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American Woodworker

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#142, JUNE/JULY 2009

ROUTER TABLE micro-adjust

44 BARGAIN WORKSHOP SUPPLIES

ROUTER JIG FOR OVAL INLAYS

Tim Coleman: Master of Details

The Art of Mortise and Tenon Doors

BUILD A 12 DRAWER DRESSER

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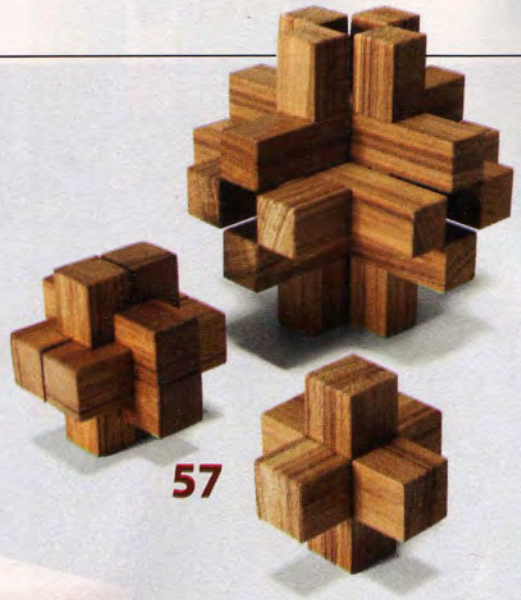

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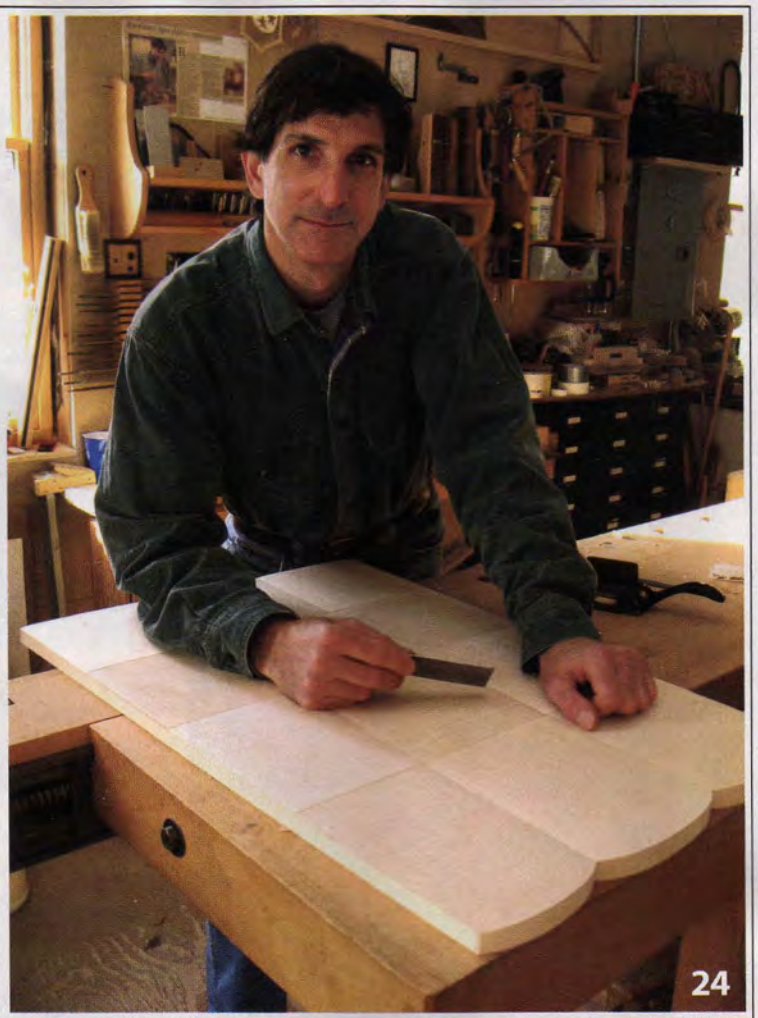

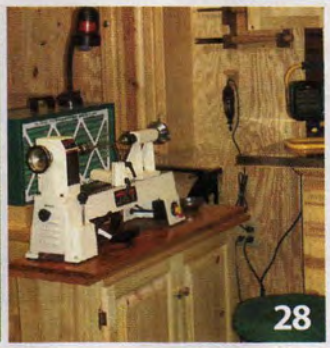

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From the Editor's Desk

Take Your Pick

A LARGE PART of what makes woodworking such a rewarding activity is the wide variety of materials, techniques and tools that are available to work with. As the builder, you get to choose your challenges. Projects can be small or large, simple or sophisticated. Sometimes woodworking isn't even about the project; it's about the process. You may simply want to get better at a certain technique, or learn an entirely new one. Developing your skills is like adding a new tool to your shop—it's a great way to expand the kinds of projects you can tackle.

Providing information that helps you build your woodworking skills is what *American Woodworker* is all about. Page through this issue and you'll find a rich mixture of projects, tips, techniques and tool information.

Do you need something practical for your home? Check out the "12 Drawer Dresser" on page 44. Even if you don't need the dresser, you'll find a great technique for installing drawers that guarantees smooth, easy operation.

Want to hone your joinery skills? Then turn to the Build Your Skills section (page 35) for complete step-by-step directions on building frame and panel doors, using traditional mortise and tenon joinery.

Maybe you're searching for new jigs to use with your router. You'll find just such a handy jig on page 62 in "Routing For Oval Inlays." Once you learn about this technique, you'll be able to apply it to other types of inlays and projects.

If your shop time is limited, check out "Wooden Burr Puzzles"on page 57 and "Pizza Paddle"on page 66. Either project can easily be made in a weekend, using wood you probably have in your scrap pile. Yet both offer unique challenges and a chance to practice your jig-building and joint-cutting skills. The end products are useful too. The puzzles will keep your friends (or enemies) busy, and the pizza paddle will serve up your movie night pizzas in style.

In addition to these great projects and techniques, you'll also find the usual collection of wonderful Workshop Tips and Well-Equipped Shop tools. And of course, there's this issue's Great American Woodworker,Tim Coleman (page 24). For Tim, it's all about the details. And for *American Woodworker*, it's all about helping you build your skills. In this issue, like every issue, there's a lot to choose from. So take your pick and tell us what you think. We'd like to hear how we can make *American Woodworker* even better and more useful to you. Send your comments to AWEditor@americanwoodworker.com, or take our issue survey at: www.americanwoodworker.com/IssueSurvey142.

In closing, I wish you a great summer working in your shop. Stay cool and keep the chips flying.

Randy Johnson

More On the Web at AmericanWoodworker.com

Video

To see the solutions to these puzzles, go to **www.AmericanWoodworker.com/burrpuzzles**

Forum

Add your comments or ask questions about this project at **www.AmericanWoodworker.com/12DrawerDresser**

Shop Project

Get complete plans for our favorite shop-made router table and fence at **www.AmericanWoodworker.com/AWRouterTable**
See plans for adding a shop-made router lift to this table at **www.AmericanWoodworker.com/ShopMadeRouterLift**

Technique

Learn Lonnie Bird's method for making arched-top frame and panel doors at **www.AmericanWoodworker.com/TombstoneDoors**

Your Tips

To share your own Thrifty and other Workshop Tips, post a blog at **www.AmericanWoodworker.com/MembersTips**

Project

Find complete plans for building this jewelry box at **www.AmericanWoodworker.com/TreasuredWoodJewelryBox**

Best Blog Contest
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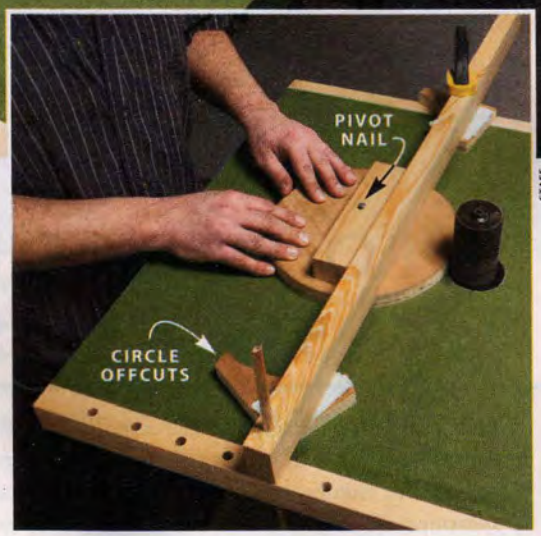


STAFF

Spindle Sander Extras

MY OSCILLATING SPINDLE SANDER'S auxiliary table makes quick work of edge sanding short boards and forming perfect circles. Make the table from melamine or a laminate-covered material and fasten it to your sander's table. Make a fence the same length as the table and drill a hole through one end for a 3/8" x 6" dowel. Drill a series of 3/8" holes in a strip of hardwood and attach it to the back edge of the table.

To edge sand, place the board next to the sanding drum and adjust the fence so that it contacts the opposite side of the board. Remove the board and clamp the fence. Push the board along the fence, making sure you're going against the drum's rotation. If you need to remove more material, unclamp and pivot the fence. Always take light passes.

To sand circles, attach a 3/4" x 1-1/2" x 8" board to the back side of the fence. Drill a hole in this board large enough to slip a nail through. The nail acts as a pivot point. Rough cut your circle on the band saw, then place the offcuts plus a few business cards under the fence for clearance. Tap the nail into the center of the workpiece, move the fence so that the circle's edge just touches the sanding drum, and you're ready to go.

Donald W. Arnsmeier

Terrific Tips Win Terrific Tools!

We'll give you $100 for every original workshop tip we publish. One Terrific Tip is featured in each issue. The Terrific Tip winner receives a 12" Leigh Super Jig with VRS (Vacuum and Router Support), a $239 value.

E-mail your tip to workshoptips@americanwoodworker.com or send it to American Woodworker Workshop Tips, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121. Submissions can't be returned and become our property upon acceptance and payment. We may edit submissions and use them in all print and electronic media.

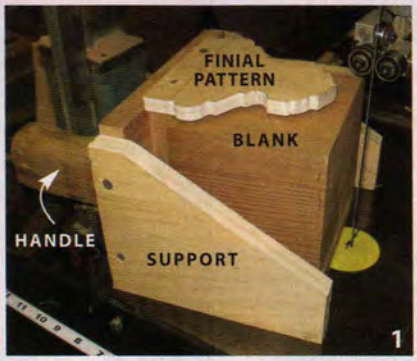
EDITOR: BRAD HOLDEN; PHOTOGRAPHS COURTESY OF CONTRIBUTOR UNLESS NOTED

Shave-A-Shelf

I DEVISED A NEW WAY to fit a shelf into a dado. I use my router to make a tiny adjustment to the shelf's thickness instead of fine-tuning my dado set with shims to match the plywood's thickness. This may be standard practice for some woodworkers, but it's new to me.

For 1/4" deep dadoes, I use a 1/4" rabbeting bit with a bearing. I set the bit's depth-of-cut to the absolute minimum, and experiment. Once I've got a perfect fit, I shave all of the shelves.

George Davis



Pattern-Cut Finials

THE TRADITIONAL WAY TO MAKE a square finial on a bandsaw is to mark and cut the pattern on one side of the blank, then tape the offcut back on to the blank in order to guide the cuts on the adjacent side. This is difficult to do with an intricate pattern because it's hard to keep the offcut in one piece.

I use a sled with a handle for steering it. First, I screw the finial blank to the sled (**Photo 1**). Next, I screw a pattern to the top edge of the sled and follow the pattern to cut the first side of the finial (**Photo 2**). Then I unscrew the finial, rotate it 90°, screw it back on the sled, and cut the next side (**Photo 3**). The sled's side supports are an important safety feature–they keep the finial from being pulled down by the saw's blade during the second cut.

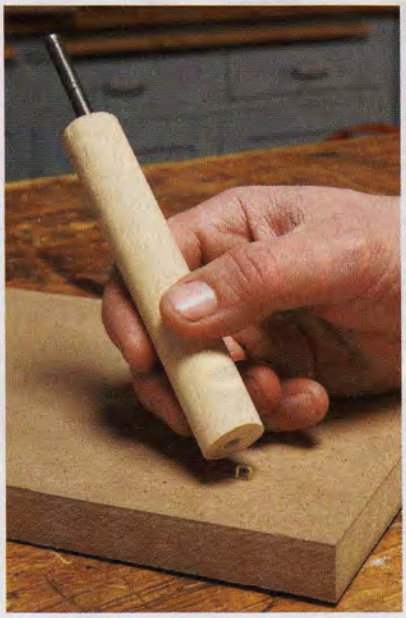
Dan Miller

Suction Box

IF YOUR SHOP IS INSIDE or attached to your house, you know that migrating sawdust is a problem, especially if you do a lot of power carving. To minimize dust, I cut out one side of a 65-quart plastic storage box ($12), and taped the box upside down to a down-draft table. I taped paper over the holes not covered by the box for better suction inside the box.

Used in conjunction with my shop's dust collection system, my suction box helps keep the house dust free.

Leo O'Campo



Staple Set

PNEUMATIC STAPLERS don't always set 1/4" crown staples flush. Driving them the rest of the way with a hammer causes the staples to kink, so I designed this easy-to-make tool, which I call a "staple set."

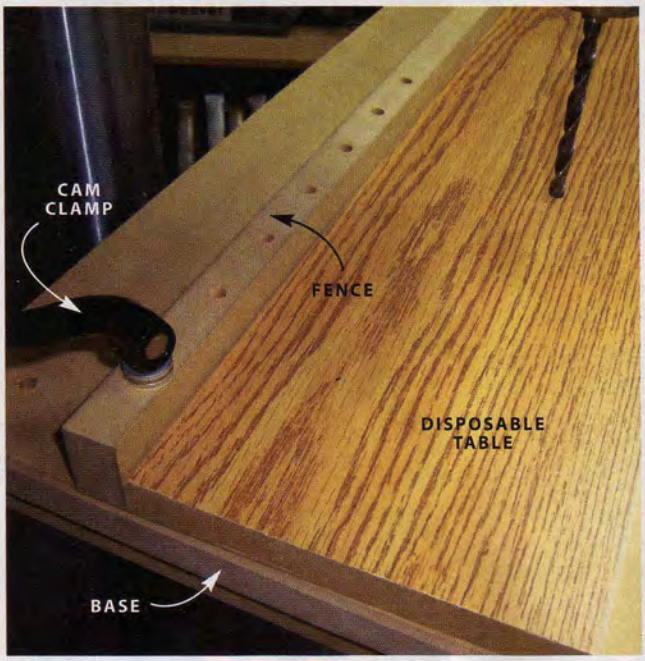
To make the set, cut a 5" section of dowel at least 1" in diameter and drill a 1/4" hole down the center. You'll have to drill the dowel from both ends to reach all the way through. Insert a 6-1/2" length of 1/4" steel rod into the hole. Place the staple set over the staple and tap the steel rod. This sets the staple without bending it.

Bob Enderle

Glue Caddy

BEING AN IMPATIENT SORT, waiting for glue to reach the bottle's spout became a pet peeve of mine. To put an end to this, I made a stand with a hole in the top matching the diameter of the bottle's lid. It allows the bottle to stand upside down so the glue is always ready to use. For stability, I made the base slightly larger than the top.

Mark Thiel



Disposable Drill Press Table

INSTEAD OF MAKING DISPOSABLE INSERTS for my drill press table, I found that it's faster and cheaper to make disposable fence/table assemblies. I can use the entire surface of my disposable tables, so I get more life from them.

First, make a 3/4" x 16" x 20" base for your drill press table and bolt it in place. Epoxy a 3" 1/4-20 bolt through one corner of the base. Then cut a fence 3/4" x 2" x 18". Drill 1/4" holes 2" apart along the 3/4" surface of the fence's length. Screw the fence to an MDF or plywood off-cut. Slip the fence/table assembly onto the bolt through the fence's first hole, and secure it with a cam clamp or jig knob. Pivot the other end to position the fence and clamp it in place.

When the first area of the disposable table is full of holes, loosen the clamp and move the fence to the next hole. When you've moved the fence through all of the holes, unscrew the fence and screw it to the opposite edge of the disposable table and start over. When the whole board is used up, salvage the fence for the next disposable table.

Serge Duclos

Low-Budget Office Supplies

I BUY MOST OF MY drawing equipment at a large office supply store. I keep this long list handy so I can stock up whenever I go to the store:

1. **Eraser tips.** The erasers on my pencils never last long enough. $0.79 for 12.
2. **9 x 12 manila envelopes** for storing a project's paperwork. Write pertinent information on the outside. $9 a box.
3. **Graph pads** for drawing projects to scale. $4 each.
4. **Legal pads** for notes, sketches, cutting lists, material costs, construction notes, etc. $7 per dozen.
5. **Clipboard storage case with calculator.** For traveling, I keep inside the case a legal pad, graph pad, pen, project envelopes and a phone list of lumber and hardware suppliers. $17.
6. Hand crank **pencil sharpener**. $13.
7. **Poster board** for full-size layouts and patterns. $1.99 for three sheets.
8. **White chalk** for marking stock when jointing or planing. $1 a box.
9. **Drafting tools.** These include a 12" engineer's ruler, three French curves, a circle template, a 45° triangle, a 30° triangle, a protractor and a 24" T-square. The total cost is about $20.
10. Paper Mate Mirado **Black Warrior Pencils**. These are my favorite pencils. Their soft lead is ideal for marking wood. $2.50 a dozen.
11. **Large rectangular erasers.** $2 for three.
12. **Stretch wrap.** I use it for bundling parts until I'm ready for assembly. $13 for 1,000 feet.
13. **Dry-erase boards.** Hang them up to keep to-do lists, reminders about shop supplies needed, etc.

E-mail your tip to thriftywoodworker@americanwoodworker.com or send it to American Woodworker, Thrifty Woodworker, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121. Submissions can't be returned and become our property upon acceptance and payment. We may edit submissions and use them in all print and electronic media.

EDITOR: BRAD HOLDEN

$1 Shop Supplies

WHEN BUYING SUPPLIES for my shop, I often visit a store where stuff costs only $1. Many items sell for much more at a home improvement store, so I save a pile of money. You never know what you're going to find in a $1 store, but here's a list of things to look for:

1. **Plastic drawer organizers**, 3 to a pack. They're perfect for storing small parts or mixing finishes or epoxy.
2. **100 cable ties** for binding cords, dowels, or anything that needs bundling.
3. **Shelf liner** for use as a sanding or routing pad. It's labeled "Crisper Liner" at my store.
4. **Micro-fiber cloths.** They work better than tack cloths for removing dust, and you can wash and re-use them.
5. **LED lights.** Stick them in cabinets, under cabinets, or wherever you need a little extra light.
6. A **small tripod** for a lightweight digital camera. A photo is useful for remembering a setup weeks later.
7. **Paintbrushes.**
8. **Dust masks.**
9. **Popsicle sticks** for mixing epoxy, stirring finish, using as small shims, filling stripped-out screw holes, etc.
10. **Latex gloves** for finishing.
11. **Plastic funnels** for pouring finishes.
12. **Spray bottles** for solvents or water.
13. **Toothbrushes** for cleaning a spray gun or machine parts. They're a must for restoring rusty old tools.
14. **Small paper cups** for glue and small amounts of finish.
15. **Ziploc bags.** Store your foam brush in one of these if you're applying multiple coats of finish. It'll stay usable for a day or two.
16. **Big wall clock.**
17. **Over-the-door hooks** to hang finished parts for drying.
18. **Cotton swabs.** I use these to clean the rim on paint, poly and stain cans.
19. **Plastic measuring cups.** I use these for finishing materials when I'm following or writing a recipe.
20. Wind-up 60-minute **timer**.
21. Heavy duty **shop towels**.
22. **WD-40.**
23. **Hand cleaner.**
24. **Wire whisk.** Chuck it in your drill to stir paint.
25. 2" blue **painter's tape.** I mark parts by placing a piece of tape on them, then write on the tape. It's easier to peel off the tape than it is to erase pencil marks on the wood.
26. 2" **putty knife**.
27. Painter's **5-in-1 tool**. This makes a great pry-bar, glue scraper, putty-knife cleaner, etc.
28. **Toothpicks** for dabbing glue or repairing stripped-out screw holes.
29. **Wax paper** for keeping glued-up parts from sticking to wooden supports. It's also good for waxing tool tables and miter gauge bars.
30. Elastic **bandages**. Enough said.
31. Big plastic **dustpan**.

Premium Planer for Small Shops

LAGUNA'S PLATINUM SERIES 16" Thickness Planer offers big capacity, a spiral cutterhead, two feed-rate speeds and digital precision at an attractive price. The German carbide insert cutters in Laguna's Shear-Tec spiral cutterhead promise great results and long service life. Dual feed speeds allow quick stock removal or superior finish cuts. Digital readout dials in precise thicknesses, making repeatable cuts effortless. A positive gear drive system and four-post support make height adjustments smooth and accurate. Table rollers positioned beneath the chain-driven feed rollers help to smoothly feed narrow and wide boards. A 3 hp motor supplies plenty of power to process stock up to 16" wide and 8" thick. Laguna's Platinum Series 20" Thickness Planer is similarly equipped and adds 4" in width capacity and a 5-1/2 hp motor.

Source: Laguna Tools, www.lagunatools.com, (949) 474-1200, Laguna Platinum Series 16" Planer, #MPL5000-0120, $2500; 20" Platinum Series Planer, #MPL6000-6120, $3995.

Magnetic Fences

CLAMPING A GUIDE for sawing on your bandsaw or tablesaw can often be a real pain. Here's a new solution from MagSwitch, the maker of those super-strong magnetic featherboards that can be released with one turn of a knob. Their latest product is a magnetic Universal Base that accepts two kinds of vertical supports: a tapered Resaw Fence and a straight Dual Roller Fence. Both are equipped with ball bearings for a smooth, non-marring feed. The Resaw Fence is tapered so you can adjust the angle of your workpiece for blade drift as you saw. The Dual Roller Fence can be adjusted for drift before you start sawing, and is also useful for supporting tall stock on the tablesaw. The Universal Base accepts either two 20mm MagJigs or a pair of the more powerful 30mm MagJigs. Both effectively turn on or off with a turn of a knob, making setup and release quick and easy.

Source: MagSwitch, www.magswitch.com.au, (303) 468-0662, MagFence Universal Mounting Base only, $24.99; MagFence Resaw Fence, $34.99; MagFence Dual Roller Guide, $39.99; Combo kit, includes all three plus two 30 mm MagJigs, $149.

Better Tracking for Narrow Blades

KEEPING NARROW bandsaw blades straight and stable is tricky, particularly when you're cutting small, intricate patterns. Carter Stabilizer guides offer an economical solution for blades 1/4" wide or less. Just remove your bandsaw's support block holder, replace it with the Stabilizer, and you're ready to cut. Stabilizer guides are available for many popular bandsaw brands.

Source: Carter Products, www.carterproducts.com, (888) 622-7837, Stabilizer Bandsaw Guides, about $80.

PHOTOS COURTESY OF THE MANUFACTURER UNLESS NOTED.

Make Pocket Holes Even Faster

WITH KREG'S QUIK-KIT quick change kit, you can swap between bits for pocket hole drilling and pocket screw driving as fast as a gunfighter slings lead.

The Quick-Change Chuck accepts both hex shank bits. You simply pull back the sleeve, insert the bit, let go and you're off and running.

The QUIK-KIT includes the quick-change chuck, a hex shank pocket hole bit, a hex shank #2 driver bit and a stop collar. The bit is also available separately.

Source: Kreg Tool Company, www.kregtool.com, (800) 447-8638, Kreg QUIK-KIT Quick-Change System, $29.99; QUIK-BIT Hex Shank 3/8" Pocket Hole Drill Bit, $17.99.

Better Ripping

HERE'S A PRODUCT that saves time and material, and effectively boosts the power of your contractor's saw. It's Freud's Thin Kerf Glue Line Ripping Blade. This blade saves time by creating a surface that's ready to glue, eliminating a trip to the jointer. It saves material by cutting a thinner kerf than a standard blade, which can really add up if you're sawing a board into many narrow pieces. Cutting that thin kerf requires less power than a standard blade, a real plus when using a saw with less than 3 hp. The blade features triple grind teeth, a non-stick coating, and laser-cut anti-vibration slots. It does not require stabilizers.

