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#161, AUG/SEPT 2012

Tommy Mac
Tour his new shop!

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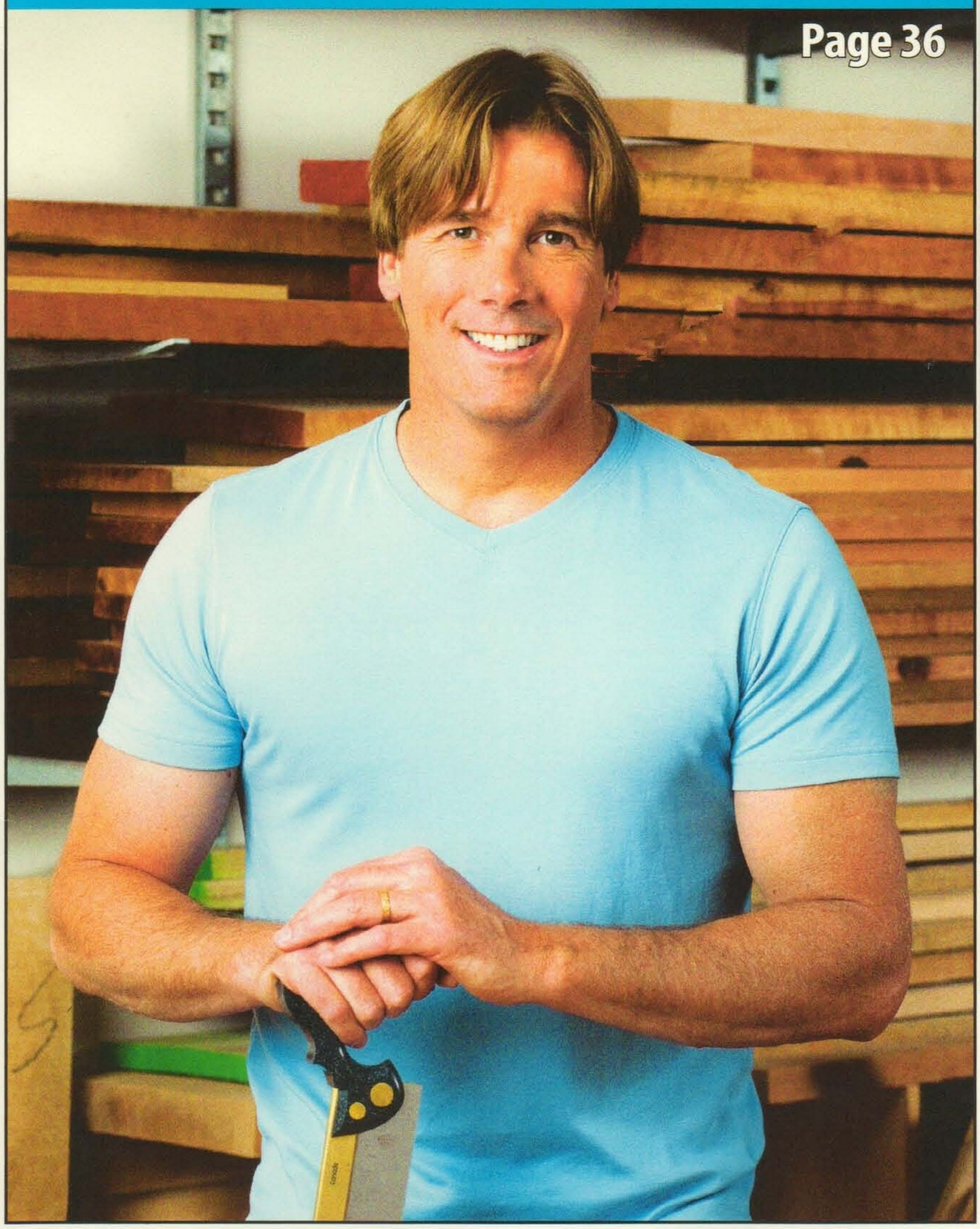

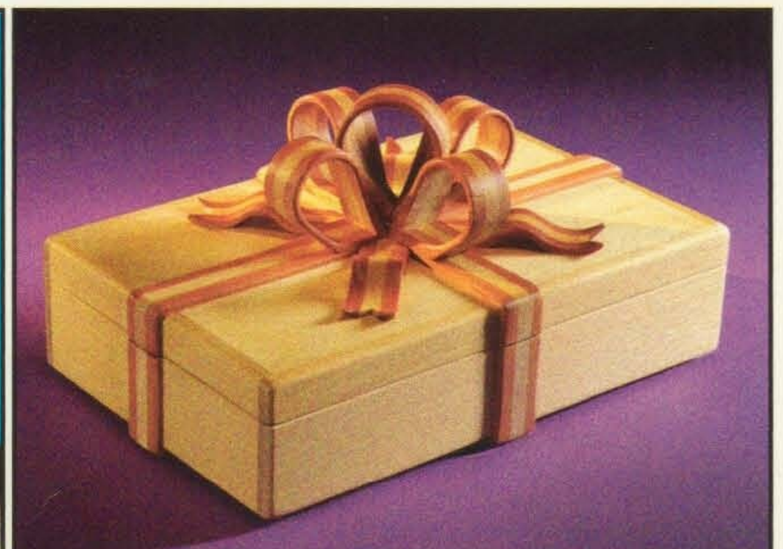

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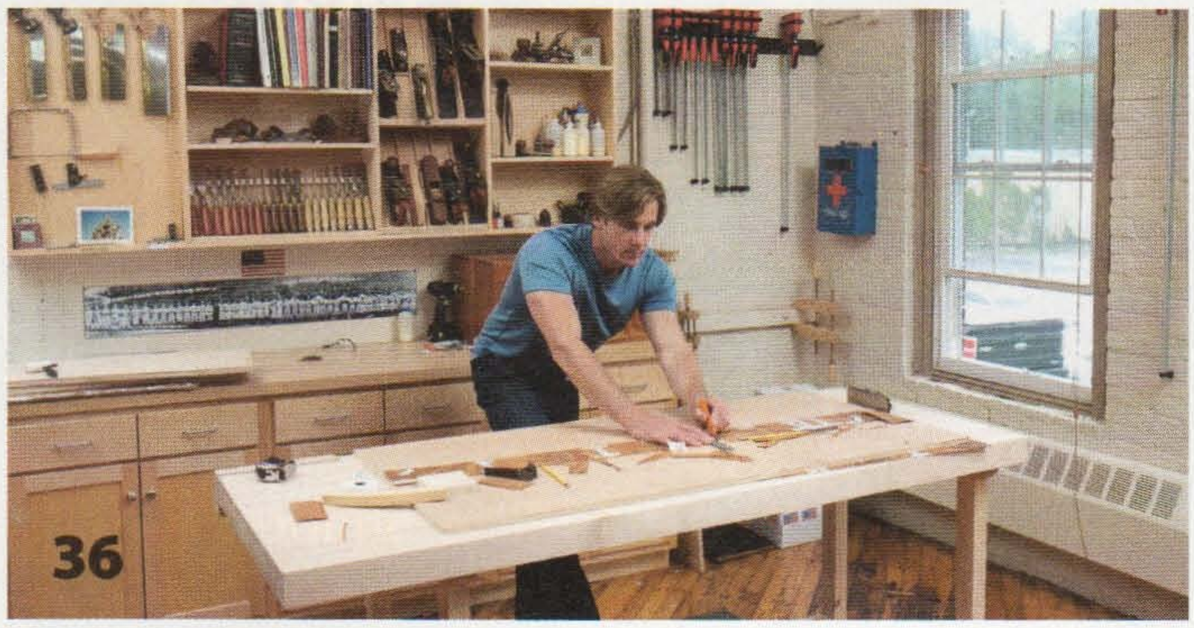

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American Woodworker

#161, August/September 2012

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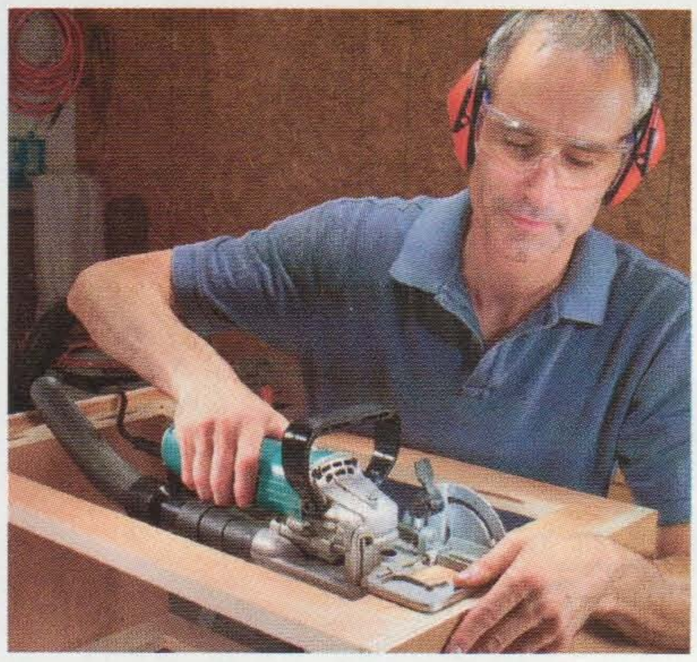

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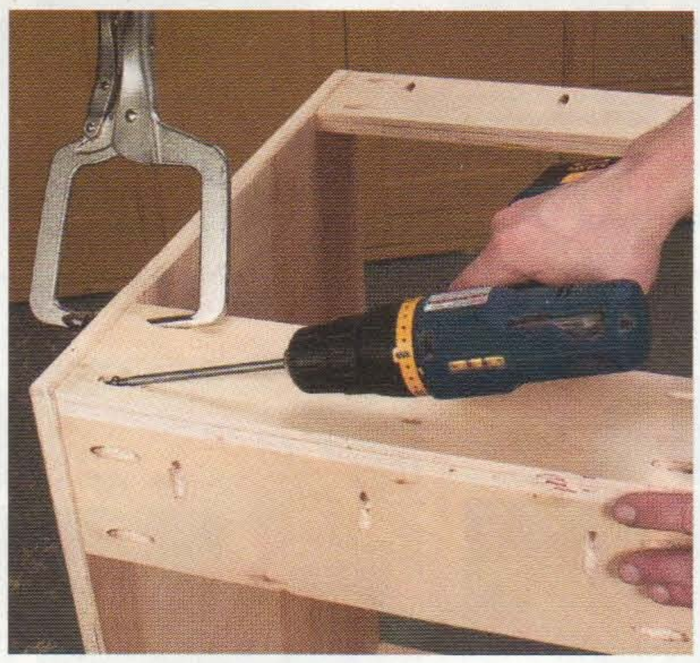

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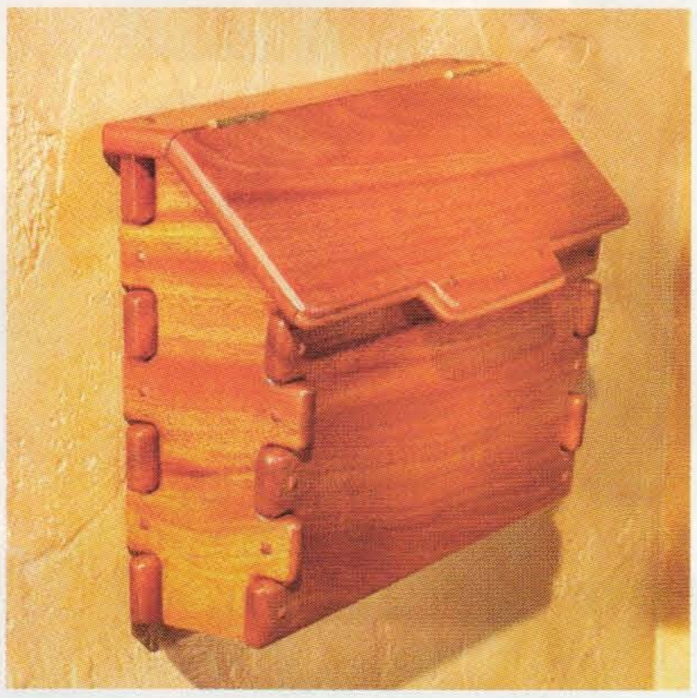

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- Rabbeting capacity: ½"
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- Cutterhead speed: 5000 RPM
- Cuts per minute: 20,000
- Approx. shipping weight: 500 lbs.

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- Motor: 3 HP, 220V, single-phase, TEFC, 3450 RPM
- Precision ground cast iron table size: 8" x 76⅜"
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- Cutterhead speed: 5350 RPM
- Max. rabbeting depth: ½"
- Approx. shipping weight: 560 lbs.

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- Motor: 3 HP, 220V, single-phase, TEFC, 3450 RPM
- Precision ground cast iron table size: 9" x 72½"
- Cutterhead knives: 4 HSS, 8" x ¾" x ⅛"
- Cutterhead speed: 5000 RPM
- Max. depth of cut: ⅛"
- Max. rabbeting depth: ½"
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- Precision-ground cast iron table size: 15" x 20"
- Min. stock thickness: 3/16"
- Min. stock length: 8"
- Max. cutting depth: ⅛"
- Feed rate: 16 FPM & 30 FPM
- Cutterhead speed: 5000 RPM
- Approx. shipping weight: 675 lbs.

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G0453P ~~$1050.00~~ **SPECIAL $945.00**

15" 3 HP PLANER WITH SPIRAL CUTTERHEAD

- Motor: 3 HP, 240V, single-phase
- Precision ground cast iron table size: 15" x 20"
- Maximum cutting width: 15"
- Max. stock thickness: 8"
- Min. stock thickness: 3/16"
- Min. stock length: 8"
- Max. cutting depth: ⅛"
- Feed rate: 16 FPM & 30 FPM
- Cutterhead diameter: 3"
- Cutterhead speed: 5000 RPM
- Approx shipping weight: 675 lbs.

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- Motor: 3 HP, 220V, single-phase
- Precision ground cast iron table size: 15" x 20"
- Max. cutting height: 8"
- Max. cutting depth: ⅛"
- Cutterhead knives: 3
- Cutterhead diameter: 3"
- Cutterhead speed: 5000 RPM
- Feed rate: 16 & 30 FPM
- Approx. shipping weight: 675 lbs.

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Terrific Tip!

Zero-Clearance Bevel Cutting

AFTER COMPLETING A 45° BEVEL CROSSCUT on my table saw one evening, I heard a loud bang and felt the table shake. After turning off the saw, I found that a small, wedge-shaped offcut had jammed between the blade and the edge of the throat plate. The force of the impact pushed the blade into the opposite side of the insert, causing a nasty gouge.

I checked to make sure *I* hadn't sustained any nasty gouges and thought about how to prevent this from happening again. I realized that I would have used a zero-clearance insert for a 90° cut, so I made a set of inserts for bevel cuts, too. Each insert only works for one angle, but that's a small price to pay for safer sawing.

Bill Wells

COURTESY OF CONTRIBUTOR

Instant Antique Hardware

NEW HARDWARE is often way too shiny for my taste, so I chemically "age" it. If the metal is raw steel, I use standard gun bluing. But if it's plated with zinc, I turn to Super Blue, a double-strength bluing. Super Blue gives zinc-plated hardware a beautiful copper-brown patina.

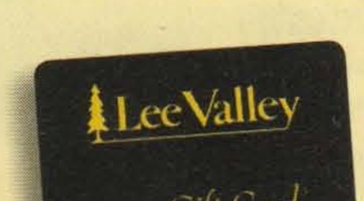
Super Blue also works on highly polished steel, hardened steel and nickel and chrome alloys. It doesn't work on stainless steel.

Though the directions say to wipe on the liquid bluing, I've had better results soaking parts in a shallow container. When I get the color I want, I rinse the part thoroughly with water to stop the process and wipe on a coat of 3-In-1 oil or other light machine oil.

David Stacey

SOURCE:

Birchwood Casey, birchwoodcasey.com, 800-328-6156, Super Blue Liquid Gun Blue, 3 oz. #13425, $10; 32 oz, #13432, $66.



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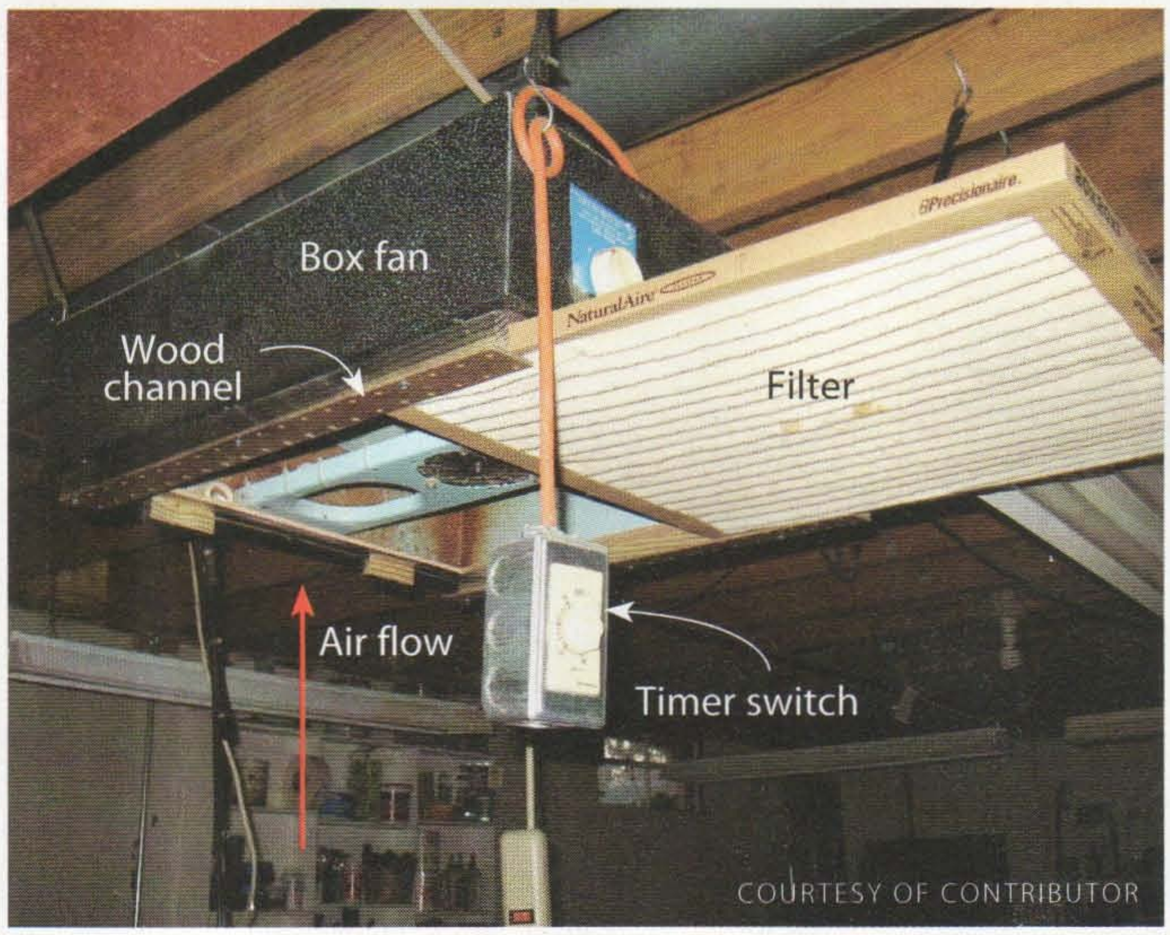


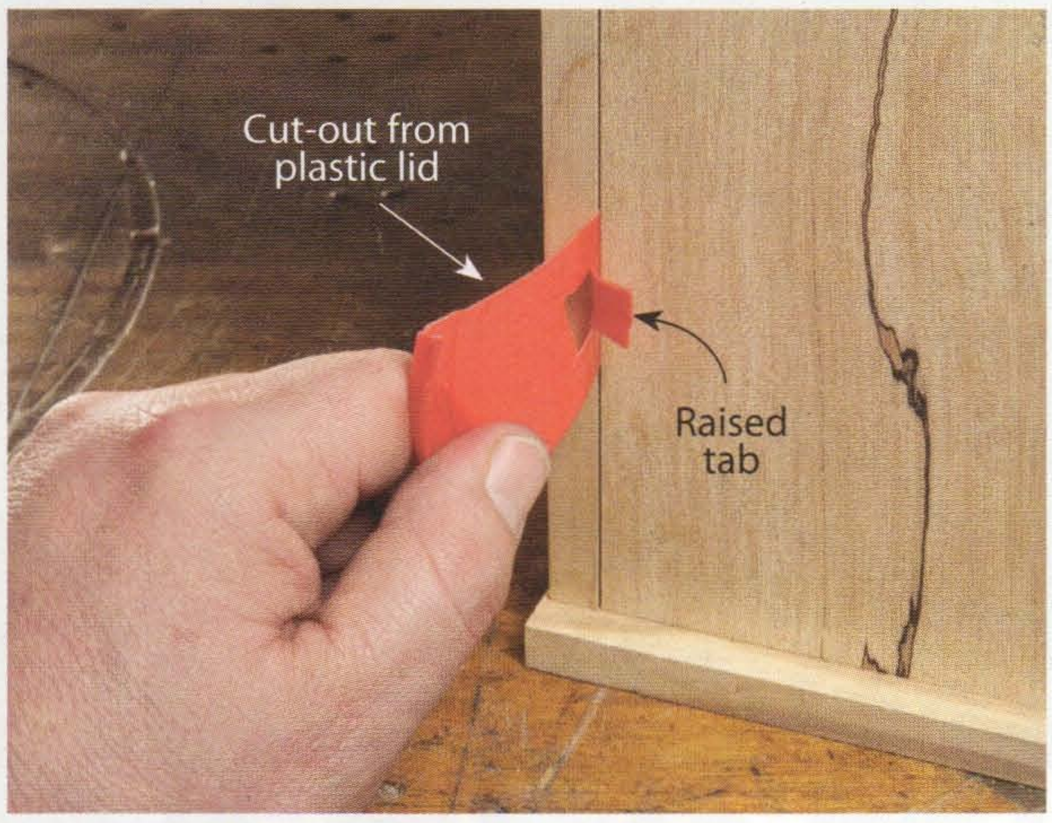
FINE, AIRBORNE DUST PARTICLES are a real health concern in my basement shop. My inexpensive, low-tech air cleaner lets me breathe a little easier.

I suspended a box fan horizontally from my shop's ceiling joists and added a pleated furnace filter to the intake side. I found that a 1" x 20" x 20" filter nicely fits a standard-size box fan.

To hold the filter in place, I removed the fan's back grill and screwed on a couple pieces of scrap to form a channel for the filter to slide into. I hung the fan using bungee cords to dampen any vibration that may be transmitted to the floor above. I also added a timer switch to allow the fan to run for a while after I leave the shop.

I was concerned that blocking the fan's air intake by adding the filter might overheat the motor, but that hasn't been a problem. I generally run the fan less than 30 minutes, and my fan—like most box fans—has a thermal cutout to prevent overheating. It just shuts off if it gets too hot. Nevertheless, for efficient dust collection and safety, I frequently replace the filter.

John Cusimano



Hook for Inset Doors

HAVE YOU EVER closed an inset door in a cabinet you were building and found that you couldn't open it, because you hadn't added the knob yet?

Well, I have. Here's an easy, effective solution: Make a little hook from a plastic lid.

Cut out the opener as shown above, with a raised tab that's cut on three sides. Fold the tab at its base to give it a little spring.

To use, just slide the opener through the door's gap—with the raised tab facing the door's edge—until the tab catches, then pull. For drawers or strong hinges, use heavier plastic.

Charles Mak

No-Lathe Rounding

I DON'T HAVE A LATHE, so when I need to make a cylindrical part, I do it by hand. Using this holding device, I can easily turn a square piece into a round piece using a hand plane—and you can, too.

This jig is about as simple as it gets. It's just a wide board with a deep V-groove in one edge and a shallow V-groove in the opposite edge. Stop blocks screwed to the end of the jig serve both grooves. Use whichever groove suits the thickness of the blank you start with.

Draw the final diameter of your part on each end of the blank. Butt the blank against the stop and start planing off corners. Keep going until you've created an octagon with equal sides. The sides don't have to be equal in width—just eyeball it. Plane off the corners again to make sixteen equal sides, and so on, until you reach your layout lines.

Alejandro Balbis

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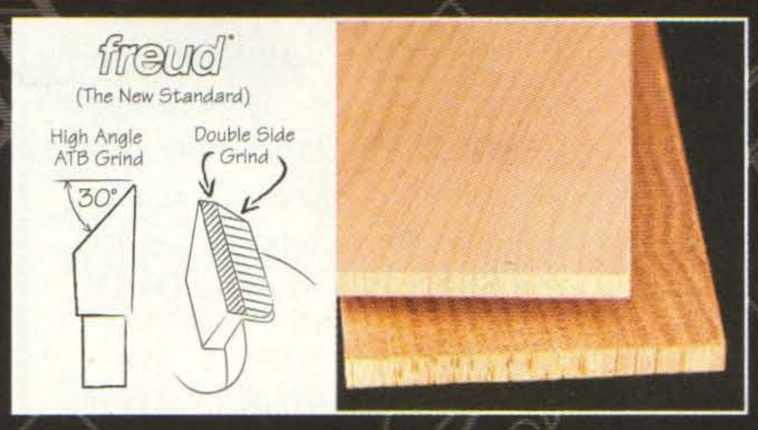
Choose from four blades in the Full Kerf Premier Fusion series – 8", 10", 12" and 14" or try the new Thin Kerf 10" Premier Fusion. Use a Premier Fusion blade once and you'll be convinced.

Freud's Fusion Tooth Design vs. Others



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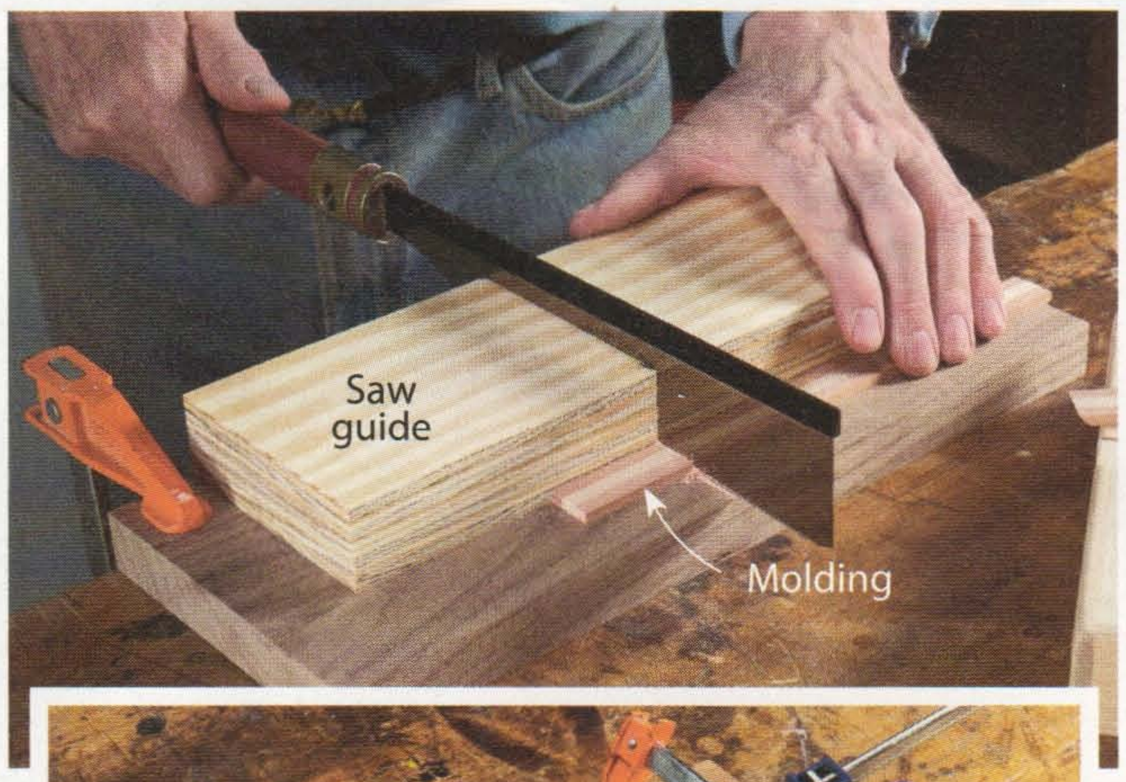
Pull Saw Miter Box

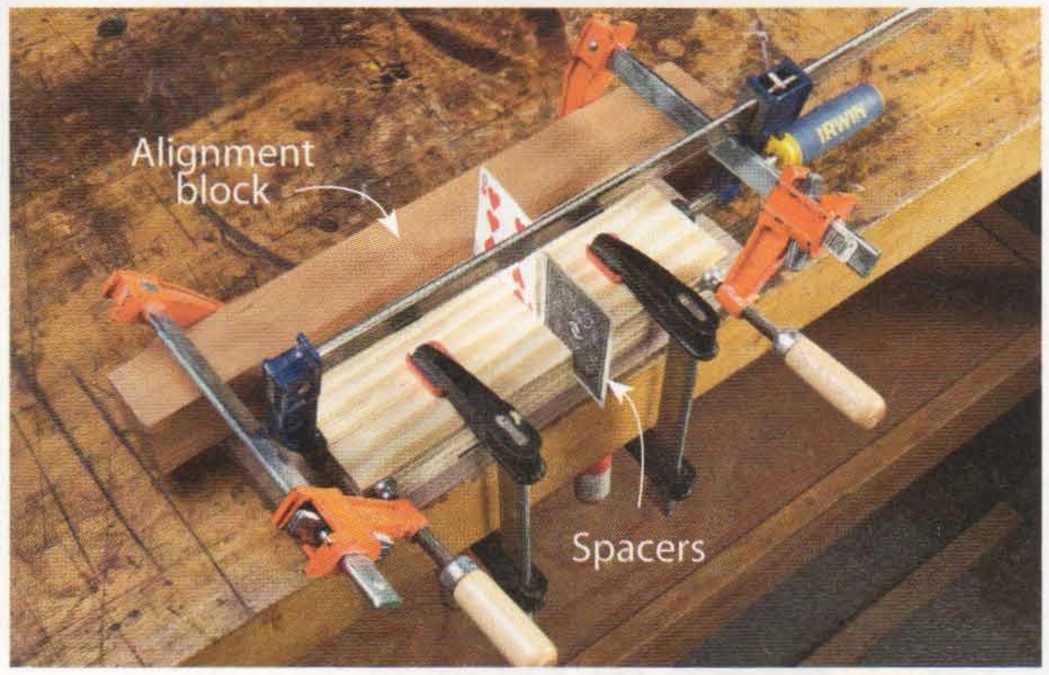
SHORT LENGTHS OF MOLDING can be awkward—and sometimes dangerous—to cut with power tools. I'd rather cut them by hand, using a Japanese pull saw and a shop-made miter box.

Make the two guide blocks for the miter box from a 1-1/2" x 4" x 12" blank. (I glued two pieces of 3/4" plywood together.) Crosscut the blank in half on the tablesaw or with a miter saw. Next, using paper or playing cards, make up two spacers that are exactly equal to the thickness of your saw's blade. (The blade of my saw is the same thickness as one playing card.)

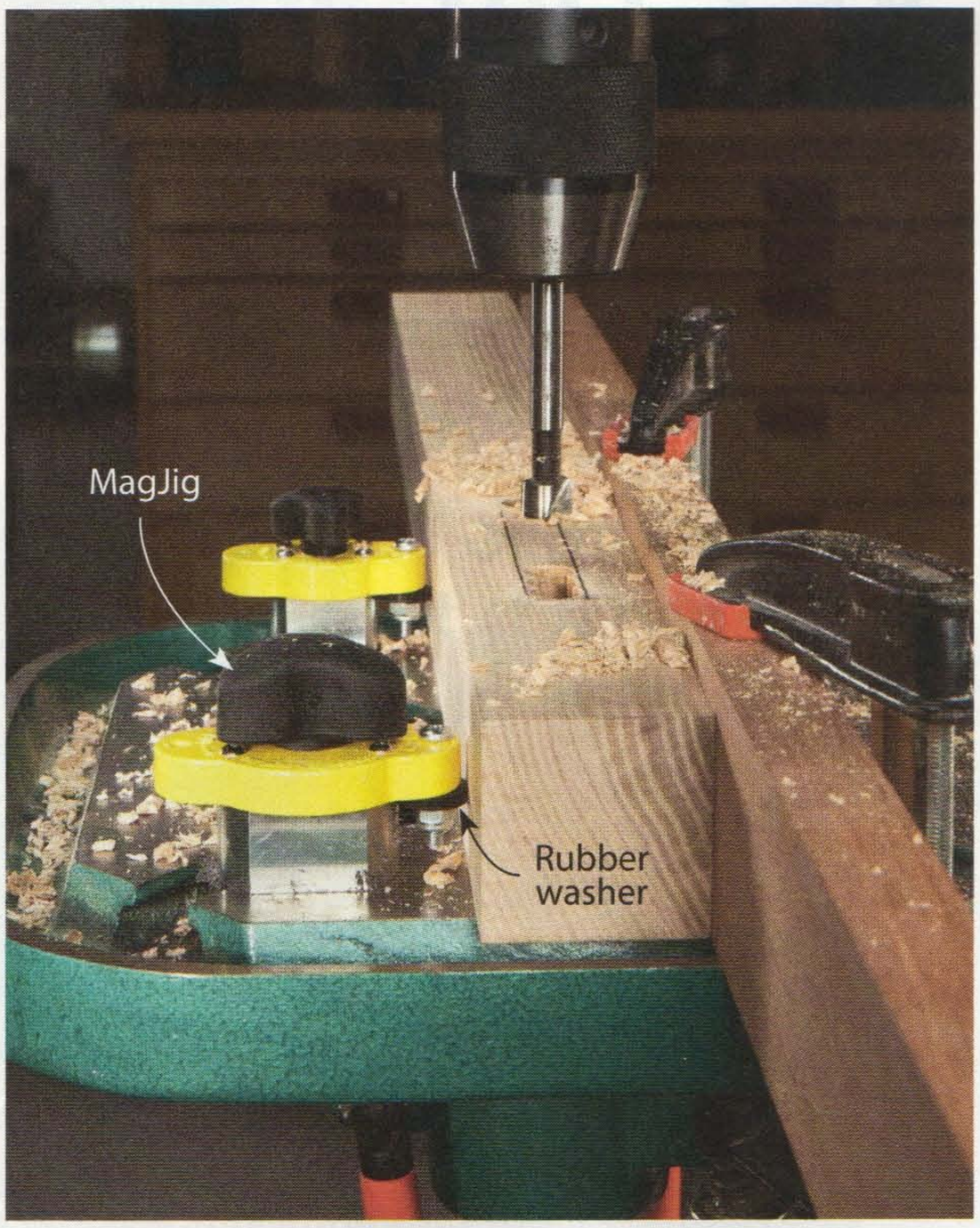
To glue the blocks to a base, place the spacers between the blocks and clamp the blocks end-to-end. Next, clamp a straight, stout piece of wood across the front of the blocks to pull them into alignment. Finally, glue this assembly down to the base. Don't remove the spacers until the glue is dry.

Tom Caspar





For information on how to buy and use a pull saw, go to **AmericanWoodworker.com/WebExtras**



Rubber Roller Bearings

DRILLING A MORTISE requires you to move the stock from side to side. Using a Forstner bit, you drill the end holes first, then drill overlapping holes in between. To keep the workpiece tight against the fence, it helps to have a featherboard that works in both directions. I made one using a pair of MagJigs.

A MagJig is a magnetic clamp. Turn its knob one way and it exerts a powerful magnetic force. Turn the knob the other way and it lets go. Mounted on a cast iron drill press table, it is rock solid.

I added a rotating rubber washer that acts like a roller bearing to each Magjig. The washer spins on a machine screw that passes through a mounting hole in the MagJig. A nylon locking nut secures the washer.

You could make the same kind of roller-bearing device without using MagJigs, but I love these things because they're so easy to position.

Jim Reinhart

SOURCE:

Magswitch, mag-tools.com, 303-468-0662, MagJig 95 magnetic clamp, #8110004, $24.99 ea.

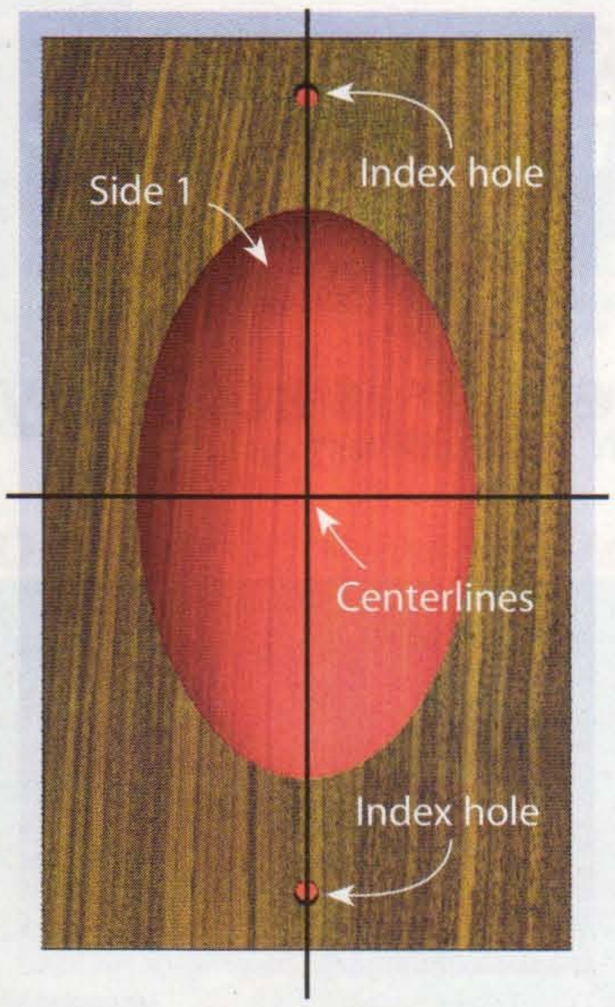
By Randy Johnson

CNC Two-Sided Machining

Two carefully placed index pins ensures accuracy.

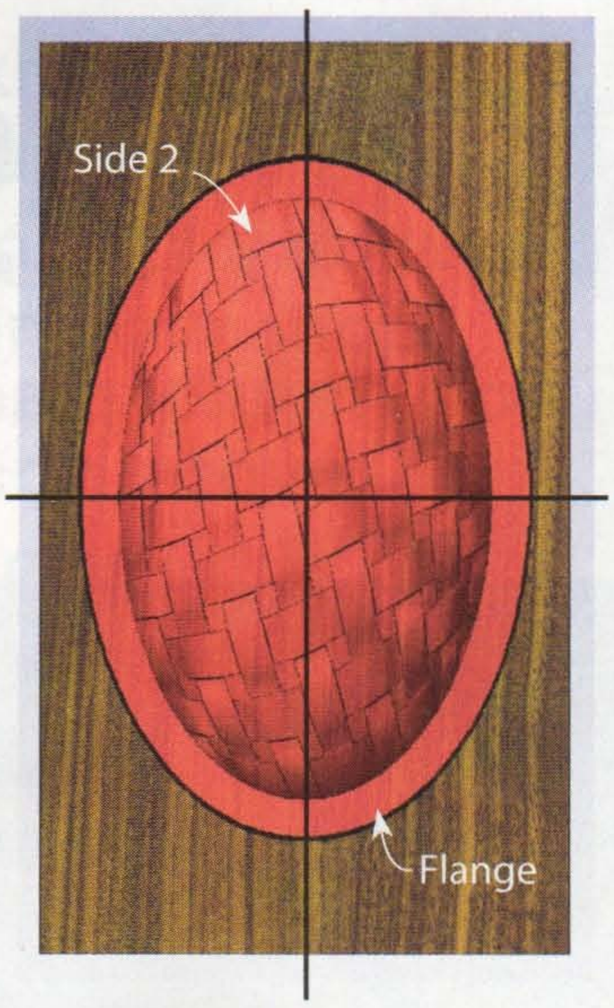
SKILLED WOODTURNERS can easily match a bowl's inside and outside surfaces by eye and touch. Creating two-sided shapes on the CNC, however, requires a different strategy: To ensure that both sides align, the top and bottom shapes must be positioned carefully during both the design and the machining steps. I'll demonstrate the process using the lid of the box shown here. (The bottom of the box is machined using the same setup even though the bottom has a different shape and wall thickness.) To set this box apart from a typical round turning, I made it as an oval with a weave pattern on top. In fact this process can be used with almost any shape—one of the many benefits of CNC machining.

PHOTOGRAPHY: JASON ZENTNER



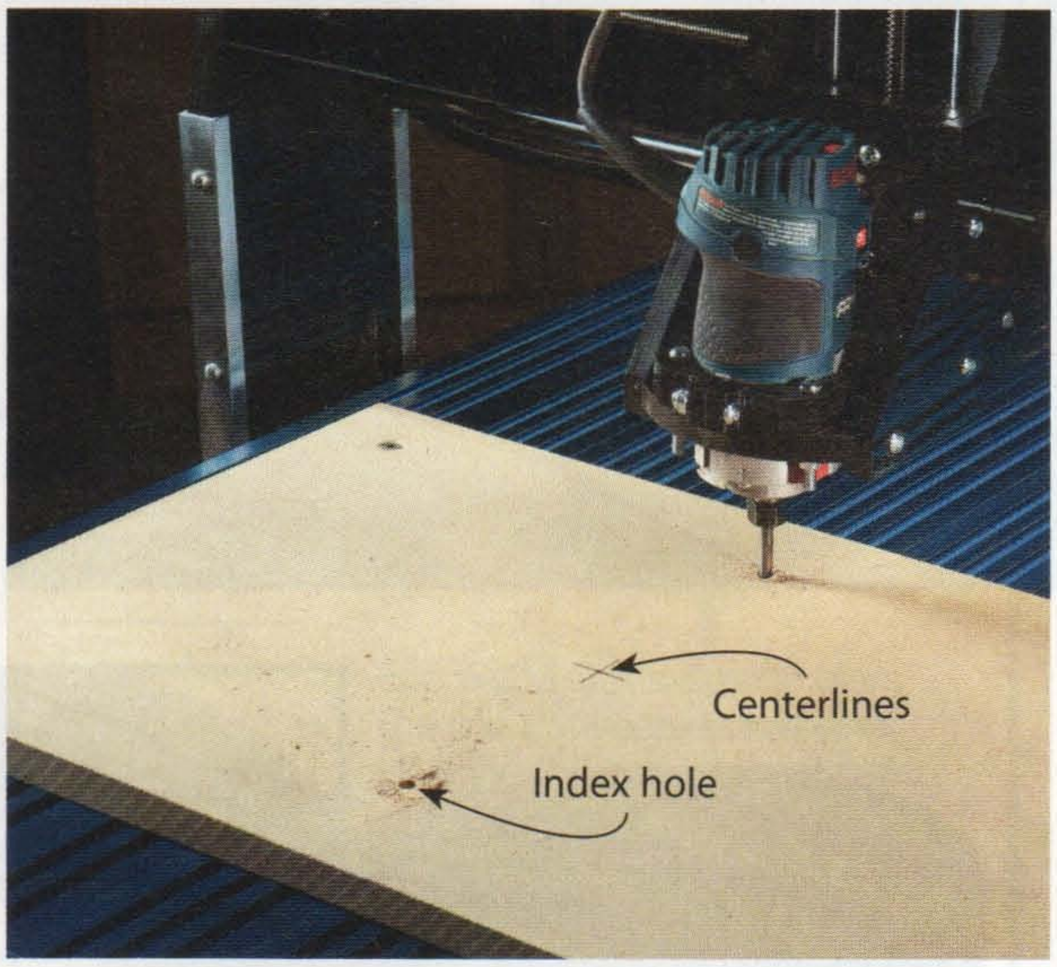
Step 1: Work from the Center

LAYOUT EACH SIDE OF YOUR DESIGN on a pair of centerlines. Then locate index holes at opposite ends of the long centerline, outside the machined area. Here, I've started with the lid's bottom side (Side 1). Its concave oval shape measures 1/2" deep x 4-1/2" wide x 7-1/2" long. This lid is designed to be made from 3/4" thick stock. "



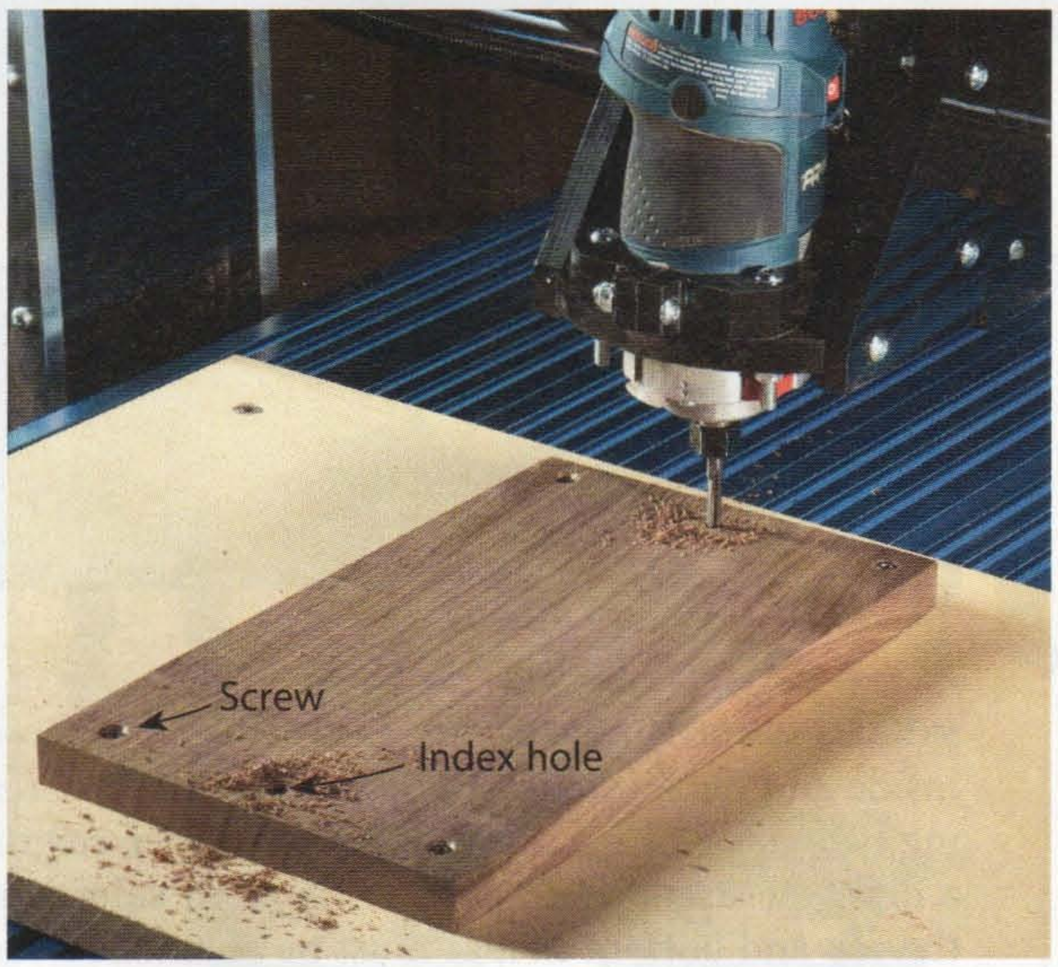
Step 2: Layout Side 2

THE SIZE OF SIDE 2 determines the thickness of the project. To create the 1/4" thickness for this lid, I added 1/4" to the measurements of Side 1. Thus, the model for the top side of the lid (Side 2) measures 3/4" thick x 5" wide x 8" long. In addition, I added a 1/2" wide flange around the lid to provide clearance for the small router bit used during the finish routing phase (see Step 7).



Step 3: Rout Index Holes in the Deck

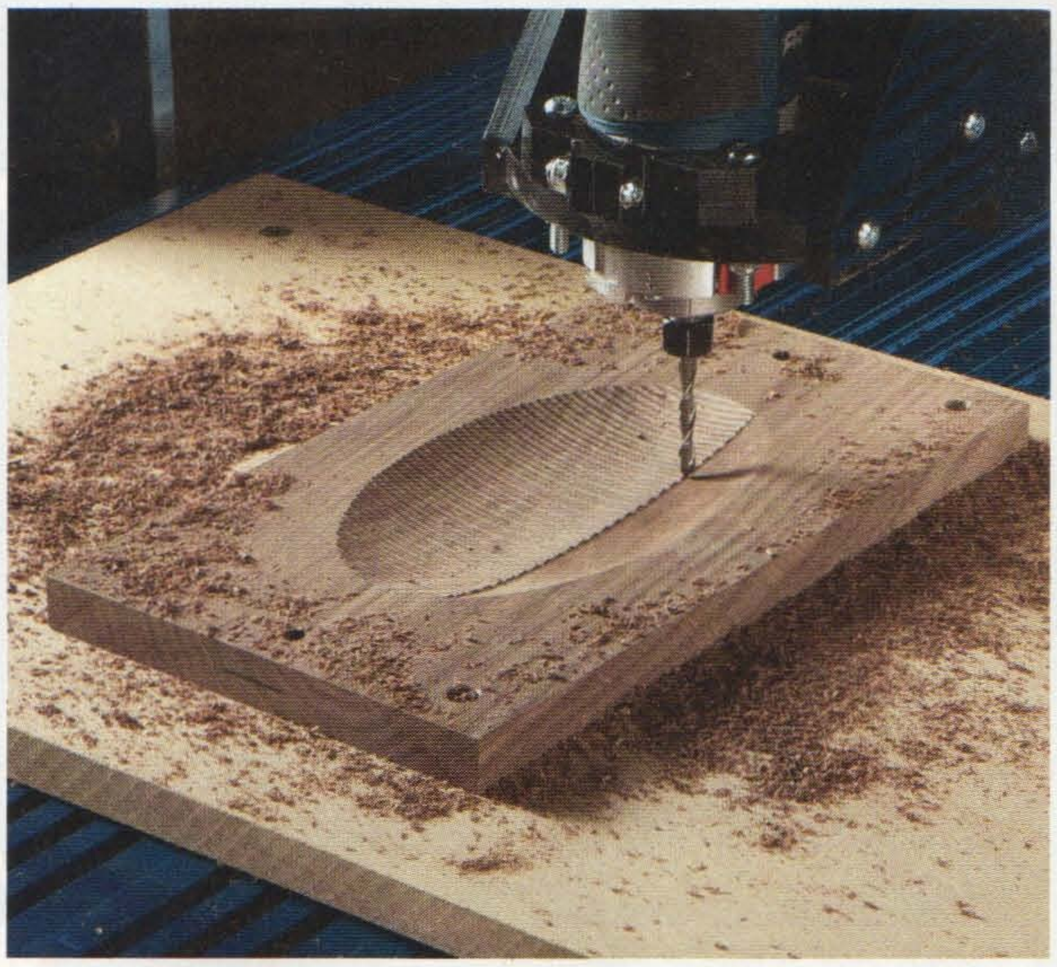
USE A STRAIGHT BIT to rout a pair of index holes 1/2" deep into the deck of your CNC or use an auxiliary deck board. For this project, I fastened a piece of 3/4" MDF to the aluminum deck of the CNC Shark Pro Plus I was using. The centerlines on the deck served as the X-Y (left and right) reference point for setting the router bit's location.



