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AUGUST 2025 | #284

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**640
PAGES**

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NEW!

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BY LOGAN WITTMER



FROM THE EDITOR

Planting For The Future

By Logan Wittmer

The older I get, the more and more I've noticed a difference in myself. Among those differences have been my preferences for the time of year. It used to be that Winter was my favorite. Hunting, ice fishing, trapping, and working in the shop. Don't get me wrong, I still love it. But I'm starting to dislike (not hate) the cold. In fact, as I'm sitting here, it's early May. Plants are starting to bloom. The turkeys are gobbling (minus one tom). And, I've recently been doing something that I've been enjoying more and more every year—planting stuff. Plants, a few vegetables, but more so—trees.

Let's be fair—as a sawyer, I can't help but drive by a beautiful tree and think, "Yeah, I'd saw that". But, on the other hand, I don't harvest trees that don't need to be taken down or can't be sustainably harvested. Most of my logs come from yard trees that need to be removed for one reason or another. Sometimes, we will harvest timber and remove the big, mature trees to make room for new growth. However, the gloom-monger in me looks at our modern society and can't help but think of what the land would have looked like a few hundred years ago before humans started clearing it. Just to be clear—I am far from an eco-warrior. But, as an outdoorsman and someone who makes their living with a natural product, it does make me sad.

That said, I like to do what I can to help. Maybe, more importantly, I do what makes me happy. And lately, that's been planting saplings anytime I can. Last year, it was Kentucky coffee trees, autumn blaze maples, bur oak, and London plane. This year, I'm dropping saplings of black oak and swamp white oak. I may never see these trees reach maturity, but hopefully, my kids will. Cheers!



ABOUT THE AUTHORS



COLLIN KNOFF: *Dust Deputy Cart*—pg. 42

Collin has been fascinated with building things as long as he can remember—from LEGO sets to taking apart things around the house just so he could see how they went back together (sorry Mom!). It wasn't until he took wood shop in high school, however, that he found the best way to channel that energy, and has been a maker ever since. Collin joined the *Popular Woodworking* team as the Digital Editor in 2019, and is excited to be part of the bright future ahead for the next 40 years.



WILLIE SANDRY: *Charging Cabinet*—pg. 52

Living in the Pacific Northwest, Willie Sandry is a longtime fan of Arts & Crafts furniture. He enjoys taking inspiration for his projects from antique furniture exhibitions as well as "old barn finds." Never one to do a job partway, Willie has developed a vast skill set to elevate his projects. From sawing lumber and kiln drying it to finishing a chair with top-notch upholstery, Willie sees a project through from the start until the finish. YouTube: *The Thoughtful Woodworker*.

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NEW TOOLS

Kreg Mortise Mate

Kreg Tool, known for their innovations in pocket hole jigs, recently launched their new loose tenon joinery jig, called the Mortise Mate. *Kreg Tool* partnered with Canadian tool maker *JessEm* to design the Mortise Mate. The premise is simple—use a drill with a special bit to mill out pockets for loose tenon joinery. *Kreg* offers bits in 6 mm, 8 mm, and 10 mm sizes, to meet a variety of applications.

The Mortise Mate clamps to the workbench, and the drill with bit is inserted in the front (the drill is held horizontally). After clamping your workpiece in place, the drill is turned on. A lever on the front of the Mortise Mate shifts the bit left and right. After each pass, the bit holder automatically advances the bit slightly deeper until final depth is reached. The result is a mortise that is routed in just a few seconds with only a cordless drill.

As I mentioned, the bits available are offered to meet a variety of applications. A few adjustments on the Mortise Mate expand the versatility as well.



■ MORTISE MATE

Kreg Tool

KregTool.com

Price: \$299.00+

You can adjust the mortise location (vertically, for a variety of stock thicknesses), as well as setting the mortise depth if you're working on thin stock. I think that over the next few years, we'll see the Mortise Mate bringing the idea of loose tenon joinery into shops at a reasonable price point. — *Collin Knoff*



■ COMPASS ST-1500

Harvey Industries

HarveyWoodworking.com

Price: \$1,579.00

Harvey Compass ST-1500 Sliding Table

There are some tools that, on the surface, appear exorbitant. Sliding tables (or sliding table saws, for that matter) are one of those. And, I thought so too, until I recently added the Compass ST-1500 from *Harvey Industries* onto my *SawStop* table saw. I have

to tell you—it's a game changer. Now, let me back up and preface this a bit. I recently took on a set of entry doors as a project (foreshadowing—they'll be in an upcoming issue). Cross-cutting and mitering some big, heavy pieces of mahogany were just the excuse that I needed to order this table (and, I'll admit, it's not cheap). But let me tell you what. If you regularly work with long stock or sheet goods, the ST-1500 is well worth it.

The ST-1500 is built around *Harvey's* Compass MG-36Pro miter gauge. The gauge is mounted to a milled aluminum table that slides on a set of ball-bearing rails. These rails give the table a silky-smooth action. With these heavy mahogany rails on it, the table slides just as easily as it does without any load on it. The fence is extremely accurate as well, both the flip stops and the vernier scale for setting up angled cuts.

The Compass ST-1500 is pretty universal. I put it on my *SawStop* (I did not follow instructions; however, *Harvey* suggested taking off the left wing of the saw, but I left mine on). *Harvey* lists several other models that it's compatible with, but you could mount it on anything if you're willing to drill a few holes. In fact, I originally planned on switching it over to my shaper, but after using it for several months on the table saw, it will probably stay there (after I take off the wing, as they suggest).— *Logan Wittmer*

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■ NEW TOOLS

Pliers from *Vampire Tools*

I think that there are certain tools that everyone owes it to themselves to own a nice set of. Without a doubt, pliers are one of those. For years, I've used sets of pliers from either the big box stores or from discount tool stores. I've broken several sets, and have some that are now missing teeth. I recently found a company that makes some of the nicest pliers around, and that company is *Vampire Tools*.

In my mind, what makes the pliers from *Vampire Tools* different is that they are thoughtful. Their plier line (aptly named *Vampliers*) features specialized jaws for other tasks. Some of the nicest are their screw extracting jaws (inset photo at right). These jaws are designed to grab the heads of screws and offer a grip as you back it out. The screw extractor pliers are only one version of the several that *Vampire* offers (and they have other cutting tools apart from pliers). Their side nippers are phenomenal for those times when you need to nip wires or zip-ties in the shop. *Vampire Tools* are manufactured in Japan, and the quality speaks for itself. — *Bob Reynolds*

■ **VAMPLIERS**
Vampire Tools
VampireTools.com
Price: Varies



Blue Spruce *Micro Squares*

Having one or two really nice squares is essential in the shop. Being able to check parts for square, and set up machines are some of the most frequent uses of mine. *Blue Spruce* recently released a pair of micro squares that are perfectly sized to fit in your apron pocket.

The squares, milled out of stainless steel, are available in either a combo-square or double-square configuration. Both come with two blades — one 1/4" and the other 1/2" (shown here). The larger blade is perfect for almost all of my shop tasks. The smaller blade is ideal for reaching in tighter areas to make marks or measure joinery.

One of my favorite features of these little squares are the locking knobs. They're easy to access and don't feel like they slip, as some others have a tendency to do. — *Logan Wittmer*

■ **MICRO SQUARES**
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NEW TOOLS

Mullet FitsAll Hose Kit

I was a bit skeptical when I saw the *Mullet FitsAll* Hose Kit. Not that it wouldn't be good, but that the value wasn't there at \$100. After spending some time testing it in my shop, I'm still not convinced it's the perfect solution for everyone, but it's certainly a system that will work for anyone. For those that don't know, the *Mullet FitsAll* Hose Kit is a dust hose and attachment system that is guaranteed to fit your tool, or *Mullet* will 3D print you one for free. I'm really the perfect target for this, as if there's one thing I've learned over the years, it's that no two manufacturers use the same size dust port. I don't think this is hyperbole either; I tested every tool in my shop with a dust port, and only two brands matched.

The eight included couplers in the kit seem to be very well made, and are nicely pliable to fit and grip different connectors. The hose seems to be sturdy, though the plastic is a bit stiff out of the box at least. That's offset by the rotating couplers, which also have

FITSALL HOSE KIT

Mullet Tools
MulletTools.com
Price: \$100



a vent function for reducing pressure while sanding. The hose and couplers are not inherently static dissipative, but are made with an "anti-static additive" for what it's worth. Stay tuned for a follow-up on the 3D printed connector option, I have an old Black and Decker sander with an oblong dust port that's just perfect for something like this. — Collin Knoff



NEW TOOLS

Jet JBS-18 Bandsaw

A bandsaw is a wonderful tool. It can make cuts that follow curves, cut joinery, size parts, and resaw material. And, like most other tools in the shop, generally the bigger the better. Jet's JBS-18 bandsaw is a large saw, perfect for most home shops.

The Jet line from JPW (Jet, Powermatic, Wilton) offers a variety of products to home hobbyists and professionals alike. In the case of this particular saw, it's offered in two different versions: one in a 230v/3HP setup, and the other in a 115v/1.75HP configuration. For most everything I do in my shop, the 1.75HP motor has been plenty of power. I could see where some large, heavy resawing would require more power, but at that point, I don't mind slowing down my cuts to compensate.

There are several features that I believe put this saw in the "premium" category. The first is the blade guides—they offer tool-less adjustment, so you can quickly adjust them as needed without digging out tools. The dual dust ports do a good job at capturing dust, and that's not something you say about a bandsaw very often. The fence system on this is of a pretty standard and simple design, but it's effective. It's adjustable, true, and has very little deflection. Finally, the foot brake has a motor disconnect, as well as a mechanical brake to bring the blade to a stop. — Gregory Kopp



JET JBS18

Jet

Jettools.com

Price: \$2,699.99

Kellogg Depth Gauge

Sometimes, having a simple tool is best. That doesn't mean that your simple tool can't be fancy, however. This Extra-Fancy Depth Gauge from Kellogg Fine Tools is an example of that. Clark Kellogg machines these depth gauges in Houston, Texas. The idea behind the tool is simple, but it's executed flawlessly. The top section of the gauge threads into the body. Loosening it allows the rod to extend, while tightening it locks the rod in place.

The rod can be dropped into a hole and pushed to the bottom.



KELLOGG DEPTH GAUGE

Kellogg Fine Tools
heartwoodtools.com

Price: \$79.99



Then, you can lock it in place to transfer measurements where necessary. The fine diameter of the rod means that it doesn't have measurements on it. However, you can use a rule if you're a numbers

type of person. The depth gauge is perfect for measuring hole depths, recess depths, or any other measurement that is too fine and delicate to measure with larger tools. — Logan Wittmer

PHOTOS BY THE AUTHOR UNLESS INDICATED

WORKSHOP TIPS



Silky-Smooth Polyurethane

Every woodworker I know uses water-borne polyurethane. Of all the ways I've seen to get a silk-smooth finish, abrasive, steel-wool substitute pads are by far the best. The coarseness of the pad determines the final sheen. A green pad (0) leaves a dull luster, gray (00) leaves satin, and white (0000), gloss. I start with a pad that's coarse enough to remove imperfections. Then I work through the different pads until I get the luster I want. I made a cork-faced block ($\frac{1}{4}$ " cork glued onto a wooden block) for flat surfaces. For edge profiles and other contoured surfaces, I just fold the pad over and go. After a final buffing with a soft, clean cloth, I have a flawless finish you just have to run your hand over.

— Beverly Stedman (Hammond, IN)



PHOTOS BY MIKE HABERMANN AND BILL ZUELKE

Easy Compressor Drain

To reduce the amount of moisture in compressor lines, you should drain your tank daily or weekly depending on use. This can be a real pain because the tank's stopcock is located under the tank. To make it easier to reach the stopcock, I extended it out the side. After disconnecting the power to the compressor, I drained the tank. Then I brought the stopcock to the hardware store as a reference for pipe size. I purchased a short nipple, two elbows, and a 12" straight pipe to extend the stopcock to the side, where it can be reached.

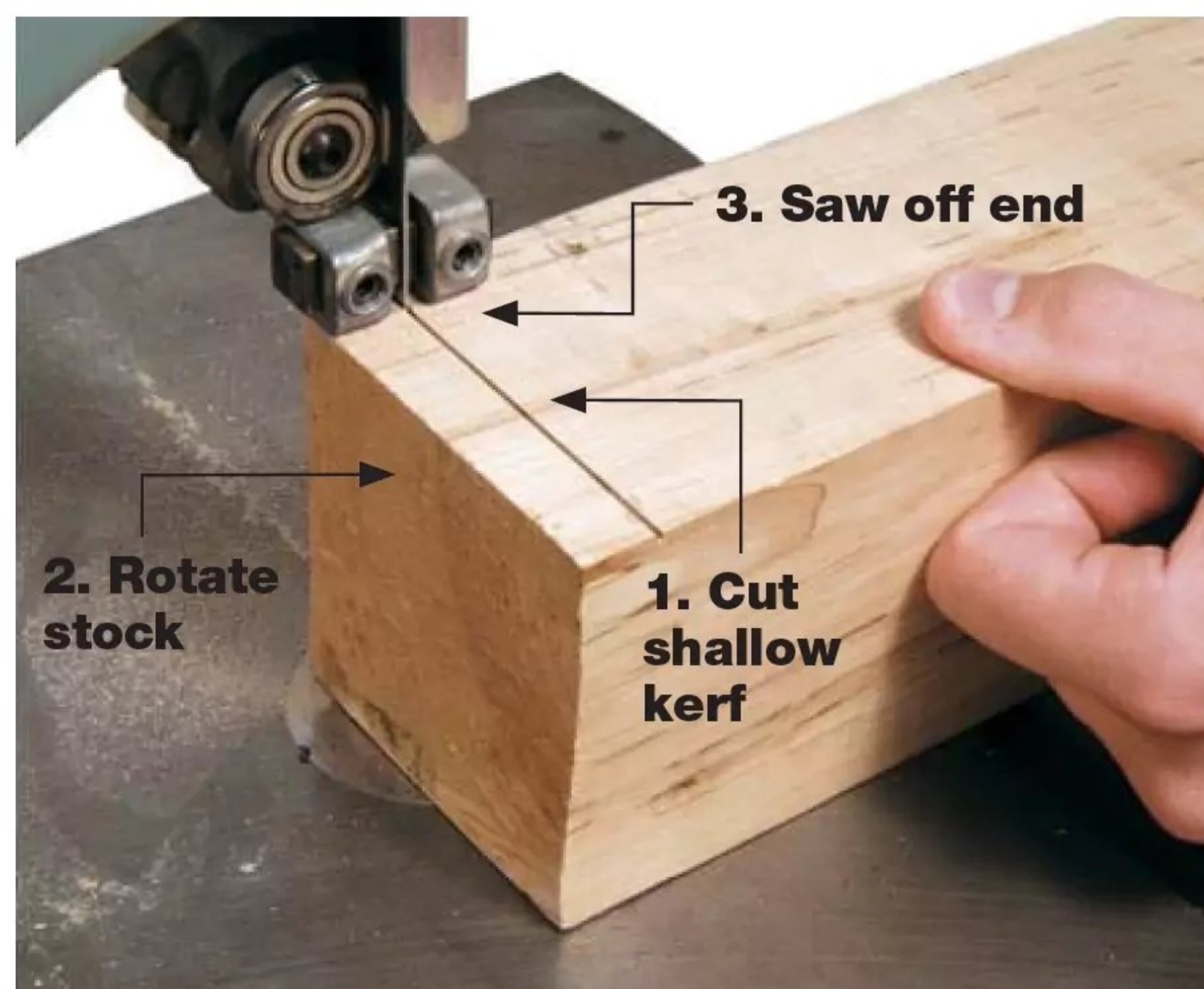
Because the stopcock is used to drain the water from the bottom of the tank, make sure that all of your added plumbing is either level, or down hill and make sure to seal the pipe joints with Teflon tape. — Tom Lovelace (Austin, Texas)

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Quick Squaring Cuts on a Bandsaw

Here's a quick simple way to square the ends of large stock using your bandsaw: Make a shallow cut on one face of the workpiece and rotate it a quarter turn. Using this shallow kerf as a guide, simply saw off the end. As long as your blade is set at 90° to the table, you should get near-perfect results. — Jim Vasi



WORKSHOP TIPS

Zap the Gap

I hated the black hole that appeared when I installed bifold doors in my kitchen cabinets. To get rid of this annoying gap, I decided to make the main door (the one with the hinges) $\frac{3}{4}$ " wider, so it would extend behind the second door. This alternation required cutting a pair of $\frac{3}{4}$ " deep notches in the main door in order for the hinges to work properly (these notches are only visible when the doors are open). I also had to measure from the inside edge of each notch to drill the bifold hinge cup holes. —*Ed Wood*

BEFORE



AFTER



MAIN DOOR



HINGE NOTCH

PHOTOS BY VERN JOHNSON



Ten-Minute Light Stand

I got tired of jury-rigging extra light for finishing, so I built this light stand from a 4' length of 2" x 2" and $\frac{1}{4}$ " plywood. The 6" x 17" legs include $\frac{1}{2}$ " by 3 $\frac{1}{2}$ " feet. The post aligns with the bottoms of the leg cutouts, so it doesn't touch the floor. Each leg simply butts against the previously attached leg. The light clamps anywhere on the post, so I can direct light where it's needed. It's been so useful, I wish I'd taken ten minutes to build it ten years ago. —*Hanover Trust*



Fast Toggle Clamp Adjustment

Toggle clamps are great for all sorts of jigs and fixtures. However, you need a wrench to adjust the length of their posts. To make life easier, replace the clamp's hex nut with a wing nut. For clamps with two nuts, once the wing nut is loose, the adjustment nut can be turned by hand. —*Kirk Evans*



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WORKSHOP TIPS

Convenient Benchtop Protection

My workbench is beautiful and I want to keep it that way, so I cover the top with builder's paper whenever I'm gluing or staining. But the heavy roll was hard to handle and a nuisance to store until I devised this simple holder made from 4" PVC drain pipe (10' length).

The holder is no wider than the roll, so there aren't any protruding hangers or rods. Using my chop saw, I cut the PVC pipe and the roll of paper to the width of my workbench. Then, on my table-saw, using the fence, and with the blade set just high enough to cut through the pipe, I carefully cut a lengthwise slot.

I screwed the pipe to the end of my bench, using the drain holes for access. Then I slid in the roll of paper. It was a tight fit at first, because the new roll was the same diameter as the pipe, but once I'd covered the bench a couple of times, the paper pulled out easily. —Gerry Casiello



PHOTO BY RAMEN MORENO

Auxiliary Compressor Tank

My small air compressor cycled so often during use that the noise almost drove me crazy. As much as I hated to spend money, it looked like a bigger compressor would be my only option. That's when I discovered air-storage tanks. By connecting a 5-gal. storage tank to my compressor's tank, I more than doubled its air-storage capacity. Now my compressor cycles much less frequently.

Standard plumbing components, available at any hardware store, connect the storage tank to the compressor. The storage tank is still portable because the input ball valve allows airtight disconnecting and reconnecting.

The tank is mounted upside down, so the moisture produced by the compressed air collects in a 4" long trap. Cracking a ball valve mounted at the end of the trap expels the moisture.

Make sure the pounds-per-square-inch (psi) pressure rating of the storage tank you buy is equal to or greater than your compressor's psi rating.

An onboard safety switch prevents the compressor from pressurizing higher than its psi rating, so I fully open the compressor's regulator and use the storage tank's regulator to adjust the line pressure. This arrangement pressurizes both tanks to the compressor's limit and provides maximum air storage.

—Richard Tendick

Extension Cord Reel

I just bought a storage reel for extension cords. I started with one end of the cord and rolled to the other end. This left me with one end buried and unusable without unrolling the whole cord. **Solution:** Start rolling from the center of the cord, leaving both ends free regardless of how much is left on the coil.

—Dick Wright (Oakton, Virginia)



PHOTO BY VERN JOHNSON

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WORKSHOP TIPS



Knee-Saving Compressor Drain

Crouching to operate my compressor's drain valve was no big deal until my football-ravaged knees started acting up. To keep from grimacing in the sawdust, I devised a more civilized way to clear the tank. I replaced the drain valve with a 90° elbow, a 200-psi-rated reinforced hose and a ball valve. Barb fittings on the elbow and ball valve and clamps on the hose keep everything air tight. I chose a ball valve instead of an air nozzle so no one would mistake my new drain for a regular air hose. —*Richard Fenwick*

PHOTO BY VERN JOHNSON

Sawing with Sticky Notes

First, set a block to cut your part slightly oversized ($\frac{1}{16}$ " is plenty). Attach a thin pile of sticky notes to the stop block, make a cut, and then add individual notes until you're right on the money. They'll all stay in place for cutting more parts at the same length. Put the sticky notes back on the pad when you're done. —*Brad Holden*





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WORKSHOP TIPS

Toggle Clamp Sanding Block

I made this quick-release sanding block from four pieces of 1/2"-thick birch plywood. The top three pieces are glued together. Wrap a quarter sheet of sandpaper around the bottom piece and slip on the top assembly. The toggle clamp locks the top assembly to the bottom.

All four pieces measure 2 1/2" wide by 7" long. The toggle clamp mounts on the bottom piece. The second piece has a hole just large enough for the toggle clamp's base to fit through. This leaves a lip for the toggle to clamp onto. The third piece has a clearance hole for the entire clamp. The fourth piece is the same as the third, and builds up the block so the clamp sits inside. I glued on pieces of cork to cushion the sanding surface and fortify the toggle clamp's grip. —Mark Thiel



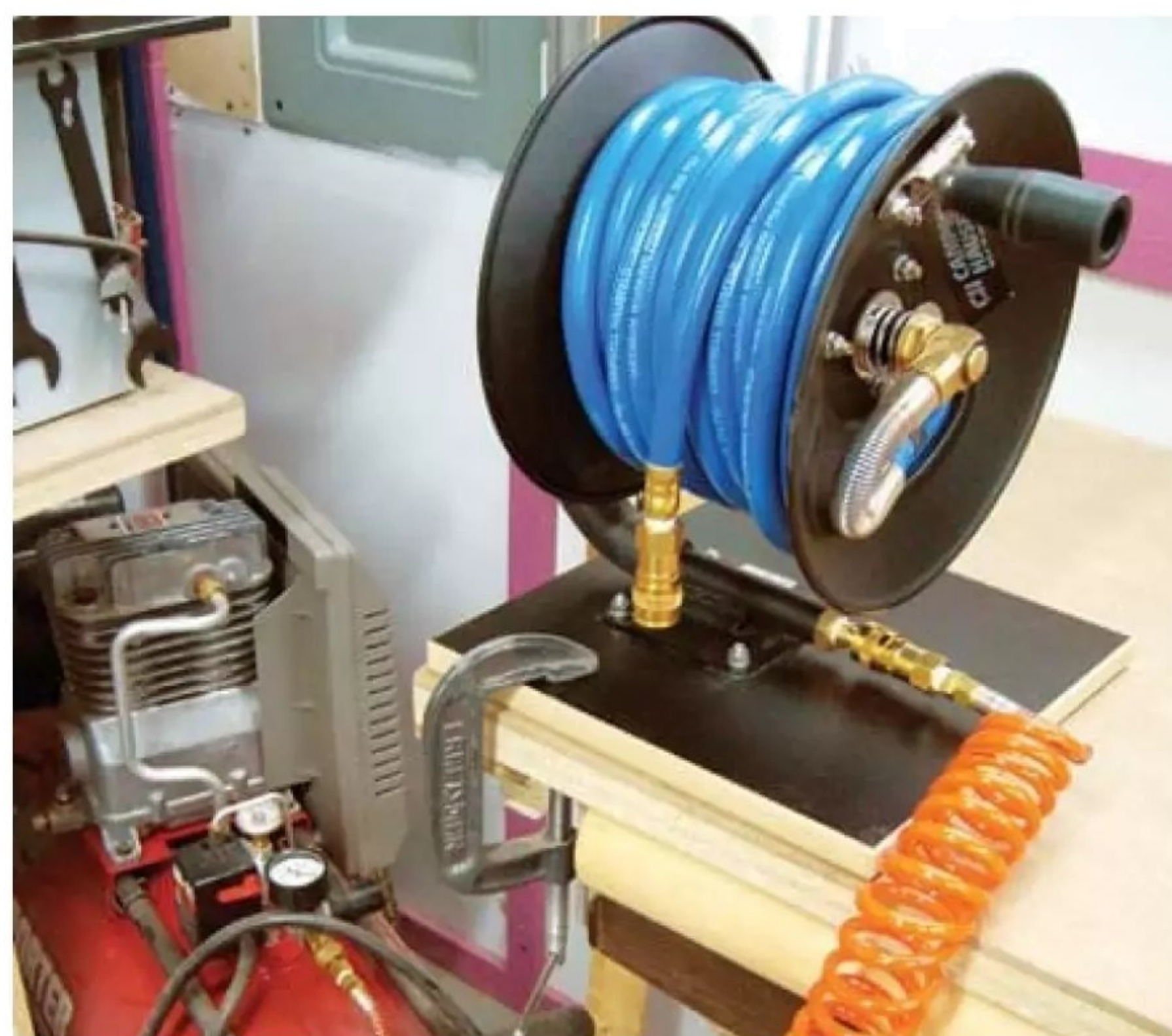
PHOTOS BY VERN JOHNSON

Multipurpose Bambo Skewers

Bambo skewers (think shish kebobs) have endless uses in the shop. They're sold in bags of 100 in cooking supply stores. I use them for getting glue into mortises, dowel holes, and biscuit slots. Wrap a bit of cloth around the tip, and they're great for getting glue out of crevices. You can even use them as a fastener for delicate work, instead of a brad or small finish nail. After drilling an appropriately sized hole, I tape one end of the skewer in, cut it off flush and sand it smooth. —Barry Barker (Richmond, IN)

Portable Hose Reel

Instead of mounting my compressor's hose reel to the wall, I mounted it to a board. This way, I can take the reel where I'm working and clamp it in place. —Serge Duclos



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Book Club

New Book

Excerpt from the author

If there's one thing to be said about woodworkers, it's that we're old school and prefer to pick up a book (or a magazine). With that in mind, I'm thankful for the community of master woodworkers that put forth a great effort to put some of their knowledge down into the pages of a book to share with all. Here is a small sample of a recently published book that I believe you will enjoy as much as I did.

The Complete Starter Guide to

Making Wooden Boxes



AUTHOR: Albert Kline
PUBLISHER: Fox Chapel Publishing

PURCHASING INFO:
Release Date: May 2025
Price: \$24.99
Websites: FoxChapelPublishing.com

- **10 box projects** ranging in difficulty from a simple butt joint design to a desk tray with a marquetry bottom
- **Step-by-step photos** and instructions make techniques and projects easy to follow
- **Beginner-friendly**, breaking down complex techniques making them easy to understand and execute
- **Learn the basics** from tools, materials, and safety equipment to woodworking fundamentals

JOINERY

A book on box-making essentials would be incomplete without an in-depth discussion of joinery. After all, at its core, a box is just four boards of wood joined together with a top and bottom. Getting a good foundation in joinery is absolutely necessary if you want to make boxes, and it will help you immensely as you continue in your woodworking. That's why before we go into the projects, we're going to take some time and focus directly on the topic.

So, what is joinery? It's basically exactly what it sounds like. Joinery is the term woodworkers use to describe the method by which two pieces of wood are joined together. How that is done can be achieved in any number of ways—with adhesives, fasteners, interlocking wood parts, or any combination of methods.

In this chapter, we'll go over some of the most common and useful joints used in box-making, progressing in difficulty as we go. Getting familiar with these joints early on is essential for completing the projects presented in this book, so make sure you spend the time and effort necessary to really master them.

Some of the joints you may find exceedingly simple, while others can take quite a bit of time to get the hang of. As with most things in life, the way to get good at them is by practicing. It's a good idea to spend some time just attempting to make a successful joint before moving on to a full project. And try not to get discouraged if your first few attempts at the more challenging joints are less than perfect. I can't possibly count the number of sad, gap-and-crack laden dovetail



joints I put together before getting comfortable with them.

Different joints have different properties that make them more suitable in some circumstances than others. A miter joint, for instance, is a great option for a small jewelry box, but would be potentially disastrous if used on a drawer. That's why, in addition to showing you how to actually do the joint, we'll discuss the pros and cons of each method.

By the end of this chapter, you should have a solid understanding of box-making joints, how to do them, and their relative advantages. The joints are presented here primarily so you can complete the projects in this book, but they can also serve as a reference for any project you may take on later. My hope is you'll gain the knowledge, skills, and confidence to employ these joints in all of your woodworking.

PHOTOS BY THE AUTHOR ALBERT KLINE, COURTESY OF FOX CHAPEL PUBLISHING

BUTT JOINT

Undoubtedly the simplest joint you can use on a box, butt joints are achieved when the ends of two boards are “buted” up against each other. Even though they are very simple, they serve as a good example to bring up some key considerations in box-making.

