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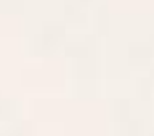
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Woodsmith® (USPS 465-410) (ISSN 0164-4114) is published bimonthly by the Home Group of Active Interest Media Holdco, Inc. The known office of publication is located at 2143 Grand Ave, Des Moines, IA 50312. Periodicals Postage Paid at Des Moines, IA, and additional mailing offices.
Postmaster: Send address changes to Woodsmith, Box 37274, Boone, IA 50037-0274.
Postmaster: Send all UAA to CFS. (See DMM 507.1.5.2); NON-POSTAL AND MILITARY FACILITIES: Woodsmith, Circulation Department, PO Box 37217, Boone, IA 50037 Printed in U.S.A.

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Subscriptions: \$29/year, Single copy: \$7.99

Canadian Subscriptions: Canada Post Agreement No. 40038201. Send change of address information to PO Box 881, Station Main, Markham, ON L3P 8M6.
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EDITORIAL

Woodsmith Magazine
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from the editor Sawdust

Some elements of building a good project are obvious: beautiful wood, solid joinery, clear plans, and sharp tools come readily to mind. The other day, Erich came in to chat and shared another: light and shadow.

He wrote the Atomic bar and Shoji wall cabinet projects. Each of those makes expert use of light and shadow to enhance its appearance. On the bar, thin strips lift the front lattice away from the panel behind it. The resulting shadow lines make the gridwork more dramatic.

The shoji cabinet takes a different approach. There are two different widths of lattice strips in front of the translucent shoji paper. After assembly, the offset surfaces catch and reflect light, enhancing the geometric effect. Subtle details like that are a testament to the skill of the Woodsmith design team and project builders. They spend a lot of time fine-tuning designs and studying past and current work to incorporate small details that have a big impact.

Which reminds me, that Atomic bar owes its origin to shop manager, Marc Hopkins. Earlier this year, he hosted a pool party and “needed” a bar to suit the theme. He came up with the one you see here. He built it over several lunch hours and weekends in the shop at Woodsmith. We all thought it was cool. So Dillon drew up the plans you’ll find on page 28. If you have a



project idea, I’d love to hear it. Send me an email phuber@aim-media.com. It might just end up in these pages.

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▲ Creating a series of holes along the centerline allows you to have several different distances on the same guide.

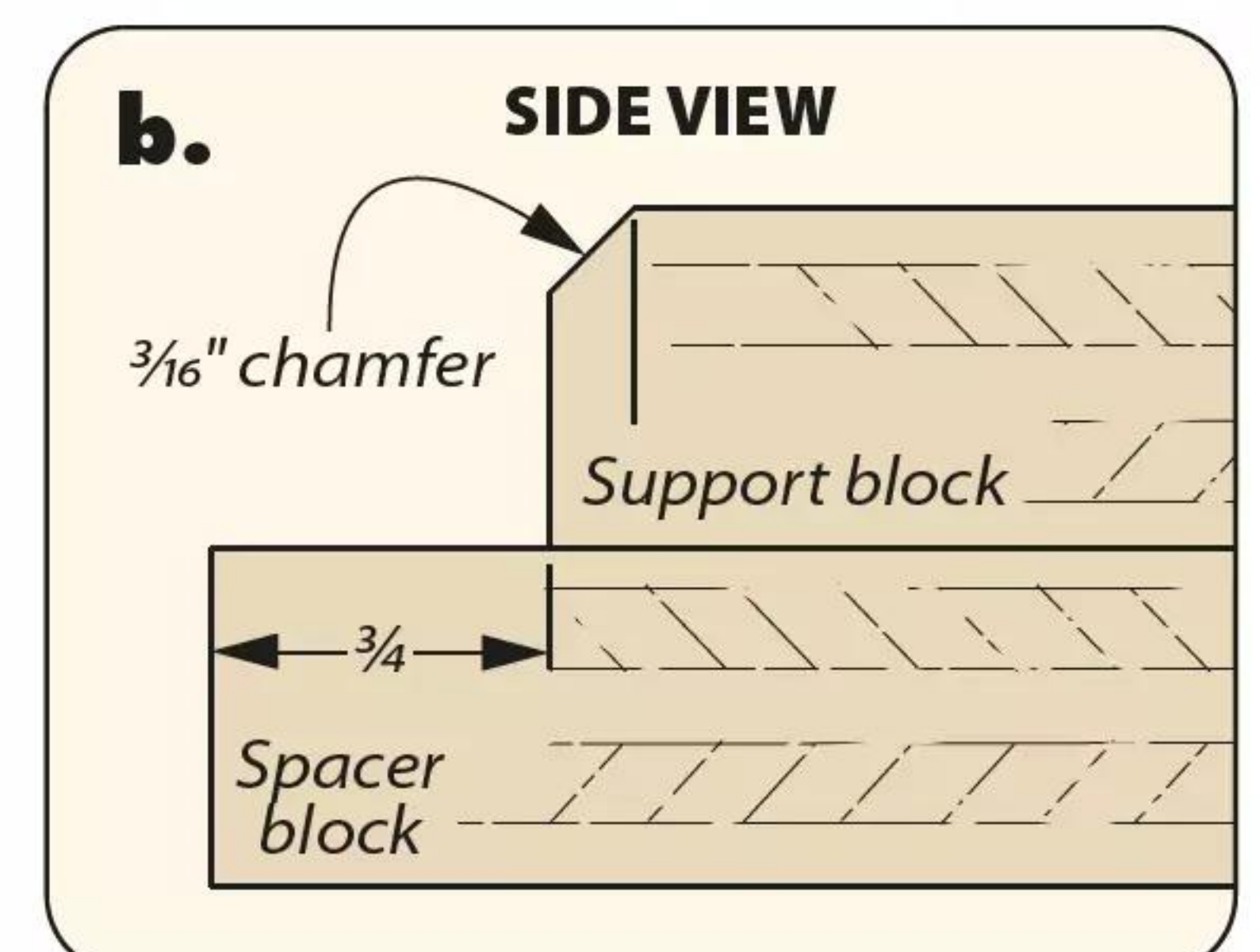
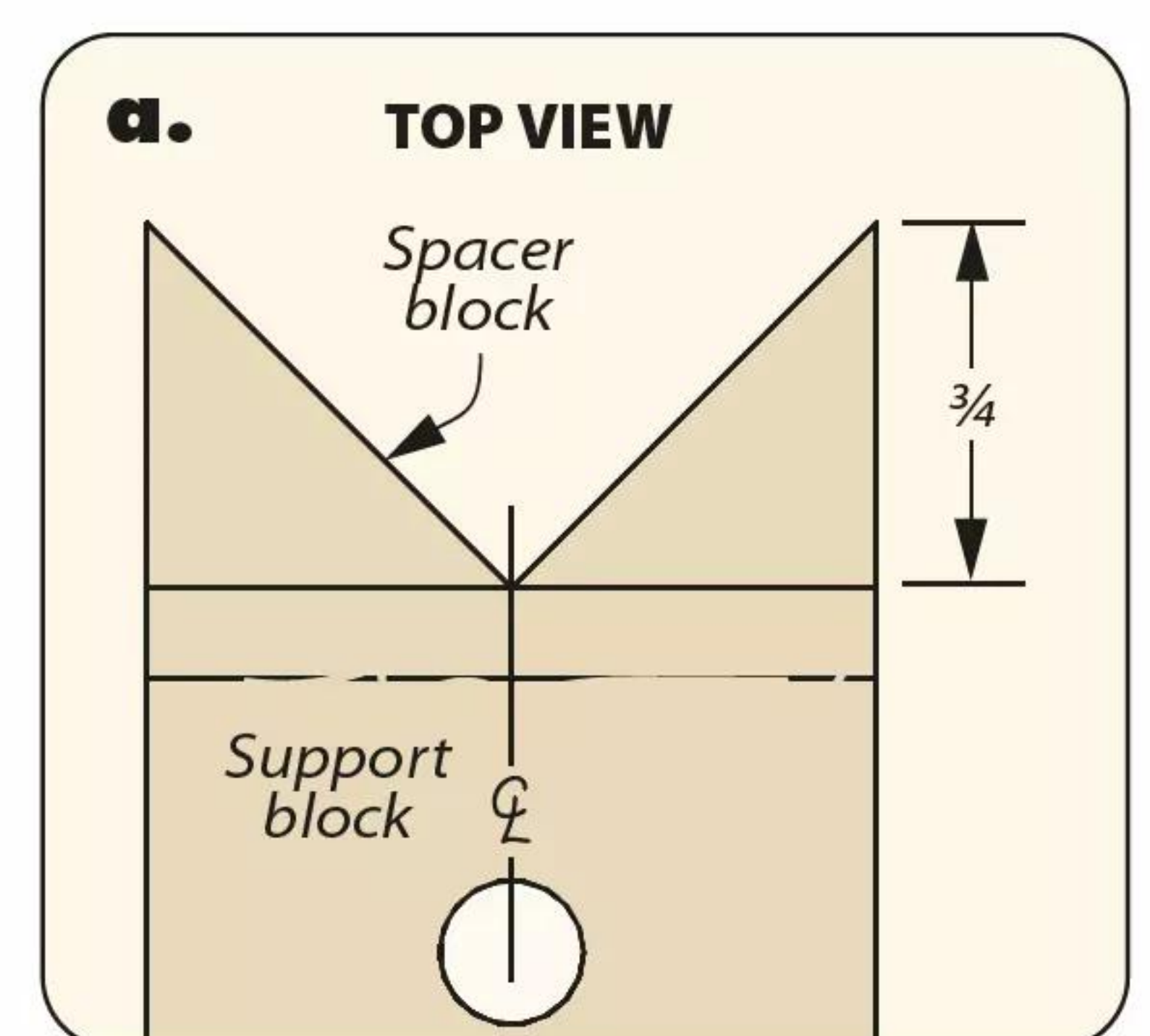
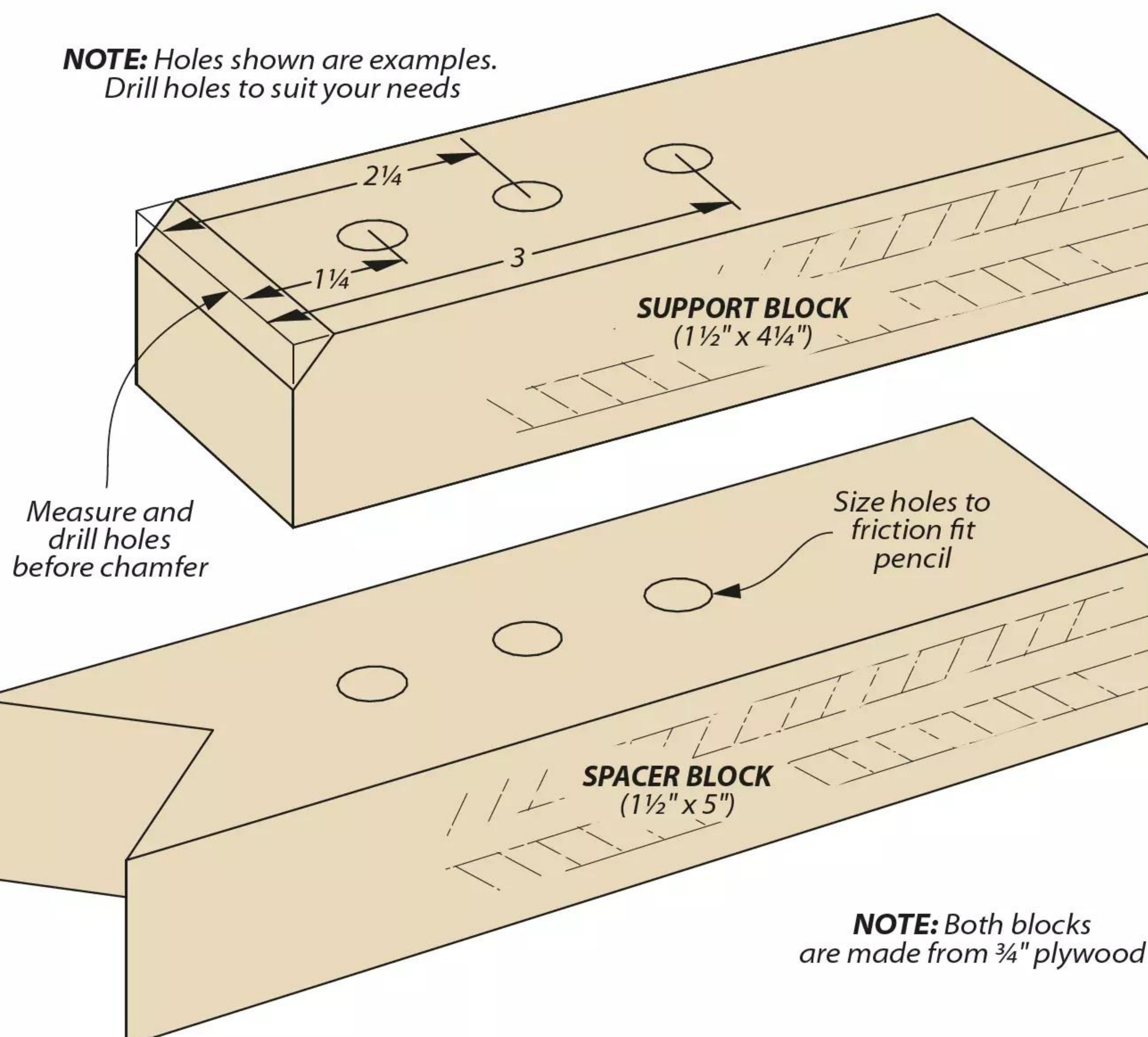
Offset Tracing Guide

On my latest project, I needed to make a base that would extend exactly $1\frac{1}{2}$ " from the profile of the piece above it. To do this, I made the simple guide you see here.

The guide consists of two pieces: a spacer block to establish the distance from the perimeter, and a support block on top of it to help keep my pencil in place. The "V" shape on the front of the spacer allows this guide to stay accurate no matter the shape of the piece. The holes are friction fit for my pencil, and determine how far the layout is offset from the original.

Dan Martin
Galena, Ohio

NOTE: Holes shown are examples.
Drill holes to suit your needs





Stand Off Stop Block

When cutting small pieces on the table saw, it's nice to have a stop. Using the rip fence isn't a good idea, since the pieces could easily bind and kick back.

Instead, I turned my jointer push block into a standoff block. I set the fence with the push block even with the blade

(left photo). For cutting I hook the heel of the block on the front edge of the saw table. The workpiece clears the chamfered corner on the block just before it makes contact with the blade.

*Phil Huber
Urbandale, Iowa*



For more on this jointer push block, head to:
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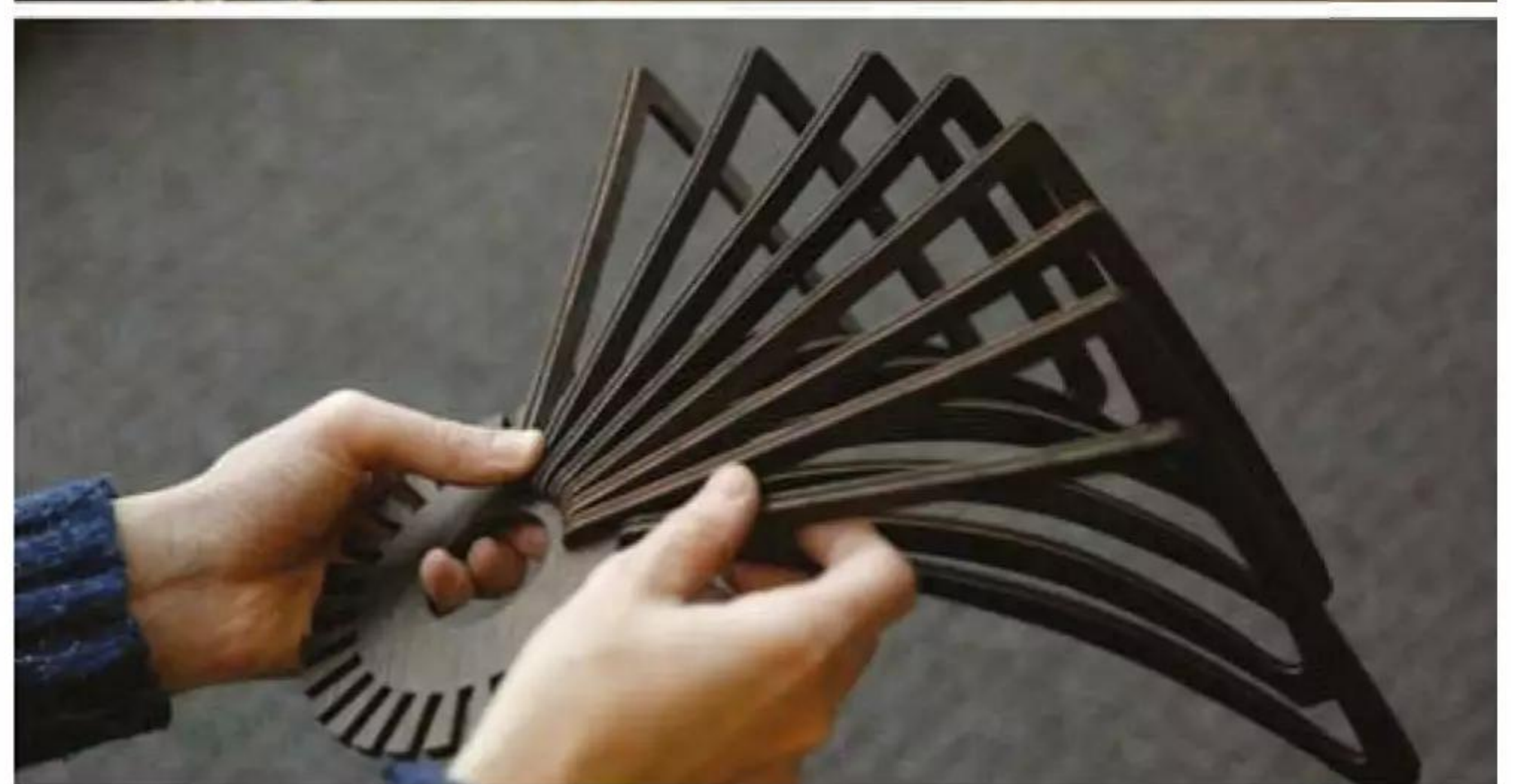
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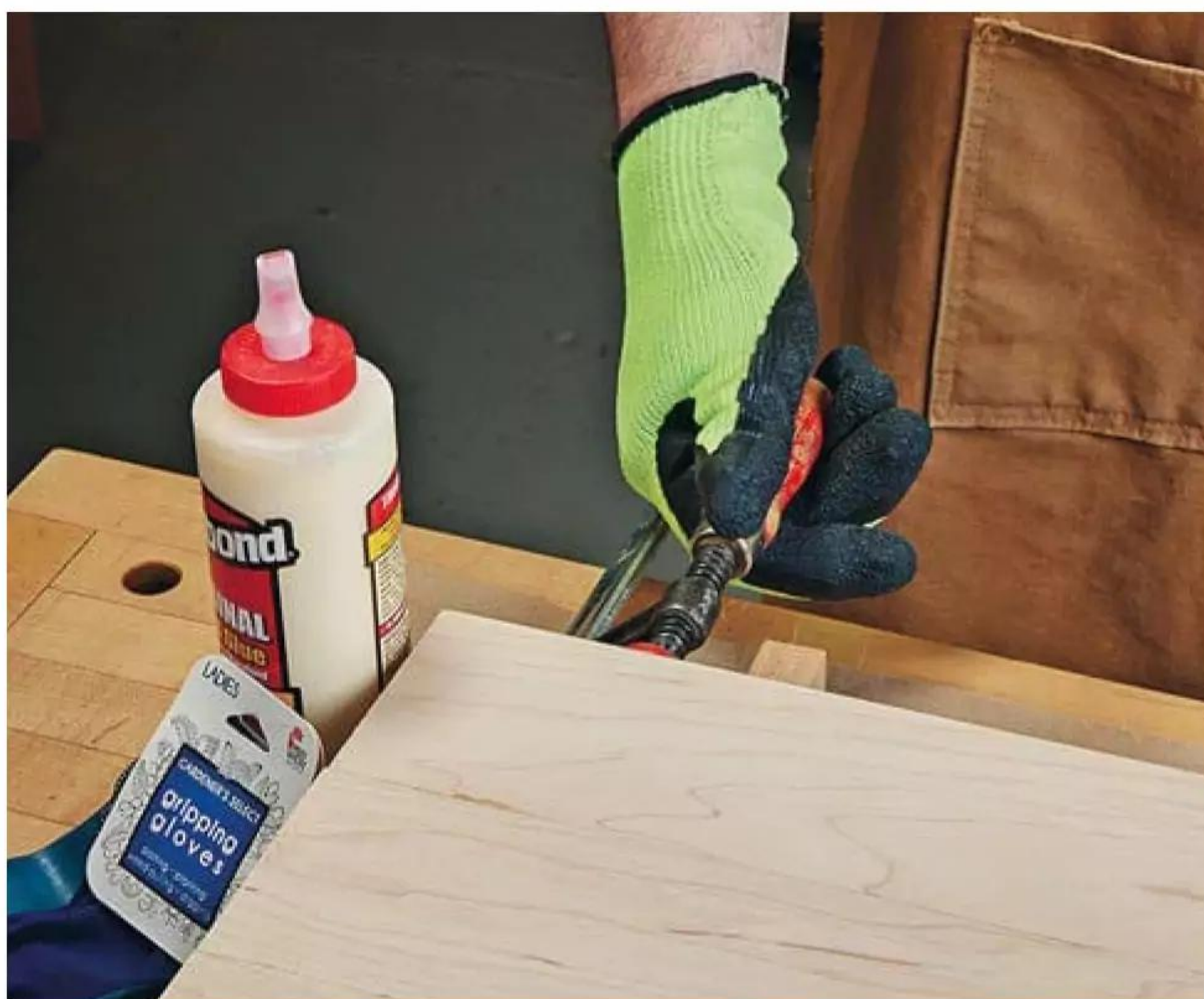
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QUICK TIPS



Get a Grip. Emanuel Ringel of Ambler, PA has seen many tips over the years for making clamps easier to tighten. They all seem to involve modifying the smooth, wood handle, but when he needs some extra “oomph,” he slips on a pair of rubber-coated gloves for extra gripping power — no modifications required.



Steel Wool Recycling. Pete Wohlers of Dothan, AL doesn’t waste his steel wool. After using a pad, he cleans it with mineral spirits, blots it dry, then places it in a plastic sandwich bag with some spare silica gel. This keeps out the oxygen and water that often causes pads to rust, allowing them to be reused several times.



Miter Gauge Holder

It’s nice to have a few different miter gauges. To keep them easily at hand, I prefer to mount them on the wall with aluminum tubing. One end is cut at 45° to make the gauge easy to grab and a single screw keeps it secured.

Logan Ward
Mesa, Arizona



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Table Saw Alignment

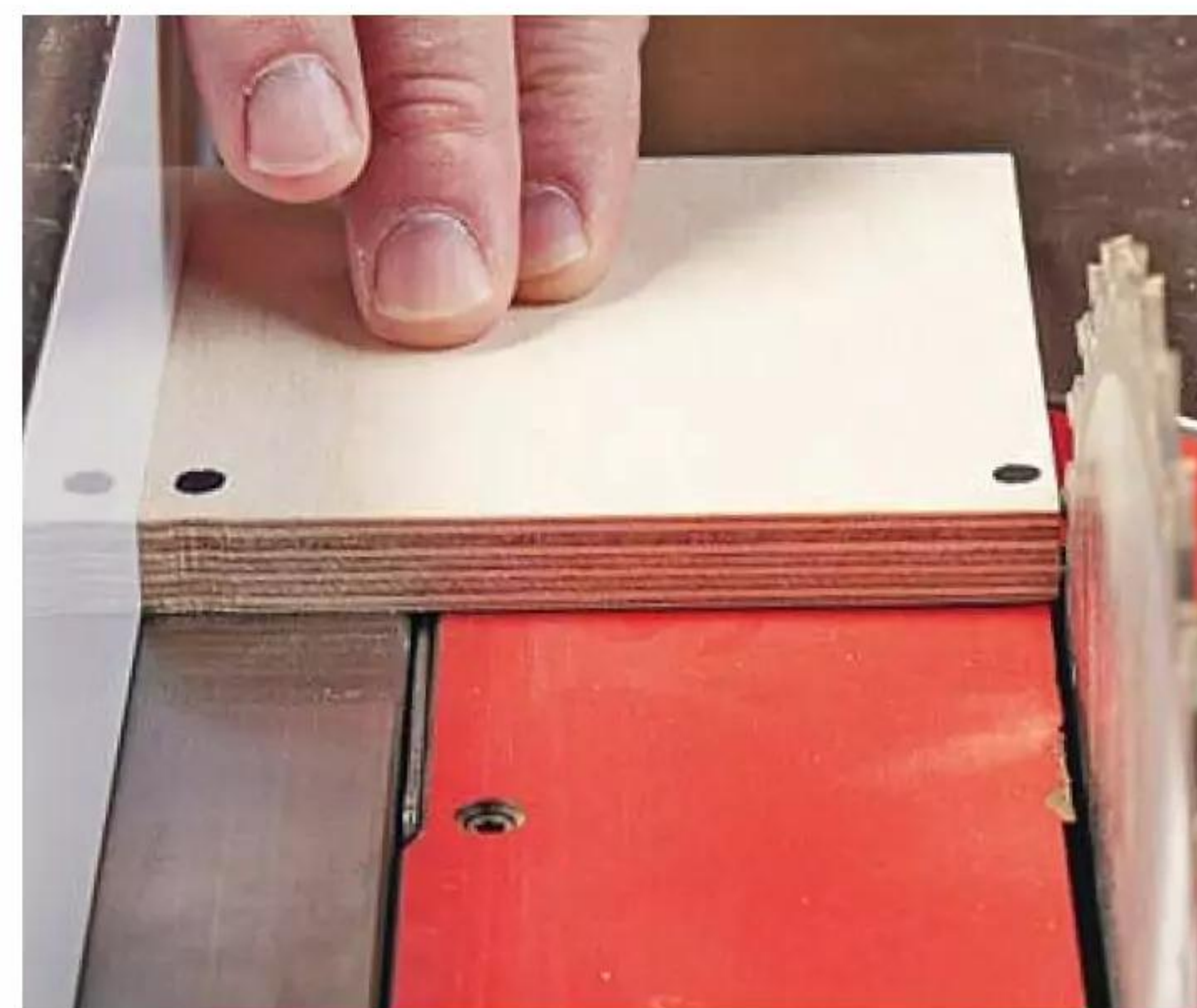
It's no big secret that the fence on a table saw can come out of alignment, and that's bad news. At best, you'll be left with a rough or burnt edge, and at worst you risk binding the workpiece and having it kick back. Luckily, it's easy to verify your fence adjustment with just a couple steps.

First, mark one tooth to use as a reference. Next, cut a block to help you measure the distance between the fence and the blade. (The two dots on the block allow you to orient the block consistently.) Measure the infeed side first. Rotate the blade so the marked tooth is beside the block, then position the fence so the block is flush to it and the blade. Now, move the piece to the outfeed side and rotate the blade. If there's a gap, or if the block is too tight, then you'll need to adjust your fence accordingly.

*Dan Martin
Galena, Ohio*



▲ Begin by marking a tooth. This will be used as a reference to ensure the fence is properly aligned.



▲ With the marked tooth on the infeed side, position the fence so it and the blade are touching the block.



▲ Position the block and marked tooth at the outfeed side. If there's a gap, you'll need to adjust the fence.



▲ Adjust the fence until the block is touching both the blade and fence, as it was on the infeed side.




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Improved Drill Guide

Drill guides are becoming more popular these days, and with good reason. However, they all share one slight but common and annoying flaw. With their small bases, they tend to tip over easily, which invariably moves the bit and possibly ruins the cut.

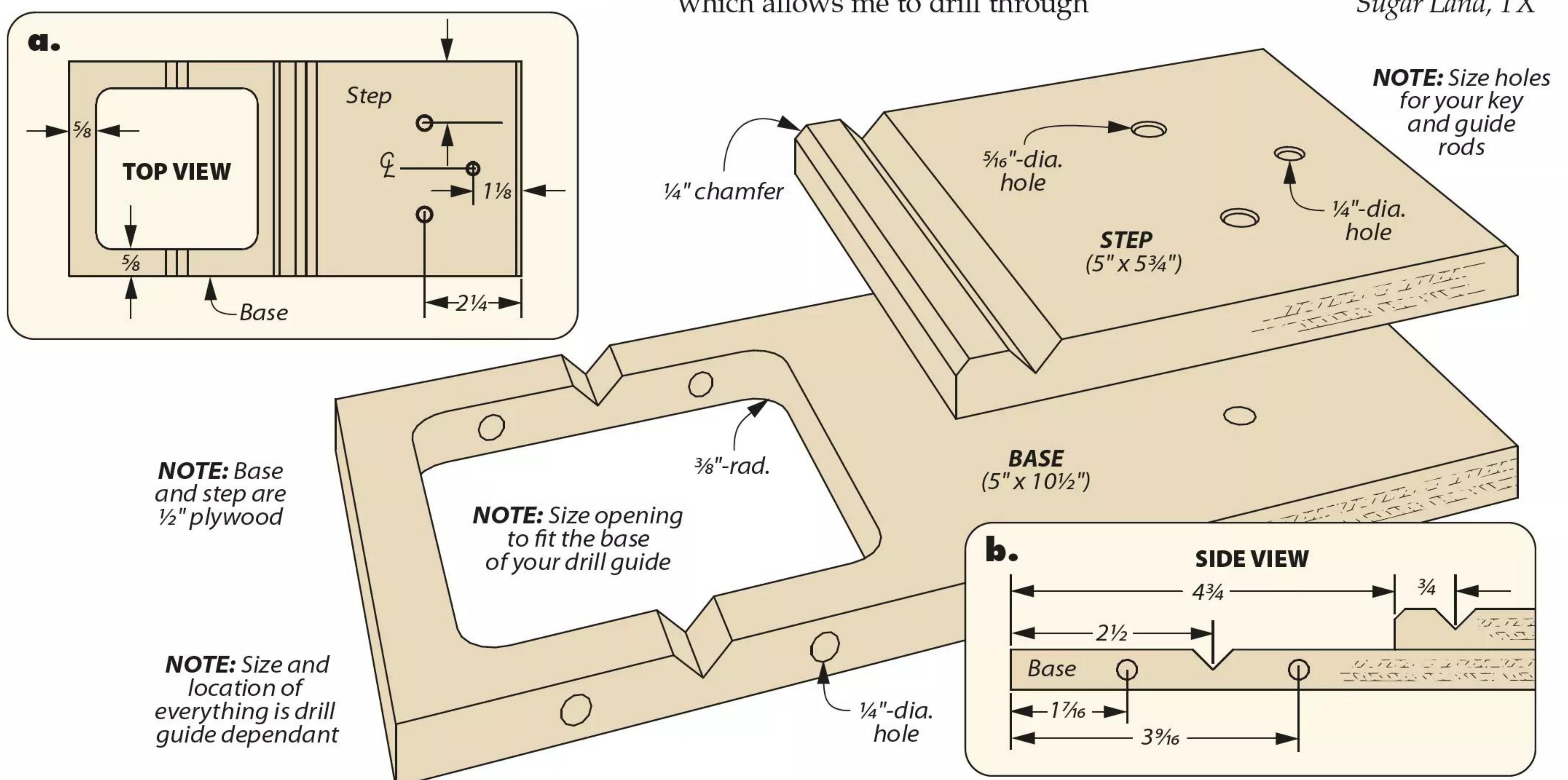
To solve this, I added the base and step you can see below.

This brand of drill guide already has four holes tapped and threaded to accommodate $\frac{1}{4}$ "-20 screws, making it an easy addition. The base adds a great deal of stability, preventing any tipping.

In addition to the base, I also added a step to the rear of this add-on. This serves two functions. The first is a deeper V-groove, which allows me to drill through

dowels usually too large for the guide. Second, a few holes drilled in the back offer storage: two holes to hold the guide rods and a third for the key for the chuck. A slight chamfer on these made with a countersink bit helps make it easy to quickly slot the rods and key in place.

*Hermie Tolerba
Sugar Land, TX*





▲ The additional platform and step provide greater surface area for more stable drilling.



▲ A V-groove in the step allows the carriage to be reversed when drilling larger dowels.



▲ Three holes on the step offer storage. Here one holds the key and two hold the guide rods.



▲ With this drill guide, 1/4"-20 screws secure the base using the guide rod holes.

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ALL
About

Epoxy Inlays

Usually, it's hard to resist opening the lid on a small box to see what's inside. That's not the case with these turned gift boxes, however. The intricate inlays on the outside are what grab all the attention. In this issue we'll focus on making the dragonfly lid. In the next issue (*Woodsmith* 278) we'll shape the bowls and fit their respective lids.

EPOXY INLAYS. Now I know, you're probably thinking that making these inlays is a tedious, time-consuming matter. But it's really a simple two-step process. First, the openings are cut on the lid with a scroll saw (photo, page 14).





▲ After filling in the openings with colored epoxy, turning the lid brings the dramatic inlay to life. You'll attach the lid to a sacrificial blank to create this profile. Then you'll make the box to fit the lid. Those details will be covered in the next issue in *Woodsmith/278*.

Then these openings are filled with colored epoxy. Once the epoxy cures, turning the lid to shape reveals the decorative inlay, as you can see in the photo above. (For information on the coloring agents and the epoxy we used, see the Box on page 15.)

AS THE BOX TURNS. Making the inlays is half the fun of these unique gift projects. The other half is turning the boxes to shape. The good news is you don't need to be an expert to do this. All three boxes can be turned using a few simple lathe tools (a round-nose scraper, a square-end scraper, and a parting tool) and some straightforward scraping techniques.

ENDLESS POSSIBILITIES. As you can see in the photo at left, I made three boxes. The instructions (and dimensions for turning the box) with the dragonfly on the lid begin on the next page.

Keep in mind, however, that you don't have to make any of the three boxes shown here. The beauty of turning a project on a lathe is that the possibilities for creativity are virtually limitless. Using the instructions in this article, you may want to experiment with the shape and size of your own turned box. It's surprising how small changes in the shapes and dimensions

can make a big difference in the appearance of the box itself.

PICKING A PATTERN. As for the other patterns (the stalks of wheat, and the symbol for love on the lids of the boxes at left), they are available online at Woodsmith.com/277. But here again, you may want to come up with another pattern altogether.

BUYING BLANKS. That takes care of everything except for the wood. To match the color and figure between the lid and the box, I cut both pieces from a single blank. This requires a thick piece that you're not likely to find in a scrap bin, so I would recommend purchasing some turning blanks.

Each box requires a 3"x6"x6" turning blank. (Refer to sources on page 66.) Not only were these blanks thick enough to cut the lid and box from a single blank, but they had amazing figure and were very stable.

I made the box with the "love" symbol from bubinga, and the box with the stalks of wheat from figured Western maple. As for the dragonfly box, it's made from a thick chunk of 12/4, quartersawn white oak. Like I mentioned earlier, you can turn the page and take a look at how we tackled the dragonfly lid.

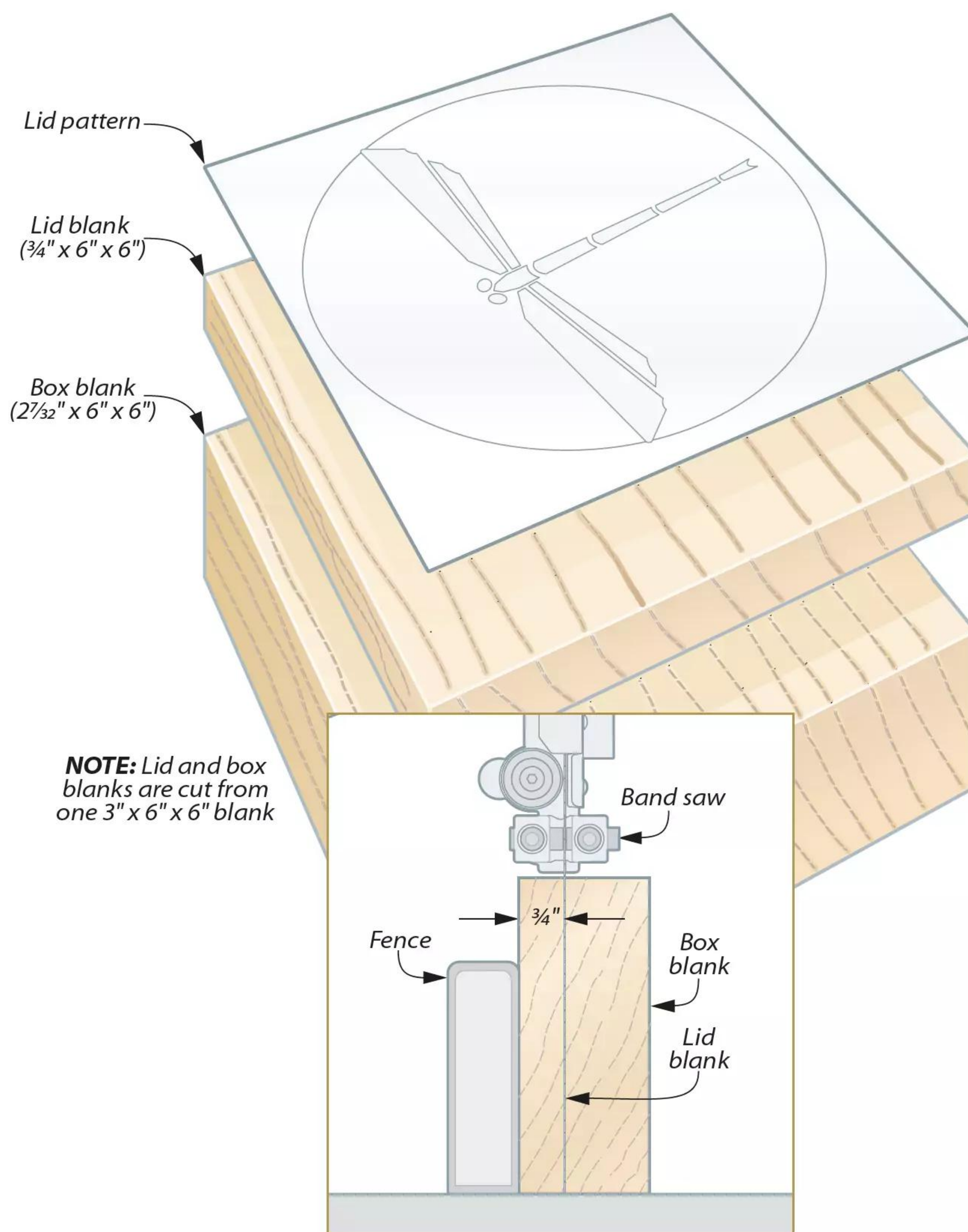
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MAKING A DRAGONFLY LID

As mentioned on page 13, both the lid and box portions of this gift box are made from a single wood blank as shown in the drawing to the left. This ensures consistent color and grain pattern between the lid and the box on the finished piece.

CUT THE LID FREE. Once you select a block of wood, the first step is to separate the lid blank from the box blank. To do that, use a band saw to slice a $\frac{3}{4}$ "-thick piece from the blank (detail at left). You'll notice in the detail that I kept the band saw kerf on the box side of the workpiece. Set the thicker box blank aside for now.

APPLY & CUT PATTERN. With that complete, select a pattern that you like, make a copy of it, and apply it to the top of the lid blank with spray-on adhesive. The next step is to cut out the pattern with a scroll saw. To cut each opening, you'll have to make a "pierce" cut. This requires drilling small holes ($\frac{1}{16}$ " or $\frac{1}{32}$ ") in each section, so you can insert the scroll saw blade before attaching it to the arm of the scroll saw. (I used a #9 skip-tooth blade to make these cuts cleanly.) Then cut out the openings as shown in Step 1 below.

MIX EPOXY. Once the cutouts are complete, you can focus your attention on the colored epoxy mixture that will fill them. The epoxy I used is a 30-minute epoxy

BRING A DRAGONFLY TO LIFE



Pierce Cuts. Start with pierce cuts on the scroll saw. Carefully cut each opening before moving to the next.



The Proper Mix. Add a half-teaspoon of colorant to 4 fl. oz. of epoxy and stir slowly to prevent bubbles.



Fill It Up. Pour the mixture into the openings in the blank and use a scrap stick to smooth the surface.

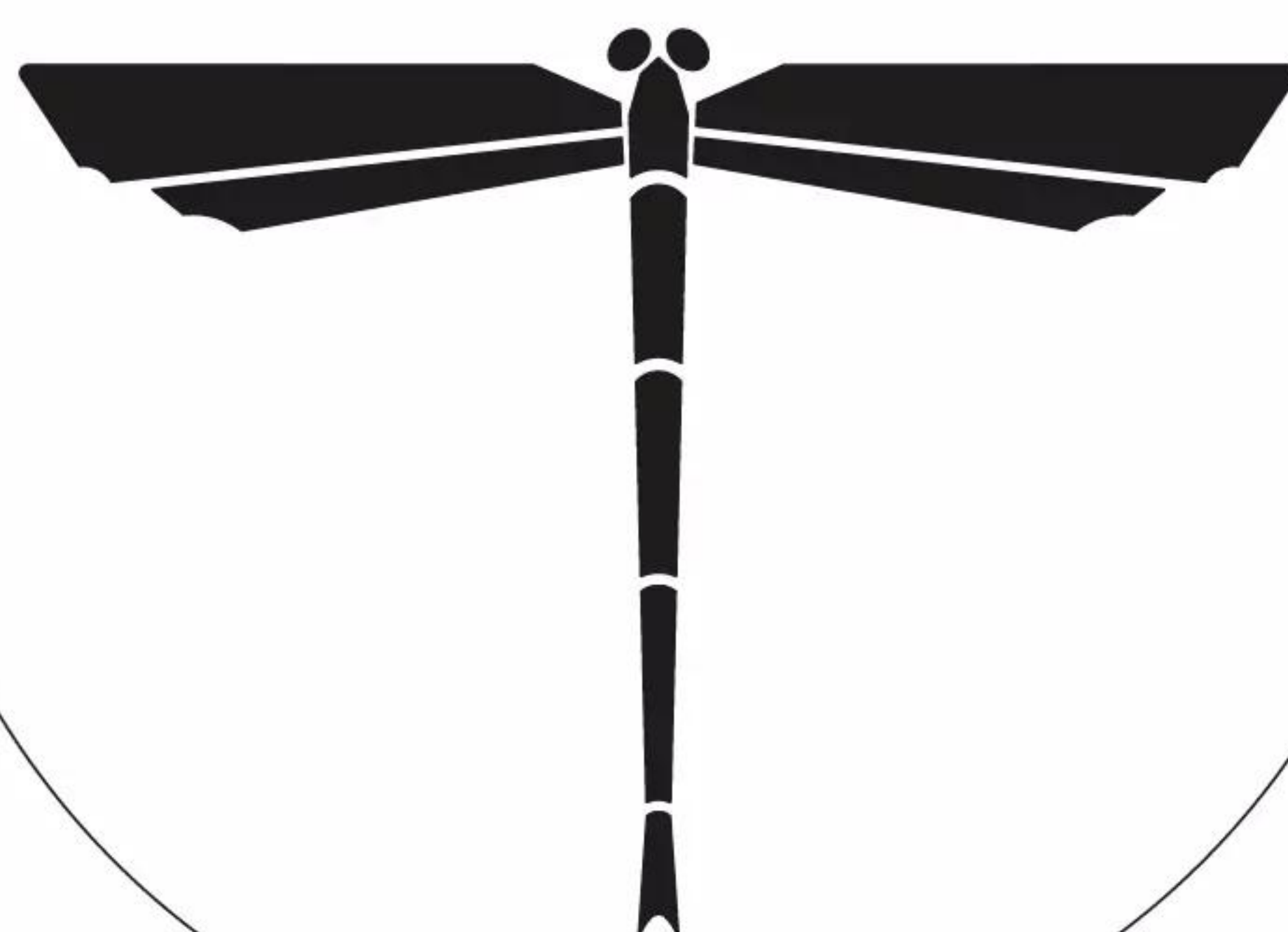
EPOXY & COLOR



from a hobby shop. It cures slowly, so you can mix in the color and pour the epoxy into the lid cut-outs before it sets. I got good results by using tempera powders (available at craft stores). Liquid concentrate and powdered color tints designed for use with epoxy are also available. First, mix about 2 fl. oz. each of epoxy and hardener together. Then add the colorant. It doesn't take much — just about a half-teaspoon of powder or liquid (Step 2 shows this).

FILL CUTOUTS. Before pouring the mixture into the cutouts, place masking tape over the back of the lid blank, so it won't leak through. Then fill the cutouts with the epoxy mixture (Step 3). As you're pouring, be sure to even out any voids in the epoxy with a small scrap piece. A blow dryer will remove any bubbles that show up. Don't worry about being too neat and tidy here, though. You'll clean up the surface when you turn the lid (and the box) to shape. Those details will be in the next issue. **W**

NOTE: Enlarge pattern 200%



For full size lid patterns and turning dimensions, go to:
Woodsmith.com/277

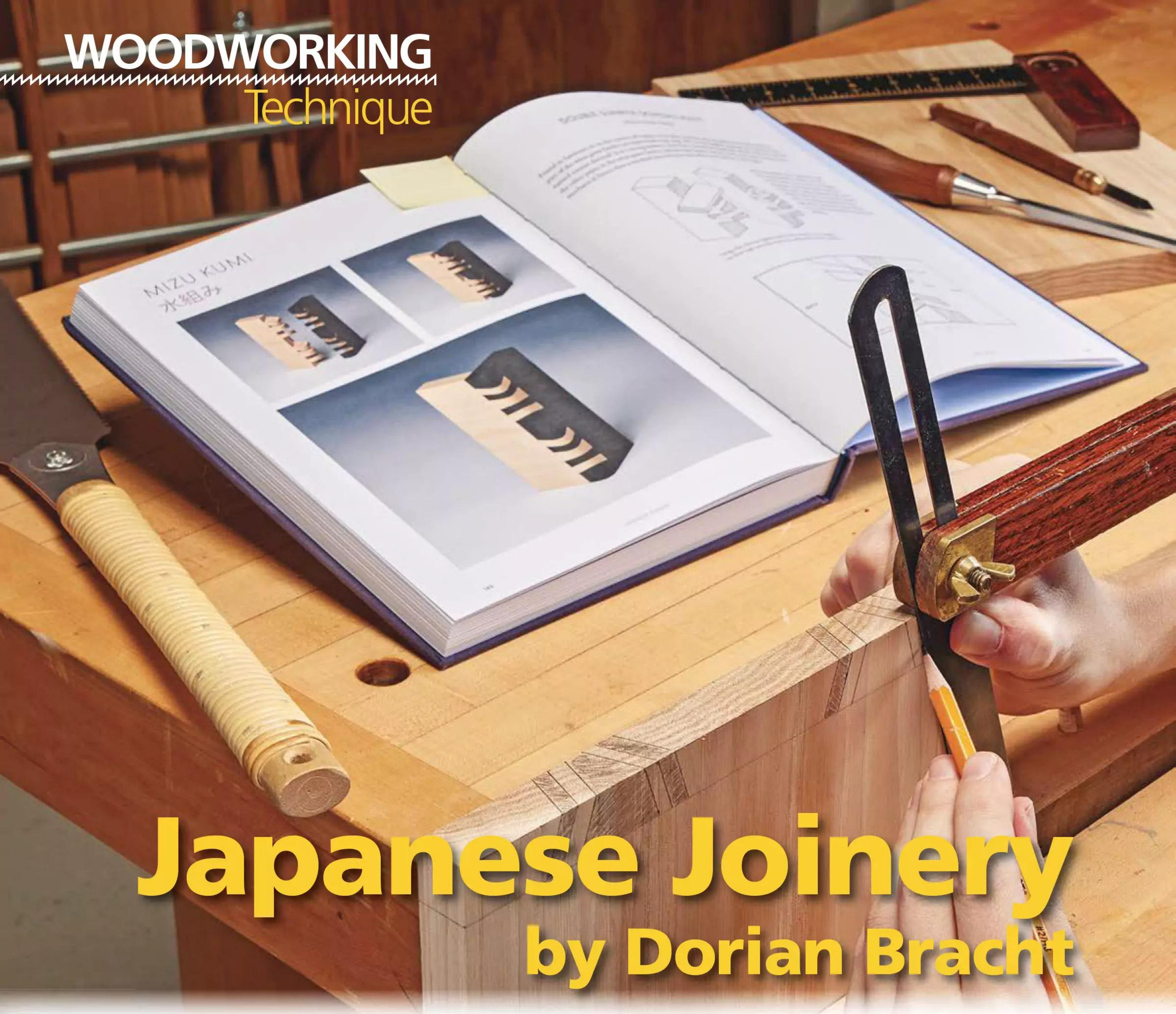
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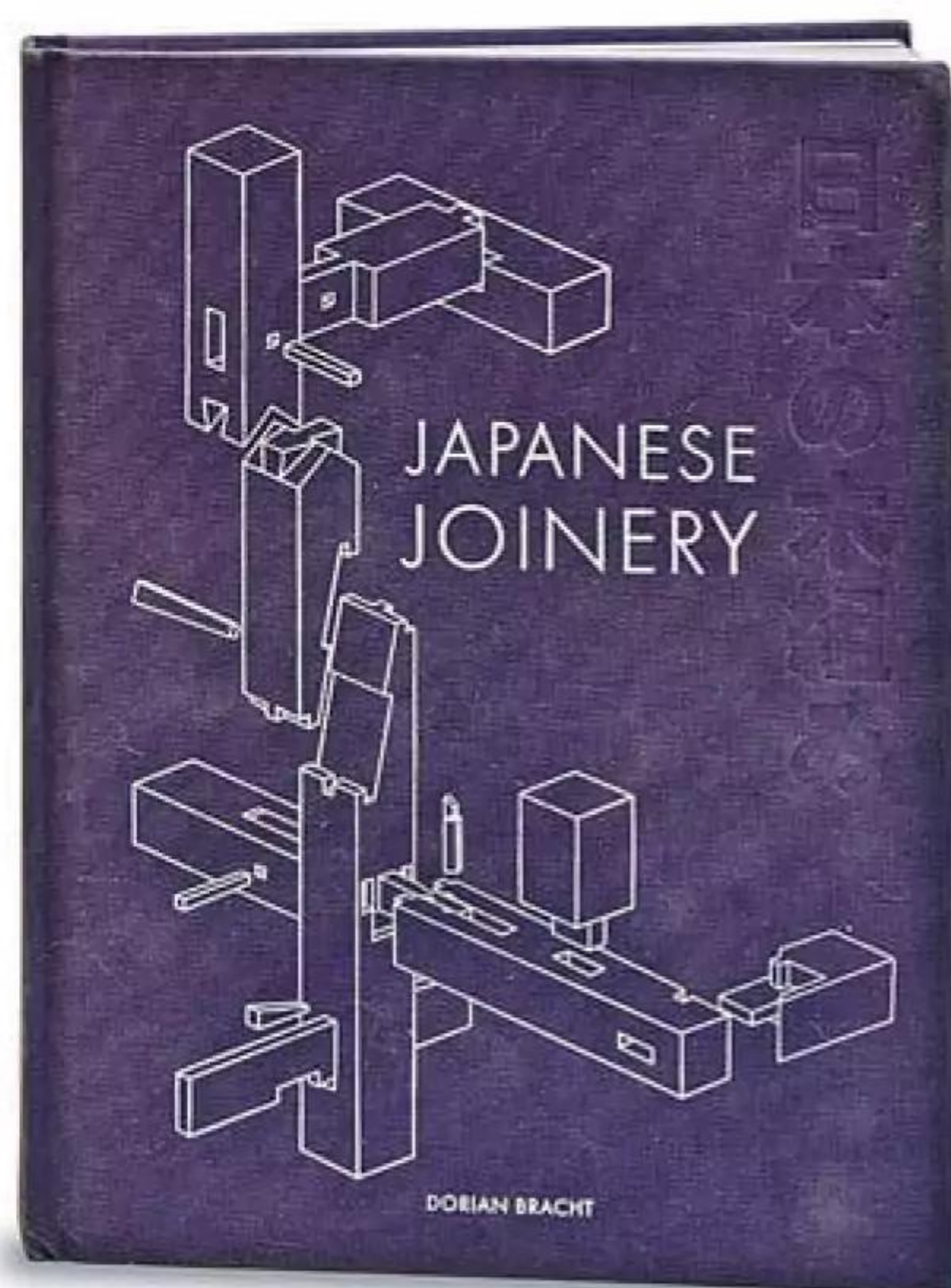
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Japanese Joinery by Dorian Bracht



As a relatively niche hobby, it's always nice to find a new voice on woodworking. The internet has thankfully provided a broad platform to a number of people, but there's still something viscerally satisfying about a good book. And, the newly released book you see at left has been one that captured my recent attention.

JAPANESE JOINERY. The book *Japanese Joinery* by author and woodworker Dorian Bracht is a fascinating exploration on the art of woodworking, centering around its

namesake. Traditional Japanese joinery has a reputation for being intricate and precise. This book will not dissuade you from that opinion, but it will break down and present the joints in a way that's easier for a Western woodworker to get a grasp on.

You won't find full projects in this book. Instead, Bracht offers a broad collection of joints from across Japan, including both structural and furniture joinery. He provides their use, and ways to incorporate them in your work.

