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WOOD®

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PRACTICAL KINDNESS

GOOD WOODWORKING, LIKE GOOD HOSPITALITY, ADAPTS TO REAL LIFE RATHER THAN PRETENDING THAT LIFE ISN'T IMPERFECT.

If I were to write this letter about entertaining and hospitality, you could reasonably expect me to focus on the gorgeous sideboard project on *page 32* (and its matching pedestal table from issue 307 of December 2025/January 2026). They're both stunning projects that would serve perfectly at the heart of a welcoming dinner party.

I am an introvert from a family of introverts, so formal dinner parties will never be a passion of mine. But for a couple of decades, since I moved my family to more northerly climes, the central image representing true hospitality to me has been a disorganized pile of shoes in the entryway. If you were to walk into a home in some of the warmer states, immediately kick off your shoes, and wander around the house sock-footed (or worse, barefoot!), you'd be committing a major faux pas. Up here, where snow, chemical ice-melt, and mud can dominate the landscape for months at a stretch, the opposite is true.

And I've come to enjoy the informality of the northern norm. I've learned it's known as "scruffy hospitality," a low-pressure style of receiving guests. It prioritizes comfort and connection over a curated experience. It welcomes guests as part of the daily family routine in all of its lived-in glory. It acknowledges the messiness that comes with humanity and graciously accommodates it.

So, for my money, the shoe storage cubby on *page 20* is this issue's shining example of hospitality. Like many projects we woodworkers undertake, this one shows how we can graciously accept the messiness of everyday life while simultaneously meeting it with quiet thoughtfulness that makes a casual welcome even more inviting.

We do the same for ourselves in our shops. They're not always the cleanest of places–mine certainly isn't–but we step back and take a look at the deficiencies and meet them with often unassuming solutions–a scrapwood jig, a basic clamp rack, offcut storage, etc. The drill press table on *page 46* might look like little more than a table with a fence, but it smoothes away common frictions encountered with that tool, making workshop life that much easier.

In an often unostentatious way, woodworking is the craft of solving the small, human problems around us that others may not even notice. It's the art of meeting the messiness of the world and the people in it (including ourselves) with practical kindness.

Now get out to the shop and make something. The world needs it.

Lucas

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WOOD®

Issue No. 309 | May 2026

PLANS

ON THE COVER

32

High style meets high capacity in this dining-room beauty. Build it to match the Pedestal Table from issue 307 (December 2025/January 2026) using store-bought legs and shop-made trim.

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IN THE BANK

My niece asked me to make a piggy bank for her daughter, and issue 307 (December 2025/January 2026) could not have been more timely. She loves dragons, so I laser-engraved Toothless from *How to Train Your Dragon* on the back wall. I constructed this bank from mahogany, cherry plywood, and maple for the columns.

Stephen Johnson
Scituate, Massachusetts

KIND KUDOS

Three things got my attention in issue 306 (November 2025). Ken Burton's "Bandsaw Logs into Lumber" was technically spot on: The ½" blade recommendation is exactly correct for the reasons he gave.

What a practical, good-looking design the "Tri-Tiered Towel Rack" is! All the right-angle joinery offers a myriad of construction choices.

Lastly, it's good to see Harbor Freight getting its due in the "Tools & Materials" column. The company's tools are getting better, and customer service and warranties are very good. Plus, it regularly offers coupons, so I usually wait for those offering 20 percent off.

Bernard Brown
Turlock, California

SHOPSMITH SHOPS

After seeing Chris Hubert's letter in issue 306 (November 2025), I was pleased to see that I am not the only owner of a Shopsmith. I bought my Mark 5 in 1984, including the bandsaw and jointer attachments. About 15 years ago, at an auction, I bought a Shopsmith stand-alone bandsaw as well as a later model combination machine, which now resides in my grandson's garage workshop. My Shopsmith is currently used primarily as a horizontal boring machine and disc sander. Thanks to *WOOD*® magazine for all the advice and ideas for projects over the years.

Cleveland Forrester
Chambersburg, Pennsylvania

Shopsmith tools have a long history of serving woodworkers with small shops. Over the years, their sales have dipped and the company has changed hands a couple of times, leaving its future uncertain. You'll be happy to know we recently received news that Shopsmith has been purchased by a company (Shopsmith USA) that says it's committed to reviving the products and reputation of this venerable brand.

Randy Maxey
Contributing Editor

I am also the owner of not one, but two Shopsmiths, and I wouldn't trade them for anything. My shop is only 14×20', so I have limited space for tools.

This credenza is from issue 60 (April 1993). It proves you don't need a large shop equipped with every full-sized woodworking tool to build great projects.

Derryl Nelson
Sweetwater, Texas

continued on page 6

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PROJECT PRICING

I've noticed that your plans include the project cost. I'm curious how that cost is calculated with variances in lumber pricing from region to region. Could you elaborate?

Max Randella
via email

Pricing is really pretty simple, Max. We list the specialty items you'll need in Sources with the price we paid. We use the quantity of lumber and sheet goods shown and base our prices on national sources that ship. We realize that some may pay more depending on region and source, but some will likely pay less. We add that cost to the items in Sources to create the total. We don't include common shop supplies and consumables such as blades, common bits, screws, glue, and finish.

Dave Stone
Managing Editor

TEA FOR TEN

I knew the "Tea Light in Triplicate" project in issue 292 (November 2023) would make a great Christmas gift, so I made ten of them! I used bloodwood, cedar, and hard maple then finished them with clear lacquer.

Dan Weldon
Palm Bay, Florida

SOURCES UPDATE

Some parts listed for the "Does-It-All Tablesaw Sled" in issue 300 (December 2024/January 2025), are no longer available from our original specified source, Lee Valley. We found similar parts at Rockler.com:

- 2 ft. Universal T-Track, no. 22104 (4)
- 3 ft. Universal T-Track, no. 26420 (2)
- Easy-to-Grip 1½" 4-Star Knob, Female Thread, ¼"-20, no. 59277 (6)
- Easy-to-Grip 5-Star Knob, Male Threading, ¼"-20, no. 58261 (2)
- 1½" T-Bolts, ¼"-20 Thread, 5-Pack, no. 38002 (2)
- 3½" T-Bolts, ¼"-20 Thread, 5-Pack, no. 35856 (2)
- Brass Threaded Insert for Hard Wood, ¼"-20, 25-pack, no. 73842
- T-slot nuts can be ordered from Lee Valley (leevalley.com). Some T-track will also accept a common ¼"-20 hex nut that can be used instead.

CUTTING DIAGRAMS ARE KEEPERS

I want to thank you for continuing to include cutting diagrams. Even though I've been woodworking for quite a while and reading your magazine for decades, I find the diagrams very useful. Yes, I know the diagrams show mythical, perfect boards that you can't actually go buy, but they're helpful when I shop for lumber and cut the boards into project pieces. I buy a bit extra to make up for mistakes as well as defects in the boards.

Mark Harvis
via email

Cutting Diagrams generate heated arguments amongst the *WOOD*® staff between those that say they're unrealistically idealized space wasters and those that say they're generally helpful if taken with a grain of salt. Weigh in at: woodmail@woodmagazine.com.

STEVE GRAHAM of Wyoming, Minnesota, built two chess sets for his sons as Christmas gifts. This one features a walnut and yellow birch board. The storage drawer fits between two splined mitered frames. Steve turned all the chess pieces on the lathe.

PAUL OLEYNIK of Flat Rock, Michigan, made each piece of this model train. He also made some of his own tools to make the pieces. He worked in both the woodshop and metal shop at the Cadillac factory before becoming an engineer there, retiring in the late 1980s.

MIKE KANZER of Landenberg, Pennsylvania, built this storage cabinet using red oak and cherry wood scraps. He made the drawer fronts from a single piece of cherry, continuing the grain across the fronts. He finished the cabinet with a natural Danish oil to highlight the grain, and three coats of polyurethane on the drawer fronts.

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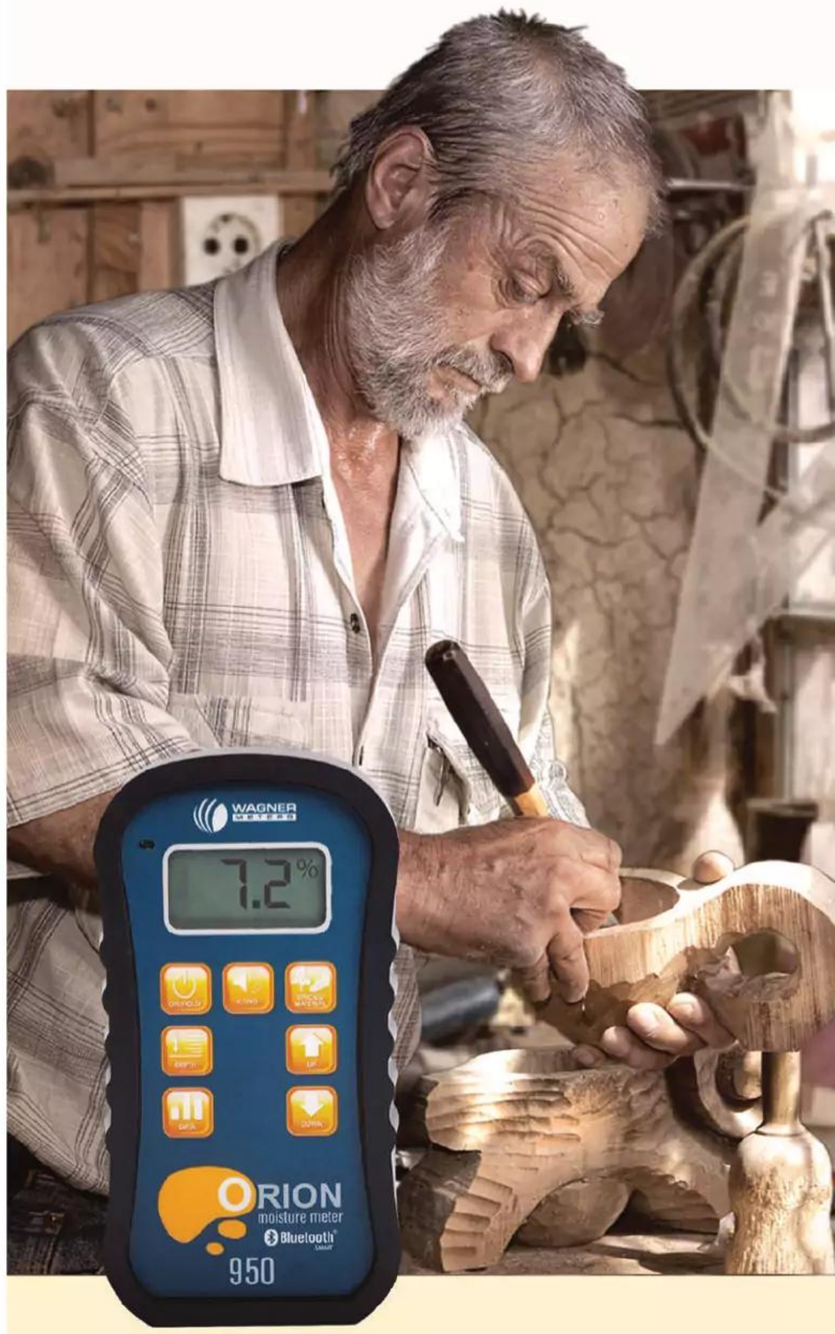

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TIMBER-FRAMED INSPIRATION

The post-and-beam framing on this workshop provided an opportunity to learn and develop large-scale woodworking joinery skills. The resulting cozy workspace inspires creativity.

WRITER: RANDY MAXEY

Bob's workshop brings to mind the modest cabins erected by many pioneers. Once you step inside, the timber framing and tongue-and-groove paneling create a homey, relaxing atmosphere.

A repurposed school workbench along the right-hand wall pairs well with the traditional bench nearby. On the opposite wall, a plywood bench with drawers houses a tool sharpener and supplies.

Bob Maurais retired in 2007 as an industrial arts teacher. He and his brother started a pest control company they later sold to a larger company where he worked until full retirement in 2025.

PHOTOGRAPHER: BOB MAURAIS; **ILLUSTRATOR:** ROXANNE LEMOINE

Bob Maurais drew inspiration for his fantastic timber-frame workshop from watching a PBS series about cabins in the Alaska wilderness and from the cabins he saw watching "Little House on the Prairie" with his kids. Years later, this retired industrial arts teacher decided to build "Grampy's Little House" to bring his inspiration to life and to create a space better than his crowded basement shop.

To get started, Bob attended a course on post-and-beam construction at Shelter Institute in Woolwich, Maine (**sheltercourses.com**), specialists in timber frame construction. For his shop, Bob ordered 6×6" pine timbers from Shelter Institute then spent the next eighteen months on construction, challenging himself to employ and hone his woodworking skills to frame his shop. Using a variety of hand tools, including chisels and Japanese-style saws, he cut the tenons on the ends of the beams. Power drills, routers, and router jigs sped the creation of the post mortises while delivering consistently repeatable results. Bob secured the joints using traditional dowel pegs.

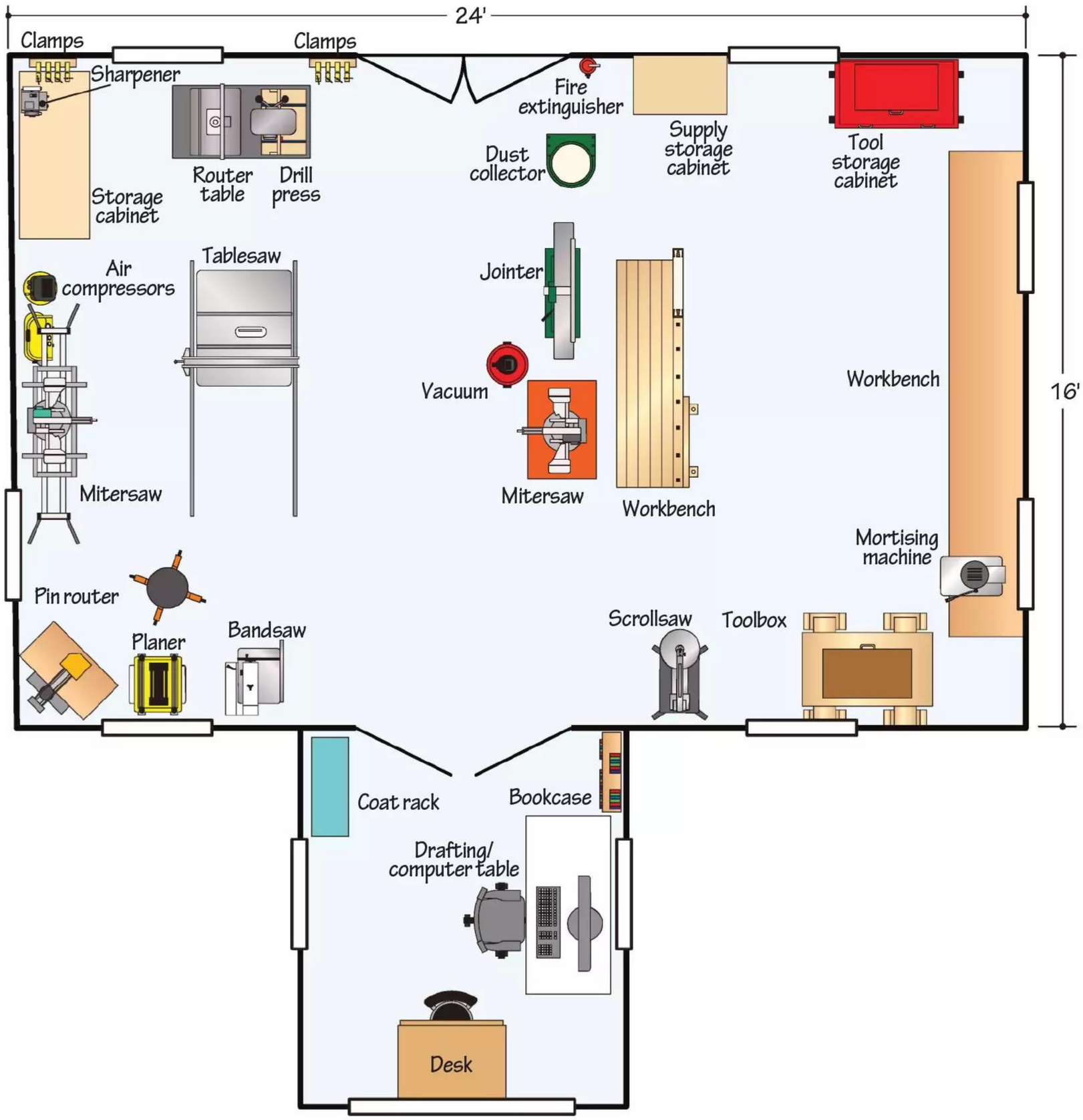
Conventional, plywood-sheathed 2×4-framed walls attached to the posts and beams clad the exterior of the building. Bob installed vertical board-and-batten siding made from 1×12 boards. Fiberglass batt insulation fills the wall cavities.

SHOW US YOUR SHOP

Send high-resolution digital photos of your shop to ***woodmail@woodmagazine.com*** and we may showcase it in the magazine!

PASSING ALONG THE INSPIRATION TO THE NEXT GENERATION

"I knew I wanted to be an Industrial Arts teacher after my experiences working with my high school industrial arts teacher, Mr. William Brazier. I credit him for my love of teaching. In my 31 years as an industrial arts teacher, I had the privilege of mentoring over 3,500 students—all had a sampling of woodworking."



A loft with tongue-and-groove flooring offers an ideal storage space for lumber. The custom ladder raises and lowers using a rope and pulley system Bob designed.

Tongue-and-groove boards used for roof sheathing also create the wood-themed ceiling inside. Roofing membrane and architectural asphalt shingles finish the roof.

The electrician ran a 50-amp feed from the house main panel to a subpanel in the shop. Most circuits are 20-amp, 110-volt with the table saw and jointer connected to 220-volt circuits. Bob relies on a heat pump for climate control.

On the interior, Bob paneled the walls with 1/2" MDF. "The more-durable MDF allows me the flexibility to surface-mount tool and clamp racks, cabinets, and other items," he says. Higher up, on the gable ends, Bob stuck to the tongue-and-groove theme. Finally, he installed barnwood-style vinyl-plank flooring. The shop also features a loft Bob uses primarily for storage.

Bob built a scale model of the timber framing as inspiration for the build. Inside the office sits a model of the finished workshop he presented to his wife, Barb, on their 30th wedding anniversary in 2005.

Each joint in the timber frame was carefully cut and numbered to make assembly easier. Angle braces reinforce the post-and-beam connections. Tongue-and-groove sheathing encloses the roof.

With all of the timbers required for the workshop, Bob had to get creative in finding ways to cut all of the joinery accurately. Grouping similar parts made layout more consistent.

On the back of the building, an 8×8' bumpout serves as Bob's office. Above the double doors to the office hangs a scale model of the shop's timber frame. Inside the office, in front of the large window, he shows off another model of the completed shop. This cozy space provides Bob a place to relax while listening to music or working on design ideas at his drafting table.

Ample floor space in the shop makes layout of Bob's eclectic, lifetime collection of vintage and modern tools practical and flexible. There's plenty of space between tools and benches for maneuvering materials and projects without feeling cramped.

As the school where Bob taught was reorganizing their shops, he was fortunate enough to snag cabinets and a workbench. The 12'-long workbench fills one wall of the shop, providing plenty of worksurface and storage space. A more traditional workbench with face and tail vises sits a few steps away parallel to this one and creates an ideal assembly area for projects.

Bob and his wife, Barb, and their grandchildren love spending time in this idyllic workspace. Each year, they design and create wooden Christmas trees to donate to two local fundraisers: one for a local church and the other for the Shriners. It's safe to say that "Grampy's Little House" has become a big part of Bob's family and frames up a legacy for generations to come.

BOB'S ADVICE FOR NEW WOODWORKERS

- Network with local craftspeople and fellow woodworkers. Veteran woodworkers are a constant source of knowledge and are typically ready to assist a newbie.
- Craft shows are an excellent source of ideas—look for projects that don't require fancy tools and expensive equipment.
- Remember, anything handmade will be cherished, blemishes and all.
- Don't stress about not having a fully equipped shop. Start modestly and invest in quality hand tools.
- Care for your tools and make certain to understand and follow all appropriate safety rules.

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Q: SHOPPING FOR A LATHE

I'd like to get into turning and I've been looking at lathes. But with such a wide range of sizes and prices, it's a bit overwhelming. As a first-time lathe buyer, what are the key features I should consider?

Richard Foley
New Braunfels, Texas

A: As with most woodworking tools, size is the main consideration when shopping for a lathe, Richard. But it's not the only concern. You'll also want to take into account power, stability, and a few other key features.

Two factors determine a lathe's capacity: swing and center-to-center distance. Swing refers to the largest diameter workpiece that will fit on the lathe. The center-to-center distance refers to the longest workpiece that will fit between the centers of the headstock and tailstock. Based on these two factors, most lathes fall into one of three categories—mini, midi, and full-size.

Mini lathes typically have a 10 to 12" swing and a center-to-center distance of 16 to 20". You can easily pick up one of these lightweight lathes and move it out of the way when you need the bench space. They're a great choice for small turnings such as pens, bottle stoppers, or small bowls.

Midi lathes offer similar or slightly larger capacity than mini lathes, but typically with more robust construction and more powerful motors. The extra weight adds rigidity and stability, allowing them to handle beefier blanks while taking heavier cuts. Mounted to a workbench or an optional stand, midi lathes are a popular entry-level choice because they're large enough to do some serious turning and yet relatively affordable.

Full-size lathes are the heavyweights of the group. With swings from 12 to 20", center-to-center distances of 36" or more, and motors from 1 to 3 horsepower, they're capable of turning large bowls, long table legs, or balusters. The headstocks on some of these lathes rotate 90° or slide to the far end of the bed for outboard turning. This makes it possible to turn platters or bowls larger than the lathe's swing.

Weighing several hundred pounds, these lathes are not easily moved and many require 240 volts of power. But they'll handle just about any turning project you can throw at them.

As any turner will tell you, the initial lathe purchase is just the first step down a slippery slope. Tooling and accessories are just as important, so choose a lathe with a common spindle thread size, such as 1"×8 tpi or 1¼"×8 tpi. Uncommon spindle threads make it harder to find aftermarket accessories such as chucks and faceplates (although spindle adapters may provide a workaround).

Similarly, check the taper size of the headstock and tailstock spindles. Most lathes are equipped with a no. 2 or no. 3 Morse taper, either of which will accommodate standard centers and accessories. And finally, the convenience of variable-speed control allows you to change spindle speeds without having to shift V-belts.

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Throw Yourself a Bone

Full tang stainless steel blade with natural bone handle —now ***ONLY*** *$79!*

The very best hunting knives possess a perfect balance of form and function. They're carefully constructed from fine materials, but also have that little something extra to connect the owner with nature.

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The blade is full tang, meaning it doesn't stop at the handle but extends to the length of the grip for the ultimate in strength. The blade is made from 420 surgical steel, famed for its sharpness and its resistance to corrosion.

The handle is made from genuine natural bone, and features decorative wood spacers and a hand-carved motif of two overlapping feathers— a reminder for you to respect and connect with the natural world.

This fusion of substance and style can garner a high price tag out in the marketplace. In fact, we found full tang, stainless steel blades with bone handles in excess of $2,000. Well, that won't cut it around here. We have mastered the hunt for the best deal, and in turn pass the spoils on to our customers.

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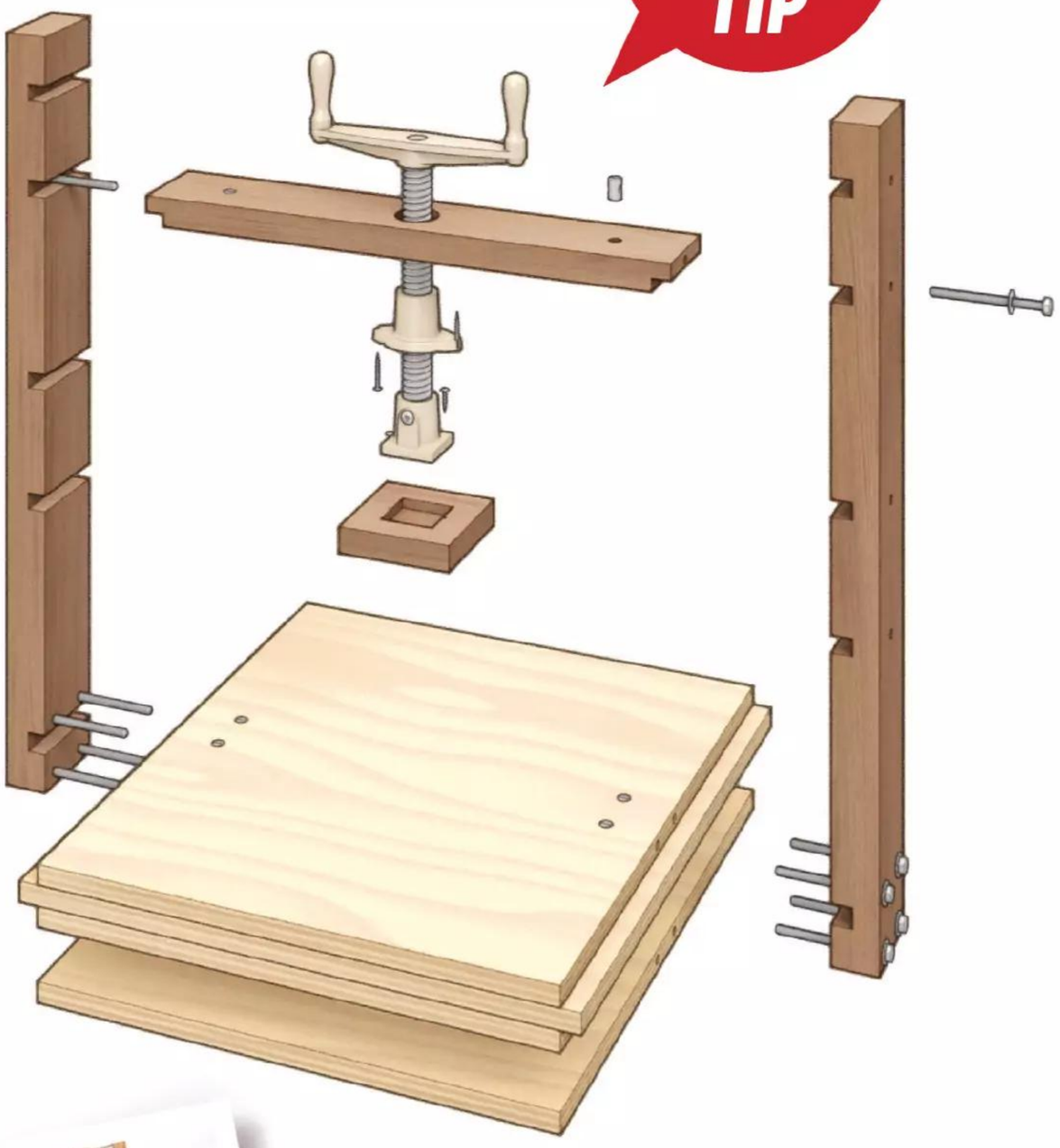
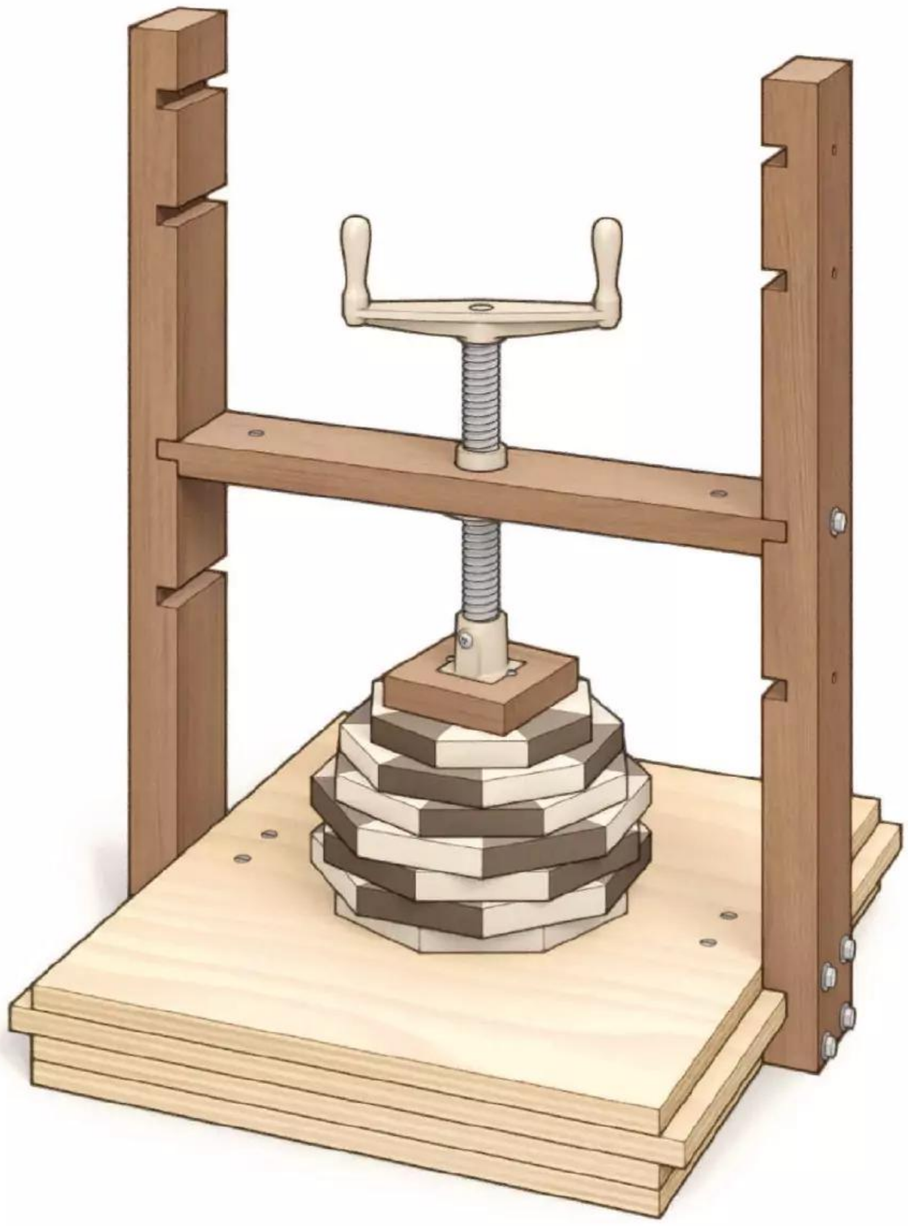
TOP SHOP TIP





A PRESSING MATTER

To simplify gluing up the layers of segmented bowls before turning at the lathe, I built an adjustable press. It's also handy for laminating other parts (up to about 18×18" in my case).

Cut four base layers to size from ¾" ply, making three the same and one 1½" longer. Glue and screw them together with the longer layer located to form a tongue on each end of the base. Make the uprights from two layers of ¾" hardwood and cut dadoes for the base and crossbar.

Cross dowels and 5/16"-18 bolts secure the uprights to the base and crossbar. Install a veneer press clamp in the upright, adding a wood pad to distribute clamping pressure.

Steve Meyer
Columbus, Indiana

◀ For his Top Tip, Steve wins a flip-top tool stand and small parts organizer from Powertec worth $589.

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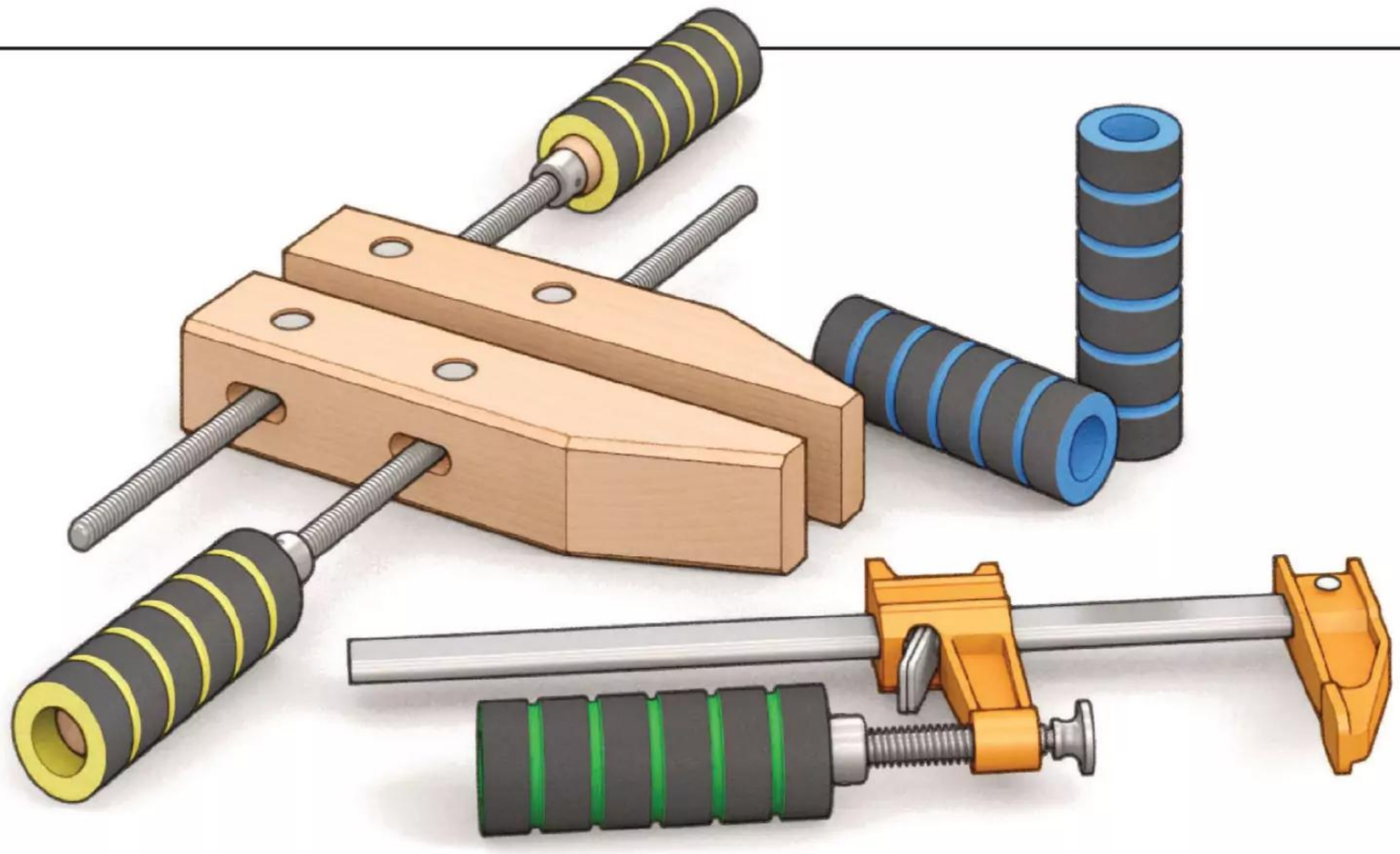
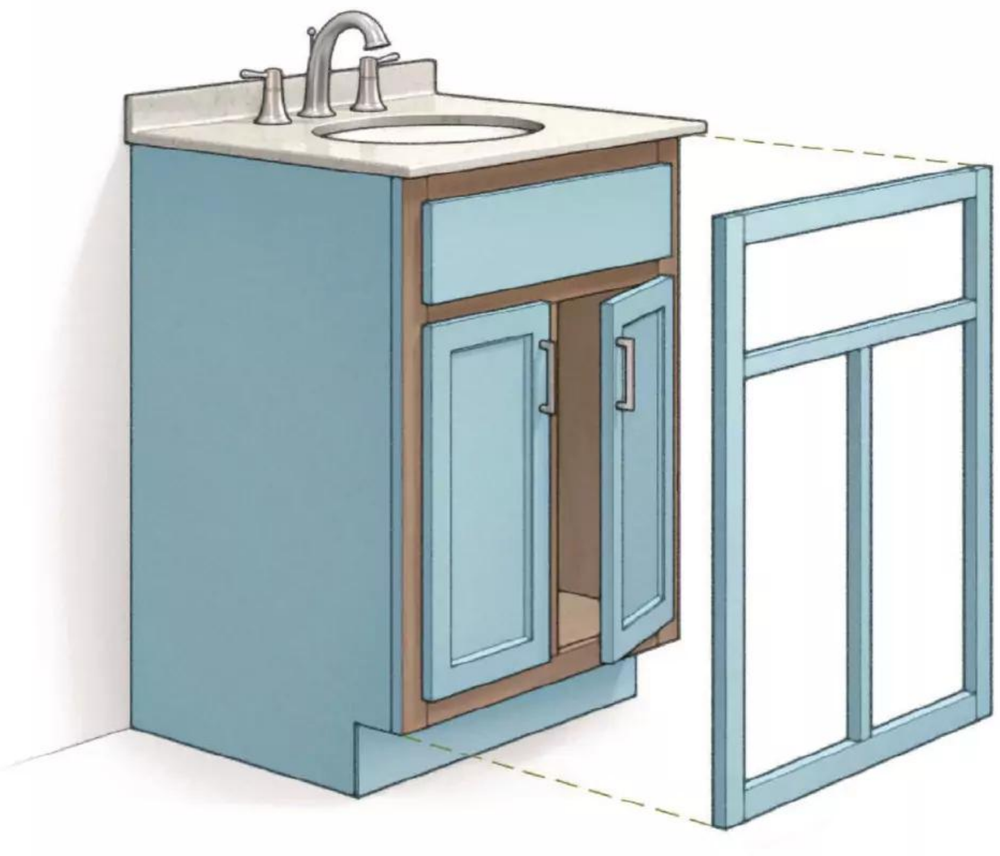
ILLUSTRATOR: CHRISTOPHER MILLS



GET A HANDLE ON IT

To get a good grip on small clamp handles, I covered mine with inexpensive BMX-style bicycle handlebar grips I purchased online. Simply slip them over the clamp handles for a secure, comfortable hold. I struggled installing the first couple until a cyclist friend gave me this trick: Spray hairspray into the grips, then slip them on while it's still wet. It lubricates the grips to slide on easily, then dries to glue them in place.

Tom Little
Lacey, Washington



A FRESH LOOK

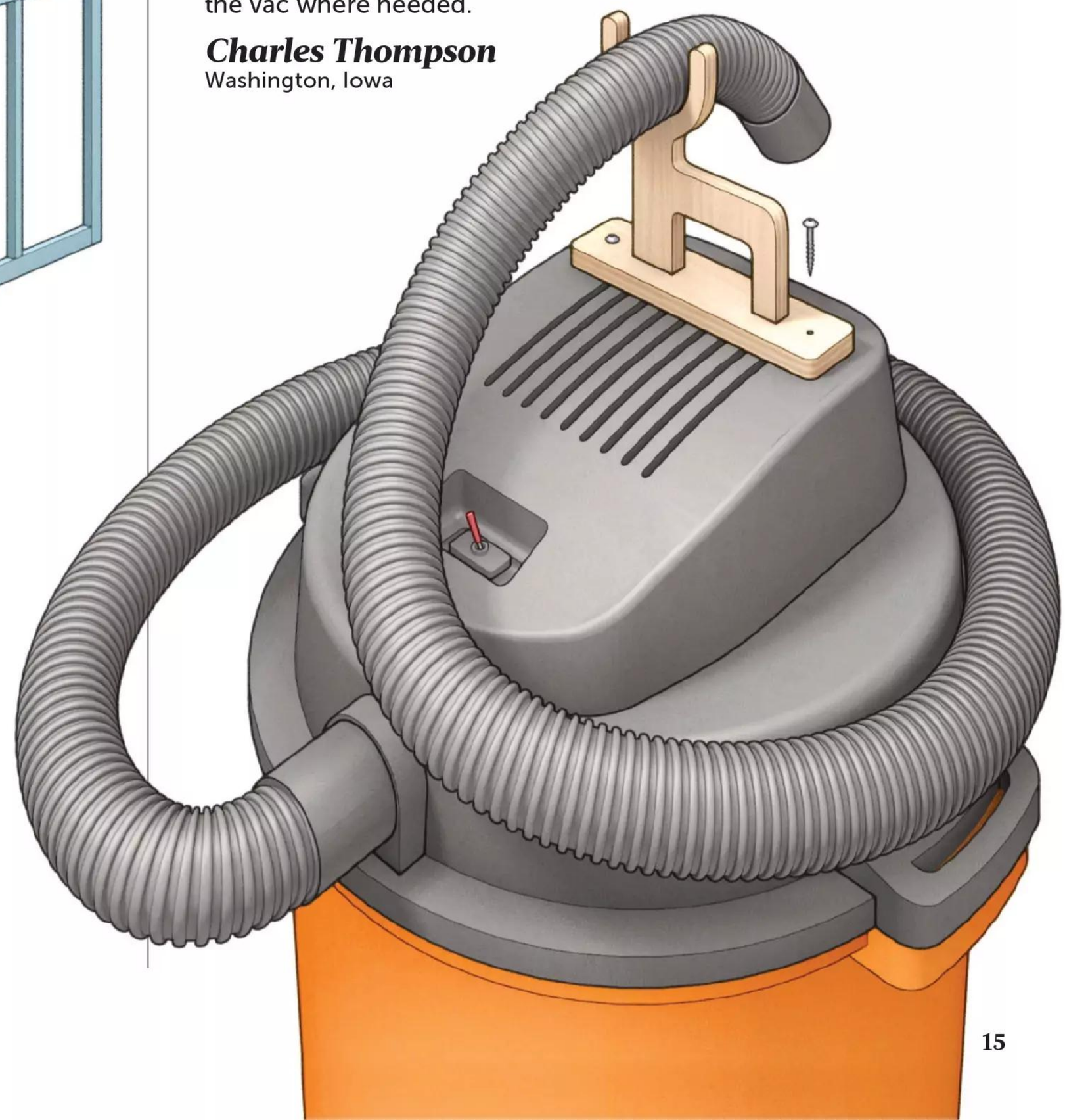
I recently refaced my cabinets and wanted the doors and drawer fronts to be inset instead of overlay. But that would have meant all new drawer boxes and hardware. Instead, I created face frames that overlay the existing cabinet fronts and surround the doors and drawers. I sized the rails and stiles to sit flush at the outside and to create ⅛" gaps all around the doors and drawer fronts, creating the appearance of inset fronts.

Tom Carrell Jr.
Brookport, Illinois

A FORK WITH A HANDLE

My shop vacuum did not have onboard storage for the hose, so I created my own from ½" plywood. I fashioned a handle and a fork to hold the end of the hose and mounted it to a plywood base. Removing the vacuum's handle allowed me to mount my new rack-and-handle combo using the original mounting screws and holes. Now I can easily reach the hose plus use the handle to move the vac where needed.

