POPULAR
Woodworking
MAGAZINE
FEBRUARY 2026 | #287

TEXTURED WALL CABINET
This cabinet takes notes from Sam Maloof's designs

DRILL PRESS UPGRADE
Willie Sandry offers a drill press upgrade that compliments any shop

SCANDINAVIAN SKEWS
Lara Reisigl Domeneghetti introduces this traditionally ground carving tool

SHEA ALEXANDER

Hearth Stool

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INTRODUCING

11" Benchtop Oscillating Drum Sander

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- Dust port size: 4"
- Footprint: 11½" x 22"
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- Approximate shipping weight: 100 lbs.

Learn more about the Grizzly benchtop sander!

G0404

INTRODUCTORY PRICE

$1150

$99.95 FREIGHT

MADE IN AN ISO 9001 FACTORY

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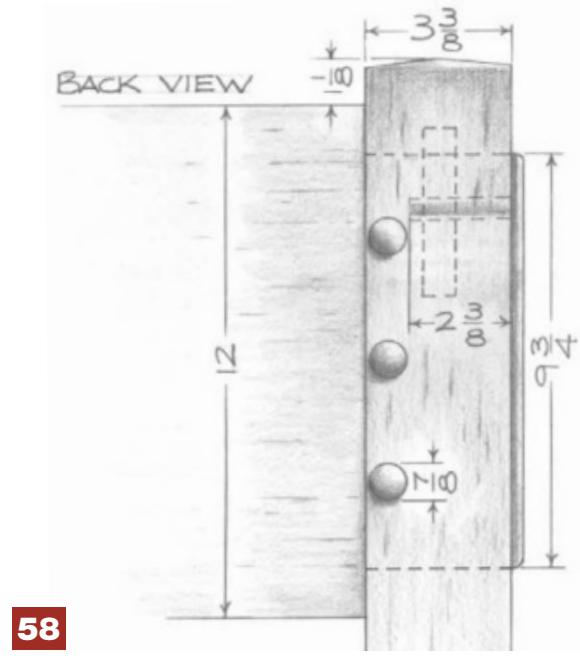

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FROM THE EDITOR

The Rear View Mirror

By Logan Wittmer

It's hard to believe that Woodworking in America 2025 is already a month in the rearview mirror. What a weekend it was—packed with seminars, demonstrations, vendors, and plenty of good old-fashioned camaraderie. I had the chance to visit with many of our subscribers, and the feedback we received was overwhelmingly positive. It's always rewarding to see so many woodworkers come together to share knowledge, stories, and a genuine passion for the craft.

Even though we just wrapped up, we're already deep into planning for WIA 2026. And I'll be honest—it's a mix of emotions. I love the event for all the reasons above, but I also know how much work goes into making it happen. Still, the energy and enthusiasm from this year remind me why it's worth it. We're on track to keep growing Woodworking in America every year. Keep an eye on your inbox in early spring for details about next year's event. If I were a betting man, I'd say it's likely happening in October, right here in Des Moines, Iowa—but we'll make the official call soon.

Another exciting development you may have heard about is our Woodworking Tours program—a sort of "side quest" we've been building between *Popular Woodworking*, *Fine Woodworking*, and *Woodsmith*. These are week-long, small-group tours to some of the world's great woodworking destinations. In fall 2025, we took 30 woodworkers to England for eight days of exploring historic workshops, museums, and the roots of English craftsmanship. That tour was led by *Woodsmith's* Phil Huber and *Fine Woodworking's* Mike Pekovich.

Looking ahead to 2026, we're planning three new tours: one through New England, another return trip to England, and a third through Scandinavia. A few of us from the magazines will once again join the groups to guide the tours. We do keep the groups small, so spots are limited. If the idea of traveling with a group of like-minded woodworkers sounds appealing, keep an eye on your email—tour sign-ups will open shortly after the holidays. I'm already looking forward to seeing some familiar faces—and meeting new ones—at both the tours and next year's WIA. Cheers!

ABOUT THE AUTHORS

SHEA ALEXANDER:

Hearth Stool*– *pg. 40

Shea Alexander is a custom furniture builder out of the Shenandoah valley in Virginia. Shea's love of woodworking was seeded at a young age, thanks to his father's introduction to carving. Shea is the co-founder of Alexander Brothers, where him and his brothers offer custom leather working, furniture, blacksmithing, as well as a full-service lumberyard.

LARA REISIGL DOMENEGHETTI:

Scandinavian Chisel*– *pg. 20

Lara Reisigl Domeneghetti has over 12 years of training in the fine arts and traditional handcrafts. Beginning her journey as a decorative painter and sculptural woodcarver in Italy, she went on to earn a Post Graduate Diploma in Historical Carving in London. Now based in Norway, Lara combines hands-on making with cultural and philosophical inquiry, exploring not only how objects are made but why they matter.

COLLIN KNOFF:

Maloof Cabinet*– *pg. 48

With a background in industrial design and digital content management, Collin found the perfect fit for his skills and interests when he became the Digital Editor of *Popular Woodworking* in 2019. He has a particular passion for mid-century modern furniture; there's just something about the clean lines, functional beauty, and timeless appeal. Collin is committed to making woodworking approachable and accessible for everyone, growing the craft and fostering the next generation of makers.

KEVIN PIERCE:

Stickley #210 Illustrations*– *pg. 58

Kevin Pierce is an accomplished illustrator known for bringing woodworking projects to life through his detailed drawings and diagrams. His artwork has appeared in several woodworking books, where his clear and precise style helps woodworkers visualize complex techniques. Pierce's contributions have made him a trusted visual guide for craftspeople learning through the page.

WILLIE SANDRY:

Drill Press Upgrade*– *pg. 28

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

PHOTOS PROVIDED BY THE AUTHORS

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WORKSHOP TIPS

PHOTO PROVIDED BY THE AUTHOR

Make Shavings, Not Dust

I hate sanding. Even with dust collection, machine sanding is noisy and makes my arm feel like jelly. I like to turn to the scraper, a quiet hand tool that doesn't make any dust at all.

Think of a scraper as a substitute for sandpaper. In fact, scraping is *faster* than sanding. It's easy to remove mill marks with a Stanley #80 and get a perfectly flat surface to boot. Then turn to a plain cabinet scraper for the final licks. Your arms will get a healthy workout, but you won't have to worry about spewing dust into the air.

The harder the wood, the better the scraper will work. Lightweight woods, like pine and basswood, can't stand up to scraping, but with the majority of hardwoods you'll get a surface that requires a very light sanding with fine paper.

Thin Kerf Rip Blade

It's hard to collect dust from a tablesaw, but choosing the right blade can help minimize the amount of dust you create. A thin-kerf blade makes about 25% less dust than a standard blade. That's far less dust in your face!

Here's more: Use a dedicated rip blade when cutting the length of a board. A rip board makes relatively large shavings that are less harmful to your lungs than some of the small shavings and dust made by combination or crosscut blades. Combine rip teeth and a thin kerf into a single package and you've got a great dust-busting tablesaw blade.

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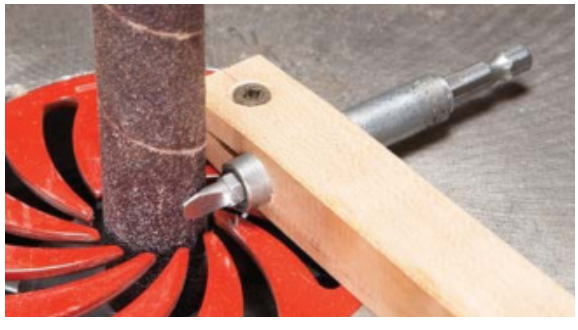
WORKSHOP TIPS

Venetian Blind Trick

When gluing plastic laminate to a substrate, lots of folks use sticks or dowels to support the laminate. Supports allow you to perfectly position the laminate, since it can't be shifted once it contacts the glue. I use old mini-blinds, curved side down. Mini-blinds are easy to pull out and easy to clean. — *J.A. Wilson*



New Road for Old Drivers

I use lots of Phillips-head sheetrock screws, which are made of hardened steel. They're tough on bits. A worn-out bit can't be re-sharpened so I reshape it to fit a slatted screw using a small diameter sanding drum. I place the bit in a magnetic holder and slide the holder into a wooden block that has a kerf cut in one end. Tightening a screw squeezes the ends of the block tight around the holder. Using a block, I can precisely position the bit in order to grind perfectly parallel sides. — *Simon Watts*

Extendo Chucks

I have a hard time throwing things away, such as these chucks from a couple of worn-out drills. To put them back into service, I brought a 3' long, 3/8" diameter threaded rod at the hardware store and cut it into two pieces, 12" and 24" long. I threaded the old chucks onto the rods and secured them with jam nuts. I covered the exposed threads with 3/8" i.d. vinyl tubing, also from the hardware store, to protect my fingers. I now have two extended chucks for drilling or driving in hard-to-reach areas. — *Serge Duclos*

"Y" Shaped Fittings are Best

Don't you hate getting held up in your car at a crowded intersection? Dust has the same problem trying to enter the main run of a central dust collection system. Give it a freeway on-ramp by installing a Y fitting rather than a T fitting. T fittings create more turbulence in the air passing through them, so you get less suction. A 45° Y is more efficient, and a 30° Y is best.

Position the Y so it comes off the side or top of the main branch. If the Y points down, material passing through the main run will fall into the branch run when the branch's blast gate is closed.

PHOTOS PROVIDED BY THE AUTHOR

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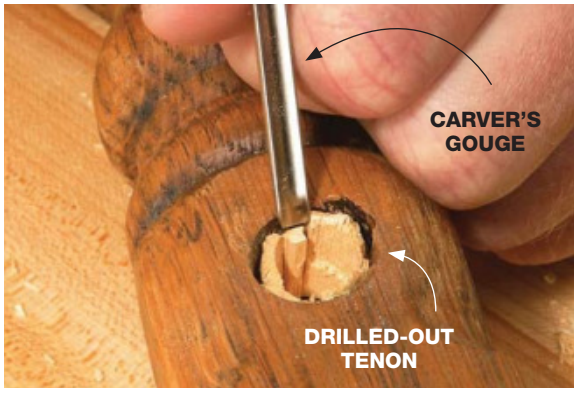
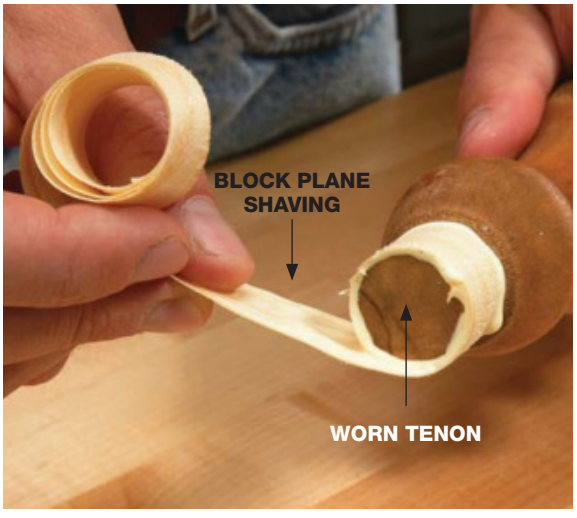
WORKSHOP TIPS

Hollow Out, Then Chip Out Broken Tenons

When half of a dowel or tenon stays in its hole, you'll be tempted to grab a bit of the same size and completely drill it out. But this is almost certain to leave you with an enlarged, off-center hole. Instead, use a bit that's about 1/8" smaller than the socket. Then break out a section of the remaining material and the rest will chip out easily. A small carver's gouge is the perfect tool for the job, but a narrow chisel or even a sharpened screwdriver will work, too.





Wrap Up a Worn Down Tenon

When a joint loosens and begins to wobble, the tenon and socket wear each other down. To enlarge the tenon and restore a tight fit, wrap it with a shaving from your plane. Keep in mind that wear and shrinkage turn round sockets and tenons into ovals. This means you'll have to do some careful sanding to shape the tenon just right.

Restore Strength with Steel

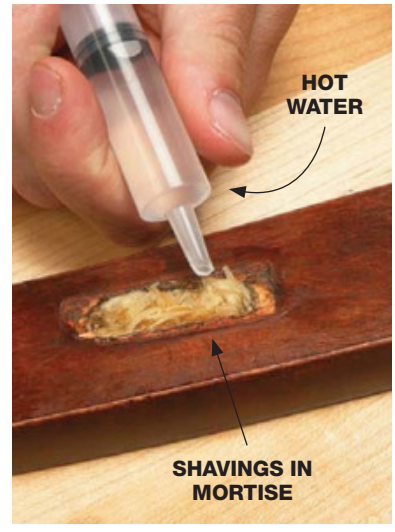
Most furniture fractures can simply be glued back together. But some breaks are messy, leaving splintery fractures that won't form a strong glue joint. You could replace the entire part, or you might be able to reinforce it from inside—usually without removing it. Begin by gluing the part back together as you normally would. Next, you'll need a long drill bit and a steel rod to length. Diameters depend on repair, but the bit should be 1/16" to 1/8" larger than the rod. Steel rod (threaded or smooth) and 12"-long bits are available at home centers.

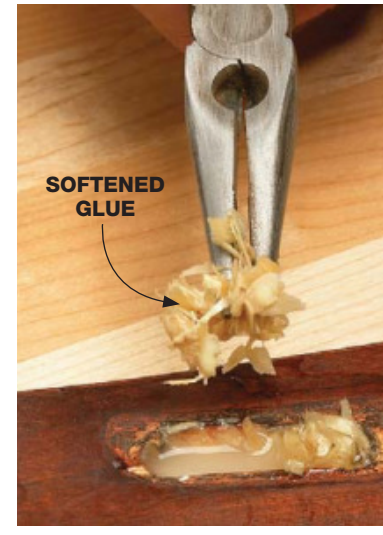
1 Bore a deep, oversized hole that extends through the re-glued fracture. For easier drilling and less stress on the fracture, start with a smaller bit before drilling the full-diameter hole. Pull the bit out every few seconds to clear wood glue.

2 Partly fill the hole with epoxy and insert the steel rod. Be prepared for epoxy overflow as you insert the rod by taping adjacent surfaces and watching for drips.

Shaving & Hot Water Get Glue Out of Holes

Scraping, sanding, or reaming old glue out of socket or mortise is slow, tedious work. And it's tough to do without enlarging the hole. So why not let heat and moisture do the work for you? A big syringe lets you put steaming-hot water right where you want it and crushed shavings from a block plane are great for soaking up the softened glue. Pull out the shavings with needle-nose pliers after 15 minutes or so. You might have to repeat the process a couple of times, but it's still safer than other methods. Let the wood dry out for a couple days before reassembly.



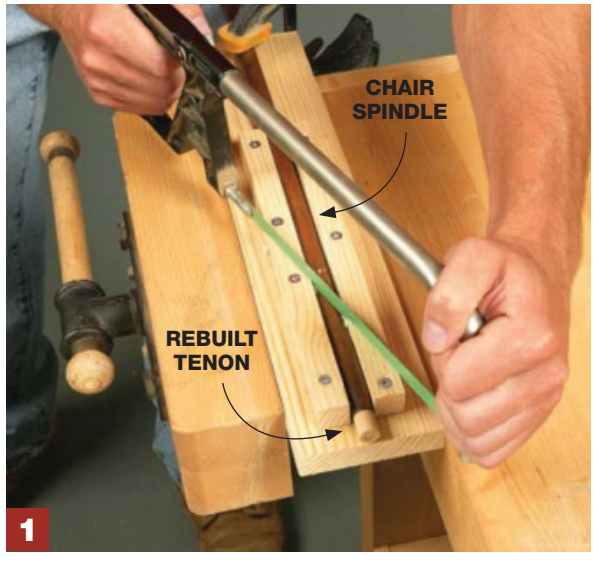


Insert a Spindle or Rung

A broken spindle or chair rung can be removed well enough. But how do you get the repaired or new part back in without major disassembly? The answer is a scarf joint: a long, tapered cut that provides plenty of surface area for a strong area joint. A scarf joint is less visible than a simple cross cut.

