

ISSUE 301 MARCH 2025

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PROJECT PLANNER OR SEAT-OF-THE-PANTSER?

DO YOU PLAN OUT YOUR PROJECTS METICULOUSLY OR THROW CAUTION TO THE WIND AND DIVE IN TO THE BUILD?

I've been recently reminded that new tools come with consequences—you often have to rearrange your shop, buy new accessories, build all-new jigs to fit. Over the years, I've learned that I should pause, consider those consequences, and form a plan before I purchase or upgrade. And then I throw what I *should* do out the window and buy straightaway, because ... new tools!

Which is why I find myself with blades, bits, pushblocks, miter gauges, etc. strewn across my shop while I rebuild the storage under my upgraded tablesaw and router table. The first of those two projects—underwing tablesaw storage—I planned out meticulously. I measured for critical dimensions, drew it out in CAD, and purchased all of the materials and hardware before I started. For the second project, I decided I'd cobble as I went using scrounged scrap, piece-by-piece, between the legs of the router table stand.

Guess which of these two projects looks like it was designed to fit perfectly in its space and which is on pause while I try to figure out how to drive screws in an inaccessible and slightly out-of-square drawer cavity? Let's just say I might not be a good seat-of-the-pantser.

As you read this, I'll be carrying that lesson into what we on the WOOD® staff imaginatively call "Issue Planning." Throughout the year, we're constantly gathering ideas, considering trends, and collating reader feedback. We will soon sit down to discuss, map, and finesse the topics you'll be reading about for the next year or so.

Of course, nothing is set in stone, but that careful consideration ahead of time means that each issue comes together looking purpose-built rather than a cobbled-together Franken-zine. We work hard to ensure that a year's worth of issues covers a broad range of topics, skill levels, and interests.

It also means that now—right now!—is the best time to send in any suggestions that you'd like to see in the magazine. Got a project that's always been on your bucket list? Pass it along. Have a technique that you've been dying to learn? Let us know. Considering the purchase of a tool you'd like to see us review? Drop a line to woodmail@woodmagazine.com. We're happy to toss your article ideas onto the table for consideration.

Then get out to the shop and build something. We'll help. 🌱

Lucas

LUCAS PETERS

✉ lucas.peters@woodmagazine.com

📷 @peters.lucas

EDITOR-IN-CHIEF LUCAS PETERS
MANAGING EDITOR DAVE STONE
CREATIVE DIRECTOR JESSICA ENO
SENIOR DESIGN EDITOR KEVIN BOYLE
DESIGN EDITOR JOHN OLSON
ADMINISTRATIVE ASSISTANT CHRISSY TASSIN

CONTRIBUTING CRAFTSMEN JIM HEAVEY, BRIAN BERGSTROM

PHOTOGRAPHERS JASON DONNELLY, CARSON DOWNING, JACOB FOX, BRIE GOLDMAN, KELSEY HANSEN

CONTRIBUTING EDITORS VINCENT ANCONA, ZACH BROWN, KEN BURTON, KERRY GIBSON, RANDY MAXEY, CRAIG RUEGSEGER

CONTRIBUTING ILLUSTRATORS LORNA JOHNSON, ROXANNE LEMOINE, CHRISTOPHER MILLS

PROOFREADERS SAM CADY, BABS KLEIN, MARK LANE

ADVERTISING AND MARKETING

PUBLISHER

MARTY WOLSKE

ACCOUNT EXECUTIVE BRIAN KOSSACK
brian.kossack@woodmagazine.com

ONLINE MEDIA KIT woodmagazine.com/mediakit

BUSINESS MANAGER DARREN TOLLEFSON

CONSUMER MARKETING MANAGER KARLEE BAHLMANN

SENIOR PRODUCTION MANAGER COURTNEY PETERSON

PREPRESS DESKTOP SPECIALIST SOPHIA MOZENA

COLOR QUALITY ANALYST SARAH SCHROEDER

PRESIDENT, LIFESTYLE

ALYSIA BORSA

SVP & GROUP GENERAL MANAGER, HOME

MÉLANIE BERLIET

SVP, AI OPERATIONS

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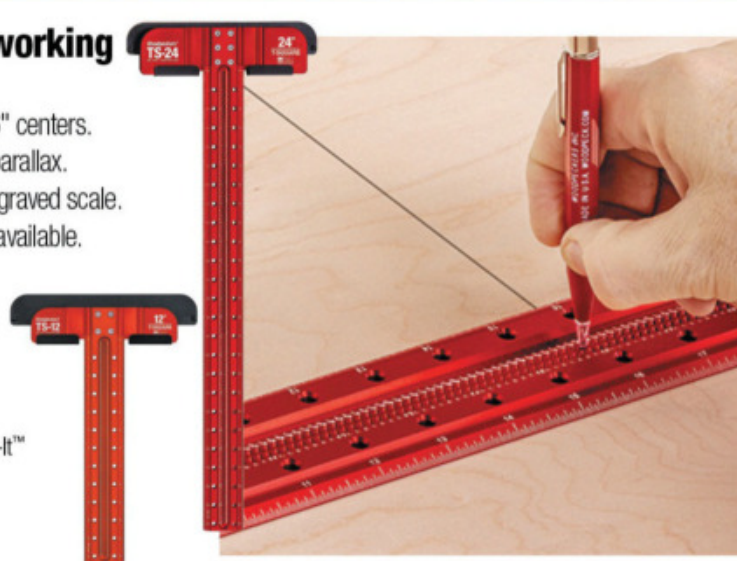
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Issue No. 301 | March 2025

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This outdoor chair is comfy to sit in, effortless to rise from, and easy to build. We packed our entire lounging wish list into a single, singular seat.
- 38 THREE-TIERED TOOL CHEST**
Elegant design makes this capacious chest a luxurious home for your tools. But straightforward tablesaw joinery keeps it an easy build.
- 56 FULLY LOADED HOPPER CAR**
This pint-sized hauler features outsized details like sliding roof covers, a reversible load diverter, angled end panels, and a working dump gate.
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Haring today, Gauguin tomorrow? Display your young artist's latest works whether they're in their contemporary or post-impressionist period.



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PLANE PICKIN'S

These plane facts will help you discover the bliss of seeing wispy curls and a glass-smooth surface. It's an addiction. Using a well-tuned hand plane can cause distractibility, a lost sense of time, and a woodworker's high.

• **The Mighty Block Plane**
woodmagazine.com/ontheblock

• **Cut the Cord With These Popular Planes**
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BOXED IN

As a woodworking and design teacher, I want to thank *WOOD*® magazine for being a great resource. It has helped develop many projects for my students.

The “Secret-Compartment Jewelry Box” featured in issue 157 (September 2004) has been a favorite. When building their boxes, students learn about machine safety, material selection, joinery, and finishing.

Other popular projects from *WOOD* include the “Tile-Topped Keepsake Box” (issue 173, November 2006), the “Remote Control Holder” (issue 183, May 2008), the “Telephone Stand” (issue 190, May 2009), and the “Decorative Keepsake Box” (issue 269, September 2020). With *WOOD* magazine’s help, we have encouraged and inspired many young people to develop a passion for woodworking.

Jim Wickens

Auburn, Washington



Thanks for the kind words, Jim, and for taking the time to share your students’ work. We are thrilled to take part in encouraging young folks to explore woodworking.

Lucas Peters

Editor-In-Chief



Purchase plans for the
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[woodstore.net/
jewelrybox](http://woodstore.net/jewelrybox)



YOU SAY YOU SAW RESAW?

Job well done by Vince Ancona in the article “Thick to Thin” in issue 297 (September 2024).

I have thoroughly researched resawing on the bandsaw over the years and I found the article very informative.

One thing I’d add: Some bandsaws have two speeds. The slower speed is appropriate for carbide-tipped blades when resawing dense hardwoods like purpleheart and Brazilian cherry.

Everett Israel

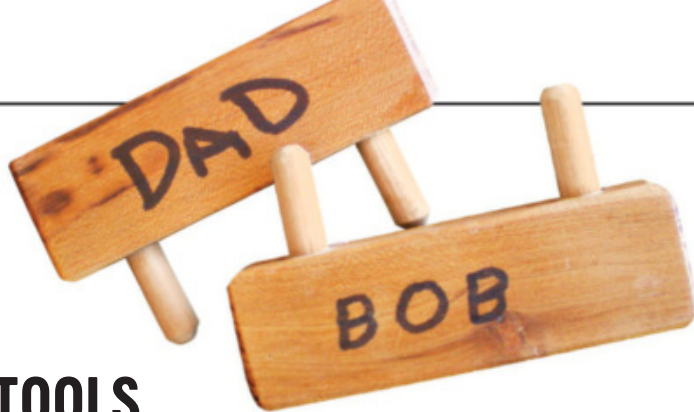
via email

As I read through the plans for the “Top-Tier Tool Chest” featured on the cover of issue 283 (September 2022), I realized my skill set is quite different than seven years ago when I took up woodworking. I’m no longer a novice. Even so, this project challenged me. You provided the plan, but I had to apply my skills to complete the build.

My version uses walnut for the case with quartersawn sycamore for the drawers. The sycamore came from a friend’s property in southwest Virginia. I finished the case with Watco natural oil. For the drawers, I used water-based polyurethane sanded to 400 grit, then applied wax with 0000 steel wool.

Lawrence Hincker

Blacksburg, Virginia

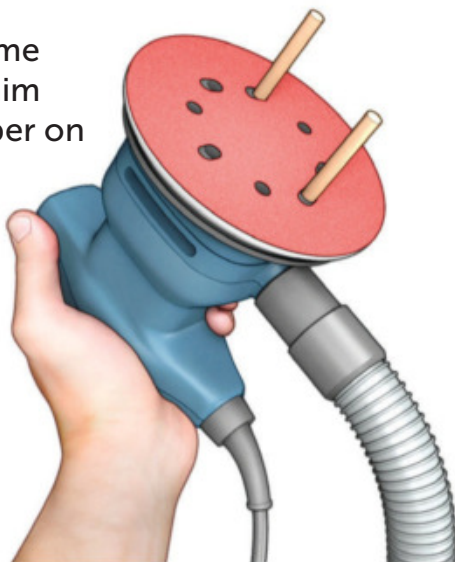


TIPS AND TOOLS

I recently stumbled upon the Shop Tip “Locked and Loaded” by Maryann Kusin in issue 292 (November 2023) where she uses dowels to position a sanding disc on a sander. Maryann’s tip reminded me of a similar idea by my dad, Dean Sawin, who included a handle to make a one-piece tool.

I still have this tool he made for me back in the early 1990s. I think of him every time I put a piece of sandpaper on my random-orbit sander. It brings back lots of memories of our time together in his workshop. Dad, a former woodworking instructor at our high school, has been gone nearly 20 years. But the woodworking skills he taught me live on in my shop every day.

Robert Sawin
Rye, Colorado



I received a set of two hand planes by Melbourne Tool Company for submitting the Top Tip in issue 295 (May 2024). Not owning a jointer, I use hand planes frequently. After using these planes for several months, I have to say these are among the finest that I have ever used. I frequently use old Bailey and Stanley planes along with a few Veritas and Record planes. These Melbourne planes are now the first ones I reach for, especially when I have highly figured wood or end grain to be planed. Highly recommended.

Tom Peters
via email

We’re glad you like the planes, Tom. We encourage our readers to submit Shop Tips (see page 20) for their chance to score sweet tools—not to mention the immortality of being published in their favorite woodworking magazine.

Randy Maxey
Contributing Editor



THE JOYS OF TOYS

I have enjoyed building the whole Mil-Spec project series and I’m hoping you might reintroduce the series. I would love to see a P-51 and a B-1. The SR-71 would be the crown jewel. Let’s not forget the F-22, B-2, and B-29. I’ve been building these planes for my son for Christmas for 10 years. One year we built the AC-130 gunship together. I don’t want to miss another Christmas, so please help a guy out and give us other plane designs.

Sam Seybert
via email

Great work, Sam. We’re glad you’ve enjoyed those toys. I don’t know if we’ll ever expand the Mil-Spec collection, but we do have lots of fun, interactive toys. Check out the Timber Line Express train series (the latest car is on page 56), as well as our Construction-Grade series at woodstore.net/work.

John Olson
Design Editor



MAIL CALL!

My husband built this fabulous mailbox post featured in issue 297 (September 2024). It was a joint collaboration: He built the post but I added the mosaic address numbers and decorative inlays.

LeAnn Dickson
Fort Bragg, California

THAT’S A TINY SHOP!

Jeff Green’s shop in issue 293 (December 2023/January 2024) really caught my eye. I’m in the middle of developing my own 16x19’ shop and his provided a lot of great ideas. Who would have thought all those cabinets, benches, and tablesaw/router combo would fit into a 15x15” space as shown in the floor plan illustration! Seriously, though, kudos to Jeff. 🌲

Jay Kaknes
via email

Well, Jay, you are very observant for catching our error in the shop floor plan! Of course, the shop dimensions should be 15x15 feet, not inches. We like to throw “errors” like this in on occasion to make sure we get great letters to publish. Yeah, that’s it. Yeah.

Randy Maxey
Contributing Editor



After suffering a stroke, **JEFFREY WILLS** of Tomah, Wisconsin, experienced short-term brain damage that affected his speech, memory, and thought processes. Wondering if the stroke affected his woodworking skills, he made this rocking horse for a cousin's newborn, Brody, using maple, cherry, and walnut. Jeffrey was pleased with the outcome despite the challenges.

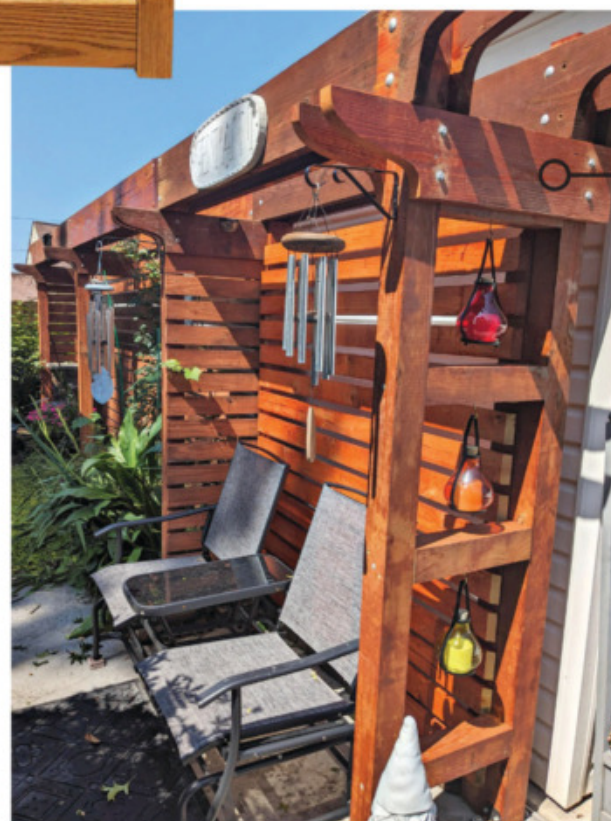


PAUL ENGLE of University Place, Washington, designed and built this pair of chairs as well as an accompanying table that his wife uses for assembling jigsaw puzzles. He used English walnut and birds-eye maple for the chairs. The table is walnut and white oak. He finished them with a medium walnut stain followed by spray-applied satin oil-based polyurethane.

LEO MARTIN of Chelmsford, Massachusetts, made this ice chest from red oak using a hardware kit from Rockler (rockler.com). Leo's daughter, Cheryl Dow, says Leo crafted this one from memory as a replica of one he saw as a child. "His passion for detail shows in all his work," Cheryl says.



GARY ROHS of Cincinnati, Ohio, made this blanket chest for his wife. She had always wanted one made from mahogany. Gary inlaid bowties in the battens of the lid to give the impression of butterflies flying up when you open the top.



Janet Rote, wife of **DAVID SPINNER** (Wickliffe, Ohio), designed this pergola to cover up the side of their garage and create a park setting in their backyard. David built it using 10' 4x4 posts with 1x4 slats. The top was constructed with 2x10s and 2x8s. All was treated lumber with an applied stain. Janet says their backyard now looks like a sanctuary.



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D Dennis H. Verified Buyer
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• **JEFF KOWELL** of Colorado Springs, Colorado, designed and built this desk for his daughter, incorporating an alder frame with wormy maple top and drawer fronts. Having designed this project from scratch, he considers it a turning point in his woodworking.



• Tired of batteries getting scattered and lost, **JOHN YOUNG** of Baraboo, Wisconsin, designed and built this battery center that holds AA, AAA, C, and D cells. The drawer holds 9-volt and watch batteries.



• When his wife saw a coat rack and umbrella stand in an antique store, **DAN WESSELL** of Jamestown, New York, took a few photos of it. Using the floor tiles in the photo as a reference for the dimensions, he designed then built his own. He made his version from quartersawn white oak, white oak veneer, and copper-clad aluminum for the umbrella base. Antique door knobs of various shapes serve as coat hooks. Since then, Dan has built several other racks, including one he donated to a local charity that sold for \$1,600.

In memoriam

Judy Gale Roberts, a world-renowned expert in intarsia, passed away on September 2, 2024 at the age of 68. We first featured Judy's spectacular wooden mosaics in issue 24 (August 1988), where she also graced the cover. More projects appeared in issues that followed.

One of Judy's most famous pieces, "For All Mankind," below, commemorates the 50th anniversary of the Apollo space missions and hangs at the Kennedy Space Center. The piece consists of more than 1300 pieces of wood, some from a sycamore tree grown from seeds that made a trip to space.

You can see more of Judy's creations on intarsia.com, the site she founded and turned into the go-to source for all things intarsia, including patterns, tools, supplies, DVDs, and books. Judy's husband, Steve, along with other longtime staffers continue running Judy's site as her living legacy.

Though Judy is no longer with us, her impact lives on, inspiring others to explore the art of intarsia.



• After spotting Jamie Simmons' repurposed baby grand piano in issue 289 (July 2023), **GILBERT JENNETT** of Houston turned an old baby grand piano with a cracked sound board into a "piano bar." An old teak entertainment center forms the base cabinet, while a fold-up shelf made from the music stand and other parts creates a fold-down shelf for mixing and serving drinks. Pressing the piano's soft pedal activates an electric lock, the sostenuto pedal turns on LED lights, and the sustain pedal works as a dimmer switch.



• **EDWARD BRADY** of Colorado Springs, Colorado, built this media cabinet to house his stereo system, plus his album collection in slide-out trays. Solid walnut with waterfall end joints makes up the case. He veneered the doors with zebrawood. 🌿



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A SHOP TO SHARE

Connection, creativity, and accomplishment bring an entire community of woodworkers together in a shared shop space.

WRITER: RANDY MAXEY



▲ Charlie Aumiller (second from right, front row), titled “Woodworker Emeritus” by his friends, was the prime woodworker for most of two decades. He helped the shop grow into a vital part of the community.



One wall features consolidated storage options in wall cabinets, under-bench storage drawers, tool racks, and an eclectic collection of steel cabinets.

The woodworking shop at the Frasier senior living community in Boulder, Colorado, serves a vital role. Sure, it scratches the resident woodworkers’ itch for a space to create, providing a well-equipped and safe workspace. But, more important, it brings educational opportunities and a sense of camaraderie to new and experienced woodworkers alike while serving the community of 500.

For more than 60 years, the small workshop on the 20-acre campus has benefited from tool donations. With each donation, better tools replace older ones, resulting in a collection of top-notch equipment. Tools that leave the shop get donated to local charities.

The shop resides on the ground floor of the oldest section of the building behind a locked door that limits access to those residents who have signed a

liability waiver after an interview with the Director of Facilities. He witnesses the signing of the liability waiver after ascertaining their woodworking experience.

Resident-to-resident training also occurs on a regular basis. For example, five women completed a seven-week course, “Women Working Wood.” The shop also hosted a training session for two individuals interested in a refresher course on using the tablesaw. But the most common form of education occurs when residents hang out in the shop and chat about all things woodworking.

Frasier, a nonprofit organization, updates utilities in the space as needed. They removed a defunct baseboard heating system to make way for new cabinets. Recent LED lighting upgrades replace the old fluorescent fixtures to enhance visibility and safety.



SHOW US YOUR SHOP

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



Large windows flood light into the shop, including onto the hub of the space: a large workbench. Dual vises and an ample benchtop serve multiple users well.

“
ONE OF THE GREAT JOYS OF LIVING HERE IS SHARING HOBBIES AND INTERESTS WITH OTHER RESIDENTS WHO ARE REMARKABLY ACTIVE, INTERESTING, AND ACCOMPLISHED.
 ”

-CURT ESHELMAN, RESIDENT

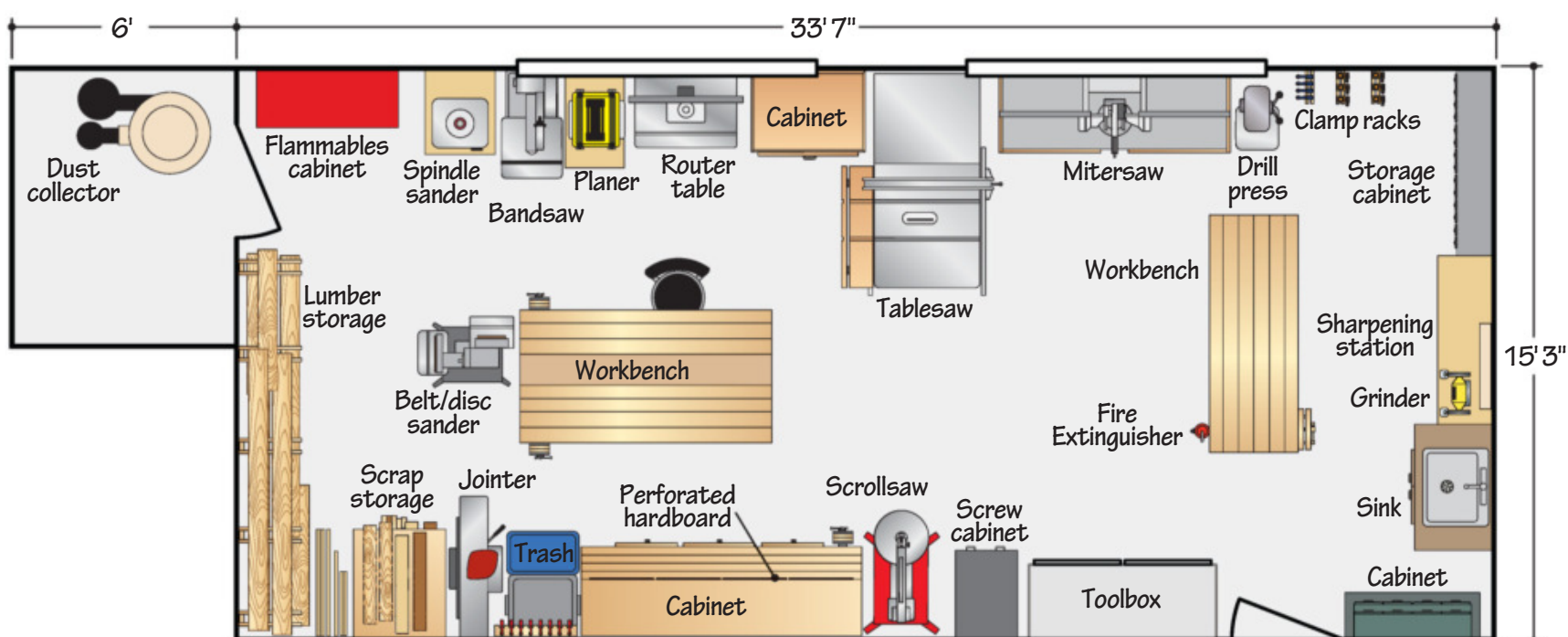
Fire safety is a high priority. The shop connects to the building’s sprinkler system, including the horn and strobe lights. A fire extinguisher mounted near the door provides additional protection. Woodworker Curt Eshelman recalls, “A fire inspector told me to mount the extinguisher near the door so your instinct is to go there, then make a choice: tiny fire, put it out; big fire, exit quickly and close the door behind you.” An emergency call system mounted near the door provides a direct line to help if it’s needed in a hurry.

Frasier woodworkers try to rely on water-based finishes but safely store flammable materials, such as oil-based finishes and solvents, in a steel cabinet designed for storing flammable materials.

A central dust collector feeds multiple tools through dedicated ductwork and shop-made plenum boxes mounted to walls. Each one features multiple blast gates and a remote power switch that controls the collector.



Featuring storage on the outside and inside of the hinged doors, this “Tool Repository” provides a home for a variety of hand and portable power tools with plenty of storage in the drawers below.





◀ Shop-made plenum boxes equipped with several gates connect multiple machines to the dust collector. An on/off switch on each box remotely controls power to the dust collector.



The newest addition to the shop, a SawStop table saw, replaces the old Delta Unisaw. The saw's blade-brake technology is already credited with preventing a potentially serious injury.

The shop is well-organized thanks, in part, to a variety of donated metal storage and tool cabinets. Every drawer and door in the shop bears a label describing its contents, making every fastener, piece of hardware, and tool accessory easy to access. Dedicated organization ensures that anyone can easily find items when needed, and return them just as easily when done, which helps keep the shared space running smoothly.

Overall, the shop is self-supporting. The woodworkers often do repairs for other residents without charge. Some residents make a donation in appreciation. Donations not tied to receiving services go to the nonprofit corporation. When a resident works on a large project, they buy their own wood and finishing material. For small projects, however, the shop provides materials free of charge. The goal is to make the shop user-friendly for woodworkers of all interests and skill levels.

Tomas Mendez, Vice President of Operations shares, "The Frasier woodshop is more than just a place to create—it's a space for connection, purpose, and lifelong learning. It encourages creativity, fosters friendships, and promotes a sense of accomplishment. The woodshop offers a fulfilling way to stay engaged and inspired at any age." 🌱

COMMUNITY ORGANIZATION

Donated cabinets make it easy for every shop user to find tools, hardware, and a myriad selection of woodworking tools, supplies, and accessories.



FASTENERS

An old computer punch card cabinet offers drawers that prove the right size for storing fasteners.



FINISHES & SOLVENTS

Flammable materials reside in this metal safety cabinet that seals to prevent fire.



HARDWARE & ACCESSORIES

Color-coded, labeled drawers in donated army field cabinets keep hardware like nails, nuts & bolts, and cabinet hardware organized.



TOOLS, SUPPLIES, & FIRST AID

Providing storage for small tools and accessories, this cabinet also features large drawers for safety equipment and first-aid supplies.



The Gold Rush of 2024



Glimmering 24k gold in a tungsten setting

Ah, my dear compatriots, allow me to share a tale of intrigue and fortune. Picture this: a venture into the heart of a South American goldmine, where the earth yields its treasures to the daring and the cunning. With every step as we follow Diego, our mining master, the air thickens with anticipation, the scent of wealth mingling with the thrill of the unknown.

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Q: WHERE TO GET STARTED WITH SHARPENING

I'd like to start incorporating some hand tools into my woodworking. What's a good, basic sharpening setup to keep chisels and plane irons in working condition?

Brian Albone
Findlay, Ohio

A: When it comes to sharpening, it's all too easy to get sucked into a black hole of opinions regarding the merits of different sharpening media, bevel angles, and microbevels. Leave those debates for the online armchair woodworkers and instead focus on just the basic supplies needed to keep your tools sharp.

At its simplest, sharpening involves using an abrasive to remove metal from the back and bevel of a tool to create two flat, smooth, intersecting planes that form a sharp edge. A lot of woodworkers start off with wet/dry sandpaper adhered to a piece of plate glass. We recommend going with a longer-lasting solution using sharpening stones or plates.

There are many sharpening stone options, but we like the simplicity of a combination coarse (325) and extra-fine (1200) grit diamond plate and an 8000-grit waterstone [Sources]. Use the coarse side of the diamond plate to quickly flatten the back and establish the initial bevel. Then use the extra-fine side of the plate to remove the coarse-grit scratches. After the diamond plate, move on to the waterstone to polish the surfaces for a mirror-like finish and a truly sharp edge.

While some woodworkers master the art of holding their tools freehand while

sharpening, we recommend a honing guide. A basic, side-grip guide will handle most chisels and plane irons and is straightforward to set up and use.

A few optional items will help round out your kit. A spray bottle is handy for misting the diamond plate and waterstone with water when sharpening. A rubber mat protects your workbench and provides a non-slip worksurface. And a jeweler's loupe or small magnifying glass allows you to examine the tool's edge to check your progress. Finally, you'll want a supply of paper towels or rags to keep things clean. 🌱

SOURCES:

- Coarse/extra-fine DuoSharp Bench Stone no. W8ECNB, \$128, DMT, dmtsharp.com, 800-450-2172.
- 8000-grit Shapton Glass Stone no. 834945, \$90, Woodcraft Supply, woodcraft.com, 800-535-4482.
- Veritas Side-Clamping Honing Guide no. 05M0940, \$50; eye loupe set no. 99W8301, \$8; Lee Valley, leevalley.com, 800-871-8158.
- Rubber mat no. 89956, \$24, Rockler Woodworking, rockler.com, 800-279-4441.



For more information on sharpening equipment, download the article at:
woodmagazine.com/sharpeningshowdown

TIP!

Use the coarse side of the diamond plate to occasionally flatten and maintain the waterstone.



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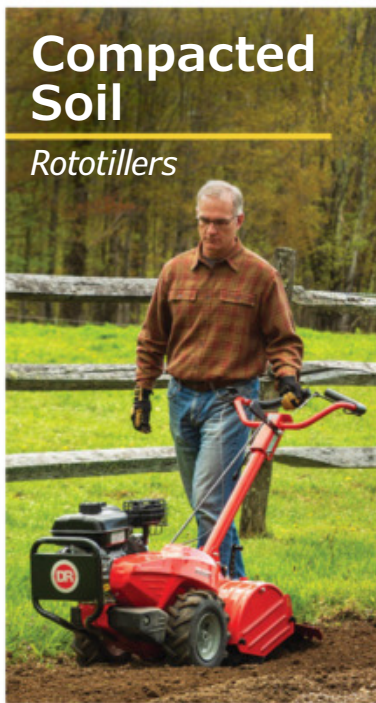
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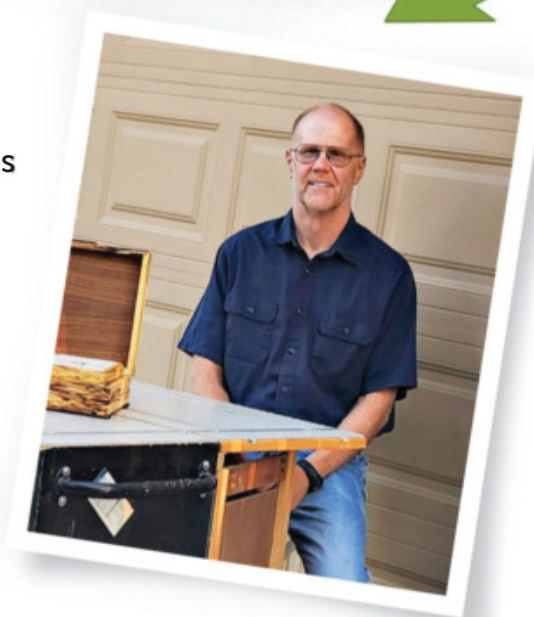
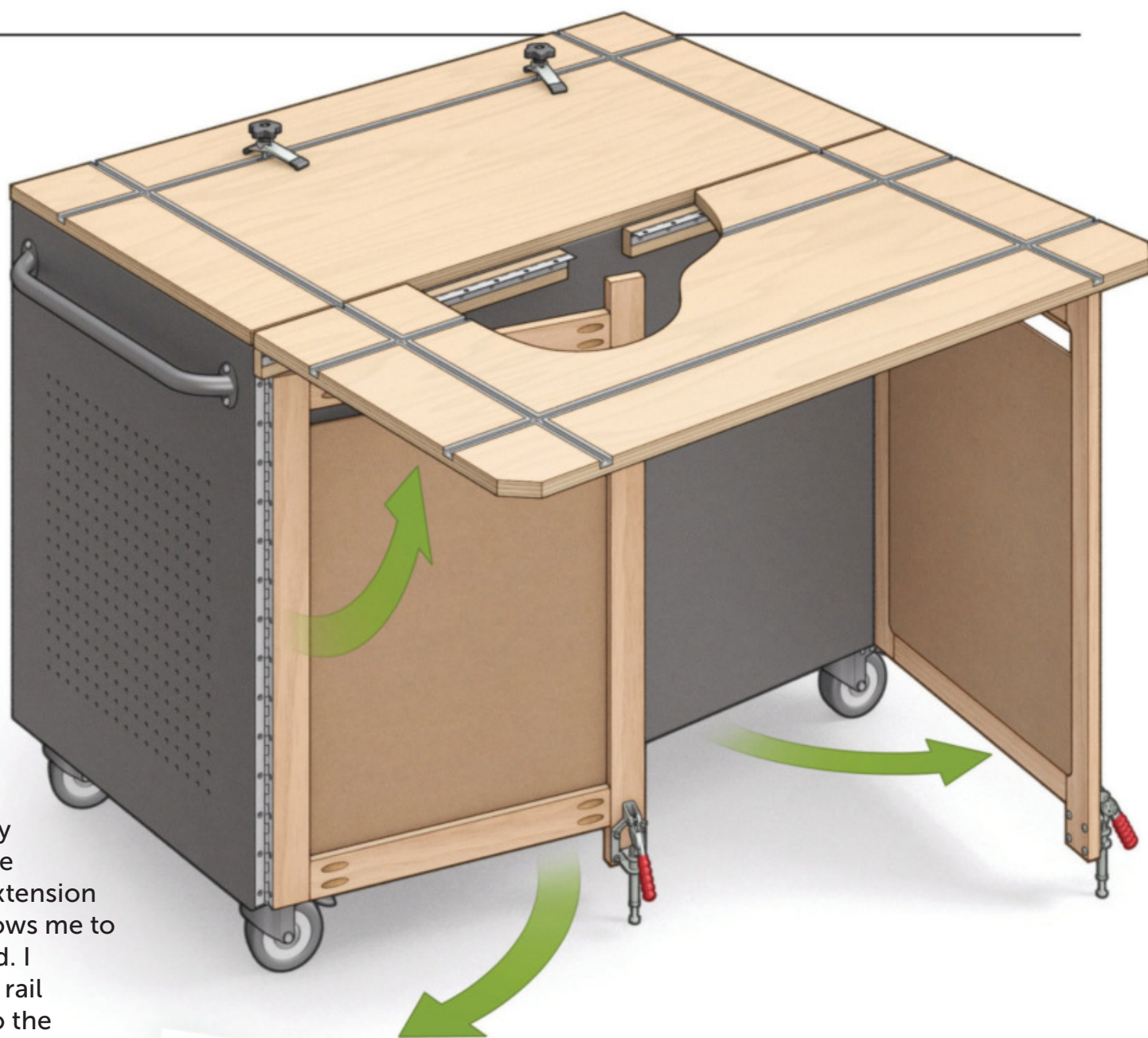
**TOP
SHOP
TIP**

TOOL CART CONVERSION

This rolling tool cabinet with a flip-up worksurface extension has proven to be one of the handiest additions to my shop. Using a metal tool cabinet as the base, I added a $\frac{3}{4}$ " plywood top. An extension table also made from $\frac{3}{4}$ " plywood allows me to expand the worksurface when needed. I attached it to a continuous hinge and rail mounted on the rear of the cabinet so the extension sits flush with the main top during use. Channels cut in the main top and in the extension accommodate T-track.

To support the extension, two hinged wings at each edge of the cabinet fold outward. At the bottom corner of each wing, I use a horizontal toggle clamp to lock the support in position and level the extension.

Bruce Hornberger
Ridgecrest, California



For his tip, Bruce wins a Rivercast epoxy system with pumps and accessories from System Three worth \$330.



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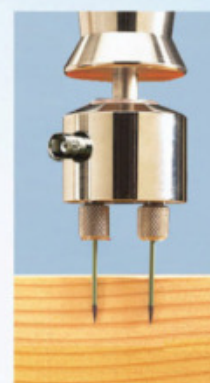
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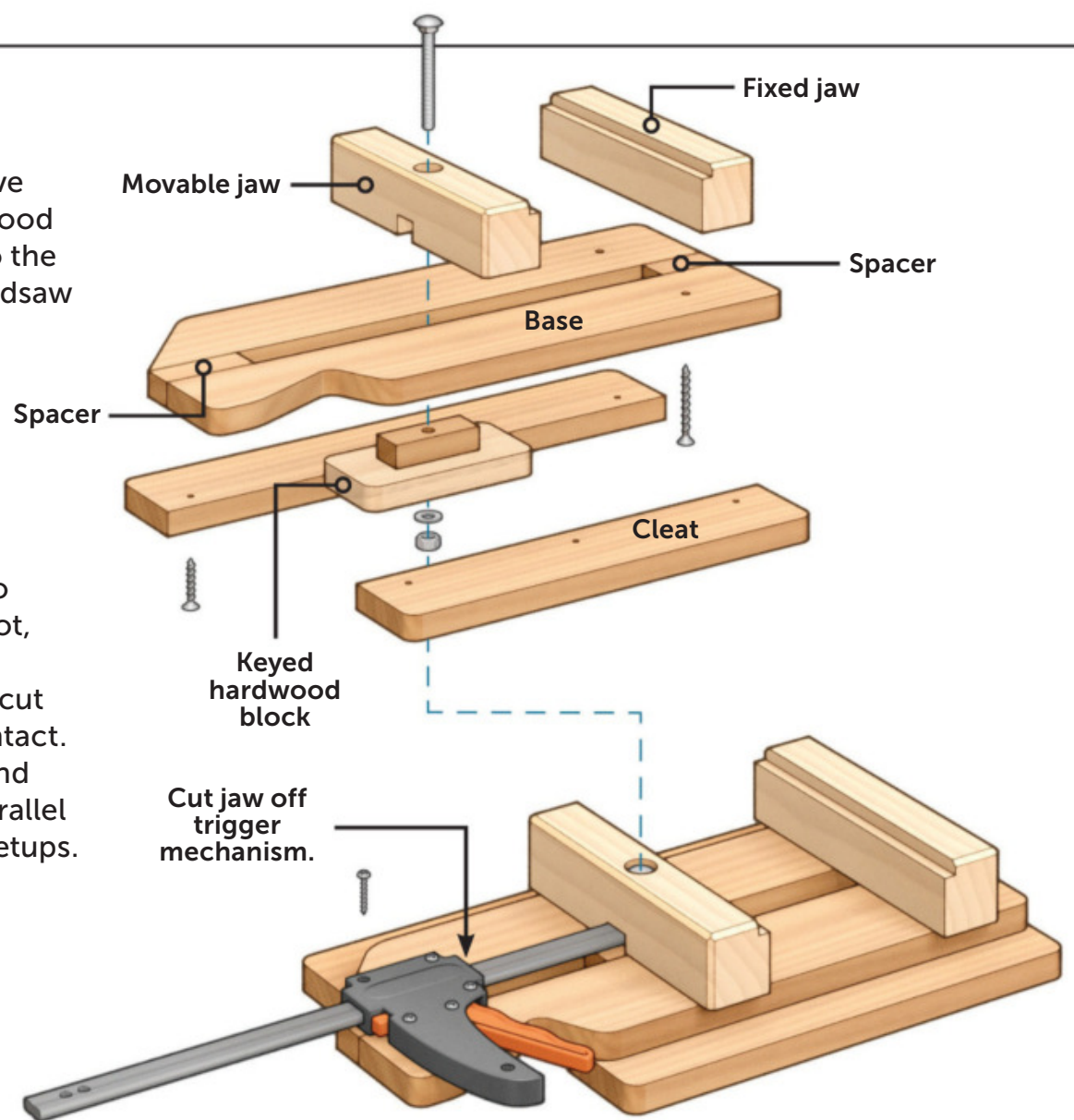
I made a quick-action drill-press vise from an inexpensive one-handed bar clamp. The vise features a slotted plywood base with cleats along the sides to facilitate clamping to the drill-press table. I shaped one end of the vise with a bandsaw to provide an anchor spot for the clamp handle while allowing free space to operate the clamp's trigger.

