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- Drop leaves
- Art of marquetry
- Drafting tool kit



*Shaker chest of drawers, p. 48*





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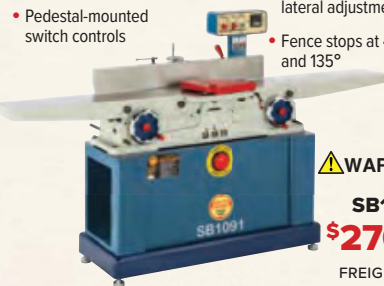
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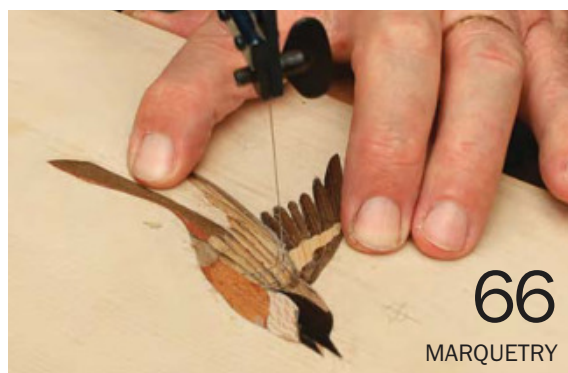
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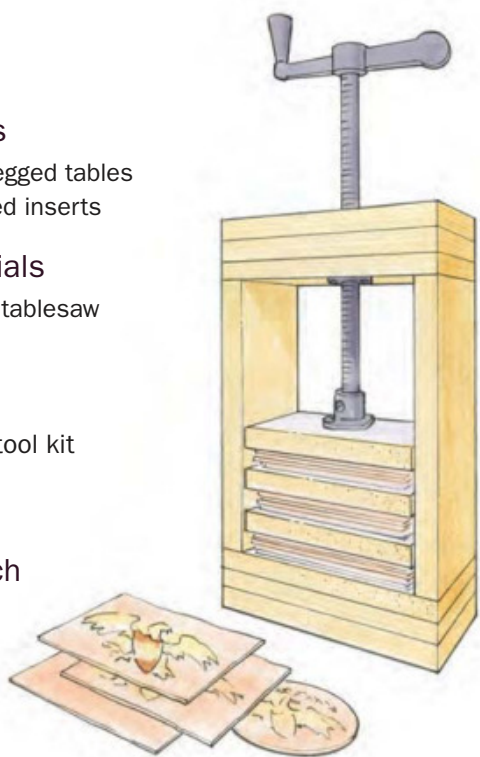
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## For members

### VIDEO

#### Breaking down drop-leaf table joinery

Steve Latta demonstrates his straightforward techniques for creating two joints—rule and knuckle—(p. 58) that would have most woodworkers scratching their heads.



### VIDEO

#### Back it up

There is no reason the back of your case shouldn't reflect the care you put into the rest of the project. Editor and creative director Michael Pekovich (p. 32) shows how he uses a special box of shims to space his shiplapped boards perfectly.

## Online extras

Free content at [finewoodworking.com/290](http://finewoodworking.com/290)



### VIDEO

#### Behind the design: Mike Korsak's En Pointe

Mike Korsak (p. 22) takes you through the design process—including his hand-drafted sketches—for his case on stand, En Pointe.



### VIDEO

#### Master Class with Tom McLaughlin

Follow along with Tom McLaughlin while he builds a Shaker-style dresser (p. 48) in this eight-part video series.

## Additional perks of Unlimited

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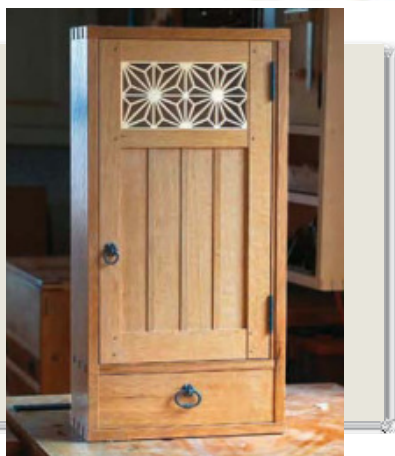
Unlimited includes two digital book collections: *The Complete Illustrated Guide to Woodworking* and *Methods of Work*.



### VIDEO WORKSHOP

#### Hanging Wall Cabinet with Mike Pekovich

FWW editor and creative director Michael Pekovich builds a small cabinet that packs in a lot of techniques. It has dovetailed case construction, through-mortise-and-tenon joinery, a dovetailed drawer, a frame-and-panel door, and a decorative kumiko panel. In this series, while demonstrating how to build the cabinet, he teaches woodworking techniques that can be applied to building any piece of furniture.



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# contributors

**Steve Latta** (“Putting the Drop in Drop Leaves”) was in college in Ohio when he began woodworking. “It was just a natural fit. I was paying for college fixing bicycles and I overhauled a bike for this guy who owned a furniture shop and he told me I was good with my hands. He offered me a job and I took it. Never looked back, no regrets.” From there, Steve worked in several shops, taking as much as he could from each before moving on. Because he wanted to do period work, he ended up about an hour west of Philadelphia and has stayed in the area ever since, raising three children with his wife, Elizabeth. Feeling burned out from working in cabinet shops, Steve sought a teaching job, and as providence would have it, the local technical college, Thaddeus Stevens, was looking for someone like him. He’s been professor of cabinetmaking and wood technology there for more than 20 years.



After spending his 20s building log homes in Ohio, **Craig Vandall Stevens** (“The Art of Marquetry”) went to California and attended The Krenov School (then known as College of the Redwoods) for two years in the early 1990s. Afterward, he worked as a studio furniture maker for more than 25 years before taking his current position as executive director at Philadelphia Furniture Workshop. There he does most of the teaching, cleans the coffee maker, and shares studio space with his wife, Mami, who learned woodworking in Japan.



Since his job expanded last year to editor and creative director, **Michael Pekovich** (“Building with Rabbits and Dadoes”) hasn’t let any grass grow under his feet. In addition to managing our staff during a pandemic, designing and editing the magazine, and teaching woodworking, Mike has also been writing his second book. *Foundations of Woodworking* will be out this fall. Those who know Mike will not be surprised to learn that in addition to writing the book and taking the photos, he also designed it. We’re pretty sure he sleeps sometimes, too.



After three decades making high-end furniture on commission, **Tom McLaughlin** (“Shaker Chest of Drawers”) is now devoted to teaching others via live video—with his wife, Kris, behind the camera—through their website, [epicwoodworking.com](http://epicwoodworking.com). They have three kids, all of whom are artistic. The youngest is a graphic artist and two are working musicians, one in Nashville and another in Los Angeles. Tom wants in on the action, so he’s learning to play the guitar. And, unsurprisingly, he’s making electric guitars, for his kid and for himself.



We are a reader-written magazine. To learn how to propose an article, go to [FineWoodworking.com/submissions](http://FineWoodworking.com/submissions).

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## From the Editor

### What we make matters

The joke among woodworkers is that, since we'd rather be alone in our shops anyway, the social isolation of the last year hasn't really affected us. While it's true that woodworking is often a solitary pursuit, there is an important potential for connection to others in the work we make. For the most part, whether it's a bowl, box, table, cabinet, or chair, the things we make are meant to be used. If we take the time to make something that does its job well and is a pleasure to use, then we enhance the daily life of the user in a small but important way. Even as I make things for others, I find meaning in the pieces that others have made for me, and I feel a connection to them in use. By being mindful of that potential, we can put our passion for the craft to a more important end.

My enjoyment in spending time in my shop is really only half of the equation when it comes to investing meaning in my work. Without an intended purpose for the things I make, it's hard to justify the time and effort I've spent on the project. When I build something for a specific person—whether a friend, family member, or client—that person keeps me company in the shop. They are in my thoughts, helping to guide my efforts. The finished piece may not be something I would necessarily make for myself, but I enjoy the opportunity to let others push my boundaries a bit.

Perhaps the reason we are so content in our shops, then, is that we are not alone. Instead, we find constant companionship with those who are on our minds and in our hearts as we build.



*A simple spoon carved with a keen eye, given to me by a student, is a treasured possession.*

—Michael Pekovich

### The plane truth

I enjoyed reading Vic Tesolin's *Handworks* in *FWW* #288 ("East meets West handplane") about making a pull plane. I noticed that he used a 37° bed angle, and the illustration on p. 73 shows the iron being installed bevel-up. Assuming that the blade is ground at 25° (the default for the Veritas blade specified), that yields a 37°+25° = 62° cutting angle. That would put this plane in the "high-angle" category, suitable for figured wood but a bit unconventional for ordinary use. Installed bevel-down, it would become a low-angle plane with

a cutting angle of 37°, making it suitable for a different purpose. Perhaps he intended for it to be used both ways?

—CHUCK TAYLOR, Everett, Wash.

**Vic Tesolin responds:** *In the illustration, the blade is shown with its bevel facing up. You are correct that this creates a "high" effective cutting angle, which some woodworkers use for reducing tearout in difficult-to-plane woods. However, I typically use the plane with the bevel down, which makes the effective cutting angle lower than that of your standard 45°. The lower the cutting angle, the nicer the surface left behind. Not all woods will*

*plane smoothly at this angle but a good number of North American woods will. I always go with the lower angle if I can. You'd be amazed what you can do with a sharp blade and a tight mouth.*

### Cutting question

I really enjoyed the article "Artistic Cutting Boards" by Mark Gardner (*FWW* #288) and I would like to try and craft some myself; however, I read the piece three times and nowhere do I find what kind of woods he uses. I realize that it probably was overlooked, but not all of us are master craftsmen. I am sure it needs to be a hardwood of some kind for durability against knives.

—DAVID JOHANSON, via email

**Mark Gardner responds:** *There is no rule book on what wood to use for a cutting board, but I prefer hardwoods, with the exception of ring-porous hardwoods like oaks or ash. Even grained woods will wear better than woods that have hard and soft layers to their growth rings, which is what you find with ring-porous woods. I used cherry for my cutting boards in the article. Cherry is a moderately hard wood that carves well, and it also contrasts well with many of my favorite milk paint colors.*

### A better screwdriver

I was pleased to read the story on driving screws (*FWW* #288). The fundamentals are always important. As a boat builder and restorer, I use screws every day, and the techniques described by Mike Korsak are spot on. But as important as techniques are, so are the tools. A screwdriver is a screwdriver? Hardly. Some years ago I bought a nice set of parallel-tip screwdrivers, and as simple as a screwdriver may seem, these tools give me immense satisfaction. I take painstaking care on the details but even so, at some point in a job a regular screwdriver will likely damage fasteners or wood. But a nice, well-built parallel-tip screwdriver registers perfectly in the screw's slot, drives the screw home securely without fear of slippage or damage, and just feels great in the hand. Sometimes the simplest tools can be the most rewarding.

—MICHAEL S. GRACE, West Melbourne, Fla.



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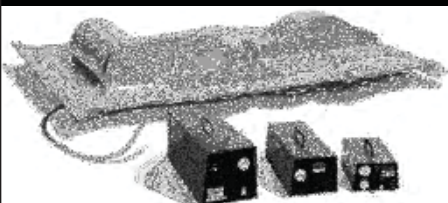
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# workshop tips

## Smart router jig for three-legged tables

The most daunting part of building tea tables, candle stands, and other three-legged tables is cutting the long dovetail sockets that hold the legs in the central column. After cutting these once by hand, I came up with a router jig that cuts them more quickly and uniformly. I've used it to make four more of these tables since.

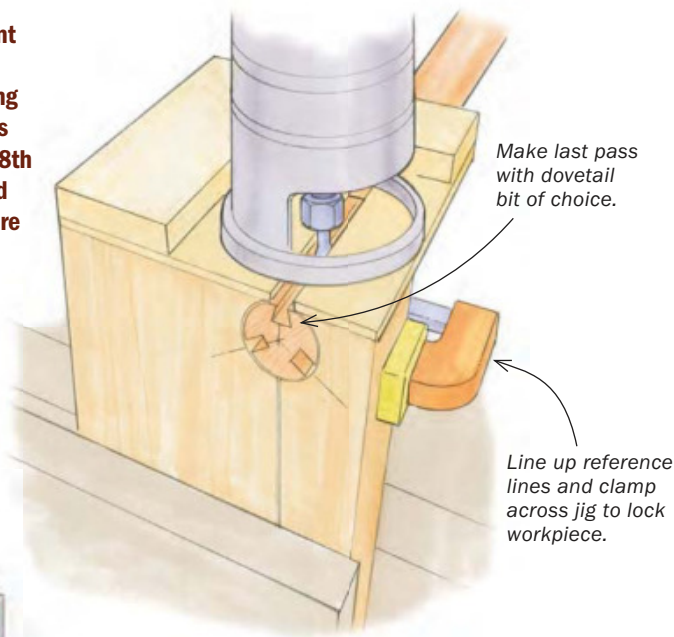
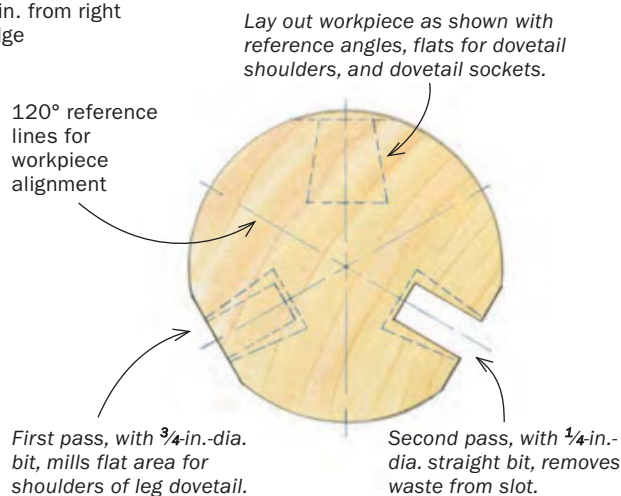
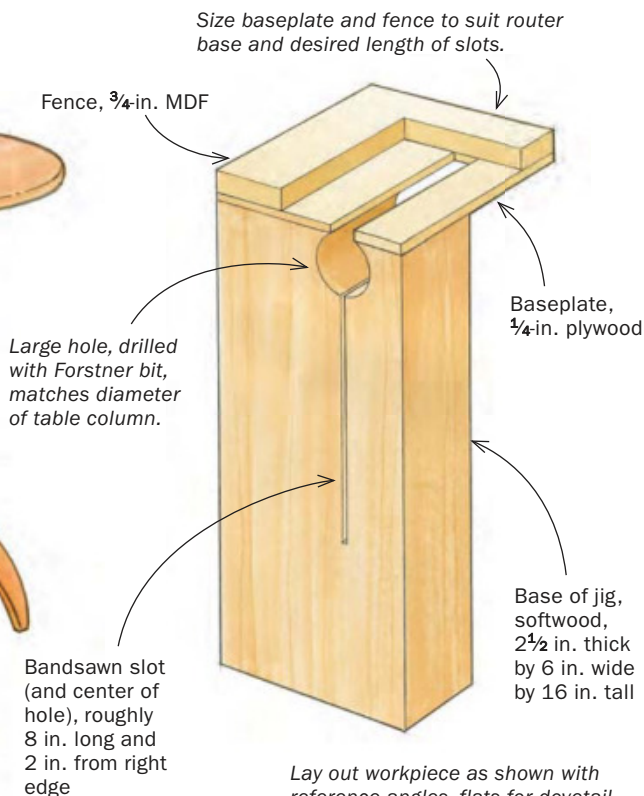
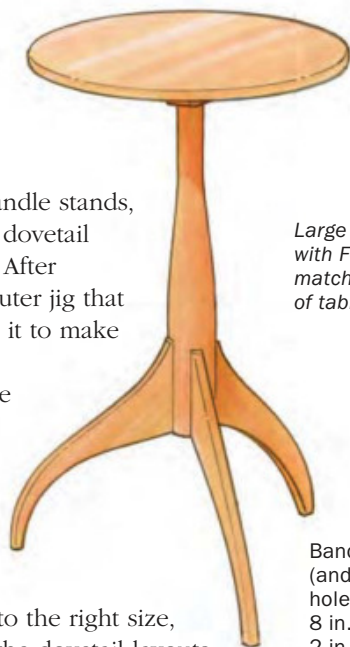
The jig is pretty straightforward. To cut the hole in the base, I used a large Forstner bit of the appropriate size. The bandsawn slot below the hole makes the base flexible for clamping. The fences on top guide the router and limit its travel, and thus determine the length of the dovetail sockets.

Using the jig is easy. After turning the column to the right size, mark the bottom end with 120° centerlines and the dovetail layouts. Then clamp the column in the jig, aligning your layout marks with corresponding marks on the jig. Cut each slot in three steps, using three router bits. Use your penciled layout to set the depth for each bit.

I start with a 3/4-in.-dia. straight bit to mill the flat on each leg. Then, to clear out some of the waste in the dovetail, I change to a 1/4-in.-dia. straight bit, keeping its cutting depth slightly above the bottom of the finished socket. The final cut is with the dovetail bit of choice.

To cut the mating dovetail keys on the legs, I mount the same dovetail bit in the router table, and creep up on the fit. If the joint is a bit tight, I often use a small file or chisel to widen the slot very slightly at the opening and narrow the beginning of the dovetail to create a slightly tapered joint.

—ARNIE BANDSTRA, Ottawa, Ill.



## Best Tip



**Arnie Bandstra grew up helping in his father's basement shop, catching plywood and long boards off the back side of a Delta Unisaw. By his early teens he was making Christmas gifts for his mother and three sisters. He has attended eight of the biannual "Working Wood in the 18th Century" conferences at Colonial Williamsburg. Retired from his career as a civil engineer, Arnie makes furniture and repairs chairs for clients.**

### A Reward for the Best Tip

Send your original tips to [fwtips@taunton.com](mailto:fwtips@taunton.com). We pay \$100 for a published tip with illustration; \$50 for one without. The prize for this issue's best tip was a Woodpeckers Stainless Steel Precision Woodworking Square Set, 6 in. and 12 in.

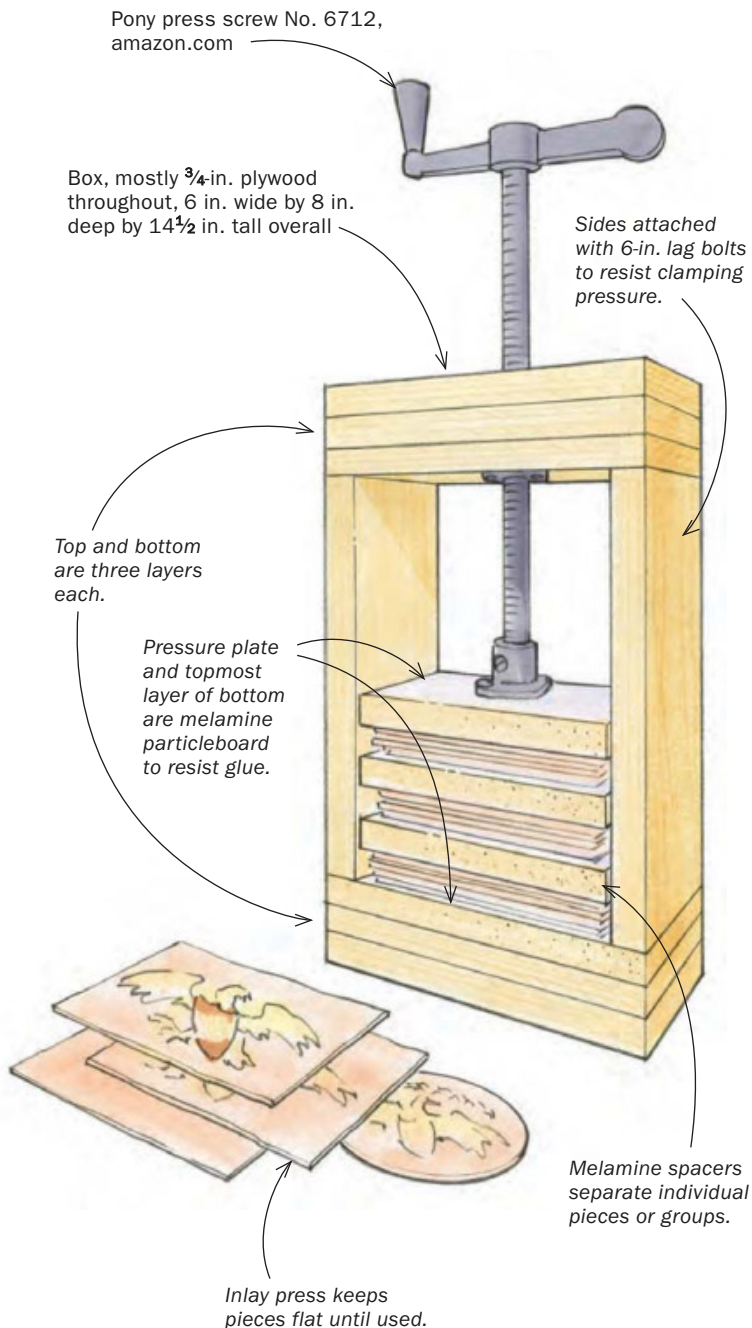




## Handy little press for inlay

When making paterae inlay, I usually end up with clamped blocks all over the shop floor. If you don't clamp these small veneer patterns flat, they turn into potato chips before you have a chance to use them. Also, I make paterae in batches, and always have extras to store. So I used a press screw from Pony Tools to make this small device for keeping them all flat. To separate individual pieces or groups, I insert melamine spacers.