Step 4: Rout Index Holes in Side 1

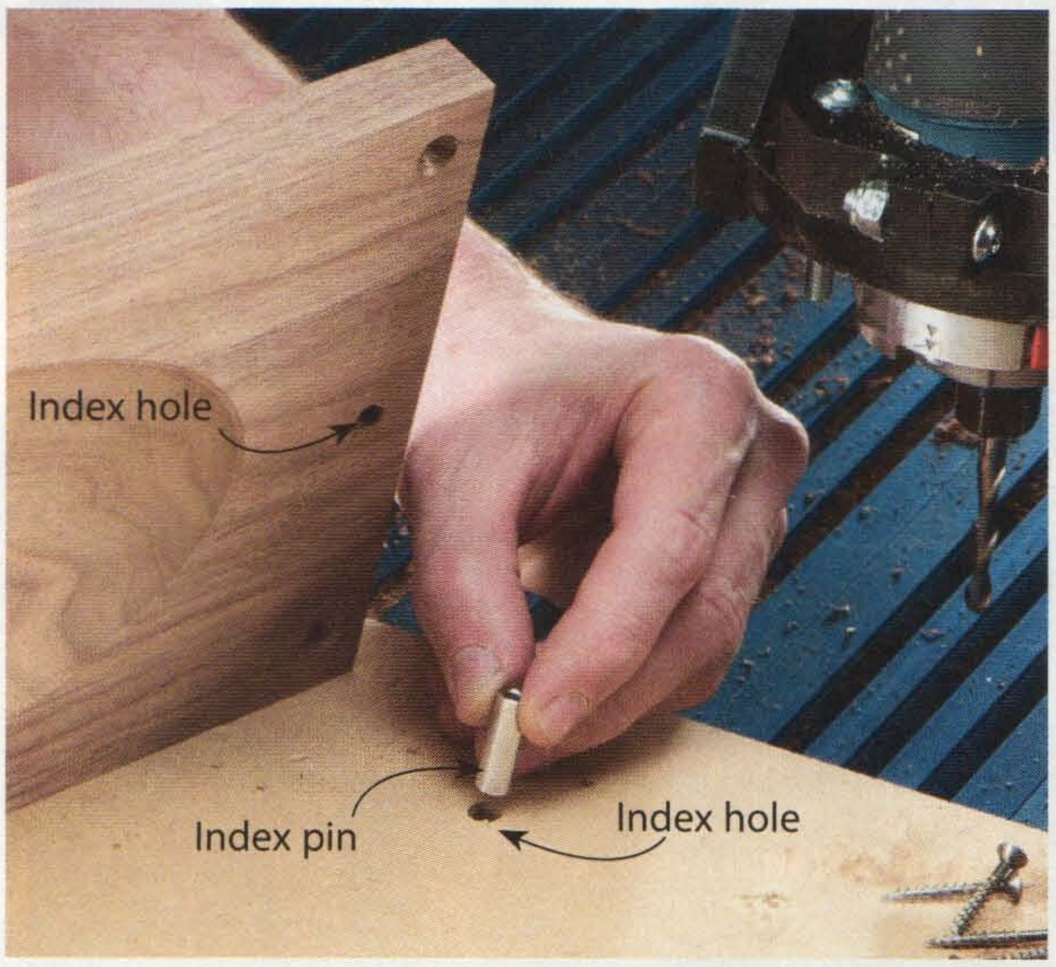
Fasten your work piece to the deck and rout 1/2" deep index holes into it. This establishes Side 1 of your project—the underside of the lid in this case. The index pins I used were 1" long so the 1/2" deep holes worked just fine. The workpiece does not have to be perfectly centered with the centerlines on the deck for this step, because the index holes and pins will correctly align the blank when it's turned over to rout Side 2.

OVAL BOX, LID AND WEAVE TEXTURE WERE CREATED USING VECTRIC ASPIRE 3.5 DESIGN SOFTWARE



Step 5: Rout Side 1

TO CREATE THE LID'S CONCAVE underside surface, I used a 1/4" ballnose bit for both the roughing and finishing passes, but I routed across the grain on the roughing passes and with the grain on the finishing passes. The finishing pass left only light mill marks that were easily removed with 120 grit sand paper.



Step 6: Insert the Index Pins

REMOVE THE BLANK and insert index pins in the deck. Then flip over the blank and install it on the pins. Here I used 1" x .30" dia. aluminum dowels for index pins, but I've also used nylon dowels (both are available at most hardware stores). Pieces of a round pencil also work quite well. They're cheap and easy to replace when eaten by the dust collector.

Step 7: Rout Side 2

MACHINE SIDE 2 similar to Side 1. Start with roughing passes across the grain, using the 1/4" ballnose bit. The flange around the lid is routed during the roughing phase. To achieve more detail in the lid's weave pattern, I switched to a 1/8" dia. ballnose bit for the finishing pass (shown above). The finishing pass stays on the weave, and the flange provides clearance to keep the small bit from contacting the tall shoulder.

Step 8: Cutout and Complete

Rout around the oval and through the blank using a 1/4" straight bit. Leave tabs to keep the lid attached. Remove the blank and finish cutting out the lid on the bandsaw. Then use a disc sander to smooth the lid's edge. Clean up the edges of the weave pattern by hand with a V-Parting carving chisel. The 3D model for this project can be downloaded at **AmericanWoodworker.com/CNC.**

The Well-Equipped Shop

by Brad Holden

Compact Router, Big Features

IF YOU'VE EVER used your laminate trimmer as a router, you understand why compact routers are becoming so popular. Their comfortable one-hand operation makes them easy to use and downright handy. But there's a fairly large gap in performance and capability between a laminate trimmer and a full-size router.

Makita's RT0700C Compact Router perfectly bridges this gap. In addition to functioning as a first-rate laminate trimmer, features such as its 1-1/4 hp electronic variable speed motor and accessories that include a plunge base with a 1-3/8" depth capacity make the RT0700C a genuine woodworking tool.

A typical laminate trimmer is a pretty bare-bones affair, limited by a 1/4" collet and a 3/4 hp or 1 hp motor. With variable speed from 10,000 to 30,000 rpm and electronic speed control to help maintain constant speed under heavy loads, the RT0700C's larger motor has ample power for many common edge treatments, as well as dadoes and mortises. The extra power also allows using some heavier, 3/8" shank bits, so the RT0700C comes with both 3/8" and 1/4" collets.

The RT0700C is loaded with user-friendly features, to boot. Its soft-start mechanism slowly ramps up the rpms, eliminating the white-knuckle effect associated with old-school hard-start routers. Its rack-and-pinion fine-depth adjustment is another big benefit. On a standard laminate trimmer, the motor housing just slides up and down inside the base, so making fine adjustments is an exercise in frustration—and a real turn-off for general routing. With the RT0700C, you simply dial a knob.

The RT0700C comes packaged with a straight edge-guide, a template guide, a dust nozzle and a straight base.

COURTESY OF MANUFACTURER

To get the plunge base—for woodworkers, the RT0700C's most desirable feature—go for the RT0700CX3 Compact Router Kit (shown in the photo, above). In addition to straight and plunge bases for woodworking, the kit includes tilt and offset bases for typical laminate jobs and all the other accessories that come with the RT0700C. The tilt base is infinitely adjustable with positive stops at 30° and 45°. The offset base allows for routing in hard-to-reach areas and as close as 3/4" to a wall.

SOURCE

- Makita Industrial Power Tools, makita.com, 800-462-5482, 1-1/4 HP Compact Router, #RT0700C, $129, 1-1/4 HP Compact Router Kit, #RT0700CX3, $259.

Precision Sliding T-Bevel

HOW ACCURATE can you be if you use a protractor to read the angle of a sliding T-bevel? A degree or two? How about +/-0.3°—that's how close you can get with the new Digital Sliding T-Bevel from General Tools & Instruments.

The stainless steel blade is 8" long and locks in place by turning a steel knob. You can position the blade in either the "T" or "L" configuration.

Practical buttons make the tool quite user-friendly. A "Zero" button resets the display from any position. A "Hold/Reverse" button will either lock in a measurement or reverse the angle, showing the complementary angle, and the "Flip" button inverts the display 180° when the tool is upside down.

Since the device is also a simple computer, I'd like to suggest one more button, for setting a miter saw. If you have an internal corner of 124°, for example, you'd set your saw at 28° to cut the two miters. The math isn't complicated (90 minus half of 124)—or is it? I'd sure like a chip to figure that out for me!

COURTESY OF MANUFACTURER

SOURCE

General Tools & Instruments, generaltools.com, 800-697-8665, #828, Digital Sliding T-Bevel, $35.

EDITOR: TOM CASPAR • PHOTOGRAPHY: JASON ZENTNER UNLESS NOTED

Non-Steel Wool

IF YOU'VE ONLY DIPPED your toe into the world of water-borne finishes, Siawool from Lee Valley just might make you take the plunge.

I stayed away from using water-borne finishes for a long time. That warm, subtle sheen you get from rubbing out a finish with steel wool and paste wax just wasn't attainable, because you can't use steel wool with water-borne finishes. Why? Let's just say steel and water don't play well together. You could end up with little rust spots in your finish.

Siawool is made from nylon fibers impregnated with abrasive particles. It looks and performs just like its steel counterpart, but it doesn't have any adverse reaction to water. You can use it wet or dry.

Other synthetic substitutes for steel wool are available, most commonly in a "scouring pad" format that's useless for rubbing moldings or sculpted surfaces because the pads will round all the edges that should stay crisp.

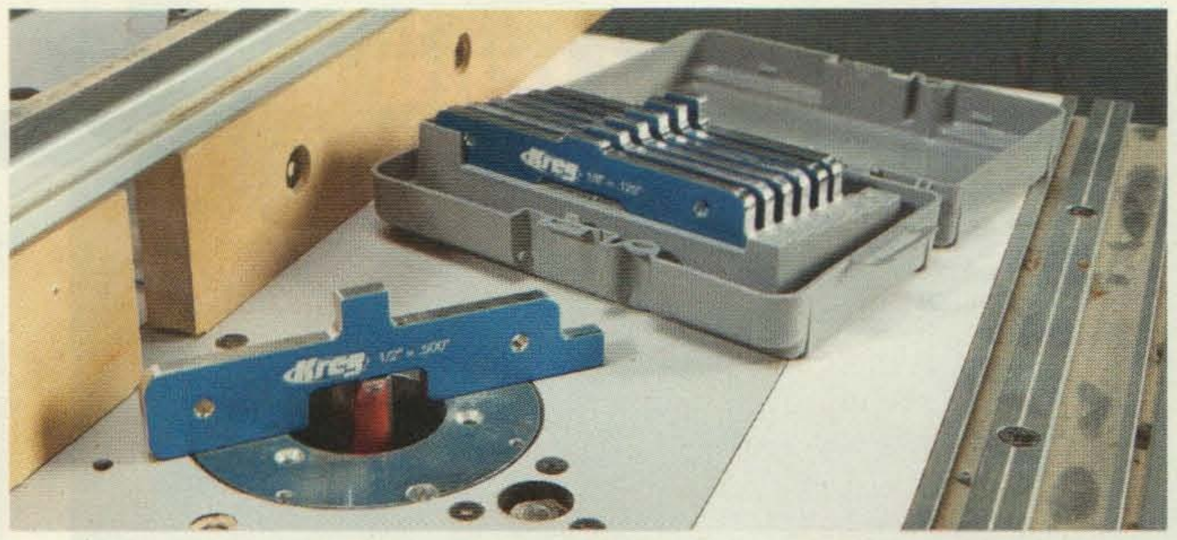
Siawool, on the other hand, acts just like steel wool, forming exactly to the surface being worked. Another thing I like is that it comes in a big wad, so you can tear off and form any size batten you need. It's available in coarse, medium and fine grades, the equivalents of 180, 320 and 800 grit sandpaper.

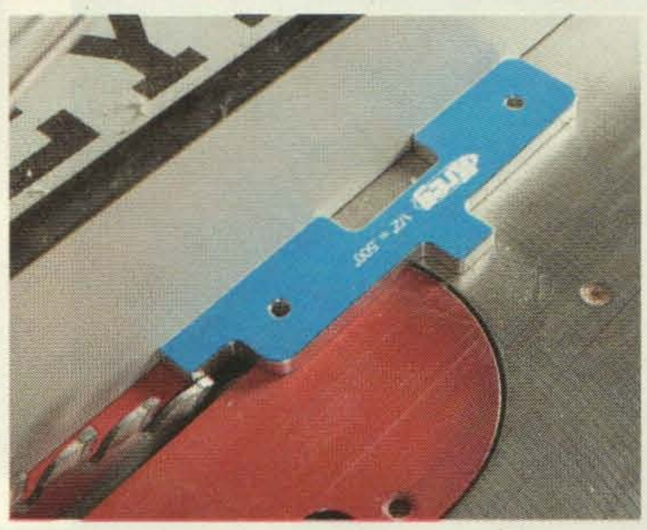
Siawool does come at a price—it costs about three times more than an equal amount of high-quality oil-free steel wool. But if you want to rub out a water-borne finish, it's the only game in town.

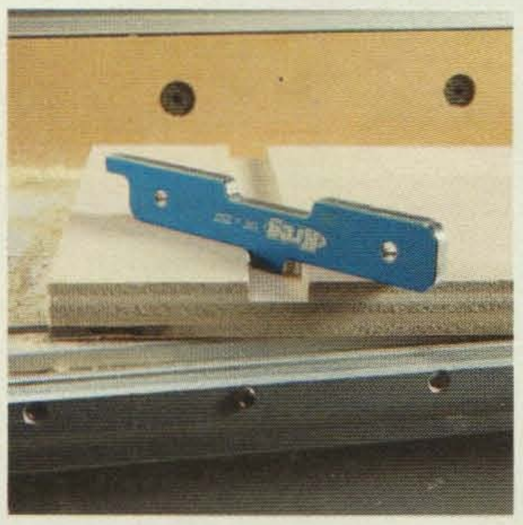
SOURCE

Lee Valley & Veritas, leevalley.com, 800-871-8158, Fine Siawool, 75g, #53Z08.21, Medium Siawool, 75g, #58Z08.21, Coarse Siawool, 75g, #58Z08.20, all $12.50.

3-in-1 Setup Bars







ACCURATE TOOL SETUP is half the battle of doing good work. Kreg's Precision Router Table Setup Bars make the battle a little easier. This kit includes seven bars in 1/16" increments from 1/8" to 1/2". They're accurately milled—I checked the end tabs with a micrometer, and they were within .001".

These bars are made from aluminum, so they're not affected by moisture or changes in humidity. And as aluminum is soft, they won't damage router bits.

Although they're called Router Table Setup Bars, you'll find uses well beyond the router table. The folks at Kreg obviously put some thought into these guys, because you can use them to measure height (top photo), depth (bottom right photo), and width (bottom left photo). You gotta love a tool that's not a one-trick pony.

I do, however, have a short wish list that would make these bars even more useful.

First, I wish the corners were square—particularly on the depth gauge tabs. Notice in the bottom right photo that the bar has to be angled for the tab to fully drop into the dado, which is 3/4" wide—a common width. The angled tab makes the depth harder to gauge. But if the bar was positioned straight across, the tab's radiused corners would cause an inaccurate reading.

Second, I wish the bars were dead flat, so you could stack them to measure in perfect 1/4" increments. That's not possible with these bars—when they're stacked, light shows between them.

SOURCE

Kreg, kregtool.com, 800-447-8638, Precision Router Table Setup Bars, #PRS3400, $45.

Fully Adjustable Fence

IF YOU'VE BEEN THINKING about replacing your bandsaw's stock fence, it doesn't get any easier than switching to the Carter MagFence II. There's no retrofitting or making sure you have the right hardware for your particular saw. Just stick on the MagFence II and you're ready to go.

Two built-in MagSwitches—magnets with on/off switches—provide the stickum. Turning them on solidly adheres the MagFence II to any cast-iron surface. Turning them off stops the magnetic attraction, so you can remove or reposition the fence. It's easy. Adjusting for drift angle is also a piece of cake, because the fence has no guide rail to restrict its positioning.

To accommodate any size bandsaw table, the fence has four mounting positions for the MagSwitches. The only limitation is that the table must be made of cast iron; this fence won't stick to aluminum. Since the MagSwitches are removable, you can use them in homemade jigs or any 30mm Magswitch jig.

The MagFence II measures 3" x 15". Its extruded aluminum fence is equipped with T-track for attaching jigs or featherboards. Plastic wear faces for resawing are available in 3" and 5" heights.

COURTESY OF MANUFACTURER

SOURCE

Carter Products, carterproducts.com, 888.622.7837, MagFence II Next Gen Magnetic Fence, #MF-II, $100; 3" Sacrificial Wear Face, #MF2-SWF3, $25; 5" Sacrificial Wear Face, #MF2-SWF5, $30.

Finely Crafted Box Hinges

FINELY CRAFTED PROJECTS, such as the boxes made by Ian Hawthorne, deserve the best hardware. These Neat Box Hinges from Hawthorne Crafts will lend beauty, subtlety and durability to any small project. Crafted in County Antrim, Northern Ireland, these hinges are "cracking good." They're set in, like knife hinges, so when the box is closed, only the short barrel on the back of the box is visible; hence the "Neat Hinges" name.

Most box hinges are installed the "short way," along the back. Hawthorne Neat Hinges are installed the "long way," along the box sides. This creates a more durable joint, because the screws are less likely to pull out.

Neat Hinges are also beautifully made. Fit and finish is flawless. Their movement is precise, with a built-in stop at 93°, just enough past 90° to ensure that the lid stays open.

Neat Hinges come in nickel or brass, polished to a mirror finish. The hinges are slightly more than 8mm wide, so minimum stock thickness is 12mm (just less than 1/2"). Mr. Hawthorne recommends an 8mm dia. bit, but states that a 5/16" dia. bit will also work. A drilling guide is included with the hinges to ensure straight pilot holes. Brass hinges come with #3 x 5/8" brass screws. Nickel hinges come with M2.5 x 16mm stainless steel screws.

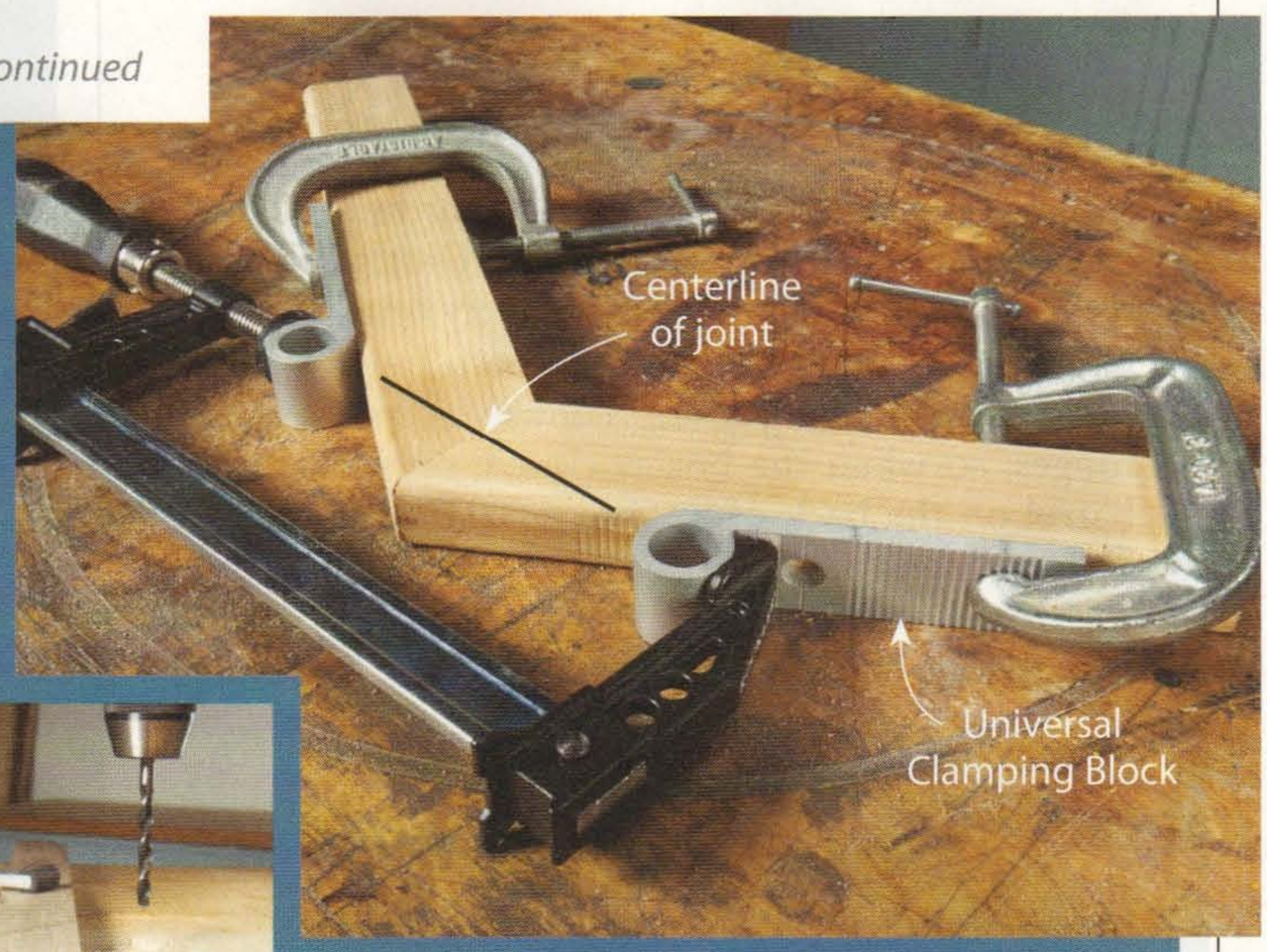
SOURCE

Hawthorne Crafts, hawthornecrafts.com, ian@hawthornecrafts.com, Neat Hinge Pair, #NHQ-php, Brass $40, Nickel, $45.

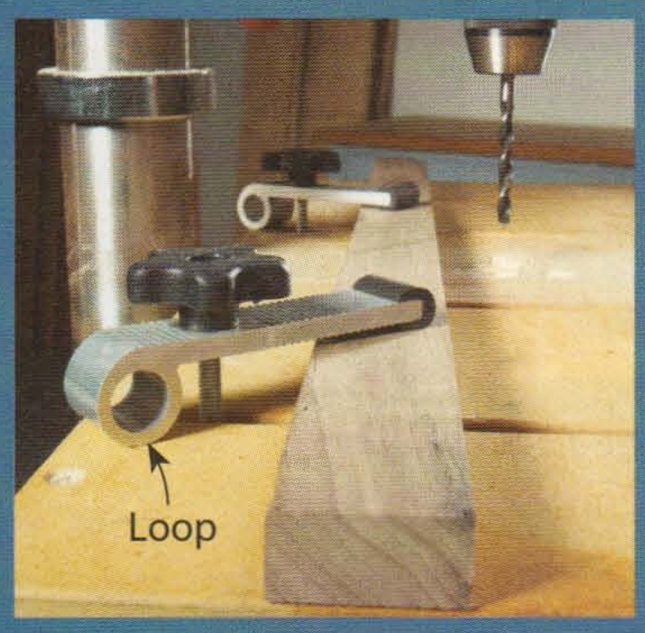
continued

Multipurpose Clamp Aids

THE "UNIVERSAL CLAMPING BLOCK" really lives up to its name. It's just a flat aluminum bar with a loop on one end, yet it can be used to clamp a mitered frame, a workpiece on a drill press, the sides of a mitered cabinet and more. It's the kind of simple tool that makes you mutter, "Why didn't I think of that?"



Let's look at the mitered frame operation. You can put direct pressure across a joint of almost any angle using two Universal Clamping Blocks, due to their round loops. A series of ridges on the Blocks keep them from slipping. Of course, the ridges may dent your wood, in which case you just slip a neoprene pad between the Block and the workpiece. (Pads are included with the Blocks.)



On a drill press, the Blocks work like cantilevered hold-downs. You'll just need to add T-bolts and knobs, which aren't included. As for the cabinet with long miters, here's where the hole in the loop comes in—it's for a 3/4" o.d. pipe. To clamp that joint, you slide a number of Blocks onto the pipe, then clamp the outer blocks to the cabinet. To see how this works, and many other clever applications, visit the manufacturer's website listed below.

SOURCE

Blokkz, blokkz.com, 714-267-8440, 2 Universal Clamping Blocks (includes 2 neoprene pads), #UCB5R20, $25.

Ultimate Face Vise

A GOOD VISE IS ESSENTIAL to a good workbench. It's your extra pair of hands, hands you rely on every day. The trend in vises seems to be to cut corners in order to make them cheaper. While I appreciate saving money, I don't mind saving up for a top-of-the-line tool, especially one that will last a lifetime. The new Veritas Quick-Release Front Vise from Lee Valley definitely fits that bill.

The Veritas is a wood-jaw vise, as opposed to the metal-jaw vise you're probably familiar with. A metal-jaw vise comes ready to use; you just bolt it onto the bench and add wood faces. A wood-jaw vise doesn't come with any jaws at all; the edge of the bench becomes the rear jaw, and you make the front jaw to suit.

Why would this be better? Let me give you two reasons. First, there's holding power. The larger the amount of surface area between the jaws, the better the vise will grip your work. With a wood-jaw vise, you can make the width and depth of the jaws any size you want.

Second, a wood-jaw vise neatly solves the long-board problem, because its rear jaw effectively extends the full length of the bench. Most metal-jaw vises are installed so the rear jaw stands proud of the bench's edge. When you clamp up a long board (to plane or sand its edge, for example), its long, free end flops around because there's nothing to brace it against. With a wood-jaw vise, the board butts up against the bench, nice and secure. For additional support, you clamp it to the bench.

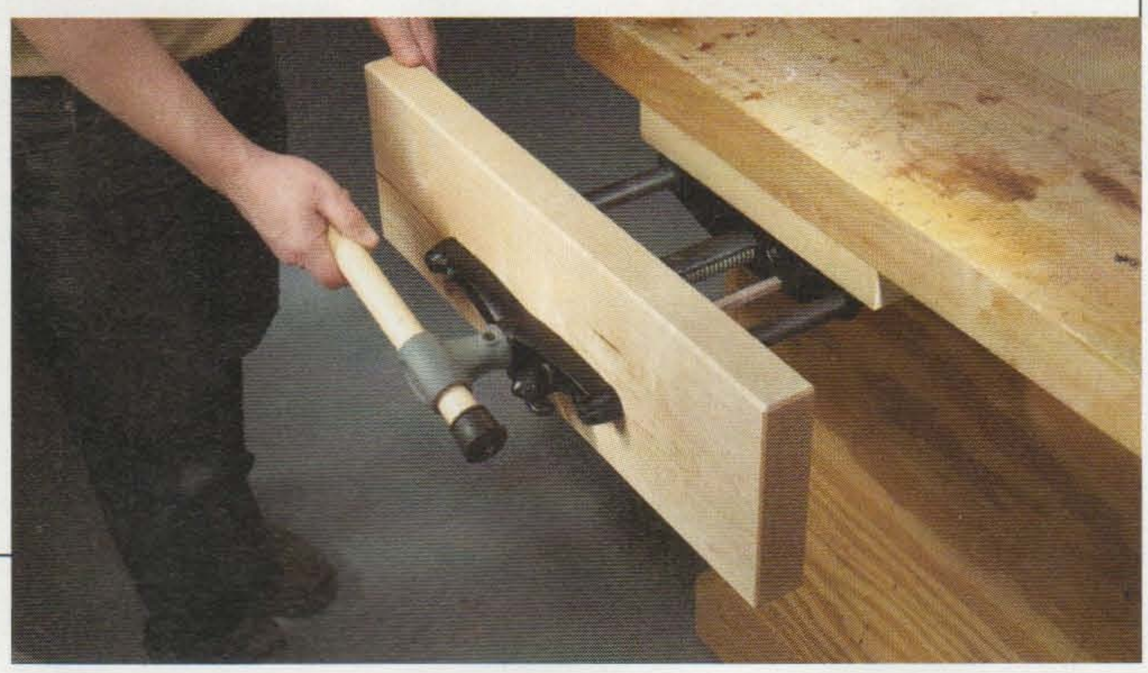
The Veritas Front Vise is beautifully engineered, with an action that's smooth and easy. You can spin the handle with one finger, like the propeller on a rubber-band airplane. Rapidly moving the front jaw in and out to any position, when the quick release is engaged, is equally effortless. Tolerances are tight; there's virtually no racking or sagging of the front jaw, even when it's opened up to its full 12" capacity.

The screw has an extruded aluminum cover, a feature I haven't seen before. The cover keeps debris out of the screw's threads and lubricant off of your workpiece. Nice!

The kit includes all the hardware you'll need, a maple handle with rubber O-rings and plastic caps, a mounting template and complete, easy-to-follow instructions. You can also purchase a set of 20" x 5" leather jaw liners.

SOURCE

Veritas Tools, Inc., veritastools.com, 613-596-1922, Quick-Release Front Vise, #05G34.01, $289; Leather Jaw Liners, set of 2, 05G34.03, $20.



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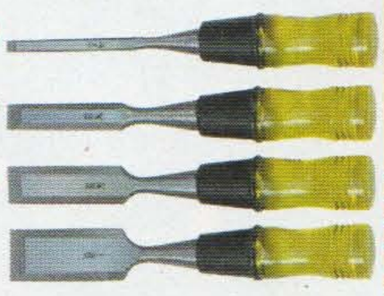
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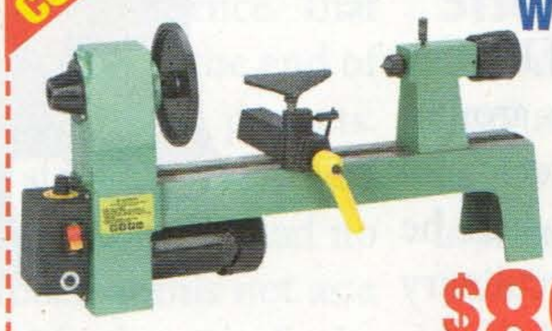

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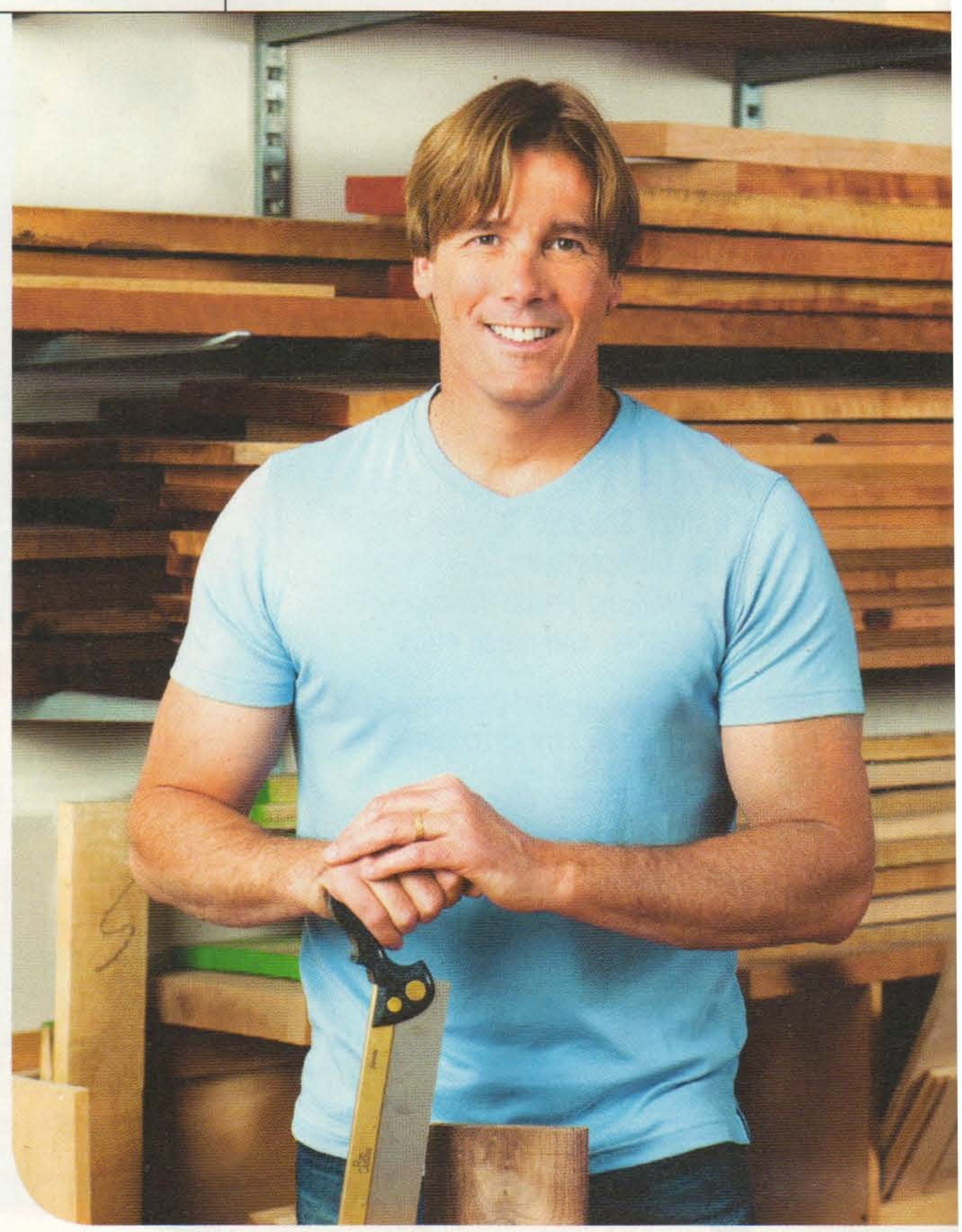
Tommy MacDonald



From carpenter to cabinetmaker to TV personality, there's nothing "rough" about what this guy does.

by John Lavine

"I'M A STORYTELLER NOW," explains Thomas MacDonald, better known to his television viewers as Tommy Mac, the host of the PBS series "Rough cut." "I'm a woodworker at heart, but my current job is to tell the story of woodworking to a national audience. And do you know what's the hardest part? Making it look entertaining. To put a little flavor in it, and keep a smile on your face when you're doing the 4th or 10th take on some process at the end of a 12-hour day of shooting. Man, that can be a real challenge."

But Tommy is no stranger to challenges, which he faces as enthusiastically as he greets his viewers each week. In fact, Tommy's genial personality and tenacious work ethic, as much as his hand skills, have seen him through the unexpected twists and turns he's faced in his career as a woodworker.

Good with his hands

From his earliest days growing up on the outskirts of Boston, Tommy was always "Dad's helper" with fix-it projects around the house. By 6th grade he was hanging out at an afterschool program at a nearby vocational technology center, where he was exposed to everything from auto body repair to culinary arts. Gravitating toward woodworking, Tommy studied cabinetmaking in high school and eventually entered a four-year apprenticeship program in the local carpenter's union. He

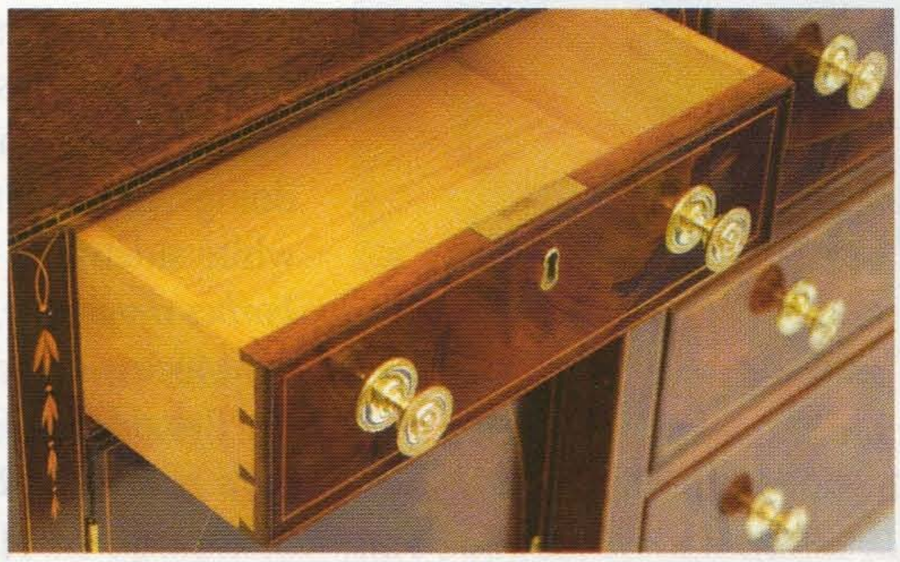
Slant Top Desk (2008)
Curly maple
42-1/4" x 38-1/4" x 19-1/4"

graduated from that program with his journeyman's certificate and went on to get his builder's license at age 21. He then launched his career by doing a wide range of residential and commercial work in the greater Boston area.

Like a lot of area tradesmen, Tommy went to work in the '90s on Boston's "Big Dig," the mammoth tunnel project. But while swinging a sledgehammer, Tommy separated his shoulder. Despite multiple operations, his orthopedic surgeon ultimately told him that his construction career was over. This was a hard time for Tommy; he needed to find an alternative career.

Fortunately, his surgeon had a suggestion: the North Bennet Street School (NBSS) in Cambridge, MA. Tommy took a tour and fell in love with the place. He applied to and was accepted into the Cabinet and Furniture Making program. A last-minute opening in the school's enrollment allowed him to bypass the typical 18-month wait period. Instead, he started almost immediately, in April of 2000.

Entering far behind his classmates and without any preparation, Tommy immediately felt overwhelmed and intimidated. As he puts it, "I didn't know anything about anything. Carpentry and furniture making are totally different animals. What saved me is that I've got really good hand skills. I always knew that as soon as I got the tools in my hands it would be all right."



Federal Breakfront (2006)
Mahogany, pine, maple, brass hardware
82-3/8" x 67-1/2" x 22-7/8"

That summer Tommy set up his first shop—in the house where he was living. He then searched the job board at NBSS for any projects that he could take on. In this he was fearless. "If I could price it right," he explains, "then even if it turned out I didn't know how to do the work, I could always find someone to bail me out." The strategy paid off. Tommy stayed busy, gained valuable experience and returned to school with more confidence. That fall he threw himself into the program, and by the end of the school year had completed all the required projects. "I have the ability to work hard and stay focused, and I brought a sense of urgency to the work because I had no other career choices," he says. "I approached this not as a hobby or school, but as my new job. I built a Pembroke table in five weeks, then did a blanket chest with flat-relief carved panels in five weeks, followed by a drum table with a turned column, tapered and reeded legs, and a veneered apron." The second year Tommy pushed himself further, building more sophisticated and challenging furniture. Chief among them was a Salem block front secretary that he started in December and worked on through the spring (**Photo**, page 28).

Showtime

Tommy was in the thick of that piece when one of his instructors made an offer he couldn't refuse: "Bob Vila is in the building filming a segment on the school, and he's looking for a project to show. Would you like to be on TV?" Tommy jumped at the opportunity. He met the production crew and they shot the segment, including a little shell-carving demonstration that Tommy talked them into. After filming was done, Tommy and all the other stu-

EDITOR: RANDY JOHNSON | PHOTOGRAPHY: PORTRAIT BY ANTHONY TIEULI FOR WGBH EDUCATIONAL FOUNDATION; FURNTURE PHOTOS BY JOHN GILLOOLY

A Great American Woodworker

continued

Salem Block Front Secretary (2002)
Mahogany, brass hardware
103" x 45" x 24-1/2"

dents were invited to furnish a house for another episode.

Amazingly, Tommy was the only student to take them up on the offer, bringing all nine pieces of his furniture, including the newly finished secretary. As a result, when the house was filmed and Bob Vila walked from room to room, each one had Thomas MacDonald piece in it. "It was like a huge infomercial for me on national television," Tommy recalls. Just as important, Tommy developed a great relationship with the Bob Vila production team.

That relationship was instrumental to Tommy's growth, supplementing his furniture-making education. The production crew schooled Tommy on the fine art of branding and the need to be savvy about old and new media. They advised him on everything from business cards to the Internet, and even helped him set up a website for his work. That spring he graduated from NBSS and launched himself once again into the world, this time as a furniture maker.

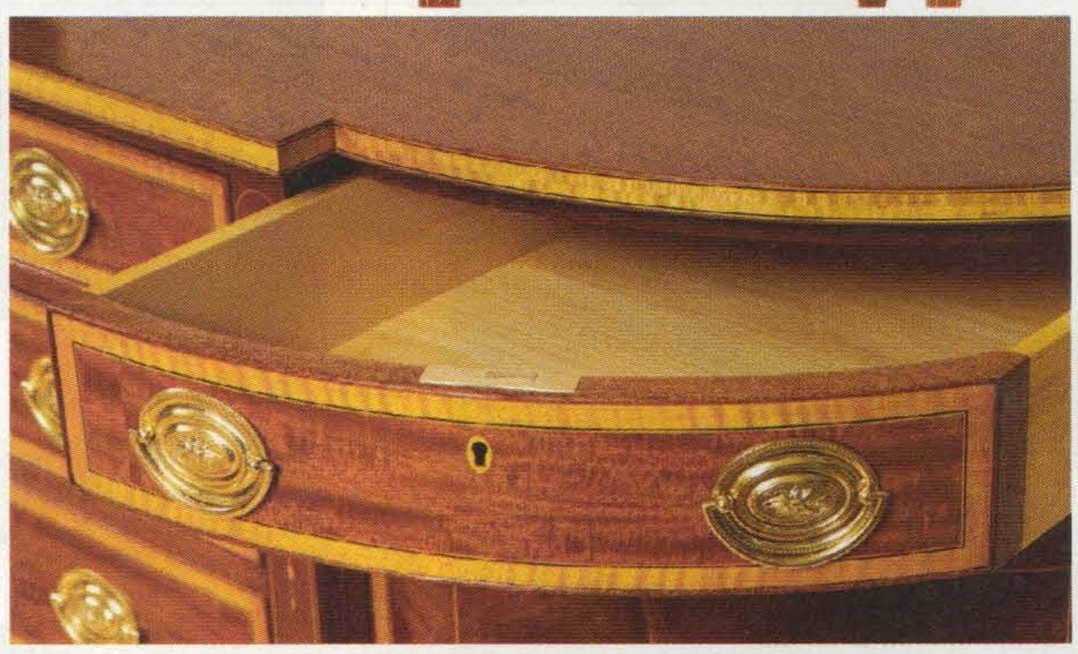
His first big commission came from a client who had seen his work on the Bob Vila show. On the basis of that exposure, Tommy got a six-figure contract to build two Federal-style pieces of furniture inspired by John and Thomas Seymour. As before, he was unafraid to take on work beyond his ability, and enlisted the help of Steve Brown (one of his NBSS instructors) to handle some of the challenges. Mindful of the lessons learned from his friends at BobVila.com, Tommy also contacted local papers about the work he was doing. As a result, a story about one of the pieces, a Hepplewhite sideboard (**Photo**, page 29), was later picked up by *Forbes* magazine, complete with a cover photo.

More accolades followed, including a "Best of Show" at the Providence Fine Furnishings Show. At this point Tommy's friends at BobVila.com contacted him again with a new proposal: They would give him a video camera, let him shoot whatever he was building, and they would then edit the material and put it on the website.

With another opportunity to showcase his work, Tommy went for the most ambitious project he could imagine: a giant Boston bombé secretary. Once again he called on Steve Brown for help, especially with the carving, which was challenging to begin with and even more difficult for Tommy because of his shoulder injury. Over 90 videos detailing the construction, shot during the 14 months this project took to build, were posted to BobVila.com. The segments drew lots of interest and something of a following—too much, in fact, for Bob Vila, who asked Tommy to take them elsewhere. So, Tommy moved the videos to his own website. The year was 2007. Though he didn't know it at the time, the seeds of "Rough Cut" had been planted.

It took over two more years of hard work building

Hepplewhite Sideboard (2005)
Mahogany, curly maple, bronze hardware
40" x 68" x 26"



furniture and promoting himself, along with chance connections and happy coincidences (among them, the retirement of Norm Abrams)—before Tommy was able to enter into an agreement with WGBH in Boston to produce "Rough Cut." Now in its third season, the show draws more than one million viewers each week and was recently nominated for an Emmy award.

A day in the shop

The center of activity in Tommy's shop is his workbench. "I compare woodworking to writing music," he says. "Most people who write music do it at a piano. Similarly, I was taught that woodworking begins at the bench, with hand tools. 'This is how you make a mortise-and-tenon' or whatever. And once you learn that technique, by hand, then you can explore doing it with a router or a tablesaw or some type of jig."

Tommy takes great pleasure in demonstrating techniques and giving helpful hints. Unfortunately, there are no tricks of the trade that will make glue dry fast enough to satisfy a TV camera! This means that projects that appear on "Rough Cut" typically have to be built four times, in various stages of completion, and in advance of the show. With a workload like that, Tommy needs help to get all the furniture built, so "Rough Cut" is most definitely a team effort. It also means that building a Boston bombé or a Salem block front for the show is out of the question.

Nevertheless, Tommy chooses projects for the show that incorporate some of his favorite techniques from the most challenging furniture pieces he has built. His Federal breakfront (**Photo,** page 27), displays exceptional veneering work, with a flitch of crotch mahogany carefully laid out across the drawers and doors of the lower case. For "Rough Cut," Tommy created a coffee table from figured maple veneer that was simpler to build, but no less handsome—and a great project for learning the technique. "The show has been a great learning process for me as well," Tommy says. "The first year was tough, the second year was a little better, and this year I'm hitting my stride and hoping to really show the vision I have for "Rough Cut." My goal is to educate, encourage and entertain." So far, that has been a winning combination.

by Randy Johnson

Click-N-Carve CNC

Compact and quiet with a simple game-like interface.

MANUFACTURER

A SURE SIGN that CNC routing is catching on with woodworkers is the increasing number of benchtop CNC machines that are available. With its retro paint job and computer game-like interface, the Click-N-Carve—one of the newest benchtop machines—features a contemporary approach. Beyond its looks, the Click-and-Carve is an entry-level model that's simple and straightforward to operate. It runs quieter than most electric hand drills and functions pretty much as its name implies—you click and it carves.

The Click-N-Carve's design software converts photos into relief carvings with only a few mouse clicks. As with most photo-to-carving software, dark areas carve deep and light areas are left high. That means the results are highly dependent on the contrast levels in the photo. One of Click-N-Carve's editing features allows you to raise selected sections of a photo image, such as the hair or clothing. The results aren't perfect, but photo-to-carving software is a developing technology and is sure to get better in the future.

The Click-N-Carve is best suited for light-duty relief carving in wood and hard plastics, partly because it uses small (4mm dia.) bits. The machine's software does, however, accept 2D vector line art, 3D models, and even g-code created by other software packages—a laudable feature.

SOURCES

Amazon.com, #84030, (shown above) $2200-$2400

Rockler.com, #84030 (capacity 11.8" x 11.8" x 3.98"), $2200-$2400; #84015 (capacity 8.7" x 6.3" x 2.48"), $1599.99.

The Click-N-Carve is simple to learn and operate. Its game-like controller includes all the basic commands needed to control its movements.