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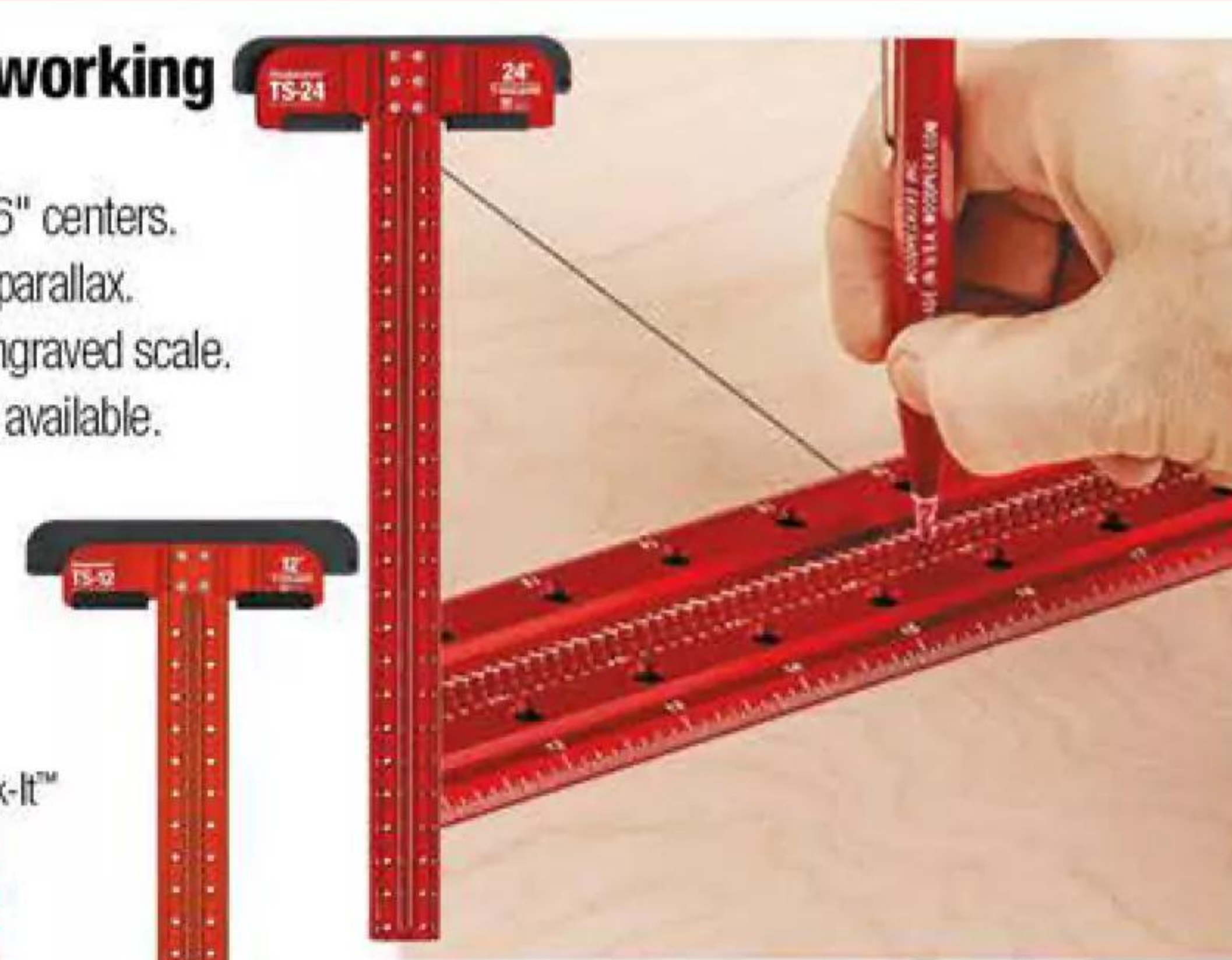
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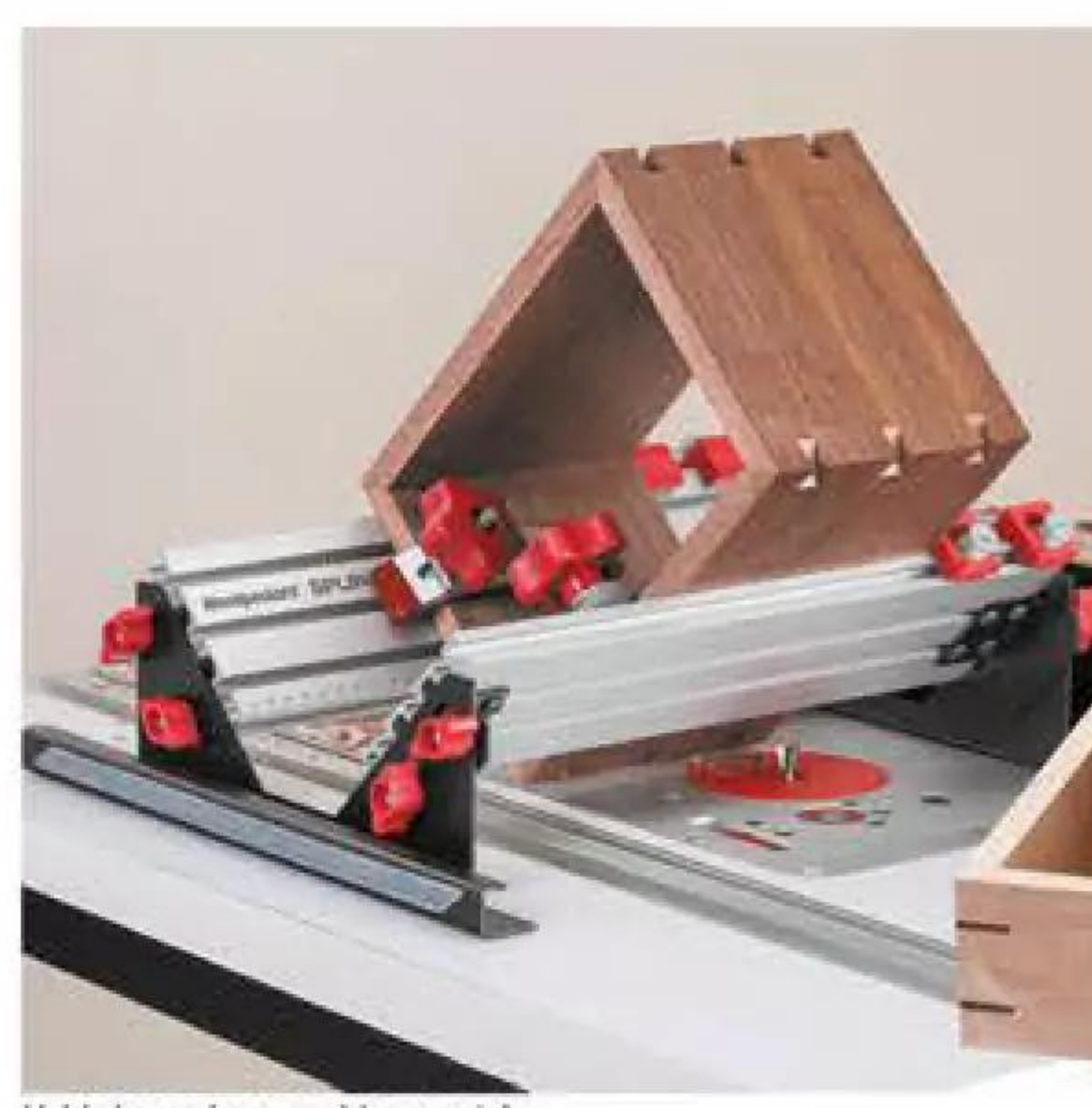
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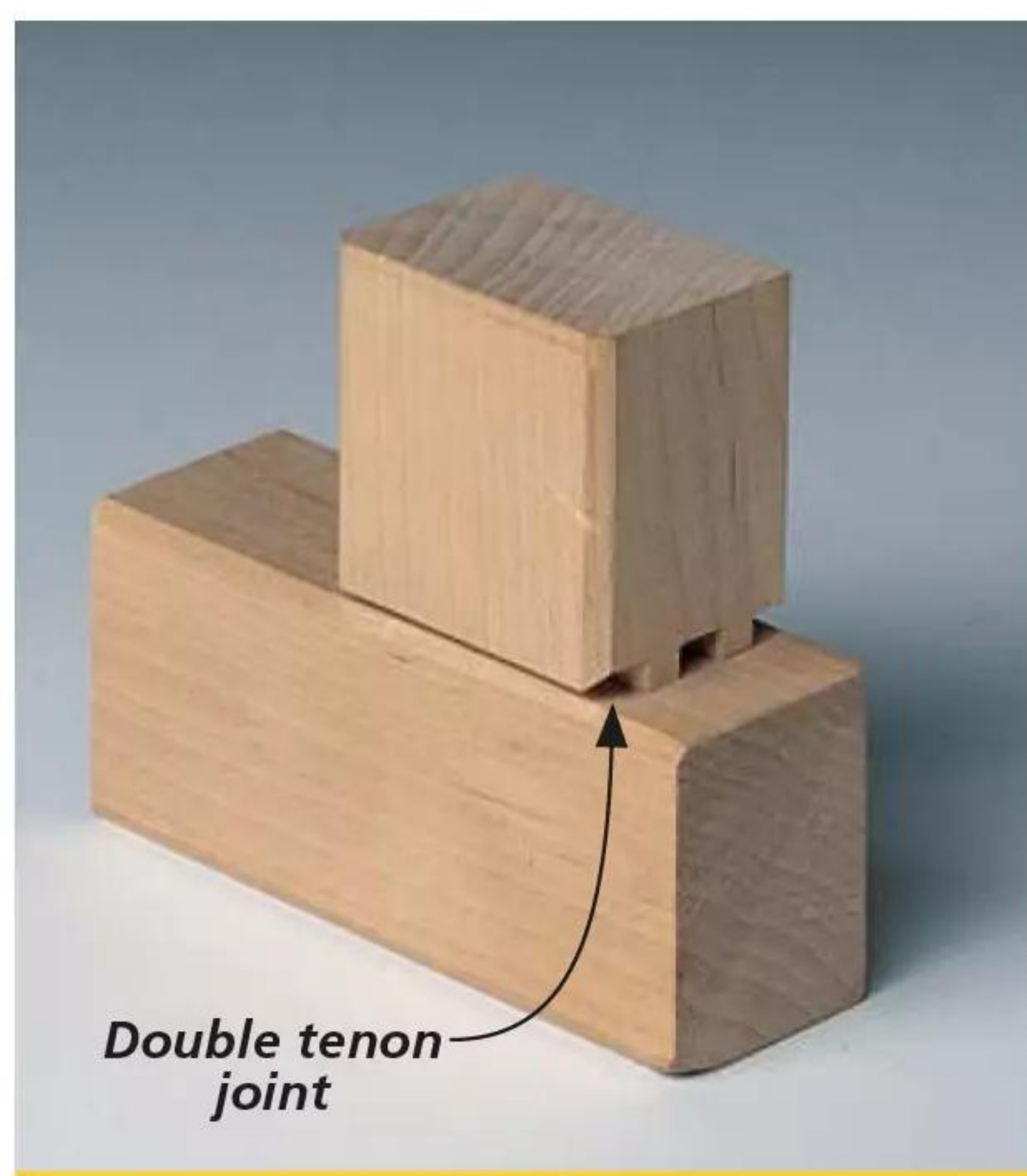
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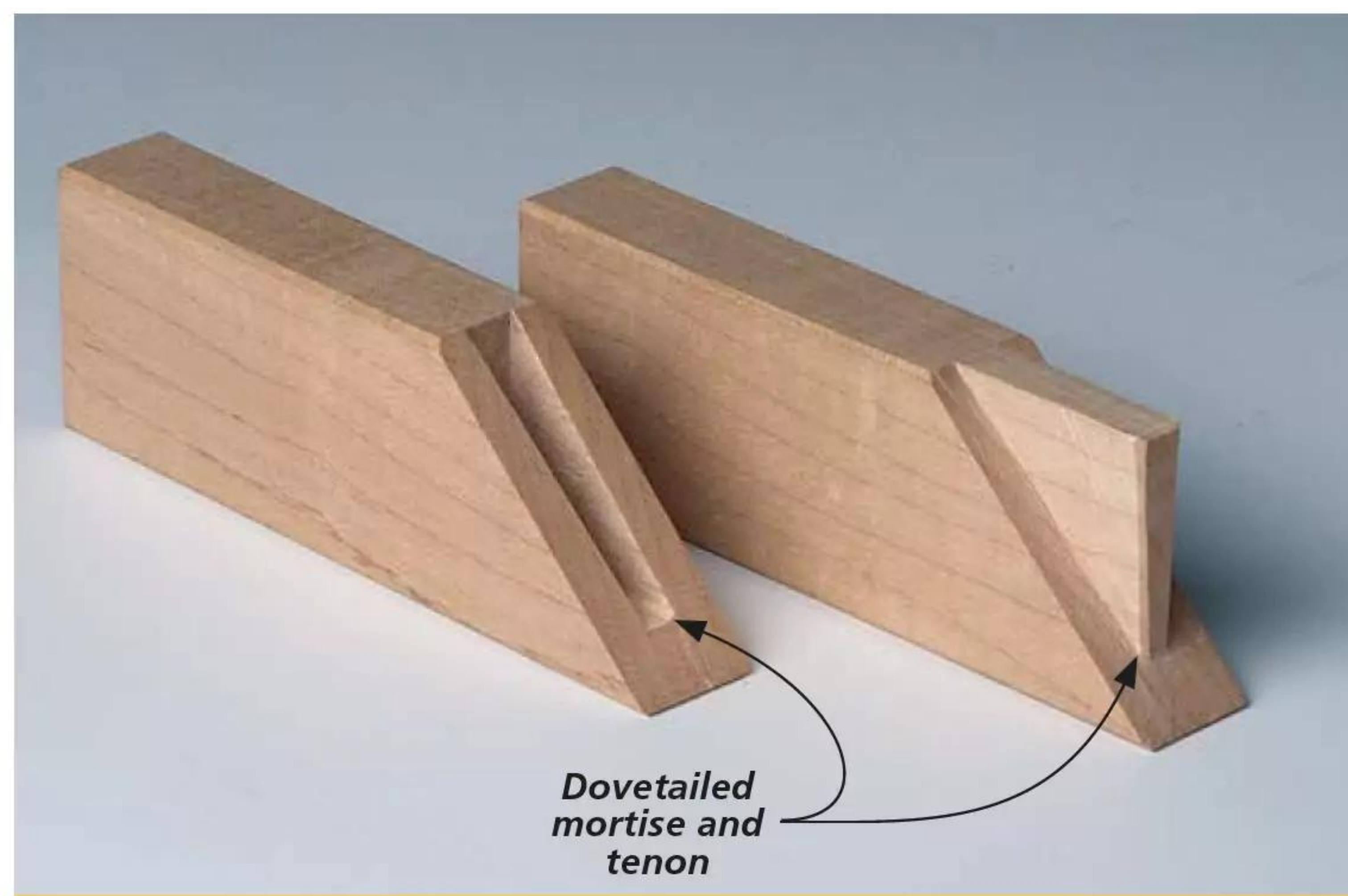
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▲ The *nimai hozo* joint is a familiar double tenon with mitered sides, commonly used for *shoji* screen doors.



▲ Much like in Western woodworking, mitered frames are quite common, though this joint uses a sturdy, dovetailed mortise and tenon joint.

A JOINERY JOURNEY

There is one line in the introduction of *Japanese Joinery* that stuck with me: “I would become someone who has cut every joint in existence at least once in their lifetime.” It’s a lofty goal, but one that it seems Bracht is well on his way toward accomplishing.

There are a number of joints featured in *Japanese Joinery*, and the average Western woodworker will find both the familiar and the strange among them. The *nimai hozo* (double tenon joint) and the *kakushi tome ari sanmai hozo* (blind mitered dovetailed mortise and tenon joint) shown above wouldn’t be too out of place in a piece of Western furniture. However, the joints at left and below are a different story.

ALL-WOOD JOINTS. Traditional Japanese joinery does not involve fasteners. Joints are designed to resist applied forces with the wood alone, requiring

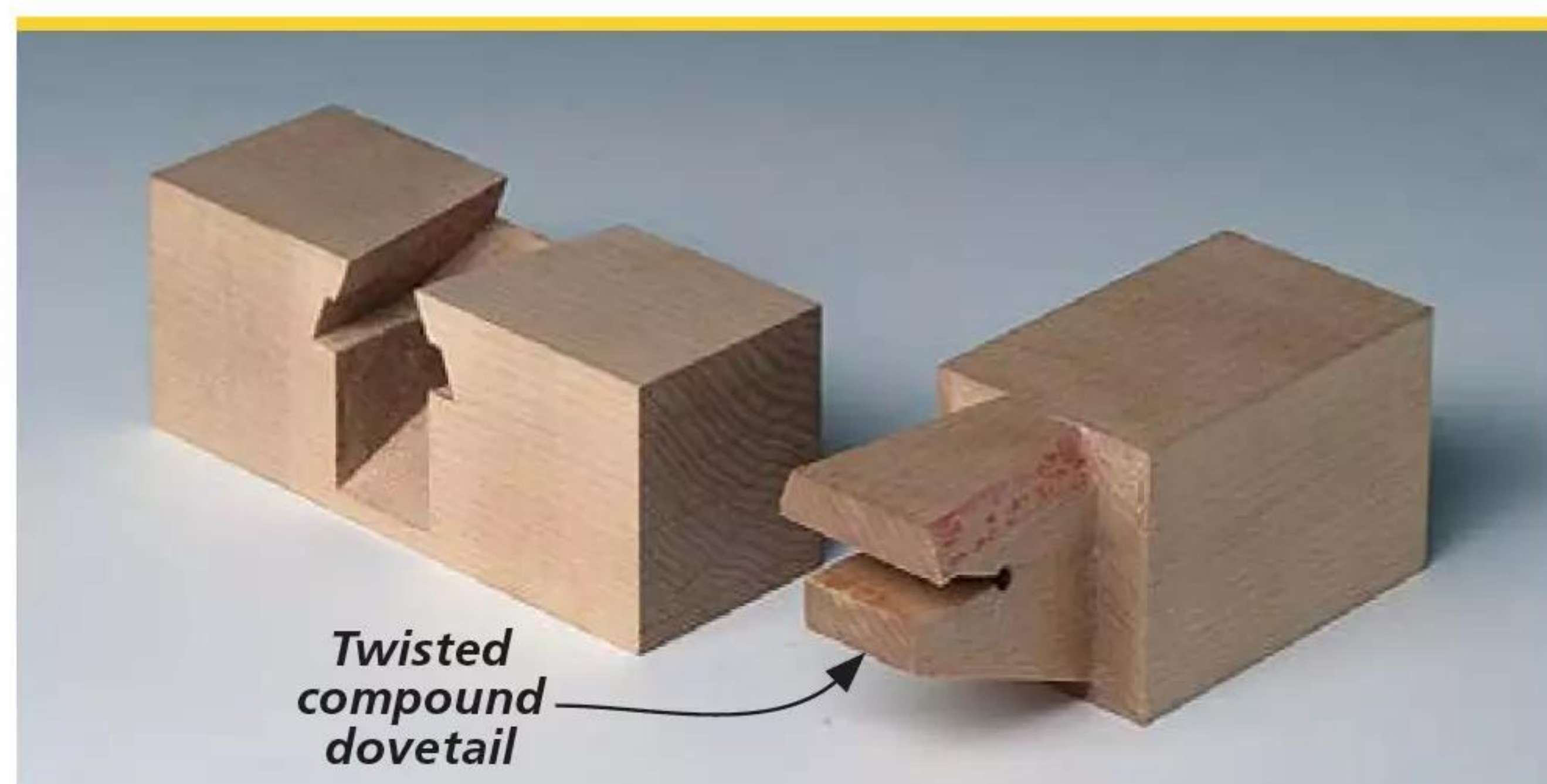
intricate design and a precise fit. Bracht has compiled an impressive collection of joints used in both architecture and furniture, ranging from the pillars of centuries-old gates and temples to modern-day case joinery.

The two photos to the lower left are prime examples of the more complex joints you’ll find in this book. The *nimaihozo no sumiyoshi-an* (twisted compound dovetail with oblique tenon joint) in the upper photo is strong against twisting, shearing, tension, and compression — plus it has one impressive look. However, it requires the craftsman to freehand-cut a dovetail with twisting sides.

Below is the *suitsukizan* (keyed sliding dovetail) joint. While it’s relatively simple in design, it gets more complex in execution, as it’s used to join boards into larger panels without glue, or even to construct floors and ceilings. Bracht includes a hand-drawn illustration with this joint (and many others), showing how it’s used in a raised platform for a *tokonoma*, an alcove used to display photos and art.

KINDS OF JOINTS

Japanese Joinery divides the joints into three categories. First is the lengthening joints, which focuses



▲ Traditional Japanese joinery rarely uses fasteners, opting instead for intricate and remarkably strong joints. Bracht’s book contains a wide variety of joinery for both architecture and furniture.

largely on carpentry and framing. While the joints outlined here don't have much application for a furniture maker (unless you're going to timber frame a new shop), there are some fascinating insights into historical Japanese architecture. One I enjoyed is the splice on the pillars of Otemon Gate, which you can see Bracht's illustration of below.

The latter two chapters of the book contain joints that will be more applicable to many woodworkers. These include the right-angle joints you see on the previous page, as well as the example of case joinery you'll find on the following pages. This is where Bracht breaks down many of the complex joints, and he does so in a way that's easy for intermediate woodworkers to grasp.

HAND TOOLS. Before the chapters on joinery, Bracht covers the tools he uses for these joints, and for the furniture he makes in his own shop. This book focuses on using hand tools, encouraging you to work primarily with the big three: saws, chisels, and hand planes. Given the shapes on these joints, you'll find that hand tools are often the most practical way to get the job done, if not the only way.

A PASSION FOR JOINERY. *Japanese Joinery* will hold the attention of anyone with a historical interest in woodworking, or with a keen eye for joinery. Not all the joints in this book will be reasonable to apply to your own projects. Many are for splicing

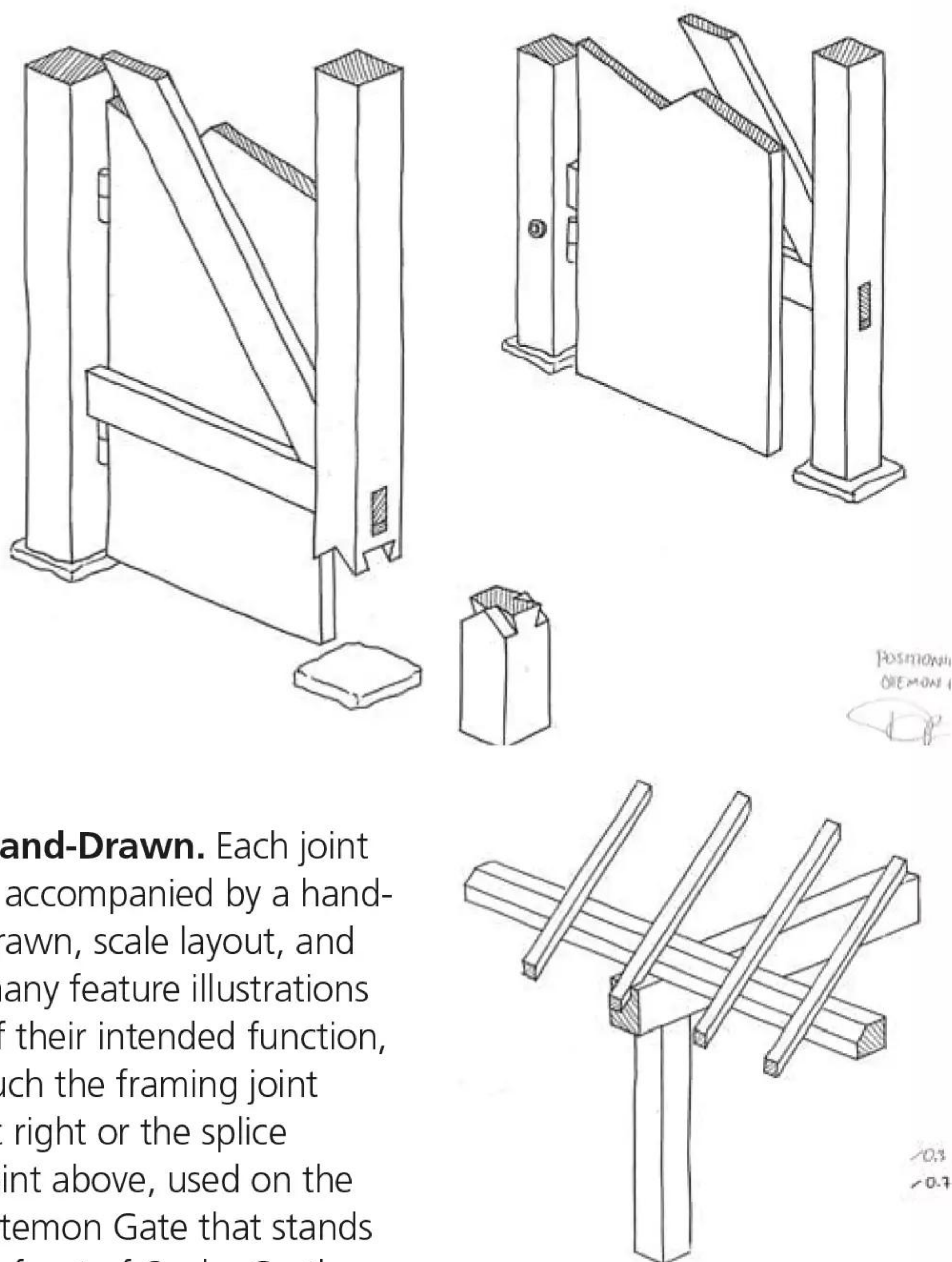
ABOUT THE AUTHOR

Dorian Bracht is a German furniture maker who has owned and operated his own business in Berlin since 2012. Dorian spent his youth studying abroad in both Los Angeles and Hong Kong. He finished his schooling in Berlin before apprenticing under a master furniture maker in Leipzig. Dorian practices traditional techniques, and constructs his furniture without using glue, screws, or nails.



together timbers, or for framing the roof of a house. However, these joints are excellent ways to practice your woodwork, and are quite gratifying (and fun) when you finally get them right.

On page 20 you'll find a few images from Bracht's section on the *mizu kumi* joint. This is a difficult joint to make, but it provides a good example of the process for the joints you'll find in the book.



Hand-Drawn. Each joint is accompanied by a hand-drawn, scale layout, and many feature illustrations of their intended function, such as the framing joint at right or the splice joint above, used on the Otemon Gate that stands in front of Osaka Castle.

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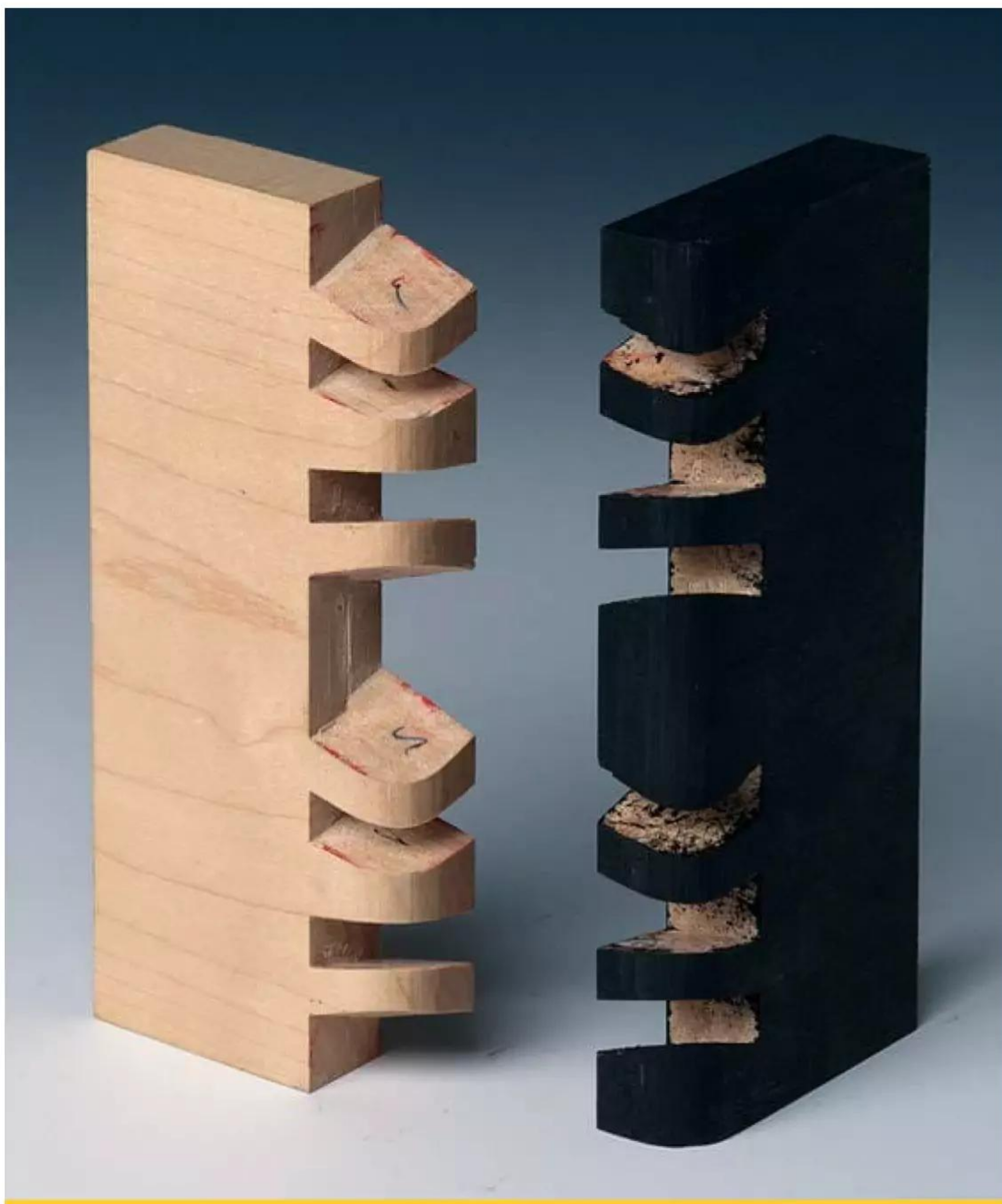


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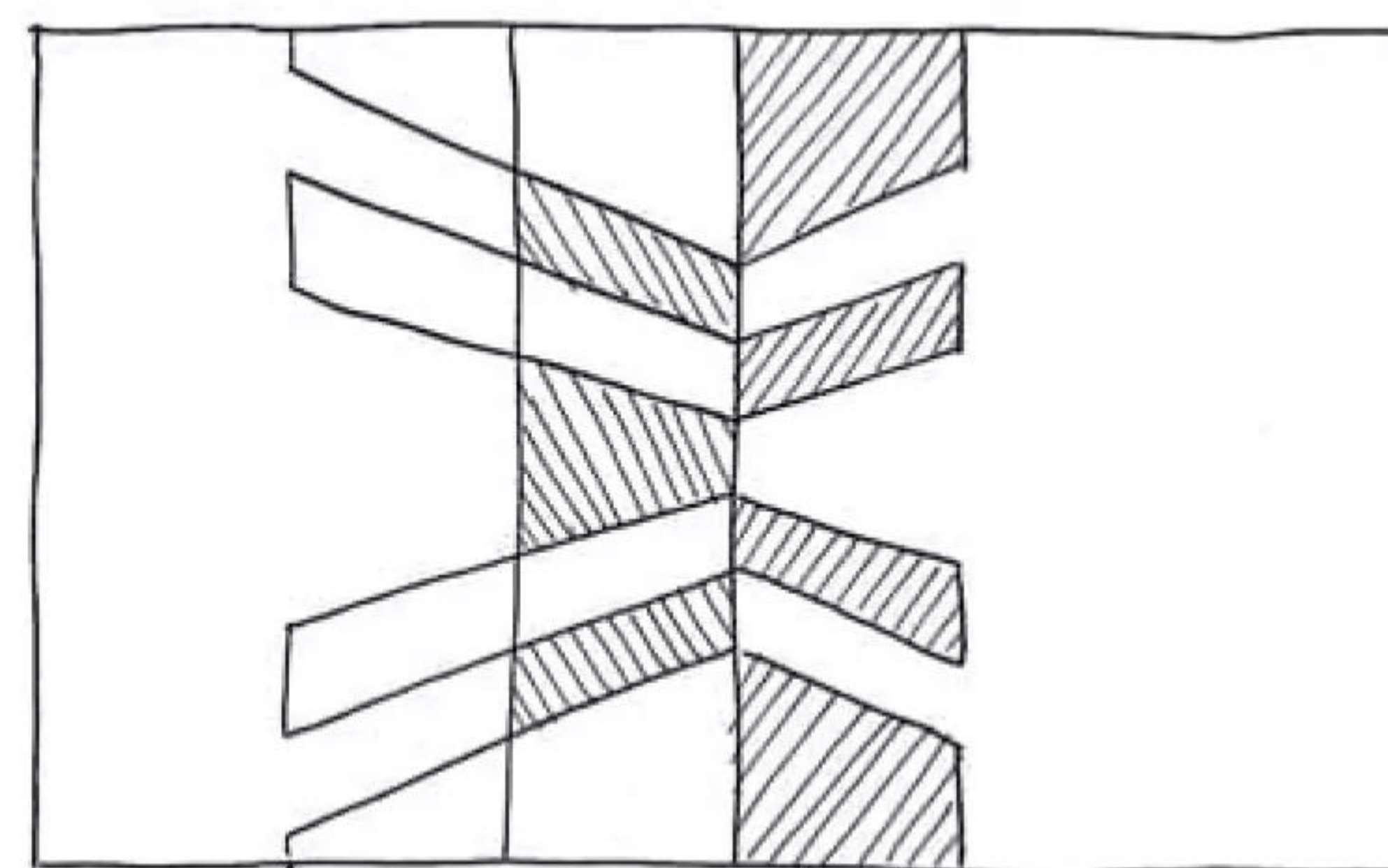
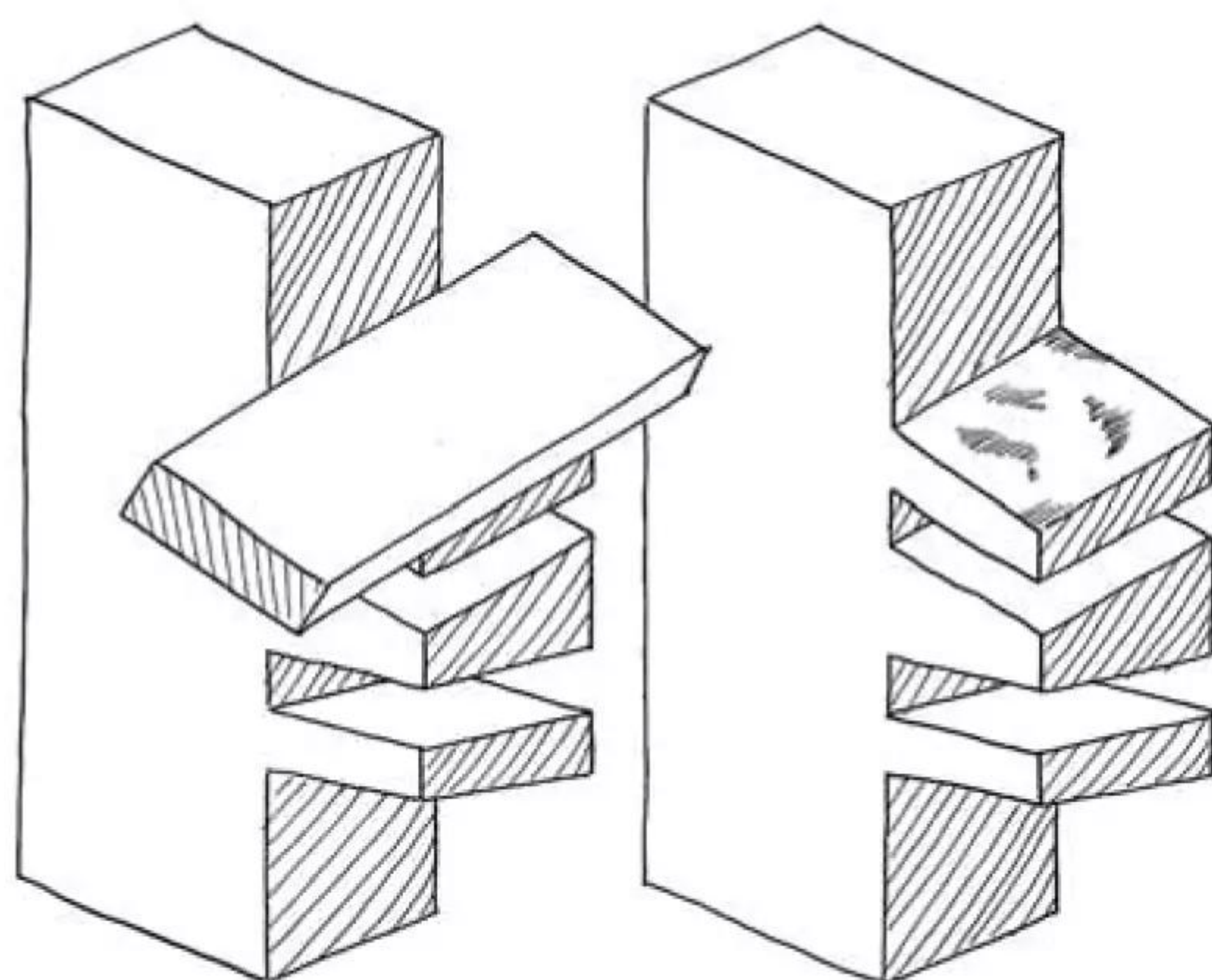
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▲ The book includes three photos of each completed joint, showing them apart and together, as well as demonstrating how the pieces mate.



Bracht uses a dimensioning system in which the layout seems to “fold out” from a single reference edge.

JAPANESE JOINERY IN PRACTICE

To give you a sense of how the joints in this book are presented, I’ve included a few images from the *mizu kumi* joint, known as the double sunrise dovetail in English. This is similar to a twisted dovetail in Western woodworking, though the outer tails have a slightly steeper grade than the interior ones, requiring high precision when paring the joint, and usually a good bit of fitting.

DIMENSIONS & LAYOUT. At the beginning of *Japanese Joinery*, Bracht demonstrates the Japanese methods of marking up a timber (for carpentry) and a workpiece (for furniture making). With each joint, he provides a layout that follows that technique. You can see the layout for the *mizu kumi* above. The drawings are done in scale, showing each face straight-on, as if the finished workpiece had been unfolded.

In terms of laying out these joints, this style of dimensioning is one I came to enjoy. It’s simple, and works well to break down complex assemblies into something that can be easily laid out onto each workpiece and then practiced.

DESCRIPTION & INSTRUCTION. Every joint begins with a description. This includes what structures or furniture you might encounter a joint on, historic or notable

uses of the joint, as well as its advantages and disadvantages. The descriptions are brief, but I found they gave a good overview of a joint before diving in, and provided inspiration as to how I might incorporate them.

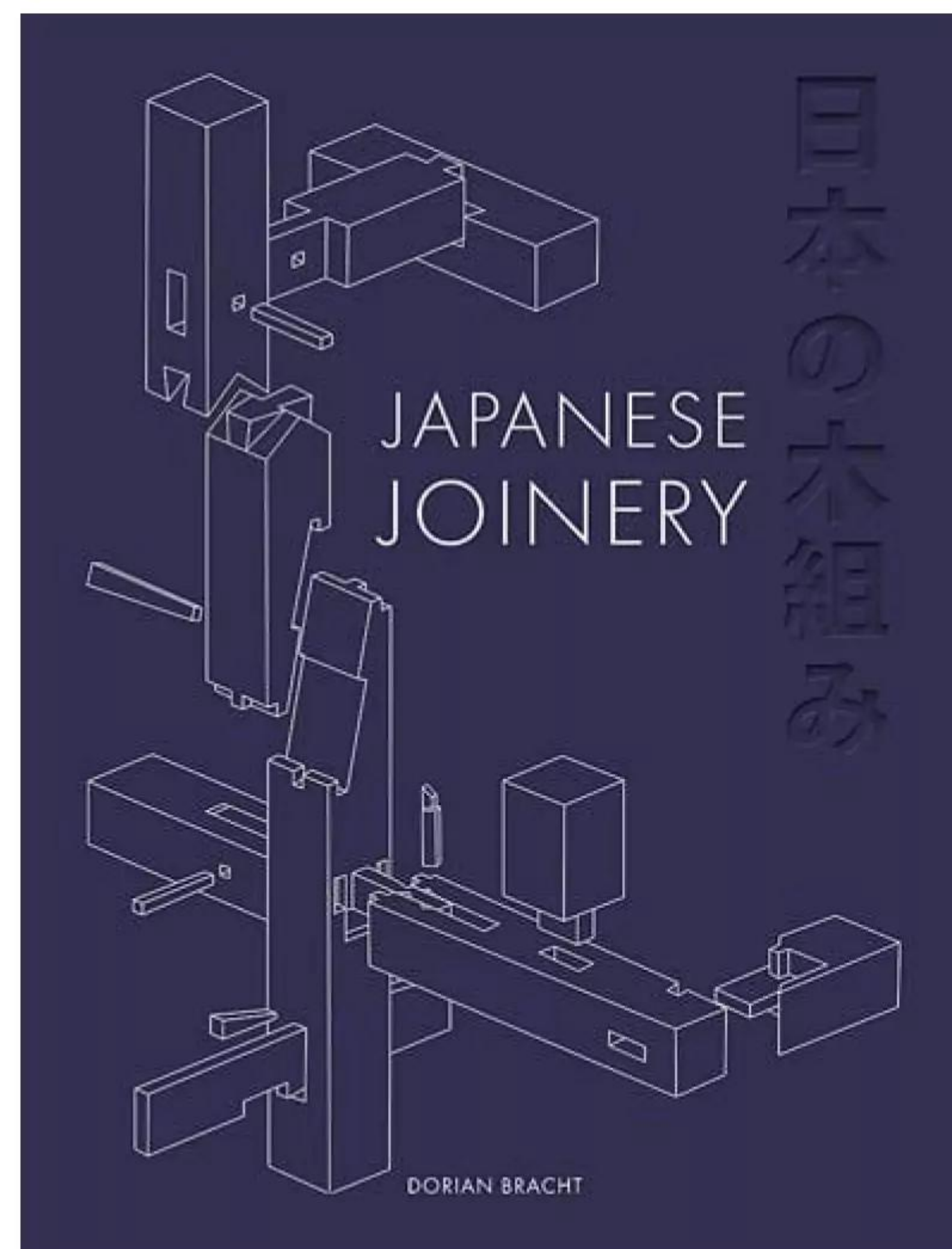
When it comes to instructions, this is a book written for woodworkers. Bracht provides helpful notes and illustrations (like the drawing of fine-tuning the *mizu kumi* on the previous page), but the book assumes you already have woodworking experience. The notes focus on the fine details — the kinds of things someone takes to heart after many attempts of perfecting the joint.

PHOTOGRAPHY. If you harbor any inklings that Dorian Bracht may not be a talented woodworker, the photos in this book will cure you of that idea. Each joint was made by Bracht, using the selection of hand tools he covers in the

early pages. Though the book doesn't contain in-process shots, it includes photos of the mating part, as well as their assembly and the completed joint. Along with the layout and illustrations, I found this sufficient, but it may not offer the precise instruction a beginning woodworker needs.

FINAL THOUGHTS. I enjoy the history of woodworking, and appreciate the time and precision required to make a finely tuned joint. As such, there's a lot for me to like in *Japanese Joinery*. While many of the joints in this book may go over the heads of less experienced woodworkers, they show the incredible results from dedicated practice.

Additionally, I found many of these joints to be fantastic inspiration for my own work. The examples provided in these last pages are just a few. If joinery intrigues you, then I suggest you give *Japanese Joinery* a read. **W**



Japanese Joinery. by Dorian Bracht, GMC Publications, RRP \$44.99, available online and from all good bookshops.



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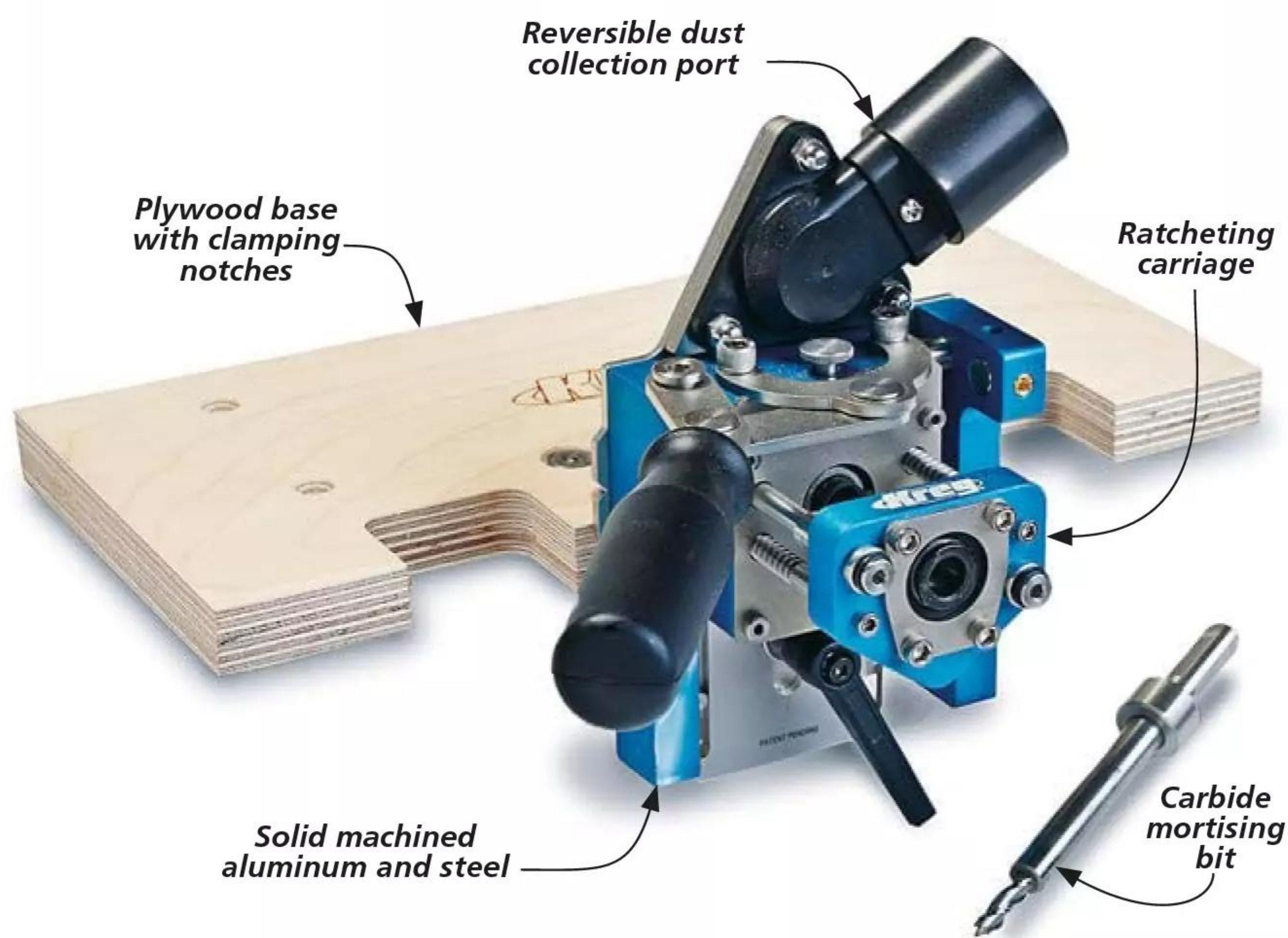
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Mortises & Handy Holders



Joinery is the most important part of any project — it literally ties things together. And, just like there's more than one way to skin a cat, there's even more ways to make a table. This issue's Great Gear begins with a new tool from *Kreg*, which presents a quick and easy method of making loose tenon joints.

Following that is a series of T-track accessories from *Milescraft*. While joinery is far from their only function, users of T-track workbenches and tables will find much to appreciate in the selection *Milescraft* provides, whether it's joining, planing, sanding, or any other task.

KREG MORTISEMATE

The first tool to look at is the MortiseMate from *Kreg*. This nifty tool is a jig that allows



▲ Attaching an auxiliary base to main base allows for more options when clamping the jig onto your workbench.



▲ To locate the mortise, align the jig's centerline with marked lines on one of your workpieces. Or you can use the built-in gauge.

you to cut mortises for loose tenon joints (with matching loose tenons also available from Kreg).

DRILLED MORTISES. For those interested in loose tenon joinery, a variety of commercial options are available. Domino joiners are great choices, but a tool like the MortiseMate offers a distinct advantage. Where other systems often require proprietary tools,

the jig here works with nearly any hand drill — and not requiring a new power tool naturally means a much lower price tag.

SETUP. The MortiseMate is an easy tool to set up. It comes with a “mini worksurface” attached to the jig itself. Four additional pilot holes and screws are included, with Kreg's suggestion that you secure the jig to

your workbench. I didn't want the jig to be a permanent fixture however, and chose instead to secure it to a larger piece of plywood I could clamp to my bench (left photo above).

The upper right photo shows centerlines that assist in locating the mortise. Another option is to use the thickness gauge that's based on common stock sizes.



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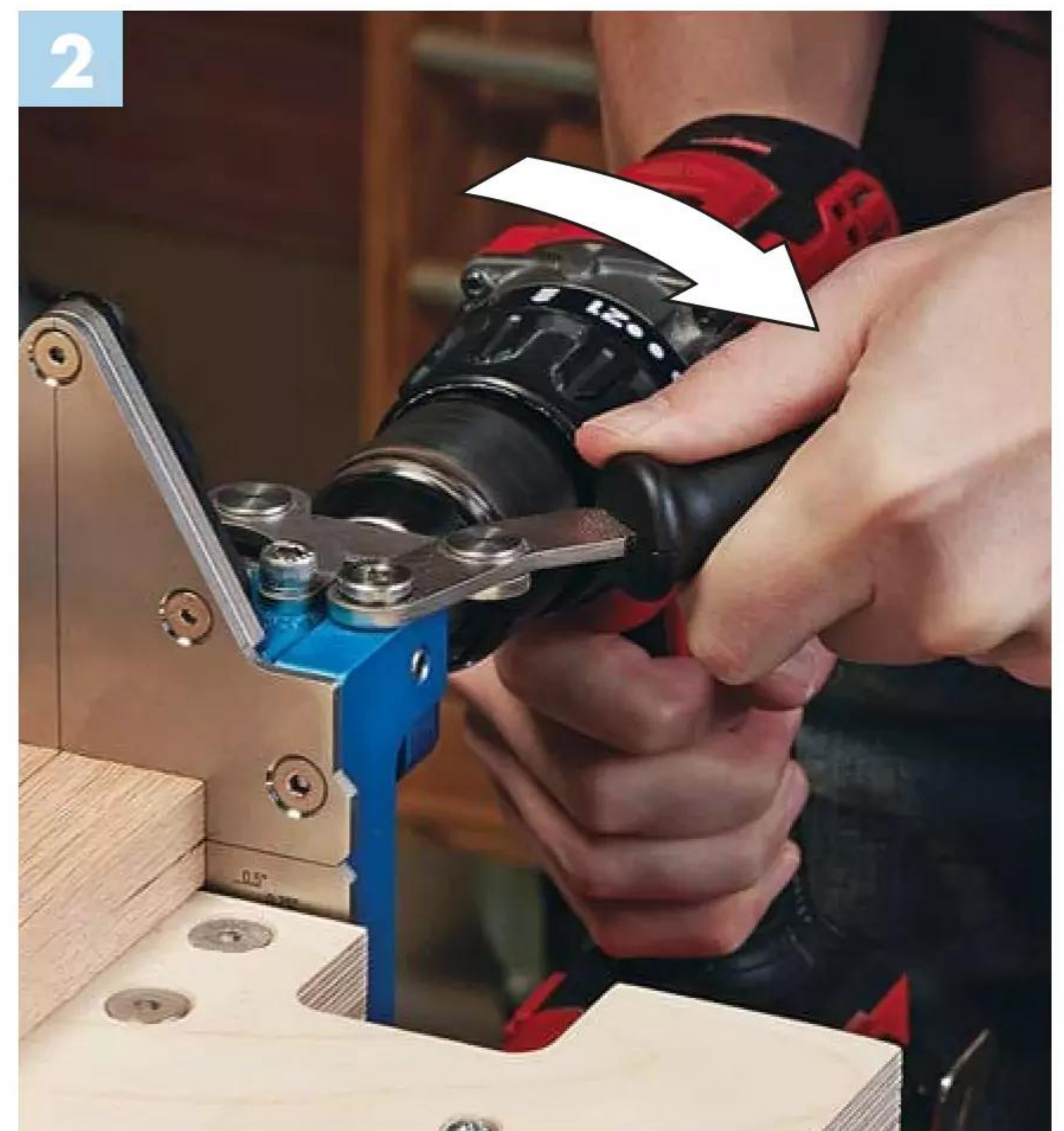
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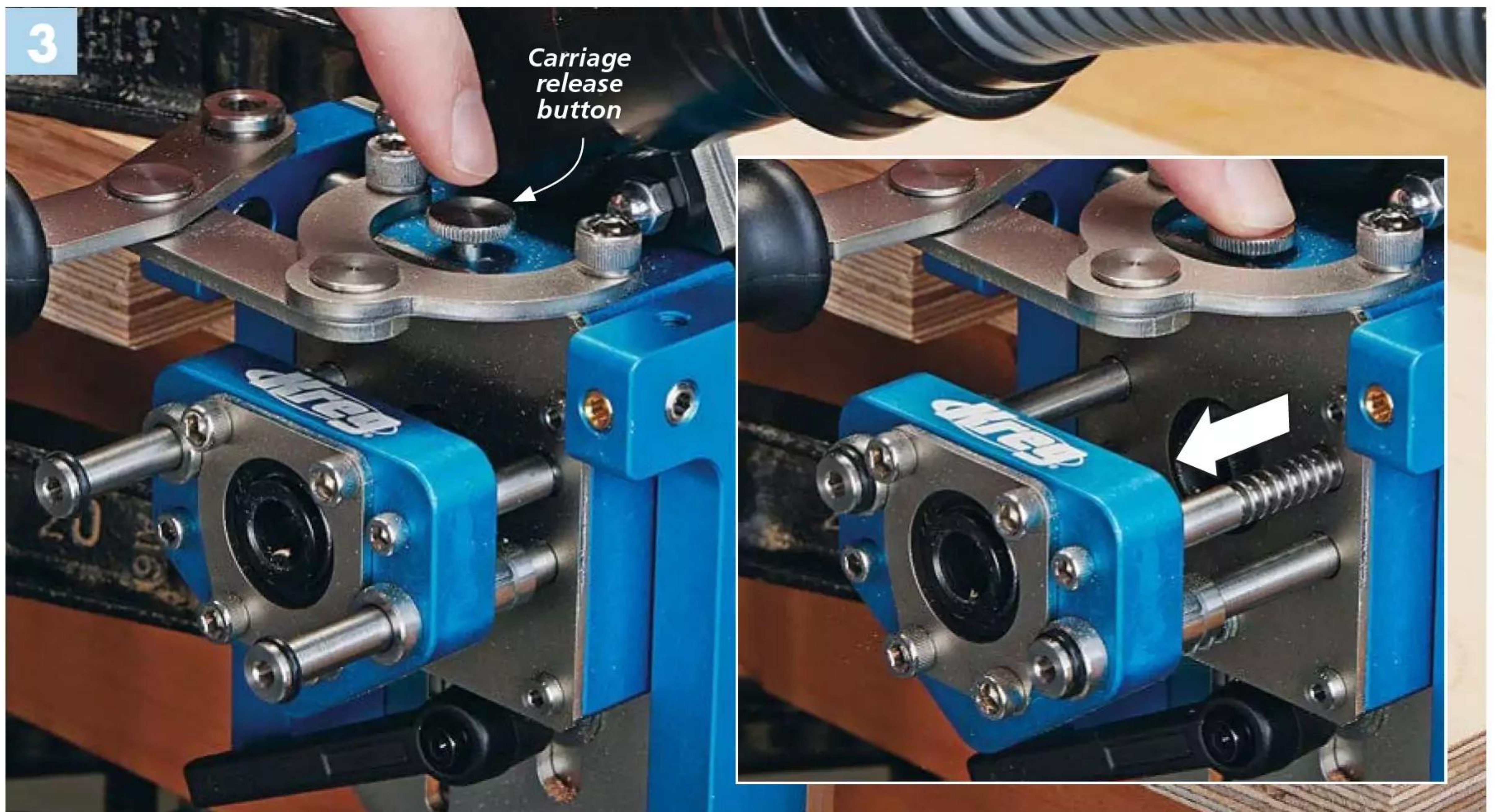




▲ As you drive in the drill, move the handle to slide the carriage, removing waste across the mortise.



▲ As the lever reaches the end, it ratchets $\frac{1}{16}$ " deeper, gradually increasing the depth of the mortise.



▲ Stop drilling once the carriage ratchets fully, the mortise is complete. Pushing the carriage release button springs the carriage back to its original position, ready to drill out another mortise.

USING THE MORTISEMATE

Using the MortiseMate is easy, and pretty fun too. As I mentioned before, any corded or cordless hand drill you can chuck the bit into will work.

THE BIT. Although you'll be using a drill, the bits used for the MortiseMate are more like router bits than drill bits. The bit is designed to cut

side-to-side (in addition to plunge cutting), guided by the carriage as you use the jig. The tool comes with a 6mm carbide cutter (though 8mm and 10mm options are also available), along with a stop collar to set the depth of the mortise.

IN ACTION. You can see in the steps above how the jig works. You'll begin by inserting the

bit into the carriage, then moving the lever as you push in (Step 1). When you reach the end, the carriage ratchets in by $\frac{1}{16}$ ". Move the lever back and forth, steadily driving in until you reach the full depth. Once finished, pressing the release button will send the spring-loaded carriage back to its original position (as in Step 3).



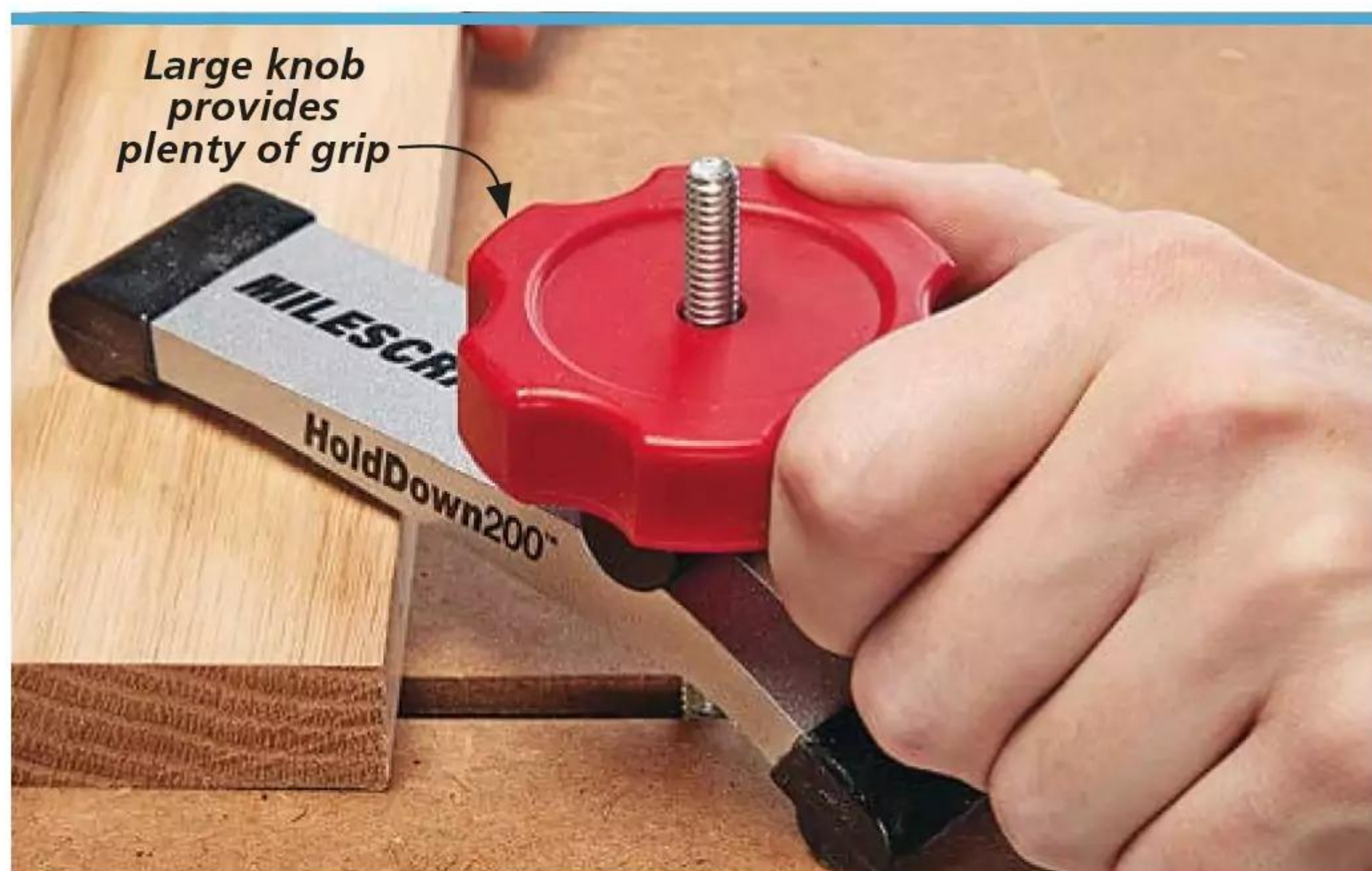
▲ The cam-action makes these bench stops easy to set. With a profile of $\frac{5}{8}$ ", these make great stops for planing $\frac{3}{4}$ "-thick workpieces.