1 Make a scarf cut, slicing the part in two. A fine-tooth dovetail saw is perfect for the job, but a fine hacksaw blade also leaves a clean cut with almost no tear-out.

2 Glue and insert the ends of the scarfed part. Then immediately glue the scarf joint together.



PHOTOS BY MIKE HABERMANN

Connect

NEW TOOLS

Ultra-Shear® Ultimate Stack Dado 2.0

Over the past few years, *Woodpeckers*' Ultra-Shear line has become my go-to for router bits and saw blades. The company made a serious investment—both in high-end machinery and development time—to produce what I'd argue are some of the best-performing cutting tools on the market today. As the manufacturer and retailer, they have the ability to offer this level of quality at a notably lower price point than many competitors.

Recently, the team unveiled an update to their already-excellent Ultimate Dado Stack with the release of the Ultimate Dado Stack 2.0. The new design features lighter chippers, which *Woodpeckers* describes as resembling a "bicycle sprocket." This design trims weight from the entire stack, allowing table saws equipped with electronic blade brakes to stop the blades faster and more efficiently.

DADO STACK 2.0
Woodpeckers
Woodpeck.com
Price: $349.99+

While the lighter chippers are a welcome upgrade, the real headline here is performance. The Ultimate Dado Stack 2.0 delivers the same performance that made the original a favorite in my shop. It's available in both a standard configuration and a flat-top grind version—the latter producing flat-bottom dadoes that require no cleanup for tight joinery. — *Logan Wittmer*

Veritas Low Angle Jack Plane

In the world of hand tool enthusiasts, there's a devoted camp of woodworkers who live and die by their low-angle handplanes. That group just received some exciting news—*Veritas* has unveiled a complete redesign of their beloved Low-Angle Jack Plane.

The most notable upgrades include a newly closed toe (still with a fully adjustable mouth), added heft (she's a solid 6 pounds now), and pre-drilled holes that accept several of *Veritas's* popular accessories. These changes make the plane more user-friendly and adaptable right out of the box.

What continues to make low-angle planes so appealing is their sheer versatility. The 12° bed angle, paired with the standard 25° iron, delivers an effective 37° cutting angle—perfect for slicing through end grain, shooting miters, and even jointing and smoothing tasks. Add on accessories such as the Shooting Grip, Variable-Angle Fence, or the new Technical Fence (shown above), and you've got one of the most capable and customizable planes in your till.

LOW-ANGLE JACK PLANE
Veritas
LeeValley.com
Price: $299.00+ (Plane), $89.00 (Fence)

The *Veritas* Low-Angle Jack is available with O1 (my personal favorite), A2, or PM-V11 blades. The ability to tailor cutting angles simply by swapping irons makes owning an extra blade or two an easy choice. For those looking for one plane that will cover almost every task in their shop, I don't know that you have any further to look. — *Bob Reynolds*

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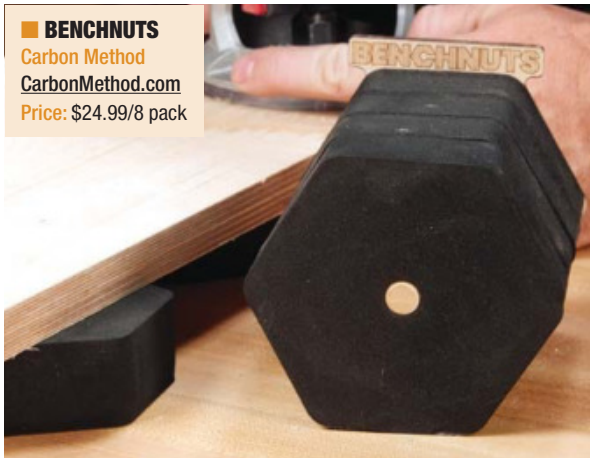
NEW TOOLS

BenchNuts by *Carbon Method*



BENCHNUTS
Carbon Method
CarbonMethod.com
Price: $24.99/8 pack

I'm a huge fan of bench stand-offs. I use them constantly—for sanding, routing, finishing, and just about any task that requires keeping a workpiece off the bench. So when I was chatting with the crew from *Carbon Method* at our Woodworking in America event, they told me about their new product, BenchNuts. I figured they were simply *Carbon Method's* take on the standard shop staple. Turns out, I was wrong—way wrong. These things are fantastic.

As you can see in the photo to the right, BenchNuts take a different approach. Instead of the usual plastic puck with foam faces, each BenchNut is a simple die-cut foam hexagon (hence the "nut"). But don't let that simplicity fool you—the material is the secret. The closed-cell foam has insane grip. I have no idea what kind of foam it is, but it's perfect for the job. That tracks with *Carbon Method's* obsession with material science—it's what makes their coatings so good, and now it's what makes BenchNuts special.

Each pack includes eight BenchNuts, giving you plenty of support for whatever you're working on—assembly, routing, sanding, or sawing. They measure about 3 3/4" across (flat to flat) and accept a standard 1/2" dowel, making them easy to integrate into jigs, fixtures, or even 3D-printed setups. — *Logan Wittmer*

Angle Grinder Head from *Foredom*

ANGLE GRINDER HEAD
Foredom
Foredom.net
Price: $144.30

Ironically, some of the most versatile tools in the shop come from very specialized corners of woodworking. Take my *Foredom*, for example. Anyone in the carving or woodturning world knows the name well. *Foredom* has been building flex-shaft tools for over a century, and while they've long served those markets faithfully, I've discovered that their tools are incredibly useful for all sorts of shop tasks—especially when you start exploring their wide range of handpieces and accessories. One of my favorites is the Angle Grinder Head, shown here.

This attachment is designed to fit the H.30 chuck-style handpiece. It's machined out of metal, and feels like it's meant to be put to work. A square-drive adapter is held in the handpiece chuck and keys into the grinder head, which then tightens securely with a clamping collar. Fire it up, and you can't help but grin—it's a cute little tool that feels great in hand and makes short work of whatever you put in front of it.

The Grinder Head accepts 2" discs, and *Foredom* offers more than a hundred different options—from flap sanding discs (like the one shown here) to hook-and-loop pads and Scotch-Brite-style woven abrasives. In fact, nearly any 2" disc with a 3/8" arbor will fit. Whether you're shaping, smoothing, or grinding, this little mini-grinder that is hard not to love. — *Danielle Lowery-Ruscher*

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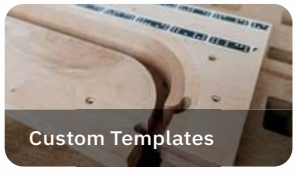

SHAPER

PRECISION CUTTING SIMPLIFIED

Connect

NEW TOOLS

A2-26 *Hammer* Jointer/Planer Combo

A2-26
Hammer
Felder-Group.com
Price: $2599.00

In a small shop, every square foot matters. I recently downsized from a roomy single-stall garage to a space that's almost half the size. To make the most of it, I turned to the new *Hammer* A2-26 jointer/planer combo—my first step toward a more efficient layout.

The A2-26 follows the same proven design principles as *Hammer's* larger machines, including their reliable cutterblock system, but it comes in at a far more approachable price point. You can choose between straight knives or a spiral cutterhead, both offering a 260mm (10.25") jointing and planing capacity.

Ironically, the feature I value most about this machine is its modest footprint. At just 42" long, and with the optional mobile base, the A2-26 delivers tremendous capability in a compact package. When you factor in its performance and build quality, it's one of the best values in small-shop machinery. — *Greg Kopp*

BITWASHER
Shaper Tools
ShaperTools.com
Price: $99.00

Shaper Tools BitWasher

The sharpness of a blade or bit plays a huge role in the quality of cut you'll get. A dull edge leaves a rough surface, burns the material, and demands extra force to push through. But before you assume your bit is dull, there's a good chance it's just dirty. Pitch and resin buildup can mimic the same symptoms as a worn edge.

Shaper Tools' new BitWasher offers a smart solution. It's an ultrasonic cleaner designed to remove built-up residue from router bits and small blades. The complete kit includes the cleaner, a mesh basket for holding parts, a bottle of cleaning solution, and a set of tools for scrubbing and retrieving items.

The BitWasher features a simple dial timer that runs up to twenty minutes, though *Shaper's* cleaning solution is strong enough that I've rarely needed more than ten. As you can see in the before-and-after photos to the left, the results are impressive. The ultrasonic action handles most of the grime, and any leftover residue comes off easily with the included brush.

For anyone who wants to keep their bits cutting cleanly and extend their lifespan, the BitWasher is an easy win. — *Collin Knoff*

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NEW TOOLS

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Keeping your parts flat, square, and true is essential for building projects that not only look good but last for generations. Square stock makes every step of construction easier—from joinery to assembly—and having a square you can trust is just as important as the accuracy of your tools. Enter the new Inspection Square from *Blue Spruce Toolworks*.

From the moment you pick it up, it's clear this tool means business. The blade is machined from a solid piece of stainless steel and measures a full 1/8" thick. The 6" model tips the scales at over a pound, giving it the reassuring heft and stability that serious work demands. It's built to stay true for a lifetime of use.

What really sets this square apart—beyond its precision machining—is the beveled edge along the blade. As shown in the photo, the bevel makes it incredibly easy to check an edge visually, while also providing a natural guide for a pencil. No more awkward angles or inaccurate marks.

Each Inspection Square also includes a Rack-It holder for convenient storage in your shop. It's the kind of tool you'll reach for every day—and one you'll likely hand down someday, still dead square. — *Logan Wittmer*

BenchPilot for Shaper Origin

BENCH PILOT
Shaper Tools
ShaperTools.com
Price: $1499.00

One of the most exciting tools of the year, in my opinion, was *Shaper Tool's* release of BenchPilot at the AWFS show in Las Vegas. BenchPilot is an add on to the Shaper Origin that turns this "handheld" CNC into something much closer to a gantry-style unit.

The system works with a couple of clips that get mounted onto Origin. These lock into the gantry on BenchPilot, and Origin connects to BenchPilot via BlueTooth. All of a sudden, Origin is being moved on its own, and all you have to do is load up your file into it.

So, the question may be asked, what makes this different than a standard CNC? Well, in my mind the two things you get are the simplicity of setting up files with Origin (and, if you've ever watched a file be set up in Shaper Studio, you'd know what I mean—it's dead simple), and you get the ability to use BenchPilot with Workstation for vertical workholding (as you see above).

For current Origin users, I think you'll recognize that the addition of BenchPilot really unlocks a world of possibilities in your shop. You can set up a task for Origin, then allow BenchPilot to let it run as you do other stuff in the shop. In my mind, it turns your Origin into a little shop buddy that can work alongside you. — *Logan Wittmer*

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NEW TOOLS

EM-Smart Fiber/Diode Dual Laser

Today's woodworking shop looks far different than it did just a decade or two ago. It's no longer unusual to see a CNC router or laser engraver sharing space with the jointer and table saw. I've covered a few CO_2 lasers in the past, but recently I've been experimenting with a new machine from *EM-Smart* that's taken things to another level. Their Dual Laser system combines a 20W diode and a 20W fiber laser in one compact unit—opening up a remarkable range of creative and practical possibilities in the shop.

The *EM-Smart* Dual Laser takes a completely different approach from a Co2 laser. Instead of moving a gantry, it uses a pair of rapidly moving mirrors inside the head to direct the beam. The result is a small, bench-top laser that engraves and cuts with surprising speed and precision.

There's a lot packed into this little machine—far more than I can cover here. (For a deeper dive, check out my full video on our YouTube channel and website.) But here are the highlights: the diode laser excels at cutting and engraving common shop materials like wood and leather. The 2"-wide engraving on the wooden bowl shown below took just about 15 seconds. Switch to the fiber laser, and you can engrave bare metals such as brass, aluminum, and tool steel—no coatings required. The image at the lower right shows vector engraving on an O1 steel parallel. The fiber also performs well for cutting or marking certain plastics, making it a handy tool for fabricating jigs, templates, and shop fixtures.

That versatility is what makes this laser so compelling. Whether you're personalizing projects, fabricating shop aids, or even exploring small production runs, the Dual Laser earns its keep quickly.

EM-Smart also offers several accessories, including interchangeable lenses for specific applications and a rotary chuck for engraving on turned objects or stainless-steel tumblers (a fun side hustle, if you're so inclined). A new EM-Smart Dual 2 was recently released that features a 30w MOPA and 20W diode laser. I'll be testing a deep-engraving lens for brass soon—stay tuned for those results.— *Logan Wittmer*

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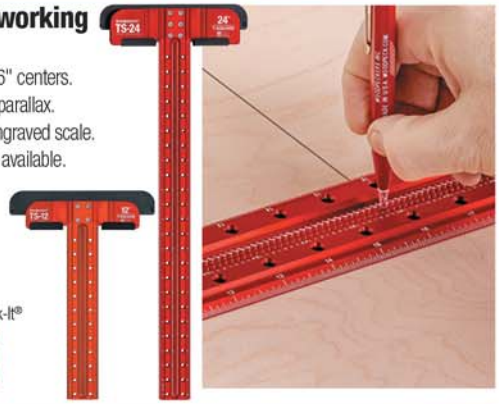

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LIVING HISTORY

Scandinavian Grind Skew Chisel

This tool is a carver's dream, but it had to be saved from history first.

By Lara Reisigl Domeneghetti

There is an unfortunate reality that many woodworking techniques and tools have been lost to time as traditions die out and technology advances. Wood, as a medium, is also often impermanent and susceptible to the elements. Research historians such as myself have to rely on the limited historic artifacts and artwork to understand medieval woodworking practices.

One such artifact is the Tylldal chair, a 12th-century Norwegian artifact that was rediscovered in the late nineteenth century in a church in the village of Tylldal. The chair is an intricately-carved masterpiece that gives us a glimpse into the past, and has been a key part of my research.

How I Research

While my academic background includes formal studies, my primary identity is that of a practitioner. My first major experience in this field was at the City & Guilds of London Art School, where I first reconstructed the Tylldal chair in 2019. That project showed me how overlooked medieval Scandinavian furniture is. I also uncovered the challenge of figuring out exactly what tools were used between the 11th and 13th centuries. Tool traces on original carvings have often been eroded through centuries of use, obscured by layers of later paint (as seen on the original Tylldal chair), or are too fragmentary to allow for definitive conclusions, even for the most experienced craftspeople.

Because of this, tool analysis is often based on the craftsperson's skill and judgment. But this is where the act of making becomes important. By carving myself, I learned which techniques were easy or hard to do — and how that might have shaped how the original artist worked. This kind of knowledge adds a valuable layer to what we learn from books and artifacts.

Seeing the Chair Up Close

During my initial visit to the Historical Museum in Oslo in 2018 — when the chair was still on display in the main medieval exhibition space — the conditions for research were far from ideal. I was not permitted to approach the

HISTORIC PHOTOS PROVIDED BY THE AUTHOR; ALL OTHERS BY COLLIN KNOFF

chair closely, and the lighting in the exhibition area was poor. Time constraints and the immobility of the object further limited my ability to investigate. Only later did it become clear that the design elements of the chair were intrinsically linked to the historical choices of tools and materials.