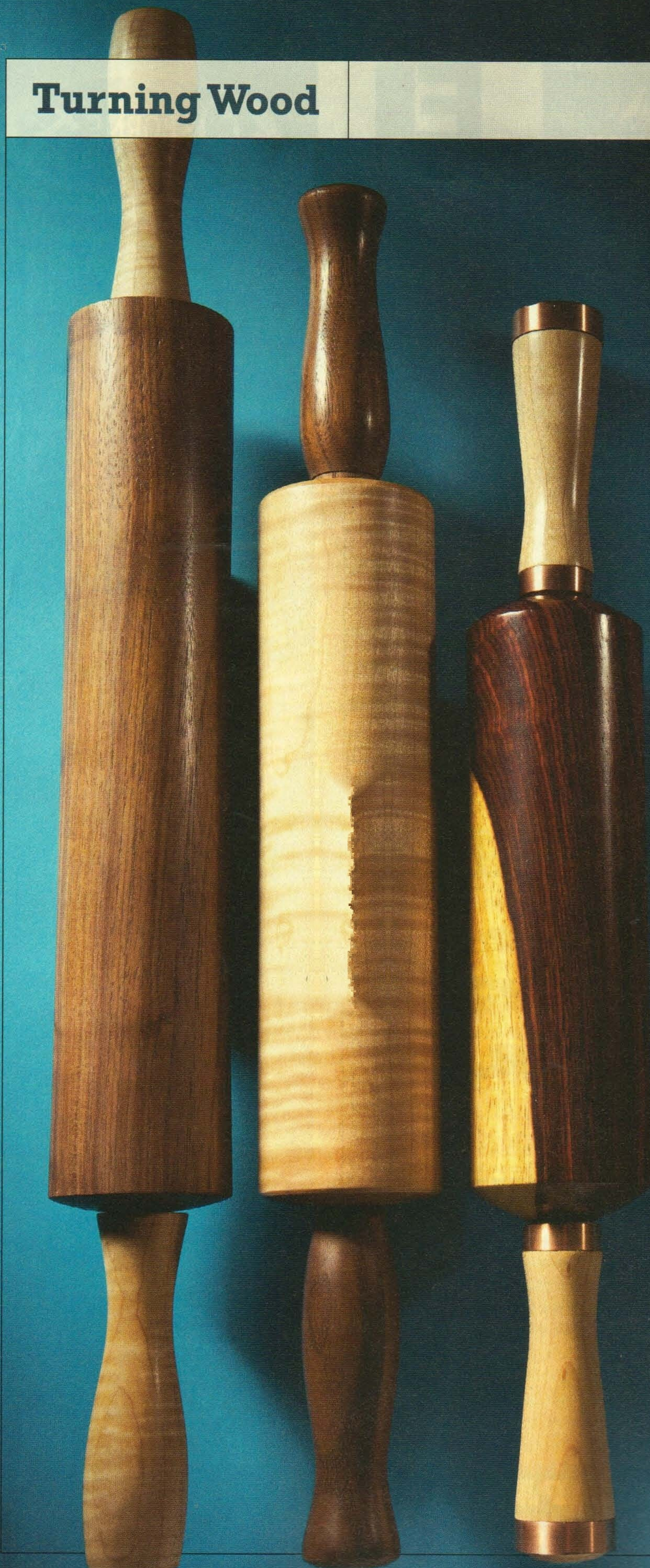
Translate photos directly into carvings, using the Click-N-Carve's photo-to-carving software. This carving was created without any additional editing, from a photo that had nice, even contrast. The process went straight from photo to software to routing.

Import 3D carving models from other sources with ease. This design was imported from the VectorArt3D.com website. Once imported to the Click-N-Carve, the model's size (including its depth) can easily be changed. The ability to import 3D models is a nice benefit, and expands the usefulness of any machine.

PHOTOGRAPHY: JASON ZENTNER

by Tim Heil

Tim's Rolling Pins

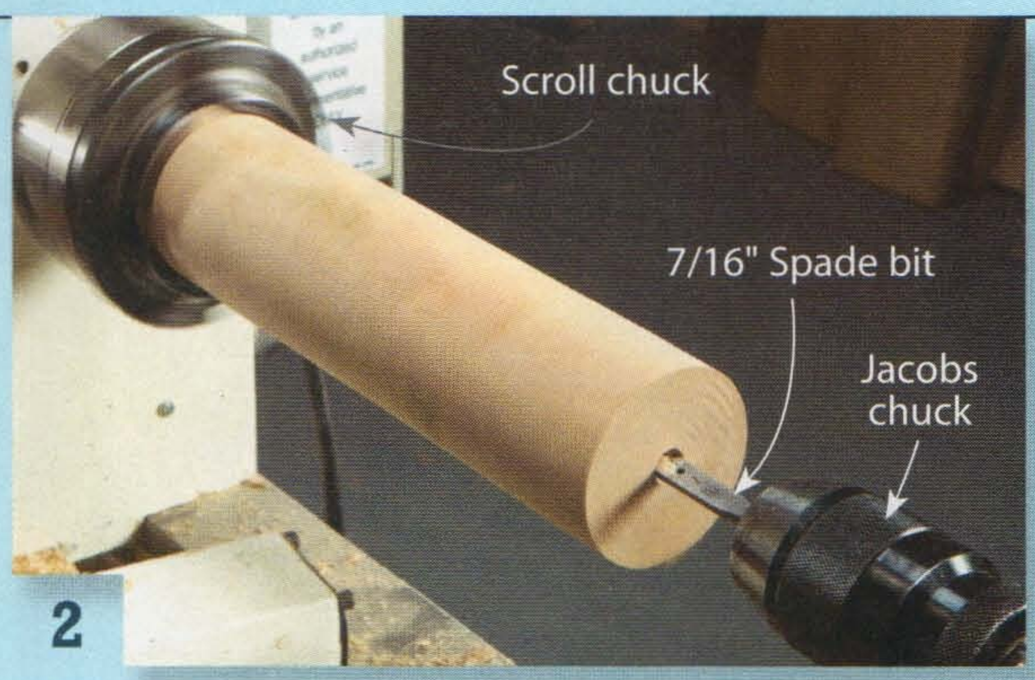


Even an ordinary kitchen tool can be beautiful.

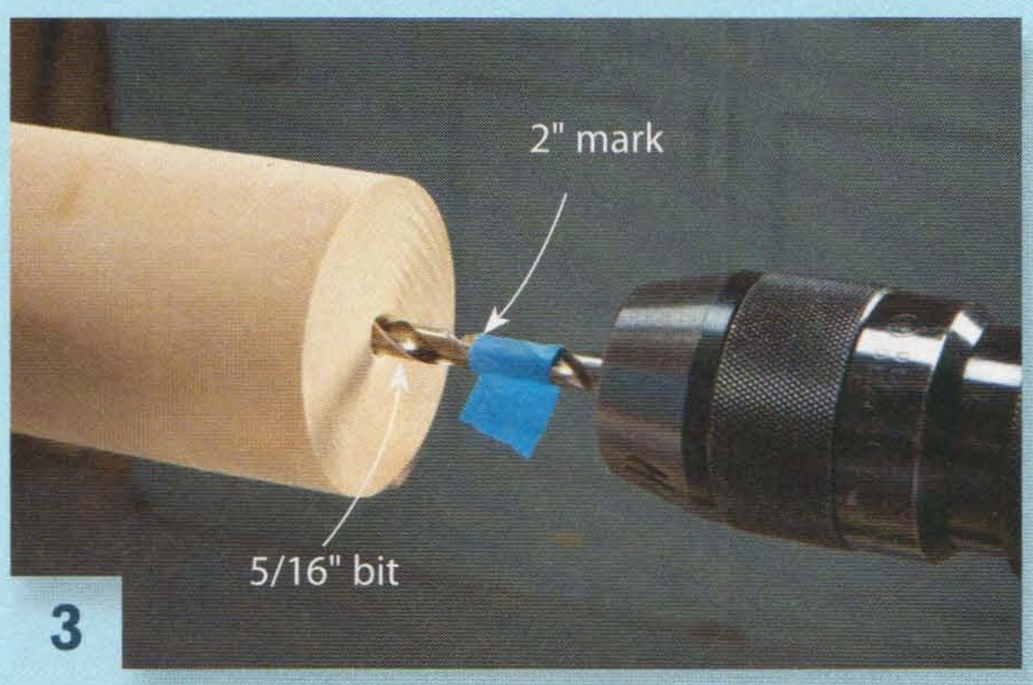
IF YOU'RE LOOKING for an easy-to-make gift for someone who loves to cook, here it is: a custom-made rolling pin. There's something about this humble tool that really appeals to the imagination. Once I got started making rolling pins, I couldn't stop. I took a dozen different ones to a charity auction, and guess what outsold everything else?

While you could make a rolling pin from one long chunk of wood, my rolling pins have separate handles. When you grip the handles, the body of the rolling pin is free to rotate. Of course, that's not a new design, but I've played around with handles quite a bit. Sometimes I make them from different species than the body or add ferrules just for show. I like to make the rolling pin's body from a visually striking wood and the handles from wood with less figure or a more subdued color.

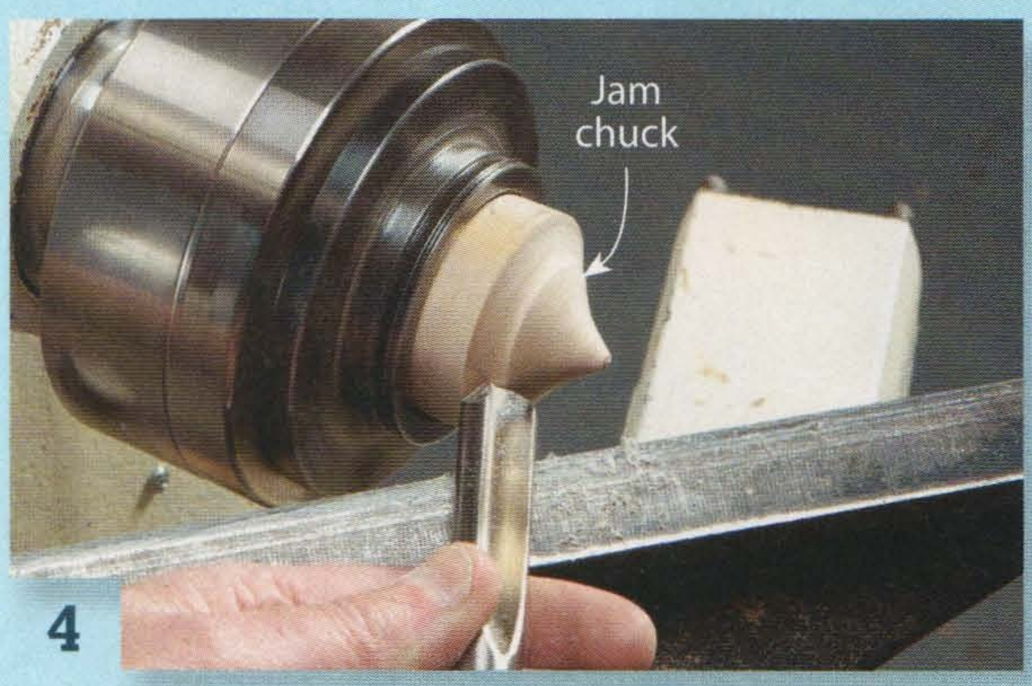
Begin by roughing out the body of the rolling pin, slightly oversize. Next, mount the blank in a scroll chuck and install a Jacobs chuck in the tailstock.



Drill a 7/16" dia. hole approximately 1/4" deep into the end of the blank. I use a short spade bit for this operation.



Drill a second hole precisely 2" deep with a 5/16" dia. bit. Mark this depth with a piece of tape on the bit. Repeat the same procedure on the opposite end of the blank.



Turn a cone-shaped jam chuck larger in diameter than the 7/16" hole you drilled in the end of the blank. Leave the jam chuck in the scroll chuck.

All of my handles are made in the same, simple way (see below). An ordinary carriage bolt passes all the way through them, and the carriage bolt is epoxied into the rolling pin's body. You might ask, "How do you keep the epoxy from squeezing out and gluing the handle, too?" Well, I've got an elegant solution for that—as you'll see later on.

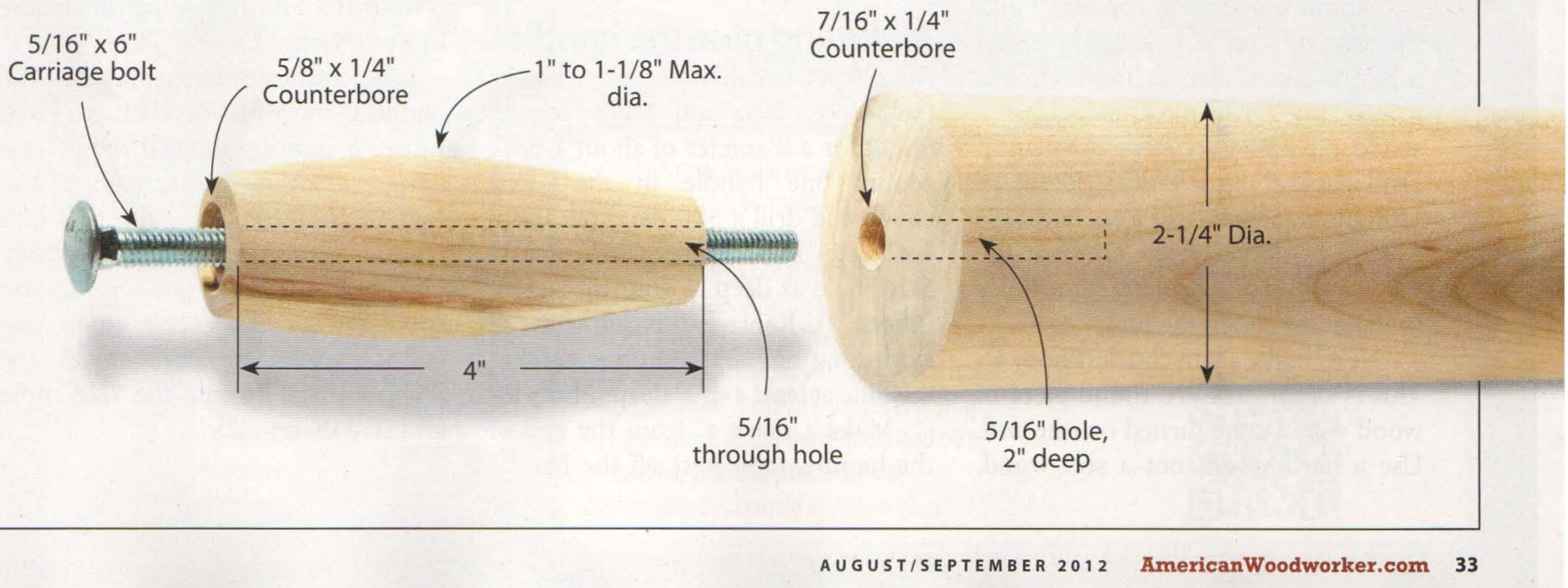
A lesson in centering holes

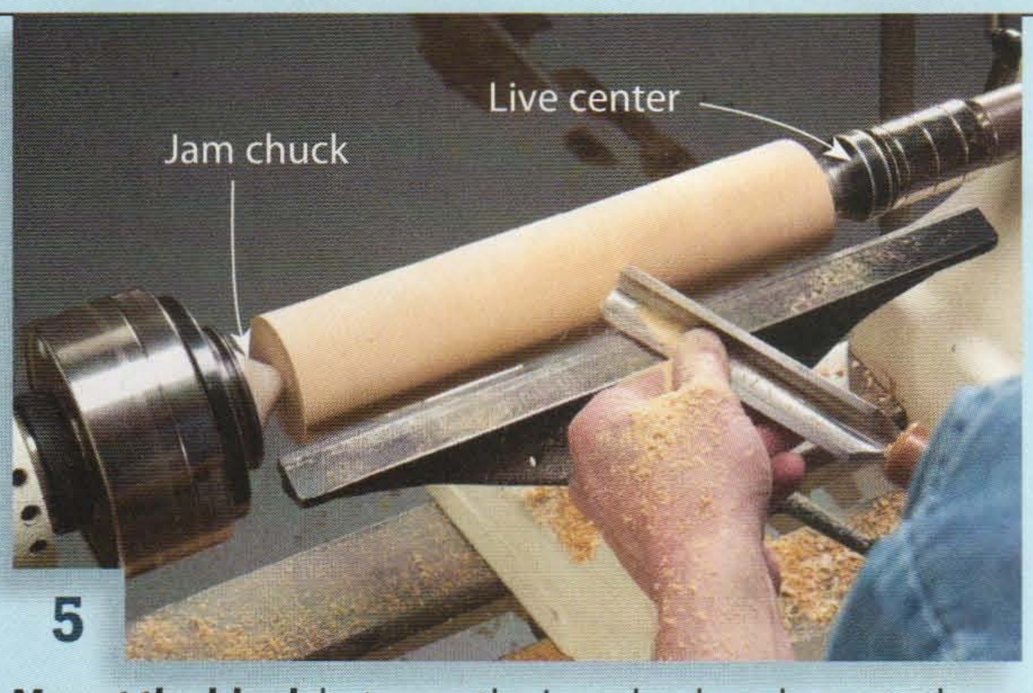
You don't need advanced turning skills to make a rolling pin, but you may learn a valuable lesson: how to center a turning on a drilled hole.

If you're new to turning, you might think that's easy. You just turn a part, such as the handle, then drill a hole all the way through it. But that's not the turner's way.

A turner aims for precisely centered holes (in this case, to make a handle that doesn't wobble). Here's how it's done. You turn the parts to rough size first, then drill the holes on the lathe—not a drill press. Then you insert conical centers in both holes and turn the part to completion. That's how the holes end up being perfectly centered.

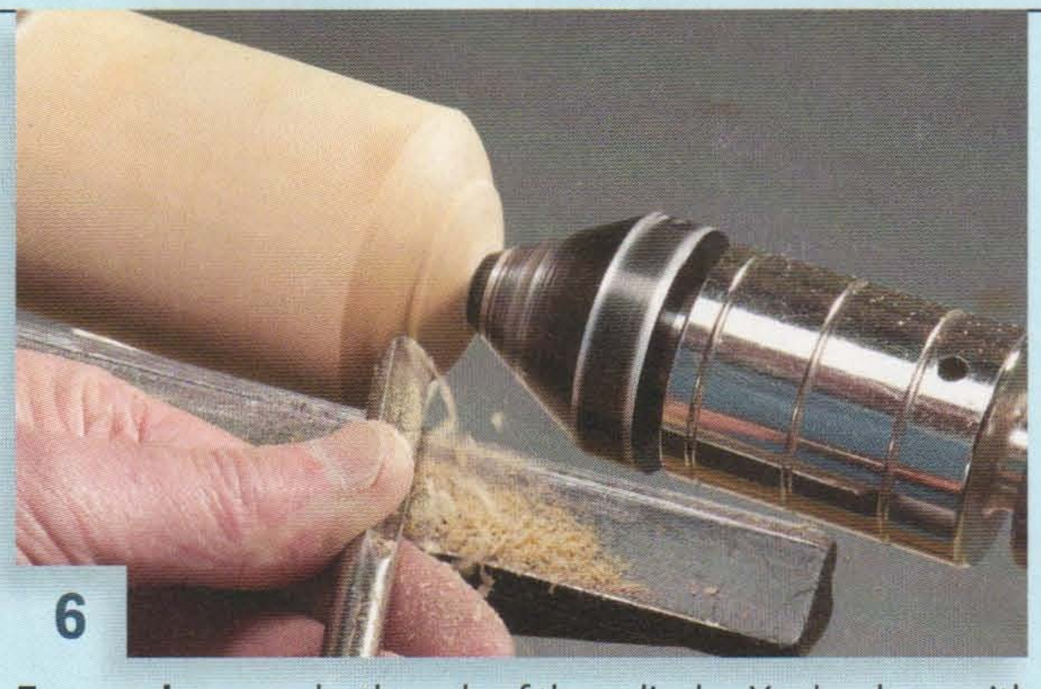
You'll need three accessories to





5

Mount the blank between the jam chuck and a cone-shaped live center, so it's perfectly centered on the drilled holes. Turn the blank into a true cylinder.

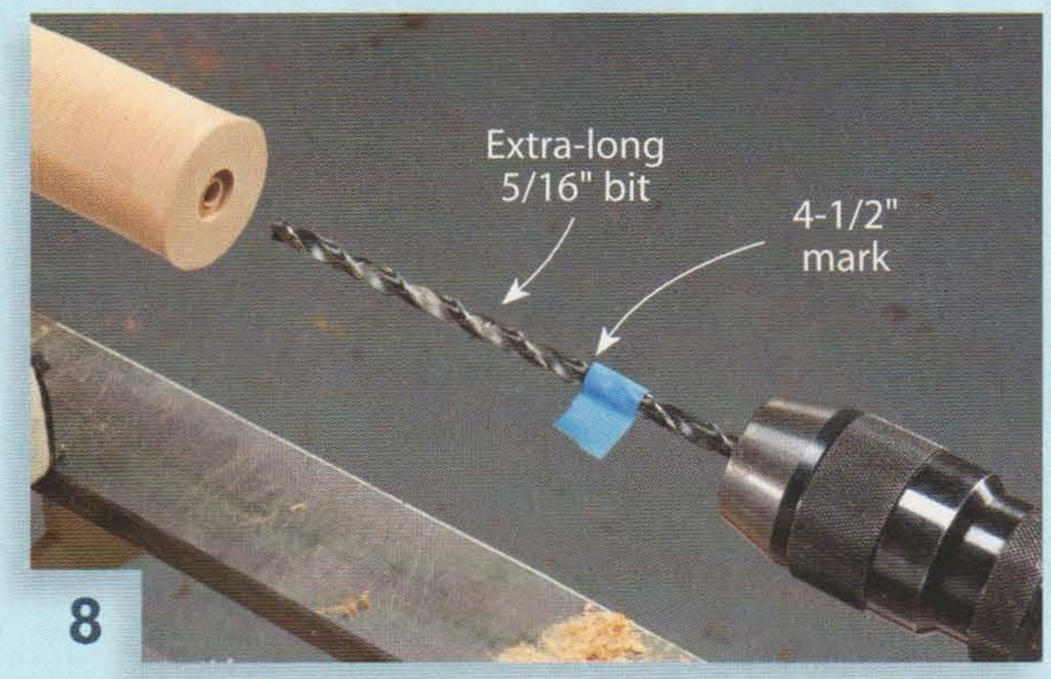


6

Form a dome on both ends of the cylinder. You're done with this part of the rolling pin.

7

Rough out two blanks for the handles, then mount one in a scroll chuck. Drill a 5/8" dia. hole about 1/4" deep, then drill a 5/16" dia. hole as deep as your bit will go.



8

Continue drilling the hole with an extra-long 5/16" bit. Make this hole at least 4-1/2" deep.

make perfectly centered holes: a scroll chuck, a Jacobs chuck and a live center with a large, conical tip. Many types of these items are available in woodturning catalogs.

Make the body

Start by making the body of the rolling pin. You'll need a chunk of wood that's 10" to 12" long and at least 2-1/2" square. Turn it into a rough cylinder (**Photo 1**).

Mount one end of the body into the jaws of a scroll chuck and install a Jacobs chuck in your tailstock. Put a 7/16" dia. bit in the chuck (I use a spade bit and cut short its shank). Drill a hole about 1/4" deep (**Photo 2**). Using a 5/16" bit, drill a second hole exactly 2" deep (**Photo 3**). Turn the wood around and drill the same holes in the other end of the body.

Next, make a jam chuck (**Photo 4**). This is simply a short, round piece of wood with a cone turned on one end. Use a hard wood, not a soft wood, so it won't crush in use. Mount the rolling pin's body between the jam chuck and a live center. Turn the body to final diameter—about 2-1/4" (**Photo 5**). As the name implies, a jam chuck drives the wood by friction alone, so take light cuts.

On the live center end, use a detail gouge to give the end of the body a dome shape (**Photo 6**). Turn the wood around to shape the other end. Sand and you're done.

Make and glue the handles

Rough out two handles from blanks that are 6" long and 1-1/2" square. Shoot for a diameter of about 1-3/8". Mount one handle in the scroll chuck and drill a 5/8" dia. hole about 1/4" deep into its end. Next, drill a 5/16" hole as deep as your bit will go (**Photo 7**). Replace this bit with an extra-long one and continue drilling the hole at least 4-1/2" deep (**Photo 8**).

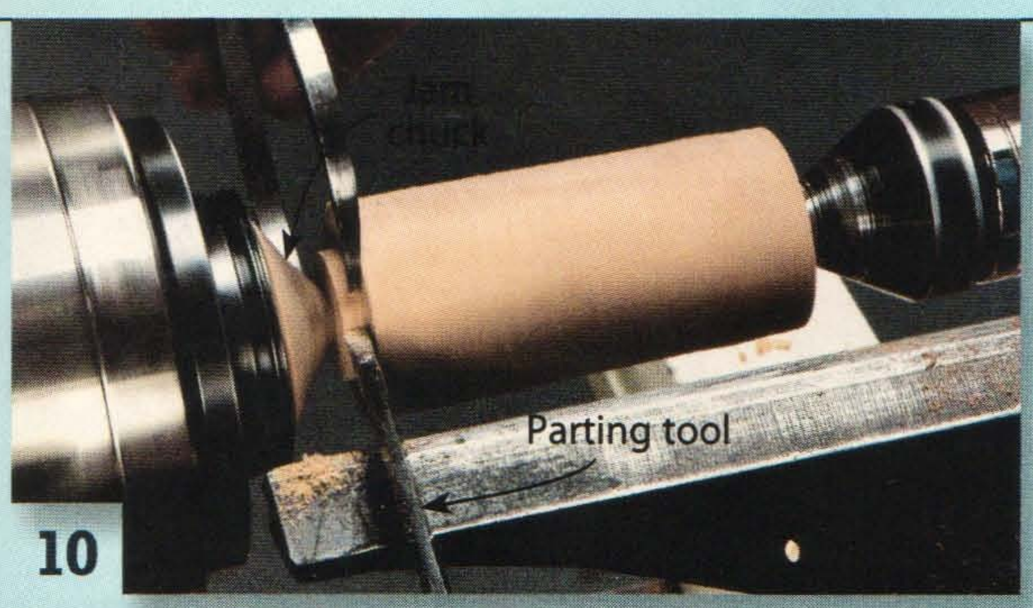
Make a mark 4" from the end of the handle, then part off the handle at the mark (**Photo 9**). The deep hole you drilled should have passed all the way through the resulting piece. Repeat the same procedure with the second handle.

To true each handle, mount it between the jam chuck and live center. Both handles should be similar in shape and size, of course, so I use a story stick to mark major and minor diameters, then turn the handle down to these dimensions using a caliper (**Photo 10**). Finish shaping the handle by eye (**Photo 11**).

Use 5-minute epoxy to glue the handles. You won't need much. First, insert a carriage bolt through one handle, then fill the threads of the bolt with epoxy. Push the bolt and handle into the rolling pin's body (**Photo 12**). If all goes well, you shouldn't see any excess glue come out of the joint. If there is any excess, it should well up into the 7/16" hole and stay there.

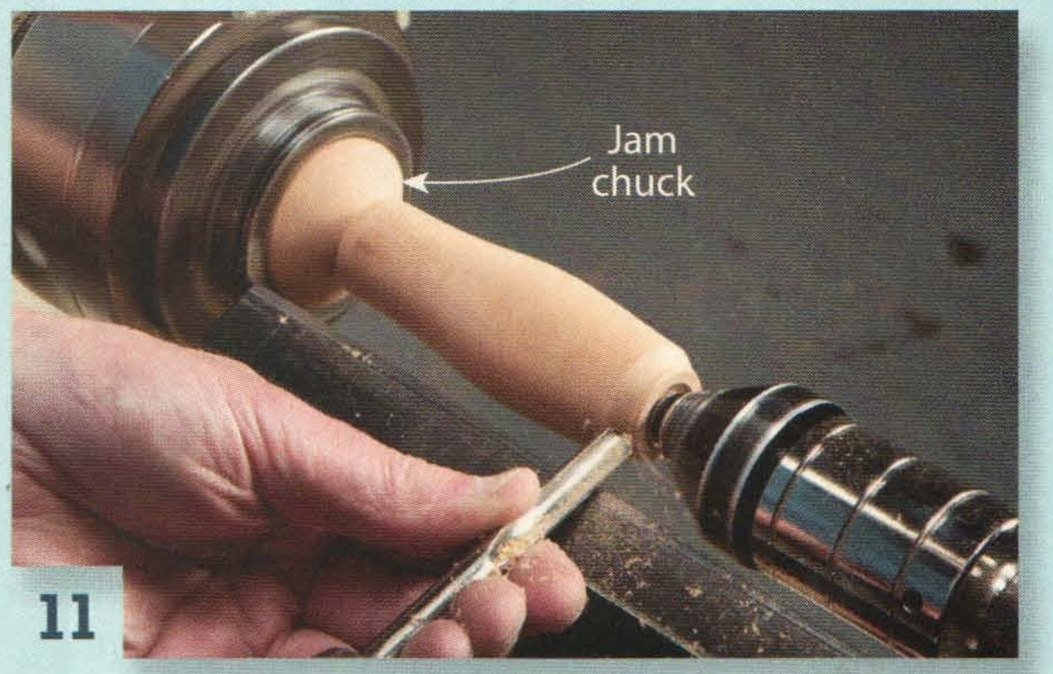
9

Use a parting tool to cut the handle 4" long. Repeat the same operations on the second handle.



10

Mount each handle between the jam chuck and the live center. In order to make identical handles, lay out their end diameters with a caliper and a parting tool.



11

Shape the handles any way you want and sand them smooth.

12

Slide a carriage bolt through a handle and coat its threads with epoxy. Push the bolt into the rolling pin. If any glue squeezes out, it will pool in the 7/16" counterbored hole.

Tommy Mac's Dream Shop

MY SHOP is different from most shops in one big way: we shoot the television show "Rough Cut" here. Of course, it wasn't always like that. My first shop, back when I started at North Bennet Street School in Boston, was in a dilapidated ranch house where I lived. It was really a mess, but I redid the basement and turned it into an awesome shop. I borrowed money to buy my first equipment, large old industrial machines that I could get for a good price because most people aren't equipped to use them. My bench was in my living room. In fact, the whole house was basically just a shop. That's where I worked for a long time. I eventually fixed up that house and sold it. Then I moved my shop to a separate building in the town where I live.

Now my shop is in a great old mill building that's about 150 years old. It has 3" thick hardwood floors, high ceilings and a spacious layout. The shop floor is about 2500 square feet, with another 200 square feet or so for a bathroom and an office area with a desk and chairs. I got this space hoping to shoot "Rough Cut" here—and in fact when I brought the folks from WGBH over to see the space, it really helped to convince them. I've been in the shop for five years, and the show is just now in its third season.

The machines are important, but the heart of my shop is my bench.

When I first envisioned "Rough Cut," I thought of it as being in a one- or two-car garage with pretty simple tools, and we actually went pretty far down that road before we had a group meeting about how we wanted the show to look. We decided that we really wanted the setting to be the ultimate dream shop for people who watch the show. So we decided to go with the type of equipment that I was using anyway—we just switched to new tools that are all single-phase 110- or 220-volt, since that's what most people can accommodate.

We recently installed some new Powermatic equipment—8" and 12" jointers, and a 20" planer, all with the Byrd helical cutterheads with carbide inserts. They're unbelievably quiet, and changing the inserts couldn't be easier. I

EDITOR: JOHN LAVINE | PHOTOGRAPHY: JASON ZENTNER

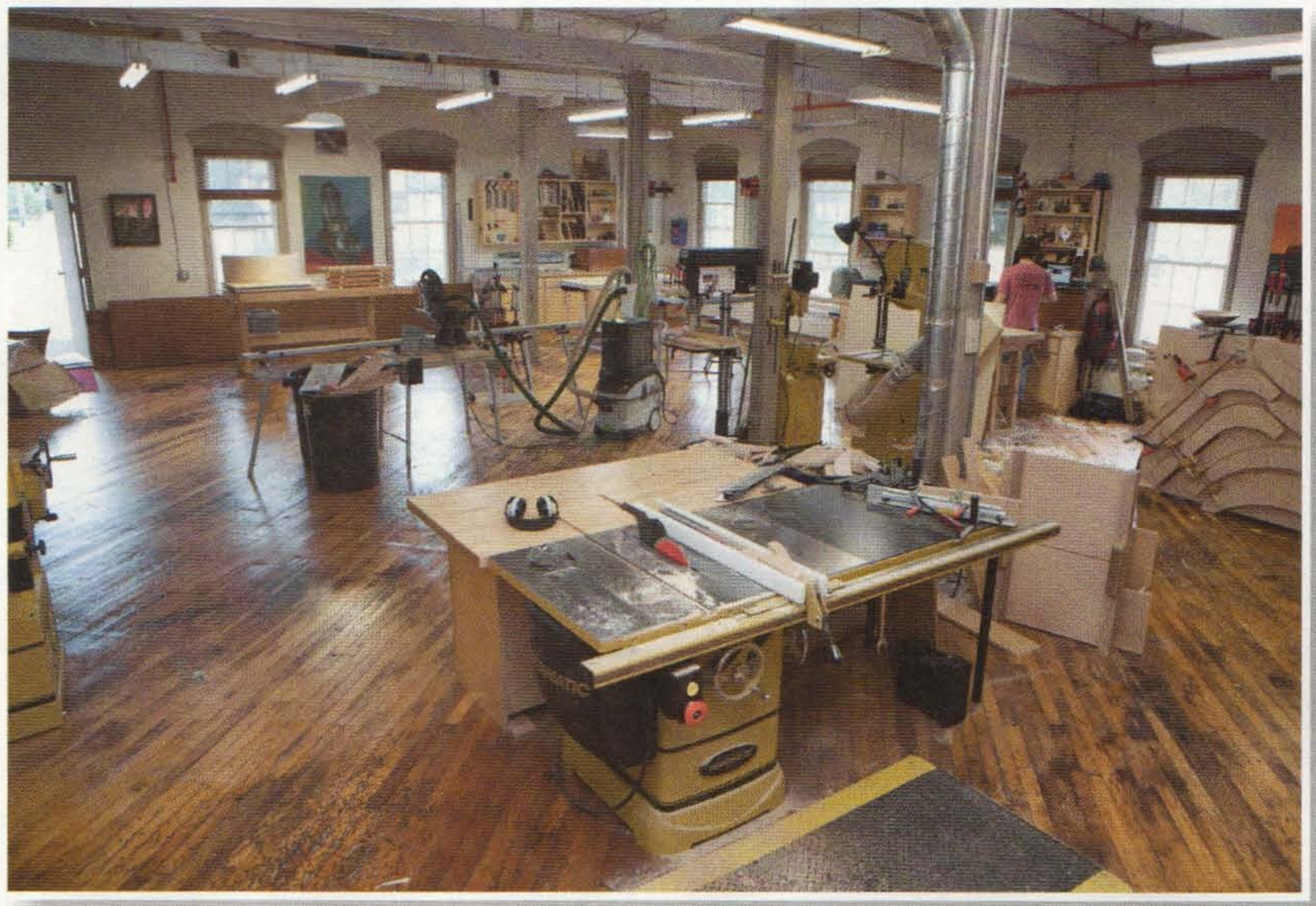
really believe you should get the biggest jointer and planer you can afford. The difference in price between a 6" and an 8" jointer or between a 16" and a 20" planer is not all that much, and the extra capacity makes all the difference for being able to mill up wide boards for furniture. Likewise, I believe you should get the most powerful tablesaw you can afford. I've got a 5hp 10" saw, which can handle 3" thick material without any strain. The other heavy-duty machine that I use all the time is my mortising machine. It's a standing machine (not a bench-top model) that's sturdy and totally reliable.

On the other hand, some things in my shop don't need to be big, because I don't use them too much or too hard. The sanders and drill press don't need to be production size. I'm actually considering downsizing to a mini-lathe. And my 14" bandsaw does all it needs to do. If I need to do some big resawing or wide-belt sanding there are other shops nearby where I can go to have that done.

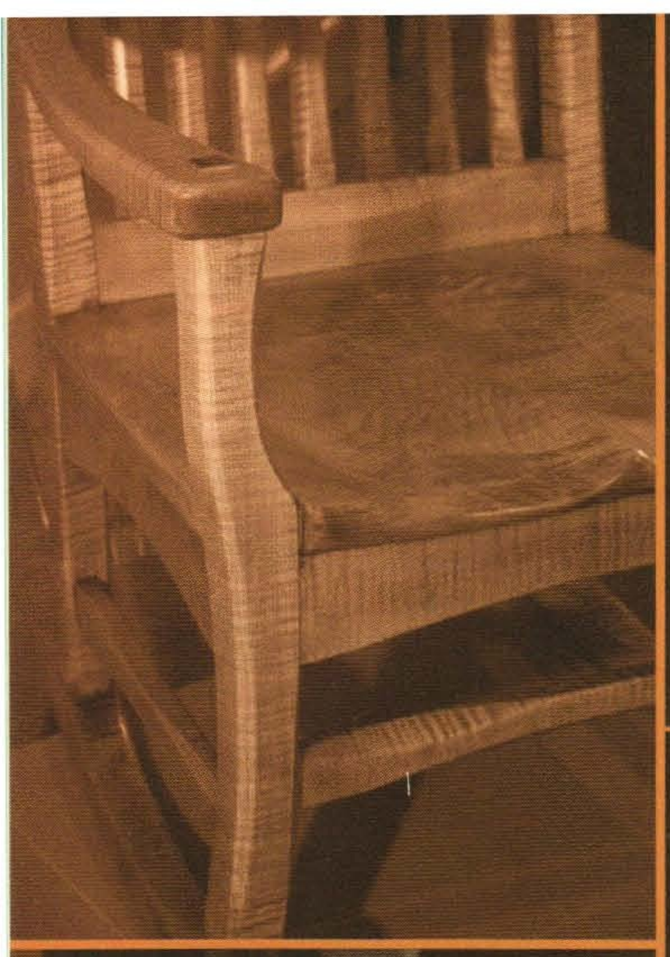
The machines are important, but the heart of my shop is my bench. At school they taught us how to do things at the bench, using hand tools. That was the foundation, and everything goes from there. I have a different philosophy about my bench. I didn't want to spend the money or take the time to build a fancy European bench. I just wanted one that was simple and solid. Mine has just one vise, a 10" Jorgensen bench vise. I built a set of cabinets and a tool crib behind my bench for storing all my tools, which helps keep the clutter off the bench and makes it more usable.

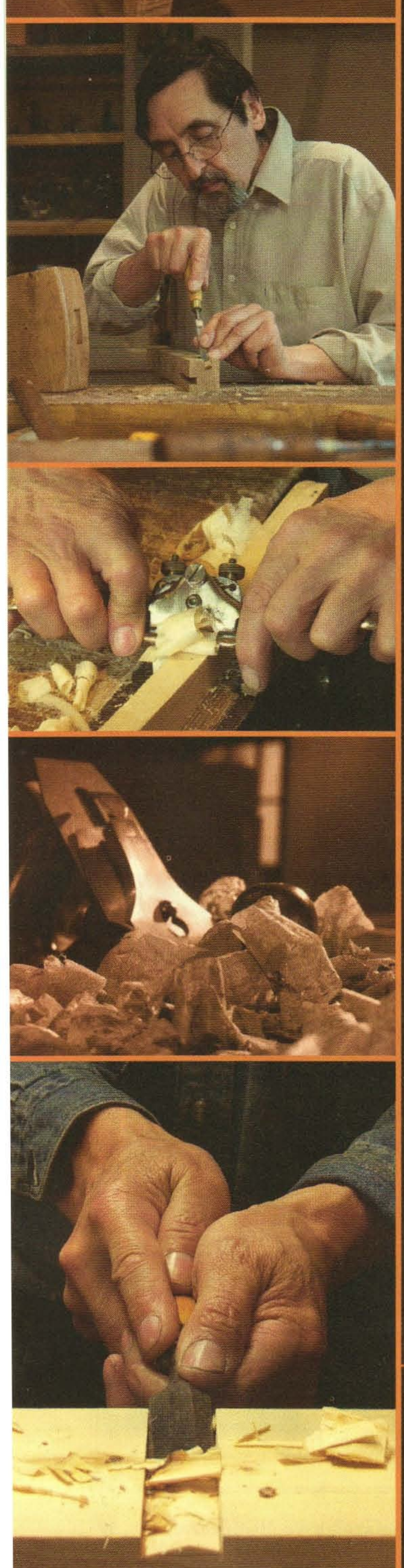
My shop has lots of windows that provide lots of natural light and make it easy to work. The funny thing is, those windows let in too much light for shooting the television show, and we've had to use window shades and tinting to help control it. But other than that, my shop really is the ultimate dream shop.

Thomas MacDonald
Boston, Massachusetts



Watch a video tour of Tommy's "Rough Cut" studio shop at **AmericanWoodworker.com/WebExtras**





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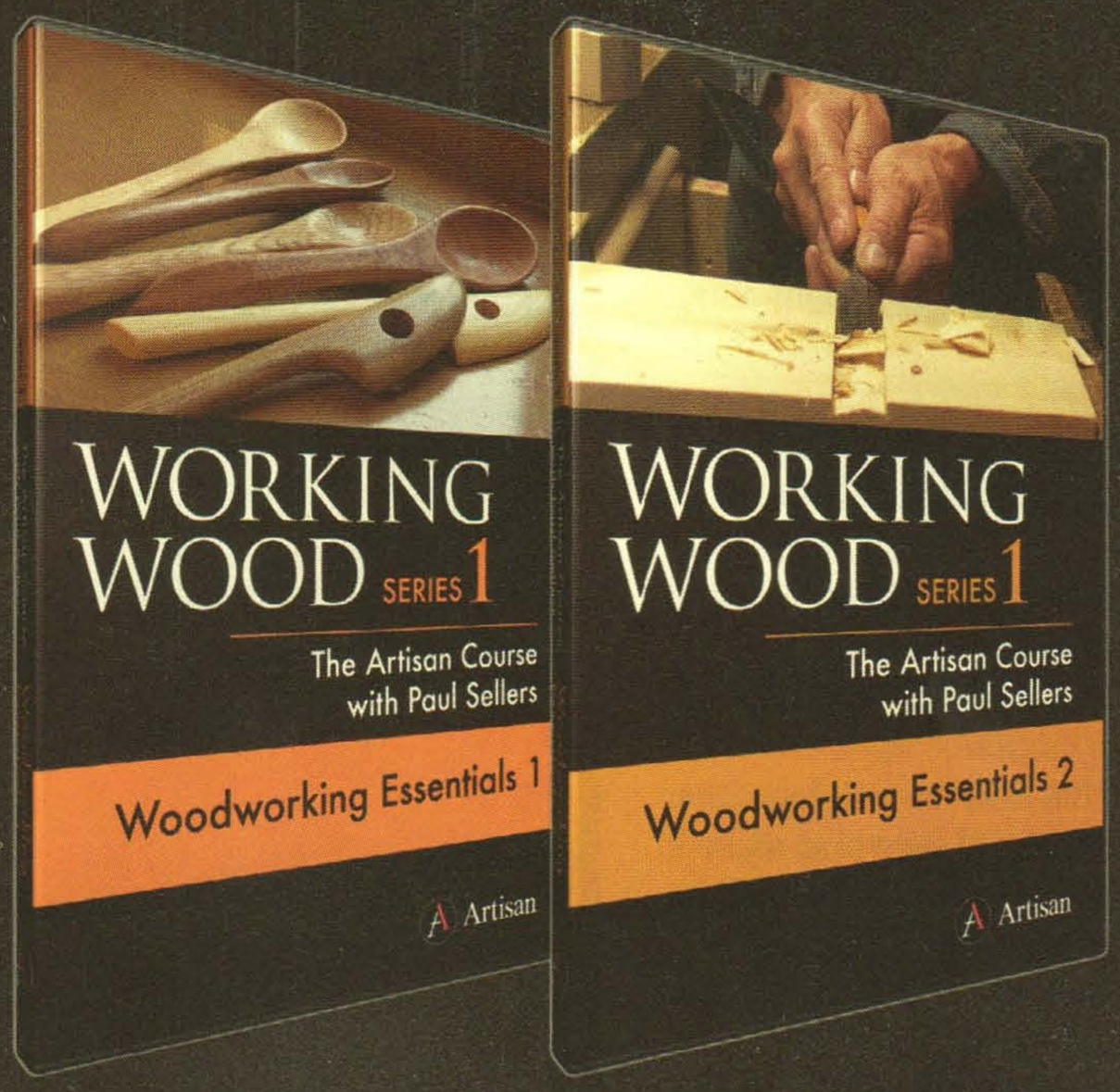

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Portsmouth Card Table

Restrained elegance in an American classic.

