal for spraying small work with water-based finishes. A fan placed in the window pulls spray fumes outside.

Finish small projects in a booth you can build for under \$20

by Michael Dresdner

BENCHTOP

Commercially built spray-finishing booths cost thousands of dollars, and they're usually worth the investment. Outfitted with air filtration, explosion-proof fans, and high-tech features, these finishing rooms guarantee the safe, controlled environment that full-time spray finishing requires.

But where does this leave the rest of us? Even for a small-shop woodworker, a spray booth is essential if you want to spray finishes. In this article, I'll show you a collapsible benchtop booth based on a simple box fan. There is one important warning, though: This booth is designed *only* for spraying nonflammable materials, such as waterborne coatings. Do not use it for solvent-based finishes!

How It Works

No matter how well you aim the spray gun at the wood, a certain amount of finish escapes as airborne mist called overspray. This cloud of fumes can settle on everything in the shop, smell bad, and stick to your newly applied finish, leaving it rough as sandpa-

per. A well-designed spray booth will capture the overspray and direct it out of the building, away from you and your work.

In its simplest form, a spray booth is an air funnel. You stand at the large end spraying into the funnel; a fan at the small end draws "dirty" air out. Clean air should come in as straight a line as possible past you, and continue past the work being sprayed. There it becomes "dirty" with overspray and fumes before it continues out of the room. When the booth works correctly, you are always in the path of (and breathing) clean air. Air laden with fumes and mist is headed straight out of the building. A filter in front of the fan protects it from finish buildup.

My booth consists of a cardboard-shrouded fan sitting in the open window of my shop just above the bench. I turned the fan on its side so I can reach the speed-control dial easily. Cardboard taped to the benchtop keeps the surface clean while I spray. Once I'm finished, I remove the fan, fold the shroud up flat at its two duct-tape "hinges," and close the window. The whole unit stores below the bench and sets back up in under two minutes.

Building the Booth

For the small benchtop booth in the photo, I bought an inexpensive (\$14) 20-in. box fan with three speeds. The "shroud" that forms the funnel is made from pieces of corrugated cardboard and some duct tape. The filter is a \$1 furnace filter (available at home centers) secured with removable masking tape. When it gets gummy and clogged with accumulated finish, you simply replace it. Including the trip to the store, I spent less than \$20 and two hours on the whole project, and it works like a charm.

Start with three pieces of corrugated cardboard about 18 in. wide. You'll need two sides about 3 ft. long and a top about 4 ft. long. Lay out the parts as shown in the bottom drawing, then cut them to size. I used a protractor to lay out one 120° angle, cut out that piece, then used the cut piece to lay out the angles on the remaining pieces. If your fan is smaller or larger than 20 in., alter the dimensions to suit as shown in the drawing.

With the parts cut and laid flat on the benchtop, match up the mitered angles as shown in the drawing, and tape all three pieces together with duct tape. Make sure to tape both sides of each joint. Now stand the assembly upright and secure the filter to the inside of the shroud with masking tape and you have your booth.

On my booth, the sides extend below the fan so that they meet the top of my bench. To protect the wall at the rear of my bench from overspray, I taped an additional panel of cardboard between the two sides of the booth. Set your booth up whatever way is most convenient for your work area.

One Final Accessory

A useful accessory to your spray booth is a small turntable. (See photo.) With a turntable, you can turn whatever you're spraying so that a new side faces you, while still aiming the spray at the fan.

Make your turntable with lazy-Susan hardware and some plywood, or buy a small commercial turntable from an art supply store. ▲

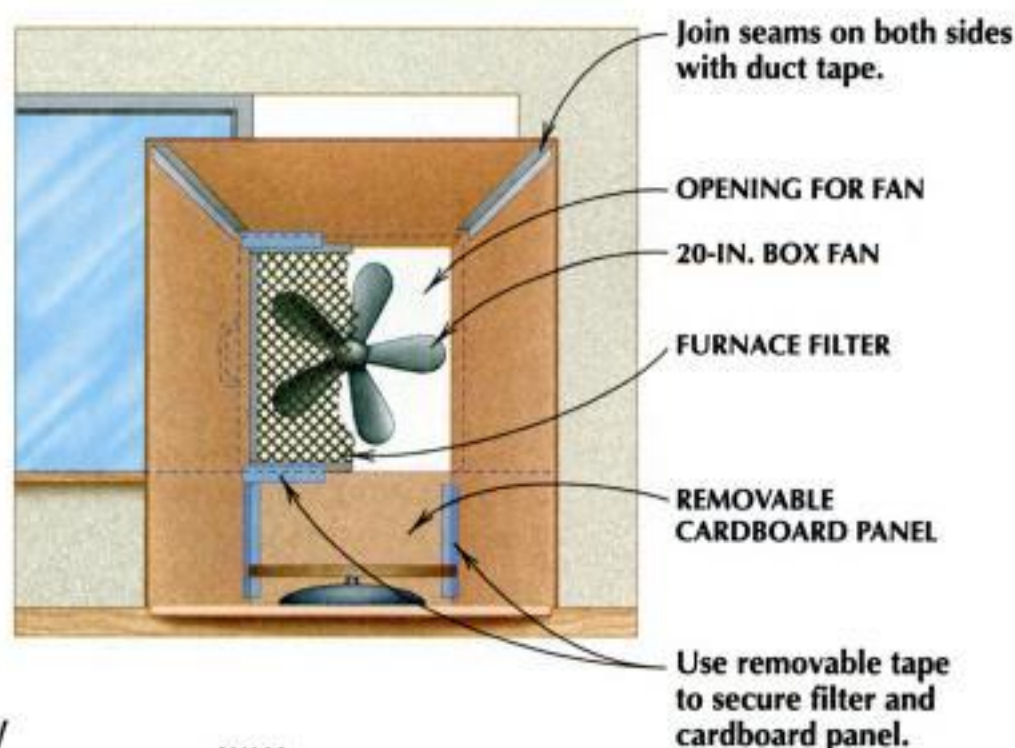


MICHAEL DRESDNER
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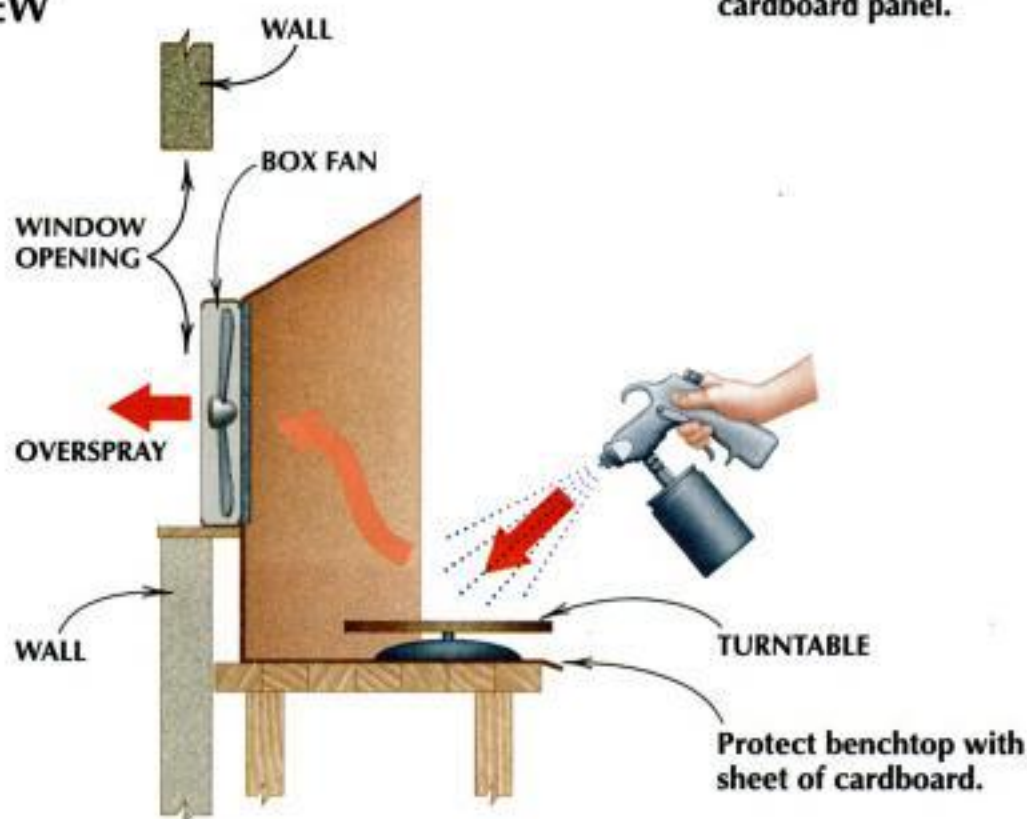
WINDOW BOOTH

Designed for use with waterborne finishes, this spray booth captures overspray effectively and sends it out the window. A fan behind the cardboard shroud exhausts finishing fumes through an open window, keeping the work and the shop free from overspray. A fourth, removable panel protects the wall. When you're done spraying, simply stow the booth by folding it flat.

FRONT VIEW

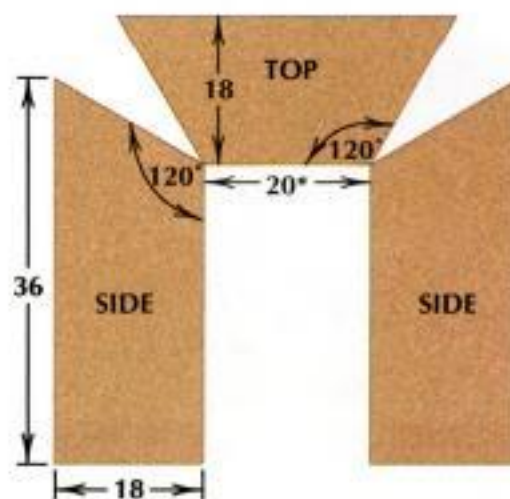


SIDE VIEW



BOOTH PARTS

Use corrugated cardboard.



*Or to suit width of fan.

Curved-Top Toolbox

Build a treasure chest for your favorite tools

by Pat Curci

Function and beauty. The author's cherry tool tote features a coopered lid, a locking handle, pull-out drawers, and marquetry.



Inside secrets. Swing the handle down to access the dove-tailed drawers and open the lid. Beneath the lid is a deep tool till for tall cargo.

A joiner's toolbox was your calling card in the days when horsepower referred to the animal kingdom—not machines. Today, we have a glut of power tools to serve our every need, yet we still rely on hand tools for some of our most exacting work. And as in days past, these precious tools deserve a fitting abode.

I've built two of these curved-top toolboxes, one for myself and one for a woodworker friend. The curved, or coopered, top is easy to build, thanks to several jigs that I use. Both boxes were tailored to specific hand-tool collections. Decide what you'd like to store before building your own box. You can increase its height (one of mine has three tiers of drawers instead of the two shown here), but I advise that you stay within an inch or two of the lengths and widths shown.