Subsequent visits allowed me to examine the artifact up close and under proper lighting, enabling a level of detail that had previously been unattainable.

Learning from Practice

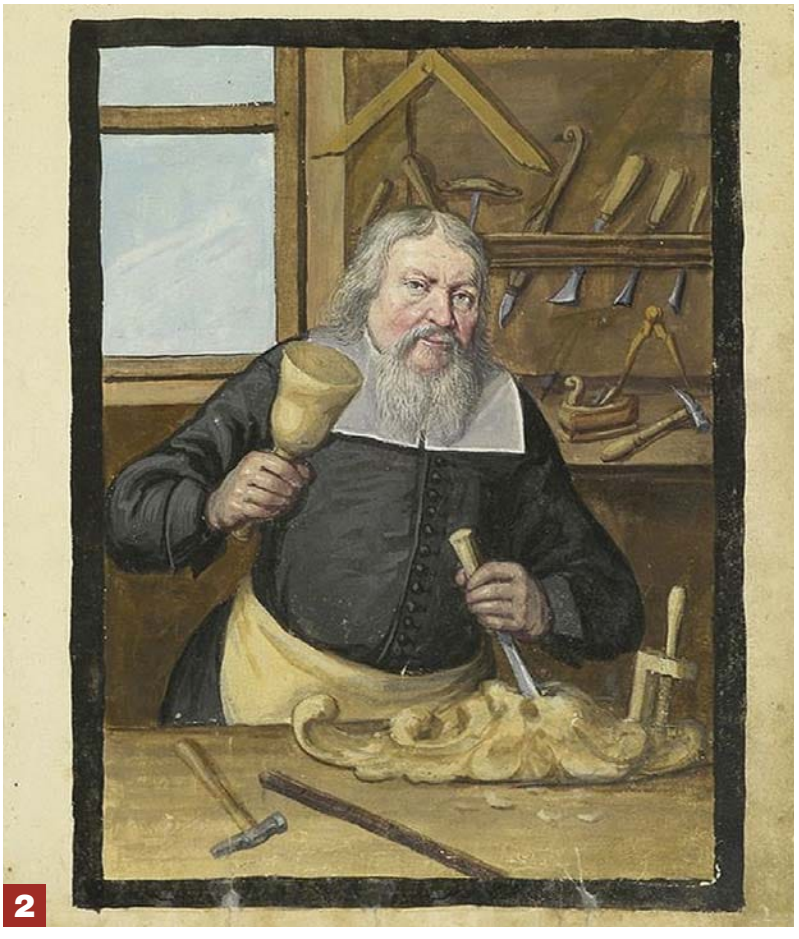
Through close observation of the tool marks on the original Tylldal chair, it became evident that a limited number of specialized tools were responsible for producing its characteristic ornamental features. Among these, one particular tool form stood out due to the distinct curvature and depth of the cuts observed. This prompted further investigation into historical sources — ranging from medieval illustrations and carved iconography to pre-industrial tool catalogues — in search of analogous implements.

The tool form most closely resembling one used in the ornamentation of the Tylldal chair has been identified in several of these sources. It bears a notable similarity to a skew chisel featuring a curved cutting edge, often described as having an "axe blade" profile.

There is ongoing debate regarding the historical specificity of this tool. Some argue that it represents a distinctly medieval type, while others suggest that the curved edge may simply reflect the users sharpening preference, resulting in a slightly convex edge line. Either way, it's a tool that shows up again and again in my research.

In my own tests, I used a modern skew chisel made from high-carbon steel. While it's not exactly the same as what medieval woodworkers used, it's a useful approximation of the carving experience.

1



2

1 The Tylldal chair is completely covered in complex and detailed carvings.

2 The form of this chisel is seen in contemporary art during the time it was being used. Here it appearers on the tool rack behind the craftsman.

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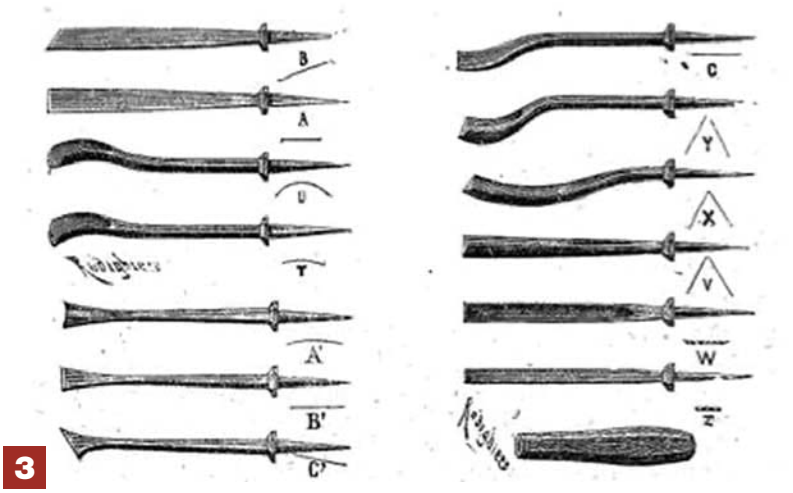

3

3 Historic catalogues offer key insights into the types of chisels the carvers would have used in their work.

4 This smaller tool is part of a newer set I'm working with. It doesn't feature the exact fishtail shape but it follows the same principles.

5 I usually aim for a bevel angle between 25–30°, and for fishtail shapes, I tend to ask for a flare that brings the cutting edge to around 1.5–2× the shaft width. The blade is usually at a 65° to the shaft, unlike the sharper hooked skew.

The distinctive curve of the blade and edge offers certain functional advantages—chief among them, the ability to execute freehanded, sweeping motions and produce fluid curved lines with greater ease than is possible using tools with a straight profile. Compared to a carving knife, the skew chisel—especially the medieval version—offers more control in some ways, but also has its own limits.

4

Testing The Chisel

Armed with my modified skew chisel and historic knowledge gleaned through research, it was time for some hands-on practice. The skew chisel with a Scandinavian grind produced a quality of line that was convincingly close to the historical example, albeit slightly stiffer in execution. When comparing the results of my replica to the original, the resemblance was striking. The incredibly fine engraved lines, likely the product of the thriving walrus tusk carving tradition in Trondheim, centered around the Nidaros Cathedral between the 11-12th century—commonly referred to as morsecarving, are a testament to the use of a skew chisel.

These fine lines, created using techniques closely related to kolrosing, appear to have been made with the same axe-shaped skew chisel. This single tool would have allowed for a range of operations—from incision and step-cuts to shaping and even miniature carving—making it a versatile instrument in the medieval craftsman's toolkit.

The tool, when properly handled, operates more like a drawing instrument than a conventional chisel. It is guided with one hand holding the neck or head of the blade, while the other hand applies controlled downward pressure. This technique demands a reorientation, even from experienced carvers, but the outcome—as demonstrated by students in my courses—is a versatile workhorse for innumerable types of cuts. **PW** - *Lara Reisigl Domeneghetti*

5

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Using a Skew Chisel

A Drawing with the tip.

B Drawing with the heel

C Shaving with the tip

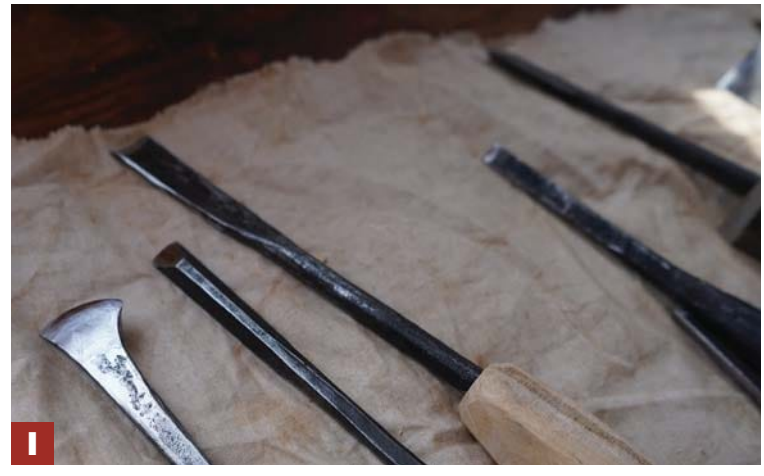
D Gouging with the round shape of the blade

E Sculpting with the blade

The Scandinavian grind skew chisel is a single tool that can undertake a wide variety of tasks. Instead of swapping between different implements, the user simply needs to reposition their hands to make entirely different types of cuts.

The curved cutting profile not only allows for this range of cuts, but it provides opportunity of grips as well, which helps maintain ergonomically sound body and hand positioning. It's clear that the 12th century carvers who used this tool had a very diligent approach to their work, as it was their entire livelihood.
PW - *Collin Knoff*

For additional info on making your own chisel, visit Popular-Woodworking.com/OnlineExtras



F The chisel is capable of kolrosing, a Scandinavian technique that involves carving decorative, thin lines into wood.

G In only twenty minutes, the carving begins to take shape.

H Most of the chisels are custom-made by blacksmiths. This particular version was on loan from Norwegian Handicraft Institute. It is 22 mm wide, has a 25 mm long cutting edge, and the entire tool is 255 mm long including the handle.

I Though incredibly versatile, the Scandinavian skew chisel is only part of larger compliment of tools a carver would have utilized.

J A more finished example of the carving.

Soup Up Your Drill Press

PHOTOS BY WILLIE SANDRY

The area below your drill press table is the perfect spot to pack in some storage, and turn your drill press into a robust work center.

By Willie Sandry

The drill press may be an unsung hero, quietly doing its job off in some dusty and neglected corner of the shop. Well, that changes today with a series of modifications and upgrades to transform a mundane drill press into a capable drilling machine loaded with storage and extra features. The fact is most drill presses are not built for woodworking, as evidenced by the small round table they're often outfitted with. Worse yet, many factory tables lack any T-tracks or dog holes for adequate clamping, which creates a possible safety concern. Other common frustrations with this tool are poor bit-holding power and chucks that are difficult to adjust. These issues will all be addressed with this simple plan including a 4-drawer storage cabinet with bonus tool case storage and side hooks. Plus, we'll add a woodworking style fence with over and under-table dust collection, as well as options for upgrading your factory chuck.

Inventory the gear you'd like to fit in a drill press cabinet, to confirm the size shown will work for you. My accessories consist of standard and Forstner bits, as well as T-track and various small specialty clamps. Basically, all small-size knickknacks well-suited for a bank of graduated drawers. You'll see many drill press cabinet plans that wrap around the column of the tool. That's a lot of extra work for very little benefit, so this Stabile-Base cabinet is a basic rectangle shape with an angled base to act like a toe-kick design. Another key difference here is stability of the tool. Most DP cabinets are designed for caster wheels, so they don't contribute to the overall tool stability. I realized the table of my drill press never goes lower than 6-8" below the chuck, so for me the wheels aren't necessary. In fact, this design bolts directly to the slots in the cast iron base to add weight and stability to the frame of the tool. If you move the DP around frequently in the shop, consider raising it onto a sturdy mobile base. I don't remember moving my last drill press since the day I lugged it home, so for me the stabile-base concept is perfect.

Use your best method to break down a sheet of plywood. Luckily the sides and four fixed shelves layout easily on a single sheet of $^3/_4$" birch ply. Other parts you'll need are the bottom panel and two top cleats. A small back panel is made from a scrap of $^1/_2$" plywood, or a handi-panel from the big box store.

Start with Cabinet Frame

The cabinet goes together with dadoes and rabbets for the most part. The exceptions are the bottom panel and top cleats, which are attached later with pocket screws and glue. With a dado blade sized to fit your particular plywood, mill the four dadoes for the fixed shelves according to the rendering on page 35. Normally, cutting dadoes on panels much longer than they are wide can be problematic at the table saw. However, since the overall side panels are so small, it wasn't an issue. I


1


2

1 A cordless track saw makes quick work of breaking down large sheet goods. If you don't have a track saw, a basic circular saw and edge guide will work fine. Once the oversized parts are all manageable, trim all your plywood parts from the materials list to final size at the table saw.

2 Carefully cut the four dadoes required in each side panel with a dado blade. Use stock guides or featherboards and firm downward pressure with a push paddle to control the cut.

do recommend stock guides or featherboards to consistently hold the workpiece against the fence. If you're not comfortable with these cuts at your table saw, you could knock them out with a router and straightedge. My "shop grade" plywood barely measured 11/16" thick, so a dado blade with shims was my best approach. With the 3/8" dado blade height unchanged, add a sacrificial fence and make a roughly 1/2" wide rabbet in each side panel. These rabbets will receive the 1/2" plywood back panel, and they're mirror-image cuts, so take a second to orient your panel correctly before making each cut. And just like that, you'll have two sides and four shelves ready for a quick sanding and assembly. Just remember to trim the lower corner of the cabinet first, which is an easy task with a track saw.

The basic case assembly comes together very quickly with glue and clamps. I frequently use clamping cauls for long dadoes, and it's tempting to use four cauls on each side of these joints. Instead, I took a more basic approach with small parallel clamps to align the parts. Then I added one long caul on each side to ensure the shelves were fully seated in the dadoes. This approach is quicker and less cumbersome than using eight cauls along the joints.

While the main carcase comes together with dado joinery, the rest of the cabinet frame is easier still. The bottom panel and pair of top cleats are simply attached with pocket hole screws and glue.

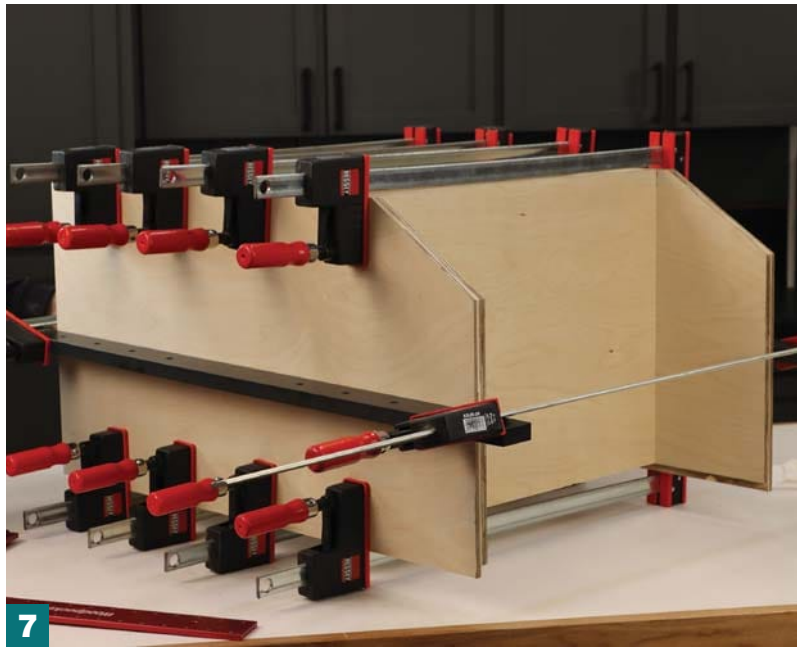
TIP: When working with projects that involve multiple joinery types, it's crucial to be patient.

3 With the same dado blade height, add a sacrificial fence to the rip fence and cut a rabbet in each side panel, that will receive the back panel.

4 The right accessories sure make work more enjoyable and mine include a fine-toothed dado stack like the *Infinity* Dadonator XL, a selection of magnetic and plastic shims, and a special Dado Nut from *Woodpeckers*. It's essentially a rotating nut fixed to a slim washer, which is perfect when you can't use a standard arbor washer. Finally, make up a sample dado board or spot-on plywood joinery without the guesswork.

