

RODALE'S AMERICAN WOODWORKER

DECEMBER 1992 #29

HALF-BLIND DOVETAILS

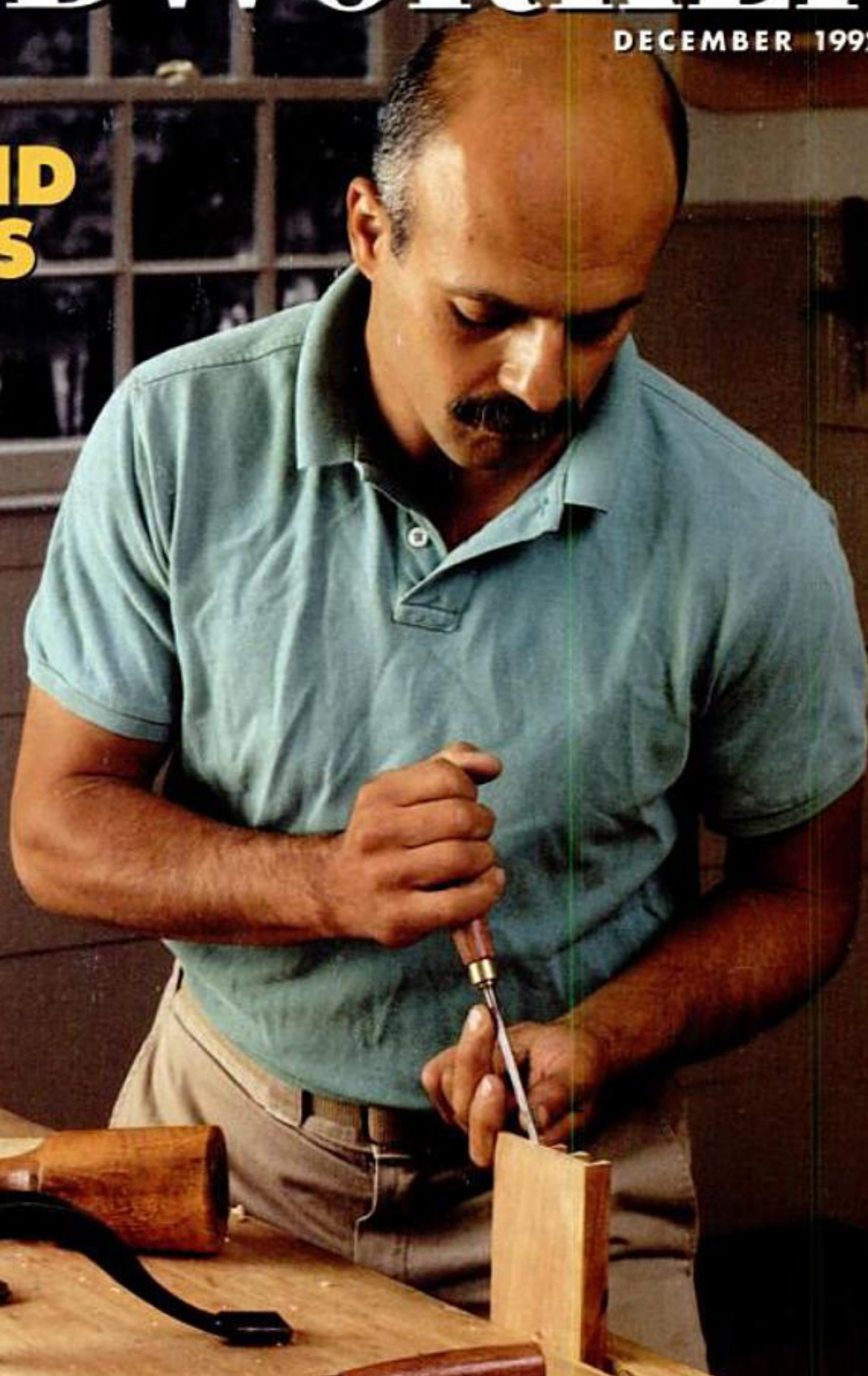
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RODALE'S AMERICAN WOODWORKER

Issue No. 29
November/December 1992
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A WORD FROM THE EDITOR

AMERICAN WOODWORKER



TEAMWORK IS THE KEY

A magazine is only as good as the people who make it, and **AMERICAN WOODWORKER** has put together the best team of woodworker/journalists in the business. Allow me to introduce a few key players on our editorial staff:

Ellis Walentine, our associate editor, has more than 20 years of experience as a professional woodworker and designer. His shop in Coopersburg, Pennsylvania, specializes in architectural woodworking and fine furniture. In 1979 he helped start up Guild X, one of the first woodworking guilds in the country.

Andy Rae, our new assistant editor, was a professional furniture maker in Princeton, New Jersey, before joining the **AW** staff in September. Andy studied woodworking at Bucks County Community College in Newtown, Pennsylvania, and he "apprenticed" with noted woodworkers George Nakashima and Frank Klausz as well as architect Paolo Soleri.

Glenn Hughes, our assistant art director, specializes in one-off contemporary furniture and "art" furniture. Glenn studied design at Bucks County Community College and "apprenticed"

for a year with Jeffrey Greene in New Hope, Pennsylvania.

Dave Sellers, our assistant editor in charge of new products, is a tool junkie with a mechanical engineering degree from Pennsylvania State University. Before coming to **AW** in 1989, Dave worked in the product-testing division here at Rodale Press.

Mike Mandarano, **AW**'s art director, came to us from **FINE HOMEBUILDING** magazine in 1991. Mike studied illustration and advertising at Syracuse University and mechanical engineering at Northeastern University in Boston.

Phil Gehret, on our design-shop staff, has been working wood for more than 40 years. Phil's first love is building period-furniture reproductions.

Fred Matlack, head of our design shop, has a collection of pedal-powered woodworking machinery that would make the folks at the Smithsonian jealous. He's a hard-core machine head, and a crackerjack problem solver. If it has to do with jigs, fixtures or machinery, Fred has a clever solution.

Kevin Ireland, our managing editor, is a veteran newspaper man with more than 14 years in the word-smithing business. Before joining the staff back in March, he was executive editor and associate publisher of four weekly newspapers on Long Island, New York. No stranger to the tools of the woodworking trade, Kevin paid his dues when he remodeled two houses.

All this in-house talent doesn't exist in a vacuum of course. We can't get by without our many regular contributors: Toshio Odate, Jim Cummins, Simon Watts, Mike Dresdner, Dick Burrows, Mike Dunbar, Mario Rodriguez, Bob Flexner, Dick Boak, Rude Osolnik, Stephen Blenk, Dale Nish . . . I just don't have room here to name everyone.

All this expertise adds up to a lively mix of the most practical, in-depth woodworking information you'll find in any publication. We hope you enjoy it.

David Sloan
Editor and Publisher

EDITOR AND PUBLISHER

David Sloan

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LETTERS

Where's That Router Jig?

My compliments on the fine article on building a router table (AW #24). The article was timely and helped firm my plans. The only thing I'd like to see as a follow-up is the [crosscutting] jig that was mentioned.

Don Greenfield
Crofton, KY

See the accompanying drawing for the router jig.

Saw Safety Follow-up

I read with interest your article on tablesaw safety (AW #27). It is time someone spoke out about blade guards and anti-kickback devices being dangerous in *certain conditions*. There is another safety problem on the tablesaw I have never read about. That is reaching across the blade trying to catch your expensive wood before it falls to the floor. I mounted a 1/2-in. plywood platform on the rear of my saw for small stuff and have a long one with a support leg for long stuff. I am amazed that no manufacturer has offered this.

Roland D. Rossi
Gladwin, MI

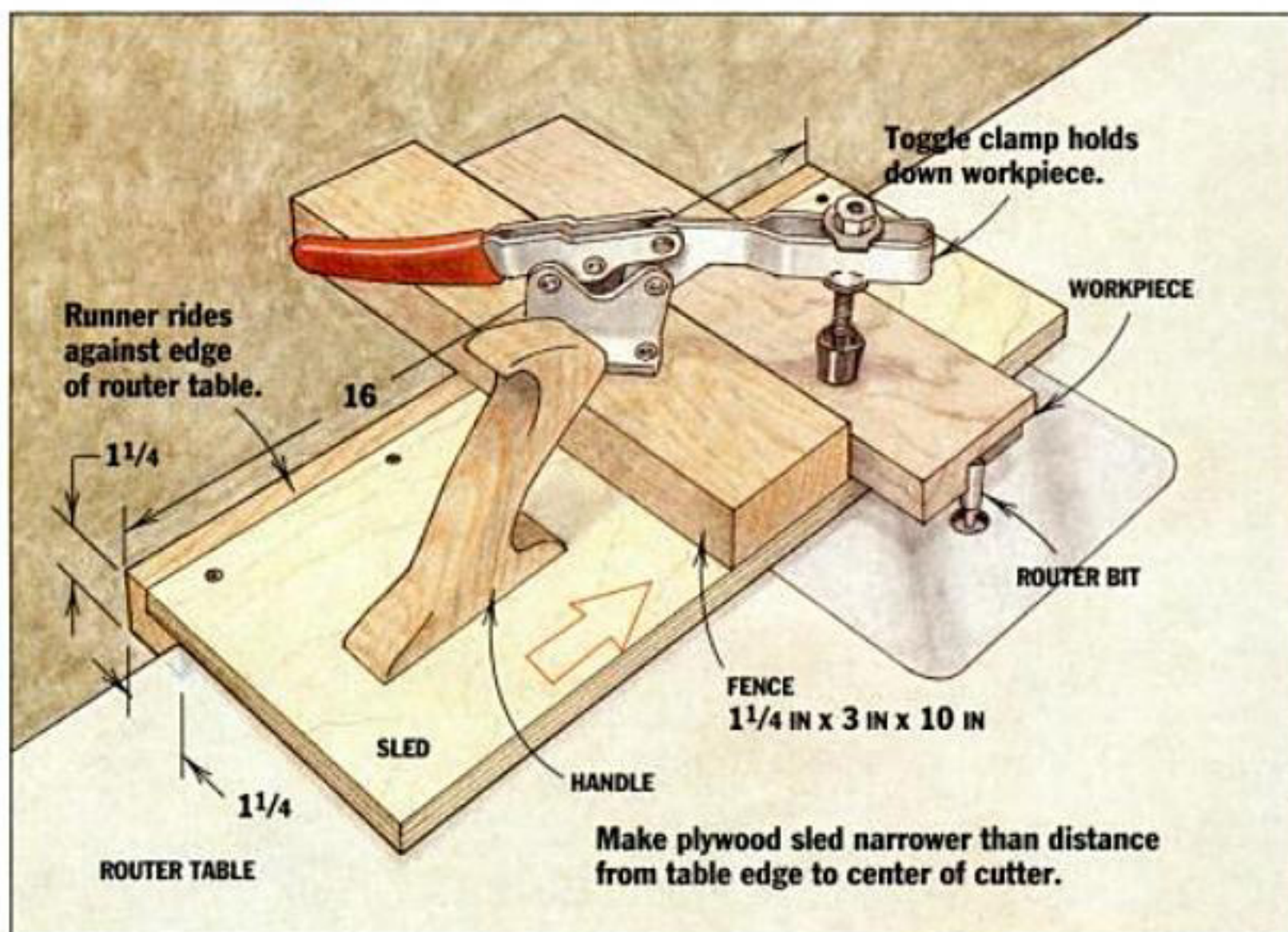
Chain That Key

I have a Makita 12-in. planer which I have used for the better part of a year with good results. The other night, though, while surface planing some 3/4-in. oak, the on-off switch safety key vibrated out of its slot and fell on the infeed side of the oak board. What followed was a loud commotion and the demise of the planer blades. All owners of these planers should install a safety chain to keep the key out of trouble, and Makita should redesign this safety system.

Steven A. Hays
Mason City, IA

HVLP Sprayer Review

I'd like to draw attention to some omissions and inaccuracies in your "HVLP Sprayer" article (AW #28).



It is not correct to state that you get "orange peel" finish by having too much air. "Orange peel" is caused by spraying the coating too thick, using the wrong size jet/needle/air cup [combination] or having insufficient power at the turbine.

Water-based coatings must be sprayed straight from the can. This means you need a more powerful turbine to atomize them. A three-stage turbine producing 6 psi is the minimum to do a good, consistent job [with water-based finishes].

Many water-based coatings contain chemicals that attack metal parts in the spray gun and cup. It is essential that a spray gun featuring stainless steel fluid parts be used. Apollo sprayers offer a Teflon cup not to make cleaning easy, as suggested, but to prevent corrosion caused by these chemicals. Only two of the 11 spray guns tested meet this standard.

Buying an HVLP sprayer is a good investment. I suggest your readers shop around and acquaint themselves with all the facts. If you buy a good one it will give you many years of reliable service.

John B. Darroch
President
Apollo Sprayer Inc.

Antique Tool Section?

Since most woodworkers seem to have an obsession with tools, I would like to see either a special section or a regular section in your magazine on classic, unique and antique tools used by craftsmen of old. I have a trunk of tools used by my carpenter grandfather and enjoy just looking at them and holding them and thinking about the labor and satisfaction from their work. Even a section on their history and current value might expand your audience.

Gene Femrite
Shakopee, MN

Moser Suit Off Base

I find it interesting that you classify Thos. Moser Cabinetmakers as a "David" in its lawsuit vs. Hardin Furniture Co. (AW #27). Moser has more than 80 employees and a reputed gross income in excess of \$6 million. I also think Moser is off base. The man has written and published books with measured drawings of his designs. [If someone copies them] what does he expect? And how does he protect a basically indigenous design concept?

John McAlevey
Warner, NH

LETTERS

Forest Debate Continues

Re: Tracy W. Buhler's criticism of your editorial on old growth forests (AW #27). I would like to see a series of articles showing the current state and future prospects of our forests. [For example,] why do we export raw logs to Japan and elsewhere when our own mills are idle? Why do our mills refuse to cut the metric sizes in demand around the world? Is the current trend of using only rainforest wood from approved spots helpful, or is it better to educate that [leaving the rainforest intact] is *the best use* of the land?

Glenn W. Griffin Jr.
Litchfield, OH

Low Grades for Test

Your article on "Aftermarket Fences" (AW #28) was well written and informative. However, I must take issue

with [testing] side deflection by applying a 10-lb. side load at the back edge of the saw table. The test should be performed near the front of the blade and the front edge of the table, where workpiece support and stability are most critical. Once the cut is made, the job of the fence is basically completed.

The Delta Unifence is designed to support the workpiece in these areas. To illustrate this point, we re-enacted the article's side load test. Our results follow: back edge of table—0.013-in. deflection; near the front of blade—0.0025-in. deflection; front edge of table—less than 0.0005-in. deflection.

Mark B. Schiefer
Marketing manager

What's on your mind? We value your comments, complaints and corrections. Send your letters to: "Editor," AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098.

Corrections

Re: "HVLP Sprayers" (AW #28). Apollo Sprayer specifications were for the 3-year-old 700 model, not the 700+ listed. Also the gun mentioned was an older model that has been discontinued. The new gun has a narrower trigger and produces a spray pattern from 1/4 in. to 24 in.

Specifications for the Wagner FineCoat did not include the turbine rating, which is 4 PSI at 47 CFM and failed to mention that the spray pattern can be adjusted at the air cap.

Re: "Sanding Dust and Your Health" (AW #25). Canadian readers should call 513-533-8328 for a copy of the NIOSH report, "Health Effects of Exposure to Wood Dust: A Summary of the Literature."

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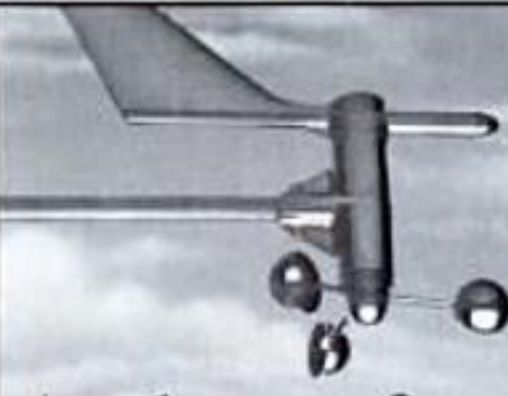
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CIRCLE NO. 18 ON PRODUCT INFORMATION FORM

Finish for Shop Jigs

Q *What is the best finish for wooden, shop-made jigs and fixtures?*

Randy Hillenbrand
Lynnwood, WA

A There are only two major considerations when choosing a finish for wooden shop fixtures. First, the finish should afford moisture protection so the jig won't warp or change dimension. Second, the finish should be very durable to resist the heavy wear of repeated use.

My favorite is catalyzed lacquer. It's easy to spray, dries and cures quickly, and is extremely durable. If you don't own spray equipment, brushable polyurethane, either oil-based or water-based, will work as well.

Incidentally, I often line the sliding or bearing surfaces of jigs with plastic laminate because it wears better than plywood or fiberboard and it's easy to replace if you apply it with contact cement. Remember to account for its thickness when you design the jig.

Michael Dresdner
Finishing consultant
Nazareth, PA

Adjusting "Heel" on a Radial Arm Saw

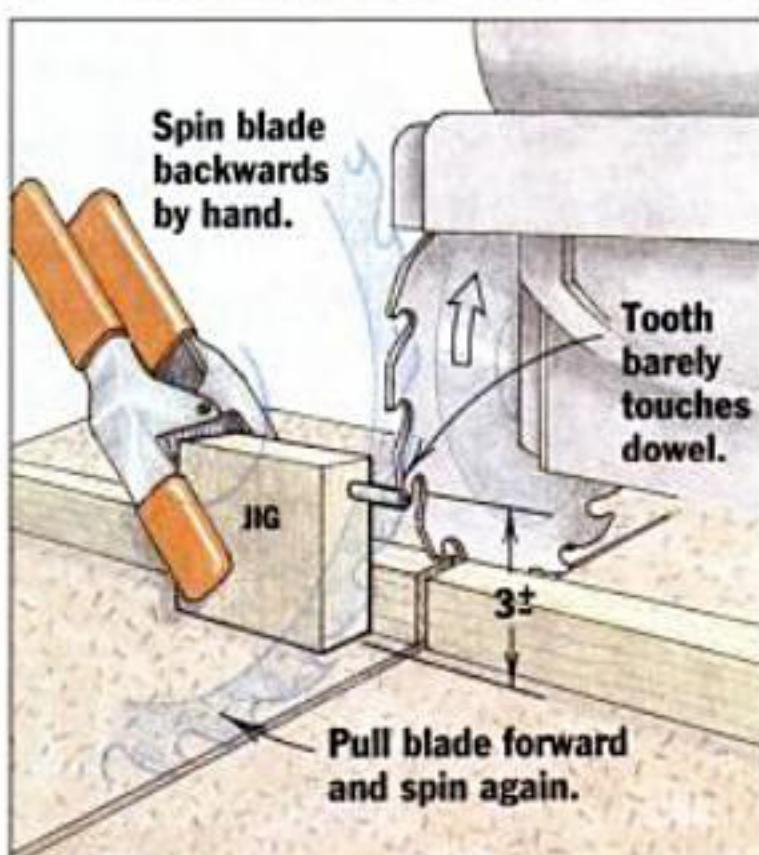
Q *I have a radial arm saw that burns and splinters the wood when crosscutting and binds when ripping. I think the problem is the "heel" of the blade, but so far I've been unable to eliminate it. What's the best way to correct this problem?*

Martin Wale
Pointe Claire, Quebec, Canada

A "Heel" is a misadjustment of the saw causing the back teeth on the blade (the teeth exiting the cut) to follow a different line from the front teeth (the teeth entering the cut). Heel usually produces pronounced saw tooth marks on the cut edge as well as burning and binding.

Your owners' manual should explain how to adjust the heel of your saw. The problem many saw owners have is determining when they have it adjusted properly. I use a little home-made jig that makes the saw blade ring and allows me to adjust the heel by ear. (See drawing.)

The jig consists of a short dowel with a rounded tip extending from the side of a block of wood that you clamp to the saw fence. The dowel should be 3 to 3½ in. above the table. To use it, first unplug the saw and remove the blade guard. Push the carriage back and clamp the jig to the fence with a spring clamp so the dowel just grazes the side of one or more of the front



teeth. If you give the blade a backward spin by hand, you'll hear a distinct ringing sound when the teeth graze the dowel.

Now without moving the jig, pull the carriage forward until the rear teeth are in line with the dowel and spin the blade again. If it produces a different sound (or no sound) the heel is out of adjustment. Adjust the locking position of the saw yoke until the ring is the same in both saw positions. If you find that the heel quickly goes out of adjustment again, remove the yoke from the carriage and lightly sand the mating surfaces so they will not slip under the normal pressure of the yoke clamp.

You can also use this method to

check the horizontal heel and toe of the blade by turning the block so the dowel is vertical.

Jon Eakes
Woodworking writer
Montreal, Quebec, Canada

Drawer Finishing

Q *What, if anything, should I use to finish the insides of drawers where clothing will be stored?*

Joe Reeves
Zanesville, OH

A I generally finish drawers with shellac, because it's simple to apply, it seals the wood adequately, and it's natural-looking. Shellac will give you a smooth finish with just light sanding, and unlike oils and varnishes, it won't smell bad when trapped in an enclosed space.

You can make your own shellac by dissolving shellac flakes, available in orange or blond colors, in denatured alcohol. For sealing wood, I recommend a "one-pound cut," one pound of shellac flakes to a gallon of alcohol. Most canned shellac is prepared as a three-pound cut, so you'll have to dilute it with two parts denatured alcohol to one part shellac to make a one-pound cut.

Brush two coats of this mixture on all the drawers' interior surfaces, sanding lightly with 220-grit steatite paper after each coat dries. Rub the final surface with a soft cloth to remove any dust and produce a satiny luster. If you like, you can apply a coat of paste wax for more protection against smudges and dirt.

A note about shelf life: Most canned shellac has a shelf life of 18 months to two years from the manufacture date stamped on the can. When shellac is initially dissolved in alcohol, it begins a process of "esterification" that makes it dry slower and softer the more it ages. If you plan to apply a topcoat, your shellac should be as fresh as possible, preferably less than six months old. A

Q & A

READERS' NETWORK

As expected, Jack Wignall's question on tablesaws vs. radial saws (AW #28) was controversial. Our own informal poll gave tablesaws the edge. Here are some of the things you readers had to say:

I have used a radial saw for over 30 years and I wouldn't want to be without it. I didn't think I'd like a tablesaw as well, but when I acquired one a few years ago, I was amazed at its versatility. If I had it to do over again, I'd get a good tablesaw for accuracy, and a portable compound-miter saw for crosscutting long stock.

Folker H. Weiss
Ashland, OR

If Mr. Wignall decides on a table-saw, please let him know I have one for sale. Cheap. Except for cutting dovetails, there isn't much I can't do on my radial saw.

Ray Dupske
Waterloo, IL

I suggest Mr. Wignall buy a good tablesaw. Radial saws are advertised to do 101 different operations, but they do only one easily and safely—cut wood to length. I've taught woodworking to people of all ages, and I believe the tablesaw is the safest and most versatile.

Harold Street
Cedar Falls, IA

...the fact remains that the table-

saw is the heart of the shop, unchallenged for safety and versatility.

Voicu Marian
Alliance, OH

This Issue's Question:

I'm planning on enlarging my shop and adding some stationary equipment. I've run across several deals on heavy old machines. Are these better than the ones being made today?

Bruce Gerhart
Cincinnati, OH

Send your opinions to: "Reader's Network," AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098.

soft shellac sealer coat can cause subsequent topcoats to crack or "alligator." For drawer finishing, as described here, freshness is of less concern.

Ellis Valentine
Coopersburg, PA

Keeping It Together

Q *I have a checkerboard made by my father in the 1920s. The board consists of thousands of tiny pieces of walnut and maple glued to a 3/4-in. thick pine backing board which is edged with 1/4-in. mitered strips. The pine board has split down the middle and I'd like to replace it with a piece of plywood. How can I do this without having all the pieces come apart?*

Kenneth S. Dorr
Silver Spring, MD

A The easiest way to do this is to glue a temporary plate to the top of the board. This will hold the pieces in place while you remove the pine board and replace it with plywood.

First, remove the mitered edge strips. This will be easier if you crystallize the old animal hide glue by insert-

ing some denatured alcohol into the joints with a syringe. Once you've removed the edges, work some glue into the crack and clamp the checkerboard together again. This will restore the veneer pattern and prevent paint stripper from getting into it later.

Next, strip the clear finish off the top surface of the checkerboard with a varnish remover. Then use white glue and glue this surface to a piece of scrap plywood with a sheet of heavy paper in between. When the glue has cured, remove the pine board with a hand plane or hand scraper, leaving only the marquetry veneers attached to the scrap plywood.

Now, re-glue the walnut and maple pieces to a permanent plywood back-

ing, using any glue you like. Balance the construction by gluing a sheet of veneer to the other side of this backing. When it has cured, carefully split the assembly along the paper-line using a knife or other thin, sharp-edged tool. Remove what's left of the paper and white glue with hot water or a scraper. Replace the edge strips, sand, and apply a finish of your choice.

Bob Flexner
Finishing consultant
Norman, OK

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

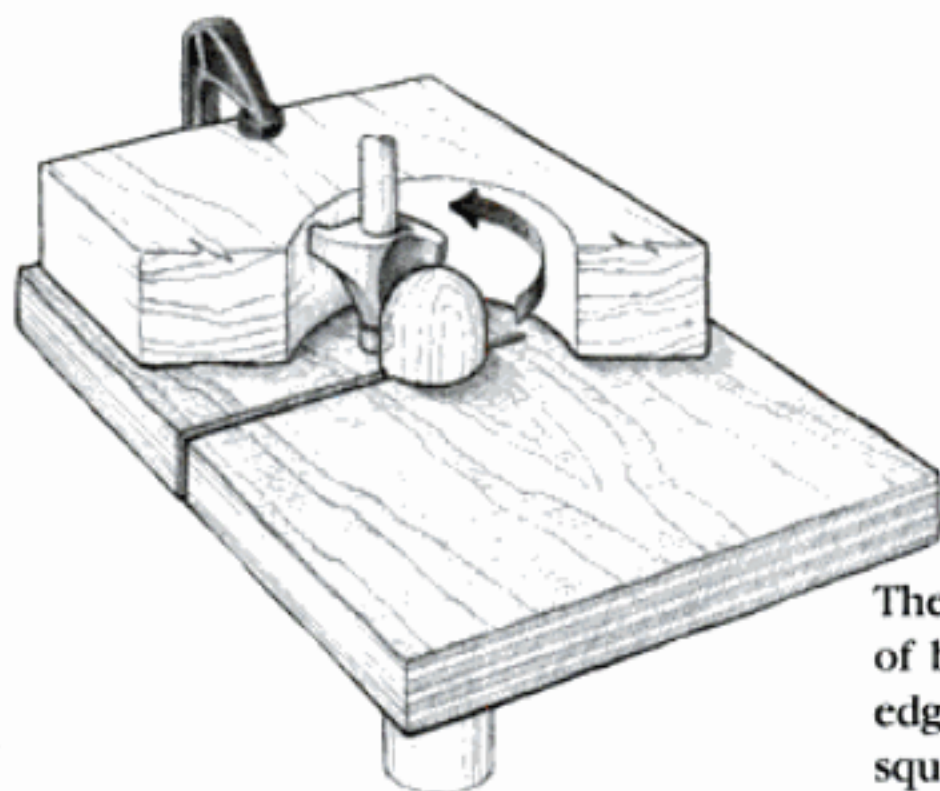
WHERE TO FIND IT

Western red cedar oil and other cedar products are available from Cedar-al Products, HCR 63—Box 6, Clallam Bay, WA 98326, (800) 431-3444.

Stainless steel tape is available from Johnson Smith Co., 4514 19th Court East, Box 25500, Bradenton, FL 34206-5500, (813) 747-2356.

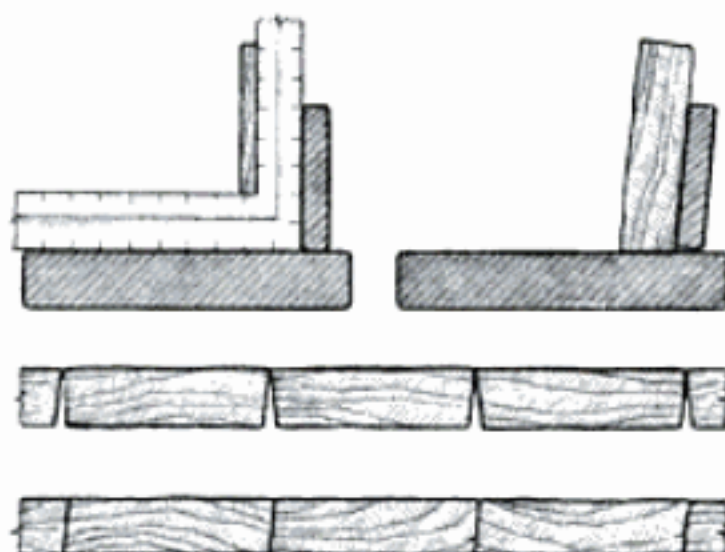
Desktop leather, leatherworking tools and supplies are available from Berman Leathercraft Inc., 25 Melcher St., Boston, MA 02210-1599, (617) 357-8564.

TECH TIPS



Foolproof Board Joining

The first step when joining a number of boards for a tabletop is to run the edges over a jointer so they're flat and square. Before doing so I always check that the jointer fence is dead square to the table. But even so, the edges sometimes end up a fraction off, leaving gaps in my joints. I recently discov-



Rounding Ends of Large Dowels

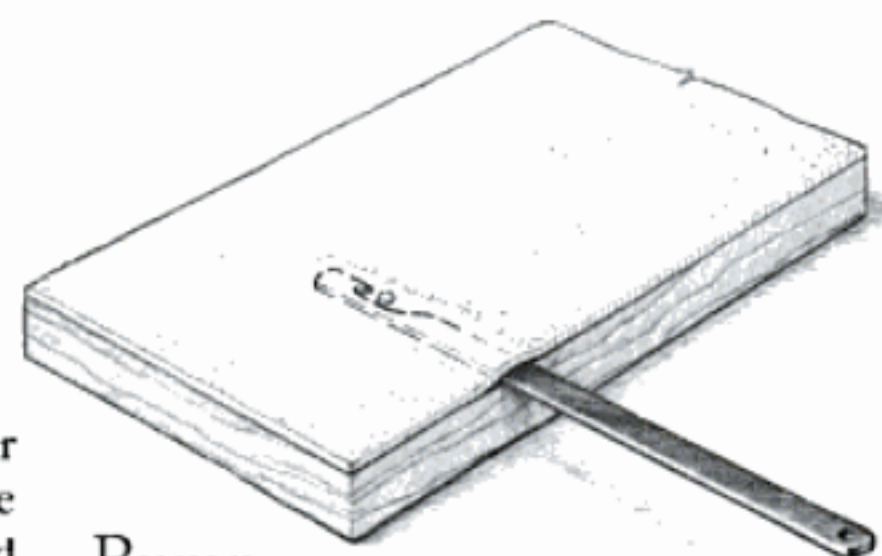
For a recent project I had to round the end of a 1-1/2-in. dia. dowel, and since I don't have a lathe I decided to use my router. First, I drilled a 1-1/2-in. hole in a piece of plywood, and sawed a slot from the edge of the plywood through to the other side of the hole. In this way, when I put the plywood in a vise the hole would close slightly and grip the dowel. Next, I made a support plate for the router and drilled a 4-in. hole in the middle with a fly-cutter.

I then mounted a carbide-tipped round-over bit in my router. The bit was fitted with a pilot bearing the same radius as the rod—3/4 in. With the dowel locked in the plywood and the support plate clamped on top, I rounded the dowel in three or four passes, lowering the router bit a fraction each time, and moving it always *against* the direction of cut.

Yeung Chan
Millbrae, CA

ered I can compensate for slight errors in the fence setting by alternating the boards as I feed them through the machine. I send the first board through with the good face against the fence, the next with the good face away from the fence. In this way any small errors cancel each other out instead of adding up.

Judy Anderson
Ann Arbor, MI



Bump Extractor

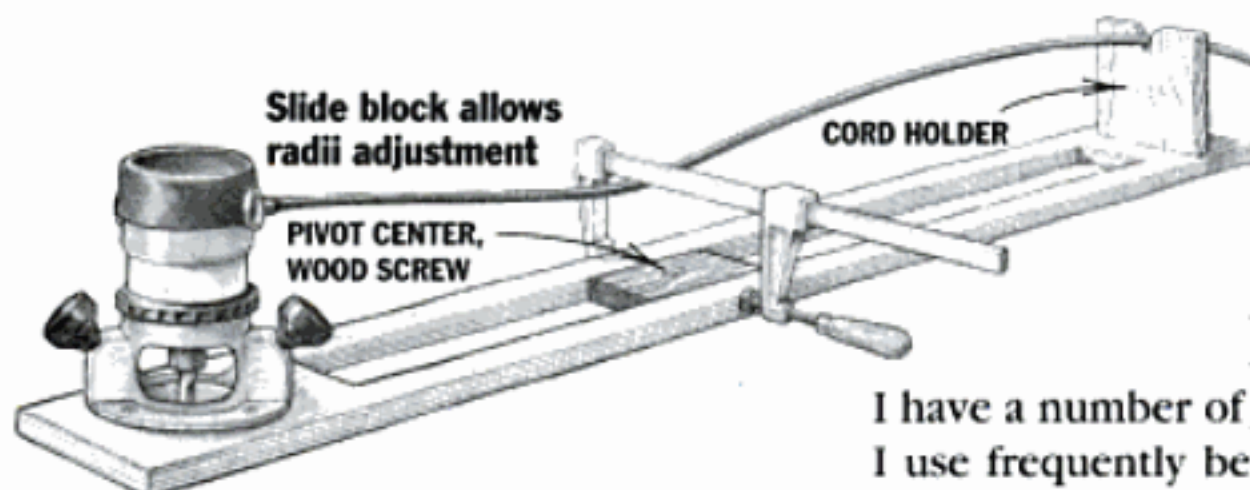
Anyone working with laminates knows how annoying it is to discover a lump under the surface. I use an old hacksaw blade as a "bump extractor." Here's how it works: I smooth out the hacksaw teeth on a grinder and then grind a hook at one end of the blade as shown. If a lump shows up, I heat the end of the blade with torch, slip it in between the laminate and the substrate, and grab the alien particle. It works every time.