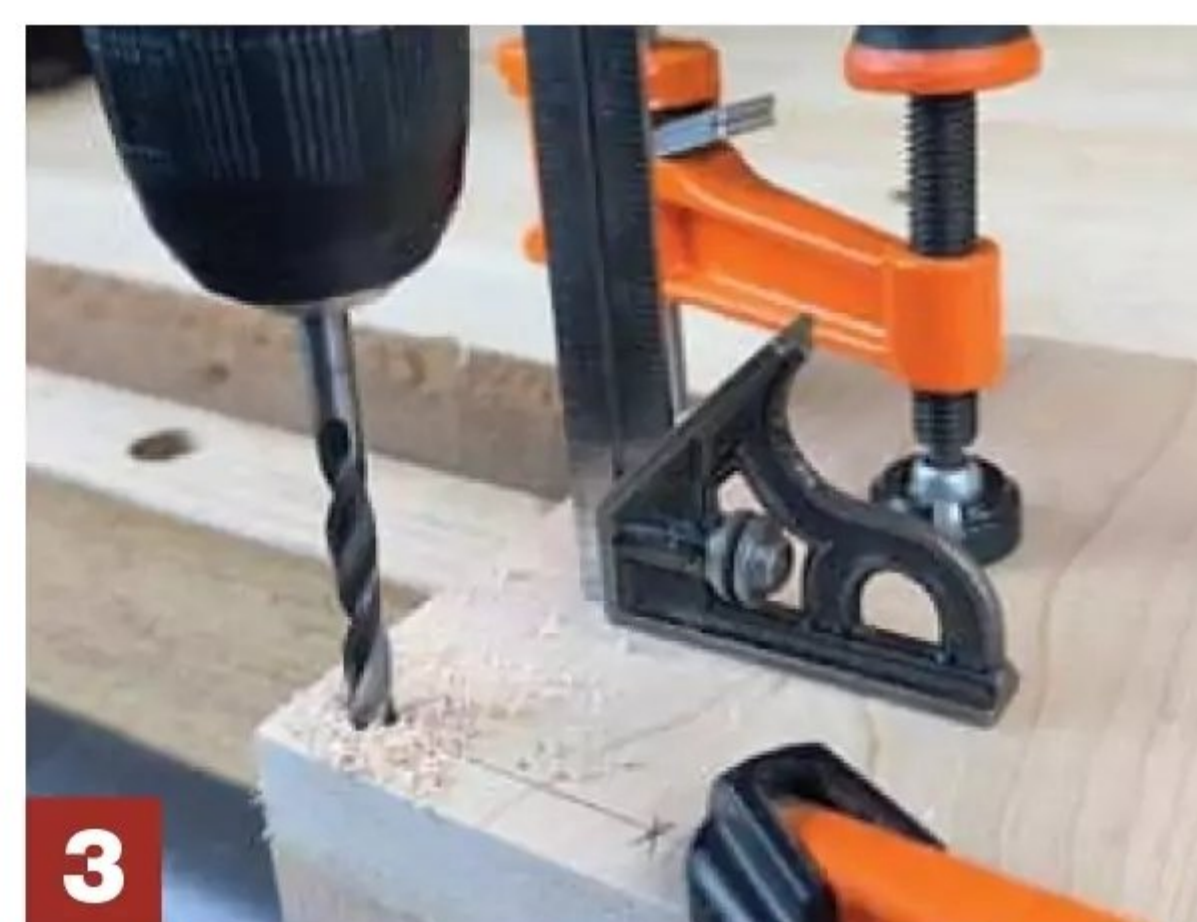
The thing about butt joints is that they aren’t really joints in themselves—they need something additional to actually hold everything together. Probably the most common way of securing a butt joint is by driving screws or nails through the face of one board and into the endgrain of the other. Dowels, biscuits, and dominoes are other common options.

Regardless of the method used, it’s important to know why a butt joint can’t be held together with just glue. There’s no need to get into the details, but just remember this: glue on endgrain will not result in a reliable joint. Since a butt joint has endgrain touching long grain, any glue applied here is of little structural use. It might hold the joint together temporarily, but eventually it will fail.



A rendering of a simple butt joint. Useful for when you need a quick and easy joint. Butt joints are simply the edges of two boards “buted” up against each other. Dowels, screws, or nails are typically used to strengthen the joint, as any glue here is of little use.

How to Make a Butt Joint Overview



1 Start with two pieces of square stock, and on one, mark the location for the dowel pins. Make sure these are centered in the board they are entering—for example, if your stock is $\frac{3}{4}$ " (19mm) thick, make a mark $\frac{3}{8}$ " (9.5mm) from the edge of the board. The number of pins depends on the width of your board. Choose a number and evenly space them along the width of the board. After marking with a pencil, make indentations with an awl.

2 Spread a bead of wood glue along the endgrain of another piece of scrap. Butt it up against the other and clamp the boards together. Spend time making sure that everything here is aligned, using your fingers to feel for any proud wood at the joints. Let the joint sit for about 30 minutes so the glue has time to set temporarily.

3 Using a $\frac{1}{4}$ " (6mm) drill bit (adjust size accordingly for different stock thicknesses), drill straight into the marks you made. Drill as straight as possible. Putting a combination square on your workpiece as a visual reference can help. Make sure you drill about 2" (5.1cm) or so into the mating board.

4 Cut some dowel stock a bit longer than the holes you drilled, coat them in wood glue, and pound them into the holes. After about 30 minutes, trim the dowels with a flush cut saw, and clean up the joint surface with a hand plane or some sandpaper affixed to a sanding block.

RABBET JOINT

A rabbet joint isn't all that different from a butt joint, and the same general principles apply. It's an end-grain-to-long-grain joint, so glue alone isn't sufficient to keep it together. Still, there are some differences that give it an advantage over the butt joint.

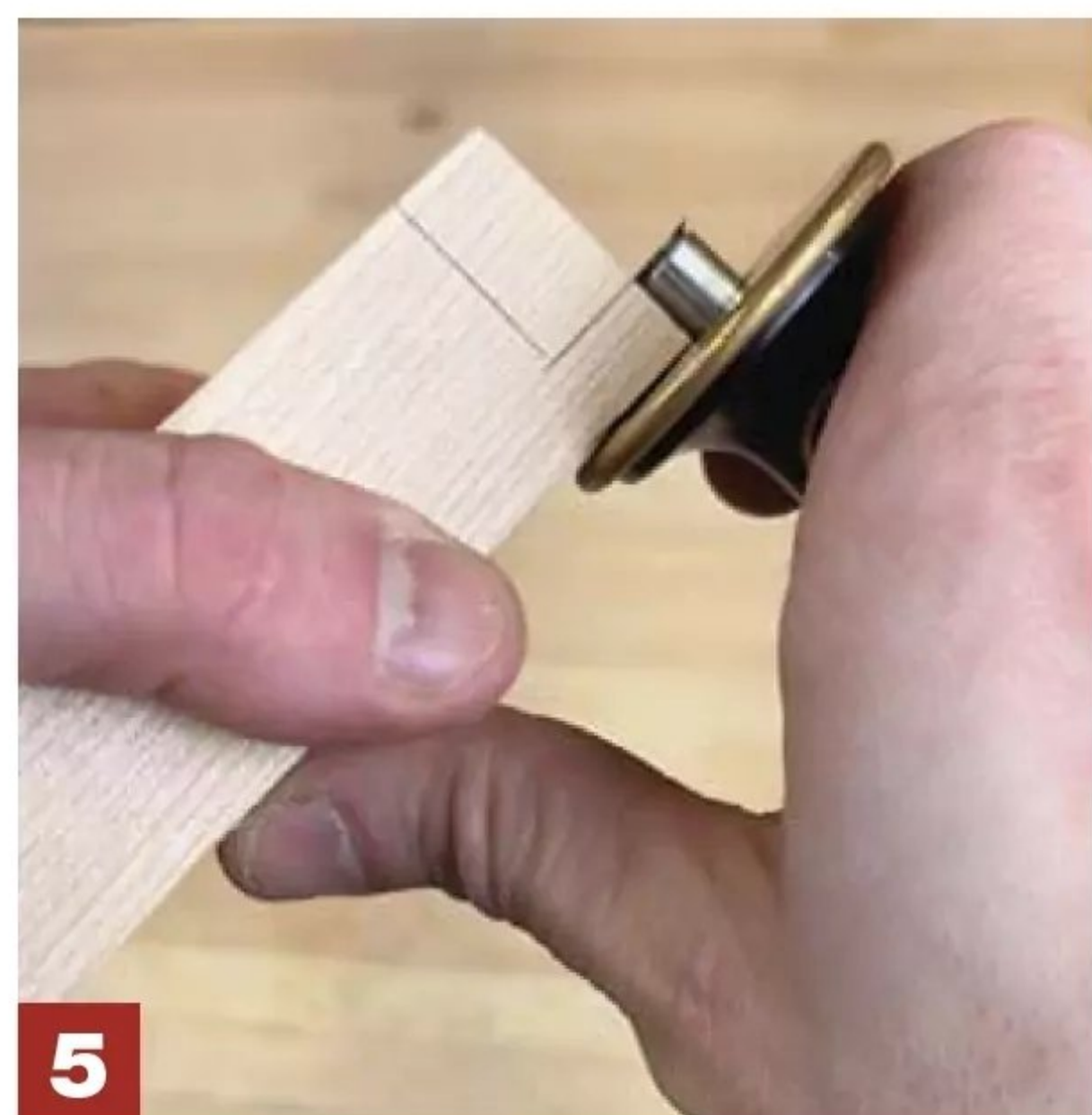
Rabbet joints are made by cutting a notch—or rabbet—in the edge of a board. The mating board is then glued and (typically) pinned in the rabbet. The nice thing about a rabbet joint is it is very easy to keep things aligned when clamping, gluing, and pinning. The geometry of the joint keeps things in place.

Pinned rabbet joints are a good option for drawers when you don't have the time (or haven't yet developed the skills) to do half-blind dovetails. The pins provide mechanical strength to resist the forces put on the drawer by being opened and closed repeatedly.

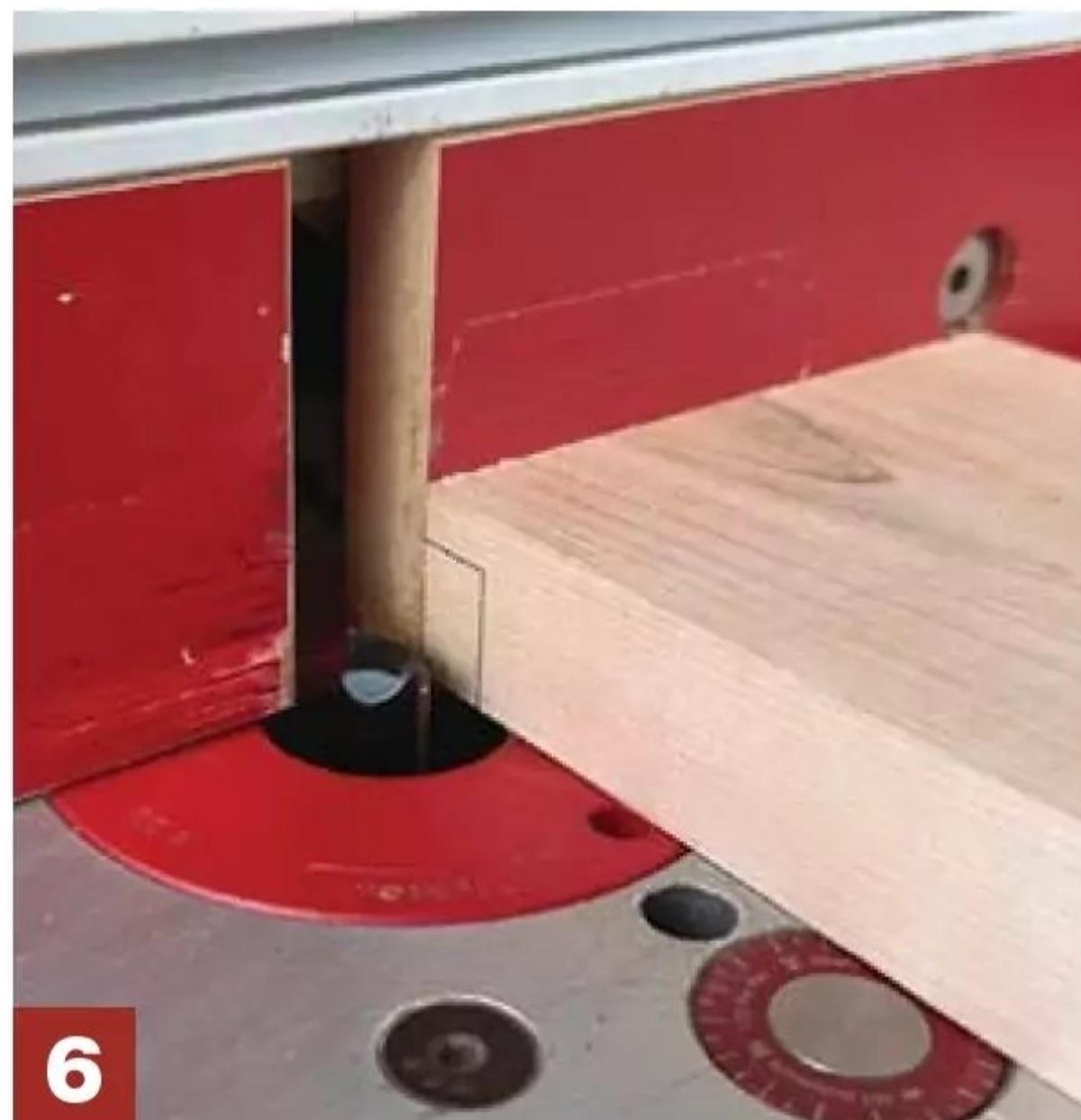


A rendering of a rabbet joint. A more sophisticated version of the butt joint, a rabbet joint takes advantage of a small notch—or rabbet—cut in the edge of one board to provide mechanical strength. Like the butt joint, dowels are often used to provide additional strength. This is useful for when you want an uninterrupted drawer front, but don't have the time to do a half-blind dovetail.

How to Make a Rabbet Joint Overview



5



6



7



8a



8b

5 Start with two pieces of stock, one about 1/8"–1/4" (3–6mm) thicker than the other. Set a marking gauge to the thickness of the thinner board, and on the thicker board, mark the location for the rabbet along the inside face and edges—this will help prevent tear-out at the router table by severing the wood fibers.

6 With a 1/2" (13mm) upcut spiral or straight flute cutter bit in your router, set the router table fence so that the cutter aligns with your marking gauge line. If your rabbet is wider than your router bit, first set the bit to remove slightly less material than the width of the bit and cut the rabbet. Then, repeat the process again with the bit set at your gauge line.

7 Don't try and rout the rabbet all in one go. It's not only dangerous but also risks ruining your entire project. Routers should always be viewed as finishing tools, not for bulk material removal. Take light passes, pushing your stock with a scrap block to avoid blowout at the exit of the cut. Raise the router bit by about 1/16"–1/8" (1.5–3.2mm) before each pass until you reach your final depth.

8 Spread a bead of glue along the inside of the rabbet and clamp the mating board in place. Use clamps in both directions to make sure the joint is fully closed. After the glue has had time to set, repeat the steps from the butt joint section to mark, drill, and trim pins.

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MITER JOINT

The main benefit of the miter in box-making is aesthetic—it's the only joint covered here that shows no visible endgrain. Just like butt and rabbet joints, glue alone here can be risky. The miter joint is mostly endgrain-to-endgrain contact, so don't expect the glue to hold in tough situations. Since miters are typically used in light-duty applications, however, some woodworkers opt to leave them alone and hope for the best. In situations when you need a little extra reinforcement, however, splines (thin strips of wood inserted into saw kerfs across the miter joint) can be added after the glue has set.

There are any number of ways to cut miters with both hand and power tools, but I've found the absolute best way to get a gapless joint is by using a mitered shooting board and hand plane. This removes all the hassle of fussing with angle settings on a table or miter saw. Once the board is built and dialed in, you can cut beautiful miters all day long without even thinking about it.



A rendering of a miter joint. Typically used in light-duty applications like small keepsake boxes, miter joints are a good option if you don't want any visible endgrain in your joint. Since the contact point between boards is mostly endgrain, though, the glue joint isn't particularly strong. Adding splines is a good idea if you think the extra strength will be needed, although I often skip them.

How to Make a Miter Joint Overview



9 Mark the inside faces of four box sides, making sure your pieces are square.

Place a box side down on your mitered shooting board with the inside face facing up. Place a hand plane on the 45-degree ramp and begin planing the ends of the box side. Take light passes with the hand plane, making sure you are applying downward pressure against the 45-degree ramp.

10 Continue checking the edge as you plane until you have just created a full 45-degree cut. Repeat on both ends of all four box sides. If you cut too much, don't panic—the only thing that really matters here is that opposing sides are the exact same length. Check opposing side lengths against each other, and make light plane passes where appropriate until they are equal.

11 Place all 4 box sides with the inside faces down and edges touching. It also helps to set up a straight edge to press the boards against and keep things in alignment. Stretch blue painter's tape across the joints, pulling tightly before you press down. You want the tape to have a bit of stretch to it as you close the joint.

12 Carefully turn all four sides over and lightly brush a 50/50 mixture of wood glue and water on all the miters. Allow to dry for about 10-30 minutes. This "glue size" will help seal the endgrain and ensure that the ensuing glue joint is much stronger.

13 Spread some wood glue on all the miters and fold the joints together carefully. If the tape is tight enough, you should feel the joints "snap" together as you bend them. Once all four corners are together, apply tape to the final joint and seal things up. On wider boards, you may want to add some strap clamps to tighten things up. Let the glue set and you're done!

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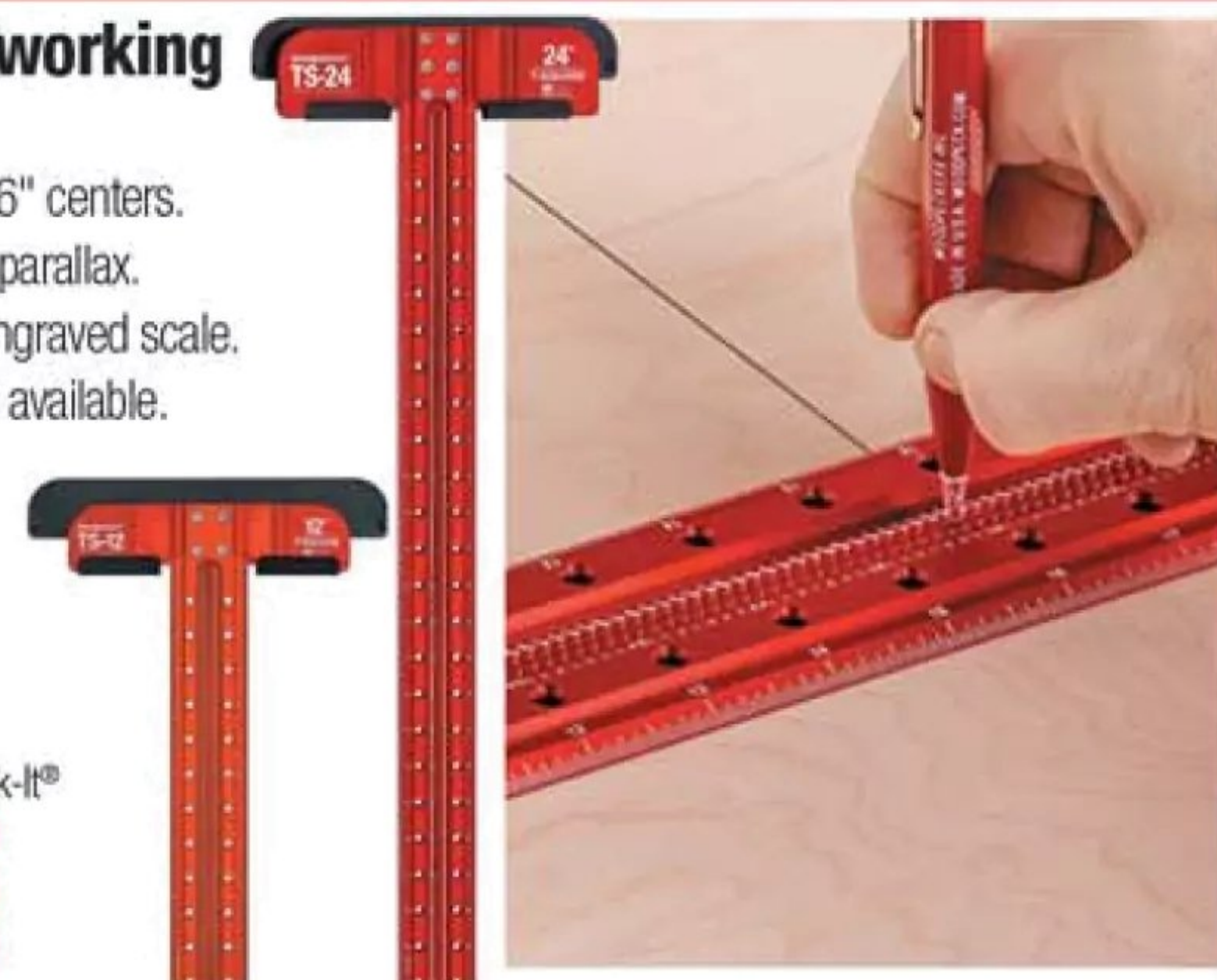
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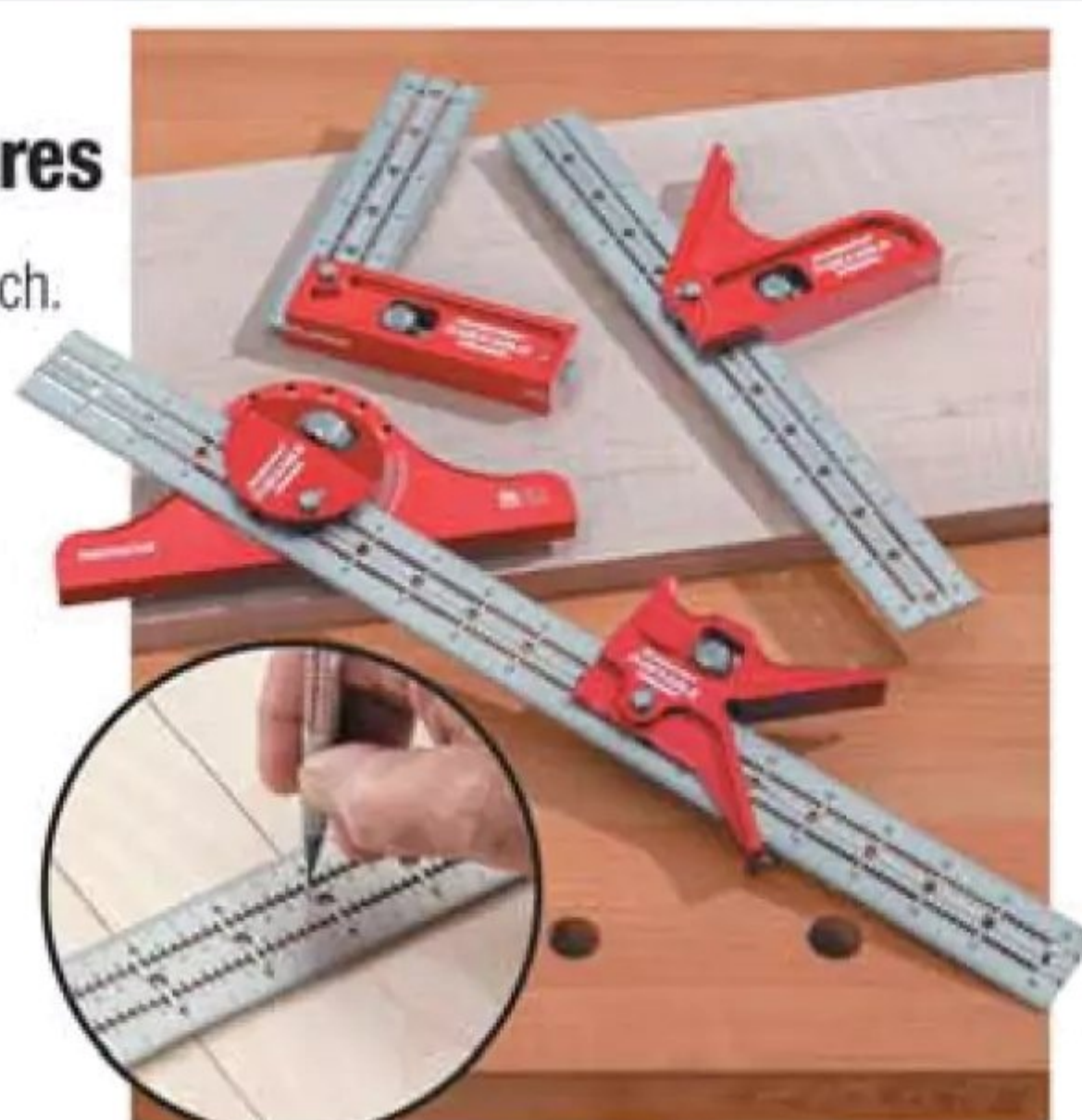
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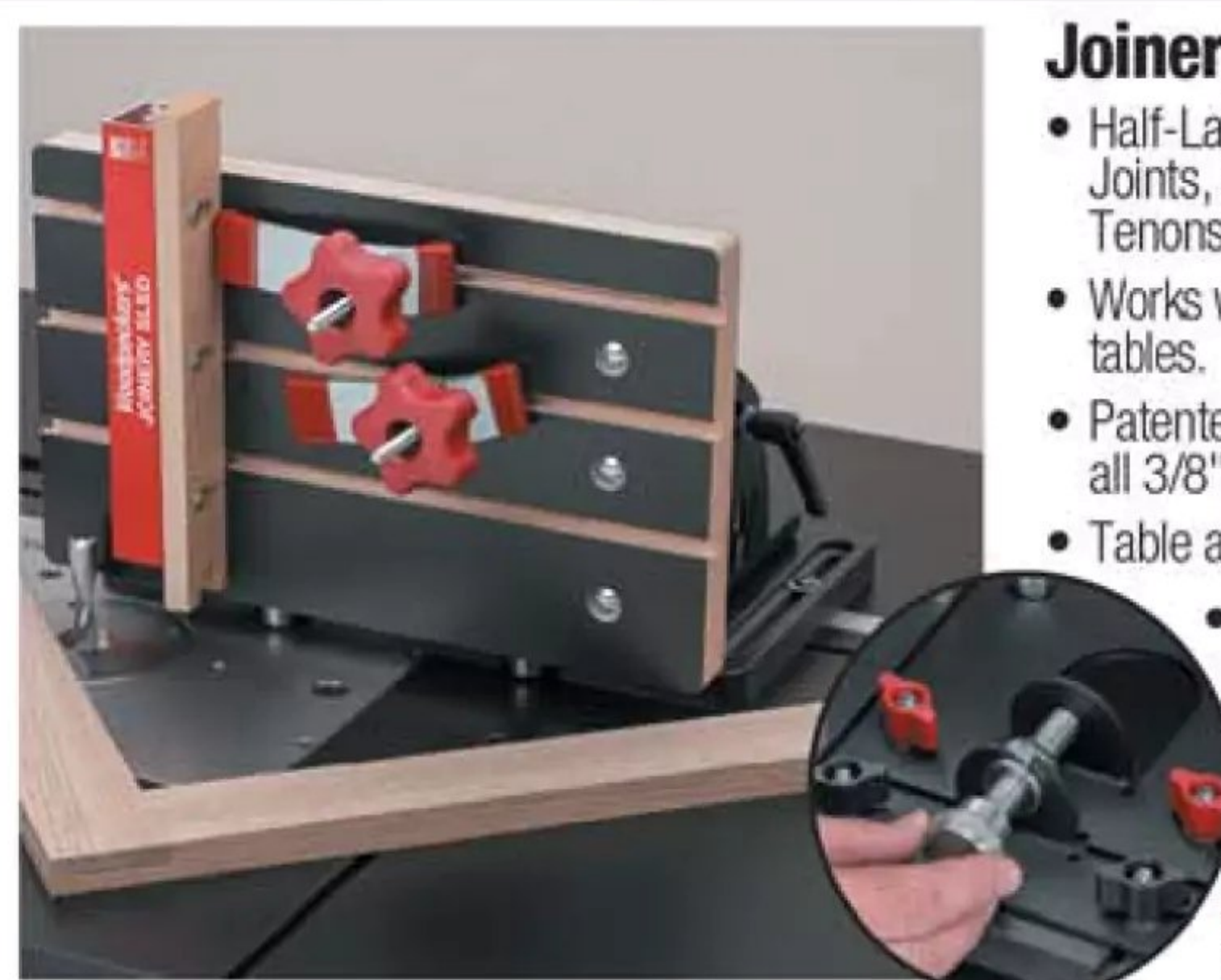
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■ Miter Joint Tips

Miters can be extremely frustrating to get right off the bat. A lot of people struggle with small gaps either on the inside or the outside of the joint. These issues are the result of two things: either your opposing sides are not of equal length, or your joints aren't exactly 45 degrees.

Continually check your miter with a combination square. Even if your shooting board is set up right, bad planing technique can give you angles that are slightly off. Make sure you are applying pressure against the 45-degree ramp as you plane—this is very important!

There are methods to somewhat fix gappy miters—like rolling the shaft of a screwdriver along the point of a miter to close it up—but these rarely give results that are fitting for a fine box. Taking the extra time to make sure everything is dialed in perfectly really is the best way to get a miter that both looks good and stays together.



One method for securing miters during glue-up is to use a strap clamp.

THROUGH DOVETAILS

The through dovetail is a highly versatile and visually appealing joint that just so happens to be incredibly strong. Because of this, it is my favorite joint to use in box-making, and one that is essential to master if you want to get in the business of making fine boxes.

The strength of the dovetail comes from two sources. The first is mechanical. Note how the “tails” of one board fit perfectly into corresponding gaps in the opposing “pin” board. This is the first joint we’ve seen where one piece of wood is locking into another without the assistance of glue or fasteners.

The dovetail joint also has ample long grain-to-long grain wood contact. The sides of the tails and the pins (both long grain) touch each other directly, so any wood glue applied here is going to be incredibly strong. Together with the mechanical nature of the joint, once the glue dries on a dovetail, it simply isn't going to come apart without some serious destruction.

Of course, they take quite a bit of practice to get right, and many people are so intimidated by them that they never even try. After mastering the joint myself, I can say with absolute certitude that there is no magic trick or shortcut here. The way to get good at dovetails is to approach them with focus and purpose, and to cut a lot of practice joints.