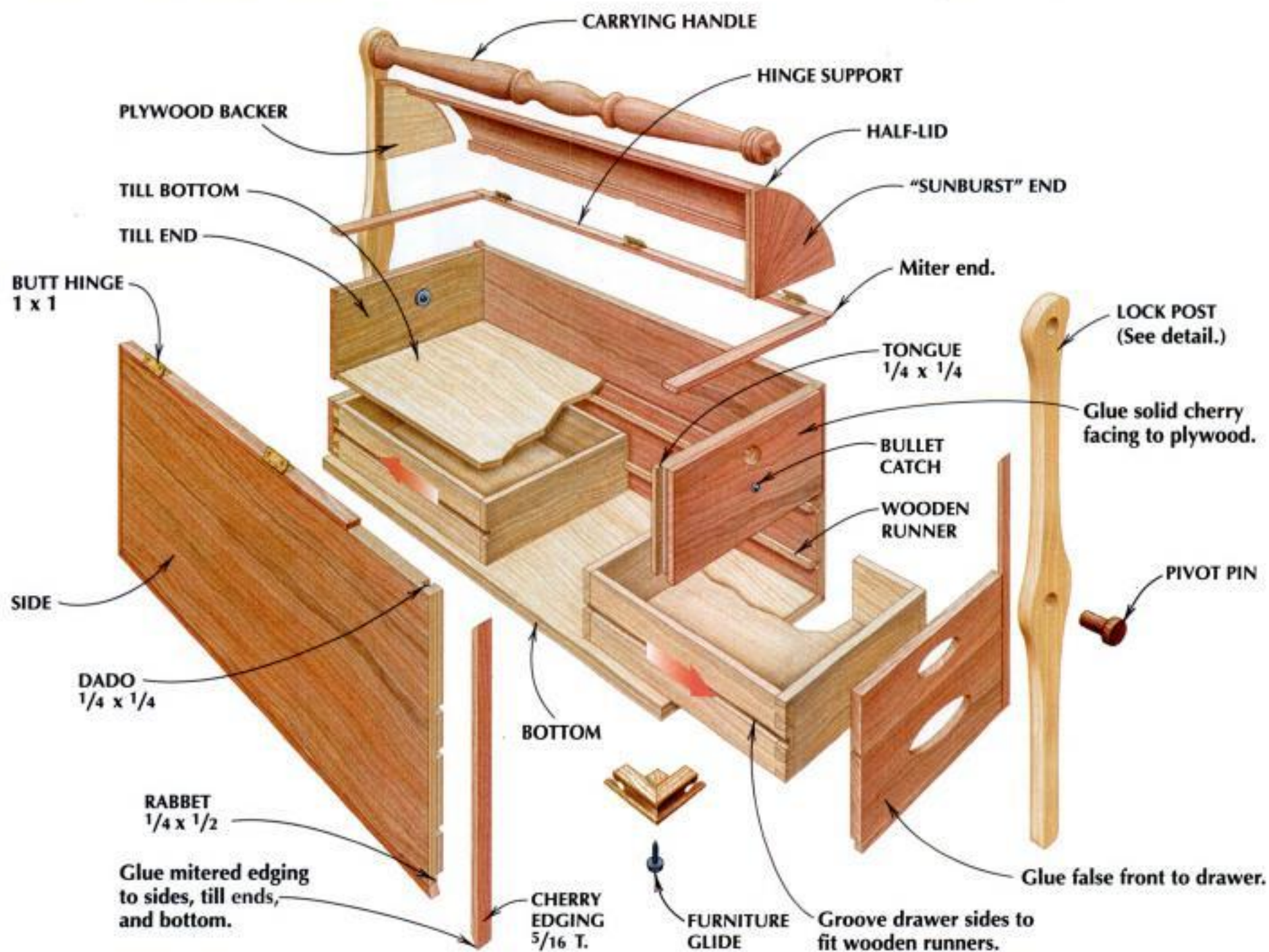
The casework in my box is hardwood plywood, which keeps it light but strong. Choose your favorite hardwood to trim the plywood edges and to make the drawers and the curved lid.

Begin with the Case

I used 1/4-in. and 1/2-in.-thick plywood for the case parts: the sides, bottom, till bottom, and till ends. (See Figs. 1 and 2.) Before cutting the case joints, glue solid wood edging to the

FIG. 1: TOOLBOX

The case is built from cherry plywood edged and faced (on the till ends only) with solid cherry. Two coopered lids form the top. The carrying handle is turned from laminated strips of cherry and maple. In the "up" position, the handle and its lock post prevent the drawers from opening. Pivot the handle down to open the coopered lids and access the drawers from either end of the box.



plywood as shown in Fig. 1. Trim the edging flush to the plywood with a hand plane and scraper.

If you want to add marquetry inlay to the sides of the case as I did, I suggest you prepare the marquetry veneer panel and apply it before edging the sides. (For more on marquetry, see AW #52.)

Once you've edged the plywood parts, use the tablesaw or the router table to cut the dados, rabbets, and grooves. Then glue and assemble the case, taking care to keep the parts square as you glue up the assembly.

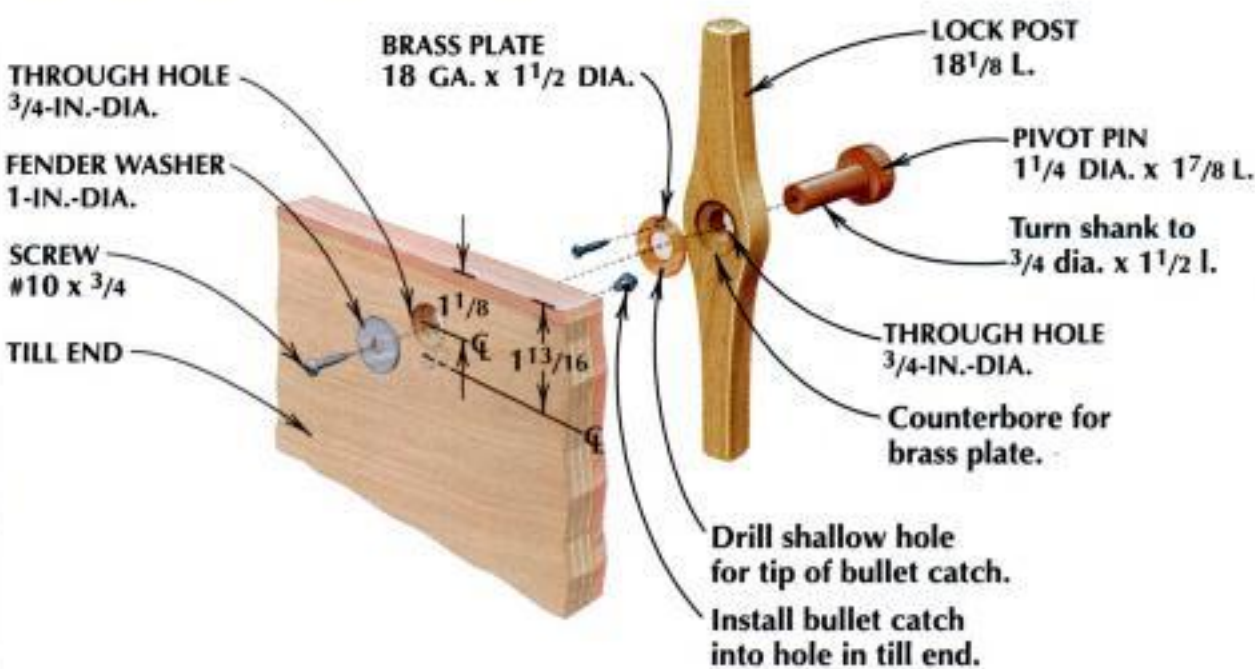
I made bracket feet for my case from leftover maple. (See Figs. 1 and 2.)

Make the Drawers

Each drawer in this toolbox is unusual in that it consists of a single box made from solid wood with an applied, or

LOCK POST AND CATCH DETAIL

Turn the pivot pin to the dimensions shown for each end of the toolbox. Then drill a hole through the toolbox's till end and through the lock post. Assemble the catch as shown.



Coopering the Lid

The coopered lid gives my toolbox its distinctive appearance and provides a functional bonus. With its high, curving lid, the till below it will easily hold tall items such as planes.

Coopering is essentially the art of fitting together boards, or staves, that are beveled along their edges to form a curve. (For more on coopering, see AW #67.) In my toolbox, the coopered lid is really two half-lids. (See Fig. 1.)

Begin construction with the sunburst ends. There are four ends, two for each half-lid. Each end consists of a plywood quarter-circle, onto which you laminate nine tapered pieces of cherry. To provide a solid-wood look to the finished end, I edged the plywood with strips of solid cherry. I bandsawed the plywood $\frac{1}{16}$ in. over the finished radius of $4\frac{1}{16}$ in., then routed the end to final size with a template and a pattern-cutting bit. (See Fig. 2.)

Next, I cut the $\frac{5}{16}$ -in.-thick, tapered cherry pieces that make up the sunburst pattern. You can saw out the pieces on the bandsaw and clean them up with a plane if you prefer, but I like the precise, clean cut that my radial-arm saw affords. Each piece has a 5° taper on each side, for a total angle of 10° . (See Fig. 2.) I used a jig clamped to my saw's table to hold the stock at the correct angle. (See top photo, right.) The left side of the jig has a fence at a 5° angle; the right side has a fence at 10° . I cut individual pieces by ripping one side of the stock using the left fence, then ripping the opposite side with the stock against the right fence.

Once you've tapered the cherry pieces, you're ready to create the sunburst pattern, and glue a plywood end on top of each sunburst. To ensure proper alignment of all the tapered pieces, I constructed a simple plywood jig. (See center photo, right.)

Next, I applied glue to the plywood ends and placed the ends over the tapered pieces. The pieces should extend beyond the plywood by about $\frac{3}{8}$ in. or more, creating a rabbet for the coopered top. You'll trim excess rabbet material later. A heavy weight placed over the plywood ends provides sufficient clamping power. (See bottom photo, right.)

Now you're ready to cooper the lids. Each coopered half-lid consists of nine $\frac{5}{16}$ -in.-thick staves, for a total of 18 staves. (See Fig. 2.) Each stave is beveled on both edges, and then the

MAKING THE SUNBURST ENDS



Two-sided taper. Curci rips the tapered pieces using the radial-arm saw and a plywood jig with angled fences. Rip the first taper with the stock against the left fence; rip the opposing taper using the right fence.



Assemble the sunburst. Right-angled fences align the tapered pieces on this shop-made jig. Hold the pieces tightly together by tapping a brad into the jig at the end of each piece.



Glue the plywood to the sunburst. Butt the plywood ends against the jig's fences and on top of the tapered pieces. A heavy weight does an excellent clamping job.

nine staves are glued together edge-to-edge to form a half-lid.

The first order of business is to rip all the staves on the tablesaw. To maintain a continuous grain pattern on the finished top, I ripped my staves from two wide, $\frac{5}{16}$ -in.-thick cherry boards, one board for each half-lid. Mark the boards with a large "V," then rip them into individual strips about $\frac{1}{16}$ in. wider than the finished stave width. Later, during glue-up, you can use the marks to help you assemble the staves in the correct order. To accurately bevel the edges of the staves, I rely on a sled jig that holds each stave securely while I push it past the blade. (See left photo, page 80.)

Gluing up the staves is next. To simplify glue-up, I made a curved plywood cradle that helps align the staves and direct clamping pressure. (See middle photo, page 80.) The key to making the

jig is to construct its curved surface to the inside radius of the coopered top, in this case $4\frac{1}{16}$ in. A plywood spine down the center of the jig with plywood ribs on each side lets me glue up two lids in one shot. Glue and nail each end rib just shy of the interior length of the lid to allow for gluing the sunburst ends to the coopered top.

It's wise to make a dry run before gluing any assembly together. Once you've tested your clamping procedure, apply glue along the edges of all nine staves, except for the two outermost edges. Place the staves edge-to-edge in the cradle. Then spread glue in the rabbets on the sunburst ends, and position these pieces against each end rib and under the staves. Now draw the staves together with band clamps, and pull the sunburst ends to the staves with a couple of quick clamps. Paper under the band clamps will

prevent glue from sticking to the band fabric. (See middle photo, page 80.)

Once the glue has dried, remove the clamps and plane the curve true. (See right photo, page 80.) I leave the inside of the lid faceted, and simply scrape away any glue squeeze-out or slight misalignment.

The last step to building the lids is to glue and clamp a $\frac{5}{16}$ -in.-thick hinge support with a 5° bevel along the bottom edge of each half-lid. (See Figs. 1 and 2.) With the support strips in place, you can mortise the top of the case and the bottom of the lids for the butt hinges that hold the lids to the case.

Make the Locking Handle

The carrying handle makes my toolbox portable, and locking posts secure the drawers during transport. When the handle is above the lid, a catch secures the posts over the drawers, preventing the drawers from accidentally spilling open. To access the contents of the box, you simply pivot the handle down to one side. (See bottom photo, page 78.)