Charles Thompson
Washington, Iowa



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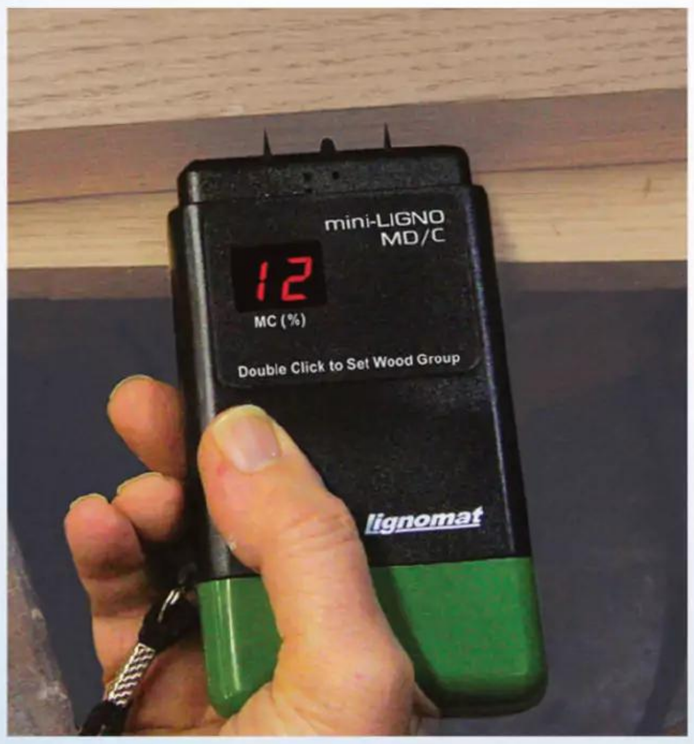

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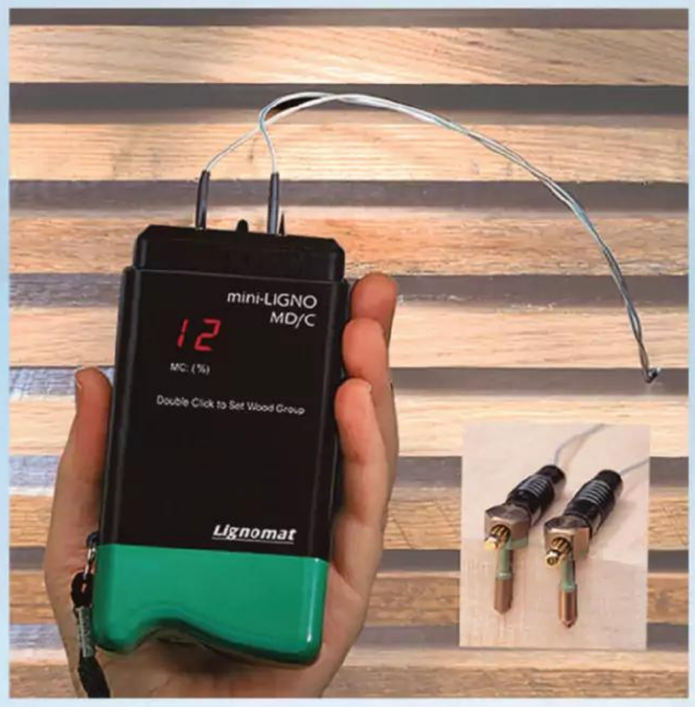

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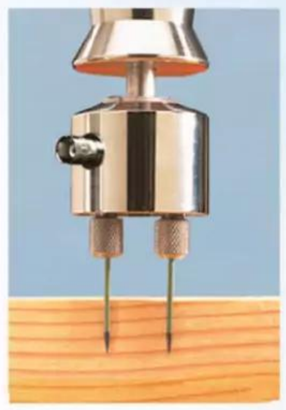

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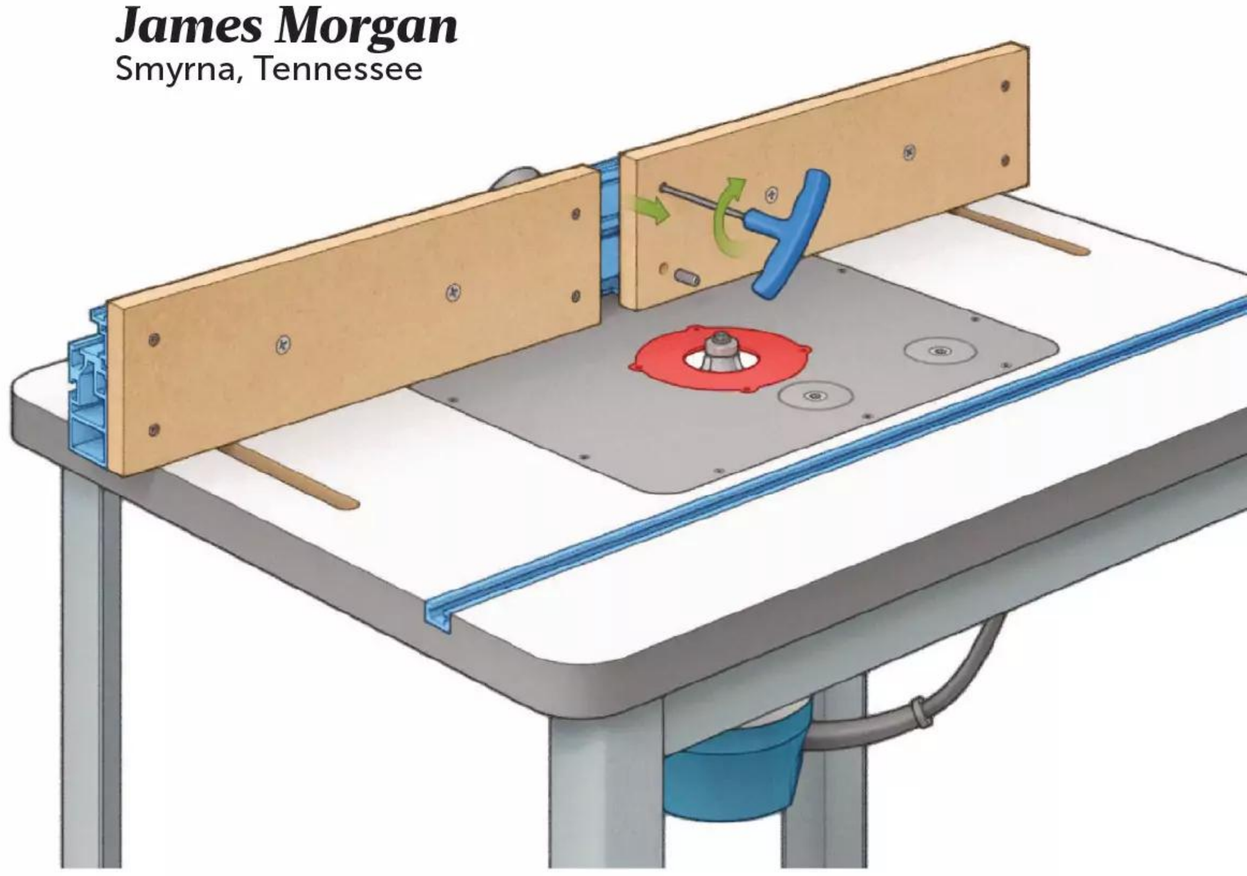
FENCE SQUARED

I made plywood fence faces for my router table, but was challenged to align the faces and get them exactly square to the table. I solved it with setscrews. By installing setscrews at the top and bottom of the faces, I can make adjustments to align them and ensure they're square to the table.

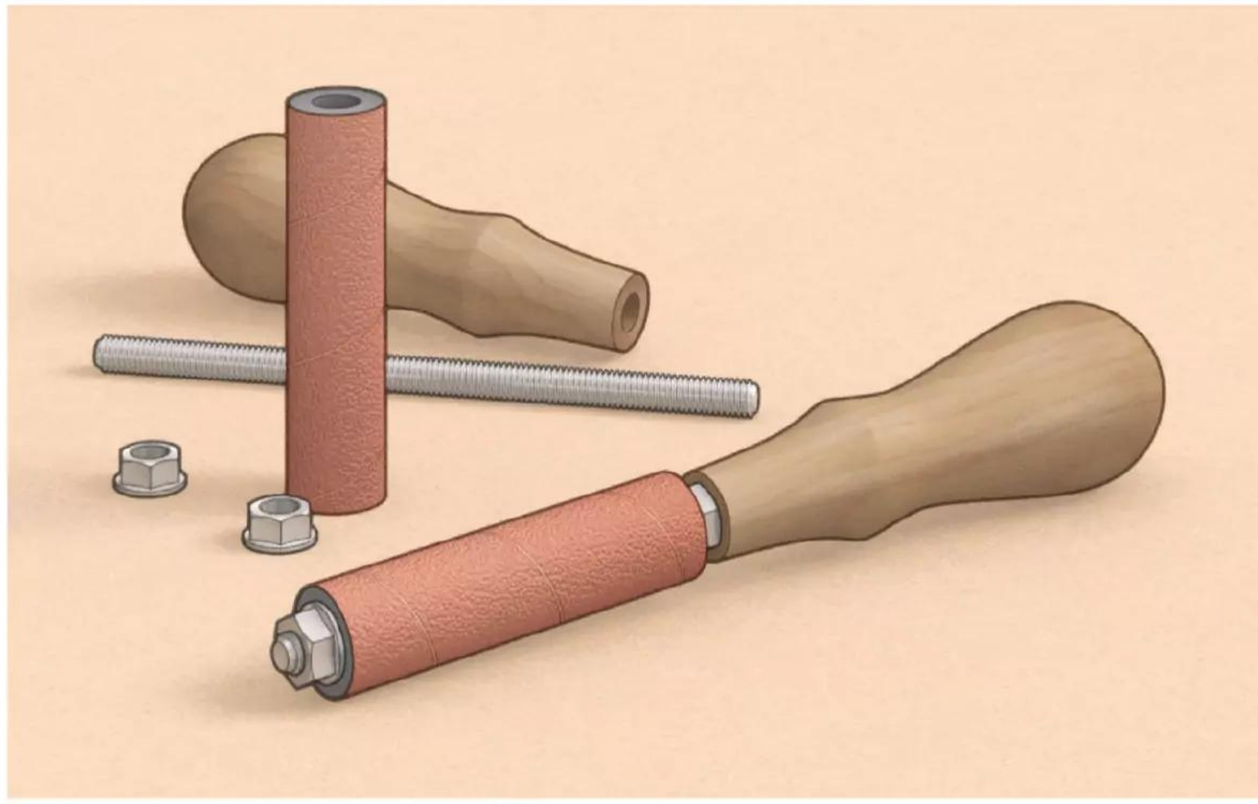
James Morgan
Smyrna, Tennessee



HANDLING DRUMS

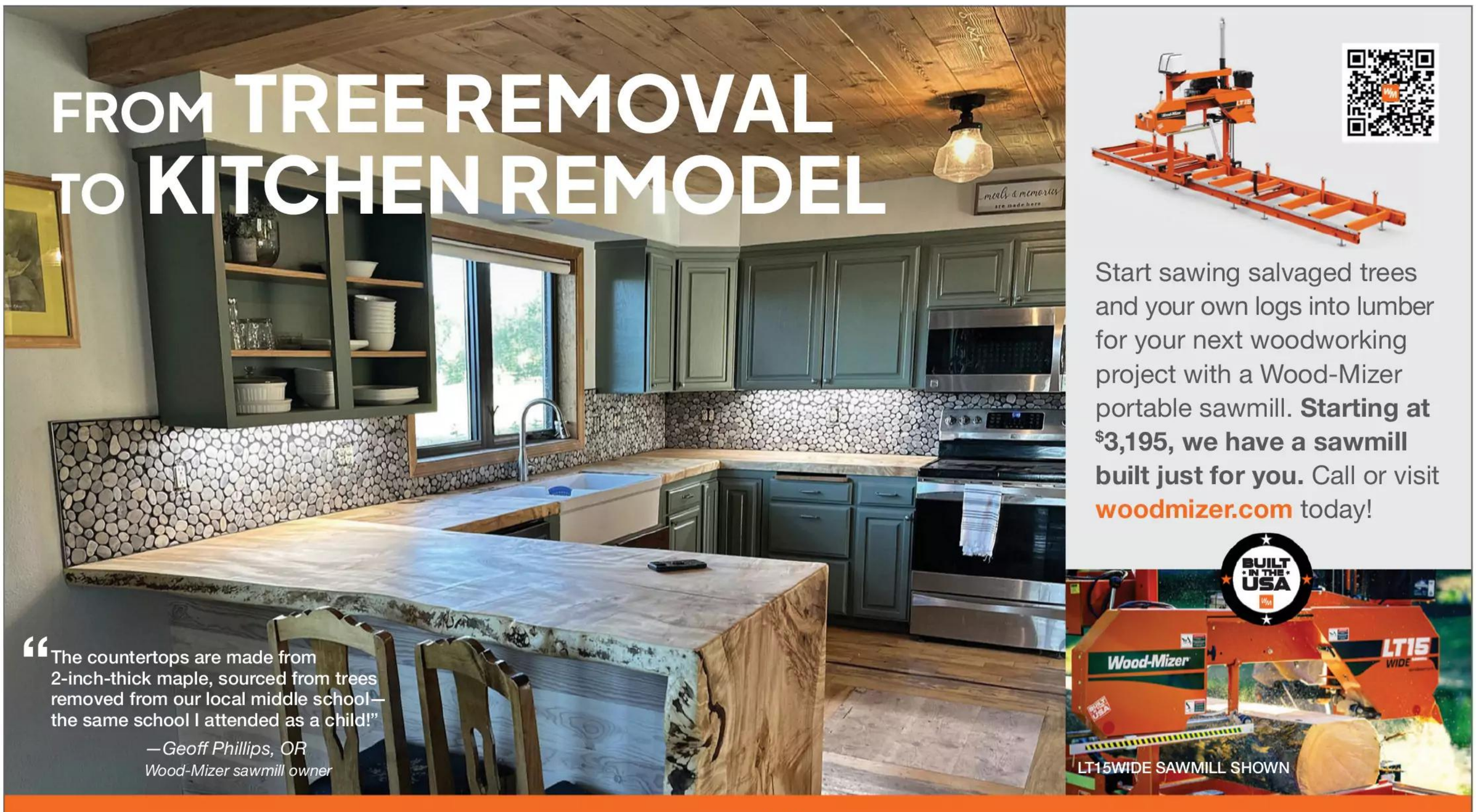
To create contours by hand, I use the sleeves from my spindle sander mounted to a shop-made handle. After turning a handle on my lathe, I drilled a ½"-diam. hole and used epoxy to secure a section of ½" threaded rod. Flange nuts secure the sanding sleeves to the rod.

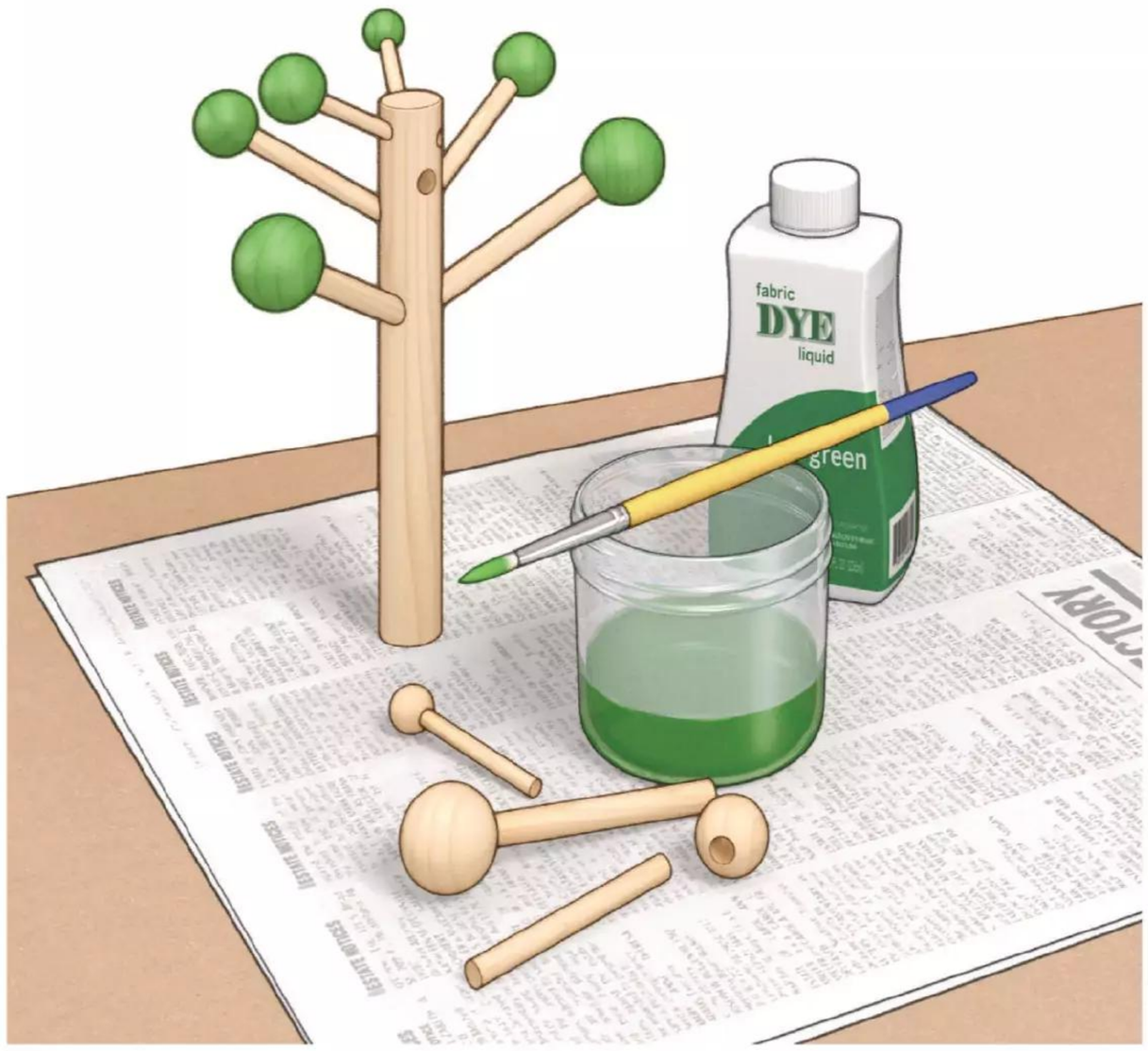
Phil O'Rourke
Pittsfield, Massachusetts



continued on page 18

The WOOD® Archive





LIVE AND LET'S DYE

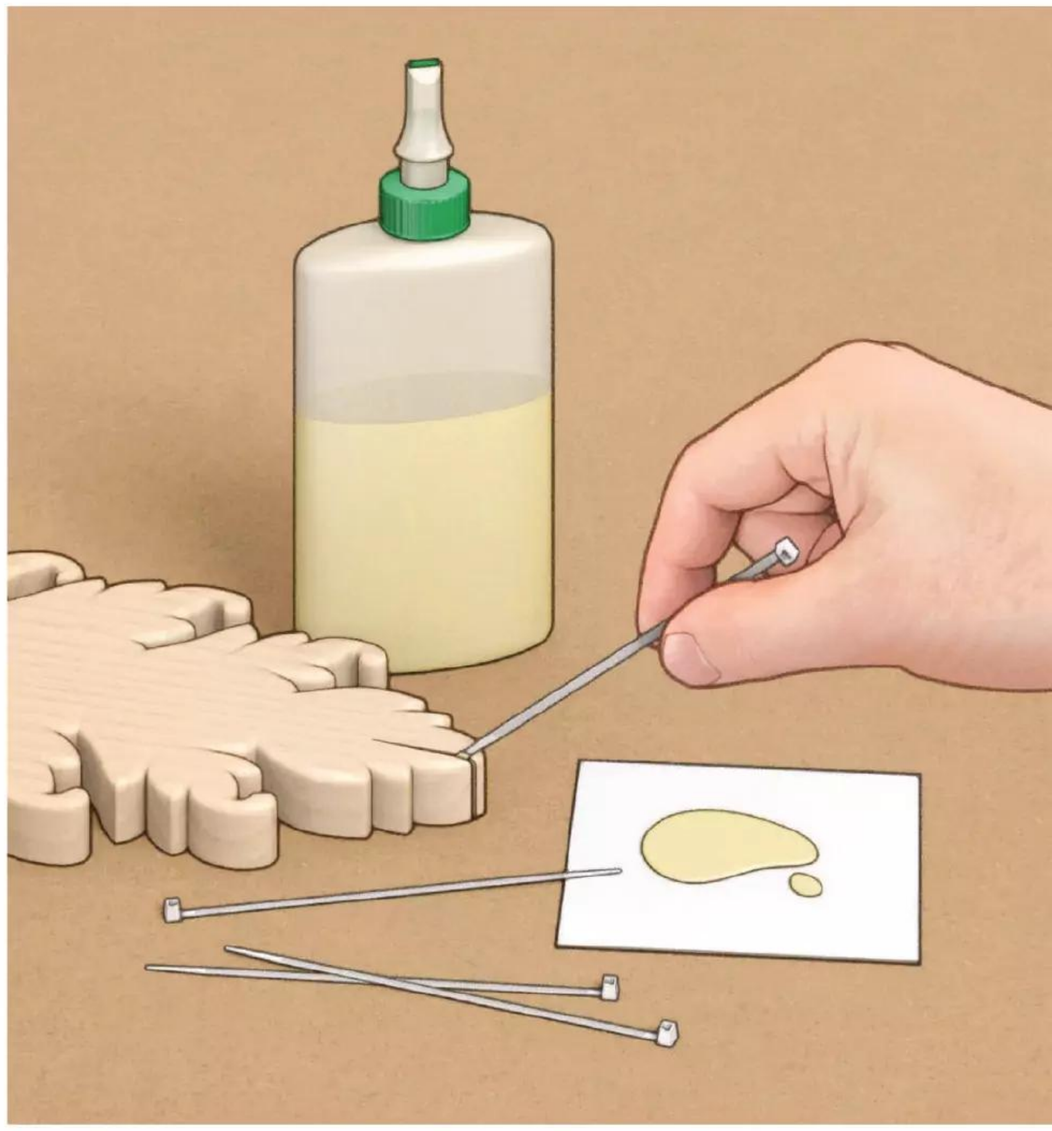
Instead of buying expensive wood dyes, especially when I don't need a large amount, I grab all-purpose dye (often used for dying fabric) from our local craft store. These dyes are available in many colors and cost a lot less. The concentrated liquid mixes with water, but I've discovered the powdered dye dissolves in alcohol and doesn't raise the grain as the water-based version might.

Dan Martin
Galena, Ohio

ZIPPED UP TIGHT

Plastic zip ties make perfect applicators for hard-to-reach places. Useful for epoxy and wood glue application, the thin tip easily slides into tight spots, and the ties are available in a variety of sizes to match the glue-up task at hand.

David Long
Lexington, Kentucky



DOGGONE GOOD BENCH COVER

If your pets eat dry food, don't throw away those food sacks. They're durable and made to resist moisture transfer, ideal for protecting your workbench during glue-ups and finishing.

Bud Weisser
Evans, Georgia

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"I never expected it to be so beautiful that it takes your breath away."

— Kaya C., on Stauer Opals

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In a quaint village, nestled between rolling hills, lived a young woman with a deep appreciation for gemstones. Her grandmother gifted her a delicate cross pendant adorned with opals. The opals shimmered with a mesmerizing play of colors, reflecting hues of blues, greens, and fiery oranges. Her grandmother shared the legend of the opals, believed to bring hope, purity, and luck to those who wore them.

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SOLE-MATE STORAGE

Shoe clutter have you feeling de-feeted? Put your foot down and tame the mess with this attractive shoe storage cabinet.

WRITER: VINCE ANCONA
DESIGNER/BUILDER: JOHN OLSON

OVERALL DIMENSIONS
47¾"W × 13⅝"D × 36"H

If you've been putting off organizing the pile of shoes next to the front door or on the bedroom floor, here's a chance to stop being a loafer and pull yourself up by your bootstraps. Three graduated rows of cubbies store various sizes of footwear. And a pair of drawers hide socks, gloves, hats, keys, or a dog leash.

A tablesaw, planer, router, and drill are the main tools you'll need to build this project. Solid wood panels glued up and trimmed to size make up the major components of the case. Shallow dadoes, all made with a router and a simple jig, lock the parts together and aid with alignment during glue-up.

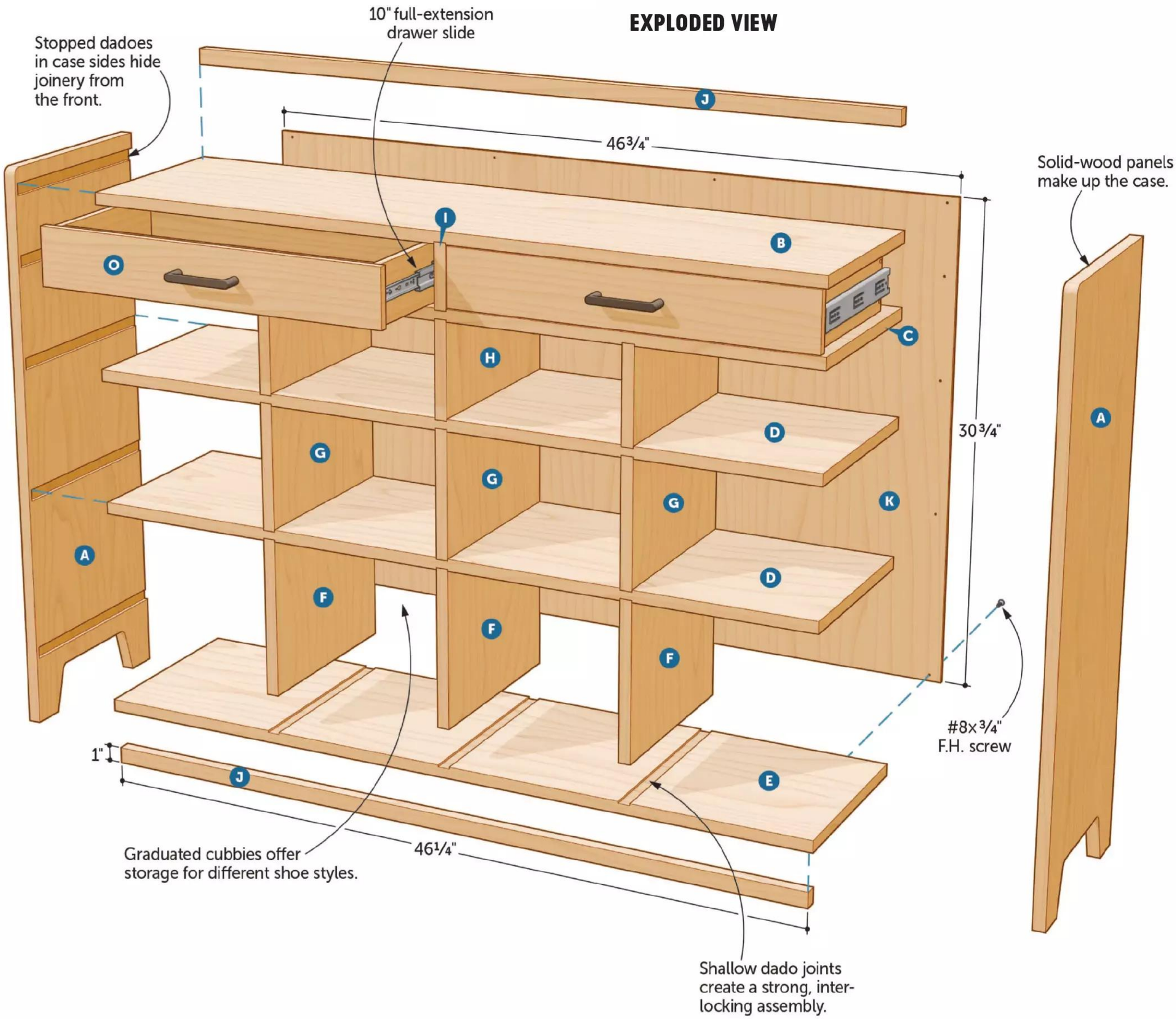
START WITH A SIDE STEP

1 Edge-glue blanks for the sides (A), top (B), drawer shelf (C), shoe shelves (D), and bottom (E) **[Exploded View, Parts List]**, making them all slightly oversize in both width and length. While you're at it, edge-glue additional material for one 12×30" blank and two 12×26" blanks for the vertical dividers (F–I). Plane all the blanks to a consistent ¾" thickness. Trim the sides (A), top (B), drawer shelf (C), shoe shelves (D), and bottom (E) to final size. Set the vertical divider blanks aside for now.

TIP!

Make your blanks extra long and cut them to length after planing to eliminate any planer snipe.

EXPLODED VIEW



PHOTOGRAPHER: KELSEY HANSEN; **ILLUSTRATOR:** CHRISTOPHER MILLS

TIP!

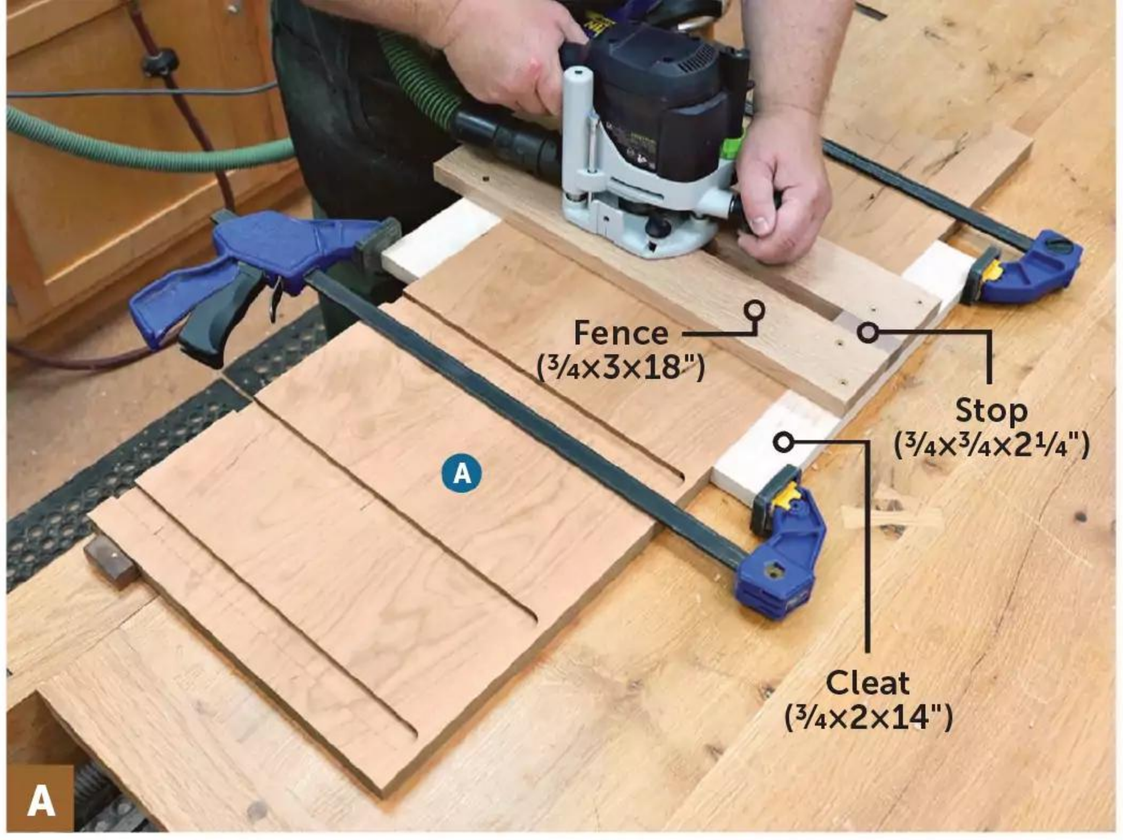
If you don't have a 1" Forstner bit, skip the drilling, cut close to the layout line, and sand the curve smooth.

2 Lay out the foot profile on one end of each side (A) **[Drawing 1]**. Using a 1" Forstner bit, drill holes in the corners of the waste areas, then cut away the waste with a jigsaw or bandsaw to create the feet. Round the top, front corner of each side. Sand the edges smooth.

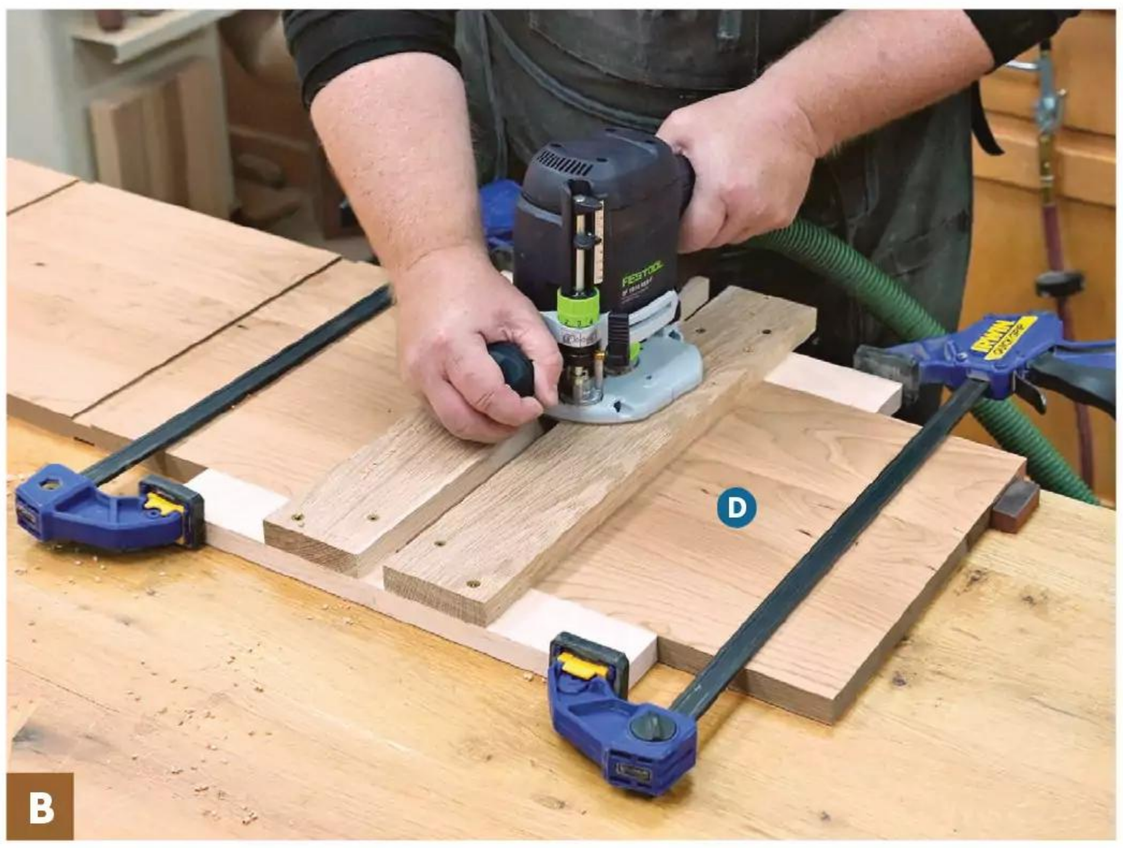
3 Lay out the stopped dadoes on the case sides **[Drawing 1]**, ensuring you have a left and right side.

4 Make the jig described in *Dead-on Dado Jig, below right*. Using the jig, rout the ¼"-deep stopped dadoes in the case sides **[Photo A]**. Square the end of each dado with a chisel.

5 Lay out the rabbet on the rear, inside edge of both sides (A). Tape a straight-edged scrap along the layout line and use the flush-trim bit to rout the stopped rabbets **[Drawing 1]**.

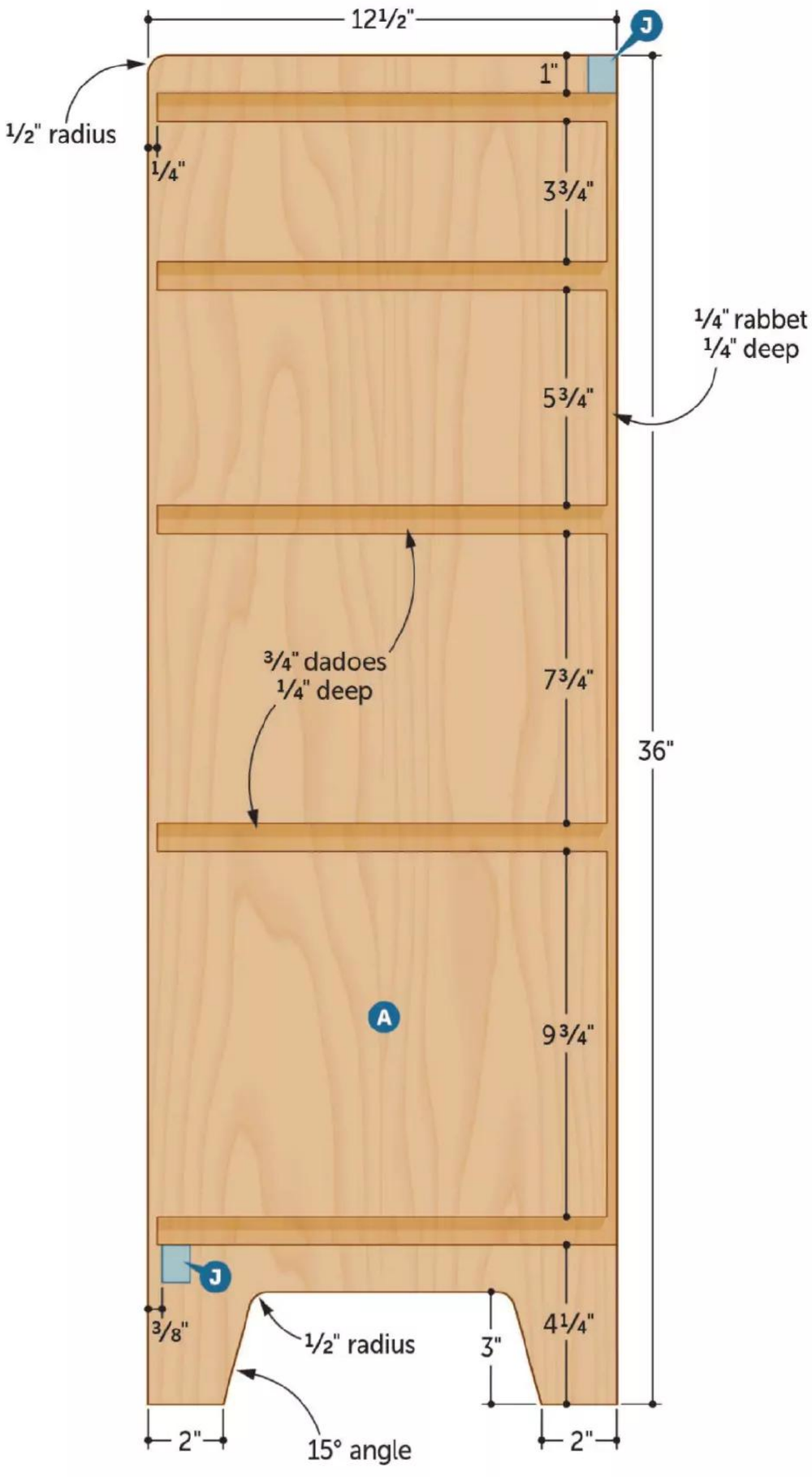


To rout the ¼"-deep stopped dadoes in the sides (A), attach a stop to the jig cleat with double-faced tape, overlapping the side (A) by ¼". Rout the dadoes with a ⅝" top-bearing flush-trim bit.



Remove the stop from the jig and move the back cleat in by ½" to straddle the top (B), drawer shelf (C), shoe shelves (D), and bottom (E) as you rout the ⅛"-deep through-dadoes.

1 SIDE (LEFT SIDE SHOWN)



DEAD-ON DADO JIG

We used a router jig **[Photo A]** to create accurate dadoes. To make the jig, screw one of the fences to one of the cleats, square with the edge. Use a shelf to position the second fence, sandwiching it between the fences before screwing the second fence in place on the cleat. Place the jig on one of the case sides (A) to position the second cleat. Attach the cleat with screws only (no glue) so you can reposition it to fit the other parts of the project. Attach a stop to the first cleat using double-faced tape. (You'll need to remove it later.)

6 Lay out the dadoes in the top (B), drawer shelf (C), shoe shelves (D), and bottom (E) **[Drawing 2]**. Note that the top and bottom have dadoes in one face only while the other panels have dadoes in both faces.

TIP!

Don't forget to adjust the bit depth before routing the dadoes.

7 Retrieve the dado jig and remove and reattach one of the cleats to sandwich one of the shelves. Remove the stop from the jig and rout the 1/8"-deep through-dadoes in parts B through E **[Photo B]**.

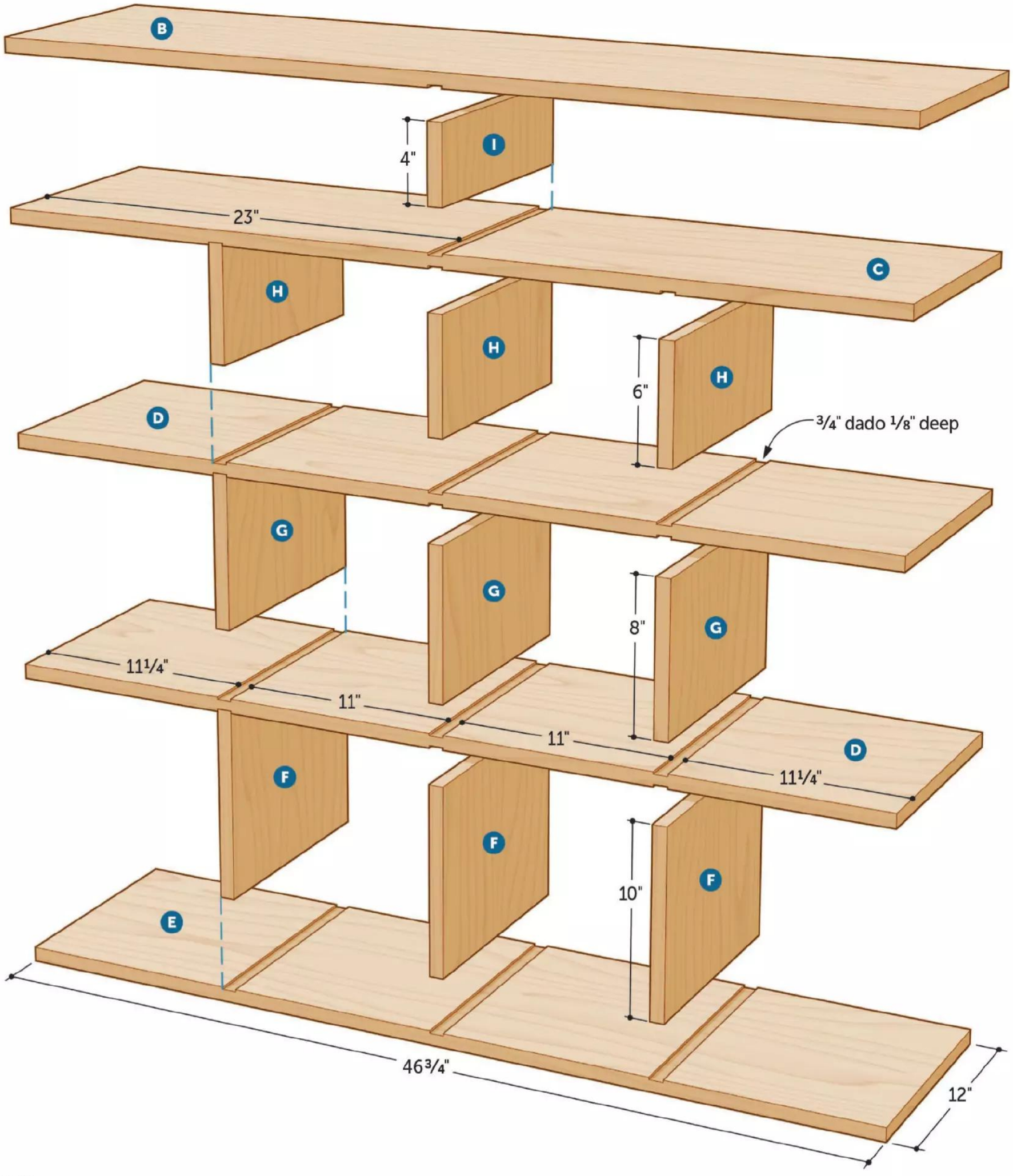
8 Dry-assemble the sides, top, shelves, and bottom. Measure between the dadoes to verify the lengths of the vertical dividers (F-I). Retrieve the divider blanks and cut the dividers to length sequentially to maintain a continuous grain pattern **[Drawing 2]**.

9 Finish-sand all the parts. Working from the bottom up, glue and clamp the vertical dividers (F-H) between the bottom (E), shoe shelves (D), and drawer shelf (C), making sure to keep the dividers in order. Check the assembly for square as you apply the clamps. Once the glue dries, add the drawer divider (I), top (B), and sides (A).

TIP!

Go lightly on the sanding to avoid affecting the fit of the joinery.