by Mario Rodriguez

Fig. A Exploded View

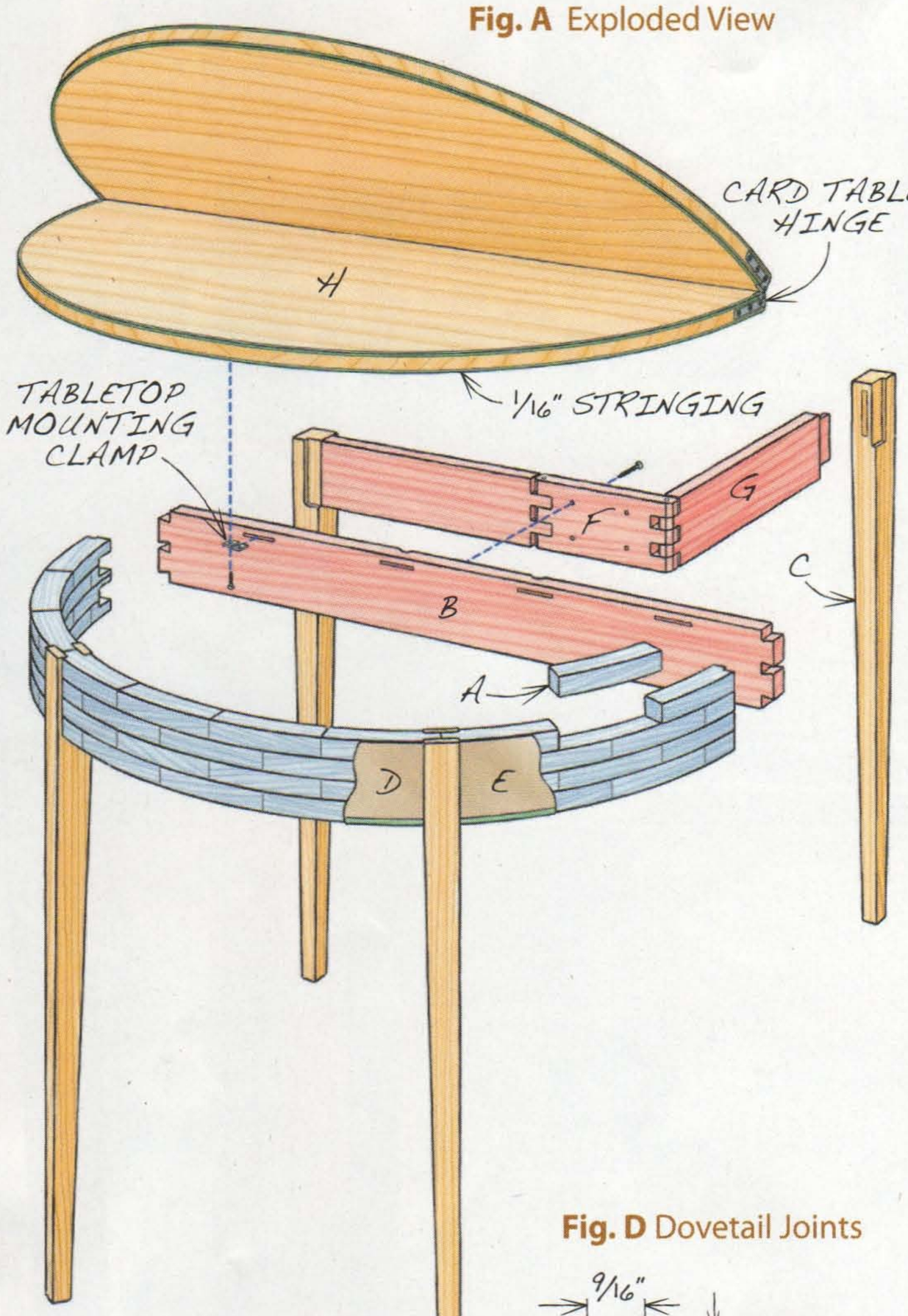


Fig. B Apron Staging Board

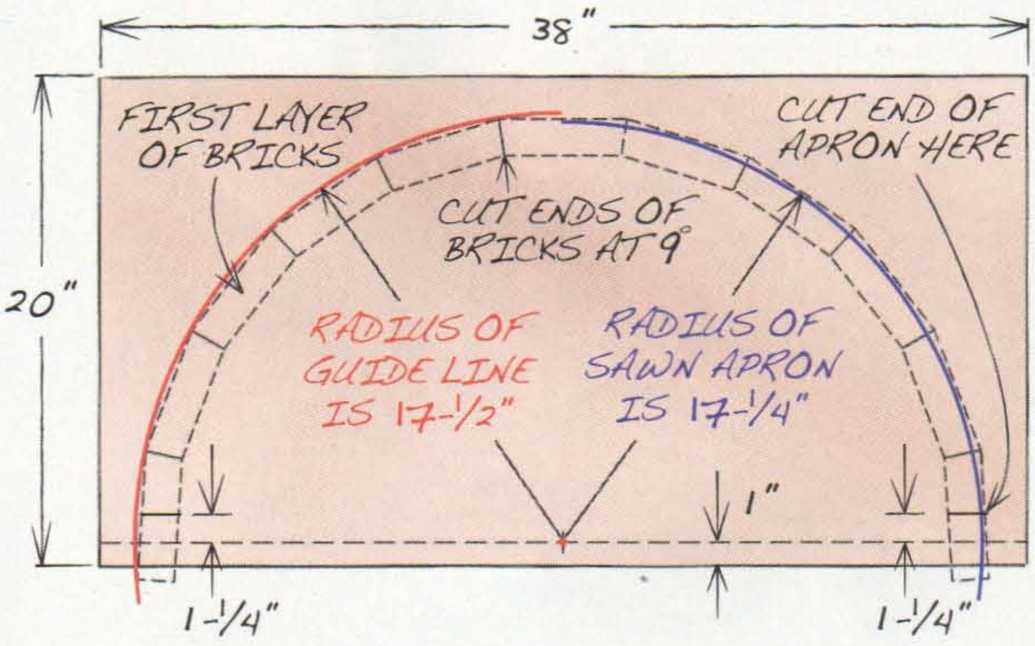


Fig. C Plan View

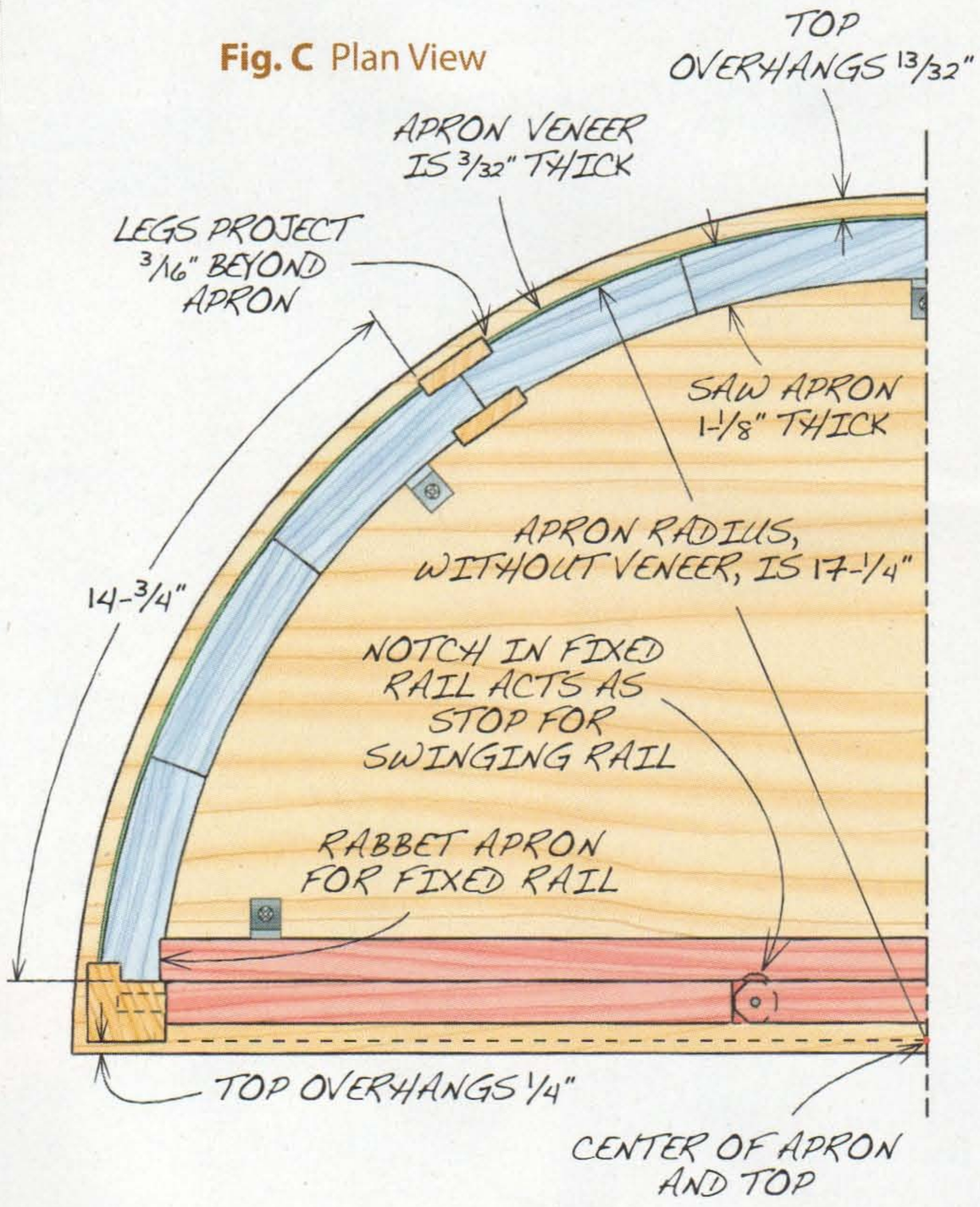


Fig. D Dovetail Joints

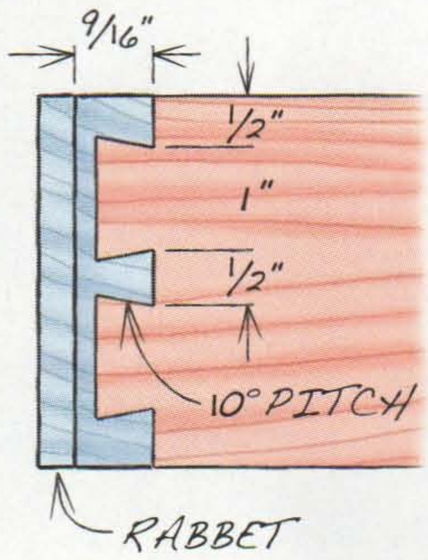


Fig. E Leg Gauge

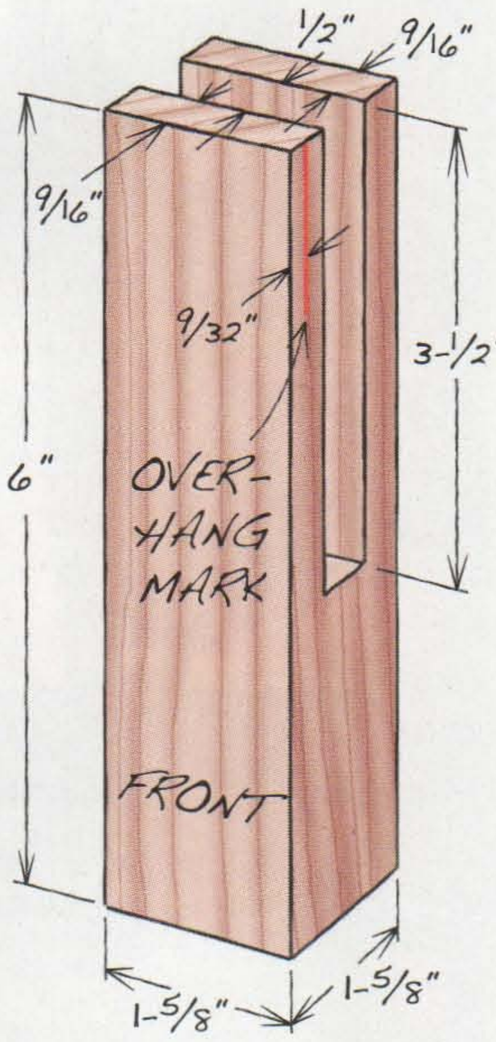
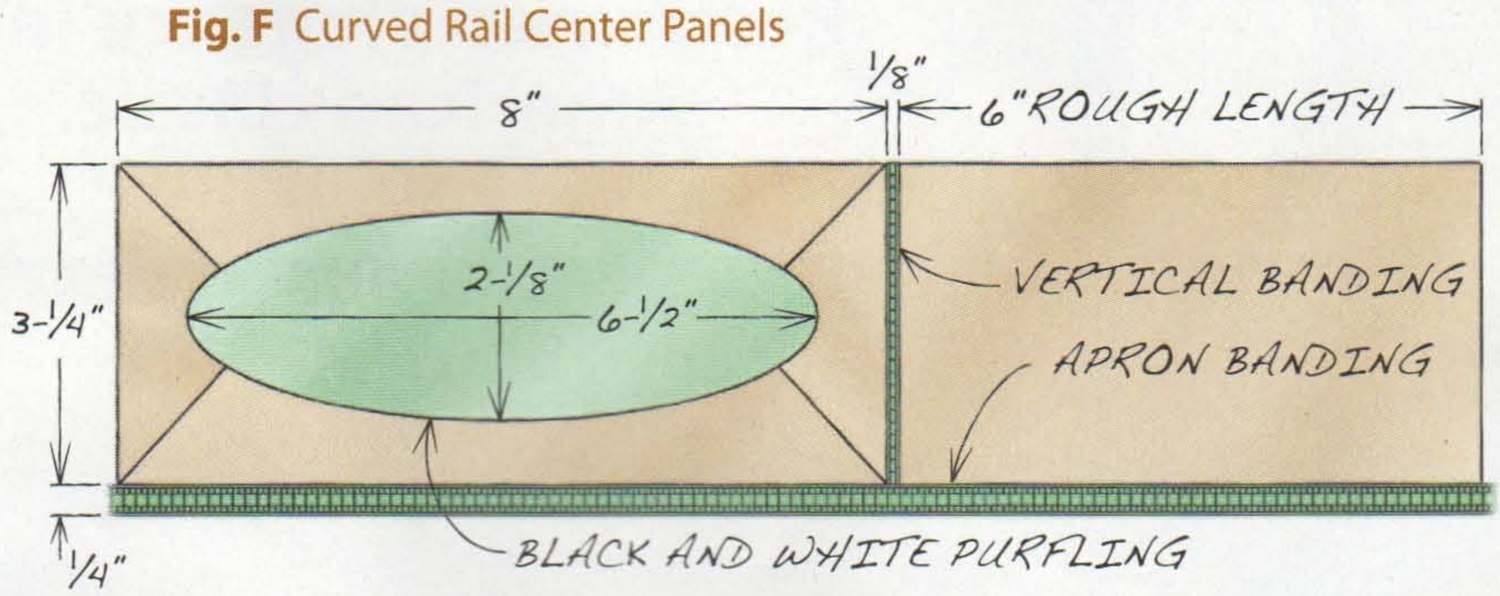
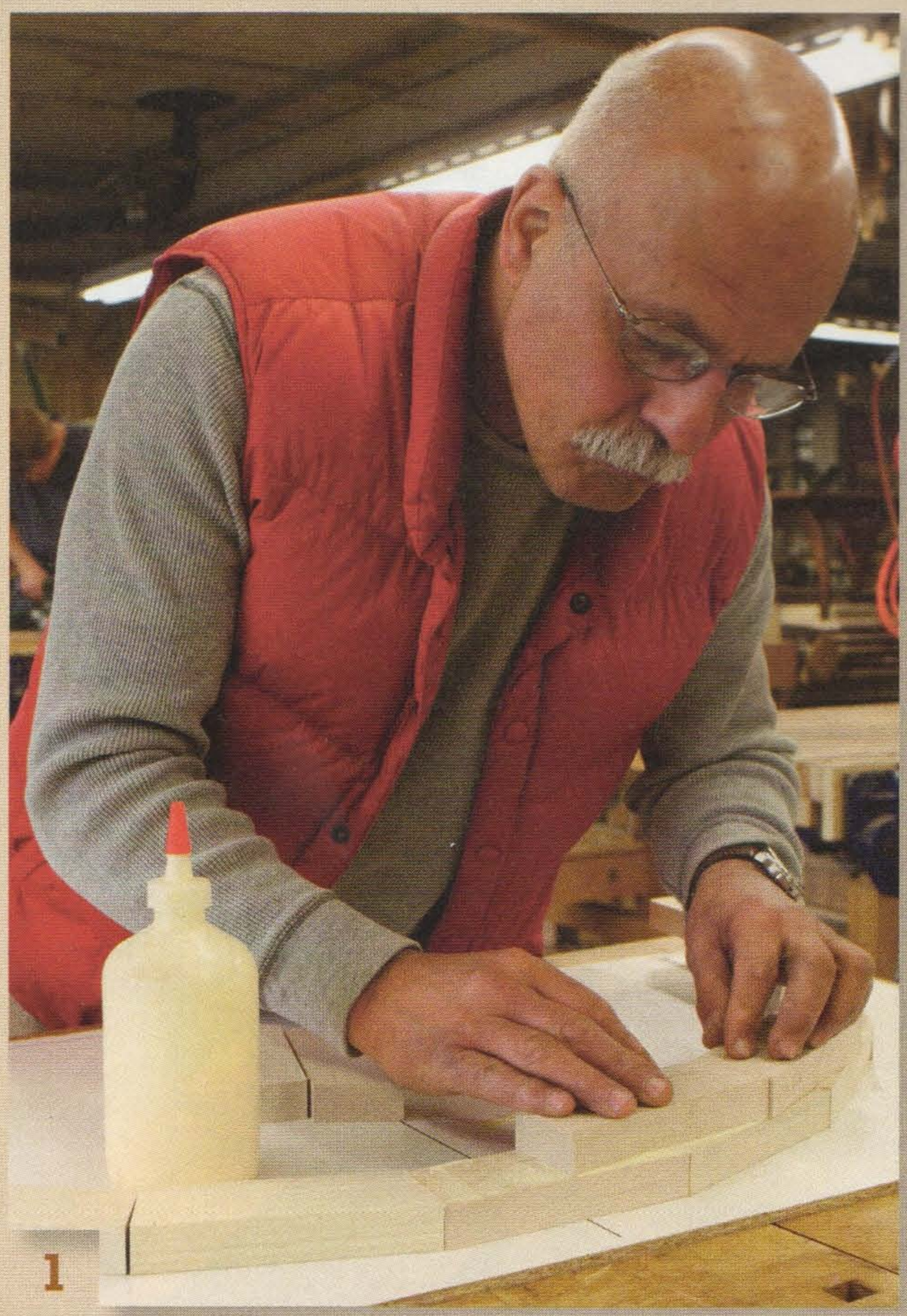


Fig. F Curved Rail Center Panels



EDITOR: TOM CASPAR | PHOTOGRAPHY: MARIO RODRIGUEZ | ILLUSTRATION: FRANK ROHRBACH

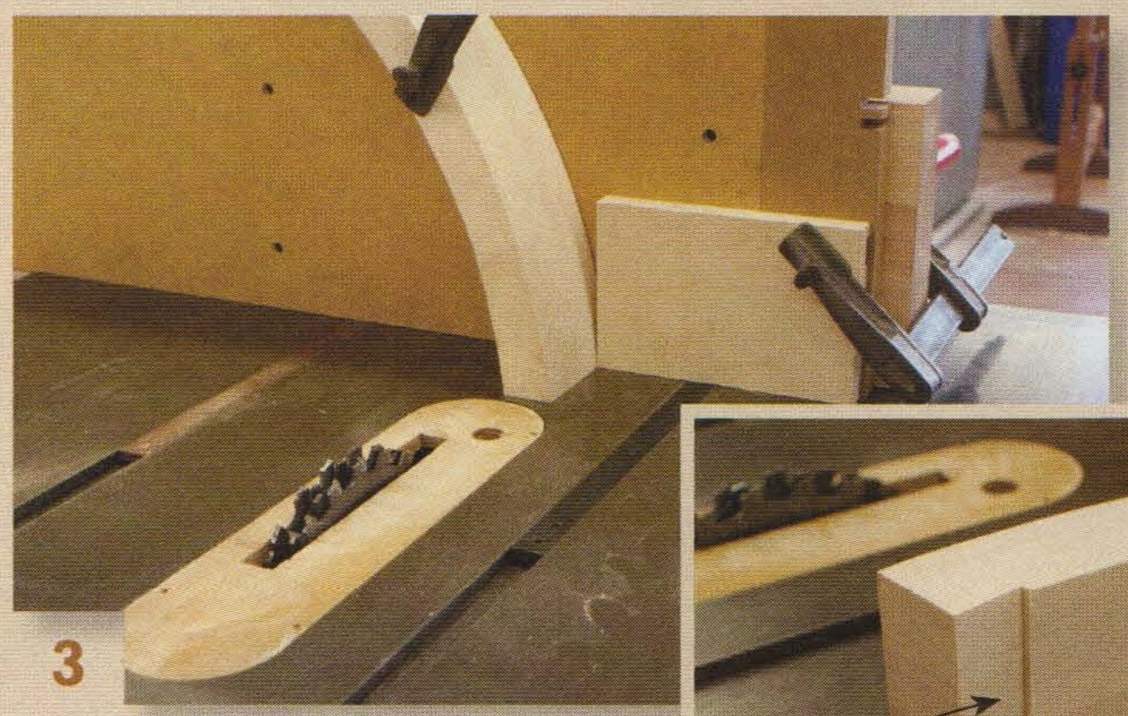


1

Glue up the curved apron by building a wall of overlapping "bricks." The bricks don't have to be clamped—just press down firmly and rub them back and forth until the glue grabs.

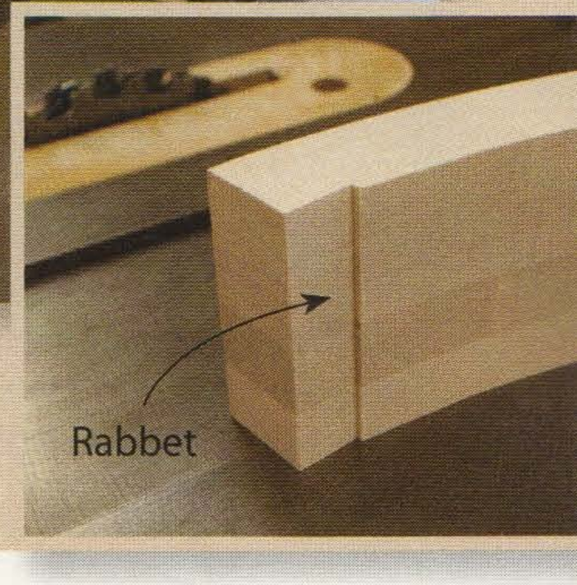
2

Saw both sides of the apron into a half-circle. Trim the ends of the apron on the bandsaw as well.



3

Saw rabbets on both ends of the apron to receive the back rail.



SOMEDAY IN YOUR woodworking career, you'll want to reach for the sky. Maybe you'll have an urge to make an ambitious piece of your own design, or perhaps you'll prefer to walk in the shoes of cabinetmakers who have gone before and build an American classic. If you love period furniture, this table is for you.

Our table dates back to the early days of the American republic, when card-playing parties were often hosted in fashionable homes. During the day, the table was placed against a wall, with the top folded over. On the night of a party, the table was brought out to the middle of the room. The backs legs were swung out and the top opened up into a full circle.

In the decorative arts, the era of 1790 to 1830 is known as the Federal period. The demilune ("half-moon") card table became an icon of Federal design, with cabinetmakers in each part of the country interpreting it in their own way. I've studied many Federal card tables and have come to prefer those made in Portsmouth, New Hampshire, for their restrained elegance.

This particular table is not a reproduction—it's my own design, based on those Portsmouth pieces. Its method of construction and joinery are similar to the tables built in Federal-era shops. While you'll most likely use power tools to mill all of the wood and to cut some of the joints, building this table still requires skilled work with hand tools. Once you're done, I'm sure you'll say with genuine pride, "I made that!"

Build the apron

When most people first see a half-round card table like this, they assume that the apron is cut from one massive piece of wood. "That wouldn't really work," I explain. "It's made from 50 pieces, not one."

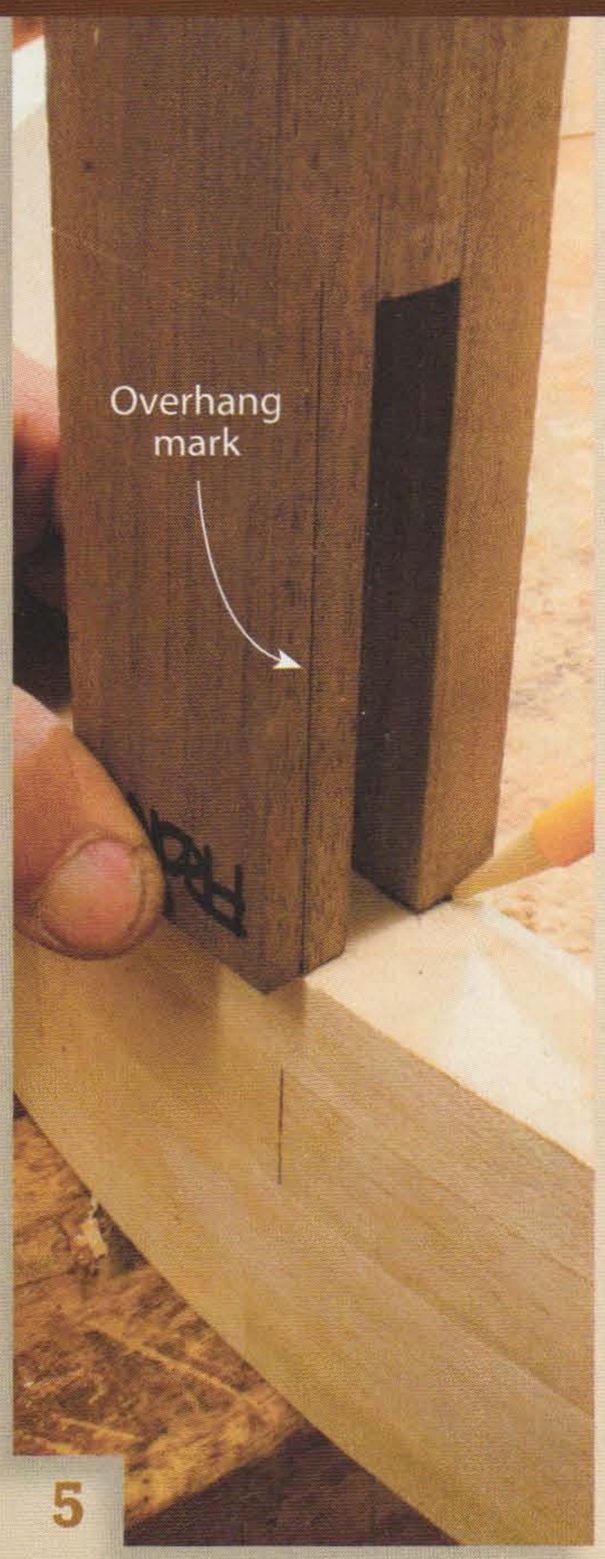
Those pieces are laid up like bricks in a wall (Fig. A, page 40). This technique was employed by Federal cabinetmakers and is still the easiest way for a builder in a small shop to make this type of apron. Begin by milling the bricks (A). Cut both ends of each brick at 9° (Fig. B).

In order to build the wall, make a staging board to guide you (Fig. B). The board must be dead flat to prevent the wall from becoming twisted. I use a sheet of melamine; lines drawn on it are easy to see and glue won't stick to it. Using a trammel, draw a large arc on the staging board to indicate the outer perimeter of the wall. (Note that the radius of this arc is larger than the arc of the finished apron.)

Lay down the first course of bricks inside the arc (**Photo 1**). Butter the ends of the bricks with glue. If the bricks don't fit tight against each other, don't worry. Small gaps are OK because the

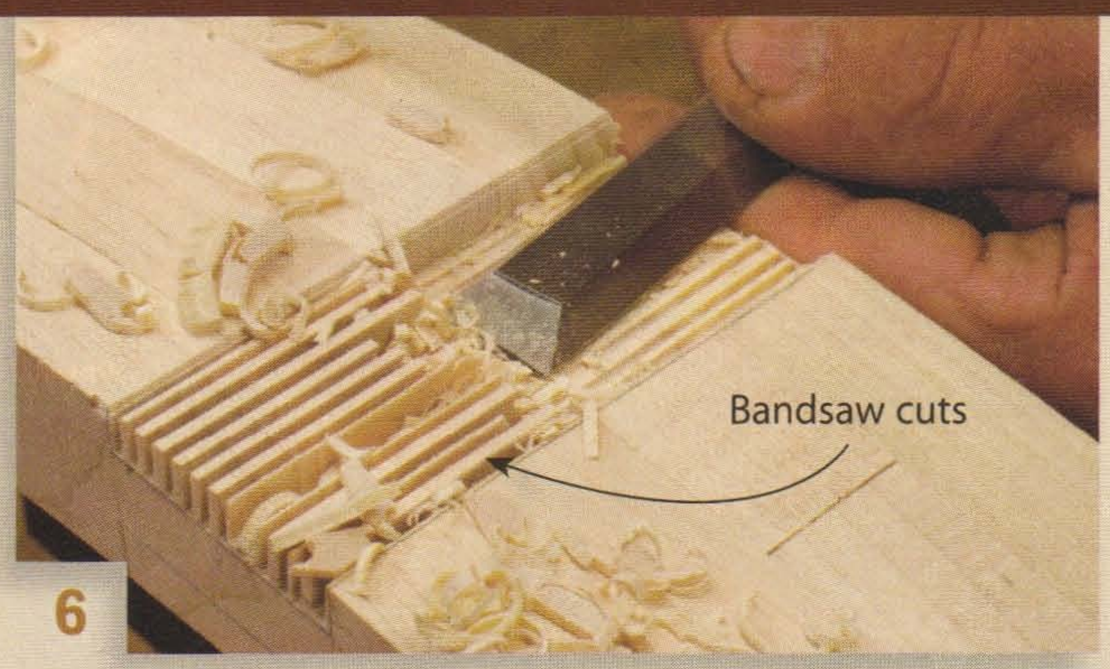
4

Make a gauge block for laying out the bridle joints that connect the front legs to the apron.



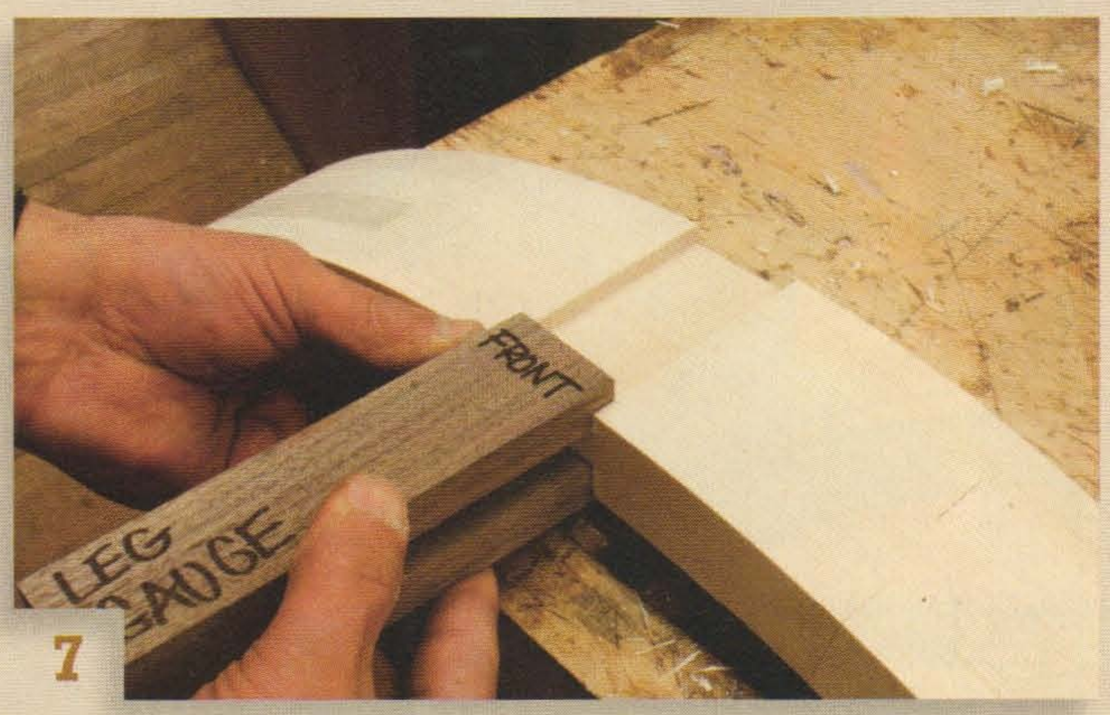
5

Use the gauge block to lay out the joints. To orient the block, line up two overhang marks with the front of the apron.



6

Cut kerfs on both sides of the apron using the bandsaw or a tenon saw. Clean out the waste with a chisel and a shoulder rabbet plane.



7

Test the fit of the bridle joint with the gauge block. If the joint is too wide or too narrow, let it be. Later on, you'll mill the actual leg to fit.

main source of the wall's strength is its staggered structure. You don't have to clamp the bricks end-to-end.

Build the second layer of the wall. These bricks should overlap the lower bricks about halfway. Again, you don't have to clamp. Spread a generous amount of glue on a small portion of the lower layer, then press firmly on each new brick and rub it back and forth until the glue squeezes out and grabs. As you build the wall, use a square to make sure it is plumb. Let the glue dry overnight.

Draw the outside radius of the apron on the wall (Fig. B). (I use a half-round MDF template.) Saw the wall on the bandsaw (**Photo 2**). Leaving a small flat spot or divot is OK—you can patch it later, if necessary. Use a marking gauge to draw the inner radius of the wall and cut this on the bandsaw as well. If the outer surface of the apron is rough with teeth marks, smooth it with 60 or 80 grit paper.

Level the top and bottom surfaces of the apron with a No. 7 or No. 8 plane, making sure the surfaces remain parallel and square to the outside face. Cut the ends of the apron to length (Fig. B) using the bandsaw.

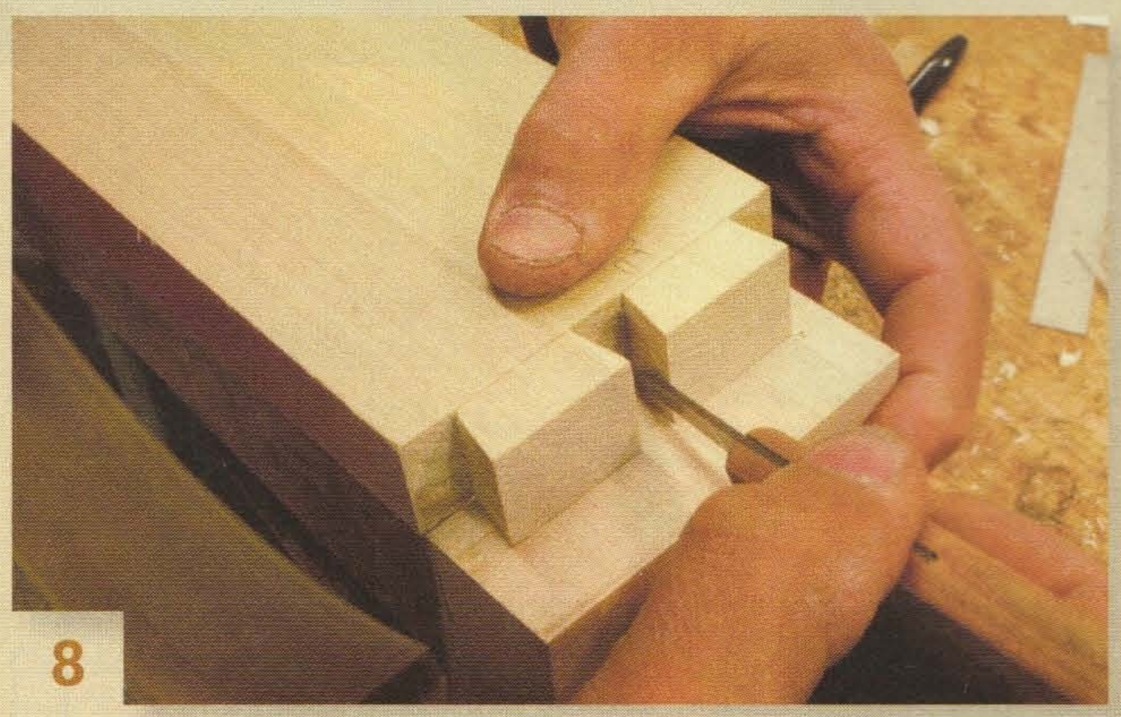
Make the apron joints

In order to join the rear fixed rail (B) to the apron, cut a shallow rabbet into each end of the apron (**Photo 3**). Use a dado set and support the apron with an extra-tall fence. Raise the dado set to 7/8", the thickness of the rail.

Next, lay out and cut bridle joints in the apron for the front legs (C). I've found that the best way to do this is to make two gauge blocks (Fig. E) that are the same width and thickness as a leg. Cut a deep notch in each gauge block on the bandsaw, then chop out the waste (**Photo 4**). Mark both sides of each gauge block to indicate how far the front of the block should overhang the apron bricks (Fig. E).

Mark the location of the bridle joints on the top of the apron by measuring from each end of the apron. (Fig. C). Place a gauge block on these marks, line up the overhang marks with the front of the apron and draw around the end of the block (**Photo 5**).

Use the bandsaw or a tenon saw to cut the outside edges of the bridle joints, then make a series of cuts across the joints to make it easier to pare and plane away the waste (**Photo 6**). Mark each gauge block as representing the left or right leg, then test the fit of the joint as you remove the waste (**Photo 7**). Make any necessary adjustments to the most accessible part of the joint. If the leg's width doesn't fit, use a plane to narrow the gauge block; don't cut the shoulders of the apron. If the notch in the gauge block is too narrow, keep planing the apron; don't try to widen the notch. Make

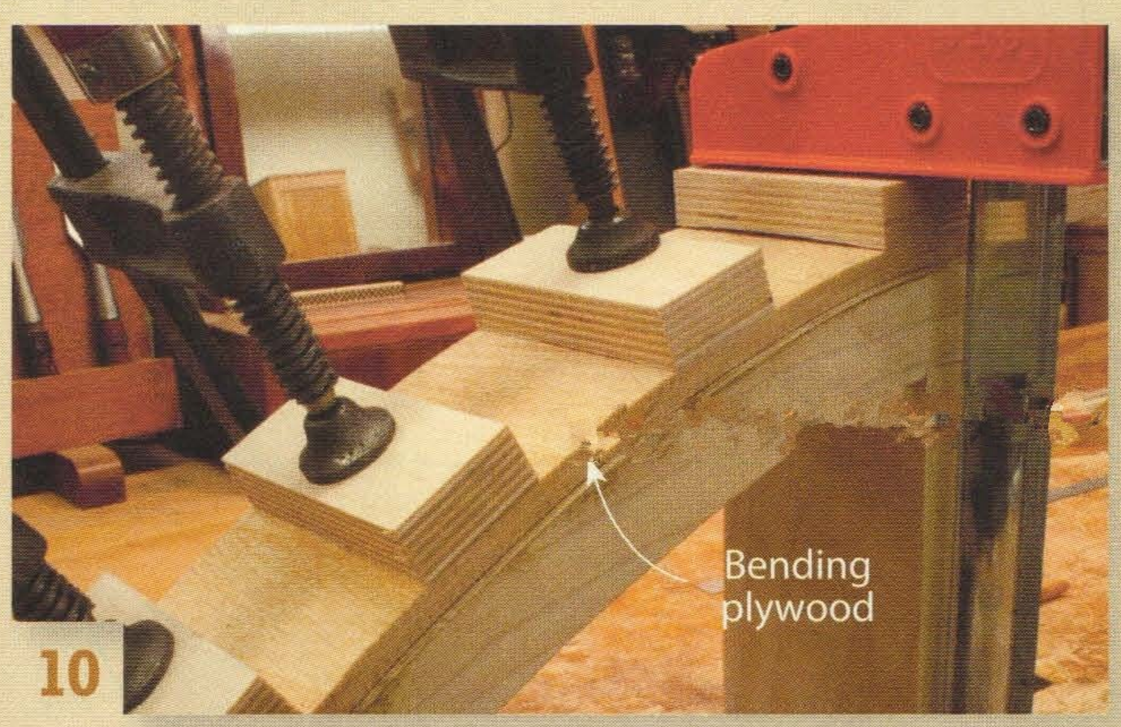


8

Cut large half-blind dovetails to join the back rail to the apron. Card tables of the Federal period were moved around a lot, so strong joinery was essential.

9

Prepare extra-thick veneer for the apron. I make it myself by gluing standard-thickness veneer (and banding) to a flat board first. Resawing this board yields extra-thick stock.



10

Glue the veneer to the apron using a caul made from bending plywood and glued-on blocks. The extra-thick veneer will form a smooth curve even if the apron has a small flat spot.

11

Trim overhanging veneer at the bridle joints. Make the legs and fit them to the apron.

sure the front overhang of the block remains correct.

Next, turn your attention to the rear fixed rail. First, measure the distance between the ends of the apron, inside face to inside face. Add the lengths of two sets of dovetails (Fig. D) to calculate the total length of the rail, then mill the rail to final size. Lay out and cut dovetails on both ends of the rail, then place the rail in position on the apron and scribe around the dovetails to lay out the sockets (**Photo 8**). Saw and chop the sockets; then glue the rail in place.

Veneer the apron

Veneering a curved surface with a complex pattern of shapes, inlays and bandings has always been a formidable challenge, but I've figured out an easy way to do it. (For complete information on this, see "Veneering on the Curve," AW #160, June/July 2012.) Here's the short version. You prepare a flat board first, then glue the various elements of the design to it, one at a time, and level them off. Then you resaw the front of the board, removing a piece about 3/32" thick. The resulting veneer is still flexible enough to bend around the apron, but thick enough to span over any slight imperfections in the apron's surface without leaving telltale depressions or shadows in the finished piece.

Start veneering the apron by applying the pieces (E) that span the front and back legs (**Photo 9**). Cut these pieces so they overhang the end of the apron and the bridle joint by about 1/8". To ensure adequate and even pressure, use a clamping belt made from bending plywood and glued-on wood blocks (**Photo 10**). Glue on the center panel (D, Fig. F) in the same way, then trim off the overhanging portions.

Make the legs

Mill all four of the table's legs, leaving them square for now. Cut notches in the two front legs, then fit them to the apron (**Photo 11**).

Cut mortises in the two back legs to receive the swinging rail ends (G, Fig. H). In addition, rout a recess in each leg so it will be able to cover the end of the apron (**Photo 12**). Square the corners of the mortises and recesses.

Saw tapers on all four legs (**Photo 13**). Each leg is tapered on two sides, but in different ways—there are two "rights" and two "lefts" (Fig. J). As you can see in the illustration, the back side of each leg is tapered. None of the front sides are tapered. The "right" and "left" orientation of the legs refers to their sides. I like to think of it this way: The sides that face the center of the table, going around the apron, are the ones that are tapered. All of this can be quite confusing, I know, so don't underestimate the need for extreme care at

Fig. G Leg, Front and Side View

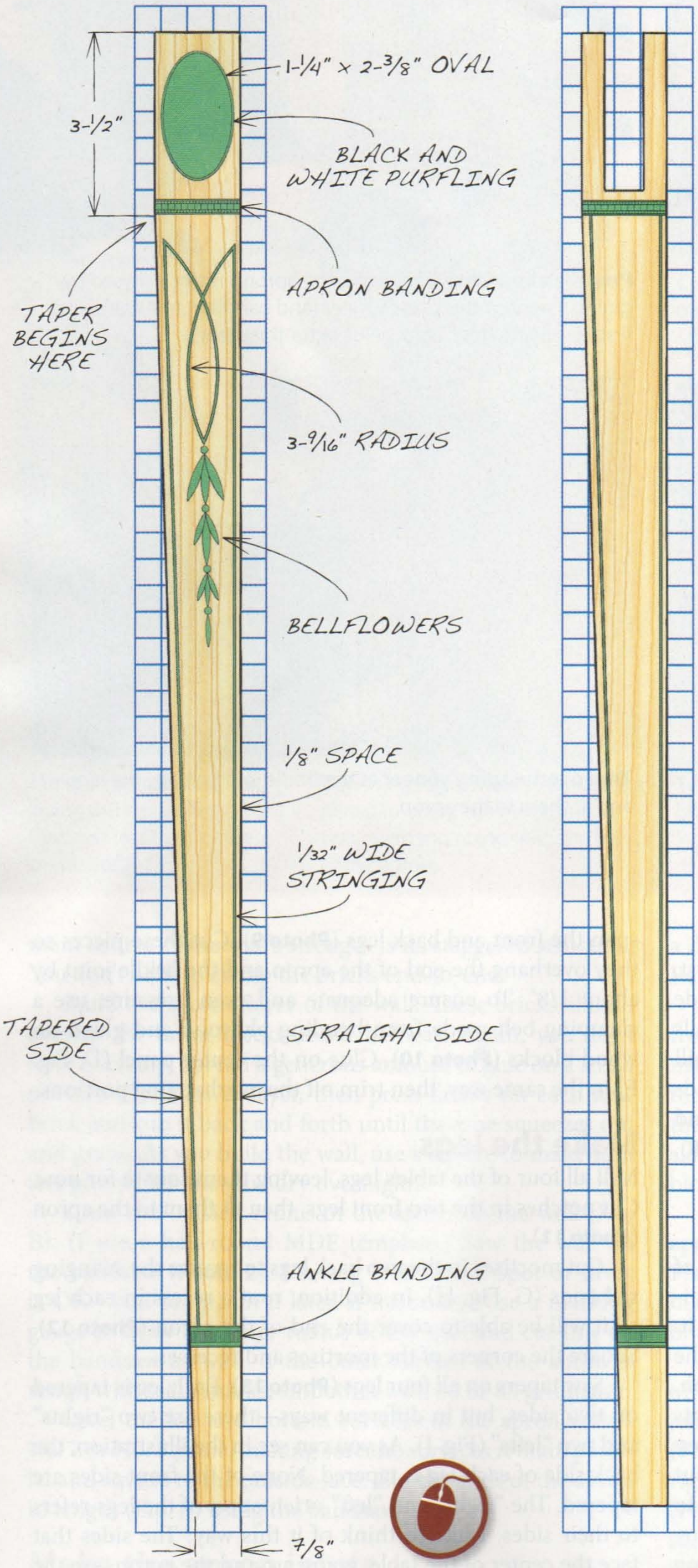


Fig. H Rear Leg Joinery

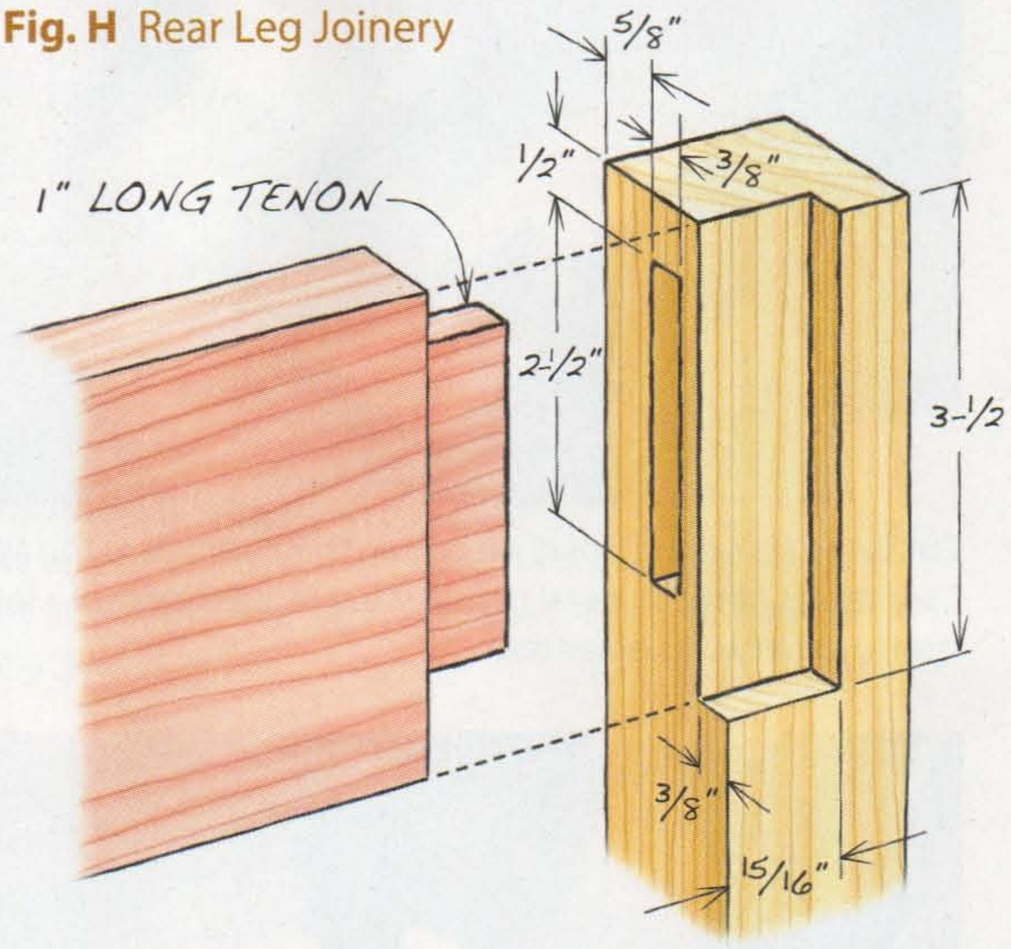


Fig. J Orientation of Leg Tapers

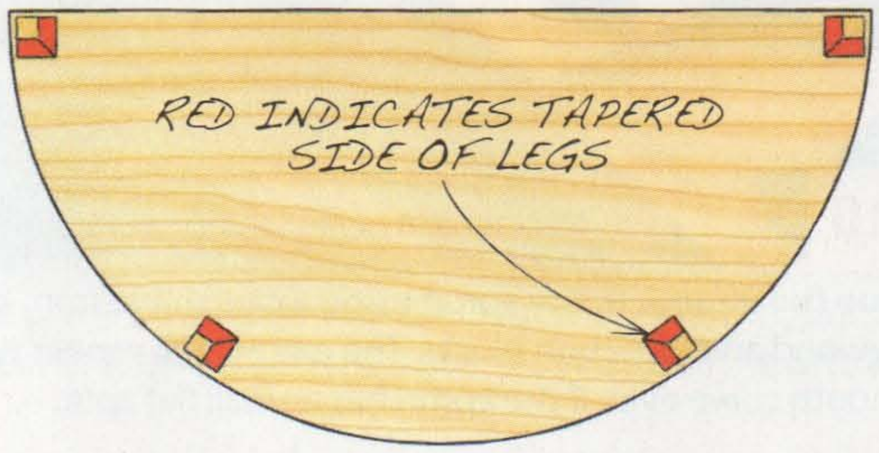
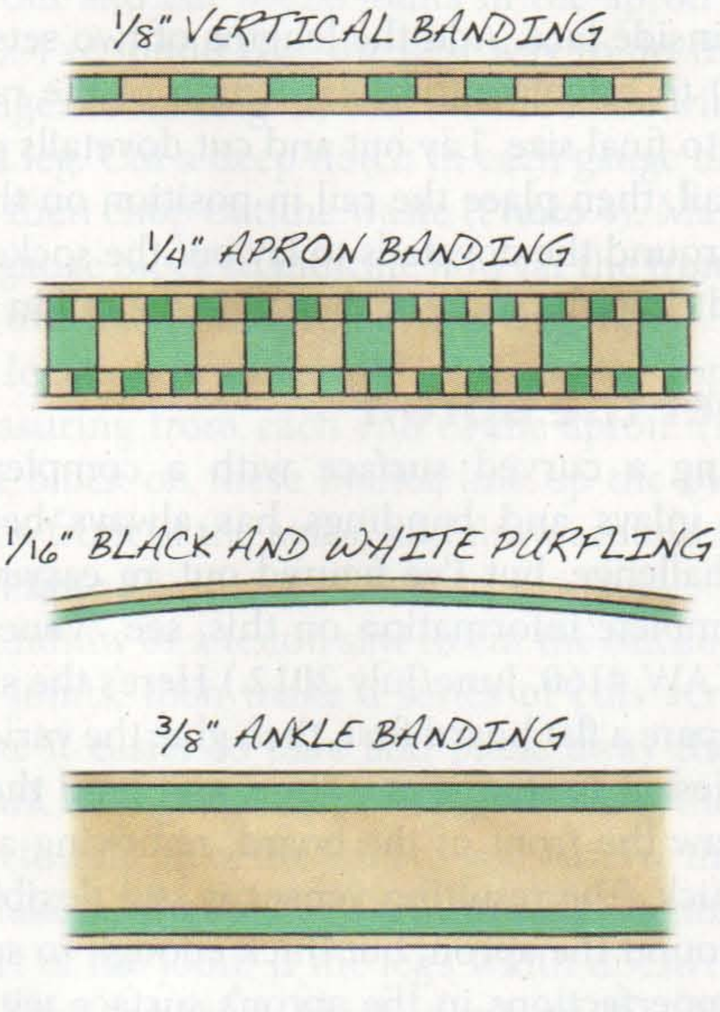


Fig. K Bandings and Purfling



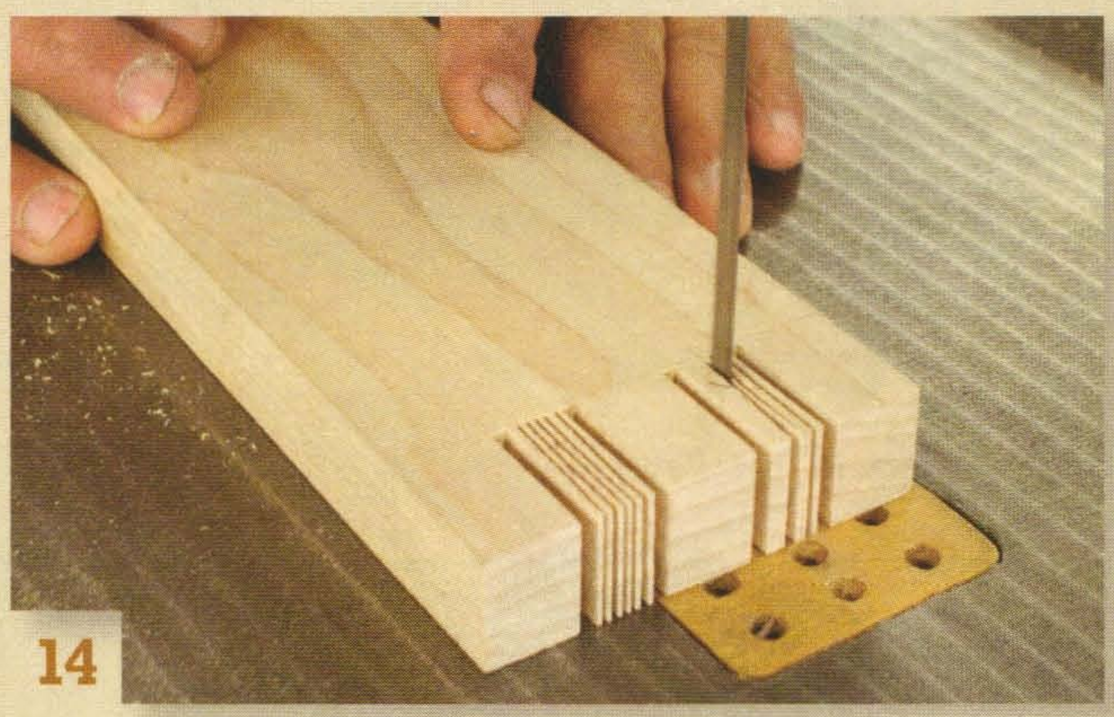
To download full-size patterns of these leg illustrations, go to **AmericanWoodworker.com/WebExtras**

12

Cut mortises in the two back legs—they'll be connected to rails that swing out from the table. These legs also require recesses in order to wrap around the apron. To rout the recesses, butt the legs together (see inset).

