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Product Weight	7.8lb
Angle Adjustment Range	0° - 45°, left and right
Pendulum Mode	Yes - 3-Stage
Dust Extraction	Yes
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Monday nights just got a little tastier. Kick off the season with this clever snack server that's sure to please any football fan.
- 36 **Teaching Table**
Yep, build this table, and you'll learn mortise-and-tenon joinery, leg tapering at the table saw, shaping curved components, correct glue-up procedures, and more.
- 44 **Build a Box Guitar**
Wood never sounded so good! This fresh interpretation of a cigar box guitar contains some fine joinery and plenty of other features that a musician will love.
- 58 **Compact Clamp Cart**
Turn a sheet of ¾" plywood and a half-sheet of ½" plywood into a roll-around clamp corral with shelves for your other shop essentials.

Tools & Techniques

- 30 **10 Tips for Better Table Tops**
A table's top is its starring component. Here's some great advice to make sure that it plays its lead role to perfection.
- 54 **Flame Finish**
Shou sugi ban is woodburning at its most exotic. Who would have thought that torching and brushing oak would create a luxuriously textured surface that's resistant to water, bugs, and even fire!



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Contributors

When not teaching woodworking classes, Rob builds custom furniture at the Lohr Studio, in Schwenksville, Pennsylvania.



If you've been reading the magazine, you've seen **Rob Spiece** share his expertise on making small boxes, flattening slabs, recovering from woodworking mistakes, and more. This issue's contributions (Flame Finish, p. 54; Teaching Table, p. 36, 10 Tips for Better Tabletops, p. 30) are further evidence of the woodworking (and writing) talents that Rob continues to cultivate at the JD Lohr School of Woodworking. Outside the shop, Rob has taken up a new activity with kids Sid and Laura: fishing. "We've been out about 10 times so far," Rob says. He also enjoys hanging out with wife Andrea, and tearing up the racquetball court with anyone who wants to play an opponent with workshop-strengthened forearms.

The football cutting board on page 26 comes from an impressive collection of man-cave projects that designer/woodworker **Jim Harrold** has developed since retiring as editor of *Woodcraft Magazine* three years ago. Jim sells his creations through galleries in Hawaii, where he likes to vacation.



Jim's writing and editing career began in the early 1980s, when he joined Better Homes & Gardens Meredith Corporation to produce a series of DIY books and magazines. Later, he became the Executive Editor of *WOOD* magazine, and then joined Woodcraft LLC to head up its woodworking publication. When he's not designing or building an original project, you'll catch Jim on a Kona fishing boat in hot pursuit of an Ahi (yellowfin tuna) or marlin.

Jim hauled in this 105 pound Ahi on a recent trip off the Kona coast. Poké anyone?



Doug (far left) teaches box-making skills across the country. This one took place last summer at the Connecticut Valley School of Woodworking.

"My dad bought me a used ShopSmith™ for my 14th birthday," says **Doug Stowe** (Box Guitar, p. 44). "I turned pro in 1976. Between furniture commissions, I made boxes to keep busy. My first box guitars were made with students at the Clear Spring School, in Eureka Springs, Arkansas."

Today Doug continues to teach woodworking in the Clear Spring School, and at craft schools and woodworking clubs throughout the country. He's authored 12 books (including his latest "Box Maker's Guitar Book"), several DVDs, and dozens of articles on woodworking and education. Doug lives on a forested hillside in Eureka Springs, Arkansas. ■

On the Web



Extra extras. This issue is packed with bonus content. We have projects, techniques, patterns, and templates for just about everything in the issue. Check out our website to read the extras online, or download a free PDF. There's even a video of Rob's flame finish in action.

Survey Says!? Well, actually, that's up to you. Check out our online survey to give your opinion, and let us know how we're doing. All you have to do is go to woodcraftmagazine.com. You'll see the survey link at the top of the page. It takes only a moment to complete, and your answers will help shape the content of your favorite woodworking magazine. (That's us, by the way. Right?) ■



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Table matters

A few years ago, I took the “Practical Woodworking” class at The JD Lohr School of Woodworking in Schwenksville, PA. At the end of the week, I had a nice-looking table for my home and a wealth of knowledge for my shop. The curriculum touched on just about everything from how a tree grows to how to apply a finish. I gained valuable experience and made fast friends with the instructors and my fellow students.

My instructor Rob Spiece wrote the article on page 36. You can build the same table at your own pace and in the comfort of

your own shop. Essential skills like laminating legs, creating mortise & tenon joinery, and making a table top (p. 30) are inherent in the table's construction.

Making the table top was a hard-won lesson for me. My top was dead flat and looked perfect until I sliced through a biscuit while crosscutting to size. The fix? Make a smaller table. I sliced sliver by sliver to keep as much length to the

top as possible. And then I had to resize the long aprons and recut their tenons, but the table turned out great in the end.

Former staff designer Shayne Hiles and I both earned a spot on the school's instructively entertaining Wall of Shame. Me for my biscuit blunder, and Shayne for gouging his top. I learned my lesson,

and never made that mistake again.

Taking the class was an enriching adventure, so it was fun to stroll down memory lane as we produced this story. It's been years since I built the table, but the skills I learned have proved useful in many other projects. I encourage you to check out

the story even if you know these basics, as it could be a good refresher course. And who knows? You may learn a new way to tackle a certain technique, opening yourself up to new ideas that you can take to *your* shop for your next project. ■



Wall of Shame. My buddy Shayne and me accepting our mistakes and our place on the wall.

Chad McClung

Share your ideas.

We love hearing from readers! And there are all kinds of reasons to get in touch with the crew at *Woodcraft Magazine*. Check out the details below.

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Email us at tips@woodcraftmagazine.com and put “Tips & Tricks” in the subject line or visit woodcraftmagazine.com, and click on Contact.

Important: Please include your phone number, as an editor may need to call you if your trick is considered for publication.

Have a tough woodworking question?

We'll do our best to find the expert and provide the answer. Email us at editor@woodcraftmagazine.com and put “Expert Answers” in the subject line.

News & Views:

This catch-all column is where we do our best to correct mistakes, publish feedback from readers, and share other noteworthy news items. It's easy to participate in this discussion. Just email us at editor@woodcraftmagazine.com and put “N&V” in the subject line.

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Share photos of your projects:

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magazine

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Jory Brigham

Making modern furniture, with nostalgic aspirations



West Coast furniture maker and woodworking teacher Jory Brigham has a modern take on nostalgia. He designs pieces with mid-century flair and the idea that furniture should last. And Jory believes that anyone can find their individual style. You just need to do two things: Work with your hands and don't let adulthood erase the creativity, curiosity, and energy you have as a child. Although he grew up in a family full of craftsmen, Jory still managed to cut a swath all his own, creating an impressive variety of furniture collections that have attracted clients from all over the country. Remarkably, Jory also finds time to teach woodworking classes at his workshop in Paso Robles, California. I had the opportunity to visit with Jory, and meet his wife Alison, daughter Parker, son Bozley, and a menagerie of pets that include snakes, chickens, lizards and other critters. Here are some highlights...

—Lori Harper

WM: Three words to describe Jory Brigham?

JB: Stubborn, driven, and...difficult.

WM: Describe your design aesthetic to someone who's never seen your work.

JB: Well, I can only tell you what I would hope it is. I hope my designs stir emotion. Whether it be curiosity, comfort, happiness, or my favorite, nostalgia. I try to include different styles, eras, and even cultures into my pieces. I love to hear people say that my designs remind them of their grandparents' furniture. That was back in the day when people bought furniture with an intent to hand it down to their children. They weren't scared to invest in something that would be a part of their family for generations.

WM: What's the one thing you wish people knew about making furniture?

JB: If you truly love woodworking, part of your soul goes into every piece you make. There are so many different approaches to furniture making. Everybody does it differently. That's how you get one-of-a-kind creations.

How much of one's self can go into a piece of furniture made on a CNC machine or by a robot?

WM: What makes working with your hands so satisfying?

JB: That is a deeper question I am not really capable of answering. I can only say that it is fulfilling to create a tangible piece that affects the people around us. Working with your hands can be an opportunity to create something unique from your whole being – physically, mentally, and emotionally. That's rare these days.

WM: What're the best and worst things about teaching woodworking classes?

JB: The best thing is the people we meet at the school. And I love the different ways that the class impacts my students and gets them creating. Getting people to think in a non-conventional way is so cool. The worst thing is the huge mess that we make in class.

WM: What kind of people take your class?

JB: We get men and women ranging in age from 17-70. Some students are cabinetmakers looking



onlineEXTRA

Visit our website and click on onlineEXTRAS for more of my conversation with Jory.

—LH.



to learn new techniques, while others are just getting started as woodworkers. We also get a lot of people from Silicon Valley—computer engineers and computer programmers. I never knew there was such a correlation between that kind of work and woodworking.

WM: What advice would you give your younger self?

“Thinking like an adult can kill your imagination and slow your growth as a designer and craftsman.”

JB: Don't be in a hurry to think like an adult. Thinking like an adult can kill your imagination and slow your growth as a designer and craftsman. And you may garner the wrong lessons from otherwise helpful experiences. The thing that saved me is that I took forever to act like an adult. I still have trouble recognizing things I should be afraid of. And it takes me far too long to learn my lesson. Being naive and stubborn kept me thinking that someday I would do what I loved, even though I didn't know how to get there. If I had

known how hard it was going to be to make it as a professional woodworker, I may have just quit.

WM: What does it sound like when you're alone in your shop?

JB: Peace.

WM: What task seems never-ending?

JB: Sanding.

WM: What is one thing you allow yourself to spend money on?

JB: Tools. ■



See Jory's furniture line at www.jorybrigham.com.
To sign up for classes, go to jorybrighamworkshop.com.

Mistakes make us great

I wanted to compliment you on your editor page "Getting Sharp" (page 6, June/July 2018, issue 83). I am retired and can relate to every word. I can also most certainly relate to the Wood Filler article, called "Great Mistakes," on page 72. The two articles tie together nicely.

I am sure there are millions of woodworkers who feel as I do: If I could make one piece of furniture without a mistake, it would be a real miracle. I didn't realize until I read the article what a mistake, along with an ingenious fix, could mean to me. Robert Spiece did a masterful job in making me feel like one of the best woodworkers in the world.

I have now decided to start a business of making mistakes and finding the fix. That way I will always make the perfect piece of furniture. The only thing I haven't figured out is how to keep people from feeling dumb for making another stupid mistake. Every time I mess up, I think, "How could I do such a stupid thing as that?"

From now on when I make a stupid mistake, I will yell aloud, "Fantastico!" Then I will spend the necessary time plotting some ingenious plan to fix it, and none will be the wiser until I brag about how I did it as pointed out in Robert's article. Thank you for such an uplifting way to call attention to the mistakes we make and what they really do for us.

—Robert Lafferty, Munfordville, Kentucky, via email

Rob Spiece replies:

I'm glad the essay struck a chord. There's certainly no one among us who can't relate.

Maybe take a beat before you dive head first into your best mistakes. Rather than elation, I encourage you to continue with the familiar feelings of rage and disappointment after screwing something up. That "stupid" feeling we get is essential to turning the mistake into a learning process, so I don't think we want to lose that. Save your exclamation of "Fantastico!" until your problem is solved.

Thanks so much for the note...I think I'll spend a few moments "reveling in my own genius"!



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Hearing aid protection

While reading the Aug/Sept 2018 issue, I saw the letter from a reader concerning hearing aids and working in the shop. You requested suggestions from your readers, so I am submitting mine.

During service in Vietnam, I lost the high frequencies in my left ear. Thanks to the VA, I have two wonderful digital hearing aids. When I retired and began working daily in my shop, I too was concerned about doing damage to my hearing aids, especially when operating my thickness planer. I used to wear shooter's headsets, what we called "Mickey Mouse" ears in the military. They worked but they were hot and blocked out all noises, so I couldn't hear the phone or my wife.

Last year I purchased a set of noise-canceling headphones, and that did the trick. Now I can keep my hearing aids in, hear the shop sounds, and even answer my cell phone while wearing the headphones. It was the perfect solution for me and I hope it will help someone else.

—Michael J. Schofield, via email

Senior Editor Joe Hurst-Wajszczuk replies:

Thanks for writing, and most importantly, thank you for your service to our country.

There's a lot of truth to the saying, "If it works for you..." however, it's important to point out that "noise canceling" is not the same as "hearing protection."

There are dozens of products that claim to be "noise canceling" but do not carry an ASTM rating. These products might be great for plane trips or listening to music at the gym, but woodworking is a different situation. Believe it or not, some "noise canceling" headphones can exceed safe-listening thresholds while playing music, actually contributing to hearing loss.

To work effectively in a workshop situation, hearing protection must have the ability to instantly block out loud noises (e.g. the shot of a pneumatic nailer or the scream of a router). Otherwise, you might be causing damage every time you pull a trigger or flip a switch. The device must have this ability in addition to its digital technology. That way, it can provide protection even when the battery is dead. ■

Turn for Troops celebrates 15 years of giving

Volunteers and Woodcraft employees have turned more than 160,000 wooden pens for the *Turn for Troops* program, which celebrates its 15th year in 2018. Those pens have been sent to U.S. military personnel on active duty and recovering in rehabilitation centers, along with personal notes from the turners. One major responded, "Thank you from the bottom of my heart. It is Americans like you who make old soldiers like me proud to serve."

In continued recognition of our troops, pen turning events will be held at most Woodcraft stores over Veterans Day weekend, November 10-11. No experience is necessary to participate; folks of all ages are welcome to join in this event for our military forces. All you need is a desire to say "thank you" to a servicemember.

—Lori Harper, Special Projects Manager for Woodcraft, LLC



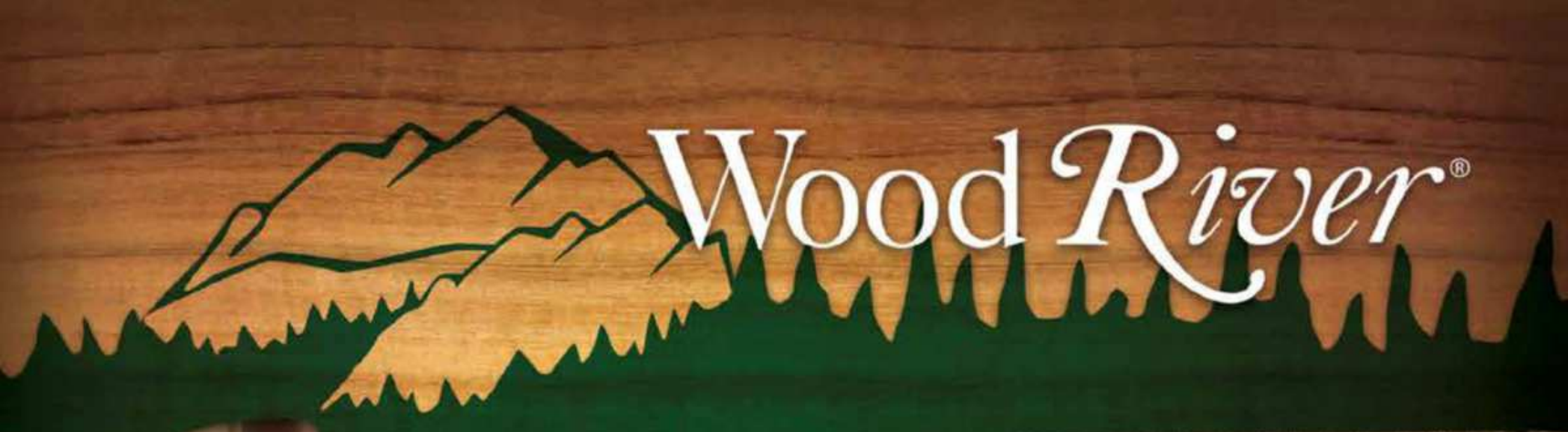
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Clamp with a new twist

Bessey GearKlamp

Traditional F-style clamps are a fixture in most woodshops for good reason. Thanks to their stone-simple design, these clamps reliably deliver pressure wherever it's needed—most of the time. Whether you own a few clamps, or your collection numbers in the dozens, odds are good that you've encountered a few situations where the handle got in the way. With their new GearKlamp, Bessey has found a clever way around the problem. By repositioning the handle on the steel bar, they've created a clamp that can reach

into spots where others can't.

To eliminate the traditional handle with its threaded screw, Bessey managed to hide a geared drive in the clamp's bottom jaw. To apply clamping pressure, you make your initial adjustments by depressing the release button and sliding the moveable jaw against your workpiece. Then twist the handle to advance the jaw pad, which has a $\frac{3}{4}$ " throw.

The clamp operates very smoothly. Applying pressure was easier, in fact, than with my smaller-handled F-style clamps, and much easier than

Overview

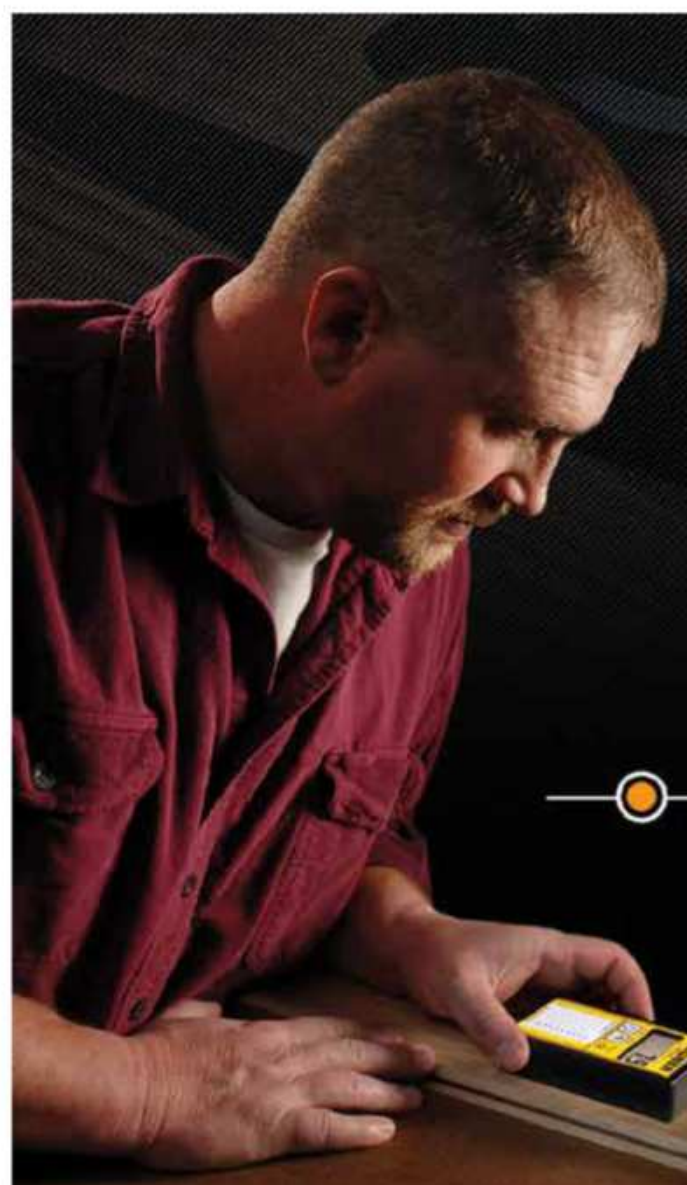
- Available with 6-, 12-, 18-, and 24"-long bars.
- $2\frac{3}{8}$ " throat depth
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- Retail price ranges from \$15.97 to \$24.97

with one-handed trigger-style clamps. And despite the internal gear mechanism, the GearKlamp weighs only slightly more than its cast-metal counterpart. This is probably because the jaws are made from a fiberglass-reinforced composite.

GearKlamps cost $1\frac{1}{2}$ to 2 times more than traditional F-clamps, but I suspect that, like me, most woodworkers would consider this a reasonable upcharge for a clever solution to difficult clamping problems.

—Tester, Joe Hurst-Wasjszczuk

Button releases jaw.

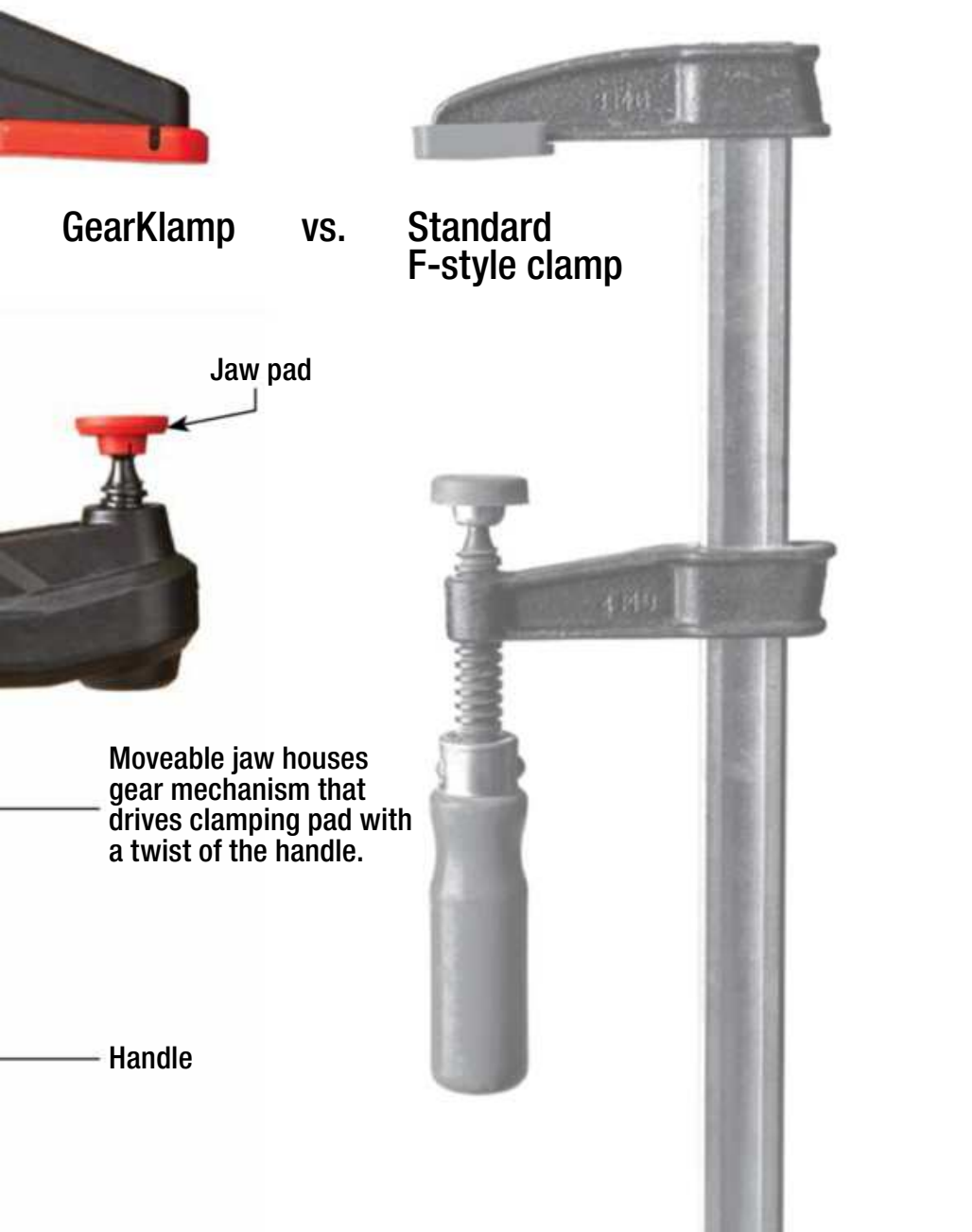


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The advertisement features a background image of stacked wood slabs and a pile of cut lumber in the foreground. The Cook Woods logo is prominently displayed in the center.