Brian Gillespie
Newfoundland, NJ

Cornstarch Lubricant

I recently learned that cornstarch makes an excellent lubricant. I keep some near the tablesaw in a shaker with a perforated lid. Now and then, I shake it over the table and fence, and voilà!—the heaviest, roughest boards glide smoothly across the surface.

Margaret Scally
Albuquerque, NM



Routing Large-Radius Curves

I've used this jig to rout curves with radii as small as 10 in. and as long as 14 ft. when making a curved door header. I can adjust the radius with great accuracy by loosening the clamp and sliding the pivot block in its slot.

Larry Humes
Bellingham, WA

Magnetic Blade Holders

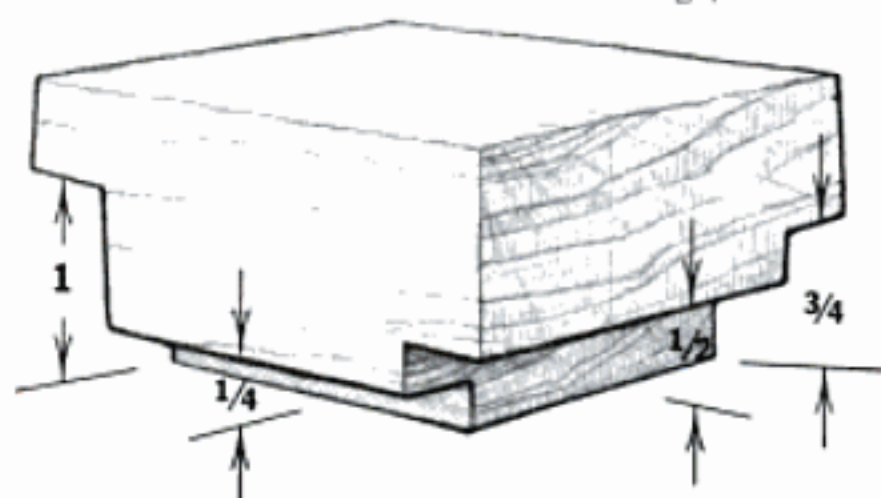
I have a number of Japanese saws that I use frequently because they are elegant tools and I enjoy seeing them. I used to put them away in their cardboard sleeves after each use but then I had a better idea. I screwed a row of magnetic door catches to the wall up above my bench. Now when I'm done sawing, I can just reach up, touch the blade to the magnet and the saw clicks into place.

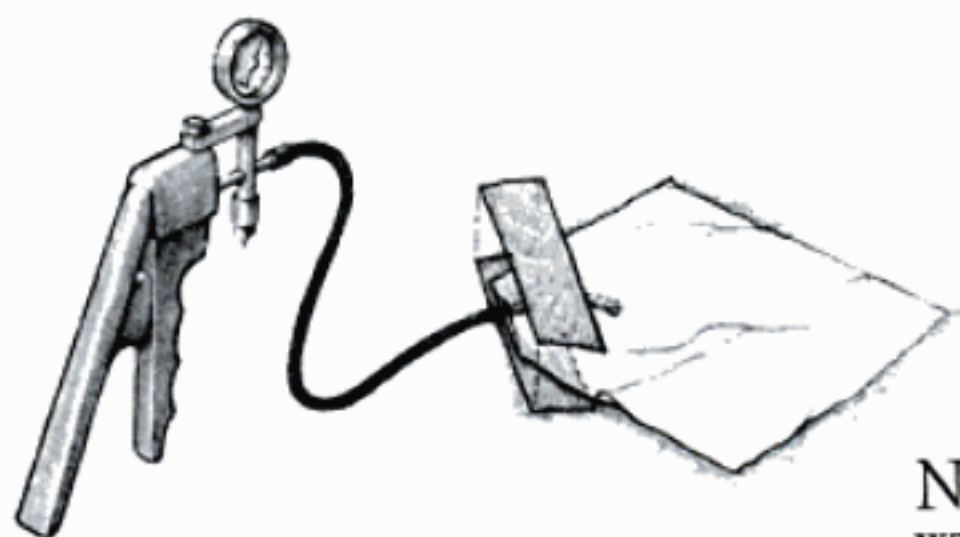
Ann Souzamoto
San Francisco, CA

Height Gauge

The quickest way I know to set the height of a tablesaw (or router) is with gauge blocks. I made this one from a 3-in. length of 2 x 4 cut to the settings I most frequently use. If you need more settings use another block. You can use this gauge block equally well for setting the fence to the saw blade.

L.T. Murphy
Oak Ridge, TN

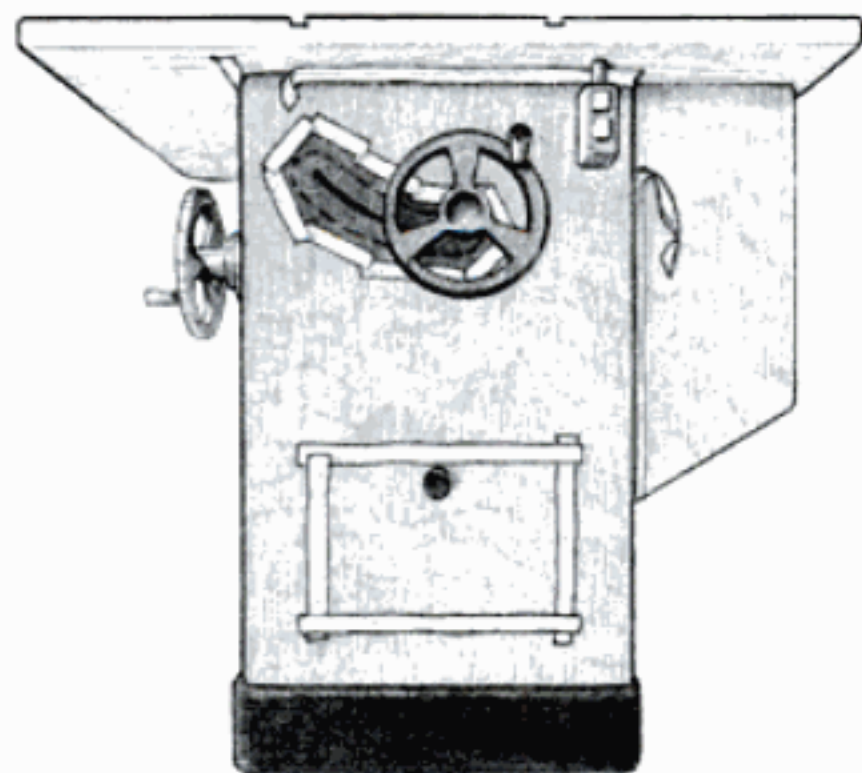




Vacuum Bagging on the Cheap

No need to blow your bait and beer money on a \$400 vacuum pump. For small projects—veneering jewelry boxes, for example—I use a Ziploc freezer bag attached to a hand-operated vacuum pump. These simple pumps, (Mityvac is one brand) are made to bleed brake systems, cost around \$30 and are available in most automotive parts stores. To make a leak-proof seal where the tube enters the bag, snip one corner off, insert the tube and lay a piece of duct tape underneath it, sticky side up. Put another piece on top and firmly flatten everything out.

Michael Chilquist
Pittsburgh, PA



Not so Dusty

To improve the dust collection on my tablesaw I used duct tape to seal all the seams around the clean-out door and between the floor and stand. I also closed the gap for the tilting arbor wheel with a piece of slotted rubber that's attached with duct tape. The suction is so strong now that it actually helps hold the wood down on the table!

Glenn Hughes
Emmaus, PA

TECH TIPS

No-Stick Clamp Blocks

When gluing up a tabletop I've always put 1/4-in. blocks under the pipe clamps. This both protects the surface and centers the pressure along the edge of the board. But sometimes the blocks stick and take a piece of the table with them when I pry them loose. To avoid this, I now use blocks made of Plexiglas or pre-finished plywood paneling.

Ben Erickson
Eutaw, AL



Drawing Fair Curves

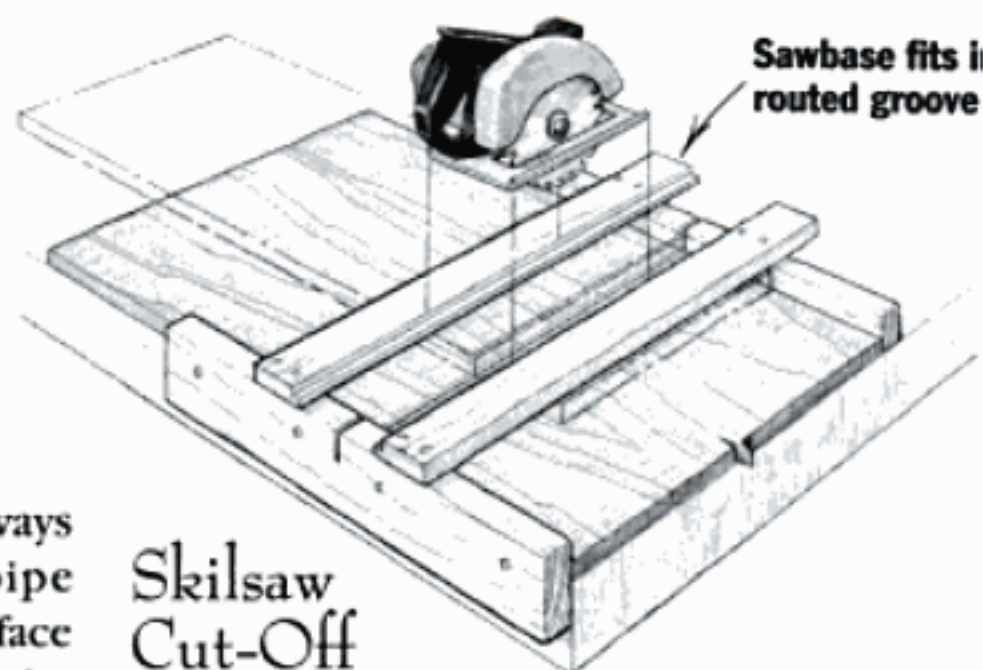
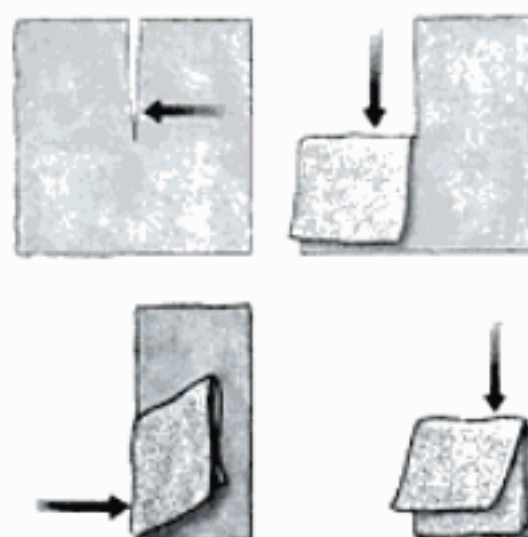
Ever tried drawing a fair curve with a sprung batten and ended up holding the pencil with your teeth? Next time, try compressing the batten with a pipe or bar clamp. Increase the pressure, and the curvature becomes sharper. When it has the right curve, lay the batten on the paper or project. Now you can draw the line with a hand to spare.

Alison Weatherly
Berkeley, CA

Folding Sandpaper—Again

I like David Hurd's method of folding sandpaper (AW #28). Here's another way that a local boatbuilder showed me. You cut the sandpaper halfway through and then fold it as shown. It makes a nice, thick pad and nowhere is the grit rubbing against itself.

Madeleine Johnson
Halifax, Nova Scotia



Skilsaw Cut-Off

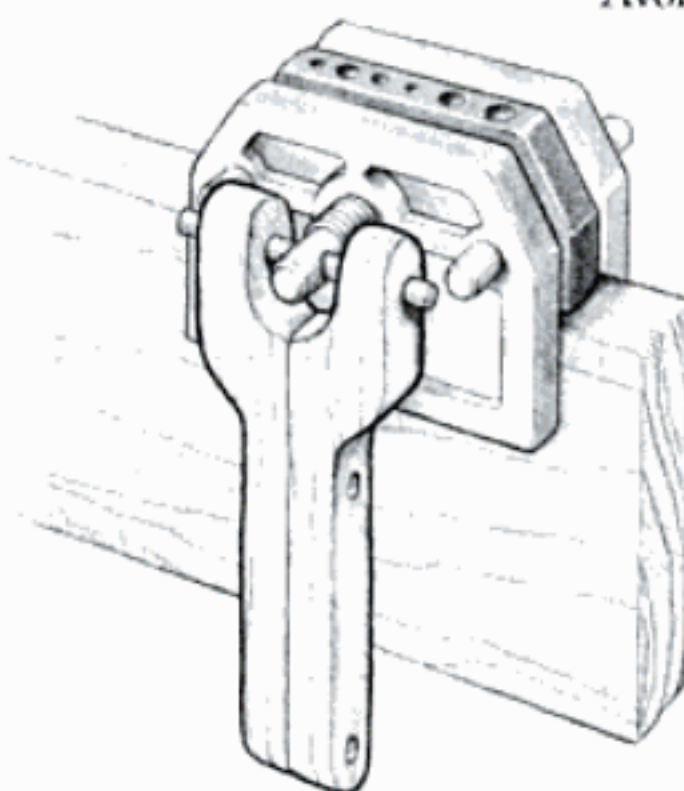
This is a useful jig for anyone who does a lot of crosscutting of rough stock but doesn't own a radial arm or cut-off saw. I find it especially handy not to have to mount the skilsaw—it just drops into the wood guides—so it is always free for other uses. For my purposes a 24-in. x 48-in. base was convenient, but the dimensions can vary to suit individual needs.

Bruce Levine
New York, NY

Hand-Saver Handle

The Dowel-It dowelling jig is a useful, versatile tool but it has flaws: The handle is too small and its sharpness hurts the hand when tightened. After suffering this minor annoyance for years I finally made a wooden handle long enough to apply the necessary torque. The two halves of this new handle slip over the steel pin and attach with wood screws.

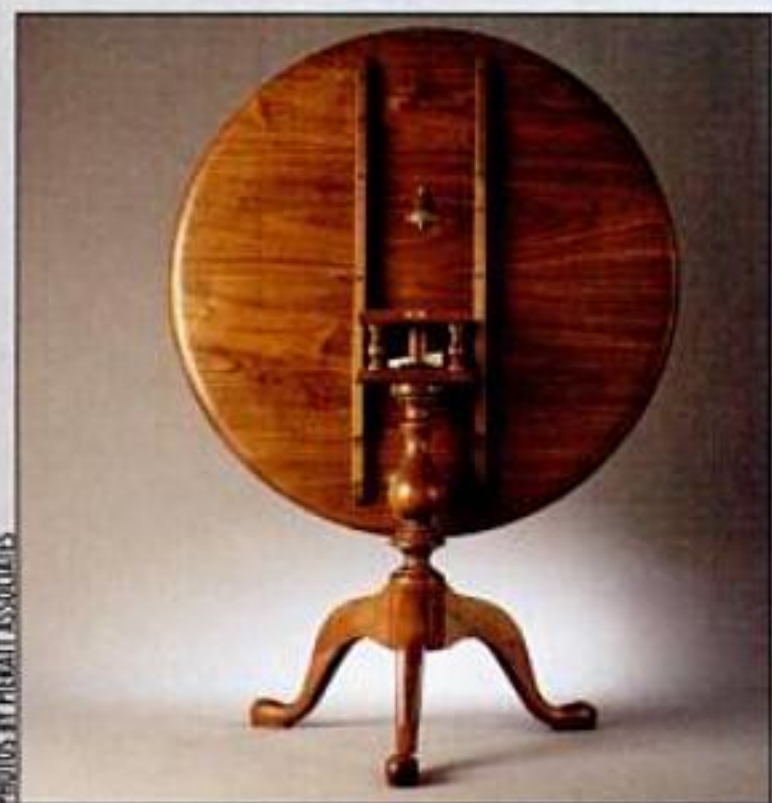
April Lambert
Avon, CT



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

QUEEN ANNE TILT-TOP TABLE

The Top Tilts for Display and Rotates for Use



Tip-and-turn tables like this reproduction Queen Anne tea table were popular around Philadelphia in the late 1700s.

BY LONNIE BIRD

During the 18th century tea drinking became a popular custom in America, and craftsmen fashioned special tea tables for their wealthy patrons. The wide variety of surviving tea tables is evidence of the remarkable ingenuity of artisans of the period. Some tables are round, others square, and many of them have drop leaves or tilting tops. This diversity reflects differences in tastes as well as cultural and ethnic variations between colonies.

Tip-and-turn tables like the one featured here were highly favored in and around Philadelphia. This one is a reproduction of a Queen Anne table built in Philadelphia from 1740-90. The unique birdcage support under the top enables the top to both rotate when in



use and tilt up for storage or display against a wall. Because of its moderate size, the table is easy to move, making it suitable for a variety of purposes.

This is basically a turning project. The pedestal, birdcage spindles and retaining washer all must be turned on the lathe. (See Fig. 1 and 2.) You also can turn the top, but I've offered an alternate router-based method which will give you the same results. (See

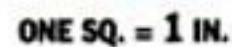
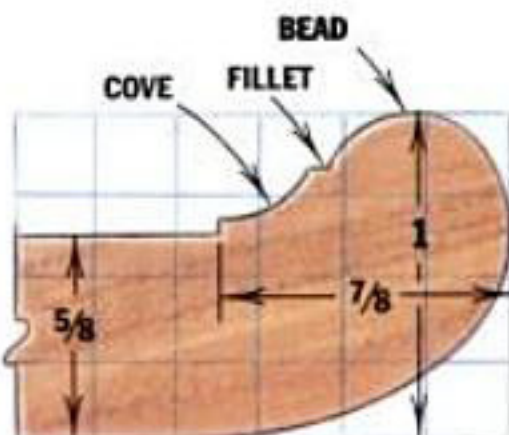
sidebar, page 27.)

I made the table out of walnut—the same wood as the original. Other Queen Anne tea tables were made of mahogany or tiger maple.

Turning the Pedestal

Turn the pedestal first. (See Fig. 1.) If possible, turn the pedestal from solid stock rather than gluing up a blank. If you use a laminated blank, don't laminate more than two pieces or you'll end up with unsightly curved and elliptical glue lines on the finished piece.

TILT-TOP TABLE





◀ This pencil jig makes it easy to mark the centerlines of each leg joint on the pedestal base.

Chisel flats where the legs attach to the pedestal so joints will meet flush.



No matter which joint you use, I recommend that you secure the joint with a 1/16-in. thick sheet metal "spider" screwed to the bottom of the pedestal. (See Fig. 1.) Many early cabinetmakers used this method.

To locate your joints, mark the centerlines on the pedestal base. I've found that the legs look best if you place one of them directly below the concentric annual rings on the vase-shaped section of the pedestal. (See photo, left.) Transfer the centerlines up the 4-in. long cylinder at the base of the pedestal. I've made a simple jig that will make this task quick and accurate. (See photo, left.)

In order for the legs to meet flush against the pedestal, you'll need to either cope the legs at the shoulder of the joint to match the curvature of the pedestal or flatten the pedestal where the legs will attach. The latter operation is an easier way to achieve a perfect fit. Early cabinetmakers used both methods. Whichever approach you choose, make sure to cut the shoulders of each leg joint *before* bandsawing the legs to shape. This way you'll have a straight edge to register against the machinery. Then bandsaw the side-view profile of the legs and complete the joints. (For more on sliding dovetails, see AW #11, November/December 1989; and AW #27.)

Next, shape the front-view profile of the legs. Note in Fig. 1 that the legs are 2 in. thick at the pedestal and taper down to 1 1/4 in. at the ankle before flaring back out to their full 2 in. thickness again at the foot. First you should draw a centerline down each leg blank to serve as a guide during shaping. Next, bandsaw the taper. After sawing the legs to shape, round each leg with rasps and files. Be careful not to remove the centerline or the legs won't be symmetrical.

When you're satisfied with the leg profile, carve the pad foot. Outline the height first with a marking gauge and then deepen the gauge line with a "V" parting tool. Then round over the edges with gouges. Finally, scrape and sand the legs.

After test-fitting the legs in the pedestal, glue them in one at a time. The clamping arrangement I used is shown in the photo at left.



▲ To carve the pad foot, first outline the height with a marking gauge and then deepen the gauge line with a "V" parting tool.

There are a few key points you should keep in mind while turning the pedestal. The post at the top of the pedestal must fit the holes in the birdcage to allow the top to turn. (See Fig. 1 and 2.) Rather than using calipers, size the post to fit in a 1 1/4-in. dia. hole bored into scrap stock. The scrap should turn smoothly around the post without stop.

Also, make sure to keep the shoulder that supports the birdcage flat and square. When you're finished turning,

sand and finish the pedestal on the lathe. Then leave it on the lathe until you've completed the joinery.

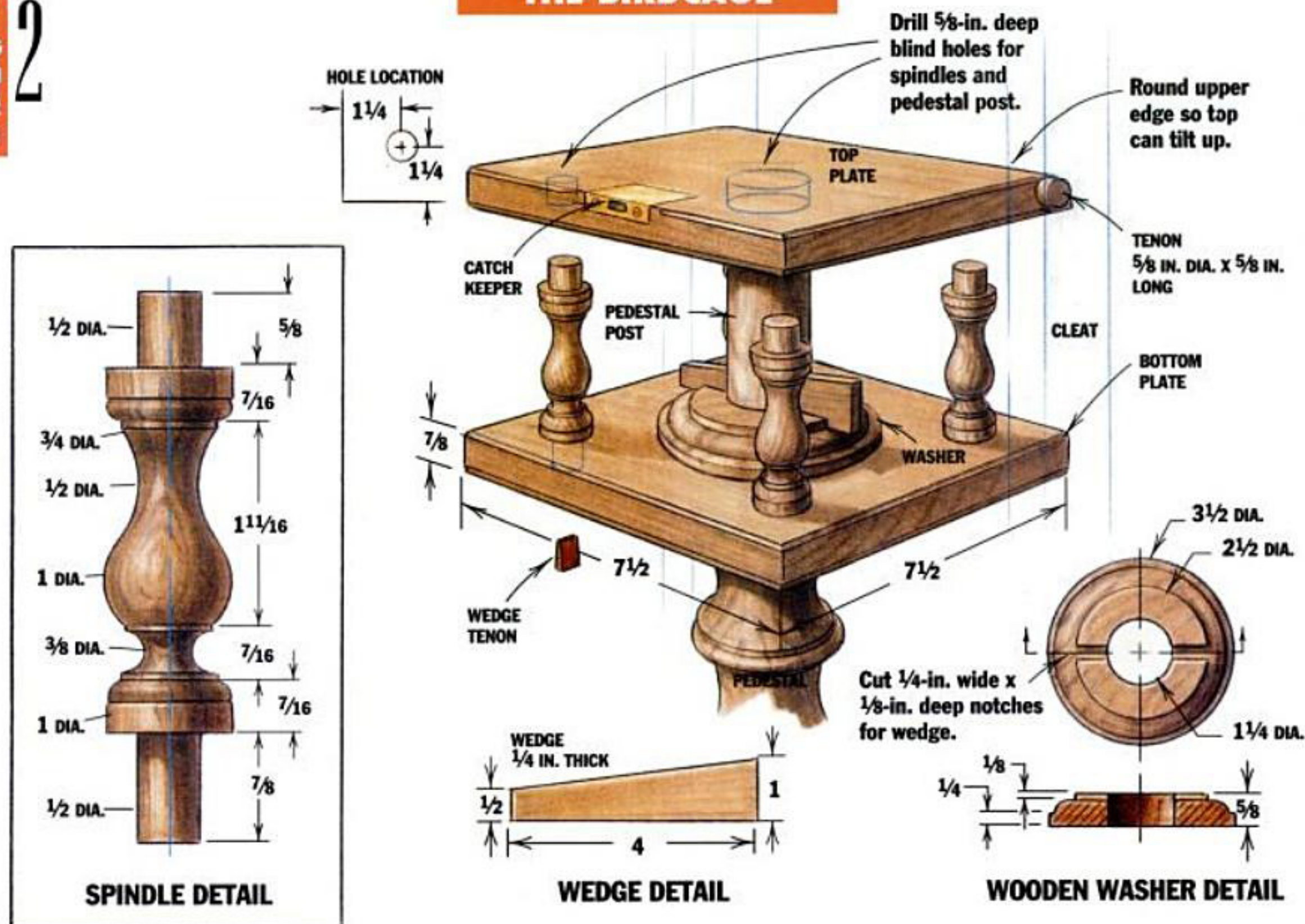
Making the Legs

The legs on antique tea tables are joined to the pedestal with sliding dovetails. This joint has resulted in cracked pedestals on many old tables. For this reason, I chose to use a mortise-and-tenon joint instead. This allows twice as much face grain surface area for a strong glue joint.



▲ To secure leg while glue dries, author places leg in vise, then applies pressure by clamping the pedestal to the bottom of the vise.

THE BIRDCAGE



Making the Birdcage

The birdcage comes next. It's nothing more than a box consisting of an upper and lower plate connected by four turned spindles. (See Fig. 2.)

The tabletop pivots on two $\frac{5}{8}$ -in. dia. tenons projecting from the upper plate, as shown in Fig. 1 and 2. There are two ways to make these. You can cut out the top plate with two $\frac{5}{8}$ -in. long "ears" and round these ears with a knife and a file. Or you can round the ends of a piece of $\frac{7}{8}$ -in. square stock on the lathe and glue the stock onto the plate.

On the lower plate, lay out the centers for the $1\frac{1}{4}$ -in. dia. pedestal post hole and the four $\frac{1}{2}$ -in. dia. spindle holes. Tape the upper and lower plates together so you can drill both plates at once. Note in Fig. 2 that the holes go through the lower plate but only partially into the upper plate. A Forstner bit makes a clean, flat-bottomed hole. After drilling the holes, chamfer or round the edges of the plates and round the upper edge of the top plate next to the tenons to allow clearance

for the top to pivot.

Next, turn the four birdcage spindles, sanding and finishing them right on the lathe. The tenons on these spindles should fit snugly into the plate holes, but you may also wish to cut kerfs in the tenons and wedge them in place for extra strength. If you like, you can blind-wedge the tenons in the upper plate by inserting a wedge partially into the kerf and driving the tenon into its hole. The bottom of the mortise forces the wedge into the tenon and locks it in place.

Turning the Top

You have several options for making the top: dish it on the lathe, dish it with a router (see sidebar), or simply make a flat top by cutting a circle on the bandsaw and shaping the edge with a router.

To turn the top, you'll need a stout lathe with an outboard spindle and a floor stand tool rest. (Most 12-in. swing cast iron lathes will suffice.) I glued the tabletop to a 24-in. dia. plywood waste

block that is screwed to a large faceplate. The whole assembly is then mounted on the outboard spindle of the lathe and turned at a low speed (200-300 rpm) with scrapers. The top is then pried away from the waste block and the two cleats that connect the top to the birdcage assembly are immediately screwed to the top's underside to keep it flat.

Because you'll need to install the two cleats right after turning the top, make them first. (See Fig. 1.) Drill $\frac{5}{8}$ -in. dia. holes in the sides of the cleats to accept the tenons on the birdcage's upper plate. Also, drill and countersink the screw holes for the screws that fasten the cleats to the top.

Now for the top. Glue up the top blank from $\frac{5}{4}$ boards that match in both color and grain (if you choose to make a flat top use $\frac{4}{4}$ stock). Many old tables have tops made from a single board, but of course wide boards like that just aren't available today.

While the glue is drying, bandsaw the 24-in. dia. waste block from $\frac{3}{4}$ -in.

plywood (for more on sawing circles, see AW #1, March/April 1988). Fasten the waste block to the outboard faceplate with screws. Then mount the faceplate on the lathe and true up the waste block's face and edge with a heavy scraper.

Once the top blank is dry, saw out a 35-in. dia. circle on the bandsaw. With a jointer plane, flatten the underside. Then remove the waste block/faceplate assembly from the lathe, center it on the underside of the tabletop and glue it down with a layer of heavy paper between the top and the waste block. I use grocery bags and plenty of yellow glue. The paper allows you to pry off the waste block after turning.

When the glue has dried overnight, you're ready to turn the top. Start the job in the morning so you can see it through to completion. Left unfinished, the top may twist or cup overnight making it difficult to finish turning the next day.

Mount the work on the lathe. (Wear a face shield!) Start the lathe at its slowest possible speed. If the lathe wants to dance around the room, weight the lathe stand with sandbags or concrete blocks.

Begin by truing up the edge of the top with a sharp, heavy scraper. Stop frequently and sharpen the tool. Just true the edge at this stage—don't turn the top to its finished diameter yet.

When the edge runs true, reposition the tool rest and true up the face with a scraper. By now the top should be spinning pretty smoothly. Keeping the speed low (300 rpm), turn the face to the finished rim thickness (1 in.). When the face is running true, turn the top to its finished 34-in. dia.

Now take a break and study the drawing of the raised rim. (See Fig. 1.) It's basically a bead, a fillet and cove. Turn the fillet first with a square scraper, then the cove with a round nose scraper and finally the bead with a square scraper. You should sand the raised rim now, as it may move slightly once you start dishing out the top.

Dish the top with a heavy scraper and check for flatness as the work pro-



To shape the tenons on the birdcage's upper plate, the author first rounded the ends of a square spindle and then glued the spindle to the upper plate.

gresses. Keep the tool sharp to minimize cross-grain tear-out. When the turning is complete, sand the top, while it's still on the lathe, to 220 grit. Then remove the top from the lathe and sand it by hand following the grain to remove the circular scratches.

Separate the top from the plywood disc with a large, wide chisel. Insert the chisel under the edge of the waste block, bevel down, and carefully working your way around its perimeter, tap the chisel lightly with a mallet to pry it free. Avoid gouging the underside of the top. Once you remove it, scrape away the paper and glue from the underside of the top and sand it.

Now screw the cleats in place to prevent the top from cupping. Do this by screwing one cleat down first, and inserting the birdcage top-plate tenon in the hole in the cleat. Then slide the other cleat over the other birdcage tenon and screw that cleat to the tabletop.

Turning the Washer

Turn the 3/8-in. thick wooden retaining washer that mounts over the pedestal's post next. (See Fig. 2.) Screw a waste block that is about 4 in. to 5 in. dia. to the lathe's faceplate and glue the workpiece to the waste block

with a piece of paper bag between the two pieces.

Turn the washer with scrapers. Before removing it from the lathe, bore the 1 1/4-in. dia. hole with a Forstner bit mounted in a chuck in the tailstock. This method will ensure that the hole is concentric with the washer itself.

Pry the washer from the waste block with a chisel. Be careful, the washer is thin and will break if pried with much force. Then, moisten the back of the washer and rub off the glue and paper with your fingers. Finally, carefully chisel two notches in the top of the washer for the wedge that secures the birdcage to the pedestal. (See Fig. 2.) This pre-

vents the washer from turning when the top is rotated.

Place the birdcage and washer on the pedestal and mark the pedestal for the tapered wedge mortise. (See Fig. 2.) Accurate location is important. If the mortise is too high the top will rattle. If it's too low the wedge may cause binding and make it difficult to rotate the top. Cut the mortise with a brad point bit chucked in a hand-held electric drill. Then clean the mortise up with a chisel.

Next, place the assembled table upside down and position the brass catch and its keeper (available from Ball & Ball, 463 W. Lincoln Hwy., Exton, PA 19341, 215-363-7330). Mount the hardware and check to see that it works properly. Remember to remove the hardware before finishing.

Final sanding and finishing will complete the job. Antique tables were commonly finished with varnish or shellac. I like to use a tung oil varnish, on unstained wood, because it brings out the natural color. ▲



L O N N I E B I R D
is woodworking instructor at the University of Rio Grande, Ohio.