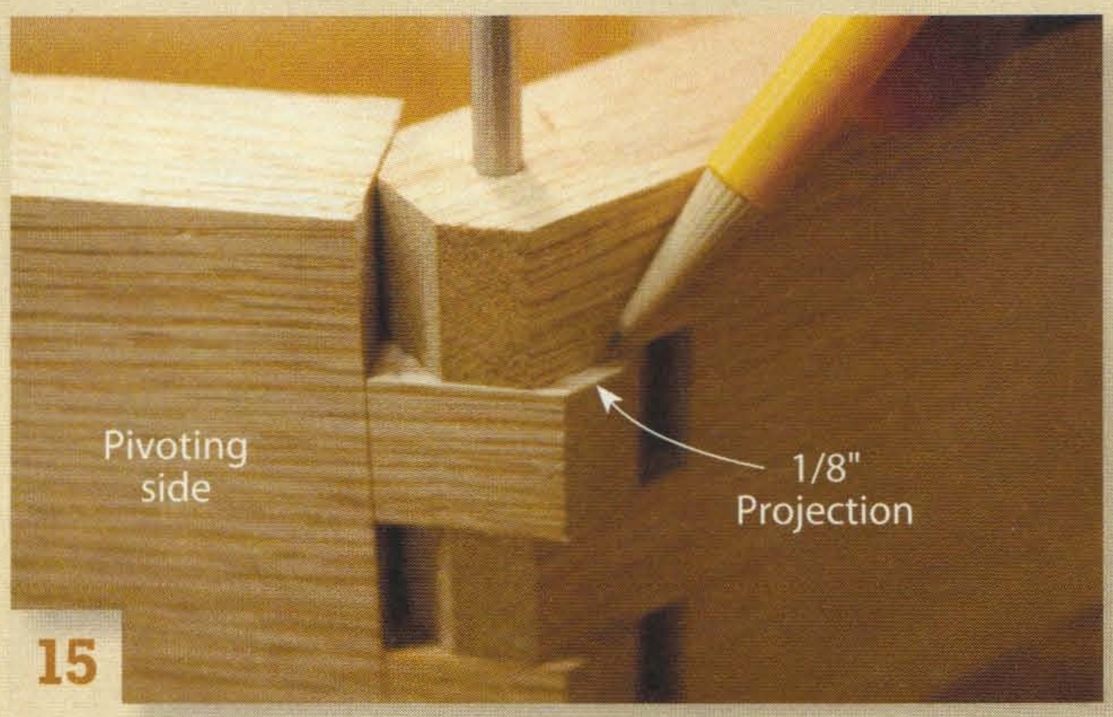
13

Taper the inside faces of all four legs. You'll also taper one side of each leg—but proceed carefully. Two legs are tapered on the left side; the other two are tapered on the right side.



14

Saw knuckle joints for the two swinging rails that are joined to the back legs. Make the outer cuts on the tablesaw. Remove most of the waste on the bandsaw, then chop out the rest.



15

The swinging rail pivots on a steel pin. The pin is positioned so that the knuckles on the pivoting side project by 1/8" when the rail is opened at 45°.

this stage. Mark your legs carefully, walk away, then come back the next day and make sure the layout is correct. Shading in the waste areas before cutting will help you visualize the correct arrangement of the tapers.

Finish the legs by adding their banding, stringing, bellflowers and inlay (Figs. G and K). (For complete information on making these elements, see "Stringing Inlay," AW #157, Dec/Jan 2012; "Bellflower Inlay," AW #158, Feb/Mar 2012; and "How to Make Banding Inlay," AW #159, April/May 2012.) Note that the ankle banding goes all the way around each leg, and that the back sides of the legs don't have any stringing or other decoration on them.

Make the swinging rail

Mill the center (F) and ends (G) of the three-part swinging rail to final thickness and width. Cut the center section to exact length, but leave the end pieces 1" extra long for now.

The knuckle joints that connect these parts allow the back legs to swing out and support the top. As you open each leg, the knuckles on the swinging rail stick out. They'll bump into a stop, limiting the amount that the leg can swing to 45°. I'll show you how this works as we go along.

First, lay out the knuckles on each piece (Fig. L). Carefully mark out what is to be removed and what will remain on each part. Make all the outside cuts for the bearing surfaces on the tablesaw, standing the pieces upright. Remove most of the remaining waste on the bandsaw (**Photo 14**), then chop to the shoulder lines. Your goal is to make a fairly tight fit between the fingers, so the legs won't swing loosely when the table is moved.

Chamfer the ends of the rails by making bevel cuts on the tablesaw. Assemble the knuckle joints and drill holes for the pivot pins (see Sources, page 47). Cut the pins extra long, to make it easier to remove them during construction, then insert them in the joints. Open the joints and make sure that the knuckles on the end rails project about 1/8" (**Photo 15**).

Next, make the stops. They're simply notches cut into the back fixed rail (Fig. C). Place the assembled swinging rail on the fixed back rail. Open each knuckle joint 45° and mark where the protruding fingers contact the fixed rail. Remove the swinging rail and plane 45° notches in the fixed back rail, using an angled board as a guide (**Photo 16**).

Place the assembled swinging rail back in position, lying flat, and note how long the end rails must be—including their tenons—so the back legs will project beyond the apron by the correct amount (Fig. C). Disassemble the swinging rail, cut the end rails to length, saw tenons on their ends and

The Complete Portsmouth Card Table Series

This article is the last installment in a 5-part series on building an American classic. In the series, I've covered how to make the stringing, bellflowers and bandings that grace this beautiful table. I have also written an article on how to veneer the table's curved apron using an innovative, new approach specifically tailored for the small-shop woodworker.

All of these articles, plus the one you're reading, are available in PDF downloads at awbookstore.com.

If you'd like to join me in a hands-on master class on building this table, visit the website of the school where I teach: PhiladelphiaFurnitureWorkshop.com

—Mario Rodriguez

Fig. L Swinging Rail and Knuckle

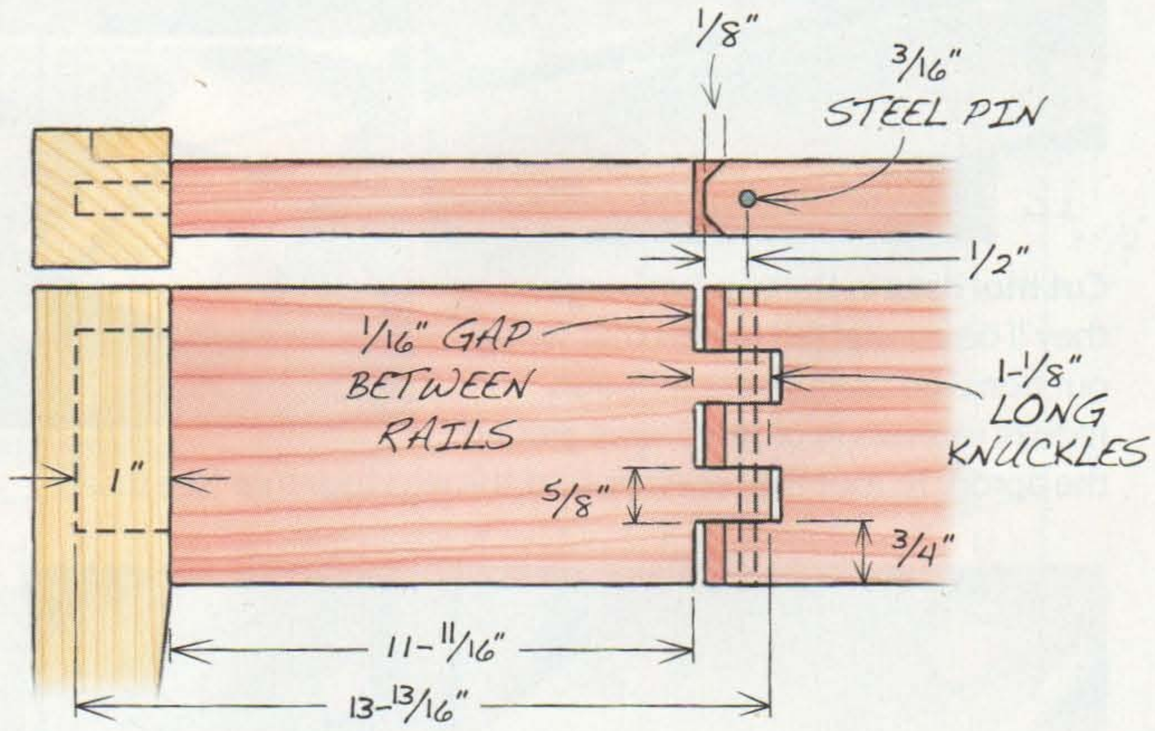
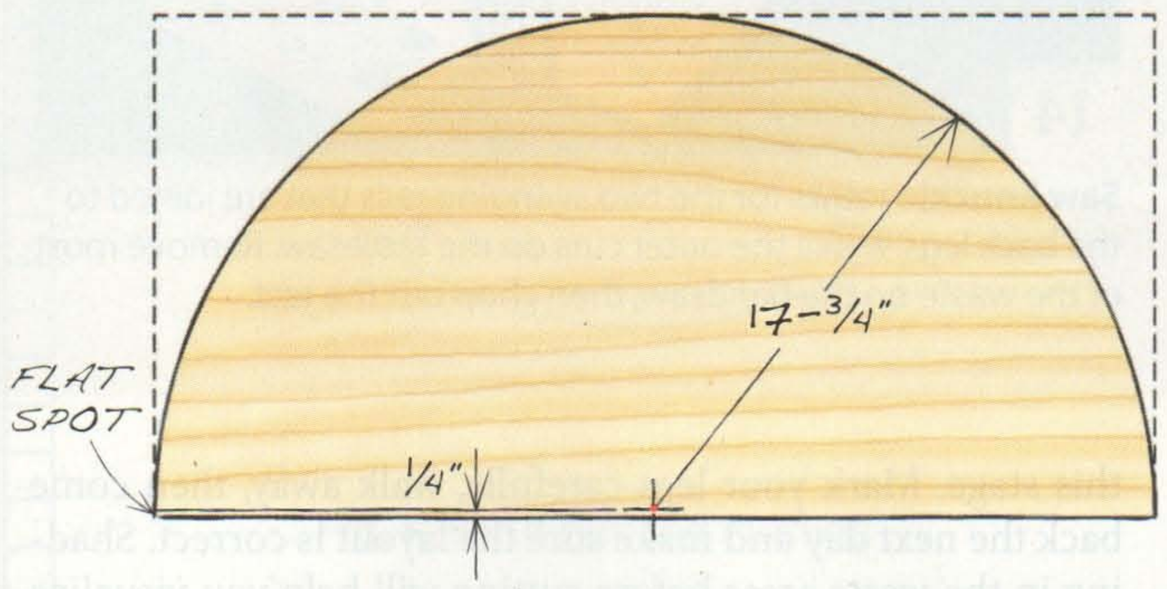


Fig. M Top Layout



Cutting List

Overall Dimensions: 29-1/2" H x 35-1/2" W x 17-3/4" D

Part	Name	Qty.	Material	Th x W x L
A	Apron brick	50	Yellow poplar	7/8" x 1-1/2" x 5-15/32" (a)
B	Rear fixed rail	1	Yellow poplar	7/8" x 3-1/2" x 33-5/16" (b)
C	Leg	4	Mahogany	1-5/8" x 1-5/8" x 28"
D	Front veneer	1		3/32" x 3-1/2" x 19" (c)
E	Side veneer	2		3/32" x 3-1/2" x 14-1/2" (c)
F	Swinging rail, center	1	Oak	7/8" x 3-1/2" x 8"
G	Swinging rail, end	2	Oak	7/8" x 3-1/2" x 13-13/16" (d)
H	Top	2	Mahogany	3/4" x 17-3/4" x 35-1/2"

Notes:
a) Quantity includes about 6 extra. Miter both ends at 9°. The apron is four layers high, for a total width of 3-1/2"
b) Includes two sets of dovetails, each 9/16" long.
c) Length is approximate.
d) Includes 1" tenon.

16

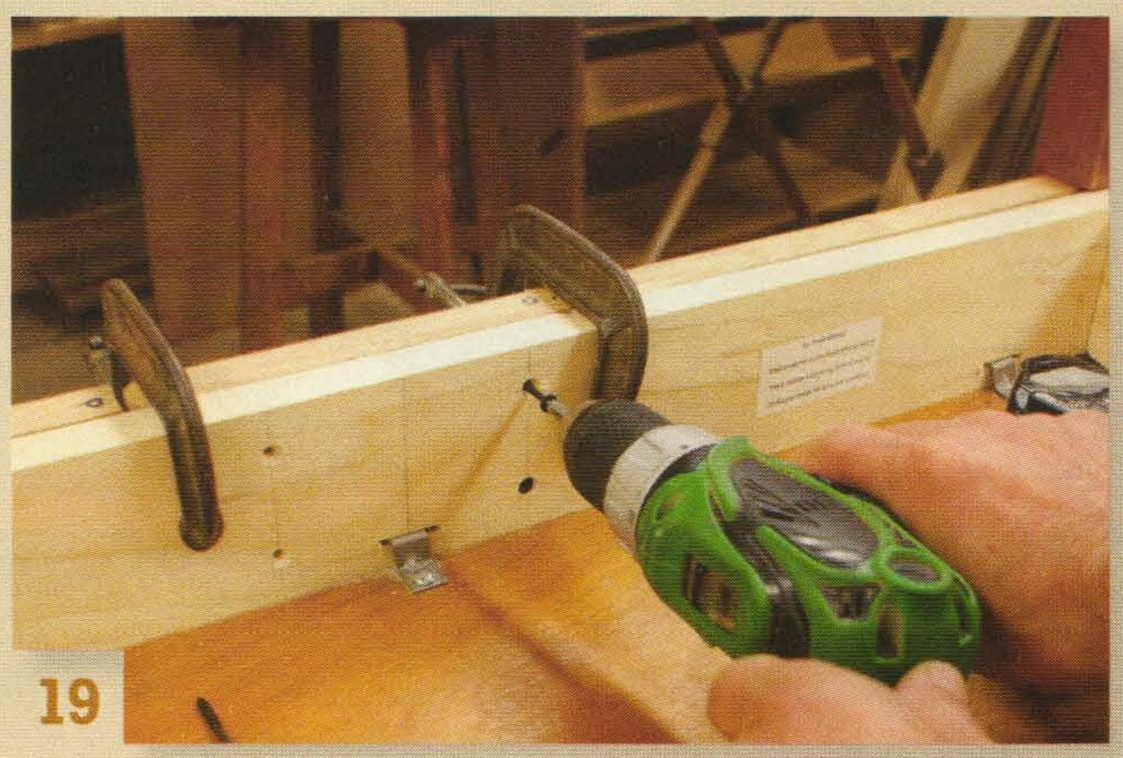
Notch the rear fixed rail opposite the point where the knuckles will stick out. This notch acts as a stop for the swinging rail.

17

Fasten the top to the base. Glue the rear legs to the swinging rail, then clamp this assembly to the table.

18

Swing out the rear legs 45° and open the top. Make sure the top lies flat on both legs. You may have to unclamp and adjust the position of the swinging rail to achieve this.



19

Once you've made any necessary adjustments, fasten the center portion of the swinging rail to the table.

glue the rails to the legs.

There's one more step: cutting rabbets on both ends of the apron to receive the back legs. Reassemble the swinging rail one more time and clamp it to the fixed back rail. Butt the back legs up to the apron and lay out the rabbets. Unclamp the swinging rail and cut the rabbets by hand.

Add the top

Make the two halves of the top (H) with identical curves (Fig. M). Glue in a small line of purfling all around the upper and lower curved edges of both pieces. Clamps aren't necessary; tape will do.

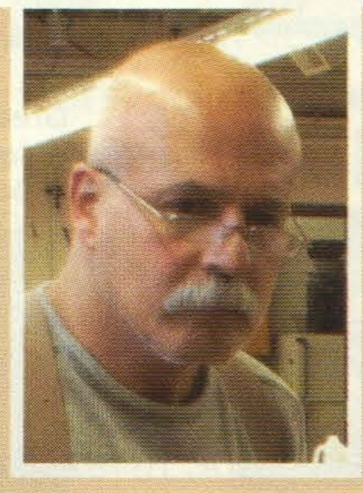
Join the halves with card table hinges (see Sources). When laying out the mortises, be sure that each hinge's knuckles protrude by 1/32". This will ensure that the two halves clear each other when the top is opened.

Rout slots along the inside edge of the apron and back rail to receive table top clips (see Sources). Clamp the swinging rail, with the back legs attached, to the back fixed rail. Fasten the top to the base (**Photo 17**).

Turn over the table and swing out the back legs. Open the top and rest it on the legs (**Photo 18**). Check that the top lies flat and contacts both legs. If there's a problem, unclamp the swinging rail and adjust its position. Once everything is good, screw the swinging rail in place (**Photo 19**). Cut the pivot pins to final length and peen over their top ends so they won't slip out some day, many years from now. Yes, this table will be treasured for that long!

SOURCES

- McMaster Carr, mcmaster.com, 330-342-6100, unhardened 3/16" drill rod, #8893K27, $2.88 for 3 ft. length.
- Horton Brasses, horton-brasses.com, 800-754-9127, Card Table Hinge, #H-53, bright brass finish, $24 per pair.
- Lee Valley, leevalley.com, 800-871-8158, Tabletop Mounting Clamps, #13K01.01, $6.50 for pkg. of 50.

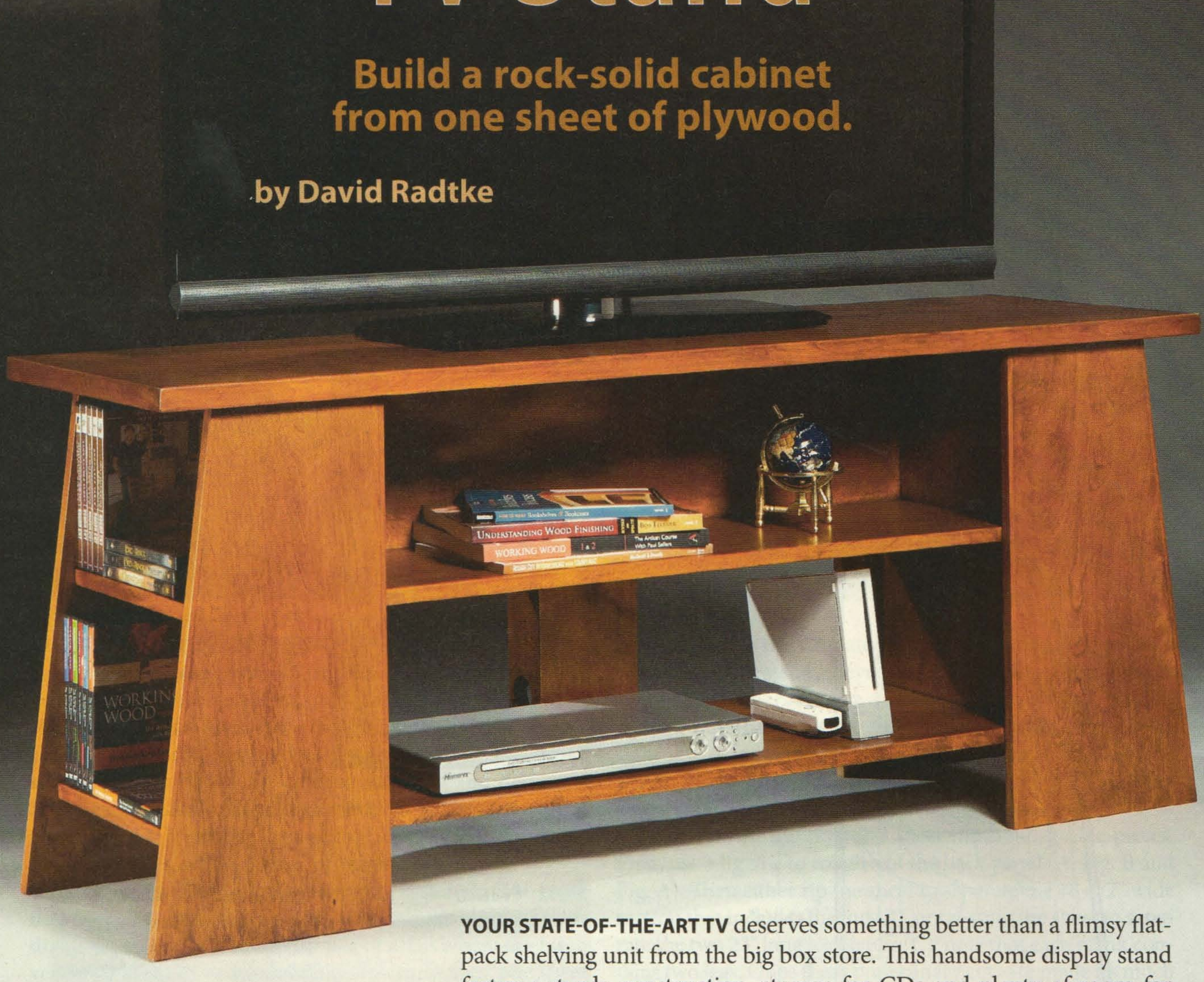


Mario Rodriguez has taught woodworking restoration in New York City, run a small school of his own in Warwick, NY, written two books and restored an 18th century farmhouse. He's now teaching at the Philadelphia Furniture Workshop, www.philadelphiafurnitureworkshop.org.

Contemporary TV Stand

Build a rock-solid cabinet from one sheet of plywood.

by David Radtke

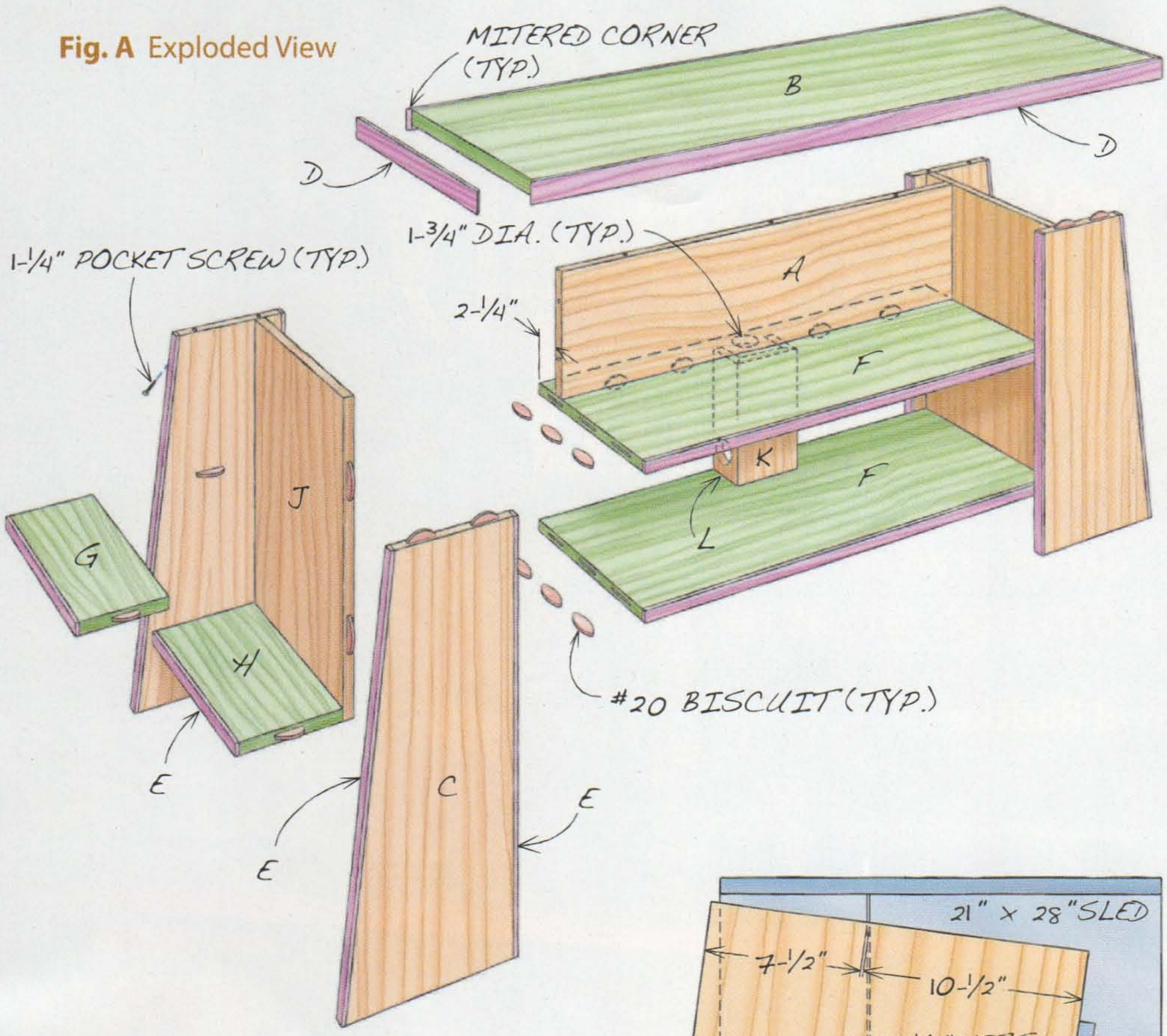


EDITOR: TIM JOHNSON | PHOTOGRAPHY: JASON ZENTNER | ILLUSTRATION: JASON POLEDNIAK

YOUR STATE-OF-THE-ART TV deserves something better than a flimsy flat-pack shelving unit from the big box store. This handsome display stand features sturdy construction, storage for CDs and plenty of room for cable, gaming and sound-system components. It's even designed to hide the cord clutter that's inevitable when you connect everything together. You can build it in a couple weekends using basic shop tools and a single sheet of plywood. If you use birch plywood from the home center, as we did, you can build this cabinet for less than most flat-backs will cost.

The finishing touch is a wipe-on finish that makes birch plywood—even budget-priced birch plywood—look rich and sumptuous. Professional finisher Kevin Southwick explains how to create that look in "Cherry Finish for Birch Plywood" (see page 54).

Fig. A Exploded View



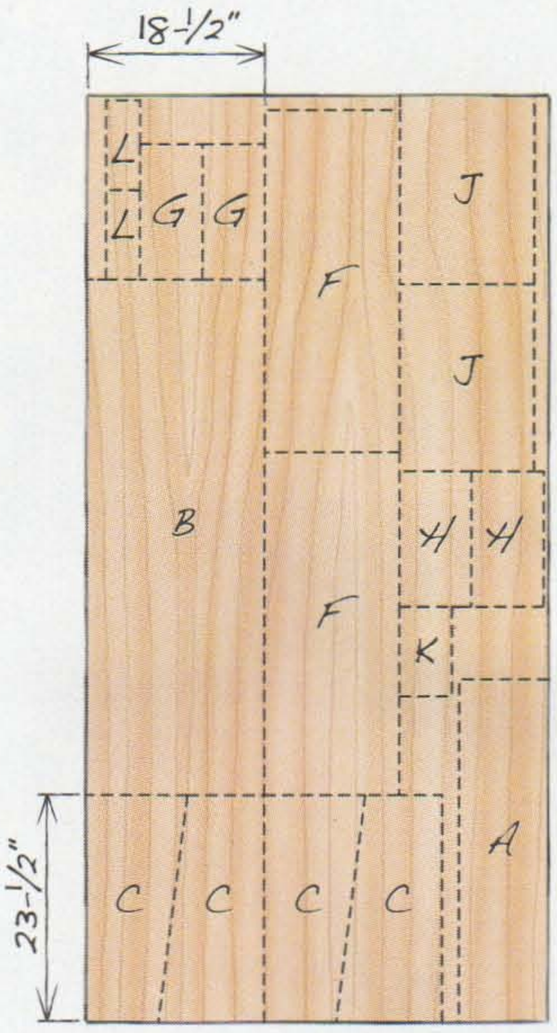


Fig. B Plywood Cutting Diagram

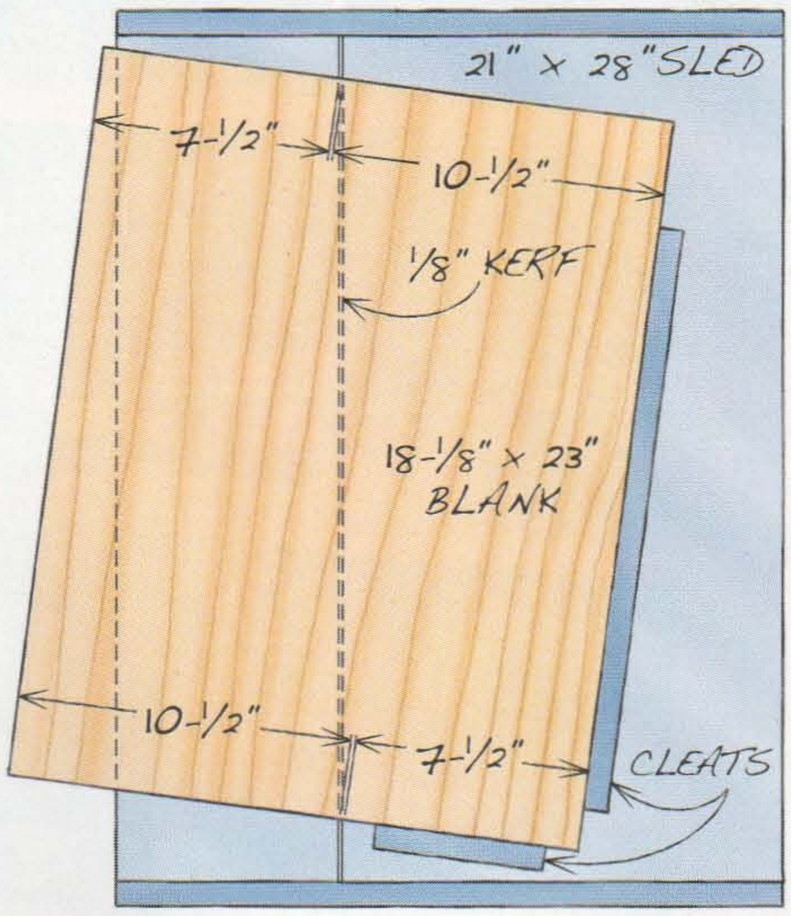
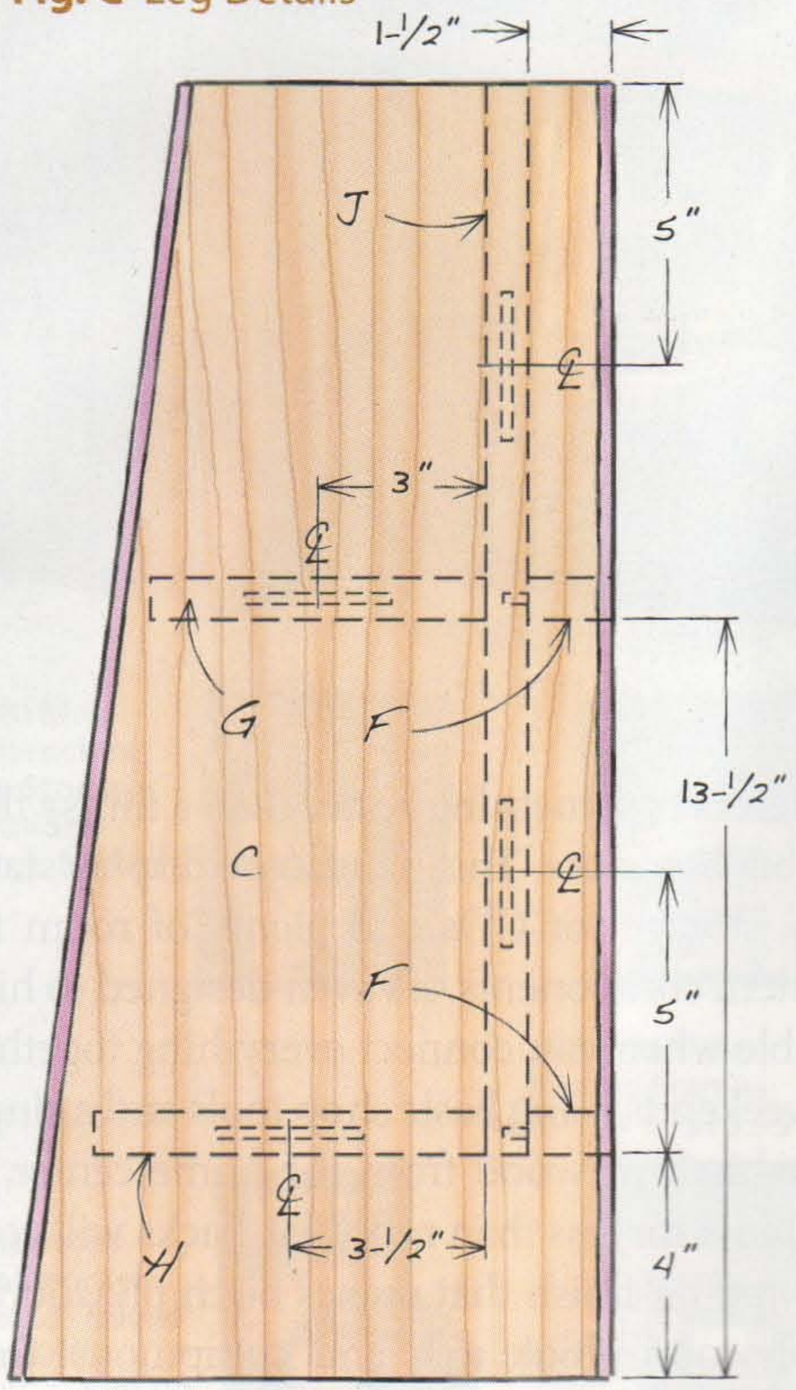


Fig. D B Leg Tapering Set-up

Fig. C Leg Details

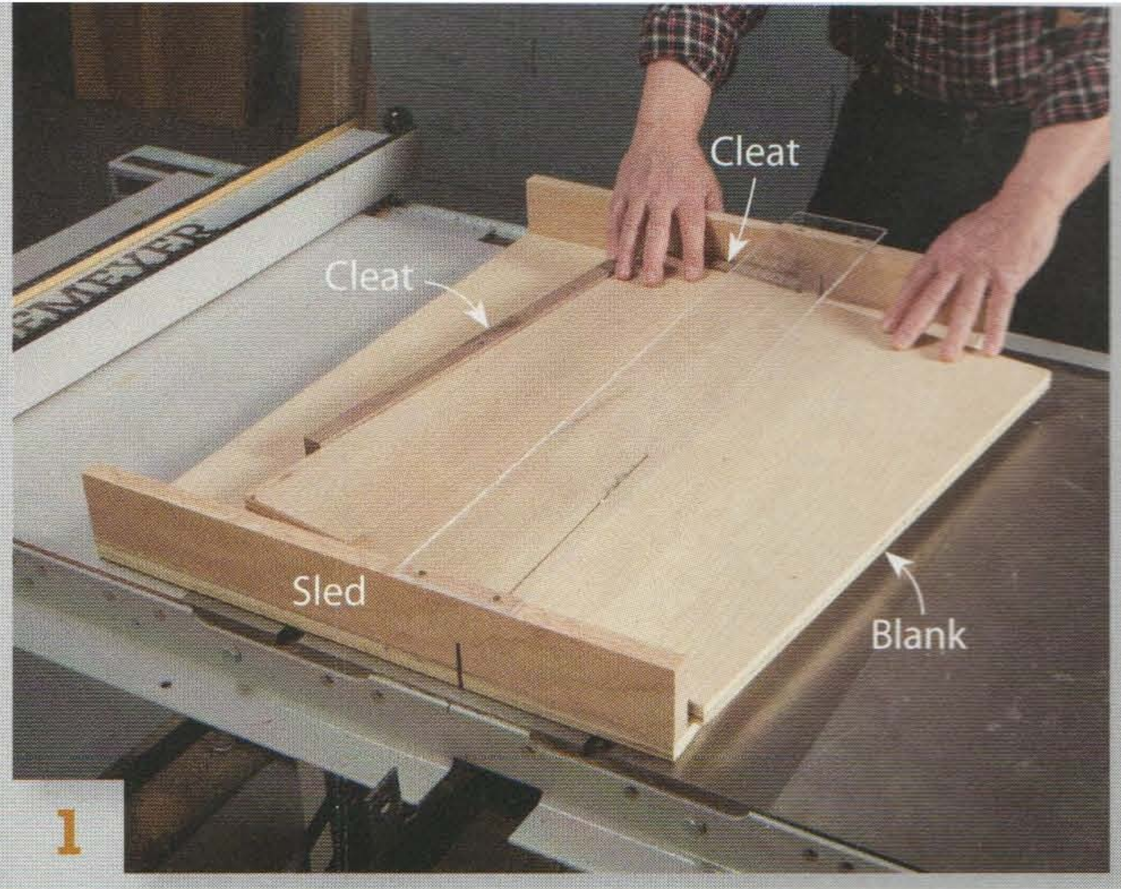


Cutting List

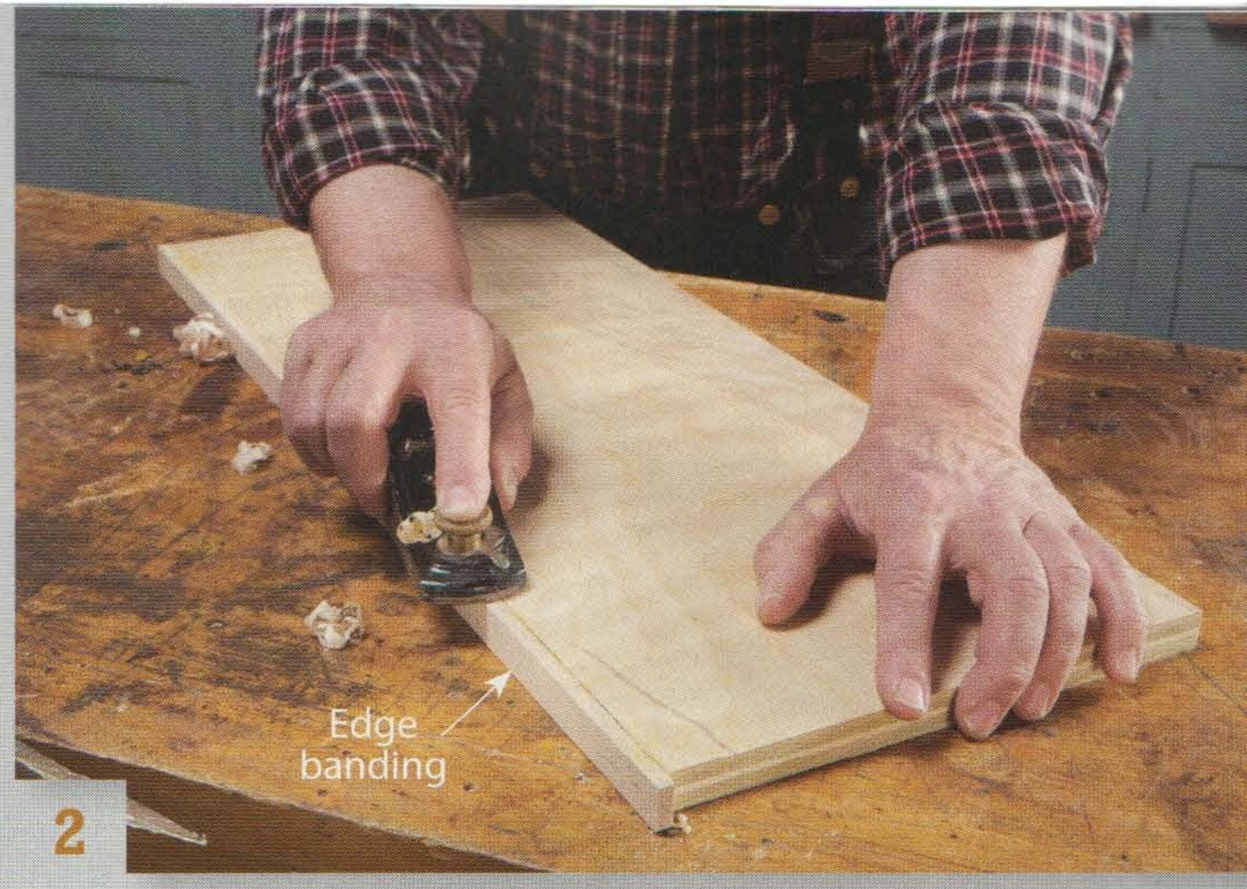
Overall Dimensions: 23-3/4" H x 53-1/2" W x 17" D

Part	Name	Qty.	Material	Th x W x L
A	Back Panel	1	Birch plywood	3/4" x 8-25/32" x 35"
B	Top	1	Birch plywood	3/4" x 16-1/2" x 53"
C	Leg	4	Birch plywood	3/4" x 10-1/2" x 23" (a)
D	Wide edge banding	2	Birch	1/4" x 1" x 84" (b)
E	Narrow edge banding	4	Birch	1/4" x 3/4" x 96" (b)
F	Center shelf	2	Birch plywood	3/4" x 13-1/4" x 35"
G	Top end shelf	2	Birch plywood	3/4" x 6" x 13-1/2"
H	Bottom end shelf	2	Birch plywood	3/4" x 7" x 13-1/2"
J	End panel	2	Birch plywood	3/4" x 13-1/2" x 19"
K	Chase center	1	Birch plywood	3/4" x 5" x 8-3/4" (c)
L	Chase side	2	Birch plywood	3/4" x 3" x 8-3/4" (d)

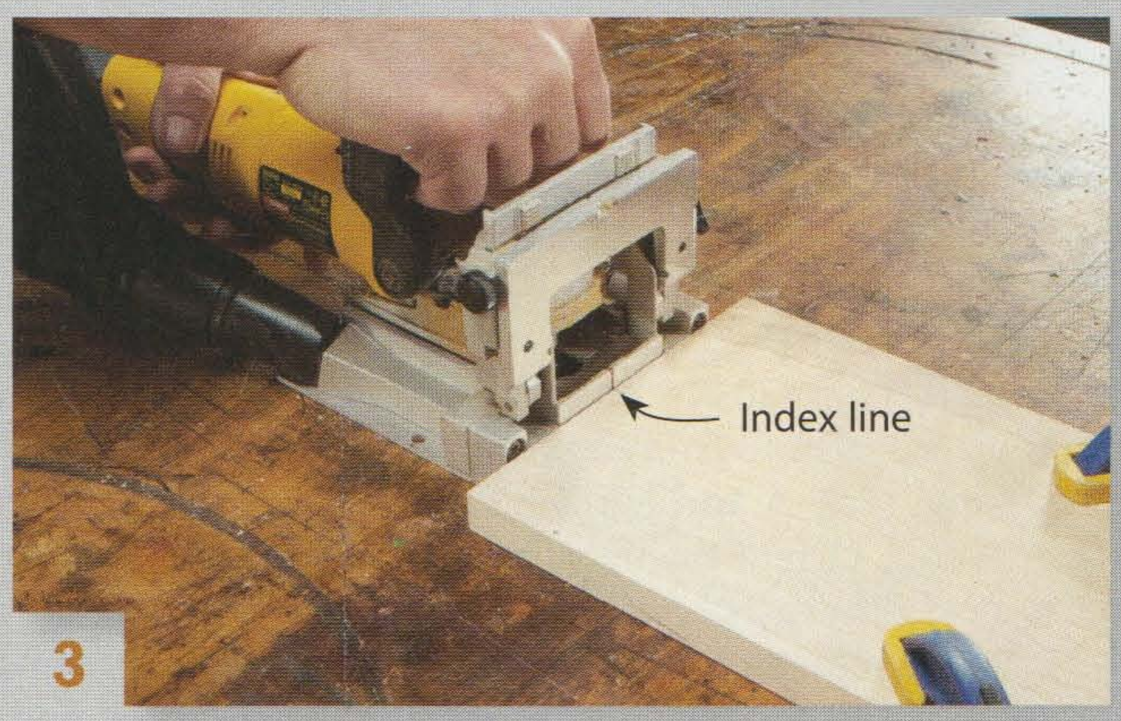
Notes:
a) Leg tapers to 7-1/2" at top. Cut two tapered legs from one 18-1/8" x 23" blank.
b) Cut length to fit.
c) Both edges mitered.
d) One edge mitered.



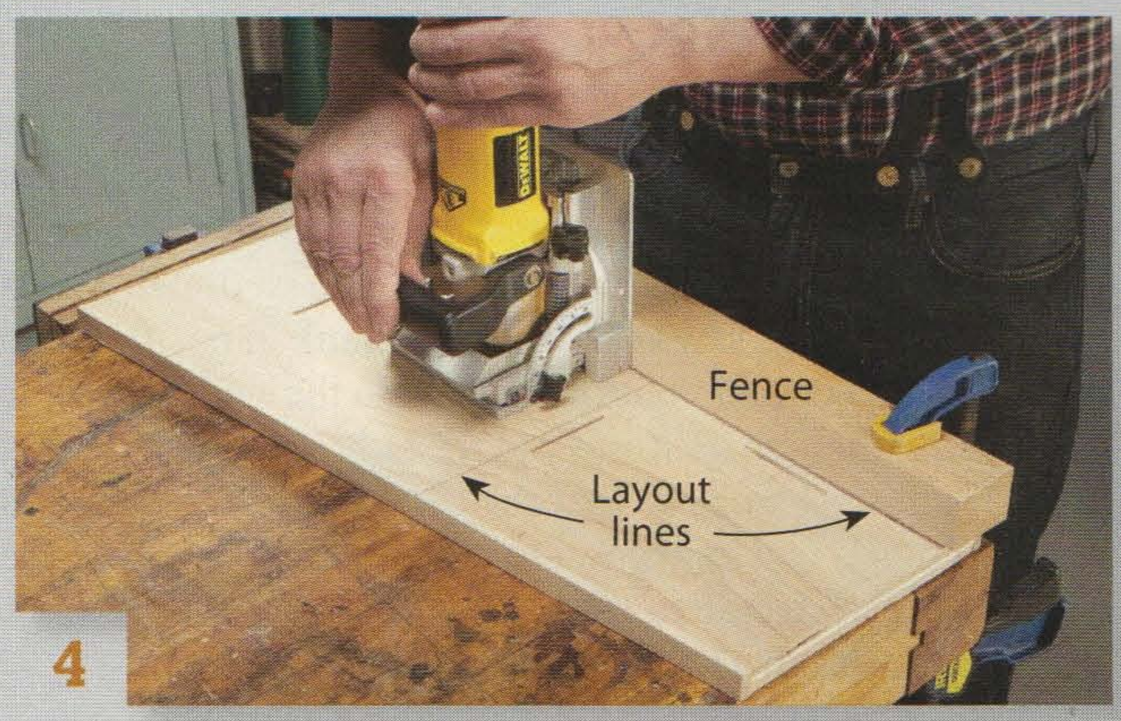
Cut two tapered legs at once using a sled with cleats attached to hold the blank at an angle. Runners attached to the bottom of the sled ride in the saw's miter gauge slots.



Plane the edge banding nearly flush with a block plane. Then finish the job by hand sanding with a block. Power-sanding is risky because the veneer is so thin.



Use the bench to register the biscuit joiner when you cut slots for biscuits in the ends of parts such as the shelf shown here. Center each biscuit using the joiner's index line.



Use a fence to register the biscuit joiner when you cut slots in the faces of parts such as the leg shown here. Position the fence on a layout line that indicates the bottom of the adjoining piece.

Home center plywood

Home center birch plywood isn't likely to win any awards, because it's a lower grade product than the birch plywood sold at hardwood lumberyards. The face veneers on home center plywood are usually very thin and they almost always contain both light-colored sapwood and dark-colored heartwood. Grain patterns and figure can vary widely, even on the same sheet. Try to avoid sheets with significant color contrasts, wild grain or pronounced figure.

Some sheets may contain substrate materials that aren't flat. Eyeball each sheet at a low angle and avoid sheets with divots or depressions in the surface or areas where the birch veneer appears to be sanded thin. You only need one sheet of 3/4" birch plywood for this project, so if you can't find a sheet you like, try another store or come back another day.

As far as purchasing solid birch for edge banding the plywood, it's a puzzle why home centers that stock birch plywood don't always stock birch boards. I didn't want to use iron-on edge banding, so I had to go to a hardwood lumberyard to buy the birch.

