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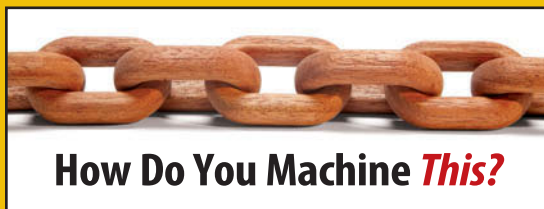
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#160, June/July 2012

Features

36 Arts & Crafts Coat Rack

Learn how to make large joints while building a project with only 6 pieces.

42 Wall Cabinet of Maple

It's all about the wood.

48 The Secrets of Spalted Maple

What makes this wood so special? Fungus.

49 Alphabet Puzzle

Dado a few sticks, then practice your ABCs.

52 Turned 3-Leg Stool

Combine your woodworking and woodturning skills.

58 Tool Cabinet

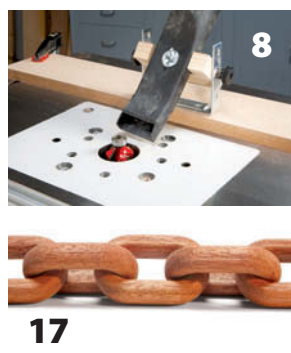
Store your planes and chisels where you sharpen them.

64 How to Install Knife Hinges

They're a sure sign of good craftsmanship, but are almost invisible.

68 Veneering on the Curve

The 'flat board first' method enables you to veneer a curved part with any pattern you want.



Departments

8 Workshop Tips

17 CNC Workshop

22 Well-Equipped Shop

29 A Great American Woodworker

34 My Shop

74 Oops!



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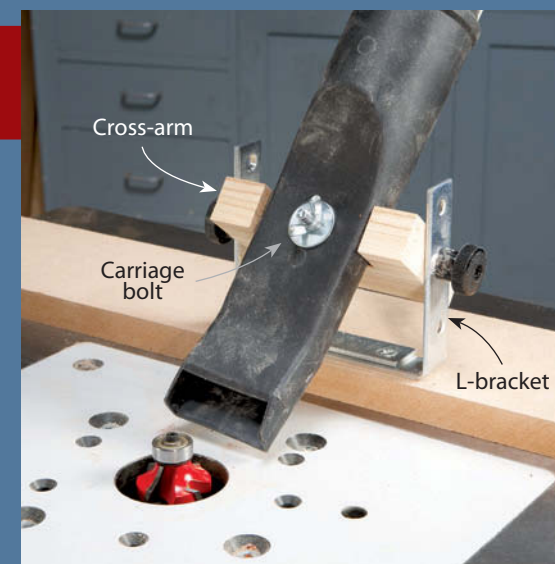
Terrific Tip!

DUST IS A REAL PROBLEM when you can't use a router table's fence and its dustport. If you're routing curved parts with a bearing-guided bit, for example, you don't use a fence, but you do make a lot of dust. I've devised a way to suck up that dust with my shop vacuum's nozzle. The nozzle is attached to an adjustable stand that allows me to aim the nozzle directly at the bit.

All you need to make the stand is some common hardware and a board that's as long as your router table. The fixture that holds the nozzle is made from two L-brackets.

To build the stand, overlap the brackets so they form a "U" shape and line up their holes. Center the brackets on the board and attach them with screws. Cut a wooden cross-arm to fit inside the "U." Cut a notch in the cross-arm wide enough for your vacuum's nozzle. Drill a hole for a carriage bolt through the notch. Drill the same size hole through the nozzle. Drill a pilot hole in each end of the cross-arm for a hanger bolt.

Slip the carriage bolt through the cross-arm and nozzle, then add a washer and wing nut. Hold the cross-arm between the L-brackets and install the hanger bolts through one of each bracket's screw holes. Use jig knobs to secure the cross-arm at the desired angle.



Len Urban

Shopping List

- 2 – 6" L-brackets
- 2 – 1/4"-20 x 1-1/2" hanger bolts
- 1 – 1/4"-20 x 3" carriage bolt
- 2 – 1/4"-20 female jig knobs
- 1 – 1/4"-20 wing nut
- 1 – 1/4" fender washer



Self-Storing Glue Kit

GLUING UP A PROJECT can turn ugly in a hurry if you don't have all your supplies on hand. I put together a kit that contains everything I need: a small white-nylon paintbrush for spreading glue, a putty knife, a wooden wedge and a cotton rag for removing glue squeeze-out, and a gallon jug for water. A plastic or paper cup screwed to a small block of wood serves as a glue container for dipping the brush. I stack additional cups inside the screwed-down cup and toss them away after each use.

The gallon jug has a large cutout so it's easy to dip the rag or toss in the brush, wedge or putty knife before the glue on them hardens. When I'm finished, I pour the water out of the jug and store all the supplies inside.

Tom Caspar



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Workshop Tips

continued

One Man's Trash ...

I JUMP AT ANY CHANCE to dig through an old building—you never know what you'll find. Rummaging through an old farmhouse and barn slated for demolition, I found enough material to build a stout workbench.

The bench's base is made from some interior doors that I salvaged from the house. The top is made from a few hunks of discarded bowling lanes that I found in the barn. The wood was in good shape but coated with dirt and oil. I washed and scrubbed enough of that thick hard maple to make a 2' x 5' top, then clamped a few pieces together with four 3/8" threaded rods and added a maple frame to cover the nuts. A local cabinet shop sanded the surface for me.

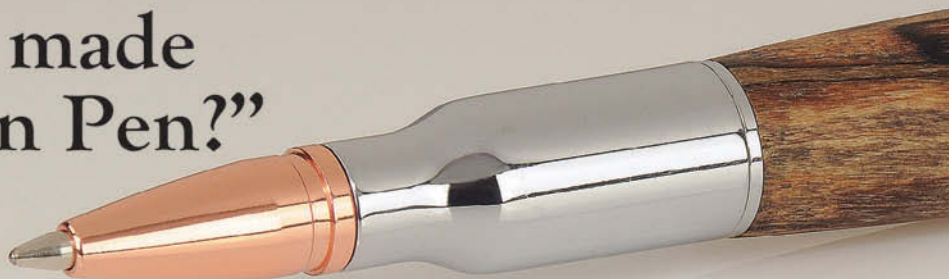
The bench is very heavy, stable and durable. With a new vise, the total project cost about \$100.

Tom Petersburg



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Super-Accurate Tablesaw Tilt

TABLESAW TILT GAUGES are inherently inaccurate. After all, the degree lines are usually at least 1/16" wide. I use a digital angle gauge instead, which is accurate to 1/10 of 1°, and mount it on a bracket in front of the saw.

You could attach this gauge directly to a saw blade to measure its tilt (the gauge has a magnetic base), but I've found it hard to read when I'm bending down to turn the tilt wheel. Putting the gauge under the saw, in front, is much more convenient.

I made the bracket from a piece of plywood, painted black, and a short length of angle iron. The bracket fits tight on the rod that holds the elevation wheel and pointer. When the blade tilts, the bracket tilts, too—just like the pointer.

To use the gauge, I first set it on top of the saw and zero it. Then I put it on the blade and adjust the blade's tilt until the gauge reads exactly 90°. Next, I move the gauge down to the bracket, zero it again and tilt the blade to whatever angle I want.

Alan Schaffter

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Workshop Tips

continued

Long Stock, Short Fence

ROUTING LONG, STIFF PIECES, such as handrails, presents a couple of problems. First, it's very hard to get (or make) stock that's extremely straight and 12' to 14' long. Second, a piece that thick won't flex, so a featherboard isn't going to keep it tight against your fence.

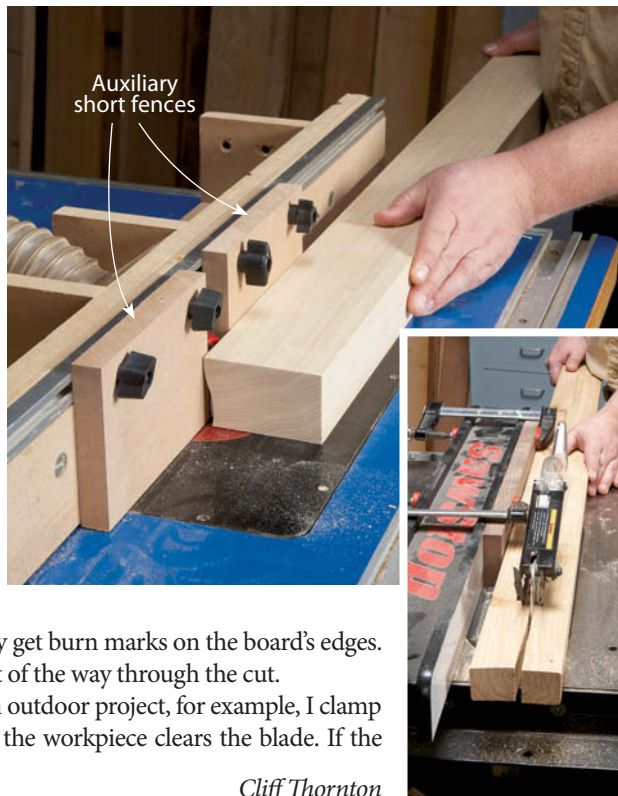
The solution? Use two short fences, each about 5" long. If your workpiece is slightly curved, the bend won't affect the shape of the profile very much.

I also use short fences on my tablesaw in some situations. When ripping a board, internal forces may cause it to spread apart as it is cut. The right-hand side of the board then binds against the fence and the blade. Dimensional softwood lumber is much more prone to this problem than kiln-dried hardwood, but you never know.

You should always use a splitter or riving knife on your saw to prevent kickback from this kind of binding, but you'll probably get burn marks on the board's edges. The binding may get so bad that you can't push the board the rest of the way through the cut.

A short fence solves both problems. If I'm ripping cedar for an outdoor project, for example, I clamp a short sub-fence to the saw that stops right at the point where the workpiece clears the blade. If the board starts to warp, it has nothing to push against.

Cliff Thornton



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Hacksaw Flush-Cutter

FLUSH-CUTTING DOWELS, corner keys or screw-hole plugs used to frustrate me because my saw's teeth always left scratches on the project's surface. Rather than buy a special flush-cutting saw, I made one from a hacksaw blade.

I used my disc sander to grind off the wavy set of the teeth from both sides of the blade. No set, no scratches. Removing the set from both sides of the blade enables me to pull it from right or left.

Bill Wells



Close-Quarters Clamping

AN F-STYLE CLAMP works well for getting into tight spaces, but how do you turn the handle? The answer: Just drill a couple of holes through it and insert a screwdriver.

A 90° offset to the holes ensures that the handle won't be significantly weakened and makes at least one hole accessible at all times.

John Cusimano

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Universal Shooting Board

I USED TO HAVE THREE shooting boards for planing end grain: one for 90° cuts, one for 45° horizontal miters and one for 45° vertical miters. Now I've combined them all into one.

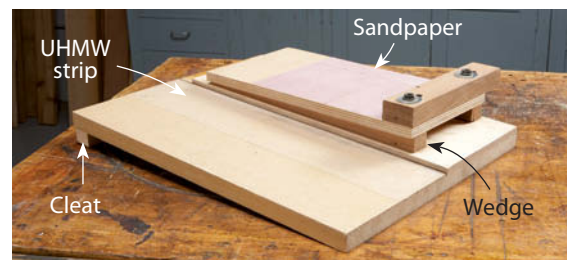
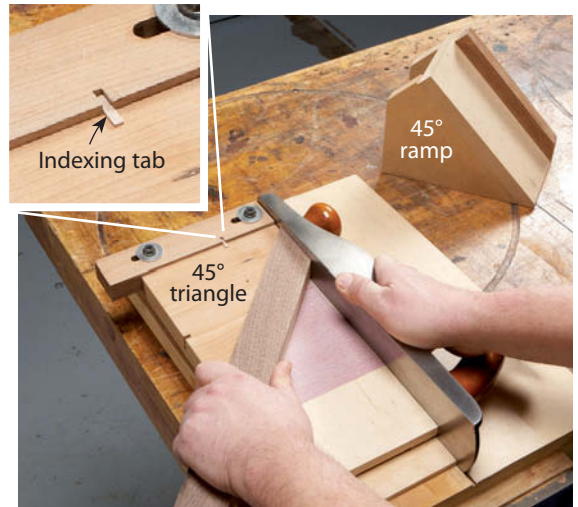
The jig's main body is a typical shooting board for trimming pieces at 90°, except that it has long wedges to tilt the bed. (As a part is planed, the bed's tilt creates a shearing action that makes the plane easier to push. Tilting the bed also results in a cleaner cut.) A cleat fastened under the shooting board's front edge allows me to clamp the device in my face vise. Slotted screw holes in the stop block allow me to move the block over when it gets worn. PSA-backed sandpaper helps hold the stock in place. A PSA-backed strip of UHMW plastic creates a slick surface for sliding the plane.

Two 45° attachments go on top of the shooting board, up against the stop block. The horizontal mitering attachment is simply a 45° triangle. The vertical mitering attachment is a 45° ramp with a fence. Each attachment has a small tab that engages in a 1/8" x 1/4" slot in the middle of the stop block. The tabs lock the attachments in place, so they won't slide.

Doug Perlick

SOURCE

Woodcraft, woodcraft.com, 800-225-1153, UHMW "Slick Strip," 1/32" Th x 3" W x 10' L, #16L65, \$21.99.



Anti-Racking Credit Cards

HAVE YOU EVER CLAMPED a part in one side of a vise, only to find that the piece slips? If you had looked at the vise's front jaw, you probably would have noticed that it was skewed, pinching just one corner of the workpiece. That condition is called "racking," and virtually every vise suffers from it.

What you want is even pressure. The best way to create it is to clamp an object of equal thickness in the opposite side of the vise. I use a stack of worthless credit cards—the kind you get with junk mail—that are bolted together. By swinging part of the stack out of the way, I can easily match the thickness of any workpiece.

To make this anti-racking device, tape together your pile of cards and drill a hole through them. (This is the fun part!) Remove the tape and insert a bolt with a washer. On the bolt's threaded end, slip on another washer and a wing nut.

Charles Mak



Pick-Up Switch

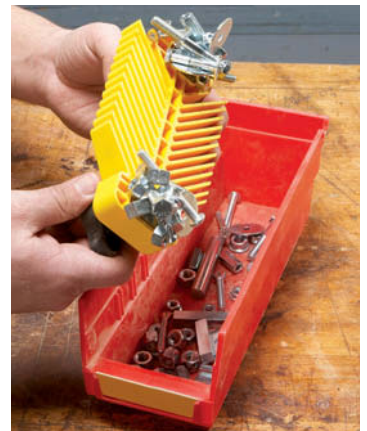
WHILE STARING AT THE PILE of assorted hardware I just accidentally spilled onto my sawdust-covered floor, my thoughts quickly turned from banging my head against the wall to patting myself on the back. Here's why.

I grabbed my MagSwitch featherboard, turned on its two magnets and picked up all the hardware—minus the sawdust—in one fell swoop. Holding the featherboard over the parts box I had dropped, I turned off the magnets and watched all the bits and pieces of hardware fall right back where they came from. The whole clean-up operation took less time than it has taken me to tell you about it!

J.M. "Mike" Jeffries

SOURCE

Rockler, rockler.com, 800-279-4441, Magswitch Universal Featherboard, #26804, \$55.99.





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- Approx. shipping weight: 756 lbs.



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- Precision ground cast iron table size: 9" x 72 1/2"
- Max. depth of cut: 1/8"
- Max. rabbeting depth: 1/2"
- Cutterhead dia.: 3"
- Cutterhead speed: 5000 RPM
- Cuts per minute: 20,000
- Approx. shipping weight: 500 lbs.

WITH 4 KNIFE CUTTERHEAD

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G0656PX ~~\$1195.00~~ **SALE \$1150.00**



15" PLANERS

- Motor: 3 HP, 220V, single-phase
- Precision-ground cast iron table size: 15" x 20"
- Min. stock thickness: 3/16"
- Min. stock length: 8"
- Max. cutting depth: 1/8"
- Feed rate: 16 FPM & 30 FPM
- Cutterhead speed: 5000 RPM
- Approx. shipping weight: 675 lbs.

WITH 3 KNIFE CUTTERHEAD

G0453P ~~\$1050.00~~ **SALE \$1025.00**

WITH SPIRAL CUTTERHEAD

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14" 1 HP BANDSAW

- Motor: 1 HP, TEFC, 110V / 220V single-phase, 1725 RPM
- 4" dust port
- Cutting capacity/throat: 13 1/2"
- Max. cutting height: 6"
- Overall size: 66 1/2"H x 26 3/8"W x 30 3/4"D
- Precision ground cast iron table size 14" x 14"
- Table height: 43 5/16"
- Tilt: 45° R, 15° L
- Fence construction: Deluxe extruded aluminum
- Blade speeds: 1500 & 3200 FPM
- Blade size: 92 1/2 - 93 1/2" (1/8" to 3/4" wide)
- Approx. shipping weight: 198 lbs.



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14" HEAVY-DUTY BANDSAW

- Motor: 1 1/2 HP, 110V/220V, single-phase, TEFC
- Precision ground cast iron table size: 14" x 20 1/2"
- Table tilt: 15° L, 45° R
- Cutting capacity/throat: 13 1/2"
- Max. cutting height: 6"
- Blade size: 92 1/2" - 93 1/2" L (1/8" - 3/4" W)
- Quick release blade tension lever
- Cast iron wheels
- Approx. shipping weight: 262 lbs.

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12" BABY DRUM SANDER

- Sanding motor: 1 1/2 HP, 110V, single-phase
- Conveyor motor: 1/2 HP, 110V, single-phase, variable speed 5-35 FPM
- Max. stock thickness: 3 1/2"
- Min. stock length: 8"
- Sanding drum size: 4"
- Sanding belt: 3" x 70" hook & loop
- Dust collection port: 2 1/2"
- Approx. shipping weight: 160 lbs.

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- Portable base: 21 1/4" x 33 1/2"
- Approx. shipping weight: 126 lbs.

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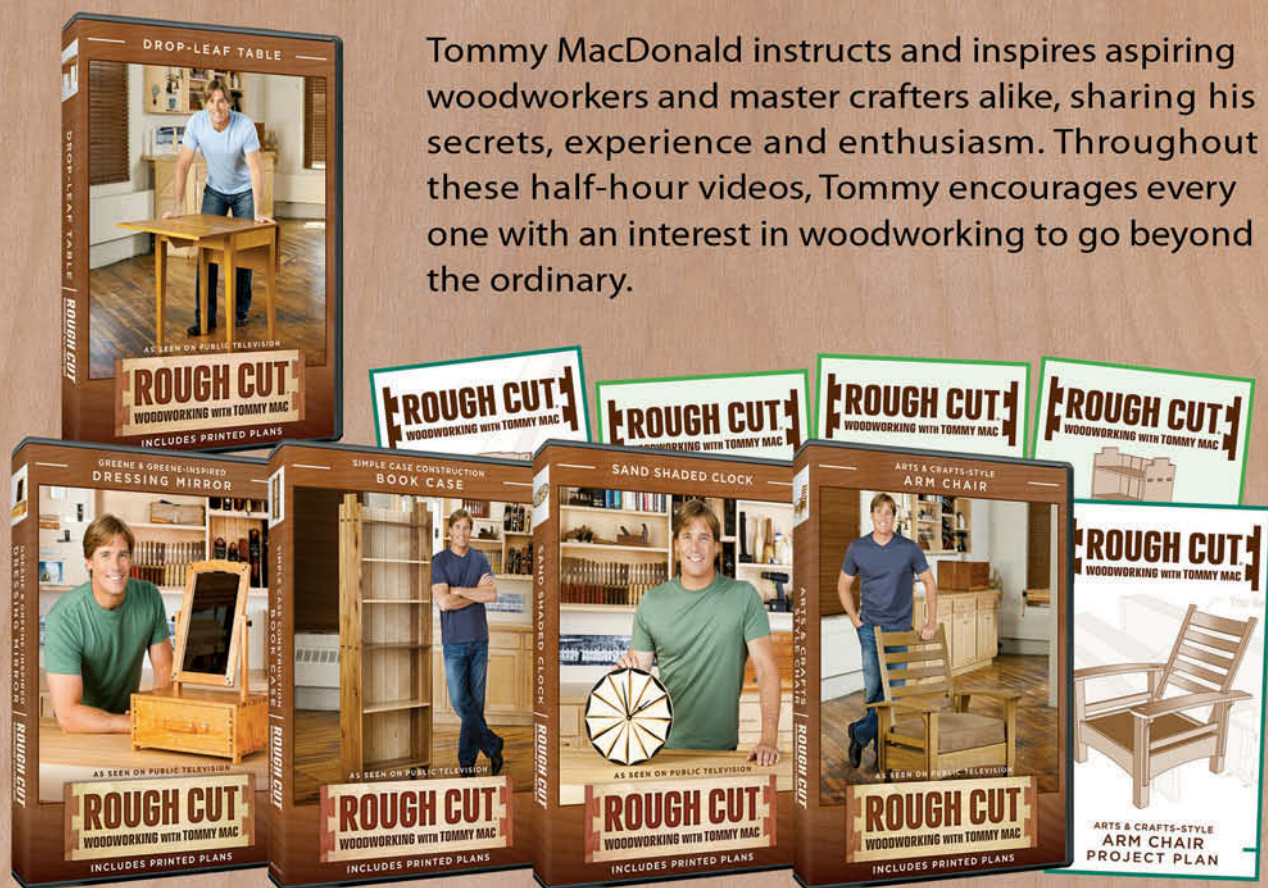
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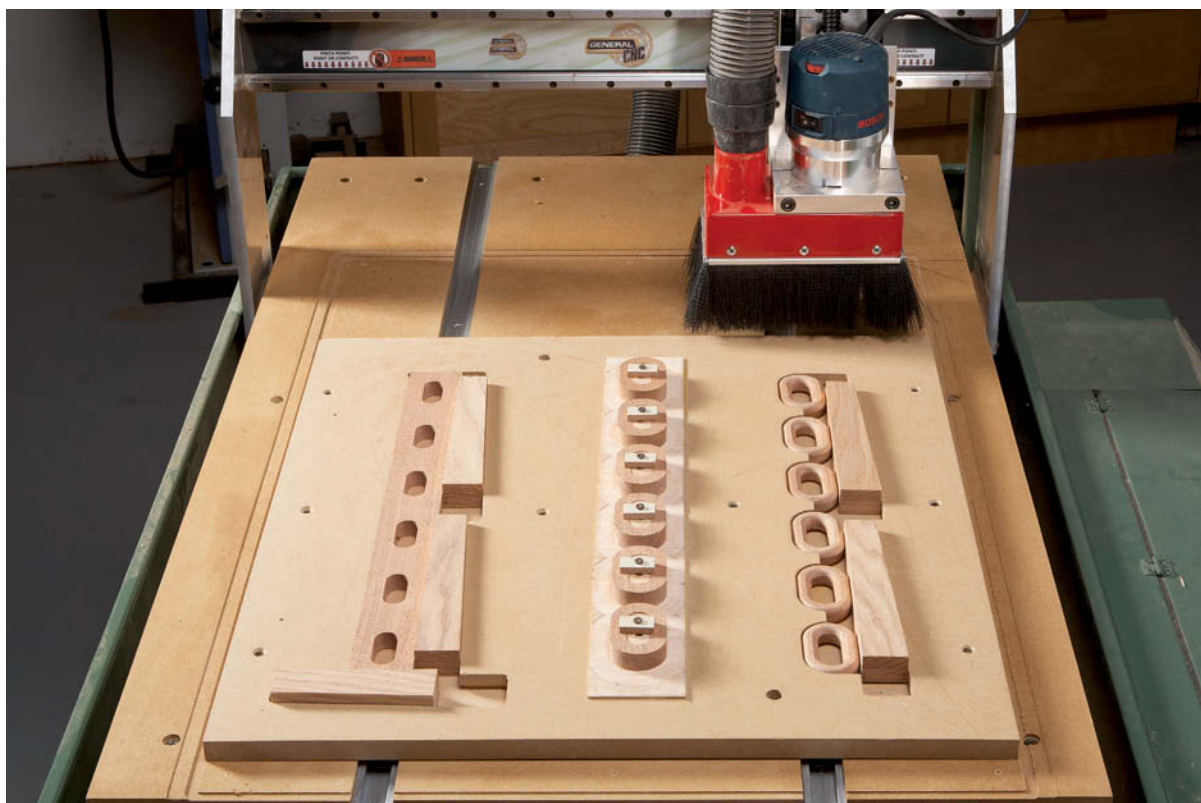
CNC Wooden Chain

Lessons in small parts jiggging.