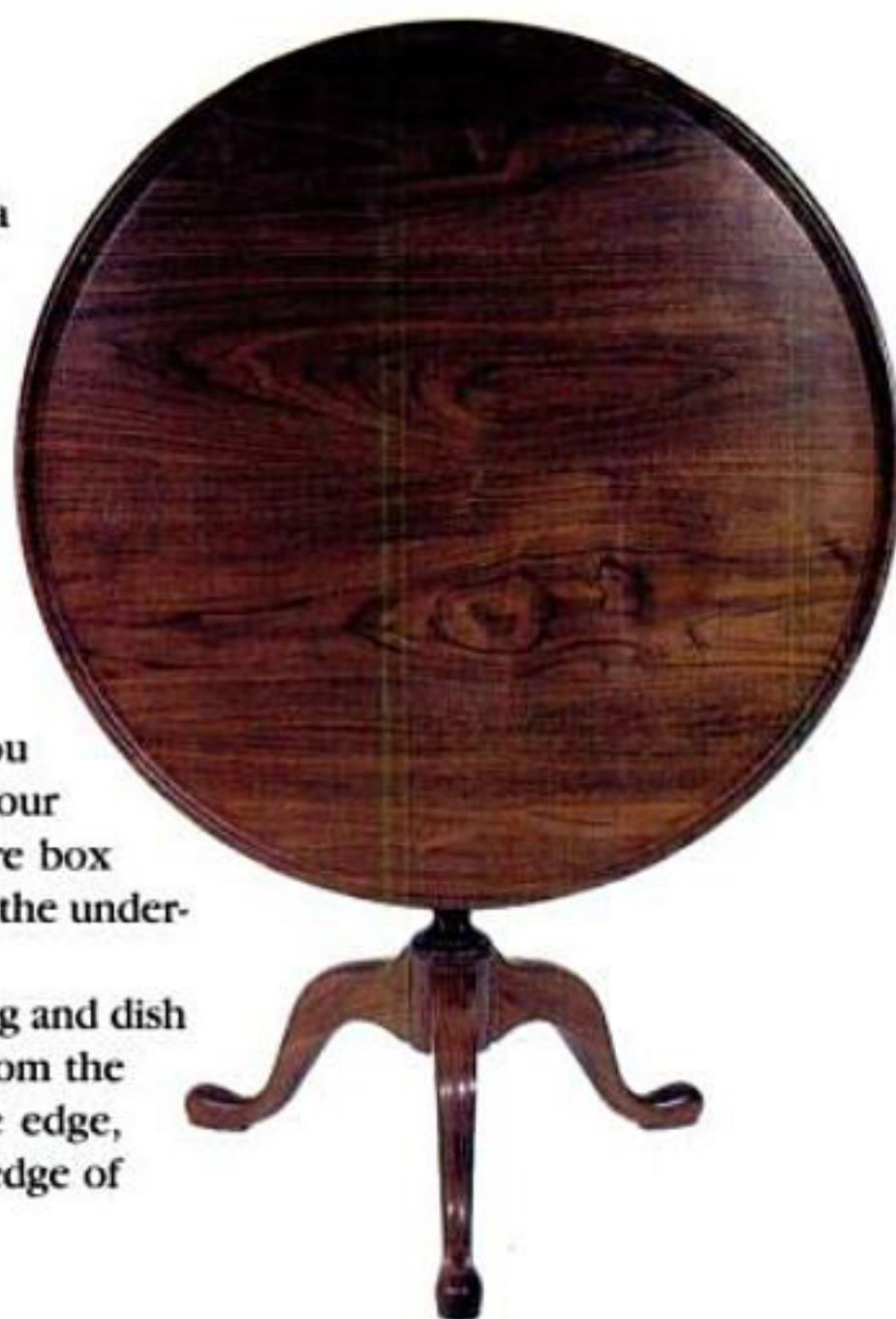
DISHING A TABLETOP WITH A ROUTER

Dishing a round tabletop on the lathe requires a fairly sturdy lathe. You can accomplish the same thing with a router and a simple pivot pin jig. (See drawing.) The jig is simply a plywood board with a plunge router mounted underneath at one end (with the bit exposed). The other end has a slot for the pivot ($\frac{1}{4}$ -in. bolt).

To use the jig, bore a $\frac{1}{4}$ -in. dia. by $\frac{3}{8}$ -in. deep hole in the center of the tabletop's upper side and place the top upside down over the jig with the hole over the pivot bolt. You can then rotate the top on the pivot, while the router cuts the rim's profile (both inside and out).

You'll need a few different bits to shape the rim, though if you don't have the suggested bits, feel free to modify the edge to suit your available bits. I recommend a straight bit for cutting the fillet, a core box bit for the cove, a $\frac{1}{4}$ -in. round-over bit for the bead, and for rounding the underside edge of the top.

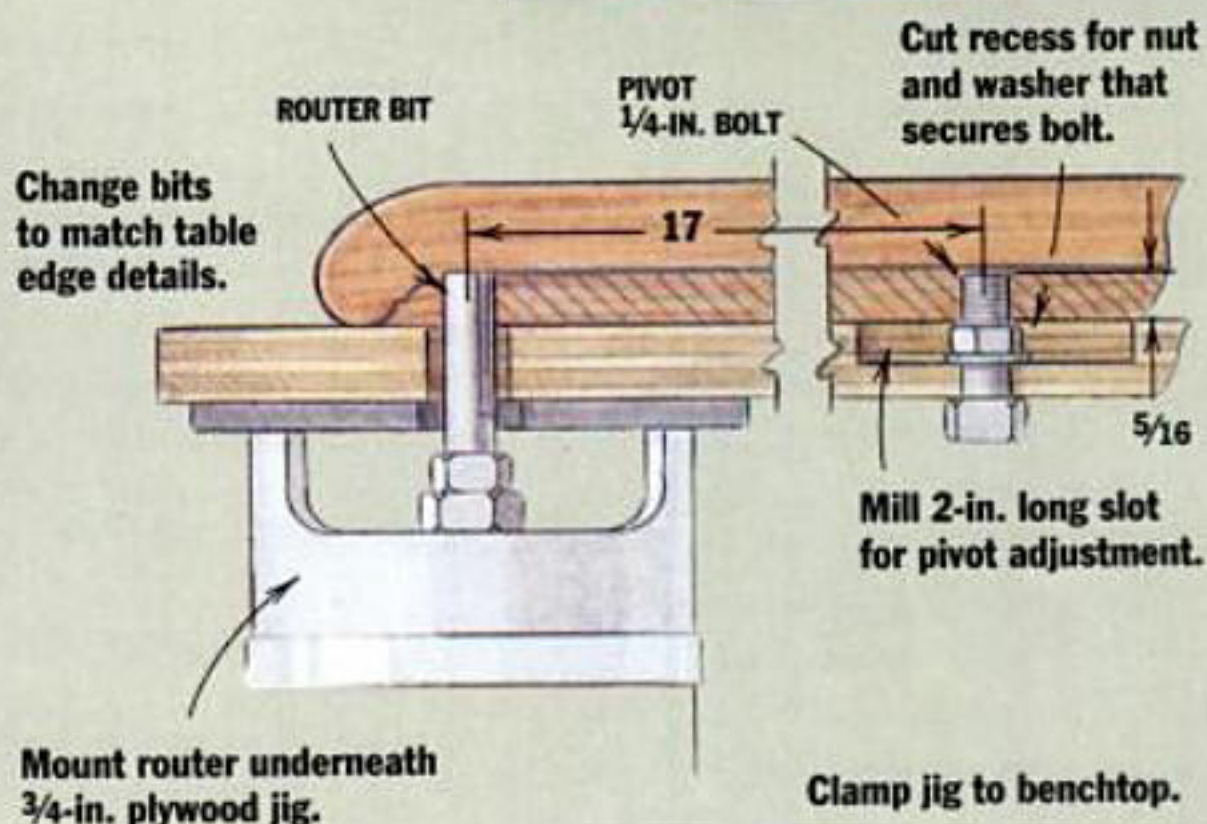
Use the jig to shape the rim only. Then remove the top from the jig and dish the rest of the top freehand with a router and a straight bit. Work from the center of the top outward toward the edge. As you approach the edge, you'll need to provide extra support for the router just beyond the edge of the top.—L.B.

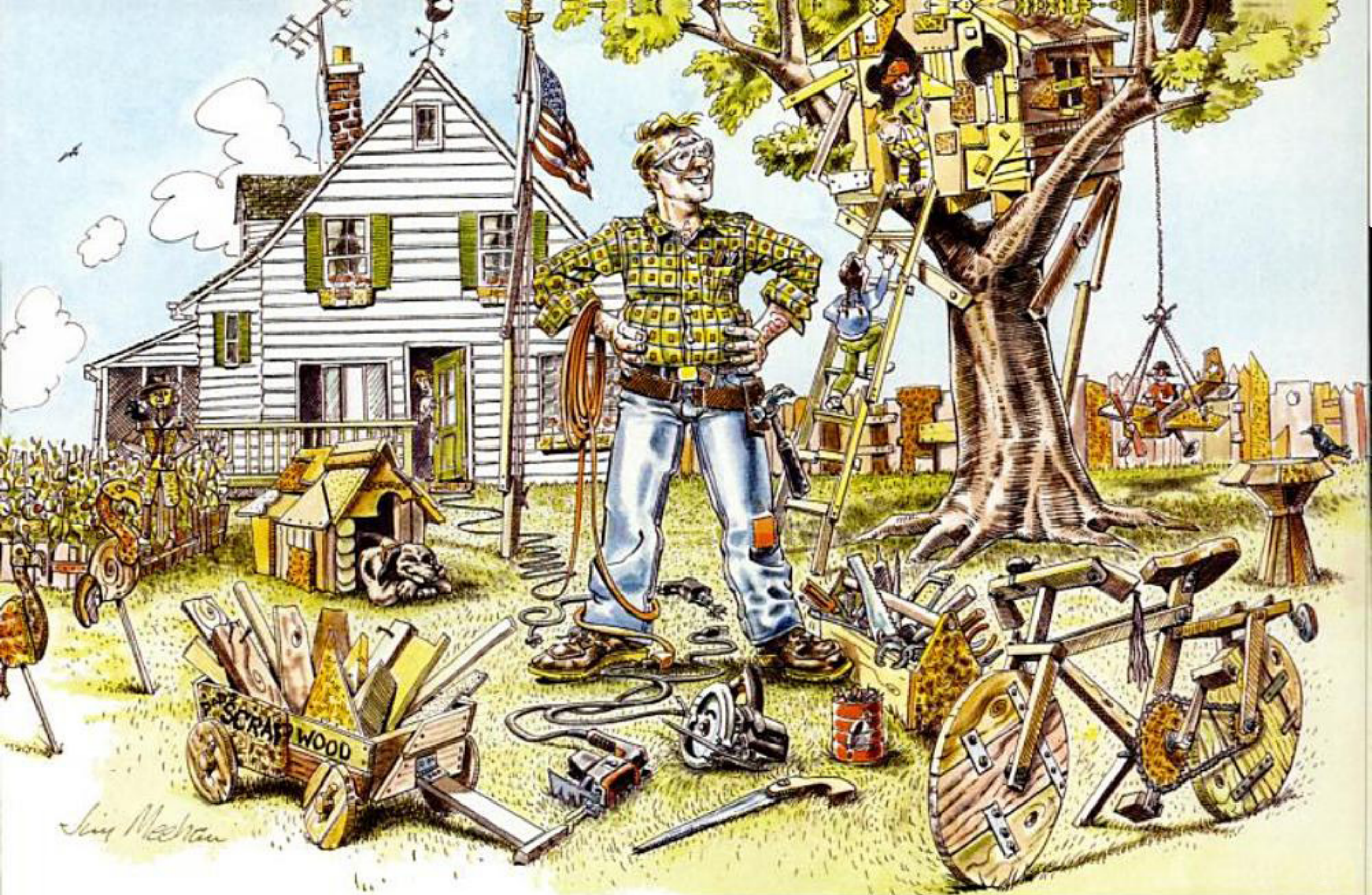


DISHING JIG

A simple plywood pivot jig secures the router for routing the tabletop and cutting the ogee profile.

Moving the pivot in a 2-in. slot determines where the bit contacts the tabletop.





DEALING WITH SHOP SCRAP

*Clever Ways to
Remove the Clutter*

BY JIM CUMMINS

Every woodworking job produces its share of scraps. Some are obvious treasures because they're a size or species that's hard to replace. Others might be sentimentally loaded, such as wood harvested from a tree you used to climb as a kid. Still others are good wood that's a normally unusable size, such as a stack of clear, short boards produced as offcuts.

If you have a place to tuck this stuff away, your shop will be richer for it. These scraps will give you the chance

to broaden your woodworking interests and try new skills. To me, a shop without an interesting scrap pile is like a refrigerator without any snacks.

But if you can't store scrap efficiently and use it regularly, it will accumulate to choke you.

Weeding Out

Controlling your scraps should be a routine, painless part of your work, not an involved distraction. Don't fret over "wasting" obviously useless stuff.

Condemn it to the trash or burn pile immediately. Then put the good wood back into storage, separating out any knotty, waney, warped or twisted scrap until you can deal with it all at once—such as when you're about to change knives and sawblades.

While your planer and jointer knives are chipped, you can plane twisted or dirty wood down to a clean surface, ensuring your re-sharpened knives will have a longer life. This also pertains to sawing. When a tablesaw blade starts

to cut poorly, use it to make the rough cuts you'd normally avoid—dirty wood, hard knots and bark inclusions. Remember, though, it's dangerous to cut with an extremely dull blade.

This strategy will take care of 90 percent of your scrap, but what about the rest? Consider a short mahogany board left over from a job. You know you'll be working oak for the next six months and don't have any mahogany projects in mind. What to do? Experience tells me you should probably bite the bullet and get rid of it. Otherwise, you'll still have it five years from now, along with 20 other odd boards you don't know what to do with. So make a quick box, or even an oak-mahogany chessboard. Or trade it for a piece of the wood you'll be working. Any woodworking club should have a newsletter or a bulletin board featuring trades.

Storage

Your shop probably specializes in a particular kind of raw material, whether it's sticks, boards, sheets or chunks. There's no best way to store things, but your strategy should be built around the stuff you work with most often. Look at the racks, shelves and bins around any lumberyard for ideas.

My shop, for example, buys and makes a lot of molding. We store it in a horizontal rack (see photo, right) like the trim-molding rack at my lumberyard, but my compartments are smaller and there are a lot more of them. You can make smaller-scale racks especially for scrap sticks by building cages of wire fencing or even stacking PVC pipe with sticks stored not only in the pipes but between them.

I chose horizontal racks because the molding I deal with is too long to store vertically. Yet vertical racks arranged in aisles have advantages. They can have open fronts so they're easier to clean and sort through, and gravity files things to length automatically. Also, vertical racks won't tie up the workshop the way horizontal racks will, where you need about as much free space in front as there is inside to maneuver long sticks.

We store lumberyard boards flat underneath the rack until they're dry.

As we put them away on delivery, we note each one's quality and mark the end as to future use. This system would work with scrap boards, too, as would color-coding—the way a lumberyard sorts its dowels. You can use colors to indicate length, grade, thickness, diameter or whatever suits your needs. Hang a set of rainbow-colored wide-tip markers on the wall to make the job relatively simple.

Other ways to store boards include mounting angle-brackets to a wall, or suspending shelves from the ceiling. With open shelves on brackets you don't need end space to withdraw and insert your stock—and you can run them the full length of a wall. Storing the scraps on top of the boards gives you more incentive to use them since they're the first pieces you see and touch when you go to get wood.

Also, don't overlook normally "dead areas." Say you're storing long boards horizontally on 2x4 angle brackets. You can create cubbyholes between the brackets by screwing plywood to the bottom of the 2x4s.



This molding rack made from 1x1s is a series of hanging grids extending back 12 ft. You can use similar small-scale racks to store dowels, scrap or other long and thin stock.



Woodturners can reduce scrap and check stock for defects at the same time by sawing square blanks into octagons. The no-math, no-measurement trick shown in these two photos sets the saw fence at the perfect distance to produce an octagonal turning blank. Tilt the blade to 45°. Rest the squared stock against the blade (left), and bring the fence up until it touches the corner of the stock. Then lay the wood flat and run it by the blade to remove the corners. The same idea works on the band-saw with the table tilted to 45°.

PHOTOS BY KEVIN IRELAND



These two fixtures convert waste strips into laminated “boards” that can be used for many products. To make the breadboard, for example, contrasting strips were glued up in the short jig until they were about 5 in. wide. This 20-in. “board” was then crosscut in the middle to make two 10-in. boards that could be “bookmatched” between wider oak scrap strips.

defects that would cause you to junk the blank during turning.

Chunks, the last category of materials, are the woodturner’s meat. You can store a lot of these on shelves or in bins, but remember: it’s the quality of the pile that counts, not the quantity.

Steady Uses

As a source of wood for interesting projects, the scrap pile is a gold mine. Even tiny pieces of wood can yield belt buckles, chopsticks, hair clips, handles for your pocket knife and many other objects. You can turn jewelry on a lathe. Or use a motor tool to sculpt pieces so tiny you have to hot-melt glue them to the end of a stick to work them. I suspect you could make beads and buttons by running them through a rock-polishing machine. And you could use precious scraps for tools, marking gauges, try-squares and handles, just as the old-time craftsmen did.

You could also decorate existing furniture with inlays of sentimental woods. Or use a drill press as a rudimentary lathe for turning occasional knobs and finials. Just epoxy a threaded rod onto the scrap, bandsaw it round, then chuck it in the drill press and use the belt sander for shaping.

But these projects are mostly diver-



To make hoops, band-clamp a thin strip around a basketball, using a band-sawn “bridge” under the clamp head to maintain the curve. Then inflate the ball to tighten the lamination.



A shopmade jig such as this prototype will rout clear, short boards into trivets or other quick projects. Clamp heads on the underside hold the work against a fixed right-angle fence and two right-angle shims that help center different size stock.

sions that don’t use much wood. Slightly better would be a production run of bases for pen-and-pencil sets. Or replacing the plastic handles on good, stainless tableware sets with beautiful wood.

Templates

Having a few templates for production items can encourage you to convert scrap even as you make it. Just trace the template onto the scrap, roughly cut the parts to size, then store them in a net bag (such as the kind oranges come in) until you get a complete set of whatever you’re making. With these hanging on the wall, you’ll be constantly reminded of which projects are in the works.

A really good template will let you make things with little time wasted on calculations and machine setups. For example, the template shown on page 33 (see Scrapwood Cam Clamps) gives you all the dimensions, saw settings and hole spacings you need to make a clamp. You can make a lot of these before you have too many. And you can sell your surplus.

You can apply the template idea to birdhouses, production boxes or whatever. For projects requiring several templates, hook the templates together with a key ring or piece of wire.

Templates can have ingenious features, too. In addition to serving as patterns for tracing or overall shape, they can have notches showing where each piece of wood will glue to its neighbors. You can make them from Plexiglas to allow you to best orient grain direction. You can design them with integral fences and pins to precisely locate stock and keep it from slipping. A template can double as a router guide, incorporate precise angle settings or even be a push stick.

Jigs and Fixtures

As a result of rabbeting, my shop’s scrap includes a lot of thin strips that I can turn into kitchen cutting boards and other familiar craft items. You can dress these strips safely on the table-saw, using feather boards and a hold-down block above the blade, then glue them up. Clamping fixtures let you painlessly glue strips into “boards,” using wedges to apply the pressure. (See photo.) You mount the fixtures to

A PRO'S APPROACH

In my profession of picture framing, scrap accounts for about 25 percent of my materials and I have to deal with it ruthlessly.

My crew and I have stopped trying to save odd-sized pieces of glass, for example, because these prove impractical to sort through and prone to damage. Instead, we cut all scraps to standard sizes and file it with the new glass.

Similarly, we cut all scraps of mat board to standard sizes and store them vertically in bins mounted atop a cabinet where they're easy to page through. We avoid confusion between similar colors such as beige and ecru by filing the boards in alphabetical order.

To bring some sanity to storing hundreds of styles of

[molding](#), we put cut pieces back in the rack (see photo, [page 29](#)) with the mitered end facing out to indicate that they are not full length. Scraps shorter than about 2 ft. go into vertical bins mounted above our miter machine. The compartments have built-in gauges at 6, 9, 12 and 18 in. so we can see at a glance if a piece is long enough for a job.

But is my scrap flow under control? We had a frame-it-yourself room a few years ago, at the height of the fad. It was located in a drafty, uninsulated room that we were able to heat comfortably with scraps in a wood stove. When the fad died out, we eventually ran out of customers, but we never ran short of fuel.—J.C.



A round magnet prised from the back of a discarded speaker makes a convenient stop when bandsawing assorted scrap to usable length. It's easy to adjust, yet it takes a serious whack to move it.

a wall and then clamp and glue scraps together as you cut them.

Strips of interesting wood don't even have to be full width to be useful in this setup. After you laminate the main board, you can run a shallow saw kerf down its full length and then glue a narrow contrasting piece into it. You can also use this trick to cover and reinforce a less-than-perfect glue joint.

I've even turned these strips into hoops, using a simple basketball press. (See photo, previous page.)

The router is a terrific machine for converting scrap into finished products. The bottom photo on the previous page shows a jig that makes kitchen trivets from waste. You clamp the work beneath, then rout a series of grooves halfway through it. You just flip the work over and rout grooves in the other direction to complete the grid.

Keep in mind that you can easily hide most small defects in scrap. A

craft-store owner once lovingly handed me a small box lid and said, "Just look at that craftsmanship!" The lid showed a perfectly round, contrasting inlay as decoration, something the store owner took for a level of workmanship that died out around the middle of the Renaissance. What the maker had done, actually, was to drill a hole clear through the lid, pound a dowel into it, and sand it flush. "Mmm..." I said in appreciation, handing it back to him. What defect the dowel disguised, I certainly don't know.

Getting It Out Of the Shop

What you make from your scrap will depend on the type of wood you have, your machines and your whim. Somebody locally will take all you can make of something. The trick is to find out what that something is. It doesn't have to be complicated. For example, I knew a guy at the local lumberyard who set up a spare-time business drilling out plugs for contractors to use in floors. That guy had the smallest waste pile I'd ever seen, and all of it was full of holes.

If the plug market in your area is sewn up, you might apply the same idea to cutting circles for toy wheels. You or somebody will use them eventually. Or you could make sets of rectangular building blocks.

You could glue up carving blocks such as those used for decoys. If you don't feel like getting into carving yourself, you can sell the blocks to the nearest art supply store.

A computer-printed label and a professional-looking package will aid sales

and give the product respectability. Mesquite scrap for barbecues sells rapidly around here, partly because it's packaged in a neat, attractive bag. Your hickory chunks (or apple, alder or whatever other wood will make flavorful smoke) could sell in a similar fashion.

Even if you personally don't want to sell the work, you can give it to a church fair or other charitable event and earn an income tax deduction.

Getting down to the ultimate scrap, planer and jointer shavings make good animal bedding, with the notable exception of toxic woods such as walnut and a lot of exotics. And sawdust can make mulch, or be bagged as aromatic sachets.

Or forget profit and just build good will. I heard of one guy who gave his friends toilet seats, presumably made from mitered scraps assembled into a ring. He could safely say his friends thought of him regularly.

Whatever you decide, the main trick is to make scrap management as routine as machine maintenance or sweeping the floor. Good habits make the rest of life more enjoyable—that's why we bother with them. ▲



JIM CUMMINS
writes, edits and putters around his picture-frame shop in upstate New York.

SCRAPWOOD CAM CLAMPS

BY JIM CUMMINS

Cam-action clamps can substitute for regular screw-type bar clamps in many applications. You just slide the clamp heads until they contact the workpiece, then turn the cam to flex the tongue and apply some pressure.

Traditionally, cam clamps are made from hardwoods like beech, but plywood scraps are even better. As Fig. 1 shows, the head assembly on this scrapwood clamp consists of a core of plywood sandwiched between two "cheeks." Cut-outs in the core provide

the "mortise" for the bar and the relief area for the cam, which pivots on a dowel pin. For convenience, the core, cheeks and cam all are made from the same basic blank, which is 1½ in. wide by about 7⅞ in. long.

With the template shown here, no measurements are necessary. You use its width to set the tablesaw fence for ripping the core, cheeks and bar, and the overall length to set the core and cheek crosscuts. In addition, the template contains the profiles for the cam and the cam relief area, the length and width of the heel, and cut-outs marking the beginning and end of the saw cuts for the tongue and bar "mortise."

If you make your template thick and durable enough (mine is aluminum salvaged from the baseplate of a defunct circular saw), it can serve as an exact guide bushing for drilling the holes for the dowel pin. Finally, you can use the template as a spacer for creating the "mortise" for the bar (see photo, opposite page), and as a scraper to remove dried glue beads. Best of all, you can't misplace half of it—it's one piece.

Making the Clamps

If you are making the clamps from ¼-in. plywood, you'll need six blanks for each clamp head. One for each cheek, two that you'll glue together to form the core and two more that you'll glue to form a cam blank. (You can cut two cams from each blank and save one for the next clamp head.) You'll need to glue up some additional scraps for the bar.

Start with the core. Trace the cam relief area on the core blank and band-saw the waste. Then trace a line along the edge of the "mortise" that is closest to the tongue and crosscut it. (Save the scrap end; it will become the heel.) Next, glue the cheeks to the core and



PHOTOS BY KEVIN IRELAND

These cam clamps offer moderate clamping power and are easy and inexpensive to make.



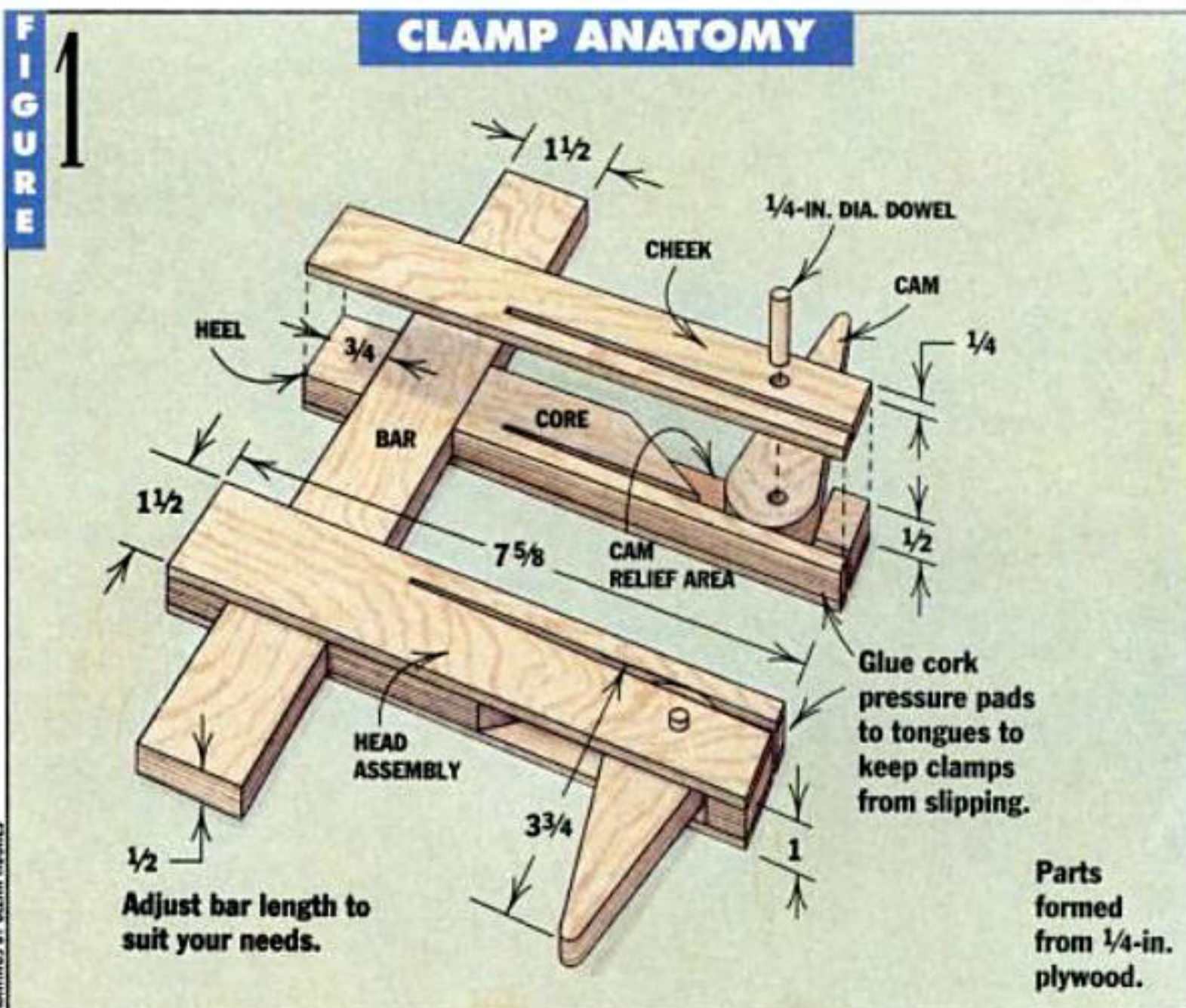
During glue-up, use the template as a spacer to determine the width of the bar "mortise."

the heel, using the width of the template as a spacer to create the "mortise" for the bar. (See photo.) The heel will project beyond the end of the head assembly at this point, but you will cut off the waste later.

Now lay the template on the assembled head and drill the dowel pin hole. With that done you can trace, then bandsaw the tongue slit. Follow up with a freehand cut to widen the original slit to increase the flexibility of the tongue.

Slip the cam into place and try the action, making adjustments to the cam profile if needed. If you have to reshape the cam consistently, modify your template.

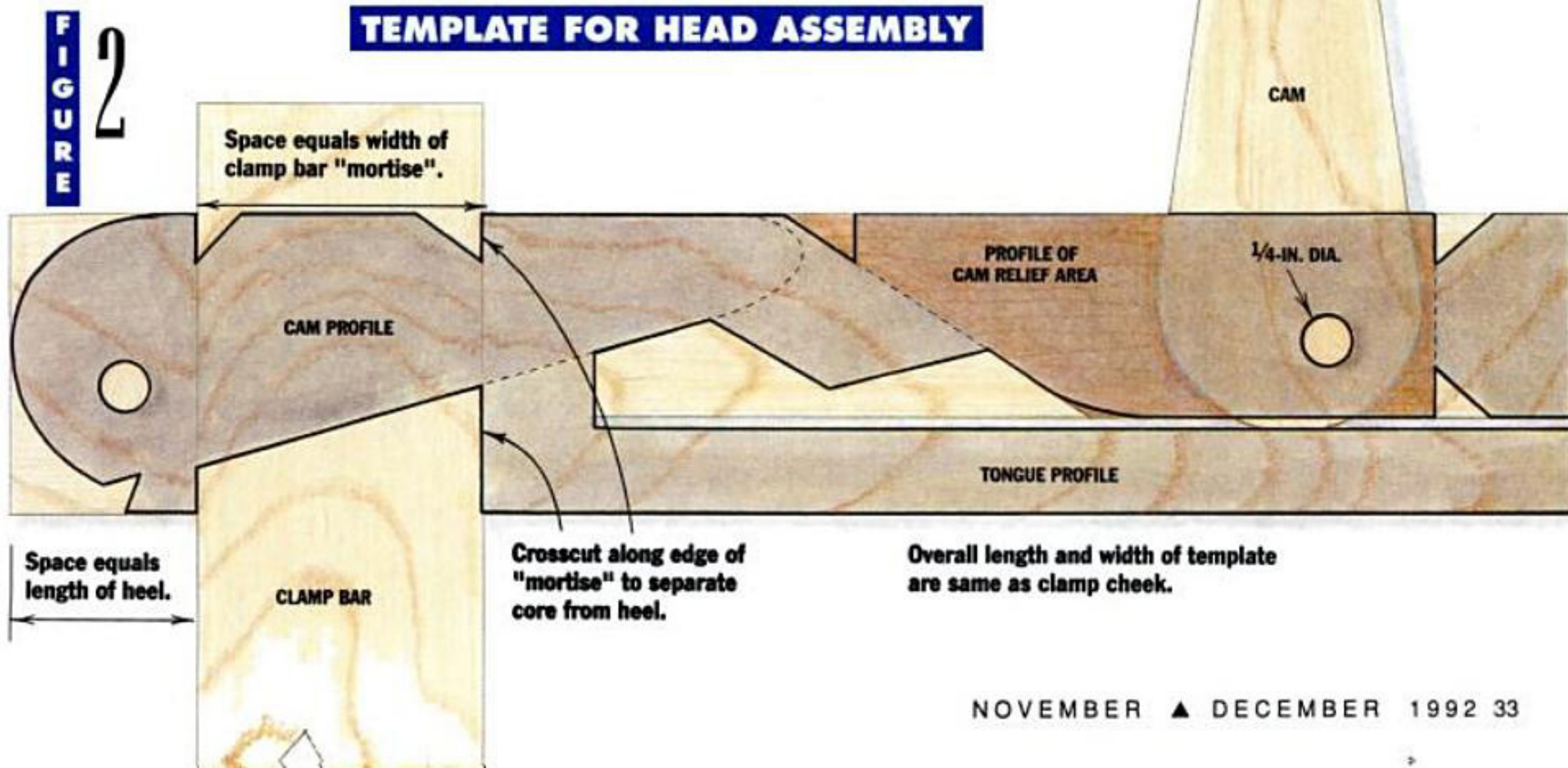
Next, remove the cam, cut off the protruding heel, and dress the edges of all clamp parts to remove glue beads. Insert the cam again and secure the dowel with a tiny drop of glue—you might want to drive it out later for repair or adjustment.