Source: Freud, www.freudtools.com, (800) 472-7307, Freud Industrial Thin Kerf Glue Line 10" Ripping Blade, #LM75R010, $59.

Large Capacity Midi-lathes

EVER HEARD of running a lathe backwards? It's a useful option for obtaining a super-smooth surface because you can sand in both directions. The new 46-460 from Delta is the first benchtop model to offer this feature. With a 12-1/2" dia. swing, Delta says that this lathe also has the largest capacity in its class. The 46-460 is a rheostat-controlled, variable-speed machine with a range from 250 rpm to 4000 rpm. It has a 1 hp motor.

Delta has also introduced another 12-1/2" swing midi-lathe: the 46-455. It uses a traditional pulley system to deliver five speeds: 500, 950, 1550, 2700 and 4000 rpm. It's powered by a 3/4 hp motor.

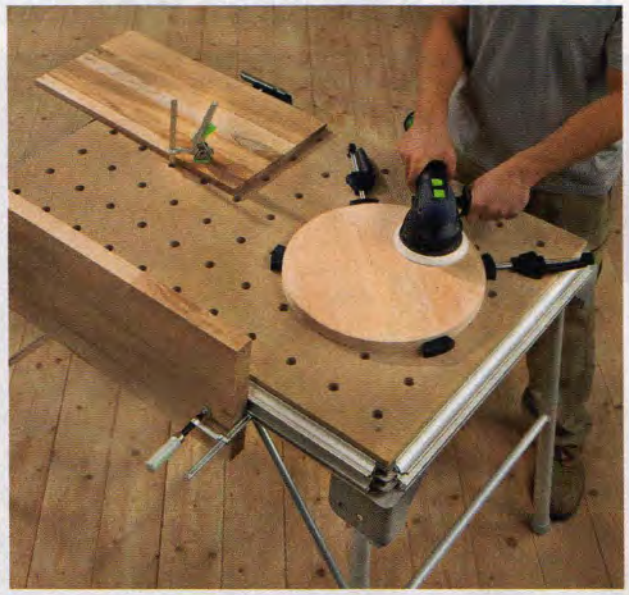
Both machines come with a 3" faceplate, 6" and 10" tool-rests, and an indexing head with 24 positive stops. A 25-1/2" modular bed extension can extend the bed to a maximum of 93" between centers.

Source: Delta Machinery, www.deltaportercable.com, (800) 223-7278, Midi Lathe 46-460, $599; Midi-Lathe 46-455, $499.

Safely Rip Thin Strips

THIS TABLESAW JIG allows you to rip consistent thin strips safely and accurately. The jig clamps in the miter slot to the left of the blade. After each cut, you move the rip fence until the board touches the jig—then rip again for another perfect strip. (Always install a zero-clearance insert in your tablesaw whenever you rip thin strips.) This jig is made of solid phenolic resin. It has a ball bearing guide at the tip, a graduated scale to fine-tune thickness and a 4-5/16" range of adjustment (from 1-3/8" to 5-11/16" away from the miter slot).

Source: Rockler Woodworking and Hardware, www.rockler.com, (800) 279-4441, Thin Rip Tablesaw Jig, #36833, $21.99; Zero Clearance Inserts, #69147 #69155, #69163, $26.99.



Space-Saving Workbench

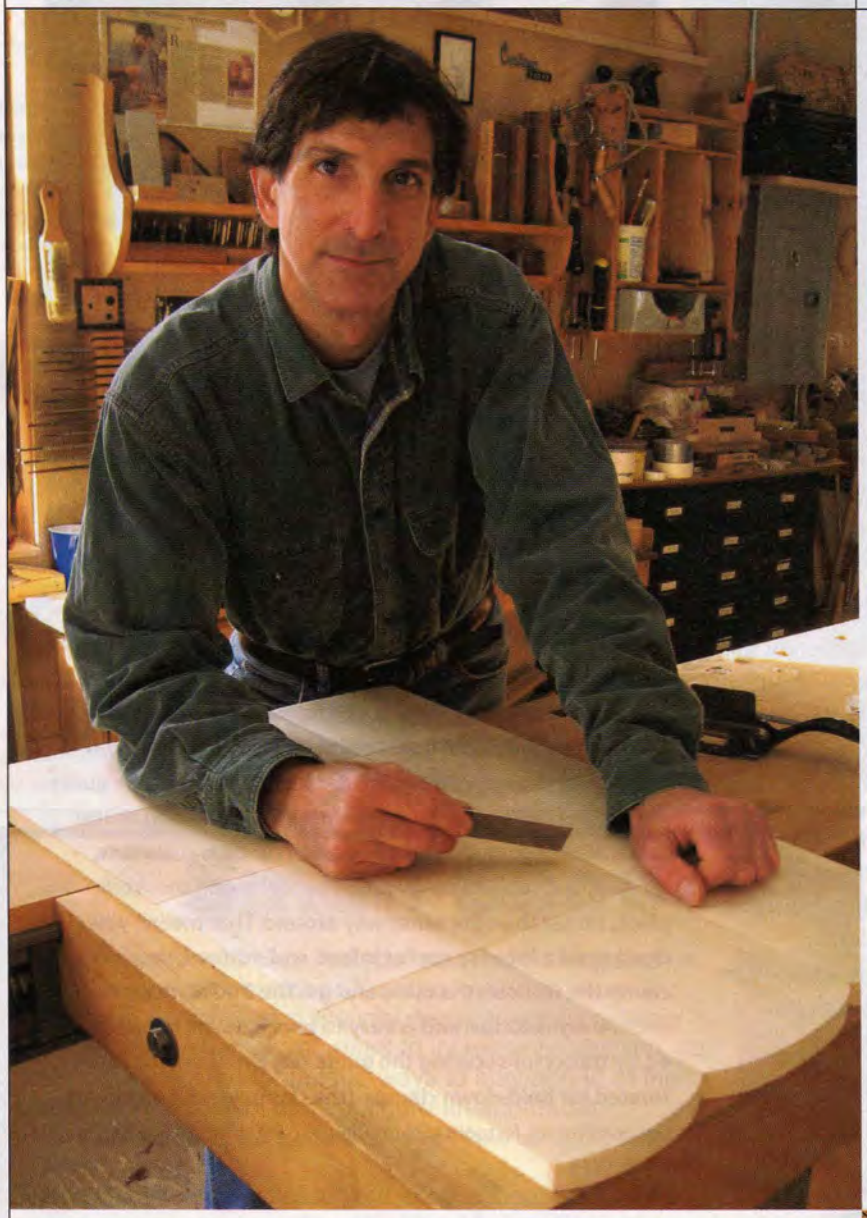
IF YOU WORK in a small space, on a jobsite, or must stow all your tools when you're done, check out the new Festool MFT/3 Multifunction Table. It's designed to work hand-in-glove with the Festool guide rail system, which accommodates their plunge-cutting circular saw and router. The guide rail system replaces or supplements a tablesaw and router table, allowing you to make precision rip cuts, cross cuts, dadoes, and rabbets by guiding the tool along the workpiece, rather than the other way around. That means you don't need a lot of space for infeed and outfeed; you just clamp the work on the table and go. The MFT/3 measures 30" x 45", weighs 62 lbs. and is easy to knock down. It's surrounded by tracks for securing the guide rail, while the top is perforated for hold-down clamps (the clamps aren't included).

Source: Festool, festoolusa.com, (888) 337-8600, MFT/3 Multifunction Table, $575.

Super Sawblade

EVERY WOODWORKER wants a tablesaw blade that performs equally well in all cutting situations. After, all, changing blades for different cuts and materials takes time. Besides, buying and maintaining an arsenal of specialty blades costs money. Infinity Cutting Tools promises that its new Super General 10" 40-tooth blade will eliminate the need to switch blades by producing super-smooth results whether you rip or crosscut in hardwood, softwood or face-veneered plywood. Made from German steel, with C4 micro-grain carbide teeth, sound dampening slots, PTFE coating and a precision ground hub, the Super General 1/8" kerf blade is built for quiet, vibration-free operation and a long service life.

Source: Infinity Cutting Tools, www.infinitytools.com, (877) 872-2487, Infinity Super General 10" x 40T Blade, #010-044, $109.



Tim Coleman

It's all in the details.

By Spike Carlsen

TIM COLEMAN has had sawdust in his veins for as long as he can remember. As a kid, he was so enamored by woodworking that he had his own workshop. At the age of ten—when most kids were asking for a bike for Christmas—Tim asked for a jigsaw. He couldn't wait to get to junior high school, where he could take wood shop. "And the year I started was the year they decided boys should take cooking and home economics and girls should take shop class. I was devastated," he recalls. But clearly this wasn't enough to stand in the way of Tim's passion for woodworking.

An Artisan's Life Story

Post-graduate studies in wood

After graduating from college with an English major in the mid-80s, Tim decided it would be wise to have a skill to fall back on—and he naturally turned to woodworking. He moved to Seattle, where there was a vibrant woodworking community, and apprenticed under a furnituremaker. As luck would have it, the furnituremaker worked in a cooperative workshop with eight or nine other woodworkers. By peeking over the shoulders of others, Tim learned cabinetmaking, carving and sculpture as well, skills that show in his work today.

Tim learned countless techniques in the workshop, but it was a lecture by James Krenov that opened his eyes to the world of furnituremaking as an art form. "I was blown away by his whole approach. I fell in love with the idea of furnituremaking as a form of self-expression. That was a real turning point," Tim explains. As a

Tim creates unique borders reminiscent of hand-tooled leather by carving and stamping patterns into light colored wood, applying dark stain, and then scraping off the excess.

EDITOR: TIM JOHNSON • PHOTOGRAPHY: COURTESY OF TIM COLEMAN

Extraordinary patterns highlight Tim's work. The intricate border on his "Yew and Me" cabinet was created by applying a layer of sycamore veneer over western yew, and then carving away the bulk of the sycamore.

These lessons remain evident in Tim's designs today. His works range from freestanding cabinets to tables, chairs and desks. Before beginning a piece, he'll often make a mockup out of cardboard or scrap wood to get a feel for proportion, especially for pieces that have curves that are hard to get a feel for on paper. Since many of his methods are idiosyncratic, he prefers to work alone.

Details, details

One of Tim's trademarks is the exquisite detail that goes into each piece, detailing that takes many forms. One technique is the use of applied veneers (see "The Delicate Art of Applied Veneer," page 27). He also uses stamping on certain pieces. "My first workshop was in a former manufacturing plant that used to make steel stamps for the tool industry, and I kept finding old stamps between the floorboards and on the windowsills," he recalls. He originally used these old stamps to create patterns and to texture pieces, but eventually began making his own stamps. Sometimes the stamped patterns are dominant, other times they serve as background texture.

result of that lecture, Tim eventually wound up in California, where he spent several years working with Krenov at the College of the Redwoods.

What "Krenovian" ideas have stuck with him? "Krenov felt if you paid attention to the wood, it would suggest it's final form. Rather than starting out with a firm idea for a piece of furniture, then selecting the wood, Krenov often starts with the wood and lets it inspire the project. It allows for spontaneity. It's very gratifying when it works," Tim explains. "Krenov talked about composing a piece, rather than working off a strict plan. He'd cut out parts larger than needed then rough clamp them together to get a sense of scale and proportion. But he's still old school in some ways; he never sacrifices quality or function."

The upper doors of Tim's "So Sweet" cabinet feature stamped and carved patterns. The divider features pierced veneer applied over a contrasting substrate (see "The Delicate Art of Applied Veneer," page 27).

In this graceful jatoba settee, Tim creates pleasing patterns using nothing more than wood and space.

While Tim uses power tools in the initial stages of production, he enjoys working with hand tools. "I love the immediacy of a hand tool on a piece of wood. It's not only pleasurable; it's often more efficient than using power tools. I don't even own a belt sander."

Tim likes working with domestic hardwoods, such as cherry, walnut and maple, but also uses more exotic species, such as English sycamore and Japanese ash. "I have some absolutely incredible Japanese horse chestnut stashed away that's unlike anything I've ever seen," he muses. "Every couple of months I'll pull it out and stare at it, then put it back. I haven't found the perfect use yet, but I will some day. Luckily there's no expiration date on wood."

Tim's work is split evenly between commissions and speculative pieces. He's had some unusual commissions. One was working on a cabinet that now houses the Emancipation Proclamation. Another involved creating molds for forming the fiberglass seats for a sports stadium. Speculative pieces allow Tim the freedom to really stretch and try new things. One piece required over 600 hours of painstaking labor.

Learning by teaching

Tim likes to pass on his woodworking skills and passion to others. He's taught summer classes at the College of the Redwoods and Peter Korn's Center for Furniture Craftsmanship. "I hold a lot of information in my head when I do my own projects and it's hard to articulate. But when I start working with someone else on a project, the information flows. I learn when I teach," Tim explains. "It's fascinating to watch students react to wood as it misbehaves. It isn't the easiest material to work with, because it doesn't always do what you want it to do. Wood reacts. A board has a lot of life in it."

Tim's work shows a lot of life, too. His pieces weave influences from India, Asia, Art Deco and modernism. He also draws from nature and from the teachers he's studied with. To see more of Tim's work, visit these two websites: www.furnituremasters.com www.timothycoleman.com.

Spike Carlsen is author of A Splintered History of Wood: Belt Sander Races, Blind Woodworkers and Baseball Bats, *published by HarperCollins.*

The crisp fluted patterns on this cabinet are tempered by delicate patterns of tone and texture, the result of Tim's deft use of maple and quartersawn oak.

The Delicate Art of Applied Veneer

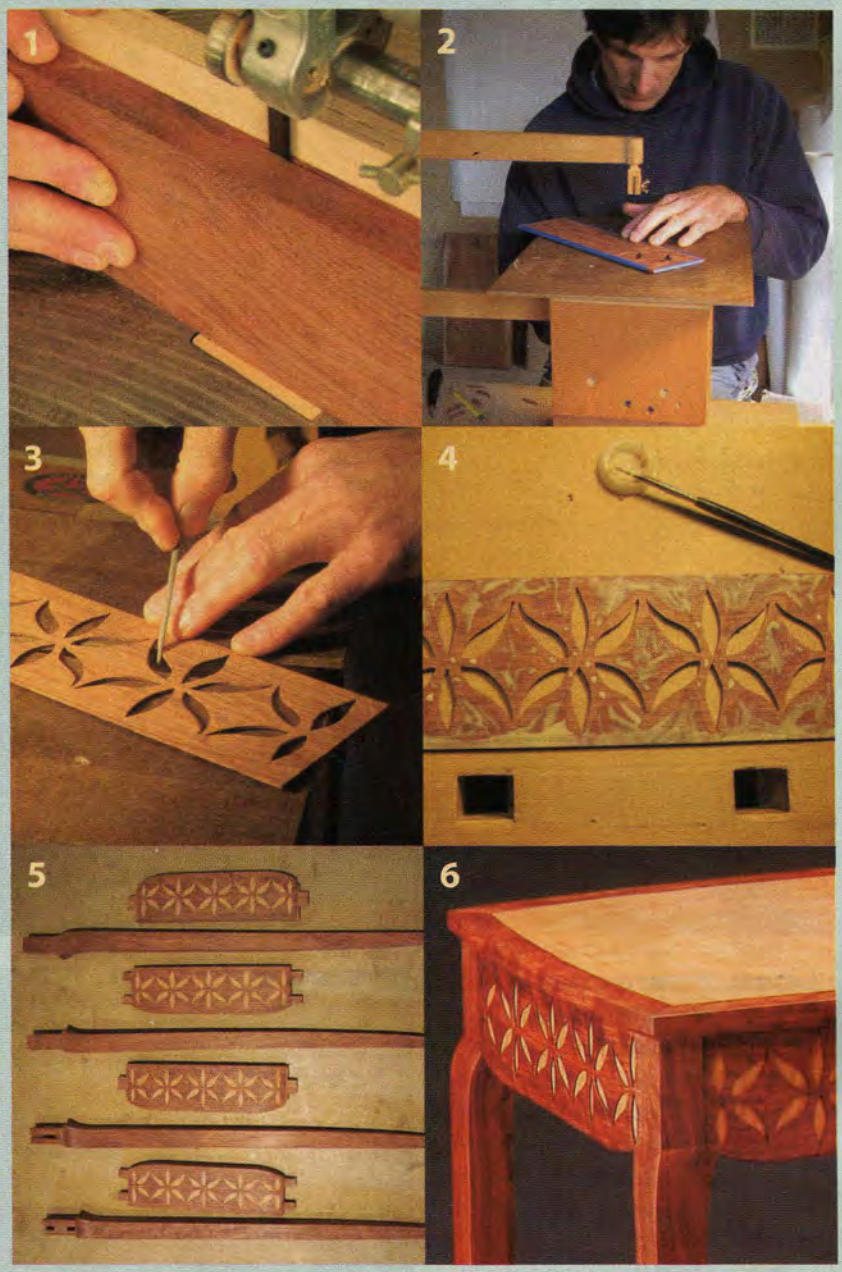
WOOD VENEER HAS BEEN AROUND for a long time; examples have been found on well-preserved Egyptian coffins nearly 4,000 years old. But Tim has developed some rather unique techniques for working with the material.

For starters, he cuts his own veneer **(Photo 1)**. Most commercially available veneers are thin—and getting thinner, according to Tim. He resaws veneer pieces 1/16" to 1/8" inch thick, and then runs them through a stationary belt sander to create strips of uniform thickness and smoothness. Tim sometimes applies these veneers in a conventional manner—to create a uniform surface or in a parquet pattern—but just as often he cuts decorative patterns into them and applies them to the surfaces of his pieces. The underlying wood shows through and the resultant texture and shadow lines create a richly unique look and feel. "It's not really veneering or marquetry—I'm not quite sure what to call it," Tim admits.

Once Tim has determined the pattern, he uses a hand made, hand-operated scroll saw to cut out the design **(Photo 2)**. Sometimes he cuts the pieces out individually, other times he gang saws two or three pieces at a time. He uses small files to clean up the cutouts **(Photo 3)**, and on certain projects rounds over the outer edges to create a "pillow" effect.

He applies the glue carefully and strategically **(Photo 4)**, because any squeeze-out requires tedious sanding and scraping to remove. He then uses a mini-press made from clamps and scrap wood to glue the veneer to the substrate, which is often a contrasting color **(Photos 5 and 6)**.

Though the process seems painstaking, Tim enjoys it. "I've done it long enough now that I'm pretty fast at it. It's almost become second nature."



1. The process begins by resawing 3/32" thick veneer from solid wood, and then running each piece through a stationary belt sander to create 1/16" thick strips.
2. Tim cuts out patterns using a unique saw called a "marquetry donkey," which he built based on plans from an old French woodworking catalog. To operate the donkey, Tim bounces its lower arm by hand.
3. Small files are used to clean the edges of the sawn out pattern. Tim sometimes bevels the outer edges, to create a pillow effect.
4. Glue is strategically dabbed on to avoid squeeze out around the pattern's inner parts, where it is especially difficult to remove.
5. The pattern is glued onto the substrate—table aprons in this case, with a piece of contrasting veneer sandwiched in between.
6. The thick, cut-out veneer adds decorative patterns, deep shadow lines and texture to the completed table.

My Penmaker's Workshop

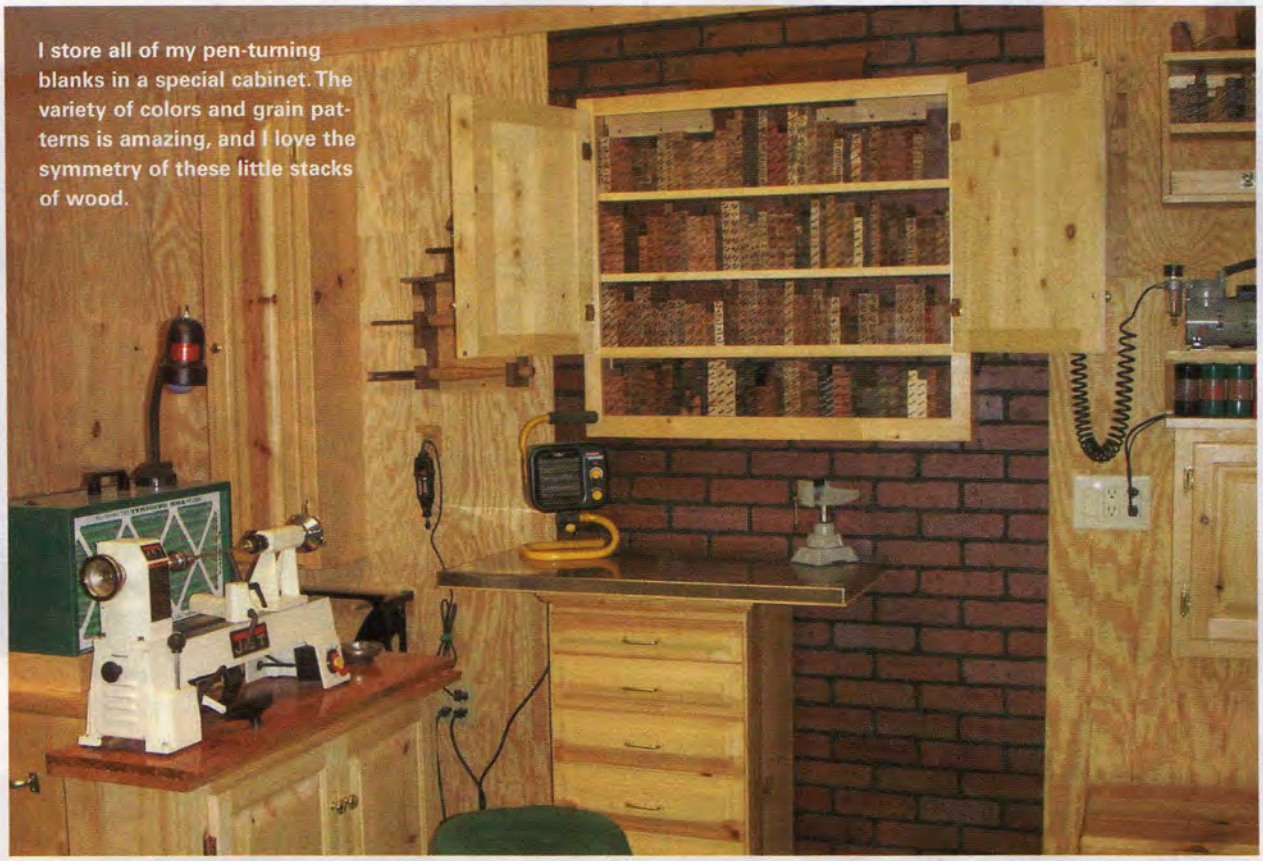
I STUMBLED ONTO PEN MAKING seven years ago, while scouring through my husband Jerry's woodworking magazines and catalogs, looking for a special Christmas gift for him. I came across a mini lathe that was advertised as the perfect tool for making custom pens … and I knew I was hooked.

I envisioned myself sitting at a little student-sized workbench with my new mini lathe, diligently working away on tiny projects. I ordered the lathe and lobbied Jerry for space in his basement workshop, assuring him that I would only need a teeny bit of room. I had no woodworking experience, so I bought some books about turning pens. When my lathe arrived, Jerry showed me how to hold a gouge and a skew.

As my interest in pen turning grew,

My husband, Jerry, built the cabinets and helped me set up my 12' x 12' shop. All of my power tools are scaled for making pens and other small projects, such as fishing lures, wine bottle stoppers and game calls.

EDITORS: DAVID RADTKE AND TIM JOHNSON • PHOTOS COURTESY OF LYNN VANDERPOOL



I store all of my pen-turning blanks in a special cabinet. The variety of colors and grain patterns is amazing, and I love the symmetry of these little stacks of wood.

my notion of adequate space changed. Jerry and I now share the basement, with my area having grown into a full-fledged 12' x 12' pen turning shop. It accommodates everything I need to make a pen—a large 8' workbench and four other smaller work surfaces, 24 drawers and 18 cabinets. Jerry custom-built them all for me—a great reward for all those years of woodworking-oriented Christmas presents!

The workbenches, shelves and cabinets support the scaled-down tools of my "five inch" turning trade: three mini lathes, a mini drill press, a mini disk sander, a mini shaper (for the pen boxes), a mini air filter, a mini metal cut-off saw (for the brass tubes), a mini duplicator, mini air compressors and a mini vacuum. Following my theme of small-scale tools, I cut my pen blanks to length with a fine-cut power handsaw, instead of a using a miter saw. In fact, the only full-size tools in my area are my turning tools.