PERFORMANCE. There's not much to complain about with the Mor-tiseMate. As long as you have a dust collection system hooked up, the mortises are easy to cut and come out clean. It's a nice alternative to an expensive dedicated tool, though I recommend taller individuals raise the attached platform by about 5".

MILESCRAFT T-TRACK SERIES

The second item in this issue's Great Gear is a collection of stops and hold-downs from Milescraft. These are designed to slot into most T-tracks (using $\frac{1}{4}$ "-20 T-bolts). There's a number of options available, beginning with the relatively simple one you see above.

CAMSTOPS. The first are the Cam-Stops, which come in standard and "XL." As shown above, these are bench stops with threaded cam clamps, making them quick to set. They're sized for use with $\frac{3}{4}$ " stock, so you won't have to worry about hitting them with a sander or, God forbid, a plane blade.



▲ This classic style of hold-down applies pressure from above, making it great for the drill press.



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▲ These InLine Clamps are a versatile option. The screw secures them in the T-track while the cam lever locks the workpiece in place.

T-TRACKS CONTINUED

The CamStop shown on the previous page is far from the only option *Milescraft* has in its T-track lineup. These begin with the HoldDown clamps shown on the previous page.

HOLDDOWNS. The design for the HoldDowns features two arms: a short arm for thick pieces and a long arm for thin ones. They work best where the required clamping force is focused up and down (at the drill press, for example). These come in two sizes: the "100" (3 $\frac{1}{8}$ " long) and the "200" (5 $\frac{1}{4}$ ").

INLINE CLAMPS. *Milescraft's* InLine Clamps work well for a variety of tasks on a surface with T-track. The T-bolt threads onto the red thumb nut, allowing the upper body to rotate freely as needed.

The head's unique shape accommodates a number of differently shaped workpieces at different angles. The flat edge works well on square pieces, while the V-groove can hold a corner or provide two points of contact against a round piece.

Once you've positioned the clamp and screwed down the T-bolt, you then adjust the bar. To lock it in place, all you need to do is pull the quick-cam lever.

MULTISTOP. The MultiStops are a step up from the CamStops on the previous page. While they lack the cam, their shape makes them useful for many tasks. Their flat edges can be used like the CamStops, as a bench stop or to support a flat edge. The rounded face works on concave workpieces, such as a curving leg or a decorative arch.

However, I found myself using these in the orientation you see to the lower left, with the arms providing two points of contact against a round workpiece. These can be used together, or with the InLine Clamps depending on the size of your piece and spacing of your T-tracks.



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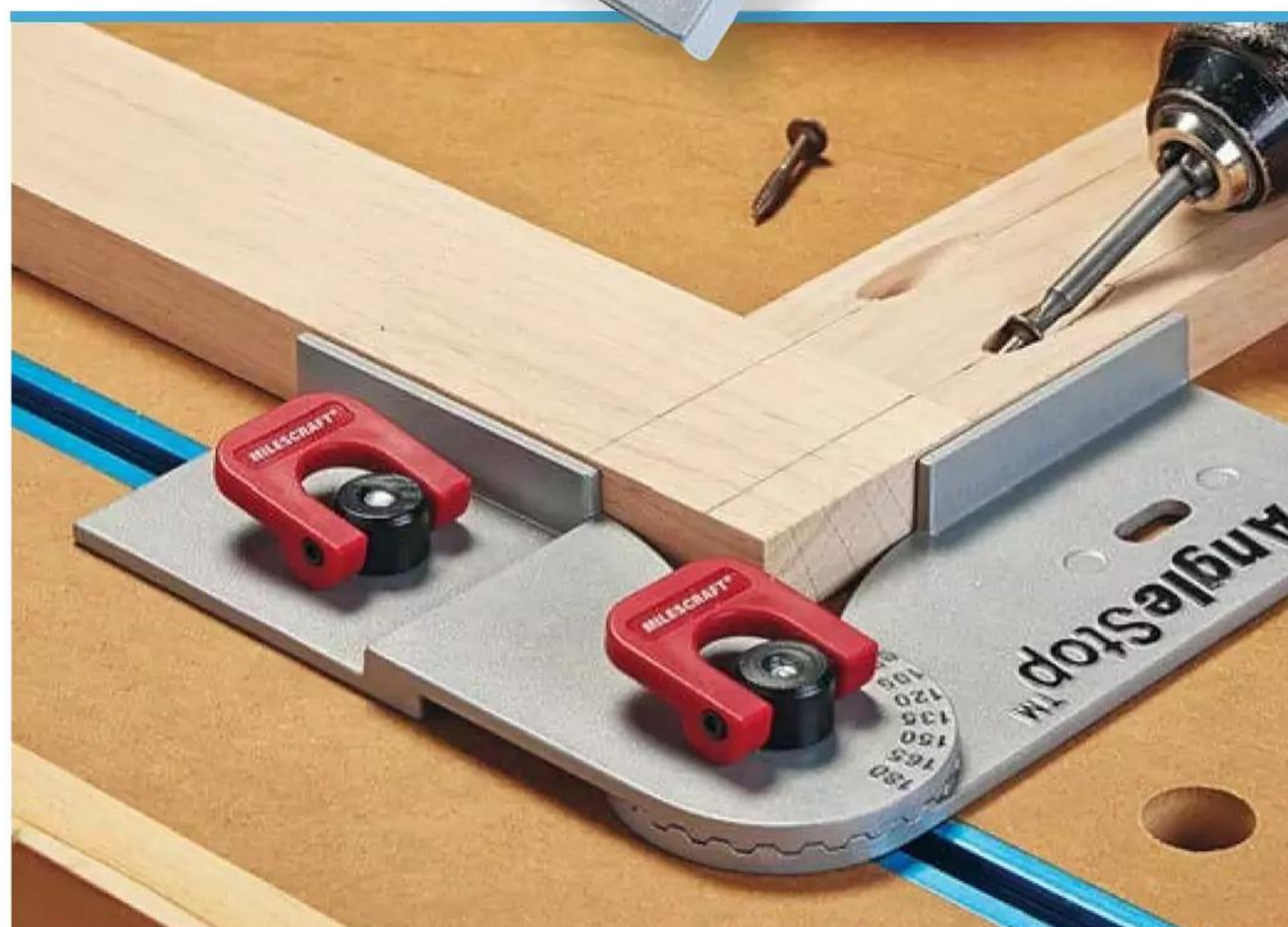
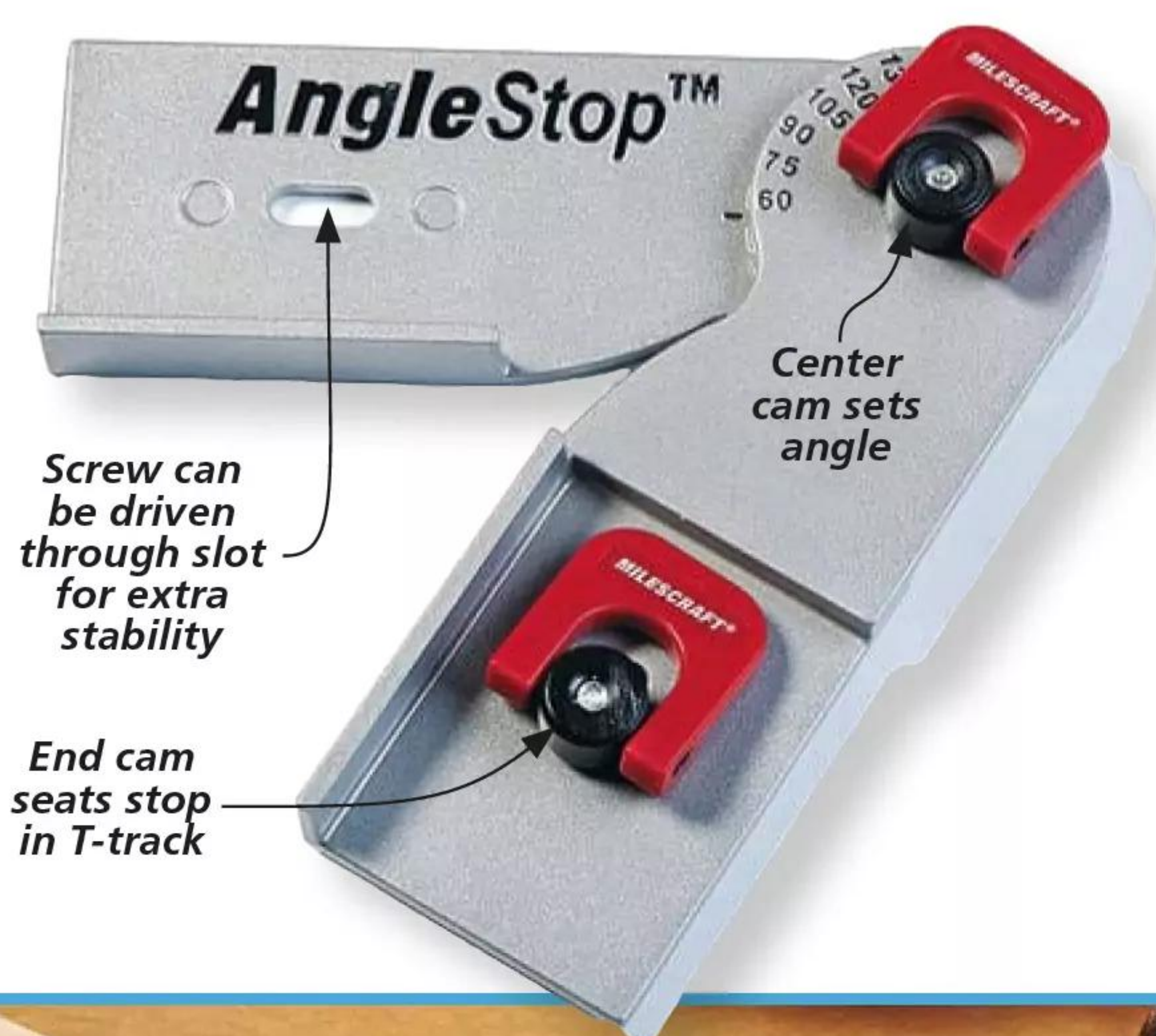


▲ The MultiStops can be oriented in a number of ways, using their arms, their flat edges, or even the rounded back on a concave workpiece.

ANGLESTOP. The final tool in *Milescraft's* T-track series is the AngleStop you see below. The base of this tool resembles the CamStop XL, but with an arm that can be adjusted to a fixed angle. The angles range from 60° to 180°, with interlocking teeth on each piece to form a secure and reliable connection. This means the stop works well when working on 90°, such as when securing a mitered frame or pocket screwing a rail and stile like you see below, and on other, less common angled assemblies.

One particular thing about this stop I like is the inclusion of the screw slot on the arm. While these clamping solutions work well most of the time, there's only so much force a small T-bolt can hold up to. However, the screw slot lets me fasten the stop down directly for a stable hold.

T-SLOT ROUNDUP. The *Milescraft* T-slot series of clamping options is a nice collection to have. While I find the Multi-Stop and AngleStop to be the most useful of the bunch, each has its place, and none are particularly pricey. T-tracked benches and tables are a great way to incorporate quick-to-set-up stops, clamps, and hold-downs into your shop. *Milescraft's* selection is a good choice if T-tracks are your style — check out page 66 if you're interested in picking one or more of them for yourself. [W](#)



▲ The AngleStop can be set between 60° and 180° in 15° increments. Like the CamStops, a 5/8" profile works well for 3/4" material.

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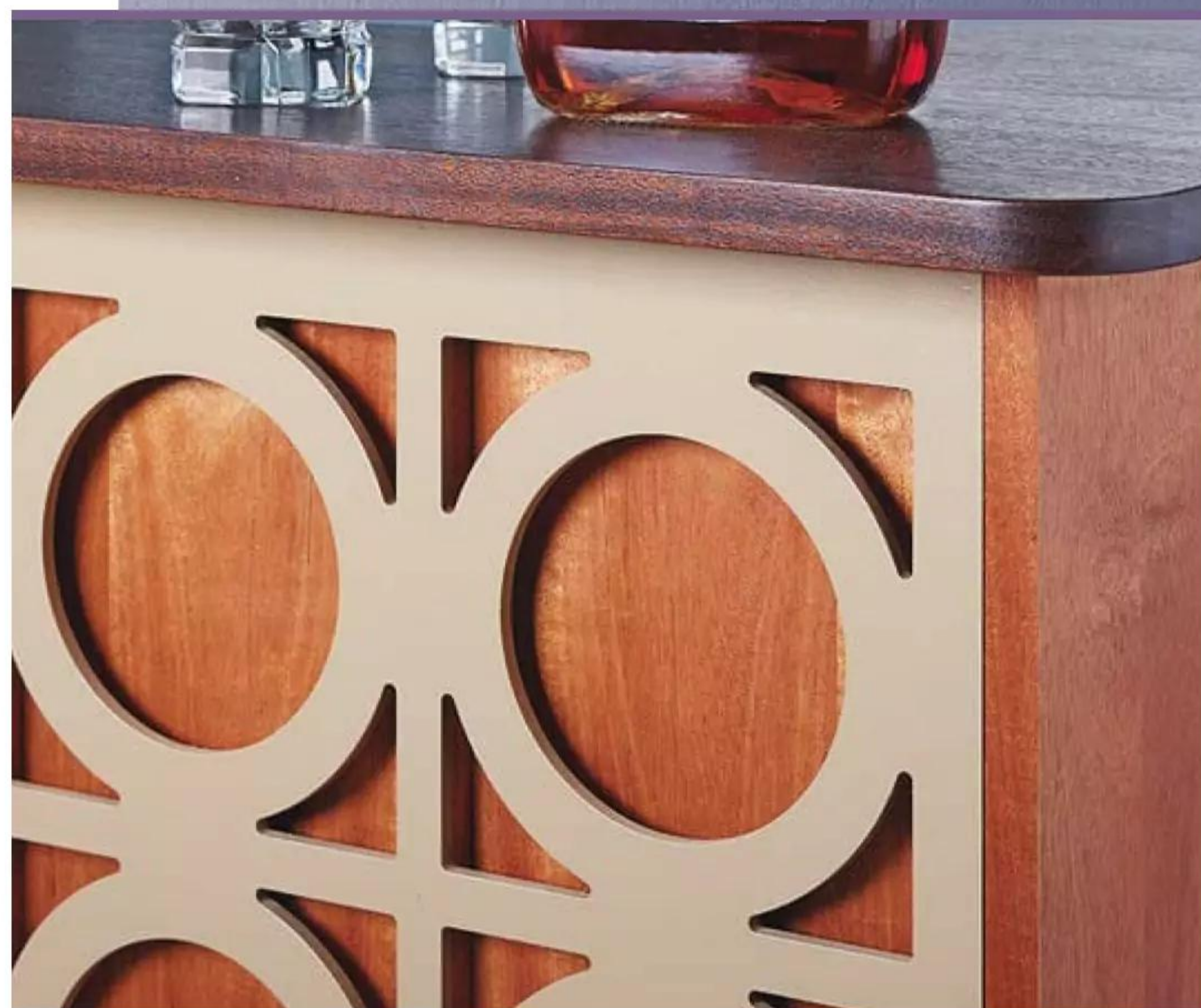
While there's a strong retro vibe to this bar, the fact is it's a lot more durable and elegant than its predecessors.

As libation-oriented basement furniture from the 1950s goes, the homage you see to the right has a lot going for it. First, by comparison to the bars of the past that were built into the room with dimensional lumber and dressed with grass mats; it's light and unattached to the room it resides in. Mobility is a good thing. Second — no grass mats. That's not to say there isn't a place for the *Tiki* genre of party rooms, just not here. That's enough from the history side of things — let's take a closer look at this bar.

GOOD WOOD. Starting at the top we've got nicely contrasting thick African mahogany that's the gentle yet firm focal point of the bar. The case parts are plywood, veneered with African mahogany as well, but left unstained to provide further contrast. Then there's the painted lattice front that brings a dynamic lyrical energy to the bar.

GOOD SHAPES. It's not just the front of the bar that has pleasing shapes. The angled shelf and top that sport flowing corners play into the streamlined look of the Mid-Century movement. Lastly, the hairpin legs lighten the overall look and give the illusion that the bar is floating. The legs were not shop-made, they were purchased online and screwed to the underside.

JOINERY. Simple yet sturdy tongue and groove joinery is used to assemble the shell of the case. That's combined with the ubiquitous pocket screws holding the top, shelf, and bottom to the shell. All this means is the project will come together quickly. If you're so inclined, it's time to roll up the sleeves, head to the shop, and get after this project.

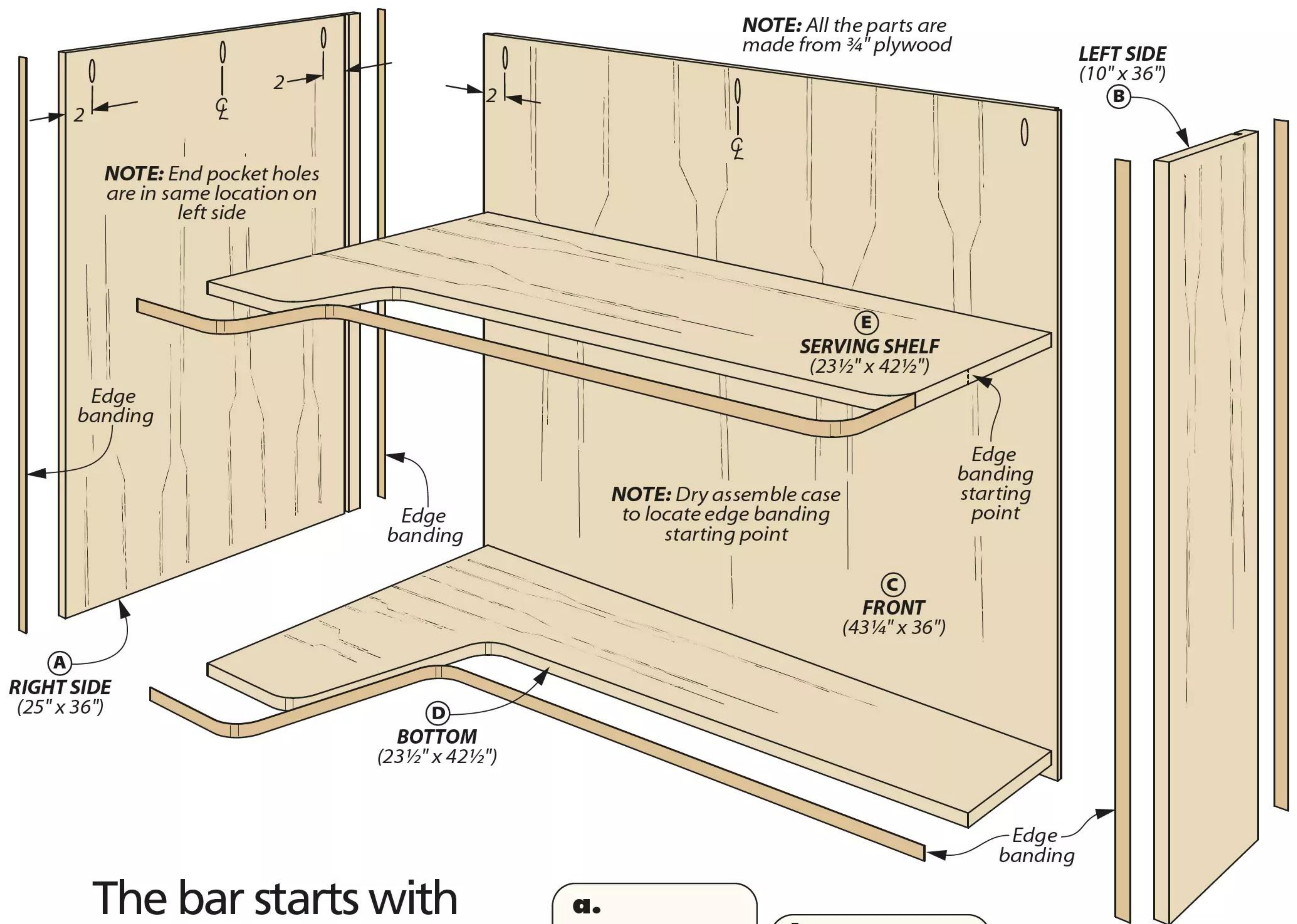


▲ The decorative lattice front on the bar is accentuated by the shadow-play that's created by the strips of wood that lift it away from the surface.



▲ Between the bottom and the serving shelf of the bar you'll find plenty of storage for whatever treats (liquid or otherwise) that you want to keep on hand for guests.

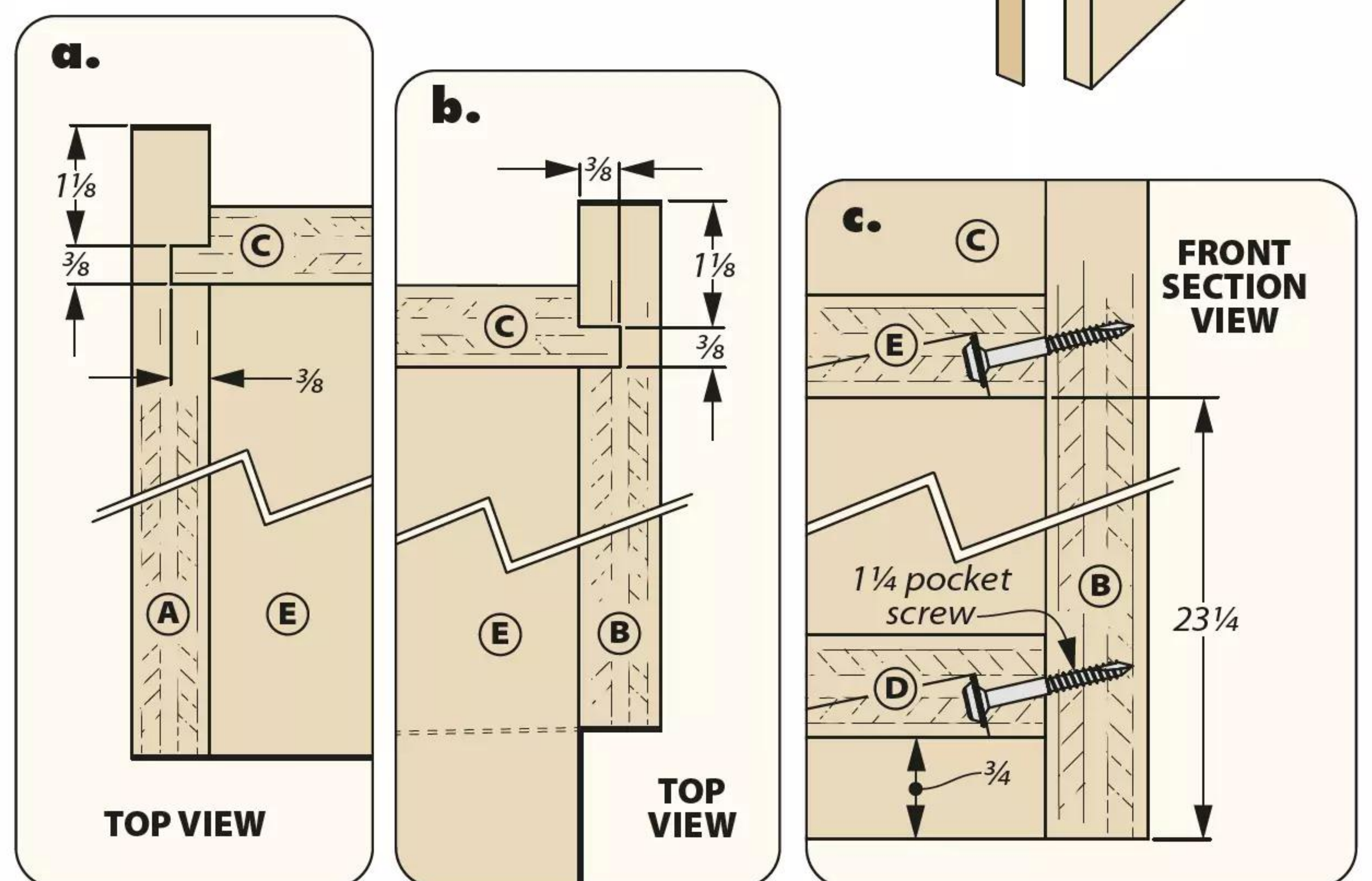




The bar starts with SHAPELY SHELVES

The case of the bar is an austere affair that's comprised of five pieces of plywood. The plywood used on this project is loosely defined as a combi-core material. It's a plywood that has a veneer core sandwiched between outer layers of MDF covered with the wood veneer of choice. In our case that would be African mahogany (to partner with the wood top you'll make shortly).

GROOVES FIRST. Start by cutting the front, right, and left sides to size. (The reference point for these parts is from the front of the bar.) You'll cut the grooves with a dado set. Detail 'a' shows the groove that runs along the inside face of the right side. The groove on the left side (detail 'b') is a mirror cut that can be done at the same time with the same set up.



TIME FOR A TONGUE. To join the sides to the front you need to make a tongue that runs along both edges of the front (detail 'b'). This calls for a dado set buried in an auxiliary fence.

You might as well drill the holes for the pocket screws on the inside faces of the sides and the front. These are for fastening the top to the base. The pockets

on the left side are set in the same distance from the edge as the ones you can see on the right side. Now you need to add edge banding to the exposed plys.

EDGE BANDING. The banding is a little wider than the plywood, so it's easy to hold it centered on the edge while ironing it in place. Once the edging has cooled, you can use a sharp utility

knife to slice away the majority of the waste. Be mindful of the grain direction though. You don't want the knife to cut into the plywood. A sanding block makes quick work of removing any remaining material.

BOTTOM & SHELF

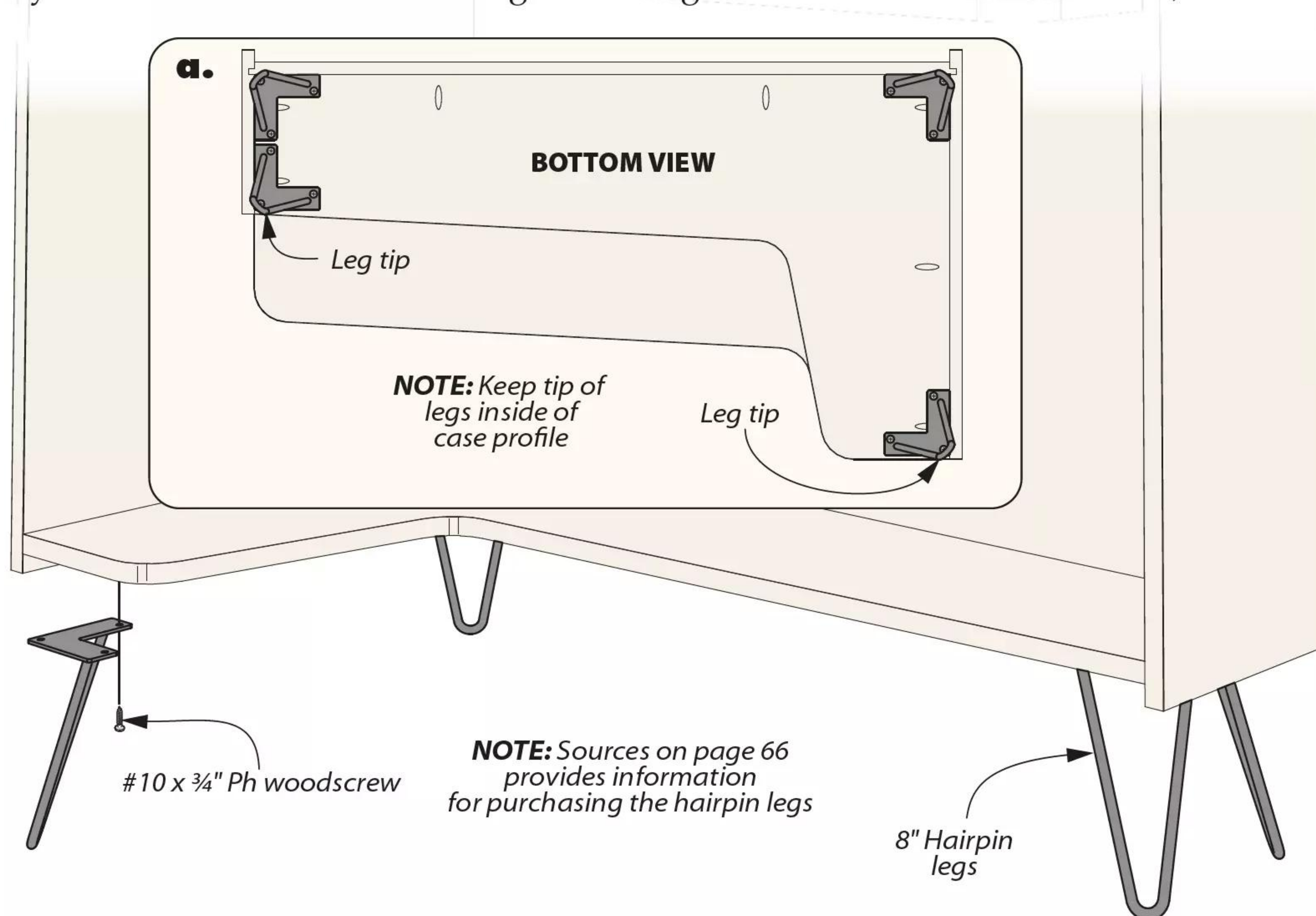
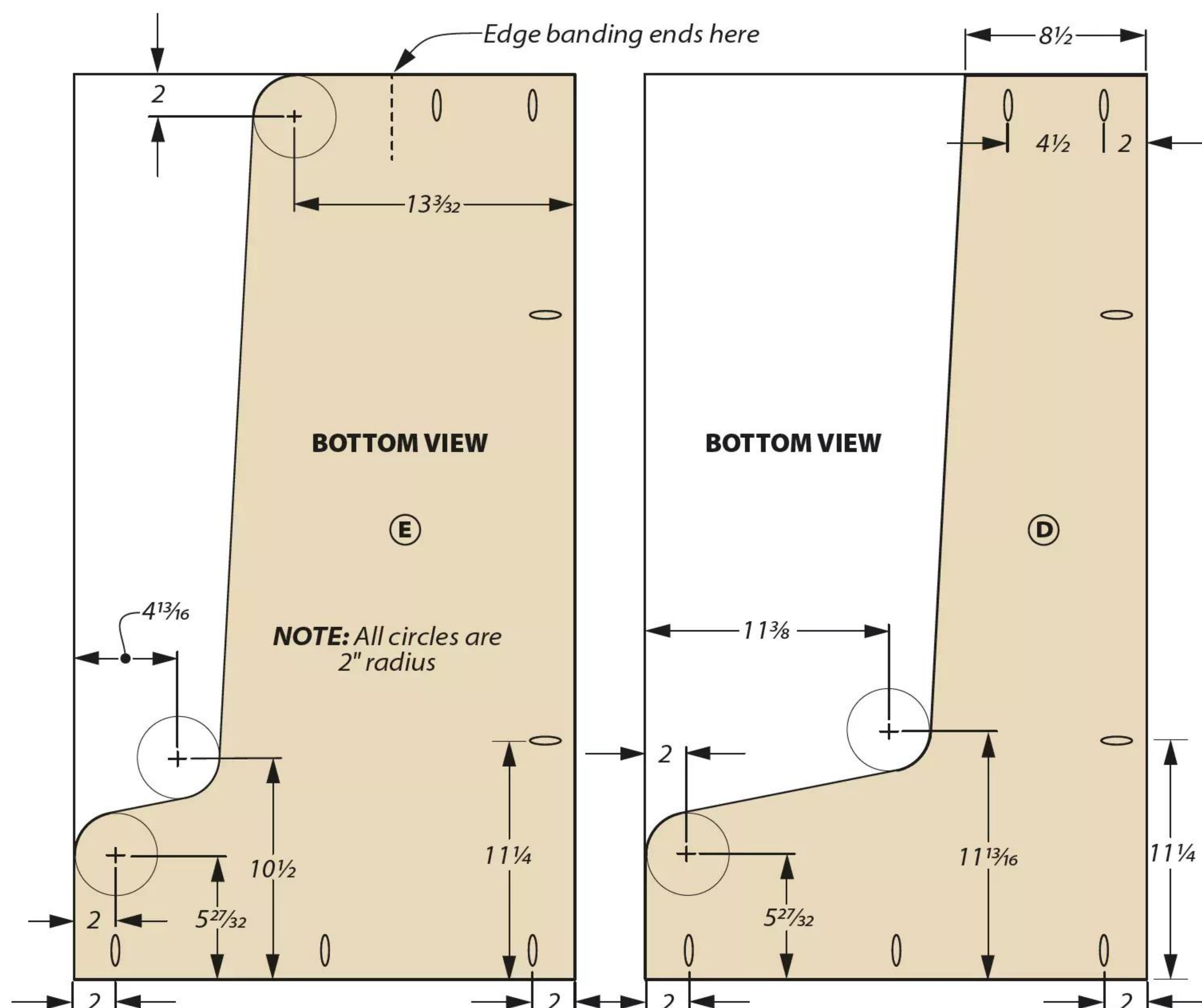
Next up is making the bottom and serving shelf. Their overall size is the same — but as you see in the drawings to the right, the final profiles of the two are different. The bottom stays within the contour of the sides, while the left side of the serving shelf is wider to accommodate storage. Once you've done the preliminary layout work, remove the excess material with a jig saw — staying on the waste side of the line. Then it's just a matter of using straightedges and curved templates along with your router and a flush-trim bit to hone the profile of the edges.

MORE EDGING. Before assembling the base you'll need to add the edging to the parts you just made. The bottom is easy enough since both ends are trapped between the sides. But the edging on the left end of the serving shelf protrudes beyond the side. To nail down

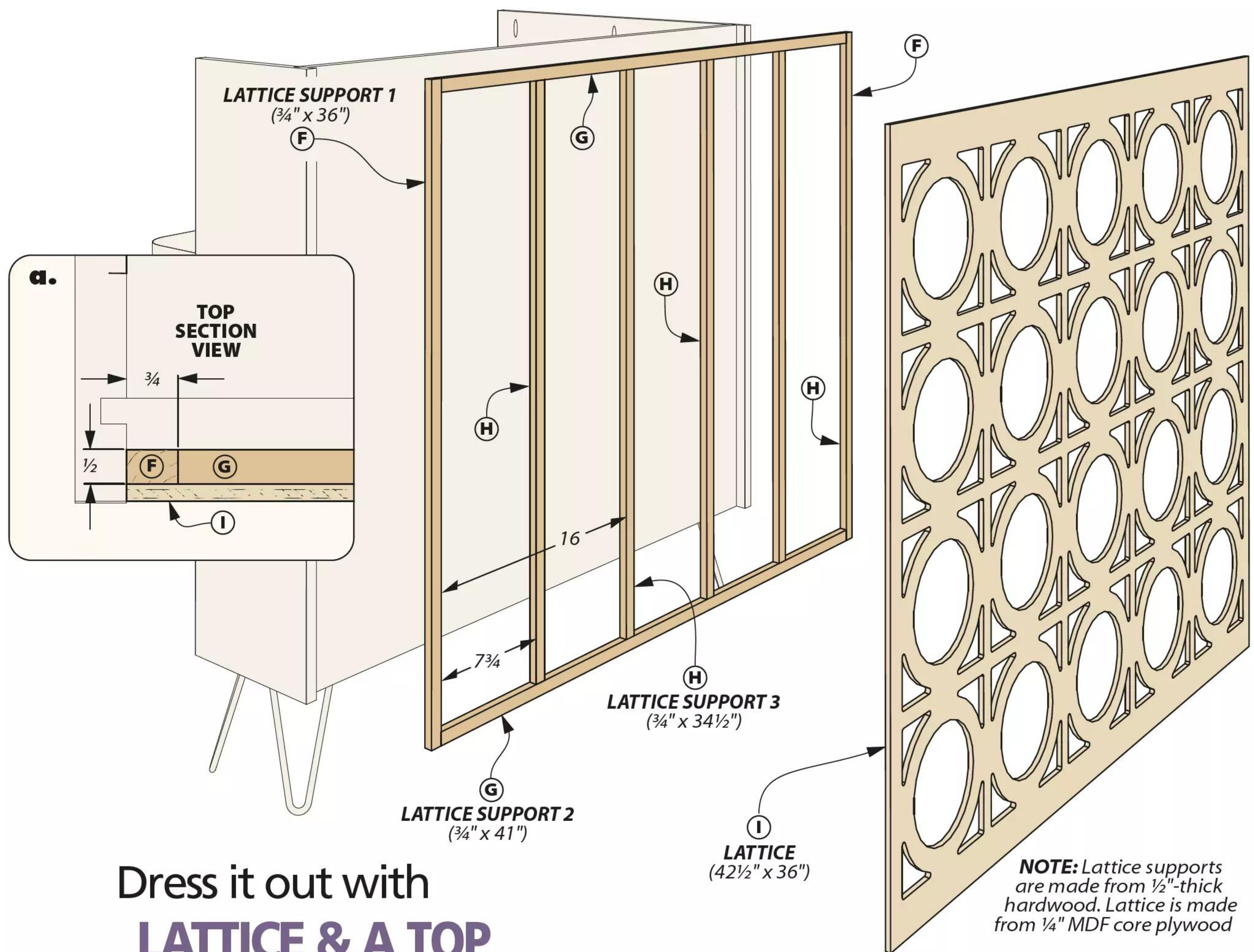
the location of the edging, dry-assemble the case and mark where the edging terminates. Then apply the edging from there. Once that's done, drill the pocket screw holes on the underside of both workpieces.

ASSEMBLY. I assembled the base face down. Start by applying glue to the grooves in the sides

and clamping them to the front. Then you can use spacers to position the bottom in the case and screw it in place. Then attach the serving shelf (both locations are shown in detail 'c' on the previous page). The last thing to do is flip the case upside down and screw the legs to the underside, as shown below.



▲ The hairpin legs provide a buoyant lift to the bar, and are easy to install on the underside of the base.



Dress it out with LATTICE & A TOP



For more on a CNC computer pattern and full-sized pattern go to:

Woodsmith.com/277

At this stage the bones of the bar are complete — all that's left to do is gussy-up the front and add the top. Let's start with the front.

Leaving the front blank is always an option — it's a boring option though. The plywood veneer does have a beauty of its own there's no doubt. But the painted lattice with its repeating tondo motif cradled in a square

brings the bar to life. On closer inspection you'll notice that the lattice has a subtle ally in the supports that are brad nailed to the front of the bar (detail 'a').

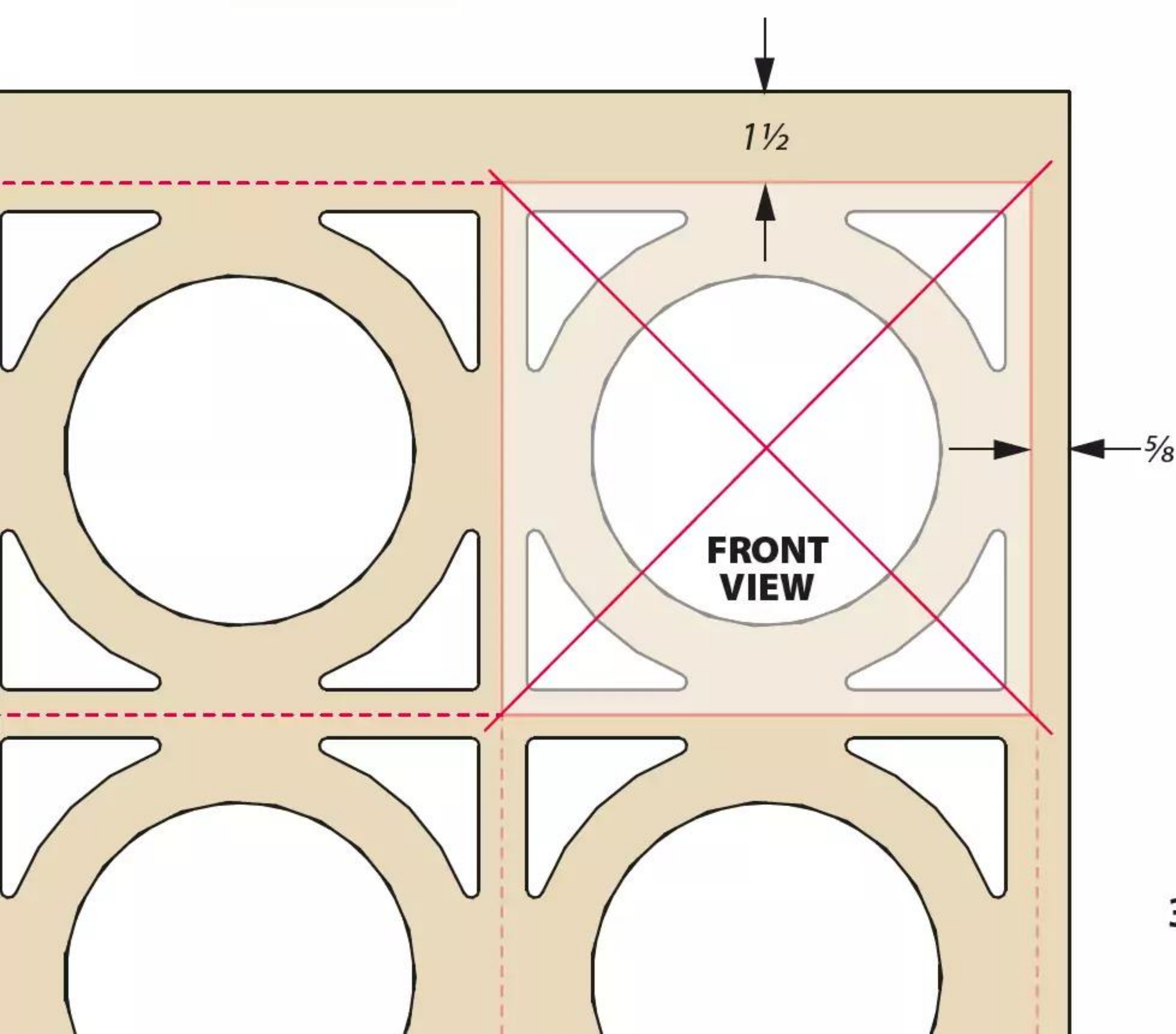
THROWING SHADE. Simply stated, by lifting the lattice off the surface of the bar, the supports employ shade as a design element to enhance the look of the lattice. You clearly see this effect in the photos at the beginning of this project.

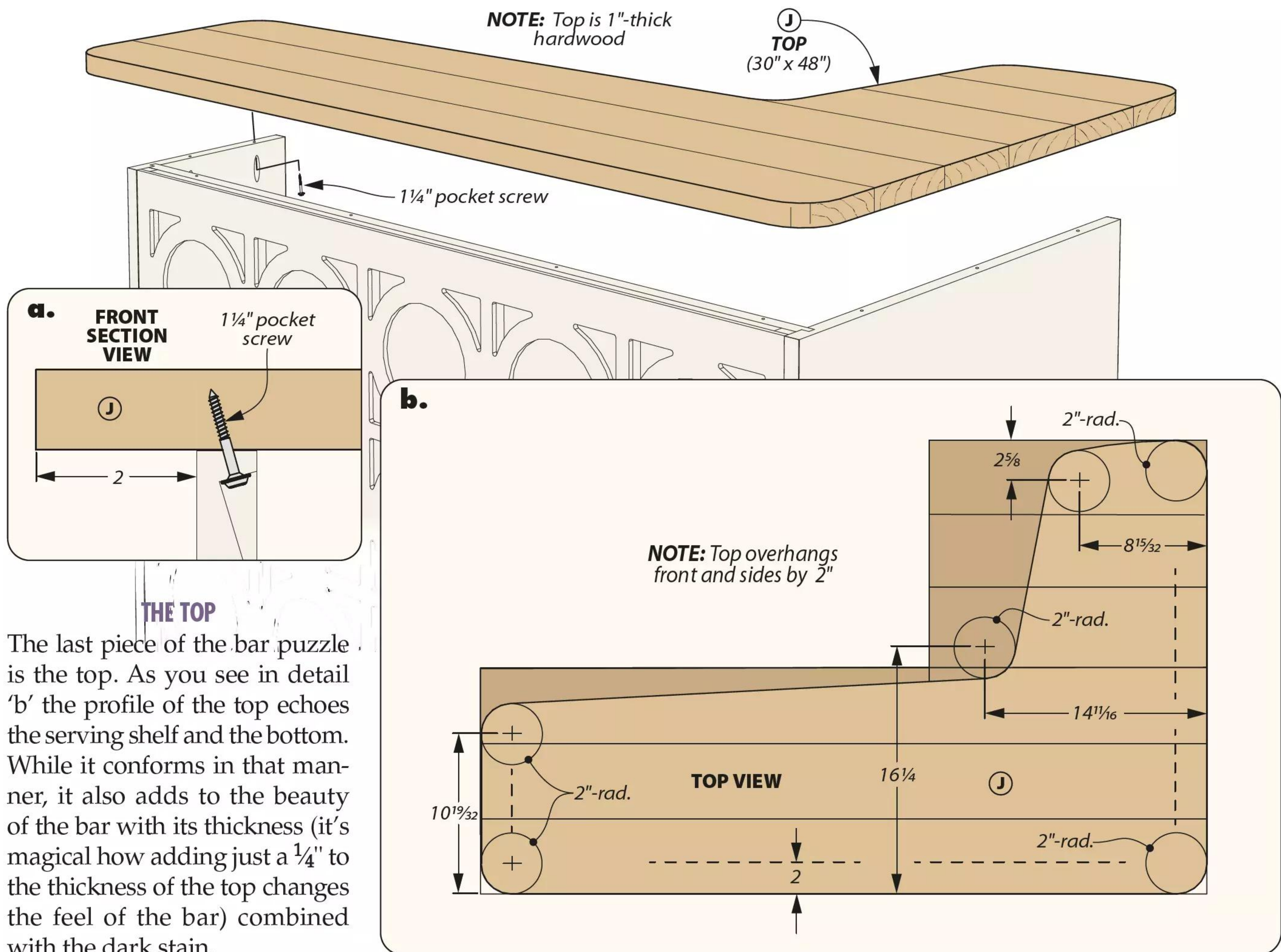
The supports that you see in the main drawing above and detail 'a' hide behind the perimeter and vertical ribs of the lattice. I ripped them out of the same material that's being used for the top. First I cut and installed the two vertical pieces that fit against the sides. Then it was time to cut and brad nail the long horizontal pieces at the top and bottom. Lastly, you need to cut and install

the four field supports. Now you can focus on the lattice.

LATTICE PANEL. There are two ways to tackle the lattice panel. You can make a template to tile across the workpiece using a small router. (The pattern is shown in the drawing below to the left.) Or if you have a CNC machine at your disposal you can go download a pattern file. Both options are available at Woodsmith.com/277.

Before installing the lattice you'll want to take a break and apply a couple of coats of lacquer to the front and the supports. Frankly, you could finish the whole base at this time. Only the top gets stain in this project. It's also a good idea to sand and paint the lattice as well. Then it's just a matter of nailing the lattice in place, filling, and painting any showing nail holes.





THE TOP

The last piece of the bar puzzle is the top. As you see in detail 'b' the profile of the top echoes the serving shelf and the bottom. While it conforms in that manner, it also adds to the beauty of the bar with its thickness (it's magical how adding just a $\frac{1}{4}$ " to the thickness of the top changes the feel of the bar) combined with the dark stain.

GLUE UP & SHAPE UP. If you sized and glued up the panels shown in detail 'b' while I was chatting about its merits, good for you — otherwise you need to do that now. After you've packed away the clamps and scraped off any squeeze out, it's time to lay out

the profile. Bringing the top to its final shape is a repeat performance of making the bottom and serving shelf.

I chose to stain and finish the top before screwing it to the bar base. Both details show the how

the top is oriented on the base and held in place from underneath with pocket screws.

All that's left is to move the bar to its new home and stock it with refreshments. Whoever helps with the move is first in line. **W**

Materials, Supplies & Cutting Diagram

A Right Side (1)	$\frac{3}{4}$ ply. - 25 x 36	F Lattice Support 1 (2)	$\frac{1}{2}$ x $\frac{3}{4}$ - 36	• $\frac{7}{8}$ " x 25' Mahogany Edge Banding
B Left Side (1)	$\frac{3}{4}$ ply. - 10 x 36	G Lattice Support 2 (2)	$\frac{1}{2}$ x $\frac{3}{4}$ - 41	• (4) 8" Hairpin Legs
C Front (1)	$\frac{3}{4}$ ply. - 43 $\frac{1}{4}$ x 36	H Lattice Support 3 (4)	$\frac{1}{2}$ x $\frac{3}{4}$ - 34 $\frac{1}{2}$	• (12) #10 x $\frac{3}{4}$ " Ph Woodscrews
D Bottom (1)	$\frac{3}{4}$ ply. - 23 $\frac{1}{2}$ x 42 $\frac{1}{2}$	I Lattice (1)	$\frac{1}{4}$ ply. - 42 $\frac{1}{2}$ x 36	• (22) 1 $\frac{1}{4}$ " Pocket Screws
E Serving Shelf (1)	$\frac{3}{4}$ ply. - 23 $\frac{1}{2}$ x 42 $\frac{1}{2}$	J Top (1)	1 x 30 - 48	

1" x 6" - 72" African Mahogany (Three Boards @ 3.8 Bd. Ft. Each)



$\frac{3}{4}$ " x 5 $\frac{1}{2}$ " - 48" African Mahogany (1.8 Bd. Ft.)



ALSO NEEDED: One 48" x 96" Sheet of $\frac{3}{4}$ " African Mahogany Plywood, One 48" x 48" Sheet of $\frac{3}{4}$ " African Mahogany Plywood, One 48" x 48" Sheet of $\frac{1}{4}$ " Birch Plywood

DESIGNER Project



Shoji Cabinet

The simple, timeless design and subtle geometry of this cabinet allow it to live comfortably in almost any space you wish to place it.

As old as shoji paper is — the material has an uncanny knack of always appearing young, new, and contemporary. To be clear — shoji paper isn't. In Japan's distant past shoji was the name for a tool that was used to obstruct. And as words do, it evolved into the opaquely translucent paper that obstructs details, but not light.

What's not to love about the gauzy, lacy, backdrop that shoji paper panels create for the finger-like lattice that combs through the surrounding light? As wonderful as those elements of the door are, there's even more charm to consider with this cabinet.

CHERRY. Our cabinet is made of cherry. If I had to choose one species of wood to work with for the rest of my time it would be cherry. It's a well-behaved wood that's a joy to work with. Just look at the lattice and handles in the photos — enough said.

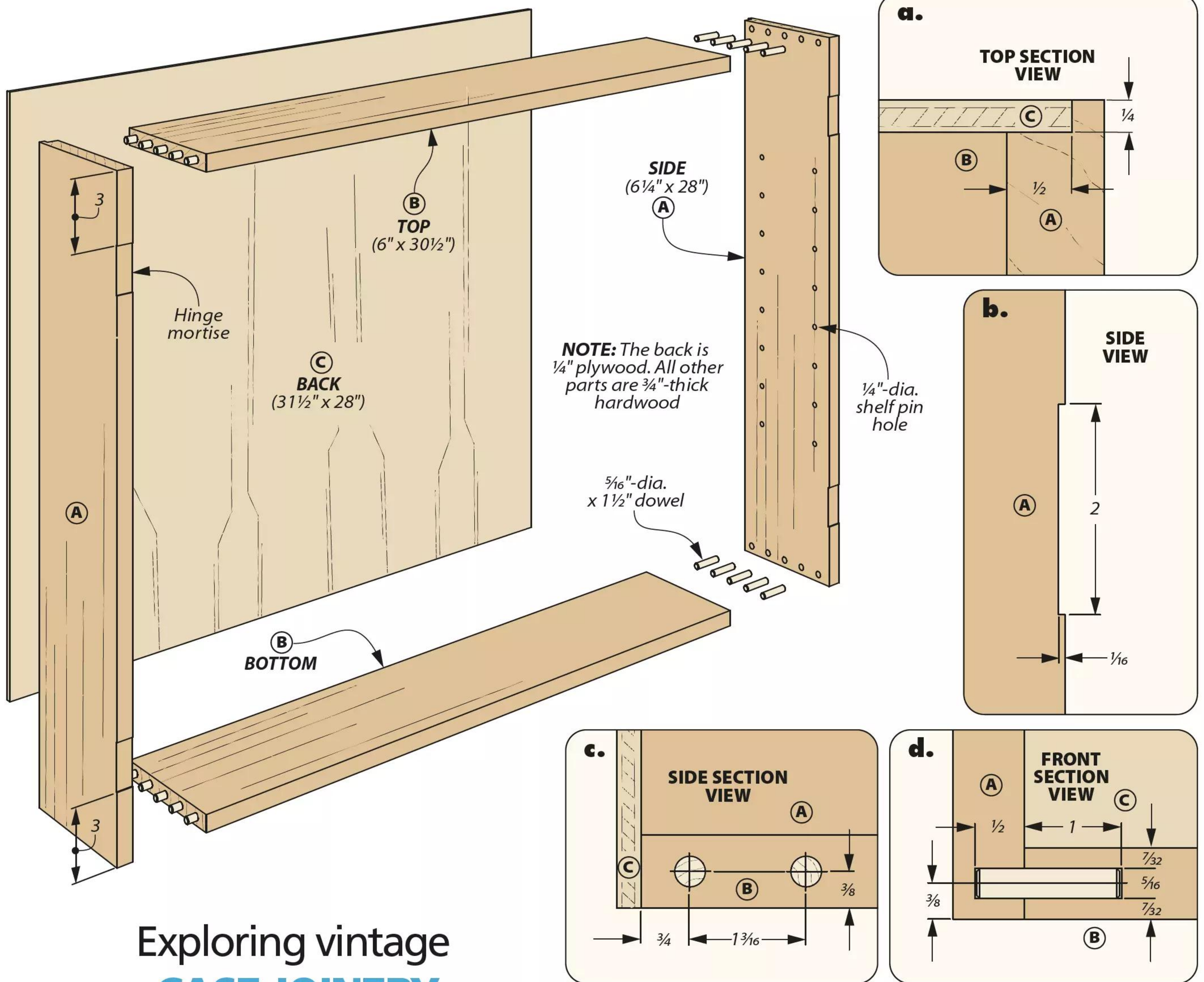
DOWELS. The hidden surprise on this cabinet is the joinery for the case — good old-fashioned dowels. Our creative director, Chris Fitch (and designer of this project) stated, "I remember years ago reading woodworking icon James Krenov's book *"The Impractical Cabinetmaker"* and seeing that he used dowel joints and thinking that they must be okay, and they are. Anyway I chose them because they offer a combination of a clean look, good strength, and fast easy assembly. I think dowels are often overlooked." Not any longer, Chris.



▲ The two sizes of lattice on top of the beautiful shoji paper provide you with a light and shadow show that's always enjoyable.



▲ Shop-made cherry handles add to the warmth of the cabinet. Cherry dowels lift them off the surface of the doors.



Exploring vintage CASE JOINERY

Now that you can see the dowel strategy in the drawing above, there's one more quote from Chris, "Dowel joints are easy to make with homemade layout jigs — all you really need is a sharp brad point or Forstner bit." That's just how we tackled this ancient joinery. But let's survey the bigger picture first.