Two vise jaws, one fixed and one movable, feature a small rabbet along their top, inside edge to elevate a workpiece for drilling through-holes. I glued and screwed the fixed jaw to the base, keeping it square to the base sides.

A keyed hardwood block on the underside attaches to the end of the clamp's bar and slides along the base's slot, keeping the vise jaws parallel.

I removed the jaw from the end of the clamp bar and cut the jaw off of the trigger assembly, leaving the handle intact. I bolted the vise's movable jaw through the clamp bar and hardwood block on the underside. Being square and parallel on three sides, the vise allows for easy and repeatable setups.

Darl Gilliland
Otsego, Michigan



SPACED OUT

I build a lot of cabinets with inset doors, and it's always frustrating to get the gaps even around the door. My solution is to cut thin strips of hardwood to act as spacers and label their thickness. I set these in or tape them to the door frame to center the door in the opening, experimenting to find just the right thickness.

The spacers prove useful for other tasks like setting the height of router bits, so I measure and mark their thickness and keep them in an airtight jar for future use.

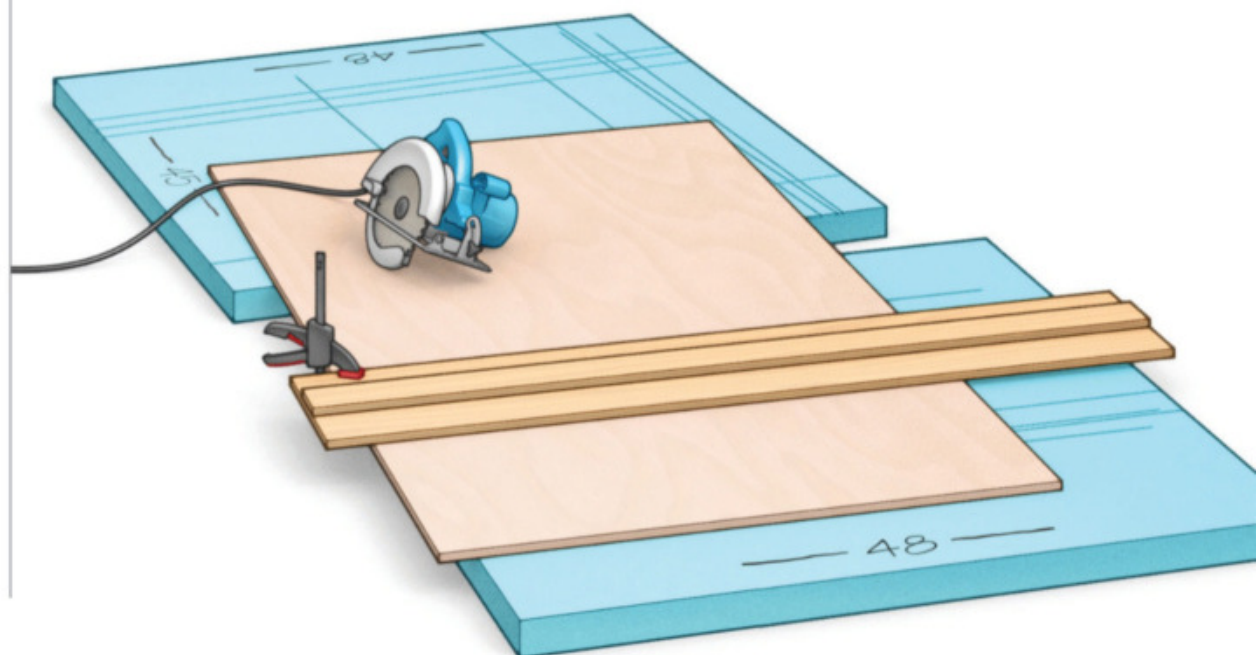
Bill Newcum
Syracuse, Indiana

TWO SHEETS TO THE WIND

I use a 2"-thick sheet of rigid foam insulation to support sheet goods when cutting them to size with my circular saw. But I split the 4x8' sheet into two pieces to make this easier. First, I cut 6" from one end and discarded it. Then I cut the remaining 90"-long sheet into two 45x48" pieces. Butting the shorter halves together provides clearance for a straightedge for full-length rip-cuts.

When cutting a partial sheet of plywood, one foam piece suffices without lots of extra to get in my way. Because the sheets are almost square, I labeled the dimensions near each edge so I can easily orient them properly.

Craig Ruegsegger
Altoona, Iowa

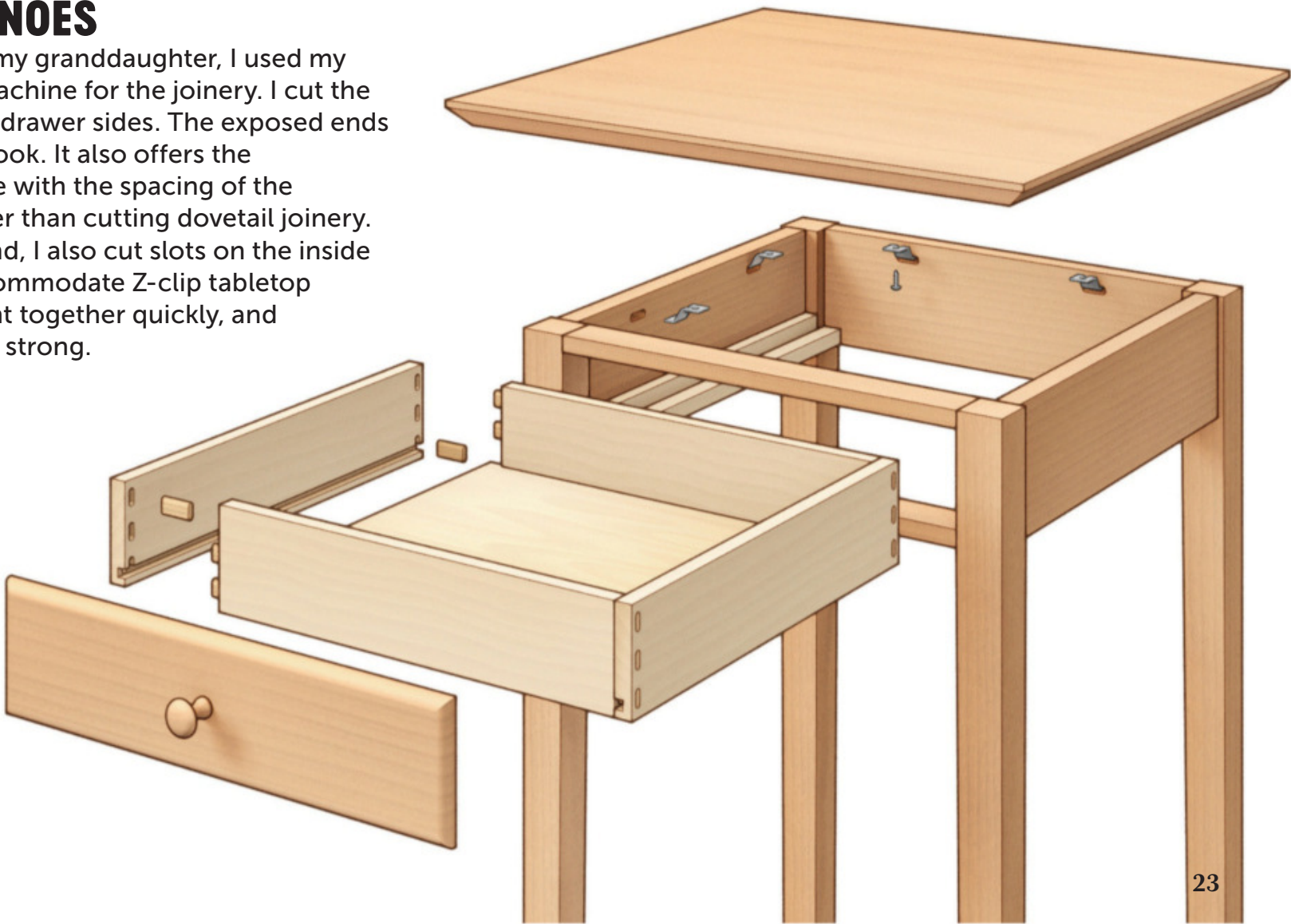


LET’S PLAY DOMINOES

While building a table for my granddaughter, I used my Festool Domino joining machine for the joinery. I cut the Domino slots through the drawer sides. The exposed ends add a unique, decorative look. It also offers the opportunity to get creative with the spacing of the Dominoes. Plus, it’s quicker than cutting dovetail joinery.

With the machine in hand, I also cut slots on the inside of the table aprons to accommodate Z-clip tabletop fasteners. The project went together quickly, and I know the joinery is super strong.

Loren Engelmann
Plato, Minnesota



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23

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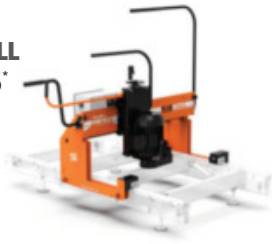
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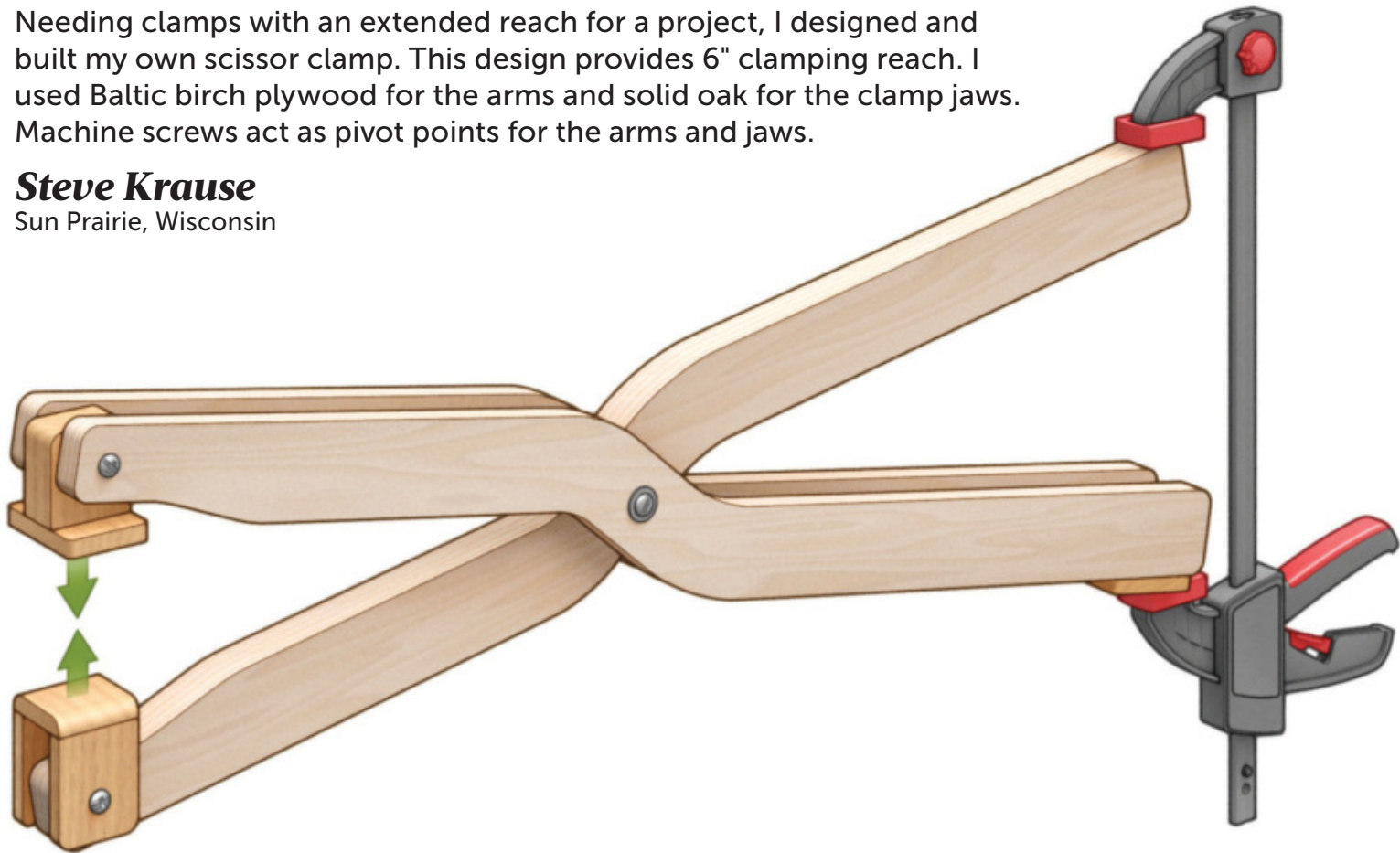


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REACH FOR A CLAMP

Needing clamps with an extended reach for a project, I designed and built my own scissor clamp. This design provides 6" clamping reach. I used Baltic birch plywood for the arms and solid oak for the clamp jaws. Machine screws act as pivot points for the arms and jaws.

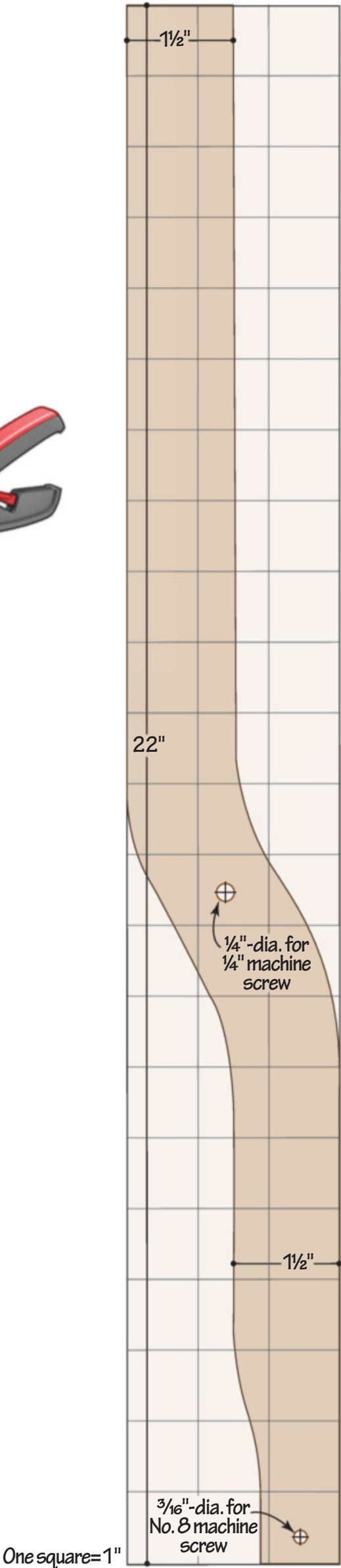
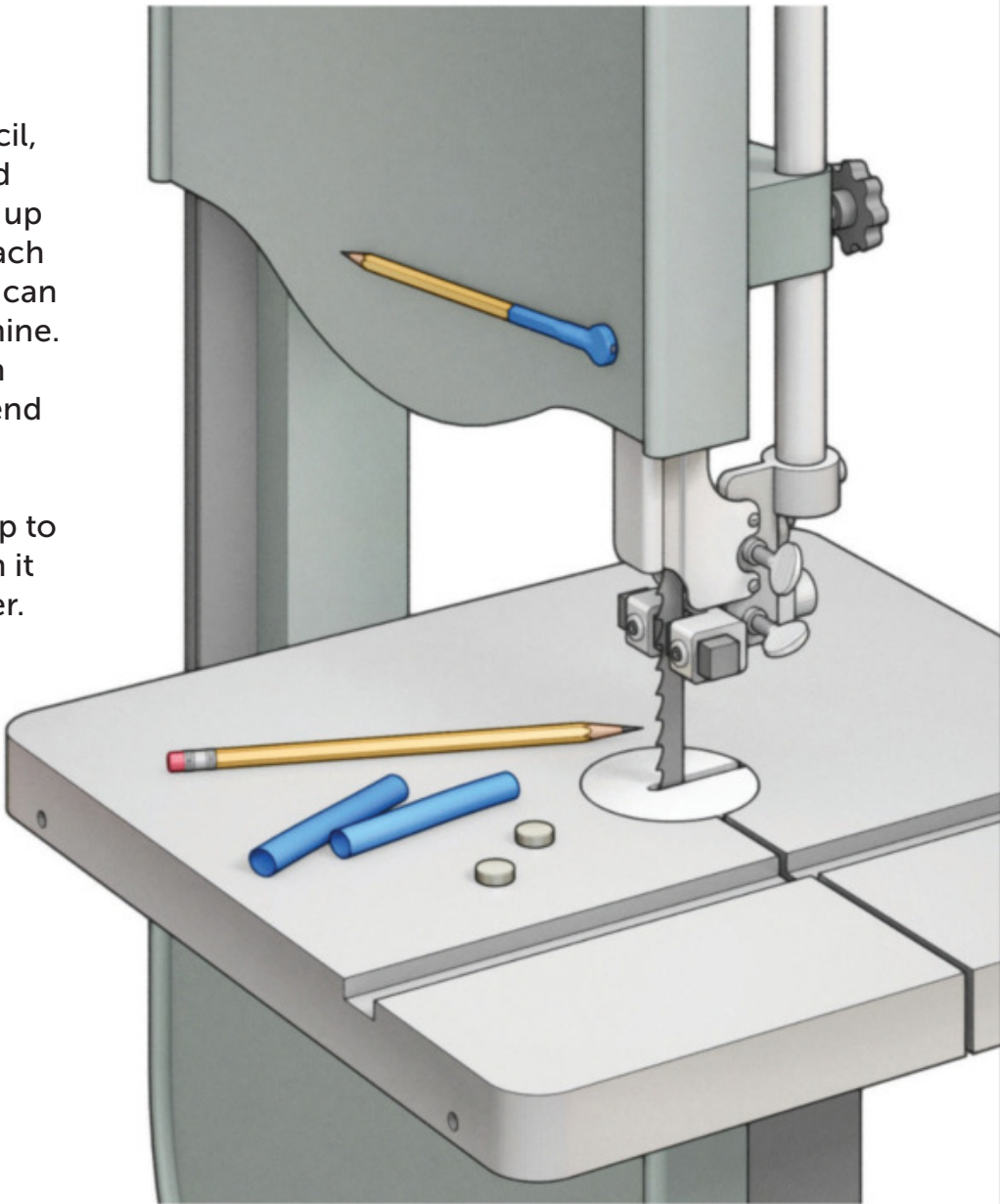
Steve Krause
Sun Prairie, Wisconsin



ATTRACTIVE PENCILS

Whenever I need a pencil, it seems I can never find one in my shop. I came up with an easy way to attach magnets to pencils so I can stick one to every machine. I join small rare-earth magnets to the eraser end of the pencils using heat-shrink tubing. It's permanent and holds up to heavy shop use, though it does cover up the eraser.

Tom Brock
Sacramento, California



MUTUAL SUPPORT

After emptying the bag on my dust collector, it's challenging to hold the bag in place while positioning the attachment strap.

It occurred to me to use strong magnets to hold the bag, leaving both of my hands free. This makes the task much easier while eliminating the frustration.

Chuck Trupe II

Whitestown, Indiana

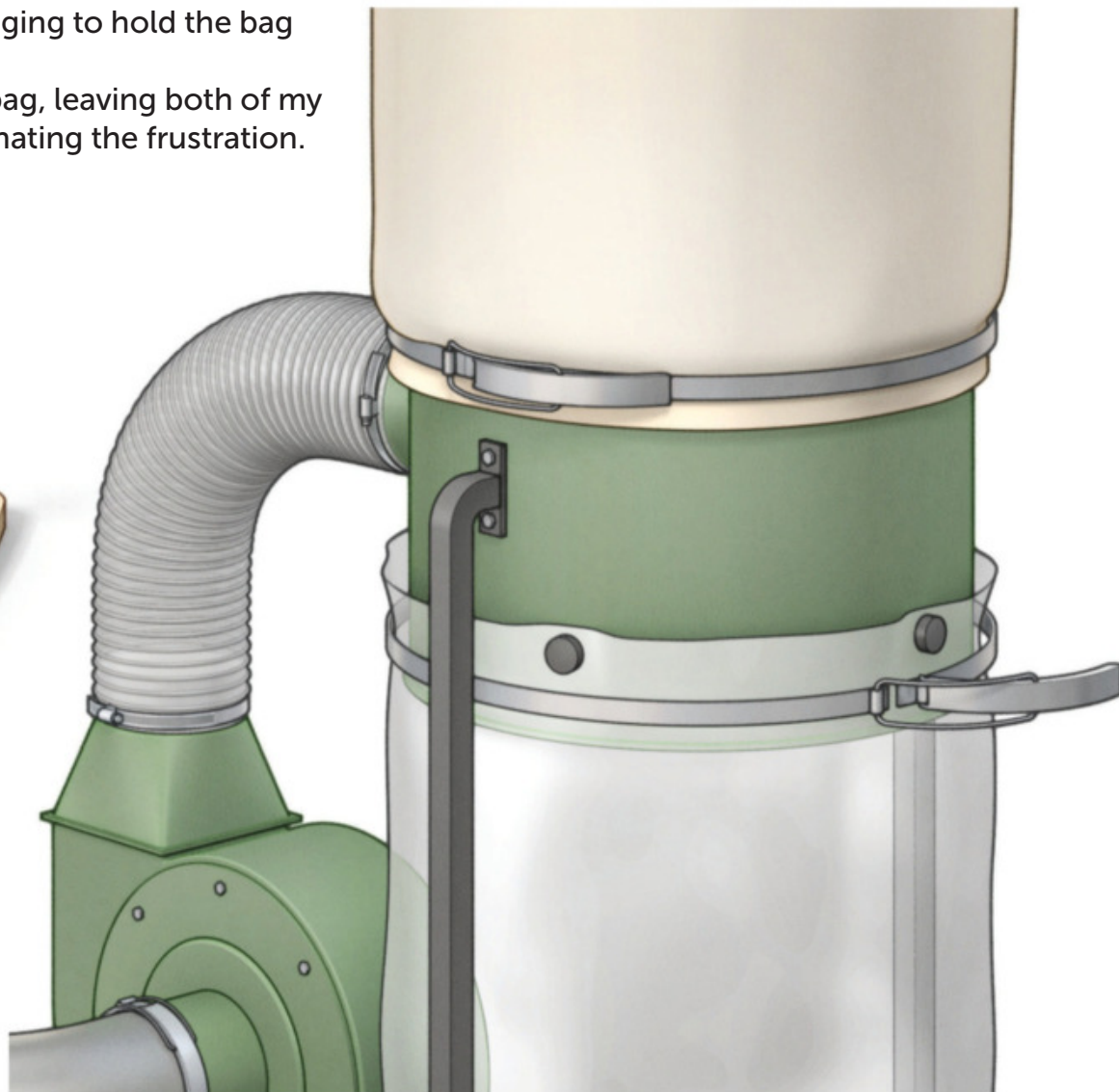


PUT A CORK ON IT!

I make a lot of cutting boards, trivets, and coasters, and I've found that wine corks make great nonslip feet. After slicing the corks in rounds to $\frac{1}{8}$ " or $\frac{1}{4}$ " thick on my bandsaw, I attach them with cyanoacrylate (CA) glue.

Jim Goode

Gilbert, Arizona

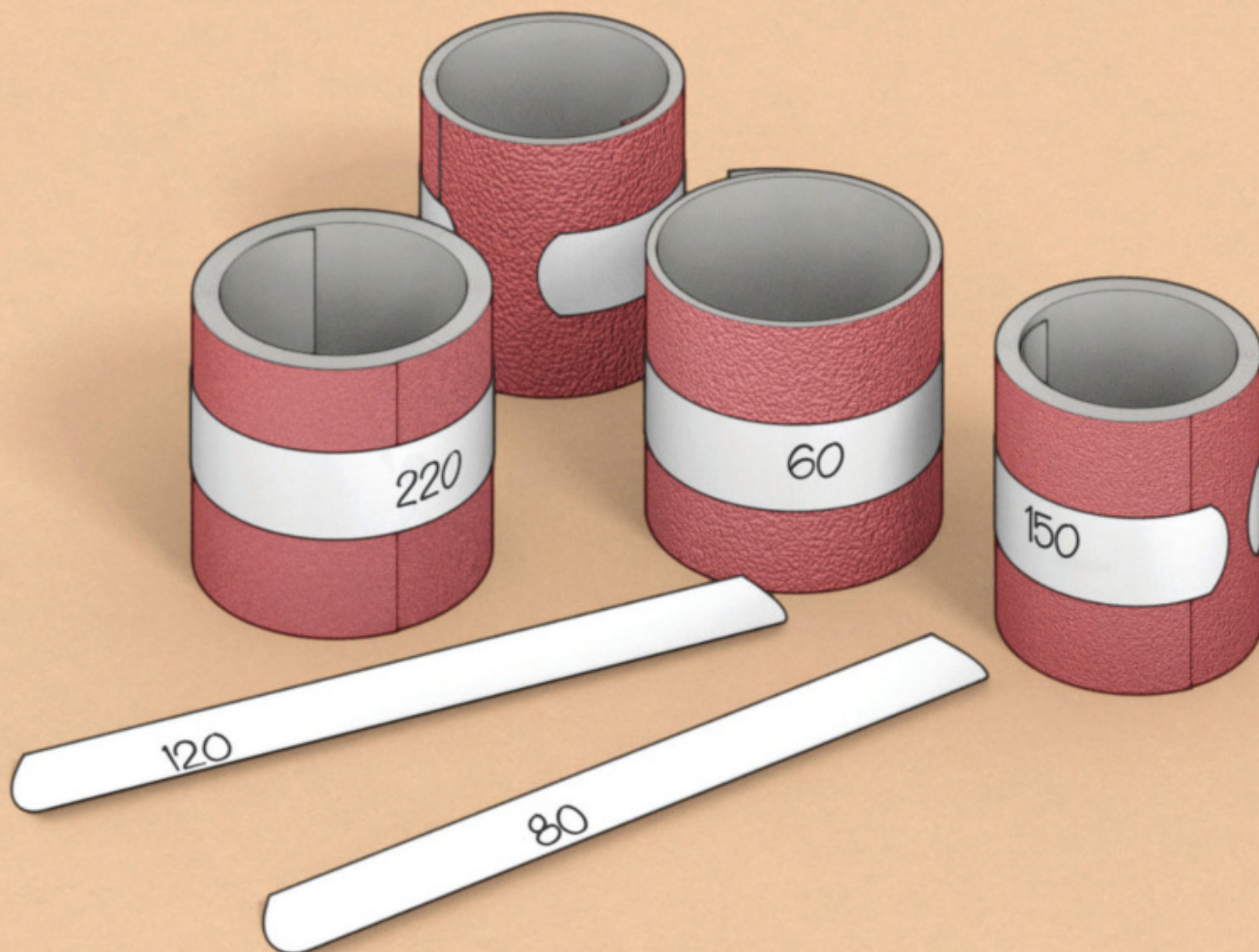


SNAPPY SLAPSTICKS

I've discovered an inexpensive way to organize and store rolls of sandpaper as well as cords and cables: snap bracelets. Made of thin metal, similar to what is used in a tape measure, these short strips stay straight when unrolled due to their curved shape across their width. Tap the convex side of the strip on your wrist or other object and it immediately snaps to form a circle. I order my snap bracelets in bulk from Amazon, but I've also found that the thin aluminum slats from venetian blinds work just as well.

Randy Wolfe

Hoover, Alabama



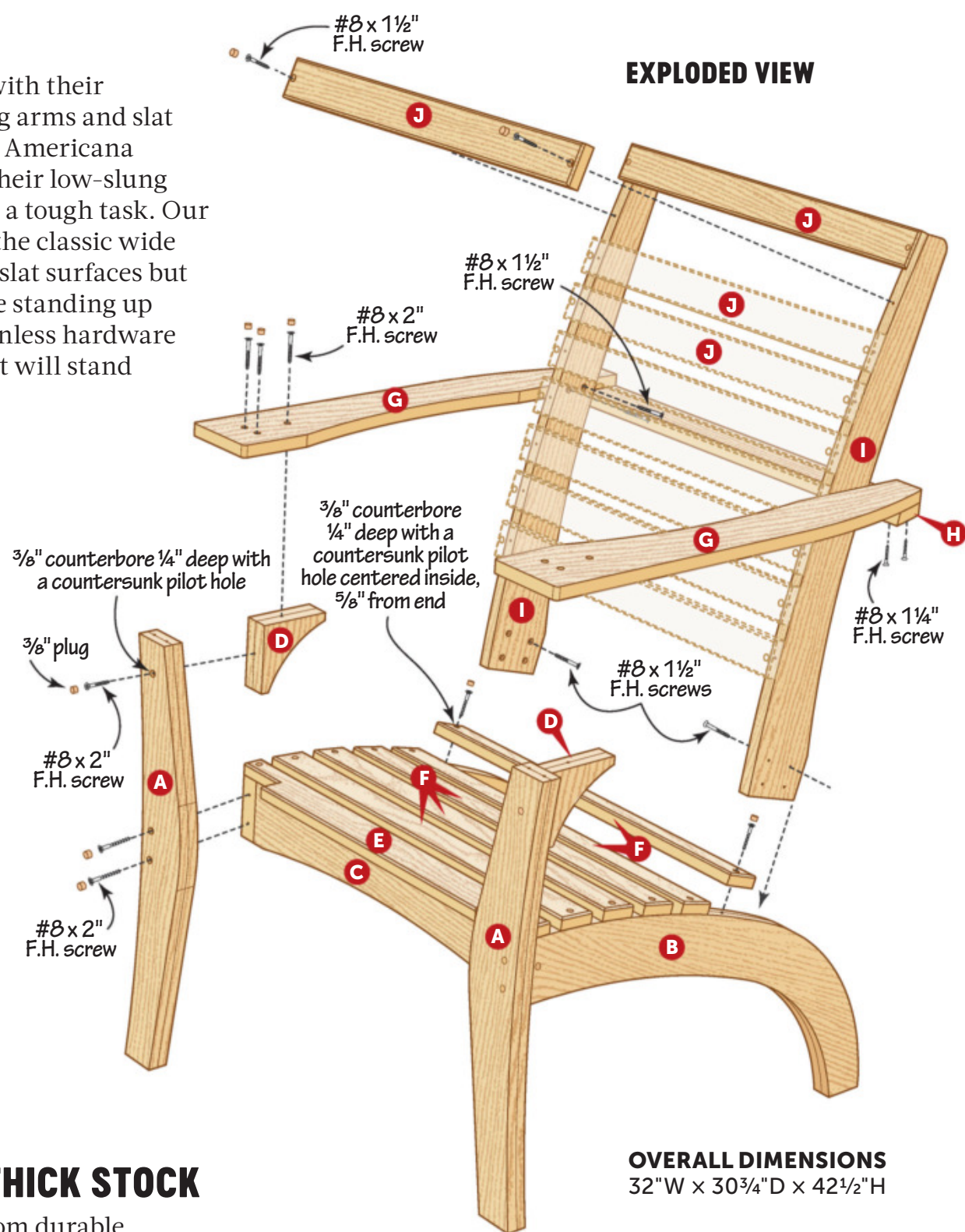
A photograph of a light-colored wooden Modirondack chair with a slatted back and armrests, sitting on a wooden deck. To the left, another similar chair is partially visible with a blue and white striped towel draped over it. The background is a lush garden with green plants and trees.

MODIRONDAK CHAIR

This updated take on a timeless classic keeps many traditional Adirondack features, but offers a comfortable, elevated seating position.

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

A dirondack chairs, with their wide, drink-holding arms and slat construction, epitomize Americana outdoor furniture. But their low-slung seats make re-emerging a tough task. Our redesigned chair keeps the classic wide arms and easy-to-build slat surfaces but elevates the seat to make standing up easier. And we used stainless hardware and waterproof glue that will stand up to the elements.



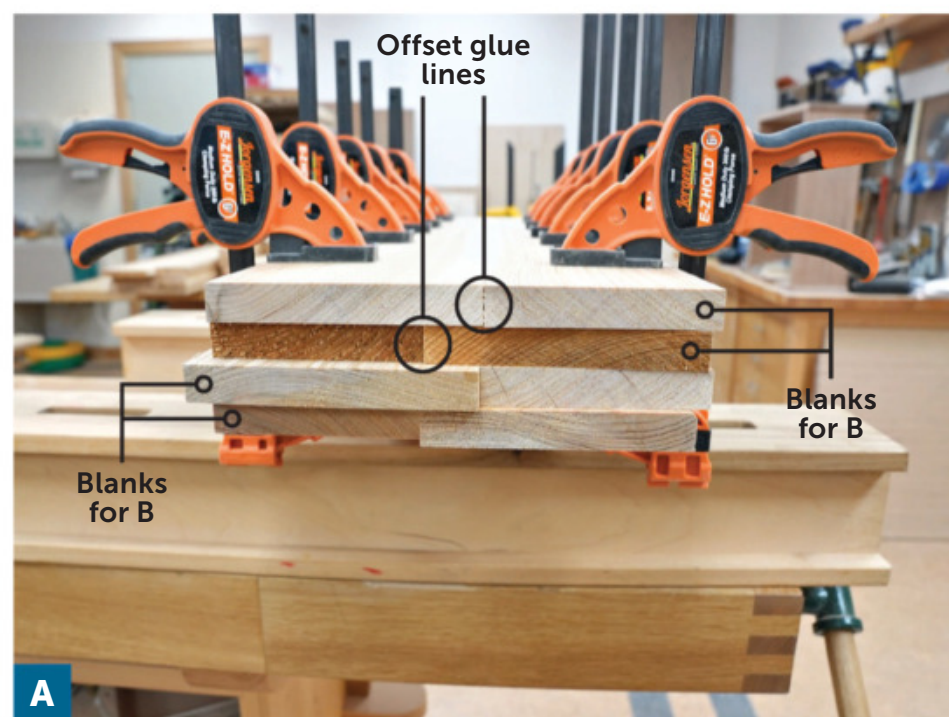
STOCK UP ON THICK STOCK

We built our chair from durable, weather-resistant cypress. Cedar, redwood, and white oak would be suitable alternatives. Some of the chair parts measure 1¼" thick for extra strength. Because we could get only ¾" cypress, we glued up boards to make thicker and wider stock.

1 Start by creating blanks for the front legs (A) and apron (C) by laminating slightly overwidth and overlength boards [Materials List]. For the arm brackets (D), laminate two pieces to make a blank about 12" long.

2 The curved back legs (B) each require a blank about 10" wide, which is wider than most boards you're likely to find. To make those blanks, edge-glue boards to create four panels about 10×36". Then laminate them in pairs [Photo A].

3 After the glue dries, plane all the laminated blanks to 1¼" thick.



To get the necessary width for the back legs (B), edge-glue ¾" stock, then glue the boards face-to-face, offsetting the edge-glued joints. Clamping both blanks at once helps keep the stock flat.



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PATTERN YOUR PARTS

1 Use the gridded patterns to make full-size templates [Drawing 1]. We marked 1" grids on 1/4" hardboard, drew each part shape, then cut and sanded the templates to shape. On the back leg template, mark where the backrest upright will attach in a later step.

2 Trace the templates for the front legs (A) and back legs (B) onto the blanks [Photo B]. Jigsaw or bandsaw the legs to shape, staying about 1/8" outside the lines.

3 Attach a template temporarily to a leg blank with double-faced tape and pattern-route it to shape. See *A Pattern for Success*, below, to prevent tear-out when pattern-routing curved workpieces. Remove the template, then repeat for the remaining legs.

4 Repeat the marking, cutting, and pattern-routing steps for the arms (G) and backrest uprights (I). Finish-sand all the pieces and set the arms and uprights aside for now.



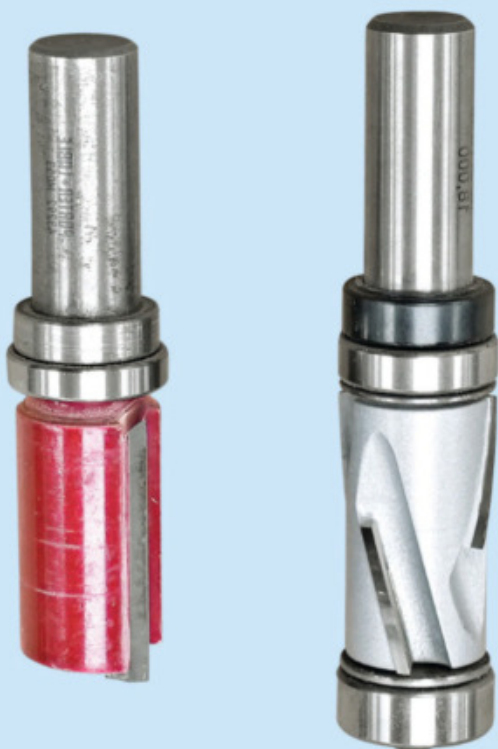
B Scribe the front (A) and back leg (B) templates on the workpiece blanks. Select the sides with the best looking faces and mark them in mirrored pairs so the best sides face out on the finished chair.

