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The Retro Issue

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#166, JUNE/JULY 2013

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Jefferson's
Lap Desk**

1776



ca. 1580

Make a 'Faldstool'



**ca.
1830**

**Craft
a Wooden
Clamp**



1958

Gift a Play Table



**ca.
1910**

Design a Picture Frame



Precision Plunge Base

**Upgrade Door Panels
with Veneer**

**4 Ways to Use
Good Proportions**

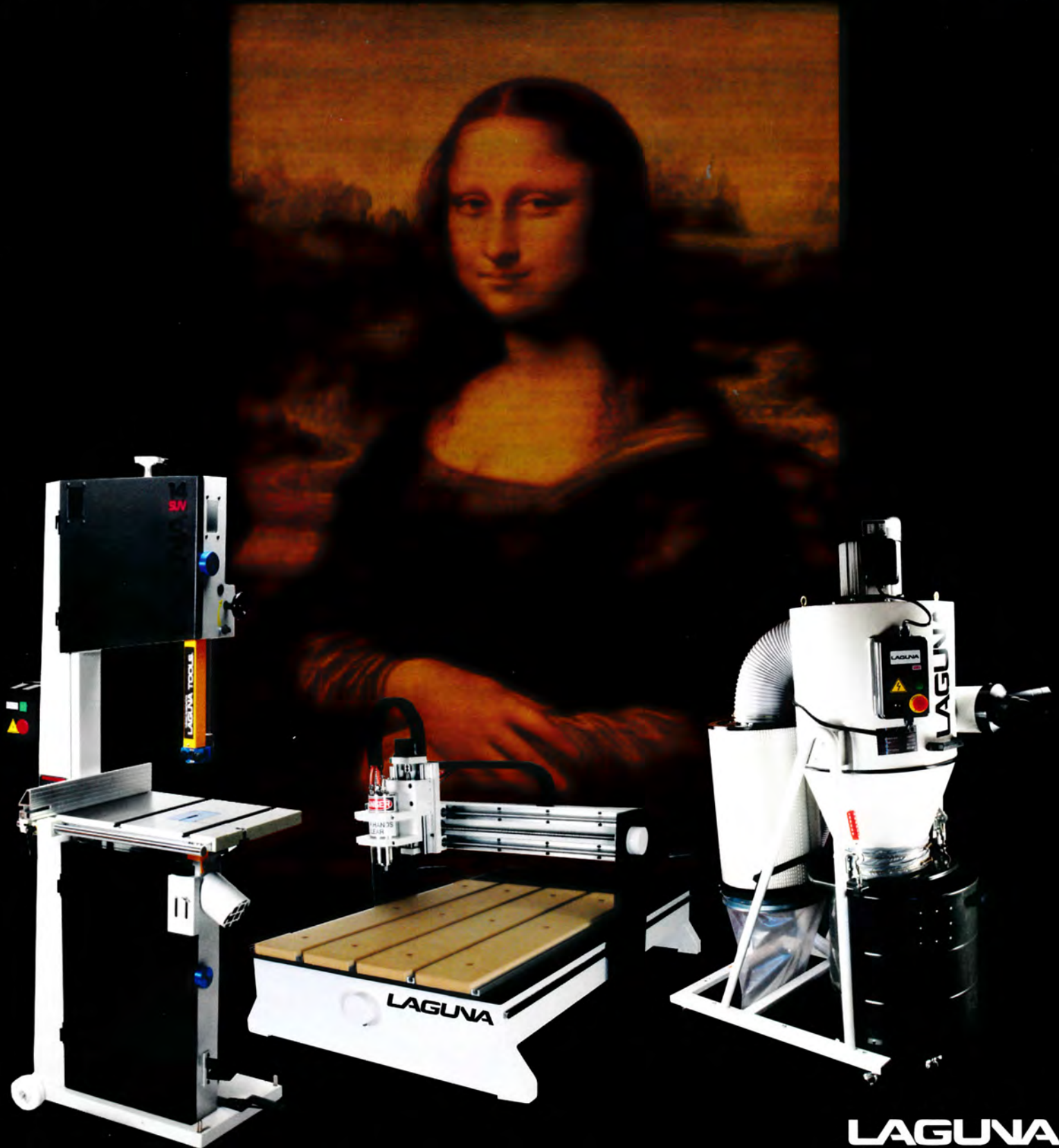


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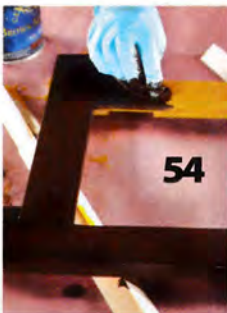
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COMMERCIAL



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Shorter Open Time	✓	✓
Doesn't Stain Skin	✓	✓
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See an easy way to build cabinet doors (p. 64) at
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AMERICAN WOODWORKER

#166, June/July 2013

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WOOD® Magazine - May 2013

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LOT NO. 46753 FINE

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SUPER COUPON!