Cut the tapered legs

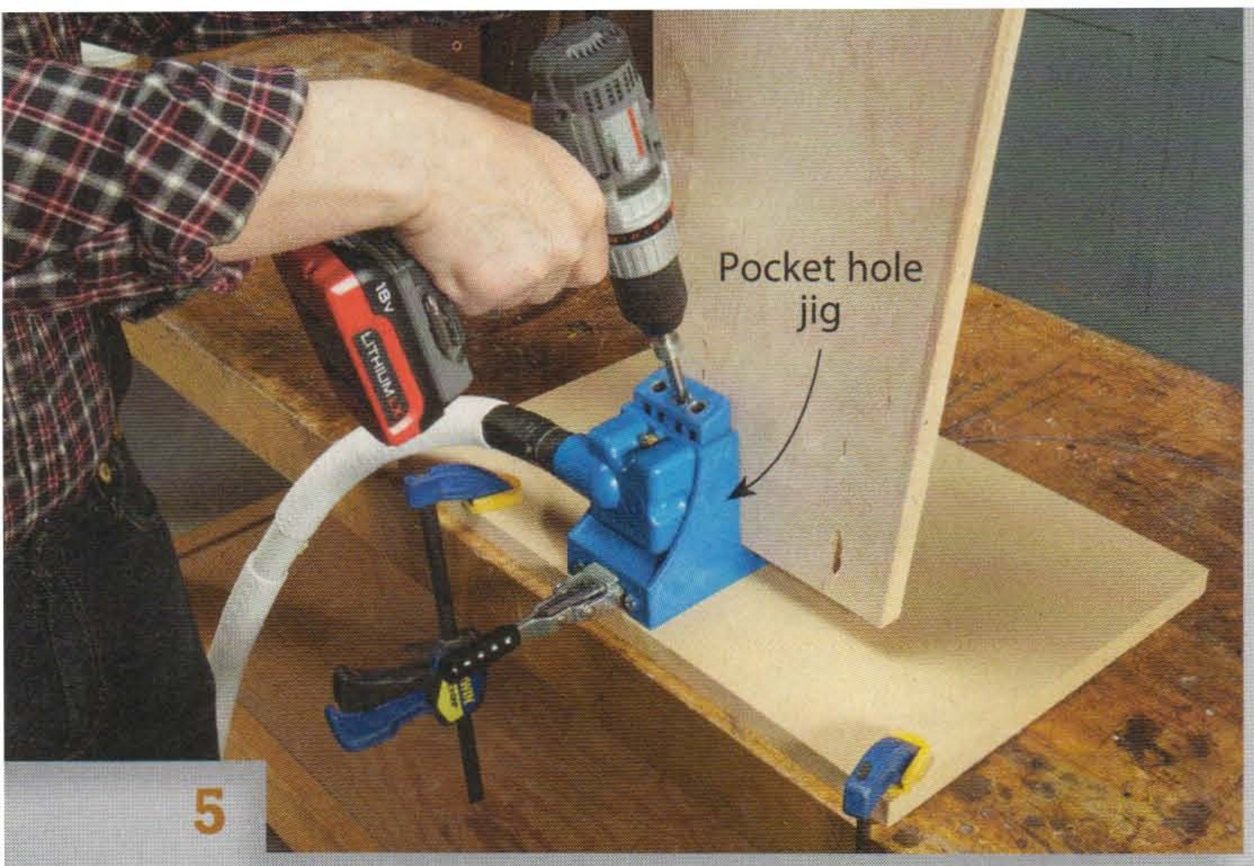
The veneer on home center plywood is prone to chipping, so before you cut the sheet, it's a good idea to install a zero-clearance throat plate in your tablesaw along with an 80-tooth alternate top bevel (ATB) blade designed for cutting plywood.

Lay out the parts on the plywood according to the cutting list (page 50) and cutting diagram (Fig. B, same page). Note: Oversize the parts by 1/2" in both dimensions when you lay them out.

Break down the plywood sheet into manageable pieces. First, use a jig saw to rough-cut the back panel (A, Fig. B and Fig. A). Then either rip the sheet to separate the 18-1/2" wide section that includes the top (B), or crosscut the sheet to separate the two 23" long leg blanks (C); note that each blank contains two legs. Once these preliminary cuts are made it's much easier to cut all the pieces to final size.

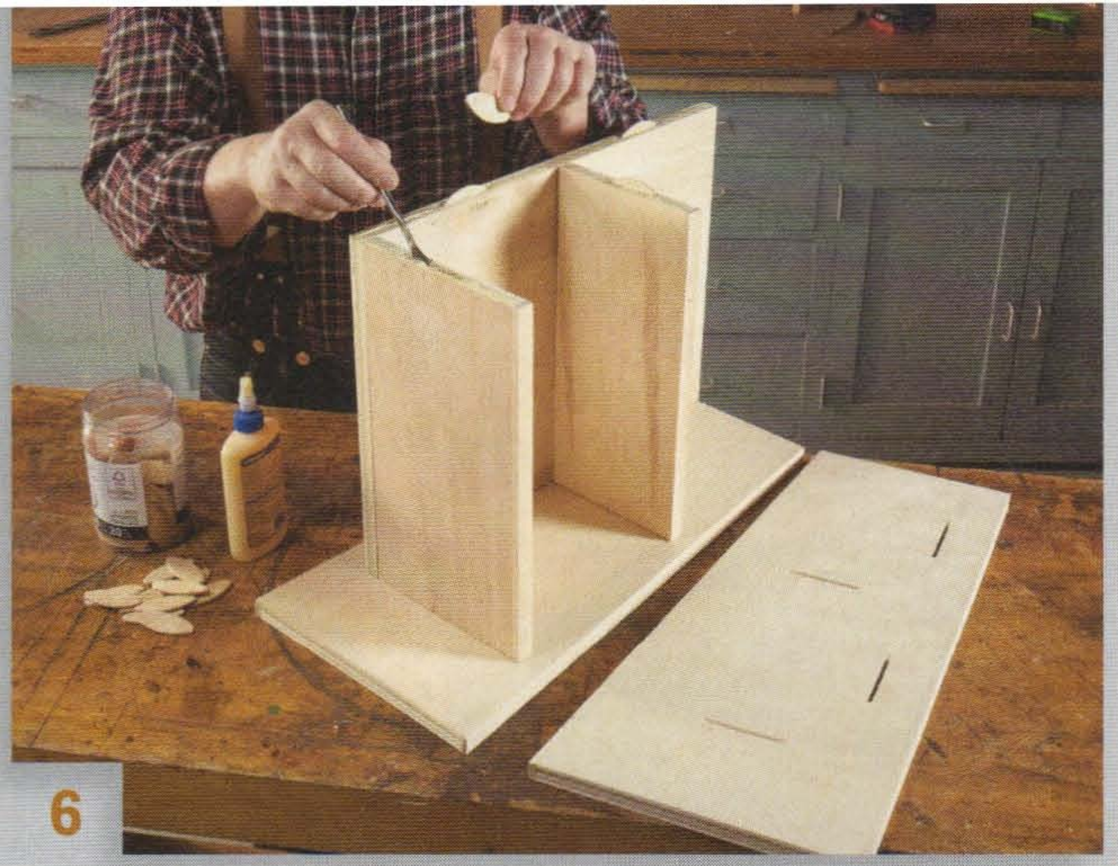
Rip the two leg blanks 18-1/8" wide. Then use a crosscut sled to cut each blank into two identical tapered legs (**Photo 1**). Fasten a pair of cleats to the sled to hold the blank at the correct angle (Fig. D).

Learn more about biscuit joinery at
AmericanWoodworker.com/WebExtras



5

Drill pocket holes in the back legs and the back panel. Using both pocket screws and biscuits simplifies assembly.



6

Assemble the bookshelf ends with biscuits and glue. Work on a flat surface and make sure the glued-up assembly is square.

You don't need to measure any angles—just mark the legs' 7-1/2" top and 10-1/2" bottom measurements onto the ends of the blank. Place the blank on the sled and align the 1/8" spaces between the two lines you've drawn on its ends with the sled's saw kerf. Hold the blank in position and trace its right edge and bottom edge onto the sled. Screw the cleats along these marks, and you're ready to cut the tapered legs. Orient the blanks so that the front faces of the left and right front legs will look good together. Pay attention to the grain: You may decide to cut one of the blanks with its back face up, because that's the best-looking face.

Edge band the plywood

Rip lengths of wide edge banding (D) for the top and narrow edge banding (E) for the legs, center shelves (F) and top and bottom end shelves (G, H). Spread a generous bead of glue on each plywood edge and spread it evenly. Center the edge banding on the plywood and stretch tape across the joint to hold the edge banding in position for a couple minutes to allow the glue to tack. Then clamp the joint, using a caul to evenly distribute the pressure.

Tip▶ Here's a neat trick: After gluing and taping the edge band to one shelf, use another shelf of the same length as the clamping caul. This trick works for the tapered legs, too.

Be sure to remove all the squeezed-out glue before it dries. For a neat, finished appearance, I glued the top's 1" edge banding all around and mitered the corners.

Trim the edge banding flush with the ends of each piece. Then use a block plane to flush the edge banding with the plywood faces (**Photo 2**). Set the plane to make fine shavings and follow the grain. It's OK to sand the faces of the edge banding with a random orbital sander, but it's best to sand the plywood by hand, using a sanding block.

Learn more about pocket hole joinery at
AmericanWoodworker.com/WebExtras

It's a good idea to plane and sand a test shelf to get a feel for the limits posed by the super-thin birch veneer on this low-cost plywood.

Easy joinery

Lay out slots for #20 biscuits in the ends of all the shelves, the top ends of both front legs and the bottom edge of the back panel (Fig. A and Fig. C). Center the slots or space them evenly. Orient the biscuit joiner horizontally to cut these slots (**Photo 3**).

Lay out matching slots in the top face of one center shelf and in the inside faces of each leg and both end panels (J). Note that on the end panels, the center shelves mount directly opposite the end shelves, but only the center shelves are biscuited. Draw lines that indicate the bottom of each adjoining piece. Then clamp a fence on the line and orient the biscuit joiner vertically to cut these slots (**Photo 4**). The fence registers the biscuit joiner so that these slots will align with the ones already cut in the ends of the other pieces. To cut the slots in the end panel for the bottom center shelf, simply clamp the fence to the end of the end panel.

Lay out and drill pocket holes in the back faces of the back legs and back panel, using a jig (**Photo 5** and Sources, page 53). Set up the jig to assemble 3/4" stock with 1-1/4" coarse-thread pocket screws.

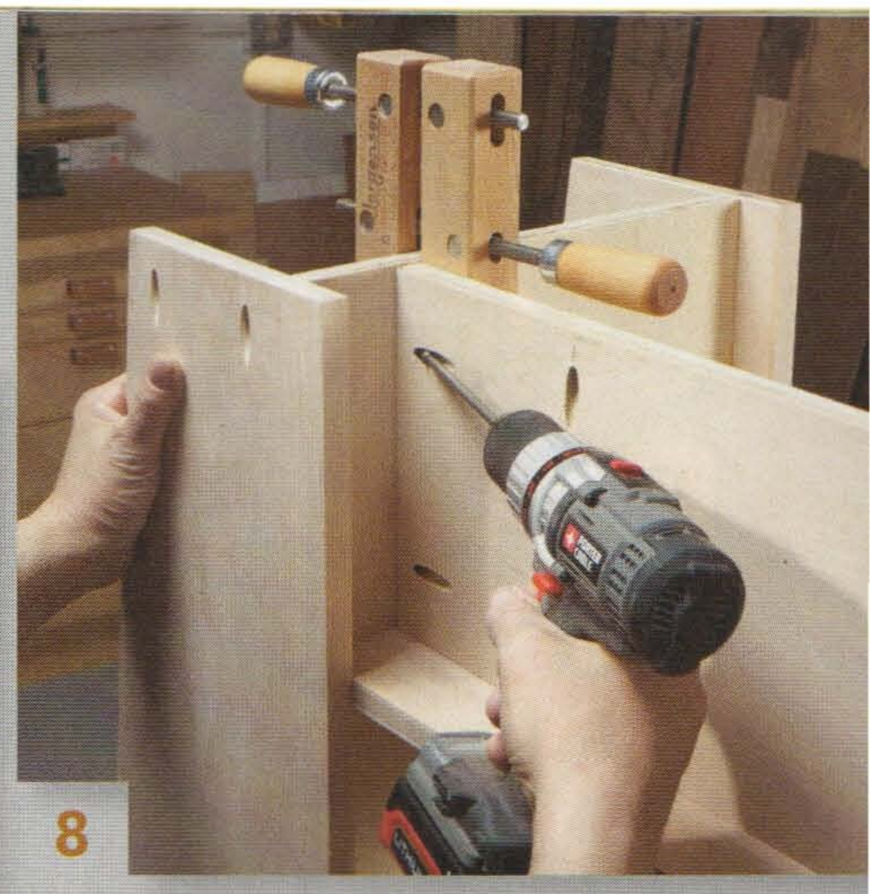
Assemble in stages

Start by gluing together the two bookshelf ends (**Photo 6**). Sand all the parts by hand, using a block. Start with 120 grit sandpaper, then switch to 150 grit for final sanding. Be careful not to sand through the veneer. Remove any layout lines that won't be covered by the joints.

Working on a flat surface, dry-assemble the parts to make sure everything fits properly. Then use a flux brush (available at hardware stores) to spread glue into the slots and on the plywood edges. Position the back panel first, flush with with the leg at the top and the layout line at the back. Then install the shelves, followed by the remaining leg.

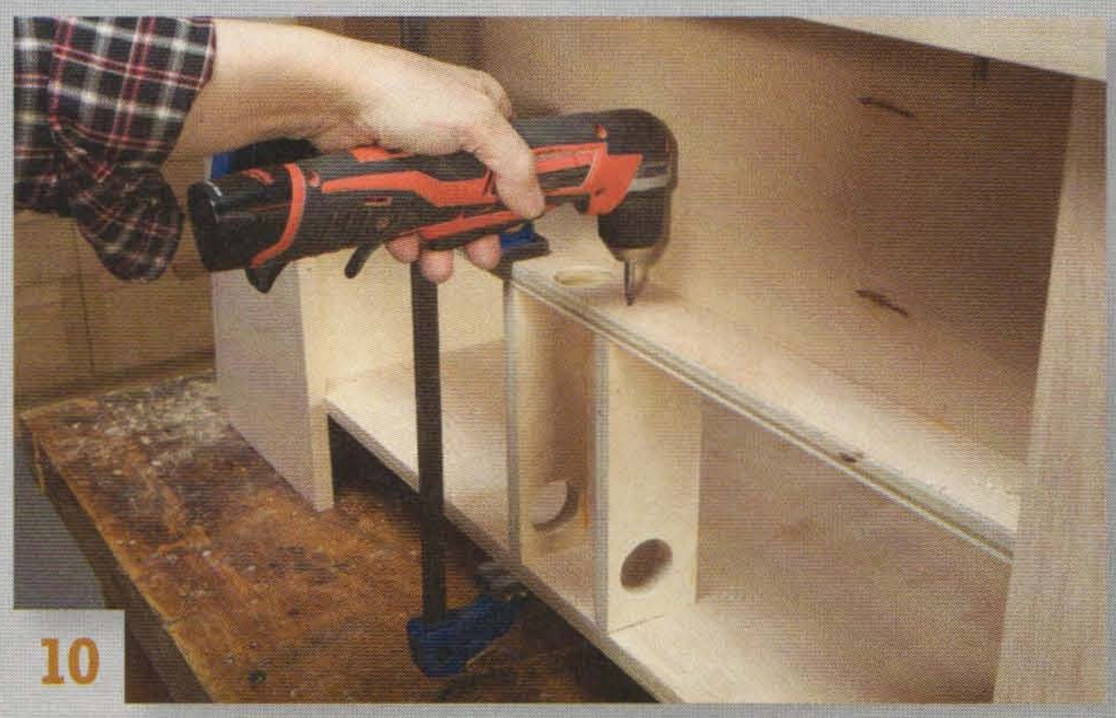
Stand up the assembly to clamp it together. Make sure everything is straight and square and remove any squeezed-out glue before it dries. Note: You'll be able to

Glue and clamp the shelves between the ends. You can use short clamps to complete this job by clamping 2x2s to the lower shelf (photo, at right).



Pocket-screw the back panel to the end panels to keep the base from racking. Use a clamp to back up the glued butt joint.

Install the top. Glue and clamp the biscuit joints at the front and install pocket screws at the back. This method hides the joinery at the front and eases the assembly in back.



Fasten the cord chase after centering it on the hole in the upper shelf. The chase and the recess behind the back panel make it easy to hide all the power cords.

clamp the bottom shelf to the back panel, but not the top shelf. Use a couple pin nails to secure it.

Drill a 1-3/4" dia. hole in the upper center shelf, 1-1/4" from the back edge and centered between the ends. Finish-sand this shelf and the back panel and then assemble these parts using biscuits and glue. Make sure the ends remain flush when you clamp the joint. Finish-sand the lower center shelf.

Glue the center shelves between the bookcase ends (**Photo 7**). This large assembly can be hard to manage, so it's a good idea to enlist an assistant to help apply glue, install biscuits, align the parts, position the clamps and remove the squeezed-out glue. Fasten the back panel to the end panels to stabilize the base (**Photo 8**).

Locate and cut the biscuit slots on the underside of the top. You can flip over the base and center it on the top to transfer the slot locations, but there's an easier way: Inside the edge banding, the top overhangs the base by 3/4" at the front. That means all you have to do to properly register the biscuit joiner is install a 3/4" wide fence against the front edge banding. Similarly, the top overhangs the base at both ends by 2-1/2". So, just measure the slot center locations in the top of each leg and add the 2-1/2" overhang to transfer them to the top.

Install the top. Apply glue in the slots and to the ends of all the legs and both end panels. Insert the biscuits, position the top and clamp it at the front, using the underside of your bench. Then anchor the back of the top with pocket screws (**Photo 9**).

Assemble and glue the mitered cord chase (K, L) after drilling 1-3/4" dia. holes in both of the side pieces. Then fasten it between the center shelves (**Photo 10**). Install grommets for a finished appearance (see Sources).

SOURCES

- Kreg Tool Company, kregtools.com, 800-447-8638, Kreg Pocket Screw Jig, #K4, $99.99.
- Rockler Woodworking and Hardware, rockler.com, 800-279-4441, Standard Plastic Grommet, #91108, $4.69 each (3 required).

David Radtke is a woodworker, custom cabinetmaker, freelance editor and design consultant living in Minneapolis, MN. See more of David's work at **www.davidradtkedesign.com**

Cherry Finish for Birch Plywood

Achieve rich, warm color without blotching in 4 easy steps.

by Kevin Southwick

IF YOU'VE EVER stained birch plywood a dark color, the results were probably so blotchy and difficult to reverse that you vowed, "Never again!" Which is too bad, because if you could stain birch plywood a deep, reddish-brown color so it looked like cherry plywood, you could save a bundle on materials for your next project.

Here's why you should never say "never." I'm going to show you how to give birch plywood a rich, warm color that resembles cherry. This process effectively blends the dark-colored heartwood and light-colored sapwood that typically appears on most grades of birch plywood. It even works on the budget-priced grades you'll find at home centers (see "Contemporary TV Stand," page 49). This process also blends solid wood edge banding with the plywood's veneered surfaces. It uses readily available finishing products and it doesn't require any special finishing equipment—you won't even need a brush!

Baby steps

Creating a deep, uniform tone on birch plywood is a real challenge. Using regular dark-colored liquid oil-based cherry stains or dyes will result in unsightly blotching and/or a harsh unnatural color. Moreover, using stain or dye alone will not help blend the wood's light and dark colors. Even gel stains (which are sometimes touted as "blotch-reducing" because they don't soak in quite as much as liquid stains or dyes) work only a little better to meet these challenges.

Nonetheless, a more traditional cherry look can be achieved with a good plan and a little extra care. The best way to accomplish this is to deepen the color gradually, using a series of steps that are designed to minimize the risk of blotching. Each step also helps blend color differences between dark heartwood and light sapwood and also between birch veneer and solid birch edge banding.

Sand carefully

Sand the plywood and edge banding to 150 grit. The final sanding should be by hand to ensure no machine marks. On some grades of birch plywood the veneers are super-thin and the surfaces aren't perfectly flat, so be careful. It can be easy to sand through the veneer, especially when you're flushing up the edge banding.

Step 1

Mix two teaspoons of TransTint Golden Brown dye in 32 ounces of water (see Sources, page 55). When applied to the bare wood, this diluted golden tone provides a warm ground color without causing noticeable blotching. Blotching becomes more noticeable with dark-colored stains or dyes, so you shouldn't use them for this step. In order to minimize blotching, you have to deepen the color gradually.

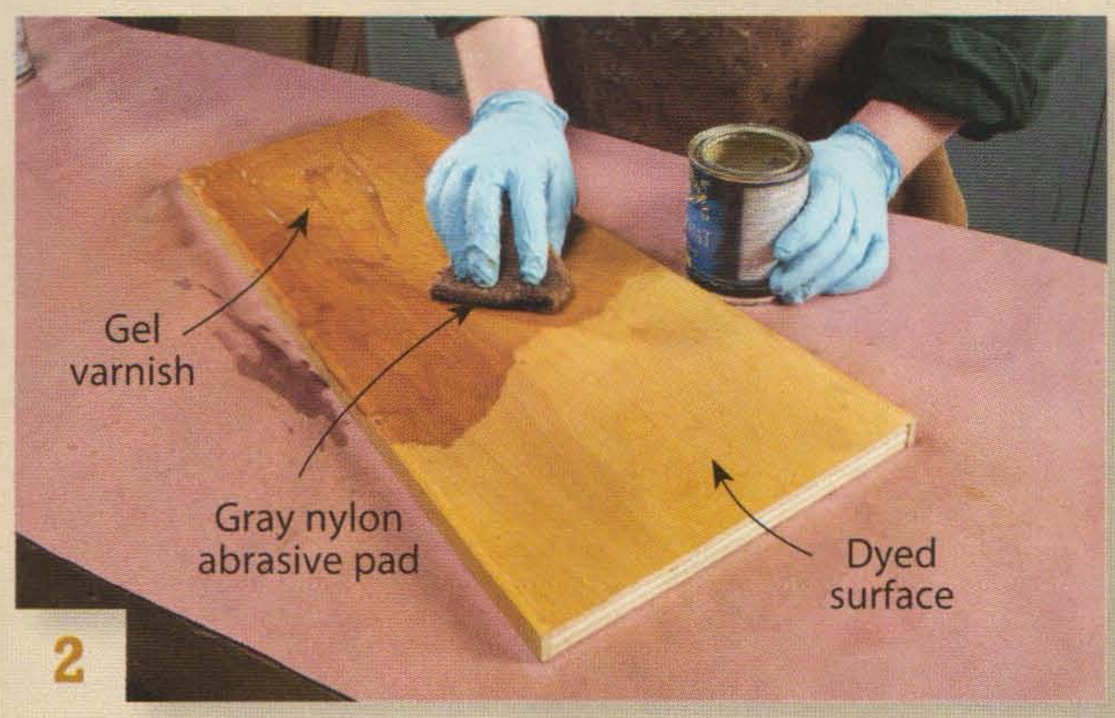
Apply the dye and work it around to ensure consistent saturation and consistent color (**Photo 1**). Keep the wood wet long enough for the dye to saturate the surface—about two minutes. Wipe off the excess and let the surface dry for an hour or so, just long enough to let the water evaporate. Overnight curing isn't required.

Step 2

Stage 1: Use General Finishes Clear Gel

EDITOR: TIM JOHNSON | PHOTOGRAPHY: JASON ZENTN

Quickly apply a coat of diluted golden brown water-based dye, using a pump sprayer and a rag. Let the dye saturate the surface, then wipe off the excess and let the surface dry.



Apply a generous coat of clear gel varnish and rub it in to scrub off any grain-raising caused by the water-based dye. Remove the excess varnish and then immediately move to the next step.

Apply golden brown gel stain. The wet gel varnish acts as a stain controller to keep the wood from looking blotchy. Rub off the excess stain and let the surface dry overnight.

Now you can safely darken the color to a rich, deep brown, because the wood is sealed against blotching. To simulate cherry, wipe on and rub off dark, reddish-brown gel stain.

Topcoat (see Sources) as a stain controller to seal against blotching (**Photo 2**). Wipe on a coat and scrub it in, using a gray nylon abrasive pad to remove any raised grain caused by the water-based dye used in Step 1. Then rub off the excess.

Stage 2: Without any delay or drying time, follow by applying General Finishes Nutmeg Gel Stain (**Photo 3**; Sources). Work it in and rub off the excess within five minutes. Rub harder to lighten darker areas. Allow 24-hour drying time.

This two-stage application reduces blotching in two ways. Putting the clear gel varnish on first partially fills the wood's porous areas, as a liquid stain controller does. Unlike a stain controller, though, the gel varnish doesn't evaporate. It remains in the wood's porous areas and dries, to help seal the surface. In addition, the nutmeg gel stain is a darker shade of golden brown than the dye, but it isn't dark enough to cause blotching, so it simply adds part of the final color.

Step 3

At this point, the surface is sealed well enough to prevent blotching (especially in the porous areas), but it's still absorbent enough to soak up a little more stain. This makes it possible to evenly deepen the wood's overall color and tone it to look like cherry by using a dark, reddish-brown gel stain (**Photo 4**). Liberally apply General Finishes Brown Mahogany gel stain (see Sources) and rub off the excess.

Let the surface dry for 24 hours. Then you can selectively add color to any areas that remain too light by using the brown mahogany gel stain as a glaze. As the previous coats have dried, there's no risk: You can erase any glazing attempts that you don't like with a little paint thinner on a rag. After glazing, allow 24 hours before applying clear coats.

Step 4

For a perfect hand-rubbed look, wipe on and rub off two more rounds of General Finishes Gel Topcoat. If you want a waterproof surface, apply one or more coats of General Finishes Satin Arm-R-Seal (see Sources).

SOURCES

- Homestead Finishing Products, homesteadfinishingproducts.com, 216-631-5309, TransTint Liquid Dye, Golden Brown, #6002, 2 oz., $17.
- General Finishes, generalfinishes.com, 800-783-6050, Nutmeg Gel Stain, Brown Mahogany Gel Stain, Gel Topcoat, all about $22 per qt.; Arm-R-Seal Oil & Urethane Topcoat, Satin, about $20 per qt.

Kevin Southwick is a wood-finishing specialist and furniture restorer/conservator in Minneapolis, MN. To learn more, visit **southwickfurnitureconservation.com**.

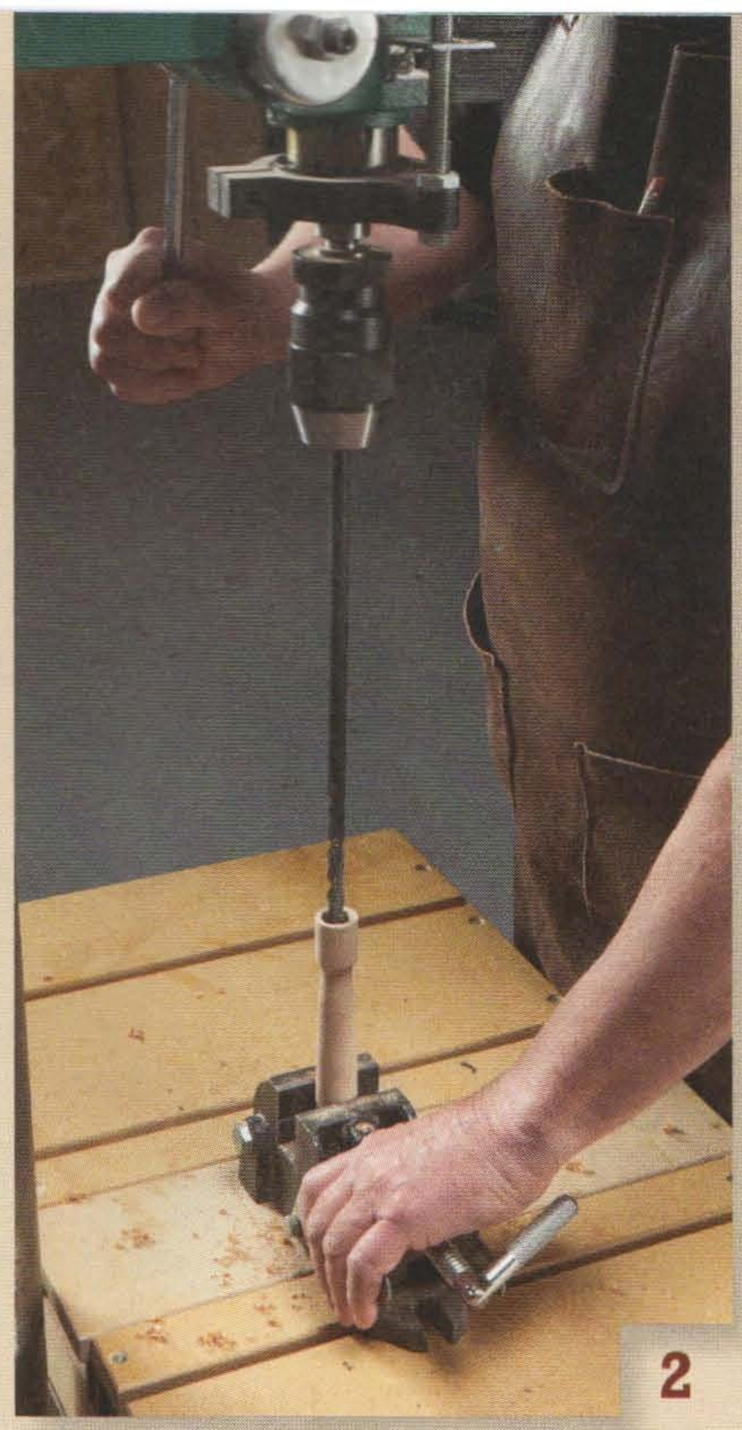
See 4 ways to keep birch from blotching at **AmericanWoodworker.com/WebExtras**

Extreme Pyrography

Deep burning requires a new kind of pen, cooled by air. Here's how to make one.

by Richard Tendick

Begin making the pen by drilling a large, shallow hole in a handle that you've turned on a lathe. A dowel shaped with a rasp would also work.



Drill all the way through the handle with an extra-long bit.

Insert a piece of brass tubing into the handle.

YEARS AGO, when I was a Cub Scout, a trusting den mother put a wood-burning pen in my hand. I scorched a lot of wood trying to draw a sailboat, but the results weren't all that impressive. Today, turners have taken the old art of pyrography to a whole new level. They use pens that run much hotter and penetrate deeper, creating a three-dimensional effect.

There's just one problem: The handles of most commercial pens get really hot! It's painful to hold them for more than a few minutes.

I've designed a new pen with a handle that doesn't heat up, because it's cooled by air. With this pen, you can spend all the time you need to make a complicated design. My pen is very simple to make and doesn't require any expensive parts—but you will need a compressor.

How the pen works

Before showing you how to make this pen, let me explain how it works (see Fig. A, below).

The hot wire used to burn the wood is attached to metal terminals embedded in J-B Weld, a metal-filled epoxy. Heat from the wire is transferred from the terminals to the epoxy and then down a brass tube that runs the length of the pen's handle. Heat moves faster through these metal parts than through the handle's wood, which is an insulator.

A small air hose runs up inside the handle alongside the lamp cord that delivers power to the hot wire. Compressed air from the hose picks up the heat of the brass tube and blows warm air out of the end of the pen. The result: The wood stays cool.

Tips and power supply

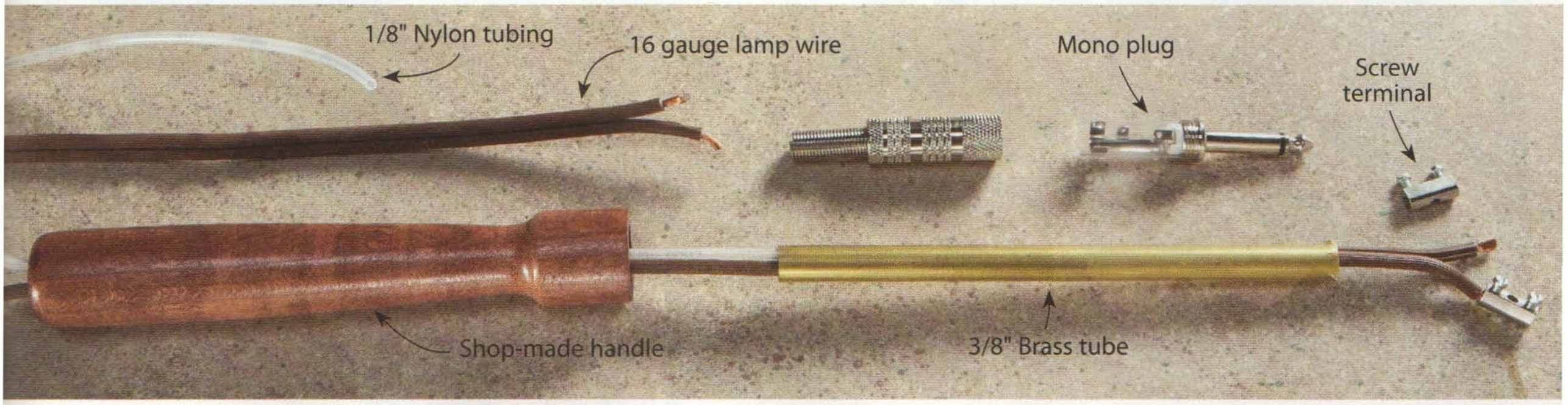
The tips of all wood-burning pens are made from nichrome wire (like the wire in a toaster). Tips are interchangeable, so you can burn a variety of patterns. My pen allows you to swap tips quite easily by tightening a couple of screws.

Like a toaster, a tip heats up when a low-voltage electrical current is run through it. This power is supplied by a transformer (see Sources, page 60). Regulating the amount of power coming out of the transformer regulates the heat of the tip. My pen plugs right into a commercial transformer just fine.

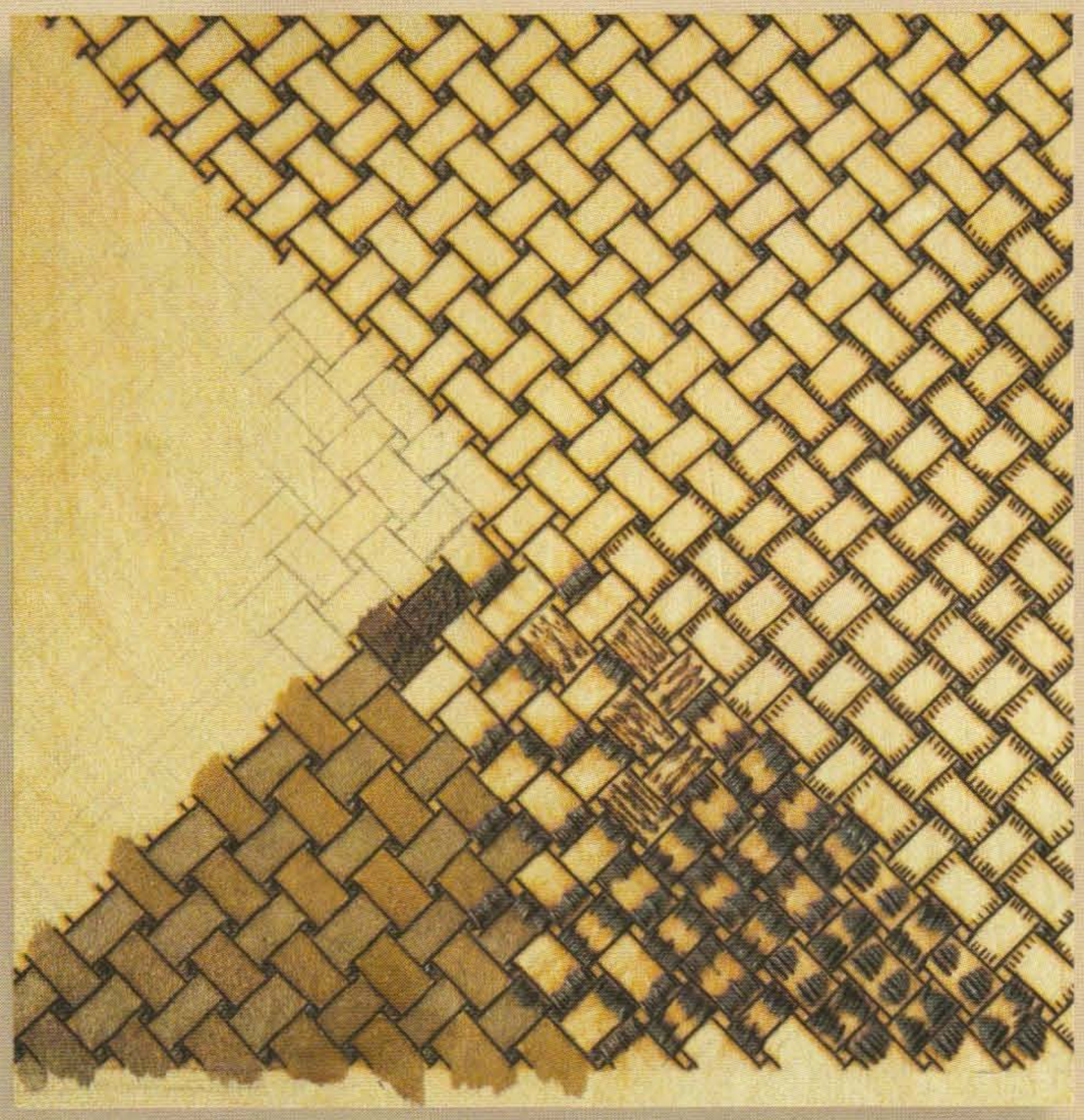
I've saved a lot of money by making

EDITOR: TOM CASPAR | PHOTOGRAPHY: JASON ZENTNER

Fig. A Exploded View



How to Make Your Own Tips —and Why



The basket weave pattern at right looks pretty realistic, doesn't it? Of course, it's not woven or carved, but burned deep into the wood using the high-heat, air-cooled pen featured in this article. It's just one example of the many creative designs you can make with a custom-made set of wood-burning tips.

A wood-burning tip is simply a piece of round nichrome wire that's been bent or flattened into various shapes. Nichrome wire comes in two thicknesses: 20 gauge and 22 gauge (see Sources, page 60). Both of these wires will fit into the terminals of the pen I designed. As supplied, nichrome wire is easy to bend. But once it's heated, it turns brittle and can no longer be bent or shaped.

The shape of a tip is limited only by your imagination, but remember that only the portion that contacts the wood determines the design it will burn. The wire doesn't have to be a continuous, separated strand—as long as it has two ends to insert in the pen's terminals, you can cross or twist it, mangle it or flatten it any way you want. The only rule is that you can't cut it anywhere between the ends that go into the pen's terminals.

Stylus tips

I "drew" all of the lines on this board using a tip that looks like the pointed end of a knife. To make this kind of tip, cut a 3" piece of 20 gauge wire and bend it tightly in the middle, so the wires almost touch. Use a hammer to flatten one side of the bend. Refine this edge with a file to make it as sharp as possible.

Separate and bend the loose ends so they'll fit straight into the pen's terminals. Cut them off at the same length and you're ready to go. The knife's sharp edge allows the tip to penetrate farther into the wood than if it were simply a round wire.

Outlining an area with a sharp knife also has an amazing effect on dyes. As you can see on the lower edge of the board shown above, water-based dyes tend to bleed across wood, making crisp patterns almost impossible to achieve. A burnt line, however, forms a boundary that the dye won't cross. I used different shades of the same dye in this board to create an effect that looks quite real!

Let's take the same type of tip, a tightly bent "U" made from 20 gauge wire, and skip the flattening and filing steps. This is one of my favorite shapes for stippling a background (I'm using it in the photo on page 56). With burns spaced no more than 1/16" apart, I use this tip to make a random pattern that looks like the outside of a black walnut shell.

Stamping tips

The tips I just described work like a stylus—a pointed tool that creates a line, cross-hatching or a small depression. You can also make a wood-burning tip that works like a stamp. To create a repetitive pattern, you just keep stamping one or more designs.

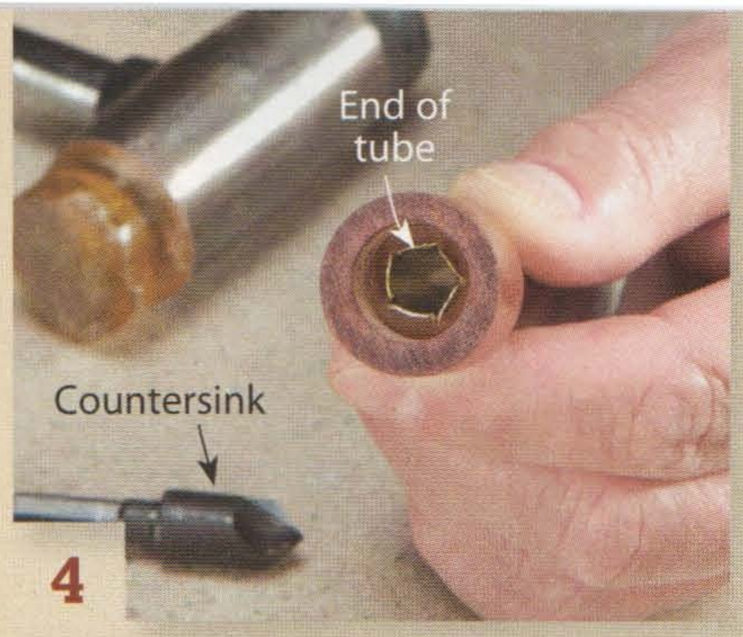
Let me show you how to make two of these tip designs, the "fern head" (lower left) and the "basket weave" (lower right). Both are very well-known in the turning world and are closely associated with the work of particular artists.

To create the fern head, snip off 3" of 20 gauge wire. Bend the wire 90° about 1" from an end. Grip this end with a small pair of locking pliers, then carefully bend the other end into a spiral with needle-nose pliers, one short section at a time. Leave about 3/16" between each revolution. When the spiral is about 3/4" across, bend another 90° leg. Cut both legs to the same length.

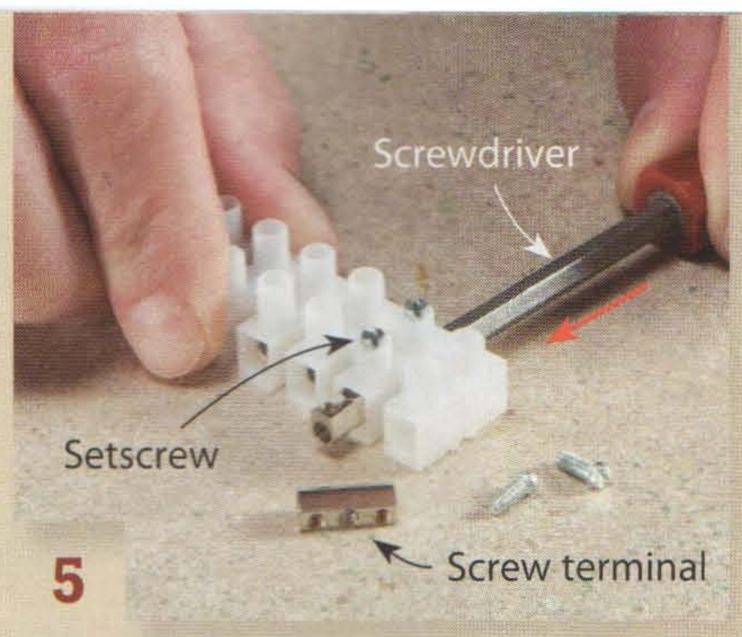
To make a basket weave tip, cut off about 4" of 20 gauge wire. Clamp 1" of the wire to a dowel or nail, using a pair of locking pliers, then turn the loose end tightly around the form using needle-nose pliers. After about five wraps, leave the wire sticking out 90° from the form. Release the locking pliers and pull the tip off the form. Bend the first end parallel to the second and cut both ends the same length. Stretch the coil to make the pattern you want.

A "fern head" design, created by the turner Graeme Priddle, is made by twisting nichrome wire into a spiral shape.

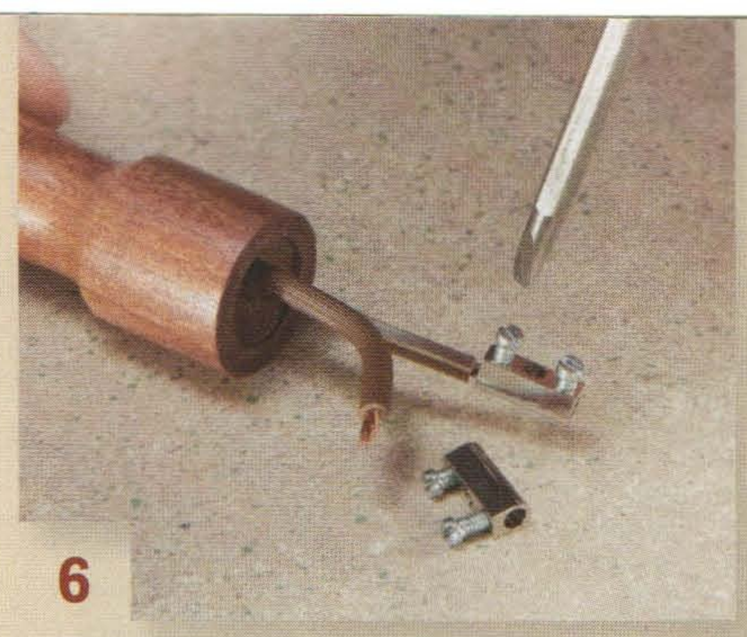
The "basket weave" design, first used by the turner Molly Winton, is made by coiling nichrome wire around a dowel or nail.



Widen the end of the tube. Place a countersink in the tube and strike it with a mallet. Expanding the tube helps lock it in place.



Remove two pairs of setscrews and screw terminals from a terminal strip, an inexpensive device you can buy at an electric supply store.



Push a length of lamp cord through the handle, then fasten the terminals to the wire.

Stuff a small ball of cotton down the brass tube to plug up its end. Pull back on the lamp cord until the terminals only protrude halfway.

Insert a small piece of wood between the terminals to separate them.

Caution: The terminals must not touch each other or the brass tube, or the unit will short out.

my own tips and transformer. To make tips, all you need is a length of nichrome wire, a wire cutter and some pliers (see How to Make Your Own Tips—and Why, page 58).

Making your own transformer is almost as easy, but you do need to be familiar with basic wiring skills. The savings are substantial: Commercial transformers can cost $150 or more. I found plans on the Internet for converting a $40 battery charger into a transformer, but before I started I consulted with a master electrician. He suggested a number of changes that make a much better unit. I've made a video of the process—see it at the website below.

Save big bucks by making a power supply unit from a battery charger. Watch how at **AmericanWoodworker.com/WebExtras**

Make the pen's body

Make a handle that's about 1" dia. and 6" long. You can turn it yourself, shape it by hand from a block of wood, or use a dowel. Very dense woods, like cocobolo, work best, because they're less likely to scorch if you inadvertently point the pen straight down while it's burning.

If you've turned your handle, you can drill through it on the lathe, too, using a Jacobs chuck in the tailstock. Otherwise, it's best to use a drill press. Clamp the handle in a drill-press vise or in a handscrew to hold it vertical. Install a 5/8" Forstner bit in the drill press and drill a hole 1/2" deep into the handle (**Photo 1**). Next, drill all the way through the handle with a standard 3/8" bit, followed by an extra-long 3/8" bit (**Photo 2**).

Insert a 3/8" dia. brass tube (.014" wall thickness) into the end of the handle (**Photo 3**). (You should be able to find this tubing at a hardware store.) Extend the tube 1/8" into the 5/8" dia. hole. Mark the point where the tube sticks out of the handle. Withdraw the tube and cut it to length at the mark. Reinsert the tube into the handle.

Flare the end of the tube, so the tube can't slip out (**Photo 4**). Stand the handle on end, place a countersink into the end of the tube and give the countersink a smart tap with a mallet.

Wire the pen

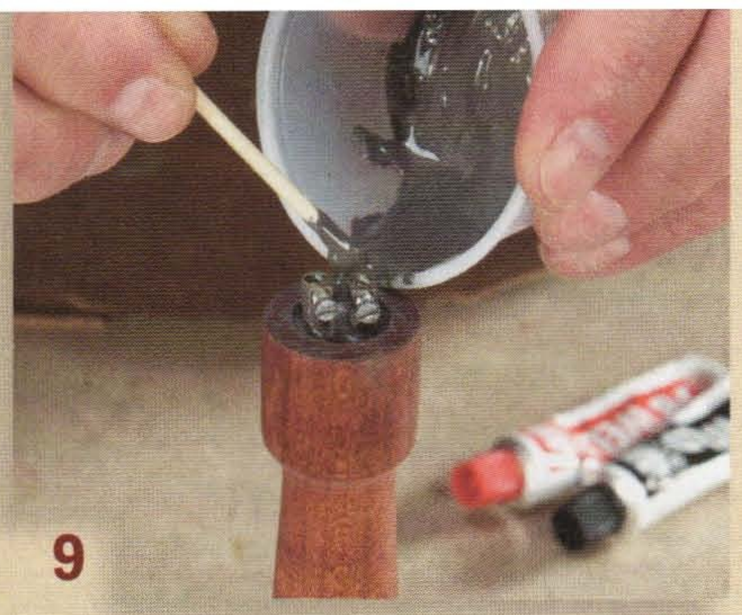
To make the device that will hold the hot-wire tips, you'll steal some parts from an inexpensive electrical component (see Sources). Remove two pairs of setscrews from the terminal (**Photo 5**). (You may have to cut off the top of the sleeve around the setscrews in order to remove them). Push out two of the connecting terminals with a screwdriver or punch.

Cut about 48" of 16-gauge lamp cord and insert it through the base of the handle. Strip about 1/4" of the insulation from both wires. Place one terminal onto the end of each wire (**Photo 6**). Orient both terminals to face the same way, then tighten the setscrews as hard as you can.

You will be "potting" the terminal ends into the handle by pouring in J-B Weld epoxy, which is available at most hardware stores. To keep the J-B Weld from running down the brass tube, stuff a portion of a cotton ball into the tube around the wire to form a plug (**Photo 7**). Pull the lamp cord back through the tube until the centers of the terminals are even with the rim of the handle. Place a toothpick or sliver of wood between the connectors to separate them (**Photo 8**).

Caution: The terminals must not contact the brass tube. They must also be separated by a non-conductive spacer. If the terminals do touch the tube or each other, the unit will short-circuit and blow a fuse in the transformer.