5 Trim the angled shape on the lower front of each cabinet side with your best method. If you have access to a track saw, it makes quick work of this cut.

6 Glue the sides together with the four fixed shelves, taking care to align the parts at the front of the cabinet.



Rather than rushing to trim and glue all parts immediately, it's often advisable to wait until the entire case comes out of the clamps. By trimming the final parts after assembly, you can ensure a more accurate and seamless project.

Wait to trim the bottom panel and cleats to length, with measurements directly from the cabinet. This way, if your dadoes weren't spot on 3/8" deep, everything will fit just fine. Next drill a series of pocket holes along the

7 Add a pair of clamping cauls, one on each side of the cabinet, to guarantee tight dado joints where the clamps can't reach.

8 Drill pocket holes with your best method. The *Kreg* foreman mounted on a multi-purpose shop stand lets you work at a comfortable height.

9 Clamp the bottom panel between the uprights and drive 1 1/4" pocket hole screw. Glue is optional, but it's a great way to add strength to the basic butt joint.

10 Likewise, add the top cleats to complete the case frame. The front cleat simply aligns with the front of the cabinet, while the rear cleat needs to align with the rabbet you cut earlier. Temporarily add the back panel as a space-filler to make sure everything is properly aligned.

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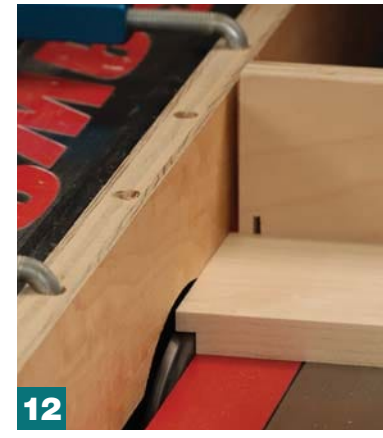
bottom panel, and a pair of pocket holes on the ends of both cleats. For years I used the smallest pocket hole jig available—a *Kreg* Jr. jig. It worked great, but can be tedious if you have many holes to drill, so at some point I upgraded to a *Kreg* Foreman on a tool stand, which is great for cabinet work. Once your holes are drilled, lather on some glue and clamp the remaining parts in place before screwing the fasteners home. Finally, edgeband the exposed plywood edges, and trim them flush.

Build the Drawers

Now move on to the bank of drawers that make this small cabinet so incredibly useful at the drill press. The drawers feature a classic graduation with the largest at the bottom, and the smallest up top. You'll find all the dimensions for the drawer boxes, as well as the false fronts in the materials list on the next page. I opted to use 5/8" thick Maple hardwood for the drawer boxes, but Poplar would be another good choice. The joinery of choice here is locking rabbets, and while it doesn't have the glamour of dovetails, it sure makes a strong and functional drawer box. I especially like the fact that it resists force in precisely the right direction for a drawer application.

If you've ever made locking rabbet joints, you've undoubtedly heard of the quarter/quarter/quarter method. My approach is similar, but perhaps safer because there's no need to cut workpieces vertically. Start by setting up a dado blade that's half the thickness of your material. The drawer box parts are 5/8" thick, so we'll use a 5/16" dado stack, set 5/16" from the rip fence. Use this setup with a miter gauge to cut a dado in the ends of the drawer front and drawer back. Now keep the dado blade at the same height, as you add a sacrificial fence to the rip fence. Set it to cut a 5/16" wide rabbet and make a pass in both ends of each drawer side. With that, the four sides of the box will fit together neatly and resist the stress of being opened repeatedly. All that's left to do is plow a groove for the 1/4" plywood bottoms, and for that I switch to a full kerf combination blade. Position the groove about 1/4" up from the bottom edge of all your parts, and make two or more passes until the plywood easily slips in. Here it's helpful to pop the parts together and draw a reference mark where the groove should go. You'll note the groove is on the *same* side as the joinery for the sides, but *opposite* the joinery on the front and back. Maple isn't getting any cheaper, so make your errors with pencils, not saw blades.



11 With a 5/16" dado stack set 5/16" high and 5/16" from the top rip fence, cut a narrow dado in both ends of the drawer sides.

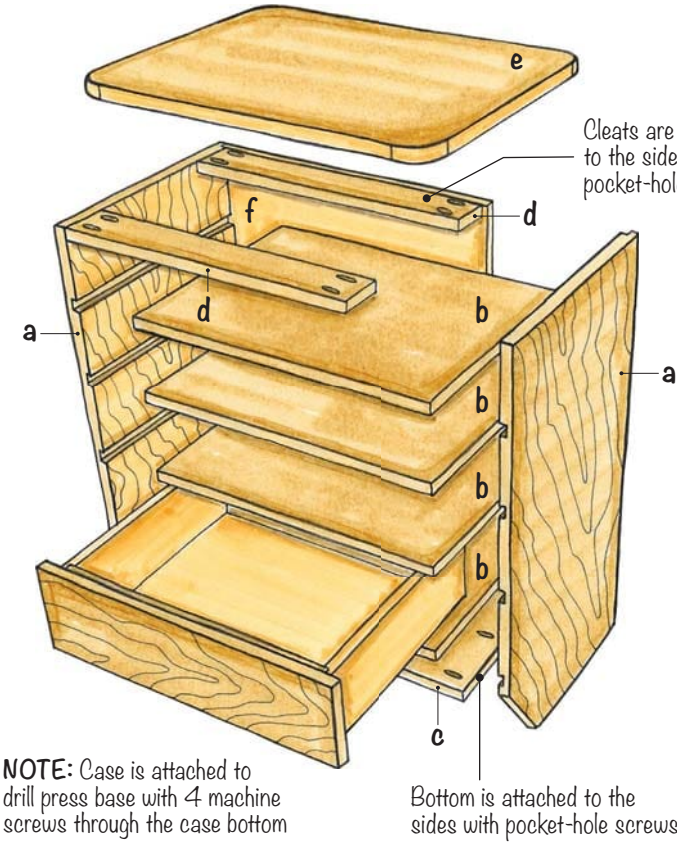
12 With the same blade set still locked at the same height, add a sacrificial fence and adjust the fence to make a 5/16" wide rabbet in the ends of all the drawer fronts and backs.

13 Cut a groove for the 1/4" plywood bottom and permanently assemble the drawer. Measure your diagonals and double check it for square before setting it aside to dry.

Odds-N-Ends

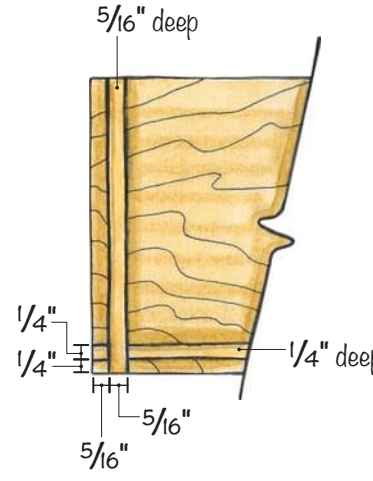
At this point there are just a few things left before we can mount the new storage cabinet to the drill press. Make a top panel from

Drill Press Cabinet



NOTE: Case is attached to drill press base with 4 machine screws through the case bottom

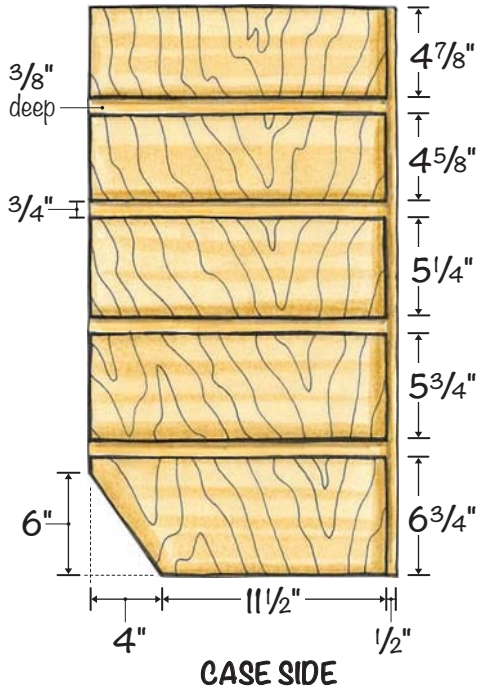
Bottom is attached to the sides with pocket-hole screws



DRAWER SIDE
(interior view)

Materials List

- 4 Folding storage hooks, Zeyu brand; https://amzn.to/41K7GMS
- 4 Kurled drawer pull hardware (5"), Bukobyhe brand; https://amzn.to/3FmUFA3
- 4 Pairs of 14" ball bearing slides, Baidice brand; https://amzn.to/4BVTBpE
- 4 Furniture connectors bolts, 1/4" x 2 1/2" with fender washers and nuts
- 8 feet of 3/4" black t-molding; TMolding.com



CASE SIDE

Cutlist

No.		Items	Dimensions (in.) T	W	L	Comments
2	A	Sides	3/4	30 1/4	16	Plywood
4	B	Fixed shelves	3/4	21 1/4	15 1/2	Plywood
1	C	Bottom shelf	3/4	20 1/2	11 1/2	Plywood
2	D	Top cleats	3/4	20 1/2	3	Plywood
1	E	Top panel	3/4	23	21 1/4	MDF
1	F	Back panel	1/2	30 1/4	21 1/4	Plywood
2	G	Drawer #1 front/back	5/8	18 7/8	3 5/8	Maple
2	H	Drawer #1 sides	5/8	15 1/4	3 5/8	Maple
2	I	Drawer #2 front/back	5/8	18 7/8	4 1/8	Maple
2	J	Drawer #2 sides	5/8	15 1/4	4 1/8	Maple
2	K	Drawer #3 front/back	5/8	18 7/8	4 3/4	Maple
2	L	Drawer #3 sides	5/8	15 1/4	4 3/4	Maple
2	M	Drawer #4 front/back	5/8	18 7/8	5 1/4	Maple
2	N	Drawer #4 sides	5/8	15 1/4	5 1/4	Maple
4	O	Drawer bottoms	1/4	18 3/4	14 1/2	Plywood
1	P	Drawer #1 false front	3/4	21 1/4	4 5/8	Maple
1	Q	Drawer #2 false front	3/4	21 1/4	5 1/8	Maple
1	R	Drawer #3 false front	3/4	21 1/4	5 5/8	Maple
1	S	Drawer #4 false front	3/4	21 1/4	6 1/8	Maple

14 The secret to getting T-molding flush with the top is to make a test board from the same material and laminate it with Formica. Set a slot-cutting bit for a centered cut and test fit. Once all is well, tap the molding into the slot with a rubber mallet (no glue required) and trim it to length with tin snips.

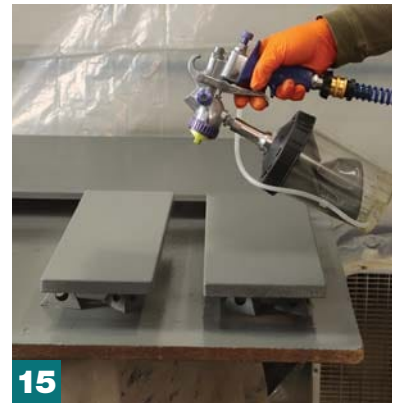
15 Paint the drawer fronts, along with the main cabinet and back panel.

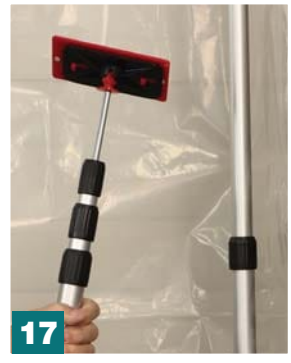
3/4" MDF, and round the corners as desired. Usually a 1 1/2" to 2" radius is minimum for adding T-molding, and large sweeping curves are easier to edge than tight corners. Add plastic laminate with contact adhesive and trim it flush with a router. Then cut a slot with a 3-wing slot cutting bit around the perimeter of the top panel. You'll match slot width to your specific T-molding, but typically 3/4" T-molding has a 3/32" barb, and requires a 0.06" or 1/16" slot for a good friction fit.

A Primer on Painting

Even small cabinets like this are faster to spray than brush, but the problem for most DIY woodworkers is figuring out how to contain overspray. First, a turbine style HVLP sprayer like the new *Fuji* D6 really minimizes overspray from the source. Plus, it's billed as a 6-stage turbine, so it can push latex or urethane-modified cabinet paints without thinning. I like HVLP spray guns that offer some sort of pressure assist. My favorite setup for spraying cabinets is a T70 bottom feed gun with a 1.5mm aircap set, and an aftermarket 3M PPS pressure cup.

As far as setting up a temporary spray booth, I haven't found anything quicker than using dust barrier poles—typically used to corral home construction dust. I like the *ZipWall* version best, because they have a special clip that holds the plastic in place. This way you can work from the floor





16 A turbine style HVLP will give the best finish, and a 6-stage unit lets you spray unthinned latex or urethane modified with cabinet paint. Just push the button for the desired turbine output and fire it up with the handy remote control. A *Fuji* T70 with 3M PPS pressure cup completes the spray rig.

17 Dust barrier poles make an impromptu spray booth, along with some clear plastic sheeting. *ZipWall* poles have an easy twist-lock, plus a spring-loaded action for easy inset (inset photo).

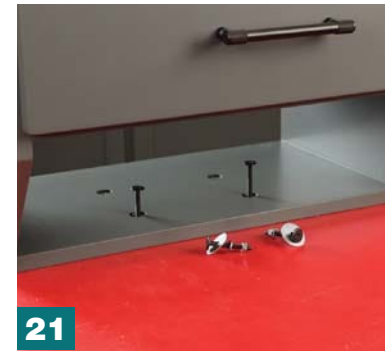
18 Install the drawers on slides, using 1/4" MDF as a spacer.

19 Drill for the drawer pulls and use those holes to temporarily attach the false fronts to the drawer boxes.

20 Then permanently mount the front with four screws from inside the drawer as usual. Then just remove the temporary screws, drill the holes through, and add your drawer pulls.

21 The Stabile-Base cabinet installs to the drill press with four furniture bolts, fender washers, and nuts.

22 Add folding hook to each side of the cabinet for extra storage.



of your shop, with no ladders required. Be sure to do 3 key things when spraying in a garage setting:

1. Use good ventilation, including 1-2 fans that perforate the booth.
2. Eliminate any source of open flame (like a heater) while spraying. Once the mist clears, you can close the garage door and heat it up to help dry.
3. And perhaps the most important of all, wear a respirator approved for organic vapors.

Installing Drawers and Final Assembly

The drawers get a clear lacquer finish and are hung on 14" long full extension ball-bearing slides. Everyone has their own trick for adding the false fronts and getting a nice even reveal. Some use double sided tape to hold them in place and hope they don't shift in the process. I like to start by drilling the pair of holes for the knurled 5" drawer pulls with a common jig. Then lay the cabinet on its back and arrange the drawer fronts for proper spacing. Secure the fronts temporarily through the holes you drilled, which makes life a lot easier—plus you get to skip the double-sided tape. Then screw the fronts to the drawer box as you normally would from inside. From there just remove the temporary screws and use the holes as guides to finish drilling through the drawer box too. Now mount your drawer pulls of choice and test each drawer for a smooth action. The top of the cabinet attaches with six screws drilled through the cleats from underneath. Since the top-drawer opening isn't very deep, you may have to drill and drive these 1 1/4" pan head screws at a slight angle. Finish the cabinet by adding any accessories you want, such as folding hooks. I like a pair of them on both sides, carefully set to the same height. This lets me hang the drill press fence when not in use, or just a quick place to hang my safety gear.