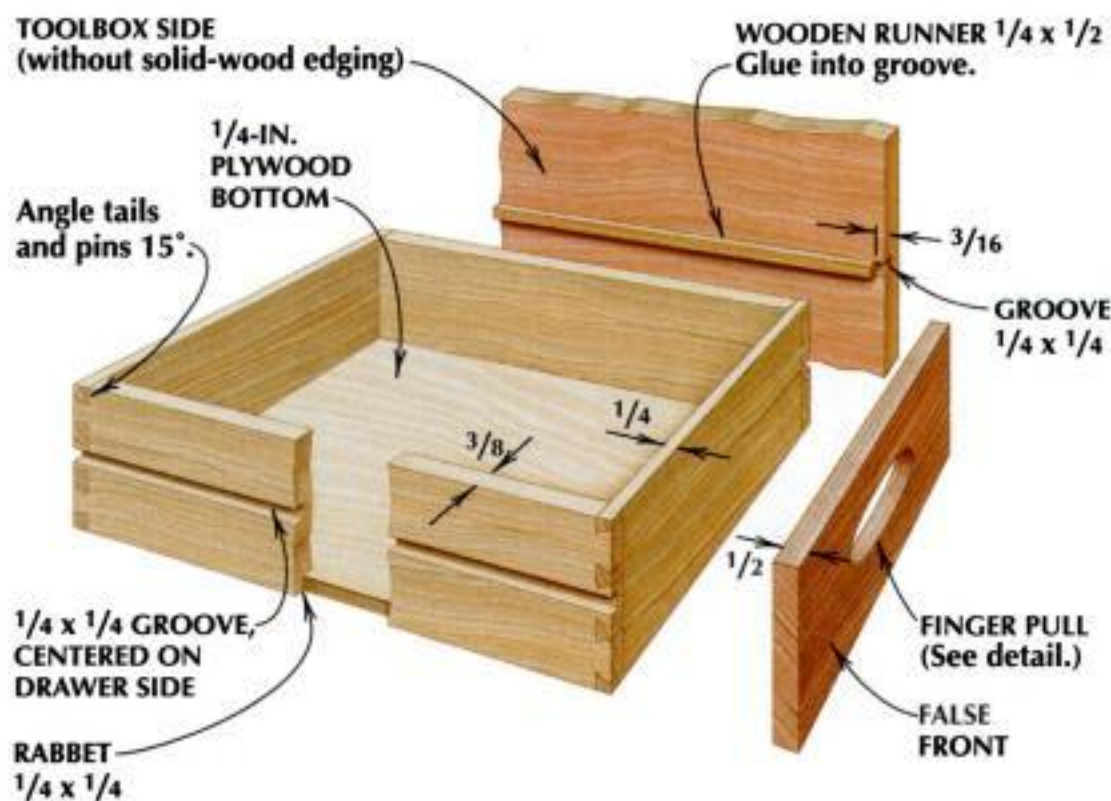
I turned the handle from a laminated blank of cherry and maple. Tenons on each end of the handle fit into holes drilled in the posts. Establish the shoulder-to-shoulder distance between the tenons by measuring the length of the toolbox and adding $\frac{1}{8}$ in. (See Fig. 2.) Before gluing the handle to the posts, drill and countersink each post for the catch hardware. (See Fig. 1 detail.) Then glue up the assembly, taking care to align the handle square to the posts.

Once the glue dries, position the handle assembly over the case and shim it in place. Mark through the holes in the posts for the holes in the case. Then drill the case holes, turn the two pivot pins, and assemble the hardware. After assembly, the bullet catches should click into the shallow holes in the brass plates as the posts are brought to vertical.

To protect the case and bring out the depth of the wood grain, I used a Danish oil on all the parts. Three coats wiped on left a glow that future generations will appreciate. ▲

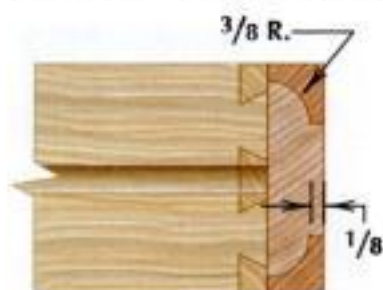
FIG. 3: DRAWER DETAIL

Assemble the drawer box as shown, then groove the sides to accept the wooden runners in the toolbox sides. Complete the drawers by gluing the false fronts to the drawer boxes.



FINGER PULL DETAIL

Saw or rout an elliptical cutout in the false front, then rout the back side of the cutout with a piloted, $\frac{3}{8}$ -in. cove bit.

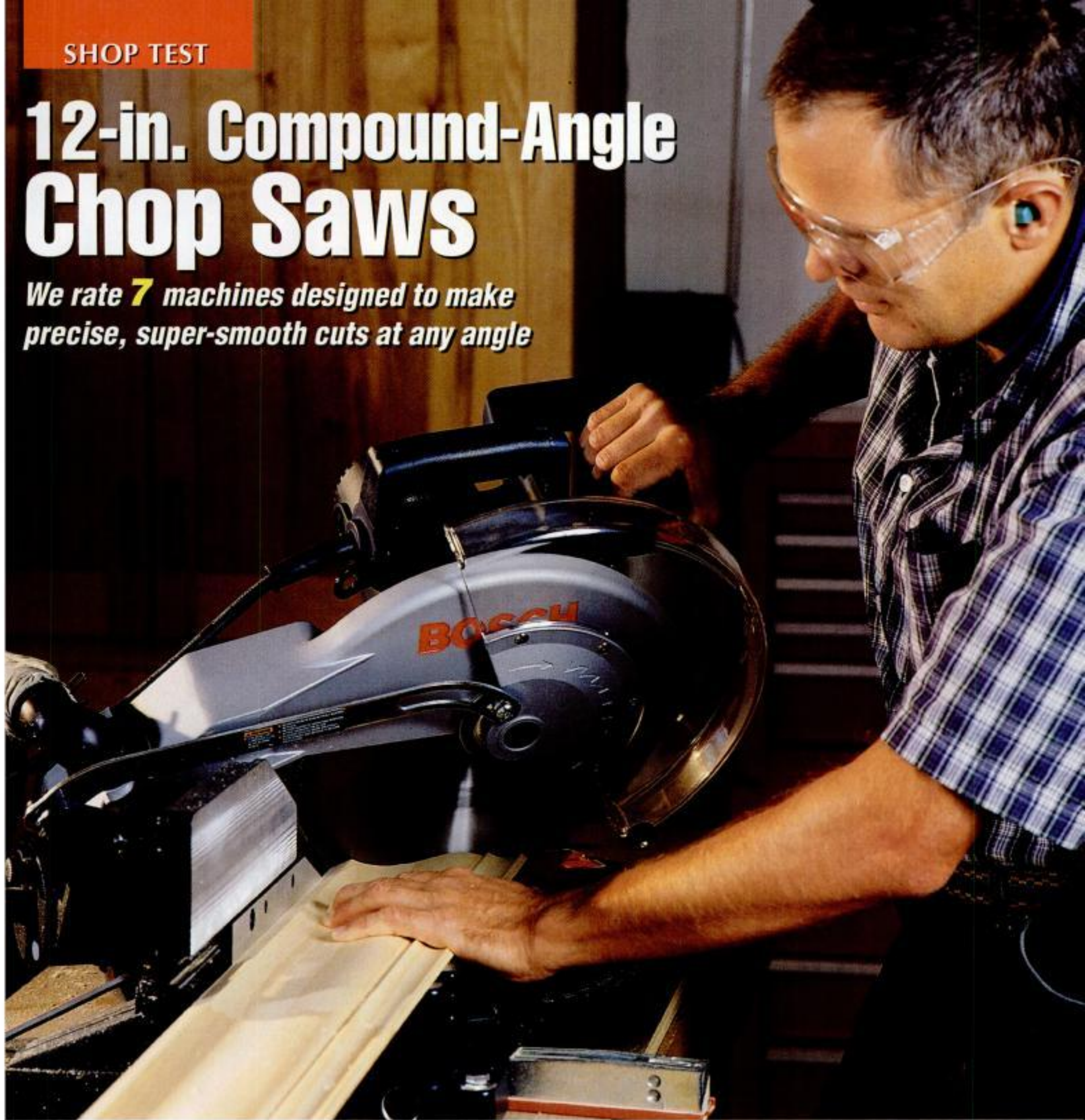


PAT CURCI

is a custom furniture maker in San Diego. He teaches woodworking at Palomar College in southern California.

12-in. Compound-Angle Chop Saws

*We rate **7** machines designed to make precise, super-smooth cuts at any angle*



Big capacity. A 12-in.-dia. blade earns these saws the big-boy reputation among chop saws, with the ability to cut thicker and wider stock than their smaller brothers.

Who says you need to lay out lots of cash to make super-smooth cutoffs at just about any angle? The seven compound-angle chop saws in this Shop Test get this work done for \$269 to \$370—quite a bit less than you'd pay for a typical sliding compound saw. And thanks to their 12-in.-dia. blades, these saws have impressive cutting capacities. Every saw we tested can cut a piece of 2½-in. by 7⅞-in. stock at 90° and make a 45° miter in a 2½-in. by 5¼-in. board. They can cut even thicker stock if it's not as wide: 3⅞ by 5⅞ at 90° miter, and 3⅞ by 4⅞ at 45° miter. Capacity specifications are listed in the chart.

Text continued on page 86. ▶

CHOP SAWS

Model	Street Price	RATINGS			OVERALL RATING	SPECIFICATIONS					Net Weight (lb.)
		Miter Adj.	Bevel Adj.	Ease of Use - Fence		Miter Cut Range L, R (")	CAPACITIES				
					1 2 3 4 5		Crosscut at 0° T x W	Miter @ 45° T x W	Bevel @ 45° T x W		
BOSCH 3912 (800) 815-8665	\$319	4.5	4	4		52, 52	2 1/2 x 7 7/8 3 7/8 x 5 7/8	2 1/2 x 5 1/2 3 7/8 x 4 1/8	1 3/4 x 7 7/8 2 3/4 x 5 7/8	45.4	
Price includes dust bag. Optional extensions (\$18), clamp kit (\$20), crown stop (\$20).											
PROS: Positive miter detents; auxiliary fence easy to adjust; safety button on switch good for left- or right-handed operation; vernier scale on miter cursor; bevel detent pin for crown molding. CONS: Bevel scale difficult to read.											
CRAFTSMAN 23514 Available at Sears.	\$309	4.5	4.5	3.5		45, 45	2 1/2 x 7 7/8 3 7/8 x 5 7/8	2 1/2 x 5 1/4 3 7/8 x 4 1/8	1 3/4 x 7 7/8 2 3/4 x 5 7/8	41.3	
Optional dust bag (\$12), extensions (\$18), clamp kit (\$20).											
PROS: Two bevel scales make easier reading from any position; easy-to-read miter scale; positive miter detents; best safety button on a pistol-grip handle; fastest electronic brake. CONS: No auxiliary fence; no vernier scale on miter cursor; pistol-grip handle.											
DELTA SIDEKICK 36-235 (800) 438-2486	\$310	3	4	4		47, 47	2 1/2 x 8 3 1/2 x 7	2 1/2 x 5 3/4 3 1/2 x 5 1/4	1 3/8 x 8 3 3/4 x 4 3/8	50.3	
Price includes dust bag, work clamp.											
PROS: Long auxiliary fence; widest foot for good stability; best dust collection; auxiliary fence easy to adjust; easy-to-read miter scale; vernier on miter cursor. CONS: Miter adjustment stiff, detents difficult to locate; turntable lever pinches fingers when adjusting miter beyond 45°; bevel scale difficult to read; no safety button on switch.											
DEWALT DW705 (800) 433-9258	\$350	4.5	4.5	4		48, 48 48, 3	2 1/2 x 7 7/8 3 7/8 x 5 7/8	2 1/2 x 5 1/2 3 7/8 x 4 1/8	1 3/4 x 7 7/8 2 3/4 x 5 7/8	45.4	
Optional dust bag (\$15), extensions (\$30), horizontal clamp (\$35), length stop (\$25), crown stop (\$30).											
PROS: Best vernier cursor for micro miter adjustments; positive miter detents; easy-to-read miter scale; auxiliary fence easy to adjust; very good horizontal work clamp; great variety of optional accessories. CONS: No holes for mounting wooden subfence; auxiliary fence adjustment requires loosening two lock knobs; no vertical work clamp; no safety button on switch.											
MAKITA LS1220 (800) 462-5482	\$370	5	5	4.5		48, 48	2 1/2 x 8 3 7/8 x 6	2 1/2 x 5 5/8 3 7/8 x 4 1/4	1 3/4 x 7 7/8 2 3/4 x 5 7/8	39.2	
Price includes dust bag. Optional vertical clamp (\$30); horizontal clamp (\$69); extensions (\$31); work stop, crown stops (\$49).											
PROS: Best bevel lock lever; auxiliary fence easiest to adjust, no lock knobs necessary; soft-start motor; excellent miter detents and miter table adjustments, easiest to micro-adjust; excellent fit and finish; vertical work clamp best in test; quick-release horizontal work clamp best in test. CONS: Wooden subfence difficult to mount; no vernier scale on miter cursor.											
PRO-TECH CS 72121 (800) 888-6603	\$300	3	3	2.5		49, 49	2 1/2 x 7 7/8 3 7/8 x 5 7/8	2 1/2 x 5 1/2 3 7/8 x 4 1/8	1 3/4 x 7 7/8 2 3/4 x 5 7/8	47.2	
Price includes dust bag, work clamp. Optional extensions (\$30), length stop (\$8).											
PROS: Quick-release, two-way (horizontal and vertical) work clamp; easiest access to blade arbor bolt; fence perfectly straight and square to blade; vernier scale on miter cursor. CONS: Pistol grip handle; switch and safety lock button hard to operate; miter adjustment stiff and difficult to micro-adjust; miter cursor too wide; bevel movement very stiff; auxiliary fence cumbersome to reposition; no holes for mounting wooden subfence on left side; blade guard design spews dust on operator.											
TRADESMAN 8338 (800) 243-5114	\$269	2.5	3	3		48, 48	2 1/2 x 7 7/8 3 7/8 x 5 7/8	2 1/2 x 5 1/2 3 7/8 x 4 1/8	1 3/4 x 7 7/8 2 3/4 x 5 7/8	44.5	
Price includes dust bag, extensions, work clamp.											
PROS: Bevel detent pin for crown molding; large, flat table provides good workpiece support. CONS: Miter adjustment shifts slightly when tightening lock knob; pistol grip handle; bevel scale difficult to read; no vernier scale on miter cursor; auxiliary fence cumbersome to reposition; arbor lock may slip when changing blades.											

