

5 PROJECTS IN

GUILD ♦ EDITION

EVERY ISSUE!

Woodsmith®

Woodsmith.com

Vol. 44 / No. 258

WEEKEND

WORKBENCH

- Rock-Solid Durable Top
- Low-Cost Materials
- Loads of Storage

Also:

Router Jig
For Perfect Tenons

Wood Hand Planes
Expert Setup Tips

All New Projects:

- Industrial Bookcase
- Craftsman Dresser
- Mid-Century Cat Tower

Dec/Jan 2022

\$7.99US \$8.99CAN



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Display Until Jan 25, 2022

Woodpeckers®

Precision Woodworking Squares

- One-piece central core machined to exacting tolerance.
- Stainless model includes scribing guides for perfect parallel layout.
- Lip formed by base keeps the square flat on your work.
- Scales engraved to a tolerance of $\pm .004$ " total stack-up error.
- Guaranteed accurate to $\pm .0085^\circ$ for life.
- Available in inch or metric graduations.



Precision Woodworking Square

Includes a Woodpeckers wall-mountable wooden case

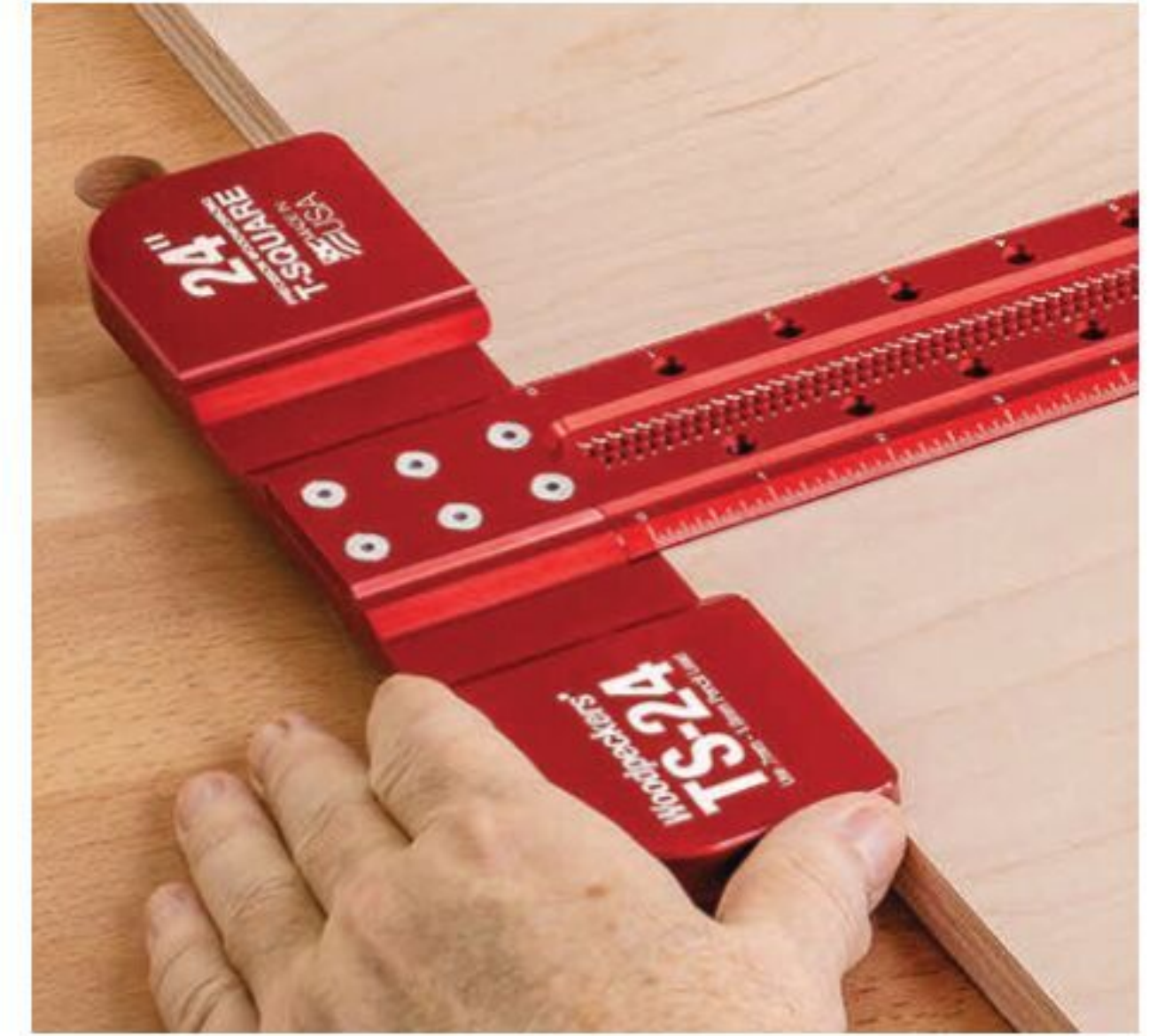
12" 1281....\$129.99

12" 1282SS Stainless Steel....\$149.99

Other Sizes Available on Woodpeck.com

Precision T-Squares

- Precisely spaced 1mm holes machined every 1/16".
- Laser engraved scale accurate to $\pm .004$ ".
- Outer edges machined to a 30° bevel for easy reading.
- 600mm metric version available.



Precision T-Square

Includes a wall-mountable Rack-It™

TS-12 12"....\$89.99

TS-24 24"....\$124.99

TS-32 32"....\$154.99

Precision Taper Jig

- Produce tapers from 0° to 15° safely & accurately.
- Clamp material securely to sacrificial base.
- Standard 32" capacity can expand to 48".
- Clamp handles provide safe and secure gripping points.



Precision Taper Jig

32"....\$279.99

48"....\$399.99

in-DEXABLE Combination & Double Squares

- Push-button index locks head at any full-inch.
- Laser-cut scribing guides for precision parallel lines.
- Retractable support keeps head aligned to your stock.
- Combination & Double Squares in two sizes.



in-DEXABLE Squares

Includes a wall-mountable Rack-It™

Double 6"....\$129.99

Double XL 12"....\$169.99

Combination 12"....\$169.99

Combination XL 18"....\$199.99

Set w/ MDF Wall Case....\$649.99

EZ Edge Corner Plane

- Plane sole is a perfect 90° to fit your stock.
- 3 radius profiles and 45° chamfer available.
- Hardened blades are easy to re-hone.
- Profile perfectly centered on your stock.

EZ Edge Corner Plane

Includes a wall-mountable Rack-It™

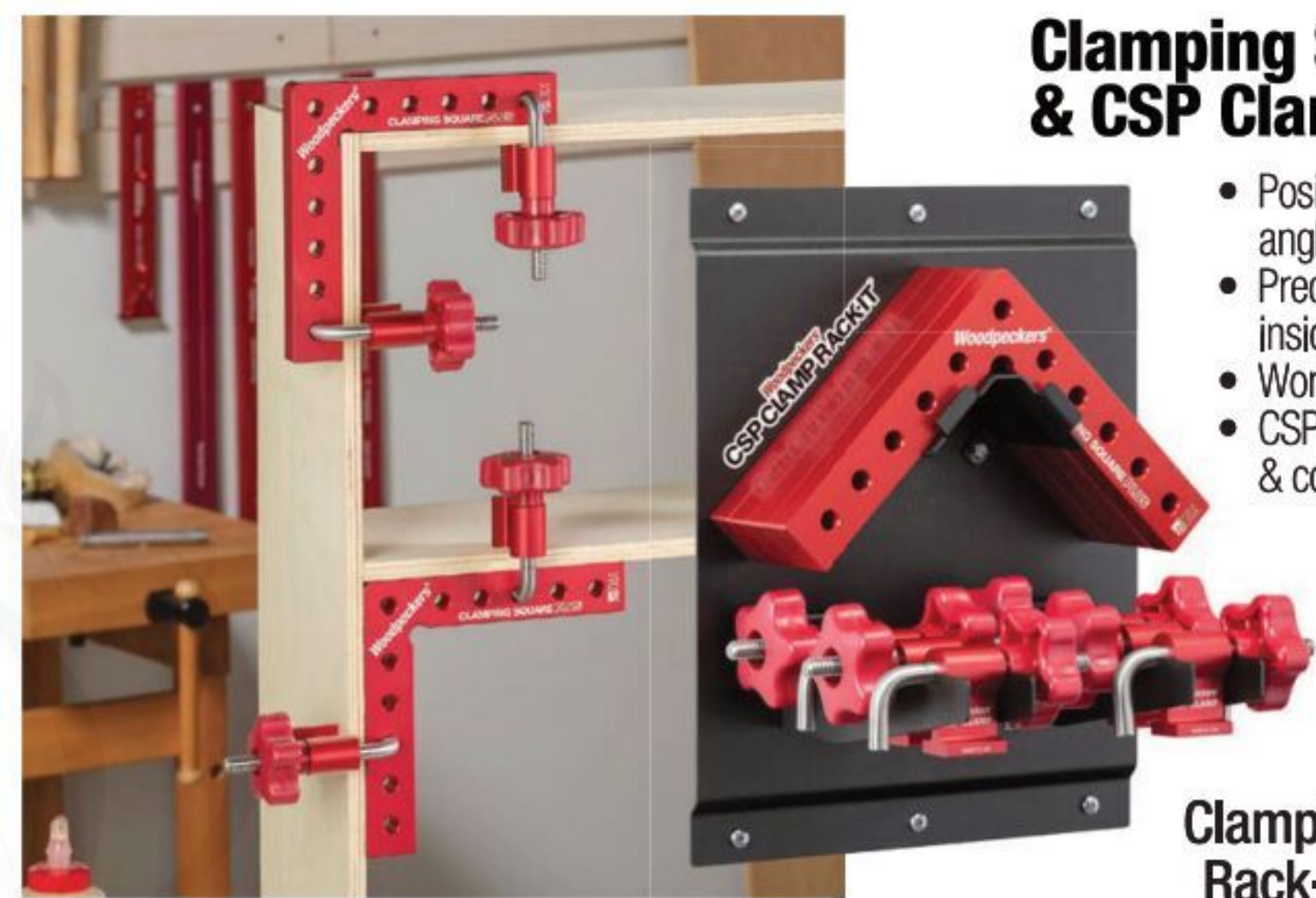
1/8", 3/16", 1/4" Radius
-or- 45° Chamfer....\$159.99

Deluxe Set....\$569.99



Clamping Squares PLUS & CSP Clamps

- Positions stock at right angles for joinery & fastening.
- Precision milled for both inside & outside alignment.
- Works with any clamp.
- CSP Clamps add speed & convenience.



Clamping Squares PLUS

Rack-It™ Kit....\$259.99



Dust Port fits either end!



Drill Press & Hose not included.

DP-PRO Drill Press Table System

- DP-PRO Fence integrates dust collection & delivers accuracy.
- Micro-adjustable DP-PRO Flip Stops.
- DP-PRO Drawer Base simplifies installation on any drill press.
- DP-PRO Tables are full 1" thick with laminate top & bottom.
- Extension Wings for long material support.
- Drawer Base and Fence compatible with all drill press tables.

DP-PRO Drill Press Table Master System

36" Table, 24" Fence....\$399.99

36" Table, 36" Fence....\$419.99

48" Table, 36" Fence....\$449.99

48" Table, 48" Fence....\$469.99



DeVe Square™ SS

- Offset base for convenient joinery layout.
- Mark perfectly parallel to the edge of stock with the scribing guides.
- Machined steps in base provide convenient set-up blocks.
- 45° & 90° fixed references; Intermediate angles graduated in 1° increments.

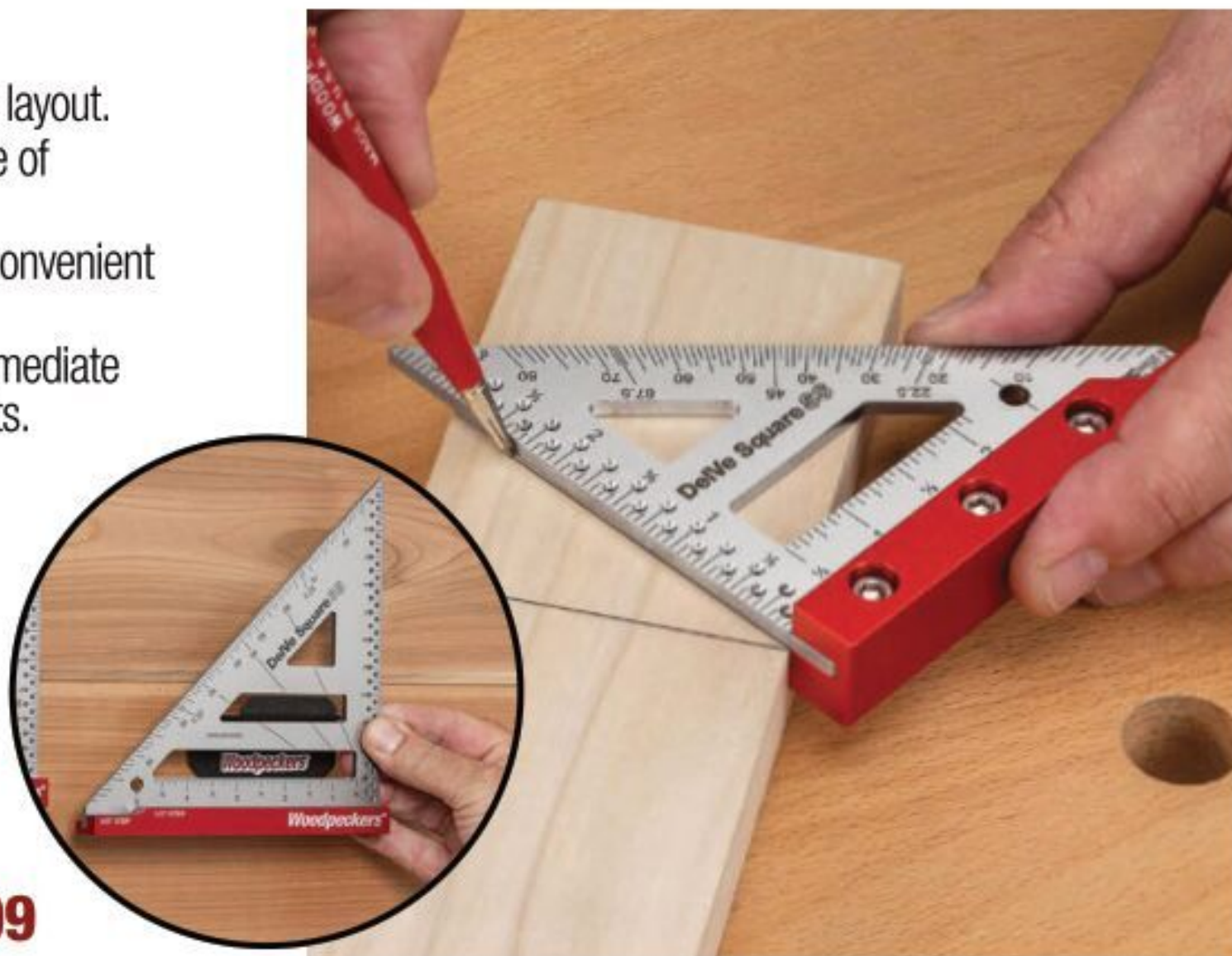
DeVe Square SS

Includes a wall-mountable Rack-It™

3-1/2"\$99.99

6"\$129.99

3-1/2" & 6" Set....\$199.99



AUTO-LINE DRILL GUIDE™

- Drill perfectly perpendicular holes anywhere.
- Fence fits on all 4 sides & works 4 different ways.
- Laser-engraved target lines indicate center of bit.
- Works with nearly all 1/2" & smaller drills.
- 1" capacity inside frame & 2" capacity outboard.
- Optional extensions & stops available.

Auto-Line Drill Guide

Drill Guide....\$259.99

Deluxe Kit....\$369.99



Drill not included.

Multi-Function Router Base

- Micrometer adjustment positions cutter perfectly.
- Cut parallel to existing edge or pivot in a perfect arc.
- Wide, stable base improves routing accuracy.
- Works with most routers that have guide rod holes.

Multi-Function Router Base

Includes 1 Pair Extension Rods

w/ 5/16" Guide Rods....\$239.99

w/ 3/8" Guide Rods....\$239.99

w/ 10mm & 1/4" Guide Rods....\$239.99



Router not included.

Exact-90 Miter Gauge

- Perfectly square cuts every time.
- Patent pending miter bar adjusts to any 3/4" miter slot.
- Graduated fence with micro-adjustable flip stop and 45" extension.
- Extra-long miter bar increases cross-cut capacity of most saws to 24".
- Miter Bar available separately to build jigs and cut-off tables.
- Flop Stop keeps wide panels level with table for perfect squaring cuts.

Exact-90

Miter Gauge....\$329.99

25.5" Miter Bar....\$69.99



RIP-FLIP Fence Stop System™

- Bring your rip fence back to the same spot each and every time you need it.
- Stop drops out of the way when not needed, flips up when you want it.
- Couple two stops together for perfect fitting dados in two cuts.
- Models available for SawStop T-Glide Fences* and Powermatic Accu-Fences*.
- Extra stops and dado couplers available. Add as many as you need!

RIP-FLIP Fence Stop System

36" Capacity - Fits SawStop*....\$209.99

30" Capacity - Fits Powermatic*....\$219.99

52" Capacity - Fits SawStop*....\$219.99

50" Capacity - Fits Powermatic*....\$229.99

Slab Flattening Mill-PRO

- Wider, thicker, thinner & cleaner than the original.
- Router carriage now has adjustable height & built-in dust ports.
- Standard width of 48-1/2" expands to 62" with optional extension.
- Standard length of 59" expands to 132" with optional extension.
- Flatten stock as thin as 3/4" & up to 3-7/16" without shimming.
- Straight-line edges on stock up to 2" thick.

Rail can be positioned
for narrower slabs or
all the way to the edge!



Slab Flattening Mill-PRO

Basic....\$899.99

Extended....\$1199.99



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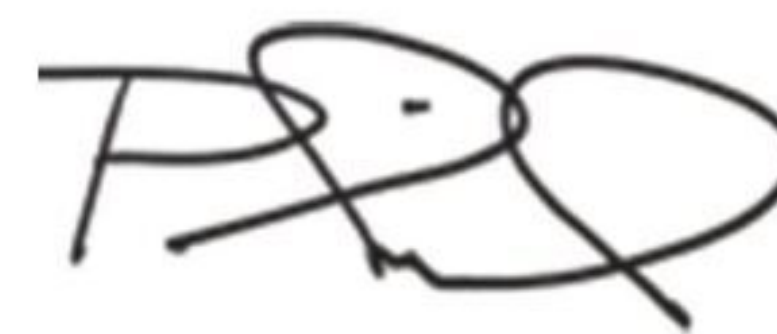
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from the editor Sawdust

My shop notebook sits close by me all the time. It's been my wood-working companion for nearly 20 years. It's mostly filled with sketches and notes for projects (or potential projects). Those I've built have the date they were finished. In the back I keep several lists: Annual Lists of completed projects, Project Lists by name or room of the house, as well as a Shop Project List for tools, jigs, and storage items to enhance my shop. Flipping through it from time to time offers a great daydreaming activity and reminds me of how far my woodwork-ing education has come. I'm curious to know how other woodworkers record their shop time. Let me know at phuber@aimmedia.com



VIC TESOLIN, CONTRIBUTING WRITER

◀ Vic Tesolin founded and co-owns *Vic Tesolin Woodworks*, focused on woodworking education and inclusivity. From his shop, Vic teaches in-person and online private instruction and online group classes. He also travels to teach in-person group work-shops. Vic is the author of *The Minimalist Woodworker* and *Projects from the Minimalist Woodworker*.

Vic is a veteran of the Royal Canadian Horse Artillery and is a guest instructor at Rosewood Studio and KJP Select Hardwoods.

Find out more at: www.victesolin.com and follow along at: Instagram @vic_tesolin_woodworks and Facebook @victesolinwoodworks

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1. Free or nominal rate outside-county copies included on PS form 3541	3,220	3,288
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3. Free or nominal rate copies mailed at other classes through the USPS	0	0
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I certify that 50% of all my distribution copies (electronic and print) are paid above a nominal price.		
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18. I certify that all information furnished on this form is true and complete.		
(signed) Phil Huber, Editor		

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contents

No. 258 • December /January 2022



Projects

designer project

Industrial Modern Bookcase 24

Inspired by the classic combo of iron and wood found in factory carts, this bookcase evokes a sturdy presence.

heirloom project

Craftsman Dresser 30

Designed to round out a Craftsman-style bedroom set, this dresser looks just as good on its own.

weekend project

Craftsman Mirror 40

Building this mirror offers a crash course in Craftsman construction from materials, to joinery, to signature details.

shop project

Utility Workbench 44

A stout workbench comes together quickly with the right design, materials, and techniques.

designer project

Cat Condo 52

Create a three-tiered playset for the felines in your life that has the look of fine furniture.

Departments

from our readers

Tips & Techniques 6

great gear

Favorite Tools & Accessories 12

working with tools

Modern Wood Planes 16

router workshop

A Jig for Accurate Tenons 20

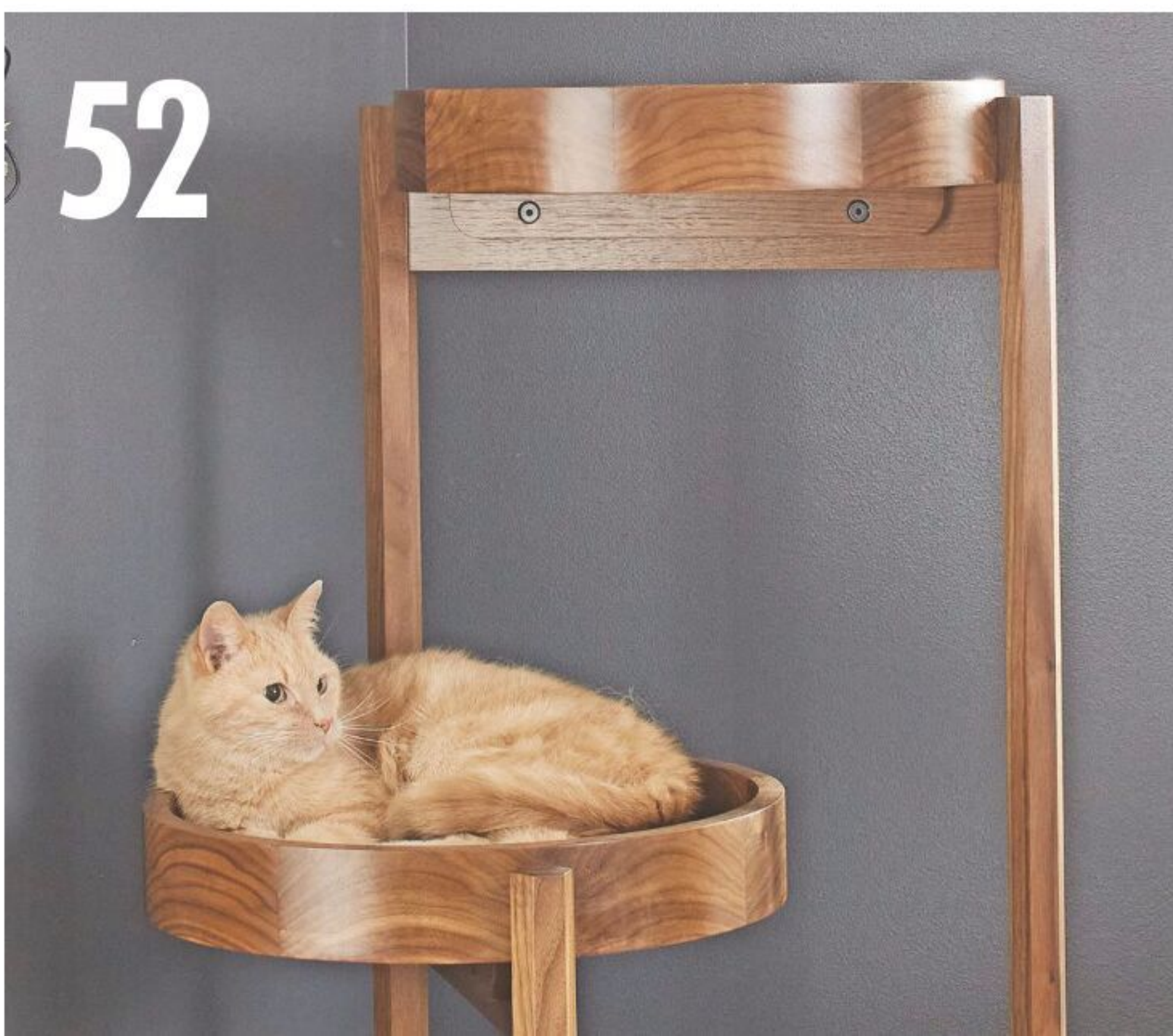
woodworking essentials

Drill Press Safety Devices 58

mastering the table saw

Dado Blade Basics 62

Sources 66

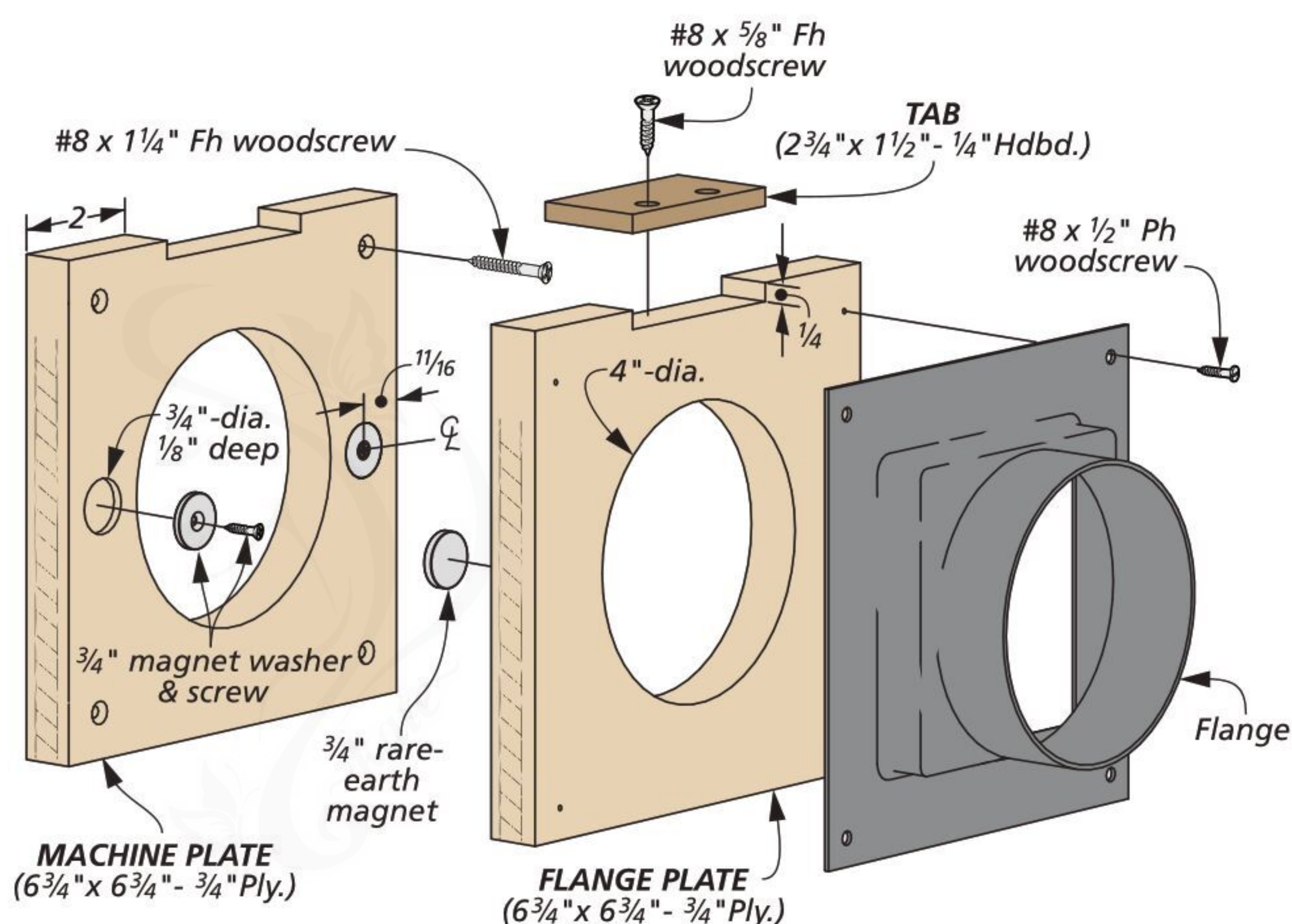
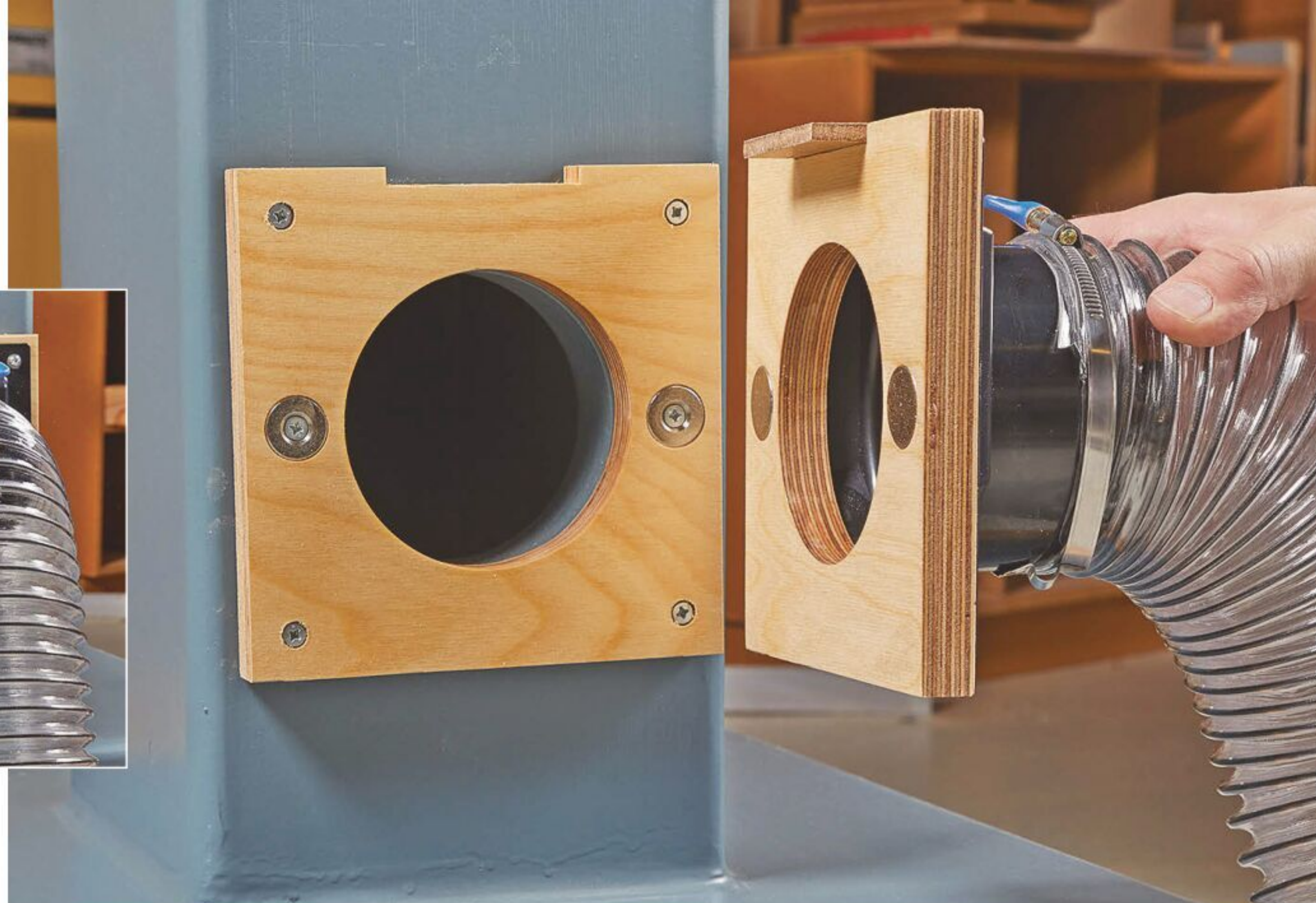


READER'S Tips

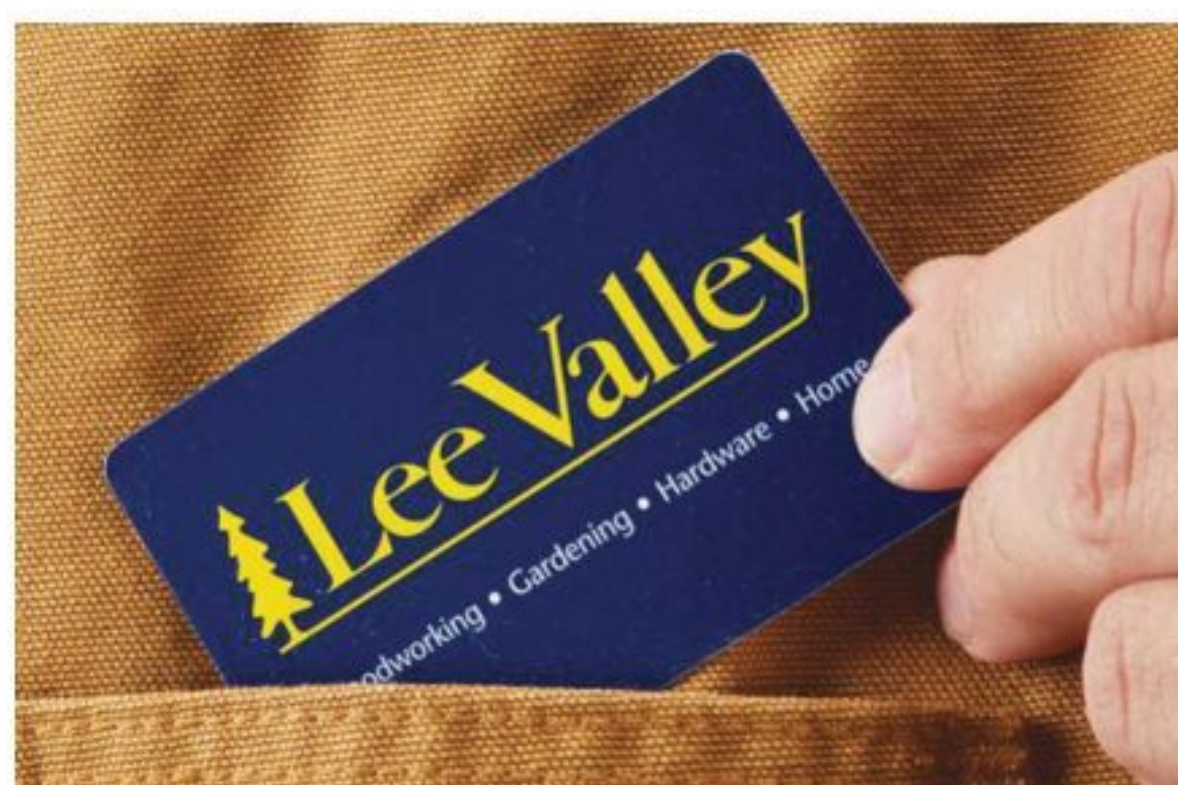
Magnetic Dust Collection

In my shop, I found swapping dust-collection hoses from machine-to-machine to be a pain — until I simplified the procedure. This is done with plywood connector plates held in place by rare-earth magnets recessed into each side. I found that if I put magnets on both of the connectors, it was a bit much. Instead, I used the magnets on the flange side and magnet washers on the machine side. The magnets held the plates together well, but they didn't have good shear strength, and I often found them sliding down. To prevent this, I cut dadoes in the top of each plate and screwed a small hardboard tab to the top of the flange side to hold the plates at the same level.

Dan Mays
Walcott, Iowa



SUBMIT A TIP TO WIN



If you have an original shop tip, we would like to hear from you! Jump online and go to:

SubmitWoodsmithTips.com

You'll be able to tell us all about your tip and upload your photos and drawings. You can also mail your tips to "Woodsmith Tips" at the editorial address shown on page 4. If your tip is selected it will get published right here in the magazine. You'll be entered to win a gift cart to Lee Valley.

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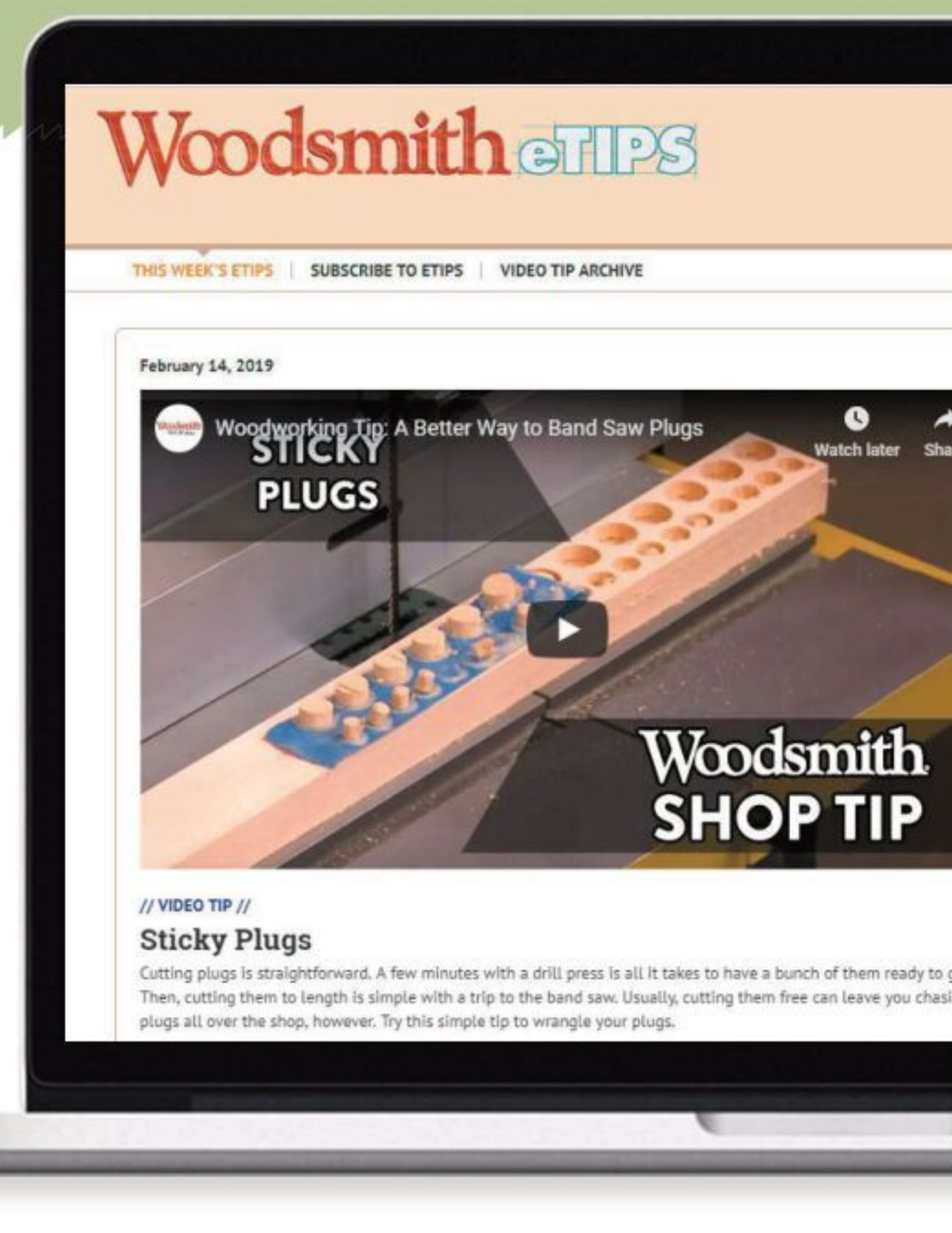
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Perfectly Flat
Surgically Sharp
Stunningly Beautiful*



Blue Spruce
TOOLWORKS

Imagine a chisel perfectly flat and surgically sharp right out of the box...introducing our new *Optima Chisels*. Each chisel back is perfectly lapped and polished to give you unrivaled flatness. Each bevel is individually ground and honed by skilled craftsmen. The double-tempered and cryogenically treated A2 steel blades have the fine grain structure needed for surgical level sharpness and the durability to keep it. And, like all Blue Spruce Tools, they're a delight to hold, admire and use.

Visit our website to learn more about these remarkable new tools. **BlueSpruceToolworks.com**

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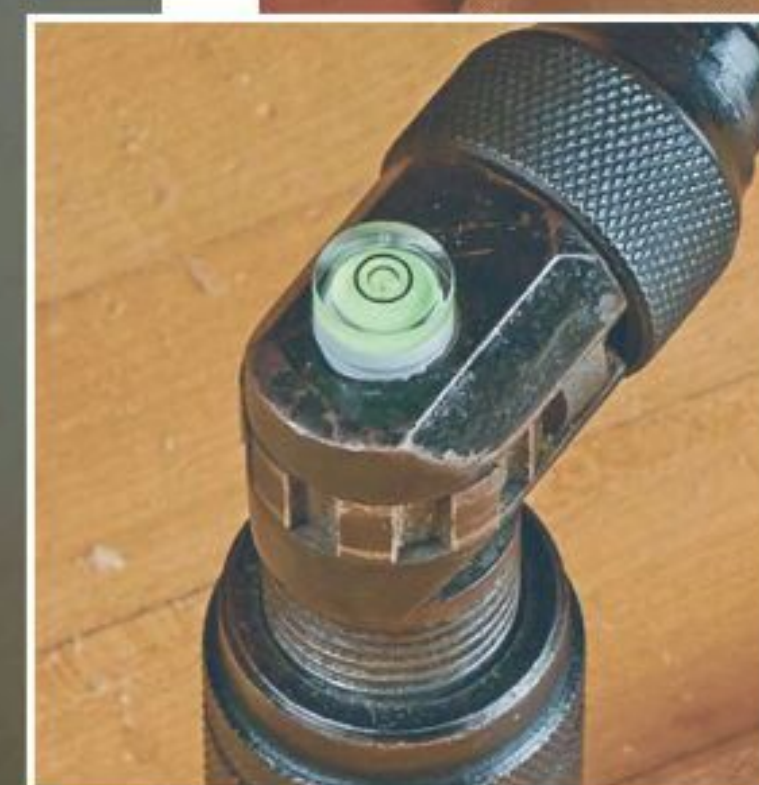
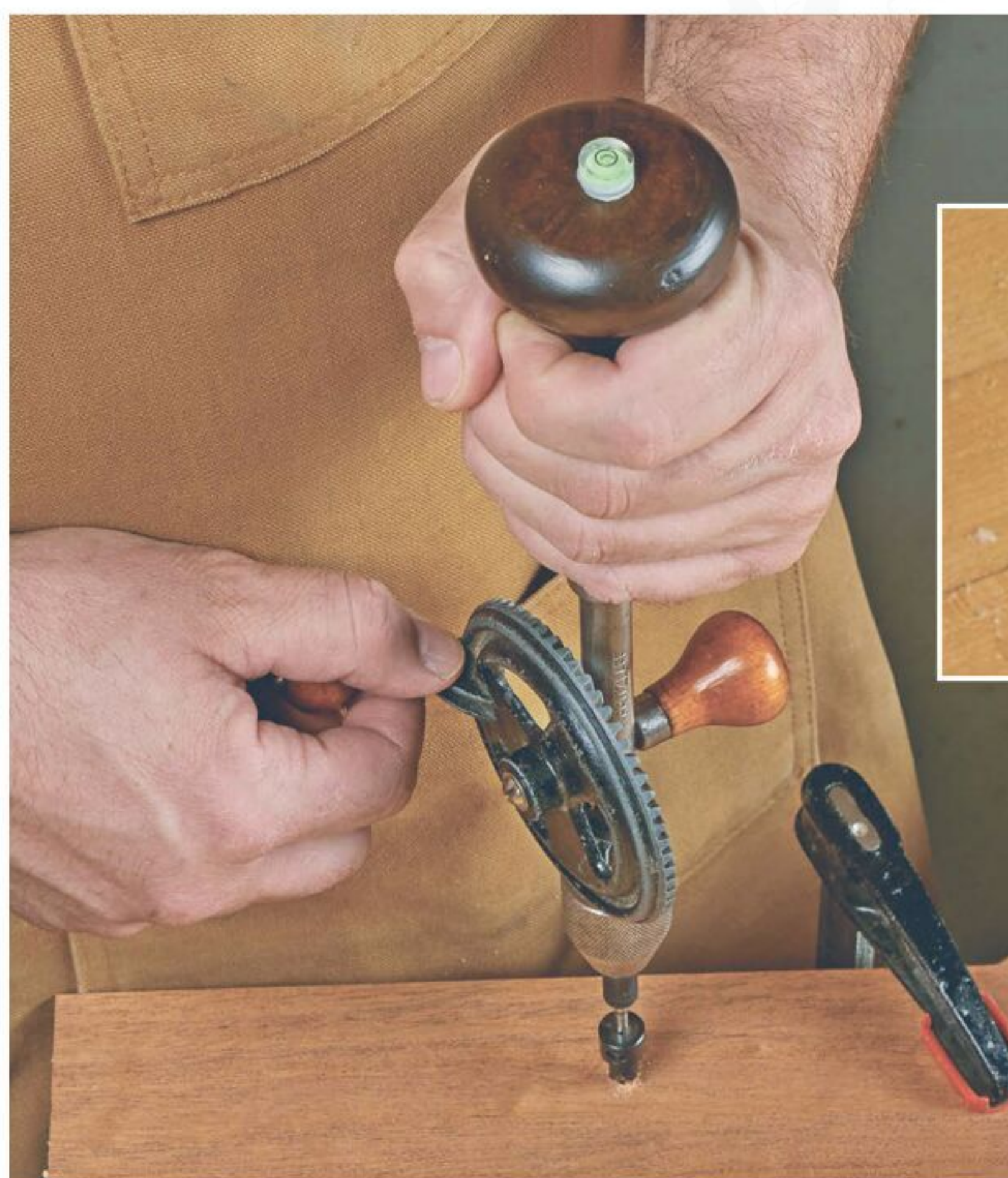
QUICK TIPS

Improved Grip. John Finger of Chesterfield, VA had always gotten great use out of wood-handled F-clamps, but he found it became harder to get a good grip on them as the years went by. By adding bicycle handle bar grips to his clamps, he now had a stronger, more comfortable grip.



Easy Pattern Removal.

Dan Martin of Galena, OH was putting patterns on his workpieces, but he wanted an easy way to get the leftovers off once he was done. He masked the surface with painters tape first, then used spray adhesive to attach the pattern, making for an easy removal.



Plumb Hand Drilling. Charles Mak of Calgary, Alberta came up with this handy trick. By attaching a bubble level to his hand drills with a bit of CA glue, he was able to quickly make sure that his holes would be plumb. Check multiple sides with a square to ensure the bubble is plumb before gluing.

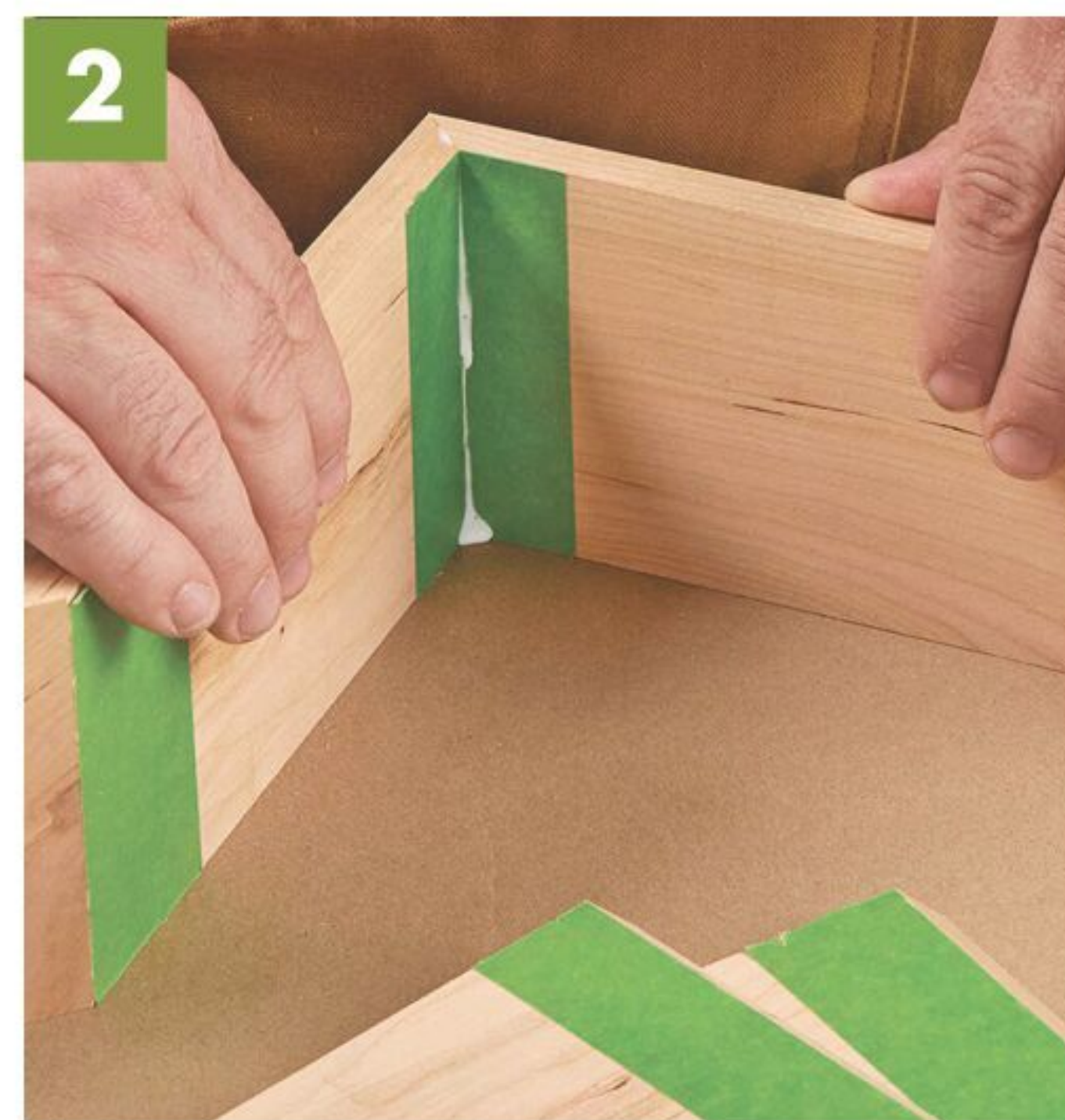
Squeezeout Free Gluing

I've always struggled with cleaning up the squeezeout from gluing miter joints. When I was working on a mitered box recently though, I was struck with an idea. Once I was ready to make the miter cuts, I took some painters tape and laid it on the edges of my workpieces,

overhanging where I was going to make the cut. After making the miters on the table saw, I had a perfect "zero-clearance" tape right up to the edge of that board. To keep the squeezeout off all of your pieces, make sure you do this for all edges that are going to be

glued. I did the glueup as normal and clamped everything in place. I came back once the glue had dried and peeled the tape off to find a flawless, glue-free surface left behind.

*Nathan Terepocki
Peoria, Arizona*



FOR THE LOVE OF WOOD

*Santa's Sleigh
milled and made by
Gregg Turk.*

15 Sawmill Models
starting with the LX25 at \$3,295

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LIVE the wood life™

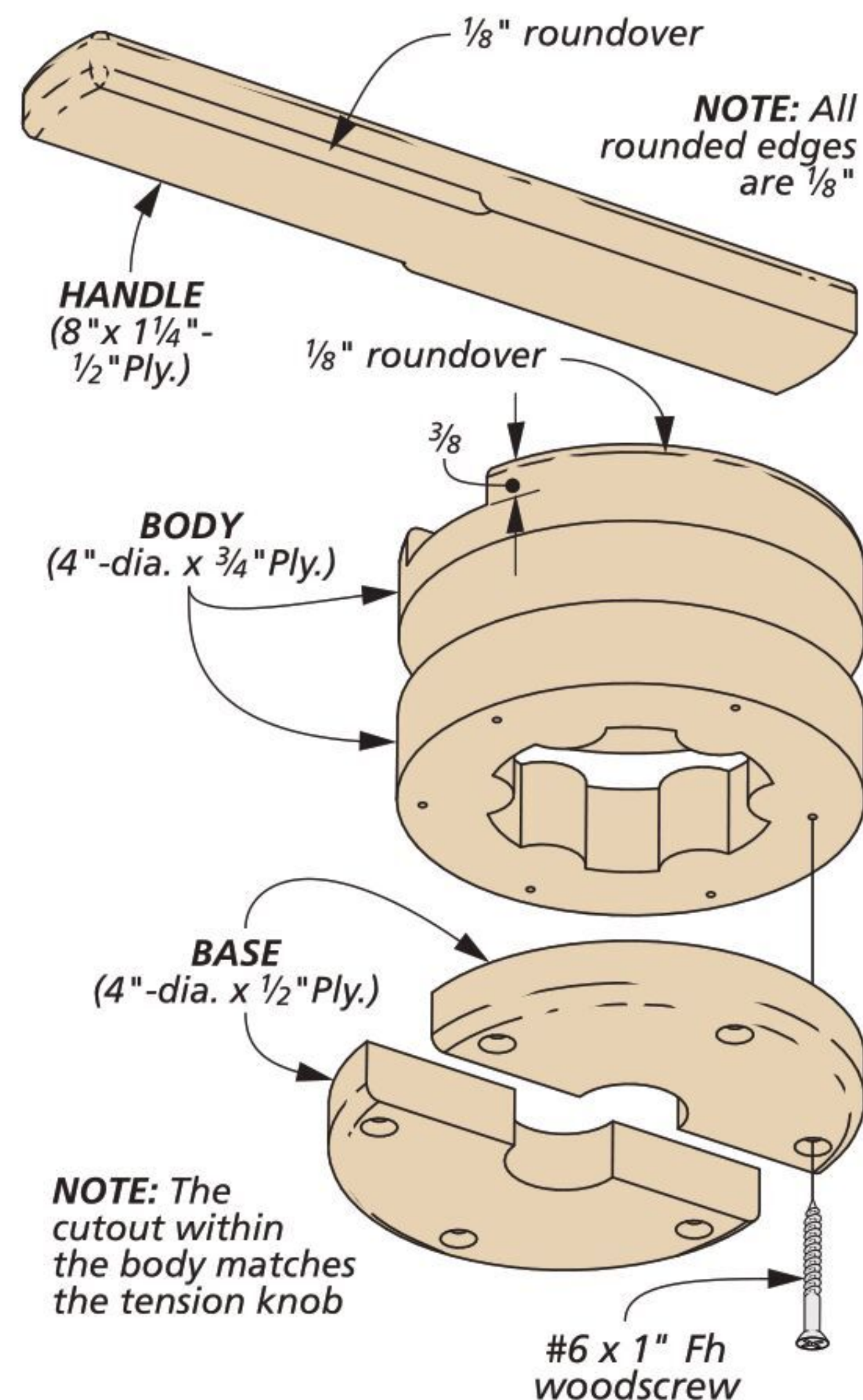
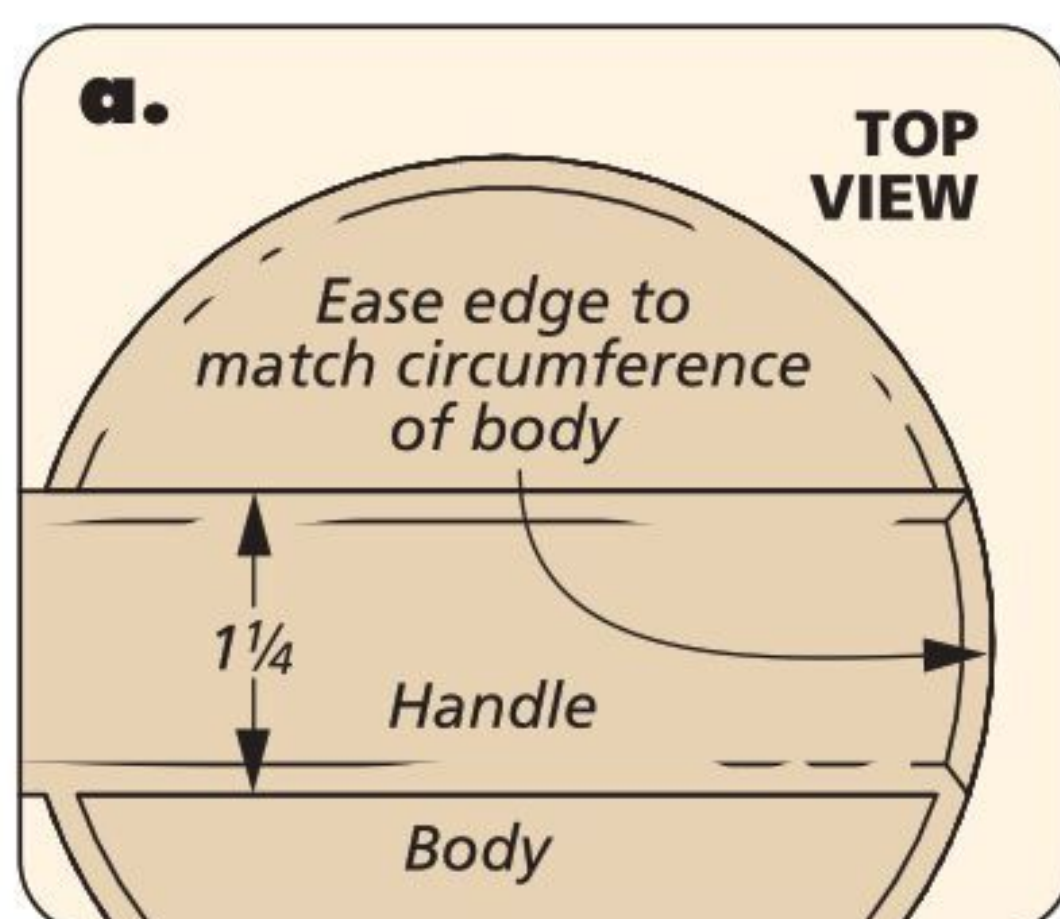
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from forest to final form®



For full-sized patterns of the tensioner parts for this saw, visit: Woodsmith.com/258



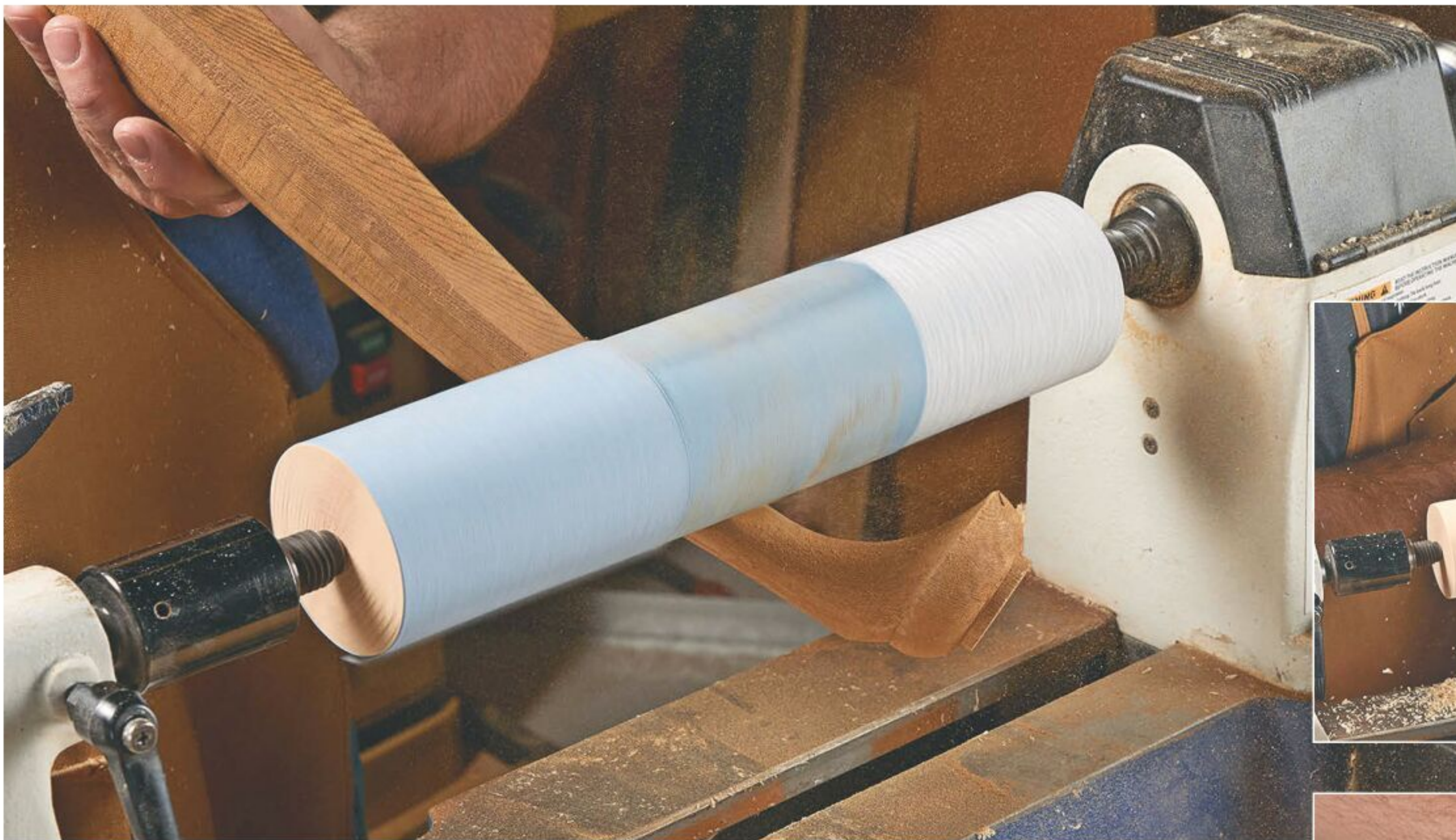
Band Saw Tensioner

I've been using a 14" Powermatic band saw for years, but the older I get the more difficult I find the small tensioning knob. After looking at the cost of aftermarket options, I decided to make my own using leftover plywood.

I started off with a few pieces of 3/4" and 1/2" stock, then created a template of the original tensioner knob. Using the template and a pattern bit in my router, I cut out a space for the original knob in one layer of the body. On the top layer I cut a dado to fit the handle at the table saw. Over at the band saw I cut out the hole in the base for the tensioning shaft. Next I made the handle and rounded off the edges. The cutouts allowed me to screw together the new tensioner right over the original knob.

*Jim Fox
Hartford, Iowa*





Lathe Drum Sander

In a woodshop with limited space, having one tool perform multiple functions is invaluable. Instead of investing money and shop space in a drum sander, I glued two two-by-fours together and turned them down to make a 3"-dia. dowel. I then wrapped adhesive-backed sandpaper

around the dowel (photo at right). Remember which direction your lathe will be spinning when you attach the sandpaper so it doesn't peel itself off while you're sanding. Once the lathe is turned on, you've got a drum sander.