MY INSPIRATION for this project came from a wooden chain I made years ago using a handheld plunge router and plans from Patrick Spielman's *New Router Handbook* (1993). Since making the chain involved routing a bunch of the same parts, it seemed like a good project for a CNC. Patrick used a one-link-at-a-time routing jig setup that partly relied on the router's base to hold the links steady during routing—something not possible with a CNC. So making the links on the CNC

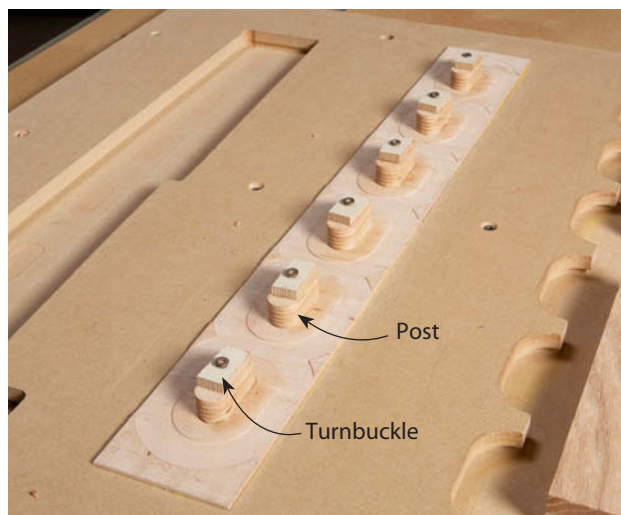
became a good exercise in designing CNC small parts jiggging. I had three goals in mind while developing the jigs. I wanted them to be simple to make, easy to use, and sufficiently durable. After trying various methods involving clamps and hold-downs, I settled on a combination of recessed cutouts, wedges and small turnbuckles. But the real secret to these jigs came from the CNC's ability to easily and precisely create matching parts that fit snugly together like puzzle pieces.





Jig 1: Routing Inside the Links

Rather than make this jig out of separate pieces of wood, I found it easier to rout it as a recess in a piece of MDF. I used three wedges to hold the workpiece in place while routing. The bottom wedge forced the workpiece tight against the upper end of the jig, while the two side wedges pushed the workpiece to the left. The wedges were also created with the CNC, so matching the tapers in the recess to the angle of the wedges was a breeze. The wedges have a 1 in 20 taper, which made them easy to secure and remove with a couple stiff mallet taps. The wedges proved very secure, as they never once vibrated loose during routing. I also routed an undercut around the bottom of the recess with a T-slot router bit. The undercut insured that the workpiece didn't hang up on any stray wood chips at the bottom of the jig.



Jig 2: Routing Outside the Links

Creating the second jig required the most experimenting. I initially created it as a recess similar to jig 1, but the MDF proved too weak and the center posts easily broke off. A piece of Baltic birch plywood glued to the top of the MDF created a much stronger jig. I made the center posts .05" shorter than the thickness of the work piece. This made it easy to apply pressure with the turnbuckles. The center posts were also .05" smaller in diameter than the inside of the links. This slight gap was needed so the workpiece could slide onto the posts without binding, but was still snug enough to prevent the workpiece from shifting during routing. A couple workpieces were slightly warped, which made them hard to slip on to the center posts. A few taps from a mallet solved that problem. Once the links were routed into separate parts, they were easily removed.



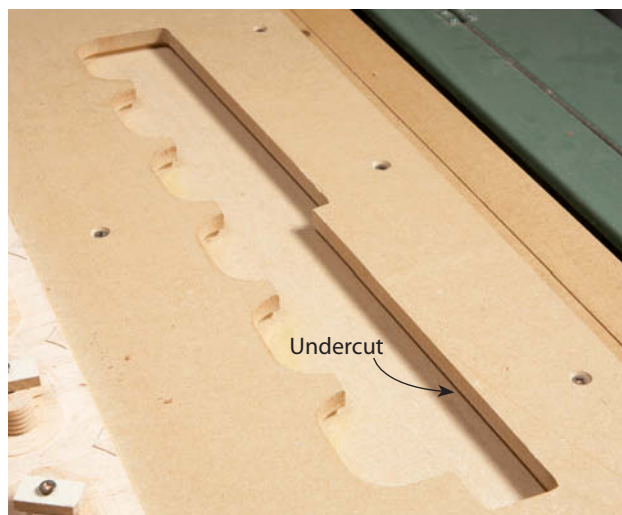
Rounding Over the Outside

Jig 2 served a dual purpose. Once all the links were routed into separate parts, I switched to an ovolo bit and rounded over the outside corners. The links were flipped over to do the other side. The snug fit on the center posts and the turnbuckles helped to hold the link securely in place for this step.



Only Three Bits are Required

The 1/2" dia. straight bit did the heavy work of removing stock from both the jigs and the chain links. The slotting bit created the undercut at the bottom of jigs 1 and 2 to prevent stray wood chips from getting in the way. The 1/4" radius ovolo bit gave the links their round shape.



Jig 3: Rounding Over the Inside

Similar to the first jig, the third jig used wedges in a recess to hold the parts in place. This jig really took advantage of the CNC's ability to cut parts that fit together like a glove. The recessed pockets for the links were cut the same size as the link, without any clearance gap. This created a very snug fit and required a couple extra mallet taps on the wedges to make sure the links were fully seated. This snug fit insured that the links didn't move or vibrate while I rounded over the inside corners. After the first side was done, I flipped the links over to rout the other side.



Note: Although CNC's are capable of precise machining, you should always test your setups and adjust the dimensions of your jigs, parts and tool paths to accommodate slight variations in materials and bit diameters.



A Quick Sanding

Sanding each link took a minute or two per link, but removing the machine marks at this stage was easier than doing it after assembly. Next time I'll use a flap sander or inflatable drum sander and save my finger tips.



Break Every Other Link

A quick hit with a mallet was all it took to crack the links in half. I used quartersawn boards for this project because when broken, they tend to create flatter joints than plainsawn wood. The flat joints made reassembly easier.

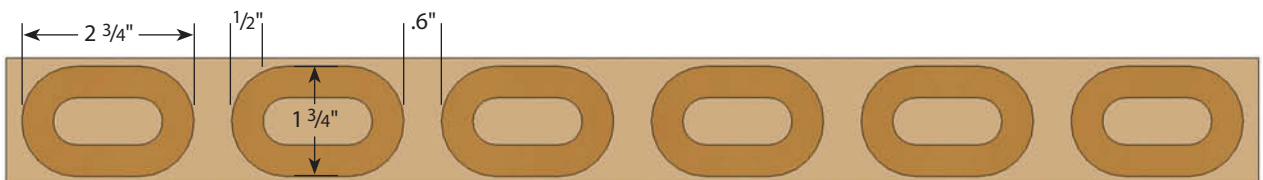


Glue and Clamp Back Together

I assembled the chain by adding two unbroken links to each broken link. Then I assembled these three link sections with more broken links until the chain was complete. Because the links were broken on the grain, the glue joints were nearly or completely invisible. Using a light application of glue and removing the squeeze out while it was still soft made cleanup sanding easy. After it was done, I dipped the chain in an oil finish a couple of times and rubbed it dry with a cloth.



Okay, it's kind of cheating—but it works.



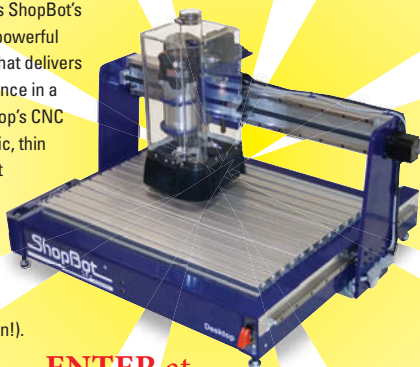
The Dimensions

The six links started out as a board measuring 5/8" x 2" x 20". The .6" spacing between the links provided the necessary clearance for the 1/2" dia. straight bit and the bottom end of the ovolo bit. The six links produced 11-1/2" of finished chain. Drawings for the three jigs can be downloaded at AmericanWoodworker.com/CNC.

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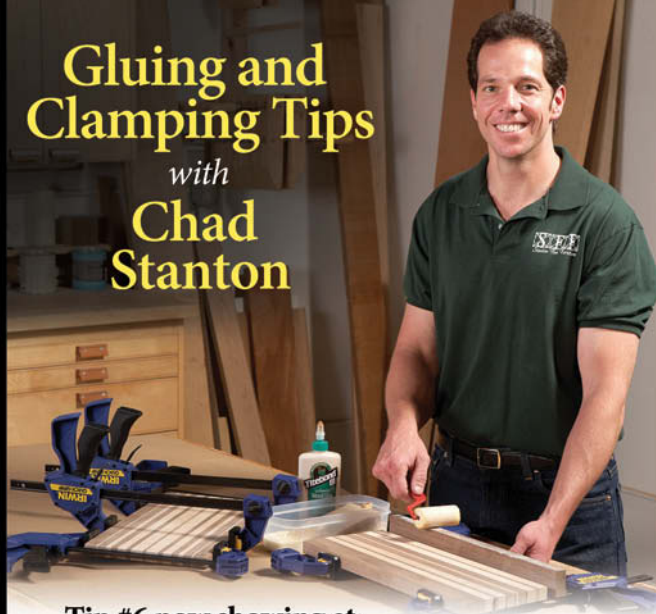
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Drum Roll, Please

DRUM SANDERS for small shops have been available for quite a few years now, but it's been a long time since any of them have been improved in any significant way. The engineering team that first brought the Performax drum sanders to market now work for a new company, SuperMax, and they have just released their long-awaited upgrade to the basic open-end drum sander: the SuperMax 19-38. I've been using one for a few months now, and I can report that it's one heck of a nice machine.

If you're not familiar with what drum sanders are used for, I'd like to point out that a drum sander isn't really a substitute for a planer—it's a partner. A planer can remove a lot of material, fast; a drum sander works much slower. But there are three important ways that a drum sander can supplement your planer:

- A drum sander will never tear out the grain—even on highly figured wood—and can leave an incredibly smooth surface. The 19-38 uses sandpaper strips that range from 24 grit (for surfacing roughsawn boards) through 80 grit (for removing planer ripples) and on up to 220 grit (for finish sanding cabinet doors, for example).

- An open-end drum sander can handle very wide material. You just run your stock through twice, flipping the piece around between passes so each side goes under the sanding drum. The 19-38 can handle pieces up to 38" wide this way, or up to 19" wide in a single pass.

- A drum sander can also process very short material. The 19-38 can sand pieces as short as 2-1/4" long.

The first thing I noticed about the 19-38 was the enormous amount of cast iron used in its construction. (It weighs 286 lbs., without a base!) This large mass dampens vibration and stiffens the sanding arm, enabling the machine to perform very precise work. You'll get less than .010" variation in thickness across the sander's width, according to SuperMax.

The second thing I noticed was the 19-38's huge motor. Rated at 1-3/4 hp, this motor pulls just about as much power as you can get from 120 volt household service. You'll need that extra power when using coarse 25 grit paper on wide stock. It's best to dedicate one 20 amp circuit in your shop just for this sander.

The last big thing I noticed was that the 19-38's head doesn't tilt. On older open-end sanders, you're supposed to slightly tilt the head when sanding wide stock to avoid overlap marks. The downside is that



you have to fiddle with bolts to tilt the head, then recalibrate the machine to level the head when you are done. The 19-38 is much easier to adjust: The bed tilts, not the head, and it's indexed. To tilt the bed .003", all you do is flip a lever. To get back to level, you flip it again. Simple!

The conveyor belt on the 19-38 is powered by a separate, direct-drive DC motor, giving you an infinitely adjustable feed rate from 0-10 feet per minute. For surfacing roughsawn boards, you select a fast feed rate; for finish sanding, you use a slow to moderate feed rate.

Available options include a set of casters, a closed stand with casters, a digital readout and infeed/outfeed tables.

SOURCE

SuperMax Tools, supermax.com, 888-454-3401, 19-38 Drum Sander with Open Stand, #71938-D, \$1,399; Closed Stand with Caster Wheels, #71938-CL, \$370; Caster Set – box of 4, #98-0130, \$89; Digital Readout, #71938-DRO, \$195; Infeed/Outfeed Tables, #71938-7, \$99.



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DEWALT INTRODUCED their new 20 Volt Max compact impact driver last year, and I absolutely loved it. Now they've improved it by switching to a brushless motor, adding three speed settings and redesigning the collet to make it easier to change hex-style bits.

A brushless motor is more efficient, and that translates into longer running time. According to DeWalt, you now can work 57% longer between chargings.

The previous 20 Volt Max was a one-speed, which was overkill for most cabinetmaking jobs. With three settings, you'll be able to cover a much wider range of driving tasks.

The new collet features a push-button release. Now, you don't have to let go of the drill's handle to change bits or drivers. You just extend your forefinger and depress a button located above the trigger. Your other hand is free to remove the bit and switch to a new one.

The new motor also allowed DeWalt to make this impact driver lighter and even more compact. Equipped with a 1.5 amp-hr. battery, the driver weighs 3 lbs. (It weighs 3.6 lbs. with a 3 amp-hr. battery.) At just 5-1/4" long, nose to tail, you can get into some pretty tight spaces, and the grip is extraordinarily comfortable.



COURTESY OF MANUFACTURER

A "fuel gauge" on the battery pack gives you a quick indication of how much battery life is left. If you already own other tools that use the same DeWalt battery, you can purchase this impact driver without batteries at a lower price.

SOURCE

DeWalt, dewalt.com, 800-433-9258, 20V Max Lithium Ion 1/4" Brushless 3-Speed Impact Driver, tool only, #DCF895B, \$169; tool with two 1.5 AH batteries, #DCF895B2, \$279; tool with two 3.0 AH batteries, #DCF895L2, \$349.

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MOST WOODWORKERS I know own at least one can of WD-40. Wherever there's steel—and there's plenty of that in our shops—there's rust, corrosion and stuck parts. The folks at WD-40 have now come out with a whole line of additional products you might find useful when dealing with balky woodworking machines, tools and hardware.

My shop is in an unheated garage, where rust is always an issue. I'll certainly be checking out one of these new products: WD-40's Long-Term Corrosion Inhibitor. According to the manufacturer, it protects metal from corrosion for up to one year outdoors and two years indoors.

Speaking of rust, I love restoring old tools. WD-40 says their new Rust Remover Soak restores lightly rusted metal parts back to bare metal. You let the parts soak overnight, pull them out, rinse them, dry them and apply a protective coating of your choice. It's made with non-toxic, biodegradable ingredients. Boy, do I have a lot of candidates to try this out on! I'm not sure what it will do to a tool's japanning, but I'll be careful.

WD-40 has also introduced white lithium grease in a spray can. If your tablesaw groans when you raise or tilt the blade, this is the product you need to provide long-term lubrication for the saw's elevation and tilting gears. White lithium grease dries, so it won't attract sawdust and gum up the gears' teeth.

Other members of the family include Rust Release Penetrant Spray and Water Resistant Silicone Lubricant. I would keep all silicone products out of the shop, however. If silicone gets on your wood, you'll have one heck of a time getting a finish to stick to it.

SOURCE

WD-40, WD40.com, 888-324-7596, Long-Term Corrosion Inhibitor, 6.5 oz., \$15; Water Resistant Silicone Lubricant, 11 oz., \$7; Rust Release Penetrant Spray, 11 oz., \$7; Protective White Lithium Grease, 10 oz., \$7; Rust Remover Soak, 128 oz., \$35.



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The kit contains a 5.3 qt. reservoir with a built-in 1500 watt heating element, a 10' long steam hose, a brass fitting to attach the hose to your box and two hinges and a latch for the box's door.

I found that if you fill the reservoir with hot water, you'll get steam in about 10 minutes. It will last about 75 minutes, which is plenty of time for wood that's up to 1" thick. If the water level gets too low, a safety switch turns off the heating element.

SOURCE

Rockler Woodworking and Hardware, rockler.com, 800-279-4441, Steam Bending Kit and Plan, #42826, \$90.



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A Ripping Good Time

IF YOU'RE JUST STARTING to put together an arsenal of blades for sawing hardwoods, allow me to make a suggestion: Get a rip blade.

Sure, a general-purpose blade does a reasonably good job of ripping boards, but just wait until you work with stock that's 2" thick or wood that is really dense, like maple or white oak. If you replace the general-purpose blade with a rip blade, such as the new 20-tooth Forrest Woodworker II, you'll be amazed at the difference.

Using a rip blade is almost like adding extra horsepower to your saw. With fewer teeth engaged in the wood at any one time, a rip blade puts a lighter load on your motor, so it won't bog down. Having larger gullets, a rip blade is more efficient at removing chips. Both factors reduce friction, resulting in few—if any—burn marks and a very straight cut.

The Forrest Woodworker II rip blade is available in full-kerf (.125") and thin-kerf (.100") models. If you have a contractor's saw, I'd recommend the thin-kerf.



COURTESY OF MANUFACTURER

SOURCE

Forrest Manufacturing Company, Inc., forrestsawbladesonline.com, 800-733-7111, 10" 20 Tooth Woodworker II Saw Blade, Full Kerf, #WW10206125, \$75; Thin Kerf, #WW10206100, \$77.

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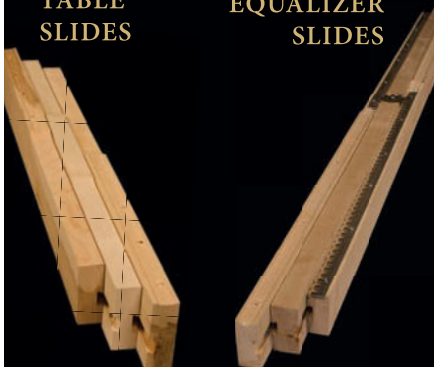
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Norm Sartorius

Spoons to stir the soul.

by Spike Carlsen

SOME WOODWORKERS THINK BIG. Norm Sartorius prefers to think small. But that small thinking has served him well. For over twenty-five years Norm has carved out a living by crafting small things: spoons. “Not spoons to stir the soup,” he explains, “but spoons to stir the soul.” And that’s what they do.

From cutting boards

Norm graduated with a degree in psychology and worked for five years as a social worker at a psychiatric facility. But he found the experience less than satisfying. With a hankering to work with wood, but with little woodworking experience, Norm arranged a 600-hour apprenticeship during which he learned to make bread boards, light switch plates and kitchen utensils. But more importantly, he found a mentor that encouraged him to hone both his business and woodworking skills.



Cocobolo Spoon (2008)

8-1/4" x 2-1/2" x 2"

Photo: Jim Osborn

Even though my work is rarely used, I always want each piece to feel natural, logical and comfortable to hold. This spoon is severely right handed. –NS



Assateague Spoon (1993)
Crotch mahogany
8" x 3" x 1"

Photo: Jim Osborn

Shells were among the first primitive spoons. This spoon celebrates the Virginia Atlantic coastline near my childhood home. —NS



High Spout (2010)
Black & white ebony burl (Laos)
8" x 3-1/2" x 4"

Photo: Jim Osborn

The burl grain is in the deep gray spoon bowl. The tall spout seems exaggerated and stretched, lifted up. Exploring the limits of the spoon form entails distorting each element. —NS

America 2008 (2008)
Pao Ferro (Bolivia)
8" x 2-1/2" x 2"
Photo: Jim Osborn

My first and only effort to make a political spoon. Made during the primary season of the 2008 election, it was a reaction to the polarized debates that year. Now, four years later, the intensity of political discourse is even more extreme—perhaps the title should just read America. Little is shared by the left and right sides; this piece is literally torn apart. It's a wonder the integrity of the whole survives. This spoon was challenging to carve because it was always on the verge of collapse. It's one of my all time favorites. —NS

Norm retreated to the hills of rural West Virginia and tried supporting himself by selling wares at craft fairs. "I sold more knife racks and cutting boards, but right from the beginning, people paid the most attention to my spoons. I enjoyed making spoons, but I always thought of them as being functional utensils," Norm observes. His early spoons sold for a whopping ten bucks. Eventually Norm began paying more attention to the grain of the wood, and varying and exaggerating the shapes of his spoons accordingly.

At a craft fair, Norm met Bobby Falwell, a furniture builder and former sculpture instructor who had studied under Wendell Castle and other masters. "Bobby saw talent in my work and asked me to work with him," Norm recalls. "I thought I would learn a lot about woodworking by taking Bobby up on his offer, so I did." By day, Norm helped Bobby make one-of-a-kind pieces of furniture; by night, he continued to hone his specialty. "Bobby encouraged me to think of my spoons as art or sculpture. He'd hold up one of my spoons—not like you'd hold a regular spoon—and try to make me see it as something other than a thing you'd stir rice with." Soon, Norm was on the path to making spoons full-time.

He was invited to exhibit his spoons as a side show to a turning exhibit at the St. Louis Craft Alliance. "It was my first participation in an event showing just wood art," Norm recalls, "and my first inclusion with the work of prominent turners such as Bob Stocksdale, David Ellsworth and Al Stirt. I figured if people were able to view turning wooden bowls as art, why couldn't you look at spoons the same way?" And that's the way Norm—who is now 65 years old—has been looking at spoons ever since. Today you can find his spoons at The Renwick Gallery, a branch of the Smithsonian American Art Museum in Washington D.C., The Carnegie Museum of Art in Pittsburgh, PA and more than a dozen other museums.



Let the wood speak

When Norm teaches classes, he encourages students to bring in wood that has some historical or sentimental value to it. "If you're emotionally attached to a piece of wood, you'll put more effort into what you're making. Wood from an apple tree that's been in your backyard your whole life, or from the leg of your grandparents dining room table, carries a lot of weight," Norm explains. And he practices what he teaches. He's used woods from a tree planted by George Washington, from the famed and fallen Wye Oak in Maryland, and from woods that woodworkers from around the world have sent him. He's used 5,000-year-old river gum, rare amboyna burl and mystery woods found in the desert.

"Every single woodworker on the planet has a boxful of scraps in their shop too small to use, but too fancy to burn," he laughs. "I'm the solution to that problem."

When Norm was asked to make a spoon to be awarded to the legendary folksinger Pete Seeger at a music festival, Norm called him to obtain a special piece of wood. "Pete didn't want to give up his banjo, but I was able to get a boxful of black locust wood he'd been using for firewood," Norm recalls. "I carved four overlapping hearts on the handle to represent all the lives that Pete's music and exemplary life have touched. Art or not, Pete told me he was going to use it."

About 80% of the spoons Norm creates are the result of the wood suggesting what shape and size it wants to be. "I always keep six to eight of my most exciting pieces of wood sitting out in my shop where they're right in my face—and then I wait," he muses. "When the idea comes, I act on it right away; I rough out the shape while it's fresh in mind."

While some spoon makers start by carving the bowl, Norm likes to work from the outside in. "It fixes the outside form, which is sculpturally what one sees first," he says. "Then I hollow to that form, so the spoon's overall shape isn't determined by its bowl."