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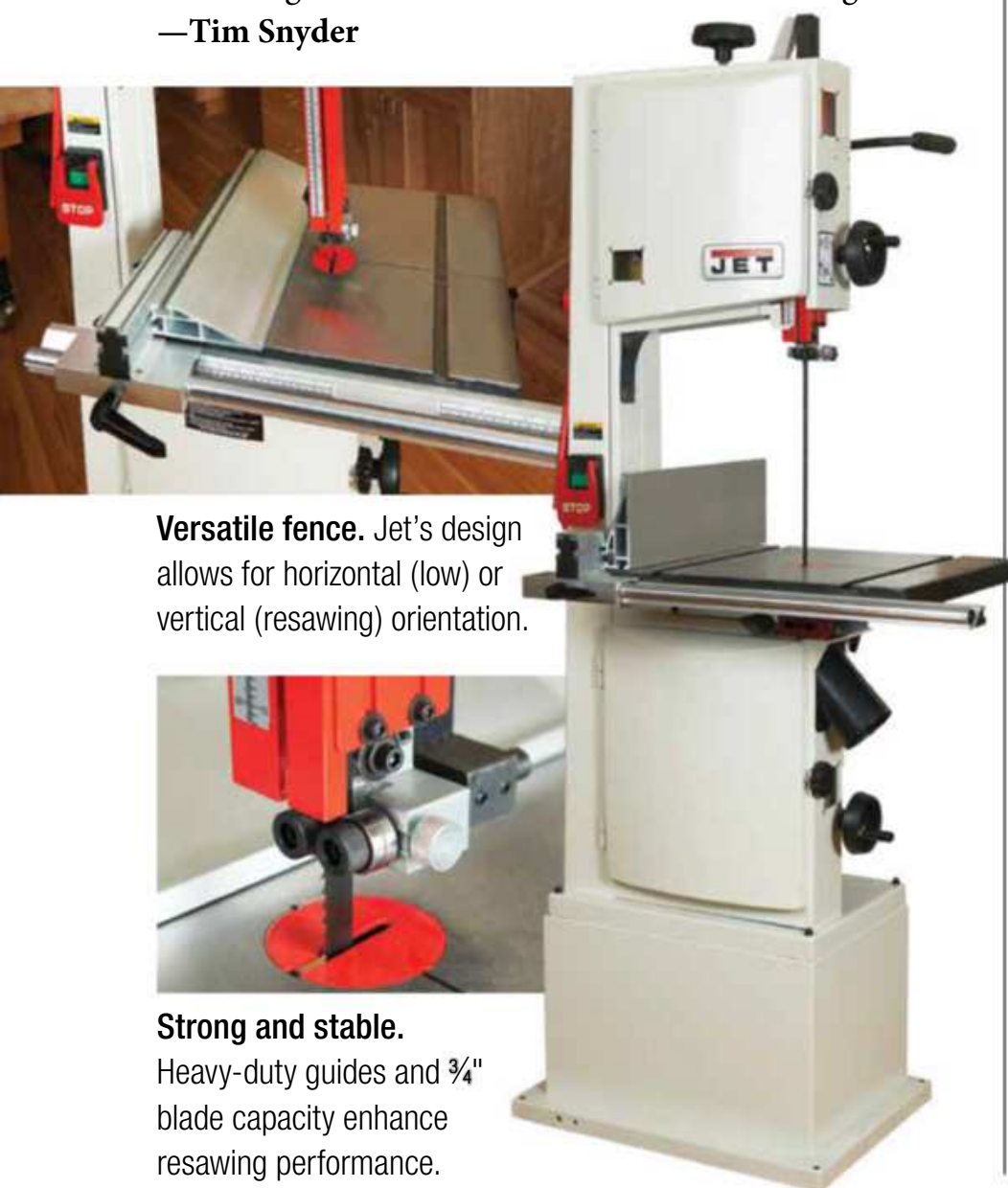
FIRST LOOK

New bandsaw is a heavyweight contender

Jet model JWBS14-SFX

Jet's new 14" bandsaw enters a tool category with a large number of competitive models. But this saw has some innovative features that woodworkers will appreciate, especially with regard to heavy-duty resawing. For starters, there's just over 13" of resaw height, and the saw can accept $\frac{3}{4}$ " blades. Independently adjustable upper and lower ball bearing guides provide excellent blade stability, while an enclosed base and heavy-duty tubular steel construction provide plenty of mass; the saw weighs over 300 lbs. Jet's product design team made room for an oversize table (17" $\times$ 21½") to handle large work, and a re-engineered trunnion system that makes it easy to tilt the table for angled cuts. A pair of 4" dust ports helps to maximize dust extraction. The saw comes with a top-quality miter gauge and an aluminum fence that can be used horizontally or vertically (like the old Delta Unifence). The 6"-high vertical mode is excellent for resawing. ■

—Tim Snyder



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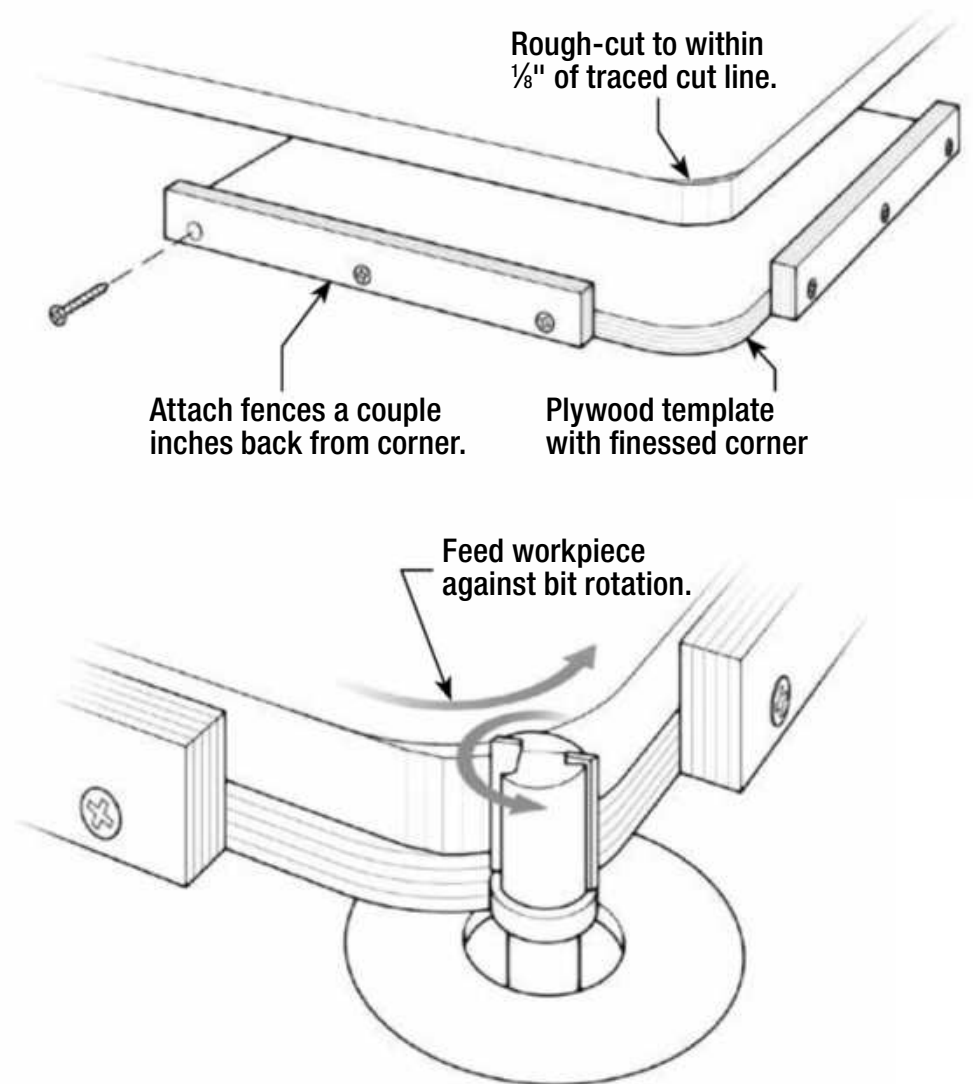
TOP TIP

A quick corner rout

When making shelves and small table tops, I like to radius the corners for both aesthetics and safety. I find that the most efficient and consistent way to do it is using a template on a table router outfitted with a flush-trim bit. A pair of fences on the template allow for quick, accurate positioning of the workpiece. Make the template from a piece of $\frac{1}{2}$ " hardwood plywood, shaping one of the corners as desired with a jigsaw or bandsaw. If necessary, smooth and fair the profile by filing and/or power-sanding. Attach two fences as shown, keeping them back from each end of the curve by a couple of inches so they don't impede bit travel.

To shape your workpiece, first trace its corners using the template, then saw to within $\frac{1}{8}$ " of the line. Install a flush-trim bit with a shank-mounted bearing into your table router, and adjust the projection of the bit so the bearing contacts the pattern. Holding the workpiece firmly against the template fences, trim the corner to shape, making sure to move the workpiece against the rotation of the bit.

—Marvin Mertz, Baton Rouge, Louisiana



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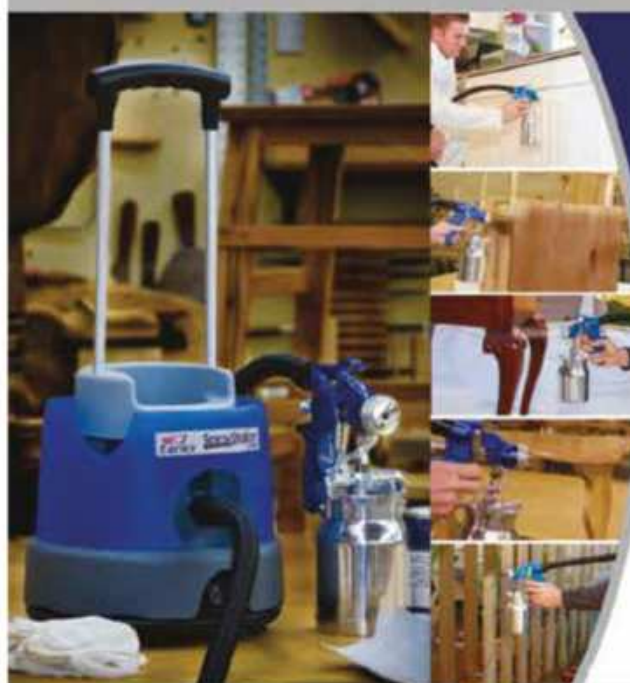
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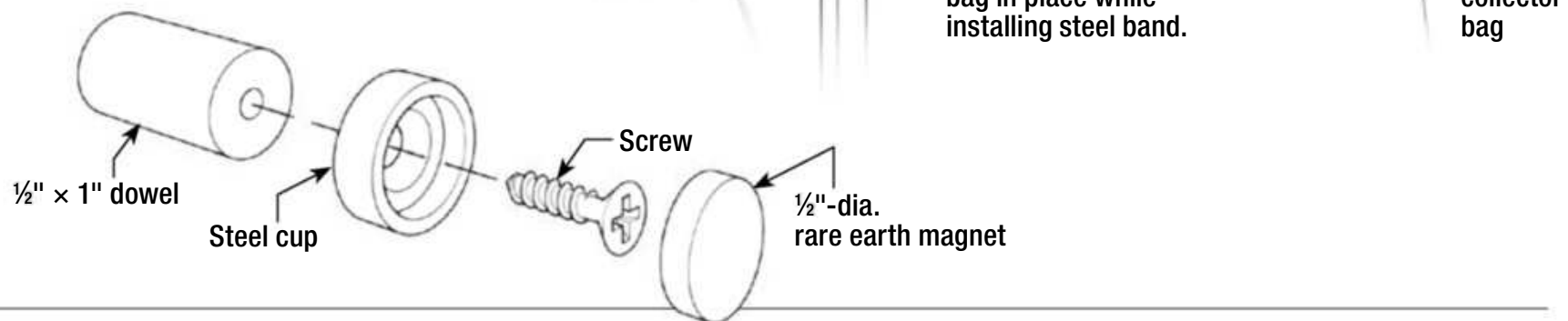


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Mags to hold bags

Changing the bag on my dust collector always made me wish I had four hands—two to hold the bag in place, and two to replace the metal holding strap. Since I'm unlikely to grow an extra set of mitts, I decided to put a couple of ½"-diameter rare-earth magnets into play for the job. I screwed commercially available steel cups to the ends of short dowels to hold the magnets in place. They temporarily hang the bag in place while I apply the strap. Works great!
—Ed Williams, Makawao, Hawaii



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Morse taper as jam chuck

Here's an easy way to make custom-sized dowels on a lathe using squared stock that's too small to hold with a spur or jawed drive chuck. Just remove the chuck, and use the Morse taper in the drive spindle as a jam chuck of sorts. (A #2 Morse taper will snugly accommodate a 5/8"-square blank.) Push one end of a wannabe dowel into the tapered recess, center other end on the tailstock, and turn.

—Mikey Panicky, Ventura, California

Microfiber grain detector

With certain woods that lack distinct graining, it can be difficult to gauge which direction to plane in order to prevent tearout. In these cases, I've found that dragging a microfiber cloth on the surface is very helpful. With most woods, there's a noticeable resistance when the cloth is pulled against the slope of the grain. So, whichever way the cloth moves easiest, that's the direction you want to move the cutter.

—Thomas Moss, Bradenton, Florida

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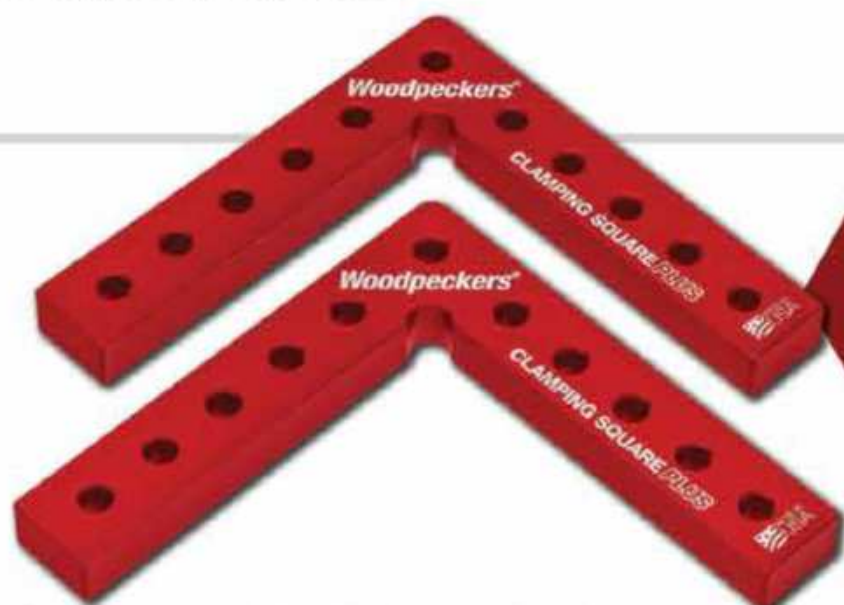
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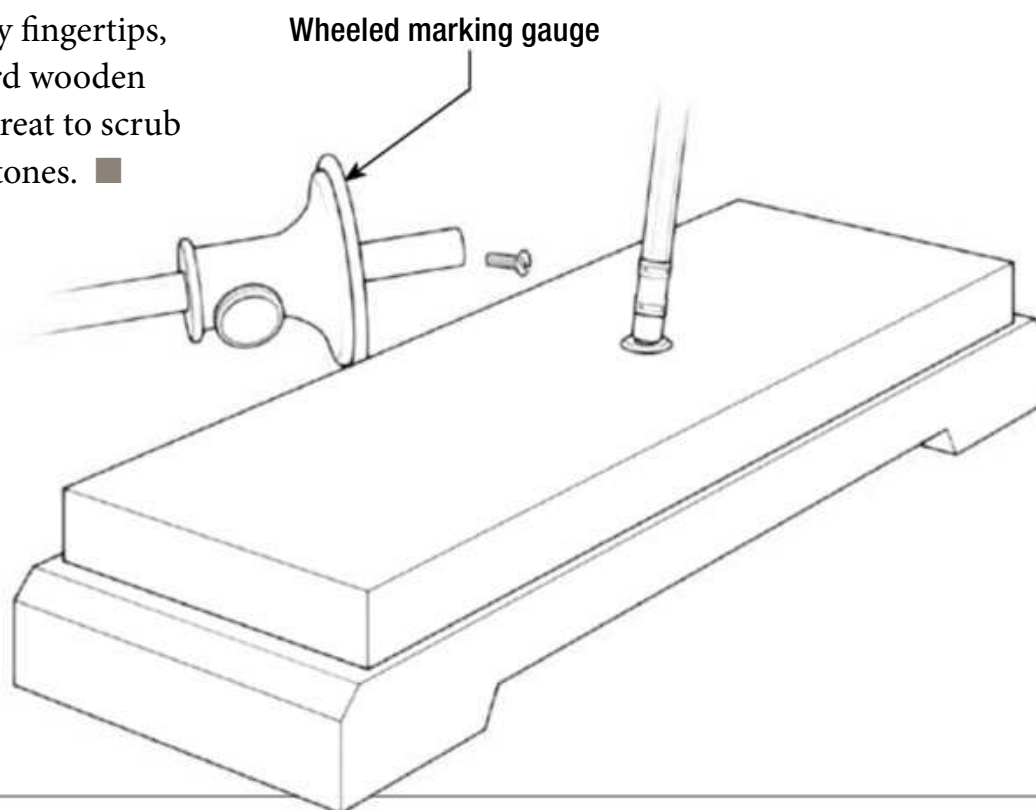


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Marking gauge wheel sharpening

I love my wheeled marking gauge but, like any other cutting tool, it needs occasional sharpening to work effectively. The darned wheel is so small, though, that it can be hard to hone. After abrading my fingertips, I discovered that a standard wooden pencil with eraser works great to scrub the wheel on my honing stones. ■

—Mark Hassleblad,
Los Angeles, California



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Score Big with a FOOTBALL CUTTING BOARD

Earn extra points on game day with this special server.

By Jim Harrold

With a little bit of walnut and maple, you can craft a cutting board that's sure to be a big hit with any football fan. Cutting the cross stitch slots in the joining halves of the football blank involve a technique that is similar to making finger joints, and the nifty trick for bending and applying the maple stripes allows the walnut football shape to expand and contract without restriction. Now let's give this project a proper kickoff.

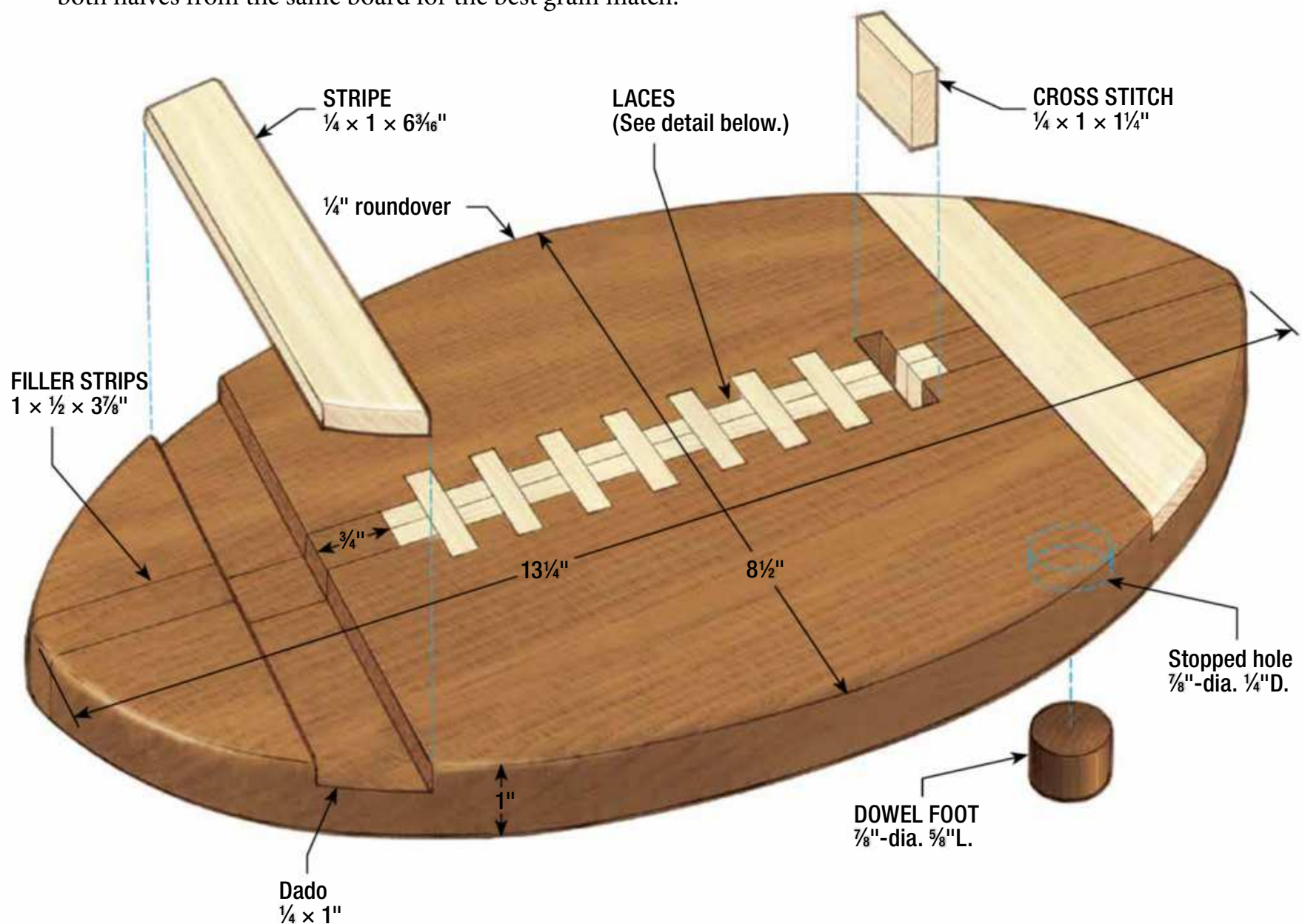
Order of Work

- Glue the lace strips and spacers to one half, and lay out the cross stitches.
- Cut slots for the stitches, glue the halves together, and tap the stitches in place.
- Make the stripes and lay out the football.
- Shape the football and add the feet.
- Load it up with tasty snacks, and enjoy the game.

Two halves, with cleverly cut notches

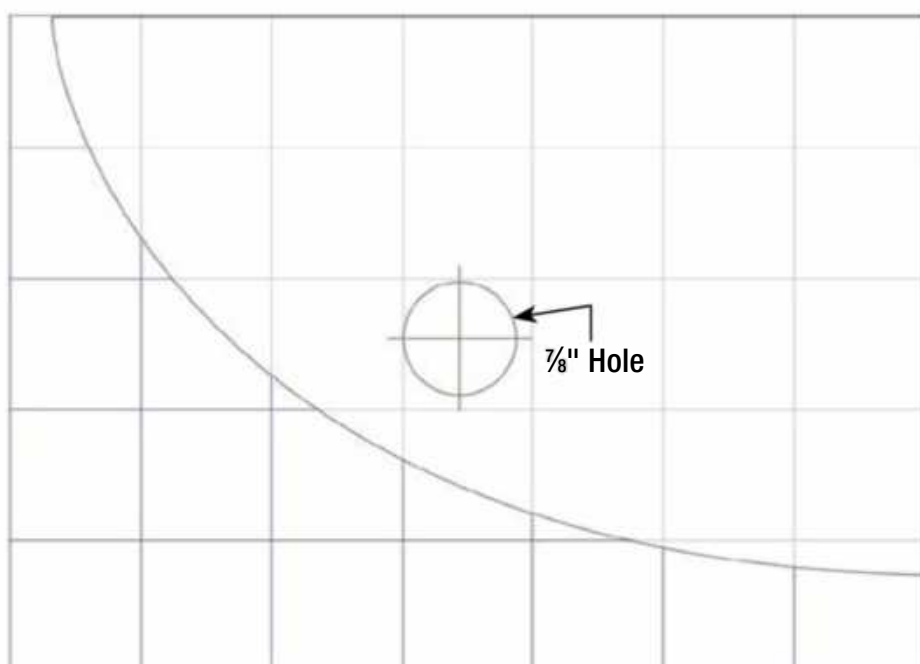
The iconic football shape is created using walnut for the football and maple for the stitches and stripes. For stability and looks, I used riftsawn stock with straight grain as opposed to the cathedral grain of flatsawn boards. I cut both halves from the same board for the best grain match.

Each half is notched at the table saw to make the cross stitches, and then glued together. Shallow dadoes on the top make room for the stripes. The feet are cut from a walnut dowel rod.

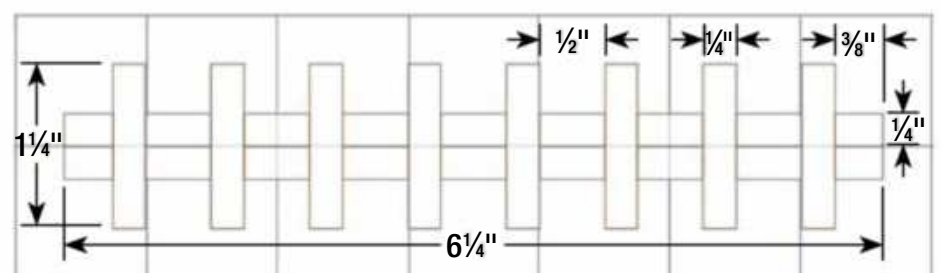


Half-Size Patterns

Quarter Football



Laces and Stitches



1 square = 1"



onlineEXTRA

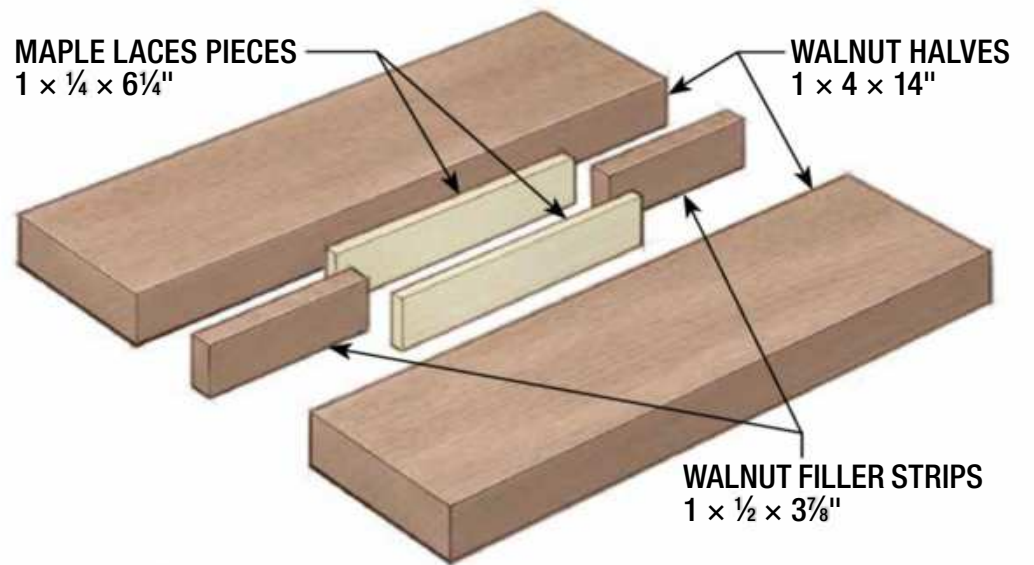
For full-sized drawings of the template and laces and stitches pattern, go to woodcraftmagazine.com.

Add lengthwise stitches to one walnut half, then cut notches for cross stitches

Plane a 5 × 30" length of walnut and a 2 × 12" length of maple to 1" thick. From this stock, rip a ½"-wide length of the walnut for the filler strips, and two ¼"-wide lengths of maple for the laces. (This will mimic the fine seam of the laces on an actual leather football.) For safety and accuracy, I used a featherboard at the table saw using a zero-clearance insert.

Now lay out the slots for eight cross stitches. Tape together the halves keeping the ends flush. Mark four cross stitches on each side of a cross grain centerline. These slots require two separate cutting sessions at the table saw. Once all the slots are cut, glue the halves together. Then cut and install eight cross stitch pieces.

Make the football blank



Shallow slots in both halves. Install a ¼" dado set in your table saw and set the cutter height at ⅜". Put the halves together with double-stick tape, making the ends and inside edges flush. Attach a wood auxiliary fence to your miter gauge to eliminate tearout. Align the slot layout with the cutter, clamp, and cut.



Deeper slots in the wider half. Separate the halves from each other and raise the cutter to ⅞". Now, finish cutting the cross-stitch slots in the wider half that contains the lengthwise lace parts, registering on the slots cut earlier.



A rectangular football. Use the 1"-wide cross-stitch pieces as indexing keys to ensure precise alignment. Once fully clamped and aligned, remove the keys to prevent them from being glued in place. Use moistened cotton swabs to remove glue in the slots. Finally, glue in place the cross stitch pieces and sand them flush when dry.

Stripes, curves, and finish...Touchdown!

Lay out the football's 1"-wide stripes $\frac{3}{4}$ " from the end of the laces. Extend the lines onto the edges to align the dado cutter, and cut the dados as shown.