*Steven Bunker
Acworth, Georgia*

EST 1928

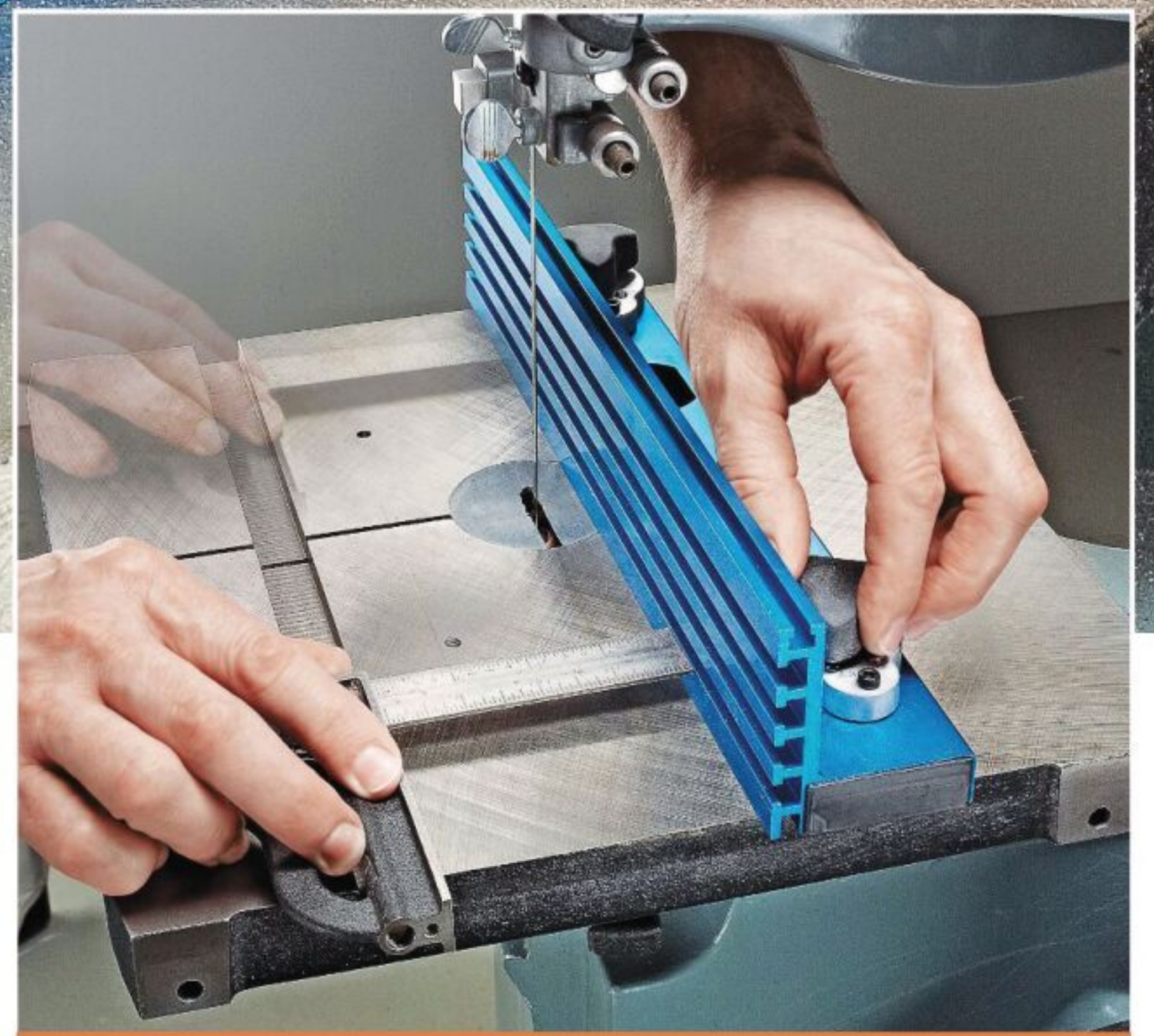
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Build Playtime Into Your Day

TOGETHER, WE CAN CREATE ANYTHING®

Find your toy making supplies at
woodcraft.com/handcraftedtoys

To Find Your Local Woodcraft Store,
Visit woodcraft.com Or Call 800-225-1153.



▲ It's simple to set up the fence, just use the miter gauge slot and a combination square to set the distance between the fence and your band saw blade.

A Parade of Faves

New and improved! Version 2.0! Enhanced Features! These are just a few of the marketing slogans we've heard. Sometimes it's hot air — all wind up and no pitch. Other times it's a solid claim and a good, new thing. That's what we're trying here, some new things for the Great Gear department.

The goal is to highlight more tools in each issue with shorter, honest, and light-hearted appraisals of the merits and capabilities of the tools we're impressed with — new and old.

CARTER MAGNAFENCE

Fences for band saws often have to be able to adjust to the drift of the blade. I've got an old

shop-made fence that tackles the drift problem just fine. But after playing with the fence you see above, my old fence might mysteriously break.

Carter's *Magfence II* anchors to the saw table with strong magnets that allow you to attach the fence to any cast iron table. The photos above show how easy it is to use. And since the fence isn't

The PM-1800 will be your new best friend in the shop



▲ After putting the plywood in place, roll the PM-1800 into position at the table saw or workbench.



▲ When you're comfortable with the set up, drop the kickstand to anchor the PM-1800. Then you can rotate the swing arm to a horizontal position.

attached to fixed rails, it's simple to make adjustments for blade drift. You can throw it in the cart at carterproducts.com.

A BACK SAVER

A good day in the shop is when you don't have to crawl back into

the house because of hoisting around heavy sheet goods. (MDF, I'm looking at you.) The PM-1800 Panel Carrier made by PortaMate is your best friend here. This no frills panel mover looks vaguely similar to a standard two-wheel dolly, but with a pair of inline wheels and a swing-arm sheet goods carrier on one side. But the photos above show you how it's a cut above a normal dolly. Search "PM-1800" online for purchasing options.

ANGLE ANGEL

The Wixey Digital Angle Gauge you see below is one digital tool I'm happy to have in the shop.



▲ The PocketTweez, tweezers are a modest investment that will last a lifetime.



▲ First, you need to set the gauge on the flat surface of the tool and "zero" it out.



▲ Then, with the gauge on the side of the blade, adjust the blade to the angle you want.



All you need to do is calibrate the gauge to the bed of the tool, then simply move it to your blade or fence and adjust it to the correct angle. This readout is accurate to $\frac{1}{10}^{\circ}$. And, as long as there's a magnetic surface to attach this gauge to, you'll be able to find the angle you need. You can buy this at wixey.com.

TWEEZERS

Removing a splinter is not my idea of a fun time. These tweezers make it a quick task. Made from stainless steel, they grab the finest splinter without slipping. Search "PocketTweez" on Amazon.com to get the goods.

▲ This gauge can be attached to any magnetic surface. It's the easiest way to find and set the angle that you want.



▲ Upgrade your shop dust collection setup with these auto-sensing units.

IVAC PRO

Okay, cleaning up dust in the shop sucks, but a good dust collector really sucks ... there, that gets some of the dad puns out of the way regarding dust collection in the shop. What doesn't suck is having your dust collector sort of on auto pilot. Which is what the *iVAC Pro* does.

Dust collectors are a pretty standard fixture in most shops. The problem is having to turn on the dust collector before turning on the tool — it's such a hassle. This is especially true if your dust collector is in the opposite corner of the shop. Even with a handheld remote switch, this adds an extra step.

Plug the tool in here and you're good to go

The *iVAC Pro* takes a different approach. You simply plug each tool into a transmitter. When the tool is turned on, it sends a wireless signal to the receiver switch attached to the dust collector and turns it on automatically.

The web site for the *iVAC Pro* ivacswitch.com has tons of information to guide you along the path. *Rockler* has most of the parts available.

WOODPECKERS TRIANGLE

When I retired my tool belt and took up an apron I kept a small engineer's square in the front pocket. The triangle you see in the photo to the left has replaced the square. The laser engraved anodized aluminum triangles

are easy on aging eyes (so I've been told). It's a no-brainer to replace the sad little square I used before. You can guilt family members into pooling funds for this handsome gem.

If you're in the market, their whole line of tools is worth taking a look at. You can buy from *Woodpeckers* online at woodpeck.com and other online sources.

KREG DRAWER SLIDE JIG

I love metal drawer slides, they add so much potential to the space and operation of drawers. But I hate installing them. Period. Not much more needs to be said, other than this jig from *Kreg Tool* has calmed me down.

Kreg Tool's version of a drawer slide jig packs a lot of features into a pair of mirror-image brackets. The photos at left show how it works.

The jig works on frameless and face frame cabinets and accommodates most types of drawer slides, from epoxy-coated slides and side-mounted ball-bearing slides to under-mount slides. The drawer slide jig is available online at kregtool.com.

ROCKLER GLUE SPREADERS

So — glue spreaders. Let me tell you about some glue spreaders.

▼ This precision set of triangles from *Woodpeckers* is as cute as a bug's ear. That's only topped by how handy they are to have around.



▲ Clamp the drawer slide bracket to the case side. Rest the drawer slide on top while you drive the screws in place.



▲ Flip the drawer bracket around to support the drawer box to install the other portion of the slide with perfect alignment.

The scraper will make quick work of the dried leftover glue



All of the silicone application tools are available at Rockler.com

▲ The offerings you see above from Rockler make working with glue almost heavenly. The easy to clean silicone tips certainly do corral the messy part of the process.

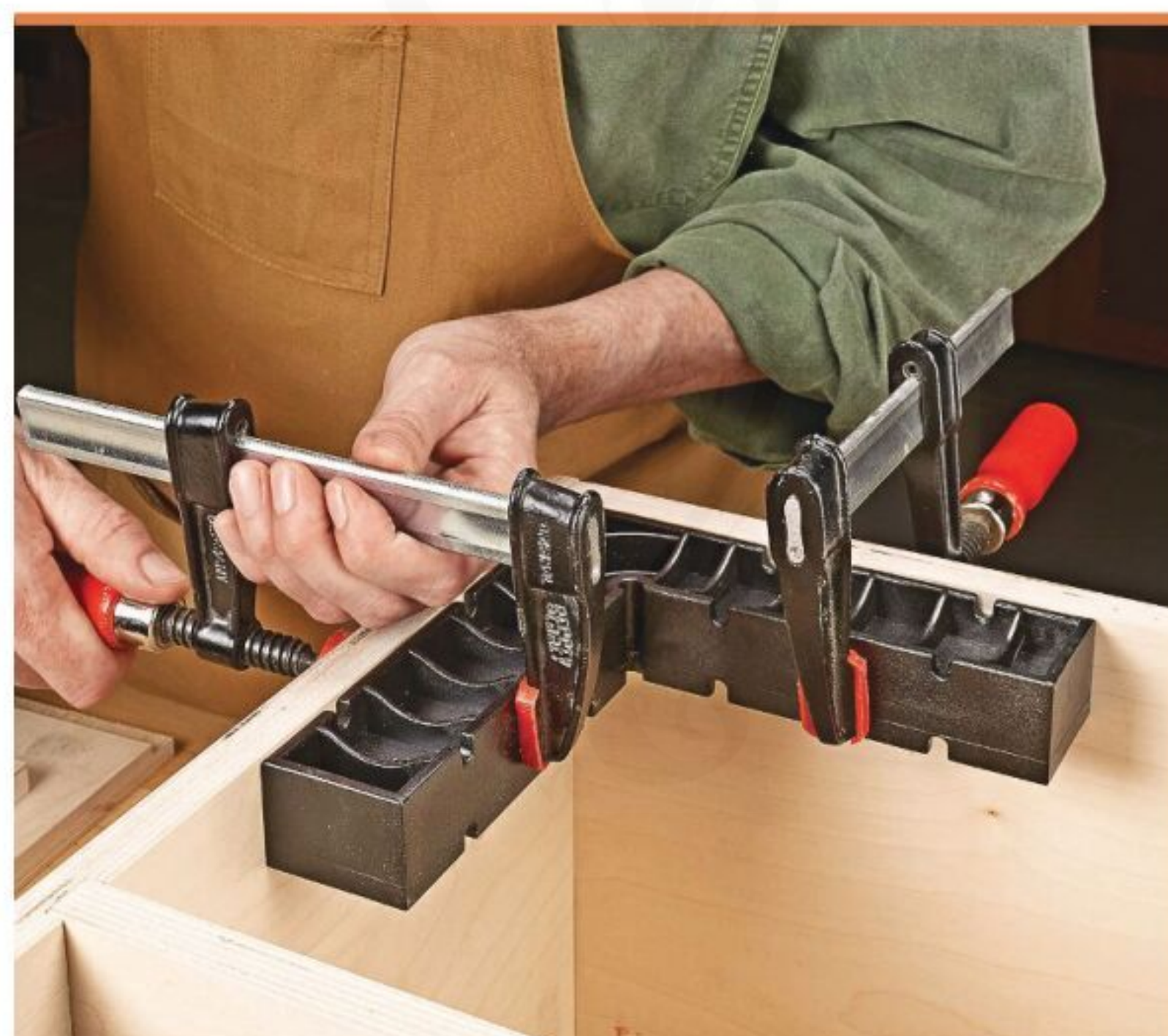
Over the decades here at *Woodsmith* we've received so many clever tips about the spreading of glue, and the discarded little bits of things you can use to spread the glue that we considered doing a book on the subject. No more. Game over.

Rockler has messed that up for all of us with the offering you see in the photos at the top of the page. It's the last glue spreaders you'll ever need. The flagship product is the glue brush you see in the glue tray. It spreads an even coat of glue where needed. The large spreader allows you to apply an even coat of glue over large surfaces quickly. The mini brush you see sitting on the spreader is ideal for applying glue inside dowel holes and mortises.

CLAMPING SQUARES

The *Square-It Assembly Square* from Rockler is a zen-like jig. It simply butts into the corner of an assembly and accepts a pair of clamps that hold the pieces in alignment against the square.

The square is designed with features to help whether you're clamping inside or outside corners. The clamps come in



▲ The *Square-It* assembly square is designed not only to confirm your assembly is square, it's an ally in the clamping process.

two sizes and an adjustable version as well. These darlings are available at individually or in sets at Rockler.com.

So that sums up the new and improved version of Great Gear. I want to take a moment to assure you that all of the reviews I do here, and the knuckleheaded opinions I express, are, sadly my own. And I assure you, I do not receive any sort of reimbursement from tool manufacturers. Questions? Insights? Do you want me to brag on a tool you love? Give me a shout at elage@aimmedia.com. 



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Making Modern Wooden Planes



▲ When starting with a blank, consider what size and style of hand plane is going to best suit you.

There are many metal hand planes available today, but they tend to fall into two categories: high-end and expensive or poorly made and cheap. This can be a deterrent for people looking to get into woodworking. Companies like *Lie-Nielsen* and *Veritas* make outstanding products, but the price is reflective of the quality and North American manufacturing. On the other end, we have what I call 'plane-like' objects that certainly appear to be hand planes until you try to adjust and use them. The vintage market can be a good source for decent quality tools, but you have to know how to tune them up as they almost certainly require fussing and repair to get them up to a usable state. Thankfully there is an affordable and quality option that many don't consider, and that is making your own wooden body plane.

THE EXPERIENCE

Making your own planes is one of the most gratifying builds you'll ever do. You're essentially building a tool out of wood that will help you build other projects from wood. Once you realize the power of this, you may rethink your hand tool set up. When you make your own plane, you control all the features: length, width, weight, bed angle, and style are all yours to decide on (photo at left). For example, when I was a student at Rosewood Studio, I built a project with long facets that required planing. My *Lie-Nielsen* #4 was too large and heavy for the task, so I made a small rosewood smoother that was perfectly suited to the task.

A new premium smoothing plane will set you back around \$300, depending on the make and model. A cheap version (the plane-like object) will be

frustrating to use and not worth the savings. Making your own planes is an inexpensive option and the tools you make will work every bit as well as a premium metal plane. A *Hock Tools* blade will set you back around \$60 and the wood can generally be had for around \$20 per plane. At those prices you can make a smoother, jack, and jointer for the price of one premium plane.

One of the best things about using wooden planes is the warmth they have in your hands. They are comfortable to use, and can be made to suit the way you work and even the shape of your hands. They also create a lustrous surface due to the wood-on-wood burnishing that occurs when the sole rubs against the workpiece.

MODERN STYLES

There are many examples of wooden planes in antiquity, but sadly these planes are typically in poor condition and beyond repair. There are also a handful of makers who are building new wooden planes, which is a great option if you don't want to take the time to make one yourself. James Krenov popularized what is now known as the "Krenovian" style plane. As you can see in Figure 1, this plane is made from multiple parts, creating a "sandwich" with two outer cheeks and an inner core made

from two pieces.

This style of building is popular because it is simple to do and can be done with a minimal tool set. Sandwich-style building is highly adaptable and can be used to make planes of many types and sizes. I've even built a pull-style Krenovian plane (Figure 2) that can be found in my second book (visit woodsmith.com/258 for more information).

MATERIAL. There are many choices when it comes to woods that you can use to make hand planes. The key to choosing a suitable wood is to pick something that will be hard-wearing and stable. The list of North American woods with these properties is relatively short, with white oak and hard maple being at the top in my opinion. It is possible to make a plane out of relatively softer woods, such as black cherry or black walnut, just be sure you add a hard-wearing sole.

The woods I favor for plane making are South American bocote, cocobolo, and jatoba, as well as African padauk and rosewood, though rosewood is getting more difficult to source due to being listed on the CITES Appendix II. When using exotic woods, it's important to consider the amount of natural oils within the wood. Some species, like cocobolo,



▲ The Krenovian plane is built by sandwiching together multiple parts. It's adaptable and easy to build, making this style a good choice when building your own plane.

have a lot of oil that can interfere with PVA adhesives doing their job. However, wiping down the glue surfaces with spirits before assembly will remove much of the oil and should result in a successful glueup.

ADJUSTMENTS. Wood planes oftentimes don't have mechanical adjusters, so all adjustments are done with a hammer. While a claw hammer could be used to adjust your fine planes, there is a much better option. I use a small wood mallet (Figure 3 below) to adjust my planes because it is lightweight and will be gentler on the wooden body. Heavier hammers make it easy to over-adjust planes and can damage the wood.



▲ Between the price of the blade and the wood, this pull-style plane set me back less than a third of what a commercial alternative would have, plus I could make it to suit my own preference.



▲ A light wood mallet offers a great amount of dexterity and control in its swing. When adjusting, make a pass across a scrap piece of stock after each tap to fine-tune your plane.



▲ In order to advance the blade, tap the back of it gently with the mallet. This sinks the blade down for a deeper cut.



▲ Tapping the rear of the plane will cause the blade to retract. To remove the blade entirely, tap repeatedly until the wedge releases it.



▲ Once the blade has reached the correct depth, tap gently on the sides of the blade to center the blade.

The head on this hammer is relatively small which makes it easier to strike the various areas on the plane and blade. The adjustments are straightforward. Hammer taps to the back of the blade (Figure 4 above) will advance the blade and taps to the rear of the plane body (Figure 5) will retract the blade. Repeated taps to the rear of the plane will dislodge the wedge and release the blade. Lateral adjustments to center the blade are achieved by lightly tapping either side of the end of the blade (Figure 6).

SET UP. To set the plane up for use, place the blade onto the bed, then position the wedge in place and tap it home with the hammer. If the blade is sticking out from the bottom, gently tap the back of the plane body to retract the blade. Keep in mind that the hammer taps will also

relieve a bit of pressure on the wedge, so give the wedge a light tap to reseat it (Figure 7).

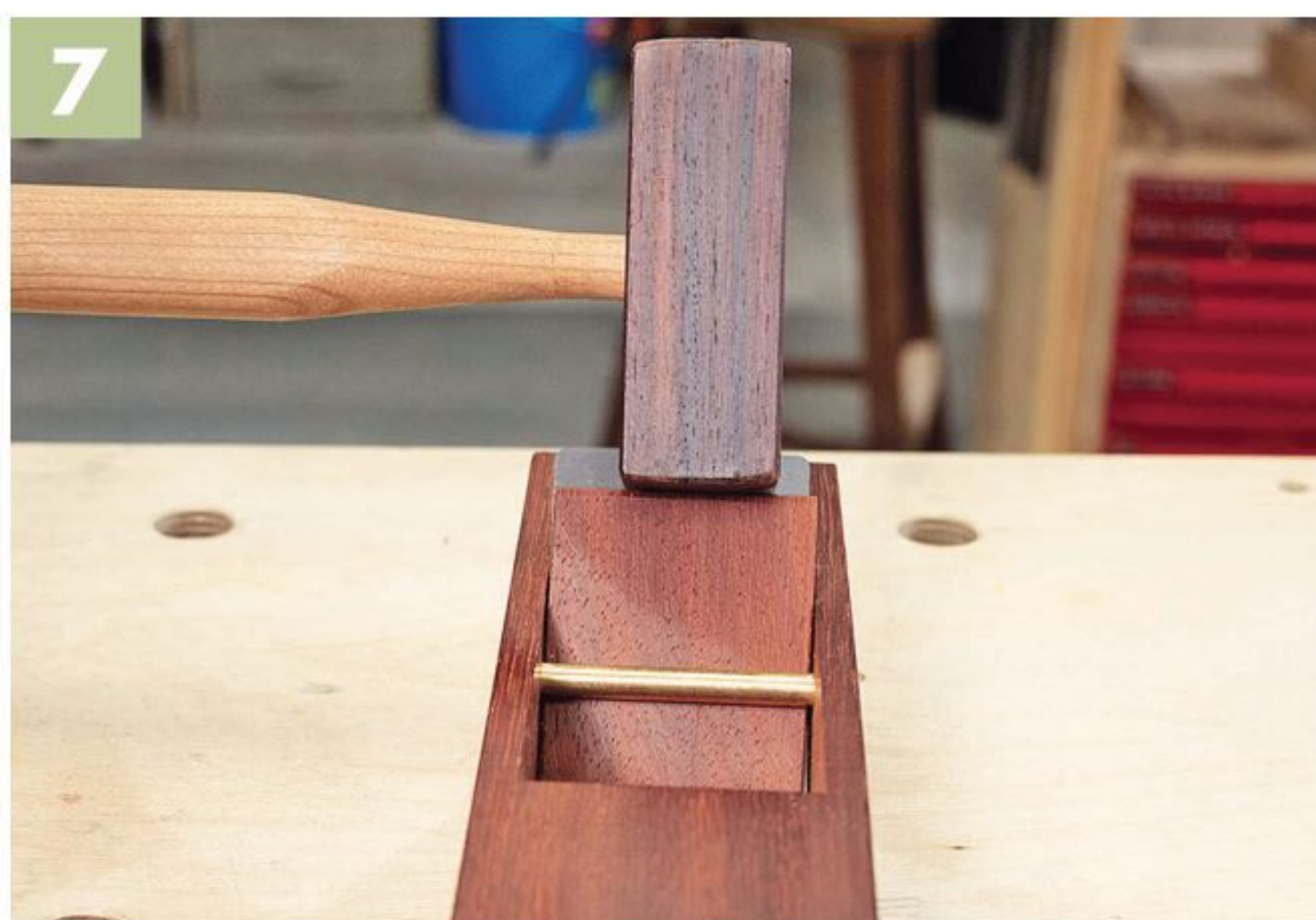
Adjust the blade forward with light taps to the back of the blade until the desired depth of cut is reached. Then adjust with lateral taps to make any blade position adjustments. Always follow any adjustment to the blade with a light tap to the wedge to ensure the setting is locked in.

When it comes to removing the blade, there is an important point to note. When striking the back of the plane body to remove the blade, the wedge loosens, and the blade is free to slide out of the bottom of the plane and onto the floor or a project you are working on. To avoid this, keep pressure on the wedge and blade with your thumb while tapping the plane body (Figure 8).

MAINTENANCE

There is a myth suggesting that wooden planes require a lot of maintenance and therefore are a nuisance to own. The truth is that they do require a bit of maintenance, but it's nothing dramatic. The maintenance centers around keeping the sole flat. If you live in an area of the world where there are large relative humidity swings, then you will likely have to flatten your sole a few times a year.

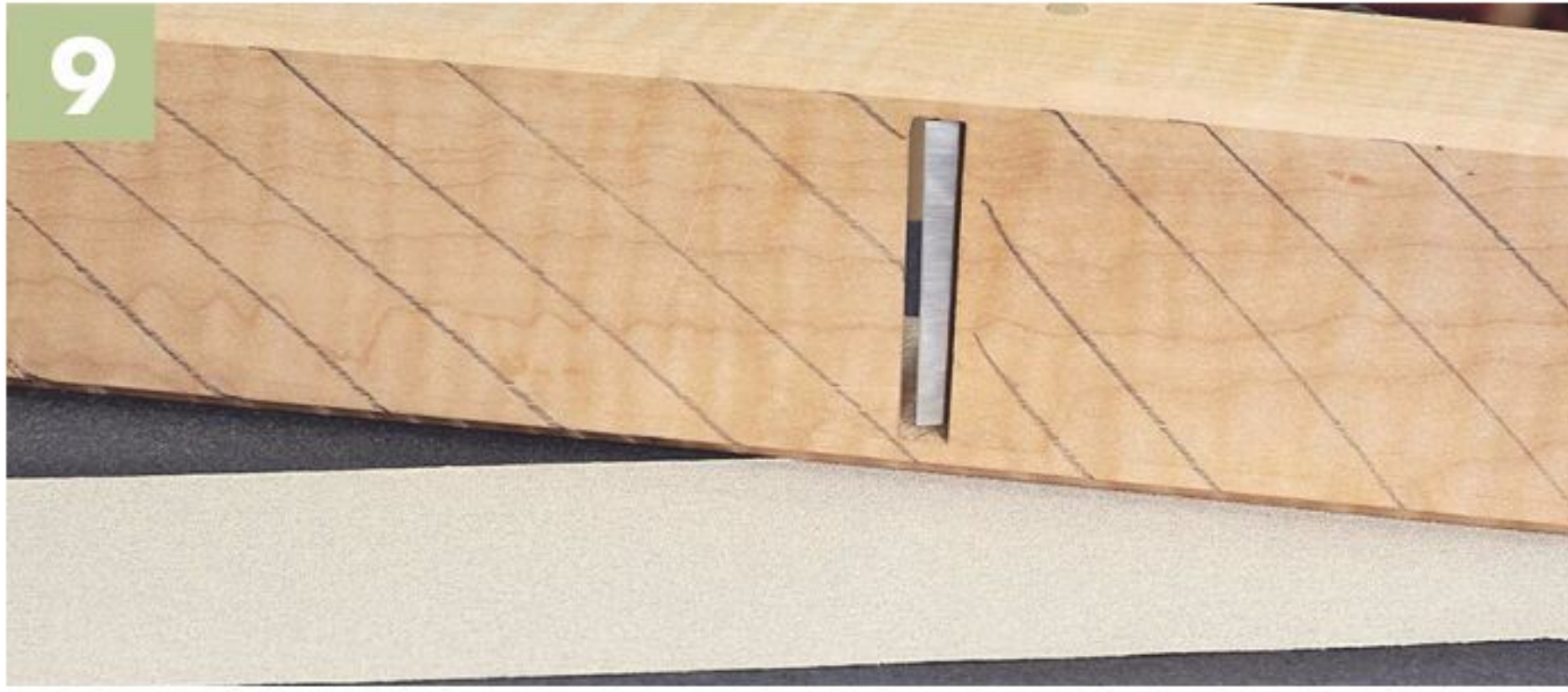
The process only takes about a minute or two. Start by adhering 150-grit sandpaper to a flat surface, such as a machine table or a flat piece of MDF (or other sheet material). Set the plane so that the iron is backed off completely and the wedge is set in place. It's vital that the blade wedge stays under tension while flattening to keep the whole plane in tension. The



▲ The movement caused by tapping will cause the wedge to loosen. In order to restore its grip on the blade, give a light tap to the top of the wedge after adjusting.



▲ When removing the blade, be careful not to let it slide out of the bottom onto a workpiece or the floor. Use your thumb to keep the wedge and blade in place.



▲ Marking the sole with a soft pencil will help you keep track of how much material is being removed, to avoid taking too much off your sole. Once the marks are gone, you're done.



▲ Work the plane back and forth over some sandpaper. Using the same force and technique here as you would when planing will get you the best results.

body deforms slightly when under pressure, which changes its shape, so if you flatten the plane without the wedge in place the sole will come out of flat when the plane is set up.

Once the plane is set, run some soft pencil marks across the sole, as in Figure 9, then pull/push the plane on the sandpaper using the same grip and pressure you would use

while the plane is in use, as in Figure 10. Keep watch on the pencil marks and stop once the marks are gone. That's it! A couple of minutes a couple times a year is hardly what I would call a nuisance.

MOUTH INSERT. After years of flattening, the mouth can start to open which will make it less suitable for fine work. You have a couple of choices when this happens. You can leave the mouth open and use the plane for more coarse operations like scrubbing, or if you want the plane solely for fine work, you can inlay a small piece of wood in front of the mouth to reduce the gap (Figure 11). It takes me about an hour, but keeping a plane is well worth it to me. **W**



▲ When the mouth of a plane begins to open, the surface it leaves behind will suffer. At this point, the plane can be retired from fine work, or the mouth can be inlaid with a small wood insert to return it to its former glory.

MAKING THE WHOLE FAMILY

Making your own planes is not limited to bench planes. Wooden routers, grooving planes, and other specialty planes are extremely handy in the shop. It allows you to make custom tools that are designed to work the way you do. For example, for installing bottoms in drawers I often find myself needing a 6mm groove that is 6mm deep and offset 6mm from the edge of a board. So instead of playing around with an adjustable plow plane (when working with hand tools), I made a fixed grooving plane to cut the groove to the

dimensions that I wanted (photo to the right.)

Wooden planes and tools can be extremely useful in the shop. You can design them to suit the tasks you do and can save you a bit of money – money you can use to buy more wood to make more projects! I feel that it bears mentioning that making your own tools can be addictive. Before you know it, you will have more planes than you know what to do with. That being said, they make a fine gift for that woodworking friend who has everything.



▲ Once you've practiced your hand at bench planes, moving on to more specific planes can be a fantastic follow-up. These can challenge your woodworking skills even more, and be made for exactly what you need.

Tenoning with the Router



▲ All you need for quick and accurate tenons on workpieces of any size is a router and a handy jig.

Mortise and tenons might be my favorite joint. They're strong, reliable, and easy to hide if you don't want to see them (though I've always enjoyed the look of through tenons myself). Tenons aren't too hard to make most of the time. I tend to cut my tenons on the table saw, as it usually goes pretty quick. However, when it comes to long or oddly shaped workpieces, tenons can get a little more difficult.

The project I'd been working on was coming along nicely, but the next step presented a real

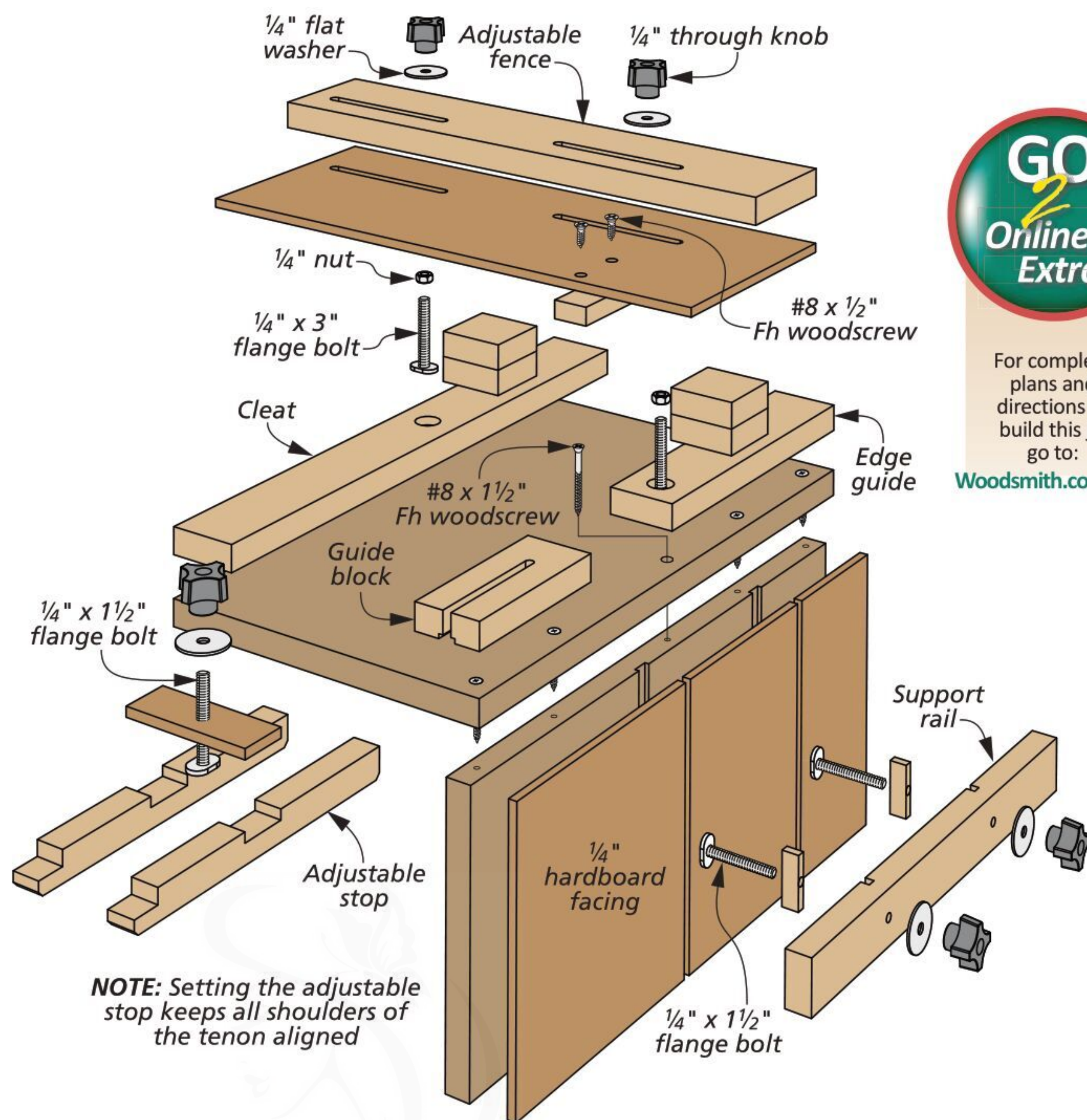
challenge — cutting a tenon on the ends of several long rails. At the table saw, I would have to set up a support to keep it balanced, and even then the leverage can cause a piece to twist away from the miter gauge when cutting.

While brainstorming how to fix this problem, I had an idea: what if I could move the cutter instead of moving the piece? What if I could just clamp the piece down and rout the tenon? Thus this jig was born.

TENONING JIG. There are three major parts to this jig: the fence, the adjustable stop, and the

base (which includes the cleats and edge guide). It features an adjustable support rail, as well as a double-sided adjustable stop. The base is "L" shaped to fit over the side of your bench. This gives the tenoning jig two ways of cutting: one for the cheeks and one for the edges. In both methods the workpiece is held in place while a fence guides the router. To cut the cheek, the workpiece is held flat in the top part of the jig. To cut the edge, the workpiece is placed against the side of the jig.

Though this jig was created for longer pieces, it's also built to work on pieces of varying size. Thanks to the support rail and fence, the jig can hold long or short pieces while cutting tenons of varying sizes. Even better, the adjustable stop ensures that the shoulders are perfectly aligned all the way around the tenon, and that multiple tenons will all be identical.



For complete plans and directions to build this jig go to:
Woodsmith.com/258



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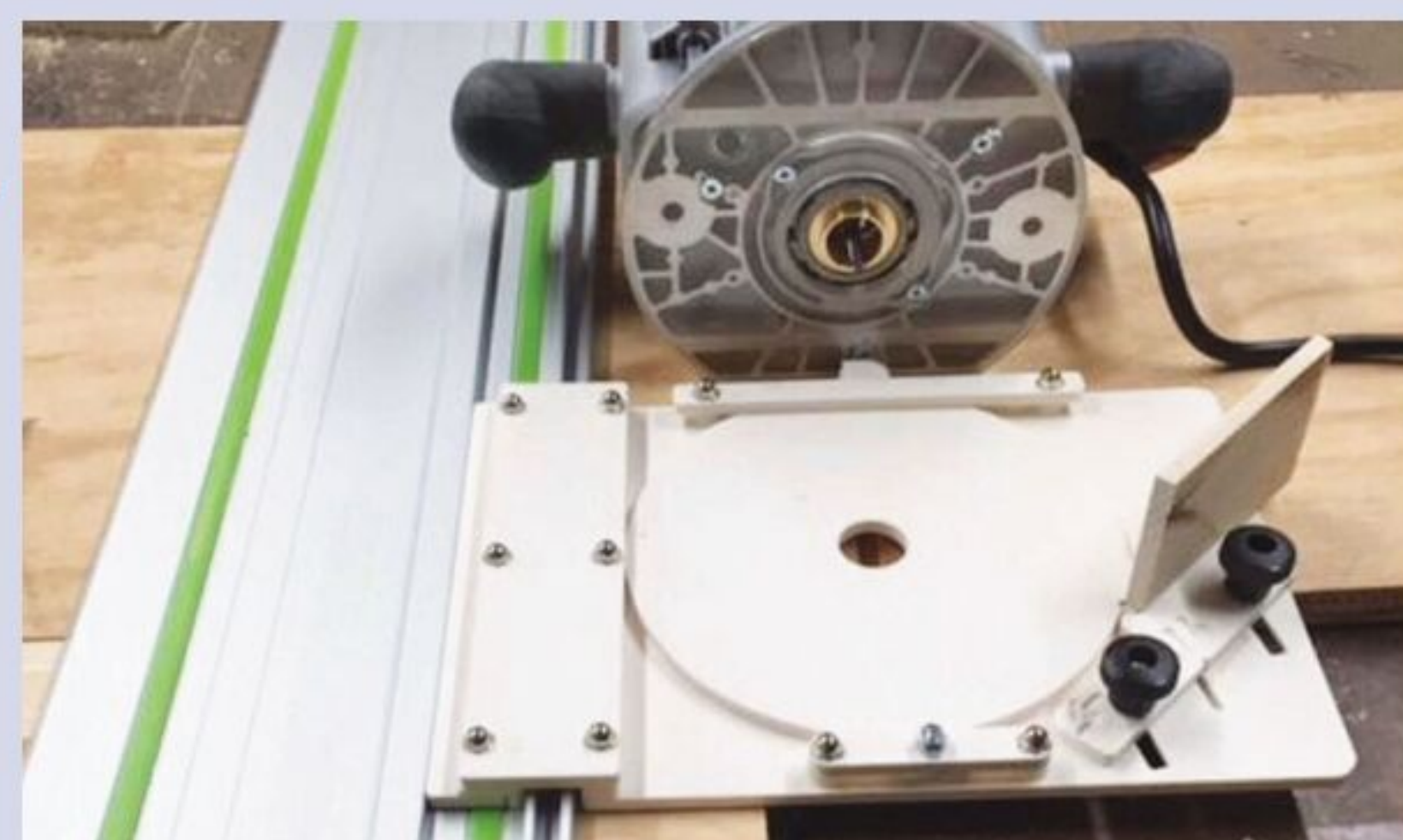
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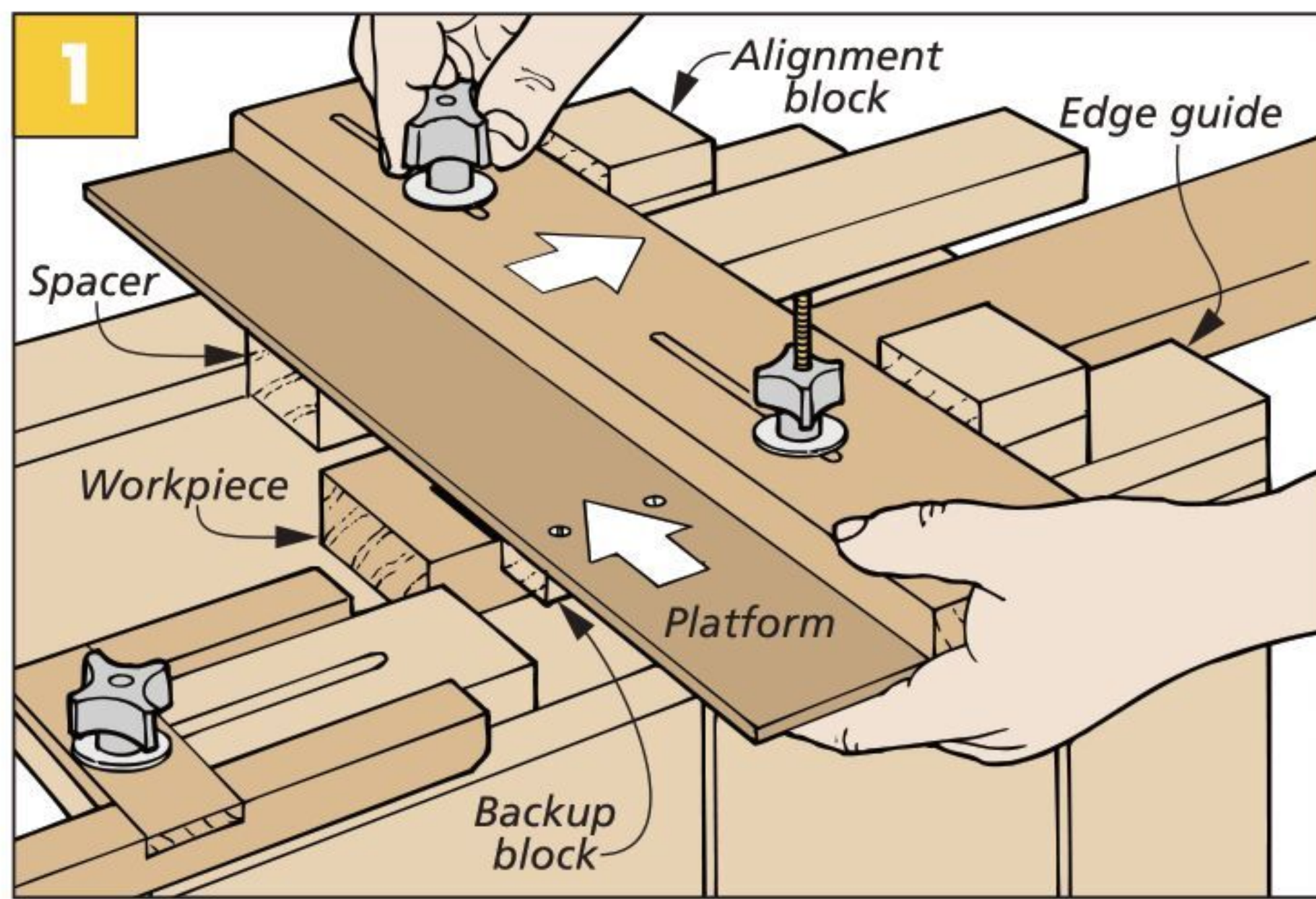


What can we help you make today?

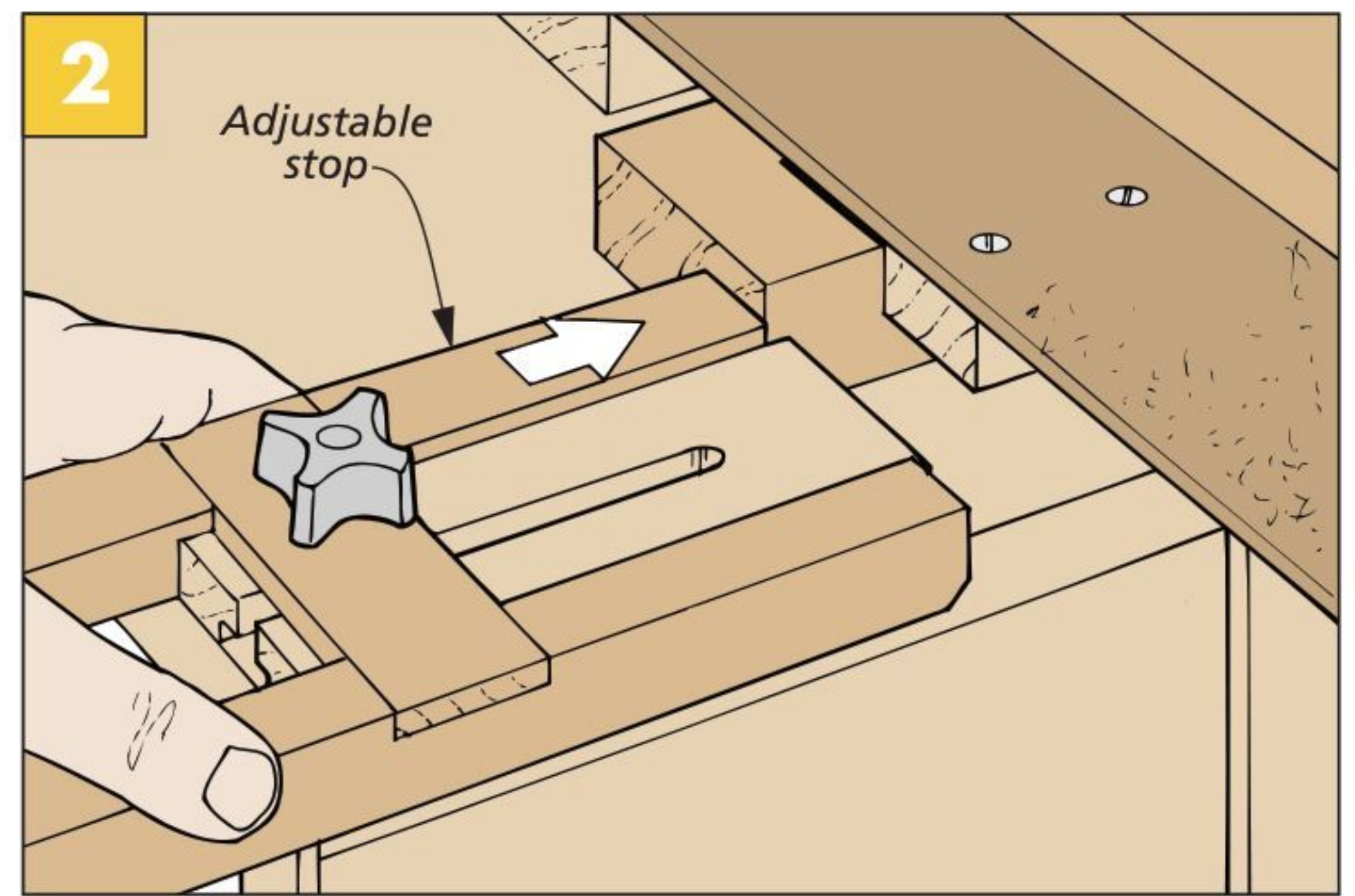


Get precise dados with your router & our Dadright™ Jig. Versions available for ProGrip™ style clamps, Festool™, Makita™, TrueTrac™ and more.

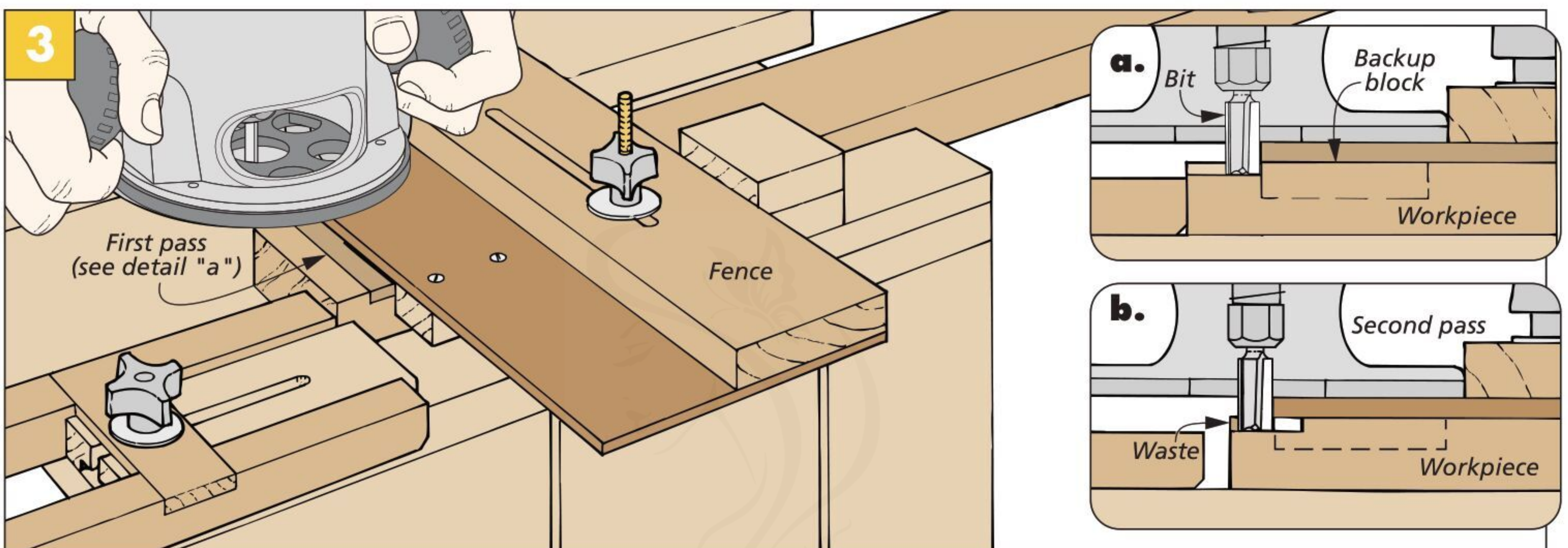




Position the Workpiece. After positioning the workpiece in the jig, slide the fence forward until the backup block butts up against it. Tighten the fence to lock it in place.



Set the Stop. Now slide the adjustable stop against the end of the workpiece and lock it in place. The stop ensures that all four shoulders align.



Cut the Cheek. With the base of the router riding against the fence, cut the shoulder of the cheek first (detail 'a'). If you need to make additional passes to complete the

tenon, loosen the fence and slide the workpiece away from the top (detail 'b'). To finish the cheeks, flip the workpiece and repeat the process.

USING THE JIG

One nice thing about this jig is you can set it up and rout a tenon in a matter of minutes. Once everything is set, just start with the cheeks, then go to the edges.

CUTTING THE CHEEKS

First, I laid out one of the shoulders of the tenon and made a single line across the face of the workpiece. A square-shouldered cut depends on two things: the position of the workpiece in the jig and the location of the fence.

SETUP. The fence should be square to the edge of the workpiece. To ensure this, I placed the workpiece against the edge guide and pushed the fence against the alignment blocks.

Since the blocks are square to the edge guide, this is all that's needed to square up the fence.

To make sure the router bit cuts precisely along the shoulder line, I slid the workpiece in until the shoulder aligned with the reference edge. Then I slid the fence forward until the backup block contacted the workpiece (Figure 1 above). There's a risk of chipout as the bit cuts through the edge of the workpiece, but having the backup block against the piece will support the wood fibers and reduce chipout.

Next, I took a piece of scrap the same thickness as my workpiece and slid it under the unsupported end of the fence before tightening it down. Using a

chunk of scrap as a spacer helps the fence apply even pressure once it's tight.

ROUTING. The fence locks the workpiece in place so you can rout the first shoulder, but how do you get the shoulder on the opposite side to align with it? The jig features an adjustable stop, making it easy to get the exact same setup for the other cheek (Figure 2).

With the adjustable stop set, rout the cheeks. Some tenons may need a few passes to remove all the material. I found the best way to get this was to establish the shoulder first, then loosen the fence and slide the workpiece back for each subsequent pass (Figure 3). Remember to use the

same bit here as you used to cut the reference edge. Along with this, remember to keep the same point on the router base in contact with the fence for each pass to stay consistent.

CUTTING THE EDGES

With the cheeks cut, you can turn to routing the edges of the tenon. While the process of cutting is the same, the setup here is slightly different.

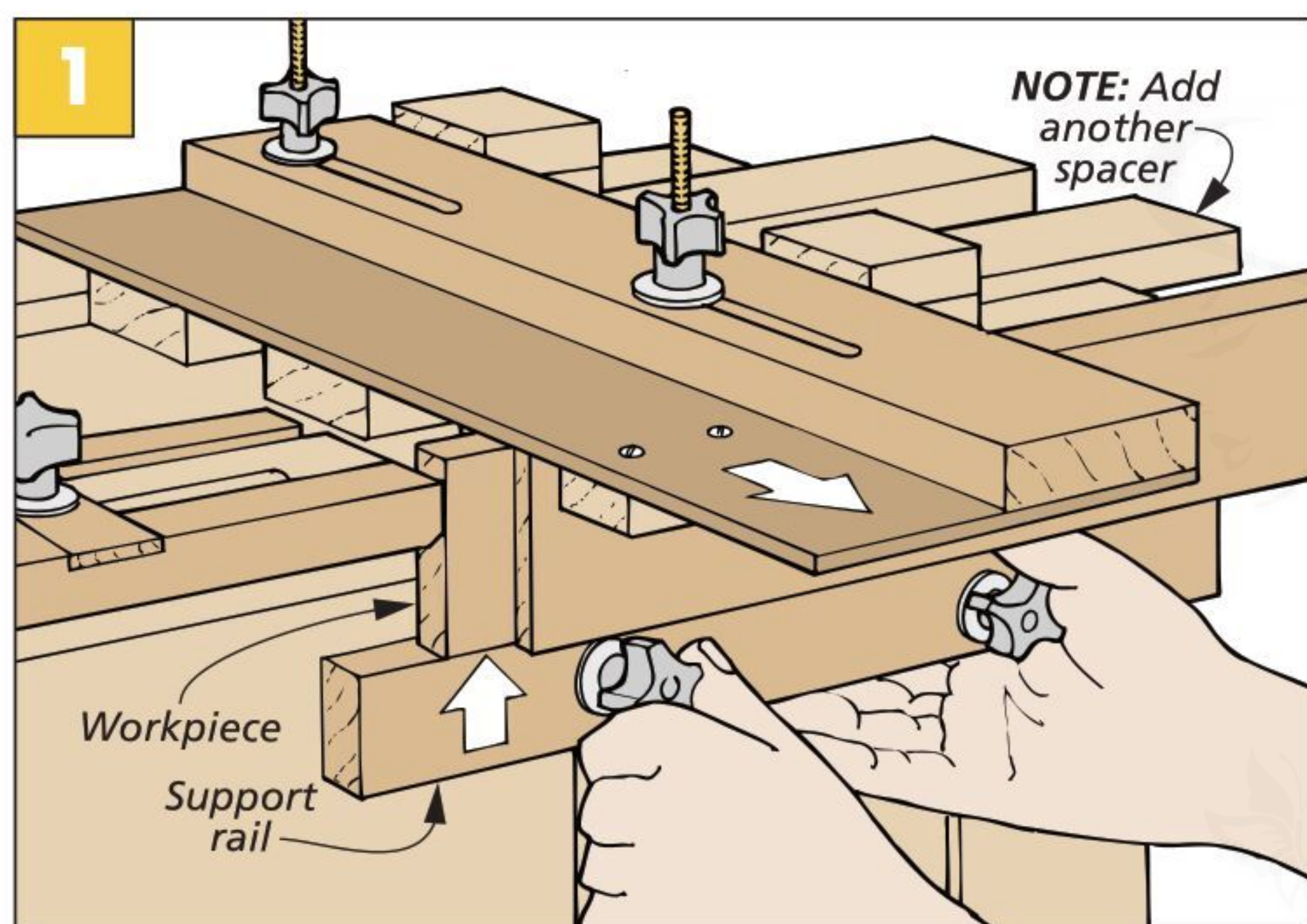
FINISHING THE TENON. I first set the piece on the support rail and raised the rail until the top edge of the workpiece butted against the platform (Figure 1 below.) Tightening the knobs locks the rail in place while you rout.

To make sure the fence is parallel to the base, slide a second spacer underneath the fence. The workpiece also needs to be flat against the side of the jig, so slide the end of the workpiece against the adjustable stop, then push the fence over until the backup block is against the workpiece. The stop will keep all the shoulders aligned. Now tighten down the fence and the support rail.

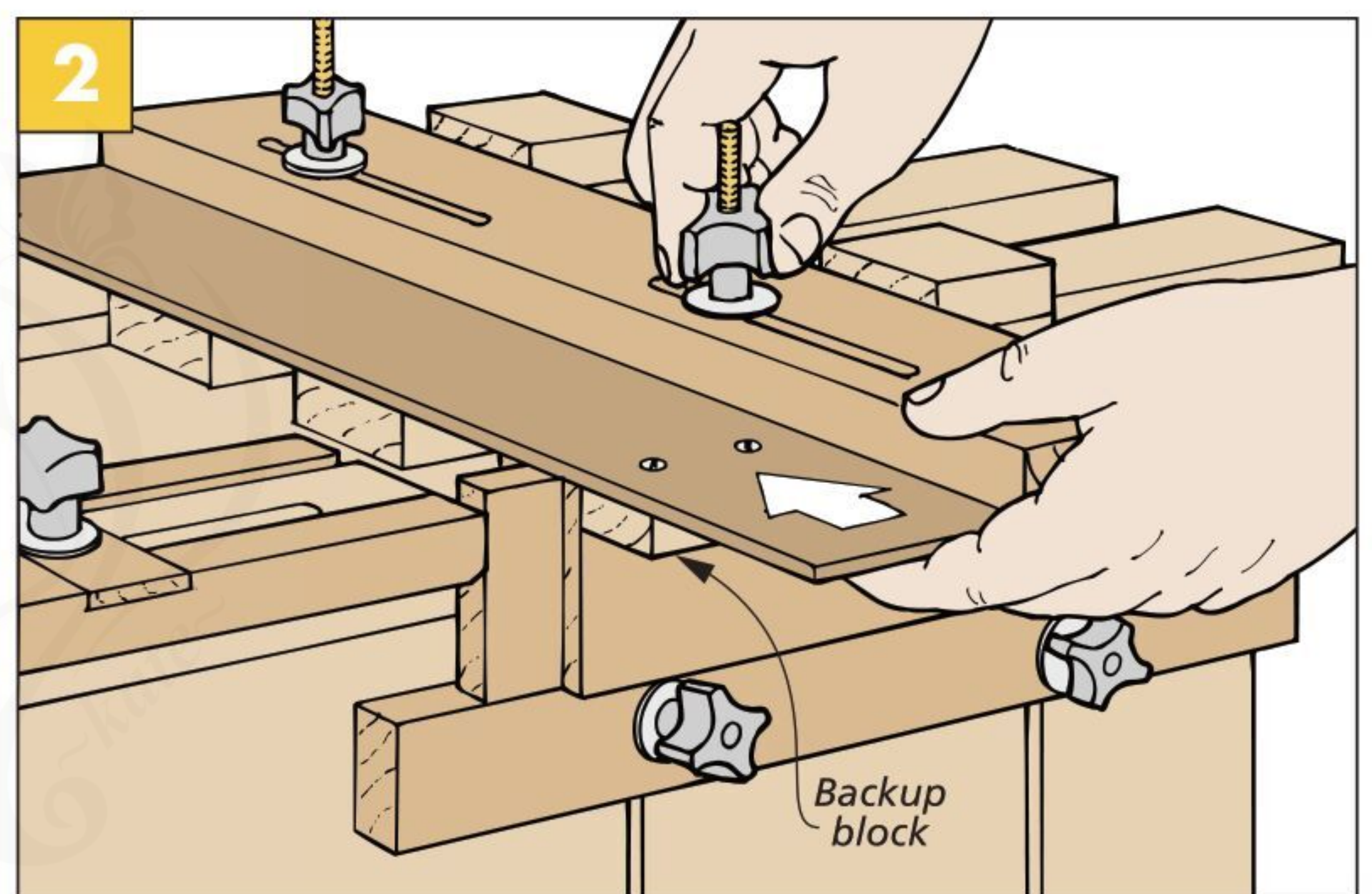
At this point, it's just a matter of routing the edges. As with the cheeks, some pieces may require several passes. After I had the first edge finished, all I needed to do to complete my tenon was flip it over and repeat the process.

With all this in mind, what's the advantage of using this jig and a router instead of the table saw when cutting tenons? Aside from being able to cut pieces that would be a pain on the table saw, I found that this jig truly excels in speed. It really shines when you need to cut a number of identical tenons for a project.

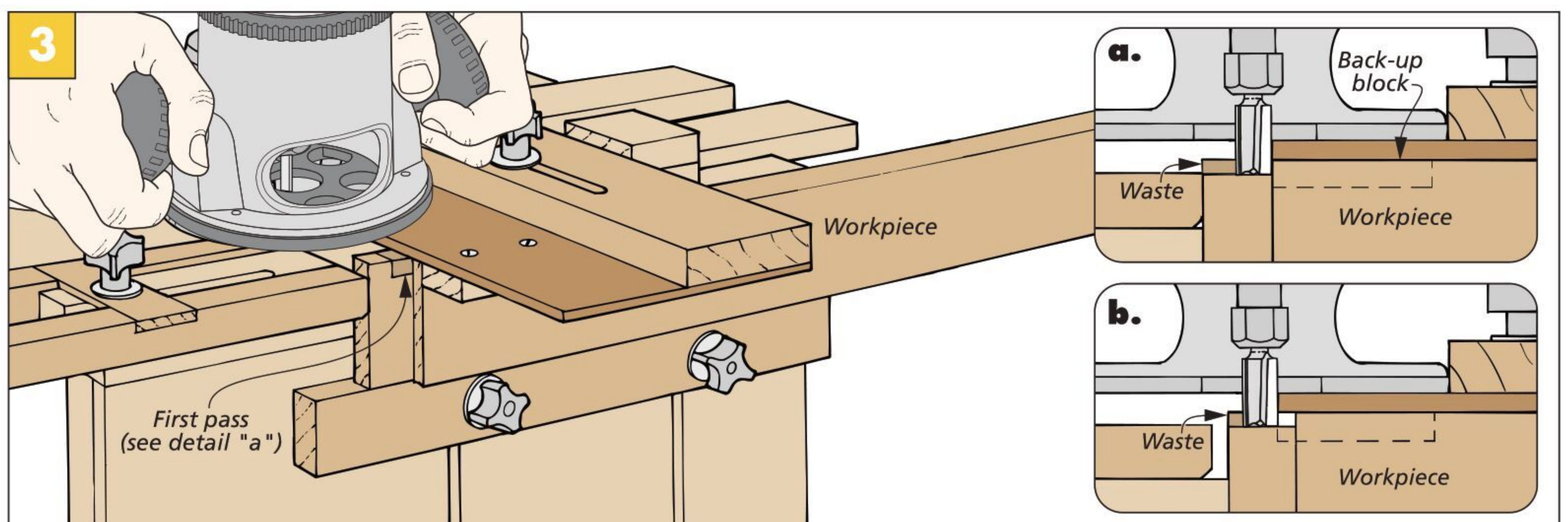
Additionally, by using the adjustable stop, you can be sure that your tenons will all stay a consistent size without much fiddling at all. The jig is an easy way to cut reliable tenons, and it's so simple that you may find yourself bringing it out again the next time you've got a project with mortise and tenons. **W**



Support Rail. Keeping the stop in place, butt the workpiece up against the platform and the stop. Locking the support rail holds the workpiece in place.



Backup Block. Slide the fence until the backup block contacts the workpiece, then tighten the knobs to lock the fence. The backup block helps keep the piece flat and prevents chipout.



Establish the Shoulder. Again, it may take several passes to rout the edges. Start by establishing the shoulder on the first pass (detail 'a'), then loosen the fence and slide the workpiece

away from the stop for each pass after (detail 'b') until all the material is removed. To complete the tenon, repeat the process on the opposite edge.



Industrial Bookcase

This bookcase, built in the industrial modern style, works well in any room with its minimalist, open aesthetic.