—JIM SHAPIRO, San Francisco





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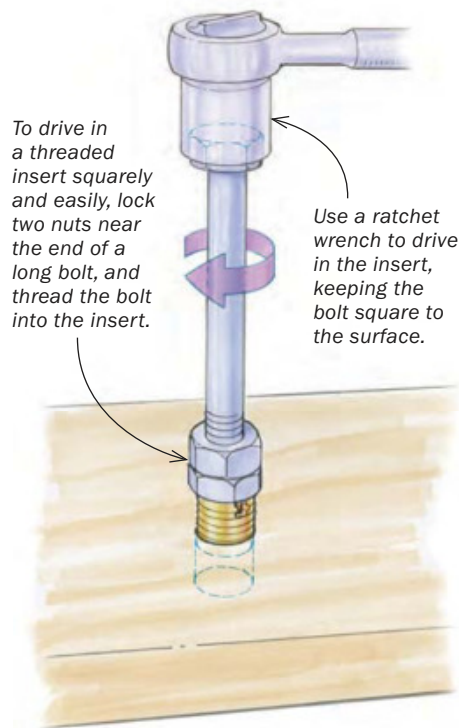
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To drive in a threaded insert squarely and easily, lock two nuts near the end of a long bolt, and thread the bolt into the insert.

Use a ratchet wrench to drive in the insert, keeping the bolt square to the surface.

## Easy way to install threaded inserts

Threaded inserts can be tricky to screw into place. When the thread first grabs, there is a tendency for the insert to tip sideways and enter at an angle. While special tools are available to help, a simple substitute is readily available. Find a bolt that's at least 2 in. long and fits the insert, lock two nuts near the end, and thread the tip of the bolt into the insert. Then use a ratchet to drive the insert into place. The long bolt makes it easy to keep the insert plumb, and the ratchet does the rest.

—PAUL VANDEN BOUT, Susan, Va.

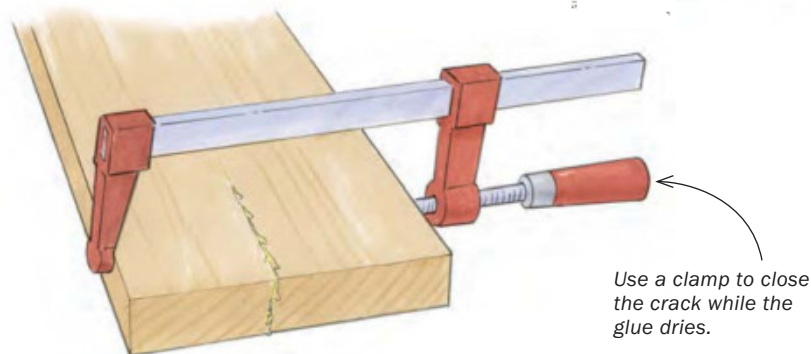
## Dental floss works glue deep into cracks

Dental floss works great to push glue deep into a crack, before you clamp it closed. As you use the floss, it gets a little fuzzy, which only helps it do its job. I recommend using unwaxed floss. (Mint flavoring is not required. Whichever type you choose, you can tell your dentist you are flossing.)

—CHRIS MALLER,  
Bar Harbor, Maine



Work glue deep into the crack.

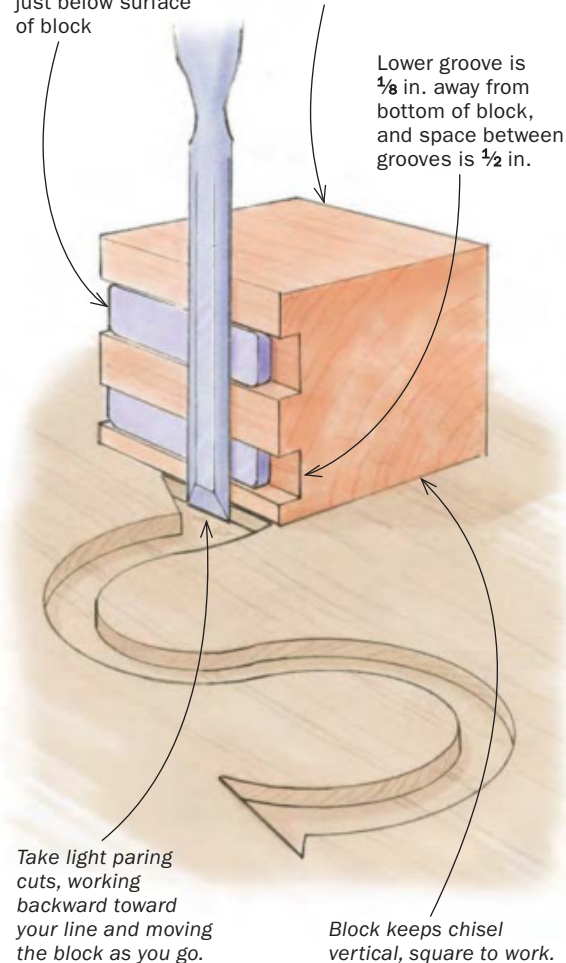


Use a clamp to close the crack while the glue dries.

Rare-earth magnets,  $\frac{3}{8}$  in. wide by  $2\frac{1}{4}$  in. long, epoxied into grooves with faces just below surface of block

Guide block, hardwood, 2 in. thick by  $1\frac{3}{4}$  in. high by 3 in. long

Lower groove is  $\frac{1}{8}$  in. away from bottom of block, and space between grooves is  $\frac{1}{2}$  in.



Take light paring cuts, working backward toward your line and moving the block as you go.

Block keeps chisel vertical, square to work.

## Magnetized block keeps chisel square

As I was inlaying a maple "S" into a walnut plaque, I came up with the idea to magnetize the block I was using to guide my chisel. The new block keeps the chisel much more stable as I pare back the recess to my layout lines (after routing away most of the waste). To make the guide, I jointed two adjacent faces of a hardwood block, cut two grooves in the vertical face, and epoxied two long rare-earth magnets into the slots. They sit just below the surface of the wood, which lets them hold the chisel firmly without impeding its sliding action. I found the magnets on Amazon.com, and made the block wide enough for my widest paring chisel. It works so well that I'll be making one at  $45^\circ$ , and another at  $90^\circ$  with a vertical fence glued to it, to guide my mortise chisels.

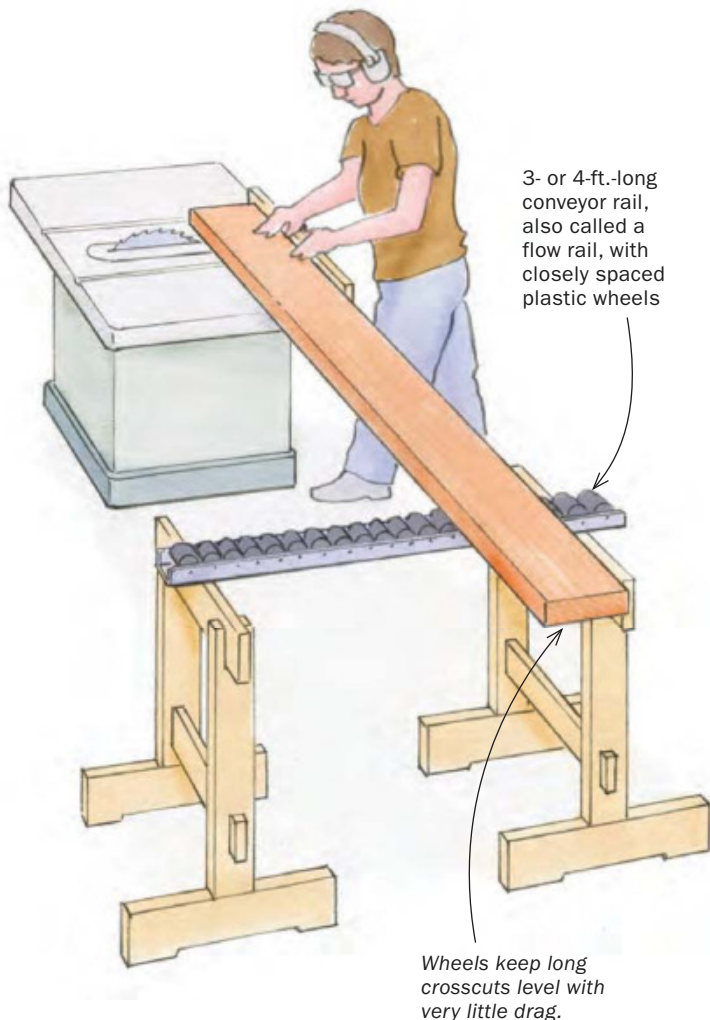
—RUSSELL SHELLY, Haddon Heights, N.J.



## Conveyor rail supports long crosscuts

I don't have a sliding table for my saw, so I support the ends of long crosscuts with a 4-ft.-long conveyor rail, also called a flow rail. The wheels keep long, heavy pieces level with almost zero drag, keeping crosscuts accurate. My rail is mounted between a staircase and a support post near my tablesaw; a sawhorse or work stand is another great option.

—CHRIS BECKSVOORT, New Gloucester, Maine



## Quick Tip

### Scrape your pins

When fitting dovetail joints, you'll find that a card scraper will take a very fine, even amount off the pins. The scraper won't get off track the way a chisel can, and it's less likely than a file to round edges.

—DAN SWEENEY, Westlake, Ohio



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# tools & materials

## ■ MACHINES

### Capable, lightweight tablesaw

LAGUNA'S NEW FUSION F1 TABLESAW is an upgrade of the original Fusion that I reviewed several years ago, and the improvements make it a winner again.

The saw table is cast iron, and the wings are stamped steel. The cabinet is now made in two sections—an upper saw cabinet and a lower leg assembly. There's a sheet-metal floor in the upper cabinet to help contain sawdust. The main dust-collection port is at the back of the cabinet and has a smaller connection on one side for the blade-guard collection hose. The blade guard consists of two linked clear plastic guards with a central mount that contains the dust-collection port for catching all the annoying sawdust blades love to fling. Dust collection is very effective with the blade guard in place, but it's still good without it.

The rip fence has a nice, versatile feature. You can easily slide off its aluminum face and replace it with a sacrificial face or custom jigs. The fence slides easily and locks securely with little fussing. Plus, its magnifying cursor actually works, providing great accuracy.

I ran a bunch of hard maple, 4/4 and

6/4, past the 60-tooth blade that comes with the saw, and found no lack of power. That's impressive considering that a 60-tooth blade is not an ideal blade for ripping heavy hardwood. The motor is 1½ hp (13 amp max draw), 110 volt. The arbor lock simplifies blade changes and is one of the better ones I've seen.

I checked the setup of the saw and found the blade parallel to the miter slots, which is amazing considering the miles the saw traveled to get to my shop.

The saw weighs just under 200 lb., which is fairly light, making it convenient for a small shop, especially with the optional mobility kit (\$75).

—Roland Johnson  
is a contributing editor.



Tablesaw by Laguna  
Fusion F1  
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**Smooth settings.** Blade elevation and angle adjustments are smooth and easy, with little effort required to tilt the blade to its 45° max.



**Adaptable rip fence.** The rip fence is a single aluminum face on a stout steel frame. The aluminum face can be removed easily for attaching a sacrificial face or custom jigs, a nice touch.



**Super dust collection.** The port is 4 in. with a 1½-in. T off the side for the blade-guard collection hose. Dust collection is very effective with the blade guard in place, but even without it, dust collection is still good.



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## ■ SAFETY

### Bluetooth earmuffs

**WHEN USING MACHINES**, I used to wear music-free over-ear hearing protection. That meant interrupting the music or podcast I was listening to, and if I had just a little work to do this slight nuisance could cause me to forgo hearing protection. With Link from ISOtunes, I no longer have to choose.

The headset's Bluetooth quickly connected to my phone, and the audio quality is good. I'm a fan of the Link's five-button controls, which make it easy to control the audio. This is better than models with a few buttons that do everything, and far better than those that require the phone to control the audio.

The comfort level is on a par with any good-quality earmuff, and the Link fits my enormous head nicely. As expected, they are tight. This makes them tiresome to wear after a while, but the upside is they stay in place when I'm moving around. In fact, this winter they become my go-to for more active use, like clearing snow from my driveway.

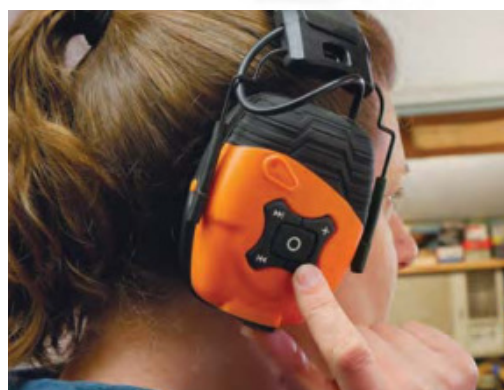
Another plus is that the Link's rechargeable battery can be swapped out with three AAAs in a pinch. This almost negates my only complaint, which is the lack of a separate 3.5mm input for when the battery is dead.

The Link supports phone calls, too. The friend I chatted with said the call quality was great on their end. On my end, it felt like I was talking in a void, but that just speaks to the Link's noise isolation.

—Ben Strano is Fine Woodworking's digital brand manager.

Bluetooth hearing protection by ISOtunes

Link  
\$80



**Easy-to-use controls.** As opposed to some Bluetooth hearing protection with minimalist controls that force you to remember specific button commands or use your phone to control the music, the Link's controls are simple and familiar.

## ■ HAND TOOLS

### Better bevel gauges

**A SLIDING BEVEL GAUGE** is a must-have for your tool kit. It's probably most associated with laying out dovetails, but it comes in handy when working with angled joinery as well. It's a simple tool consisting of a beam and a pivoting blade with some way to secure it. It really only needs to do one thing well, and that's to hold its angle once you lock it in place. In addition, the locking mechanism shouldn't get in the way when you're using it. While there are many gauges on the market, most fail one or both of these tests. With this in mind, I was curious to try out the offering from Blue Spruce, which has a reputation for turning out some nice tools. At first glance, the fit and finish was beautiful, and I was happy to see a lock-down knob on the bottom of the beam, where it's safely out of the way during use. I was even happier to see that with moderate pressure to the knob, the blade held firmly in place. While you can spend less for a bevel gauge, I'm not sure you'll find one that works as well.

—Michael Pekovich is FWW's editor and creative director.



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## ■ TOOL NEWS

### New tools to look for

#### Cordless pin nailer

The new battery-powered 23-gauge pinner from Milwaukee includes a double-action trigger and nonmarring tip, and its dry-fire lockout feature prevents misfires. The nailer can handle headless pin nails  $\frac{1}{2}$  in. to  $1\frac{3}{8}$  in. long.



#### Mobile base

Bora's latest mobile base, the PM-1050, is adjustable from 12 in. square to 26 in. square, or up to a 16-in. by 36-in. rectangle. It raises machine height by less than 1 in., can handle up to 400 lb., and can lock into position with non-skid feet.



#### Benchtop lathe

Grizzly is introducing a new compact lathe, the T32536. It features a  $\frac{1}{8}$ -hp motor with variable spindle speed between 750 rpm and 3200 rpm. The cast-iron construction has a footprint of  $5\frac{1}{2}$  in. by  $23\frac{1}{2}$  in., with 8 in. of swing over the bed, 5 in. of swing over the tool-rest base, and 13 in. between centers. It comes with two different-size tool rests.





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fundamentals

# Assemble a drafting tool kit

BY MIKE KORSAK





## A PORTABLE DRAFTING STATION



Instead of creating a dedicated drafting space in his midsize shop, Korsak pulls out a sheet of MDF as an on-demand drafting board when needed. Its smooth surface is ideal, and it can be cut to appropriate size and stowed away easily.

All of the woodworking, carpentry, and timber-framing jobs I've held have reinforced the value of figuring something out first on paper (or with a computer) before any cutting or building took place. When I designed timber-frame structures, design work was done with a computer, using computer-aided design (CAD) software. With CAD, I built 3-D models of each frame I worked on, and these models would include every joint, fastener, connector, etc. In essence, these buildings were built twice—the first time in CAD, the second time in real life. This approach eliminated a lot of potential building mistakes at the design stage, where they could be resolved before they became a major problem at the job site.

In my work as a furniture maker, I still subscribe to building it twice, although I do it mostly on paper, not in CAD. (I talk about where CAD fits into my design process on p. 29.) I'd still much rather figure out how things should go together (or not!) before I start cutting any wood, as opposed to discovering a design mistake during the build itself. To accomplish this, I generally design furniture by drafting full-scale drawings using pencil and paper.



**Size the paper to the project.** For full-size drawings, Korsak prefers a roll of wide plotter paper, which he secures with blue tape (above). For joints and other small details, instead of cutting up his large rolls of paper, Korsak just grabs a sheet of printer paper (left).

## STRAIGHT LINES

Grab a T-square for horizontal lines, and a drafting triangle for vertical ones. Korsak registers the T-square on only one edge of the MDF, which he ensures is straight, guaranteeing all of his horizontal lines are parallel. He uses the triangle, registered off the T-square, to draw vertical lines.



## MEASURING

A tape measure works well for big measurements. For accuracy, don't use the hook. Start at the 10-in. mark instead. For shorter measurements, Korsak uses the 12-in. rule from his combination square. Its  $\frac{1}{8}$ -,  $\frac{1}{16}$ -,  $\frac{1}{32}$ -, and  $\frac{1}{64}$ -in. graduations allow for flexibility and accuracy.



## ANGLES

A protractor proves useful when designing with complex geometry. Korsak uses his basic model for homing in on a design that involves multiple angles, like this sunburst veneer.



When drafting by hand I use the same tools and techniques that I was taught back in high school (many thanks, Mr. Miller). And since these drawings are full scale, I draw all of the furniture components at their final size. This means my drafting tool kit needs to accommodate workpieces, curves, and details big and small. My kit's neither large nor expensive, but it also doesn't hinder my designs no matter their complexity.

### Moveable, adaptable drafting station

As much as I'd love to have a dedicated drafting table, space is limited in my shop. But full-size drawings are crucial to my process, so I found a solution: MDF laid on my workbench. I generally have it in my shop in various sizes, so I pick a piece that corresponds to the size of the drawing. MDF has a very smooth surface, so there's no chance of





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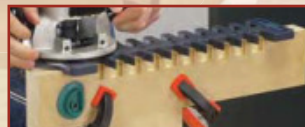


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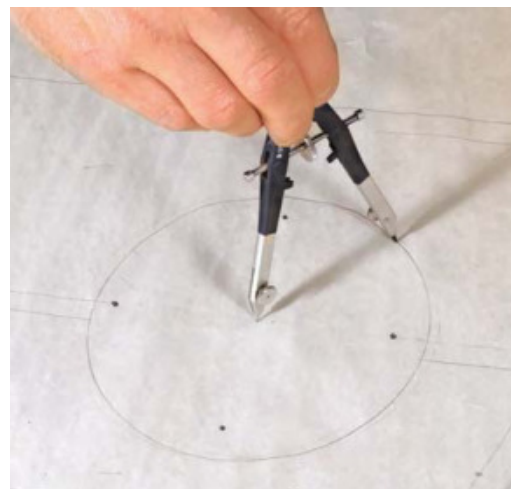
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## ARCS SMALL TO LARGE

A circle template helps create a wide range of small circles and arcs, and is handy for sizing drawer pulls and small cove moldings. A compass (top right) is indispensable for general work, and a simple beam trammel (bottom) handles large arcs of any diameter. Korsak's beam trammel is simply a stick with two holes. One gets a nail to act as the pivot point. A pencil fits in the other to scribe the arc. Because the heart of this trammel is just a stick, the radius of the arc is limited only by the stick's length.



a pencil veering off course like it would in the open grain of plywood or solid wood. One edge of the MDF should be true and flat for a T-square to register against.

Since my drawings are full scale, I use plotter paper: wide, long paper that comes in rolls. I sometimes use standard printer paper when focusing on specific details, such as intricate joinery. For drawing, I like mechanical pencils that use refillable 0.5mm lead. They leave a very fine, crisp, even line, and I don't have to sharpen them.

It seems that for every pencil line, three are erased, so I use high-quality erasers, namely Staedtler Mars white erasers. Low-quality erasers will smear the lead instead of removing it. I also use an eraser shield, a piece of thin metal that has cutouts of various shapes and sizes. These cutouts let me target where I erase while protecting the lines I want to keep, leaving my final drawings clean and accurate. All of these supplies are available at office-supply stores.





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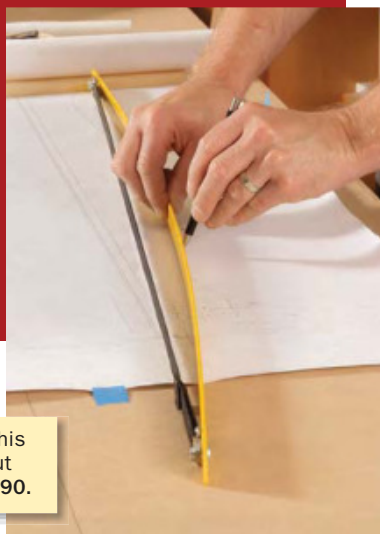


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## OTHER CURVES



French curves (above) are great for irregular curves. They are available in sets, which provide a wide variety of shapes. Korsak marks the section of a curve he likes with blue tape so he can repeat it elsewhere. Drawing bows are good for larger work and come in symmetrical or asymmetrical curves. By adding or relieving tension, you can tighten or relax the curve. These bows are helpful because once you use one to dial in your desired curve on paper, you can keep the bow at the same tension and transfer the curve to a furniture part.



### Online Extra

To watch Korsak explain his design process, check out [FineWoodworking.com/290](http://FineWoodworking.com/290).

### Getting it straight

My drawings start with straight lines, including the floor, the height and width of the piece, and elements such as drawer boxes and dividers.

For the floor and height, as well as any other horizontal lines, I grab a long T-square. Referencing it only off the drafting board's flat and true reference edge ensures that all of my horizontal lines will be parallel. It doesn't even matter if the T-square itself is square as long as it's rigid.