You can make this clamp with one fixed head if you want, but I like to leave both heads free. This way I can use them on bars of various lengths, making it easier to fit the clamp into tight spaces. Sand the bar to thickness to produce a good sliding fit.

You can easily make one clamp at a time, or rough-cut and stockpile the standard-size pieces until you have a bagful. The cam heads don't even need to be on a bar. The router jig shown on page 30 has a couple screwed to the bottom to hold the work in place.

TEMPLATE FOR HEAD ASSEMBLY



FIRE

Woodworker Ric Hanisch sees scrap as the start of blazing art.

PALACES

BY RIC HANISCH

I call these structures fire palaces because they are built to burn—they're designed for the single purpose of releasing the stored energy of the sun.

The basic fire palace runs 18 in. to 4 ft. tall and is constructed like a log cabin. (See photos.) Larger strips go near the bottom, thinner ones on top, and shavings and smaller pieces go inside as kindling. Dollops of glue, placed where side pieces overlap, hold it all together.

Once aflame, a fire palace can burn for up to 30 minutes and produce 10-ft. flames. A spectacular setting for a firing is in the middle of a pond, where the reflection off the water doubles the fiery effect. To set a palace afloat, I contrive a barge of plywood with a 2 x 4 edge and a sand bed.

Try a fire palace at your next picnic, or take a box of parts along with you on your next vacation and assemble one as a family project. Kids love to be architects/sculptors for the few hours it takes to construct one. ▲





Many combination machine owners, like Total Shop owner Bob Gonzales, have to work in confined spaces.

A BUYER'S GUIDE TO COMBINATION MACHINES

*Shop-In-A-Box
Technology for
Every
Pocketbook*

BY ELLIS VALENTINE

Who hasn't come face to face with a Shopsmith? This ubiquitous piece of machinery that seems to do 1,001 things to a piece of wood crops up on television, in shopping malls, in your neighbor's basement—maybe even in your own basement. A lot of people swear by the Shopsmith because it's compact, versatile, doesn't cost a fortune, and meets their woodworking needs.

But the field of combination machinery includes another type of combination machine as well, one that has been popular in Europe for a long time. These "machining centers," as they're called, are tablesaw-based and generally larger than the lathe-based,

Shopsmith-type machines, with different abilities. ([See chart, page 40.](#))

Still, combination machines, with the exception of the Shopsmith, haven't caught on yet in the United States. Most American woodworkers still prefer the relative convenience of single-purpose machines. To find out why, and to learn more about combination machines, I talked to the manufacturers, surveyed about 100 owners, and tested machines made by Shopsmith, Total Shop, Kity, Robland, and Felder. I decided that there are actually some very good reasons to purchase a combination machine, along with some undeniable drawbacks.

Why Buy a Combination Machine?

The concept of combining several woodworking functions into one machine is not new. The earliest combination woodworking machines were made in the mid-1800s in England. These cast-iron behemoths actually did take up less space than single-function machines available then, but only one person could use the combination machine at a time. This made them suitable only for one-man shops, or for very large shops where they were often dedicated to one or more specialized operations.

Over the past 100 years, advances in engineering and manufacturing, along with the development of compact elec-

tric motors, have transformed combination machines into the sophisticated, and in some cases portable, units of today, with many good features.

Space-savings tops the list of reasons to buy a multipurpose machine. A combination machine takes up less room than four or five individual machines, and you can generally use the same infeed/outfeed area for all functions. Even the largest models can be rolled into a corner when not in use.

Economy is another popular reason to buy, although it depends on what your alternatives are. To make a fair comparison, weigh the *direct* cost of the combination machine against the combined cost of equivalent single-purpose machines you'd have to buy, either new or used. In any event, your *indirect* costs for shop wiring, lighting and dust collection will be lower because you're dealing with just one machine.

Portability is important, too. All the machines I tested offered casters, and some machines were compact enough to be loaded in a station wagon. Several contractors told me they bought their machines exclusively for jobsite use.

Versatility is another advantage. David Meltzer, a Felder owner from Dallas, observed that combination machines represent the "best available way to [tackle] the majority of commonly encountered woodworking problems." For most owners, the ability to accomplish a wide range of tasks with one machine outweighs the inconvenience of setting it up for each operation.

Combination machines derive special abilities from their basic engineering. On the Shopsmith, for example, you can use the tilting table for sawing, sanding, drilling or horizontal boring, eliminating the need for specialized jigs and fixtures. (See photos, page 37.)

Finally, the "instant-shop" capability of a combination machine has appeal to beginners and journeymen alike who want to start cutting wood right away, without waiting to acquire and hook up four or five separate machines.

Disadvantages of Combination Machines

A jack-of-all-trades, as the saying goes, is master of none. In the case of combination machines this is not *necessarily* true, but there are some inescapable trade-offs:

Only one person can work on a combination machine at a time, so even though you have the capability of five machines, you have the productivity of one. If you work alone, this won't be a critical factor.

Kity, Robland and Felder, three European manufacturers, offer a partial solution to this problem—*separable* machines. They may be combined or separated as needed, and may be oper-

move belts or couplings. One minor irritation of the larger machines, though, is the hassle of changing between the jointer and planer, a process that involves cranking the planer bed up and down several inches so you can swing the dust-collection chute into position.

Combination machines force you to organize your work differently. If you typically make small production runs or work from parts lists, you probably won't mind all the changing because you're used to setting up once for each machine function. But if you prefer to work in sequence (i.e. face and edge your workpiece, then plane, rip, crosscut and shape it), you could get tired of constantly resetting the machine.

Dadoes are a problem on the European machines because dado heads won't fit. Their tablesaws' arbors weren't designed to accommodate thick blade sets.

Also, the switches on the European machines with multiple motors take some getting used to. Even though only one function will operate at a time, the lit-

tle symbols on the selector switches can be confusing, and you have to be sure to select the one you want.

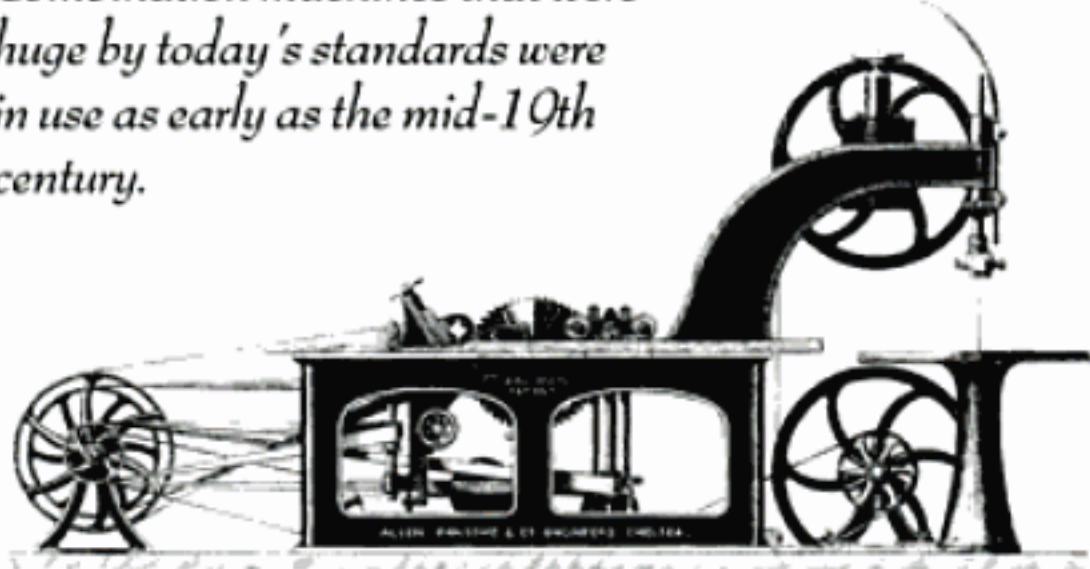
The Last Word

There weren't any clear winners or losers among the machines I tested. (See following pages.) They offer different advantages to different woodworkers at different prices, and their owners seem to love them. If you're thinking of buying one my advice is to read the following reviews and chart, then let your personal woodworking style, pocketbook and preferences dictate which is right for you. ▲



ELLIS VALENTINE
is associate editor of *AMERICAN WOODWORKER*.

Combination machines that were huge by today's standards were in use as early as the mid-19th century.



ated separately as well.

Rip capacity may be less than on a conventional tablesaw, especially on the European machines with the jointer/planer adjacent to the tablesaw.

Changeovers take time. Although manufacturers tell you how quickly you can move from one operation to the next, a majority of owners considered changeover time the biggest single disadvantage.

Changeovers were more annoying to owners of the lathe-based machines—Shopsmith and its clones—which rely on one motor to power all the functions. On these machines, changing over requires coupling or reconfiguring the motor to the new function *and* changing arbors, chucks, blades, etc., as well. No single step takes much time, but together they add up.

The European machines were less complicated to change over because, with the exception of the Kity K5, they all had three motors dedicated to different tasks, so you aren't required to

SHOPSMITH MARK V



Shopsmith is the undisputed sales leader in multipurpose machines, with more than 424,000 units sold since 1947.

The Shopsmith Mark V has a single 1½ hp motor and Reeves variable-speed drive unit (expansion pulleys). These power five standard functions (see chart, page 40) and a mind-boggling assortment of optional accessories, including a 4-in. jointer, 20-in. scroll saw, 6-in. belt sander, 12-in. planer, 1-in. bandsaw, router conversion kit, drum sander, biscuit joiner and strip sander.

There are actually two versions of the Mark V—the Model 510, tested here, and the earlier Model 500. The Model 510 has an improved saw table with extension legs, better blade guards and a sturdier rip fence, and it costs about \$300 more.

In addition to the machines, Shopsmith offers a wide array of services, like local courses of instruction, videotapes and project plans. It has retail stores and a large mail-order catalog designed to make Shopsmith the one-stop shopping center for the large hobbyist market.

Because of its innovative design, the Shopsmith allows you to do many types of work, like lathe and drill press functions, that the European combination machines do not. But Shopsmith is not designed for heavy production woodworking. Some owners use it as a dedicated machine for specialized tasks like angled drilling, compound sawing and sanding, and horizontal boring. One of its unique features is the eccentric tailstock, which makes off-set turnings easier.

The Shopsmith is a well engineered machine. It requires only one Allen wrench to make most of the changes. Maintenance is easy, repair frequency is low, and the resale value is high. Also, the company stocks parts for all older models.

The biggest complaint from owners involved the need to frequently change



The Shopsmith has some unique features, like the quick-clamp miter gauge (above) and the tilting table for horizontal boring and disc sanding (below).



attachments. Also, several owners didn't like the tilting table for crosscutting, especially with long boards.

Recommendation:

You should consider a Shopsmith if you're a beginner, hobbyist or do-it-yourselfer, with limited shop space and a tight budget. Don't plan to work with large timber or lots of plywood; this machine is best suited for crafts, small production items, spindle turning and occasional pieces of furniture.

SHOPSMITH CLONES: TOTAL SHOP; CENTRAL MACHINERY

When the patent on the Shopsmith Model 500 ran out in 1975, low-priced copies of the basic machine began to appear on the market. Today, there are at least two companies, Total Shop and Central Machinery (Harbor Freight Tools), that sell clones of the Model 500 for several hundred dollars less. The Shopsmith Model 510 is still protected under various patents.

Although the clones accept almost all Shopsmith accessories, Shopsmith company policy prohibits it from selling accessories to owners of clone machines. Also, Shopsmith will not warranty accessories used on clones.

Although I didn't get to see a Central Machinery unit, I did visit a Total Shop owner to test his machine. (See photo, page 35.) The fit and finish of the Taiwan-built Total Shop were not quite as good as the American-made Shopsmith. This led to some doubts about the machine's overall quality. But in one crucial test I was able to rip through 1-in.-thick red oak easily, without any appreciable teeth marks that might have indicated wobble, runout or misalignment of critical tablesaw components.

One problem I did notice with the Total Shop was table deflection when using the horizontal borer, which

would yield crooked holes unless you clamped a stabilizing beam between the main table and the fixed extension table. (The Shopsmith Model 510 solves this problem with a rail system that keeps the table from deflecting when this sort of stress occurs.)

Recommendation:

If price is your biggest concern, these clones will do everything the basic Shopsmith Model 500 will, for less money. Both Total Shop and Harbor Freight Tools are reputable companies, but neither can provide the range of accessories or the comprehensive sales and service of Shopsmith.

KITY K5

Kity (pronounced "kitty") is a French manufacturer that produces only machinery for home workshops and small production shops. Its K5 "machining center" consists of three *separate* machines, all mounted to a small platform. A single 1½ hp motor powers one machine at a time. To change from one machine to another, you simply flip a small flat drive belt onto the pulley of the desired machine.

The K5 is designed to provide the same five basic functions as the larger European machining centers, but on a smaller scale and at half the price of the least-expensive competitor.

The K5's portability is its most popular asset. Several owners said they bought the machine expressly for job-site work.

Another nice feature is the layout of the individual machines on the platform. The jointer/planer is mounted lower than the level of the tablesaw so it won't interfere with saw operations,



PHOTO COURTESY OF FARRIS MACHINERY

and the shaper swivels to allow clearance for jointer/planer operation.

Every owner that I surveyed found the 8-in. tilting-table tablesaw least useful of the five functions. They thought it was underpowered and difficult to adjust. The standard machine doesn't have any cranks or levers to raise, lower or tilt the table, but an optional table-elevating lever is available for \$39.95. You can extend the rip and outfeed capacities with optional sup-

port tables ranging in price from about \$180 to \$480. The K5 I tested produced an excellent cut but I had to feed thick stock slowly. A clever right-angle miter gauge is standard.

The ¾-in. spindle shaper performs well and has a convenient hold-down system, but there is no micro-adjustment on the fence.

I was impressed with the 6-in. jointer/planer, which produces a beautiful surface and has two disposable, double-edged knives that are easy to set.

One limitation is the left-hand (counterclockwise) rotation of the mortising/boring chuck, which requires special drilling and mortising bits available only from the distributor.

Recommendation:

The K5 will produce professional results in a very small amount of space. It is suitable for hobbyists of all skill levels, furniture makers who don't need large machine capacities, and job-site work.

KITY 609/638

Kity recently introduced a line of larger multipurpose machines to the American market. The 609/638 combination machine is actually two *separate* machines—the 609 tablesaw/shaper, and the 638 12-in. jointer/planer with optional horizontal mortising/boring attachment. Kity also offers two 10-in. jointer/planers, the 636 and 637, that may be substituted for the 638, at very substantial savings.

The ability to separate is a real advantage for the 609/638. The machines fit through doorways and two people can work at the same time. If you separate the machines, you can use the optional extension table to increase ripping capacity to 35 in. You can put an after-market rip fence on this saw, but you'd have to keep the machines separate. The rip fence is extruded aluminum and can be moved forward or backward for different ripping tasks. Lightweight, accurate, cast-alloy tables add to portability and will not rust or corrode.



PHOTO COURTESY OF FARRIS MACHINERY

The rolling table, used with the tablesaw and shaper, works smoothly and has a telescoping fence with a stop for repeat cuts. The raise/lower lever for the saw blade works quickly and smoothly, but it's somewhat tricky to set blade height accurately.

The three-speed shaper has a lighted control panel and tilts from -5° to +30° from vertical. Microswitches on the shaper access door and the jointer-bed hinges prevent you from accidentally starting a motor. The shaper fence was the best one that I tested. It has conve-

nient hold-down and hold-in features and micro-adjustment capability.

Jointing and planing were a pleasure on the 638 machine, although one owner said he thought the planer feed speed was a bit fast for the final pass on some hardwoods. The three disposable double-edged knives are easy to set accurately.

The mortiser (which I didn't test) has the same limitation as the K5's, the counterclockwise rotation. Also, because of the fast chuck speed (7000 rpm), you shouldn't drill holes larger than about ½ in. diameter.

Recommendation:

The Kity 609/638 is a full-sized, professional combination of machines for the intermediate to advanced woodworker. If you'd like to save some money and can get by with a 10-in. jointer/planer, I'd suggest looking at Kity's 636 or 637 models instead of the 638, and make alternate plans for mortising and boring.

ROBLAND X31

The Robland X31, manufactured in Belgium, is a true, single-chassis combination machine, with a 10-in. tablesaw, rolling table, a tilting-spindle shaper, a 12-in. jointer/planer, and a horizontal mortising/boring attachment—all included in the basic package. It is slightly smaller and heavier than the Kity 609/638, and has cast-iron tables. Options include a larger rolling table for bigger plywood work (\$150 upcharge); a variable-speed planer feed motor (\$395); and a "mobility kit," including casters and tow bar (\$125) for moving it around.

On the whole, the Robland is a solidly built and smooth-running machine. Like other single-chassis machines, the rip capacity is limited because of the attached jointer/planer. (See chart.) Its sturdy rolling table allows you to crosscut a 4-ft.-wide piece of plywood, although one owner told me that the larger rolling table was



PHOTO COURTESY OF LAGUNA TOOLS

a good investment. An arbor-locking pin makes blade changing easy. I had some difficulty, however, making precise blade height adjustments with the raise/lower lever.

The 3 hp shaper has a stepped spindle that accommodates cutters with either 3/4-in. or 1 1/4-in. dia. bores. It is very straightforward, with only one speed (5500 rpm), and the spindle doesn't tilt.

The rugged jointer/planer cut very

well and left a smooth surface on all the wood I ran through it. Still, one owner recommended the variable-speed planer feed option because he occasionally found the standard feed rate of 29 fpm to be too fast for the final pass on hardwoods.

The mortiser, which attaches to the side of the jointer/planer with two bolts, produced very smooth slot mortises, although the cam-action hold-down clamp had a tendency to dent the wood. This could be eliminated by using a scrap block between the clamp pad and the work.

Recommendation:

The Robland X31 is a sturdy and capable one-man shop for the intermediate to advanced woodworker. It is best suited for furniture construction and millwork. While it may be moved around the shop fairly easily with the optional "mobility kit," at 1,100 lbs. this is definitely stationary equipment.

FELDER BF6 26, BF6 31, AND BF6 41

Felder is an Austrian company that has been making woodworking machinery for more than 30 years. Its three combination machines offer rugged, heavy-duty features and uncompromising attention to detail over a range of capacities and prices.

The only difference between the BF6 26 and the BF6 31 machines is the size of the jointer/planer. (The BF6 26 has a 10 in.; the BF6 31 a 12 in.) However, the BF6 31 costs \$1,549 more. The BF6 41, on the other hand, is a much larger machine—more than 900 lbs. heavier than the BF6 26—with a 16-in. planer and a 69-in. crosscut capacity on the rolling table (8-ft. capacity optional). All three of the machines have a dial-type thickness gauge on the planer crank, accurate to 0.002 in.

Felder builds these machines to last, and to hold their accuracy. They have heavy-duty adjustment bolts for all criti-



PHOTO COURTESY OF DELTA POINT

cal machine alignments. The guide rails, which hold the fences and extension tables in place, are machined right into the tables for maximum rigidity. The large rolling tables (see chart) provide better support for large panels than any others I tested.

One drawback of the Felder machines is they're set up for three-phase power, meaning you'll have to install three-phase power, buy a phase converter or purchase the optional \$500 single-phase motor package.

Electronic braking, which is mandatory in Europe, is optional on both single- and three-phase models, but the standard double-V-belt pulleys stop the motors almost as fast.

On the jointer/planers, four-knife heads with disposable blades are standard. The outfeed rollers are deeply grooved for positive feeding of rough stock.

One unique feature is the 16,000-rpm router spindle available for the shaper. A convenient spindle-holding mechanism makes changing from the router to the shaper spindle easy.

Recommendation:

As one Felder owner put it, "The Felder machine is not a machine for the novice woodworker any more than a Ferrari is a car for the novice driver." This is the machine for the enthusiast or professional who wants quality and performance at any cost.

S P E C S O N C O M B I N A T I O N

SPECIFICATIONS	FELDER BF6 41	FELDER BF6 26	ROBLAND X31	KITY 609 / 638
LIST PRICE	\$13,300	\$7,890	\$5,450	\$6,290 ^②
DIM. (L x W x H)	76 in. x 102 in. x 35 in.	76 in. x 100 in. x 35 in.	60 in. x 60 in. x 36 in.	68 in. x 68 in. x 34 in.
WEIGHT	2,068 lbs.	1,122 lbs.	1,100 lbs.	891 lbs.
MOTOR(S)	(3) 3 hp (4 hp opt.) / 3600 rpm	(3) 3 hp / 3600 rpm	(3) 3 hp / 3400 rpm	(3) 3 hp / 3600 rpm
ELECTRICAL REQ'TS.	220v / 30 amps 3 phase ^①	220v / 30 amps 3 phase ^①	220v / 30 amps 1 phase	220v / 20 amps 1 phase
TABLESAW	Standard	Standard	Standard	Standard
SPEED	4800 rpm	4800 rpm	3500 rpm	3600 rpm
BLADE DIA.	12 in.	12 in.	10 in.	10 in.
ARBOR DIA.	30 mm	30 mm	5/8 in.	5/8 in.
MAX. BLADE HT.	4 in.	4 in.	3 3/16 in.	3 3/8 in.
MAX. RIP WIDTH	37 1/2 in. / 57 in. w/ext. rails	37 1/2 in. / 57 in. w/ext. rails	9 1/2 in. / 25 in. w/aux. fence	11 1/2 in. / 35 in. w/ext. table
RAISE/LOWER	crank blade	crank blade	lever blade	lever blade
ROLLING TABLE	yes - 69 in. crosscut	yes - 48 in. crosscut	yes - 50 in. crosscut	yes - 48 in. crosscut
TILT	arbor to 45°	arbor to 45°	arbor to 45°	arbor to 45°
JOINTER/ PLANER	Standard	Standard	Standard	Standard
CUTTERHEAD SPEED	4800 rpm	4800 rpm	5500 rpm	7000 rpm
NO. OF KNIVES	4 disposable	4 disposable	3	3 disposable
MAX. WIDTH	15 7/8 in.	10 in.	12 in.	12 in.
MAX. THICKNESS	8 1/2 in.	8 1/2 in.	9 in.	9 in.
JOINTER LENGTH	66 in. / 105 in. w/opt. ext.	53 in. / 92 in. w/opt. ext.	55 in.	61 in.
PLANER FEED SPEED	variable 14 - 46 fpm	21 fpm	18 fpm ^④	29 fpm
SHAPER	Standard	Standard	Standard	Standard
SPINDLE DIA.	1 1/4 in.	1 1/4 in.	1 1/4 in. / 3/4 in.	30 mm
SPINDLE SPEED	3500, 6100, 7800 rpm	3500, 6100, 7800 rpm	6000 rpm	4880, 6400, 8700 rpm
SPINDLE TILT	0° to 45°	0° to 45°	N/A	-5° to +30°
MAX. CUTTER DIA.	10 1/2 in.	10 1/2 in.	7 in.	7 in.
MAX. CUTTER HT.	4 3/4 in.	4 3/4 in.	5 in.	3 1/2 in.
HORIZONTAL MORTISER/ BORER	Option \$750	Option \$750	Standard	Option \$500
SPEED	4800 rpm	4800 rpm	5500 rpm	7000 rpm
ROTATION ^⑦	RH / LH	RH / LH	RH / LH	LH
MAX. PLUNGE DEPTH	5 7/8 in.	5 7/8 in.	5 1/2 in.	4 1/4 in.
MAX. SIDE TRAVEL	7 7/8 in.	7 7/8 in.	7 in.	4 3/4 in.
FEED METHOD	table levers	table levers	table levers	table levers
MAX. CHUCK CAPACITY	5/8 in. dia.	5/8 in. dia.	5/8 in. dia.	5/8 in. dia.
DISTRIBUTOR	Delta Point 5200 Dixie Road, Unit 29 Mississauga, Ontario L4W 1E4, Canada (416) 629-8786		Laguna Tools 2081 Laguna Canyon Rd. Laguna Beach, CA 92651 (800) 234-1976	Farris Machinery Inc. 320 N. 11th St. Blue Springs, MO 64015 (800) 872-5489
WARRANTY	6 months parts & labor		2 years parts & labor 30-day money-back	2 years parts & labor 30-day money-back

① 1 Phase option \$500 ② w/637 jointer \$5,490, w/636 jointer \$4,690 ③ Model 500 \$1,599 ④ 220v Optional \$30 extra ⑤ Suggested rpm

MACHINES

KITY K5	SHOPSMITH MARK V MODEL 510	TOTAL SHOP	CENTRAL MACHINERY
\$2,395	\$1,899 ^⑥	\$1,195	\$800
48 in. x 48 in. x 42 in.	102 in. x 27 in. x 47 in.	71 in. x 20 in. x 41 in.	71 in. x 20 in. x 41 in.
150 lbs.	220 lbs.	275 lbs.	275 lbs.
(1) 1½ hp / 3600 rpm	(1) 1½ hp / 3450 rpm	(1) 1½ hp / 3450 rpm	(1) 1½ hp / 3450 rpm
115v / 20 amps 1 phase	115v / 20 amps 1 phase	110 / 220v / 10 / 20 amps 1 phase	110 / 220v / 10 / 20 amps 1 phase
Standard	Standard	Standard	Standard
4600 rpm	variable (3600 rpm) ^⑤	variable (4200 rpm) ^⑤	variable
8 in.	10 in.	10 in.	10 in.
5/8 in.	1¼ in. (5/8 in. optional)	5/8 in.	1¼ in. (5/8 in. optional)
2¾ in.	3¼ in.	3¼ in.	3 in.
24½ in. / 57 in. w/ext. table	76 in. crank table	53 in. crank table	53 in. crank table
manual table	optional sliding table \$59	N/A	N/A
N/A	table to 45°	table 45°	table 45°
Standard	Jointer \$379 / Planer \$845	Jointer \$339	Jointer \$220
7000 rpm	variable (6200 rpm) ^⑤	variable (5200 rpm) ^⑤	variable (5200 rpm) ^⑤
2 disposable	3 jointer / 3 planer	3	3
5⅞ in.	4 in. jointer / 12 in. planer	4 in.	6 in.
4 in.	4 in.	N/A	N/A
28 in.	28 in.	28 in.	31 in.
29 fpm	5 - 12 fpm	N/A	N/A
Standard	Option \$381	Option \$133	N/A
¾ in.	½ in.	½ in.	—
7440 rpm	variable to 10,000 rpm	variable to 5200 rpm	—
N/A	table tilts to 45°	table tilts to 20°	—
4⅝ in.	2½ in.	2¼ in.	—
3⅞ in.	1⅞ in.	1⅞ in.	—
Standard	Standard	Standard	Standard
7000 rpm	variable to 5200 rpm	variable to 5200 rpm	variable to 5200 rpm
LH	RH	RH	RH
3½ in.	4¼ in.	4¼ in.	4¼ in.
4¼ in.	15 in. w/hold down miter gauge	14 in.	14 in.
table levers	quill lever	quill lever	quill lever
¾ in. dia.	½ in. dia.	½ in. dia.	½ in. dia.
Farris Machinery Inc. 320 N. 11th St. Blue Springs, MO 64015 (800) 872-5489	Shopsmith Inc. 3931 Image Dr. Dayton, OH 45414 (800) 543-7586	Total Shop Box 25429 Greenville, SC 29616 (800) 845-9356	Harbor Freight Tools 3491 Mission Oaks Blvd. Camarillo, CA 93011 (800) 423-2567
2 years parts & labor 30-day money-back	1 year parts & labor 30-day money-back	1 year parts & labor 30 day money-back	1 year parts & labor 30 day money-back

⑤ Variable speed optional \$395 ⑥ RH = right hand (clockwise) LH = left hand (counterclockwise)

ABOUT THE OWNERS...

In my survey, I discovered some interesting patterns among the owners:

The average age for all owners was 52.6 years. Shopsmith and Total Shop owners were older than the combined average, and Kity owners were younger. Overall age range was 25 to 76 years.

Expertise varied with the make of machine. Owners of the lathe-based machines rated themselves as beginners or intermediates, while the majority of owners of the European machines were advanced or expert woodworkers.

Shop size varied enormously, from 140 sq. ft. to 2,400 sq. ft. The median was around 600 sq. ft., larger than I expected and suspiciously similar to the size of a two-car garage.

Type of woodworking varied according to the machine *type*. Lathe-based machine owners tended to be occasional woodworkers, while owners of the European models were almost exclusively enthusiasts, artisans or professionals. Fully half the Robland owners said they derived part or all their income from woodworking.

Other machines owned. Almost all of the respondents owned other stationary equipment. Shopsmith (and clone) owners had the least additional equipment, while owners of the larger European machines generally owned bandsaws, lathes, drill presses and belt sanders.

Dealer responsiveness. Almost everyone who responded to the survey considered dealer support to be excellent.

Overall satisfaction was generally in the "very good" to "excellent" range, indicating that, whatever the disadvantages, these owners were pleased with their purchases. All except two of the respondents thought their machines were worth the investment.—E.W.



Pandora revisited. Open the lid on this innocent box and a critter leaps out to snap at your thumb.

NASTY BOXES

Snappy Little Stocking Stuffers That Bite

BY DAVID SLOAN

On a tour through Delaware's fabulous Winterthur Museum, I was taken by two mysterious little boxes sitting on a dresser in one of the Pennsylvania German rooms. "Pardon me," I blurted to Nancy, my guide. "What are those small painted boxes?"

"Nasty boxes," she replied, without missing a beat. "If you open the lid, a snake or a rat leaps out and pricks your thumb with a pin!"

Nasty boxes. Wow! The concept appealed to the 12-year-old brat in me. I used to spend hours poring over comic book ads full of hand buzzers, whoopee cushions and squirting boutonnières. Here was the 19th-century equivalent of the infamous "snapping pack of gum." I just *had* to learn more.

Unfortunately, Winterthur, like

most museums, has a very strict no-touch policy for objects in the collection so our guide wasn't permitted to open the boxes. I had to imagine what was hidden inside. I drifted off to sleep that night conjuring images: sinister reptiles with curare-tipped fangs. . . .

Months later, with the help of Nina Maurer, an intern at Winterthur, I was able to examine the nasty boxes firsthand. There were seven "trick boxes" as they call them, in the Winterthur collection. Here's what I found:

Each box is made from thin stock (about $\frac{1}{8}$ in. or so) held together with tiny nails. The lid slides in dovetail

grooves in the sides of the box. A carved wooden critter pivots on a pin that passes through the sides of the box. A string, tied and glued to the lid, pulls the animal up and forward when you open the lid. (See drawing.) Stone simple. The faster you open the lid—the faster the critter leaps out.

On some of the boxes, the animals did indeed have sharp pins in their snouts. But the maker's goal was to startle, not to maim. Except for one vicious black serpent that really *will* jab you, a tiny restraining bar stops the animal an instant before the pin hits your flesh.

Winterthur's nasty boxes all date

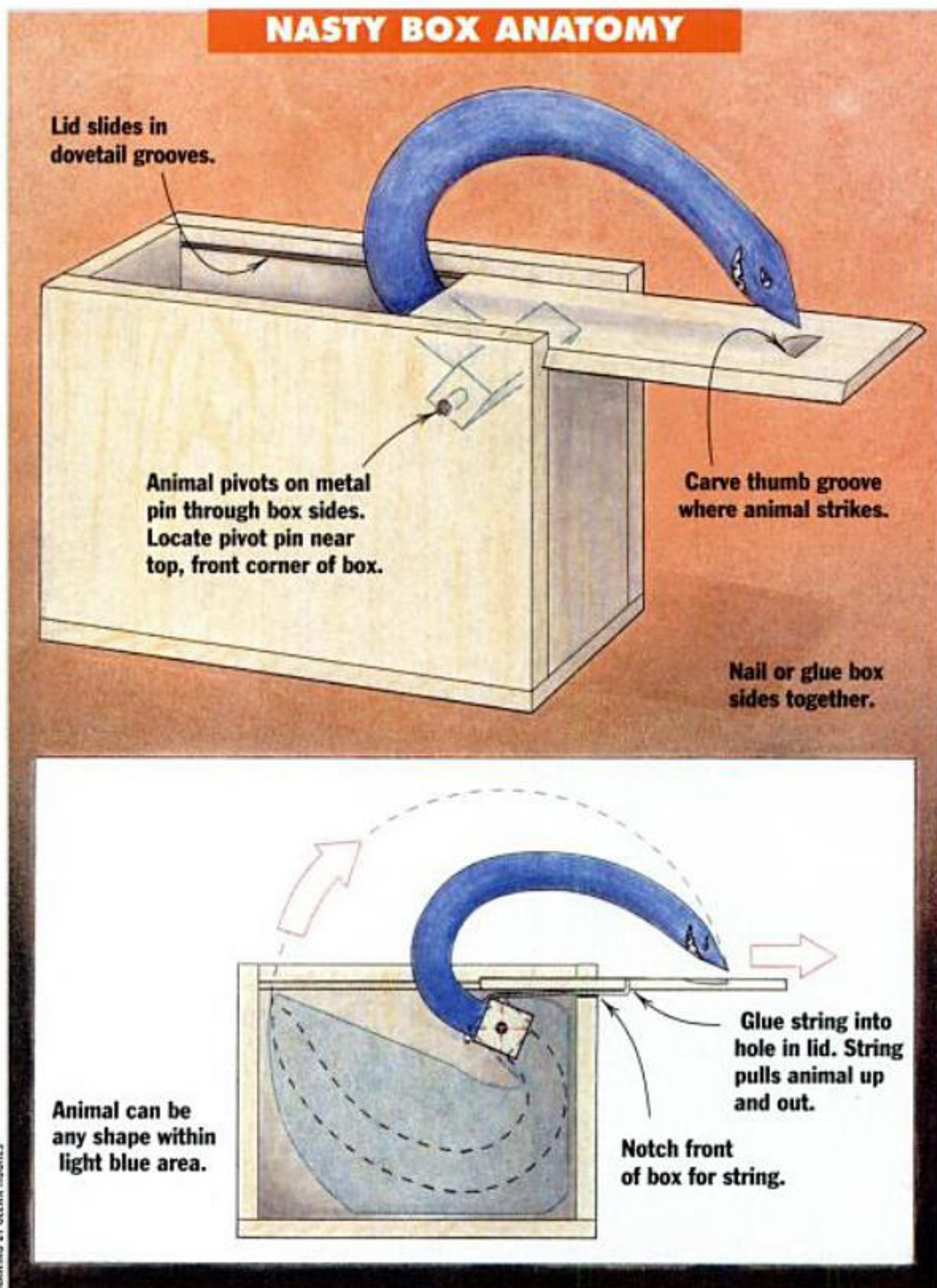
from the 19th century but little is known about their origins or makers. Three boxes (photos, below) are attributed to Absalom Bixler, a potter who worked in Denver, Pennsylvania. Bixler's carvings were the liveliest and best executed of all the boxes. The work shows imagination and a delightfully warped sense of humor. One of the Bixler boxes features three animals—a rat, a bird and a snake—that leap out together, side-by-side. Ouch!