“

LOW-SLUNG ADIRONDACK CHAIRS WERE DESIGNED TO BE STABLE ON SLOPING TERRAIN. OUR REDESIGN, WITH ITS HIGHER PROFILE, INCREASES COMFORT ON LEVEL GROUND.

-KEVIN BOYLE, DESIGN EDITOR

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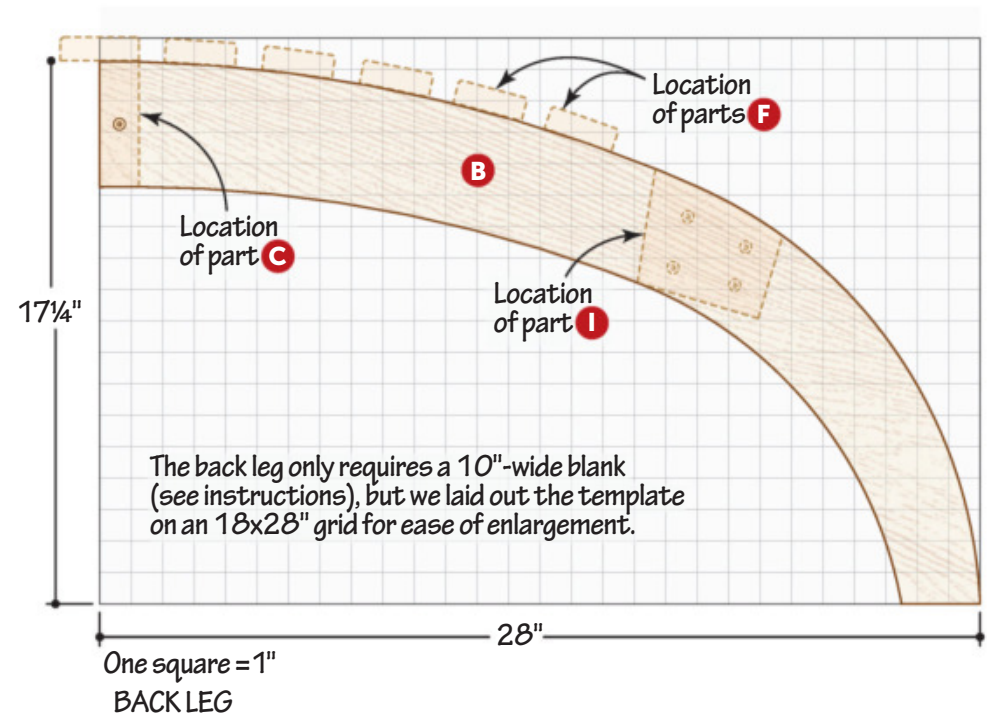
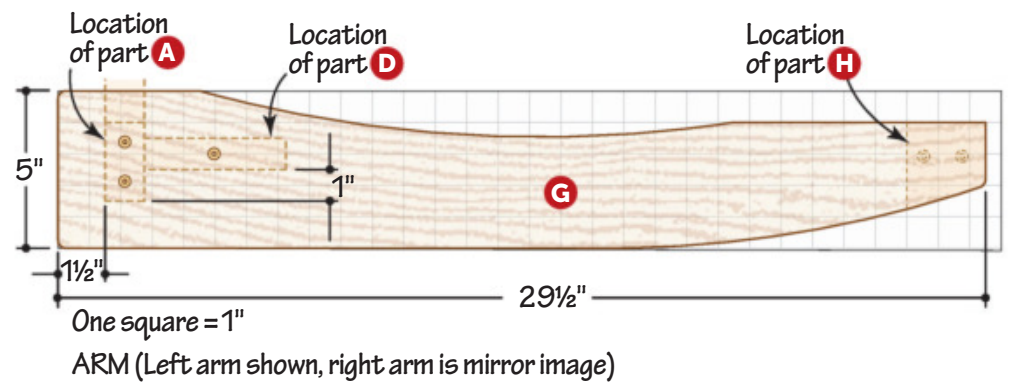
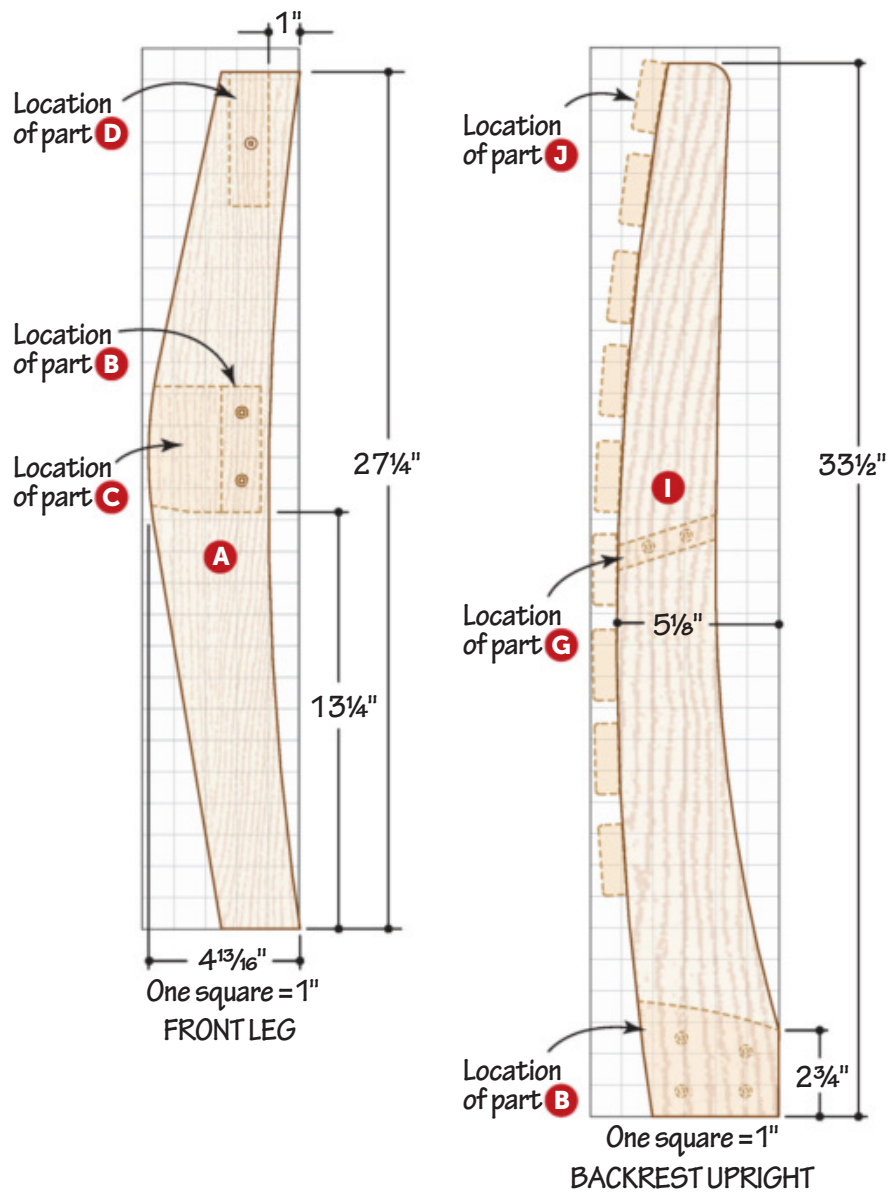
A PATTERN FOR SUCCESS

Pattern routing lets you create multiple identical pieces and eliminates a lot of sanding. It's a straightforward technique, but presents challenges on large, curved workpieces such as the ones in this project because the face grain crosses the shape of the workpiece in multiple directions. You'll need a carefully-planned approach to avoid heartbreaking tear-out.

To prevent tear-out, we recommend using a bit equipped with dual bearings; one at the top of the cutters and another at the bottom. This allows you to flip the workpiece so the template sits on top and guides the upper bearing, or sits underneath and guides the lower bearing, *photos, next page*. You also need to maintain proper routing direction and avoid climb-cutting—routing in a direction that lets the bit's rotation yank the router along the workpiece.

To further reduce tear-out, we prefer a compression bit, *left*, because the angled upcut and downcut flutes shear the wood fibers and apply cutting force toward the center rather than outward toward the ends, where the wood fibers are unsupported and more likely to tear away. By contrast, a bit with straight flutes, *far left*, creates more of a chopping cut that can cause chatter and tear-out, especially when routing across end grain.

1 GRIDDED PATTERNS



After routing the end grain, rout the edge grain from center to corner on the convex edge and corner to the center on the concave edge to "pet the fur" of the grain in the correct direction.



Flip the workpiece template-side-down and again rout from center to corner on the convex edge and corner to center on the concave edge, this time with the bottom bearing following the template.



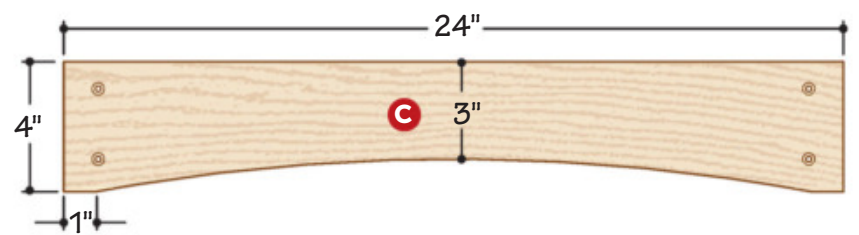
ASSEMBLE THE BASE

Unless otherwise shown, drive the screws used for assembly into counterbored shank holes that you later fill with face-grain plugs glued into the counterbores.

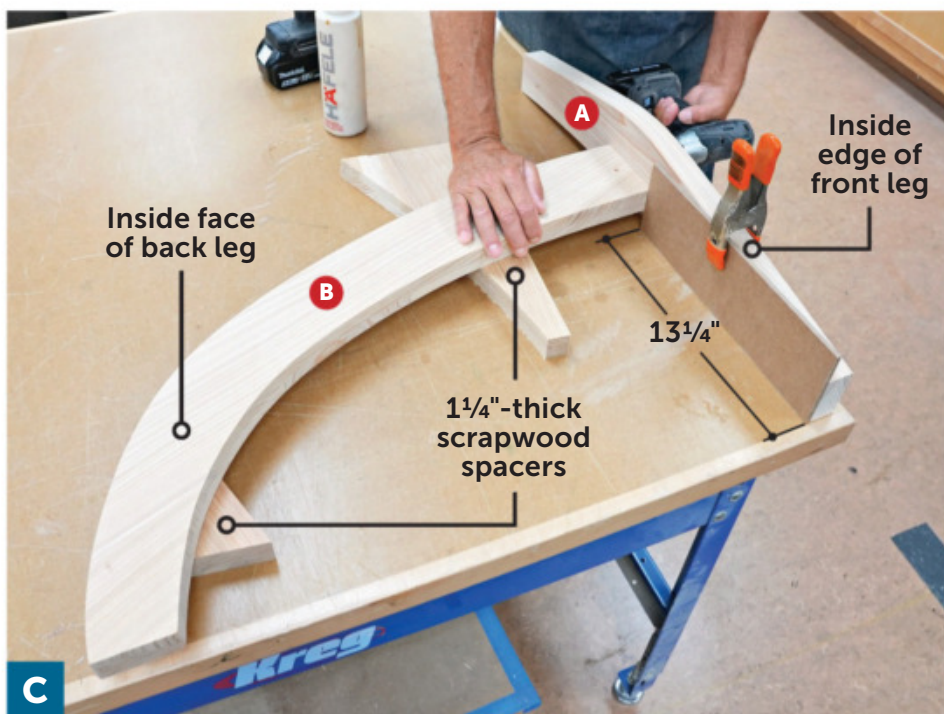
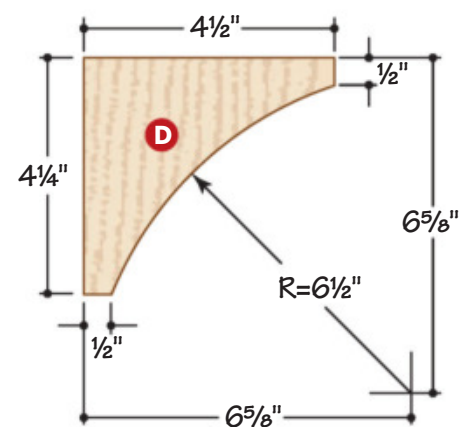
1 On a flat surface, use spacers to position one back leg (B) against a front leg (A) [Exploded View, Photo C]. Drill counterbored holes in the front leg, spread glue on the end of the back leg, and attach it to the front leg with screws. Then repeat for the other leg assembly.

2 From the 1 $\frac{1}{4}$ "-thick blank you made earlier, cut the apron (C) to size and

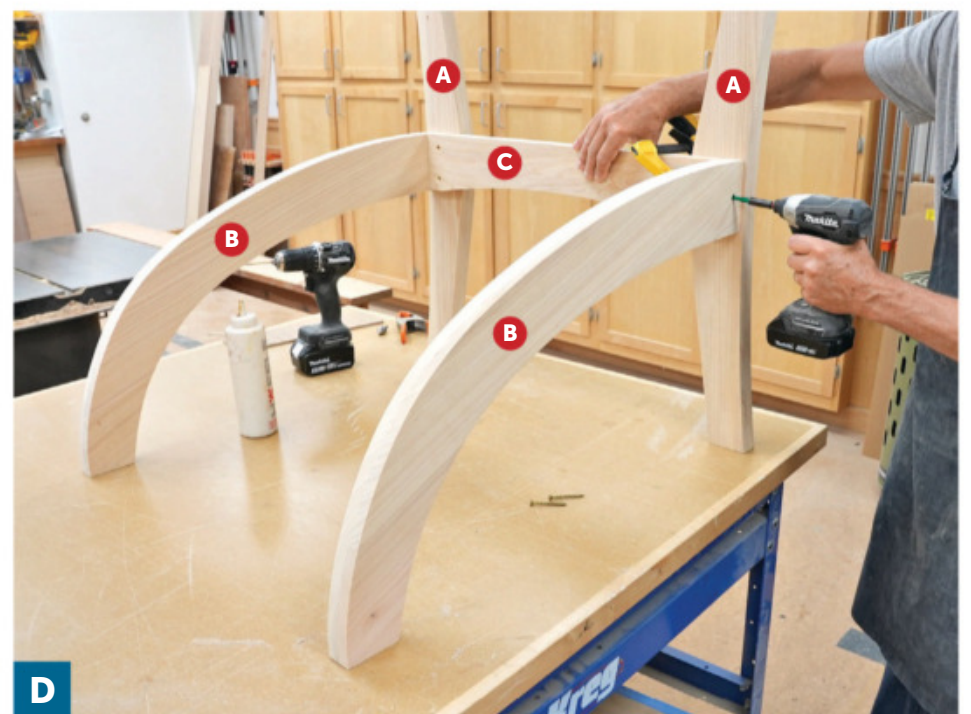
2 APRON



3 ARM BRACKET

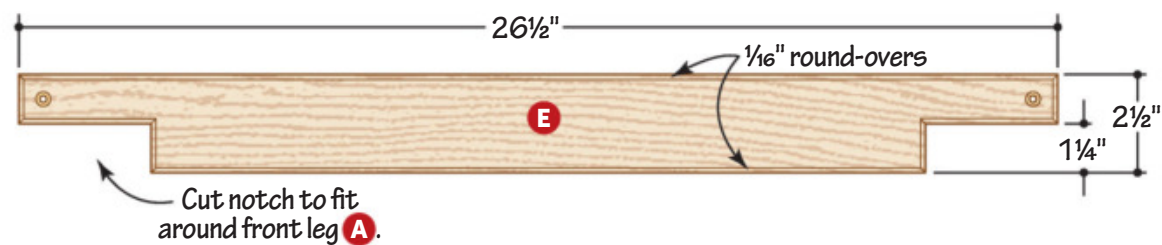


Prop a back leg (B) on 1 $\frac{1}{4}$ "-thick scrap spacers to position it against a front leg (A). Clamp a spacer to the front leg and flush with the bottom end to position the back leg vertically.

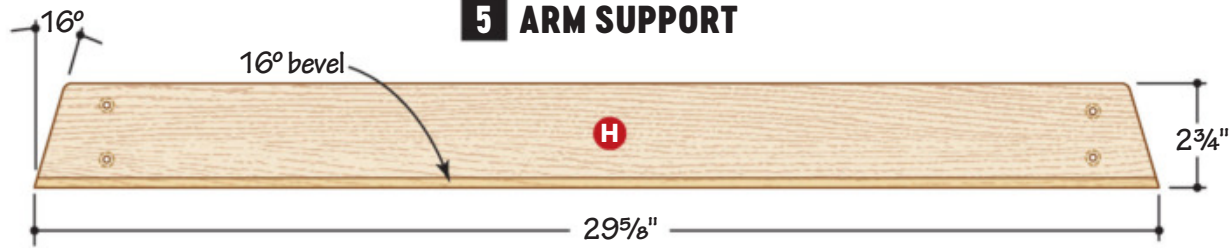


Glue and clamp the apron (C) between the leg assemblies (A/B). After the glue dries, drill counterbores and drive screws through the back legs into the apron and through the apron into the front legs.

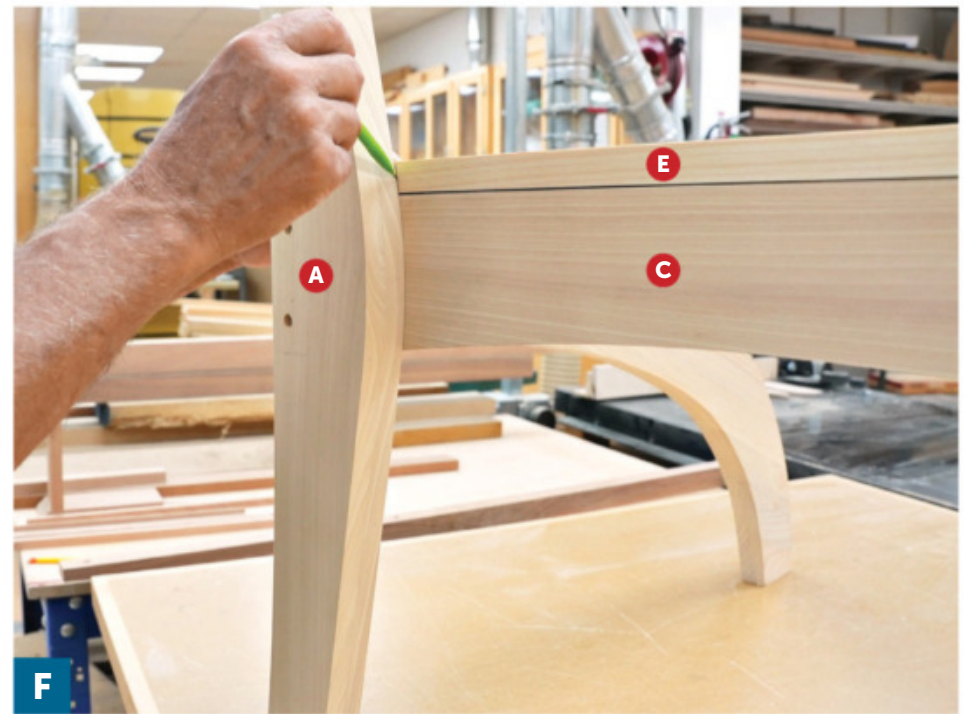
4 FRONT SEAT SLAT



5 ARM SUPPORT



Glue and clamp an arm bracket (D) to the front leg (A), then drill a counterbored screw hole through the front leg and drive the screw. These and other counterbores get filled later with face-grain plugs.

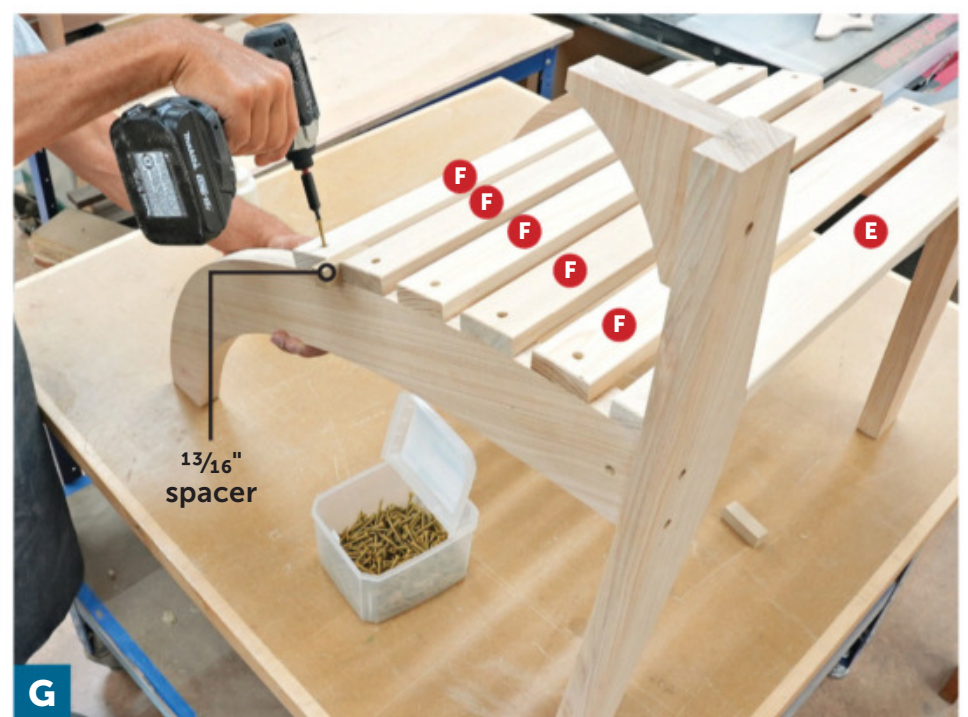


Butt the front seat slat (E) against the front legs (A) and scribe the location where the legs intersect the slat. Then notch the slat so that its front edge will be flush with the front face of the front legs.

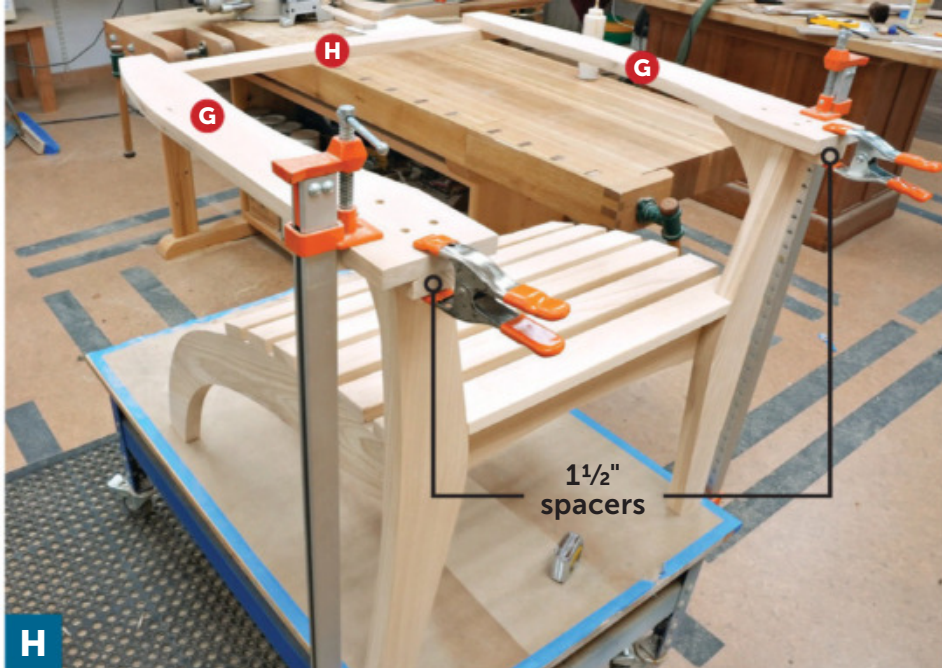
shape [\[Drawing 2\]](#). Glue and clamp the apron between the leg assemblies (A/B), drill counterbored holes, then drive screws to hold the assembly together [\[Photo D\]](#).

3 Cut the arm brackets (D) to size and shape from the final 1 1/4"-thick blank and sand the curves smooth [\[Drawing 3\]](#). Glue and clamp the brackets to the front legs, then drive screws in the counterbored holes to attach them to the front legs [\[Exploded View, Photo E\]](#).

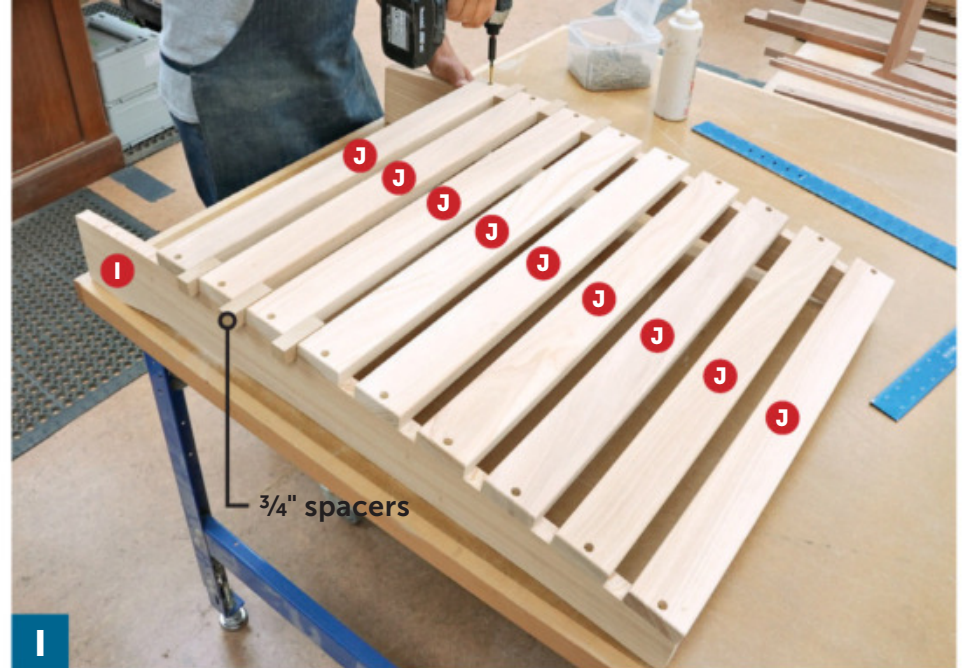
4 Cut the seat slats (E, F) to size [\[Materials List\]](#). Mark the beveled notches for the legs in the front seat slat (E) [\[Photo F, Drawing 4\]](#) and cut them with a jigsaw. Then rout a 1/16" round-over on the upper edges of all the slats and drill counterbored pilot holes where shown [\[Exploded View\]](#). Glue and screw the front slat in place, then use spacers to attach the remaining slats [\[Photo G\]](#).



Fit the notches in the front slat (E) against the legs and screw the slat in place. Then use a scrapwood spacer to position the subsequent seat slats (F) and attach them with glue and screws.



Clamp 1½" spacers flush with the front ends of the arms (G). These position the arms on the front legs. Glue and clamp the arms to the legs and brackets, then add screws.



Starting with the top back slat (J), glue and screw the slats to the backrest uprights (I). Use ¾" spacers to position the slats, and check the assembly for square periodically.

ADD THE ARMS AND BACK

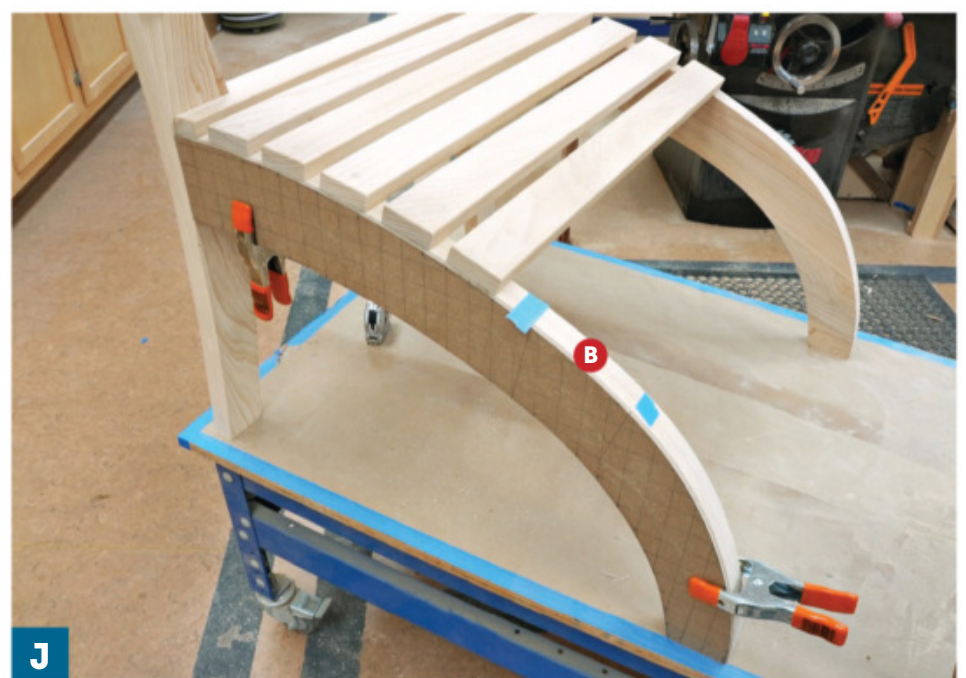
1 Cut the arm support (H) to size, bevel-cutting the front edge and miter-cutting the ends [Drawing 5]. Clamp the support to the underside of the arms (G), checking for square and leaving 24" between the arms. Trim one end of the support to final length, if needed, then glue and screw the support to the arms. Glue and clamp the arm assembly (G/H) to the base, then drill counterbored pilot holes and glue and screw the arms to the front legs and arm brackets [Photo H].

2 Cut the back slats (J) to size [Materials List], rout a 1/16" round-over on the upper edges, and drill the mounting screw pilot holes. Glue and screw the slats to the upright supports (I) [Photo I].

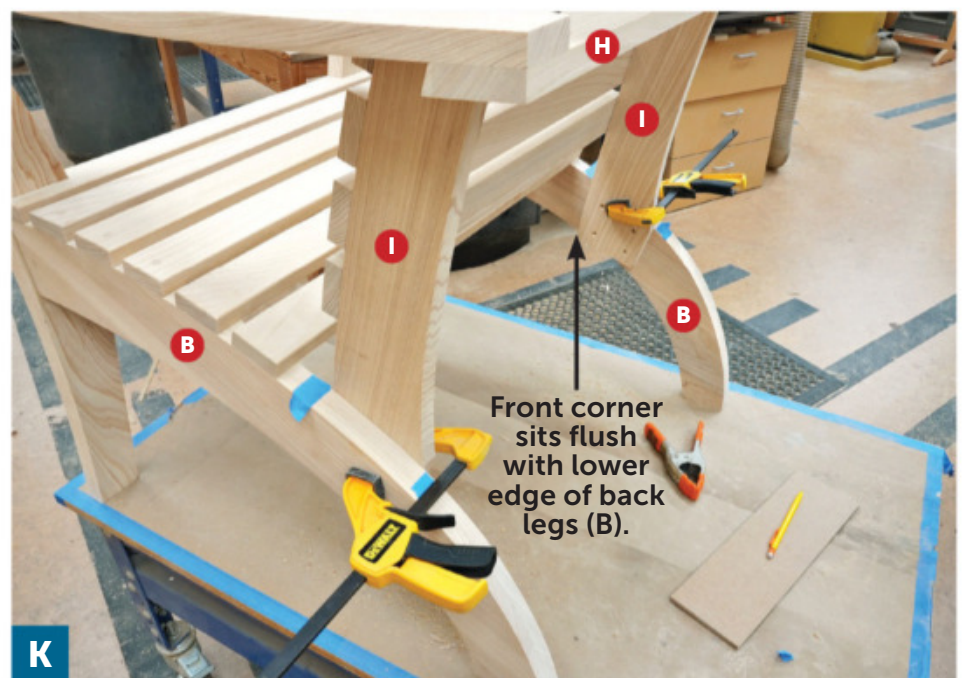
3 Use the back leg pattern to position the back assembly on the back legs [Photo J]. Then glue, clamp, and screw the backrest uprights (I) to the legs [Photo K] and to the arms (G).

4 Use a tapered plug cutter and cut face-grain plugs in leftover project stock to cover the screws. Try to match the color and line up the grain before gluing the plugs in place. Trim and sand the plugs flush and finish-sand the completed chair. Apply the finish of your choice—or not. We chose to let our cypress chair weather naturally. When the cypress has weathered to a color we like, we'll seal it with Cabot Australian Timber Oil.

For now, pour yourself your favorite beverage, take a seat, and relax. And don't worry if you have to get up to check the grill—it's an easy, no-rocking rise to get back on your feet. 🌿



Clamp the back leg pattern to the back leg and use masking tape to mark the locations where the edges of the uprights intersect the back legs.



With the back assembly (I/J) butted against the arm support (H) and using the tape for alignment, glue, clamp, and screw the uprights to the back legs (B). Then screw the uprights to the arms.



Learn to cut tapered plugs at woodmagazine.com/perfectplugs



MATERIALS LIST

PART		FINISHED SIZE			Matl.	Qty.
		T	W	L		
A*	FRONT LEGS	1 1/4"	4 13/16"	27 1/4"	LC	2
B*	BACK LEGS	1 1/4"	17 1/4"	28"	LEC	2
C	APRON	1 1/4"	4"	24"	LC	1
D	ARM BRACKETS	1 1/4"	4 1/2"	4 1/4"	LC	2
E	FRONT SEAT SLAT	3/4"	2 1/2"	26 1/2"	C	1
F	SEAT SLATS	3/4"	2 1/4"	26 1/2"	C	5
G	ARMS	3/4"	5"	29 1/2"	C	2
H	ARM SUPPORT	3/4"	2 3/4"	29 21/32"	C	1
I	BACKREST UPRIGHTS	3/4"	5 1/8"	33 1/2"	C	2
J	BACK SLATS	3/4"	2 1/4"	24"	C	9

*Parts initially cut oversize. See the instructions.

MATERIALS KEY: C—cypress, LC—laminated cypress, LEC—laminated, edge-glued cypress.

SUPPLIES: #8×1 1/4" F.H. stainless screws, #8×1 1/2" F.H. stainless screws, #8×2" F.H. stainless screws, waterproof exterior glue.

BITS: 1 1/2"-long pattern cutting router bit, 1/16" round-over bit, 3/8" tapered plug cutter.

SOURCE: Compression pattern router bit no. 85-940, \$150, Infinity Cutting Tools, infinitytools.com.

PROJECT COST: It cost us about \$225 to build this project. Your cost will vary by region and source.

CUTTING DIAGRAM

We purchased 39 board feet of 3/4" cypress and cut the parts to the sizes shown in these example boards.



3/4 x 5 1/2 x 96" Cypress (2 needed)



3/4 x 7 1/4 x 84" Cypress



3/4 x 5 1/2 x 84" Cypress (2 needed)



3/4 x 3 1/2 x 84" Cypress



3/4 x 5 1/2 x 84" Cypress



3/4 x 5 1/2 x 84" Cypress



3/4 x 5 1/2 x 96" Cypress (2 needed)

WOOD INNOVATION AWARDS

2025

Sometimes innovation is revolutionary; this year, it was evolutionary. We rounded up an eclectic collection of products that elevate the craft of woodworking by improving on tools and expanding on systems.

WRITER: DAVE STONE
PHOTOGRAPHERS: CARSON DOWNING,
BRIE GOLDMAN, MANUFACTURER-PROVIDED

CREATE CONNECTIONS IN T-TRACK SYSTEMS

Rockler's new T-track drop-ins make it easy to connect, turn, and terminate tracks, and provide convenient places to insert and remove track bolts without having to slide them through entire lengths of track. Made from aluminum, the drop-ins are available in five styles: T-intersections, end caps, 90° corners, 4-way intersections, and in-line inserts. All fit into a $\frac{3}{8} \times \frac{3}{4}$ " slot or can be surface mounted, and attach with a single included screw. While designed to work with Rockler's T-tracks, the fittings are compatible with almost any aluminum track that shares a similar profile. Buy each type separately in packs of four, or pick up a starter kit that includes two of each.

T-TRACK DROP-IN STARTER KIT

Rockler, [rockler.com](https://www.rockler.com)
No. 75139, \$30





DADO BLADE HAS A LOCK ON SETUP SIMPLICITY

The CMT 8" Locked Dado Pro includes unique plastic spacers with shaped keys that fit into cutouts in the blades and chippers, locking them together to prevent slipping. While this helps the blade comply with a European safety standard, on this side of the pond, we were more impressed with how the locking design makes it super easy to install and remove from the saw. Instead of sliding the blades and chippers onto the arbor one at a time then rotating them to position the teeth, simply stack the blades, chippers, and spacers (along with included shims, if needed) then slide the whole assembly onto the arbor.

The blade cuts 19 dado widths from $1\frac{5}{64}$ – $1\frac{3}{16}$ ", and produces smooth bottoms and crisp edges thanks to blades with alternating flat and beveled top grinds plus flat-top chipper teeth, all set at a -12° hook angle.

LOCKED DADO PRO
CMT, cmtorangetools.com
No. 230.312.08, \$135



ARTICULATING PORT FOR DUST-COLLECTION DUCTS

Rockler adds another handy component to its growing Dust-Right dust-collection lineup with its articulating dust port. These ports are made up of wedge-shaped sections that independently rotate 360° , allowing you to contort the shape to make turns or route around obstructions. The segments hold position well, and are repositionable if you reconfigure your system.

Made from thick plastic, the ports are available in 4" or $2\frac{1}{2}$ " outside diameter, and feature ridges that lock into Rockler's mounting brackets, sold separately.