The sides of the case require the most attention. There are the dowel holes on the inside face, along with the shelf pin holes. The front edge will receive a shallow mortise for the hinges. Lastly, there's a rabbet along the rear edge for the plywood back. The top and bottom have holes

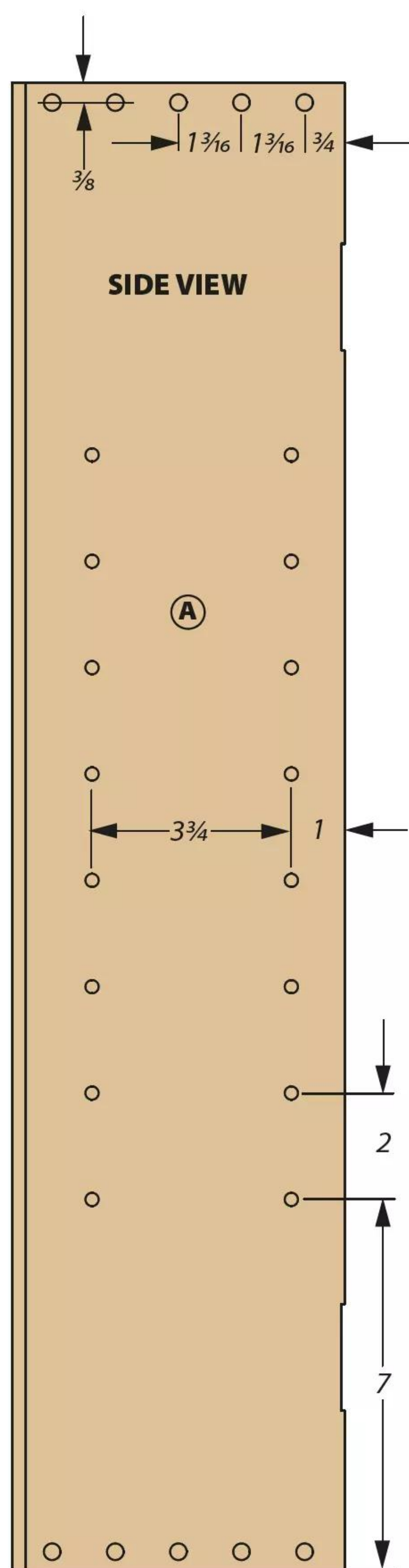
drilled in the ends for the dowels, and the plywood back is just that, a back. (The latter two are slackers in comparison to the sides.) Let's get started with the four parts that make up the case.

SIDES FIRST. Over at the table saw, cut the top, bottom and sides to size. Then you can change out the blade to a dado set and cut the rabbet in the sides for the plywood back. Detail 'a' shows what this looks like.

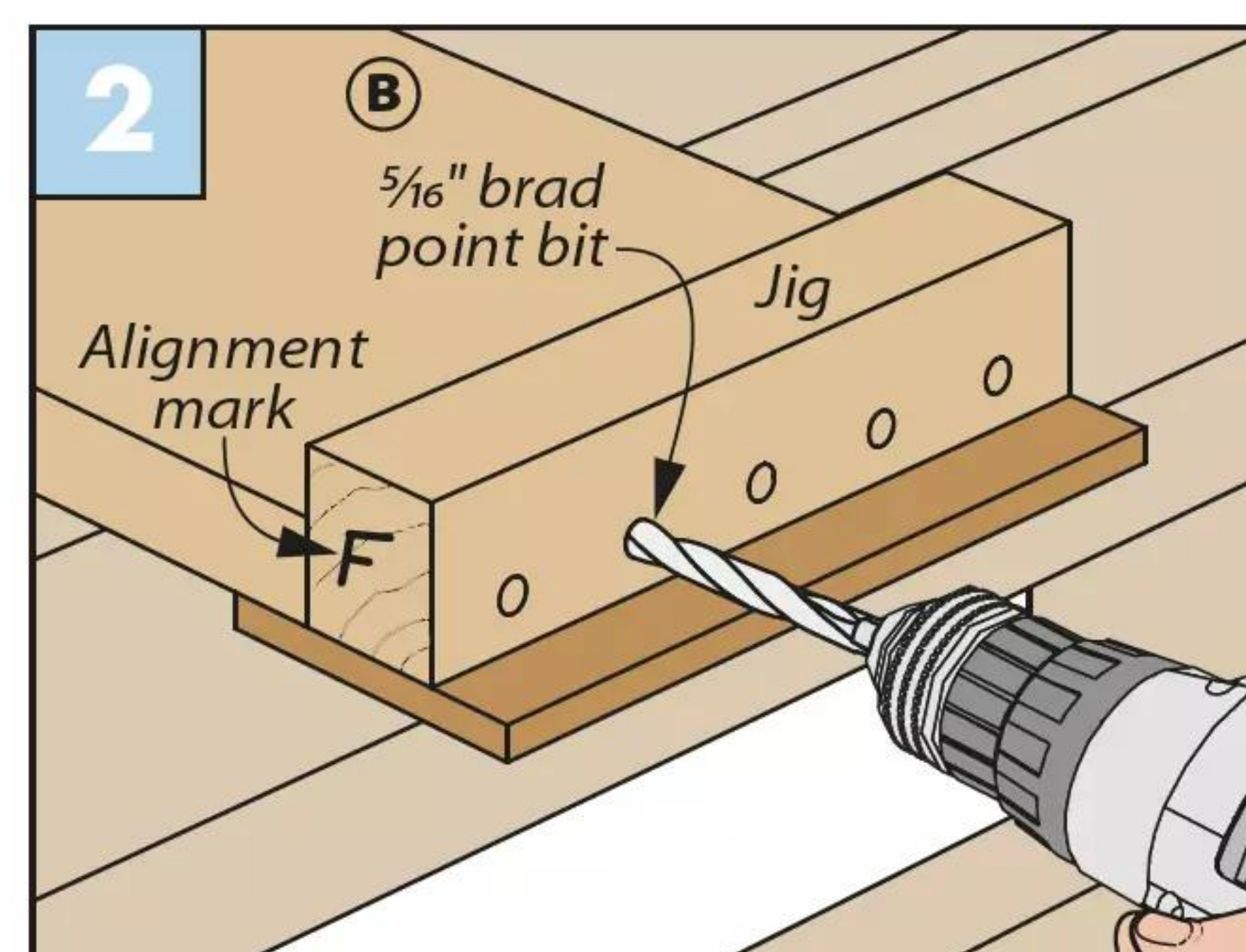
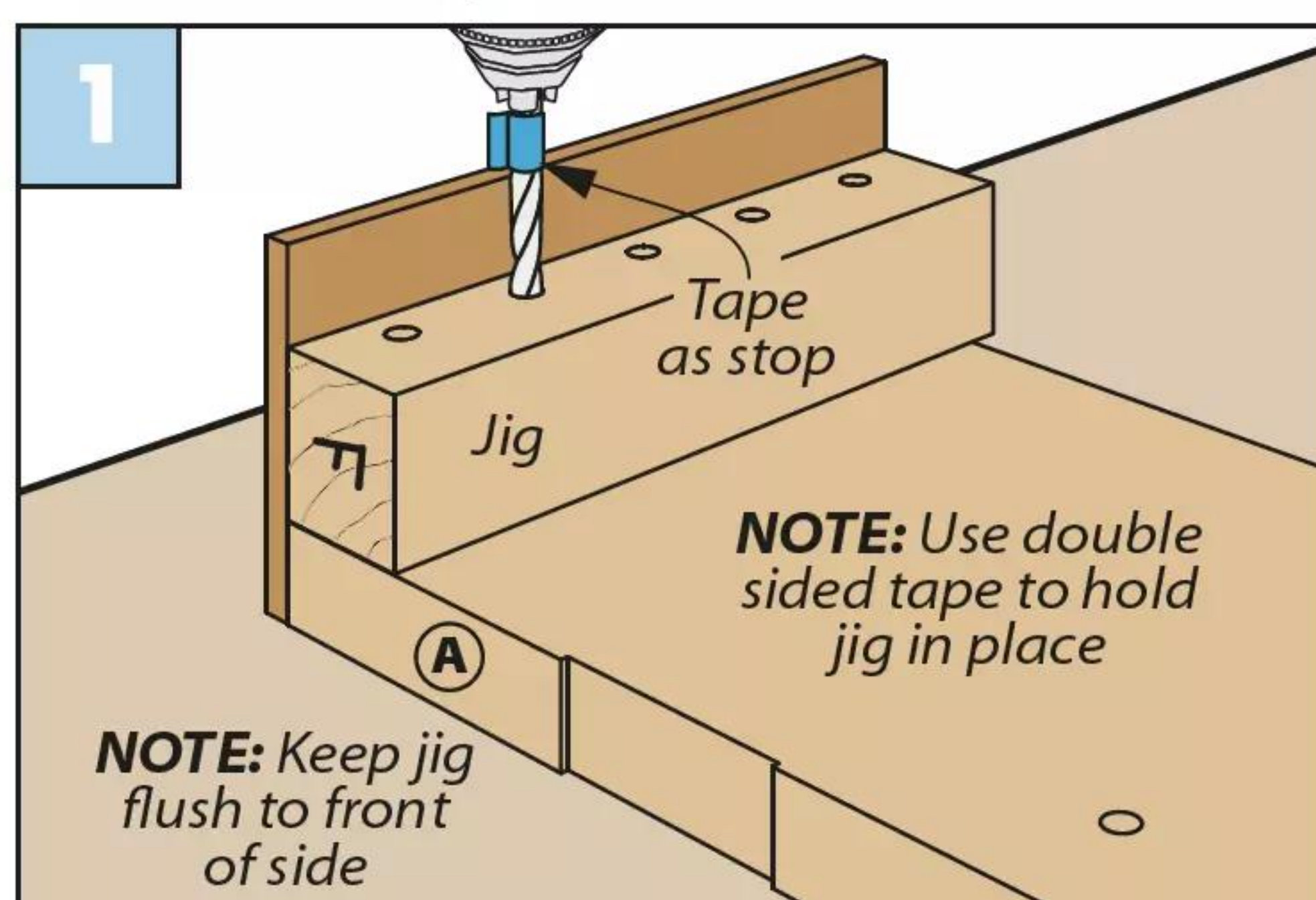
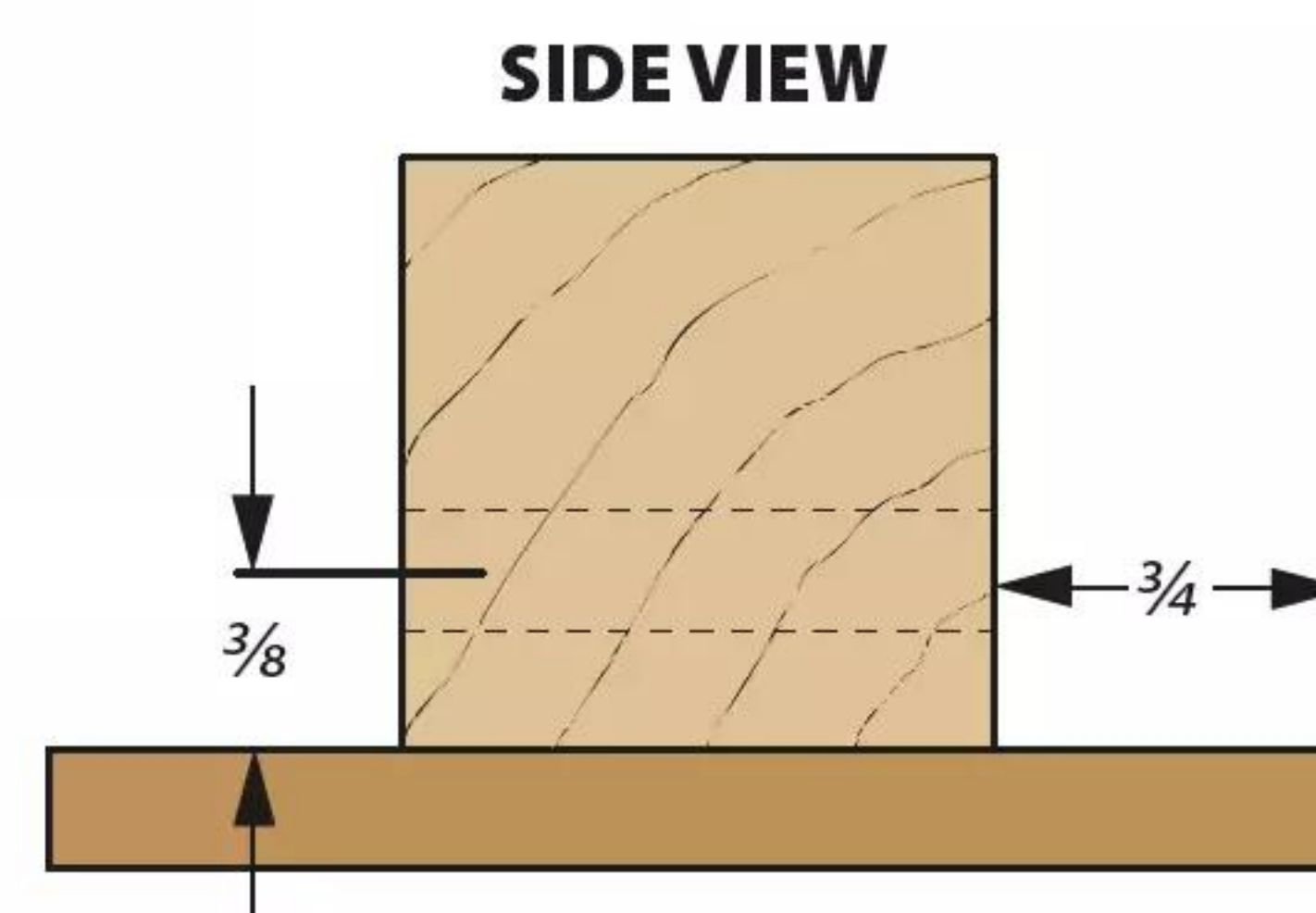
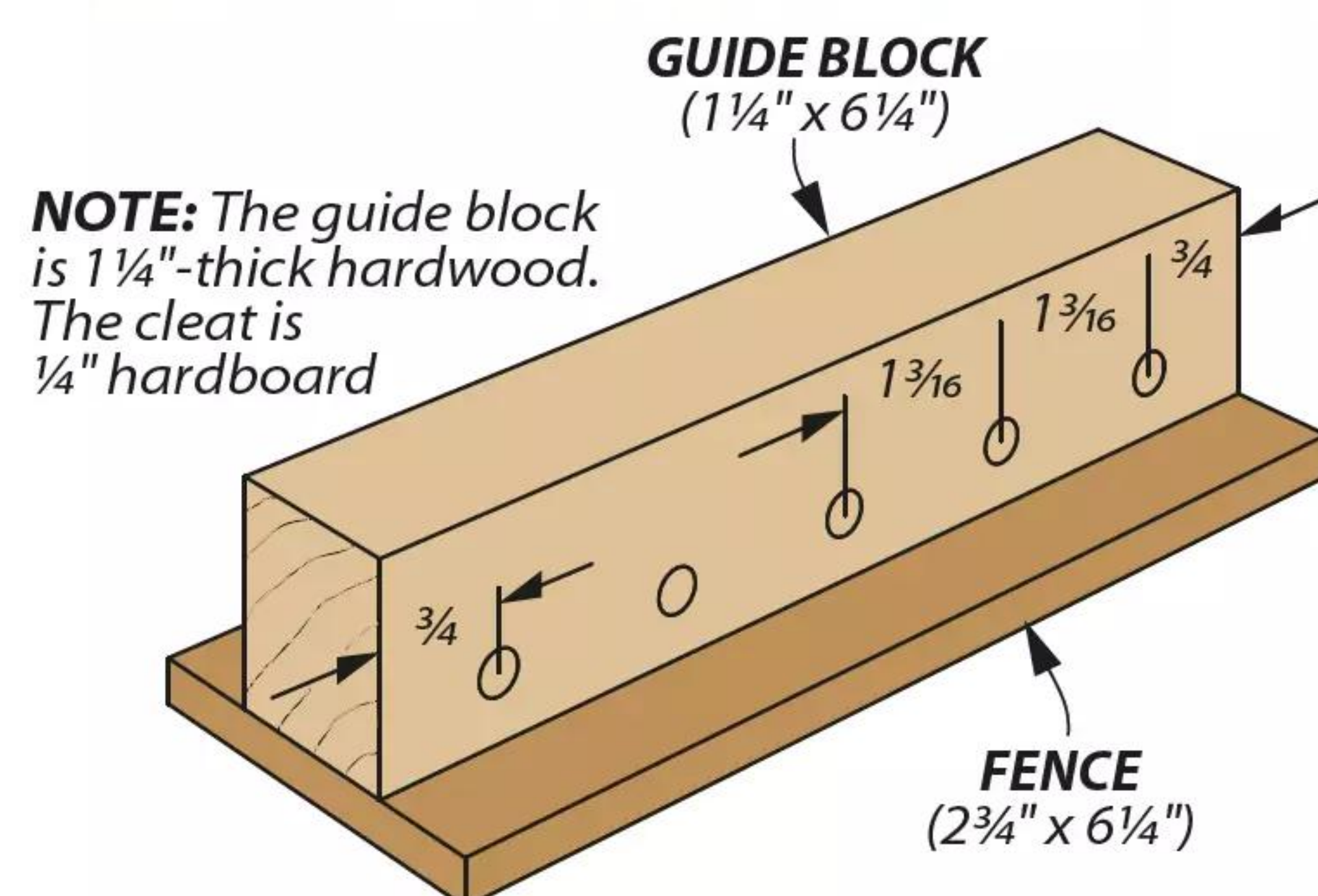
The main drawing and detail 'b' show the location of the mortises you need to make for the hinges. Even if you purchase the hardware from the source we specify, occasionally the product

will vary, so it's important to confirm the mortise size with the hinges you end up using.

SHELF PIN HOLES. Next on the to-do list are the shelf pin holes in the sides. You could do this after the case is assembled with a hardboard template (which I've often done). But since the hole is a 1/2" deep, I chose to use the drill press with its built in depth-stop along with a brad point bit. After laying out the hole locations on the sides, I headed to the drill press. The box at the bottom of the next page shows what this looks like. Now it's time to drill the dowel holes, but first you need to make a jig.



A SIMPLE DOWELING JIG



Dual Action. This simple jig is a perfect guide for drilling dowel holes in all of the case parts of the cabinet. In Figure 1 it's being used to drill holes in the sides. Figure 2 shows it guiding the drill bit while making holes perfectly aligned to the sides.

DOWEL JIG

I have a well-made doweling jig that I purchased many moons ago. The problem is it's designed for making frames, not cases. The simple little jig you see in the box above is designed to do both. It consists of a hardwood guide block that's centered on a

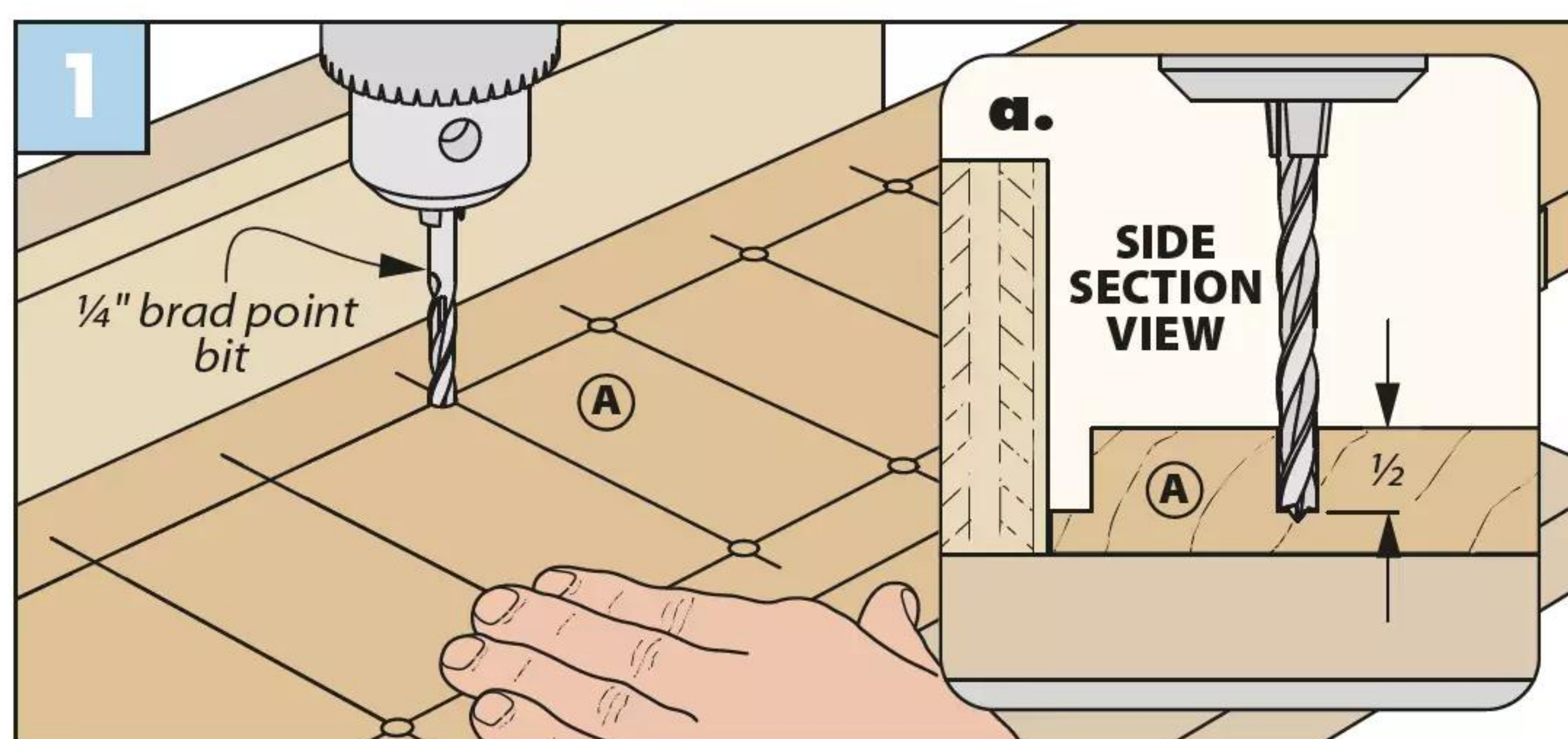
hardboard fence. I chose to do the layout on the block and drill the holes at the drill press before gluing it to the fence. Then it's time to drill some dowel holes.

FACE FIRST. Figure 1 shows drilling the holes in the sides. I used several short strips of double sided tape to hold the jig in place. You'll want to use a stop collar or some tape on the bit when drilling these holes.

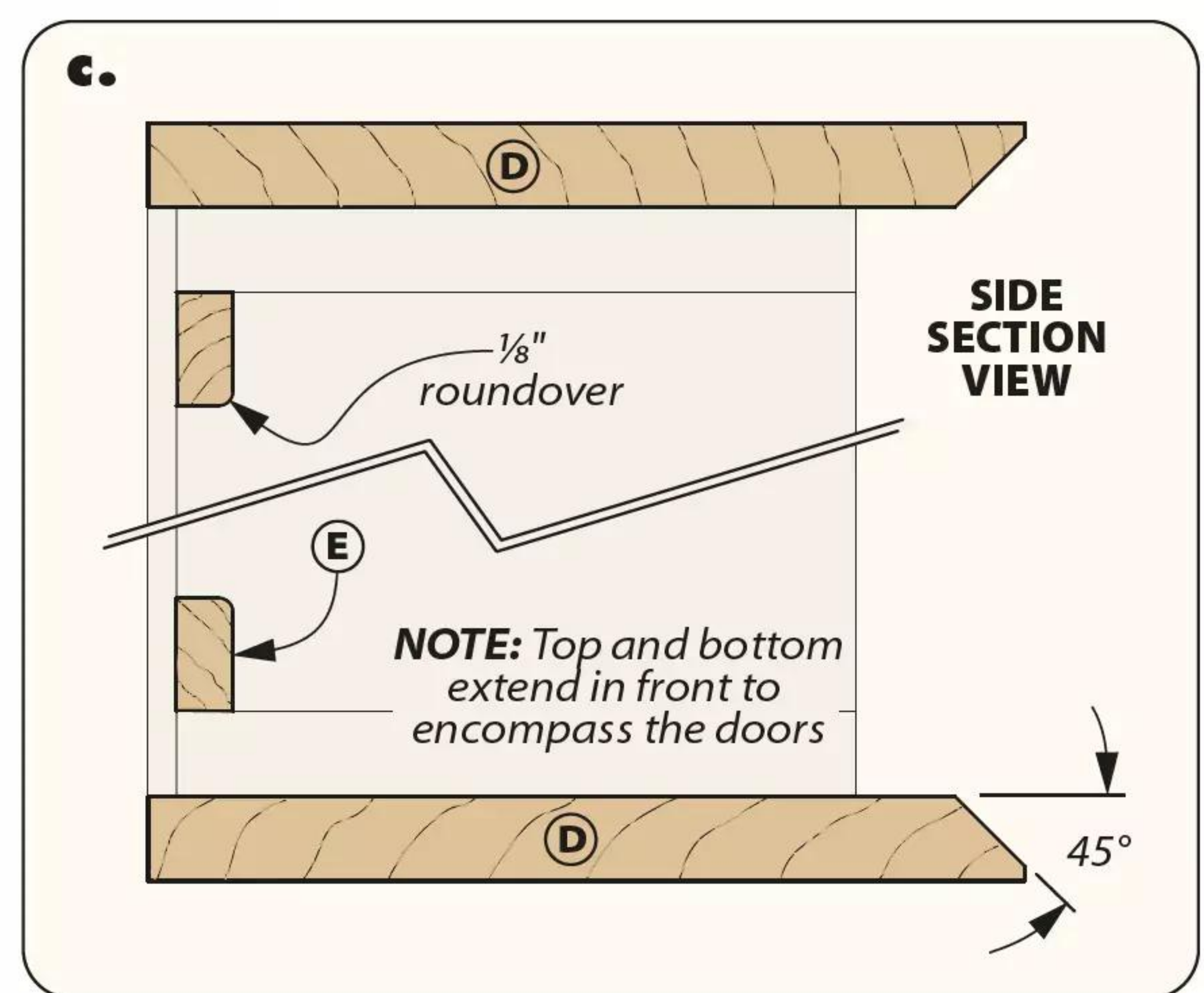
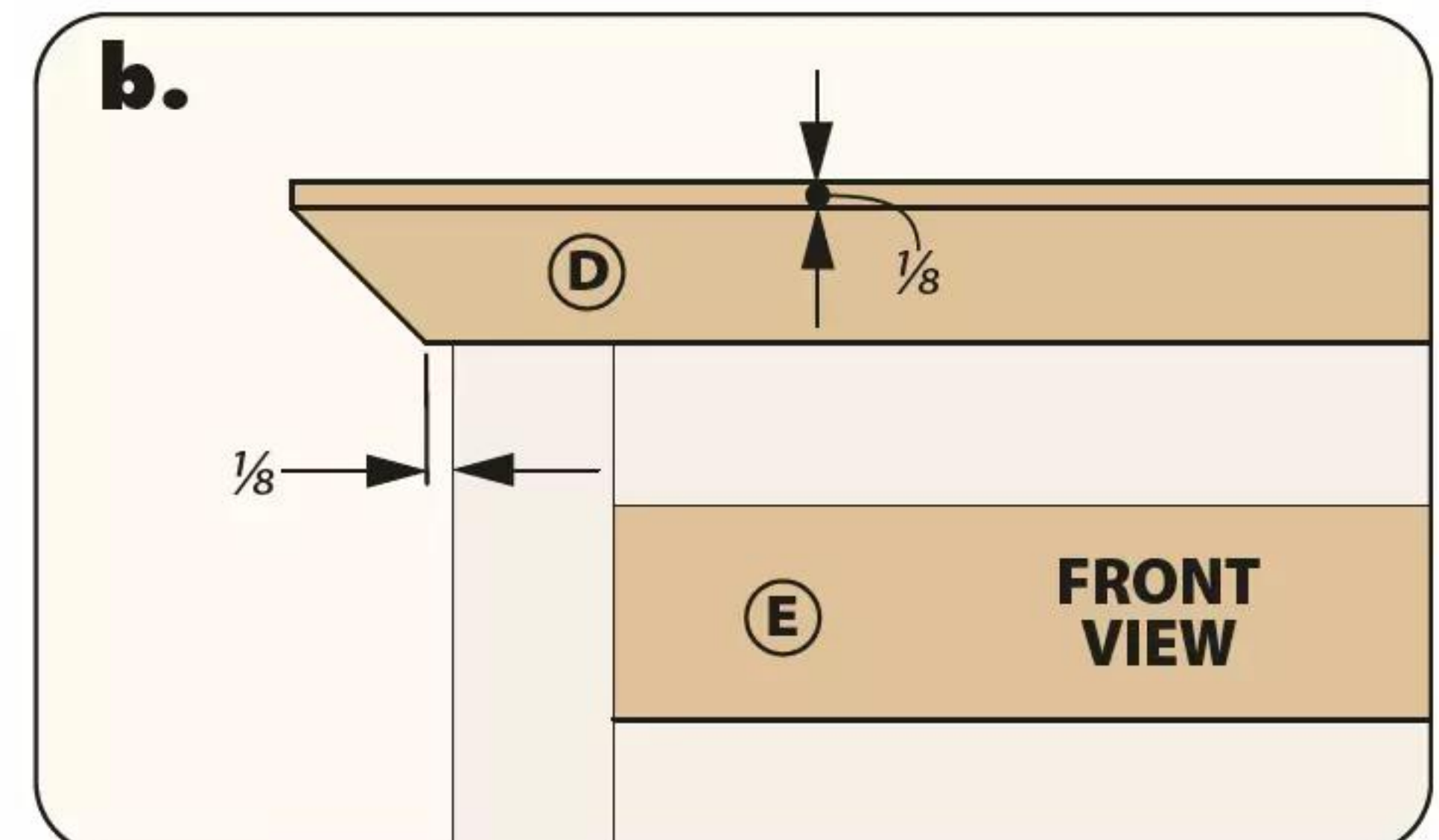
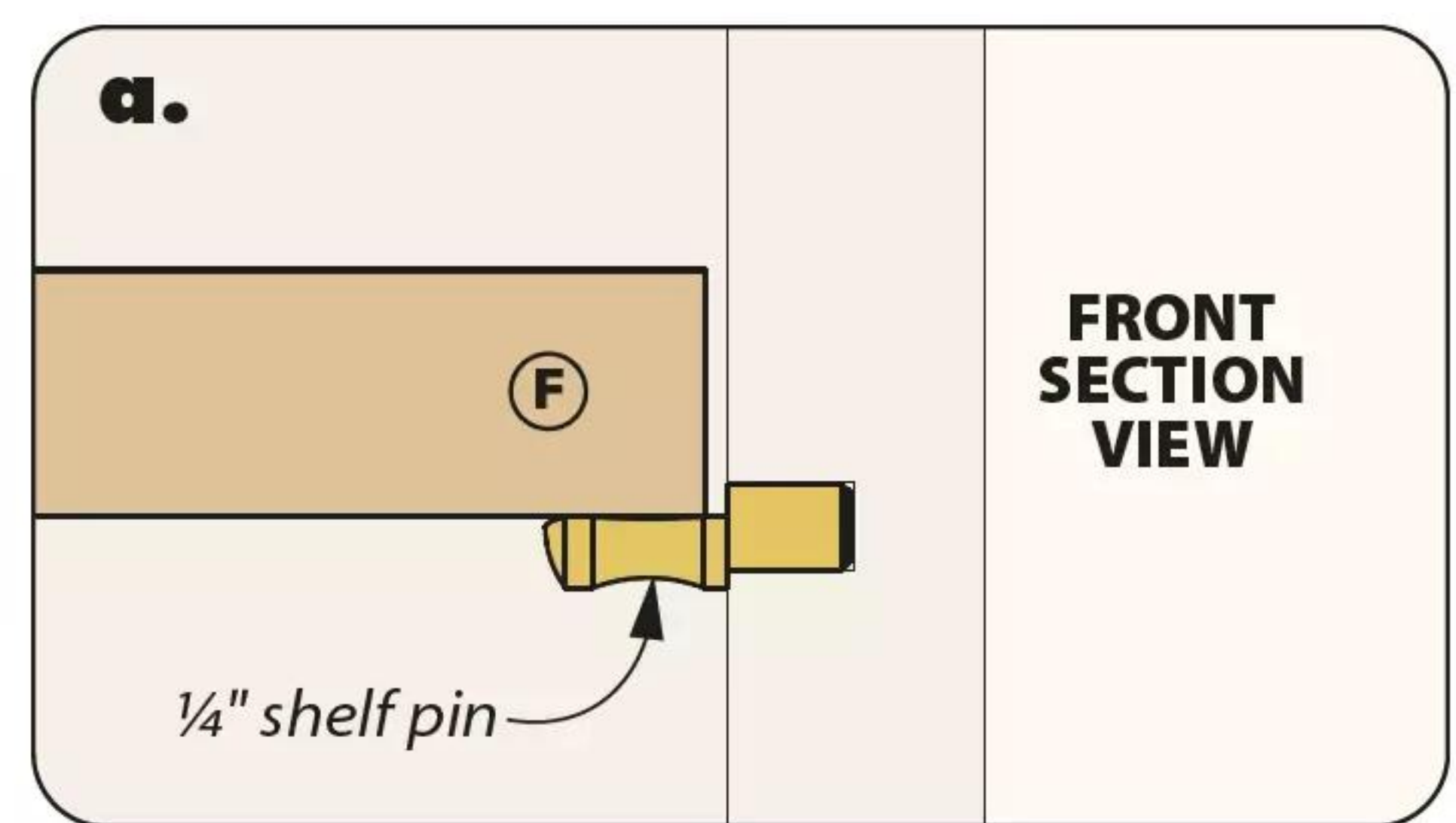
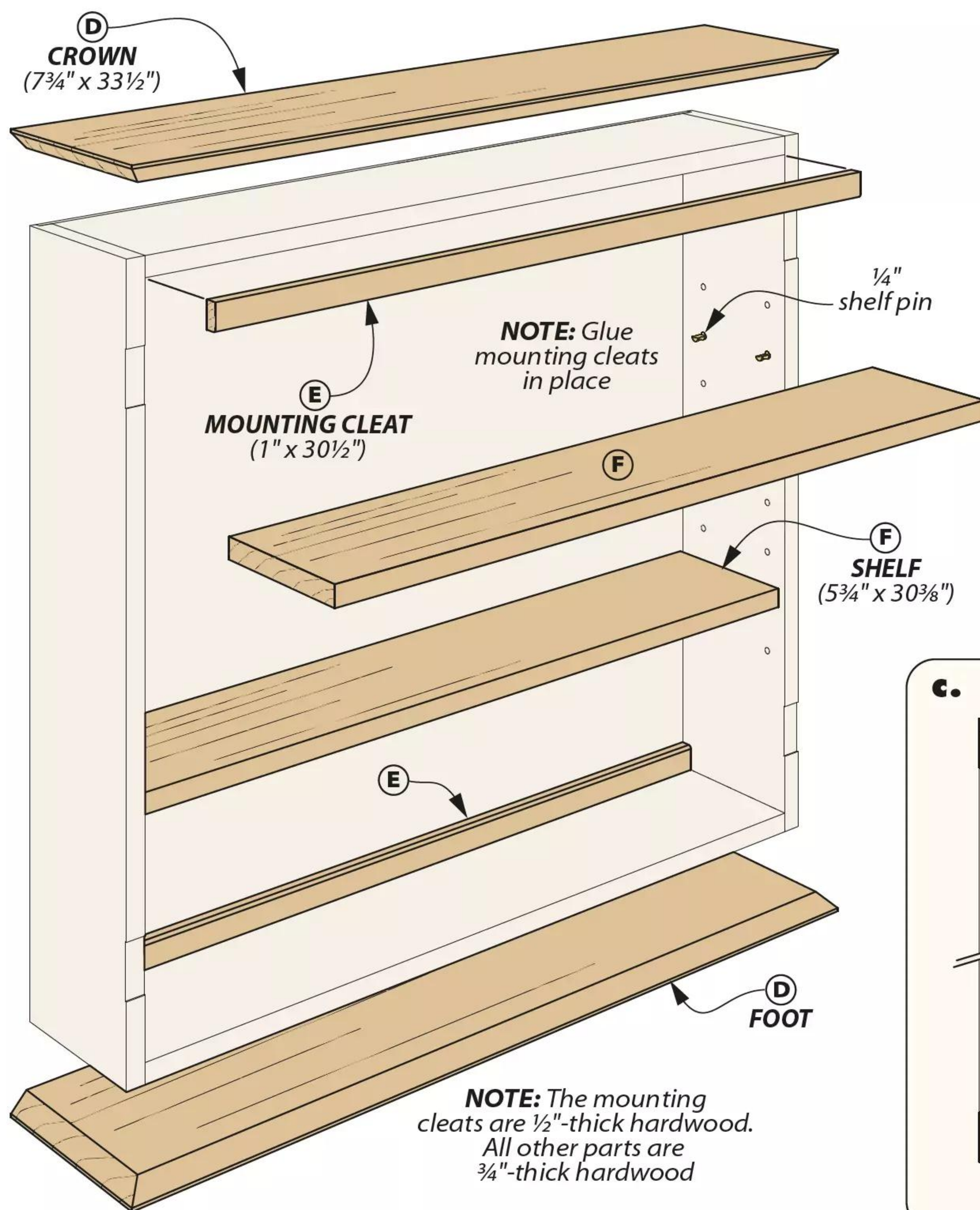
Once you've moved the jig to the ends of the top (and bottom) you can drill those holes a touch over 1" deep. Now you can bring in the dowels (the 1 1/2" pre-made versions). Also, let's not forget to cut the plywood back to size. With that you'll be ready to glue up the case.

GLUE UP. Take a moment to gather all the accessories you'll need for a successful glueup. (For me this mostly means a bowl of warm water to clean up my mess.) Then get 'er done.

SHELF PIN HOLES



Quick & Accurate. Using the drill press ensures that the shelf pin holes are square to the face of the sides.



Complete the CASE & DOORS

Next up is completing the case of the cabinet. This involves adding a crown and foot to the case, two mounting cleats, and the adjustable shelves. Then we'll make the door frames that highlight the lattice and shoji.

CROWN & FOOT. In theory, the cabinet could go without the foot and crown parts you see in the main drawing above. But the stately look these two parts provide is worth the modest effort required to add them to the project. Plus, if you don't hang the cabinet on the wall, the foot will stabilize it.

Start at the table saw cutting the boards to size. Then you'll

need to tilt the saw blade to 45° and cut the bevel on the front and sides of both boards, (detail 'b' and 'c' show this). Detail 'b' also shows that you need to leave a small flat along the outer edge of both pieces. When the cutting is done, sand out any blade marks that might have been left behind. To complete this stage, glue the pieces flush to the back of the case and centered side to side. Now you can tend to the mounting cleats.

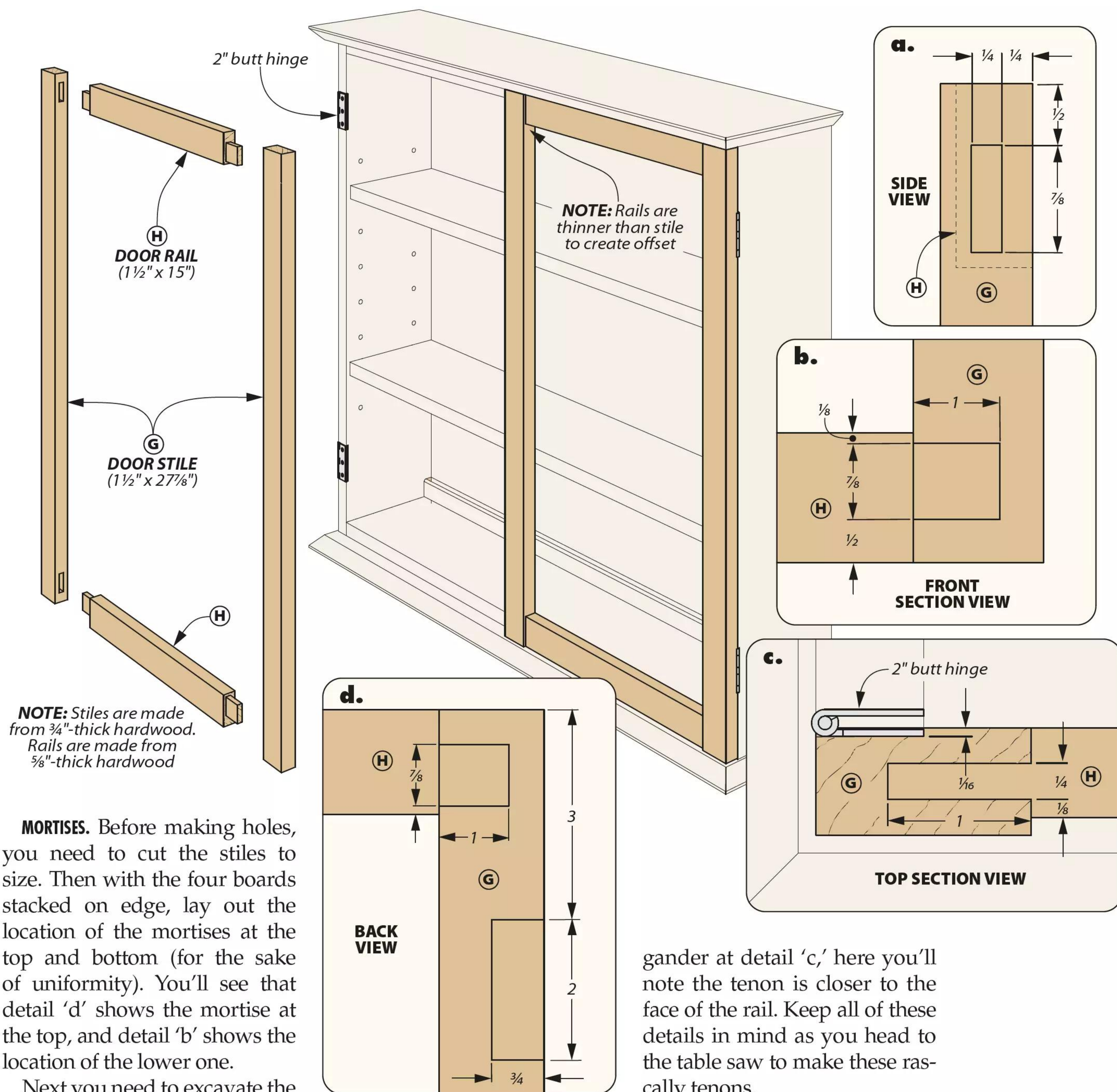
MOUNTING CLEATS. The two cleats you see in the main drawing and detail 'c' add rigidity to the cabinet and are the perfect surface for mounting screws if you intend to hang the cabinet on the wall. Once you've cut them to size, head to the router table and round over the outside

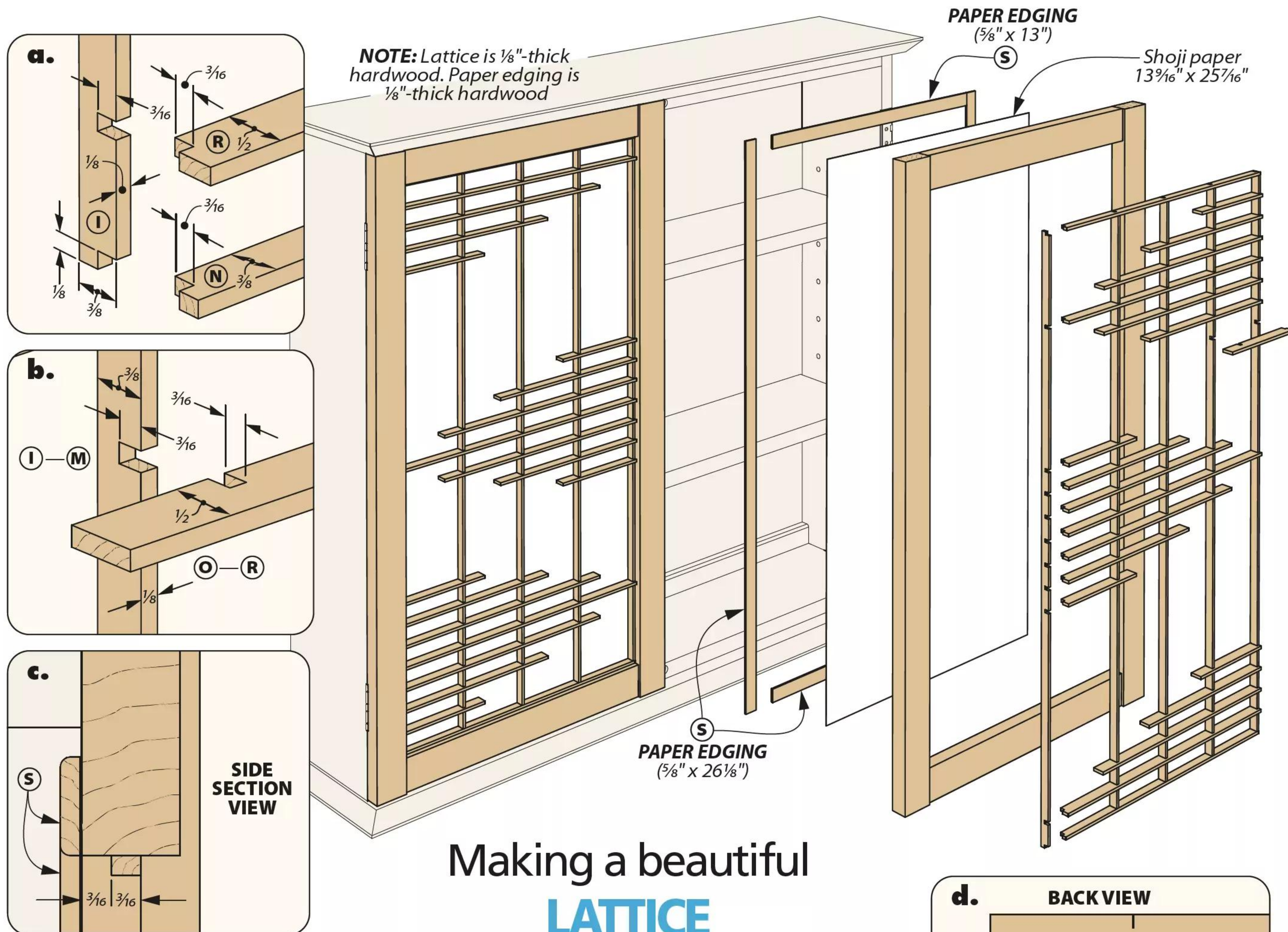
edge of both those little fellows. Then glue them in their proper place in the cabinet.

To complete the inside work of the cabinet you need to make the two adjustable shelves. After cutting them to size, ease the edges with sandpaper. Now it's on to making the doors.

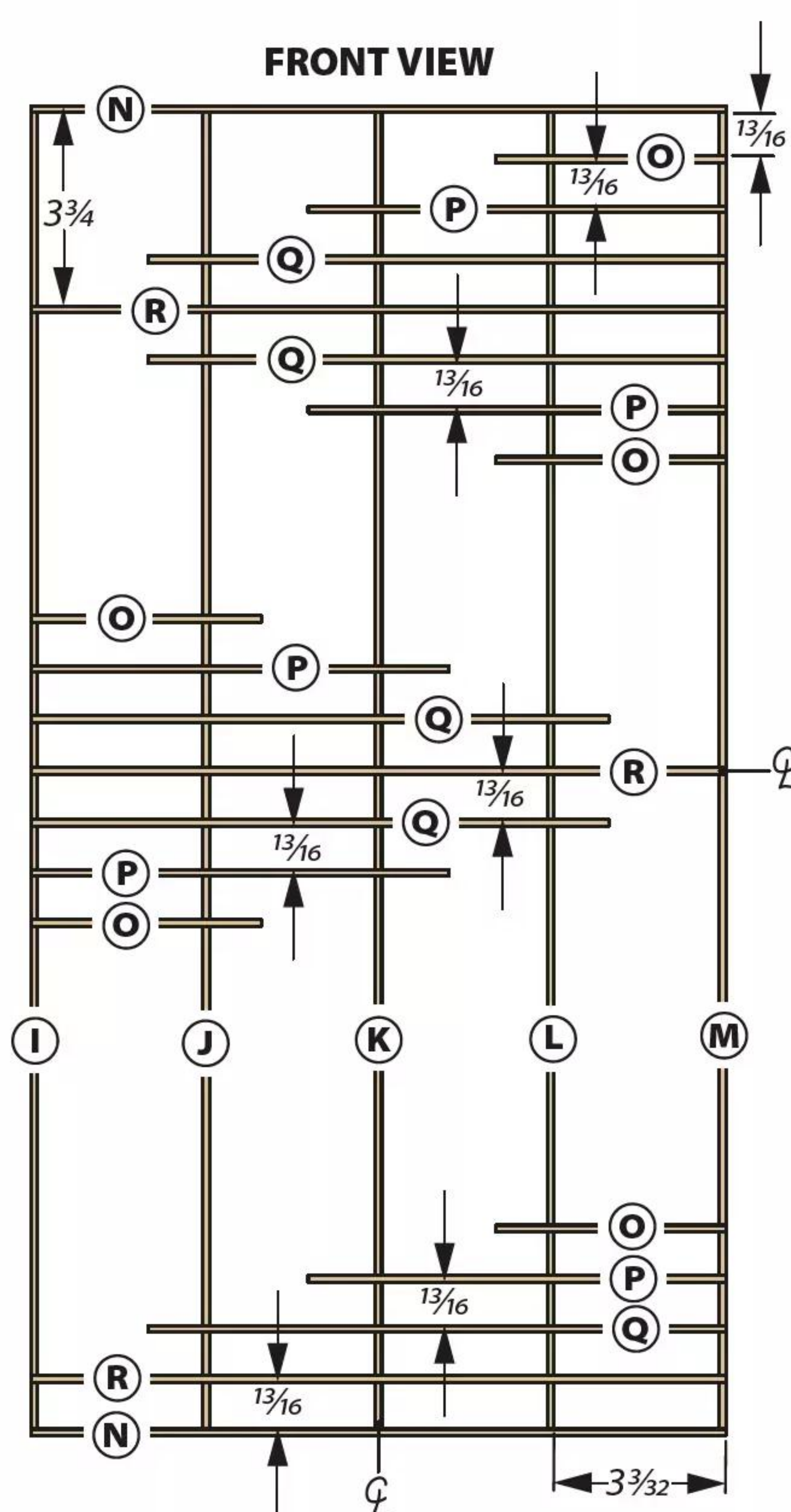
DOORS

In essence the doors are a stile and rail frame that hold the shoji screen and its backing paper. Although the doors are light, you still want solid, strong joinery holding them together. To fit that bill, generously sized mortise and tenons were called into play. They're shown on the next page in the main drawing and in various states in the details. First, let's consider the mortises.





Making a beautiful LATTICE



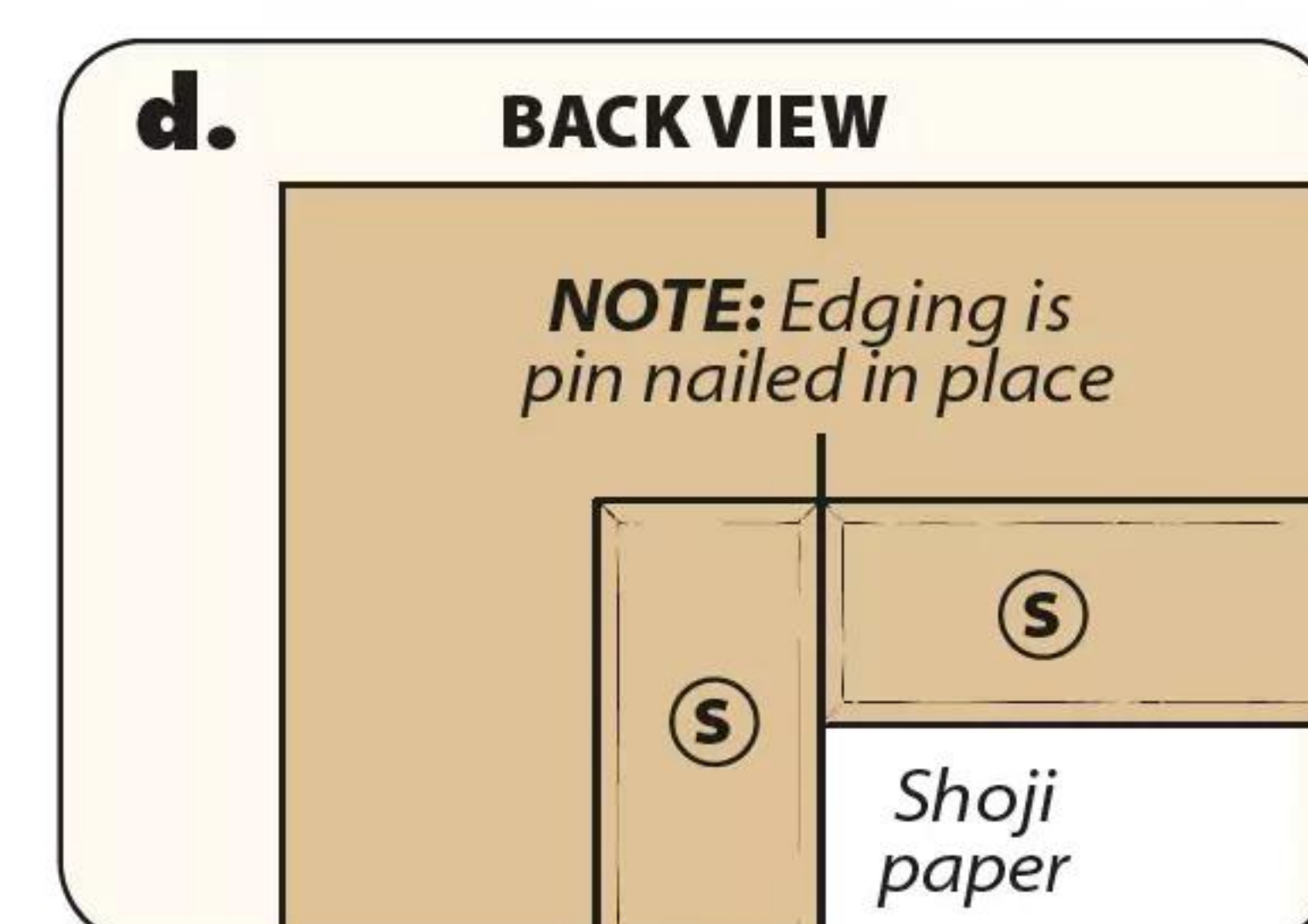
We've come to the icing on the cake — making the lattice that fits in the doors. Which is the prelude to draping the back side with shoji paper.

The Front View that you see to the left shows everything you need know — at first glance it might seem overwhelming, but let's break it down and take a closer look.

SIZE MATTERS. To start, all the pieces are $\frac{1}{8}$ " thick (it's the width that varies). All the vertical parts and the two that are the top and bottom border are $\frac{3}{8}$ " wide. These parts are the base of the lattice that the horizontal parts rest on.

The horizontal parts are all $\frac{1}{2}$ " wide. They reside above the base lattice frame and where the two layers intersect they're joined with half-laps.

THE PATTERN. If you look at the seven horizontal parts in the center of the grid you'll see what resembles an arrowhead. This pattern is flipped and repeated above and below the center one. The pattern above is a full



version, and the one below is half of the arrowhead.