About two-thirds of the work is done with hand tools, but Norm often starts by roughing out the shape on a bandsaw and refining it using a pneumatic sanding drum and die grinder. He usually does the rest of the shaping by hand, using scrapers of every shape and size. "I've made scrapers out of old putty knives and stainless steel kitchen



Airhead (2012)
Australian Snakewood
6" x 3" x 1-1/2"

Photo: Jim Osborn.

This figural spoon seems to be taking a walk with its fair hair flowing. Only skeletal evidence of the bowl form remains, suggesting absence of mind. Is this good or bad? Does this reflect a Zen state or a vacant mind?
—NS



Offering (2010)
Needlewood (Australia)
10" x 8" x 8"

Photo: Jim Osborn

This is a sculptural large spoon with beautiful natural weathered surfaces and great red figured grain in the carved areas. The upright handle seems to have been bent into position with a natural fold where a hole shows between the bowl and handle. There is also a point, somewhat spout like, coming from the bowl lip. —NS



Conquistador (2012)
Honduras rosewood burl
16" x 8" x 7"

Photo: Jim Osborn

With its bowl and bowl rim shape, this spoon evokes a helmet. It has power that seems to dominate its surroundings. The wood is exceptionally rich; the bowl is completely burl, while the pronounced rim is all straight grain. The handle is mostly burl with some curving straight grain around its terminal ball. —NS



Paela Burl Spoon (2012)
6-1/4" x 3-1/2" x 2"

Photo: Jim Osborn

Like a miniature mountain range, the burl eyes peak under the bark, making for attractive texture but an uncomfortable grip. Turning the bowl sideways kept the weight and the geometry of this spoon unbalanced in a desirable way. —NS

Spike Carlsen's new book, *Woodworking FAQ: The Workshop Companion* (Storey Publishing) is now available. His other books include *A Splintered History of Wood* and *Ridiculously Simple Furniture Projects*.



Folded Spoon II (2010)

Cocobolo burl
6-1/2" x 4-1/4" x 1"

Photo: Jim Osborn

*In 1998 I carved another piece called *Folded Spoon*. This one is larger but still appears to have had the handle bent back toward the bowl. In fact it almost looks hinged. I suppose this is a remnant memory from a set of camping utensils I owned as a child. —NS*

knives," he explains. "My dentist gives me all his old dental tools for smaller details."

Norm also spends a lot of time sanding. Then he usually applies three or four coats of Waterlox penetrating finish. If a piece needs a little extra luster, he'll apply paste wax.

Norm produces about two spoons per week. He sells some through galleries, but prefers face-to-face contact with prospective buyers. "I'm really just a retail guy," he says. "I show my work almost entirely at craft fairs." These encounters have produced many of the serendipitous moments—from meeting his wife to meeting mentors and other artists—that have changed the course of his life. "I can't overstate the role of serendipity in getting me where I am today," Norm says. Will he ever run out of ideas or enthusiasm? "Spoons are an infinite category," Norm explains. "You can make thousands of them and no two are the same. I still have fun making each one."

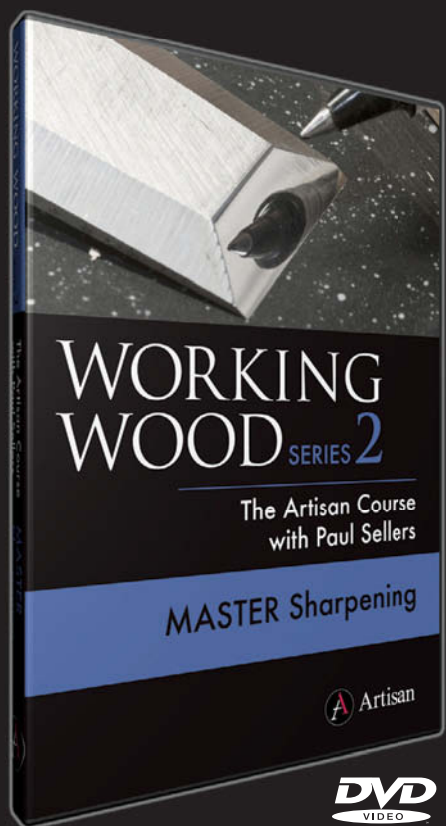
See more of Norm's work at www.normsartorius.com.

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Tree Fort Shop

The perfect place for a young sprout to branch out.



January 17, 2012

I am a young wood worker near the age of ten. It all started when I looked at a boy scout wood carving merit badge book. A couple of months later my Uncle Mark showed me his shop. I told him I loved woodworking so he gave me a chisel set, clamps, and wood working books. Later he took me to a wood show. We made a tool box and a shelf.

I decided to put my wood shop in our treeless tree fort (with four posts and a tree next to it.) We put shackles on the roof and stained everything so it's water proof. I love to work in a wooden project. I think my shop is so cool. I and my Dad spent a lot of time on the fort and now it's put to a great use. My workshop is my safe haven. I love to use it as a get away when I need a break. Whenever I leave the shop I put everything in order so I never lose my tools.

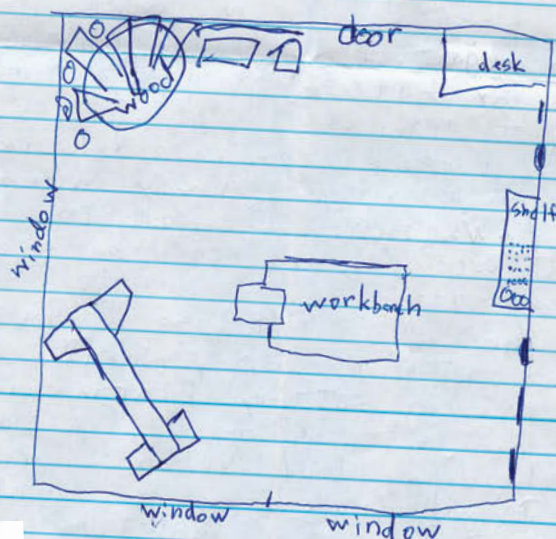
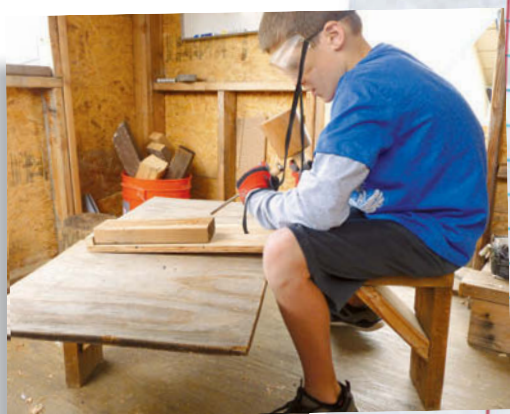
I have only started so I have just finished getting my shop ready. But my first project is a cutting board and my dad has just asked me to fix our wobbly dining table. When I grow older I will make many more things to talk about. I only use hand tools and my Dad's power drill. My shop has all sorts of handy tools.





In my shop I have my workbench in the middle. Then I put wood in one corner and my saw horse in another. the other two corners have tools in them.

My parents love that I get into woodworking. They said, "I love how you enjoy it and it keeps you happy."



Sam Gackowitz



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E-mail your entry to myshop@americanwoodworker.com with digital photos attached. Or mail your description with digital photos on a disc to My Shop, American Woodworker, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121. Please include your phone number. Submissions cannot be returned and become our property upon acceptance and payment. We may edit submissions and use them in all print and electronic media.



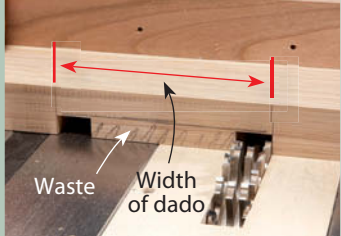
Arts & Crafts Coat Rack

Learn how to make large joints while building a project with only 6 pieces.

by Stewart Crick

BOLD JOINERY is one of the hallmarks of Arts and Crafts furniture, which I love to make. This coat rack, originally built by Gustav Stickley between 1900 and 1910 and catalogued as a “No. 53 Costumer,” has two kinds of large-scale joints. Huge through mortise and tenon joints connect the rails to the posts. The feet are connected to the posts by equally large bridle joints.

If you’ve been waiting for an opportunity to advance your joinery skills, here’s an ideal project. You’ll only be making three different parts, in pairs, so it certainly isn’t too complicated. Fitting these large joints may seem daunting, but I’ve devised a number of tricks to make the process very machine-friendly.



1
Begin by making the posts. Each post will be glued up from two pieces, or “half-posts.” Clamp all four half-posts together in order to trim them to the exact same length.

2
Cut dados in each of the half-posts. When the halves are glued together, the dados become through mortises. Use a stop block and a spacer to ensure that all the dados are the same width.



3
Make a set of keys that fit tightly into the dados. Wrap the keys with packing tape to prevent glue from sticking to them, then place the keys in the dados.

4
Glue the posts together. The keys will align the opposing dados. Glue the post on a stiff plank or on a platform, such as this torsion beam, to make sure the post comes out straight.

Make the posts

Stickley used quartersawn oak to make his Costumer, and so did I. Plainsawn oak would work fine, though, and is easier to find in the thick sizes you'll need.

I laminated the posts from two pieces of wood (A) rather than make them from one extra-thick piece. This approach makes mortising much easier. You won't have to chop huge holes; you'll cut dados, instead, in opposing pieces that I call “half-posts.” The dados must line up just right for this method to work, though. Here's how you'll pull that off.

First, mill each half-post at least 1/8" oversize in thickness and width. Trim them 1" extra long (see Cutting List, page 38). Assemble the pieces in pairs, as if they were the completed posts. Mark the ends of each pair with a cabinetmaker's triangle, so you can keep track of how the half-posts should be oriented. Set the pieces aside for a few days. If the wood wants to bend or twist, this will give it time to settle down.

Next, joint the faces that will be glued together. It's best not to run these surfaces through the planer at this time; if you did, and your planer snipes the ends of the boards, you'd get unsightly gaps between the laminations at both ends of the posts.

Plane the opposite sides until the pieces are the correct thickness. Joint the sides of each piece and rip them to final width. Mark the mating sides with triangles, then trim all four

half-posts to length (**Photo 1**). Re-assemble the half-posts and lay out the dados on both sides of each piece (Fig. B). Shade in the waste, so you don't accidentally cut in the wrong place.

Set up your tablesaw for cutting the dados (**Photo 2**). I use two miter gauges joined by a long fence to prevent the half-posts from wiggling while I make these cuts. You could also use a single aftermarket miter gauge that's been adjusted to fit tight in one miter slot or a sled with two runners.

All of the dados must be the same width. Use a stop block and a spacer—the spacer determines the width of the dado. If your dado set is 3/4" wide, the spacer should be 3-3/4" long. Make the two outside cuts first, with and without the spacer, then remove the spacer and make overlapping cuts to remove the rest of the waste.

Make a set of wooden keys from 3/4" thick stock for aligning the dados (**Photo 3**). The keys must fit tightly into the dados—but not too tight, or assembly will be difficult. The best approach is to make them from a board that's at least 12" long. Rip the board about 1/64" narrower than a typical dado, rout all of its long edges with a 1/8" roundover bit and cut the



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Fig. A Exploded View

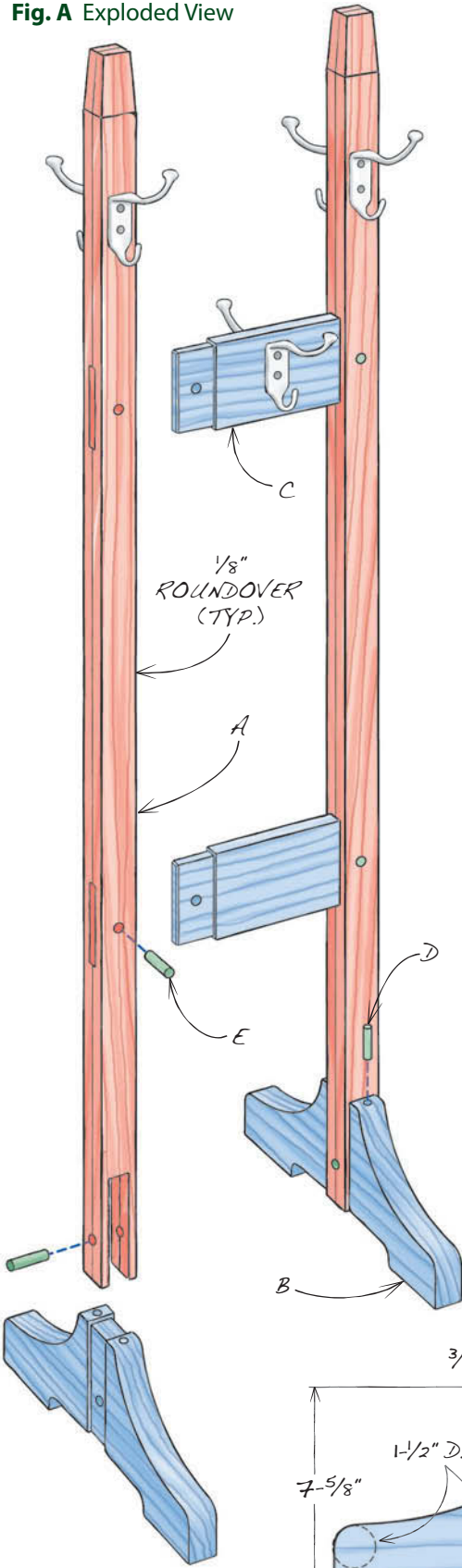


Fig. B Half-Post Layout

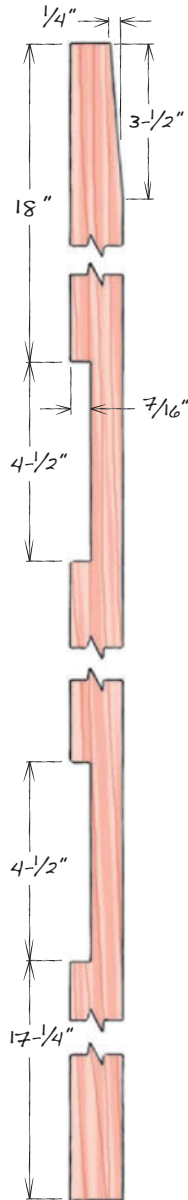


Fig. C Mortise and Tenon Joint

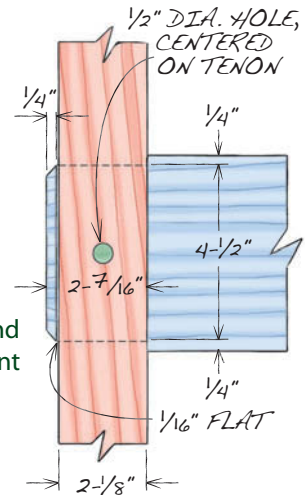
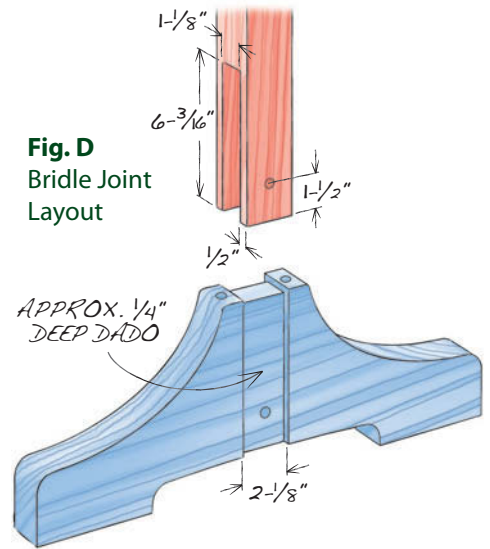


Fig. D Bridle Joint Layout



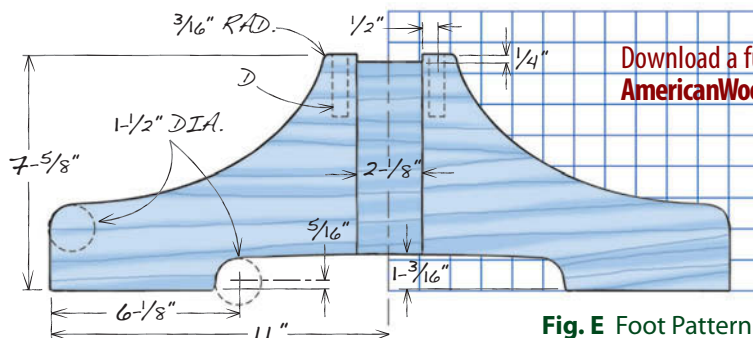
Cutting List

Overall Dimensions:
71-3/8" H x 12-3/4" W x 22" D

Part	Name	Qty.	Th x W x L
A	Half-post	4	1-1/16" x 2-1/4" x 70-1/4" (a)
B	Foot	2	1-5/8" x 7-5/8" x 22"
C	Rail	2	1-1/8" x 5" x 13-3/8" (b)
D	Dowel	4	1/2" Dia. x 2"
E	Peg	6	1/2" Dia. x 2-1/8"

Notes:

- a) After gluing the half-posts together, mill to final dimension: 2-1/8" x 2-1/8" x 70-1/4".
- b) Distance between shoulders is 8-1/2".



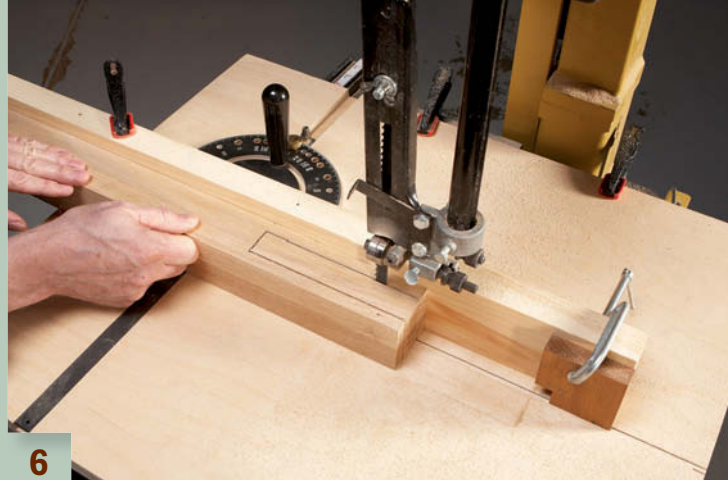
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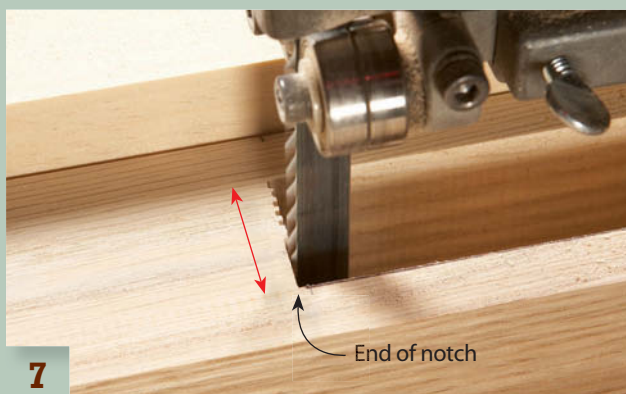
Fig. E Foot Pattern



5 **Taper the tops** of the posts. The posts are almost 6 ft. long, so you'll need to support them with a stand that can be raised as high as your bandsaw's table.



6 **Saw the sides** of a long notch in the bottom ends of the posts. You'll need a fence for this operation—I made this one using a piece of plywood and my tablesaw's miter gauge.



7 **Remove most of the waste** between the two side cuts, then nibble away the end of the notch. In this setup, sliding the miter gauge back and forth produces an end that's absolutely straight and square.



8 **Cut dados** on the feet to fit into the notches. The width of the dados must exactly match the thickness of the posts. Add playing cards, one at a time, to a spacer in order to gradually increase the dado's width.

piece into four 3" lengths. Wrap each key with packing tape to prevent glue from sticking to it (masking tape isn't a good substitute, because it can tear). Keep adding layers of tape, if necessary, until the key fits the dado just right, without any wiggle.

Glue together each pair of half-posts (**Photo 4**). Use cauls to spread out the clamping pressure. Let the posts sit in the clamps overnight, then joint one side until the two halves are flush. Plane down the other side to the post's final width.

The tops of the posts are tapered on all four sides (Fig. B). Lay out the tapers on one side and saw them (**Photo 5**). Rotate the posts 90°, lay out the second pair of tapers and saw them the same way. Use coarse sandpaper and a block to flatten the tapers.

Next, draw long notches on the bottom ends of both posts (Fig. D). To cut the notches, I used a special table that I clamp to my bandsaw (**Photo 6**). The table is a 22" wide by 26" long piece of 3/4" plywood with a groove cut into it to fit my miter gauge. The table also has a bar underneath it that sits in the bandsaw's miter slot, plus a slot for the blade. I screw a long fence to the miter gauge to guide the work.

This setup will allow you to cut a perfectly straight notch

with square ends. First, set up a stop block on the fence to limit the length of the cuts. Position the fence so it's 1/2" away from the blade and clamp the fence to the table. Saw both sides of the notch. Next, temporarily tape a 1/32" thick shim on the stop block to shorten the lengths of the next cuts. Unclamp the fence from the table, shift it about 3/16", re-clamp the fence and make another cut down the inside of the notch. Repeat this operation until you've made about six parallel cuts in the notch's waste. Slide the miter gauge out of the way and make a series of angled cuts to remove the thin wafers of waste left inside the notch. Be sure to stop all of these cuts about 1/32" short of the notch's top.

Move the miter gauge and post back and forth to nibble away at the stubble at the end of the notch (**Photo 7**). For the process to work, you must only remove a very small amount of material during each pass. Take a number of swipes, advancing the post each time, until the post butts up against the stop block. The result will be a square end.

Make the feet

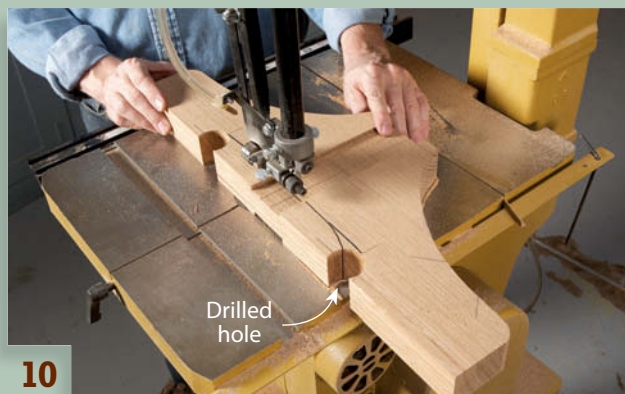
The feet (B) are quite wide, so you may have to glue them up from two pieces. Mill two blanks to final size and mark their top edges. Cut dados across both faces and the top of each blank (Fig. D). The width and the depth of these dados are exactly the same all around. Draw the dados on both blanks.



Watch a video on how to set up and use this bandsaw fence system
AmericanWoodworker.com/WebExtras



9 **Glue oak dowels** into holes alongside the dadoes. The dowels reinforce an area of short grain that will be created when you saw out the foot's profile. If your dowels fit too tight, compress them by pounding each one through a fluting plate.



10 **Cut out the foot's profile.** Drill two holes along the base of the foot first, using a Forstner bit in a drill press, so you don't have to saw a tight curve.



11 **Glue the foot** to the post. This bridle joint is difficult to pull together with more than one clamp, so don't make the fit too tight.



12 **Saw tenons** on the rails that will connect the posts. Use a dado set, making multiple passes on the end of each rail.

Stand up the blanks and mark the left side of each one with a big X, on both sides.

We'll fine-tune the *width* of the dadoes first, then the depth. Set up a 3/4" dado set in your saw and raise it 3/16" above the table (the final depth of the dadoes will be about 1/4"). I use the two-miter gauge setup for these cuts to ensure that the dadoes will be straight. Place one of the blanks against the fence of your miter gauge and line up the right side of the marked dado with the dado set. Butt a stop block against the end of the blank and clamp the block to the fence. Cut a dado across one side of the blank, flip the blank over (keeping the end marked X against the stop block) and cut the other side. Repeat these steps on the second blank.