Whether your drill press is basic or cutting edge, these upgrades will improve the precision, dust collection, and overall function, for more enjoyable time in the shop. **PW** – *Willie Sandry*

Take It Up a Notch

Table and Fence with Over / Under DC

I've long dreamed of a drill press with dust collection both above and below the table. The *Infinity* DPT-200 with PRO fence is a nice place to start, because the hollow aluminum fence extrusion has a cutout for excellent topside collection. Plus, the ample-sized laminated table surface has four T-Tracks and will improve many basic drill presses with small tables. To add the lower dust collection port, I cut a 3 x 3" hole below the sacrificial insert. I secured a scrap of 1/2" MDF towards the back of the opening, to limit the cutout size to what I needed. Then a plunge router and guide bushing were used to complete the opening. Finally, I shortened the length

A Drill press tables usually aren't built for woodworking, but the cast iron table on the *Laguna* DP20 is fantastic. It has a lot of bells and whistles you'd want, like a sacrificial insert plus T-tracks and dog holes for all sorts of clamping options.

B Cut a hole in the aftermarket table for the lower dust collection. A large guide bushing helps steer the plunge router with 1/4" spiral bit around the desired path.

C A magnetic 2 1/2" dust collection fitting clings to a flat spot under the table. Shorten the sacrificial insert to allow it to slide backwards and expose a slot for effective dust collection.

of the Infinity sacrificial insert, which is just a piece of 1/2" MDF, to allow it to slide to the rear of the table and expose a dust collection slot. A magnetic 2 1/2" *MagFitt* dust collection fitting mounts perfectly under the cast iron table to provide suction via a flex hose.

Replacement Chuck Options

If the chuck that came with your DP is stiff to turn or has more runout than you like – replace it! Factory chucks are notoriously poor quality, but luckily quality options are abundant. Some models even feature ball bearings for a smooth, precise action. Be sure to match the arbor to the taper of your drill press. For instance the DP20 uses a Morse #2 taper. Then there's a short taper where the arbor meets the chuck to consider. You can buy a chuck that matches the taper of your arbor, such as a Jacobs 3 (JT3), or purchase a new arbor to fit. What really drives me to replace a chuck is a loose-fitting chuck key that feels like it might strip out. I was impressed with the large K4 chuck key that comes with either the Llambrich CBB-16J3 or Jacobs 16N ball bearing Super Chuck. They're just bigger and beefier than a typical chuck key and fit snugly in the larger 3/8" pilot hole. Overall, these premium chucks are about the size of a dinner potato and have a hefty feel in the hand. The Llambrich ball bearing chuck can handle bit sizes 1/16" - 5/8" or 1/8" - 5/8" for the Jacobs Super Chuck.

D

E

Another top-tier option is an integral keyless chuck like the Llambrich JK-130-MT2 with 1/32" to 1/2" bit capacity. It even comes with a special wrench to add a little extra clamping force for demanding drilling jobs. Or if you need a chuck with a budget price, but still a quality feel, try the Accusize CanCNC standard bearing model, which also performed well in testing.

PW – *Willie Sandry*

D A keyless chuck can be threaded onto the spindle to make bit changes tool-free, and convenient. This version has an included wrench to allow an extra-firm grip.

E Jacob's chucks come in various sizes, and a larger chuck (such as this JT3) will offer a larger variety of bit holding options.

Hearth Stool

This stool is a simple little seat that combines traditional chair building techniques and good woodworking.

By Shea Alexander

PHOTOS BY LOGAN WITTMER

When it comes to furniture, one of the most basic things is a place to sit down. However, building chairs is intimidating for many woodworkers. With all the angles and curves to get right, it can seem a bit complicated. So let's scale that back to a chair with no back, shall we? Well, that would be a stool. And if you take away a leg, it becomes a three-legged stool. Let's start there.

When choosing a species, anything reasonably strong will do. Some common choices would be Oak of any type. Ash, elm, cherry, walnut, and maple work too. The piece for your seat its only requirement is that it's tough, as the legs in a stool act as wedges, so you just don't want it to split. As long as the seat is free of voids and cracks, you should be fine, and crooked, gnarly grain is likely all the better to prevent it from splitting. For the legs and stretchers, you want as straight as a grain as possible with no runout. If you follow the growth rings from one end of the part to the other, you want them to go end to end without running off the side of the part.

The Seat

Starting with the seat, you want to first mark the center by drawing intersecting lines from corner to corner. I do this on both sides of the blank. Then you must decide which is the top and bottom faces. I prefer to make the top the bark side of the tree as it will give a more pleasing grain pattern when dished. Once that is decided, set your compass to 5 3/4" and draw an 11 1/2" circle on the bottom face using the center point we marked. This is the outside of the seat. We will then draw two more circles, one with the compass set to 5" and one with it set to 4".

Next, you will mark the sightlines. These lines help guide you as you drill the leg mortises. Taking a ruler or straight edge, draw a line from the center point to the outside edge, intersecting all of the circles you previously drew. Then, using a protractor, lay out two or more lines radiating from the center 120° from this first line. Where these three lines intersect the circle you drew with the compass set at 4" is the center point to drill for the leg mortises.

Once these layout lines are done, it is time to drill the leg mortises. I recommend using a drill press with a tilting table. First, set the table to 13° relative to the bit. Then, using a 1" bit, you will position your sightline for each mortise in line with the line of the sight of the bit when you are facing the drill press and drill each mortise through the seat.

Now you will carve the top of the seat. At this point, the only marks on the top side of the seat are the center point marks. Before carving, you will set the compass to 5 3/4" and mark the outside diameter of 11 1/2". For this stool, I left a simple 1" wide flat facet before the dished carving started. Set your compass to 4 3/4" and mark a second circle to define the edge of that facet.

Now that those layout lines are done, you will make a depth reference, so you know how deep to carve. Using a 1/4" bit, drill a 3/8" deep hole on the center mark. Then, using your tools of choice, be that a scorp, travisher, gouge, or grinder, carve the dished portion of the seat, stopping at the bottom

1 The seat starts by marking the center. Using a straight edge, cross the corners to locate the center.

2 Use a compass or angle finder to divide the bottom of the seat into three parts, and mark those angles.

3 Drill mortises for the legs by using an inclined drill press table.

4 On the top of the seat, start to shape a dish with a scorp.

5 Bandsaw out the shape of the seat using a narrow blade.

6 Lay out a bevel on the bottom of the seat.

7 A draw knife quickly removes the waste and forms the bevel.

of the depth hole and using the line drawn with the compass set to 4 3/4" as your guides. I shoot for a perfect inverted dome shape, then finish it up with sanding.

Once the top of the seat is shaped, you will cut out the circle shape of the seat to the circle line you marked with the compass set to 5 3/4". This is best done with a bandsaw, but a good jigsaw or bow saw with a narrow blade will also do a great job. You will then clean up the outside saw marks with a spokeshave or sander. Next is the under bevel, setting the seat on edge and using a marking gauge or combo square set to 3/4", you will mark a line around the edge of the seat 3/4" off the bottom of the seat. Then, using a draw knife, you will connect this line with the circle line of the bottom that you drew with the compass set to 5" to create a flat underbelly facet. I use the drawknife to get within 1/16" of the lines and then work to the line with the spokeshave or the sander. Now on to the legs.

Legs

Time for legs. You will start by taking the square blanks from the cutlist and sawing them into a square 4-sided taper. Tapering from 1 1/4" on the small end to 1 3/4" on the large end. I normally lay these out with a ruler, saw outside the line on the bandsaw, and then clean up to the line with a handplane. Once done, you will octoganize the entire leg into a tapered octagon. The first step here is to lay out an octagon on each end of the leg.

Start by clamping the leg in the vise with the end facing up. You will use a combination square and draw a single diagonal line from one corner to the other.

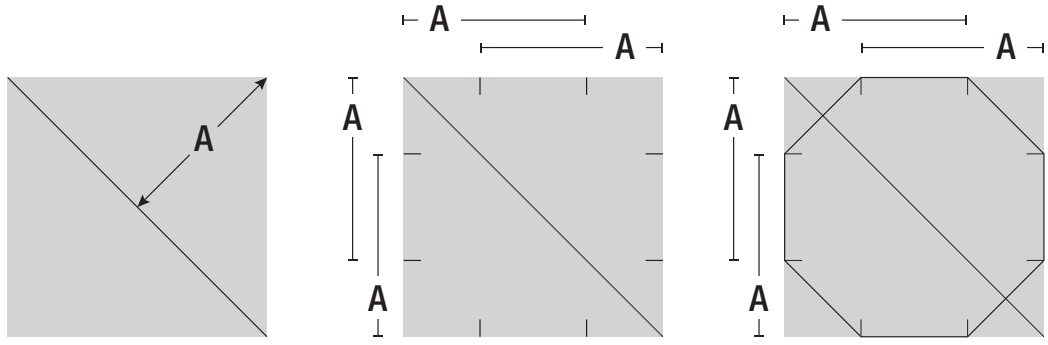
Then you will measure the distance from the adjacent corner to the line segment. This is the only dimension you will need; let's call that dimension A. Then set a combination square to this distance and use that going forward, knowing what the exact measurement is irrelevant.

You will then mark a point from the corner towards the center in both directions from each corner using that same distance measured. Then we will connect these points across the corners. This forms our perfect octagon.

Once you have marked an octagon on each end of the leg, you will hand plane off the corners of the leg to connect the octagon facets on each end. Now you have a tapered octagon!

Now it's time for leg tenons. For this article, I am using the *Veritas* 1" Power tenon cutter. If you have a lathe, this can easily be done by turning between centers to a 1" diameter.

Marking the Perfect Octagon

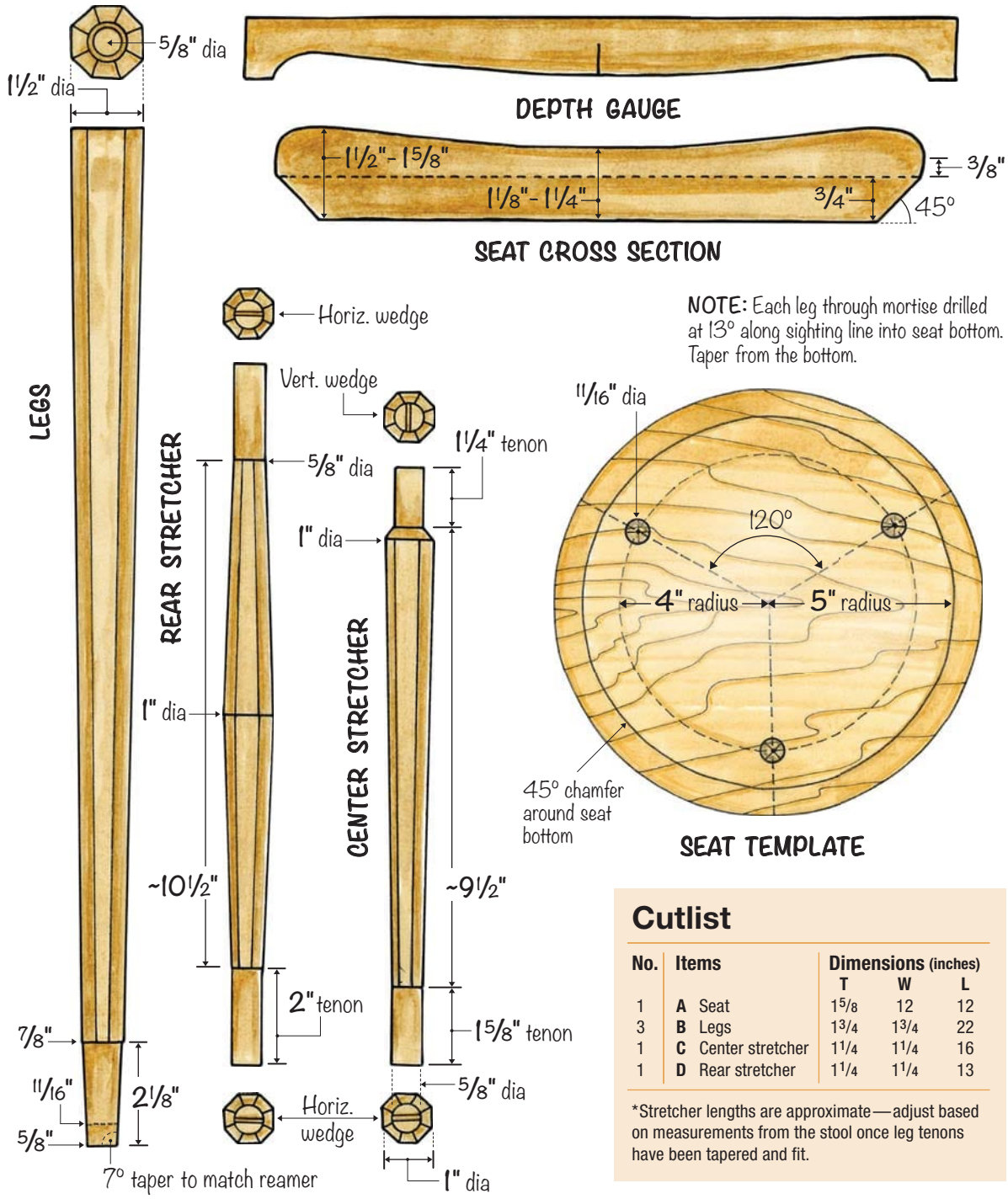


8-10 The legs of the stool are a tapered octagon. The blanks are sawn into tapers (your method of choice — bandsawing the taper is easy). Now, lay out the octagon on each end. An easy way of laying out octagons is shown in the three steps at the top of the page and photos 8-10.

11 After laying out the octagon, it's time to plane down to the line. I use a tapered jig to hold the legs, and that allows me to plane parallel to the bench.

12 The finished legs are smooth and tapered. These legs are now ready to have tenons cut at the ends.

Hearth Stool

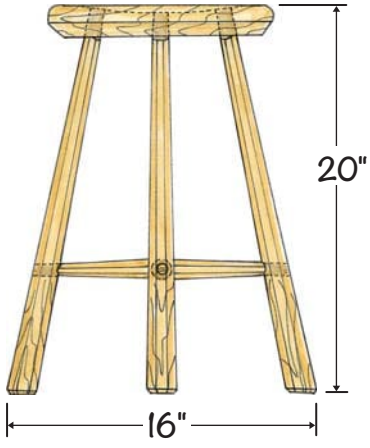


Cutlist

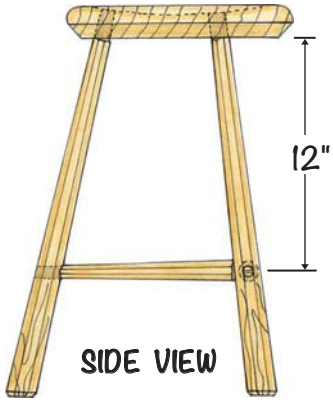
No.	Items	Dimensions (inches) T	W	L
1	A Seat	1 5/8	12	12
3	B Legs	1 3/4	1 3/4	22
1	C Center stretcher	1 1/4	1 1/4	16
1	D Rear stretcher	1 1/4	1 1/4	13

*Stretcher lengths are approximate—adjust based on measurements from the stool once leg tenons have been tapered and fit.