29 PIECE TITANIUM NITRIDE COATED DRILL BIT SET

drillmaster

SAVE 60%

\$9.99 REG. PRICE \$24.99

LOT NO. 5889

Item 5889 shown

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SUPER COUPON!

12" SLIDING COMPOUND DOUBLE-BEVEL MITER SAW WITH LASER GUIDE

NEW!

CHICAGO ELECTRIC POWER TOOLS

SAVE \$180

\$119.99 REG. PRICE \$299.99

LOT NO. 98194/69684

Item 98194 shown

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SUPER COUPON!

MECHANIC'S GLOVES

LARGE X-LARGE

LOT NO. 93640/60447 **LOT NO. 93641/60448**

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\$3.59 REG. PRICE \$9.99

Item 93640 shown

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SUPER COUPON!

30", 11 DRAWER ROLLER CABINET

US GENERAL

INCLUDES:

- 6 Drawer Top Chest
- 2 Drawer Middle Section
- 3 Drawer Roller Cabinet

SAVE \$150

\$149.99 REG. PRICE \$299.99

LOT NO. 67421

Item 67421 shown

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FREE!

WITH MINIMUM PURCHASE OF \$9.99

PITTSBURGH

1" x 25 FT. TAPE MEASURE

ITEM 47737/69080/69030/69031

REG. PRICE \$5.99

Item 47737 shown

LIMIT 1 - Only available with qualifying minimum purchase (excludes gift value). Coupon good at our stores or website or by phone. Cannot be used with other discount, coupon or prior purchase. Offer good while supplies last. Shipping & Handling charges may apply if not picked up in-store. Non-transferable. Original coupon must be presented. Valid through 9/14/13. Limit one coupon per customer per day.

SUPER COUPON!

CENTRAL PNEUMATIC

3 GALLON, 100 PSI OILLESS PANCAKE AIR COMPRESSOR

LOT NO. 95275/69486/60637

\$39.99 REG. PRICE \$79.99

Item 95275 shown

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SUPER COUPON!

PITTSBURGH

RAPID PUMP® 3 TON HEAVY DUTY STEEL FLOOR JACK

WEIGHS 74 LBS.

SAVE \$80

\$69.99 REG. PRICE \$149.99

LOT NO. 68048/69227

Item 68048 shown

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SUPER COUPON!

CENTRAL MACHINERY

4" x 36" BELT/6" DISC SANDER

LOT NO. 97181/93981

SAVE \$45

\$54.99 REG. PRICE \$99.99

Item 97181 shown

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SUPER COUPON!

PITTSBURGH

6" DIGITAL CALIPER

LOT NO. 47257/61230

SAVE 66%

\$9.99 REG. PRICE \$29.99

Item 47257 shown

Includes two 1.5V button cell batteries

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SUPER COUPON!

NEW!

800 WATT/900 MAX. WATTS PORTABLE GENERATOR

LOT NO. 66619/60338/69381

SAVE \$90

\$89.99 REG. PRICE \$179.99

Item 66619 shown

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SUPER COUPON!

20% OFF!

ANY SINGLE ITEM!

LIMIT 1 - Save 20% on any one item purchased at our stores or website or by phone. *Cannot be used with other discount, coupon, gift cards, Trade-In Club membership, extended service plans or on any of the following: compressors, generators, tool storage or carts, welders, floor jacks, Towable Ride-On Trencher (Item 65162), open box items, in-store event or parking lot sale items. Not valid on prior purchases after 30 days from original purchase date with original receipt. Non-transferable. Original coupon must be presented. Valid through 9/14/13. Limit one coupon per customer per day.

SUPER COUPON!

CHICAGO ELECTRIC POWER TOOLS

5" RANDOM ORBITAL PALM SANDER

Item 93431 shown

SAVE 33%

\$19.99 REG. PRICE \$29.99

LOT NO. 93431/69857/69917

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CHICAGO ELECTRIC POWER TOOLS

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8 Functions: Sanding, Remove GROUT, Cut Metal, Cut Flooring, Cut Plastic, Plunge Cut, Scrape Concrete, Scrape Flooring

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\$14.99 REG. PRICE \$59.99

LOT NO. 68861/68303/60428

Item 68861 shown

Accessories sold separately

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SUPER COUPON!

CENTRAL MACHINERY

2 HP INDUSTRIAL 5 MICRON DUST COLLECTOR

LOT NO. 97869

SAVE \$100

\$149.99 REG. PRICE \$249.99

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SUPER COUPON!

CENTRAL MACHINERY

16" VARIABLE SPEED SCROLL SAW

LOT NO. 93012

SAVE 25%

\$59.99 REG. PRICE \$79.99

Item 93012 shown

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SUPER COUPON!

12" RATCHET BAR CLAMP/SPREADER
PITTSBURGH
LOT NO. 46807/68975/69221/69222

Item 46807 shown

SAVE 66%

\$199 REG. PRICE \$5.99

83647091

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SUPER COUPON!

4 PIECE 1" x 15 FT. RATCHETING TIE DOWN SET
LOT NO. 90984/60405

Item 90984 shown

SAVE 52%

\$799 REG. PRICE \$16.99

63642363

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SUPER COUPON!