2 DIVIDERS

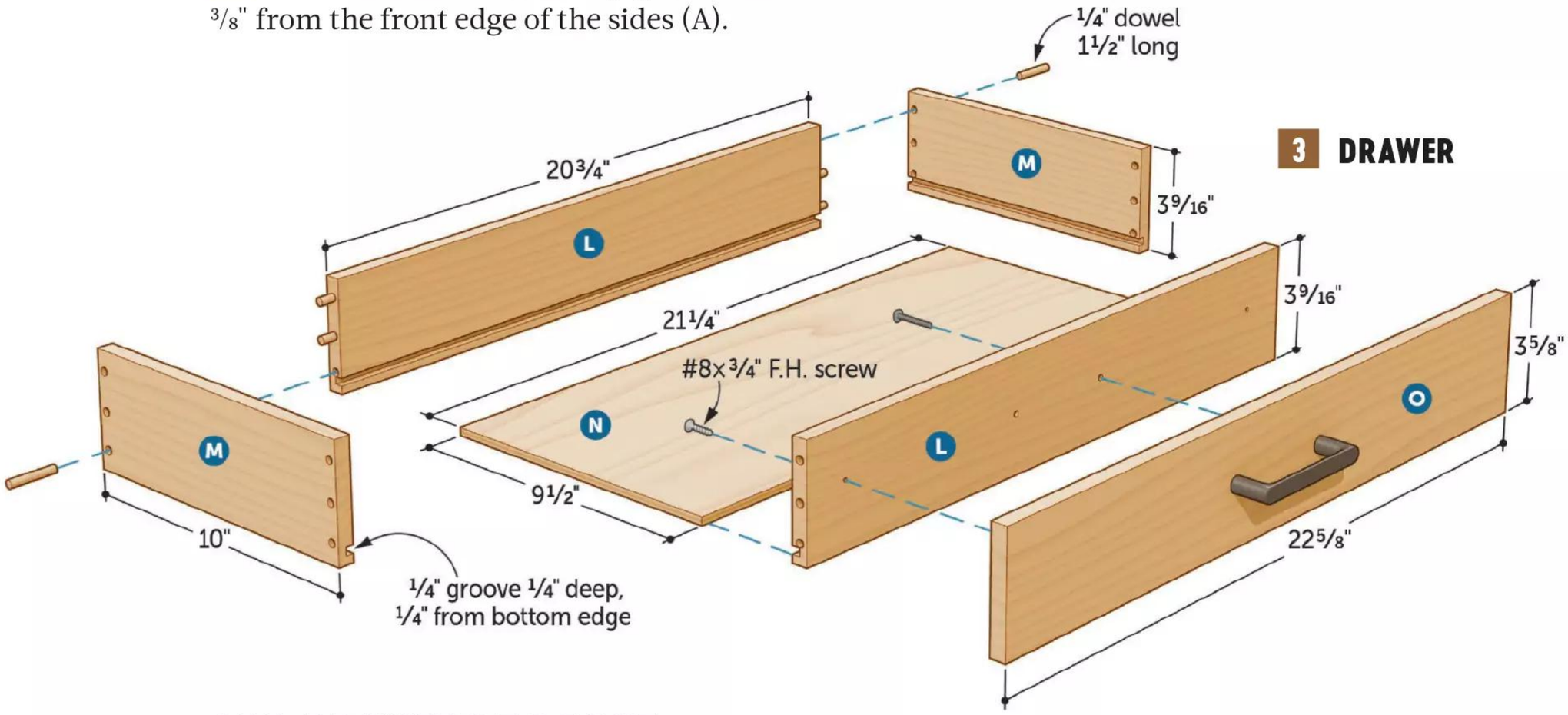


NOW A BACK STEP

1 Cut two trim strips (J) to size **[Parts List]**. Glue one to the top (B), overhanging the rear edge slightly so the strip is flush with the sides (A) **[Exploded View, Drawing 1]**.

2 Glue the second trim strip to the underside of the bottom (E), set back 3/8" from the front edge of the sides (A).

3 Measure the opening at the back of the case, then cut the back (K) to size. Position the back in the case and drill countersunk holes through the back and into the edges of the shelves and dividers. Set the back aside.



ADD DRAWERS TO BOOT

1 From 1/2" stock, cut the drawer fronts and backs (L) and sides (M) to size **[Parts List, Drawing 3]**. Cut a 1/4"-wide groove along the inside face of the drawer parts (L, M) for the drawer bottom (N).

2 Cut the drawer bottoms (N) to size **[Parts List]**. Glue and clamp the fronts, backs, and sides around the bottoms, checking for square and ensuring the ends of the sides are flush with the outer faces of the front and back.

3 After the glue dries, mark the locations on the drawer sides (M) for dowels that reinforce the joints **[Drawing 3]**. Drill holes through the sides and into the ends of the front and back **[Photo C]**. Cut the dowels to length, then spread glue on one dowel at a time and drive them into the holes. After the glue dries, trim and sand the dowels flush. Drill a couple of 1/8" holes through the front of each drawer to attach the false fronts.

4 Measure the case openings and cut the drawer false fronts (O) to size, allowing for a 1/16" gap on all four sides. Don't attach the false fronts just yet.

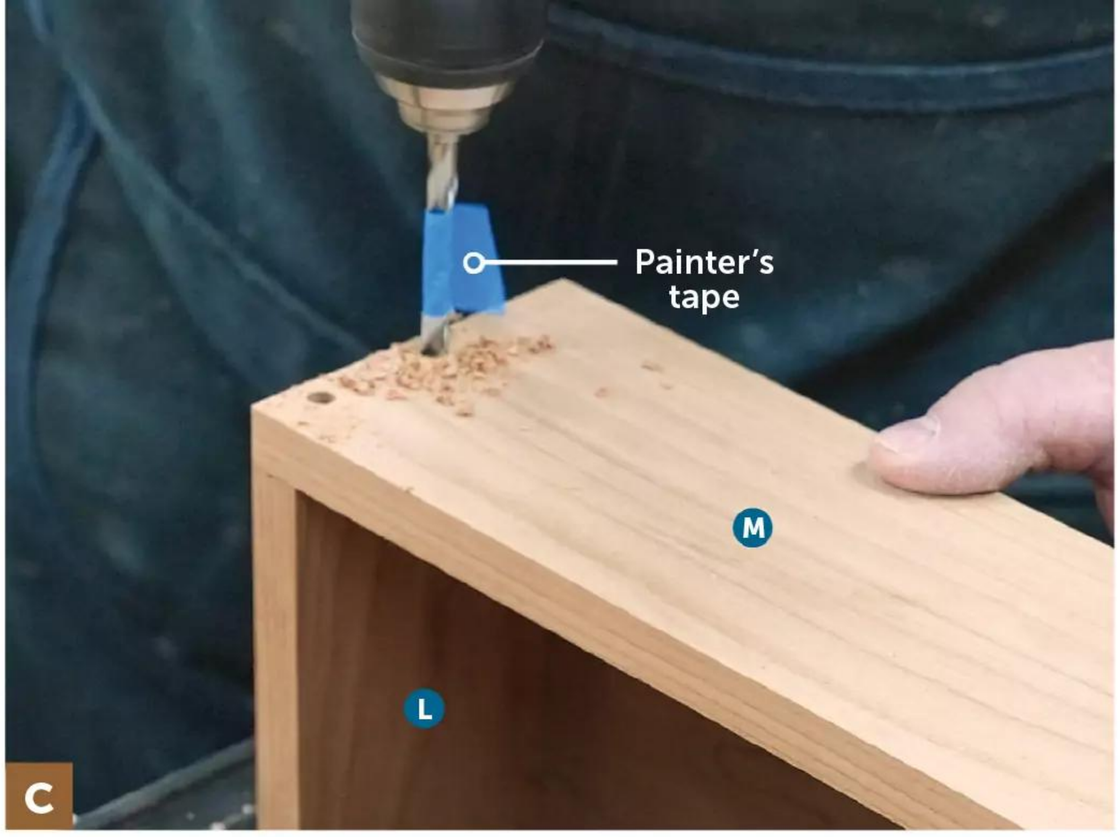
PARTS LIST

PART		FINISHED SIZE T	W	L	Matl.	Qty.
A	SIDES	3/4"	12 1/2"	36"	C	2
B	TOP	3/4"	12"	46 3/4"	C	1
C	DRAWER SHELF	3/4"	12"	46 3/4"	C	1
D	SHOE SHELVES	3/4"	12"	46 3/4"	C	2
E	BOTTOM	3/4"	12"	46 3/4"	C	1
F*	LOWER DIVIDERS	3/4"	12"	10"	C	3
G*	MIDDLE DIVIDERS	3/4"	12"	8"	C	3
H*	UPPER DIVIDERS	3/4"	12"	6"	C	3
I*	DRAWER DIVIDER	3/4"	12"	4"	C	1
J	TRIM STRIPS	3/4"	1"	46 1/4"	C	2
K	BACK	1/4"	46 3/4"	30 3/4"	CP	1

PART		FINISHED SIZE T	W	L	Matl.	Qty.
L	DRAWER FRONTS/BACKS	1/2"	3 9/16"	20 3/4"	C	4
M	DRAWER SIDES	1/2"	3 9/16"	10"	C	4
N	DRAWER BOTTOMS	1/4"	21 1/4"	9 1/2"	CP	2
O	DRAWER FALSE FRONTS	1/2"	3 5/8"	22 5/8"	C	2

*Parts initially cut oversize. See the instructions.

MATERIALS KEY: C–cherry, CP–cherry plywood.
SUPPLIES: #8x3/4" flathead screws, 1/4" dowel rod
BITS: 5/8"-diam. top-bearing flush-trim router bit (Freud 50-103), 1" Forstner and 1/4" brad-point drill bits.
SOURCES: 10" overtravel drawer slides (2 pairs) no. 48386, $20/pair, #6x1/2" panhead screws (package of 100) no. 63945, $12, rockler.com; 3 3/4" matte black pulls (2), no. 5977636, $8 each, lowes.com.
PROJECT COST: It cost us about $380 to build this project. Your cost will vary by region and source.



Use a brad-point bit to drill holes through the drawer sides (M) and into the drawer fronts and backs (L) for dowels. A piece of painter's tape wrapped around the bit serves as a depth stop.

With the slide resting on a 1⅛"-wide spacer, install the drawer slides ½" back from the front edge of the drawer divider (I) and sides (A). Use the slotted screw holes so you can make any adjustments.

LACE IT ALL UP

1 Finish-sand the project and ease any sharp edges with a sanding block.

2 Apply a finish. We applied a seal coat of shellac, followed by three coats of wipe-on polyurethane. (See our favorite wipe-on finishes on *page 60*.)

3 Install the drawers by first attaching the drawer half of each slide centered on the height of the drawer side and flush at the front. Then mount the other slide half to the cabinet **[Photo D]**.

4 Attach the false fronts to the drawers, first with double-faced tape, then with screws.

5 Lay out the hole locations for the pulls and drill holes through the false fronts and drawer fronts. Attach the drawer pulls. Then attach the back (K).

6 Pair up all your shoes and load them into the cubbies according to size: sandals and flip-flops up top, sneakers in the middle, and boots on the bottom.

Note: **The screws that came with our pulls were too short, requiring us to purchase longer screws.**

CUTTING DIAGRAM

We purchased 55 board feet of 4/4 cherry. Before cutting parts to size, we planed them to the thicknesses shown in these example boards.

¾x7¼x96" Cherry (2 needed)

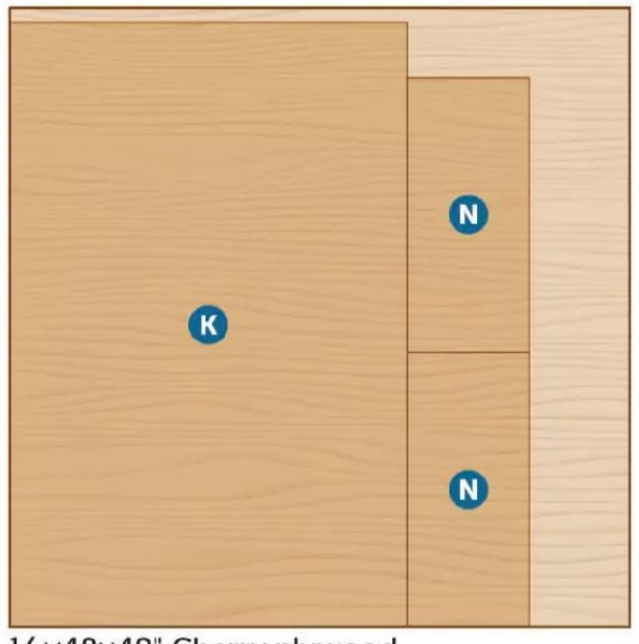
¾x7¼x96" Cherry (2 needed)

¾x7¼x96" Cherry (2 needed)

¾x7¼x96" Cherry

¾x7¼x96" Cherry (2 needed)

½x5½x96" Cherry (2 needed)



¼x48x48" Cherry plywood

¾x3½x48" Cherry

5 FUNDAMENTAL TABLESAW JOINTS

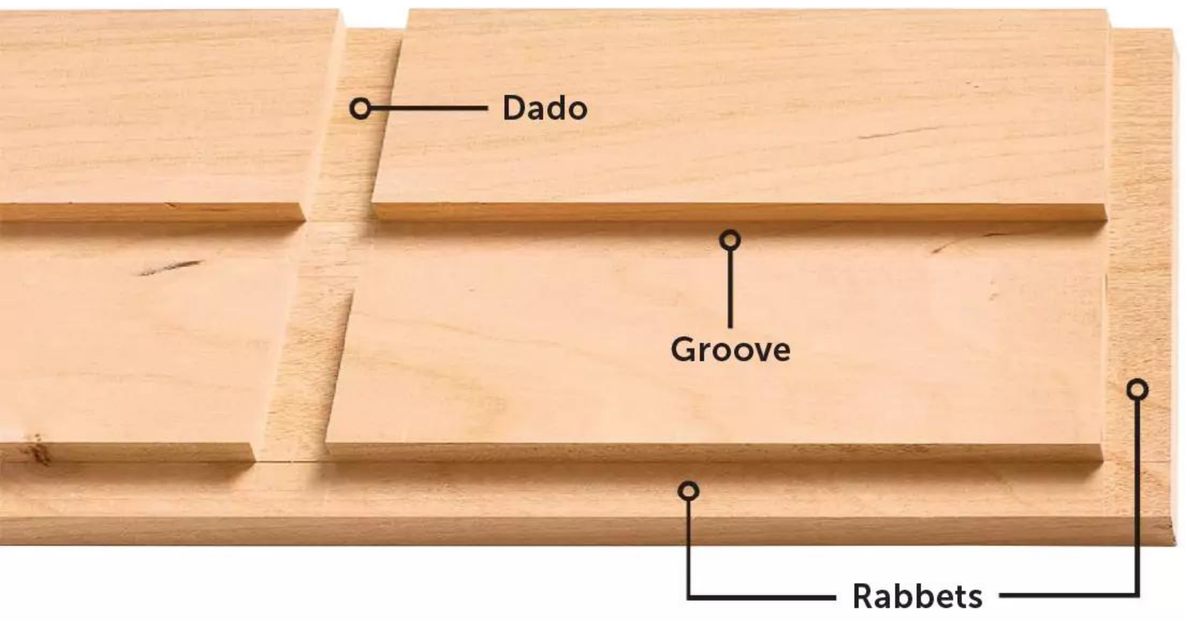
Using only your tablesaw, you can easily turn out these strong, tight-fitting joints for carcases, drawers, frames, panels, and dozens of other uses.

WRITER: VINCE ANCONA

When cutting a groove, apply downward pressure to the board with a push pad as you move it forward. Your hand (or a featherboard) holds the workpiece against the rip fence.

Most woodworkers value the tablesaw for its ability to quickly and accurately break down and dimension stock. But if that's all you use it for, you're overlooking a big chunk of this tool's functionality. Armed with just a little know-how, you can transform any tablesaw into a joinery-cutting dynamo. Here's a look at five essential joints you can knock out at the tablesaw in just a few minutes.

PHOTOGRAPHER: CARSON DOWNING



SHAKE YOUR GROOVE THING

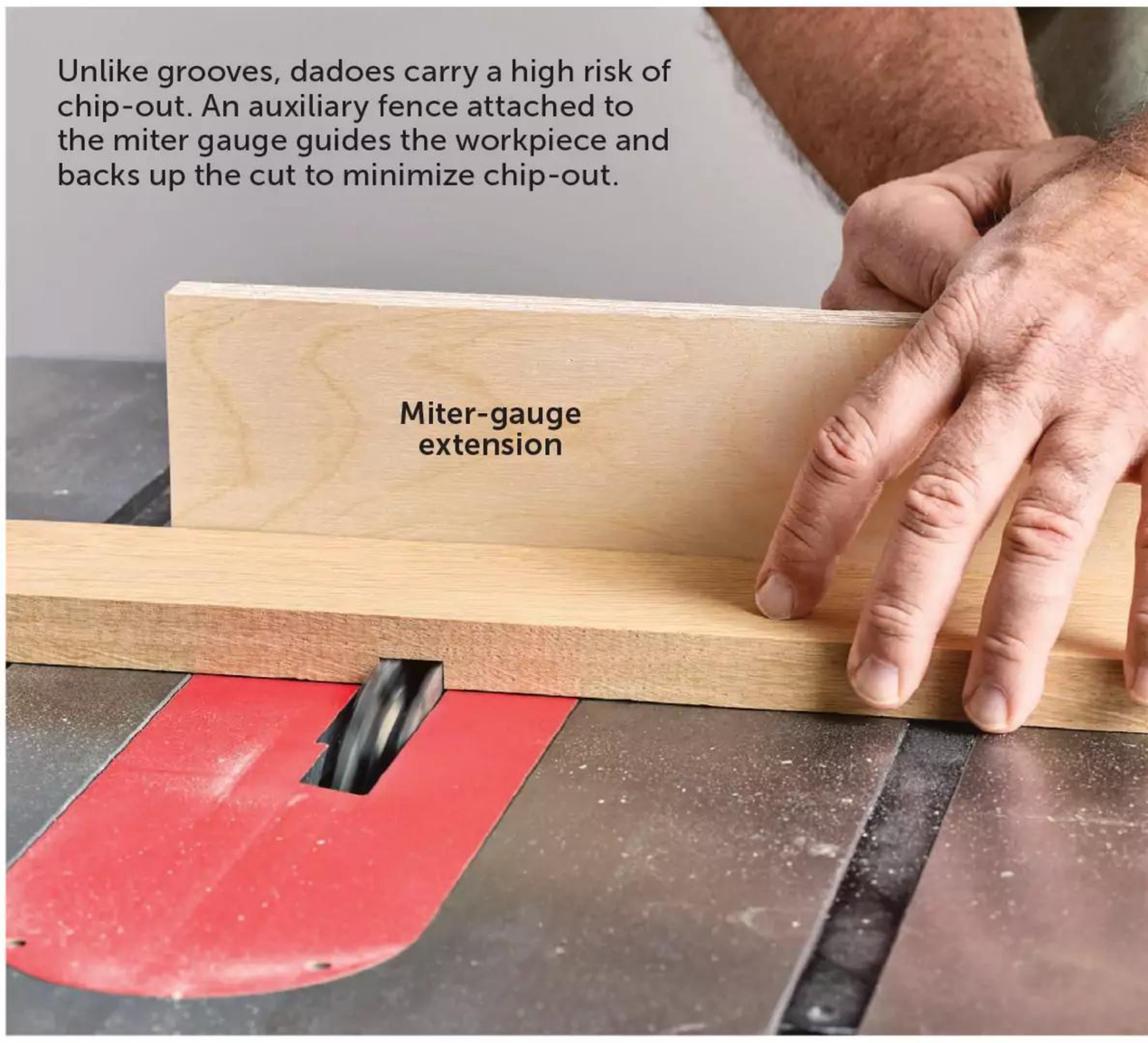
Grooves, dadoes, and rabbets are used in some of the most basic joints. Even though they go by different names, each consists of a channel cut in the surface of the board sized to match a mating workpiece. The only difference is their orientation. Grooves run parallel with the grain; dadoes run perpendicular. A rabbet is an L-shaped recess cut along the edge or end of a board. When equipped with a dado blade, a tablesaw excels at making all three of these versatile joinery cuts.

Grooves are the easiest to cut. Using chippers and shims, set up your dado stack to match the width of the mating workpiece. Then use the rip fence to position the groove on the board. Guide the board using a pushpad to ensure a consistent depth throughout the length of the groove, *previous page*.

Alternatively, you can cut a groove in overlapping passes using a narrow dado stack, or even a standard blade, by moving the fence after each pass. This method is more time consuming, but it allows you to sneak up on the exact width of the groove and to cut grooves wider than your dado blade capacity.

Cut dadoes just as you would a groove, but instead of the rip fence, use a miter gauge to guide the workpiece. Attach an extension to the miter gauge to steady longer workpieces and to prevent tear-out as the dado blade exits the cut, *above*.

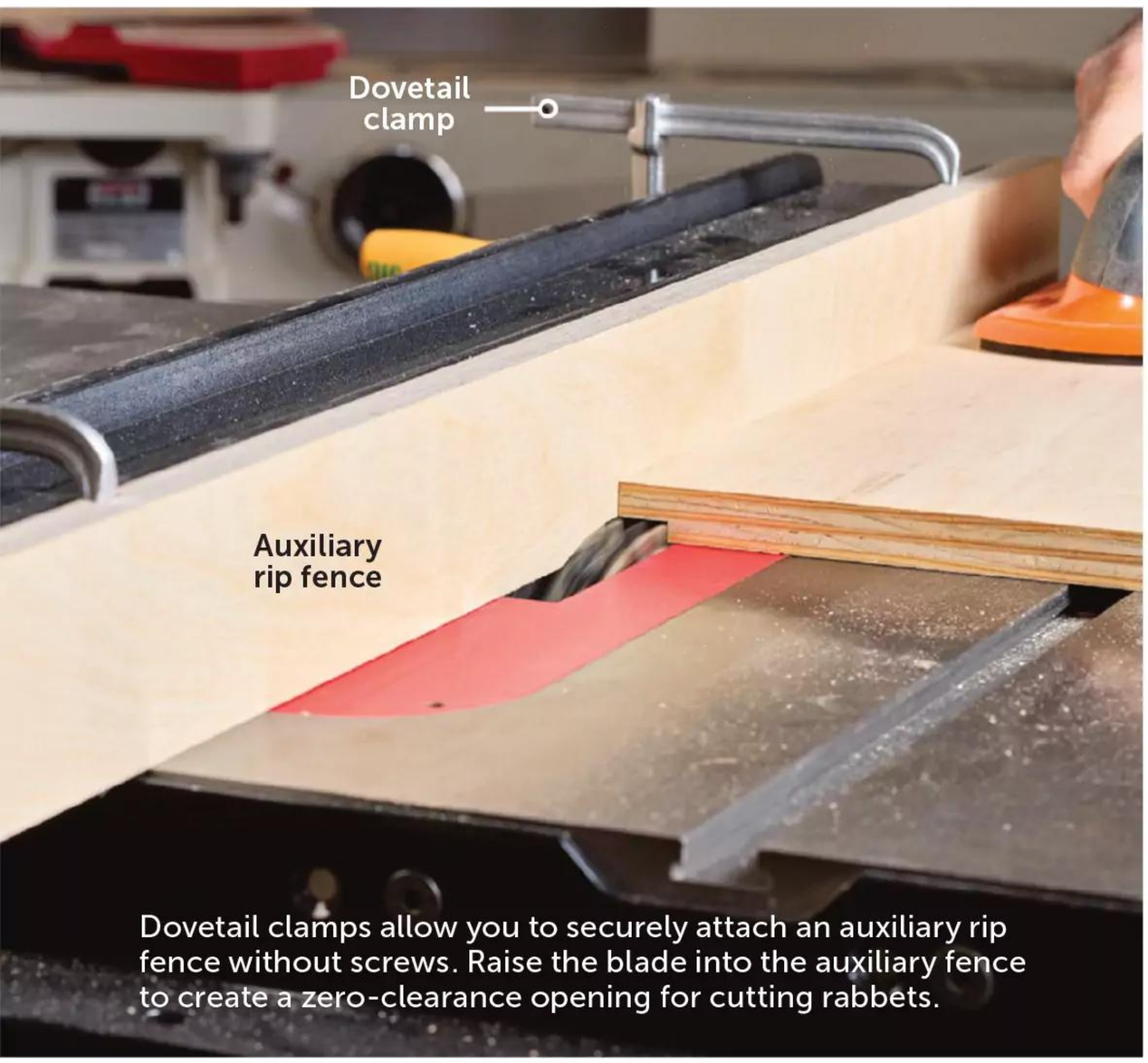
The procedure for cutting rabbets is slightly different. Start by installing a dado stack on your tablesaw. Then attach a ¾"-thick auxiliary fence to your rip fence. With the blade lowered below the surface of the saw table, position the rip fence so the auxiliary fence overlaps a majority of the dado stack's width. Turn the saw on and slowly raise the blade into the auxiliary fence slightly higher than the depth of the desired rabbet, then turn off the saw. The resulting crescent-shaped cavity allows you to reposition the fence to "bury" part of the dado stack, exposing only the amount needed to establish the rabbet width. Then adjust the blade height to set the rabbet depth, *left*.



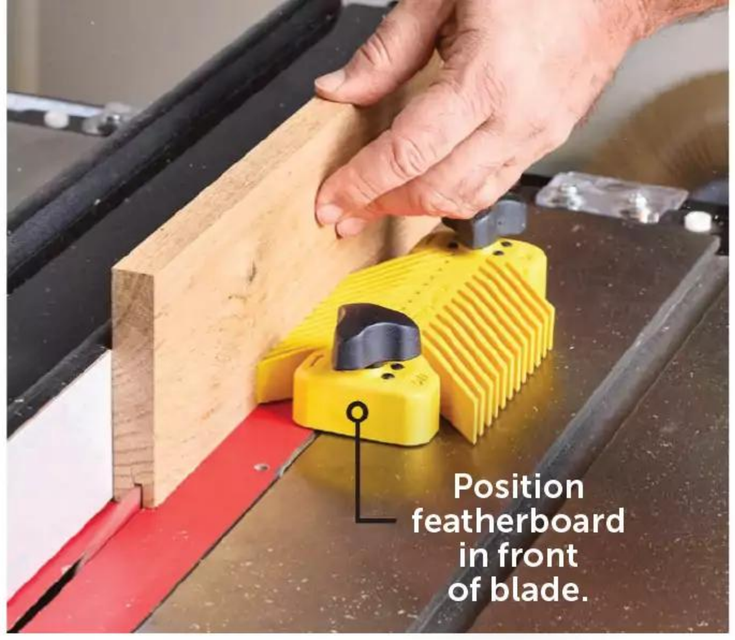
Unlike grooves, dadoes carry a high risk of chip-out. An auxiliary fence attached to the miter gauge guides the workpiece and backs up the cut to minimize chip-out.

Should you use a 6" or 8" dado blade?
woodmagazine.com/dadobladesize

Watch Jim Heavey demonstrate cutting grooves, rabbets, and dadoes.
woodmagazine.com/groovycuts



Dovetail clamps allow you to securely attach an auxiliary rip fence without screws. Raise the blade into the auxiliary fence to create a zero-clearance opening for cutting rabbets.



When cutting the groove, first position the rip fence to cut the side of the groove farthest from the fence. Use a featherboard to hold the workpiece firmly against the rip fence.

Flipping the workpiece end for end to make the second cut automatically centers the groove on the thickness of the workpiece. Finish by repositioning the fence to remove any waste between the cuts.

With a dado blade buried in an auxiliary rip fence, create the tongue by cutting a pair of rabbets on the edge of the mating piece. A push pad maintains downward pressure on the board.

LICK THE TONGUE & GROOVE

Tongue-and-groove joints are often used with solid-wood cabinet backs. A tongue on the edge of one piece fits into a groove on the mating piece, allowing both pieces to expand and contract with seasonal changes in humidity.

To cut this joint, start with the groove. Centering the groove is easiest by making multiple cuts with a single blade. Position the rip fence to cut the far side of the groove, *above left*, then flip the workpiece end for end to cut the opposite side of the groove, *above center*. Repeat these two cuts on all of your workpieces before nudging the rip fence toward the blade slightly to remove any waste with additional passes.

To cut the tongue, bury a dado blade in an auxiliary rip fence and cut a rabbet on both faces of the workpiece, *above right*. Start with the blade a bit low and then raise it in small increments until the tongue fits the groove. To allow the pieces to expand and contract, the tongue shouldn't bottom out in the groove.

Use this same technique to build stub-tenon door frames. After cutting grooves in the frame stiles, rabbet the ends of the rails, matching the tongue length to the groove depth.

See Senior Design Editor Kevin Boyle cut stub tenon and groove joints.
woodmagazine.com/stubtenonandgroove

NEVER SAY NEVER

One of the cardinal rules of tablesaw safety is to never use a miter gauge and rip fence together. The reason is that once you cut *through* the workpiece, the piece between the blade and the rip fence becomes trapped. The blade can catch this cut-off piece and kick it back with enough force to cause injury.

But when you're cutting these types of joints, you aren't cutting through the workpiece, *right*. You're cutting away only a portion, turning it into sawdust and leaving no cut-off piece to be trapped. Not only is this method safe, it also yields better results.

When using a miter gauge and rip fence together to cut a rabbet, allow a small clearance gap between the end of the miter-gauge extension and the rip fence.

HALF-LAPS IN NO TIME

For super strong frames or doors, half-laps provide plenty of glue surface and are relatively quick and easy to make once you have everything dialed in. The joint consists of two workpieces, each reduced to half their thickness where they overlap.

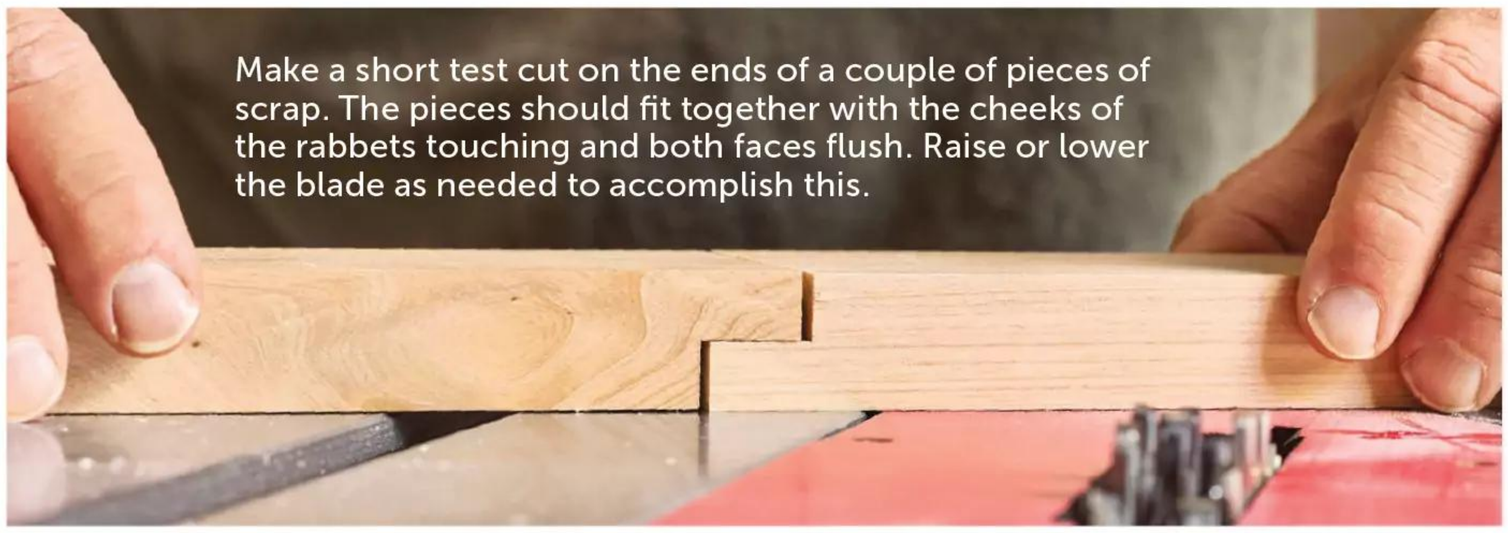
Using a wide dado stack, raise the blade to about half the thickness of your stock and make a narrow cut on the ends of two test pieces that are the same thickness as your workpieces, *below*. Raise or lower the blade until you achieve a flush fit with your test pieces.

TIP!

Don't measure. Use the mating workpiece against the fence to set this distance.

With the blade height dialed in, position the rip fence so the distance from the fence face to the far side of the dado stack equals the width of the mating workpiece. Then, starting at the end of the workpiece, *bottom left*, make a series of overlapping cuts until the end of the workpiece butts against the fence, *bottom right*. Repeat the process on the mating workpiece to complete the joint.

> **"A GOOD-QUALITY DADO BLADE IS ONE OF THE BEST INVESTMENTS YOU CAN MAKE FOR YOUR TABLESAW."**
>
> ***-KEVIN BOYLE, SENIOR DESIGN EDITOR***



Make a short test cut on the ends of a couple of pieces of scrap. The pieces should fit together with the cheeks of the rabbets touching and both faces flush. Raise or lower the blade as needed to accomplish this.

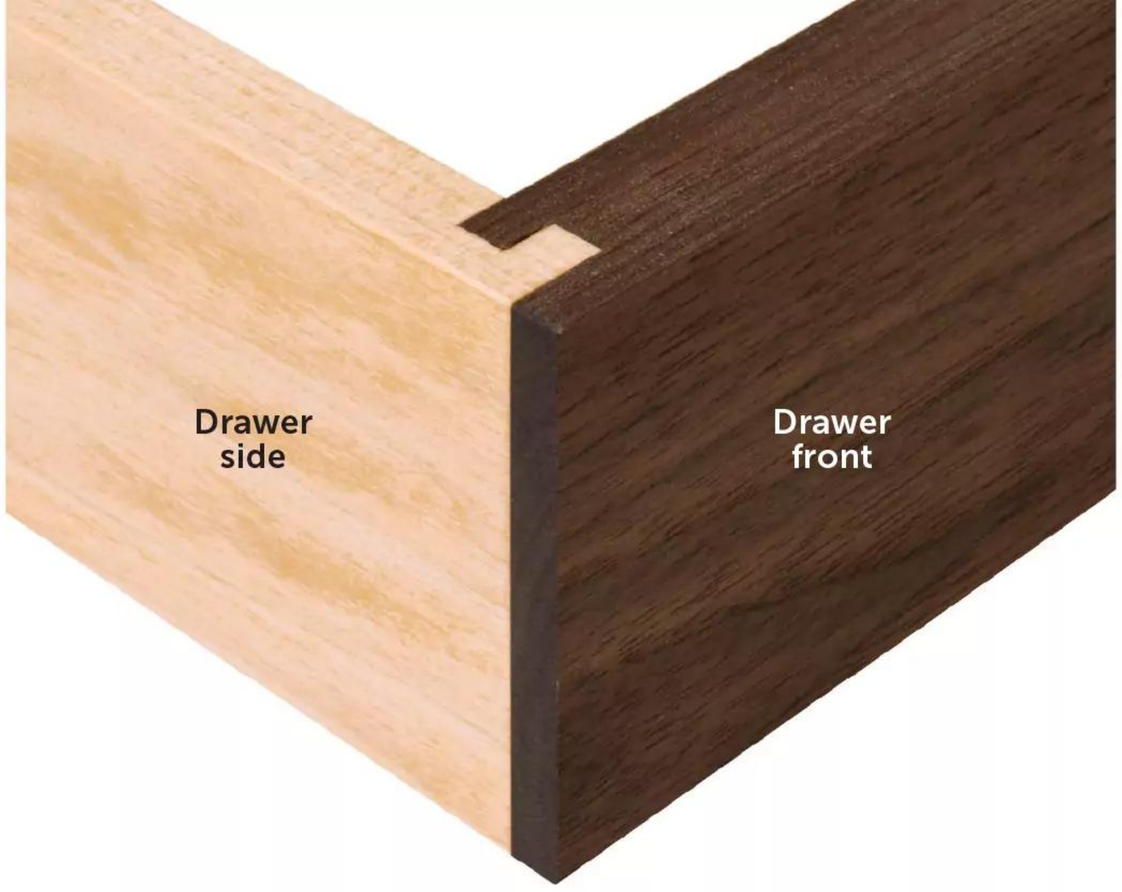
Starting at one end, remove the waste by making a series of overlapping passes. An extension on the miter gauge supports the workpiece to prevent tear-out.

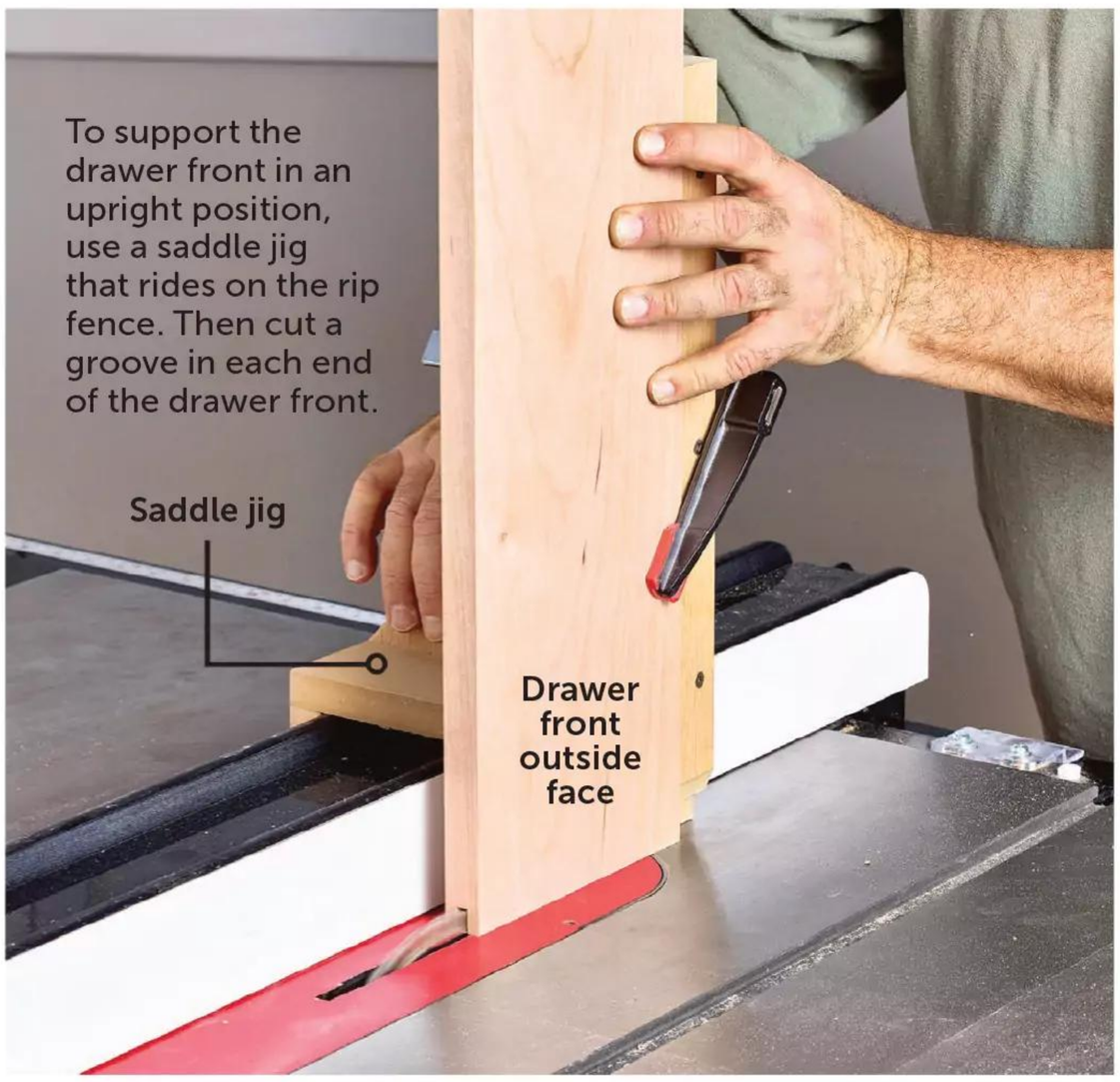
Use the rip fence as a stop for the final pass. Slide the workpiece from side to side over the dado blade to smooth and clean up the surface of the half-lap.

Build a saddle jig for your rip fence.
woodmagazine.com/saddlejig

LET'S TALK DRAWER LOCK

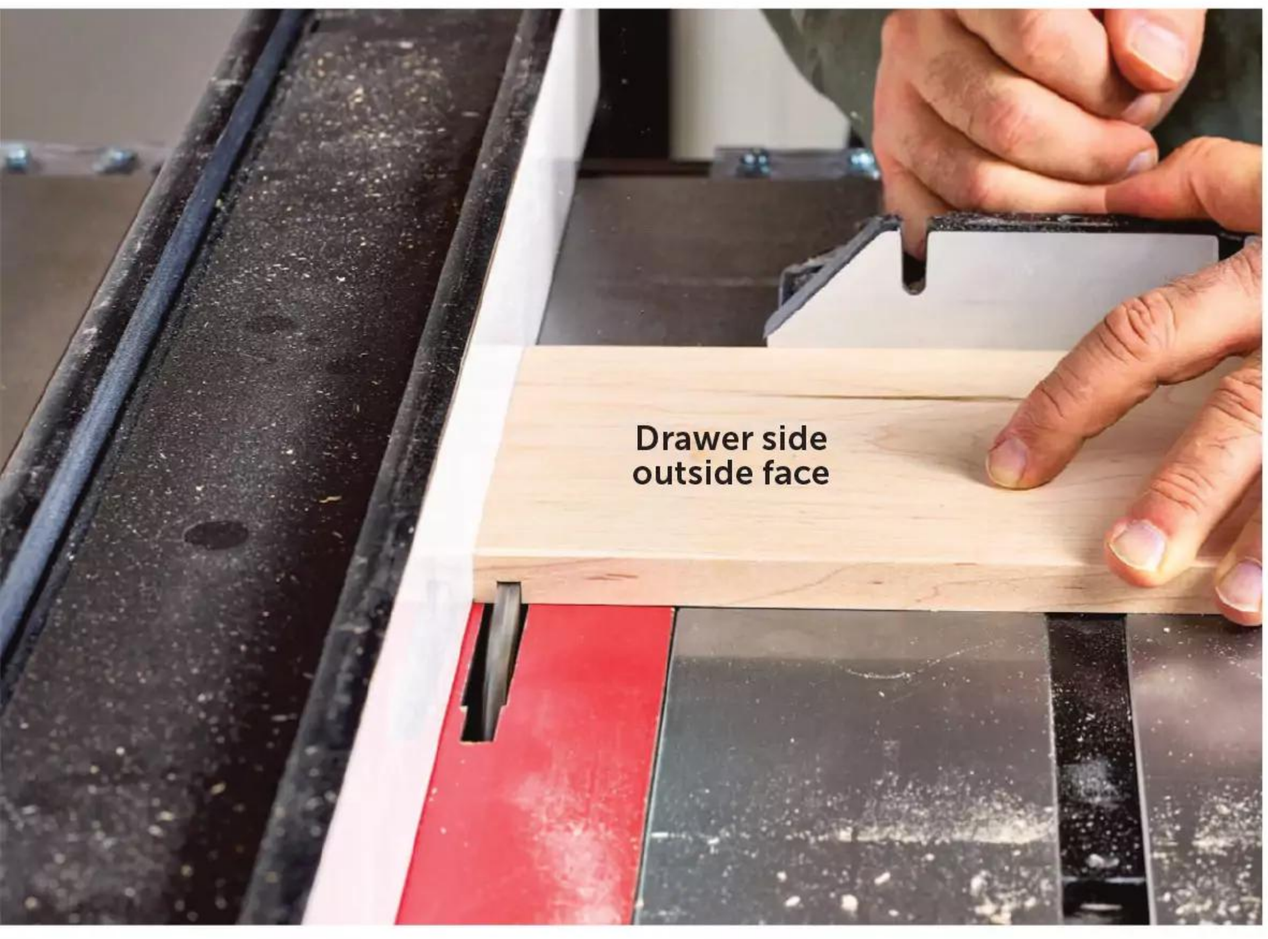
For creating drawers, it's hard to beat a drawer lock joint, also called a tongue-and-dado joint. The drawer sides interlock with the front and back, creating a strong joint that resists the forces from repeated opening and closing of the drawer. A shop-made saddle jig supports the workpieces while cutting the joint.