DUST-RIGHT ARTICULATING PORTS
Rockler, rockler.com
4" port no. 77128, \$18; $2\frac{1}{2}$ " port no. 78447, \$13



SANDING DISKS GET AN ALL-NEW DESIGN

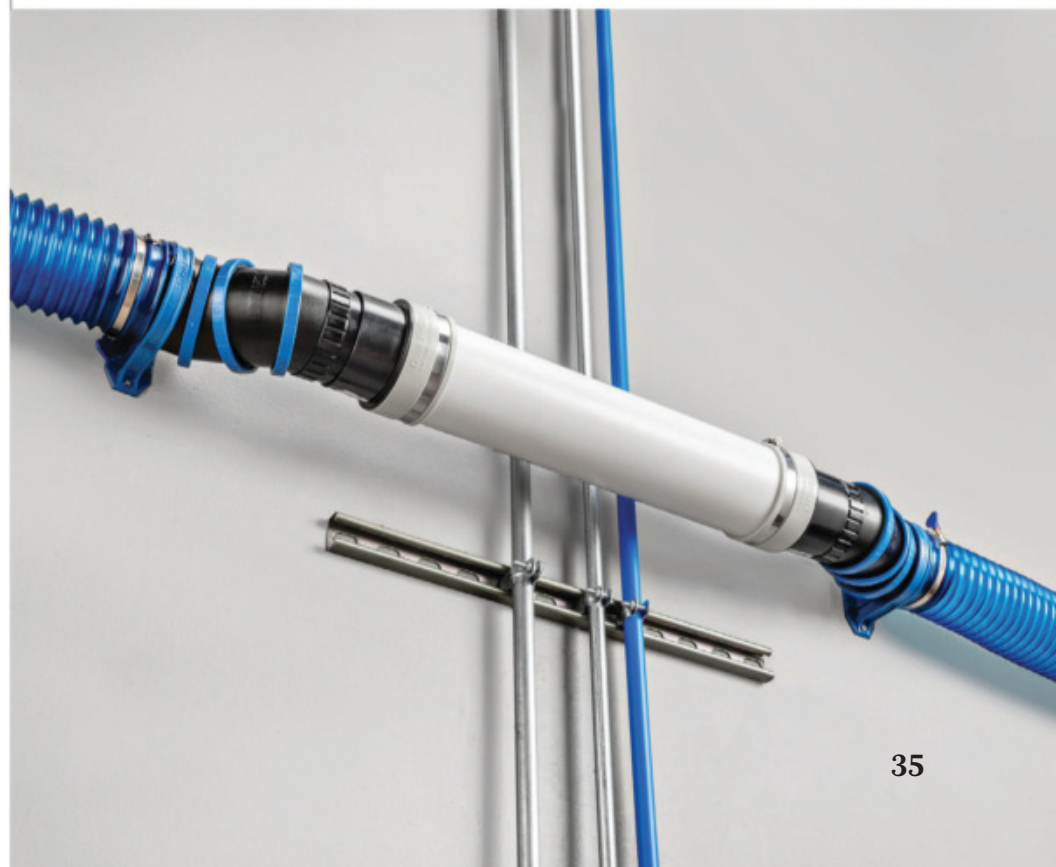
The hourglass-shaped abrasive clusters on Mirka's Ultimax Ligno sanding disks give them a distinctive look and, according to the company, distinct performance improvements.

Those clusters are composed of a proprietary blend of aluminum-oxide and self-sharpening ceramic particles that the company says lasts longer and cuts more effectively than other blends. According to Mirka, the clusters distribute pressure more evenly and forcefully while presenting hundreds of tiny edges to improve cutting efficiency.

The spaces between abrasive clusters provide pathways for sanding dust to move toward the multiple holes in the disk where it can be collected by your sander, regardless of its dust-collection hole pattern.

We definitely appreciate making sanding more efficient, so we're anxious to test these head-to-head against other disks. Already, though, we love one simple feature: The sanding grit is printed on the abrasive face, meaning you don't have to pull your disk off the sander to see what grit you're using.

ULTIMAX LIGNO SANDING DISCS
Mirka, mirka.com
From \$0.50/disk, depending on quantity





DUST-COLLECTION FITTINGS HAVE MAGNETIC PERSONALITIES

Woodcraft hopes to simplify moving a dust-collection hose from one machine to another with its new line of MagFitt magnetic dust hose connectors and machine couplings.

Made from ABS plastic, these new connectors feature rare-earth magnets embedded in the flange on the hose connector fitting along with a mating metal ring on the machine coupling. The two halves stick together easily without requiring excessive force to pull apart, and they seal well to prevent dust leaks and airflow loss.

Machine couplings are available in 2½" and 4" sizes, as well as a 4" to 2½" reducer. Hose connectors come in 2½" and 4" sizes.

MAGFITT DUST-COLLECTION FITTINGS

Woodcraft, woodcraft.com

MagFitt dust-collection fitting system, \$9-\$20

REEL IN SQUARE BOX ASSEMBLIES

An out-of-square box, drawer, or cabinet carcass can usually be trued up with a bit of clamping pressure across the longer of the two diagonals. But that can require a very long clamp, along with corner blocks to help hold the clamp jaws in place and three or four hands to set it all up.

This clamp takes a different approach with padded brackets that hook over corners easily, a nylon strap that connects them for up to 7' of reach, and a ratcheting crank. Simply extend the strap, hook the brackets across the longer diagonal, and crank to pull the corners inward until both corner-to-corner measurements are equal. The stepped design of the brackets even makes room for your tape measure.

SQUARE-IT BOX-SQUARING CLAMP

Rockler, rockler.com

No. 77860, \$50

“
LAST YEAR, MANUFACTURERS UNLEASHED A FLURRY OF NEW PRODUCTS. THIS YEAR, MANY BRANDS CHOSE INSTEAD TO ITERATE AND IMPROVE ON THEIR TOOL LINES.

-DAVE STONE, MANAGING EDITOR

”



PRECISELY SET UP BITS, BLADES, AND MORE

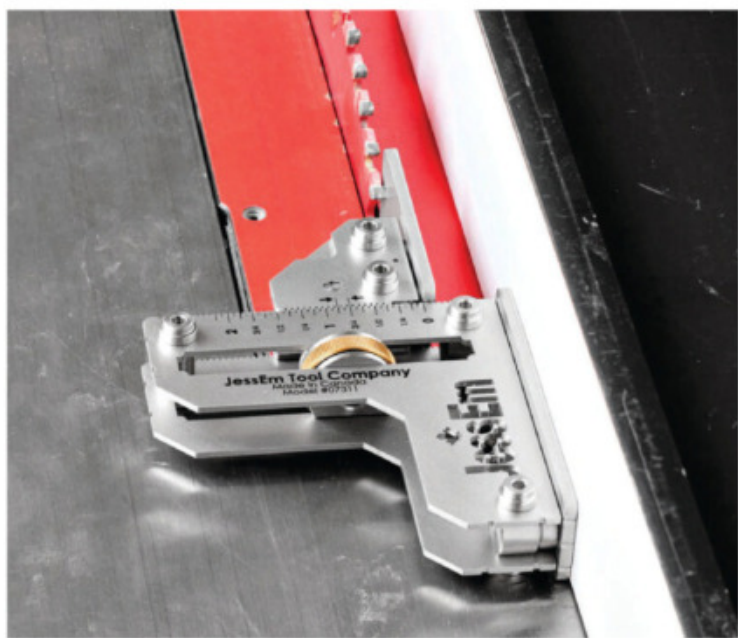
JessEm hopes to replace multiple setup tools in your shop with a new gauge that works for setting blade and bit heights, fence positions, drilling depths, and more. Scales etched on both sides register off either face of an adjustable arm, allowing inside and outside measurements. The tool-setting gauge adjusts in $\frac{1}{16}$ " increments, with teeth that lock it in place with the turn of a large dial.

JessEm makes the tool from stainless-steel in two sizes. The large version measures up to $3\frac{1}{4}$ ", the small up to 2". We tried the large version, and were impressed with its heft, build quality, and accuracy. Versions with metric scales are also available in both sizes.

STAINLESS-STEEL TOOL SETTING GAUGE

JessEm, jessem.com

Large, no. 07310, \$85; small, no. 07311, \$63;



ONE PEDAL DEPLOYS FOUR FEET TO KEEP SWIVELING MOBILE BASE STEADY

Harvey Industries equipped its new Spider M-1500Pro mobile base with features designed to simplify moving woodworking machines. Four swivel casters allow you to rotate the machine 360° in a small space and roll it in any direction. Each caster height adjusts individually to level your machine on floors that are uneven or sloped as much as $\frac{1}{4}$ " per foot.

Unlike other mobile base mechanisms that lever the casters to raise the base off of its fixed legs, the Spider uses a single foot lever that simultaneously raises and lowers all four legs to fix the base in place while the casters maintain contact with the ground. Each leg offers adjustable spring pressure to provide adequate downward pressure.

With a weight capacity of 1,500 lbs, the Spider base adjusts to handle machine footprints from $16\frac{1}{2}\times 20\frac{7}{8}$ " to $25\frac{19}{32}\times 29\frac{59}{64}$ ". An adjustable extension (no. M-1500E) sells separately.

SPIDER PRO MOBILE BASE

Harvey Industries, harveywoodworking.com

No. M-1500Pro, \$469

BENCHTOP PLANER OFFERS FLOOR-MODEL CAPACITY AND POWER

The Oliver 10055 planer offers capacities usually reserved for stationary machines. With a wider throat and 15×23 " table plus extensions, it has a capacity that exceeds its lunchbox-planer competitors, handling boards up to 15" wide by 6" thick. A big mouth needs to be backed by big cutting power, so Harvey included a 2hp, 230-volt motor. The planer cuts at two feed speeds—12' or 20' per minute—using a helical cutterhead that holds 40 four-sided cutters.

We haven't tested a production model yet, but we made a few planing passes with a prototype at the International Woodworking Fair last summer. We were impressed with the machine's power, quiet operation, and planing results. At almost 160 lbs, benchtop doesn't mean portable in this case, but we appreciate having large capacity and 230-volt power in a benchtop machine at a fraction of the price of many of its stationary counterparts. 🌱

10055 BENCHTOP PLANER

Oliver Machinery, olivermachinery.net

No. 10055, \$1,699



FLOOR-STANDING TOOL CHEST

Built to resemble fine furniture, this tall chest provides a handsome central repository for your best and most-needed tools and supplies.

WRITER: CRAIG RUEGSEGER

DESIGNER: KEVIN BOYLE

BUILDER: BRIAN BERGSTROM

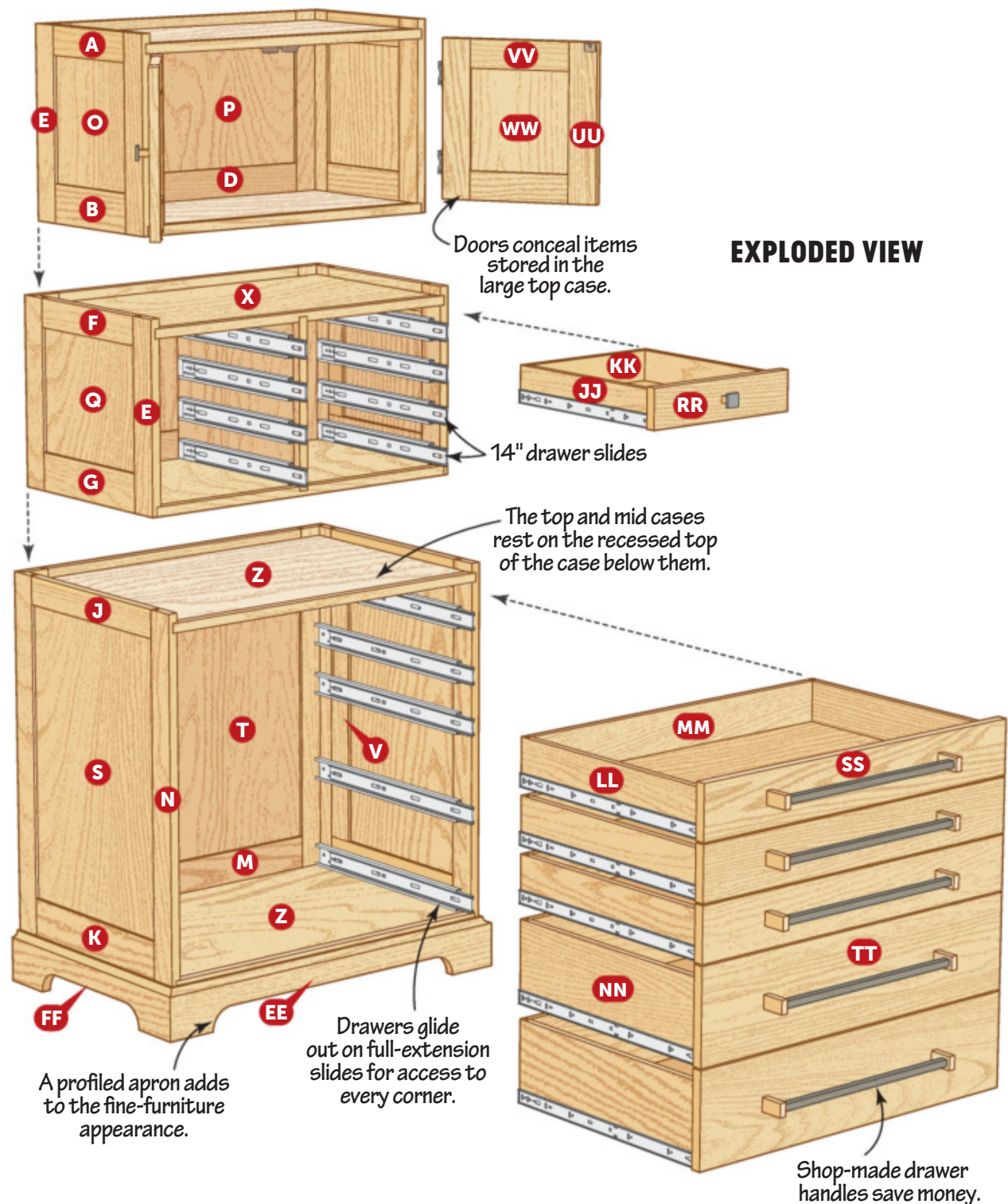


OVERALL DIMENSIONS
31¼" W × 21¼" D × 61¼" H



Your shop deserves furnishings as nice as the rest of the house, right? It just makes sense to showcase some of your nicest work in the place where you build it. This tool chest fills the bill. Three separate cases that stack on each other provide 13 drawers and a spacious cabinet behind two doors. With this near your bench, everything you need should fit inside neatly organized.

This is a big project with lots of parts, but don't let the Materials List intimidate you. Its construction lies within the skills of even a novice. Each case and the doors consist of simple frames joined by stub tenons and grooves surrounding plywood panels. All of the joinery is cut on the tablesaw, and we show every step for every joint.



A Make a single pass if using a 1/4" dado blade or, if using a rip blade, make a pass with each face against the rip fence. A featherboard prevents the stock from moving away from the fence.

CRANK OUT THE CASES

Each case shares similar parts and dimensions, so it makes sense to cut all of the rails and stiles to size at the same time, and then cut their matching joinery.

- 1 Cut the rails and stiles (A–N) for all three cases to size and label them [Materials List, Drawing 1]. Save cutoffs for testing setups later. Mark the edges that will receive the grooves for the panels.
- 2 If your plywood is truly 1/4" thick, install a 1/4" dado stack in your tablesaw. If the plywood is less than 1/4" thick, install a rip blade. Set the blade to 3/8" above the table and, using the saved cutoffs, make test cuts to establish a centered groove that fits the 1/4" plywood [Photo A]. Cut the grooves in the marked edges of all the rails and stiles [Drawings 1, 2].

TIP!

To simplify setups later when cutting dadoes and rabbets in the side and back assemblies, mill the rails and stiles to the same thickness as your 3/4" plywood.

3 To cut the stub tenons on the rail ends, set up a $\frac{3}{8}$ " dado blade and attach an auxiliary face to the rip fence. Set the blade to just under $\frac{1}{4}$ " above the table and make test cuts on each face of a cutoff to form a tenon [Photo B]. Then cut the stub tenons [Drawing 2].

TIP!

We cut the side panels (O, Q, S) to show a continuous grain flow down the three cases.

4 Dry-fit each frame and measure for the length of the side and back panels (O–T). The width matches the length of the assembly's rails, including the stub tenons. Cut the panels to size and finish-sand them.

5 Spread glue on the inside cheek of each groove and both cheeks of each stub tenon, then assemble the side and back frames around their panels [Drawing 1]. Clamp across the stiles and check each assembly for square. Mark each side assembly to indicate which face is the outside and whether it is for the right or left side.

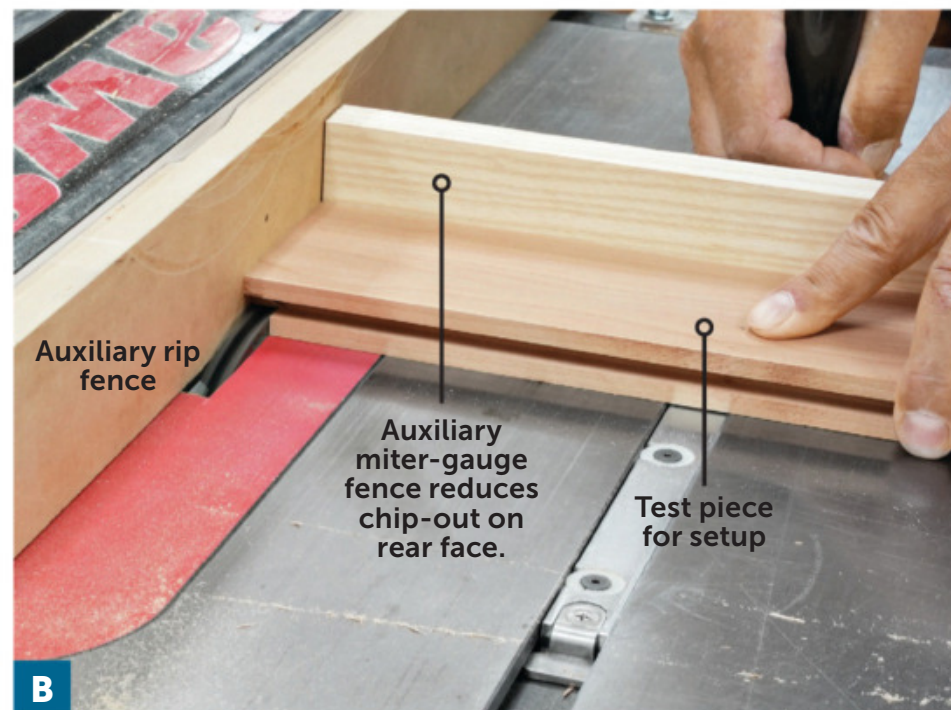
TIP!

The fillers must sit flush with the face of the stiles. If $\frac{1}{4}$ " plywood is too thin or thick, plane solid stock to thickness.

6 Cut the drawer slide fillers (U, V) to size and glue them to the side panels (Q, S) against the rear stiles of the middle case and bottom case [Drawings 3, 4].

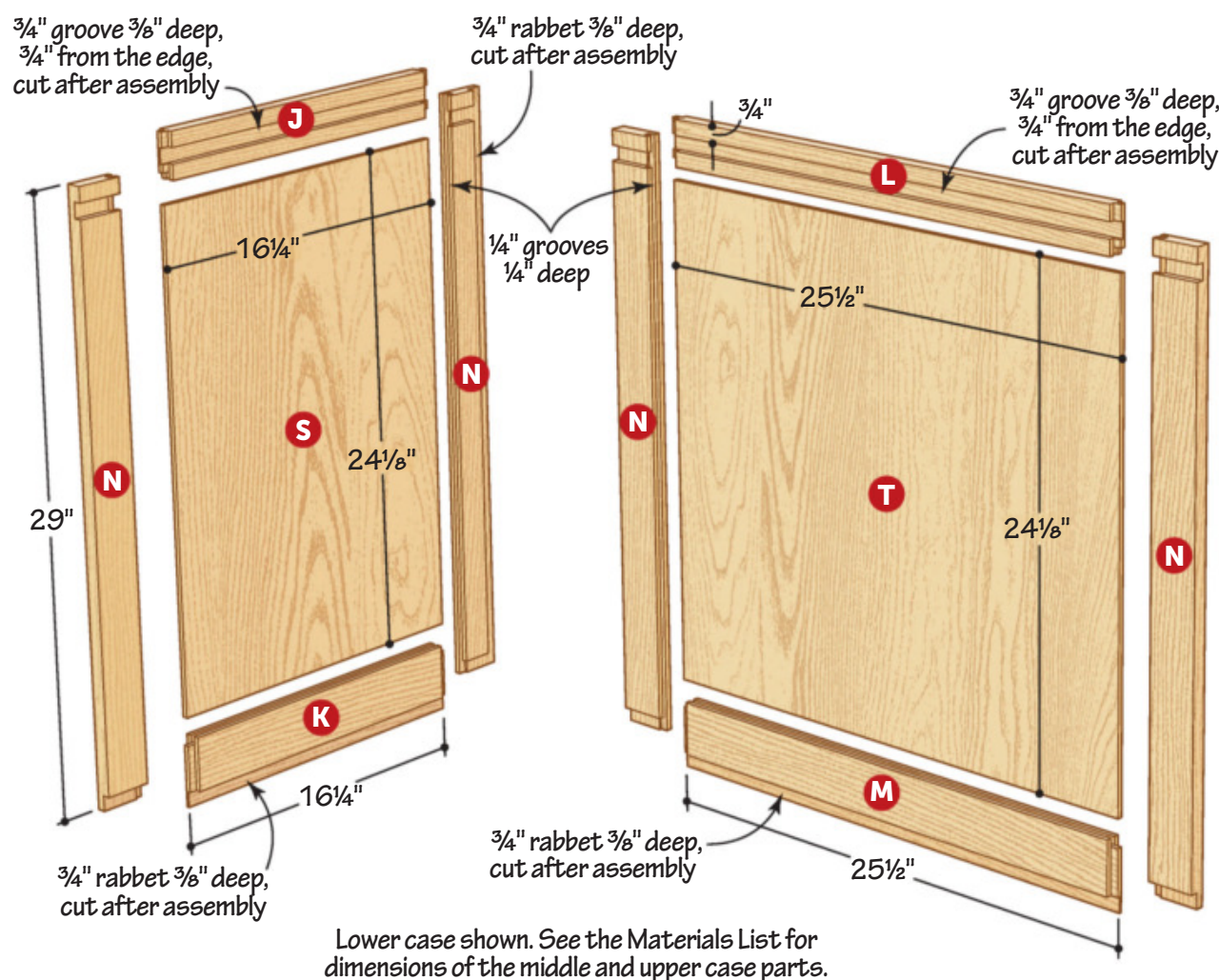
7 Set up a dado blade to match the thickness of your $\frac{3}{4}$ " plywood. Cut a groove across each side and back panel assembly to receive the top [Drawing 1].

8 Add an auxiliary face to the rip fence and position it to just touch the dado blade. Rabbet the bottom edge of each side and back assembly, and the back edge of the rear stile (E, N) of each side assembly [Drawing 1]. Finish-sand the inside face of each assembly.

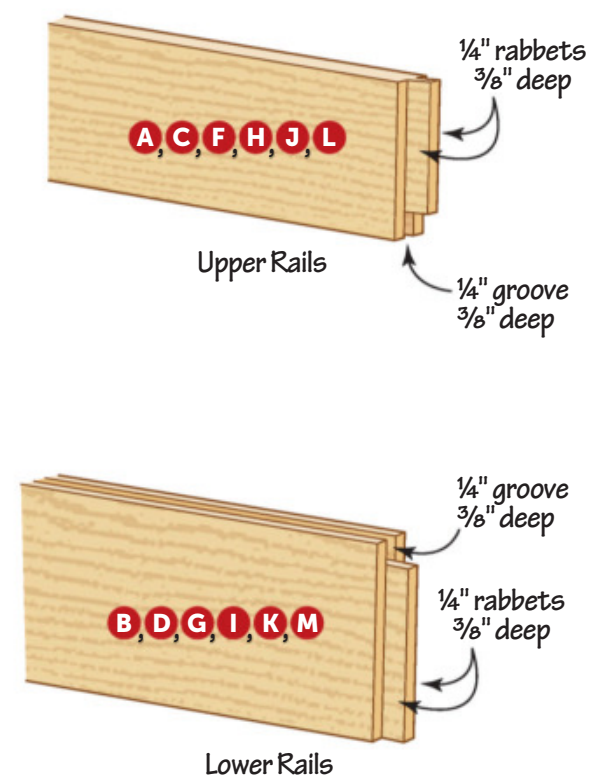


Position the auxiliary rip fence so the blade just brushes it. Make a cut on each face of a test piece and check the tenon's fit in a groove. Raise the blade slightly if needed and repeat to get a friction fit.

1 FRAME & PANEL ASSEMBLY



2 RAIL JOINERY



HAVE A PANEL DISCUSSION

1 Cut the top and bottom panels and middle case divider (W-Z) to final width and $\frac{1}{2}$ " longer than listed **[Materials List]**. Cut the edging (AA-DD) $\frac{3}{4} \times \frac{7}{8}$ " and $\frac{1}{4}$ " longer than listed. Glue edging to each of the tops, bottoms, and the middle case divider, centered on each panel's length and proud of each face **[Drawings 3, 4, 5]**.

2 Install a flush-trim bit in your table-mounted router. Add a tall auxiliary fence and adjust its face flush with the bit's bearing. Trim the edging flush with the top and bottom panels and the middle case divider **[Photo C]**.

3 Crosscut each end of the panels to bring the edging flush and the panels to final size. Finish-sand the panels.

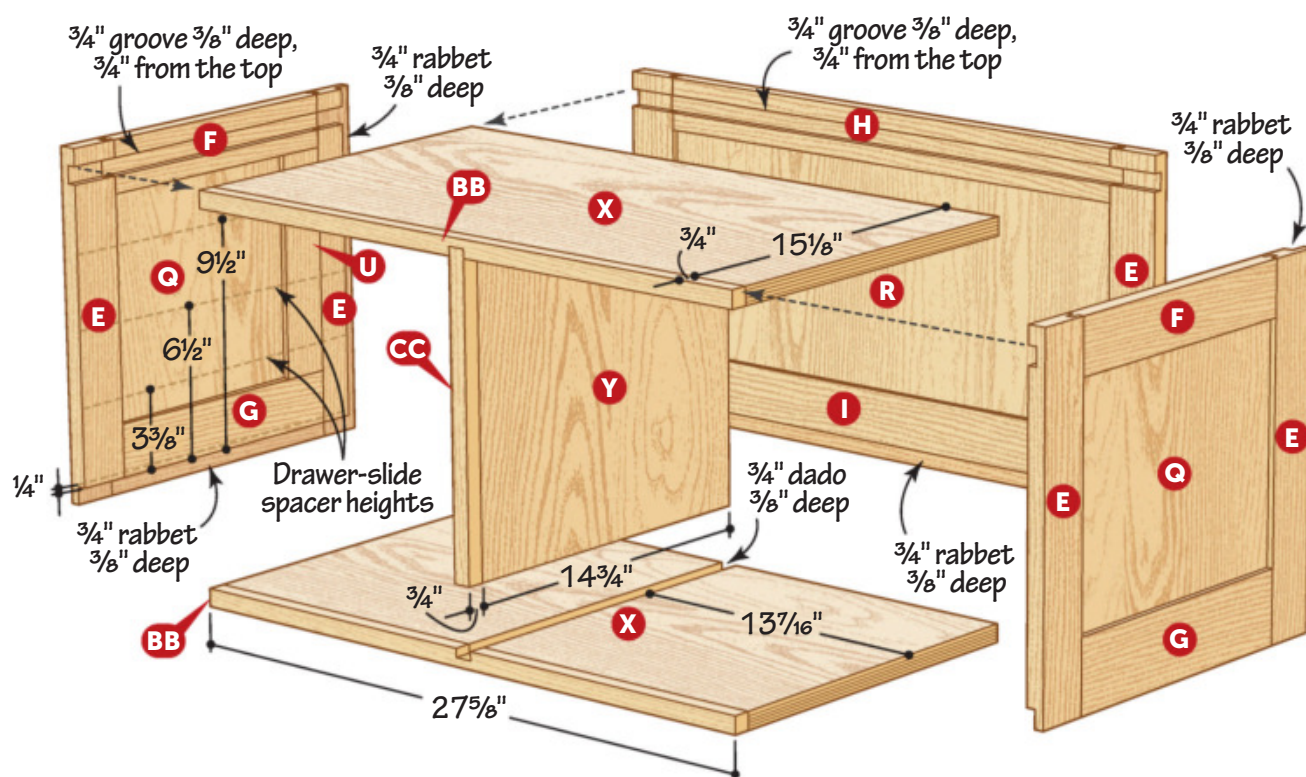


Attach an auxiliary fence 1" above the table to provide clearance for the edging that stands proud of the panel. Set the bit height so the cutter just touches the joint between the edging and panel.

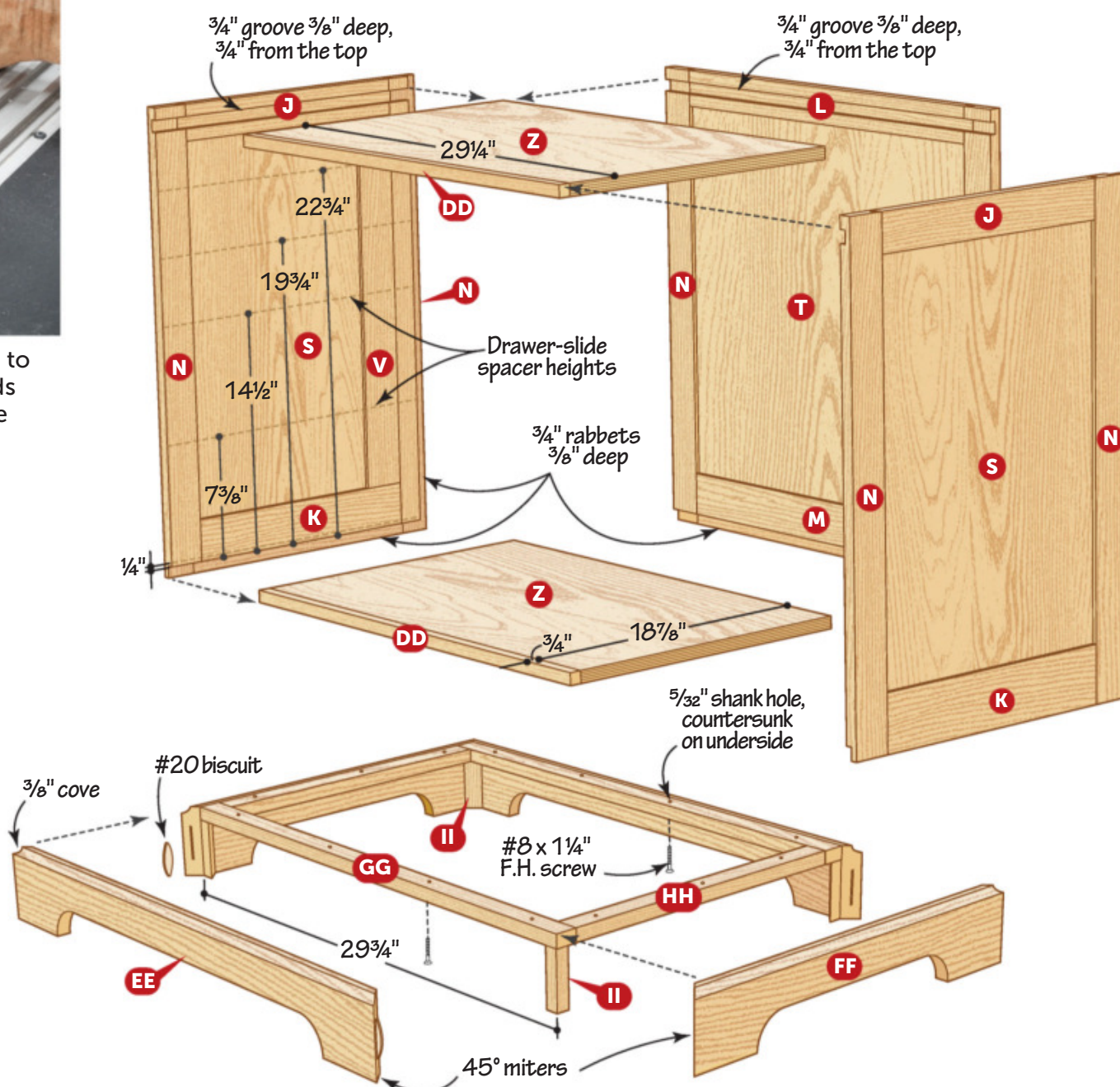
I DESIGNED THIS PROJECT TO BE MODULAR. THE BOTTOM CASE CAN STAND ALONE, AND THE TWO UPPER CASES CAN STACK ON A BENCHTOP.

-KEVIN BOYLE, SENIOR DESIGN EDITOR

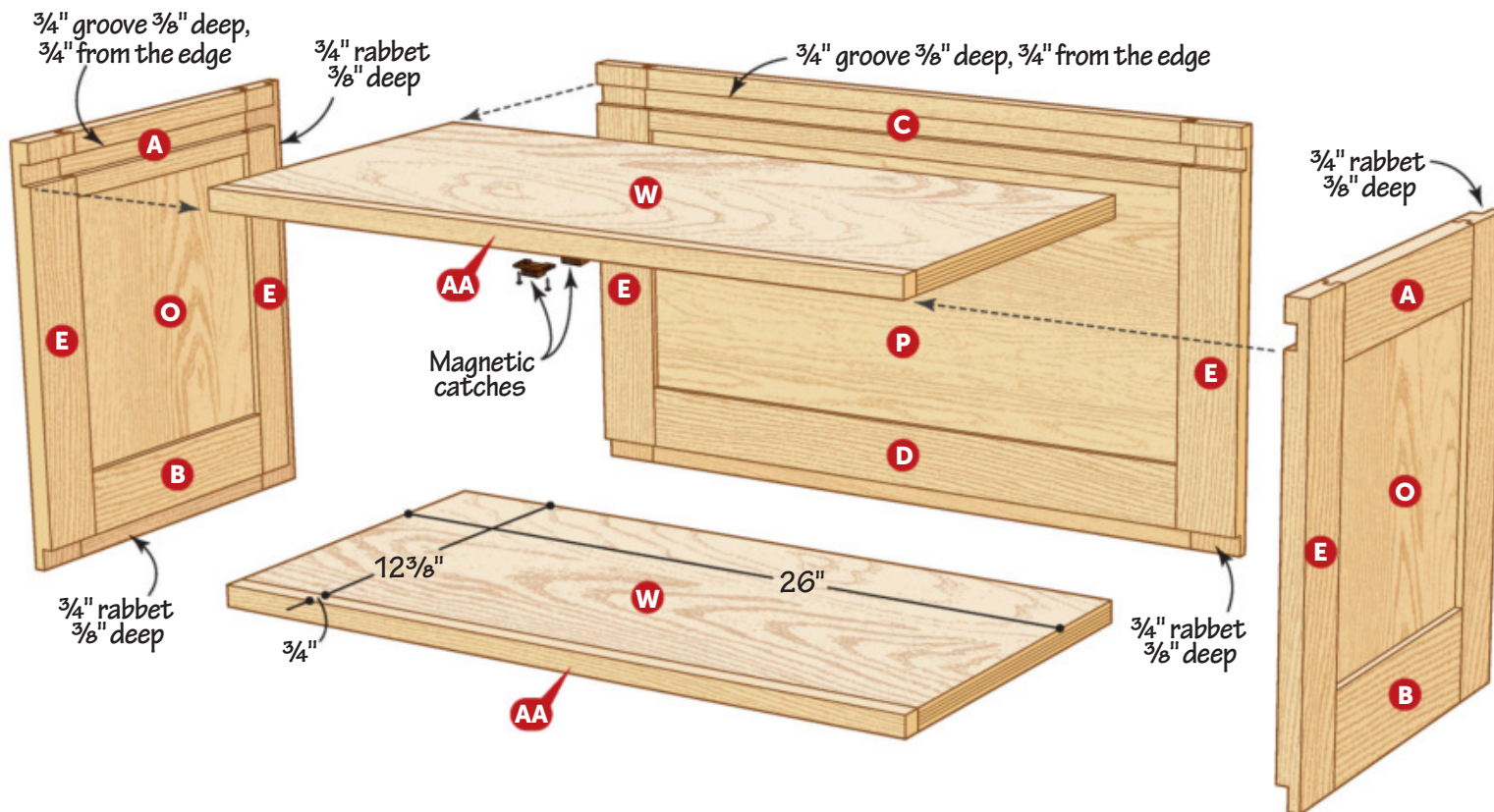
3 MIDDLE CASE



4 BOTTOM CASE



5 TOP CASE

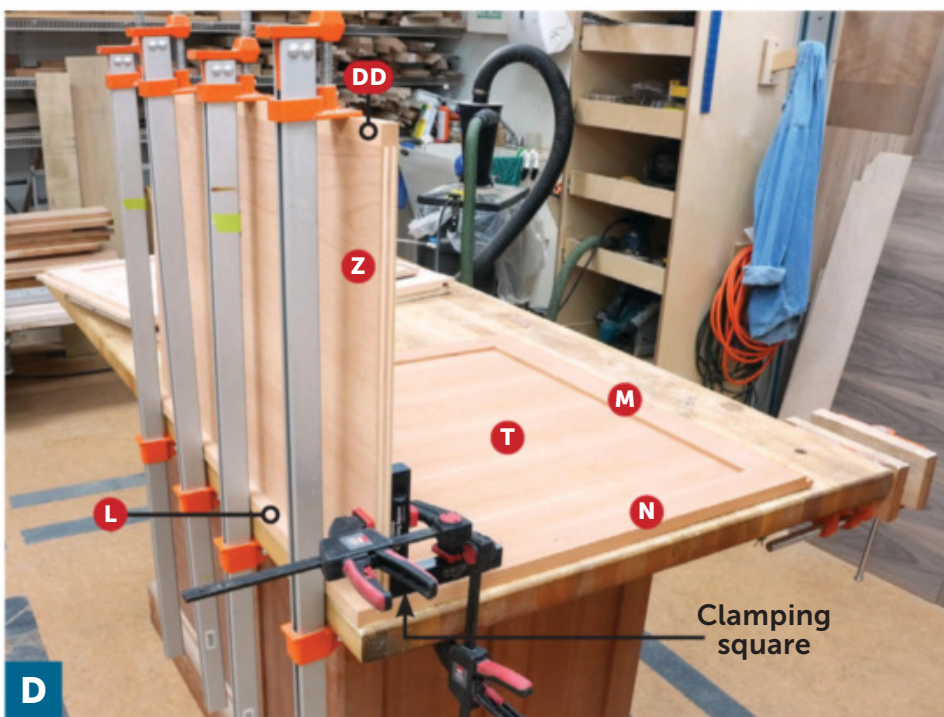


LET'S GET IT TOGETHER

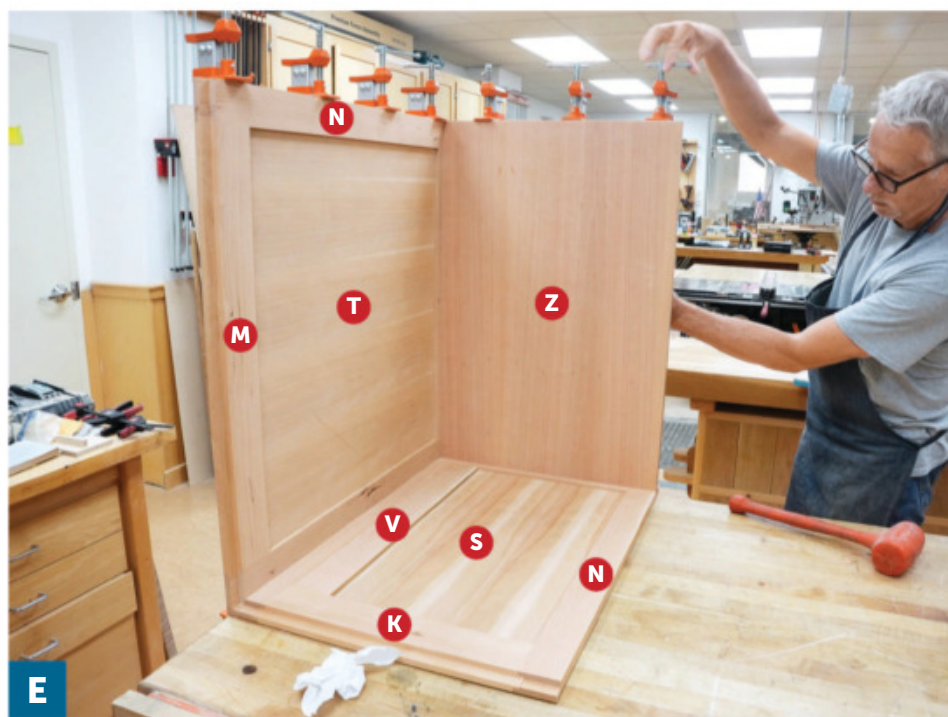
To reduce stress and the number of clamps you'll need to juggle, assemble the top and bottom cases first by gluing one panel to another and letting that assembly dry before adding another. If you have enough space and clamps, assemble like panels on the top and bottom cases at the same time. The divider in the middle case requires a slightly different process.