As I was working on this article, my friend Mike stopped in. "I have a box like that," he said. The next day he brought in a small soapstone box from Africa. When I opened the lid, a serpent popped out. The mechanism was identical to the boxes from Pennsylvania. Curiouser and curiouser. How did nasty boxes migrate from an African village to a Pennsylvania farm? Or vice versa? The world may never know.

The real motivation behind all my scholarly research? I plan to stuff a few stockings with nasty boxes this Christmas. Let's see, there's that nice man from the Internal Revenue Service, the mechanic who screwed up my van, my acupuncturist (Hey, maybe he'll want some as calling cards!), my mother-in-law. . . . ▲

DAVID SLOAN

is editor and publisher of *AW*. Thanks to Nina Maurer and Carol Schmiegel at the Winterthur Museum for making this article possible.



Nasty boxes circa 1870 attributed to Absalom Bixler, Denver, Pennsylvania. Note the pins in the snouts of the birds and rats. A restraining bar stops the animals so the pin won't actually injure.

HALF-BLIND DOVETAILS

Getting it Tight the First Time

BY MARIO RODRIGUEZ

Dovetails are the benchmark of serious cabinetmaking. They're awe inspiring when perfect and disappointing when not. If you've never cut a dovetail joint by hand, the process may seem a bit daunting, but if you start small, you'll soon find it's not that hard.

Half-blind dovetails—commonly used to join drawer sides to drawer fronts—are a good version of the joint to cut your teeth on. With half-blind dovetails you only see one side of the joint, so small inaccuracies aren't as noticeable as on through dovetails.

What follows is my method of making half-blind dovetails for a small drawer, using a few tools I've modified to make the task a bit simpler and more accurate. ([See sidebar, page 47.](#)) I've had students produce beautiful dovetails on their first or second



With half-blind dovetails you only see one side of the joint, so any small inaccuracies aren't as noticeable as on a through-dovetailed joint.

attempt with this method. I think you'll be surprised at the results, too.

Laying Out and Cutting the Tails

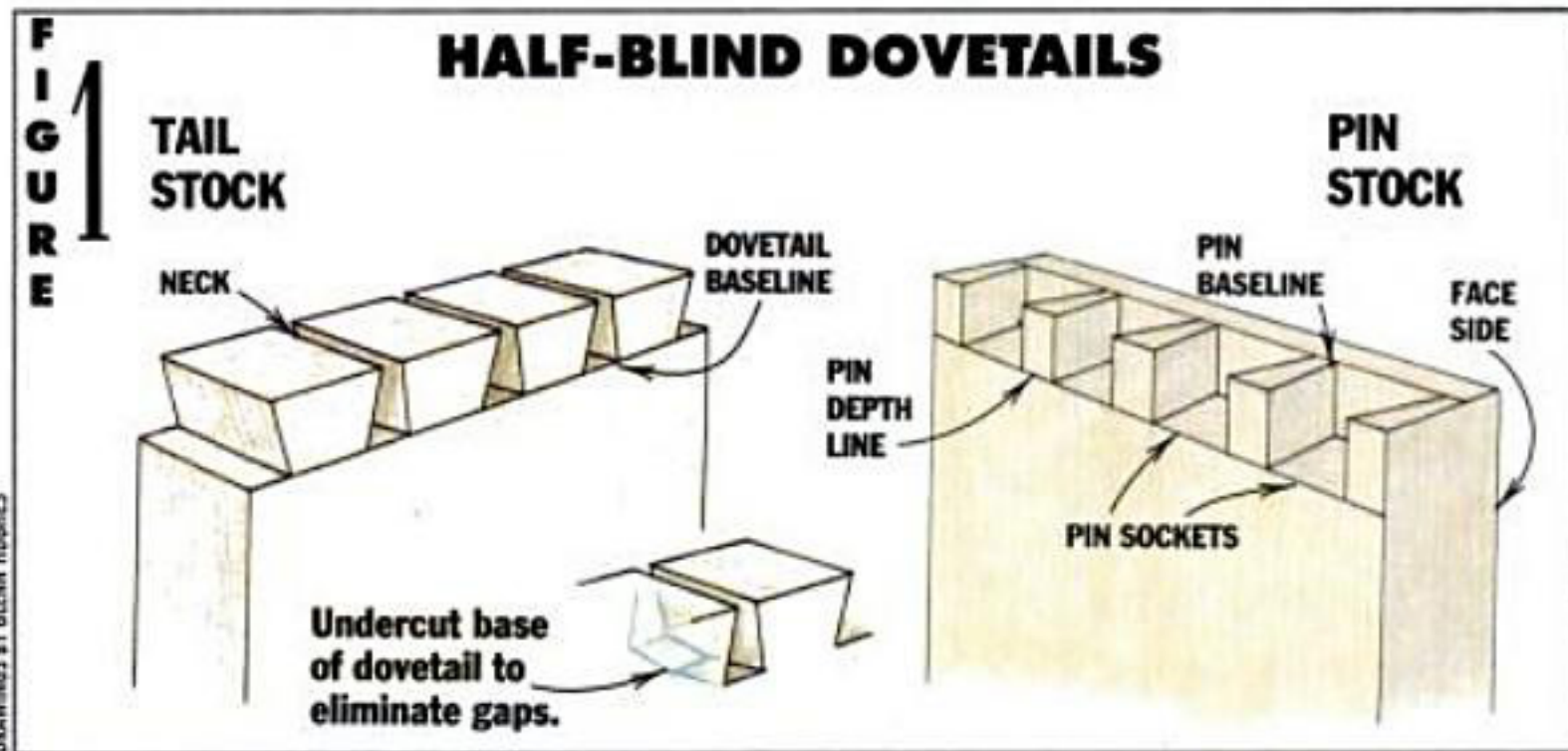
After you've squared your stock, the first step in making half blinds is to scribe the baseline around both faces and both edges of the board that will have the tails, as shown in Fig. 2.

Next, mark out the tails. Since I often build multiples of a piece, I like to use sheet metal templates to make layout a little bit quicker and more accurate. (See sidebar.) However, you can also use a sliding bevel.

You can mark the tails with a utility knife or a sharp pencil, but I like to use a chip carving knife (available from Garrett Wade, 161 Avenue of the Americas, New York, NY 10013, 800-221-2942).

If you do use a template, after scribing one side of the board, flip over the template to scribe the tails on the opposite side of the board. This is important or the marks won't align.

Now you're ready to saw the tails. My secret to clean, fast tails is



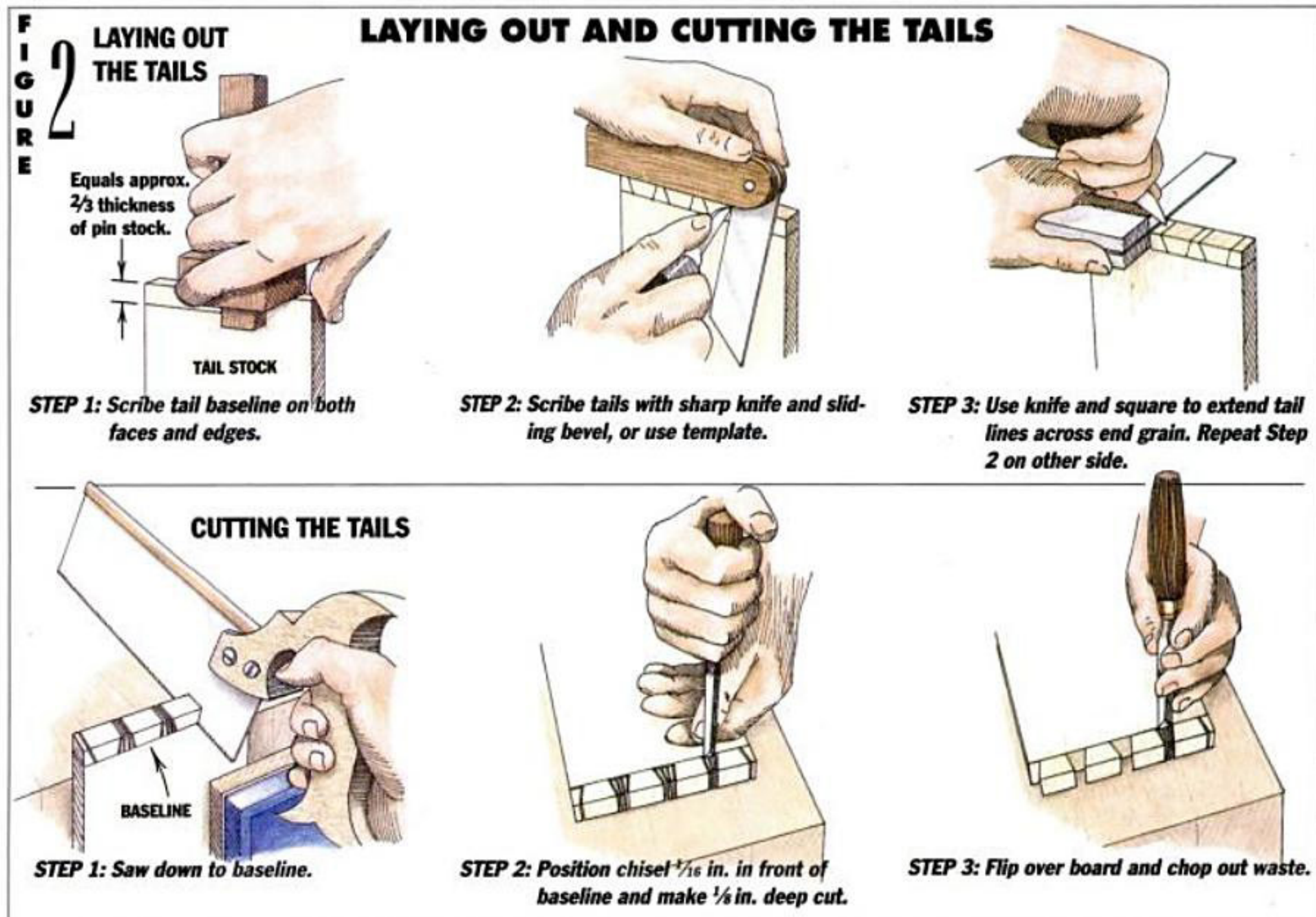
cutting right to the layout lines with my "no set" saw. (See sidebar.) If you use a saw with set, stay inside your lines so you don't cut away the marks by accident. After sawing to the marks you may want to make some extra cuts within the tail waste so it is easier to clean the socket.

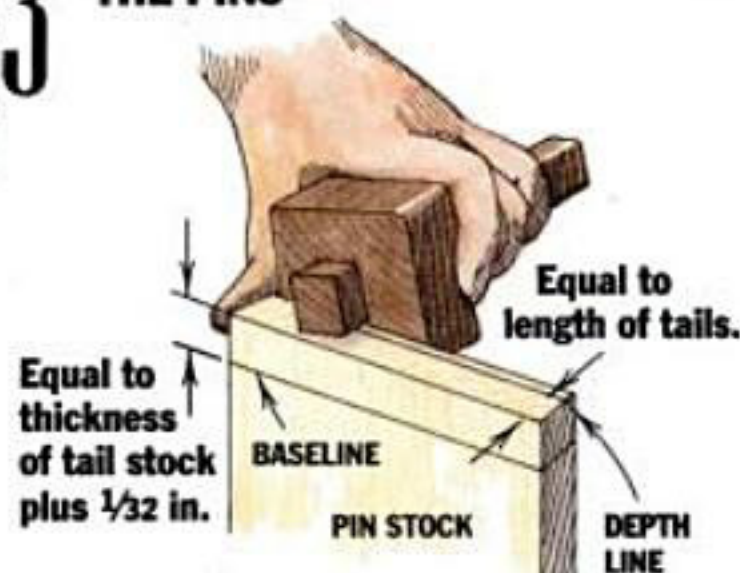
To chisel out the waste, first clamp the stock to your bench, then position your chisel about $\frac{1}{16}$ in. in front of the baseline and use a mallet to make a cut about $\frac{1}{8}$ in. deep. (See Fig. 2.) This will prevent tear-out when you chisel

through from the other side. Now flip over the board, reposition the chisel and chip out the waste.

Next, using a sharp chisel (I use the triangular section chisel, shown in the sidebar), pare down to the baseline from both sides, undercutting slightly toward the center.

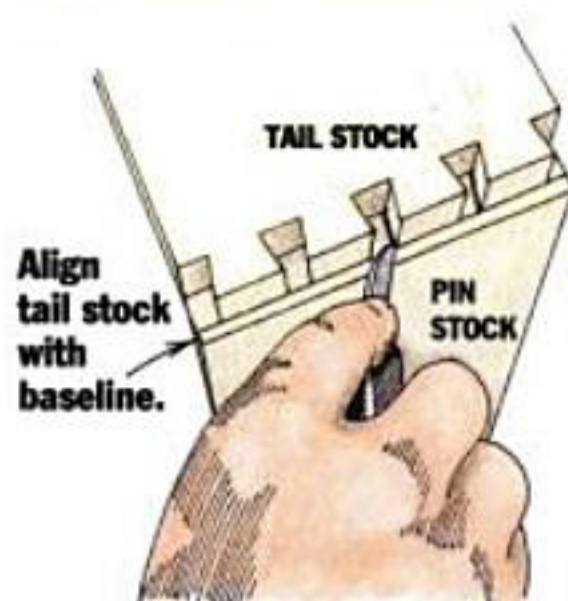
A good paring technique is essential. I hold the chisel between my thumb and forefinger with my fingers against the workpiece. This grip allows me to slow the cut by applying pressure between thumb and forefinger.



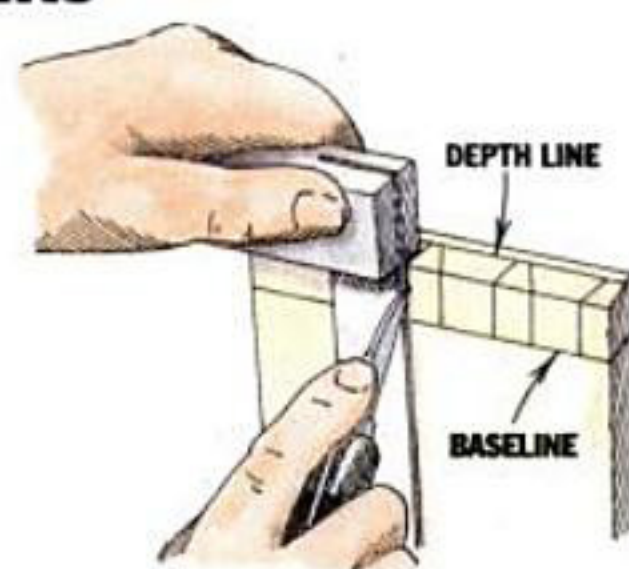
LAYING OUT
THE PINS

STEP 1: Scribe baseline and depth line.

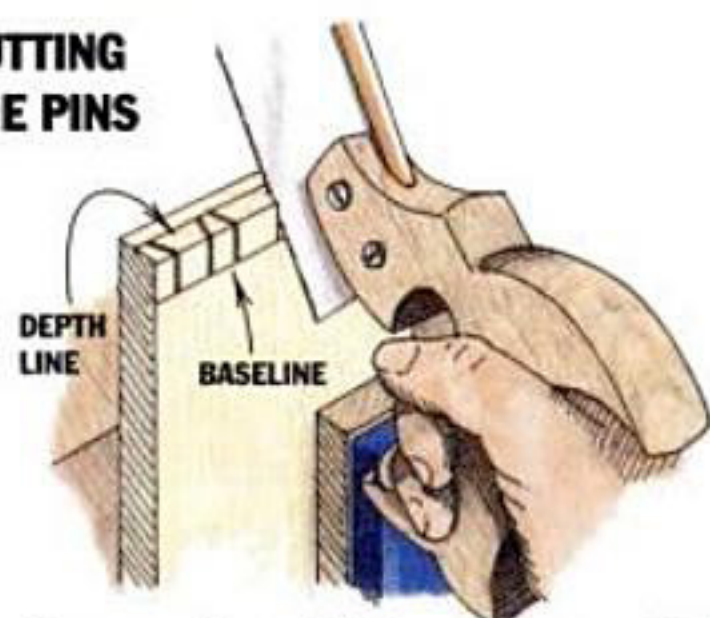
LAYING OUT AND CUTTING THE PINS



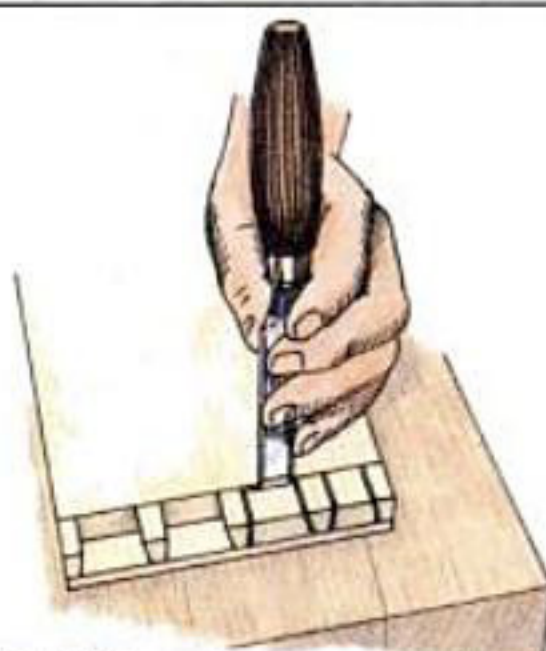
STEP 2: Mark pins from tails.



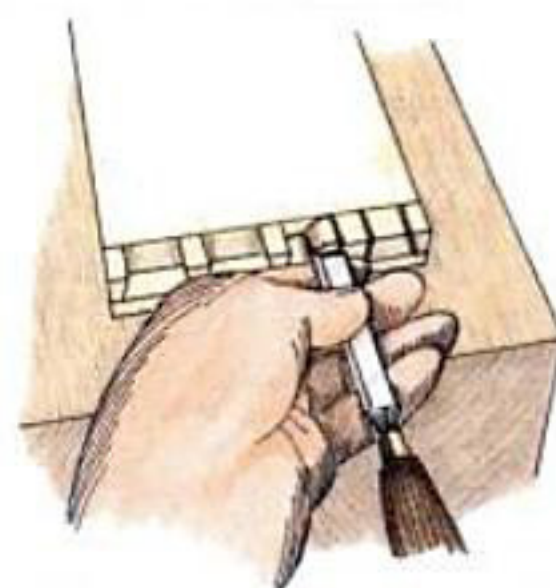
STEP 3: Use knife and square to extend pin lines down inner face.

CUTTING
THE PINS

STEP 1: Saw on a diagonal between baseline and depth line.



STEP 2: Make 1/8 in. cuts across grain to prevent tear-out.



STEP 3: After each cross-grain cut, clean out waste from end grain, paring waste away in layers.

Aim for thin, almost transparent shavings. If your chisel is sharp, paring cuts shouldn't require any force, just controlled, light pressure.

Laying Out and Cutting the Pins

Theoretically, you could lay out your pin sockets from the tail template (if you use one), but I prefer to mark the pins by scribing directly from the tails. That way if I've made a slight error on the tails, it will carry over to the pins, giving me a gap-free joint.

First scribe the depth line and baseline, then align the tail board with the pin baseline, clamp the boards securely so they don't shift at this critical step, and carefully scribe around the tails with a pointed marking knife. (See Fig. 3.) Using a square and your marking knife, extend the lines down the inner face of the pin stock to connect them with the pin depth line. This gives you the pin profile.

Now saw diagonally to the pin baseline and the depth line. (See Fig. 3.) This time, stay about 1/32 in. inside the line and make additional cuts between the pins to ease waste removal.

To chisel out the waste, clamp the pin stock flat on the workbench, and pare with a bench chisel, starting 1/16 in. above the pin depth line. Chop about 1/8 in. deep at each pass, working with great care. After each cross-grain cut, clean out the waste from the end-grain side. (See Fig. 3.) Pare the waste in layers rather than large chips because the pins are delicate.

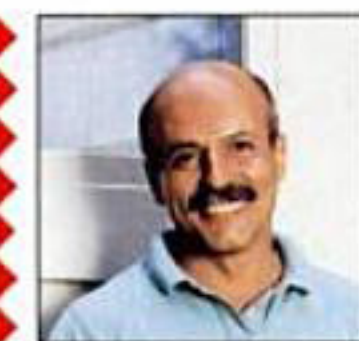
There are two situations that complicate the clean-up. First, you're working in tight corners. Second, the neck of each pin ends in a sharp angle. Remember, you're working end grain and it has a tendency to split off. After removing the waste use a sharp 1/2-in. bench chisel to carefully pare the sloping sides of each pin and a 1/4-in. spear-point chisel to get into the corners. (See sidebar.) Then pare down to the pin depth line with a triangular-section chisel and undercut the line slightly. Now you're ready for a test fit.

Testing the Fit

Insert the pin stock into a bench vise with the pin depth line almost flush to the workbench surface. Lightly

tap the tail stock onto the pin stock. As you tap, feel for stiff resistance and check the back of your dovetails for crushed fibers. If you have to pare the joint for a better fit, take waste off the pins. The pin sockets provide more clearance and better visibility for trimming. Working into the end grain will be easier and give you better control.

The methods I've described allow me to incorporate dovetails into my finer work with speed and economy. Hand-cut dovetails should be considered an important milestone in a craftsman's development. And for the "old pros" it's a way to stay sharp and reaffirm their craftsmanship. ▲



MARIO RODRIGUEZ

is a professional cabinetmaker and teaches woodworking at the Warwick Country Workshops, Box 665, Warwick, NY 10900.

TOOLS FOR BETTER DOVETAILS

Every cabinetmaker I know strives to devise techniques and tricks to make cutting dovetails easier and more accurate. I'm no exception. To help me perfect my dovetailing skills, I've made or modified a few hand tools, including sheet metal templates, a spear-point chisel, a triangular cross-section chisel, and a "no-set" backsaw with a custom-made handle.

Templates for Tails

To make dovetails on designs I produce frequently, or on pieces with multiple components, such as a chest of drawers, I use sheet metal templates to lay out the tails. (See bottom photo.) These take little time to cut out with a knife and small snips, and once done, they reduce lay-out errors. Also, they're inexpensive. I make mine from aluminum flashing, which is sold in rolls.

Making a template is simple. I just lay out the tails in pencil (I use a 15° angle on my tails), then scribe the tails and the baseline with a sharp knife. You can use tin snips to cut the shoulders down to the baseline, then just flex the waste piece back and forth until it snaps off.

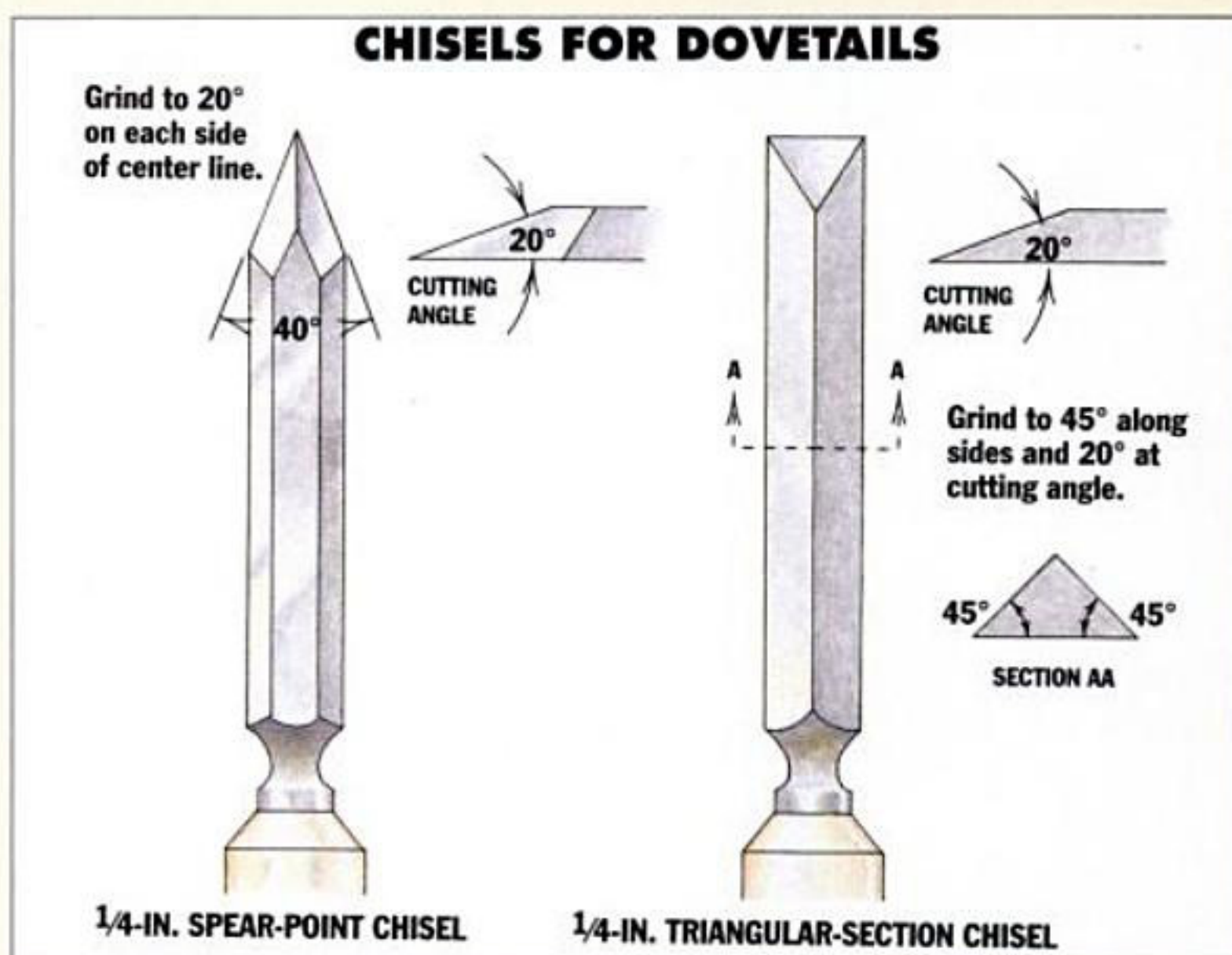
A "No Set" Saw

I find the best way to cut accurate dovetails is to use a 12-tpi saw that has no set and features a custom handle made to fit my hand. (See photo, right.) With the set removed, the saw produces a narrow kerf that rarely needs further clean-up. Also, it allows me to cut right up to the layout lines. Keep in mind that it takes a little practice to guide a "no-set" saw since it will have a greater tendency to bind.

To hammer out the set, remove the saw handle, sandwich the blade in heavy paper for protection and lay it on a flat, metal surface (a machine table will do). Then lightly tap the teeth, hammering down the length of the blade and back again. Turn the saw blade over and repeat the operation. When done, check the blade for straightness.

Chisels for Dovetails

Paring waste in the tight corners and sharp angles of dovetail joints can



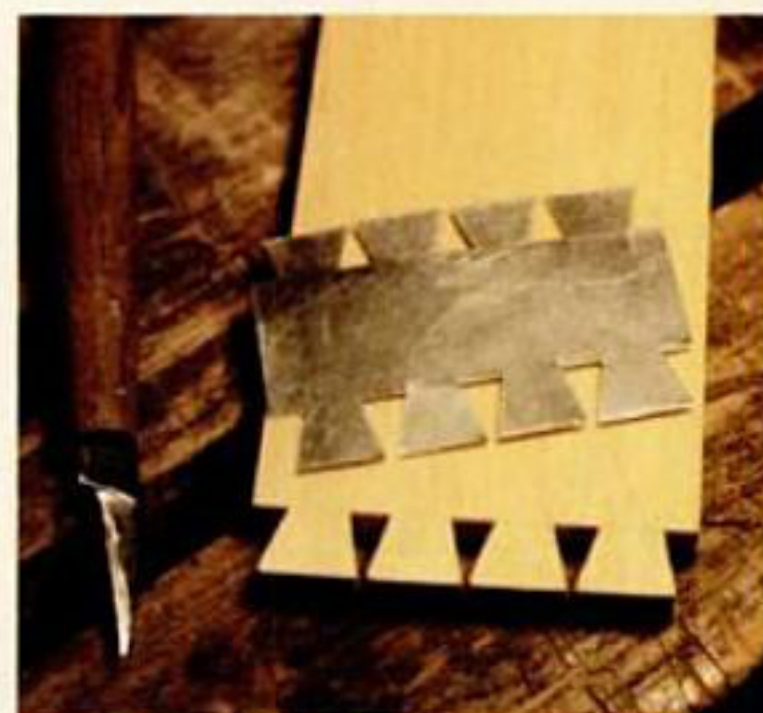
A custom-made saw handle will feel better, and provide more accurate control. And it looks great too.



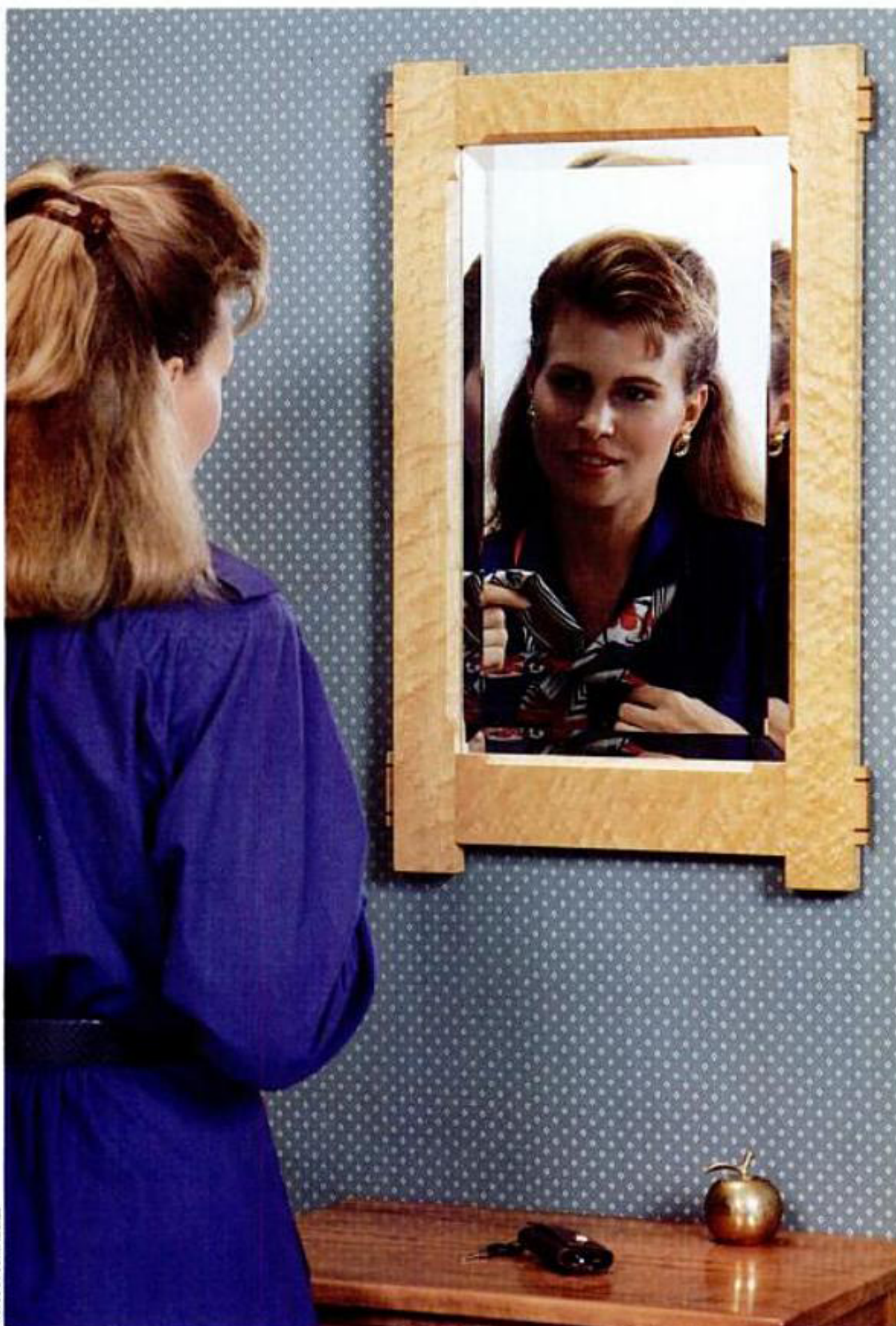
be a problem with regular chisels. I've gotten around it by regrinding two chisels to create custom tools.