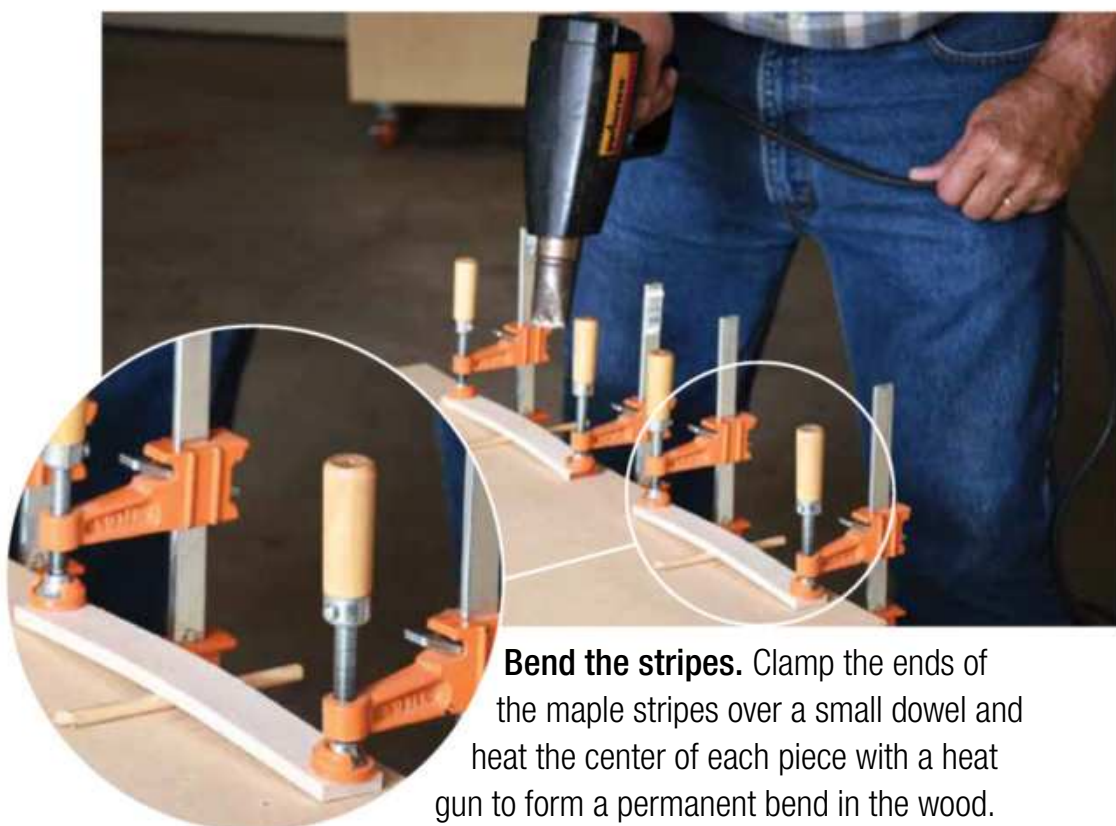
Size two pieces of maple to fit the dados. I give the stripe pieces a permanent bend along their lengths and apply glue to only the middle two inches, clamping the concave

faces into the dados. The pressure created by the bend keeps the stripes' top faces flush to the cutting board, allowing for wood movement.

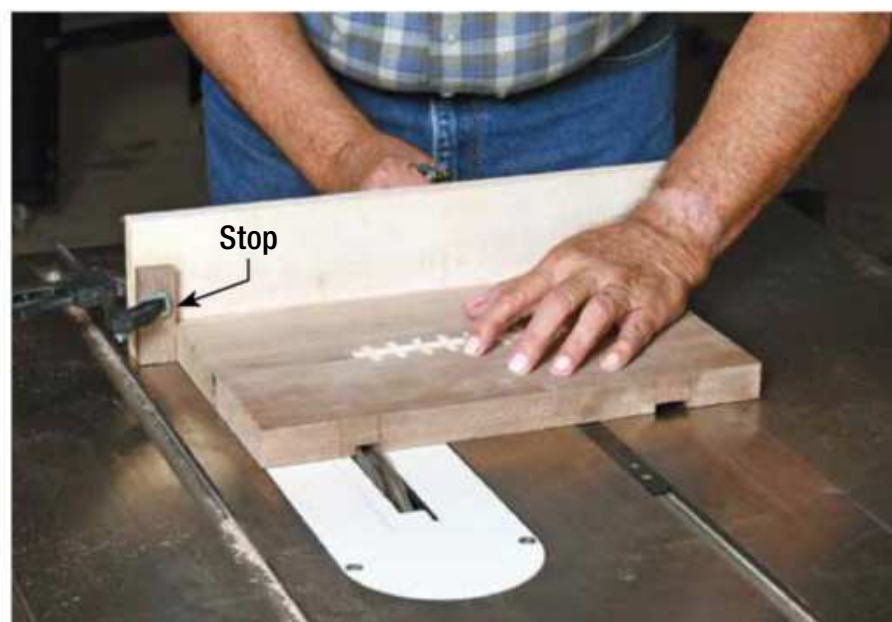
Now the football will start to take shape. Copy the Quarter Football Template (p. 27), and trace the shape as shown. Cut out the shape, and then sand and round over the edges.

Make the feet from $\frac{7}{8}$ "-dia. dowel rod. Just cut four $\frac{5}{8}$ "-long pieces, and glue them into $\frac{1}{4}$ "-deep holes drilled with a Forstner bit.

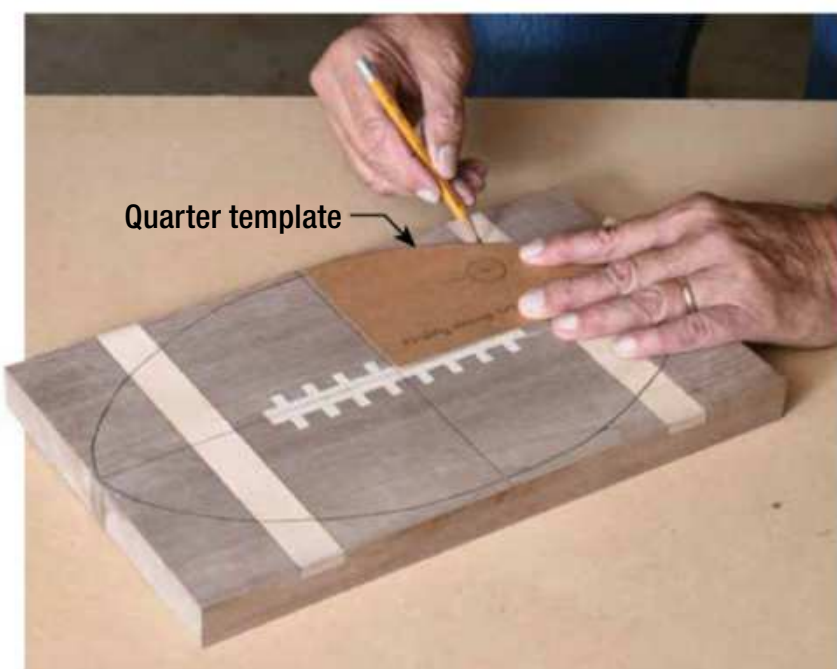
I sanded the entire football through 220-grit and applied mineral oil. It's almost time for kick-off. Load up your cutting board with your favorite game-day snacks and enjoy. ■



Bend the stripes. Clamp the ends of the maple stripes over a small dowel and heat the center of each piece with a heat gun to form a permanent bend in the wood.



Dadoes for the stripes. Using a dado set and a miter gauge with an auxiliary fence and a stop, cut $\frac{1}{4}$ " deep $\times$ 1" wide dadoes across the top face of the cutting board.



Lay out the football shape. To center the football outline on your blank, strike one line between the long lace strips, and a perpendicular line centered between the two middle stitches. Set the template against the centerlines and trace each section as shown.



Shape the football. Cut the blank to shape, sawing just outside the lines. Use a disc sander to remove saw marks and achieve a smooth, accurate edge. Chuck a $\frac{1}{4}$ " roundover bit in your router table, and round-over the top edges of the cutting board using a pair of push pads for safety.



10 Tips for Better TABLE TOPS

They all add up to a stunning surface.

By Robert Spiece

What's it take to make a table top? You just edge-glue a few boards together, sand 'em, and there you go, right? Not so fast. Not if you want something that looks great and represents quality workmanship. After all, a table's top is its most prominent feature. Sure, it's basically just a panel, but you can screw it up any number of ways by mismatching boards, milling them incorrectly, or improperly joining them, among other errors. If you want to create table tops that dress up rooms in style, and that show people you know your stuff when it comes to woodworking, check out these 10 time-tested techniques.



onlineEXTRAS

- Jointer Fundamentals
- Composing with Grain

1

Start with good material

A good table top starts with good material. If you can, buy boards graded FAS (firsts and seconds). An FAS-graded board must be at least 6" wide, 8' long, and 83.33% free of knots and defects (depending on the species). Unfortunately, many small mills don't sort by grade, in which case you'll just have to do the best assessment you can on your own.

Your stock should be close to flat in the rough. Crook, minor bowing, and cupping can all be dressed out, but seriously bowed or twisted boards are almost always a bad choice because they tend to suffer from indomitable internal stresses. Also, dressing out the warp often leaves insufficient thickness.

For the 15½"-wide table top at the bottom of page 32, I needed a board at least 8" wide and twice as long as the top. That way, I could use a single piece for the whole panel, which helps in getting a good grain and color match right at the start.

It's not all about workability, though. Also look for a board with the potential to be a beautiful table top. Before cutting the board down, scrutinize its edges, considering where to create the seam. For a natural transition, arrange to join straight-grain to straight-grain edges if possible, and try to avoid abutting edges with grain runout, which can create a visual clash at the seam.



Stare it down.

Sight down a candidate board to check for crook and bow. This crook can be ripped away, and there's very little bow, so it's in promising shape.



No propellers. A twisted board presents milling problems, and should generally be avoided for table tops. Twist is easily detected by sighting across the tops of *winding sticks*: a pair of straight sticks of contrasting color placed at the ends of a board.

2

Flitch it if you can

Getting a good grain and color match is much easier if you're working with a *flitch*, which is a series of sequentially sawn boards from the same tree. A flitch can be costly, but it's well worth the bookmatching opportunities that can create high drama in a glued-up panel. With the walnut flitch shown here, I'm careful to locate my edges so my book match lines up on all of the boards that will comprise the tabletop. Picking a couple of identifying marks like small knots or streaks helps me keep the boards aligned. In the case of these pieces, I measured in from the waney edge.



A matched set. There's no better way to ensure grain and color consistency than to use only boards from the same tree. These walnut slabs will be judiciously milled and edge-joined to create a simple, but singular, rectangular table top.

3

Switch, flip, and slip to make a match from a random batch

When composing a table top from random stock, enjoy the puzzle! Take advantage of your myriad potential matches by trying every possible combination of boards in every possible orientation. Try to work with the flow of the grain. With flatsawn boards, take advantage of the straight grain typically found on either edge to make a panel with blended seams. The cathedral patterns in the centers of such boards can be artfully arranged, even though such a multi-board constitution will never mimic the grain of a single plank. If you're bookmatching a tabletop, a seam in the center makes sense. However, I'm often trying to make up one unified panel without bringing attention to the seams. In that case,

using an odd number of boards and keeping the seams off-center will help to randomize the look, leading to a more visually natural composition.

Some woodworkers claim that alternating the heart face and sap face on adjacent boards will "equalize" a panel, ensuring a flatter surface, but I've found this to be a myth. Instead, compose the visually best surface, and rely on the panel's attachment to the table base to keep it flat. Use denatured alcohol as shown to bring out the natural color tones.

In the near photo at right, I arranged the seams to incorporate the sapwood as a design element. In order to achieve this effect successfully, it's important to use the sapwood from both mating edges to form a natural transition.

Otherwise, the colliding heartwood and sapwood would create a hard, straight, visually ruinous glue line.

Once you have a pleasing arrangement, be sure to view it from all sides and angles. Depending on the way the grain is laying, it can reflect light differently, especially with figured material. I've been surprised on multiple occasions when the top looked perfect when viewed from one end, but completely wrong from the other.

So just do your best to make the most pleasing arrangement possible. And don't fret if you don't get it "perfect." Keep in mind that wood is a natural material and will only bend to your will so much.

4

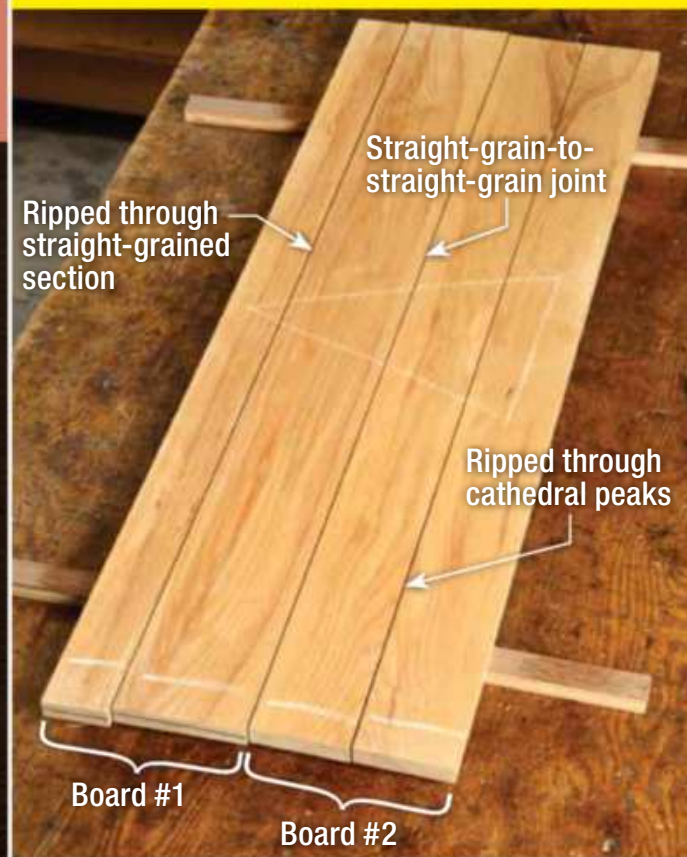
Locate rips to minimize grain disturbance

You'll often need to rip a board down to minimize cupping or just to suit your jointer's capacity. But before ripping, consider where the kerf is going to fall, and the $\frac{1}{8}$ " or so of wood that will be lost to it. After the rip, and after jointing both edges, you may lose close to $\frac{1}{4}$ " of wood to the cuts. If you've sliced through the slope of cathedral grain, the interruption is likely to be obvious when the edges are rejoined. It's best to choose a path through straight grain, where the joint usually comes back together without a trace of a glue line. If your straight grain doesn't fall in the right place, try bisecting the peaks of the cathedral pattern, which will tend to rejoin nicely.

When rejoining ripped sections, don't be afraid to shift the parts to achieve the best match. This is particularly a good approach when trying to reestablish cathedral grain flow. It helps to leave yourself as much extra length as possible to make this work.

Also, try to use natural variations in color to create an artful arrangement. Notice the two dark streaks flanking the center seam in the photo at far right. This creates visual interest that also helps draw attention away from the joint.

PANEL LAYOUT



GLUED-UP PANEL



Don't interrupt. This panel is constructed from one 8'-long board that was crosscut in half, aiding color- and grain-matching. Each half was then ripped to alleviate cupping. Board #1 was ripped through a straight-grained section, while board #2 was ripped through the tips of the grain cathedrals. At the center of the panel, the two boards meet with a straight-grain-to-straight-grain joint, which makes the seam nearly undetectable.



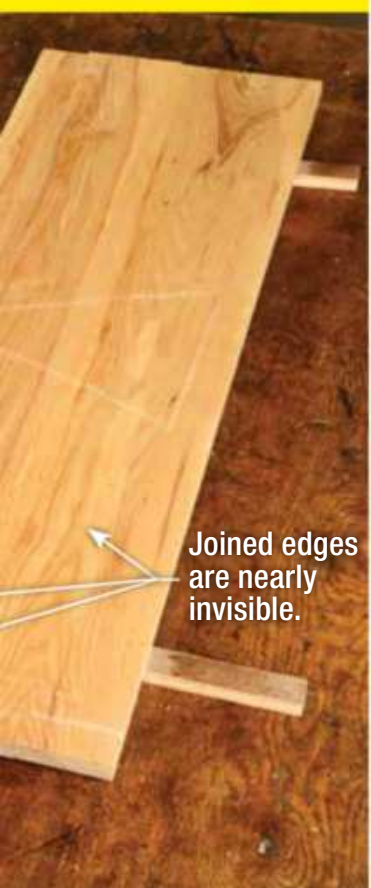
Alcohol enhanced. When working with random boards, do your best to integrate color and grain into one solid composition. Wipe and/or spray denatured alcohol onto the surface to pronounce both grain and color in order to get the best possible match. At left, the lighter sapwood meets at the seams, drawing attention to them, but also providing visual interest. At right, the opposite faces of the same boards join to create a cohesive heartwood composition.

5 Lay out to avoid tearout

Make sure to keep track of your individual boards' grain direction throughout the planing process and afterward. If you don't, you risk accidentally edge-joining them together with opposing grain directions, which invites tear-out when planing the final, composite panel.

I mark the feed direction on every board as it exits the planer. If I notice tear out, I'll reverse direction on the next pass. If the tearout is reduced, I mark the leading end of the exiting

board with "GD" for "good." This label means "Only plane this board in this direction, or you'll be sorry." For example, the crotch grain on the board next to the planer in the photo below looks beautiful as is, but if fed in the opposite direction it would be chewed up beyond repair. The most beautiful boards will often struggle in both directions. The notations made at the planer help me to work with the lesser of two evils and minimize clean-up after the glue up.



Marked for travel. Chalking the leading end of a properly oriented board as it exits the planer ensures that you won't accidentally feed it the wrong way on the next pass, inviting tearout. You'll need to re-mark after every pass, so keep the chalk handy as you work.

6

Use a jointer!

Nothing beats a jointed edge for making perfect seams. In my experience, even table saw blades that purportedly create a “glue line rip” don’t really create the kind of neat seam I’m interested in. Joint all mating edges, then do a dry clamp to ensure absolute closure. I like to test the joint using a light-duty “F-style” clamp. If it closes the joint perfectly, I know that pipe clamps will have no problem. Be picky at this stage, and make sure each joint closes perfectly. To help detect the offending edge in a gap, slide one board past the other. If the gap moves with the board, rejoin that edge. If the gap stays in place, rejoin the opposite board.



Feed with care. A successfully jointed edge depends on proper feed technique, especially with longer boards. Make sure to press the face of the board firmly against the jointer fence, and maintain leading end contact with the outfeed table. If the board is short enough, begin with your hand on the trailing end so that you can feed in one uninterrupted stroke.

8

Stagger your clamps and clean up the panel’s show face

Pipe clamps offer plenty of power to close an edge joint, while helping to keep the table top flat under pressure. I place the clamps over and under, making sure that the pipes contact both faces of the panel in order to keep it flat. Look for a nice, even bead of squeeze-out along the entire length of each joint. I use strips of wax paper to prevent black iron stains on the “show” face of the top. I use the bandsaw to cut these little 2"-wide rolls from a standard roll of supermarket wax paper.



Careful clamping and clean-up. Placing half of the clamps on top of the panel assembly equalizes the tendency of the panel to cup under pressure. On the “show” side of the panel, I scoop up the wet excess glue with a putty knife, then remove the upper clamps one at a time to clean up each unimpeded section in turn with clean water. Finally, I protect against black stain by placing a strip of wax paper under each reapplied clamp.

9

Plane in parts

Make things easier on yourself by working to the capacity of your planer. For example, to make a 44"-wide dining table top, I’ll begin by gluing up two separate 22"-wide panels from boards that I planed slightly oversized in thickness. Then, after planing both assembled panels to almost-finished thickness on our 24" planer, I have



7

Biscuit long boards

For table tops under 30" long, a simple edge joint is easy to assemble and plenty strong. For longer table tops, I use biscuits as alignment aids to bring adjacent board faces flush. They won't create a dead-level seam, but they'll get you pretty close. I start my biscuit layout 4" in from the end to prevent exposing a biscuit when crosscutting the top to finished length. Lay out and cut your biscuits 8-12" apart. Don't get sloppy with the slotting, as an angled biscuit may actually force your boards out of alignment. I keep my hand planted firmly down on the joiner's fence, with the edge of the board overhanging my bench to ensure unimpeded contact with the tool.



Alignment aid. Biscuits help align boards during the glue-up. When joining the boards, I typically apply glue to only one edge of each joint and to all of the slots, but not the biscuits themselves.

10

Plane and scrape before sanding

only have one seam to deal with in my final glue-up. You can apply the same idea to smaller planers. Gluing up separate parts first, rather than gluing up the entire panel at once, might seem like an extra step, but you'll thank yourself when it comes to leveling the finished surface.

Fill that mouth. Glue up a table top in sections whose widths approach your planer's capacity. This reduces the amount of work needed to flatten the finished panel after the sections are joined.



Sanding isn't the best option for leveling seams. A belt sander works in theory, but the reality is usually fraught with divots and tracks. And a random-orbit sander will ride up on the high spots, producing an uneven surface. It's best to attack the seams with hand planes and cabinet scrapers, which will create a much flatter surface. Start planing at a diagonal with a jack plane, using a straightedge to gauge your progress.

Then plane diagonally again, but at 90 degrees to your original direction. When your straightedge indicates a relatively flat surface overall, plane parallel to the grain. Then switch to a smoothing plane and scraper to clean up the previous plane track marks. Don't worry about creating a glass-smooth surface at this point, just get it to the point where a random-orbit sander can take over. ■

Flatten first. A sander typically won't take out the humps and valleys on a joined-up panel; you really need to use a jack plane for that, first working diagonally to the grain, then parallel to it. Follow up by scraping, and then sanding to smooth the surface.



Scraper clean-up. A card scraper does a great job of removing plane tracks, and needs only fine-sanding as a follow-up.

Teaching TABLE

A “furniture making fundamentals” course built into a popular project

By Robert Spiece



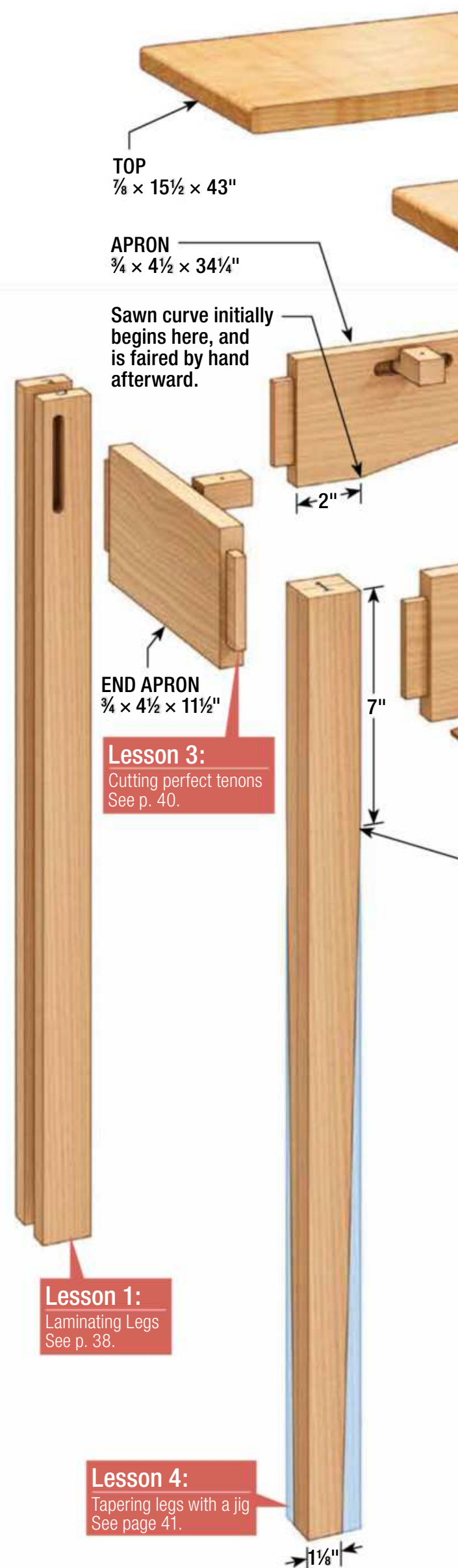
At the JD Lohr School of Woodworking, we use this hall table project as a vehicle to teach fundamental approaches to furniture making. By building this piece, you'll learn a slew of great techniques that will give you a jump start in your wood-working education.

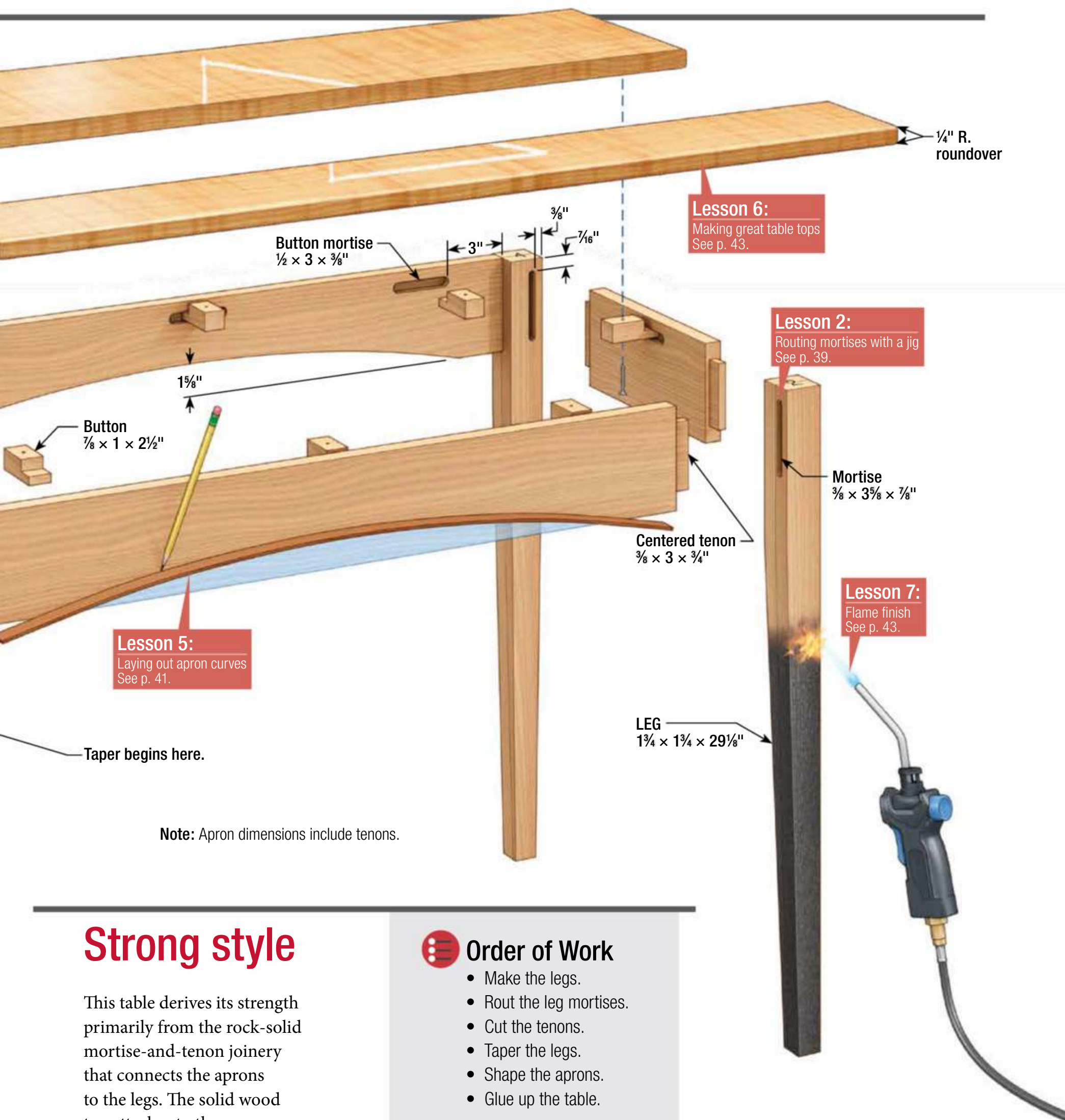
For example, when making the top, you'll learn how to glue up a strong panel with attractively composed grain. Same thing for the legs; whether you're cutting them from 8/4 stock, or laminating them to thickness, I'll show you how to achieve visual harmony on all the faces. The technique for tapering the legs will also serve you when making many future

tables. As for the aprons, you'll discover a simple, time-honored trick for laying out their curves, and a neat planing trick for fairing their edges after cutting.