- 1** Begin by gluing a case top panel assembly (W/AA or Z/DD) to the case's back panel (C/D/E/P or L/M/N/T) **[Photo D]**. Allow the glue to dry.

- 2** Add a side panel assembly to the top and back panel assembly, using your benchtop to help hold the pieces in place **[Photo E]**.
- 3** Next, glue the bottom panel in place and add the remaining side panel.
- 4** Assemble the middle case by first gluing the divider (Y/CC) between the top and bottom panels (X/BB) **[Drawing 3]**. Use clamping squares to keep the top and bottom square to the divider. After the glue dries, glue this assembly to the back (E/H/I/R). Then add each side assembly (E/F/G/Q/U).



Glue a top panel, with the edging up, into the groove of a back panel. Use a clamping square to keep the panels perpendicular. Clamping to the workbench keeps everything stable.



Place a side assembly inside face up on a corner of your bench. Apply glue to the groove and rear rabbet in the side assembly, then clamp the top/back assembly to it.

STRING ALONG THE APRONS

The base consists of profiled aprons with their mitered corners reinforced by biscuits and glue blocks. Blocking inside the aprons provides a surface for screwing the assembled base to the bottom case.

- 1** Cut the aprons (EE, FF) to width and $\frac{3}{4}$ " longer than listed. Rout the cove along the outside top edge of each piece.
- 2** Bevel-cut one end of each apron, then set up a stopblock on an auxiliary miter-gauge fence and bevel-cut each pair to finished length [Drawing 6].
- 3** Lay out the profile on each apron. Bandsaw or jigsaw just outside the line, then sand to the line.

- 4** Cut a slot for a #20 biscuit in each bevel, then glue the aprons together [Photo F].

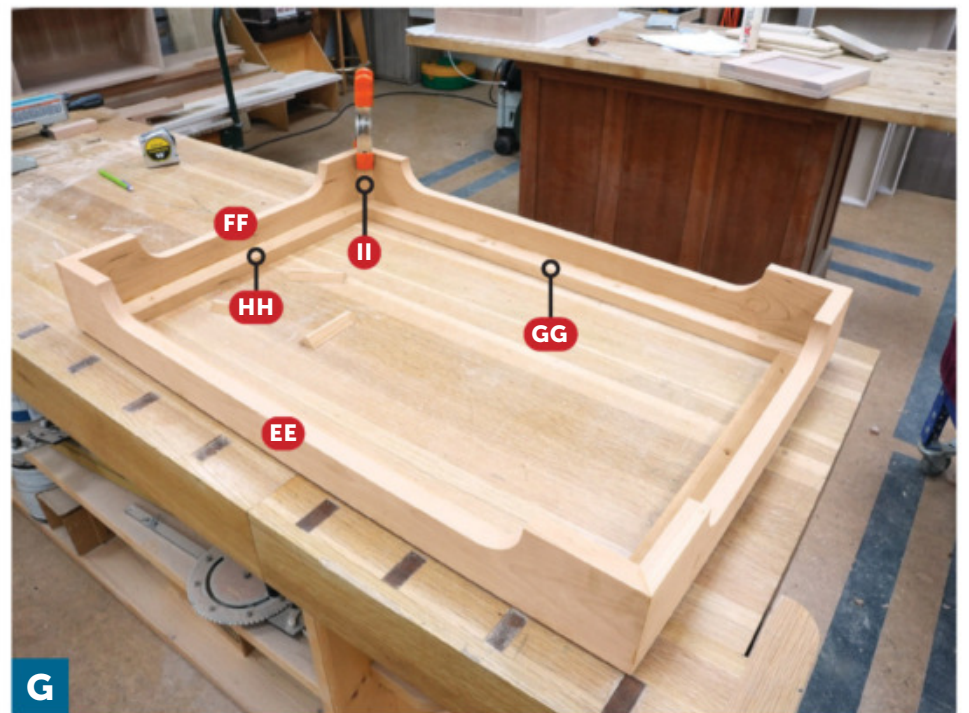
- 5** Cut the apron blocking (GG, HH) to size and drill countersunk shank holes in the bottom faces [Drawing 4]. Glue the blocking to the aprons, flush at the top.

- 6** To make the corner blocks (II), bevel-rip the edge of a $\frac{3}{4} \times 2 \times 15$ " strip at 45° . Cut the blocks to length and glue one in each corner [Photo G]. Finish-sand the aprons.

- 7** Turn the bottom case upside down and glue and screw the apron assembly to it, centered.

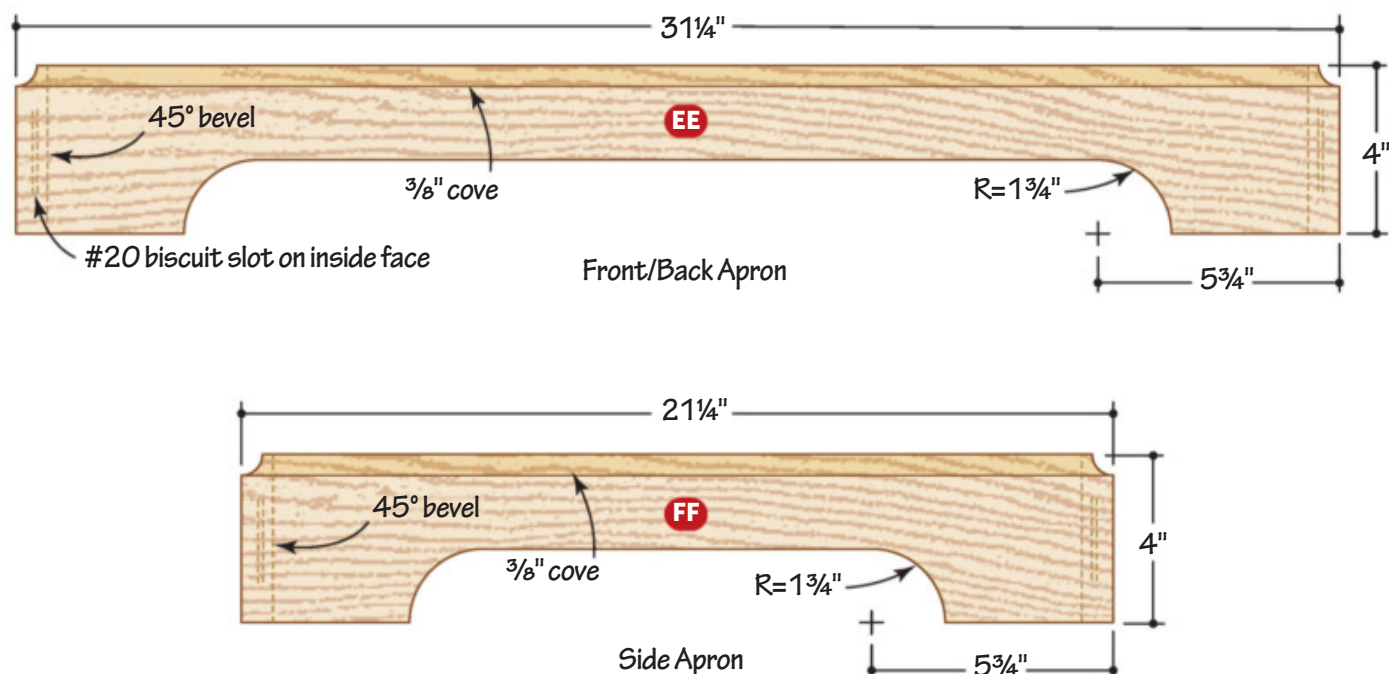


A biscuit in each beveled corner helps keep the corners aligned as you tighten a band clamp around the aprons. Check for gaps at each corner and ensure the assembly is square.



Position the corner blocks (II) against the blocking (GG, HH). Use spring clamps to hold the corner blocks against the aprons (EE, FF) while the glue dries.

6 APRONS



SIZE UP YOUR DRAWERS

Although there are 13 drawers in three sizes, they all use identical lock-rabbet joints, so once you have the tablesaw set up, you can cut all the joints at once.

1 Mill maple stock for the drawer sides, fronts, and backs (JJ–OO), along with a couple of extra test pieces, to exactly $\frac{1}{2}$ " thick. Cut the sides, fronts, and backs to size [Drawing 7]. Follow the steps in *Locked-in Lock Rabbits*, next page, to cut the joints. Finish-sand the inside faces of the drawer parts.

2 Dry-fit the drawers and measure for the drawer bottoms (PP, QQ). Cut the bottoms to size from $\frac{1}{4}$ " plywood and finish-sand them.

3 To assemble the drawers, apply glue to the tongues on one end of a drawer front and back, and to the drawer-bottom grooves in the front, back, and one side. Assemble these three pieces, then slide in the bottom. Add glue to the tongues on the opposite end and to the groove in the remaining side before clamping the drawer. Check for square and set the drawer aside to dry.

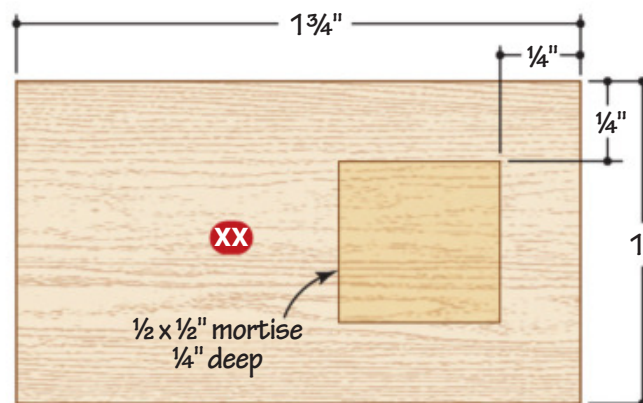
TIP!

Apply glue to only the bottom of the drawer grooves to prevent glue squeeze-out inside the drawer.

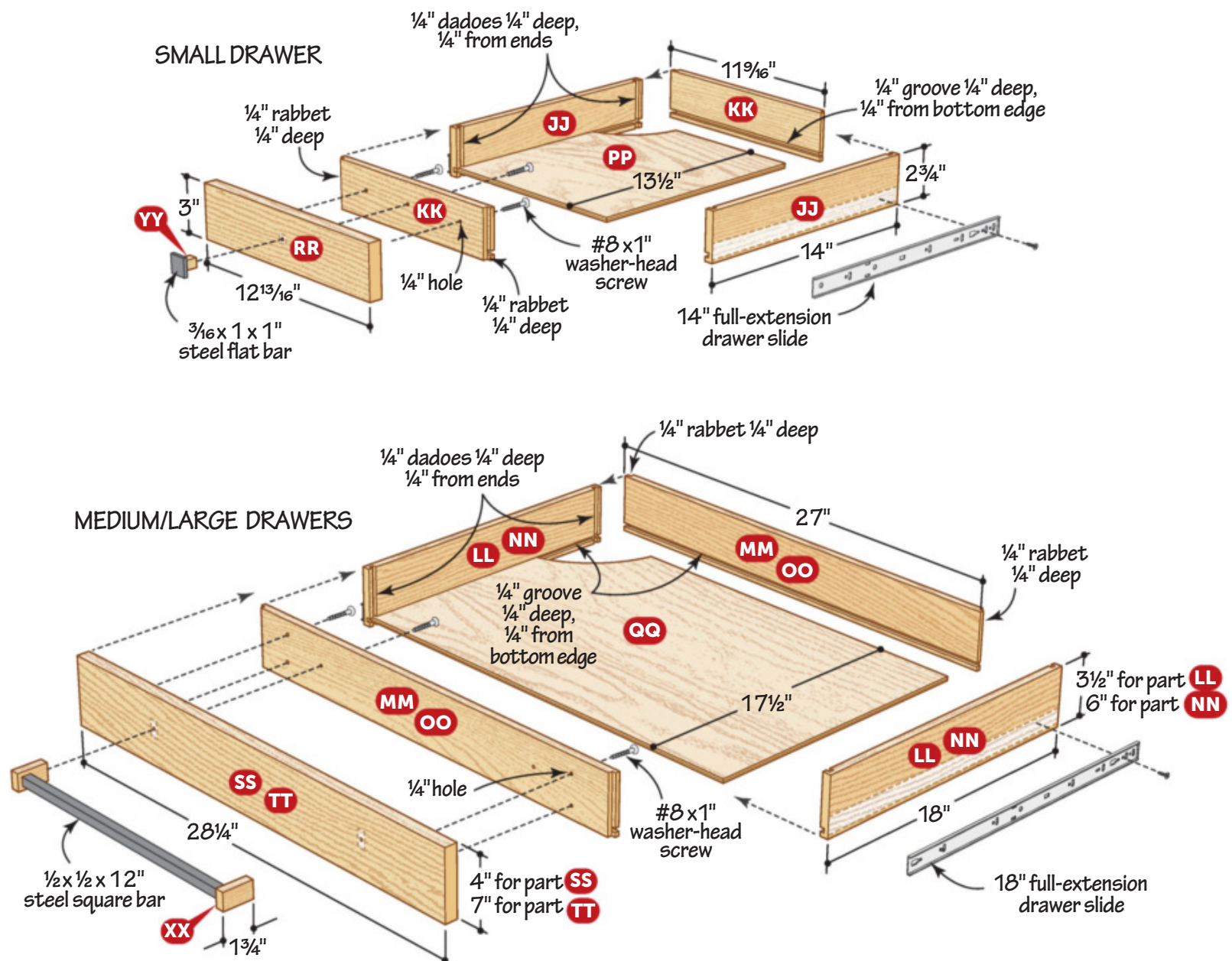
4 After the glue dries, drill two $\frac{1}{4}$ " holes in each small drawer front (KK), and four in each medium and large drawer front (MM, OO) [Drawing 7]. Making these holes slightly oversize provides room for adjusting the false fronts when adding them later.

5 From cherry stock, cut the drawer false fronts (RR–TT) to size and set them aside for now.

7a HANDLE STANDOFF



7 DRAWERS

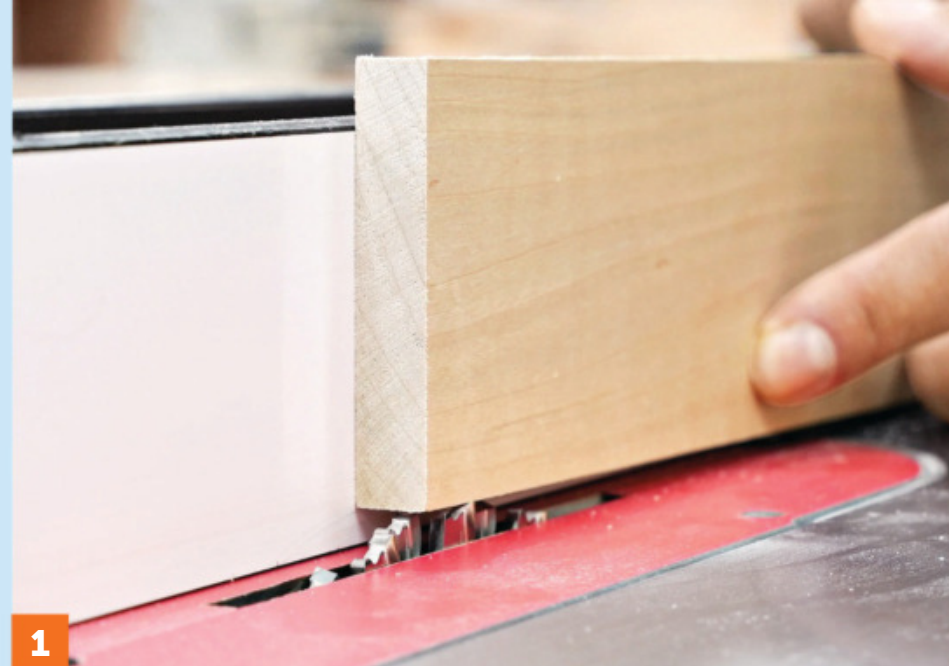


LOCKED-IN LOCK RABBETS

With just a 1/4" dado blade in the tablesaw, you can easily cut sturdy lock-rabbit joints, as well as the groove for a drawer bottom, and assemble a drawer quickly. One secret is to mill your stock to precisely 1/2" thick, which makes setups easier. Here's how to create them in four simple steps.

- 1** Set up a 1/4" dado blade in your tablesaw and raise it 1/4" above the table. Use a piece of your drawer stock to set the rip-fence position **[Photo 1]**.
- 2** Cut a dado across the inside face on each end of the drawer sides **[Photo 2]**.
- 3** Add an auxiliary face to your rip fence and position the fence so it just touches the dado blade. Lower the blade slightly and make a cut on the end of a test piece **[Photo 3]**. When fitting the test tongue in the dado of a drawer side, you want a friction fit that stays together when you hold up the drawer side. Don't force the fit; a too-thick tongue can break off the outside edge of the dado. Adjust the blade height as needed to achieve this. Then lock the blade height adjustment and cut a tongue on each end of the drawer fronts and backs.
- 4** Remove the auxiliary rip fence face and position the rip fence 1/4" from the blade. Cut a groove in all drawer pieces for the drawer bottoms **[Photo 4]**.

With the joinery complete, you need only to cut the drawer bottom to size. Then glue up a drawer with locked-in strength.



1 Place a piece of drawer stock against the rip fence and adjust the fence position until the outside face of the drawer stock is flush with the outermost edge of the dado-blade teeth.



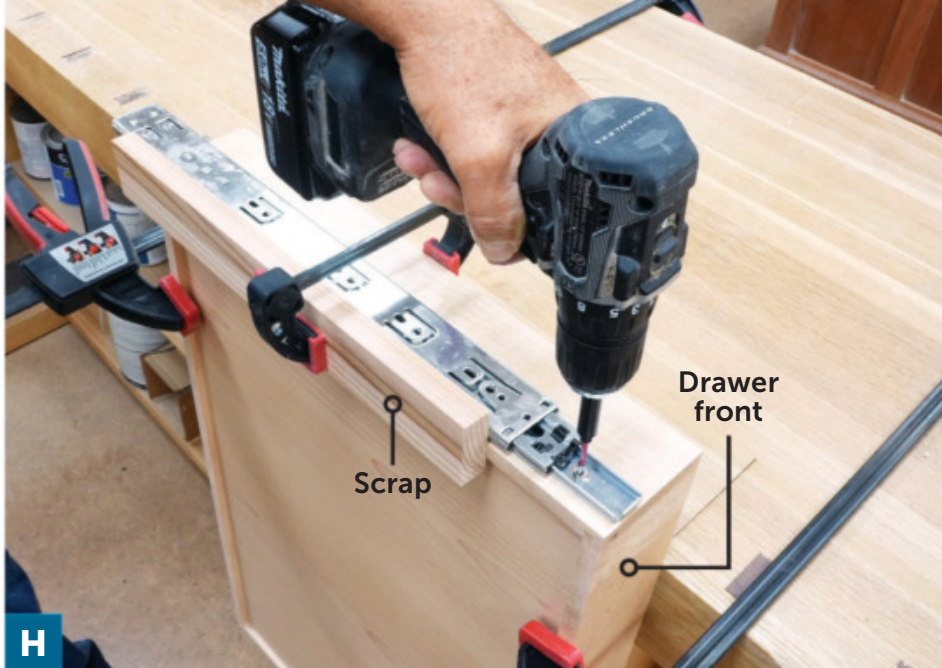
2 Attach an auxiliary fence to your miter gauge to steady the drawer side and prevent chip-out when the blade exits the workpiece. Butt the drawer side against the rip fence and make the cut.



3 Lower the blade slightly and sneak up on the final thickness of the tongue on a test piece. Then, rabbet the drawer front and back. Apply consistent pressure during the cut for an even tongue thickness.



4 Cut the 1/4"-deep groove for the drawer bottom on the inside face of each drawer front, back, and side. A push pad helps apply even pressure throughout the cut.



H Place the fully assembled slide against the scrap block and flush with the front of the drawer. Drive a screw into the front and middle screw holes in the inner slide.



I Rest a slide on top of the spacer, flush with its front edge. Screw the slide in place to the stiles and slide filler. Repeat for the other side, then cut down the spacer for each remaining pair of slides.

DOORS ON AND DRAWERS IN

1 Measure the height and width of the top case opening (ours measured $12\frac{5}{8} \times 25\frac{1}{4}$ ") and cut the door stiles (UU) and rails (VV) to size [Drawing 8]. If your opening differs, adjust the stile and rail length accordingly.

2 Cut the grooves and stub tenons on the rails and stiles. Dry-fit the doors and measure for the door panels (WW). Cut the panels to size and finish-sand them. Then, glue up the doors.

3 Apply finish to the cases, doors, and drawer false fronts. We sprayed on two coats of satin lacquer.

4 To mount the drawer slides, clamp a scrap to the bottom of a drawer side [Photo H]. Pull the outer portion of the slide back to reveal a screw hole in the inner slide and attach the slide to the drawer. Move back farther and

drive a second screw into the inner slide, then separate the slide halves. Repeat for the other side, making sure the slides face the same direction, and then for the remaining drawers.

5 Clamp an $18 \times 22\frac{3}{4}$ " plywood spacer inset $\frac{3}{4}$ " from the front edge of the bottom case to support the slides as you install them [Photo I]. Cut down the spacer for the lower slides [Drawing 4]. Use $\frac{1}{4}$ "-thick spacers for the bottom slides. Repeat for the middle case, starting with a $14 \times 9\frac{1}{2}$ " spacer [Drawing 3].

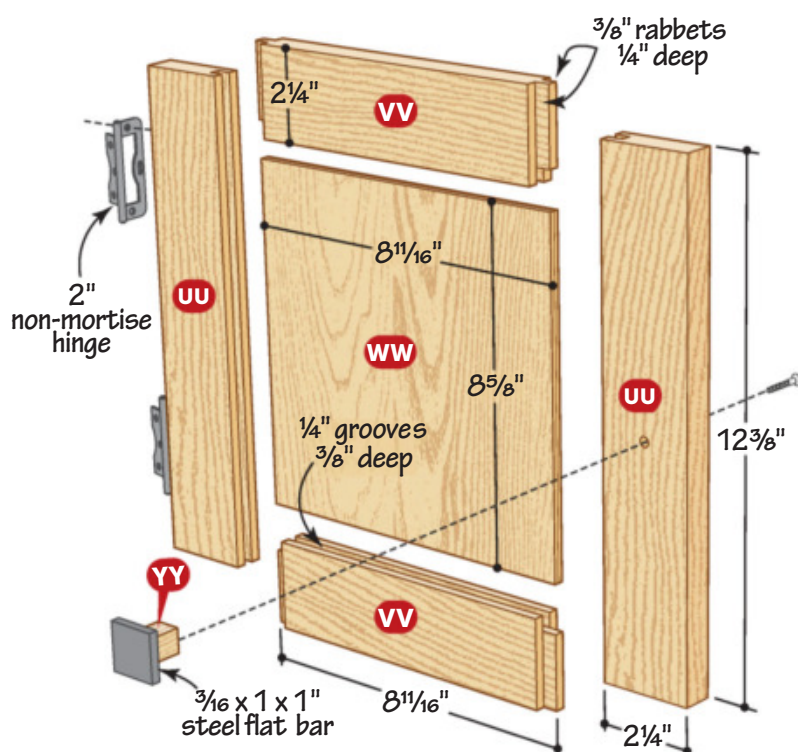
6 Install the drawers into the cases and check their operation. Then remove all but the bottom drawers.

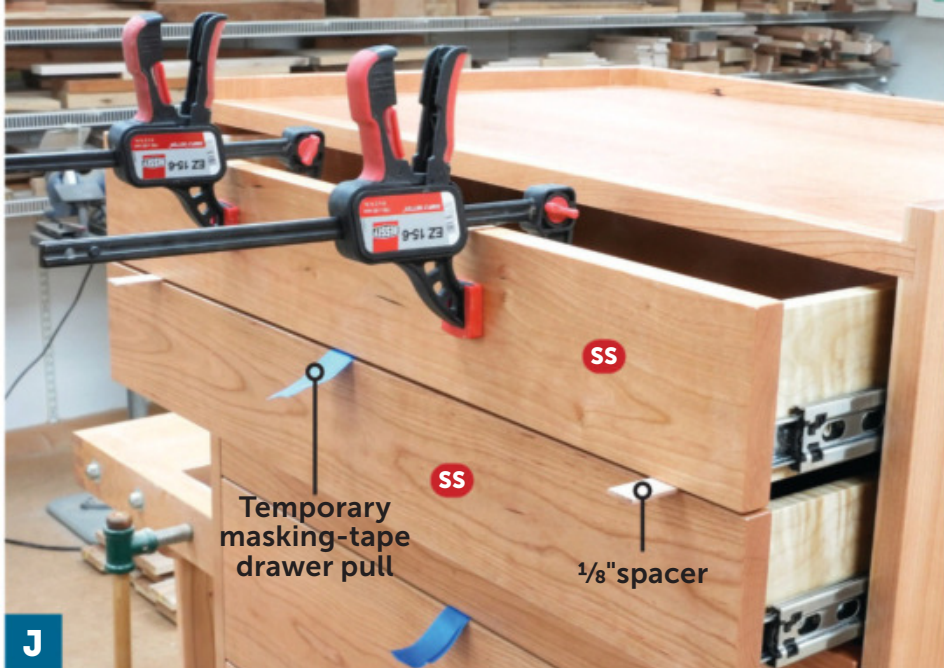
7 To install the false fronts (RR-TT), cut spacers from $\frac{1}{8}$ " scrap. Place these on the bottom of the bottom case and rest a large false front (TT) on them, centered side-to-side. Clamp the false front to the drawer and drive washer-head screws through two of the $\frac{1}{4}$ " holes in the drawer front into the false front.

8 Install the next drawer up, then place the spacers on the just-installed false front and repeat, working your way to the top drawer [Photo J]. Close all the drawers and check the spacing of the false fronts. Make any adjustments needed, then drive the remaining washer-head screws into each false front. Repeat this process for the drawers in both sides of the middle case.

9 Attach the hinges to the doors. Rest a $\frac{1}{8}$ "-thick spacer on the case bottom to support a door [Photo K]. Screw the hinges to the case. Repeat for the other door. Install the magnetic catches on the cabinet [Drawing 5] and the strike plates to the doors.

8 DOOR





Slightly pull out the second drawer down, then rest the spacers and false front (SS) on it. Clamp the false front in place and drive the screws as for the other drawers.



The steel rule from a combination square supports the door just above the case bottom (W), establishing an even reveal. Drill the hinge screw holes with a self-centering bit, then drive the screws.

HANDLE THE PULLS



Learn about tools and techniques for working with metal.
woodmagazine.com/heavymetal

- 1** For the handles and knobs, cut five 12" lengths from $\frac{1}{2} \times \frac{1}{2}$ " square steel bar and one 14" blank from $\frac{3}{16} \times 1$ " flat bar. Clean each piece with denatured alcohol or lacquer thinner, then sand them [Photo L]. Cut the flat bar into 1"-long caps and file the ends smooth. Clean the metal again and then coat the parts with gun blue [Sources] to impart protection and color.
- 2** Cut a $\frac{1}{2} \times 1 \times 20$ " blank for the handle standoffs (XX) and a $\frac{1}{2} \times \frac{1}{2} \times 20$ " blank for the knob bases (YY). Lay out the standoffs [Drawing 7a], including the mortises. Be sure to leave space for saw kerfs between the standoffs. Then, form the mortises [Photo M].
- 3** Cut the knob bases to $\frac{3}{4}$ " long and then drill a $\frac{7}{64}$ " hole centered in one

end of each base to accept a mounting screw. Epoxy the knob bases to the steel caps, and epoxy a standoff to each end of the handles. Clamp lightly from end to end and allow the epoxy to cure. Finish-sand the wood parts and spray two coats of lacquer on the completed knobs and handles to protect them from rust and fingerprints.

4 Screw the knobs and handles to the doors and drawers [Drawings 7, 8].

5 Grab a helper and move the cases into a convenient, prominent place in your shop. Stack them, and then load them up. You'll be amazed by how many tools and supplies suddenly become better organized, and you'll enjoy the benefits of your craftsmanship every time you work in the shop. 🌱



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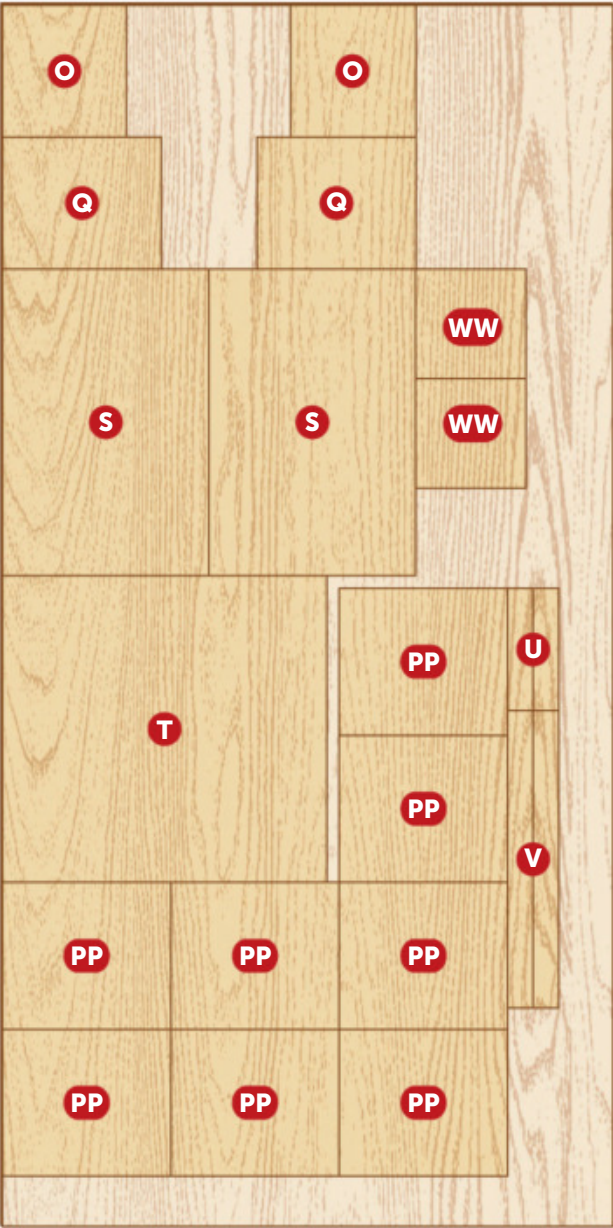


To prepare the metal for finishing, sand it with 80-grit, then 120- and 150-grit sandpaper. Before wiping the steel with alcohol or thinner, put on nitrile gloves to prevent transferring oils from your hands.



A $\frac{1}{2}$ " chisel in a mortising machine quickly forms $\frac{1}{4}$ "-deep mortises in the blank for the handle caps (XX). If you don't have a mortiser, drill $\frac{1}{2}$ " holes with a Forstner bit, then square them up with a chisel.

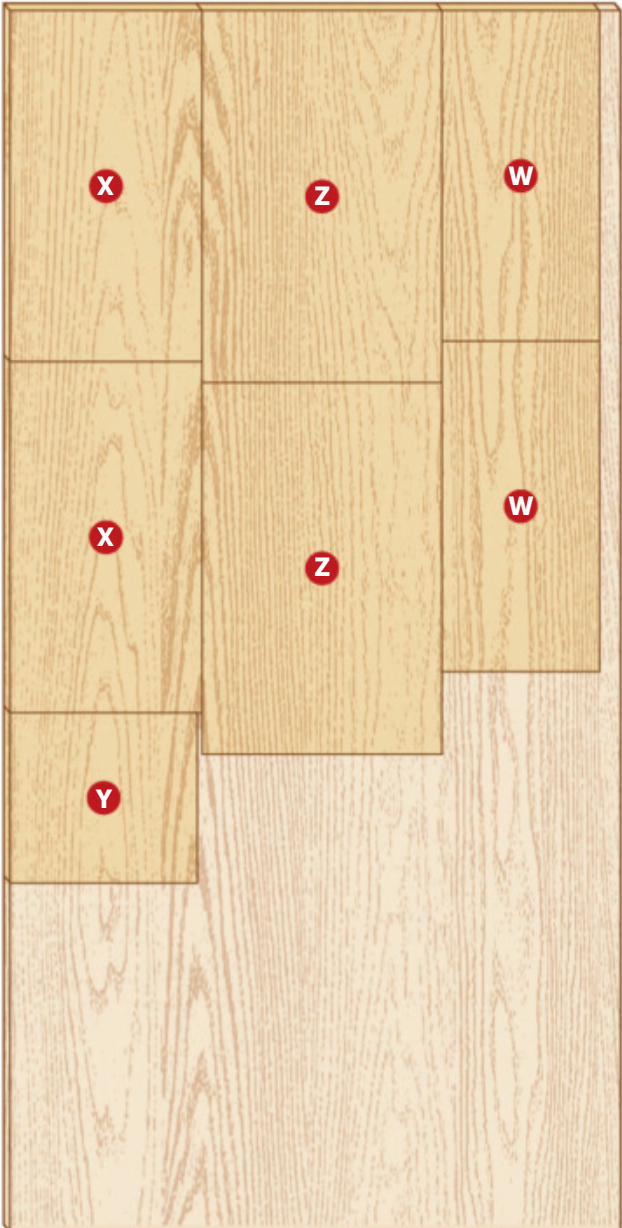
CUTTING DIAGRAM



1/4 x 48 x 96" Cherry plywood



1/4 x 48 x 96" Cherry plywood

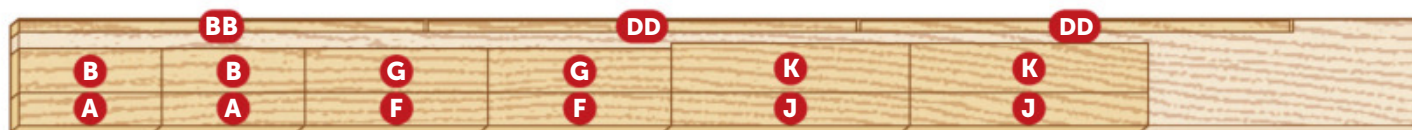


3/4 x 48 x 96" Cherry plywood

MATERIALS LIST

PART		FINISHED SIZE			Matl.	Qty.
		T	W	L		
A	TOP-CASE SIDE UPPER RAILS	3/4"	2 1/4"	9 3/4"	C	2
B	TOP-CASE SIDE LOWER RAILS	3/4"	3"	9 3/4"	C	2
C	TOP-CASE BACK UPPER RAIL	3/4"	2 1/4"	22 1/4"	C	1
D	TOP-CASE BACK LOWER RAIL	3/4"	3"	22 1/4"	C	1
E	MIDDLE-/TOP-CASE STILES	3/4"	2 1/4"	14 7/8"	C	12
F	MIDDLE-CASE SIDE UPPER RAILS	3/4"	2 1/4"	12 1/2"	C	2
G	MIDDLE-CASE SIDE LOWER RAILS	3/4"	3"	12 1/2"	C	2
H	MIDDLE-CASE BACK UPPER RAIL	3/4"	2 1/4"	23 7/8"	C	1
I	MIDDLE-CASE BACK LOWER RAIL	3/4"	3"	23 7/8"	C	1
J	BOTTOM-CASE SIDE UPPER RAILS	3/4"	2 1/4"	16 1/4"	C	2
K	BOTTOM-CASE SIDE LOWER RAILS	3/4"	3 3/8"	16 1/4"	C	2
L	BOTTOM-CASE BACK UPPER RAIL	3/4"	2 1/4"	25 1/2"	C	1
M	BOTTOM-CASE BACK LOWER RAIL	3/4"	3 3/8"	25 1/2"	C	1
N	BOTTOM-CASE STILES	3/4"	2 1/4"	29"	C	6
O	TOP-SASE SIDE PANELS	1/4"	9 3/4"	10 3/8"	CP	2
P	TOP-CASE BACK PANEL	1/4"	22 1/4"	10 3/8"	CP	1
Q	MIDDLE-CASE SIDE PANELS	1/4"	12 1/2"	10 3/8"	CP	2
R	MIDDLE-CASE BACK PANEL	1/4"	23 7/8"	10 3/8"	CP	1
S	BOTTOM-CASE SIDE PANELS	1/4"	16 1/4"	24 1/8"	CP	2
T	BOTTOM-CASE BACK PANEL	1/4"	25 1/2"	24 1/8"	CP	1

PART		FINISHED SIZE			Matl.	Qty.
		T	W	L		
U	MIDDLE-CASE DRAWER SLIDE FILLERS	1/4"	2"	9 5/8"	CP	2
V	BOTTOM-CASE DRAWER SLIDE FILLERS	1/4"	2"	23 3/8"	CP	2
W*	TOP-CASE TOP/BOTTOM	3/4"	12 3/8"	26"	CP	2
X*	MIDDLE-CASE TOP/BOTTOM	3/4"	15 1/8"	27 5/8"	CP	2
Y*	MIDDLE-CASE DIVIDER	3/4"	14 3/4"	13 3/8"	CP	1
Z*	BOTTOM-CASE TOP/BOTTOM	3/4"	18 7/8"	29 1/4"	CP	2
AA*	TOP-CASE TOP/BOTTOM EDGING	3/4"	3/4"	26"	C	2
BB*	MIDDLE-CASE TOP/BOTTOM EDGING	3/4"	3/4"	27 5/8"	C	2
CC*	MIDDLE-CASE DIVIDER EDGING	3/4"	3/4"	13 3/8"	C	1
DD*	BOTTOM-CASE TOP/BOTTOM EDGING	3/4"	3/4"	29 1/4"	C	2
EE*	FRONT/BACK APRONS	3/4"	4"	31 1/4"	C	2
FF*	SIDE APRONS	3/4"	4"	21 1/4"	C	2
GG	FRONT/BACK APRON BLOCKING	3/4"	1 1/4"	29 3/4"	C	2
HH	SIDE APRON BLOCKING	3/4"	1 1/4"	17 1/4"	C	2
II*	CORNER BLOCKS	3/4"	3/4"	3 1/4"	C	4
JJ	SMALL DRAWER SIDES	1/2"	2 3/4"	14"	M	16
KK	SMALL DRAWER FRONTS/BACKS	1/2"	2 3/4"	11 9/16"	M	16
LL*	MEDIUM DRAWER SIDES	1/2"	3 1/2"	18"	M	6
MM	MEDIUM DRAWER FRONTS/BACKS	1/2"	3 1/2"	27"	M	6
NN	LARGE DRAWER SIDES	1/2"	6"	18"	M	4



3/4 x 7 1/4 x 96" Cherry



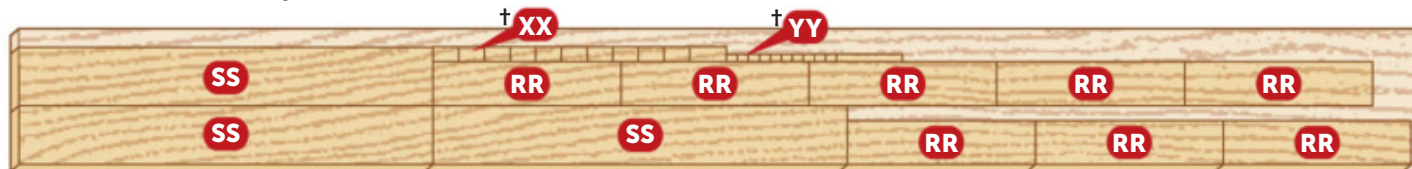
3/4 x 7 1/4 x 96" Cherry



3/4 x 5 1/2 x 96" Cherry (3 needed)



3/4 x 5 1/2 x 96" Cherry



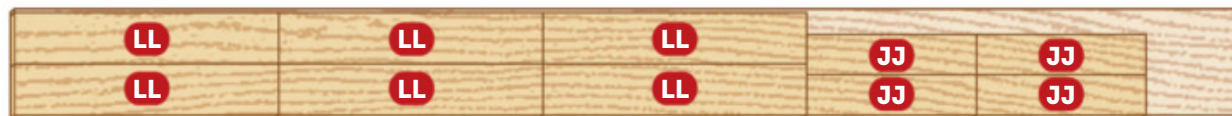
3/4 x 9 1/4 x 96" Cherry †Plane or resaw to the thickness listed in the Materials List.