A rendering of a through dovetail. Even stronger than a box joint, a dovetail takes advantage of wedge-shaped joinery to provide a mechanical lock – the glue is just insurance here. Use when strength is absolutely necessary, or when you just want a very attractive looking joint that shows off your woodworking skills.

Clear instructions and a lot of tips along the way can really speed things up. In this example, I am using stock that is $4\frac{5}{8}$ " (11.8cm) wide and $\frac{5}{8}$ " (16mm) thick. Any measurements referenced here are based on those dimensions, so if your stock is different, adjust measurements accordingly.

■ Making Wooden Boxes



14 Gather two pieces of scrap, and set a marking gauge to project a bit more than the thickness of your stock. Scribe a line on the faces and edges of one board (the “tail board”) and only on the face of the other (the “pin board”).

15 Clamp the tail board in your vise with the end facing up. Draw a pencil line across the ends of the board about 1/4" (6.4mm) from the edge. Set a pair of dividers to open 1 3/8" (3.5cm) and place one point into a pencil mark. Set the other point into the board and make a mark. Rotate and “walk” the dividers along the edge of the board, making light marks with the points as you go.

16 Repeat this process, starting from the pencil mark at the other edge of the board. When you are finished, you should end up with four equally spaced marks. Use your combination square to extend pencil lines across these marks.



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20



21

17 Set a bevel gauge to your desired dovetail angle. For this example, I chose seven degrees because it's a nice overall angle that provides adequate strength. Use the bevel gauge to transfer pencil lines to the face of your tail board down to the marking gauge line.

18 With the tail board clamped in your vise, place your saw directly on one of the lines. It is very important to ensure that your cut is square across the board here, so make sure you don't deviate from the guideline. Cuts that aren't perfectly square can cause problems later, so take your time.

19 Use the thumb and forefinger from your non-sawing hand as a fence to stabilize the saw on the line. Tilt the saw slightly to match the dovetail angle you drew on the face of the board. Once you feel comfortable that your saw is square across the board and tilted at approximately the correct angle, you are ready to cut.

20 Focus on holding the angle you set in the previous step while gently moving the saw forward and backward to establish a cut. The feel for this takes some time to build up, so practice on some scrap wood. Try not to put any downward pressure as you cut—the weight of the saw and gravity should be just enough to guide everything properly. Continue sawing, checking continually to make sure you aren't going past your marking gauge lines (especially on the side of the board that isn't facing you). Once you've reached your marking gauge line on both the front and the back of the board, your cut is complete.

21 Using a fret saw or coping saw, remove the waste between tails. Don't risk cutting into your baseline by getting too close here. The goal now is to remove the bulk of the waste, not all of it. Everything will be cleaned up later with a chisel.

Spacing Dovetails

The distance between divider points in Step 2 is completely arbitrary. I chose that dimension because I knew it would yield three nicely spaced dovetails on the boards used in this example—and it didn't require any confusing math at all.

First, pick how many dovetails you want in your project, and set your dividers so that they are equal to about the width of what one tail would be. For example, if you chose four dovetails, open your dividers so they are about $\frac{1}{4}$ the width of your tail board. Place one point of the divider in a pencil line like Step 2, and walk along the board, except this time do not make any marks.

Count the number of "turns" you do with your dividers as you walk. This will be the number of dovetails on your project. The last "turn" is when the point of the divider goes past the pencil mark on the opposite end of the board. The distance between this pencil line and the point of the dividers is the pin width.

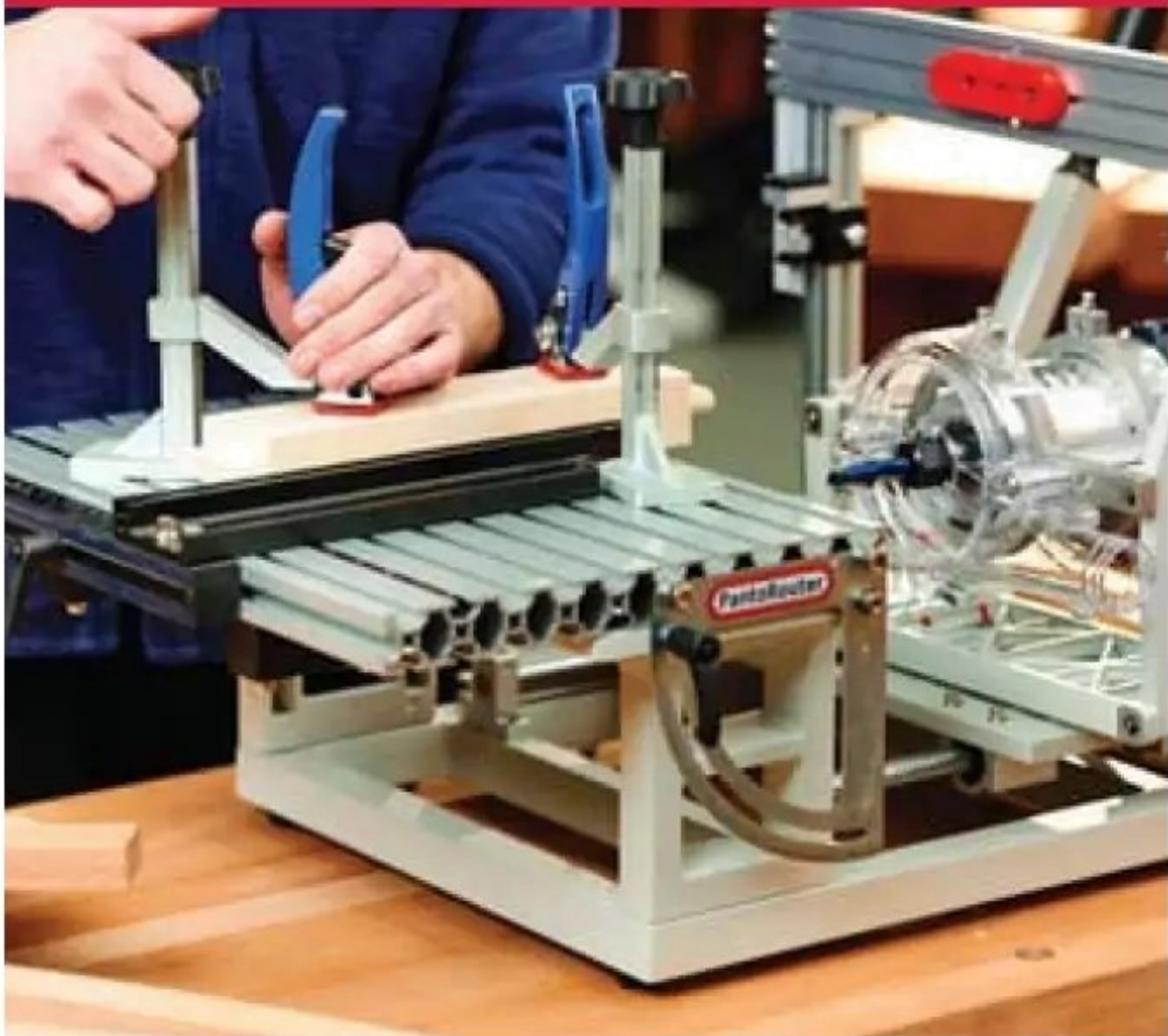
If you find that you aren't getting the number of tails you want, or the pin width is too small or large for your liking, simply open or close your dividers accordingly and start again. Once you have everything set, do the process laid out in steps 2 and 3, and you'll have nice and evenly spaced dovetails.

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■ In The Shop

Reviving The Shaper

This shaping powerhouse has fallen out of favor of router tables, but in some instances, it may be the better tool in your shop.

By PW Editors



When it comes to being a jack of all trades, the router table may be king in the shop. From joinery to shaping, they do it all. However, in my opinion, there's a cousin of the router table that may be even more versatile. And that is the shaper. If you'd look back 20 or 30 years, I'd wager that you'd find as many shapers in shops as router tables. However, the advances in router motors and lifts pushed many shapers out of the shop. But that shouldn't have been the case. There are many situations where you may be better off with a shaper versus a router table. Yes, I'll admit that shapers are generally a production-g geared tool. They are designed for all-day use, cutting raised panels and doing production work. However, you don't need to run a cabinet shop to take advantage of a shaper.

Like a Router, But Not

On the surface, a router table and a shaper do the same thing—they spin a cutter. The biggest differences are the bits, the bit holding, and the power behind the machine. Let's put it this way. Picture the router table as your commuter sedan. It gets you to and from work. The shaper, however, is an 18-wheeler. Sure, it can be a daily driver, however there's significantly more power behind it. When you must haul a trailer full of freight (or spin a big profile cutter), the 18-wheeler will do it whereas a sedan will not. A shaper is like that—it will spin a big bit with enough power to make a full cut.

When looking at a shaper or shaper cutter, the most significant and noticeable difference is the bit (cutter) and cutter holding mechanism. As you can see in photo 1 on the next page, shapers use a spindle to hold bits. My Harvey shaper came with three different ones to choose from—a $\frac{3}{4}$ " spindle, a $1\frac{1}{4}$ " spindle, and a router collet spindle. These

PHOTOS BY LOGAN WITTMER



1

1 Shapers utilize a spindle to hold the cutters. Modern shapers will have replaceable spindles, and even router collet spindles.

2 A variety of speeds as well as forward and reverse are conveniences of modern machines.

3 Shaper fences are generally more robust than standard home router table versions.

spindles are shafts that attach to the motor (with a drawbar), and the cutter slips over the shaft. Spacers are used to pinch the bit between the washer and the spindle base. On this Alpha, the router collet is an ER style to accept standard router bits.

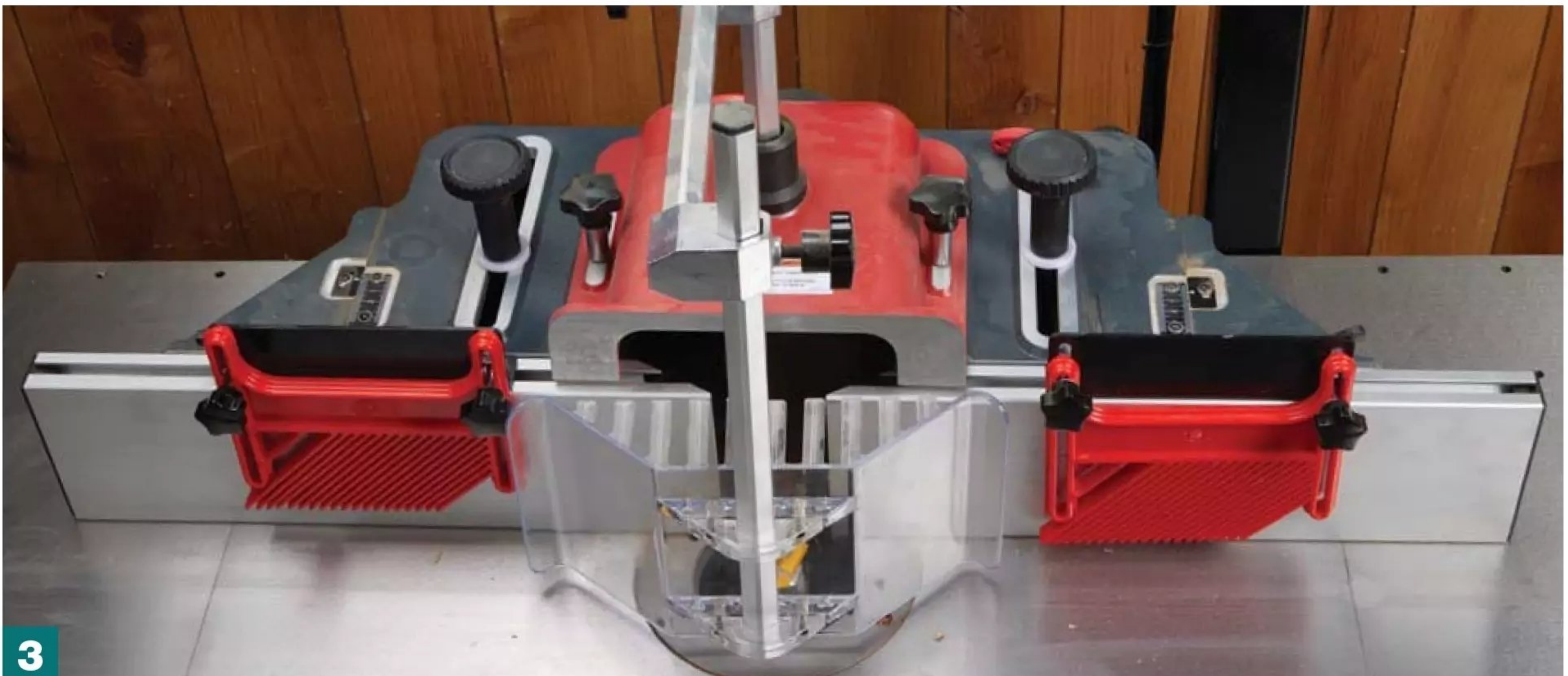
As I mentioned before, shapers are powerhouses. They pack a lot of torque under the hood. Like an 18-wheeler, they have limited speeds. As you can see in photo 2, the speeds available on shapers are much



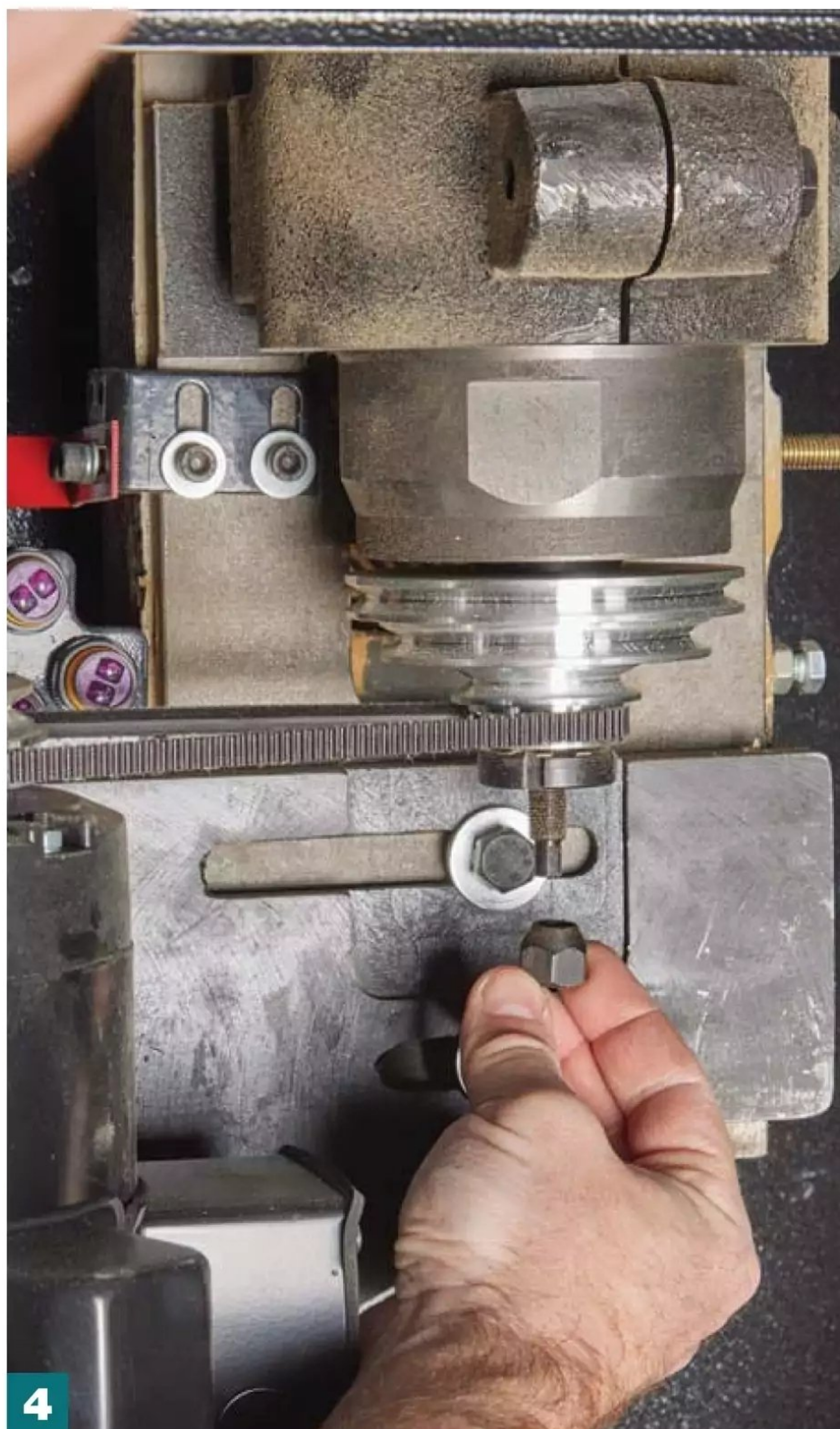
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lower than on routers. This is because the bits they spin are much larger, so the surface speed at which the outermost edge spins is significantly faster (therefore requiring lower RPM). This can potentially be a limiting factor using standard router bits in a shaper, but I haven't run into that problem yet.

Also, note the control box in photo 2. There's a forward and reverse switch. That's right, shapers can be run in both directions. This isn't something that you can do on a router table. When would you use this? The answer is actually "fairly often." When cutting with some large profiles, it's better to flip the cutter upside down, and trap the workpiece between the bit and the table. You can also squeeze out some extra life from rabbet cutters by flipping the cutter over, running it in reverse, and using the portion that's usually below the table. It's one of those things that you don't know you need until you use it.



3



Beefier Construction

One of the most significant advantages of a shaper versus a router table is that they're (generally) built a lot better. They're geared towards a production shop, therefore a shaper has a lot of cast iron. They're big, heavy, stable, and meant to run all day long. I don't know how many times I've used a router table, and it feels like it will rattle apart as I work on it.

A good example of how heavily a shaper is built is shown in photo 4 above. The step pulley, spindle housing and motor are all built like a tank. This means that, even with the largest cutters installed, you can make full-depth passes without the smallest blip in the motor. Seriously, the motor doesn't even know there's wood there. Now, I'm basing much of my experience on my modern shaper. However, a lot of vintage shapers are available secondhand (for a very reasonable cost). Your mileage with those may vary from my experience with mine.

Of course, there are a few downsides to shapers



4 Spindles are held on via a drawbar. The internals of a shaper are built for production, and are cast iron.

5 Shaper cutters are stacked on the spindle using a series of spacers.

6 The mass of a shaper cutter combined with the torque of the motor make cutting buttery-smooth.



as well. The cutters can be more expensive (that's all relative, as there are some costly router bits out there). With that said, there are many more options for cutters as well. About half a dozen bits cover 95% of what I do in my shop. I've listed those on the next page, including where I bought them from. They are more powerful, which means they're usually 220/240v. But, if you have the power and the space for a shaper, I suggest you try one. I've found it's much more valuable than a router table in my shop.

PW—Logan Wittmer

Essential Cutters



TONGUE & GROOVE

A Woodline USA
SKU: WL-1588



RAIL & STILE SHAPER

B Infinity Tools
SKU: 83-040
(with 83-046 for exterior doors)



OGEE PANEL BIT

C Infinity Tool
SKU: 83-001



JOINTING/ PATTERN CUTTER

D ShearTak
SKU: 80204003



WAINSCOT

E Woodline USA
SKU: WL-1598

A Tongue and groove bit. I use this for standard frame and panel assemblies. The Craftsman desk in the last issue? Almost all this bad-boy.

B-C Rail and Stile door bit. These are used for creating cope and stick doors. The additional spacer (83-046) is used for exterior doors. These match with the ogee panel bit for a traditional style raised panel door.

D Jointing/Pattern cutter. This massive cutter is great for jointing operations on the shaper, or by adding a matching bearing, you can create a gigantic pattern bit for template shaping large parts.

E Wainscot Bit. Wainscoting or bead board is a great way to add detail to a back panel. This set makes it easy to run a batch all at once.

F Rabbet head. The addition of a few insert cutters on the top (and bottom) of this spiral head make it a great way to cut rabbets. If any head is “standardly loaded” into my shaper, it’s this one.



RABBET HEAD

F ShearTak
SKU: 807-0392

PROJECT #2508

Skill Level:

Advanced

Time: 4 Hours

Cost: \$20

The late Thomas Moser popularized Shaker design. This side table is my ode to him and his contributions to the woodworking community.

By Logan Wittmer

Shaker Side Table

Inspiration in your wood-working journey can come from many different places. One of my inspirations has always been furniture designer Thomas Moser. His elegant designs have deep roots in the Shaker style and are oddly classic, yet modern. Back in 1972, Thomas left teaching to build handmade furniture in Maine. Over the next 50 years, Thomas built a thriving business building furniture. He published several books that outlined his construction methods and offered shop drawings for other craftsmen to utilize. In early 2025, Thomas Moser passed away at his home in Maine, surrounded by family. This round side table is built directly from “Thos. Moser’s Measured Shop Drawings” book. This book is available second-hand on various websites, and has a permanent place in my library.

Side tables, such as this, are found in many of the Shaker Villages and Museums. The size of the top varies, as does the shape of the base, depending on where and when it was built. In traditional Shaker communities, these tables are made from hardwood, such as cherry, walnut, or maple. Sometimes, they were painted; often, they were not. I have a section of ash from a friend which had great figure in it. While the Shakers would not go out of the way to use figured wood in their furniture, I am no Shaker. Curly ash it is.

The Pedestal

The central pedestal of this style of table is its core. Everything attaches to it, and that’s where the joinery is located. I love the simple design of these pedestals — I made mine a fairly smooth curve. Some have more of a “wine bottle” type look, and I feel they are a bit chunkier. I like the smooth, flowing curve look.

The pedestal is turned at the lathe. After roughing the blank



round, I used a template that I had made to lay out points along the length. You can see my template in Photo 1. After laying out the marks, I use a parting tool and calipers to define critical diameters (photo 2). The parting tool kerfs act as a guide to help you create the correct shape while turning. I swap out the parting tool for a skew chisel and start working down to the parting marks.

1 The template that I use shows both the (half) profile of the turned pedestal, as well as measurements that are used to set the calipers.

2 Make parting cuts until the calipers slip over the blank.

3 A skew chisel is a great tool to remove material and get a finished, smooth surface.



4 Start to work down the neck of the pedestal.

5-6 A skew chisel does much of the heavy waste removal and shaping.

7 When making sets, I like to compare the shapes to ensure they look like they belong in the same family.

8-9 The only critical dimension is the tenon on the top. Its size doesn't matter, but make sure it matches a Forstner bit in your shop.

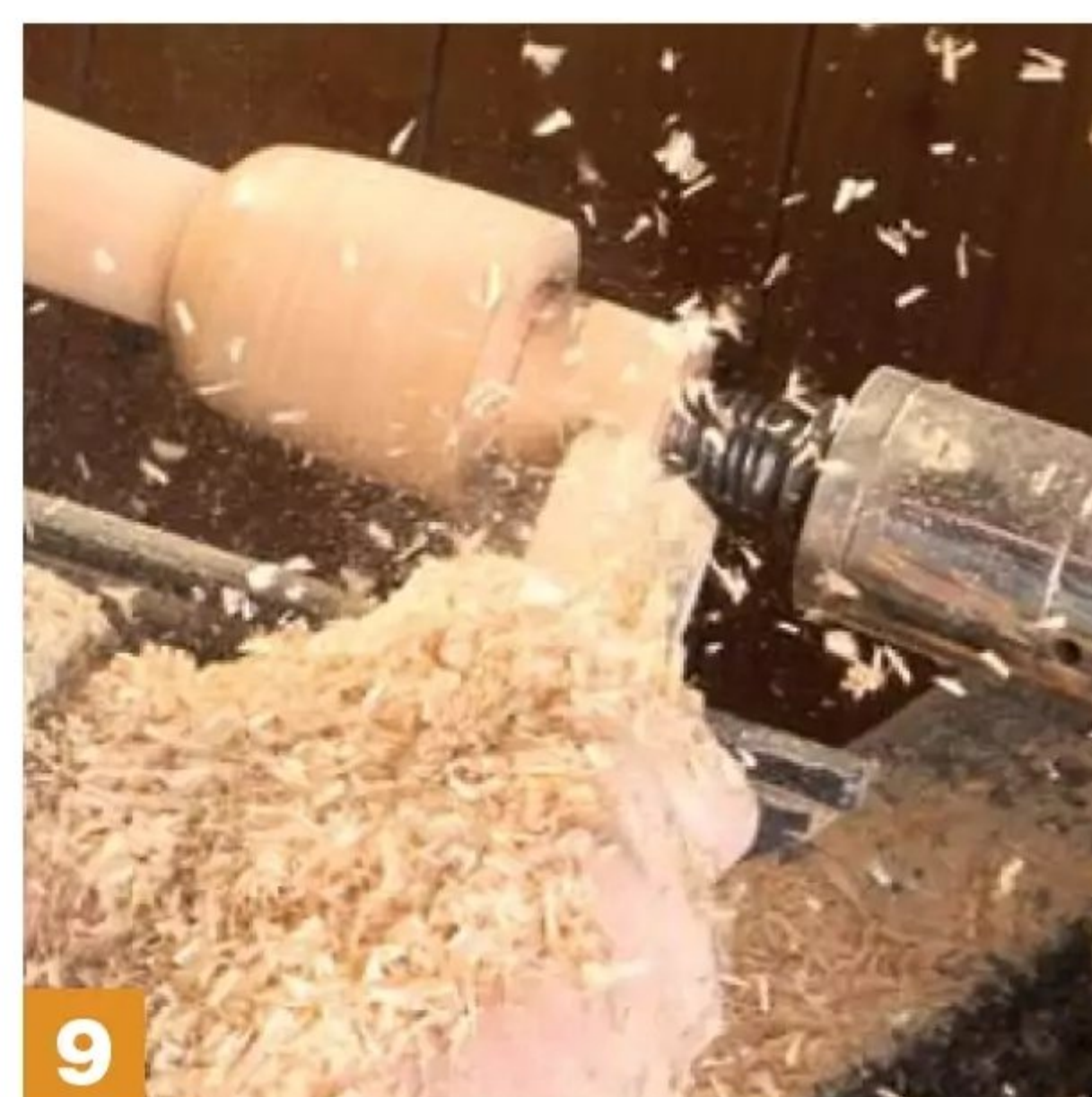
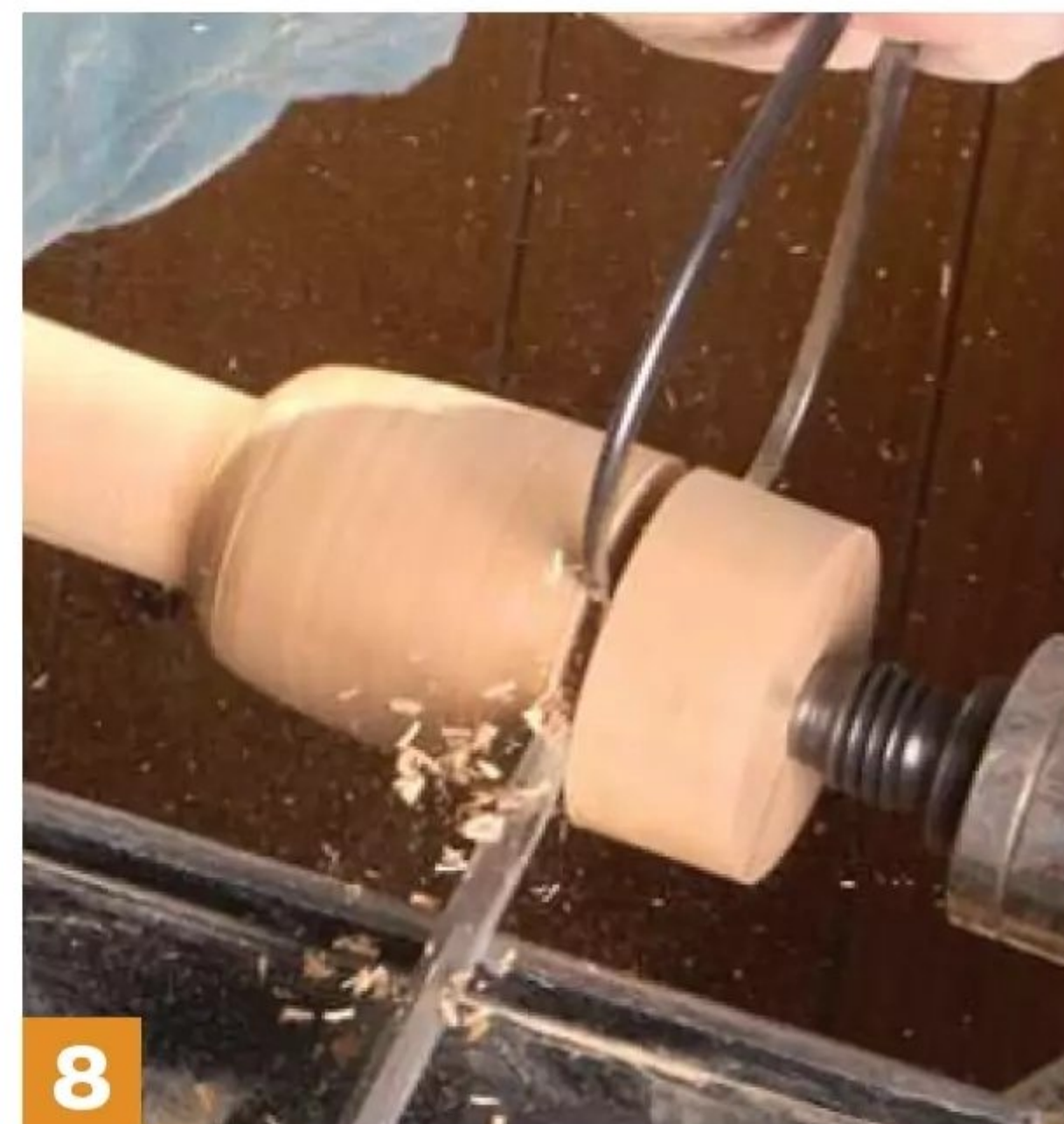
The first part of the pedestal is at the bottom—a wide, flat area where the feet will mount. This needs to be perfectly smooth and flat. It's also about a quarter of an inch smaller in diameter than the largest part of the pedestal. This allows the legs to register on the bottom of this lip. After turning, use a hard, flat sanding block to make sure this area is flat and not tapered.