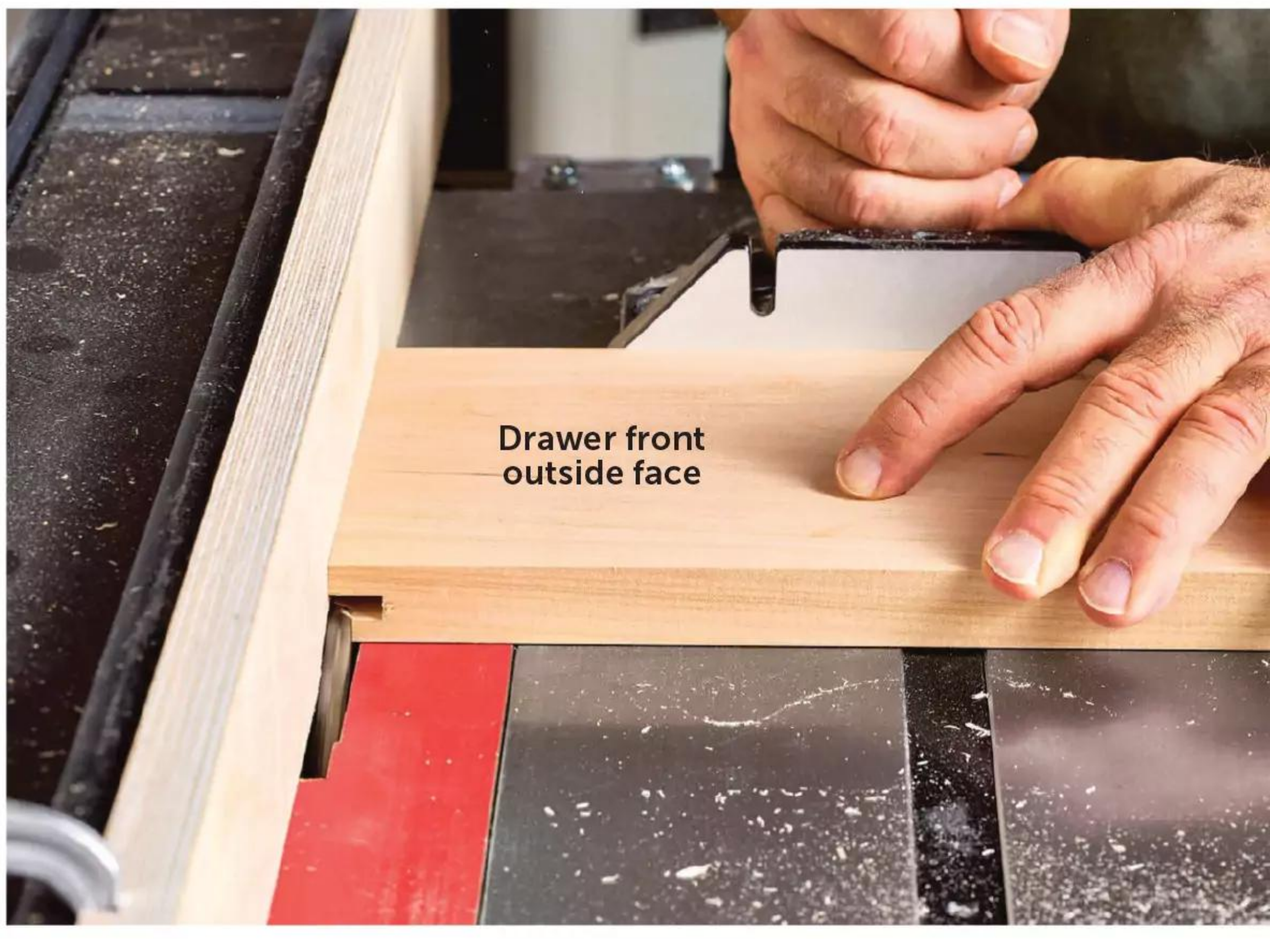


For drawers with ¾" fronts and ½" sides, install a ¼" dado stack and set the height of the blade to match the thickness of the drawer sides, *above*. Position the rip fence so the face of the saddle jig is ¼" from the blade. Standing the drawer front on end with the inside face against the saddle jig, cut a centered groove on each end, *left*.

Remove the saddle jig and reposition the fence ¼" from the dado stack. Lower the blade to ¼" and cut a dado near each end of the drawer sides, *below left*. Install an auxiliary fence on the rip fence and gradually trim the inside tongues on the drawer front to allow the sides and front to fit together, *below right*. The goal is for the drawer sides to fit flush with the ends of the drawer front.



Reposition the rip fence and lower the dado stack to cut a dado at both ends of each drawer side. Use the rip fence as a stop and the miter gauge to guide the workpiece.



Trim the tongue on the inside face of the drawer front to match the depth of the dado in the drawer side. Trim a little at a time, nudging the fence away from the blade until arriving at the perfect fit.

Raise the blade to match the width of the tenon workpiece. Then with the mortise workpiece clamped to a jig for support, cut the first wall of the open mortise.

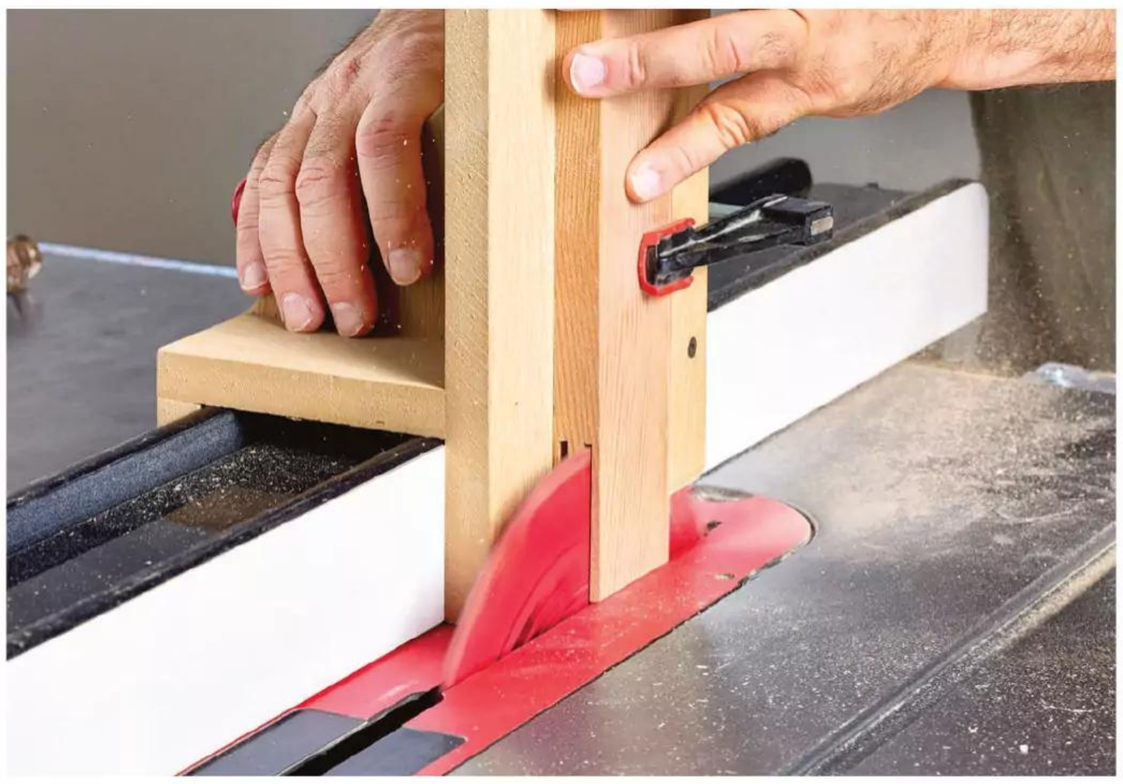
Flip the workpiece around to cut the second wall of the mortise. If any waste remains between the two cuts, reposition your rip fence and make additional passes to remove it.

REIN IN BRIDLE JOINTS

Open mortise-and-tenon joints, also known as bridle joints, provide a lot of glue surface and mechanical strength for tasks such as attaching a rail to a table leg. In this joint, the tenon passes all the way through the mortise and is exposed on the edge and end of the mortised piece.

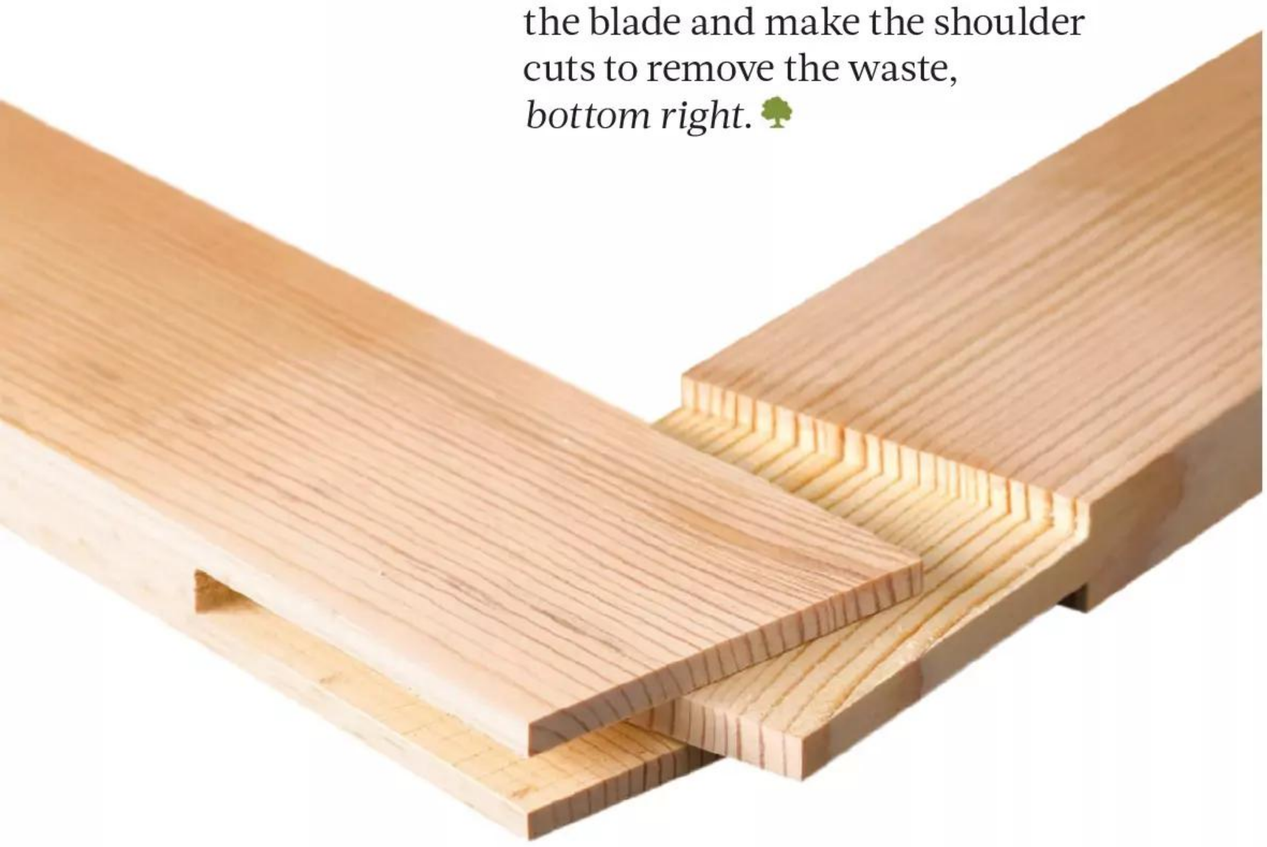
As with any mortise-and-tenon joint, start by making the mortise. Using a saddle jig to support the workpiece on end, cut one wall of the mortise, *above left*. Then flip the workpiece around to cut the second wall, *above right*. Nibble away any waste that remains between these two cuts.

If the two pieces are different widths, adjust the blade height to match the width of the mortised workpiece. Reposition the rip fence and cut the tenon cheeks in a similar fashion, sizing the thickness of the tenon to match the mortise, *middle right*. After making the two cheek cuts, lower the blade and make the shoulder cuts to remove the waste, *bottom right*.



Use the saddle jig to help cut the tenon as well. Using the mortised workpiece as a gauge, reposition the rip fence to cut the tenon cheeks, flipping the workpiece between passes.

Lower the blade to make the shoulder cuts. A stopblock clamped to the rip fence ahead of the blade prevents the waste from becoming trapped between the blade and fence.



HIGH-STYLE SIDEBOARD

Commercially turned legs simplify building this stylish server, making it the perfect addition to any dining room.

WRITER: KERRY GIBSON
DESIGNER: KEVIN BOYLE
BUILDER: BRIAN BERGSTROM

PHOTOGRAPHER: JASON DONNELLY; **ILLUSTRATOR:** CHRISTOPHER MILLS

Be honest. At first glance you thought, "I'd like to build that sideboard, but I could never turn those legs." Guess what? You don't need a lathe, thanks to the premade legs we found **[Sources]**. Even the custom trim surrounding the door and drawer panels is easy to make with just a few router bits.

We built our sideboard as a companion to the "Pedestal Table" in issue 307 (Dec 2025/Jan 2026). Change it up to suit your style with different legs, trim, stain color, or wood species.

The sideboard features a generous top for serving, along with center drawers and shelved side compartments to hold dining accessories.

MAKE YOUR CASE

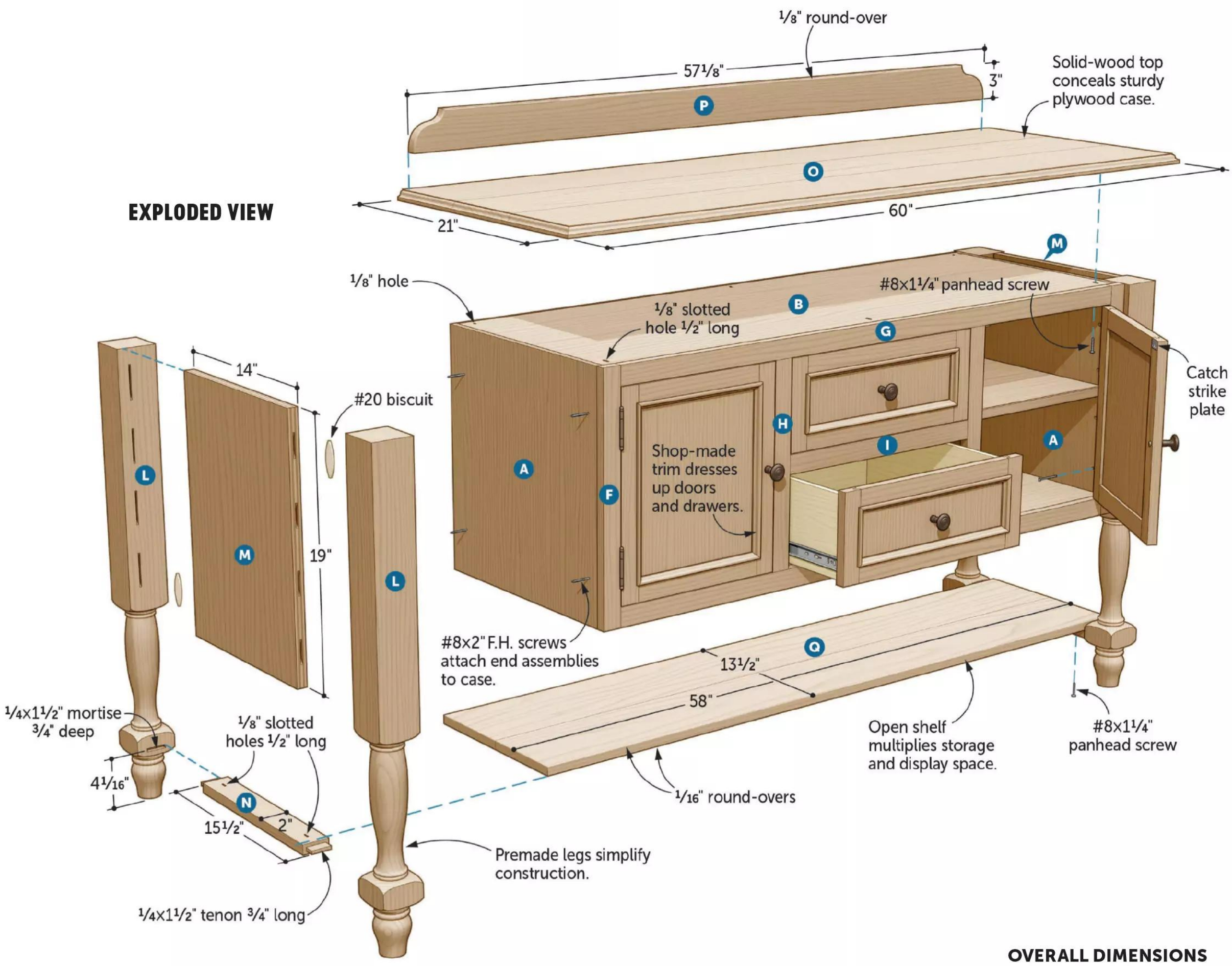
1 From ¾" plywood, cut the case sides (A), top/bottom (B), vertical dividers (C), and horizontal divider (D) to size **[Drawing 1, Parts List]**. Install a ¾" dado stack in your tablesaw and set the cutting depth to ¼". Position your rip fence ¾" from the blade and cut a dado in each side (A) **[Drawing 2]**.

2 Position the rip fence 15⅜" from the blade and cut the dadoes in the top and bottom (B) **[Drawing 1]**, rotating the workpiece end-for-end to cut the second dado. Reset the fence to 8¼" from the blade and cut a dado in each vertical divider (C) **[Drawing 3]**.

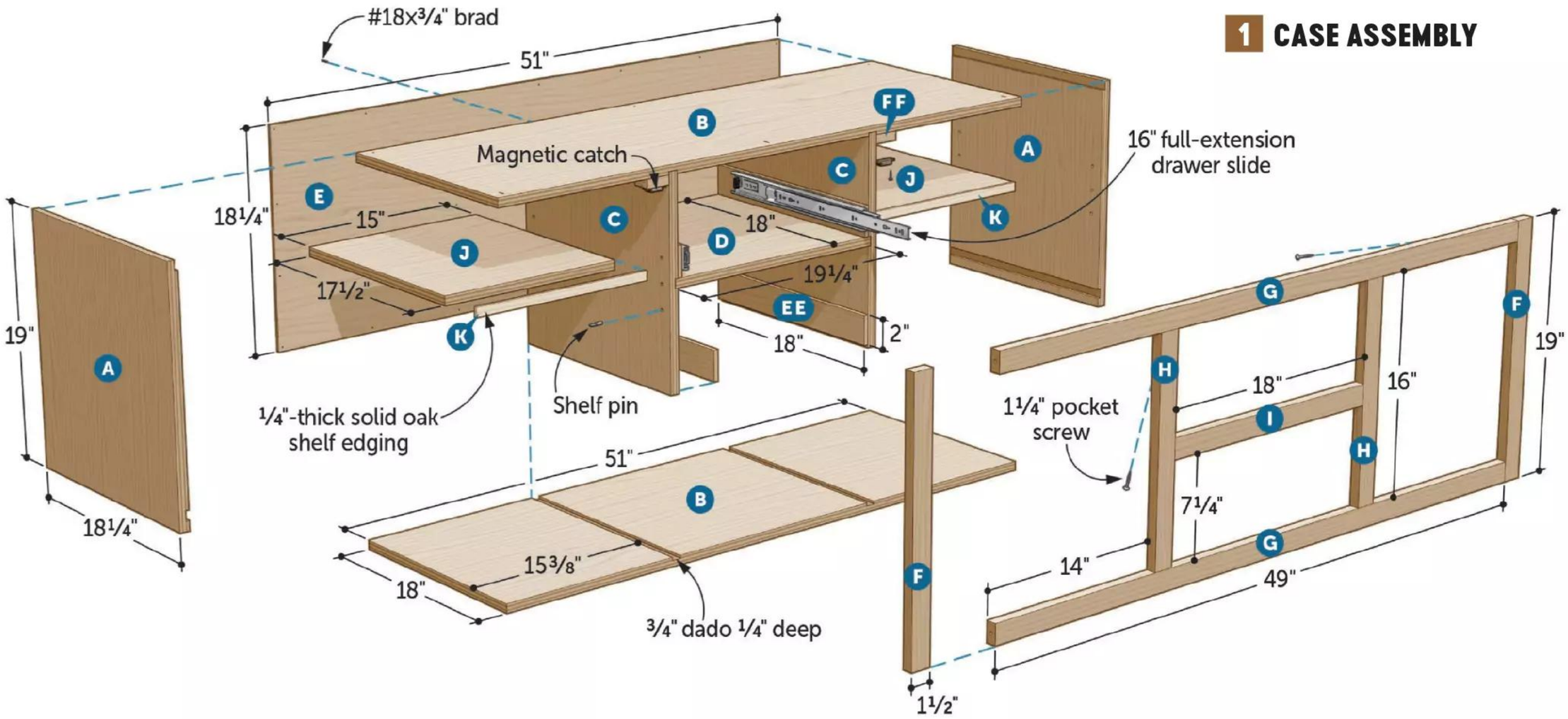
TIP!

For parts A, B, and C, orient the best face of your plywood inward and toward the side compartments for the best appearance on your finished piece.

EXPLODED VIEW



OVERALL DIMENSIONS
60"W × 21"D × 38¼"H



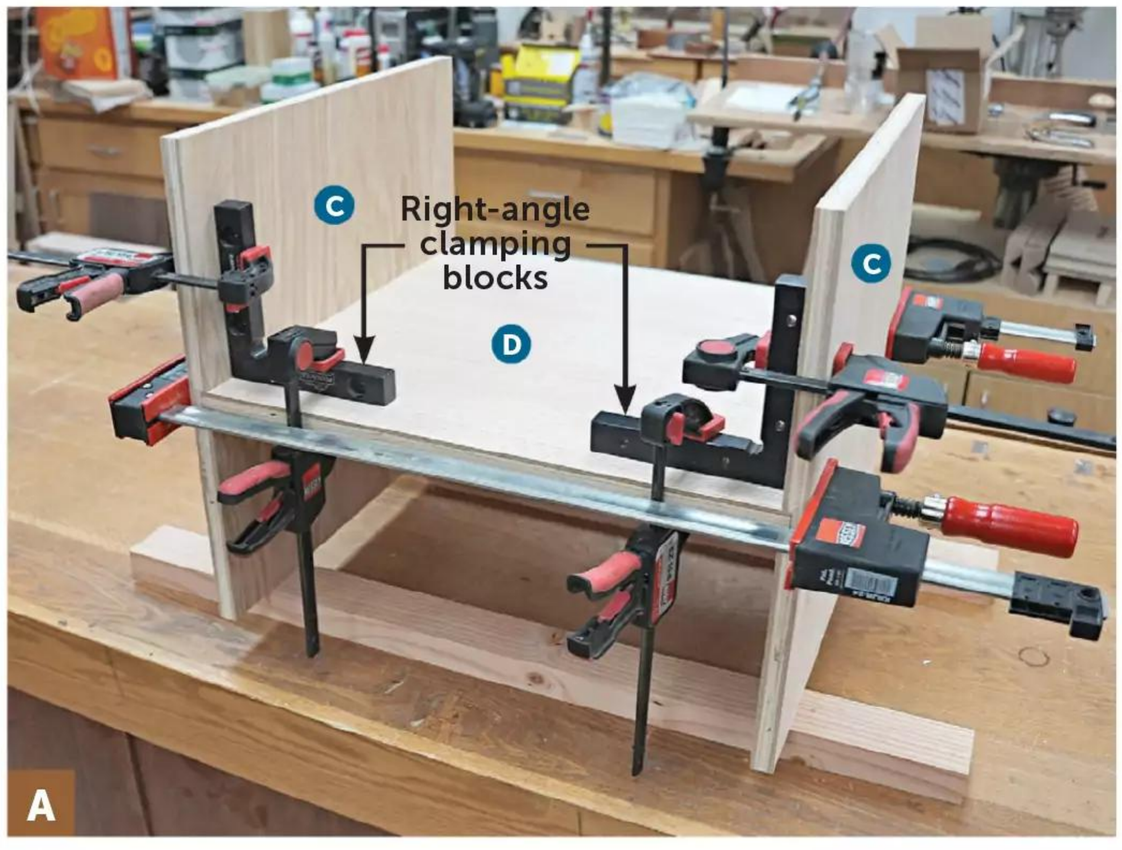
1 CASE ASSEMBLY

3 Attach an auxiliary face to the rip fence and position the fence so the blade just brushes against it. Cut the rabbet in the upper end of each side (A). Next, bury all but 1/4" of the dado blade in the auxiliary face and cut a rabbet along the rear edge of each side.

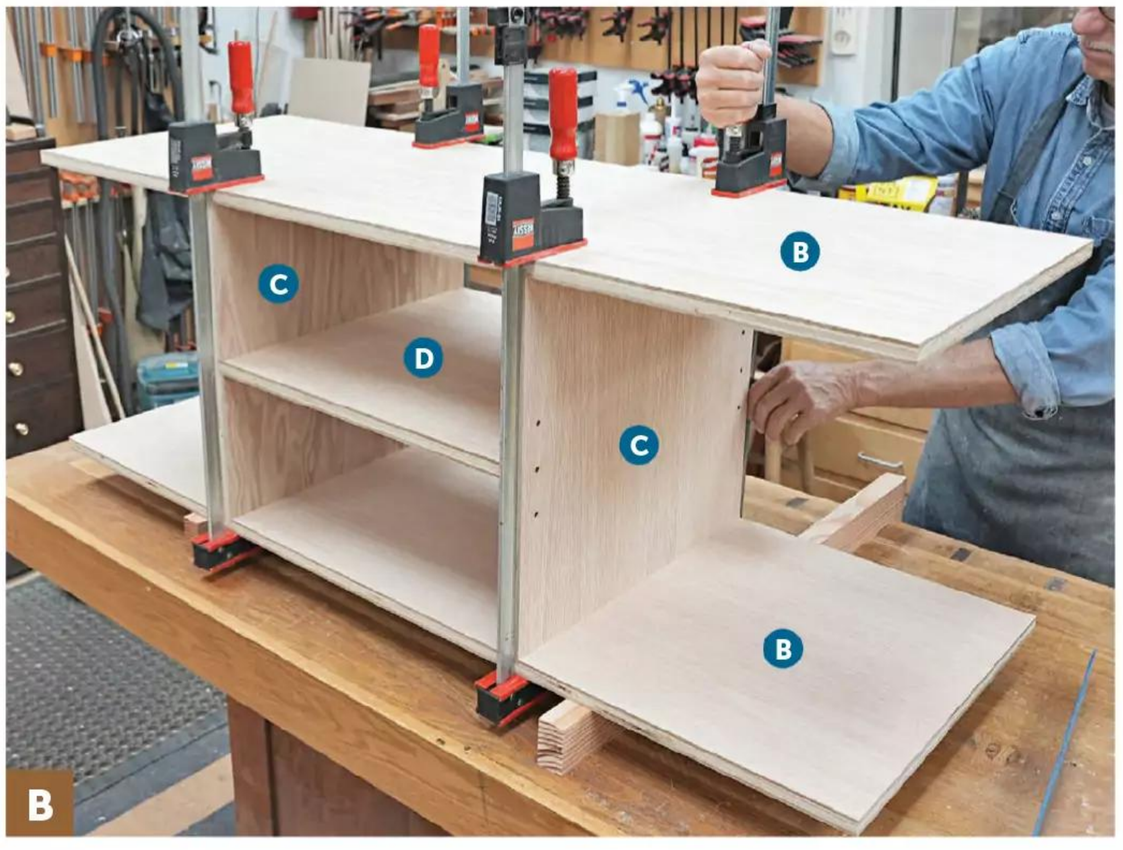
4 Mark out and drill the shelf-pin holes in the sides (A) and vertical dividers (C) **[Drawings 2 and 3]**. Finish-sand the case panels (A–D).

5 Begin the case assembly with the internal case components (C, D) that form the drawer enclosures **[Photo A]**. After the glue dries, add the top/bottom (B) **[Photo B]**. Finally, glue and clamp the sides (A) to the case center assembly, keeping the front edges flush.

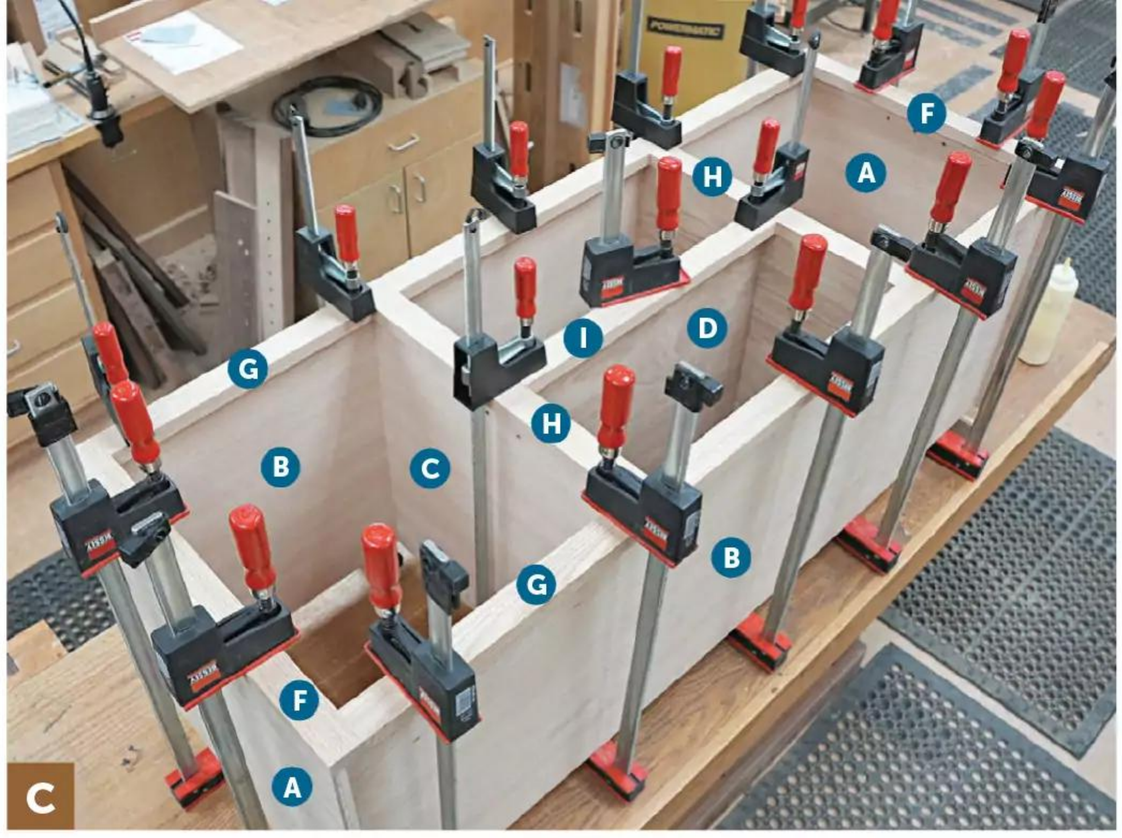
6 From 1/4" plywood, cut the back (E) to size **[Parts List]**, check the fit in the case assembly (A–D), then set the back aside.



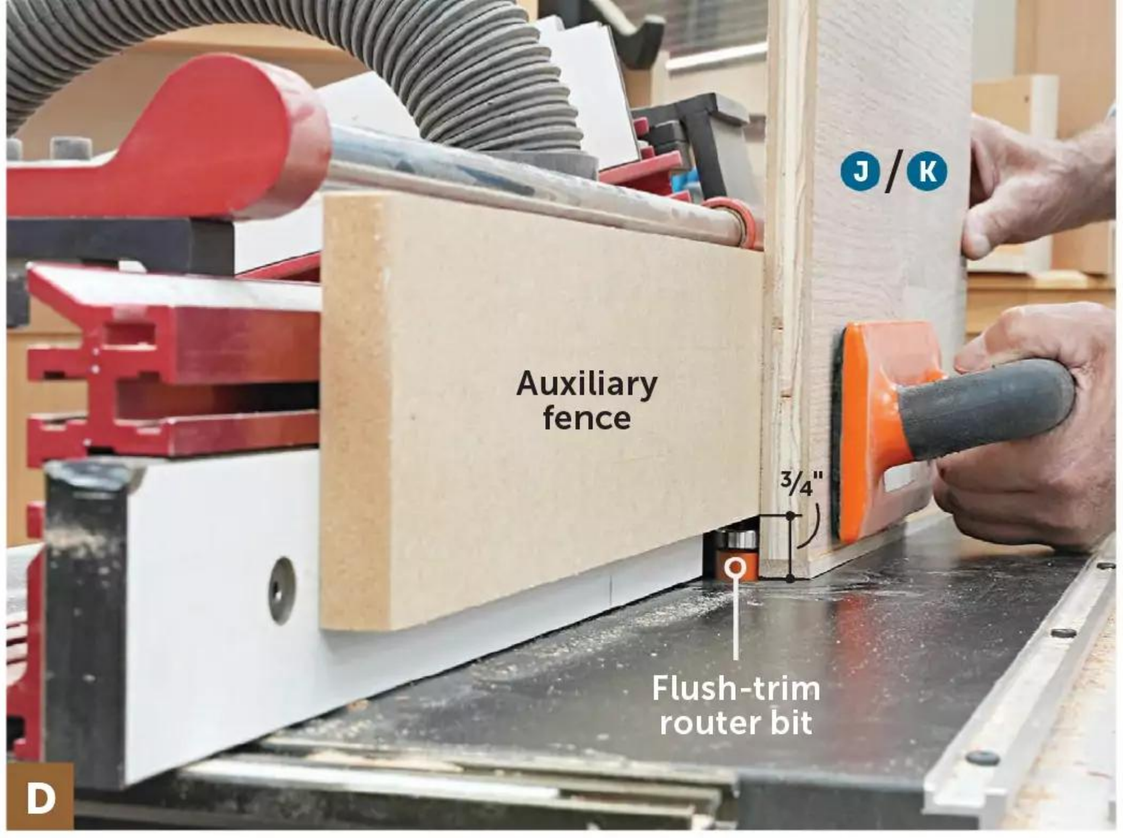
Right-angle blocks help square the case assembly while you glue and clamp the horizontal divider (D) between the two vertical dividers (C).



Align the edges of the top and bottom (B) with the internal case assembly (C, D) when you glue and clamp it between them.

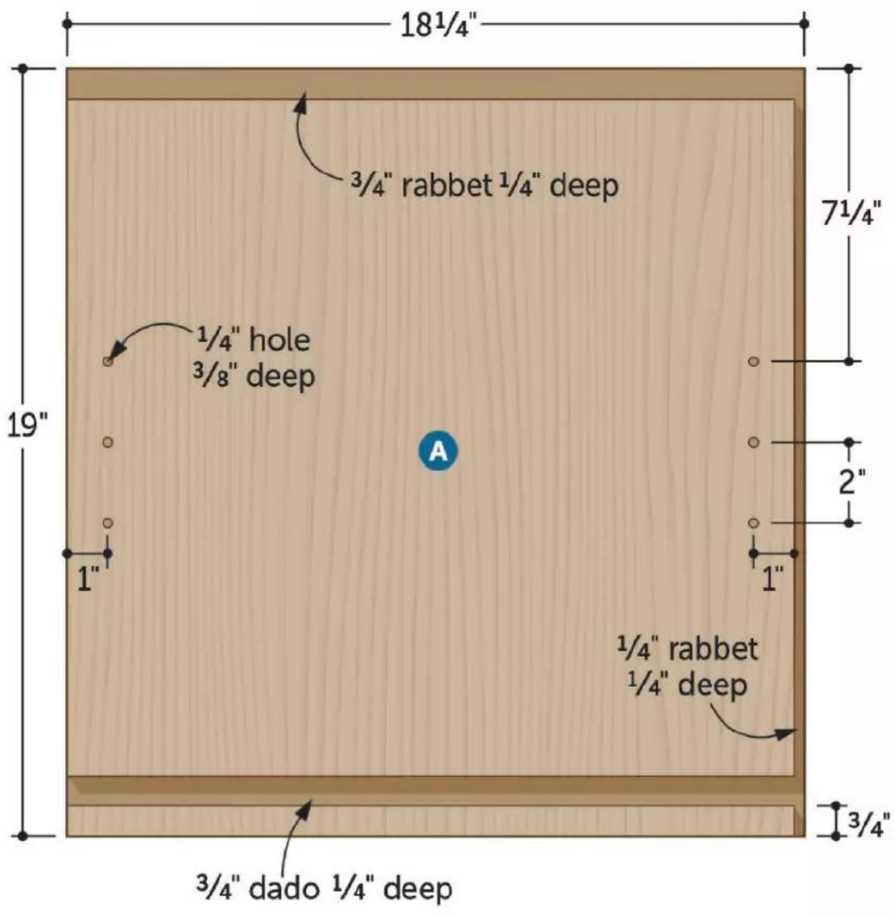


Keep the top and side edges flush as you glue and clamp the face frame (F–I) to the case assembly (A–D). The lower rail (G) will overhang the case bottom (B) by ¾".



Affix a raised auxiliary fence to the router table fence. Set its face flush with the bearing of a flush-trim bit. Use a pushblock as you trim the edging (K) flush with the shelf (J) on both faces.

2 CASE SIDE (LEFT SIDE SHOWN)



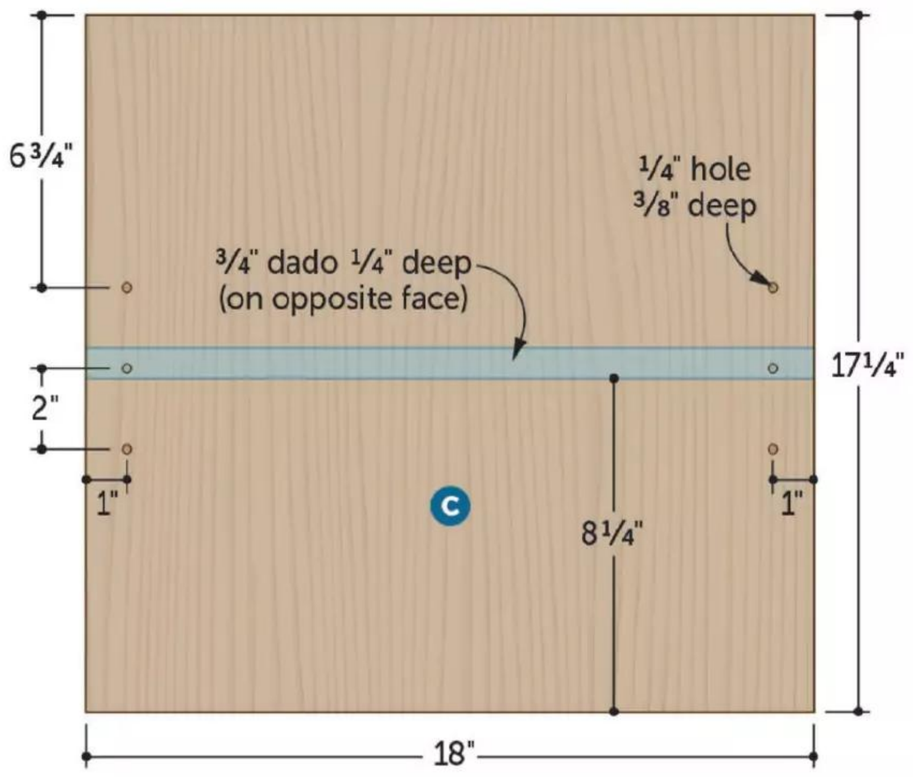
FRAME UP AND ADD SHELVES

1 From ¾" stock, cut the face frame parts (F–I) to size **[Parts List, Drawing 1]**. Drill pocket holes in each end of the top and bottom rails (G), the inner stiles (H), and the inner rail (I). Glue, clamp, and screw the face frame together. Finish-sand the assembly.

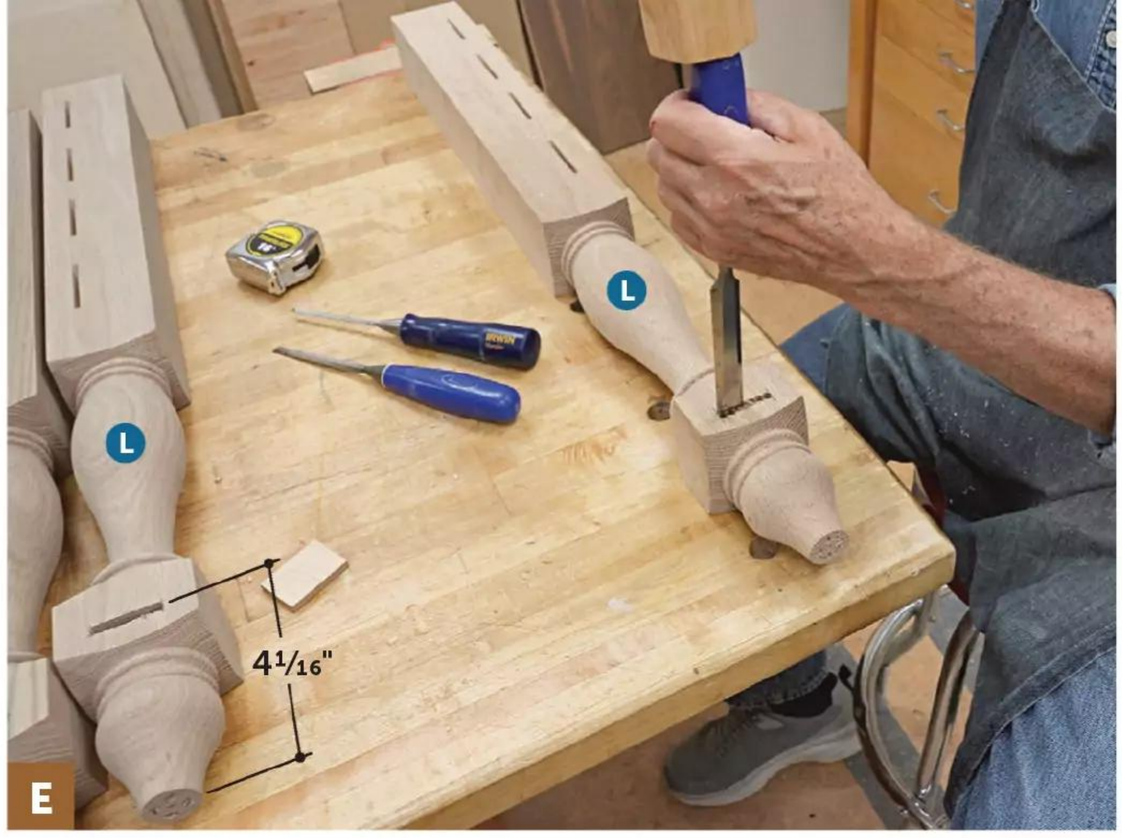
2 Glue and clamp the face frame to the front of the case assembly **[Photo C]**.

3 From ¾" plywood, cut the shelves (J) to size **[Drawing 1]**. From 4/4 stock, rip the shelf edging (K) to ¼" thick, trim it to length, then glue and clamp it to the front edge of the shelves (J), leaving it slightly overhanging each face. After the glue dries, trim the edging flush with the shelves at the router table **[Photo D]**.

3 CASE VERTICAL DIVIDER

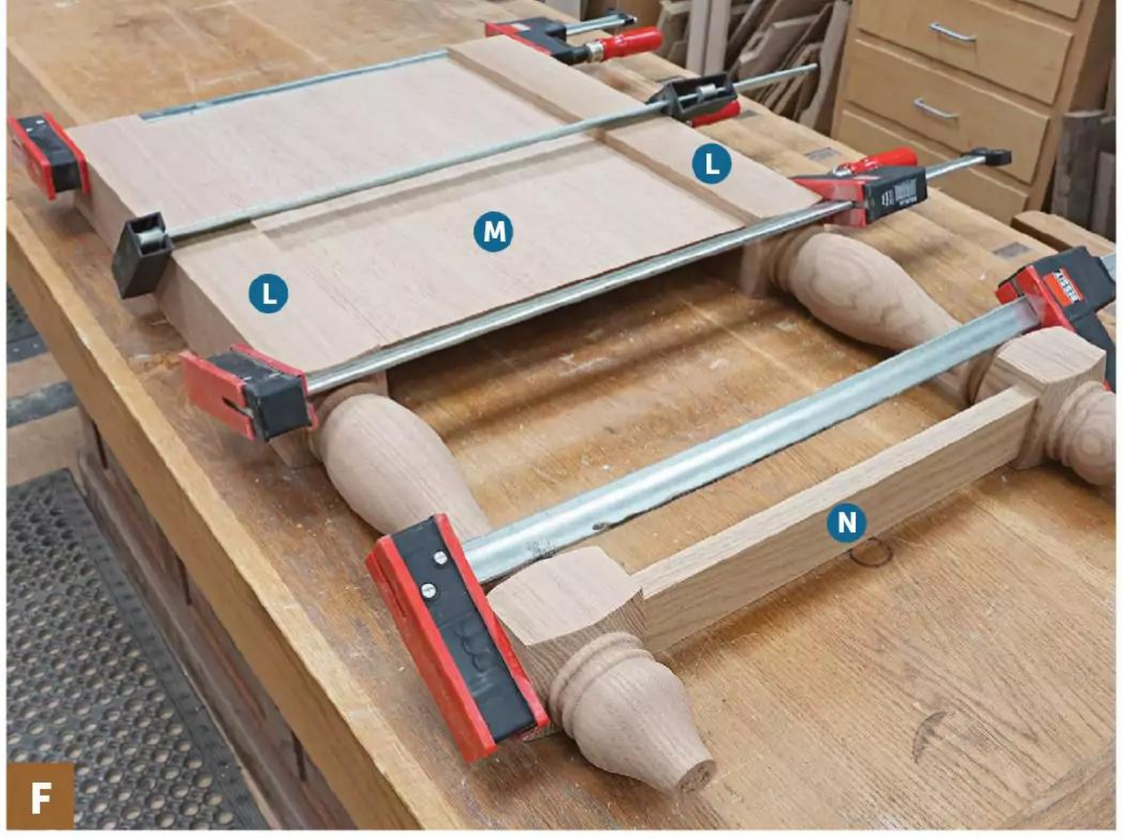


> **USING COMMERCIALLY AVAILABLE TURNED LEGS SAVES TIME, ELIMINATES THE NEED FOR A LATHE, AND ENSURES UNIFORMITY.**
>
> *-KEVIN BOYLE, SENIOR DESIGN EDITOR*



E

On the leg face with biscuit slots, drill out a ¼×1½" mortise, ¾" deep and centered 4 1/16" from the bottom of the leg. Use a ¼" chisel to square the mortise ends and a wider chisel to smooth out the sides.