In addition to pens, I now make a host of other five inch projects, including letter openers, wine bottle stoppers, fishing lures and game calls. These small projects don't throw a lot of sawdust around, so my shop is easy to keep clean and neat. I store my respirators, face protection, project hardware, bits, calipers, rulers, files, glues, gloves, and sanding and finishing supplies inside cabinets and drawers, where they stay dust free and easily accessible.

My projects don't require a lot of material (I can get up to 12 blanks out of a small piece of turning stock), so storage space isn't an issue. I've accumulated over a hundred different local and exotic hardwood turning blanks. I study books and articles about their origins and the legends that surround some of them, and wherever Jerry and I go, I watch for anecdotes about how they have been or are being used. I write that information on cards that accompany my pens. I get teased about the 144 square feet of space that I "need" to make a pen, but sharing woodworking with Jerry is one of the high points of our 40 years together.

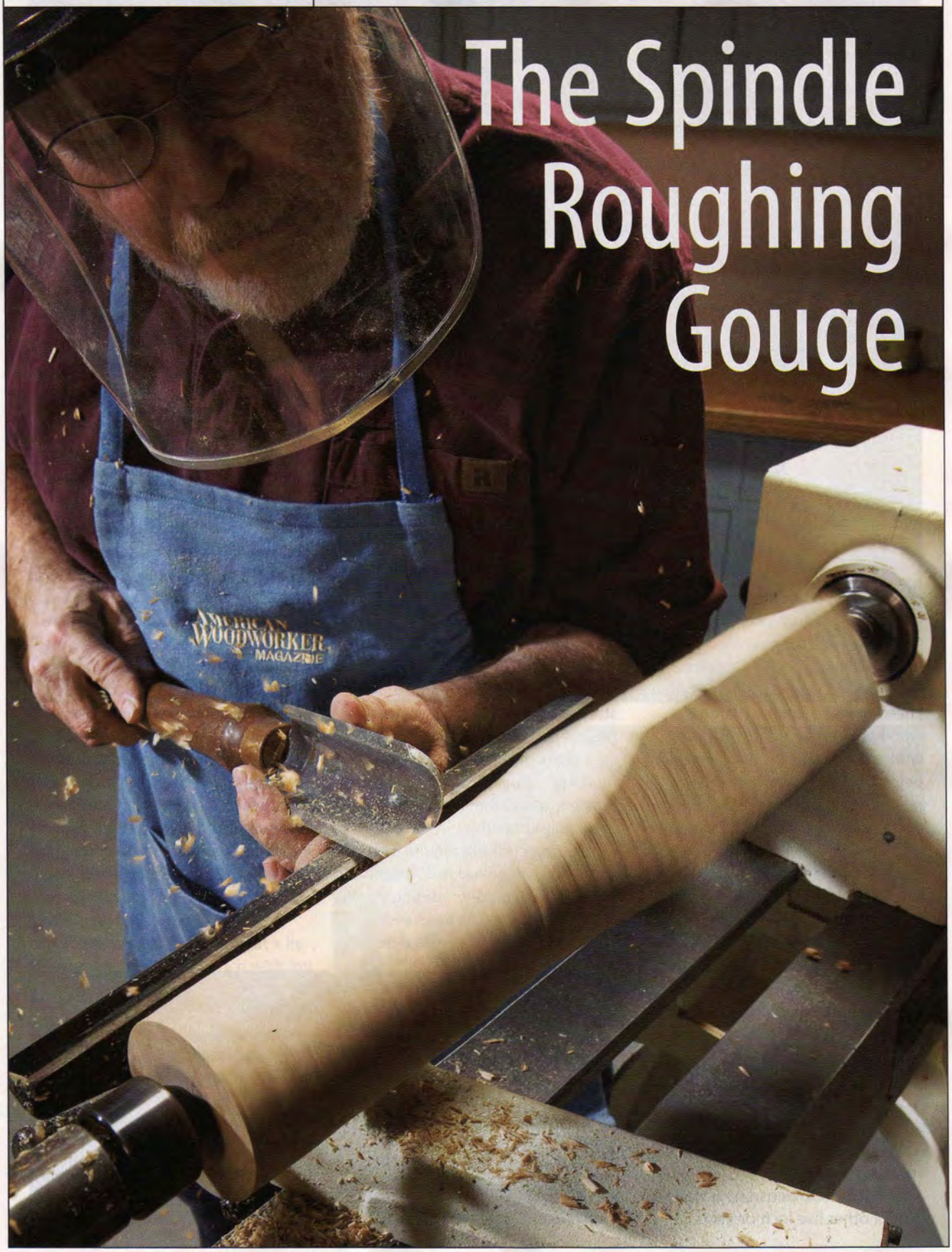
—Lynn Vanderpool
Gilmanton Iron Works, NH

Tell Us About Your Shop

Send us photos of your shop, a layout drawing and a description of what makes your shop interesting. Tell us what you make in it and what makes your shop important to you. If "My Shop" features your shop, you'll receive $100.

E-mail your entry to myshop@americanwoodworker.com with digital photos attached. Or mail your description with prints or digital photos on a disc to My Shop, American Woodworker, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121. Please include your phone number. Submissions cannot be returned and become our property on acceptance and payment. We may edit submissions and use them in all print and electronic media.

The Spindle Roughing Gouge



EDITOR: TIM JOHNSON

by Alan Lacer

WHEN I INTRODUCE someone to woodturning, I choose the spindle roughing gouge. When I work with kids, it's the first tool I place in their hands. Why? Because, used correctly, the spindle roughing gouge is one of the safest, most user-friendly turning tools. And don't be fooled by its name. The spindle roughing gouge can leave a very smooth surface. Master this tool, and you'll learn basic techniques that apply to using virtually all cutting-type turning tools. However, the spindle roughing gouge must be shaped and sharpened correctly and used in the appropriate applications—or its friendliness can quickly disappear.

Designed for spindle work

A spindle roughing gouge is designed to quickly shape square wooden blanks that are mounted on the lathe with the grain running parallel to the bed.

Borrowed from, and primarily made in England, this tool is deeply fluted (curved), and its cutting edge is straight **(Photo 1)**. In the U.S., most turning sets come with a completely different roughing tool—a large, shallow gouge with a domed or fingernail shape. This tool looks a bit like a spindle detail gouge on steroids. Users of "American" style roughing gouges are usually instructed not to attempt removing a blank's square corners on the lathe; instead, they're directed to saw off the corners before mounting the blank.

Spindle roughing gouges are available in several sizes. My advice is to buy the largest size, as it simplifies a leveling cutting action **(Photo 2)**. The spindle roughing gouge is not the best choice for detail work or for making quick turns. And don't even think of using it to rough out a bowl or vessel blank **(Photo 3)**. Its large surface area makes it awkward to maneuver in a confined space, its long straight edges leave exposed sides and corners that will easily catch, and its tang is not strong enough to engage the cutting edge far beyond the tool rest. Using a spindle roughing gouge for bowl turning is dangerous; use a bowl gouge instead.

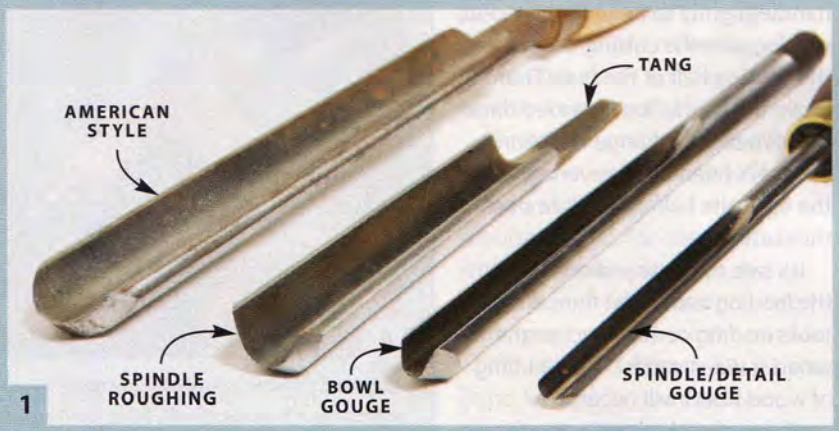
Strengths

The spindle roughing gouge is a great choice for creating cylinders of any size **(Photo 4)**. And it's the best tool for removing the corners on any square stock measuring up to 5" x 5". It's much faster and safer than tilting the tablesaw blade and running the stock through numerous times. The spindle roughing gouge easily creates straight tapers, and it can also produce shapes that are slightly convex or concave. But don't ask this tool to detail or turn quickly—it simply does not perform these tasks with a lot of control.

Using the spindle roughing gouge

The spindle roughing gouge is a cutting tool, so the edge requires support from the bevel during use. Start with the flute on the tool rest and hold the handle low **(Photo 5)**. Point the flute in the direction of travel. Move the tool forward so its bevel contacts the wood (no wood chips or dust should fly when the bevel touches). Raise the

Turning Gouges 101



1

The spindle roughing gouge is one of four gouges commonly used for turning. It is instantly recognizable by its deeply fluted semi-circular shape, vertically ground edge and tang-style end.

2

Spindle roughing gouges come in several different sizes. Widths are measured across the inside of the flute. You don't need them all; just buy the largest size you can find.

3

Never use a spindle roughing gouge—a tang-type tool—for bowl turning. A bowl gouge is machined from solid rod, so it can extend further over the tool rest, to hollow the inside of a bowl.

handle slightly to engage the wood, making sure the cutting occurs on the leading half of the flute. Then move the tool in the intended direction. When you change directions, the tool's orientation reverses, so the opposite half of the flute does the cutting.

It's safe to cut anywhere along the leading half of the flute. If the tool's leading corner touches the wood, it won't catch—only a lifting of wood fibers will occur.

If you raise the handle too far, the tool will stop cutting and begin to scrape. Scraping dulls the tool, tears the wood surface and takes more energy to make the cut—this usually results in some loss of control.

To rough a square blank (remove the corners, that is), start in the middle **(Photo 6)**. When working difficult woods that are quite hard or "chippy," it's best to nibble off the corners in several light passes rather than with a few heavy cuts.

For concave and convex shapes, work from larger to smaller diameters **(Photos 7 and 8)**. To make smooth finishing cuts, angle the tool about 45° to the axis of the lathe and take light cuts **(Photo 9)**.

Shaping and sharpening

Preparing any turning tool for use includes these three steps: shaping the profile, putting an edge on that shape by grinding, and completing the edge by honing. When viewed from above, the spindle roughing gouge's edge should run straight across **(Photo 10)**. From the side, the edge should appear vertical or canted back at the top, no more than 5° **(Photo 11)**. If your gouge does not have this profile, regrind it so it does. To shape the profile, set your grinder's tool rest so it is perpendicular to the face of the wheel.

Once you've shaped the profile,

Using the Spindle Roughing Gouge

4

Use the spindle roughing gouge on any surface that is cylindrical or gently tapered. The stock's size doesn't matter; a large tool will always do a better job of leveling the surface than a small one.

5

To use the spindle roughing gouge, hold the handle low and point the flute in the direction of travel. Engage the wood and move in the intended direction.

6

To remove the corners from a square blank, start in the middle and move toward the end. Reverse directions to finish the job.

7

The spindle roughing gouge can create shapes that are slightly curved. As in all spindle work, make concave and convex cuts from large to small diameters—this leg's concave taper is created by cutting from both directions.

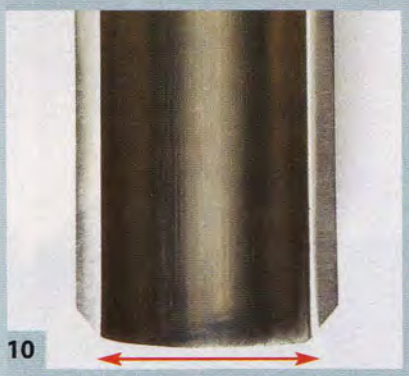
8

Virtually all of the shapes on this handle can be completed with the spindle roughing gouge. Rolling the ends and cutting the flat area for the ferrule are the exceptions.

9

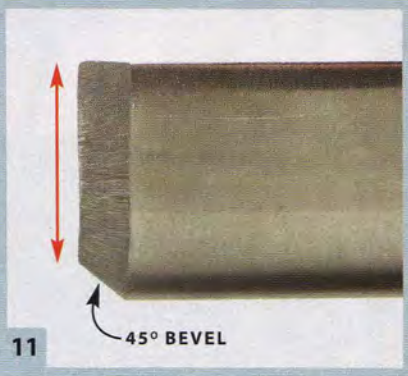
Although it's called a "roughing" gouge, this tool can leave a very smooth surface if you make light cuts. The coarse surface on the left resulted from a heavy cut.

Sharpening the Spindle Roughing Gouge



10

The edge of this spindle roughing gouge is properly shaped. When viewed from above, the edge runs straight across.

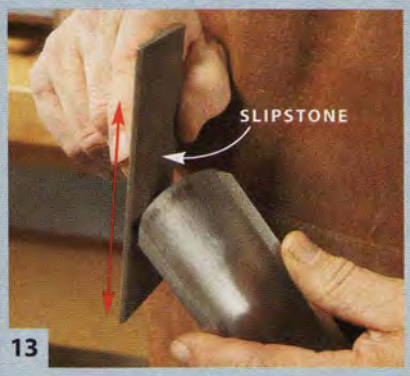


11

When viewed from the side, the edge appears vertical. It can also cant slightly back. The edge should never extend forward at the top.

12

To sharpen the tool, grind a 45° bevel behind the edge. Hold the tool parallel with the wheel's edge and flat on the tool rest. Then roll it slowly from corner to corner. Stop grinding when the sparks appear evenly along the edge.



13

Hone the edge. With the slipstone touching only the back of the bevel, start an up and down motion on the outside edge. Then, without coming off of the back, touch the area just below the cutting edge. Maintain this two-point contact to hone effectively.

14

Use the slipstone's rounded edge to hone the inside. Hold the slipstone flat in the flute and move in an out, following the flute's curve, without tipping forward over the edge.

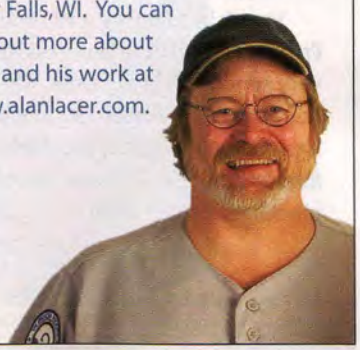
set your grinder's tool rest to create the 45° bevel angle that will sharpen the profile's edge. Hold the tool flat on the rest, with the tool's edge parallel with the grinding wheel. Start at one corner and slowly roll the tool to the other corner **(Photo 12)**. Grind slowly and deliberately, with control. Be sure the grinding wheel's first contacts are at the bevel's back edge—never just below the cutting edge. Stop grinding when the sparks are gently coming over the top of the tool and appear evenly along the edge. Here's a bench test for sharpness: If the edge appears black under a light, the tool is sharp. If you see white along the edge, it isn't. White is light reflecting off a flat (dull) surface. A sharp edge is so thin, it won't reflect light.

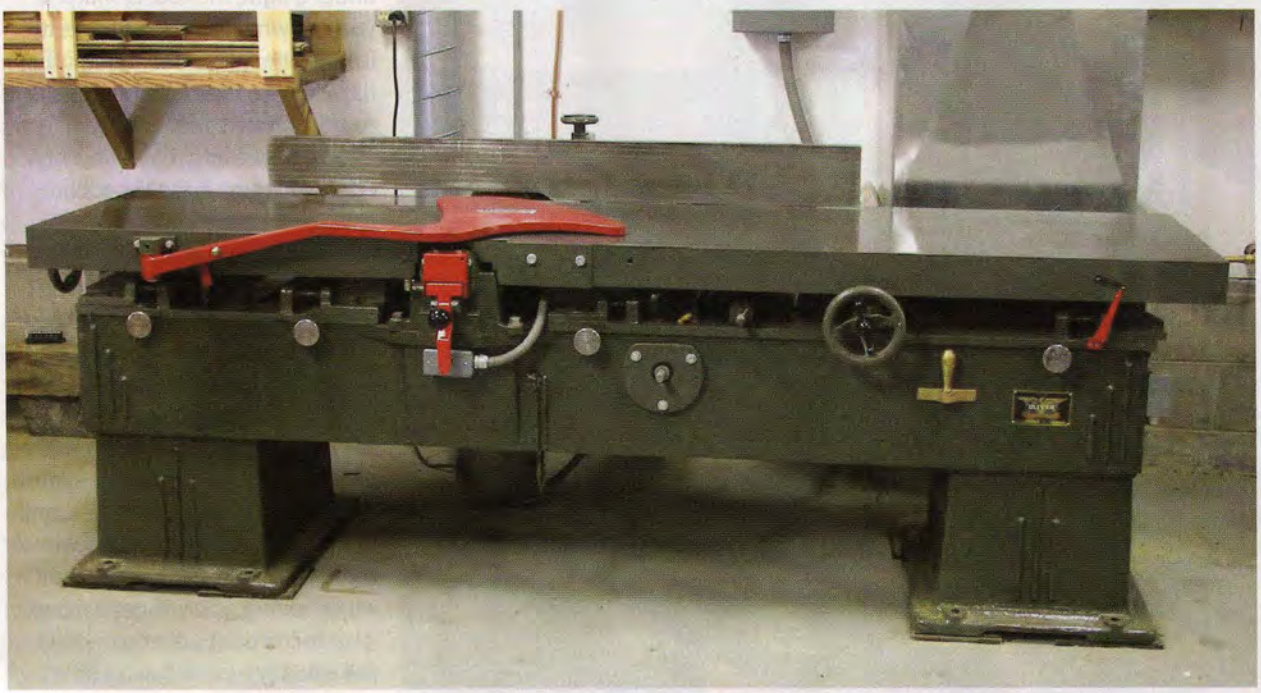
To achieve and maintain a fine edge, you must hone the tool, using a slipstone (a hone with a rounded edge). For the best results with today's woodturning tool steels, plan to use diamond plated honing materials. Hone the outside of the edge first **(Photo 13)**. As you hone, be sure to maintain two points of contact on the bevel. The hone can bridge the bevel because the bevel is slightly concave, thanks to the radius of the grinding wheel. If you lift off the back of the bevel while honing, you will get a rolled (also called dubbed) edge—this will actually have a dulling effect.

To hone the inside edge, hold the slipstone flat in the tool's flute and follow the curve **(Photo 14)**. If you tip over the outside of the edge you will dull it.

While using the tool, hone it at the first signs of dullness: cutting requires more pressure, torn fibers, short chips or dust appear, and/or you hear a flat or dull sound when cutting. Return to the grinder if honing requires removing too much steel, either because the concave area of the bevel has disappeared, or because you let the tool get too dull, or if the edge was somehow damaged.

Alan Lacer is a woodturner, writer and instructor living near River Falls, WI. You can find out more about Alan and his work at www.alanlacer.com.





Go for the Big Stuff

I'M NOT SURE IF I qualify as a tool nut–machine crazy is more like it. I started out on a Shopsmith, but now have 17 industrial-grade machines.

It all started when my wife saw an ad for a planer in the local paper. They were asking $350, so I figured that the planer would be a decent 12" model. Nope. It was a 16" Powermatic with a 5 hp, 3-phase motor. I bought it, of course, and have been adding heavy-duty machines to my shop ever since. The latest is pictured above: an Oliver No. 12CD Pattern Shop jointer. It's 24" wide, has an 8' 10" bed and a 7-1/2 hp motor. The infeed table tilts up to 5° side to side to put a draft on a mold pattern.

I work in a factory and I'm not rich. I'm not setting up a business–just one very serious shop at home. My wife has always supported my woodworking–she has plenty of projects in mind for our house. And I have lots of machines to play with!

—Dave Judy

Pride of Place

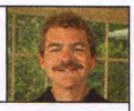
WHEN MY DAD, KEITH HUDSON, set out to make a tool cabinet, he went all the way. Dad's been a carpenter for over 40 years in Oxford, England. To make this hutch, he used rafters salvaged from an old building at Somerville College, Oxford University.

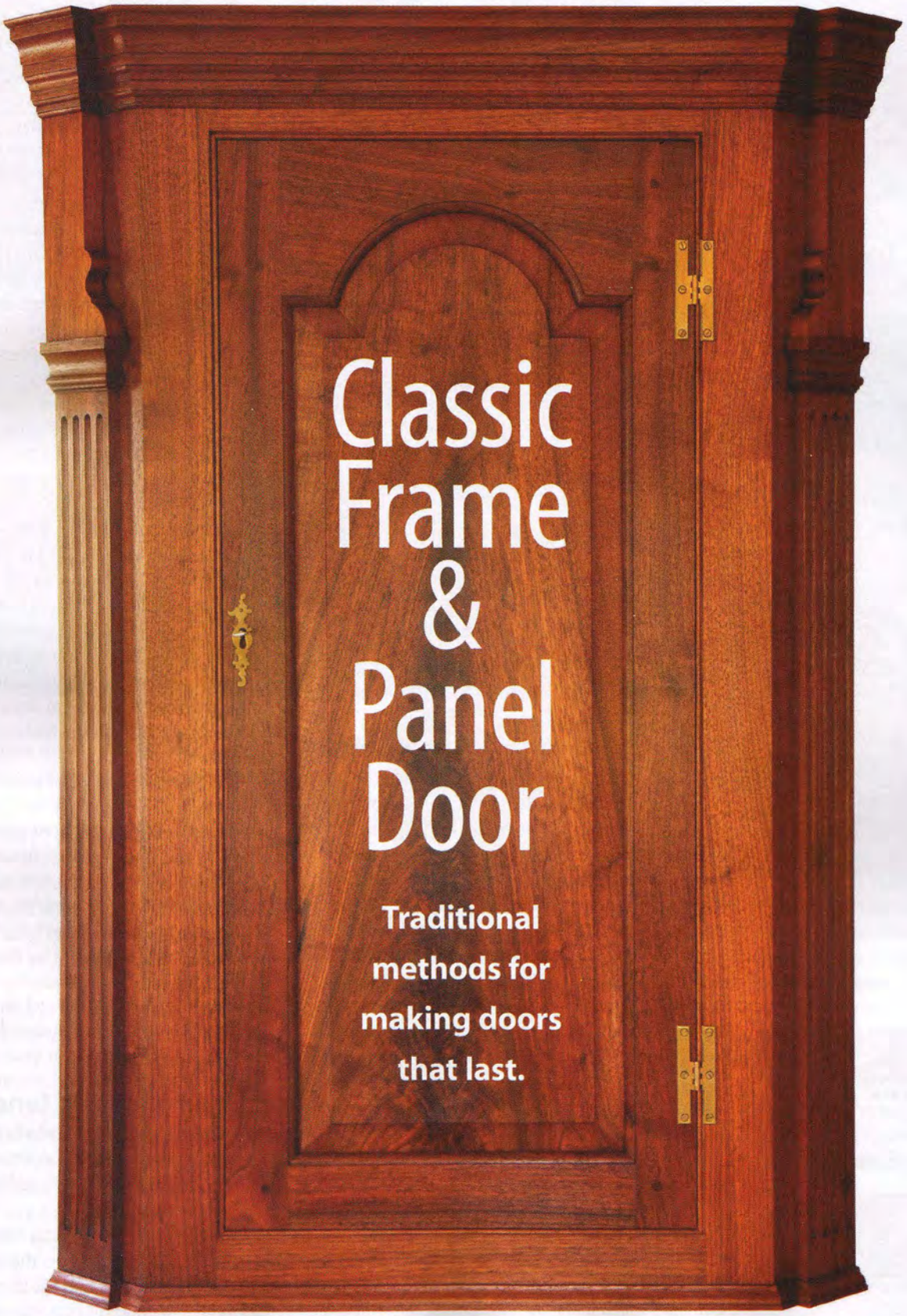
Not having a truck, he piled the wood on top of his old MGB GT sports car and brought it home to his patio shop. That's right–Dad works right outside his back door, and when it rains, everything must come inside. Dad stores his tools wherever he can find room. There's a big cupboard in the kitchen which is full of tools, another under the stairs, and yet another in the garage.

He built this cabinet to hold all his hand tools-particularly a set of 80-year-old molding planes originally used by his father. The drawers contain all sorts of chisels and carving tools. Although storing tools in such a beautiful cabinet might imply that they are just for show, Dad says that each one still sees regular action. Good tools deserve a good home, right?