For the best in structural integrity and longevity, you won't find this piece constructed with screws, but with venerable mortise-and-tenon joinery. I'll show you how to make these joints to ensure that your work stays together for generations. And the glue-up process will teach you an approach you'll use on many similar tables and other pieces.

So welcome to class! And, hey, even if you already know all this stuff, you still end up with a fine looking table that will sit pretty in any room of the house.





Strong style

This table derives its strength primarily from the rock-solid mortise-and-tenon joinery that connects the aprons to the legs. The solid wood top attaches to the aprons with L-shaped wooden “buttons” that allow the panel to expand and contract seasonally across the grain. The tapered legs and arched side aprons provide style to accompany solidity.



Order of Work

- Make the legs.
- Rout the leg mortises.
- Cut the tenons.
- Taper the legs.
- Shape the aprons.
- Glue up the table.



onlineEXTRAS

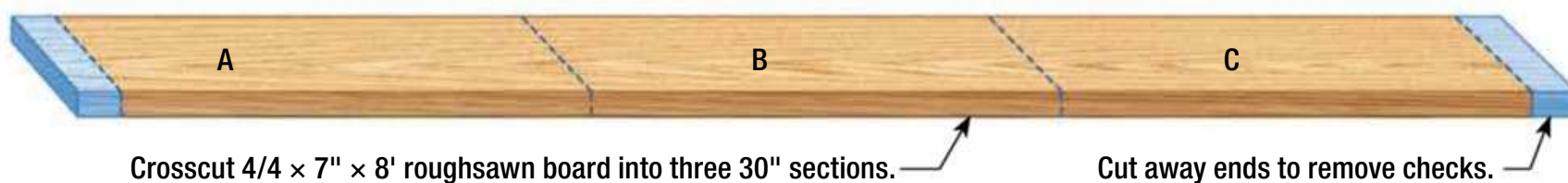
- Mortising Jig
- Tapering Jig
- Batch-cut Buttons

Laminating table legs

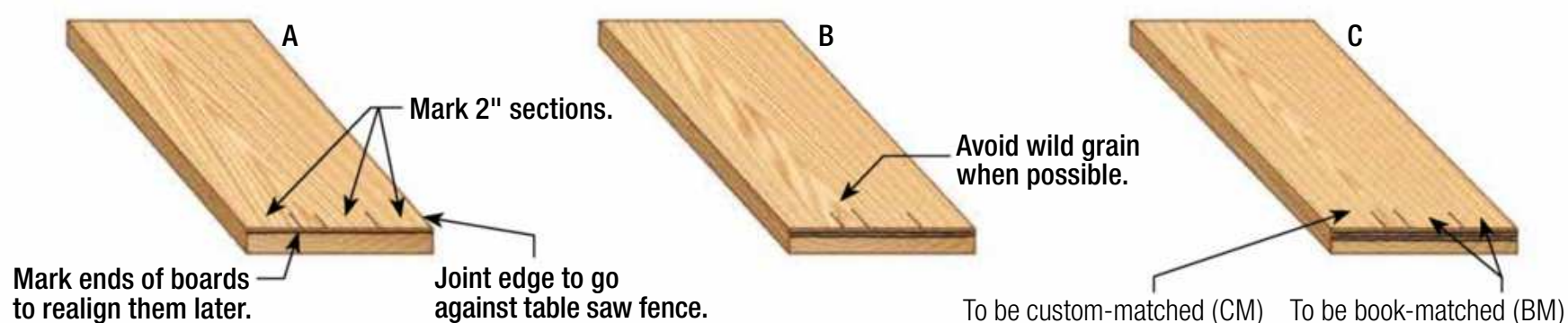
Making table legs by laminating stock requires a thoughtful approach to prevent an unsightly collision of grain at the seams. Here's a great technique for creating four 1 3/4"-square legs from one 4/4-thick board. Three

of the legs will have book-matched grain on one face, and one leg will have custom-matched grain. (That is, lay them out the best you can.) Use the most straight-grained sections of the board to create attractive legs.

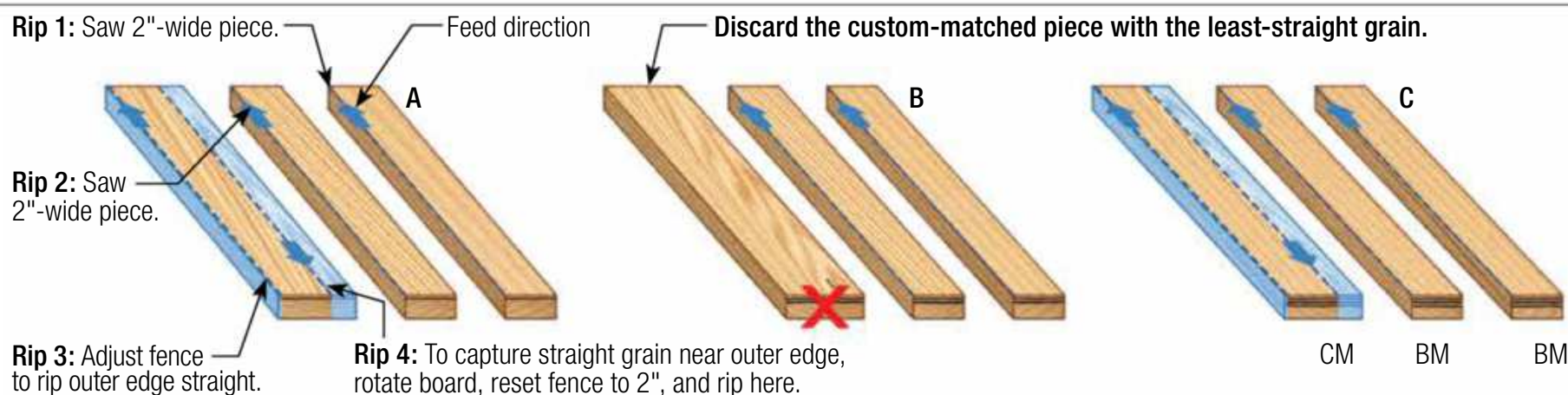
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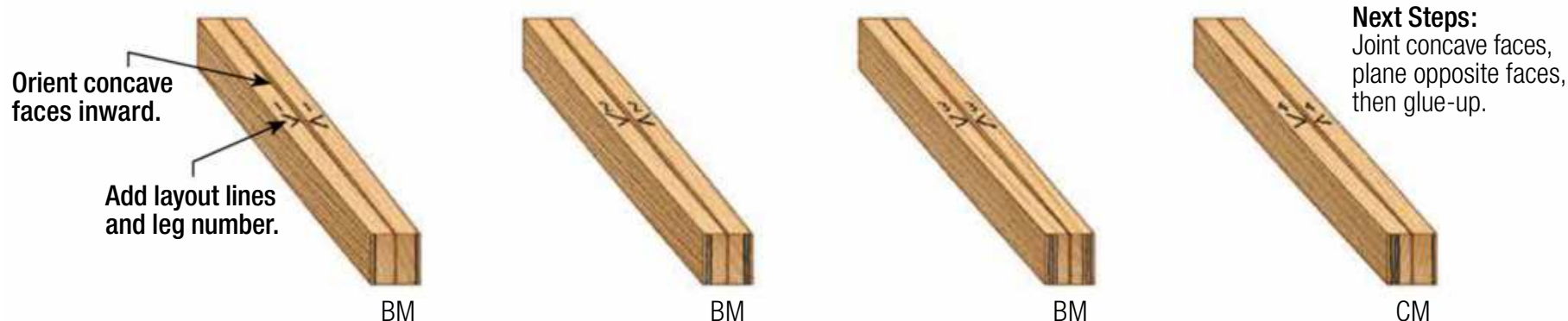
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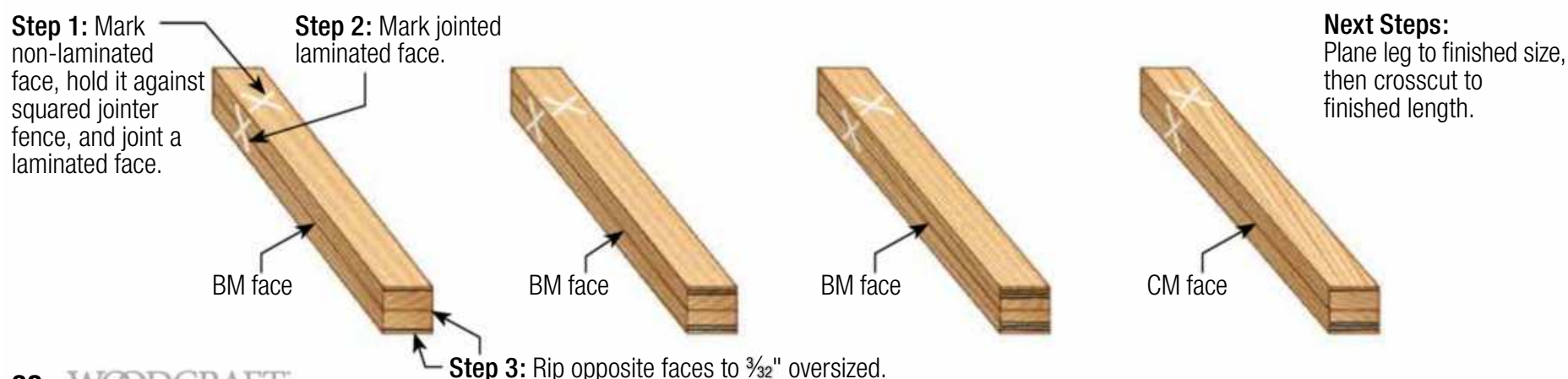
3



4



5



Pretty legs require thought

Begin by making the legs, as this is where the joinery layout starts. If you make your legs from 8/4 stock, prefer rift-sawn sections, which will display relatively straight grain on all faces. Avoid

sections with wide cathedral grain. Unfortunately, 8/4 stock isn't always available, in which case you'll need to glue up each leg from two pieces of 4/4 stock. The figure (facing page) shows

you a great way to create four matching legs that don't call loud attention to their seams. The photos below demonstrate a quick, accurate method for crosscutting the legs to length.



Quick, safe crosscutting. To cut each leg to length, I first square up one end (left), and then register that end against a 2" spacer block sitting against my rip fence to make the second cut (right). Employing a spacer like this allows use of the fence's scale (adding 2"), but creates clearance between the workpiece and the fence for a safe crosscut that won't jam and kick back.

Joinery begins with the mortises

Determine the best orientation of the legs, and mark them as shown to indicate their relative positions. Then lay out the mortises where shown in the drawing on page 37. If you use a good mortising jig, you need only lay out two mortises as shown below, center.

Alternatively, you could do the cutting simply with a router outfitted with an edge guide, in which case you'll need to lay out one mortise in full, and then just the end lines for the rest. Jig or not, rout to a $\frac{7}{8}$ " depth ($\frac{1}{8}$ " more than the tenon length) in a series of passes no more than about $\frac{3}{8}$ " deep to prevent stressing the bit.



Pretty, good order. Arrange the dimensioned legs so that the straightest grain will be on the most prominent faces. Then number them 1 & 2 at the front, and 3 & 4 at the rear for easy re-orientation later.



Jig-ready. If you use a good mortising jig, you need lay out only two mortises, as the jig will then automatically register the others. Still, make sure to mark the other mortise faces with chalk to avoid set-up confusion.



A good mortising jig. The mortising jig we use in our class (See onlineEXTRAS) automatically registers the position of the legs in the jig for quick, accurate routing of the mortises.

Precise tenons visit the saw, then a hand plane

I cut the tenons at the table saw using a $\frac{3}{4}$ " stack dado, setting up the cut with a test piece milled to the precise thickness of my apron material. I register the tenon length using the fence and my 2" spacer block. Creep up on the thickness by raising the blade a bit at a time and then checking the results against the mortise. Aim for a slightly fat fit at the saw so that you can trim to a precise thickness afterward using a shoulder plane.

Next, saw the tenon edges. Make sure to cut them slightly shy as shown, which saves you the trouble of having to round the tenon edges or square the mortise ends. It also allows some adjustment for flushing the aprons to the top ends of the legs.

All that's left to complete your mortise-and-tenon joints is to fine-tune the tenon thickness, using a rabbet block plane (as shown) or a shoulder plane. Take just a few

swipes, then test the fit. Repeat as necessary until the tenon inserts with slight to moderate hand pressure. You should be able to pick the leg up by the apron without the joint being so tight that you have to grunt and contort your face to seat it. Glue can quickly swell a too-tight joint and make assembly a sweaty nightmare. Don't worry if you overcompensate and plane the tenon too thin, as you can always build it back up with veneer to take another stab at it.



Cheeks first. Set up the cut using scrap and a stack dado. Register the length of the tenon against a fence-backed spacer block, saw one cheek, then flip the piece to saw the other.



Edges next. After sawing all the tenon cheeks, raise the dado head to cut the tenon edges, again registering the piece against the fence spacer before feeding the work across the blade.



Slightly shy. After sawing the edges, the tenon width should extend only across the flat faces of the mortise, not into the rounded ends. This does not compromise the joint strength.



Final fitting. Registering an apron piece against a bench hook, use a finely set rabbet block plane (shown) or shoulder plane to trim the tenon to final thickness.

Tapers shape the legs

I taper just the inside faces of the legs, starting at 7" down from the top, as shown in the drawing on p. 36. You could lay out the tapers, cut them at the bandsaw, and then clean up to your cut lines with a jointer or hand plane. However, a table saw tapering jig does the job much more efficiently and consistently. Plus, when using a jig, you need only lay out the tapers on one leg, which you'll then use to set up the fence and stop on the jig.



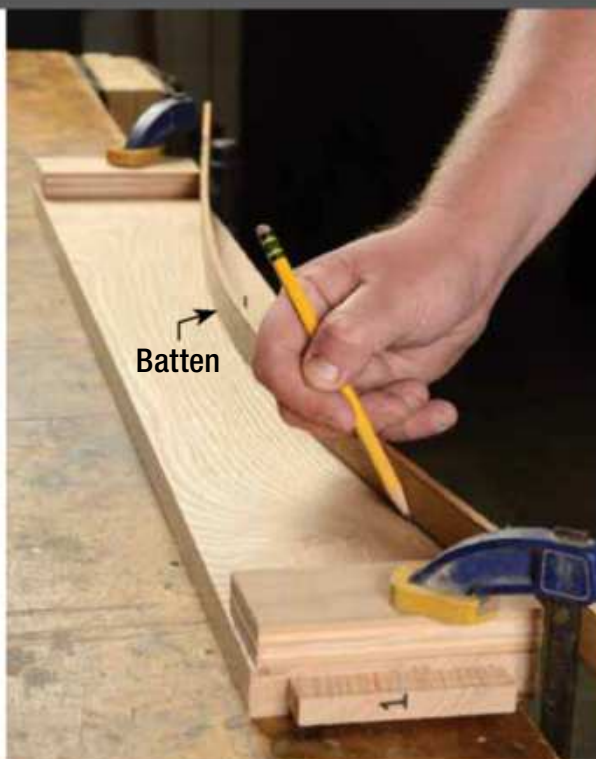
A jig for the job. A table saw tapering jig provides the best way to shape the legs. This version (see onlineExtras) was designed by woodworker and teacher Steve Latta.

Fair curves for a shapely apron

To shape the long aprons, begin by laying out the curve using a batten. (If the apron includes curved grain, orient the batten to complement it, as shown.) Note that the curve begins 2" in from each tenon shoulder. Trace a nice, bold line that you won't lose at the bandsaw, and cut just outside it. Next, fair and smooth the curve. Don't give in to a temptation to do this with a spindle sander or the nose of a belt sander, as it's likely to go badly using a small drum on such a large curve.

Fairing a curve like this is best done with a cutting tool like a spokeshave. A block plane will also work as long as you skew it. Whatever tool you use, fair back some of the wood where the ends of the curve meet the flats. The goal is to create an easy sloping transition. Follow up by smoothing the entire bottom edge of the apron with sandpaper.

Finally, rout the button mortises, which will provide purchase for the button hold-downs that secure the top to the table base.



Spring the curve. To lay out the apron curve, trace against a thin wooden batten held in place with a finishing nail at the center and a 2"-wide block at each end to automatically locate the curve's ends.



Just plane fair. A block plane does a great job of fairing the apron curve, as long as you skew it, which effectively shortens the sole enough for the blade to contact the concave edge.



Mortising for buttons. A router outfitted with an edge guide and 1/2"-dia. plunge bit makes easy work of cutting the button mortises. Here, a simple holding jig secures the workpieces for the job.

Glue up in stages

In preparation for glue-up, do a dry clamping to ensure the joints close well and the top edges of the aprons align with the tops of the legs. This is also a good time to prepare your clamping cauls and rehearse your procedures before reaching for the glue.

When you're ready to glue up, begin with a side assembly. Apply glue to the long mortise walls, and then to the tenon cheeks. These face-grain to face-grain contact surfaces are all that matter. Definitely avoid the

tenon shoulders to prevent a big squeezeout mess. Immediately pull the joints together with clamps, and check that the top edges of the apron align with the tops of the legs. If the apron sits lower than the leg, work quickly to correct the alignment as shown below. If the leg sits lower, place a caul atop the uprighted apron and leg, and spread a pipe clamp's jaws between the caul and the underside of your workbench to pull the parts into alignment.

Scrutinize for glue squeezeout and remove it immediately. I scrub it away with a tooth brush and clean water. Afterward, I feather the water outward to randomize any remaining traces. When you have completed both end assemblies, wait about an hour for the glue to set, then clamp both assemblies to the long aprons, and check the base for square by comparing its diagonal measurements.



Side assemblies first.

Taping $\frac{3}{4}$ "-wide cauls to the legs in line with the apron directs the clamping pressure across the apron to prevent the legs from cocking. If the apron sits shy of the top of the leg, invert the assembly, and tap or clamp it into alignment as shown here.



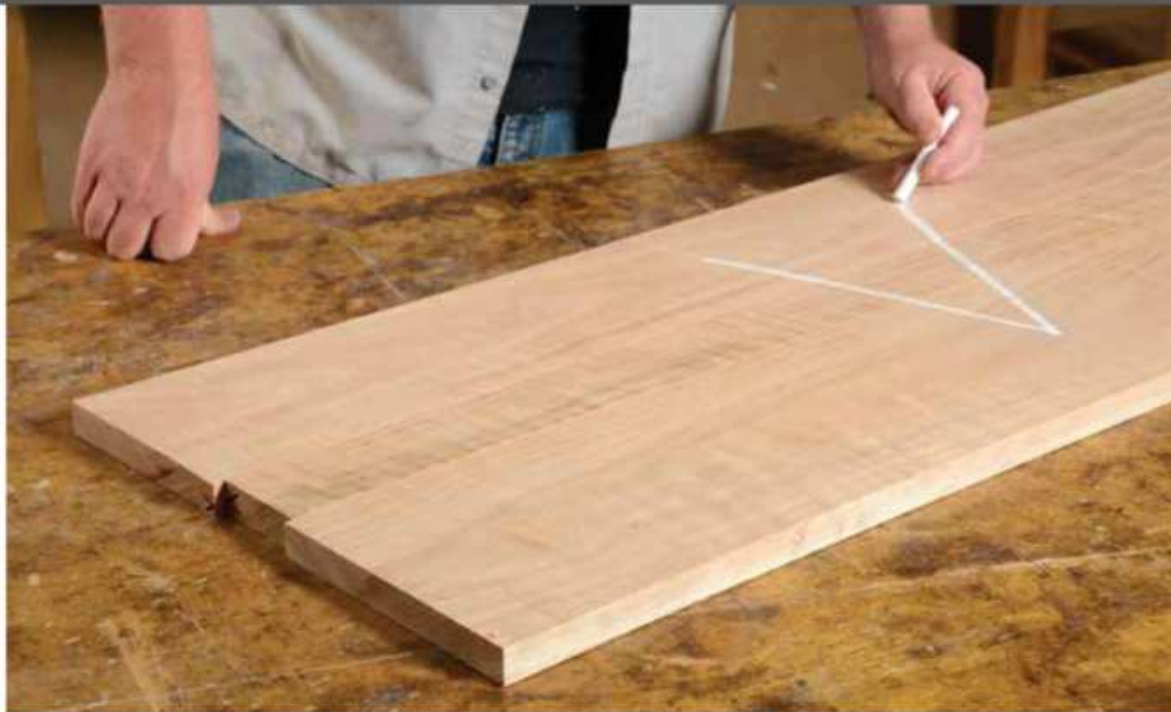
Then connect the aprons.

After the glue sets on the end assemblies, glue them to the aprons. Use strong clamps, again making sure to align the aprons' top edges with the tops of the legs before the glue tacks up.

Tips to make the top

The table top is really the star of the show, so spend some time selecting just the right board. You want some 4/4 stock that excites you, but that is also flat enough to yield $\frac{7}{8}$ " in thickness after milling, which is no small feat. For a visually cohesive laminated top, cut all the pieces from the same board. Ideally, you want straight grained sections on edges to obscure the seams. Remove any end checks, then cut the pieces at least an inch over their finished length. When you're happy with the composition of your boards, mark their orientation with a triangle. I run each mating edge over the jointer to ensure perfect closure. Once you confirm everything pulls tight, glue up the panel.

After glue-up, level and smooth the top with hand planes, and then scrape and sand it. Saw it to final dimensions, rout a $\frac{1}{4}$ "-radius roundover on all edges, and finish-sand. (See page 30 for tips on making great table tops.)



Composition for triangle. When laminating a top from multiple boards, note your final composition with a triangle to ensure that you glue the boards back up in the same order.



Crosscutting to length. After ripping an assembled top to final width, cut it to length using a crosscut sled.

Finishing up

All that's left is to apply a finish and attach the top. The usual approach we teach begins by slathering on boiled linseed oil, letting it soak in, and then wiping off the excess, which really "pops" the wood's natural color and figure. After the oil dries for at least 5 days, apply four or five coats of a wipe-on poly, sanding between coats with 400 grit sandpaper and rubbing with 0000 steel wool. After the final coat is applied, allow the piece to cure for a week, then do a final rub-out with 0000 steel wool lubricated with mineral oil. Alternatively, if you make your base of oak or ash, consider treating it with a flame finish, as shown at right.

The last step is to make the wooden buttons (See onlineExtras), and use them to attach the top. Make sure to set them back $\frac{1}{8}$ " or so from the long aprons to allow for seasonal expansion. Okay, class over. Nice work! ■



Black base, tawny top. The flame finish (see p. 54) on this red oak base beautifully complements the natural tones of the figured oak top.

Build a BOX

Tune up your woodworking skills with a project that will bring enjoyment for years to come.