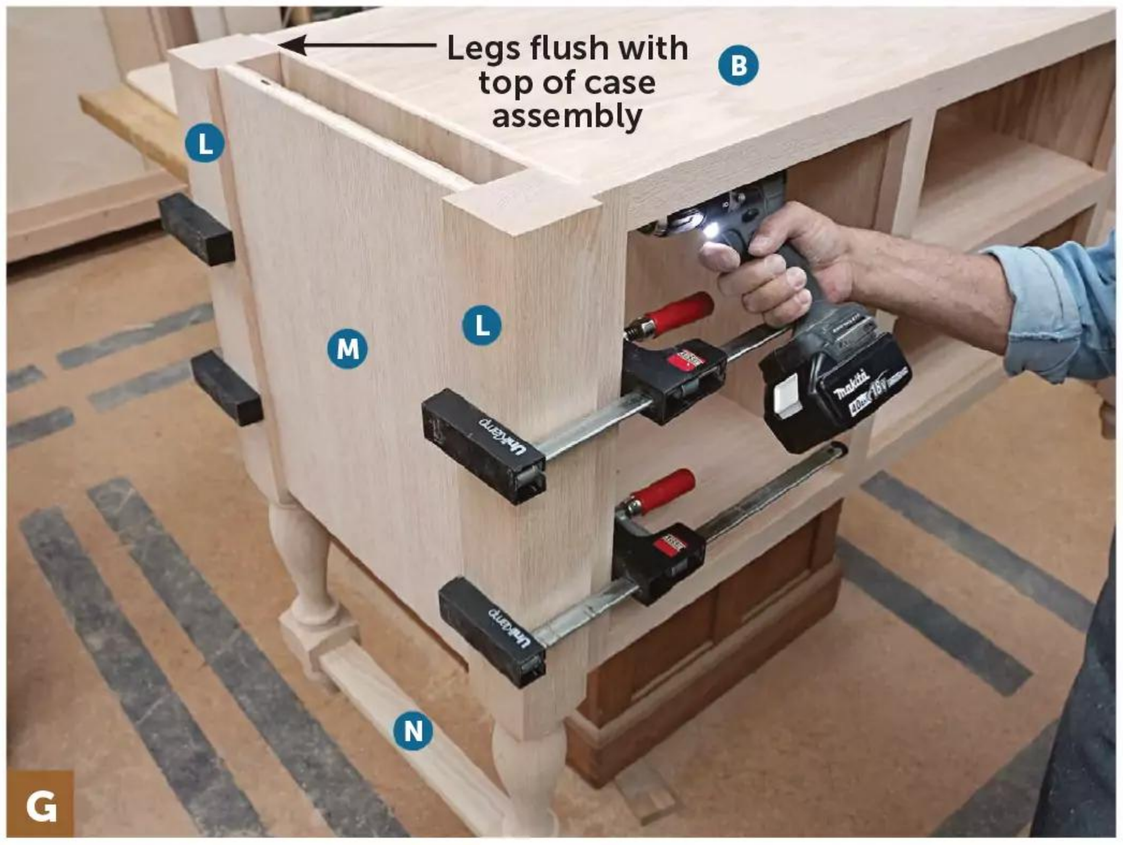
F

Apply glue to the edges of the end panels (M), to the biscuit slots in the panels and legs, and to the leg mortises. Apply glue to the tenons on the stretchers (N), add biscuits, and clamp the assembly.

ADD LEGS AND END PANELS

Note: **When selecting legs, make sure they have a square upper section at least 19" long.**

1 Buy **[Sources]** or make four legs (L) 3×3×34½". Cut the end panels (M) and stretchers (N) to size **[Exploded View, Parts List]**. Cut four #20 biscuit slots centered in the side edges of the end panels. Pair and orient the legs for best appearance and transfer the biscuit marks from the end panels to the leg faces they will attach to, making sure the paired legs mirror each other. Set the biscuit joiner fence offset to ⅞", which will inset the end panel ½", then cut the marked biscuit slots in the legs.



G

Set the case assembly (A-I) on risers then glue and clamp a leg assembly (L-N) to one end of the case. Drive screws through the case and into the legs. Repeat to attach the other leg assembly.

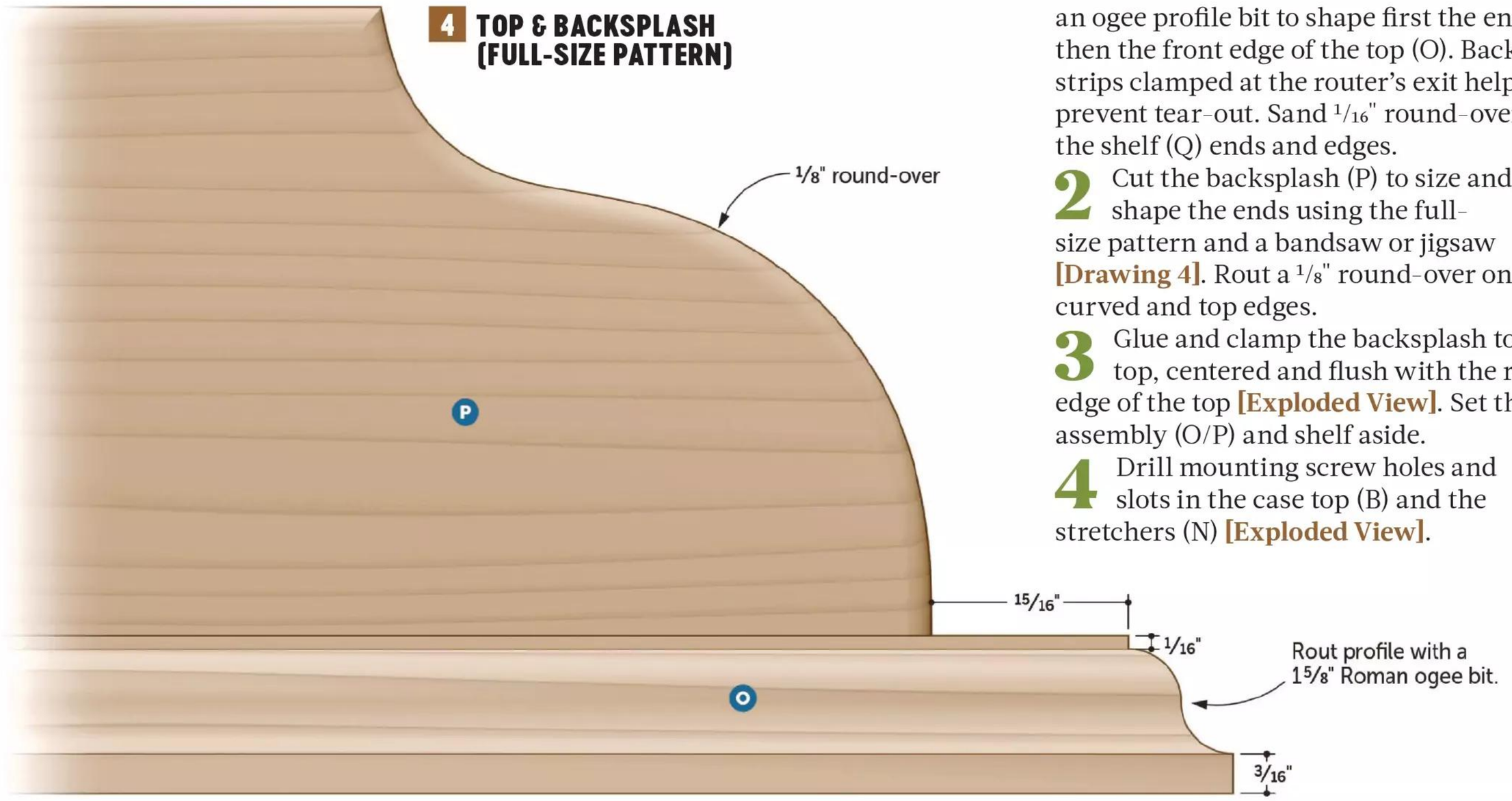
2 Mark the location of the leg mortises in the square lower section of each leg **[Exploded View]**. Use a drill press with a ¼" brad-point bit to rough out the mortises, then use chisels to square up the mortise walls **[Photo E]**.

3 Form tenons on the stretchers (N). Then glue and clamp the leg assemblies (L–N) together **[Photo F]**.

4 Glue, clamp, and screw the leg assemblies to each end of the case assembly (A–I), centered front to back **[Exploded View, Photo G]**.

CREATE TOP AND SHELF PANELS

1 Glue up oversized panels for the top (O) and the shelf (Q) and trim them to size **[Exploded View, Parts List]**. Use a router and



an ogee profile bit to shape first the ends, then the front edge of the top (O). Backer strips clamped at the router's exit help prevent tear-out. Sand 1/16" round-overs on the shelf (Q) ends and edges.

2 Cut the backsplash (P) to size and shape the ends using the full-size pattern and a bandsaw or jigsaw **[Drawing 4]**. Rout a 1/8" round-over on the curved and top edges.

3 Glue and clamp the backsplash to the top, centered and flush with the rear edge of the top **[Exploded View]**. Set the top assembly (O/P) and shelf aside.

4 Drill mounting screw holes and slots in the case top (B) and the stretchers (N) **[Exploded View]**.

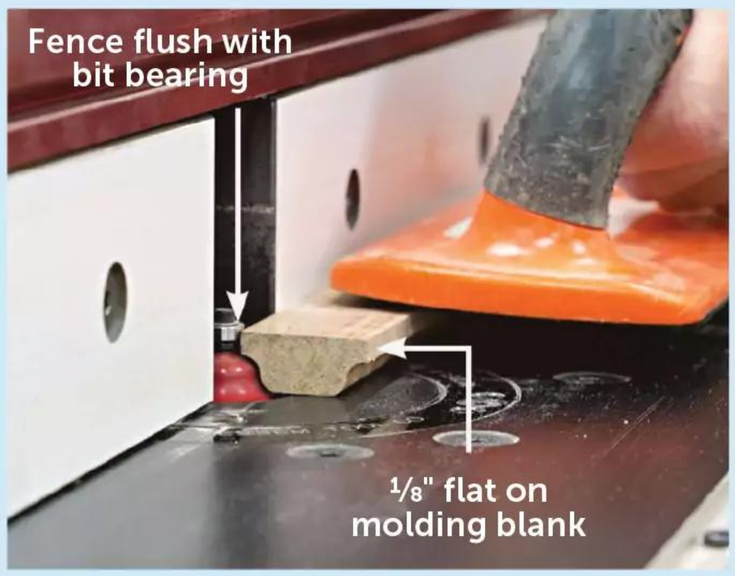
SHOP-MADE OGEE MOLDINGS

Miniature moldings, such as the decorative ogee moldings on the sideboard doors and drawers, are easy to produce in the shop. You start with a larger blank in order to safely shape both edges using router bits and then perform additional machining steps before ripping the blank into two pieces of molding at the tablesaw. Selecting different bits lets you produce moldings in a variety of profiles.

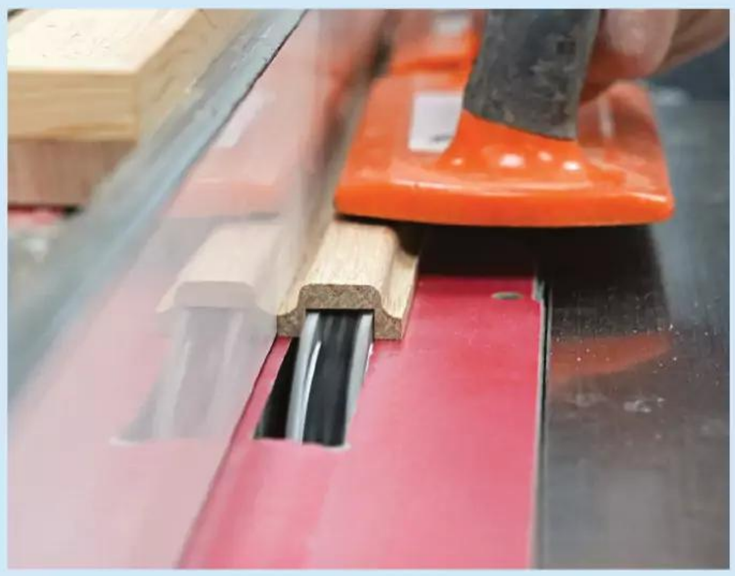
For the ogee moldings, start with 1/2×1 1/8×27" blanks. Install a Roman ogee bit (we used a 1 5/16"-diameter bit) in the router table and rout the profile in both edges of the blank, *below left*.

Install a 1/2" dado stack in the tablesaw, set the cutting height at 1/4", and cut a centered groove the length of the blank, *below middle*. Install a regular blade in the tablesaw and rip the blank in half.

To finish up, round off the sharp corner left where you ripped the blank in half. To do this, we used scraps of 1/4" stock to support the molding as we ran it past a 1/8" round-over bit, *below right*.



Install a Roman ogee bit in the router table and set the cutting height to leave a 1/8" flat. Set the fence flush with the bit's bearing and rout the profile in both edges of the 1/2×1 1/8×27" molding blank.



Set the tablesaw rip fence to center the dado stack on the width of the blank. Then use a pushblock to guide the molding blank and apply consistent downward pressure as you plow a groove the length of the blank.

Install a 1/8" round-over bit in the router table. Tape pieces of 1/4" scrap to the top of the router table so the rabbet in the molding rides on the edge of the outer scrap and your fingers stay away from the bit.

DOORS AND DRAWER FACES

The paneled doors and drawer fronts feature stub-tenon construction. The rails and stiles are made from the same size stock, so reduce setups by cutting and machining them at the same time. To dress the sideboard up a bit, we framed the panels with miniature moldings (See *Shop-Made Ogee Moldings, previous page*).

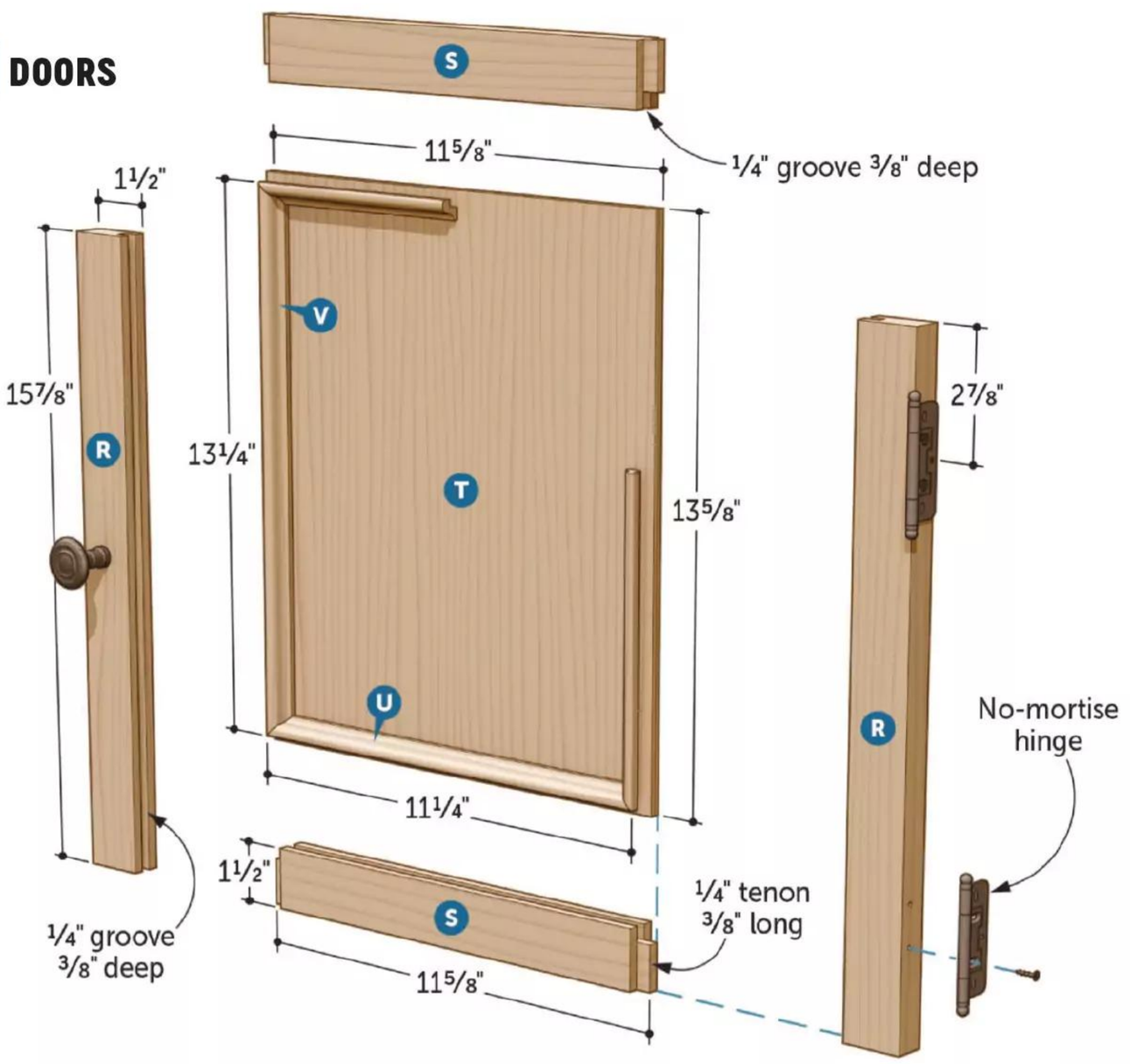
1 From ¾" stock, cut the door stiles and rails (R, S) and the drawer stiles and rails (W, X) to size **[Drawings 5 and 6, Parts List]**. Install a ¼" dado stack in the tablesaw and cut a centered ¼" groove ⅜" deep in one edge of all the rails and stiles. Lower the blade to ¼" and set the rip fence ⅜" from the blade. Cut a test tenon in a piece of scrap and check the fit in the groove. When you achieve a snug fit, cut a tenon on each end of all the door and drawer rails (S, X).

2 From ¼" plywood, cut the door and drawer panels (T, Y) to size. Finish-sand the panels. Glue and clamp the door assemblies (R-T) and drawer front assemblies (W-Y), checking the assemblies for square.

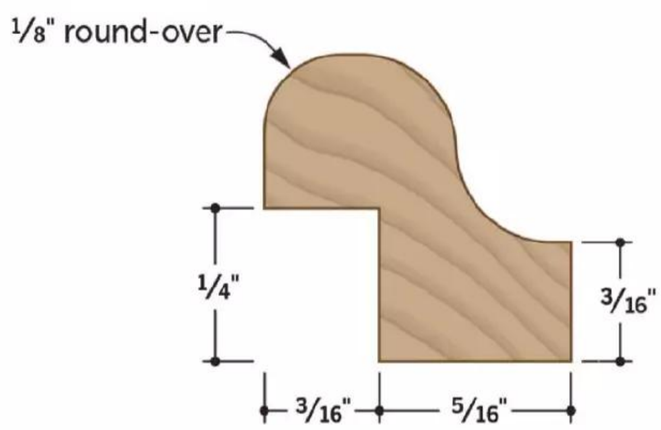
3 Cut the door trim (U, V) slightly over-length, miter-cut one end, then fine-tune the miter on the other end for a tight fit. Glue and clamp the trim to the doors. Then repeat the process to fit and install the drawer front trim (Z, AA).

Fine-tune miters on a shop-made shooting board.
woodmagazine.com/finetunemiter

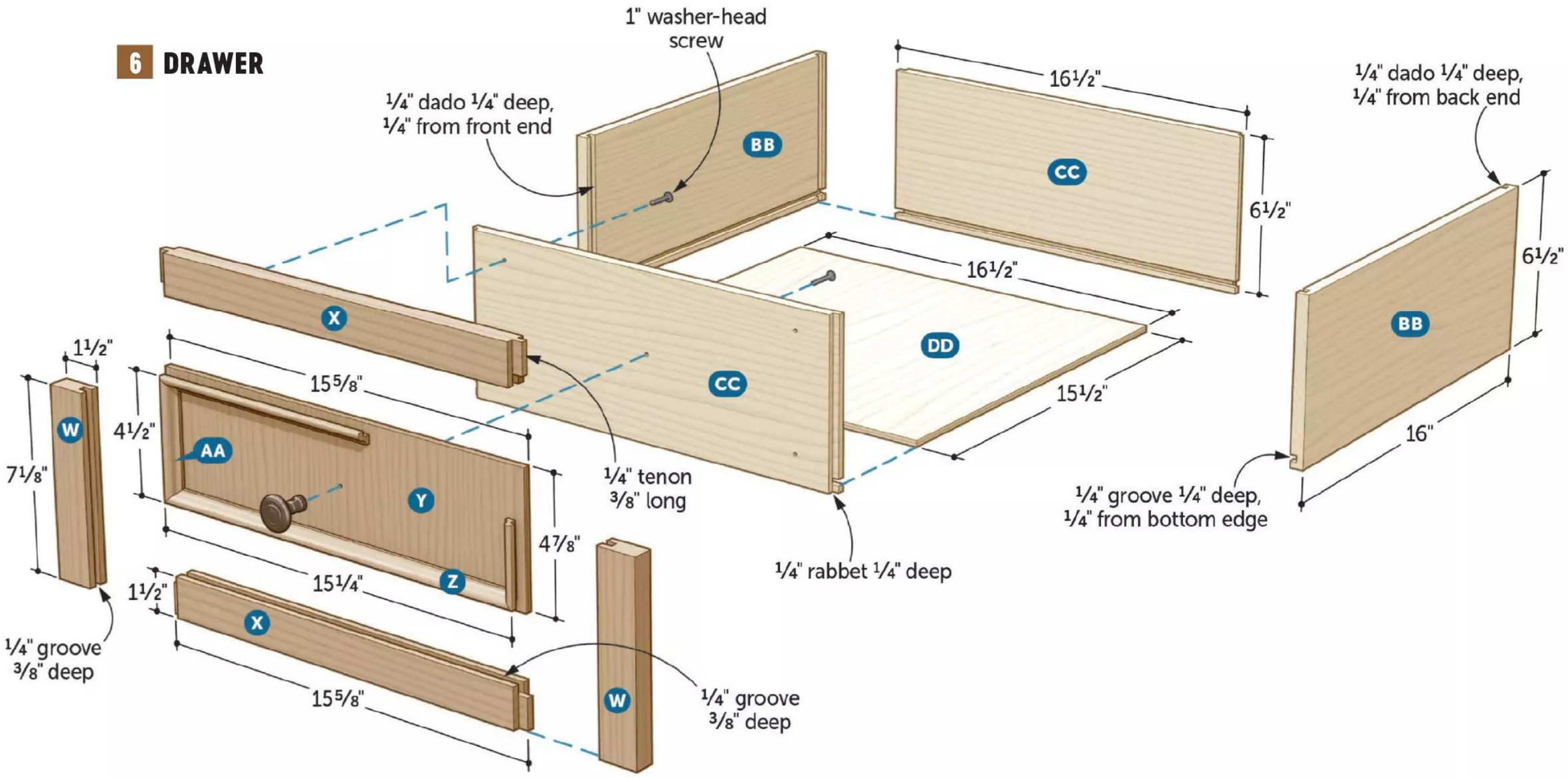
5 DOORS



5a DOOR & DRAWER TRIM DETAIL



6 DRAWER



BUILD THE DRAWER BOXES

1 From ½" stock, cut the drawer sides (BB) and drawer fronts/backs (CC) to size **[Drawing 6, Parts List]**. Install a ¼" dado stack in the tablesaw raised to ¼". Set the rip fence ¼" from the blade and cut a groove for the bottom panel (DD) in the drawer sides, fronts, and backs.

2 Without changing your setup, cut dadoes in the inside faces of the drawer sides near each end. Then install an auxiliary fence flush with the blade and cut a rabbet in each end of the outside faces of the drawer fronts and backs.

3 From ¼" plywood, cut the drawer bottoms (DD) to size. Then glue and clamp the box assemblies (BB–DD) together, checking them for square.

4 Measure the offset between the edge of the face frame inner stiles (H) and the vertical dividers (C) in the drawer opening. Plane four spacers (EE) to thickness to match the offset. Cut the spacers to finished size **[Parts List]**. Then clamp and glue the spacers in place, resting on the case bottom (B) and horizontal divider (D) **[Drawing 1]**.

5 Cut the door catch mounting blocks (FF) to size **[Parts List]**, then glue and clamp them in place.

SAND, STAIN, AND SEAL

1 Finish-sand the entire project, set aside the drawer boxes, then stain the remaining assemblies and parts, including the inside and outside of the case assembly. We used Pure Color water-based stain in Silver Nickel.

2 Apply a topcoat to everything. We used two coats of satin polyurethane, sanding lightly between coats with a 400-grit sanding sponge.

> **DETAILS, SUCH AS THE MATCHING OGEE PROFILES ON THE TOPS AS WELL AS ON THE DOOR AND DRAWER MOLDINGS, TAKE A PROJECT TO THE NEXT LEVEL.**
>
> ***-KEVIN BOYLE, SENIOR DESIGN EDITOR***

Place a ⅛"-thick spacer under the case portion of the drawer slide and position the front end of the slide flush with the inside edge of the face frame. Drive the mounting screws.

Draw a line on the drawer box sides ⅞" from the bottom edge. Center the mounting holes in the slide on the line and make sure the front of the slide is flush with the front edge of the drawer box.

BRING IT ALL TOGETHER

TIP!

Don't use glue when attaching the top and shelf. Instead, tighten screws in holes completely. For the screws in slots, tighten them, then back them out slightly.

1 Use screws through the holes and slots in the case assembly **[Exploded View]** to attach the top (O) flush with the back legs. Install the bottom shelf with screws so it is centered between the legs and overhangs the stretchers (N) evenly at each end.

2 Mark and drill holes for the knobs in the door stiles and install the knobs. Place 1/16" spacers under the doors and install the doors using no-mortise hinges. Then install the magnetic catches according to the manufacturer instructions.

3 Separate the full-extension drawer slides into case and drawer components. Install the case portion of the slides in the drawer openings **[Photo H]**.

Apply double-faced tape to the back of the false front's rails. Place 1/16" spacers underneath the front and on each end to position it in the drawer opening. Then adhere the false front to the drawer box.

Then install the drawer portion of the slides on the drawer boxes **[Photo I]**.

4 Re-engage the slides and push the drawer boxes into the drawer openings. Install the drawer false fronts **[Photo J]**. Push the drawer open from the backside and clamp the fronts in place. Drive washer-head screws from inside the drawer box into the drawer stiles **[Drawing 5]**. Drill a hole for the knob centered on each drawer front and install the knobs.

5 Attach the back (E) to the case with brads. Move the sideboard into the dining room, load up the shelves and drawers with dining accessories, and raise a toast to your work as you dine with family or friends.

Purchase plans for the matching pedestal table at woodstore.net/pedestaltable

PARTS LIST

PART		FINISHED SIZE T	W	L	Matl.	Qty.
CASE						
A	SIDES	¾"	18¼"	19"	OP	2
B	TOP/BOTTOM	¾"	18"	51"	OP	2
C	VERTICAL DIVIDERS	¾"	18"	17¼"	OP	2
D	HORIZONTAL DIVIDER	¾"	18"	19¼"	OP	1
E	BACK	¼"	18¼"	51"	OP	1
F	STILES	¾"	1½"	19"	O	2
G	RAILS	¾"	1½"	49"	O	2
H	INNER STILES	¾"	1½"	16"	O	2
I	INNER RAIL	¾"	1½"	18"	O	1
J	SHELVES	¾"	17½"	15"	OP	2
K	SHELF EDGING	¼"	¾"	15"	O	2
L	LEGS	3"	3"	34½"	O	4
M	END PANELS	¾"	14"	19"	OP	2
N	END STRETCHERS	¾"	2"	15½"	O	2
O	TOP	¾"	21"	60"	EGO	1
P	BACKSPLASH	¾"	3"	57⅛"	O	1
Q	BOTTOM SHELF	¾"	13½"	58"	EGO	1
DOORS						
R	STILES	¾"	1½"	15⅞"	O	4
S	RAILS	¾"	1½"	11⅝"	O	4
T	PANELS	¼"	11⅝"	13⅝"	OP	2
U*	TOP/BOTTOM TRIM	½"	½"	11¼"	O	4
V*	SIDE TRIM	½"	½"	13¼"	O	4

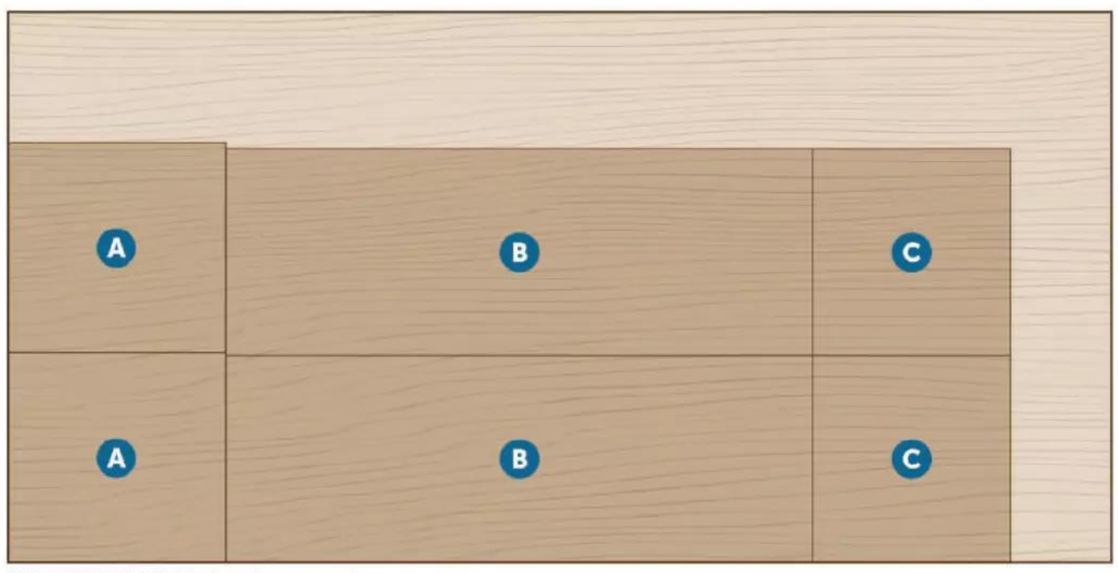
PART		FINISHED SIZE T	W	L	Matl.	Qty.
DRAWERS						
W	FRONT STILES	¾"	1½"	7⅛"	O	4
X	FRONT RAILS	¾"	1½"	15⅝"	O	4
Y	FRONT PANELS	¼"	15⅝"	4⅞"	OP	2
Z*	TOP/BOTTOM TRIM	½"	½"	15¼"	O	4
AA*	SIDE TRIM	½"	½"	4½"	O	4
BB	BOX SIDES	½"	6½"	16"	M	4
CC	BOX FRONT/BACK	½"	6½"	16½"	M	4
DD	BOX BOTTOM	½"	16½"	15½"	MP	2
EE	SPACERS	⅜"	2"	18"	O	4
FF	DOOR CATCH BLOCKS	¾"	1½"	2"	O	2

*Parts initially cut oversize. See the instructions.

MATERIALS KEY: O—red oak, EGO—edge-glued red oak, OP—oak plywood, M—maple, MP—maple plywood.
SUPPLIES: #8×2" F.H. screws, #8×1¼" panhead screws, #8×1" washer-head screws, 1¼" fine-thread pocket screws, #18×¾" brads, #20 biscuits, ¼" shelf pins.
BLADE AND BITS: Dado set; 1⅝" Roman ogee, 1⅝₁₆" Roman ogee, ⅛" round-over, and flush-trim router bits; ¼" brad-point drill bit.
SOURCES: Marshall kitchen island legs (4) no. 2401, $63 each, osbornewood.com; knob (4) no. RIC-BP74032BORB, $7 each, no-mortise hinges (4) no. SHC-1100B-10B, $20 each, 16" full-extension drawer slides (2 pairs) no. AC-383216EC, $32/pair, magnetic catches (2) no. BK-P109-2C, $3 each, cabinetparts.com.
PROJECT COST: It cost us about $825 to build this project. Your cost will vary by region and source.

CUTTING DIAGRAM

We purchased 30 board feet of 4/4 red oak and 10 board feet of 4/4 maple. Before cutting parts to size, we planed them to the thicknesses shown in these example boards.



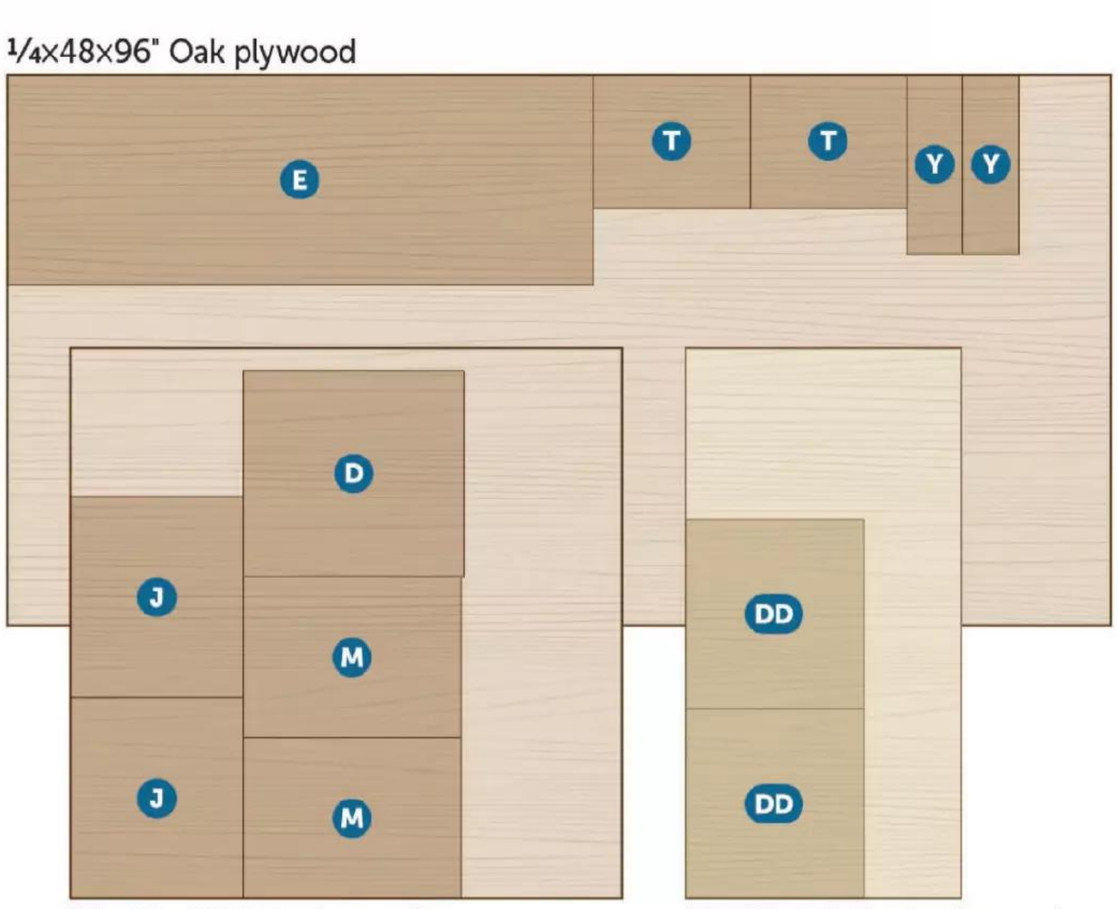
¾x48x96" Oak plywood

¾x7¼x96" Oak

¾x7¼x96" Oak

¾x7¼x96" Oak †Plane or resaw to the thickness listed in the Parts List.

¼x48x96" Oak plywood



¾x48x48" Oak plywood

¼x48x24" Maple plywood

¾x7¼x96" Oak †Plane or resaw to the thickness listed in the Parts List.

¾x7¼x96" Oak (2 needed)

½x7¼x96" Maple (2 needed)

RELIEF CARVING ON THE CNC

Tap into your CNC router's third axis capabilities to give your projects a traditional hand-carved look without the handwork.

WRITER: KEN BURTON

If you mainly use your CNC machine for cutting profiles and routing pockets, the vertical z-axis doesn't get much glory, relegated to simply plunging to cutting depth or withdrawing to move. But that vertical axis gives a CNC router three-dimensional carving capabilities, making it the star of the show when creating relief carvings.

PHOTOGRAPHER: KEN BURTON

PICK YOUR PATTERN

The simplest type of pattern used for 3D relief carving is a digital image known as a heightmap. In these grayscale images, the brightness of individual pixels determines the depth of cut: The lighter the pixel, the shallower the cut; the darker the pixel, the deeper the cut.

TIP!

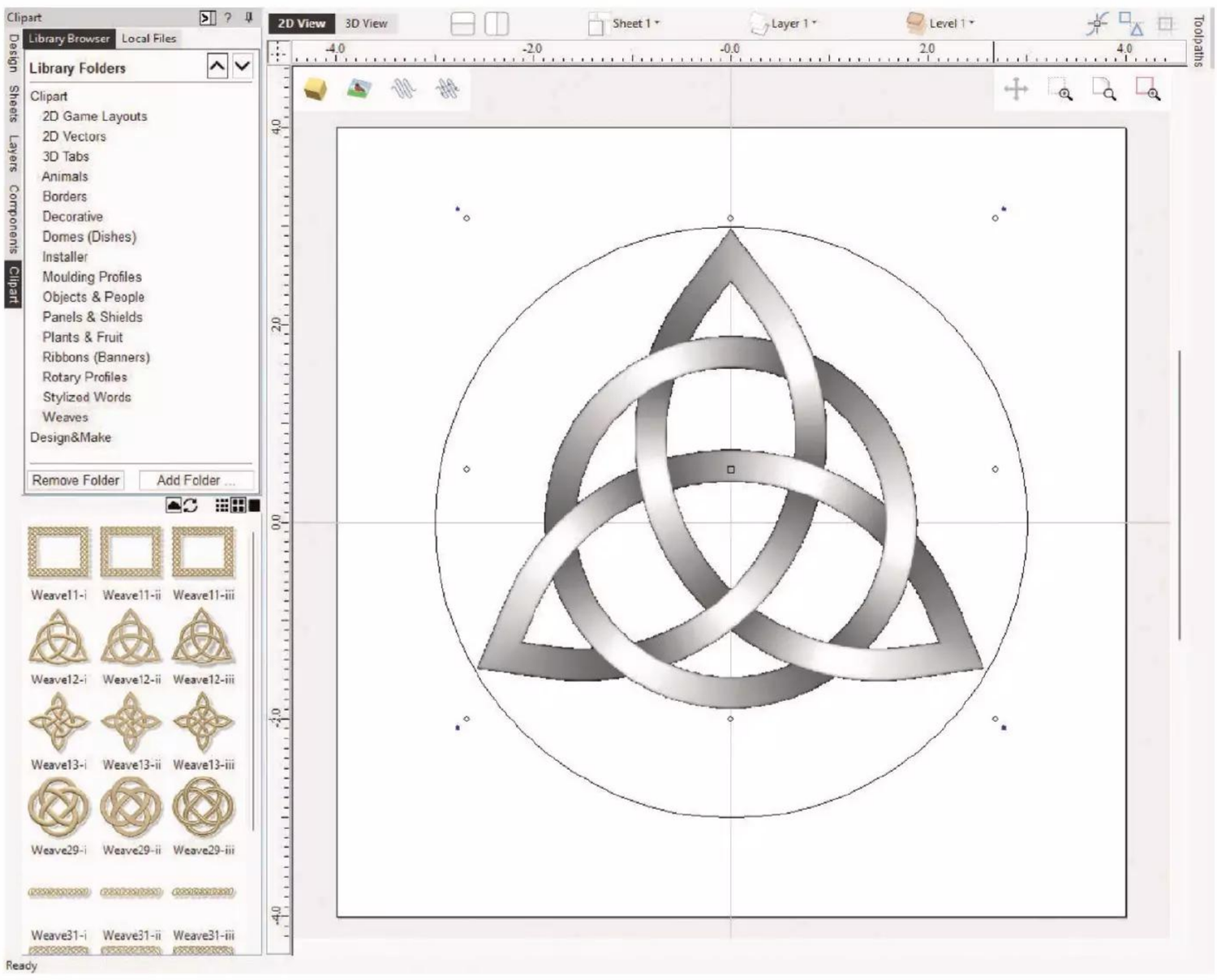
If you plan to do a lot of relief carving, consider upgrading from a router to a spindle for longevity and noise reduction.

But getting started with relief carving doesn't require creating complex modeling or artistic design work. Several options put 3D design within easy reach. If you're content to work with preexisting 3D designs, you can download them as components or clipart and then import them into your CNC design software. Some CAD/CAM programs, such as Vectric's VCarve Pro, include a library of designs.

Websites such as **designandmake.com** offer ready-to-use models you can purchase and download. And Vectric now offers a powerful web-based modeling service called EasyCreate (**easycreate.vectric.com**). With it, you can upload an image or have the website create one, almost instantly, using artificial intelligence (AI) prompts. Manipulate it as needed, and then click a button to produce a TIFF or V3M file that you can load into one of Vectric's software packages to create your toolpaths.

If you want to precisely replicate an intricate piece of trim or an existing carving, you can outfit your CNC with a digitizing probe. See *Digital Duplication* on *page 44*.

To demonstrate setting up and creating a CNC relief carving, we selected a traditional Celtic knot design, *previous page*, from the clipart files in VCarve Pro.



Place your selected component and then scale it to the desired size on your workpiece. We've added a recessed circle to serve as a boundary around the carving.

SET UP YOUR JOB

Open VCarve Pro and define the thickness, width, and length of your workpiece the same way you would for a 2D job. Also set the origin (or zero) point. This example uses a $^{7}/_{8}$×8×8" workpiece with its origin in the center.

Open the *Clipart* tab and select a design you like. Then place it on your workpiece, *above*.

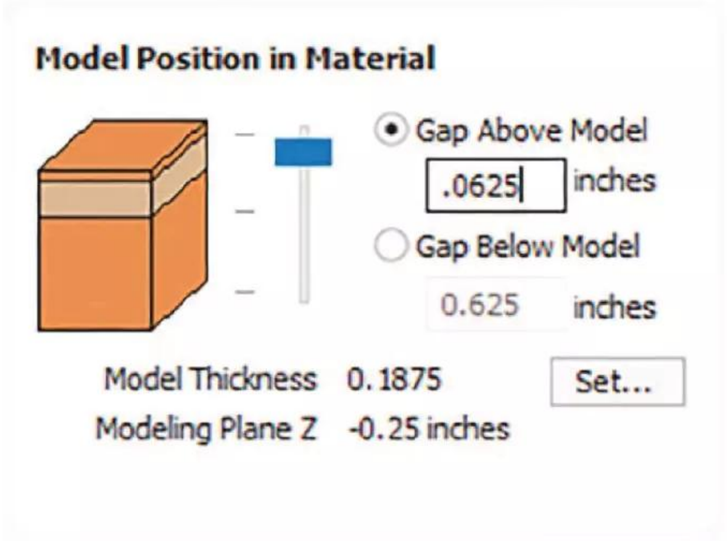
Once you're happy with the component's placement and scale, check its thickness, in the *Materials Setup* menu.

DIGITAL DUPLICATION

A digitizing probe, like this one from Next Wave CNC, chucks into your powered-down CNC router to create a digital model of a physical object. Think of it as carving in reverse. Instead of carving using a file you've imported, the probe travels over an object and repeatedly taps the tip against the surface, recording each tap as a point in space to form a 3D map. When complete, you import the generated file into your CAM program and assign toolpaths to carve a duplicate. While very accurate, the process is time consuming. Probing the bird shown here took several hours.

This is essentially a measurement of the distance between the highest point of the model (lightest pixels) and the lowest (darkest pixels). You may need to increase or decrease it as appropriate for your workpiece. The default thickness of our knot clipart was almost the same as our workpiece thickness. Reducing its thickness to 3/16" sized it more appropriately for our material while retaining plenty of definition.

Finally, in the same menu, position the component within the thickness of the material, *right*. We recessed the top of our model below the workpiece surface 1/16".



Adjust the model position in the material to establish where the maximum height of your carving will sit relative to the workpiece surface. It can be flush or recessed.

ASSIGN TOOLPATHS

Most 3D carving is done in two stages, with two different bits. A straight bit removes most of the waste material. Then a smaller roundnose bit takes care of the final cleanup. See *A Bit About Bits*, *next page*.