NOTE: Full-sized printed plans are available at AlexanderBrothers.com



FRONT VIEW

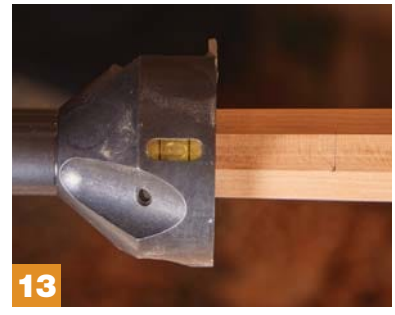


SIDE VIEW

Tools

When it comes to creating this stool, I recommend using the follow hand tools:

- *Veritas* tenon cutters in 1" and 5/8" LeeValley.com
- Travisher by Elia Bizzare HandToolWoodworking.com


13


14


15


16

13-14 The tenon cutter is ran in-line with the leg to form the tenon.

15 Use a pair of channel-lock style pliers and a leather scrap. This compresses the tenon for easier fitting.

16 Test fit the legs and mark the grain and wedge direction.

Start by clamping the leg horizontally and leveling it. Because the leg is tapered on the outside, be sure to register the level between the centers of the leg. Then, on the small end of the leg, we will make a mark 2 1/8" in from the end of the tenon cutter to cut the tenon to the mark. The tenon cutter has a built-in level that you use as a guide to ensure the tenon stays centered on the leg.

TIP: I recommend practicing with the tenon cutter on scrap until you are comfortable with it before cutting the tenons on your legs.

Leg It Up

Now it'll start looking like a stool. Let's dry-fit all three legs in the seat. With these straight tenons, if they are cut accurately to the mortise diameter, dry fitting them will be squeaky tight, and you run the risk of them not coming back out, so before putting them in the seat, I recommend you slightly compress the tenons. Compressing the wood fibers in a joint does not compromise the joint, and when wet glue is added, they will swell back tight with no issue. This practice allows you to dry-fit your parts without the risk of them getting stuck.

The easiest way to do this is using a pair of channel lock pliers with a scrap of leather to pad the jaws and firmly squeeze, compressing the tenon, working the pliers around all sides. This should allow the legs to fit easily in the mortise without getting suck. You will also do this on the stretchers later in the process.

Once the legs are dry fit and seated tightly in the seat, rotate each leg so the endgrain of the tenon and the grain in the seat are parallel; this aligns the long grain in the seat and the long grain in the tenon for a better glue bond. Then mark

17 Use a rubber band stretched between the legs to layout the stretcher location.

18 Use a long bit and scrap to guide the bit and drill the mortise locations.

19 The stretcher is drilled in the center and can be done at the drill press.

20 Shape the stretchers.

the kerf for the tenon wedge perpendicular to the grain of the seat. This ensures that as the wedge expands to tighten the tenon, the tenon does not also split the seat. You will also do this on the stretchers to prevent the stretcher tenons from splitting the legs.

Next, saw the wedge kerf at the end of the leg going deep enough for the wedge to go about 2/3rds the way through the thickness of the seat. If your mortise and tenon fit snugly, I make my wedges the length of the kerf depth plus 1/4" and 3/16" on the thick end of the wedge.

Time for Stretchers

With all three legs dry fit and the wedge kerfs cut and rotated to be perpendicular to the grain of the seat, flip the stool upside down on the bench. With the tenons sticking through the top of the seat I normally put 2 strips about 1" thick under the seat so the tenons are off the bench top and clamp the seat to the benchtop.

Take both stretcher blanks from the cut list and mark octagons on the ends, hand plane them into straight octagons following the same procedure as the legs.

Now we will mark the stretcher mortise locations. On octagon legs I like the stretchers to land in the center of a facet of the octagon so I will slightly rotate two legs to have their facets facing each other. This may change the wedge orientation in the seat grain, but it's normally not more than a few degrees and doesn't impact strength that much.

The stretchers are 12" off the bottom of the seat so measure off the seat and do a quick pencil tick at 12" on the facets that are facing each other, then take a long rubberband and stretch it between the two legs aligned with those tick marks, then mark the mortise location between the sides of the rubber band. The rubber band simply gives you visual points of reference to find the center of the leg.

To drill the first mortise, I clamp a scrap across two legs to act as a steady rest and use a 5/8" drill bit on an extension. The height of the rest off the seat should be 12" minus half the diameter of the bit extension to put the center of the bit level at 12" off the seat. When drilling the mortises, I use a good quality brad point bit and start by running it slowly in reverse to score the face of the leg facet. This helps to prevent tearout on the leg. These are through mortises, so if tearout is a concern on the exit of the bit, simple clamp a scrap block on the back side of the leg. Small amounts of tearout are normal and can be hand planned out before assembly later.

Once this first mortise is drilled, thread the drill bit extension through this first mortise using it as the rest to drill the mortise opposite from it. You should now

21 Glue up the chair with hide glue and drive in the wedges.

22 Chisel off the excess. You can sand the tenons smooth with the seat or leave it a chiseled texture.

23-24 Level the stool.

have two opposing 5/8" through mortises in each leg 12" off the bottom of the seat.

Using a ruler, take measurements between the two mortises to determine the length of the stretcher and the length of the tenons. Using a 5/8" Veritas power tenon cutter or a lathe, cut both tenons on the ends of the stretcher and compress them as you did on the legs. Then, dry fit it in the legs and reassemble everything. Next, rotate the stretcher so the end grain of the tenons is parallel to the length of the leg and mark the wedge kerfs. Then measure between the legs and mark the center of the stretcher for the mortise location of the intersecting stretcher.

Remove the stretcher and saw the wedge kerfs as you did on the legs and drill the 5/8" mortise in the center for the intersecting stretcher. Now reassemble.

Next use the mortise in the center of the stretcher as a rest to drill the stretcher mortise in the 3rd leg 12" off the bottom of the seat. Repeat the same process for the second stretcher, measuring, marking, and sawing the wedge kerfs. The entire stool can now be dry fit to check for alignment. At this point, any final shaping, such as tapering the stretchers, can be done with a hand plane or spokeshave.

Final Assembly

At this point, go ahead and complete all sanding or card scraping of all your part surfaces before glue-up. For glue, I recommend something that will give you a long open time. I prefer hide glue, but a product like *Titebond* Extend would also be suitable.

I begin by gluing the stretchers into a "T" and then gluing them into the legs. Now, this leg assembly can be glued into the seat. Begin the wedging by driving each leg into the seat, listening for a sound change when it is tight. Insert the wedges with glue and drive them home. Lastly, we check the rotation of the center stretcher and drive home the stretcher wedges with glue. Be very gentle driving home the stretcher wedges as they do not need a lot of force to seat them, and you don't want to split the stretchers or the legs.

Trim and Level

Once the glue is dry, it's time to trim the tenons and level the stool. I find a shallow sweep gouge works well to trim the tenons inside the dish of the seat, and then a saw for the stretcher tenons.

To level the stool, start by putting a level on the seat and use some wedges under the legs to level. Then use a scribe to mark the bottoms of edge leg referencing off the bench top.

Saw each leg to your mark and it's time for final sanding and finish. **PW** – *Shea Alexander*

This simple cabinet is elevated by thoughtful details.

By Collin Knoff

PHOTOS BY COLLIN KNOFF & LOGAN WITTMER

Textured Walnut Wall Cabinet

When you get right down to it, a wall cabinet is basically a box with a door on it. That doesn't mean there isn't plenty of opportunity for creativity though. The design for this one here evolved over time in my sketchbook, but as soon as I started actually building it, I changed almost every single thing... Why? Bits of it were practical, but mostly it was due to the fact that as soon as I started cutting things out, the wood inspired me in a different way than I expected. Some of the core ideas remained intact—I was always going to make it out of Walnut, and a cabinet by Lara Mays inspired the idea of texturing the door, though the choice of texture changed. Some details came into play later, like the shape of the decorative cutout, which is cribbed from a Maloof design.

Basic Joinery

Speaking of Sam Maloof, the joinery decisions for the cabinet were also closely inspired by him. I've been reading his autobiography, and his pragmatic approach really spoke to me when it came to the joinery. Sure, I could have actually used dowels for the joints, but it would have added a lot of complexity with no real upside. Instead, screws with plugs over the top, just like his chairs, work great. The top and bottom are held in a rabbet and dado—but sticking with the straightforward theme, we chose a fool-proof way to cut them.

Prepping Stock

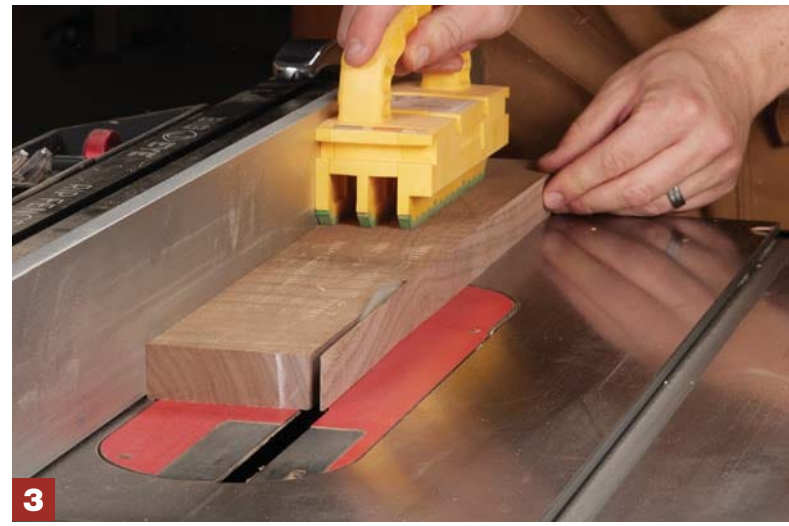
With the size of this wall cabinet (outlined in the measurements on page 51), it was pretty simple to find stock that was wide enough to create all of the case pieces without doing a glue up. But just because you could, doesn't mean that you should. There is some debate whether alternating growth rings actually helps keep panels flat or not, so what I decided to do was to break apart my stock into equal strips, then match them up for the best-looking panels possible. My goal was to create straight-grained panels where I could, and avoid most of the sap wood (I do, however, use that later on for the back panel).

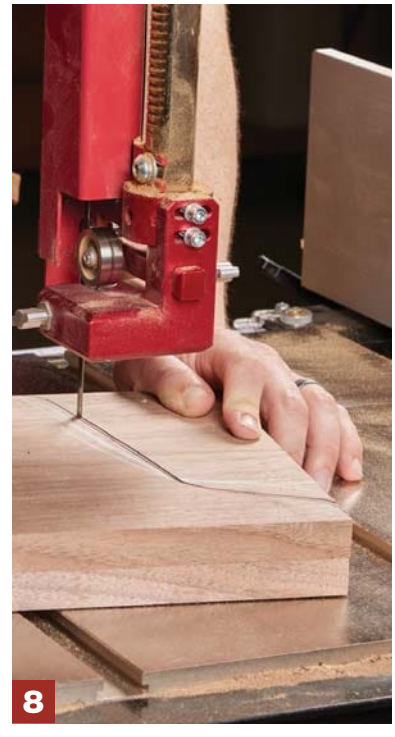
As you can see in the photos below, my breakdown process is as follows. Start by ripping the stock to rough width at the bandsaw. Joint a face to clean up the surface and create a flat reference face (and while there, joint an edge as well). Now, head over to the table saw to rip the stock to the same width. The goal here was to create panels that were at the final width, with equal number of boards making up each panel.

1 The bandsaw is a great way to break down stock. The rough stock isn't flat, and the band saw can rip the boards apart without much fear of the blade getting pinched during the cut.

2 Joint a face and edge on each workpiece. An obnoxiously large 16" jointer is not necessary, but is fun.

3 Rip the stock to the final width.





Grain Match & Glue

At this point, we're going to take all of the smaller boards we've cut and reassemble them into stable, good-looking panels. Flip the boards around, mix and match, and try different orientations until you're happy with the appearance of the panel. Mark it using chalk to keep everything sorted, and glue the panels together. For mine, three strips made each panel (top, bottom, and sides).

After you've given your stock a few hours to dry, you are able to proceed with processing them down. A careful glue up leaves glue joints that just need a few swipes of a plane to level. If you're less than careful, you can lightly run them through the planer again. Then, trim the panels all to near-final size (photo 6).

The sides of the cabinet have a decorative cutout on the lower edge. I find it easiest to cut both sides at once. Use double-sided tape to stick the two sides together (photo 7). Create a hardboard pattern of your shape and cut it at the bandsaw. Transfer the shape to your sides, and cut them out. Now, at the workbench, use the hardboard pattern to rout the ends of the cabinets to shape. The pattern guides the bit, and makes both sides the same shape.

4 After taking all that time to match up boards for the best grain pattern, spend one extra second to draw a carpenter's triangle for reference.

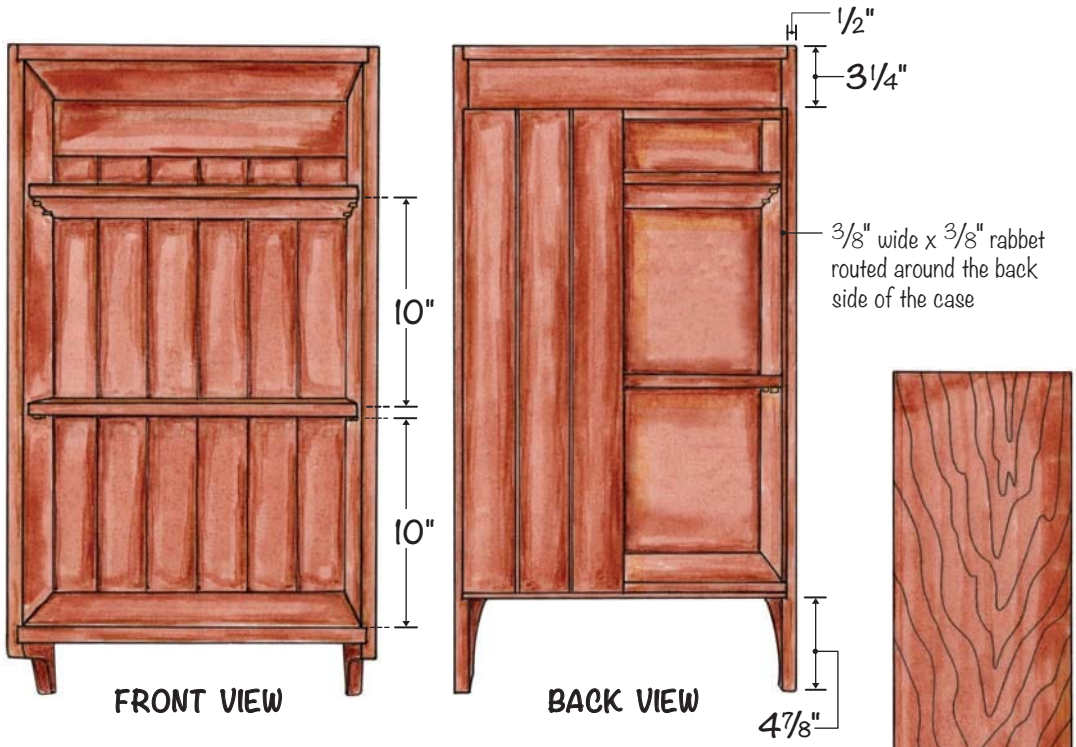
5 Three clamps help spread pressure equally and prevent gaps.