—Ben Hudson

We'll pay you $100 to share your favorite tools, new or old, with fellow readers. Contact us by e-mail at **toolnut@americanwoodworker.com**, or mail us at American Woodworker, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121. Please include digital photos of your tools if possible.





Classic Frame & Panel Door

Traditional methods for making doors that last.

Fig. A
Parts of a Frame and Panel Door

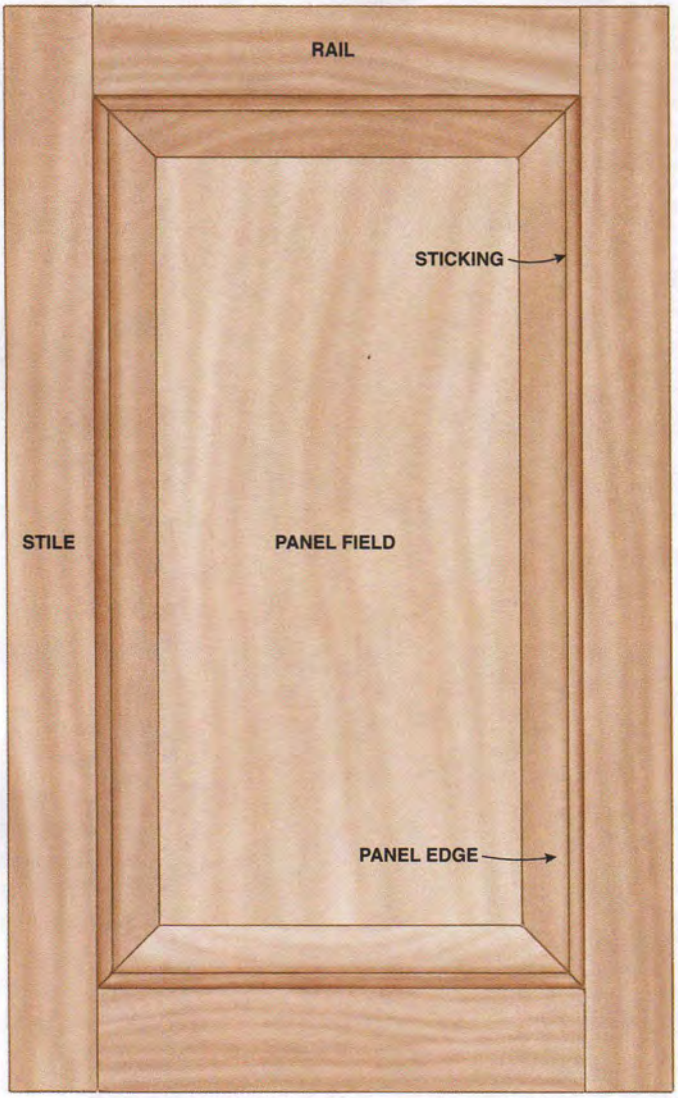
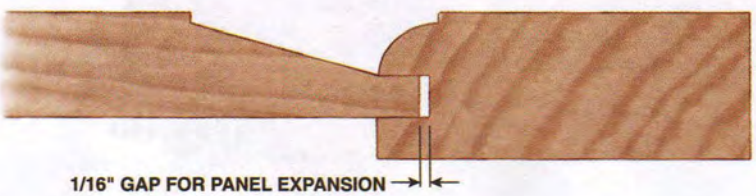


Fig. B
Sticking Profiles

Fig. C
Panel Expansion



FEW DESIGN ELEMENTS are as simple, beautiful or enduring as the frame-and-panel (Fig. A). Woodworkers have been using this type of construction for centuries to build doors, wall paneling and cases. It's a classic solution for dealing with an unavoidable problem: the seasonal expansion and contraction of a large panel. It's also a great way to display a prized plank of figured stock.

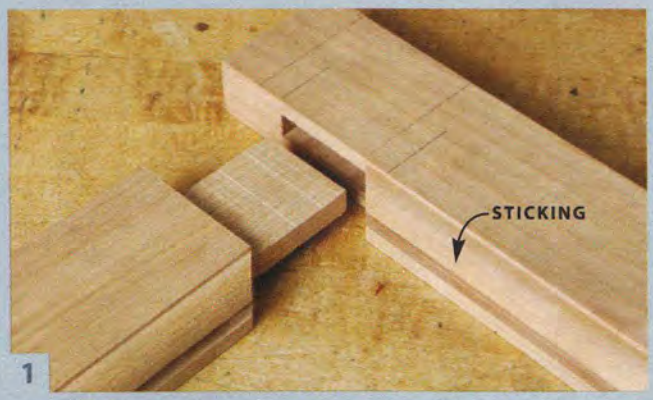
Frame-and-panel is a very flexible design. By changing the shape and proportions of the panel or the frame, the design can be easily adapted to fit almost any style of furniture or architecture. Panels can be beveled or flat, rectangular or arched; the edges of the frame can be shaped with a decorative molding called a "sticking," (Fig. B) or left square.

The main idea, though, is that the solid-wood panel isn't glued in place: it's free to float in grooves all the way around the frame. As a panel shrinks in width in winter, it's free to withdraw in the stile's grooves. As it expands in summer, there should be enough room in the grooves so the panel doesn't bottom out and force the frame apart (Fig. C).

I'll show you how I build a very traditional frame and panel door–one which will withstand years of use. It has mortise and tenon joints, a sticking which is mitered at the corners, and a rectangular raised panel. For more information on making this type of door with an arched panel, as shown on page 35, see my article on "Tombstone Doors" in AW #72, April 1999, p. 72, or go to the AW website (see page 34).

Why mortise and tenon?

There's more than one way to build a frame and panel door. Today, most woodworkers use a pair of cope-and-stick router bits, which allow you to quickly and easily construct a kitchen full of doors. One bit shapes the decorative sticking profile and the panel groove; the second bit cuts the tenon



1

Here's the joint I'll be making. It provides a rigid mechanical interlock and plenty of surface area for glue. Note how the molding, or "sticking" is mitered, and how the joint is cut to accomodate the miter.

2

Begin by drawing the mortise and sticking layout lines on one stile, then clamp the stiles together and transfer the lines. The stiles are extra-long to aid in assembly; they'll be cut to length later.

3

Scribe the mortise from each face to perfectly center it on the stile.

4

Cut the ends of each mortise first, then stagger a hole in between. Finally, center the bit on the remaining waste.

and copes the ends of the rails to match the sticking. However, most of these bits create a short, stubby tenon (equal to the depth of the panel groove) which has only a small surface area for glue. Cope-and-stick joints are fine for lightweight doors, but I believe that large doors with solid-wood panels require more robust joinery.

For strength and longevity, it's tough to beat traditional mortise and tenon joints (**Photo 1**). Unlike coped joints, deep mortises and long tenons provide mechanical interlock and plenty of surface area for glue. When I build traditional furniture that's intended to last for generations, I always use mortise and tenon joints for the doors.

Mill the stock

When selecting stock for the stiles and rails, I choose straight-grained material that is free of knots, dramatic figure or runout (where the grain runs at a significant angle to the board's faces). I've found that straight-grained stock works best because it provides greater strength for the door and resists warping. I save figured stock for door panels.

Stile and rail stock must be flat, true and square. If your boards are warped or twisted, the completed door will also be twisted and will never close properly. I avoid surfaced two sides (S2S) stock because there's a good chance that it's not perfectly flat. Instead, I use rough stock and flatten one face of each board on my jointer before planing it to thickness. For most doors, I make the stiles and rails 13/16" to 7/8" thick. I always mill a couple of extra pieces as well, choosing an inexpensive wood such as poplar to serve as test pieces when setting up the mortiser and tablesaw. After planing, I joint one edge of each piece and rip it to width.

The final step is to cut the stock to length. I leave the stiles about an inch longer than the height of the door. The extra length provides "ears" which allow for easy disassembly of the framework after dry fitting. I'll trim the ears after door is glued up, making the edge of each rail perfectly flush with the end of each stile.

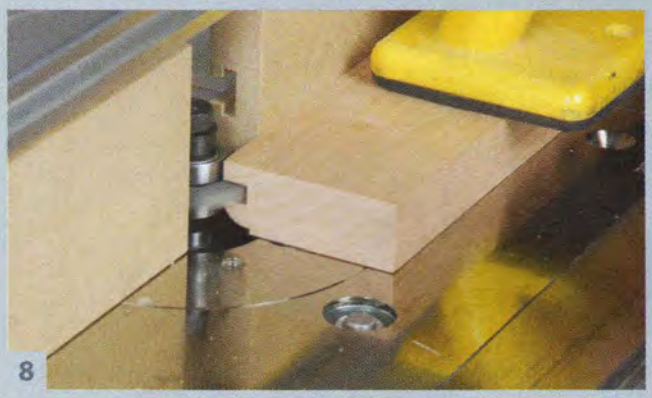
The length of the rails is a critical dimension because it determines the width of the door. I calculate the rails' length during the layout process in the next step.

For more information on making traditional arched-top doors, go to www.AmericanWoodworker.com/tombstonedoors

Cut the tenon on a test piece with a dado set. Remove equal amounts from each face to center the tenon. Clamp a board to the fence for protection.

Test the tenon. For a strong joint, this should be a snug fit. If you need a mallet to assemble the joint, the tenon is too thick.

Shape the sticking profile the full length of all the rails and stiles, plus a test piece.



Rout the panel grooves 5/16" deep with a slotting cutter.

Layout

Accurate layout is the key to ensuring that the joints fit precisely (Fig. D). I start by marking the overall height of the door on both ends of one stile; this is the most important dimension because it determines if the door will fit the opening. I work inward to mark smaller dimensions, beginning with the width of each rail. Next, I determine the width of the sticking from a sample piece and mark this on the stile. This line indicates where the sticking will be mitered.

Finally, I mark the haunch at the end of the stile. As a rule of thumb, I make the haunch 3/8" on a cabinet door. The area between the sticking's miter reference line and the haunch becomes the mortise. To ensure that the stiles match, I clamp the two together and transfer the layout to the mating stile to create a mirror image (**Photo 2**).

The last step of the stile layout is to mark the mortise's width. A 3/8" wide mortise works well with frames that are 7/8" thick; if the frames are thinner, I use 1/4" or 5/16" mortises. I center the mortise on the stock in order to ensure that the stiles and rails are going to be flush after assembly; a small error in centering the mortise will result in offset joints. To help ensure accuracy in setting up the mortising machine, I scribe the mortise from each face with a marking gauge (**Photo 3**).

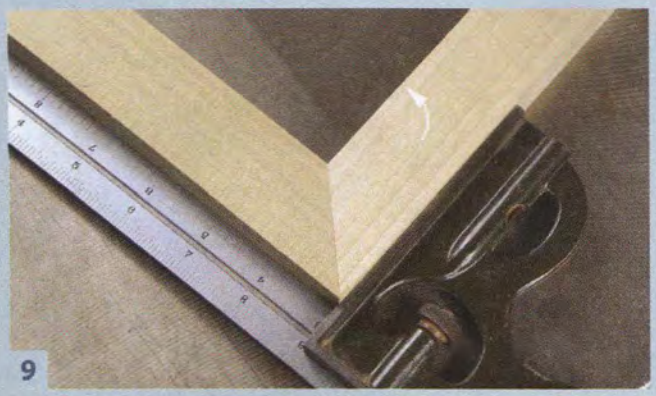
There is really no need to mark the rails. Instead, I simply cut them to length prior to cutting the tenons. To determine the rail length (Fig. E), I subtract the width of the stiles from the overall width of the door, and then I add the sticking width (times two) plus the tenon length (times two). Keep in mind that the sticking at each mortise is removed from the stile after mitering; that's why it is necessary to add the extra length to the rails.

As a rule of thumb, I make the tenon length three-fourths of the stile width. This ensures a strong mechanical interlock and lots of surface area for glue.

Cut the mortises first

I typically cut the mortises first, then cut the tenons to fit. It's easier to adjust a tenon's thickness by taking a fine shaving with the dado set or a rabbet plane than it is to change the width of the mortise.

I cut the mortises with a hollow chisel mortiser (**Photo 4**), but you can also cut them with a router and a straight bit or simply drill a series of holes and square the mortise with a chisel. What's most important is that the mortise is centered and its walls are perpendicular, parallel and smooth.

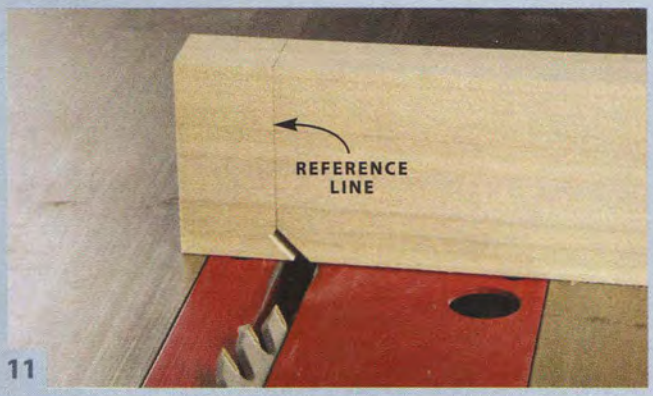


9

To miter the sticking, tilt the tablesaw blade 45°, attach a backing board to the miter gauge, and make two test cuts. Butt the pieces together. A gap is twice the error of the blade's tilt.

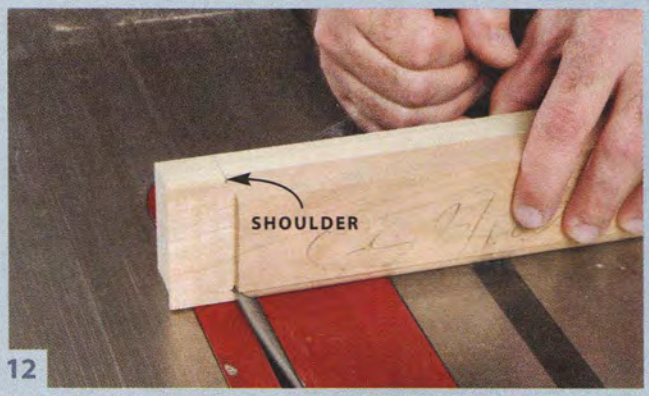
10

Adjust the blade's height so that the tips of its teeth cut to the top of the sticking profile on the test piece.



11

Mark the backing board attached to the miter gauge. Draw a reference line from the corner of the kerf. Continue the line over the top of the backing board.



12

Miter the rail's sticking by aligning the tenon's shoulder with the reference line.

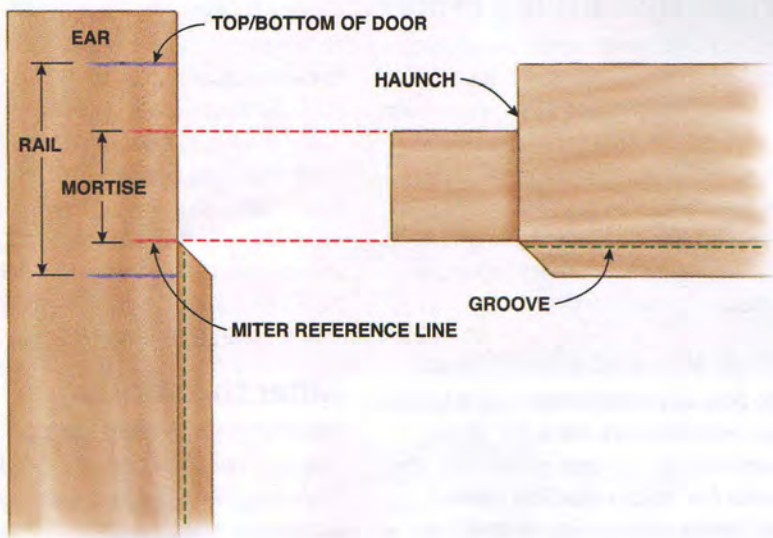
When setting up the mortiser, I add three numbers to calculate how deep to cut: 1) the length of the tenon, 2) the width of the sticking, and 3) another 1/16", to ensure that the tenon doesn't bottom out during assembly and to make room for excess glue.

Cut the tenons to fit

To cut the tenons, I use a stacking dado set and guide the workpiece with the miter gauge (**Photo 5**). I cut the same amount from both sides to center the tenon on the rail. The tablesaw's fence serves as a stop to limit the tenon's length. I cut a tenon on the test stock first and gradually raise the dado set until the test tenon fits snug in the mortise (**Photo 6**).

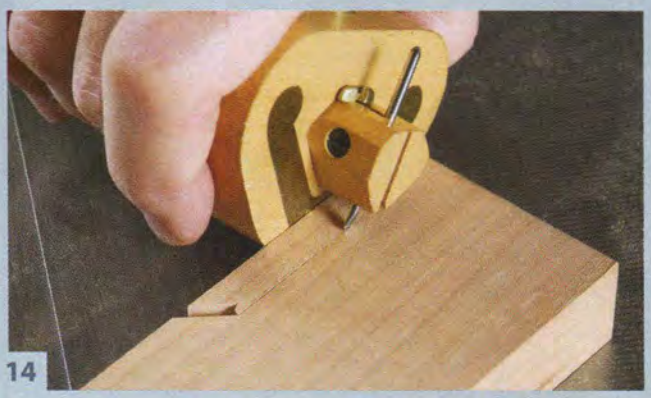
To gauge the fit of the tenon, I slide it into the mortise with hand pressure alone. If I were to need a mallet to insert the tenon, I know that the tenon

Fig. D
Stile Layout Lines



13

Miter the stile by aligning its miter reference line with the reference line on the backing board.

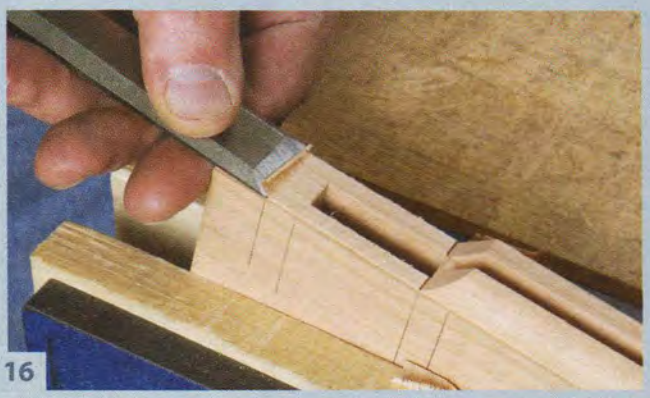


14

Set a marking gauge to the width of the sticking and scribe a line on the stile's back, behind the mortise.

15

Remove the waste by sawing close to the sticking's edge or the scribed line, depending on which end of the stile you're cutting. Guide the cut with a fence.



16

Pare the remaining waste. Go down to the sticking's inside edge on the front and the scribe mark on the back.

is too thick and that it may split the stile. Once the tenons fit properly, I cut the haunches.

Shape the sticking profile

The next step is to shape the sticking profile on the inside edges of both the stiles and rails (**Photo 7**). I always shape the sticking profile in two passes to avoid unsightly tearout; the first pass is a light scoring cut and the second pass is to the full depth of the profile. I also shape a test piece for setting up the tablesaw to cut the miters.

Rout the panel grooves

The final step before mitering is to cut the panel grooves. For a 7/8" thick frame, I make my door panels 5/8" thick with a 1/4" thick edge. The panel is positioned in the frame so that the panel's face is flush with the faces of the stiles and rails after assembly (Fig. F). This configuration requires a 1/4" wide groove located 5/8" from the face of the frame stock.

I cut the grooves 5/16" deep. The panel edge fits 1/4" into the grooves, leaving 1/16" on each side of the panel for seasonal expansion.

I cut the grooves on the router table (**Photo 8**). Like the sticking cut, I make the grooving cut in two passes to avoid tearout. If the sticking is less than 5/16" wide, it's important to stop the groove between the mortises to avoid an unsightly gap at the top and bottom edges of the door.

Miter the sticking

The sticking is mitered twice on each stile and rail. The first step is to tilt the tablesaw blade to 45°. For the greatest accuracy, I miter the ends of two pieces of test stock and position them within the legs of a square. A gap in the miter is twice the error (**Photo 9**).

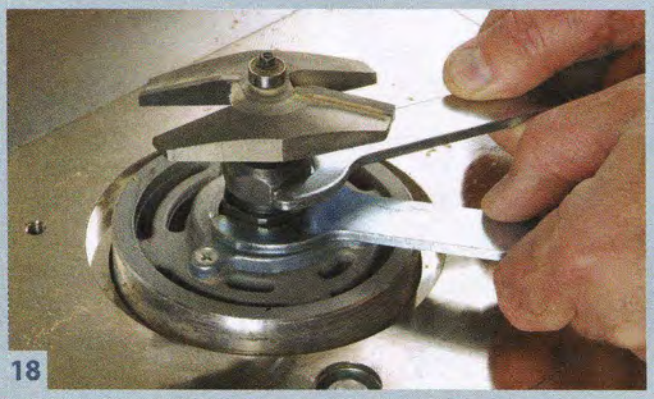
I adjust the height of the blade by making a cut on a test piece that has a sticking profile. When properly adjusted, the tip of the saw kerf precisely matches the sticking's width (**Photo 10**).

Next, I attach a new backing board to the miter gauge and saw a kerf in it. Then I mark a fine line from the tip of the kerf to the top of the backing board (**Photo 11**). This line will serve as a reference to align the stock when cutting the miters.

Large doors require robust mortise and tenon joinery.

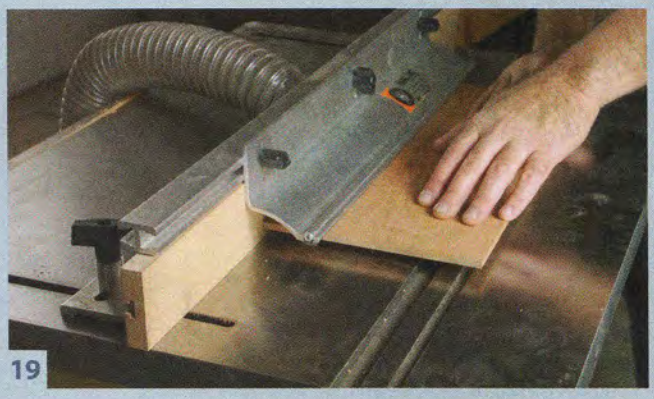
17

Measure for the panel. Overlap the rule 1/2" to allow for a 1/16" clearance between the bottom of the grooves and the panel.



18

Lock the panel-raising bit securely in the router collet. Dial the router down to the appropriate speed for the bit's diameter.



19

Rout the panel. Use a barrier guard to shield your hands from the bit.

20

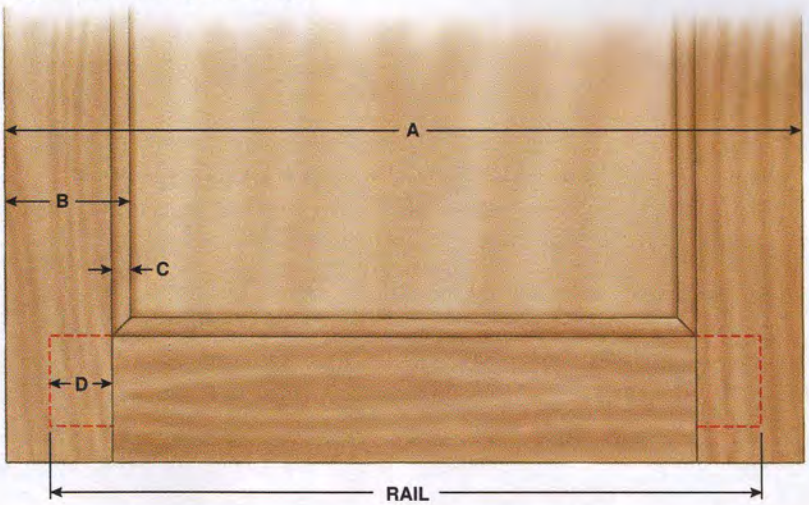
Clamp the assembly on a flat surface to prevent it from twisting. Saw the stiles to final length to make the outside corners flush.

To cut the miters on the rail, I simply align the shoulder of the rail with the reference line on the backing board (**Photo 12**). To cut the miters on the stile, I align the sticking layout lines with the reference line (**Photo 13**).