Next, make a spacer that is 1-5/16" square. Place it against the stop block and cut more dadoes on both sides of the blanks. Remove the spacer and cut out the rest of the waste. You should now have a dado on both sides of the blanks that is about 1/16" narrower than its final width.

Add shims to the spacer to gradually increase the width of the dados (**Photo 8**). I use playing cards, cut in half lengthwise, and tape them to the block one at a time until the width is almost right, then add pieces of notebook paper on top of the playing cards until the width is perfect. How will you know when it's perfect? It's easy—place one of the posts on your

bench with the mortises facing up, then try to slide the blank along the top of the post. Keep widening the dado until you can push the blank with one finger.

Now for the dado's depth. Raise the dado set a little bit and re-cut both sides of the blanks. Try inserting the blank into the notch. Keep raising the blade, making more cuts, until the blank slides easily into the notch. Finally, cut a dado in the top of the blank by standing the blank on edge.

The original builders of this coat rack added dowels (D) to reinforce the feet (see Sources). Lay out holes for the dowels (Fig. E) and drill them by hand or on a drill press. Cut the dowels about 1/4" extra long and glue them into the holes (**Photo 9**). (My dowel rod was a bit too fat, so I pounded the pieces through a fluting plate to compress them—see Sources, page 41. I left the top ends of the dowels round, so the flutes wouldn't show.) Cut the dowels flush and sand them even with the top of the feet.

Draw the profile of the feet on the blanks (Fig. E). Drill two holes along the bottom of each foot using a Forstner bit, then saw the profile on the bandsaw (**Photo 10**). Sand the sawn surfaces, then rout a 1/8" roundover around the feet. Rout the same roundover along all the edges of the posts.

Glue the feet to the posts (**Photo 11**). I used Elmer's Glue-All because it seems to be more slippery than other kinds of glue—you sure don't want this long joint to get stuck halfway home!



13

Cut the shoulders of the tenons on the bandsaw, using a fence. Cut off the waste piece by hand.



14

Saw chamfers on the ends of the tenons. Use a stop block to control the width of the chamfers.



15

Drill holes for pegs which will lock the joints in place. To prevent blowout, insert a tight-fitting block into the mortise. Drill from both sides.



16

Glue the stand together. After removing the clamps, continue drilling the peg holes through the tenons, then add the pegs.

Make the rails

Mill the rails (C) to final dimension. Cut the tenons on the tablesaw (**Photo 12**). Aim for a fit that allows the rails to drop through the mortises without any pressure. On a large joint like this, there's a fine line between too tight and just right—lightly sanding or planing the tenons after cutting them on the saw may make all the difference.

Cut the tenon's shoulders on the bandsaw (**Photo 13** and Fig. C). Use a handsaw to remove most of the waste, then pare the remainder with a chisel. Saw chamfers on all four sides of each tenon (**Photo 14**). Sand the chamfers and rout a 1/8" roundover on all four edges of the rails.

Final assembly

Lay out and drill holes for the pegs (E) that will go through the rails and the feet (**Photo 15**, Figs. C and D). Glue the sides of the coat rack together (**Photo 16**). Cut the pegs a bit extra-long and glue them in the holes. Trim and sand them flush.

Quartersawn oak is a wonderful wood to finish, and there are many ways to do it. For some ideas on how best to bring out its figure, visit the AW website at the address at right.

Add the hardware (See Sources) after you apply the finish. I found a company that makes beautiful reproductions of the hangers used on the original coat rack, but you may want to use hardware that's less expensive. 🛠️

SOURCES

- Woodcraft, woodcraft.com, 800-225-1153, #50A03, 1/2" Round Oak Dowel, 36" L, \$3.49 ea.
- Highland Woodworking, highlandwoodworking.com, 800-241-6748, Dowel Former for 1/4", 5/16", 3/8" and 1/2" dowel stock, #128251, \$14.99.
- Arts & Crafts Hardware, arts-n-craftshardware.com, 586-772-7279, Gustav Stickley Coat Hook, \$45 ea.
- House of Antique Hardware, houseofantiquehardware.com, 888-223-2545, 5-1/2" Cast Iron Mission Style Coat Hook, #R-010BM-9907, \$5.29 ea.



Stewart Crick

A lifelong woodworker, Stu writes, teaches and builds Arts & Crafts furniture from his Manassas, Virginia workshop. He also serves as an at-large director of the Washington Woodworkers Guild. Visit his website at www.stuswoodworks.com.



Download tips and techniques for finishing oak at AmericanWoodworker.com/WebExtras



Wall Cabinet of Maple

It's all about the wood.

by Brad Holden

JAMES KRENOV, a legendary woodworker, coaxed beauty from every board he touched. Through his books, Krenov inspired a whole generation of woodworkers to follow his path. While recently leafing through *The Impractical Cabinetmaker* (1979), I was struck by a small cabinet Krenov had built from spalted maple. It's a master class in design—simple, quiet and elegant.

It took me quite some time to find the right wood for this project. Although I could have used other species, I wanted to follow in the footsteps of the master and chase the elusive charm of spalted maple—wood that's been embellished by nature's rotting agent, fungus.

During the hunt, I learned that spalted maple's personality can vary dramatically from board to board. Krenov had chosen pieces that spoke in a quiet voice, so that's what I looked for. When I found the right boards, I slightly altered the dimensions of Krenov's cabinet to suit my wood. I'd urge you to take the same liberty, too.

Preparing the wood

Building this cabinet is a golden opportunity to study how wood works, in two important ways. First, you'll be paying close attention to how your wood looks—its figure. Second, you'll be watching how the boards react as you plane them thinner or rip them into narrower pieces. Their figure may change, for better or worse, and they may cup or twist, which you'll need to fix.

Let's look at these two aspects of fine woodworking in more detail. Usually, the first thing I do with roughsawn boards is to cut them into smaller pieces roughly the size of each part. This cabinet requires a different approach. I recommend that you start milling the boards as whole pieces, particularly if you're working with spalted maple. The idea is to keep your options open as you become more familiar with your wood. It's best not to crosscut or rip your boards until you know them well.

Make sure that your lumber has been properly dried and is well acclimated to its environment before starting to work with it. When you plane the boards to thickness, take them down in stages over the course of a few weeks.



Measuring only 10" wide, this cabinet is designed to display the beauty of two wide boards: the door and the back.



1 Flatten rough-sawn lumber as whole boards using your planer and a sled. This piece measures 10" across—wide enough for the cabinet's door, but probably too wide for your jointer.



2 Outline the parts using cardboard "windows." These simple devices help you to visualize how the figure of each piece will look before crosscutting or ripping the boards.



3 Rout a rabbet in the front edge of the sides. The door sits in these rabbets, making the sides appear thinner than they really are.

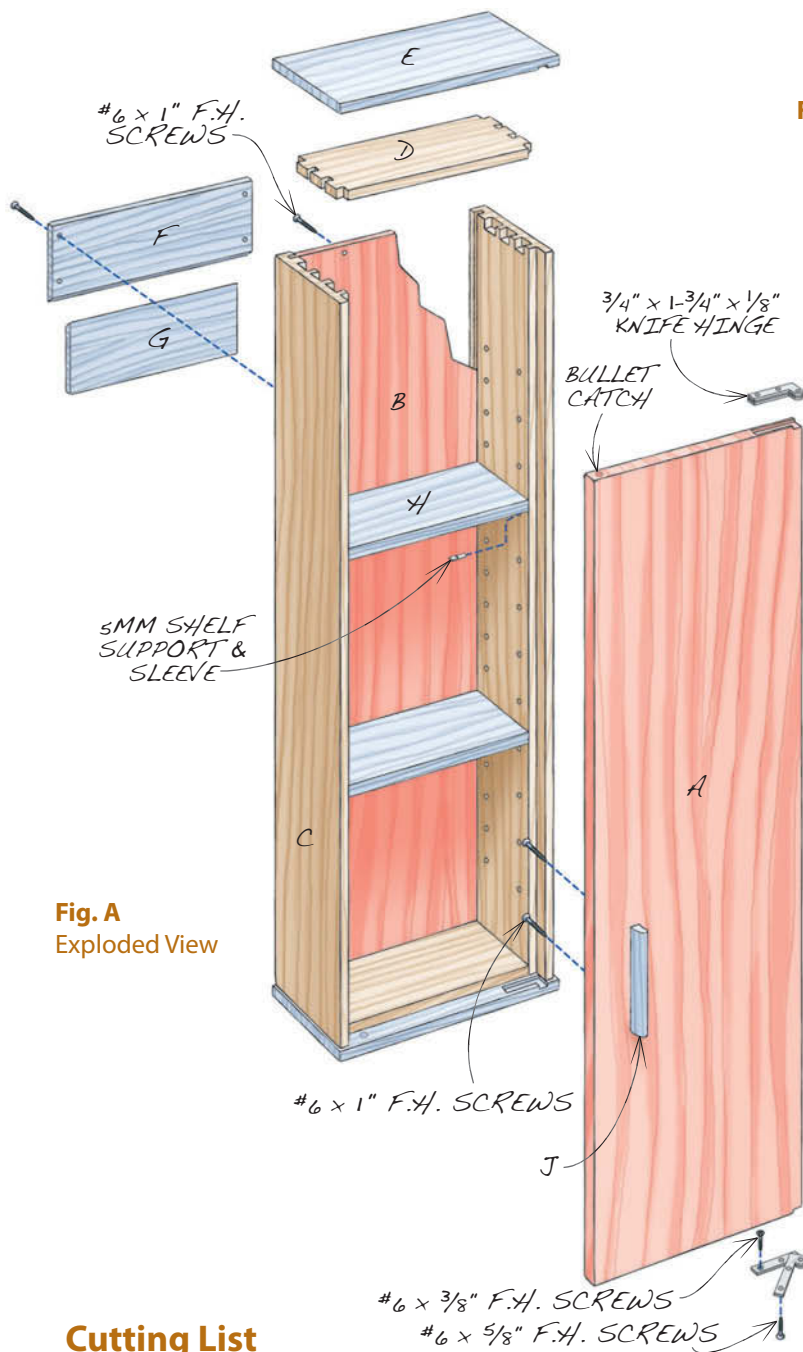


Fig. A
Exploded View

Cutting List

Overall Dimensions:
28-3/4" H x 10-3/8" W x 5-1/16" D

Part	Name	Qty.	Th x W x L
A	Door	1	9/16" x 9-1/2" x 28" (a)
B	Back	1	1/4" x 9-1/8" x 28"
C	Side	2	3/4" x 5" x 28"
D	Sub-top, sub-bottom	2	3/8" x 3-7/8" x 9-1/2" (b)
E	Top, bottom	2	3/8" x 5-1/16" x 10-3/8"
F	Cabinet cleat	1	1/4" x 3" x 10-1/8"
G	Wall cleat	1	1/4" x 3" x 8-3/4"
H	Shelf	2	3/8" x 3-3/4" x 8-5/8"
J	Handle	1	3/8" x 1" x 3" (c)

Notes:

- a) Trim to fit.
- b) If you are using biscuits, dowels or pocket screws, cut these parts 8-3/4" long.
- c) Carve to suit.

Fig. B Back View of Cabinet

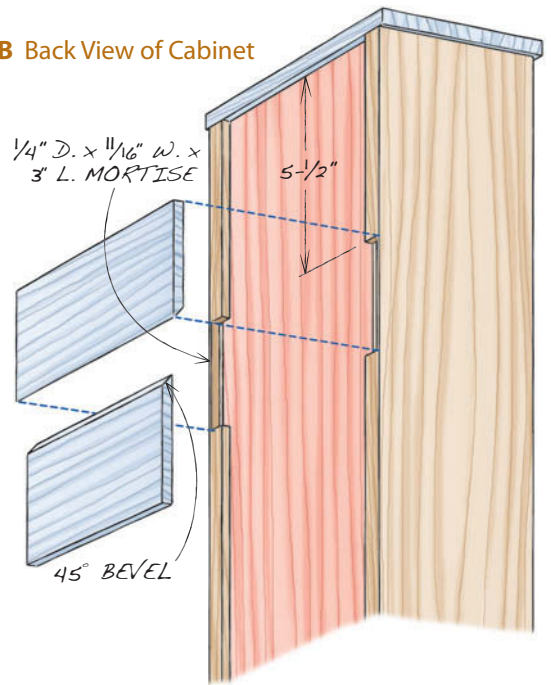


Fig. C Detail of Typical Corner

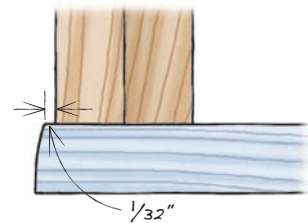


Fig. D Knife-Hinge Mortise in Door

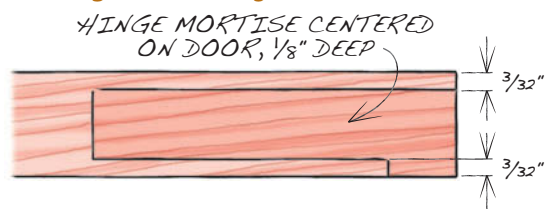
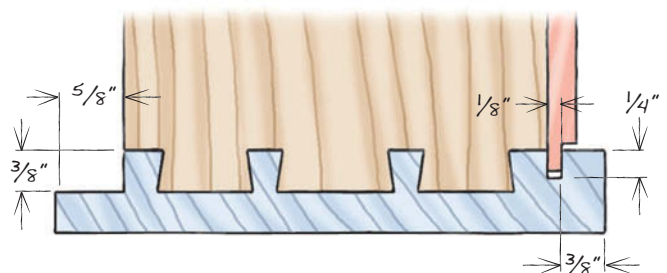


Fig. E Case Joinery



As you mill your lumber, take every precaution that the wood stays flat. Why? Take a look at how the cabinet is built. It's basically a dovetailed box (Fig. A). If your boards are warped—even a little—you'll have a hard time fitting the dovetails. You'll also end up with a box that's twisted, and that means the door won't close right. In addition, the door itself can't be cupped or twisted. If it's off, it won't hang with a nice, even margin all around.

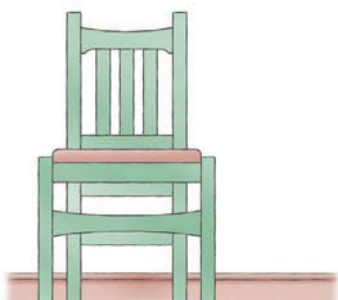
You'll need boards about 10" wide for the door (A) and back (B). Flattening their faces will be a bit of a challenge, because the boards will be too wide for most jointers. I wouldn't recommend gluing these parts from multiple boards, however. The whole point of the cabinet is to show off the beauty of a single board.

When working with extra-wide boards, use your planer as a jointer (**Photo 1**). Of course, you shouldn't just push the boards through the machine hoping they will come out flat. You probably know the rule, "garbage in, garbage out." Applied to planers, it goes "twisted in, twisted out." Place the boards on a dead-flat sled and shim them so they won't wobble or bend. After flattening the top faces of the boards, set aside the sled and plane the wood the normal way, flat side down.

There's nothing "normal" about working with spalted maple, however. Its appearance can change dramatically as you remove layers from its surface. The black lines that make the wood so distinctive, for example, can get wider or thinner or shift in unpredictable ways.

Each time you pick up a board during the milling process, study its figure. Look for patterns that might make a good door, side or back when viewed vertically, at shoulder height (see the illustration below). I've found that the best way to visualize how a part might look is to cut out a cardboard "window" the same size as the part (**Photo 2**). Place the window on a large board and move the window up or down, or give it a twist, until the wood's figure looks balanced and even. If you see a pattern in the wood's figure that you like, stop right there. Outline the part, then mark the side and leave it alone; from here on, only plane the opposite side.

This wall cabinet is fairly small in scale, as is much of the work of James Krenov.



4

Saw a groove in the back edge of the sides. The back of the cabinet will slide into this groove, like the lid of a pencil box.



5

Cut half-blind dovetails for joining the sides to the sub-top and sub-bottom pieces. You could also use biscuits, dowels or pocket screws for these joints because they won't show.



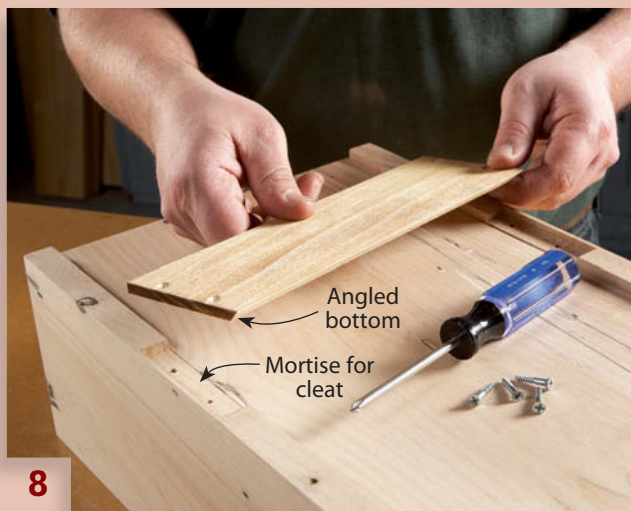
6

Glue the sides to the sub-top and sub-bottom. Shape the front edges of the sides into a gentle curve using a block plane.



7

Slide the back into place. The grooves allow the back to expand and contract, similar to the construction of a frame and panel door.



8

Attach a cleat for hanging the cabinet on a wall. The bottom of this cleat is angled to fit on top of a second cleat, which will be fastened to the wall.



9

Temporarily clamp the cabinet's top and bottom pieces in place, then trim the door to fit. Use playing card shims to establish a consistent gap on all four sides of the door.

Krenov's secrets

As designed by Krenov, this case is constructed in an unusual way: It's a four-sided box with a doubled-up top and bottom. This ingenious design makes it much easier to hang and fit the door, which swings on knife hinges. I'll show you how this system works later on.

Mill the wood for the sides (C), sub-top and sub-bottom (D) to final size. While you're at it, mill the top and bottom (E) to final size, too. Rabbet the front edge of the sides (**Photo 3** and Fig. E), then saw a groove along the inside face of the sides, to receive the back (**Photo 4**). I'm not sure how Krenov installed the back on his cabinet—or what provision he made for hanging the cabinet on a wall—but I think you'll find my design for solving both problems works very well.

Drill holes in the sides for shelf pins, using whatever spacing you think best (Fig. A). Sand the inside faces of the sides, the sub-top and the sub-bottom.

Lay out and cut half-blind dovetails to join the sides to the sub-top and sub-bottom (**Photo 5** and Fig. E). This is Krenov's method of construction—and it's very sound—but you could also use biscuits, dowels or pocket screws, because these joints don't show in the finished piece. Glue all four pieces together.

Gently round the front edges of the sides with a block plane (**Photo 6**). As you plane, leave the inside edge of the sides alone; just round over the outside edge. (You may have to do this again, after the door is trimmed to fit. These edges should end up flush with the door.) Plane the front and side edges of the top and bottom pieces in the same manner (Fig. C).

Next, mill the back. It's about the same size as the door, so I began reducing the thickness of both pieces at the same time. That way, I could hold off deciding which would be the door and which would be the back until both were 5/8" thick. At that point, I chose the better piece for the door, set it aside and continued planing the back down to its final thickness, 1/4". Trim the back to final size, then rabbet it to fit into the grooves in the sides (Fig. E). Slide the back in place (**Photo 7**). To allow for seasonal movement, don't glue the back. Screw it to the sub-top and sub-bottom (Fig. A).

Mill two cleats for hanging the cabinet on the wall (F and G). Rout mortises in the sides to receive the cabinet cleat (Fig. B). Trim this cleat to fit, rip its bottom edge at an angle and screw it in place (**Photo 8**). Trim the second cleat to fit between the sides of the cabinet, angle its top edge and set it aside.

Fit and hang the door

Here's where the plot thickens. The actual top and bottom of the cabinet are still loose pieces, right? Looking at the whole design (Fig. A), you'll see that these pieces are mortised to receive the door's knife hinges. Once the mortises are cut, you can't adjust them, or the door, to fine-tune the gaps between the door and the sides of the cabinet. To enhance the cabinet's sleek appearance, you'll be shooting for gaps that are very small—about 1/32". So, how are you going to pull this off?

The answer lies in those loose top and bottom pieces. Once the knife hinges are installed, the pieces are connected to the door. If you move the top and bottom pieces side-to-side, you move the door, too, and that's how you'll fine-tune the gaps. Now that you've got the general idea, let me fill in the details.

Begin by planing or sanding the top and bottom surfaces of the cabinet perfectly flat. Make sure that the mating faces of the top and bottom pieces are flat, too. Clamp the top and bottom to the cabinet.

Finish milling the door to final thickness (remember, keep it flat!). Measure the door opening and cut the door for a snug fit. Carefully trim the door so there's an even and consistent gap all the way around (**Photo 9**). The size of this gap should be equal to the space between the two leaves of the knife hinges. If you're building this cabinet in the winter, when humidity is low, increase the gap between the door and the left side of the cabinet, so the door has room to expand when humidity is high. If you need to re-plane the front edges of the cabinet's sides so they're flush with the door, now's the time to do it.

Cut mortises for the knife hinges in the door and in the top and bottom pieces (see Source, below). For full instructions, see "How to Install Knife Hinges," page 64. In addition, install bullet catches in the same pieces.

Add the top and bottom

Once you're done with the hinge mortises, glue the top and bottom pieces to the cabinet. It's prudent to glue only one at a time, so let's start with the top. To begin, screw all of the knife-hinge leaves into their mortises (**Photo 10**). Next, lay the cabinet on its back and stand the bottom piece in place. Place the door in the cabinet and engage the two leaves of the lower knife hinge.

Brush glue on the sub-top (**Photo 11**). Place the top in approximate position and engage the two leaves of the upper knife hinge. Add clamps, but use very little pressure. Tap the top side-to-side in order to fine-tune its position (**Photo 12**). The door will move along with the top. Your goal is to position the top so that the gap on the hinge side of the door is correct. (You may have to tap the bottom piece, too, to even up the gap.) Once the top is situated, tighten the clamps. After the glue is dry, repeat the procedure for the bottom piece. When the glue dries, stand the cabinet up and check the door's swing. If the hinged side rubs against the rabbet behind it, remove some wood from the door with a plane or sanding block.

Make as many shelves (H) as you'd like and shape their front edges to please your eye. Apply a finish of your choice (I used wax, which allows spalted maple's figure to remain sharp and crisp), then attach a handle (J) of your own design. To hang the cabinet, screw the loose cleat to the wall, beveled side facing in. Make sure the cleat is level. Place the cabinet against the wall and slide it down onto the cleat. The two bevels will engage, and your cabinet is ready to be enjoyed! 🛠️

SOURCE:

Lee Valley, leevalley.com, 800-871-8158, Double-Offset Knife Hinges, 3/4" x 1-3/4" x 1/8", #05H01.36, \$23.20/pr.



10

Remove the top and bottom pieces. Cut mortises in them, and in the door, for knife hinges. Knife hinges come in two parts; screw each part in place.



11

Place the door in the cabinet, then glue the top to the subtop. The two halves of the knife hinges will engage each other.



12

Fine-tune the position of the top by tapping it with a mallet. Adjusting the top side-to-side also adjusts the position of the door, since the knife hinge connects the two pieces. This process ensures that you have an even gap on both sides of the door. Repeat these steps when gluing on the bottom piece.

The Secrets of Spalted Maple



Find out how to make your own
spalted wood at
AmericanWoodworker.com/WebExtras

What makes this wood so special? Fungus.

by Brad Holden

IF THERE'S ONE WOOD that can really challenge your sense of design—and your woodworking skills—it's spalted maple. Those inky black lines can both delight the eye and drive you crazy.