The triangular-section chisel (see drawing) is good for cleaning out the acute corners of the tails. You can make one by grinding a $1/4$ -in. bench chisel so the sides are 45° and the cutting edge is 20° .

The spear-point chisel has a 40° angled point (20° on each face), and a 20° cutting angle. (See drawing.) It's great for cleaning up tight corners. Grinding the point angle can be a bit tricky, but it doesn't have to be perfect. It just has to do the job.—M.R.



Sheet metal templates make marking the tails quick and accurate.



PHOTOS BY JOHN HAMEL

Exposed wedged tenons and chamfered edges give this simple mirror frame an understated elegance.

WEDGED-TENON WALL MIRROR

BY RIC HANISCH

Simplicity is something that appeals to me. I appreciate it in nature and I like to make it part of the furniture I design as well.

In this mirror frame, which was part of a run of 10, I chose a clean and simple design in which the complexity of form comes from the exposed mortise and tenon joinery. (See Fig. 1.) To provide a foil to the frame's severe geometry, I made the parts from bird's-eye maple, a difficult wood to work, but it gave me a kind of surface decoration that was irregular in a regular way.

You have to be very precise in cutting exposed mortise and tenon joints such as these or you'll end up with visible gaps. But as you'll see, they're not hard to make if you use a few shop-made jigs and work carefully.

As I do with all my projects, I started by making a scale drawing to show the proportions of the piece, and full-size drawings showing the joinery. Then I made a list of the construction steps. This is particularly important when building multiples, as I often do, because it forces me to think through the entire construction process. With this done, I sketched the jigs I'd have to build, noted the special tools I would need, and estimated the time each step would take.

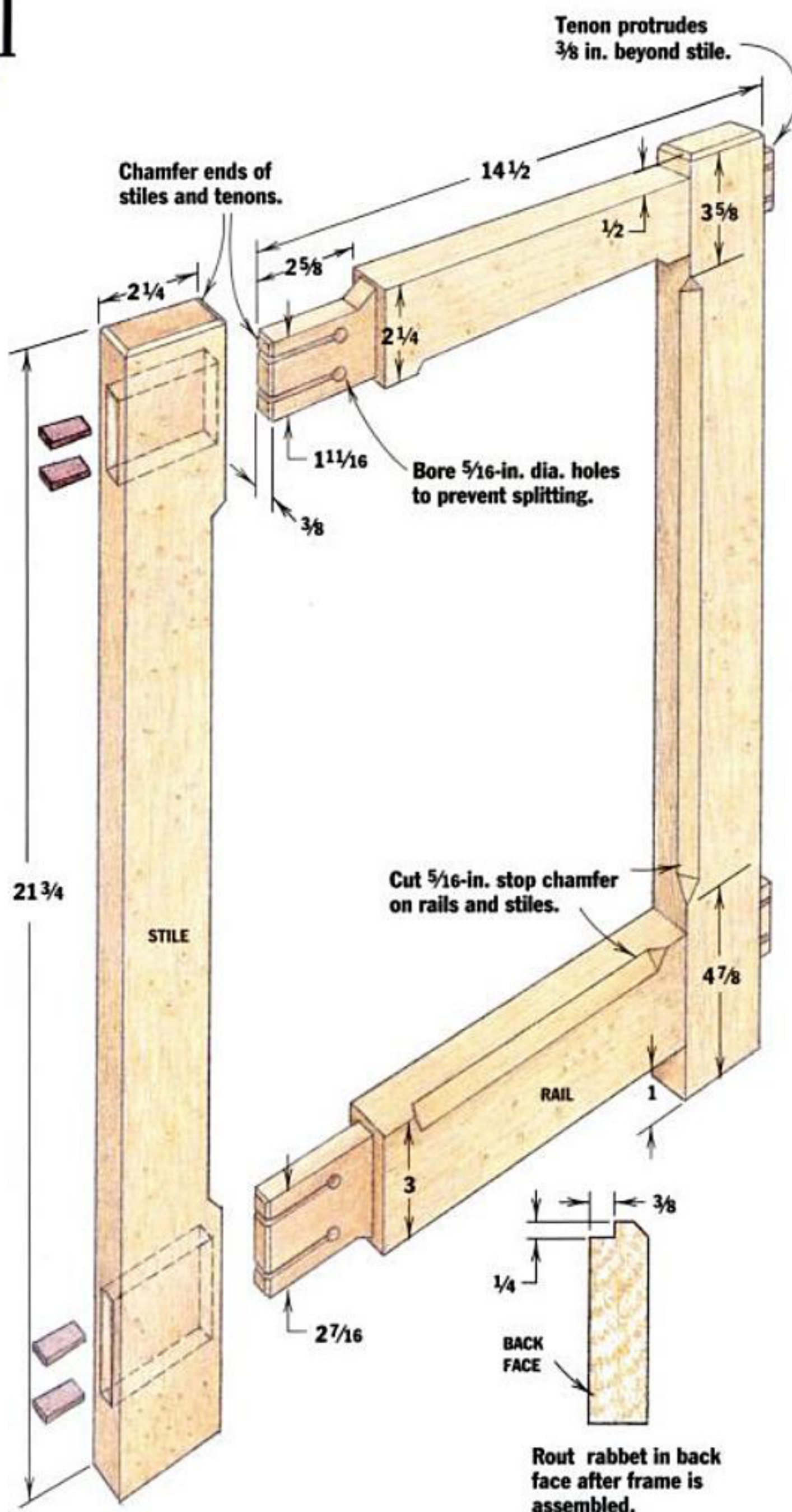
I file this information when a project is done, so that years later I can quickly look back and see exactly how I made something.

Laying Out the Stock

I used paper patterns to lay out parts so it would be easy to choose the best grain pattern for each piece and dodge around defects. Then, before dimensioning the wood, I cut the rails and stiles oversize on the bandsaw. This left me more pieces to process, but this approach wastes less stock than if I planed the entire board to thickness before cutting out the parts. It also gives me more options for feeding parts through the jointer and planer. I can feed each part in the optimum direction for minimum tear-out.

After machining the parts, I trimmed them to final dimension and hand-planed the surfaces to remove planer marks and tear-out. It's important to plane before cutting the joints and assembling the frame. Otherwise,

MIRROR FRAME



Note: Stiles and rails made from $\frac{7}{8}$ -in. stock.



An easy way to rip uniform wedges is to use a cut-off box and an angled block. For strength, the long grain should run down the length of each wedge.

the faces of the rails and stiles may not register exactly.

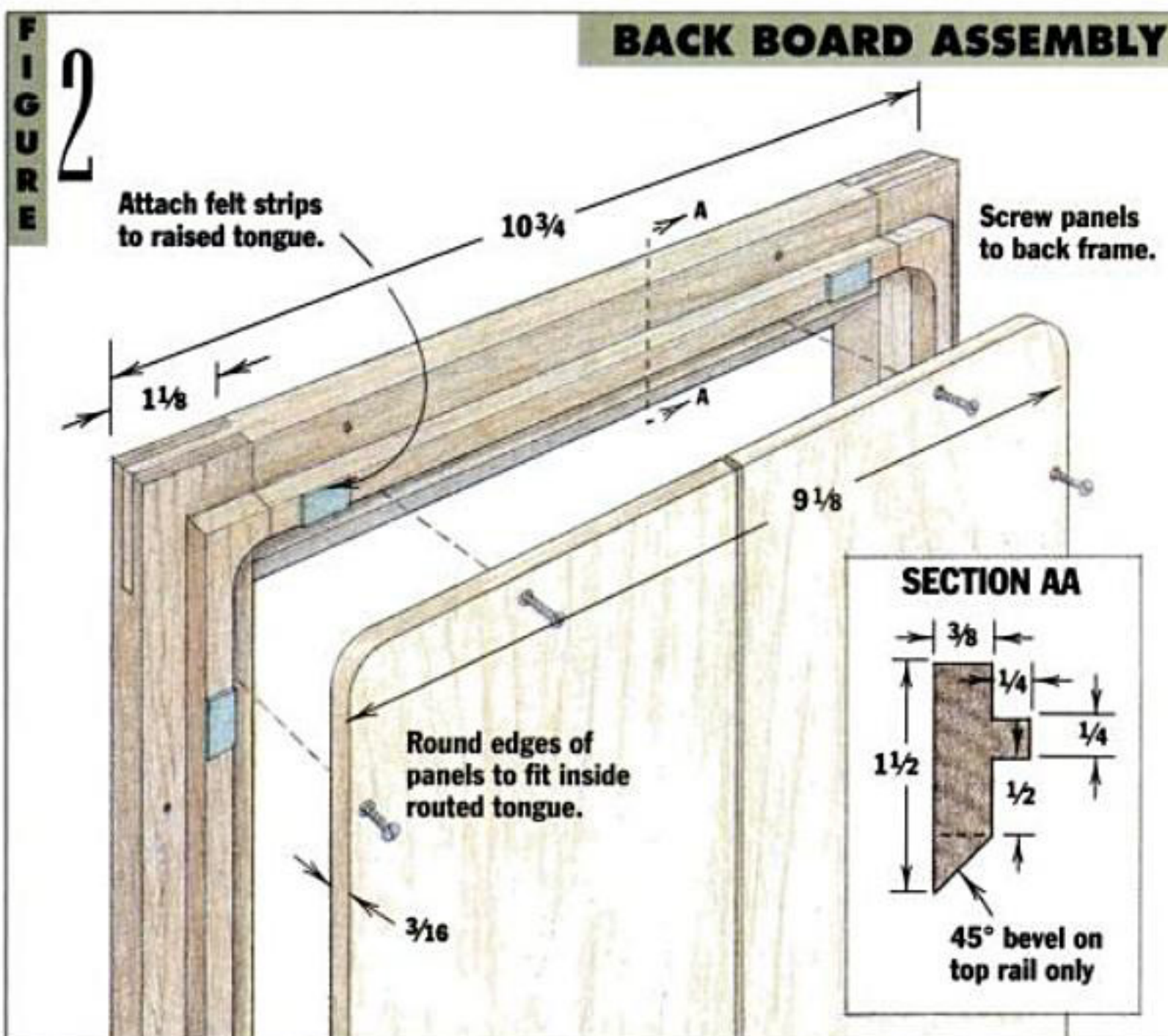
Through Mortises and Tenons

I decided to use haunched mortise and tenon joints on these mirrors because they keep as much solid wood as possible at the end of the stiles for maximum strength. (See Fig. 1.) I roughed out the mortises with a simple shop-made slot mortiser, though you could make the mortises on the drill press, or cut them by hand. (See AW #18 and #26 for more on mortising.) To finish the mortises, I pared them with a chisel, taking care to keep the outside edges clean and precise since they would show in the finished joint.

Next came the tenons. It can be tricky to work exposed through tenons because you need to fit each one without damaging the finished cheeks. My method is to cut the tenon just a hair oversize (about $\frac{1}{64}$ in.) on the tablesaw. That way, when I lightly plane and scrape the cheeks to remove the saw marks, I end up with a perfect fit.

I cut the cheeks on the tablesaw, using a shop-made tenoning jig that holds the workpiece vertically against the fence. Then I bandsawed most the waste, set up a stop block on my table-saw's cutoff box and sawed the shoulders. (See AW #14 for a cutoff box plan.) Next, I turned the rails on edge, established $\frac{1}{6}$ -in. deep shoulders using the same stop block, and made a series of cuts to remove the waste along the edge of the tenon. Finally, I bandsawed the sloping haunches and fit each tenon cheek, using a rabbet plane and cutting lightly across the grain.

Finishing the surface of the tenons was a simple matter of scraping and sanding, though I did work carefully,



and frequently checked the fit to my mortises to make sure I hadn't removed too much material.

Since the through tenons would be on prominent display, I wanted fairly wide wedge slots and wedges of uniform thickness. I cut both of them on the tablesaw.

First I bored holes where the wedge slots would end to prevent the rails from splitting when the wedges were in place. Then I laid the stock flat on the table, set the blade high and ripped a kerf that extended into the hole.

I ripped the wedges on the tablesaw, using the cutoff box for safety. (See photo.) Making the angle on the wedges was easy. I placed a small piece of wood between the jig's fence. After each cut, I'd flip the stock over to get the proper angle for the next cut.

Chamfering the Frame

To provide some balance between the frame parts and the beveled mirror glass I planned to install, I decided to chamfer the inside edge of the rails and stiles (see photo) with a 45° chamfer bit on the router table. Before starting the cuts, though, I used a chisel and a shop-made L-shaped guide block to cut the ends of the chamfers. This prevented split-out. Then after routing, I used

the same guide block to clean up the rounded shoulder left by the router bit. (See photo.)

After routing the chamfers, I planed and scraped my stock to a finished surface and hand-planed small chamfers on the ends of the stiles and rails. (See Fig. 1.) With that done, the frame was ready for glue-up.

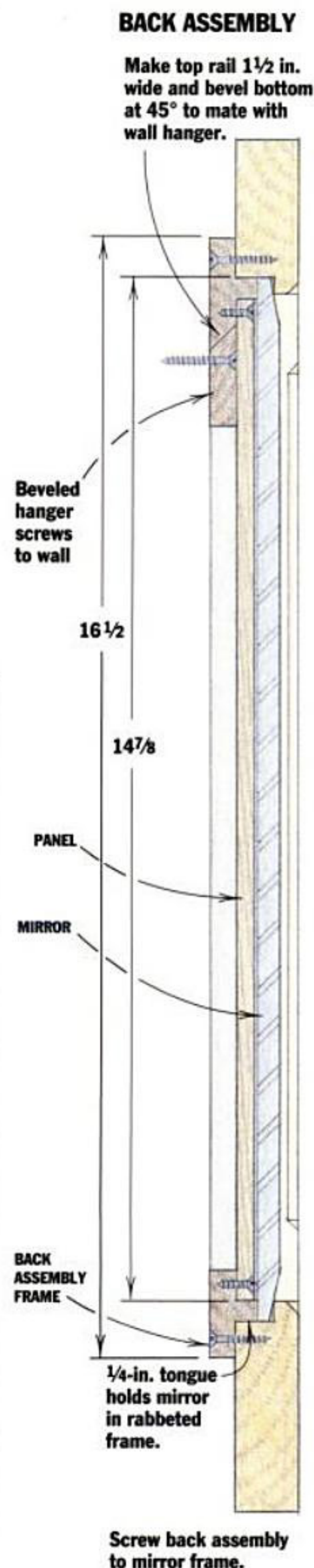
Gluing the Frame Together

When gluing the joints I took care to apply glue only to the concealed part of the tenon and not to the inside of the mortise. This reduced the chance that glue would end up on the exposed part of the tenon when I slipped it home. Then, before driving home the wedges, I applied additional glue to the wedge slots, using a glue syringe (available from Garrett Wade, 161 Avenue of the Americas, New York, NY 10013, 800-221-2942).

With the frame together, I was ready to rabbet the back to accept the mirror. (See Fig. 1.) I made the cut with a router and a $\frac{1}{4}$ -in. rabbeting bit, and squared the rounded corners with a chisel.

Making the Back Assembly

You could use plywood to form the back panel that holds the mirror in place, but I wanted to construct some-



CONTROLLING TEAR-OUT IN FIGURED WOODS

Tear-out is a common problem when working with figured woods because the grain runs in many directions at once and it becomes impossible to plane "with the grain."

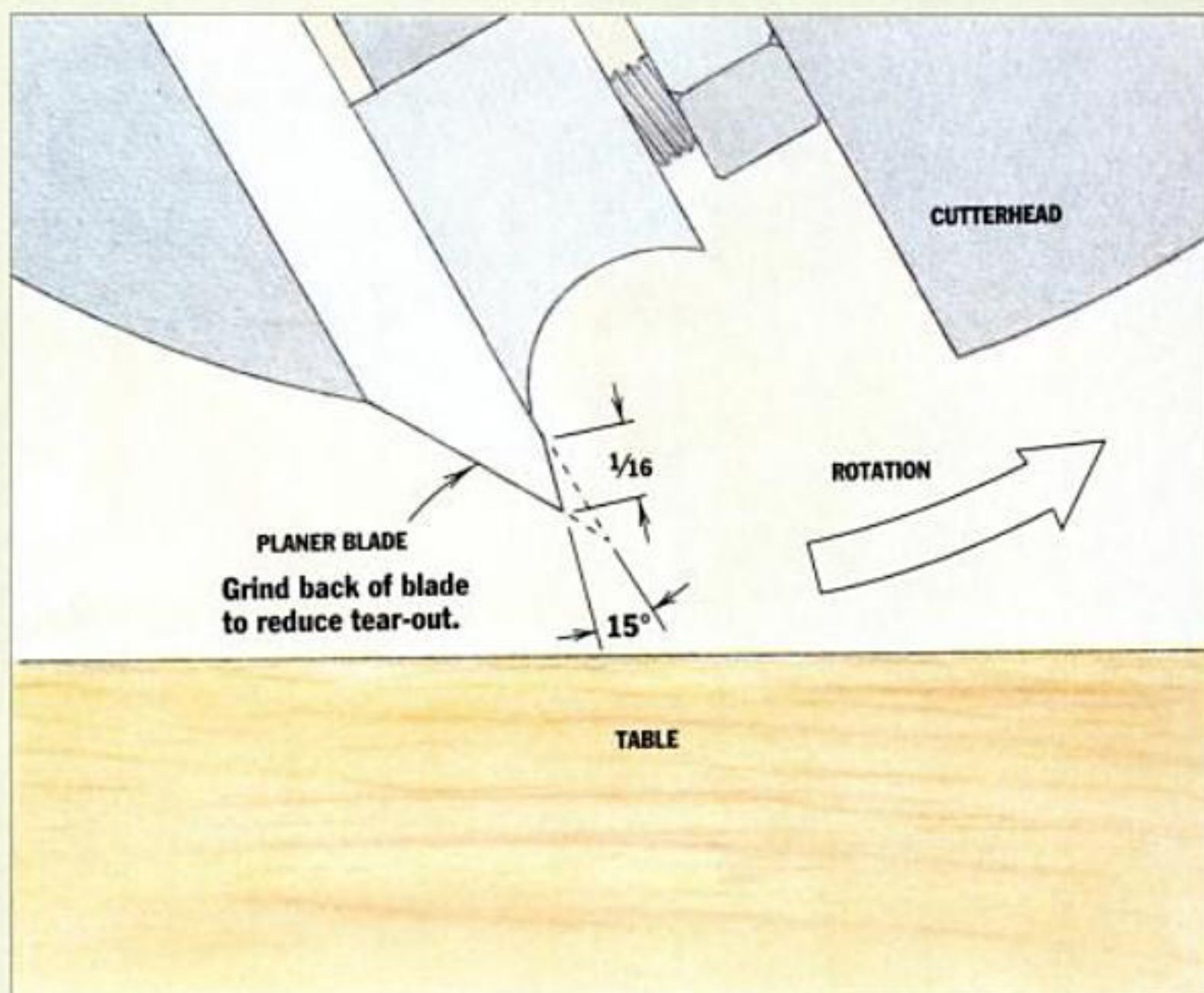
You can reduce the chances of tear-out by keeping your tools razor sharp, so they'll shear the wood fibers instead of ripping them. The following techniques will also help control tear-out.

Cut rough sawn stock into individual parts before planing. By cutting the figured wood into smaller pieces you have more flexibility when choosing how you'll feed the stock through the planer and jointer, minimizing tear-out.

Hand-plane parts before assembly. This helps you avoid cross-grain planing where, for example, the end of a rail meets a stile. Planing at an angle to the grain will also reduce tear-out.

Make two cuts instead of one. For example, when thicknessing stock in the planer or routing a profile on the edge of a piece, take two passes, with the second one being a very light cut that cleans up some of the tear-out from the first cut.

When in doubt, use a scraper. This tool is a sure thing for producing tear-free surfaces.



Backbeveling Planer Blades

There's one other step that will help reduce tear-out on highly figured woods: When you send out your planer blades for sharpening, have the shop add a backbevel. (See drawing.) The bevel changes the cutting angle from the usual 30° (ideal for softwoods) to

45°, an angle less inclined to tear wood when cutting against the grain. This works well on jointers too.

If you make this modification, you may want to keep a spare set of "regular" blades since the trade-off for smoother cuts is a reduction in the ability to take very deep cuts.—R.C.



▲
An L-shaped angled block acts as a guide for chiseling the 45° ends of the chamfers.

thing that was a little more in character with the aesthetics of the frame. So I decided to make a frame-and-panel assembly consisting of two thin cherry back panels held in a mortised and tenoned walnut frame. (See Fig. 2.) A ¼-in. thick tongue cut in the walnut

holds the mirror against the bird's-eye frame. (See Fig. 1.)

I started with ⅝-in. stock and formed the outside edge of the tongue with a cut on the tablesaw. Then I assembled the back frame and used a router and straight bit to form the inside edge of the tongue. Thin strips of felt glued to the tongue prevent scratches where the tongue touches the back of the mirror. (See Fig. 2.)

I decided to hang the mirror on mating beveled strips (see Fig. 1), so I made the top rail of my back assembly ⅜ in. wider than the sides and bottom parts to give me room to form a 45° bevel that would fit a corresponding hanger strip. (See Fig. 1.) If you opt for a plywood back, you could use standard mirror hanging hardware instead.

As a finishing touch, I lightly

scraped the face of the frame to remove tear-out and then sanded the scraping marks.

I finished the frame with Waterlox, a wipe-on oil/varnish blend, that I thinned with naphtha (about 20 percent) and applied in thin coats until I achieved a good build-up.

That's all there is to it. I assembled the parts, hooked the mirror on the wall hanger and then stood back for a moment of reflection. ▲



RIC HANISCH
is an architect and designer living in Pennsylvania.



TURNING A VICTORIAN ORNAMENT

BY STEPHEN H. BLENK



*Trim Your Tree
With a Classy
Trinket*

With their delicate blown-glass ornaments, the Christmas trees of Victorian times always had a special elegance. That yesteryear charm is hard to re-create today, but you can recapture a bit of it and test your craftsmanship by turning ornaments in wood.

Your turned ornament can be as simple or as complex as your skills and tools allow. Turn a solid ball if you're a beginner, or push the limits a bit and make a hollow ball and a tiny wood or fossilized ivory ornament to hang inside it.

The large hollow ornament pictured here is turned from a laminated block made by gluing up long, beveled strips of light- and dark-colored hardwoods. You turn the block to a cylinder, cut it into smaller ball-size pieces, and then turn each piece round. After that, you hollow each ball and then separately turn delicate, tapering spindles to decorate the top and the bottom.

Turning and hollowing the globe is not as difficult as you might expect, once you make the shop-built chuck described on page 55. The chuck, which is screwed to the lathe faceplate, holds the ball securely while you work on it.

You'll also need a tablesaw for ripping the laminations and an indexing setup on your lathe to bore accurately through the globe. If your lathe doesn't have a built-in indexing feature, use a protractor to lay out 60° angles on an auxiliary faceplate and work from those guidelines.

Ripping the Laminations

You could laminate each ball blank individually, but I find it easier to glue up hardwood strips about 16 to 18 in. long to make a hexagonal "log." Long strips are easier to align and clamp than short ones, and it's easy to turn the hexagonal log into a cylinder and then cut it into ball blanks with a parting tool.

You can use any hardwood that turns cleanly for ornaments. My favorites are padauk for the dark wood, and maple or oak for the light color. You'll need 12 strips of material for

PHOTOS BY ROSS HAMILTON

the main ball: six of each color.

For a 3-in. to 4-in. dia. ornament, rip the laminations from straight-grained stock milled about $\frac{3}{4}$ in. to 1 in. thick. Each of the strips must be diamond shaped, as shown in Fig. 1. To cut them, tilt the saw blade exactly 60° to the tabletop and locate the fence so that the width of the face of the cut strip will equal the width of the beveled edge. (See drawing.)

If everything is set correctly, each diamond will have two 60° angles and two 120° angles. Fitting the 60° angles of the darker-colored wood together creates the central six-pointed star. The 120° angles of the contrasting wood fit between the points of the star to create the hexagon. (See drawing.)

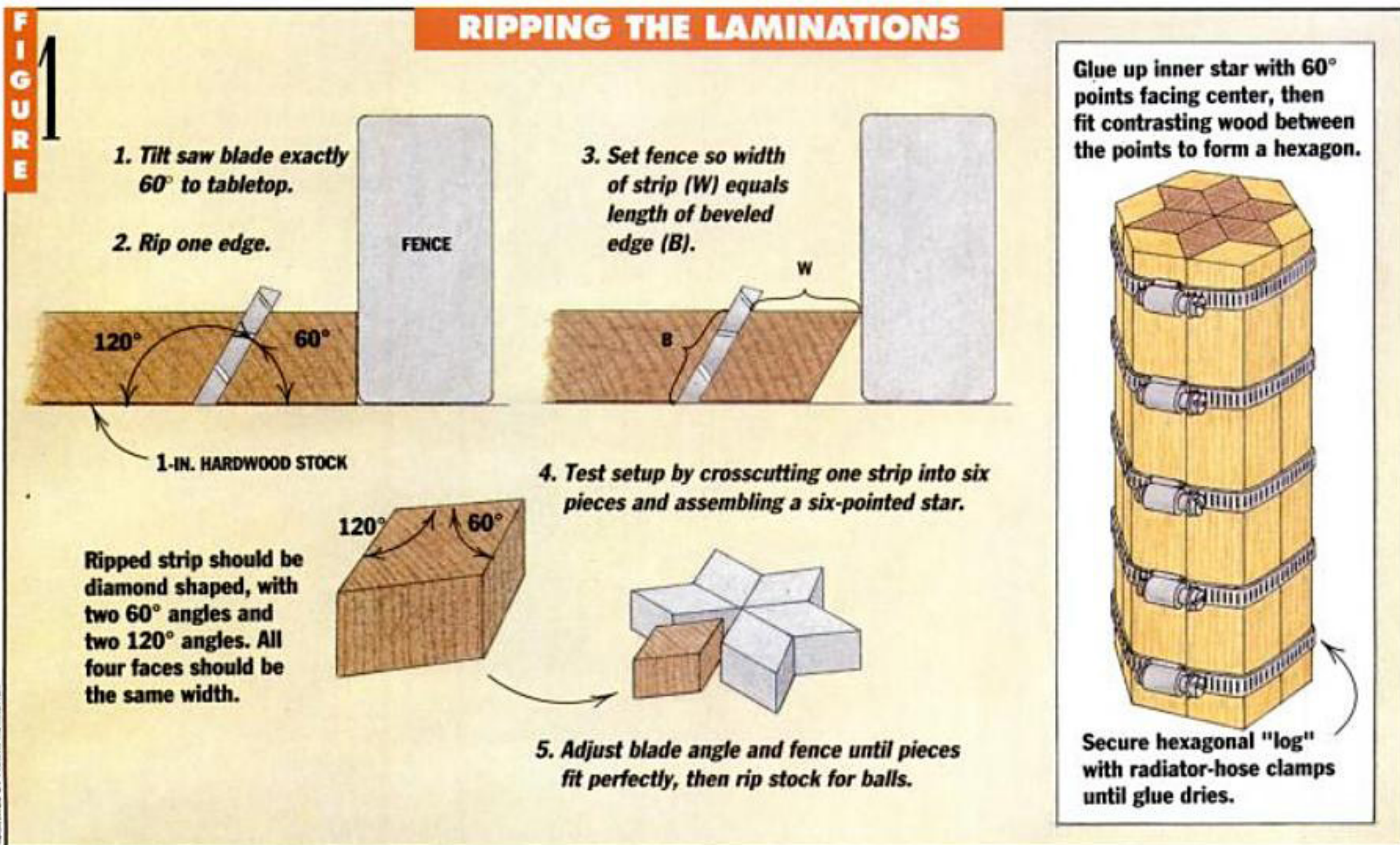
The angles *must* be accurate; any errors will be multiplied by the number of strips and you'll never get a strong glue-up. To check the angles, rip a test strip and cut it into six short pieces of equal length. Fit the sharp points together, as shown in the drawing, to make a six-pointed star, and secure the pieces with a rubber band. They should fit without gaps. If they don't, adjust the saw blade angle and fence location as needed.

Once the angles mate perfectly, rip



It's much easier to make ornament balls by first turning a long cylinder then parting it into ball blanks.

To mark the ball for boring and hollowing, draw a line around the circumference then mark three 120° or six 60° lateral lines crossing the circumference line.



SHOP-BUILT HOLLOWING CHUCK

If you've ever had trouble drilling a hole in a round object, you'll appreciate how this shop-made lathe chuck holds your stock firmly and keeps it from spinning as you work.

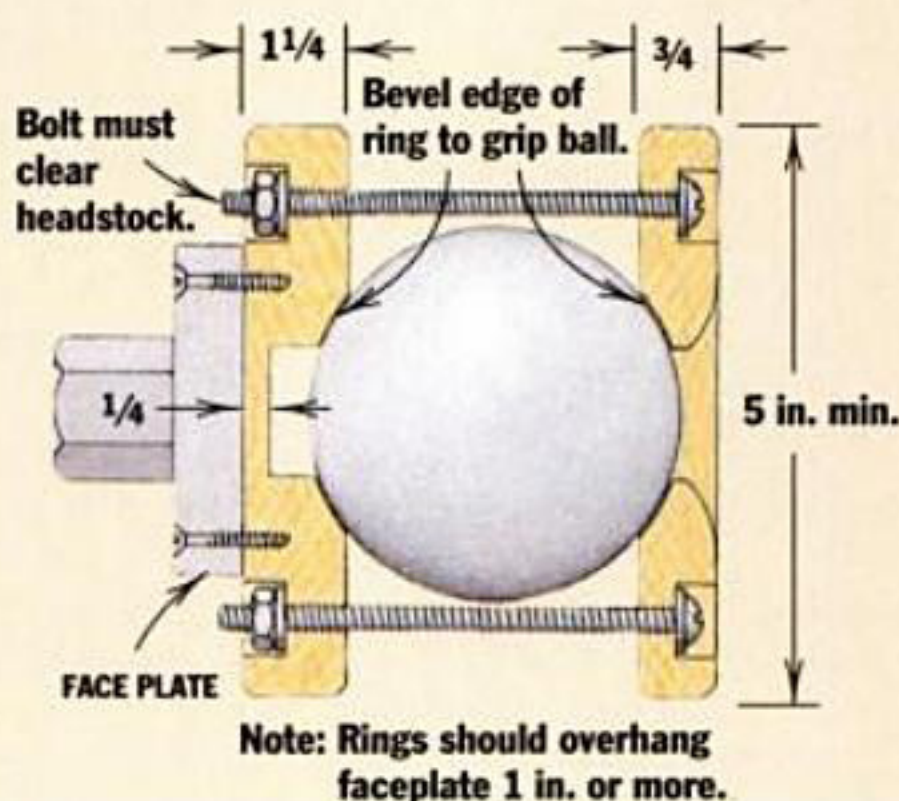
The chuck consists of two wooden rings that screw to a faceplate. For accuracy, turn both rings from a single 2-in. thick block of maple or oak.

First, fasten your stock to a small faceplate with $\frac{3}{4}$ -in. long screws. The wood should be at least 5 in. in diameter, as shown. After truing the face of the wood, bore a $1\frac{1}{4}$ -in. dia. hole about $1\frac{1}{4}$ in. deep in the center of the block. Don't drill into the faceplate! Now, stop the lathe, and index three points 120° apart on the back side of the overhang, and bore three perpendicular $\frac{1}{4}$ -in. dia. holes through the block at these points. Then part off about $\frac{3}{4}$ in. of the face to make the front ring.

Set the ring aside, and face off the remaining portion. Be careful not to hit the faceplate screws. Bevel the shoulder of the center hole to provide the maximum grip on a round object. Repeat this beveling process on the front ring after bolting it bevel side up to the chuck ring with 2-in. long, $\frac{1}{4}$ -in. dia. round-head machine screws run through the three holes previously

drilled. The screw heads should face front, so you don't catch your fingers.

Turn the ring over and replace the 2-in. screws with $\frac{1}{4}$ -in. bolts long enough to clamp your ball between the two rings. I find 4-in. screws to be good for most ornaments. It's a good idea to countersink the bolt heads to avoid any contact with tools or fingers.—S.B.



enough wood for your ornaments. Since setting the saw is time-consuming, I generally run enough strips for several ornaments.

Gluing Up the Hexagonal "Log"

After crosscutting the beveled strips to length, you're ready to glue up the hexagon. Use fresh yellow glue (aliphatic resin). Old glue can be too thick to penetrate the wood and may not cure well; you don't want a piece to come apart on the lathe.