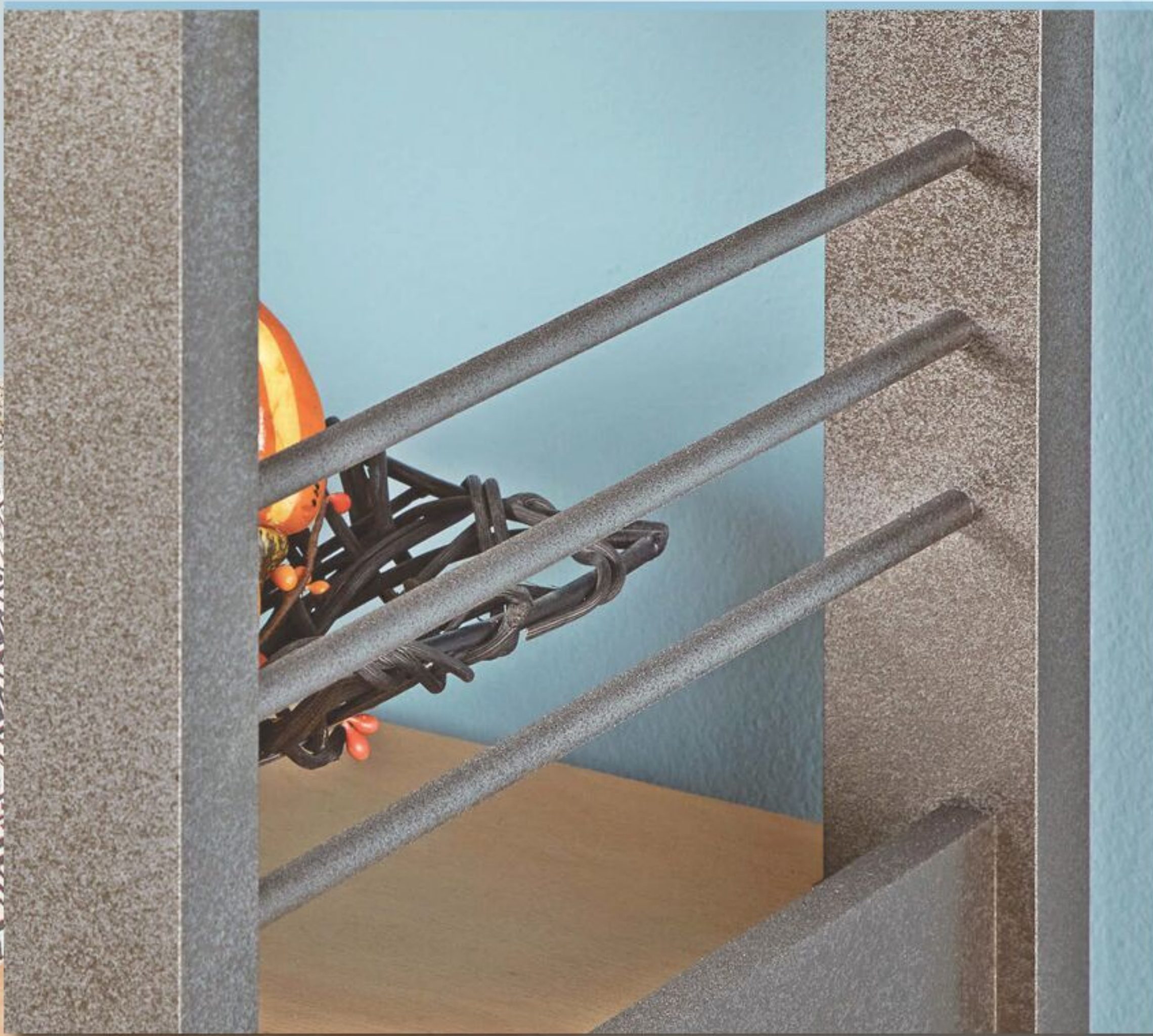
Necessity is the mother of invention. The industrial modern style rose to popularity within the last fifteen years, as populations grew where no new housing could be built. In response, old and abandoned buildings were renovated into living spaces. These commercial and industrial buildings often featured exposed structural elements (brickwork, beams, ducts, piping) that weren't considered conventionally attractive in a home. The time and effort that would be needed to hide these elements was considerable in a lot of cases, leading many people to choose to live with them instead. The old raw and rough elements were left there, while sleek, chic designs were introduced to juxtapose them. This look became the industrial modern style, and what is often hidden in other styles is a key part of this look.

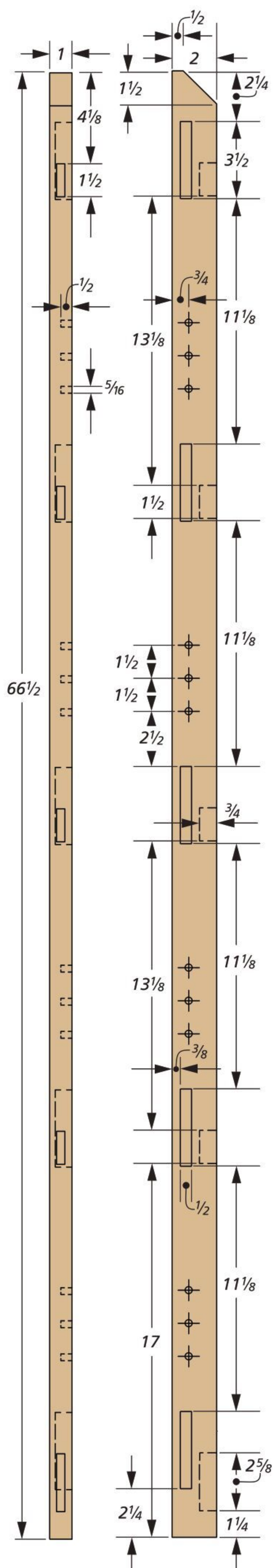
In attempting to capture the style, our creative director, Chris Fitch, created this industrial bookcase. The steel rods and wood wheels evoke the repurposed aesthetic, yet the bookcase itself strives towards clean minimalism. The body of the bookcase was painted with an "aged galvanized" image in mind, while the wheels and shelves are oiled and lacquered for a smooth contrast. The rails, slats, and posts of the bookcase are all held together by mortise and tenon joints, making this piece surprisingly sturdy. The bookcase offers an informal feel that's sure to find a home in any room in the house.



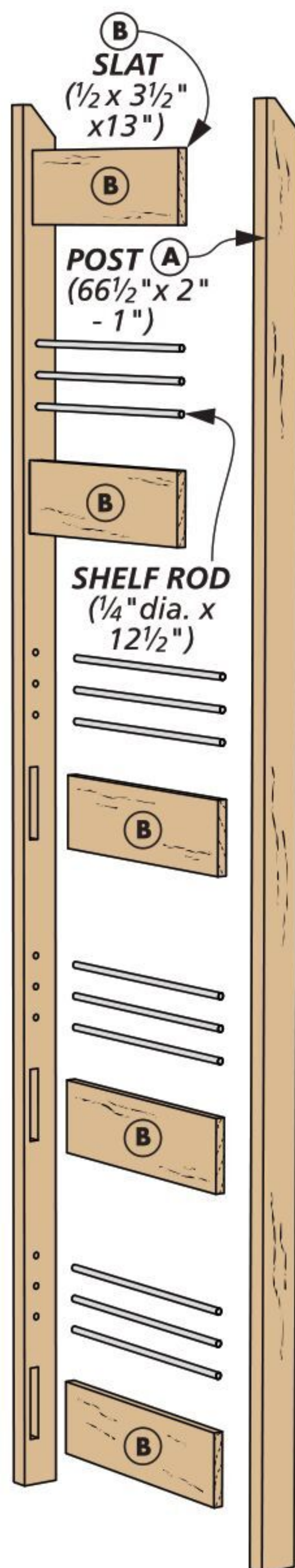
▲ Reflecting the industrial design, the bookcase sits on wheels bolted to the lower rails. The bolts allow the bookcase to be moved easily, while providing enough resistance to keep it from rolling on its own.

▼ Steel rods form the ends of the shelves, keeping your books safe from falling off while emphasizing the exposed, geometric designs that the industrial modern style is known for.





NOTE: Posts are made from 1"-thick hardwood. Slats are 1/2"-thick hardwood



Assembling the FRAME

To begin building the bookshelf, I started with the frame. The posts are joined on two sides by the shelf rails, using mortise and tenon joints. On the other two sides, the posts are joined by steel rods and slats which fit directly into the posts.

POSTS. First I focused on making the posts. Two sides of each post will be full of mortises, and when it comes to cutting that many mortises, I always prefer using a router jig. (You can find the one I used in the box below.) Once you've cut the mortises into the posts, square up the corners with a chisel. The slats will fit directly into the mortises — no tenons — so sizing the slats to fit the mortises is important.

With the mortises done, I took the rails over to the drill press to bore the holes for the rods. Once those were finished, I mitered the top inside ends.

SLATS & RODS. Next, I cut the steel rods and the end slats to size. To keep things simple, I decided to put together the end assemblies before moving to the rails.

END ASSEMBLIES. Get stretched and get yourself a bowl of warm water and some rags, because it's time to do a glueup. There are more than a few pieces to the end assemblies, and because of that I found liquid hide glue to be the best choice. It's slow to set and the wet glue actually lubricates the slats when you're inserting them. A bit of paste wax on the ends of the steel rods helps ease them in as well. I used a mallet to help insert the rods in the holes, then fit the slats into the mortises.

Once the slats and rods had been inserted, I put on my clamps and let them tighten everything in fully for me, using a few pieces of scrap to make sure they wouldn't bite in. Here's where a slow-setting glue is invaluable. It gave me plenty of time to make sure the end assemblies were square. After wiping up any squeezeout, let the glue do its work. In the meantime, you can move onto the rails, which will join our end assemblies to finish the frame.

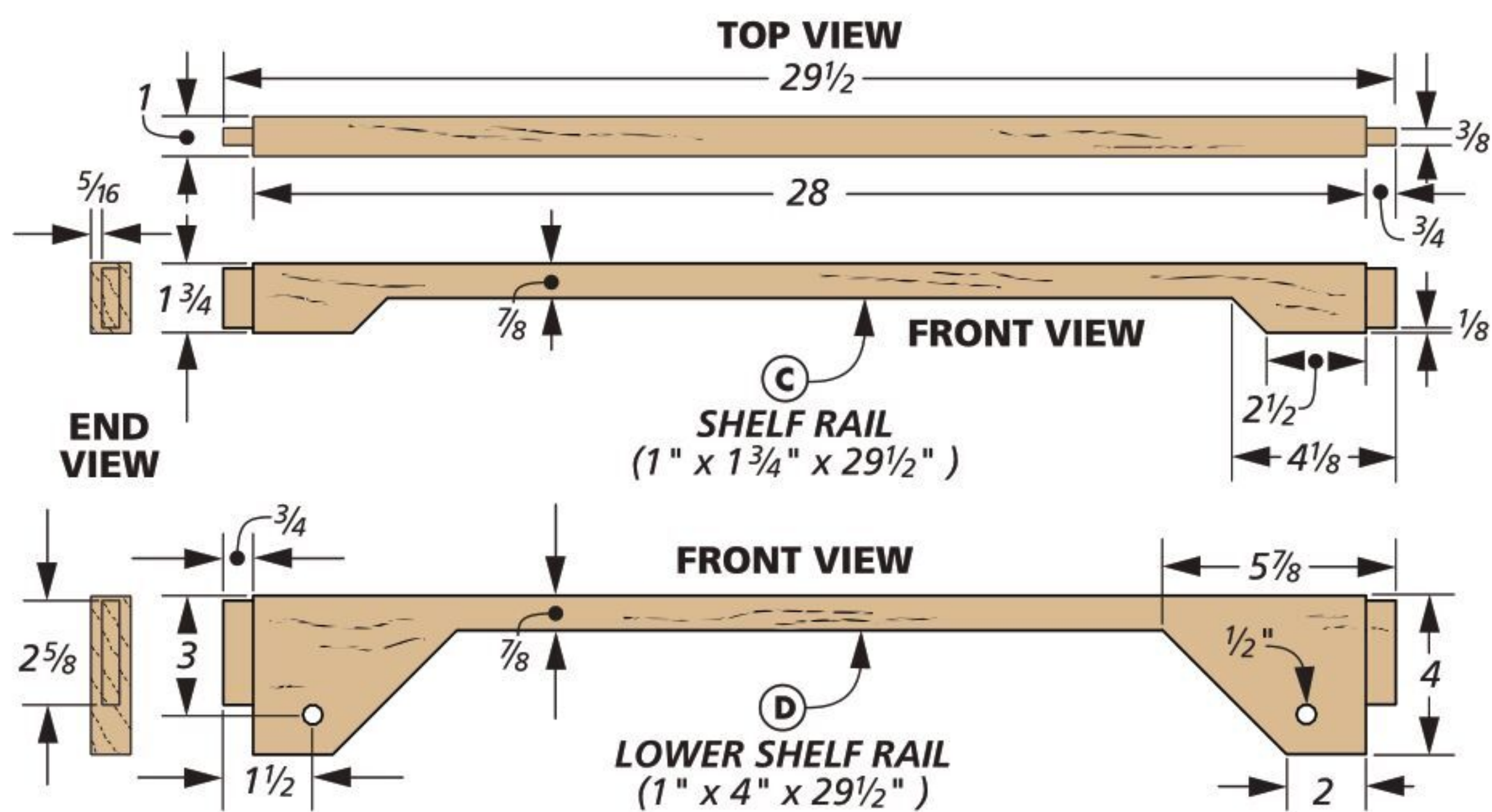
MAKING FORTY MORTISES

Mortising Jig. This jig is made to replace the baseplate of a plunge router. Using adjustable guides on the bottom, the jig keeps your router in line with the piece while you rout, so all you need to focus on is achieving the right length and depth. After doing a little squaring with a chisel, I had all forty mortises in my posts.



For plans and details on this mortising jig, go to:
Woodsmith.com/258





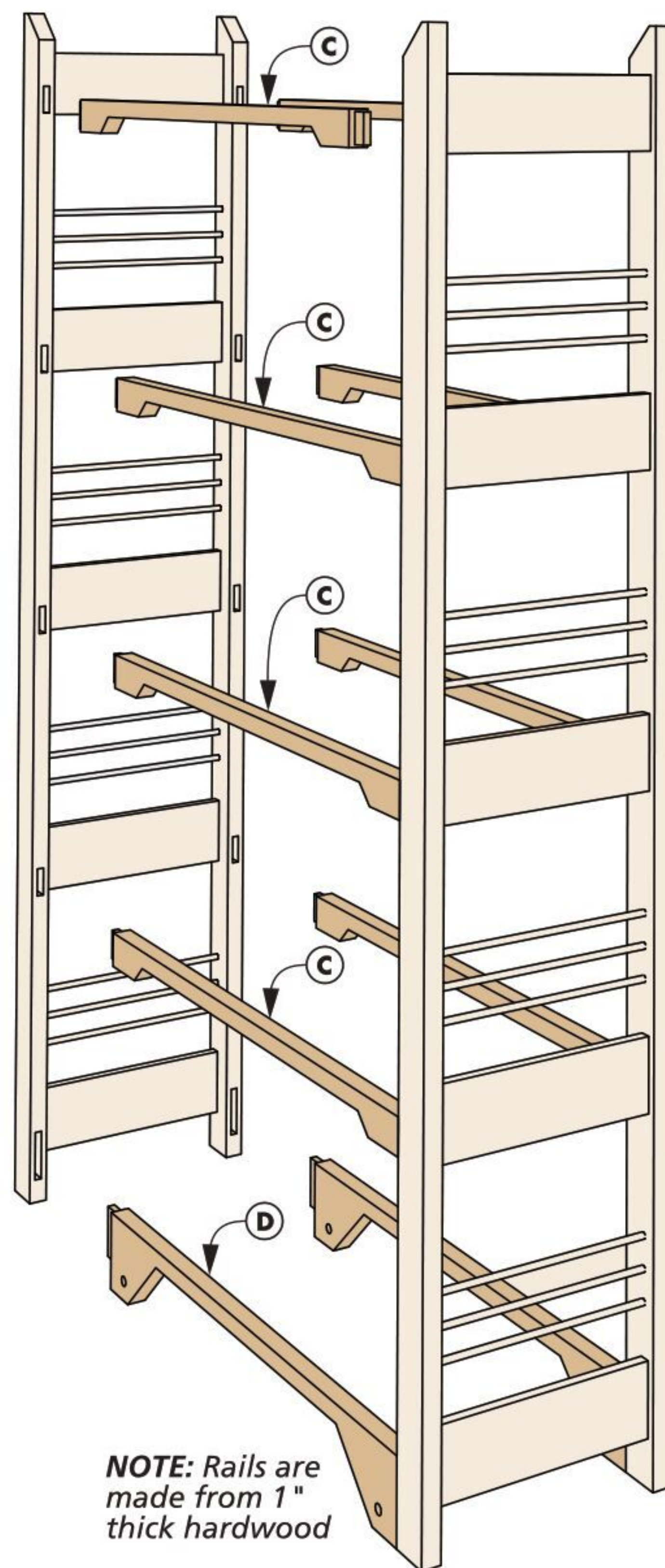
CONNECTING THE ENDS

The end assemblies are connected with a total of ten rails. As you can see in the main drawing above, eight of these will be the thinner upper rails, while the two lower rails are thicker, with holes drilled to accept the bolts for the wheels later on. To achieve the bridge-like shape of the rails, I took a trip to the band saw where I roughly cut out the shape I wanted. Despite the length, it wasn't difficult to get the approximate shape. After that, I used a pattern bit on my router (along with a straight piece of scrap to keep me in line) to achieve the final edge.

TENONS. To make the tenons, I used a $\frac{3}{4}$ " dado blade on the table saw. You'll need an extra-long auxiliary fence on your miter gauge when cutting the cheeks of the tenons to support the shoulders, as shown below.

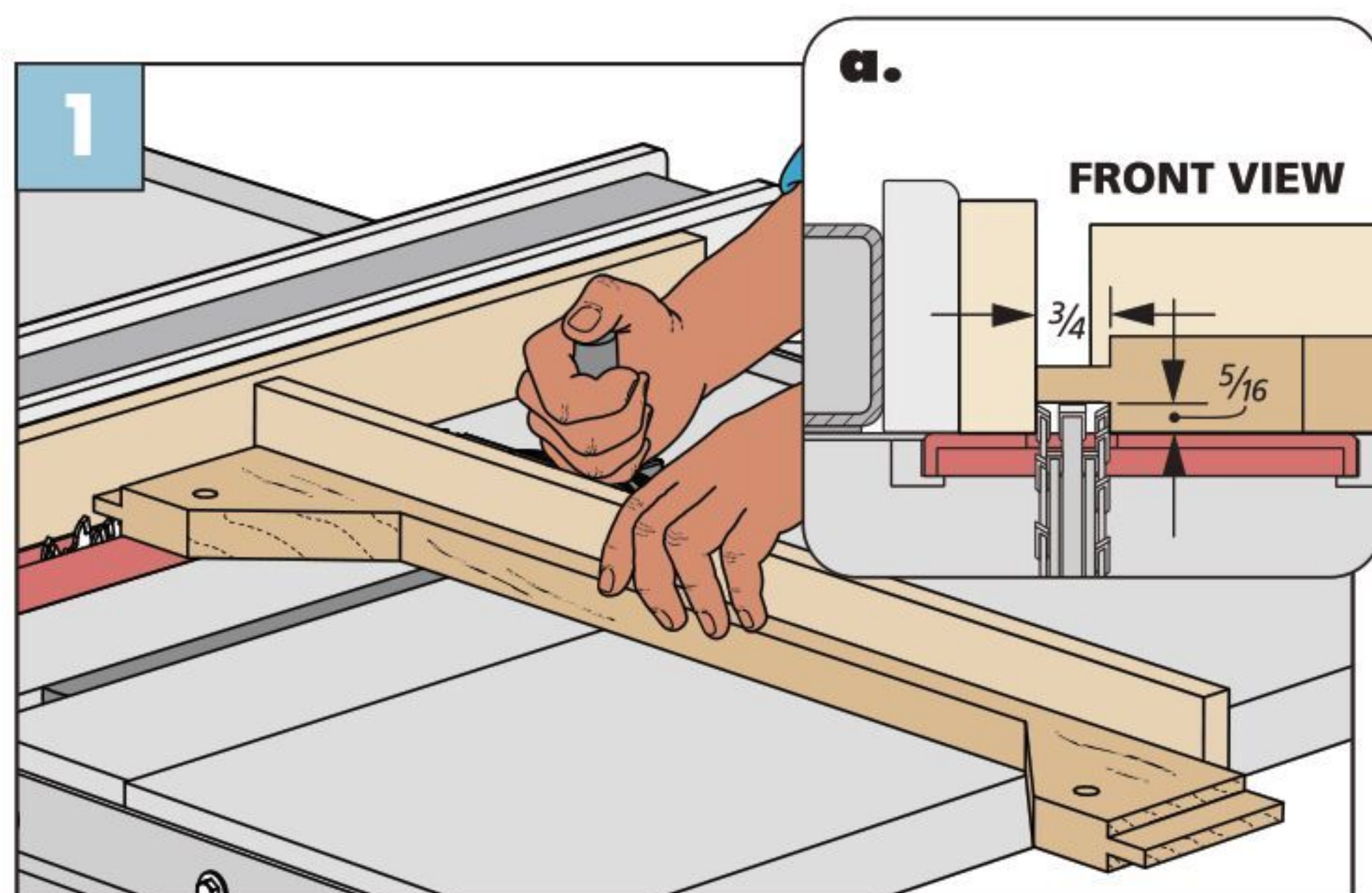
With the tenons cut, there's just one more thing to take care of on the rails. Head to the drill press and drill out the holes for the wheels.

FRAME ASSEMBLY. With the end assemblies and rails ready, it's time to glue the tenons into their mortises on either side. Again, I chose to use hide glue to give myself enough time for both assembly and squaring.

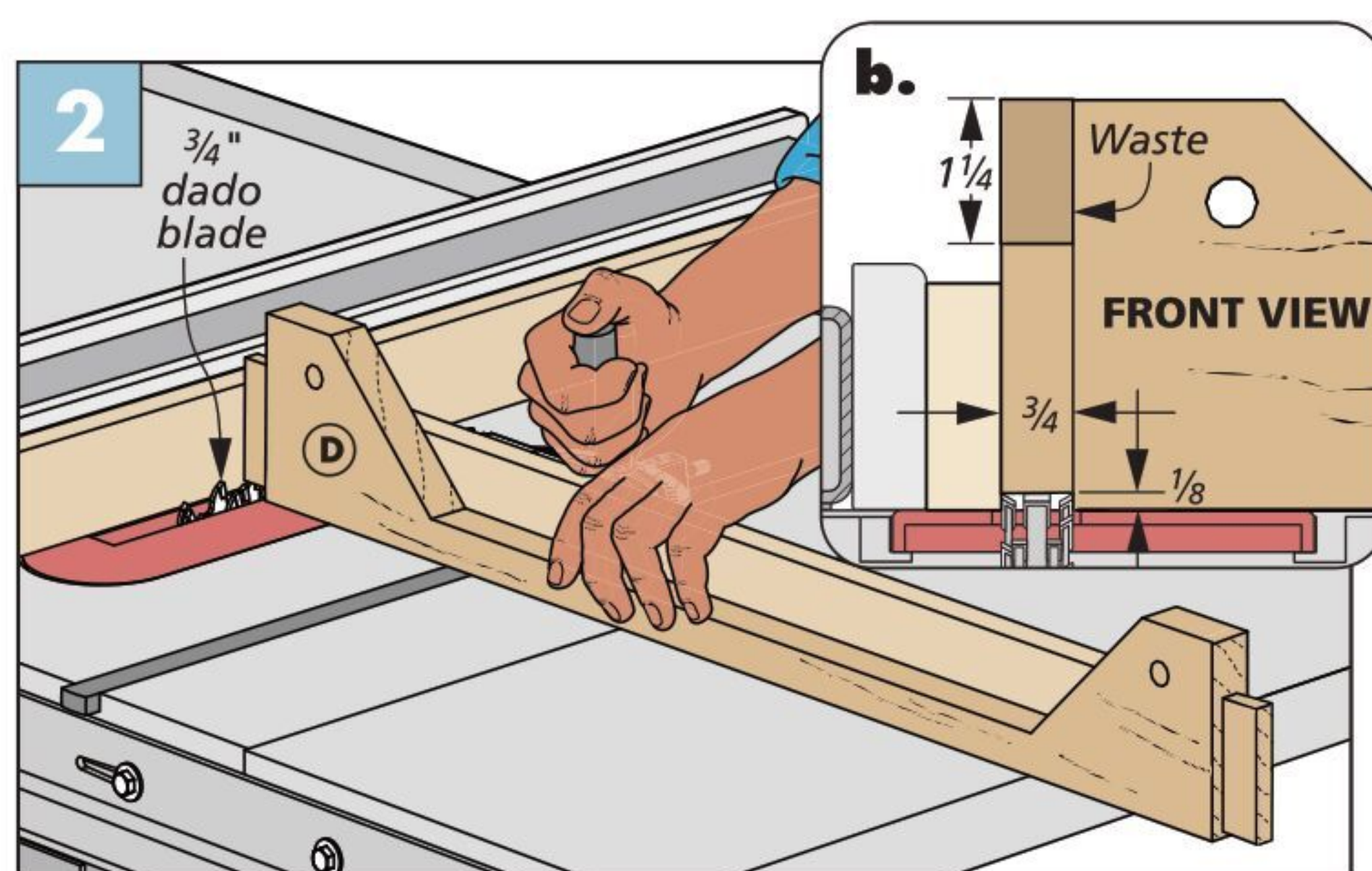


NOTE: Rails are made from 1" thick hardwood

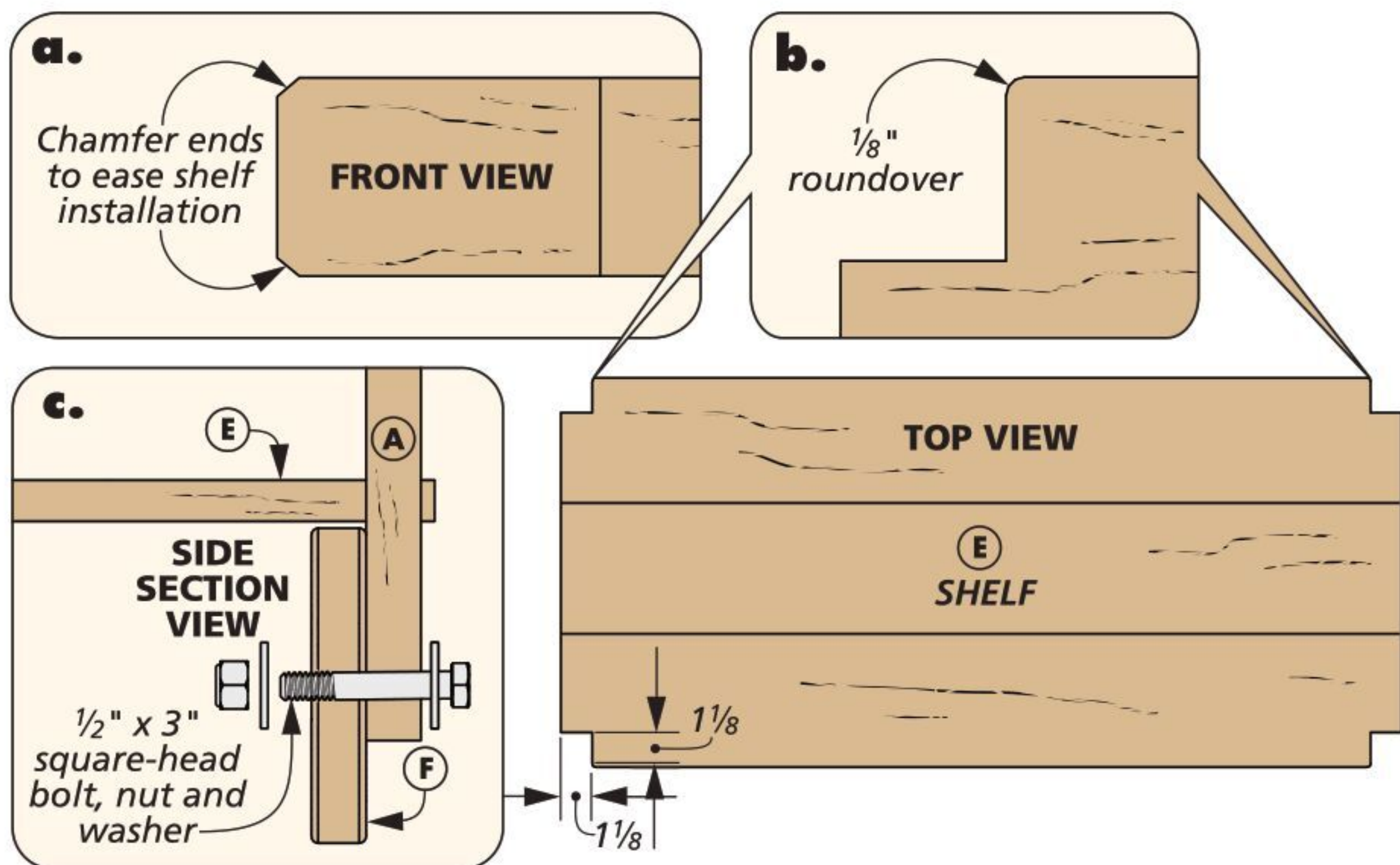
TENONING ON THE TABLE SAW



Cut the Cheeks. Make the cheek cuts for the rails using a $\frac{3}{4}$ " dado blade and a long auxiliary fence on the miter gauge. The fence will keep the long board stable, while also supporting the wood to prevent chipout.



Cut the Shoulders. Use the same method you used to cut the cheeks on the shoulders as well. Again, using a long auxiliary fence prevents chipout and makes finishing the tenon much safer.



Adding the **SHELVES & WHEELS**

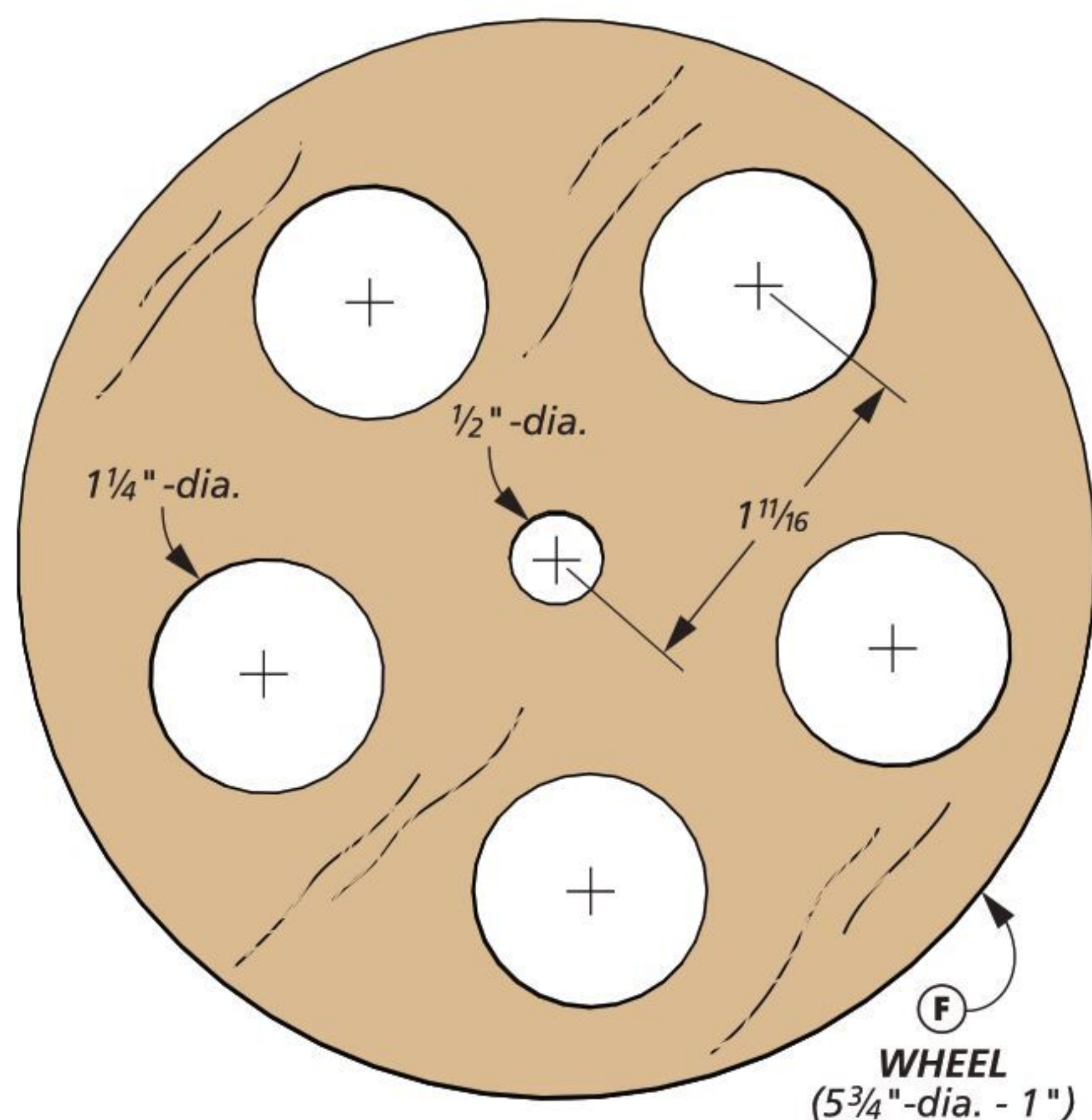
The skeleton of the bookcase is in place, but it still needs some meat on its bones. My next step was to make the shelves. I chose to go with beech for the shelves and wheels, as it's sturdy and I enjoy the light color here. The shelves fit tightly in the frame, so a few accommodations need to be made for them to slide in.

After cutting the shelves to size, I cut notches in each of the corners to wrap around the posts. Next, I got out the router and rounded over the front and back edges. Finally, I chamfered

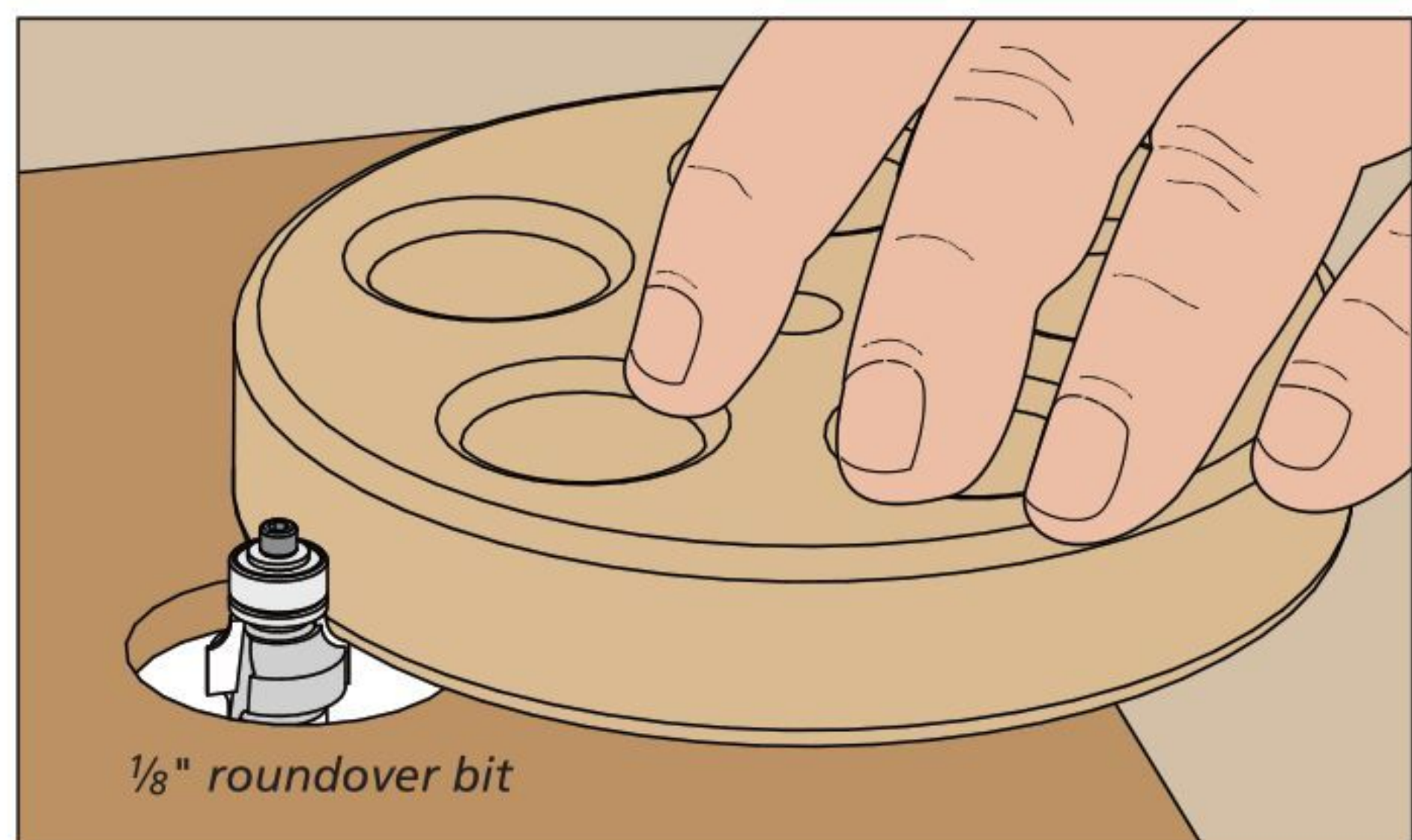
the edges of the shelves to make it easier to slip them in place.

WHEELS. The last pieces needed for the bookcase are the wheels. Print out four copies of the template provided in the link below and glue them to 1"-thick stock. I used my band saw to get a rough cut of the wheels here, but I wanted to make sure they were round enough for smooth rolling. For this, I used a circle-cutting jig for the router, which you can find online along with the template. By using the jig and sneaking up on the final

NOTE: Enlarge wheel pattern 200%



ROUNDING IT UP



Wheel Roundover. After drilling the holes in the wheels, I took them over to the router table. Using an $\frac{1}{8}$ " roundover bit, I softened up both the edges and around the holes.



For a full-size wheel pattern and plans for a circle-cutting jig, go to:

Woodsmith.com/258

diameter of the wheels, I was able to get nicely rounded circles that would be easy to roll.

Next, I went to the drill press to bore out the holes. If you used the jig, you'll find you've already got a pre-centered hole in each of your wheels. Then I headed over to the router table. As the drawing on the previous page shows, I added a roundover on every edge of the wheels.

FINISHING. With all the pieces made, it was time to put the finishing touches on the bookcase. In keeping with the industrial modern style, I wanted to try something a little different. I decided to paint the frame with an "aged galvanized" look in mind. I also chose to embrace the natural grain on the shelves and wheels for an accent of color and contrast in texture.

PAINT. As you can see in the boxes to the right, I used two paints to get the look I wanted. After applying a primer, I sprayed on two coats of the "Antique Pewter" you see in the upper right photo. Lightly

spraying on another coat of paint (this time the "Burnished Amber" at the lower right) gave the frame's faux-metal finish the aged look I was aiming for.

SHELVES & WHEELS. Once the body had been painted, I turned my attention to the shelves and wheels. All I did to finish these pieces was apply a coat of Danish oil (to bring out the color of the beech) and a few coats of lacquer (for protection and durability). After the last coat of lacquer dried, I gave all the pieces a light buffing for a satiny finish.

Finally, to attach the wheels to the bookcase itself I used square-headed bolts. Bolt the wheels on through the holes you drilled in the lower rails. Using bolts here instead of a pair of axels provides enough resistance to keep the bookcase from rolling around, while still allowing the wheels to move the bookcase easily. As for the shelves, they rest directly on the rails. The tight fit will keep those shelves in place all on its own. [W](#)

SPRAY PAINT FINISH




Antique Pewter. This paint gave the frame the metallic color and raw texture I was aiming for.




Burnished Amber. A light spatter of this paint over the base gives the bookcase its aged look.

Materials, Supplies & Cutting Diagram

A	Posts (4)	1 x 2 - 66½"	• (24) 5⁄16"-dia. - 12-½" Steel Rod
B	Slats (10)	½ x 3½ - 13	• (4) ½" x 3" Square-head Bolt
C	Shelf Rails (8)	1 x 1¾ - 29½"	• (8) ½" Washers
D	Lower Shelf Rails (2)	1 x 4 - 29½"	• (4) ½" Nuts
E	Shelves (5)	¾ x 14 - 30¼"	
F	Wheels (4)	5¾ dia. - 1	

1" x 4½" - 72" Hard Maple (Two boards at 2.3 Sq. Ft. each)



½" x 4½" - 72" Maple (Two boards at 2.3 Sq. Ft. each)



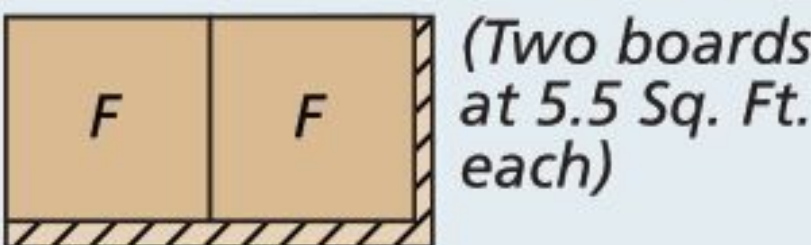
1" x 4½" - 96" Hard Maple (Two boards at 3.0 Sq. Ft. each)



¾" x 5½" - 96" Beech (Five boards at 3.7 Sq. Ft. each)



1" x 6½" - 12" Beech



HEIRLOOM Project



Craftsman Dresser

The good-looking dresser you see here is the next offering in the suite of Craftsman pieces for your bedroom. Lucky are the ones who get to build, and add this fine piece to their collection.

A piece of Craftsman furniture is a perfect example of an object that is greater than the sum of its parts. Simple rectangles of wood, a modest taper here, a gentle arc there, and a handful of squares moving quietly over the surface. These elements alone are respectable enough, but when you braid them together in the dresser you see here, there's an earthy symphony that the eye never tires of.

This dresser is the latest addition in a suite of Craftsman inspired projects for the bedroom that started with the gentleman's dresser back in issue 219. Like its predecessor, it's mostly white oak and maple frame and panels made with tongue and groove joinery. Lots of woodworking fun and challenges here.

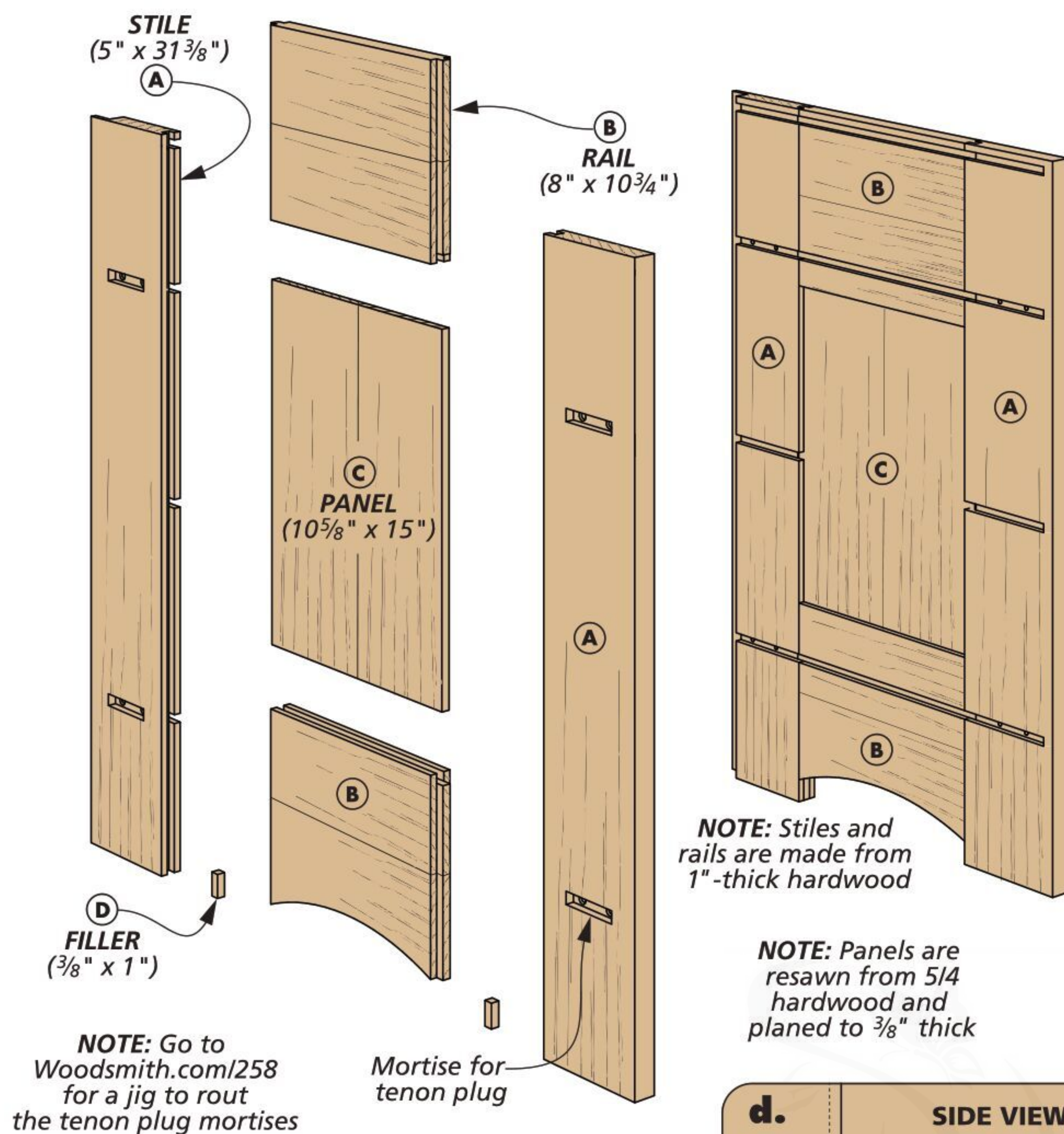
In the spirit of generous marketing quotes, "but wait...there's more!" You have the added bonus of a wall mirror that echoes the design elements of the bed that you see in the inset photo. So if you choose to build it as well, your handsome quartet of furniture will blossom into a quintessential collection of Craftsman furniture.



▲ The contrast between maple sides and white oak drawer fronts highlights the use of dovetail joinery. Beauty, and joinery that lasts a lifetime is a good combo.

▼ This dresser is the next branch of the handsome family tree you see here. The Gentlemen's dresser (issue 219), the Bed (issue 235), and the Nightstand (issue 252).





Building the SIDES & BACK

The solid-wood side panels you see above, along with the back panel that's on the next page, are made with tried and true tongue and groove joinery. It's a classic joint that makes for strong, good looking panels.

The grooves in the stiles and the tongues on the rails provide plenty of glue surface. The joinery journey starts with sizing all the material.

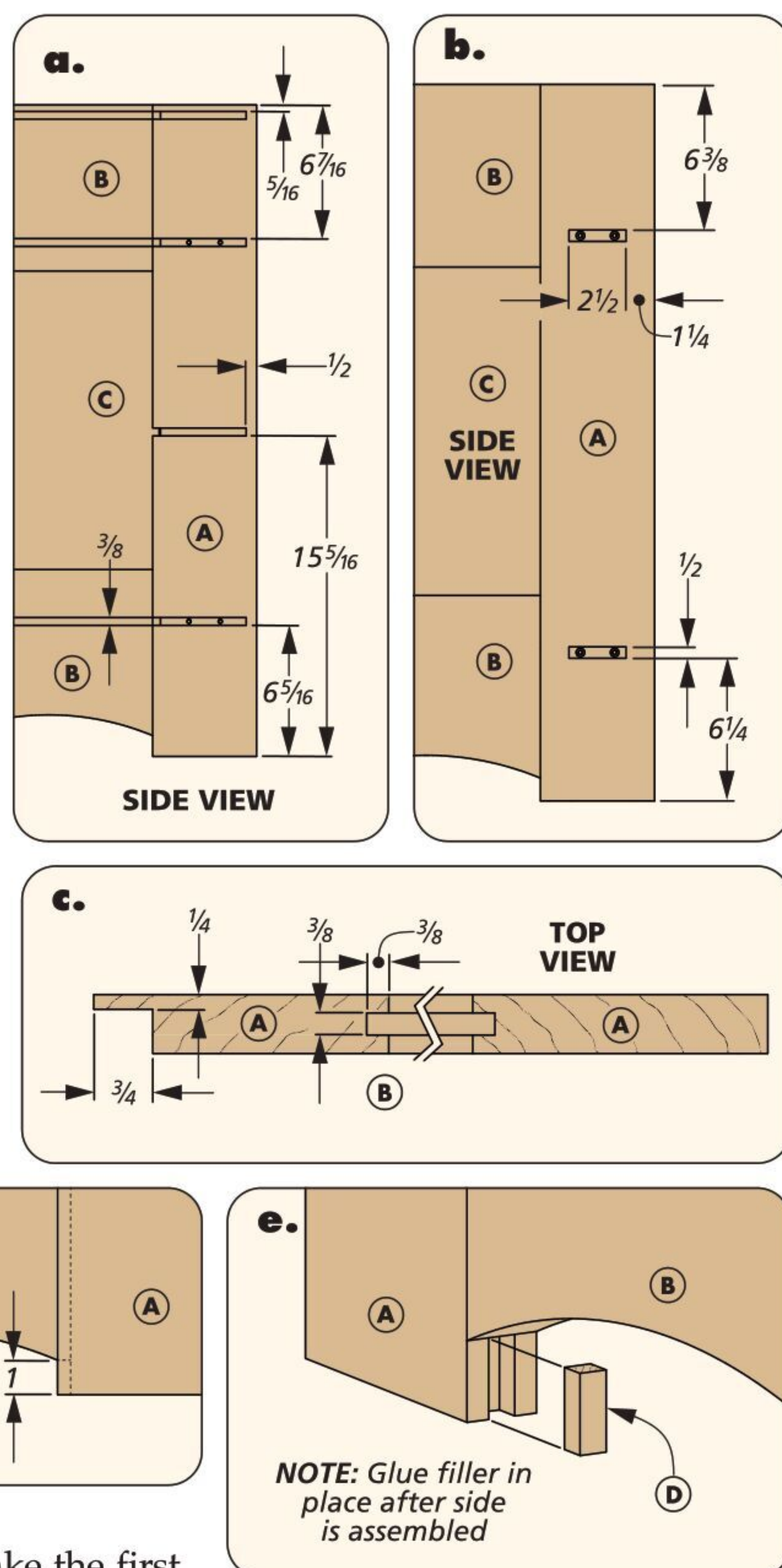
As you see in the main drawing above, you'll need to glue up the boards for the rails and panels. First, the panels are resawn to 3/8" from 5/4 (1") stock. I left the material for both of these parts oversized for the glueup phase, then dressed them to their final dimensions afterwards.

GROOVES. Over at the table saw, start out with the grooves in the

stiles (detail 'c'). Make the first pass with a 1/4" dado blade close to the center of the board. Then flip the board end for end and make a second pass. The groove you're making here is to accept the panels and rails. Notice that you'll need these grooves on the inside edges of the rails for the panels as well. The tongues that go into these grooves will be made to fit later.

There's one more thing to do on the rear stiles — make the rabbet for the back. Change the dado set to make this rabbet you see in detail 'c.' Do this with the dado blade buried in an auxiliary fence, and the stile flat on the table.

TONGUES. Now you can make the tongues (detail 'c') to mate with the grooves. The tongues



require a setup similar to the rabbet you just cut in the stiles. The dado blade is buried in an auxiliary fence like before, but the rails are flat on the table saw bed and supported with your miter gauge.

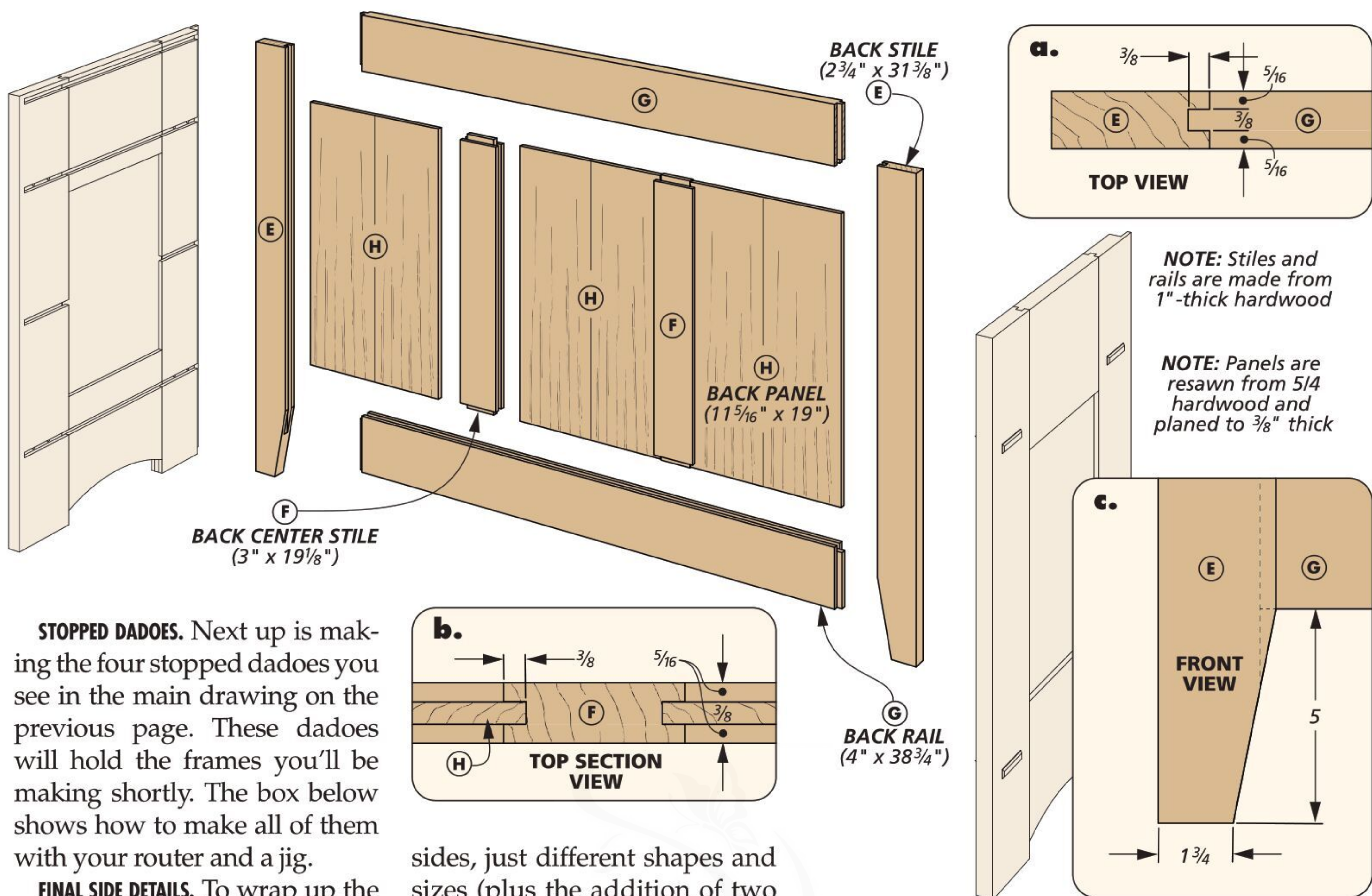
ARC ON BOTTOM RAIL. Lay out the arc on the lower edge of the bottom rail (detail 'd'). Then cut out the shape at the band saw (or use a jig saw) and sand the arc profile smooth.

GLUE UP SIDES. It's important to be careful about how much glue you're using when assembling all wood panels — the parts have to be allowed to move. It's best to just glue the center of the top and bottom of the panels, and the upper third of the rails.



For more on routing plug mortises, go to:

Woodsmith.com/258



STOPPED DADOES. Next up is making the four stopped dados you see in the main drawing on the previous page. These dados will hold the frames you'll be making shortly. The box below shows how to make all of them with your router and a jig.

FINAL SIDE DETAILS. To wrap up the sides you need to rout the mortises for the faux tenons (detail 'b' on previous page). And drill countersunk holes in the mortises afterwards. Lastly, glue the fillers in place (detail 'e').

THE BACK PANEL

The back panel is a repeat of the joinery methods used on the

sides, just different shapes and sizes (plus the addition of two center stiles).

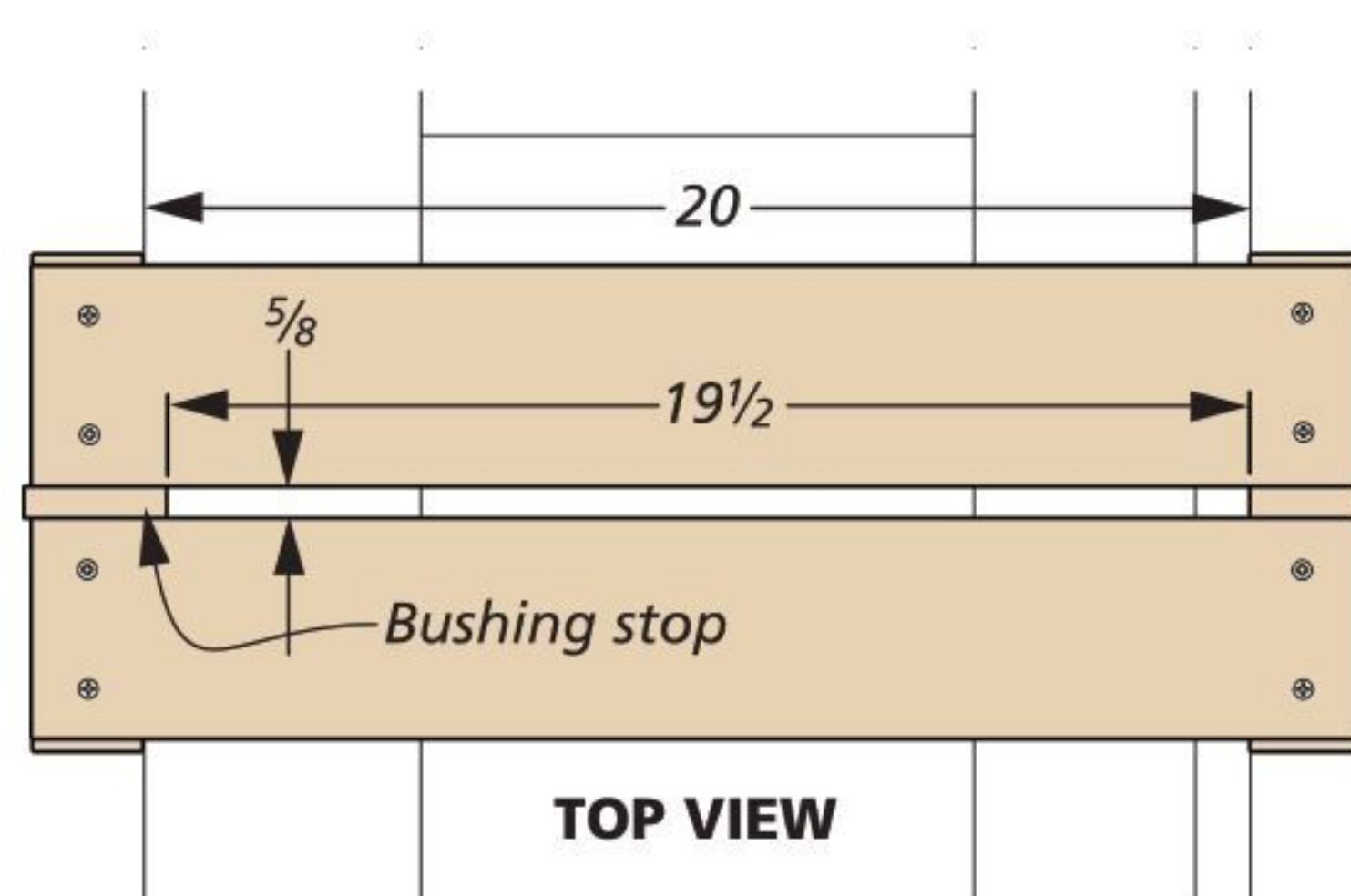
STILE SIZES. Your keen eye will notice that the center stiles (detail 'b') are wider than the outer stiles. That's because the back sits in a rabbet in the sides and you see a 1/4" of the sides.

As for the outer stiles, they're tapered at the bottom (detail 'c'). So it's back to the band saw to

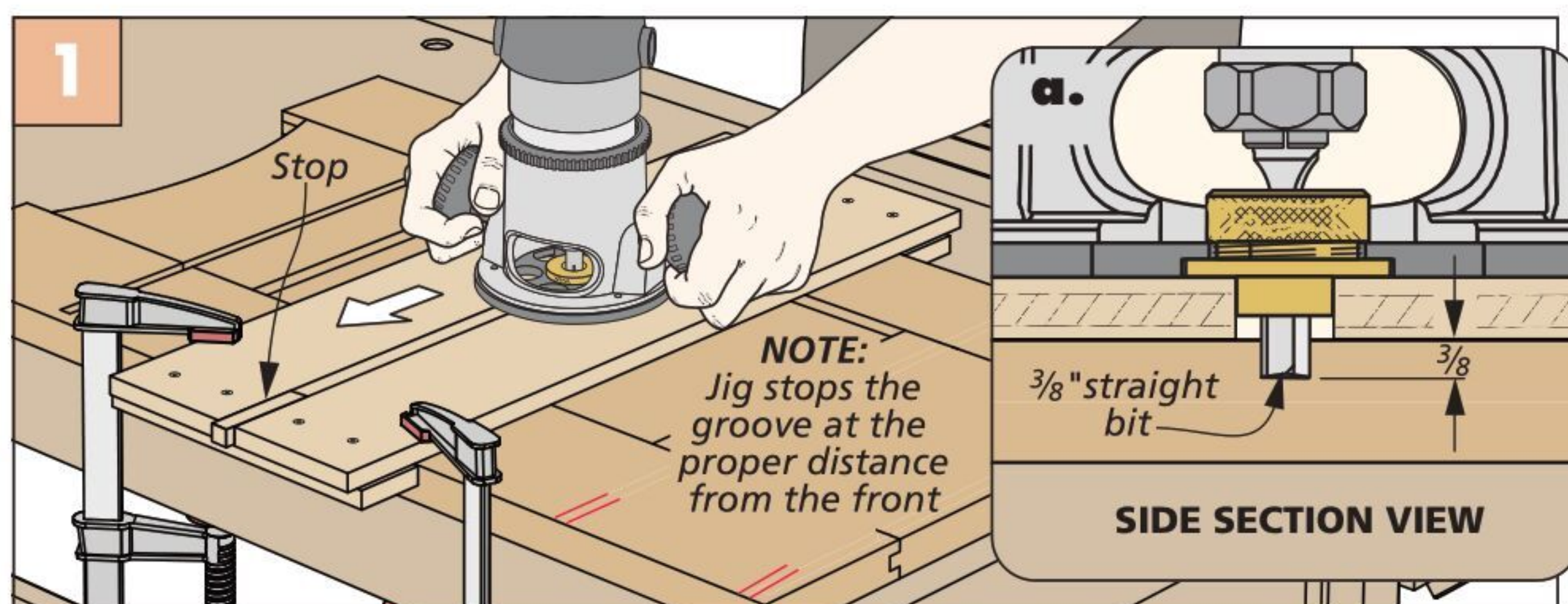
make this cut. After sanding the taper smooth, you're ready to glue up the back.

GLUE UP. Before smearing the wet stuff, a dry run assembly of the back is a good idea. The real glueup completes the last part of the case exterior. Next up are the interior frames.