By far the hardest part of this pedestal to turn is the smooth, gentle curve where it necks down from the biggest to the smallest diameter. A spindle roughing gouge is easiest to get this shape, but you may need to clean it up with a bit of sanding.

However, I like turning this entire pedestal with a skew. Light planing cuts leave a smooth surface, and using the bevel to guide your cut, I found it naturally wants to create a curved profile.

When turning these pedestals, I turn my Harvey lathe up as fast as it will go—about 3,500 RPM. The faster the speed, the easier and smoother the cuts will be.

After the curve has been shaped in (I check it against another I have, just to judge consistency), you can turn (har har) your attention to the top of the pedestal. The pommel at the top is curved (and is sometimes referred to as a tulip, which makes



Shaker Side Table

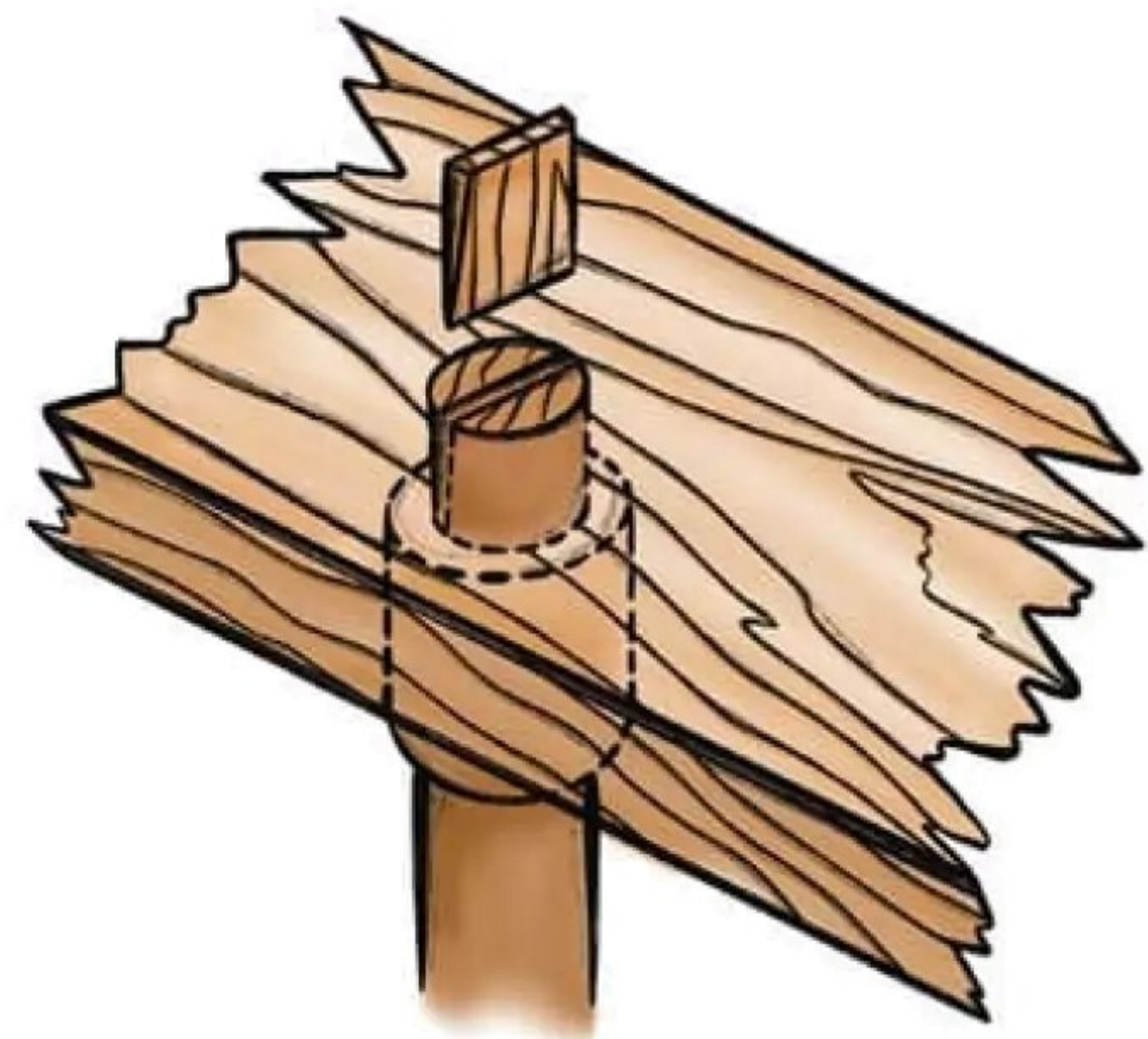
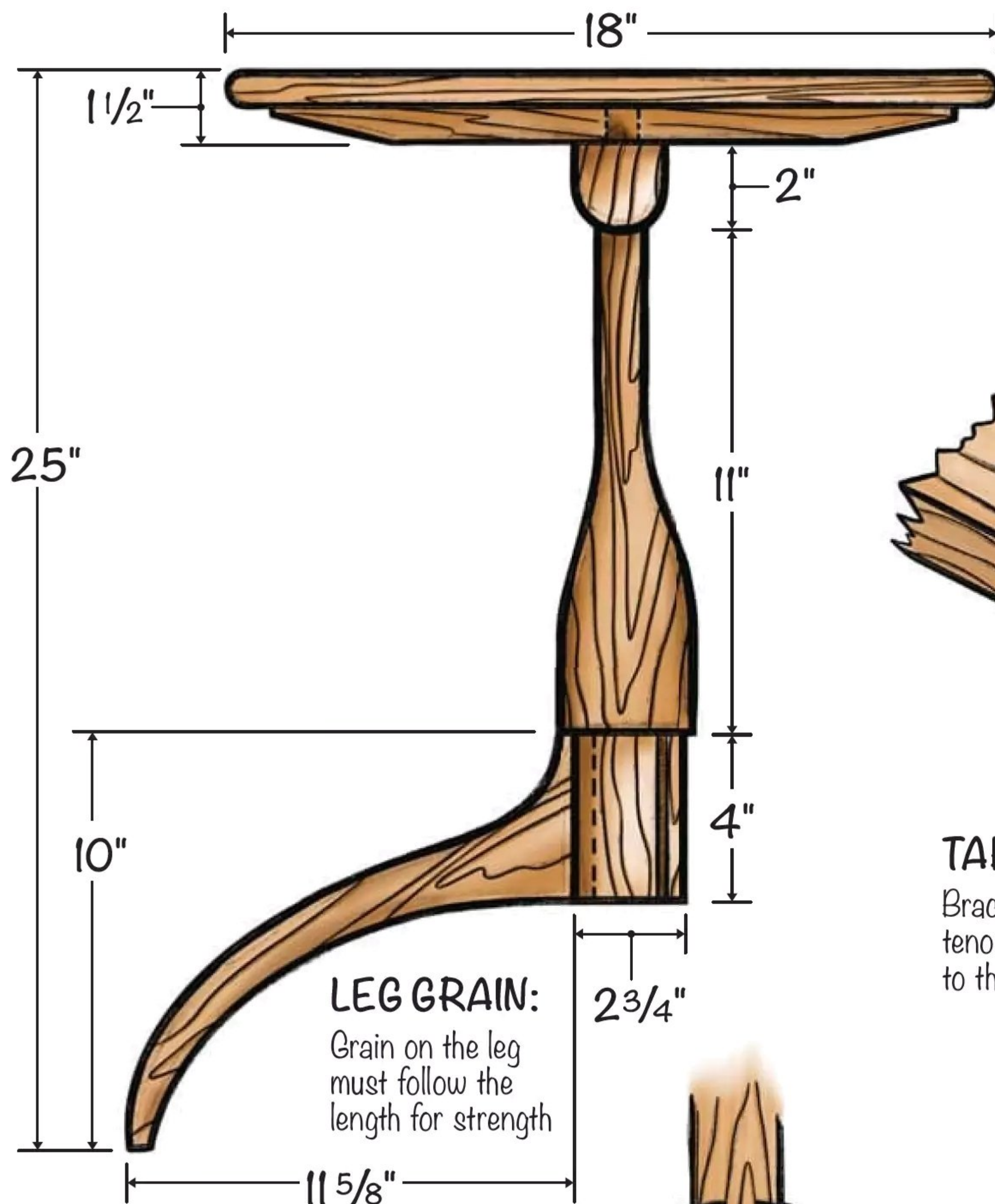
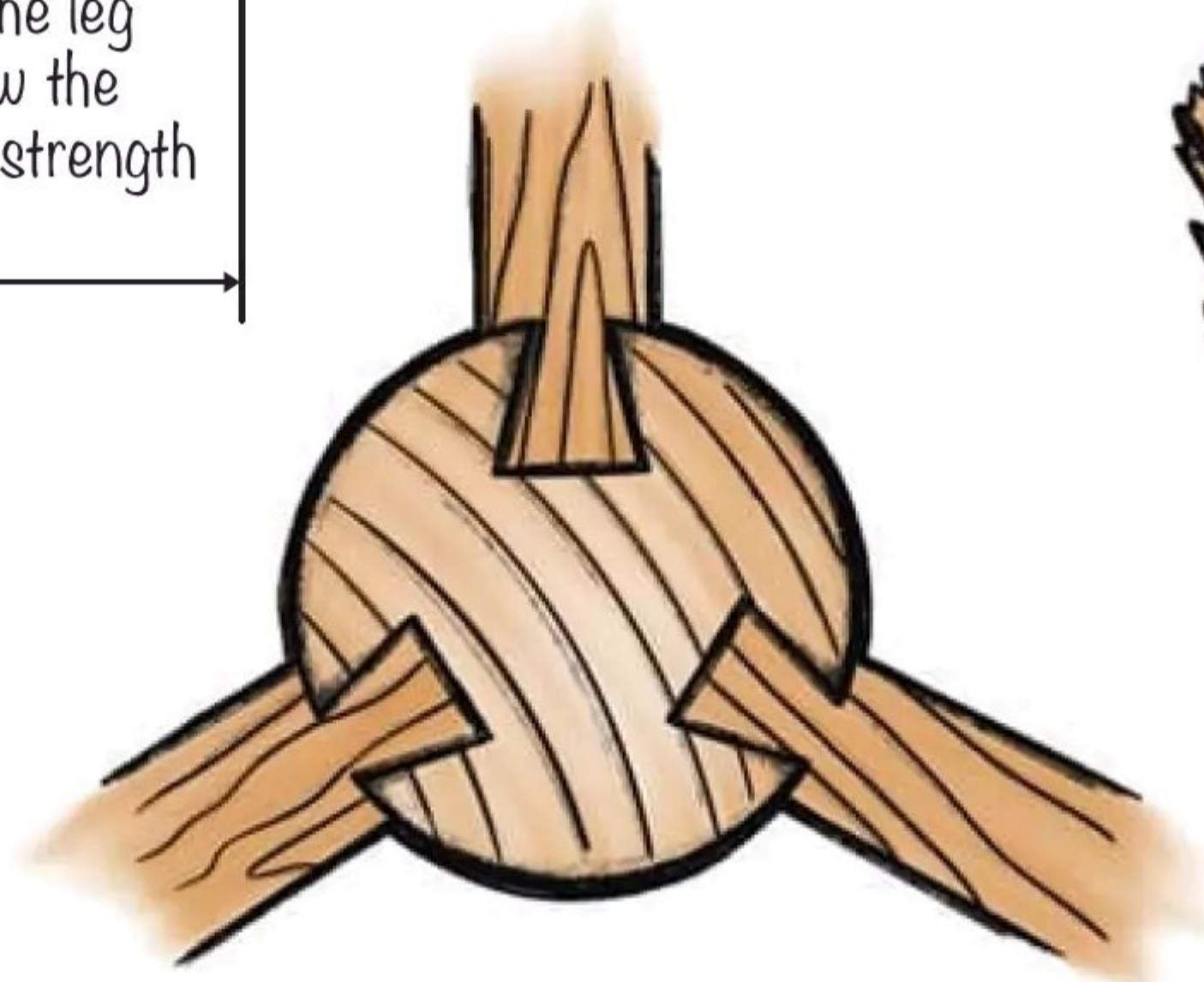


TABLE TOP JOINERY:

Brace is attached to the pedestal with a tenon and a wedge. The top is screwed to the brace.



BOTTOM DETAIL:

Sliding dovetails spaced 120° apart and are 4" long



NOTE: Templates for the legs and base are available at PopularWoodworking.com/onlineextras

Cutlist

No.	Items	Dimensions (in.)		
		T	W	L
1	A Pedestal	3	3	18
3	B Legs	3/4	6	15
1	C Brace	3/4	4	16
1	D Top	3/4	18	18

sense, looking at its shape). Above the pommel is a tenon—size this to match a Forstner bit that you have in your shop. Mine is 1" diameter. Sand the pedestal, stopping between grits to sand along the grain. Apply a coat of finish to the pedestal, avoiding the glued areas (mainly the tenon up top).

Legs Next

The legs are up next. Now, because of the spindly nature of these, you need to pay attention to the grain direction. You want the grain to be as continuous as you can, along the entire length of the leg. In my instance, I cut fresh leg blanks off the hunks of ash, as you see in photo 12. Trace the legs onto your stock, and cut them out at the band saw. Because of the direction of the grain, cut the legs as close as you can to the layout line, leaving just a hair of waste—this is to help with the next step, which is routing.

Once again, the leg pattern is made from MDF, and is the easiest way to make a set of legs that match. Use double-sided tape to hold the template to the cut legs. Now, at the router table, you'll want to rout away the waste. Use a sharp bit (I like the spiral pattern bits from *Woodpeckers*) and pay attention to the grain direction. If you left just a sliver of waste, I found you can rout against the grain without a whole lot of problems. If your band sawing is not up to snuff, make sure to flip the blank around and always rout downhill. This will avoid any major tear-out.

Joinery

Now comes the trickiest part of the table—forming the sliding dovetail joint that attaches the legs to the pedestal. There are several ways to do this. Christian Becksvoort, a former employee of Thos. Moser and master of Shaker furniture, suggests cutting them by hand. Maybe I'll have



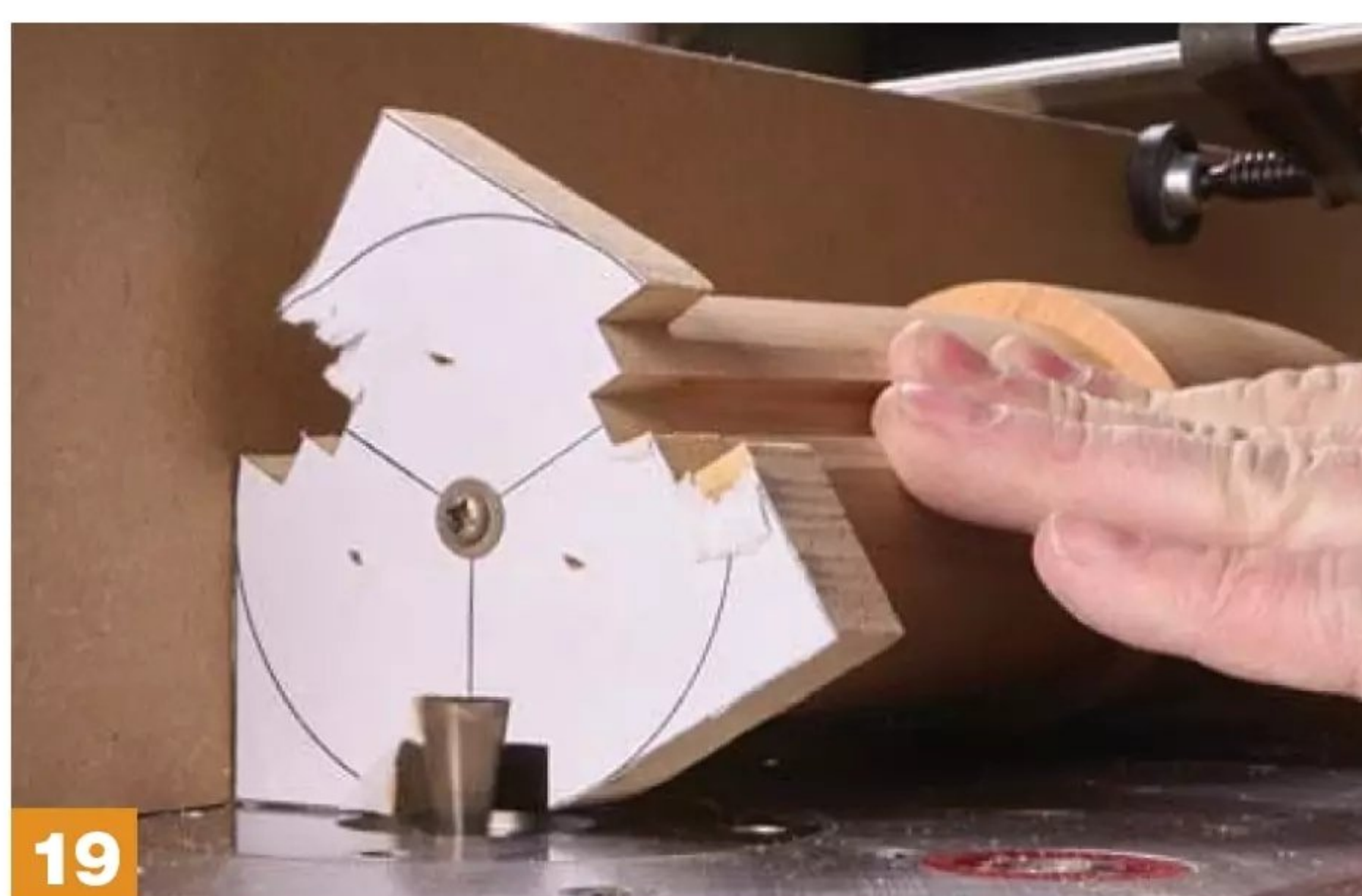
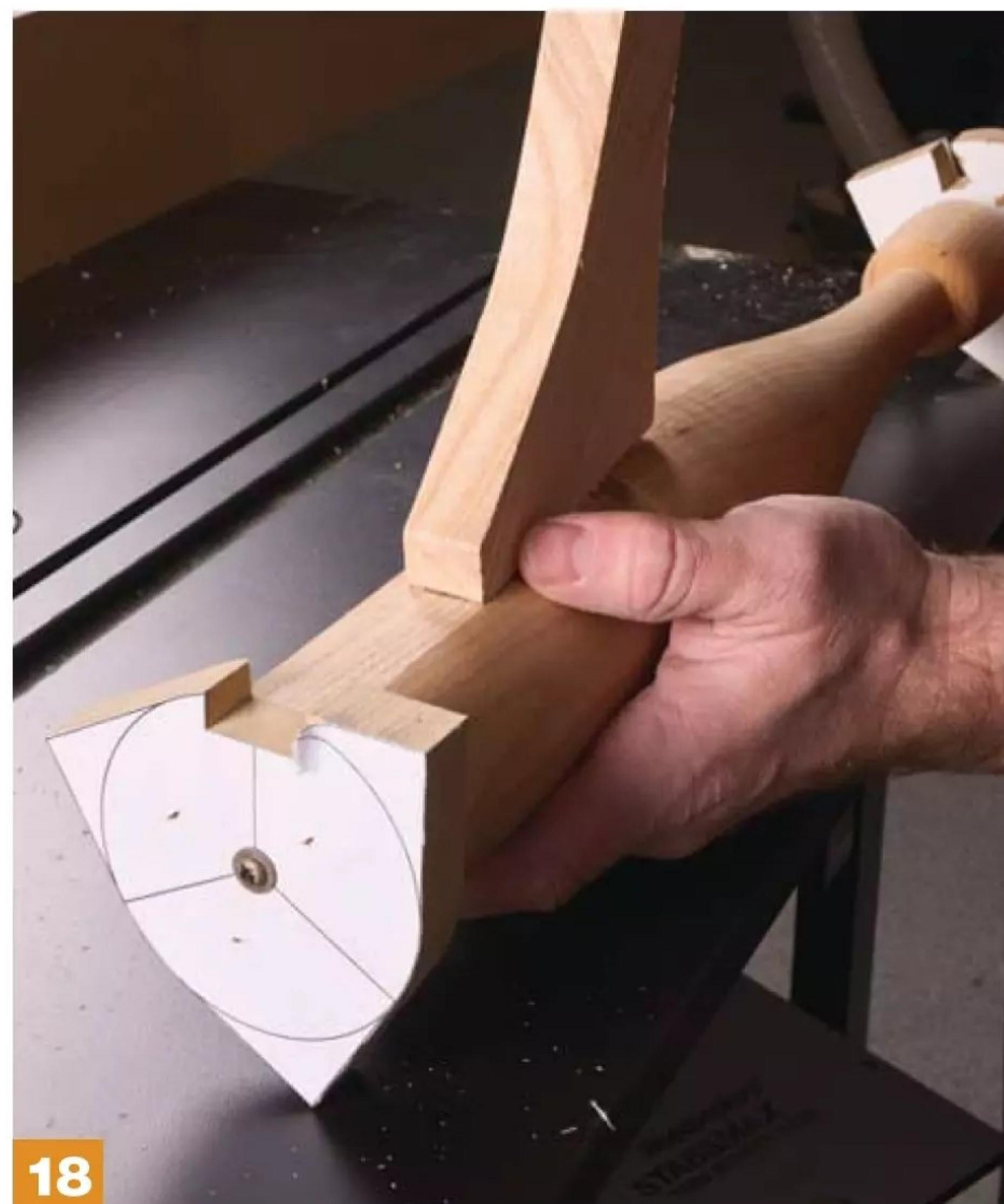
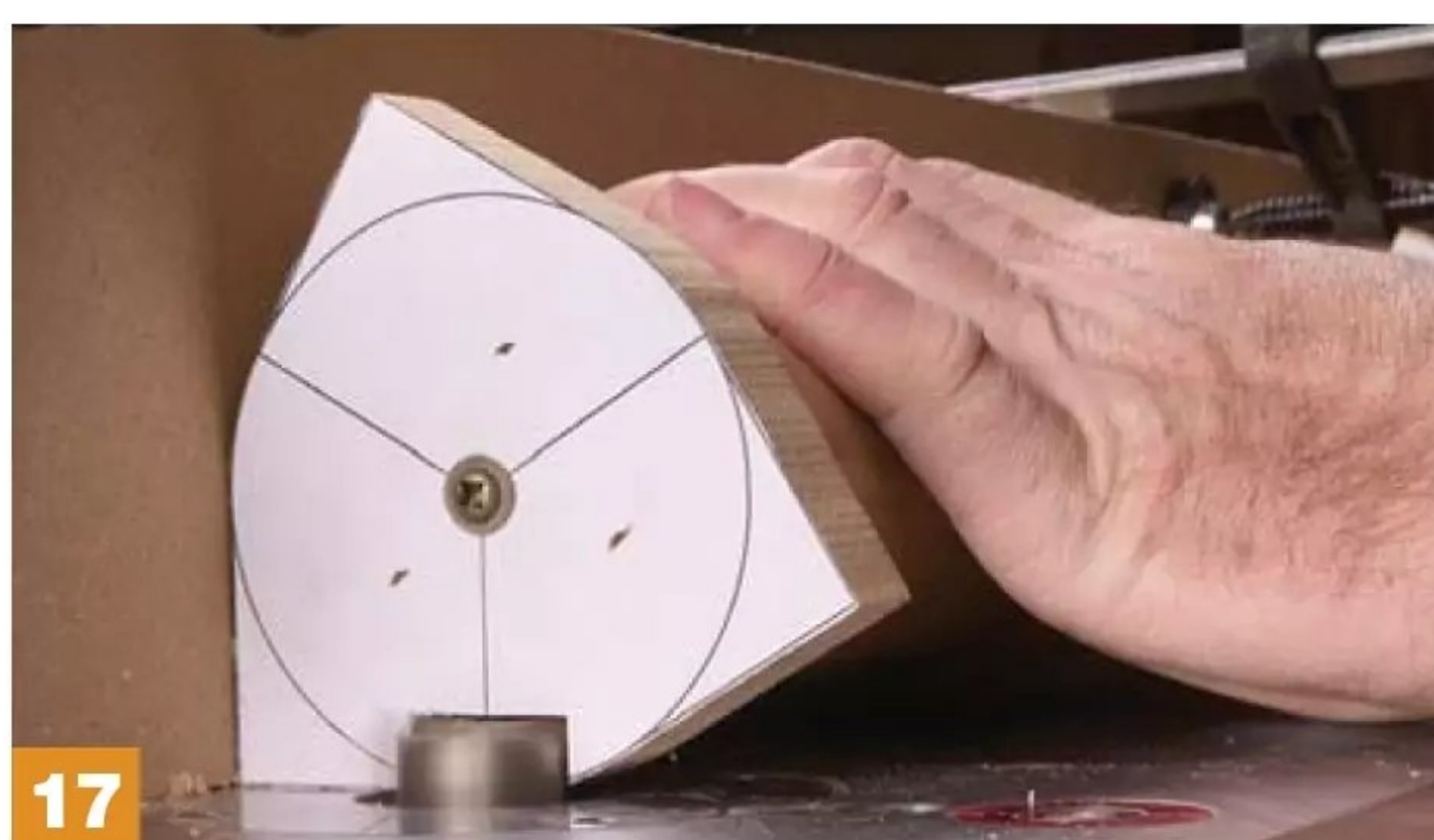
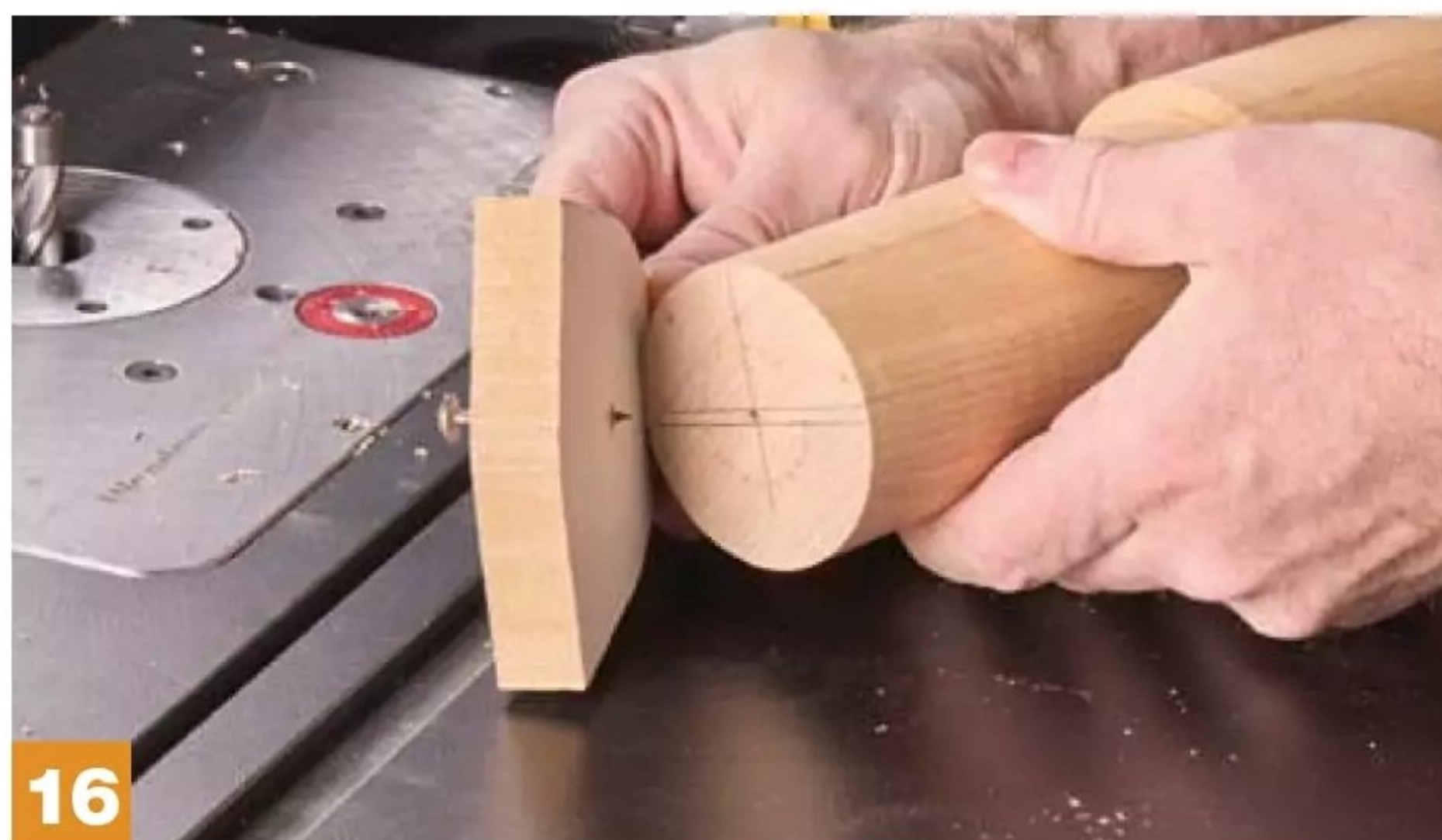
10-11 Sand and finish the leg while it's on the lathe. Check out the finishing schedule at the end of this article for my formula.