Remove the excess sticking

The last step before assembly is to remove the excess sticking at each mortise. I adjust a marking gauge to the width of the sticking and scribe a line on the back of the stile as a reference mark (**Photo 14**). The inside edge of the sticking works as a reference mark on the face of the stile. You can use a bandsaw (**Photo 15**) or a handsaw to remove most of the sticking, then finish the job with a chisel (**Photo 16**).

Fig. E Calculating Rail Length



To calculate the length of the rails, you'll need to know (A) the width of the door, (B) the width of the stiles, (C) the width of the sticking, and (D) the length of the tenons (about 3/4 the width of the stiles).

Next, add and subtract these numbers:	For example,	
A	A = 12"	12"
- (B x 2)	B = 2"	-4"
+ (C x 2)	C = 1/4"	+1/2"
+ (D x 2)	D = 1-1/2"	+ 3"
= Rail length		= 11-1/2"

Shape the panel

Next, I dry assemble the framework and measure for the panel (**Photo 17**). I size the panel 1/2" wider and longer than the opening in the frame. This allows for the panel to fit 1/4" into the groove around the perimeter, leaving a 1/16" clearance.

Like tabletops, drawer fronts and chest lids, door panels are a show surface. I use one wide board for a door panel and look through my stash for stock with dramatic, showy figure. When making a matching pair of doors I'm careful to select matched stock for the panels.

Once I've flattened the panel and milled it to size, it's ready for shaping. Traditional door panels have a beveled edge which creates a raised field, or center. There are a variety of router bit profiles to choose from to make a beveled edge (Fig. G). When using these bits, be sure that your router is securely mounted in the table. Make certain that the bit is secure in the collet (**Photo 18**). Large horizontal panel-raising bits require a powerful router with variable speed. You may want to choose a vertical bit if your router has less than 3 hp. I prefer using a router table with a large top in order to support the panel (**Photo 19**), and use a barrier guard to keep my fingers out of harm's way (see Source, below). This guard, which I designed, sits right on top of the workpiece, ensuring an even cut.

Removing a lot of material requires taking a number of passes. I bevel the panel edges for a snug, but not tight, fit in the frame's groove (Fig. H). A snug fit allows the panel to float with seasonal changes in humidity while preventing the panel from rattling in the groove each time the door is opened.

Assembly

Before assembly, I smooth all the surfaces of the panel and the inside edges of the frame; these areas will not be easily accessible after assembly. It's a good idea to finish the panel before assembly, especially if the finish includes a stain or dye. An unfinished surface will be exposed the first time the panel contracts during the dry winter months.

When clamping, I always work on a flat surface in order to avoid gluing a twist into a door (**Photo 20**). I apply the glue sparingly and carefully to avoid excess glue reaching the panel and gluing it in place. Once the glue has dried, I trim off the ears at the tablesaw.

Fig. F
Determining the Groove's Location and Panel's Thickness

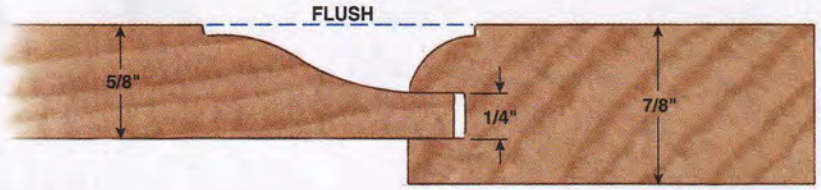
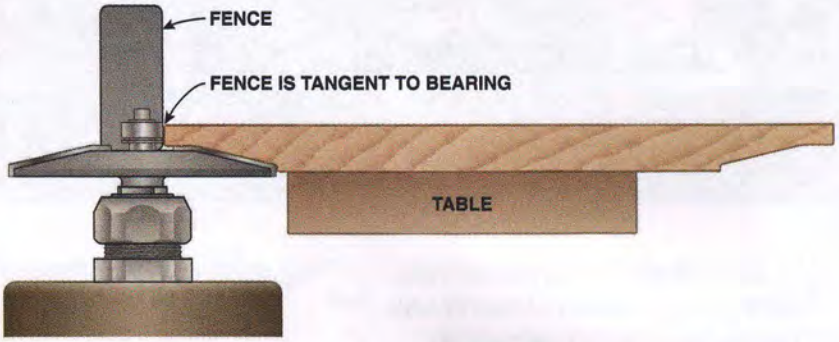


Fig. G
Panel Edge Options

Fig. H
Shaping the Panel's Edge

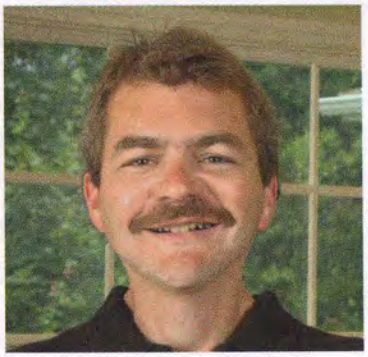


SOURCE

- Rockler, www.rockler.com, (800) 279-4441, Bench Dog Panel-Loc Panel Cutting Guard, #27398, $57.

Lonnie Bird

Long-time woodworker, author and teacher, Lonnie runs a school in East Tennessee. You can find out more about his school at www.lonniebird.com.



12 Drawer Dresser

A master craftsman's method for making perfectly spaced drawers.

By Bruce Kieffer

Comments or Questions? visit
www.AmericanWoodworker.com/12DrawerDresser

I MADE THIS DRESSER for a client whose father designed and built similar furniture back in the 1950s. Its grid system is very modern looking, but getting all the spacing just right requires an old-fashioned, methodical approach to ensure that the case is square each step of the way. I also used the same clever system for positioning the drawers that my client's dad used, and it worked extremely well.

STAFF

Part of the difficulty in spacing the drawers is that their fronts aren't applied–they're an integral part of the drawer box. When installing a drawer with an applied front, you just position the front with shims until the margins are even, then screw it to the drawer box. This dresser is different–you have to position the entire drawer. Here's how the system works: These drawers are guided by tracks that run underneath the drawer's bottoms. When building the dresser, leave the tracks loose in the web frames inside the case. Next, build the drawers, slide them in the case, and adjust each track's position until the drawer is perfectly centered side to side. Once that's done, lock the tracks in place with glue blocks.

This dresser uses web frame construction, which has gone out of favor in factory-made furniture. That's too bad, because web frames do a bang-up job of making casework absolutely rock solid. The finish is as retro as the construction–it's a white stain with a clear water-based polyurethane topcoat. The funky drawer pulls add the perfect final touch.

Construction nótes

I determined the heights of the drawers based on the spacing of my dovetail jig, which is 7/8" on center. My dimensions leave a half-pin at the top of each drawer. My jig's spacing is fairly standard, but before you build, check your jig's spacing and adjust the drawers' heights and cabinet's height if necessary.

When you cut the dadoes and rabbets in the case's ends (B1) and dividers (B2), note that the critical dimension isn't their depth, but what's left over. When you cut into the sides, for example, the remaining wood should be 1/2" thick. This method ensures that all the other dimensions will work out, regardless of the precise thickness of your plywood.

I made each row of drawer faces from one long, full-width board. This avoids mismatched figure and an annoying banded look that results when narrow boards are edge-glued together. However, if you goof up one drawer front, you have to remake all three in that row.

Build the case

1. Cut the web frame parts (A1 – A5). Machine the drawer tracks (A6) (See Fig. B). Cut biscuit grooves for joining the web frame stiles and rails.

2. Rout the drawer track grooves in the web frame stiles (Figs. A and C). There are many different parts to deal with, so label them and set them in stacks for the right, middle and left sections of the drawer case.

3. Glue and clamp the web frames together. Do not glue the drawer tracks in their grooves (**Photo 1**).

4. Lay out and cut grooves in the top and bottom web frames to receive the dividers (B2, **Photo 2**).

5. Cut the case ends (B1) and dividers to size. Cut dadoes in the ends and dividers (See Fig. C). The dadoes should be cut to a depth that leaves 1/2" of plywood on the sides and 3/8" on the dividers.

6. Cut the rabbets on the top of the case sides so 1/2" of plywood remains.

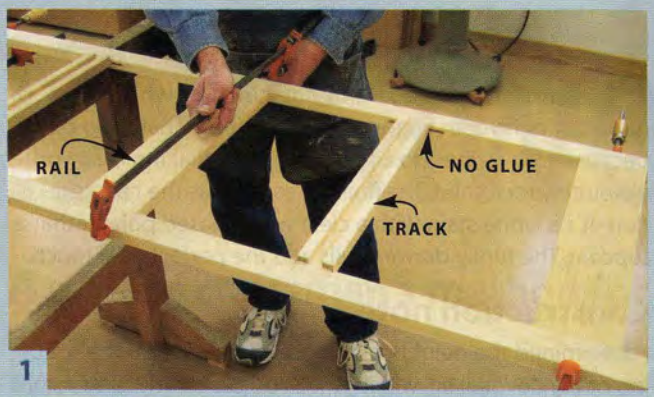
7. Rout the rabbets for the back (B8) on the sides.

8. Glue and clamp the middle section web frames and dividers. Make sure the assembly is square (**Photo 3**).

9. Drill and countersink the screw holes in the top web frame for attaching the dresser top.

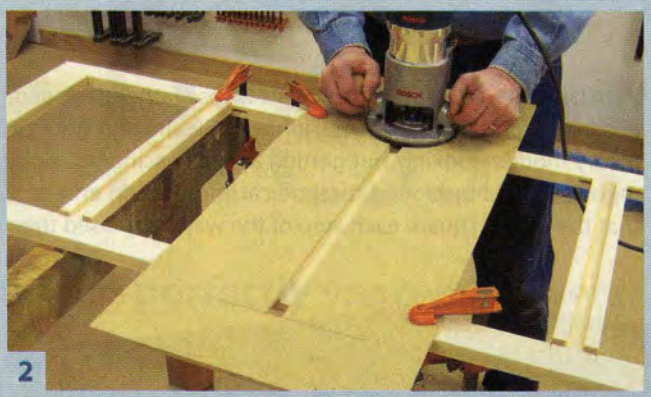
10. Glue and clamp the top and bottom web frames to the case's middle section (**Photo 4**).

11. Glue the end web frames and case sides to the partially assembled inner case (**Photo 5**). This is a lot of gluing and clamping for one person. Either get some help or do it in



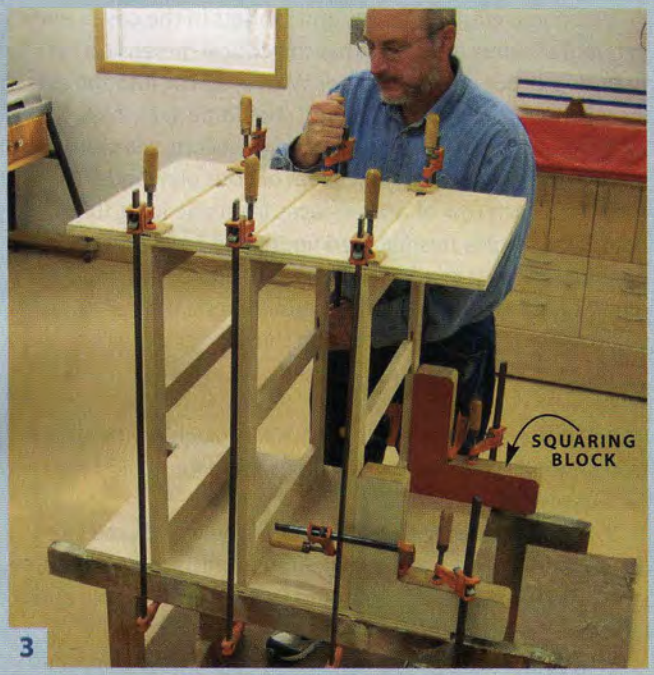
1

Build the upper and lower web frames, which run the full length of the case. Glue the rails, but don't glue the drawer tracks. You'll adjust their positions later when fitting the drawers.



2

Rout grooves in the rails for the plywood vertical dividers. Guide the cut using a shop-made template. Size the slot so the plywood fits tight in the grooves.

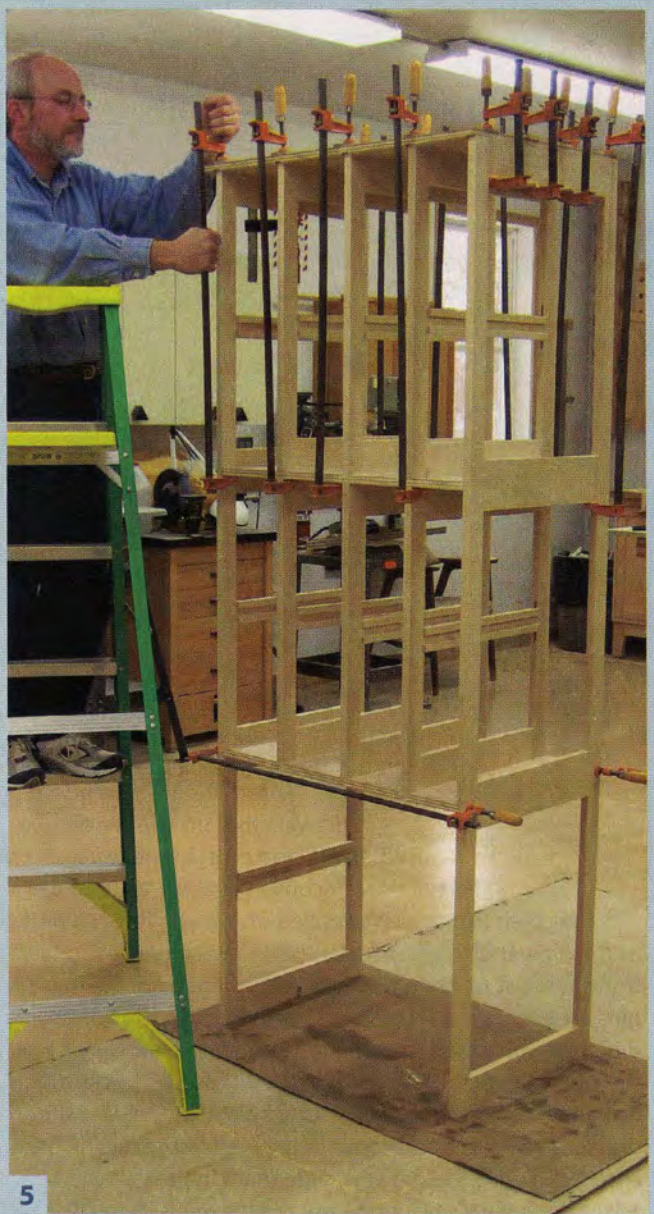


3

Glue short web frames to the vertical dividers, making the middle section of the dresser. Position the web frames upright so the assembly is easier to clamp. Use L-shaped squaring blocks to ensure that everything stays square.

4

Build out from the middle section, starting with the top and bottom web frames. For assemblies like this, I work on sawhorses and use long, straight support boards and large squaring blocks.



5

Stand the assembly on end to add the remaining web frames and end panels. I prevent glue from dripping on the floor by placing a sheet of cardboard under the assembly.

EDITOR: TOM CASPAR • PHOTOGRAPHY: BRUCE KIEFFER UNLESS NOTED • ILLUSTRATION: BRUCE KIEFFER

6

Glue edging onto the front of the cabinet. The edging is mitered at the corners, down at the base. Draw the miters tight with long clamps.

7

Use an orbital sander to sand the cabinet's ends. An orbital sander is not as aggressive as a random orbit sander and gives a better final finish.

Build from the center out to make the drawer openings perfectly square.

stages by gluing a few joints at a time. Dry fit some of the parts; use them to align the pieces you glue.

12. Cut the bottom (B3) and glue and screw it to the underside of the bottom web frame. Make sure its front edge is flush with the front edge of the web frame.

Apply the edgings

13. Cut the bottom edging (B4) and end edging pieces (B5) to size. Rout a 3/8" radius roundover on the inside edges of these pieces. Miter and glue the bottom edging to the front edge of the plywood, leaving all of the web frame edge exposed (**Photo 6**). Miter and attach the side edging. Keep the outside edges flush to the faces of the plywood. Rout a roundover on the outside edges of the edging.

14. Cut the top edging piece (B6) to size and fit it between the end edging pieces. Glue it in place.

15. Cut the divider edging pieces (B7) to size and fit them between the top and bottom edging pieces. Glue them in place so there's an equal overhang on each side of the plywood dividers.

16. Cut the back (B8) to size and screw it in place.

17. Finish sand the case's ends (**Photo 7**).

Build the base

18. Cut the base parts (C1-C4) to size. Cut biscuit grooves in the cross braces and front and back pieces. Miter the ends of the base sides and ends.

19. Glue and clamp the base together. Drill screw holes in the cleats for attaching the base to the case. Glue the cleats to the base.

20. Screw the base to the case. Set the front of the base 3" back from the front of the case's bottom edging (Fig. E).

Build the drawers

21. Here are a couple of tips for dimensioning the drawer parts: First, the lengths of the drawer sides in the cutting list includes 5/8" total for their tails. If your jig cuts a different length tail, make any necessary adjustments to the sides' lengths. Second, I add 1/16" to the finished length of my drawer face and back, then cut the dovetail sockets an extra 1/32" deeper so the ends of the front and back protrude 1/32". After assembly, I sand the overhang flush.

22. Cut the drawer parts (D1 - D10) to size. Measure the height of all the drawer openings, then cut the drawer sides 1/16" narrower.

23. Rout the half-blind dovetails in the drawer parts. Note: On the three lower drawers, the bottom edge of each drawer's face hangs 11/16" below the drawer's side (Fig. A). This distance is 3/4" on all other drawers. Because of this offset, there is no dovetail socket at the lower end of the drawer faces. Half-blind dovetail jigs are not designed to allow for this blank space, but there is an easy way to create it. Rout the lower tail of each drawer side using a sacrificial backer board rather than

Fig. A Exploded View

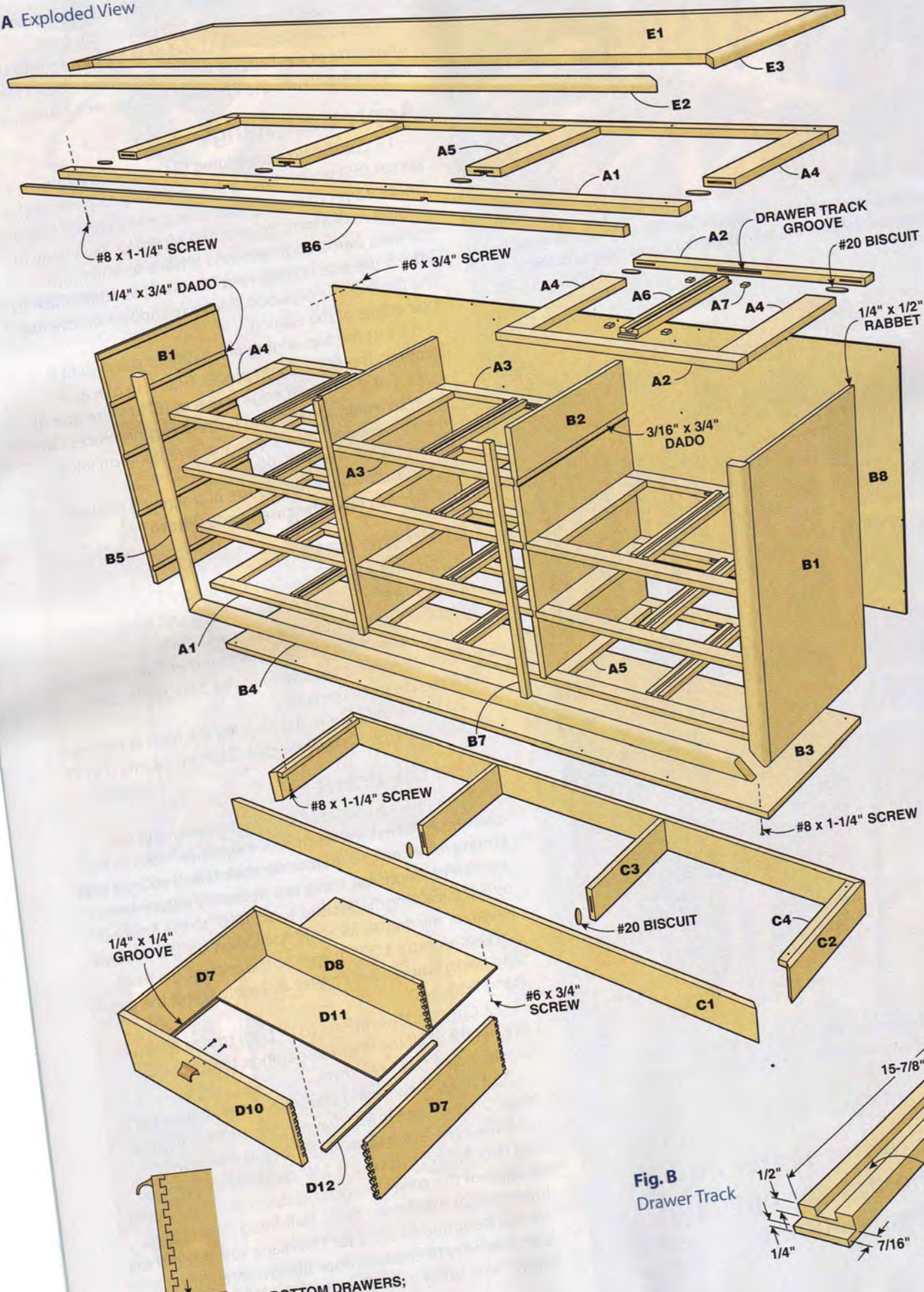
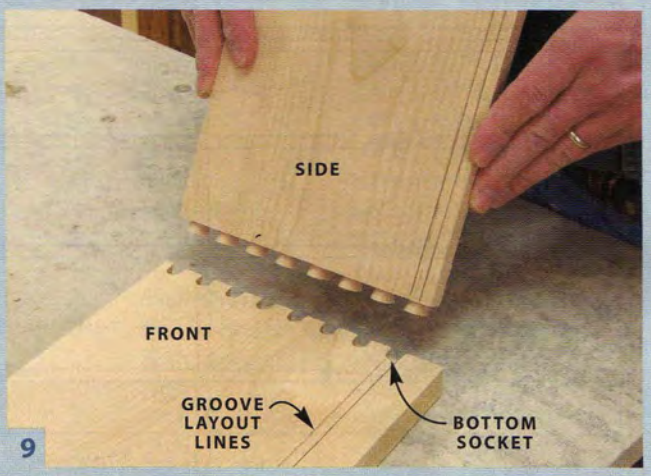
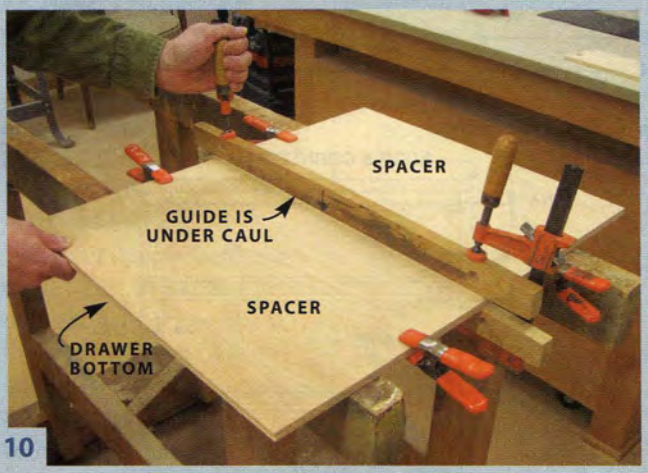


Fig. B Drawer Track

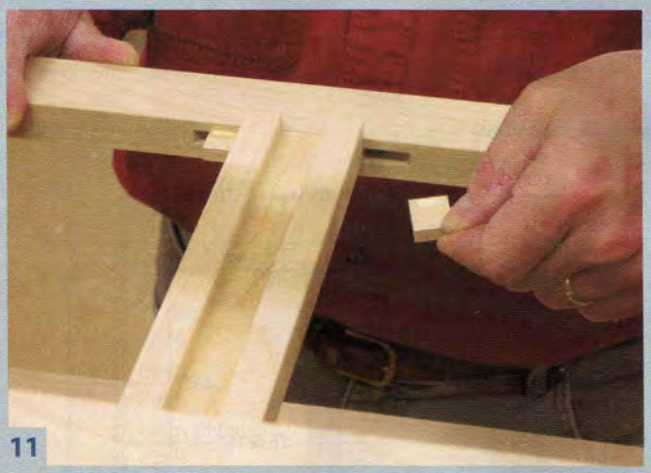
Rout the drawer joints with a half-blind dovetail jig.