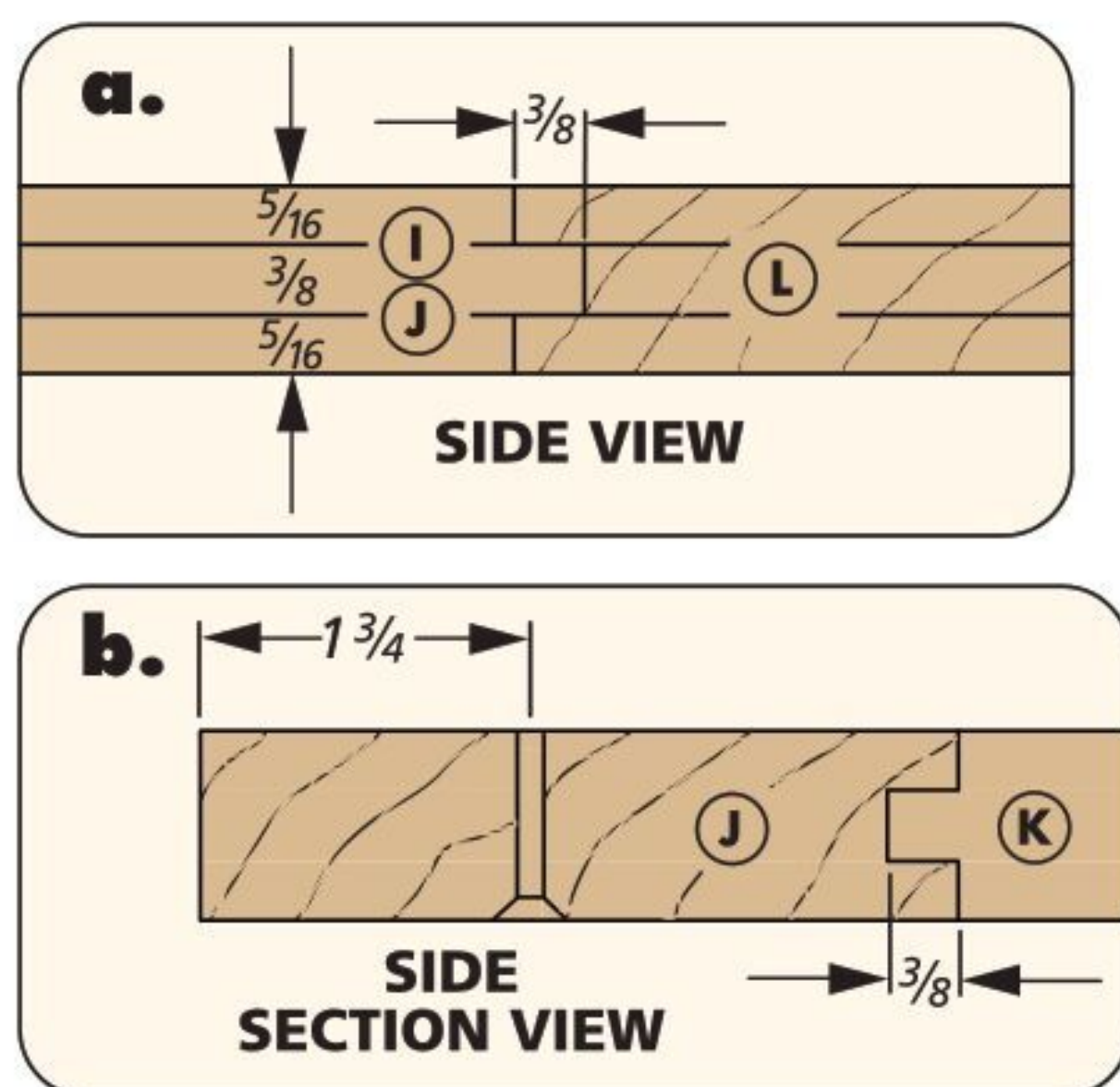
STOPPED DADOES & MORTISES



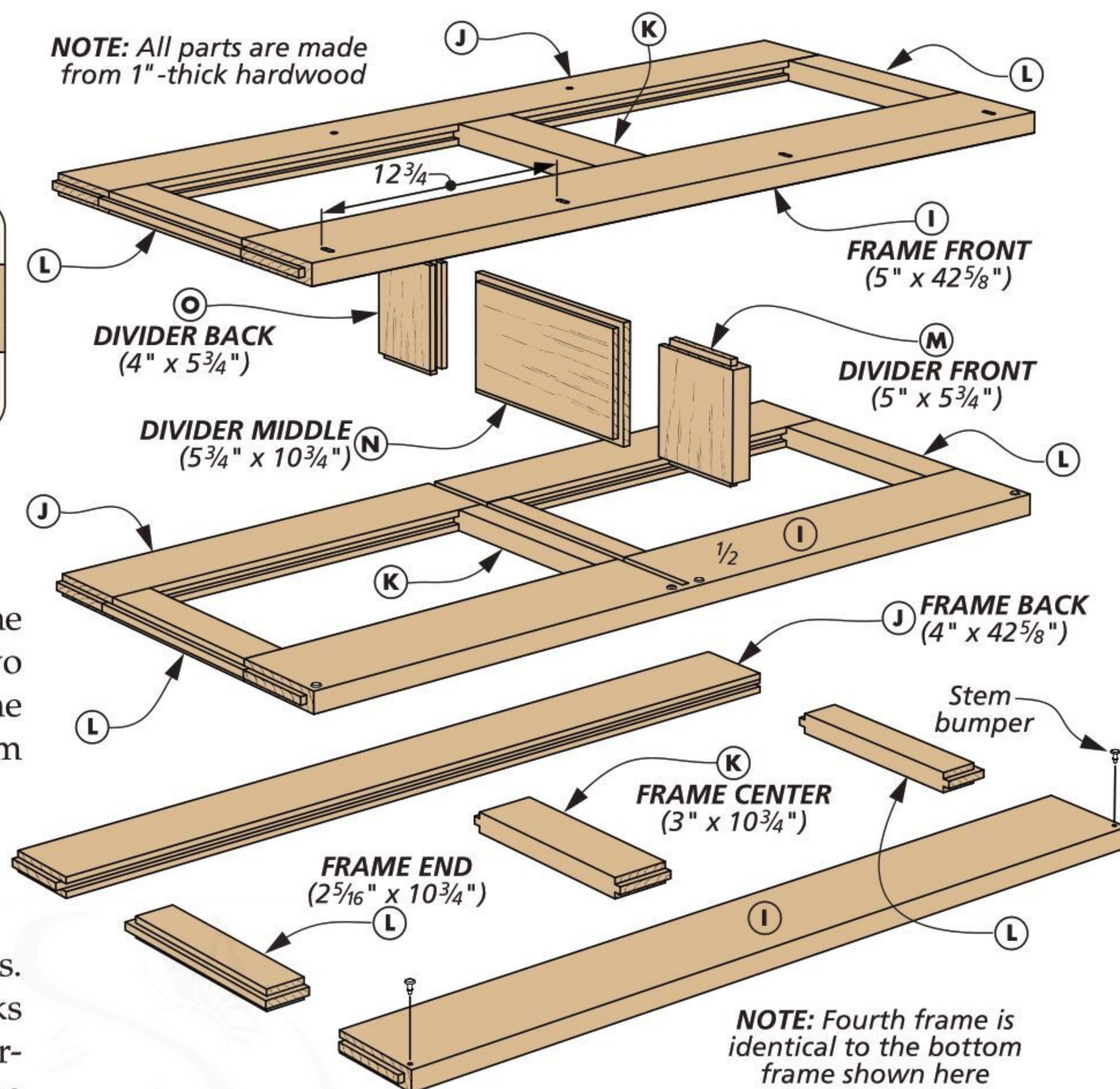
A Simple Jig. The cleats on the underside of the jig fit perfectly on the panel sides. The gap is the size of your router bushing.



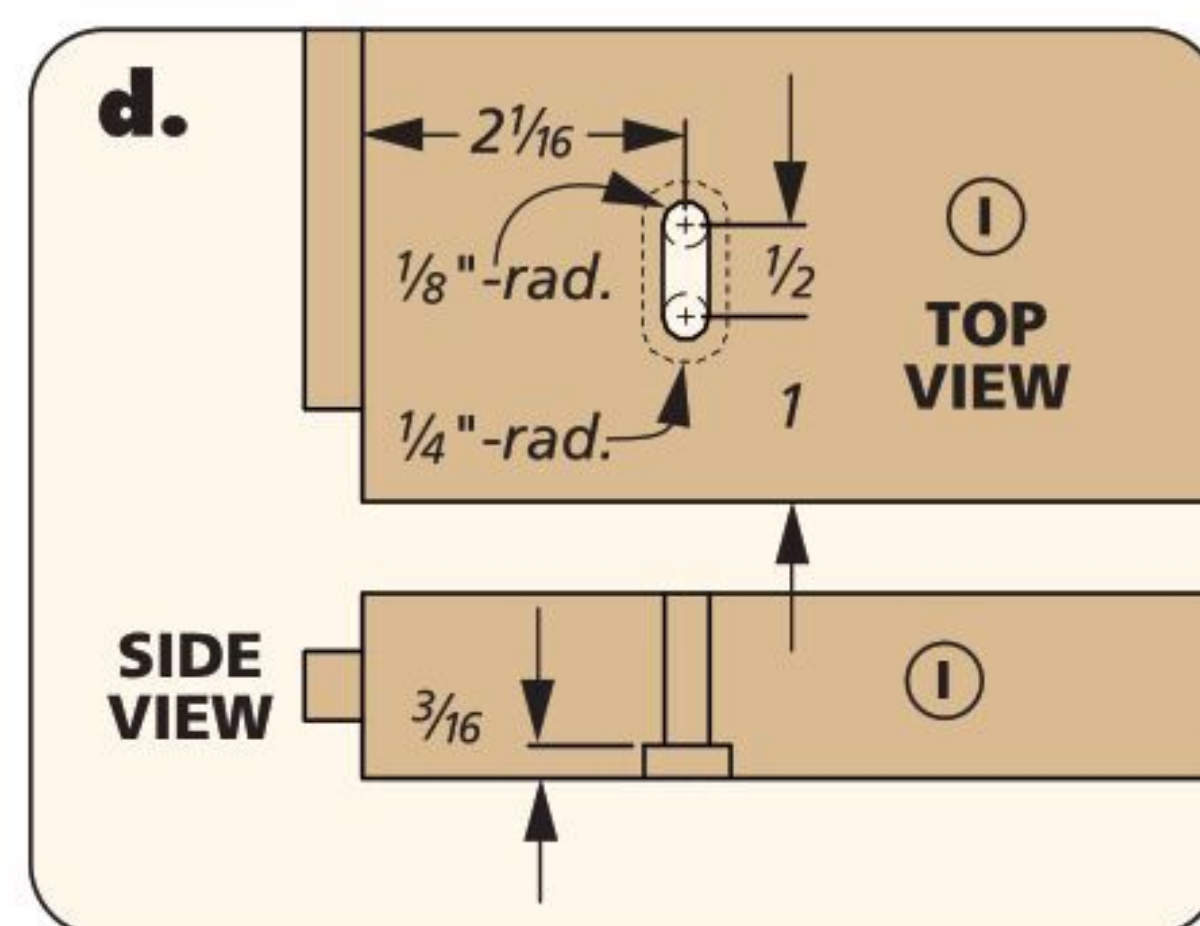
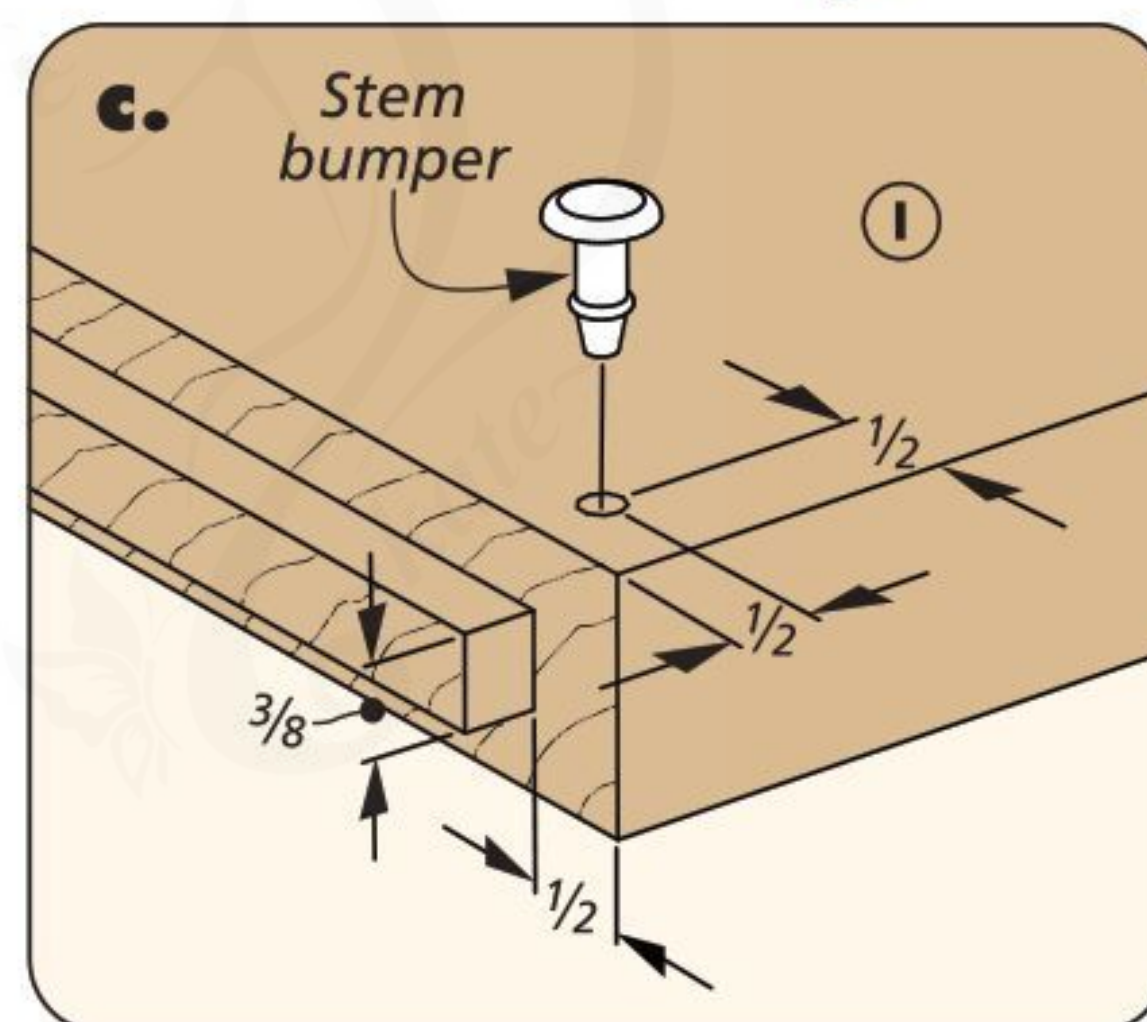
Stopped Dados. The clamps hold the jig and side firmly in place while you rout the stopped dados. When all the dados are routed, use a sharp chisel to square up the front of the dados.



NOTE: All parts are made from 1"-thick hardwood



NOTE: Fourth frame is identical to the bottom frame shown here



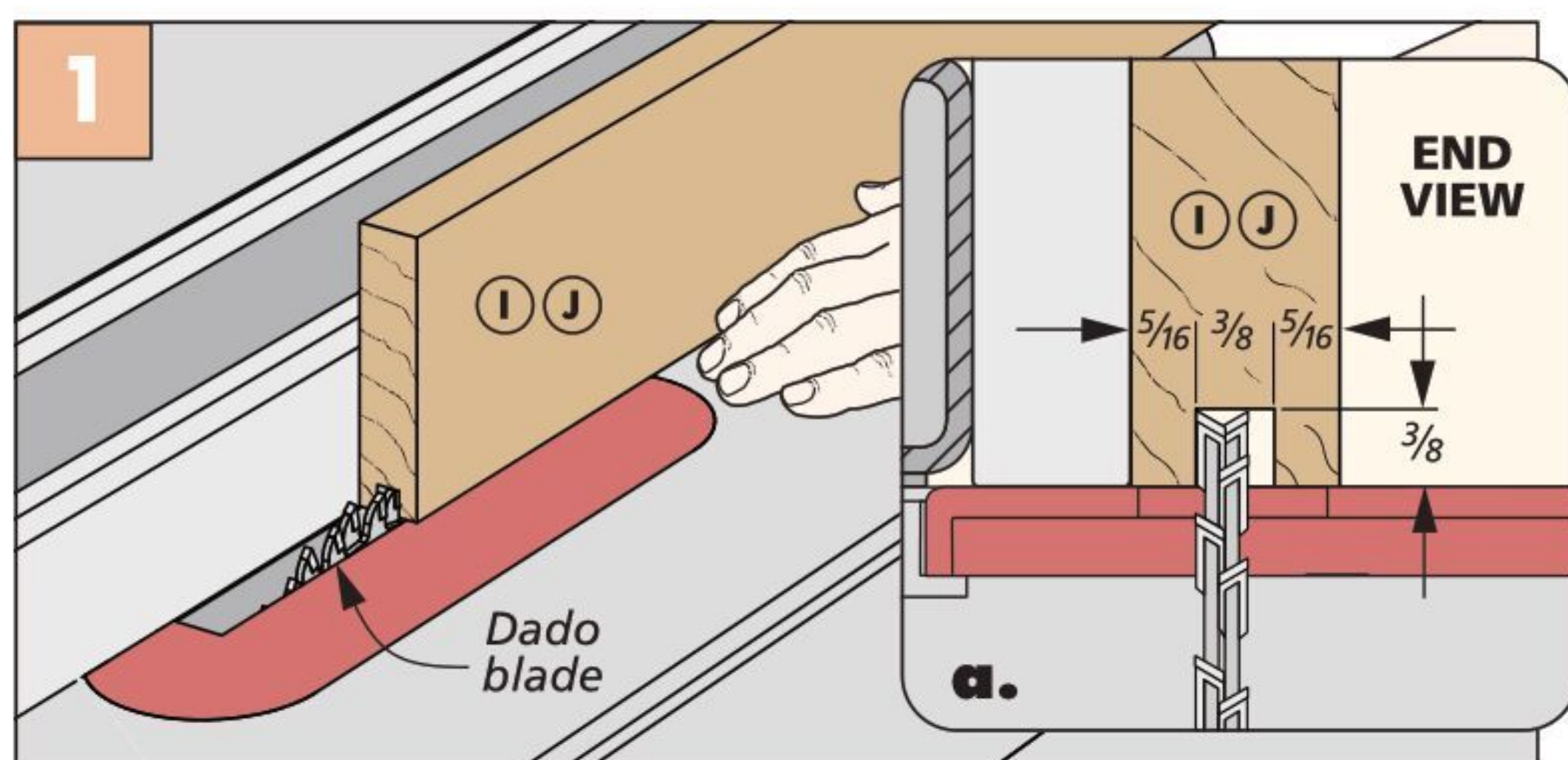
Making the **FRAMES**

The four frames you see in the drawing to the right serve two functions. First, they bring the sides and back together to form the case of the dresser. Second, they create the cavities that hold the drawers you'll make later on.

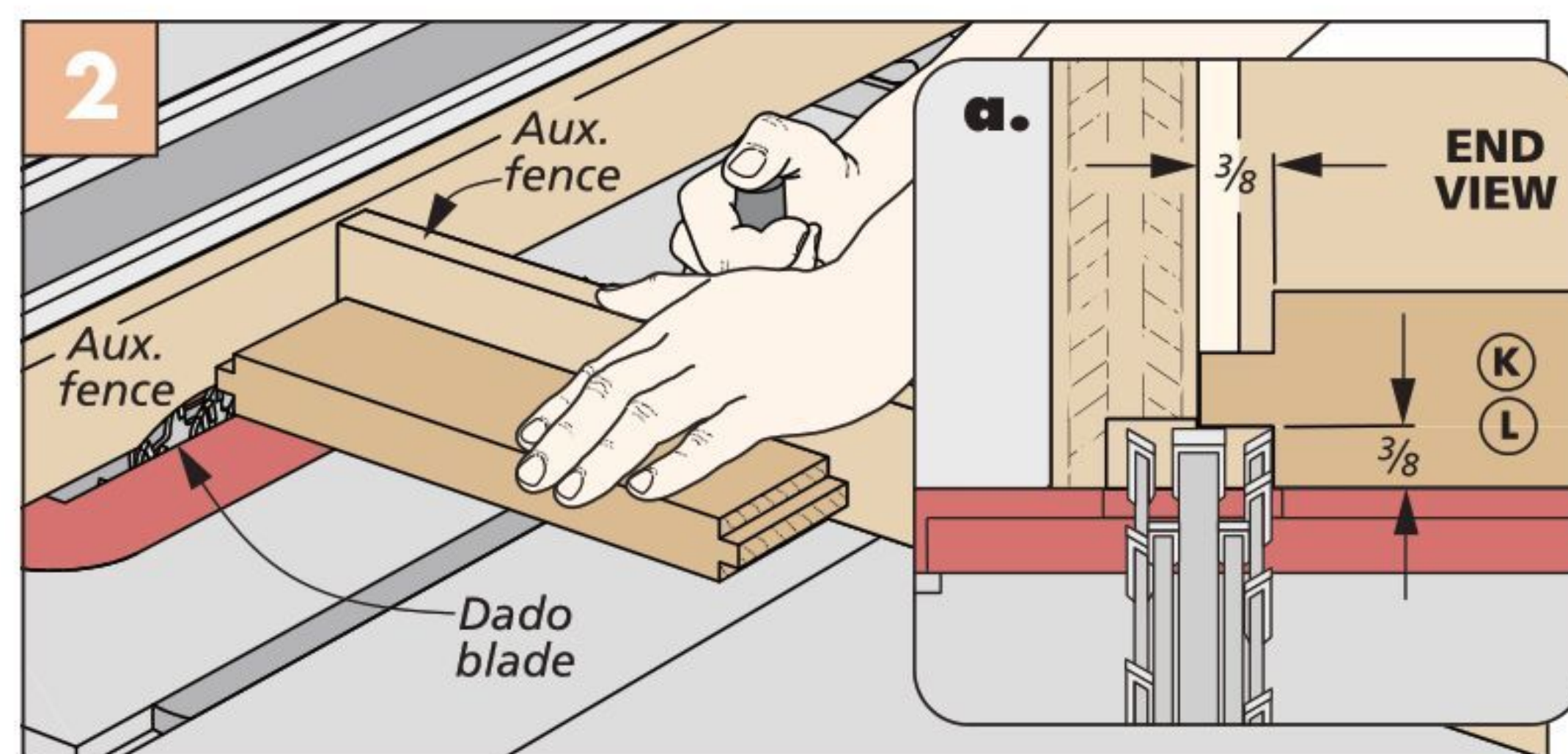
And, yes, I said four frames. Your eyes aren't playing tricks on you. Since they're structurally identical, we left out the one that is the twin of the frame that is exploded.

All the frames mate with the dados you made in the sides. Notice in the top two frames there are dados to hold the divider pieces for the smaller drawers. You'll make the divider in a little while. Let's start with the parts for the frames.

MAKING THE FRAME PARTS



Grooves First. A dado blade in your table saw is how you start the centered groove. Flip the workpiece between passes and adjust the fence to arrive at the proper groove size.



Tongues Next. To make the mating tongues, the dado blade is buried in an auxiliary fence. Raise the blade in steps, like making the groove, you want to sneak up on a perfect fit.

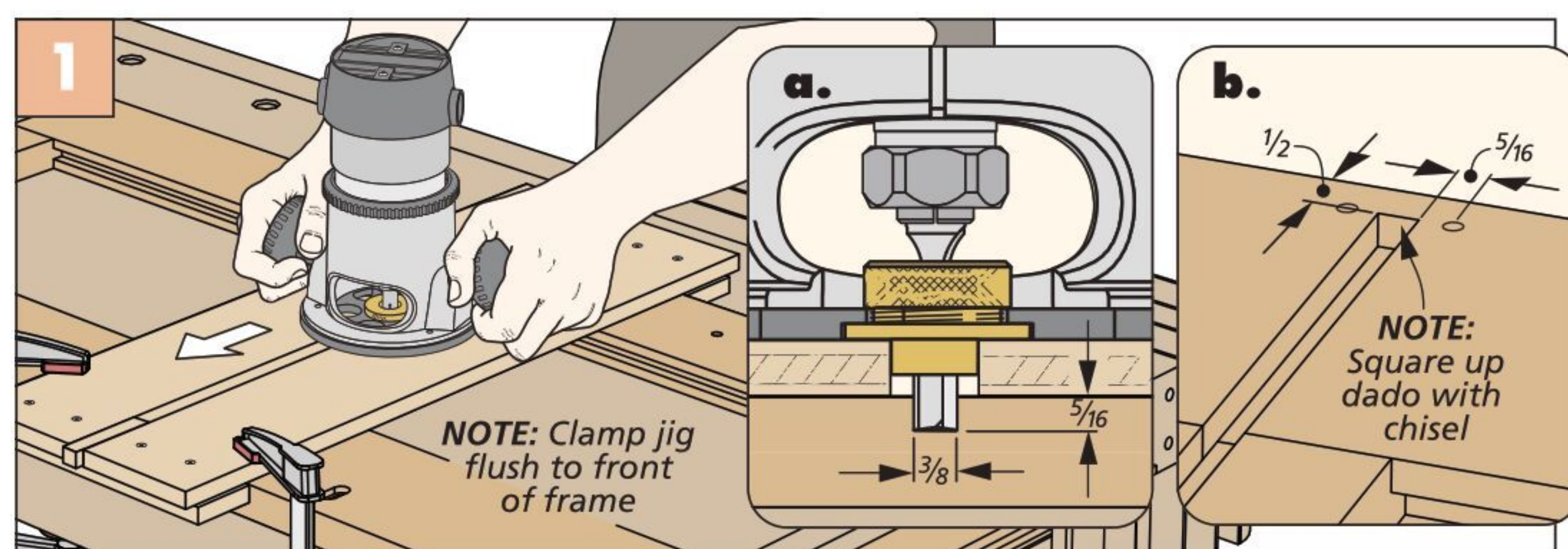
FRAME PARTS. Figure 1 in the box below shows where the joinery process is kicked off. The centered grooves in the front and back frame pieces will mate with the end and center pieces shown in Figure 2.

Before gluing up the frames I addressed a few details on the front and back frame workpieces. As you see in the main drawing and detail 'b' on the previous page, there are a couple of mounting holes to drill on the top frame back. The top frame front has four counterbored slots (detail 'd'). All these holes are for mounting the top to the dresser case, later on. Next, drill the holes in the lower three frames for the stem bumpers (detail 'c'). The bumpers allow the drawers to travel smoothly in the dresser.

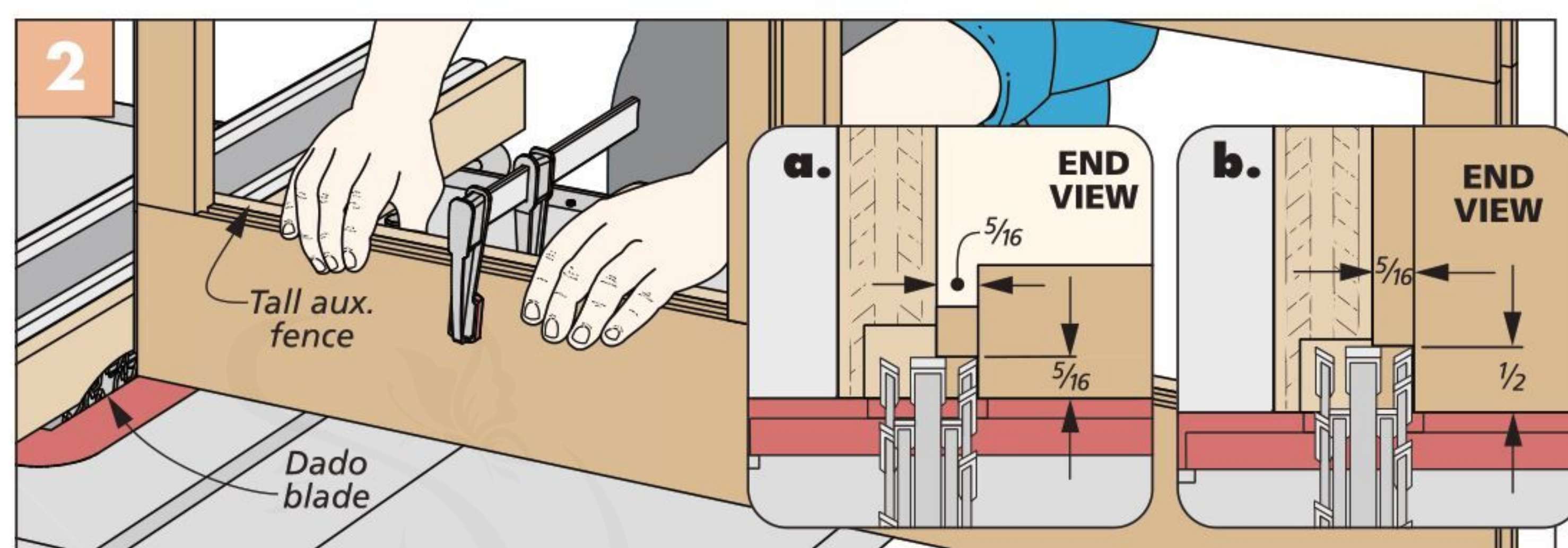
GLUE UP THE FRAMES. Nothing new here, gluing up the frames is actually less stressful than the panels you did earlier. Just make sure each frame is square. After the clamps are off, there are dados to make for the dividers.

Figure 1 in the box above shows how to make the dados for the divider. Figure 2 shows the details for the tongues and the shoulders. Now, you can make the divider.

PREPARING THE FRAMES



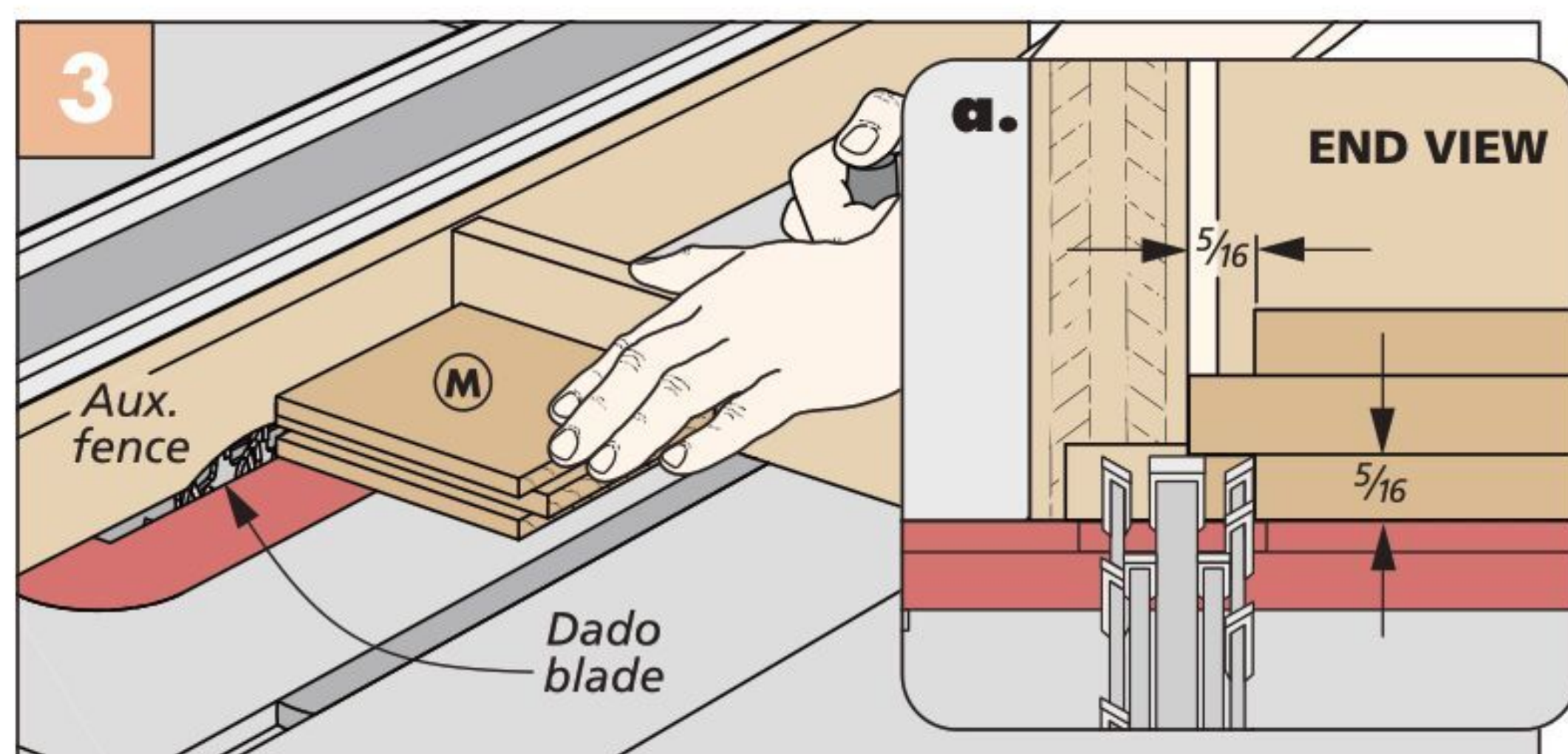
Accommodations for the Divider. The jig you used on the side works here. For the stop to register and perform properly, clamp the jig flush to the front of the frame.



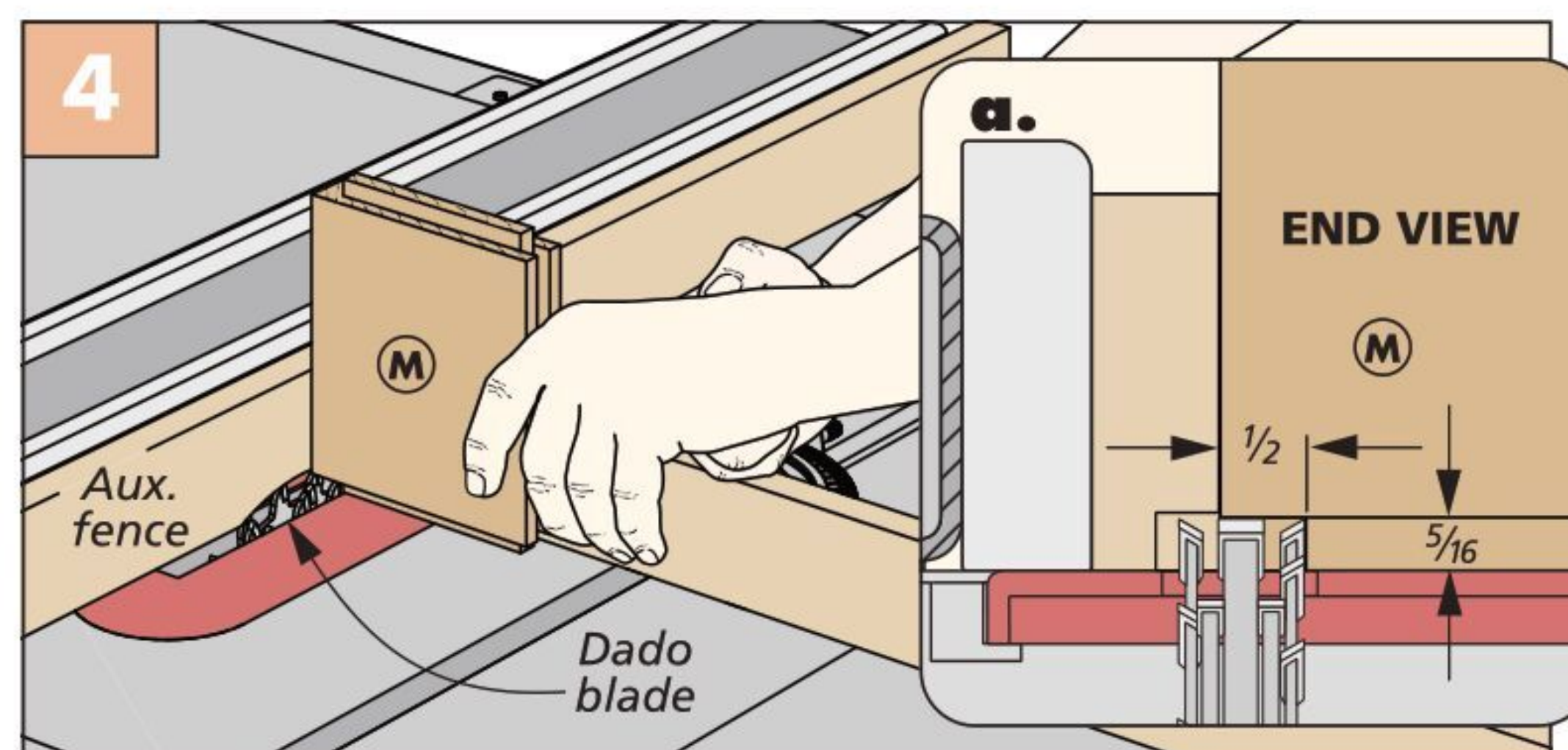
Tongues & Shoulders. First, cut the tongues on the assembled frames. Then with the workpiece clamped to a tall auxiliary fence on your miter gauge, cut the shoulders.

Figures 3 and 4 below shows the work you need to do on the divider parts. The main drawing on previous page shows the three parts. After they're made, you can glue them up.

SETTING THE STAGE. Next, you need to glue together these four frames to the sides and back you made earlier. This is the part where the master of ceremonies booms out "drum roll please!"



Tongues for Dividers. The three parts that make up the divider assembly have tongues that you cut at the table saw with the same setup as the tongues on the frame pieces.



Making Shoulders. To cut the shoulders on the front workpiece you have to stand the piece on edge. Use your miter gauge with an auxiliary fence to do this safely.

It's time to **ASSEMBLE & TOP OFF THE CASE**

So, yeah, maybe a drum roll is a little dramatic. But it does take some forethought and planning to bring all the parts of the case together. You do have one ace up your sleeve though — the frames that are screwed to the sides.

As you see in the drawing in the box below, the bottom and second from the top frame are screwed to the sides through the mortises that hold the tenon plugs. The rest of the info in the box will help you successfully assemble the case of the dresser. Then you can turn your attention to the remaining details of the case.

WOOD SELECTION. The top of the dresser, as you see on the next page, is glued-up from narrow boards. I probably don't need to tell you this, but I'm going

to — take your time selecting and matching the wood for the top. It's a juggling act between matching grain pattern and wood color that you want to be interesting but subtle.

After the clamps are stowed and the top is trimmed to size, you can rout the mortises. The jig you used on the sides works here as well. Then ease all of the edges but the rear bottom that is flush with the case.

ATTACH THE TOP. Notice in details 'a' and 'd' that there are two different types of screws that hold the top in place. Pan head screws go in the slots at the front, while standard wood screws go in the back. Also, take note in detail 'd' that there are no screws in the mortises at the front of the top. As the main

drawing shows, the screws in the back come from both directions, through the mortises in the top, and the underside through the back rail. At the front, the screws in the slots allow the top to move. Now let's go to the other end of the case and add the skirt.

THE SKIRT. The main drawing on the next page shows that the skirt is glued to cleats that in turn are glued to the case under the bottom frame (detail 'b'). Detail 'c' shows how far the cleat and skirt are set back from the front of the case.

THE TENONS. It's time to make the faux tenons for the mortises. The box at the bottom of the next page shows you how. Once they're made and installed you can move on to the drawers.

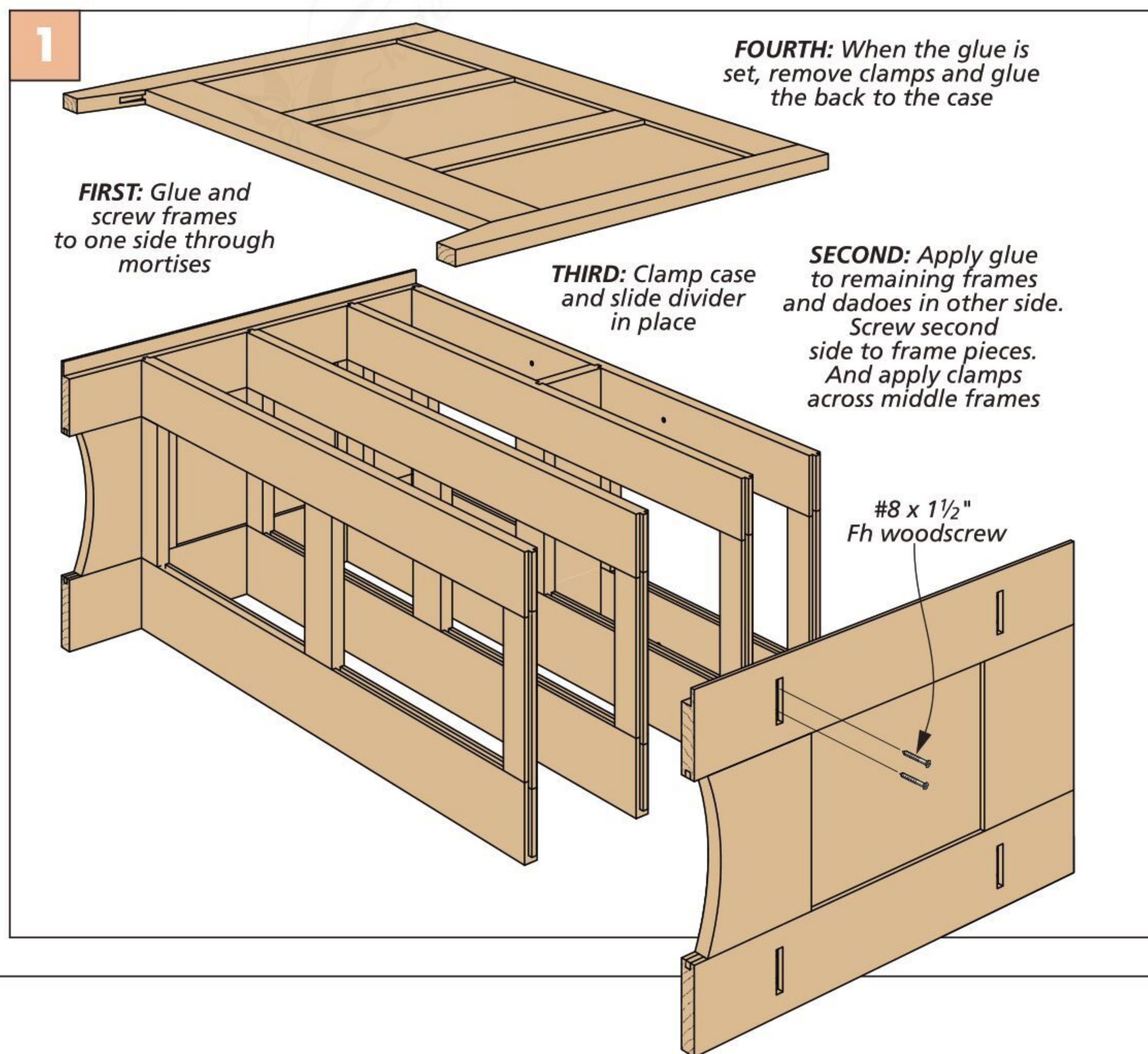
BRINGING THE CASE TOGETHER

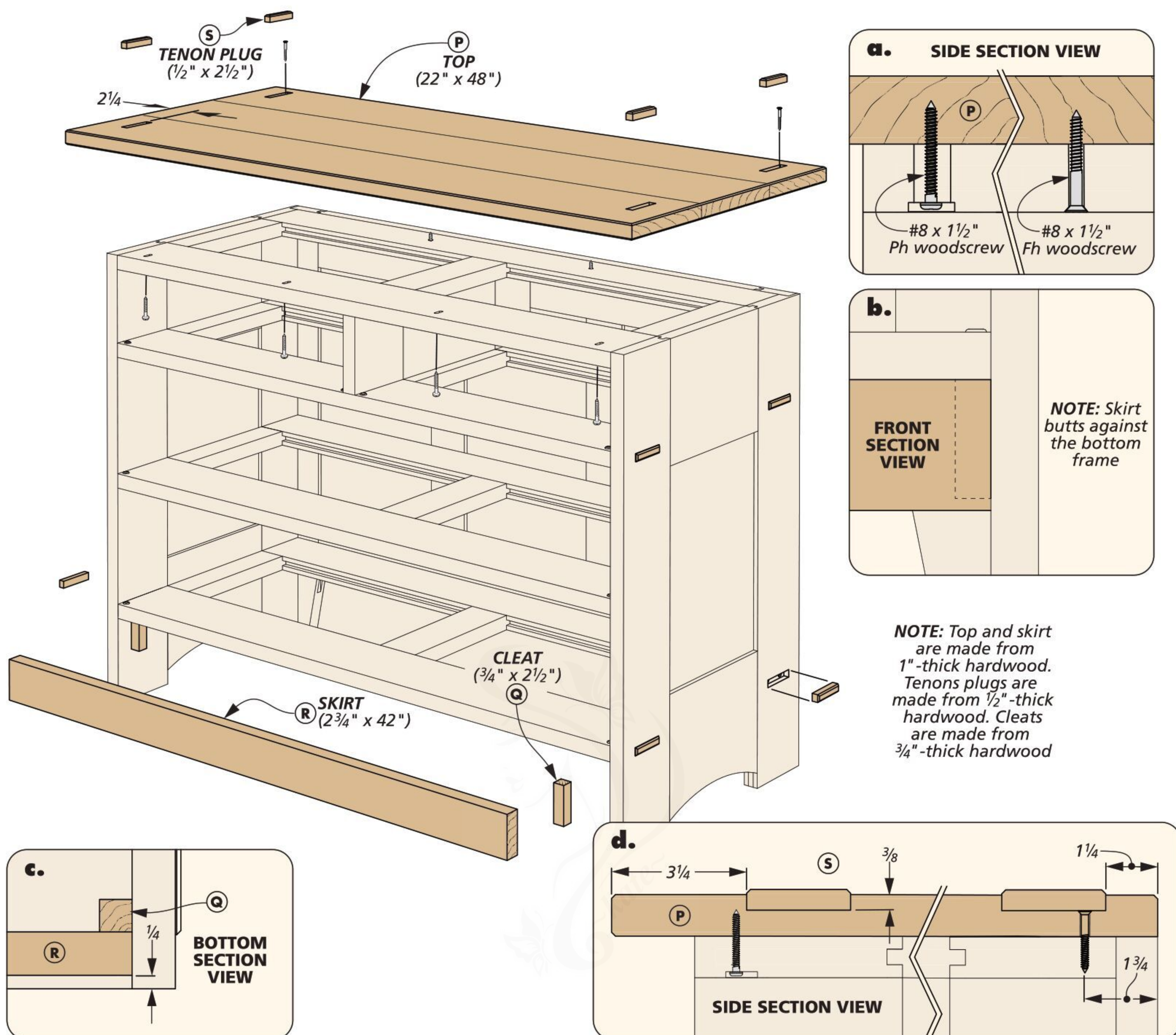
There are a handful of things to do to have a successful assembly of the dresser case. Here's a short list that will help.

First, have the right accessories on hand. Rags and warm water for any mess the glue makes. I always apply a little beeswax to the threads of the screws that I'm using. And keep them in a bowl close to the drill.

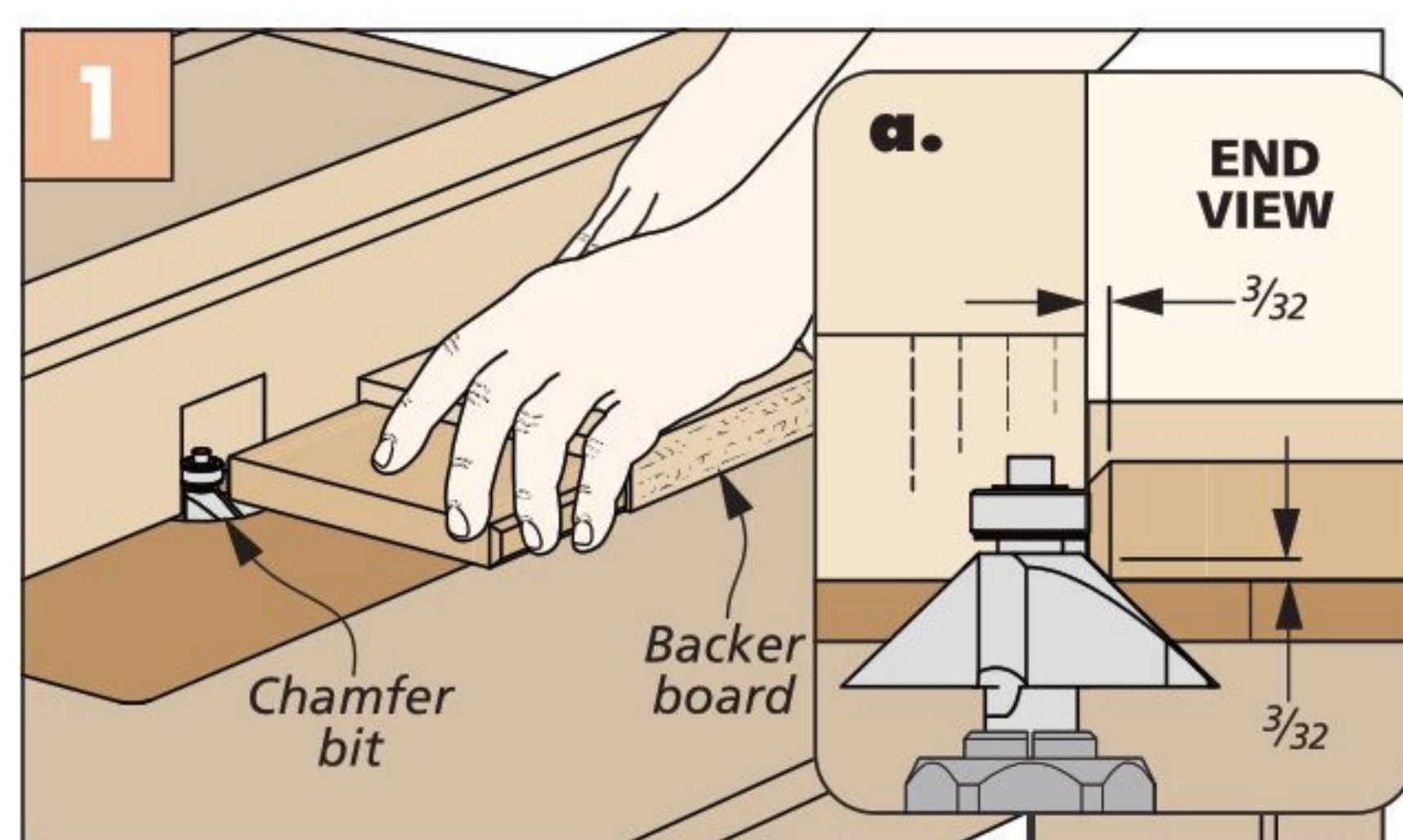
Also, after cleaning the area of unwanted items, I pre-gap and place the clamps close to where they'll be needed.

DRY RUN. The dry run allows you to pre-drill for the screws, removing any step that consumes time always helps. Making sure the edges of the sides and frames are flush is also done in this rehearsal. Finally, using slow-set glue will give you extra time.

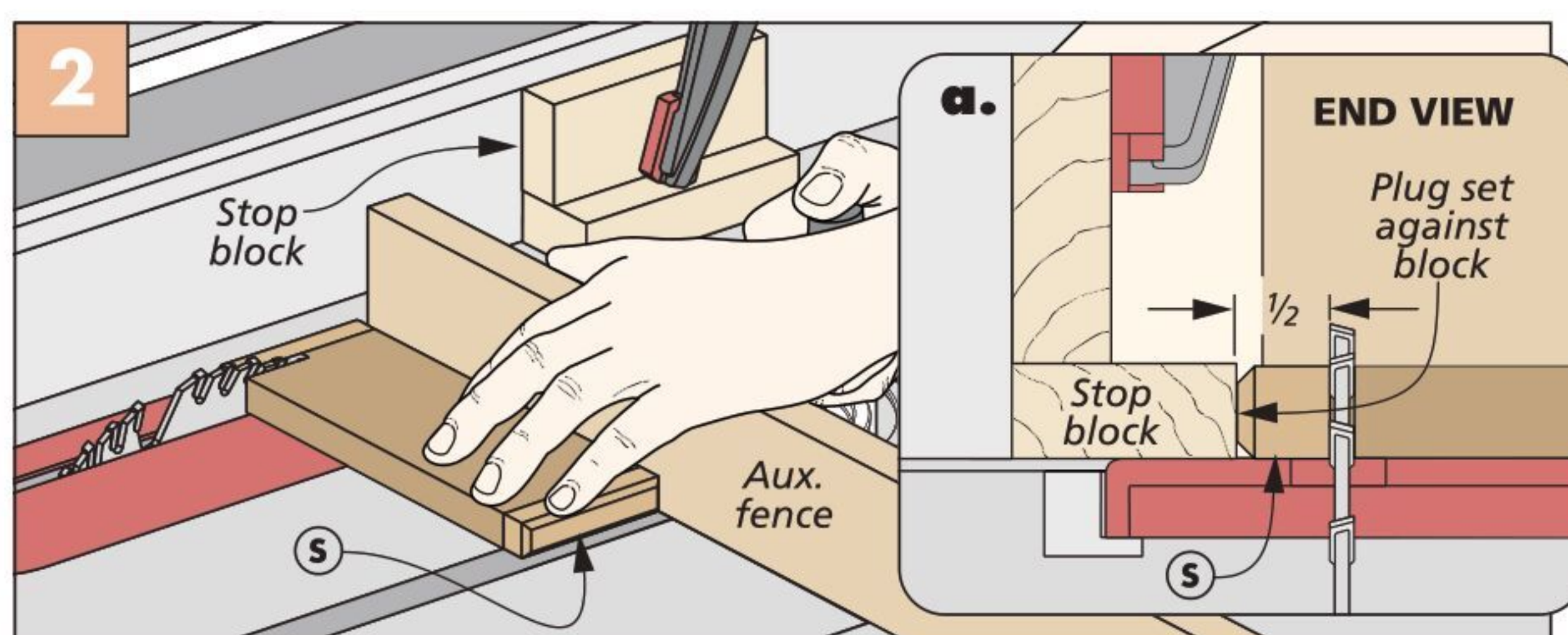




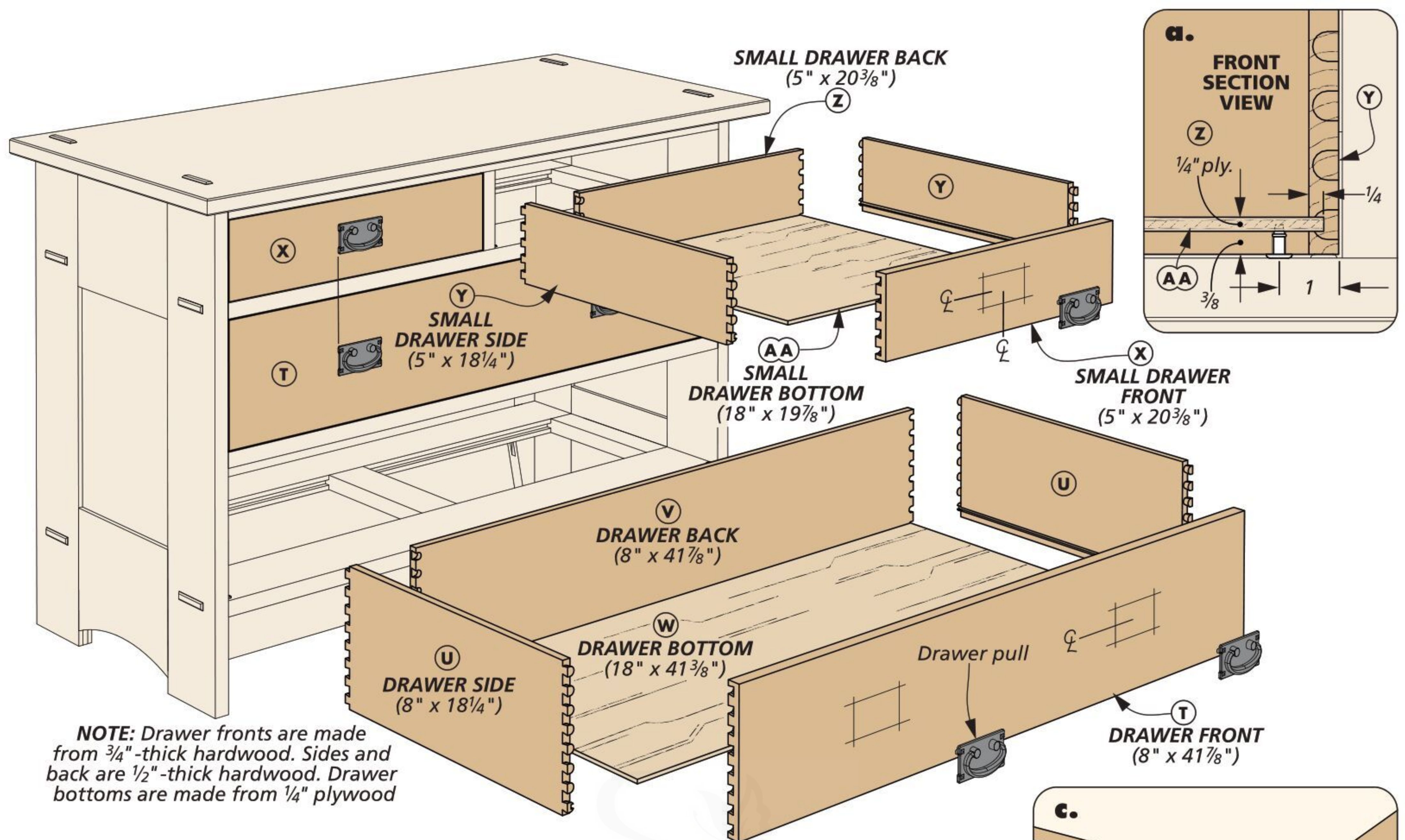
FAUX TENON PLUGS



Rout the Chamfers. A chamfer bit chucked into your router table lets you ease the edges of the tenons. For safety, always use a backer board.



Cut the Tenon Plug Free. An L-shaped stop block clamped to the fence ahead of the saw blade provides room for the workpiece between the fence and the saw blade as you cut the tenon plug free.

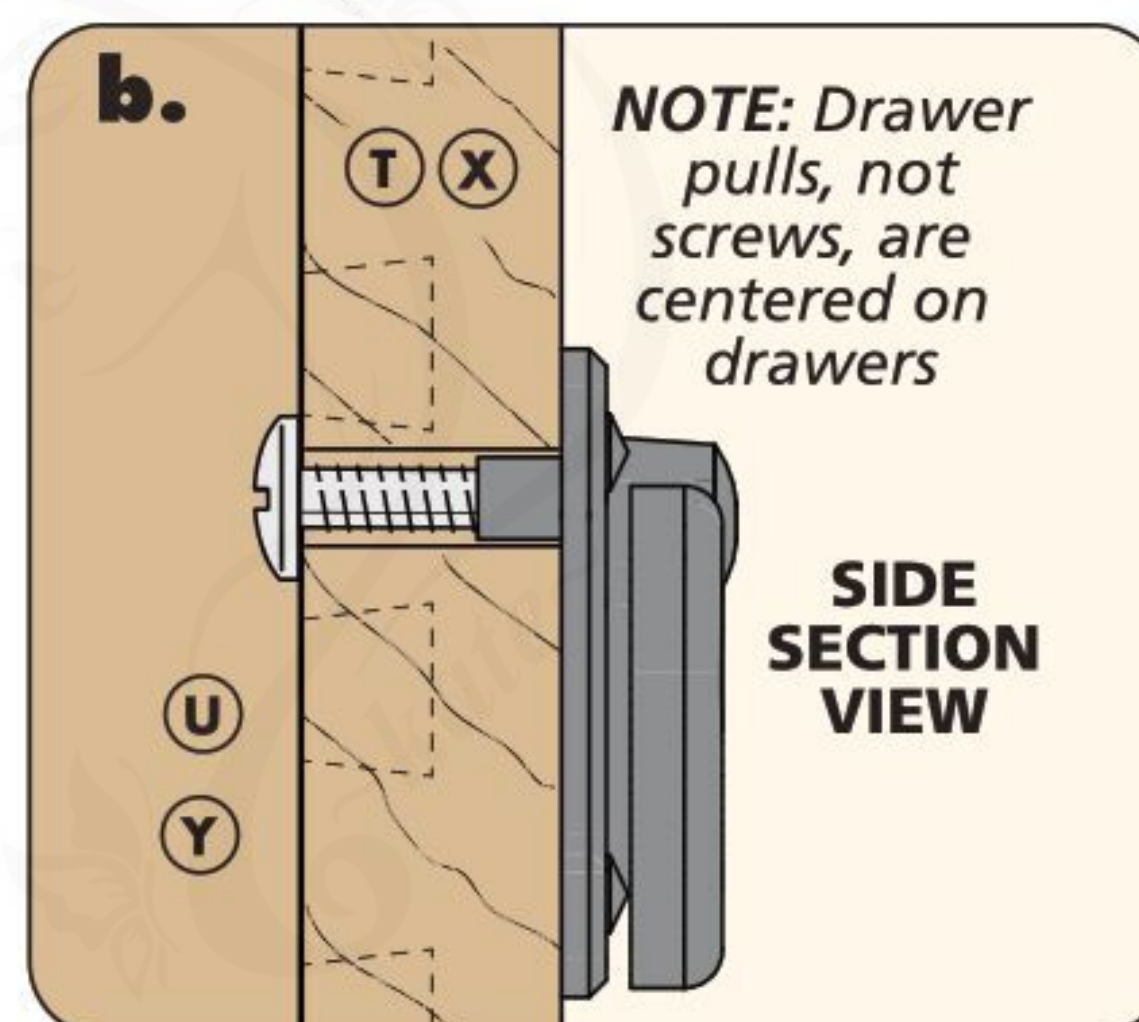


Finish with the **DRAWERS**

The four drawers, with their white oak fronts, maple sides and back, and plywood bottom, are next on the list. You cannot come up with stronger joints than the half-blind dovetails used on this drawer. The process starts with sizing the parts.

DRAWER DETAILS. All the drawers above have an even reveal around the opening they reside in — including space for the stem bumpers. (The bumpers are installed on the lower edge of the drawer backs and in the front of the case frames.) The drawer depth shown, fits the dresser case perfectly.

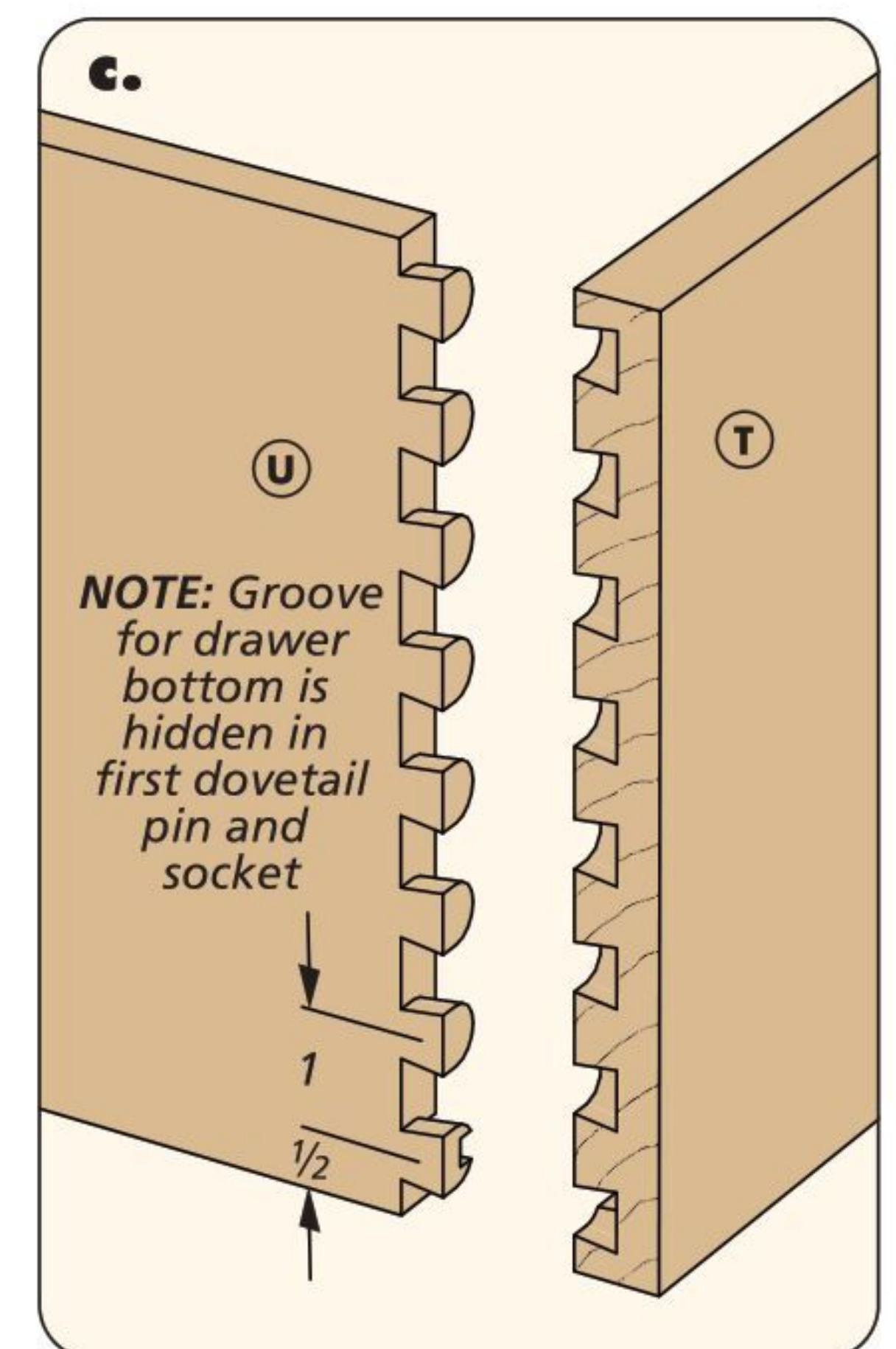
The wood choice and thickness for the drawers is an optimal combination for a drawer that needs to perform for a long time. The main drawing above shows that the sides and back are made from ¹/₂"-thick material. The lighter wood (in color and thickness) makes it easier to operate the drawers. The drawer front



is ³/₄" thick. The added thickness gives plenty of support for all the pulling and pushing that the drawer is put through in its lifetime.