12 Start to break down stock for the legs. Here, I used a hunk of curly ash from which the entire table came.



13 Rough cut the legs at the bandsaw. The key here is to stay as close to the line as possible and not leave a bunch of waste.

14-15 Stick the template onto the legs and trim away the waste. Pay attention to the grain direction to avoid blowout.



that confidence some day. Until then, the method I use is shown above. Using a pair of guide blocks screwed to the center point of the pedestal allows you to clock the pedestal in 120° increments. The dovetail is routed in three steps. The first is done with a wide rabbet bit to create a flat face for the leg to mate against (photos 17- 18). Then, without moving the fence, I use a straight bit to remove most of the waste from the dovetail slot. Then, swapping out the bit for a dovetail bit, I cut the rest of

the slot. You can see the waste grooves and the start of the dovetail slot in photo 19.

Cutting the matching dovetail on the legs is fairly straightforward. Leave the dovetail bit in the router table, and lower it to match the depth of the slot. Make a few test cuts on a piece of scrap the same thickness as your leg. You can make the dovetail wider or narrower by adjusting the fence. Pay attention to the depth of the dovetail as well, and adjust the bit height as necessary for a good, snug fit.

16 The dovetail slots are cut using support blocks on each end of the pedestal.

17-18 Start by routing a flat in each of the three locations. Size the flat to match the leg stock.

19 After routing a groove to remove the waste, rout the dovetail.

20 The legs are routed using the same dovetail bit, buried in an auxiliary fence. Check the fit until it slips in with firm pressure.



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25 Drive the sliding dovetail into the pedestal with glue. The pedestal bottom should be a little long, and hang past the bottom of the legs.

26 A spindle sander is a good way to flush the bottom of the pedestal with the bottom of the legs.

21 Roundover all of the edges of the legs.

22 Remove the top section of the dovetail on the leg.

23 A spokeshave helps blend curve of the leg to the pedestal.

24 Slot the tenon with a backsaw.

Final Fitting

Once the dovetails fit in the pedestal, there are still a few details to take care of. First, the legs get a slight roundover. Zip around both edges of the legs, being careful to avoid going across the top edge. Now, the top edge of the dovetail needs to be knocked off. This will allow the leg to seat fully into the pedestal. Test the fit in and make sure the legs seat fully. Once they do, trace the curve of the pedestal onto the top of the leg. You'll use a spokeshave to blend the roundover into the larger diameter shape of the pedestal. You can see this in photo 23. The tenon on the top of the leg will get glued into the brace in a bit. But first, a kerf needs cut in



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27 Glue up the top.

28-29 The brace is beveled and the ends slightly rounded.

30 Clean up the bevels with a hand plane. Extra points for a fancy plane.

31 Next, chamfer the edges of the brace.

32 Glue the brace in place and drive a wedge to lock it home.

the tenon for a wedge. You could do this at the band saw, or with a hand saw (photo 24).

After sanding the legs, they can be glued in place. Apply glue to the dovetail, and drive the legs home. Once the glue is dry, you can sand the bottom of the pedestal flush with the legs. I use a spindle sander for this, but an orbital sander would work as well, just a bit slower.

Now, let's switch into top mode. The top needs to be 18"- diameter. I glued mine together from several boards, using the slip-match method. This gives a clean, uniform appearance, even though it is glued together. While the top was drying, I switched over to the brace. This brace is drilled with a center hole to match the tenon. The ends are slightly rounded (to match the shape of the top). They also have a long bevel on the ends. These details cause the brace to blend into the table and pretty much disappear.

Both the bevel and the rounded ends are cut at the band saw. I free-hand cut the bevels, simply striking

a line and cutting close. Likewise, I rounded over the ends in a similar fashion. At the bench, I used a plane to smooth out the bevel and the rounded ends. The long edges of the brace get a heavy chamfer with a router. Once the brace is sanded and a finish is applied, it can be attached to the pedestal. Glue the outside of the tenon, and then glue a wedge in place. Smack the wedge firmly with a hammer until it bottoms out. The remaining tenon and wedge can be trimmed flush with a pull saw.

Finish the Top

With the glue on the top panel dried, you can cut it to shape. Cutting the circular top can be done in a few ways. If you must, a jigsaw will suffice. You'll need to clean up the edges with rasps and sandpaper, more than likely. The next best option is a band saw. If you have a circle cutting jig, this is easy. If you free-hand it, there will still be a bit of clean-up to do. I feel as though the best method to cut clean circles is with a router trammel, as you see in photo 34. I



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33-34 A scrap block taped onto the top is a pivot point for the router trammel. Rout the top out in a few passes.

35-36 The edge gets rounded over in two passes. You're going for a near bull-nose profile.

37-38 The brace is installed cross-grain, so make sure to wallow out the outer holes so that the top has room to move.



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use a scrap block as a pivot point (inset photo 33) taped to the center of my panel. The trammel is located in the drilled hole in the scrap block and swings the router around the central point. Using a spiral upcut bit and making multiple passes, you're left with a circle that is super clean and only requires a light hand sanding to clean it up. The best part of all is that using a scrap block means you don't need to drill into your blank unnecessarily.

The top gets the same round-over treatment that the legs got earlier. The goal here is to create a round-over that is almost a

bull-nose. Take time to dial in the height of the bit to leave a flat for the bearing to ride on as possible. Make a pass around one edge first (photo 35), and once that's done, flip the top over and do the other side (photo 36).

As long as you don't have a center pivot hole drilled in your blank, take a look at the top and decide which grain pattern looks the best, and make that the top of the table. Position the pedestal and brace centered on the bottom of the top. Make sure the brace is going across the grain — this will help keep the top flat. Yes, you'll need to worry about expansion

and contraction, so when you drill pilot holes for screws, simply rock the drill back and forth to elongate the holes on the far ends of the brace. This adds some expansion room. (To be fair, because my top is fairly quarter-sawn, it won't expand and contract a ton.) Before attaching the top, I mark the mating ends (simply because the holes are free-hand drilled, and only fit one direction). The top can be sanded and finished. My finishing schedule can be seen on the next page. Attach the top with a few screws and flip the table over to see how it looks.

PW – Logan Wittmer

Finishing Schedule



Finishing figured wood is an intimidating thing. You have a special material and you want to apply a finish that is going to enhance the figure that's already there. Here is my oil-based approach to most curly woods.

My first step is to get a good surface for my finish to soak into. I start (usually) with a rough sanding block. 120-grit or so. Sand the entire surface, and wipe away the dust. What you'll find is that the dust settles in any small areas of tearout. If you have some of those spots, I tackle them with a card scraper or a freshly sharpened plane. Then, it's onto sanding. With this finish (penetrating oil), I sand up through 320-grit.

This finish is a two-step finish. The first step is to apply a penetrating oil that soaks deep into the fibers and highlights the figure. I use *Glancy's No. 1* oil for this. This is flooded on and allowed to absorb before wiping the surface dry. After 24 hours, I come back with a white *Scotch-Brite* and lightly buff the surface. This cuts back any *Glancy's* on the top, and opens it up for the next layer, which is Danish Oil. A final coat of paste wax adds extra protection for the day-to-day wear.

PW – Logan Wittmer

A-B Prep the surface. Despite what many hand plane snobs will say, there's no shame in sanding. Tackle any tearout with a sharp card scraper, then sand through the grits.

C A penetrating oil soaks down deep into the figured surface.

D-E Cut back the penetrating oil with a fine scouring pad. Then, apply a top coat. I keep Danish oil in a glass jar, ready to use. Sorry, it's not actually raspberry preserves.



This dust collection cart houses a vacuum and cyclonic dust separator for an efficient, clean workstation.

By Collin Knoff

PROJECT #2509

Skill Level:

Beginner

Time: 2 Days

Cost: \$180

Dust Collection Workstation

PHOTOS BY LOGAN WITTMER

Every inch of space in a shop is precious. That is why I'm not a big fan of unitasker tools and equipment. When it came time to design a dust collection cart for my shop vacuum and Dust Deputy, I faced a dilemma: Do I try to minimize the overall footprint, or get maximum functionality out of the cart itself? Most of the designs I found online were smaller, but didn't include any useful space on top for storage or working. At the same time, they were too tall to fit under a standard workbench or shop table, which meant they would always be taking up precious floor space.

After weighing the pros and cons, I decided that turning the cart into a full-on sanding station would be the best option for my needs. I would optimize every inch possible for storage while still allowing for a highly portable workstation. The work height of the table is higher than usual, but it's perfect for sanding flat pieces or small projects (assuming you're a 95th percentile male). With my design direction chosen, it was time to start building.

Solid Foundation

As usual, you'll start by cutting everything to size first. I prefer a track saw for this type of work. Not having to wrestle sheet goods on the table saw saves your back and gives you more accurate cuts anyway.

I wanted my vacuum and Dust Deputy to nest in the cart. This would help hold them in place as I moved things around. By laminating two sheets of plywood, I could simultaneously strengthen the base and provide that functionality with a few circular cutouts. Off note—you'll want to lay out your specific dust vac with your dust bucket to figure out the location of the cuts. If you have an especially large vacuum, you'll want to do this early on and adjust



1 A track saw and a sheet of foam are all it takes to give you easy, accurate sheet good cuts.

2 I used the *Woodpeckers Multi-Function Router Base* to cut the circles in the base.

3 The base is laminated for extra strength.

4-5 I used a pin nailer to help keep the base from shifting, and to hold the middle tight. Then I clamped around the edges.



6 A flush trim bit was used to clean up all around the base.

7 With your base all figured out, you can determine the dimensions for the rest of the cart.

8 I used finish washers for a cleaner look.

the overall size of the cart before even breaking down the plywood.

Once I knew where my cutouts needed to be, I used a router circle-cutting jig to make the actual cuts. A large piece of foam elevated the plywood above the workbench and provided support during the cutting process. After the holes were cut, I laminated the two sheets of plywood for the base. A handful of pin nails helped hold things down in the center, then I used clamps around the outside edges. Once the glue had dried, I returned with a flush-cut bit to clean up the outside edges of the base.

Pay Attention to Details

I want to defend plywood projects. Plywood has numerous benefits, as it's inherently stable, generally affordable, and easy to work with. Plywood is an ideal choice for shop projects like this. Don't let a stigma about a material make you take less care in your work.

Likewise, the casework for the



cart is as unpretentious as it gets; screws and pocket holes are all it takes. And again, even with simple forms of joinery, it doesn't mean you should make a halfhearted effort. I marked out the locations of each hole before I started drilling. Even if it's never seen, I wanted the screws to be equidistant from the top and bottom, as well as side-to-side. I also used finish washers throughout the project for any visible screws. As the name implies, they do double duty,

acting as a washer and providing a cleaner final look.

Speaking of things looking clean, I did use pocket hole plugs in some of the more obvious locations. You can purchase these or make them yourself with dowels, which is nice when using less common woods. The plugs are glued and clamped into place, then cut flush with a chisel before being sanded.

Strictly speaking, glue isn't 100% necessary for most of these joints if you're using enough

9 Pocket holes are easy to do, and are plenty strong.

10 I clamped the panel into place so it wouldn't shift when driving screws.

11 The rear cubby was exactly sized for my dust vacuum.

12 I used some right-angle clamps to keep everything square.

13 Pre-assembling the cubby made install easy.



fasteners. The amount of force that would be required to snap the screws is pretty high. What it does do, though, is hold everything nice and firm. A case assembled with screws only will start to squeak and shift eventually. The glue will keep it rock solid.

Make Space

From the get-go, I wanted to utilize every inch of space in the cabinet. That meant adding a few extra inches on both ends to make room for shelves instead of a flat surface that didn't serve any function. These were the first parts of the case built.

Sticking with my mantra of paying attention to detail, I chamfered the edges of the shelf uprights after cutting them to size. This is, of course, entirely optional. The added benefit of the laminated base becomes immediately noticeable during assembly; I was able to utilize it as a structural element I could drive screws into. I drilled the bottommost screw in first. Then used a square to ensure the upright was perfectly perpendicular before driving in the remaining screws.

The shelf backs came next. There is no reason I couldn't have just screwed it into place from the outside as well, but I thought that the pocket holes would provide a cleaner look. Pocket holes





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14-16 Plugging the pocket holes is easy to do, and leaves a much nicer finished look.

17-18 After I drilled the screw from the underside, I went ahead and installed the casters.

19 The same process is used for the lower part of the cart top.

20-22 To laminate the two sheets of plywood, I spread glue all around before nailing and clamping again.

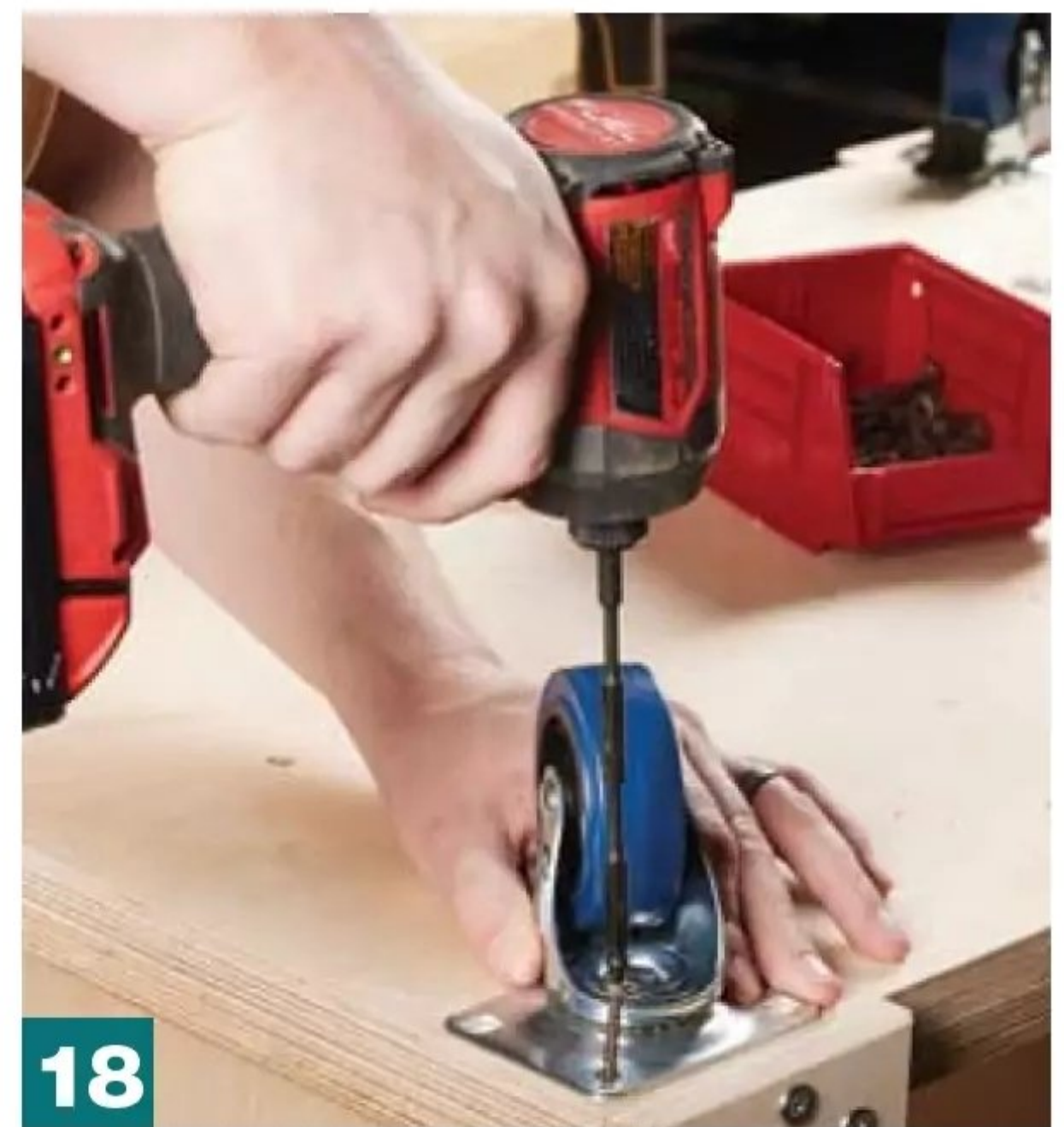
can have a tendency to shift a bit when installing the screws, which I did not want. I made sure to clamp everything firmly in place to prevent that from happening, as well as to make sure everything was completely square.

With the ends taken care of, I had to decide what to do with the front and back. I decided that one more tall recess would give me space to store the vacuum extensions. With the vacuum in place, I used a large framing square to determine exactly how big a cubby I could install.

With my dimensions figured out, I cut the plywood and pre-at-



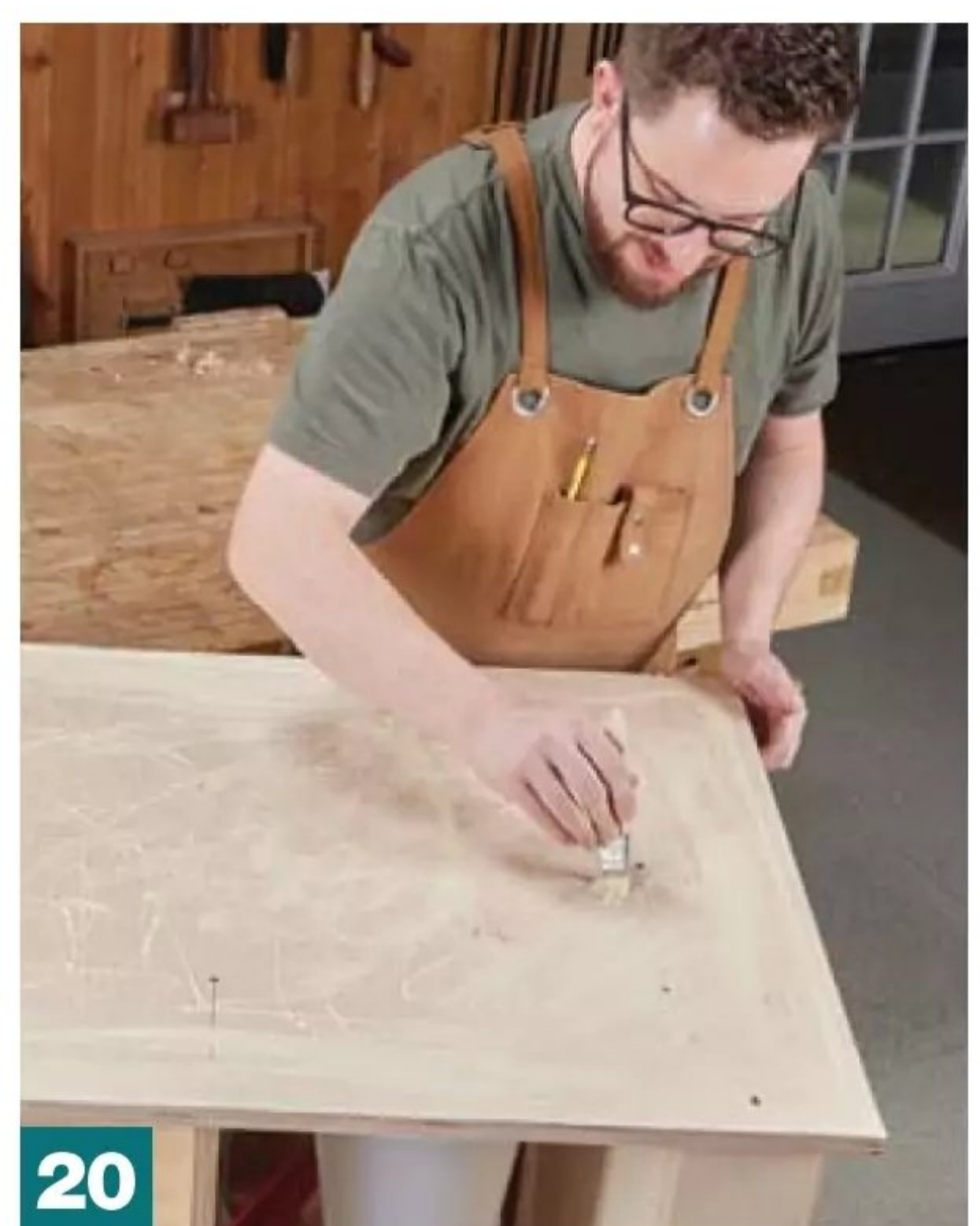
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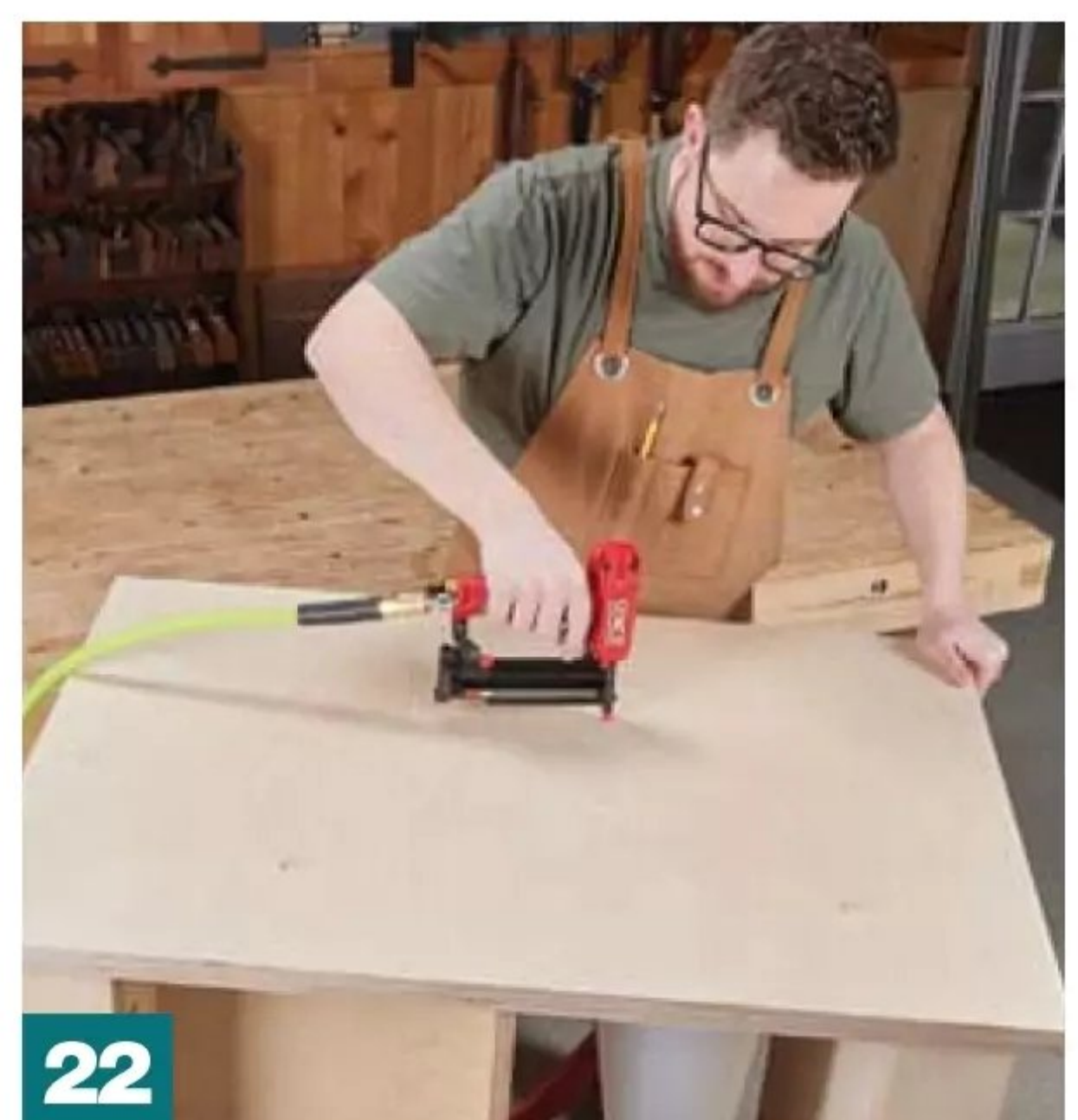
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tached the edge to the back. It can be tough to align things for assembly when you only have two hands. To solve this, I clamped the larger back piece in my face vise, then attached some right-angle clamps to support the other part. This saved me the trouble of

trying to balance anything. All I had to do was hold the side panel in place to drill the holes and drive the screws.

Doing Flips

With the case looking good up top, it was time to get to the bottom

23 I cut the shelves tightly enough that they friction fit, which made it easy to drill holes.

24 A single pocket hole in the middle prevents sagging.

25 The finish washers really make a difference.

26 The fronts were simply pinned into place.

27 The cubby was pre-built to make installation easier.



of things. Driving screws from underneath adds a lot of strength and helps prevent the structure from shearing when exposed to uneven forces.

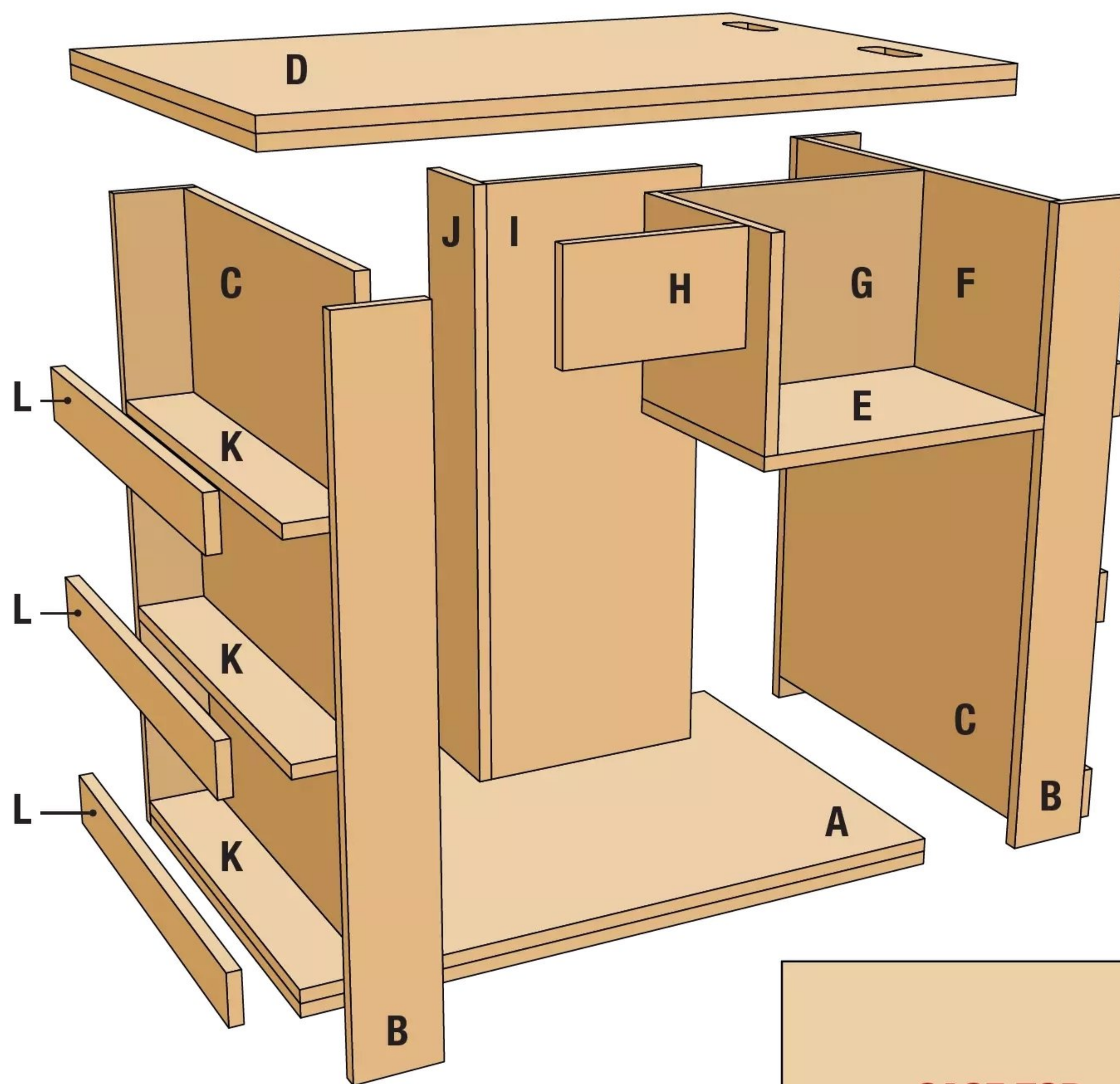
Getting the screws lined up correctly from the bottom just takes a bit of planning. I used a ruler with a depth gauge to set the distance for my screw holes from the sides and ends of the case. I used $\frac{3}{4}$ " plywood, so I eyeballed an extra $\frac{3}{8}$ " beyond the ruler to mark the hole. This worked perfectly each time but one, where I got a bit overconfident and tried to eyeball without the benefit of a ruler when adding one extra screw. Lesson learned. With everything laid out, I used a countersink bit to pre-drill all the holes, then drove all the screws firmly home with an impact drill. Since I already had the cart flipped over, I took advantage of my access to the underside of the case to add the rubber casters before returning it to an upright position.