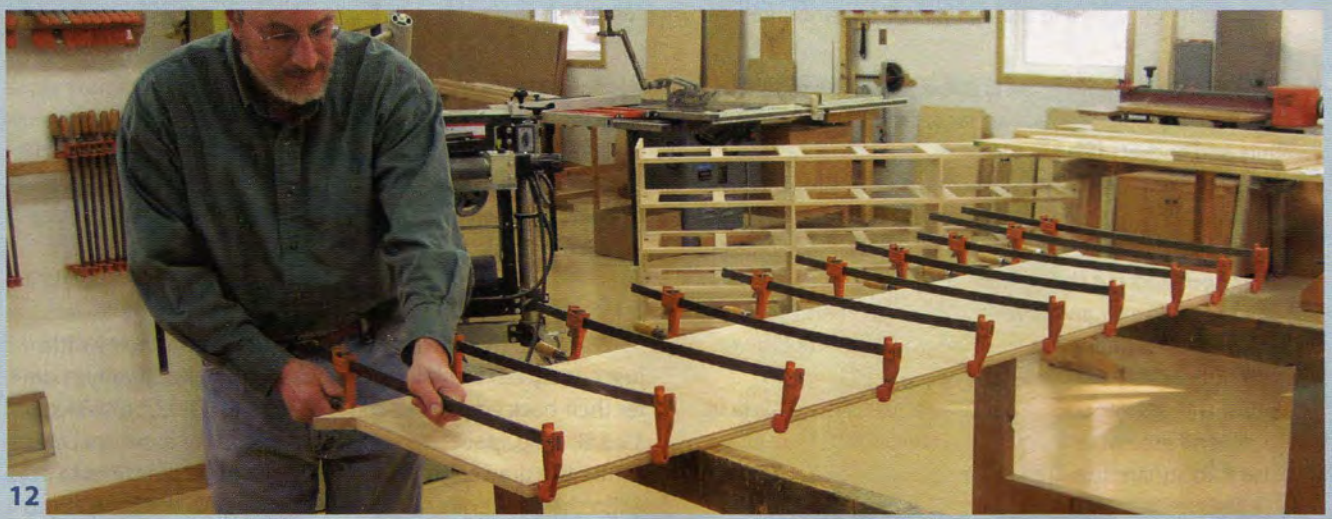
Lay out the drawer-bottom grooves so they're in line with the bottom socket of the drawer's front. Cut the grooves, then glue the drawers.



Remove the bottoms from the drawers, then glue a guide precisely in the center of each bottom. Use two plywood spacers to locate the guide. Put the bottoms back in the drawers and slide the drawers into the case.



Adjust the tracks side to side to center the drawers. Then glue stops on either side of each track to lock it in position.



Glue and clamp the edging pieces to the top. Do the long sides first, and then fit and attach the ends.

Fig. C Front Elevation

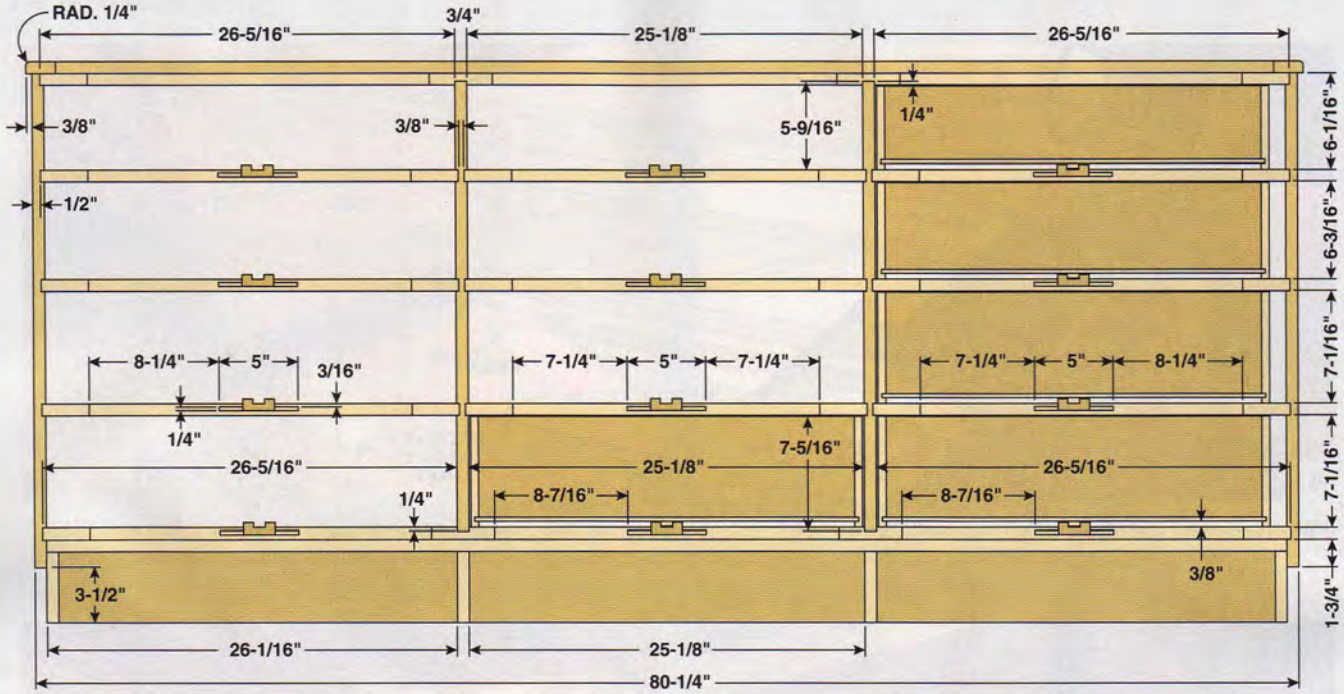


Fig. D Top View

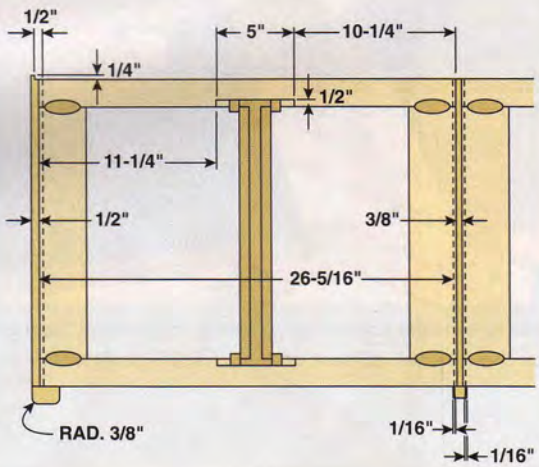
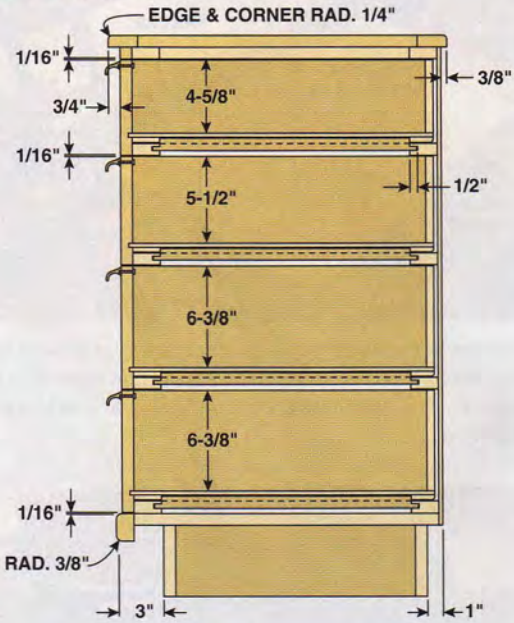


Fig. E Side Elevation



the drawer face. Once that tail is cut, remove the sacrificial board and substitute the drawer face, then cut the remaining tails and sockets (**Photo 8**).

24. Lay out and drill holes in the drawer faces for the drawer pull bolts. The pulls are centered on the drawer faces, and there's a 1/16" reveal above the pulls when they're mounted.

25. Lay out and cut the drawer bottom grooves (**Photo 9**). I use my table saw and a flat-toothed 1/8"-kerf blade. I make two cuts to define the groove's width so the drawer bottom slides easily into it.

26. Cut the drawer bottoms (D11) to size plus 1" extra in width. When I assemble a drawer, I slide its bottom in place and use it to square the drawer. Since it's easier to sand and finish a drawer without the bottom in place, the 1" tab makes it easy to remove the bottom after the glue has dried. Cut the drawer bottoms to their finished widths after the drawers are assembled, then reinstall them.

27. Assemble the drawers.

Mount the drawers

28. Make the drawer guides (D12), and trim their widths just enough so they slide in the drawer tracks. Slightly chamfer their back edges and corners. Cut two 11-13/16" wide by 19-3/8" long spacers from 1/4" plywood. Use these spacers to center the drawer guides on the drawer bottoms (**Photo 10**). Align the back ends of the guides flush with the back edges of the drawer bottoms. This will leave the tracks 1/4" shy at

the front so the drawer bottoms can slide into the grooves in the drawer face.

29. Slide the drawer bottoms into the drawers and screw them to the bottom edges of the drawer backs.

30. Make the drawer track stops (A7).

31. Insert the drawers in their openings and push the drawer faces tight against the web frames. Shift the drawers side-to-side until the spaces between the drawers and case are equal. The tracks will shift along with the drawers. Once all the alignments are made, carefully remove the drawers without disturbing the alignment of the tracks, then glue the stops in place (**Photo 11**).

Build the top

32. Cut the pieces for the top (E1 - E3). Miter the ends of the edging pieces and fit them to the panel. Glue the edgings (**Photo 12**). Shape a 3/8" radius on the top's corners, then rout a 1/4" radius roundover all around the top's edge. Align and screw the top to the case.

Finish

33. Disassemble any screwed-together parts and apply your favorite stain and finish. To achieve a whitewashed look, I applied one coat of Bix Pre-Stain wood conditioner applied with a foam brush, one wiped-on coat of Zar Country White Wood Stain, and three brushed on coats of Varathane Water Based Polyurethane Clear Satin (Sources, below).

CUTTING LIST

Dimensions: 81" W x 35-3/8" T x 21-1/2" D

PART	NAME	QTY.	MATERIAL	TH X W X L
Web Frames				
A1	Stile	4	Birch	3/4" x 1-3/4" x 79-1/4"
A2	Stile	12	Birch	3/4" x 1-3/4" x 26-1/2"
A3	Stile	6	Birch	3/4" x 1-3/4" x 25-1/2"
A4	End rail	22	Birch	3/4" x 3" x 15-7/8"
A5	Mid rail	4	Birch	3/4" x 4" x 15-7/8"
A6	Drawer track	12	Birch	3/4" x 2" x 16-1/4"
A7	Drawer track stop	48	Birch	1/4" x 3/4" x 5/8"
Drawer Case				
B1	End	2	Birch plywood	3/4" x 19-5/8" x 31-1/8"
B2	Divider	2	Birch plywood	3/4" x 19-3/8" x 28-3/8"
B3	Bottom	1	Birch plywood	3/4" x 19-3/8" x 78-3/4"
B4	Bottom edging	1	Birch	1-1/8" x 1-3/4" x 80-1/4"
B5	End edging	2	Birch	1-1/8" x 1-3/4" x 31-1/8"
B6	Top edging	1	Birch	3/4" x 3/4" x 76-3/4"
B7	Divider edging	2	Birch	3/4" x 7/8" x 28-5/8"
B8	Back	1	Birch plywood	1/4" x 30-1/8" x 79-1/4"
Base				
C1	Front and back	2	Birch	3/4" x 4-1/2" x 78-3/4"
C2	End	2	Birch	3/4" x 4-1/2" x 16-3/4"
C3	Cross brace	2	Birch	3/4" x 4-1/2" x 15-1/4"
C4	Cleats	2	Birch	3/4" x 1" x 15-1/4"
Drawers				
D1	Side	6	Birch	1/2" x 5-1/4" x 19-1/4" (A)
D2	Back	3	Birch	1/2" x 5-1/4" x 24-7/8"
D3	Face	3	Birch	3/4" x 6" x 24-7/8"
D4	Side	6	Birch	1/2" x 6-1/8" x 19-1/4" (A)
D5	Back	3	Birch	1/2" x 5-1/2" x 24-7/8"
D6	Face	3	Birch	3/4" x 6-7/8" x 24-7/8"
D7	Side	12	Birch	1/2" x 7" x 19-1/4" (A)
D8	Back	6	Birch	1/2" x 6-3/8" x 24-7/8"
D9	Face	3	Birch	3/4" x 7-3/4" x 24-7/8"
D10	Face	3	Birch	3/4" x 7-11/16" x 24-7/8"
D11	Bottom	12	Birch plywood	1/4" x 19-3/8" x 24-3/8"
D12	Guide	12	Birch	5/16" x 3/4" x 19-1/8"
Top				
E1	Panel	1	Birch plywood	3/4" x 17-3/4" x 77-1/4"
E2	Front and back edging	2	Birch	3/4" x 1-7/8" x 81"
E3	End edging	2	Birch	3/4" x 1-7/8" x 21-1/2"

(A) Length based on 5/16" long tails. Your dovetail jig may cut tails of a different length.

SOURCES

- Colonial Bronze, www.colonialbronze.com, (860) 489-9233, Satin Bronze Drawer Pulls, #425, US10 finish, $10 ea.
- Bix Manufacturing, www.bixmfg.com, (615) 792-3260, Pre-Stain, #6002, $7/qt.
- UGL, www.ugl.com, (570) 344-1202, Zar Oil Base Wood Stain, #139 Country White, $9/qt.
- Varathane, www.rustoleum.com, (847) 367-7700, Water Based Polyurethane, Clear Satin #2002, $10/qt.

Bruce Kieffer is a freelance woodworking author, technical illustrator and custom furniture builder. You can see a collection of his work from the past 30 years on his website, www.kcfi.biz.

"Two-Cent" Micro Adjuster

Pennies make it easy to adjust your router table fence.

by Jerry Spruiell

"IF I COULD JUST OPEN that sliding dovetail by 1/128", I thought while staring at my router table setup, "choirs of angels would sing!" Sure, I could buy a micro-adjuster for the fence, but that would mean I'd have to leave the sanctuary of my shop and spend money. So, I dug in my heels, got a fresh cup of coffee, and started scratching my head. Using left over hardware and scraps from my offcut pile, I eventually came up with this micro adjuster. It works great and has a nifty on-board clamping system that makes it easy to install and remove on any router table top (with or without T-track).

The best way to create the small pieces that comprise this jig (see Fig. A, page 55) is to start with blanks that are oversize in length. Drill the holes and cut the grooves and tenons first. Then cut each piece to final length. To start, you'll need some hardwood scraps to make the jig's body and post. To make the top piece, start with a blank that's 7/8" x 3" x 12" long. Cut a 1/8" x 3/4" groove on one side and a 1/2" x 1-3/8" notch in one end. The post's tenon will go in the notch.

Centered in the top's groove and 7/8" from each end, drill 1/16" x 3/4" counterbores with a Forstner bit, to hold two pennies (**Photo 1**). Next, drill holes all the way through, centered in the counterbores, using the correct size bit for the threaded inserts you're using (see Sources, page 55). Flip the top over and thread in the inserts until they're flush. Cut the top to its final 4" length, and put one penny in each of the counterbores.

Mill a strip of springy hardwood, such as oak or birch, to fit flush in the groove, minus the thickness of the PSA sandpaper that you'll adhere to the surface. After applying the sandpaper, drill two countersunk holes in the center of the spring strip and pilot holes in the groove. Install the pennies and attach the spring strip (**Photo 2**). Thread the clamp bolts into the threaded inserts (**Photo 3**). The pennies evenly distribute the pressure.

The height of the jig's side piece is the thickness of your router table plus a strong 7/8". Pre-drill and countersink holes for the screws, and fasten the side piece to the top piece.

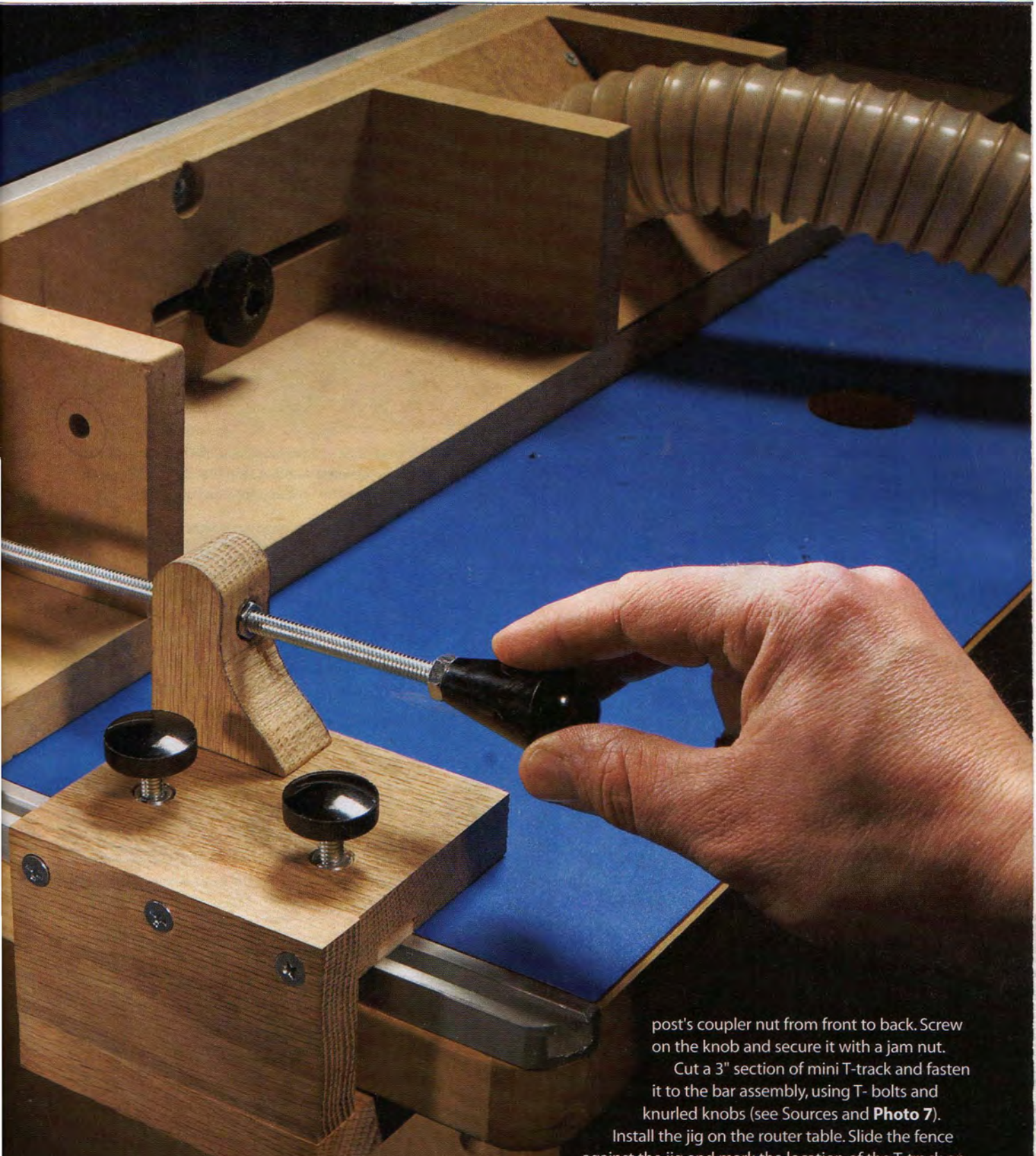
The width of the jig's bottom piece depends on the overhang of your router table's top. Drill a hole in this piece, positioned so that you can access the screws that hold the spring strip in the top piece, just in case you ever need to replace it. Glue and screw the bottom piece to the side piece.

To make the post, start with a 7/8" x 1-3/4" x 12" blank. Bandsaw a tenon to fit the notch in the jig's top. Next, cut the post's profile (**Photo 4**). Drill a hole through the post and install the coupler nut, using epoxy (**Photo 5**). Take care not to get epoxy on the threads. Glue the post to the top piece.

To make the T-bolt bar, cut a short piece of aluminum bar stock (see Sources). Epoxy two wood blocks on each end of the bar, leaving a space for a lock nut. When the epoxy has cured, drill three holes, one through the center of the bar and one through the center of each block.

Next, cut a length of threaded rod (see Sources). I cut mine at 9"; you may have to adjust the length to fit your setup. Lock nuts and washers hold the T-bolt bar on the rod. The first nut

EDITORS: BRAD HOLDEN AND TIM JOHNSON • ILLUSTRATION: FRANK ROHRBACH



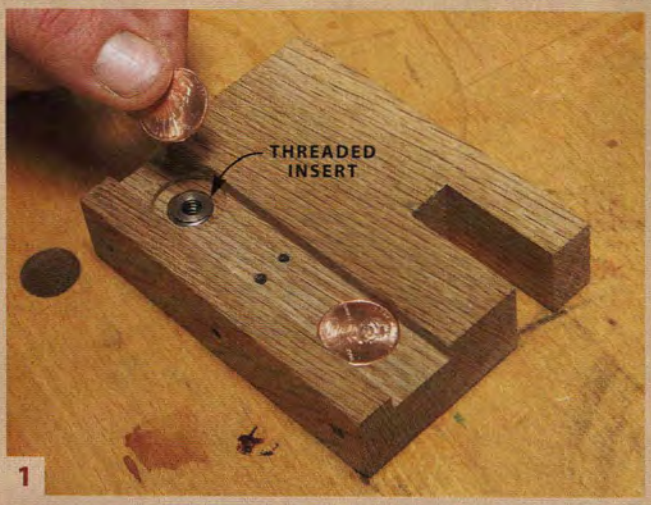
has to thread almost the entire length of the rod, so chuck the rod in your drill and spin it while holding the nut with a wrench. Stop about 5/8" from the end, and install a nylon washer.

Next, slip on the T-bolt bar assembly, with its flat side against the nylon washer. Install a second nylon washer and the second lock nut to secure the assembly (**Photo 6**). It should be just tight enough so there's no slop. Thread the rod through the post's coupler nut from front to back. Screw on the knob and secure it with a jam nut.

Cut a 3" section of mini T-track and fasten it to the bar assembly, using T- bolts and knurled knobs (see Sources and **Photo 7**).

Install the jig on the router table. Slide the fence against the jig and mark the location of the T-track on the fence's back. (**Photo 8**). Back off the jig, remove the T-track and screw it in place on the fence (**Photo 9**).

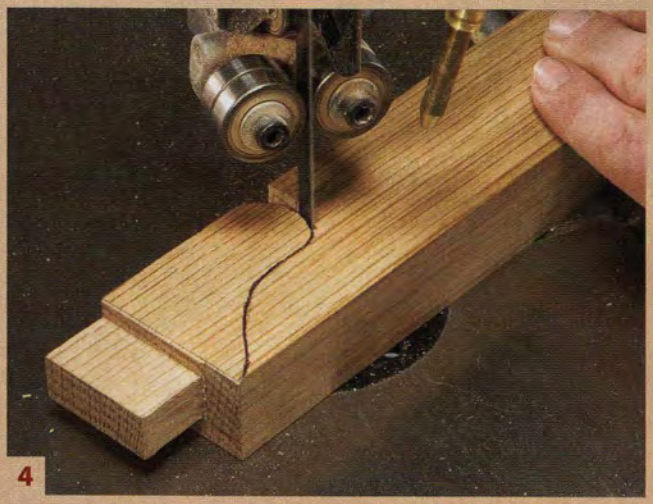
To use the jig, remove the T-bolts and install them in the T-track. Position the fence approximately where you need it, slide the jig onto the table's edge, and attach the T-bolts to the T-bolt bar. Tighten the jig's spring clamp and you're ready to micro adjust!