KEY TO THE RATINGS: 5=excellent, 4=very good, 3=good, 2=fair, 1=poor.



BOSCH 3912



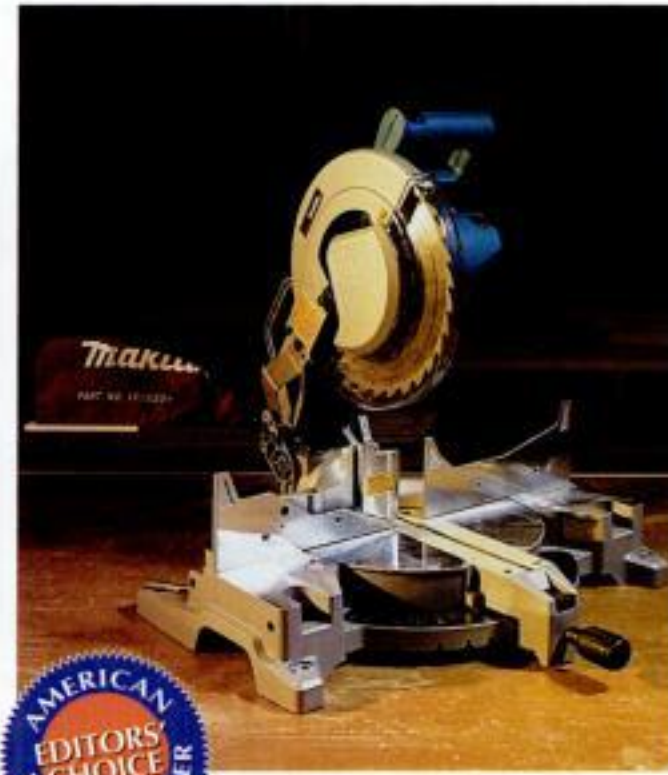
CRAFTSMAN 23514



DELTA SIDEKICK 36-235



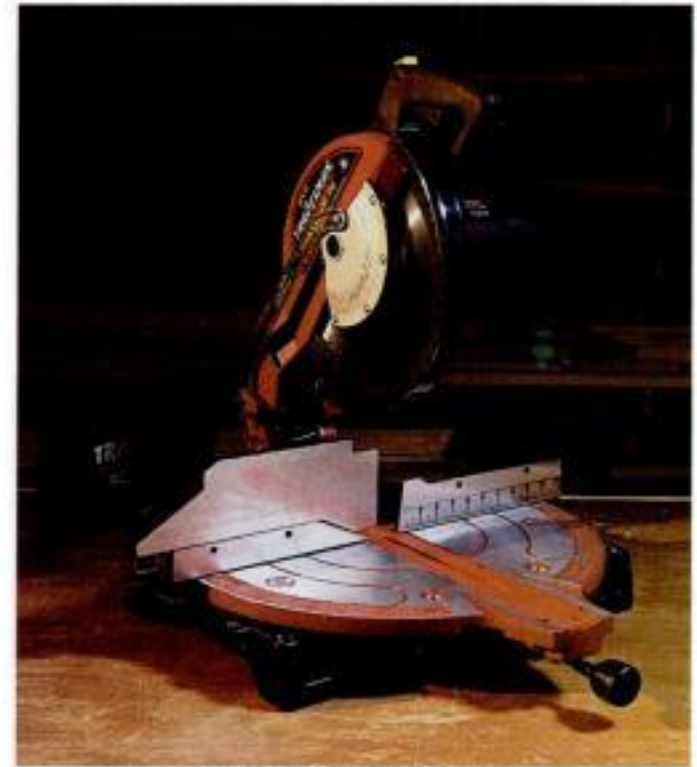
DEWALT DW705



MAKITA LS1220

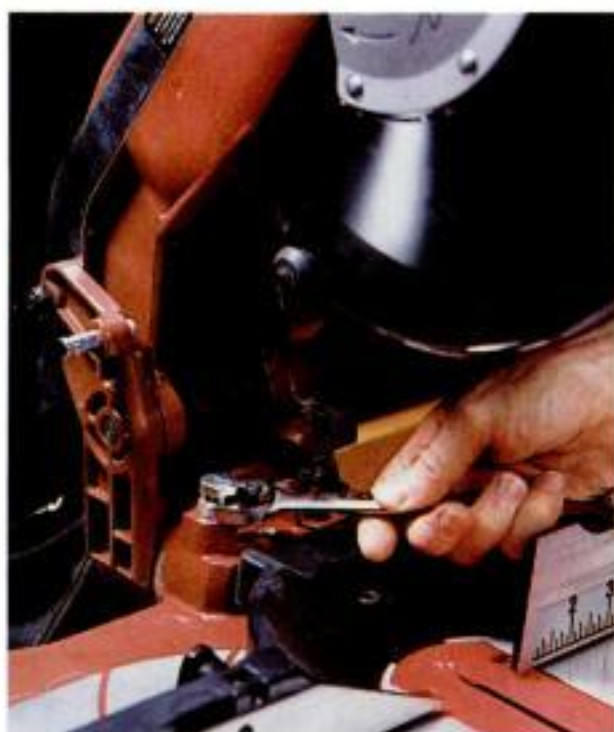


PRO-TECH CS 72121



TRADESMAN 8338

FAVORITE FEATURES



Setting bevel stops accurately is a snap with large, up-front, and easy-to-reach adjustment screws and lock nuts, such as those shown here on the Tradesman.



No locks, knobs, or levers. Makita's auxiliary fence is both simple and effective—to change from straight cut to bevel, you just rotate the auxiliary fence left or right about a pivot screw.



Best for bevels. You have to reach behind the saw to get to the bevel lock levers on all the saws, but Makita's lever is the most accessible and easiest on the fingers.

Light weight and compact size are other important attributes in this test group. The most totable saws in our test, the Makita (39.2 lb.) and Craftsman (41.3 lb.), are truly easy to transport from your shop to a jobsite.

What's Important

To evaluate the seven saws in our test group, we made all kinds of cuts in all kinds of wood, including molding, hardwood, softwood, particleboard, and plywood. Straight out of the box, the Makita produced the smoothest cuts with its 32-tooth standard blade. The DeWalt scored a close second. When we fitted each saw with a premium-quality Freud chop saw blade (LU85M012, about \$125) we found that they all produced satin-smooth cuts. And all of the saws had plenty of power.

Fences—We examined the fences and tables on each saw to find out if they were straight and square to the blade. The Makita and Bosch fences required some adjustment to be brought into square. The good news is that none of the saws were out of

alignment enough to affect accuracy—straight, miter, and bevel cuts came out right on the money.

All the miter saws we tested feature an auxiliary fence attached to the main fence and designed to provide extra stock support near the blade for 90° cuts. However, auxiliary fences get in the way of the cutting head when they're tilted for bevel cuts, so they're designed to swing, slide, or be repositioned to provide clearance. Makita's auxiliary fence is the easiest to move—simply swing it over with one hand. The Bosch, DeWalt, and Delta auxiliary fences require loosening knobs or levers but were still easy to use. The other auxiliary fences were more cumbersome to move.

Blade changing—Changing the blade on these saws is straightforward but awkward—you could use three hands to push the arbor lock button, hold the guard up, and twist the blade wrench all at once. Changing the blade takes three or four minutes after you get the hang of it.

Handles—After shaking hands with these saws for a few days, we preferred

the ones that have horizontal "D" handles for comfort and ease of use. The Pro-Tech, Tradesman, and Craftsman saws sport pistol-grip-style handles that were more awkward to grip. The switch safety button on these saws was also more difficult to operate.

Miter and bevel adjustments—All the saws have a rotating table that you can swing at least 45° right or left for miter cuts. Most of the saws we tested will rotate a few degrees beyond 45. (See chart.) The Makita saw sets the standard for ease of use and adjustability with a table that swings very smoothly. The Craftsman and DeWalt were runners-up.

All the saws have detents—stops that represent common miter angles (0°, 15°, 22.5°, 31.62° and 45°). The detents on the Makita, DeWalt, Bosch, and Craftsman models locked into place more positively than the others. To help you set angles at a fraction of a degree ($\frac{1}{2}^\circ$ or $\frac{1}{4}^\circ$), all the saws except the Craftsman, the Makita, and the Tradesman include a vernier scale. (See left photo, opposite page.)

Sometimes you need to set an angle

BEST IN TEST

BEST FIT AND FINISH: Makita **BEST MITER ADJUSTMENT: Makita** **BEST BEVEL ADJUSTMENT: Makita**



Splitting degrees. Vernier scales, such as this one on the cursor window of the DeWalt saw, are designed to help you set the miter angle on exactly $1/2^\circ$ or $1/4^\circ$ increments.



Accessories. It's worth equipping your saw with a full menu of accessories, such as the dust bag, work extensions with stop, and work clamp, shown here on the DeWalt saw.



Best work clamp. Makita's work clamp outperforms the others by letting you clamp wood closer to the blade, for more accuracy and increased safety with short boards.

just a hair off one of the detents. The Makita's smooth-moving table will let you perform this "micro-adjusting" easily, and the setting stays put when you tighten the miter lock knob. When we micro-adjusted most of the other saws, the miter table had a tendency to "slip" into the detent, making tiny degree increments difficult to set. This tendency was most noticeable on the Delta, because its turntable movement is very stiff.

All the saws tilt to the left at least 45° for beveling, but they aren't equal when it comes to bevel locks and bevel scales. Makita's bevel lock lever is the most accessible and easy to use. (See right photo, opposite page.) The Craftsman saw's bevel scale was the winner by a mile—it's not only large and easy to read, but actually consists of two scales, so visibility from either the right or left side is ensured. Tradesman has stiff movement in bevel setting.

Dust collection—All of these saws spew clouds of dust. We were surprised to discover that most saws collected about 80% to 85% of the debris in their dust bags; the Delta was best

thanks to a rubber dust deflector behind the blade. The Pro-Tech was the exception in this area, collecting only about 50%—its blade guard design allowed a stream of dust to escape out the front. Dust bags are an extra-cost option on the DeWalt (\$15) and the Craftsman (\$12). Attaching a shop vacuum to the saws increased dust collection efficiency to about 95%.

Accessories

Accessories and add-on features can help you to make the most of your chop saw. To create a true chop saw workstation, you'll need a dedicated stand or bench, outboard extensions to support long stock, and work clamps with adjustable stops. You'll get a clamp along with your saw if you buy the Delta, Pro-Tech, or Tradesman saws—on the others, it's an extra-cost option. (See chart.) We liked the Makita's vertical work clamp best because it can clamp stock much closer to the blade. (See right photo, above.) Both the Makita and the DeWalt models offer an optional quick-release hori-

zontal clamp that holds stock against the fence instead of against the table. The Pro-Tech's clamp can be switched from horizontal to vertical duty. The Makita and DeWalt saws can accommodate the greatest range of accessories.