Tip Top Shape

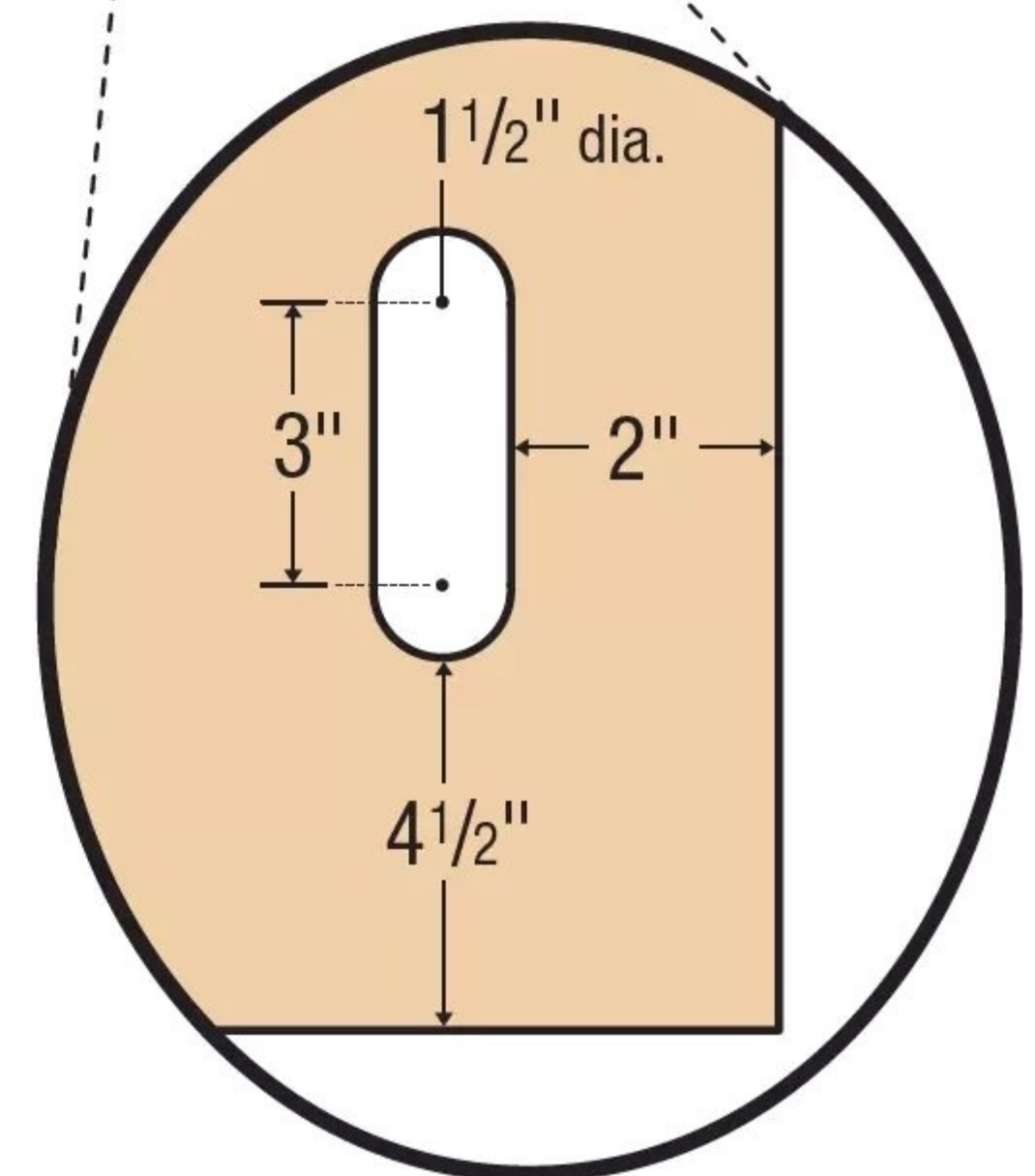
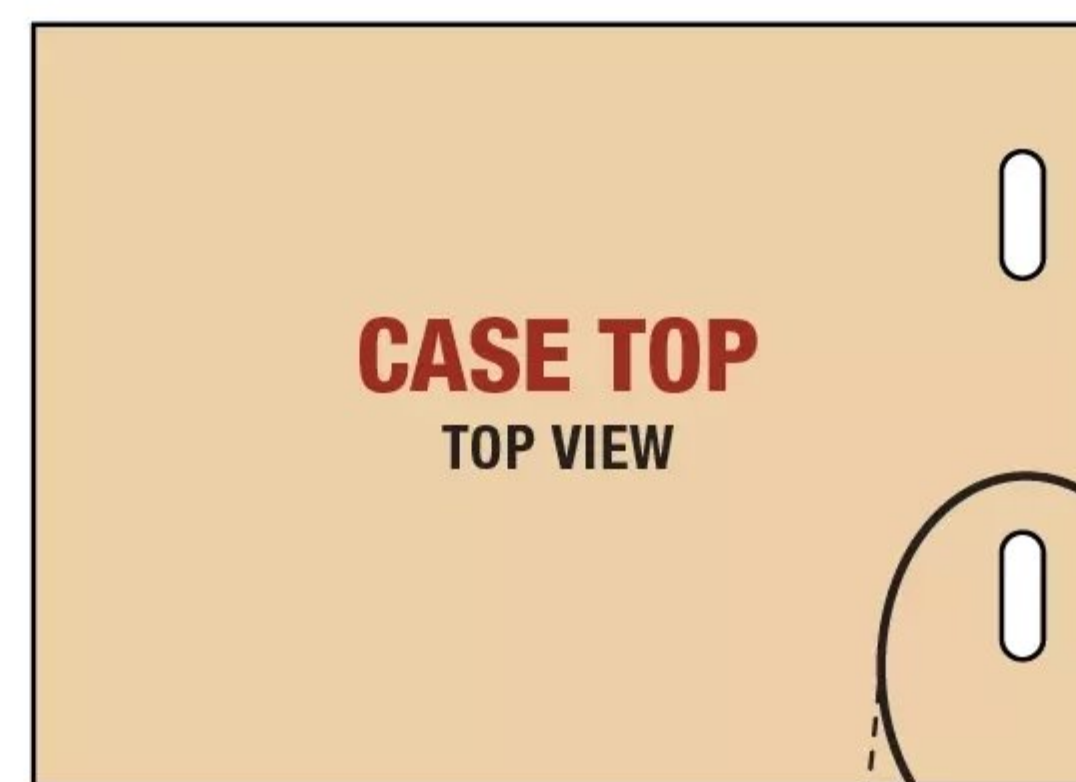
The main casework is almost finished, with just the top remaining. I made mine slightly oversized, as I think it just looks better. I aimed for a 1" overhang on all sides, so I cut my top pieces 2" oversized. I centered the lower layer of the top on the case with a bit of help from the depth gauge again, getting it just right. This



Dust Collection Workstation

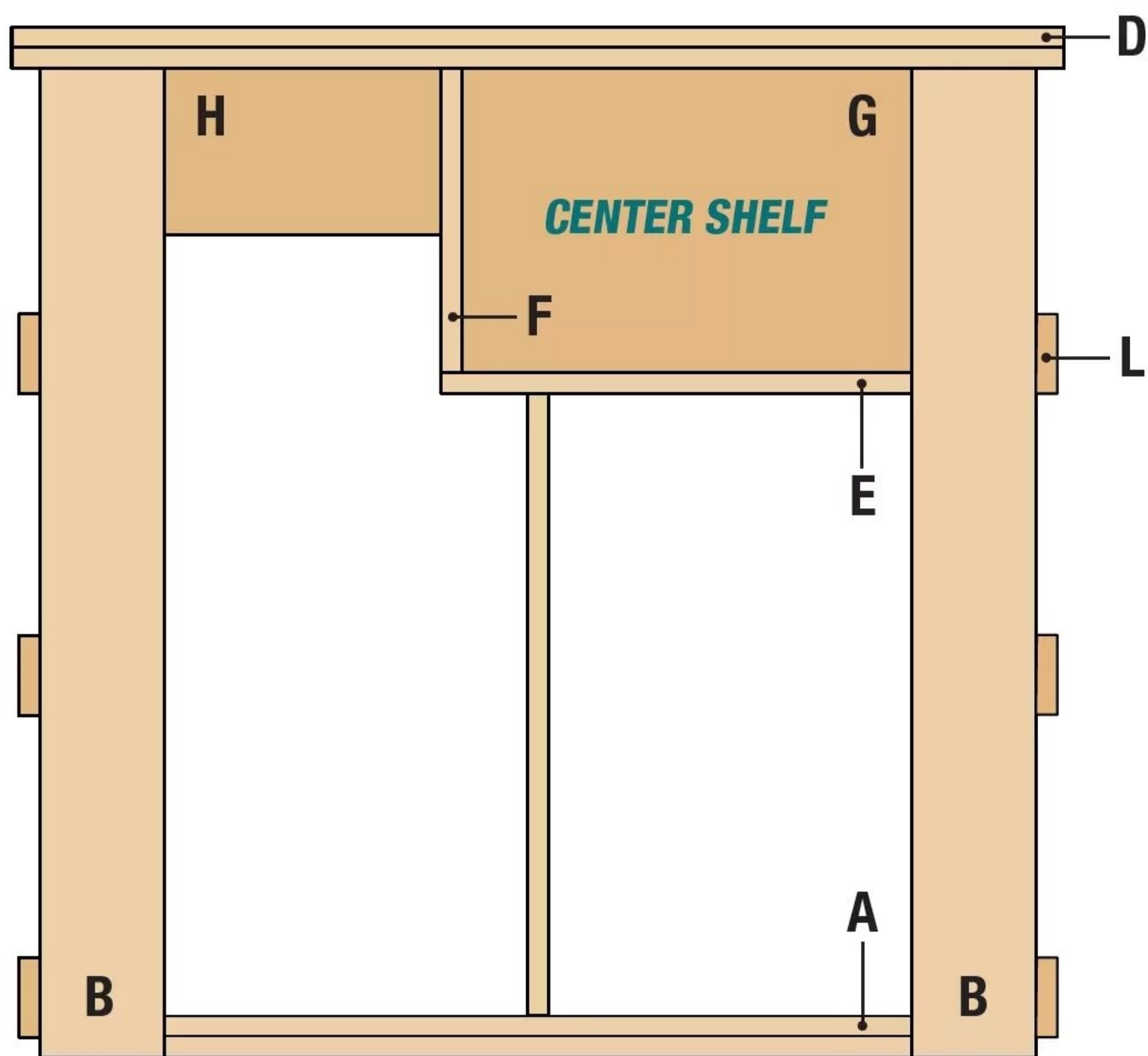


NOTE: A full Sketchup model is available at PopularWoodworking.com/onlineextras

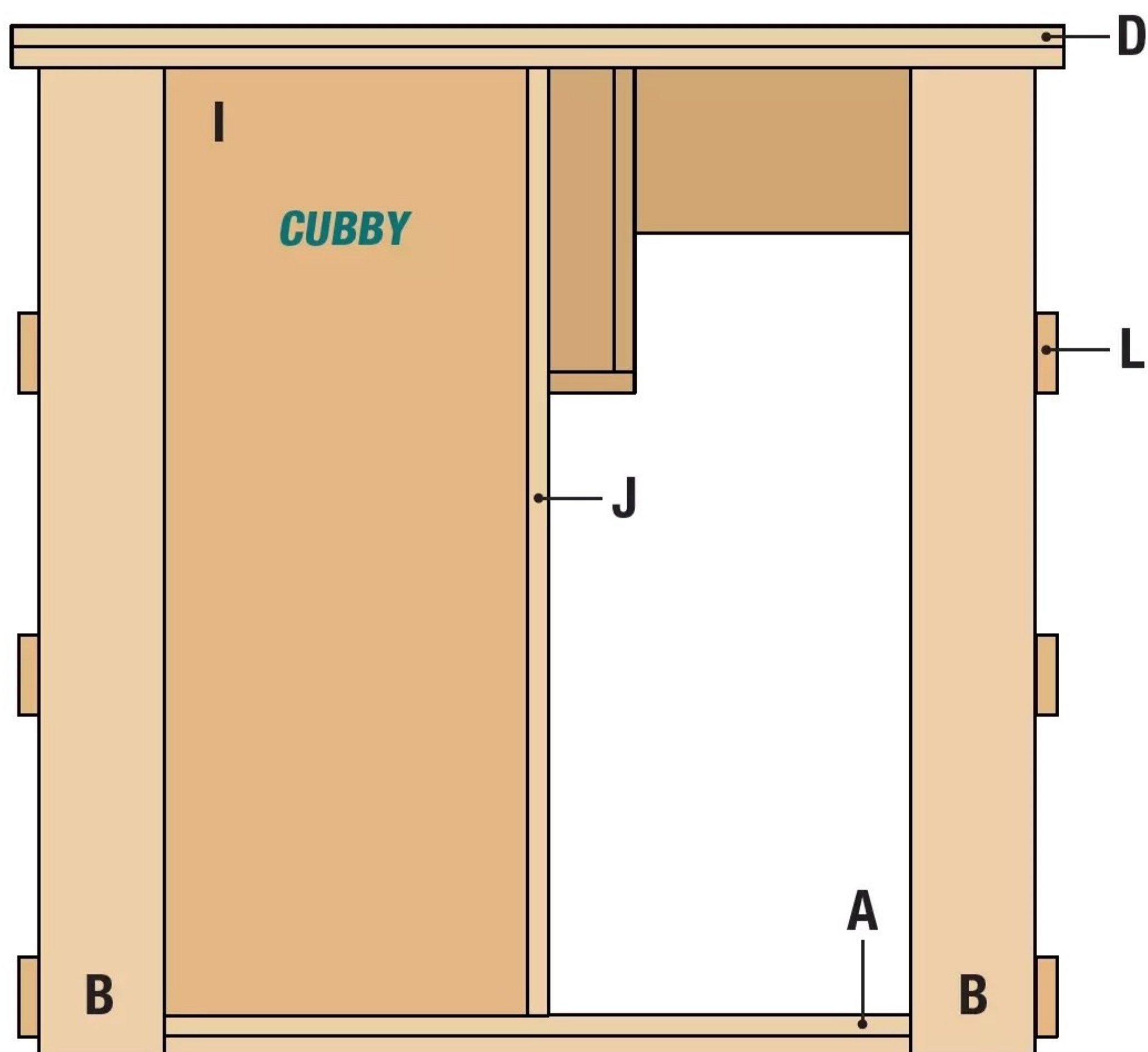


Cutlist

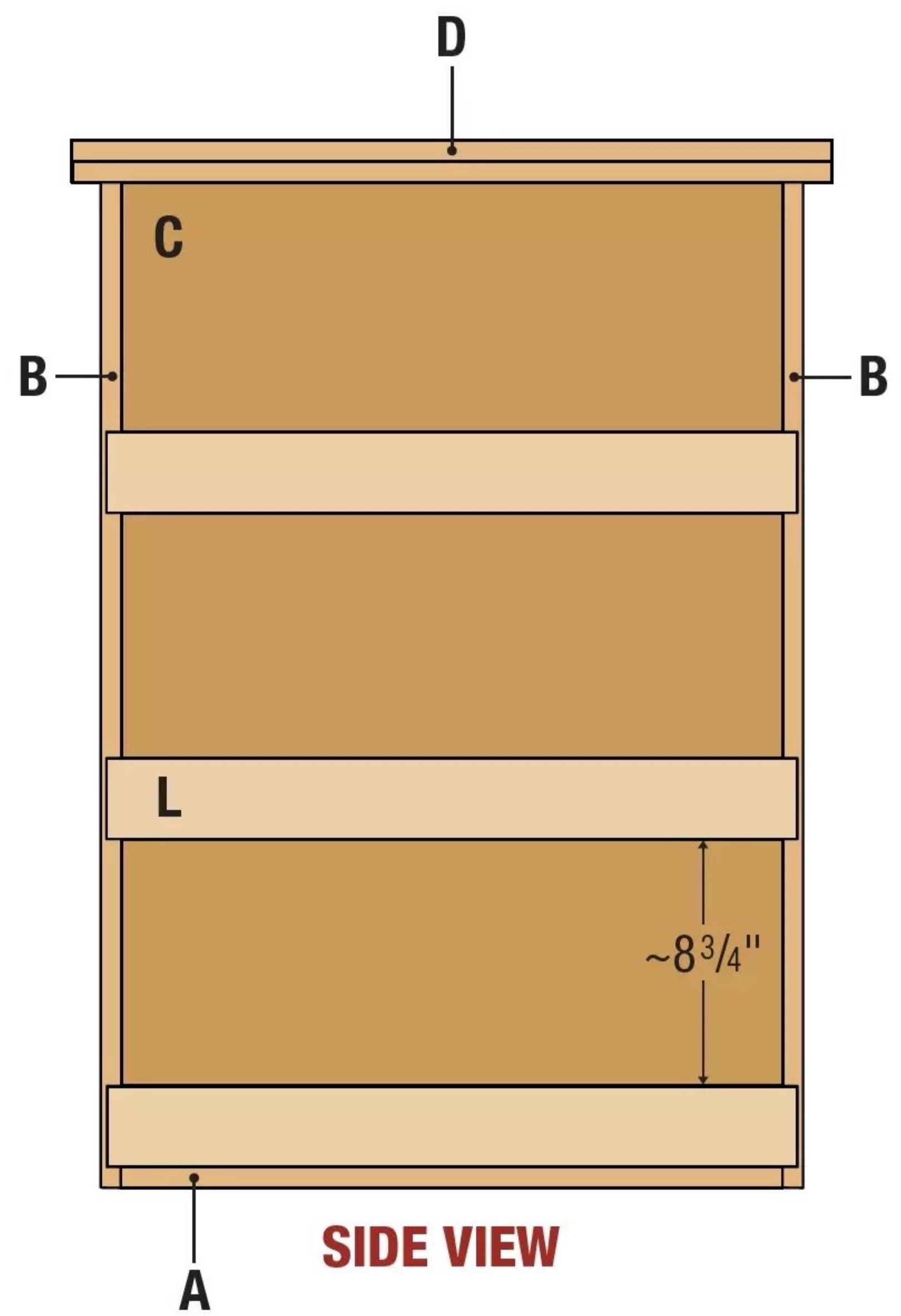
No.	Items	Dimensions (inches)		
		T	W	L
2	A Base	3/4	36	23 3/4
4	B Uprights	3/4	4 1/2	35 3/4
2	C Sides	3/4	23 1/2	34 1/4
2	D Top	3/4	38	27
1	E Center shelf bottom	3/4	17	12 1/4
1	F Center shelf side	3/4	12 1/4	11
1	G Center shelf back	3/4	16 1/4	11
1	H Center shelf support	3/4	10	6
1	I Cubby back	3/4	13 1/8	34 1/4
1	J Cubby side	3/4	6	34 1/4
4	K Side shelves	3/4	23 1/2	3 3/4
6	L Side shelf faces	3/4	24 9/16	2 7/8



FRONT VIEW



BACK VIEW



SIDE VIEW



28



29



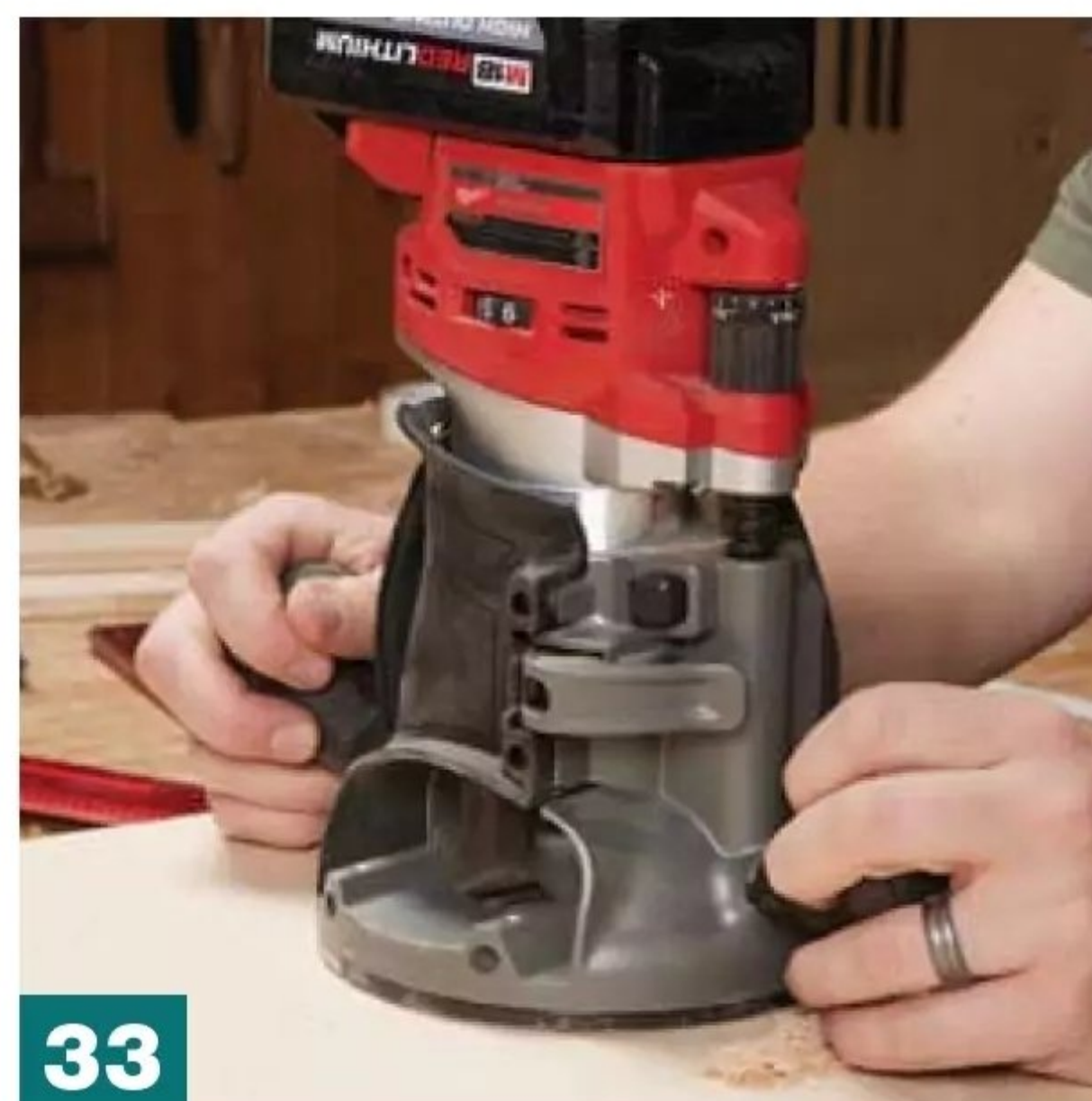
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28 A Forstner bit creates the two ends of the hand holds.

29 Use a making knife to define the rest of the opening.

30 A jigsaw makes quick work of the rough opening.

31 Make sure your double-sided tape is sticking well.

32 Carefully line up your straight edge to bridge the gap.

33 Cut your final opening with a flush trim bit.

part was intended to be structural, so I drove screws down into the case in the same fashion as I had with the bottom. I made sure to sink the screw in deep enough that they weren't protruding at all. Next, I installed the upper layer of the top. I spread glue on the entire surface, then tacked/clamped it. Make sure all your nails are fully seated. Otherwise,

you might chip out the laminate later. Once the glue was dry, I came in with the flush trim bit again to clean up the outside edges.

Shelves and More

At this point, it was time to start installing shelves and making some final decisions. After measuring some boxes of sandpaper and a bottle of glue for reference, I settled on three shelves about 11" apart. This is a great time to think of any specific needs you might have and make the height taller or shorter.

The shelves are affixed from the ends with screws, with a pocket hole in the middle to prevent sagging. I used a bit of 1/2" plywood scrap for the front of the shelves, pinned into place. Routing a chamfer on all four edges of these shelf fronts cleans up the look, and avoids any edges that can chip during the cart's life.

I went back and forth a bit on

what to do with the space above the shop vac, deciding between a drawer and a cubby. I decided to make it a cubby for now, and I could always come back later and add a drawer if I wanted one. I plumbed the Dust Deputy with the wet/dry vac to ensure I had space for the hoses without pinching anything. You can see in the final shots that it was the perfect size for my sander case, which was entirely intentional and not an accident. To make the cubby, I effectively built three sides of a box. Before I assembled my partial box, I drilled the pocket holes I would need for installation later.

The other thing I wanted to include in the front of the case was a power strip. Having it in an easily accessible place would be great if I needed to plug a sander or anything else in. For that I used an extra piece of scrap, strategically installed with some more pocket hole screws.

Get a Grip

The workstation top needed a bit more finessing to get it the way I wanted it. Since the cart was meant to be mobile, I decided some handholds would make it easier to push and pull. Instead of making a routing template, I tried a new method for cutting the grips. The first one turned out a little wonky, but I quickly got the hang of it.

You'll naturally start by marking the basic location of each handle. I went in with a Forstner bit and bored out the ends of the opening. I used a ruler and a marking knife to bridge the space between the holes where the hand would go. I then took a jigsaw and, making sure to stay inside the line, removed most of that waste in the middle. Next, I placed a dead-straight piece of scrap right on the line using some double-sided tape. This becomes the reference point for the bearing on the flush trim-bit. I made a single pass to give a definitive edge to that half of the grip, then moved the straight edge to the opposite side and repeated the process. This gives me a perfectly cut opening to work with going forward. Then I removed the straight edge altogether. I made the additional passes with the router to complete the process. Was this faster than creating a template? Possibly, though any advantage disappears if you have to make more than a handful of cutouts.

Lamination

With everything assembled and handholds cut, the top can be laminated. Using a paint roller, apply contact cement to both the laminate's underside and the cart's top. Allow to dry as per the instructions on the can, usually 15-20 minutes. It will still be tacky. You only get one good shot at installation, so a second set of hands is useful. You want to sort of "roll" the laminate into place instead of



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34 The contact cement must be spread across both surfaces and allowed to dry completely.

35 A j-roller helps press out any air bubbles.

36 The final step was chamfering all around the top for a professional look.

setting it down flat. This will help prevent air bubbles from being trapped underneath. Use a j-roller to push out bubbles and provide a nice, firm adhesion.

If you are alone, you can suspend the laminate above the plywood top with dowels, ensuring the two glued surfaces don't touch. Once the laminate is aligned to your liking, stick the center down, and work towards

the edge, remove the dowels one by one. Finally, make sure it's firmly attached with the roller.

The final step is usually trimming the edge with a laminate flush trim bit, but I decided to go a step further and chamfer the edge, too. It looks nicer and will wear better with time. Lastly, I finished the cart with a few coats of lacquer and added some 3D-printed accessory holders. **PW** – Collin Knoff

■ Charging Cabinet



PHOTOS BY WILLIE SANDRY

Build the perfect place to store and charge your growing collection of batteries and cordless tools.

By Willie Sandry

PROJECT #2510

Skill Level:
Intermediate
Time: 2 Days
Cost: \$200



Cabinet making is a great skill to have, and once you successfully tackle your first cabinet, you'll have confidence to make another. Plus, you can customize the size and features for your specific needs and make them strong enough to handle the rigors of shop life. With so many cordless tools available, it's nice to have a dedicated charging station for all those batteries. This is especially true if you own multiple brands and platforms of cordless tools. Throw in some yard tools and an eBike, and the batteries can overrun your shop, so let's get started on a handy cabinet built to house all those accessories.

One of the main challenges in cabinet building is breaking down full sheets of plywood. Make sure to have some featherboards and plenty of outfeed support to control the panels. Often, I'll break panels down with a track saw or cordless circular saw, before taking more manageable pieces to the table saw. Size the plywood panels according to the materials list, starting with the side panels and fixed shelves. Since we're basically building two 30" cabinets ganged together, you'll need 4 side panels. Normally wall cabinets have only 2 fixed shelves per unit, but due to the addition of the open charging cubbies, this wall unit uses 3 fixed shelves per unit, for a total of 6.

Basic Joinery

Most of the joinery is cut in the side panels, so that's a good place to start. Take a moment to set up a dado stack that exactly matches the thickness of your plywood. Aim for an easy friction fit that lets the parts come together without much struggle. Once test cuts confirm the right dado width, you'll want to cut three dados in each side panel. Two are located $1\frac{1}{8}$ " from the end of the panel, so it makes sense to mill those all at

the same time. Then reset your rip fence and cut the final dado for the middle-fixed shelf, which is located $9\frac{7}{8}$ " from the bottom of the side panel.