HALF-BLIND DOVETAILS. The dovetail layout that's shown in detail 'c' will work for both drawers. When all the routing is done, stow away the dovetail jig and router. Next, you'll need to head over to the table saw to cut the grooves for the drawer bottoms.

Since there's no false drawer fronts on this project, you have to find another way to hide the groove for the drawer bottom. The box on the next page shows how to do that. All you have to do is locate the groove in the



center of the lowest tail on the side pieces. That setup will place the groove in the lowest socket on the drawer parts. There are a few more things to do before assembling the drawers.

PRE-ASSEMBLY. First, drill the holes for the stem bumpers (detail 'a'). They're centered on the thickness of the drawer back. Now let's look at the drawer pulls.

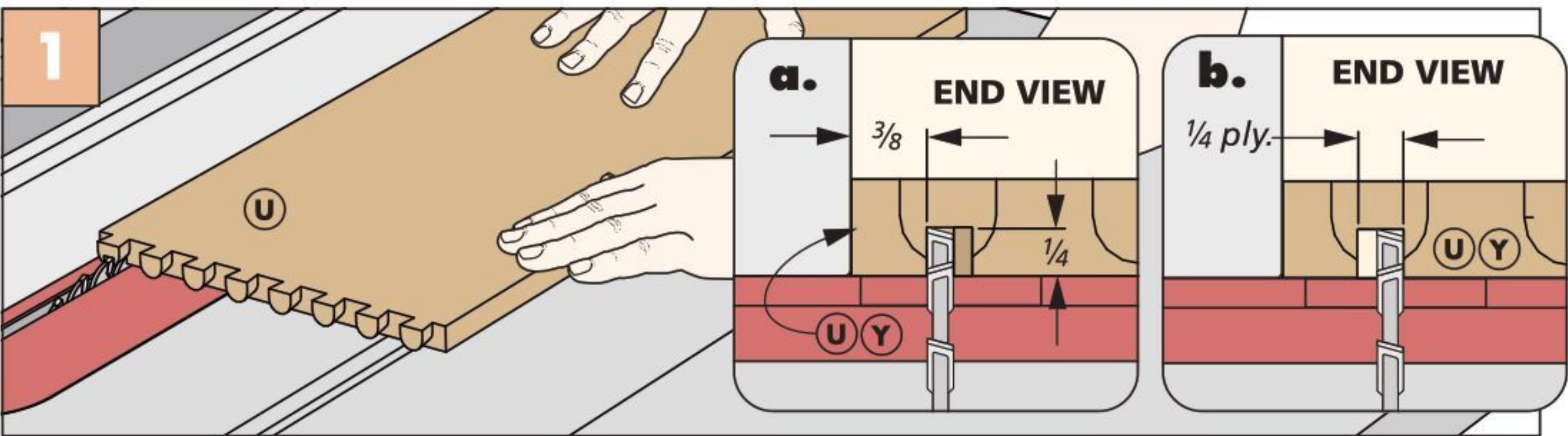
It's easier to lay out and drill the holes for the drawer pulls before the drawer is assembled.

The main drawing shows the pull centered on the face of the small drawers. For the big drawers, center them horizontally and align them vertically with the pulls on the small drawers.

It's best to stain the drawer fronts before assembly. Doing so you'll save a lot of time and headaches. Now you can glue up the drawers. Be mindful of any glue squeeze out.

FINISH. Two coats of lacquer will protect this beautiful dresser for a lifetime. Enjoy. 

DRAWER BOTTOM GROOVE



Hide the Groove. The groove for the drawer bottom is hidden inside of the dovetail joinery. I made multiple passes to match the thickness of the plywood bottom.

Materials, Supplies & Cutting Diagram

A Stiles (4)	1 x 5 - 31 ³ / ₈	L Frame Ends (8)	1 x 2 ⁵ / ₁₆ - 10 ³ / ₄	W Drawer Bottoms (2)	1/4 ply. x 18 - 41 ³ / ₈
B Rails (4)	1 x 8 - 10 ³ / ₄	M Divider Front (1)	1 x 5 - 5 ³ / ₄	X Small Drawer Fronts (2)	3/4 x 5 - 20 ³ / ₈
C Panels (2)	3/8 x 10 ⁵ / ₈ - 15	N Divider Middle (1)	1 x 5 ³ / ₄ - 10 ³ / ₄	Y Small Drawer Sides (4)	1/2 x 5 - 18 ¹ / ₄
D Fillers (2)	3/8 x 3/8 - 1	O Divider Back (1)	1 x 4 - 5 ³ / ₄	Z Small Drawer Backs (2)	1/2 x 5 - 20 ³ / ₈
E Back Stiles (2)	1 x 2 ³ / ₄ - 31 ³ / ₈	P Top (1)	1 x 22 - 48	AA Small Drawer Btms. (2)	1/4 ply. - 18 x 19 ⁷ / ₈
F Back Center Stiles (2)	1 x 3 - 19 ¹ / ₈	Q Cleats (2)	3/4 x 3/4 - 2 ¹ / ₂		• (24) #8 x 1 ¹ / ₂ " Fh Woodscrews
G Back Rails (2)	1 x 4 - 38 ³ / ₄	R Skirt (1)	1 x 2 ³ / ₄ - 42		• (4) #8 x 1 ¹ / ₂ " Ph Woodscrews
H Back Panels (3)	3/8 x 11 ⁵ / ₁₆ - 19	S Tenon Plugs (12)	1/2 x 1/2 - 2 ¹ / ₂		• (16) Stem Bumpers
I Frame Fronts (4)	1 x 5 - 42 ⁵ / ₈	T Drawer Fronts (2)	3/4 x 8 - 41 ⁷ / ₈		• (6) Drawer Pulls
J Frame Backs (4)	1 x 4 - 42 ⁵ / ₈	U Drawer Sides (4)	1/2 x 8 - 18 ¹ / ₄		
K Frame Centers (4)	1 x 3 - 10 ³ / ₄	V Drawer Backs (2)	1/2 x 8 - 41 ⁷ / ₈		

1" x 8 1/2" - 96" White Oak (Four Boards @ 7.1 Bd. Ft. Each)



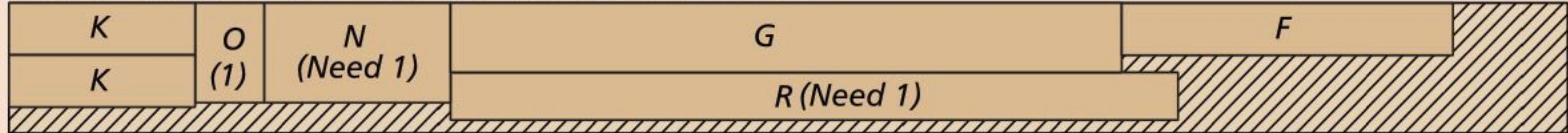
1" x 6" - 96" White Oak (Four Boards @ 5.0 Bd. Ft. Each)



1" x 6" - 96" White Oak Resawn to (2) 3/8" layers (5.0 Bd. Ft.)



1" x 7 1/2" - 90" White Oak (Two Boards @ 5.9 Bd. Ft. Each)



3/4" x 8" - 66" White Oak (Two Boards @ 3.7 Bd. Ft. Each)



1/2" x 8" - 84" Hard Maple (Two Boards @ 4.7 Sq. Ft. Each)



1/2" x 5 1/2" - 60" Hard Maple (Two Boards @ 2.3 Sq. Ft. Each)



ALSO NEEDED: One 48" x 96" Sheet of 1/4" Birch Plywood



Craftsman Mirror

Mirror, mirror, on the wall who's the ... I'll leave inquiring questions up to you. But it's true that there is a certain magic to mirrors. That magic mostly comes from the alchemy that appears to happen when you apply silvering to the back of a piece of glass — the simple act of physics transforms the glass, giving it the magical power we call a reflection.

This reflection will add light and depth to the environment it resides in. It also helps in the more mundane activities of life, like straightening your tie, or a final check for little green bits left from lunch hiding in your teeth.

But this mirror is also graced with the Craftsman inspired frame you see in the photos on this page. The design pays homage to a bed frame that was in issue 235 of *Woodsmith*. You can find that plan, and plans for a night stand and dresser, that form a wonderful Craftsman suite of bedroom furniture at WoodsmithPlans.com.

▲ First, faux tenon plugs add interest to the sides of the mirror. Then there's positive and negative space interplay created by the middle stiles. Finally, the cap adds the crowning Craftsman touch to the mirror.

Start with the STILES & RAILS

Mirrors of the size we are using here are heavy, so it's important to have a frame that can carry the load. That's not going to be a problem though, as you see in the drawings to the right. In keeping with the Craftsman spirit, the stiles and rails used for this mirror are generously proportioned. As are the tenons on the three rails that join them to the stiles.

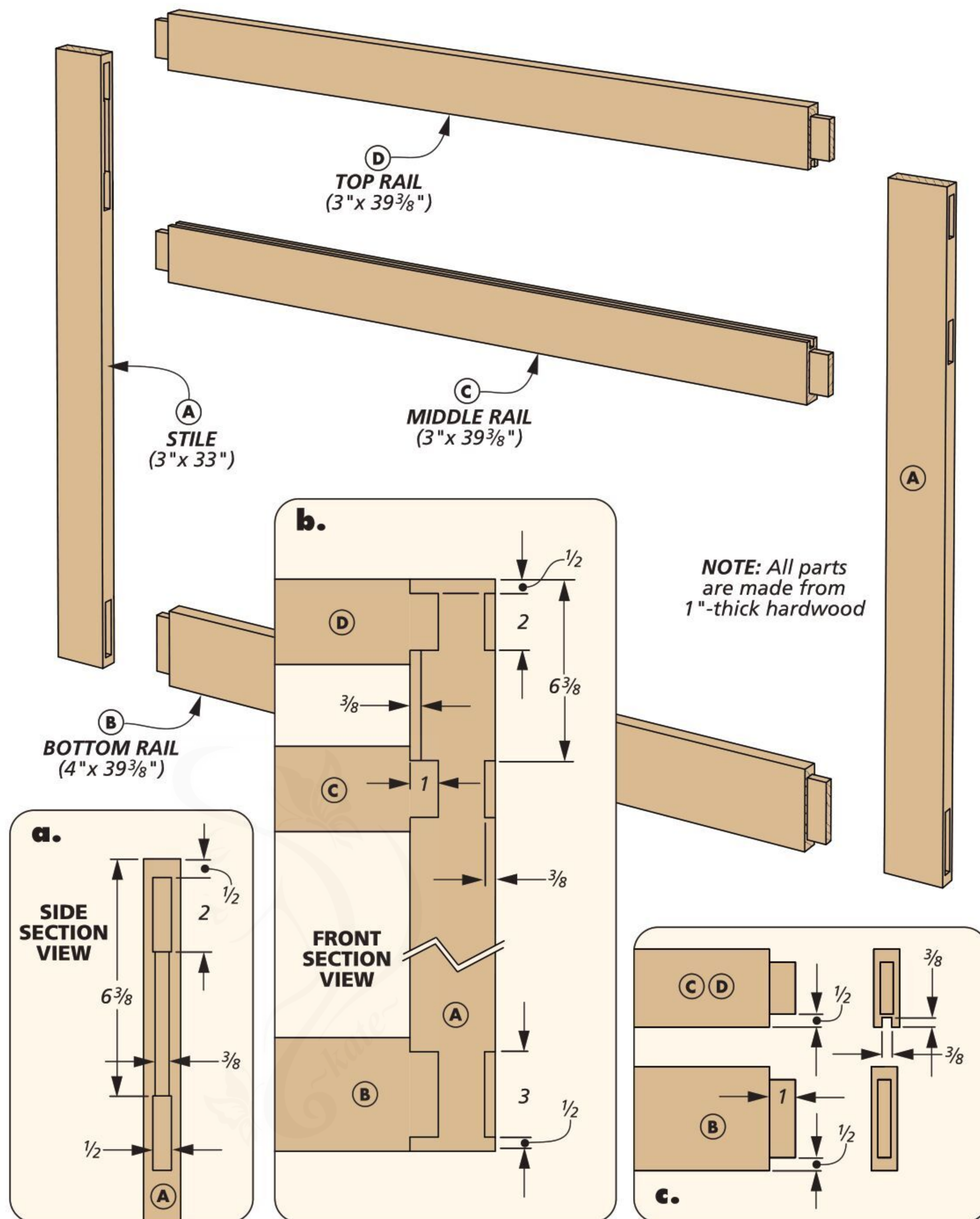
To get started, cut the workpieces to their final size. Then you can set aside the rails and focus on the stiles.

MORTISES IN THE STILES. There are two sizes of mortises you need to make in the stiles. The longer mortise is for the bottom rail tenons on the inside of the mirror, and the tenon plugs on the outer edges of the stiles. The shorter mortises are for the middle and top rails, all of these are shown in detail 'b.' The box below shows the steps needed to make the mortises on the inside, as well as the outside edges of the stiles.

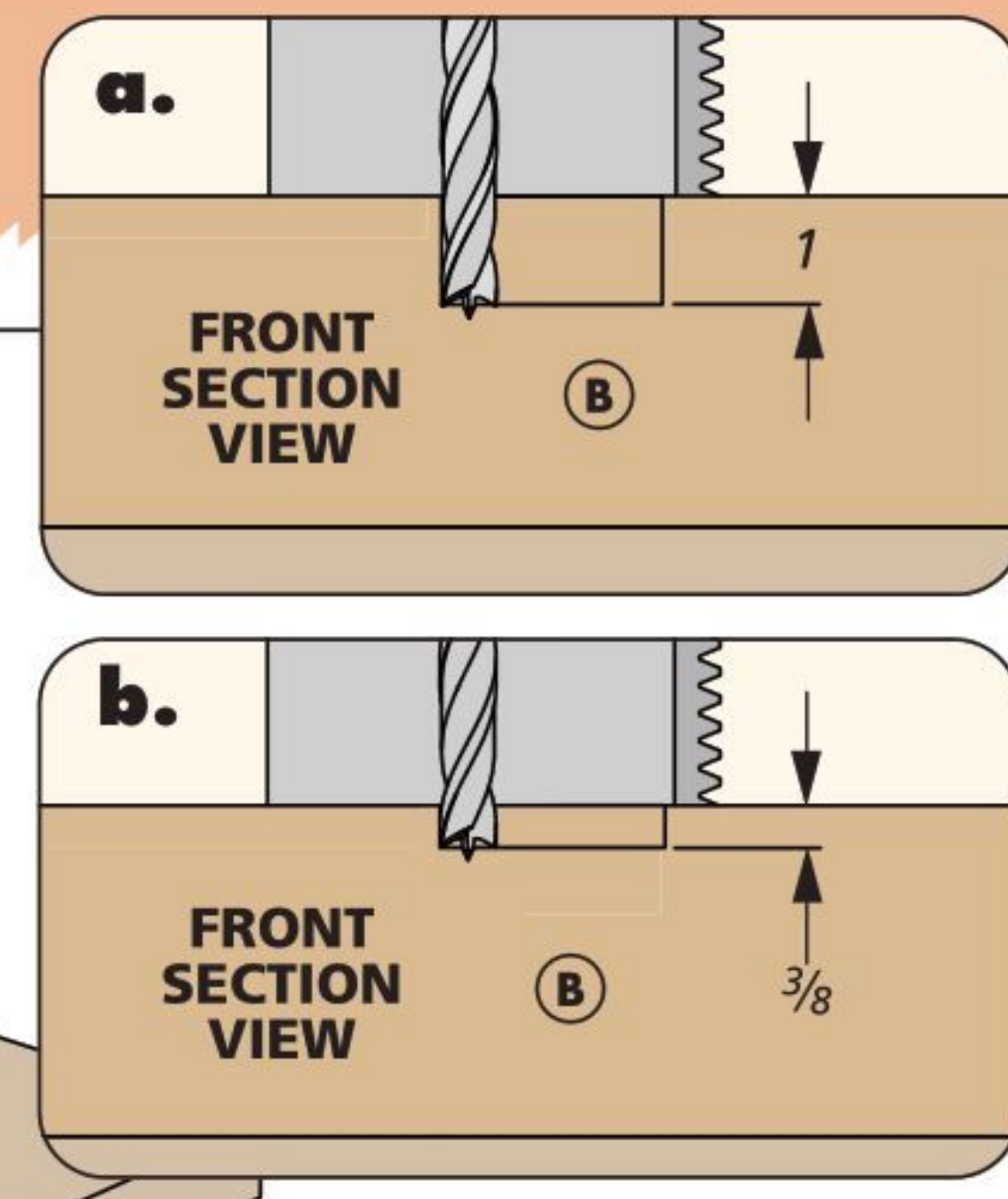
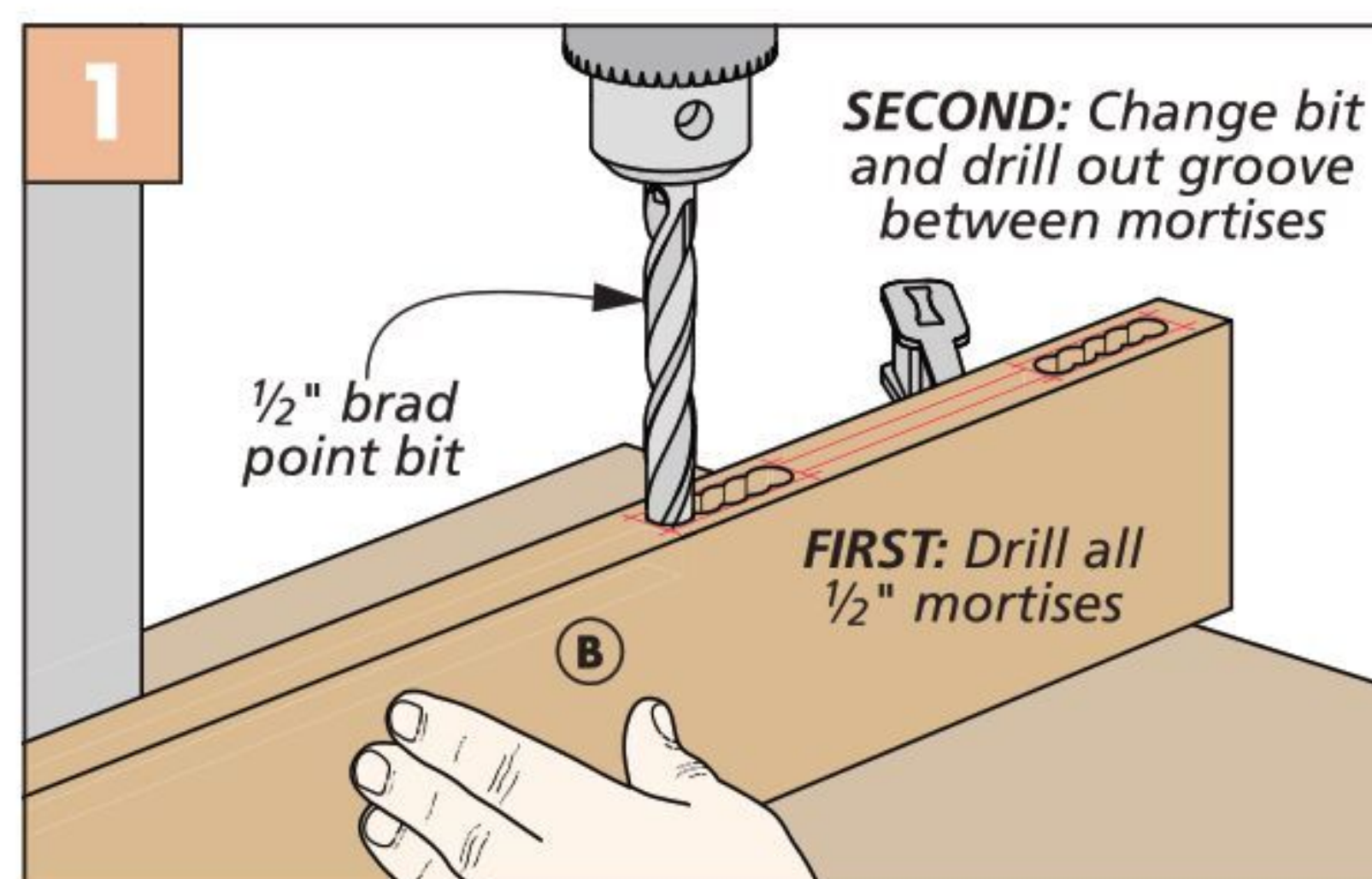
Detail 'a' shows a groove between the two upper mortises. This groove holds a filler piece that you'll make later. I used a smaller brad point bit and made those grooves at the drill press.

TENONS ON THE RAILS. The tenons on the rails are made at the table saw. Using the rip fence as a stop, and the miter gauge to guide and support the rails, I cut all the cheeks first. Then I stood the rails on their edges to make the shoulders (detail 'c').

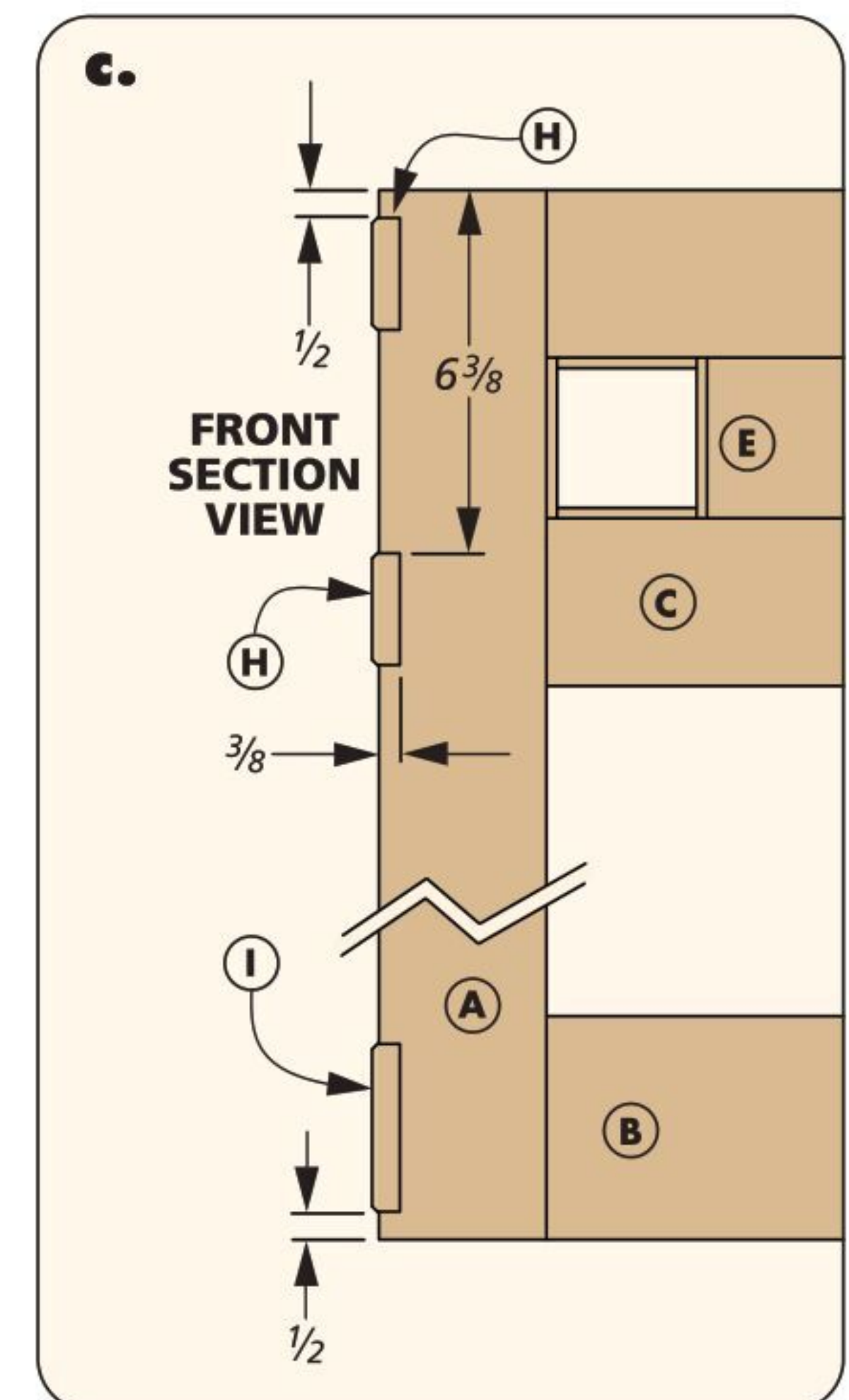
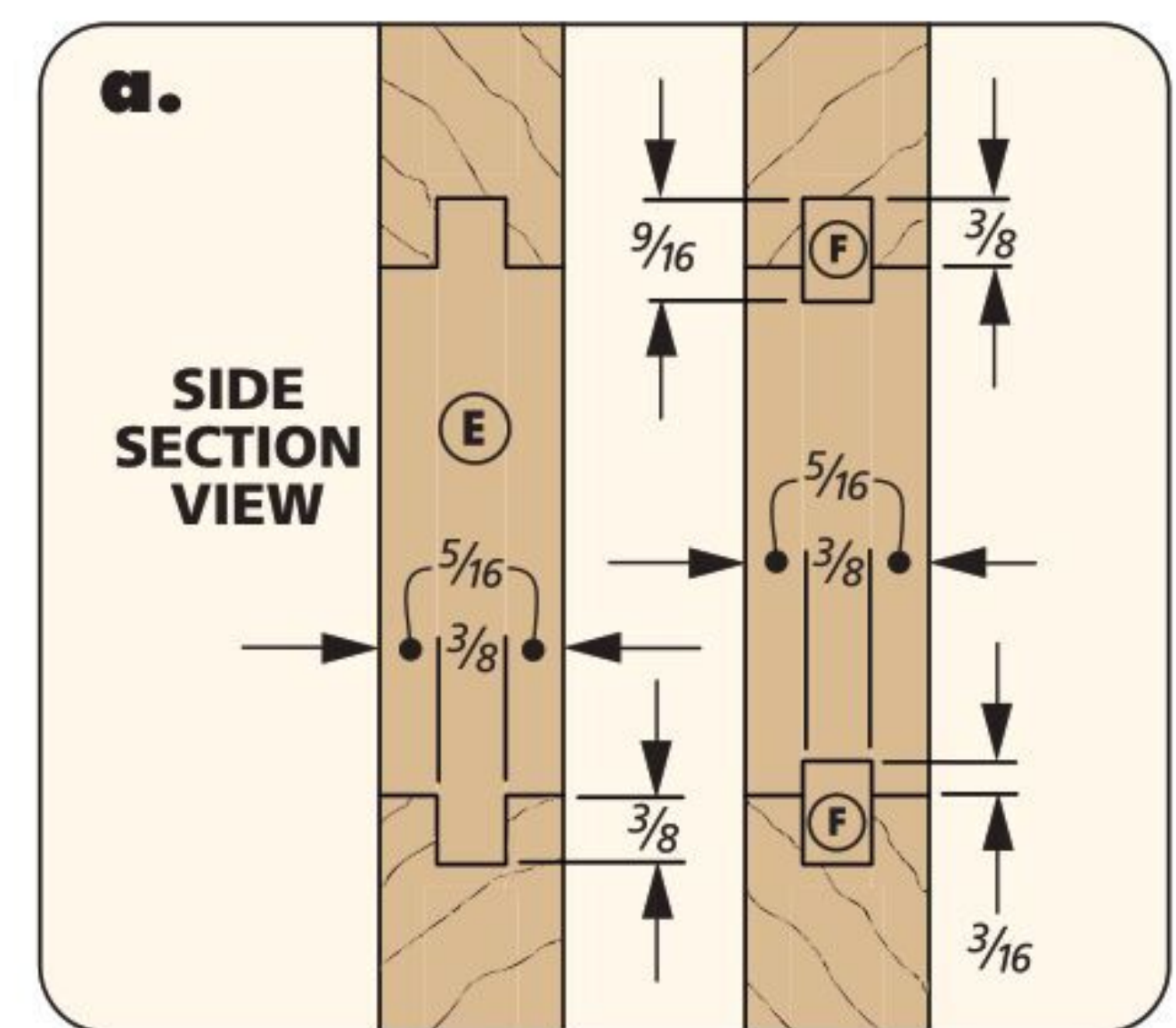
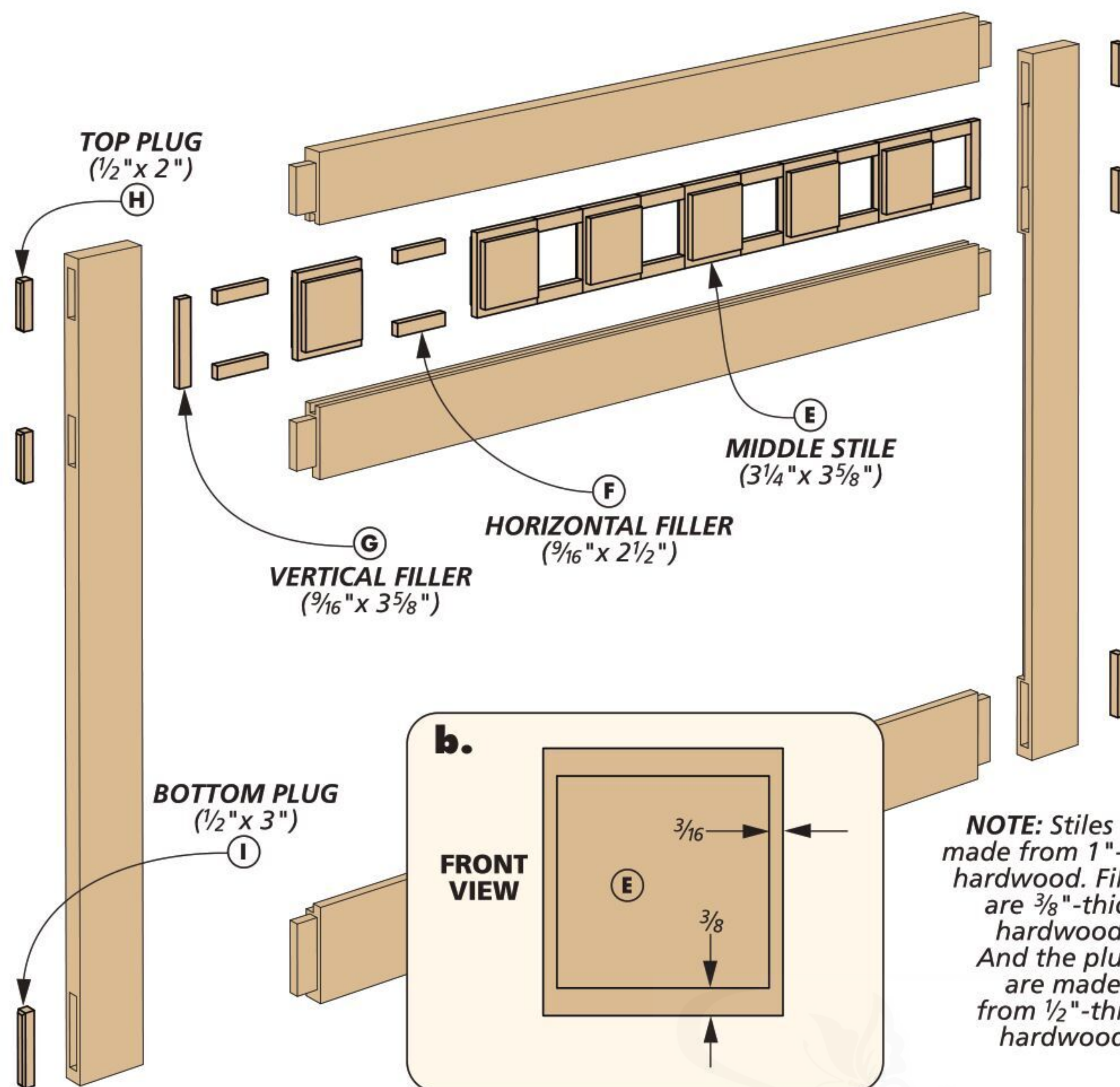
All that's left here is making the grooves in middle and top rail (detail 'c'). Now you're over half way home on this project. On the next page you'll find the directions for making the rest of the parts of the mirror frame.



MORTISE ON BOTH SIDES



A Two-Tiered Mortise. Start out with the larger, deeper mortises for the rails (detail 'a'). Use this bit for the tenon plug mortises as well (detail 'b'). Then you can change out the bit and make the groove between the two rail mortises.



NOTE: Stiles are made from 1"-thick hardwood. Fillers are 3/8"-thick hardwood. And the plugs are made from 1/2"-thick hardwood

Throw in some **DECORATIVE DETAILS**

You've got a few more pieces to make before you can glue up the mirror frame. As you see in the drawing above, there are six middle stiles. Technically, these are the only pieces you need to glue up the frame. But I wanted to use the filler pieces to help space the stiles evenly across the

length of the mirror. The tenon plugs and the cap for the top of the mirror are decorative elements that can wait until later.

START WITH STILES. The easiest way to make the stiles is to start with a blank that's longer than the total length of the six stiles. Using your table saw

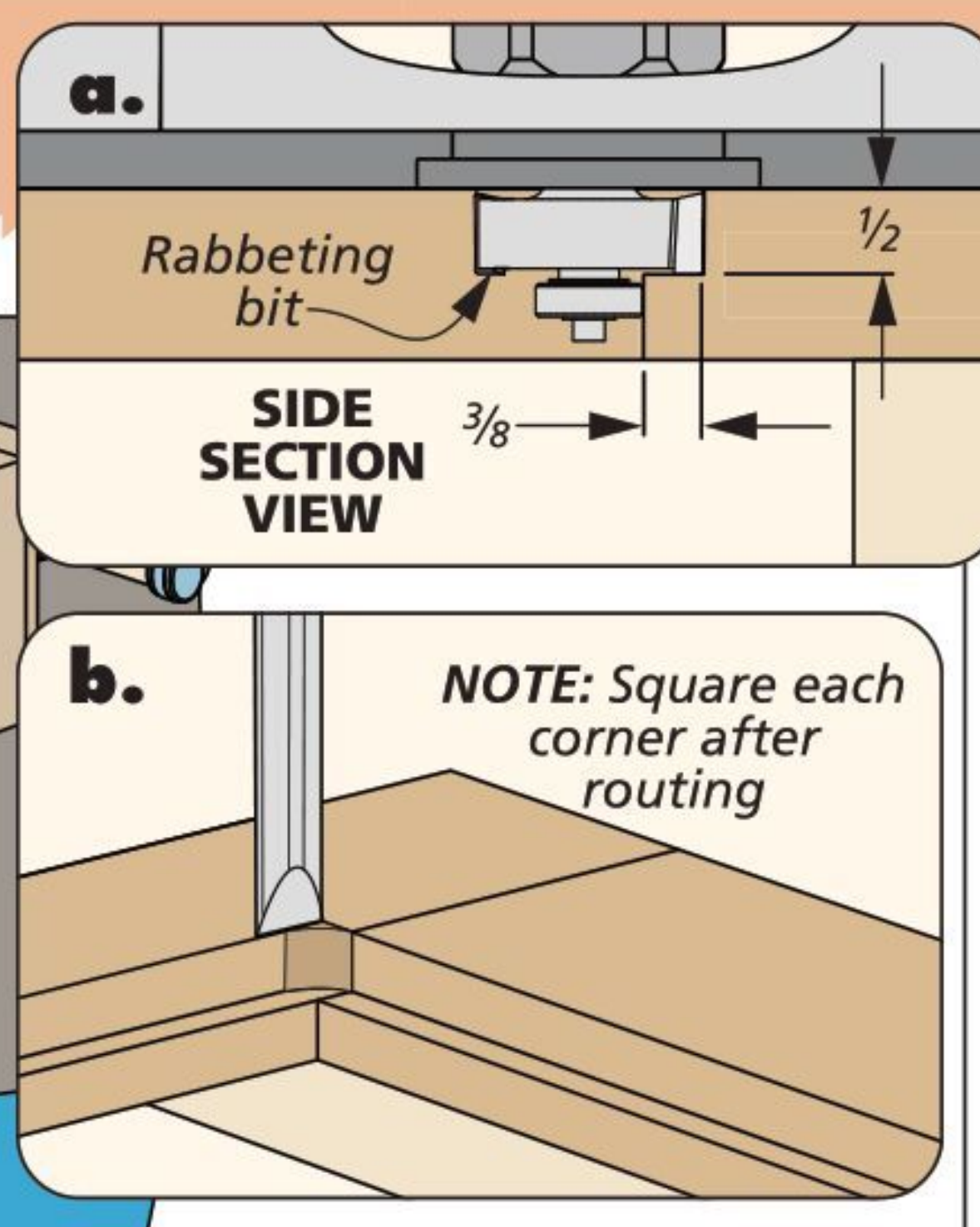
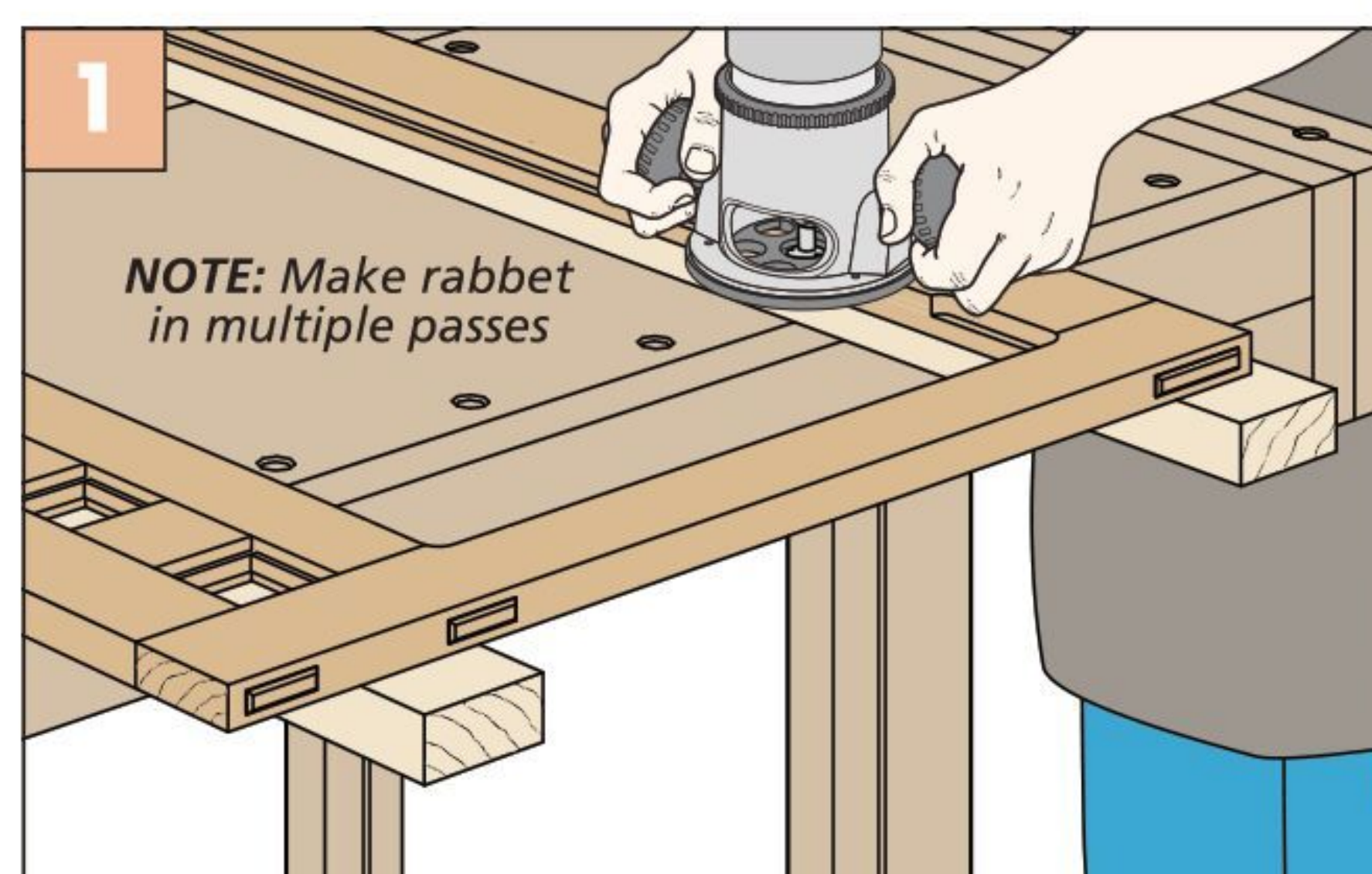
with a dado blade buried in an auxiliary fence, cut the narrow tongues on the long edges (detail 'b'). Then, cut each of the middle stiles out of the blank.

Making the tongues that go in the groove of the rails is just a matter of switching back to the setup you used for the tongues, this tongue is a little wider than the first one you made.

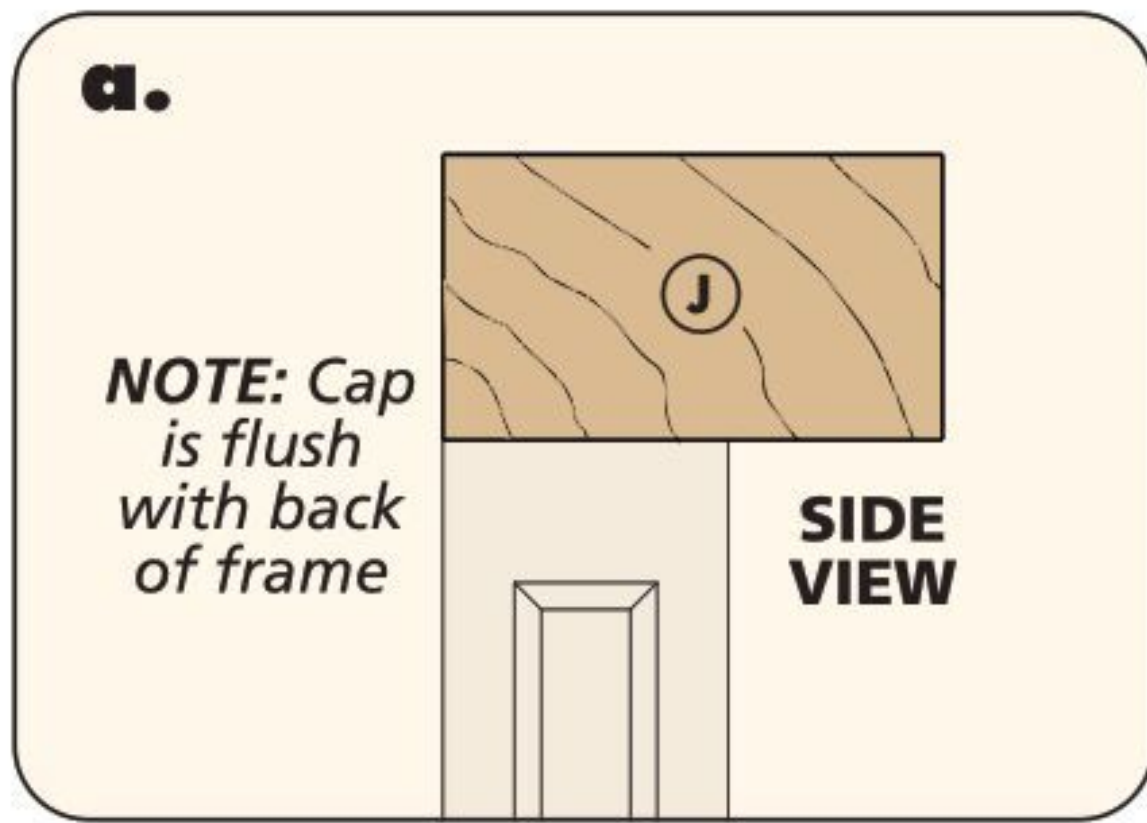
FILLERS. The filler strips do the double-duty of spacing the stiles in the frame, and adding a nice shadow line accent across the top of the frame. I milled the fillers in long strips, but held off on cutting them to length until the next step — the dry run.

DRY RUN. Doing a dry run before going live with glue has always paid off in my book. In this instance there's an added benefit of getting to space the stiles,

ROUTING BACK RABBET



Use a Rabbeting Bit. A rabbeting bit chucked into your router is the best way to make the rabbet in the back of the frame that holds the mirror and hardboard back.



and cut the fillers to an exact fit. Then a light pencil mark keeps track of all the part locations during a glueup. Still, I use slow set glue when this many parts are involved.

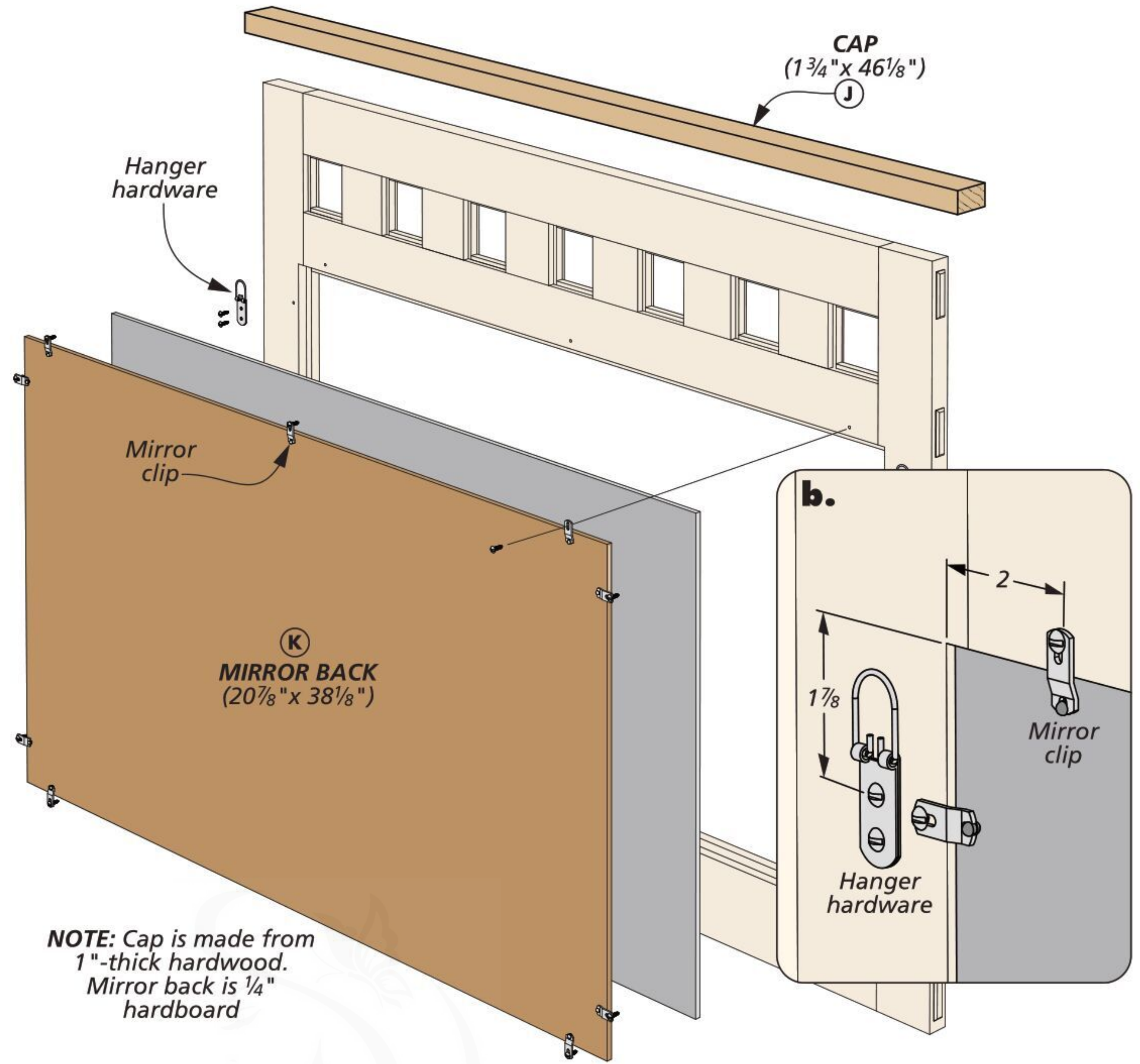
RABBET. To accommodate the mirror and the hardboard back, you'll need to add a rabbet to the backside of the mirror. The box at the bottom of the previous page shows you how.

DECORATIVE DETAILS

There are just a few things to left do on the mirror. Let's start with the cap. The cap that's glued on the top of the frame adds to the Craftsman look. It's centered on the length of the mirror and flush with the back (detail 'a').

TENON PLUGS. As you see in detail 'c' on the previous page, the tenon plugs come in two sizes to match the rails that they're associated with.

I started with long blanks that are the width and length of



the mortises in the stiles. Next, chamfer both ends with a chamfer bit at the router table. Then cut them to fit at the table saw. Repeat this process until you have all the plugs you need.

The mirror clips you see in detail 'b' hold the mirror and hardboard back in the frame.

The hanger hardware will need screws in studs with broad heads to hold the mirror on the wall.

After the stain is dry, two coats of lacquer will be a good reflection on your woodworking skills. Sorry, I couldn't resist. This mirror is an instant classic in whatever setting it resides. **W**

Materials, Supplies & Cutting Diagram

A Stiles (2)	1 x 3 - 33	F Horizontal Fillers (14)	$\frac{3}{8} \times \frac{9}{16} - 2\frac{1}{2}$	K Mirror Back (1)	$\frac{1}{4}$ hdbd. x $20\frac{7}{8} - 38\frac{1}{8}$
B Bottom Rail (1)	1 x 4 - $39\frac{3}{8}$	G Vertical Fillers (2)	$\frac{3}{8} \times \frac{9}{16} - 3\frac{5}{8}$		
C Middle Rail (1)	1 x 3 - $39\frac{3}{8}$	H Top Tenon Plugs (4)	$\frac{1}{2} \times \frac{1}{2} - 2$		
D Top Rail (1)	1 x 3 - $39\frac{3}{8}$	I Bottom Tenon Plugs (2)	$\frac{1}{2} \times \frac{1}{2} - 3$		
E Middle Stiles (6)	1 x $3\frac{1}{4} - 3\frac{5}{8}$	J Cap (1)	1 x $1\frac{3}{4} - 46\frac{1}{8}$		

1" x 7" - 84" White Oak (5.1 Bd. Ft.)



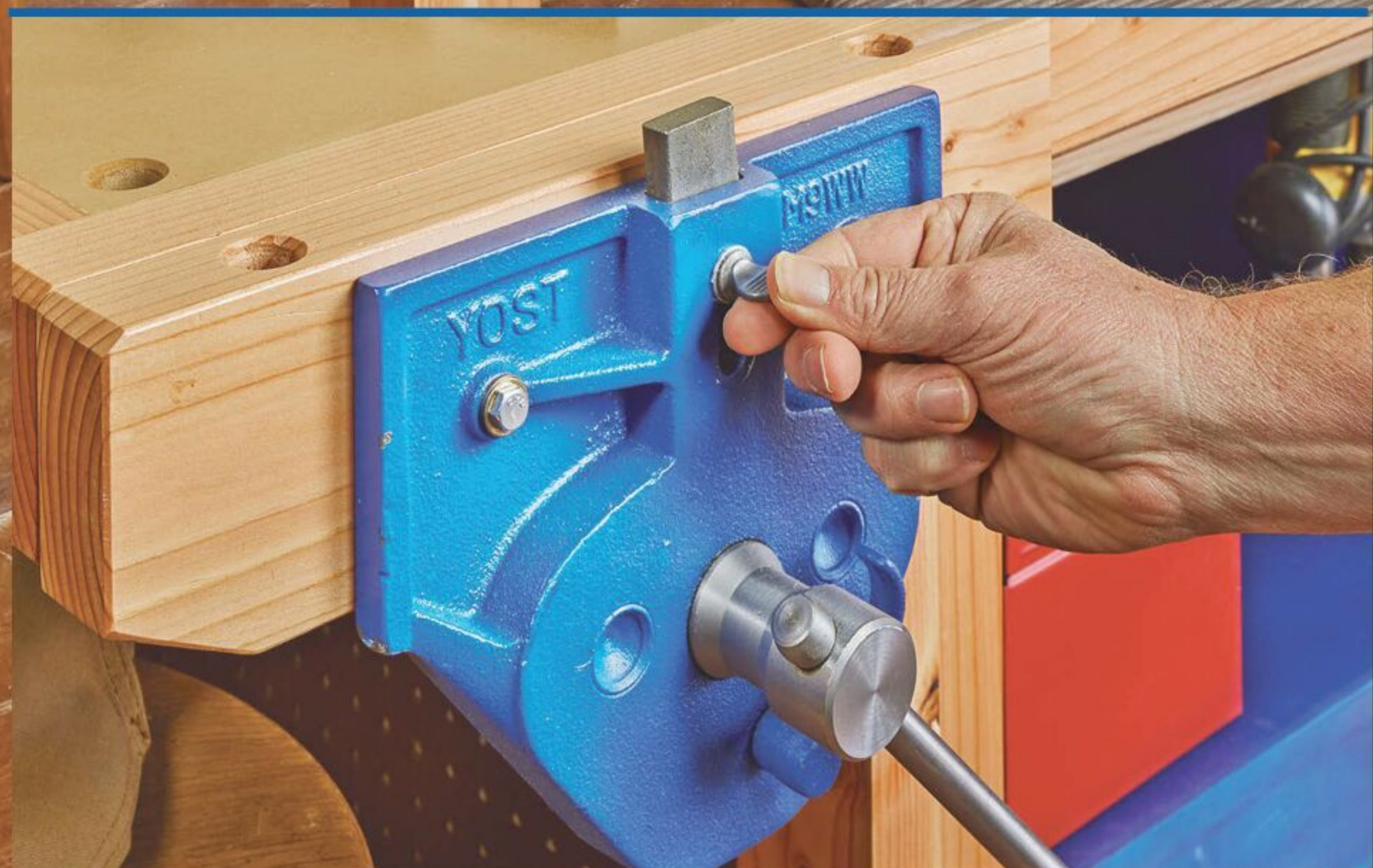
1" x 7" - 48" White Oak (2.9 Bd. Ft.)



$\frac{1}{2}$ " x $4\frac{1}{2}$ " - 24" White Oak (0.8 Sq. Ft.)



ALSO NEEDED: One 24" x 48" Sheet of $\frac{1}{4}$ " Hardboard



▲ The quick-release vise that's integrated into the front of the bench earns its keep in multiple ways. The wood vise face holds parts firmly in place without marring the surface. And the dog holes open a world of workholding possibilities.

Weekend Workbench

A new bench that's heavy enough it can't be pushed around, but doesn't cost a ton of money to build? You bet! And that's a good thing for you.

This simple but sturdy workbench ticks all the boxes when it comes to a reliable woodshop workcenter. It's made of a trio of fairly economical materials — “two-by” Douglas fir forms the skeleton, pegboard in the sides, and MDF for the shelf and the top. Plus, all this stuff is available at local hardware stores and home centers.

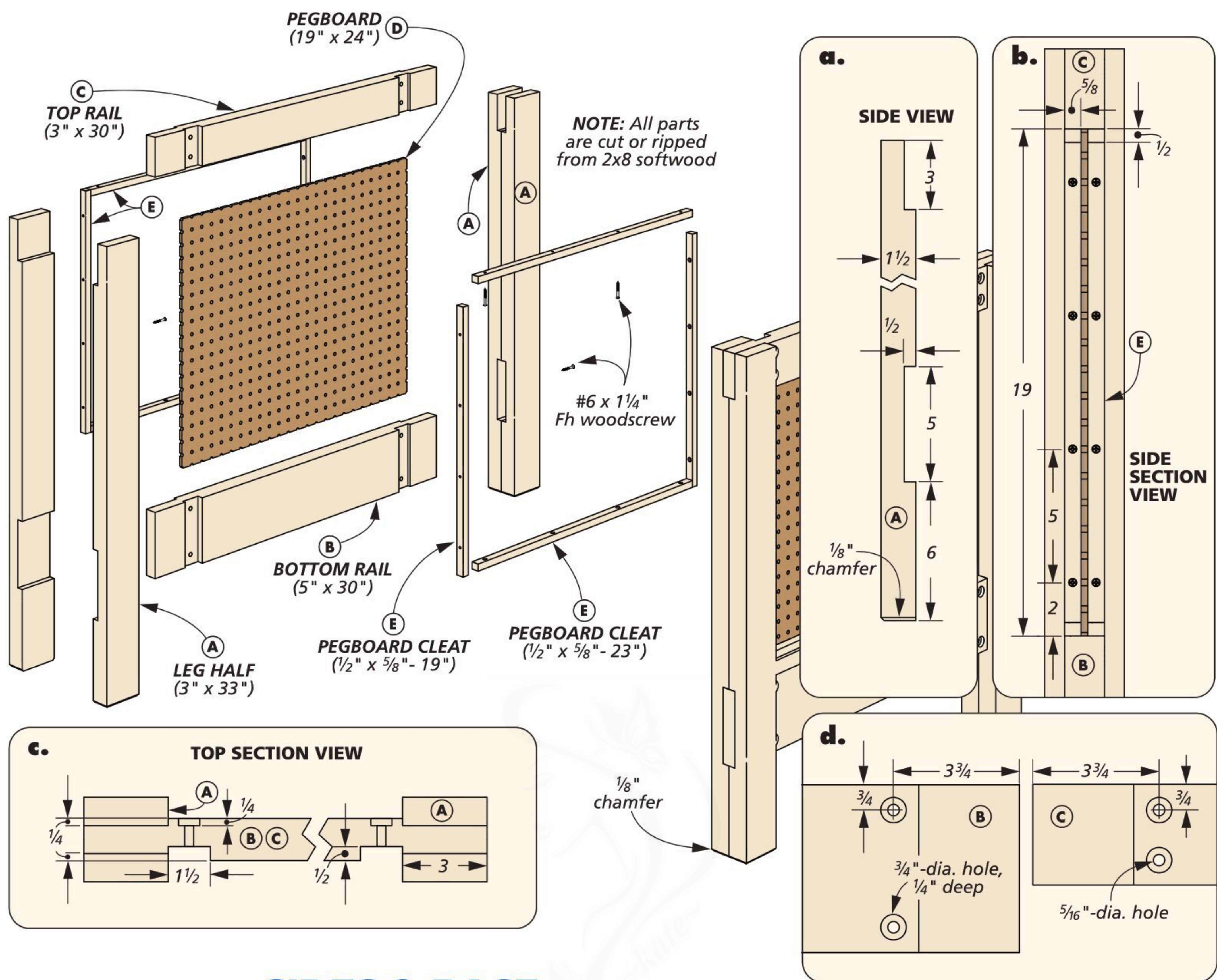
As simple as it is, this bench will answer the call of duty on multiple fronts. If you need a large flat surface to assemble a project, or repair a chair, you've got it here. But your more focused woodworking desires aren't shortchanged either, notice the heavy duty vise bolted to the front. Also, the wood jaw has a pair of dog holes that align to the holes in the top. So if planing, scraping, or most any other woodworking task is at hand, you'll be able to tackle them with your material held firmly in place.

The subject of how much shop storage you should have is similar to the age-old clamp conundrum — you can't have too much storage, or too many clamps. That's especially true when you look at the cabinet here that sits on the shelf of the workbench. So, let's see — a new bench, with added storage options, it's a win-win on all accounts.

If you so desire you could probably build this bench in a weekend (maybe one of those long weekends). But what's the hurry? This strong bench is going to give you years of service, so take your time and have fun while making this ally for your shop adventures.



▲ The term “storage galore” isn't hyperbole when it comes to this workbench. The ends of the bench are put to work with pegboard, while the lower shelf hosts a cabinet with plenty of storage options.



Start with the **SIDES & BASE**

The sides you see above are made up of a pair of legs that are tied together with rails. The rails are joined to the legs with mortise and tenon joinery. To make the joinery manageable, I glued up the legs from two-by material. So keep the goal of matching the grain patterns of the leg halves in mind when heading out for the material.

If you take your time selecting the boards for this project, you'll be happier in the long run. I look for the straightest grain possible when shopping. Also, it's a good idea to let the lumber acclimate in your shop for a while.

LEGS. With all the parts cut to length, it's time to focus on the joinery. It's fair to say that most

of the joinery involved in making this bench is right up front when you're making the sides. A lot of problems are solved by using two halves to make the legs. Instead of large open and closed mortises to contend with, you're looking at a rabbet in the top, and a dado towards the bottom of each leg half (detail 'a').

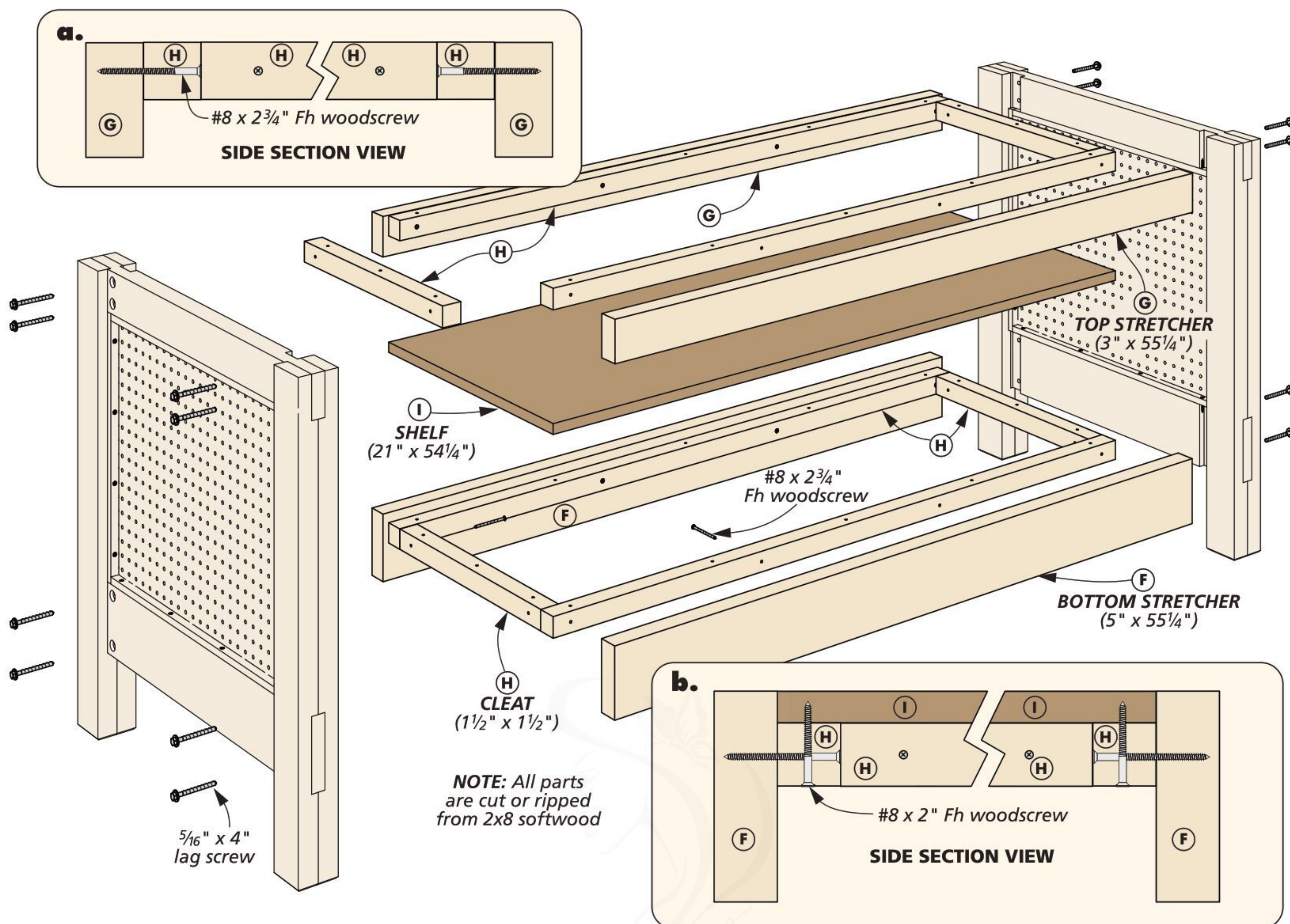
When you're done at the table saw with these parts you can glue them up. I made a spacer to use in the large mortise to keep the halves aligned. While the glue's drying, turn your attention to the tenons and dados on the rails.

RAILS. Notice in the main drawing above that the rails are different sizes, but the tenon

profiles and the dado depths are identical on both (detail 'c'). I chose to make the dados for the stretchers first. Then it's just a matter of lowering the dado blade to nibble away the tenons.

All that's left to do on the rails is drill the counterbored shank holes that you see in detail 'd.' Before gluing up the legs and rails, add the chamfer at the bottom of all the legs.