Recommendations

The competition is tight in this tool category, but we were able to single out some winning performers. Our Editors' Choice award for best performance regardless of price goes to the Makita. It's the lightest saw we tested, so it tops the list in portability—an important consideration if you're going to do both shop and jobsite work. But this saw also had excellent ratings for its miter and bevel adjustments, and its unique flip fence couldn't be easier to operate.

Our Best Buy award—best performance for the money—goes to the Craftsman saw. Only the Makita can beat it for portability, and we especially liked the smoothness and ease of its miter and bevel adjustments. A great buy for \$309. ▲

BEST BEVEL AND MITER SCALES: Craftsman **BEST DUST COLLECTION:** Delta **BEST AUXILIARY FENCE:** Makita

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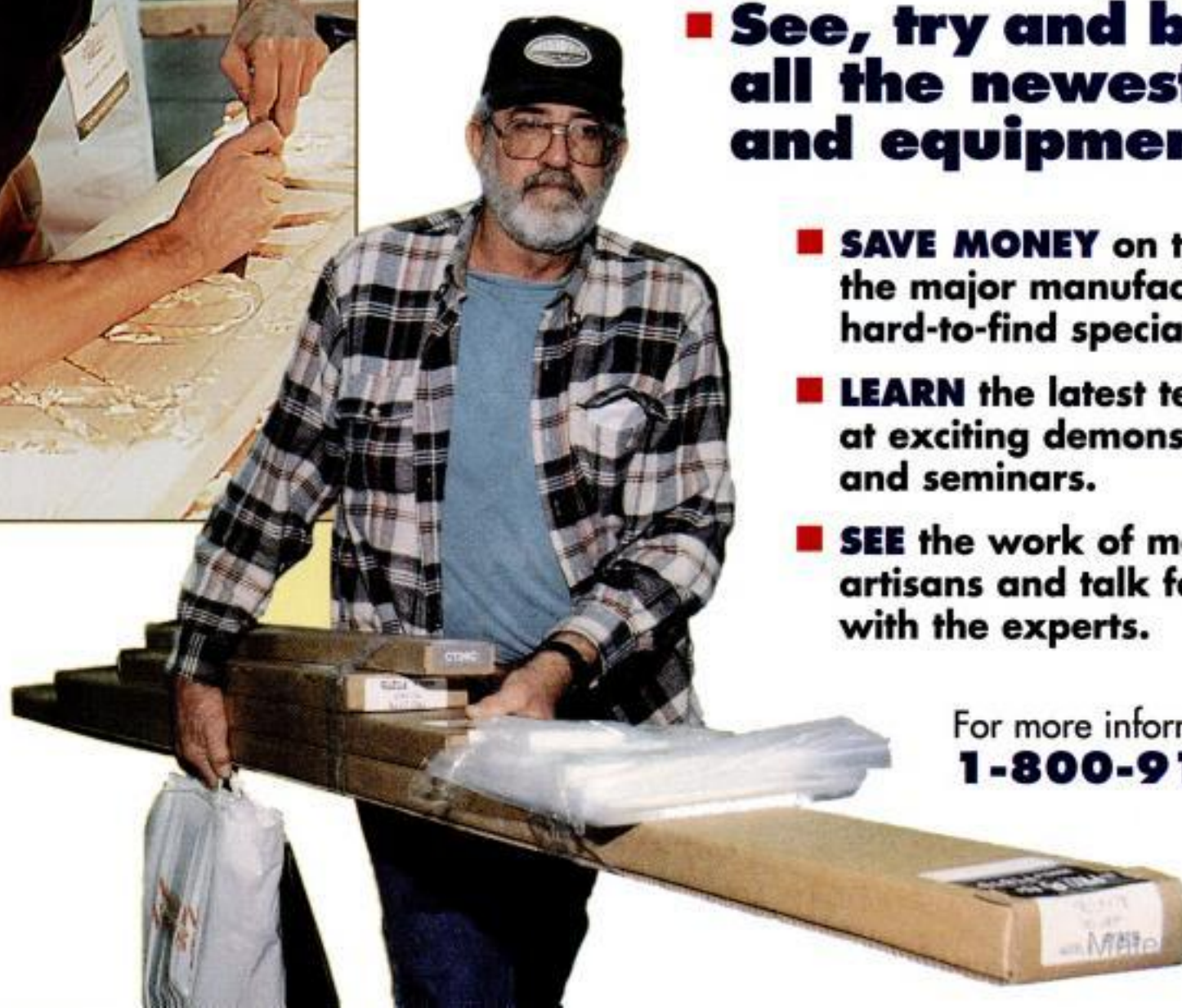
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About the presenter: Michael Dresdner is a contributor to *AMERICAN WOODWORKER* magazine. Michael writes our "Just Finishing" column and is the author of *The Woodfinishing Book* (Taunton Press, 1993).

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About the presenter: Sandor Nagyszalanczy is a furniture designer and the author of four books, with 18 years of woodworking experience and six years as an editor of *Fine Woodworking* magazine.

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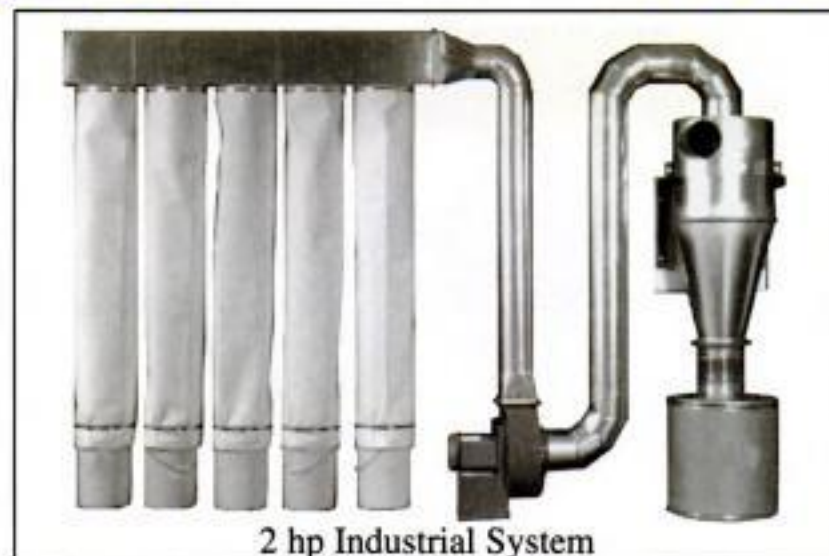


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Axel Pegs	\$5.20/100	
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6" Maple Spindles	\$26/100	
9" Maple Spindles	\$57/100	
3/8"x1-1/2" Spiral Pins	\$2.15/100	



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3/8"x36" Standard Dowels	\$35/100	
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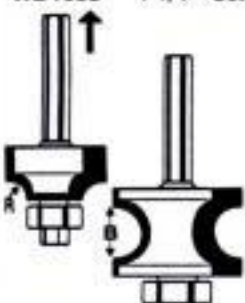
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Roundover Bits with Bearing

1/4" Shank	Radius	
WL-1040	1/16"	\$9.
WL-1041	1/8"	\$9.
WL-1042	3/16"	\$9.
WL-1043	1/4"	\$9.
WL-1044	5/16"	\$10.
WL-1045	3/8"	\$11.
WL-1046	1/2"	\$13.

1/2" Shank

WL-1049	1/8"	\$9.
WL-1042-5	3/16"	\$9.
WL-1050	1/4"	\$9.
WL-1044-5	5/16"	\$10.
WL-1051	3/8"	\$12.
WL-1052	1/2"	\$13.
WL-1053	5/8"	\$16.
WL-1054	3/4"	\$18.
WL-1055	7/8"	\$25.
WL-1056	1"	\$27.
WL-1057	1-1/8"	\$30.
WL-1058	1-1/4"	\$30.



Bullnose Bits with Bearing

1/4" Shank • Bead	Opening	
WL-1100	1/4"	\$12.
WL-1101	3/8"	\$14.
WL-1102	1/2"	\$16.
WL-1103	5/8"	\$18.
WL-1104	3/4"	\$19.
1/2" Shank		
WL-1110	1/4"	\$12.
WL-1111	3/8"	\$14.
WL-1112	1/2"	\$16.
WL-1113	5/8"	\$18.
WL-1114	3/4"	\$19.
WL-1115	1"	\$22.
WL-1116	1-1/8"	\$25.
WL-1117	1-1/4"	\$28.
WL-1118	1-1/2"	\$32.



Cove Bits

1/4" Shank • Radius	
WL-1159	1/8" \$10.
WL-1160	3/16" \$10.
WL-1161	1/4" \$11.
WL-1162	3/8" \$13.
WL-1163	1/2" \$14.

Cove Bits (continued) 1/2" Shank

WL-1169	1/8"	\$10.
WL-1170	1/4"	\$11.
WL-1171	3/8"	\$13.
WL-1172	1/2"	\$14.
WL-1173	5/8"	\$18.
WL-1174	3/4"	\$20.

Chamfer Bits

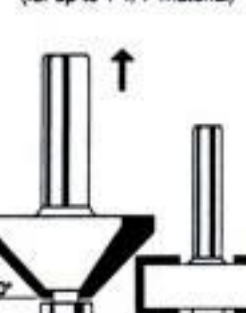
1/4" Shank • Degree	
WL-1180	15° \$10.
WL-1181	25° \$10.
WL-1182	45° \$12.
WL-1183	45° \$14.

(for up to 3/4" material)

1/2" Shank

WL-1184	45°	\$10.
WL-1185	11-1/2°	\$12.
WL-1186	15°	\$12.
WL-1187	22-1/2°	\$12.
WL-1188	30°	\$14.
WL-1189	45°	\$15.
WL-1190	45°	\$22.

(for up to 1-1/4" material)



Rabbeting Bits

Rabbeting Bits		
1/4" Shank • Kerf		
WL-1220	1/2"	\$11.
WL-1220-2	1/16"	\$10.
WL-1220-3	1/8"	\$10.
WL-1220-4	1/4"	\$10.
WL-1220-5	3/8"	\$10.
1/2" Shank		
WL-1225	1/2"	\$11.
WL-1225-2	1/16"	\$10.
WL-1225-3	1/8"	\$10.
WL-1225-4	1/4"	\$10.
WL-1225-5	3/8"	\$10.
WL-1225-6	3/4"	\$12.

Roman Ogee Bits

Roman Ogee Bits		
1/4" Shank • Radius		
WL-1230	5/32"	*13.
WL-1231	1/4"	*15.
1/2" Shank		
WL-1235	5/32"	*13.
WL-1236	1/4"	*15.

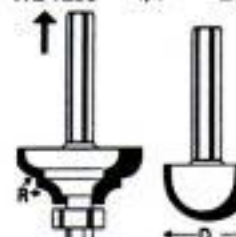
Double Roman Ogee

Double Roman Ogee		
1/4" Shank • Radius		
WL-1240	5/32"	*18.
WL-1241	1/4"	*20.
1/2" Shank		
WL-1245	5/32"	*18.
WL-1246	1/4"	*20.

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Classical Ogee Bits 1/4" Shank • Radius

WL-1250	5/32"	\$18.
WL-1251	1/4"	\$20.
1/2" Shank		
WL-1252	5/32"	\$18.
WL-1253	1/4"	\$20.

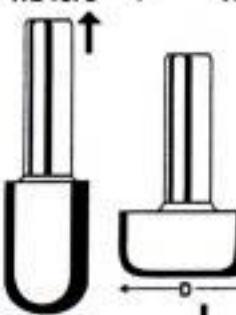


Core Box Bits

1/4" Shank • Diameter	
WL-1370	1/8" \$10.
WL-1371	1/4" \$8.
WL-1371-1	3/8" \$9.
WL-1372	1/2" \$10.
WL-1373	3/4" \$12.

Roundnose/Core Box

1/2" Shank • Diameter	
WL-1375	1/4" \$8.
WL-1375-1	3/8" \$11.
WL-1376	1/2" \$12.
WL-1377	3/4" \$14.
WL-1378	1" \$16.