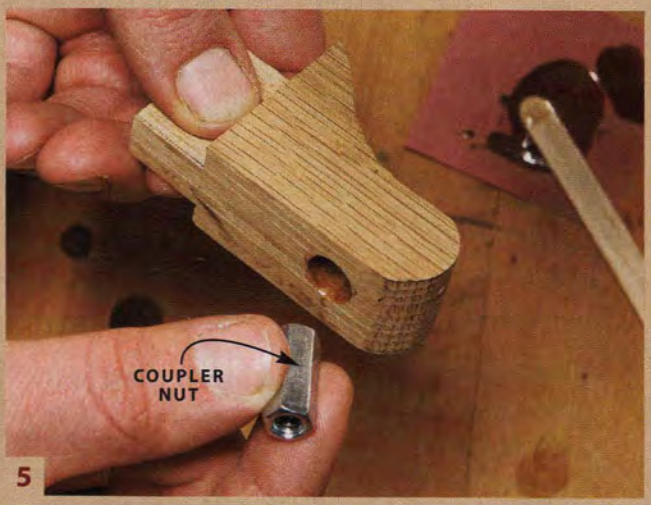
An ingenious clamp mechanism secures this jig to the router table. Pennies recessed in a groove in the jig's top transfer clamping pressure applied by threaded-in bolts.

Here's the heart of the clamping mechanism. The pennies bear against an abrasive-covered wooden strip that fits in the groove and is attached at its center, so it acts as a spring.

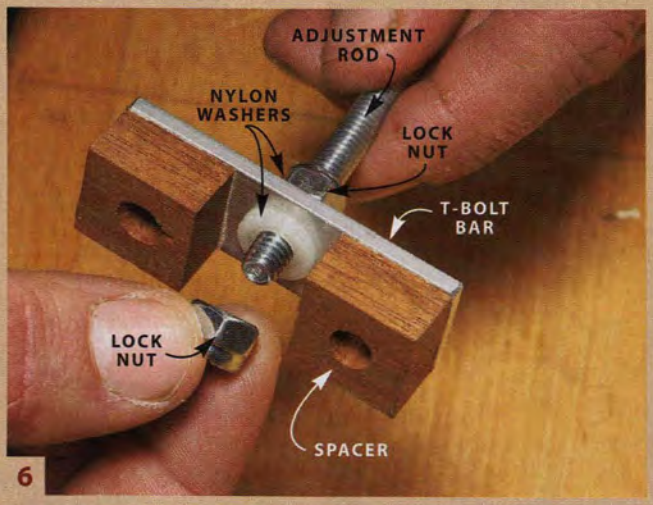
Tightening the clamp bolts pushes down the pennies, and flexes the spring. This locks the completed adjuster to the router table.



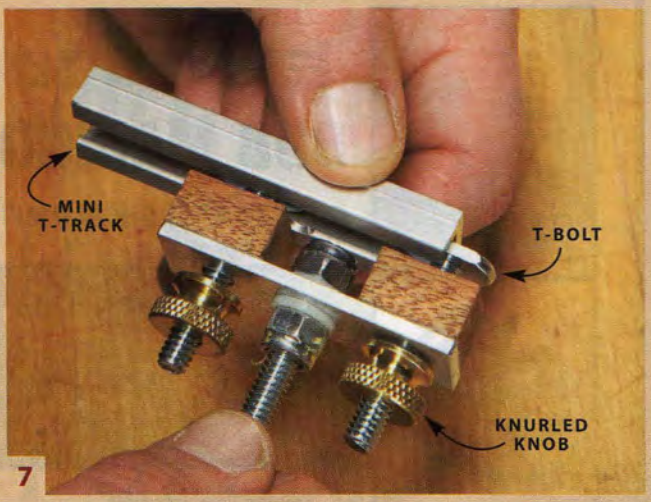
Create the post on the bandsaw. Use the fence to cut the tenon. Then saw the profile.



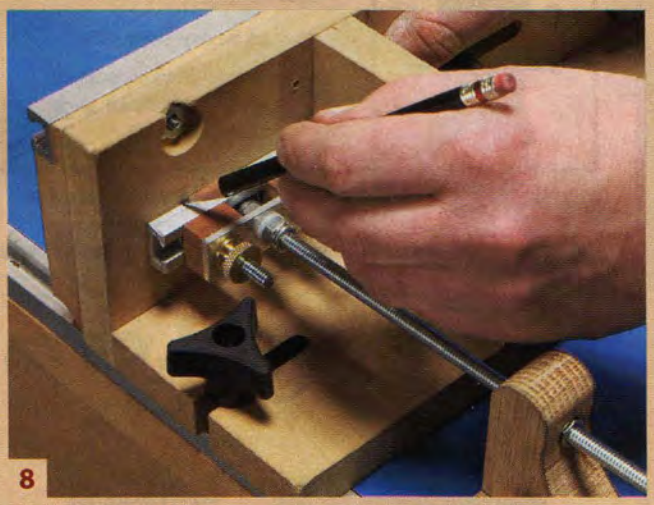
Epoxy a coupler nut in a hole drilled through the post. The jig's adjustment rod threads through this nut. Glue the post in the top's notch. Then attach the jig's side and bottom pieces.



Fasten the T-bolt bar to the end of the adjustment rod. Epoxied-on wooden spacers house the lock nut and provide clearance for the T-bolts that connect the jig to the router table fence.



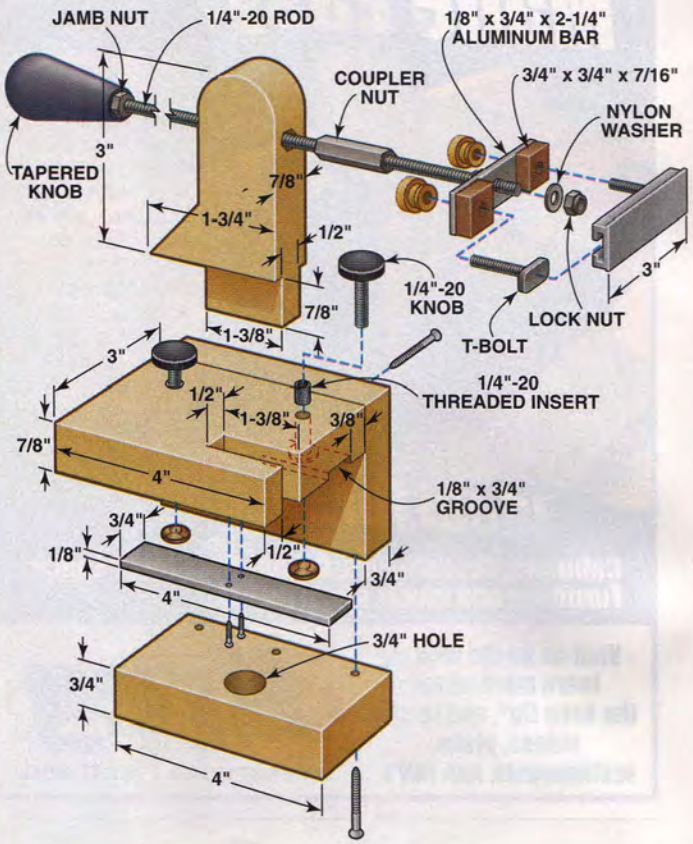
Install the T-bolts and a length of mini T-track on the bar. This allows using the jig to position the T-track on the router table's fence in the next step. Install the adjustment rod in the jig and attach the knob.



Mark the T-track's location after installing the jig, locking it in place and sliding the fence against it.

Remove the T-track from the jig and fasten it to the fence, using the marks you've made. To attach the jig, transfer the T-bolts to the T-track and then reattach them to the jig's T-bolt bar.

Fig. A "Two-Cent" Micro Adjuster



You don't need extra clamps to install this micro-adjust, because it has a nifty integral clamp mechanism.

SOURCES

- Rockler Woodworking and Hardware, www.rockler.com, (800) 279-4441, 1/4"-20 Threaded Inserts, #28803, $5 for 8 inserts; 1-5/8" Tapered Knob, 1/4"-20 tpi, #34199, $3 each; 1" Round Knob/Bolt, 1/4"-20 tpi, #34238, $2 each.
- Woodcraft Supply, www.woodcraft.com, (800) 225-1153, 16 piece Brass Knob Kit, #147919, $7 (includes knurled brass knobs, T-bolts, and nylon washers.
- T-Track USA, www.ttrackusa.com, (888) 512-9069, 24" Aluminum T-Track System (Mini T-Track), #1021, $10.
- Aluminum Bar Stock, Threaded Rod, and Coupler Nuts are available at hardware stores and home centers.

Wooden Burr Puzzles

Notch a few sticks and drive your friends crazy.

by Jock Holmen

SOMETHING'S GOT TO GIVE when pieces of wood intersect at 90° angles. That's the reality behind the curious assemblies shown here. Known as burr puzzles, because they resemble seed burrs, these brain-teasers consist of three or more notched pieces that go together at right angles. Give one of these tricksters to an unsuspecting friend and watch the fun. Disassembling each puzzle is the easy part. Putting the pieces back together is the real challenge!

Precision is the key to making the puzzles work effectively. Each part must be accurately marked, milled and cut.

Comments or Questions? visit
www.AmericanWoodworker.com/burrpuzzles

EDITOR: TIM JOHNSON • STORY IDEA: FRED ADAMS

The three piece burr

IN APPEARANCE, this puzzle is my favorite, because of its perfect, simple symmetry. It's the only puzzle of the three that requires cutting dadoes in two sizes (see Fig. B, opposite).

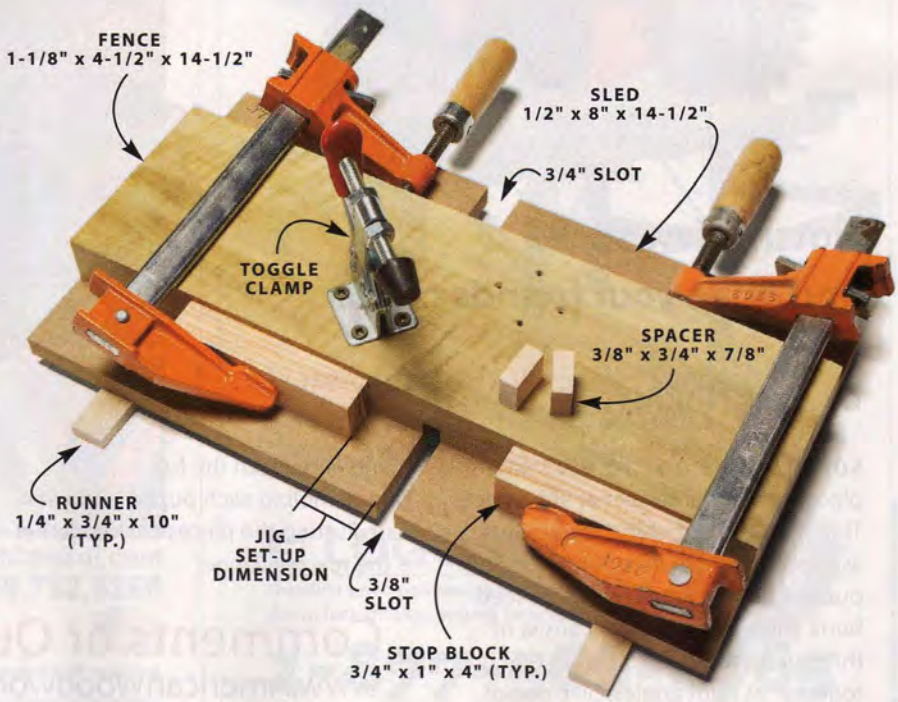
Make the pieces

1. Cut 2-1/4" blocks from square 3/4" stock, including extras for test cuts.
2. Set up the saw and the jig to cut 3/8" by 3/8" dadoes.
3. Clamp the jig's right stop block 1-1/8" from the edge of the 3/8" slot.
4. Snug a test piece and both 3/8" spacers against the right stop. Butt the left stop block against the spacers and clamp it.
5. Cut dadoes in a couple test pieces. Fit them together to check the dadoes' width and depth; make necessary adjustments.
6. Install Piece A and cut the first dado **(Photo 1)**.
7. Rotate Piece A, reposition the spacers and cut the second dado **(Photo 2)**.
8. Turn the jig around and set it up to cut 3/8" by 3/4" dadoes.
9. Clamp the right stop block 1-1/8" from the edge of the 3/4" slot.
10. Repeat Steps 4 and 5.
11. Install Piece B with one spacer at each end. Cut the first dado **(Photo 3)**.
12. Rotate Piece B one-quarter turn toward the dado set and cut the second dado.
13. Install Piece C and repeat Steps 11 and 12.
14. Ease the corners of the bridge on Piece C to create an octagon.

ASSEMBLE THE PUZZLE

1. Connect Pieces A and C.
2. Install Piece B from the top.
3. Rotate Piece C one-quarter turn.

Fig. A Dadoing Jig

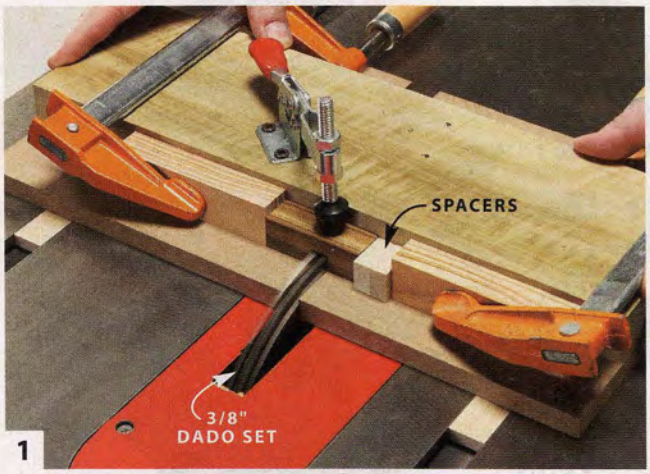


The first step for all three puzzles is to mill long 3/4" x 3/4" blanks. Use a caliper to measure the thicknesses precisely and make sure the blanks are square. Then cut the individual puzzle pieces to exact length from the blanks.

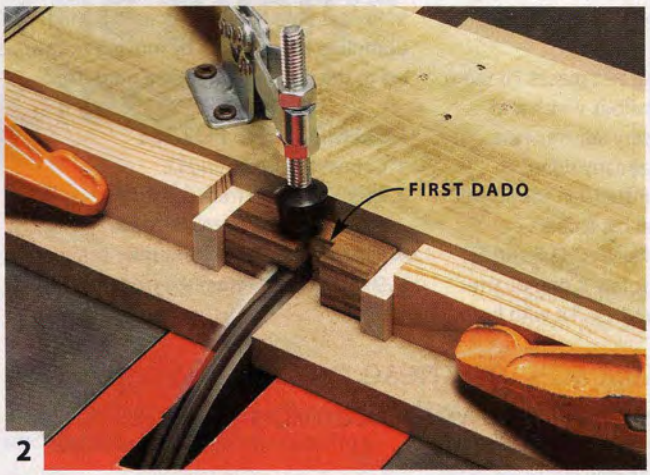
A shopmade jig makes it easy to notch the pieces for all three puzzles on the tablesaw, using a dado set (Fig. A, below). This jig consists of a sled with runners, a clamp and a fence. The runners fit the saw's miter slots, so the sled makes perpendicular cuts. For clean, tearout-free results, a different part of the jig should be dedicated to each notch size. If, as shown, the blade is offset between the runners, you can use both sides of the sled. For safety, the jig's wide fence houses the dado set from both directions. Stop blocks and spacers precisely position the pieces, so the notches (dadoes, actually) are accurately cut. Like the puzzle pieces themselves, the spacers must be precisely cut. To set up the jig, clamp one stop block to the right of the slot (the exact distance—called the Jig Set-Up Dimension—depends on the puzzle you're creating). Use a puzzle piece and the spacers to locate and clamp the other stop. After you've installed each piece, secure it with the toggle clamp before you cut the dado (see Source, below).

The dadoes have to fit perfectly, so always make extra puzzle pieces, and start by making test cuts. Testing the dado widths and depths is pretty easy, because most of the pieces go together with lap joints. When the dados fit snugly, their widths are correct; when the joint surfaces are flush, the dado depths are correct. The pieces will go together more easily if you lightly sand their edges. That's it; you're ready to go.

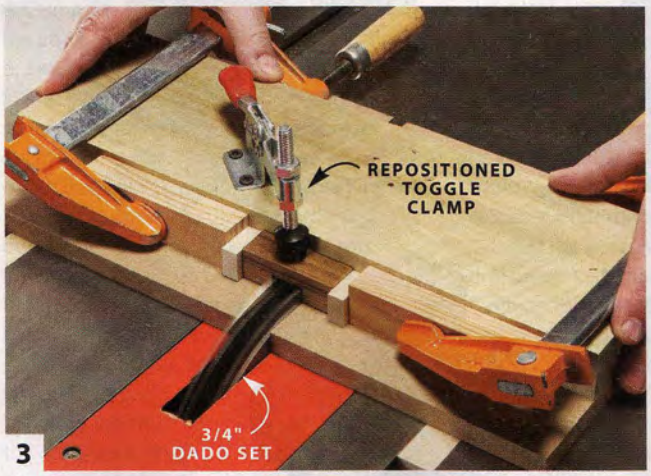
Source: Woodcraft
www.woodcraft.com, (800) 225-1153,
Toggle Clamp, #143938, $11.99.



Cut a 3/8" by 3/8" dado after clamping the stop blocks in position and installing Piece A with both spacers to the left.



Cut a second dado in Piece A after rotating it one-quarter turn toward the dado set and re-installing it with one spacer at each end.



Use the opposite side of the jig to cut 3/4" wide dadoes in Pieces B and C. Cut the first dado, rotate each piece one-quarter turn toward the dado set, and then cut a second dado. Make these cuts with one spacer installed at each end.

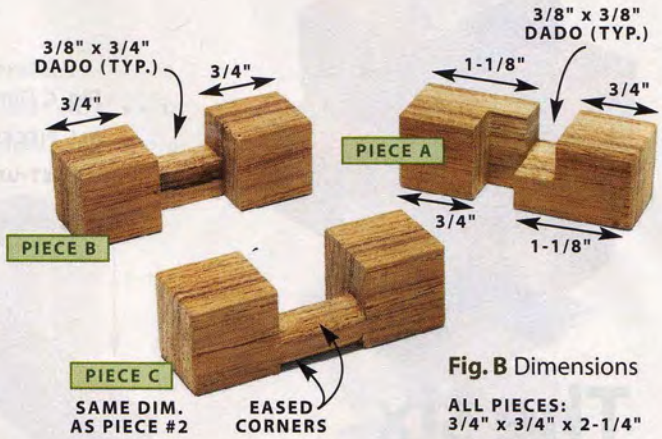
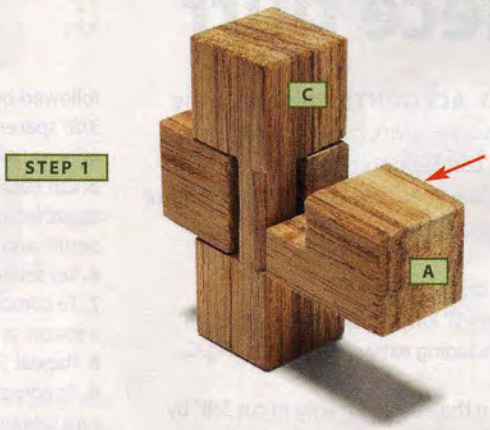
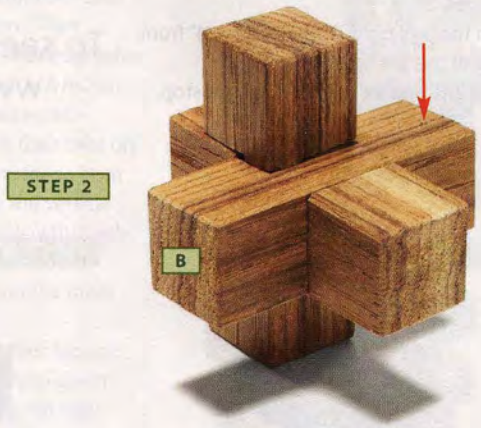


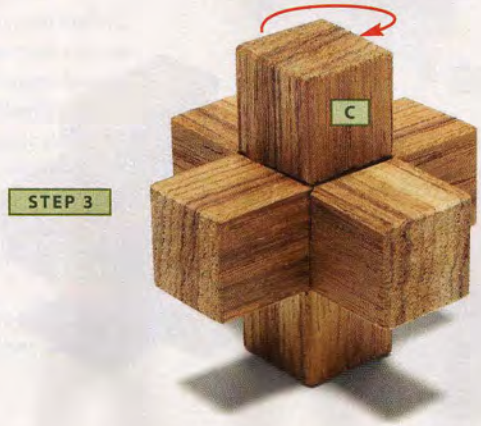
Fig. B Dimensions

ALL PIECES:
3/4" x 3/4" x 2-1/4"

JIG SET-UP
DIMENSION: 1-1/8"







The six piece burr

BY ALL ACCOUNTS, this burr is the most well known, because the six pieces can be notched in so many different ways and still assemble to create the same form.

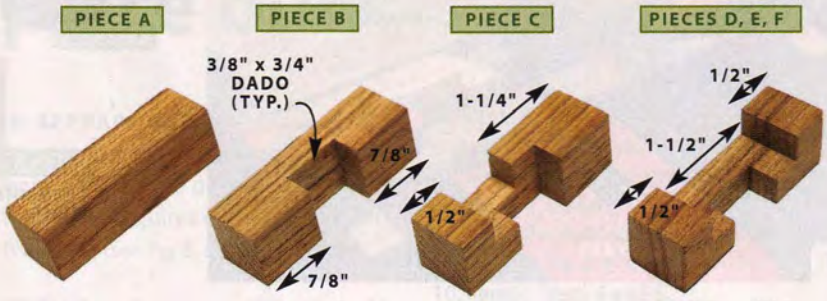
Make the pieces

1. Cut 2-1/2" long blocks from square 3/4" stock, including extras for test cuts (Fig. C, above).
2. Set up the saw and the jig to cut 3/8" by 3/4" dadoes.
3. Clamp the jig's right stop block 1-1/4" from the edge of the 3/4" slot.
4. Snug a 3/8" spacer against the right stop, followed by a test piece and the remaining 3/8" spacer. Butt and clamp the left stop block against the spacer.
5. Cut dadoes in a couple test pieces. Fit them together to check the dadoes' width and depth, and make necessary adjustments.
6. Set aside Piece A; it's already done.
7. To complete Piece B, install it in the jig with a spacer at each end and cut a dado.
8. Repeat Step 7, using Pieces C, D, E and F.
9. To complete Piece C, rotate it one-quarter turn toward the dado set. Install it with both spacers to the left and cut a second dado.
9. Repeat Step 8, using Pieces D, E and F. Complete these pieces by moving both spacers to the right and cutting a third dado.

Fig. C Dimensions

ALL PIECES: 3/4" x 3/4" x 2-1/2"

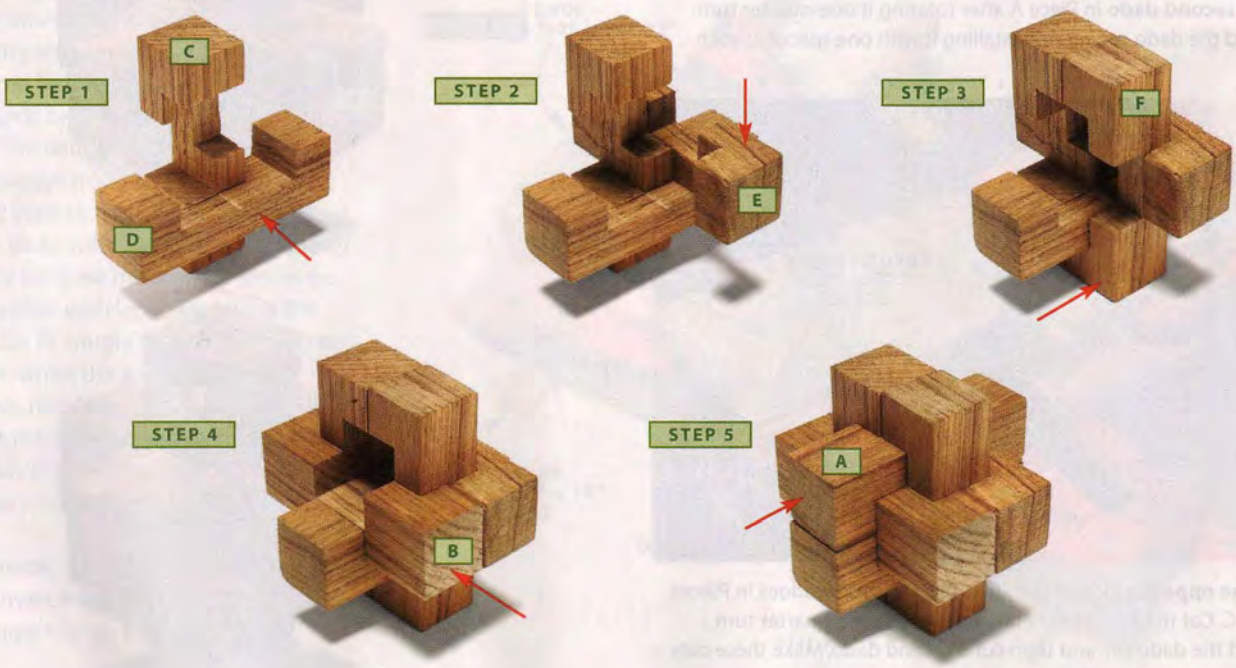
JIG SET-UP DIMENSION: 1-1/4"



ASSEMBLE THE PUZZLE

1. Connect Pieces C and D.
2. Drop in Piece E from the top.
3. Slide in Piece F from the front.
4. Slide in Piece B from the side.
5. Slide in Piece A from the front.