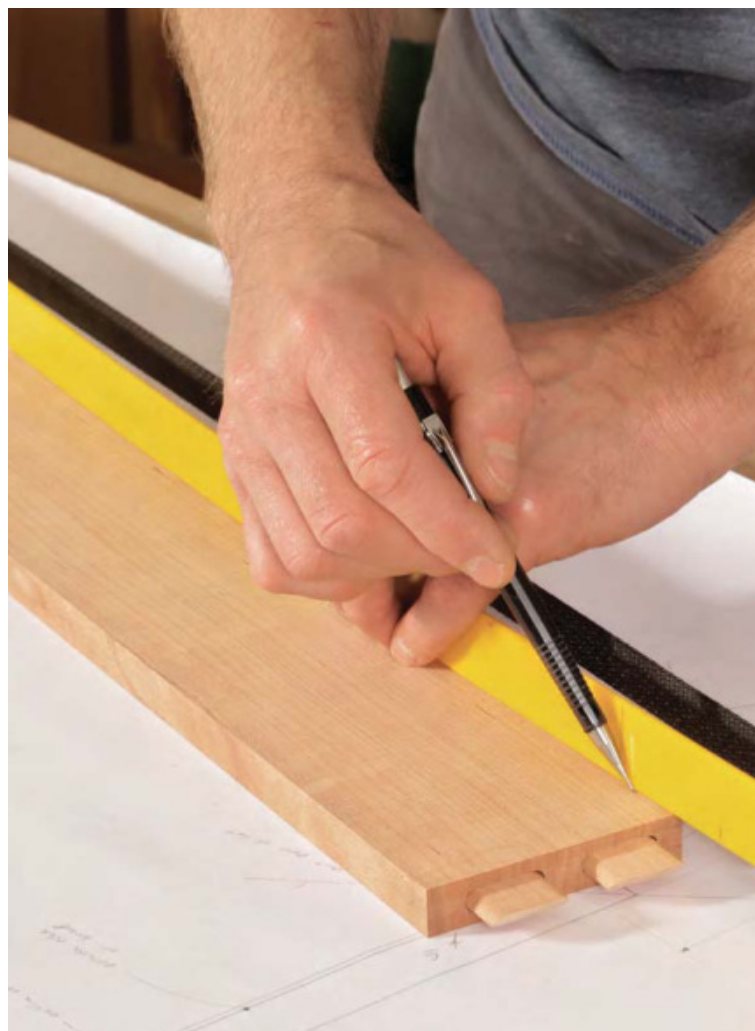
For vertical lines, I register a drafting triangle against the long leg of the T-square.

A protractor works well for laying out angles. I use one when designing, but then I put it aside. When building the actual piece, I'll consult my drawing to approximate the angles, but I let the real angles flow from the work itself.

### Creating curves

My furniture is rarely 100% straight lines, so I rely on some basic tools for finding, drawing, and transferring fair curves.

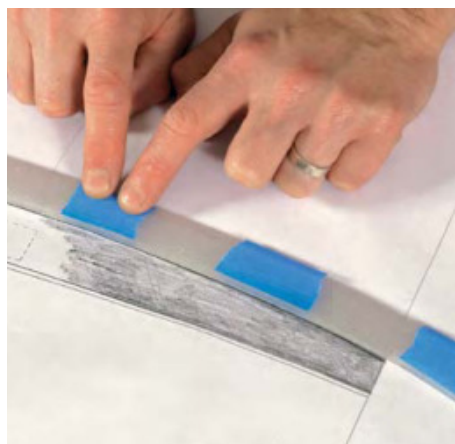
For true arcs, a circle template, a compass, and a shopmade beam trammel work great, letting me draw circular elements







**An adjustable curve allows for more versatility.** This tool is a series of thin plastic strips that are keyed to each other and fixed on one end to allow the tool to bend to fairly intricate shapes. Korsak lays down a few short pieces of blue tape across the plastic strips to secure the shape when transferring it between a drawing and a furniture part.



ranging from drawer pulls to tabletops. For more complex curves, I rely on French curves, an adjustable curve, and a pair of drawing bows, one for symmetrical curves and another for asymmetrical. Because I often use just a section of these tools, I mark the area with blue tape.

Many drawing tools work just as well on actual workpieces. Once I home in on the shape I like on paper, I can use the same tool on the furniture part. □

*Mike Korsak is a furniture maker in Pittsburgh.*

## Where CAD fits in



I sometimes use CAD in my furniture design process. Even when I do, though, I start off with hand sketching. I never use CAD at this point, since I can sketch faster than I can draw in CAD. Plus, the sketch is intended to capture an idea. Hand sketching accomplishes this goal very well, while CAD at this stage would be overkill. Once I have an idea of the general form and feel of the piece, I may move to CAD to better explore the shape and work out dimensions and proportions. I like that with CAD I can draw, for example, a two-dimensional front elevation of a piece, copy that drawing several times, and modify each new drawing to explore minor tweaks.

For more complex projects, I may build a complete 3-D model in CAD. I'll do this especially if I need to figure out some aspect of joinery or construction, or if there are a lot of individual parts to keep track of.

A 3-D CAD model is also useful for presentation purposes for clients. I can apply wood textures, rotate the model to provide an interesting (and flattering) view of the piece, and then present an image that gives a fairly lifelike look.

Nevertheless, CAD doesn't always take the place of a full-size drawing. In fact, I'll sometimes do both for a piece. As useful as a 3-D CAD model can be, I find that I have to see the piece, or some representation of the piece, full-size to really have a sense of how well the design works. I just can't get this information from a CAD model, as there's no sense of scale or relationship to space when viewing something on a computer screen.

—M.K.

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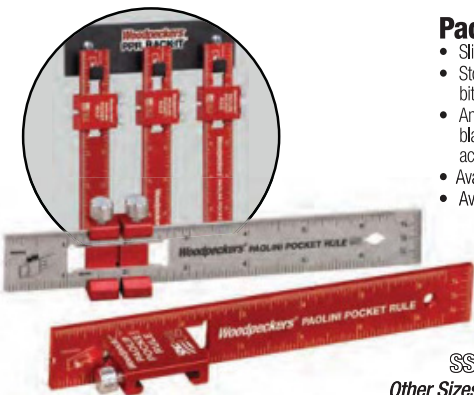
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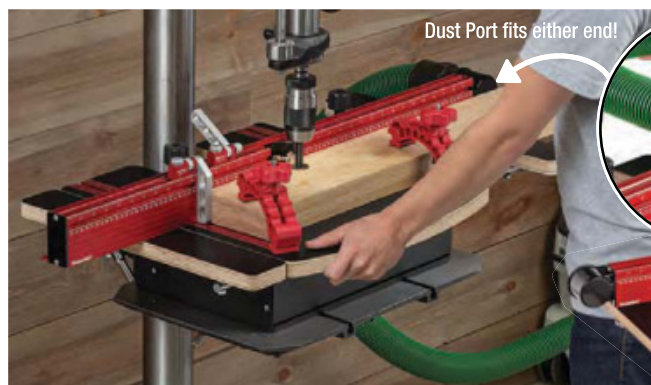
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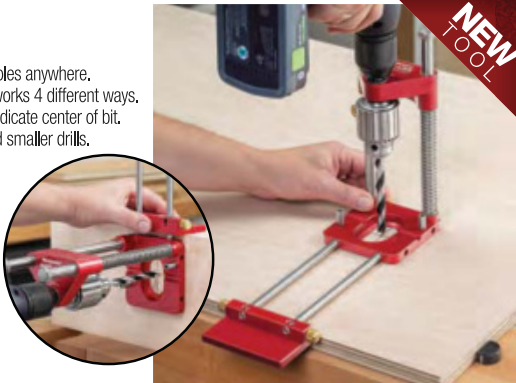
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# Building with Rabbets and Dadoes

Wall cabinet illustrates the power of simple joinery

BY MICHAEL PEKOVICH



This quick project is a great example of how building with basic joinery doesn't mean limiting the design possibilities or the strength of the construction. Rabbets and dadoes are common to just about everything we make, but they are most often seen as a supporting cast to the more powerful mortise-and-tenons and sophisticated dovetail joinery. That said, used in combination, rabbets and dadoes are a fast and versatile way to build. They are also simple to cut, which makes them a good choice for both hand and machine work. If you told me that I could only use rabbets and dadoes in my work, I think I could build a lot of projects before running out of ideas.

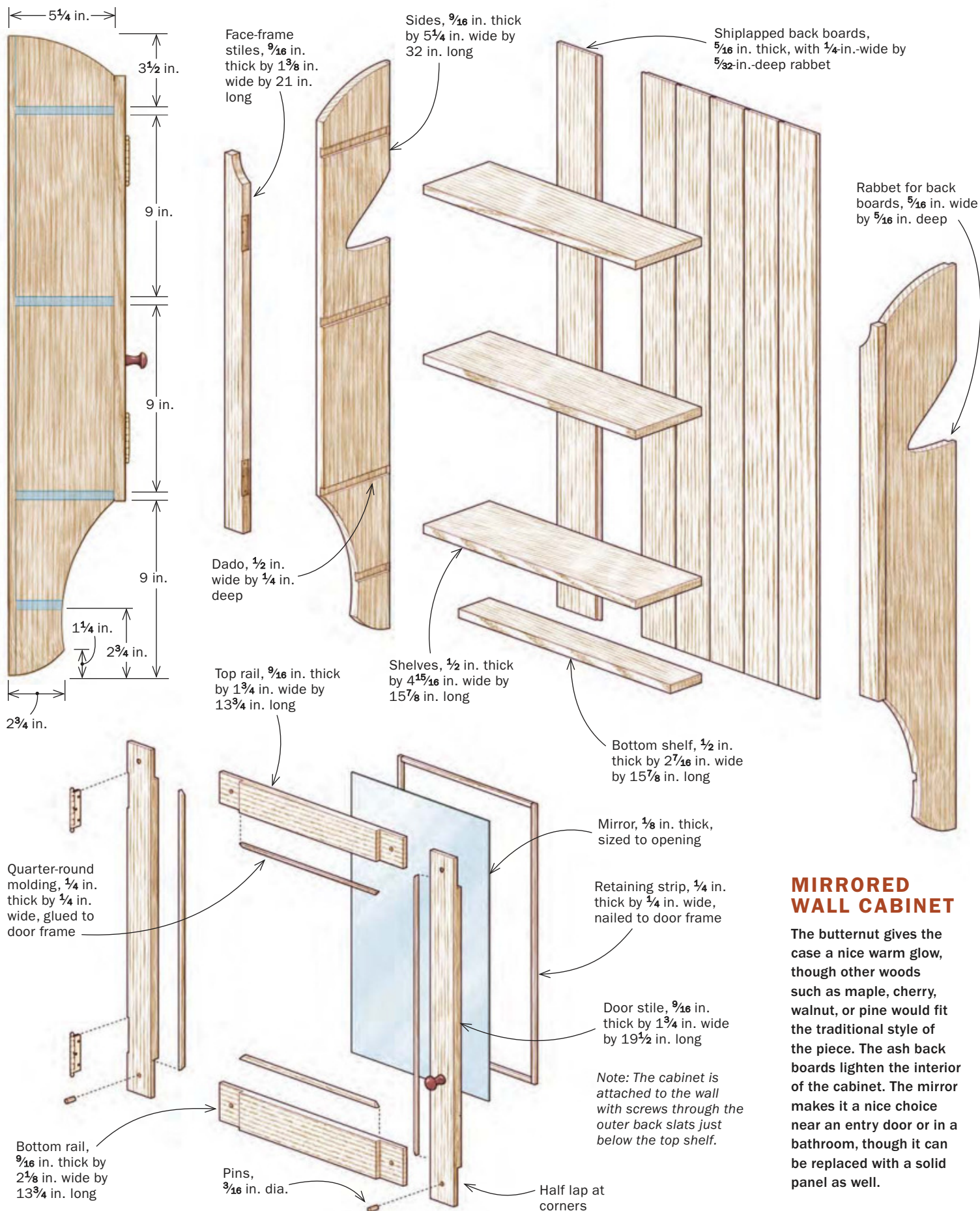
On this cabinet the sides and back boards extend beyond the top and bottom shelves, allowing them to be profiled for a light, fun look. Along with a curve at the top, there's a cove at the bottom that creates a space for a narrow exposed shelf for odds and ends. This is my favorite detail of the piece.

Vertical stiles glued to the front of the case serve as a partial face frame. Visually they add mass to the piece by hiding the narrow front edge of the sides, and they conceal the through-dadoes for the shelves. They are also an important structural element, tying the sides to the shelves and adding strength to the dado joints. The door itself consists of pinned half-lap joints at the corners with applied edging to house the mirror. The back slats also help tie the sides to the shelves at the back of the case and are rabbeted or "shiplapped" where they meet to allow for seasonal movement without creating gaps between the boards. All of these represent smart building solutions that you can put to use on any project design.

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*Michael Pekovich is a furniture maker, woodworking teacher, and FWW's editor and creative director. His new book, Foundations of Woodworking, is coming in October 2021 from The Taunton Press.*

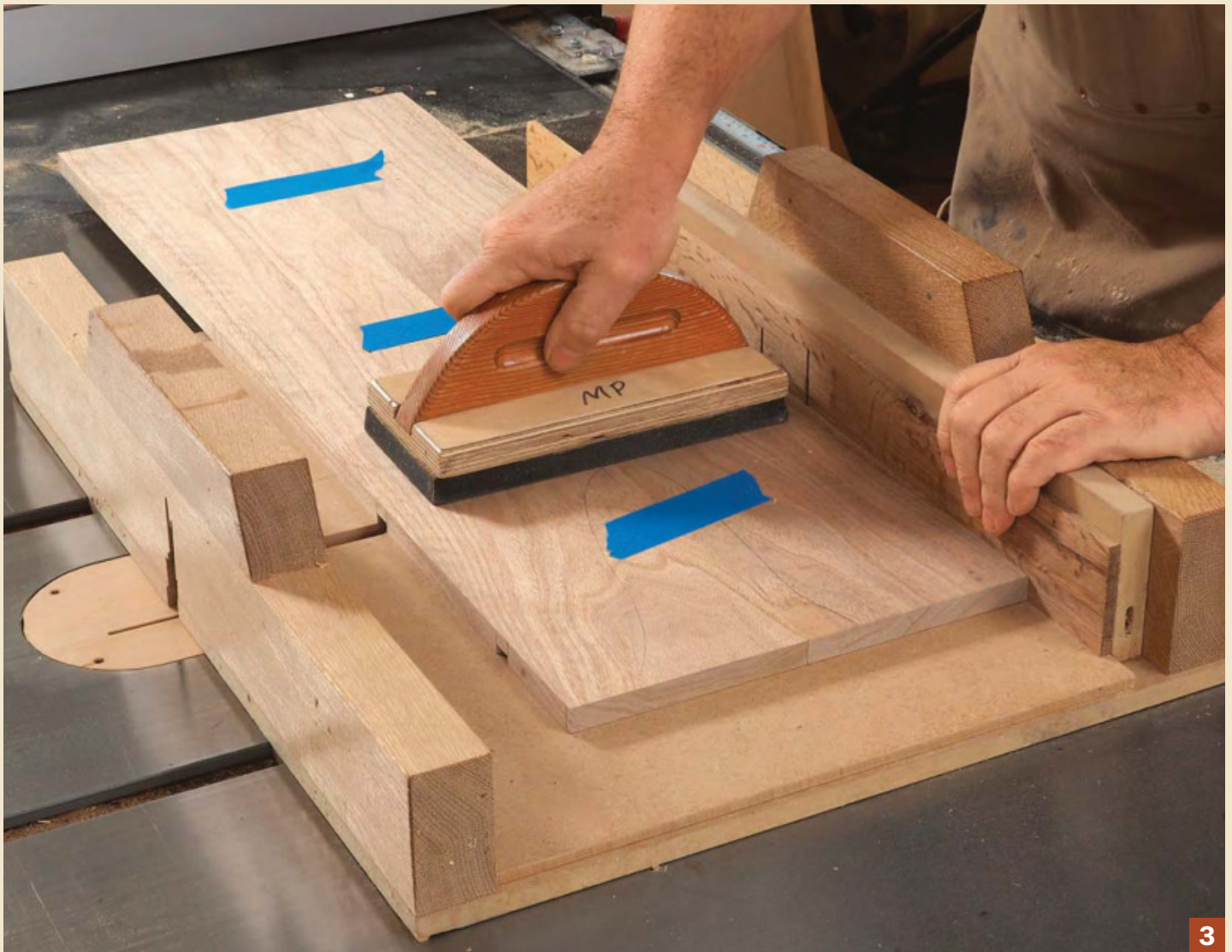




## MIRRORED WALL CABINET

The butternut gives the case a nice warm glow, though other woods such as maple, cherry, walnut, or pine would fit the traditional style of the piece. The ash back boards lighten the interior of the cabinet. The mirror makes it a nice choice near an entry door or in a bathroom, though it can be replaced with a solid panel as well.

## FAST CASE CONSTRUCTION WITH RABBETS AND DADOES







It's important that the dados on the two case sides are aligned. One way to get consistent results is to use an end stop on a crosscut sled. Another solution, which works for narrower parts, is to cut both at once. That's what I did here. Place the parts side by side with their ends aligned and stretch tape across the joint in a few locations (1). This does a good job of keeping the sides in alignment during the cut. Using this method, all you need to do is mark the dado locations on the edge of one piece and align the pencil marks with the kerf in the crosscut sled (2). Because both parts are cut at once, the dados will line up even if you miss your mark. This is why a pencil mark is fine, and it lets you skip the stop blocks. When dadoing two pieces at once, it's important to keep the stock flat on the sled. I find that a push pad spanning both parts works well (3). The final joinery task on the case is to rabbet the sides for the back boards (4). To dial in the thickness of the shelves, use a test piece dadoed like the sides to gauge your progress at the planer (5). I aim for a fit that's a little too snug, which gives me a chance to plane the parts without creating a gap in the joint (6). Once the joinery is cut, you can saw and smooth the profiles at the top and bottom of the case (7).





## A STRATEGY FOR ALIGNING PARTS DURING GLUE-UP

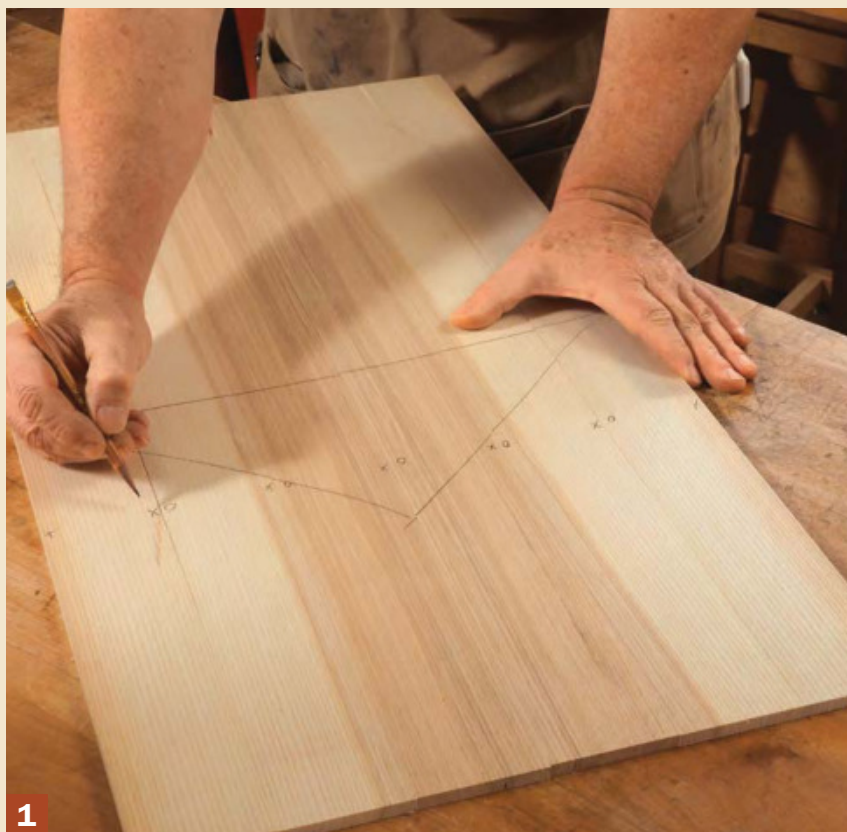


The challenge when gluing up a through-dadoed case is to make sure the shelves are aligned front to back. I use two different methods to ensure good results. At the back of the shelves where their edges need to be flush with the rabbet, I tape a strip of wood into the rabbet that I can use to register them against (1 & 2). To guarantee that the shelves align with the front of the case, I rip them slightly over width and flush them off after assembly. During glue-up, make sure the clamps are aligned over the dadoes, as it's easy to rack the case out of square if you're not paying attention (3). Once the clamps come off, flush the front of the shelves with the case sides (4). Finally, glue on the face-frame stiles (5). I cut the hinge mortises in them before assembly.



## A QUICK LESSON IN MAKING A SHIPLAPPED BACK

A shiplapped back consists of slats tacked or screwed to the back of the case. To allow room for seasonal movement, each board is rabbeted to overlap the adjoining one. As simple as it is, here are a couple of tips that can help you end up with a nice case back. The first challenge is calculating the width of the boards. You'll need to account for the width of the opening, the number of boards, the amount of overlap between each board, and finally the desired gap between the boards. It's a lot to keep track of, so I make a full-size drawing to ensure the numbers add up. Even then, I leave the end slats a little wide and then trim them to fit. Next, arrange the slats and mark a triangle across their backs. Now you can mark the rabbet locations on the edges of the slats. You'll need a pair of rabbets at each joint, one on the front face of one piece and the other on the rear face of its mate. It can get a little confusing, so I mark an "O" on every edge that needs a rabbet, and an "X" on those that don't (1). This reduces the head scratching at the tablesaw. I use a pair of push pads to ensure a rabbet of even depth along the length of the slat (2). The end slats play an important role in strengthening the case by tying the sides to the shelves, so I glue them as well as nailing them in place. The center slats are nailed at each shelf, using shims between them to maintain even spacing (3). For larger cases, I'd opt for screws instead of nails.