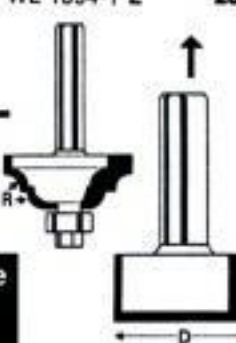


Bowl & Tray Cutter

Bowl & Tray Cutter		
1/4" Shank • Diameter		
WL-1380	7/16"	\$13
WL-1381	3/4"	\$15
1/2" Shank		
WL-1385	3/4"	\$15
WL-1386	1-1/4"	\$18

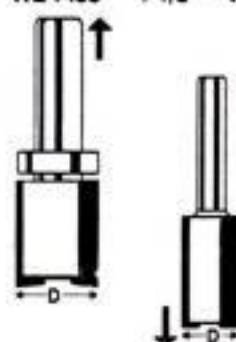
Dado & Planer Bit

Dado & Planer Bit		
1/4" Shank • Diameter		
WL-1390	3/4"	\$12.
1/2" Shank		
WL-1391	3/4"	\$12.
WL-1392	1"	\$14.
WL-1393	1-1/4"	\$15.
WL-1394	1-1/2"	\$16.
WL-1394-1	2"	\$28.



Pattern Cutting Bit 1/4" Shank • Diameter

WL-1400	1/2"	\$12.
WL-1401	5/8"	\$12.
WL-1402	3/4"	\$12.
1/2" Shank		
WL-1405	3/4"	\$15.
WL-1406	1-1/8"	\$16.



Straight Bits

1/4" Shank • Diameter	
WL-1001	1/8" \$10.
WL-1002	3/16" \$5.
WL-1002-5.5	5.5mm \$5.

(for undersized 1/4" plywood)

WL-1003	1/4"	\$5.
WL-1004	5/16"	\$5.
WL-1005	3/8"	\$5.
WL-1006	15/32"	\$5.

(for undersized 1/2" plywood)

WL-1007	1/2"	\$6.
WL-1008	9/16"	\$6.
WL-1009	5/8"	\$7.
WL-1010	23/32"	\$8.

(for undersized 3/4" plywood)

WL-1011	3/4"	\$9.
WL-1012	1"	\$10.
1/2" Shank		
WL-1020	15/64"	\$5.

(for undersized 1/4" plywood)

WL-1021	1/4"	\$5.
WL-1019	5/16"	\$5.
WL-1022	3/8"	\$5.
WL-1023	7/16"	\$5.
WL-1024	15/32"	\$5.

(for undersized 1/2" plywood)

WL-1025	1/2"	\$6.
WL-1027	5/8"	\$8.
WL-1028	23/32"	\$8.

(for undersized 3/4" plywood)

WL-1029	3/4"	\$9.
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Corner Lock Mitres

For up to 5/8" material	
WL-1420-2	1/4" shank \$25.
For 1/2" to 3/4" material	
WL-1420-1	1/2" shank \$30.
For material 3/4" to 1-1/4"	
WL-1420	1/2" shank \$38.

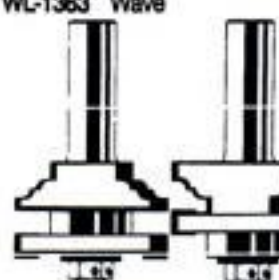
For the Shaper

Lock Mitre	WL-1581 \$40.
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Horizontal Panel Raiser with Undercutter • 1/2" Shank

WL-1346	Ogee	\$49.
WL-1347	Traditional	\$49.
WL-1348	Convex (Cove)	\$49.
WL-1359	12" Facecut with Quarter Round	\$49.
WL-1363	Wave	\$49.



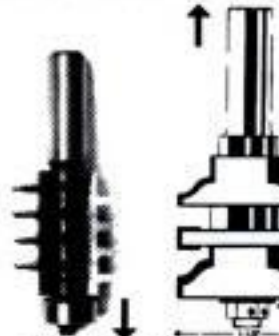
2-piece Rail & Stile Cutter Sets

1/2" Shank	Set	
WL-1360	Ogee Profile	\$59.
WL-1361	Roundover	\$59.
WL-1362	Cove & Bead	\$59.

1-piece Rail & Stile Cutter Sets

Just raise the cutter to make the matching cut. No changing or reversing.
1/2" Shank

WL-1365	Ogee Profile	\$49.
WL-1366	Roundover	\$49.
WL-1367	Cove & Bead	\$49.
WL-1368	Wedge	\$49.
WL-1374	Dbt Roundover	\$49.



Finger Joiner

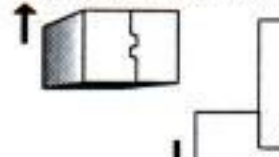
Router Bit	WL-1429 \$39.
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For the Shaper WL-1580 \$89.

Reversible Glue Joint

WL-1430	1-3/4" Diam	\$35.
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For the Shaper WL-1706 \$35.



Drawer Corner Lock

Makes drawer side separation virtually impossible
1/2" Shank
WL-1435 For 1/2" material \$30.

SHAPER CUTTERS 3/4" BORE

Corner Round		
WL-1509	1/8"	\$22.
WL-1510	1/4"	\$24.
WL-1511	3/8"	\$26.
WL-1512	1/2"	\$26.
WL-1513	3/4"	\$30.
WL-1514	1"	\$32.
WL-1515	1-1/4"	\$38.

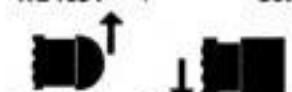


Bead

WL-1520	1/4"	\$24.
WL-1521	3/8"	\$26.
WL-1522	1/2"	\$26.
WL-1523	3/4"	\$28.
WL-1524	1"	\$30.

Flute

WL-1530	1/4"	\$24.
WL-1531	3/8"	\$26.
WL-1532	1/2"	\$26.
WL-1533	3/4"	\$28.
WL-1534	1"	\$30.



Rabbeting/Straight

WL-1540	1/4"	\$24.
WL-1541	3/8"	\$26.
WL-1542	1/2"	\$26.
WL-1543	3/4"	\$28.
WL-1544	1"	\$30.
WL-1545	1-1/2"	\$32.
WL-1546	2"	\$48.

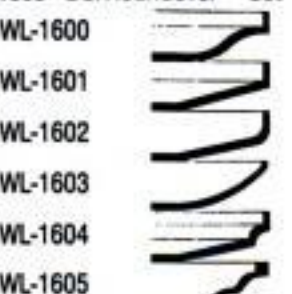


SHAPER CUTTERS 3/4" BORE

1-piece Rail & Stile

Just raise the cutter to make the matching cut. No changing or reversing.

WL-1500	Roman Ogee	\$89.
WL-1501	Roundover	\$89.
WL-1502	Cove & Bead	\$89.
WL-1503	Dbt Roundover	\$89.



Panel Raisers (Shaper Cutter)

3/4" Bore		
WL-1600	Ogee	\$59.
WL-1601	15° Facecut	\$59.
WL-1602	18° Traditional	\$59.
WL-1603	Convex (Cove)	\$59.
WL-1604	12° Facecut with Quarter Round	\$59.
WL-1605	Wave	\$59.

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GROWING REGION: Caribbean Islands, Mexico, Central America, Colombia, and Venezuela

SPECIFIC GRAVITY: 1.05 to 1.12

DENSITY: 80 to 84 lb. per cu. ft.

WOOD MOVEMENT¹

Tangential (flatsawn): medium (less than $\frac{3}{8}$ in. per ft.)

Radial (quartersawn): small (less than $\frac{1}{4}$ in. per ft.)

DURABILITY: Very resistant to decay and insect attack

SUSTAINABILITY: Endangered, subject to export restrictions

AVAILABILITY: Specialty lumber dealers

SIZE: Thicknesses: $\frac{4}{4}$ through $\frac{16}{4}$
Widths: 2 to 5 in. Lengths: 1 to 3 ft.

COST: Lumber: \$32 per bd. ft. (Note: Lignum vitae is often sold by the pound, currently \$4.50 per lb.)
Veneer not commonly available

¹Indicates wood movement across the grain from 6% to 12% moisture content.

Lignum vitae" literally translates as "wood of life." Early physicians came to appreciate the tree's pharmaceutical properties. Its resin yielded substances that are still used to treat sore throats, arthritis, and gout.

One of the most dense, resinous commercial woods in the world, lignum vitae was also very popular with ships' carpenters. They found the wood to be self-lubricating, nearly impervious to water, and resistant to extreme compression and wear. They used it to make blocks and tackles, rub blocks, and pulleys. It is still used today in the marine industry to make bushings and bearings for ship propellers.

Lignum vitae grows throughout the Caribbean, Mexico, Central America, Venezuela, and Colombia. It is an endangered species, and subject to export restrictions.

Appearance

When freshly cut, lignum vitae's heartwood is reddish brown, yellowish green, or yellowish brown. After exposure to air, it turns a dark green, often with a yellowish-brown resin streaking. The light-colored sapwood is usually removed before export.

The wood has a very fine texture, with resin-filled pores. It has unexceptional figure, except in large pieces, where a roey figure can develop because of its interlocked grain. The wood has a pleasant fragrance.

Workability

Lignum vitae is extremely hard and very tough; it's also one of the heaviest commercial woods. When sawing it, I use carbide-tipped blades with large gullets to minimize resin buildup. For routing, I use very sharp, carbide-tipped router bits.

Because of its resin, lignum vitae can be troublesome to glue. I use tongue-and-groove joinery to increase glue surface for edge joints. Otherwise, I depend on tightly fitting dovetails, mortise-and-tenon joinery, or other mechanical joints.

For surface smoothing, scraping is your best bet; sandpaper just clogs up with resin. Lignum vitae is a preferred carving wood in the Caribbean, but it has no bending properties. It turns exceptionally well to very fine tolerances, but you should avoid overheating your tool, which will liquefy the resin and gum up the cutting edge. Lignum vitae is too hard to accept fasteners, unless you tap the wood to receive machine screws.

The wood has a tendency to check, especially in dry climates. It is often finished with either paraffin or varnish to reduce moisture transfer.

Uses

Lignum vitae is widely used in the marine industry to make fittings, bushings, and bearings. It is also an excellent wood for making carving mallets, bowls, and fine turnery. In the past, it has been used to make everything from bowling and croquet balls to elevator pulleys and shuffleboard discs. It's a great wood to have around the shop for making bandsaw guide blocks, bushings, pulleys, small fences, stops, and bench dogs. ▲

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White Oak	4/4	Select	2.40		\$77.00
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Cypress	4/4	Select	2.25		\$72.00
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Solid-Color Lacquer

A rainbow of hues from easy-to-use spray cans

by Michael Dresdner



The natural textures and colors of wood are beautiful, and you can showcase that beauty with stain and clear finishes. But there are times when a splash of glossy color is just what you need to brighten up a room. That's when you reach for solid-color lacquer.

If you own spray equipment, you probably know that spraying colored lacquer is just as easy as spraying clear lacquer. But you can also get great results with no equipment—simply using the pre-mixed acrylic lacquer in spray cans. Hardware stores and home centers stock spray-can lacquer in a variety of colors, plus clear.

Lacquer vs. Enamel

Spray-can lacquer and enamel are typically sold side-by-side in stores. Both give you a hard, glossy finish, but it's easier to get excellent results with lacquer. Here are the most important differences between the two:

Lacquer contains lacquer thinner, so it dries very fast. The advantage of a fast-drying finish is that there's less opportunity for airborne contaminants like dust, bugs, lint, and hair to get stuck to the surface. Also, lacquer can be recoated any time (although it's best to wait at least five minutes), and it doesn't require sanding or rubbing between coats.

Enamel is thinned with mineral spirits, so it takes a little longer to dry, and it's more likely to drip and sag after you spray it. Its recoating "window" is usually stated as a double range—for example, "within an hour or after 24 hours." Also, it may require light sanding between coats.

Enamel is usually identified as such on the can. But spray cans of lacquer—including Krylon, the most common brand—don't always identify the product as "lacquer." You can tell if a spray paint is lacquer by the unlimited time it allows for recoating in the instructions.

While you're at the store, buy one of those clever handles, such as Rust-Oleum's Spray Grip, that turns a can into a spray gun. (See right photo, below.) It makes the can easier to control and less tiring.

Wood Selection

To get good results with a color finish, you must apply it to a smooth, uniform surface. Select close-pore hardwood (or hardwood veneer) such as maple, birch, poplar, gum, and some of the tight-grained fruitwoods.