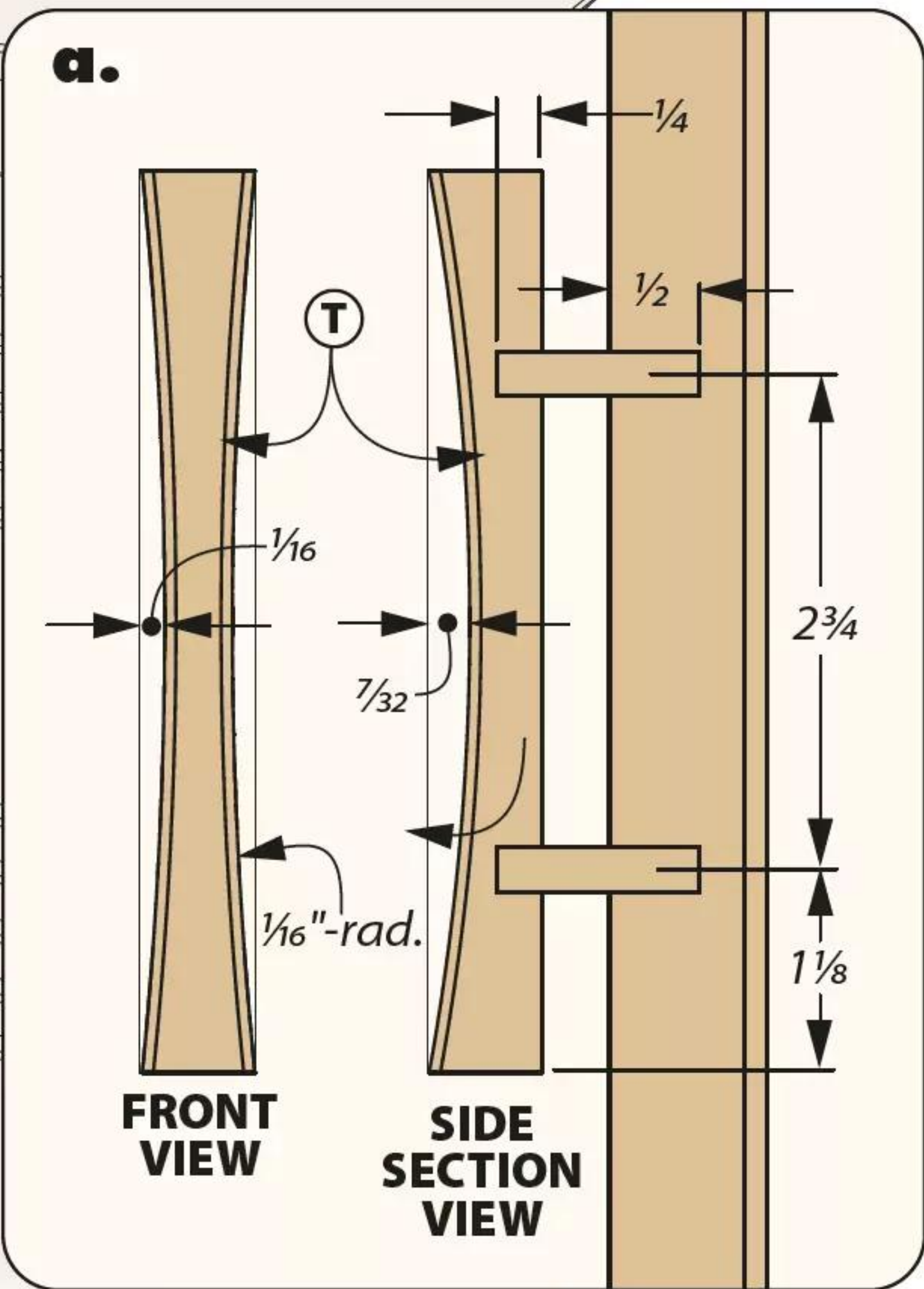
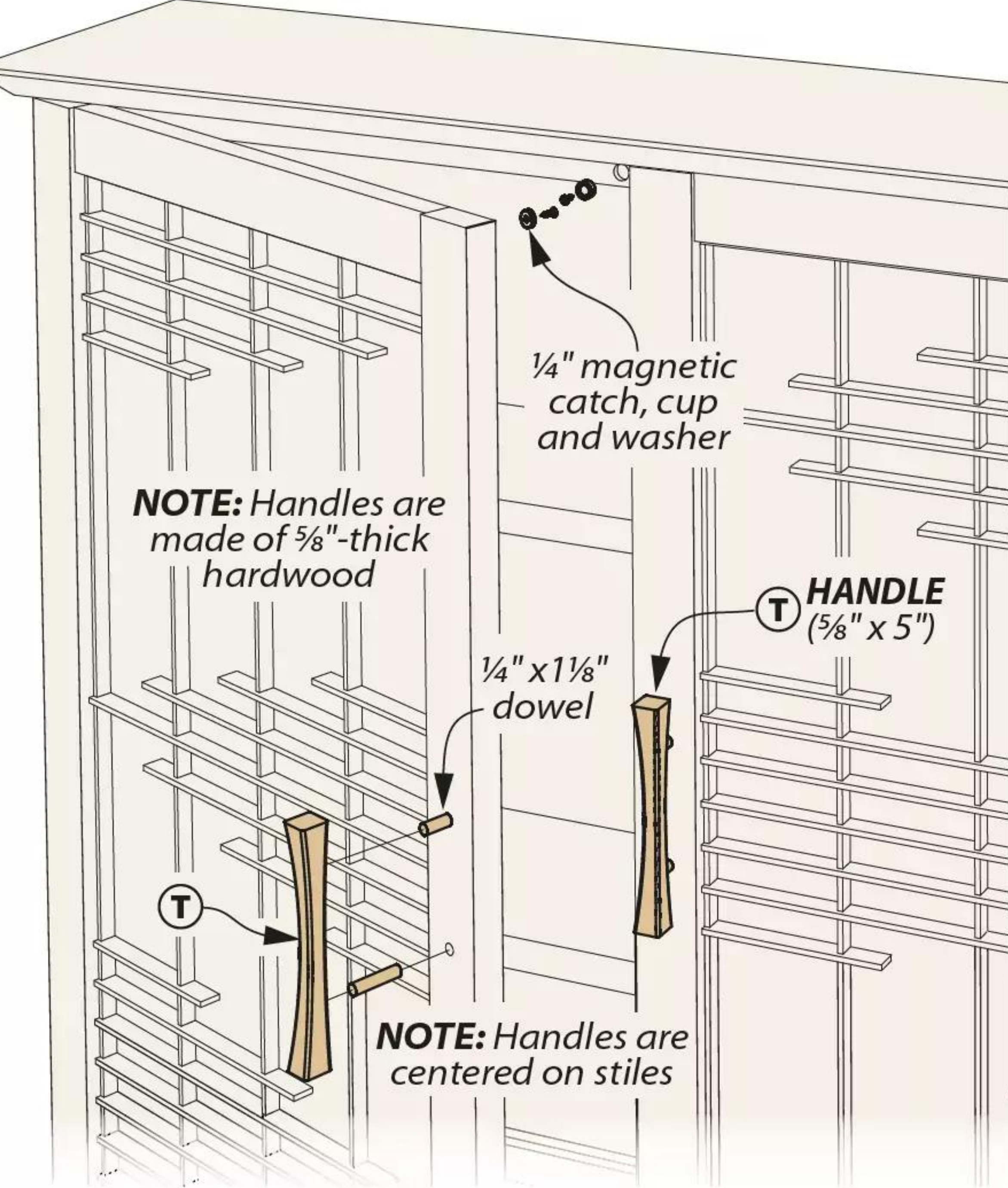
MAKE THE BASE. To get started, you'll make thin blanks in both widths (make extras of both). To keep things in order I made a square "L" shaped bracket out of $\frac{1}{4}$ " material to assemble the base lattice frame. Then I started cutting and fitting the pieces, using a flat-topped $\frac{1}{8}$ " blade in the table saw. Detail 'a' shows the cuts required to form the base lattice. Cut the half laps that join the top and bottom pieces to the vertical members. Don't glue up the base yet, hold them in place with low-tack tape. You need to locate the notches for the horizontal members.

LAYOUT TIME. To accurately locate the horizontal members I made a spacer

the width of the distance between them. Starting from the location of the “R” parts, use the spacer and an extra piece of lattice to mark the location of the half laps. When the layout is done, cut the half laps in the base, and glue it together. Then cut the notches in the horizontal members (detail ‘b’) and glue them in place.

Making the lattice grid for the other door is easy. It’s just a repeat of the first that’s spun 180° before pin nailing into the frame (detail ‘c’). Before installing the shoji paper, apply two coats of lacquer to the door and lattice.

THE SCREEN. To install the shoji paper lay the door face down on the bench and cut the paper oversized. Then apply double sided tape along the outer edge of the screen. Placing the paper accurately on the door is a four-handed operation. The first two hands lower the paper onto the tape along the outer stile. The other two hands hold the



paper taut while the first two are pressing the paper in place along the rails moving towards the inner stiles. Then it’s just a matter of trimming the paper and pin-nailing the paper edging in place (detail ‘d’). You’ve already done the mortises for the hinges, you can install those now. It’s time for the handles.

HANDLES

The handle starts as a $\frac{5}{8}$ "-square, extra-long blank (detail ‘a’). I used a flexible ruler to draw the arc profiles on the sides and top edge. After shaping, smoothing, and installing the handle, the magnetic catches are the last item to add. This jewel of a cabinet is now ready for its new home. **W**

Materials, Supplies & Cutting Diagram

A Sides (2)	$\frac{3}{4}$ x $6\frac{1}{4}$ - 28	I-M Vertical Lattice (10)	$\frac{1}{8}$ x $\frac{3}{8}$ - $24\frac{7}{8}$	• (20) $1\frac{3}{8}$ "-dia. x $1\frac{1}{2}$ " Dowels
B Top/Bottom (2)	$\frac{3}{4}$ x 6 - $30\frac{1}{2}$	N Border Lattice (4)	$\frac{1}{8}$ x $\frac{3}{8}$ - 13	• (8) $\frac{1}{4}$ " Shelf Pins
C Back (1)	$\frac{1}{4}$ ply. - $31\frac{1}{2}$ x 28	O Lattice 1 (10)	$\frac{1}{8}$ x $\frac{1}{2}$ - $4\frac{5}{16}$	• (2 pr.) 2" Butt Hinges w/screws
D Foot/Crown (2)	$\frac{3}{4}$ x $7\frac{3}{4}$ - $33\frac{1}{2}$	P Lattice 2 (10)	$\frac{1}{8}$ x $\frac{1}{2}$ - $7\frac{13}{16}$	• (4) $\frac{1}{4}$ "-dia. x $1\frac{1}{8}$ " Dowels
E Mounting Cleats (2)	$\frac{1}{2}$ x 1 - $30\frac{1}{2}$	Q Lattice 3 (10)	$\frac{1}{8}$ x $\frac{1}{2}$ - $10\frac{13}{16}$	• (4) $\frac{1}{4}$ " Rare-Earth Magnets
F Shelves (2)	$\frac{3}{4}$ x $5\frac{3}{4}$ - $30\frac{3}{8}$	R Lattice 4 (6)	$\frac{1}{8}$ x $\frac{1}{2}$ - 13	• (4) $\frac{1}{4}$ " Magnet Cups
G Door Stiles (4)	$\frac{3}{4}$ x $1\frac{1}{2}$ - $27\frac{7}{8}$	S Paper Edging (2)	$\frac{1}{8}$ x $\frac{5}{8}$ - 160 rgh.	• (4) $\frac{1}{4}$ " Washers w/screws
H Door Rails (4)	$\frac{5}{8}$ x $1\frac{1}{2}$ - 15	T Handles (2)	$\frac{5}{8}$ x $\frac{5}{8}$ - 5	• (2) 16" x 30" Sheets of Shoji Paper

$\frac{3}{4}$ " x $6\frac{1}{2}$ " - 96" Cherry (4.3 Bd. Ft.)



$\frac{3}{4}$ " x 8" - 96" Cherry (5.3 Bd. Ft.)



$\frac{3}{4}$ " x $6\frac{1}{2}$ " - 96" Cherry (4.3 Bd. Ft.)



$\frac{3}{4}$ " x $7\frac{1}{4}$ " - 48" Cherry (2.4 Bd. Ft.)



$\frac{3}{4}$ " x 6" - 30" Cherry (1.3 Bd. Ft.)



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



Softwood Tool Tote

Classic yellow pine and traditional joinery come together to create a functional and attractive way to haul your tools around the shop.

Whether it's the initial layout work or the final assembly, there are plenty of times when a project calls for you to haul an armful of tools and hardware over to the workbench. At these points, a quality form of portable storage like the tool tote you see here is a great time-saver. Not only does it make for more efficient trips across the shop, but it also corrals bottles of glue, common sizes of screws, rolls of tape, pencils, and a bevy of other items that often end up strewn haphazardly around as you work.

PINE & WALNUT. While hardwood is the go-to choice for many of our projects, a softwood like yellow pine is better for a tote such as this. Pine offers beautifully figured grain, and, despite its softness, is a stable and strong option for toting around a weighty load of tools and hardware. A walnut handle tops off the tote, juxtaposing the pine and making for a smooth, comfortable grip.

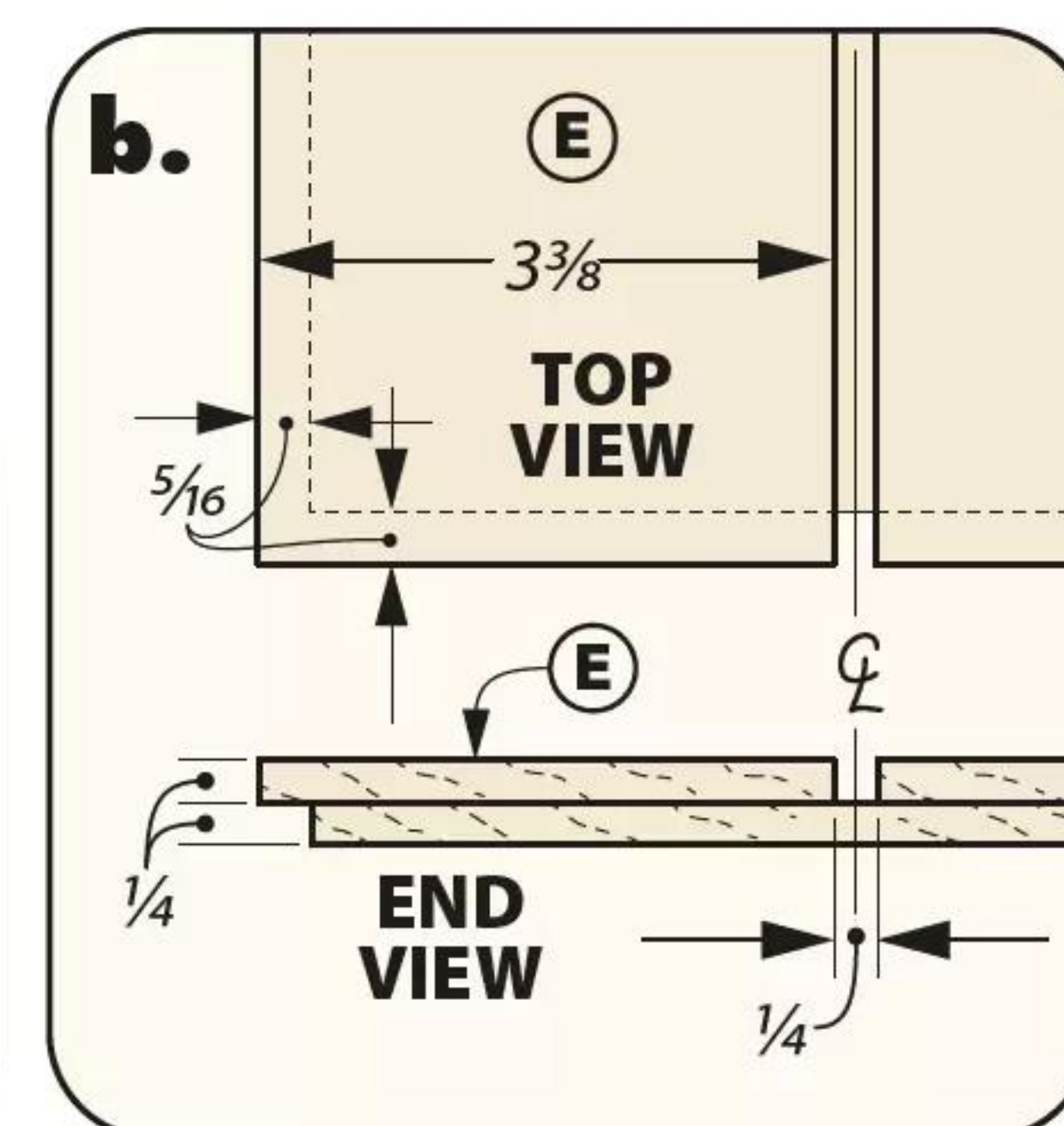
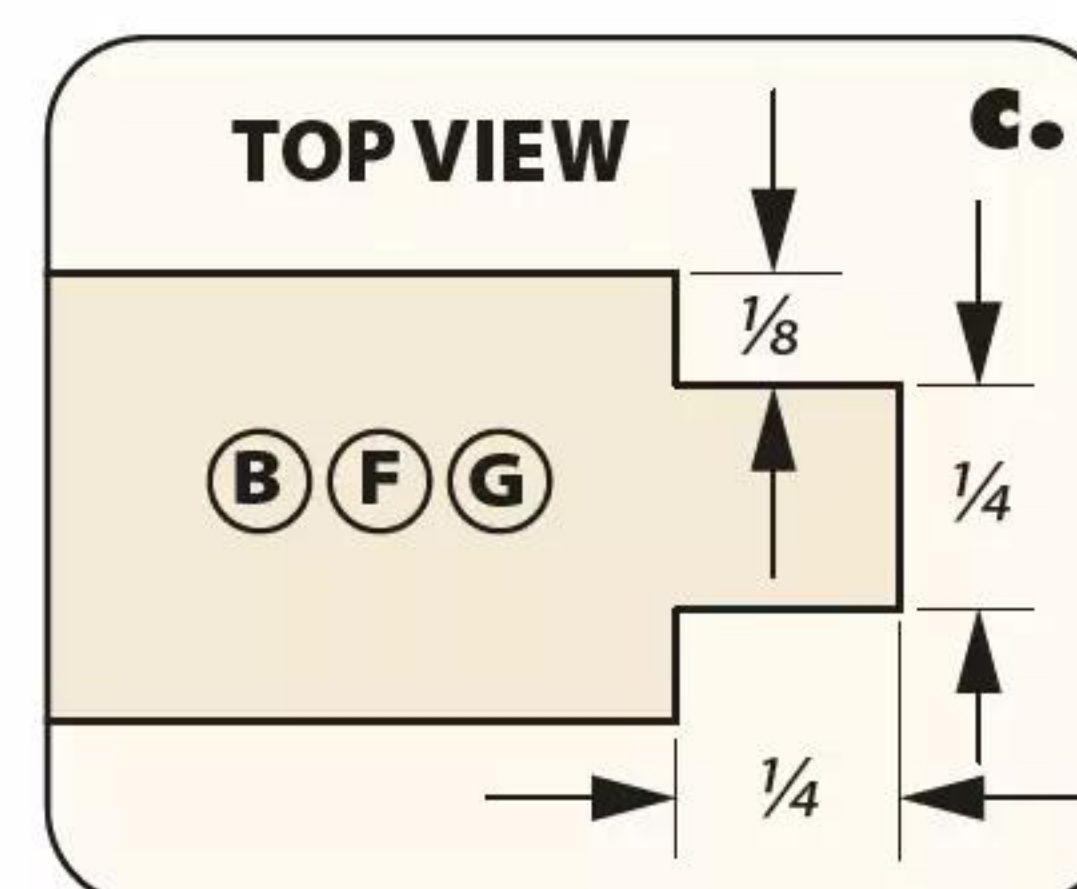
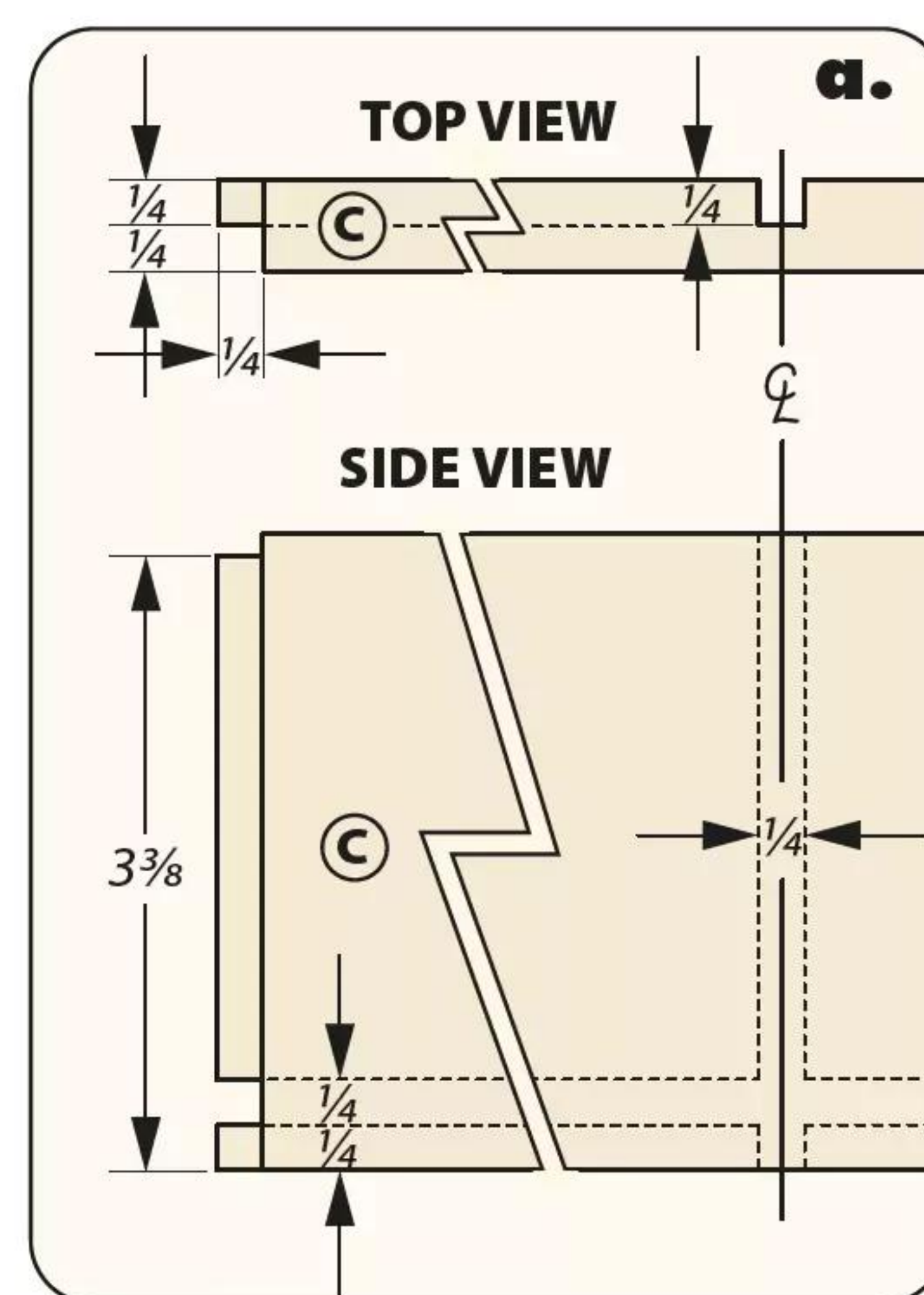
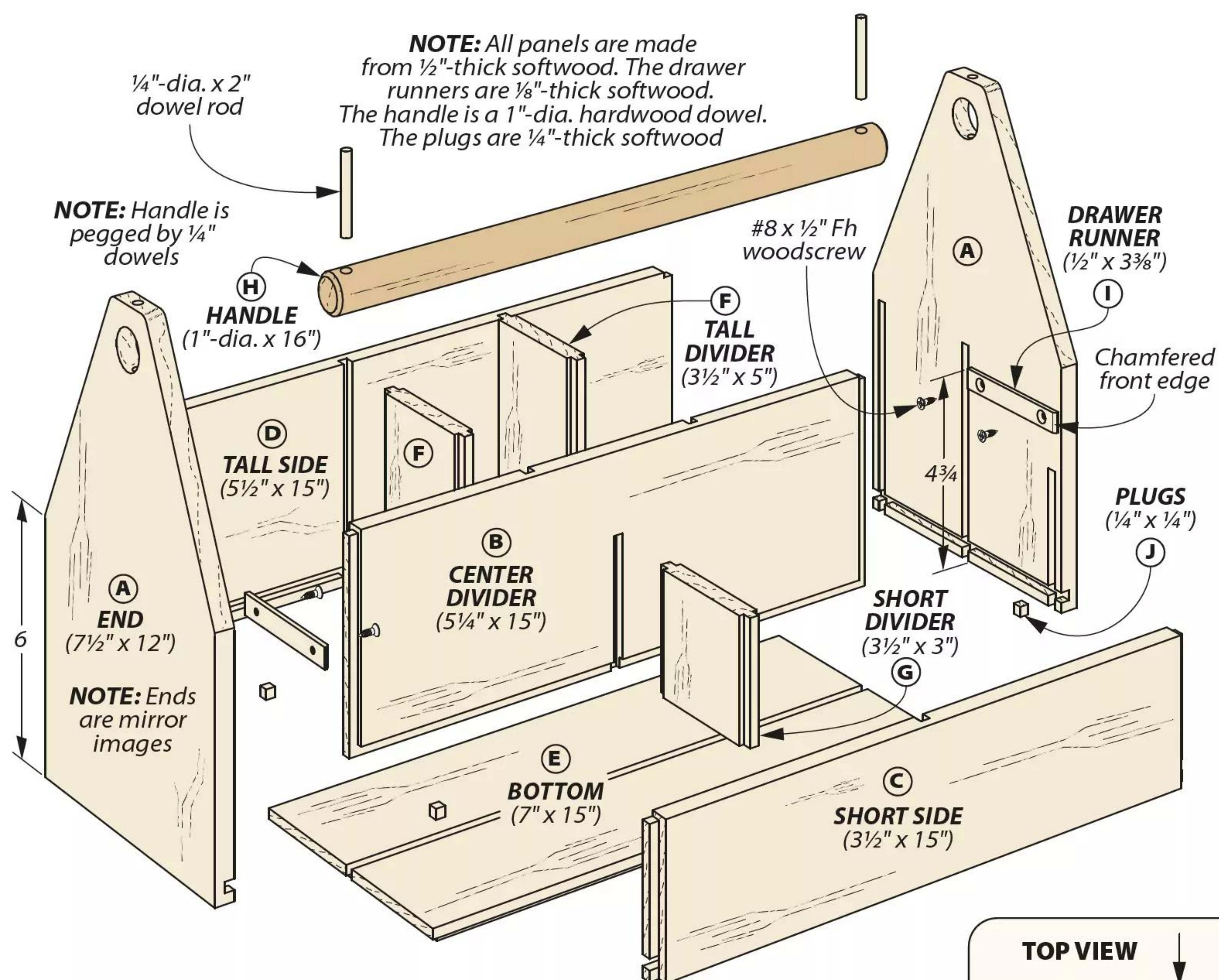
TONGUES & GROOVES. Tongue-and-groove joinery puts in the work on this project. These elementary joints are as reliable as ever, and because of their simplicity nearly all the joinery on this tote can be cut at the router table with only a straight bit. Keeping with the theme of simplicity, the narrow drawer is supported by wood runners, sliding along grooves in the drawer sides. These elements combine to create a tote that will come together quickly yet last you for years.



▲ Wood runners support a drawer with tongue and dado joinery, making for simple yet effective storage for smaller pieces of hardware like screws and washers.



▲ Dividers slot into dados without glue, allowing you to adjust the size of the tote's cubbies for large or small tools as needed.



Beginning with the TOTE CASE

This handy tool tote is a master-class in fundamental joinery. Tongues, grooves, and dados will be doing the work here, interlocking the pieces together.

ENDS. As you can see in the drawings above, most of the parts are sandwiched between the ends. This makes a great

place to start. After cutting them to size, head to the drill press to make the holes for the handle.

STOPPED DADOES. I cut the joinery for the ends (shown in detail 'd' on the opposite page) exclusively at the router table. First, I cut stopped dados for the sides and divider. The box on the

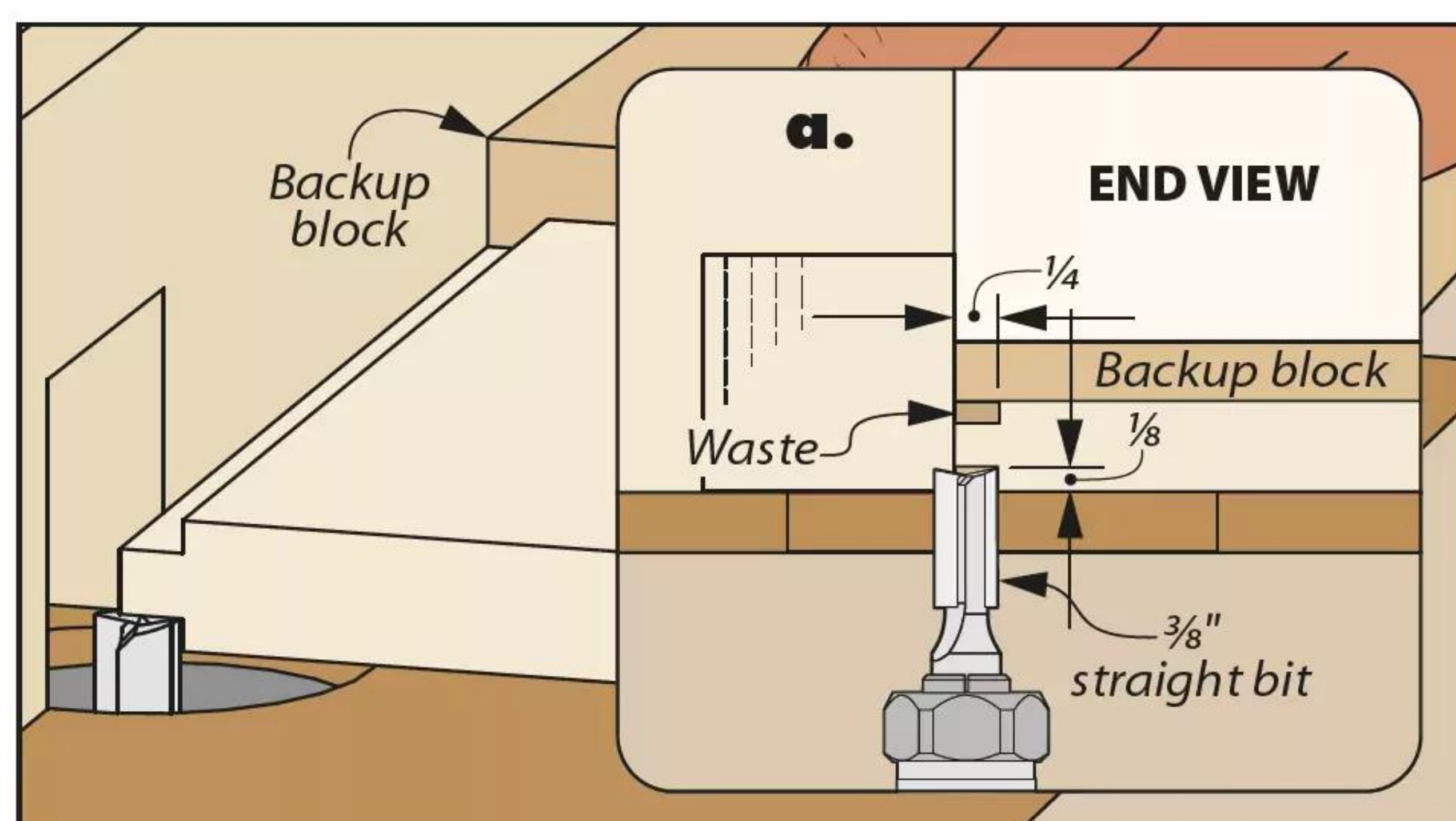
following page shows how I did this. Finish the dados by squaring their ends with a chisel.

You'll also need to cut the upper corners to create the triangular tops. I made the initial cuts at the band saw, refining the profile at the edge sander. Let's set these pieces aside — we'll get back to them later.

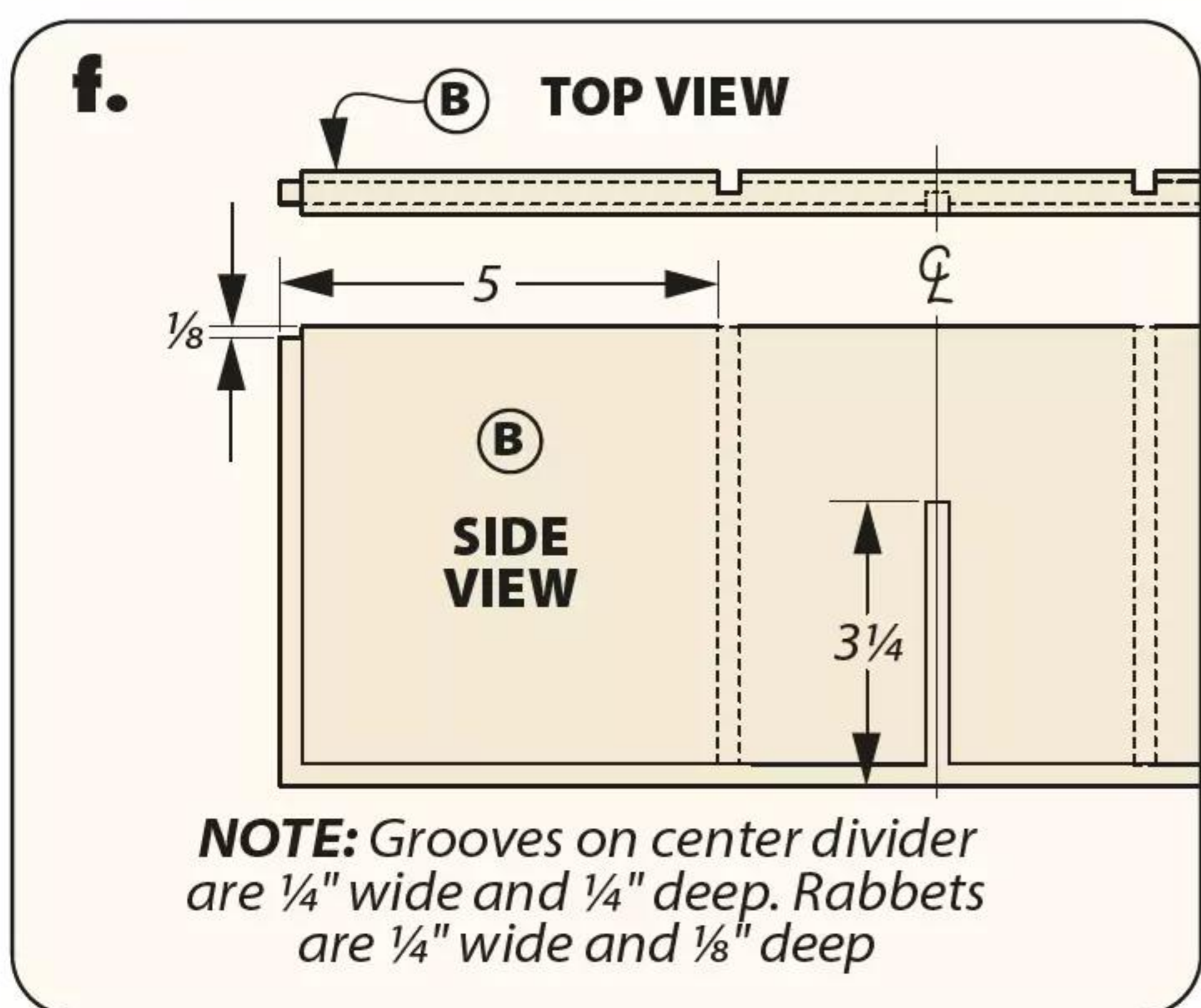
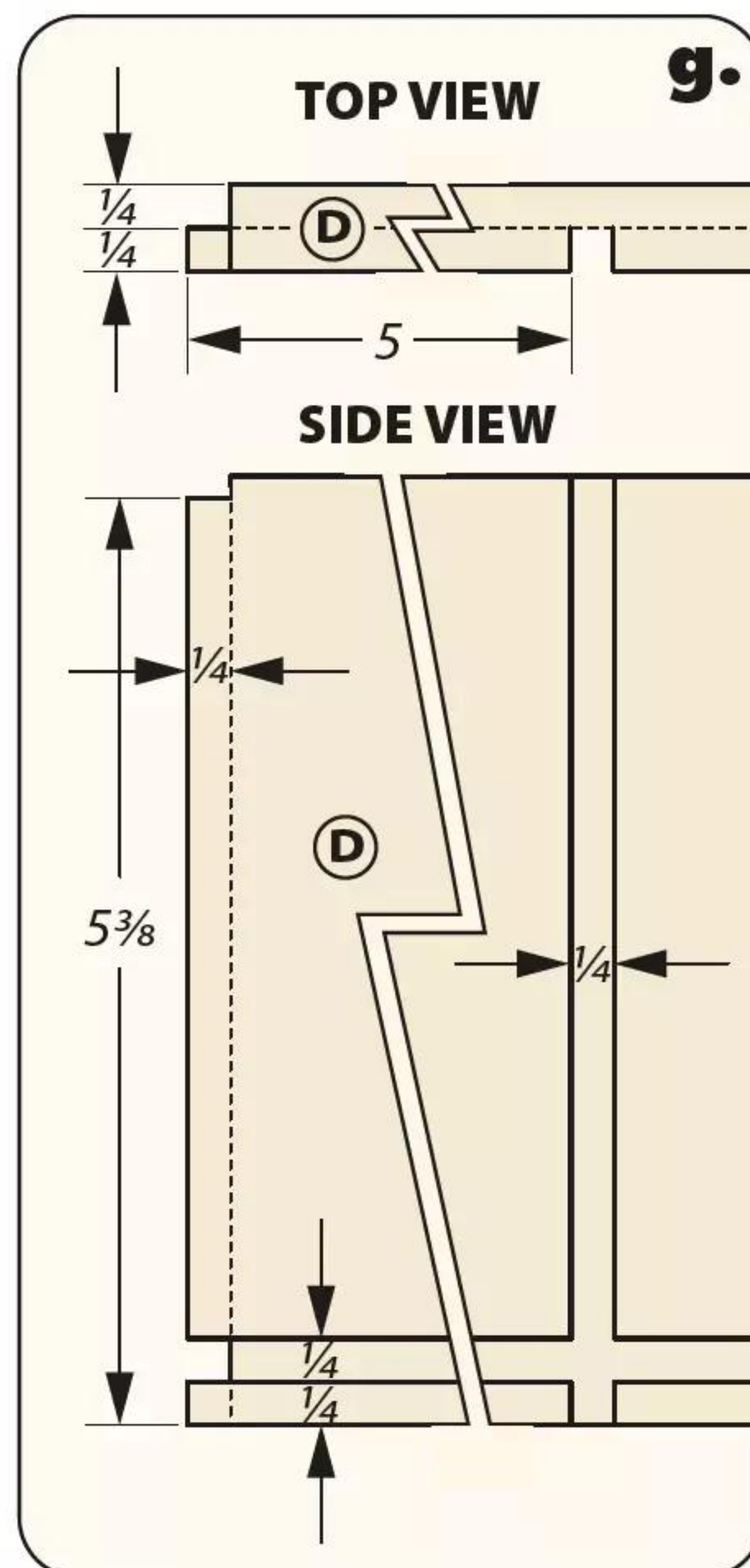
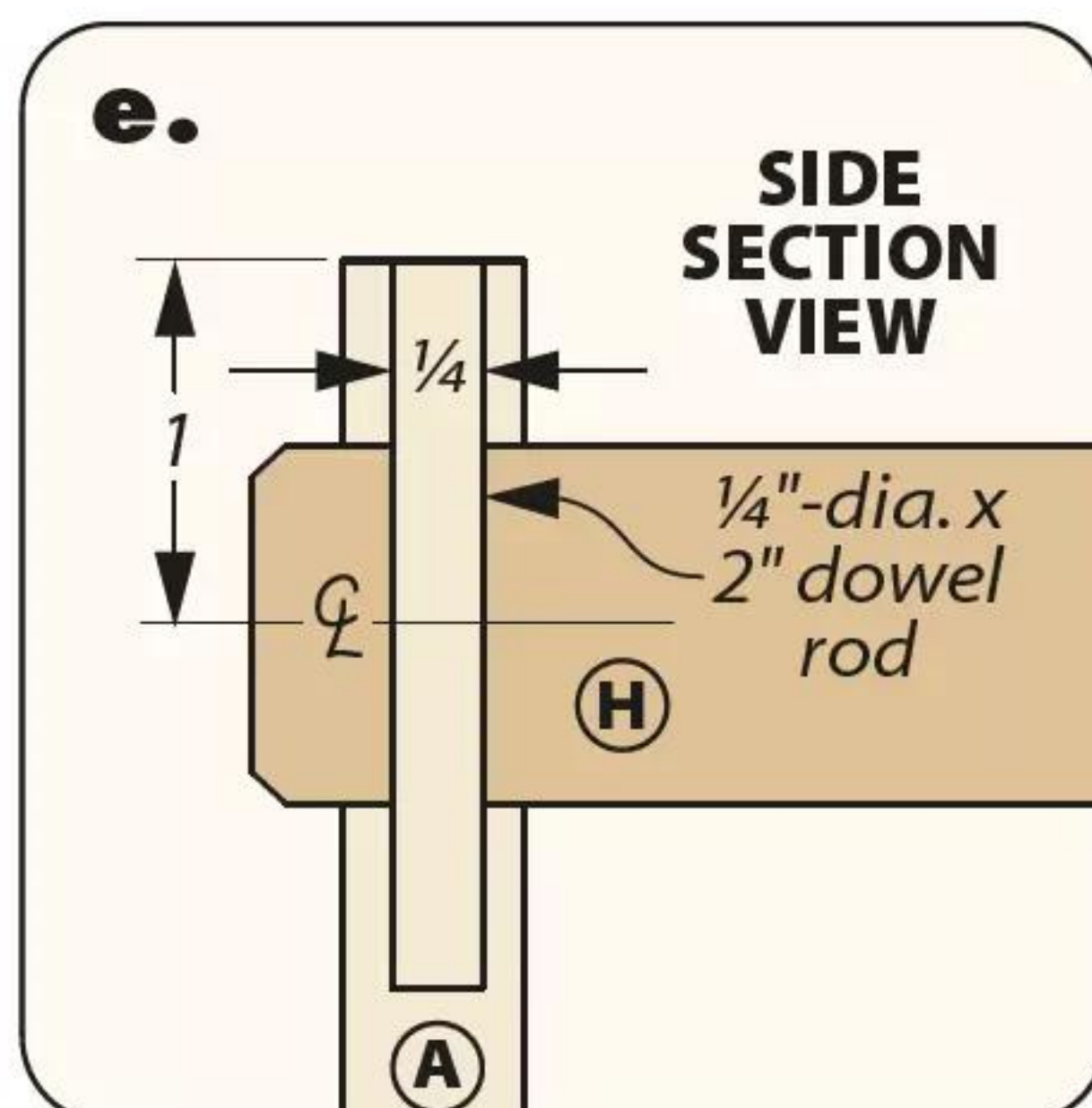
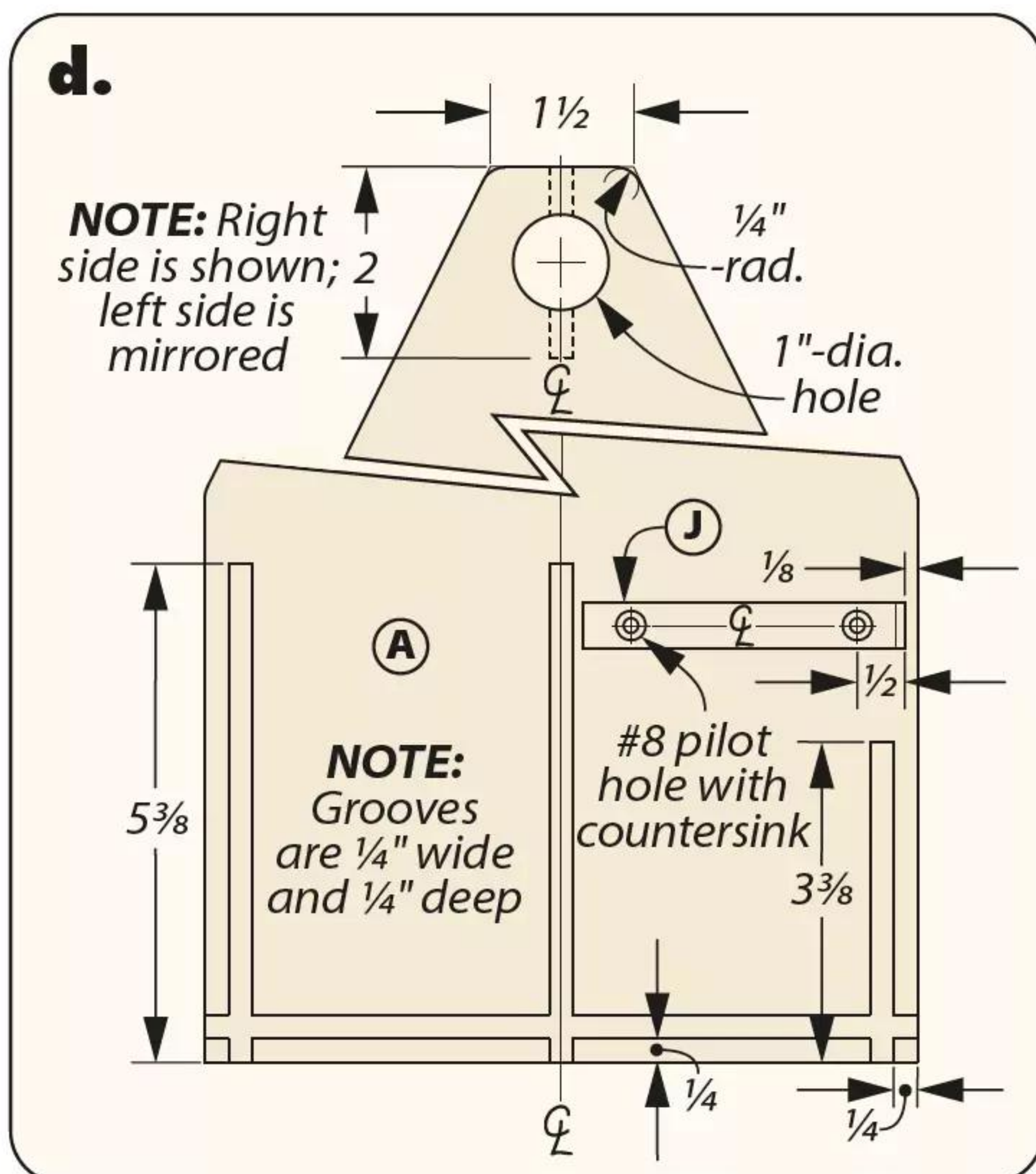
CENTER DIVIDER. The next piece on our list is the center divider that's shown in detail 'f,' next page. Rabbets on three sides form a tongue. You can see how I cut these at in the box at left. The tongues have a notch at the top, creating shoulders. To make these, lower the straight bit and nibble out the notch, supporting the workpiece with a tall fence on a miter gauge or a backer block.

Meanwhile, two through dados and a stopped dado will accept the smaller dividers.

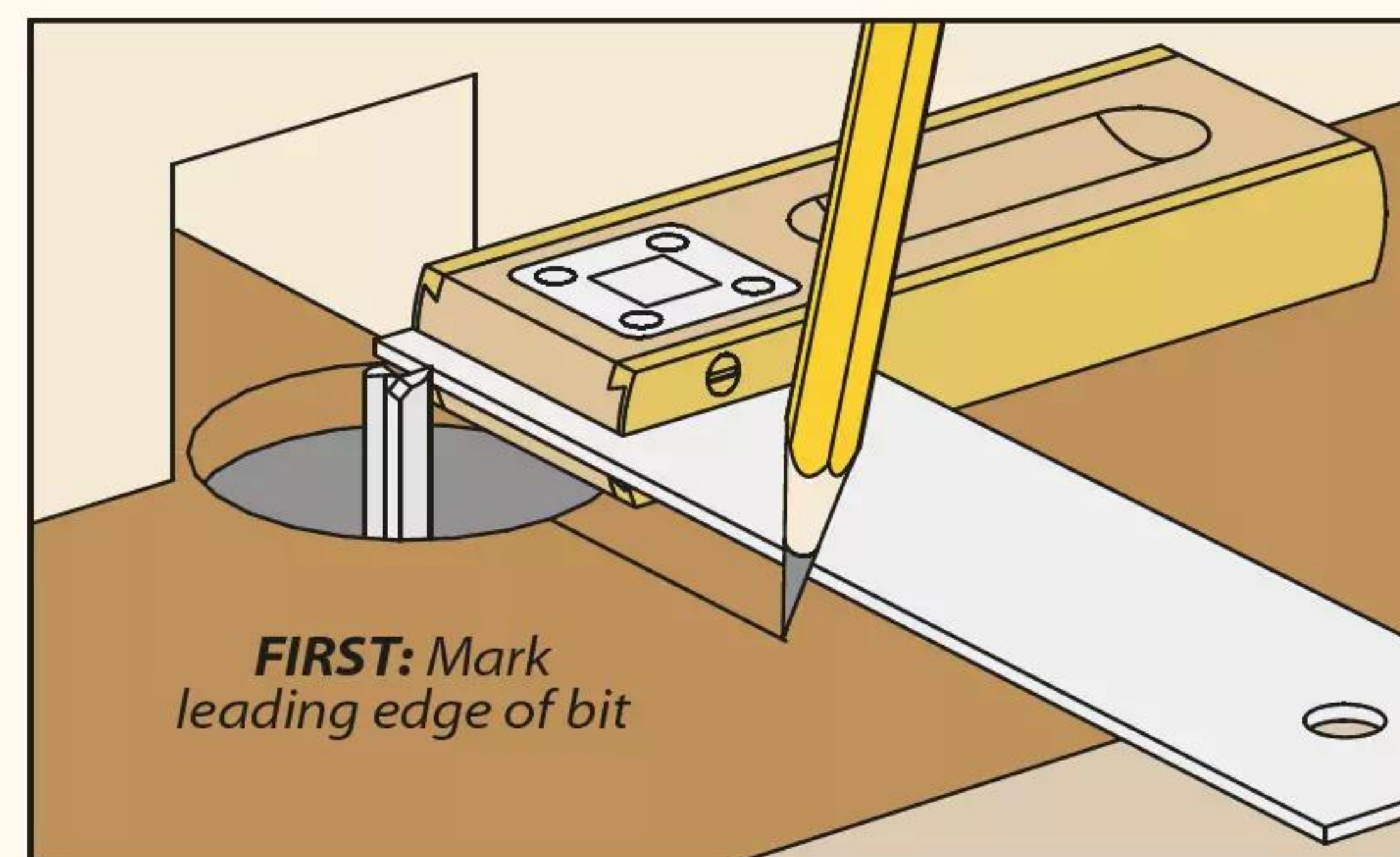
ROUTING THE TONGUES



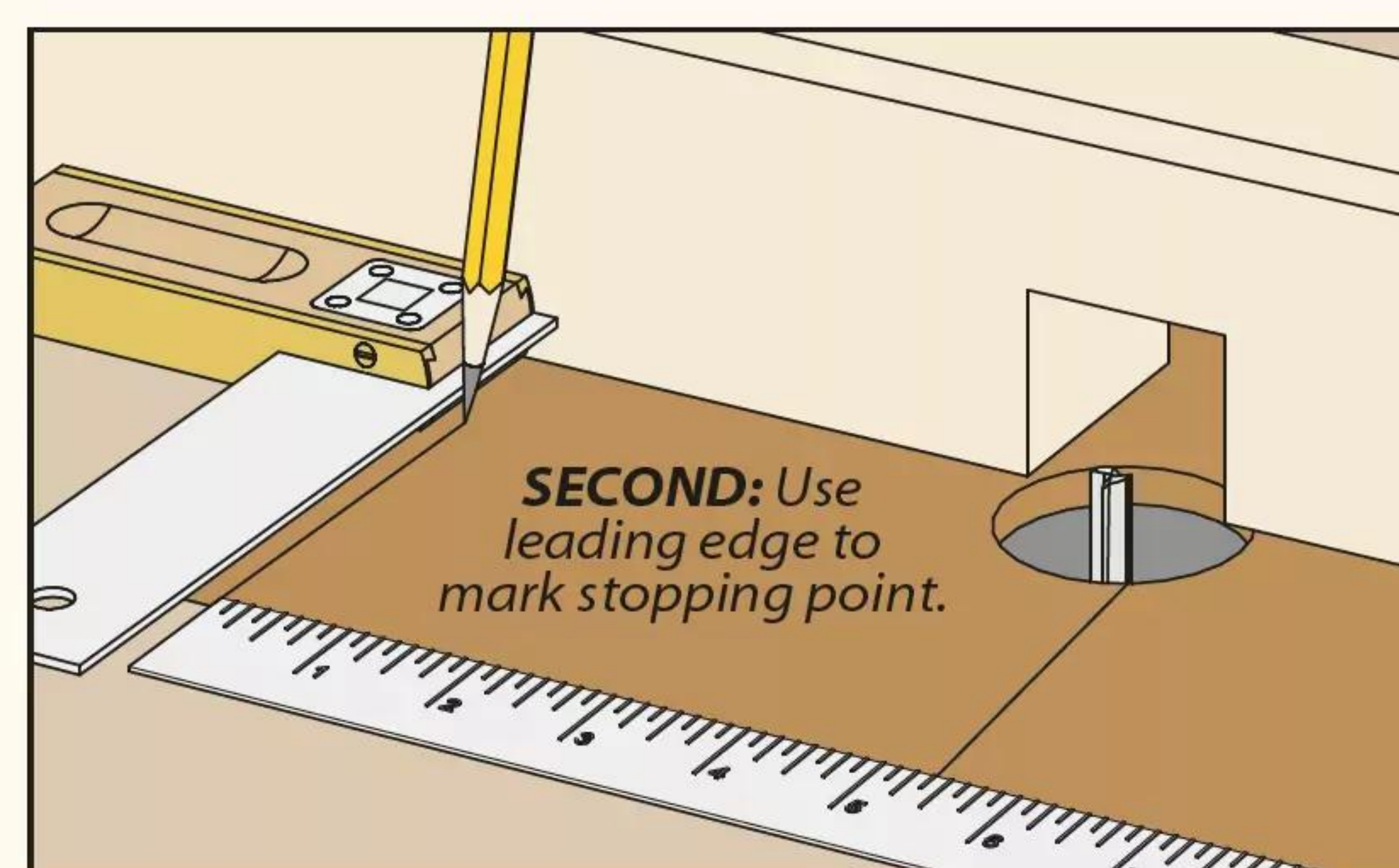
Routed Rabbets. The tongues on many of these pieces are made by cutting rabbets on either side of the edge. To do this, I used a straight bit at the router table. Using a backup block helps to support the workpiece and prevent chipout on the back end.



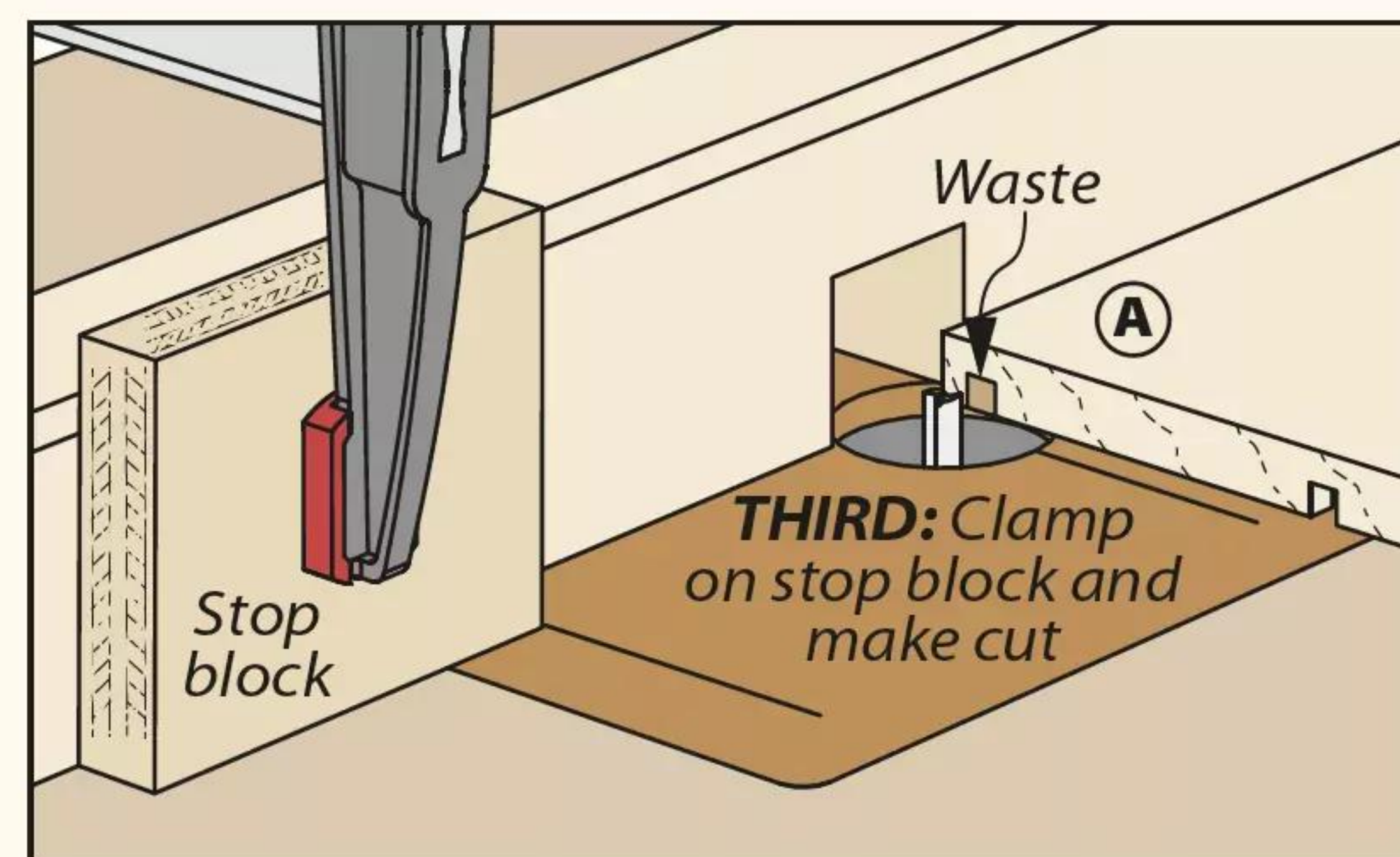
STOPPED DADOES



Leading Edge. Set the fence to the desired distance from the bit, then use a square to mark the leading edge of the bit on the table.