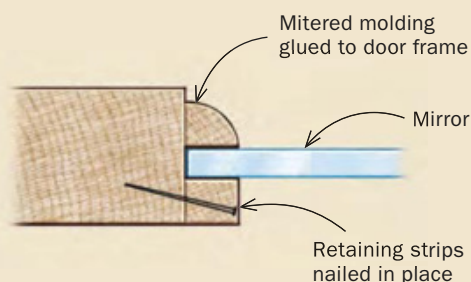
## SIMPLE, STRONG DOOR FRAME

A half-lap may not seem like a joint suited for a door frame. Though not commonly used, the joint can handle the job quite well. The broad glue surface of the joint makes it very strong and it's quick to make. I use a miter gauge and dado blade at the tablesaw in the same way that I would cut a tenon, but in this case there's just a single cheek to cut on each piece (1). The half-lap's shortcoming as a frame joint is that it needs a lot of clamps to keep it aligned during glue-up. You'll need a pair of clamps oriented across the width of the frame and a pair along the length as well (2). In addition, you'll need to clamp the joint top to bottom (3). It's not absolutely necessary, but pinning the joint after glue-up adds mechanical strength and creates a nice visual detail.





## MITERED EDGING CREATES A SEAT FOR THE MIRROR



Instead of rabbeting the frame for the mirror, you can create a rabbet by gluing mitered molding along the inside edge of the frame. On this piece, quarter-round molding creates a thumbnail profile when it's installed just below the frame surface. Start by routing a roundover on both edges of a wide piece of stock. Then rip a strip off of each edge to create the molding (1). I find the mitering and fitting of the molding is best done by hand. Saw a rough miter on each end leaving the piece overlong. Then use a handplane and shooting board to fine-tune the angle and take it to final length (2). Aim for a snug fit at the corners, but not so tight that the molding bows out at the center. For glue-up I place tape-covered MDF spacers in the opening to register the molding at the right height on the frame edge (3). The tight miters hold the parts in place allowing you to skip the clamps. To secure the mirror, I make square strips and nail them in place without glue. This allows the mirror to be removed later if necessary (4). Gluing rice paper to the back of the mirror offers a nice surprise when the door is opened.





# Adjustable L-Fence

Improved design makes setting the height easy

BY BOB VAN DYKE



The L-fence in its simplest form is a board that clamps horizontally onto your table saw's rip fence. The bearing surface of the L-fence can be positioned right over the blade, and that opens up a wide range of powerful possibilities. I wrote about it in "The Incredible L-Fence" (*FWW* #237). I used my original fence for a long time, but after years of putting up with the fussiness of positioning it at the correct height and parallel to the saw table, I made some improvements and built what a *FWW* editor dubbed my "high tech L-fence." This vastly improved version has a stationary base with a height-adjustable L-fence attached to it.

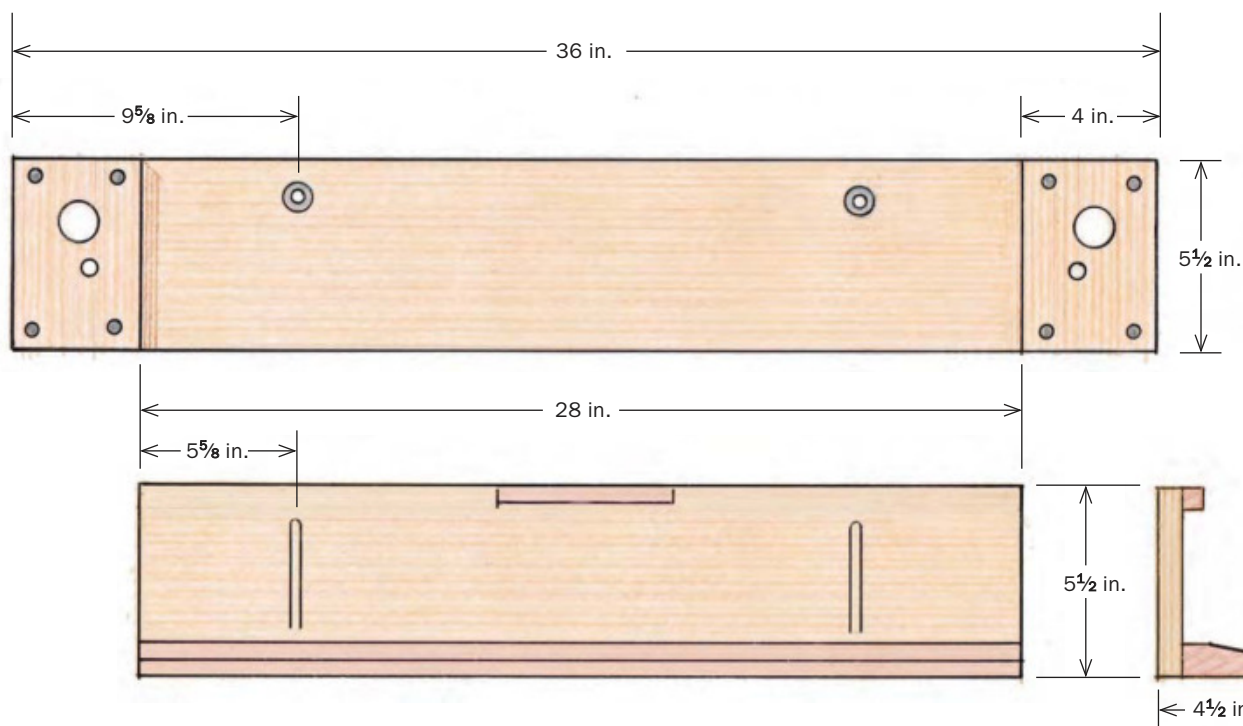
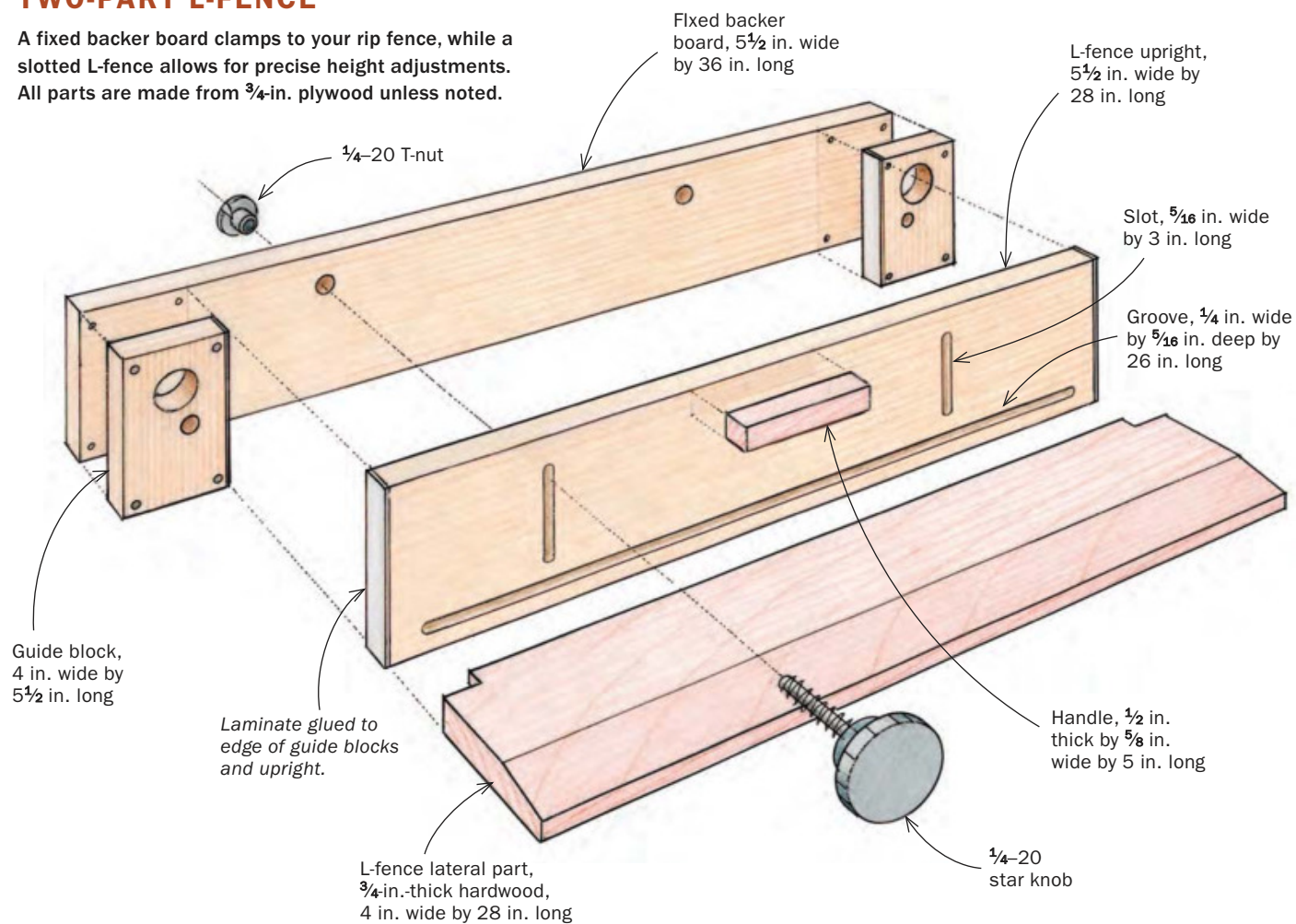
The new version is superior to my first because it's far easier to manage adjustments. The L-fence, which travels between guide blocks on the backer board, stays perfectly parallel to the table as you move it up and down, and it tightens in place firmly with threaded knobs.

You can use an L-fence as a guide to flush-cut to an exact line or pattern, cut off parts that would otherwise get caught between the fence and the spinning blade, cut very accurate burn-free miters, and say goodbye to those sacrificial pieces of plywood used to cut rabbets.



## TWO-PART L-FENCE

A fixed backer board clamps to your rip fence, while a slotted L-fence allows for precise height adjustments. All parts are made from  $\frac{3}{4}$ -in. plywood unless noted.



# Making the fence

Threaded knobs connect the movable fence to the fixed backer board. The slots in the L-fence upright correspond to T-nuts in the backer board.

**Two slots and a groove.** At the router table, cut the through-slots for the adjustment knobs and the groove that will hold the tongue of the L. Rout the slots in several passes between two stops clamped to the fence. When cutting the groove, use start and stop marks penciled on the fence.



**Tongue and glue.** Two cuts on the tablesaw create the tongue on the lateral portion of the fence. You will have to trim off the ends of the tongue to fit the groove. Van Dyke also rips a bevel on the front edge of the L.



**Trim it parallel.** Once the glue cures, trim the leading edge of the lateral part of the L so it's parallel with the upright.



# Stationary backer board

This board allows you to clamp the L-fence directly to your tablesaw fence or bolt it to your shopmade supercharged rip fence. Its guide blocks and T-nuts help with the L-fence height adjustments.

## **Install the T-nuts.**

To locate the T-nuts, Van Dyke centers the L-fence on the backer board, then uses a punch to mark the top of the slots on the backer board. He drills two holes for the T-nut, and taps it into place.



**Add the guide blocks.** For a smooth surface between the movable fence and the guide blocks, apply plastic laminate to the edges with contact cement. Trim the laminate flush, then glue and nail the guide blocks onto the backer board.



One basic principle of working with an L-fence is that, unlike with a regular tablesaw cut, you plan things so your waste piece is between the blade and the rip fence. Sounds dangerous? It's not, because the L-fence is raised off the saw table—usually higher than the blade—and its width provides a few inches of space so the waste cannot get caught between the blade and the rip fence.

Building my new L-fence is straightforward. I use Baltic-birch plywood for most of the parts because it is structurally stable, holds fasteners well, and is readily available. Solid wood or cabinet-grade plywood can also be used. The plastic knobs and T-nuts are available from any woodworking-supply store or from McMaster-Carr ([mcmaster.com](http://mcmaster.com)). I make the lateral part of the L from hardwood. The few hours it takes to make this jig will be paid back tenfold in the number of times you will use it going forward.

## **Start with the upright of the L**

The threaded knobs that attach the movable L-fence to the fixed base go through slots in the fence and into T-nuts in the backer board. The precise location of the slots is unimportant, but the T-nuts must be lined up exactly to them.

On the upright part of the L you'll rout these two through-slots and a groove to accept the tongue on the lateral part of the L.



**Final touches.** Crosscut the ends of the guide blocks flush with the backer board, and glue a small tab to the L-fence so you can easily move it up and down.



# Two ways to mount the fence

The L-fence can clamp directly to a tablesaw's rip fence or attach to Van Dyke's shopmade fence.

## CLAMP AND GO

*Use the guide blocks as your clamping surface. Because the L projects well past the rip fence, the clamps will not get in the way of your work.*



The slots are made by plunging the workpiece onto the bit. Set a fence on the router table about 2 in. back from a  $\frac{5}{16}$ -in. router bit. Because these cuts are made in several passes, it is helpful to set stops to begin and end the cuts. The slots are symmetrical, so you can use one fence setting and make cuts on both ends of the workpiece before raising the bit for the next deeper cuts.

While you're still at the router table, cut the groove that will hold the tongue on the L. This cut is stopped on both ends. Mark starting and stopping points on the fence, and pivot the workpiece down into the cut and up out of it.

## Attach the upright to the base

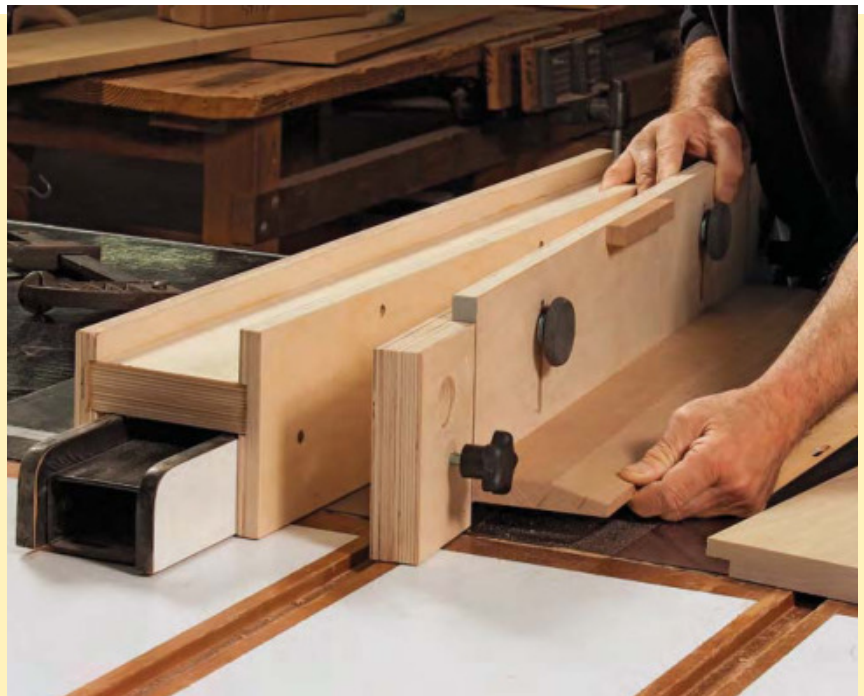
With the groove and slots finished, it's time to drill for the T-nuts. Lay the upright of the L on the backer board, centering it from end to end, and use a transfer punch or a brad-point drill bit to mark the exact location of the top of the slots on the backer board.

Using a Forstner bit in the drill press, counterbore a hole deep enough to allow you to recess the T-nuts below the surface. Then, using the dimple left from the Forstner bit to locate the center, drill a through-hole for the barrel of the T-nut. Drive the T-nuts into the recessed holes. The face with the T-nuts will be on the back of the backer board.

## Online Extra

### ATTACH IT TO A SHOPMADE FENCE

A clamp-on rip fence makes it easy to mount the L-fence. Van Dyke drilled additional holes in his L-fence that allow him to quickly bolt it in place when needed. The clamp-on fence is good for other tasks as well. To see how to build it, go to [FineWoodworking.com/290](http://FineWoodworking.com/290).





# Using the L-fence



**Adjust the height.** The tab and threaded knobs make it easy to hold, lift, lower, and lock in the height of the fence.

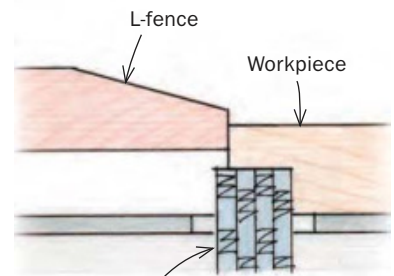
**Cover the blade.** To cut rabbets and tenons, set the L-fence to expose enough of the dado blade to equal the length of the tenon or width of the rabbet. Then ride the workpiece on the fence. It's easy, safe, and repeatable.



From cutting rabbets, tenons, dados, and miters to pattern sawing, and much more, the L-fence will change the way you think about using your tablesaw.

## RABBETS

It is common practice to clamp a sacrificial board to the rip fence and then bury a portion of the dado blade in it. The problem is that the clamps are always in the way and you end up wasting lumber or plywood every time. By setting the L-fence above the height of the dado blade and setting the fence so the correct amount of dado blade is exposed, you accomplish the same task without wasting wood and without clamps in the way.

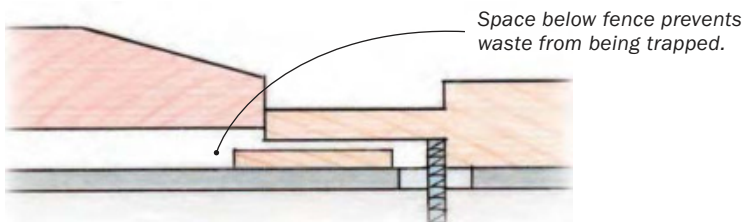


Stack dado blade for wider cut and overlap a portion with the L-fence.



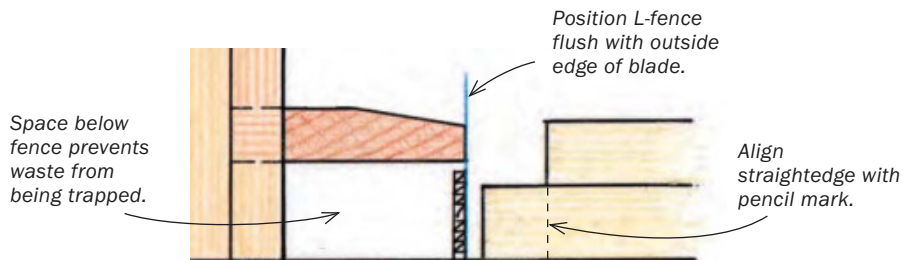
## TRIMMING TENON SHOULDERS

Making this cut with a tablesaw's rip fence as a stop creates a potential for kickback because the offcut gets trapped between the fence and the spinning blade. The L-fence solves that problem. Simply raise it so the top half of the tenon runs against it, set the fence distance to the length of the tenon, and run the end of the board against the fence. The extra space below the L-fence prevents the offcut from getting trapped. For narrow boards, support the workpiece with a miter gauge or a square pusher block. Wider pieces like the one in the photo at right can simply be run against the fence by themselves.



## FLUSH TRIMMING

An L-fence can be a good solution when crosscutting wide panels or ripping a straight edge on a wavy board. Set the L-fence slightly higher than the blade and set the edge of the fence flush with the outside edge of the blade. For flush sawing, lay out the cut line on the workpiece. Then saw away the waste, either on the bandsaw or with a jigsaw, leaving about  $\frac{1}{8}$  in. of wood on the waste side. Temporarily attach a straight piece of wood right on that line using tacks, double-sided tape, or even coarse adhesive-backed sandpaper. Now run your workpiece—with its temporary fence attached—against the L-fence. You should be cutting right on your layout line. Any waste falls away under the L-fence and does not get caught between the blade and the rip fence. If you are cutting a lot of parts, turn off the saw and check periodically for waste buildup under the fence.



**Flush the blade to the fence.** Make sure the blade is above the height of the workpiece, but just below the height of the L-fence, and use a straightedge to make sure the blade is flush with the edge of the fence.

**Crosscut a panel end.** Draw a line square to one edge. Use a straightedge backed with sandpaper for grip and place it along the line. Run the piece so the straightedge rides on the L fence, and the panel is cut along the line.



**Straighten a wonky edge.** After drawing the line you want, place a sandpaper-backed straightedge right along it. Van Dyke's straightedge has a lip at the trailing end and a handle, helping keep the straightedge stationary and the workpiece moving.



### Add a stationary base and the L piece

When it's finished, this L-fence can either be clamped directly to your tablesaw's rip fence, or bolted to a fence-straddling jig I wrote about in "Supercharge Your Rip Fence" (*FWW* #231). If you plan to use the jig from that article, drill mounting holes now through the L-fence's backer board, using the hole location template from that project. If you'll be clamping the L-fence directly to your tablesaw fence, you don't need to drill the mounting holes.

Glue plastic laminate to the edges of the movable fence and the fence guide blocks. The laminate gives a smooth surface for



the fence to slide against. Trim any overhanging laminate flush.

To make the tongue on the lateral part of the L, cut a rabbet on the bottom edge of the workpiece so the remaining wood will fit in the groove. I notch back the ends of the tongue by hand. Before dry-fitting the tongue and gluing it into its groove, I cut a bevel on the top surface of the part. This is mostly for aesthetics, but if you ever need to flush-cut something with material that overhangs both faces, the bevel allows the overhanging parts to straddle the L.