Spalted maple is just ordinary maple that's partly rotten. After the wood is cut, different colonies of stain, mold and decay fungi attack it and establish boundaries to preserve their turf. That's what those black lines are—borders between warring tribes. They don't follow any regular pattern, such as the tree's growth rings. Their abstract nature teases the eye, drawing you in and making the wood fascinating to look at.

Those lines can change in unpredictable ways inside the wood. You may have the perfect pattern picked out on a board, only to have it change drastically—or disappear—with one pass through the planer. Working spalted maple is like carefully excavating an archaeological site: You have to know when to stop digging.

The fungi colonies may also alter the color of the wood they're feasting on. Some areas might remain light, while others turn a deeper shade of yellow. Add maple's natural figure to the mix and you've got an awful lot going on in one board.

Problems to look for

Ordinary maple starts turning into spalted maple when its moisture content (MC) is still fairly high. When the MC drops, the fungi die off. The trick to drying the wood for use in furnituremaking is to stop the rotting process at just the right time.

This doesn't always work out, though. Within one board, you may find sound, hard wood with excellent working properties and soft, punky wood that you can't work at all. Sometimes, the soft spots have the consistency of popcorn—those are areas where the fungal attack has gone too far. Plan on

giving every board the “fingernail test.” If you can do serious damage with your fingernail within one of the tribal zones, cut out that section.

You may also find pockets of grayish black dust. It's OK to leave them in your finished piece if you don't mind the way they look. The problem with the dust is that it can spread when you sand. It will work its way into the wood's pores and end up looking like dirt smudges. The solution is to harden the dusty spots prior to sanding by dripping some CA glue on them. Use the thin glue, not gel. It soaks in very quickly.

If you encounter empty pockets without dust, fill in the holes with epoxy mixed with black tempera powder. It's an easy, permanent fix, and visually blends in with the other black areas.

How to buy it

Most cabinet shops don't want to deal with wood that varies so much from board to board, so spalted maple isn't normally carried by lumberyards. You'll have to do some digging to find it, but just about any operator of a small sawmill can steer you to the right supplier. Some wood dealers will induce spaltling on purpose, but others may be sitting on a “bad” batch of lumber that you'll think is gold.

While you can order spalted maple online, it's hard to predict exactly what you're going to get. It's safer to see boards in person, but even then, you've got to be careful. Remember, this isn't wood that has been dried in the normal way, so be alert for checks, cracks and of course, that punky stuff.

Spalted maple will try your patience and demand your full attention. You need to “ask” rather than “tell” each board how it would like to be used. So slow down, *way* down, pay attention, and get to know each piece intimately. The rewards are worth it. 

Alphabet Puzzle

Dado a few sticks, then practice your ABCs.

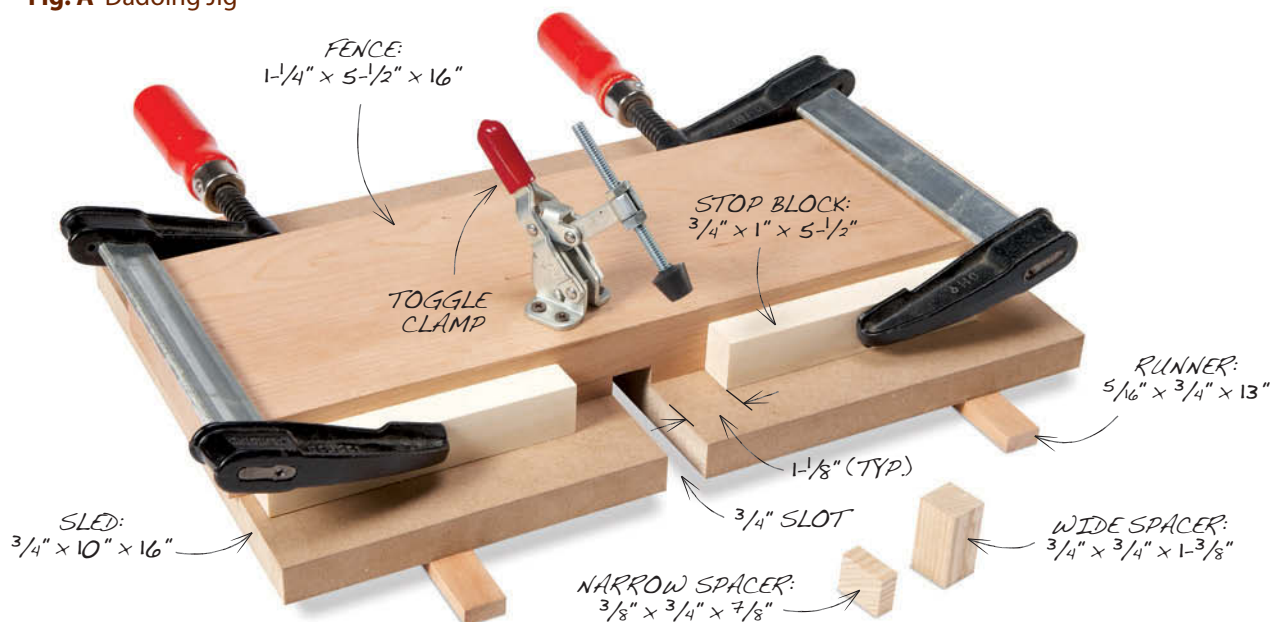
by Jock Holmen



THINK TWICE before you take this puzzle apart. It has six faces, each face has nine squares and each square is lettered. That's two complete alphabets on twelve interlocked parts, all of which are duplicates, but one. Having so many duplicates means each part can go almost anywhere. But because of the letters, each part can go in only one spot.

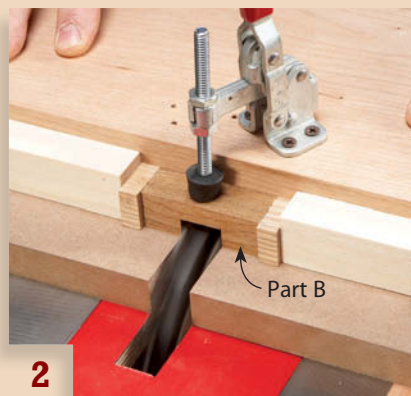
Making this puzzle may be easier than solving it, and once you're set up, you might as well make multiples. Just think, give a puzzle to each of your (highly motivated and inquisitive) kids, and the house will be quiet for the first time in months!

Fig. A Dadoing Jig

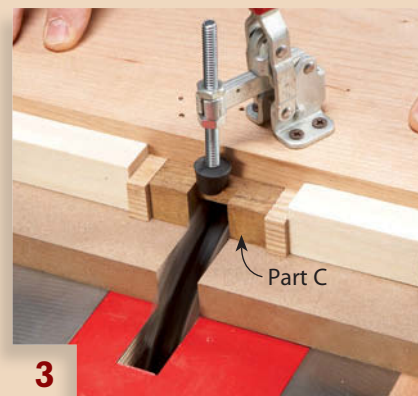




Create Part A by cutting a centered dado in the short blank after installing the wide spacers on both sides.

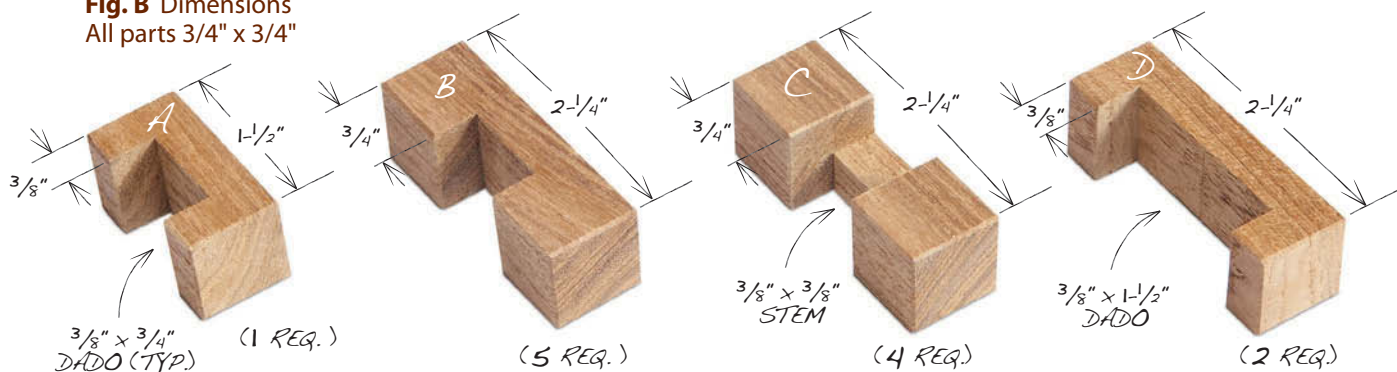


Create Part B by cutting a centered dado in nine of the long blanks after installing the two narrow spacers.



Create Part C by rotating four of the Part B blanks 90° towards the blade and cutting another centered dado.

Fig. B Dimensions
All parts $\frac{3}{4}$ " x $\frac{3}{4}$ "



Make the parts

1. Mill long $\frac{3}{4}$ " x $\frac{3}{4}$ " blanks that are absolutely square.
2. Cut the blanks to length to make the 12 parts (Fig. B), including extras for test cuts.
3. Set up the saw and the jig to cut $\frac{3}{8}$ " x $\frac{3}{4}$ " dados.
4. To make Part A, install the wide spacers and cut a dado in a 1-1/2" blank (**Photo 1**).
5. Switch to the narrow spacers and cut the dados in nine of the 2-1/4" blanks (**Photo 2**). Set five of these pieces aside as Parts B.
6. Cut a second dado in the other four pieces to make Parts C (**Photo 3**).
7. Use one wide spacer to cut wide dados in the remaining two blanks to make Parts D (**Photo 4**).
8. Very lightly sand the edges and ends of all 12 parts to create the tiny reveals that define the squares when the puzzle is assembled.
9. Scribe the middle square on the outside face of all Parts B and D (**Photo 5**).
10. Cut v-grooves on all Parts B and D to mimic the sanded reveals (**Photo 6**).

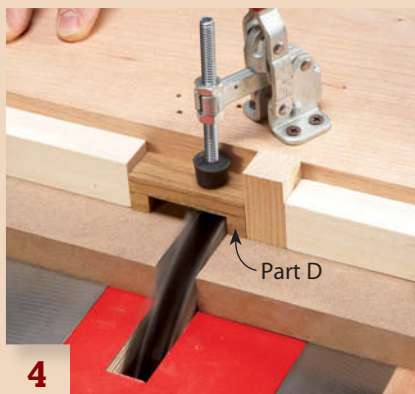
Without letters, this puzzle is pretty easy to solve. Using different types of wood (**Photo**, page 49, top left) is one way to jazz it up. Adding numbers makes solving it quite a bit more difficult. But adding 27 different characters (26 letters and a question mark) creates the ultimate challenge, especially if their orientation changes on each face.

Carving or routing the characters is one option—the puzzle featured on page 49 was CNC-routed. You could also use stamps or stencils or peel-and-stick characters—a single \$5 package of 1/2" letters and numerals (available at office supply stores) allows making four alphabet puzzles and two number puzzles.

For this puzzle to work properly,

each part must be accurately milled and cut. If the joints are too tight, the puzzle won't go together; if the parts fit too loosely, it will fall apart. So, anytime you see a dimension in this story, add the word "precisely" before it.

Dados lock the parts together to form the cube. A shop-made jig makes it easy to cut them (Fig. A, page 49).



4

Create Part D by cutting a pair of dados in the remaining two blanks. Cut the first dado with the wide spacer on one side and the second with it on the other side.



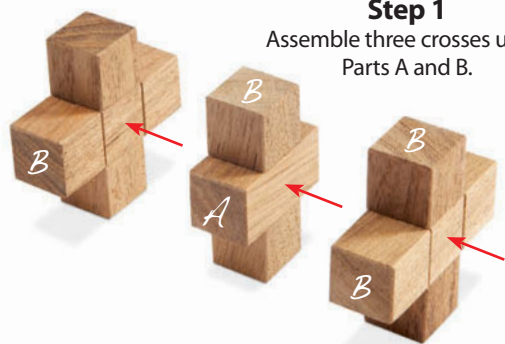
5

Divide the face of each long part into three squares. Scribe each line after installing another dadoed part flush with the end to use as a straightedge.



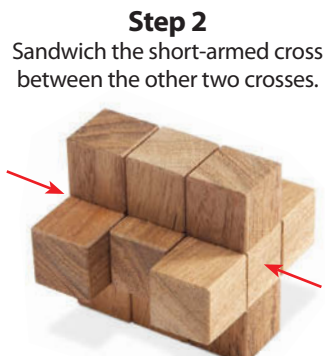
6

Mimic three separate parts by inserting a bevel-edge chisel in each scribed line and tapping it once with a mallet to create a v-groove.



Step 1

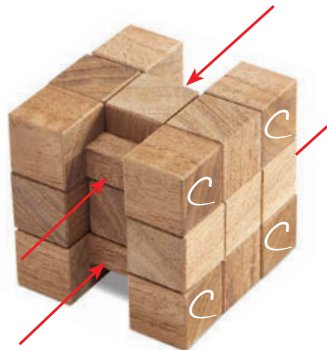
Assemble three crosses using Parts A and B.



Step 2

Sandwich the short-armed cross between the other two crosses.

Step 3
Install the C Parts with their stems touching the short arm.



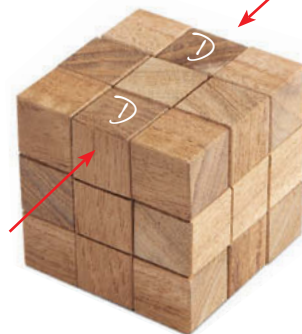
Assemble the puzzle

1. Make three crosses.
2. Slide the crosses together.
3. Install Parts C.
4. Slide in Parts D.



Learn to make three wooden burr puzzles at
AmericanWoodworker.com/WebExtras

Step 4
Slide in the D Parts to complete the cube.



This jig consists of a sled with runners, a clamp and a fence. The runners fit the tablesaw's miter slots, so the sled makes perpendicular cuts. The wide fence houses the saw's dado set, for safety. Stop blocks and spacers precisely position the puzzle parts, so the dados are accurately cut. Like the puzzle parts, the spacers must be precisely cut.

To set up the jig, clamp the stop blocks 1-1/8" from the slot on both sides. Then install the appropriate spacers and secure the puzzle part with the toggle clamp. The dados have to fit perfectly, so always make extra parts and start by making test cuts. Testing the dado widths and depths is pretty easy, because most of the parts go together with lap joints. When the

dados fit snugly, their widths are correct; when the surfaces of the assembled joint are flush, the dado depths are correct. That's it; you're ready to go. 🛠️

Jock Holmen is a wood carver who lives in Burnsville, MN.

Turned 3-Leg Stool

Combine your woodworking and woodturning skills.

by Alan Lacer



IF YOU ENJOY BUILDING FURNITURE and woodturning, but never really combined the two, here's an exciting challenge. Turning this stool requires planning, accuracy and sound joinery. Why only three legs? Beyond simple elegance, a three-legged stool has the distinctive ability to sit securely on almost any surface.

At 23-1/2" tall, this stool is just right for me—I'm 5'10" and prefer to sit with my knees slightly bent

and my feet firmly on the ground. You may want to vary the stool's height based on your own height and sitting preferences. You also have the option to angle one of the stretchers.

Choose any dry, strong wood—you can't go wrong with cherry, maple, walnut, hickory, ash or oak. Use straight-grained stock for the legs and stretchers. The stools shown here are made of quarter-sawn white oak.

Start with the seat

Everything else flows from this part (A, Fig. A, page 54 and Cutting List, page 55). Glue up the seat blank and mount it on a screw chuck (see Sources, page 57). A screw chuck makes it easy to remove and remount the seat and leaves only one hole.

Flatten the bottom side of the blank and drill a hole for the screw chuck. Note the screw's length and the desired final thickness at the center of the seat, and add plywood spacers behind the blank, if necessary, to limit the screw's penetration. Mount the blank and engage the tailstock center to add extra support and safety (**Photo 1**).

Use a bowl gouge to round the blank and shape the seat's asymmetrical rim (**Photo 2** and Fig. B). Pull away the tailstock to hollow the seat (**Photo 3**). Start at the rim and lightly hollow to the center. Be careful, as hollowing too deep will make the stool uncomfortable. It's a good idea to remove the seat and test it during this process. I hollow to a depth of 3/8" at most. A large curved scraper can be helpful to blend and level the final shape (see Sources). Make sure the transition from the rim to the seat is smoothly rounded, so it doesn't cut into the back of your legs.

Sand the seat, using a soft pad (see Sources) and a corded, reversing drill. Position the disc low and then raise it to meet the outside edge of the rotating seat. Work around the rim to sand the face (**Photo 4**). You may need to turn off the lathe and sand by hand to remove all of the sanding marks.

Before removing the seat, pencil a circle on the bottom, 1-1/2" from the rim, to locate the mortises for the legs.

Drill the leg mortises

Use geometry or trial-and-error to divide the circle drawn on the seat into three equal parts (**Photo 5**). The legs splay 12°, so the mortises must be drilled at that angle. You can buy a lathe attachment to drill these mortises (see "The Drill Wizard," page 57), or make a jig (Fig. D). This jig is adjustable—to change the drilling angle you adjust the long machine screws. (If you want to experiment with a larger or taller stool, you may want to change the angle at which the legs splay.) When you build this jig, size its centering pin to fit the hole you drilled in the seat for the screw chuck.

Square up your drill press before drilling the mortises and install a 1" Forstner bit that's marked with tape to drill 1-1/4" deep. Use a protractor to set the jig at the 12° angle. Then use the centering pin to install the seat. Clamp the seat to the jig with the jig's pointer aimed directly at the first mortise. Then clamp the jig to the drill press, aligned parallel with the table's front edge and positioned to drill the mortise (**Photo 6**). Drill the first mortise, then rotate the seat to drill the second and third mortises.

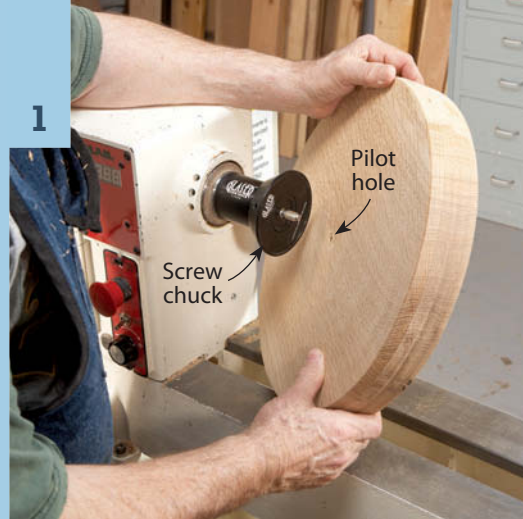
Turning duplicates

Turning three legs that look the same is not as difficult as you might think, because they don't have to be absolutely identical—just reasonably close facsimiles. However, turning duplicates does require controlling several variables:

Wood: Use stock that matches (in this case, rift- or quartersawn stock), preferably cut from the same plank or tree.

Profiles: Work with a master turning positioned so you

Mount the seat blank on a screw chuck after rough-sawing the shape, flattening its back face and drilling a centered pilot hole. After threading on the blank, engage the tailstock center for additional support.



Shape the outside edge using a bowl gouge and working from smaller to larger diameters, so you cut across the end-grain, rather than into it.



Hollow the seat using the bowl gouge, working from large to small diameter.



Sand the outside edge, using a disc mounted on a soft pad. Then work around to sand the seat's hollowed face. Keep the disc below the seat's centerline and reverse its rotation as necessary to keep it spinning against the seat's rotation.



Fig. A Exploded View

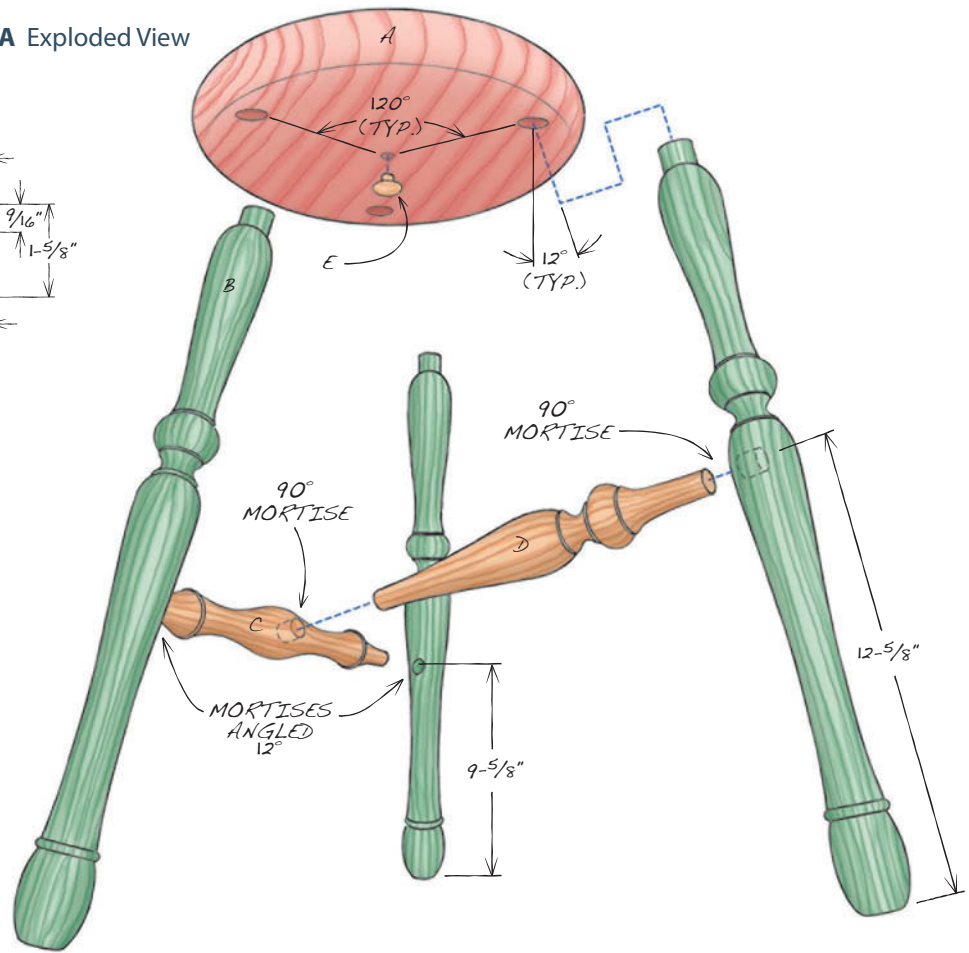


Fig. B Seat Cross-Section

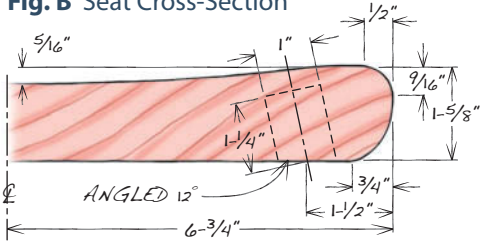
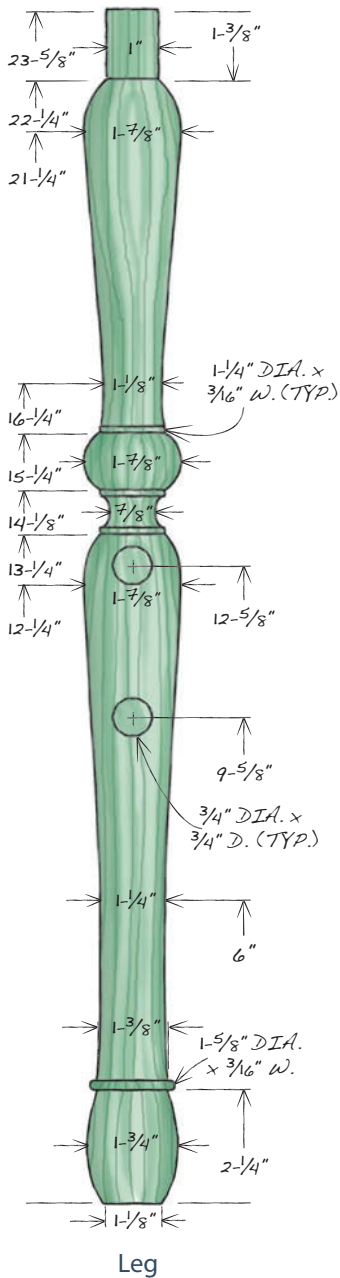
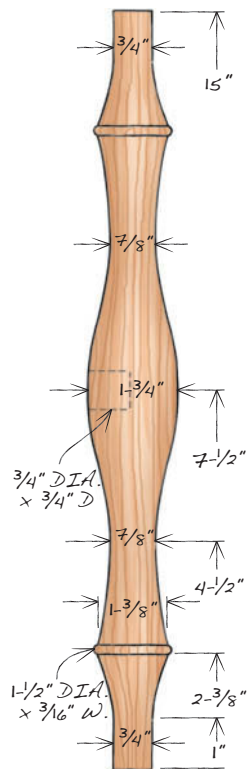


Fig. C Spindle Dimensions

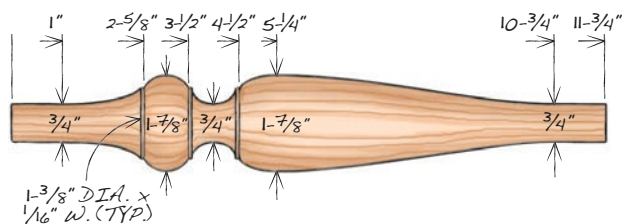
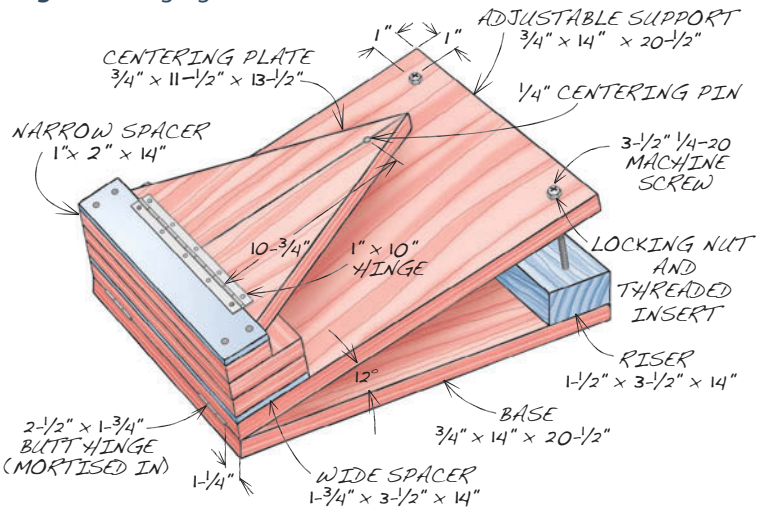


Leg



Long Stretcher

Fig. D Drilling Jig for seat



Short Stretcher

can easily sight over the blank to compare the desired profile with the one you're creating.