Mix up the J-B Weld and pour it into the hole holding the terminals

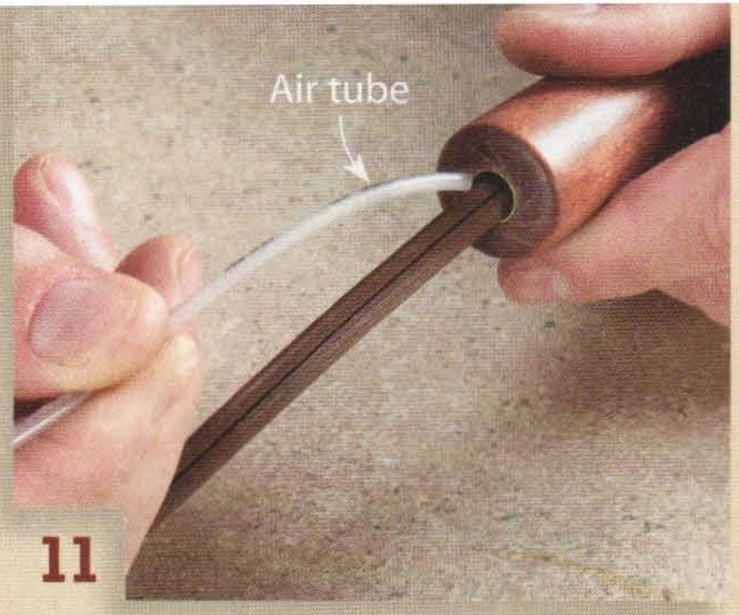


9

Cement the terminals in place with J-B Weld. This adhesive can withstand high heat and doesn't conduct electricity.

10

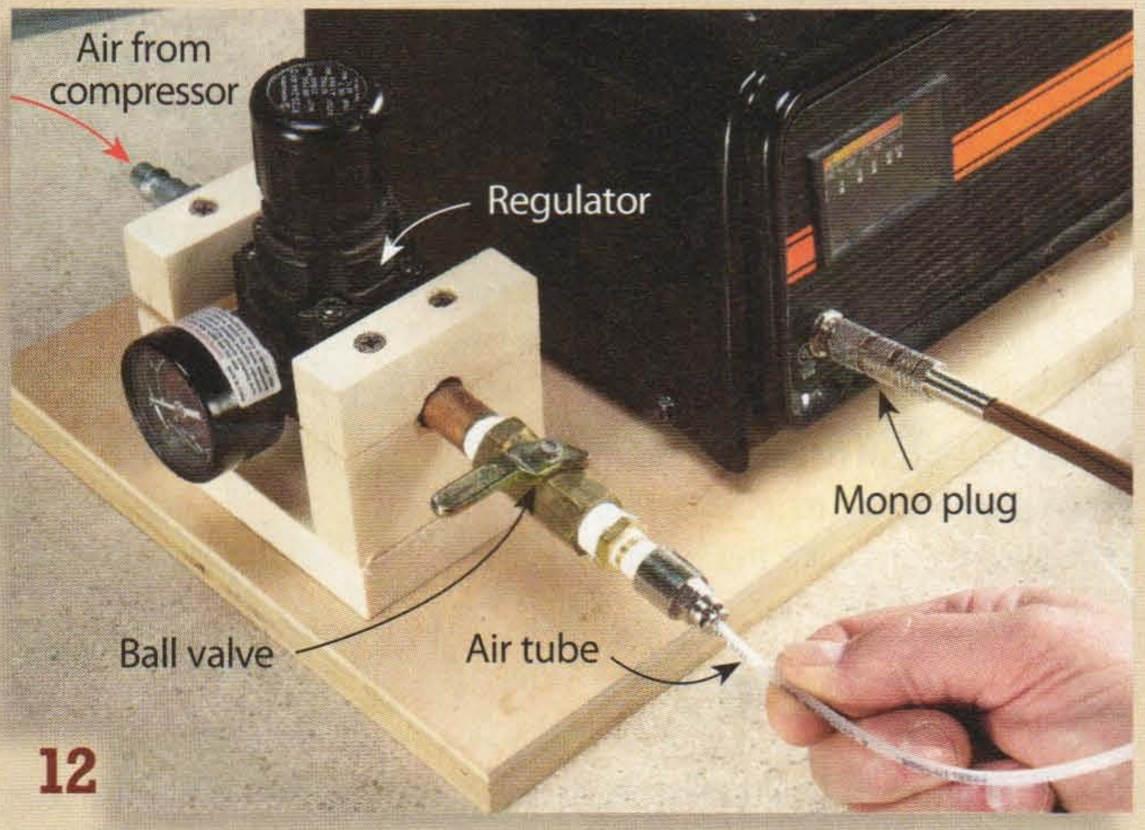
Solder the other end of the lamp cord to a 1/4" mono plug.



11

Insert an air tube two-thirds of the way up the handle. Tape the tube to the lamp wire in a number of places.

Insert the air tube into a push-in fitting connected to a ball valve and air regulator. Hook up a hose from an air compressor to the other side of the regulator. Insert the mono plug into a commercial 12 volt transformer, or one you've built yourself.



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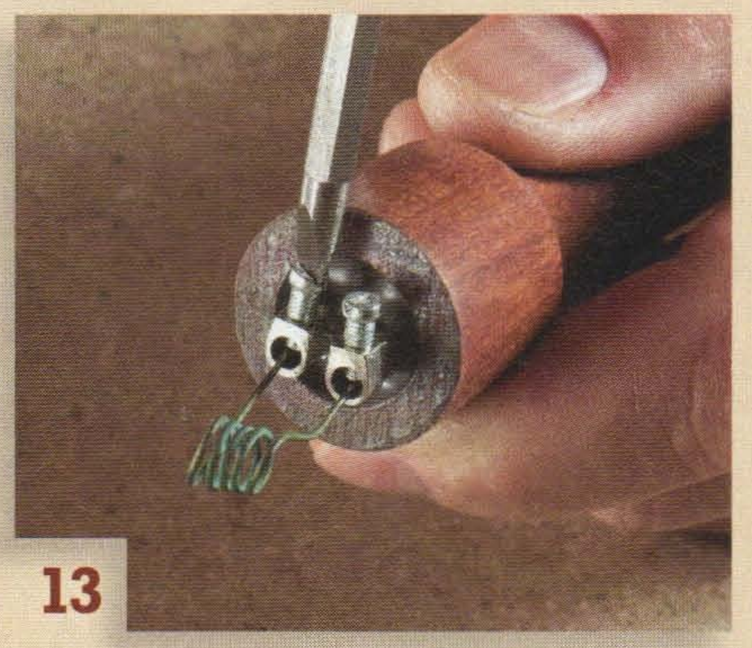


13

To burn patterns, install a tip into the terminals. It's easy to make custom tips by bending pieces of nichrome wire. Turn on the transformer and you're ready to go!

(**Photo 9**). Make sure you don't get any epoxy inside the terminals or on the setscrews that stick out of the handle. Fill the hole almost up to the rim. Allow the epoxy to cure for 12 hours.

Solder a 1/4" mono phone plug onto the other end of the lamp cord (**Photo 10**; see Sources). First, unscrew the plug from its sleeve and remove the clear plastic insulator from the plug's solder lugs. Insert the lamp cord through the sleeve, then through the insulator. Split apart the two wires of the lamp cord for about 1" and shorten one of the wires by 5/16". Strip about 1/4" of the insulation on both wires. Insert the wire ends into the holes in the solder lugs. If the holes are too small, enlarge them with a drill. Bend the wire to keep it from being pulled out and bend the tabs around the wire's insulation. Solder the wires in place. Slide the plastic insulator down the lamp cord and screw the sleeve in place.

Cool the pen with air

Cut a piece of a 1/8" OD nylon tube 48" long and insert it about two-thirds of the way down the metal tube (**Photo 11**). Tape the tube to the lamp cord with electrical tape at 12" intervals.

Of course, you'll need an air compressor to provide air to the tube. For convenience, I built a unit next to my transformer that allows me to hook up the nylon tube and regulate the amount of air pressure quite easily. This unit consists of an air regulator, a ball valve and a push-in fitting (**Photo 12**; see Sources). Wrap the threads of these components with Teflon tape to seal the connections.

When I'm ready to start burning, I turn off the ball valve and turn on the compressor. Then I insert the nylon tube into the push-in fitting, turn on the ball valve and the air supply is ready to go. To remove the tube, push in the collar of the fitting and pull out the tubing.

Start burning

Before you plug in the pen, select the tip you'd like to use. Insert it into the terminals and tighten the setscrews (**Photo 13**). Turn the heat control on the transformer to its lowest setting, plug in the pen and turn on the transformer. Gradually adjust the heat control until the nichrome wire turns red-hot. Turn on the air valve and start burning.

The best way to hold the pen is at an angle, as shown on page 56. You'll have to experiment to find out how long you should hold different tips on the wood, and how hard you should press down. Creating a small flame is not unusual, so take common-sense safety precautions, including eye protection, and provide plenty of ventilation. If you notice the pen handle starting to heat up, increase the airflow to cool it down.

SOURCES

- Hardware store: 3/8" dia. brass tube, .014" wall thickness, 12" long; J-B Weld; 16-gauge lamp cord, 48" long.
- Radio Shack, radioshack.com, 800-843-7422, 12-Position European-Style Terminal Strip, #274-679, $4.19; 1/4" Mono Phone Plug, #274-1545, $4.19.
- Packard Woodworks, packardwoodworks.com, 800-683-8876, Winton Nichrome Wire Kit (includes 3 pieces each of 20 and 22 gauge wire, enough to make 6 tips), #210101, $16.95; Burnmaster Eagle Woodburner power supply, #219301, $154.
- McMaster-Carr, mcmaster.com, 330-342-6100, 1/8" OD nylon tube, #5548K71, $.17 per ft.; Push-to-connect air fitting for 1/8" tubing, #5111K662, $4.22; 1/8" air regulator with gauge, #9892K21, $26.02; 1/8" ball valve, #4912K16, $6.48.

No-Fuss Box Joints

Build a dedicated setup that creates perfect joints every time.

by Doug Stowe

PHOTOGRAPHY: COURTESY OF DOUG STOWE | ILLUSTRATION: FRANK ROHRBACH

EDITOR: TIM JOHNSON |

IMAGINE ROUTING perfect box joints whenever you want, without having to waste time setting up your router table. This notion may seem half-baked, because box joints can be fussy to fit. But it isn't! This jig allows you to go directly from milling the parts to cutting the joints—it's perfect for woodworkers like me, who love to make boxes in multiples.

A box joint consists of pins and sockets that are all the same width. To create a box joint, you rout a series of slots (the sockets) that are spaced so that the wood left between them forms the pins. Correctly sizing the pins so they perfectly fit the sockets is the fussy part.

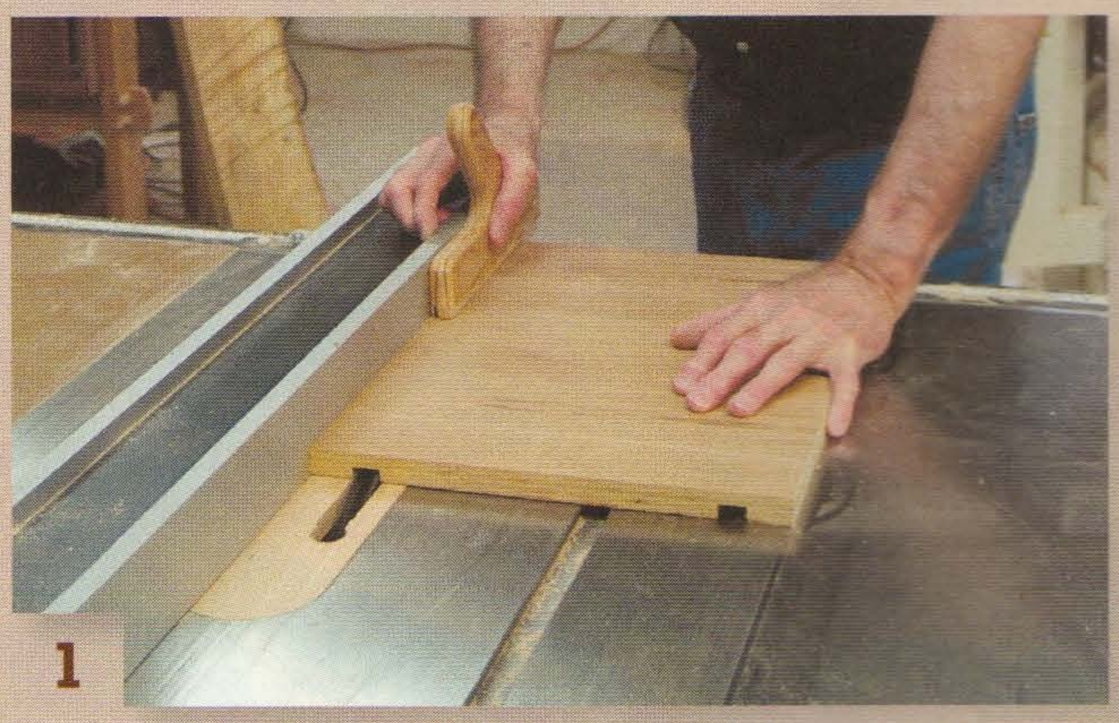
For box joints to go together, the pins and sockets must be offset—where one part has pins, the other has sockets. Sometimes called "finger joints" because the pins resemble the fingers in a pair of folded hands, box joints are popular because they're strong, attractive and easy to make—as long as you have a dependable jig.

Think of the jig shown here as a miniature router table that's dedicated to making one specific joint. You can build it in a day, using hardwood plywood or MDF, a couple pieces of solid hardwood and a small router. Dial in the perfect fit once (it's easy—I'll show you), and the jig is ready to be used again and again.

Make the jig

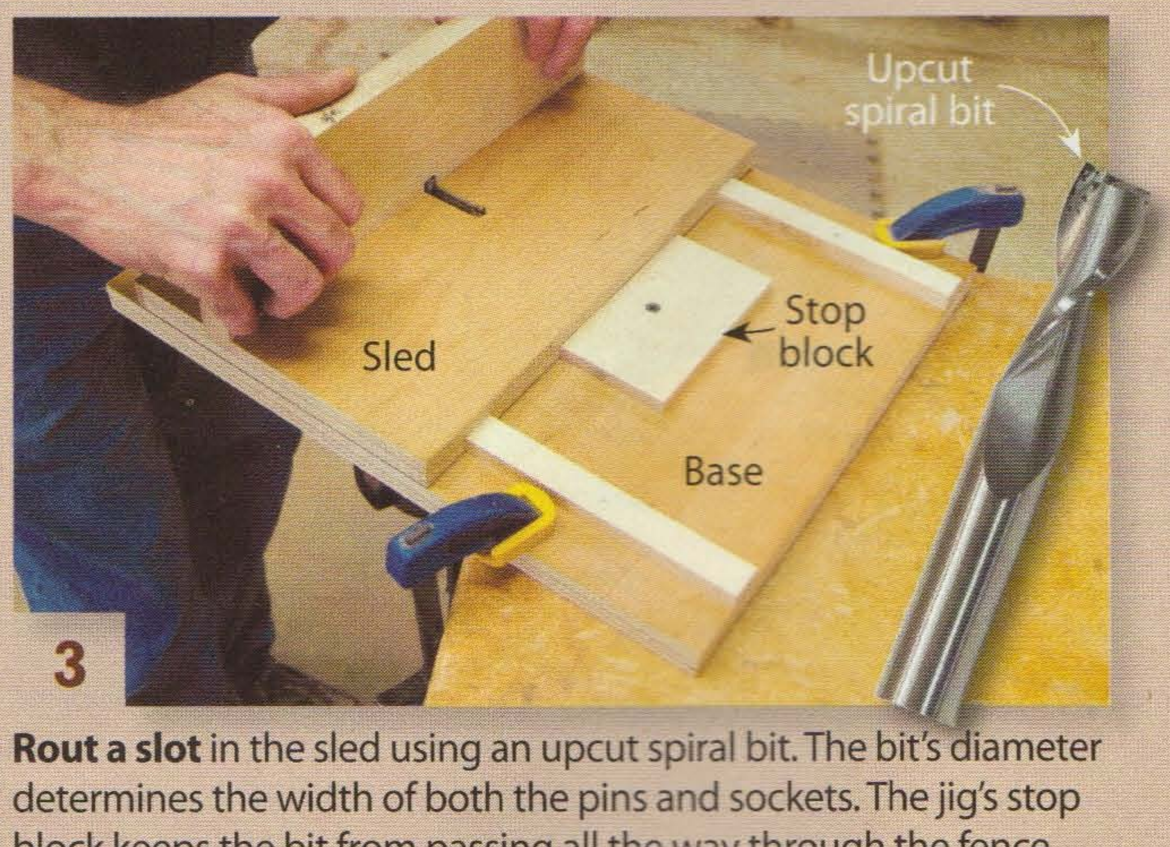
Start by cutting a pair of dadoes in a blank that contains the jig's plywood base and sled (**Photo 1** and Fig. A, page 64). After cutting the blank into the two parts, note that the dadoes are in the top face of the base and the bottom face of the sled. Flip over the sled and cut a dado for the fence 2-1/4" from the back edge. This dado is perpendicular to the dadoes for the runners.

Make the runners and fence of solid hardwood and plane them to fit the dadoes. The runners must allow the sled to slide smoothly on the base, without binding or wobbling. If the runners are too loose, the jig won't be accurate. If they're too tight, the jig just won't work. The fence should fit more tightly, almost needing to be forced into place. This pressed fit is necessary to allow fine-tuning the jig. Cut the fence so its length matches the width of the sled so that later, during fine-tuning, you'll be able to feel minute changes in position between these two parts.

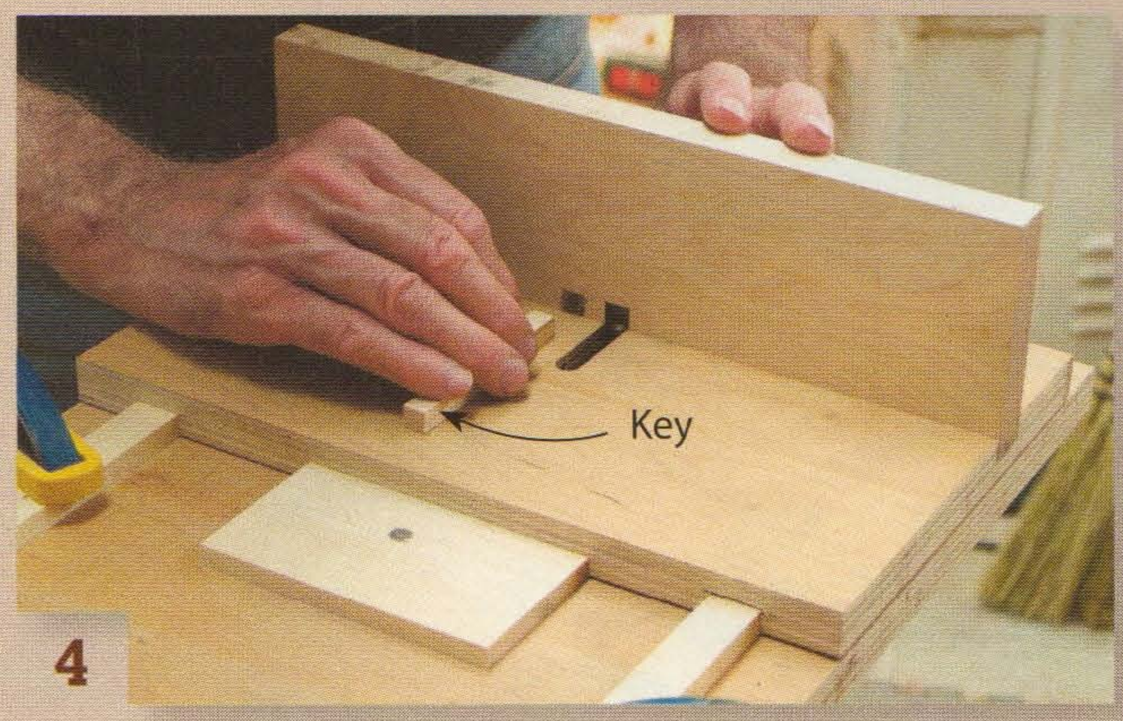


Create the jig's base and sled from a single blank. Cut dadoes for the runners, then rip the blank into the two parts. This method ensures the slots will align.

Mount the router base after drilling a centered hole large enough for the router's collet in the jig's base. Then attach the runners.



Rout a slot in the sled using an upcut spiral bit. The bit's diameter determines the width of both the pins and sockets. The jig's stop block keeps the bit from passing all the way through the fence.



Install the key after routing a second slot. The distance between the slots must match the diameter of the bit. The key indexes the workpiece for routing.

Install the router base and the runners on the jig's base (**Photo 2**). Mark a centerline for the router and then drill a hole on this line that's large enough for the router's collet to fit through, 4" from one end of the base. Remove the router's base plate, center it on the hole you've just drilled, and then carefully transfer the location of its mounting holes to the jig's base. Use these marks to drill holes for the mounting screws, countersinking them on the base's top face. You'll need 1" long flathead machine screws to mount the router base. I decided to use larger (5/32") screws as well, so I tapped the mounting holes in the router base to accommodate them.

Attach the runners with screws after drilling countersunk holes through the sled's bottom face.

Dedicate the sled

Clamp the jig's base to the corner of your workbench. Mount the sled on the base and make sure it slides properly. Screw the stop block to the base, positioned to stop the sled when the router bit is completely housed in the fence.

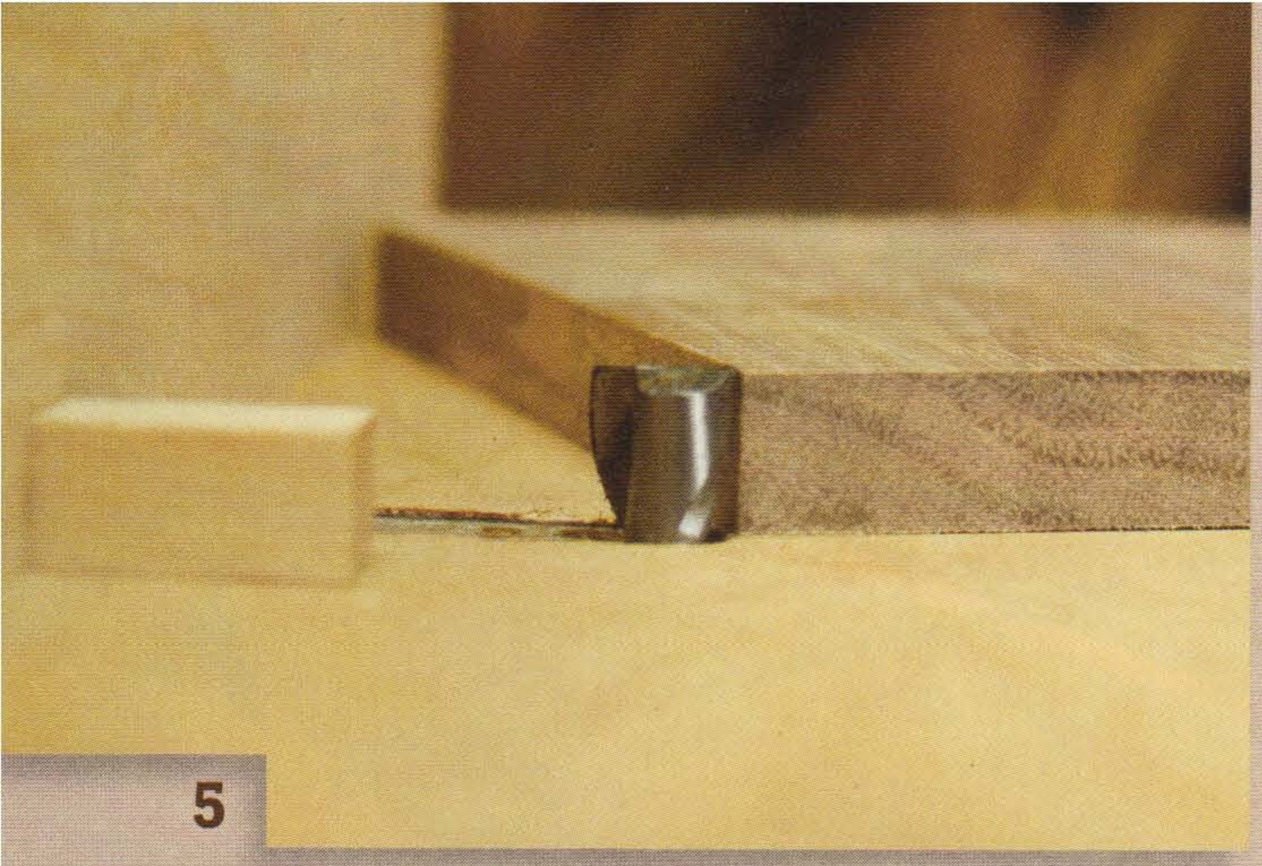
Remove the sled and install a bit in the router. An upcut spiral bit works best because it minimizes tearout (see Source, page 65). The width of the pins and sockets you want to make determines the size of the bit you'll use. Choosing the bit also dedicates the sled to making one specific box joint—the sled shown here was made with a 3/8" dia. bit, so it's dedicated to making box joints with 3/8" wide pins and sockets. If you commonly make box joints in a variety of sizes, simply make additional sled assemblies that are dedicated to the appropriate router bits.

Rout a slot in the sled (**Photo 3**). Lower the bit below the sled's surface. Position the sled flush with the back end of the base and clamp the two parts together. Start the router and gradually raise the bit to rout a hole through the sled. Shut off the router, lower the bit to 1/8" exposure and remove the clamps. Now rout the slot. Start the router, push the sled forward to the stop block and pull it back flush with the back of the base. Raise the bit another 1/8" and go again. Repeat this process until you've routed through the sled. Finish the job by raising the bit above the sled's surface by the same dimension as its diameter (3/8" in this case) to complete the slot in the fence.

Install the key

A solid maple key indexes the workpiece for routing each socket (**Photo 4**). This key is installed in a second square slot that's routed in the fence. The space between these slots matches their width. On the jig shown here, the slots measure 3/8" wide, so they're spaced 3/8" apart.

Start by milling a long, square key blank to match the width of the slot in



5

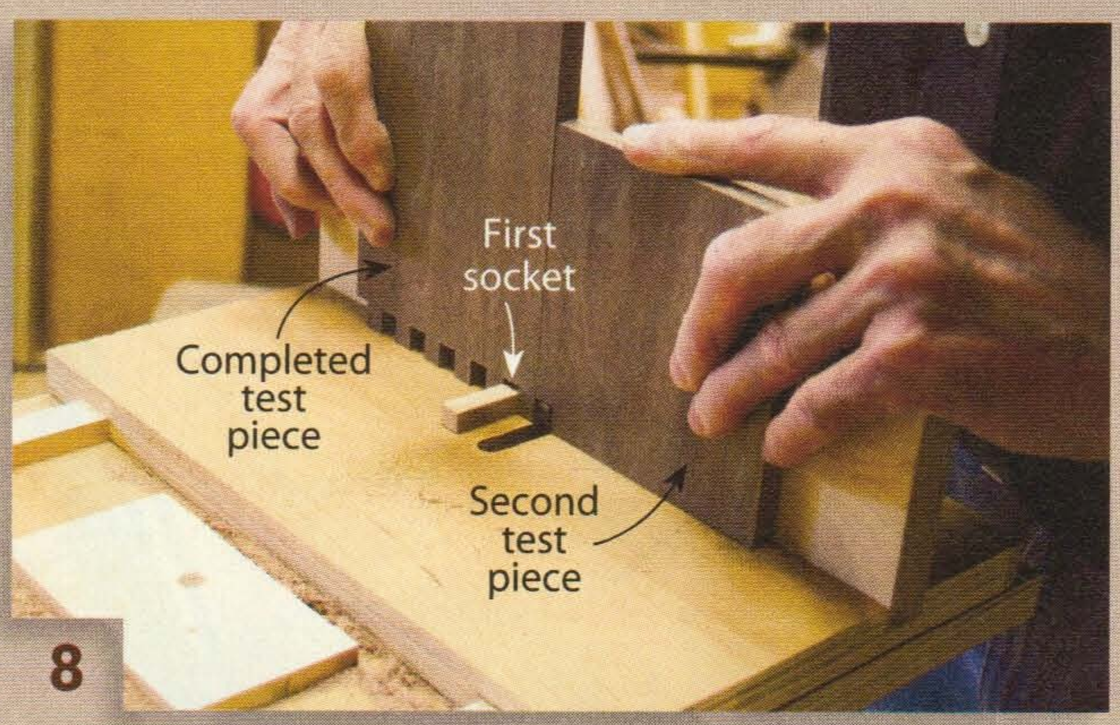
Set the bit a tiny bit higher than the thickness of the stock you plan to rout. Routing the sockets a bit too deep makes the assembled joint easier to clean up.

6

Rout the first socket in a test piece. Position the sled flush with the back of the base. Hold the test piece against the fence and snug against the key. Then slide the sled forward.

7

Use the key to reposition the test piece after cutting each socket. Then slide the sled forward to rout the next socket.



8

To index the second test piece, flip over the completed test piece and mount it on the key, using the first socket you routed. This correctly offsets the sockets, so the pieces will fit together.

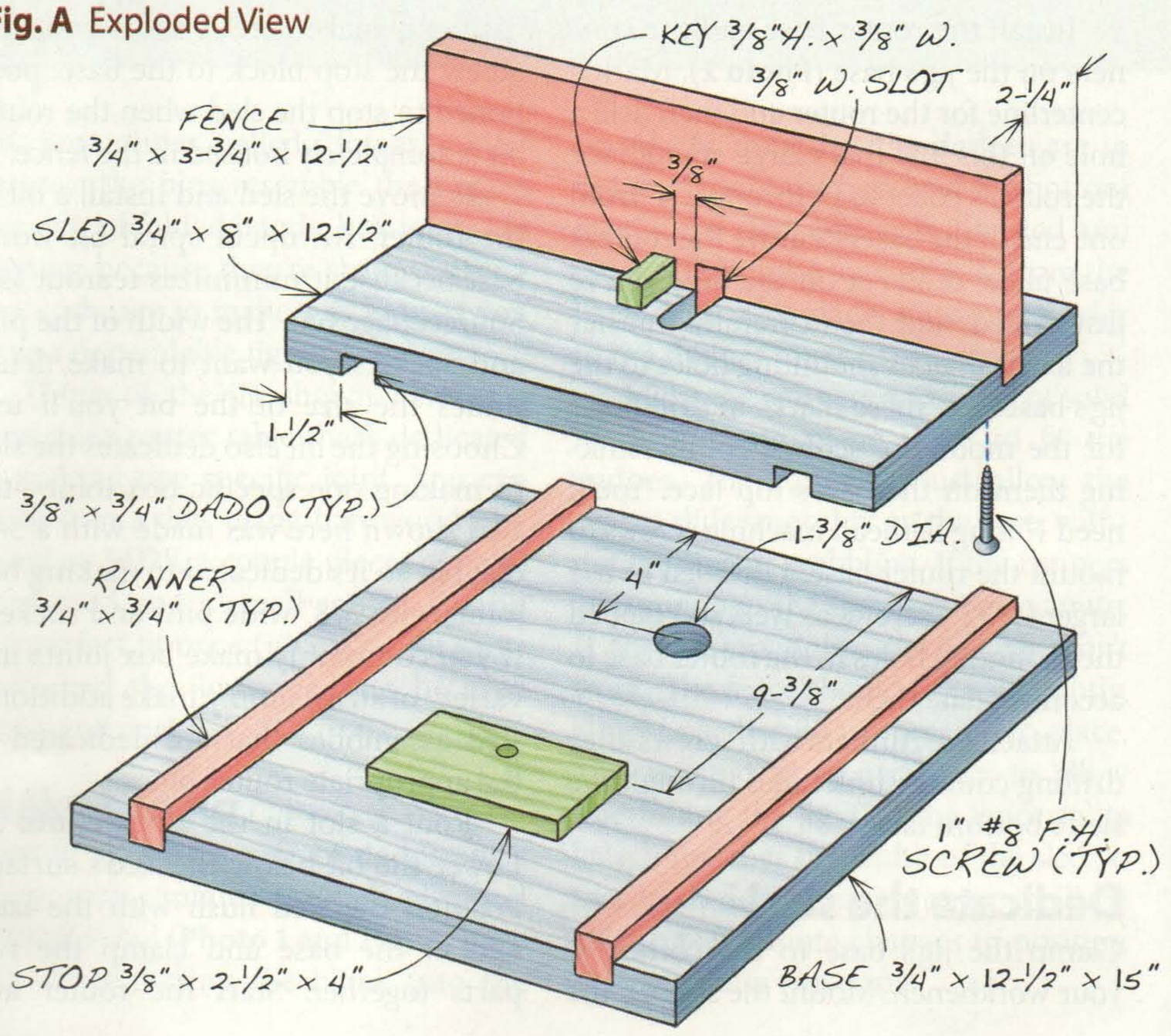
the sled. The resistance you feel when you insert the key in this slot will be the same resistance you'll feel each time you index a workpiece on the jig, so a snug but not forced fit is ideal.

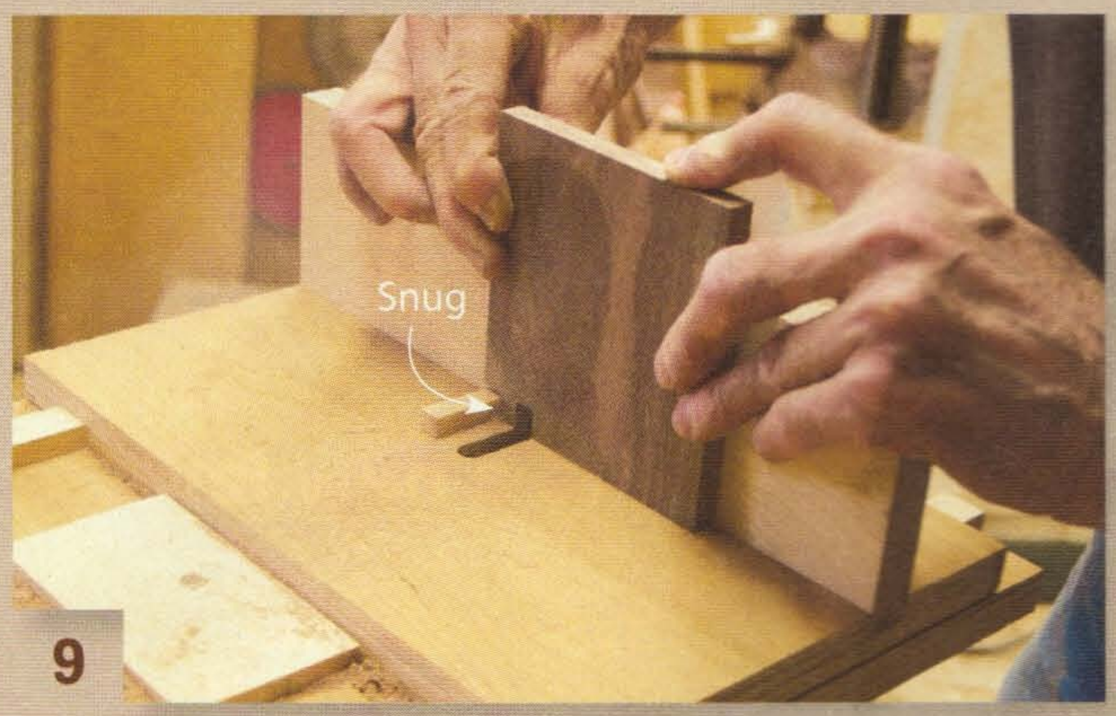
Mark the second slot's location on the fence. Then reposition the fence on the sled, carefully aligning your mark with the far side of the slot in the sled. Remove the jig's stop block. Then rout a square slot for the key through the fence. Complete this slot in several passes, incrementally raising the bit. Then install the key and reinstall the stop block.

Rout a test joint

Raise the bit slightly higher than the thickness of the stock you plan to use (**Photo 5**). Cut the parts that you intend to join oversize in width. It's best to wait until all the pins and sockets have been routed before you trim these parts to final width, because it

Fig. A Exploded View





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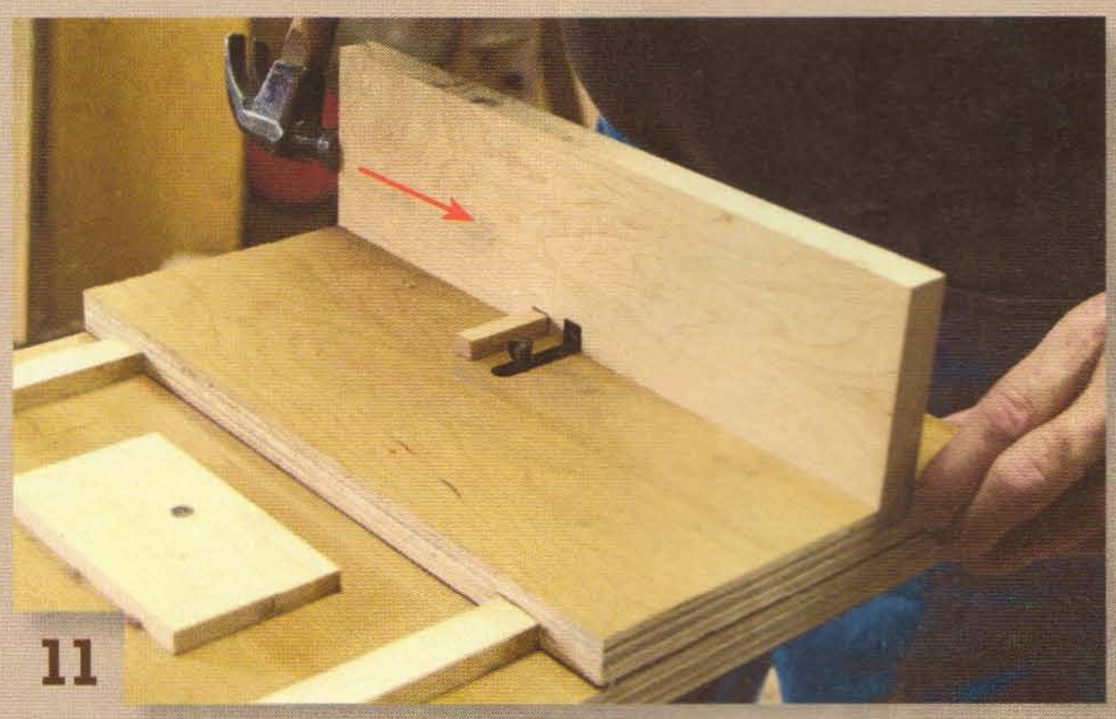
Use the key as before, to index the second test piece for routing each remaining socket.

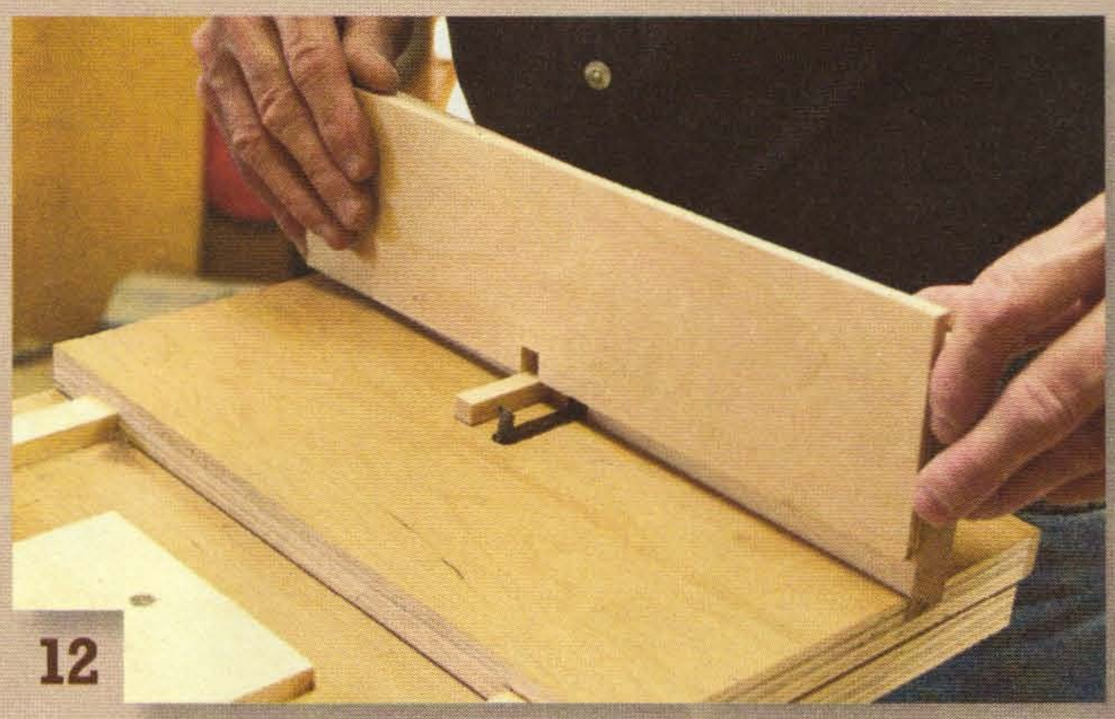
10

Test-fit the joint. The parts should slide together without wobbling or binding and the pins should stand slightly proud, so they're easy to sand flush.



11

Fine-tune the joint by adjusting the fence. If the fit is too tight, move the key a tiny bit closer to the slot. If the fit is too loose, move the key farther away.



12

Make an auxiliary fence to eliminate tearout when you rout joints in thinner stock. Set the bit's height for the thinner stock, use the key to index the fence and rout a new, shorter slot.

allows you to true up any uneven edges before you make those final cuts.

Rout the first socket while firmly holding the test piece against the key (**Photo 6**). Use the socket you've just routed to index this piece for routing the next socket (**Photo 7**). After routing all the sockets, flip this piece to its opposite face and use it to rout the first socket in the second test piece (**Photo 8**). Then rout the remaining sockets (**Photo 9**). Assemble the joint to test the fit (**Photo 10**).

Fine-tune the joint

If the joint is too tight, tap the right end of the fence to reduce the space between the key and the routed slot (**Photo 11**). This reduces the width of each pin. If the fit is too loose, tap lightly on the left end, to make each pin wider. As the fence and the sled are the same dimension, you can use your fingers to accurately gauge these tiny adjustments. Rout additional test joints to assess your adjustments. When the joint fits perfectly, install screws to lock the fence in position.

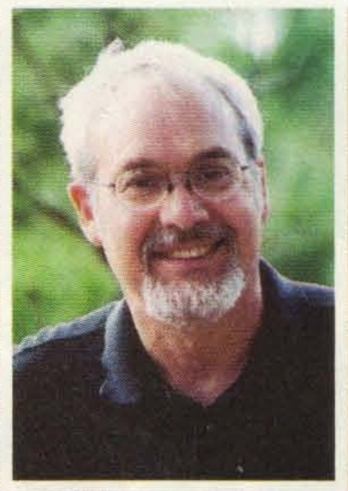
Adapt the sled

You can use the same sled assembly to cut box joints in stock of different thicknesses, but you'll quickly discover a problem: When you rout joints in thin stock after routing joints in thicker stock, the top of each socket tends to tear out on the back side. This tearout occurs because the routed slot in the fence is too tall to fully support the shorter sockets required by the thinner stock. The solution is to install an auxiliary fence with a shorter slot that will fully support these shorter sockets (**Photo 12**).

SOURCE

MLCS, mlcswoodworking.com, 800-533-9298, Spiral Upcut Router Bit, 3/8" dia., #7467, $39.99.

Build a Greene and Greene style mailbox with pronounced box joints at **AmericanWoodworker.com/WebExtras**



Doug Stowe began his career as a woodworker in 1976, making custom furniture and small boxes. He is the author of seven woodworking books and teaches box making at Marc Adams School of Woodworking and at the Center for Furniture Craftsmanship. His blog, written in advocacy of hands-on learning, is **wisdomofhands.blogspot.com**.

The Bow Box

Take your box-making and scroll saw skills to a new level.

by Ken Marble

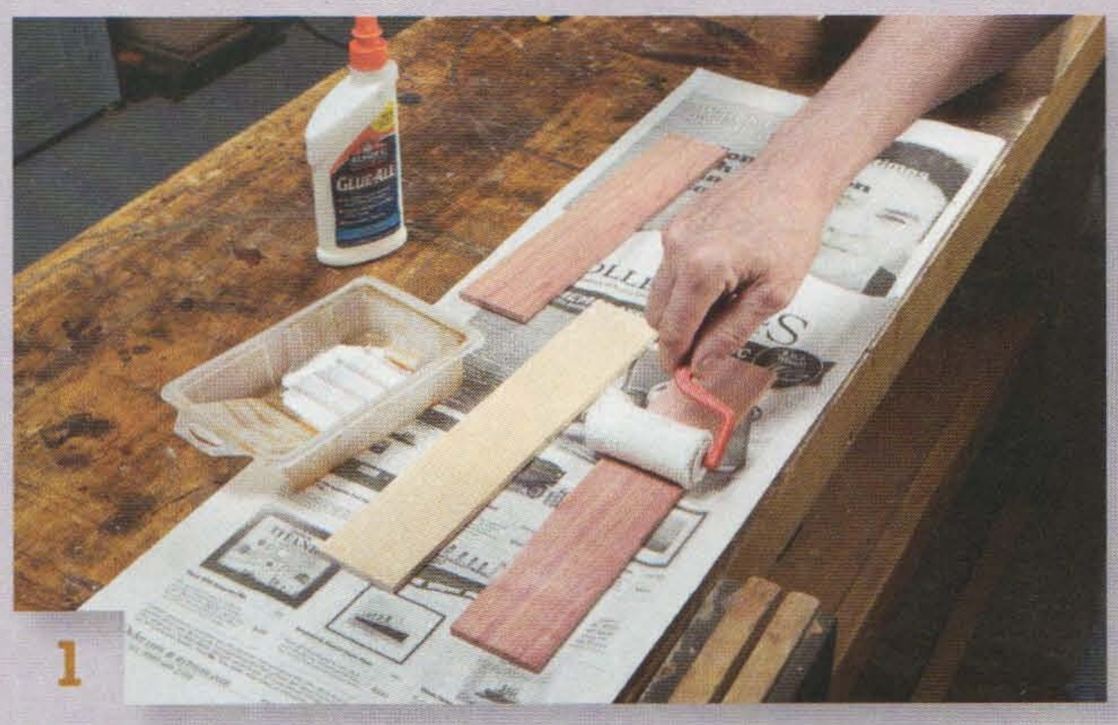
"TROMPE L'OEIL" is an old French phrase that literally means "it fools the eye." Trompe l'oeil has a long tradition in the art world—and in woodworking, too. When you first saw the bows and ribbons on this box, didn't you think to yourself, "Are they really made of wood?" Of course, the answer is "Yes!"

Here's a box that will really get your work talked about. It makes a terrific presentation gift, particularly if there's something special inside. The box itself is fairly basic, but it's made in a way that can be adapted to many different designs. Making the bows and ribbons just involves one trick: They're cut on a scroll saw (see the photo at left).

The Trick Behind the Bow

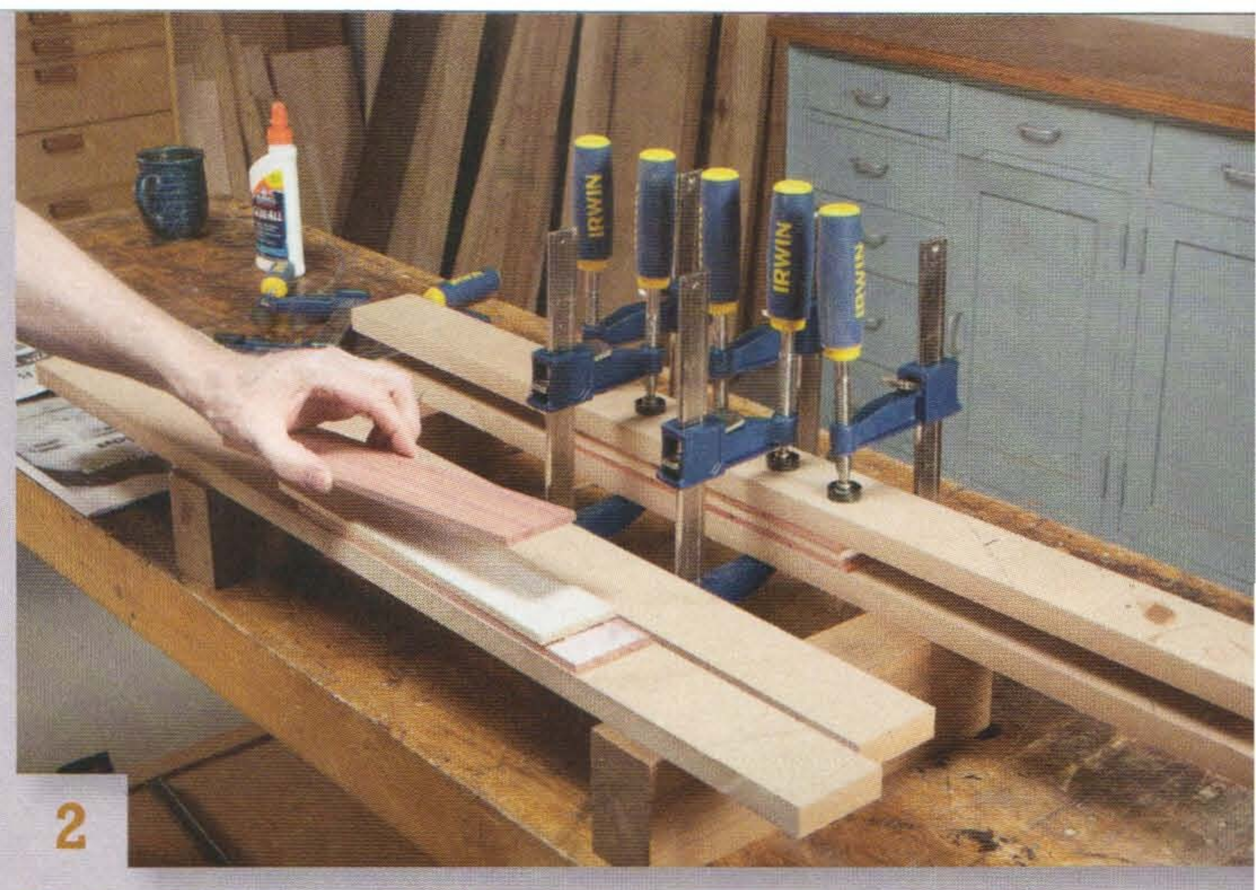
The bow isn't bent—it's sawn. It's made from a number of pieces that you cut out of a blank composed of three layers of wood. The ribbons are cut from the same material.