With the threaded knobs holding the movable fence in place on the backer board, glue and nail the guides tight to the edges of the L. Make it tight enough that the fence will not rack as it is moved up and down in use.

Glue and tack a small handle to the top edge of the movable fence to make it easy to raise and lower.

Now you can attach your new L-fence to its base and run wild with its uses. □

Contributing editor Bob Van Dyke runs the Connecticut Valley School of Woodworking.



**Cut patterns on the tablesaw.** Start with an MDF pattern you want to replicate. Secure the pattern to the workpiece using double-sided tape or finish nails. Push the assembly through the saw with the pattern on top, riding against the L-fence. You can cut all four sides.

## PATTERN SAWING

You do not usually think of a tablesaw when you have a bunch of oddly shaped parts to cut, but if you use the flush-sawing capabilities of an L-fence the tablesaw can easily duplicate any straight-sided shape. Make a pattern out of any material—plywood, MDF, solid stock. You can cut the pattern to any shape you need. When you are happy with the pattern, trace it onto the workpiece. Remove most of the waste at the bandsaw, leaving about  $\frac{1}{8}$  in. outside the lines. Now attach the pattern to your workpiece with tacks, double-sided tape, or with coarse adhesive-backed sandpaper attached to the underside of the pattern. With the L-fence flush with the outside edge of the blade, cut the parts, running the edges of the pattern against the L-fence. If you set the L-fence carefully, your workpiece should be exactly the same as your pattern.

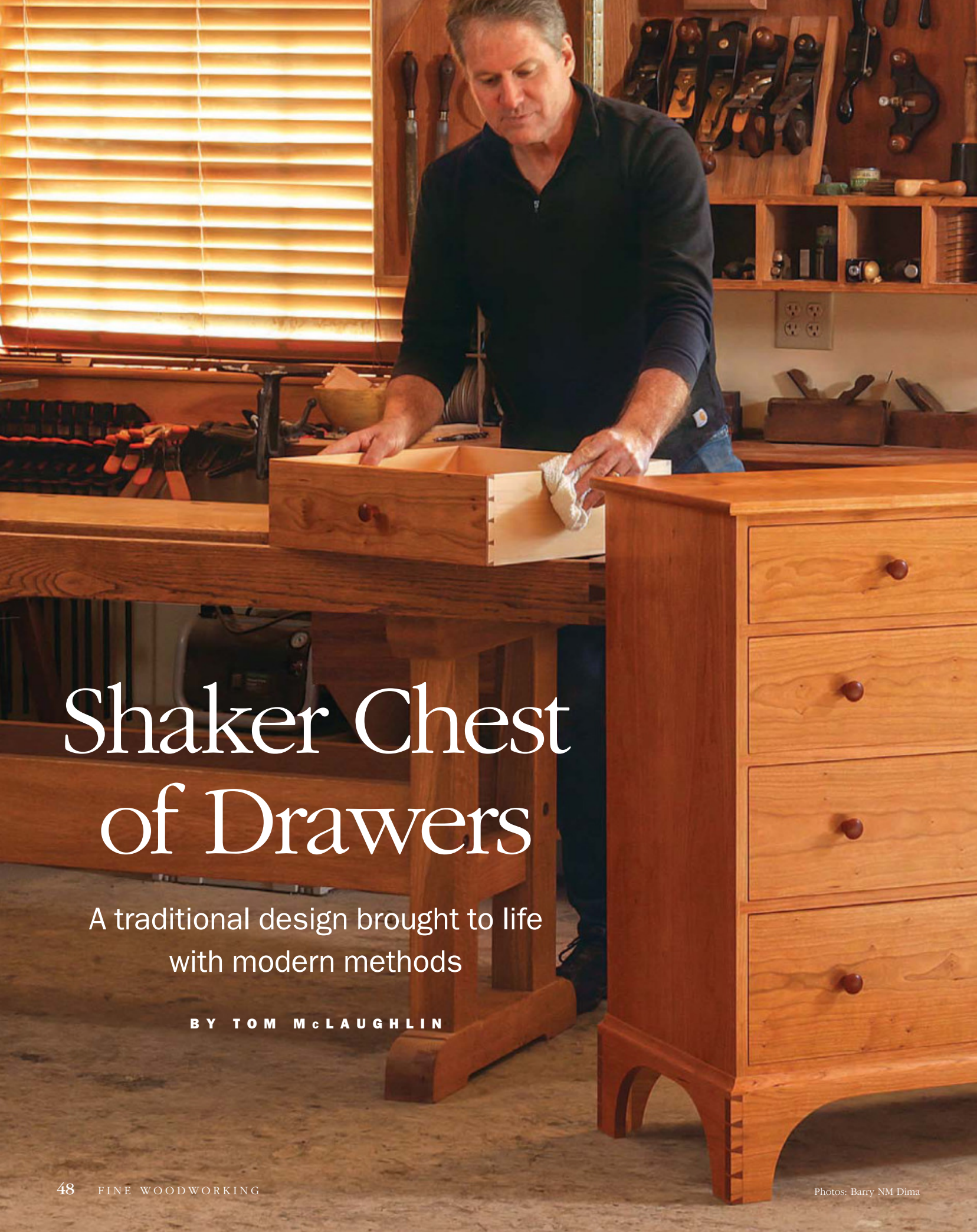
## MITERS

Think about cutting a long miter on a case side. Cutting one edge cleanly is hard enough, as there is always some burning and frequently a scar mark from the blade. If you need to miter the opposite edge parallel, you have nothing except the knife edge of the first miter to run against the fence. This is a no-win situation. But if you cut the part to its final size while the edges are still square, you can add the miters in a second step and get very clean and accurate cuts on stock of any width.



**Miter exactly to an edge.** Set up the saw with the fence on the left side of the blade (if your blade tilts left) and the blade tilted  $45^\circ$ . The case pieces should be cut to final width. Use double-sided tape to attach a straightedge perfectly flush with the edge that will be mitered. The L-fence should be set higher than the workpiece and the blade should cut through the workpiece. After cutting the miters, Van Dyke leaves the straightedges taped on. With their inside edges cut to  $45^\circ$ , they serve as clamping cauls to glue the mitered case together.



A man with grey hair, wearing a dark blue long-sleeved shirt and jeans, is working in a workshop. He is leaning over a workbench, assembling a wooden drawer. The workshop is filled with various tools, including planes and chisels, hanging on the wall. A window with horizontal blinds is visible in the background, letting in warm light. In the foreground, a partially assembled Shaker chest of drawers is visible, featuring four drawers with round wooden knobs and a curved base.

# Shaker Chest of Drawers

A traditional design brought to life  
with modern methods

BY TOM McLAUGHLIN





**B**uilding a dresser, or chest of drawers, is immensely satisfying. A dresser is practical, central to everyday living, and quietly anchors a bedroom's decor. And if made well, it can be passed down and enjoyed for generations. When choosing a design that will endure, it's hard to beat Shaker style. Esteemed for its minimalist simplicity and clean lines, Shaker furniture is right at home in both traditional and contemporary settings. The design of this specific dresser draws from my explorations of nearby Canterbury Shaker Village; the notebook of my mentor, P.A. "Pug" Moore; and an original Shaker dresser made in Harvard, Mass., in 1844.

The design may be historical, but my construction methods are almost entirely contemporary, including repeatable joinery using the tablesaw and router. And some of the dresser's construction comes from observations made while studying and repairing antiques.

### **Mindful stock selection**

When milling the parts for your dresser, consider how they will be used. For example, having chosen cherry for the primary show wood in this dresser, I selected the widest boards when gluing up the panels for the case sides and top, for the least number of glue joints and a cleaner look. To spare my good cherry, save money, and reduce weight, I took a different route for the subtop and bottom. The bottom panel will never be seen, so that's entirely white pine. The subtop is also white pine, but it gets a narrow strip of cherry glued to its front, since that edge will be exposed in the final case. The rear dividers, back boards, and dust partitions are all pine for the same reason. Poplar works well as a secondary wood, too.

This use of primary and secondary woods is common and traditional. With my drawers, though, I use a technique developed after years of seeing worn-out softwood runners and drawer sides on antiques. I future-proofed my drawers by using hard maple runners and laminating a thin strip of maple to the bottom edges of the white pine drawer sides. This gives the best of both worlds: the lightness and stability of white pine and the wear-resistance of hard maple.

### **Dovetailing the case and drawer dividers**

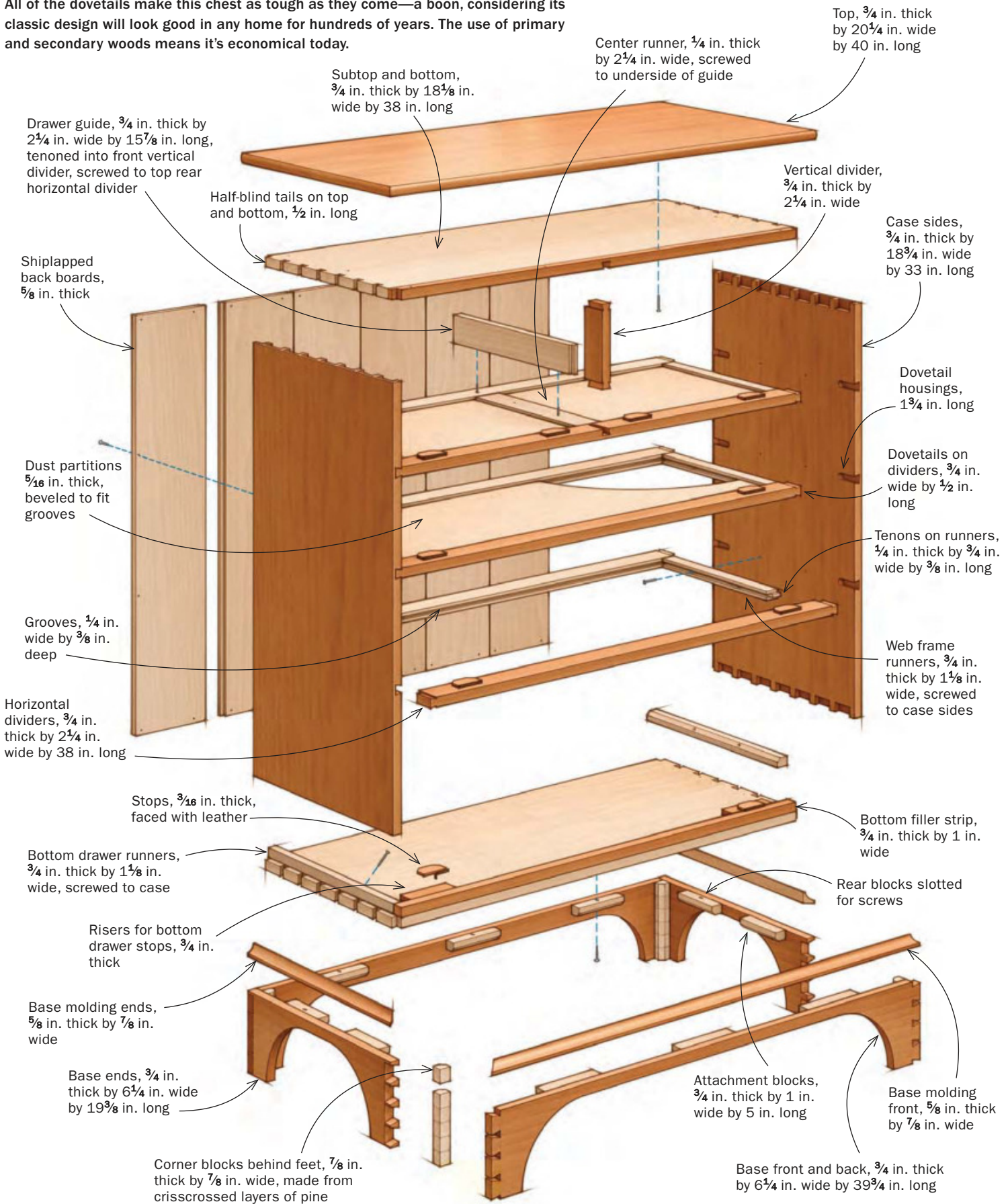
A case piece like this dresser is an intensive in dovetailing. It has three kinds: through- and half-blind for the carcass, base, and drawers, as well as sliding dovetails for the dividers.

The carcass comes first. Begin with the half-blinds. A tablesaw and drill press make relatively quick work of these. After laying out the tails on the subtop and bottom, I cut the tails at the tablesaw using a specially ground blade and a crosscut sled. Next, transfer the

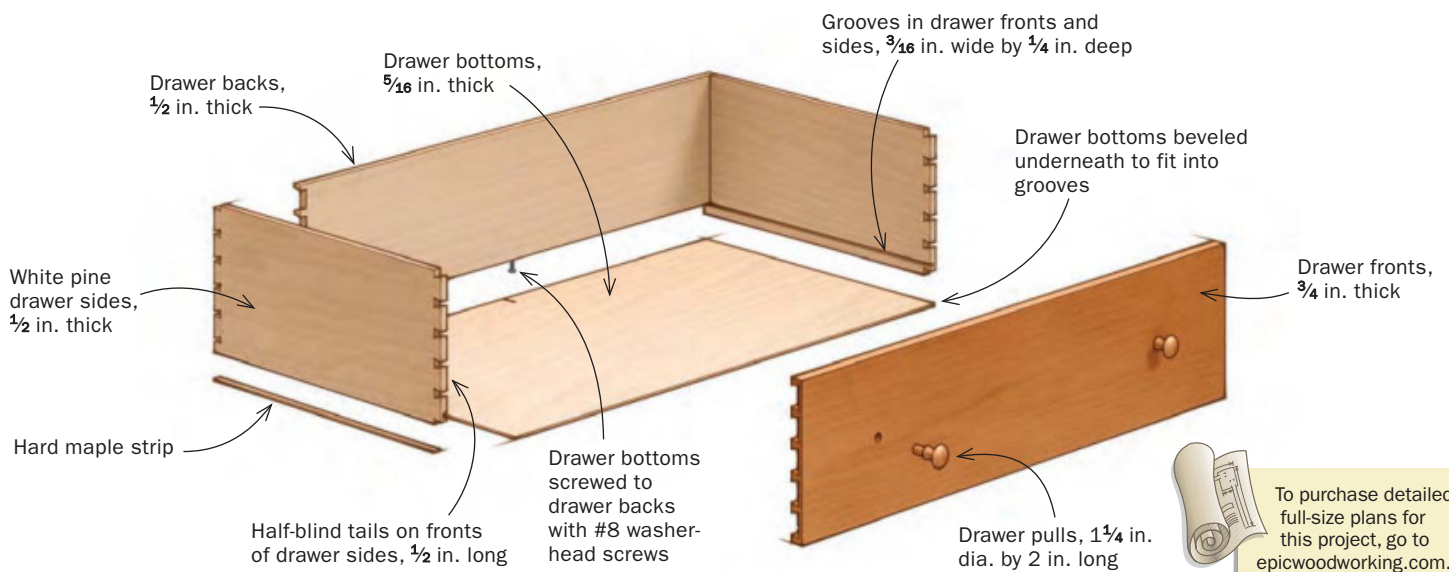
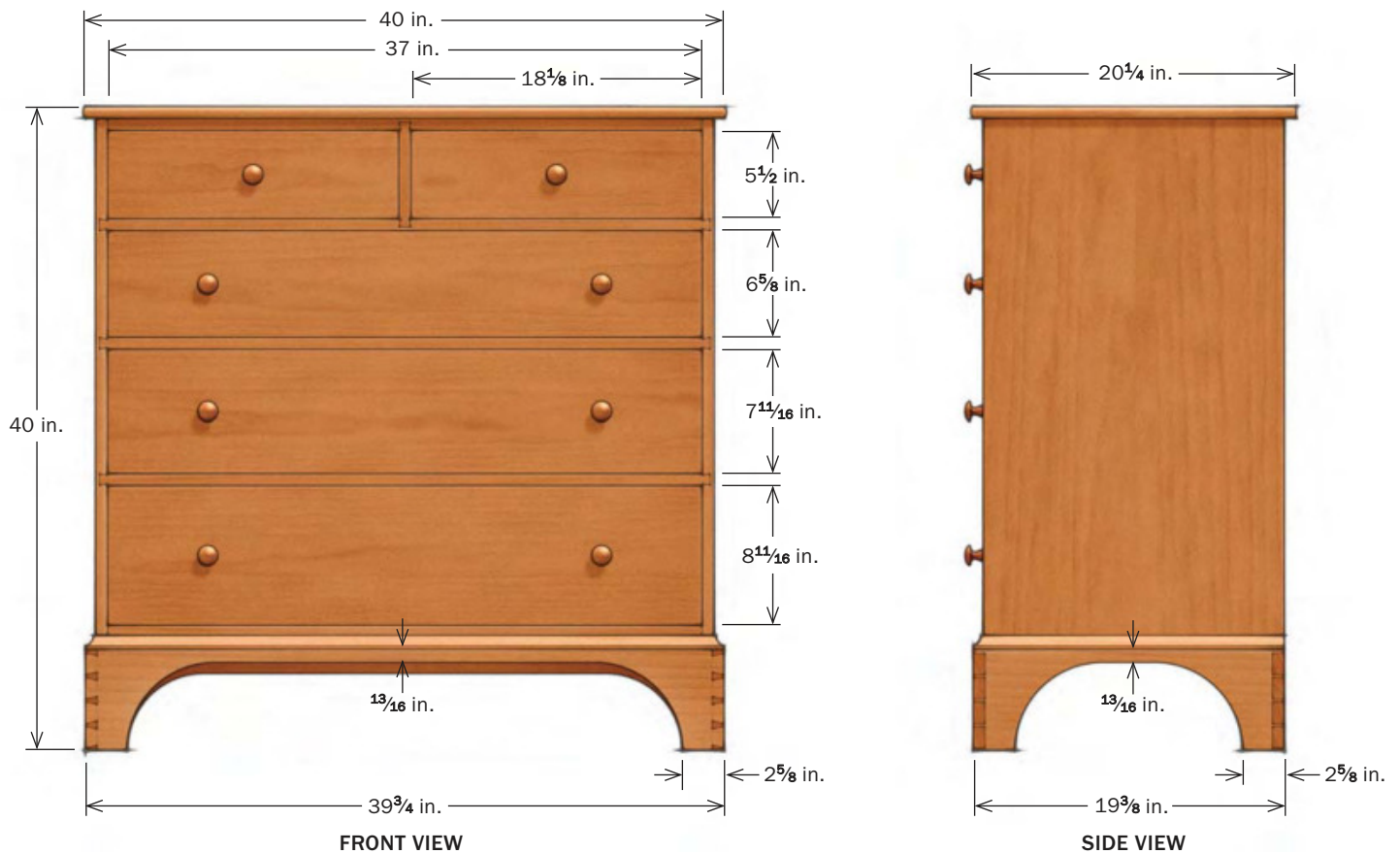


## PLENTY OF DOVETAILS FOR PLENTY OF STRENGTH

All of the dovetails make this chest as tough as they come—a boon, considering its classic design will look good in any home for hundreds of years. The use of primary and secondary woods means it's economical today.







To purchase detailed, full-size plans for this project, go to [epicwoodworking.com](http://epicwoodworking.com).

tails to the sides with a sharp marking knife. It's a good idea to scribble on the waste afterward so you don't mistakenly saw on the wrong side of the lines. After building furniture for three decades, I still do this scribble. To minimize paring and fitting, the handsaw cuts here should barely touch the knife line.

The traditional method for removing the waste between the kerfs is to chop it all out, but I have a shortcut: a drill press and a 5/8-in. Forstner bit. After drilling out most of the waste, you need only a little chiseling to cleanly and crisply work to the knife lines.

The dividers are joined to the case with sliding dovetails. To cut the horizontal dividers' housings efficiently and accurately, I use

a homemade jig paired with a router, a 5/8-in. guide bushing, and a 3/4-in.-wide 14° dovetail bit. The jig, with cleats to reference on the case, creates evenly spaced and parallel slots 90° to the edges. I use a similar jig to rout the housings for the vertical divider, which separates the top drawer opening into two compartments.

With all the slots routed, you can work on the dividers themselves. First, determine their length by dry-fitting the case. After trimming the dividers accordingly, dovetail their ends at the router table using the same dovetail bit you used for the case. It is important to fit these tails so they go together easily (but not sloppily) because if they're too tight, they'll bind during glue-up.

# Case dovetails

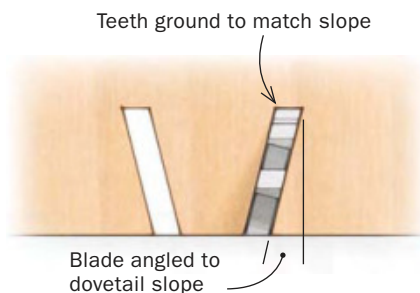
## TAILS TOP AND BOTTOM



**Tablesawn dovetails are fast, easy, and accurate.** After cutting the carcass's rabbet and laying out the tails, McLaughlin uses a specialty blade that's ground to the dovetail angle and a dedicated crosscut sled. His sled's fence is higher in the middle, creating extra bearing surface.



**Two cuts for the walls before removing the waste between.** Because the blade tilts in only one direction, flip the board to cut every other tail wall. With both walls cut, saw out the rest of the waste. A zero-clearance kerf in the sled's base helps McLaughlin line up each cut.



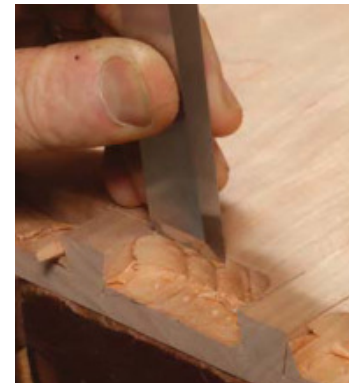
## HALF-BLIND PINS ON THE SIDES



**Cut the pin walls.** First transfer the tails to the pin board and mark the waste. It's OK to saw past your baselines inside the case. It will never be seen, it's period correct, and it will speed up removing the waste.