Placement: Create a "story stick" that locates key elements (including one or both ends) and identifies key diameters. Drive small brads into the edge of the stick at transition points between elements and at the center of important diameters. Clip the brads so they extend about 3/16". Move the tool rest close to the cylindrical blank. Start the lathe and place the stick on the tool rest, parallel to the blank and aligned at the bottom end. Then gently push the stick into the spinning blank, so the brads score the wood at all the key points.

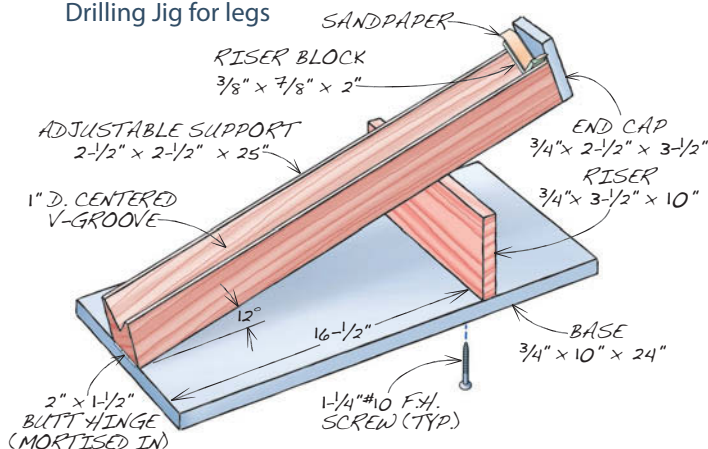
Diameters: Use outside calipers that firmly hold the setting to accurately size diameters. Fully round the two ends that contact the wood, so they won't catch. It's convenient to use different calipers for each diameter.

Turn the legs

If you decide to turn a different leg profile than the one shown here (Fig. C), plan ahead for the placement of the stretchers and keep the diameters large enough to support an adult's weight. Turn a model leg, or even a model stool,

Fig. E

Drilling Jig for legs



Get full-size patterns for turning the legs and stretchers at AmericanWoodworker.com/WebExtras

Cutting List

Overall Dimensions: 23-1/2" H x 22" Dia.

Part	Name	Qty.	Material	Th x W x L
A	Seat	1	White Oak	1-5/8" x 13-1/2" dia. (a)
B	Leg	3	White Oak	1-7/8" x 23-5/8" (b, c, d)
C	Long stretcher	1	White Oak	1-3/4" x 15" (e, f)
D	Short stretcher	1	White Oak	1-7/8" x 11-3/4" (e)
E	Domed cap	1	White Oak	3/8" x 1" dia.

Notes:

- Drill three 1" dia. x 1-1/4" d holes in the bottom, spaced 120°, centered 1-1/2" from the outside edge, and angled 12°.
- Length includes a 1-3/8" l tenon on one end. Trim tenon length to fit holes in seat.
- In two legs, drill a 3/4" dia. x 3/4" d hole 9-5/8" from the bottom, angled 12°.
- In one leg, drill a 3/4" dia. x 3/4" d hole 12-5/8" from the bottom.
- Length includes 1" l tenons on both ends. Trim tenon length to fit holes.
- Drill a 3/4" dia. x 3/4" d hole at the midpoint.

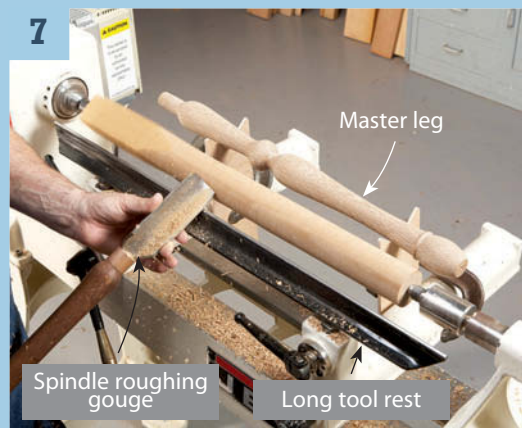
Locate the leg mortises by dividing a circle marked on the seat's back into three equal sections.



Drill angled holes in the bottom of the seat for the splayed legs, using a shop-made jig. Before drilling, make sure both the jig and the seat are securely clamped.



Turn the square leg blank to a cylinder using a spindle roughing gouge. A long tool rest allows working the entire blank. A master leg mounted behind the blank makes it easier to turn legs that match.



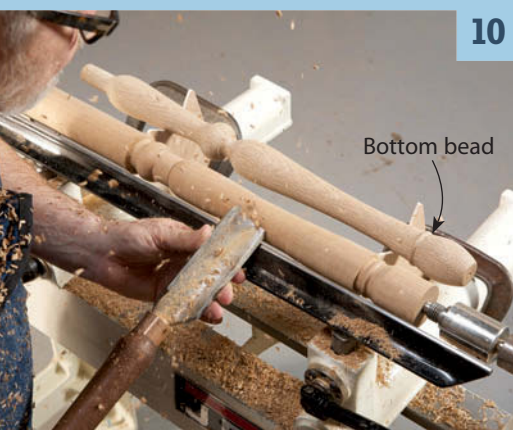
Use a story stick to score the spinning blank. The stick contains precisely located brads that transfer the turned profile's key transition points and diameters.





9

Start by turning the large bead in the middle of the leg and the shoulder below it. Do not cut the cove between them, though. Turning such a small diameter now will cause excessive vibration during the rest of the turning process.



10

Shape the leg's lower contoured portion. Establish the bead at the bottom; then follow the profile on the pattern leg as you "connect the dots." Shape the foot last.



11

Return to the center of the blank and cut the cove. Now that the leg's lower portion and most of its middle details have been completed, it's safe to turn to this small diameter.



12

Use a simple gauge to precisely size the tenon at the top of the leg. The gauge is just a scrap of wood that's been drilled with the same bit used to drill the holes in the seat.

to make sure the profiles look good in three dimensions and work well together.

When turning the legs (and other spindles with similar length and diameters) you're likely to encounter ribbing, an unwanted texturing of the surface that occurs when the wood flexes. When ribbing begins, most turners place a hand on the back side of the spindle to keep it from flexing. Make sure your hand touches only the back of the spindle, direct the force of the tool along the spindle's axis (as much as possible), and work with sharp tools. Also, wait until near the end of the turning process to turn the smaller diameters to final size. Follow the turning procedure described below to minimize ribbing.

Install a small headstock drive on your lathe (see Sources). A long tool rest adds convenience, but requires a second tool rest banjo (see Sources). Mount a square leg blank and turn it to a uniform 1-7/8" cylinder (**Photo 7**). Then use a story stick to mark the leg blank (**Photo 8**). Note that the bottom of the leg is at the tailstock end.

Turn the leg's large bead first (**Photo 9**). Use calipers and a parting tool to cut the fillets on both ends and widen them for clearance. Below the bead, extend the fillet to the shoulder below the cove. Then round the bead and roll the shoulder with a detail/spindle gouge or a skew chisel. Do not cut the cove yet—doing so now will severely weaken the blank.

Size the small bead near the foot and both of its shoulders using the calipers and parting tool. Use the skew chisel to shape the bead. Then switch to the spindle roughing gouge and shape the adjacent concave profile (**Photo 10**). It may be helpful to use the detail/spindle gouge when you work near the small bead. Turn the foot using the detail/spindle gouge or skew—use the calipers to size its base.

Return to the middle of the leg and complete the cove (**Photo 11**). Then shape the contoured section above the large bead. Turn the tenon last, leaving it slightly oversize, and finish by rounding the shoulder below it to its final shape. Remove the tool rest and sand everything except the tenon to 220 grit.

Use a go/no-go gauge to turn the tenon to its final diameter (**Photo 12**). The goal is a friction fit in the mortise—one that neither binds nor wobbles. Be careful, as removing a small amount of wood from the tenon makes a big difference. When you've dialed in the perfect fit, trim the tenons so the leg's shoulder rests against the bottom of the seat while leaving the maximum tenon length inside the mortise.

Drill the stretcher mortises

Another shop-made jig is used to drill mortises in the legs for the stretchers (**Photo 13**; Fig. E). On this jig you adjust the slope by moving the riser forward or back and securing it with screws at the desired angle. The two mortises for the horizontal stretcher (C) are drilled at 12°, the same angle as the seat mortises. Set the jig's slope at 12°. Install a 3/4" Forstner bit, position the jig on the drill press as before and drill 3/4" deep holes 9-5/8" from the bottom of the leg.

Tip ▶ To make sure the drill bit is centered on the leg, place a square block of wood in the v-grooved support, so it stands on edge, like a diamond. When the bit is perfectly centered, its point will touch the diamond's point.

The mortise for the angled stretcher (D) is drilled at 90°, 12-5/8" from the bottom of the leg. To drill this mortise, just remove the jig's riser so the v-grooved support lies flat. If you want both stretchers to be horizontal (as on the dark stool pictured on page 52), drill all three leg mortises at 12°. Note: Angled stretchers appear in historical pieces and in stools by contemporary turners such as Alan Leland and David Scotts.

Turn the stretchers

Install the legs in the seat and verify the length of the horizontal stretcher by measuring between the two 12° mortises and adding 1-1/2" for the tenons. Then follow the methods used to create the legs to turn this stretcher, size its tenons and drill its 90° mortise.

Reassemble the stool, including the horizontal stretcher, to verify the length of the short stretcher. Then turn it.

Assembly and finish

Dry-assemble all the parts to make sure everything fits.

Tip ▶ Repair a loose mortise-and-tenon joint by wrapping and gluing a wood shaving from a hand plane around the tenon.

After making any necessary adjustments, glue the stool together, using slow-setting glue such as Titebond Extend to allow plenty of working time (**Photo 14**). Apply glue to the mortises only, using a small brush to spread the glue evenly around the sides. Assembling all the parts at once requires finesse and a gentle touch. Use a rag dampened in hot water to remove any glue that squeezes out. Clamping shouldn't be necessary because the joints are under tension, but keep a fabric band clamp handy to pull everything tight, should you feel any looseness.

Have some fun with the hole left by the screw chuck in the bottom of the seat. Turn a small decorative finial or domed cap with a tenon (E) and glue it in.

Apply your favorite finish. The light-colored stool featured on page 52 has a shop-made oil/varnish blend finish. The dark-colored stool has been ebonized. 🛠️

Special thanks to Bill Hull of Norman, OK, for his help in designing and making the drilling jigs for this project.

SOURCES

- Craft Supplies, woodturnerscatalog.com, 800-551-8876, Curved Scraper, 1-1/4" wide, #988-6088, \$87.15; 1/2" Stebcenter (small drive center), #163-0250, \$62.50. • Glaser Hitec, glaserhitec.com, 805-293-1678, Glaser Hitec Screw Chuck, 1-1/4 x 8tpi, \$155.
- Oneway Manufacturing, oneway.ca, 800-565-7288, Drill Wizard, #3377, \$120; #2 MT Safe Driver (small drive center), #2593, \$42.
- Robust Tools, turnrobust.com, 866-630-1122, Double Posted Long Tool Rest, \$50 + \$3 per inch of length. • Sanding Glove, thesandingglove.com, 800-995-9328, Soft Sanding Disc Holder, 5" dia., #SM-5M, \$16.

Alan Lacer is a turner, writer and teacher who lives in western Wisconsin. See more of Alan's work at alanlacer.com.

Drill holes in the legs for the stretchers. Angle these holes to match the holes in the seat. Drill no deeper than halfway through the leg.

13



Glue the stool together.

Assemble the legs and stretchers and then install all three legs at the same time. Tap lightly with a dead blow mallet to gently seat the joints.

14



The Drill Wizard



The Drill Wizard, an after-market lathe attachment, makes it easy to drill accurate, angled holes (see Sources, at left). It can drill all the seat, leg and stretcher mortises for this stool, so it replaces both jigs. It fits tool rest banjos sized for 1" stems and requires a lathe with an indexing head. You supply the drill.



Learn how to ebonize any wood at AmericanWoodworker.com/WebExtras

Black Hills Tool Cabinet

Store your planes and chisels where you sharpen them.

by John English



WHEN ONE OF MY STUDENTS ASKED what stone I use in the grinder, I realized that I haven't used an electric grinder in years, because I do all my sharpening with water and diamond stones. Then I realized I had chisels, planes and sharpening stones stored all over the shop. Wouldn't it be nice if they were all together in a cabinet that combined storage with sharpening capability? I originally planned to build this cabinet using plywood, but then I decided that building a more elegant cabinet for my hand tools would be a constant reminder to always do my best work. However, if you follow my lead and build with solid cherry, be prepared for your spouse to decide your cabinet looks too good for your shop and belongs in the house instead.

Cut the cabinet sides

The sides (A1, Fig. A, page 60 and Cutting List, page 62) are simply flat panels cut to shape. Edge-glue boards to create the wide blanks. Rip each blank to width and crosscut them both to length. Then cut the rabbets for the cabinet's back.

Shape the upper portion of each side by making a pair of stopped cuts (**Photo 1**; Fig. D, page 62). Start by making a rip cut from the top. Complete the profile by cutting the angled line with a circular saw and a clamped-on straight-edge. Note that the blank is cantilevered off the workbench. Smooth the sawn edges by planing and scraping.

Lay out the tapered feet and use a 1" Forstner bit to create the round inside corners. Cut the profiles with a saber saw; then smooth the edges with a file.

Build three frames

Start with the cabinet's large face frame. Cut the stiles and rails (A2–A4). Bandsaw the decorative profile on the bottom rail and sand the cuts smooth. Then drill countersunk holes for the screws and assemble the frame (**Photo 2**).

Two web frames hold the cabinet together. Cut the stiles and rails (A5, A6) to size. Drill countersunk holes in the edges of the rails for the screws that fasten the frames to the cabinet sides. Elongate these holes to allow for the sides' seasonal movement by inserting the drill from the back and rocking it from side to side as the bit spins. Assemble the frames with glue and screws. Then drill more elongated holes to allow fastening the shelves.

Locate the web frames on one of the cabinet sides (Fig. D). It helps to clamp the large face frame in position first, recessed 3/4" from the side's front edge. Make sure the top web frame is flush with the top of the face frame. Locate the bottom web frame so the cabinet shelf (A7) will be flush with the top of the face frame's bottom rail. There should be a 1/2" gap between the back of each web frame and the rabbet in the cabinet side to allow for the shelves' seasonal movement. Screw both web frames to the cabinet side. Repeat the process to fasten both web frames to the other cabinet side.

Cut the cabinet shelf to fit and screw it to the bottom web frame through the elongated holes (**Photo 3**). Cut the drop-front shelf (A8) to length, but leave its width oversize. Lay it in place and mark the front bevel, which should angle about 15° (**Photo 4**). Rip the beveled edge on the tablesaw. Then cut this shelf to final width (it's wider than the cabinet shelf) and screw it to the upper web frame through the elongated holes.

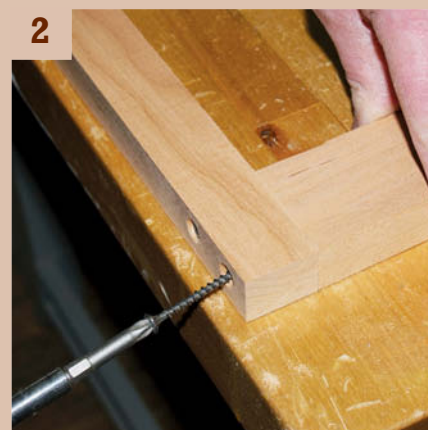
Glue and clamp the large face frame to the web frames and both shelves. The tall toe-kick space beneath this frame allows cleaning under the cabinet with a shop vacuum.

Fasten the face frame stiles to the cabinet sides with a pair of cleats (A9) secured with glue and screws. It's a good idea to drive the screws into the frame first, using a sheet of sandpaper as a spacer between the cleat and the cabinet side (**Photo 5**). When the sandpaper is removed, driving in the screws pulls the joint tight.

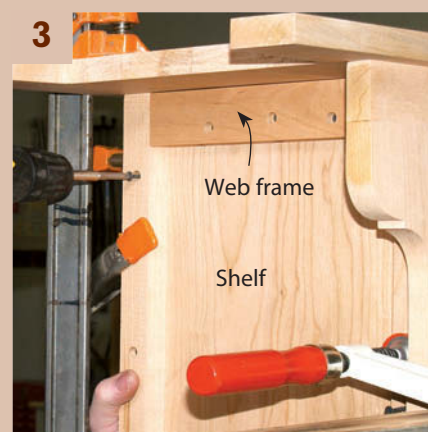
Cut the top portion of the cabinet sides. Make a stopped cut to create the straight section first. Then start from the other end to cut the angled section. Use spring clamps to support the waste.



Assemble the face frames and web frames with screws and glue.



Assemble the cabinet with screws. Drill elongated shank holes in the web frames to allow seasonal movement by the solid-wood sides and shelves.



Mark the drop front shelf. Then cut its front edge to match the slope of the side.



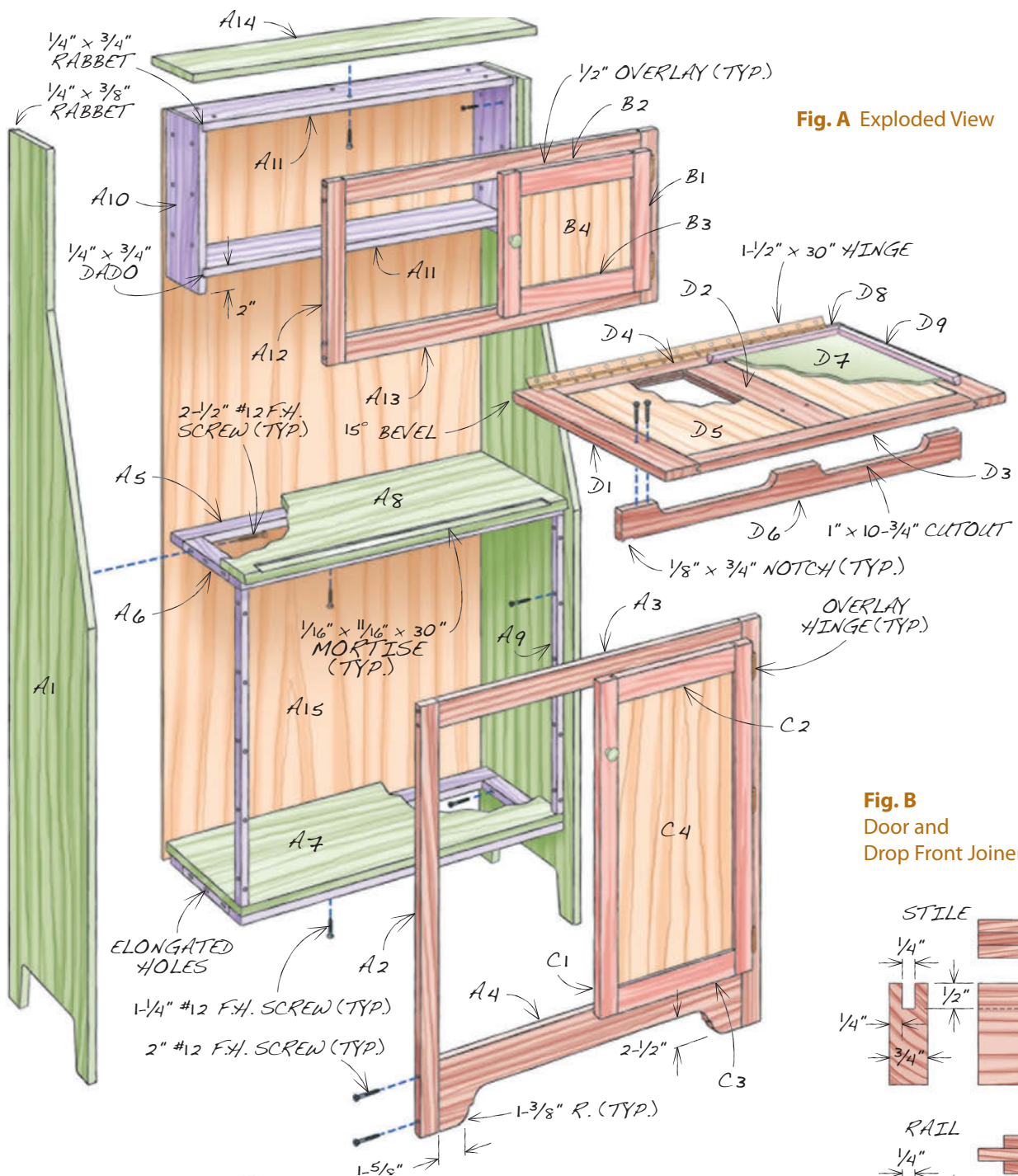


Fig. A Exploded View

Fig. B
Door and
Drop Front Joinery

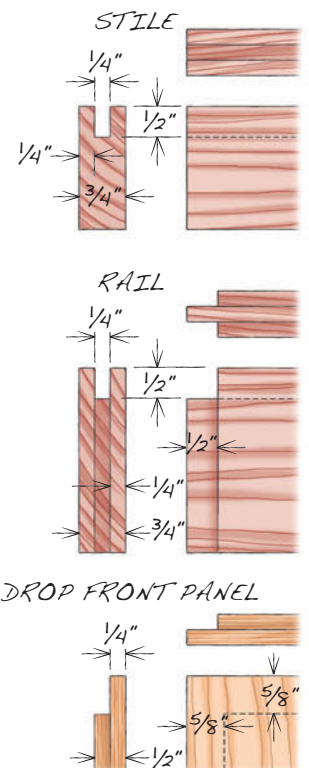
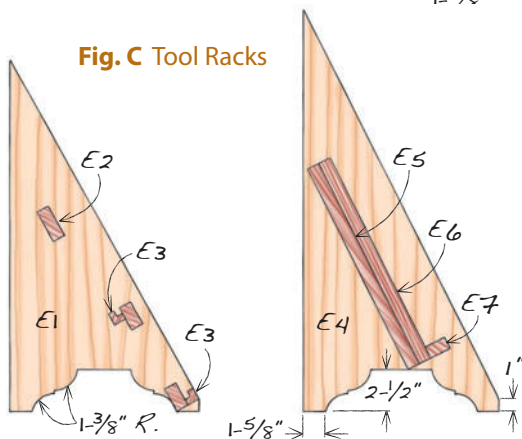


Fig. C Tool Racks



See a simple way to make
strong and rigid cabinet doors at
AmericanWoodworker.com/WebExtras

Fit the top and back

Build a box to fit between the sides at the top of the cabinet. Cut the box parts (A10, A11) to size. Mill a 1/4" deep dado and a 1/4" deep rabbet in each box side and then glue and screw the box together—measure diagonally to make sure it's square. Cut the parts for the box face frame (A12, A13) to size and screw and glue them together. Glue the face frame to the box, and while the glue dries, cut the cabinet's top (A14) and its 1/4" plywood back (A15) to size.