EDITOR: TOM CASPAR | PHOTOGRAPHY: JASON ZENTNER | ILLUSTRATION: FRANK ROHRBACH



1

Begin by gluing up two blanks for all of the ribbons and bows. Each blank is made from two pieces of 1/4" thick aromatic cedar and one piece of 1/4" thick birch.

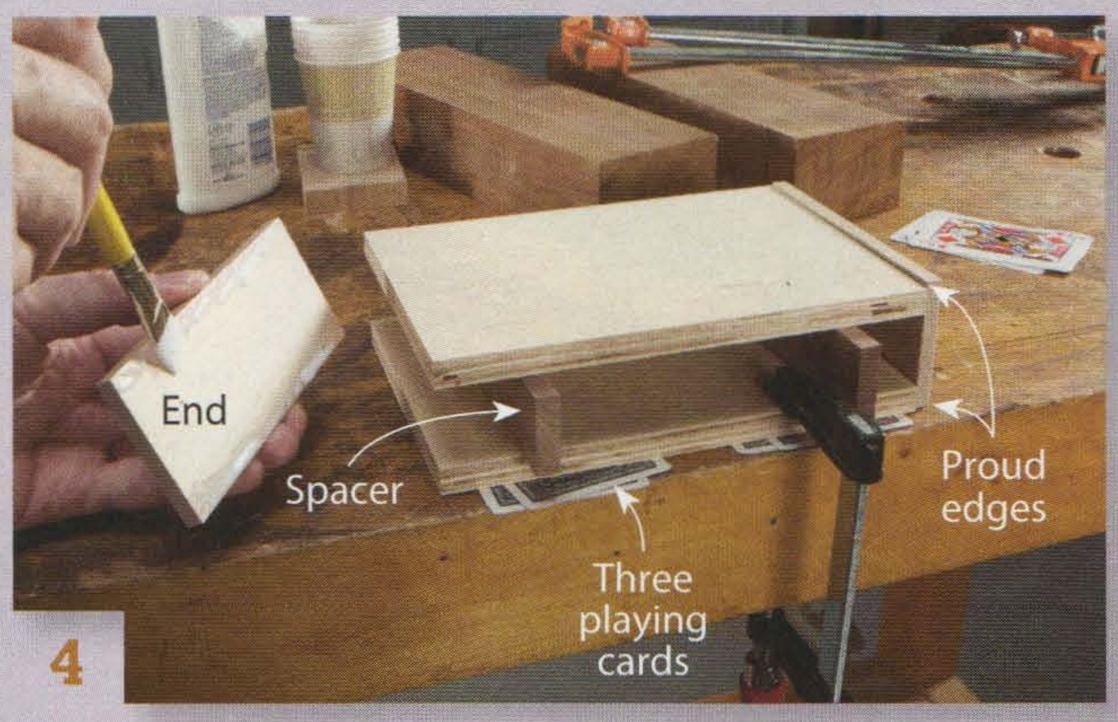


2

Clamp each blank between pieces of MDF, or any flat boards. After the glue dries, saw or joint one edge of each blank so all the layers are flush.

3

Rip one of the blanks into strips, for making the straight ribbons. You'll use the other blank to make the bows later on.



4

Glue the box in stages, starting with the end pieces. Place shims under the box to ensure that the ends will be proud. Use spacers to ensure that the top and bottom pieces are parallel.

Round or square edges?

When I first made these boxes, I left all of the edges square and glued the ribbon pieces directly on to the tops and sides. Although this approach allowed me to make lots of boxes as gifts in a short time, the look of those sharp edges wasn't quite right. I wondered if there was some way to round over the edges of the box—and the ribbons, too—in order to make the package look more realistic. But how?

The solution wasn't really that hard. You round over all the edges of the box first, and then, using a dado set, you cut grooves into the box for the ribbons to sit in (Fig. A, page 68). The bottoms of the grooves sit below the rounded edges, so there's no gap under the ribbons. The grooves also automatically align the ribbon pieces around the box.

I discovered one drawback on my first attempt to saw the grooves: My inexpensive dado set wasn't up to the job. The cuts going with the grain were OK, but the crosscuts were terrible. Every one had a ragged edge. To get better results, I had to buy a new, high-quality dado set.

To sum up, if you want the rounded-edge look, try out your dado set first. If you get splintered edges, consider having the set sharpened or upgrading to a new one. Or adopt my first method—the square-edge look—which doesn't require any dado cuts.

Make bow and ribbon blanks

I mention the dado set now for an important reason. It will be much easier to make the grooves fit the ribbons than the other way around. If you've got the ribbons in hand, you can adjust the width of the grooves by adding or subtracting shims from the dado set. Therefore, it's best to start the whole box-building process by making the ribbons first.

The bows and ribbons are cut from two 3/4" thick blanks (A and B, See Cutting List, page 68). Each blank is composed of two 1/4" thick pieces of aromatic cedar and one piece of 1/4" thick solid birch (**Photo 1**). I cut the pieces of cedar from closet lining, avoiding knots and cracks. Closet lining is a convenient material—it's available at home centers and is already milled 1/4" thick—but it's also very knotty and may contain unusable yellow sapwood. One package will contain much more wood than you'll need for one box, of course, but it's perfect for making multiple boxes.

While you're milling the birch pieces for the blanks, make a few extra for the front, back and ends of the box (C and D). All of these parts are the same thickness, width and length. I run them through a drum sander to make sure they're smooth.

To glue the blanks, roll glue on one cedar piece and one birch piece, then clamp all three pieces between flat, straight boards (**Photo 2**). After the glue dries, saw or

Fig. A
Exploded View

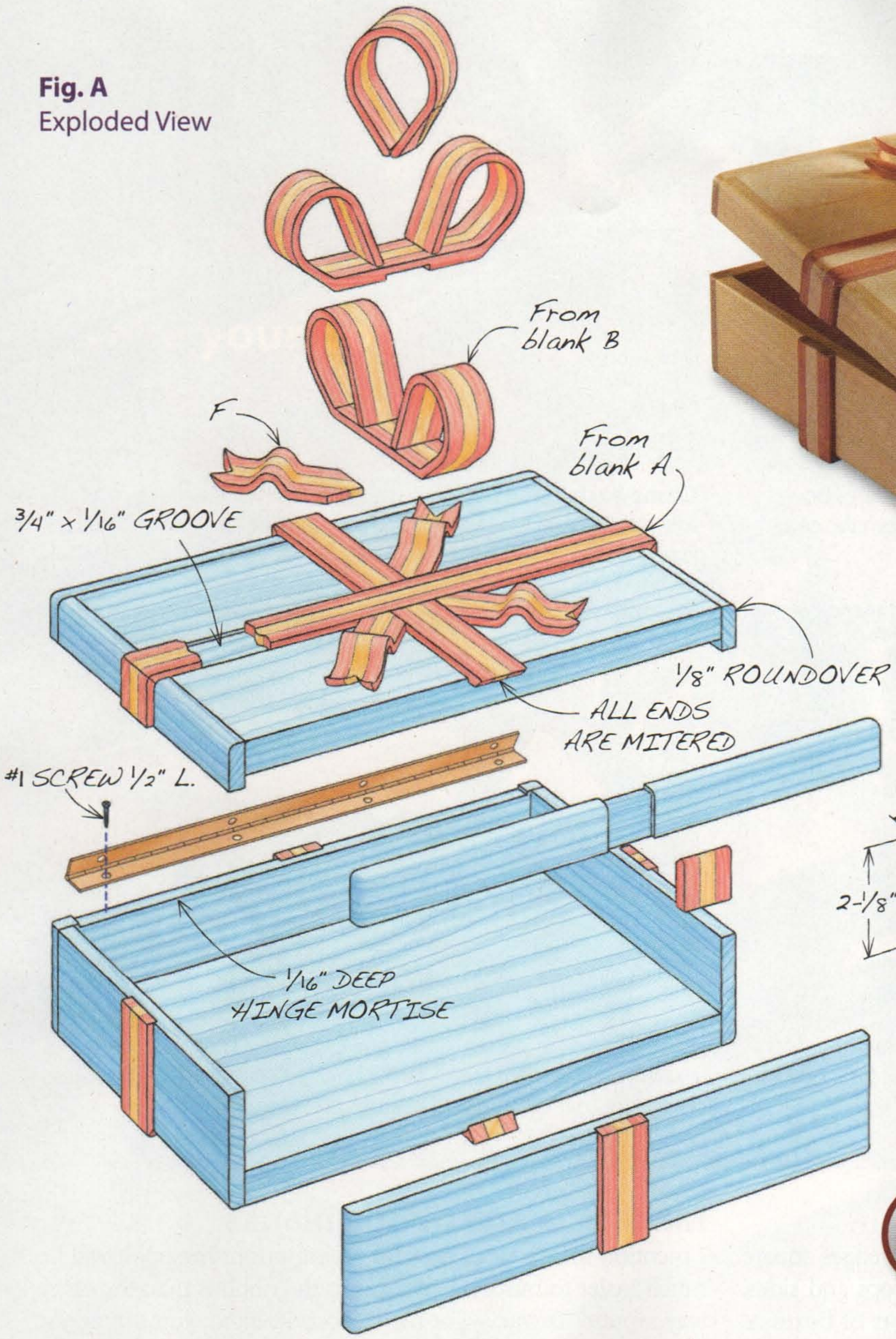
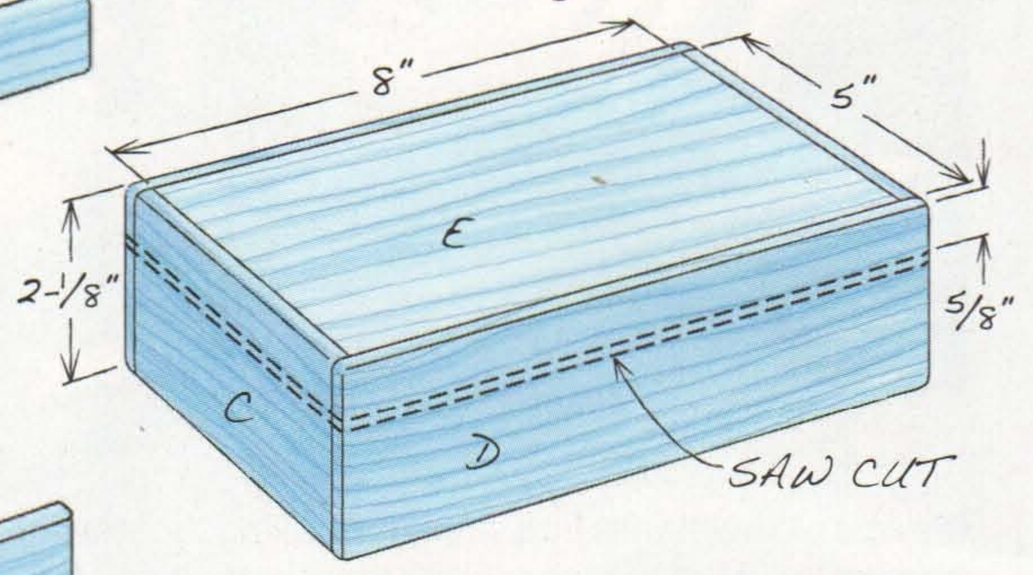
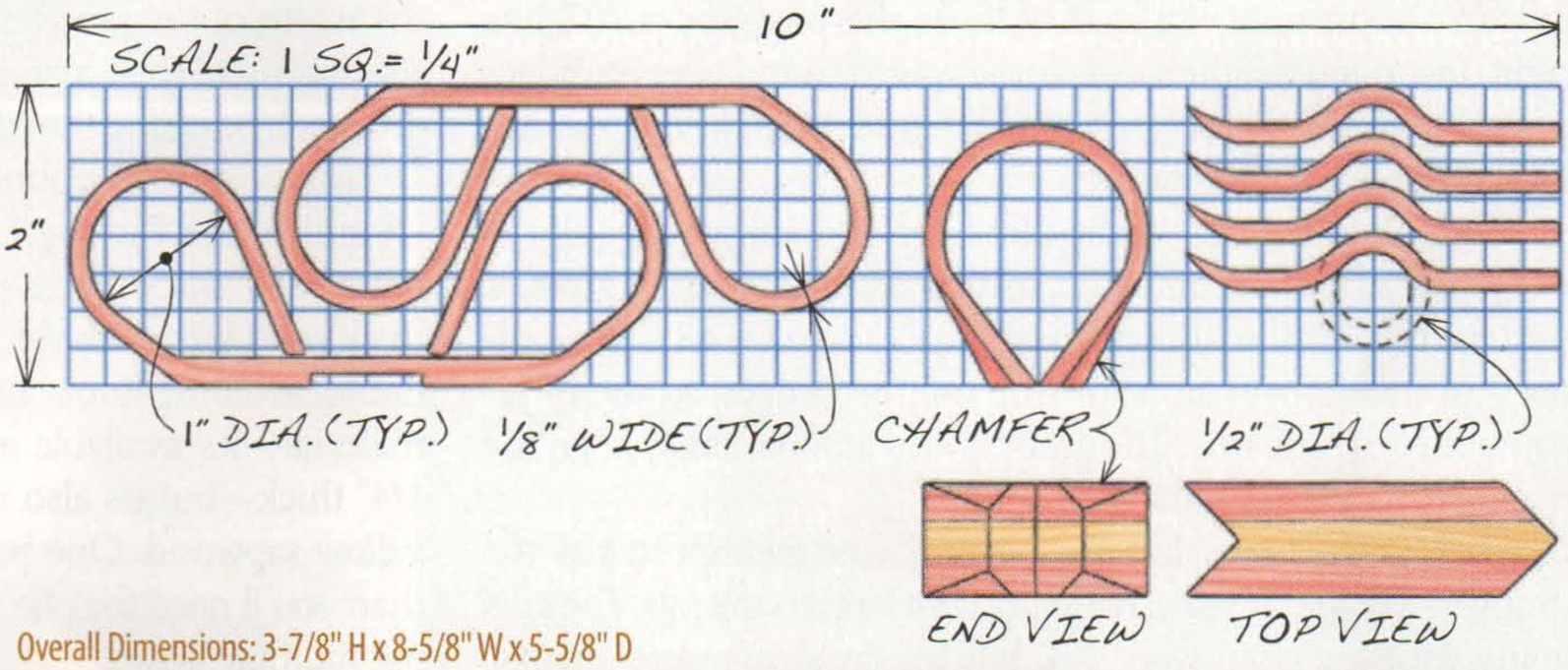


Fig. B
Box Dimensions Before Sawing



Download a full-size version of the ribbon and bow pattern at **AmericanWoodworker.com/WebExtras**

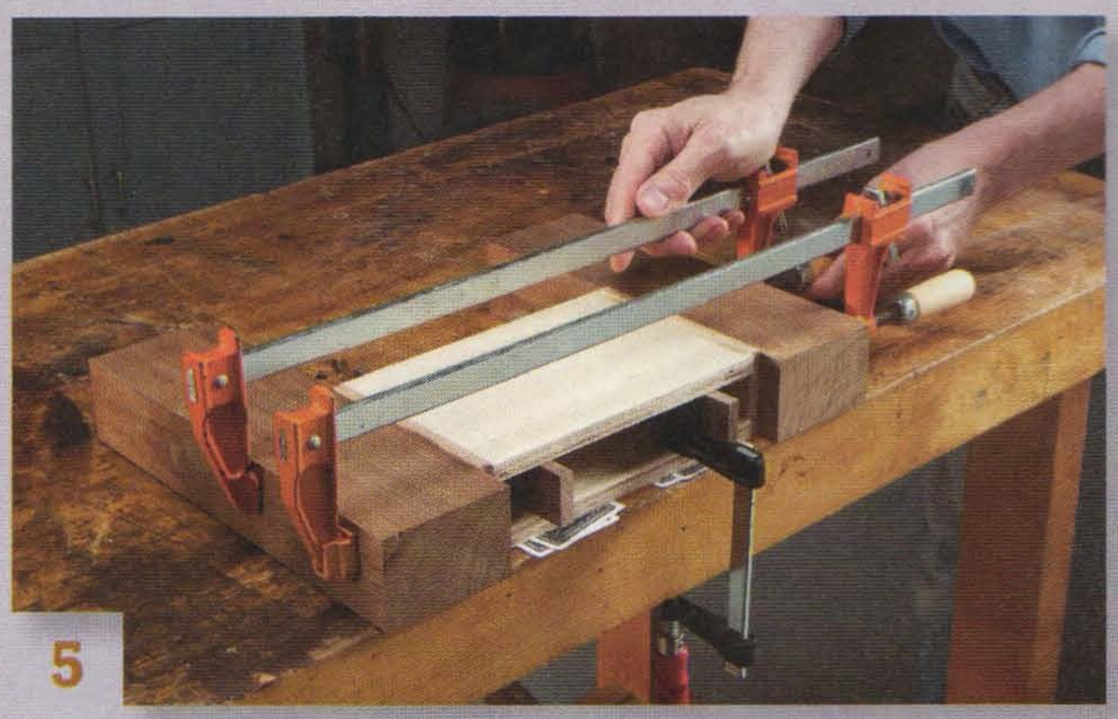
Fig. C
Ribbon and Bow Pattern



Cutting List

Overall Dimensions: 3-7/8" H x 8-5/8" W x 5-5/8" D

	Start with			To make				Final size	
Section	Material	Qty	Th x W x L	Name	Part	Qty	Th x W x L	Qty	Th x W x L
Bows and ribbons	Cedar	4	1/4" x 2-1/4" x 12"	Ribbon blank	A	1	3/4" x 2" x 12"	50 lineal inches	3/16" x 3/4" x length needed
	Birch	2	1/4" x 2-1/4" x 12"	Bow blank	B	1	3/4" x 2" x 10"	3 bow pieces and	see pattern
								4 ribbon ends (F)	see pattern
Box (Fig. B)	Birch	3	1/4" x 2-1/4" x 12"	End	C	2	1/4" x 2-1/4" x 5-1/4"	2	1/4" x 2-1/8" x 5"
				Front and back	D	2	1/4" x 2-1/4" x 9"	2	1/4" x 2-1/8" x 8-1/2"
	Birch ply	2	1/2" x 6" x 9"	Top and bottom	E	2	1/2" x 5-1/2" x 8"	2	1/2" x 5" x 8"

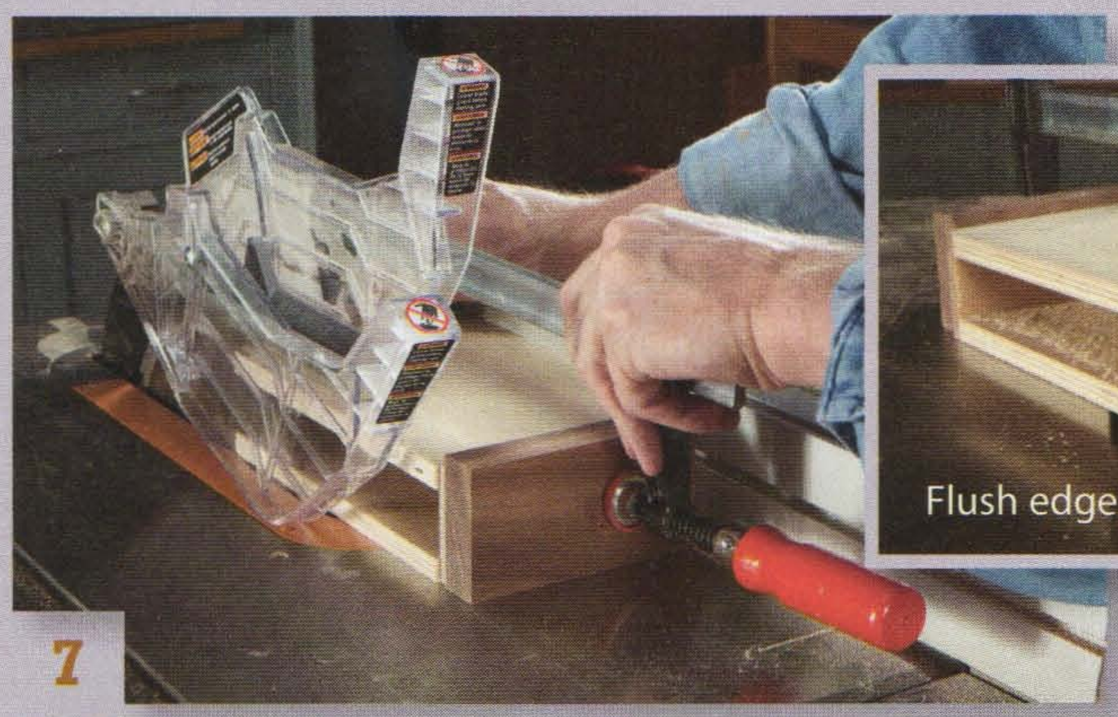


5

Clamp the ends between two large blocks to make sure the box stays square. The box is extra wide at this point, so you don't have to worry about perfectly aligning these parts.

6

Even up the end pieces with the top and bottom pieces. You can plane, scrape and sand (a nice, quiet job!) or use a flush-trim router bit.



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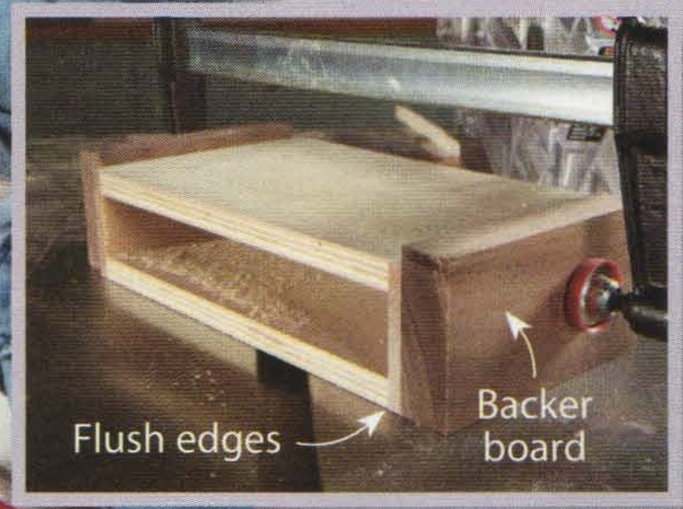


Rip the front and back of the box. This operation evens up the end pieces with the top and bottom pieces. Clamp a block to the near end piece to prevent tearout. Glue on the front and back pieces and even them up.

8

Round over all edges of the box.

joint one edge of each blank. Rip blank A into ribbon pieces (**Photo 3**). I cut the pieces about 1/32" extra-thick and ran them through the drum sander. If your saw cuts well, you could also sand the rough surfaces by hand.

Make a hollow box

While there are many ways to make a box, I've found that the classic method of gluing up a hollow box first, then sawing it apart, works best for this project. The top and bottom pieces of the box are made from 1/2" thick Baltic birch plywood. While you might consider pieces this thick to be overkill for a box this small, using thick wood means that you don't have to worry about joining the sides of the box with spline, finger joints or dovetails. Simple butt joints are fine. If you wanted to make the box look more realistic (like a wrapped present, that is), you'd miter the corners—but that's a lot more work.

Begin making the box by cutting the top and bottom pieces (E) to rough size (see Cutting List, middle column). From one of the box side blanks, cut two end pieces to rough length. The trick to gluing the box is to make sure that the solid wood pieces end up about 1/32" proud of the plywood pieces. Here's how to do it: Place shims under the bottom of the box to elevate it 1/32" above the bench top (**Photo 4**). (I use four piles of playing cards for shims; each pile has three cards in it.) Then, cut spacers to hold the top piece of plywood 1/32" below the solid-wood ends. (The exact width of these spacers will depend on the precise thickness of your plywood, which is only nominally 1/2" thick.)

Spread glue on the end pieces and center them on the plywood pieces, more or less. (The plywood pieces are 1/4" wider than the end pieces.) Clamp the box between large, square blocks (**Photo 5**). The blocks are essential. Without them, the box might end up out of square. After the glue dries, rout or plane the end pieces flush with the top and bottom pieces (**Photo 6**).

Using a fine-toothed crosscut blade, rip the box to final width (**Photo 7**). You'll have to cut both sides, of course. The plywood pieces will ride against the fence, since they're wider than the end pieces, so you'll get a nice, straight cut. When you're done, all the parts will be flush (see inset).

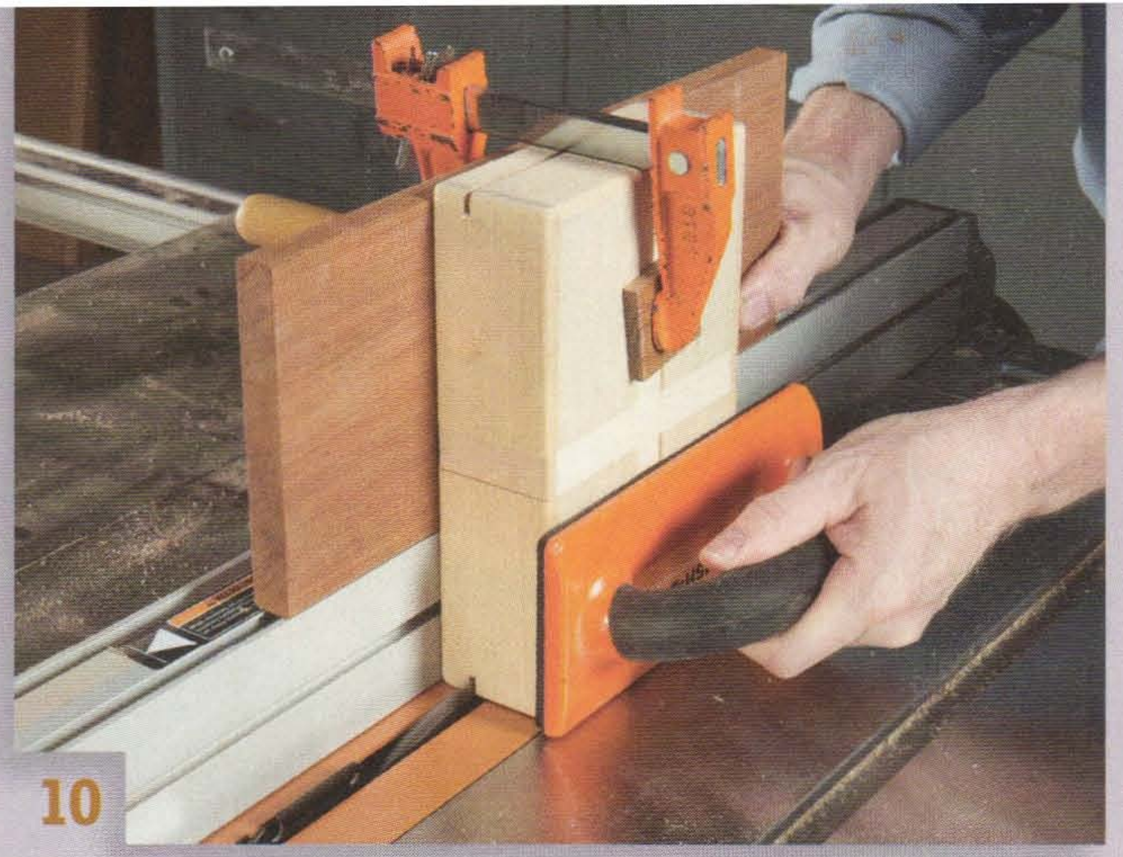
Cut the front and back pieces about 1/4" extra-long. Glue them to the box using the same shim-and-block method you used before. Trim the pieces close to final length by hand or on the bandsaw, using a miter gauge, then level all the proud edges.

Cut grooves for the ribbons

Soften all the edges of the box using a 1/8" roundover bit (**Photo 8**). To avoid tearout, rout the end grain surfaces last. Sand all of the roundovers so they're smooth and uniform.

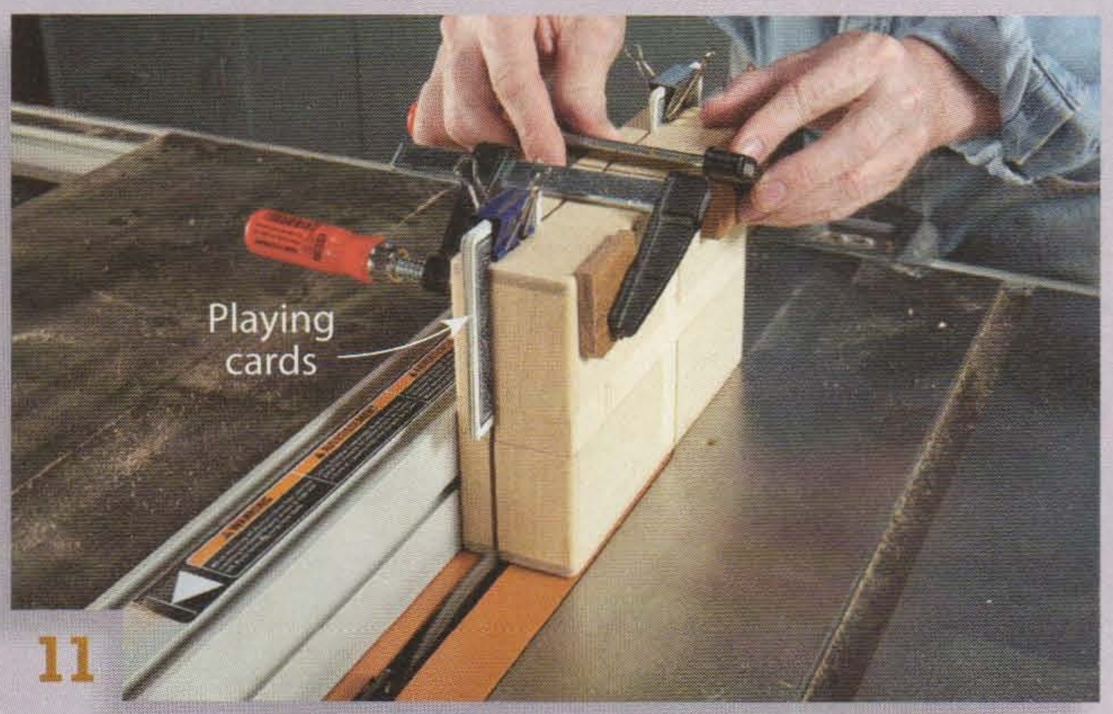
9

Saw shallow grooves all around the box, using a dado set. These grooves must be exactly the same width as the ribbon pieces you cut earlier.



10

Cut the box into two pieces, beginning with the ends. Clamp the box to a long board riding on the fence, to prevent it from tipping.



11

For the final cut, place playing-card shims in the saw kerf. Keeping the two halves clamped together helps ensure that the saw cut will be straight and smooth.

12

Cut out the bows and ribbon ends from the second blank on a scroll saw. Use mounting spray to glue the pattern onto the blank.

Measure the width of your ribbon pieces, then install a dado set in your saw to cut a groove to fit them. Raise the dado set 1/16" high and make a few trial cuts on a scrap piece of wood. It's OK if the fit is a bit tight (you can lightly sand the edges of the ribbon pieces for a better fit), but it's not OK if the fit is too loose.

To cut the grooves, fasten a 4" tall fence to your miter gauge for pushing the box and use the saw's fence as a guide (**Photo 9**). Cut all the way around the box. To avoid tearout problems, saw the narrow ends last each time.

Saw the box in two

Install a crosscut blade in your saw for the next operation. You'll be making rip cuts, but a crosscut blade will minimize tearout on the back side of the box and works fine on wood this thin. Raise the blade about 5/16" high and set the fence 5/8" away from the blade (Fig. B).

Saw the ends of the box first (**Photo 10**), then the front and back (**Photo 11**). To keep the kerf from accidentally closing during the last cut and ruining your sawn edge, insert shims into the box. I use playing cards again (and a sheet of notebook paper, if necessary) to exactly match the width of the blade's kerf. Use a binder clip to hold the cards together.

When you're done, level the open sides of the box, to make sure it shuts tight all the way around. The easiest way to do this is by sanding. Tape a sheet of 80 grit sandpaper to the top of your tablesaw, then rub the box on the sandpaper until all the high points are gone.

A hinge is optional

Installing a mortised hinge elevates the box to a real presentation piece. The continuous hinge I use has a built-in stop, holding the lid at about 95° (see Source, page 71). I have to admit that it's fussy work, though. It would be far easier to mount a pair of hinges on the outside of the box. (That's how I made my first sets of boxes.)

Here are some brief directions for installing the hinge. First, use a marking gauge to precisely lay out the two ends of the mortise. Install a 3/4" wide dado set in your saw and raise it to exactly half the thickness of the hinge—about 1/16". Cut mortises in the top and bottom halves of the box, staying about 1/16" away from the layout lines. Taking thin cuts, pare with a chisel to the layout lines.

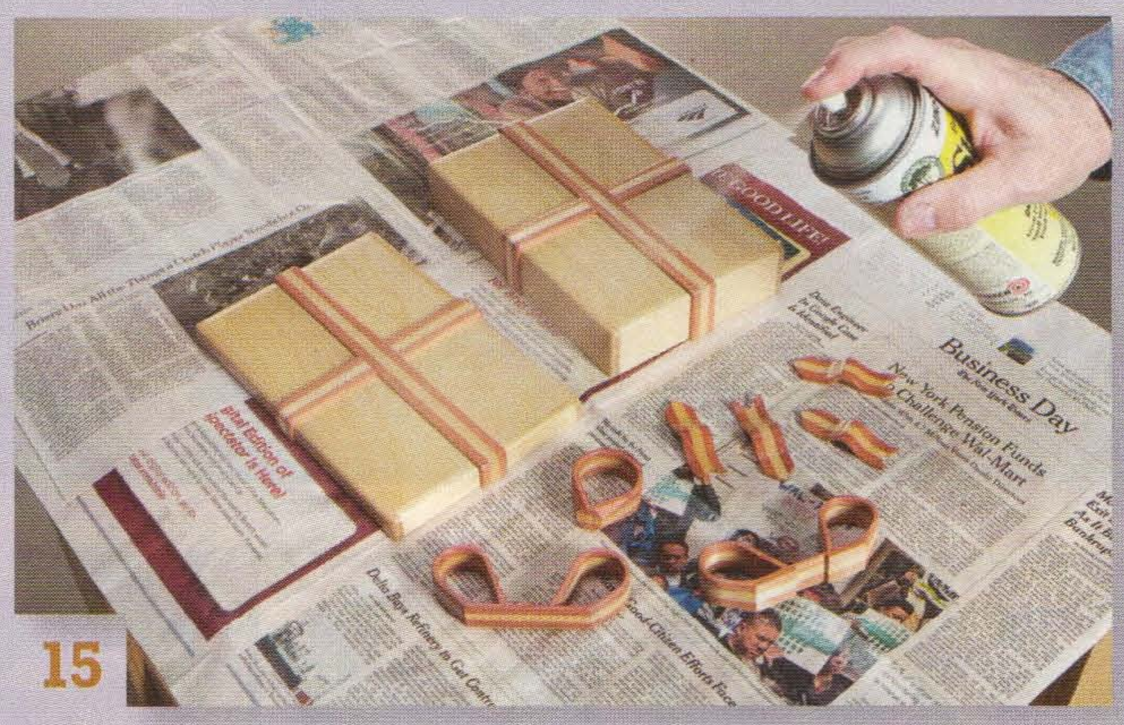
To lay out the screw holes, use a pin-style marking gauge to scribe lines down the middle of the mortises. Place the hinge in the mortise and mark the screw locations with an awl. Drill 1/16" pilot holes for the screws, using a drill press and a fence. Drill the holes the full length of the screws.

13

Cut the ribbon pieces to approximate length. Some pieces will be very short; to be safe, it's best to use a handsaw and a shop-made miter box rather than a power tool.

14

Trim all of the pieces to exact length using a disc sander. This two-sided jig allows you to safely form both mitered and square ends, even on very short pieces. Glue the straight ribbons into the grooves.



15

Spray finish on the box halves and all of the bow pieces. After the final coat, sand the bottoms of the bows and ribbon ends to remove the finish, so they can be glued onto the box.

16

Scrape off the finish from glue surfaces using a 1/4" chisel. For the ribbon ends, make a mask from a business card to show you where to scrape.

Add bows and ribbons

Enlarge the pattern (Fig. C) for the bows and ribbon ends (F) to full size, or download a full-size pattern from AmericanWoodworker/WebExtras. Rip blank B to the exact width of the pattern, then glue the pattern to the blank using 3M Spray Mount artist's adhesive or its equivalent.

Cut out the pieces on a scroll saw (**Photo 12**) or a bandsaw using a 1/8" blade. You can saw out the centers of the two long bow pieces all in one shot—just glue the pieces back together when you're done. Keep the "ribbon" as uniform as possible; it should be no more than 1/8" thick. Sand the pieces and round over all the edges. This, too, is fussy work, but it will pay off.

Cut pieces of straight ribbon to approximate length using a hand saw (**Photo 13**). (See "Pull Saw Miter Box," page 12, for instructions on how to make this jig.) Note that all the corners are mitered where the ribbon wraps around the box. The most practical way to do this is to use a disc sander (**Photo 14**). To get the angles right, I make a small jig that butts right up against the disc. The jig enables me to trim all of the pieces to exact length, no matter how short, and miter the ends of the curly ribbons. Round over the long edges of all the pieces with sandpaper.

Glue the pieces to the box. If they fit nice and tight, you won't need clamps. After the glue dries, round over the miters with sandpaper, by hand.

Spray the box parts and remaining loose pieces with a clear finish (**Photo 15**). I use shellac. Avoid a pebbly buildup by applying a few thin coats. Wait a day or so for the finish to harden, then smooth all of the pieces with OOOO steel wool. This creates a satin finish—if you want a shinier finish, spray one more thin coat.

Finally, it's time for the whole box to come together by gluing on the short, curly ribbons and the bows. Of course, glue won't stick to finished surfaces, but that's easily remedied. To remove the finish from the bottom of the four curly ribbons, rub them back and forth on a piece of 80 grit paper placed on a flat surface. Determine where the pieces will contact the lid, then cut out a mask from a business card that outlines these areas. Use the mask as a guide to scrape off finish from the box, using a 1/4" chisel (**Photo 16**).

Sand the bottom surfaces of the three bow pieces. Mark where the pieces contact the flat ribbons on the box's lid and scrape the finish off these areas with a chisel, too. Place all of the pieces in position with a few dabs of glue.

SOURCE:

Lee Valley, leevalley.com, 800-267-8735, Stop Hinge, 200 mm x 9mm, #00D8005, #2.80; #1 Flathead Brass Screws, 1/2" L, #91Z0103X, $0.80 for pkg of 10.

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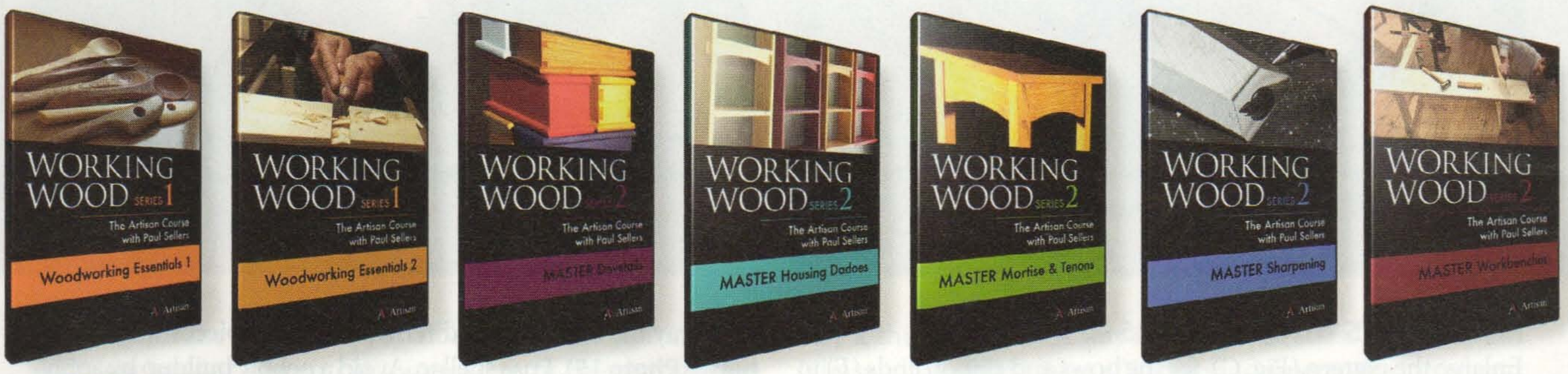

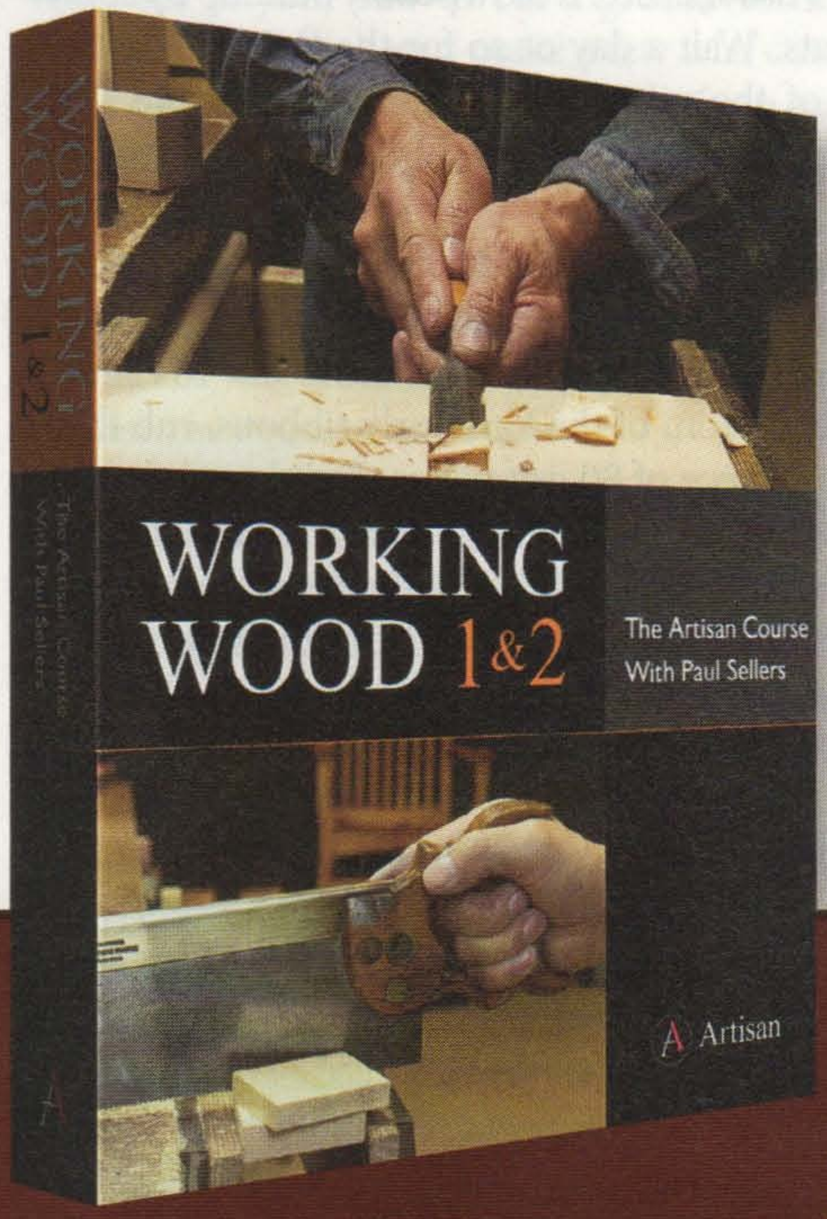

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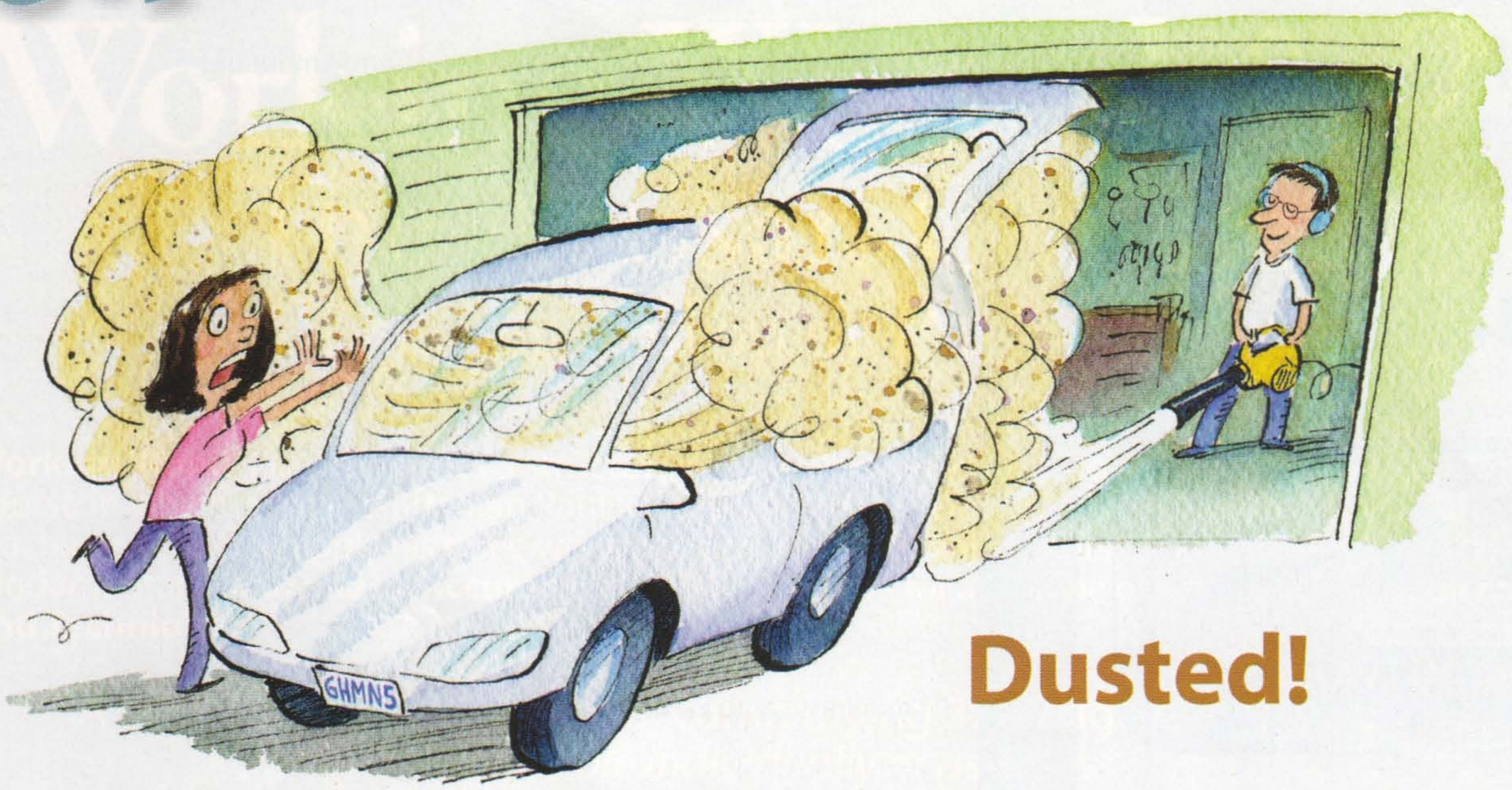
Oops! Crazy Mistakes Woodworkers Make



Dusted!

WHILE VISITING the local Habitat for Humanity store I noticed a woodturning lathe. The store manager told me it had come from an estate and was almost new, so I bought it and took it home in the back of my wife's minivan. I backed up to my garage shop and opened the minivan's hatch. But when I opened the garage door, I realized the shop was a complete mess. So, I decided to put everything away before unloading the lathe and moving it into its new home. Clearing the clutter revealed mounds of shop dust, so I got out my trusty leaf blower, donned my hearing protectors and started to blow out the dust as I always did, through the open garage door.

Unfortunately, my wife appeared just in time to see clouds of shop dust billowing out of the garage—and into her beloved minivan. As a result, I've been told that I may never again use the minivan to haul tools or materials … ever!

Peter J. Santos

Like a Sailor

MY DAUGHTER and her classmate asked if I could carve a wooden sign in Chinese characters for their school project. "Sounds like a fun challenge," I thought. The classmate, who happened to be of Chinese descent, jotted some characters on a note and gave it to me, saying, "I think that's right."

I'm not a carver, so I decided to create the characters freehand, using my laminate trimmer. Unfortunately, the bit dug into the wood here and there, so my characters didn't exactly match the sample. To check the results, I decided to visit my daughter's classmate's mother. Her eyes widened when she saw my creation and her face got red. "You must not like this person very much," she said. She wouldn't tell me exactly what my sign said, but she corrected the mistakes I'd made and sent me along saying, "Those weren't words you would say to a friend or neighbor."

I returned the next day with a new sign. After examining it, my new friend nodded and said, "Much better. Now you don't sound like a Chinese sailor."

Roy I. Steele

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