Prime, Color, and Seal

There are three steps to a solid-color finish: the primer, the color coat, and a

clear sealer on top. Of the three, the first step is the most time consuming—you will spend about 75 percent of your time on the primer coat.

To prepare for the primer, you must putty every single ding, dent, and scratch you can find, cover it with primer, and sand the primer till it is perfectly smooth.

Putty Till You Drop

When your project is assembled and ready to finish, sand all surfaces through 180 grit. With a good inspection light in front of you, look over every inch of the sanded wood surface. I like to wipe down the wood with a cloth dampened with mineral spirits. The wet wood shows its blemishes more clearly than dry wood. Putty every flaw you can see, no matter how small it is. If you can see it in the raw wood, it will stand out like a pimple on prom night once the color goes on.

Once the putty is dry, sand it flat and smooth with 180-grit paper and check the entire surface again.

Prime Time

You can use any wood or auto body primer, but my favorite is Zinsser BIN. This white, shellac-based sealer dries fast,



Make it smooth. After priming and sanding with 220 grit, fill any remaining depressions with lacquer putty. It comes in bright colors and dries very fast.



Thin coats are best. Spray on a thin coat of lacquer in a sweeping motion, holding the can about a foot from the surface. A spray handle relieves your index finger.

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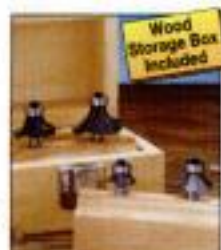
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Put on at least two good coats of primer, letting each one dry for several hours, then let it sit overnight. In the morning, sand the surface with 220-grit steared sandpaper.

Putty Again?!

Inspect the surface closely again. Any dings, pinholes, and even scratches that you can now see, you must putty.

This time around, use lacquer putty, a very fast-drying, colored (usually red) mixture in a toothpaste-like tube. It's effective only in very shallow and small depressions. You'll find it under the names Nitro-stan, Super Red Putty (3M), DFL-17 Spot Putty (PPG), or Glazing and Spot Putty (Bondo), as well as a few others at the local auto parts

store. The bright color shows up, even in the tiniest pinholes, on white or gray primer. (See left photo, page 94.) After they dry, lightly sand these putty spots flush with 320 grit.

Primer, One Last Time

Apply a final coat of primer and let it dry overnight. Sand it carefully, so as to avoid sanding through the primer, with 320-grit self-lubricated sandpaper. If you sand through anywhere, touch it up with primer and re-sand after it dries. You are ready for color when the entire surface is sealed white and completely free of blemishes.

Now for Some Excitement

It is time to brighten up your life. Spray the stuff on in thin coats to avoid drips. The same safety rules for spraying lacquer with fancy equipment also apply here: Set up a spray area in a well-venti-

lated room or, preferably, outdoors. And wear a good carbon-filter vapor mask—lacquer overspray is dangerous.

It usually takes four coats to achieve a uniform look over the entire piece. The can contains around 85 percent thinner, so each coat will lay out very nicely. Because the stuff dries fast, you can get all the color on in one day, and still have time for the clear topcoat.

Clear Protection

Colored lacquer shows scratches, so it's best to protect it with two coats of clear gloss. Use the same brand of clear lacquer as the color you used. Between coats, sand out the finish with 600-grit wet-and-dry paper and naphtha as a lubricant. If you rub the finish to a high gloss, use at least four coats of clear and let it dry several days before you rub with automotive polishing compound. (For more on rubbing to a high gloss, see AW #39.) ▲

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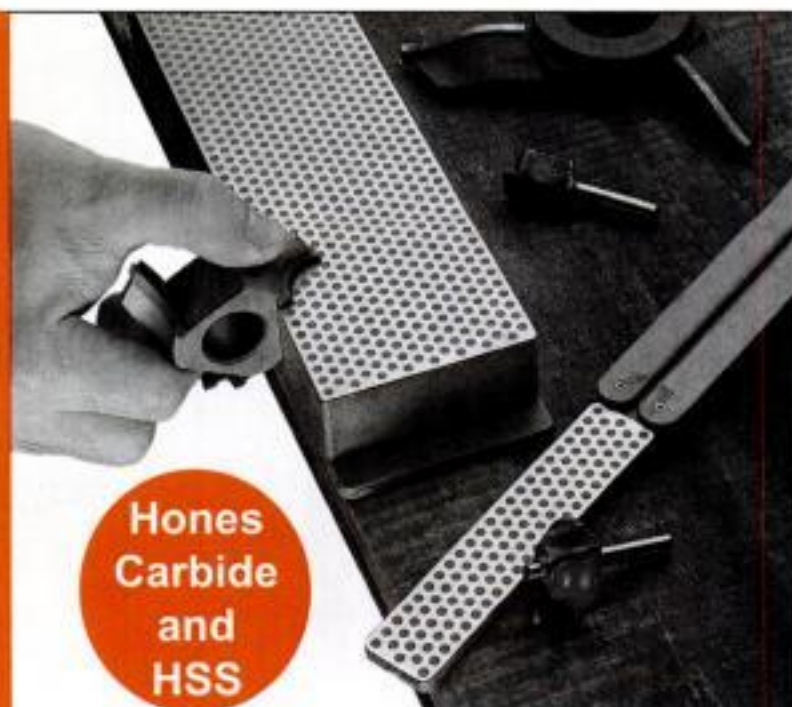
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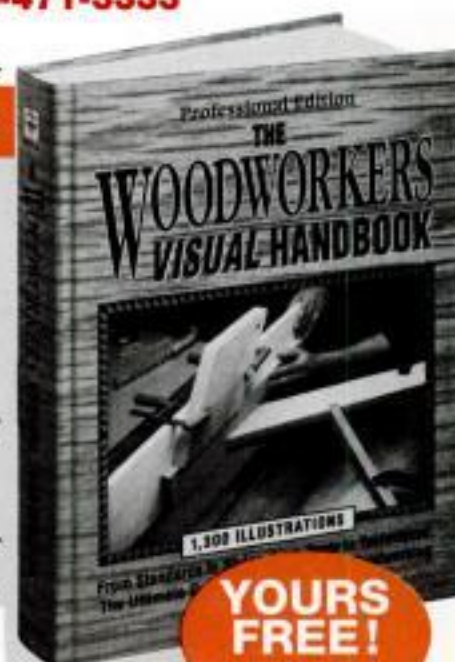
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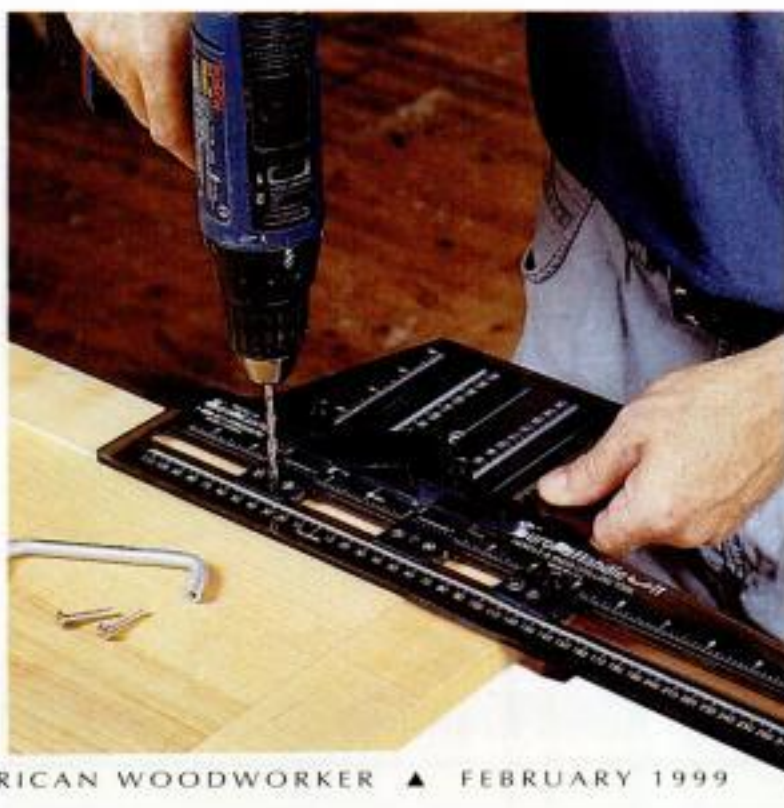
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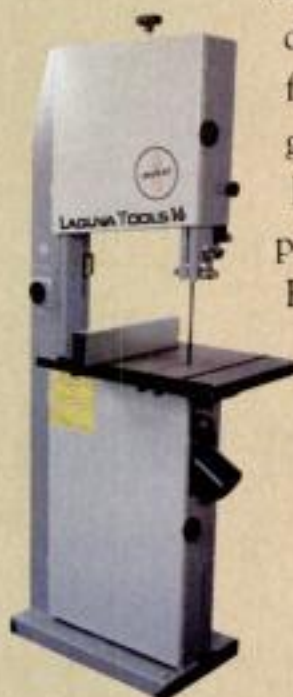
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Sliding action. Rout-R-Slide lets you make dead-straight cuts by pushing or pulling a handle to move the router.

Rout-R-Slide

by Bill Hylton

Move the router, not the workpiece. That's the concept behind the new Rout-R-Slide router table. Your router attaches to a sliding mechanism under the table that lets you move the router by pushing or pulling on a handle. The sliding action, coupled with a fence that swivels up to 45° either way, means you can cut quite a variety of joints that would require special jigs, accessories, or setups on a conventional router table. Dovetails, finger joints, tenons, and dadoes are just a few of the possibilities. With the slide locked, the Rout-R-Slide also works like a conventional router table.

But it's the "sliding" that makes this router table unique. Pushing or pulling on a rod moves the router fore and aft up to 14½ in. You can set a pair of stops to limit the router's travel in either direction for cuts like stopped dadoes or mortises.

The Rout-R-Slide has so many adjustments, scales, and stops that it will take you a long time to explore its potential. It excels at cutting through-dovetails, and I like the fact that dovetail angle and spacing can be varied easily. This application gets the most attention in the owner's

manual; other procedures are also explained, but less thoroughly. A video also comes with the tool.

The fence is equipped with a dust collector pickup, a micro-adjustable stop, and adjustable hardwood inserts for setting the clearance around the bit. A system of T-tracks and lock knobs makes it easy to position the fence almost any way you want. Several scales make repeat setups a snap.

The Rout-R-Slide package includes the fence, table, and leg set (you supply the router) and sells for \$449. Any router will work in the table, but the manufacturer recommends at least 2 HP. If you already have a satisfactory router table and enjoy making jigs, the Rout-R-Slide may not be for you. But if you want a new router table that can eliminate a good deal of jigmaking, the Rout-R-Slide is a ready-to-go package. *JessEm Tool Co., Dept. AWT, 1717 Robert St. E. #8, Penetanguishene, Ontario, Canada L9M 1G9, (800) 436-6799.*

Bill Hylton is the author of Router Magic and Woodworking with the Router (Rodale Press).