PEGBOARD SCREEN. I confess, I love pegboard. It's a nostalgic thing more than a pragmatic one. It seemed that all my uncles and every adult guy I knew had a pegboard rack in some corner of their garage, or a niche in the basement by the furnace. The level of organization was



another matter, and kind of a reflection on that fellow's view of tool stewardship.

At any rate, as you see in the main drawing on the previous page, I trapped a pegboard in the opening of each side (detail 'b'). It's held in place with cleats that are screwed to the rails and legs. After installing these parts, I turned my attention to the stretchers and the bottom shelf.

STRETCHERS, CLEATS & SHELF

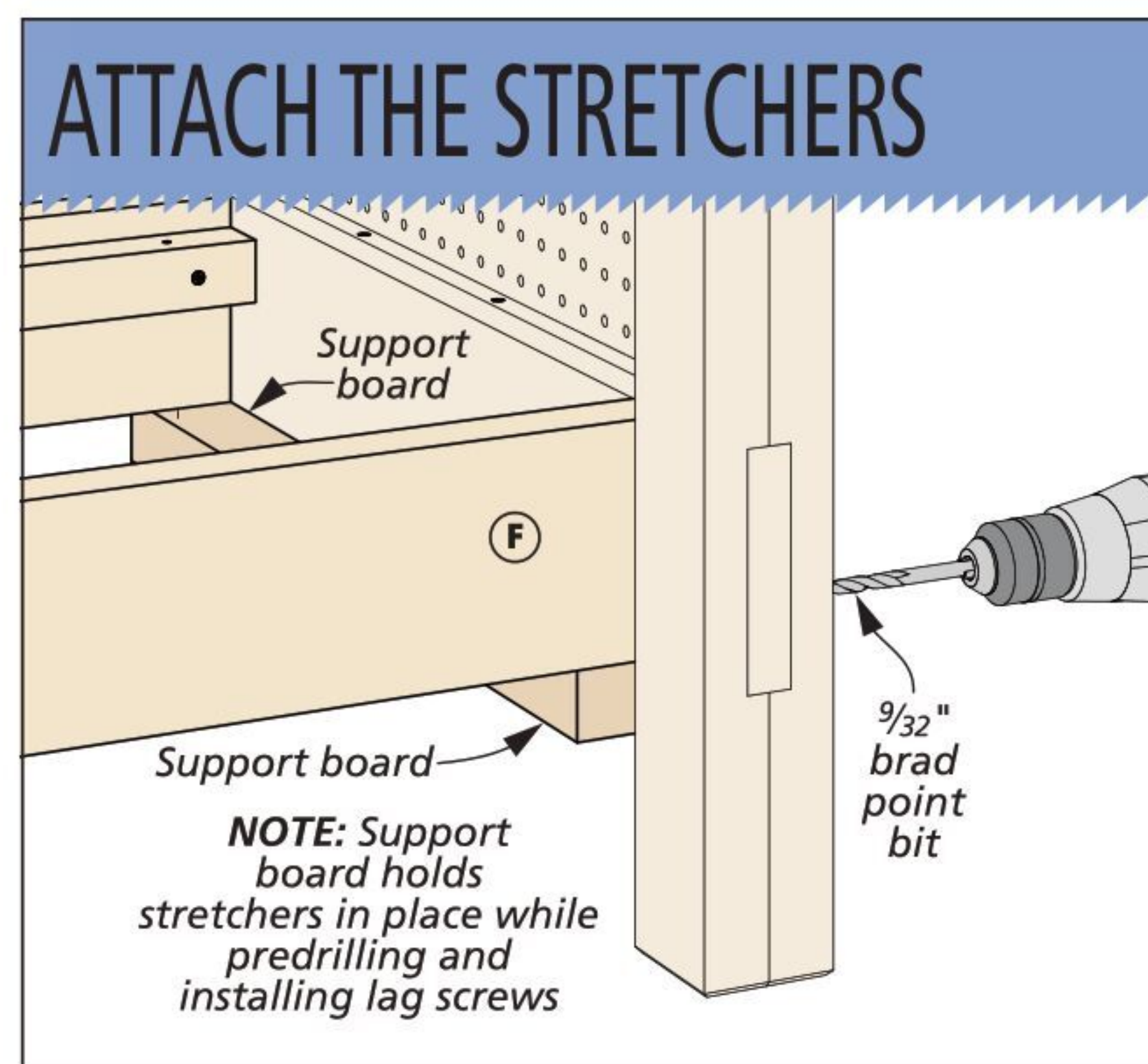
Bringing the sides together and creating a solid base for the top of the workbench involves the parts you see in the drawing above. The bottom and top stretchers fit into the dados you made in the rails earlier and are held there with lag screws.

The cleats that you screw to the stretchers in turn tie the shelf

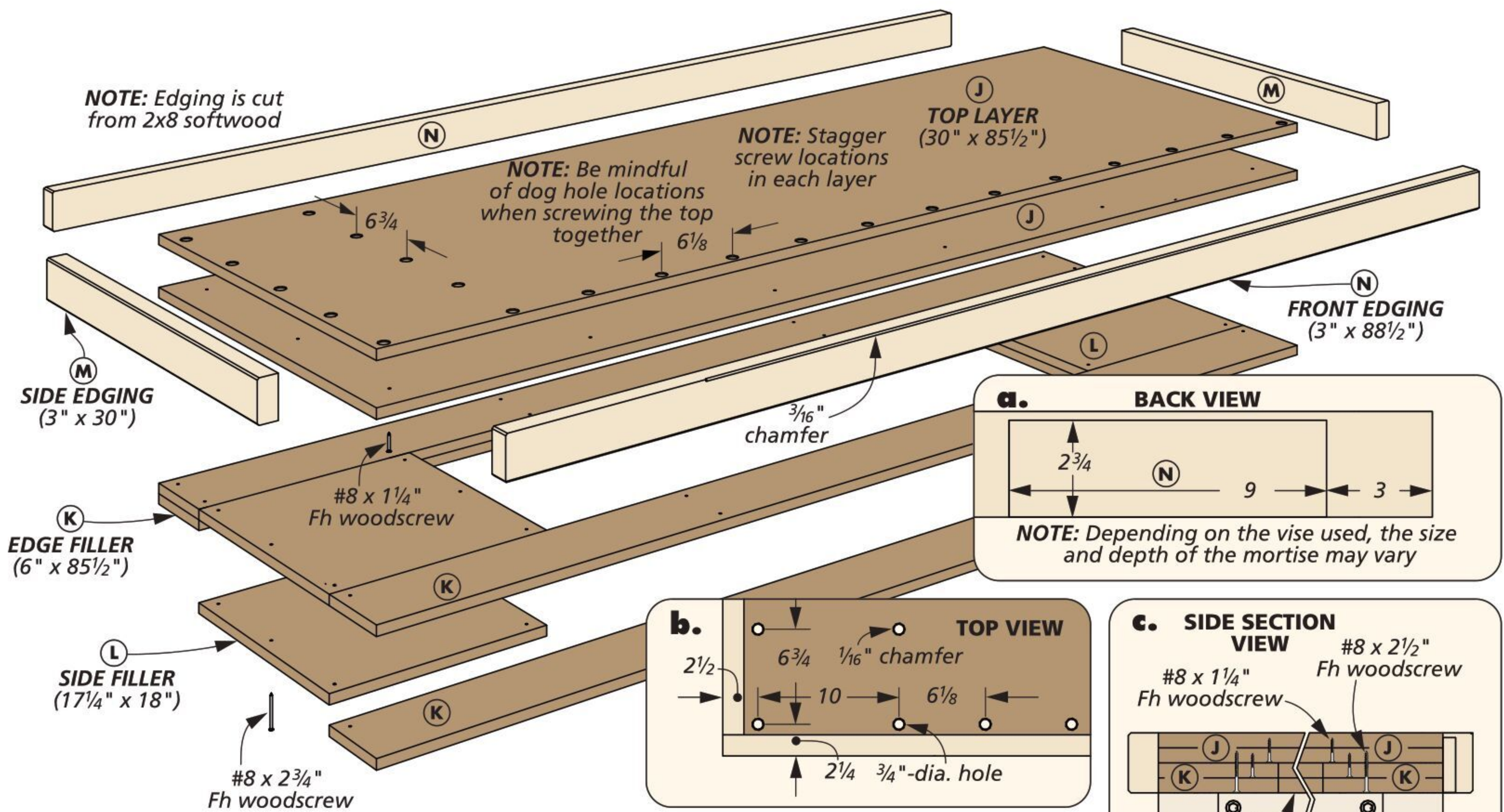
(detail 'b') and top (detail 'a') to the base. To start, I trimmed the stretchers to length, making sure all the cuts were perfectly square. This detail prevents any twist in the base assembly that could lead to a wobble. No one needs that.

SOME ASSEMBLY REQUIRED. To make things easy I screwed the cleats to the stretchers before bolting the stretchers to the sides. Also, as you see in the box to the right, I screwed a support board to the underside of the bottom rails. This let me set the bottom stretchers in place and drill the pilot holes. Then ratchet the screws in place. The top stretchers can sit on the pegboard cleats while you attach them.

Adding the end cleats is the next order of business. They are screwed into the rails on the



sides. To finish up this phase of the project, drop the shelf into its opening and screw it to the cleats from the underside. Before moving on to the top, I decided to spray a couple of coats of lacquer on the base.



Crown the bench with a **TOP & VISE**

The top of this bench is a beast. But it's the kind of beast that you want in your corner. How I'm defining beast here is a large, heavy, flat surface that will help you tame any wood-working project that you throw at it. When you talk about the attributes of heavy and flat, one material comes to mind — MDF, which is what's used here.

The drawings above reveal the ingredients that make up the top, the multiple layers of the MDF I

just mentioned, framed by more two-by material. And for good measure we've bolted a vise on the end to lend an iron grip when needed. Start by sizing all the pieces that make up the top.

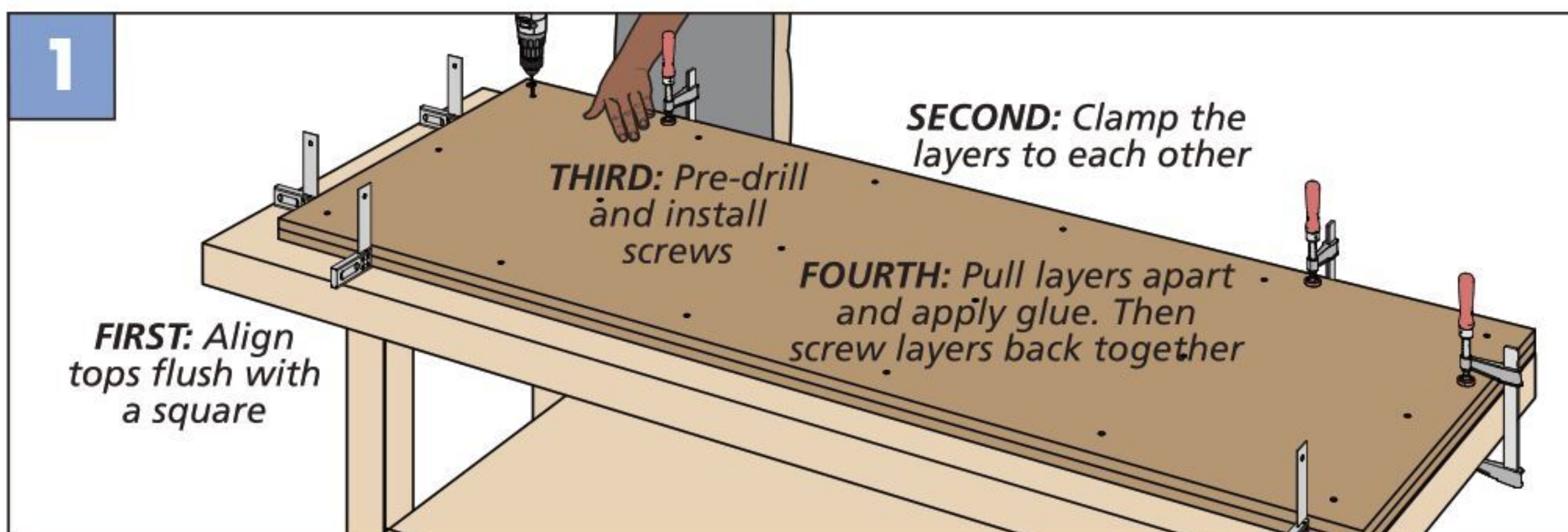
LAYERS. Notice that the top two layers are solid, while the bottom two serve mostly to support the edging, and add a little heft to the bench (detail 'c'). Speaking of edges, that's the most important thing at the start of the assembly, keeping the edges

flush to each other while you glue them up.

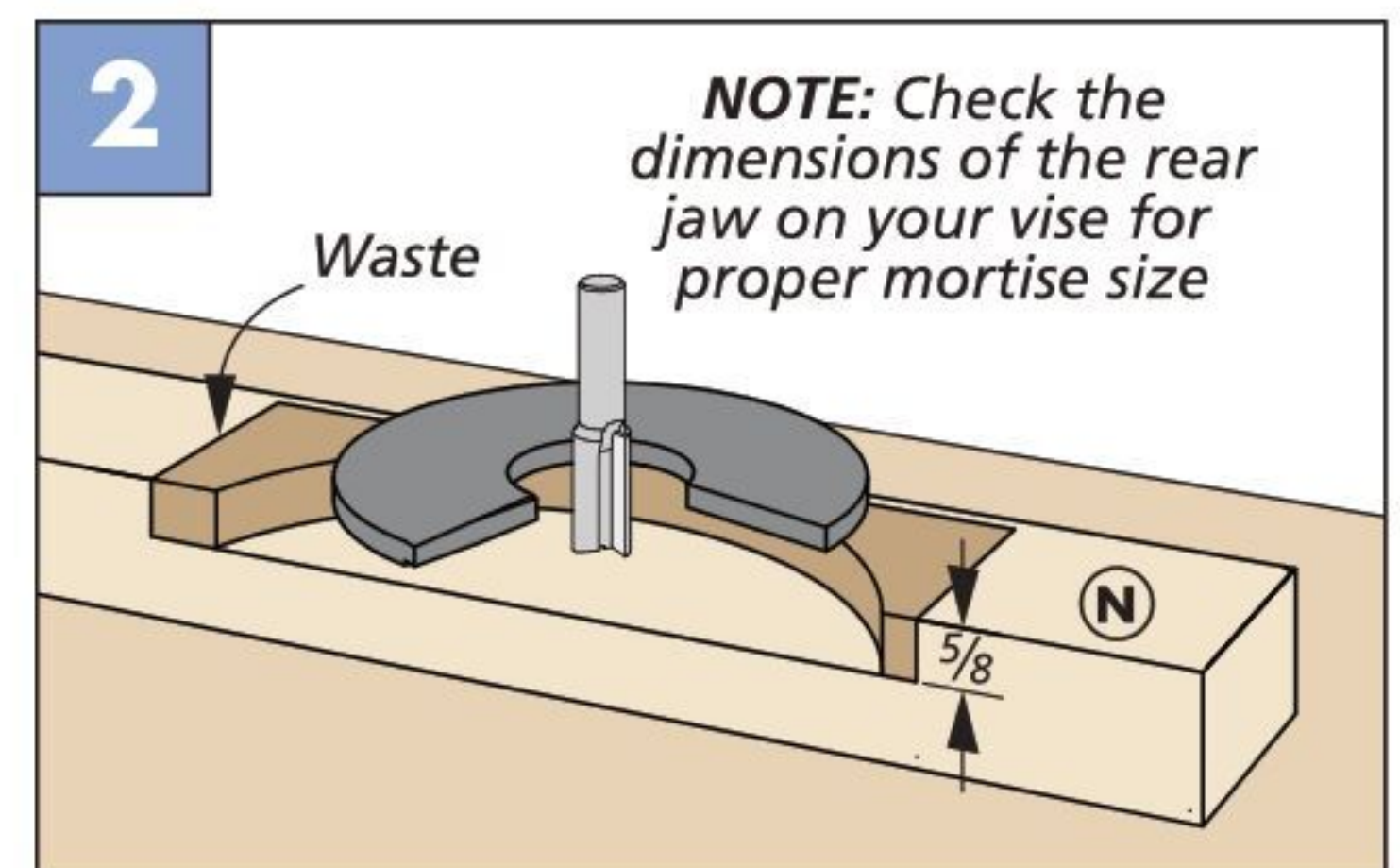
Figure 1 in the box below shows how to get the edges flush. I started with the solid top pieces upside down, clamped together with their edges flush. Screws are going to bring all the parts together, hold the parts flush, and act as clamps as well.

So you need to pre-drill the pilot holes before the glueup. Be mindful of the dog hole locations that you see in the main drawing

PREPARING THE PARTS OF THE TOP



Pre-drilling Ensures Success. MDF is slippery when there is glue involved. To control that problem, I clamped the top two layers together, pre-drilled, and then countersunk the holes a bit to ensure everything came together on the top.



Route the Mortise. You'll need to make a mortise in the back of the front edging. It doesn't have to be real tidy to work right.

and detail 'b.' When the screw holes are done, separate the layers and spread on some slow-set glue. Now bring back the other layer and screw the two together.

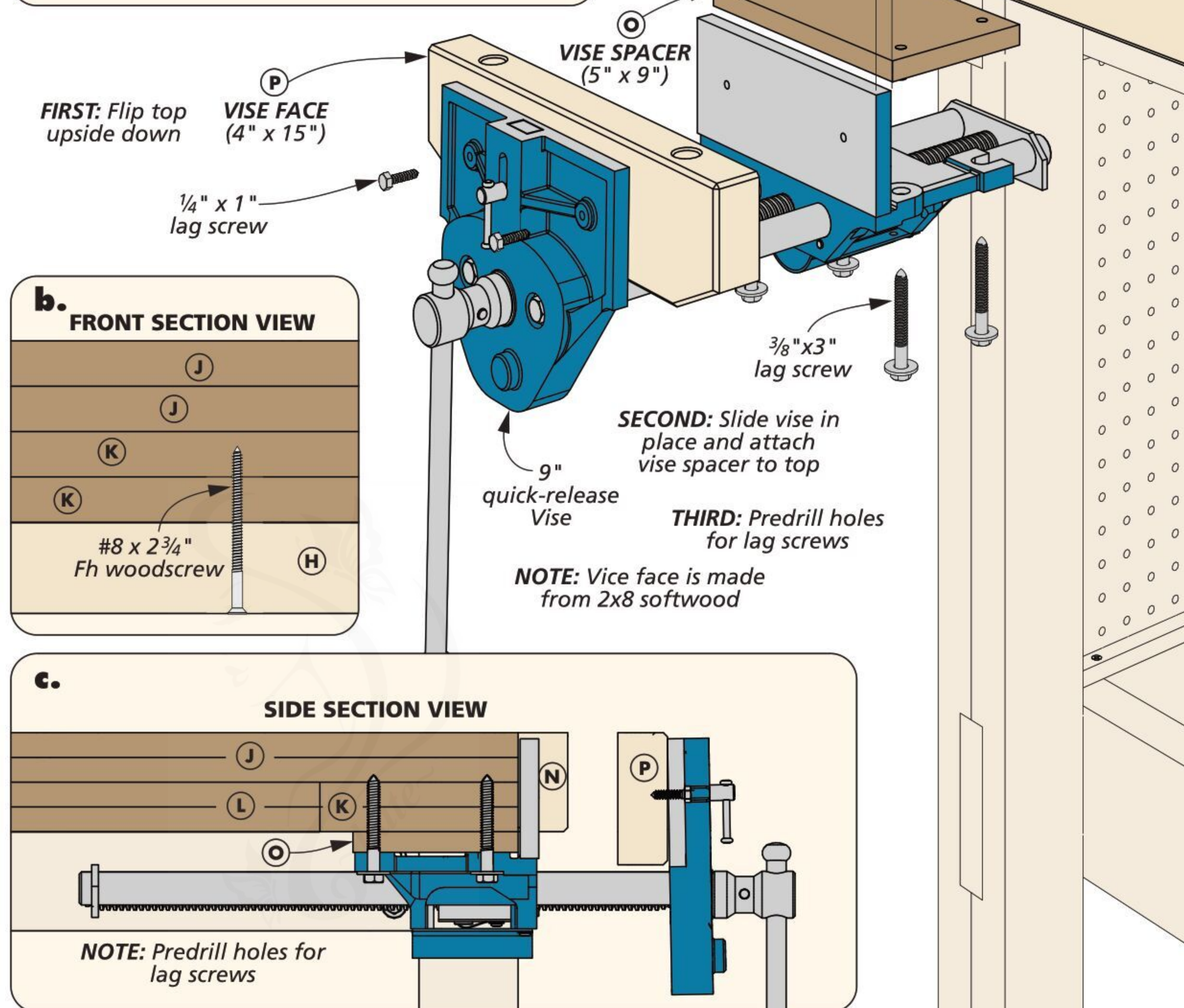
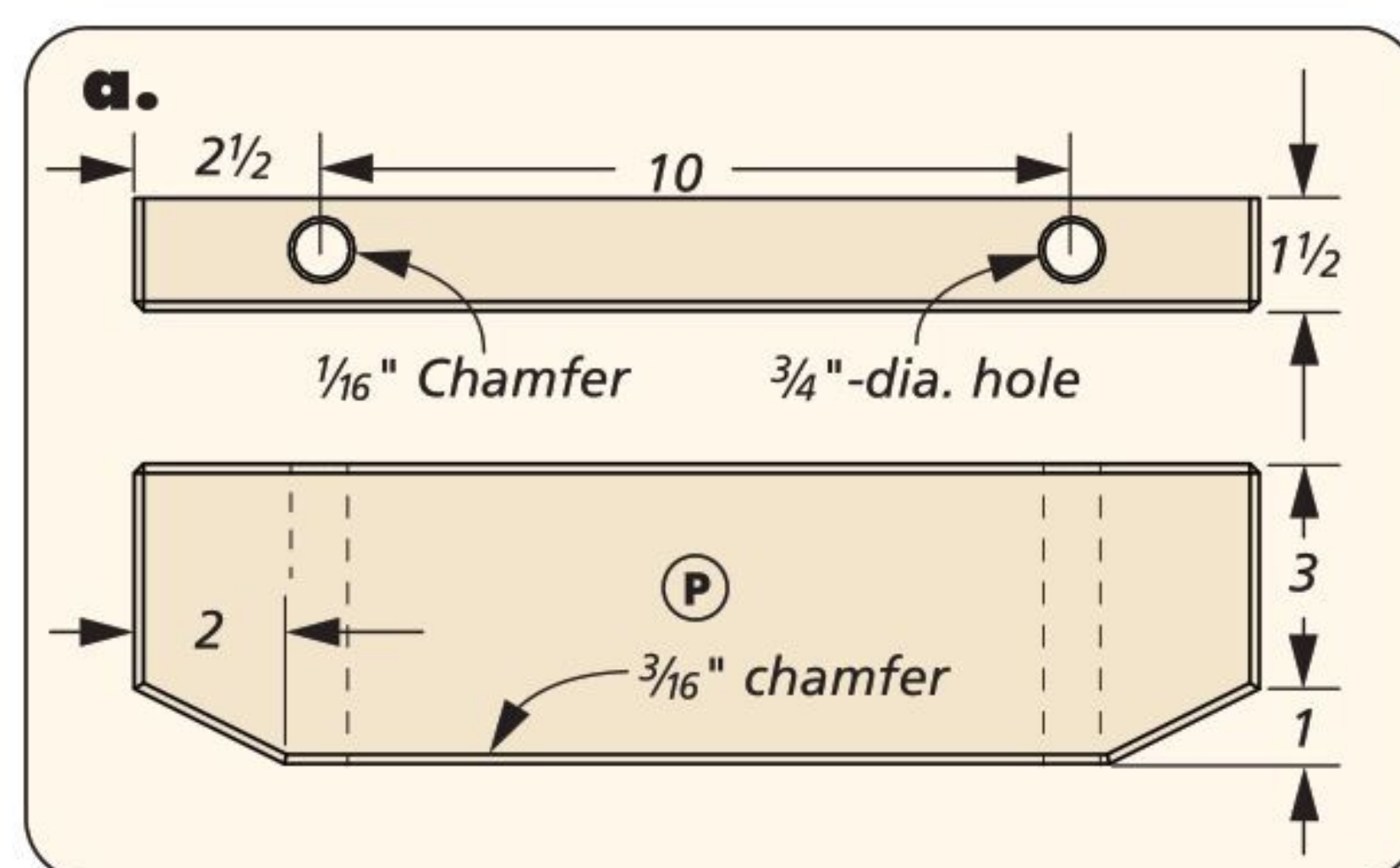
That's the toughest part of putting the top together, but don't completely let your guard down, adding the two filler layers still require some focus. You'll attach these layers one at a time. Start off with the long front and back edge fillers. Clamp them to the assembled layers, predrill the screw holes, unclamp, apply glue, and screw them in place. Again, keep in mind the dog hole locations.

After edge fillers, cut the side fillers to fit the openings then repeat the process to attach them. (Stagger the screws on all layers.) One more layer like this will complete the core of the top. Now you need to round up a friend or family member — one with a strong back — to help you flip the top right side up.

EDGING. The main drawing on the previous page shows the thick edging that wraps around the MDF core. After cutting the parts to length you can glue on the side edging. I don't have clamps long enough to glue the side edging to the top, so I daisy chained my pipe clamps to span the length of the top.

The front and back edging pieces go on much easier. Note in Figure 2 on the previous page that you'll need to rout a mortise in the back side of the front edging. This mortise accommodates the rear jaw of the vise that you'll install shortly.

INSTALL THE VISE. Call back that friend with muscles and flip the top again. It's the easiest way to install the vise. Detail 'c' shows how the rear jaw of the vise fits in the mortise you routed in the edging. You'll need to make the spacer you see in the main drawing above. The goal of the spacer is to keep the top of the



vise jaw just below the top of the bench. You should double-check that with your vise and top before bolting it down.

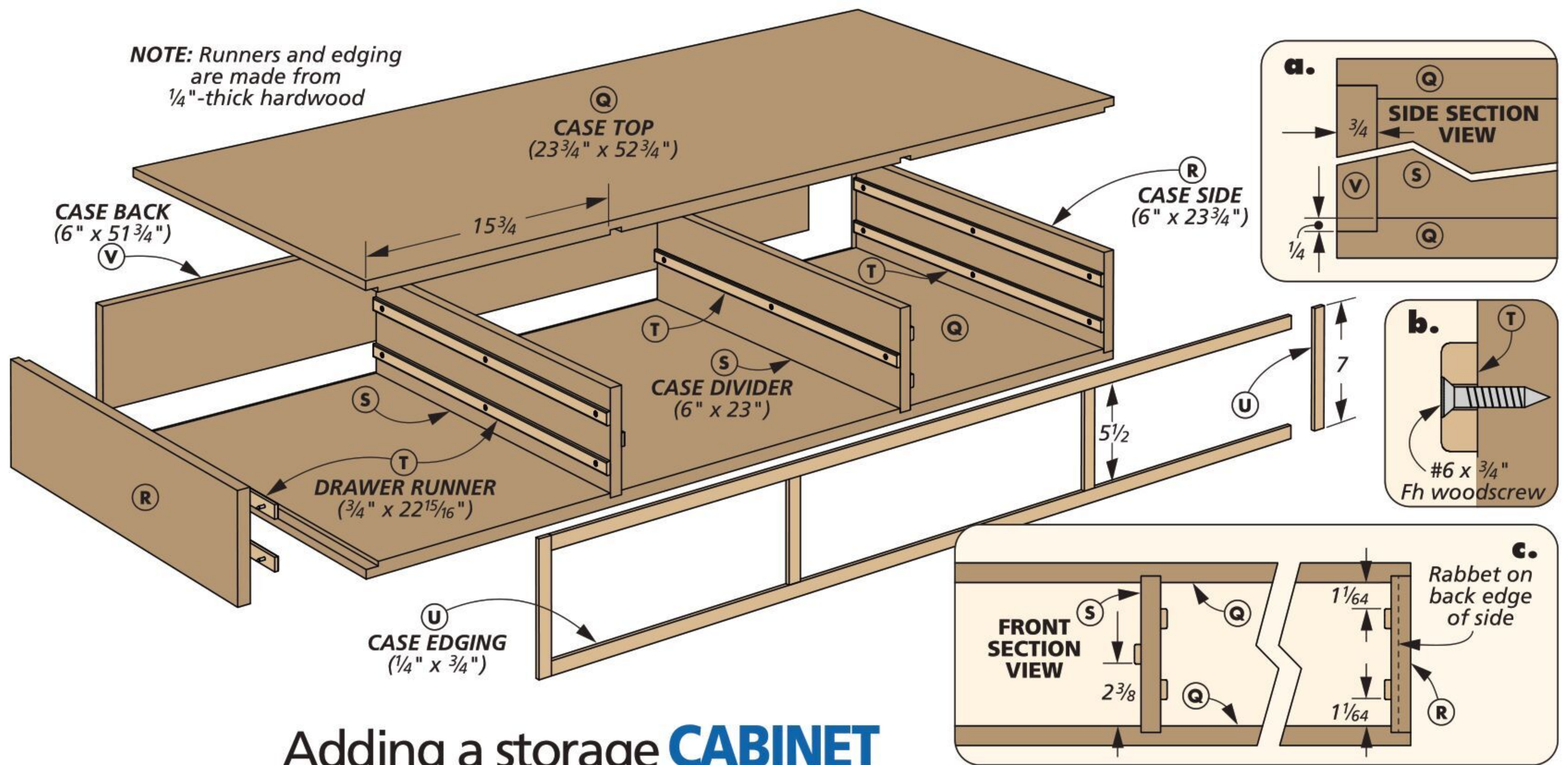
Predrilling is a must in preparation for the large lag screws that hold the vise. For ease of installation, I rubbed a little beeswax on the threads of the screws. Now you're ready to flip the top back over. Once that's done, you better give the muscle man a cold libation and a chair to watch you finish up the top.

DOG HOLES & FINAL DETAILS. After laying out the dog holes (main drawing, and detail 'b,' on the previous page), I used a drill

guide to keep the holes square to the top. After cleaning up all those drill shavings, you need to make the last part for the top — the vise face.

The face is screwed to the front jaw of the vise. Detail 'a' shows that you need to drill dog holes in the top of the face that align with the ones on the workbench. Then cut the bottom corners and chamfer all the outer edges.

All that's left to do before screwing the bench to the base (detail 'b') is to chamfer the edges on the top. Now it's time to build a simple but sturdy storage cabinet for the shelf.



Adding a storage **CABINET**

With the workbench built and out of the way, you can focus on the storage cabinet. It tucks away nicely at the bottom of the bench.

As the drawing above reveals, all the joinery for the case is done in the top and bottom pieces. Start off cutting the rabbets along the edges and back (detail 'a'), then the dados for the center dividers (detail 'c'). The remaining case parts (the dividers, sides, and back) are all the same width.

GLUE UP. Gluing up the case is just a matter of keeping all the

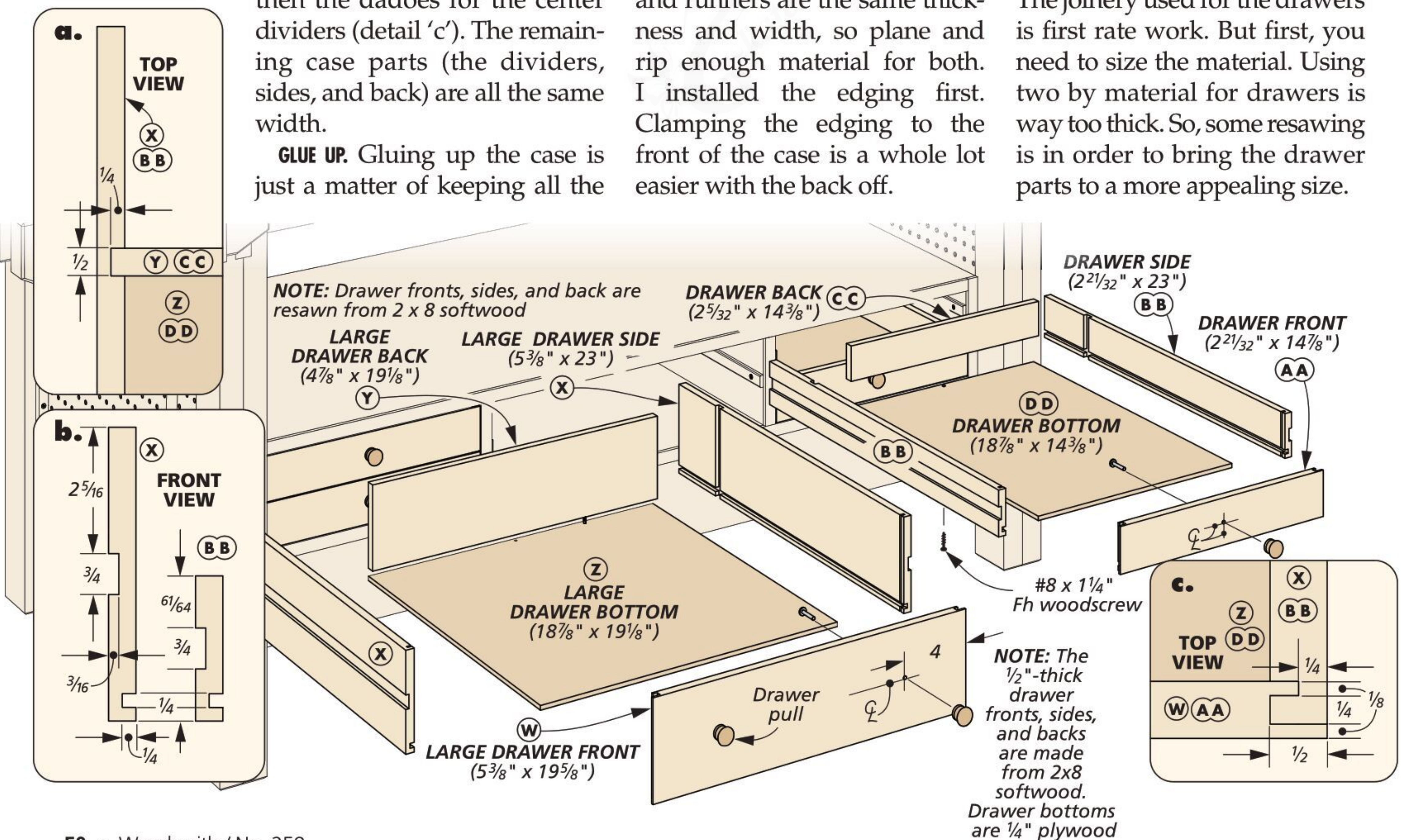
parts flush to the front and the dividers square to the top and bottom. A quick check of the front edges with your finger takes care of the former, while a pair of clamping squares address the latter. Hold off on installing the back for now.

HARDWOOD PARTS. The edging and runners are the same thickness and width, so plane and rip enough material for both. I installed the edging first. Clamping the edging to the front of the case is a whole lot easier with the back off.

The runners need a little dressing before being installed. First, drill the three shallow counter-sunk shank holes (detail 'b'). Then ease the edges with a sanding block or a light pass with a chamfer bit.

FIVE DRAWERS

The joinery used for the drawers is first rate work. But first, you need to size the material. Using two by material for drawers is way too thick. So, some resawing is in order to bring the drawer parts to a more appealing size.



RESAWING & SIZING. I left the drawer parts a little oversized while resawing them. After I was done at the band saw, I ripped all the parts to width, then planed them to thickness. Now, back at the table saw, the first thing to do is cut them to final length.

LOCKING RABBETS. Locking rabbets are used to hold the front of the drawer together (detail 'c'). A tongue on the drawer front locks into a dado that you cut into the drawer sides (detail 'c'). There's a detailed guide online at Woodsmith.com/ShopClass, that walks you through the process of making locking rabbets.

Next up is cutting the grooves in the sides for the drawer runners (detail 'b' bottom of previous page). A dado blade in your table saw will make quick work of that. Follow this up with the dado for the drawer back (detail 'a,' lower drawing).

Speaking of the drawer back, John Doyle, the designer on this project, decided to sacrifice a little drawer space for the sake of adding the "tails" you see in detail 'a.' Why? This tail lessens that annoying event of pulling the drawer completely out of the cabinet. I believe he deserves a chair and cold one with Mr. Muscles. Lastly, as detail 'b' shows,

cut the groove for the drawer bottoms (in the fronts also).

ASSEMBLY. The drawers are ready to be glued up. A handful of clamps and some clamping squares will do the trick. While the drawers are in the clamps, you can cut the drawer bottoms to size. When the clamps are out of the way, slide the drawer bottoms in from the back and screw it to the drawer. This is shown in the main drawing on the bottom of the previous page.

Well, with that, you've got yourself one fine workbench. If you're lucky, Mr. Muscles will help you set up the bench and cabinet in the shop. [W](#)

Materials, Supplies & Cutting Diagram

A Leg Halves (8)	1½ x 3 - 33	O Vise Spacer (1)	¾ MDF - 5 x 9	CC Drawer Backs (4)	½ x 2⅝ - 14⅜
B Bottom Rails (2)	1½ x 5 - 30	P Vise Face (1)	1½ x 4 - 15	DD Drawer Bottoms (4)	¼ ply. - 18⅞ x 14⅜
C Top Rails (2)	1½ x 3 - 30	Q Case Top/Btm. (2)	¾ MDF - 23¾ x 52¾	• (16) ⅝" x 4" Lag Screws • (16) ⅝" Washers • (67) #6 x 1¼" Fh Woodscrews • (48) #8 x 2¾" Fh Woodscrews • (20) #8 x 1¼" Fh Woodscrews • (17) #8 x 2½" Fh Woodscrews • (1) 9" Quick-Release Vise • (4) ⅜" x 3" Lag Screws • (4) ⅜" Washers • (2) ¼" x 1" Lag Screws • (30) #6 x ¾" Fh Woodscrews • (5) #6 x 1" Fh Woodscrews	
D Pegboards (2)	¼ pgbd. - 19 x 24	R Case Sides (2)	¾ MDF - 6 x 23¾		
E Pegboard Cleats	½ x ⅝ - 336 rgh.	S Case Dividers (2)	¾ MDF - 6 x 23		
F Bottom Stretchers (2)	1½ x 5 - 55¼	T Drawer Runners (10)	¼ x ¾ - 22⅝		
G Top Stretchers (2)	1½ x 3 - 55¼	U Case Edging	¼ x ¾ - 129 rgh.		
H Cleats	1½ x 1½ - 289 rgh.	V Case Back (1)	¾ MDF - 6 x 51¾		
I Shelf (1)	¾ MDF - 21 x 54¼	W Large Drawer Front (1)	½ x 5⅜ - 19⅝		
J Top Layers (2)	¾ MDF - 30 x 85½	X Large Drawer Sides (2)	½ x 5⅜ - 23		
K Edge Fillers (4)	¾ MDF - 6 x 85½	Y Large Drawer Back (1)	½ x 4⅞ - 19⅞		
L Side Fillers (4)	¾ MDF - 17¼ x 18	Z Lrg. Drwr. Btm. (1)	¼ ply. - 18⅞ x 19⅞		
M Side Edging (2)	1½ x 3 - 30	AA Drawer Fronts (4)	½ x 2⅞ - 14⅞		
N Front/Back Edging (2)	1½ x 3 - 88½	BB Drawer Sides (8)	½ x 2⅞ - 23		

2" x 8" - 10' Douglas Fir (2 Boards)



2" x 8" - 10' Douglas Fir



2" x 8" - 10' Douglas Fir



2" x 8" - 10' Douglas Fir (Resawn to 2, ½" boards)



2" x 8" - 10' Douglas Fir (2 Boards)



¾" x 4" - 60" Maple (1.7 Bd. Ft.)



ALSO NEEDED: Four 48"x 96" Sheets of ¾" MDF, One 24"x 48" Sheet of ¼" Birch Plywood, One 24"x 48" Sheet of ¼" Pegboard

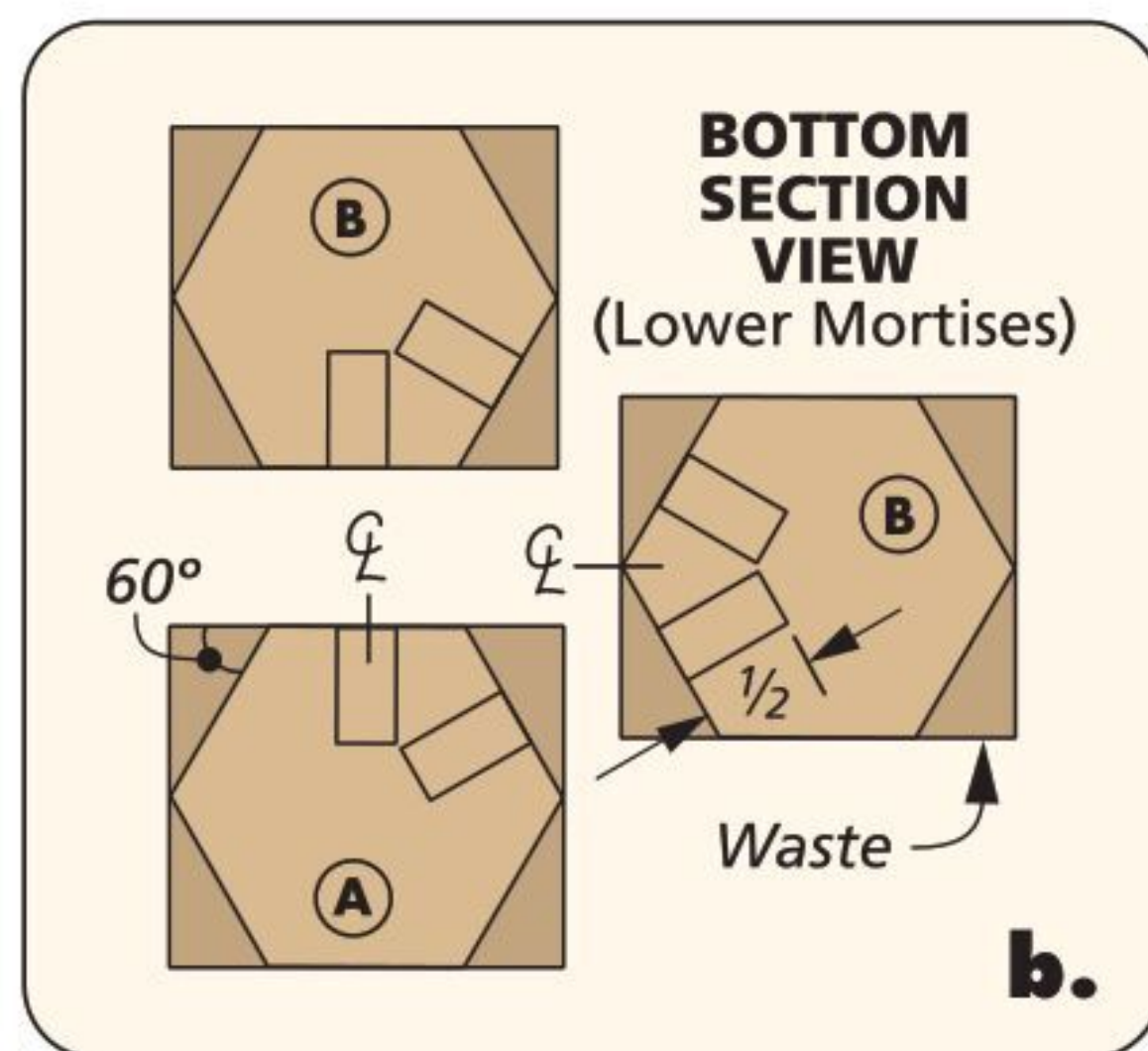
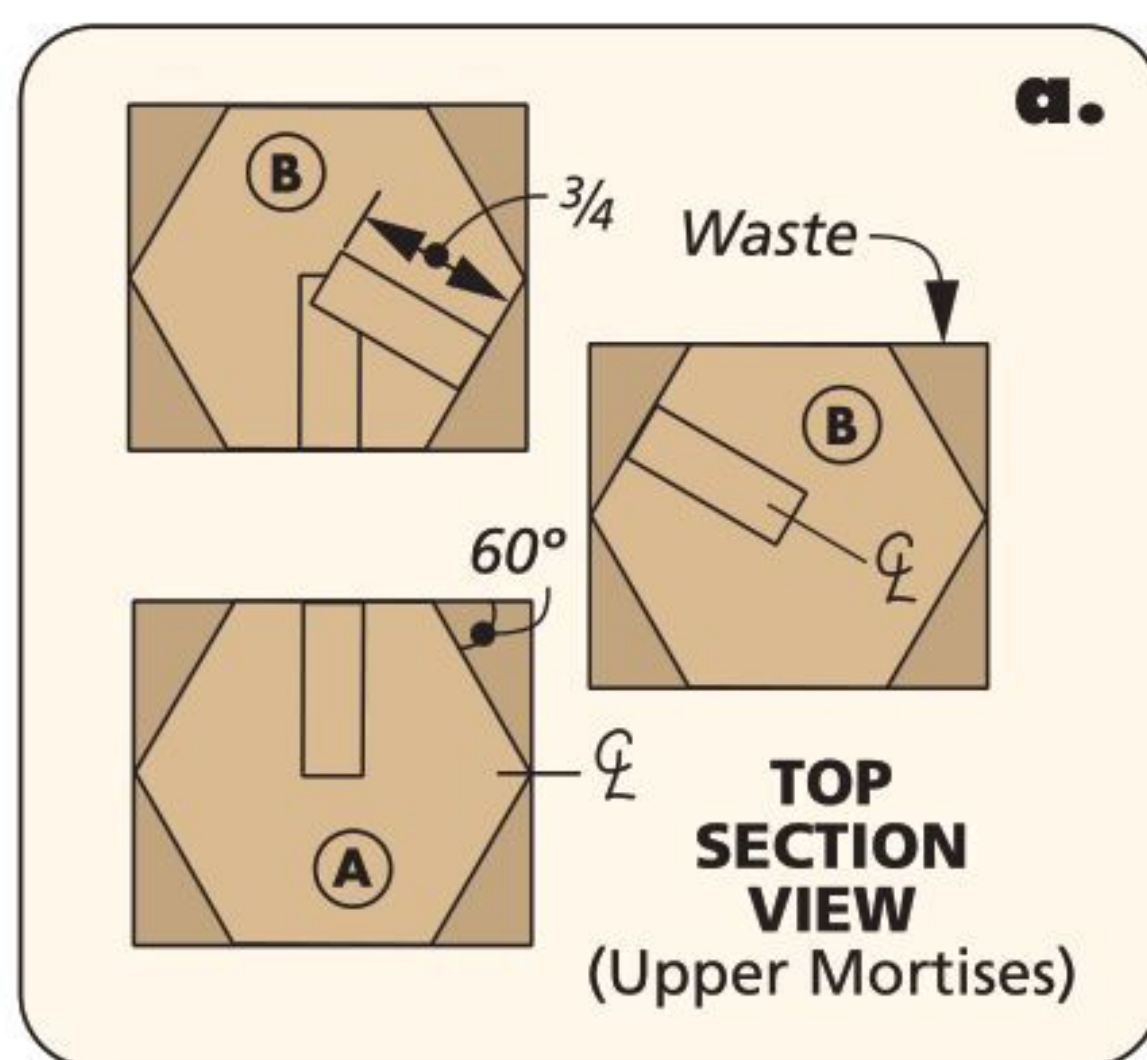
Cat Condo

This stylish cat tree is the perfect perch for your feline friend, and meets all their demands.



▲ The warm walnut and cat-friendly features make this cat tree a functional piece for your pet and a good-looking piece of furniture.





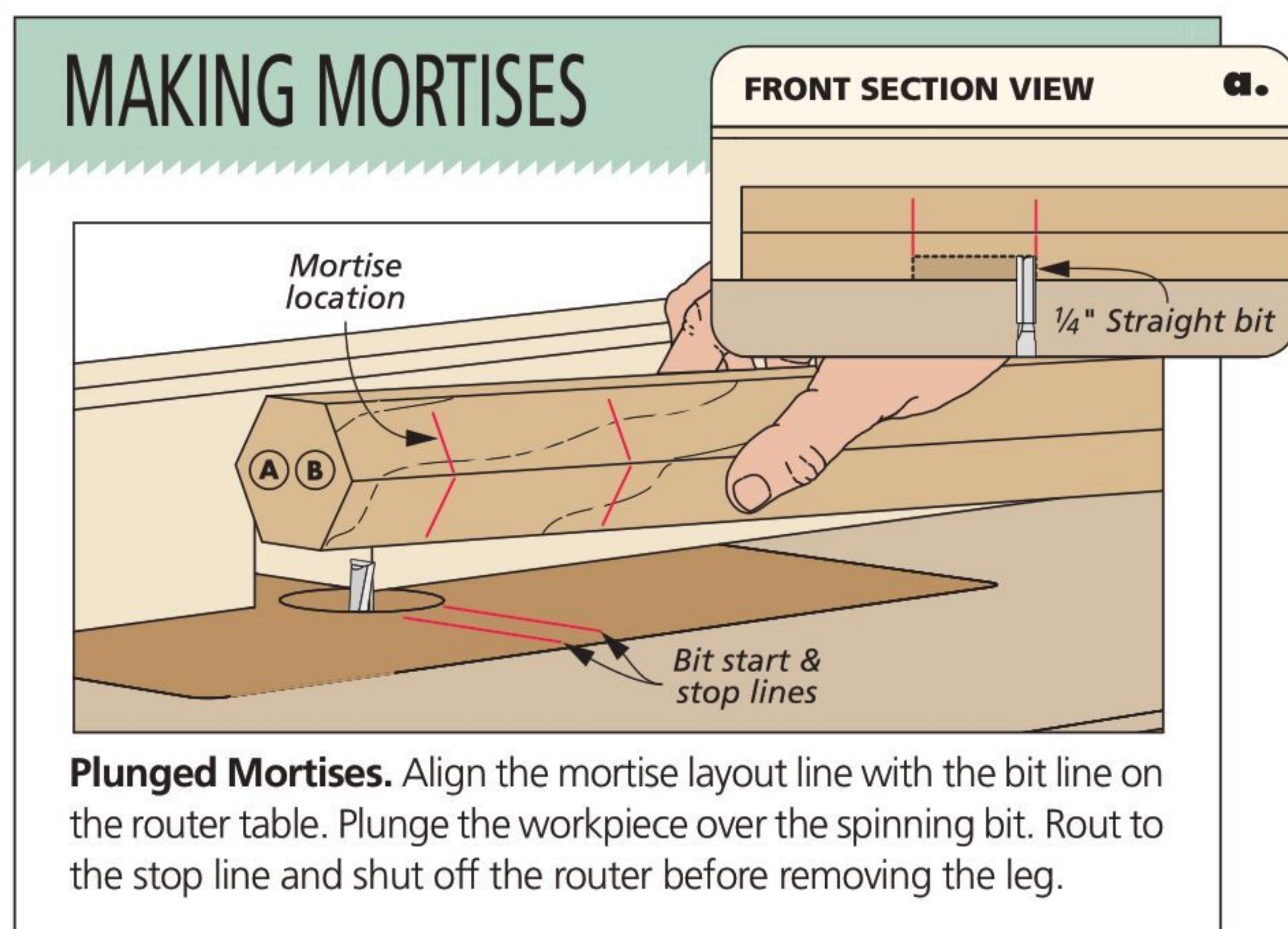
Most cat habitats that you purchase from pet stores end up being rather ... cookie cutter? So, when planning time came around at *Woodsmith*, we challenged designer Dillon Baker to come up with a good-looking cat condo. The catit (as we call it) that you see here is what he came up with. And I think even the snub-nose felines would agree it's purrfect.

SPINDLE LEGS. To give the cat tree the elevation that most cats like, you're going to start with the three long legs. Here, we used walnut. Start by cutting the legs into the hexagon shape seen in detail 'a.' This is easily done at the table saw. Just tilt the blade 30° and make four cuts to form the shape.

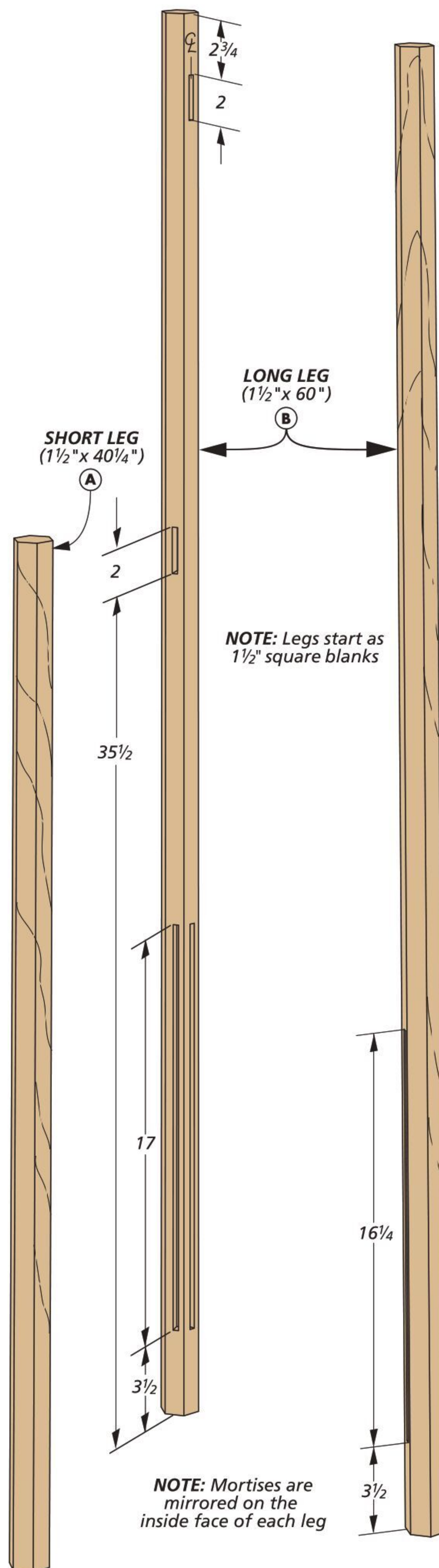
MORTISES NEXT. The parts of the tree that you'll make in a little bit are connected to the legs

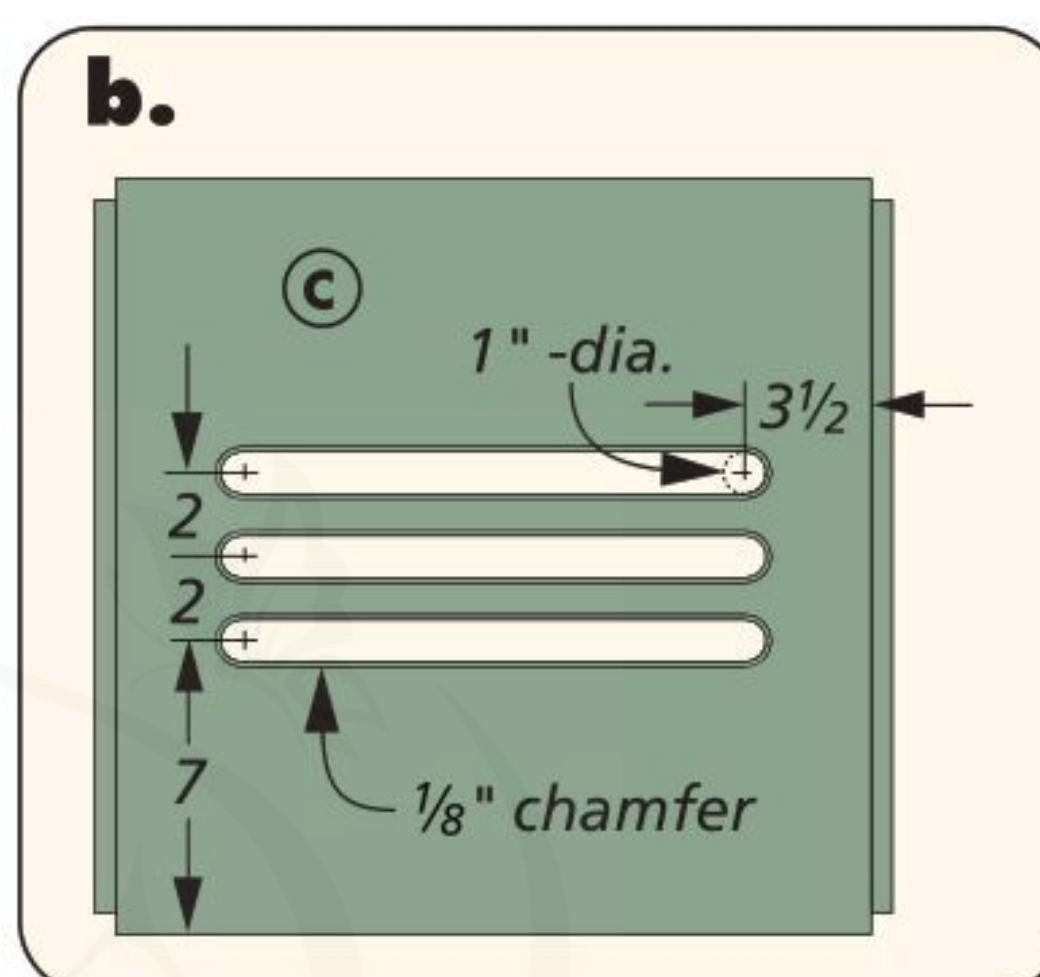
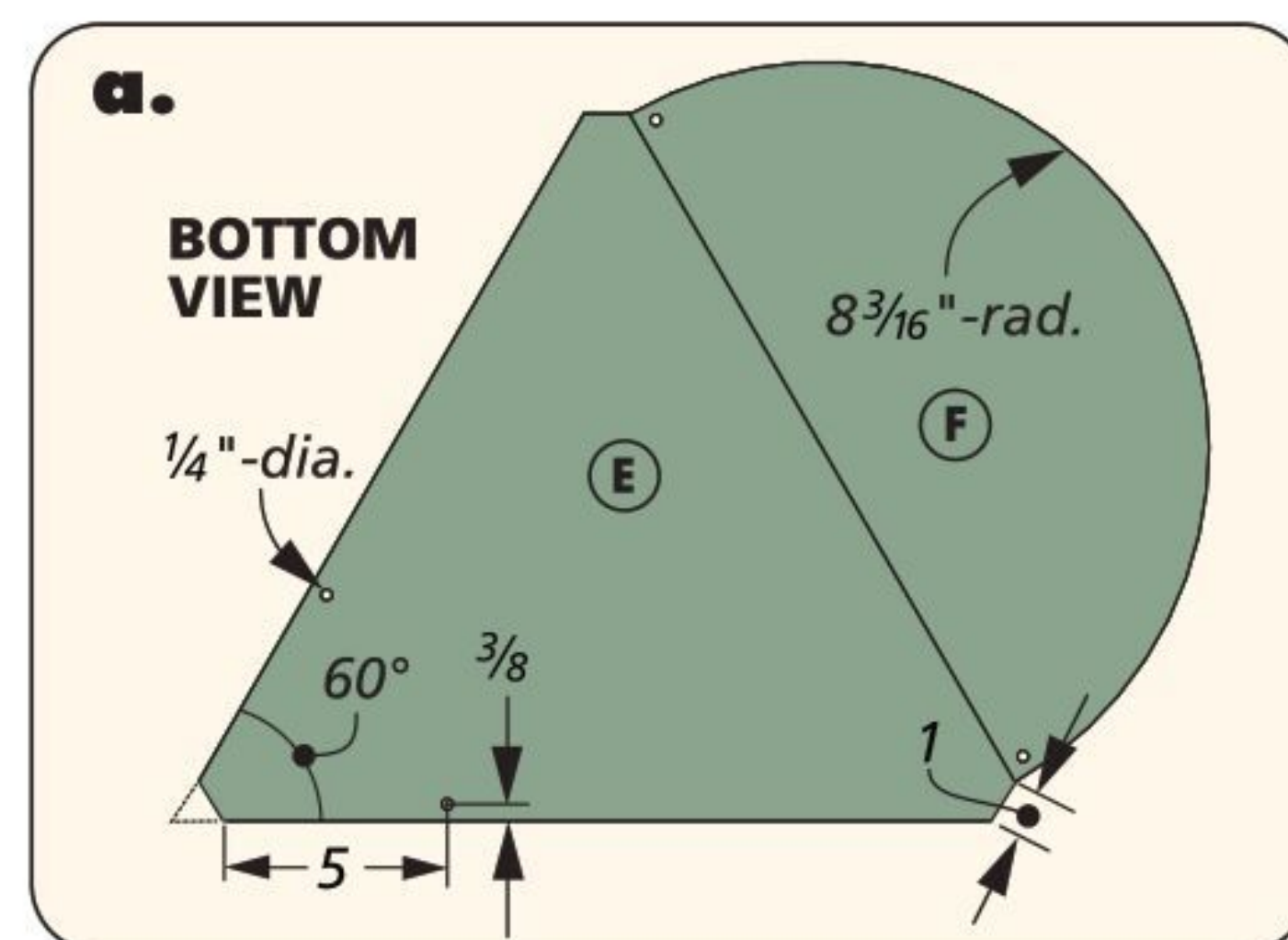
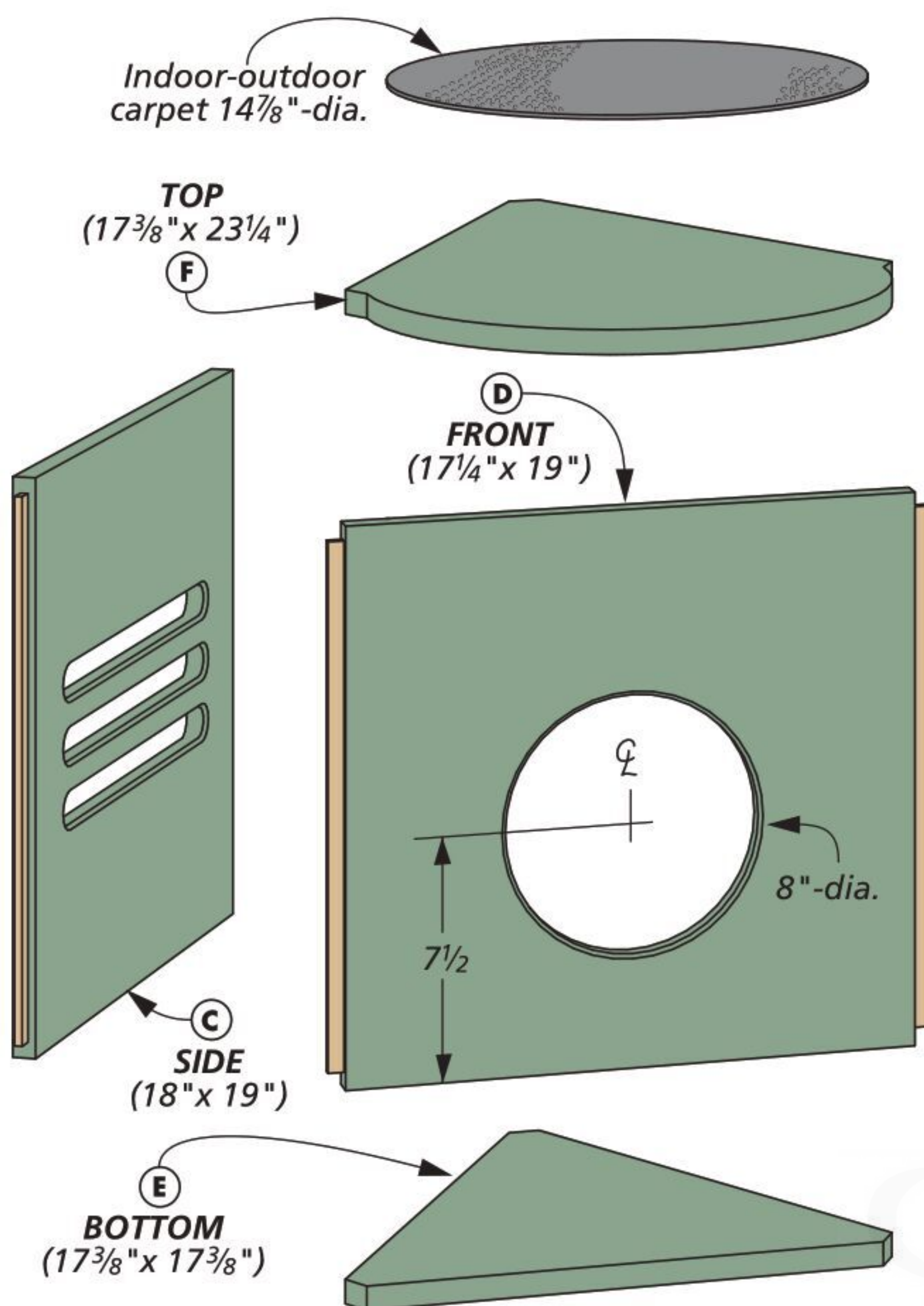
with tongues that seat into mortises on the legs. So, making those mortises is next. As you can see in detail 'a' and 'b' above, there are two different mortise depths. The mortises for the lower section of the tree are shallower. The upper mortises are deeper.