Assign the roughing tool path by opening the *Toolpath* tab and the *3D Roughing Toolpath* menu. Select the appropriate tool. We used a 1/4" end mill. To rough-cut within the boundary circle, click on the boundary circle to select it, then choose the *Selected Vector(s)* option in the *Machining Limit Boundary* section. Also choose the *3D Raster* option in the *Roughing Strategy* section. Name the toolpath and click on *Calculate*.

Next, open the *3D Finishing Toolpath* menu and select a 1/8" ball-nose end mill. Make sure the outer circle is selected and choose *Selected Vectors* from the *Machining Limit Boundary* section. Give the toolpath a unique name before clicking *Calculate*. The resulting preview should give you a good idea of what your carving will look like, *next page, top*. Save the toolpaths in separate files using the appropriate post-processor for your CNC machine.

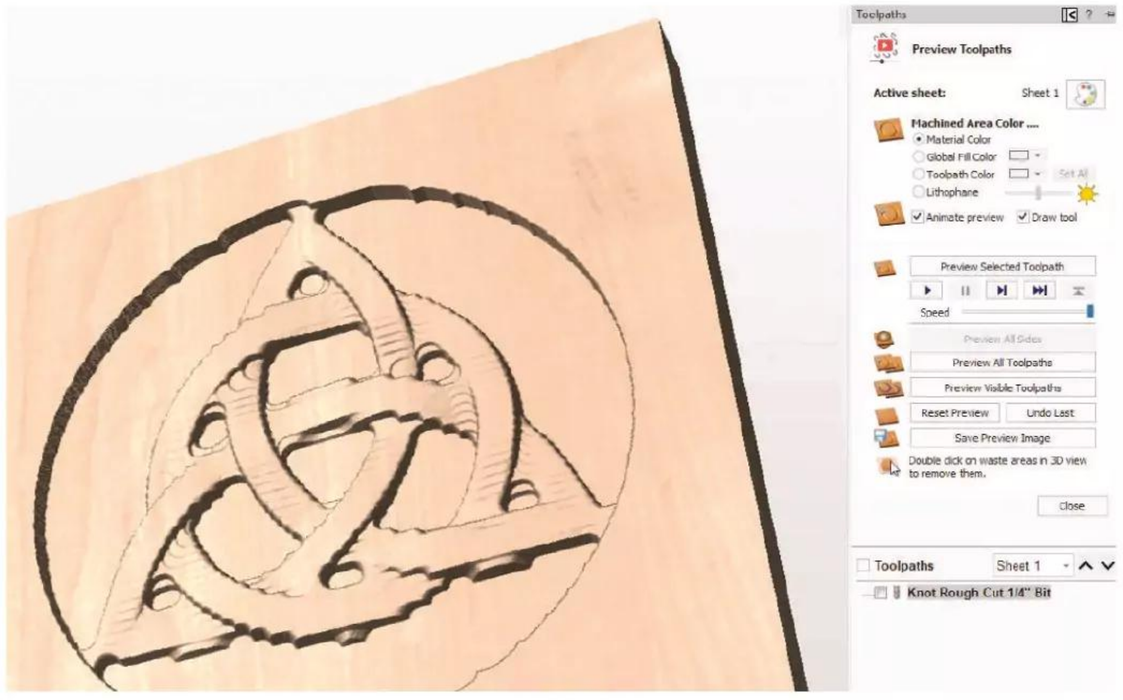
> **"RELIEF CARVING IS A GREAT WAY TO ADD CUSTOM DECORATIVE TRIM TO A FURNITURE PIECE. OR ADD A PROBE TO REPLICATE AND RESTORE ANTIQUE TRIM."**
>
> **-KEN BURTON, CONTRIBUTING EDITOR**

ROUT YOUR WORKPIECE

Secure the workpiece to the bed of your machine. Install the 1/4" end mill in the router and zero all three axes at the origin point. Run the rough-cut tool path. The results will be recognizable but choppy, *below, left.*

When the machine completes the rough-cutting path, swap the 1/4" bit for a 1/8" ball-nose bit. Re-zero the Z axis but don't change the X and Y zero points. Then run the finish-cut toolpath, *below, right.*

When your CNC finishes its job, you can leave the carving as is if the results are satisfactory. If not, refine the shapes further with sandpaper, files, or a carving knife. That takes a lot less effort than carving by hand. Plus, you can create as many exact duplicates as you want by loading up a new workpiece and running your rough- and fine-cut toolpaths again.



Previewing the tool path shows what your carving will look like after running the machine with the rough-cutting bit. Make sure it doesn't remove more material than desired.

The rough-cutting toolpath routs as close to the final lines as possible but still leaves a lot of excess material. The more intricate the carving, the rougher this pass will be.

The finish-cut toolpath refines the carving shape. Expect this job to take a lot longer than the rough-cutting pass, especially if you are using a small-diameter bit or have an intricate carving.

A BIT ABOUT BITS

Carving with a CNC router is usually done with two different bit profiles. For rough cutting, use a straight bit in a diameter appropriate to the scale of your carving. A 1/8"- or 1/4"-diameter bit works well for smaller work. For larger pieces, a 3/8"- or 1/2"-diameter bit makes the job go faster.

For the final pass, switch to a ball-nose bit. The smaller the diameter of this bit, the finer the detail you can cut. Beware, however, that the smaller the bit you use, the longer your job will take to cut.

DRILL PRESS TABLE

Stop making do with that factory metalworking table on your drill press. This overachieving add-on is a woodworking ace.

WRITER: JAN SVEC
DESIGNER: JEFF MERTZ
BUILDER: BRIAN BERGSTROM

OVERALL DIMENSIONS
29½"W × 14½"D × 5¾"H

Although indispensable in a woodworking shop for drilling precisely perpendicular holes, most drill presses come equipped with a feature-deficient table. This auxiliary table with fence and microadjustable stopblock sets things straight, supplying everything the cast-iron table on your drill press lacks.

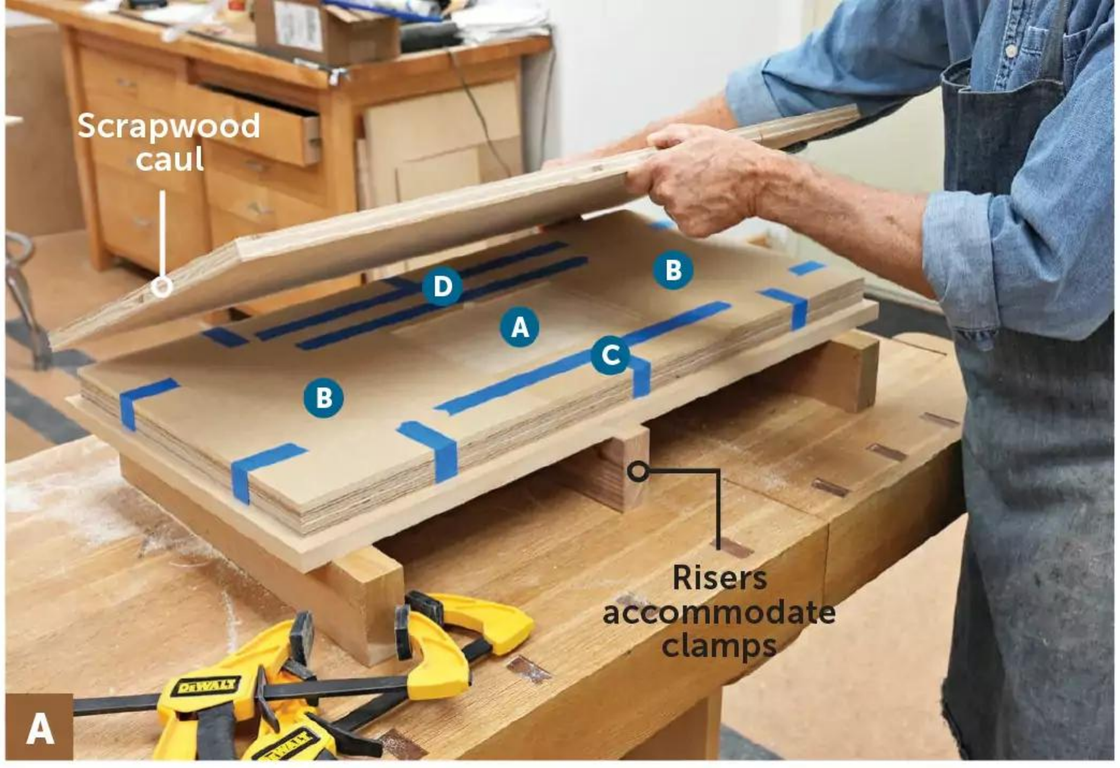
RENEWABLE-TOP TABLE

We started with Baltic birch plywood topped with ¼" medium-density fiberboard (MDF) to create a smooth, consistently flat base. Choose a mounting option based on the configuration of your drill-press table.

Note: **Avoid gluing too close to the edges that form the opening for the replaceable insert (E) to prevent squeeze-out.**

1 For the base (A), cut two 14½×29½" pieces of ½" plywood. Glue and clamp the pieces together, keeping their ends and edges flush **[Drawing 1]**.

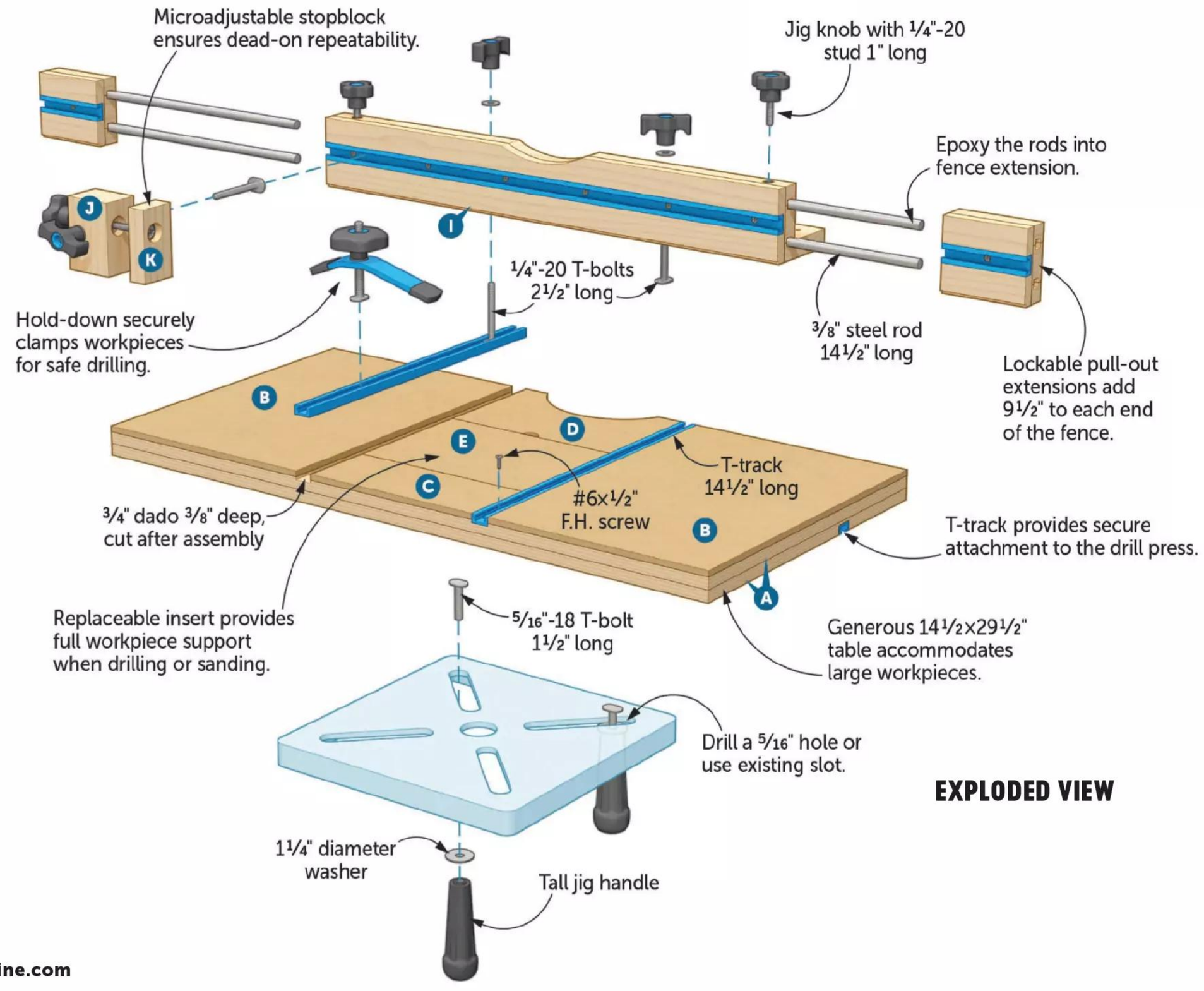
2 From ¼" MDF, cut the top sides (B), top front (C), and top back (D) to size **[Parts List]**. Mark the ⅜"-radius finger notch on the front edge of the top back **[Drawing 1]**. Cut and sand it to shape. Then spread glue on the backs of the top parts and glue them to the base **[Photo A]**.



Glue the top parts (B, C, D) to the base (A) in position with their edges flush with the base. Use masking tape to prevent shifting, then clamp the top and base between ¾" cauls to keep the assembly flat.

3 Draw the 3⅝"-radius post cutout at the rear of the table assembly (A–D) **[Drawing 1]**. Bandsaw or jigsaw and sand it to shape.

4 If your drill press has slots through its metal table, cut the groove for the T-track in the bottom of the table assembly (A–D) using a ¾" dado stack in your tablesaw **[Drawing 1]**.



EXPLODED VIEW

PHOTOGRAPHER: KELSEY HANSEN; **ILLUSTRATOR:** CHRISTOPHER MILLS

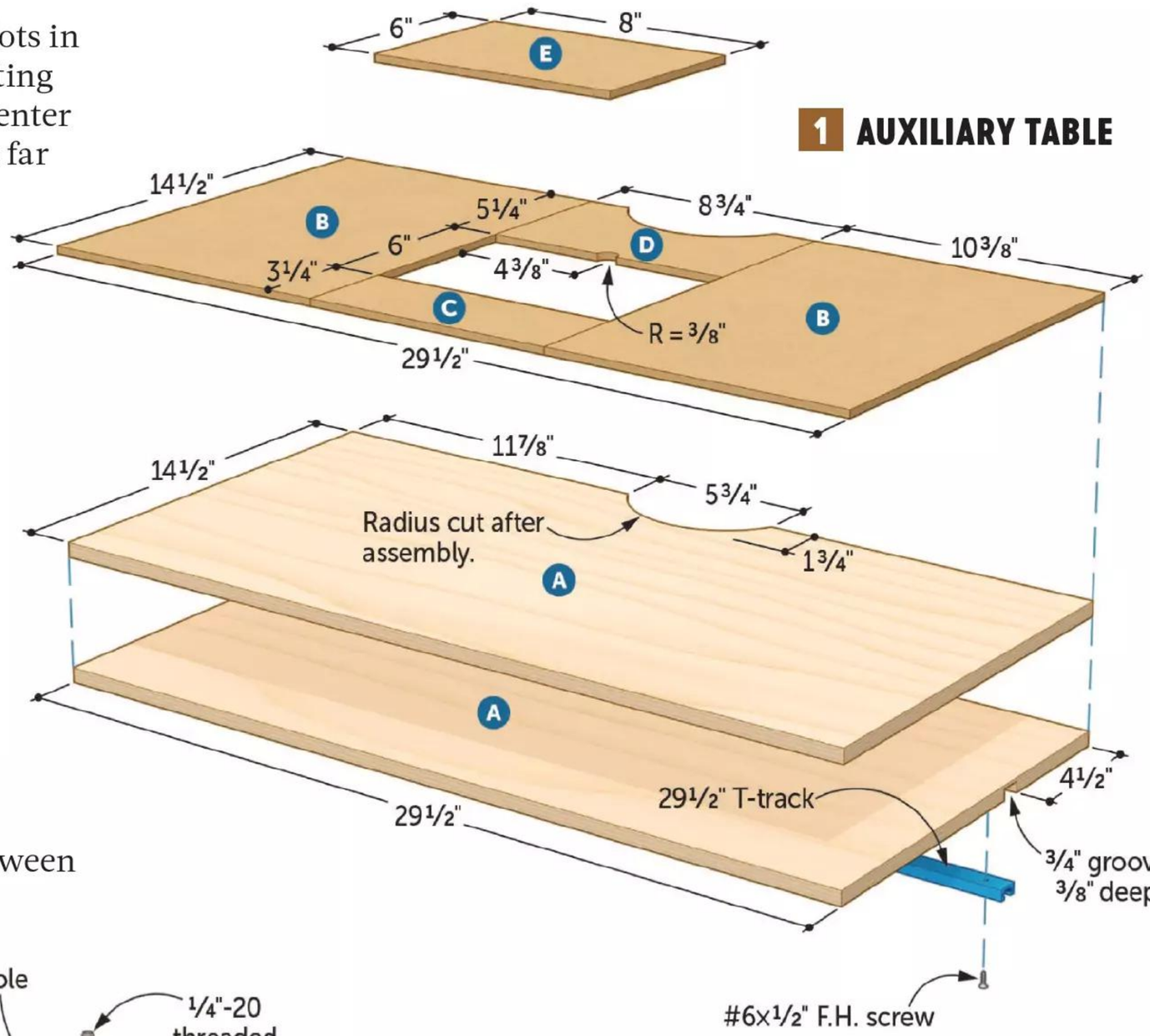
If your drill press doesn't have slots in its metal table, drill two 5/16" mounting holes about halfway between the center of the table and its rear edge and as far apart as possible. Install a bit in your drill press, center the metal drill press table under the bit, and lock the table in place. Clamp the table assembly (A–D) on the metal table with the recess for the insert (E) centered under the bit. Trace the hole locations on the underside of the table. Cut the groove for the T-track so it passes over the hole locations.

TIP!

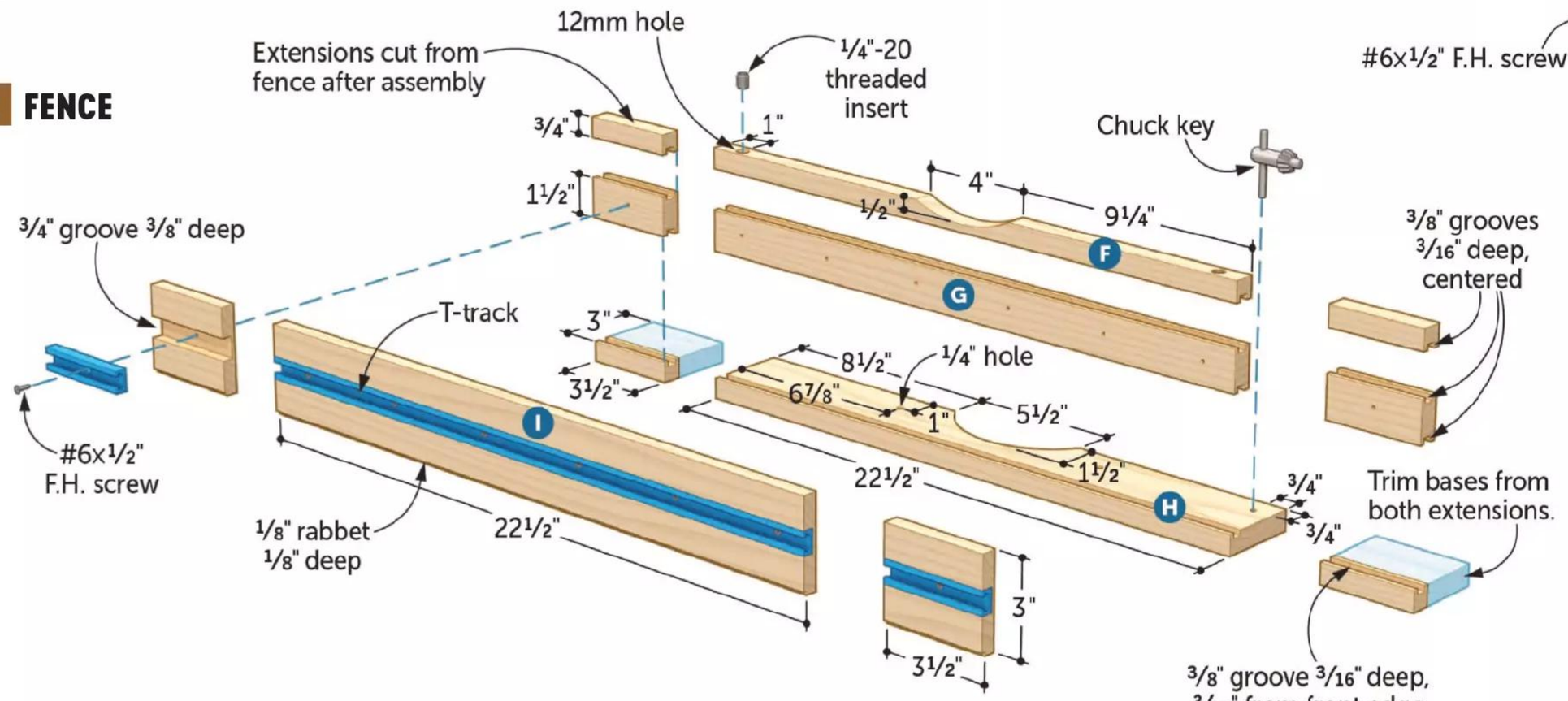
Turn your drill press into a spindle sander by making extra inserts (E) with holes to receive sanding drums.

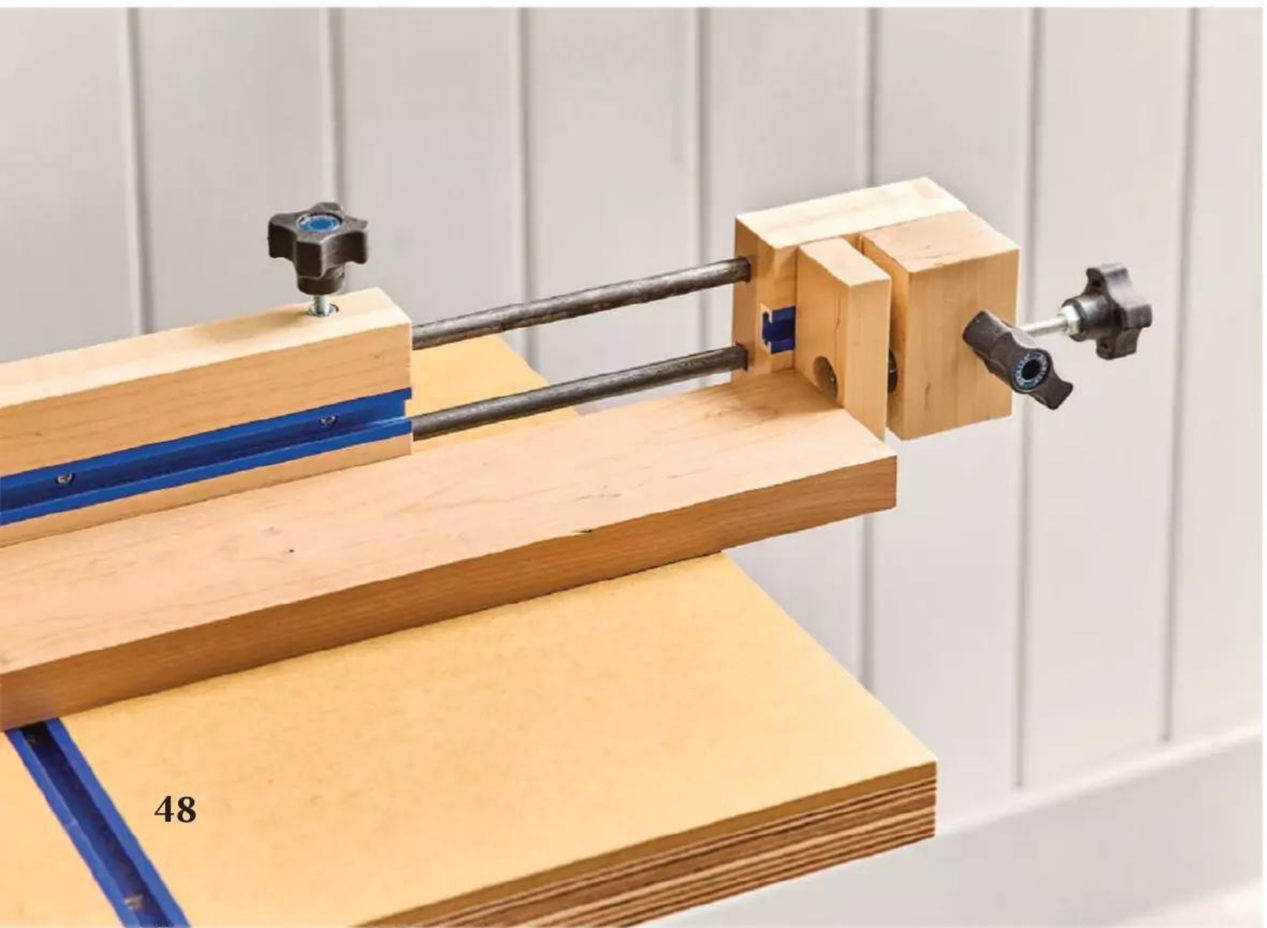
5 Cut dadoes for the top T-tracks, centered on the joint lines where the top sides (B) meet the top front (C) and back (D). Then cut the insert (E) to fit the opening in the top (A–D) between the dadoes.

1 AUXILIARY TABLE



2 FENCE





FULL-EXTENSION FENCE

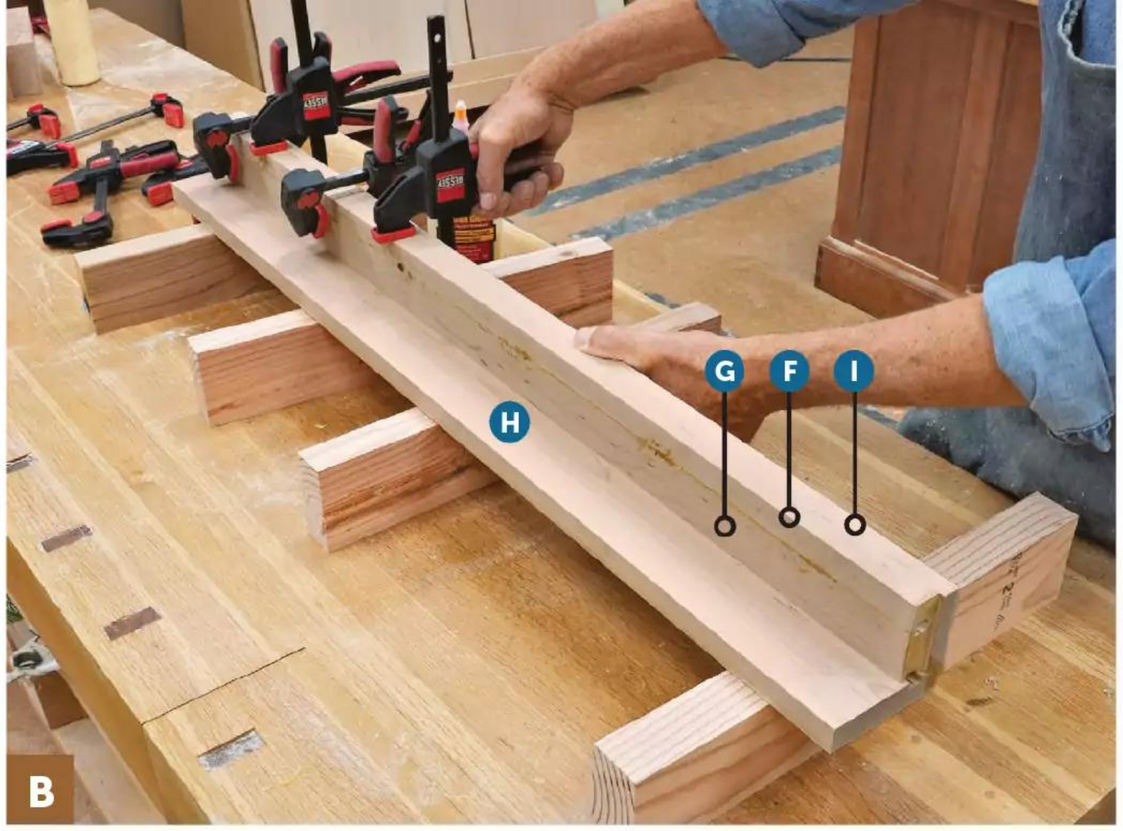
Build out the multipiece fence as a single blank, then crosscut rod-riding extensions that expand your stopblock's capacity.

1 From ¾" stock, cut the upper subfence (F), lower subfence (G), and fence base (H) to size **[Parts List]** along with scrap material of the same thickness to test your tablesaw setup. From ½" stock, cut the fence face (I) to size. Install a ⅜" dado stack in your tablesaw set to 3/16" height. Make test cuts on scrap before cutting a centered groove in the bottom edge of the upper subfence and in both edges of the lower subfence **[Drawings 2 and 2a]**.

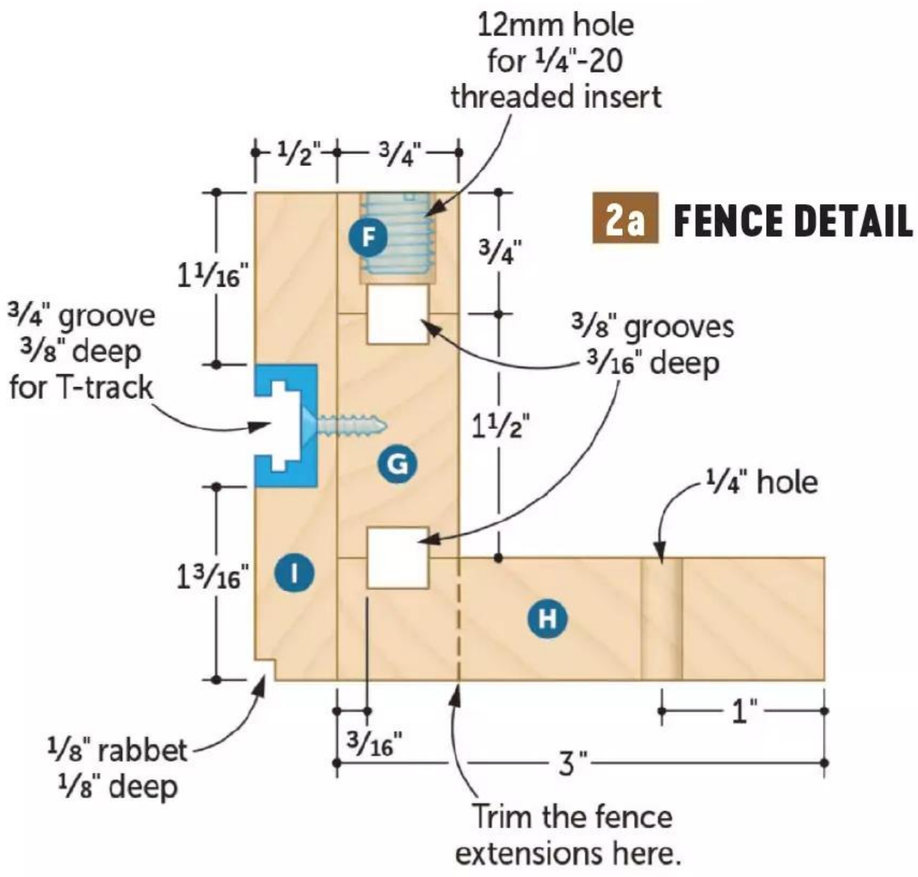
Note: **Mark the front face of the upper and lower subfences (F, G) and keep the marked face against the tablesaw fence when cutting each groove in their edges.**

2 Without changing the tablesaw setup, cut a mating groove in the top face of the fence base (H).

3 Glue and clamp the fence face (I) to the fence base (H) **[Drawing 2a]**, checking for square. After the glue dries, glue and clamp the lower subfence (G) and upper subfence (F) in place **[Photo B]**. Before the glue dries, run a length of ⅜" steel rod in and out of the square holes to clear away any excess glue.



With their marked faces against the back of the fence face (I), glue the lower subfence (G) and upper subfence (F) in place, applying clamping pressure in two directions.



2a FENCE DETAIL

4 Install a ¾" dado stack in your tablesaw and cut a ⅜"-deep groove for the T-track in the fence face (I). Then cut a ⅛×⅛" sawdust-relief rabbet along the lower edge of the fence face.

5 Trim one end of the fence assembly (F–I) square, and then crosscut it into three pieces **[Drawing 2]**, making a 22½"-long fence and two 3½"-long extensions. Cut off the base (H) portions of the extensions flush with the lower subfence (G) portions.

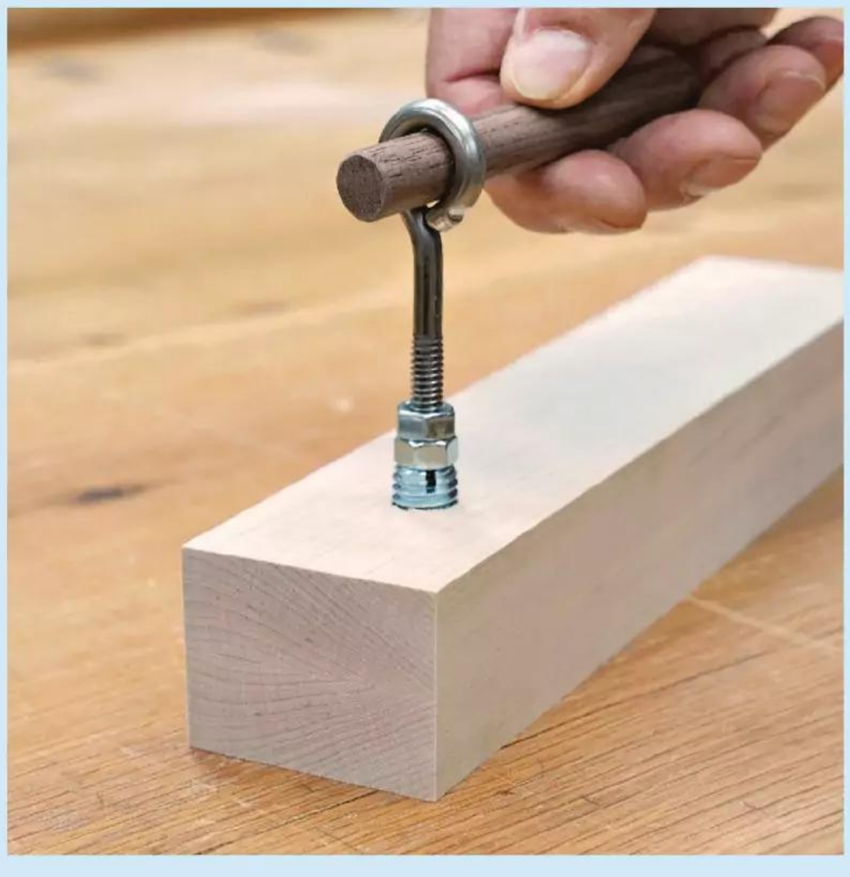
6 Mark the endpoints and centerpoints of the radius cutouts on the top of the fence and back of the base. Then bend and trace a fairing stick to join the marks. Bandsaw or jigsaw and sand the cutouts to shape. Drill ¼" holes for the bolts that hold the fence to the table and a hole for the drill-press chuck key in the fence base.

7 At the drill press, drill 12mm holes ½" deep in the central portion of the upper subfence (F) that intersect the top square hole in the fence. Install threaded inserts. (See *Inside Info on Insert Installation, right,* for tips on installing threaded inserts.) Finish-sand the fence assembly.

Note: **We purchased an inexpensive 12mm Forstner bit to drill the holes for the threaded inserts. You can also use a 15/32" brad-point bit.**

INSIDE INFO ON INSERT INSTALLATION

Driving home a slotted threaded insert using a flathead screwdriver is anything but foolproof. To prevent the inevitable wobble and keep the insert perpendicular to the workpiece surface, do this instead: Thread a pair of nuts onto a ¼"-20 eyebolt, followed by your threaded insert. Snug the nuts against the insert and then each other to lock everything in place. Use a length of dowel through the bolt's eye as a handle and give it a few firm twists to drive the insert straight in.



PRECISION HOLE PLACEMENT

To use the stopblock, first adjust it to leave about ½" between the body (J) and the pad (K). Slide the guide bar and the T-bolt into the T-track, using a ruler or tape measure to position the stopblock close to the desired distance from the drill bit. Clamp it in place by tightening the front knob. Now fine-tune the distance to the bit by turning the end knob, *right*. Because the clamping knob and guide bar (L) are centered in the stopblock body, you can use it on either side of the drill-press chuck by simply turning it over.

TABLE FIT AND FINISH

1 Mask the bottoms of the grooves and dadoes for the T-track in the table and fence, and apply a clear finish to all the parts. (We used two coats of satin polyurethane, sanding between coats with 220-grit sandpaper.) When the finish dries, remove the masking tape.

2 Cut T-track **[Source]** to length to fit the table and fence parts. Using the countersunk holes in the T-track as guides, drill pilot holes into the mating table and fence parts. Apply epoxy to the bottoms of the grooves and dadoes, then screw and clamp the T-track in place.

3 Cut four 14½"-long pieces of ⅜" steel rod with a hacksaw. Using 80-grit sandpaper, rough up 3½" at one end of each rod, and epoxy these ends into the square holes in the fence extensions. To hold the rods parallel while the epoxy cures, insert their other ends into the square holes in the fence.

4 Slide the heads of two T-bolts into the auxiliary table bottom T-track **[Exploded View]**. Position the auxiliary table on the drill press table, dropping the bolts into the slots or holes. Add washers and thread on the tall jig handles.

5 Slide T-bolts into the drill-press table T-tracks. Align the holes in the fence base with the bolts, drop on flat washers, and fasten the fence with T-knobs. Slide the extension rods into the fence, and thread in ¼"-20 4-star studded knobs to lock the extensions in place.

ADD A PRECISION STOP

1 From 1½" laminated stock, cut the stopblock body (J) to size **[Parts List]**. Cut an 11/32" dado ⅜" deep centered in the back of the body **[Drawing 3]**.

2 Cut the stopblock pad (K) to size and adhere it with double-faced tape to the side of the body with its edges and ends aligned. Chuck a 12mm Forstner bit (or a 15/32" brad-point bit) in your drill press and drill a ½"-deep counterbore in the left side of the body **[Photo C]**. Without moving the parts, change to a ¼" bit and drill a hole, centered in the counterbore, all the way through both parts.

3 Separate the pad from the body. Using a ¾" Forstner bit, drill ⅜"-deep counterbores in the body and pad, centered on the ¼" holes **[Drawing 3]**. Then, drill the 17/64" hole through the body centered in the width of the 11/32" dado and ½" from the edge of the body.

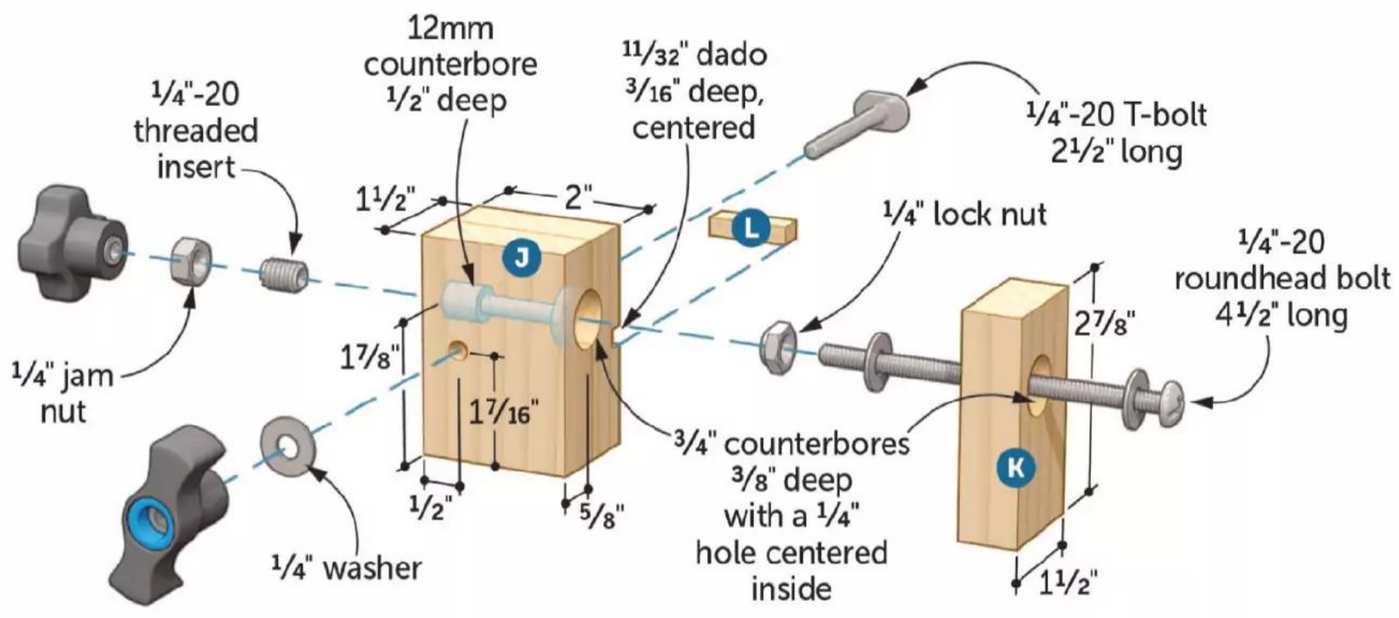
4 Install a threaded insert into the 12mm counterbore in the body. Then cut the guide bar (L) to size, and glue and

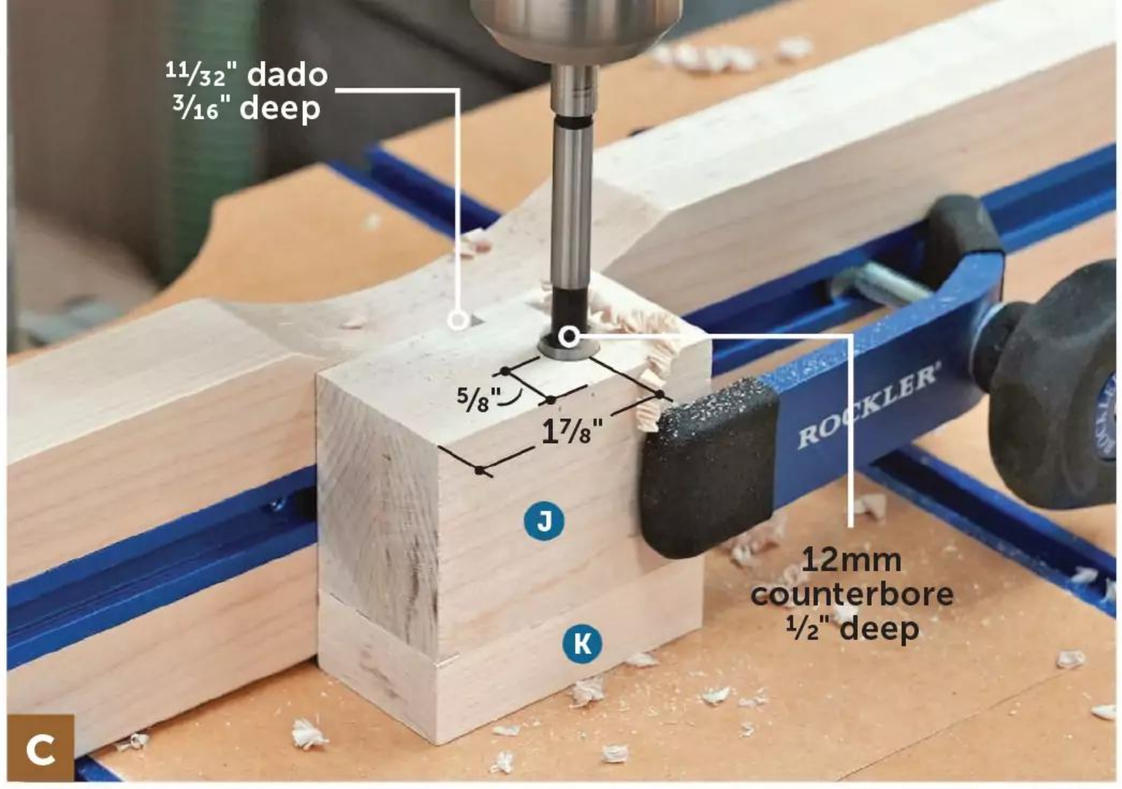
Note: Measure your T-track's opening and size the dado's width to match.

TIP!