3/4 x 7 1/4 x 96" Cherry



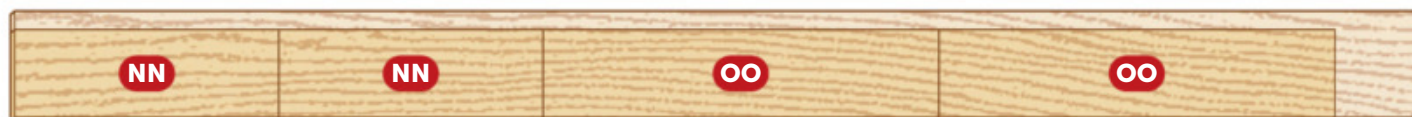
1/2 x 7 1/4 x 96" Maple (2 needed)



1/2 x 7 1/4 x 84" Maple



1/2 x 7 1/4 x 84" Maple



1/2 x 7 1/4 x 96" Maple (2 needed)

PART		FINISHED SIZE			Matl.	Qty.
		T	W	L		
OO	LARGE DRAWER FRONTS/BACKS	1/2"	6"	27"	M	4
PP	SM DRAWER BOTTOMS	1/4"	13 1/2"	11 9/16"	CP	8
QQ	MEDIUM/LARGE DRAWER BOTTOMS	1/4"	17 1/2"	27"	CP	5
RR	SMALL FALSE FRONTS	3/4"	3"	12 13/16"	C	8
SS	MEDIUM FALSE FRONTS	3/4"	4"	28 1/4"	C	3
TT	LARGE FALSE FRONTS	3/4"	7"	28 1/4"	C	2
UU	DOOR STILES	3/4"	2 1/4"	12 3/8"	C	4
VV	DOOR RAILS	3/4"	2 1/4"	8 11/16"	C	4
WW	DOOR PANELS	1/4"	8 11/16"	8 5/8"	CP	2
XX*	HANDLE STANDOFFS	1/2"	1"	1 3/4"	C	10
YY*	KNOB BASES	1/2"	1/2"	3/4"	C	10

*Parts initially cut oversize. See the instructions.

We purchased 38 board feet of 4/4 cherry and 30 square feet of 1/2" maple. Before cutting parts to size, we planed them to the thicknesses shown in these example boards.

MATERIALS KEY: C—cherry, CP—cherry plywood, M—maple.

SUPPLIES: #20 biscuits, #8x1 1/4" flathead screws, #8x1" washer-head screws, magnetic catches (2), 1/2x1/2x12" square steel bar (5), 3/16x1x16" steel flat bar.

BLADE AND BITS: Dado blade, flush-trim and 3/8" cove router bits.

SOURCES: 14" full-extension, soft-close drawer slides no. VLS2-S14-SC (8 pairs), \$9/pair; 18" full-extension, soft-close drawer slides no. FLS2-S18-SC (5 pairs), \$10/pair; 2" non-mortise hinges no. SHC-1100B-10B (4), \$17 each, cabinetparts.com. Gun blue, \$13, woodmagazine.com/gunblue.

PROJECT COST: It cost us about \$875 to build this project. Your cost will vary by region and source.

5 - ESSENTIAL - CHISEL TECHNIQUES

Learn just a few of the things you can do that make these versatile, simple tools must-haves for every woodworker.

WRITER: KEN BURTON with DAVE STONE



Ken Burton is a master woodworker, artist, educator, and writer. Formerly the Editor-in-Chief of *Woodcraft Magazine*, Ken currently operates Windy Ridge Woodworks. Catch up with him at wrwoodworks.com.

Even if you're a devotee of power-tool woodworking, knowing how and when to use a set of standard bench chisels makes you a better, more efficient woodworker. Effective chisel use boils down to knowing how to hold, position, and guide them to get the result you want. Use these common techniques to get the most out of these essential tools.



Make sure your chisels are sharp to get the best results
woodmagazine.com/getthemsharp

PHOTOGRAPHER: KEN BURTON

Before you can begin mastering chisel techniques, you'll of course need a set of chisels. You don't need expensive chisels to produce fine work. If you haven't yet invested in a set, check out *Begin With a Basic Set* on page 55 for our recommendation. Chisel work is also much safer and more satisfying when you're working with sharp tools. See our recommendations in *Ask WOOD* on page 18 for a basic sharpening setup. Then get to work with these techniques.

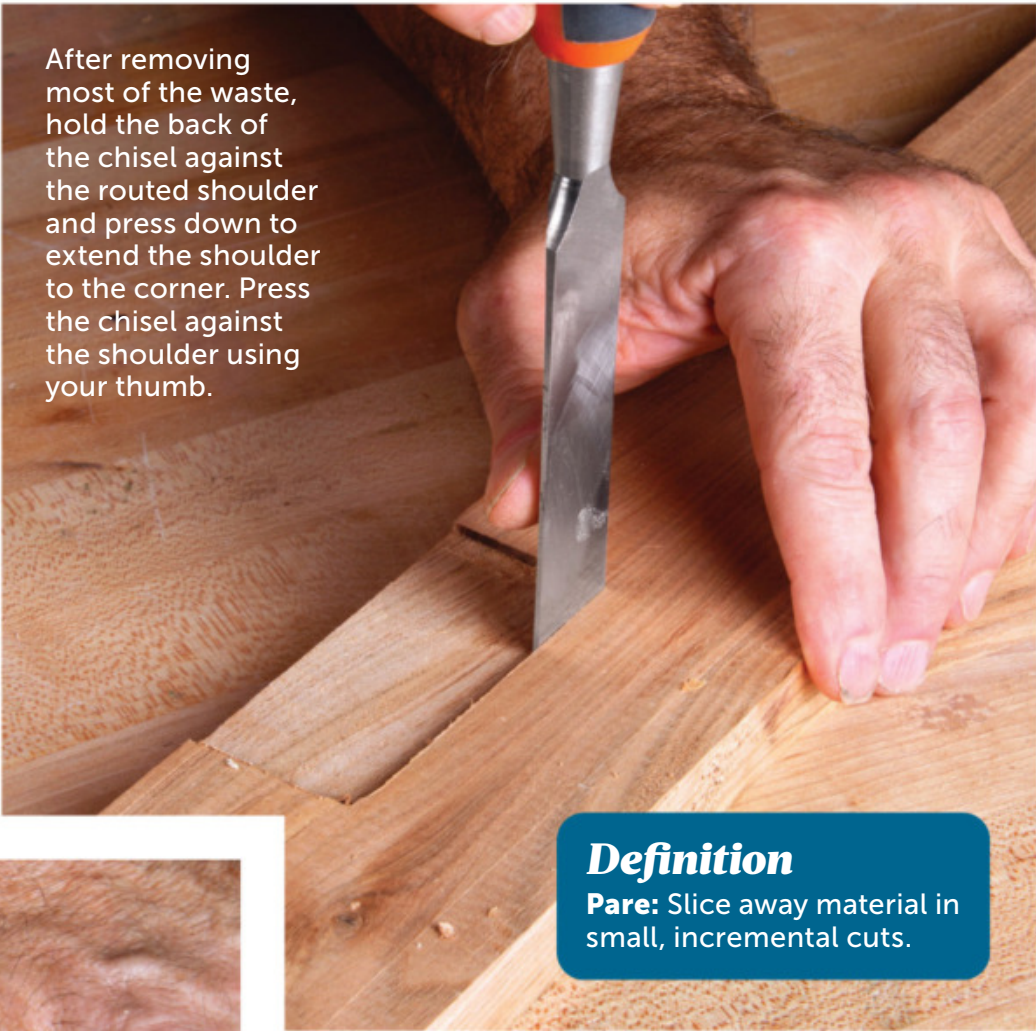
1 SQUARE UP ROUNDED CORNERS

Routing a recess for a butt hinge or a glass panel in a door frame removes the material quickly and easily but leaves rounded corners. Chisel away the excess to square the corners for a proper fit.

Frequently, one leg of these L-shaped cuts crosses the grain, while the other lies along it. Both present challenges. The cut across the grain requires more force, while the one with the grain can split the workpiece. In both cases, cut inside the line first to remove most of the waste before cutting to the mark.



Choose a wide chisel to help maintain a straight line. Hold the chisel vertically and press straight down. When cutting across the grain, strike the chisel or rock it slightly side to side to cut more effectively.



After removing most of the waste, hold the back of the chisel against the routed shoulder and press down to extend the shoulder to the corner. Press the chisel against the shoulder using your thumb.

Definition

Pare: Slice away material in small, incremental cuts.



Clean up residual waste with the chisel held horizontally, pressing its back against the bottom of the mortise for a flat cut and the chisel edge against the end shoulder to hold it square.

Cut across the grain first, staying slightly inside the line (*top photo*). Drive the chisel with your dominant hand (or a mallet) while positioning and stabilizing the blade with your other hand. Repeat the process for the long-grain cuts, then pare away the waste between the cuts.

Next, place the back of the chisel against the routed shoulder of the recess to guide the final vertical cuts, cross grain first, then long grain (*middle photo*).

Complete the recess using the chisel back, edge, and tip as guides to maintain a flat, square cut (*bottom photo*).

2 PARE SURFACES FLUSH

Reach for a chisel to bring surfaces flush with one another, such as when trimming plugs or when correcting a slight misalignment between pieces. In both instances, use the lower of the two surfaces as a reference to guide the chisel and prevent gouging.

When flush-trimming, saw away as much of the waste as possible first, leaving about $\frac{1}{16}$ " to pare away with your chisel (*right*).

The back of the chisel makes an ideal reference for flat, consistent cuts. If you can't rest the back flat, hold the bevel flat against the lower surface instead (*below left*).

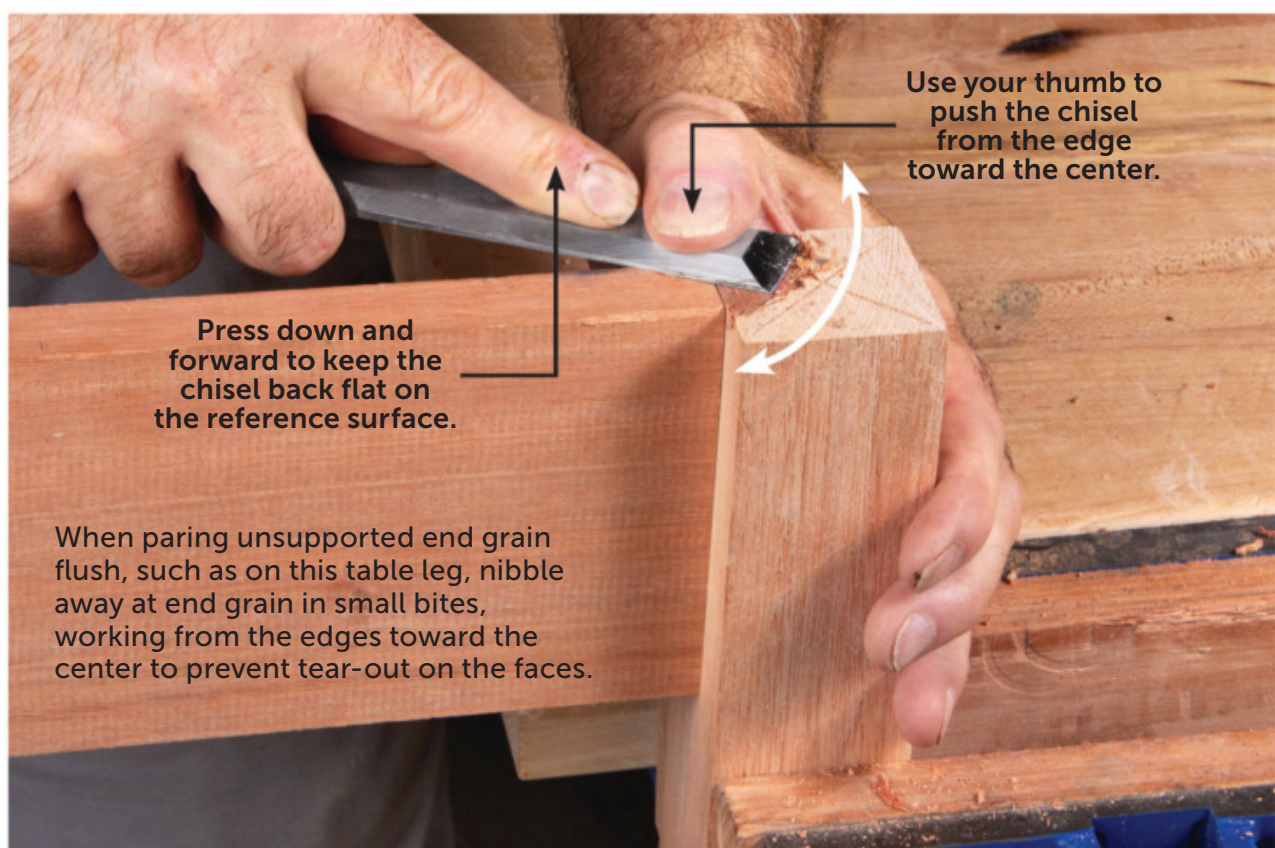
When paring end-grain plugs flush, the surrounding wood supports the fragile grain to help prevent tear-out. Where end-grain cuts are unsupported, make sure your paring cuts don't stress the fibers (*below right*).



“**EFFECTIVE CHISEL USE BOILS DOWN TO KNOWING HOW TO HOLD, POSITION, AND GUIDE THEM TO GET THE RESULT YOU WANT.**

-KEN BURTON, CONTRIBUTING EDITOR

”





3

CREATE QUICK CHAMFERS

Rather than taking the time to set up a chamfer bit in a router, it is often quicker and easier to make these simple cuts with a chisel. Holding the chisel at a slight angle to the cutline proves key in creating a shearing cut that's clean and easy to execute.

In some applications, the results don't have to be pretty, such as when chamfering the ends of a tenon for easier entry into a mortise. A few swipes with a chisel get the job done fast (*above*).

Other times, a chamfer needs to be smooth and aesthetically pleasing, such as when taking the sharp edges off the bottom of a table leg to prevent splintering. A trim router can be challenging to control without tipping on these small surfaces, so reach for a chisel, instead (*right*). Cutting each chamfer requires several light passes, but with practice, you'll get better results more quickly than with a router.



4 CLEAN OUT MORTISES

Unless you have a hollow-chisel mortiser, it's pretty tough to drill square holes for mortises. Create mortises easily by drilling out the majority of the waste with a bit that is $\frac{1}{32}$ " smaller than the desired finished width of the mortise. Then square the ends and pare the sides using chisels.

For the end cuts, select a chisel that matches the width of the mortise or is slightly narrower. Position the tip of the chisel just inside the layout line and begin cleaning out the waste (*right*). Make sure you hold the chisel perpendicular to the workpiece to prevent accidentally enlarging the mortise as you work your way down.

After you work partway down on each end, switch to cutting the mortise side walls (*below left*). For initial cleanout, a $\frac{3}{4}$ "-wide chisel works well. A sharp chisel will cut in line with the grain more easily, so a mallet may not be necessary. Continue back and forth between the ends and side walls until you reach full mortise depth. Then make final thin paring passes to reach your layout lines (*below right*).



Clamp your workpiece securely and begin chopping out each end of the mortise. Cross-grain cuts can be tough, so use a mallet to drive the chisel downward. Don't try to reach full depth in one pass.



Learn how a hollow-chisel mortiser drills square holes.
woodmagazine.com/squareholes



With a wider chisel, slice down the side walls of the mortise, just inside the layout lines. Unclamp the workpiece occasionally and tap debris out of the hole, or suck it out with a vacuum.



Finally, pare the mortise right to the lines with the widest chisel you have that fits. Work directly over your stock so you can use the weight of your body to help make the cut.

BEGIN WITH A BASIC SET

Getting started with bench chisels doesn't have to bust your budget. Avoid buying one of the super-cheap sets available online for \$10-15. You'll find it almost impossible to put sharp edges on them, and those edges won't last. Likewise, don't drop \$500 or more on your first chisel set. The Buck Brothers set I used in this article sells for less than \$40 and includes five widths from 1/4" to 1 1/4". They'll do everything shown here and more, and they're great for learning how to sharpen and use chisels before investing in a better set. You can pick up this set at woodmagazine.com/starterchiselset.

When you're ready to upgrade to better chisels, consign your starter set to home improvement and carpentry projects while saving your upgraded set for finer work.



5

FINE-TUNE TENONS

When cutting a mortise and tenon joint, create the mortise first, then cut the tenon on the tablesaw, making them just a hair thicker and wider than necessary. Fine-tune each tenon with a chisel for a perfect fit.

Start by paring the cheeks (faces), removing extremely thin amounts from one or both sides (*right*). Regularly check the tenon's alignment with its mortise, because altering the cheeks unevenly could misalign the parts. Pare the tenon edges, as well, to establish the final tenon width. Keep from removing too much material by frequently test-fitting the tenon in the mortise as you work.



TIP!

Cut your mortises first, then size your tenons to fit them.



To true an errant shoulder, hold the chisel vertically, with the back tight against the existing shoulder. Start near the center of the tenon and move toward the corner that needs to be trimmed.

To make a tenon slightly thinner, pare across its cheeks, working diagonal to the grain. Start at one corner and hold the back of the chisel on the surface as you make the cut.

Before you put the chisels away, make sure the tenon fits into the mortise completely without any gaps along the shoulders. If you see any, use a chisel to trim a small amount off of the offending part of the shoulder (*left*). For a super-tight fit, undercut the shoulder by paring away a bit of material right where the shoulders meet the cheeks. 🌲



HEAVY-HAULING HOPPER CAR

Hitch a few of these hopper cars to the Timber Line Express for efficient loading and unloading as you rock the rails.

WRITER: ZACH BROWN
DESIGNER/BUILDER: JOHN OLSON





Support block
with face 90°
to table

A

To ensure straight holes for the axle pegs, clamp the truck frames (A) against a support block on your drill-press table, then drill $\frac{1}{2}$ "-deep holes using a $\frac{7}{32}$ " brad-point bit.



Backer block

B

Install a $\frac{1}{4}$ " round-over bit in the router table and clamp a truck frame to a backer block to keep your fingers away from the bit and to prevent tear-out as you rout across the grain.

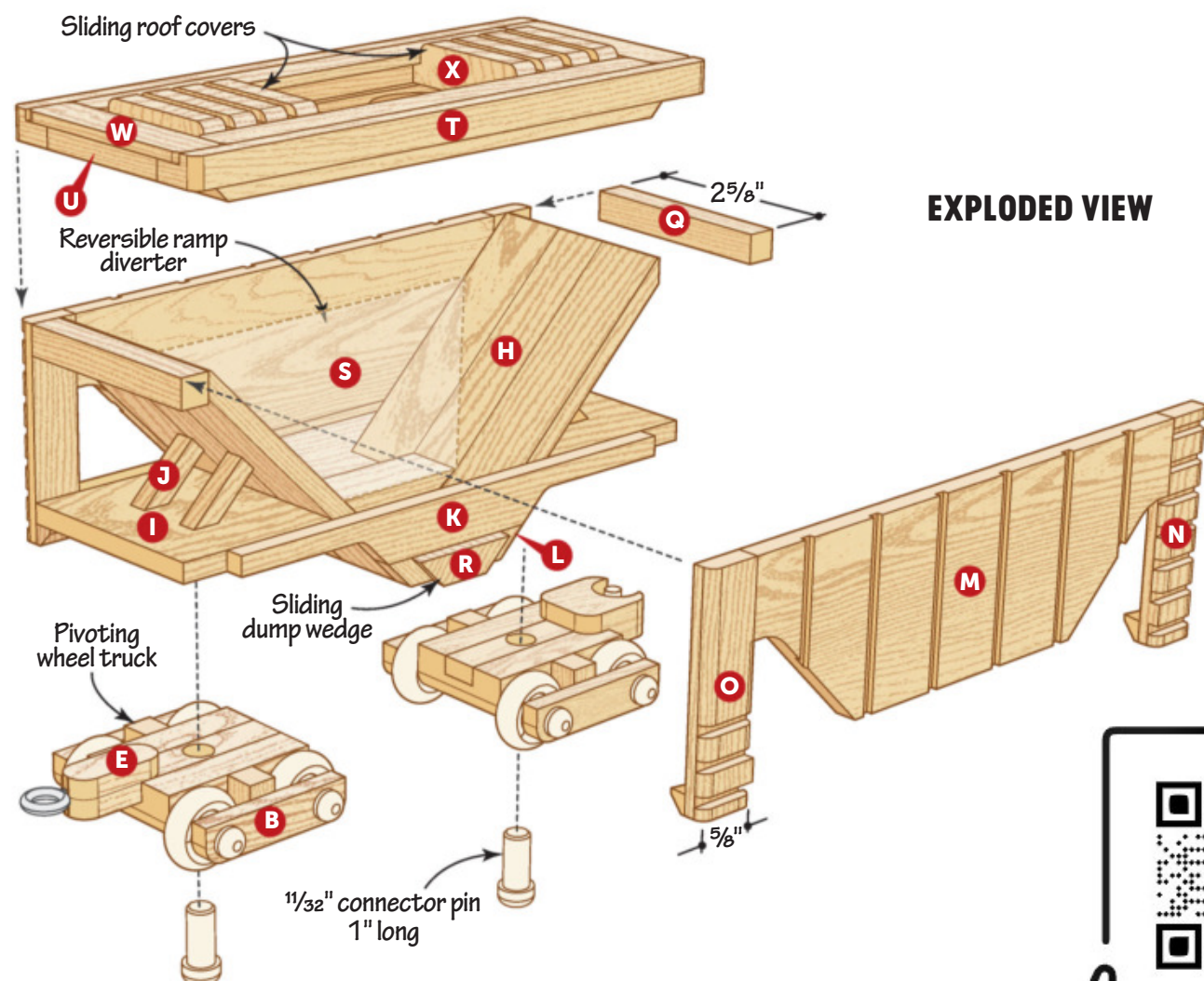
With their characteristic sloping sides and bottom door for unloading, hopper cars are used to transport bulk commodities like grain and ore. Our version has sliding covers on the roof to protect your cargo from the elements and a reversible diverter inside to direct the contents to the left or right side of the track.

Like the other cars in the Timber Line, the hopper car sits on wheel trucks that pivot with the track and connect to other cars. The kit [\[Source\]](#) includes specialty items like the wheels and pegs that help put this project on the right track.

CREATE THE WHEEL TRUCKS

1 Cut the truck frames and truck side frames (A, B) to size [\[Materials List, Drawing 1\]](#). Form the centered groove on top of each truck frame (A). Drill stopped holes in the edges of the truck frames [\[Photo A\]](#) and through-holes in the side frames (B) for the axle pegs. Round over the lower ends of the frames [\[Photo B\]](#) and the side frames.

2 Cut the spring groups (C) to size and glue the $\frac{3}{8}$ "-wide face to the sides of each truck frame (A), centered and flush to the top and bottom [\[Drawing 2\]](#).

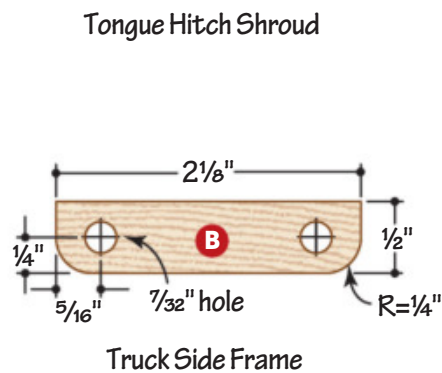
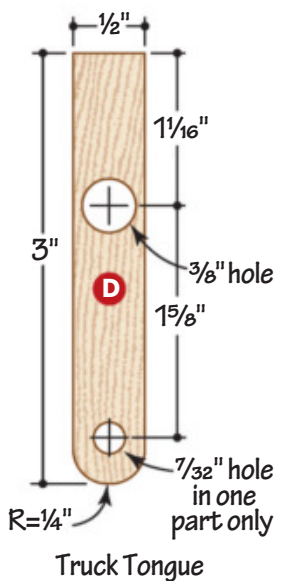
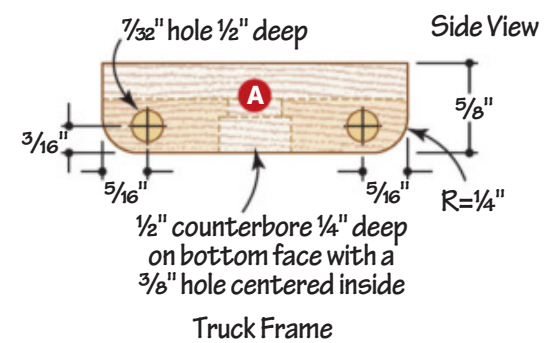
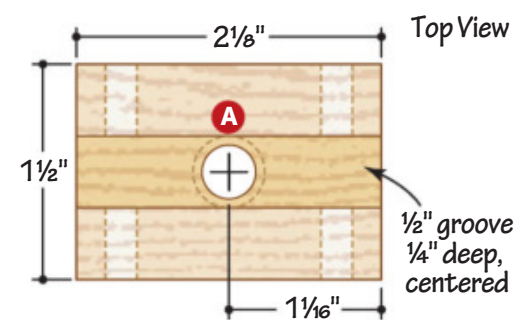
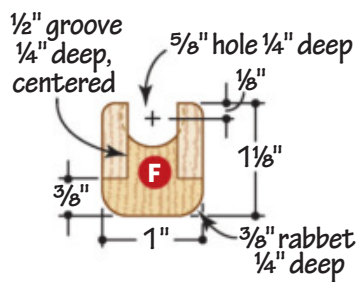
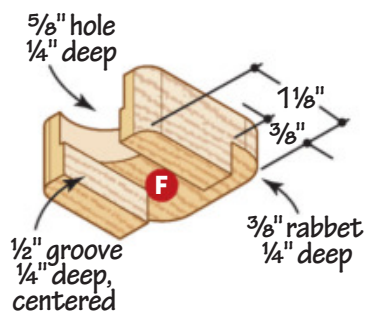
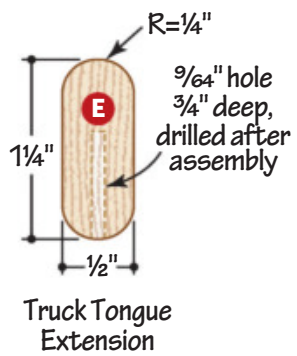


EXPLODED VIEW

PHOTOGRAPHER: KELSEY HANSEN; ILLUSTRATORS: ROXANNE LEMOINE, LORNA JOHNSON

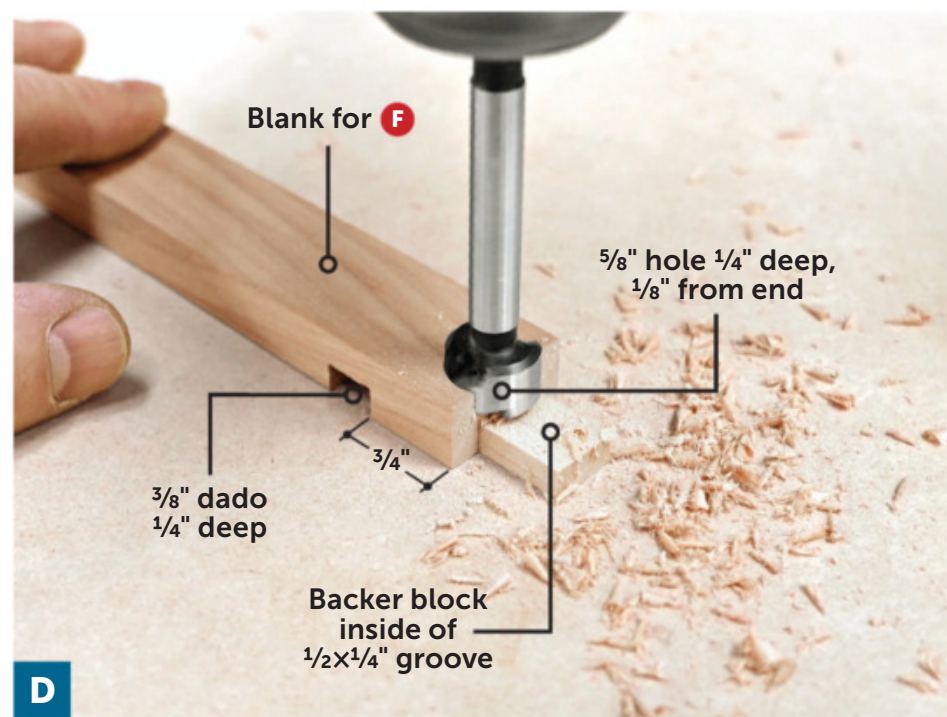
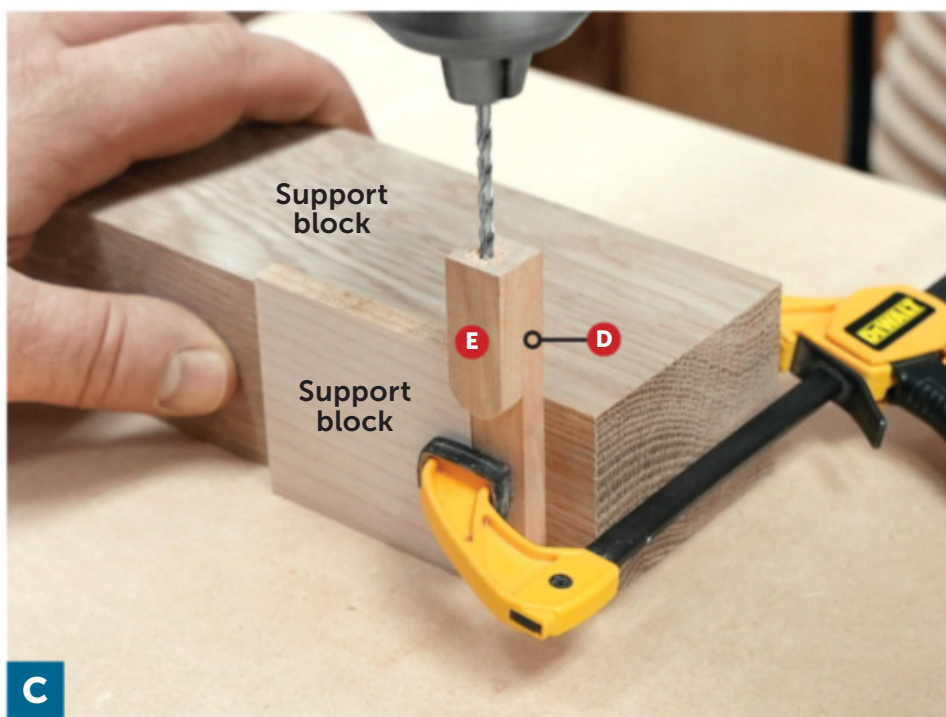


1



3 Cut the truck tongues (D) and tongue extension (E) to size **[Drawing 1]**. Round over the corners on one end of the tongue extension and glue it to the top of the front truck tongue, keeping the square end of the extension flush with the end of the tongue. Once the glue dries, drill the $\frac{9}{64}$ " hole in the front end of the tongue assembly **[Drawing 2, Photo C]**, then round over the drilled end.

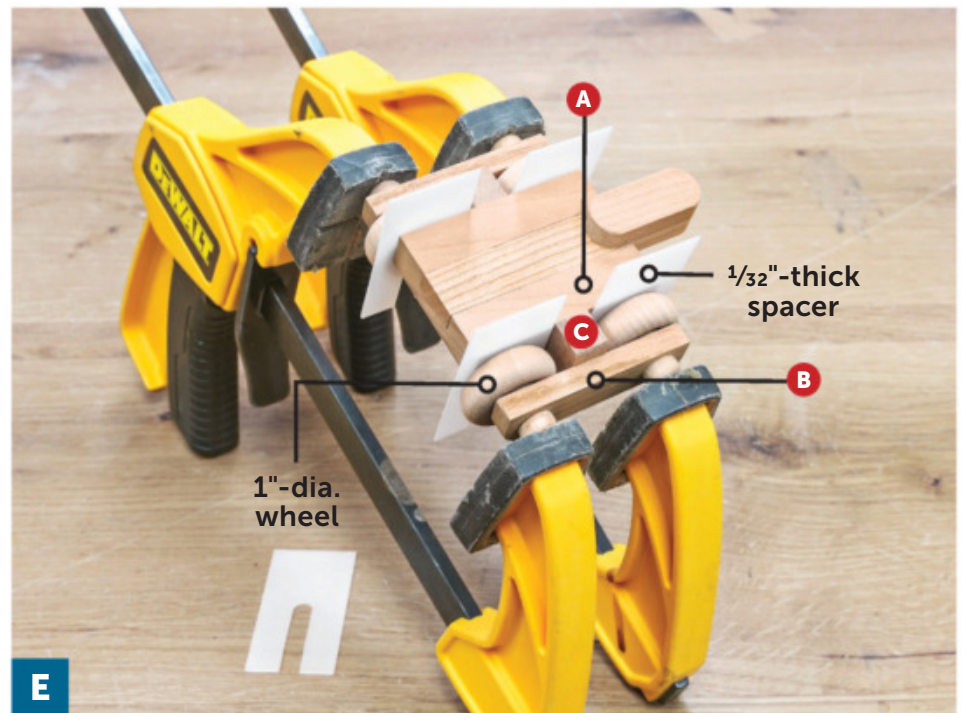
4 Glue the front tongue assembly into the groove on the front truck frame (A), flush at the back end **[Drawing 2]**. Drill the $\frac{7}{32}$ " hole in the rear tongue (D), round over the back corners, and glue it into the groove on the rear truck frame, flush at the front end.



5 Cut a 6"-long blank to thickness and width for the tongue hitch shroud (F) [Materials List]. Form a centered groove along one face to fit the rear truck tongue (D) [Drawing 1], then cut a $\frac{3}{8}$ " dado $\frac{3}{4}$ " from one end. This will become a rabbet after cutting the hitch shroud to length. Drill the hole in the top face [Photo D] and round over the corners on the same end. Crosscut the hitch shroud to length at the edge of the dado, round over the front corners, and glue it to the rear truck tongue [Drawing 2].

6 Continue the truck assembly by gluing an axle peg into each hole in the truck side frames (B) using a few drops of cyanoacrylate (CA) glue on the underside of the peg heads [Drawing 2]. Once the glue cures, slip the wheels and spacers (included in the kit) onto the axle pegs. Then use wood glue to secure the ends of the pegs into the holes in the truck frames (A), and the side frame (B) to the spring group (C) [Photo E].