6 Once the glue dries, I rough cut the sides to length.

7 I stuck the sides together using some double-sided tape.

8 Cutting both sides at the same time will keep them identical.

Maloof Cabinet



Cutlist

No.	Items		Dimensions (inches) T	W	L
2	A	Top/bottom	3/4	16 1/2	9
2	B	Sides	3/4	9	33 3/8
1	C	Top Cleat	3/4	16	3
2	D	Shelves	5/8	15 7/8	7 3/4
1	E	Door	3/4	15 7/8	27
6	F	Back slats	3/8	2 11/16	24 7/8
1	G	Door handle*	3/16	1 3/8	1 3/4

*Door handle is cut from a 3/16" thick piece of brass.

HARDWARE:

- Adjustable Ball Catch (*Woodcraft*; item #27H39)
- Pair of Offset Pivot Hinges (*Brusso*; 1 3/4" x 3/8" x 1/8" extended)
- 8 Shelf Pins; brass finish

A sharp bit and a light pass leaves a very smooth surface, even on the endgrain.

A Bit of Joinery

As I mentioned on the first page of this article, the joinery for the cabinet is simple—a rabbet holds the top of the cabinet, and a dado holds the bottom. These two joints can be cut (easily) at the table saw. However, combining a small dado clean-out bit in the router with a couple of hardboard fences makes this a hard process to screw up. Photos 10-12 show these steps. First, the rabbet. This rabbet is cut along the top edge of the sides. Carefully mark the rabbet locations, and use double-sided tape to stick down a hardboard fence along your layout lines. Then, rout the rabbet in a few passes, until the bearing guides the bit along the fence during the last pass.

After creating the rabbet, you'll see that creating the dadoes is done in much of the same way. As you can see in photo 11, the actual bottom is used to space out the hardboard fences that are taped in place. This ensures that the re-


9


10

9 Patterns make repeat cuts a breeze.

10 Shallow passes help prevent chip out when cutting the rabbet.

11 The hardboard guide for the bottom of the dado is placed first, then the bottom is used to set the second guide.

12 It's a snap to route a perfect dado using the guides.


11


12

13 The cleat is affixed to the case using dowels, providing enough strength to hang the cabinet with everything in it.

14 The Shaper made quick work of the hinge mortises.

15 Thanks to the hardware specs being programmed to the Shaper, the mortise was exactly the right size.

16 A drill guide allowed me to cut the dowel holes perfectly without a drill press.

sulting dado is an exact fit for the workpiece. This is a much more straightforward technique for creating one or two dadoes than trying to dial in a dado stack at the table saw. Once the hardboard fences are taped in place, use the same dado clean-out bit to rout the dado in a few passes. Start with a pass down the right-hand fence, then make a pass down the opposite fence. Make sure to keep in mind the rotation of the router bit so that you are not climb cutting. At this point, you can test fit the case together just to see how everything is looking.

Odds-and-Ends

Before gluing together the case, there are a few more tasks to take care of. The first is that I wanted to add a hanging cleat in the back of the case. This allows an attachment point for the cabinet on to the wall. There's no fancy joinery here — a couple of dowels are drilled into the end of the cleat. Use dowel-centers to transfer the dowel location to the case sides and drill them out.

Another thing to take care of is a by-product of the hinges I chose to use. The *Brusso* knife hinges need to be routed into the top and bottom of the case. This would be nearly impossible to do after the cabinet is assembled, so doing it now makes sense. The Shaper Origin happens to have all of the *Brusso* hardware pre-loaded into it, so you can simply pull up the SKU of the hardware you ordered and drop it on your workpiece. We used the Shaper Plate (photo 14) with Origin to position the cut. A bit of chiseling to square up the corners leaves a perfect hinge mortise (photo 15). Lastly, pre-drilling the dowel holes that will cover the assembly screws is easier to do now as well. I used a drill guide to simply position a small Forstner bit and drilled these shallow holes. This also helps locate the screws during assembly.


17


18

Sling Some Glue

Now, you're ready to assemble the case. The only things that I glued here were the dadoes and the rabbets. The hanging cleat (shown here in photo 17) is locked between the sides with dowels, so it's not super necessary to glue it. Spread glue in the dadoes and rabbets, and insert the top and bottom panels. Slap the opposite side in place. Now, here's the great thing about screws — if you have them ready to go, you can simply drive them home and you don't have to worry about clamps. Let the screws hold the case together as the glue dries. Viola.

During high school shop class, we were shown how to make matching plugs to mask screw holes. But, in my mind, it always looks like you're doing exactly that — trying to hide screws. Instead, I liked Maloof's mentality here, and made it a feature. Contrasting dowels add a small design detail, and if you didn't know they hide screws, they would just look nice. Cherry dowels plug the screws in this case. When you're choosing your plug wood, remember this however — because the dowels will be showing endgrain, they will appear a bit darker than what you might think. They soak up a bit of finish and darken. The cherry endgrain ends up a few shades lighter than the surrounding walnut.


19


20

17 The dadoes and rabbets take just a dab of glue.

18 The clamps here are to hold the case square. The screws were driven once I was satisfied.

19 Cherry plugs are another Maloof design homage.

20 The rabbet was cut on the router table.

A Fancy Back

The back of the cabinet is going to be made up of hardwood shiplap. I thought this was a nice place to use the sapwood, particularly in a contrasting pattern (more on that in a little bit). The shiplap sits in a rabbet that's cut all the way around the back of the case. The size of this case makes it pretty simple to use a rabbeting bit in the router table. Place the case over the router table, and fire it up. Run the rabbet bit around the perimeter of the case (on the inside). This creates a rabbet around the sides, bottom, and along the bottom edge of the hanging cleat. Square up the corners of the rabbet with a chisel. You don't need to be super pretty in the corners,

21-22 Two quick passes on the table saw cut the alternating rabbets without having to make any set-up changes.

23 I started in the middle and worked my way towards the edges. The two shiplap pieces on the ends were ripped down to exact size.

24 A set up block helped me get perfect spacing when installing the shiplap.

but just get them clear so you can fit a piece of shiplap tight up against the sides.

The shiplap panels are thin pieces of hardwood. They become shiplap with the addition of a rabbet along each of the long edges, on opposite faces. See Photo 20 above. I took the time to resaw some of the sapwood offcuts from the initial stock breakdown for these pieces of shiplap. The resawn blanks can be book-matched, and in turn the book-matched panels can be oriented into a hounds-tooth type pattern inside the cabinet. It's just a fun little detail that you only see when you open up the cabinet.

The ship lap is rabbeted at the table saw. Then, it's laid in place on the back of the cabinet. Because of the opposite rabbets on each successive piece, only one screw is necessary on each piece (one screw on the top, and one on the bottom). The previous piece holds the prior piece down. You do want to make sure you space out the shiplap however. The hardwood will expand and contract, and you want to give it plenty of room to do so. You can see in photo 24 that I'm using a set up block as a spacer while installing it. A short screw is driven into a pre-drilled and countersunk hole to attach the back.

A Slab Door

The door on this cabinet is a big, glued-up piece of walnut. I wanted to use the door to explore the addition of some form of organic texture. We'll get to that in a bit, but my point here is that I didn't pay as much attention to the grain on the door, as I knew it would be disrupted with some form of carving.

The first thing to manage with the door is the hinge locations. Much like the hinge pockets routed in the top and bottom of the case, the door gets the mating pocket for the other half of the hinge. These are done on the ends of the door, so I held the door in the Shaper Workstation to make these cuts. Again, a bit of clean up is required with the chisel to make the round router bit path squared off.

The texture on the door is created using an *Arbortech* power carving tool. In particular, it's the *Arbortech* Ball Gouge (30mm). The gouge is a spinning blade that limits the depth of cut (so you have control) and it attaches to their Power Carving Unit. Texturing the door is not a fast process, but it is rewarding. The biggest task is trying to force yourself to be as random as possible with the pattern, and tap the surface. You can

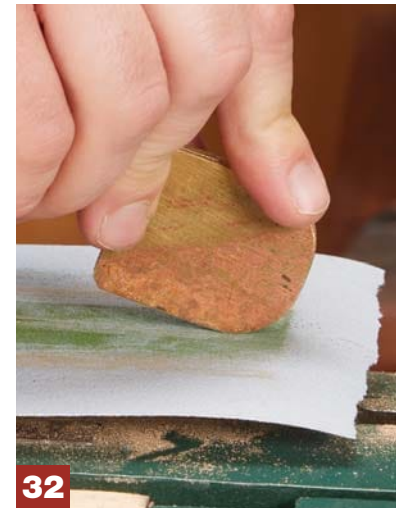
25 The Shaper was pressed into service again on the doors.

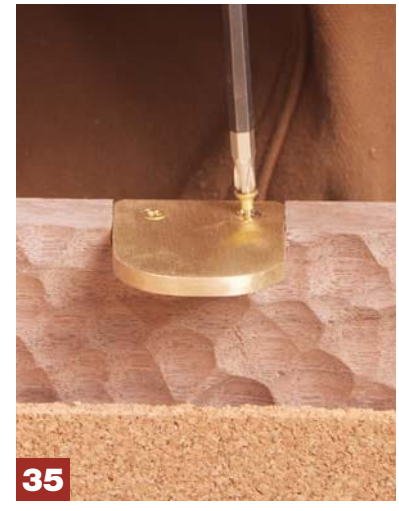
26 It's very satisfying to clean up the corners with a chisel.

27 It actually takes a bit of focus not to make accidental patterns when carving a large panel.

28 The flap disc knocks down the rough edges without dulling the texture.

29 Hinges were mounted to the body first, and the doors slid on.





30 Affixing the brass to a larger work surface makes it easier to work.

31 The Shaper Origin is also great for cutting brass.

32 Adhesive-backed sandpaper helped me clean up the edges and buff off an old chemical discoloration.

33 The notch is cut in the same way we cut the dadoes earlier.

34 A countersink bit works as well on brass as wood.

35 The final pull is perfectly integrated into the edge.

come back with chalk to highlight any flat areas and hit those again with the gouge. To clean off any fuzz, a flap disk in a drill worked really well to smooth it out. Overall, it left a really nice surface, and one that I want to work with more in the future.

The original plan for the door was to create a wood pull that was integral to the door. However, a simple brass pull seemed to fit the bill better. Plus, I had used the *Shaper* Origin a bunch on this project, so I figured why not use it to cut a simple tab-shaped brass pull.

After cutting the pull to size, I spent a few minutes with a sanding block to surface the pull and create a nice matte look. Countersinking a few screw holes is easily done with a hand drill. Notching the edge of the door can be done with a handsaw and a router plane—you're just making a little notch to fit the pull. A couple of brass screws complete the look.

Finally, you can attach the door by sliding it over the hinges (mounted in the cabinet) then screwing them in place on the top and bottom edges of the door.

For the finish, I made my own homemade Maloof-formula base finish and topcoat. Full details of that process can be found at *PopularWoodworking.com/OnlineExtras*. **PW** – ***Collin Knoff***

ENDGRAIN

Stickley #210

Stickley's #210 settee embodies Arts & Crafts simplicity, honesty, and craft in one iconic design.

By Kevin Pierce

In the previous issue, I shared some background on Gustav Stickley and the philosophy that guided his work during his years with the Stickley Brothers Furniture Company. Among the many pieces he designed, one that continues to stand out to me is the Stickley No. 210 settee—a piece that perfectly embodies the Arts & Crafts ideal. With its clean lines, balanced proportions, and quiet sense of strength, the settle reflects Stickley's belief that beauty arises from honesty and utility.

I recently had the rare opportunity to study an original example up close, taking detailed measurements and producing a full set of drawings. A special thanks to the staff at the *John Toomey Gallery* in Oak Park, Illinois, who graciously allowed access to their collection for careful examination. What follows are the drawings of the Stickley No. 210—a timeless example of functional craftsmanship at its finest.

PW - *Kevin Pierce*

While examining the materials I'd put together years ago, I found this.

"On account of the unusual width of the pieces that go into the makeup of this settee, it will be necessary to have the wood thoroughly seasoned before putting them together, otherwise shrinkage will cause them to crack open."

– Unknown (I don't know who said it, but it sounds like good advice.)

Cutlist

No.	Items	Dimensions (in.) T	W	Actual Length	Distance Showing	Comments
4	**A** Posts	3 3/8	3 3/8	36	36	
1	**B** Lower back rail	1 1/2	9 3/8	84 1/2	77 1/4	Includes 3 5/8" tenons each end
1	**C** Upper back rail	1 1/2	12	84 1/2	77 1/4	Includes 3 5/8" tenons each end
2	**D** Bottom side rails	1 1/2	5	34 5/16	27 1/16	Includes 3 5/8" tenons each end
2	**F** Top side rails	1 1/2	5	31 11/16	27 1/16	Includes 1" back tenon and 3 5/8" front tenon
1	**E** Front rail	1 1/2	7	84 1/2	77 1/4	Includes 3 5/8" tenons each end
12	**G** Slats	1/2	3 9/16	24 3/8	22 3/8	Includes 1" tenons each end
2	**H** Cleats for seat frame	3/4	1 1/4	77 1/4	77 1/4	
2	**I** Foundation rails	1 1/4	3 3/8	28 7/8	28 7/8	
2	**J** Foundation stiles	1 1/4	3 3/8	28 7/8	70	
8	**K** Pins	1/2	-	2 3/8	-	
14	**L** Pull pins	7/8	-	4 5/8	-	Includes 4 for front rail, 10 for back rail

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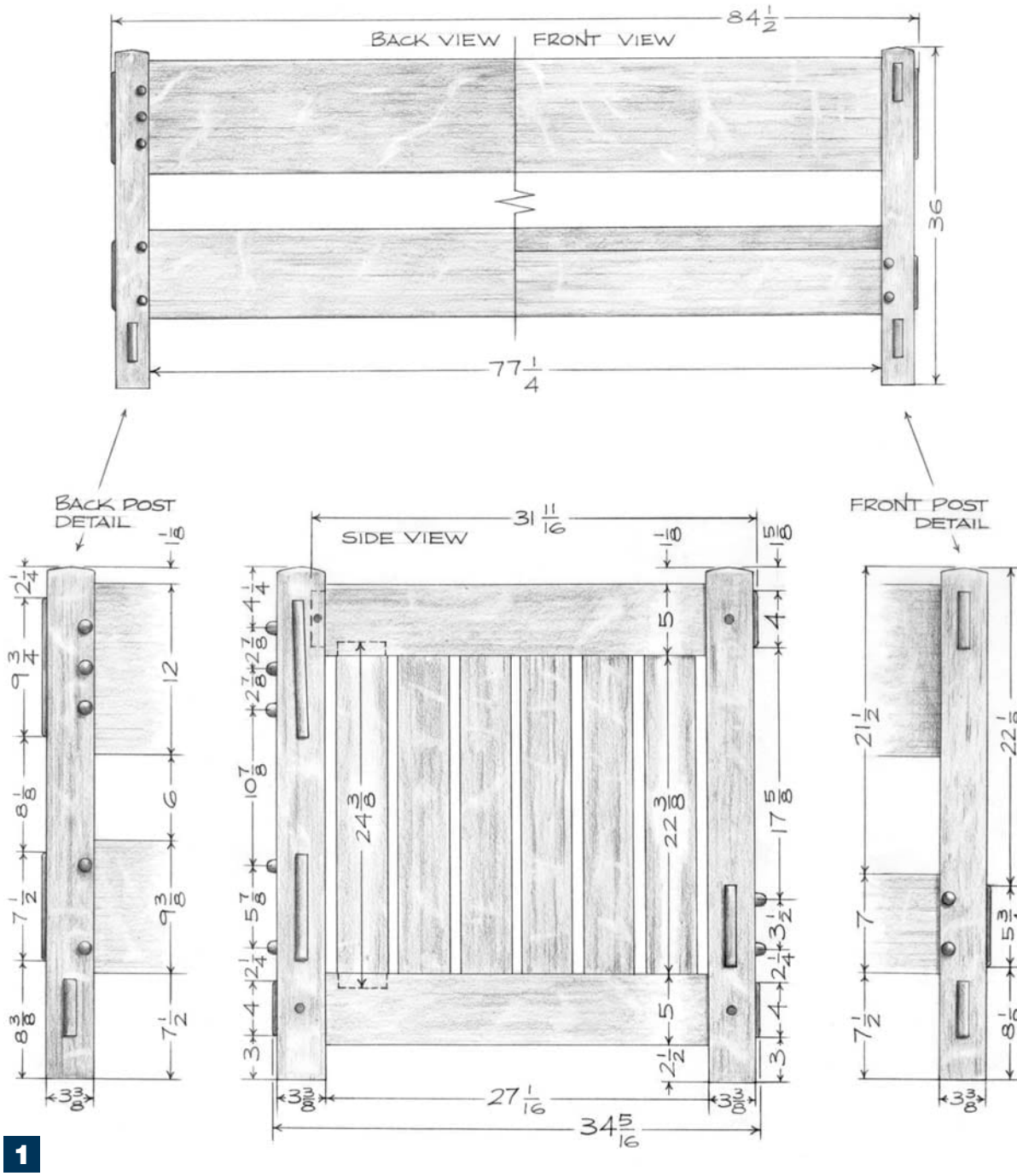

1

1 All tenons are ¾" thick. All projecting tenons are 3⅝" long. The posts are 3⅜" x 3⅜" x 36" and chamfered on the top and bottom. Then tenons for the front, back, and bottom side rails project through the posts, so these mortises must be cut through, but the top side rail only has through tenons in the front. The top side rail tenons positioned in the back posts are ¾" x 1" x 4".The bottom side rails are 1½" x 5" x 34⅝", with 4" tenons on each end. Both of these tenons project through the legs and the tenon ends are chamfered.