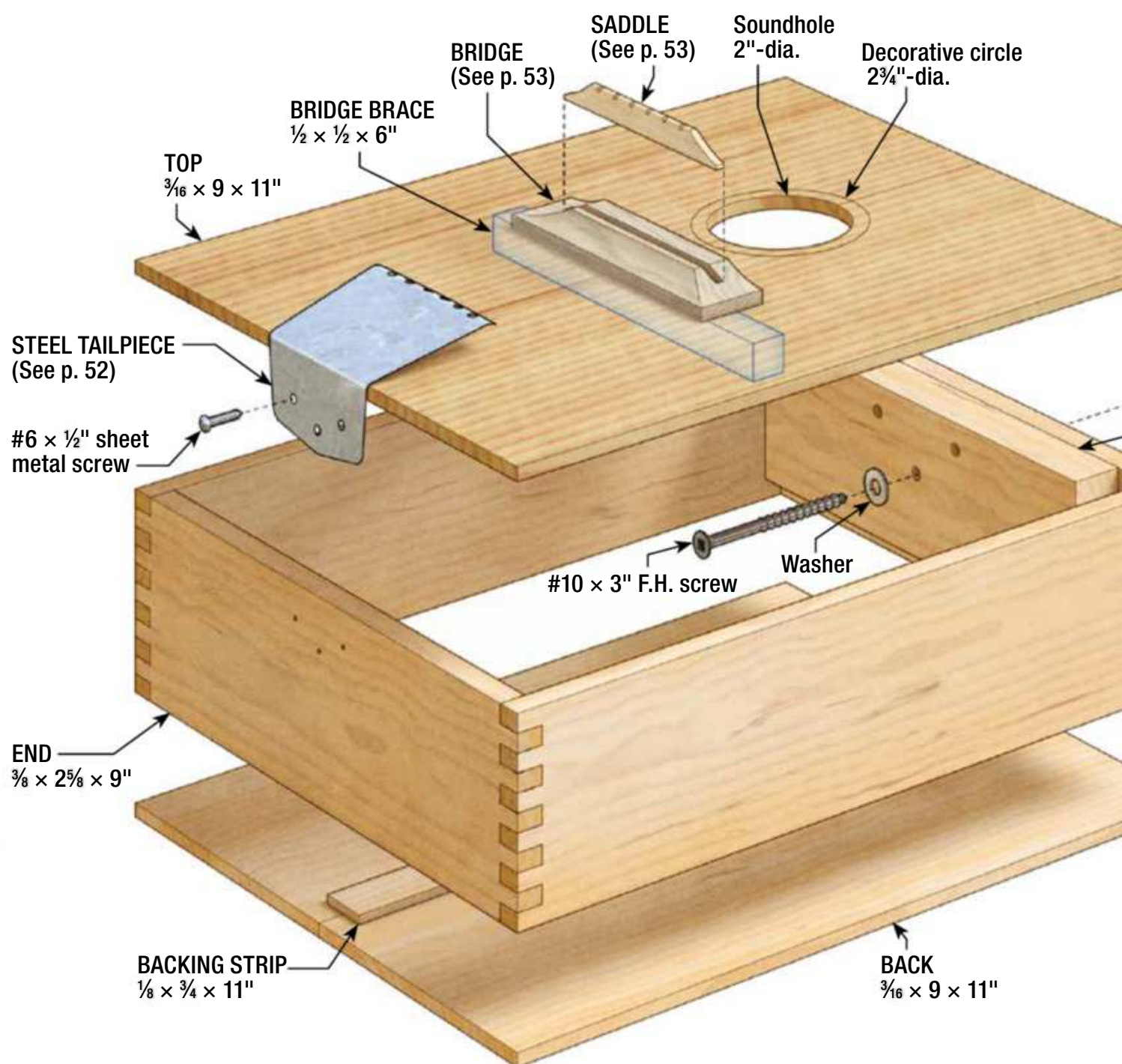
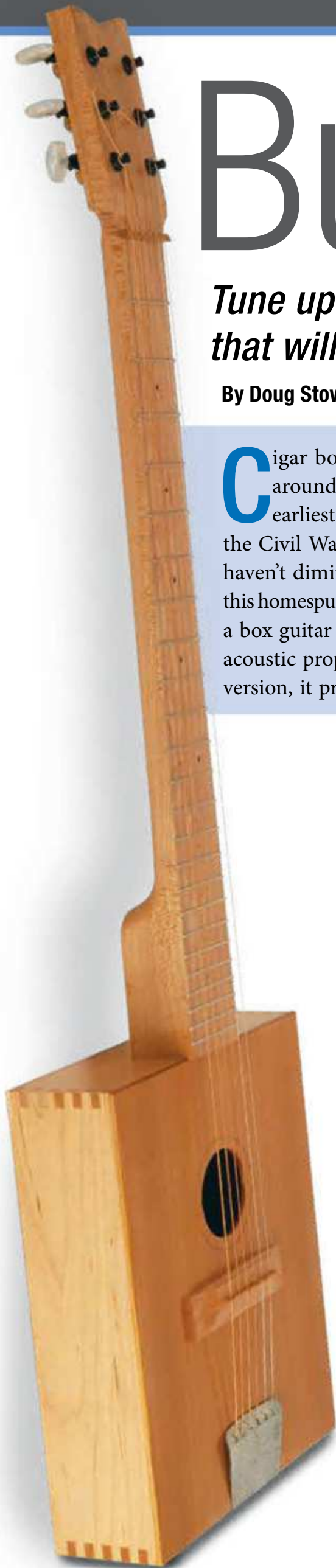
By Doug Stowe

Cigar box guitars have been around for a long time; the earliest versions date back to the Civil War era. Two centuries haven't diminished the appeal of this homespun instrument. Though a box guitar won't have the same acoustic properties as a standard version, it provides just the same

playability, in a compact, rugged package. Building your own version is a great way to get started as a luthier.

I began making box guitars with high school students in my shop class several years ago. Rather than depend on a ready supply of cigar boxes for these guitars, I decided to

put my box-making skills to good use. Although the box I'm building here is a basic rectangle with finger-joint corners, other joinery details and box shapes are also possible. The goal remains the same: Have as much fun making your guitar as you'll have playing it. Let's get started!



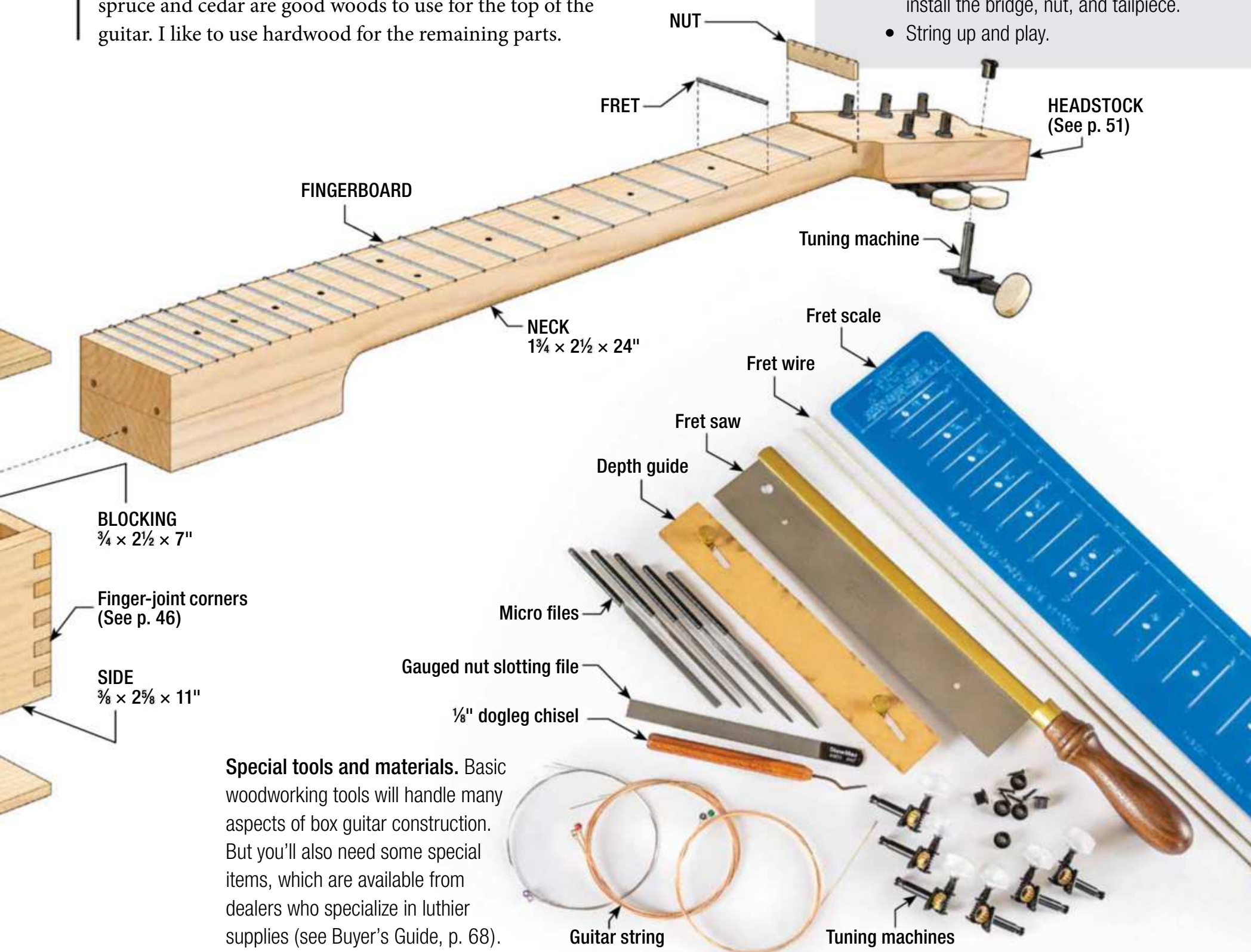
GUITAR

Well-made parts and luthier supplies make wood sound good

You don't have to be a guitar player to make a fine box guitar, but it helps to familiarize yourself with the key parts of this stringed instrument. Clear, straight-grained spruce and cedar are good woods to use for the top of the guitar. I like to use hardwood for the remaining parts.

Order of Work

- Build the box frame.
- Make and attach the back to the box.
- Make the neck.
- Cut fret slots and install the frets.
- Attach the neck to the box.
- Install tuning machines, then make and install the bridge, nut, and tailpiece.
- String up and play.

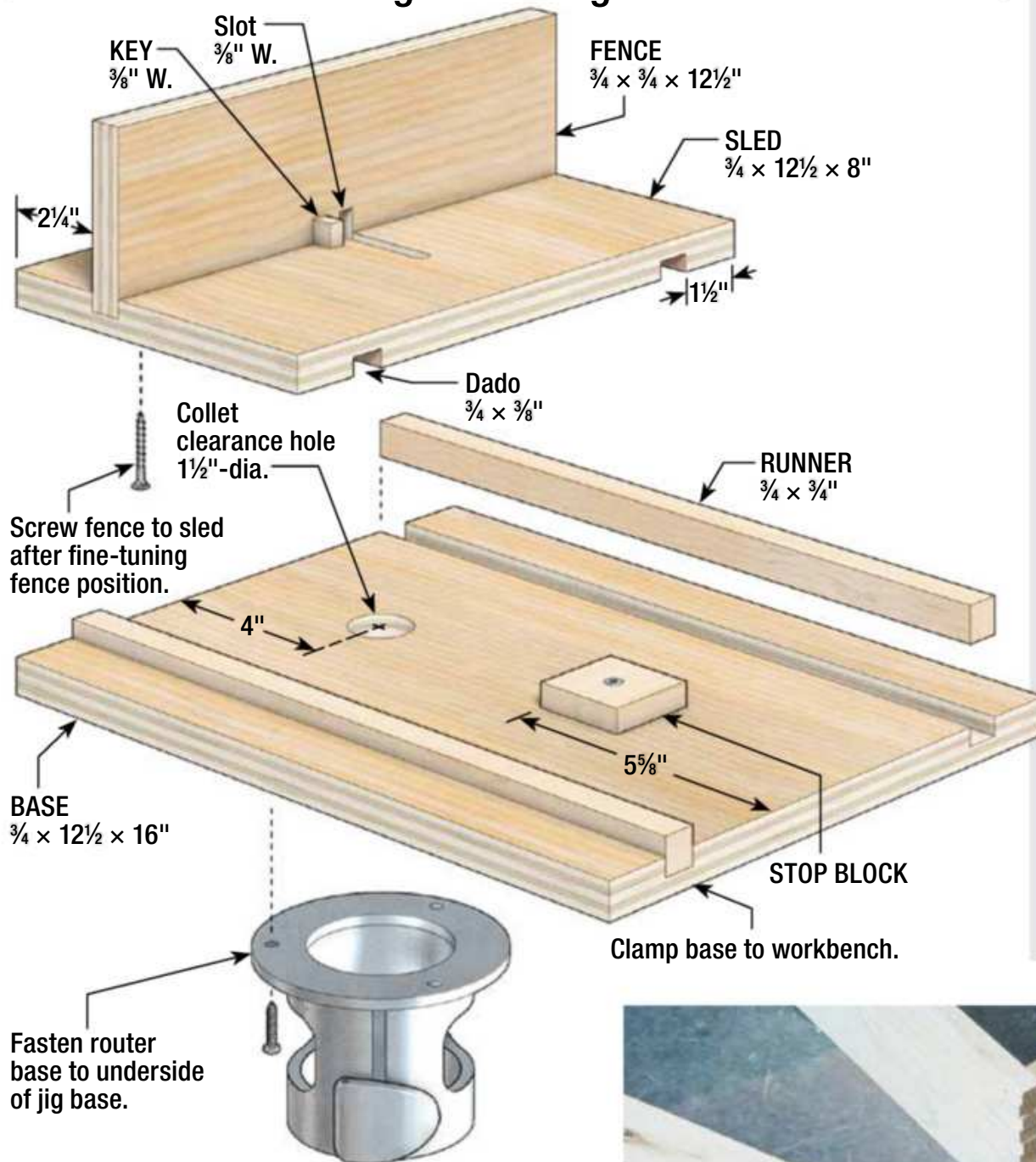


Special tools and materials. Basic woodworking tools will handle many aspects of box guitar construction. But you'll also need some special items, which are available from dealers who specialize in luthier supplies (see Buyer's Guide, p. 68).

Build a box frame with finger joints

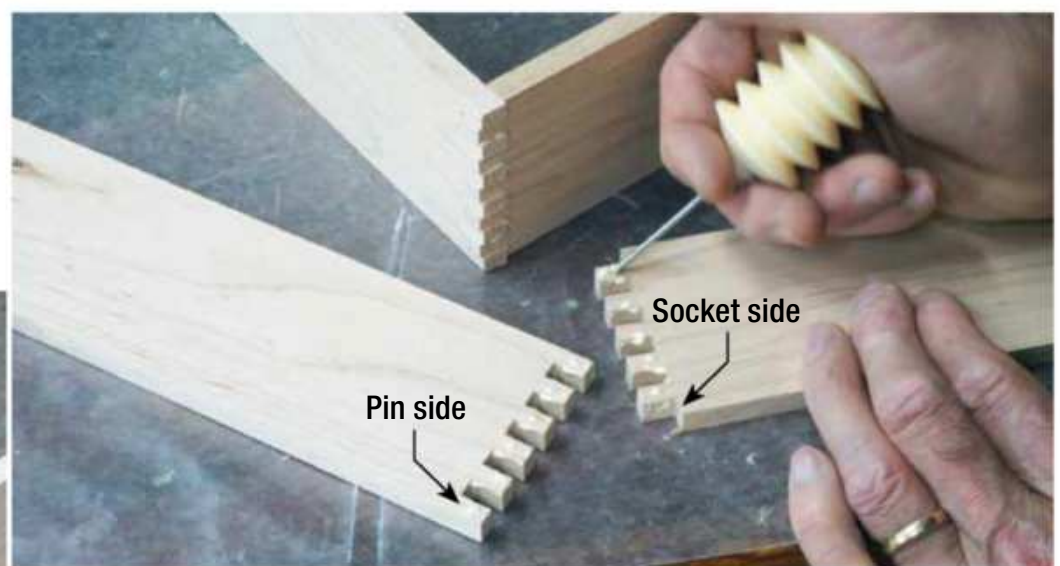
Finger joints are strong and attractive—a fine choice for box guitars and other woodworking projects. While some box joint jigs are designed to cut fingers and sockets of different sizes, mine is set up for a single size: $\frac{3}{8}$ ". Make sure to test your jig on some scrap stock before you use it to make the guitar's box frame.

Finger Joint Jig



How to make & use the Jig

- Rout runner dados in a single workpiece from which the base and sled can be cut. Then rout the dado for the fence.
- Cut the dadoed workpiece apart to create the base and sled. Then cut and install the hardwood runners.
- Drill a $1\frac{1}{2}$ "-dia. hole in the base to provide clearance for the router collet, then screw the router base to the underside of the jig's base. Outfit the router with a $\frac{3}{8}$ " straight upcut bit.
- By raising the bit in $\frac{1}{8}$ " increments, and sliding the sled on the base, rout a 1-3"-long slot in the sled.
- Screw a stop block to the base to stop the sled when the bit will be housed in the fence.
- Position the fence in its dado so you can rout a slot for the key. Then slide the fence over so the key is $\frac{3}{8}$ " from the slot in the sled.
- Clamp the jig to the edge of a workbench, and cut some test joints. If necessary, fine-tune the position of the fence (and key) until you get finger joints that fit snugly without being forced.
- Screw the fence to the sled when the fit is right.

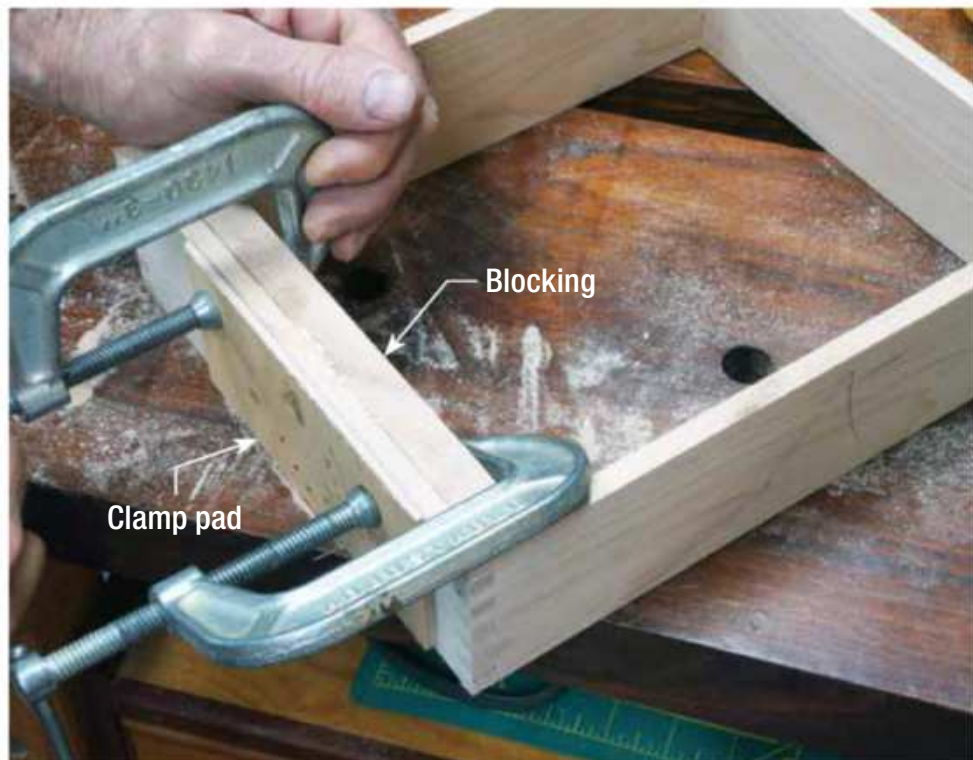


Pins first, then sockets. Two facing sides will begin with pins. Butt a side against the key, rout the first pin, then straddle the key to rout remaining pins. To rout a socket side, butt the side against a completed pin to set up the first socket cut, then complete the straddle-and-cut sequence (left). When assembling the box frame, take time to spread glue thoroughly on the joints (above), and make sure the frame is square.

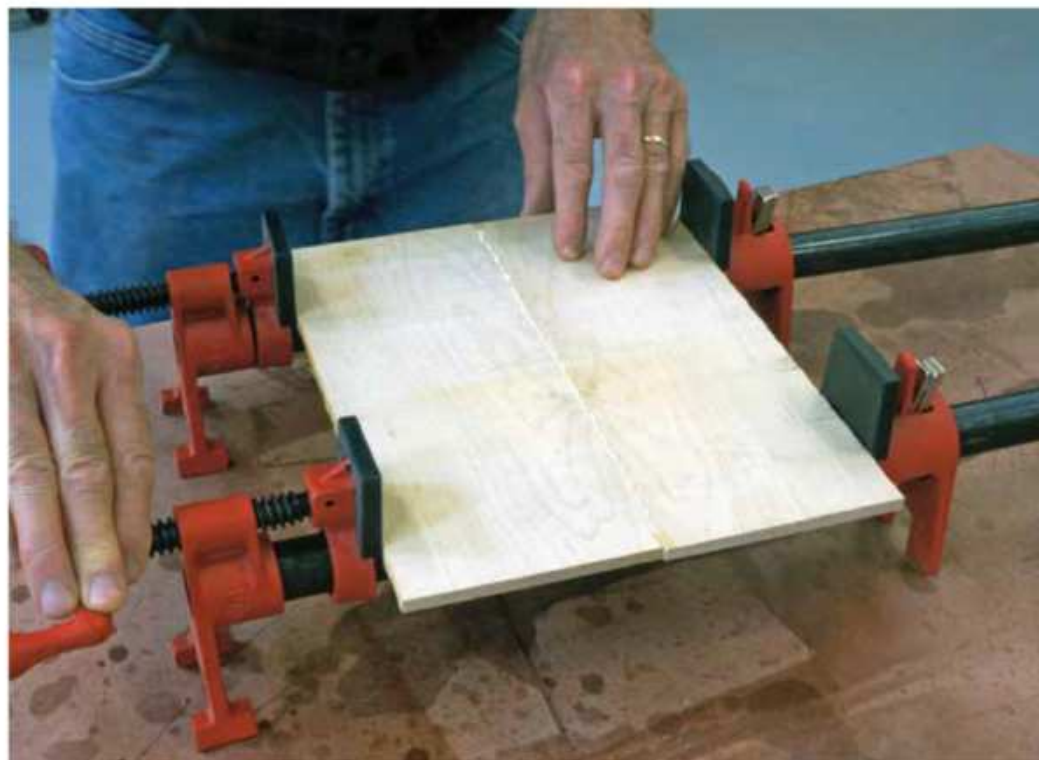
Now add blocking and a book-matched back

Once the box frame is together and the exterior has been sanded smooth, it's time to add two more parts. Gluing solid hardwood blocking to the box interior

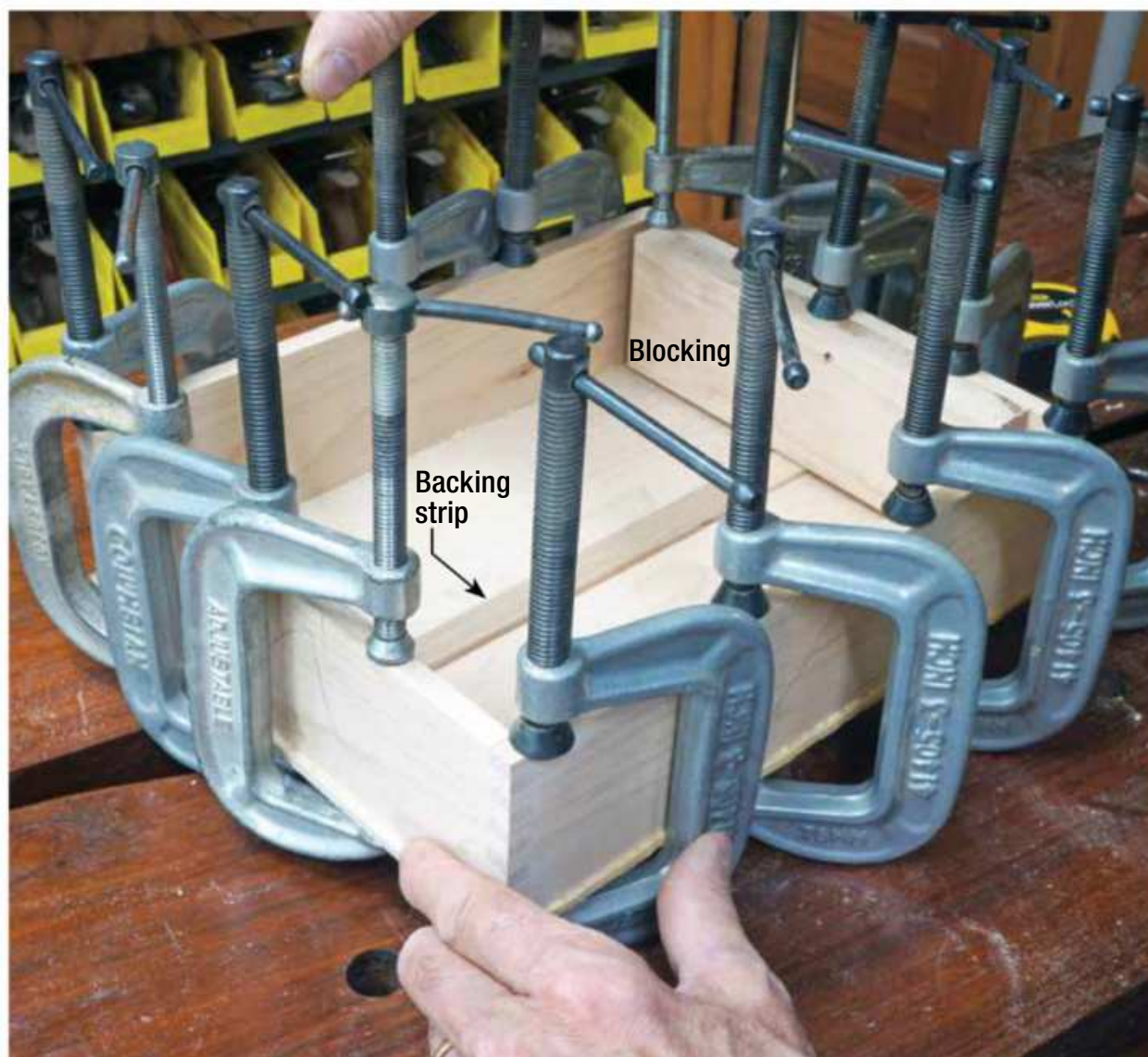
where the neck will be attached ensures a strong neck connection. The book-matched back is a traditional luthier's detail that adds beauty to the back of the guitar.



Blocking for the neck. Glue a $\frac{3}{4}$ "-thick maple block to the inside of the box where the neck will attach. The top edge of your blocking board should be flush with the top edge of the box.



A book-matched back. After planing boards to a thickness of around $\frac{3}{16}$ ", glue up the back, orienting the boards to create the best book-match. When the glue dries, plane the back slightly thinner, and glue a backing strip over the seam.



Too many clamps? Using fewer clamps and some clamping cauls to distribute pressure will work just as well here. Note the $\frac{1}{8}$ "-thick, $\frac{3}{4}$ "-wide backing strip glued in place over the book-match joint before gluing the back to the sides.

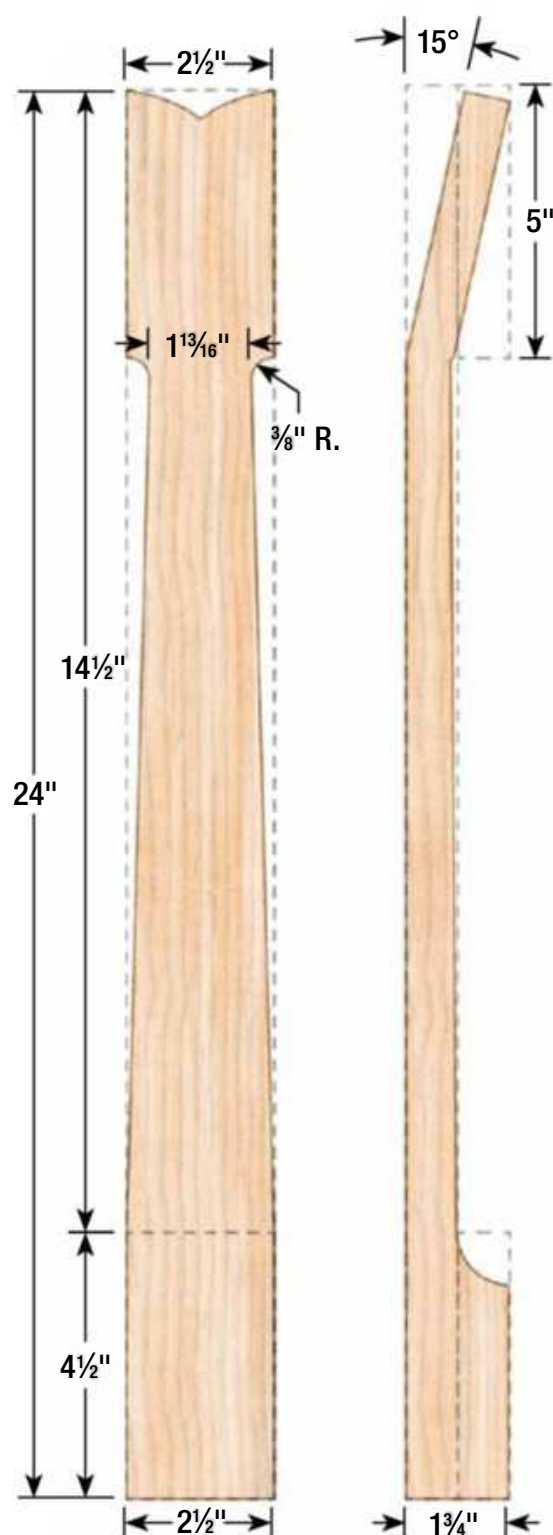


Flush-trim the back. After the glue dries, I use a flush-trim bit in the router table to trim the bottom flush with the sides.