Dry fit the pieces first. Join the sharp angles of the dark strips to create a star, then put the lighter strips between the points of the star. Once you're comfortable with the process, coat the strips liberally with glue and assemble. This job is easier with four hands.

Clamp the resulting hexagonal "log" with metal clamps made for automotive radiator hoses. Position the clamps every 4 in. to 6 in., with each clamp's screw on one of the log's flat sides. Tighten the clamps gradually, checking strip alignment as you go. Don't worry about glue squeeze-out or clamp marks; you'll remove them later when



With the ball turned round, mount it in a shop-made chuck and bore the access holes you'll use to hollow the ornament.

you turn the ball.

I let the stock dry by the wood stove overnight, then carefully inspect the log for good glue joints. If they pass this test, I crosscut each end of the log to square up the surfaces so I can mount it between centers on the lathe. It's important to center the log accurately to minimize vibration and keep the light and dark lines of the turning symmetrical.

As a final check of lamination strength, run the blank at the lathe's low speed before you turn it. Make sure you stand clear of the line of fire in case something lets go. When you're

satisfied that the lamination is solid, turn the log to its maximum diameter, about $3\frac{1}{2}$ in. to 4 in. This will produce a cylinder the color of the outer layer, divided by six thin stripes of the inner layer. (See photo, previous page.)

Turning the Ball

Now you're ready to cut the cylinder into segments long enough for mounting and turning balls. My rule of thumb is to make each ball blank as long as the diameter of the stock, plus whatever extra length I need to grip the piece in a chuck. I also add another inch for what I call the "oops" factor. This extra length gives me room to work safely between the ball and the chuck.

I use a parting tool to turn a $\frac{1}{2}$ -in. wide tenon on one end of each blank, so I can mount it in my Nova chuck. (If you don't have a Nova chuck, you can use a four-jaw chuck or other system.) After cutting the tenons, I again use a parting tool to cut part of the way through the segments, and then separate them with a handsaw or bandsaw.

With this done, you can mount and turn the ball as close to round as your skills permit. (For more on turning



Author uses several offset round-nose scrapers, made from planer blades or high-speed steel, to hollow the interior.



When hollowing the ball, carefully work your scrapers through the window hole to avoid marring the surface around the opening.

balls, see AW #13.) I rely on both a gouge and skew to achieve the shape. Use calipers to check your progress and ensure the height of the ball is truly spherical. This is important: You will be hollowing the inside on several axes determined by the outside diameter, so the closer to round the better.

When you're satisfied with the ball, sand it, then mount a $\frac{1}{4}$ -in. bit in the tailstock and bore a hole through the center from the end. This is so you can later fasten the top and bottom decorative spindles. The holes also provide a way to remount the ball on the lathe for finish sanding.

Hollowing the Ball

Now you're ready to hollow the ball. My method is to bore several large holes, then use these openings, or windows, as points of entry for an offset scraper. After hollowing the area inside each hole, I rotate the ball in the chuck and hollow another hole.

First, you must mark the locations of the windows you will bore. Draw a line around the circumference of the ball, then index your lathe to mark either three 120° or six 60° lateral lines crossing your circumference line. (See

photo, page 54.) Ideally, these lines should fall at the center of the ellipsoids you formed by turning the ball. You will drill where the lines intersect.

With your lines in place, part off the ball as close to perfectly round as possible and mount it in the shop-made chuck described in the sidebar. Now center one of the window marks in the opening of the chuck and align the ball. The best approach is to snug up the chuck just finger tight and put the ball under pressure between the chuck and the tailstock. Then you can tighten

the chuck screws in sequence without moving the ball.

To check alignment, mount a 1-in. dia. drill bit in the tailstock so that it's centered on a window mark and rotate the chuck by hand. If the ball is properly aligned, the window mark will remain *centered* rather than circling the bit point as you rotate the chuck. A bit of "Kentucky windage" may be required here to adjust the ball and bring it into alignment.

Drill the first window using the 1-in. bit in the tailstock. I rely on the $\frac{1}{4}$ -in.



Bore out the small, interior ornament with a $\frac{1}{2}$ -in. dia. brad-point bit in a hand-held drill, as shown at left. The three holes make it appear that the tiny piece is also hollowed. After boring the small ornament, round off the outside of the drilled area and turn two decorative ends, as shown above.

hole drilled through the original axis as a depth guide and bore slightly beyond this point.

Next, back off the tailstock and carefully begin turning away the interior material through the window. (See photo, previous page.) I use both a standard $\frac{3}{8}$ -in. wide round-nose scraper and a custom-made offset (bent) round-nose scraper with a $\frac{3}{16}$ -in. cutting radius. (See inset photo.) The smaller cutting surface creates less drag and doesn't generate enough torque to spin the ball in the chuck. Clean up the cuts *carefully* with the wider scraper.

Catching an edge now will create a glaring blemish so pay particular attention to the surfaces surrounding the window. Also, any further work on this area will be difficult. A little grinding and polishing on the lower right edge of your scrapers will help prevent catching.

Once you have removed as much as you comfortably can through one window, move to the next 1-in. hole and repeat the procedure. Continue until all windows are hollowed and the wall of the ball is about $\frac{1}{8}$ in. thick. **CAUTION:** the ball becomes more fragile as it's hollowed and can easily be crushed by the chuck! Inspect all glue joints each time you reposition, and reinforce any questionable ones with cyanoacrylate glue.

Turning Interior Ornaments

Compared with hollowing the ball, the interior ornaments are pretty simple. Turn a 1-in. dia. cylinder of light or dark wood, and mark it laterally on three index points (120°). Use a $\frac{1}{2}$ -in. dia. brad-point bit and hand-held drill to bore three holes into the center to create an open area. (See photo, opposite page.) Then simply round the outside of the drilled area, and turn two decorative ends. Size the ornament so it can be mounted upright inside the main ball yet will be visible through the six windows. Then sand and finish the ornament. If you like, turn an even smaller ornament to fit inside this piece.

Turning Decorative Spindles

To turn the decorative spindles for the main ornament, mount a $\frac{3}{4}$ -in. dia. blank between centers or in a chuck. Turn it round, and part one end down



Turn the decorative spindles for the main ornament between centers. A $\frac{1}{4}$ -in. dia. tenon turned on one end fits the center hole of the ornament.

to a $\frac{1}{4}$ -in. dia. tenon, about $\frac{3}{16}$ in. long. The design for this piece is up to you. Traditionally, the bottom spindles are 3 in. to 4 in. long and consist of several coves and beads, followed by tapered points. The top piece is generally shorter, about 1 in. long. It's primarily a means of fastening the hanging device. For the best fit against the ornament ball, undercut the shoulder of each tenon slightly. Before taking the piece off the lathe, bore the tenon end for the hanger for the interior ornament. I also find it's easier to spray the piece with lacquer while it's on the lathe, then part it off after the finish dries.

When you complete the two spindles, sand and finish the main ornament ball. To remount it, turn a tapered tenon on a piece of scrap mounted on a faceplate, chuck, or screw center. Shape it to fit the $\frac{1}{4}$ -in. hole you bored on the original axis of the ball. Then use your tailstock with a 60° live center to hold the ball lightly on the tenon. Sand the ball, being careful not to flatten or distort the window openings. I sand to 320 or 400 grit, and then finish with a clear lacquer.

Decorating the Ornament

To dress things up a bit, you can use sterling-silver hardware to mount the various pieces of the ornament. Sections of earring wires, or just plain silver wire, work well, or you can buy prefabricated connectors, called findings, that jewelers use (available from local jewelry suppliers, or Rio Grande

Jewelry Supply, 6901 Washington St. NE, Albuquerque, NM 87109).

You assemble all the parts of the ornament at the same time. First, fasten a small silver loop or eye to the tenon you cut on the top spindle and fix it in place with cyanoacrylate glue. Then glue the tenon into the $\frac{1}{4}$ -in. hole in the top of the main ball. This should leave the silver loop exposed inside the top of the ball. Make small hooks for the tops of the ornaments and affix them.

If you've made a tiny ornament to hang inside the small ornament, you'll need a loop for it, too. Hang the smallest ornament in the center of the middle one, and hang the middle one in the large laminated ball. Keep everything centered, so the ornament will hang straight. Finally, glue the bottom tenon into the large ball and attach a string to the silver loop on the top for hanging.

It's easier to turn several ornaments at once rather than a single one. And they are a most popular Christmas present, to be shared and cherished among family and friends. ▲



STEPHEN H. BLENK is a turner in Washington state and founder of the Olympic Peninsula chapter of the American Association of Woodturners.

SHOP-MADE ROUTER JIGS

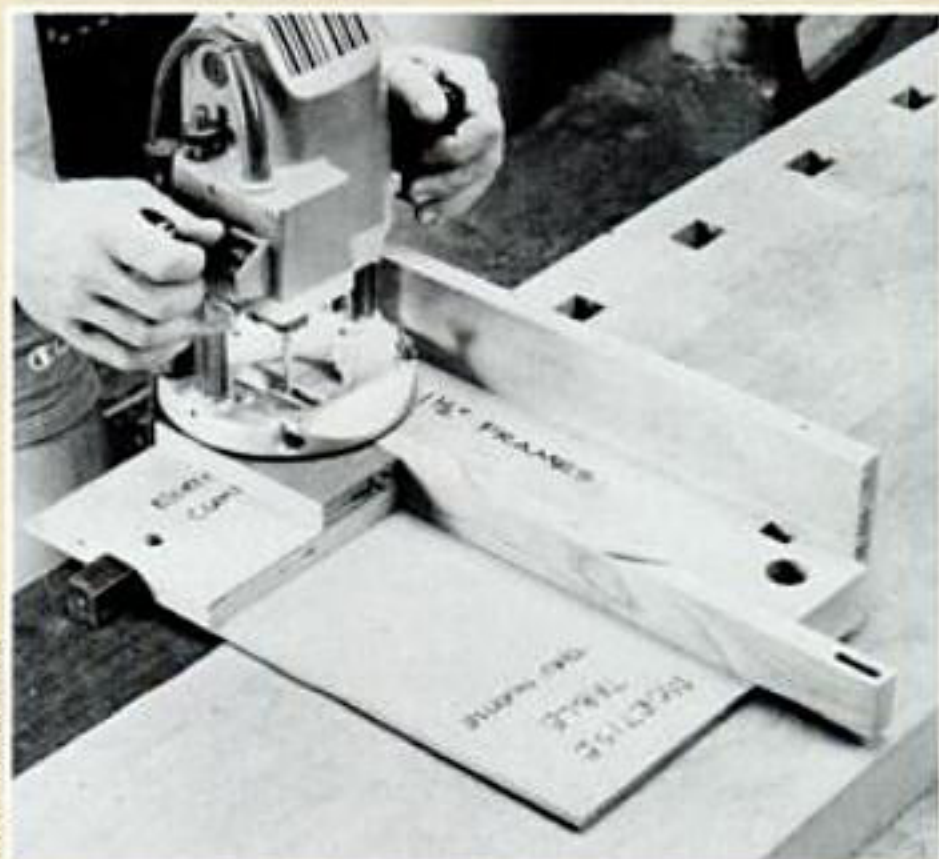
*Four Guides to Put
You in the Groove*

Woodworkers love jigs because of the big payoff for the time and effort invested.

In this article we feature four router jigs that appear in the new book, *The Woodworkers Guide to Making and Using Jigs, Fixtures and Setups*, by David Schiff and Kenneth S. Burton Jr. (1992, Rodale Press, Inc. 33 E. Minor St., Emmaus, PA 18098.)

Two of the jigs are for making mortises and two for dados, so they'll get a real workout in your shop.

There's no need to get fancy with the appearance of these jigs, but accuracy in construction will pay off in routing accuracy when you put them to work. Make them from hardwood and hardwood plywood, and assemble the jigs with glue and screws. The drawings and photos show the hardware you'll need and explain how the jigs go together.



PHOTOS BY MITCH MANDEL

PLUNGE ROUTER MORTISING JIG

Design by Andy Rae

This simple jig turns your plunge router into a mortiser. It's best suited for mortising face frames, table legs and cabinet door frames.

The jig consists of a plywood base and fence as shown. There's also a reversible clamp block, made of two pieces of $\frac{3}{4}$ -in. plywood. (The clamp block shown will work for stock up to $2\frac{1}{4}$ in. wide. Wider stock requires a thicker clamp block for adequate support.) Each new setup requires you to make a spacer sized for that particular job as explained below.

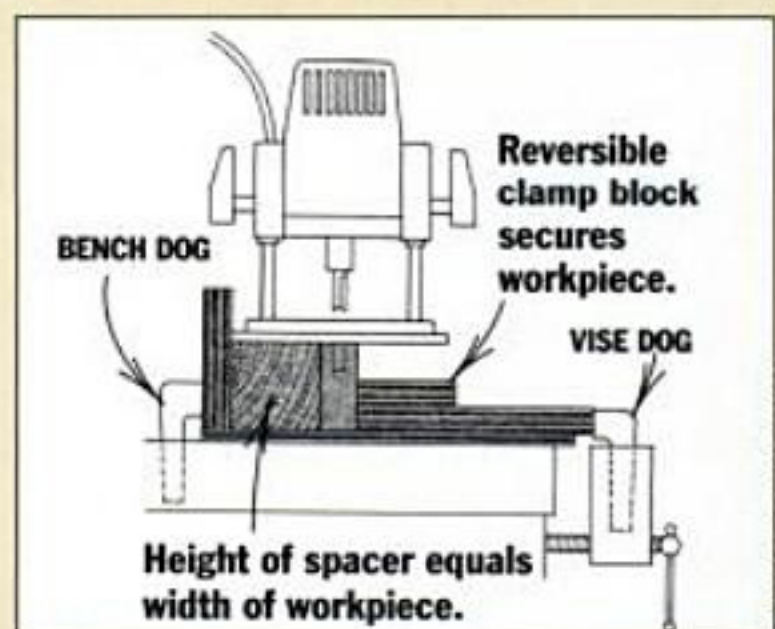
To use the jig, place it on the benchtop between two dogs. Clamp

the vise dog against the clamp block to hold the workpiece between the clamp block and wooden spacer. (See photo.) The top of the spacer is flush with the top of the workpiece. The router base rides on the spacer and workpiece. You have to rout to layout lines by eye—the jig has no end stops to preset the length of the mortise.

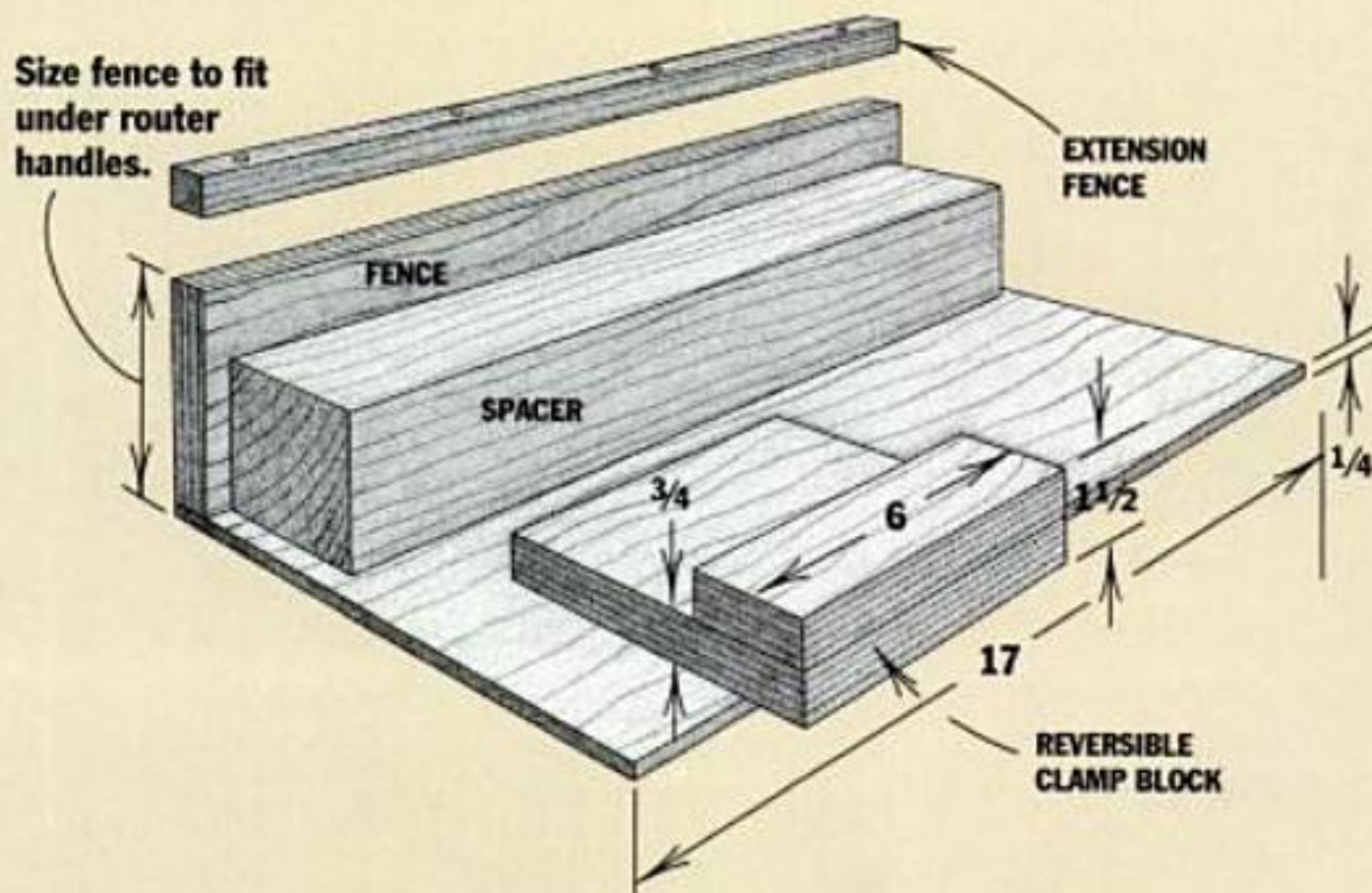
The *width* of the spacer (horizontal dimension on the drawing) determines the location of the mortise on the workpiece. For *centered mortises*, determine the spacer width by subtracting half the workpiece thickness from the radius of your router base.

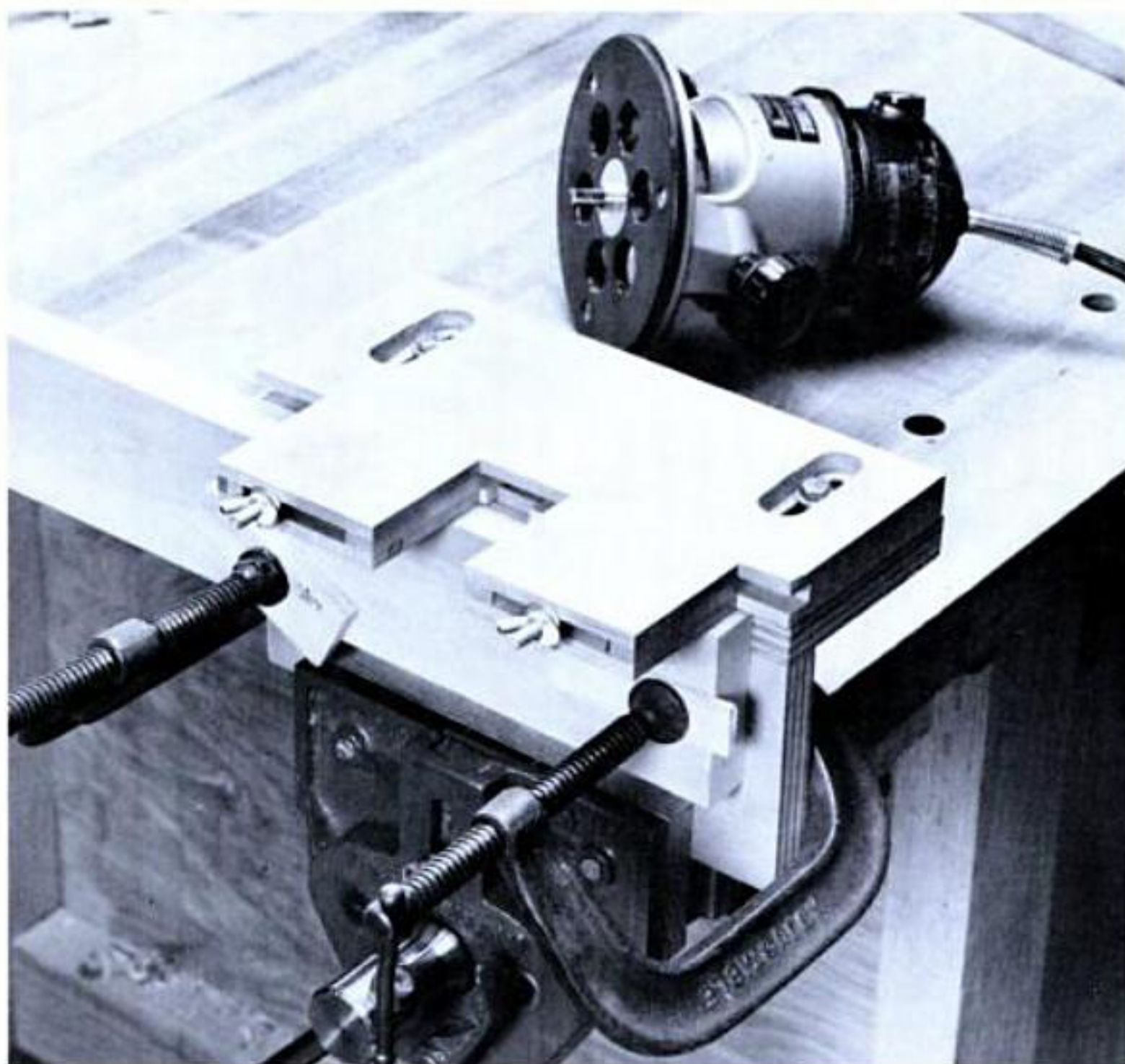
For offset mortises, adjust spacer width accordingly. The *height* of the spacer (vertical dimension on drawing) must equal the width of the workpiece.

Making spacers for each new setup may sound inconvenient, but I use the same setups again and again. Once I've made a spacer, I label it and hang it up for future use. (See photo.)



DRAWINGS BY FRANK ROHREACH





mates with a dado in the back guide to ensure these parts remain parallel during adjustment. Bolts and wing nuts lock the back guide to the mounting bracket.

To use the jig, lay out a mortise on your workpiece, clamp the workpiece to the jig and use the layout lines to determine the guide locations. If you're using a pattern bit, set the guides right over the lines. If you're using a template bushing, offset the guides accordingly. The wing nuts should be horizontal when they're tightened against the end guides so they won't interfere with the router's base. Set the bit depth, rout the mortise and square up the corners with a chisel.

When mortising a wider stile or door, clamp the work in the vise first, then clamp the jig directly to the work.

HINGE MORTISING JIG

Design by Kenneth Burton

Mortising hinges in a door or cabinet is often one of the last steps in a project, so a slip can ruin hours of work. This jig lets you rout hinge mortises fast and accurately.

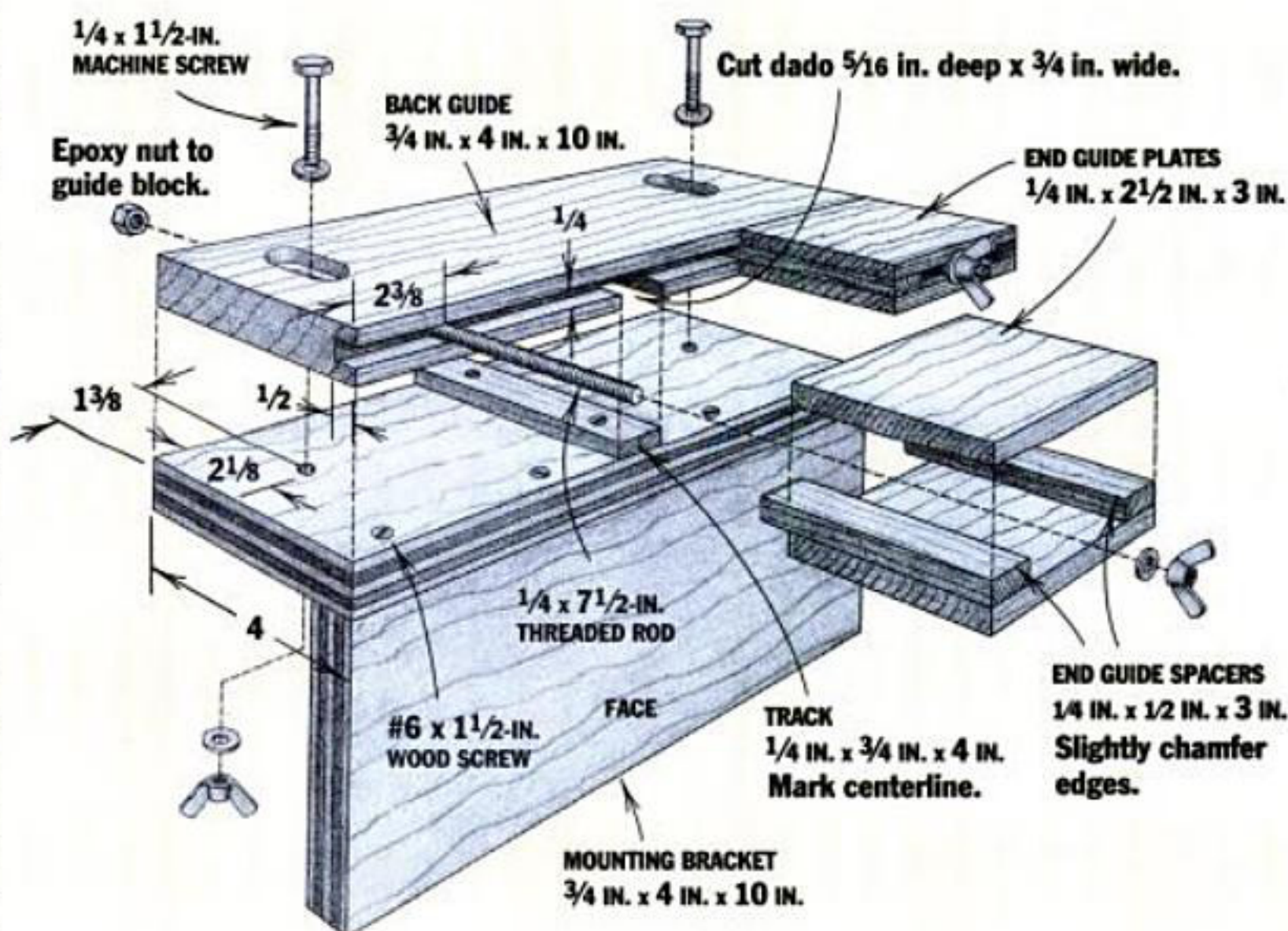
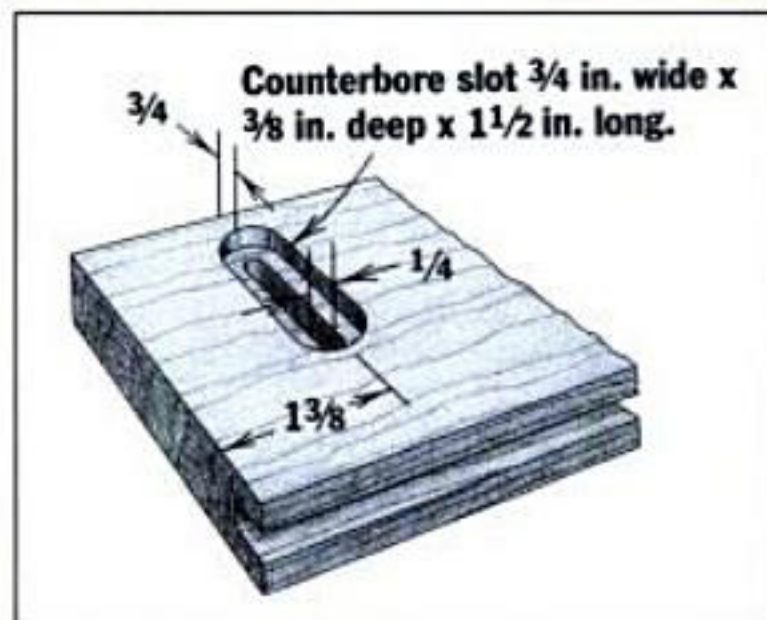
The jig consists of a back guide and two end guides all made of hardwood, and an L-shaped plywood mounting bracket as shown. The guides are adjustable for mortises of different lengths and widths.

You clamp the jig in a vise and clamp the workpiece directly to the face of the jig, then rout inside the jig's guides to cut the mortise. You can use a straight bit and guide bushing or a pattern-cutting bit with a bearing mounted above the cutter and $\frac{1}{2}$ -in. long flute (available from MLCS Ltd., P.O. Box 4053, Rydal, PA 19046, 800-533-9298).

The jig's end guides consist of two $\frac{1}{4}$ -in. thick spacers sandwiched between guide plates. The spacers are $\frac{1}{2}$ in. longer than the guide plates so they can ride in a groove in the back guide. You lock the end guides in position with wing nuts on $\frac{1}{4}$ -in. threaded

rods. The end guides should be a snug fit against the back guide and the top faces should be flush. If they aren't flush, even them up with a scraper.

A track on the mounting bracket



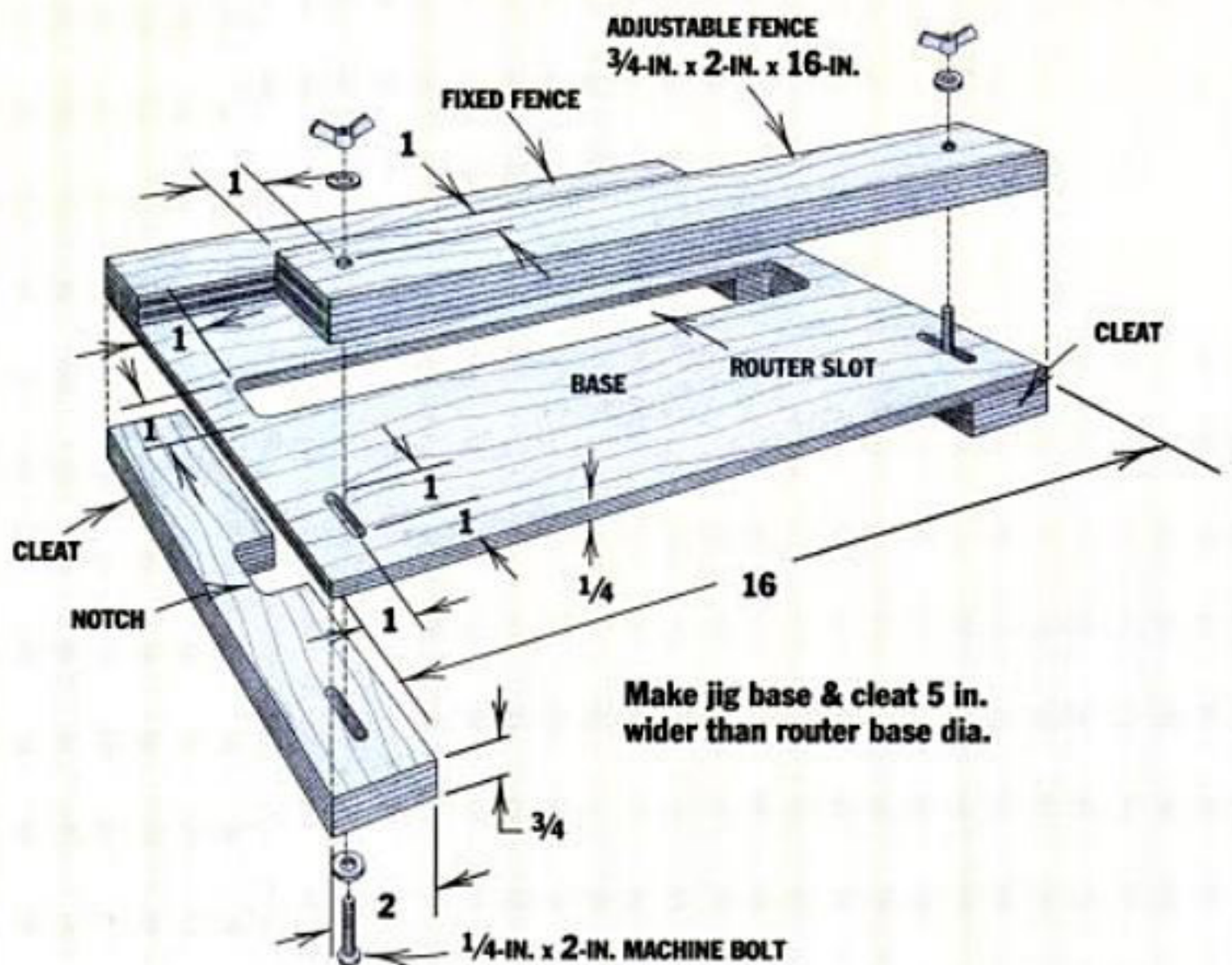


ADJUSTABLE-DADO JIG

Design by Douglas Goodale

This jig lets you use a $\frac{1}{2}$ -in. dia. straight bit to rout dados from $\frac{1}{2}$ in. to $1\frac{1}{2}$ in. wide in boards up to 12 in. wide. The jig has an adjustable fence so you can tailor dado width precisely. That's a big help when the $\frac{3}{4}$ -in. plywood shelf that will fit in your dado is actually $\frac{23}{32}$ in. thick.