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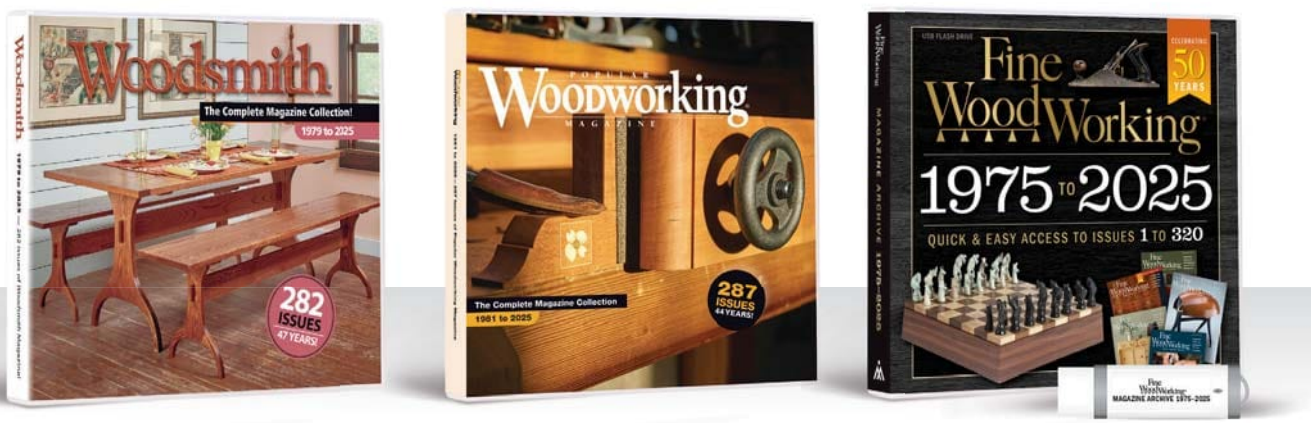

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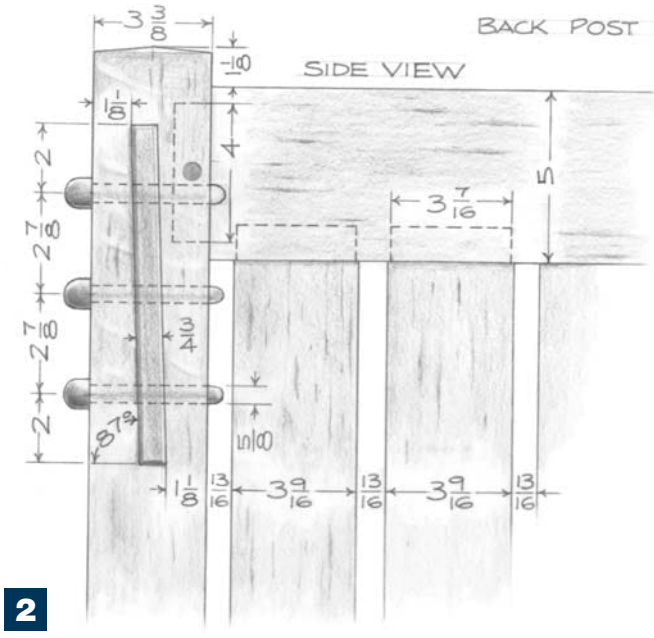

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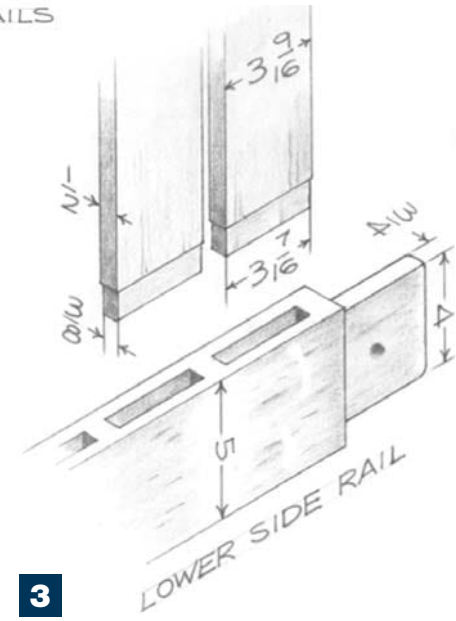
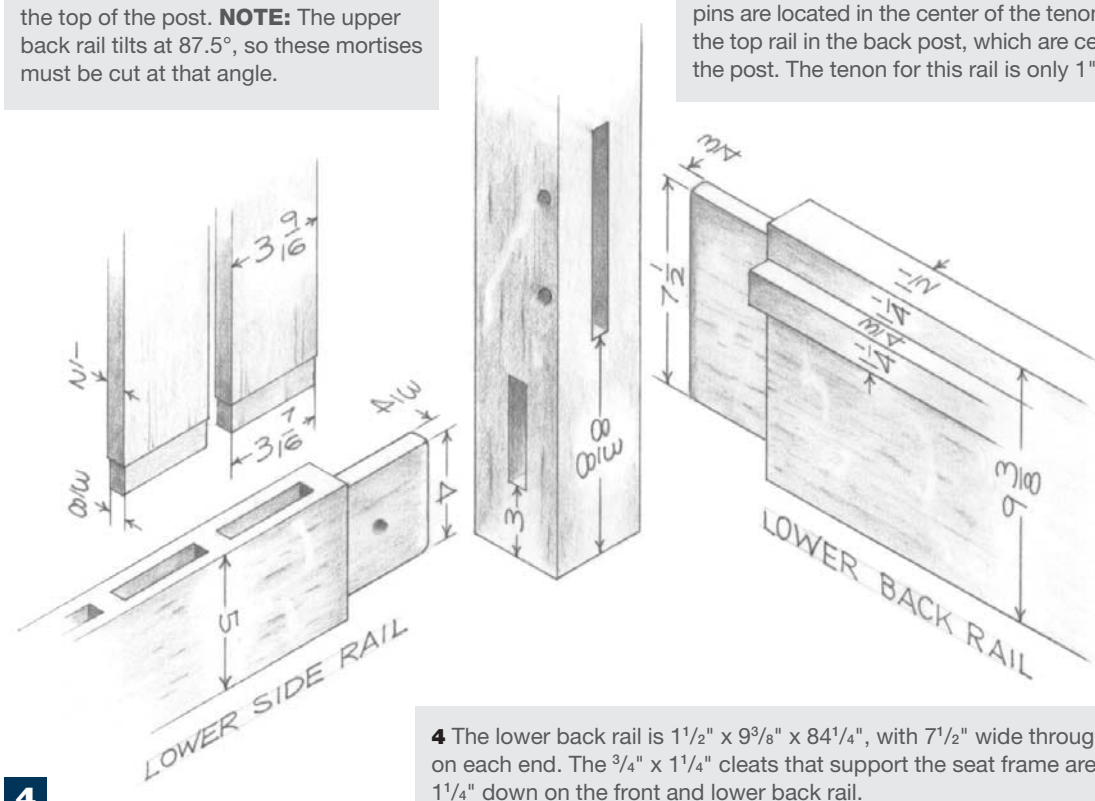


3

2 The upper back rail is 1½" x 12" x 84½", with 9¾" wide through tenons on each end. The upper rails on the back and sides are located 1⅛" from the top of the post. **NOTE:** The upper back rail tilts at 87.5°, so these mortises must be cut at that angle.

3 Each end of the side slat has a ⅜" x 3 7/16" x 1" tenon. The side rails are fixed to the posts with a ½" x 2⅜" pin. These pins are inserted from the outside and do not extend through the post. All pins are located in the center of the tenon, except the top rail in the back post, which are centered in the post. The tenon for this rail is only 1" long.



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4 The lower back rail is 1½" x 9⅜" x 84¼", with 7½" wide through tenons on each end. The ¾" x 1¼" cleats that support the seat frame are located 1¼" down on the front and lower back rail.

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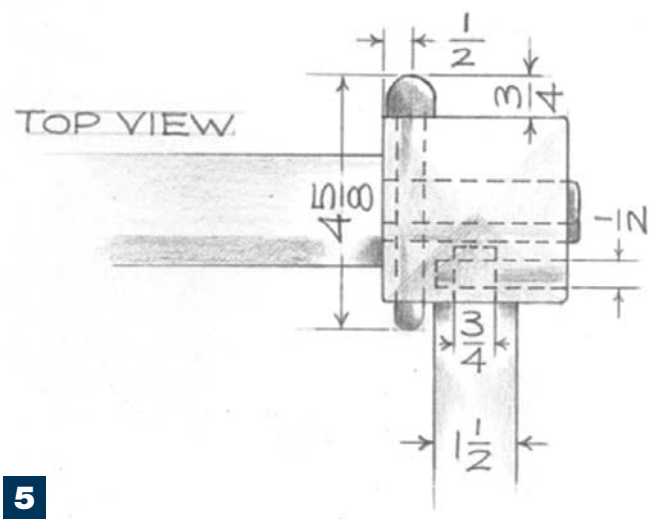
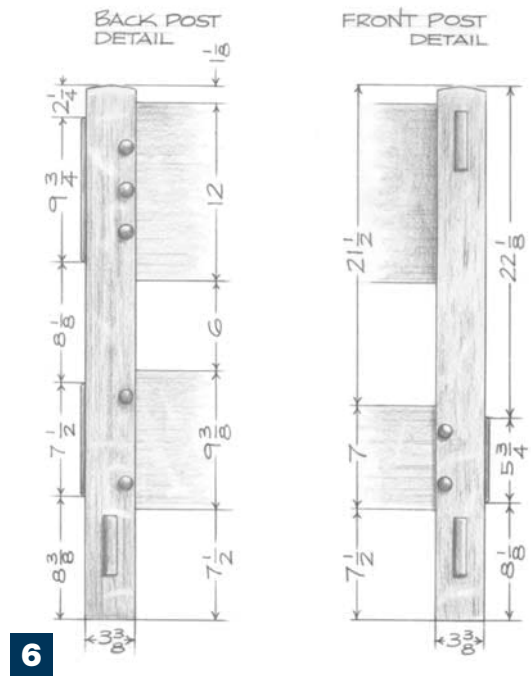


5

5 The sides are permanently assembled with glue, but the front and back rails are attached with 7/8" x 4 5/8" pull pins which can be removed in order to "knock down" the settee. The head of the pull pin is 3/4" x 7/8" diameter. The remainder is 5/8" diameter.



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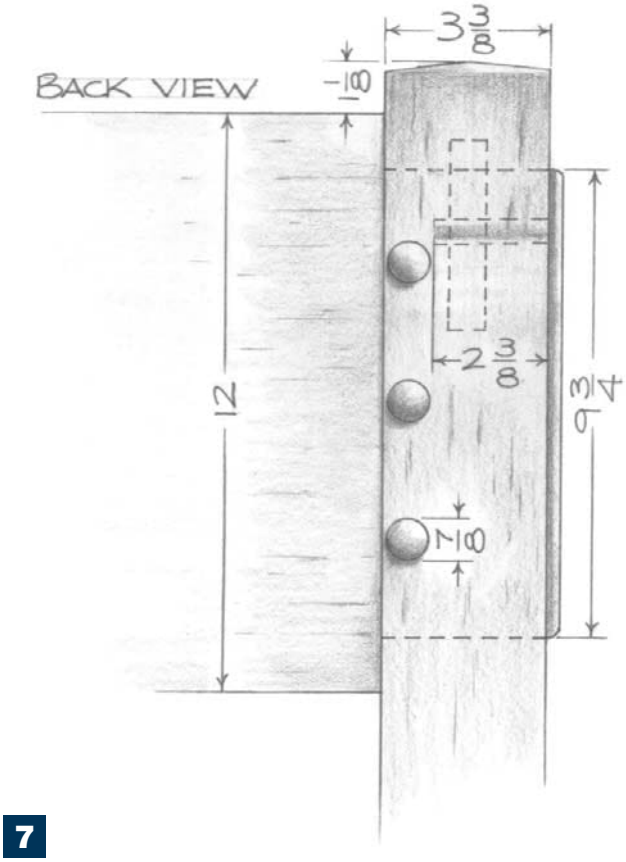

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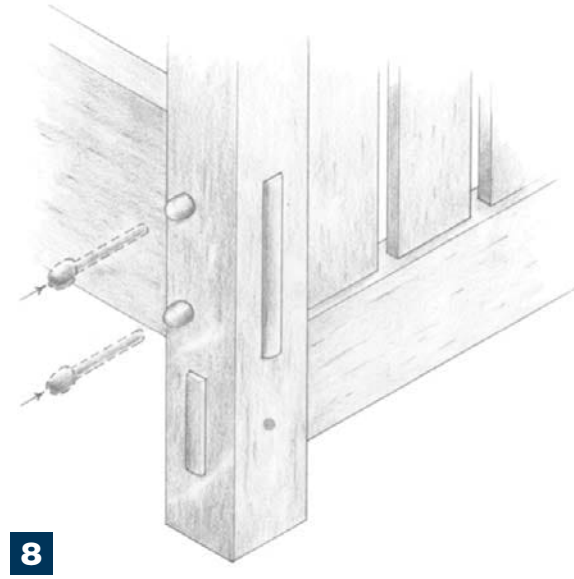

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6 The details above show the locations of the front and back rail tenons.

7 In the back post dowels shown here, both the pull pins and the pins supporting the side rail can be seen.

8 The detail below shows exposed tenons, side rail pins, and pull pins in the back posts.

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