Create the mortises at the router table. You can see this setup in the box below. The key here is to mark the location of the mortises on the legs, and the router bit (start and stop) location on the fence. Then, it's a simple matter of lining up the mortise layout lines with the router bit lines and plunging the workpiece over the bit. After routing to the stop line, shut the router off and remove the leg. Do this for all the mortises in the legs, then set them aside for now.



Plunged Mortises. Align the mortise layout line with the bit line on the router table. Plunge the workpiece over the spinning bit. Rout to the stop line and shut off the router before removing the leg.





you'll cut a tongue to fit into the mortises you just cut in the legs. This is pretty straightforward, and the box below gives all the details. After sizing the tongues, you're ready to add some of the cutouts.

To cut the ambush slots, lay-out the locations and define the ends of the slots with a Forstner bit. Now, remove most of the waste with a jigsaw, staying to the waste side of the line. You can either clean up the slots with a rasp and file, or use a router and a pattern bit. The latter will give the cleanest results — simply use a straight piece of scrap mounted in place with double-sided tape. Then, follow the scrap with a pattern bit to clean up the straight lines.

TRAMMEL TIME. The front of the cubby has a round porthole. This can be cut a few ways, but the most straightforward

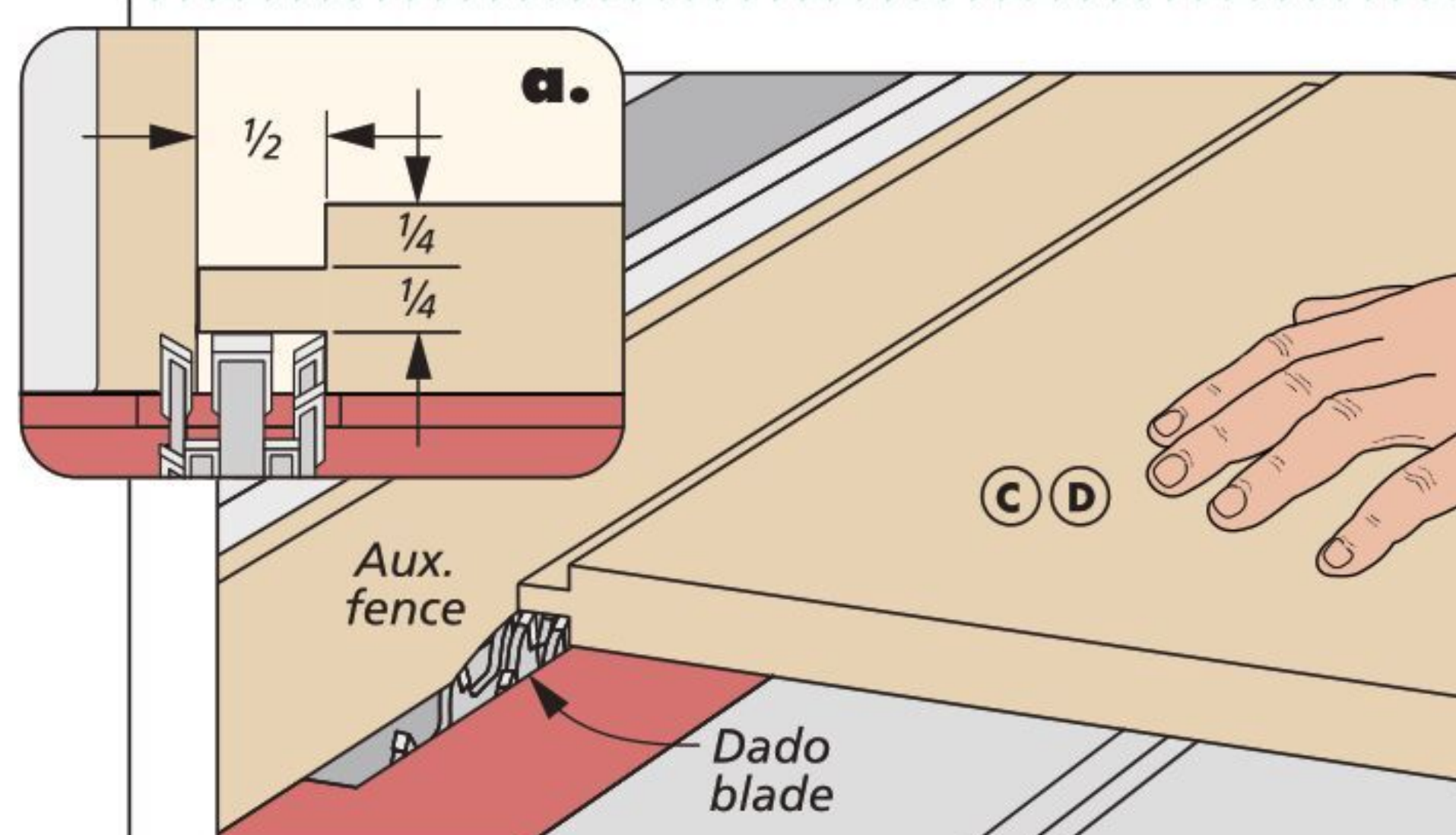
Build a HIDEY-HOLE

On the bottom of the cat habitat is a small hidey-hole for the cats to lounge in. The top is removable for easy vacuuming, and the left side offers some slits where the cat can swipe at unsuspecting legs as

they walk by. We made these out of plywood.

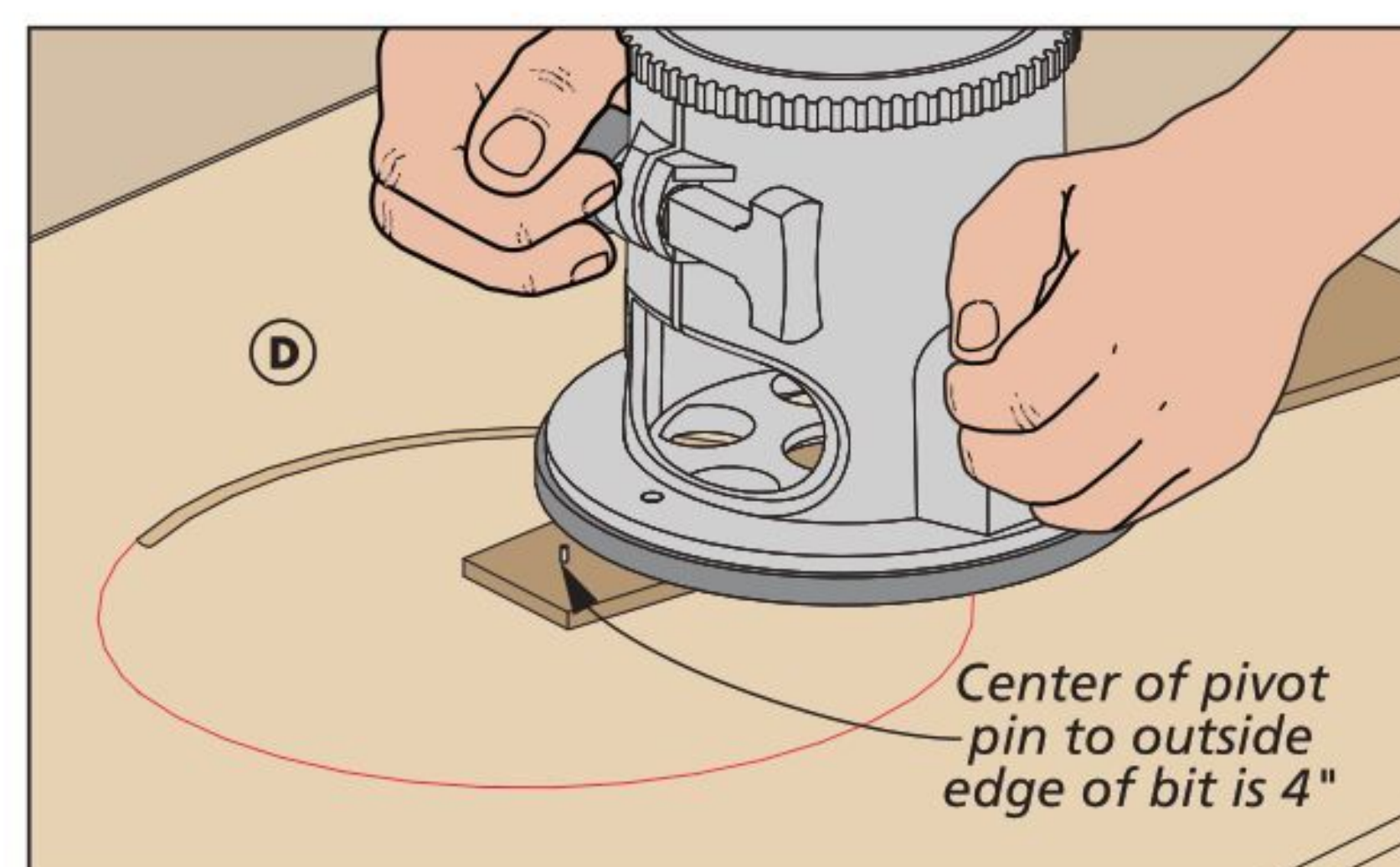
TONGUES FIRST. The cubby panels will lock the bottom of the cat tree together. After sizing the parts, bring the front and sides to the table saw. Here,

CREATE THE TENONS



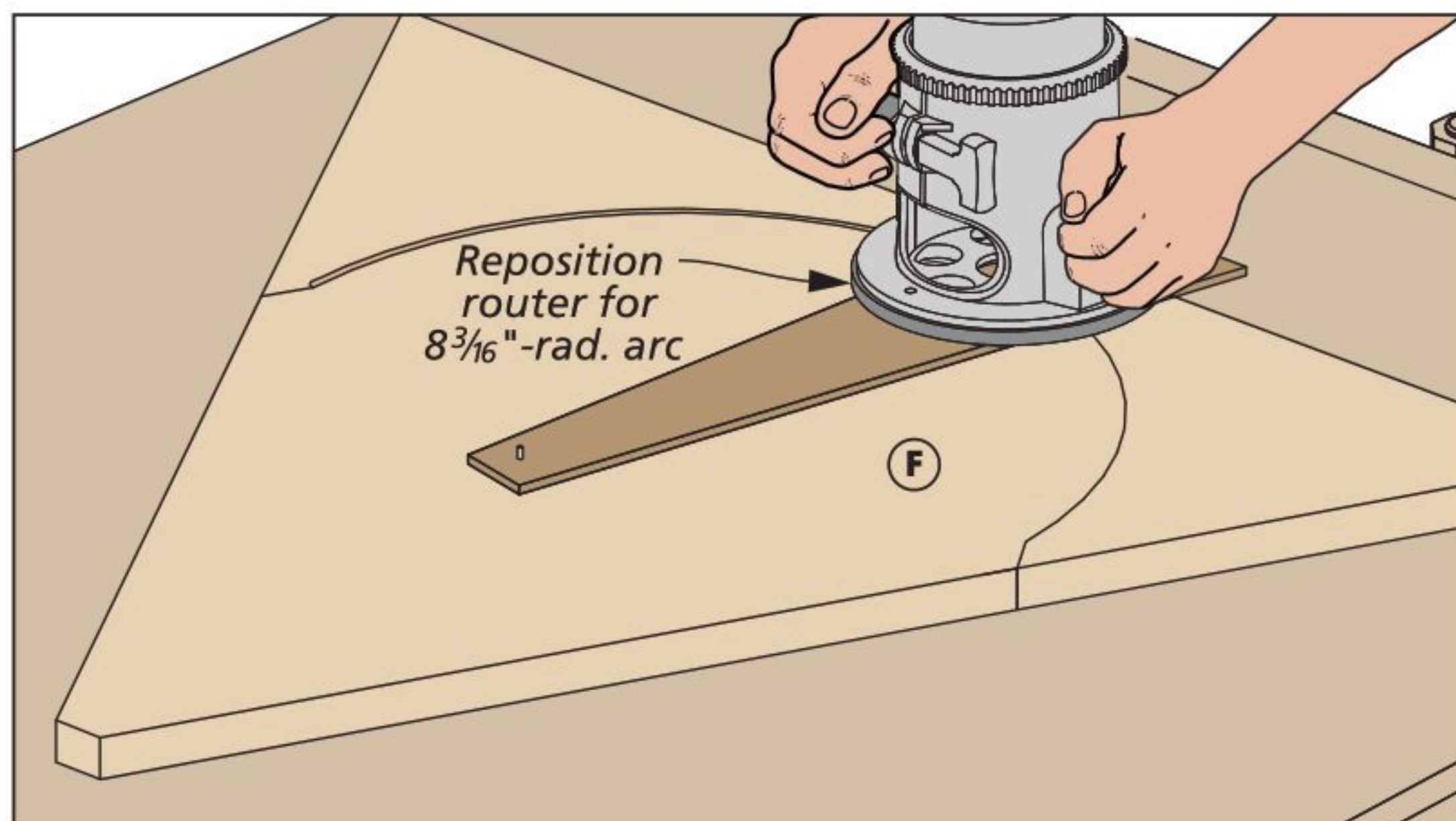
Tenons. At the table saw, load up a dado blade and bury it in an auxiliary fence. Form the tenons by making a pass across each face.

ENTRY HOLE

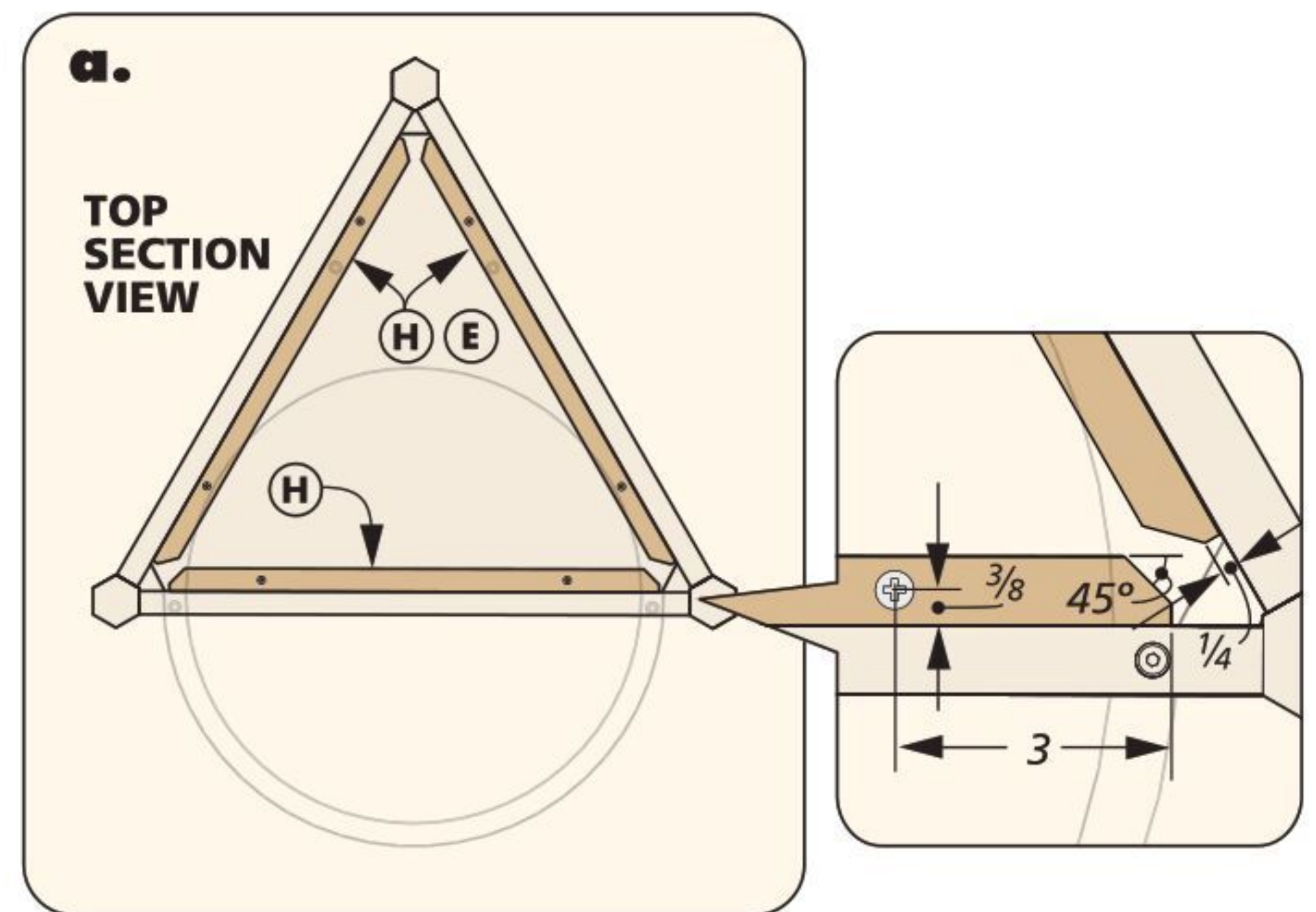


Large Hole. To make the entry hole for the cubby, use a trammel attached to your router. Make several passes, lowering the bit each pass.

ARCHED FRONT



Route Arc. Use the same trammel setup you used earlier and reposition the base for the larger arc. Shape the front edge of the top, starting and stopping just short of the outside edges.



is probably a router trammel. You can see this in the box on the previous page. The trammel can simply be a piece of hardboard with a pivot pin on one end, and the other attached to your router. Make sure to measure from the pivot pin to the outside of the bit when setting it up. After placing the pin in the center of the opening, rout the circle in a few passes until you cut through the plywood.

TOP & BOTTOM. The top and bottom of the cubby are triangular to fit within the sides. You could probably get fancy and cut these triangles at the table saw with a sled or jig. However, if you have a track saw (or a straight edge with a circular saw), that's the ticket in my opinion.

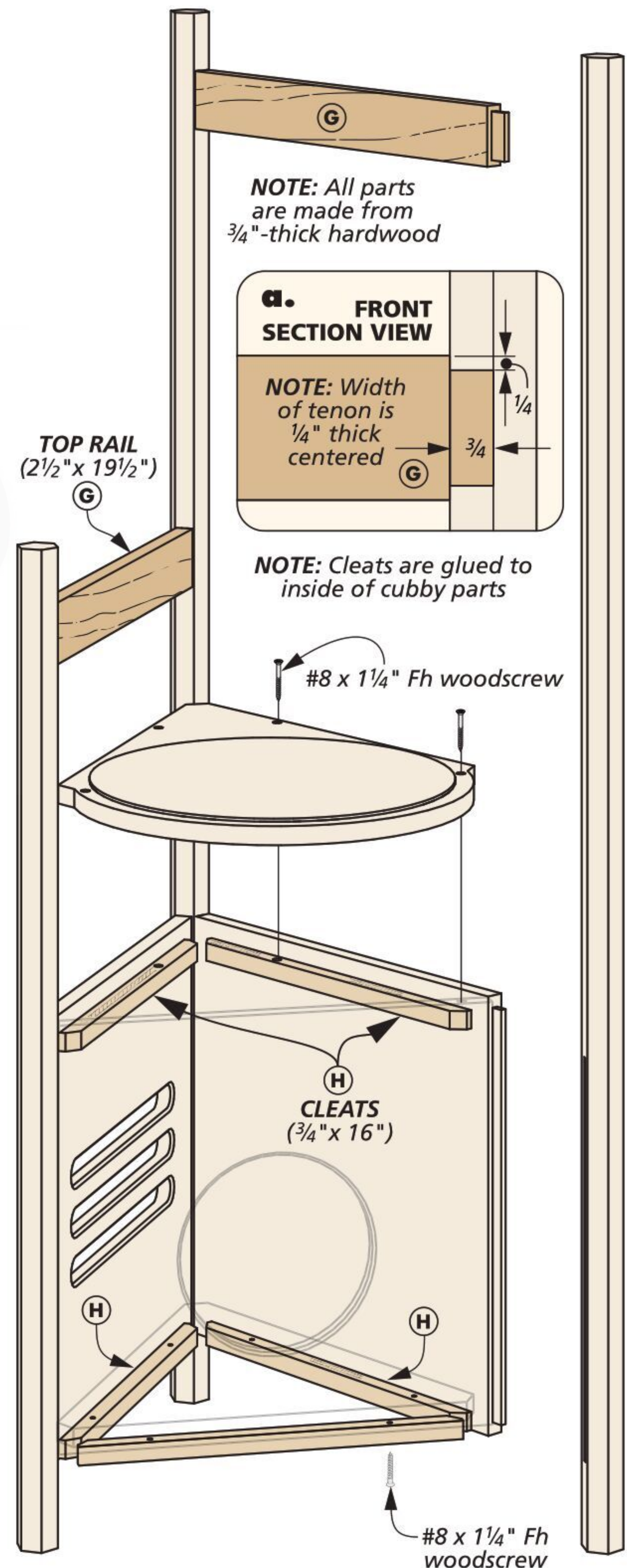
When cutting the top, cut the triangle oversized to accommodate the curved front. You can see this in detail 'a' on the previous page. This arc can be cut using the same router trammel you used before (just adjusting the pin spacing for the different radius). However, the part is small enough that you could easily cut the curved front on the band saw as well. At this time, take a moment to cut and install cleats on the inside of the

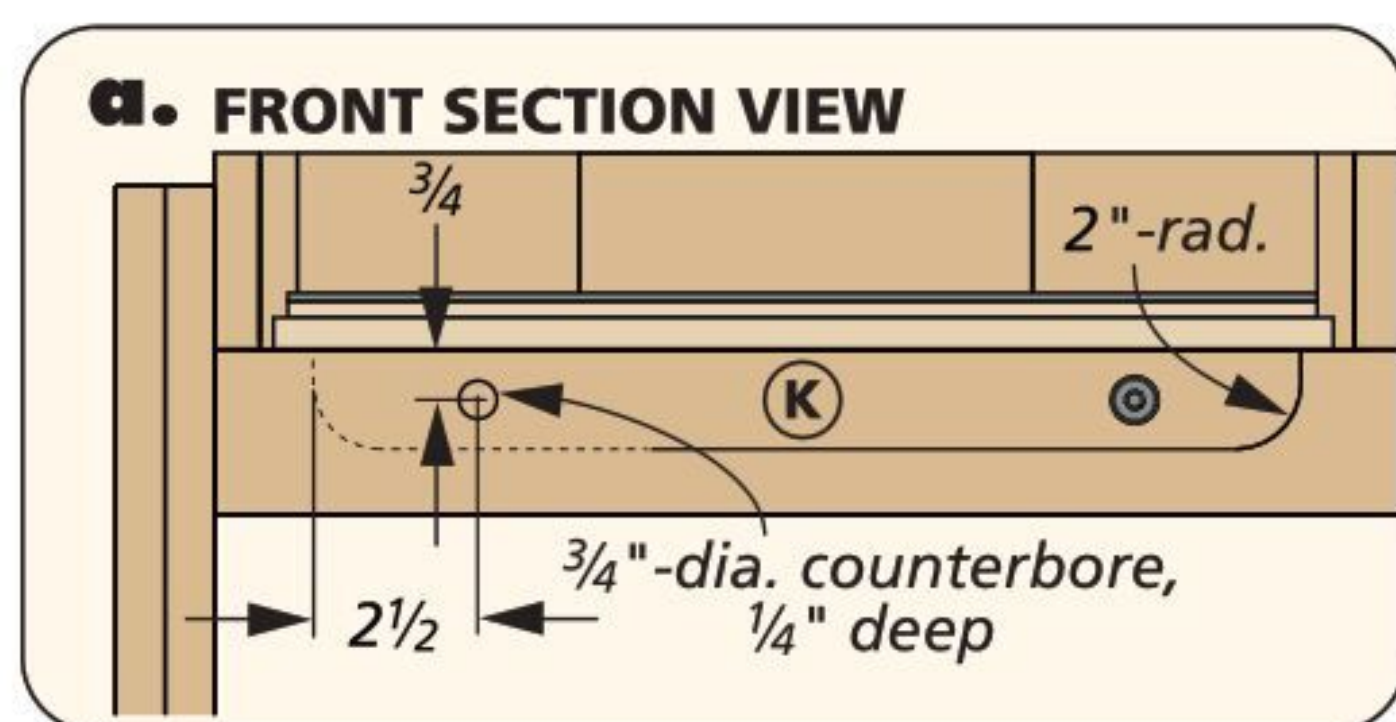
cubby, as well as add a couple of coats of paint.

TOP RAILS

Now that we have the parts to hold the bottom together, let's move on up. The two tiers above the cubby are supported with walnut rails. Because of the way the hexagon legs are positioned, the tenons on these are plain ol' tenons with no angles to contend with. The table saw setup you used before should be pretty close here — you might need to adjust the blade height slightly for the difference between the hardwood and plywood however. Also, as noted before, these tenons are a little deeper, so you'll want to adjust the rip fence as well.

When it comes time to assemble the tree, choose a long-open time glue like liquid hide glue. All the parts need to come together at the same time, so just work at it slowly, getting tenons fit into their respective mortises. Once you have the legs, sides, front, and rails assembled, hold them with a ratchet strap as you add the bottom and top to the cleats inside the cubby area.





NOTE: Hoop blanks are made from 1 1/2"-thick hardwood. Perch bottom is 1/2" plywood. Carpet base is 1/4" plywood. Brackets are 1/2"-thick hardwood

Regal PERCHES

If you own cats, you probably know that they like to climb. As high as they can. So, to keep them from scaling the drapes, we've included two perches for them to lounge on. These perches are made of hardwood with plywood bottoms. Up first is making the wood hoops.

START WITH MITERS. As you can see in the drawing at left, each hoop is made from eight, thick pieces of hardwood. After mitering the ends,

head over to the table saw to cut a slot in each end that will be for a spline. This will help beef up the joints and aid in the glueup. To make sure everything lines up, use the miter gauge with an auxiliary fence attached. Position the workpieces with a stop block and make a kerf on each end. Then, glue up the hoops with a hardwood spline in each joint.

TEMPLATE NEXT. To shape the hoop, you'll want to first break out your router trammel again. What we need to do is make a round template that will get attached to the bottom of the hoop. The template can be made out of plywood, and will be used for both the inside and outside of each hoop. Rout the outside diameter of the template first, then the inside diameter.

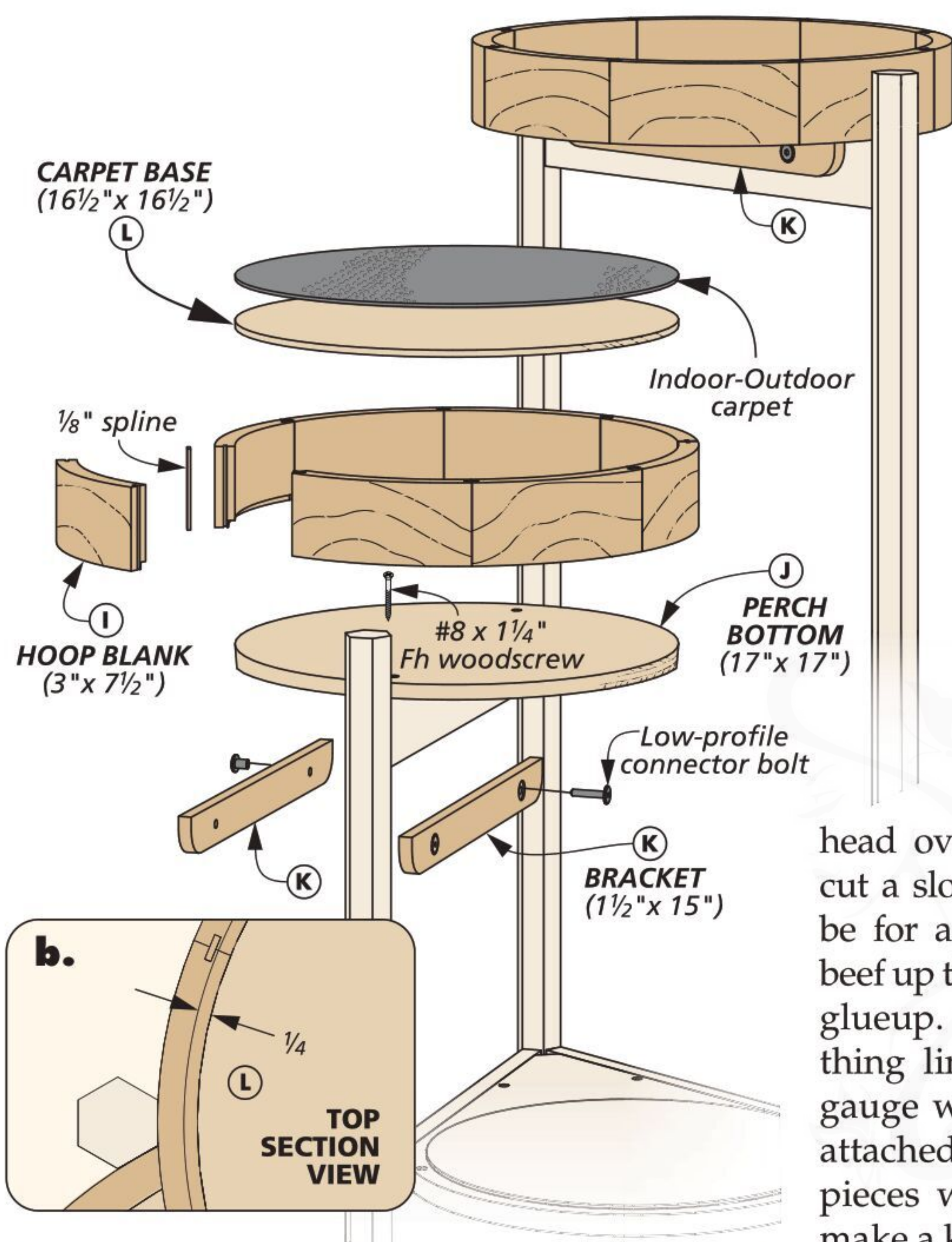
TO THE ROUTER TABLE. After attaching the template to the bottom of one of the hoops, head to the router table. Here you'll use a combination of pattern and flush-trim bits to shape the

hoop. The steps for this can be seen in the boxes on the next page. A couple of things to note here. First, there will be a bit of material to remove in some areas. Start with light passes. During the final pass, remove just a small amount of material, making sure the bearing is riding on the template.

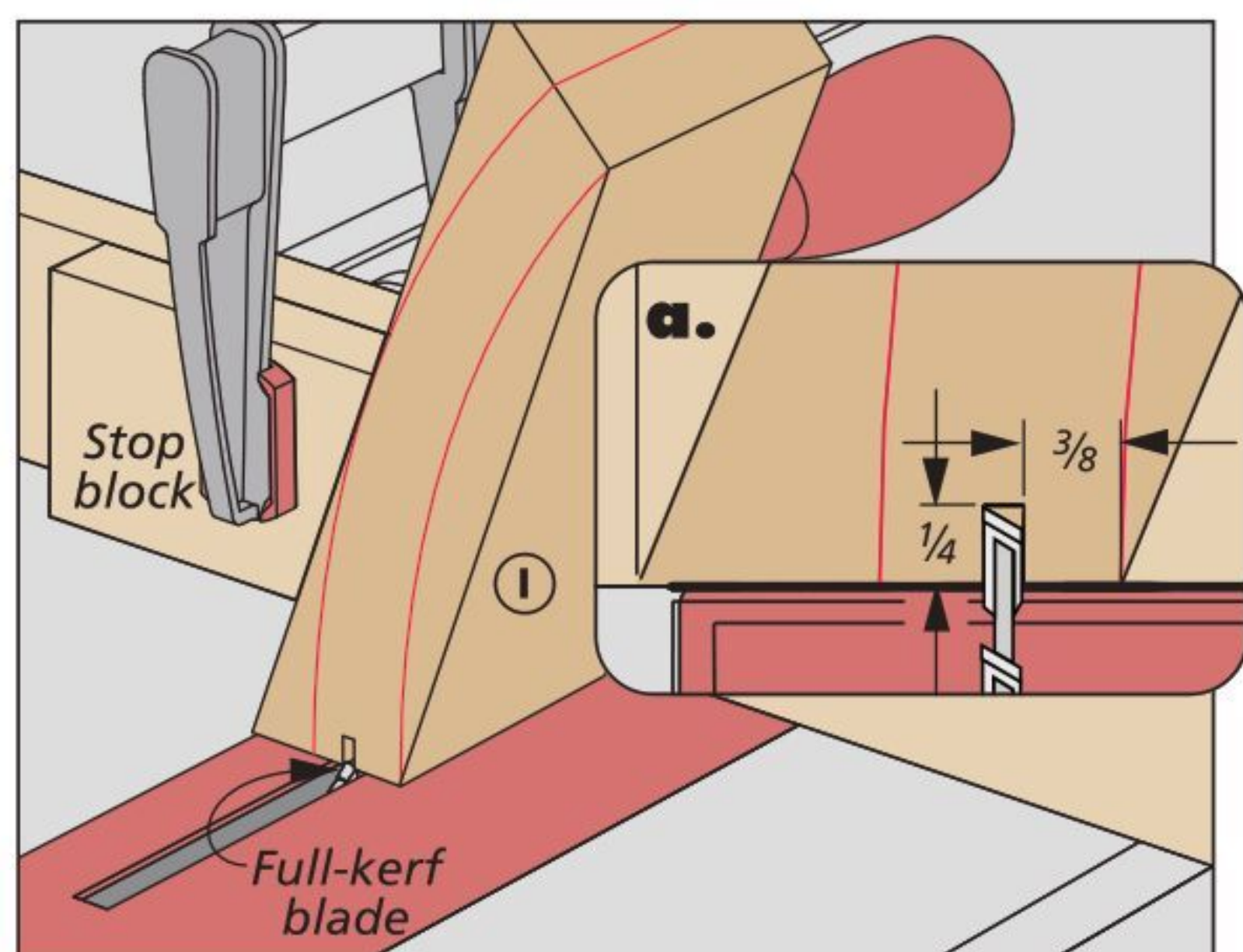
ADD THE BOTTOMS. With the hoops shaped, you'll want to add bottoms to the hoops. Rab-bet the inside bottom of the hoop with a rabbeting bit (Figure 4). Then, cut a plywood circle to fit within. Mounting the perches to the top rails is done with a pair of brackets. You can see these in the drawings to the left. The brackets are made from hardwood and are screwed to the bottom of the perch. After positioning the perch on the top rails, drill counterbores in the brackets, then drill through the bracket and top rails. The perches (with attached brackets) are mounted with a pair of connector bolts.

CARPET PADS. The final thing to take care of (other than a coat of lacquer on the hardwood parts) is to create a few carpeted pads. We have one in each of the perches, one on top of the cubby, and one inside the cubby. These are all mounted on plywood with pull tabs for easy removal. That way, they can be removed and cleaned as needed.

After final assembly and the finish has had time to cure, you can move the cat tree into its new home. It may take a little time for your regal felines to warm up to it, but once they've started lounging the day away atop the perches, you'll be hard-pressed to get them off. **W**

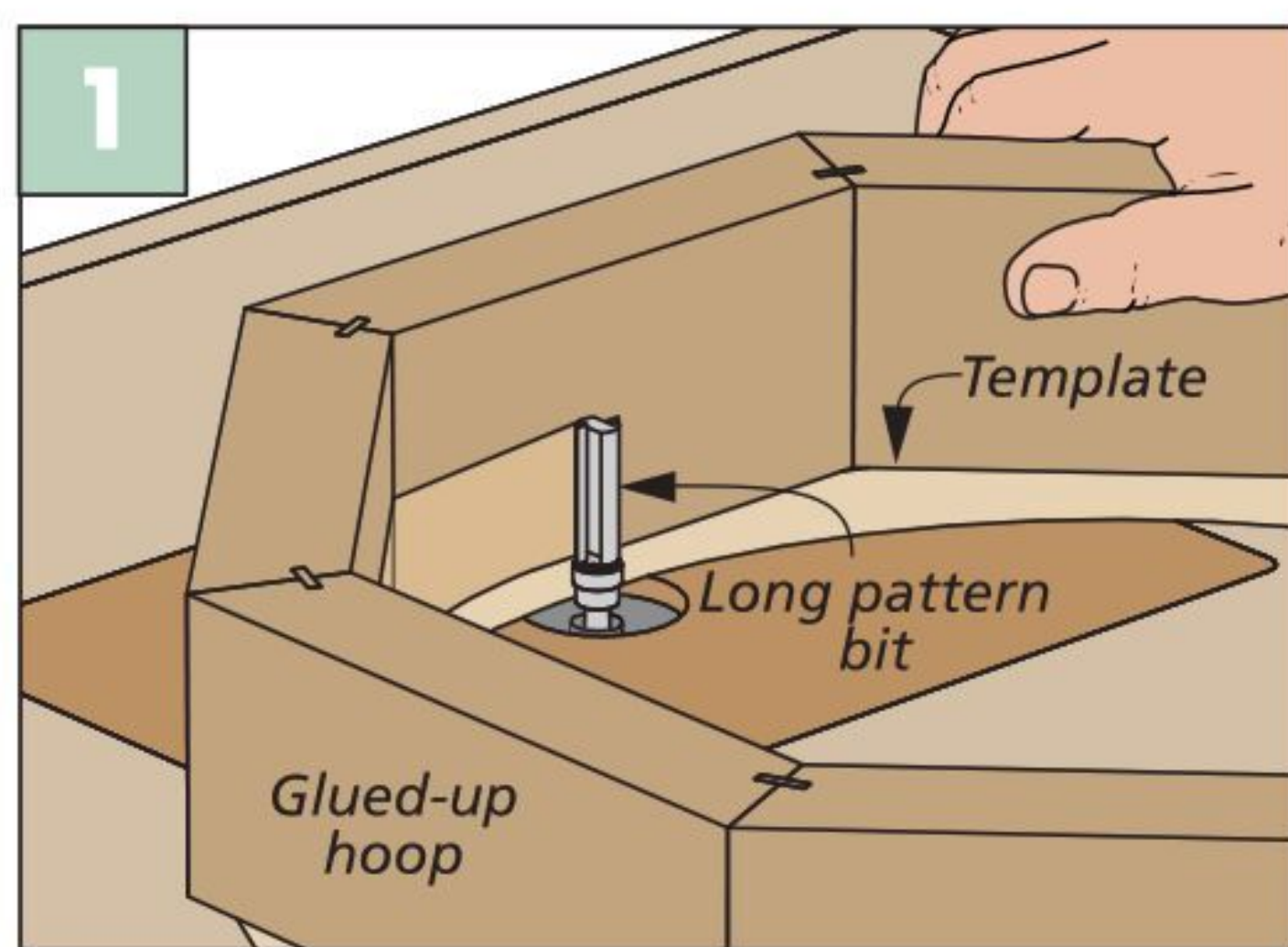


ANGLED SPLINES

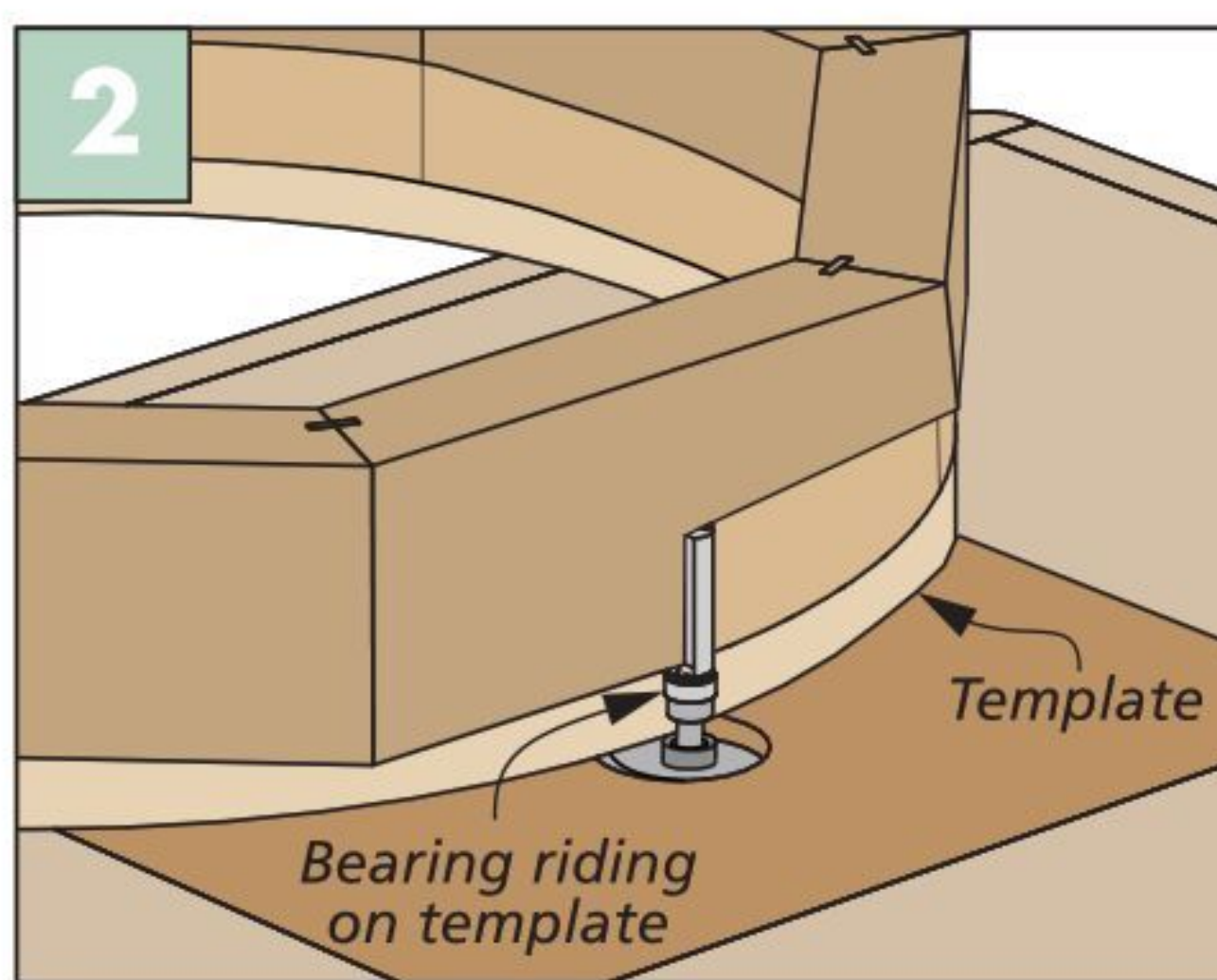


Spline Slots. Stand the mitered pieces on end and position them against a stop block. Make the slot with a full-kerf blade.

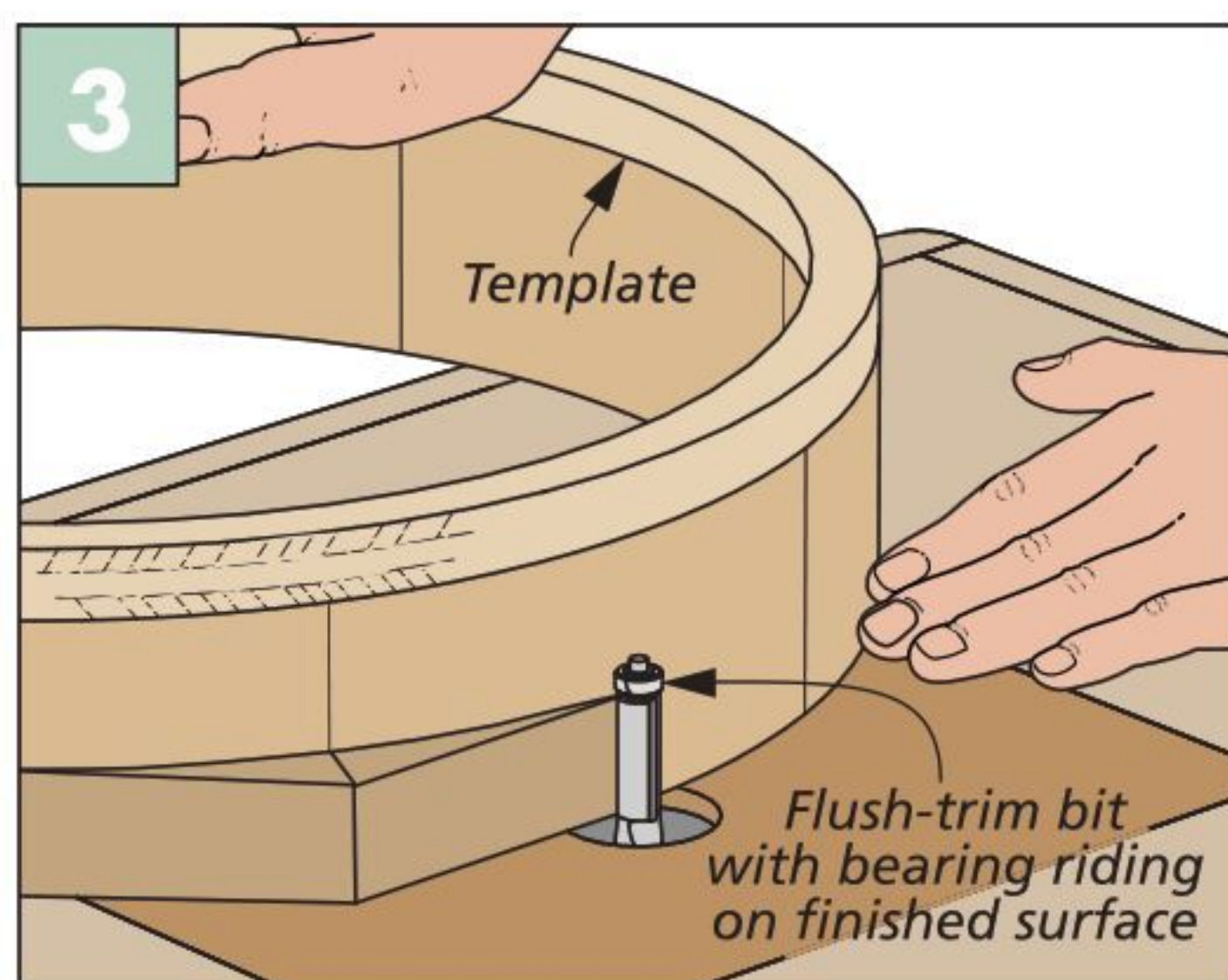
ROUND IT OUT



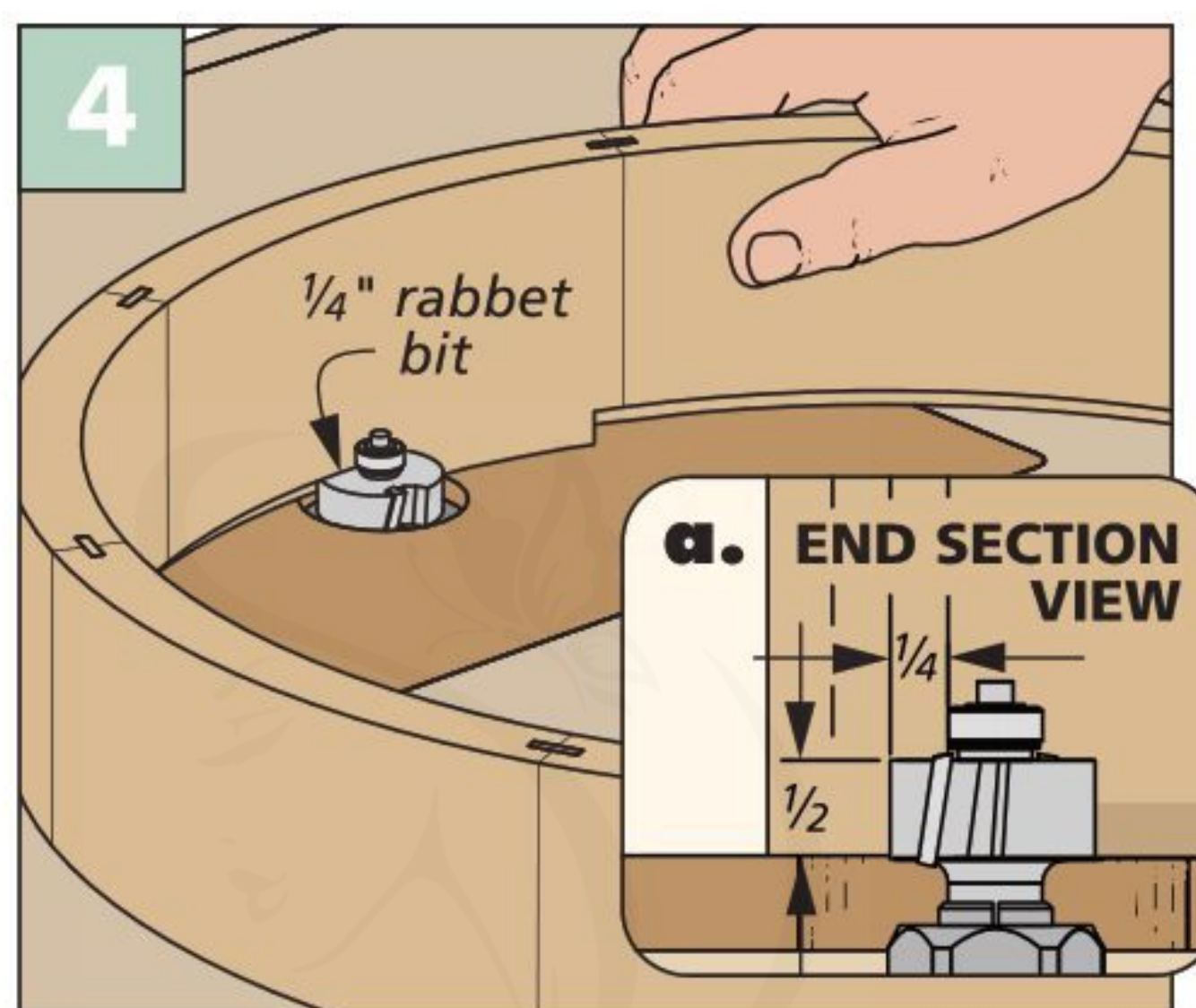
Pattern Bit First. Use a pattern bit to make an initial pass around the inside of the hoop, making light passes.



Outside Next. Now, make a pass around the outside of the blank, being sure to make small cuts.



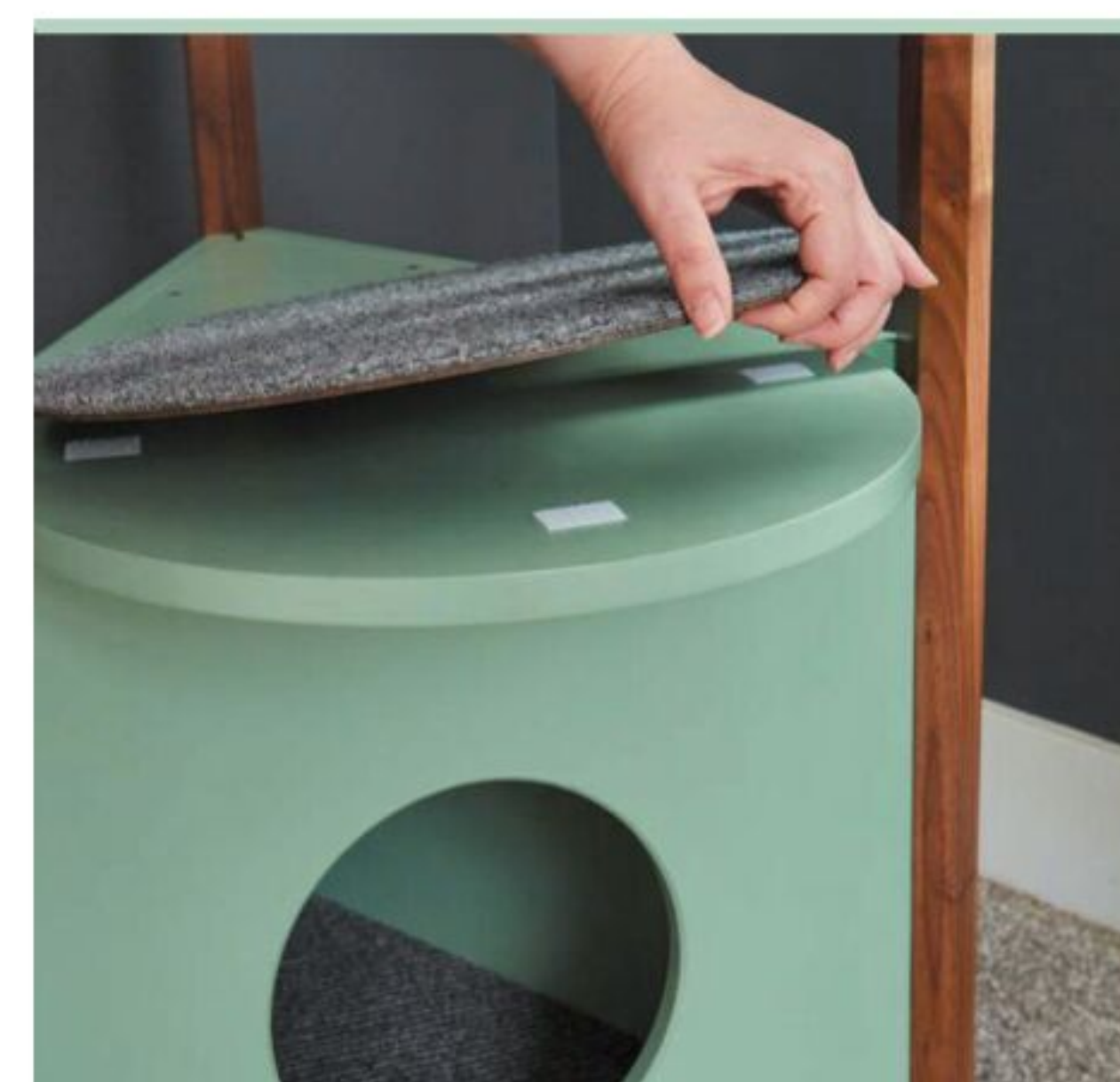
Flush-Trim Bit. Switch to a tall flush-trim bit and flip the hoop over. Rout away the remainder of the waste on the hoops.



Rabbet. A rabbeting bit will easily cut the rabbet around the inside, lower edge of the hoops.



▲ Indoor/outdoor carpet is attached to a plywood back with pull tab. This allows the pad to be removed for cleaning.



▲ The carpet on the top of the cubby is attached with a series of velcro strips to keep it in place.

Materials, Supplies & Cutting Diagram

A Short Leg (1)	1 1/2 x 1 1/2 - 40 1/4	I Hoop Blanks (16)	1 1/2 x 3 - 7 1/2
B Long Legs (2)	1 1/2 x 1 1/2 - 60	J Perch Bottoms (2)	1/2 ply. - 17 x 17
C Sides (2)	3/4 ply. - 18 x 19	K Brackets (4)	1/2 x 1 1/2 - 15
D Front (1)	3/4 ply. - 17 1/4 x 19	L Carpet Base (3)	1/4 ply. - 16 1/2 x 16 1/2
E Bottom (1)	3/4 ply. - 17 3/8 x 17 3/8	• (4) 1/4- 20 x 1 1/2 Connector Bolts	
F Top (1)	3/4 ply. - 17 3/8 x 23 1/4	• (10) #8 x 1 1/4 FH Woodscrews	
G Top Rails (2)	3/4 x 2 1/2 - 19 1/2	• (1) 2 Sq. Yards Indoor/Outdoor Carpet	
H Cleats (5)	3/4 x 3/4 - 16		

ALSO NEEDED:

One 2'x 4' Sheet of 1/4" Plywood,
One 2'x 4' Sheet of 1/2" Plywood,
One 4'x 8' Sheet of 3/4" Plywood

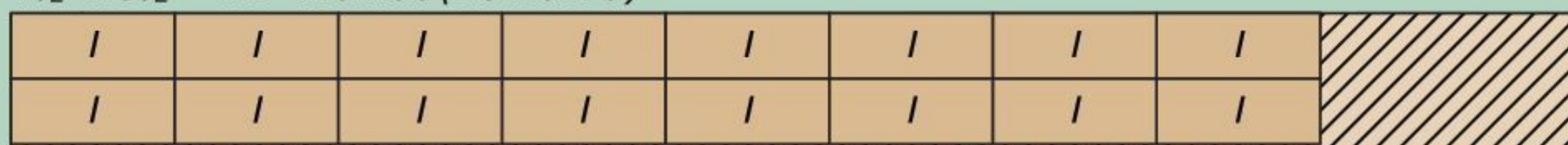
3/4" x 6" - 72" Walnut (3.0 Bd. Ft.)



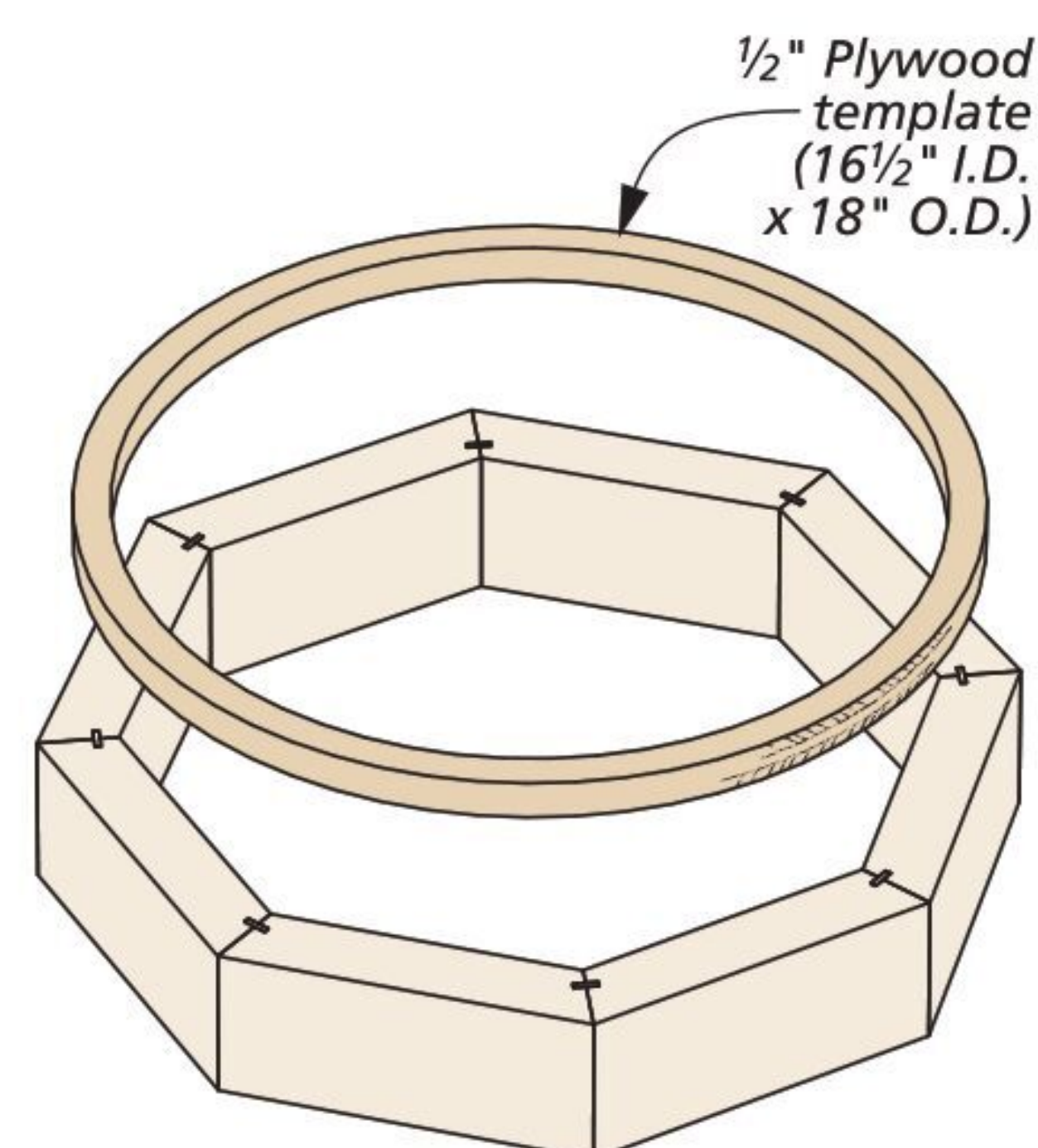
1 1/2" x 5" - 72" Walnut (3.8 Bd. Ft.)



1 1/2" x 6 1/2" - 72" Walnut (4.9 Bd. Ft.)



CIRCLE TEMPLATE



Plywood Template. Create the template for shaping the hoops out of plywood using a router trammel.



Drill Press Safety Devices

The drill press is a fairly simple tool. Usually there's not much finesse to it: just hold the workpiece, fire up the drill, and pull the quill down. Now, what if your workpiece hangs off the edge of your table? How about drilling into odd shaped pieces like dowels? Here's where hold-downs can be a lifesaver, but buying commercial hold-downs can start to add up. In this article, we've got a couple shop-made hold-downs that work just as well as commercial alternatives, but at a much more attractive price.

T-SLOT HOLD-DOWN

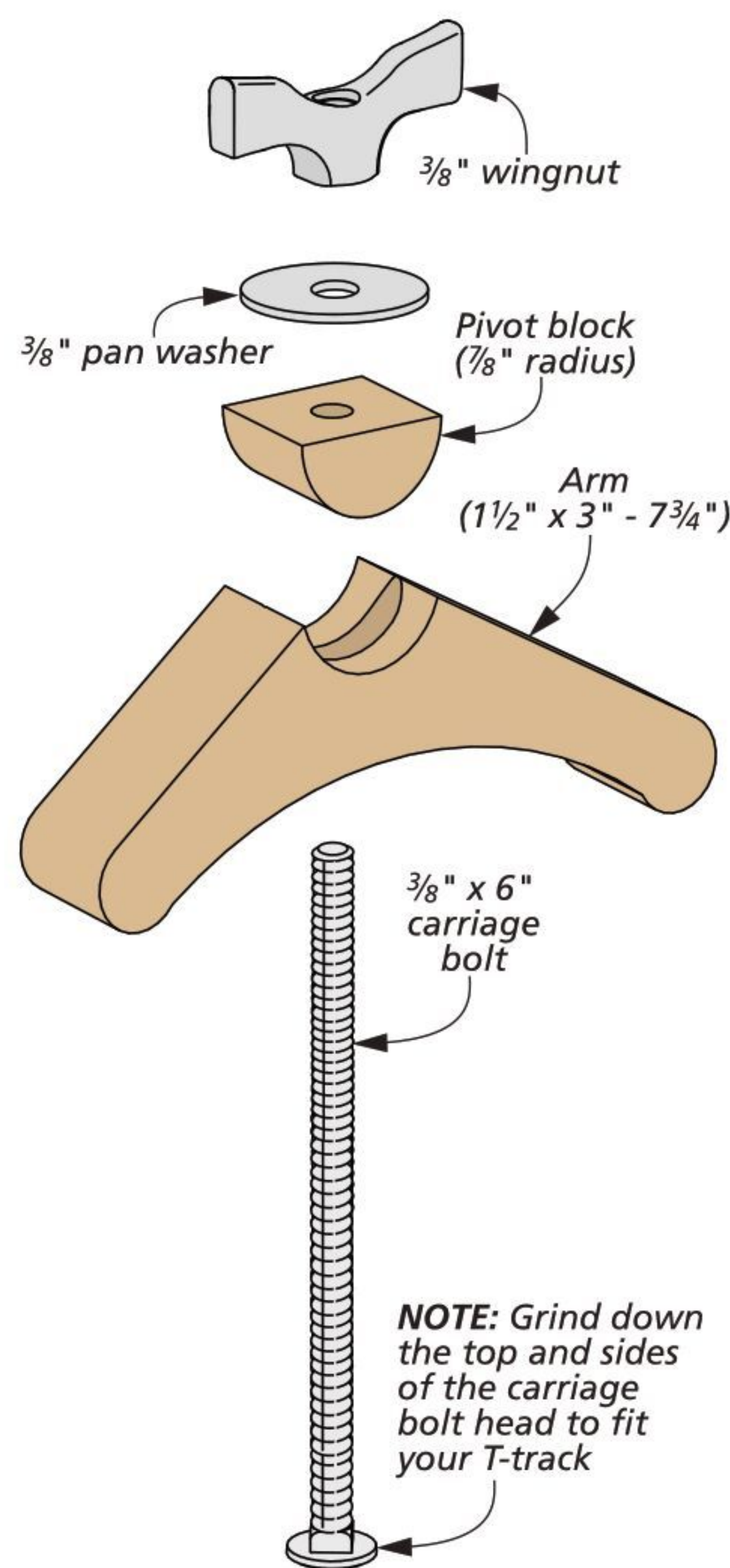
The T-slot hold-downs are great for their versatility. While they're made for the drill press, they work just as well anywhere you have T-slots in your shop.