**A Forstner bit and rough chops tackle most of the waste.** Rather than chop away all of the waste, McLaughlin sets up a fence on his drill press and drills with a  $\frac{5}{8}$ -in. Forstner bit. Then he uses a chisel to quickly remove the remaining fragile webbing.



**Chisel cleanly to your baseline and floor.** Now's the time for methodical chisel work and clean cuts. Start by incrementally chopping toward the scribed baseline (above). When that's done, pare the sockets to final depth (below).

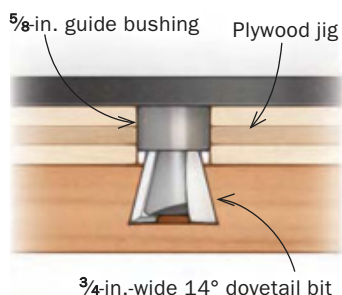




## Nifty jigs for dovetailed dividers



**Same jig handles front and rear housings.** Because of the jig's cleats, it will make perfectly mirrored housings for all of the dividers, greatly simplifying positioning and installing the runners later on. On the back edge, the jig registers off the rabbet's shoulder.



**The bushing rides the plywood jig while the bit routs the slot.** To ensure smooth walls, keep the bushing tight to the plywood. McLaughlin takes one pass, spins his router 180°, and takes another, guaranteeing the housings are centered even if his bit and bushing are not.

After setting up the cut with a test piece, I fit each tail individually with the case disassembled. If the case was still dry-fitted, I'd be trying to fit two tails at once just to determine if one was off.

When the dividers fit their sockets, set them aside and glue up the case. I use white pine cauls to fully seat the tails, since the soft wood gives way to the harder cherry under clamping pressure. When the glue is dry, plane the pins flush. Groove the dividers and runners for the dust partitions, then glue in the front dividers. The rear dividers don't get installed until the very end of the build.

### Filling out the interior

With the skeleton done, move on to the runners and guides. These are designed and installed with wood movement and reparability in mind—more lessons learned from studying antiques.

The parts for the bottom drawer opening are the simplest. There's a cherry filler strip press-fitted and glued on in front. Behind that are two runners, which are attached to the case with screws driven at an angle, similar to toe-nailing. Set these runners back  $\frac{1}{16}$  in. from the cherry strip to accommodate wood movement. The filler and runners should be the same thickness.

The web frames and vertical divider need grooves and stub

## Assemble from the outside in



**A stick with a nail checks for square.** It's critical to glue up the case square. To ease checking a workpiece this size, McLaughlin uses a long stick with a nail in one end. The nail goes in one corner (above), and he makes a pencil mark on the stick at the opposing corner (left). When the pencil mark lines up on both sides, the case is square.



**Install the horizontal and vertical dividers.** Notch the backs of these workpieces before gluing them in place. You may need to clamp across the case to close any gaps.

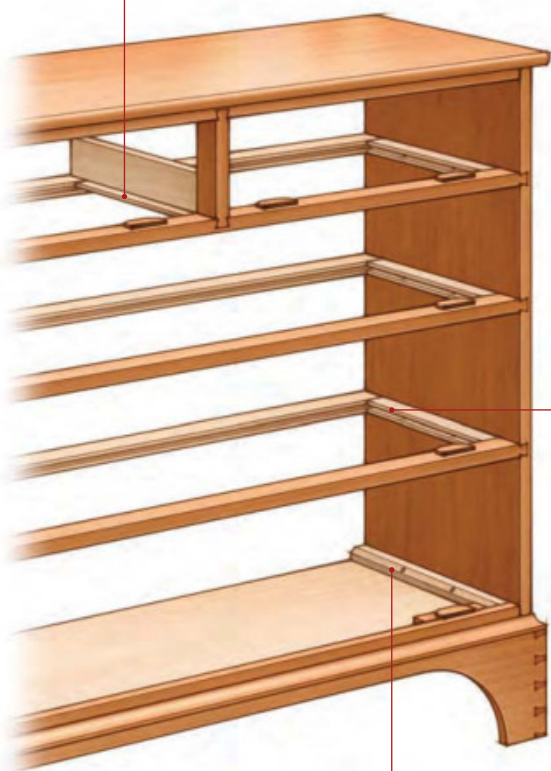
# Three kinds of runners

**Upper drawers need a guide.** This piece has a small tenon that fits into a centered groove behind the vertical divider. For rigidity, glue this tenon in place.



**Screw the central runner to the guide now, and the guide to the rear divider later.** This runner is wide enough to support both drawers. Do not screw the guide to the rear divider until putting the latter in place during final assembly.

TOP



MIDDLE



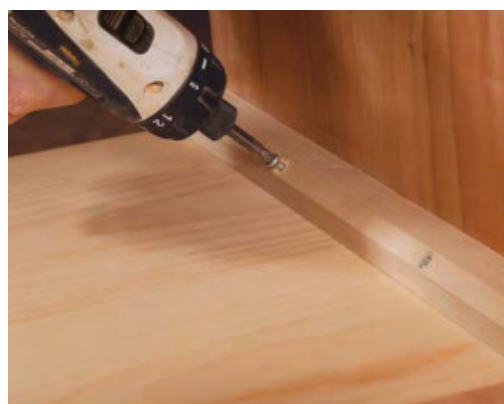
**Dry-fit the rear dividers when installing the middle runners.** Temporarily install the rear dividers, since their grooves help accurately locate the runners and their stub tenons.



**Two screws secure these runners.** Don't glue these runners to the sides or dividers. Locate the screws close together so they don't interfere with wood movement. Install the runners with a  $\frac{1}{16}$ -in. gap between dividers.

BOTTOM

**Bottom drawer gets a cherry filler strip in front.** This strip lifts the drawer above the molding, creating a little visual separation and making space for hardwood runners.



**Add two maple runners behind.** To accommodate wood movement, screw, but don't glue, these in place. Similarly, set them back  $\frac{1}{16}$  in. from the cherry strip. Driving the screws at an angle ensures the runners are tight to the case side and bottom.



## Bracket base elevates the case



**Bandsaw the arch after cutting the dovetails.** McLaughlin bandsaws close to the line before refining the cut with a sanding drum and a scraper.

tenons. These joints are all the same size and centered. This simplifies cutting them; it also means the runners should be milled to the same thickness and at the same time as the drawer dividers.

When installing the web frame's runners, dry-fit the rear dividers to help with positioning. Don't glue the runners' stub tenons into the grooves in the front and back dividers. Rather, simply screw the runners to the case sides with two screws in the grooves. Like the bottom runners, set these with a  $\frac{1}{16}$ -in. gap to the front.

The drawer guide and runner in the top center use different construction. The guide's stub tenon is glued into the vertical divider. Later, at final assembly, you'll fix the guide at the back end with a washer-head screw up through a slotted groove in the rear divider. This will keep the guide centered side to side without constricting wood movement. The runner is then simply screwed to the underside of the guide.

With a square case and well-built internals, you'll be set up to build drawers that slide well and have even reveals.

### Bracket base

The bracket base means more dovetails. After cutting and fitting these joints, cut the arches. Last, glue up the base.

To strengthen the base, I glue support posts to the inside corners of the feet. These posts are made from cross-grain blocks of pine so they expand and contract with the base.

To prepare for attaching the base to the case, I glue attachment blocks to the base flush to its top edge. Then, when I attach the base to the case, I keep wood movement in mind, using glue only on those attachment blocks along the front edge and at the front of the sides. This directs movement to the back and keeps the reveals consistent in the front. To the same end, having milled slotted holes in the blocks along the rear edge and at the back of the sides, I screw but don't glue them.

Be sure the offset between the base and case, where the molding will go, is the same along the front and sides.



**Glue up the base.** The tails are wide enough that McLaughlin can apply pressure directly to them rather than using cauls.



**Posts with cross-grain layers strengthen the base's dovetailed corners.** These reinforce the feet and act as support posts at each corner of the dresser. McLaughlin crisscrosses each layer's grain to balance strength and stability.

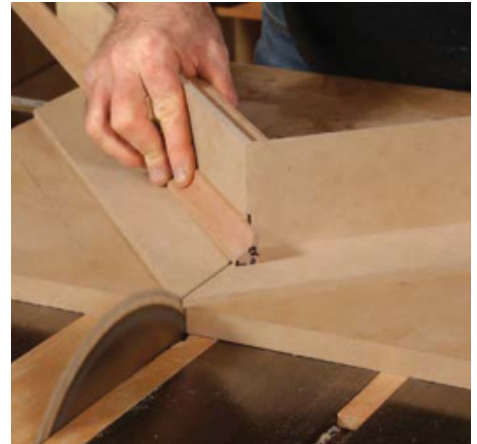


**Glue the front attachment blocks to the case; screw on the back ones.** These blocks secure the base to the case. Gluing the front ones to the case and using slotted screws on the back ones directs wood movement to the back, keeping the reveal on the front even year-round.

# Cove molding



**Route and rip each molding strip from one overwide blank.** After routing the cove molding, scrape and sand the profile before ripping it free. This method is much safer and easier than trying to work each narrow piece individually.



**Zero-clearance miter sled creates clean corners.** The zero-clearance kerf both prevents chipout and helps line up the cuts accurately.

**Glue on the front molding with a side piece temporarily clamped in place.**

The miter on the side molding helps position the front molding. Glue the whole front piece to the base and the case (right). Then attach the side moldings. Glue these to the whole base but, to allow for seasonal movement, glue them only to the first 7 in. of the case.



## Cove molding

The cove molding provides a calm, pleasant transition between the base and the case. It also conceals the pine bottom. If possible, make the cove molding from the same material you used for the base. This creates a more uniform appearance between the two.

Thickness the molding stock to match the base-case offset. But for safety while cutting the cove, keep the blank plenty wide. At the router table, use a cove bit to shape the stock. Scrape and sand the cove, then rip the molding from the blank.

To apply the molding, first miter and glue the front in place. Then miter the side pieces, cut them to length, and install them. All three pieces can be glued to the base. The whole front piece can be glued to the case, but to accommodate wood movement, only the front 7 in. of the sides should be glued.

Last, install the top, dust partitions, rear dividers, and shiplapped back boards. I don't glue in the rear dividers. The sliding dovetail, plenty strong without glue, can then be disassembled for repairs, another way to ensure this chest will last lifetimes.

## Finishing touches

I prefer oil-based wiping varnishes when finishing cherry. They're easy to apply and produce a pleasing richness as the patina deepens over time. I finish all exterior cherry surfaces and both sides of the top with two to three coats of Waterlox original sheen before adding a final topcoat of Waterlox satin sheen.

For a traditional touch, I use a scrub plane to subtly scallop the outside faces of the back boards before installing them, leaving a tactile surprise whenever someone runs their hand there.

All interior surfaces, the back boards, and the underside of the dresser are sealed and finished with two thin coats of clear shellac. (The interior is easy to finish with the rear dividers removed.) Drawer interiors and sides also get clear shellac, lightly sanded with 320-grit sandpaper, and buffed with paste wax. □

*Tom McLaughlin builds this chest of drawers in FineWoodworking.com's series Master Class.*





## Top and back



**Rout the top's radius.** This profile is an arris curve. It's a curved edge profile that meets the surface with a hard corner.



**Set the overhang and attach the top.** The top has a  $\frac{3}{4}$ -in. overhang in back, which lets it clear any baseboard and sit flat against a wall. Attach the top with countersunk screws up through the subtop.



**Install the dust partitions and rear dividers.** The dust partitions are a traditional touch, so McLaughlin takes the traditional route by beveling their undersides to fit into the web frames' grooves. After those are in, slide the rear dividers in place dry, and screw the top one to the drawer guide.



**Shims help space shiplapped backboards.** Starting on one end and moving over, install the boards with screws. Temporarily placing  $\frac{1}{16}$ -in. shims between each keeps them evenly aligned.







# Put the Drop in Drop Leaves

Use tried-and-true methods to cut the rule and knuckle joints

BY STEVE LATTA

**T**his Pembroke table makes the top tier of my all-time favorite pieces. Positioned in our reading room right next to my rocking chair and lamp, it has given me hours of enjoyment. It has also been a great project to teach, as it offers some techniques that most folks don't get to use that often—rule and knuckle joints.

The table's drop leaves are connected to the top with a hinged rule joint. On each side a swing arm with a knuckle joint extends to support the drop-leaf. There are various styles for both these joints, based on regional differences, but for this table I am sticking with the joinery from a Connecticut Pembroke table dating to the 18th century, which served as my inspiration.

## Creating the knuckles

The meat of the swing arm is the knuckle joint. Sticking with precedent, I use a five-knuckle layout, the triple knuckle fixed to the inner apron and the double knuckle cut on the swing arm. I mill the stock at least a few inches longer than necessary to provide options should life happen when I'm not paying attention.

Each knuckle joint starts with two blanks,  $\frac{3}{4}$  in. thick by  $4\frac{5}{8}$  in. wide by 14 in. long. Ideally, I'll cut each pair from a longer board for continuity. But this is not the place to use pretty stock. Function takes precedence and nice, straight grain is the ticket.

Set up a router table with a  $\frac{3}{8}$ -in. roundover bit and, for safety, accuracy, and to minimize tearout, use a

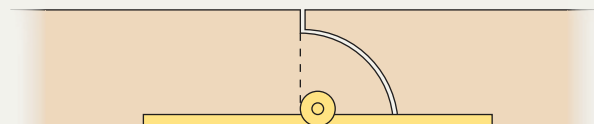
$\frac{3}{16}$ -in.-dia. steel rod serves as a hinge pin.

V-notches allow for full range of travel.

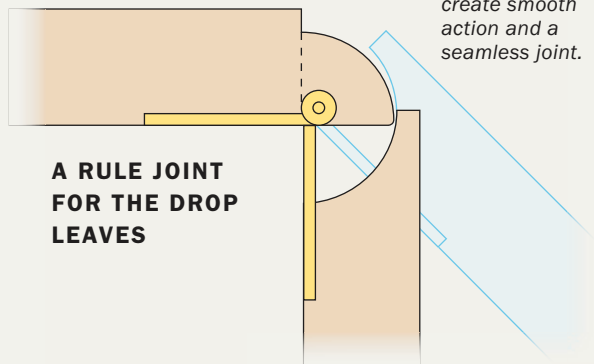
## A KNUCKLE JOINT FOR THE SWING ARM

The knuckle joint, a variation on the finger joint that serves as a hinge, has rounded knuckles that allow the support arm to swing into place when the leaves are raised, and stow out of the way when they're lowered.

Five evenly spaced knuckles



A roundover and cove combine to create smooth action and a seamless joint.



## A RULE JOINT FOR THE DROP LEAVES

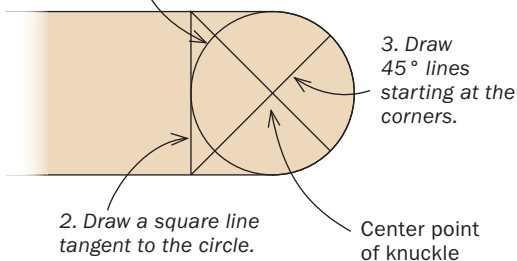
# The swing arm

On Pembroke tables, the inner rails tenoned into the legs provide the real strength. Swing arms with knuckle joints, mounted to the inner rails, support the leaves when they are raised.

**Start the knuckle joint.** At the router table with a  $\frac{3}{8}$ -in. roundover bit, round over both ends of the knuckle stock. Then use sandpaper backed with packing tape to remove any machine marks.



1. Draw a  $\frac{3}{4}$ -in.-dia. circle.



**Lay out the center of the hinge.** Using a template, draw a  $\frac{3}{4}$ -in.-dia. circle over the end of the board (right). With a combination square set at  $\frac{3}{8}$  in., find the center point by referencing off the end and each face. Because an accurate center point is everything on this joint, take your time finding it. Once located, run a  $45^\circ$  line through the center out to the show face (below right). This creates a small triangular area that you'll remove on the router table.



fence and a push block. I rout the profile on both ends of each workpiece, using a four-to-get-two approach: I'll cut knuckles on all four ends and pick the best two when they are fitted together. By "best" I mean both tight and clean.

After sanding the roundover, put a  $\frac{3}{4}$ -in.-dia. circle template at the end of the board and trace the circle, locating the center point within it. Then run a  $45^\circ$  line through the center out to the show face. Doing so creates a small triangular area that you'll remove on the router table with a  $90^\circ$  V-bit. After routing, fair one side of the V-groove to a curve with a chisel and sandpaper.

I made a pair of gauge blocks for laying out the knuckles. Once those lines are scored, excavate between the knuckles on the tablesaw using a carriage jig and a  $\frac{1}{2}$ -in. dado set. Mounted to two miter gauges, the carriage both secures the work and provides a positive reference for both sides of each notch. Having notched all the pieces, try all combinations until you get two sets with the tightest fit free of gaps.

Once the knuckle spacing is cut, you have to scoop out extra material at the base of the notches to accommodate the curves as the joined pieces swing. When both pieces fit together completely with a small gap, the excavating is complete. Secure the joints with a few strips of clear, 2-in. packing tape on both sides. The tape will prevent the pieces from sliding when you drill for the  $\frac{3}{16}$ -in. pin.



**Create a V-notch.**  
At the router table, with a 90° V-bit, run a groove down the length of the barrel. Its point should land exactly where the 45° line intersects the circle.



## Drilling for the pin

To get a true hole, it's best to drill in from both ends. Make a fence the length of your drill-press table, around 1½ in. thick and ¾ in. wider than the swing arm. One end of the fence must be square and perpendicular to the table. Set the fence so the tip of a ⅜-in. brad-point bit is centered on the knuckle joint. (To reduce the likelihood of drift, don't use a standard twist drill bit.) Make an auxiliary table from ¾-in. MDF that is the length of your fence and about 2½ in. wide. Use a spacer to elevate the auxiliary table 3 in. or so above the main table. Align one end of the auxiliary table to the square end of the fence, and bore a ⅜-in. hole through the MDF. Remove the spacer and, keeping the auxiliary table aligned to the end of the fence, clamp it to the main table. Following these steps guarantees the hole is in direct alignment with the bit.



**Transfer the V-groove line.** Use a marking gauge resting on the end of the board with the blade just hitting the bottom of the V-groove. Transfer that line to the other side of the knuckle stock.

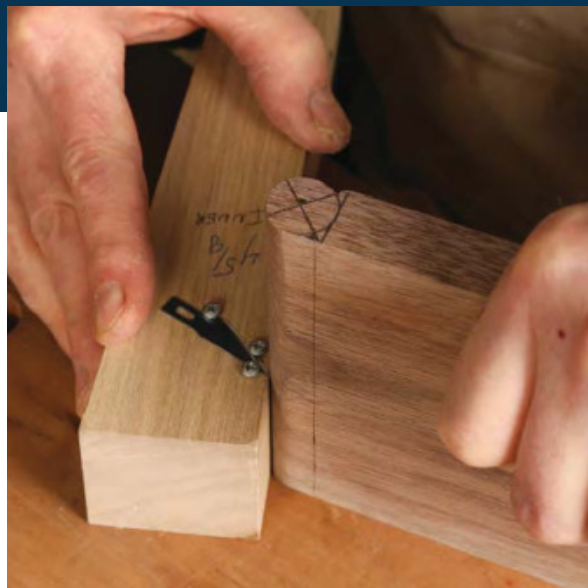


**Refine the round.**  
Use a chisel to complete the curve of the barrel and smooth it into the V-groove. Latta backs a metal ruler with sandpaper to smooth the curve even more.

# Swing-arm knuckles

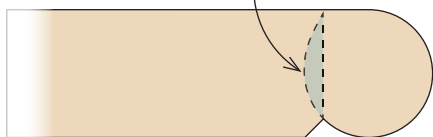
## Laying out the knuckles.

Latta made two layout blocks to use as marking gauges for the knuckle placements. The thickness of the first block is one fifth of the rail's width, the second block is twice that. With an X-Acto blade mounted to each block with a few small screws, he lays out all the knuckles referencing off the top and bottom edges. Take the extra step of clearly marking what parts are being taken away and which parts are remaining.

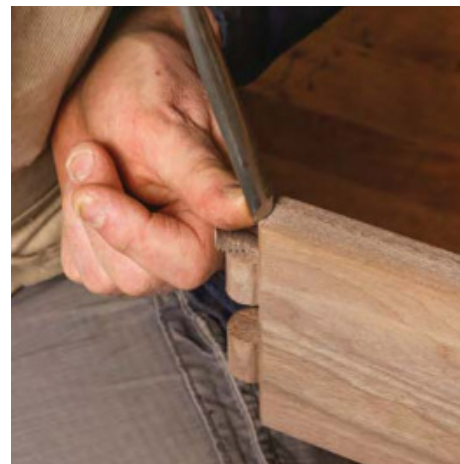


**Excavate between the knuckles.** Using a carriage to hold the parts, raise the dado head to the midpoint of the V-cut. First make a cut in the middle of the knuckle and then slide left or right, aligning directly to the score marks. The carriage is screwed to two miter gauges.

Undercut the area between the knuckles for clearance.



**Clean out the knuckles by hand.** On the piece that has only two knuckles, use a carving gouge to create concave shoulders for the top and bottom voids (far right). For the center void, and both voids of the triple knuckle, use a chisel to cut a preliminary notch and then, using the back of the chisel, scrape out the material. The two parts should fit together with a small gap.