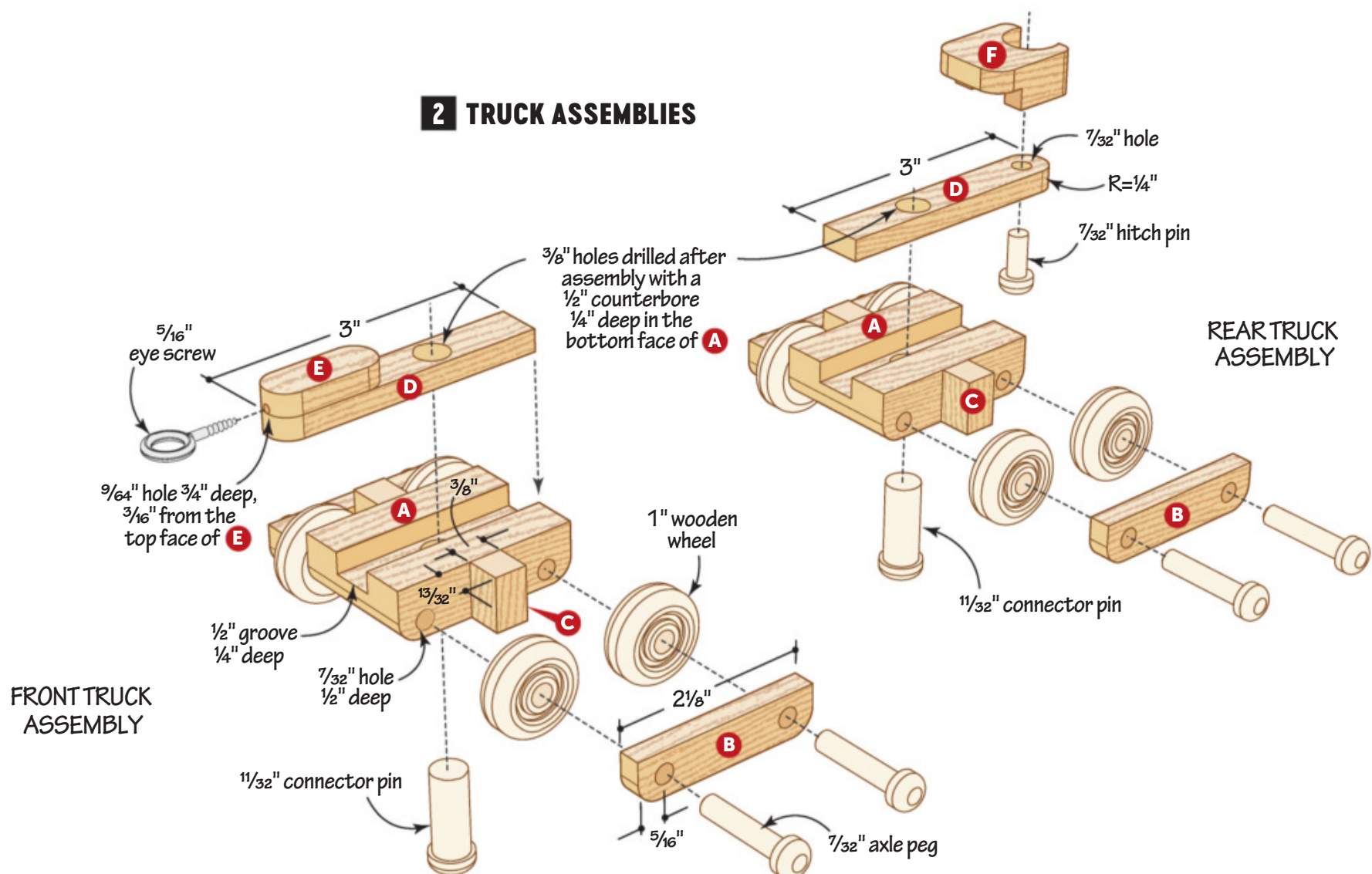
7 Form a recess for the truck connector pins by drilling a $\frac{1}{2}$ " counterbore $\frac{1}{4}$ " deep, centered on the bottom face of each truck frame (A) [Drawing 1]. Then drill a $\frac{3}{8}$ " hole through each truck assembly,



Slot the $\frac{1}{32}$ " spacers from the project kit to fit around the axle pegs between the wheels and the truck frame (A) before clamping the wheel assemblies into place. Once the glue dries, remove the spacers.

centered in the counterbore. Add the eye screw to the front truck and glue the hitch pin into the hole in the rear truck tongue (D), trimming it flush with the top of the hitch shroud (F).

2 TRUCK ASSEMBLIES

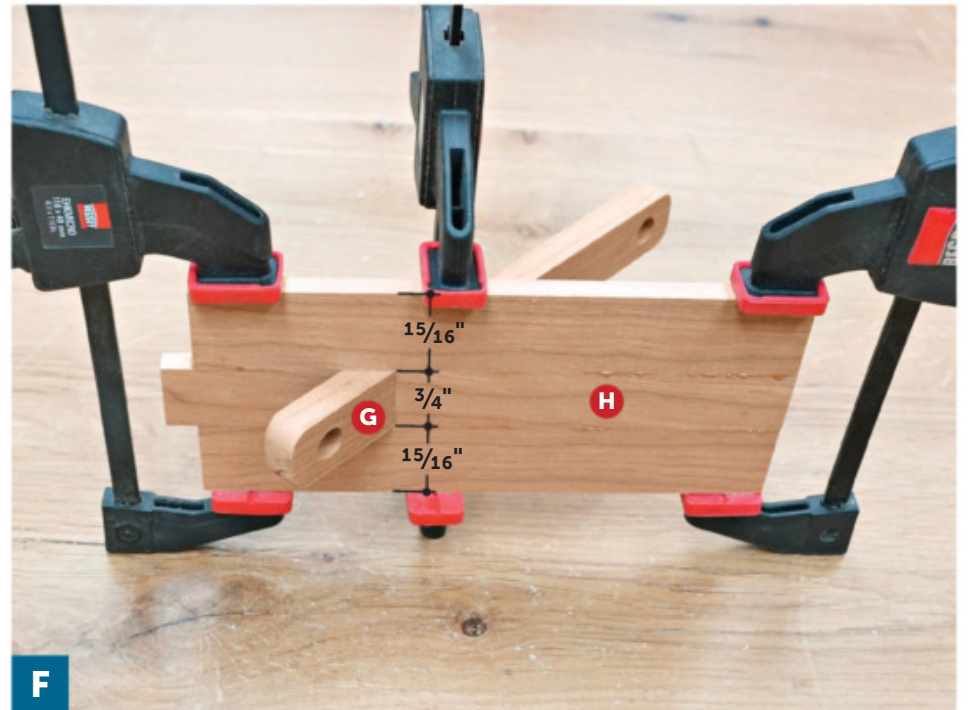


CRAFT THE CAR BODY

1 Cut the frame rail (G) to size [Drawing 3]. Drill an $\frac{11}{32}$ " hole $\frac{1}{2}$ " from each end, and round over the corners.

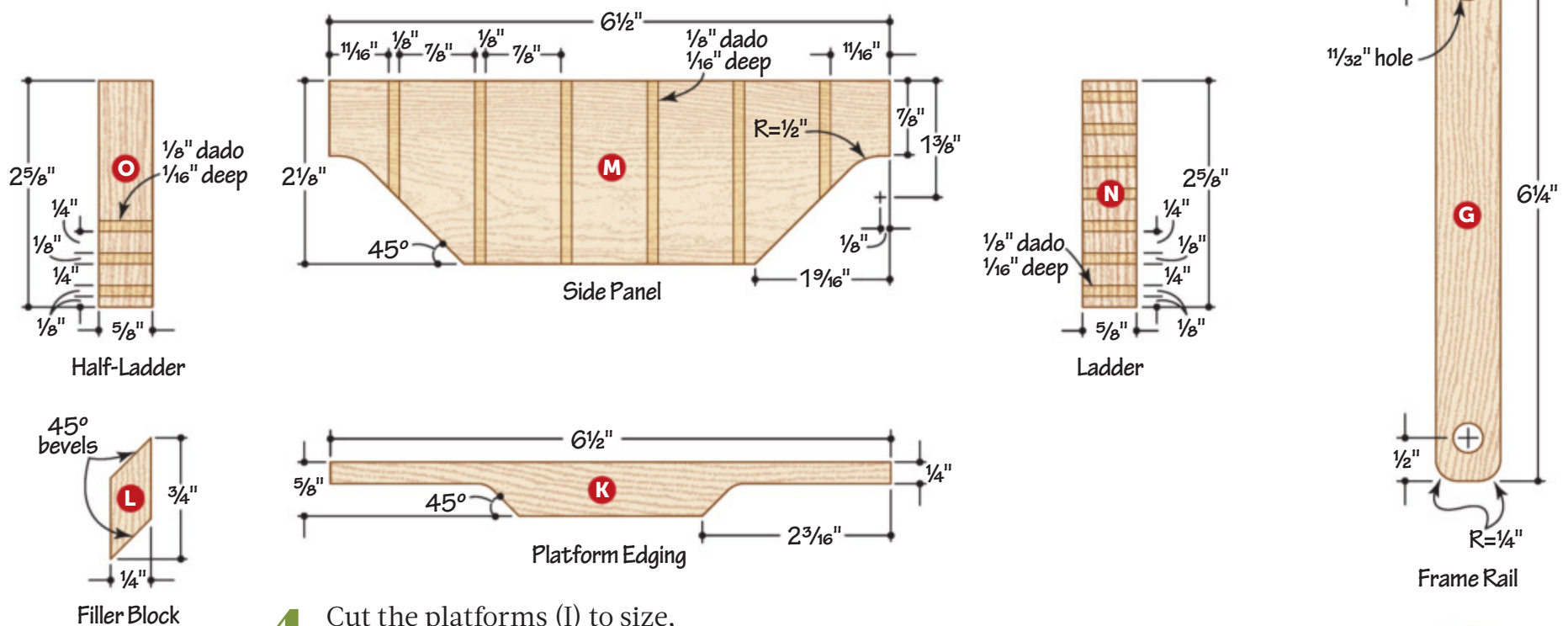
2 Build up the ramps (H) from narrower pieces to simplify the process of making the angled mortise for the frame rail (G). From $\frac{1}{4}$ " cherry, cut four workpieces $\frac{15}{16} \times 6$ " and two workpieces $\frac{3}{4} \times 6$ ". Bevel-cut the two $\frac{3}{4}$ "-wide workpieces 4" from one end, and glue each between a pair of the $\frac{15}{16}$ "-wide workpieces [Photo F].

3 Once the glue dries, lay out the top end of the ramps $3\frac{13}{32}$ " from the top of the mortise, then lay out the bottom end $4\frac{7}{16}$ " from that mark [Drawing 4]. Bevel-cut the ramps to length, then glue them to the frame rail (G) [Photo G].



F Use the frame rail (G) as a spacer to size the mortise when you glue and clamp the bevel-cut center piece between the wider outer pieces of the ramps (H), applying glue sparingly near the mortise to avoid gluing the frame rail in place.

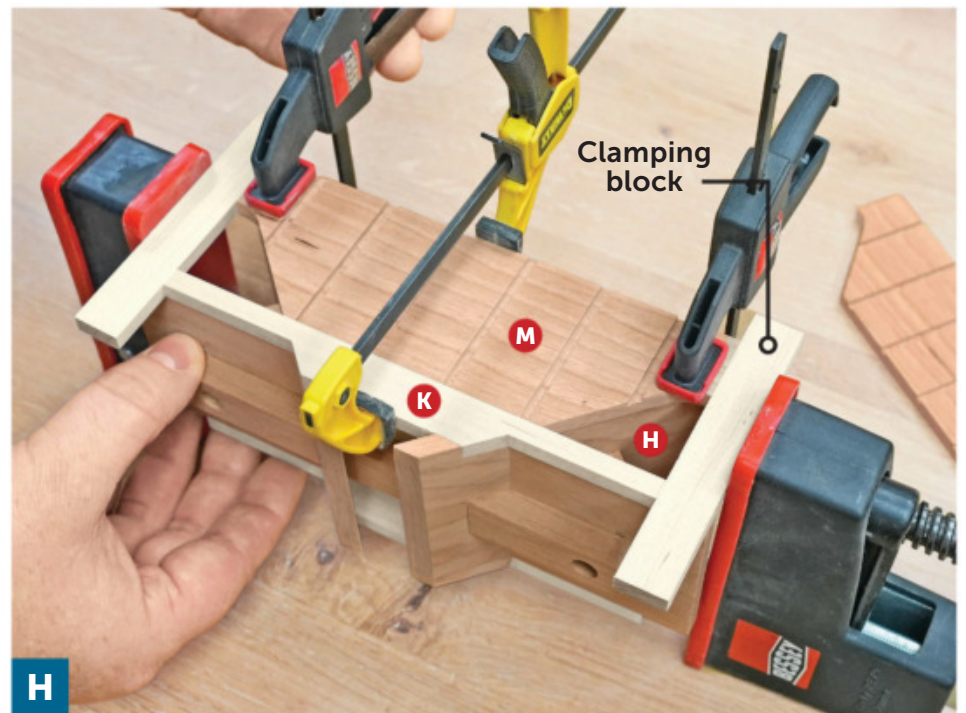
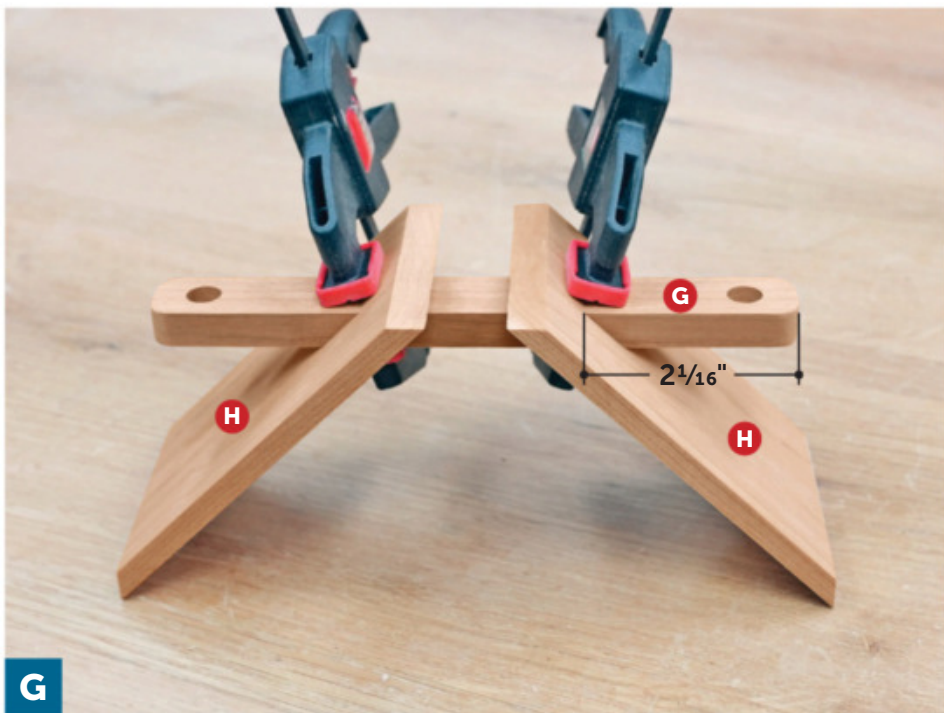
3 CAR PARTS



4 Cut the platforms (I) to size, bevel-cutting one end of each [Drawing 5]. Glue and clamp them to the top of the frame rail (G) and the underside of the ramps (H), flush with the ramp edges. Cut the ramp braces (J) to size, miter-cutting the bottom ends, then glue them between the platforms and ramps with CA glue.

5 From $\frac{1}{4}$ " maple and cherry, cut the platform edging and filler blocks (K, L) to size and shape [Drawing 3]. Glue them to the edges of the hopper assembly [Drawing 5], the edging (K) flush to the tops of the platforms and the blocks (L) flush to the bottoms of the ramps.





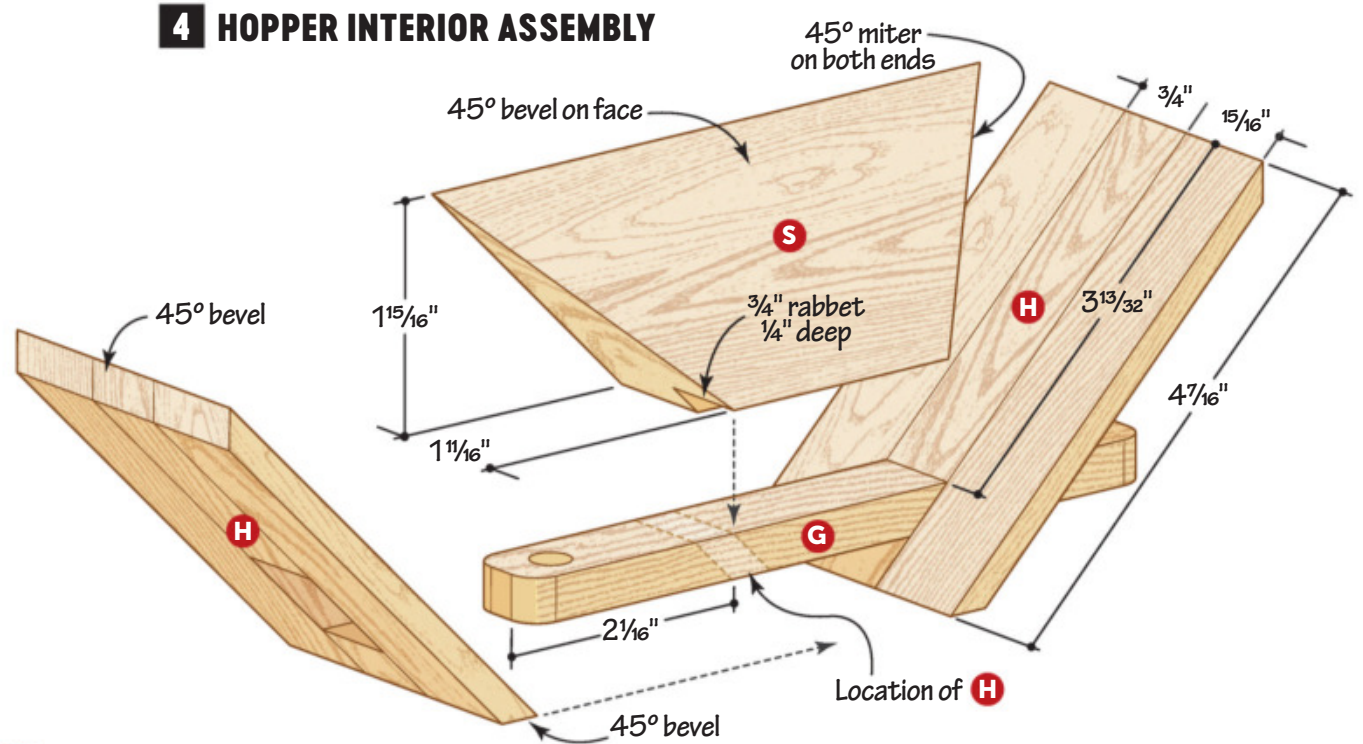
Mark the bottom face of the frame rail (G) $2\frac{1}{16}$ " from each end and apply glue just to the inside of the lines. Clamp the ramps (H) in place on the rail, aligning their outer faces with the layout lines.

Clamp the side panels (M) to the edges of the ramps (H) and the tops of the platform edging (K). Use clamping blocks to align the ends of the side panels and the platform edging.

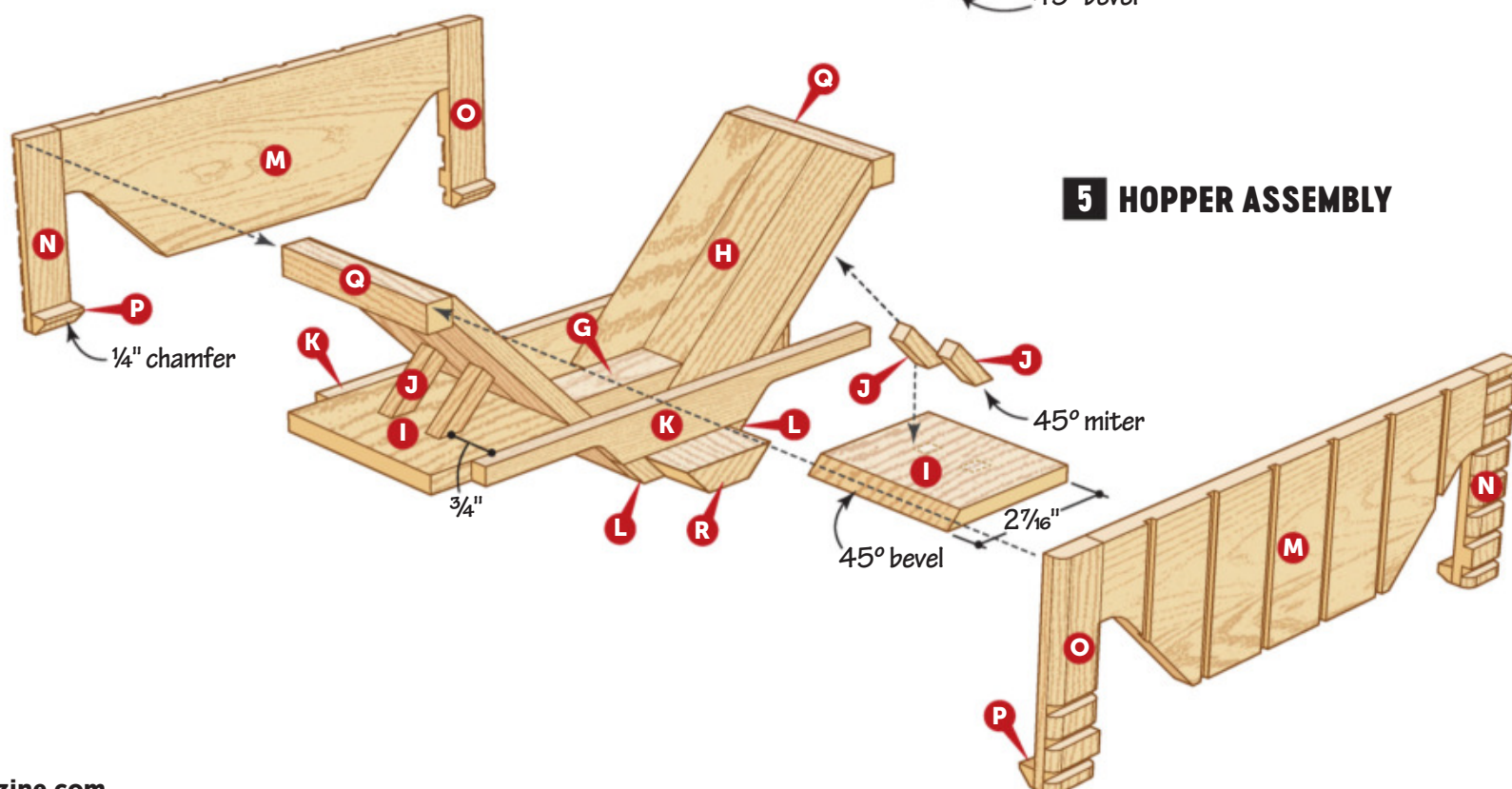
6 Cut the side panels (M) to size, form the dados across the outer faces, then cut them to finished shape [Drawing 3]. Glue the side panels to the hopper assembly [Photo H].

7 From $\frac{1}{4}$ " maple, cut two blanks $\frac{5}{8} \times 7$ " for the ladders (N, O) and four blanks $\frac{5}{8} \times \frac{3}{4}$ " for the ladder backer (P). Glue two backer blanks face-to-face to each ladder blank, flush to the ends. Once the glue dries, crosscut $\frac{1}{2}$ " from both ends of each assembly. This will bring the blank to 6" long and trim each ladder backer to its final $\frac{1}{4}$ " length.

4 HOPPER INTERIOR ASSEMBLY



5 HOPPER ASSEMBLY

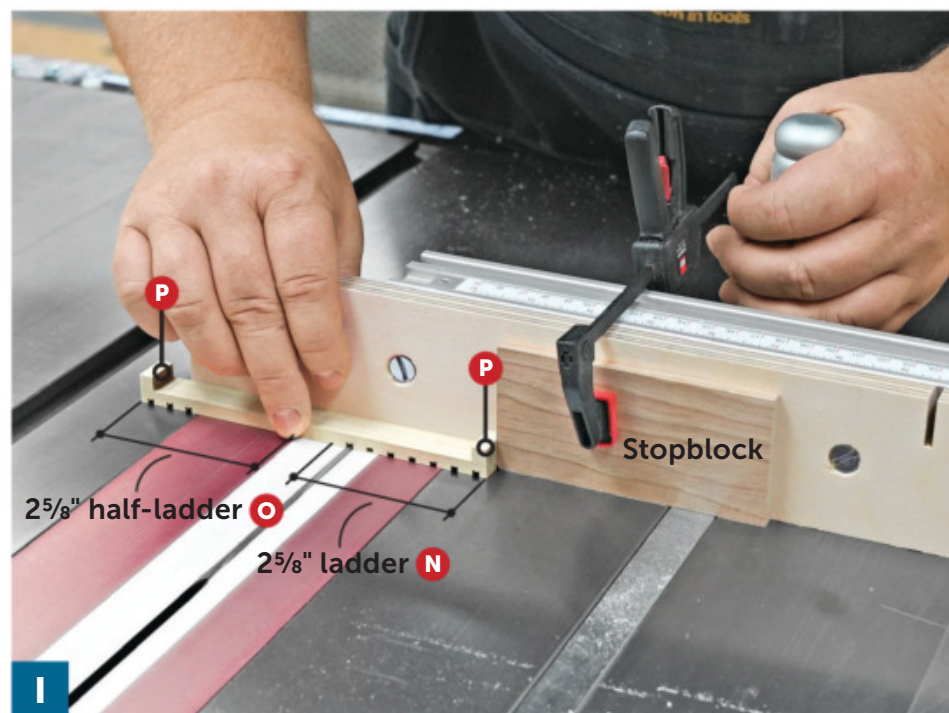


Note: If the top corners of the ramps (H) are sticking up, sand them flush to the tops of the end caps (Q).

8 Form the dados across the faces of the ladder workpieces [Photo I, Drawing 3]. Cut or sand a $\frac{1}{4}$ "-wide chamfer on the inside corner of each ladder backer (P) [Drawing 5]. Cut a ladder (N) and half-ladder (O) to length from each workpiece and glue them to the car assembly, flush to the top of the side panels (M) and to the ends of the platforms (I).

9 Cut the ramp end caps (Q) to size and glue them to the bevels on the ends of the ramps, flush to the tops of the ladders [Drawing 5]. From $\frac{3}{8}$ " maple, cut a 2×10 " workpiece for the dump wedge (R). Bevel-cut the workpiece to fit between the ramps, sneaking up on the width until you have a friction-fit that slides easily but stays in place. Cut the dump wedge to length, flush to the platform edging (K).

10 Cut a piece of 10"-long maple to thickness and width for the ramp diverter (S) [Materials List]. Rabbet the bottom edge and bevel the inside face [Drawing 4]. Miter-cut both ends of the ramp diverter to length to fit inside the car.



On each workpiece, lay out the dados for a ladder (N) on one end and a half-ladder (O) on the other end. Cut the dados with an auxiliary fence attached to your miter gauge.

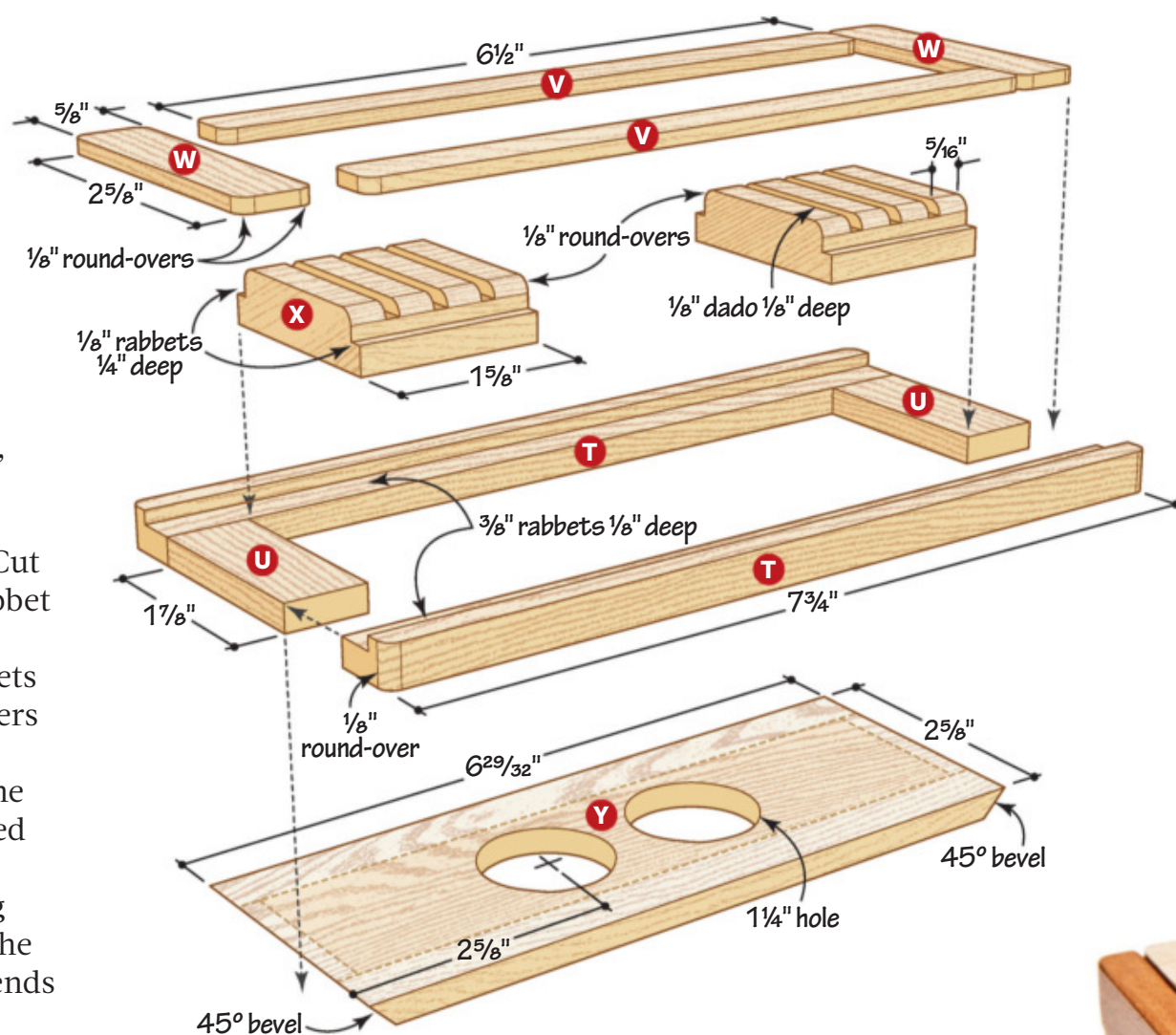
RAISE THE ROOF

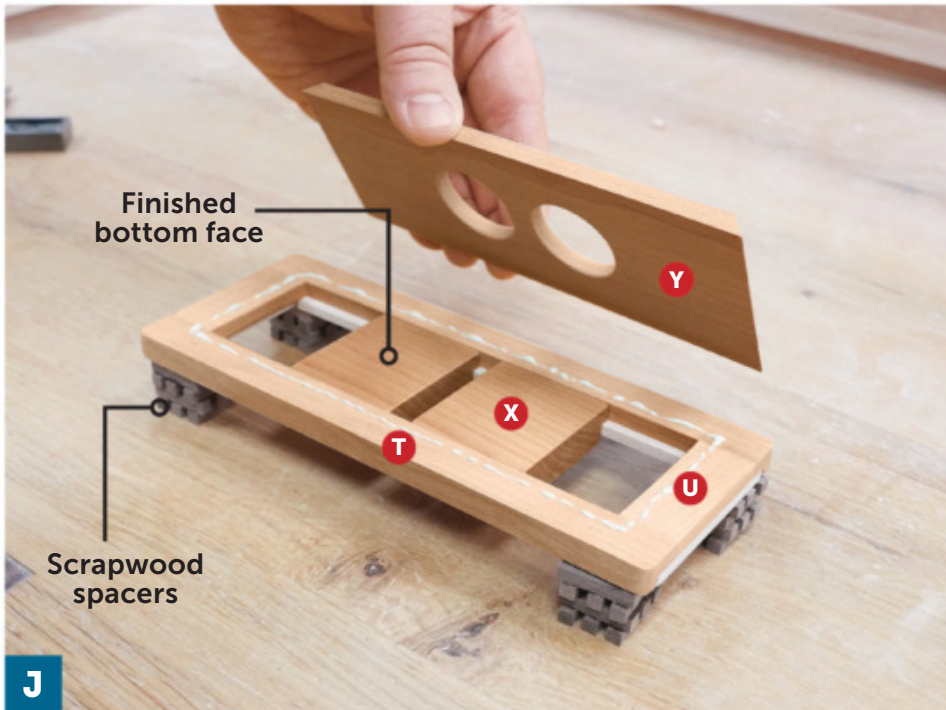
1 Cut the roof sides and ends (T, U) to size. Rabbet the sides (T), then glue the ends (U) between the sides to make a frame [Drawing 6]. From $\frac{1}{8}$ " maple, cut the roof walk sides and ends (V, W) to size. Round over the corners of the roof walk parts and the frame assembly (T/U). Glue the roof walk sides and ends into the frame assembly, flush with the ends.

2 To make the roof covers (X), cut a workpiece $\frac{1}{2} \times 17\frac{7}{8} \times 3\frac{3}{8}$ ". Cut the dados across the top face, rabbet the edges, then sand a $\frac{1}{8}$ " round-over on the top corner of the rabbets [Drawing 6]. Cut the two roof covers to final length and apply a finish (we sprayed on satin lacquer) to the bottom face before they get covered by the roof panel in the next step.

3 Measure the interior opening at the top of the car and cut the roof panel (Y) to fit, beveling the ends to fit flush with the top of the car [Drawing 6]. Drill the holes, then glue the panel to the bottom face of the roof assembly, with no glue on the roof covers (X), leaving them free to slide [Photo J].

6 ROOF ASSEMBLY





Apply a thin bead of glue around the opening on the bottom face of the roof frame (T/U) and, with the roof covers (X) in place, glue the roof panel (Y) centered on the frame.



Find free plans for the trackside unloading pit shown on page 56. woodmagazine.com/hopperpit

BRING IT ALL TOGETHER

- 1 Finish shaping the ladders by sanding $\frac{1}{8}$ " round-overs on the outer edges [Drawing 5]. Finish-sand the wheel trucks, car body, car roof, dump wedge, and ramp diverter. Ease any sharp edges and remove glue squeeze-out.
- 2 Apply a finish to each component. We sprayed on three coats of satin lacquer, buffing between coats with 0000 steel wool. Adjust the roof covers between coats to finish the whole roof assembly.
- 3 Cut the connector pins to length [Exploded View]. Apply a small amount of glue to the holes in the frame rail (G) and attach the trucks to the car using the connector pins. Don't apply any glue to the pins or the holes in the trucks so the trucks can rotate freely.
- 4 Slide the dump wedge between the ramps, drop the ramp diverter into place, and close it up with the roof. You're ready to haul. 🌲

MATERIALS LIST

PART		FINISHED SIZE			Matl.	Qty.
		T	W	L		
A	TRUCK FRAMES	5/8"	1½"	2¹⁄₈"	C	2
B	TRUCK SIDE FRAMES	¼"	½"	2¹⁄₈"	C	4
C	SPRING GROUPS	¾"	1³⁄₃₂"	5/8"	C	4
D	TRUCK TONGUES	¼"	½"	3"	C	2
E	TONGUE EXTENSION	¼"	½"	1¼"	C	1
F*	HITCH SHROUD	½"	1"	1¹⁄₈"	C	1
G	FRAME RAIL	¾"	¾"	6¼"	C	1
H*	RAMPS	¼"	2⁵⁄₈"	47⁄₁₆"	EGC	2
I	PLATFORMS	¼"	2⁵⁄₈"	27⁄₁₆"	C	2
J	RAMP BRACES	¼"	¼"	1"	C	4
K	PLATFORM EDGING	¼"	5/8"	6½"	M	2
L	FILLER BLOCKS	¼"	¼"	¾"	C	4
M	SIDE PANELS	¼"	2¹⁄₈"	6½"	C	2
N*	LADDER	¼"	5/8"	2⁵⁄₈"	M	2
O*	HALF-LADDER	¼"	5/8"	2⁵⁄₈"	M	2
P*	LADDER BACKERS	¼"	5/8"	¼"	M	4
Q	RAMP END CAPS	¾"	¾"	2⁵⁄₈"	C	2
R*	DUMP WEDGE	¾"	1²⁷⁄₆₄"	3¹⁄₈"	M	1
S*	RAMP DIVERTER	1¹¹⁄₁₆"	1¹⁵⁄₁₆"	5¹⁷⁄₃₂"	M	1
T	ROOF SIDES	¾"	5/8"	7¾"	C	2
U	ROOF ENDS	¼"	¾"	17⁄₈"	C	2
V	ROOF WALK SIDES	1⁄₈"	½"	6½"	M	2
W	ROOF WALK ENDS	1⁄₈"	5/8"	2⁵⁄₈"	M	2
X*	ROOF COVERS	½"	17⁄₈"	15⁄₈"	C	2
Y	ROOF PANEL	¼"	2⁵⁄₈"	6²⁹⁄₃₂"	C	1

*Parts initially cut oversize. See the instructions.

MATERIALS KEY: C—cherry, EGC—edge-glued cherry, M—maple.
BITS: $\frac{9}{64}$ ", $\frac{7}{32}$ ", $\frac{11}{32}$ ", and $\frac{3}{8}$ " brad-point bits, $\frac{1}{2}$ ", $\frac{5}{8}$ ", and $1\frac{1}{4}$ " Forstner bits, $\frac{1}{4}$ " round-over router bit.
SOURCE: Train Hopper Car Kit no. RS-01380E \$10 each (\$40 5-pack), woodstore.net/hoppercarkit.
PROJECT COST: It cost us about \$30 to build this project. Your cost will vary by region and source.

20 WAYS TO USE DOUBLE-FACED TAPE

This is one two-faced friend no shop should be without.