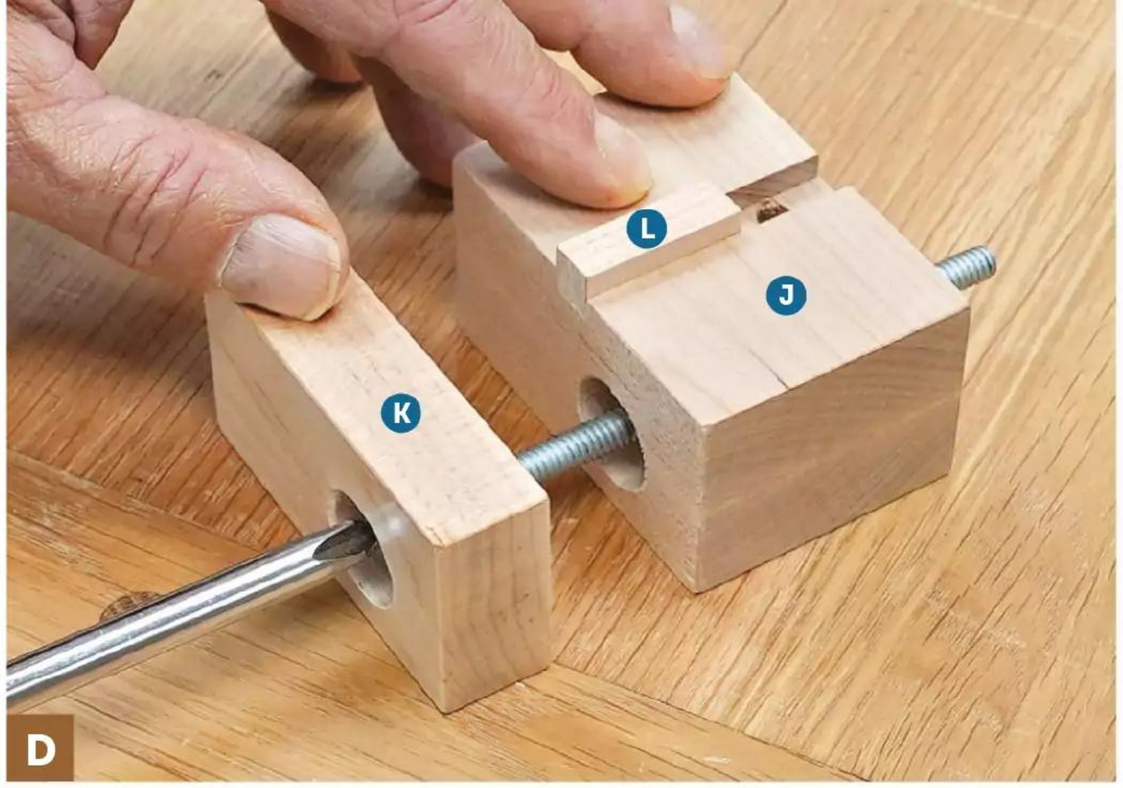
To center a ¾" counterbore on the ¼" holes, first chuck a ¼" bit in the drill press. With the drill press off, lower the bit into the hole, lock the fence against the workpiece, and clamp the piece in place, before switching to the ¾" bit for drilling.

3 STOPBLOCK





With the stopblock pad (K) facing down and the dadoed stopblock body (J) against the fence, keep the parts clamped in place to first drill a counterbore, *shown*, then a 1/4" through-hole.



With the stopblock pad (K) mounted on the bolt, slide the bolt into the stopblock body (J). Drive the bolt through the threaded insert in the body until the pad contacts the body.

clamp it in the dado in the back of the body, flush with its right edge. Finish-sand and apply a clear finish to the parts.

5 After the finish dries, slip a 1/4" washer onto a 1/4×4 1/2" roundhead bolt, and insert it in the hole in the pad (K). Slip another washer onto the bolt and then thread on a lock nut, tightening until it firmly holds the pad, but still allows the bolt to turn. Then add the stopblock body (J) **[Photo D]**. Add a nut and a 4-arm knob. Then tighten the nut against the knob to lock it in place.

6 Slide a T-bolt through the body from the back and add a washer and T-knob at the front. See *Precision Hole Placement* on *page 50* for details on using the microadjustable stopblock.

7 Assemble the hold-down clamp **[Source, Exploded View]**. Slide its T-bolt into the T-track. Now your *woodworking* drill press is ready for action.

PARTS LIST

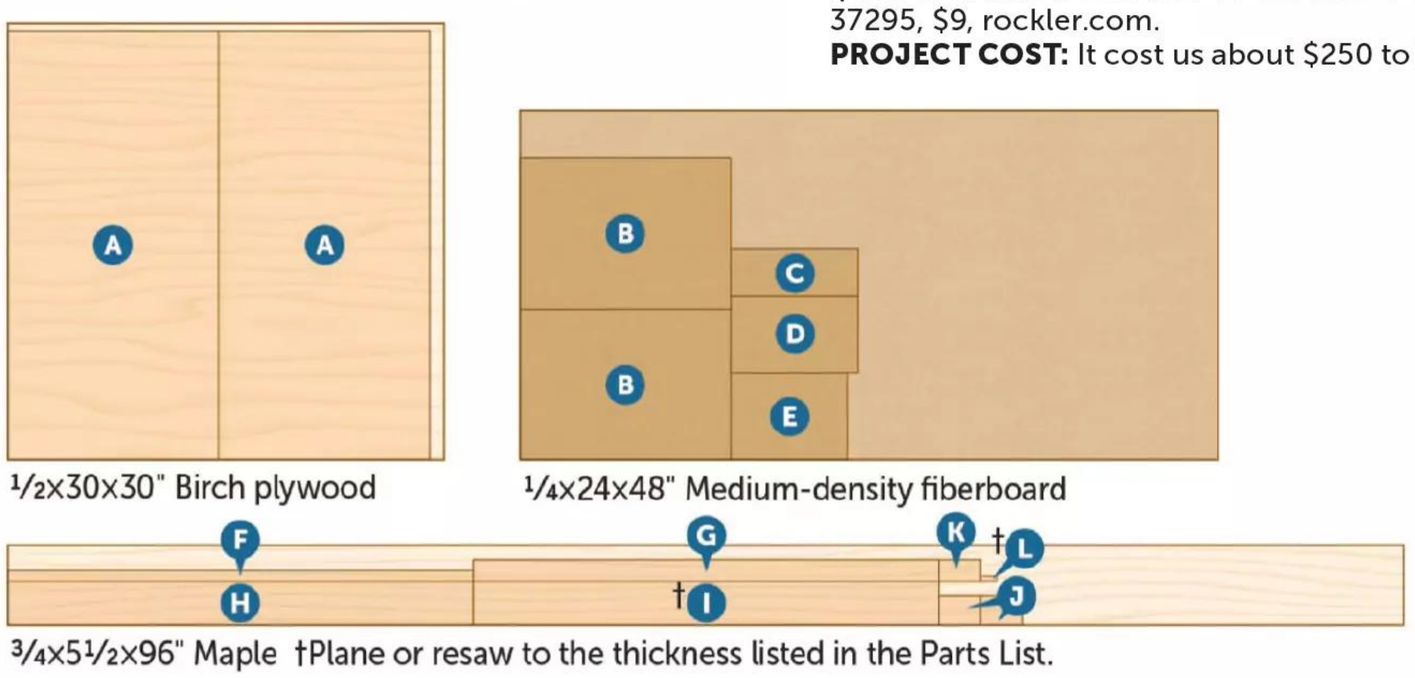
PART		FINISHED SIZE T	W	L	Matl.	Qty.
A	BASE	1"	14 1/2"	29 1/2"	LP	1
B	TOP SIDES	1/4"	10 3/8"	14 1/2"	MDF	2
C	TOP FRONT	1/4"	3 1/4"	8 3/4"	MDF	1
D	TOP BACK	1/4"	5 1/4"	8 3/4"	MDF	1
E	INSERT	1/4"	6"	8"	MDF	1
F*	UPPER SUBFENCE	3/4"	3/4"	32"	M	1
G*	LOWER SUBFENCE	3/4"	1 1/2"	32"	M	1
H*	FENCE BASE	3/4"	3"	32"	M	1
I*	FENCE FACE	1/2"	3"	32"	M	1
J	STOPBLOCK BODY	1 1/2"	2"	2 7/8"	LM	1
K	STOPBLOCK PAD	3/4"	1 1/2"	2 7/8"	M	1
L	GUIDE BAR	11/32"	3/8"	1 1/8"	M	1

*Parts initially cut oversize. See the instructions.

MATERIALS KEY: LP–laminated plywood, MDF–medium-density fiberboard, M–maple LM–laminated maple.
SUPPLIES: 3/8"×36" steel rod (2), 1/4"-20 lock nuts, 1/4"-20 nuts, 1/4" and 1 1/4"washers, 1/4"-20×4 1/2" roundhead bolts, 2-part epoxy, #6×1/2" flathead wood screws.
BLADE AND BITS: Stack dado set; 12mm and 3/4" Forstner bits, 17/64" and 1/4" brad-point bits.
SOURCE: 3' universal T-track (3) no. 26420, $20 each; 1/4"-20 female thread T-knob (3) no. 52325, $8 each; 1/4"-20 male thread 4-star knob (2) no. 51597, $8 each; 1/4"-20 female thread 4-star knob (1) no. 59277, $8; Tall jig handle 5/16"-18 female thread (2) no. 52360, $9 each; 5/16"-18×1 1/2" T-bolts [pack of 5] no. 36677, $9, Hold-down clamp (1) no. 35283, $15; 1/4"-20 threaded inserts [pack of 8] no. 28803, $11; 1/4"-20×2 1/2" T-bolts [pack of 5] no. 37295, $9, rockler.com.
PROJECT COST: It cost us about $250 to build this project.

CUTTING DIAGRAM

We purchased 4 board feet of 4/4 maple. Before cutting parts to size, we planed them to the thicknesses shown in this example board.



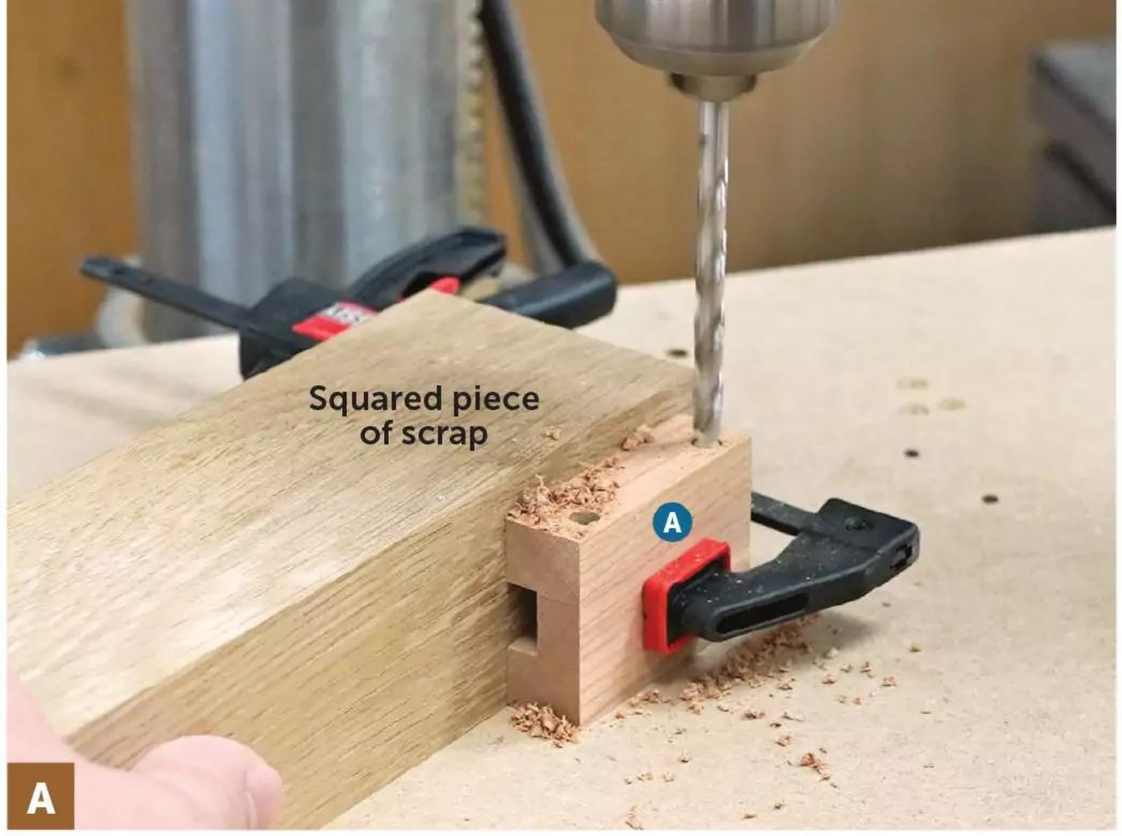
TIMBER LINE EXPRESS

TOUGH & TUBULAR TANK CAR

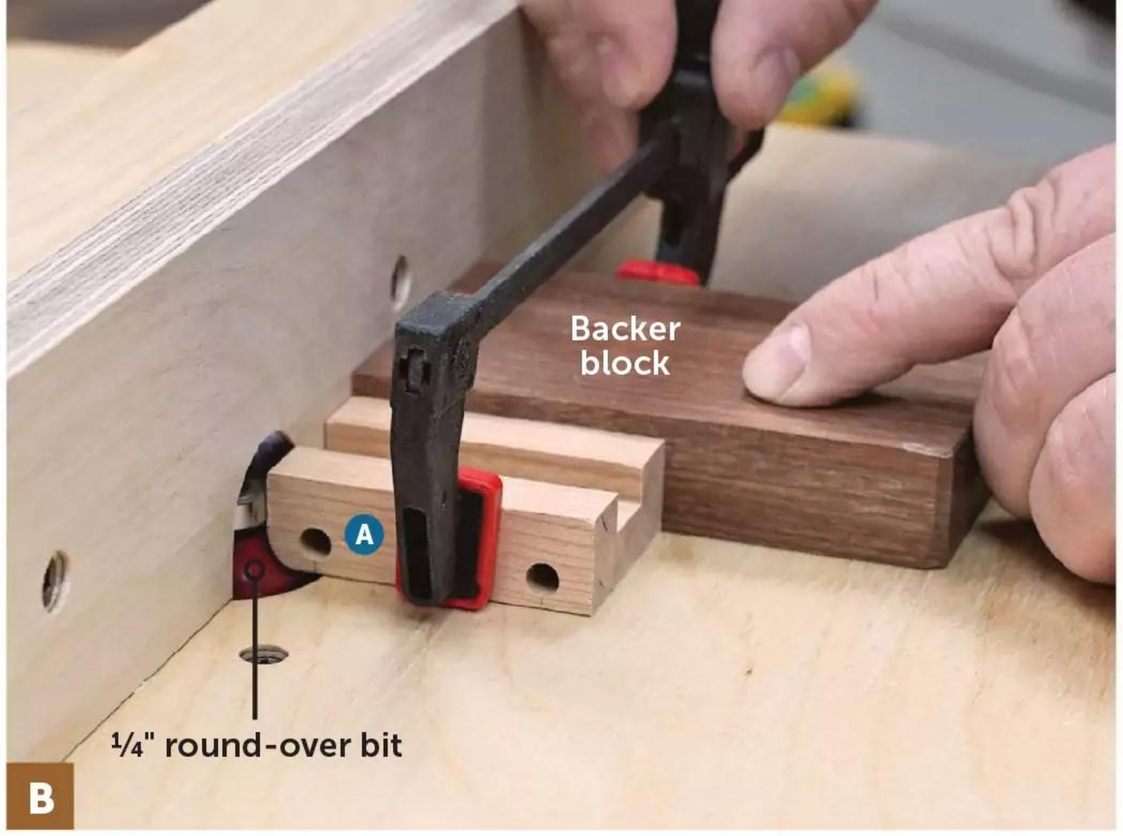
The train keeps a-rollin' with this detailed tank car, the latest addition to the *WOOD*® Timber Line Express

WRITER: CRAIG RUEGSEGGER
DESIGNER/BUILDER: JOHN OLSON

OVERALL DIMENSIONS
3 3/16"W × 10 1/4"L × 4 9/16"H



Clamp each truck frame (A) to a larger block to steady it while drilling the holes for the axle pegs. Use a brad-point bit to place the holes accurately.



Clamp each truck frame (A) and side frame (B) to a backer block to steady it against the fence and to prevent tear-out on the back edge of the workpiece.

Transporting liquid or pressurized gas cargo by rail requires a tank car. Even though the last liquids this tank car carried were rainwater and a bit of sap, your imagination can fill it with whatever you like.

A kit **[Source]** provides the wheels, pegs, and other specialty parts, including the dowel for the tank. Of course, if you want a tank made from something other than maple, simply turn to your lathe.

ROLL ON THE TRUCKS

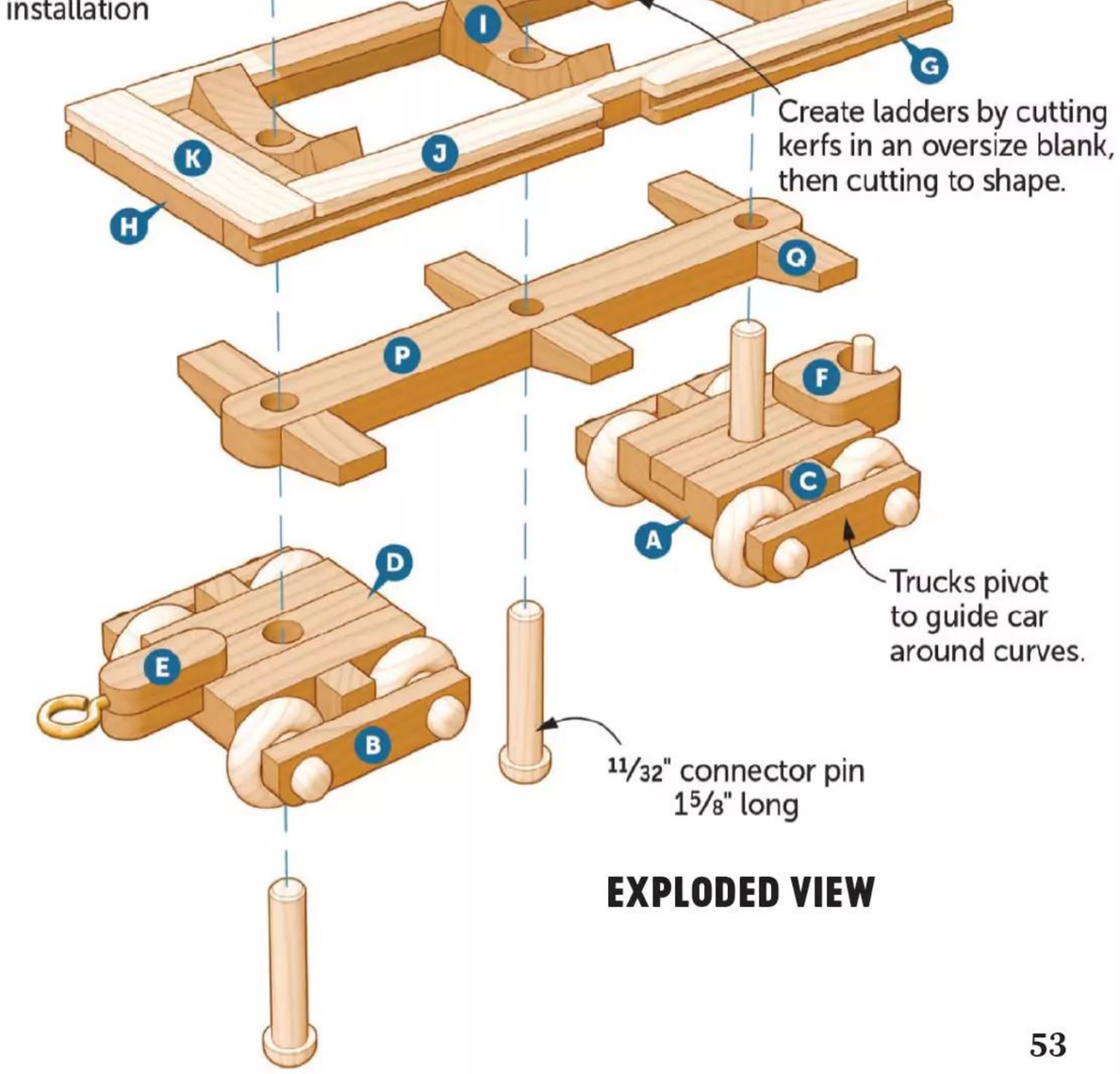
The tank car uses the same front and rear truck assemblies used on most of the other Timber Line Express rolling stock. An eye screw in a front truck hooks over a dowel in a rear truck to connect cars. The trucks pivot on pegs to allow navigating curves in the track.

1 Cut the truck frames and truck side frames (A, B) to size **[Parts List, Drawing 1]**. Form the centered 1/2" groove on the top of each truck frame (A). Drill 7/32" holes in the edges of each truck frame and in the faces of the side frames **[Photo A]**. Round over the lower ends of the frames **[Photo B]**.

2 Cut the spring groups (C) to size and glue the 3/8"-wide face to the side of each truck frame (A), centered front-to-back and flush at the top and bottom **[Drawing 2]**.

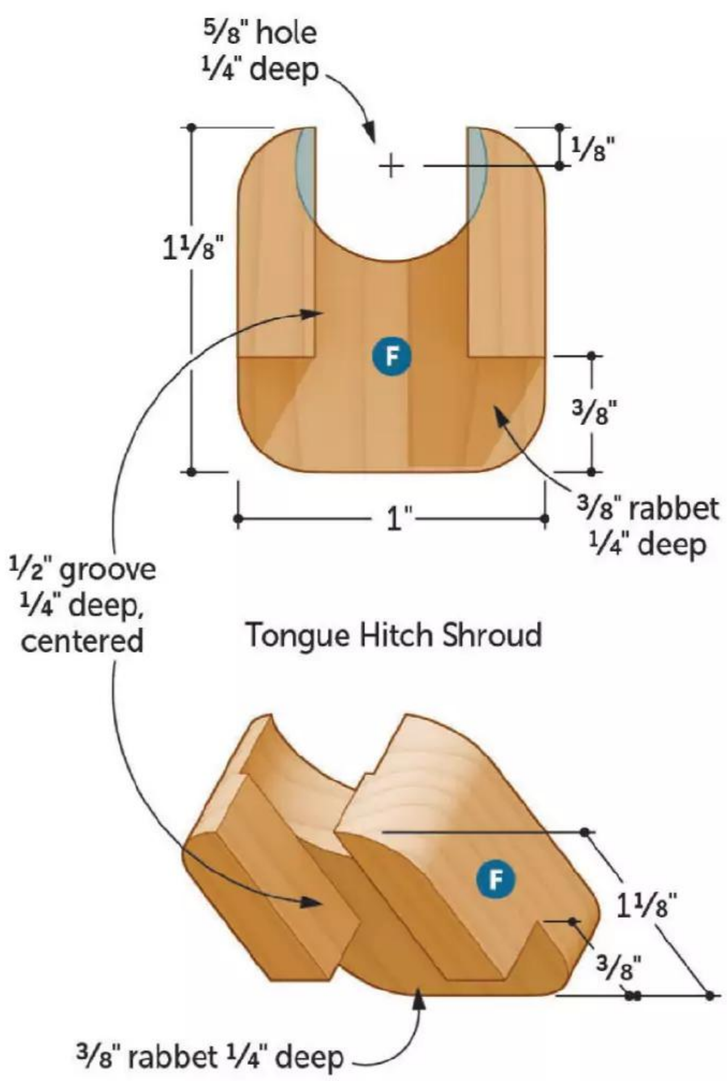
3 Cut the tongues (D) and tongue extension (E) to size **[Drawing 2]**. Round over both corners on the back end of the tongue extension (E), leaving the front end square for now.

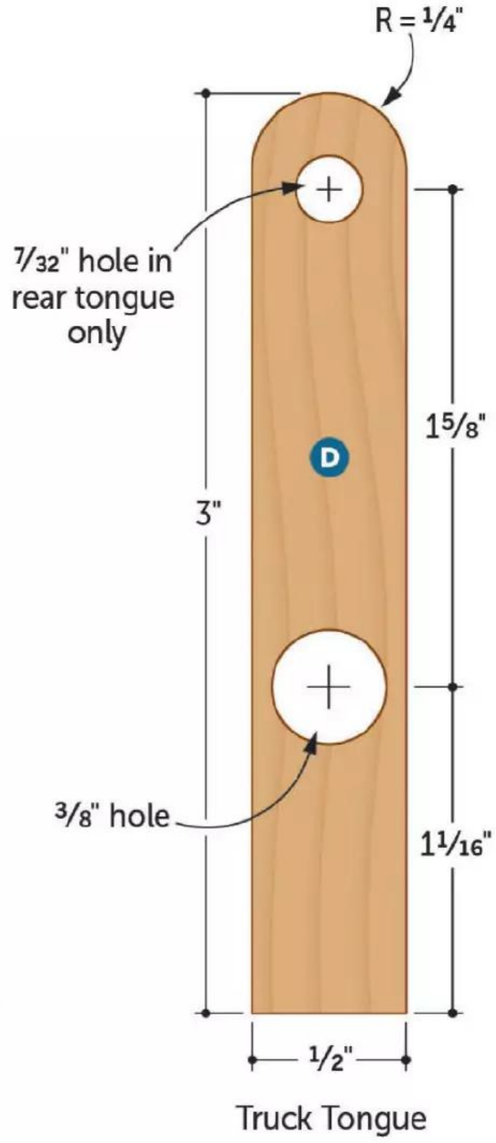
Get free plans to build the Timber Line Express track.
woodmagazine.com/trackdesign

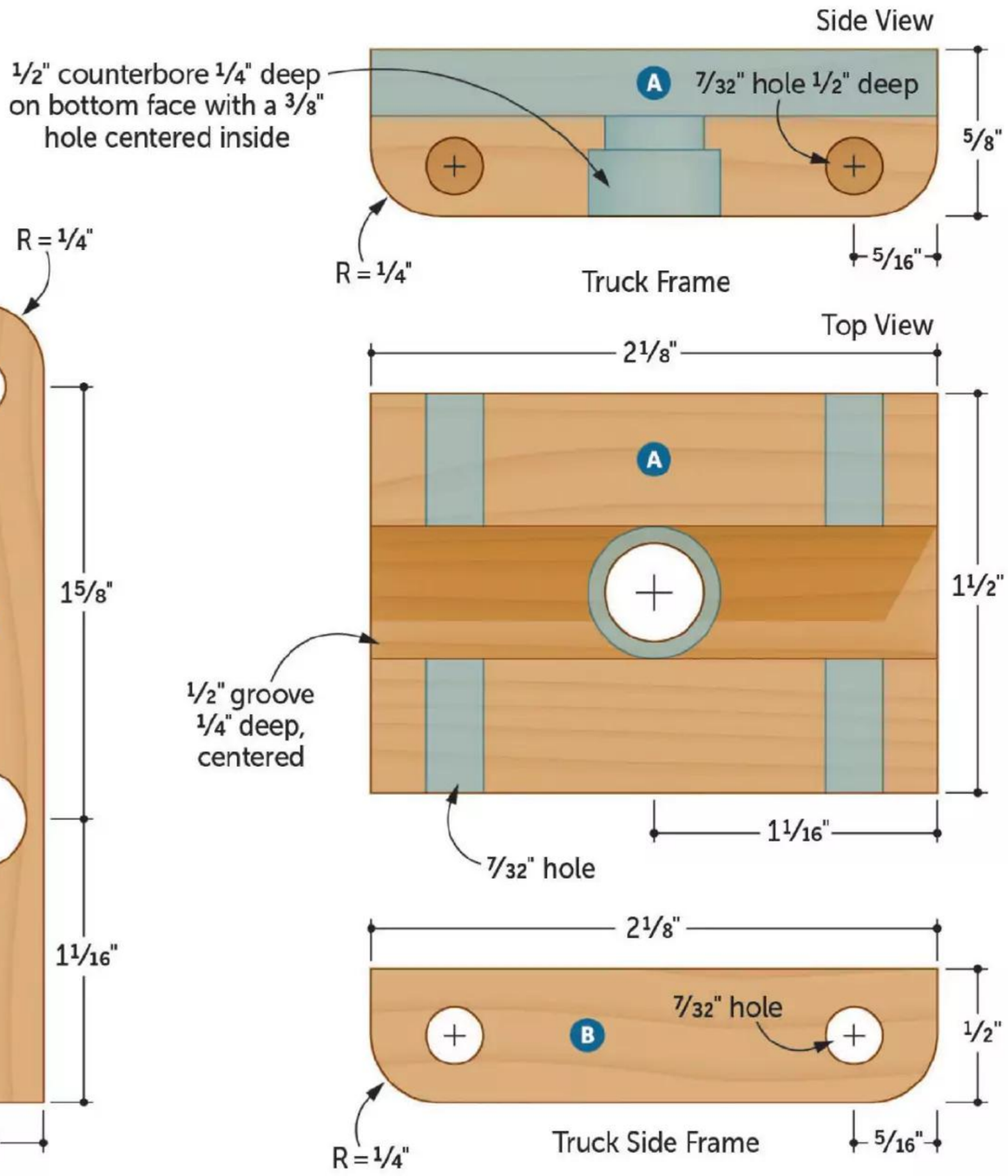


PHOTOGRAPHER: JASON DONNELLY; ILLUSTRATOR: CHRISTOPHER MILLS

1 TRUCK PARTS





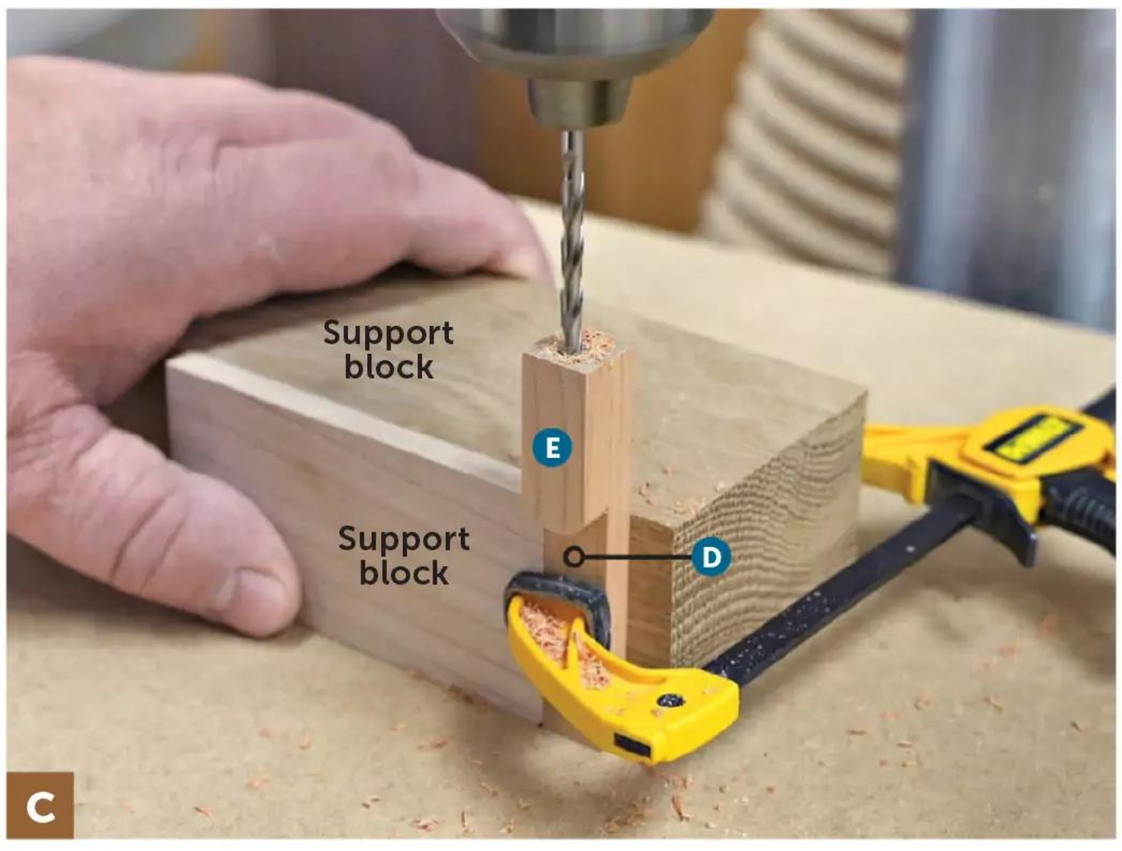


4 Glue and clamp the tongue extension (E) to the top of a tongue (D), flush at the front end. Once the glue dries, drill the 9/64" hole in the front end of the tongue extension **[Drawing 2, Photo C]**. Round over the drilled end.

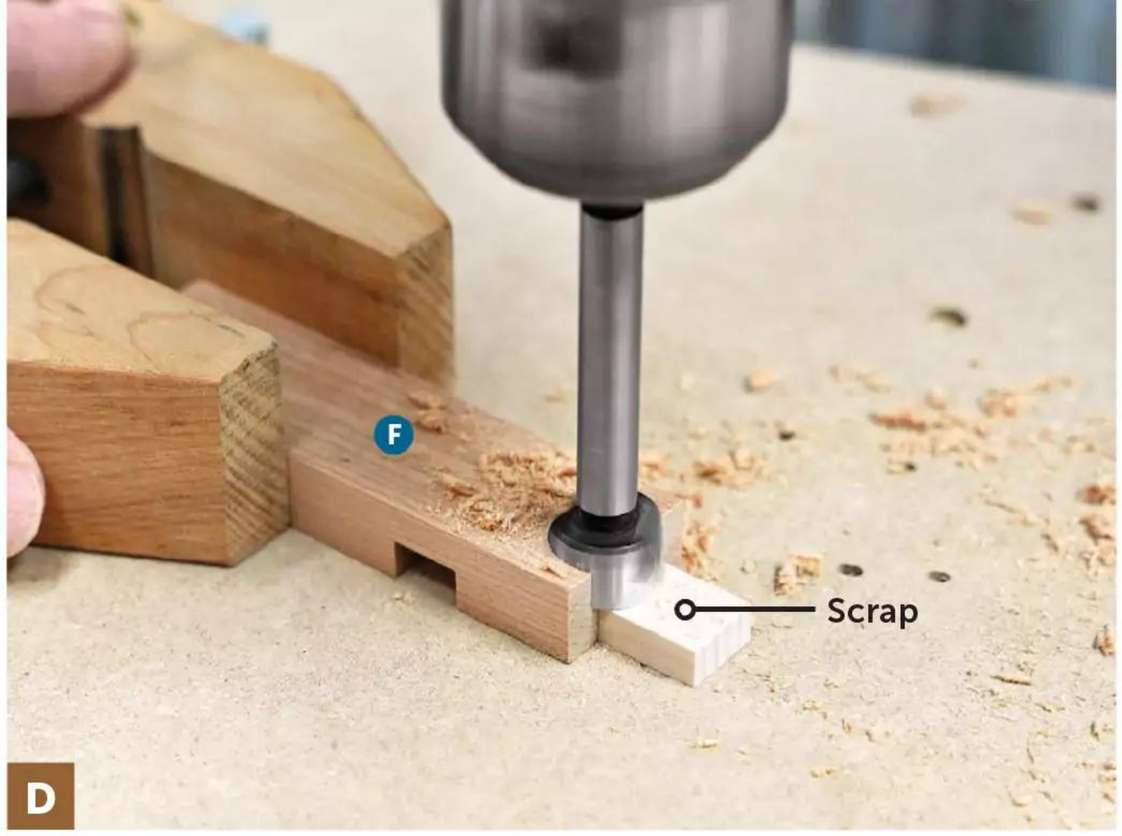
5 Glue the tongue assembly (D/E) into the groove in the front truck frame (A), flush at the back end **[Drawing 2]**. Drill the 7/32" hole in the remaining tongue (D), round over the back corners, and glue it into the groove on the rear truck frame, flush at the front end.

6 Cut a 1/2×1×6" cherry blank for the hitch shroud (F) **[Parts List]**. Form a centered groove along one face to fit the rear truck tongue (D) **[Drawing 1]**, then cut the 3/8" dado 3/4" from one end. Drill the hole on the top face **[Photo D]** and round over the corners on the same end. Crosscut the hitch shroud to length just beyond the edge of the dado to form a 3/8" rabbet. Round over the just-cut corners and glue the hitch shroud to the rear truck tongue **[Drawing 2]**.

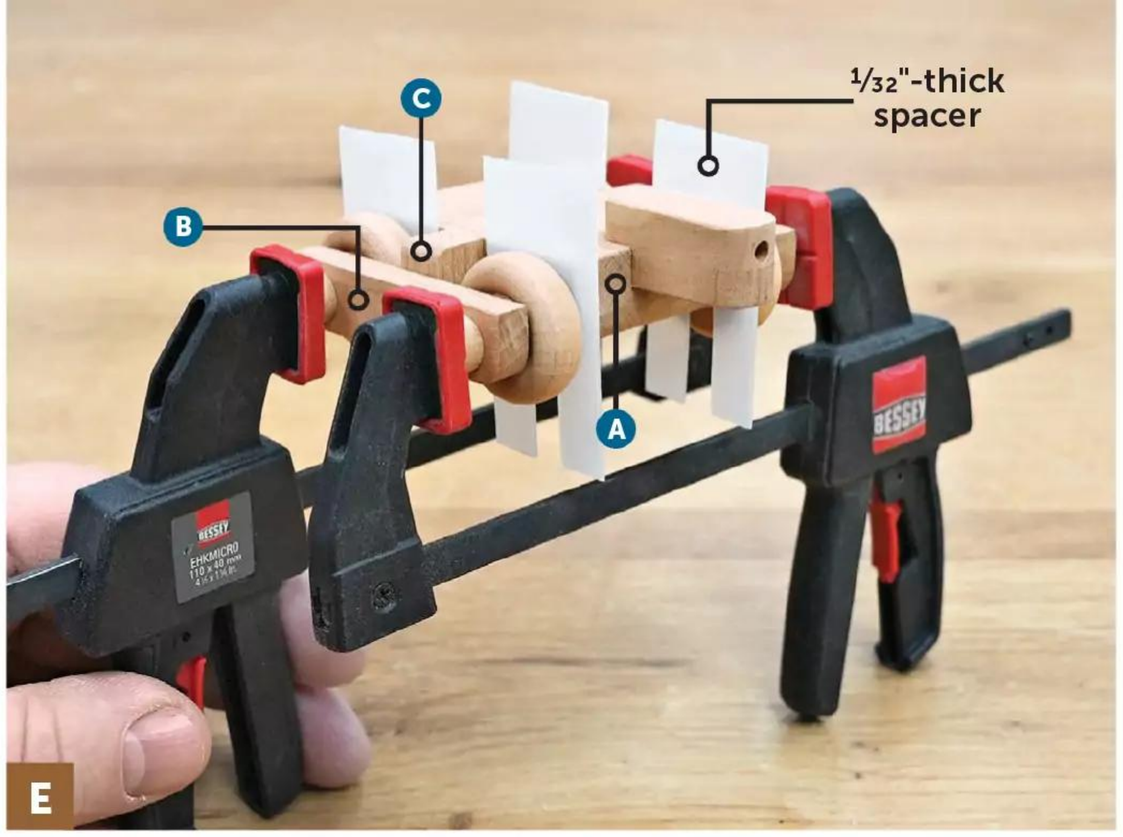
7 Begin the truck assembly by gluing an axle peg into each hole in the truck side frames (B) **[Drawing 2]** using a few drops of cyanoacrylate glue on the underside of the peg heads. Once the glue cures, slip the wheels and spacers onto the axle pegs **[Photo E]**. Use wood glue to glue the ends of the pegs into the holes in the truck frames (A), and the side frame (B) to the spring groups (C) **[Drawing 2]**.



Before drilling the pilot hole for the eye screw, support the front tongue assembly (D/E) with a pair of scrapwood support blocks to hold it perpendicular to the table.



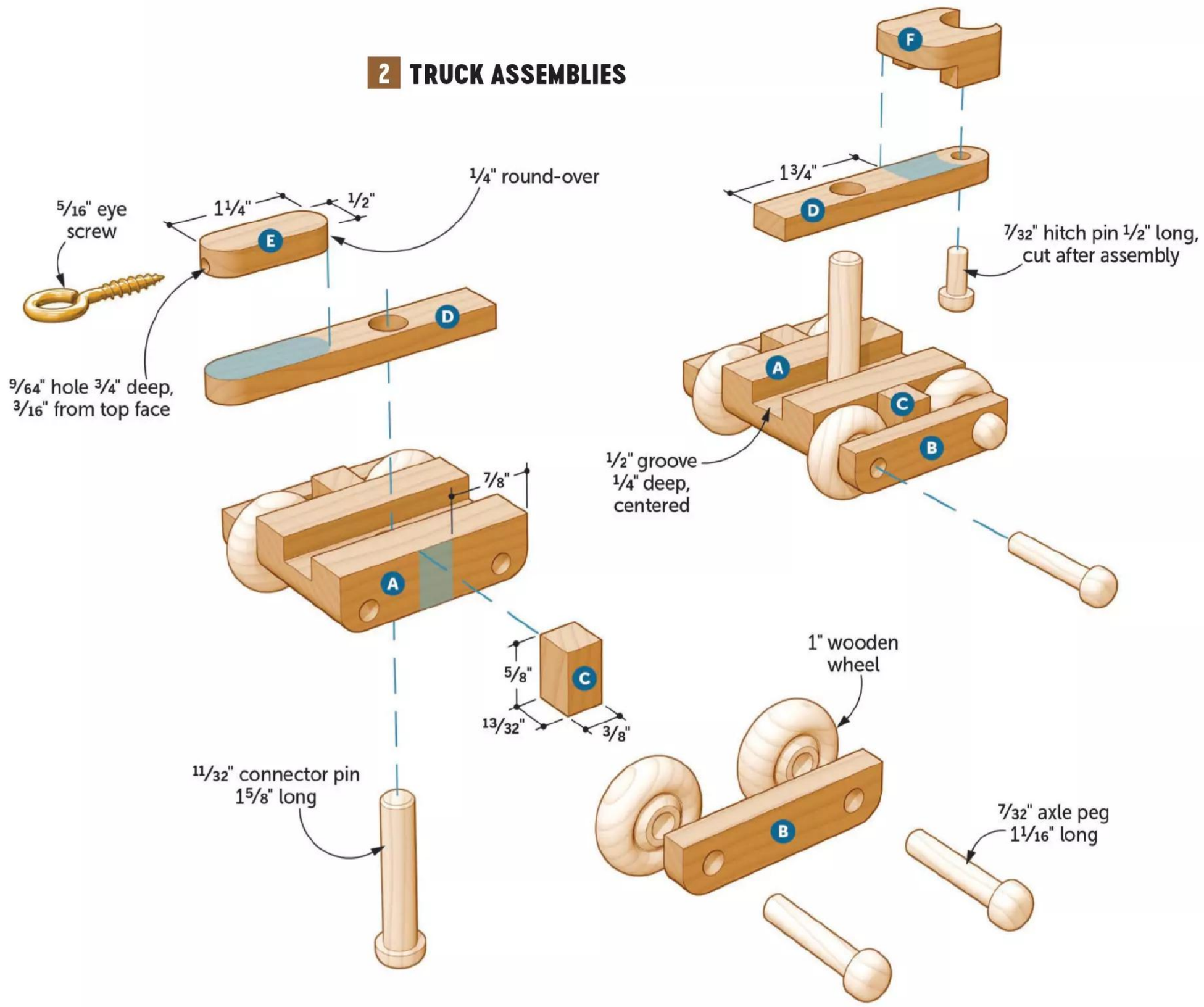
Drill the 5/8" stopped hole in the hitch shroud (F) with a Forstner bit. A scrap in the groove prevents tear-out. The hole allows the eye screw on a mating car to pivot around the peg in the rear truck.



The parts kit **[Source]** includes plastic material to use as spacers when assembling the trucks. (You can cut your own from plastic detergent or soap bottles.) Notch the plastic to fit around the axle pegs.

8 To form a recess for the truck connector pins, use a 1/2" Forstner bit to drill a counterbore 1/4" deep, centered on the bottom face of each truck frame (A) **[Drawing 1]**. Then drill a 3/8" hole through each truck assembly, centered in the counterbore. Install the eye screw in the tongue extension (E) in the front truck **[Drawing 2]** and glue the hitch pin into the hole in the rear truck tongue (D), trimming the pin flush to the top of the hitch shroud (F). Finish-sand the trucks.

2 TRUCK ASSEMBLIES



FIT A FRAME TO THE TANK

If you purchase the kit **[Source]**, you'll have the 2½"-diameter dowel for the tank to help you shape the cradles in the following steps. If you choose to turn your own tank, do that now, referring to the dimensions in **Drawing 4**, then shape the cradles to fit it.