It may feel like you just started building the cabinet boxes, but you're also nearly done! That's the beauty of cabinet making—it proceeds much quicker than building hardwood furniture. With the

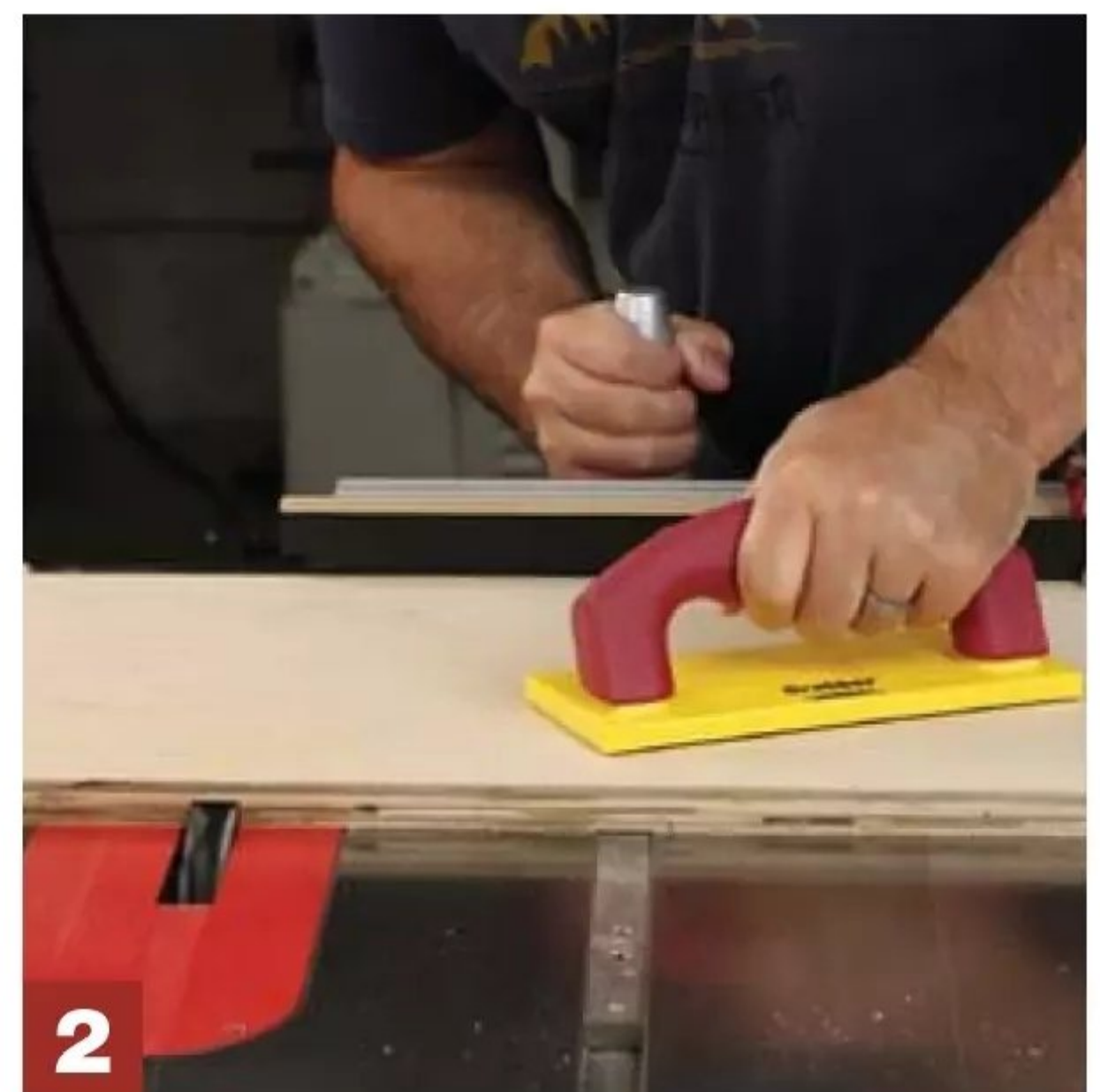
same dado blade still installed, add a sacrificial fence to your saw, and create a rabbet along the inside back edge of all four side panels. The rabbets are $\frac{3}{8}$ " wide, and just deep enough for your $\frac{1}{4}$ " plywood back panels. Now sand the parts you've made and assemble the two cabinet boxes. If a test fitting looks good, go ahead and glue each carcass together.

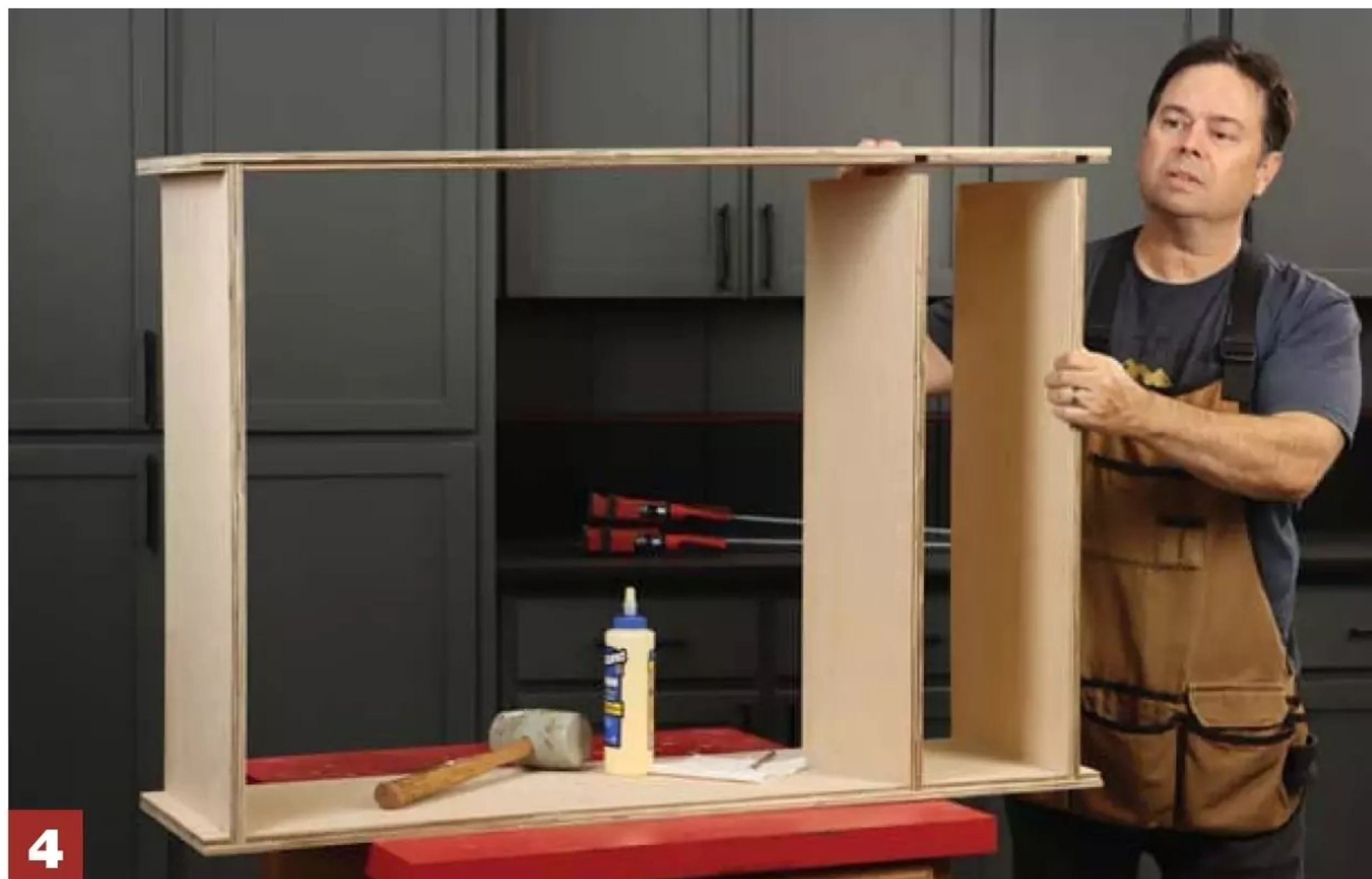


1 Rip parts to size at the table saw with safety gear. My favorite option is *Jessem's Clear Cut Stock Guides* which hold the workpiece down and against the fence simultaneously. They're great for ripping full sheets of plywood where a featherboard won't work.

2 Install a dado blade matching the thickness of your plywood and cut three dados in the side panels to receive the fixed shelves. With a sturdy miter gauge and a push paddle, you can handle these mid-sized panels at the table saw.

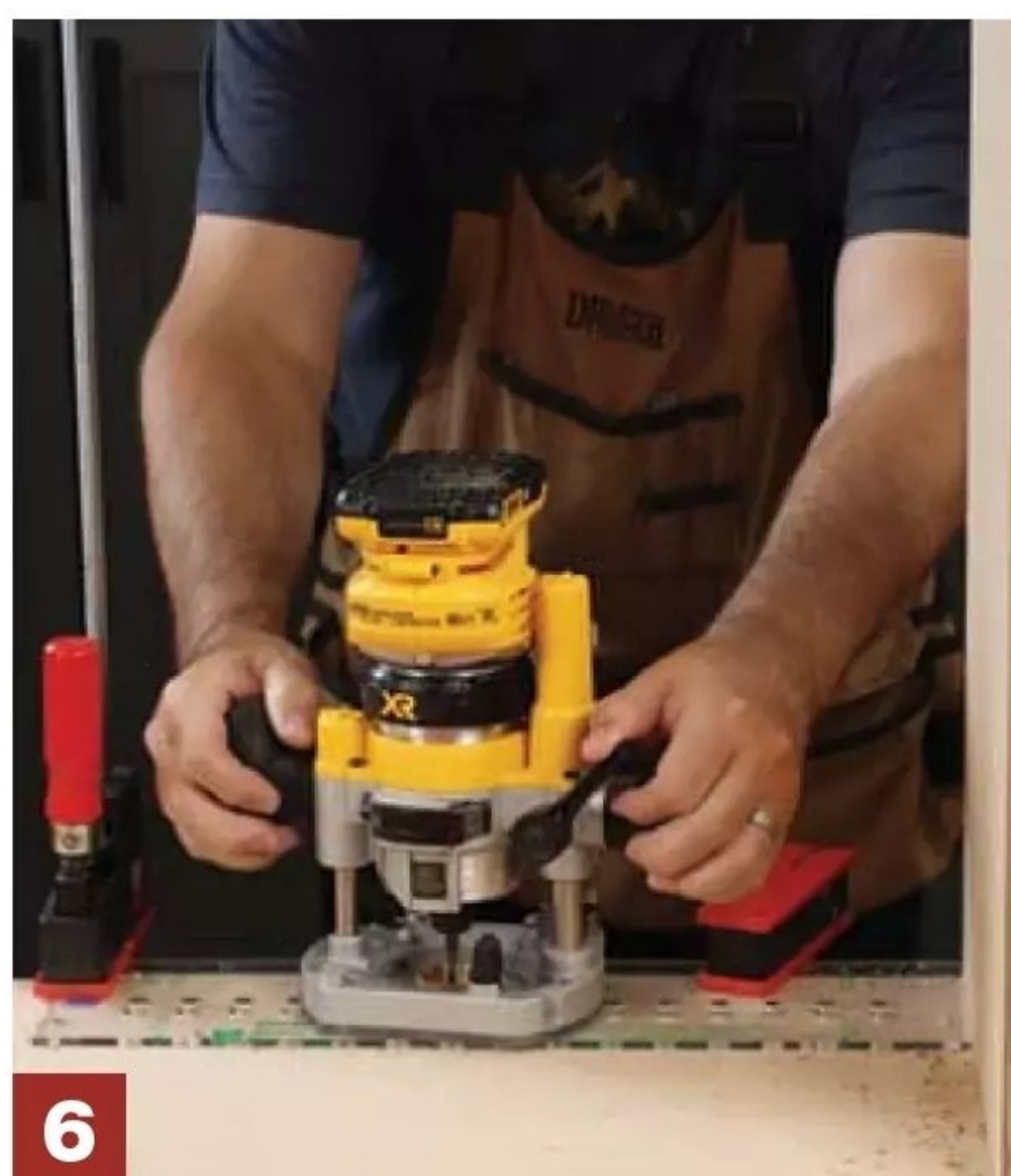
3 With a sacrificial fence setup, use the dado blade to make a rabbet along the back edge of each side panel. Set the rip fence to expose $\frac{1}{4}$ " of the blade, or the exact thickness of your $\frac{1}{4}$ " plywood. Blade height is $\frac{3}{8}$ " for this step.





4 Test fit the parts and glue the cabinets together. Be sure to check for square as you tighten the clamps.

5 Cauls are helpful to close the middle dado joint, where placing clamps would otherwise be very difficult.



6 Drill the shelf pin holes on the assembled cabinet with a compact plunge router and acrylic template. A 1/4" spiral upcut bit works best to prevent burning. Once you try this method, you'll never go back to a drill bit!

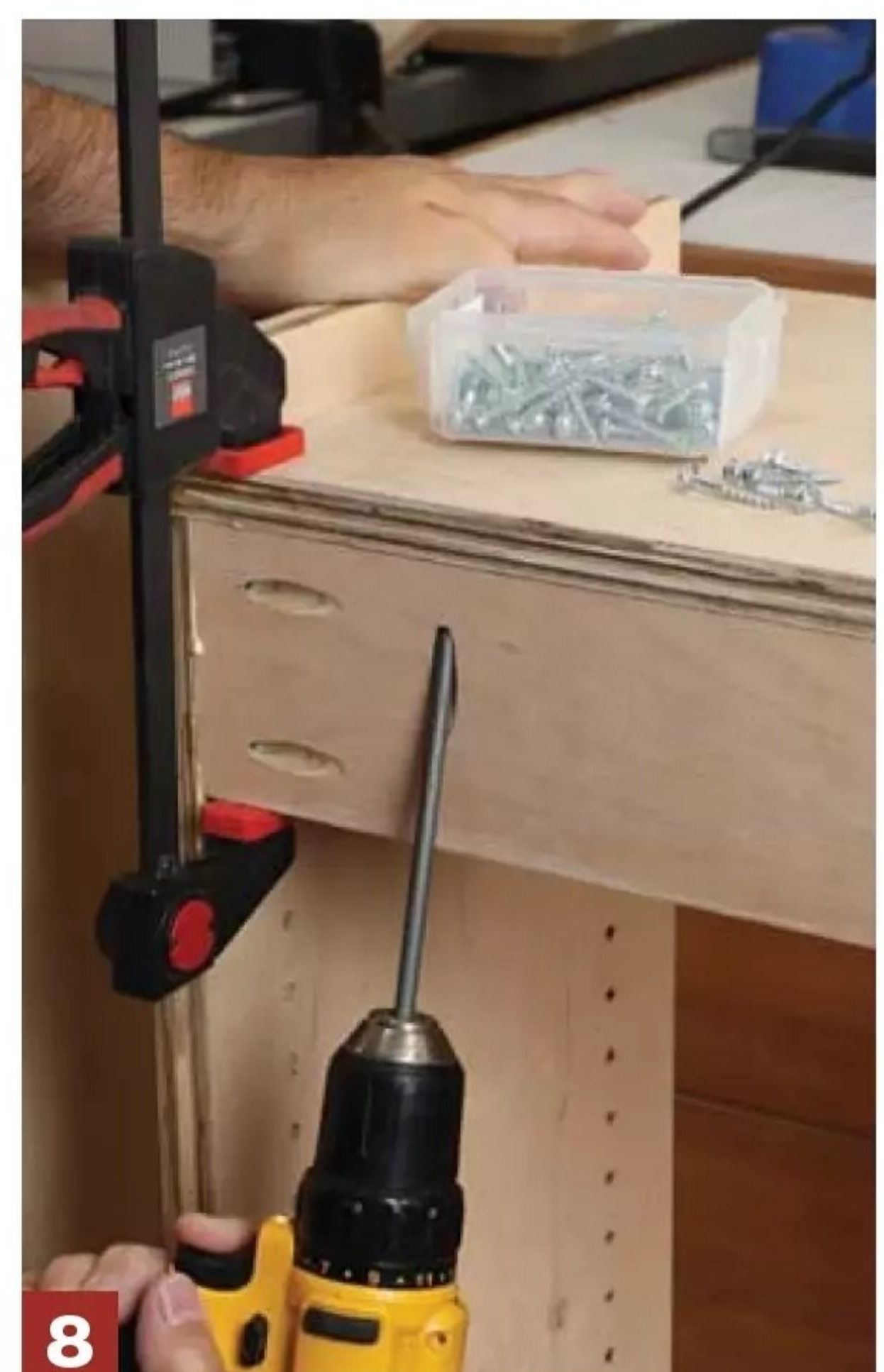
7 Cut 4 cleats to size and drill 7 pocket holes in each. That's two on each end and three down one long edge. The cleats are made from 3/4" plywood and have been edge-banded on the exposed edge (optional step).

8 Install the cleats at the top and bottom of the main cabinet opening with glue and screws. Align the cleats with the rabbeted ledge.

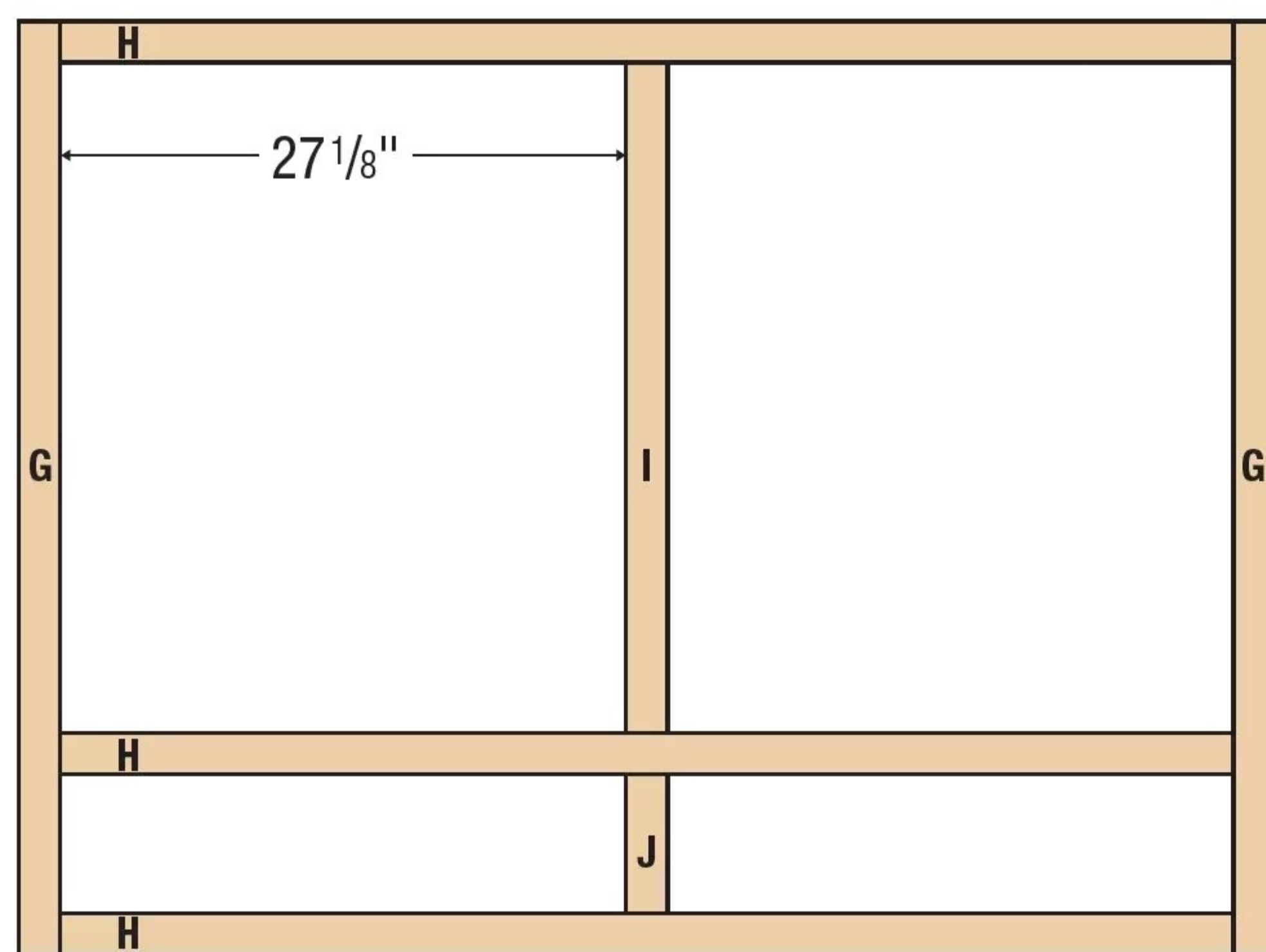
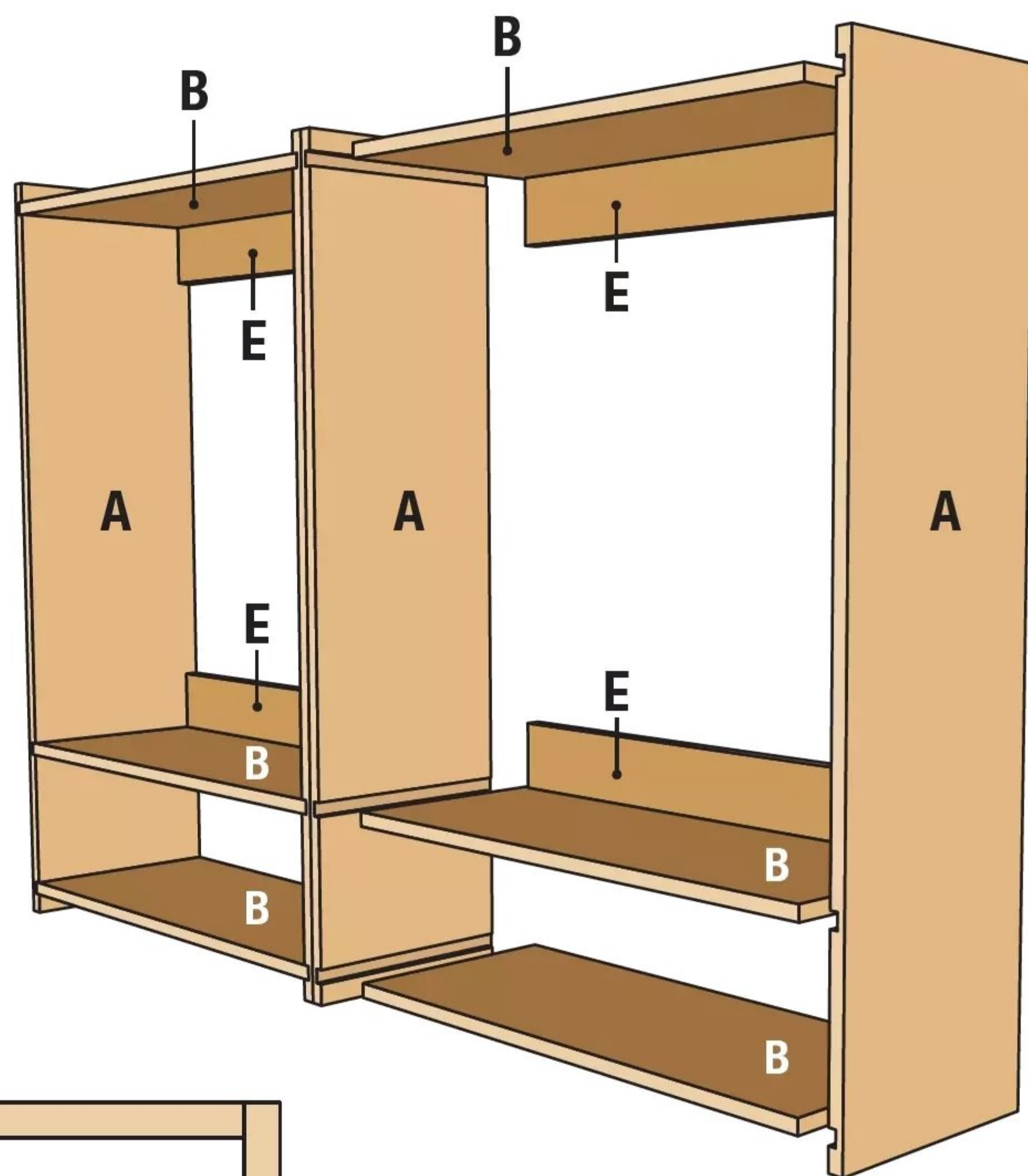
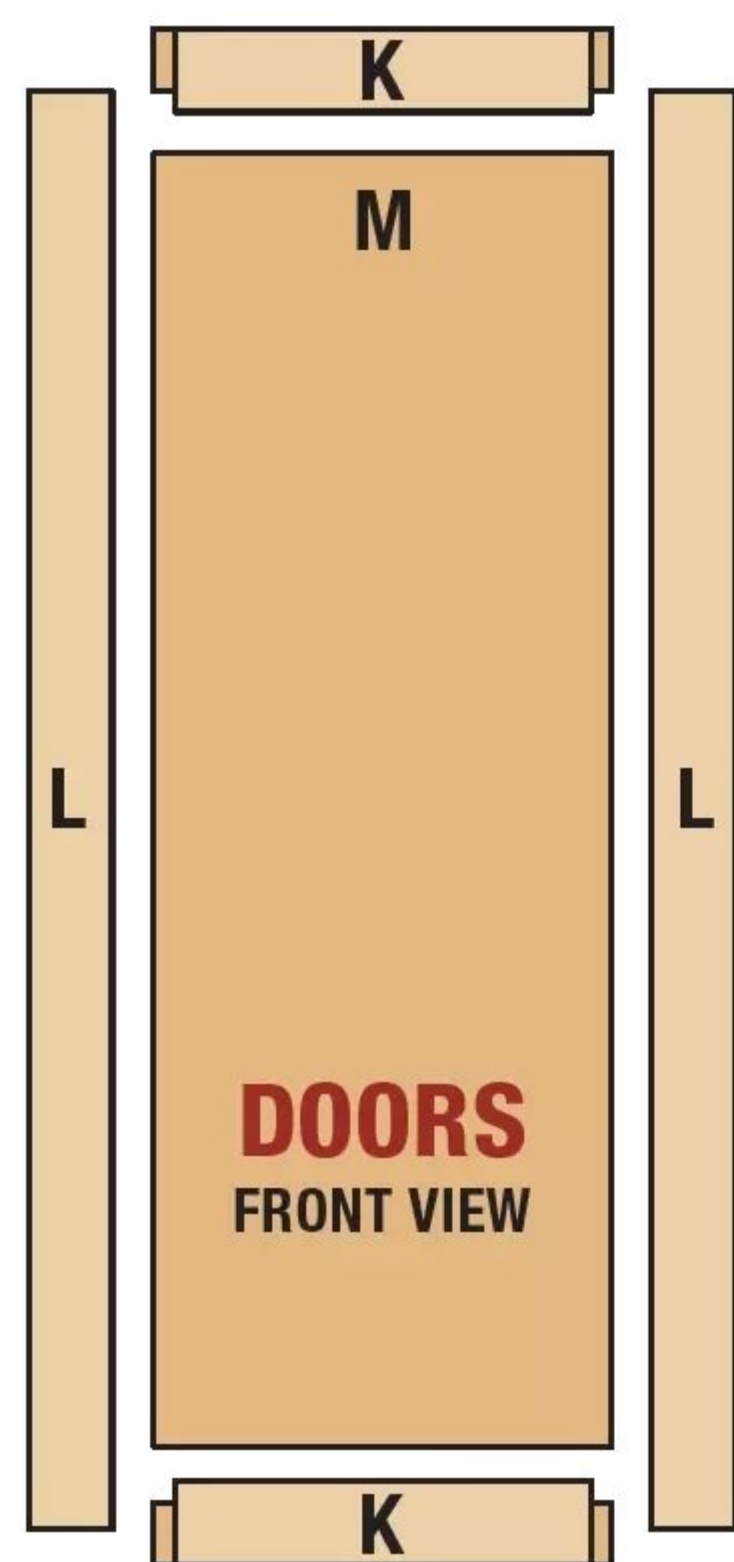


A Few Simple Details

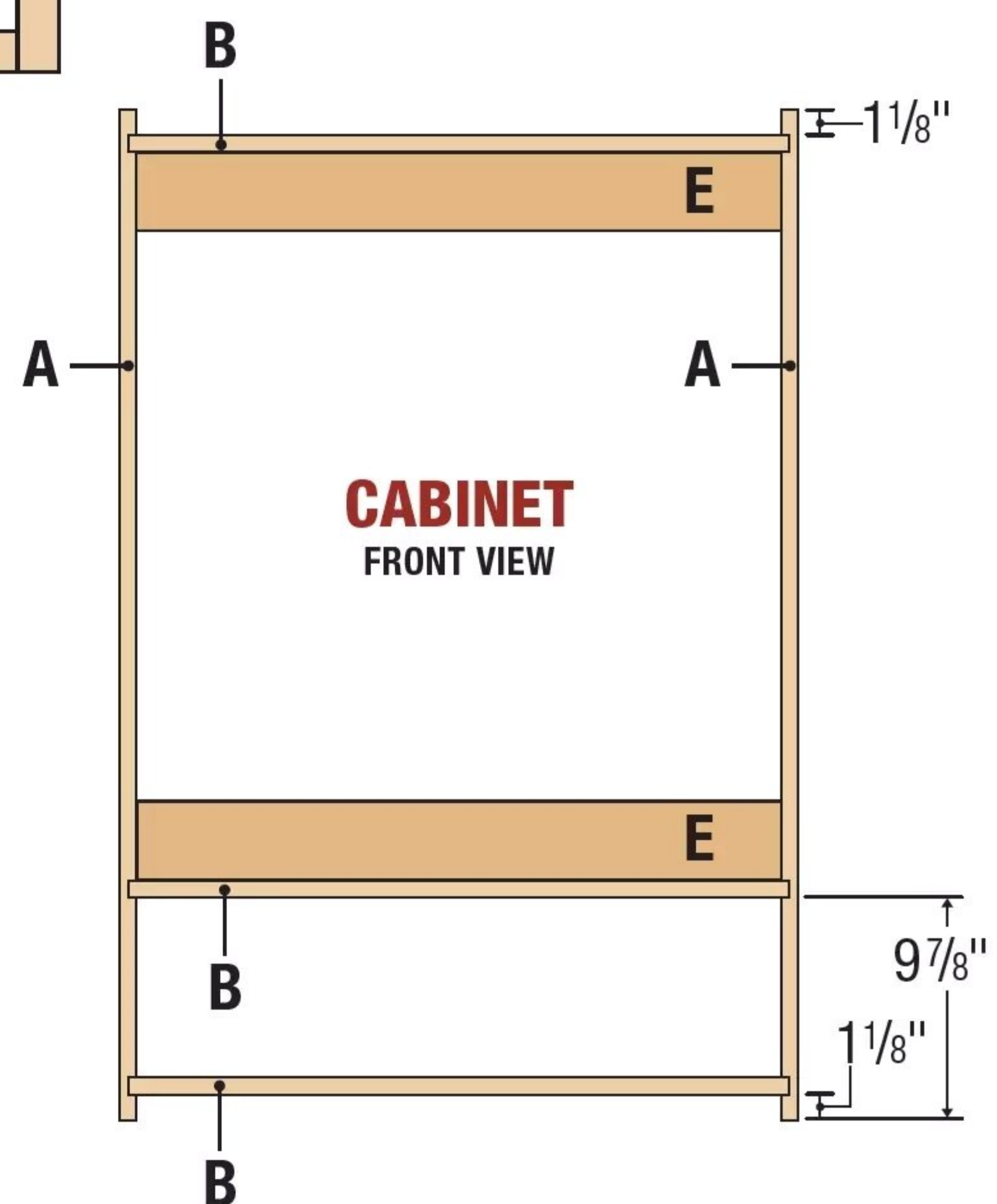
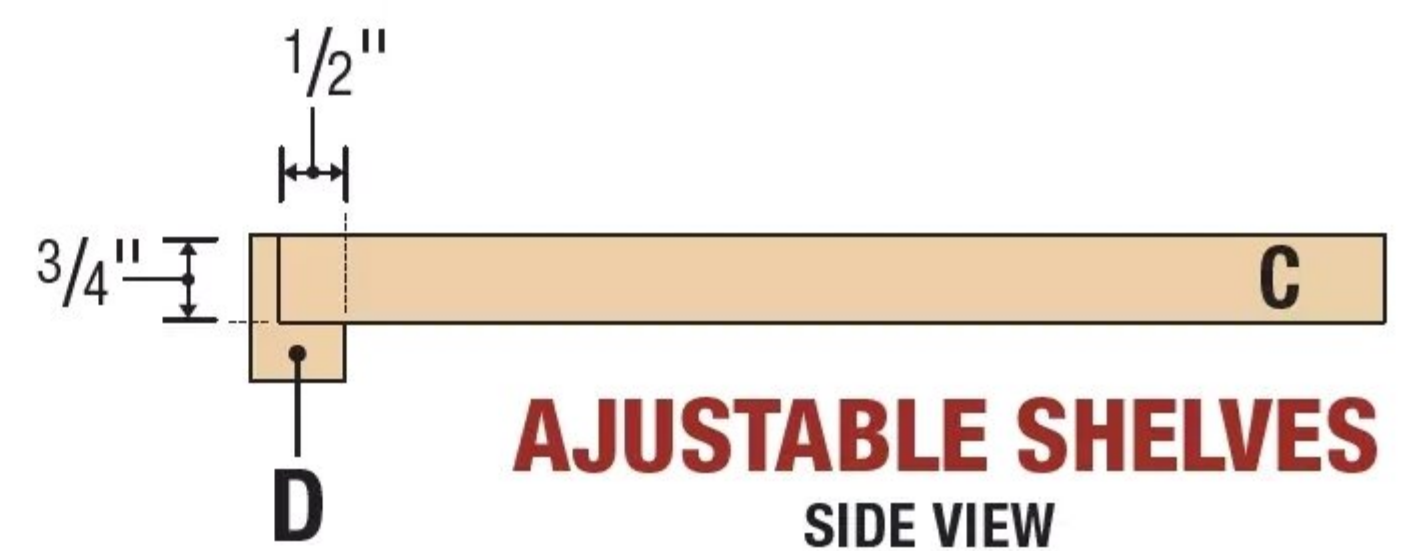
While production cabinet shops may drill shelf pin holes before assembly, I actually prefer to drill them after the cabinet box is assembled. Most DIY cabinet drilling jigs use some sort of template and a depth-limiting drill bit. To be honest, I've had terrible luck drilling shelf pin holes with a drill and switched to a plunge router setup years ago. If you equip the router with a 3/8" guide bushing, you can still use a commercially available acrylic templates. But instead of the included drill bit, use a 1/4" upcut spiral router bit. This method creates crisp, professional looking shelf pin holes that are perfectly perpendicular to the cabinet sides. Next add two cleats to the back of the cabinet box. These are 3 1/2" wide strips of plywood, secured to the cabinet box with pocket hole screws and glue. The cleats provide a secure means of attaching the cabinet to the wall, once your project is finished. It's obvious when you're building it, but worth noting, the cleats (as well as the fixed shelves) will align flush with the rabbet at the back of the cabinet.