Stopping Point. Measure the length of the dado from the leading edge line and mark the stopping point with a square against the fence.



Route the Dados. Use a stop block when making the cuts. This will ensure each dado is precise and identical on each end.

Cut the stopped dado as you did on the end pieces.

SIDES. The next pieces are the sides. With the exception of their width, these pieces are identical. You can see the joinery in details 'a' on the previous page and 'g' above. I began by routing the dados for the dividers.

From there, the sides need a rabbet at either end. This creates the tongues that will fit into the end pieces. After routing those, set the fence to cut the grooves for the bottom, then cut them on the sides as well as the ends.

BOTTOM. The last part of the case is the bottom panel. This piece is softwood as well, with a tongue on each edge to fit into the grooves you just cut in the surrounding pieces (detail 'b'). These are made by rabbeting the perimeter. Finish up the piece by cutting a groove down the center to accept the center divider.

INTERIOR & ASSEMBLY

The pieces you've made so far form the main body of the tote. However, there's plenty going on within as well, beginning with the dividers.

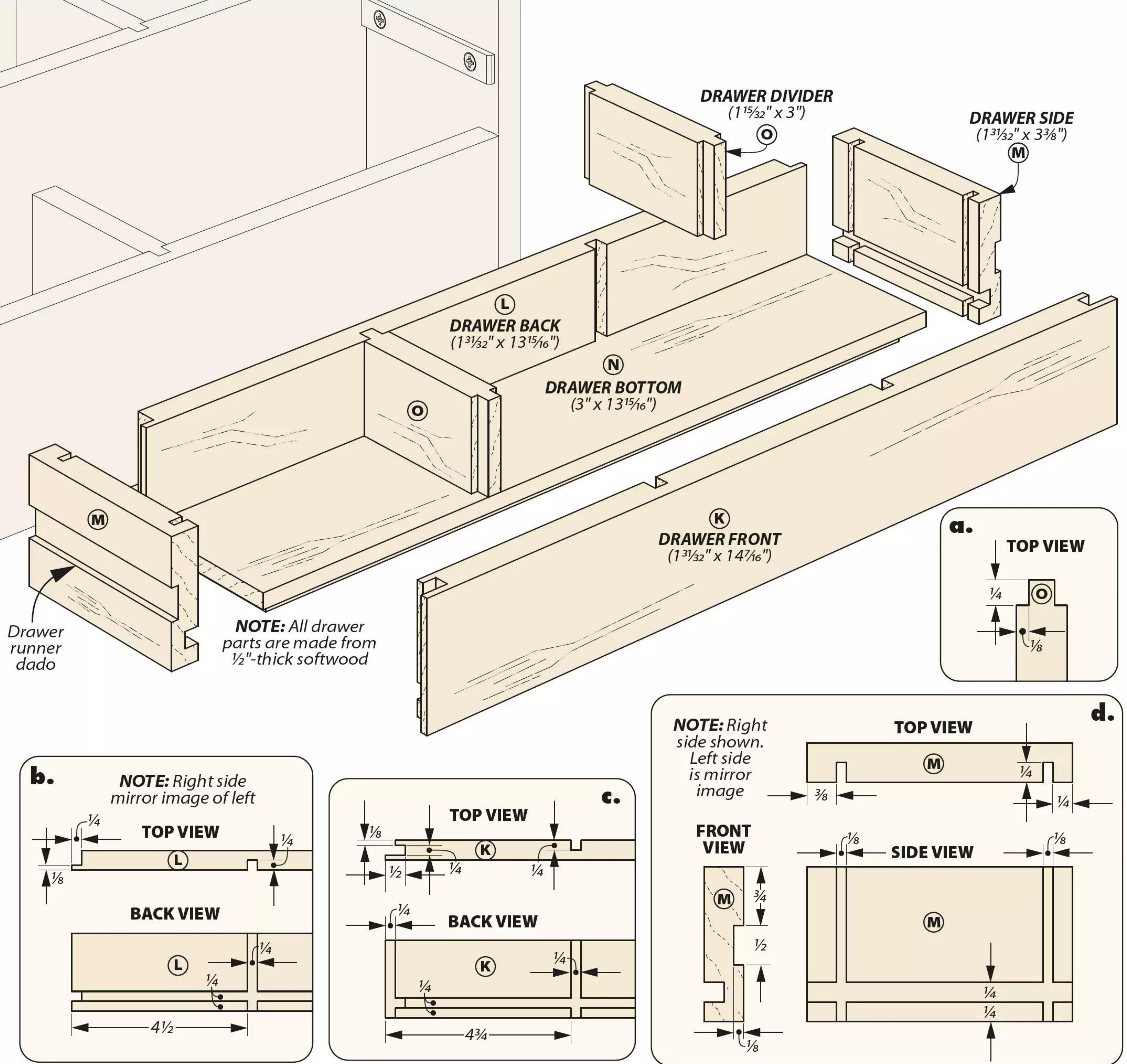
INTERIOR DIVIDERS. The interior dividers come in two sizes: two tall and one short. Each has a rabbeted tongue on either edge.

DRAWER RUNNERS. A pair of softwood runners guide the drawer (detail 'd'). I sanded a slight chamfer on the front ends of these pieces to make it easier to insert the drawer. The runners are screwed on, but I used a bit of CA glue first to stick them in place while I installed the screws.

HANDLE. The final piece to make is the handle. After cutting the dowel to length, sand a chamfer on each end. Now you're ready to put things together.

ASSEMBLY. Begin the glueup at one end, fitting in the center

divider and bottom, inserting the short divider, then bringing the sides around and capping it off with the second end. Slip the handle in place and secure it with dowels (detail 'e'). The tall dividers will slot in place without glue. Finally, glue the plugs in and sand them flush once dry.



Finish with the **DRAWER**

The final element of this tote is the drawer. The drawer is long and thin to fit into one side of the tote. Grooves in the sides allow it slide along the runners. I chose to use a softwood bottom (rather than hardboard or plywood) to keep the look consistent. A locking rabbet joint makes for a strong and appealing front for the drawer — which is where I chose to begin this portion of the project.

DRAWER FRONT. Detail 'c' above shows what needs done on the

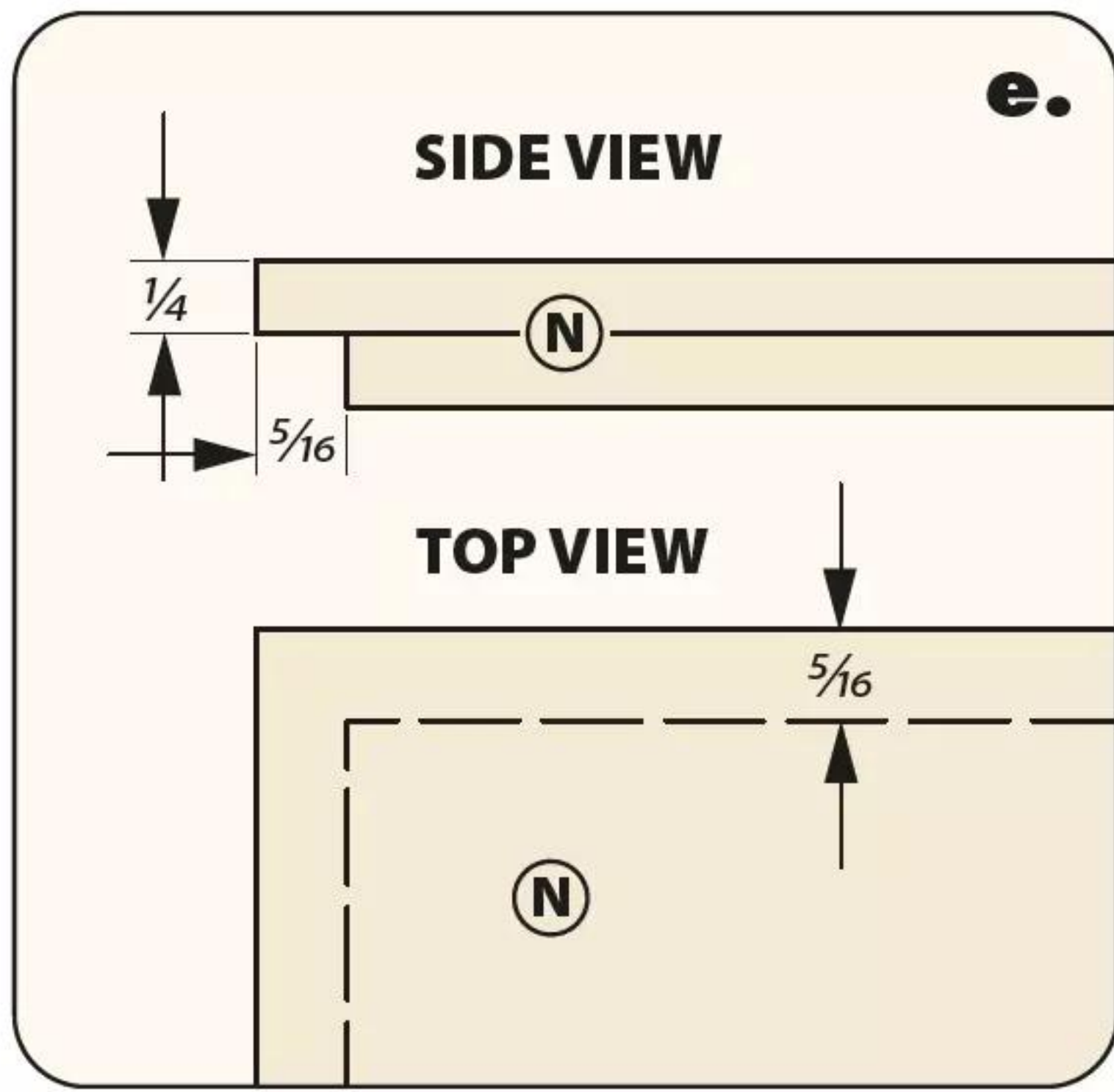
drawer fronts. After sizing the workpiece, I cut the through dadoes that accept the drawer dividers. However, I chose to wait on the groove for the bottom, as I find it better to cut all these grooves at once.

LOCKING RABBET. A locking rabbet joint is a classic choice for a drawer. It's a sturdy joint that remains hidden from the front while offering pleasant visual interest from above. The joint is made with just three cuts — you can see how they're made at the

router table in the box on the next page. Once that joint is in, set the front aside for now. We'll get back to it later.

DRAWER BACK. The back piece is nearly identical to the front, and it has the same through dadoes for the dividers as well. However, rather than a locking rabbet, a simple rabbeted tongue is all that's needed to join this with sides (detail 'b').

DRAWER SIDES. In this narrow drawer, the sides are rather small pieces, though they have



some integral joinery (detail 'd'). First is the two narrow dadoes in the inner face of each side. These accept the tongues on the front and back pieces. A single kerf from a flat-top blade at the table saw is enough here.

Next, you'll need to make the wide grooves along the outer face of each side. These allow the drawer to travel along the runners we installed earlier.

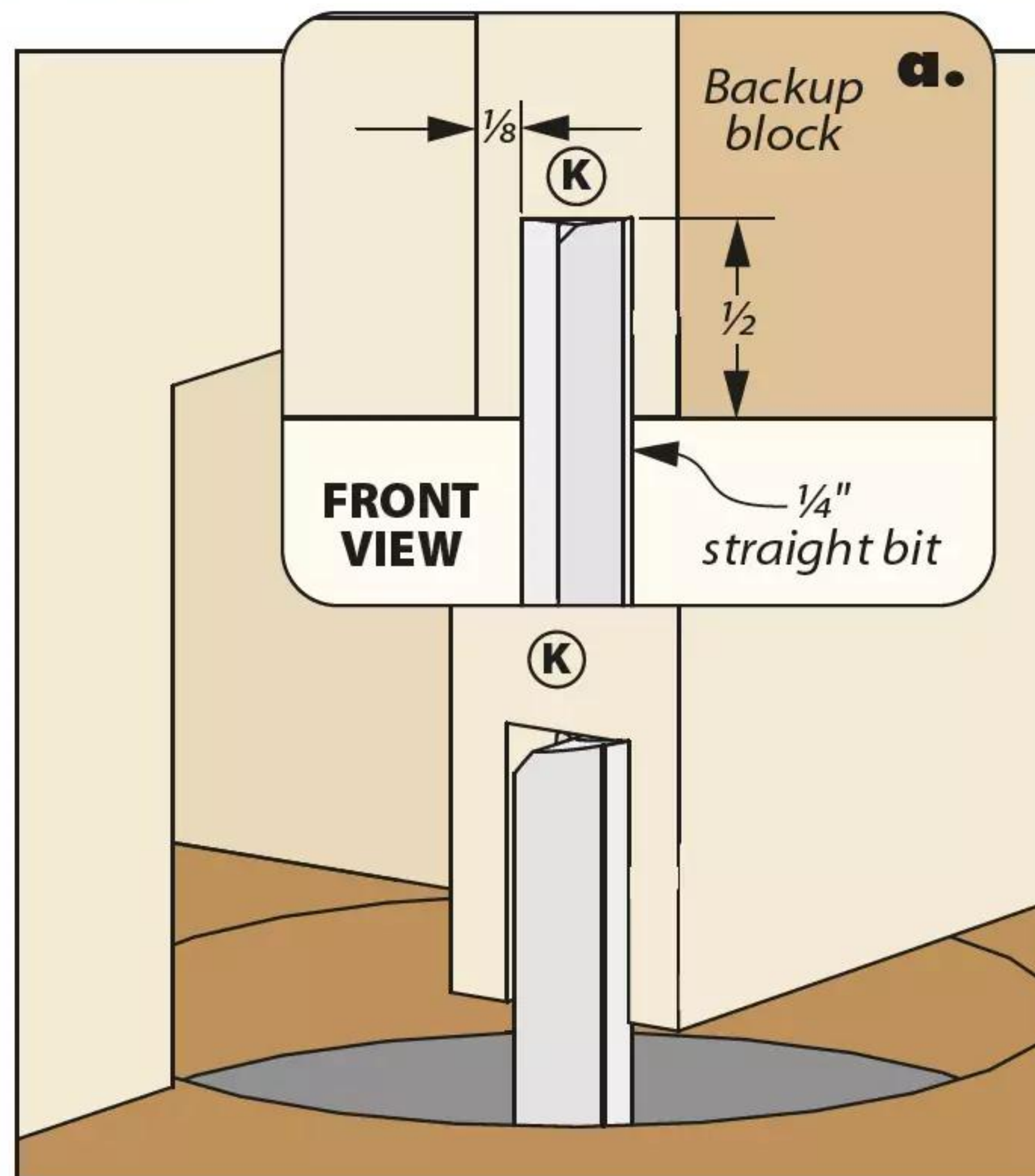
Speaking of grooves, it's time to cut the ones for the drawer bottom. Set the fence on your router table, then use a straight bit to cut the grooves on the front, back, and sides.

DRAWER BOTTOM. After sizing the drawer bottom, cut a rabbet around the perimeter. This forms the tongues that mate with the front, back, and side pieces, so size them to fit snugly in the grooves you just made.

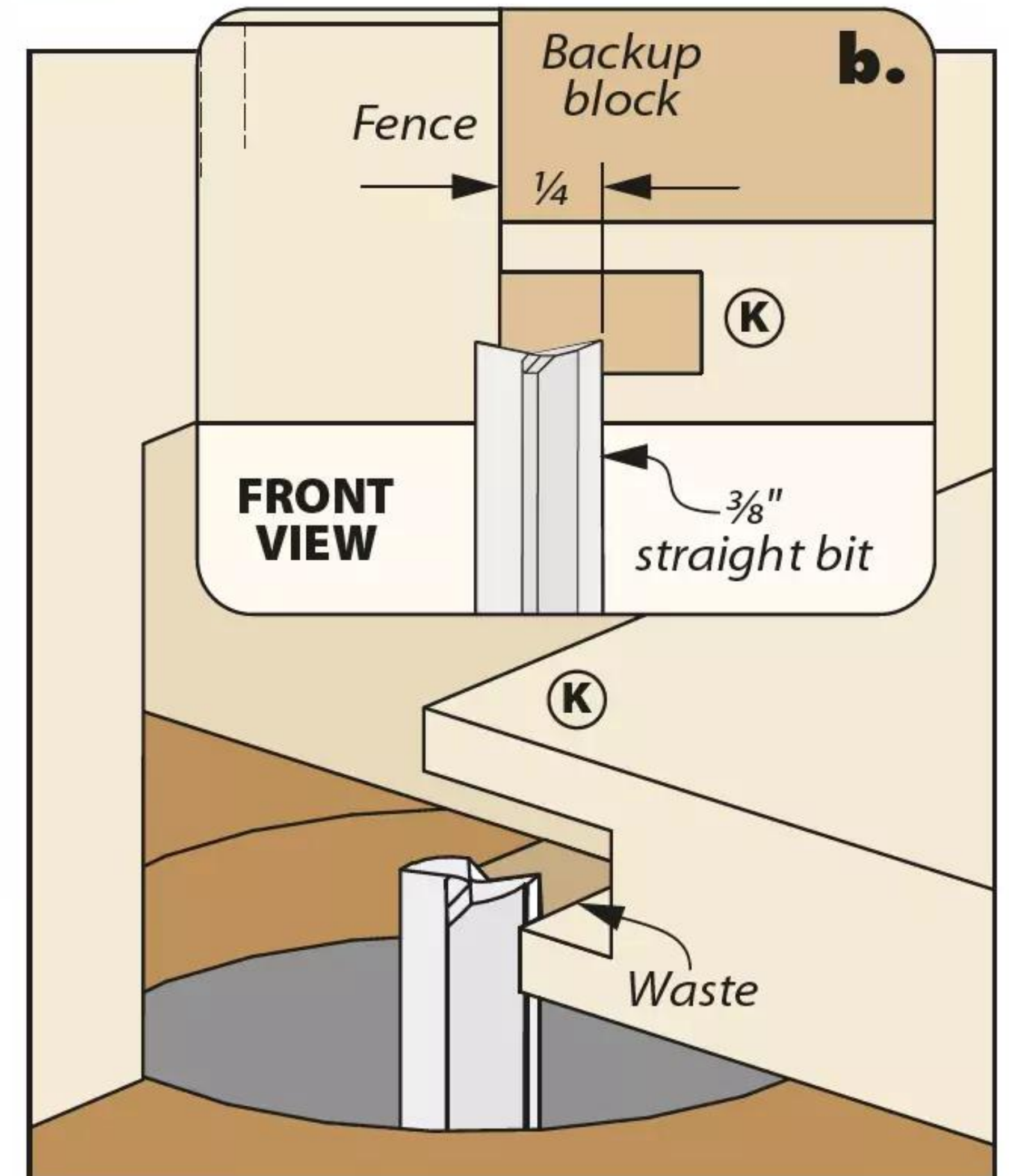
ASSEMBLY & DIVIDERS

With the drawer parts made, start the glueup by fitting the

TWO-STEP LOCKING RABBET



Edge Cut. When making the locking rabbet, begin with a vertical cut along the center of the workpiece's edge. Use a backup block to support the workpiece and prevent the back end from chipping out. A jointer pushblock or featherboard also keeps the piece tight against the fence throughout the cut.



Face Cut. To finish cutting the joint, lay the workpiece on its face and trim down the inner tongue. Again, using a backup block makes for a safer and cleaner cut. The inner tongues will slot into grooves cut in the sides, while the outer tongues will disguise the joint from the front end.

tongues into their respective grooves and dadoes. While waiting for the glue to dry, I made the drawer dividers.

DRAWER DIVIDERS. The dividers are the final pieces of this puzzle. This pair of parts is really just a shorter version of the tall dividers we made earlier. Again, I wanted them to be fit in without glue. This would allow me to add or remove them as

necessary, depending on what I need to put in the tote at the time. I measured the drawer directly when sizing these pieces, then rabbeted in the tongues and slid the finished dividers in place.

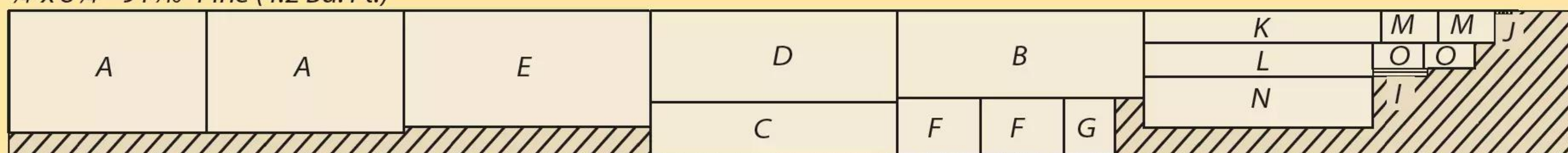
FINISH. As a shop project, it's not strictly necessary to finish this tool tote. That said, a bit of lacquer goes a long way. It adds a pleasant shine and protects the softwood against dings. **W**

Materials, Supplies & Cutting Diagram

A Ends (2)	$\frac{1}{2} \times 7\frac{1}{2} - 12$	G Short Divider (1)	$\frac{1}{2} \times 3\frac{1}{2} - 3$	M Drawer Sides (2)	$\frac{1}{2} \times 13\frac{1}{32} - 3\frac{3}{8}$
B Center Divider (1)	$\frac{1}{2} \times 5\frac{1}{4} - 15$	H Handle (1)	1"-dia. x 16	N Drawer Bottom (1)	$\frac{1}{2} \times 3 - 13\frac{15}{16}$
C Short Side (1)	$\frac{1}{2} \times 3\frac{1}{2} - 15$	I Drawer Runners (2)	$\frac{1}{8} \times \frac{1}{2} - 3\frac{3}{8}$	O Drawer Dividers (2)	$\frac{1}{2} \times 1\frac{15}{32} - 3$
D Tall Side (1)	$\frac{1}{2} \times 5\frac{1}{2} - 15$	J Plugs (4)	$\frac{1}{4} \times \frac{1}{4} - \frac{1}{4}$		
E Bottom (1)	$\frac{1}{2} \times 7 - 15$	K Drawer Front (1)	$\frac{1}{2} \times 13\frac{1}{32} - 14\frac{7}{16}$		
F Tall Dividers (2)	$\frac{1}{2} \times 3\frac{1}{2} - 5$	L Drawer Back (1)	$\frac{1}{2} \times 13\frac{1}{32} - 13\frac{15}{16}$		

- (2) $\frac{1}{4}$ "-dia. x 2" Dowels
- (4) #8 x $\frac{1}{2}$ " Fh Woodscrews

$\frac{3}{4}$ " x $8\frac{3}{4}$ " - 91 $\frac{3}{16}$ " Pine (4.2 Bd. Ft.)





Storage Bench

Classic joinery, a soft cushion, and welcome storage create a versatile seating solution for your home.

Seating usually falls into the relaxing sort (easy chair) or the purposeful sort (dining or office). I believe there's an overlooked third category: transitional. It's the place where you put your shoes on before heading out the door or where you get dressed in the morning. This bench aims to fill in those gaps.

In-between places usually have several activities going on at one time. So if the seating can help meet those needs as well, all the better. Below the cushion, three drawers corral necessities and provide some organization, as you can see in the photo below. This hybrid design opens up several places for this bench in a home: at the door, tucked below a window in a bedroom, or even as bonus seating for company.

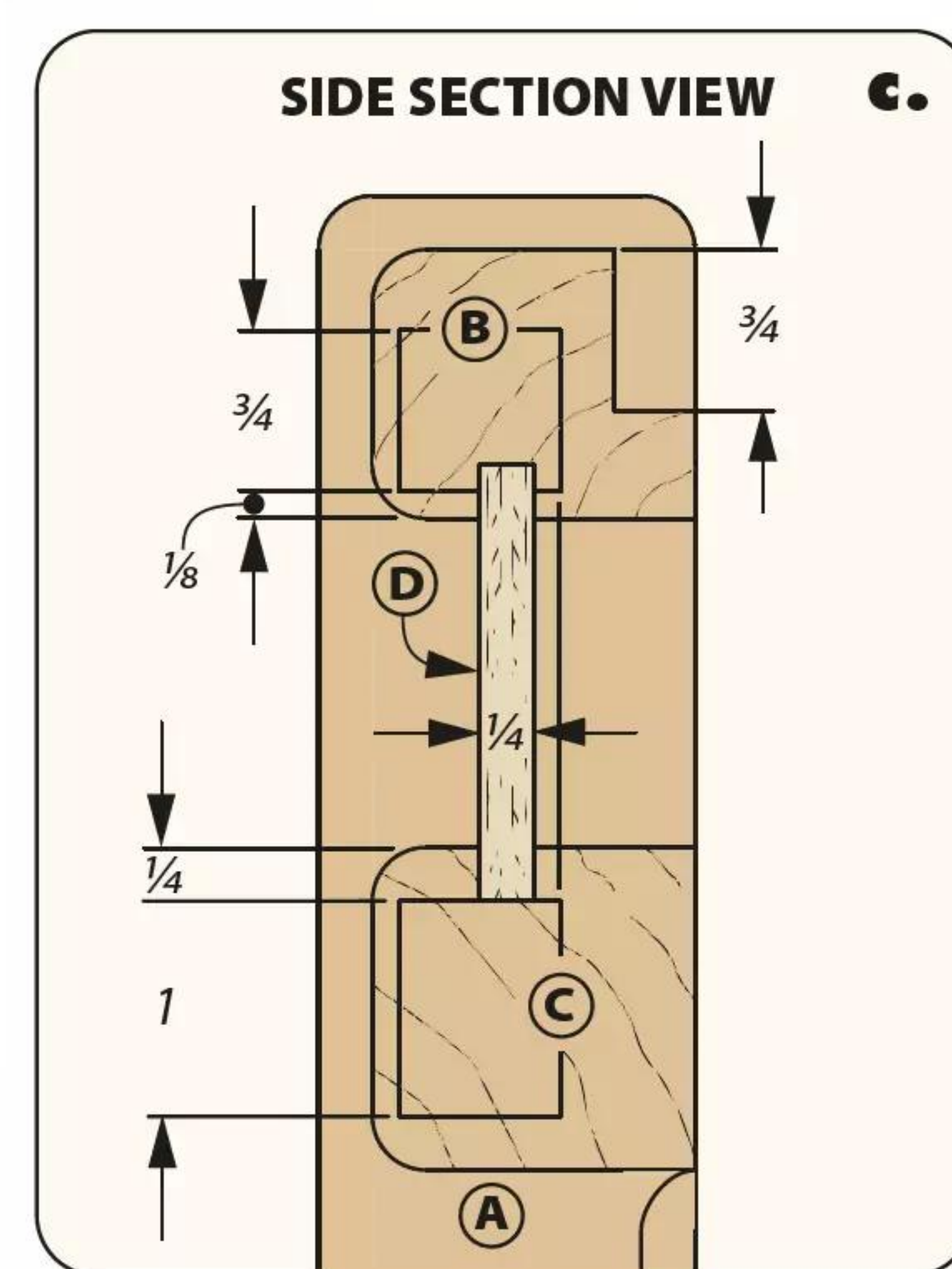
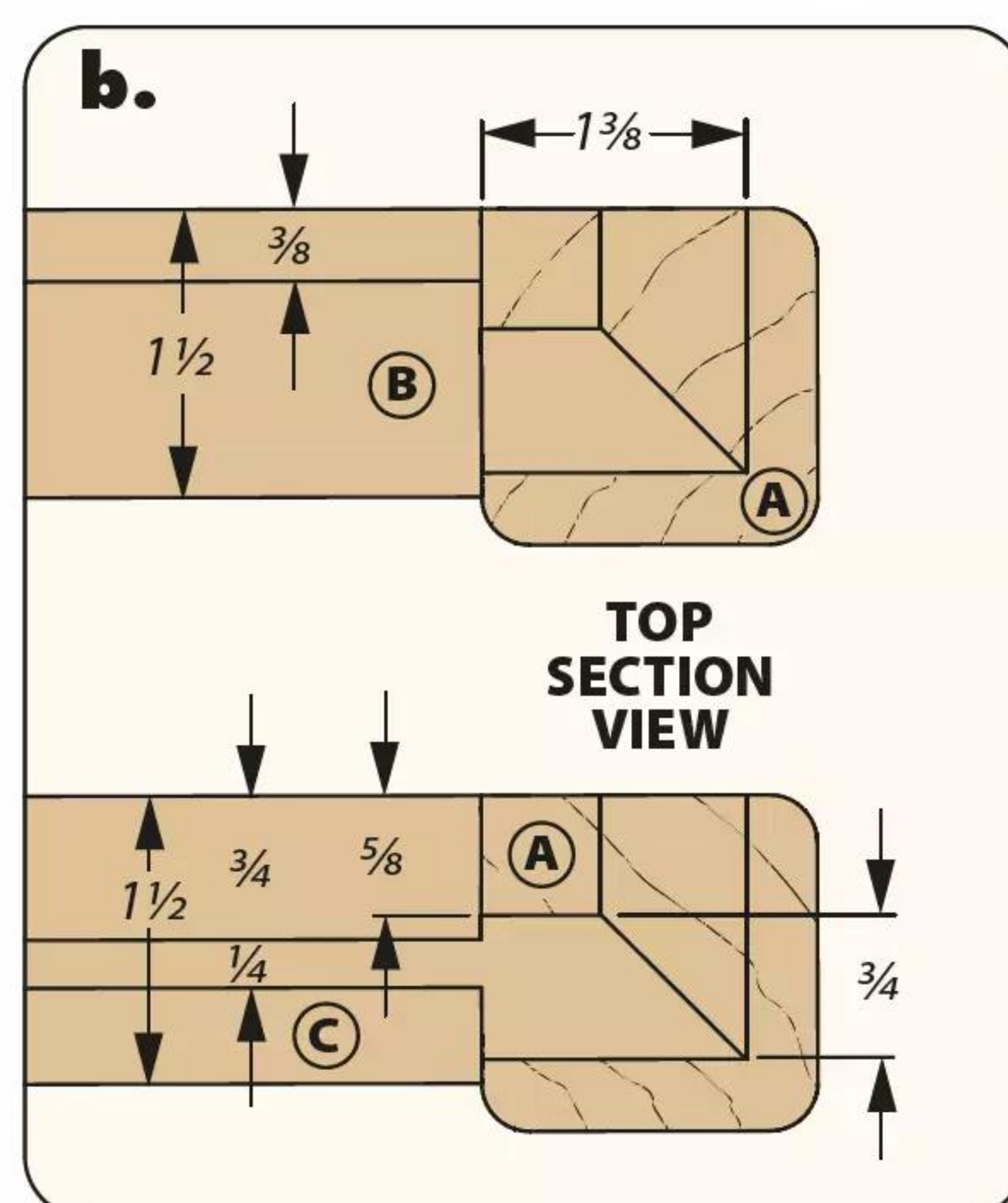
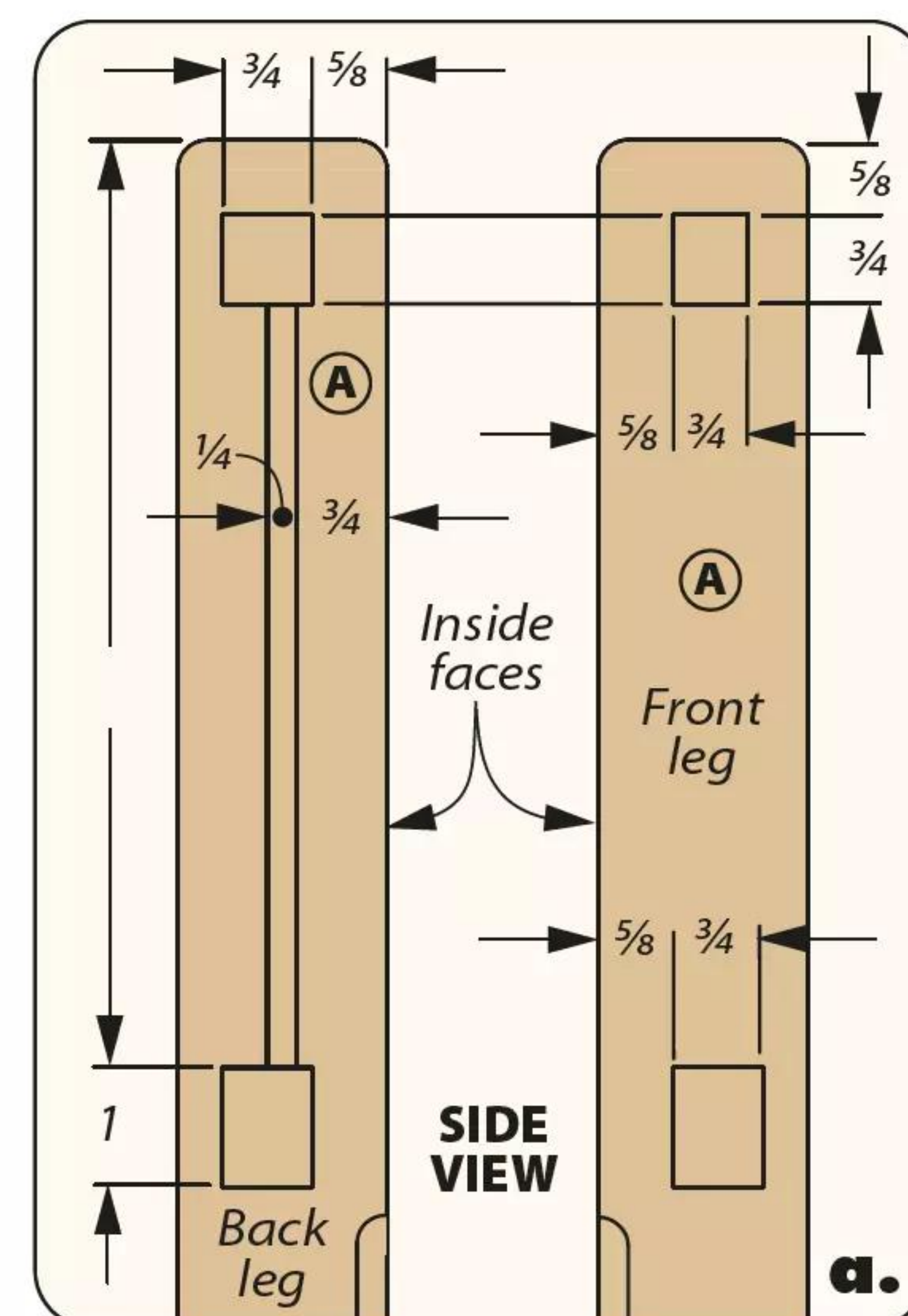
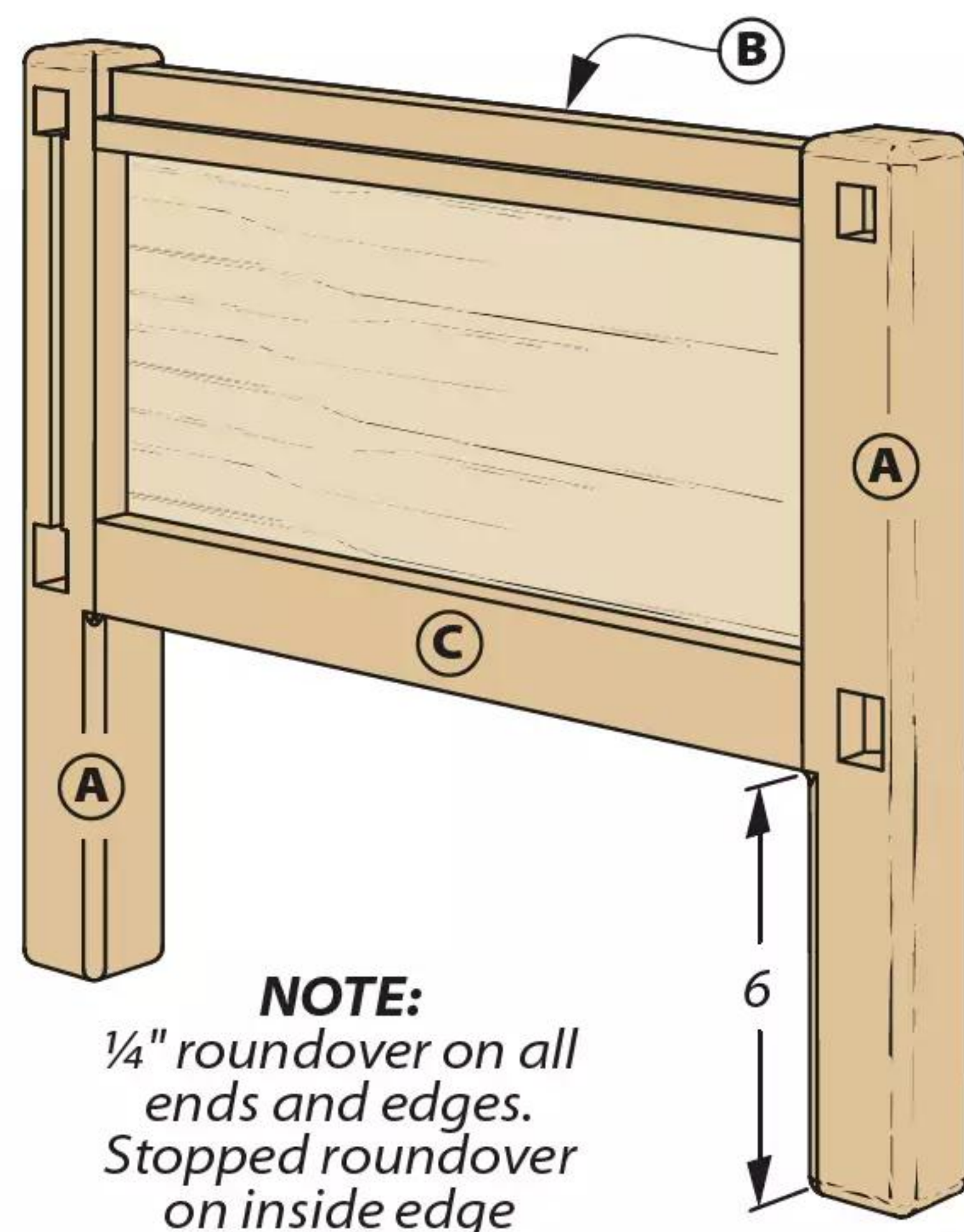
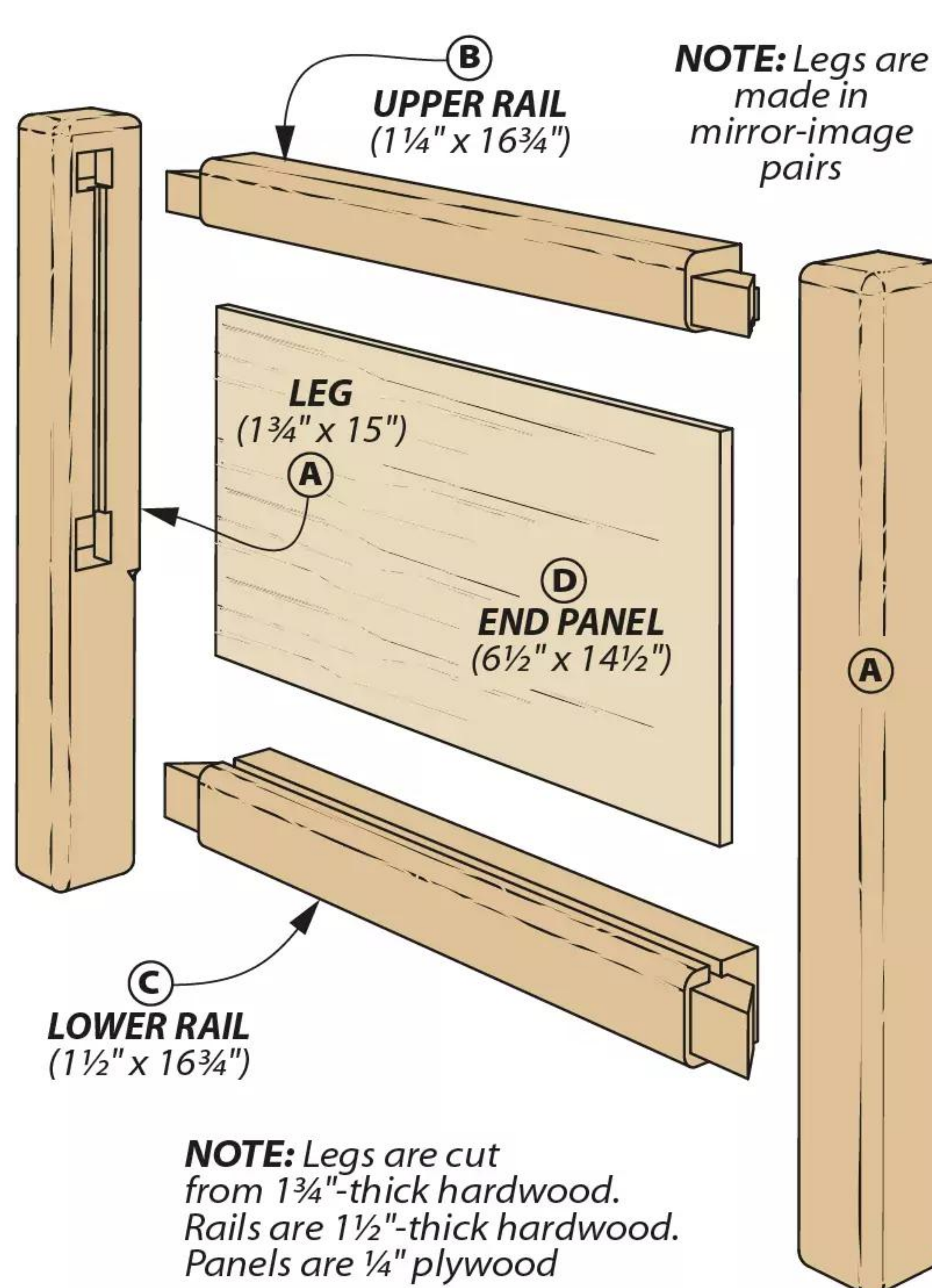
With its function addressed, it's time to explore the wood-working underneath that practicality. We used ash for the visible components. Its light tones keep it from feeling heavy.

There's enough grain pattern to provide some separation from the usual blond wood choices.

Solid wood calls for robust joinery to match. The main structure is a case study in mortise and tenon joints. To accommodate the other parts — panels, dividers, and the seat deck — rabbets, grooves, and dadoes take their turn. There's plenty to do, but none of it is complicated.

The drawers follow a similar pattern for essential, solid construction. Full-extension slides offer complete access. Since ordinary pulls could snag clothes and shins, the pulls consist of routed recesses in the false fronts. It's a functional choice that also contributes to the serene appeal of this project.

◀ Spacious drawers run on full-extension slides. The drawer fronts feature an integrated, routed pull that creates a snag-free front face to the bench.



Stout Parts, STURDY JOINTS

Coming from Wisconsin, timber framing draws my attention. The drawings for this bench give off timber framed vibes, just on a smaller scale. Frame-like “bents” link together to make up a barn. To hold the analogy, this bench has two “bents” that form the ends, as you can see above.

STOUT LEGS. Each assembly starts with a pair of legs. Mortises and grooves excavated in the faces and edges house the connecting components.

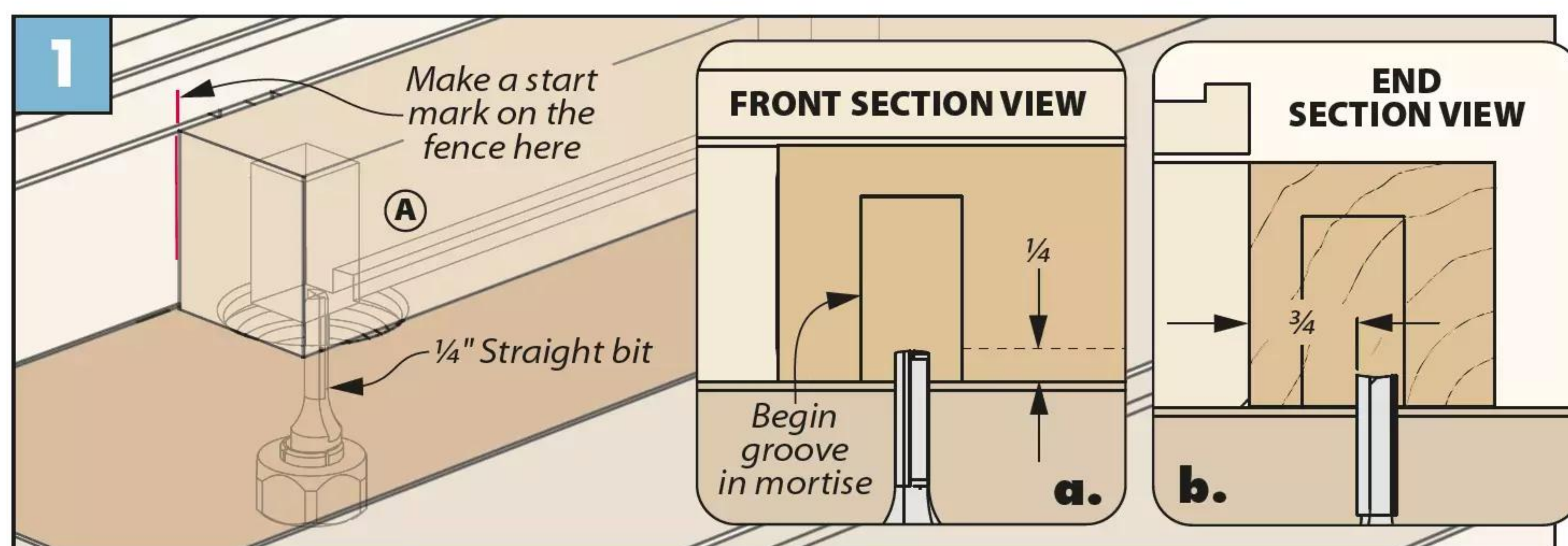
Before you start up a power tool, spend some time with a

pencil to lay out the mortises and grooves. The legs are made in mirror-image pairs. The front legs each have mortises on two faces and a groove on one. The back legs require grooves on two faces along with the mortises, as shown in details ‘a’ and ‘b.’

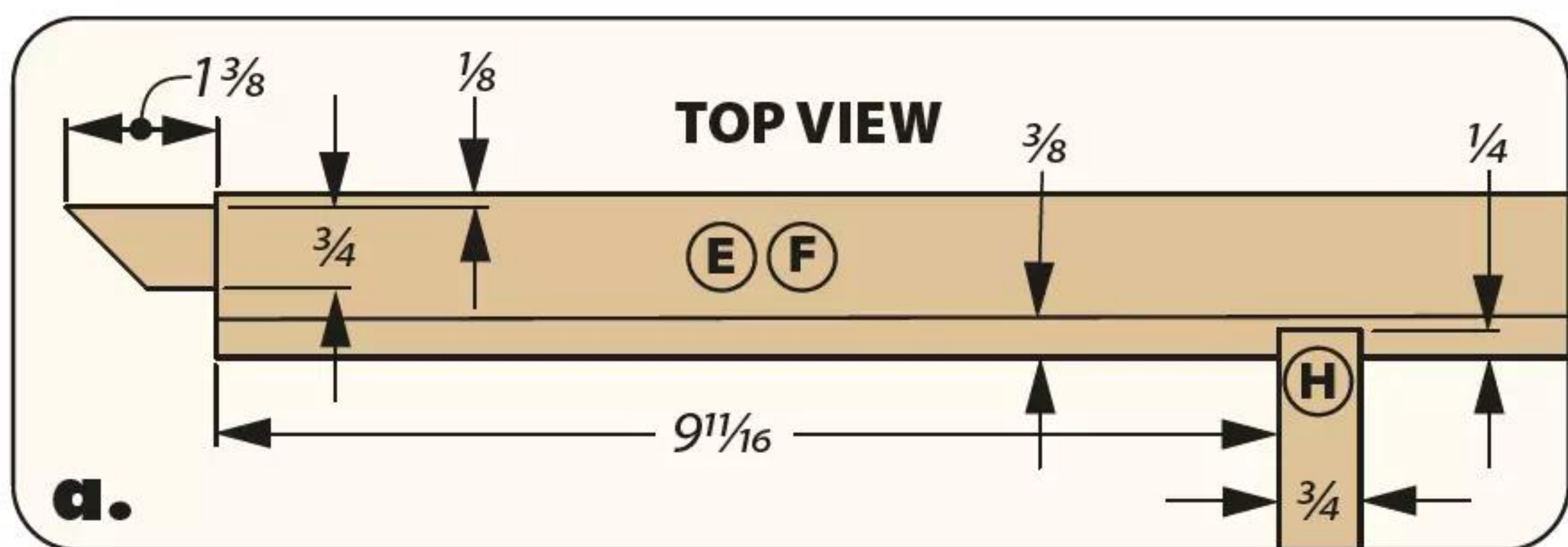
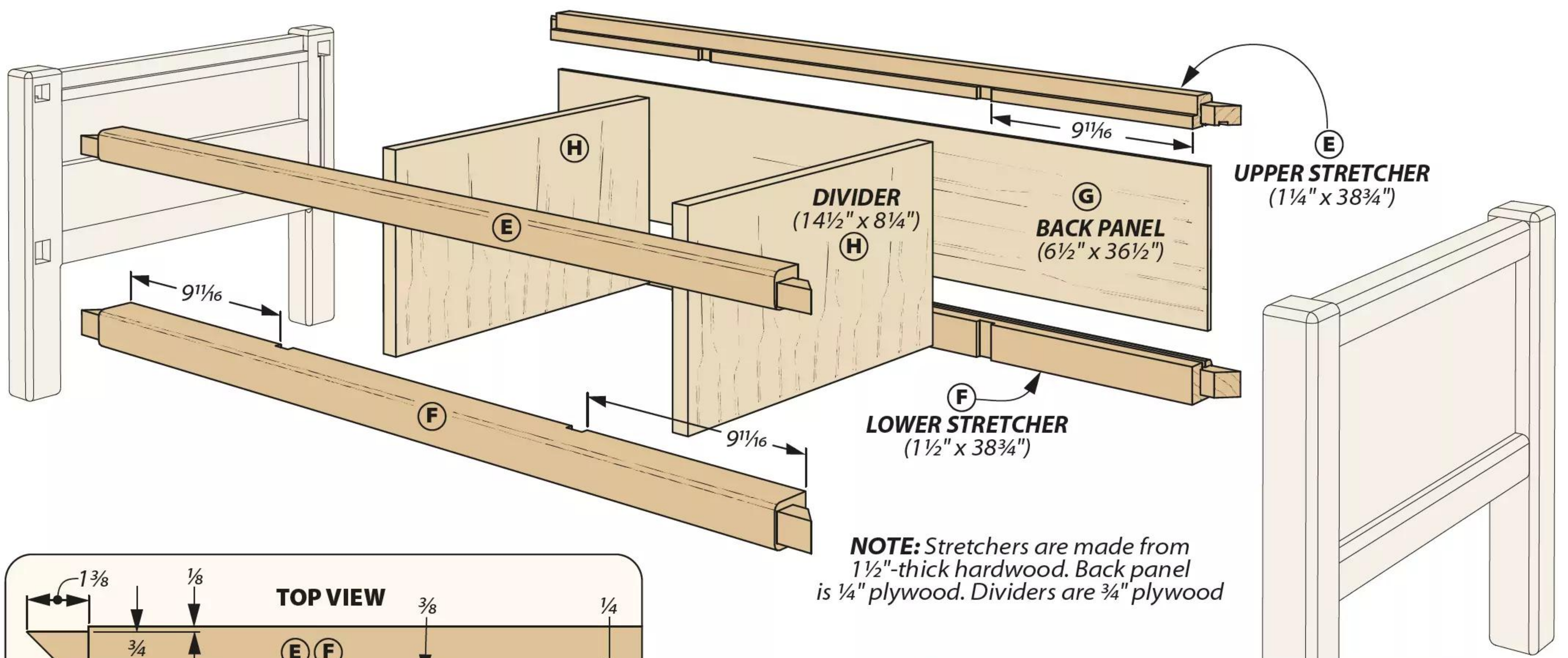
Since the mortises are pretty square, I used a drill and chop approach. For the grooves, the router table technique shown at left is what I used. The legs are completed with a roundover on all the ends and edges, though the inner edge is stopped just short of the lower mortise.

RAILS & PANELS. Keep your eye sharp while sizing the rails. The upper rail is narrower than the lower rail. The tenons on each end are mitered to maximize their length in the connecting

ROUTING STOPPED GROOVES



Mortise to Mortise. Draw lines on your router table fence to indicate where to start each groove. You’ll hear the bit stop cutting when it moves into the opposite mortise.



mortises in the legs. The remaining details are shown in details 'b' and 'c.'

This includes a groove for a thin plywood panel. The groove aligns with the grooves in the legs. I fit the rails in place and marked the location directly, just to be sure.

A rabbet formed on the upper rail cradles the seat. The outer edges of the rails sport a round-over as well.

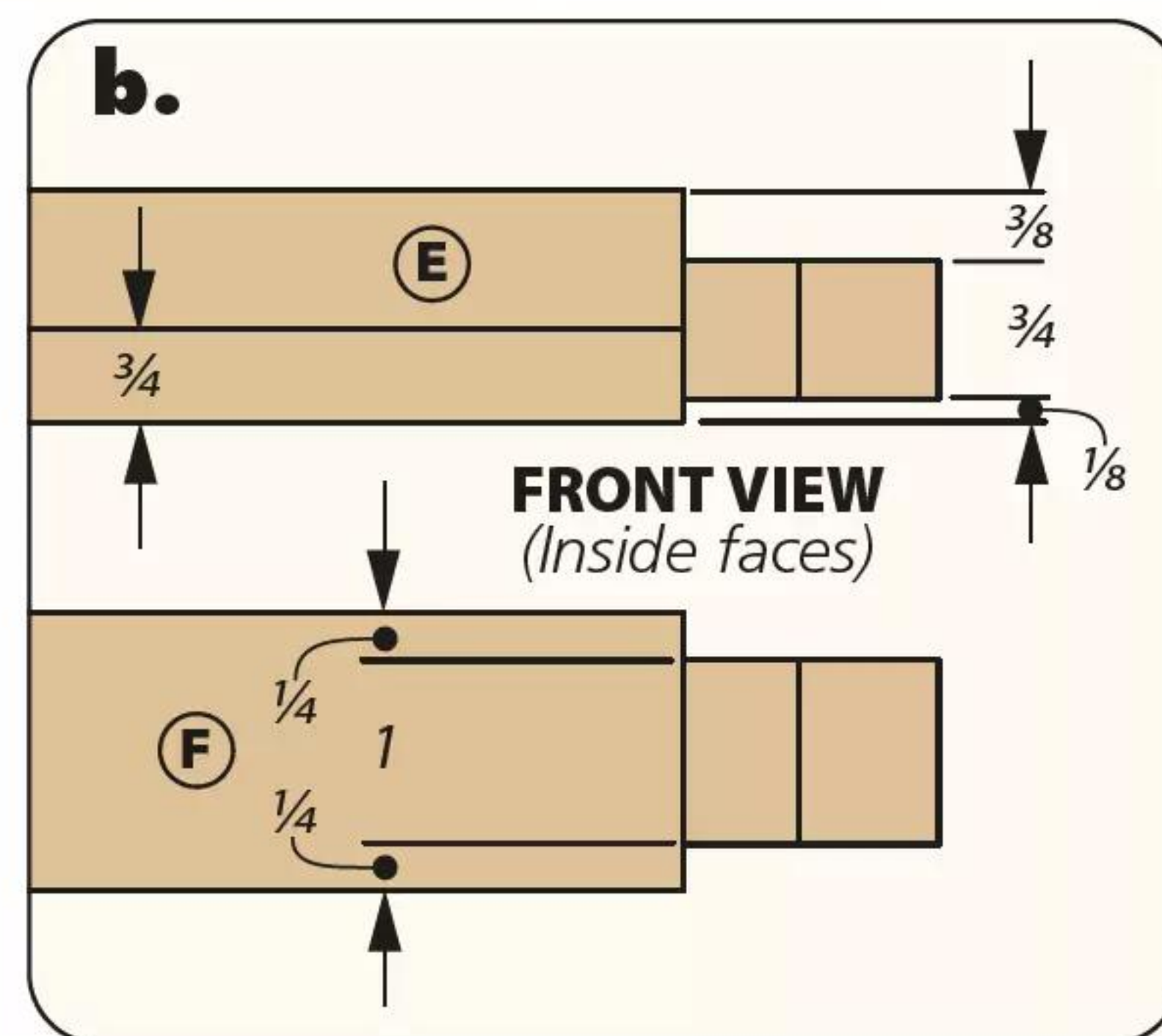
ASSEMBLY. One more dry assembly is called for in order to zero in on the size of the panel. Take note here that the face grain of the visible panels run horizontally throughout the project. After sanding the parts, you can glue up each end assembly.