1 From ¼" cherry, cut the platform sides (G) and ends (H) to size **[Drawing 3]**. Glue and clamp the ends between the sides. After the glue dries, rout ⅛" rabbets on the sides (G).

TIP!

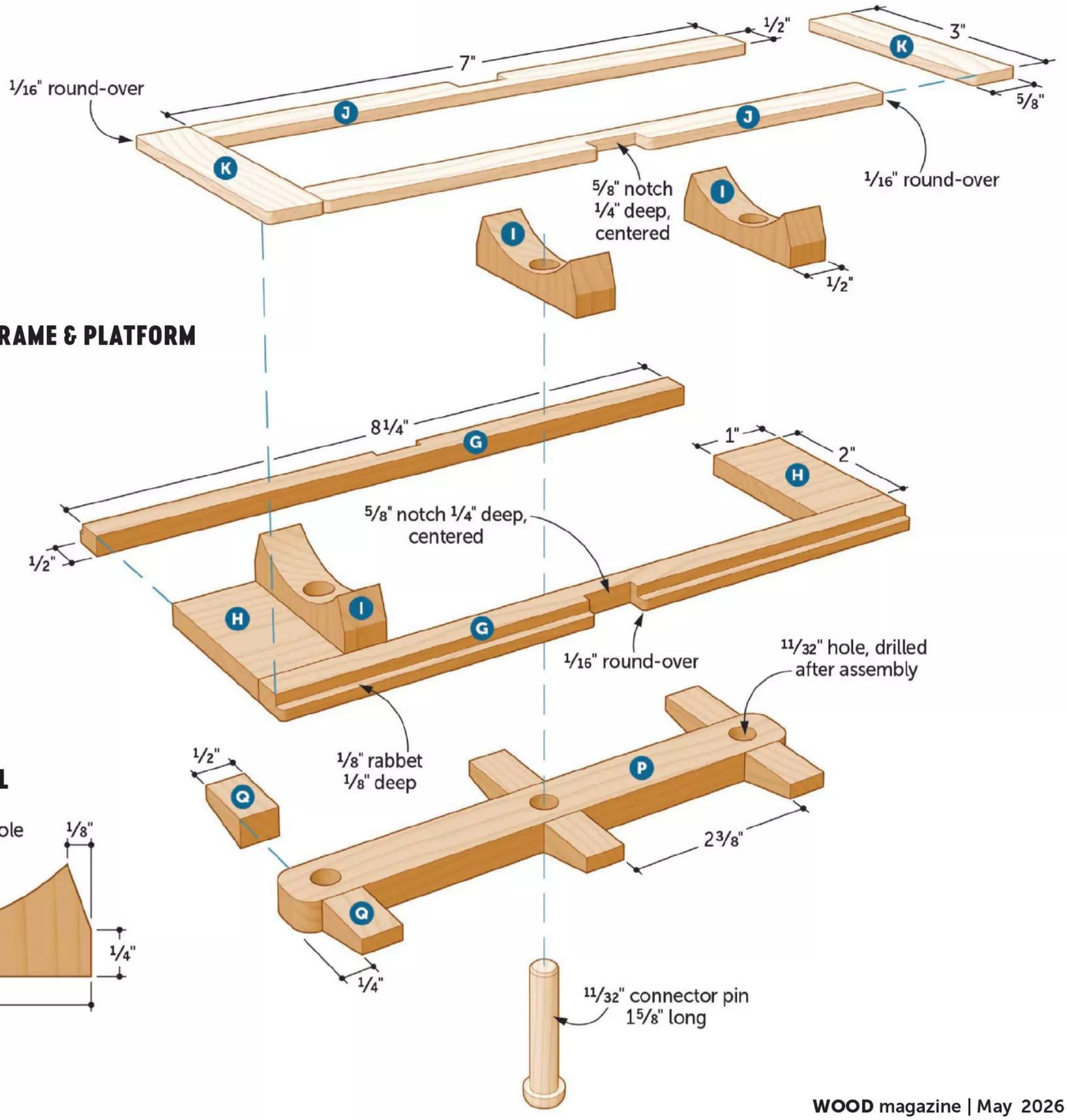
Before the glue sets, check that the tank (L) blank rests on all three cradles.

2 For the cradles (I), cut a ½×2×6" cherry blank. Lay out the arc on one end **[Drawing 3a]**, then bandsaw and sand the arc to match the tank body **[Photo F]**. Cut the cradle to length, then repeat for the other two cradles. Glue two cradles to the inner edges of the platform ends (H) and glue the third between the sides (G), centered on their length **[Drawing 3]**.

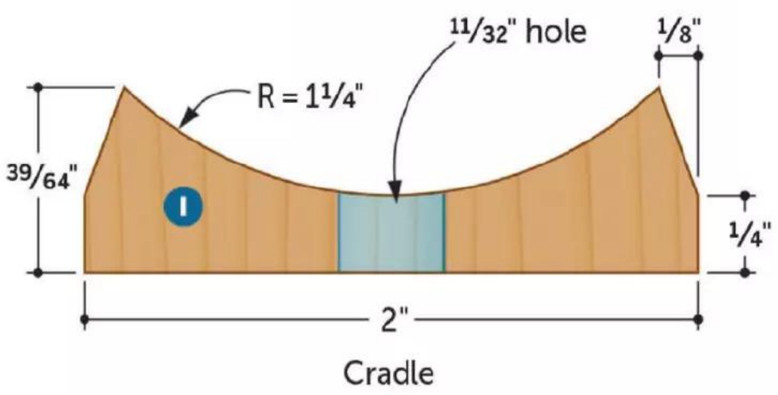
Form the cradles (I) one at a time from a longer blank. This makes it safer to bandsaw and sand the curve to fit the tank (L) before cross-cutting the cradle to length.

3 From ⅛" maple, cut the catwalk sides (J) and ends (K) to size. Sand ⅛" round-overs on all four corners, then glue the catwalks to the platform flush with the ends and edges.

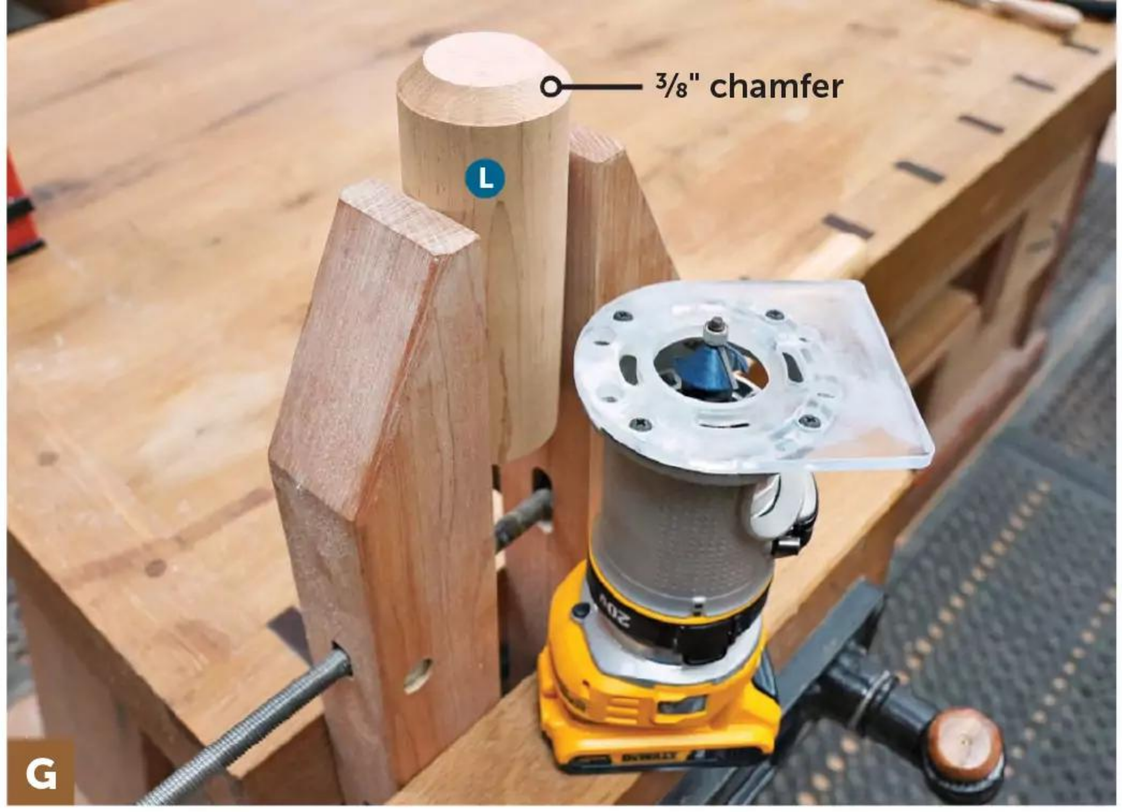
3 FRAME & PLATFORM



3a CRADLE DETAIL

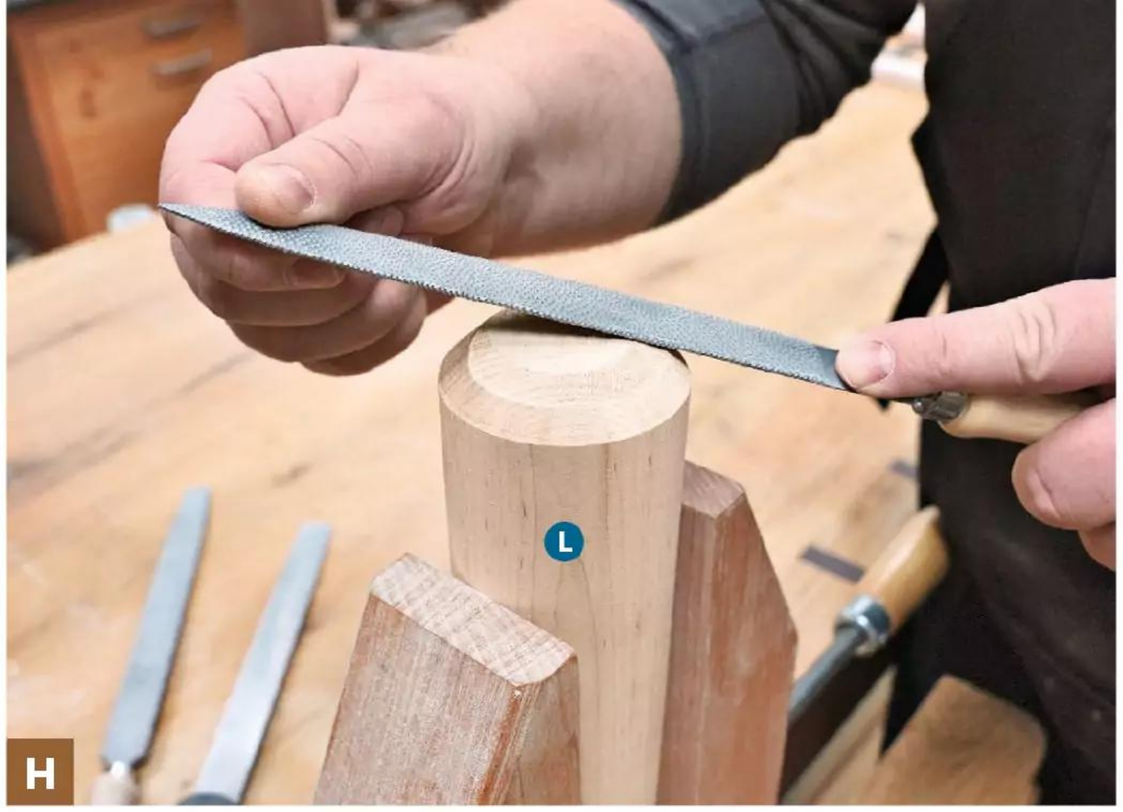


Cradle



G

Secure the tank (L) in a handscrew clamped in your bench vise. Using a trim router, take three consecutively deeper passes to rout around each end with a 45° chamfer bit.



H

Use a rasp and files to soften the top edge of the chamfer. Then blend from the centerpoint of the end to the bottom shoulder of the chamfer, creating an even dome on each end.

4 Install a ⅝" dado stack raised to ¼" height in your tablesaw and attach an auxiliary face to your miter gauge. With the platform on edge, cut the centered notches in each platform side (G) **[Drawing 3]**. Ease the corners of the notches, then finish-sand this assembly.

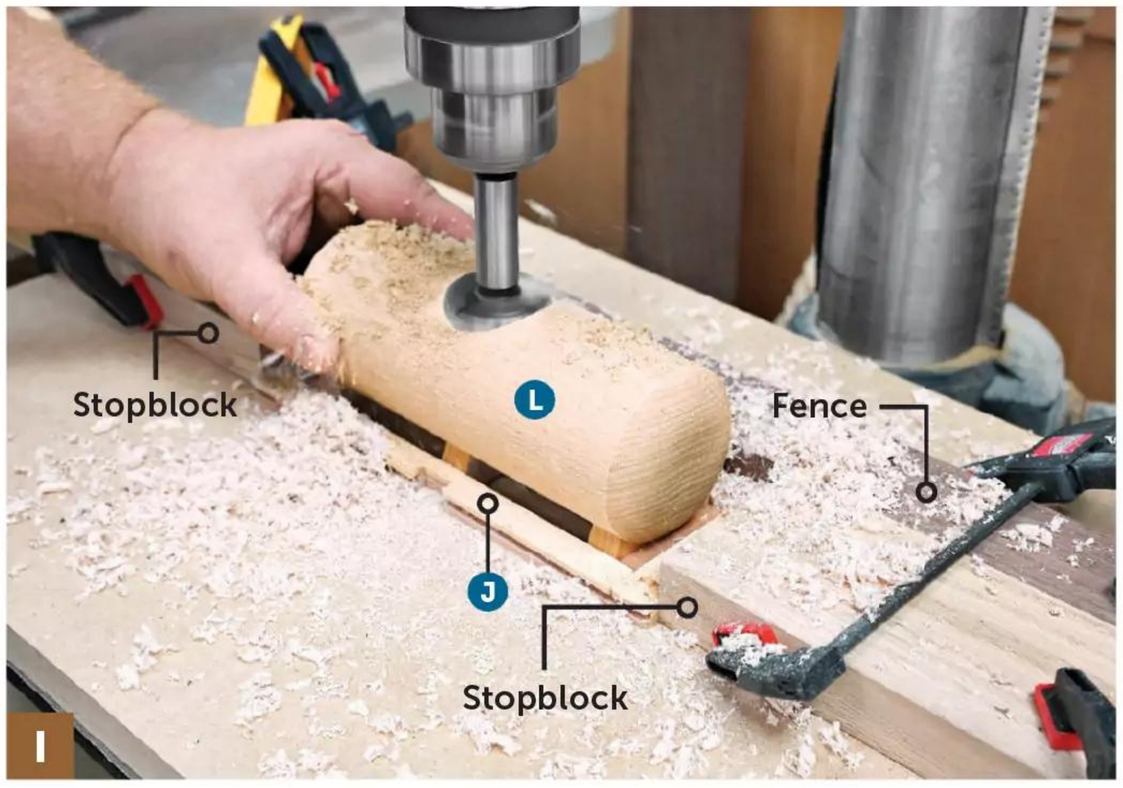
5 Secure the tank (L) on end and rout a ⅜" chamfer around each end **[Photo G]**. Round the chamfer with files and sanding **[Photo H]**. Finish-sand the tank.

6 Glue and clamp the tank to the cradles (I), centered from end to end.

7 After the glue dries, drill a 1½"-diameter hole 1" deep in the top center of the tank **[Photo I]**.

8 From a 1½"-diameter maple dowel, cut the hatch (M) to length **[Exploded View]**. Then from ⅛"-thick cherry, cut the hatch cover (N) to 1⅝" diameter. Finish-sand both pieces and glue them together.

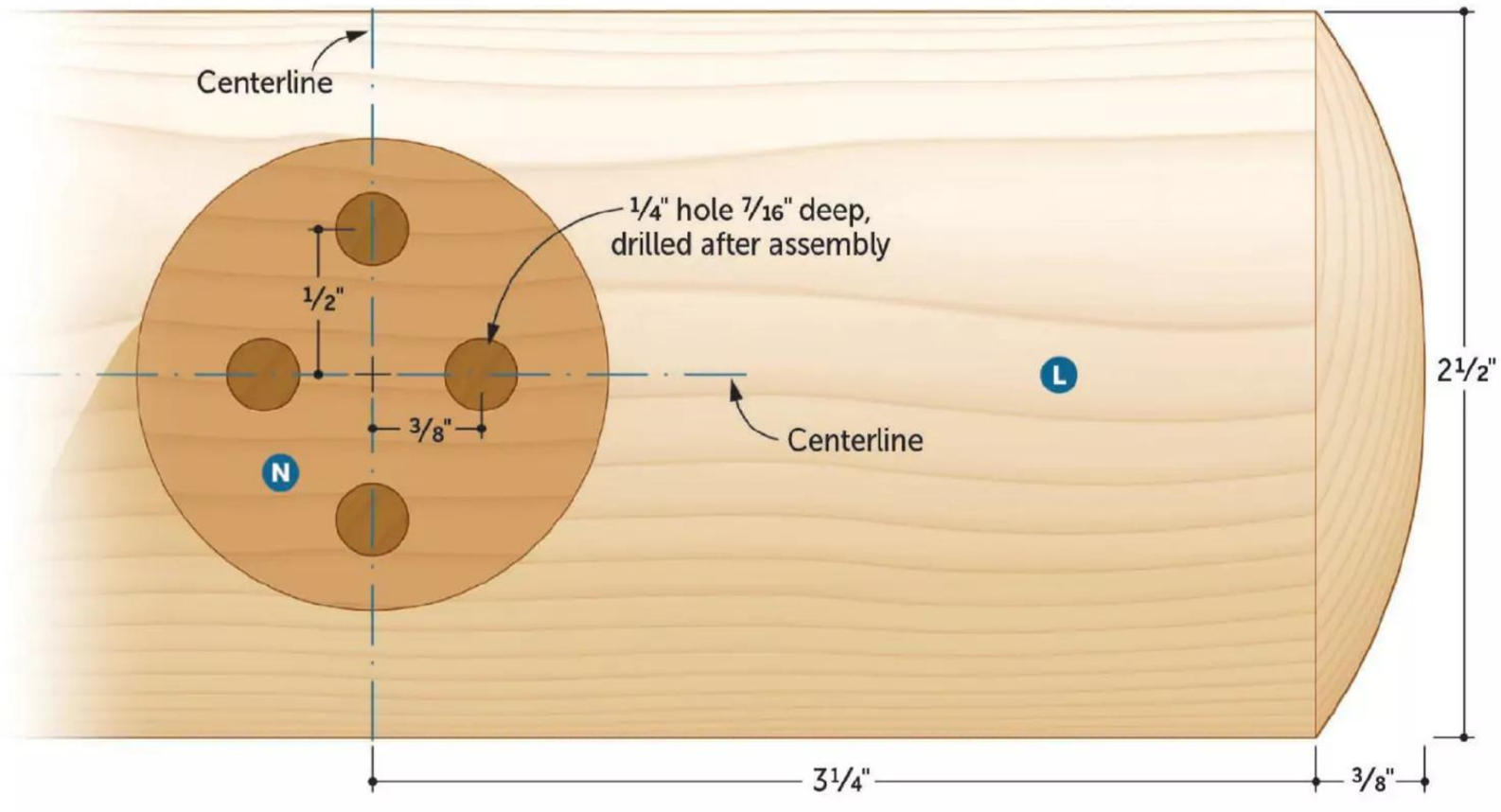
9 Glue the hatch assembly (M/N) into the hole in the tank (L). Mark the hole locations in the hatch cover and drill them 7/16" deep **[Drawing 4]**. Cut four valves (O) from a ¼" dowel, sand a small bevel around the top edge of each **[Exploded View]**, and glue them into the hatch cover and hatch.



I

Center the tank assembly (G–L) under a 1½" Forstner bit. Trap it in place by clamping a fence behind the assembly and stopblocks at both ends. Then drill 1" deep measured from the tank's highest point.

4 TANK & HATCH



CRAFT A CHASSIS

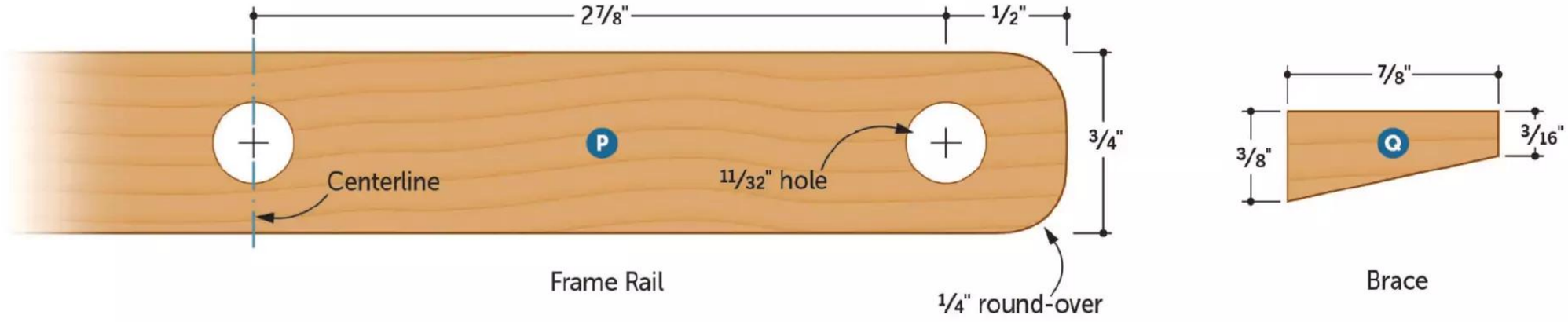
1 From 3/8"-thick cherry, cut the frame rail (P) to size. Lay out and drill the 11/32" holes, then rout 1/4" round-overs on each corner **[Drawing 5]**.

2 Cut a 3/8×1/2×12" cherry blank for the braces (Q). Lay out the taper for a brace, then bandsaw and sand it smooth. Crosscut the brace to length, then repeat to make five more braces. Glue and clamp the braces to the sides of the frame rail (P) flush at the top **[Drawing 3]**.

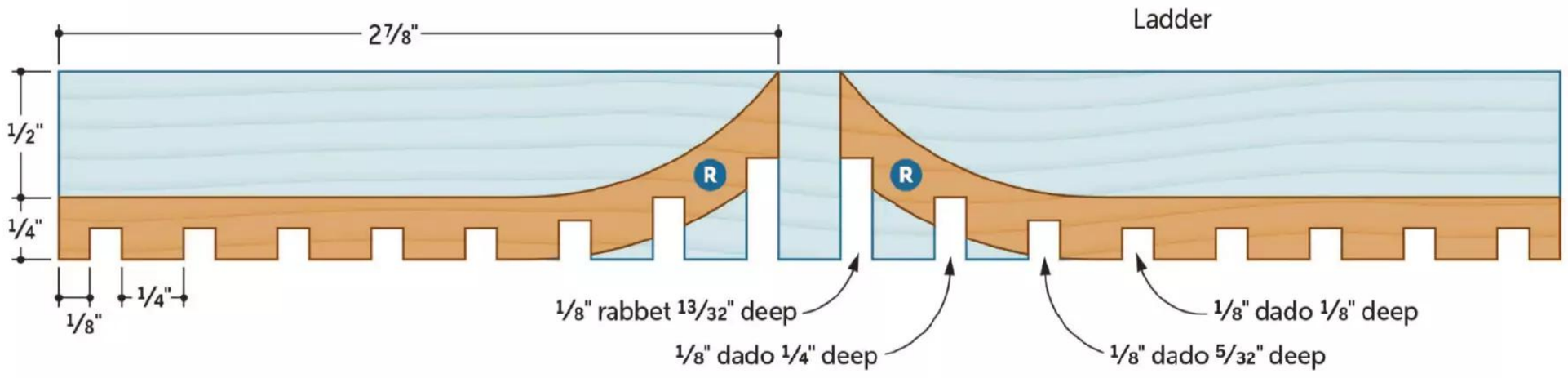
3 Glue the rail assembly to the bottom of the platform assembly (G–O), aligning the braces (Q) with the cradles (I) **[Exploded View]**. After the glue dries, wrap a tape flag around your 11/32" drill bit 1 3/4" from the end and extend the holes in the frame rail (P) through the cradles (I) and into the tank (L).

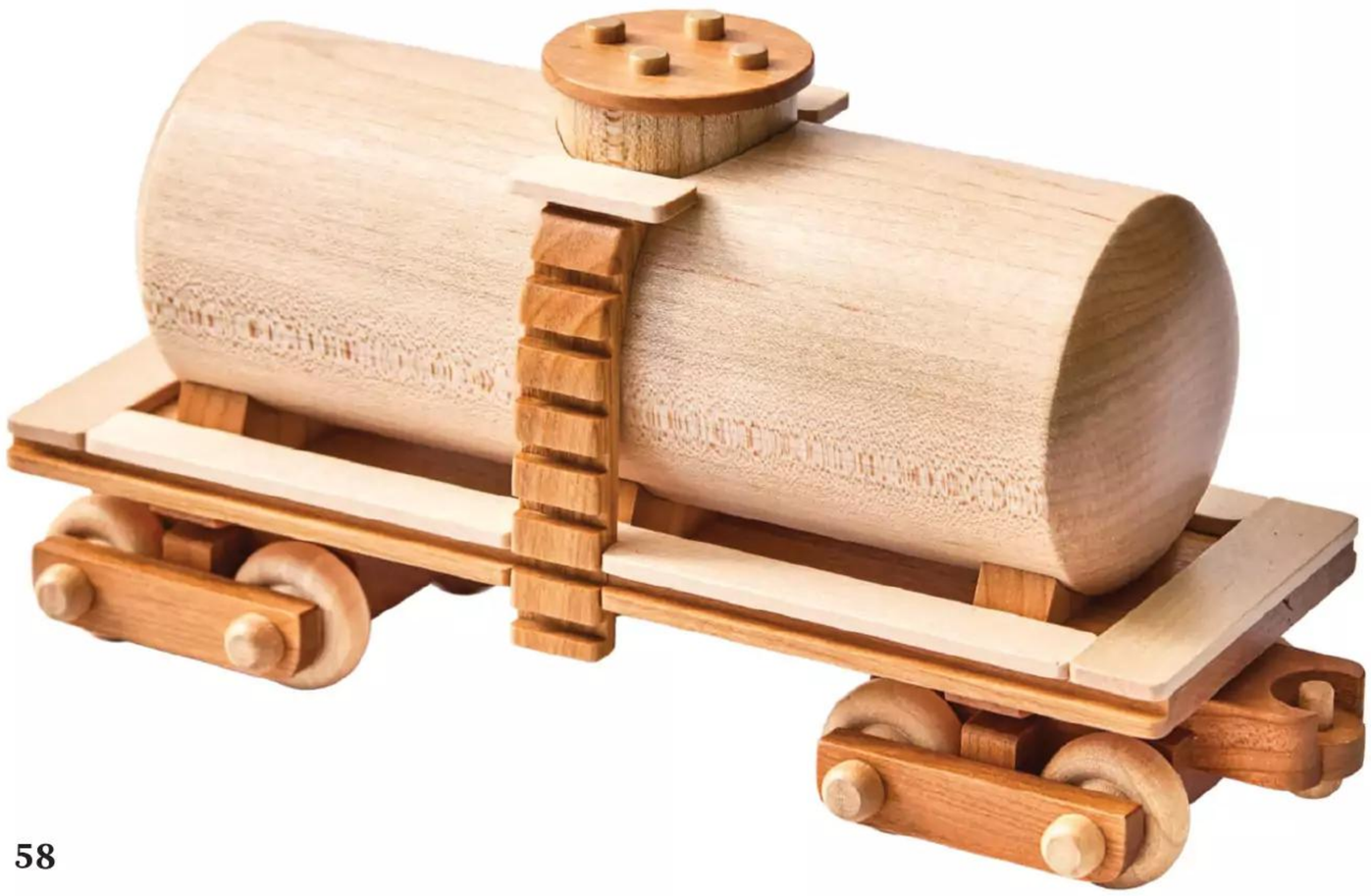
4 Glue a connector pin into the center hole in the frame assembly (P/Q) **[Drawing 3]**.

5 CHASSIS DETAILS



6 LADDER FULL-SIZE PATTERN





> **BEING MADE OF MAPLE, THESE CARS ARE WELL SUITED FOR CARRYING SOME SORT OF SYRUP.**
>
> ***-JOHN OLSON, DESIGN EDITOR***

STEP UP TO THE LADDERS

Note: The first five kerfs are 1/8" deep. The last three are each a bit deeper than the previous one. Refer to **Drawing 6**.

1 From 5/8"-thick cherry, cut a 3/4×6" blank to make both ladders. Spray-adhere a copy of the ladder full-size pattern **[Drawing 6]** to the edge of the blank. Bandsaw and sand the inside profile so the curves fit snug against the tank, but don't cut the ladders apart yet.

2 Clamp a stopblock to an auxiliary fence on your miter gauge. Cut kerfs 1/4" apart across the ladder blank to create the rungs **[Photo J, Drawing 6]**.

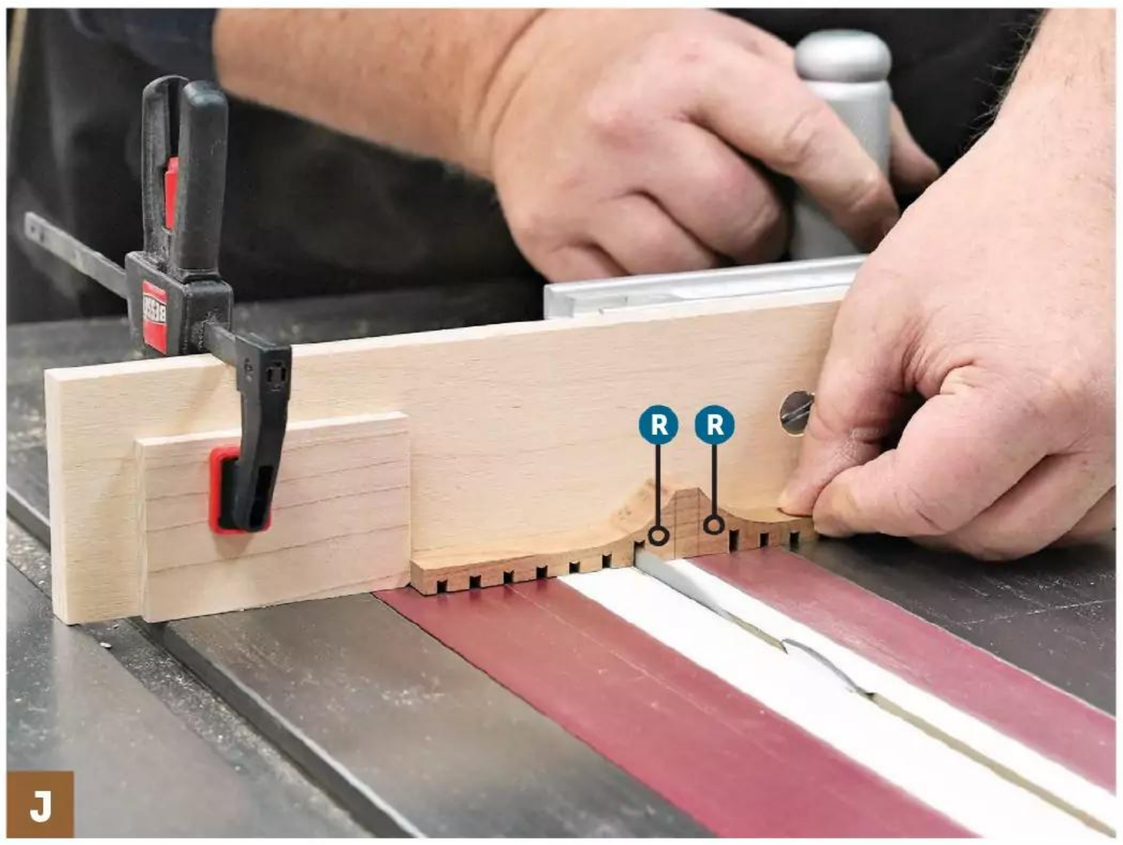
3 Bandsaw and sand the outside curve on each ladder **[Drawing 6]**. Sand 1/16" round-overs on the ladder edges and finish-sand the ladders.

TIP!

Try to align a kerf between the ladder rungs with the rabbet in the platform sides (G).

4 Apply a dab of glue to the notches in the platform sides (G) and catwalk sides (J), and to the curved portion of the ladders. Glue the ladders in place.

5 From 1/8" maple, cut the ladder catwalks (S) to size, ease the edges with sandpaper, and glue one to the top of each ladder **[Exploded View]**.



Locate the stopblock on your miter gauge to position a kerf. Make a cut in the ladder (R) blank, rotate it end for end, and make a cut on the opposite end. Reposition the stopblock and repeat.

THE END OF THE LINE

1 Touch up any areas that need finish-sanding, easing any remaining sharp edges. Tape off 1/2" at the ends of the connector pegs to protect the glue surfaces, then apply a finish to all pieces. We sprayed on three coats of aerosol semi-gloss lacquer with the assemblies upright, lightly buffing between coats with 0000 steel wool, and blowing off the dust with compressed air. Then we flipped everything over and repeated to apply three coats on the bottom faces.

2 Remove the tape from the connector pins. Using a cotton swab or small dowel, apply glue to the walls of the holes in the underside of the tank (L). Push connector pins through the trucks, then attach the trucks to the tank **[Exploded View]**. Clean up any squeeze-out immediately and make sure the trucks still pivot freely. Allow the glue to dry.

3 Now that your new tank car has made the grade, hitch it to your engine and other rolling stock, and blow off some steam.

PARTS LIST

PART		FINISHED SIZE T	W	L	Matl.	Qty.
A	TRUCK FRAMES	5/8"	1 1/2"	2 1/8"	C	2
B	TRUCK SIDE FRAMES	1/4"	1/2"	2 1/8"	C	4
C	SPRING GROUPS	3/8"	13/32"	5/8"	C	4
D	TONGUES	1/4"	1/2"	3"	C	2
E	TONGUE EXTENSION	1/4"	1/2"	1 1/4"	C	1
F*	HITCH SHROUD	1/2"	1"	1 1/8"	C	1
G	PLATFORM SIDES	1/4"	1/2"	8 1/4"	C	2
H	PLATFORM ENDS	1/4"	2"	1"	C	2
I*	CRADLES	1/2"	2"	39/64"	C	3
J	CATWALK SIDES	1/8"	1/2"	7"	M	2
K	CATWALK ENDS	1/8"	5/8"	3"	M	2
L	TANK	2 1/2" diam.		7 1/4"	MD	1
M	HATCH	1 1/2" diam.		1 1/4"	MD	1
N	HATCH COVER	1/8"	1 5/8" diam.		C	1
O	VALVES	1/4" diam.		1/2"	MD	4
P	FRAME RAIL	3/8"	3/4"	6 3/4"	C	1
Q*	BRACES	3/8"	1/2"	7/8"	C	6
R*	LADDERS	5/8"	3/4"	2 7/8"	C	2
S	LADDER CATWALKS	1/8"	1/2"	1 1/8"	M	2

*Parts initially cut oversize. See the instructions.

MATERIALS KEY: C–cherry, M–maple, MD–maple dowel.
BLADE AND BITS: Dado stack; 9/64", 7/32", 11/32", 3/8" brad-point drill bits; 1/2", 5/8", 1 1/2" Forstner drill bits; 45° chamfer, 1/4" round-over router bits.
SOURCE: Train Tank Car Kit no. RS-01471, $47, woodstore.net/tankcarkit.
PROJECT COST: It cost us about $70 to build this project. Your cost will vary by region and source.

OUR FAVORITE WIPE-ON FINISHES

Kiss brush marks goodbye and ditch the need for spray equipment with a wipe-on topcoat. We use them all the time because they're easy to apply, predictable, and they look great. Here are the oil-based wipe-on finishes we rely on most.

General Finishes Arm-R-Seal

We've used Arm-R-Seal on many projects over the years and have always been happy with the results. This urethane resin adds a warm amber color as it builds a durable, but not-too-thick, film in two to three coats. While a rag works great for application, we prefer a foam brush to apply a liberal but controlled coat. After letting it sit for only a moment, wipe away excess in long, light strokes with a rag dampened in the finish, or with the same foam brush after blotting it almost dry. Arm-R-Seal is available in satin (our preference), as well as semi-gloss and gloss sheens.

General Finishes, ***generalfinishes.com***
Arm-R-Seal Satin quart no. ASQT, $38

Arm-R-Seal Satin on cherry

PHOTOGRAPHERS: BRIE GOLDMAN, JACOB FOX, DAVE STONE

Shop-Made Wipe-On Polyurethane

Creating your own wipe-on finish is simple, usually costs less, and allows customization. Just grab a can of oil-based polyurethane, some mineral spirits, and mix equal amounts of the two together in a glass jar. For deeper penetration and faster dry time, add a bit more mineral spirits. Or build a thicker film in fewer coats by increasing the amount of poly.

Varathane, *rustoleum.com*
Ultimate Polyurethane Satin quart no. 9161H, $20

Sunnyside, *sunnysidecorp.com*
Low-Odor Mineral Spirits quart no. 80332, $12

Polyurethane and mineral spirits blend on walnut

Minwax Wipe-On Polyurethane

Large projects can consume a lot of finish, as well as finishing time. Minwax Wipe-On Polyurethane (available in satin and gloss) goes on quickly and is ready to recoat in just two to three hours, making it easy to build several coats in a day while still imparting the warm color of an oil-based finish. Plus, Minwax is almost always available at your nearest hardware store or home center.

Minwax, *minwax.com*
Fast-Drying Wipe-On Polyurethane, Warm Satin pint no. 40910000, $21

Fast-Drying Wipe-On Poly on Baltic birch plywood

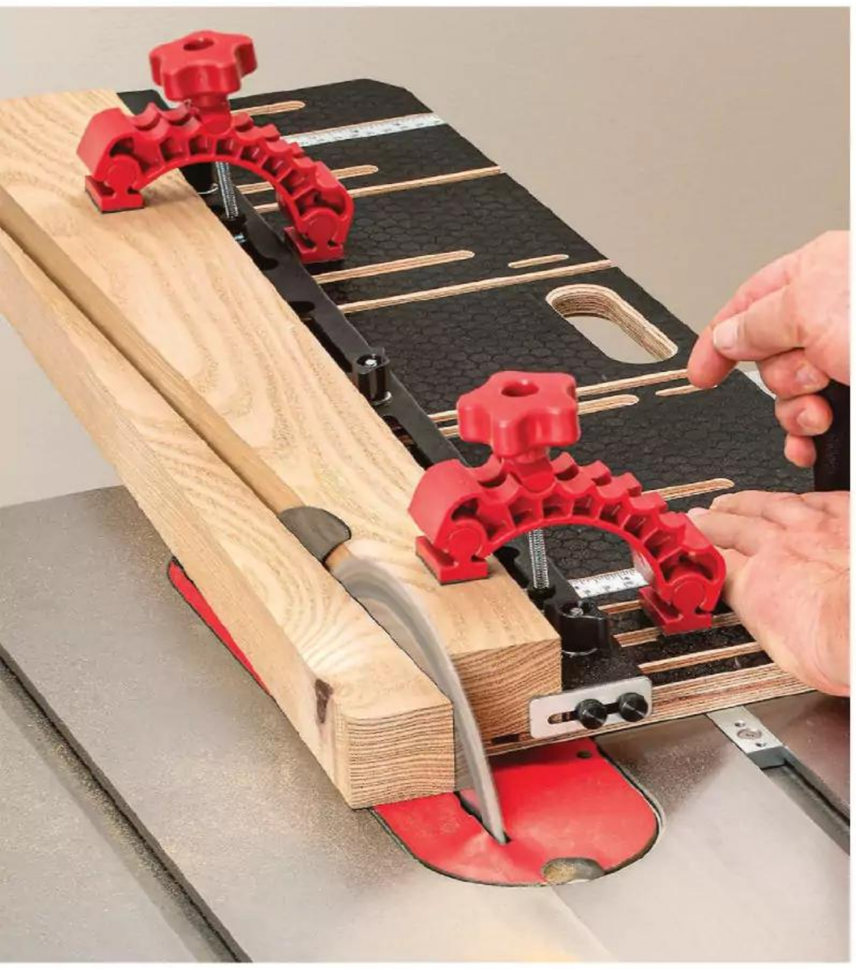
Watco Danish Oil

Danish oil penetrates into the wood, providing the look and feel of a traditional oil finish, but with the hardening properties of varnish that make it more durable. We often use the "Natural" color alone. With 15 colors to choose from, Watco Danish Oil also works well as a subtle stain that can be sealed with a clear topcoat once dry. Blending the colors creates custom hues.

Watco, *rustoleum.com*
Natural Danish Oil pint no. 65751, $15; Dark Walnut Danish Oil pint no. 65851, $15

Watco Natural on oak

Watco Dark Walnut on maple



NEW & UNTESTED

SLED CUTS TAPERS AND STRAIGHT-LINE RIPS

A new sled from Woodpeckers is filled with features designed to make it a multipurpose tablesaw accessory. They start with a plywood base that's covered with a slippery resin coating on the bottom and a phenolic top face with raised, knurled dots that grip the workpiece. Slots running across the base accept the included hold-down clamps, as well as track clamps. A lengthwise slot near the blade-side edge accepts shop-made stops.

The sled rides on a 36"-long miter bar that allows extended infeed and outfeed support for tapering long pieces, or for straight-line ripping one edge of a longer board. Patented self-adjusting springs in the miter bar are designed to ensure a tight fit in ⅜×¾" miter slots. The bar is removable with a few screws to allow guiding the sled using the saw's rip fence when working with wide pieces. The sled's hold-down clamps mount to the fence using keyhole slots.

A steel fence aligns your desired taper to the sled's edge. Scales spaced at 24" allow you to easily convert tapers measured in degrees to rise-over-run measurements. A retractable hook on the fence helps push your workpiece.

Woodpeckers, *woodpeck.com*
Taper Sled no. TSL-32, $220

SHOP-TESTED

MINI BLOCK PLANE MAXIMIZES FEATURES

Tester: Craig Ruegsegger

At just 4⅜×2⅜", this little plane fits perfectly in an apron pocket where you'll reach for it often to cut a quick chamfer or to touch up a surface. It's equipped with an adjustable throat plate, blade depth and skew adjustments, and two blade positions on the frog to increase blade projection. The 1"-wide blade has a 25° primary bevel with a 5° micro-bevel and rests bevel-up on a 12° frog for an effective 42° cutting angle.

Fit and finish set this plane apart. The knob for adjusting blade depth operates so smoothly that I thought I was feeling backlash rather than adjustment. Closer inspection showed the blade moving—about 0.003" per revolution. Retractable aluminum side plates adjust for planing a workpiece to a consistent thickness up to ¾", *above*. I used them to easily plane cherry strips to 1/16" thick.

The tool arrived with the blade fully sharpened, polished to a mirror-shine on both faces, and capable of peeling off see-through shavings. While this plane won't replace my standard block plane, it will likely see frequent use for small and quick jobs needing a precise touch.

Bridge City Tool Works, *bridgecitytools.com*
Mini Block Plane no. HP-8v2, $149

SHOP-TESTED

CROSSCUT SLED OFFERS EASY ACCURACY

Tester: Dave Stone

Rockler builds its crosscut sled from ½"-thick phenolic that slides easily on the saw table but has the heft to avoid tipping, even under the weight of the 5/4 oak boards I cantilevered off its edge. The aluminum fence adjusts accurately for angled cuts and has a telescoping outrigger that supports long boards. A micro-adjustable stop provides 38¼" of capacity and flips out of the way when not needed. The removable hold-down clamp secures long boards or wide panels effectively and keeps my hands away from the blade when cutting small pieces.

Sold separately, the drop-off platform proves an integral part of the system. It supports cutoffs, creates a zero-clearance blade opening, and allows extending the sled's adjustable, replaceable fence face beyond the blade. A removable stop offers about 7" of cutting capacity.

With its simple setup, accuracy, and quality construction, this system quickly replaced my shop-made version as my go-to crosscut sled.

Rockler, *rockler.com*
Tablesaw Crosscut Sled no. 77295, $250; Crosscut Sled Drop-Off Platform no. 79563, $65

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A GLIMPSE INSIDE THE JUNE ISSUE (ON SALE MAY 15)

SHOP TEST: CORDLESS SANDERS
We test a dozen random-orbit sanders head-to-head. Which will be declared the winner and which will be left in the dust?

CLOSET MAKEOVER
Multiply a basic closet's storage and flexibility with a deceptively simple build. Size it to fit your space with only minor modifications.

SECRETIVE CELLARETTE
This beautiful cabinet masquerades as a Prohibition-era bookcase that hides your bottles from 18th Amendment scrutiny. But a spin of its face repeals its secrets.

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