The jig base should be 5 in. wider



than your router base diameter.

To use the jig, set the adjustable fence for the desired dado width. With a 6-in. diameter router base and a $\frac{1}{2}$ -in. straight bit, the width of the dado will equal the distance between the fences

minus $5\frac{1}{2}$ in. Clamp the jig on the stock with the fixed fence to your left and the cleat against the stock's edge. (See photo.) Begin and end with the bit in the notch in the cleat, so it's clear of your stock.

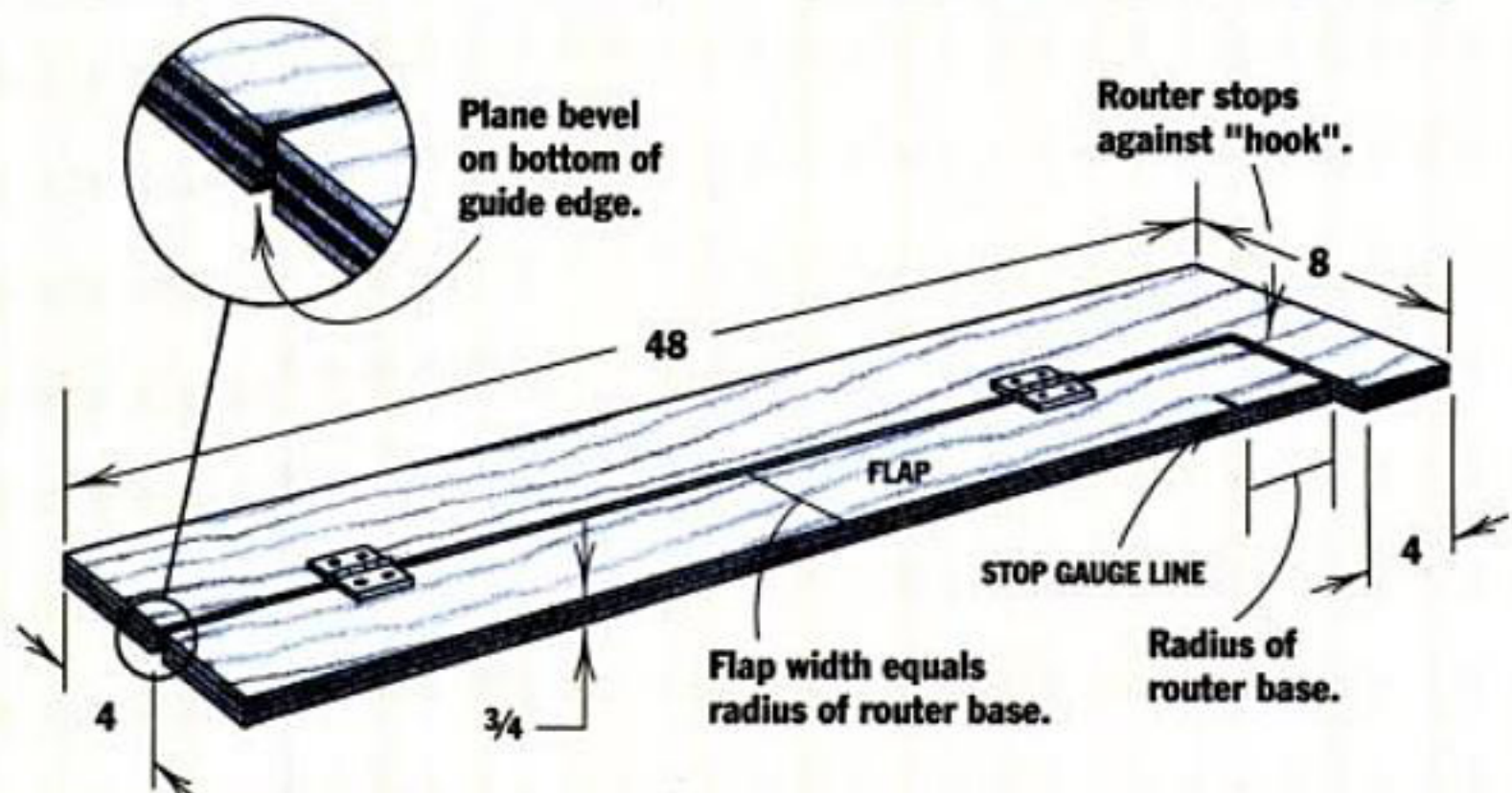
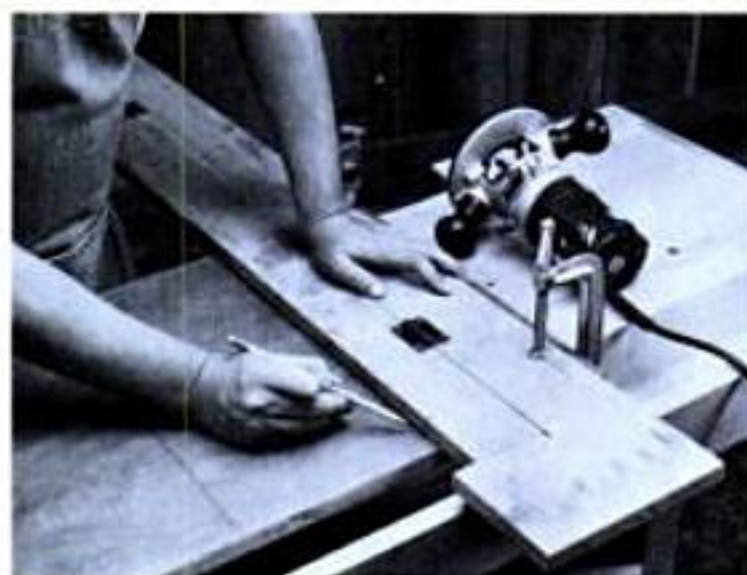
CENTERLINE DADO JIG

Design by Mitch Mandel

The beauty of this jig is that it's easy to position. It's designed so that all you have to lay out is the centerline of the dado. Then you can cut a dado of any width along the centerline with the same jig setting—up to the biggest diameter bit your router will take. You can also stop dados right where you want to.

To make the jig, cut out the pieces as shown, making the flap width equal to the *radius* of your router base. Slightly bevel the bottom of the guide edge with a block plane so chips and dust won't get in the way of the router as you dado. Then mount the hinges.

To use the jig, mark the centerline of the dado on the stock. With the flap down, align the edge of the flap with the centerline of the dado. For a stopped dado, make a stop mark on the work (offset the mark from where you want the dado to stop by the



radius of the router bit). Align the stop gauge line with the stop mark. Clamp the jig in position, flip up the

flap and run the router along the guide edge until it stops against the "hook" on the jig.

WOOD FACTS

MAPLE

BY DICK BOAK



Flat-sawn maple



Maple burl



Curly maple



Bird's-eye maple



Quilted maple



Blistered maple

PHOTOS BY ELLIS WEAVER

SPECIES NAMES

Acer saccharum (Hard, white or sugar maple; U.S.)

Acer nigrum (Black maple; U.S.)

Acer rubrum (Red maple; U.S., Canada)

Acer saccharinum (Silver maple; U.S. Canada)

Acer negundo (Manitoba maple; Western Canada)

Acer macrophyllum (Bigleaf maple; Northwest U.S., Canada, UK)

TRADE NAMES

Hard, sugar (as in maple syrup), or rock maple, soft maple, red maple, white maple (refers to sapwood). Figured variations include "bird's-eye," "curly" and "tiger" maple, "flamed," "quilted" or "blistered" and "burl."

APPEARANCE

Maple is typically tawny beige to light tan in color, but sapwood may range from silvery gray to creamy white to pinkish brown. Heartwood is generally a light cocoa brown. There are many variations, including pieces with distinctive, sometimes wildly chatoyant (changeable luster) figure.

TECHNICAL PROPERTIES

Maple is a medium to heavy hardwood with a specific gravity range of .54 (soft maple) to .72 (hard maple). Soft maple averages about 35 lbs. per cubic ft., while hard maple is 45. Planks dry slowly with a tendency to twist, though the wood is reasonably

stable after kiln drying. Because of its extremely small pore structure, it may be sanded to a high polish. Denser varieties take on higher lusters. Maple takes a finish well, with only marginal absorption.

WORKABILITY

There is considerable variation between species. Rock maple tends to burn when machine sawn. Figured and burlled varieties are prone to chip out and require special attention during machining. Due to maple's varying density and grain direction, hand-applied stains may go on rather "splotchy." Alcohol-based spray stains or hand-applied gels work better.

USES

Because it is hard, durable and readily available, maple is used for many woodworking applications, including flooring, cabinetry, paneling, butcher blocks, tool handles, cutting boards and cooking utensils. Figured maple is prized by guitar and violin makers, and is also ideal for furniture, jewelry boxes, turnings, treen, marquetry and veneer.

SIZES

Typical lumber runs 4 in. to 10 in. wide, with occasional wider boards mixed in. While 4/4 and 5/4 rough lumber is generally available, 8/4 and larger sizes are harder to find. Planks are rarely quartersawn since the more

salable, higher grade sapwood is flatsawn from the less stable and unattractive boxed heartwood.

TOXICITY

Maple is not toxic, although it is good practice to wear a dust mask when working with any wood.

AVAILABILITY

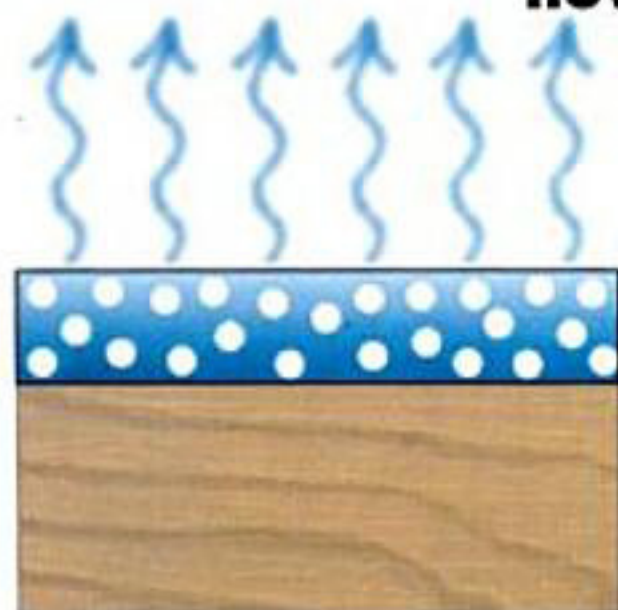
Maple is widely available through local lumberyards, sawmills and wood dealers. Figured varieties are rarer but can be purchased through specialty and exotic wood dealers. Although harvesting of maple has been heavy, there is a reasonable supply of East Coast maple (especially in Maine and Canada). "Bigleaf" maple, from the West Coast, is not endangered but is becoming quite scarce.

COST

Plain maple, in wholesale lots of 100 bd. ft. or more, ranges from \$1 to \$2.50 per bd. ft., depending on its grade and the percentage of #1 white (white both faces). Retail prices range from \$2 to \$5 per bd. ft. Bird's-eye maple wholesales for \$2.50 to \$5 per bd. ft. and retails for \$5 to \$12 depending on the color and the density of "swarmy" bird's-eye clusters across the face of the board. Highly figured, flamed and quilted maple boards are at least twice the price of plain maple and can skyrocket to more than \$20 per bd. ft.

JUST FINISHING

HOW A WATER-BASED FINISH FORMS A FILM



Stage 1: Water evaporates, forcing resin droplets (micelles) closer together.



Stage 2: Tail solvents evaporate, softening micelles and allowing them to coalesce into a continuous film.



Dry Film: Cloudiness disappears, leaving clear resin color.



BY MICHAEL DRESDNER

“**W**ater-based” has become the buzzword of finishing in the '90s, carrying with it reports that alternately praise or damn these relatively new coatings. But what is the real story behind water-based finishes?

Kinder, Gentler Finishes

Water-based coatings have made their biggest impact because they have less of an odor than other finishes, clean up with water, are safer to the user and the environment, and are non-flammable. (They are perhaps the only finishes that can be sprayed without an explosion-proof booth.)

These properties are the result of advances in chemistry that make it possible to mix the “resins,” which form the coating on wood, with water. All finishes contain resins, and a solvent or “vehicle” that enables you to brush or spray the resins. In

water-based finishes, the resins have been chemically altered to make them compatible with water. They are not *dissolved*, but are forced to coexist with water in a mixture called an “emulsion.”

Emulsions of incompatible liquids are not uncommon. We’re all familiar with milk (butterfat and water) and salad dressing (oil and vinegar), to name just two.

Like most emulsions, water-based finishes appear cloudy or milky when liquid, then take on the color of their resins when dry. In water-based finishes, the resins dry either clear (acrylic) or slightly bluish (mixture of polyurethane and acrylic), rather than the familiar amber color of nitrocellulose lacquers or oil varnishes.

Water-based finishes are formulated to have properties of durability that are similar to their solvent-based counterparts. For example, you can expect products containing polyurethane resins to have superior resistance to abrasion, cracking, and chemical or water damage. Those containing acrylic resins are generally clearer and more stain-resistant than the polyurethanes.

How They Work

Most water-based coatings form a film in the same way lacquer does—by the evaporation of solvents—rather than through the polymerization associated with oil varnishes. But with water-based coatings, this process occurs in two stages. (See drawing.)

First, the water evaporates, compressing the suspended droplets of resin, called “micelles,” on the wood surface. Then the hydrocarbon solvent, or “tail solvent,” remaining in the mixture softens these micelles, allowing them to coalesce into a film as the tail solvent evaporates.

Even though water-based finishes contain only small amounts of volatile hydrocarbon solvents, you should use a fan for ventilation and wear a vapor mask when applying them, as with any other finishing material.

Getting It On

It isn’t difficult to produce an excellent finish using water-based materials, but here are a few pointers to make it even easier:

In general...

- Don’t let the finish freeze. Remember, it contains water.

JUST FINISHING

- Use it when the temperature is 70°-90°F with 40%-70% relative humidity. Water-based coatings are sensitive to their environment as well as good to it.

- Apply light, thin coats. Thinner is better with all air-drying finishes, but here it is an absolute must. Thick coats will not only run and sag, they will also dry poorly and may stay white or hazy.

- Don't apply more than two coats per day. Allow drying time between coats. Follow product recommendations.

- Scuff the surface lightly between coats with fine sandpaper or a Scotch-Brite pad to aid adhesion of subsequent coats. Avoid steel wool. It may contain oils and can leave invisible bits of metal that will turn into invisible rust when you apply the next coat.

- Don't use a tack rag. It can leave an oily residue. Instead, use a cotton cloth dampened with water. It's cheaper than a tack rag and won't contaminate the surface.

- The residue from steared (self-lubricating) sandpaper can cause "fish-eyes" or other flow-out problems. If you use steared sandpaper, remove the dust with a damp cloth.

For spray application...

- Use a fluid tip with a small aperture (approx. 1 mm or 0.040 in.) to help you spray a light coat.

- Use an HVLP gun or a low-pressure setting (about 25 psi) on your compressed-air gun. Either one will do a good job.

- If you are using a compressed-air gun, your air supply should be clean, oil-free, and above 70°F.

For hand application...

- Choose a soft nylon or nylon/polyester-blend brush. Natural bristles will splay in water.

- Make sure your brush has *tipped* or *tapered* bristles. *Flagged* bristles,

those with split ends, may cause foaming, leaving air bubbles in your finish. (For more on brushes, see AW #26, page 62.)

- For large, flat surfaces, try a short-nap paint pad (available at paint stores).

- For small objects, you can use a lint-free rag or a printer's litho pad to apply finish.

- Whether you use a brush, a pad, or a rag, flow the material on in one direction as you would shellac or lacquer. Back-and-forth or scrubbing motions can leave air bubbles in the finish.

Of all the brands I've used, I give the highest marks to Carver Tripp, Minwax, McCloskey, and Zar. Carver Tripp is the easiest of the four to spray, while McCloskey has a slightly warmer color than the others.

Water-based finishes have come a long way since their introduction several years ago. You should give them a try.



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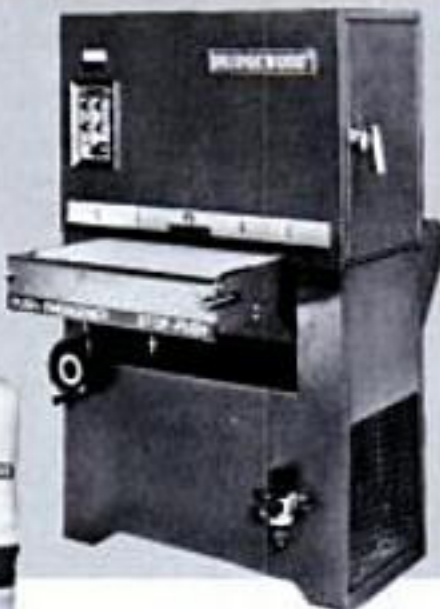
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92A

CIRCLE NO. 108 ON PRODUCT INFORMATION FORM

TOOLBOX

AMERICAN WOODWORKER editors visited the National Hardware Show in Chicago and the International Woodworking and Machinery Fair in Atlanta, the two biggest tool shows in the country. Here's what caught our eyes among the hundreds of new woodworking tools on display.



▲ Laser Miter Saw

From Star Wars to cabinet doors, Porter Cable's miter saw, the Model 7700 10-in. saw projects a red beam of laser light on the workpiece, exactly defining the line of the cut. This way you can quickly line up cuts and zip right through a job. The saw has preset miter stops and can cut a 2x6 at 90° and a 4x4 at 45°. And its 13 amp motor is the quietest we've ever heard. (List Price: \$634)

Porter Cable Corp., Dept. AWT, Box 2468, Jackson, TN 38302, (901) 668-8600.

CIRCLE NO. 601 ON PRODUCT INFORMATION FORM

Draw Centerlines On Any Stock ▶

The CS-1 Centerscribe from Bridge City Tool Works makes it easy to scribe precise centerlines on tapered, curved or straight stock. Made of brass and juara wood (a substitute for endangered rosewood), the CS-1 can scribe centerlines on tapered stock, scribe lines parallel to the edge of curved stock, locate centers on the ends of round stock, and act as a beam compass. The key is a rack-and-pinion system that centers the hardened



scribe point when you grip the stock between the tool's two opposing pads. (Price: \$169)
Bridge City Tool Works, Dept. AWT, 1104 N.E. 28th Ave., Portland, OR 97232, (800) 253-3332.

CIRCLE NO. 602 ON PRODUCT INFORMATION FORM



◀ Ring Cutting Tools

Even a beginner can turn captive or free wooden rings on spindles or bowls with Sorby's new Captive Ring Cutting Tools. You use the bead-forming tool to cut a semicircular, then use the left-handed and right-handed ring-forming tools

to shape the sides of the ring and cut it loose. The tools are available individually or in matched sets to turn ring thicknesses of 1/8 in., 1/4 in., 3/8 in., 1/2 in., 5/8 in. and 3/4 in. (Price: \$90 to \$130 for sets of three)

Anglo American Enterprises Corp., Dept. AWT, Box 10, Somerdale, NJ 08083, (609) 784-8600.

CIRCLE NO. 603 ON PRODUCT INFORMATION FORM

TOOLBOX



Planer Blade Sharpening Jig

With DMT's new Sharpening Jig and Precision Diamond Whetstone, you no longer have to send out carbide or high-speed-steel planer and jointer blades for sharpening. The black-anodized aluminum jig works like a heavy-duty chisel honing guide. You clamp a blade in the jig, pour a little water on the whetstone, then hone the edge of the blade. The jig will handle blades up to 12 in. long and it adjusts for different bevel angles. The 12-in. long diamond whetstone is mounted in a steel-reinforced plastic base. DMT guarantees the whetstone will stay flat within 0.0005 in. (Price: Sharpening Jig \$70; Precision Diamond Whetstone \$130)

Diamond Machining Technology Inc., Dept. AWT, 85 Hayes Memorial Dr., Marlborough, MA 01752, (508) 481-5944.

CIRCLE NO. 604 ON PRODUCT INFORMATION FORM

Sweating the Details

Ryobi's new DS1000 Detail Sander reaches into tight spots where most other sanders can't go. Stick-on sanding pads are available in five different grits from 40 to 150, and with several Scotch-Brite-like accessory pads you can remove paint and varnish, remove rust, smooth between finish



coats, and buff. You can also get a scraper blade to remove dried glue and paint from glass and wood surfaces. (Price: \$49.99)

Ryobi America Corp. Dept. AWT, 5201 Pearman Dairy Rd., Anderson, SC 29622, (800) 323-4615.

CIRCLE NO. 606 ON PRODUCT INFORMATION FORM



Souped-Up Plate Joiner

On many plate jointers the fence is either flimsy, hard to adjust accurately or only cuts at 90° and 45°. DeWalt's DW682K Plate Joiner solves these problems with a machined aluminum fence that's precisely calibrated and easy to adjust. Its rack-and-pinion height adjustment lets you set the fence with one hand, and the adjustment is smoother and more accurate than any other we've tried. Also it has separate lock knobs for tilt (0° to 90°), and height adjustment so you won't disturb one setting when adjusting the other. It's got a bear of a motor—at 6.5 amps the most powerful we've seen. (List Price: \$340)

DeWalt Industrial Tool Co., Dept. AWT, 626 Hanover Pike, Hampstead, MD 21074, (800) 433-9258.

CIRCLE NO. 607 ON PRODUCT INFORMATION FORM

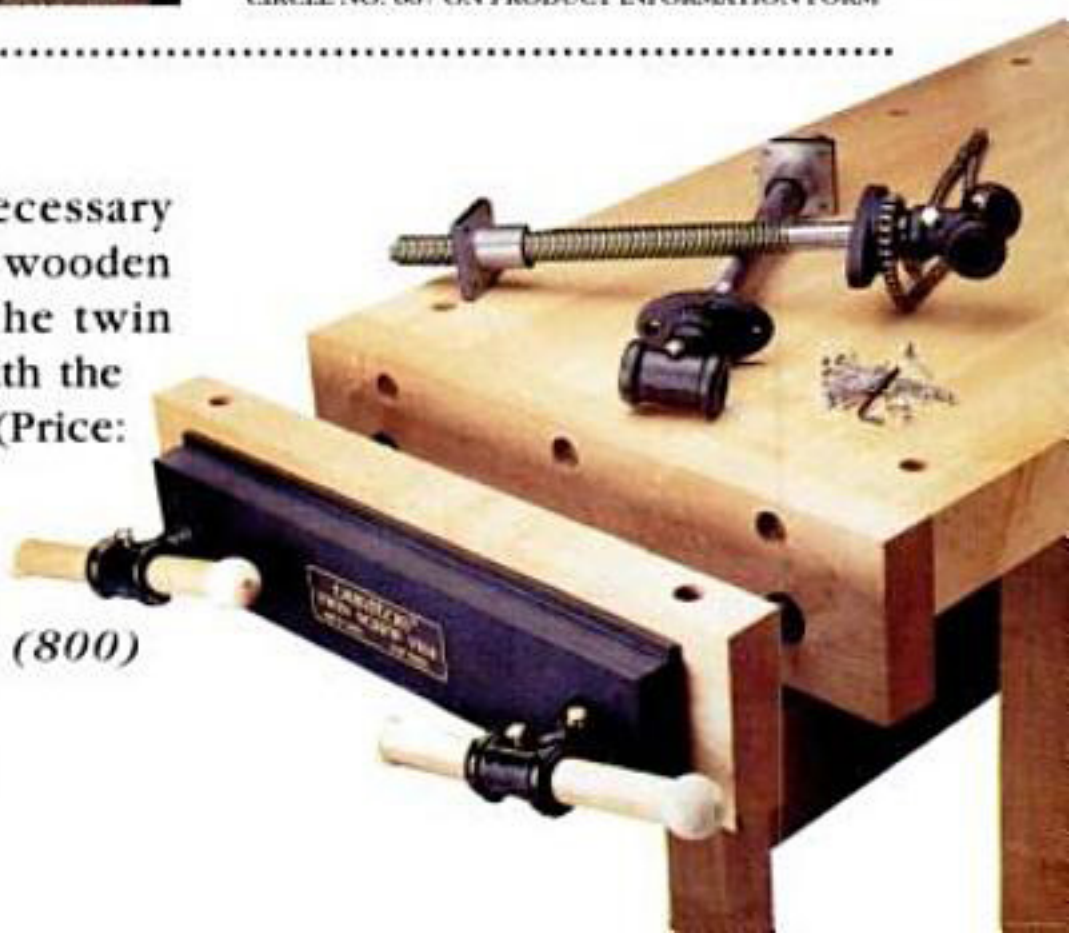
No Rack Vise

End vises are versatile, but they tend to rack when you use only one row of bench dogs or grip a piece off center or grip odd-shaped stock. The Veritas Twin-Screw Vise eliminates this problem by connecting two vise screws with a chain drive. Turn either screw and the other screw turns too, so the vise jaws stay parallel. Clamping capacity between the jaws is 12 in. The Twin-Screw vise comes as a kit

that includes all of the necessary hardware. You supply the wooden vise jaw. You can space the twin screws up to 16 in. apart with the length of chain in the kit. (Price: \$129.95)

Veritas Tools Inc., Dept. AWT, 12 East River St., Ogdensburg, NY 13669, (800) 667-2986.

CIRCLE NO. 605 ON PRODUCT INFORMATION FORM



GALLERY



Avalon table by David Savage, Biddeford, Devon, England. American maple, pearwood, glass. Dimensions: H: 15 in., W: 20 in., L: 40 in.

JOHN GOLLOP



◀ Stereo cabinet by Mark Sfirri, New Hope, Pennsylvania. Quilted mahogany, mahogany, wenge. Dimensions: H: 53 in., W: 24 in., D: 18 in.



MARK SFIRRI



GEORGE POST

▶ "Monarch" by Michael Sage, Redwood City, California. Maple, walnut. Dimensions: H: 7 in., W: 13 in., D: 13 in.

Want to see your work in "Gallery?" Send color slides or color transparencies to "Gallery," AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. Please include: materials, dimensions, name of photographer, your name, address, and phone number. Enclose a self-addressed envelope for return of photos.

GALLERY

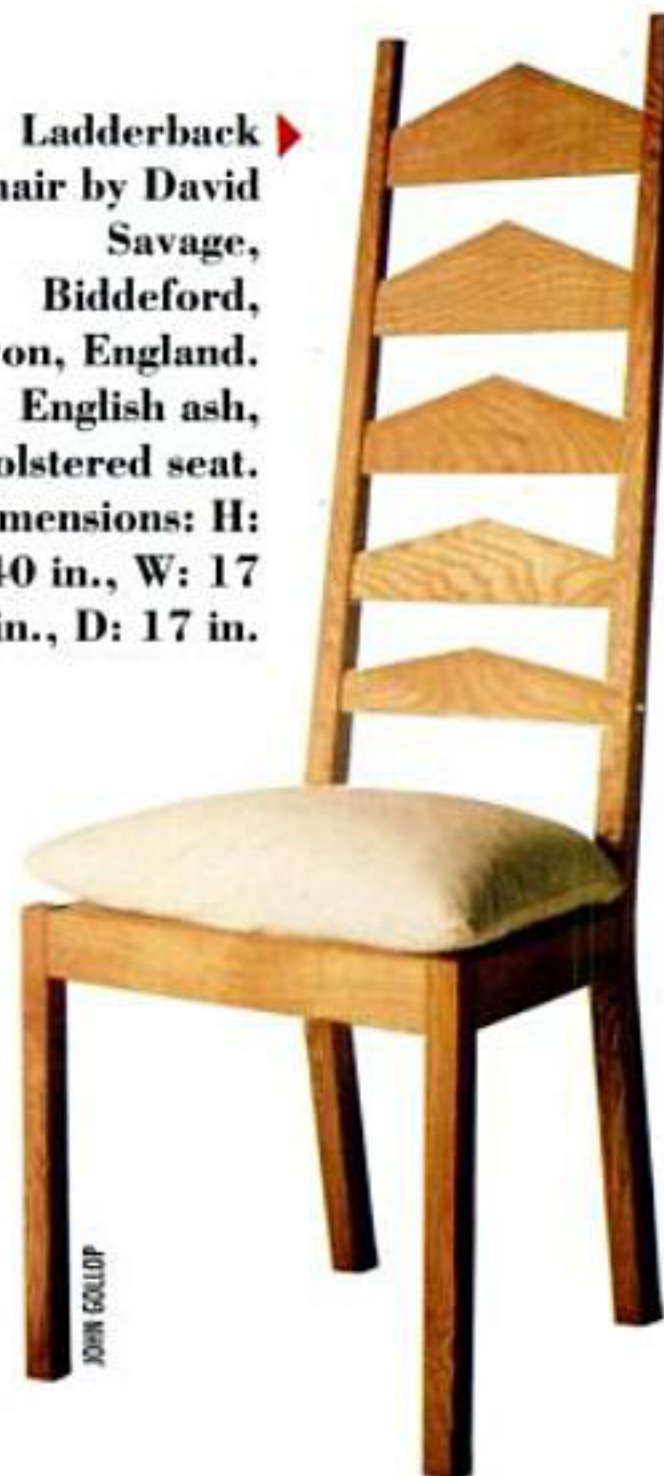


JEFF ZAGUN

▲ End table by
Darrell Peart,
Seattle. Maple,
wenge. Dimensions:
H: 20 in., W: 18
in., D: 18 in.



▶ Ladderback
chair by David
Savage,
Biddeford,
Devon, England.
English ash,
upholstered seat.
Dimensions: H:
40 in., W: 17
in., D: 17 in.



JOHN GOLLOP



KENNETH CLARKE

◀ Viking bed by
Kenneth
Clarke, West
Hempstead,
New York.
Sugar pine,
maple.
Dimensions: H:
54 in., W: 76
in., L: 96 in.

FINAL PASS

To Everything, Turn, Turn, Turn

If you followed Howard Lewin's advice in AW #26 and made turning blanks from dyed dowels and glue, you know the process not only leads to technicolor forms but also lots of technicolor shavings.

What should you do with this mess? Follow Lewin's



GEORGE TAKAMORI

Turning trash into art, Howard Lewin makes vases from technicolor shavings glued together to form a turning blank.

lead. He hates waste so much that he relaminated the shavings and took to turning again. Here, he's made fanciful vases from dowel shavings glued into turning blanks.

The next question is what does Lewin do with all the shavings from the turnings he turns from these shavings.

Selling Ecologically Correct Wood

Like many woodworkers, Dennis Leahy is concerned about the destruction of the

rainforests. But rather than simply refusing to use endangered species, he started a company that, he claims, markets "ecologically safe" alternative species.

Wise Wood Inc. sells domestic and imported species that come from sustainable sources. Imported trees are approved by the Rainforest Alliance, while domestic species carry Leahy's personal endorsement, which he awards after inspecting each mill's logging practices.

Leahy was a professional woodworker for 20 years before opening Wise Wood last July. He sees the company as the best way to save the forests. "Boycotting endangered species doesn't help," he says, "because that's just telling the people in the rainforests, 'what you have has no value so you might as well burn it and graze cattle or grow crops on the land.'" Instead, his company shows land owners how valuable the forest can be over the long term if they learn how to manage it wisely.

So far, Wise Wood's prices for small quantities of domestic wood are higher than you'd pay for uncertified lumber. But prices for imports are competitive now. For example, he can sell granadillo, sometimes referred to as Mexican rosewood, for less than \$10 a board foot, plus shipping costs. And he'll sell as little as one board.

For more information, contact Wise Wood, Box 1271, McHenry, IL 60050 (815) 344-4943.



CLAYTON HANNAH

Nothing Runs Like a (Wooden) Deere

Wooden canoe? Of course. Wooden car? Well, maybe. But a working wooden tractor?

It made sense to Clayton Hannah of Camdenton, Missouri. He built this gas-powered tractor and spreader after seeing plans for a much smaller stationary one in a toy catalog. Hannah's pine and cedar machine is built around a lawn mower transaxle and is powered by a 3½ hp gas engine. The tank sitting in the spreader holds compressed air to blow the old steam whistle that's mounted on the tractor.

Hannah doesn't put his creation to use in the field, but he has ridden it in three parades and won best entry each time. When it's not at the head of the parade, he keeps it on display at his local museum.

Franklin Gottshall Dies at 89

Franklin H. Gottshall, a well-known woodworking writer and educator, died May 25 in his hometown of Boyertown, Pennsylvania.

Gottshall, whose work was featured in early editions of AW, was the author of 16 books on woodworking, including *Reproducing Antique Furniture*, and *Provincial Furniture Design and Construction*. He taught at the high school and college levels for 35 years and also found time to contribute more than 150 articles to various woodworking magazines.

Gottshall earned an associate's degree from Rochester Institute of Technology and a bachelor's degree from the former Stout State University in Wisconsin. He was named to *Who's Who in the East* in 1963 and appeared in *Men of Achievement* in 1974.

COMING NEXT ISSUE

ROUTER ELLIPSE JIG

WORKSHOP LIGHTING

EXCELLENCE IN CRAFTSMANSHIP AWARD WINNERS

If you have a news item, anecdote or opinion you think belongs in "Final Pass," send it to AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098.