The neck needs a graceful shape...

The neck starts out as a straight length of hard maple that gets blocking glued to each end. Building up the thickness at each end gives a stronger connection where the neck joins the box, and allows the peg head to be angled back, keeping the strings in tension against the nut. The drawings below provide the details for making the neck blank and then cutting and shaping it to final size. Before cutting any tapers on the bandsaw, make sure that the end of the neck (which joins the box) is cut perfectly square. Once the rough shape of the neck is cut, take your time with final shaping and smoothing, because you'll want this part of the guitar to be comfortable to hold.

Neck Details



A blank with blocking. Start with a dead flat neck blank $\frac{7}{8}$ " thick, $2\frac{3}{4}$ " wide, and 25" long. Then thicken each end of the neck blank by gluing blocking in place as shown.



Rough out the shape. After drawing the tapered layout on the neck blank, cut the neck to rough size. Stay slightly outside the lines.

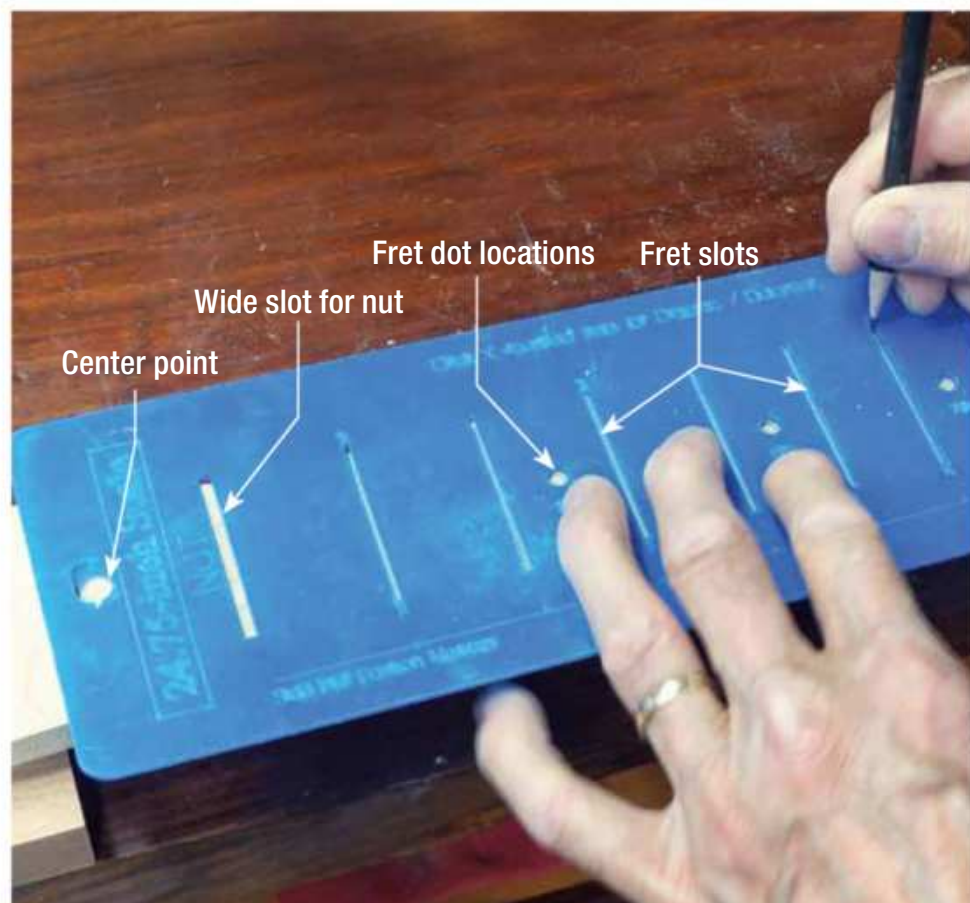


Shape, then smooth. I use a rasp to refine the shape of the neck. Fair the neck's curve by eye, but also test your progress by feel. When shaping is done, smooth by sanding to 220-grit.

...and precisely spaced frets.

Fret wire has a T-shaped profile with tiny barbs that keep frets locked in kerfs made with a fret saw. Once you've

finished installing the frets, take extra care in screwing the neck to the box. Clamp the neck in a vise as shown below.



Accurate layout. With an inexpensive fret template, you can precisely lay out frets without measuring. Align the template over a centerline on the neck, then mark the nut and fret slots with a sharp pencil.



Saw the slots. Clamp a guide block on each fret's layout line to keep the saw vertical as you cut. Adjust the fret saw's depth gauge to match the fret wire's barbed flange.



Seat, snip, and file. Allow each fret to extend beyond the neck sides when you install it, seat the fret with a hardwood block, to avoid damaging it with a hammer. Then snip the fret just proud of the sides with wire snips. Use a fine-cutting metal file to get fret ends flush with neck sides, then gently round the ends over so they're smooth to the touch.

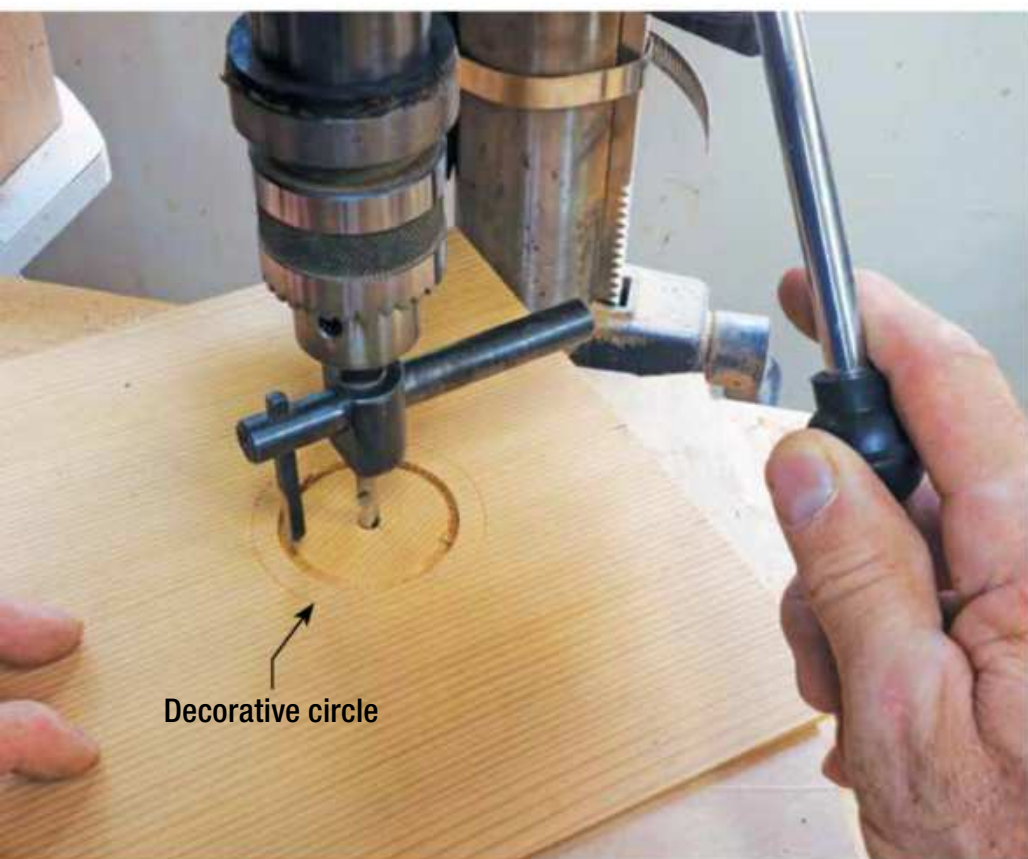


Connect the neck. Lay out a triangular pattern for drilling pilot holes in the neck and the box for three #10 $\times$ 3" screws. Layout and drill each set of holes so the neck will be centered on the box, with the fingerboard $\frac{1}{4}$ " above the box side where it's attached. With the neck clamped in a vise, I place a washer beneath each screw head, and use a ratchet-type driver to torque down the connection.

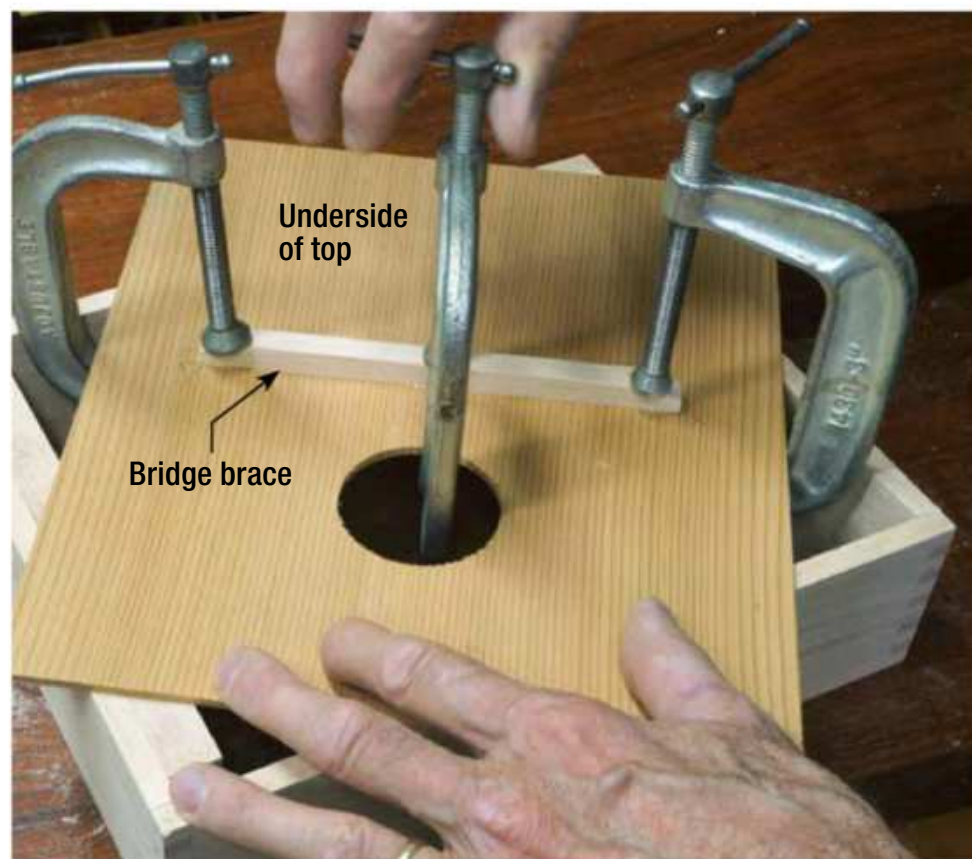
Good progress! Now let's work on the top...

Good sound depends on good wood. Luthiers often use Western cedar for guitar tops, and I found some at my local lumber yard—with enough thickness to resaw, glue up, and plane to make a good top. Look for clear stock with closely spaced growth rings; this tells you that the

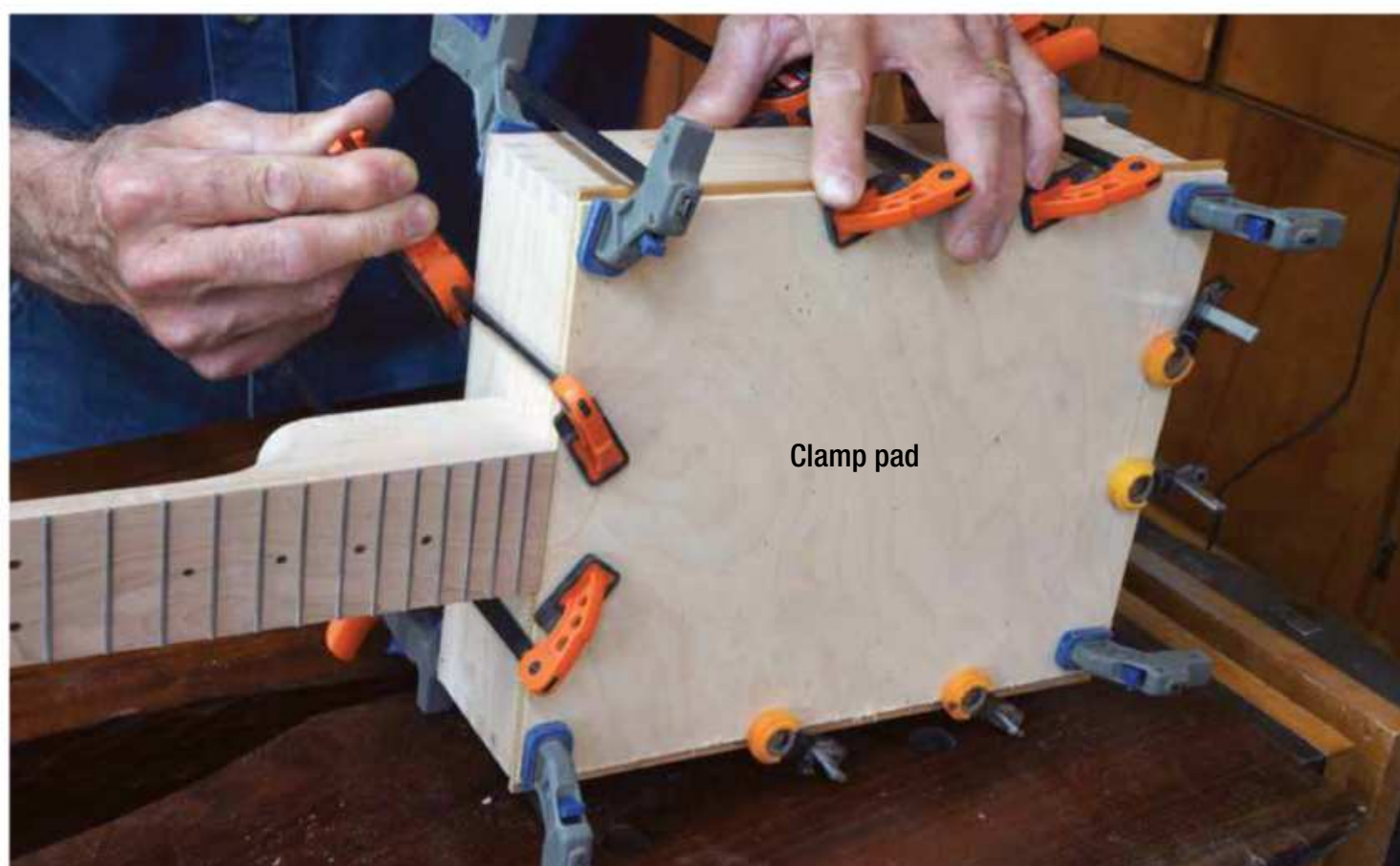
wood has taken longer to grow and will give a more vibrant tone. Plan on making a top piece $\frac{1}{4}$ "– $\frac{3}{8}$ " larger than the outside dimensions of your box, so it can be flush-trimmed after installation. After gluing up two book-matched boards, plane and sand the top to about $\frac{1}{8}$ " thick.



Make the sound hole with a circle cutter. In addition to using my hole cutter to make the 2"-dia. sound hole, I also set a larger diameter to make a decorative shallow circle, as shown here. To avoid tearout, drill halfway through, then flip your top and complete the cut from the opposite side.



Glue a brace beneath the bridge. The underside of the top needs some reinforcement beneath the planned location of the bridge. Glue a $\frac{1}{2}$ " square $\times$ 6" long brace in place as shown. Make sure to protect the soft cedar with clamping pads on the top's show face.



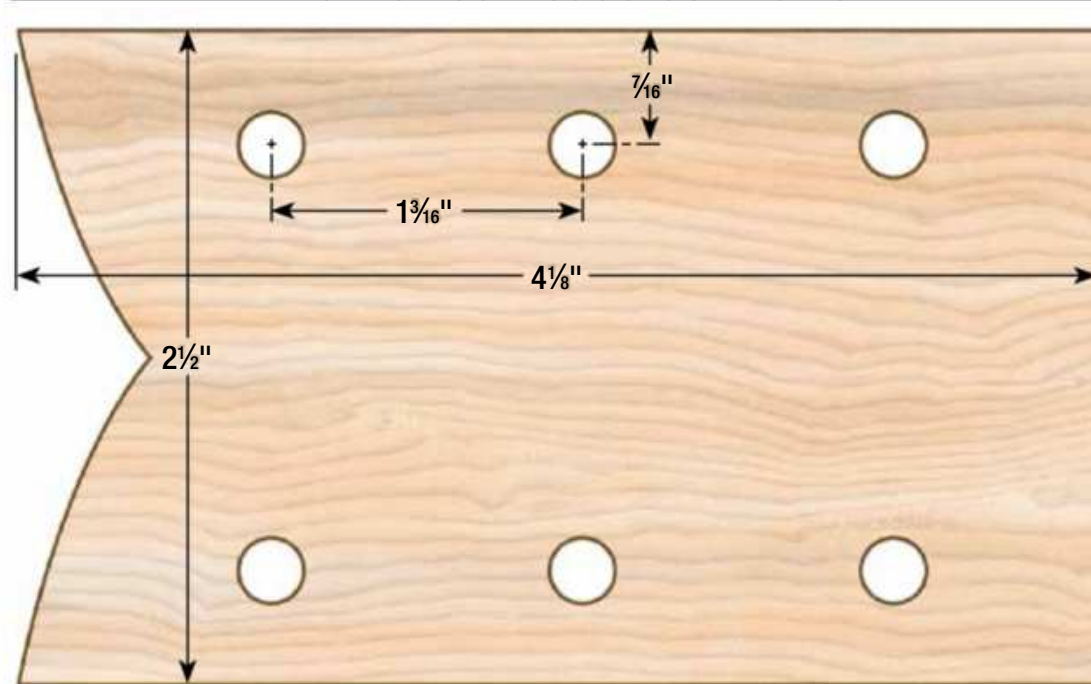
Glue the top to the box. Spread glue on the top edges of the box and press the top in place. Instead of using several clamping blocks, I simply placed a single piece of $\frac{1}{8}$ " plywood over the top before putting clamps in place. Trim the edges flush at the router table as before.

...and install the tuning machines and nut.

Tuning machines vary in size and design, so it's best to have yours in hand before you begin building the guitar neck. This will enable you to make sure that holes for pegs are sized and spaced correctly. Select a drill bit that matches your peg diameter.

Make the nut from a hard, durable wood like persimmon (which I used here) or ebony. Synthetic ivory (available from luthier suppliers) is also a good choice.

Full-Sized Headstock Pattern



Perfect holes for peg heads. To avoid tearout, I mark the hole centers and drill them out with a 1/8"-dia. bit. Then I drill in from both sides with a full-size bit, guided by the smaller holes.



Chisel out the nut slot. The nut's location is marked when laying out the frets. The width and depth of the nut slot is defined by a pair of parallel saw kerfs. I use a 1/8" chisel to remove the waste and create a flat recess for the nut.



Aim for a firm fit. I made the nut from persimmon, the only North American member of the ebony family. Cut the nut a hair oversize, then sand it for a tight fit, so it can be adjusted or replaced.



Tiny screws for tuning machines. Drill pilot holes that extend the full length of the screw shank. This will prevent stripping or breaking these tiny fasteners.

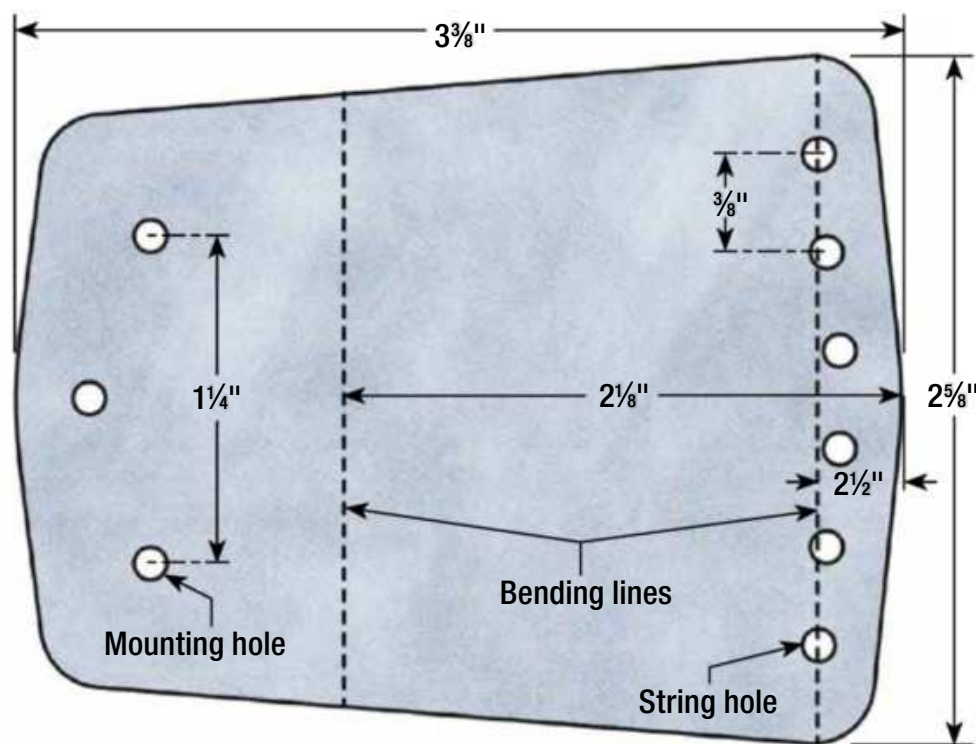
Get set for strings, then start to play!

Before tackling these final construction steps, treat your guitar to some finish. My preference is to apply several coats of wiping varnish. Once the finish is dry, it's time to focus on how to anchor the strings to the base of the guitar, support them an appropriate distance from the nut, and put them at a uniform height above the neck (action). As

you complete this final work, keep in mind that the action is important. Too high, and it's difficult to push strings down against the fingerboard. Too low, and the strings will buzz against the frets. Since the nut and the saddle are responsible for holding the strings, action adjustments are made by raising or lowering these two parts. ■

Full-Sized Tailpiece Pattern

Cut the tailpiece from galvanized sheet metal, then use a fine-cutting metal file to smooth all cut edges. All holes are $\frac{1}{8}$ " dia.



Punch, then drill. Follow the layout to mark hole centers, then use a metal punch to make a recess that will guide your drill bit. After drilling holes, you can personalize your guitar by using metal stamps on the tailpiece.

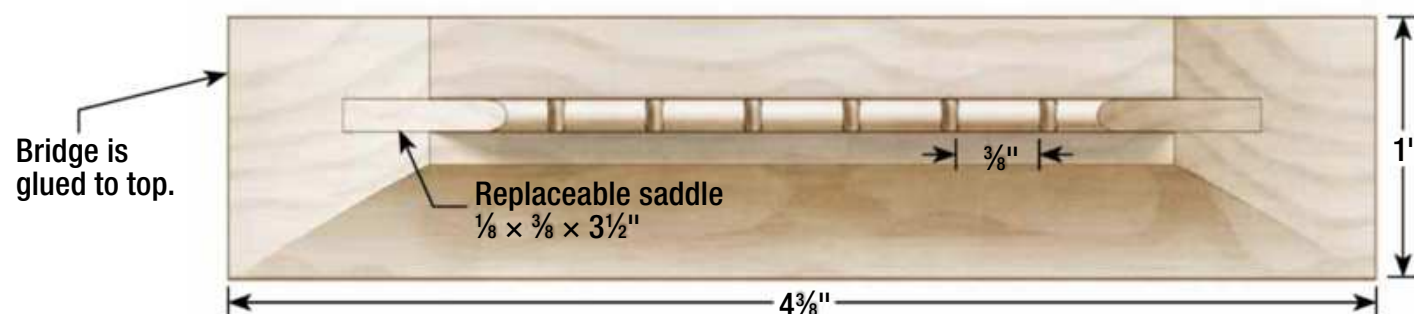


Use a vise to bend the metal. Put a near-90° angle where the tailpiece folds from the end to the front of the guitar. Then make an additional slight bend along the string holes to provide clearance underneath for the ball ends of the strings to fit.

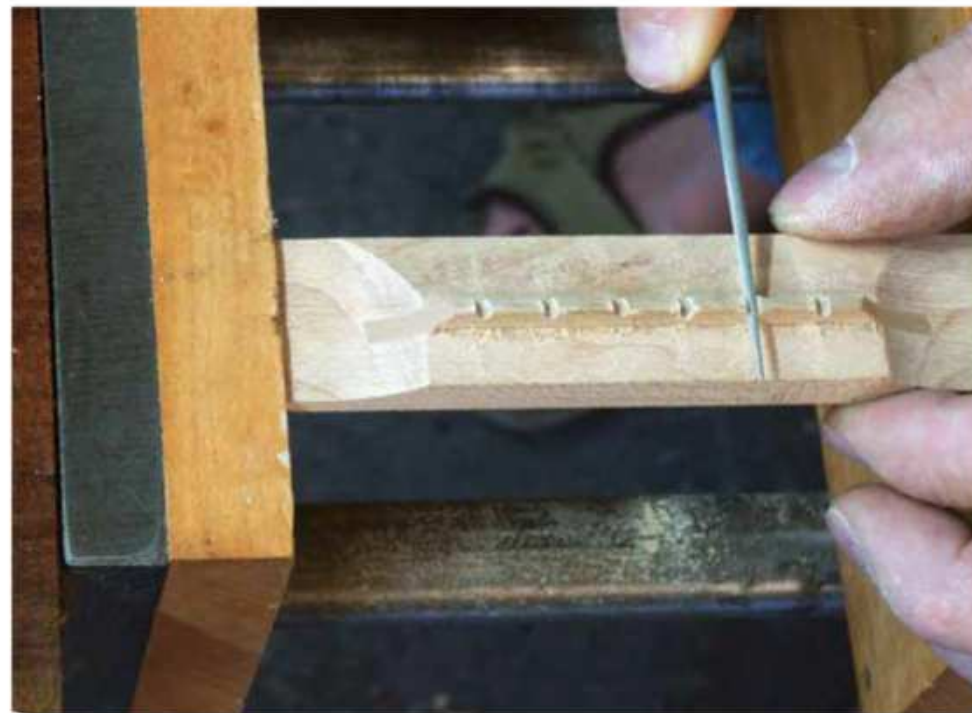


Install the tailpiece. Use a straightedge to align the tailpiece with the fingerboard. Painter's masking tape can mark the location as you drill pilot holes for three installation screws. Drive these through the tailpiece holes and into the box bottom.