MAKING CONNECTIONS

What comes next looks a lot like what came before. In this stage, the two ends join together.

STRETCHERS. Long stretchers do the major work. Think of these as extra long rails and you're on the right track. The tenons on each end you already know how to do (details 'a' and 'b').

Other familiar details include the rabbet on the upper

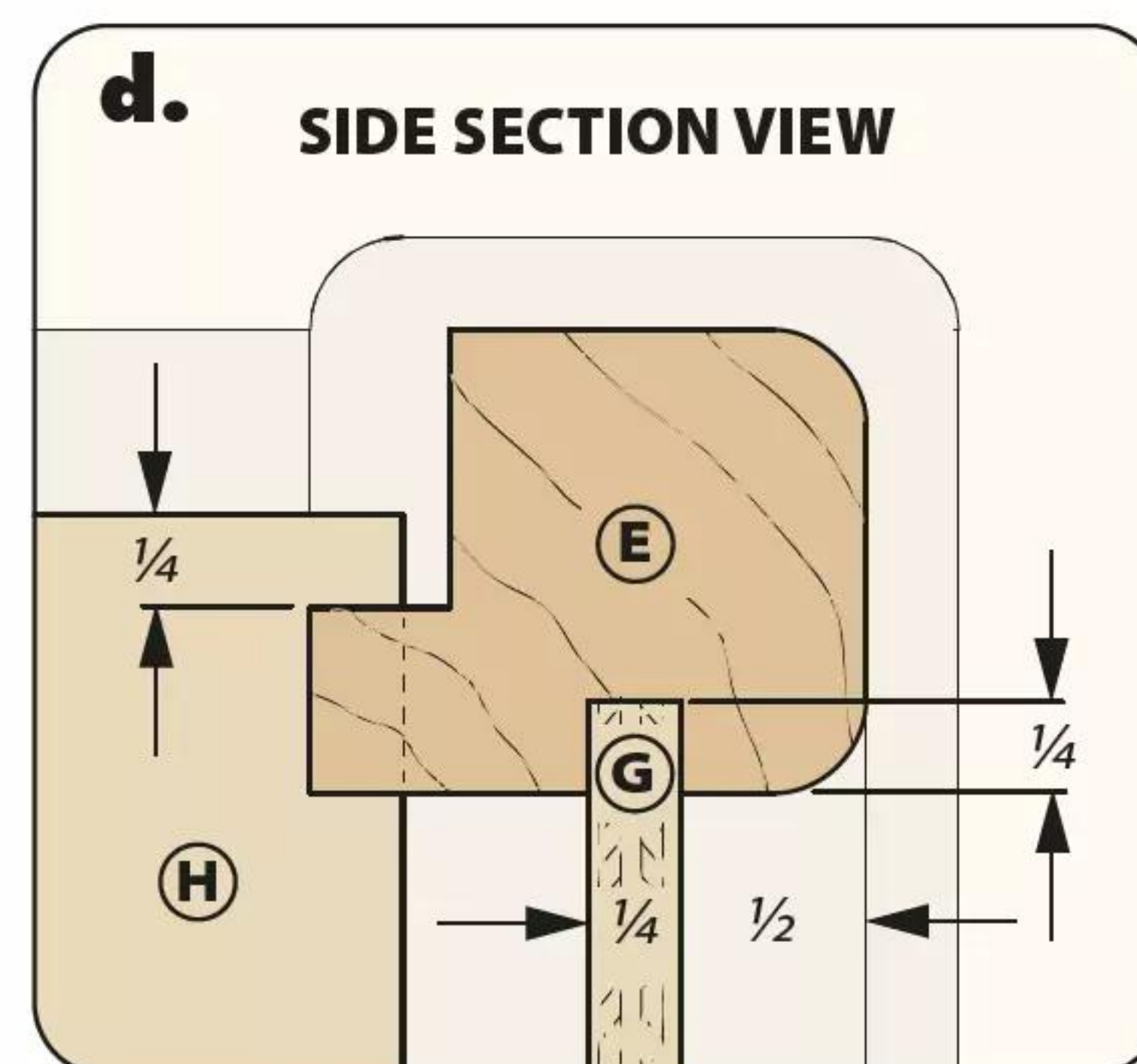
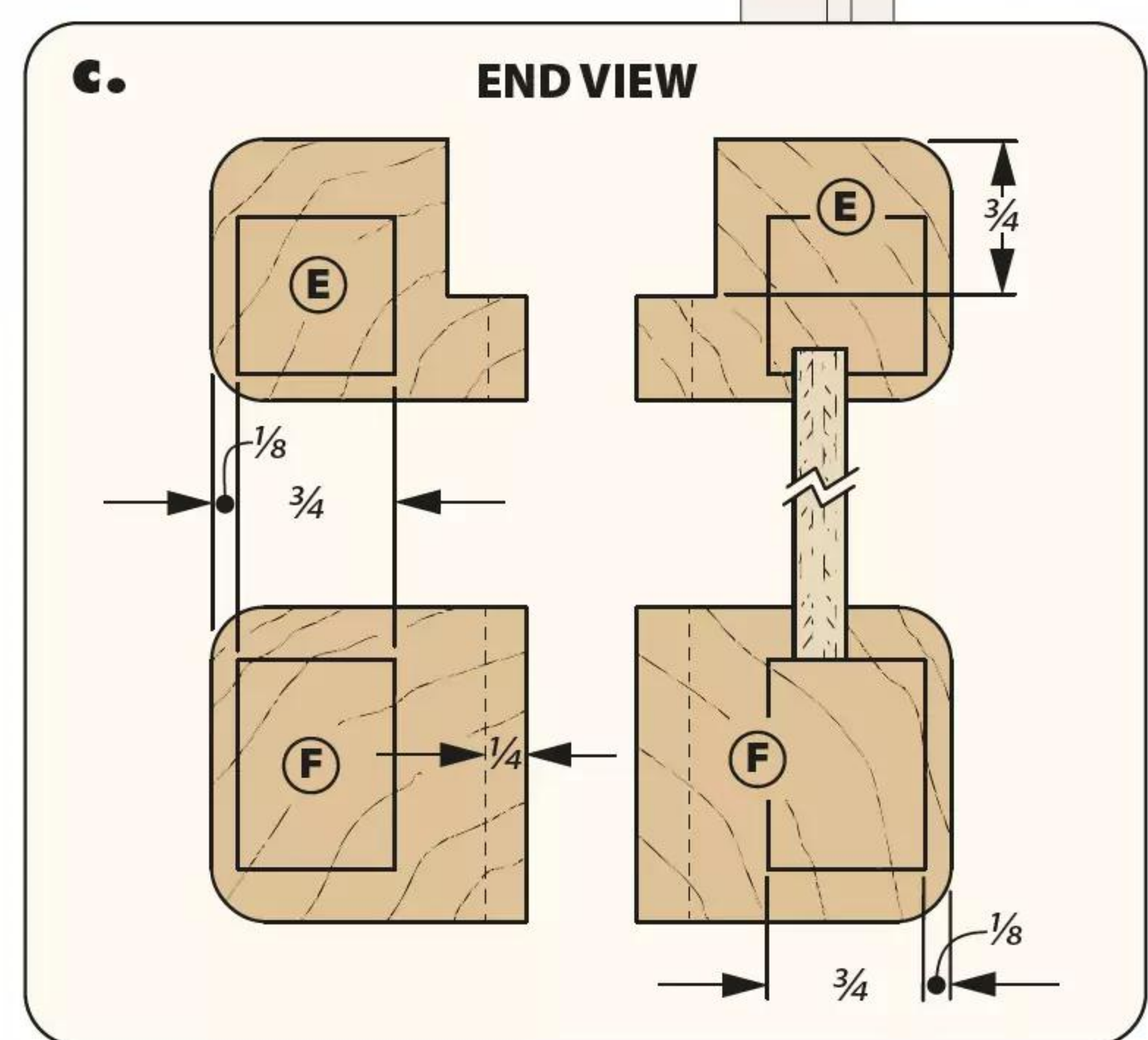


stretchers, as shown in detail 'c.' This same drawing shows that only the rear stretchers have panel grooves.

DADOES & DIVIDERS. A set of dados along the inside face constitute one of the differences in these parts. You can see these in the drawing above and detail 'a.' The dados stiffen the seat as well as house dividers to form drawer compartments.

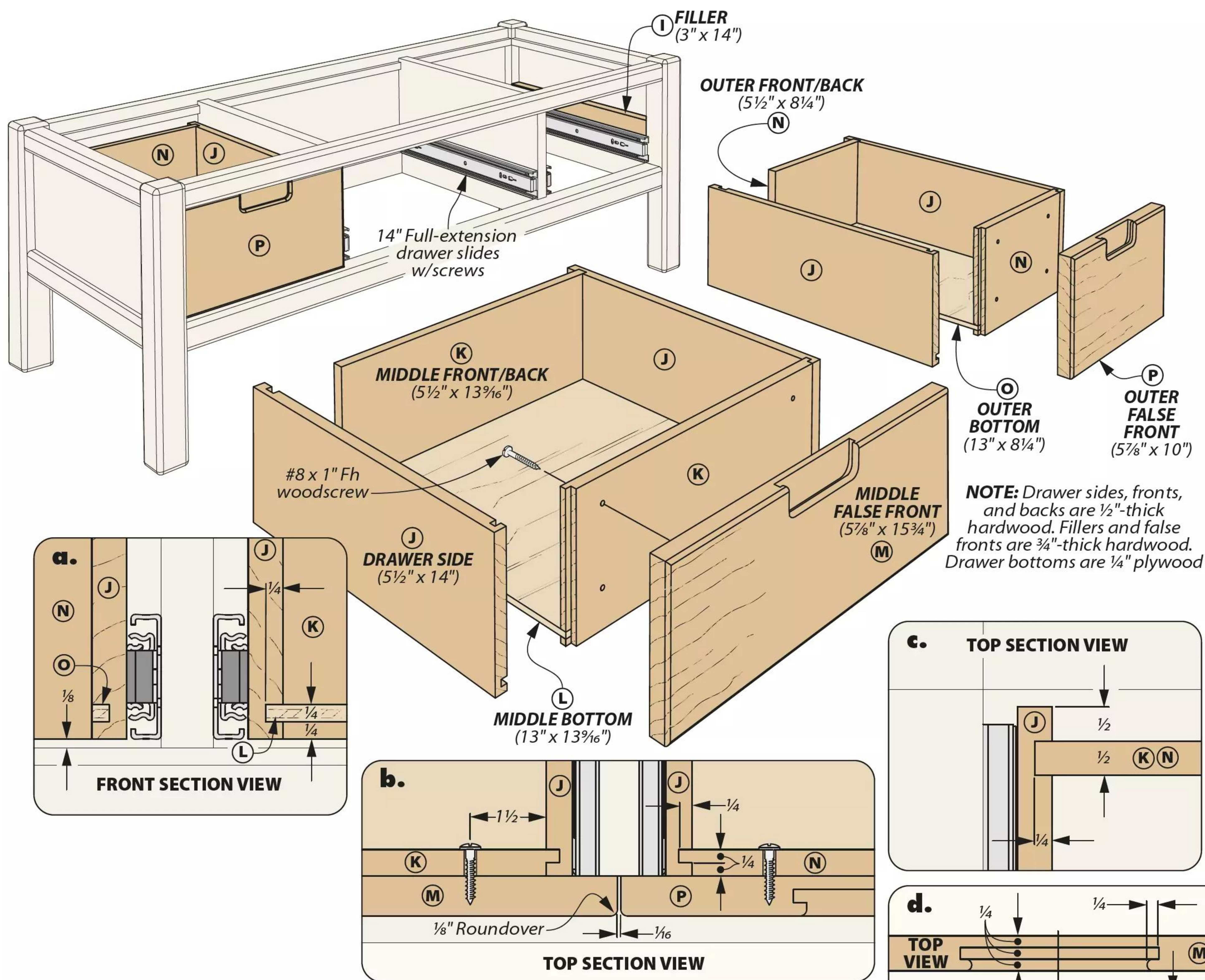
ASSEMBLY STAGES. The bold may want to leap into the final assembly all in one go. A "tor-toise" approach may prove more successful, by the end.

I cut the back panel to size and glued it to the rear stretchers. While that mellowed, I gathered up some long clamps for stage two. The back assembly now acts like one part. So together



with the front stretchers, the task feels comfortable. I glued tenons into one of the end assemblies. A few mallet taps ensured the joints were seated.

Repeat that for the opposite end. With the bench on its feet, I measured for the final size of the two divider panels. Butter the dados with glue and slip the dividers into place. Pull a few clamps across the joints.



Drawers for Storage BELOW DECKS

It seems a little dismissive to call the remaining steps “final details,” but that does sum up what’s going on. One of the tasks is transforming the structure into a comfortable place to sit. The first order of business however, is to craft drawers.

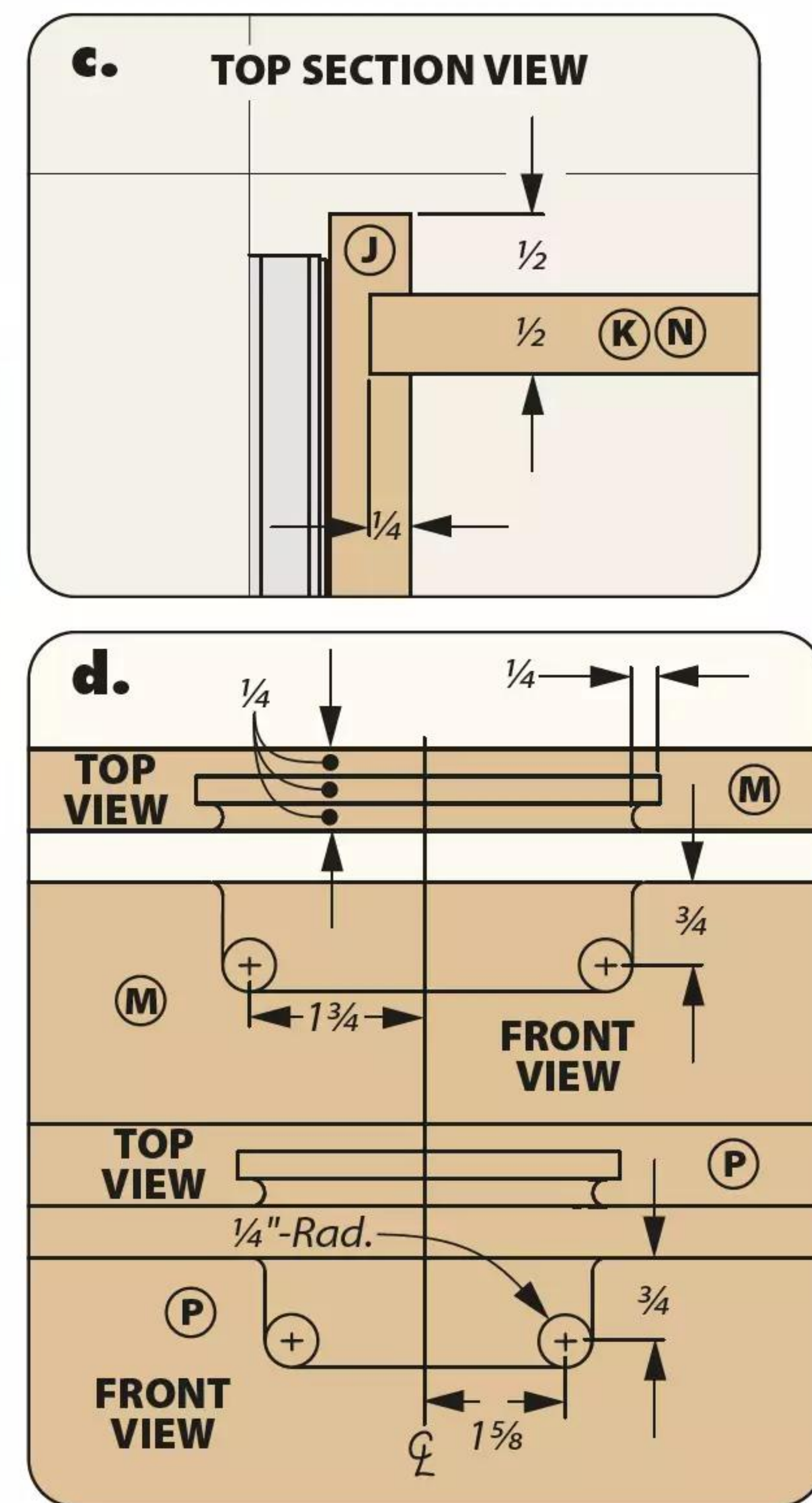
DISCREET DRAWERS. The drawers take a practical turn for construction and operation. I recommend scrutinizing the drawing above to get your bearings. Essential (not fancy) joinery forms the drawer boxes. Full-extension metal drawer slides provide smooth operation

with unfettered access. The slides do add a wrinkle and an opportunity (stay tuned).

The three drawers share the same size sides. I cut these first. A narrow dado cut near the front end accepts the drawer front, as you can see in detail ‘b.’ The drawer back is housed in a dado that matches the thickness of the drawer back. This is shown in detail ‘c.’

The lengths for the fronts and backs are determined by the size of the opening. You also need to consider the thickness of the drawer slides and the joinery.

Calculations complete, you can cut a rabbet on the drawer fronts. The resulting tongue should fit the dado in the side.



The goal is for the tongue to bottom out in the dado in order for the drawer box to be square.

Cut a groove in the box parts for the bottom. Once that piece is sized, you can glue up the drawer boxes.

FALSE FRONTS. The wrinkle created by the use of drawer slides is that we need to conceal the slides and cover the gap around

the drawers at the front. The solution is an applied false front.

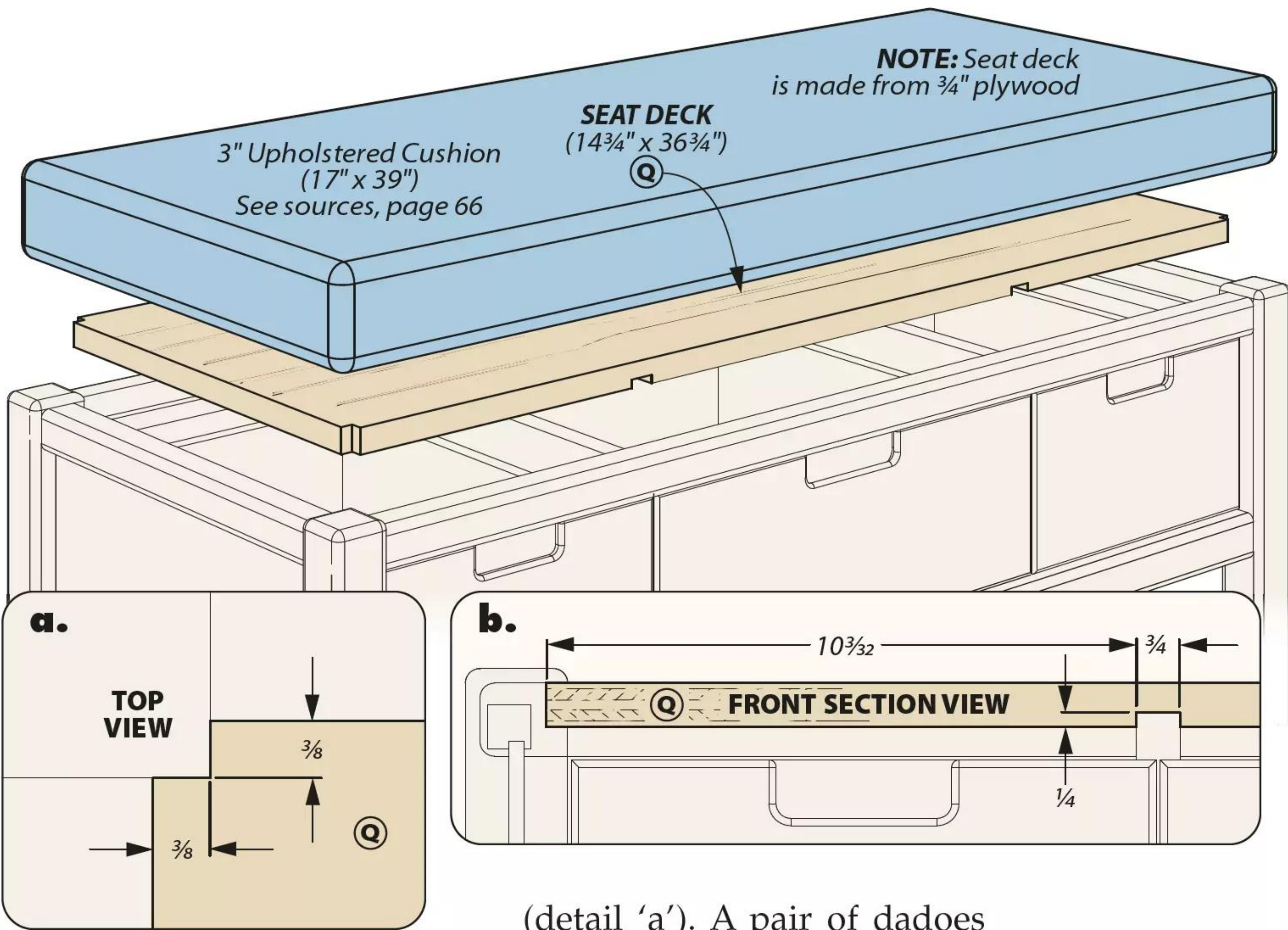
Here's where the opportunity comes in. Protruding drawer pulls get in the way if you're sitting on the bench. A routed drawer pull provides access and a clear surface.

Use detail 'd' on the previous page to make a template for each drawer size. Yes you could get by with a single size template, but in my opinion scaling the pull looks better.

The pulls are formed with a finger grip bit. Make passes across the opening to remove the waste. A final pass around the perimeter cleans up the pull and forms a ledge for your fingers.

TOP IT OFF

Leaving the top until last allows you to see what's going on while you install and fine-tune the drawers. A plywood seat deck caps off the bench. It's tempting to cut it a little small. Go for a



snug fit instead. The deck helps keep the bench square. A tighter fit makes for stronger joints with the rails and stretchers.

The details show corner notches that account for the legs

(detail 'a'). A pair of dados interlock with the dividers, as in detail 'b.' This rigidity gives you a sag-free sitting experience. On top of that, we ordered a custom sized and upholstered cushion. You can make one yourself, if you choose. [W](#)

Materials, Supplies & Cutting Diagram

A Legs (4)	1 3/4 x 1 3/4 - 15	H Dividers (2)	3/4 ply. - 14 1/2 x 8 1/4	O Outer Bottoms (2)	1/4 ply. - 13 x 8 1/4
B Upper Rails (2)	1 1/2 x 1 1/4 - 16 3/4	I Fillers (2)	3/4 x 3 - 14	P Outer False Fronts (2)	3/4 x 5 7/8 - 10
C Lower Rails (2)	1 1/2 x 1 1/2 - 16 3/4	J Sides (6)	1/2 x 5 1/2 - 14	Q Seat Deck (1)	3/4 ply. - 14 3/4 x 36 3/4
D End Panels (2)	1/4 ply. - 6 1/2 x 14 1/2	K Middle Front/Back (2)	1/2 x 5 1/2 - 13 9/16	(3 pair) 14" Drawer Slides w/Screws (12) #8 x 1" Fh Woodscrews (1) 3" x 17" - 39" Upholstered Cushion	
E Upper Stretchers (2)	1 1/2 x 1 1/4 - 38 3/4	L Middle Bottom (1)	1/4 ply. - 13 x 13 9/16		
F Lower Stretchers (2)	1 1/2 x 1 1/2 - 38 3/4	M Middle False Front (1)	3/4 x 5 7/8 - 15 3/4		
G Back Panel (1)	1/4 ply. - 6 1/2 x 36 1/2	N Outer Fronts/Backs (4)	1/2 x 5 1/2 - 8 1/4		

1 3/4" x 4" - 36" Ash (2 Bd. Ft.)



1 1/2" x 6" - 60" Ash (5 Bd. Ft.)



3/4" x 6 1/2" - 60" Ash (2.7 Bd. Ft.)



1/2" x 6" - 96" Ash (4 Sq. Ft.)

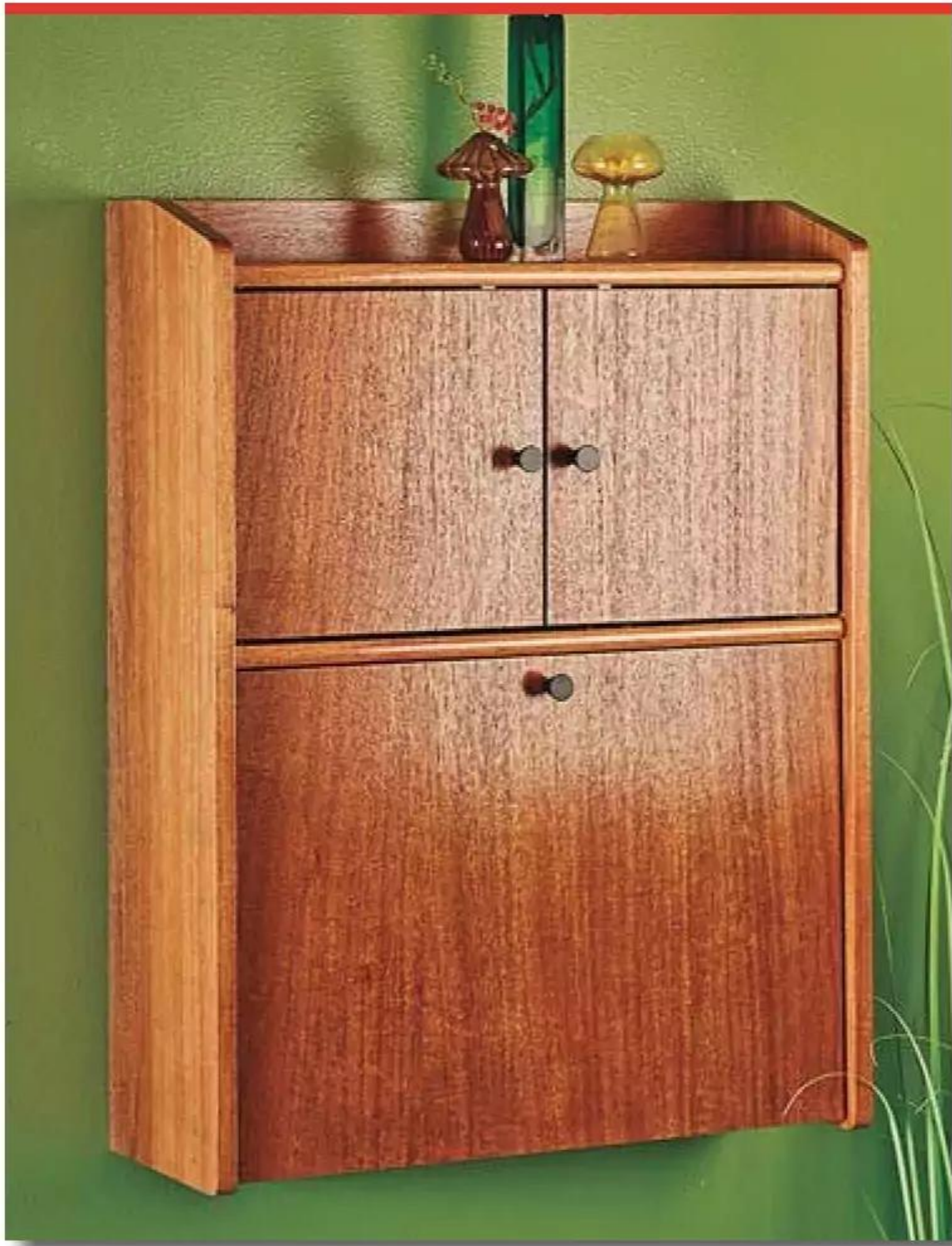


1/2" x 6" - 72" Ash (3 Sq. Ft.)



ALSO NEEDED: One 48"x 48"
Sheet of 1/4" Ash Plywood,
One 48"x 48" Sheet of 3/4" Ash Plywood





▲ When closed, this wall cabinet takes up remarkably little space, with a sleek design to match any room you choose for it.



▲ The upper doors hide a cupboard that offers plenty of storage, while the lower door folds down to create a work surface, perfect for books and laptops.

Fold-Up Wall Cabinet

This gorgeous cabinet conceals a folding work surface behind its mahogany exterior, making for an attractive and functional piece.

Both in the shop and at home, vertical storage is one of my favorite kinds. When furniture making is your hobby, it's easy to accumulate enough pieces to fill your house, but vertical storage occupies a neat niche — namely, the wall. Not only does this minimize the square-footage taken up, but it also allows an end table or sideboard to be placed below. More importantly though, it allows a bit of creative design to elevate the function of a project, as with the wall cabinet you see here.

FOLDING WORKSURFACE. The word “worksurface” will likely conjure images of your bench or an assembly table, but in the home these can take many forms. A desk (obviously), a bar counter, or a coffee table all fit that bill, especially today, when remote work is more common than ever. The lower door on this cabinet drops down to create an instant work surface, perfect for cookbooks in the kitchen, a laptop in the living room, or even just to jot down the shopping list before you head out the door for the day.

A CLASSIC CASE. When closed up, this cabinet is subtle. At less than a foot deep, you'll hardly notice the room it takes up. The tightly-grained panels, while still pleasant, don't scream for attention like a more highly figured grain would. All in all, this cabinet makes a fine addition to any room where an instant workstation comes in handy.



▲ Rare-earth magnets hold the doors closed, providing more than enough strength to secure the sturdy lower door.

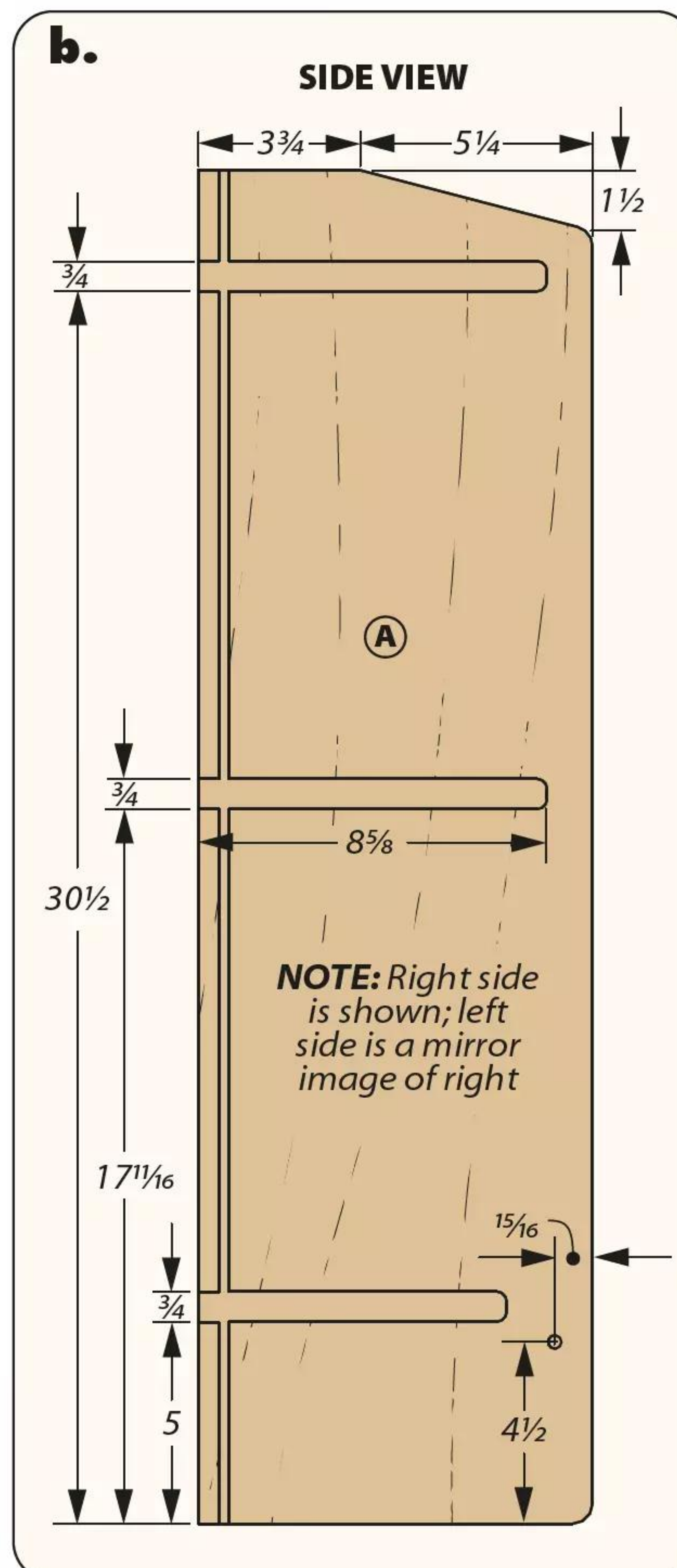
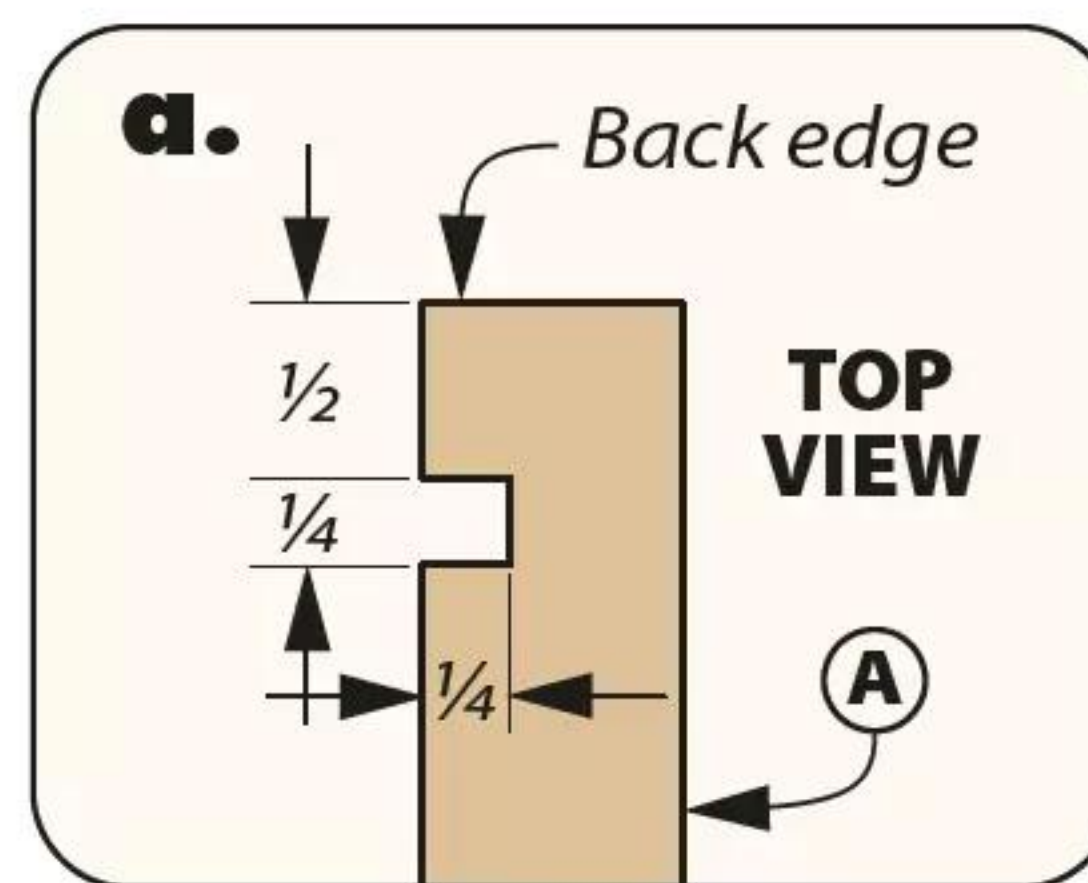
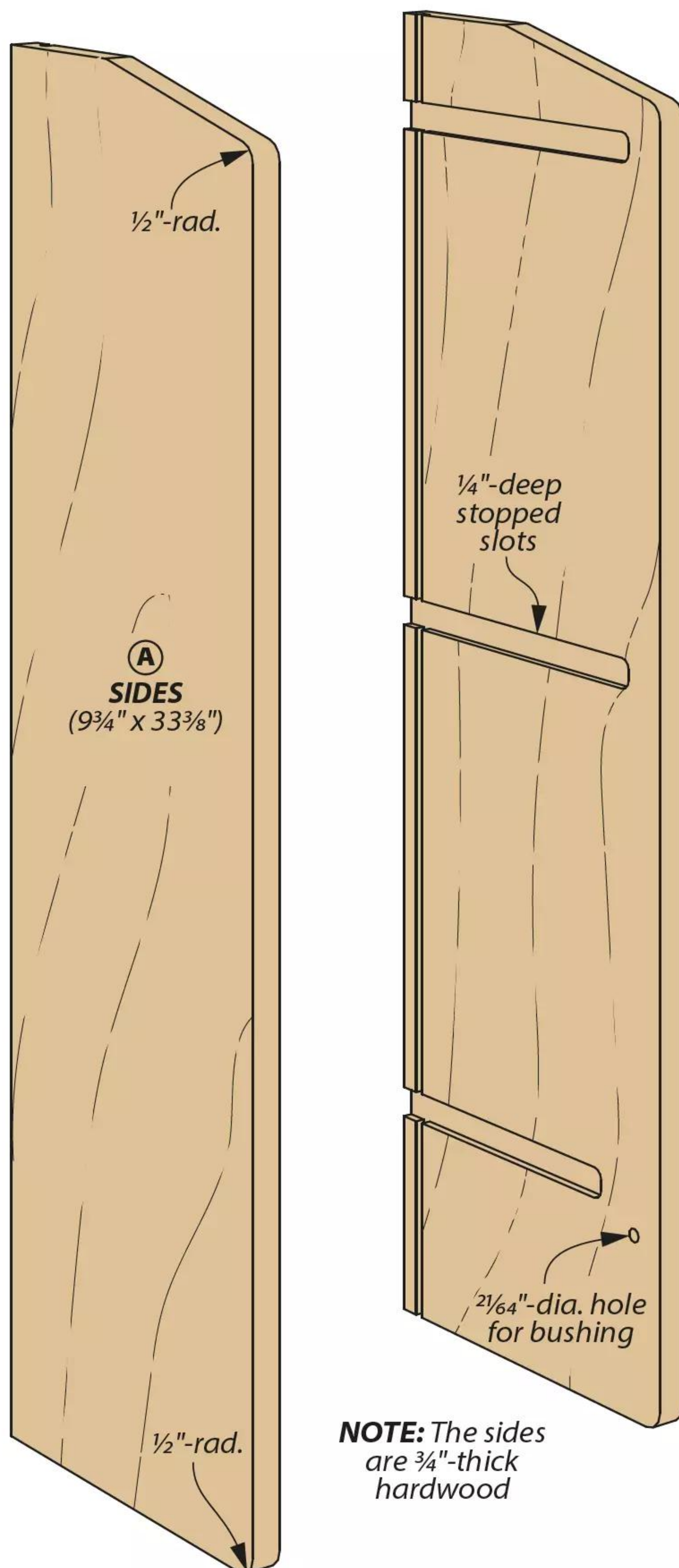
Setting up the SIDES

The joinery on the sides is what unites this case. As you can see in the illustrations at left, three stopped dadoes in each together with through-grooves along the back edges set the stage for the pieces that will come later.

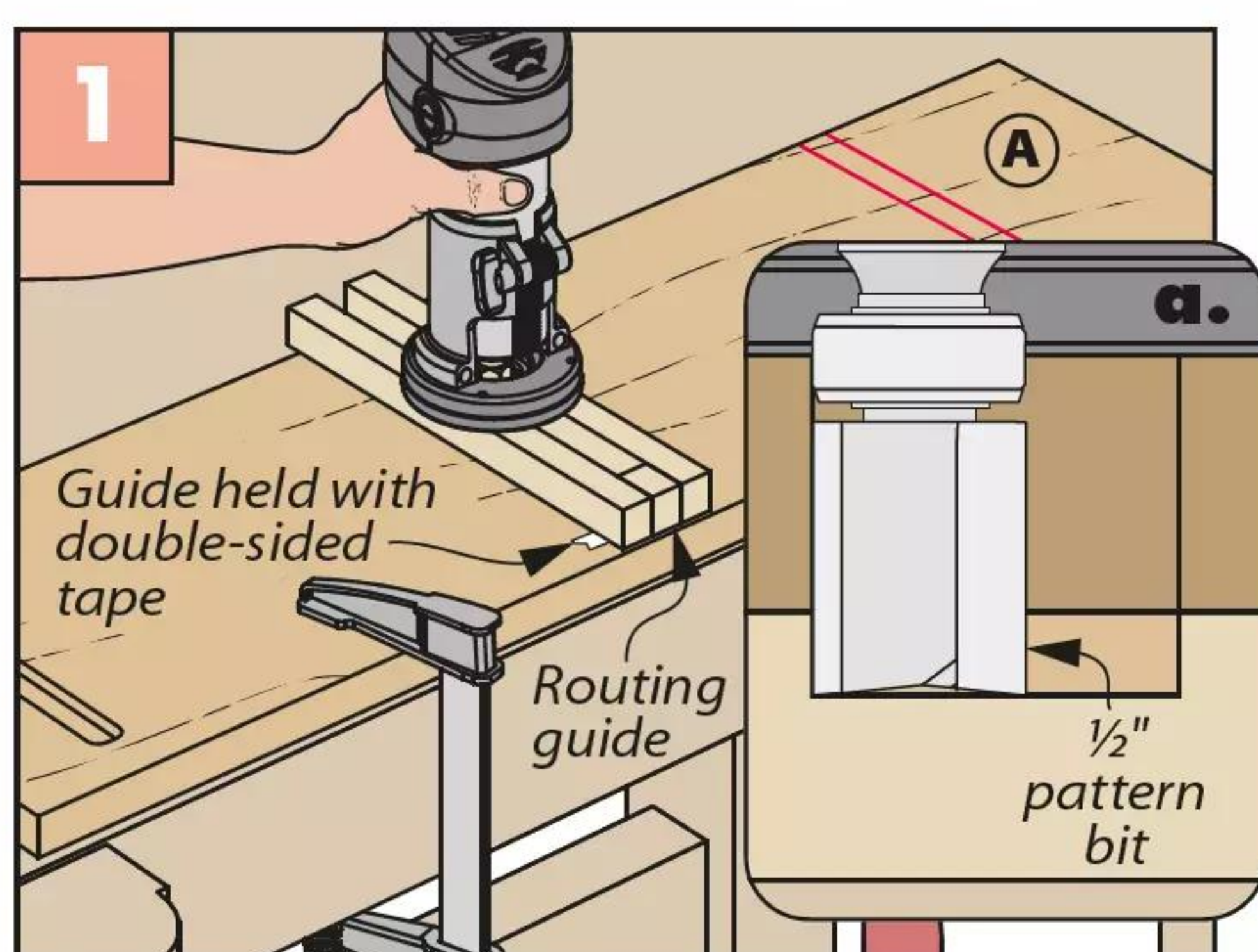
SIDES. Begin by gluing up the panels for the sides, then cutting them to size. Once you've finished, you'll need to lay out the joinery for these pieces, as well as the angled top and radiused corners on each. You can find the dimensions for these in details 'a' and 'b.'

SIDE JOINERY. You can see in the box below how I made the joinery and shaped the sides. I began with the stopped dadoes, as in Figure 1. I put together a simple guide from a few scrap pieces to help me rout the dadoes. A trim router and pattern bit will do the rest of the work. Square the corners of the dadoes up with a chisel after routing.

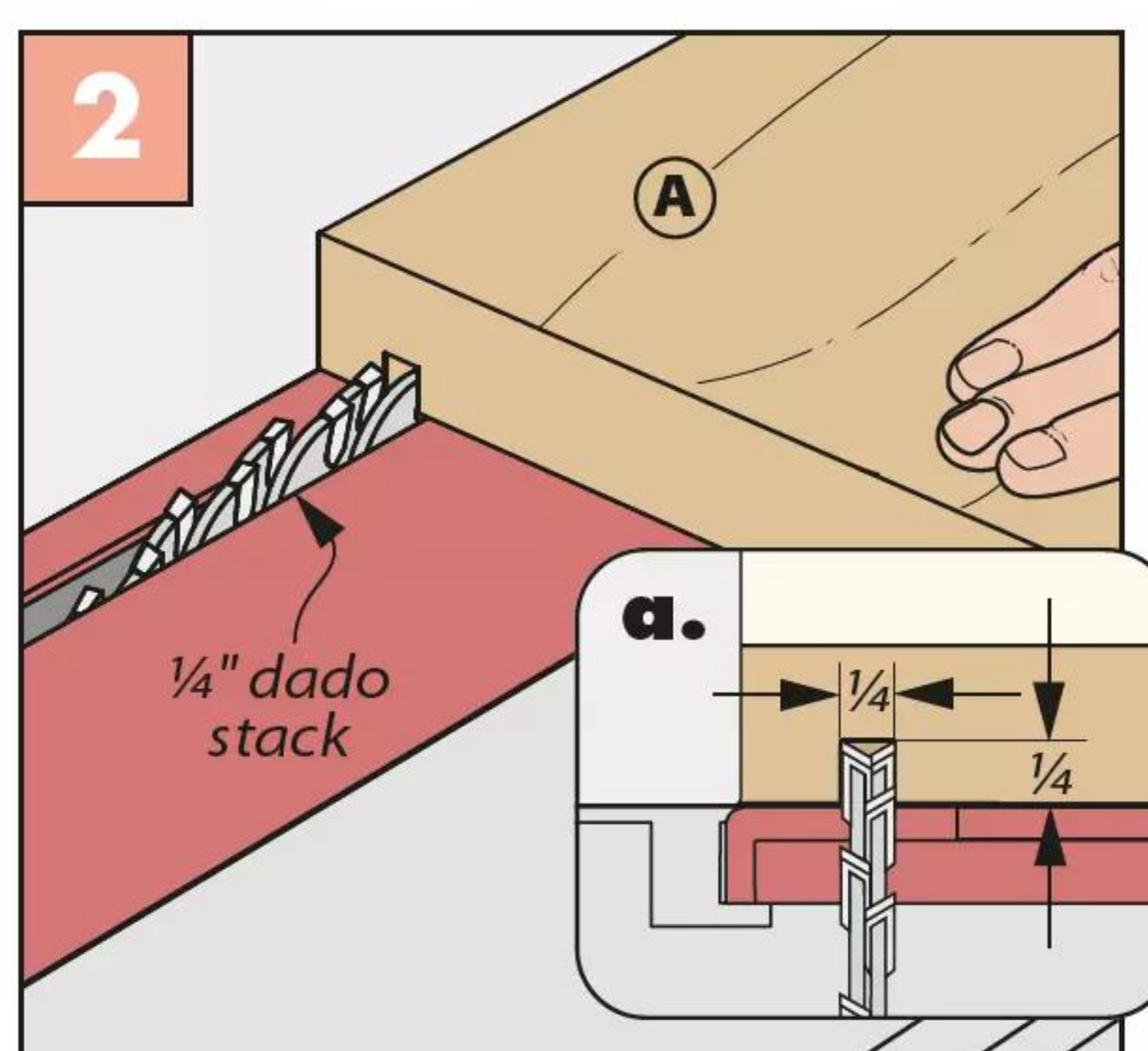
With the dadoes in place, I next cut the grooves up along the back edge of either piece (as in Figure 2). Rabbeted tongues in the back panel and rails slip into these grooves for assembly.



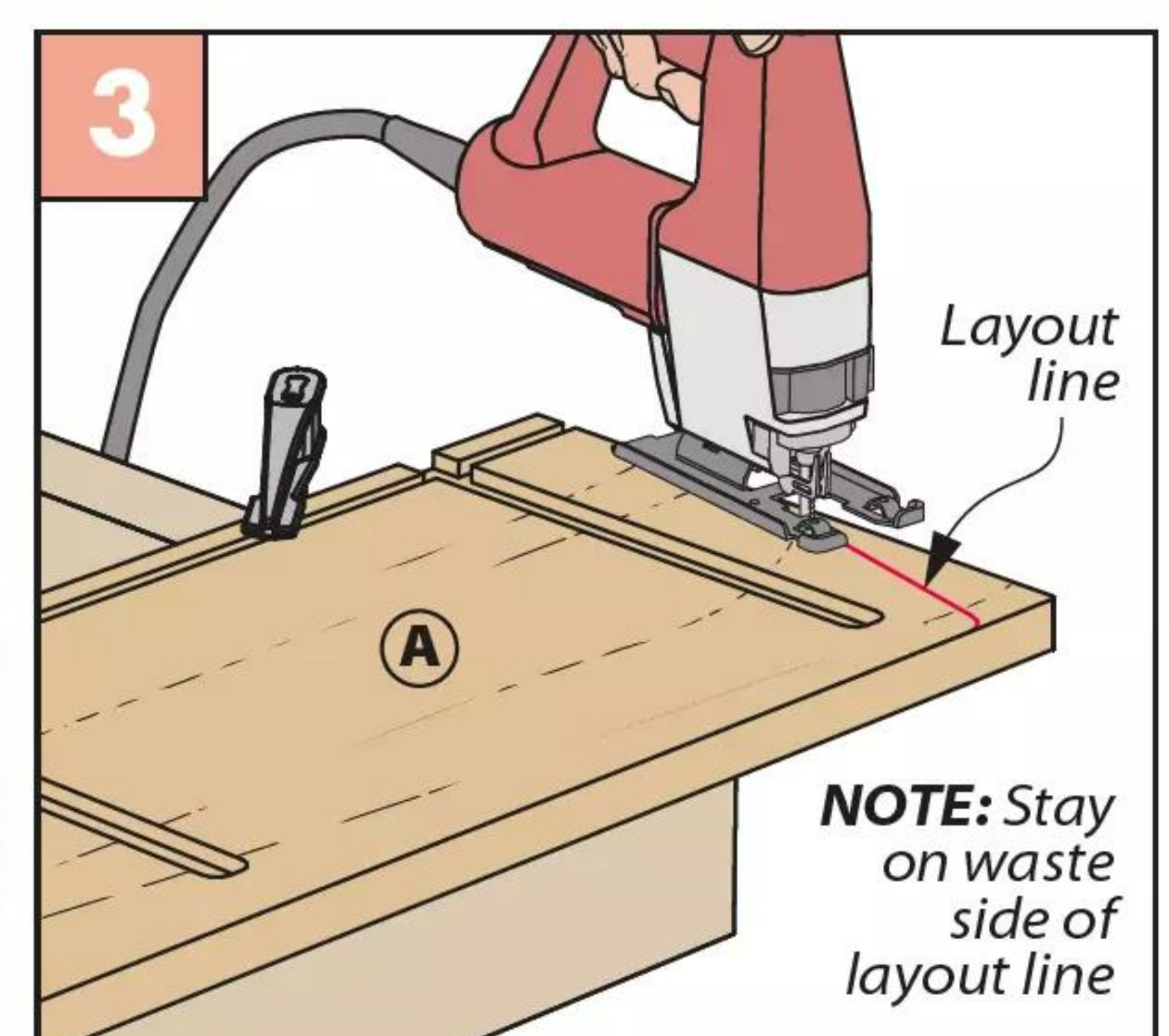
SIDE PANEL JOINERY



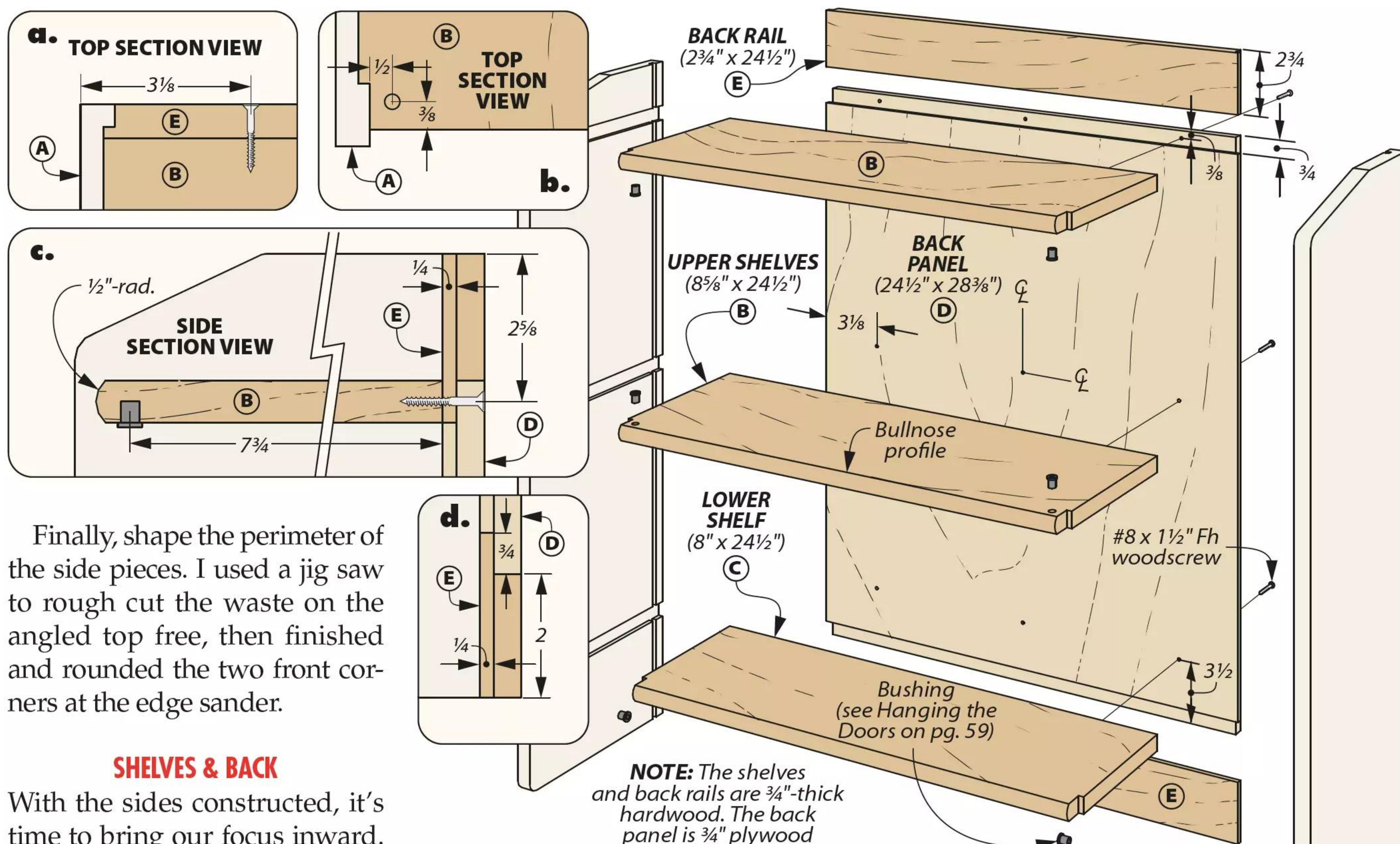
Routed Dadoes. To rout the dadoes, I used a few scrap pieces to make a guide, clearing the waste with a pattern bit.



Back Grooves. The grooves that accept the back pieces were made with a dado blade at the table saw.



Shape the Tops. Rough-cut the tops with a jig saw, then finish shaping at the edge sander.



Finally, shape the perimeter of the side pieces. I used a jig saw to rough cut the waste on the angled top free, then finished and rounded the two front corners at the edge sander.

SHELVES & BACK

With the sides constructed, it's time to bring our focus inward. Three shelves slide into the dadoes, backed by a plywood panel with hardwood rails.

SHELVES. After cutting the shelves to size, there are two items to address, beginning with the notches that form shoulders on the fronts. You can see how I made these in Figure 1.