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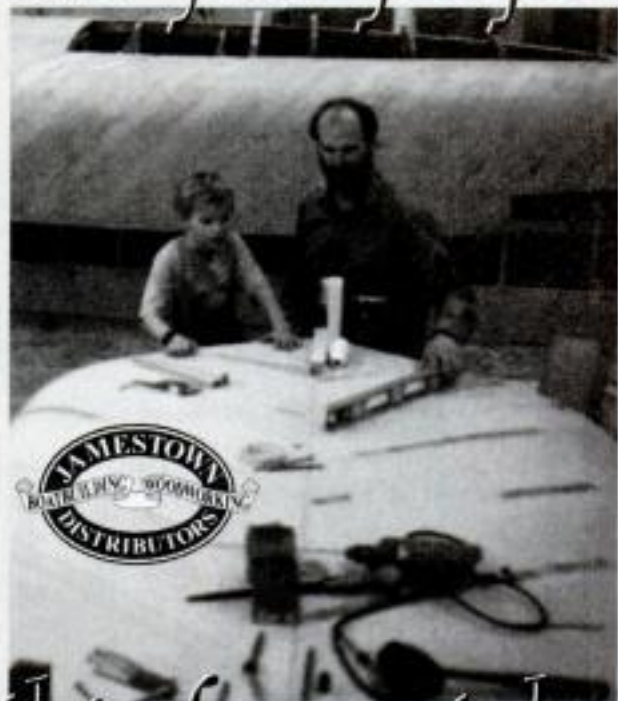
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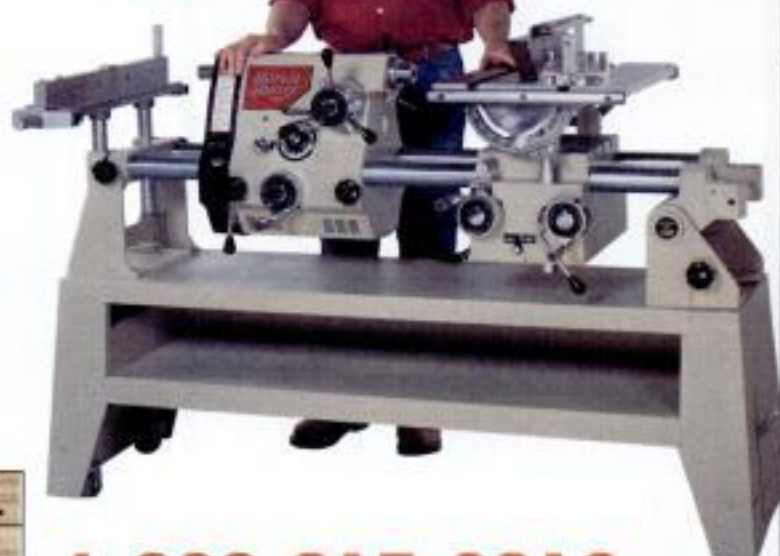
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Traditional *with a Twist*

Robbi Staples grew up in Maine, near the workshop of Shaker furniture maker Thomas Moser. The simple lines and functional style of the Shakers strongly influenced Staples when he started teaching himself to work wood 20 years ago. Now he lives in Massachusetts, and

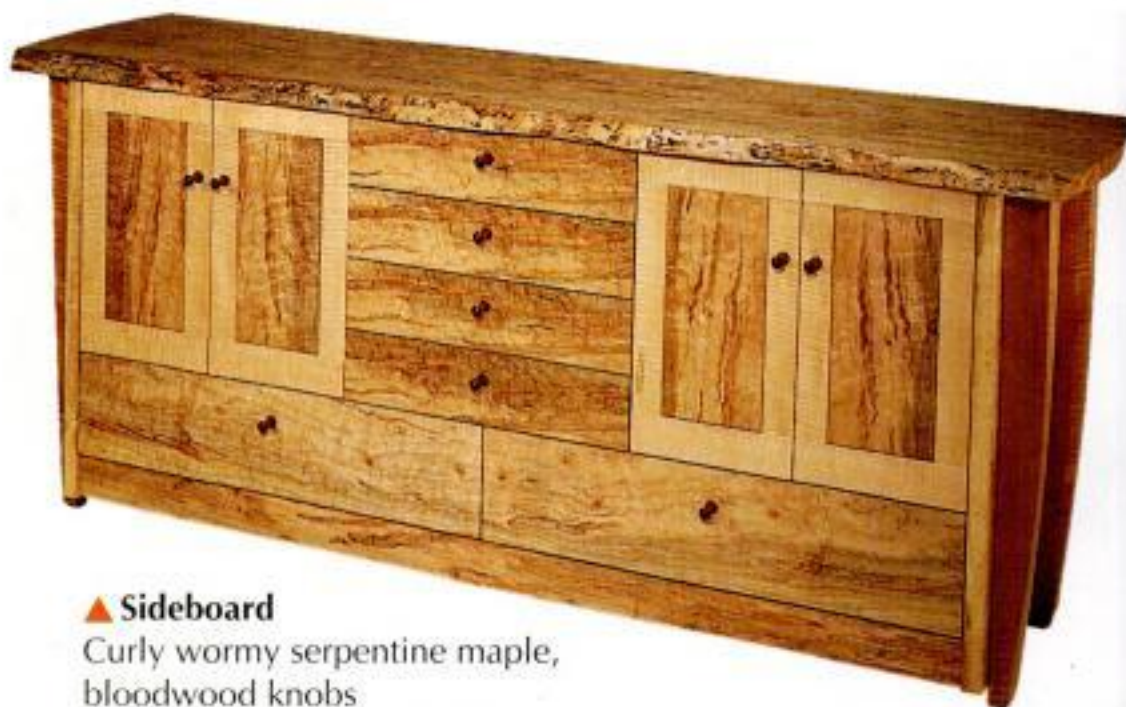
his customers are traditional sorts of folks, but they usually ask him for "something unique" in custom

furniture. Staples obliges by revising traditional Shaker forms with Maloof- and Nakashima-inspired design flourishes. Combine that with top-drawer craftsmanship and the use of highly figured woods, and you get beautiful furniture with lots of character. ▲

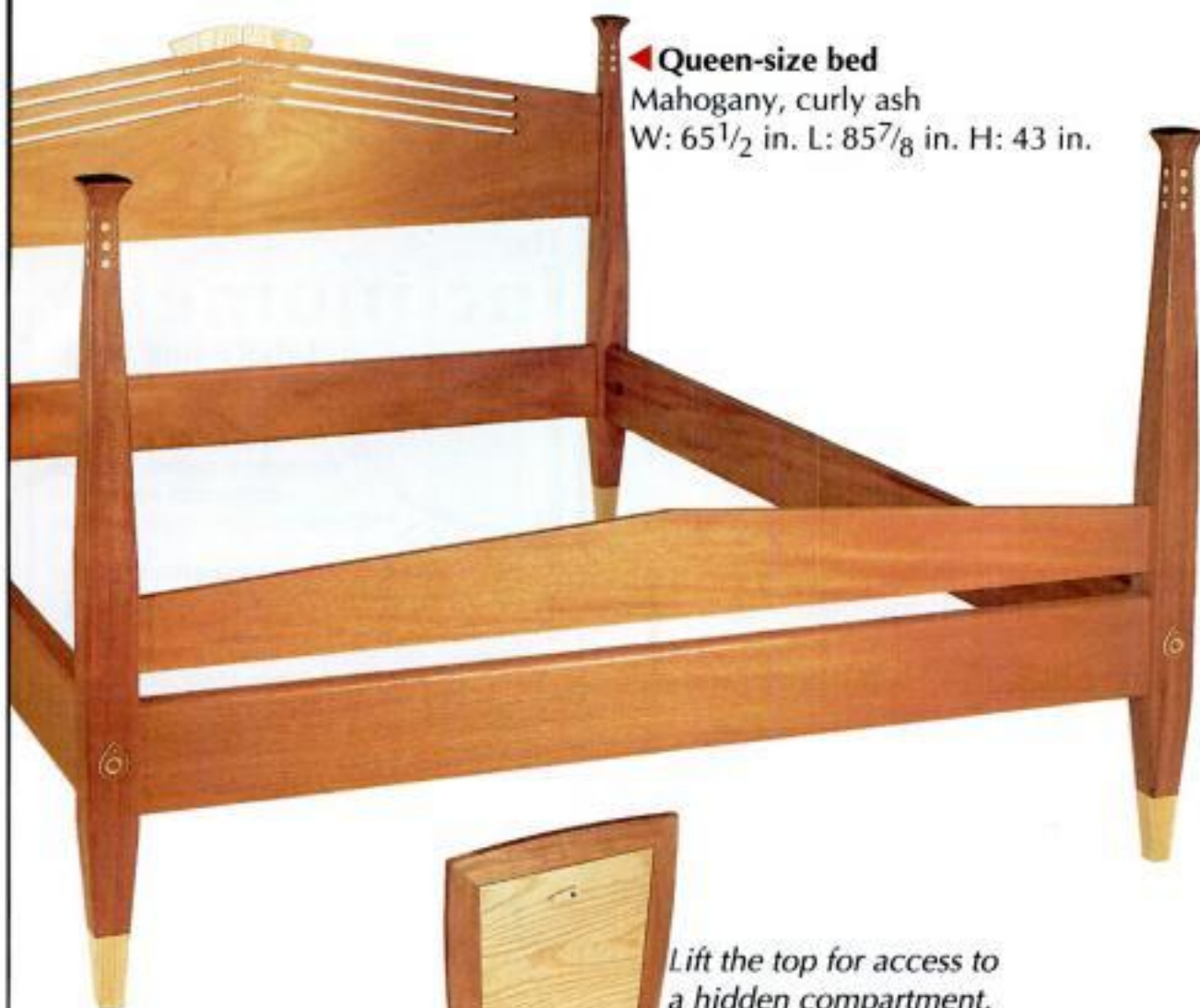
Sharp eye, sharp tool. Staples chamfers an edge with a block plane. He stresses that working with figured wood demands sharp tools.



▲ **Nine-drawer dresser**
Quartersawn white oak, curly ash
W: 46 in. D: 19 in. H: 53 in.



▲ **Sideboard**
Curly wormy serpentine maple,
bloodwood knobs
W: 75 in. D: 19½ in. H: 32 in.



◀ **Queen-size bed**
Mahogany, curly ash
W: 65½ in. L: 85⅞ in. H: 43 in.



▲ **Small wardrobe**
Mahogany, curly ash
W: 27½ in. D: 19 in. H: 62 in.

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▲ **Bedside table**
Curly ash, mahogany, bloodwood
W: 20½ in. D: 20½ in. H: 26 in.

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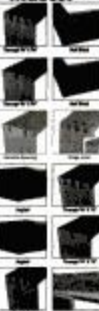
▲ **Table chair**
Curly cherry, curly ash, and cane
Dia: 45 in. H: 29 in.

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by Kenneth F. Corsell Jr.

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The only problem was that my tablesaw fence didn't have a cutout for the router bit. So I made this auxiliary fence from a length of hollow aluminum extrusion. It allows me to use straight or edge-forming bits up to 1 $\frac{3}{8}$ in. in diameter; it also provides router bit storage and built-in dust collection.

Attaching the router fence is quick and easy: Simply screw two $\frac{1}{4}$ -in. cap screws partway into threaded inserts on either side of the tablesaw fence, align the router fence's slotted holes with the screws, lower the fence into place, and tighten the cap screws with an Allen wrench. The slots allow you to mount the router fence above the table for flush-trimming edge banding.

Working with the aluminum wasn't a problem. I routed the slots with a $\frac{1}{4}$ -in. carbide straight bit—using a fence to guide the router—then drilled the $\frac{1}{2}$ -in.-dia. holes at the bottom of each slot. To create the cutout for the router bit, I drilled the bottom and face of the fence with a $1\frac{1}{2}$ -in.-dia. hole saw and connected the holes with my chop saw.

A $1\frac{1}{4}$ -in. chrome tailpiece from the hardware store serves as the fence's dust collection port. I installed a snug-fitting wooden baffle inside the fence, about $\frac{1}{2}$ in. from the bit cutout, to close off the chamber for maximum dust-collection efficiency. ▲



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Model 28-270

EXTRA VALUE

The Grand Edition 10" Contractor's Saw.* Loaded with over \$200 in extras. A 30" Unifence Saw Guide, cast iron extension wing, white laminated table board and white adjustable support legs, plus a 50-tooth ATB&R carbide-tipped blade. Then add your **\$50 rebate**.

Model 36-455

Newly designed, 3-piece stand cuts 70% of your assembly time. Flared legs improve stability. New see-through blade guard locks in the "up" position to facilitate blade changes.

White Hot.

EXTRA VALUE

Grand Edition Unisaw extras add up to over \$300. Then add a **\$100 rebate** on top of that.



Unisaw® stands alone for quality and precision. Every single arbor is flange-faced after assembly to reduce run-out. An extra step that other manufacturers don't bother with.

We've added an extra cast iron extension wing to start with. Then a 52" Unifence® Saw Guide, white laminated table and shelf board, white adjustable steel support legs and a 50-tooth ATB&R carbide-tipped blade.

Each Grand Edition Unisaw® carries the personalized name plate of its owner. Namely you.



Model 36-920

The Grand Edition series from Delta. Each a Delta classic. Each done in white. And each made in the USA and loaded with extra goodies. These babies are hot. And they'll be built in limited quantities, for a limited time only. (Extra values and rebates in effect through March 31, 1999.) For the name of your nearest participating dealer call Delta International Machinery Corp., 800-438-2486. In Canada, call 519-836-2840. Rebates are available in Canada (in Canadian funds) on these models only.

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*Based on an average of consumer-reported problems at 3-months' ownership in a survey of Ford under-8500-lb.-GVWR models and competitive models.

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