ARM. To make the arm, the first step is to lay out the pattern (Fig. 1) on a blank of 1½"-thick hardwood. Before cutting out the shape of the arm, bore a ⅞"-dia. hole through the top of the block for the carriage bolt to pass through.

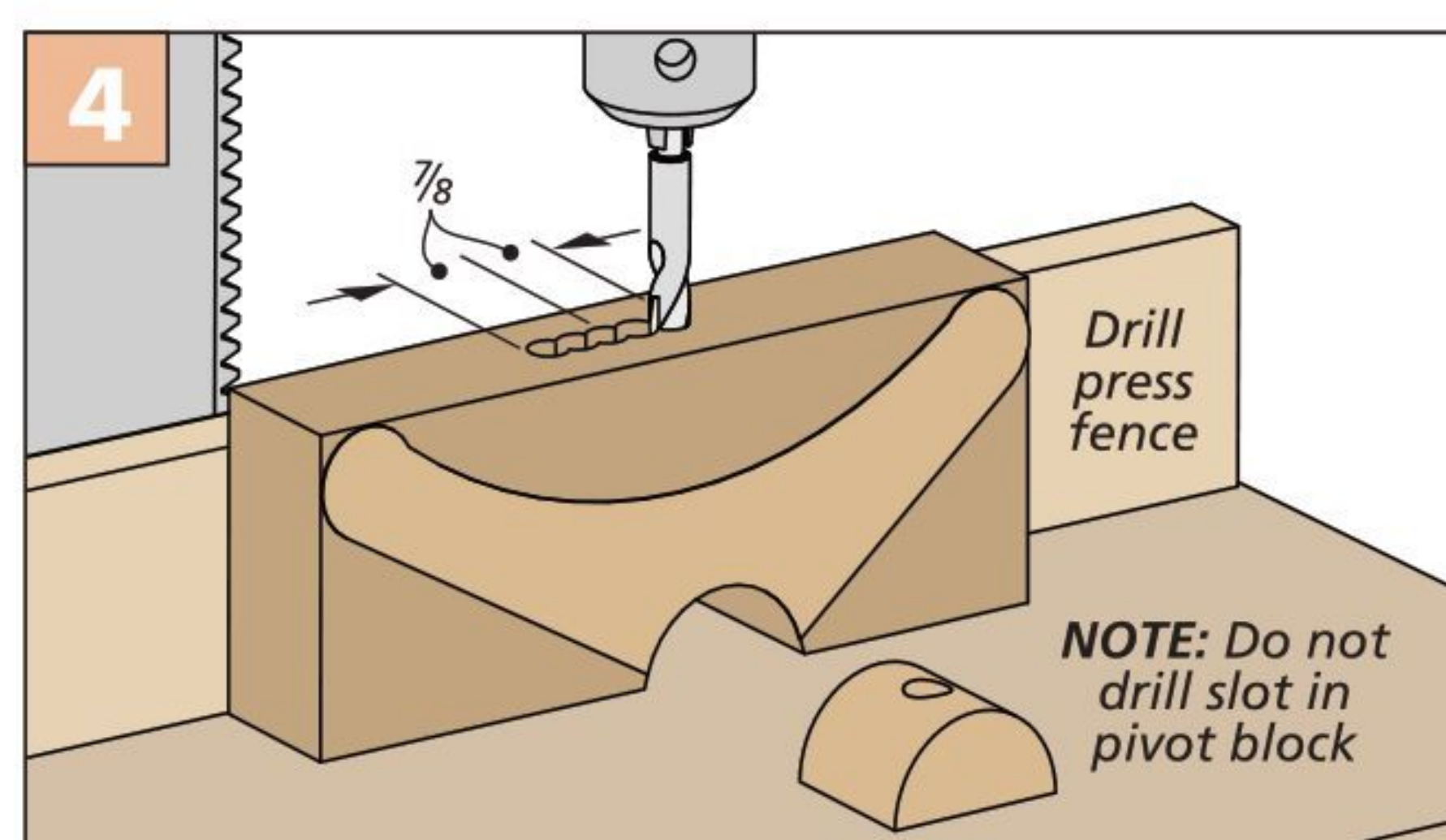
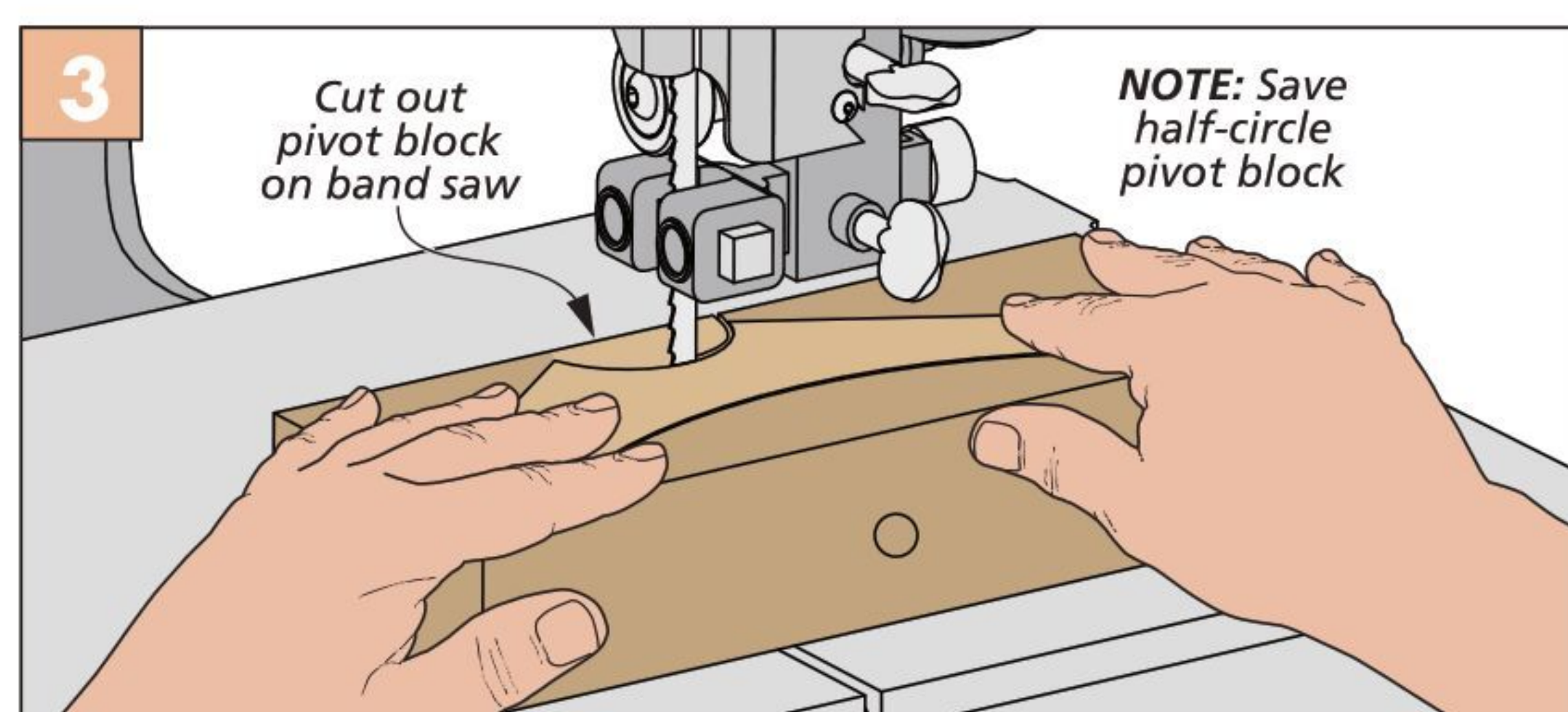
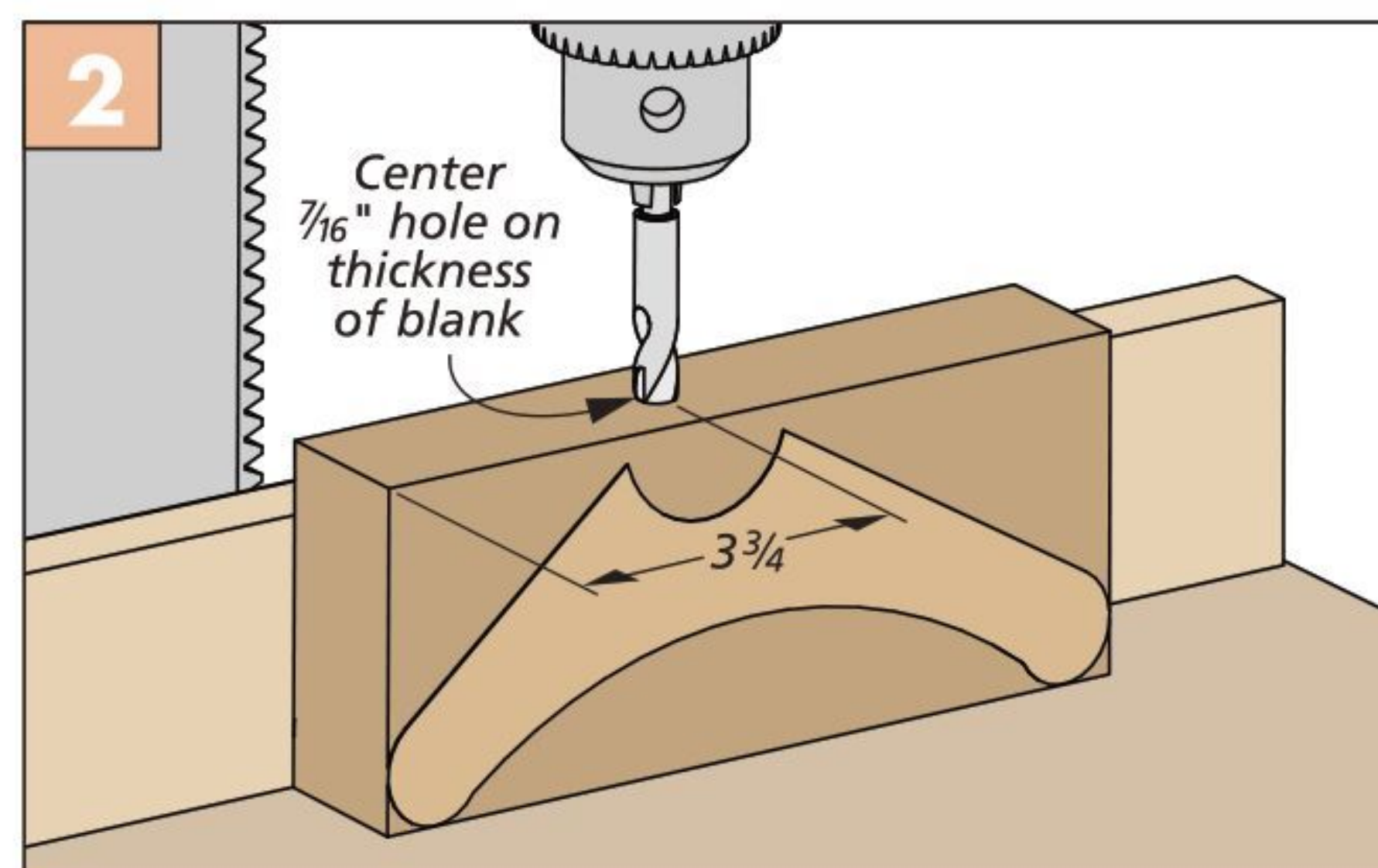
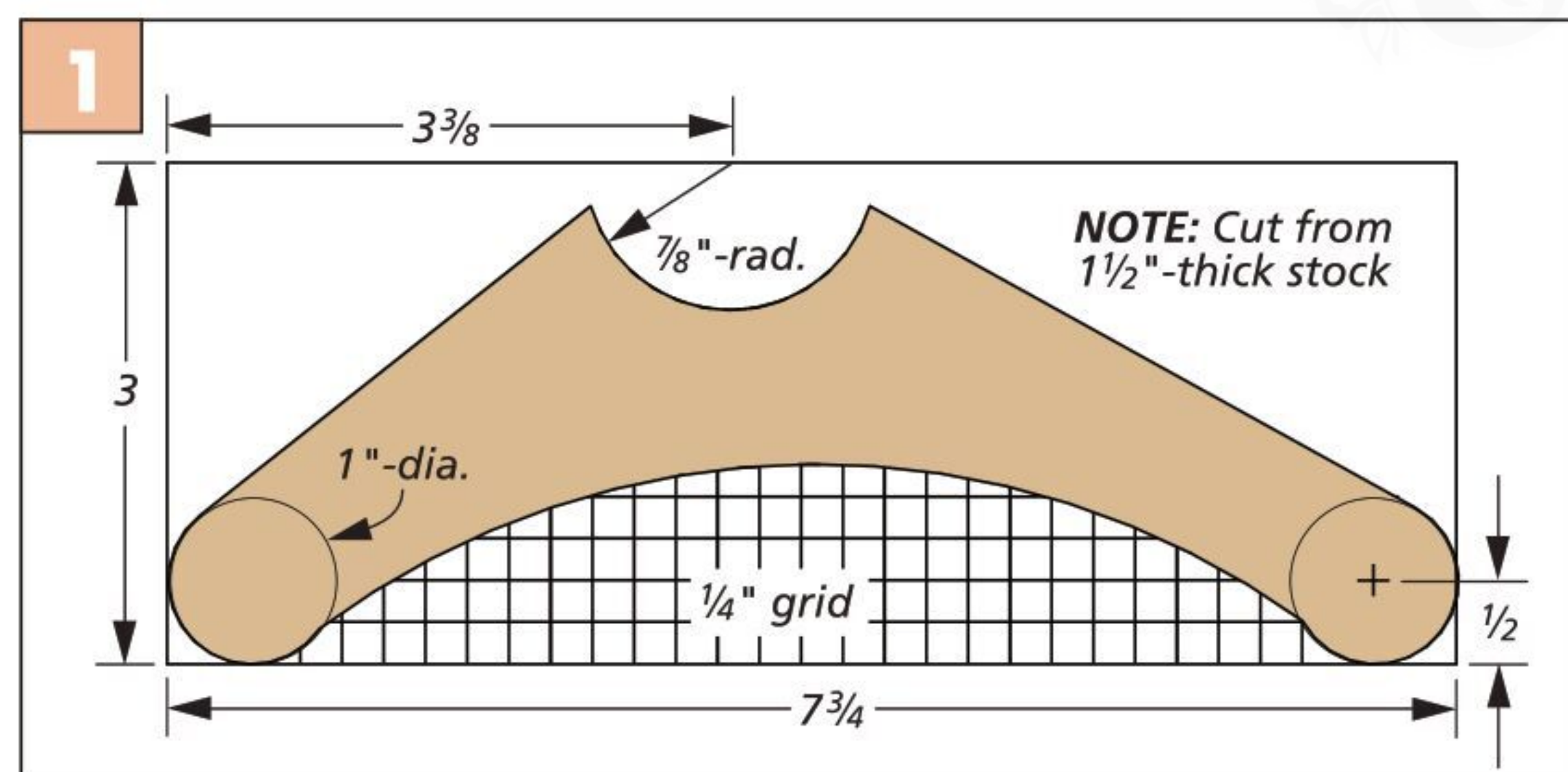
PIVOT BLOCK. Next, I cut out the semi-circular pivot block from the top of the blank, saving this piece for later. To allow the arm to pivot around the carriage bolt, bore out a clearance slot, drilling a series of overlapping holes through the bottom of the block, all the way to the pivot point. The next step is cut the arm to shape. I used the band saw, then cleaned out the slot with a chisel and file. I also softened the edges of the arm and pivot block with sandpaper.

"T" THE BOLT. Looking at the T-track, then at the carriage bolt, you may notice that the round head of the bolt needs to be flattened. After a few moments with the grinder (or file) and a couple test fits into the T-slots, I found a shape that let me to maneuver it in and out easily.

ASSEMBLY & USE. Assemble the hold-downs according to the drawing at the right. I used a washer and a wing nut on top of the pivot block as a way to tighten my hold-down. To use it, just slide the head of the carriage bolt into a T-track, slip the



workpiece underneath the arms, and tighten it down. While the long arm grants more leverage, using the small arm allow you to hold pieces up to 3" thick.





▲ Ease of use and speed make this hold-down an excellent choice when there are a lot of holes to drill.

LEVER-ACTION HOLD-DOWN

If you've ever had to drill a hole near the end of a long board, then you know how difficult it can be to keep the workpiece flat while the other end hangs off the drill press table. While the T-slot hold-downs can certainly help, what if you have a series of holes to drill? Resetting your hold-downs for each hole can be time-consuming, and frankly it's not my favorite use of shop time. As an answer, we came up with this lever-action hold-down, a relatively simple device that mounts right onto your fence.

This hold-down also makes use of the fantastic force of leverage. When you break it down, it's nothing more than a hinged arm attached to a fence. The arm acts as a lever to hold your workpiece, and it can apply far more pressure than even the strongest set of hands.

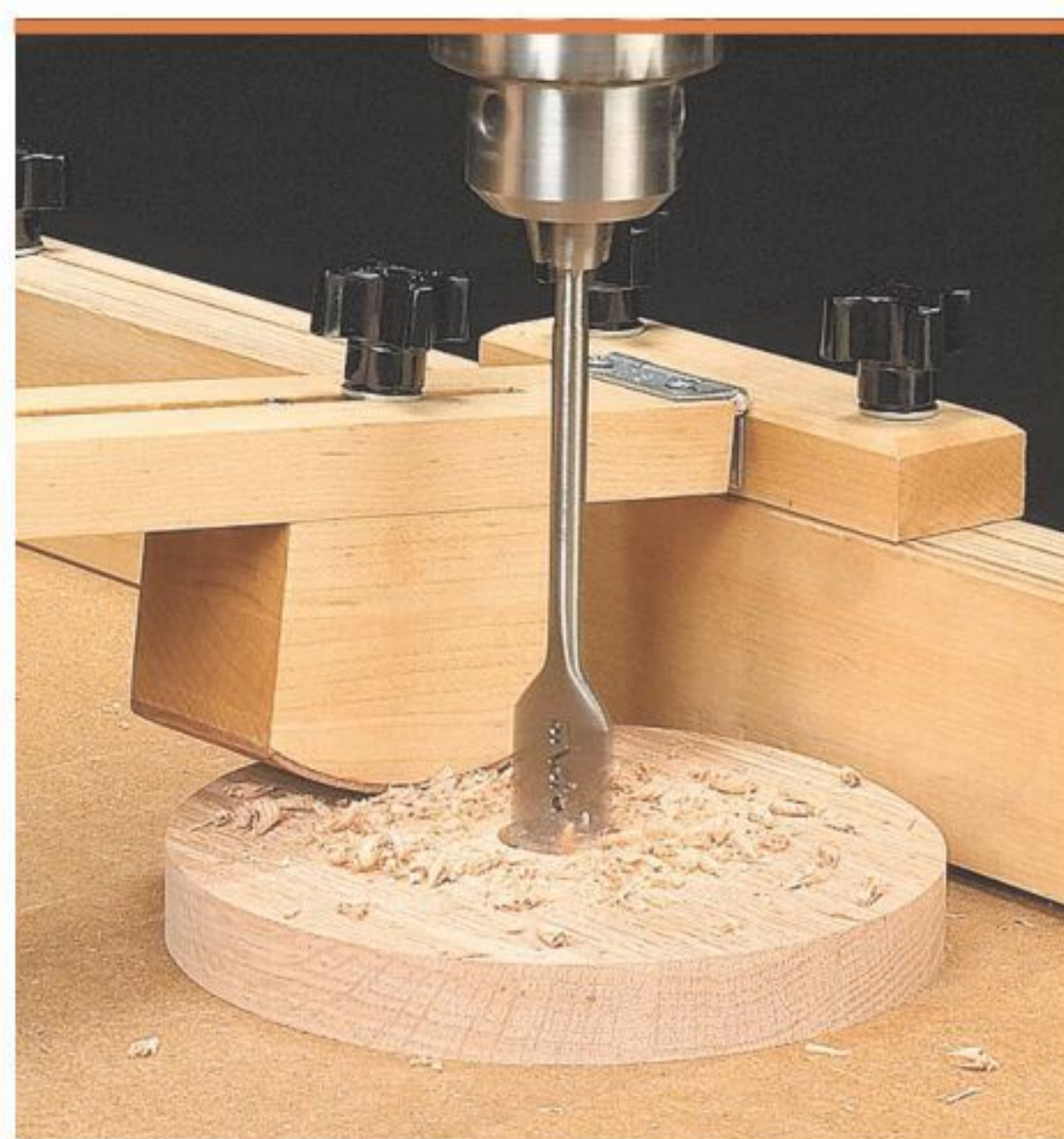
In addition, this hold-down is quick and easy to operate. Once it's on your fence, there's nothing to clamp, tighten, or screw down. Just lift the lever arm, slide your workpiece underneath, and press the arm back down. The rounded edge of the

hold-down block allows it to grip oddly shaped pieces. This hold-down has three basic parts — the lever arm, the hold-down block, and the hinge block. All three pieces are made out of $\frac{3}{4}$ "-thick hardwood.

LEVER ARM. The arm is glued up from two halves with a couple of $\frac{1}{4}$ " spacers between, allowing the hold-down block to be adjusted. Once the arm's dry, I rounded off the end on the band saw and knocked the edges down with a router. After sanding it smooth, I had a grip that fit comfortably in my hand.



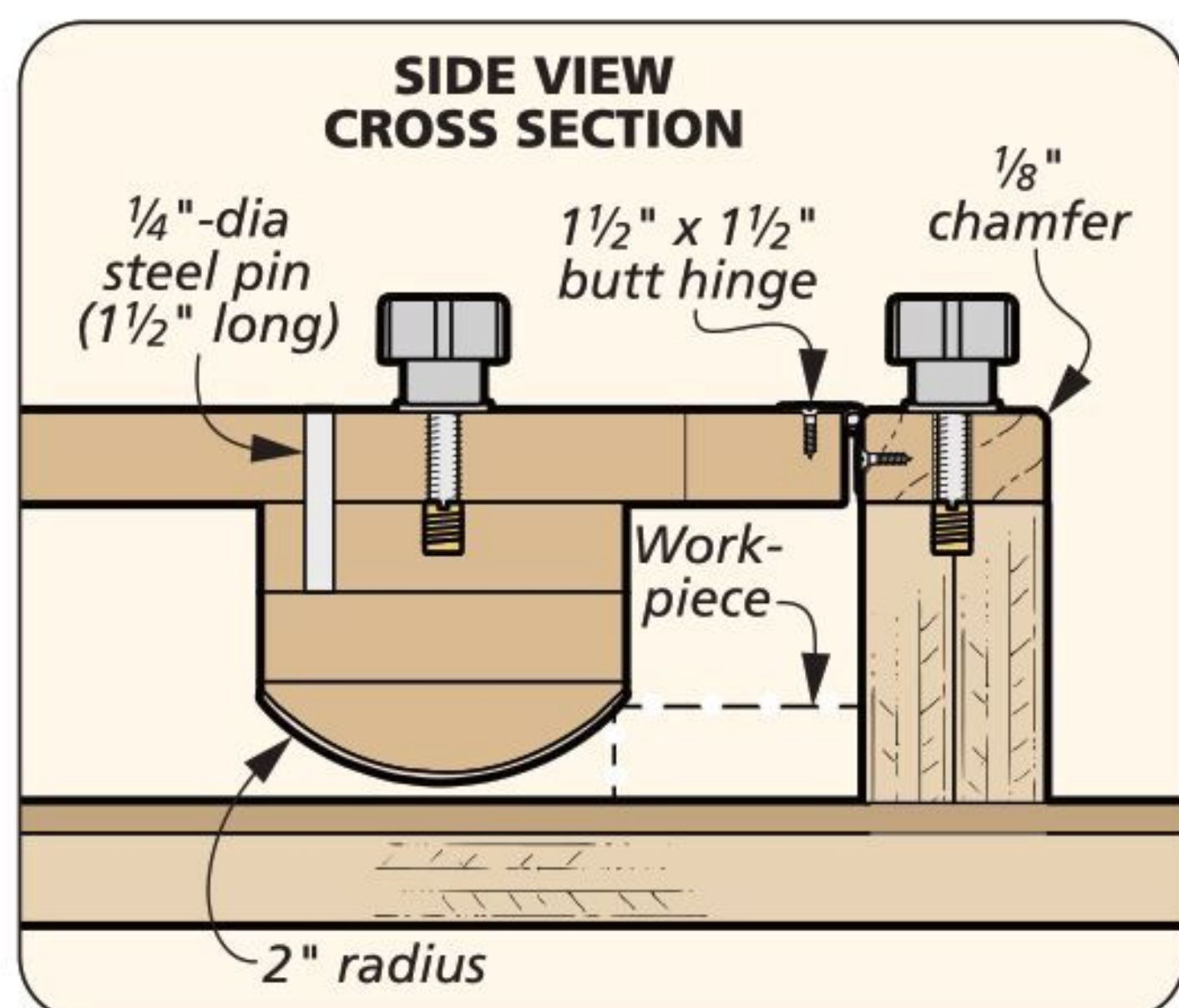
▲ The rounded bottom of the hold-down block allows the lever to firmly grip odd-shaped pieces like dowels.



▲ Positioning the lever arm next to the bit allows you to hold small pieces without putting your fingers in danger.



▲ By mounting the hold-down to a T-track on your fence, it can easily be repositioned or removed for greater versatility.



HOLD-DOWN BLOCK. The hold-down block is glued together from three layers of hardwood. I fitted a threaded insert into the top to accept the knob that'll hold the block to the arm. I drilled a hole in the top of the block and, to prevent the knob from twisting, I epoxied a steel pin to keep it aligned. To finish the block, I rounded off the bottom edge so pieces of different sizes and shapes could be held. Finally, I glued a piece of the leather to the bottom of the block to protect my workpieces from dents or marks.

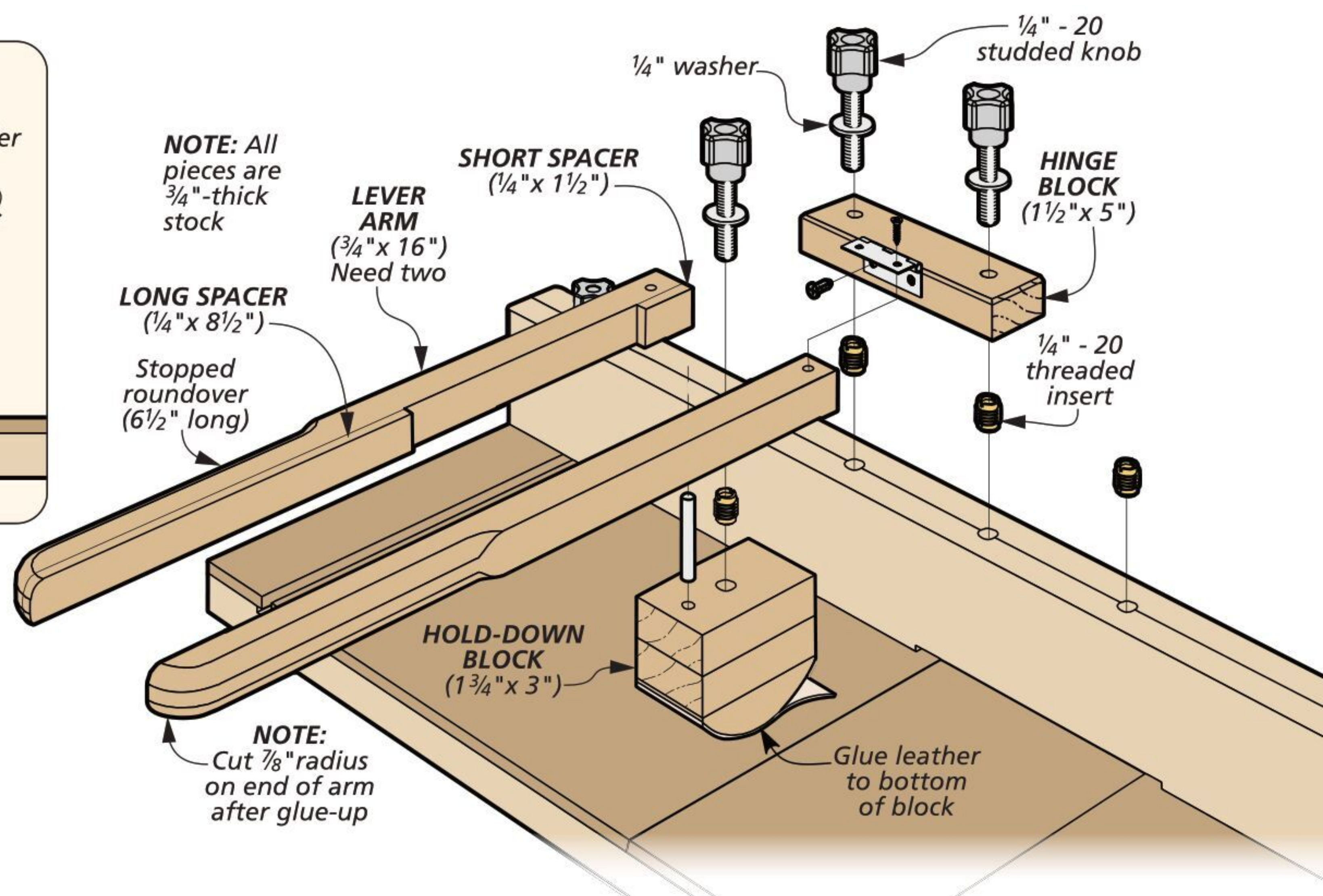
HINGE BLOCK. The last piece of the lever-action hold-down is the hinge block. It's a simple piece,

just a block of wood with a chamfered edge atop. I attached the lever arm to the block with a small hinge to allow it to pivot.

MOUNTING. When it comes to mounting the hinge block to your fence, you have a couple of choices. The simplest way is to use knobs and threaded inserts, like you see in the drawing and detail above. By installing a few sets of inserts, you can mount

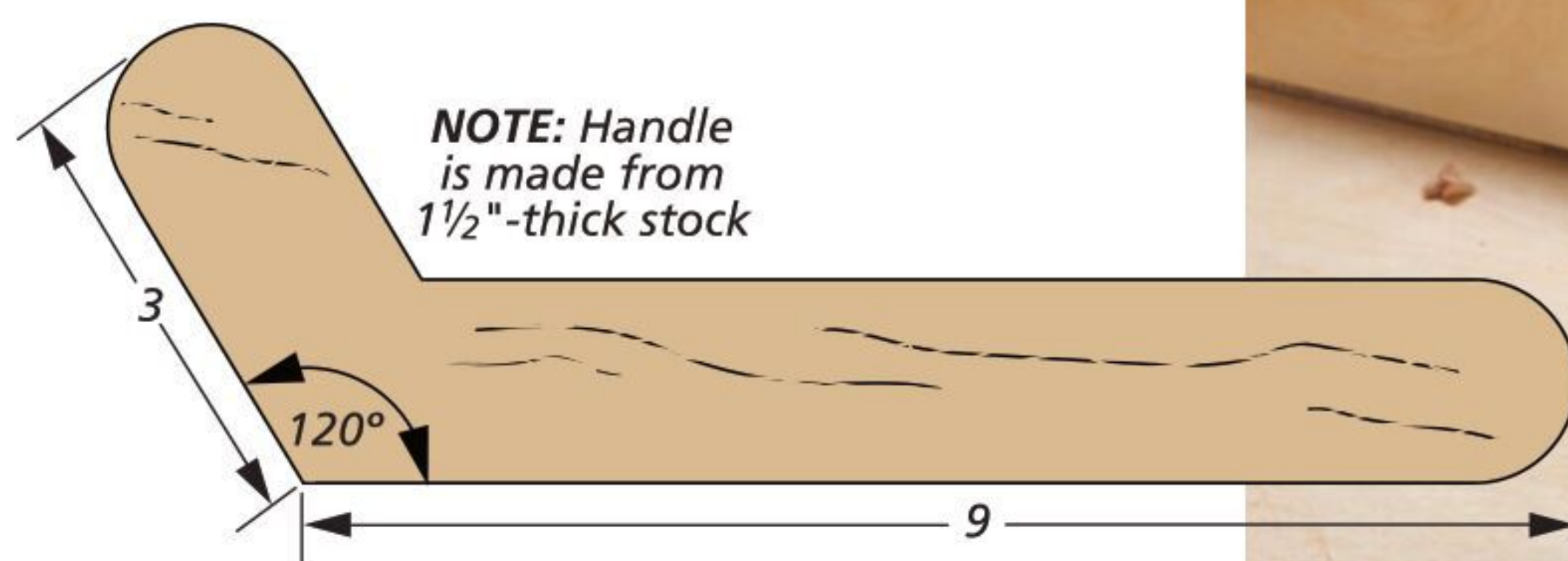
the hold-down in a couple of different spots on your fence.

Alternatively, you could use flange bolts and knobs along with a T-track in the top of your drill press fence, as you see in the lower right photo on the opposite page. This adds some flexibility when it comes to positioning the hold-down, and allows you to easily remove it when you need to. **W**



HELPING HAND

Safety Handle. Drilling small pieces makes me a bit nervous, but this simple handle keeps my hand well away from action. It's cut from a 12"-long piece of 1 1/2"-thick stock. Sandpaper glued to each end keeps the handle from slipping. Holding the long end against your fence (or table) and the short end against your piece exerts a surprising amount of force.





Dado Blade Basics



▲ Two scoring blades, a range of chippers, and thin shims comprise a quality dado blade set.

The main job of a standard table saw blade is division. You rip one wide board into two or more narrow pieces. Or crosscut a panel into smaller fractions. A dado blade on the other hand works on the principle of addition by subtraction. This isn't some form of new math. With a dado blade, you can add a groove to a workpiece by removing some of the material from that part.

Cleverness aside, this concept of what a dado blade does helps you understand its practicality in the shop. With this in mind, we'll look at what a dado blade is and how it works. From there, we can look into a few ways to get the cleanest cuts no matter the application.

All saw blades, unlike a knife or scissors, cut by removing a small amount of material — called a kerf. When you're cutting boards to size, a smaller kerf is more efficient in using power from the saw

and for maximizing yield from the board.

JOINERY BUILDING BLOCKS. With a dado blade you aren't sizing parts, instead the kerf is the important part. It's a building block for all kinds of joinery. Consider that a wide kerf is a groove when it follows the grain of a workpiece. It's a dado when cutting across the grain.

Move that kerf to the end or edge of a workpiece and you have a rabbet. (BTW — you've also just formed a tongue, too.) A rabbet cut on both faces of the end of a workpiece creates a tenon. Follow the string and you can see half laps, bridle joints, and slots around the corner.

A KIT OF BLADE PARTS. To accomplish this, a dado blade is more like a kit of components that you mix and match to suit your needs. The photo on the bottom of the previous page shows the three elements common to most dado blade sets.

The two outer blades look like small table saw blades. Called scoring blades, they define the edges of the cut and form crisp corners. These two are necessary for all blade setups. For narrow 1/4"-wide cuts, these two blades are all you need.

For wider cuts, you add one or more chippers. The look of the chippers varies among the different blade models. Most have a throwing star quality to them. They come in different widths and their flat-topped teeth plow out the waste between the scoring blades.

The final element is a set of thin plastic or metal shims. There are times when you need to create a dado blade setup for an exact size. They work like microadjusters to increase the spacing between chippers and scoring blades. Like the chippers, the shims that come with dado blades are different thicknesses. They're usually labelled.

You can even purchase aftermarket shims to give you more sizing options or better quality.

CARE & FEEDING. A good dado set will cost some money. And you'll get the best use from it with a little attention. The first thing is to keep the various parts protected between uses. Carbide teeth hold an edge a long time, but they're also brittle.

The act of cutting wide kerfs generates a lot of friction. This leads to resin building up on the teeth. The gunk impairs the cutting ability and reduces the life of the teeth, so get in the habit of cleaning your blade regularly.

Finally, a quality blade is designed to be sharpened several times. For consistent cuts, all the parts should get sharpened at the same time, regardless of the condition. Otherwise, you won't get flat-bottomed cuts.

INSTALLING IT RIGHT. Though installing a dado blade seems obvious, it pays to follow a few simple principles. It's also the starting point for getting smooth, reliable cuts from your dado set. The process is outlined in the photos at right. I'll pick out a few other items to keep in mind.

I keep a stiff brass or nylon bristle brush near the table saw to clear away debris from the arbor threads. Make sure the teeth on the scoring blades face forward. (They are mirror images of each other.) This typically means the blades' labeling faces out (Photos 1 and 4).

If you use shims, it's best to distribute them throughout the setup. Stacking them together could lead to a gap in the completed arrangement.

As you install chippers, position them so the teeth of one chipper aren't going to touch the teeth of another once the arbor nut is tightened. Finally, on wide setups, you won't be able to use the washer — that's okay.



▲ For easy access, raise the arbor to its highest point. Clear away any debris from the threads and then set the first scoring blade in place.



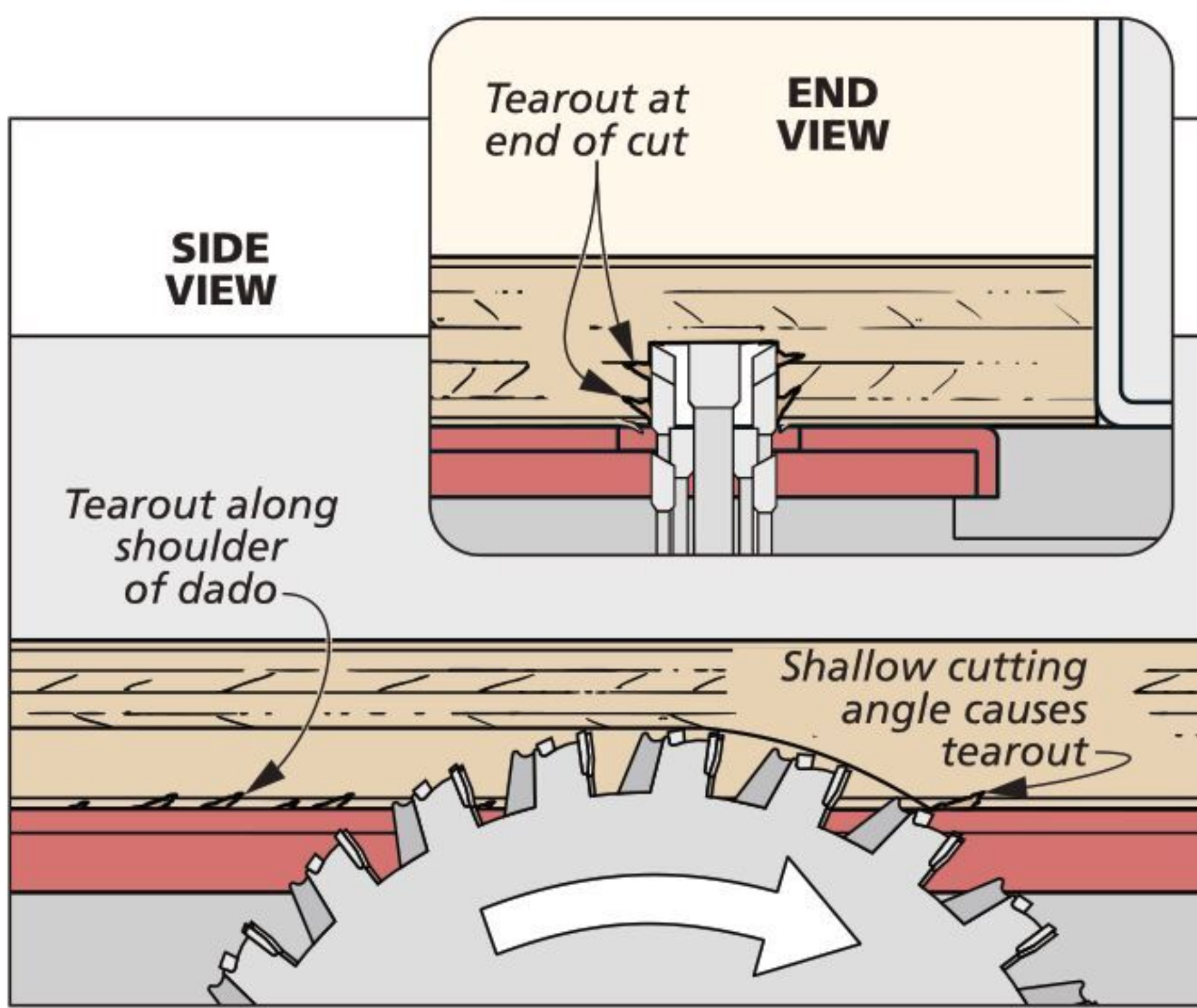
▲ To avoid creating gaps in the dado (and the resulting cut), avoid placing more than two shims in one location. Keep the shims snug against the blade.



▲ Stagger the chippers so the carbide teeth won't contact adjacent blades and chippers. The design of the chippers keeps the blade balanced regardless of the arrangement.



▲ Install the other scoring blade and double-check the setup for proper installation. The nut should fully thread onto the arbor. Then install an insert sized for the dado set.



STOP TEAROUT

The ideal cut made with a dado blade has smooth, crisp sidewalls and a flat, consistent bottom. Getting there requires experience and employing a range of options to meet difficulties as they arise.

The main obstacle standing in your way is tearout. This occurs when unsupported wood fibers break away from the surface. Let's be clear. Tearout is more



▲ This is a dado cutting triple threat. Masking tape on the workpiece and a fresh zero-clearance insert tag team for tearout-free edges. A clamped-on hold-down ensures a consistent depth of cut.

severe than a simple case of the fuzzies on the edges of a cut. Those can be cleaned up with a swipe of a sanding block. Torn out fibers are gone for good and leave ragged edges. The upper left drawing shows how the cutting forces of a dado blade influence tearout.

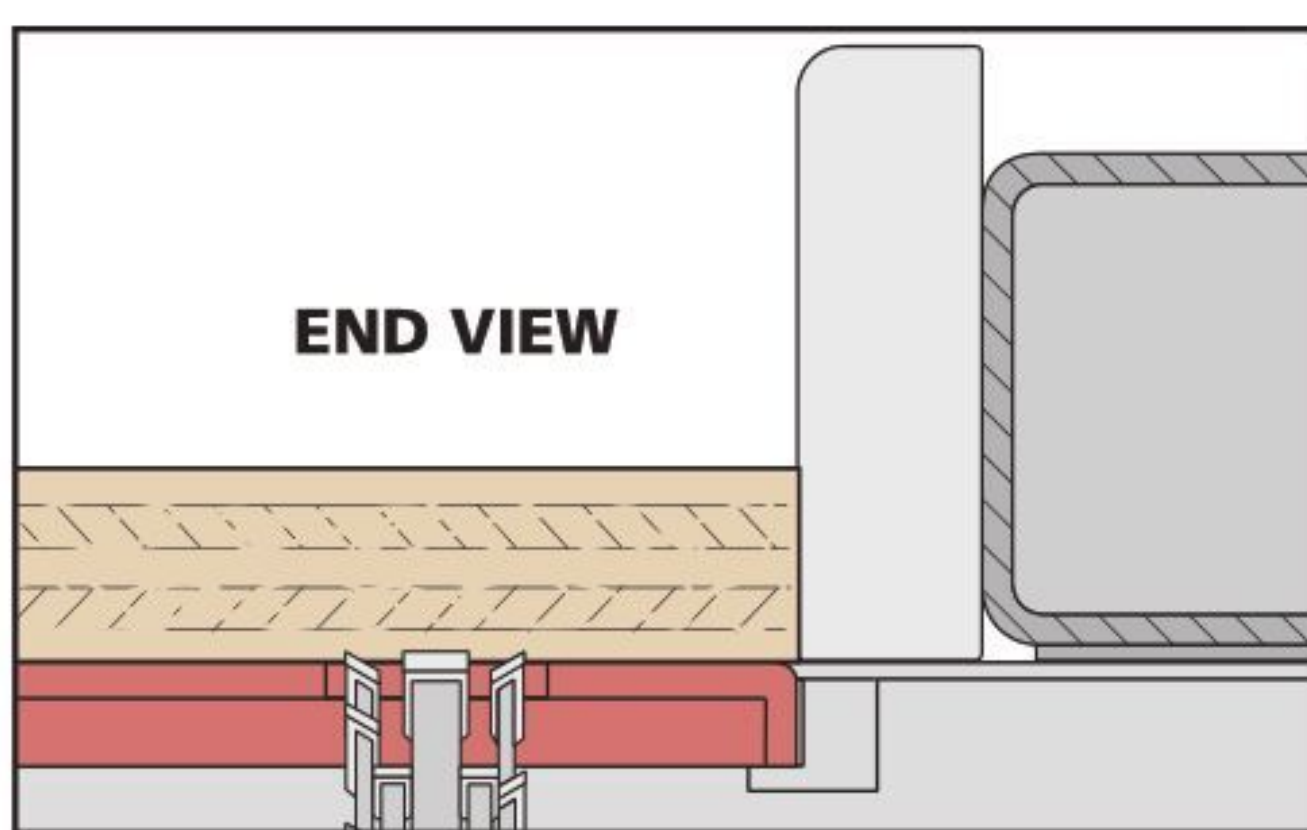
The type of workpiece and the grain orientation indicate the likelihood of getting tearout. Some materials like plywood, oak, and other open-grained hardwood are candidates. And cutting across the grain of the

wood should put your Spidey senses on tearout alert.

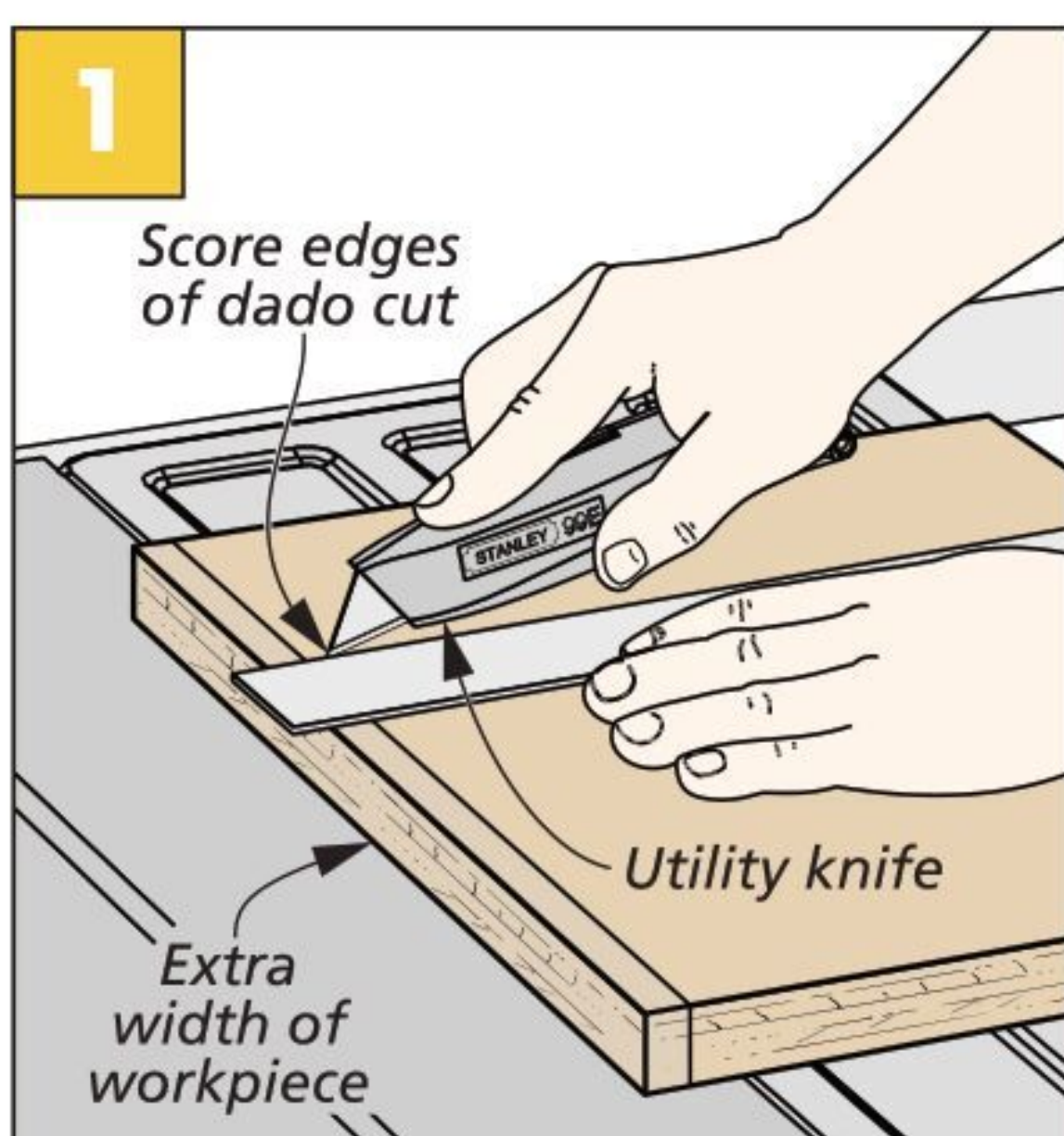
TEAROUT TAMERS. The drawings below highlight several prevention solutions. They fall into two general approaches. The first is to slice the wood fibers at the point of the cut to prevent long splinters from forming.

The other method is to provide backup to the wood fibers. This way there's no free space to break away.

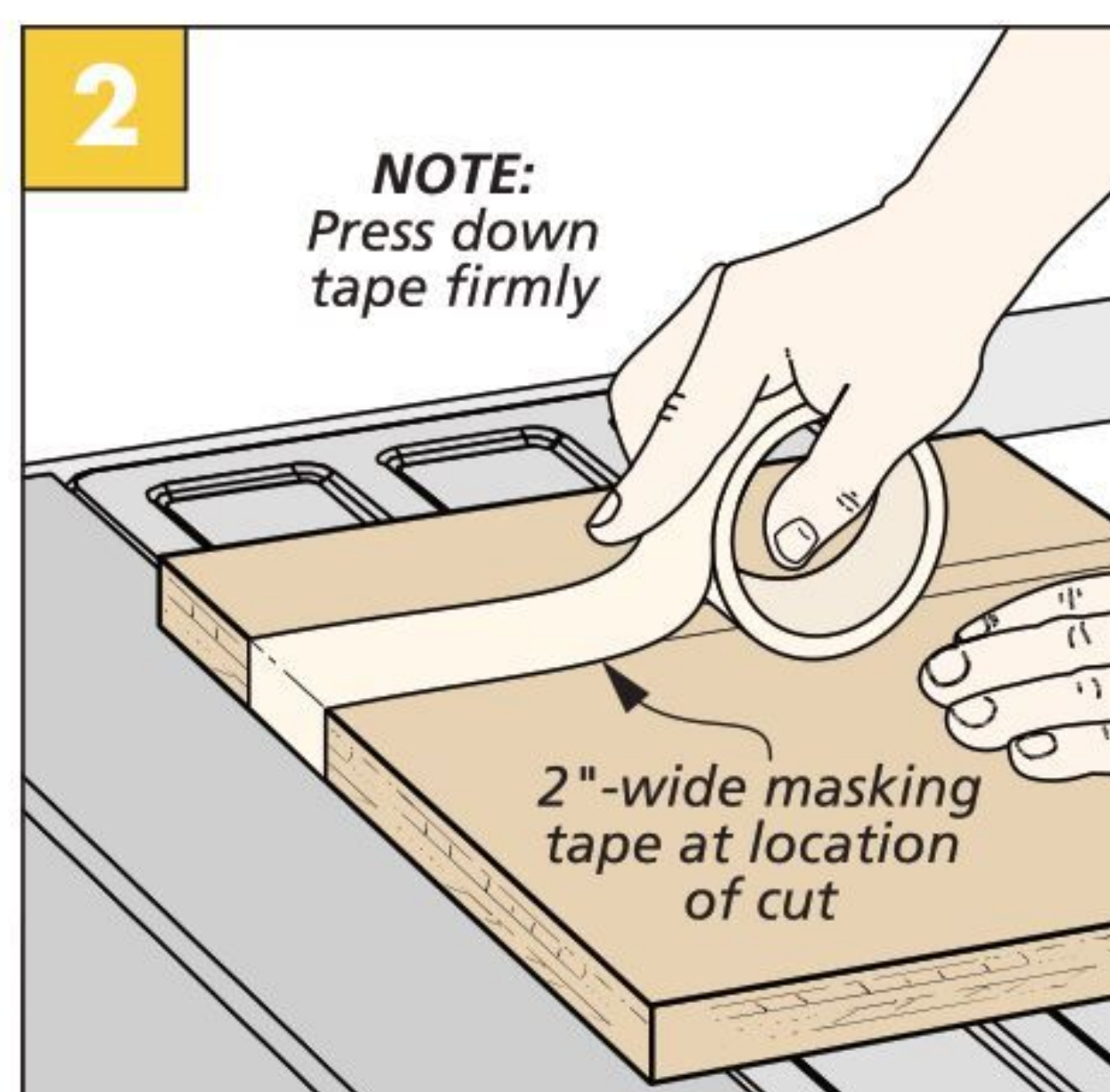
You don't need to employ all of these on every cut. Here's where experience comes in.



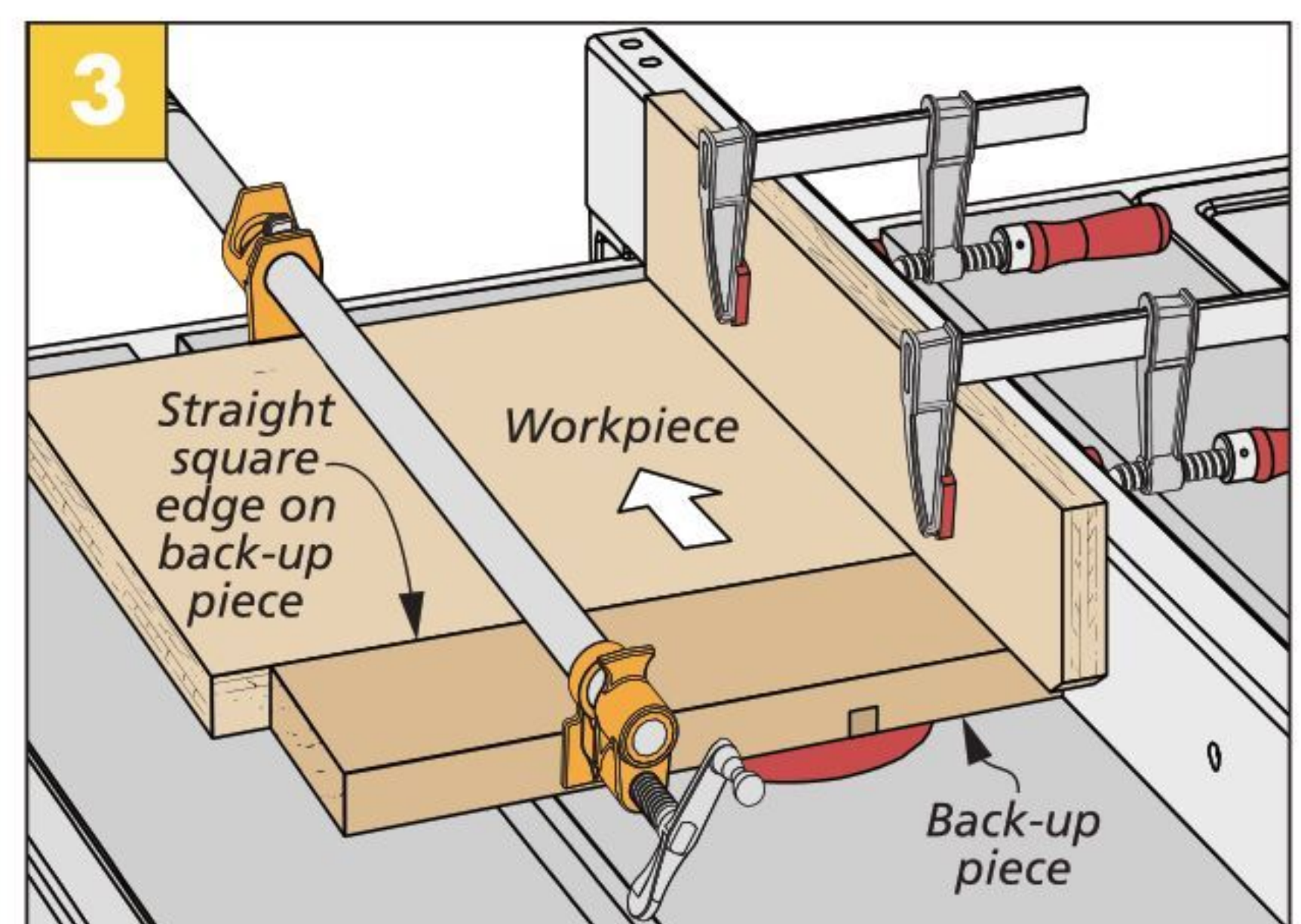
A Scoring Pass. With the blade raised $\frac{1}{32}$ ", cut a scoring pass to prevent the veneer from chipping.



Score the Edges. Slice the face veneer with a knife and straightedge to stymie tearout.



Masking Tape. A strip of wide masking tape backs up the wood fibers, preventing them from lifting.



Backer Board. Clamp a scrap piece to the trailing edge of a workpiece to prevent tearout as the blade exits the cut.

Some solutions are more effective and practical than others depending on the task.

SUPPORTING CAST

Surrounding your dado blade with a solid team is another element of good work. The accessories shown in the photos here complement a dado blade for getting better quality cuts or adding other capabilities.

ZERO-CLEARANCE INSERT. The first of these is a zero-clearance insert. This type of insert hugs the sides of the blade so there isn't a gap. It supports the workpiece to prevent tearout. It's a good idea to have a few inserts dedicated to commonly used dado blade setups. Buying that many inserts can get pricey, so I like to make my own. You can see the process at Woodsmith.com/258.

SIMPLE HOLD-DOWN. If a workpiece isn't perfectly flat, the depth of cut can vary along its length. Sometimes it's subtle enough that you don't notice it until assembly. A hold-down clamped to the rip fence, as shown in the photo on the previous page, offers some insurance.



▲ A sacrificial plywood auxiliary rip fence allows you to bury a wide dado blade to make accurate rabbet cuts. Wide push pads keep your hands away from the blade and distribute pressure for a consistent depth of cut.

You'll notice this one is basic. Commercial featherboards offer a leveled-up option.

A hold-down only works when the fence is relatively close to the blade. In other situations, wide push pads press the workpiece flat to the saw table.

AUXILIARY RIP FENCE. One common dado blade cut is forming a rabbet along the edge of a board. The setup I use is shown in the

photo above. Temporarily attach a plywood auxiliary fence to the rip fence. An arrangement like this allows the dado blade to be partially recessed in the fence without damaging the face of your rip fence.

The exposed portion of the blade matches the width of the rabbet. Another benefit of this technique is that you can make fine adjustments to the width of the rabbet by simply repositioning the rip fence.

SETUP BOARD. One last dado-related accessory is shown in the left photo. It's a sample board that I use to record the recipe of dado blade elements used to make custom cuts. One easy example is matching the exact thickness of plywood.

Whenever I need to make another similar cut, I can see if one of my previous setups matches — or at least gets me in the ballpark. I enjoy my time in the shop, but spending a lot of time tweaking a dado setup isn't why I go out there.

A dado set transforms your table saw from a cutting tool into a joinery station. Combine these tips with some practice and you'll never look back. **W**



▲ Get in the habit of recording a custom dado setup by making a cut in a sample board. Don't forget to write down the chippers and shims you used so you can recreate it later.



For instructions to make your own insert plates, go to:

Woodsmith.com/258

Sources

Most of the materials and supplies you'll need to build the projects are available at hardware stores or home centers. For specific products or hard-to-find items, take a look at the sources listed here. You'll find each part number listed by the company name. See the left margin for contact information.

MAIL ORDER SOURCES

Project supplies may be ordered from the following companies:

Woodsmith Store
800-444-7527
store.woodsmith.com

Amana Tool
800-445-0077
amanatool.com

amazon.com

Benjamin Moore
855-724-6802
benjaminmoore.com

General Finishes
800-783-6050
generalfinishes.com

Hock Tools
hocktools.com

Home Depot
800-466-3337
homedepot.com

McMaster-Carr
630-833-0300
mcmaster.com

Rockler
800-279-4441
rockler.com

Rust-Oleum
rustoleum.com

Van Dyke's Restorers
800-237-8833
vandykes.com

Varathane
Varathanemasters.com

Woodworkers Supply
800-645-9292
woodworker.com

WOODEN PLANES (p.16)

- Hock Tools
Bench Plane Bladevaries

ROUTER WORKSHOP (p.20)

- McMaster-Carr
1/4" Through Knob . . . 7921K61

INDUSTRIAL BOOKCASE (p.24)

- Rust-Oleum
Antique Pewter 271481
Burnished Amber 271480

CRAFTSMAN DRESSER (p.30)

- Van Dyke's Restorers
Drawer Pull 02042234
- Woodworkers Supply
Stem Bumper 939-910

The dresser was finished with Varathane "Gunstock" stain. When the stain was dry, I sprayed it with a couple of coats of lacquer.

CRAFTSMAN MIRROR (p.40)

- Rockler
Mirror Clips 22359
- Home Depot
D-Ring Hanger 153012

The mirror was finished with Varathane "Gunstock" stain. When the stain was dry, I sprayed it with a couple of coats of lacquer.

WEEKEND WORKBENCH (p.44)

- Rockler
1 1/4" Knobs 23085
- Amazon
9" Vise M9WW

To finish the workbench, I applied a couple of coats of lacquer. The cabinet and drawers get covered with a generous layer of General Finishes "Kline Blue" milk paint.

CAT TREE (p.52)

The hardwood areas of the cat tree are finished with spray lacquer. The cubby is painted with Benjamin Moore "Southfield Green" paint.

DRILL PRESS SAFETY (p.58)

- McMaster-Carr
1/4" Stud Knob 7921K21
1/4" Threaded Insert 91732A368

GLUE LINE RIP BLADES (p.64)

- Amana Tools
10" Glue Line Rip 610301

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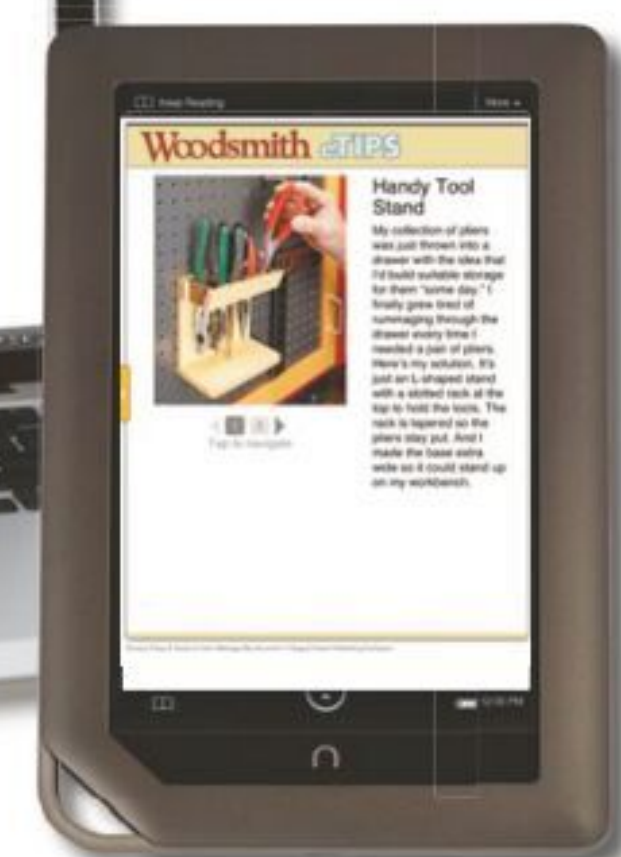


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