Next, you'll need to bullnose the front edge of the three

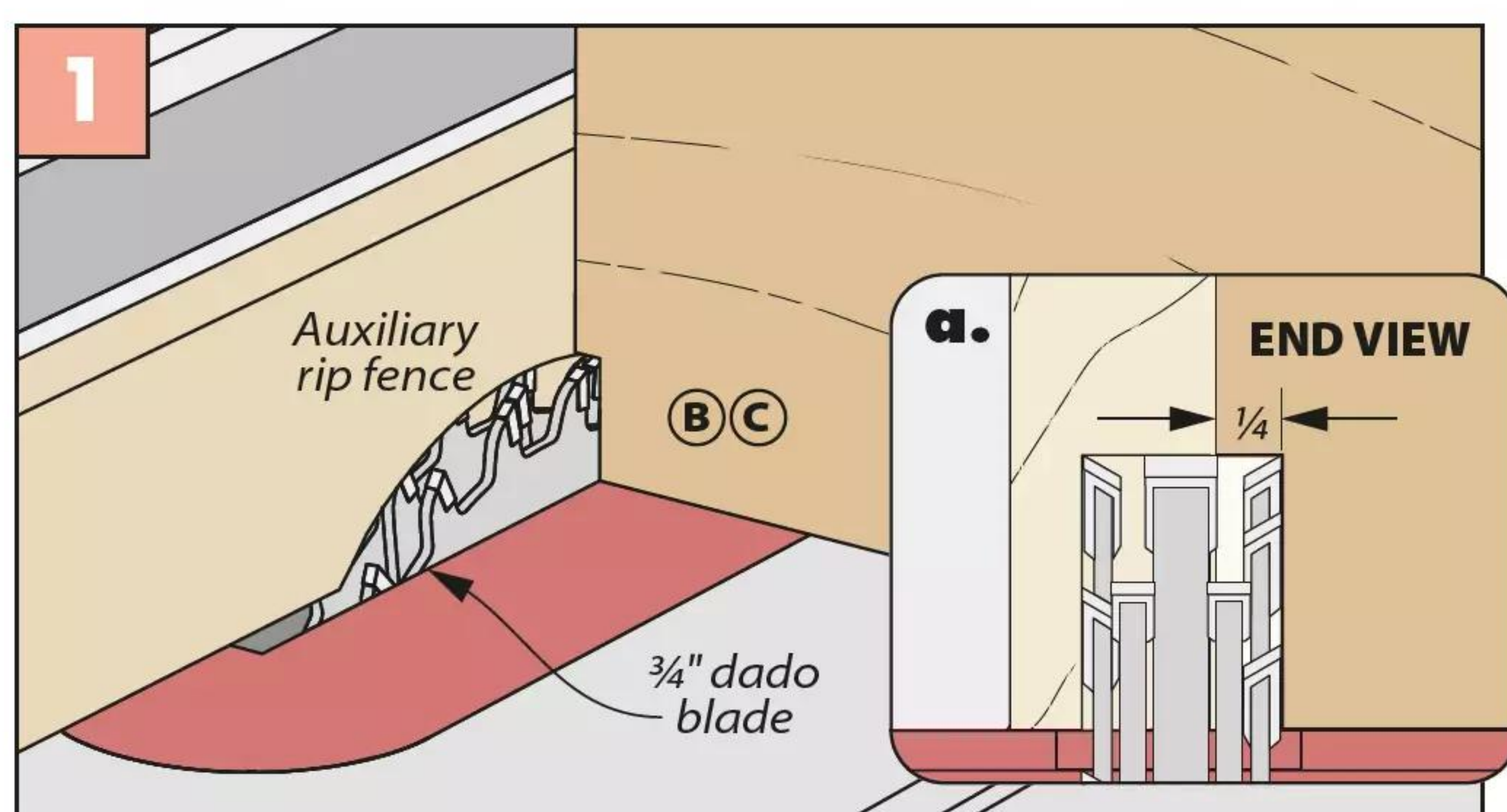
shelves (detail 'c'). I did this at the router table.

BACK PANEL & RAILS. The back of the cabinet is assembled from three pieces: one plywood panel capped by two hardwood rails, giving the impression of solid hardwood from the outside. After sizing, I cut rabbets on their ends to form the tongues that fit

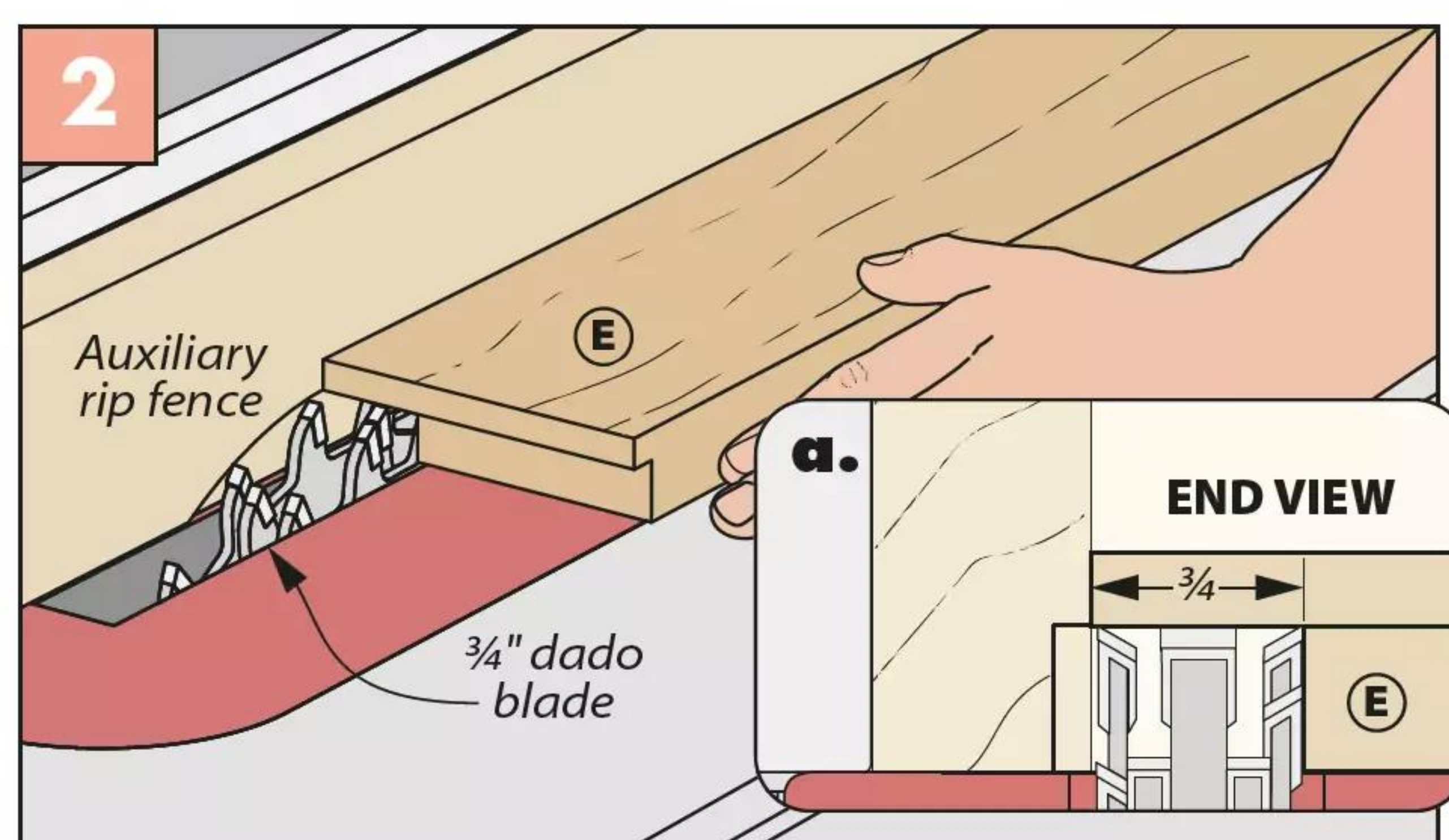
into the grooves in the side panels. Rabbeted edges also overlap between the panel and rails, joining them together (details 'c' and 'd'). I cut these at the table saw, as in Figure 2 below.

With the case made, it can be glued up. Take note that screws driven in through the back support the shelves.

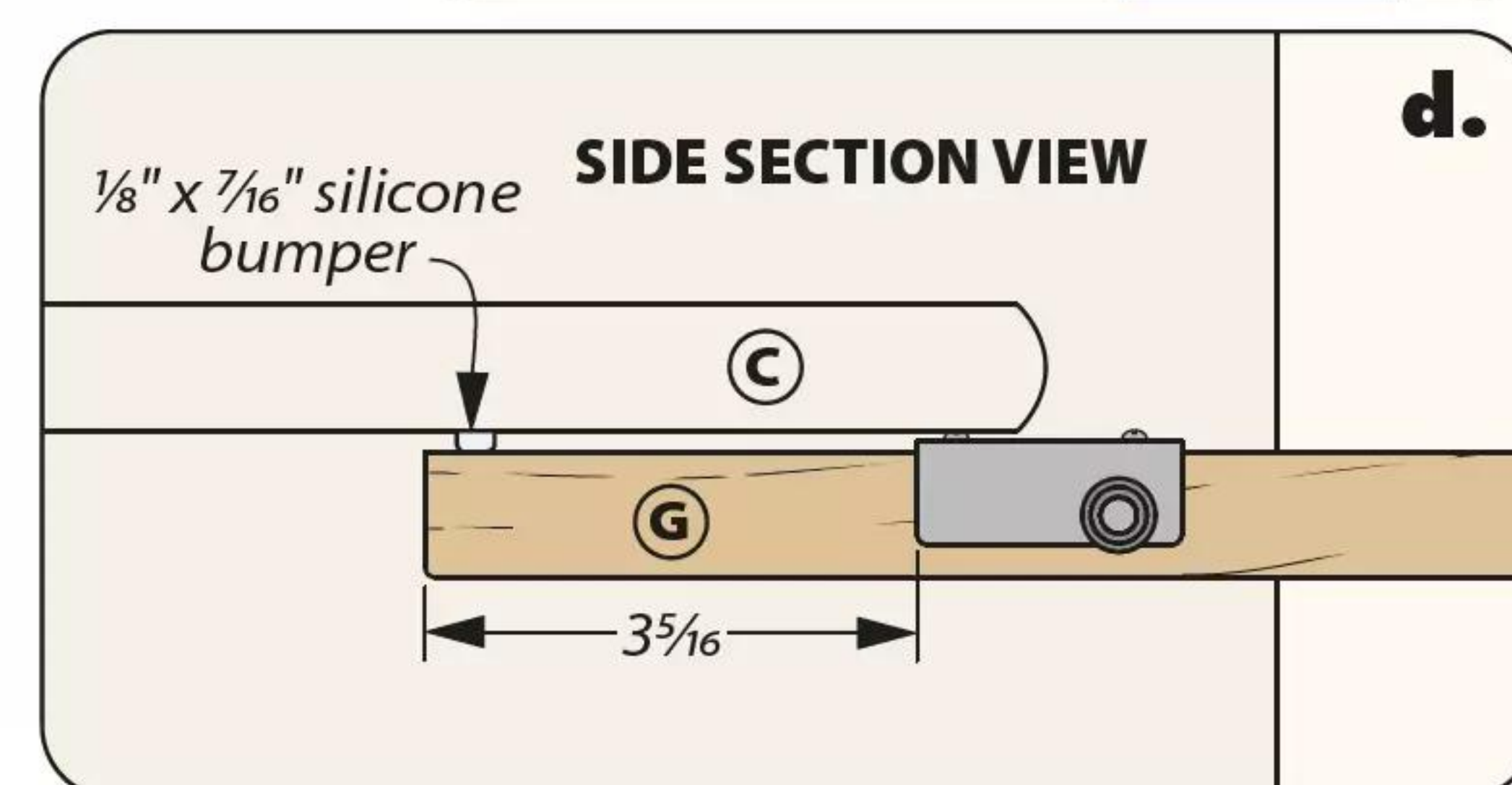
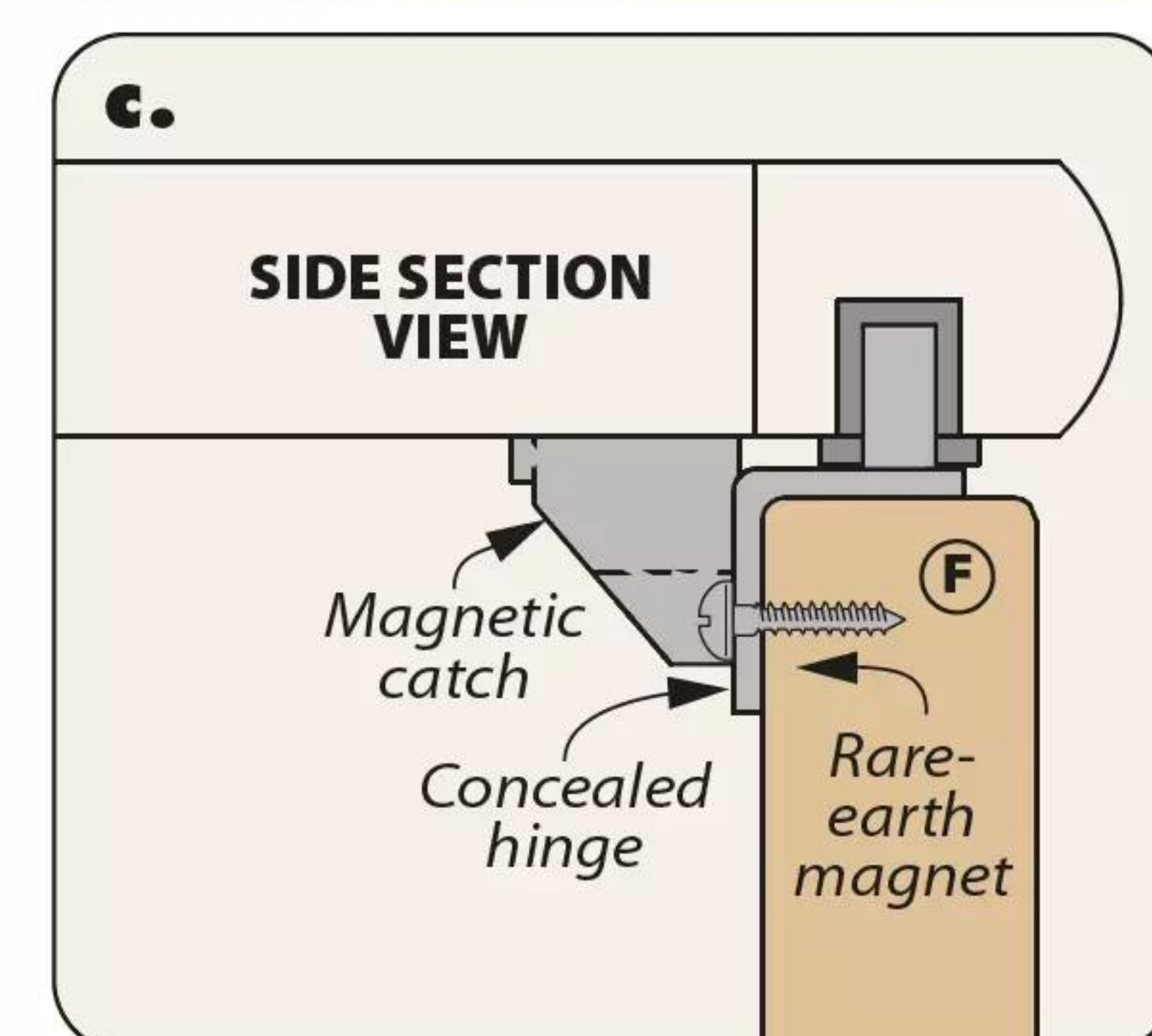
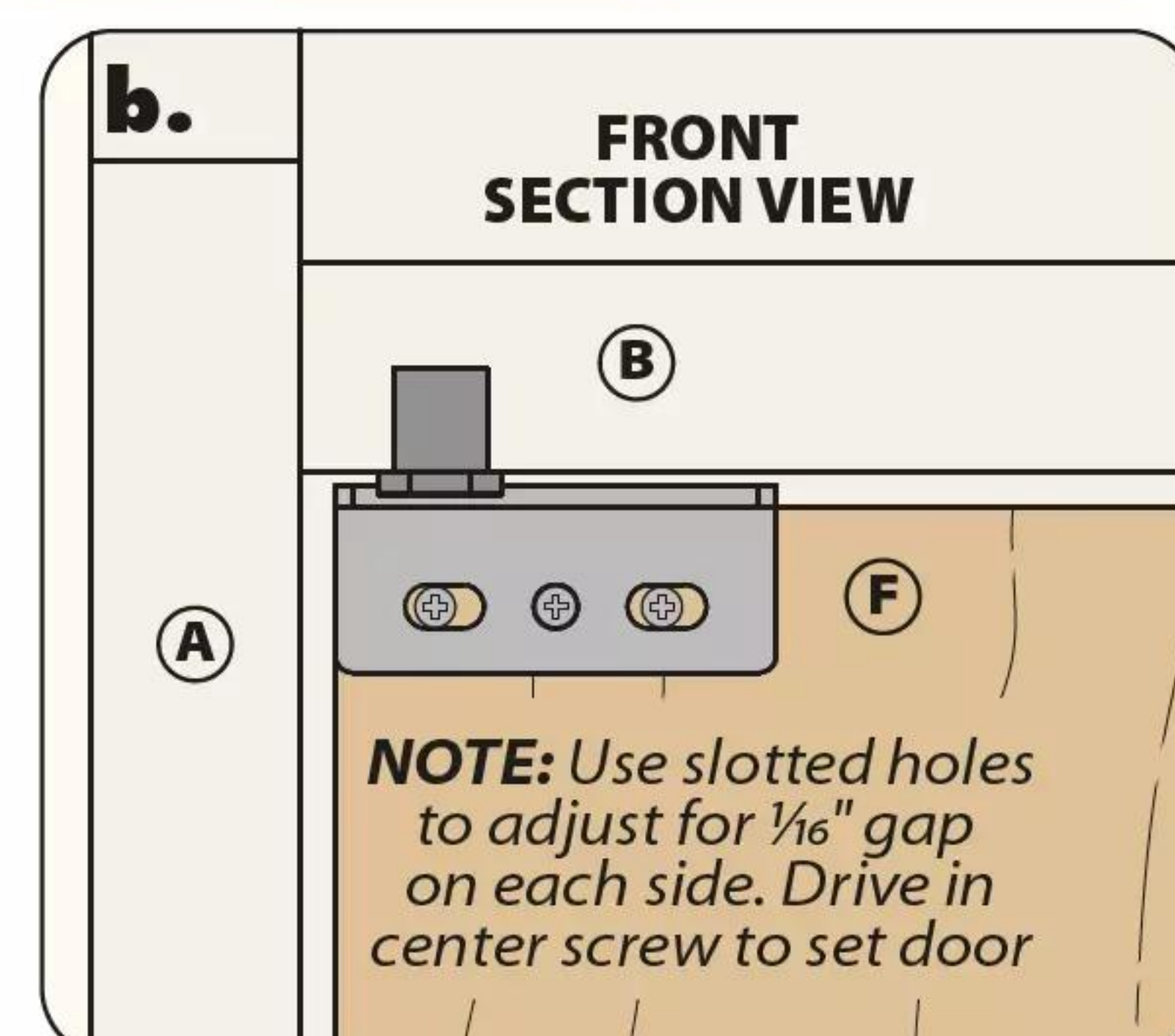
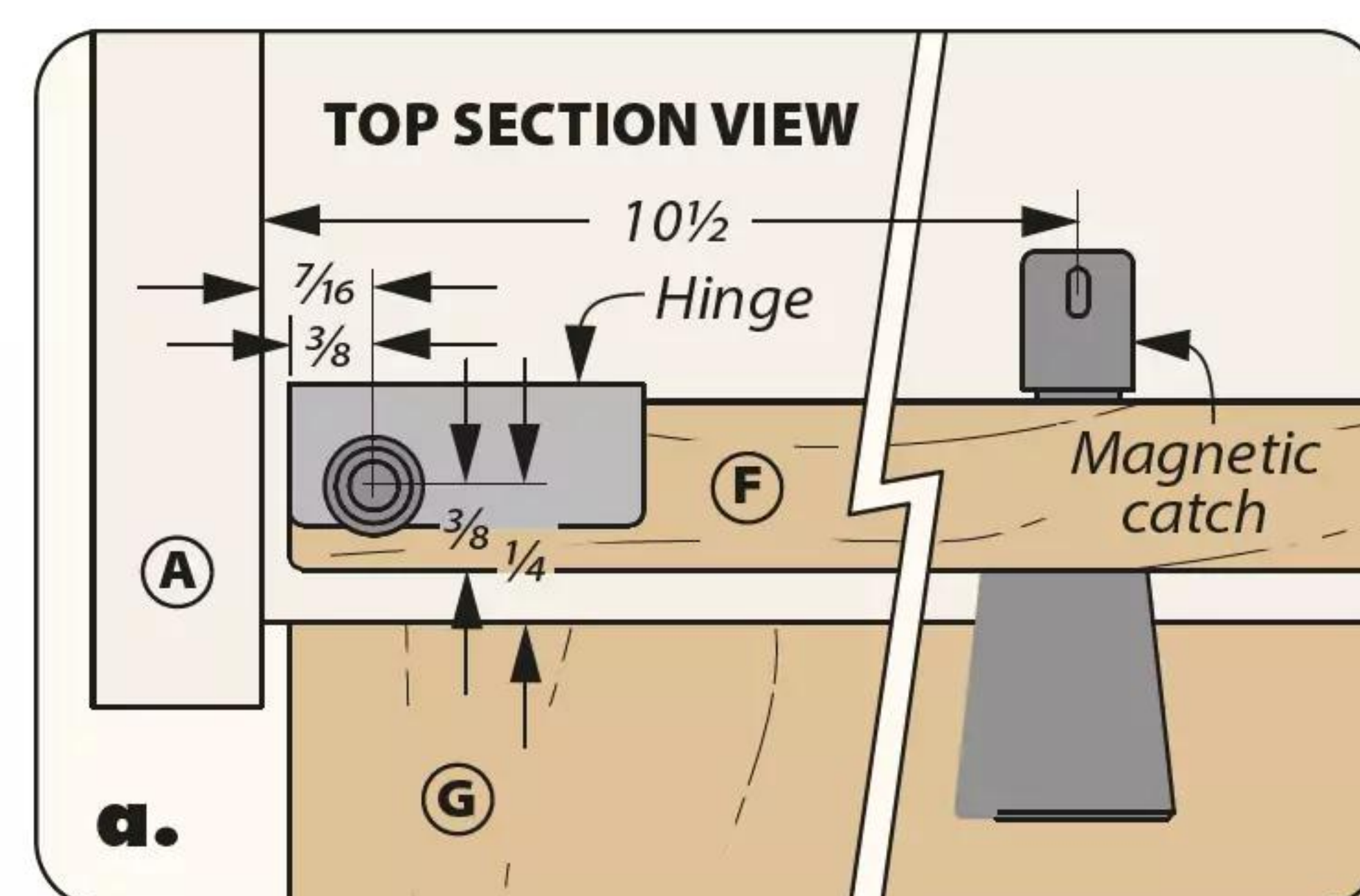
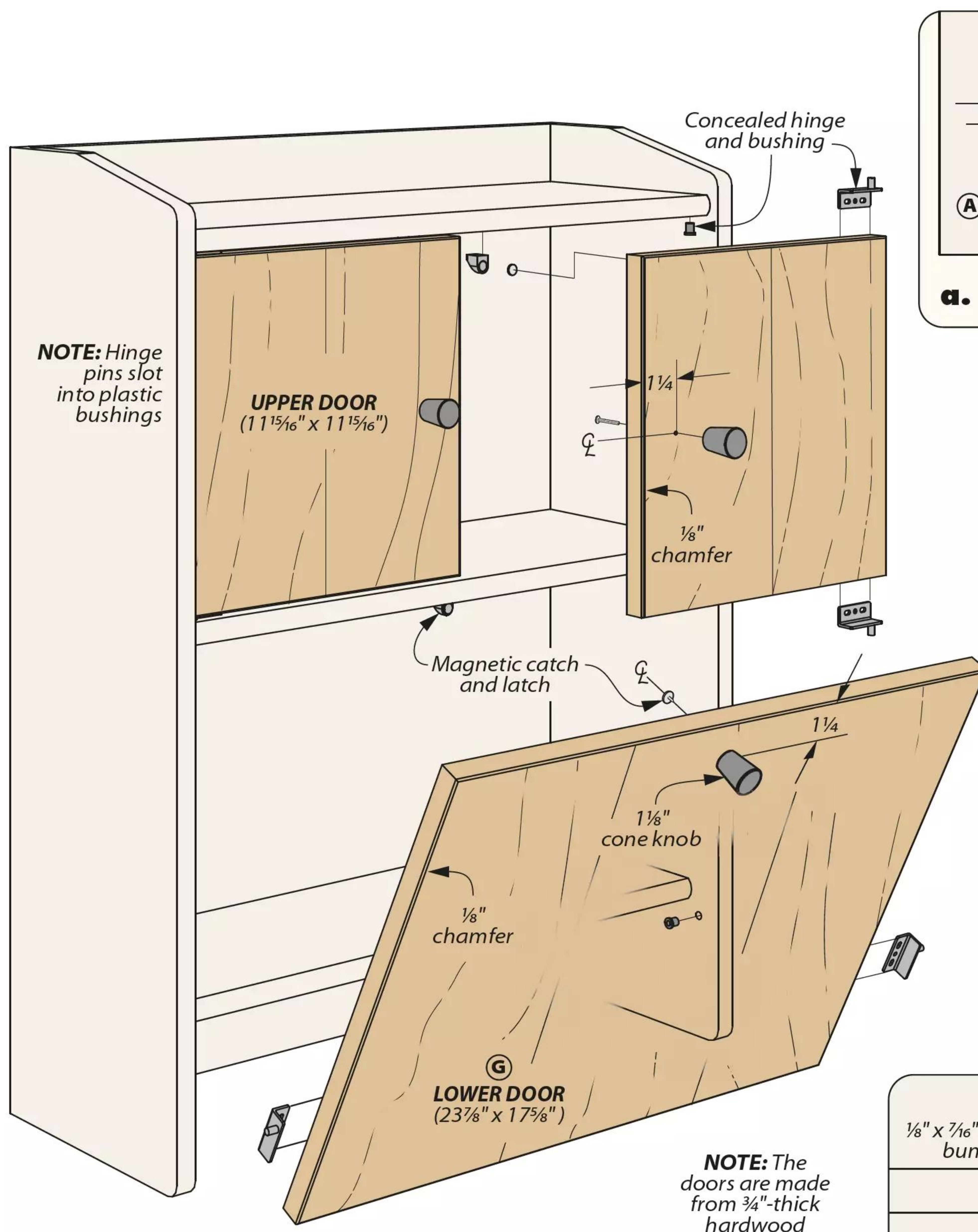
SHELVES & BACK RAILS



Shoulder Notch. To make the notches on the shelves, I used a dado blade buried in an auxiliary rip fence, along with a tall auxiliary fence on my miter gauge to support the workpiece.



Rail Rabbets. Rabbets along the back rails create tongues that allow them to join with the plywood back and sides. Cut these at the table saw as well.



Finishing the **CABINET**

Once the clamps come off of the case, the three doors you see above are next. These will be inset in the case and held by simple, concealed hinges. But before addressing the hardware, we'll need to size the doors.

UPPER DOORS. A pair of doors fit between the upper shelves, cordoning off the upper cupboard. While the dimensions of the doors are shown above, I recommend taking the measurements directly, allowing the doors a $\frac{1}{16}$ " gap on each side.

Once these doors are cut, ease their front edges with a chamfer, then set them aside for now.

LOWER DOOR. The story of the lower door is much the same as the ones above. I measured the case pieces directly to determine the proper width of this piece, but the length will need to extend beyond the lower shelf (as in detail 'd'). This extra length will brace the door against the lower shelf when opened, allowing it to be used as a worksurface.

As with the upper doors, cut the lower door to size once you've determined the dimensions, then chamfer the front edges. Now, gather up a drill, a few bits, and the hardware. Hanging the doors comes next.

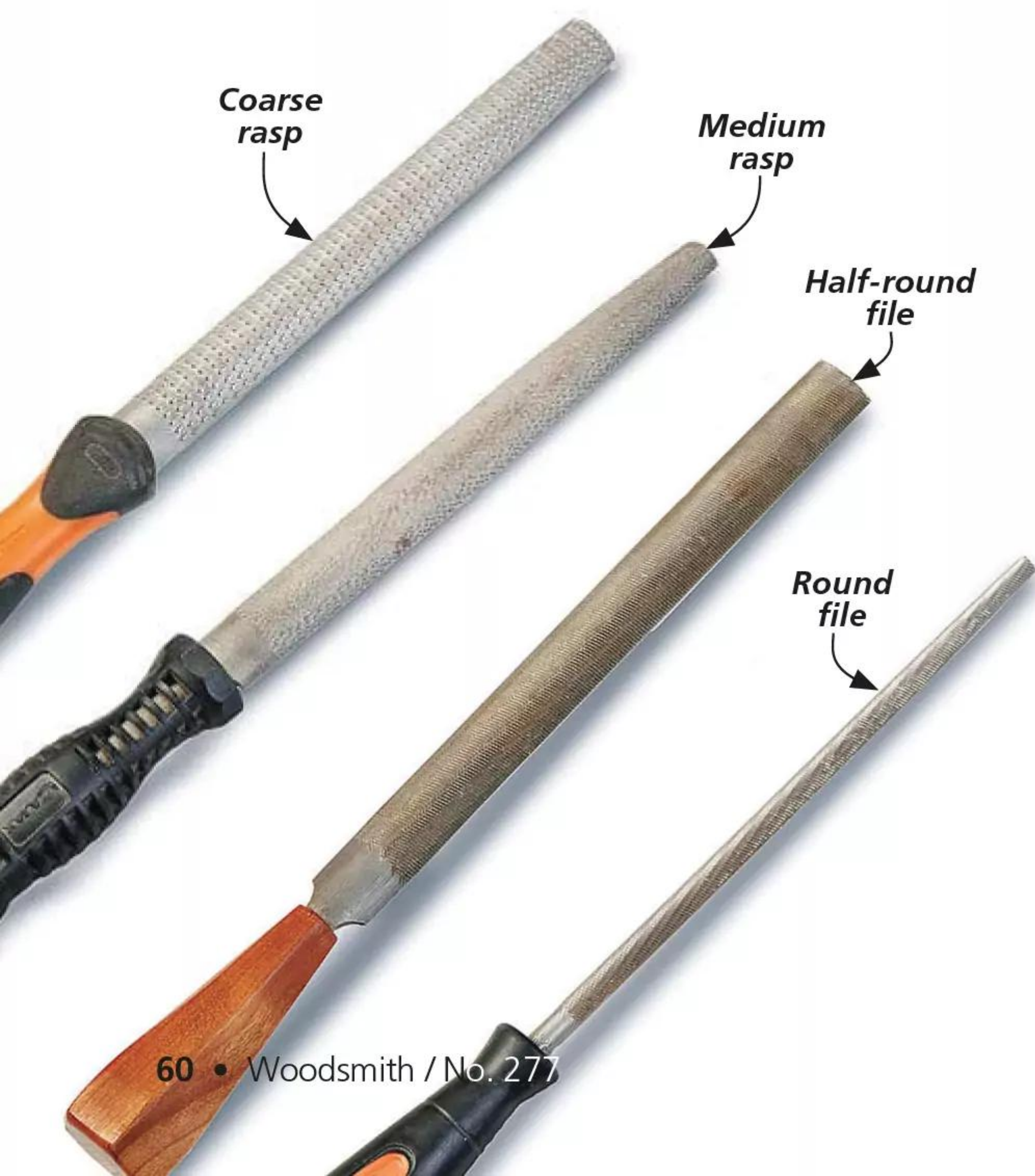
HARDWARE & HANGING

There's no big trick to installing the doors. The concealed hinges you can see above and on the next page are easy to install after you've determined the locations for the bushings.

Last come the knobs and the catch plates. For the knobs, drill out the clearance holes and thread them in place. The catch

cabinet to your wall of choice. First though, it's a good idea to take care of the finish. Once that's done, screws driven through the back rails will secure this beautiful, fold-up desk. **W**

A Set of Files & Rasps



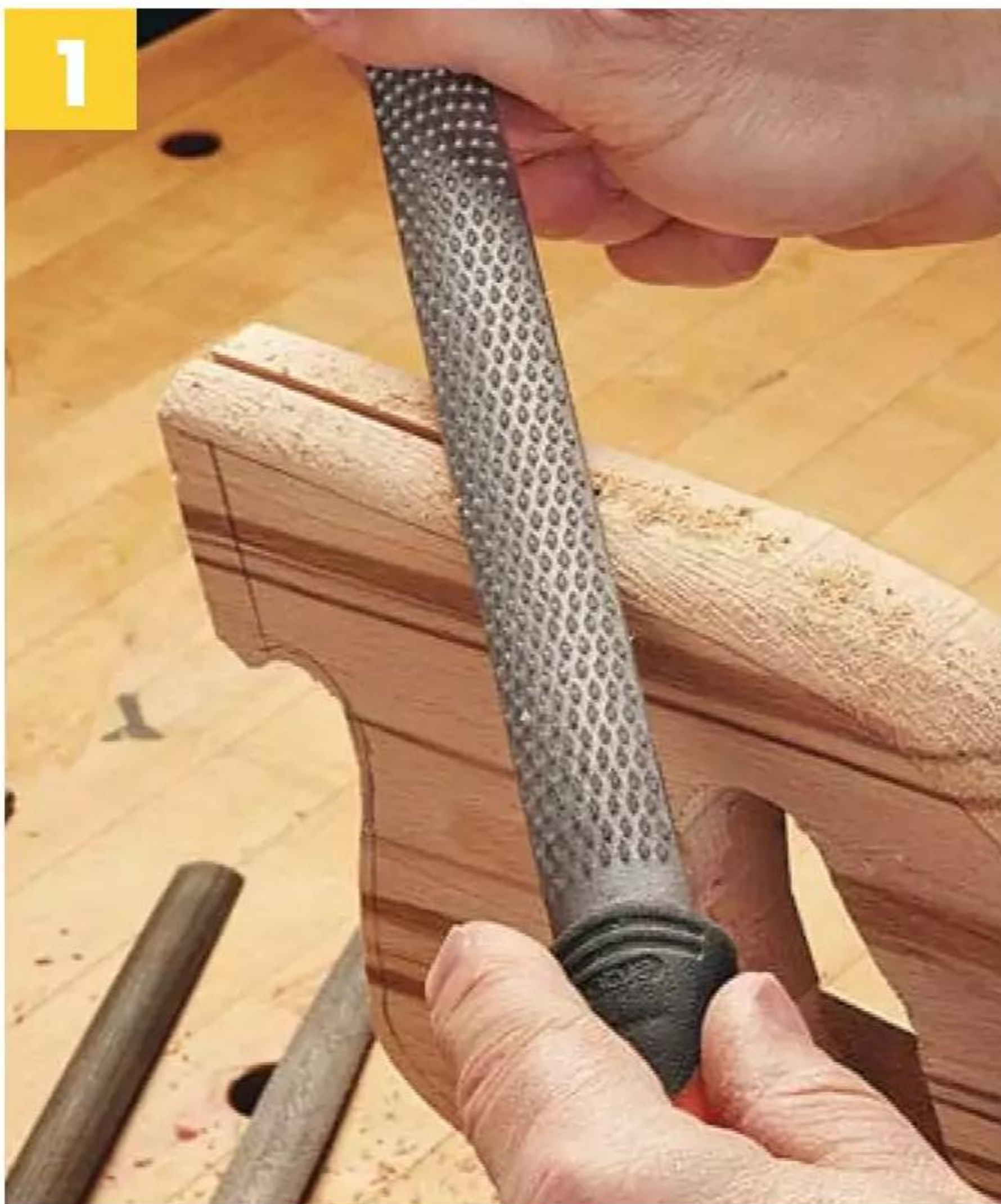
The mention of hand tools inspires visions of finely crafted planes or dovetail saws. Hand tools encompass a broad range of shop necessities. Not all of them are pricey works of art. In my shop, a small set of files and rasps are trustworthy side-kicks to create complex shapes.

RASPS & FILES. The overall shape of rasps and files are similar. The shape of the cutting surfaces sets them apart. Rasps have individual teeth punched into the surface. The cutting edges of files are linear and run diagonally across the blade. I would argue that having both

types of tools are important for shaping a workpiece well.

I don't woodwork to save time, but my shop time is precious and I would rather avoid fruitless effort. When I need to shape a surface, I reach for the coarsest tool that can do the job. Here I'm working on a custom saw handle that serves as a good example of how these tools work.

TWO RASPS. After cutting out the handle, I'm focusing on two tasks: Removing blade marks and then shaping the edges for a comfortable grip. A coarse rasp cuts wood quickly. The profile of the rasp is a half-round.



▲ Heavy shaping should be done with a fast-cutting, coarse rasp.



▲ A finer rasp (then a file) are used to refine details and remove tooth marks.



▲ A round file tucks into tighter curves than the half-round file.

This two-in-one design is more versatile. The rasp has a handle at one end. However, you should also grip the tip of the rasp for better control (Step 1).

With all these tools, make long strokes using the full length of the tool and along the edge. A few slow-motion swipes will help you develop the moves.

Don't be alarmed at the condition of the surface. The medium rasp softens the furrows and refines the shape in just a few minutes worth of work. Step 2 shows the difference in the

surface texture. This rasp also has a half-round profile. (Turn to page 66 for sources.)

A BRACE OF FILES. A half-round file cleans up the stubbly surface left by the second rasp. By now you have the idea. Once you create a uniform pattern, the work is done. Step 3 shows a round file that completes my set. It's job is only for tight spaces. Then it's sandpaper time.

Files and rasps come in a range of formats (check out the ones below). However these four should never leave your side. **W**



▲ A file card has fiber bristles on one side and wire bristles on the other to keep files and rasps clean.

REFINING WITH RIFFLERS



One of Each. The blades on rifflers feature rasp or file teeth on curved surfaces with flat, round, triangular, or square cross sections.



Blending. Rifflers work best in tight spaces to shape surfaces and ease transitions from adjoining sections.



Rifflers come in sets, refer to sources, page 66

Spline Joinery



▲ A slot cutter turns your router table into a joinery workstation for simple, strong assemblies.

The standard *Woodsmith* method for creating frame and panel assemblies has been stub tenon and groove joinery. In this approach, the thickness of the plywood panel drives the size of the groove and the matching stub tenons. I've been taking that process one step further. Why not use plywood splines instead of a separate step to make stub tenons? The concept is similar to loose tenons or biscuits.

Related to this, I've noticed that MDF core plywood measures very close to $\frac{1}{4}$ ". This means



▲ Mark a triangle on paired stiles and rails, with the apex point toward the top, to keep the parts oriented correctly for joinery and assembly.



▲ Setup blocks offer a physical reference point for setting router bits to the correct height.

you can form the groove in a single pass with a dado blade, or in my preference, a slot cutter in the router table.

There's another advantage lurking here. Since you don't need to create an integral stub tenon, sizing parts is simpler. They're based on direct measurements and no accounting for joinery. This allows you to concentrate on accurate crosscuts. Forming the joinery details won't affect the length of parts.

STRAIGHTFORWARD LAYOUT. In this joinery method, power tool setup replaces detailed layout marks on the workpiece. Your focus here is making sure to cut those details in the correct edge and end of the parts.

The way I learned to do that is to mark a triangle on matching pieces, as shown in Step 1. Arrange the frame members how you want them to appear in the final assembly. Bring the two rails together and draw a triangle across the two parts. Repeat this for the stiles.

The triangles tell you a lot. The tip of the triangle points to the top of the assembly. The edge that the triangle crosses is the inside edge of the frame. And when I'm standing at the router



▲ Using the router table fence along with the bearing on the bit provides a smooth entry and exit of the workpiece as it is cut. A steel rule helps you see when the two are aligned.

table, the triangle tells me the appropriate face is up. It's like a secret code.

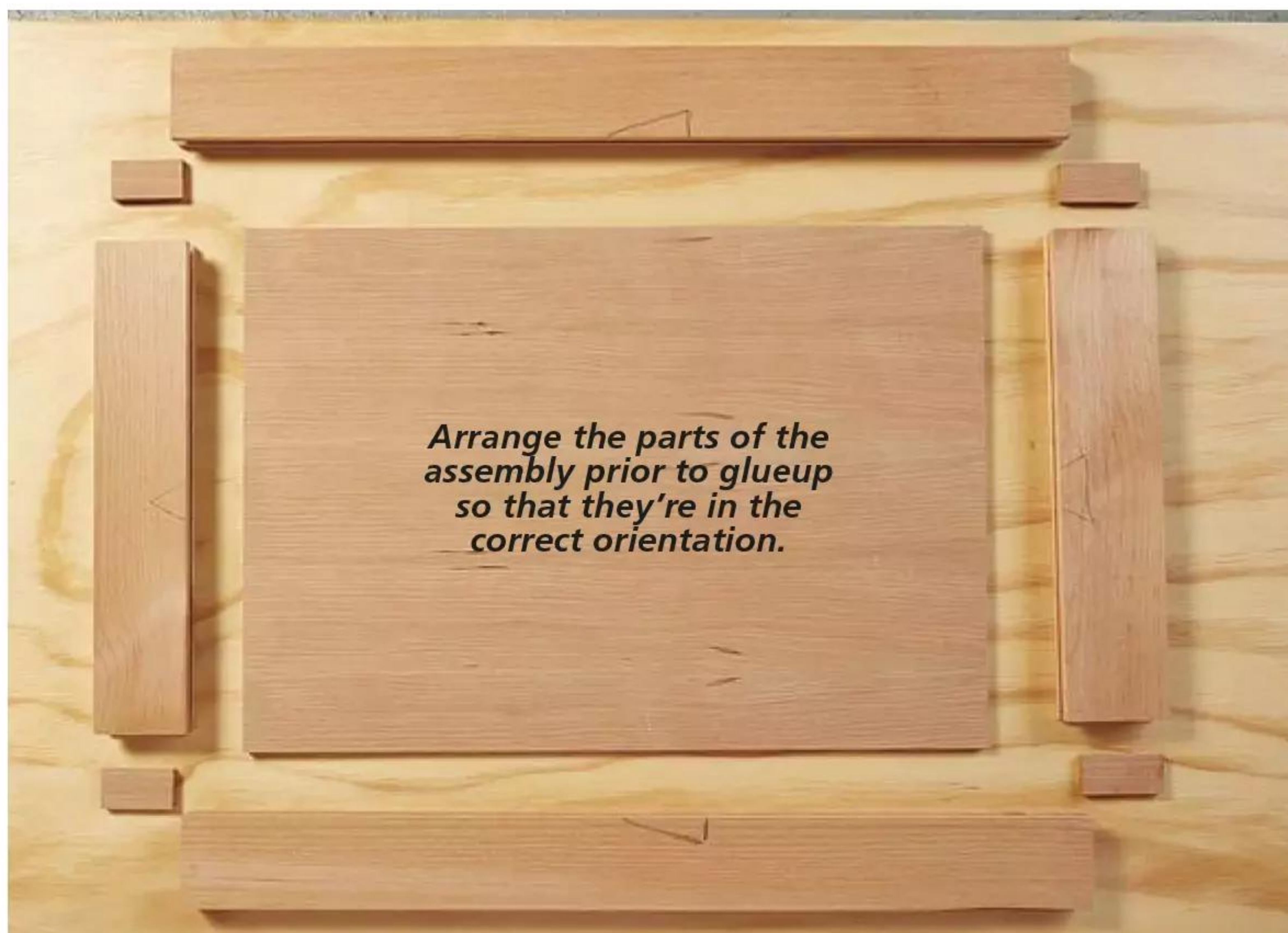
ROUTER TABLE SETUP. At the router table, I install a $\frac{1}{4}$ " slot cutter. The bit's height is determined by a setup block (Step 2). I'm using a $\frac{1}{4}$ " block here to center the groove in my workpieces. Since the groove is cut in a single pass, an exact center isn't something you need to fret over.

Now it's time to bring in the fence. Position the fence to align with the bearing on the bit, as

you can see in Step 3. I have it set for the maximum depth of cut, $\frac{1}{2}$ " in this case.

ROUTING GROOVES. With the router table programmed, the actual routing is basic work. I use push pads to provide consistent pressure as I rout along the inside edges of the stiles and rails.

The ends of the rails receive grooves, too. For this narrow cut, I use a backer block to keep the piece square to the bit and to stop tearout. This is shown on the previous page.



▲ Apply glue to the slot on the end of the rails and insert the spline. Allow the glue to set up before proceeding.



▲ Run a bead of glue into the grooves in the two rails then fit them over the ends of the panel.



▲ The final step in the process is to bring in the stiles. After brushing glue onto the exposed splines, add more glue to the groove in the stiles.



▲ Draw the clamps tight to close up the joints. Trim the exposed splines flush after the glue dries.

ASSEMBLY

The photo series above walks you through the assembly process. In the upper left photo, I've set out all the parts that need to come together and in their correct orientation along with the four splines.

The splines are cut a hair narrower than the combined depth of the grooves. The shoulder of the joint will close tight with a barely there gap on the end.

THREE PARTS. I divide the glueup into three stages. The first is to glue the splines into the ends of the rails, as in Step 1. Make sure that the splines don't extend

past the bottom of the groove. Otherwise the panel won't fit.

Allow the glue to set up for 20-30 minutes. Now the splines act like integral tenons and you have fewer loose pieces.

The second step is to glue the rails to the panel. This is shown in Step 2. The edges of the splines and panel should align, or the panel can be slightly inset.

The final stage is to glue this center section to the outer stiles, as in Steps 3 and 4.

As you tighten the clamps, be sure the faces are flush. You need just enough clamp pressure to close the joints.

PRIMED FOR CUSTOMIZING

The process that I've outlined creates a square-edge assembly that blends in with a lot of styles. It doesn't have to end there. Think of it as the base model ready for a custom trim package.

The photos on the next page highlight a couple of options. Best of all, these details are created with common, inexpensive bits you probably already have. Feel free to use those ideas, but consider them as representatives of a range of other paths to take.

CUSTOM MOLDING. A dramatic bolection molding flows over the inner edge of the stiles and rails

DRESS IT UP!



1
Cove & Bead. Rout a large, complex profile along each edge of an extra-wide blank. An ogee profile would work as well.



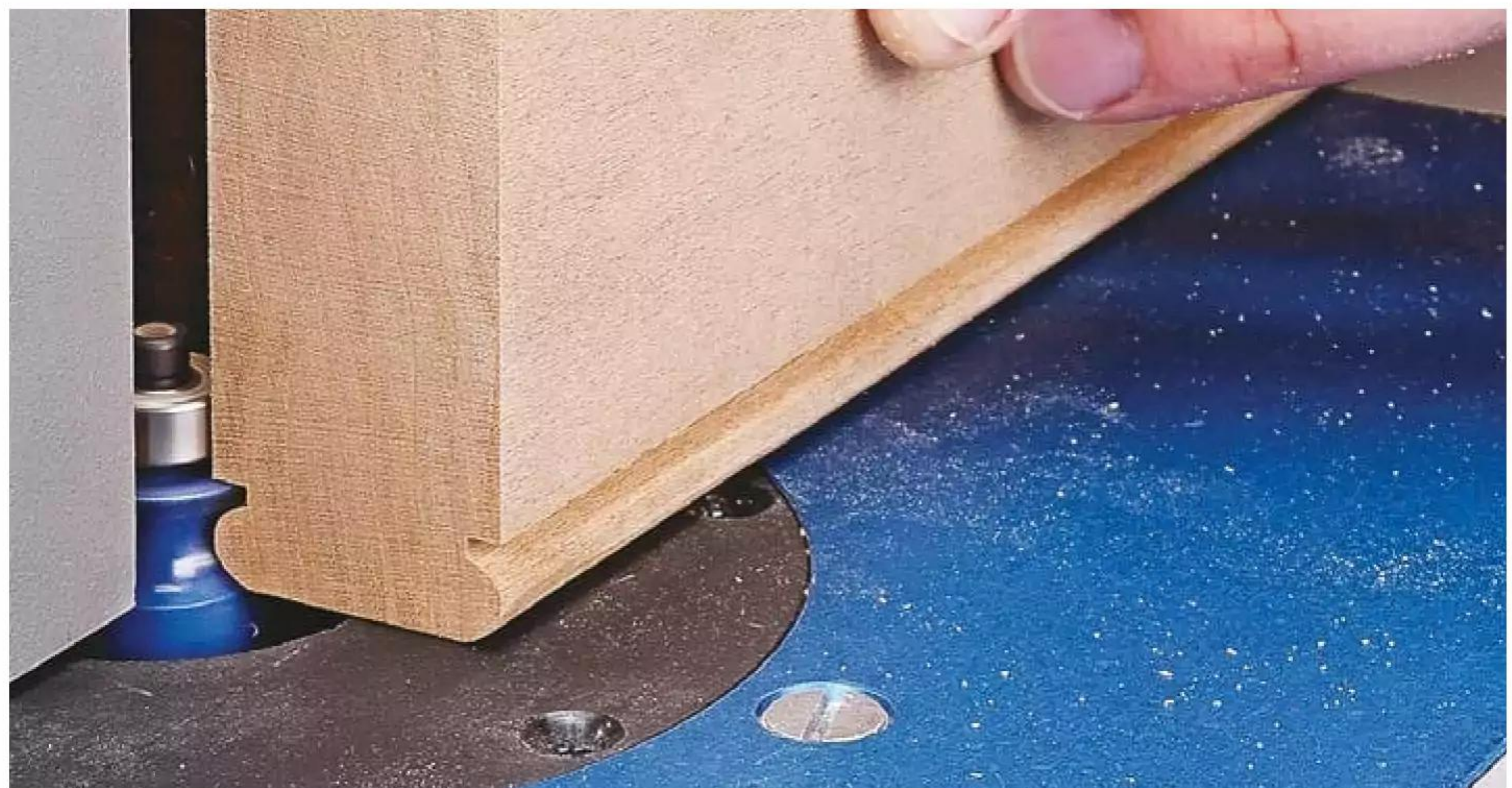
2
Complete the Circle. A point cut roundover bit forms a bead at the top of the profile ending with a fillet.



3
Make The Step. A straight bit cuts a groove that matches the offset between the frame and the panel.



4
Rip & Miter. Cut the molding free of the blank at the table saw. Then miter pieces to wrap around the frame.



Just Bead It. Rout a bead profile on oversize blanks. Rip thin strips from the blank and miter them to wrap around the inside of the frame, as shown at left.

and onto the panel. This expressive molding adds depth to the whole assembly (Steps 1-4).

SIMPLE, SUBTLE. The lower photos show a second option. Here a

small, applied bead molding tucks into the junction of the frame and the panel.

It's helpful to focus on one aspect of woodworking in order

to master details. What I've tried to do here is to show how one technique opens up opportunities for consistency, confidence, and creative expression. **W**

Sources

MAIL ORDER SOURCES

Project supplies may be ordered from the following companies:

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

Rockler
800-279-4441
rockler.com

Amana Tool
800-445-0077
amanatool.com

amazon.com

Bonstone
800-425-2214
Bonstone.com

Craft Supplies USA
800-551-8876
woodturnerscatalog.com

Custom Cushions
800-528-4576
customcushions.com

DK Hardware
877-509-8040
dkhardware.com

Eshoji.com
414-367-2501

Hairpin Legs
614-342-0586
hairpinlegs.com

Horton Brasses
860-635-4400
horton-brasses.com

Lee Valley
800-871-8158
leevalley.com

Kreg
800-447-8638
kregtool.com

Milescraft
224-227-6930
milescraft.com

McMaster-Carr
630-833-0300
mcmaster.com

Old Masters
712-737-3436
myoldmasters.com

Woodcraft
800-225-1153
woodcraft.com

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.

EPOXY INLAYS (p.12)

As mentioned in the article, I bought 3"× 6"× 6" turning blanks from *Craft Supplies USA*.

And liquid and powder tints designed for use with epoxy are available from *Bonstone*.

JAPANESE JOINERY (p.16)

Dorian Bracht's *Japanese Joinery* can be purchased from a number of online retailers and bookstores. Check at your local retailer or search online to find a copy for yourself.

GREAT GEAR (p.22)

As of the time of writing, the inline clamps from *Milescraft* are not yet available for purchase, and don't have an item number for me to provide you with. However, by the time you're reading this, they will be available on *Milescraft's* website alongside their other clamping options.

- **Kreg**
Mortise Mate KLTJ100
- **Milescraft**
CamStop 4031
CamStopXL 4032
HoldDown 100 4035
HoldDown 200 4036
MultiStop 4034
AngleStop 4033

ATOMIC BAR (p.28)

- **Lee Valley**
Mahogany Banding . . . 41A0101
- We ordered the hair pin legs online at *Hairpinlegs.com* by

going to the Hairpin Legs drop-down menu and selecting 8" Black Powder Coat legs.

The bar top was stained with *Old Masters* "Espresso" gel stain. Then the top and the body of the bar was finished with two coats of lacquer. The lattice was painted with *Benjamin Moore's* "Woodstock Tan" (HC-20).

SOJI CABINET (p.34)

- **Lee Valley**
Black Shelf Pins 05H2042
1/4" Magnet Set 99K3310
 - **Horton Brasses**
2" Butt Hinges CP-11
 - **Eshoji.com**
Kozo Mulberry Paper Silk .S131
Double Sided Tape Y1A
- We selected the "Antique" finish for the hinges from *Horton Brasses*. The cabinet, doors, and lattice was sprayed with a couple of coats of lacquer before the soji paper was attached to the back side of the door.

SOFTWOOD TOOL TOTE (p.42)

We the tool tote you see on page 42 two coats of spray lacquer, however even just a few coats of tung oil would make an adequate and attractive finish for this project.

STORAGE BENCH (p.49)

- **Lee Valley**
Finger Grip Bit 16J7274
- **McMaster-Carr**
14" Drawer Slides . . . 11435A13

We ordered a cushion from *Custom Cushions* (see margin). You can specify fabric, size, batting, and more. For ours, we selected a 3"-thick polyurethane foam cushion with a boxed edge and fiber batting. The fabric is *Sunbrella* "Laurel" (145844-0004). The finish on the bench is spray lacquer to keep the pale tones of the ash. A water-based finish like *Old Masters* "Masters Armor" provides a similar look.

FOLD-DOWN CABINET (p.54)

The mahogany used in the fold-down wall cabinet was finished with two coats of tung oil, darkening it slightly to contrast with the Baltic birch used on the back. We followed that by applying a couple coats of spray lacquer over the piece.

- **Rockler**
Concealed Hinges 30361
- **Amazon**
Magnetic Catches . . 761710527118
- **DK Hardware**
1 1/8" Cone Knobs . . . 760923282845

RASPS & FILES (p.60)

- **Lee Valley**
8" Rasp 62W2508
File Cleaner 61K0201
- **Amazon**
8" Coarse Rasp B001G5TYGE
8" Round File B0001P0OD2
- **McMaster-Carr**
Half-Round File 4221A13
- **Woodcraft**
Riffler Set 17J55

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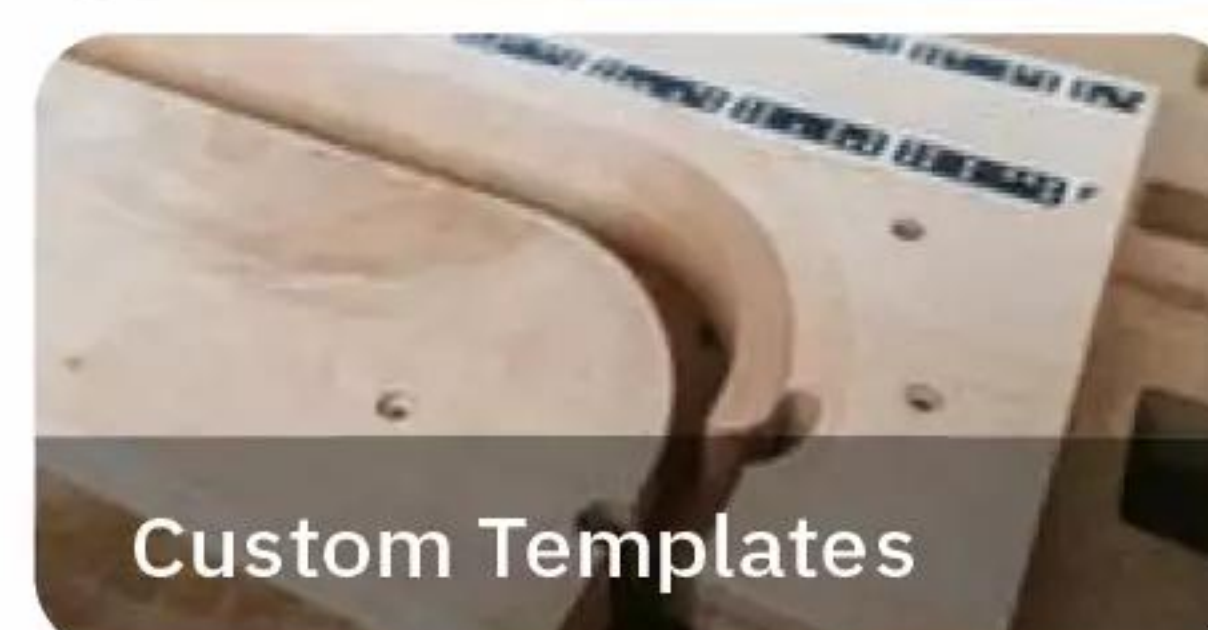
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Custom Templates



Hardware Installation



Mortise & Tenon



Fine Furniture



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