To see videos of solving these puzzles go to:
www.AmericanWoodworker.com/burrpuzzles



The twelve piece burr

A GOOD NICKNAME for this puzzle is "The Intimidator," because all twelve pieces are identical, and taking the puzzle apart is as confounding as putting it together.

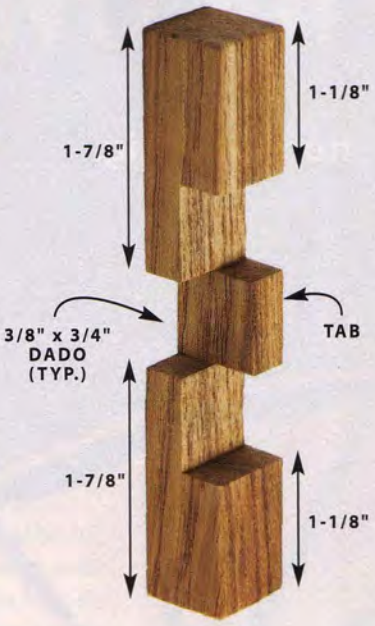
Make the pieces

1. Cut 4-1/2" long blocks from square 3/4" stock, including extras for test cuts (Fig D, above).
2. Make a pair of 3/4" x 3/4" x 7/8" spacers.
3. Set up the saw and the jig to cut 3/8" by 3/4" dadoes.
4. Clamp the jig's right stop block 1-7/8" from the edge of the 3/4" slot.
5. Snug a 3/4" spacer against the right stop, followed by a test piece and the other 3/4" spacer. Butt and clamp the left stop block against the spacer.
6. Cut dadoes in a couple test pieces. Fit them together to check the dadoes' width and depth, and make necessary adjustments.
7. Cut this dado in all twelve pieces.
8. Flip the piece end for end and reinstall it between the two spacers. Cut a second dado in all twelve pieces. Both dadoes should be in the same face.
9. Rotate the piece one-quarter turn toward the dado set and reinstall it with both 3/4" spacers on the left. Cut this dado in all twelve pieces. This last cut creates a tab, which can be used to help assemble the puzzle.

Fig. D Dimensions

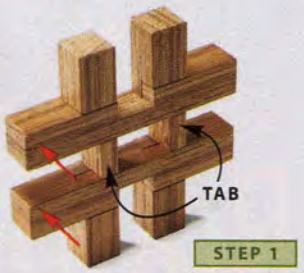
ALL PIECES: 3/4" x 3/4" x 4-1/2"

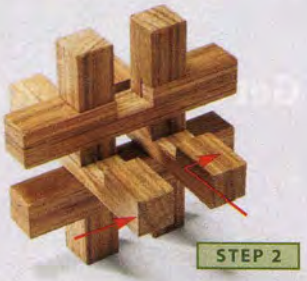
JIG SET-UP DIMENSION: 1-7/8"

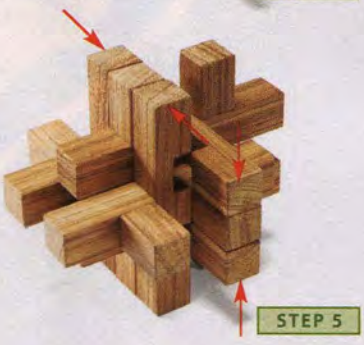


ASSEMBLE THE PUZZLE

1. Assemble four pieces to form a tic-tac-toe grid. Orient two vertical pieces with their tabs on the right and facing to the front. Then install the two horizontal pieces with their tabs on the inside and facing to the back. A rectangular space should appear in the center.
2. Install the next two pieces with their tabs on the left and facing up. Slide in one piece from the left side, until it locks around the vertical piece. Slide the second piece halfway through the rectangular space from the front. Then move it to the right, to lock around the other vertical piece.
3. Install the next two pieces with their tabs on the inside and facing down. Slide them down from above and lock them in place. You now have two intersecting tic-tac-toe grids.
4. Slide the horizontal tic-tac-toe grid to the left.
5. Install the last four pieces. Orient the two vertical pieces with their tabs on the outside and facing to the right. Slide in one from the front and one from the back. Lock them in place. Orient the two horizontal pieces with their tabs on the outside and facing to the left. Install one of these pieces from the top, and one from the bottom. You may have to hold onto the bottom piece during the next step.
6. Complete the puzzle by sliding the horizontal and vertical assemblies together.



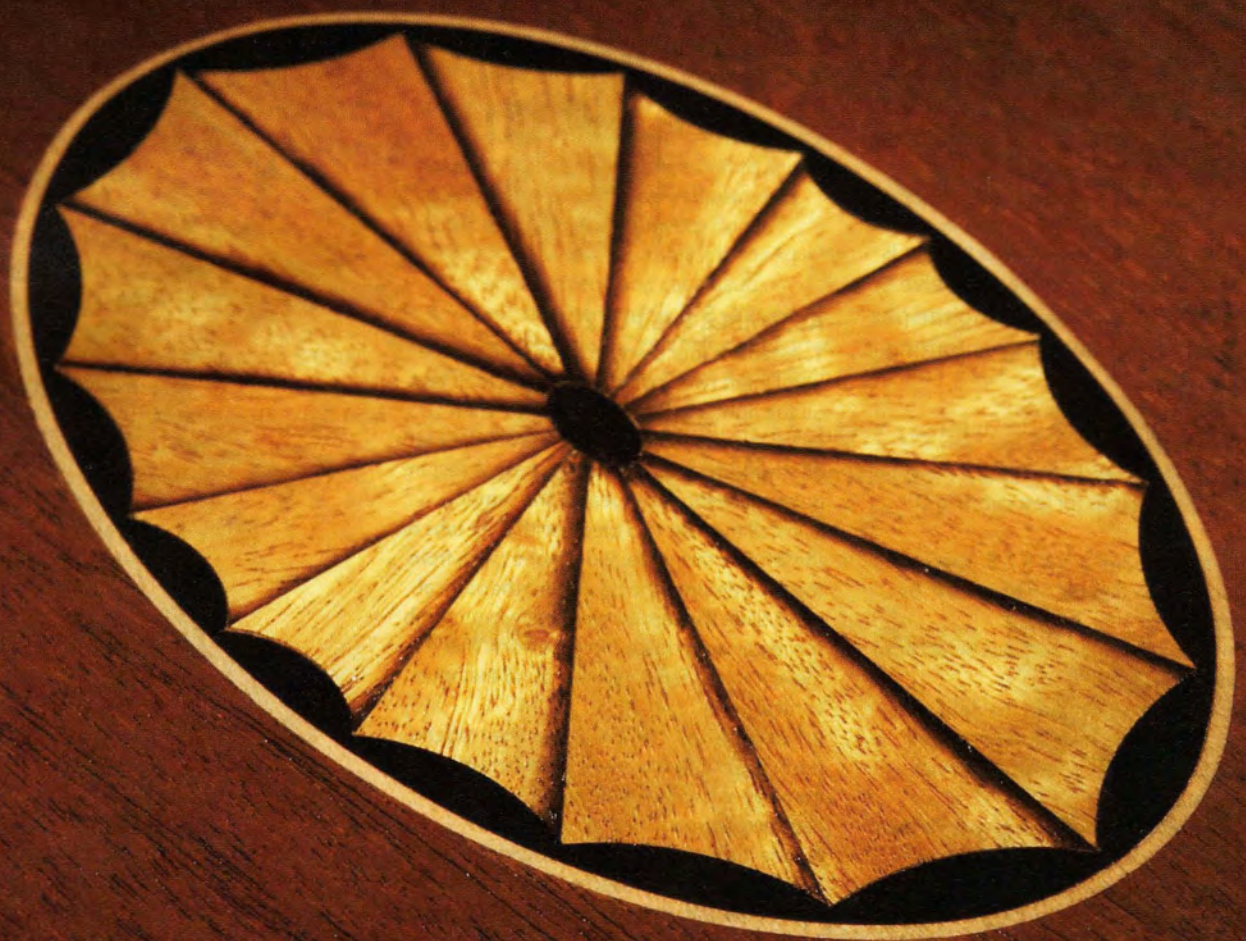




Routing for Oval Inlay

Get a perfect fit using a shop-made jig.

By Tom Caspar



INLAYING OVAL AND CIRCULAR designs is a time-honored method for adding class to a project, such as a jewelry box. Making your own inlay is an interesting challenge, but it's far easier to select one from a wide range of ready-made designs (see Sources, page 64).

Here's the $64,000 question, though: How are you going to create a perfectly-sized recess for the inlay? There's really no room for error on a prominent detail like this–you wouldn't want to ruin an inlay, or your project, using an imprecise technique. Not to worry: the following method for routing the recess ensures a good fit.

Prepare the inlay

All inlays come with a layer of tape on one side, which helps keep together the various parts of the design. The tape is always placed on the good, or top, side of the inlay. Draw centerlines for the oval or circle on the tape using a combination square.

Some oval and circular inlays are made with a rectangular or square border which protects the edges of the design. If your inlay has a border, the first step is to remove it (**Photo 1**). All the parts of the inlay are glued together, including the border, so the border must be cut off with a very sharp knife. A breakaway utility knife works well as long as you start with a fresh edge. Guide the cuts with a metal straightedge, such as the blade from a combination square. Avoid cutting into the oval border. Make a series of straight cuts–it's OK if small pieces of the border veneer remain.

Make a small station for sanding the inlay's edges (**Photo 2**). First, tape a piece of 150-grit sandpaper to a thick block. Clamp the block to a piece of plywood (melamine works well, because it's slippery). Sand the inlay by rotating it with your hands–the goal is to make a perfect oval.

Make the template

MDF is ideal for making a template because it's uniform and easy to sand. It can be any thickness. (I'm using 1/2" material). Cut the MDF the same size as the piece of wood that you'll be routing for the inlay.

Draw centerlines on the template. The oval won't be perfectly symmetrical, so mark one portion of the inlay with an "X", and make the same mark on the template. Align the centerlines of the oval and template and trace around the inlay with a sharp, soft-leaded pencil (**Photo 3**). Widen the line with a dull pencil.

Remove most of the waste by drilling (**Photo 4**). Keep the bit at least 1/32" away from the pencil line. Use a Forstner bit so you can overlap the holes.

Now for the picky part. Sand right up to the line–but don't remove any of the line (**Photo 5**). Take it easy and frequently check your progress (**Photo 6**). If you sand too far into the line, it's probably best to start over with a new template.

Some inlays have a rectangular border which must be removed. Cut off the border using a sharp knife guided by a metal straightedge.

Remove remaining bits of border material by sanding the oval on a right-angled block. This ensures that the oval's edges are square.

Make a router template from MDF. Turn over the inlay, taped side up (this is the show side), and trace around it.

Remove most of the waste inside the oval using a Forstner bit in the drill press.

Sand up to the pencil line using an oscillating spindle sander or a sanding drum in your drill press.

Check your progress by placing the oval in the template's window. Aim for a snug fit, with no gaps.

Rout the recess

You'll be routing the recess for the inlay with a top-bearing flush-trim bit (see Sources, below). Your template will probably have to be shimmed to raise it high enough above the workpiece so the bit can create a shallow recess. I chose a bit with 9/16" long flutes and made a shim from 1/4" hardboard (**Photo 7**), but many combinations of bits and shims will work. Make the shim piece the same size as the template, to help with alignment when clamping the template to the workpiece.

If your router has a small-diameter base, you may have to replace the sub-base with a larger, shop-made sub-base to prevent the router from tipping into the template, and to enable it to reach the middle of the recess.

Install the bit in your router. I unplug the router and turn it upside down to initially set the bit's height (**Photo 8**). Place cutoffs from the template and the shim next to the bit to represent their combined thickness. Add two playing cards on top–they're just a hair thinner than the inlay.

Rout a piece of scrap wood to test the bit's depth of cut. Clamp the template at all four corners to the scrap piece. This ensures that the recess is an even depth. Place the inlay, or an offcut from the border, in the recess. The inlay (not including the tape) should stand proud of the recess by about the thickness of a sheet of paper. Adjust the bit if necessary, then mark the actual workpiece with an "X" (corresponding to the "X" on the template), and rout the real recess (**Photo 9**).

Glue the inlay

Align the two "X" marks and test the inlay's fit into the recess (**Photo 10**). If the inlay is too large, remove a bit from its edges using the sanding station. Again, take it easy–the goal is for the inlay to drop into the recess using very little pressure.

Make a clamping block that's about 1/32" smaller than the inlay all around. Spread a thin coat of yellow glue in the recess–*but not on the inlay*–and position the inlay in the recess, tape side up. Make sure that the inlay is properly seated all around, then place the block on the inlay and clamp (**Photo 11**). Remove any glue squeeze-out and let the glue dry overnight.

Remove the tape by slightly moistening it with water (**Photo 12**). Sand the inlay flush with fine paper (**Photo 13**).

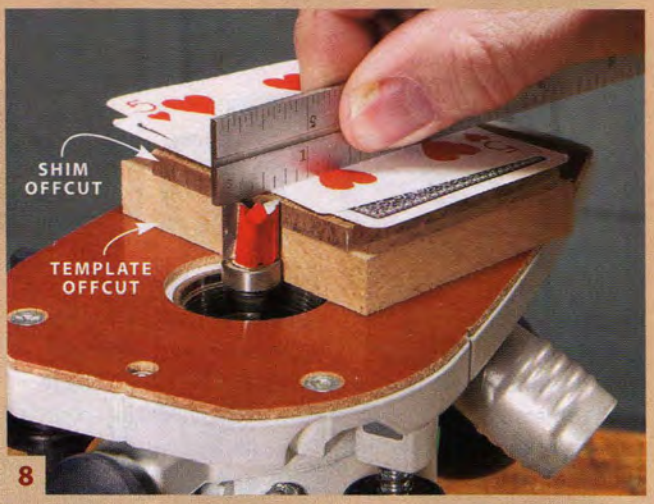
SOURCES

- Constantine's Wood Center, www.constantines.com, (800) 443-9667, Oval Sunburst Design Inlay, #IW151, $20.95; many other inlays are also available.
- Freud, www.freudtools.com, (800) 472-7307, Top Bearing Flush Trim Bit, #50-107, $27.

For complete plans to build this box go to:
www.AmericanWoodworker.com/treasuredwoodjewelrybox

7

Fasten a shim piece to the template's bottom side. The thickness of this piece is determined by the length of your router bit's cutting flutes.



8

Adjust the height of a top-bearing flush-trim router bit. Use scrap pieces, plus a couple of playing cards, to represent the thickness of the template, shim and inlay.

9

Clamp the template to the workpiece and rout a recess for the inlay. Using this bit, the recess will be exactly the same size as the template's window.

10

Test the fit of the inlay in the recess. If the inlay is too large in spots, sand those areas using the right-angle sanding block.

11

Glue the inlay. Apply even pressure by using a thick block that's just a bit smaller than the inlay.

12

Remove the tape by moistening it with a sponge. Wait a minute or two, then scrape off the tape using a dull putty knife.

13

Sand the inlay flush with the surrounding wood. Use 220 grit paper wrapped around a cork-backed block.

Pizza Paddle

Handle homemade pizza like a pro. by Fritz Schroeder

WEDNESDAY IS HOMEMADE PIZZA NIGHT at our house. Everybody likes different toppings, so we each make our own personal size pizza. My favorite is hot Italian sausage with tomatoes, mushrooms and mozzarella. Making pizza is especially easy with ready-made crusts, and you can bake them right on the oven rack.

As a home pizza specialist/woodworker, I decided to create my own paddle. Restaurant chefs use similar paddles (called "peels" in the trade) to efficiently slide pizzas in and out of their ovens. Making my own paddle was fun and easy, and using it makes me feel like a proper pizza chef. Now I just need the proper chef's hat!

All you need to make your own paddle is a board for the handle and wide blade, a couple thin strips for accents, a 12" planer, and a simple shop-made tapering sled. The completed paddle measures 11-3/8" x 24", the perfect size to handle 12" pizzas.

Build the paddle

Starting with a 3/4" x 6" x 24" board, rip a 1-3/8" strip from one side to create the handle **(Photo 1)**. Then use

EDITORS: BRAD HOLDEN & TIM JOHNSON

the wide offcut to make the blade pieces. Mark the centerline and draw a small radius at each end, on opposite sides. Then make a single S-shaped bandsaw cut to create a pair of pieces with one rounded (outside) shoulder and one transitional (inside) shoulder.

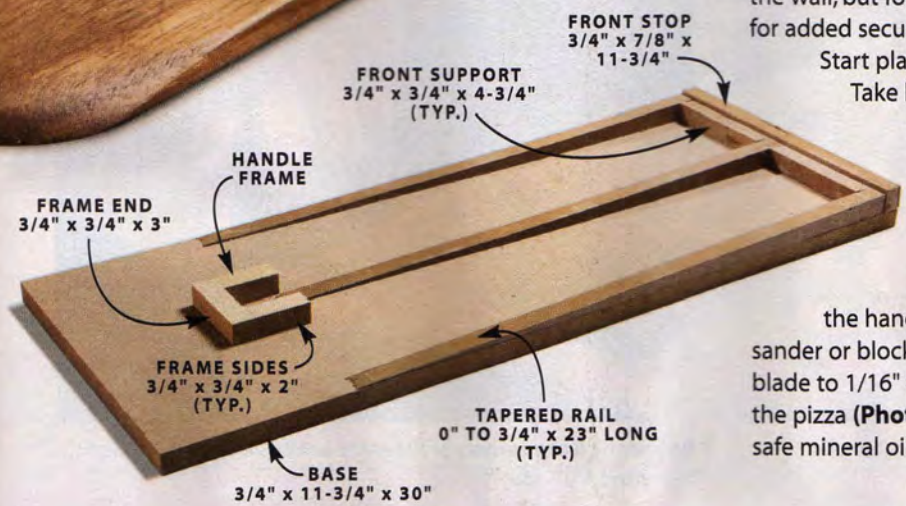
Rip a pair of 3/4" x 1/2" x 14" maple strips to accent the walnut blade. Position all the parts for assembly. You can't use biscuits or dowels to help with alignment, because the blade is going to be tapered, so make sure the parts are flat. Joint all the edges and then glue and clamp the assembly **(Photo 2)**. Before tapering, plane the paddle to 9/16" thick.

Make the tapering sled

The sled is simply a base with a tapered platform that holds the paddle at an angle as it passes through the planer (see Fig. A, below). The platform consists of three long rails that taper from 3/4" to 0". To make consistently tapered rails, tack together three 3/4" x 3/4" x 24" blanks, using double sided tape. Bandsaw the long taper and smooth the cut edge by sanding. Then pull the rails apart.

Glue the front stop to the leading edge of the base. Glue the tapered rails to the sled's base with the tall ends butted up against the stop. Glue the front support strips between the tall ends of the tapered strips. These strips support the front edge of the paddle while planing. Lay the paddle on the sled and frame the handle by gluing blocks on both sides and behind. This frame correctly positions the paddle on the sled.

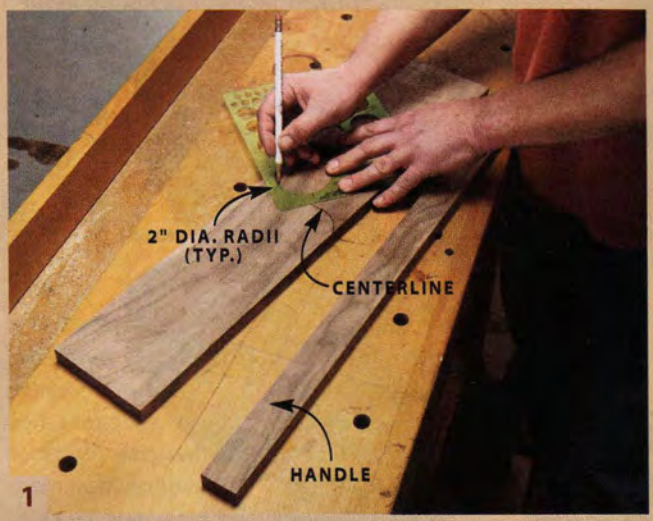
Fig. A
Tapering Sled



Taper the paddle

Drill and countersink a hole in the end of the handle. When the paddle is finished, you can use this hole to hang it on the wall, but for now, use it to screw the paddle to the sled for added security **(Photo 3)**.

Start planing **(Photo 4)**, feeding the blade end first. Take light passes to avoid tear-out. Continue until the tip of the blade is 1/8" thick. Round the corners on the leading edge of the blade. At the top end of each accent strip, extend and fair the transitional curve from the blade piece to the handle. Round over the sharp edges and make the handle comfortable to hold **(Photo 5)**. Use a sander or block plane to bevel the leading edge of the blade to 1/16" thick, or slightly less, so it's easy to get under the pizza **(Photo 6)**. Finish sand and add a coat of food-safe mineral oil to beautify and protect the wood.



1

Cut the paddle's three main pieces from a single board. First, rip the handle. Then band saw the remaining section into the two side pieces, after marking radii on opposite sides of the centerline.

2

Add accent strips between the handle and the sides and glue the paddle together. The wide part that holds the pizza is called the "blade."

3

Install the paddle in the tapering sled. Secure it by driving a screw through a hanging hole drilled in the end of the handle.

4

Taper the paddle using the planer. Take light passes until the blade's leading edge is 1/8" thick.

5

Ease the handle's sharp edges to create a comfortable grip.

6

Round the front corners of the blade and bevel its edge to slightly less than 1/16".

Wedged Woodworker

WINTER COMES EARLY HERE in Oregon, a fact I'd forgotten as I carried a custom kitchen cabinet to my truck. The cabinet was long and slender, to go above an extra-wide range. As I stepped out the shop door, my foot skidded on an icy patch, and I went down in a heap. As I fell, one of the cabinet's doors swung open and wedged between the door jam and the door. Simultaneously, the opposite end of the cabinet wedged itself under the top of the door jam. As a result, I was wedged, too, under the cabinet, on my back.

I quickly realized that I couldn't extricate myself without damaging the cabinet. So, my choices were to save myself, but wreck the cabinet, save the cabinet, but freeze to death underneath it ... or call for help.

I managed to twist my arm enough to retrieve my cell phone and dial the house. Did I mention it was past midnight? My wife was sleeping. "Come to the shop," I pleaded.

Everything was covered with ice, so billions of diamonds sparkled when the porch light flashed on. In the radiance, I could see my wife running toward me, her bare feet glinting silvery in the moonlight and her pink robe fluttering behind her like a flag—a one-woman cavalry coming to my rescue.

—Dale Thompson

Spirited Finish

THE FIRST COAT OF LACQUER made the mahogany butler table that I had just built look awesome. So, when I applied a second coat a few days later, I was sure the table would look even better. But instead, it looked washed out and pale. A third coat made things even worse. How could lacquer make wood so dull and lifeless? As I reached to check the can of lacquer, I noticed that the can sitting next to it was the same color. Oh-oh. I had grabbed the wrong can and applied two coats of mineral spirits.

—Craig Bingman

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