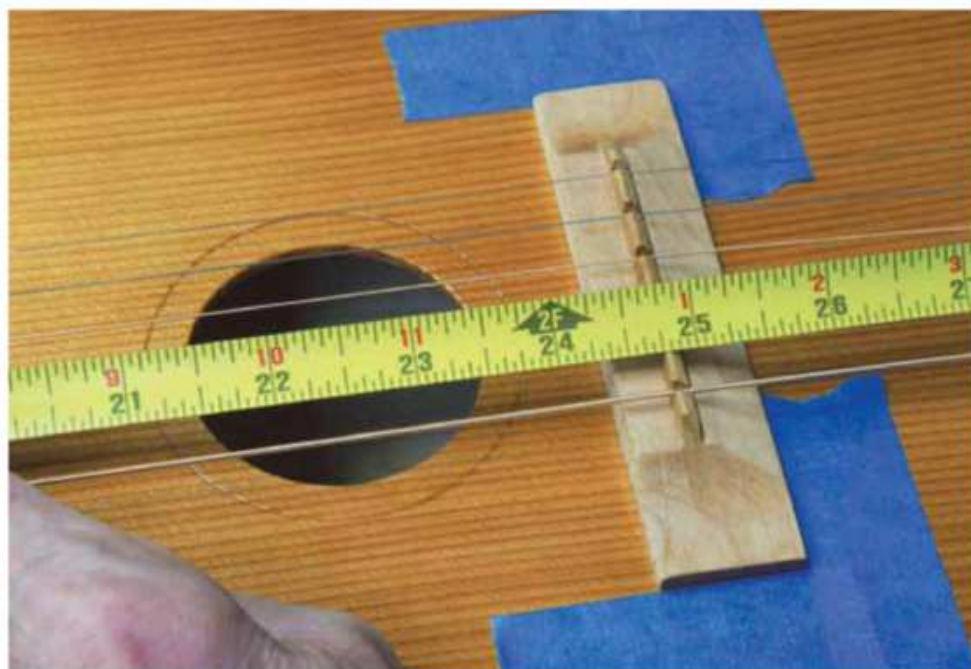
Full-Sized Bridge and Saddle Details



Finish off the nut. Space string slots $\frac{1}{4}$ " on center. Use fine rasps to file each slot, making wider slots for the thicker strings. Don't glue the nut in its slot, so it can be replaced or adjusted later.



Make the bridge. The bridge has coved ends and a slotted center that holds a separate but snug-fitting $\frac{1}{8}$ "-thick hardwood saddle containing the string slots. File these on the layout shown above, again using fine rasps.



Glue down the bridge. Proper tone depends on the correct distance between the saddle and the nut— $24\frac{3}{4}$ " for the template I'm using. String up the guitar, position the bridge as shown, and mark its outline with tape. Then loosen the strings and scuff the top where the bridge will fit using 220-grit sandpaper. Spread glue on the underside of the bridge, position it on the top, and tighten the strings to keep it in place as the glue dries. Great job! Now you can start strummin'.



Check out Doug's book:
The Box Maker's Guitar Book,
available at woodcraft.com.

(shou sugi ban)

焼杉板

FLAME

FINISH

An unlikely alliance of fire and wood creates a strikingly beautiful surface.

By Robert Spiece

The Japanese call it *shou sugi ban*. It translates to “burned cypress plank,” and is a traditional approach to treating home siding in Japan. Charring the surface of the wood creates a beautiful black finish that protects not only against rot, but also insects, who evidently hate the taste. It may seem counterintuitive, but this shallow, quick burning of the wood makes it fire resistant as well.

I’ve found that shou sugi ban is a great, tactile finish for interior work as well, and that it imparts a truly striking color and texture to a two-tone furniture piece like the table on page 36. Although cedar and pine are the traditional materials of choice for outdoor woods, I find that open grained, ring porous hardwoods like oak and ash lend a more refined look in their textures. Shou sugi ban is not a difficult skill to learn, very little equipment is required, and the style is currently very hot.



Safety Alert

To be absolutely fire-safe, you could burn outside on a concrete slab. However, I prefer to work inside in an area cleaned of sawdust, shavings, and wood scraps. If you can, begin the process with the piece upside down, targeting the raised section of the inverted piece, as I did with these table legs. For small pieces and panels, raise the work on cinderblocks. Of course you’ll want to keep water and a fire extinguisher at hand just in case. Finally, don’t work tired or mentally impaired; you need to stay alert when playing with fire!



onlineEXTRA

Visit woodcraftmagazine.com to see a short video of the author succumbing to his pyromania.

The right wood makes all the difference

I consider red oak the perfect candidate for this finish, although white oak and ash also take very nicely to it. The striking appearance is as much about texture as color. The coarse, open grain and clear delineation between latewood and earlywood in these species make the treatment really pop. The “cut” of the wood makes a difference too, as seen in the photo.

Before charring, sand the work through 180 grit. It may seem ridiculous to spend time sanding something that you’ll put a flame to, but charring doesn’t remove machine marks, and they don’t look good burned or not.

Good cooking candidates.

Oak and ash look great charred, brushed, and finished, regardless of the cut of the wood.



Tools and equipment

For the burning, I use a portable propane tank from the hardware store. It’s inexpensive and provides plenty of fuel for the job. I outfit it with an adapter on an extension hose to allow better maneuverability and flame control. For cleanup, choose a brush with stiff plastic bristles, which will remove soot without scarring the wood. To touch-up offset areas or recesses that are hard to burn properly, you can employ black aniline dye or a fine-tip black marker.



Portable propane tank with adapter and extension hose

Mixed black aniline dye

Clean and safe. When using flame in the shop, work in a clean, uncluttered area, and keep water and a fire extinguisher at hand just in case. With a table like this, invert it and burn the upended sections of the legs before righting it to finish the rest.

Artist’s brush

Black aniline dye powder

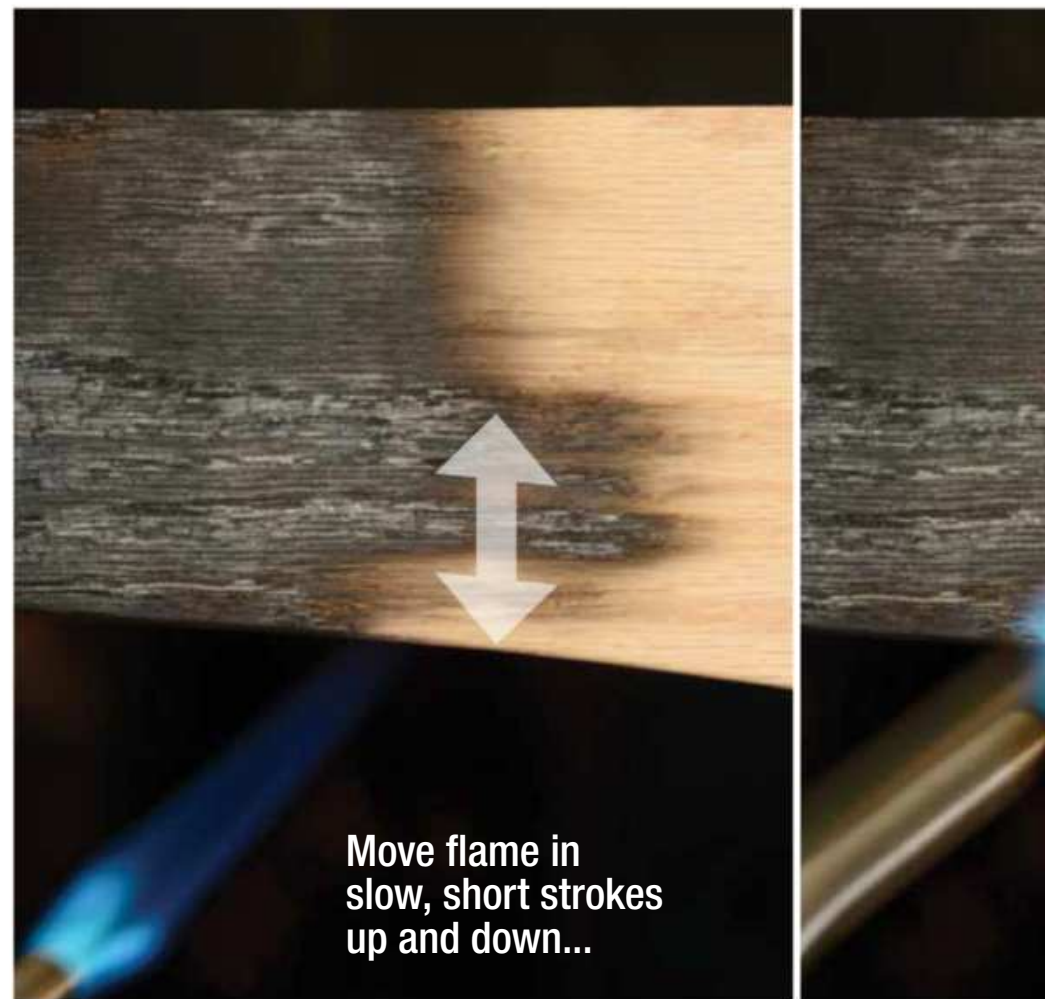
Black fine-point marker

Stiff-bristled plastic brush

Burning creates the color

With the work at the ready, adjust your torch for a strong flame. Then, working in short, overlapping passes, play the flame over the surface. The trick to achieving a consistently flat, black char is to target small areas at a time, moving along as soon as the surface catches fire, after which the flames should immediately die out. If you're getting anywhere near the point of needing to douse the project, work on fine-tuning your firebug sensibilities. Linger only as long as necessary, and avoid holding the flame too close to the work.

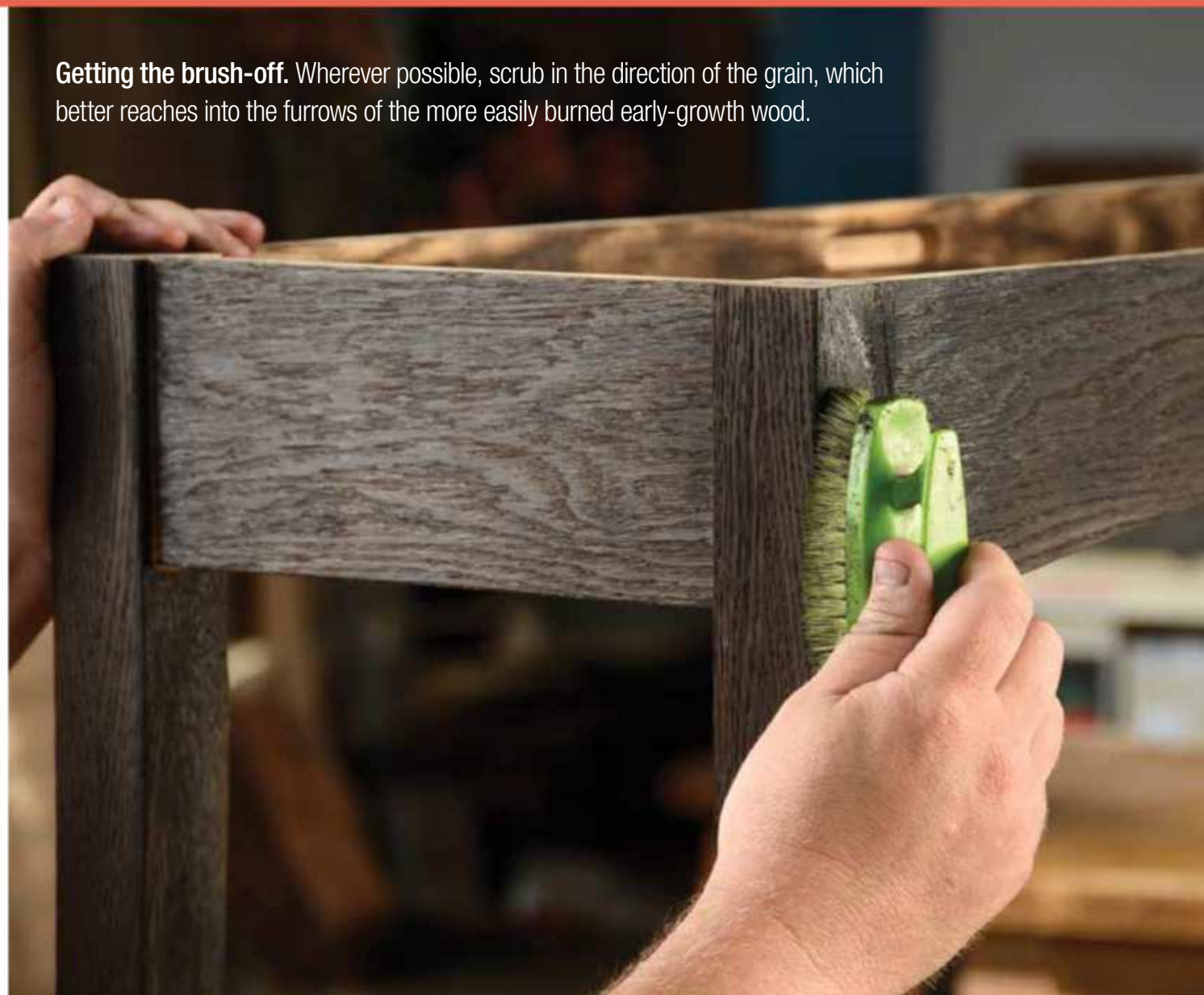
Go slowly over the piece, working one section or component in turn, paying attention to the flash point frequency as you move. You'll find that quartersawn grain burns much more evenly and easily than flatsawn surfaces, so adjust your pace to suit. It can be difficult to get a solid black burn at the juncture of offset joints or other recesses without overcooking the wood, so leave them for touch-up later with dye or a marker. Scrutinize completed surfaces and revisit any areas that haven't been fully blackened.



Brushing brings out the texture

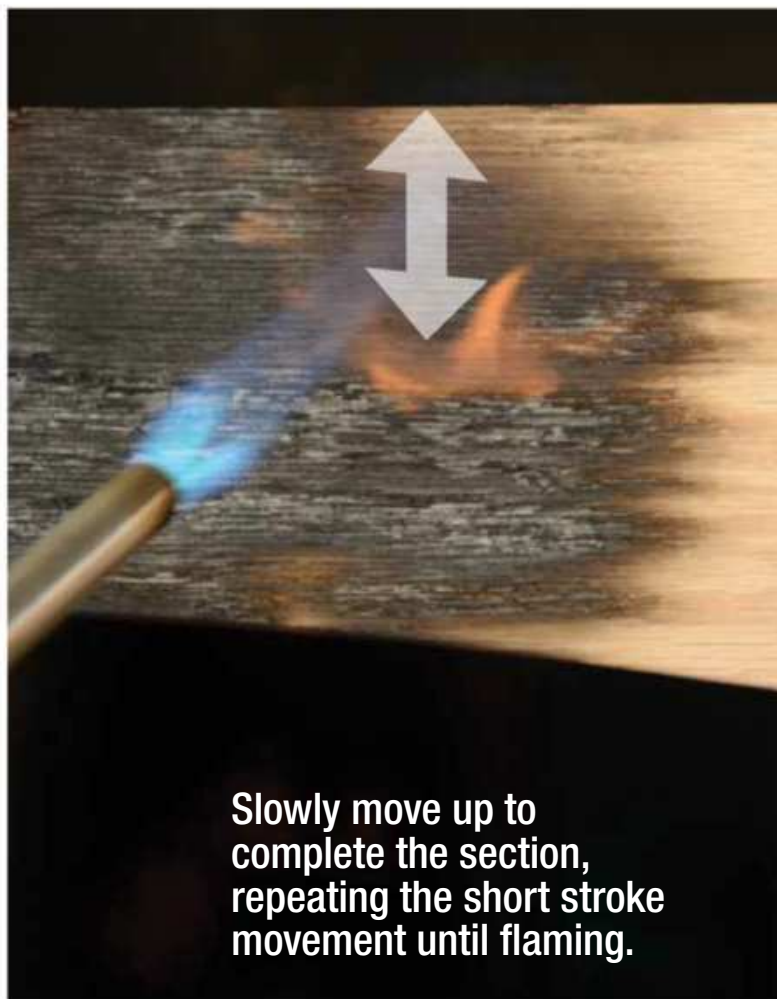
The next step is brushing, which cleans away the majority of the soot while creating texture. This is due to the fact that early growth burns away more readily than the late growth. Brushing also helps to more evenly distribute the color. It's not a complicated process, and it goes pretty quickly; just scrub vigorously in the direction of the grain.

Getting the brush-off. Wherever possible, scrub in the direction of the grain, which better reaches into the furrows of the more easily burned early-growth wood.





...until the surface flames.



Slowly move up to complete the section, repeating the short stroke movement until flaming.



Then move to next section and repeat.

Finishing includes a bit of touch-up

Now's the time to touch up around any offset joints or other recesses that you couldn't burn properly. You may be able to reach into these areas with a fine-tip marker, but applying dye with an artist's brush is a better bet. I used to dye the entire piece after burning, in order to fill in any insufficiently charred areas. However, I've found that it's kind of cool to see a bit of the oak color peeking through when lit with warm sunlight. It creates a bit of subtle warmth that the dye would remove.

Next, I suggest wiping the whole piece with boiled linseed oil. (Be sure to properly dispose of your oily rags, or you may have another type of fire to deal with.) After allowing the oil to cure for 5 days, I top-coat the piece with 3 or 4 coats of a satin wipe-on polyurethane, rubbing out with 0000 steel wool between coats. ■

Linseed oil sealer. Before applying several top coats of poly, I wipe on a coat of linseed oil to clean the surface of any loose charcoal dust and to provide some nourishment to wood that has been sapped of moisture by the flame.



Compact CLAMP CART

This roll-around caddy holds everything you need for glue-ups and fastening.

By Joe Hurst-Wajszczuk

Is it possible to simultaneously feel as if you own too many and too few clamps? If your clamps are piled more than a few steps away from your assembly table, then you already know the truth behind this woodworking paradox. When a glue-up goes smoothly, lugging clamps from one end of the shop to another (and cleaning them up at the end of the job) can feel like an endless chore. When things go south, the seconds lost searching for a few more clamps can result in disappointment, or even disaster.

This roll-around clamp caddy will clean up your clamp collection and may even tidy up your assembly operations. Despite a surprisingly small footprint—about 3½ sq. ft.—the cart's main rack can hold more than two dozen panel or bar clamps. Spin it around, and you'll discover two 36"-tall compartments offering shelving space for storing other assembly essentials, and my growing Festool collection. A pair of side racks attached to one side provide convenient storage for an arsenal of F-style, pistol-grip, and C-clamps. The remaining side can be accessorized to accommodate all sorts of clamping and joinery essentials, such as mallets, squares, and hardware.

The basic cart can be assembled in a weekend. After hanging your clamps and stocking the shelves, you can spend a few more hours building custom hangers for your most-used tools.

Like the Mobile Assembly Cart that appeared in our April/May 2014 issue (#58), this project's success hinges on its smaller stature. At 16 × 32 × 53", this caddy is easy to steer around a small workshop and through doors, but it's not well-suited for clamps longer than 60". My collection of extra-long clamps are kept on a sturdy wall-mounted rack that appeared in our Oct/Nov 2011 issue (#43). To download PDFs of both projects, go to woodcraftmagazine.com and click on OnlineExtras.

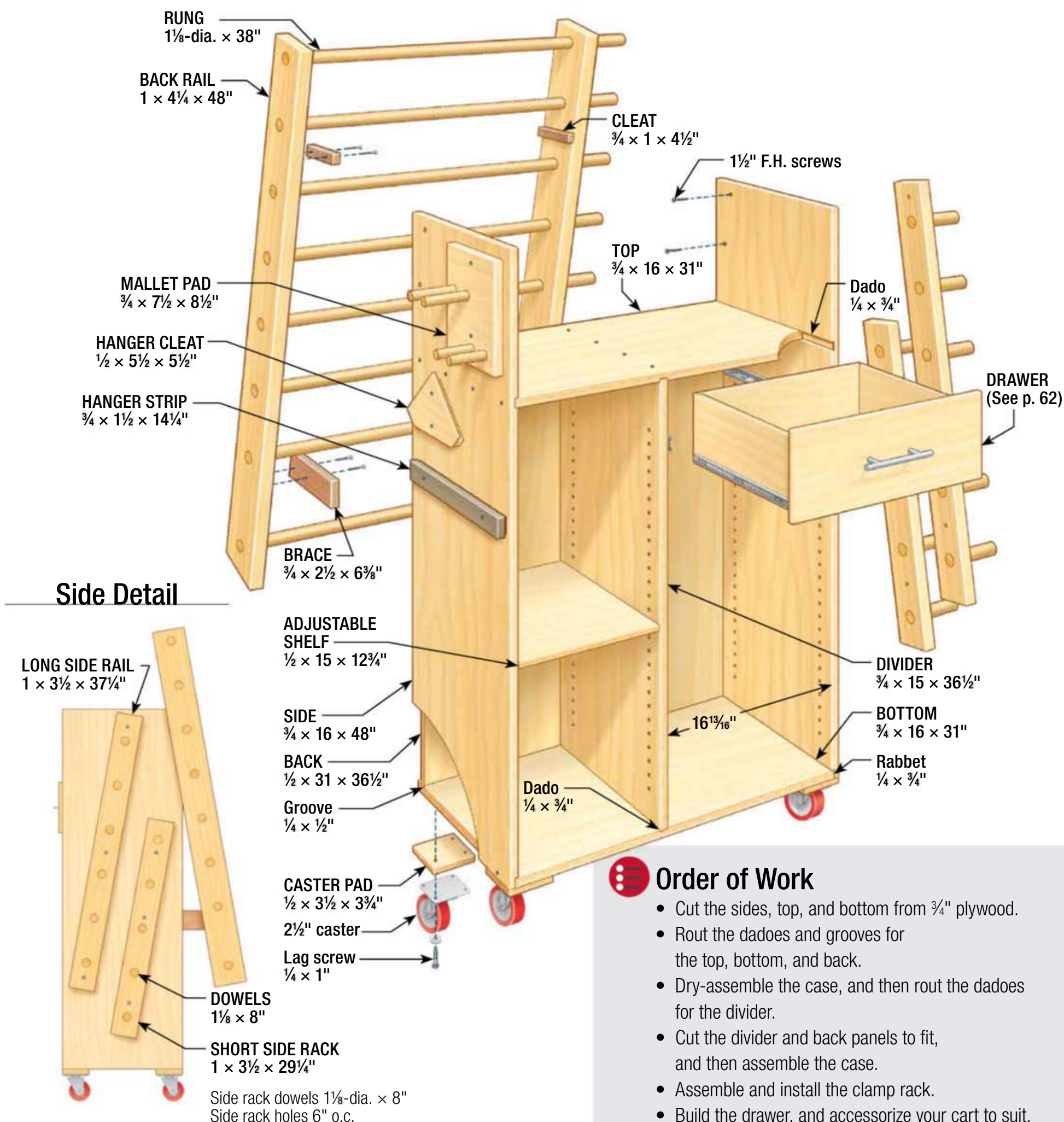


1½ sheets of plywood, 2 stair treads, and 10 dowels

This project's fixed case parts require just one sheet of ¾"-thick plywood and about a half-sheet of ½"-thick plywood. (You can use the leftover material to make shelves and tool holders.)

Download the cutting diagram (see OnlineEXTRAS) and have the plywood cut to rough size at the home center, then finish cutting the parts in your shop.

The adjustable shelves and sides can be customized to suit your storage needs, but the 16¹³/₁₆"-wide compartment is designed to accommodate Festool's Sys-AZ drawer hardware.



Order of Work

- Cut the sides, top, and bottom from ¾" plywood.
- Rout the dados and grooves for the top, bottom, and back.
- Dry-assemble the case, and then rout the dados for the divider.
- Cut the divider and back panels to fit, and then assemble the case.
- Assemble and install the clamp rack.
- Build the drawer, and accessorize your cart to suit.

A solid case, simply built

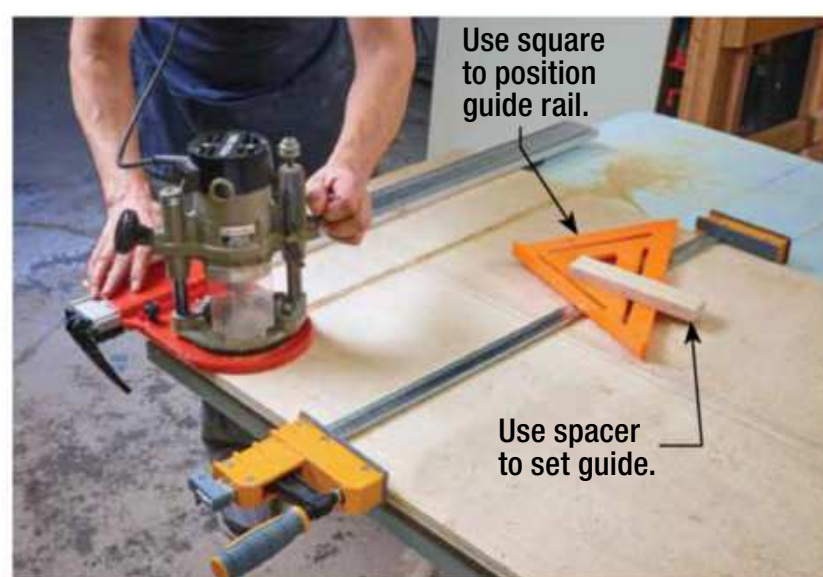
The trick to building a strong, square case is working in a manner that overcomes the tiny errors resulting from nominally-dimensioned plywood or from cutting on the wrong side of a pencil line. Start with the dimensions, then shift your focus on consistency. For example, ripping all of the outer parts of the case to width at the same time and stack-cutting corresponding parts to length ensures that matching parts are the same

size, even if your measurements are a bit off. When routing the dados and rabbets for the top and bottom, clamp the sides together, and then rout the pair at the same time. Rather than relying on measurements, use scrap to set the widths of grooves and dados, as shown.