Clamp the box in position between the cabinet sides, flush at the top and with the rabbets at the back—this creates a 3/8" setback at the front. Fasten the box to the sides. Next, position the top and fasten it. Then install the plywood back, fastening it to the box at the top and to the cabinet's sides and shelves.

Make the doors

The doors assemble with tongue-and-groove joinery (**Photo 6**; Fig. B). Cut the stiles and rails (B1–B3 and C1–C3) to size. Then cut a centered groove 1/4" wide x 1/2" deep in one edge of every part. (Make test cuts first, to dial in the setup.) Use a dado head and a miter gauge with a fence and a stop to cut the tongues on the ends of all the rails.

Resaw and edge-glue 3/4" stock to make book-matched door panels (B4, C4). When you glue the resawn boards, orient their flat faces the same way to create a level surface. Mill the panels to fit the 1/4" grooves in the stiles and rails without binding or rattling. Apply glue only to the joints when you glue each door together—the panel must float freely, to allow seasonal movement.

Add the knobs and install the doors with overlay hinges (see Source, page 62). Use three hinges to mount each bottom door. Note: The bottom doors will be flush with the cabinet sides; the top doors will extend 3/8" beyond them.

Build the drop front

Rip and crosscut the drop front's three stiles and two rails (D1–D4) to size, and mill grooves and tongues exactly as for the doors. The 1/2" thick panels (D5) are recessed in front to match the doors, but they're flush in back to provide a flat work surface. Dry-assemble the frame to double-check the panel sizes (**Photo 7**). Cut the panels to fit, and then mill 5/8" wide by 1/4" deep rabbets around the edges. Assemble the drop front with glue and clamps, measuring diagonally to check that it's square. When the glue is dry, bevel the drop front's bottom edge at a complementary angle to the cabinet's drop front shelf.

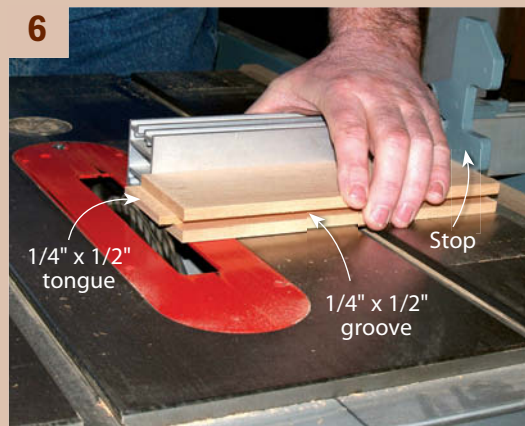
Center the drop front's continuous hinge (see Source) on the drop front shelf to locate the hinge mortise. Joint the front edge of a scrap piece and use it as a fence to rout the mortise (**Photo 8**). Shim this fence from behind to fine-tune the mortise location. Note: The width of the mortise should match the width of the hinge leaf, so the barrel stands clear. Complete both ends of the mortise by hand (**Photo 9**). Then install the hinge on the cabinet.

To locate the hinge mortise on the drop front, open the cabinet's bottom doors, place a pair of spacers on

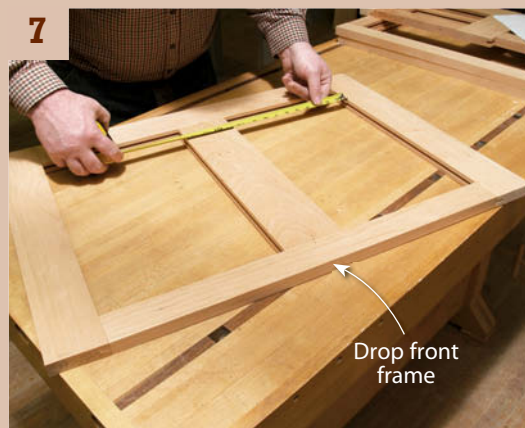
Slide sandpaper behind the cleat to ensure a tight fit when you install the face frame. Fasten each cleat to the stile, then remove the sandpaper and fasten the cleat to the cabinet.



Cut tongues and grooves to assemble the door and drop front stiles and rails.



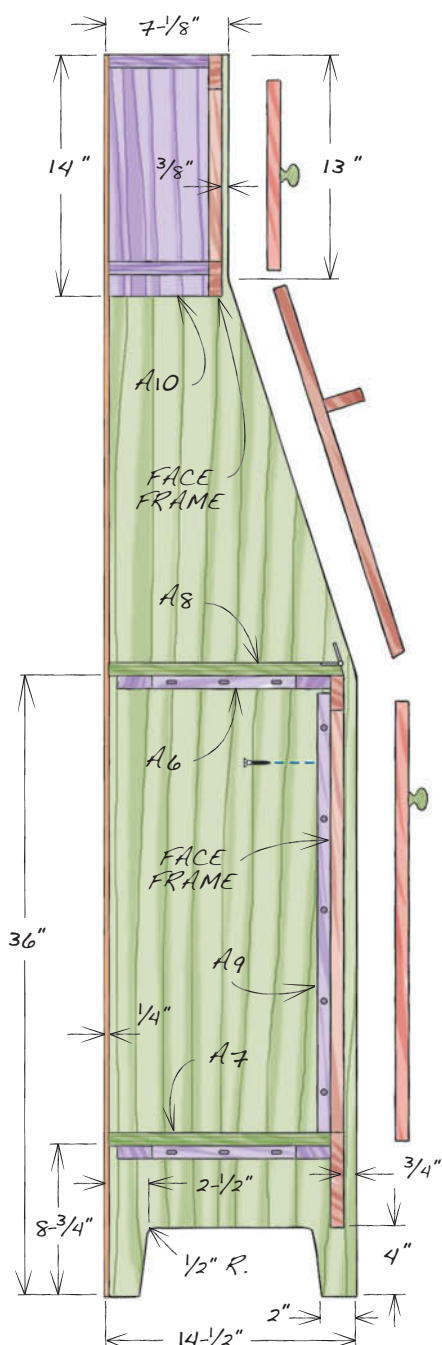
Measure each dry-assembled frame to verify the panel sizes. The 1/2" thick drop front panels are rabbeted so they mount flush with the stiles and rails on the back face.



Rout the hinge mortise in the drop front shelf, using a fence installed inside the cabinet. Wedges between the fence and the cabinet's back set the mortise's width



Fig. D Side View



Cutting List

Overall Dimensions: 72-3/4" H x 35 W" x 14-1/2" D

Section	Part	Name	Qty.	Material	Th x W x L
Cabinet	A1	Side	2	Cherry	3/4" x 14-1/2" x 72" (a)
	A2	Face frame stile	2	Cherry	3/4" x 1-3/4" x 32"
	A3	Face frame top rail	1	Cherry	3/4" x 2" x 28-1/2"
	A4	Face frame bottom rail	1	Cherry	3/4" x 5-1/2" x 28-1/2"
	A5	Web frame stile	4	Cherry	3/4" x 2" x 32"
	A6	Web frame rail	4	Cherry	3/4" x 2" x 8-1/4"
	A7	Cabinet shelf	1	Cherry	3/4" x 12-3/4" x 32"
	A8	Drop front shelf	1	Cherry	3/4" x 13-1/2" x 32" (b, c)
	A9	Cleat	2	Cherry	3/4" x 3/4" x 25-1/2"
	A10	Box side	2	Cherry	3/4" x 5-3/4" x 14" (d)
	A11	Box top and bottom	2	Cherry	3/4" x 5-3/4" x 31"
	A12	Box face frame stile	2	Cherry	3/4" x 1-3/4" x 14"
	A13	Box face frame rail	2	Cherry	3/4" x 2" x 28-1/2"
	A14	Cabinet top	1	Cherry	3/4" x 7-7/8" x 35" (e)
	A15	Cabinet back	1	Plywood	1/4" x 32-11/16" x 63-1/4"
Upper doors	B1	Upper door stile	2	Cherry	3/4" x 11" x 14-3/4" (f)
	B2	Upper door top rail	4	Cherry	3/4" x 2" x 11"
	B3	Upper door bottom rail	2	Cherry	3/4" x 2" x 11-3/4" (g)
	B4	Upper door panel	2	Cherry	3/4" x 3" x 11-3/4" (g)
Lower doors	C1	Lower door stile	2	Cherry	1/4" x 11-5/8" x 6-7/8"
	C2	Lower door top rail	2	Cherry	3/4" x 25-1/2" x 14-3/4" (f)
	C3	Lower door bottom rail	4	Cherry	3/4" x 2" x 25-1/2"
	C4	Lower door panel	2	Cherry	3/4" x 2" x 11-3/4" (g)
Drop front	D1	Side stile	2	Cherry	3/4" x 11-5/8" x 21-3/8"
	D2	Center Stile	2	Cherry	3/4" x 22-1/2" x 31-3/4" (h)
	D3	Top rail	1	Cherry	3/4" x 3" x 11-3/4" (g)
	D4	Bottom rail	1	Cherry	3/4" x 3" x 26-1/2" (g)
	D5	Panel	2	Cherry	1/2" x 11-5/8" x 18-3/8" (j)
	D6	Handle	1	Cherry	3/4" x 2-1/4" x 31-3/4" (k)
	D7	Liner	1	Hardboard	1/4" x 18" x 28"
	D8	Long retainer	2	Cherry	3/4" x 3/4" x 29"
Tool racks	D9	Short retainer	2	Cherry	3/4" x 3/4" x 19"
	E1	Chisel rack side	2	Poplar	3/4" x 11-1/4" x 21"
	E2	Flat molding	3	Poplar	3/4" x 1-1/2" x 26-3/4" (l)
	E3	Rabbeted molding	2	Poplar	3/4" x 3/4" x 26-3/4" (l, m)
	E4	Plane rack side	2	Poplar	3/4" x 11-1/4" x 24"
	E5	Plane rack cleat	2	Poplar	3/4" x 3/4" x 11"
	E6	Plane rack back	1	Poplar	3/4" x 11-1/4" x 26-3/4"
	E7	Plane rack bottom	1	Poplar	3/4" x 1-1/2" x 26-3/4"

Notes:

- Cut 1/4" d x 3/8" w rabbet on back edge.
- Cut width oversize; trim to final dimension after beveling front edge.
- Cut front edge to match slope of sides (approx. 15°).
- Cut 1/4" deep rabbet and dado for box top and bottom.
- Overhangs front and sides by 3/4".
- Doors overlay face frame by 1/2".
- Length includes 1/2" tongue on both ends.
- Cut bottom edge to mirror slope of drop front shelf (approx. 15°).
- Cut 1/4" x 5/8" rabbets around the back face.
- Width is approximate; size so that the drop front is parallel to the floor when open.
- Cut length oversize; trim to final dimension after assembly.
- Cut 3/8" x 3/8" rabbet on one edge.

SOURCE

Hardware Hut.com, thehardwarehut.com. 800-708-6649, Amerock Cabinet Knob, 1-1/4", polished brass, #AME-BP530053, \$1.79 each (4 required); Amerock Overlay Face Frame Mount Self-Closing Cabinet Hinge, #AME-BP34293, \$2.59 per pair (5 pair required); Stanley Continuous Hinge, 1-1/2" x 30", bright brass, #STA-S701-440, \$14.55 (1 required).



John English has been writing how-to articles and books for more than 15 years. He and his wife, Meg, live in South Dakota, where he teaches joinery and furniture building at the Black Hills School of Woodworking.

them and lay the drop front on top (**Photo 10**). The spacers have to be wide enough to level the drop front with the shelf. Center the drop front between the cabinet sides and position it flush with the inside edge of the exposed hinge leaf, so the gap between the drop front and the shelf matches the diameter of the hinge barrel. After marking the mortise, move the drop front to your bench, clamp on a fence and rout. Then mount the hinge. When the drop front is closed, it rests against the top face frame. And like the top doors, it extends slightly beyond the sides.

Make the drop front's handle (D6). Its feet align with the three stiles. Saw out the hand grips and smooth the cuts with a sanding drum. Round over all the edges but the bottoms of the feet.

The handle rests on the opened cabinet doors to support the drop front and keep it level. Notches in the handle secure the doors. To mark the notch locations, open the doors 90° and lay the handle on top, centered on the drop front (**Photo 11**). Use a dado head to cut the notches. Lightly round their shoulders with a file to ease the fit.

Install the handle 7-3/8" from the top of the drop front, so it will rest on the cabinet doors' stiles. Locate the screws and countersunk mounting holes in the drop front so they'll be hidden by the replaceable hardboard liner (D7) that protects the drop front's surface.

Cut the liner to size. Rabbet its retaining molding (D8, D9) and round over the top edges. Miter the molding to fit around the liner, and then fasten it to the drop front with screws driven into countersunk holes.

Apply the finish

I like wipe-on matte poly because it's easy to work with, dries quickly and looks like an oil finish, but has additional toughness. Remove the hardware and finish-sand the entire cabinet. Then apply three coats of finish, sanding lightly between coats with 400 grit paper.

Make the tool racks

I used poplar for the chisel and plane racks because it's soft enough that it won't dull sharpened tool edges.

Cut out the side pieces (E1, E4, Fig. C) and bandsaw the leg profiles—they're the reverse of the lower face frame's bottom rail. The chisel rack's bottom rail is a two-part assembly. One piece is simply ripped, jointed and planed (E2). Rout a small rabbet in the other piece (E3). Glue these pieces together. Then round over the edges, cut the rail to final length and screw it between the sides. Decide where the other supports should be placed according to the lengths of your chisels and install them (**Photo 12**). I used the same parts to make a second rail and mounted it halfway up to accommodate two rows of chisels.

The plane rack is even simpler. Screw cleats (E5) to the sides, screw the back (E6) to the cleats and finish by gluing a length of 1x2 (E7) across the bottom. The decorative cutouts on the sides of the racks make them easy to install and remove. But you don't have to mention that when your spouse sees the finished cabinet and tries to call "dibs." 🐼

Complete the mortise with a chisel.

9



Mark the hinge mortise location on the drop front, using the doors and a spacer to level the drop front with the shelf.

10



Mark notch locations on the drop front's handle. When the handle is installed, the notches fit over the open doors to support the drop front.

11



Assemble the tool racks with glue and screws. The chisel rack holds two rows of chisels. The plane rack holds up to 12 hand planes.

12



How to Install Knife Hinges

by Brad Holden

They're a sure sign of good craftsmanship, but are almost invisible.

SMALL AND DISCREET, knife hinges lend a tidy, refined look to your project. They're ideal for a small cabinet if you want the hinge hardware to virtually disappear.

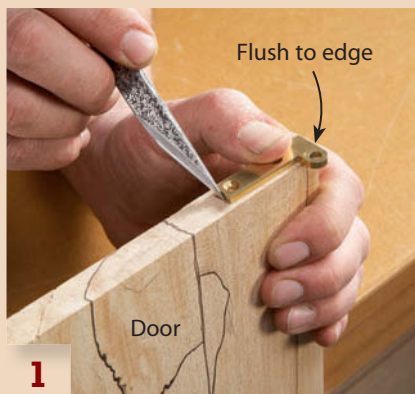
Knife hinges are also a hallmark of good craftsmanship. Precisely laying out their mortises takes patience and a steady hand. You'll be using some classic hand tools, such as a marking knife, a marking gauge and a few sharp chisels. There are no short cuts, and practically no room for adjustment once the mortises are cut.

Don't let me scare you, though. If you follow the steps outlined below, you really can't go wrong.

There are two styles of knife hinges: straight and offset. Straight hinges are used for overlay doors. Offset hinges let a door swing out farther than straight hinges, so they're used for cabinets with inset doors. I'll be showing you how to install offset hinges.



Knife hinges go undercover when installed—you can barely see them. They're perfect for the type of cabinets whose hardware shouldn't distract from the piece's design or the beauty of the wood.



1 Lay out the door mortises first. Position one hinge leaf flush with the door's edge, then scribe across the end of the hinge.



2 Set the pins on a mortising gauge to the width of the leaf.



3 Scribe the mortise from the face side of the door.



4 Scribe the hinge's offset arm, again using the hinge itself as a template.



5 Adjust the height of a 1/8" router bit to match the thickness of the leaf.

Before you start

All knife hinges are composed of two parts, or "leaves," that are easy to separate. One leaf is mortised into the top and bottom edges of the cabinet's door; the mating leaf is mortised into the cabinet itself. It's extremely difficult to cut the mortises in the cabinet after the cabinet is assembled. Your best bet is to hold off gluing the cabinet together until you've completed all the mortising.

Begin by temporarily clamping the cabinet together. Cut the door so that it's a snug fit in the opening.

Next, determine the size of the gap you'll want all around the door. This isn't an arbitrary measurement: It's determined by the gap between the two leaves of your hinges, which is the thickness of the washer between the leaves. Make shims that are the same thickness as the washer. (I use a stack of cut-up playing cards. The washers on my hinges were three cards thick.)

Carefully cut the door smaller, ending up with gaps that are the same size on all four sides. I use a hand plane when I get close to final size in order to avoid taking off too much wood.

Door mortises first

The most accurate way to lay out the mortises is with a marking knife and a marking gauge. Making shallow grooves in the wood, these tools allow you to positively register a chisel in a way that a pencil line cannot.

We'll start with the door mortises, because the thickness of the door determines the position of the hinge. Clamp the door in a vise at a comfortable working height. Position one leaf of the hinge on the door's top or bottom edge, so that the hinge is flush with the door's edge. Using a marking knife, mark the hinge's end with a short, shallow cut (**Photo 1**). Locate your knife in the cut, slide a small square against the blade and scribe a line all the way across.

Adjust a mortising gauge to the width of the hinge (**Photo 2**; see Sources, page 67). You could also use a marking gauge with a single pin or a single wheel, but you'll have to re-adjust it for each side of the mortise.

Adjust the gauge's head so that the mortise will be centered on the door. Test the setting on a piece of scrap the same thickness as your door. When you've got the setting right, scribe the mortise's long sides (**Photo 3**).



6

Route about 1/32" shy of the mortise's layout lines. Clamp two support boards to the door to prevent the router from tipping.



7

Pare to the lines using a wide chisel. Take thin shavings, so you don't split out the mortise's thin walls.



8

Temporarily assemble your cabinet, then lay out its hinge mortises. Place shims next to the hinge to determine the gap between the door and cabinet side.



9

If the sides and door of your cabinet are set back, measure this distance. Move the head of the mortising gauge away from the pins by the same amount.



10

Disassemble the cabinet, then scribe mortises on the pieces above and below the door. Remove most of the waste using your router.

Hold the hinge in place again and mark its offset arm (**Photo 4**). As before, make a short cut first, then scribe the line using a square.

The best way to remove most of the waste inside the mortise is to use a 1/8" bit in a laminate trimmer or other small router (see Sources). You could chop the mortise with a chisel, but it's risky. The walls of the mortise are usually very thin and could easily split out. The depth of the mortise should exactly match the thickness of one hinge leaf. To set the bit's depth of cut, turn your router upside down, set a hinge leaf on the router's base and slide the leaf against the bit (**Photo 5**).

Route the mortise (**Photo 6**). Clamp boards on both sides of the door to keep your router from wobbling. Extend the boards about 1" past the edge of the door to ensure that the router is steady before you start cutting. Route freehand, staying about 1/32" inside the lines. You'll find that a 1/8" bit is very easy to control. Don't push too hard, though; this bit is fragile.

Clean up the mortise by gradually paring to the layout lines. Use a wide chisel on the long sides to make straight, crisp edges (**Photo 7**). I use a 1-1/4" butt chisel.

Cabinet mortises second

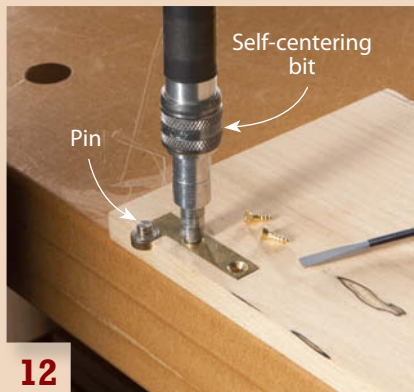
The cabinet is still clamped together, right? The first step in marking the cabinet mortises is the same as marking the door mortises: Begin with one end of the hinge. Here, though, the hinge won't be flush with the cabinet's side, because you have to allow for a gap between the door and the cabinet. On my cabinet, the gap is the thickness of three playing cards (the thickness of the washer between the hinge leaves). Place the cards, or whatever shims you're using, between the hinge and the side of the cabinet (**Photo 8**). Then mark the opposite end of the hinge, shallow and short at first, followed by a squared line.

If the door is set back from the cabinet's top and bottom, use a square to measure this distance (**Photo 9**). (If your door is flush with cabinet's top, bottom and sides, skip this step.) Slide your mortising gauge's head further away from the pins by this distance. Test your new setting on scrap to make sure it's right.

Now you can remove the clamps and disassemble the cabinet. Scribe the mortise's long sides on the cabinet's top and bottom (**Photo 10**). Lay the hinge in place, then mark its opposite end and the offset arm. Scribe these lines, as



11
Clean up the sides of the mortise with a chisel.



12
Place the leaves that have pins in the cabinet mortises. Pre-drill the screw holes using a self-centering bit. Install the screws by hand.



13
Re-assemble the cabinet and add the other hinge leaves.



14
Slide the door onto the hinges.



15
Install the screws in the door leaves. If everything fits right, glue the cabinet together.

before, using a square and marking knife. Rout the mortises. Clean them up using a chisel (**Photo 11**).