To bore the first half of the hole, line up the center point of the knuckle with the brad point, clamp the stock to the fence, and drill a little more than halfway through the joint. A registration pin will position the workpiece to cut the rest of the hole. Cut a 1-in. length of  $\frac{3}{16}$ -in. steel rod and round each end on the grinder. Insert the pin into the hole in the auxiliary table and place the drilled portion of the knuckle joint over the pin. After double checking to make sure the same face is against the fence, clamp the workpiece and bore the second hole. Having cut scores of these, I still get a sense of relief when the bit meets the first hole.

Cut another length of rod to just under the full width of the apron. Gently hammer it in from the bottom to reduce blowout. At this point, the hinge should work nicely with a little bit of sanding.

## Making the rule joint

To cut the rule joint on this table's top, which is  $\frac{5}{8}$  in. thick, I use a  $\frac{1}{2}$ -in. cove bit combined with a  $\frac{1}{2}$ -in. roundover. Before diving into the real thing, mill up a couple of test pieces  $\frac{5}{8}$  in. thick by 6 in. wide by 15 in. long. Believe me, you will recover this investment of time when making the actual joints. Using a router

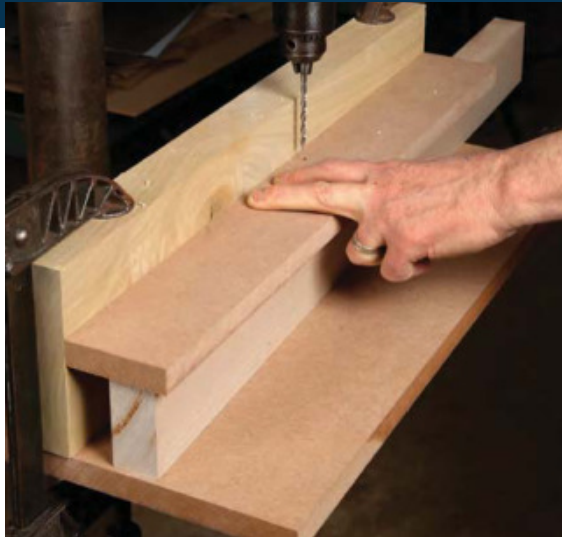


# Drill for the pin

It is easier and far more accurate to drill in from both sides with a normal-length bit than trying to use one that is extralong and sure to drift. When drilling from both sides, accuracy depends on having a proper reference point for the second hole.

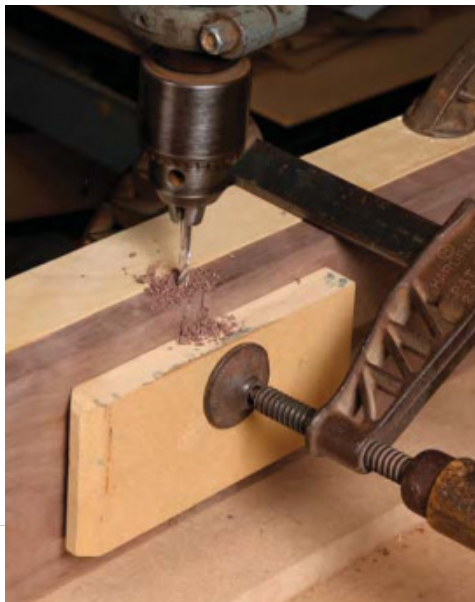
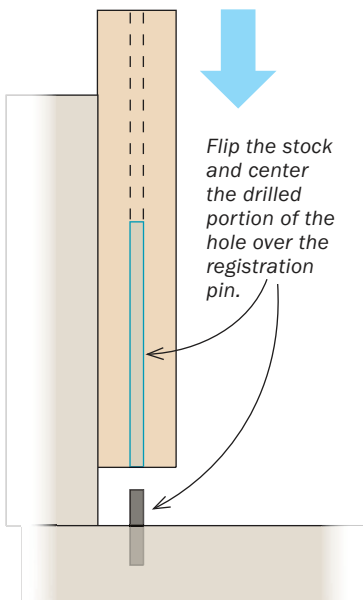
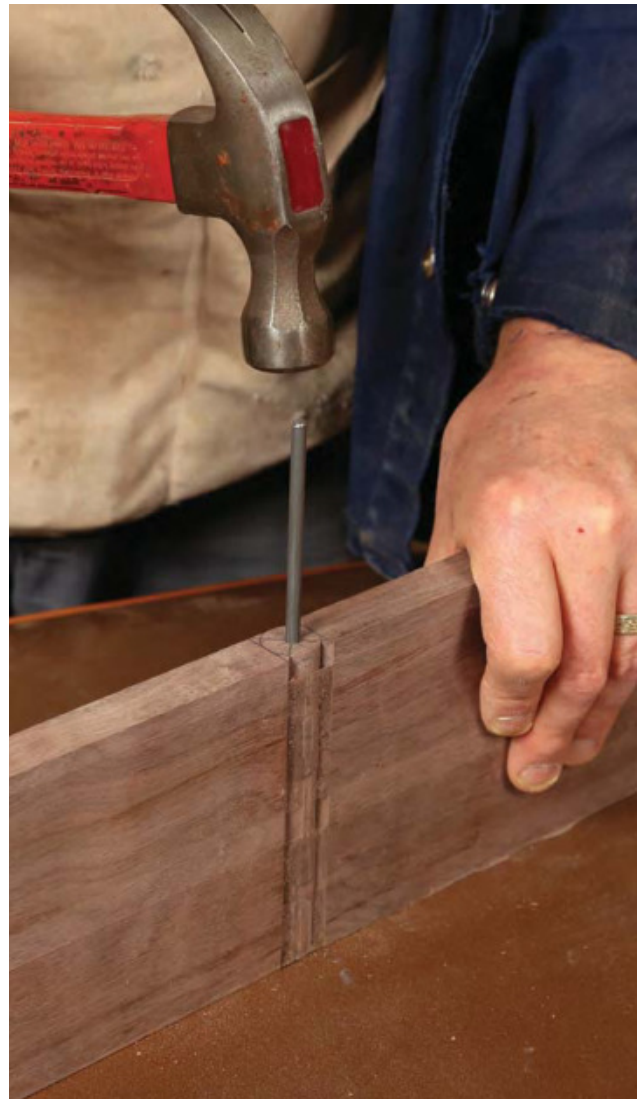
## **Setup is the key to success.**

After squaring his reference fence to the bit, Latta aligns an auxiliary table to the end of the fence and drills a hole in it for a registration pin. To drill that hole he elevates the auxiliary table on a temporary riser. Then he removes the riser and clamps the auxiliary table to the main table, flush again with the end of the fence. He assembles the knuckle joint, tapes it together, and drills the first half of the hole centered in the knuckle.



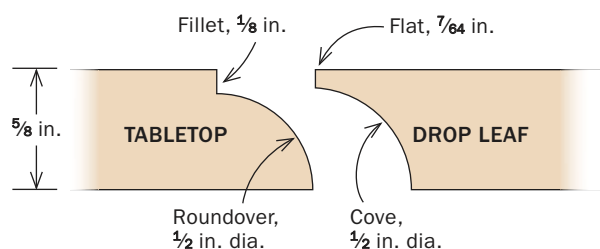
## **Flip and drill through.**

After drilling the first half of the knuckle joint, remove the workpiece, insert a length of steel rod in the registration hole, flip the knuckle board over, and seat the just-drilled hole on the registration pin. Make sure the same face of the board is against the fence, and drill through the knuckle into the first hole. Tap in a pin whose length is just less than the full width of the apron. The hinge should swing smoothly but stiffly.

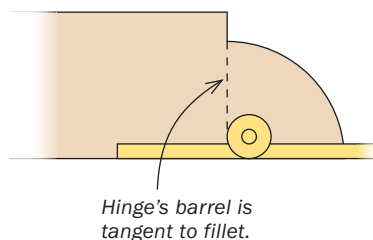
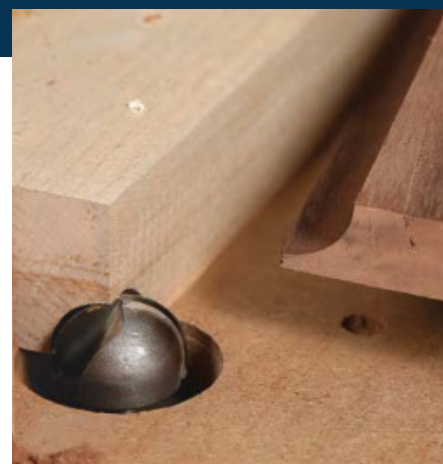


# The rule joint

This joint, named for the connections in a traditional folding ruler, links the leaves to the tabletop and looks good with the leaves up or down.



**Two complementary profiles.** The rule joint combines a roundover with a coved profile. Latta cuts both on the router table. Many router bit companies, such as Amana (AMS-118) and Freud (33-116), offer sets for just this purpose.



**Lay out the hinges.** Start on the tabletop. Use the hinge and a small square to measure, place, and score the outline for the hinge mortise.



table, run the roundover on one of the boards leaving a 1/8-in. fillet. On the other piece, still using a router table, run the cove bit. Sneak up on the fit until there is a gap the thickness of a piece of veneer between the profiles when they are butted together.

## Installing hinges

Hardware is never the place to skimp on quality. I prefer Horton Brasses for my hinges (#510). The placement of the hinges is key. With the leaves dropped, the hinges should not be visible and the gap between the top and the leaves should be minimal. Most of the illustrations that show the placement of the hinge barrel do so with a 3/4-in. top in mind. That is way too heavy for a table as delicate as this one. For this top, the back of the barrel is tangent with the fillet.

Mount the hinges to the tabletop first. Score the outline of the hinge using an X-Acto knife and a com-

**Two steps to a hinge mortise.** Once you rout and clean up the mortise to accept the hinge, you still must carve out a recess for the barrel of the hinge. Do this by hand with a sharp chisel.





## Online Extra

To watch Latta create a knuckle joint and rule joint, go to [FineWoodworking.com/290](http://FineWoodworking.com/290).

bination square set to the depth of the hinge. Take the tip of your knife and roll it over the edge to prevent blowout from the router. I use a palm router to excavate, and then I clean up the edges with a chisel. Fit the hinge into the mortise and mark where you need to dig a little deeper to accommodate the barrel. Use a chisel for this as well. Be careful not to push too hard and blow through.

With the hinges mounted to the tabletop, butt the drop leaf to it with a piece of veneer between them serving as a spacer. Transfer the hinge layout to the leaf and rout/chisel again. When you think you have a good fit, mount one screw in each side and check the swing. You can adjust the fit if needed by running sandpaper through the joint. Once you are satisfied with the fit, repeat the process on the second leaf. □

Steve Latta teaches cabinetmaking and wood technology at Thaddeus Stevens College in Lancaster, Pa.



**Transfer the hinge placement.** With the hinges set in place in the top, set the top and the leaf next to each other (with a commercial veneer between them as a spacer), and clamp them in place. Score the outline of the hinges onto the leaf, and use a trim router to waste out the mortise and a chisel to clean up your line.



**Install the hinges.** Once the hinge mortises are cut, install all the hinges, and test the fit. If you need to, shimmy a strip of sandpaper backed with packing tape in the joint and slide it back and forth along the length of the joint to tweak the fit.

# The Art of Marquetry

Learn the double-bevel technique from a master of the medium

BY CRAIG VANDALL STEVENS



**Y**ears ago, when I had the good fortune to study under James Krenov, the decorative art of marquetry caught my imagination. Marquetry linked my longstanding interests in drawing and art with the woodworking skills I was learning. Through trial and error, I developed a way of working that blended the traditional double-bevel marquetry method with the thick hand-sawn veneers that we learned to make at The Krenov School. I've enjoyed adding marquetry to my woodworking ever since.

## Defining the double-bevel technique

Simply put, double-bevel marquetry involves taping together two pieces of veneer—the background veneer and the insert veneer—

and cutting both at once so that the opening you create in the background veneer and the piece you'll insert into it are identical in size and shape. That's the double part of the technique. As for the bevel part, the background veneer is on top as you saw, and the insert piece from the bottom veneer replaces the piece directly above it, bringing a new color or grain pattern to the image. Because you make the cuts with the saw table tilted, both the background and insert pieces are beveled on their edges. With just the right bevel angle, the sawkerf is completely eliminated and the fit of the marquetry pieces is perfect.

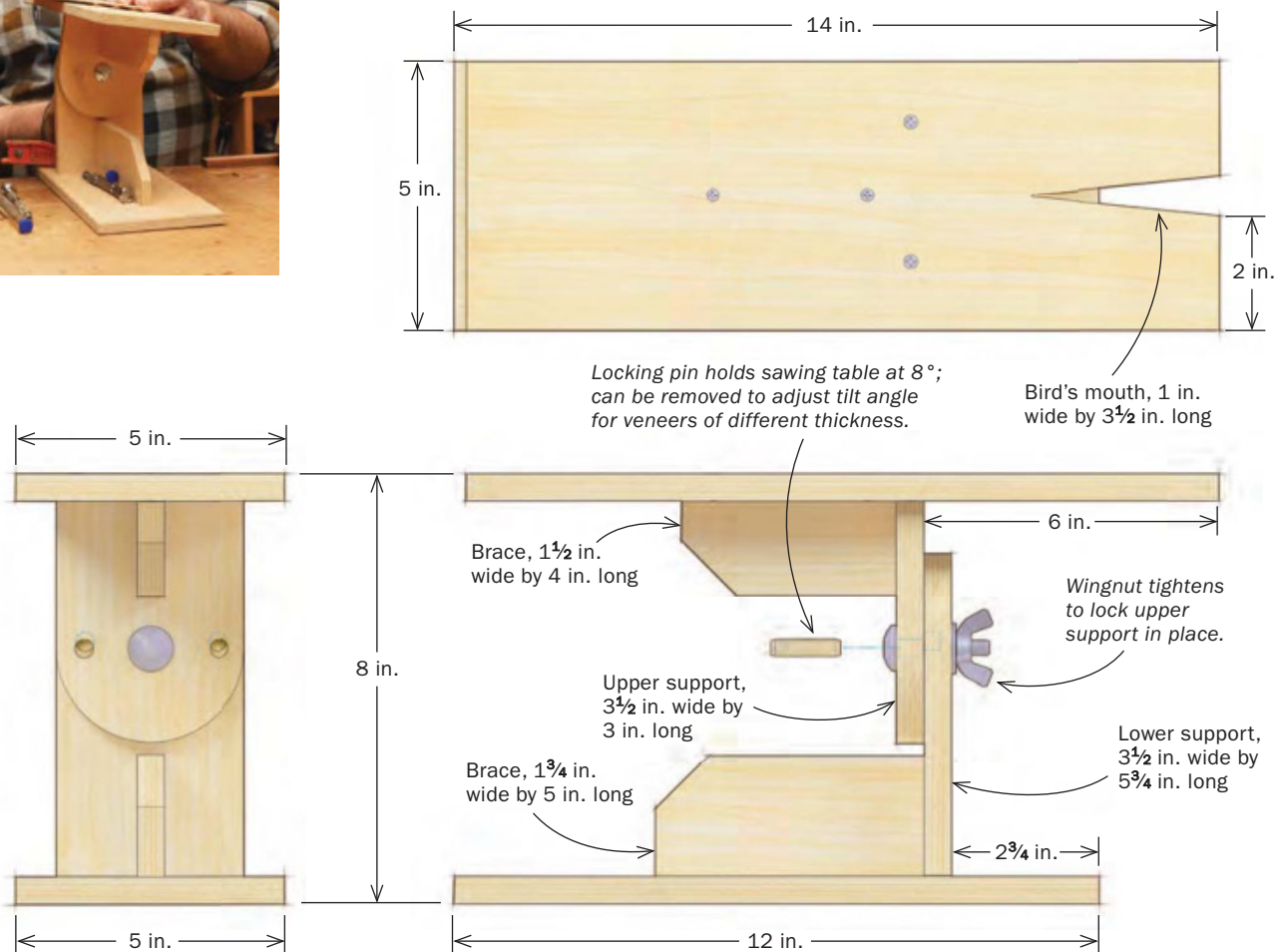
The double-bevel technique is ideal for creating a single precisely fitting marquetry design. Because the work is cut at an angle,



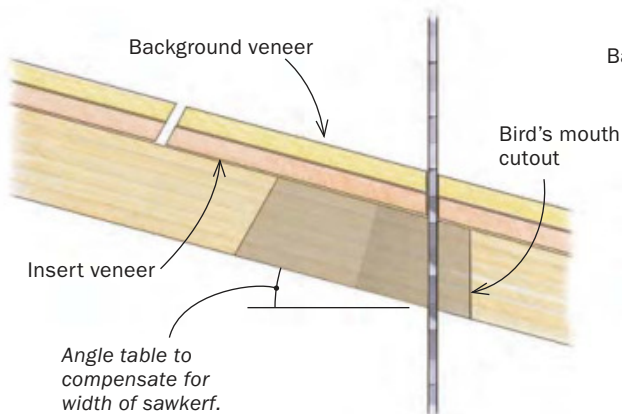


## SHOPMADE SAWING SURFACE

Build a sawing donkey to hold the work as you cut with the fretsaw. The swiveling top of the donkey creates the bevel angle. For  $\frac{1}{16}$ -in.-thick shopsawn veneers, the bevel angle is  $8^\circ$ . The cutting takes place within the bird's mouth. Be sure the fretsaw blade's travel is vertical both as seen from the side and the front. Move the work with one hand and the saw with the other. All parts are  $\frac{1}{2}$ -in. Baltic-birch plywood.



## HOW THE DOUBLE-BEVEL PROCESS WORKS



### 1. SAW THROUGH BOTH LAYERS OF VENEER



### 2. INSTALL INSERT VENEER FROM BELOW



### 3. BEVELED CUT CREATES GAP-FREE FIT





## PAINTING WITH WOOD

When selecting wood species for marquetry, Stevens avoids high contrast. Subtle variations in color are effective at producing the illusion of depth in an image. Choosing for grain and texture is also important. A curve in the wood grain can fool the eye into seeing a curve in the image, while a straight-grained piece in the same place could leave it looking flat.

### SOURCES OF SUPPLY

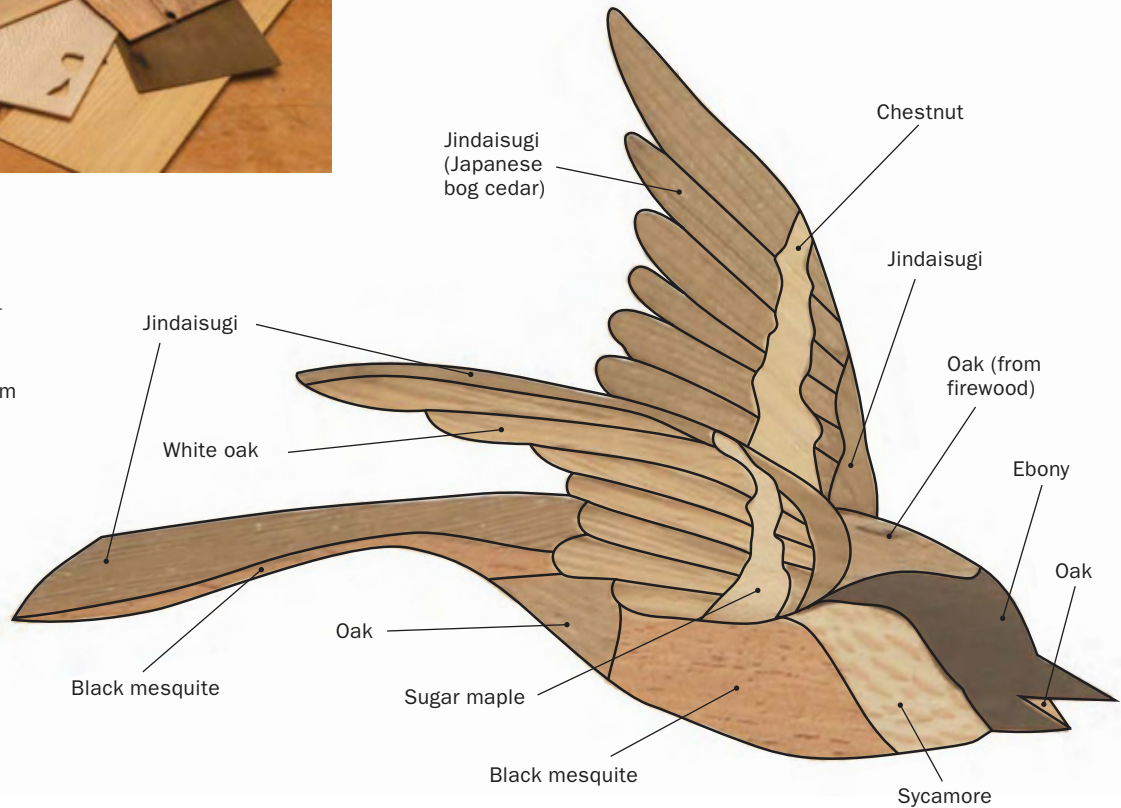
**ECLIPSE FRETSAW**  
highlandhardwareco.com

**OTTO FREI SWISS JEWELER'S BLADES**  
SIZE 2/0  
ottofrei.com

**#69 DRILL BITS**  
McMaster.com

**PIN VISE**  
amazon.com or elsewhere

**STYLUS**  
michaels.com



**Develop the drawing in stages.** Stevens works on paper through multiple iterations to develop his design. He often uses tracing paper to copy the parts of a drawing he likes, then redraws the rest. With the finished drawing laid over a sheet of graphite paper, Stevens traces each line with a stylus to transfer the design to the background veneer.