Charging Cabinet



NOTE: A full Sketchup model is available at PopularWoodworking.com/onlineextras



Cutlist

No.	Items	Dimensions (inches)		
		T	W	L
4	A Sides	3/4	11 3/4	44 3/4
6	B Fixed shelves	3/4	11 1/2	29 1/4
6	C Adjustable shelves	3/4	11 1/4	28 1/2
6	D Edging for adjustable shelves	3/4	1 1/4	28 1/2
4	E Cleats	3/4	3 1/2	28 1/2
2	F Back panels	1/4	29 1/4	44 3/4
3	H Face frame rails	3/4	1 15/16	56 1/4
2	G Face frame stiles	3/4	2	44 3/4
1	I Intermediate stile (long)	3/4	2	32 3/16
1	J Intermediate stile (short)	3/4	2	6 11/16
8	K Door frame stiles	3/4	2	34 9/16
8	L Door frame rails	3/4	2	11
4	M Door panels	1/2	11	31 9/16

* 12 +/- B.F. maple for face frames and doors (includes 25% waste)

Face Frame

When you buy cabinets from your local home center, you'll be shocked by the poor-quality materials like MDF, chip board, and plastic corner brackets too. Another thing you'll see is individual face frames on each upper cabinet. That creates headaches on install day, so instead I gang my cabinets together, and make one continuous face frame. With this approach in mind, align the two cabinets side-by-side and clamp them together. Then permanently join them with nine screws, making sure they stay flush at the front. Now you can take accurate measurements for the face frame components. I usually leave a $\frac{1}{16}$ " lip above any shelf, and $\frac{1}{8}$ " overhang at the left and right edges. This gives you some leeway when installing the face frame to the cabinet. Cut the face frame parts to size, and drill pocket holes as required. I used hard maple on this cabinet, but I've used poplar in the past, and both work fine.

The outer stiles run the full height of the cabinet, while the middle stile is intersected by the intermediate rail. Assemble the face frame with screws and optional glue, making sure to clamp the parts down as you secure the fasteners. Sand the face frame front and back, before gluing it to the cabinet assembly. A brad nailer and clamps work too, but long clamping cauls really help to get a tight joint line. Now decide if you'll leave the $\frac{1}{8}$ " overhang at the sides of the cabinet or trim it flush. My rule of thumb is simple: if the cabinet abuts a wall or another cabinet, leave the overhang. Since mine is a stand-alone wall cabinet, I trimmed the overhang flush for a full custom cabinet look. A cordless router and $\frac{1}{2}$ " diameter flush trimming bit make quick work of this task.



9 Gang the two cabinet boxes together, ensuring that the front edges are aligned. Use 9 screws — that's 3 at the top, middle, and bottom of the cabinet.

10 Pocket hole the face frame parts with your best method. If you plan on doing another cabinet in the future, it may be worth adding a pocket hole machine to your shop, like this *Kreg Foreman*.

11 Assemble the face frame, sized to cover both cabinets. Clamping the parts down to your workbench is the key to flush joints.

12 Once the perimeter frame is constructed, add the intermediate stiles to complete the large one-piece face frame.





13

13 Secure the face frame to the cabinet assembly with cauls of various length, and a few clamps.



14

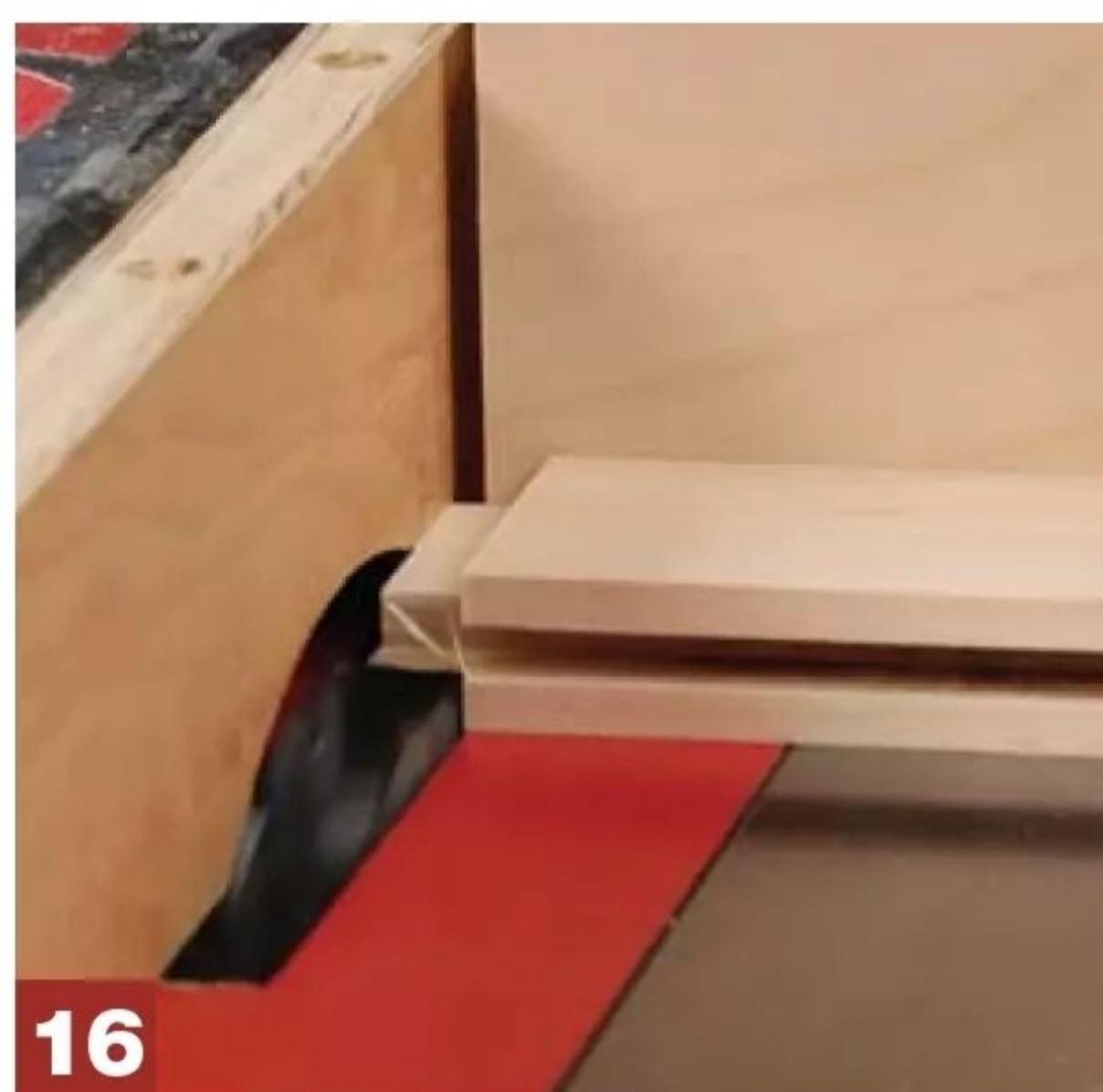
14 Trim the face frame where it overhangs the left and right side of the cabinet with a router and bearing-guided flush trimming bit.

Cabinet Doors

There are a few good ways to build cabinet doors, and while my glass front bookcase doors get special attention, these utilitarian doors use a standard approach with stub tenon joinery. Start by milling a centered groove in all the door parts, about $\frac{5}{16}$ " wide and $\frac{1}{2}$ " deep. Then use a dado blade and miter gauge setup to batch out the tenons. Raise the dado blade incrementally until the tenon fits snugly into the groove. I usually stop just shy of a perfect fit, and fine tune the tenons with a shoulder plane. The last step in making the door parts is to rabbet the $\frac{1}{2}$ " plywood panel until it fits the groove you made. The same setup used to rabbet the side panels works great for this step. Dry assemble the doors to convince yourself that the joinery is sound and sand the panel and inner edges of the hardwood parts. Then glue the doors together, making certain the stiles stay flat as you apply clamping pressure. Center the panel in the frame with a putty knife, and let the doors cure.



15



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15 Cut a groove in all door frame parts with a full-kerf combination blade. Make two passes, one from each face, for a perfectly centered groove. Note the magnetic featherboard and long pushstick for consistent cuts that are easy to control.

16 Now use a dado blade, miter gauge and sacrificial fence to cut the tenons on the door rails.

17 Fine-tune the tenon fit with a few swipes of a shoulder plane.

18 Once the stub tenon joinery fits well, rabbet the door panels to fit in the groove, and test fit the entire door.



19



20



21

19 Glue the four doors together on a flat surface. Luckily, they only require two clamps per door to assemble.

20 Once clamping pressure has been applied to the door, check that the parts remain flat with a quality straightedge. Adjust the clamps as needed to correct any twisting, before the glue sets.

21 Flip the door over and center the 1/2" plywood panel in the frame. A simple putty knife is the right tool for the job.

Odds-and-Ends

If your cabinets are destined for a painted finish like mine, take a moment to apply non-shrinking lightweight spackle to any nail holes or joint imperfections. Then make either 4 or 6 adjustable shelves and decide if they need to be reinforced with edging. At 28 1/2" long it's debatable if edging is needed, but I went ahead and added L-shaped hardwood strips to stiffen the shelves and prevent sagging. If you elect to use iron-on edge-banding instead, just be aware that your shelf width will vary slightly from the cutlist. Cabinet finishing is a topic unto its own, but my general approach is to spray the cabinet boxes before the 1/4" back panel is installed. This gives me better access for spraying and avoids common problems like blowback and overspray. I've taken to a two-tone finish where the boxes are painted, and the shelves and back panels are lacquered. With this charging cabinet in particular, I painted the lower portion of the



22

back panel, because it's visible from the front. If you'd like to learn more about spraying cabinets check out my YouTube channel, *The Thoughtful Woodworker*. Drill a pair of 35mm holes for soft-close Euro style hinges with a drill press or hinge-drilling jig. I offset the holes about 1/4" from the outside of the door stile, but a test hole will confirm you have an adequate 1/2" overlay with your particular hardware. Likewise, drill for the cabinet door pulls with a jig for accurate placement.



23

22 For paint grade cabinets, fill any nail holes or joint lines with a lightweight non-shrinking spackle. Leave the filler proud of the defect, so a single application will look good, once sanded.

23 Trim out the adjustable shelves with hardwood edging, and glue it in place. This nosing was made from 1 1/4" wide maple and rabbeted to fit the 3/4" plywood.



24

24 Use a jig to locate and drill for door pulls. I selected somewhat industrial looking black cabinet pulls with a knurled detail.



25

25 Drill 35mm holes with a dedicated hinge drilling jig, like this one from *Milescraft*. It helps to control both the offset and depth of the cut. A drill press also works for this step.

26 Hang the doors and mount the hardware. Note the hole in the left cubby for the double-gang outlet. You can also see how the back panels were painted where they show through the charging cubby and finished with clear lacquer where they're hidden inside the cabinet.

Electrical Connection & Installation

You'll likely need to add an electrical outlet that surfaces in one of the cubbies. I had an outlet close but needed to relocate it higher to match the height of the cabinet. It's pretty easy to do, but check your local electrical codes, and hire an electrician if you're not comfortable with the work. A 1/4" box extender is typically required to bring the outlets flush with the inside of the cabinet. This way, you'll have a convenient way to charge and store all your batteries, while still allowing good air circulation for the charging equipment. Cut a hole for the receptacle and install the back panels with brad nails. Screw a temporary ledger board to the wall, and set the cabinet on it, as you attach it to the wall with twelve 2 1/2" screws. When installing upper cabinets, I predetermine the stud locations and start the screws inside the cabinet. That way, you only need helpers for a moment when it's time to hang the cabinet. Make sure to drive the screws through the upper and lower cleats for adequate strength.

PW – *Willie Sandry*



26

■ Joiner's Corner

Winding Sticks

These simple tools are essential for dimensioning lumber by hand or machine.

By Logan Wittmer



It's hard to believe that something as simple as a pair of parallel pieces of stock can be a highly precise tool for flattening stock. However, once you've used a pair of winding sticks and understand how to use them, they'll become your go-to partner for wrangling rough stock.

Winding sticks can be as simple or as fancy as you'd like. A few pieces of quarter-sawn stock milled flat, square, and parallel will suffice just fine. Or, you can opt for a fancy pair—the ones I have here are from Will Adams at *Honey Brook Tools*. If you choose to make your own, there are a couple of things to remember.

First, as I mentioned, quarter-sawn stock is preferable. It moves less than flat or plain-sawn material and will remain true and

accurate. Oftentimes, winding sticks will have a few different inlays. The first designates the winding stick's center (brass rod in the pair above). Knowing the center point helps quickly position the winding sticks centered on your material. Another type of inlay you may find is contrasting inlays along the top—a long, narrow strip or a pair of inlays along each end. These help gauge the level of the sticks (you'll see an example of this in a photo in a little bit).

The length of the winding sticks isn't essential, but remember that the longer they are, the more accurate they'll be. I find 18"-24" sticks are plenty long and will fit in most toolboxes. The final thing to consider is the winding stick profiles. You can see two profiles



1 You can make (or buy) winding sticks in a variety of profiles. I find myself leaning towards the narrower topped version.

PHOTOS BY LOGAN WITTMER

Winding Sticks

in Photo 1. One is squared stock, and the other is a trapezoidal shape. I think the narrower the top edge, the easier it is to gauge with your eye.

In Use

Putting your choice of winding stick to use is a straightforward process. With rough stock, I like to break my parts down as far as possible—a saw is the fastest way to flatten a board. With the stock to rough size, use one of the winding sticks as a straight edge; start to judge the stock and see if there's any cup or bow. Photo 2 shows a light cup on the top of this stock. The second winding stick lands on the opposite end. Pay attention to any cup on this end as well.

Now, here's the trick with winding sticks: Start to lower your perspective, look down the stock, and line up the two winding sticks. The winding sticks project what's happening on the surface and amplify it.

As you can see in photo 4, there's a twist. The back right corner is high, as is the front left corner. I find myself often moving around my stock and forgetting what I'm doing, so I'll grab some chalk and squiggle across the high corners, just so I remember what I'm doing when I (inevitably) get interrupted. Before reaching for a hand plane, make a mental note of how much twist there appears to be so that you can gauge your progress.

Now, you can start to flatten the stock. Concentrate on the high spots you marked first. Many people will suggest that you use a jack plane to do this. I enjoy using my scrub plane a little more for this step—a sharp iron and a moderate cut produce large curly shavings that quickly make progress. As a side note, a scrub plane has no chip breaker. It's a rough-cut tool. Therefore, it has a tendency to tear out if you go



2 Winding sticks tell what's going on across the width of a board (cup) as well as the length (twist).

3 Make a note of the difference in cupping between the front and back winding stick. Ideally, the amount of cup will be the same.

4 As you look down the board at a raking angle, you'll see that the winding sticks extrapolate any movement that's happening on the surface of the board. Make a note of the small acute angle formed between the top of the front stick and the bottom of the rear stick. Any changes in this angle is a good way to gauge progress as you flatten the board.

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5-6 Identify the high spots and mark them with chalk. Grab your choice of plane and start to plane them down.

7-8 The goal is for the top of the winding sticks to line up, indicating they're in the same plane. After they do, you can switch over to a jack or jointer plane and start to make full-length passes, flattening the board.

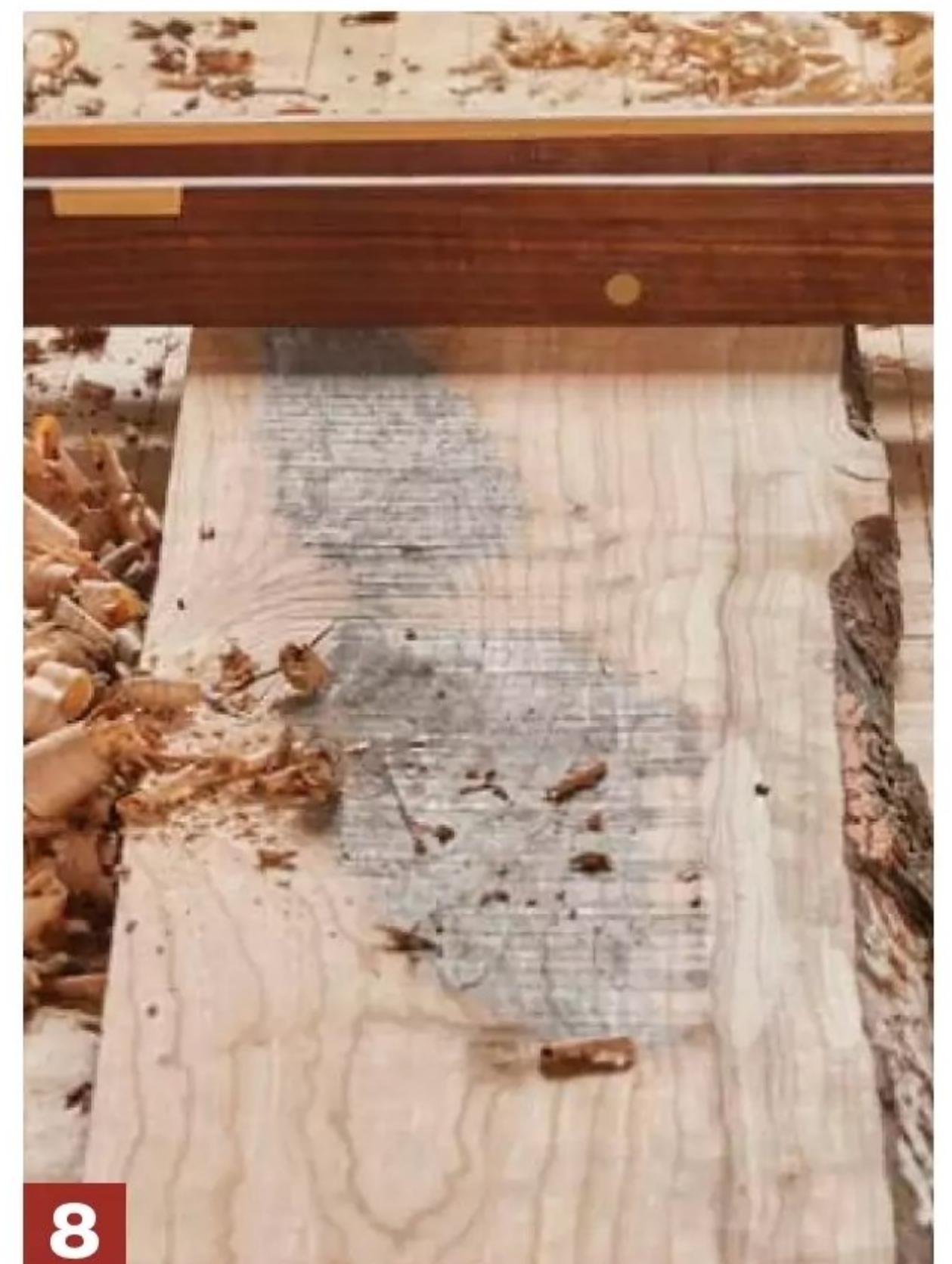


against the grain at all. I use this time to make mental notes about which direction the grain is going in different areas of the board, which helps when you get to the finer planes.

Drop the winding sticks back in place once you feel you've made progress on the high spots. Crouch down and look at the sticks. Gauge your progress. As you can see in the main photo in this article, the twist of the sticks is slightly less. You can continue working on the board's high spots until the sticks are in alignment. Take a look at photo 7. You can see how the contrasting inlay strips make it easy to judge how closely the two ends are to being in the same plane.

Once the winding sticks line up, it doesn't mean the flattening is complete. As you can see in Photo 8, there's still some work. But now, you at least know that the twist has been removed, and now plane the entire surface until it's clean and flat. Just because I'm working with a hand plane doesn't mean these are handtool-only tools. I find them just as valuable as I'm working on the jointer, especially when working with extra-long stock that is sensitive to twists.

PW - *Logan Wittmer*





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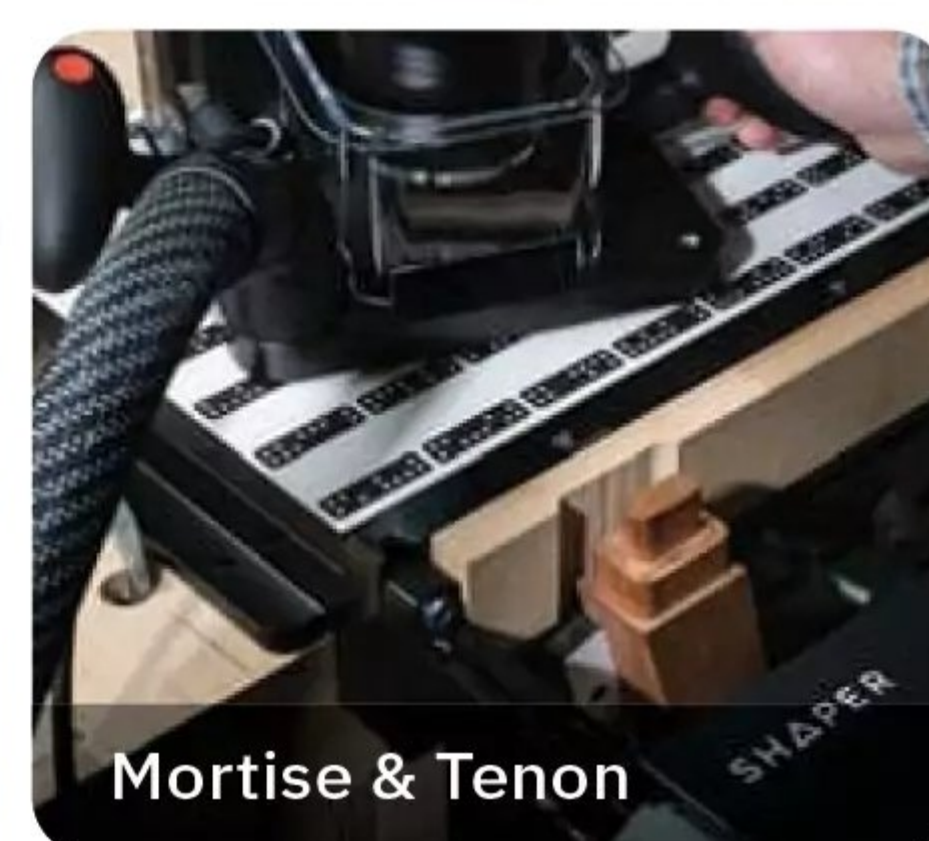
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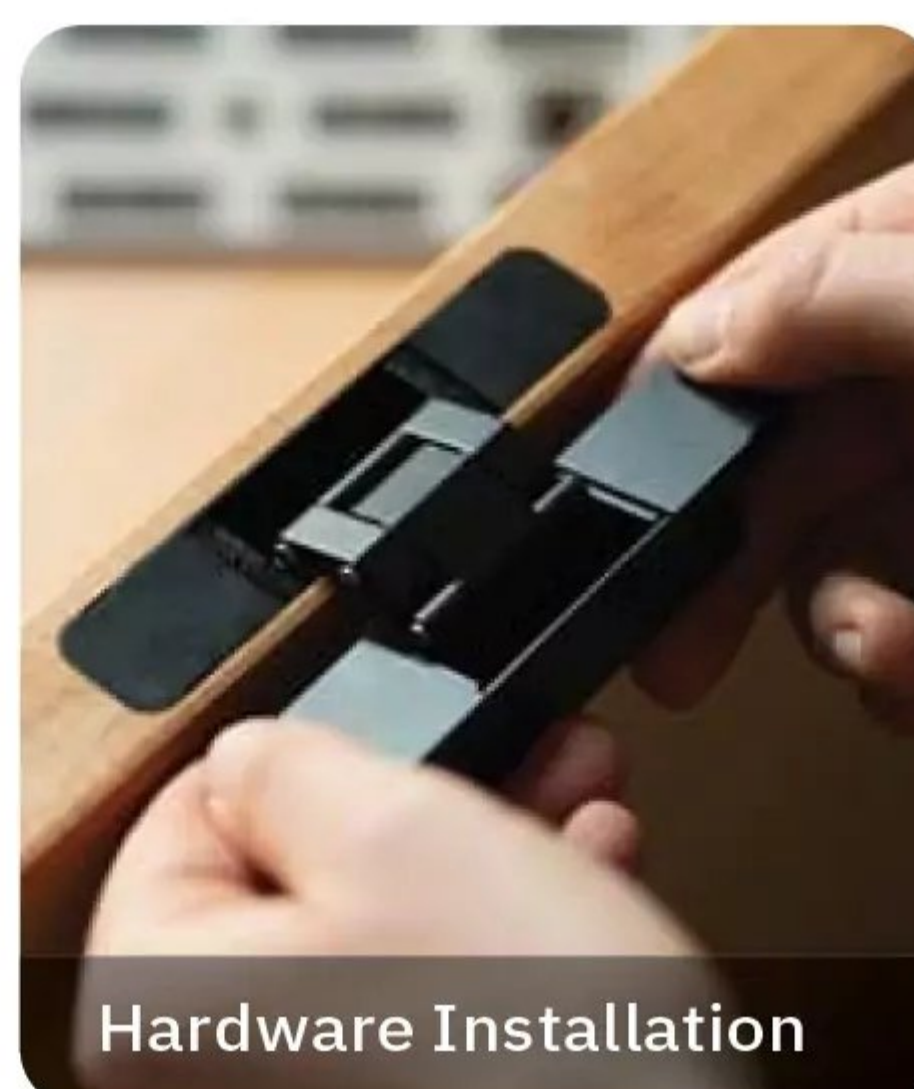
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