WRITER: VINCE ANCONA

PHOTOGRAPHERS: JASON DONNELLY, BRIE GOLDMAN, KELSEY HANSEN

Double-faced tape is one of the most useful supplies in a woodworking shop. Its strong adhesive resists shear forces, making it great for power-tool operations. Applied in moderation, it peels off easily (and leaves virtually no residue), making it a perfect temporary solution. And, of course, there's its eponymous dual-sided adhesion that frees up hands, preempts screws, and eliminates obstructing clamps. For most operations, we prefer the paper-backed variety because it is thin enough to virtually disappear between workpieces [\[Sources\]](#). Here are 20 ways to put it to use.

SAFELY TABLE-ROUT SMALL PIECES

Create a "bridge" from a piece of scrap and use double-faced tape to attach small workpieces for routing on the router table without putting your hands too close to the bit.



CLEANLY MOUNT A TURNING BLANK TO A LATHE FACEPLATE

Attach a turning blank to a faceplate with double-faced tape to avoid unsightly screw holes in your workpiece. Because not all tape has the same adhesion strength, choose one sold specifically for turning [\[Sources\]](#).



▲ TEMPORARILY ATTACH DRAWER GUIDES

Tape drawer guides or runners in place to test the drawer fit before drilling holes for screws.



◀ POSITION DRAWER FRONTS

Temporarily position false fronts on drawers in order to drill holes for mounting screws while maintaining even gaps all around.

► ATTACH A TEMPLATE

Tape a template to your workpiece for clamp-free pattern routing, sanding, or cutting. A couple of 2- to 3"-long strips will hold all but the largest templates securely. Avoid using too much tape or removal proves challenging. Slip a putty knife under the template and gently pry it off when time comes for removal. And if you're using the same template to make multiple parts, replace the tape before attaching it to the next part to ensure maximum adhesion.



ATTACH A MITER-GAUGE FENCE

Tape an auxiliary fence to your miter gauge to back up workpieces when crosscutting. Double-faced tape holds it securely without the hassle of hardware.



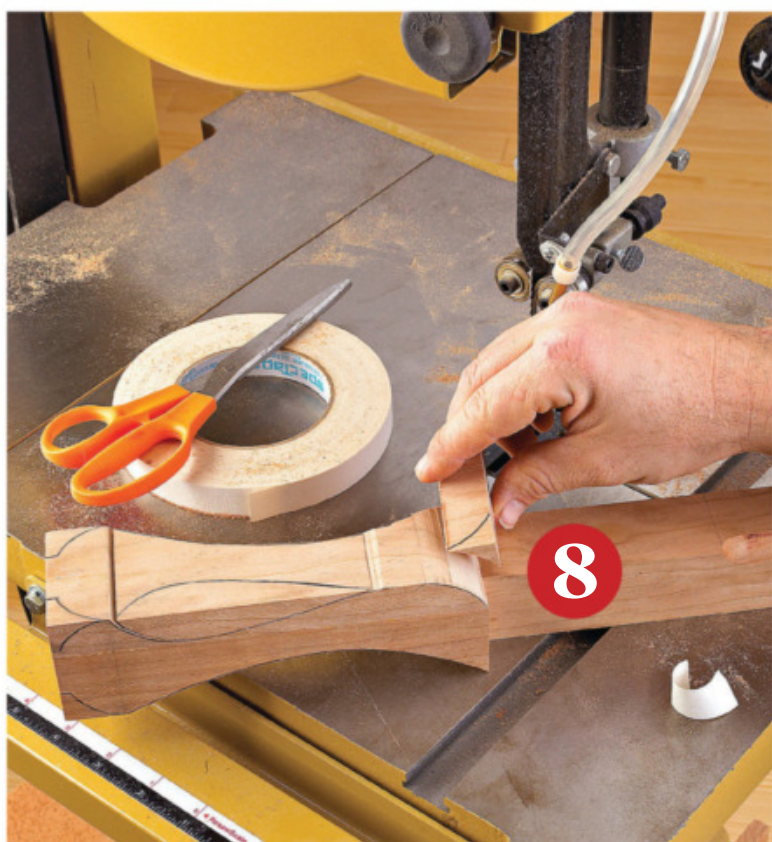
► SECURE ITEMS TO YOUR WORKSURFACE

Tape small workpieces to a benchtop for routing or sanding. Or use double-faced tape to secure a workpiece to a spoilboard for CNC routing.



▼ REATTACH CUTOFFS WHILE SHAPING

When cutting cabriole legs to shape on the bandsaw, tape waste pieces from the first two cuts back onto the blanks to make the cuts on the adjacent faces.



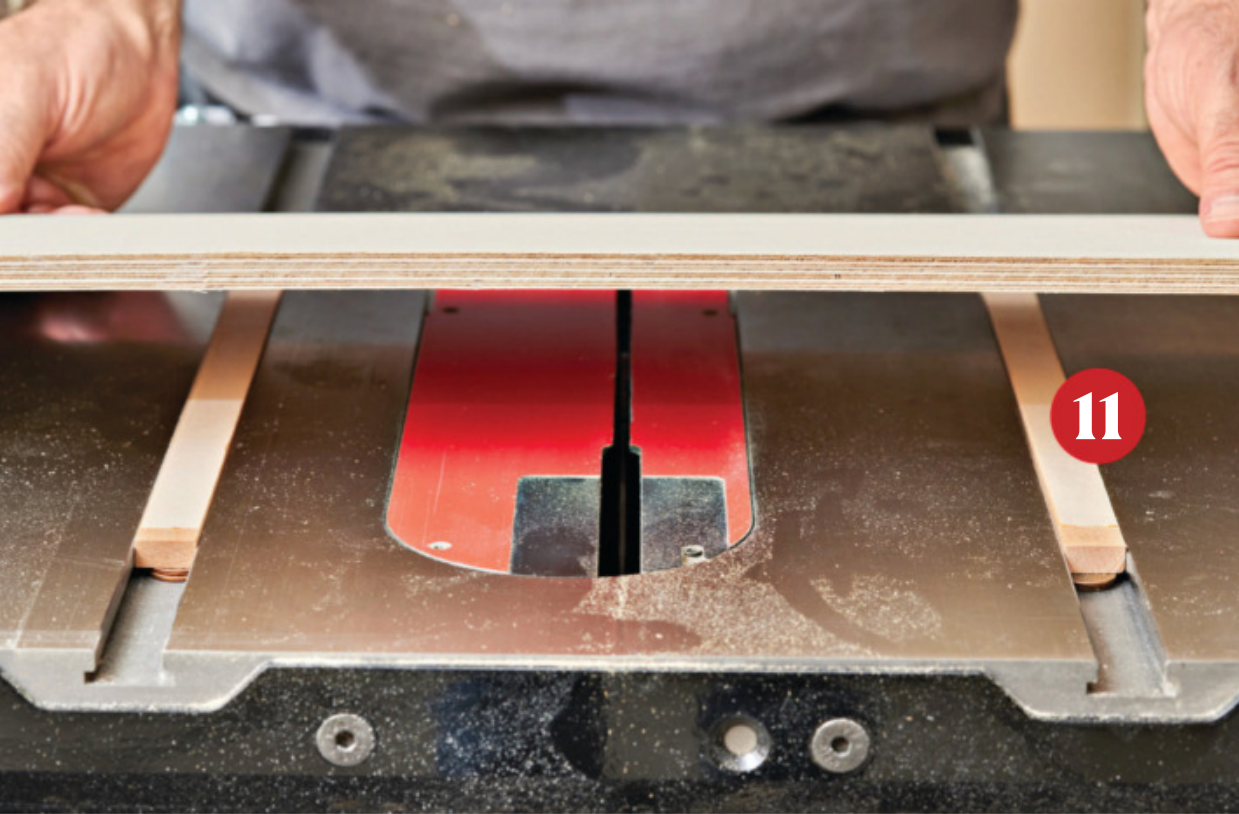
▼ POSITION STOPBLOCKS

Quickly add a stopblock to a miter-gauge fence, drill-press fence, or any other place where you need to make repeat cuts but don't want the interference of a clamp.

▲ GET A HANDLE ON SHARPENING

Attach a small block of wood to a plane iron or chisel for a convenient grip when flattening the back of the tool on a sharpening stone.





▲ ATTACH MITER RUNNERS

When making tablesaw sleds or jigs, use double-faced tape to temporarily position the miter runners so you can drive mounting screws. Place the runners in the miter gauge slots, using coins or other spacers to lift them so they sit proud of the surface. Attach tape to the top face of the runners and then lower your sled or jig on to the runners.

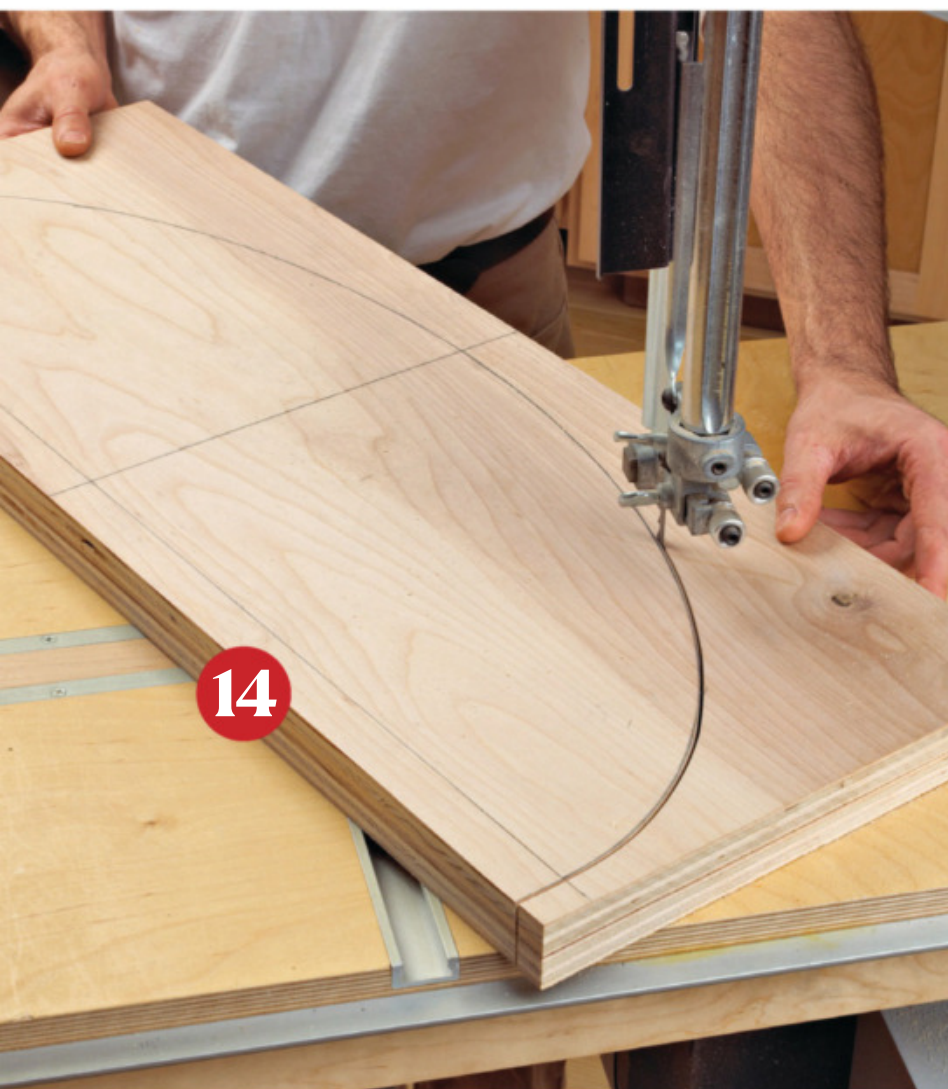
▼ ADD A ZERO-CLEARANCE INSERT

Reduce tear-out from miter saw cuts by using double-faced tape to attach a piece of hardboard to the table or fence of your miter saw, creating a zero-clearance opening.



▼ GANG WORKPIECES TOGETHER

When cutting or sanding identical project parts, stack the pieces and hold them together using double-faced tape. You'll ensure uniformity while reducing your workload.



◀ POSITION HINGES

Use double-faced tape to hold hinges in place while drilling pilot holes for mounting screws. On small boxes or cabinets, mount the hinges to the box or case, then tape the hinges to the box lid or cabinet door to check the fit and alignment before drilling holes for mounting screws.

▶ INSTALL A ROUTER TABLE INSERT PLATE

Using four scrap boards, create a template to match the size of your router plate. After drilling and jigsawing a rough opening, tape the template to your router table and rout the opening with a pattern bit.





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◀ PLANE THIN STOCK

Most planers don't play well with stock less than 1/4" thick. To support thin stock for planing, glue a rear cleat to a carrier board, tape the workpiece down, and pass both through the planer.



17



▶ ATTACH AN AUXILIARY RIP FENCE

Tape a wooden auxiliary fence to your rip fence to bury a dado blade in the fence when cutting rabbets.



18

▲ HOLD SMALL PIECES FOR FINISHING

Use double-faced tape to secure small parts to the end of a piece of scrap for staining, painting, or finishing.

▶ ROUT CIRCLES SIMPLY

Use double-faced tape to attach a trammel to your router for routing circles. Then, to avoid drilling a hole in your workpiece for the trammel pivot pin, glue a dowel pin into a scrap block and attach it to your workpiece with double-faced tape. Position the block so the dowel pin is at the centerpoint of the circle.



20

▲ RIP A STRAIGHT EDGE ON ANY BOARD

Ripcut a straight edge on a roughsawn or crooked board by taping the board to a sled so the uneven edge overhangs the sled. Place the other edge of the sled against your rip fence, then straight-line rip the offending board edge free. 🌲



19

SOURCES:

- Intertape 591 double-sided golf grip tape 2"×36 yds. no. B017IET8QM, \$25, amazon.com.
- XFasten double-sided woodworking tape 1"×36 yds. (3-pack) no. B07BBL4JXJ, \$22, amazon.com.
- Double-sided turning tape 2"×75' no. 25U0312, \$24, Lee Valley, leevalley.com.

OVERALL DIMENSIONS
13½"W x 1⅞"D x 12½"H



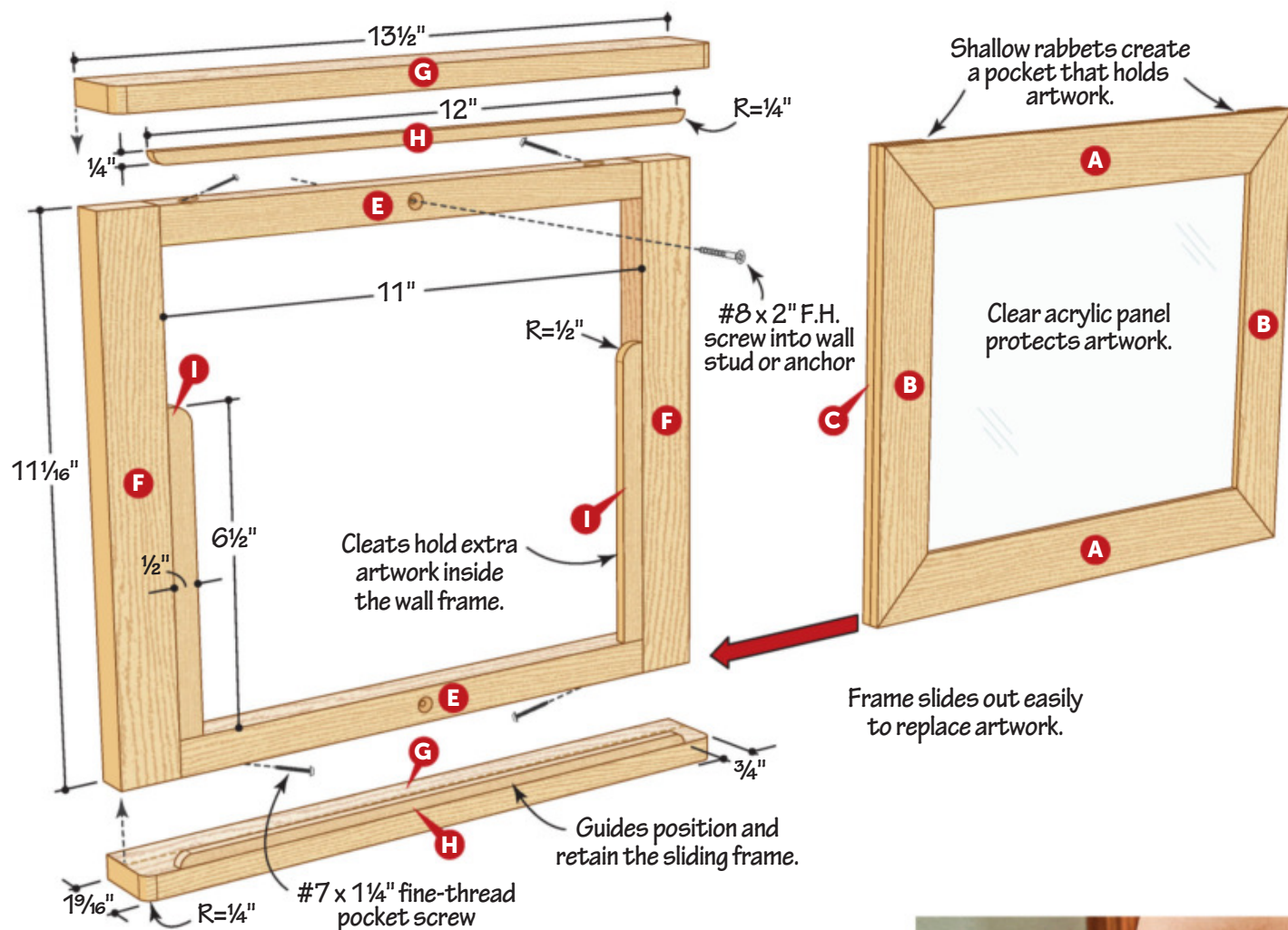
PHOTOGRAPHER: KELSEY HANSEN; **ILLUSTRATORS:** ROXANNE LEMOINE, LORNA JOHNSON

OFF-THE-WALL ART EXHIBIT

Create your own ever-changing display with this frame that allows you to quickly swap out one masterpiece for the next, and the next, and ...

WRITER: VINCE ANCONA
DESIGNER/BUILDER: JOHN OLSON

EXPLODED VIEW

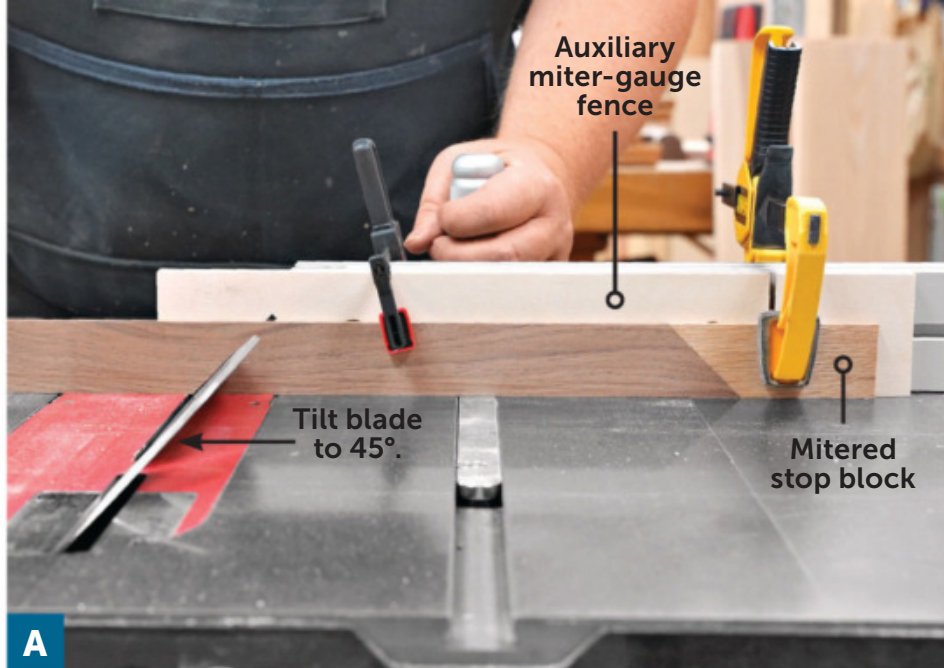


Any parent or grandparent knows that kids bring drawings and art projects home from school on a constant basis. In many homes, these end up layered on the refrigerator. This project offers an option more worthy of a budding young artist by providing a gallery-worthy frame for your petite Picasso.

This project consists of two frames—one that mounts to the wall, archiving an entire portfolio of artwork, and a second sliding frame that fits into the first to display the latest masterpiece. This allows you to quickly swap out drawings or finger paintings as often as you like. We sized our frame to hold 8½×11" sheets of paper, but feel free to alter the dimensions to hold photos or other paper sizes.

Narrow grooves on the inside edges of the frame allow you to insert or remove artwork in seconds.





With the blade tilted to 45° and using an auxiliary miter-gauge fence, miter-cut the ends of the frame pieces (A, B). A mitered stop block clamped to the fence ensures identical-length parts.



To keep the mitered frame flat during glue-up, we clamped the workpieces to 3/4" MDF wrapped in waxed paper. Apply glue and clamp one corner at a time to ensure a good fit.

MAKE A SLIDING FRAME

The sliding frame features an acrylic panel to protect the artwork, as well as rabbeted retainers to hold the artwork in place and allow you to change out the subject in seconds.

Note: To convert this frame from landscape to portrait, shorten parts A, D, E, G, and H by 2½" and lengthen parts B, C, F, and I by 2½".

1 Plane stock to thickness for the sliding frame top, bottom, and sides (A, B) and for the retainers (C, D) [Exploded View, Materials List]. Rip the stock to width and rough-cut the sliding frame parts, leaving them about 1" overlength.

2 Use a combination square or digital angle finder to set your tablesaw blade to 45°, then miter-cut the sliding frame top/bottom (A) and sides (B) to finished length [Drawing 1, Photo A].

3 Rout a rabbet on the inside edge of the mitered frame pieces [Drawing 1].

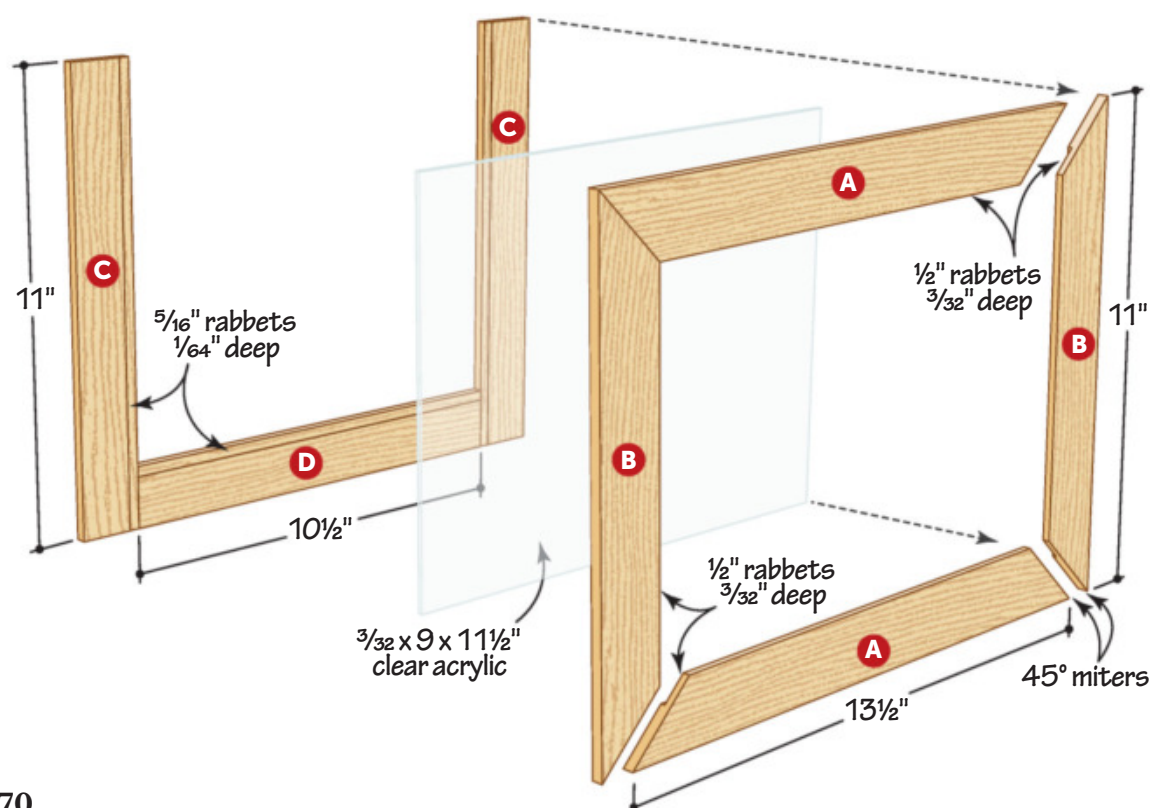
4 Glue the mitered ends of the frame assembly together [Photo B].

5 After the glue dries, scrape away any squeeze-out, especially in the corners of the rabbets. Cut a clear acrylic panel to fit in the rabbeted opening, then apply a very thin bead of silicone to the frame and glue the acrylic panel in place. Clamp a backer board to the frame while the silicone sets up to ensure the acrylic sits flush with the back of the frame.

6 Cut the side and bottom retainers (C, D) to length. Rout a shallow rabbet along one edge of each retainer [Drawing 1]. Glue the retainers to the back of the mitered frame, flush with the outer edges [Photo C].

Note: Increase the depth of the rabbets for thicker artwork or if you plan to use a matboard with your art.

1 SLIDING FRAME ASSEMBLY

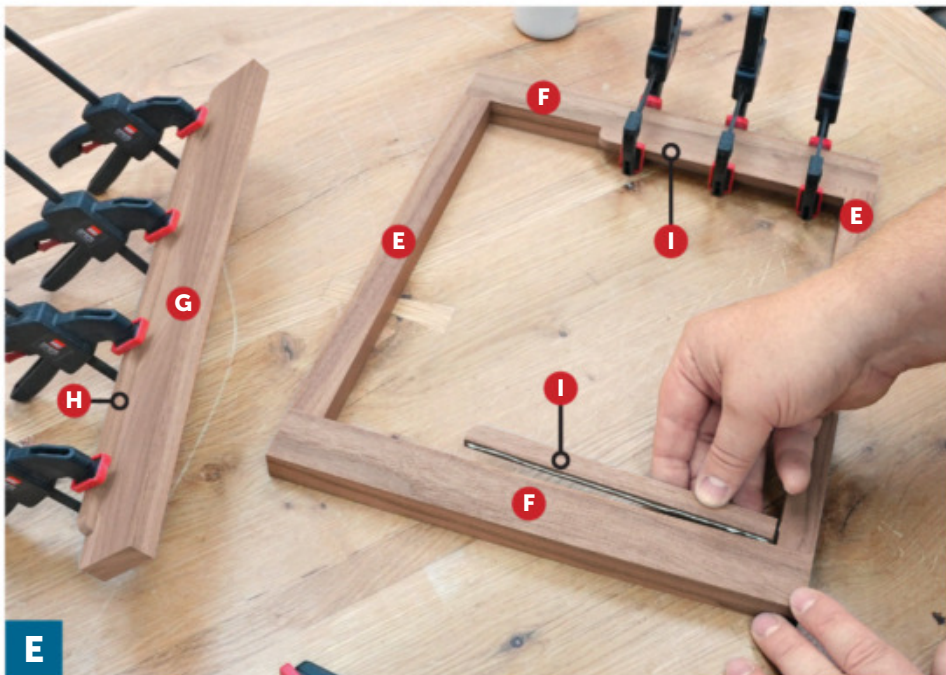




When gluing the retainers (C, D) to the frame, avoid any glue squeeze-out in the shallow rabbet. These rabbets will create a groove for the artwork.



Glue and clamp the wall frame, checking for square. Then drive pocket-hole screws through the rails (E) and into the stiles (F) to reinforce the joints. These screws will be hidden by caps (G).



Glue the guides (H) flush with the front edge of the caps (G). Glue the cleats (I) to the inside edges of the frame stiles (F), flush with the front faces and resting on the lower rail (E).

MATERIALS LIST

PART		FINISHED SIZE			Matl.	Qty.
		T	W	L		
A*	SLIDING FRAME TOP/BOTTOM	1/4"	1 1/2"	13 1/2"	W	2
B*	SLIDING FRAME SIDES	1/4"	1 1/2"	11"	W	2
C	SIDE RETAINERS	1/4"	1 1/2"	11"	W	2
D	BOTTOM RETAINER	1/4"	1 1/2"	10 1/2"	W	1
E	WALL FRAME RAILS	3/4"	3/4"	11"	W	2
F	WALL FRAME STILES	3/4"	1 1/4"	11 1/16"	W	2
G	CAPS	1/2"	1 9/16"	13 1/2"	W	2
H	GUIDES	1/4"	1/4"	12"	W	2
I	CLEATS	1/4"	1/2"	6 1/2"	W	2

*Parts initially cut oversize. See the instructions.

MATERIALS KEY: W—walnut

SUPPLIES: 1 1/4" fine-thread pocket screws, #8×2" F.H. screws, 3/32×9×11 1/2" clear acrylic, clear silicone sealant

BIT: 3/4" straight router bit

PROJECT COST: It cost us about \$25 to build this project. Your cost will vary by region and source.

ADD A WALL FRAME

The wall-mounted frame serves as a bracket to hold the sliding frame. It also has a storage compartment to hold artwork that isn't currently on display.

- 1 Cut the wall frame rails (E) and stiles (F) to size [\[Materials List\]](#). Drill a pocket hole in the outer edge at both ends of each rail, then glue and screw the wall frame together [\[Exploded View, Photo D\]](#).
- 2 Cut the caps (G), guides (H), and cleats (I) to size. Using a sanding block or power sander, round the corners where needed [\[Exploded View\]](#).
- 3 Glue and clamp the guides (H) to the caps (G) [\[Photo E\]](#). Glue a cleat (I) to the inner edge of each wall frame stile (F).
- 4 Glue the cap/guide assemblies (G/H) to the top and bottom of the wall frame, flush with ends and back face. After the glue dries, remove the clamps and drill countersunk mounting holes through the wall frame rails.

TIME TO HANG IT UP

- 1 Finish-sand both frame assemblies to 180 grit, easing any sharp edges.
- 2 Apply a finish to both frames. We sprayed three coats of water-based polyurethane, sanding lightly between coats with a 320-grit sanding sponge. After the finish cures, polish it with a non-woven abrasive pad.
- 3 Mount the wall frame to a wall stud or to hollow wall anchors. Insert your artwork into the sliding frame and slide it into the wall frame. Stand back and admire your handiwork along with the artwork. 🌳

TIP!
Tape kraft paper over the acrylic to protect the surface while sanding and finishing.

GIVE YOUR ROUTER A LIFT

A router lift increases table-routing accuracy by replacing your router's factory adjustment mechanism with one of much higher precision. Integrated measuring scales, low-backlash adjustment screws, and height locks further aid accuracy, while above-the-table bit changes increase convenience. Check out the differences in five current models.

Rockler

Rockler's Pro Lift features two height adjustment access points in the top plate. Use the quick-gear adjustment to rapidly raise the router to make bit changes and the fine gear adjustment to dial in precise heights.

One of our favorite features of the Pro Lift is how easy it is to swap insert rings. Unlike most router lifts that require a special spanner wrench to remove and install the insert ring, with the Pro Lift you simply push a button and the ring pops out. The new ring then snaps in place. Rockler offers the Pro Lift in a standard size as well as a smaller version to fit Rockler router tables, see *Size Matters*, next page.

Rockler, rockler.com
Rockler Pro Lift #55803 \$430



Woodpeckers

Changing bits with a router lift typically involves multiple turns of the crank to raise the router high enough to loosen the collet. Woodpeckers' Quicklift router lift does away with this by allowing you to raise the router to full height with just a quarter turn of the spring-assisted Quicklift wrench. It takes a little getting used to at first, but once you do, you can make rapid, coarse adjustments to the bit height before fine tuning the bit position with a standard crank handle.

Woodpeckers offers the Quicklift with either an aluminum or steel top plate. The steel plate is convenient if you use magnetic featherboards or accessories.

Woodpeckers, woodpeck.com
Quicklift 350 (aluminum plate)
QL350-A-23 \$350

Quicklift 350 HDS (steel plate)
QL350-HDS-23 \$400

SIZE MATTERS

When shopping for a router lift, you'll need to keep two key measurements in mind. First is the size of the insert plate opening. The "standard" size opening found on most router tables measures $9\frac{1}{4} \times 11\frac{3}{4}$ ". However, some manufacturers use differing dimensions.

Second is the diameter of your router motor, which can range from 3.25" to 4.2". Some router lifts accept any of those sizes while others require the use of adapters (often sold separately). A few lifts are size-specific and cannot accommodate any other router size.

JessEm

JessEm pioneered the first router lift over 25 years ago. Their current version, the Mast-R-Lift II, utilizes a simple but accurately machined threaded-rod design. This results in a smooth, almost effortless up-and-down motion with minimal backlash as you turn the crank. We were also impressed with the fit and finish of the hard anodized aluminum top plate.

JessEm's clamping block system enables the Mast-R-Lift II to accept over 20 different router motors without the need for adapter rings or modification, which means you won't have to buy a new lift if you replace your router down the road.

JessEm Tool Company, jessem.com
Mast-R-Lift II #02120 \$441

SawStop

You don't have to own a SawStop tablesaw to make use of their router lift; it will fit any router table with a standard-size opening. SawStop's lift mechanism utilizes a four-post, synchronized chain drive to eliminate backlash when raising and lowering the router.

The height adjustment access point in the top plate includes up/down markings to indicate travel direction—a convenient feature when you just need to make a tiny adjustment to the bit height. And the plate has index marks for making small adjustments to the router fence position. (Woodpecker's Quicklift is the only other lift in this group to offer these features.)

SawStop, sawstop.com
SawStop Router Lift RT-LFT \$549

Kreg

The PRS5000 Precision Router Lift from Kreg doesn't offer any bells and whistles but instead focuses on the basics—above-the-table bit changes and height adjustment, an anodized aluminum top plate, and a convenient lock feature. It accepts over 20 popular router models, giving you the option to replace your router down the road without having to buy a new lift as well.

The PRS5000 is made by JessEm for Kreg. It utilizes a similar design as the Mast-R-Lift II, but with slightly smaller guide rods and components. Like the JessEm, we find it to be a smooth operating, no-nonsense lift, but at a lower price.

Kreg Tool, kregtool.com
PRS5000 Precision Router Lift \$350



SHOP-TESTED BIG MITERSAW PACKS DUAL-VOLTAGE POWER

Tester: Dave Stone

After 30 years, I'm finally springing for a new mitersaw. It will be cordless thanks to saws like this new Metabo 12" sliding-compound model that offer huge capacity, great features, and plenty of cord-free power. I appreciate that the saw accepts the company's 18- or 36-volt batteries (sold separately), and that the motor boosts torque under heavy loads, which I noticed cutting 4x4s. The sliding action, which I found very smooth, allows 12¼" crosscuts at 90°, the saw miter-cuts up to 57°, and bevel-cuts 45° both ways.

Metabo HPT, metabo-hpt.com

36V dual-bevel sliding mitersaw no. C3612DRAQ4, \$629 (bare tool)



NEW & UNTESTED CERAMIC PROTECTION FOR FURNITURE FINISHES

Carbon Method ceramic coating isn't a wood finish. It's a protectant, similar to those used in automotive applications, that goes over the top of your existing finish to give it ceramic protection. We're anxious to test how well it lives up to the company's claims of oil, chemical, and water resistance.

Carbon Method, carbonmethod.com

Ceramic wood protectant, prep, and care products, \$20-63



SHOP-TESTED GRR-RIPPER GETS AN UPGRRRADE

Tester: Kerry Gibson

MicroJig improves upon their popular pushblock with the Grr-ripper+. This new model includes a "safe rip" feature to aid in positioning the movable center leg. Simply read the built-in measuring scale, then reposition the leg if your fence measurement falls within a large viewing lens. Like the original Grr-ripper, this pushblock grips rough or surfaced lumber well. It works with the rip fence as close as ¼" from the blade and includes an outrigger for narrow-piece support. 🌱

MicroJig, microjig.com

Grr-ripper+ push block no. GR-100+, \$50

1920s Style for a 1920s Price

It was a warm summer afternoon and my wife and I were mingling with the best of them. The occasion was a 1920s-themed party, and everyone was dressed to the nines. Parked on the manse's circular driveway was a beautiful classic convertible. It was here that I got the idea for our new 1920s Retrograde Watch.

Never ones to miss an opportunity, we carefully steadied our glasses of bubbly and climbed into the car's long front seat. Among the many opulent features on display was a series of dashboard dials that accentuated the car's lavish aura. One of those dials inspired our 1920s Retrograde Watch, a genuinely unique timepiece that marries timeless style with modern technology.

With its remarkable retrograde hour and minute indicators, sunburst guilloche face and precision movement, this design is truly one of a kind. What does retrograde mean? Instead of displaying the hands rotating on an axis like most watches, the hands sweep in a semicircle, then return to their starting point and begin all over again.

Retrograde watches by the big brands can set you back thousands; one recent offering from a big French fashion house is selling for more than \$150,000! But because we've designed the 1920s Retrograde Watch in-house, we can offer it to you for just \$99!

This watch is so wildly popular with our customers that we're actually concerned about running out; we only have ~~937~~ 729 left for this ad!

JOIN MORE THAN 1 MILLION SMART
PEOPLE WHO LOVE STAUER WATCHES

Watch Specifications:

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*Special price only for customers using the offer code.

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"[A] unique and beautiful timepiece."

— Carlos C., Los Banos, CA

Stauer, 14091 Southcross Drive W., Dept. RGW318-01, Burnsville, MN 55337 | www.stauer.com

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WHAT'S AHEAD

A GLIMPSE INSIDE THE MAY ISSUE (ON SALE MARCH 21)

PERIOD CHEST ON TABLE

Inspired by Federal-period silverware cabinets, this versatile chest on table works as a unit or separately to store your sundries in style.



PLANT POTTER'S PARADISE

Along with ample storage and worksurface, this easy-build potting bench features a catch basin for soil, making cleanup a cinch.



SHORTS AND SHEETS SORTER

This compact rack features adjustable dividers for cutoffs, a bin for plywood partials, and a slide-out support for breaking down full sheets.

OUR GO-TO ARTS & CRAFTS FINISH

Our easy, three-step finish recreates the look of a traditional fumed Arts & Crafts finish, adding depth and rich color to quartersawn white oak.



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