# Start with a practice pattern



## SET UP

*Adjust the donkey. When cutting thick shopsawn veneers, set the swiveling table at 8°. For thinner veneer, the angle will be greater, perhaps 13° to 18°. To create the necessary tension on the blade in the saw, insert the near end at the handle, then press the saw forward to flex the frame and insert the far end. Release the frame and the blade tightens.*



## SAWING

*If you tilt the sawing table so it is lower on your left, all the cuts must travel clockwise around the part you're sawing out. At the end of a cut, be sure the pieces you're removing are resting on the table, not over the bird's mouth, or they can drop through and disappear on the floor. Push the insert veneer into the background from behind. It should be a tight fit all around (below).*

only one insert piece can be made at a time. Other marquetry techniques permit you to stack veneers and cut multiples of the same shape at once, but they won't fit seamlessly like pieces cut with the double-bevel technique.

## What veneers are best for marquetry?

I slice my own veneers for marquetry from solid stock, sawing the sheets just over  $\frac{1}{16}$  in. thick on the bandsaw. I like working with thick veneer because the often small marquetry pieces are less delicate when you are sawing, handling, and gluing them, and there is plenty of thickness for scraping and sanding when the pattern is complete. Sawing your own veneers also lets you use scrapwood that might otherwise go to waste. In addition, when you add marquetry to furniture, you can saw the veneers for the marquetry from the same solid stock you use for the piece itself, producing perfect grain and color matches.

All that said, double-bevel marquetry also works well with thinner veneers. You just need to use a different bevel angle when you saw them. For  $\frac{1}{16}$ -in.-thick veneers, I tilt the sawing surface





# Inlay one piece at a time



**Tape on the feather veneer.** To saw out the first feather for his bird, Stevens tapes a piece of insert veneer to the underside of the background veneer. He orients the insert veneer so the feather's grain will be parallel along its length.



**A pinhole for starters.** For cuts in the center of the panel, drill a hole and insert the blade to start sawing. Tighten the bit in a pin vise, and rotate it with your fingers. A few twists are enough to make the hole.



**Thread the blade.** With the fretsaw pressed between your chest and the donkey, thread the loose end of the blade through the pin hole in the veneers. Pull the veneers along the blade toward the handle and tighten the far end of the blade in the frame.



**Saw and steer separately.** While one hand operates the saw in a vertical sewing-machine action, the other hand guides the veneers, steering the cut. When the cut is finished, press from above to release both sawn pieces. The one on top, cut from the background veneer, will be discarded. The insert piece, pushed in from behind, should present a gapless fit.

8° off horizontal. For thin commercial veneers, the tilt usually increases to between 13° and 18°.

## Two saws can make marquetry

You can get excellent results in double-bevel marquetry using either a hand-powered fretsaw or a motorized scrollsaw. The fretsaw has numerous advantages: It's inexpensive; it gives you complete control over the speed and nuance of the cut; and after you get the hang of it, it's a simple, quiet pleasure to use.

The action of a fretsaw should be a bit like a sewing machine: Its blade should be perfectly vertical as it rises and falls. You operate the saw with one hand and guide the workpiece with the other. It takes a little practice to get comfortable, but before long it feels quite natural. The fretsaw offers an approachable way to get started in the craft, and I still do most of my marquetry with one.

The scrollsaw has its own advantages: Most prominently, its throat is far deeper than that of the fretsaw, allowing you to





# Shade and glue as you go



**Darken one edge of the inlay.** Just as shading can make a drawing look more realistic, it can create the illusion of depth in a marquetry image. Stevens dips the insert piece for just 15 or 20 seconds in aquarium sand heated in a cast-iron pan on a hot plate. Creating humps in the sand makes it easier to restrict the shading to one edge of the feather.

create marquetry patterns in larger background veneers; with its motorized blade and foot-pedal control it frees both your hands to guide the veneers as you saw; and of course there's no learned skill required to make the blade travel vertically. Threading the blade through the tiny hole in the marquetry to start a cut is a bit fussier with the scrollsaw because the angle of insertion makes the hole harder to see. I typically countersink the hole (with a carving burr spun by hand in a pin vise) on the underside to make threading the blade easier.

## Working step by step

Even the most sophisticated double-bevel marquetry images are completed one piece at a time. If you are trying the technique for the first time, I recommend you start by making a small sample piece or two. The steps for making a simple test piece can then be applied to pieces in all shapes and sizes as you create a complex image. Here are the fundamental steps. I'll describe using a fretsaw, but nearly all the information applies just as well to the scrollsaw.

Draw a coin-sized shape on your background veneer, then place a sheet of contrasting veneer (the insert veneer) underneath and tape the two veneers together at the edges. Angle the top of your donkey (see drawing, p. 67) or the table of your scrollsaw to the appropriate bevel angle. In order to start the cut you'll need to drill a hole. With a #69 drill bit in a pin vise, drill a hole canted at the bevel angle. Then, with one end of the fretsaw blade fastened in the handle, thread the 2/0 jeweler's blade through the hole. Flex



## Forget your gallon bottle of glue.

An accordion applicator with a needle-thin tip delivers a precise ribbon of yellow glue to the edge of the insert piece. With the background veneer face down on the donkey (or another flat surface) press the inlay piece in place and then tap it in tight with a small hammer.

the frame so you can tighten the other end of the blade in the saw.

Move the workpiece and saw together into position on the donkey with the blade in the bird's mouth. The saw teeth should face away from you and the blade should be on the downhill side of the shape to be cut. Position the saw vertically.

Begin sawing clockwise around the shape, paying close attention to keeping the fretsaw frame plumb. If it relaxes away from vertical, the cutting angle changes and the fit won't be accurate. Keep the sawing within the bird's mouth and follow your pencil line. It's a lot to keep in mind but gets much easier with practice.

Guide the workpiece through the cut with your left hand and as the blade comes back around to the drill hole, carefully approach the kerf where you started sawing so the shape doesn't jog and draw attention to itself. For greater control, lengthen and slow the up and down action of the saw and reduce the feed rate of the workpiece. When you've completed the cut, unclamp the fretsaw blade and gingerly remove it from the workpiece.

## STRATEGIES FOR SUCCESS

Judging by the finished image, you'd think each piece was made and inserted at exact size. But for various reasons most pieces are glued in oversize and then sawn through for the later ones.

### OVERLAP AS YOU GO

*For clean joints, saw right through the prior piece. Stevens made the first feather intentionally overwide, then redrew the second feather's outline and sawed along it. He makes the second feather overwide as well, and repeats the process.*



### ADDING AN ACCENT

*With all the feathers finished on one wing, Stevens saws for the band of color that crosses them. He switches from dark to light veneer for the insert piece.*



### SKINNY LINES START OUT THICK

*The curving thin line along the lower edge of the bird's tail would be too fragile to saw out separately. So Stevens makes and glues in a far wider piece, then saws away all but a sliver of it as he cuts out for the tail feather.*





# Completing the panel

**Finish at the front.** To emphasize the illusion of depth in a marquetry image, inlay the parts farthest from your eye first, and overlap the parts as you go. On this bird, Stevens started the topmost feather on the far wing, and ended, here, with the accent band on the bird's near wing.



**Scrape and sand.** Stevens uses a card scraper to remove residual glue and scrape all the inserted pieces flat. He works both faces of the marquetry with the scraper, then follows with fine sandpaper.



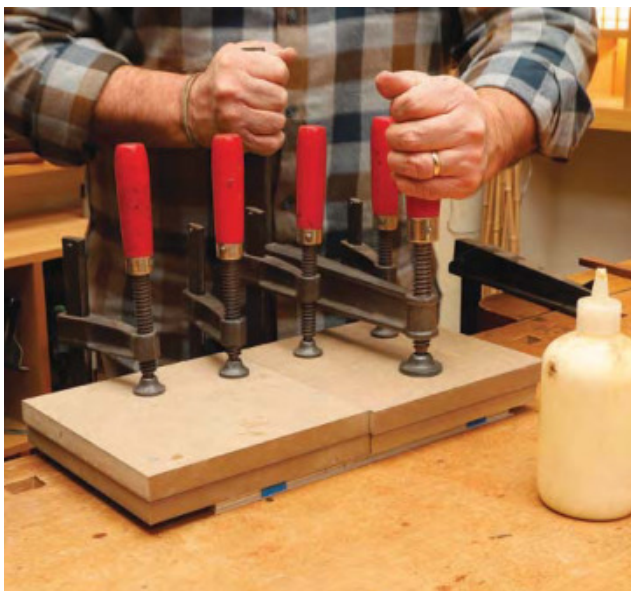
Turn the veneers over and release the two shapes you've cut with the press of a finger. Do this over the saw table or your workbench so you don't lose the small parts. Then remove the tape and press the insert piece into the opening in the background veneer. If the cut was clockwise, the saw was held vertically throughout the cut, the bevel angle was accurate, and the planets were in alignment, the insert piece from below will fit into the background veneer exactly. Glue it in place, tapping it home with a hammer, and you can immediately begin cutting the next piece.

Repeat the steps again and again and you'll have a nicely fitted marquetry project. Friends and family will be mighty impressed. □

Craig Vandall Stevens is director of the Philadelphia Furniture Workshops and the author of five books on woodworking, including *The Fine Art of Marquetry* (Schiffer, 2010).



**Glue the bird to a backing board.** After spreading glue on a plywood substrate, Stevens tapes the marquetry on top. With the blue tape keeping the marquetry from shifting, Stevens uses MDF cauls to spread the pressure evenly as he clamps the panel.



Inspiration for our readers, from our readers



## TIM BEIERLE

Roanoke, Va.

When a neighbor who was moving away asked Tim for a chest of drawers made from local lumber to take with her, he made this piece out of cherry sourced from the Blue Ridge Mountains in Virginia. He gave it a Shaker-inspired design because that's what she likes, and sized it to best fit her new space.

CHERRY, 21D X 40W X 47H

Photo: Adam Mikesell

## SAM GIBERSON

Gardiner, Maine

Sam was taking a workshop with Audi Culver and Ivy Siosi at Haystack Mountain School of Crafts when he made this coffee table. His design was inspired by the landscape surrounding the school, "from the water, to the rolling moss-covered terrain, to the angled architecture on campus." He split the top and elevated it off the base to give the illusion it was gently floating. He added texture along the angled sides of the top to inspire people to touch it.

ASH AND CHERRY, 16W X 32L X 16H

Photo: Chelsea Ellis



## RODNEY DIAZ

Southbury, Conn.

Riffing off the classic Shaker form, Rodney sized this wall-hung white pine cupboard to keep wine glasses and a few favorite bottled beverages close at hand. The outside is covered in white paint, while the interior glows from a washcoat of amber shellac. The maple knob and latch keep the contents secure, while a French cleat hidden behind the shiplapped back anchors the cupboard to the wall.

EASTERN WHITE PINE, 9¼D X 18½W X 37H





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# LAGUNA



## ABBIE NUGENT SMITH

Springfield, N.H.

During her first semester in the cabinet and furniture making program at North Bennet Street School, Abbie says, "I watched as three students in the outgoing class hustled to finish building a heartback chair each. They were beautiful, and mysterious, and I remember thinking 'I wonder if I will ever be able to build something like that?' And it turns out, I did." This was the last piece she completed as a student there.

MAHOGANY, 18D X 24W X 40H

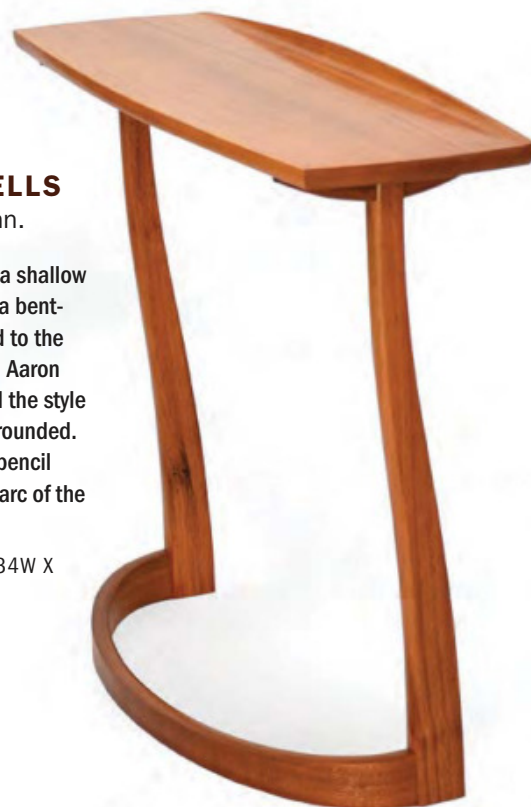
Photo: Lance Patterson

## AARON WELLS

Cookeville, Tenn.

Built for a client to fit a shallow alcove, this table has a bent-laminated base joined to the legs with bridle joints. Aaron says the client wanted the style to be minimalist and rounded. The top has a curved pencil edge that mirrors the arc of the front edge.

MAHOGANY, 11½D X 34W X 30H



## DOMINIC BAKER

Nelson, B.C., Canada

This bed was built for a friend and client who is an accomplished mountain guide and professional forester. "I wanted to combine our mutual love for trees, wood, and mountains into a piece of heirloom furniture," Dominic says. The influence of Greene and Greene was a starting point, as well as some mountain carvings Dominic had done previously. He carved these mountains from western white pine.

DOUGLAS FIR, LARCH, WESTERN WHITE PINE, WESTERN RED CEDAR, BLACK WALNUT  
84W X 74L X 47H

Photo: Blair Altman



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## JOSEPH HOLMES

Lincoln, Neb.

The story behind this cabinet is the story of a redwood board and a batch of scraps. When building a deck years ago, Joseph and a friend pulled a 14-ft. redwood board from the side of a house, cut it in half, and used it on sawhorses to hold tools and other stuff. "I kept it with me through half a dozen different shops, set up beside my bench. And in the summers I'd strap it to the roof of the Forester and go build fences and pergolas and stuff. I don't do much of that anymore, so I milled it down and built this cabinet." The drawer sides are Spanish cedar offcuts from a set of garage doors, and the Alaskan yellow cedar drawer bottoms are left over from a stint making pipe organs. The maple web frames are offcuts from another project.

REDWOOD, CEDAR, AND MAPLE  
10 $\frac{3}{4}$ D X 44W X 14H

Photo: Joseph Holmes/Terry Ratzlaff



## BRENDAN GAFFNEY

Athens, N.Y.

With a form based on Kentucky chairmaker Chester Cornett's "Two-In-One Fatman Rocker" and joinery and methods indebted to Jennie Alexander's style of green woodworking, this rocking chair was a complicated build. But it came together "without a hitch," Brendan says. He split out and shaped all the parts by hand from a section of log given to him by a friend.

BLACK AND RED OAK, 32D X 37W X 48H



## GARY HOFFMAN

Washington, D.C.

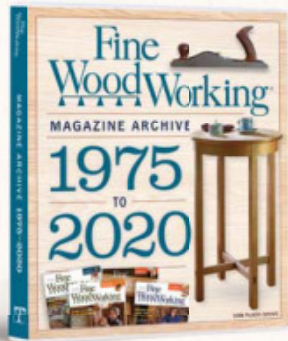
"My wife wanted a coffee table with a glass top, while I wanted a design that would be delicate with many curves," Gary said. He used wood that he had milled and kiln-dried from a large cherry tree on their property that had been damaged by lightning. The curves in the base, particularly the center circle, required some difficult mortise-and-tenon joinery. "I have made many woodworking projects over the years," Gary said, "but this is the most 'artistic' design I've tried (not an easy thing for an engineer)."

CHERRY, 14W X 34L X 20H



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## JACK SUTTON

Charlotte, N.C.

"We should remember to play from time to time, for the sake of it, even if it distracts us from more serious work," says Jack. That philosophy inspired this record player console. "The colorful circles are meant to represent the crackle of your favorite vinyl record or the bubbles in champagne," he says. He used a mixture of stains and dyes for the darker sections of the case and blended shades of milk paint for the colors. The console has storage space for about 100 records in addition to the player and spare parts.

RECLAIMED MAPLE, OAK, AND HICKORY PALLET WOOD, PLYWOOD  
16D X 32W X 22H

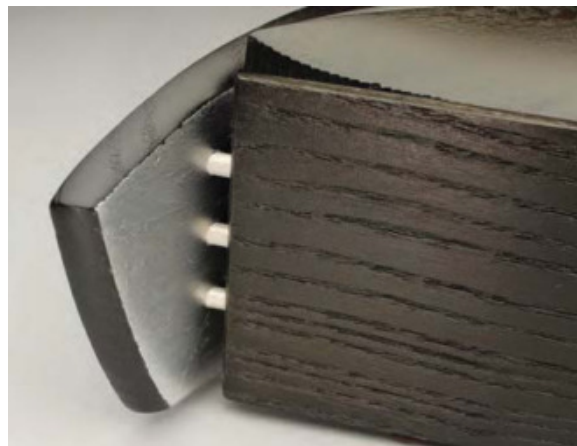


## KELLY PARKER

Parkville, Mo.

Made to house the ashes of a client's beloved pet, this box is designed to resemble, when viewed from above, a pet with its tail wrapped around its body. The body of the box is a single piece of steam-bent ash, sandblasted to produce a texture reminiscent of fur. The top and bottom are quartersawn sycamore, chosen for its contrasting texture. The interior is gilded with silver leaf, so thin that you can see the grain lines beneath it. The pins are aluminum dowels.

EBONIZED ASH AND SYCAMORE, 6½D X 11½W X 3H



## PETE RODRIGUES

Durham, N.C.

The goal of this design was to blend contrasting wood tones, mixed curves, clean lines, live edges, and cantilevered shelves. A live-edge piece of walnut, used for one shelf, dictated the overall width of the unit. The tall vertical curved piece provides stability with its width and a spine for the cantilevered shelves. The cabinet on the end adds function and form.

WALNUT AND MAPLE, 16D X 72W X 82H

Photo: Eliza Stewart



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## My gift is my craft

BY PHILIP MORLEY

I have dyslexia. It has taken me a long time to be able to say that without a feeling of shame. This sense of shame was developed early in my life and was reinforced many times through early adulthood. As a kid and teen, traditional schooling felt closed off to me in a way I couldn't control. As a result, traditional life routes felt closed off, too. The system always seemed to be working against me. Woodworking offered me the first visible path forward. And I sincerely believe that this is a path everyone deserves to have available to them.

Dyslexia is a language-based learning disorder that affects areas of the brain that process language. It shows up differently in different people, but for me and many others, it makes reading, writing, and even speech a constant struggle. The root of the problem is

*For the first time, I was told I was good at something,  
and that was all I needed to truly thrive.*

the way my brain is wired, making the connections necessary for reading and writing very difficult.

The schools I attended as a child in England had no idea how to approach my dyslexia. My teachers simply assumed I was lazy or stupid ... and therefore, so did I. They tried to drill reading and writing into me, believing that if I just worked hard enough everything would eventually click.

Not surprisingly, by the time I reached my teen years I had a pretty bad attitude. I was short-tempered, frustrated, and easily offended. Eventually, I was expelled because of my tendency to lash out physically when teased. This expulsion turned out to be a blessing.

My next school focused on special needs students and behavioral problems. Although it did little for my dyslexia from an academic standpoint, this school taught me valuable lessons. Watching the struggles of other students helped to shift my perspective on my own struggles. I found that I could be helpful to others. The teachers there helped me to realize that I had value, even if reading and writing remained elusive.

But old habits are hard to break, and I ended up involved with a group of local teens who did not always make the best decisions. I found myself in serious trouble. During a sentencing for driving a stolen vehicle, a judge saw past my poor decisions. She decided not to send me to a juvenile detention center, but gave me a lesser sentence and encouraged me to focus on a trade school.

Trade school was where my life

turned around. For the first time, I was told I was good at something, and that was all I needed to truly thrive. After I had finished initial projects early and well, the teachers started challenging me with more advanced assignments. They believed in me, and I rose to the occasion. I now know that the same wiring that made it so difficult for my brain to process words made it easy for me to process structures and visualize design and construction.

I finally found my calling. Yes, I worked hard at it and it became a passion, but I can't deny the luck involved. England had a solid network of trade schools. If it hadn't, I could have ended up in juvenile detention



instead of pursuing my vocation.

I have since learned that in Texas, where I live, 80% of prison inmates are functionally illiterate and almost double the percentage of inmates suffer from dyslexia as the general population.

In recent years, decades after all my difficulties in school, I've been teaching woodworking around the country. It's been a wonderful experience. At first, old insecurities crept up. I was terrified of having to write something in front of a class or of any expectation for those assumed skills, so I shut down any offers to teach. What business did I have in the front of a classroom? My reading and writing skills made me timid. But just as there's more than one way to learn, there's more than one way to teach, and I have plenty to share. So I ask students to write on the board when necessary, and I handle the rest. I have learned to embrace the gifts I have and spend less time regretting those I don't.

With this newfound self-assurance in hand, I have an eye to the future. My experience as someone with a learning disorder who ended up in the criminal justice system is far from unique, but the opportunities to escape feel rarer these days. I'd love to open up woodworking classes for kids and adults with dyslexia. My gift is my craft, and just as bits of luck helped me turn my life around, I'd love to share that gift with others in a similar situation. □

*Philip Morley makes custom furniture  
in Wimberley, Texas.*



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## Kimono Cabinet

Sometimes the cabinet design arrives first for Craig Vandall Stevens, and he'll create a marquetry pattern to suit it. Other times, as with this jewelry cabinet commissioned as an engagement gift, the marquetry leads. Stevens, who studied art in Ohio and furniture making in California, often uses sand shading and a process of overlaying adjacent elements to produce a compelling illusion of depth in his marquetry images (turn to p. 66 for his article on these techniques). But for this piece, which was inspired by the depiction of cherry blossoms on an antique Japanese kimono, he worked without shading or much overlay, aiming for a flatter, more stylized effect. The vertical format of the cabinet suggested itself as the right canvas for hanging branches. And the red gum veneer that Stevens sawed and matched around the cabinet presented a dramatic background for the holly, satinwood, and hornbeam blossoms and a suggestion of movement, perhaps rainfall, behind the branches.

—Jonathan Binzen