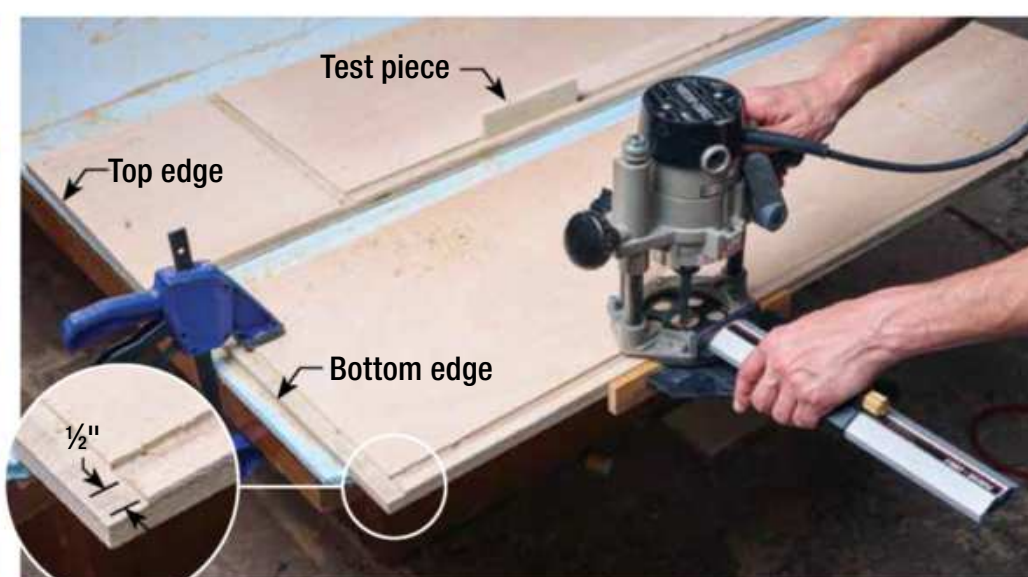
To ensure that my cart would accommodate Festool's shelving system, I screwed the case together, and then, routed the dados for the

divider with a template and flush-trim bit. After cutting the divider and back to fit, I reassembled the case, this time using glue and screws.

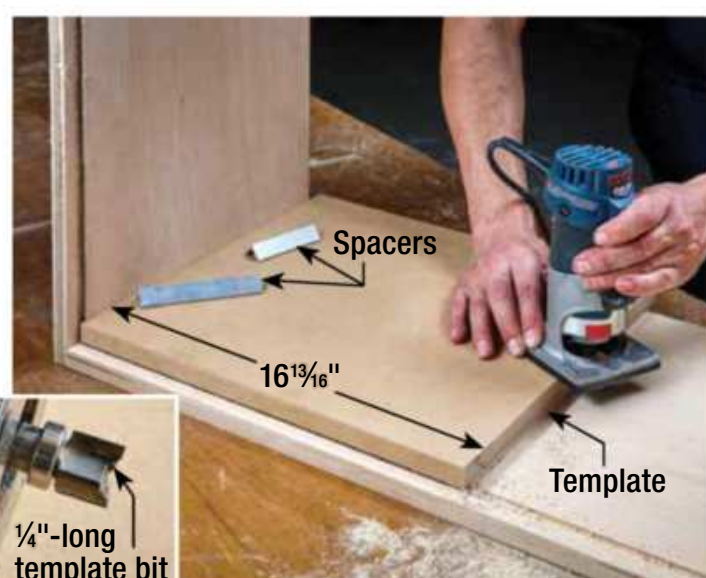
Once assembled, you can remove the clamps and continue with the build. To make the big box easier to move, I attached the caster pads and casters. Then, I set the case on its side and drilled the shelf pin holes. The 1" o.c. hole spacing offers plenty of shelf-positioning options.



Dadoes done right. Routing both sides at the same time ensures that the dadoes line up. Once set with a spacer, Bora's WTX router guide makes perfectly-sized dadoes in two passes.



Groove the sides for the back. When routing the groove for the back panel, remember to register the guide's fence against the back edge. You want the sides to be mirror images of each other, not an identical match.



Make a trustworthy template. To position the divider exactly $16\frac{13}{16}$ " from the side to accommodate Festool's Sys-AZ sliding drawers, I used a template and routed the dado with a $\frac{1}{2}$ " template bit. To complete the $\frac{3}{4}$ "-wide dado, I inserted a pair of spacers between the side and template and made a second pass.



Now get rolling. Plywood pads beef up the bottom so that the 1"-long screws don't poke through. Three screws per caster are plenty.

Quick Tip: Simple shelf pin insurance



A shelf pin drilling template can make quick work of drilling holes, but if you forget to flip the jig when drilling the opposing row, the holes on one side of your opening may not align with the other. Drawing a reference arrow on the face of the jig can help ensure that the jig is in the right orientation. Set the arrowed end against the bottom (or top) and keep it pointed in the same direction when drilling the other rows.

Make a sturdy rack to hold heavy clamps

Rather than milling the 1½"-thick rails from rough-sawn stock, I purchased softwood stair tread material from my home center. After ripping the rails to width, I taped the pair together, and then proceeded with laying out the holes (see Rack Detail). When drilling, I recommend using a drill press or drilling guide. If the holes aren't perpendicular to

the rails, you will have a difficult time assembling the rack.

Even though no glue is involved, fitting eight 1½"-diameter rods into 1½"-diameter holes is a little tricky. If a rod refuses to line up, or sticks, it will stop the process in mid-assembly. After tapping all of the rods into one rail, I used clamps, as shown, to hold the second rail in place, and then

to squeeze the assembly together.

Before attaching the rack to the cart, round over any sharp edges with a ¼" roundover bit. Then, screw the cleats to the inside faces of the back rails. Next, set the rack in place, and screw the rails to the sides. After checking the rack's angle on both sides, attach the braces where shown.

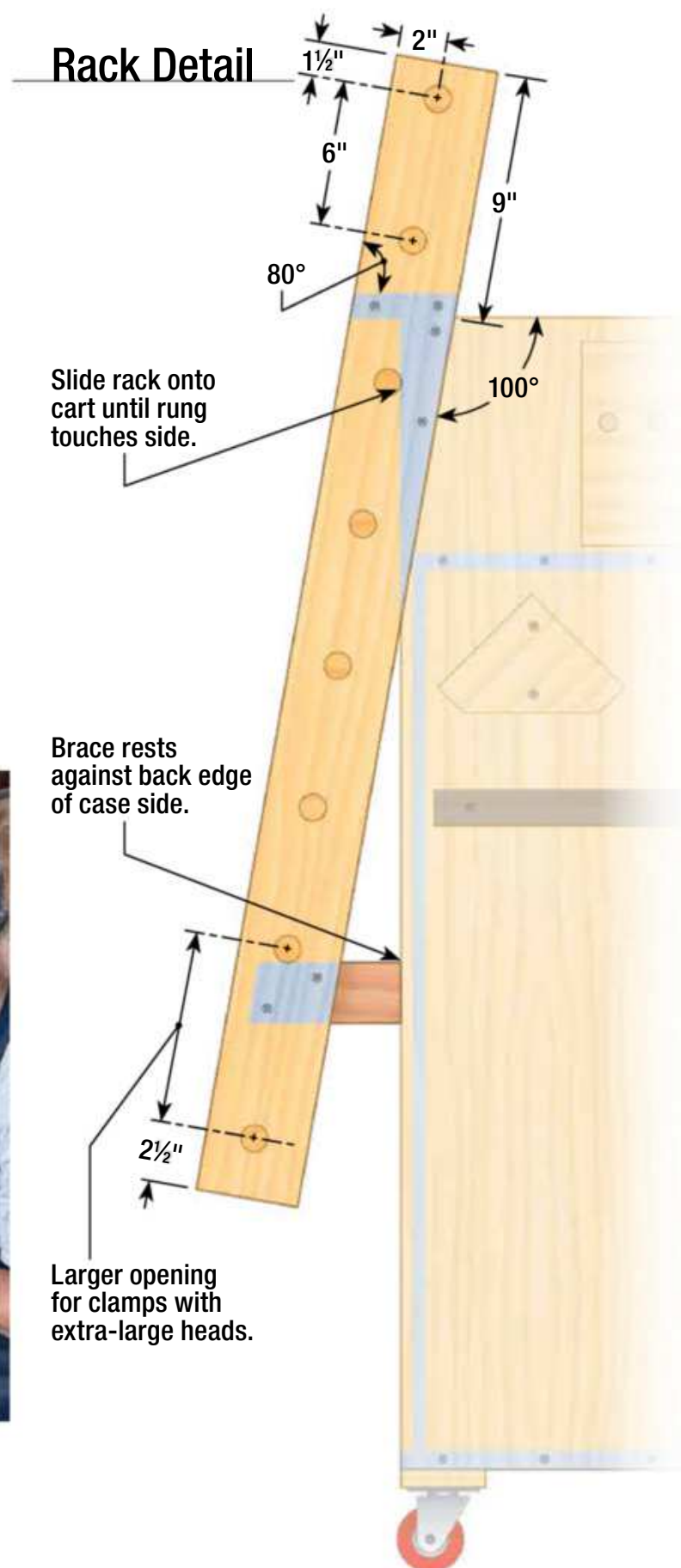


Paired to perfection.

Drilling the holes through both rails at once ensures that the holes line up. To avoid blowout, set the drilling depth so that the Forstner's tip just breaks through the bottom rail. Flip the rails and finish drilling the holes.



Under pressure. Fitting and installing the rods onto the rails requires a few extra hands. Start by applying light pressure when inserting the rungs into the opposite rail. Then, gradually squeeze the rail onto the rods until the distance between the rails matches the cart's width.



Assemble and install the drawer, then finish the cart

I made the drawer from $\frac{1}{2}$ "-thick plywood for sturdiness and because I had material left after making the case back. After ripping the drawer front, back and sides to width, I routed the grooves for the bottom where shown in the Drawer Detail. Next, I cut the sides to length and rabbetted the ends. Before cutting the front and back to length, verify the width of the opening. When using full-extension slides, the drawer's width should be 1" less than the opening.

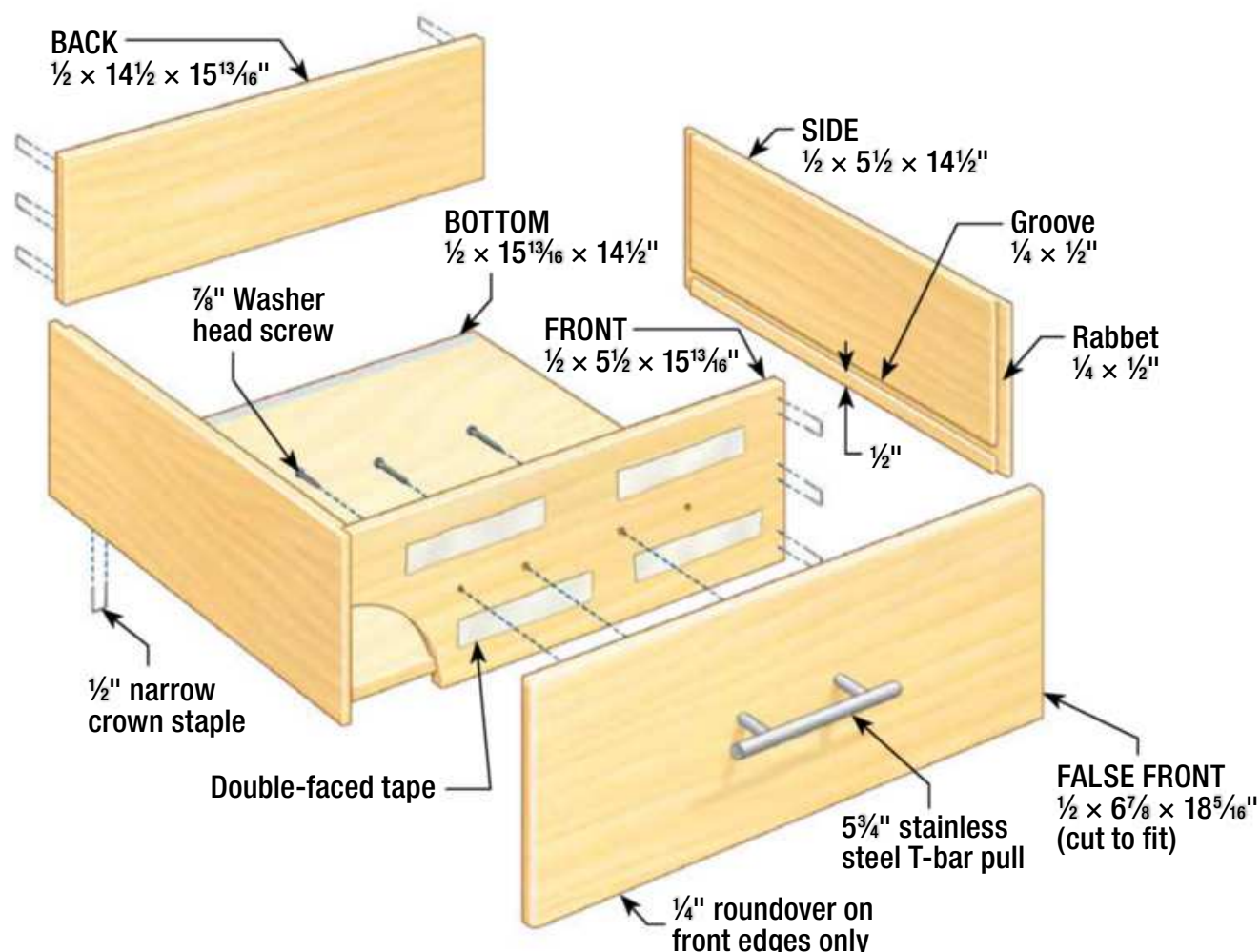
To assemble the box, I used glue and staples. Driving the staples in from the front and back rather than the sides offers plenty of holding power and conceals the utility-grade fasteners.

To install the drawer, first mount the slides 6" down from the top's lower face. Next, attach both slides to the drawer's sides with two screws apiece. Remove the drawer from the case and drive the remaining screws. Finally, re-install the drawer and attach the false front and pull.

Your cart is almost ready to work. Attach the side racks to the case (see the Side Detail, p. 59), and load up your rack with clamps. Install shelves and tool holders to suit.

Note: If you find that your cart seems tipsy, move a few clamps to the side racks to redistribute the weight and stock the shelves. ■

Drawer Detail



Slide installation made simple. Kreg's slide jig holds the hardware perpendicular to the front edge of the case. Pointing the guides in the opposite direction supports the drawer, enabling you to screw the slides to the sides.



onlineEXTRAS

- Clamp Cart Cutting Diagram
- **PLAN Mobile Assembly Cart**
- PLAN Wall-Mounted Clamp Rack
- Bora WTX Router Guide Review



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—Tim Snyder



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Defying gravity

Moving heavy machinery and furniture takes a toll on more than just your back. It can damage floors, walls, fingers, and toes. Forearm Forklift Lifting Straps won't bring back your 20-year-old physique, but these 3"-wide nylon straps can help you move heavy objects without damaging yourself or your surroundings. To relocate a chunk of cast-iron or a china cabinet, slip the straps under the object, then slip your arms into the loops and lift. Transferring the weight from your fingertips to your forearms reduces strain while increasing your control over the load. These straps do a good job of keeping me out of my chiropractor's office. I keep a pair in my shop and second pair in my truck.

—Joe Hurst-Wajszczuk

Forearm Forklift Lifting Straps

#150708, \$20.99

A little saw with big benefits

I was looking for a small folding saw to fit in my tool belt — something compact but capable of trimming shims, cutting boards to rough length, and handling other unexpected sawing assignments that come up during remodeling projects. The Genbaya folding saw excels at these tasks. The 5"-long, 14 tpi, Japanese-style "woodworking" blade that comes with this saw will make smooth, accurate cuts in any kind of wood. But if you want to expand your cutting capabilities, the saw accepts seven different blades, including keyhole, MDF, and camper/gardening versions. The blade locks in the open position, and the plastic handle has proved to be both sturdy and comfortable. No wonder this pocket-size saw has become my favorite. ■

—Tim Snyder



Genbaya Folding Blade Woodworking Saw No. 0570

#159594, \$22.00



Items above available at Woodcraft stores, at woodcraft.com, or by calling (800) 225-1153, unless otherwise noted. Prices subject to change without notice. See the Buyer's Guide on page 68 for more information.

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Buyer's Guide

Hot New Tools (p. 14)

- 1. Bessey GearKlamp.....Coming soon to *woodcraft.com*
- 2. Jet Bandsaw JWBS14-SFX.....Coming soon to *woodcraft.com*, **\$1,099.99**

Score Big with a Football Cutting Board (p. 26)

- 1. Forrest 10" Dado King Set.....#420747, **\$374.99**
- 2. Wagner Heat Gun.....*Lowes.com*, **\$19.97**
- 3. Freud Roundover Bit, ½" SH, ¼" D, 1" CL.....#815157, **\$35.99**

Teaching Table (p. 36)

- 1. #92 Medium Shoulder Plane.....#154032, **\$149.99**
- 2. Oil-free Steel Wool 0000 225g Roll.....#162190, **\$12.99**
- 3. Boiled Linseed Oil, Quart.....#85050**\$14.50**

Build a Box Guitar (p. 44)

- 1. Medium Fret Wire, 2 Foot.....**\$4.21**
- 2. Depth stop for Fret Saw.....**\$8.49**
- 3. Fret saw.....**\$48.63**
- 4. Economy Open-gear Tuning Machines, White Knobs, 3 Left/3 Right**\$14.90**
- 5. Gauged Nut Slotting File, .042".....**\$15.00**
- 6. Micro Chisel Set of 4.....**\$51.45**
- 7. D'Addario Phosphor Bronze Wound Acoustic Guitar Strings.....**\$6.99**
- 8. Needle Files, Set of 5.....**\$18.35**

(Above items available from at *stewmac.com*.)

- 9. Acrylic fretting Scale Template*cbgitty.com*, **\$12.49**
- 10. Black Open-gear Guitar Tuners/Machine Heads, 6pc., 3 Left/3 Right *cbgitty.com*, **\$9.29**
- 11. Nicholson Cabinet rasp, 2nd cut (#49)#06B01, **\$57.50**
- 12. General Tools Large Circle Cutter#16N41, **\$32.99**
- 13. Whiteside Flush-Trim, ¼" SH, ½" D, 1" CL.....#24A71, **\$16.94**
- 14. SE 36-piece Number and Letter Marking Punch Set*amazon.com*, **\$16.20**

Items above available at Woodcraft stores, at *woodcraft.com*, or by calling (800) 225-1153, unless otherwise noted. Prices subject to change without notice.

Flame Finish (p. 54)

- 1. Bernzomatic TS3500KC Multi-Use Torch Kit..... *homedepot.com*, **\$29.97**
- 2. Bernzomatic WH0159 Universal Torch Extension Hose.....*homedepot.com*, **\$15.97**
- 3. Boiled Linseed Oil, Quart.....#85050, **\$14.50**
- 4. Oil-free Steel Wool 0000 225g Roll.....#162190, **\$12.99**
- 5. Homestead Transfast Dye Powder, Accent Color, Black.....#123836, **\$12.50**

Compact Clamp Cart (p. 58)

- 1. Bora WTX Router Guide#542005, **\$49.99**
- 2. Bora WTX 36"-Wide Track Modular Clamp Edge.....#543036, **\$47.99**
- 3. Freud Upcut Spiral Bit, ½" SH, ½" D, 1¼" CL.....#828780, **\$67.47**
- 4. Whiteside Bearing Dado Template Bit, ¼" SH, ½" D, ¼" CL.....#814645, **\$21.56**
- 5. WoodRiver 2½" Caster, Swivel Plate (4 needed).....#152836, **\$13.50**
- 6. WoodRiver 15-hole 1" Spacing Shelf Pin Jig#150721W, **\$23.99**
- 7. WoodRiver ¼" Drill Bit for Shelf Pin Jig#150722W, **\$18.99**
- 8. Freud Precision Shear Forstner Bit, 1⅝" dia.....#832878, **\$16.99**
- 9. Hafele Shelf Supports, Bracket Style, Bronze, ¼" (25 pack)#27116, **\$5.29**
- 10. Kreg Drawer Slide Jig.....#162006, **\$24.99**
- 11. Kreg 3" Classic Face Clamp (2 needed).....#149086, **\$22.99**
- 12. Highpoint Full Extension Side Mount Drawer Slides, 14".....#160241, **\$14.99**
- 13. Vanitek Magnetic Tool Holder, 12" (2 bars)*amazon.com*, **\$12.99**

Great Gear (p. 66)

- 1. WoodRiver Silicone Chisel Guards, 10 pc.....#161193, **\$9.990**
- 2. Genbaya Folding Blade Woodworking Saw, No. 0570.....#159594, **\$22.00**
- 3. Forearm Forklift Lifting Straps.....#150708, **\$20.99**



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Proper angles for dovetails

Q I've started to work on laying out and cutting dovetail joints by hand, and I'm confused about the proper angle to use for dovetail joinery. What are the most common angles, and what are the factors that determine what angle to choose?

—Carl Minnick, via email

A Professional woodworker Chris Hedges replies:

Dovetail angles are expressed in two ways: as ratios and degrees. 1:8 roughly translates to 7° and 1:6 translates roughly as 9°. These days, we often hear that 9° is recommended for softwoods, while 7° should be used for hardwoods. The fact that router bits and dovetail gauges are made in these angles reinforces the notion that they are the preferred angles to use. But if you happen to study antique furniture, you're likely to see dovetail angles that range from 7° to 14° (1:4 ratio). Woodworkers who came before us chose their dovetail angles for the sake of appearance, I suspect. This notion is reinforced by research done at the Forest Products Laboratory. FPL testing on dovetail joints made at different angles between 7.5° and 17.5° showed no difference in joint strength. My suggestion: Invest in a good-quality bevel gauge that allows you to choose your own dovetail angles, and train your eye to be your guide in deciding what angles to cut. ■

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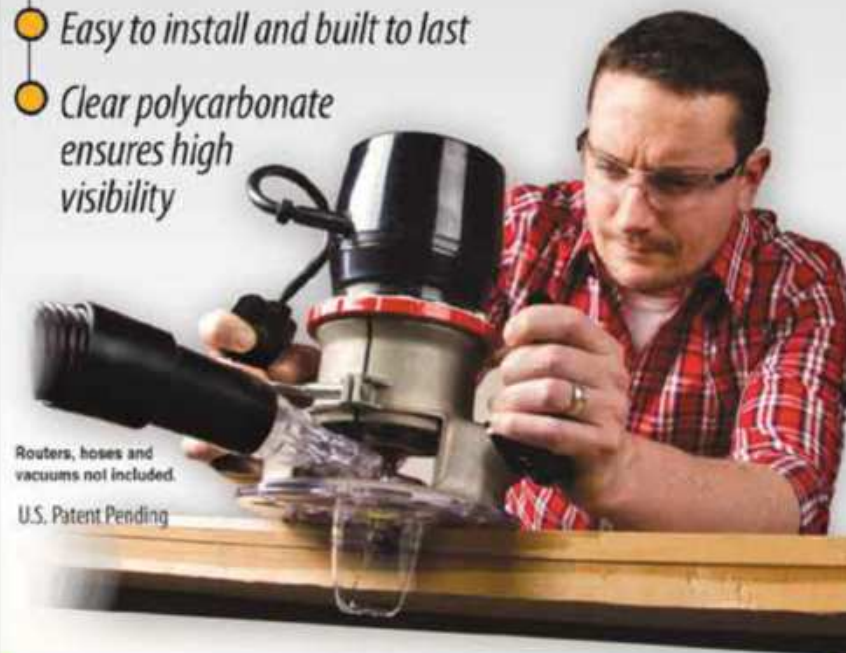
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Woodcraft is proud to partner with John Malecki, a former NFL offensive lineman turned self-taught woodworker and furnituremaker. John crafts custom furniture in Pittsburgh, PA, as well as producing tutorials and videos on his website, JohnMalecki.com and YouTube channel, [JohnMaleckiBuilds](https://www.youtube.com/channel/UCv33333333333333333333).

John attended the University of Pittsburgh and played four seasons in the NFL. After wrapping up his NFL career, he began building and selling furniture in 2014. Since then, he has worked with brands like Lululemon and West Elm Workspace PGH to build high-end industrial and reclaimed style furniture. John emphasizes the use of metal and wood in almost all of his furniture, pairing modern and industrial styles brilliantly.

A portrait of John, a man with a beard and short dark hair, smiling. He is wearing a dark grey t-shirt. The background is a plain, light color.

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Woodcraft is delighted to partner with West Coast furnituremaker Jory Brigham, who grew up among generations of woodworkers and craftsmen, discovering his own creative voice at an early age. Learning the craft without formal training gave Jory a greater appreciation for the freedom his career path has afforded him.

Since 2008, Jory has designed and built custom furniture for his own company, Jory Brigham Design, as well as offering classes in furniture building. He uses mostly domestic hardwoods and time-honored techniques to craft unique furniture at his San Luis Obispo, California, studio.

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The Final GIFT

Friendship, honor, and bravery in a pine box

By Jody Garrett

Dave and I had just sat down for our usual bagels, coffee, and conversation at the local diner. He was looking pretty good, considering his recent treatment for a tenacious form of brain cancer detected a few months earlier. This tough old ex-Navy pilot didn't talk about it much though, and I sometimes wondered if his illness shook me more than him.

He reached for his coffee and said, "I need a favor. You're a woodworker; I want you to make me a pine box." Then he handed me a one-page plan for the kind of "toe-pincher" style casket you see in the Westerns.

My jaw probably dropped when I realized what he was asking, but I wasn't going to turn down this friend of 25 years. I assured him I'd take care of it, but told him I didn't think he'd really need it for another 10 years. We finished our breakfast chat, shook hands, and—wanting to honor him with more than a toe-pincher—I was off to investigate the craft of casket-making.

Turns out it's not easy to find good information on the subject. I bought a book on the topic, but found it less than helpful. An internet search led me to a

site where I purchased a plan that was clearly intended for someone with better woodworking chops than mine. The sparse instructions were not for the faint of heart, leaving a lot to the imagination, particularly when it came to things like cutting the 35.25° and 30.33° compound angles on the lid. But I pressed on in Dave's honor and managed to complete the construction while he was away at treatment.

When he returned, he agreed to help me with the finishing work. You might think that staining and varnishing a friend's coffin with him would feel awkward, but it didn't. In fact, I suspect that we both welcomed it as a way to help reconcile his impending departure without wrangling words. And it did provide fodder for plenty of future "pine box" jokes to fend off the shadows.

Dave is still with us for the moment, and bravely facing down a 3% survival rate. As one ex-Navy man to another, I salute him. And I'm proud that my work will carry him toward his next port of call. ■



Jody

Dave



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