Next, set the hinge leaves in the cabinet mortises and pre-drill pilot holes for the screws (**Photo 12**). I use a self-centering bit for this operation to ensure that the holes are perfectly aligned. That's not so critical for the cabinet mortises, because the hinge is trapped, but centered holes are critical for the door mortises, where the hinge could slide.

If you're using brass screws, "thread" the pilot holes first with steel screws of the same size, then install the brass screws. Use a screwdriver, not a drill/driver, to avoid stripping out or breaking the screws.

You may want to re-assemble the cabinet one more time, just with clamps, to make sure the door hangs right. (Or if you're feeling confident, glue it!) Reassemble the hinges by slipping the door leaves back onto the pins of the cabinet leaves (**Photo 13**).

Lay the cabinet on its back and slide the door onto the hinges (**Photo 14**). You might need some help here, because you can't see both hinges at the same time. Once the door is in place, pre-drill pilot holes for the screws, then install the screws (**Photo 15**).

Stand up the cabinet and check the door's fit and gaps. Make any necessary adjustments using a hand plane or sanding block. 🛠️

SOURCES

- Rockler Woodworking and Hardware, rockler.com, 800-279-4441, Micro-Adjustable Rosewood Marking Gauge, #22206, \$60.
- Freud, freudtools.com, 800-334-4107, 1/8" dia. Double Flute Straight Bit, #04-100, \$17.



Veneering on the Curve

by Mario Rodriguez

The ‘flat-board-first’ method enables you to veneer a curved part with any pattern you want.

BOLDNESS WITH BALANCE—that’s how I see the front apron of a classic Federal card table. I love the way it curves, adding drama to those vibrant veneers and bandings. For a woodworker, building up those patterns on a flat piece of wood is difficult enough, but how do you do it on a curved one?

That’s the question I struggled with trying to figure out how to teach a class on building this table. Traditionally, veneers, inlay and banding would have been directly applied to the curved apron, one piece at a time. Experience tells me that this method is too difficult and exacting for many students to master during one class. My alternative: Perform all the intricate veneering on a flat piece of wood first, then resaw the board and glue the new, thicker piece of veneer, pattern and all, directly onto the curved apron.

Experimenting with this “flat-

board-first” technique, I found that it worked perfectly. My students really like it! I’m sure it will become the standard way for individual craftsmen to make these aprons from now on.

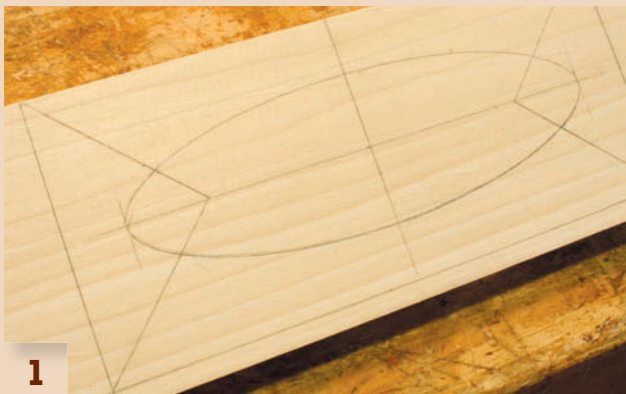


The Portsmouth Card Table

This article is the fourth in a series on making a masterpiece of American design from the Federal period (1790-1830). In this series, I’ve shown you how to make stringing and banding, shade veneer with hot sand and make bell-flowers. This article deals with veneering the curved apron.

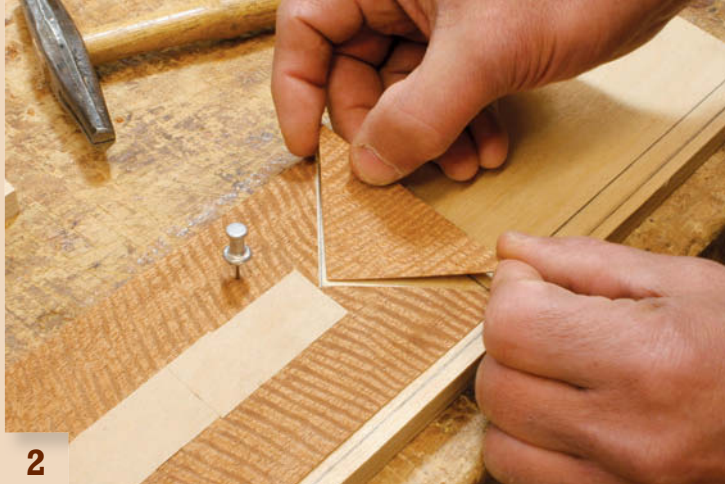
I’ll give you the plans for the entire table in the next issue, which will end the series. I also teach a master class on making the table at Philadelphia Furniture Workshop (PhiladelphiaFurnitureWorkshop.com). Join me!

—Mario Rodriguez



1

My technique of veneering a built-up pattern on a curved apron starts with a flat 3/4" thick "staging board." Draw the outline of the pattern on the board.



2

Cut the pieces of the pattern and pin them to the board, so they don't shift. When the pieces fit well, bind them together with veneer tape.



3

Build out the pattern by adding more pieces to the staging board. The center pieces of this pattern are made from fiddleback mahogany; the side pieces are crotch mahogany.



4

Glue the veneer to the staging board. After the glue dries, trim off any excess along the sides.

About the apron and veneer

Let's start by talking about how to make a curved apron. You can laminate it or build it up in the traditional way, as I did here. This apron is constructed like a masonry wall, with staggered wooden "bricks." After the bricks are stacked and glued, their sharp, jutting corners are cut to a smooth curve on the bandsaw. If there are any voids, they are filled or patched.

You may have to prepare the veneer about the same time that you're milling the bricks. If you've ever handled highly figured veneer, you know that it can be stiff, brittle and prone to cracking, much like a potato chip. In fact, it can be shaped like a potato chip! You can't work with it this way.

In order to cut a sheet of veneer into smaller pieces and fit the pieces into a precise pattern, the veneer has to be rendered flat and pliable. Fortunately, that's easy to do. First, you soak the veneer in a mixture of water, glycerine, alcohol and glue. Then you clamp it in a makeshift press for a day or so. I'll post the details of this process, with pictures, at AmericanWoodworker.com/WebExtras.

Lay out the veneer

Begin by making the "staging board." You'll glue the veneer on this board first, so it should be made from a wood that's stable, bends easily and is nice to resaw. I use yellow poplar.

I rip the staging board from the edge of a wide poplar board that is straight-grained and free of defects. This edge piece, which will be quartersawn or riftsawn, will move less and is less prone to warping than the plainsawn wood in the middle of that wide board. I can't emphasize this too much: The staging board must stay absolutely flat until you resaw it.

Mill the staging board at least 3/4" thick, about 1/16" wider than the table's apron and a few inches longer than the veneered pattern you'll be creating.

Draw the pattern on the staging board (**Photo 1**). I'll be using fiddleback mahogany for the mitered field and vertical-grain crotch mahogany for the flanking sections. We'll cut and inlay the center oval later on.

Start with the four mitered pieces of the center section. As you cut each piece of veneer, pin it to the board (**Photo 2**). When all of the pieces of the center section fit well, bind them together with veneer tape. Finally, add the side pieces (**Photo 3**).

Glue the veneer to the staging board (**Photo 4**). I use liquid hide glue (see Sources, page 72). Spread the glue with an old credit card that has notches cut into it. Use a melamine caul to spread the clamping pressure; glue squeeze-out won't stick to it.



Learn how to soften and flatten wrinkly veneer at AmericanWoodworker.com/WebExtras

The Portsmouth Card Table Series



Scribe and plane a shallow rabbet along the bottom edge of the board to receive a strip of checkerboard banding.



Glue a narrow piece of banding into the groove. Next, glue the checkerboard banding in the rabbet on the bottom of the board.



Pare away a narrow strip of veneer between the fiddleback and crotch sections using a 1/16" wide chisel. Score the sides of this groove with a marking knife before you pare.



Plane all of the banding flush with the veneer.

Add the banding

Next, cut a rabbet for the checkered banding that goes along the bottom of the apron. (To learn how this banding is made, see "How to Make Banding Inlay," AW #159, March/April 2012, part 3 of this series.) Scribe a line 3/8" from the bottom of the board, then use a shoulder plane or router to cut the rabbet (**Photo 5**). The depth of the rabbet should be about 1/64" less than the thickness of the banding.

Cut grooves for the narrow banding that separates the mitered field from the side sections (**Photo 6**). First, outline the groove by scribing two parallel lines with a marking knife. Then pare away the center waste with a 1/16" chisel.

Glue the bandings in place (**Photo 7**). Rather than use cauls, hold the banding in place with binding tape (see Sources). This tape is used in acoustic guitar making for gluing purfling around the instrument's body; it's slightly elastic but has plenty of holding power.

After the glue is dry, plane all of the bandings flush (**Photo 8**). My favorite tool for this delicate work is a Lie-Nielsen #102 low-angle block plane (see Sources).

Inlay the oval medallion

I use solid wood to make the center oval. Veneer won't work. Most veneer is too thin to survive planing and leveling in the

steps ahead—you might cut right through it.

You'll be using an inlay kit for your router to cut both the recess for the inlay and the inlay itself (see Sources). To use the kit, you'll need an oval template made from 1/4" plywood or MDF. While it's not difficult to make the template yourself, I hired a local woodworker to make one with his CNC machine. (It took him less than 10 minutes!)

The template's oval has to be a bit oversize, however. Here's why: The kit consists of a 5/16" Porter-Cable-style guide bushing, a 9/16" dia. donut that snaps onto the bushing and a 1/8" solid-carbide up-cut spiral bit. To cut the recess, you place the donut on the bushing and rout around the inside of the template about 1/16" deep (**Photo 9**). The groove you rout will be 7/32" away from the edge of the template. This means that the template should be 7/16" larger in length and width than the oval you want to make.

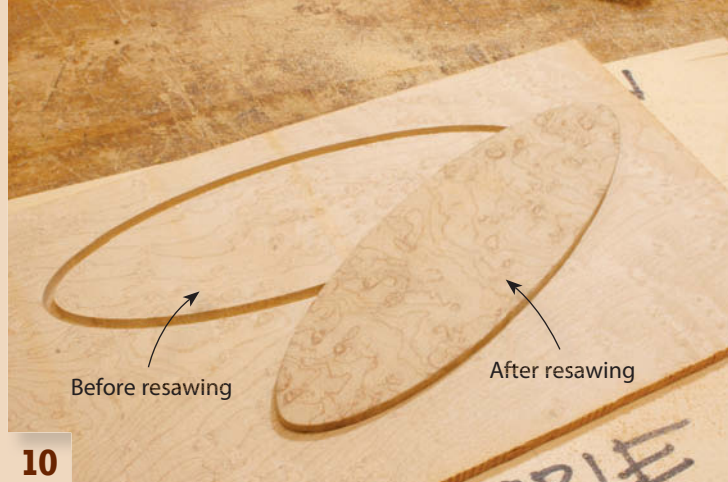
After you've routed the groove, remove the template and install a 1/4" or larger bit in a second router. (The 1/8" bit is fragile; don't use it for hogging out large areas.) Set the bit to the same depth as the groove and remove the waste inside the oval.

Next, cut out the medallion that will fit into the recess (**Photo 10**). I made the medallion from a 3/8" thick piece of bird's eye maple (a thicker piece would be OK, too). Place the template on the wood and remove the donut from the router's



9

Rout an oval recess in the middle of the pattern. First rout a border using a 1/8" bit and a special two-part guide bushing for making inlay. Remove the rest of the waste with a larger straight bit.



10

Rout a medallion from a piece of solid bird's eye maple, using the same template and a smaller guide bushing. Resaw the piece to release the inlay. This piece will fit perfectly into the recess.



11

Glue the medallion into the recess. Make a caul slightly smaller than the medallion to spread clamping pressure. After gluing, plane the medallion flush with the veneer.



12

Rout a narrow groove around the border of the medallion. This requires making a slightly smaller template and using a small end mill whose shank acts as a pilot.

bushing. Set the depth of cut to a little bit less than 1/16" and rout around the template. Be careful to keep the router's bushing tight against the template. Any deviation from the template will result in a flawed inlay.

Reset the depth of cut two more times. On the last pass, the groove should be about 1/8" deep. Resaw the board on the bandsaw to release the medallion; it should be about 1/8" thick. If all has gone well, it will fit perfectly into the recess.

Make a caul 1/16" smaller in length and width than the medallion (**Photo 11**). Put tape around the sides of the caul—and on its bottom, as well—to prevent glue from sticking to it. Use the caul to glue the medallion into the recess. Plane the medallion flush with the surrounding veneer.

Use narrow black-and-white purfling to outline the medallion; it gives the design punch and distinction (see Sources). The purfling must precisely follow the border of the medallion. This requires a second template exactly like the one you used before, only 5/32" smaller all the way around. You'll also need a Dremel and a special base for the Dremel from Stewart-MacDonald (see Sources). (I used the same tools to rout the grooves for the stringing in the legs—see "Stringing Inlay," AW #157, Dec./Jan. 2012, part 1 of this series.)

Make the new template by tracing around the old template with a 3/8" straight bit outfitted with an 11/16" bearing and a

bearing lock collar (see Sources). (The bearing and bearing lock collar go on the bit's 1/4" shank, above the cutters.) Then install the Stew-Mac base on your Dremel and insert a 3/64" end mill into the Dremel's collet (see Sources.) The shank of this bit will ride directly against the template, much like a router bit with a solid pilot. Carefully position the new template on the medallion and rout a groove slightly less than 1/16" deep (**Photo 12**).

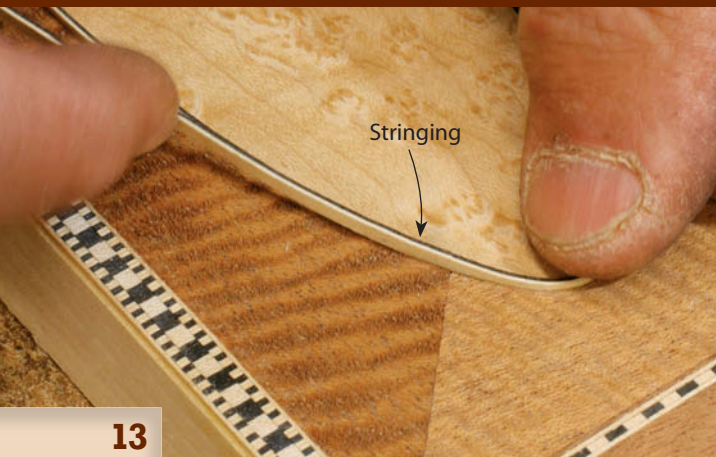
Installing the stringing requires some finesse. The ends of the medallion are curved too tight to accept the stringing as it is, but you can pre-bend the stringing by heating it up. (I used the same process to bend the stringing for the table's legs.) Mark the sections of the stringing that will have to bend the most, then gently bend these parts over a hot curved iron (see Sources). Heat makes the stringing more pliable; when it cools, it will remain bent.

Lay a small bead of glue in the groove with a syringe (see Sources), then fit the stringing into the groove (**Photo 13**). After the glue is dry, level the stringing with a block plane using gentle, circular strokes. Finally, sand the entire center section with 180 grit paper.

Cut the veneer free

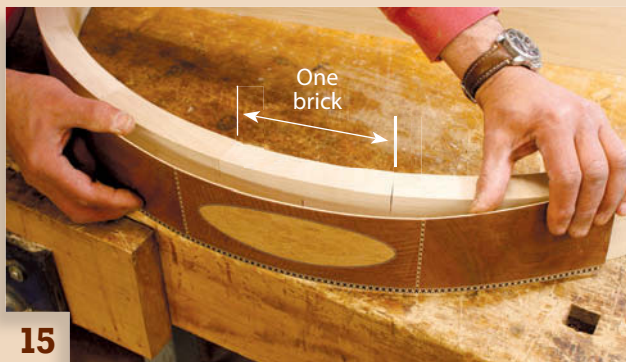
Now comes the critical part of the whole operation—resawing the staging board. Install a sharp, fine-toothed blade that's at

The Portsmouth Card Table Series



13

Glue black and white stringing into the groove. You'll probably have to bend the stringing first over a hot curved iron so it will fit this tight radius without breaking.



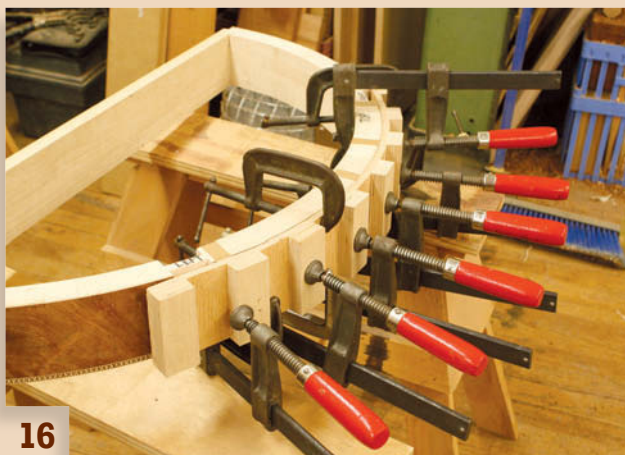
15

Flex the piece to make sure it will take the curve of the table's apron. The apron is composed of short pieces laid up like bricks, then sawn and sanded into a curved shape.



14

Resaw the staging board, releasing a piece that's only about 3/32" thick.



16

Glue the strip onto the apron. To apply even pressure, use a length of bending plywood with blocks glued on at regular intervals.

least 1/2" wide in your bandsaw and carefully adjust the saw's guides and bearings. Set up a fence 3/32" away from the blade and make a test cut in a piece of poplar that's approximately the same width as the staging board. If all goes well, the surfaces of your cut should be smooth and straight. If the cut wanders, or if the surface is uneven, replace the blade or give your saw a tune-up.

Re-saw the staging board (**Photo 14**). At 3/32" thick, the resulting piece should keep the veneer work, banding and inlay intact and provide a generous poplar backing. The piece should also bend easily enough to match the curve of the table's apron (**Photo 15**).

Glue the veneer on the apron

To prepare the apron for gluing, sand its surface and cut mortises for the table's front legs. Cut the piece you've resawed to length—it should extend about 1/8" over the mortises. You'll trim off the excess later, before fitting the legs.

Make a clamping belt by gluing blocks every 3" or so on a piece of 3/8" thick bending plywood. Apply glue to the apron, then use purfling tape to register the resawn piece in position. The bottom of the piece should be 1/32" or so higher than the bottom of the apron. (You don't want the banding to end up below the apron!) Situate the belt and add clamps (**Photo 16**).

After the glue dries, plane off any overhanging veneer on the top of the apron. Round off or bevel the bottom of the apron so it's flush with the banding. 🪚

SOURCES

• Antique Refinishers, oldbrownglue.com, 619-298-0864, 5 oz. bottle, \$8; 20 oz. bottle, \$20. • Stewart-MacDonald, stewmac.com, 800-848-2273, Binding Tape, #0677, 3/4" x 60-yard roll, \$3.99; Black and White Purfling, #1762, \$2.12 for a piece 31" long, Precision Router Base, #5260, \$53.65. • Lie-Nielsen, lie-nielsen.com, 800-327-2520, #102 Low-Angle Block Plane, \$115. • Woodcraft, woodcraft.com, 800-225-1153, Whiteside 9500 Solid Brass Router Inlay Set, #09116, \$48.99; Whiteside 1022 3/8" Straight Bit, 1/4" shank, #24A08, \$18.99; Whiteside Bearing Lock Collar, 7/16" OD, 1/4" ID, #814917, \$3.49. • Drill Technology, drilltechnology.com, 616-676-1792, Solid carbide end mill bit, SAPFM 3/64", \$9. • Coverite, coverite.com, Sealing Iron (for bending stringing), #COVR2700, \$30. • Lee Valley, leevalley.com, 800-871-8158, Curved-Tip Syringe, #25K07.05, \$2.95. • McMaster-Carr, mcmaster.com, 630-833-0300, 11/16" OD Steel Ball Bearing, 1/4" ID, #6383K12, \$4.86.



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Pants on Fire

WHEN DAYLIGHT SAVINGS TIME BEGINS, I make it a point to change the batteries in the three smoke detectors in my workshop. It was that time again, so I bought new 9-volt batteries and got out the ladder. To keep both hands free, I stored the batteries in my back pockets, keeping the new ones in the right pocket and putting the old ones in the left pocket.

It always seems to take longer than it should to disconnect the old battery, remove it and install the new one. Did I mention that I don't like looking up while standing on a ladder? Nevertheless, I successfully changed all three batteries. However, while reaching to close the lid on the last detector, my back left pocket suddenly felt really hot. I saw wisps of smoke about the same time I realized the battery terminals in that pocket had come in contact. By then, my pants were on fire.

Dawn Nelson



Size Matters

A CUSTOMER wanted a new table to match an existing table—the same design, just 6" wider, so I quickly measured and jotted down a few notes. When I delivered the new table, the customer loved it. But while testing it out, he suggested, "Maybe we should have made it more than 6" wider." When I studied the two tables, my heart sank—rather than a wider version,

I'd built an exact duplicate of the existing table. I was so embarrassed!

Fortunately, my customer had a good sense of humor. I quickly built and delivered another "new" table that was the correct size. Now I have a very nice table to sit at in my shop during break time!

Jordan Simonton



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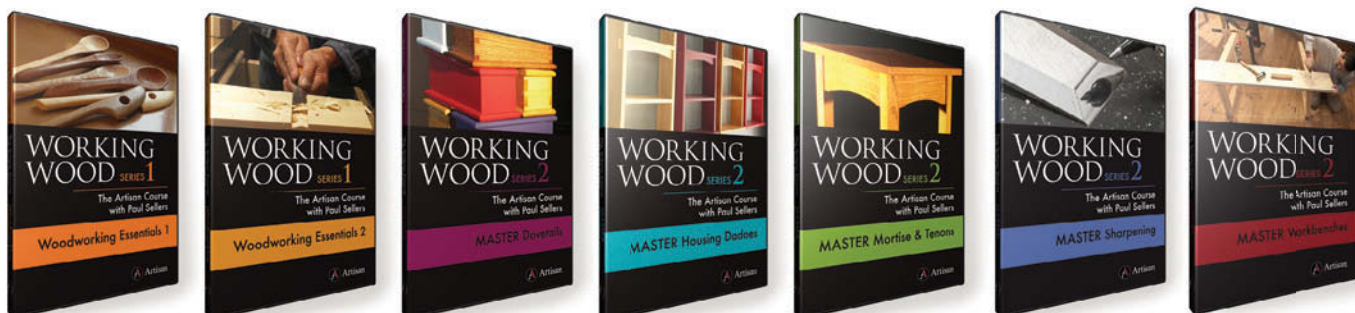
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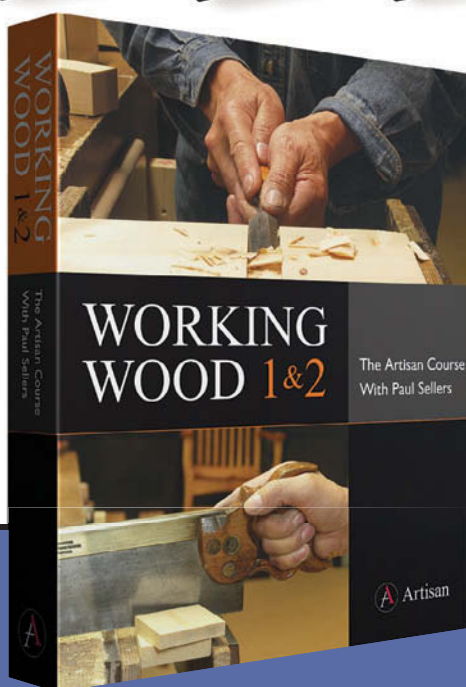


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