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LOT NO. 68019

WE CARRY A FULL LINE OF FASTENERS

SAVE 56%

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53435248

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SUPER COUPON!

EIGHT DRAWER WOOD TOOL CHEST
WINDSOR DESIGN
LOT NO. 94538

Tools sold separately.

SAVE \$40

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48232591

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SUPER COUPON!

1500 WATT DUAL TEMPERATURE HEAT GUN (572°/1112°)
drillmaster
LOT NO. 96289

SAVE 60%

\$799 REG. PRICE \$19.99

27463465

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SUPER COUPON!

10/2/55 AMP, 6/12 VOLT BATTERY CHARGER/ENGINE STARTER
CENTECH
Item 60653 shown
LOT NO. 66783/60581/60653

SAVE 60%

\$2799 REG. PRICE \$69.99

58015343

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SUPER COUPON!

12" x 33-3/8" WOOD LATHE WITH REVERSIBLE HEAD
CENTRAL MACHINERY
LOT NO. 34706

SAVE \$150

\$19999 REG. PRICE \$349.99

60670578

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SUPER COUPON!

HAULMASTER TRIPLE BALL TRAILER HITCH
LOT NO. 94141/69874

SAVE 60%

\$1999 REG. PRICE \$49.99

Item 94141 shown

60362666

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SUPER COUPON!

drillmaster 1/4" TRIM ROUTER
LOT NO. 44914

SAVE 42%

\$1999 REG. PRICE \$34.99

14122512

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SUPER COUPON!

27 LED PORTABLE WORKLIGHT/FLASHLIGHT
GARDEN
LOT NO. 67227/69567/60566

Requires three AAA batteries (included).

Item 67227 shown

SAVE 56%

\$259 REG. PRICE \$5.99

60675016

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SUPER COUPON!

12 SPEED BENCH DRILL PRESS
CENTRAL MACHINERY
LOT NO. 44836/60237

SAVE \$70

\$9999 REG. PRICE \$169.99

Item 44836 shown

80059642

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SUPER COUPON!

HAULMASTER 1000 LB. CAPACITY SWING-BACK TRAILER JACK
LOT NO. 41005/69780

SAVE 42%

\$1999 REG. PRICE \$34.99

Item 41005 shown

33191157

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SUPER COUPON!

1.5 CUBIC FT. ELECTRONIC DIGITAL SAFE
BUNKER HILL SAFES
LOT NO. 91006

SAVE \$62

\$8799 REG. PRICE \$149.99

64216795

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SUPER COUPON!

12" COMBINATION SQUARE SET
PITTSBURGH
LOT NO. 92471

SAVE 50%

\$499 REG. PRICE \$9.99

34428342

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SUPER COUPON!

60" WORKBENCH WITH FOUR DRAWERS
WINDSOR DESIGN
LOT NO. 93454/69054

SAVE \$90

\$13999 REG. PRICE \$229.99

Item 93454 shown

504773324

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We FedEx Most Orders in 24 Hours for \$6⁹⁹

GRAND OPENINGS Downey, CA Indio, CA Lakewood, CO Hyannis, MA Medford, MA Kansas City, MO Green Brook, NJ Pennsauken, NJ

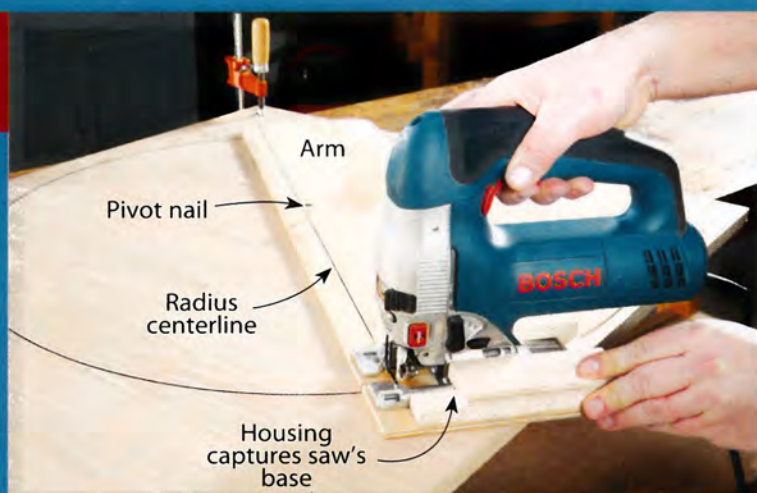
Terrific Tip!

Jigsaw Circles

A JIG FOR CUTTING LARGE CIRCLES usually utilizes a router, but my router is mounted in a router table. Removing it is a pain, so I made a circle-cutting attachment for my jigsaw. While it won't leave as smooth an edge as a router would, a jigsaw will finish the job in one pass—and make less dust.

My jig cuts circles up to 50" and as small as 23" in dia. (any smaller and the results aren't as good).

To make the jig, cut a 1/4" plywood arm as long as you need and as wide as the length of your saw's base. Then make a housing for the saw's base by gluing strips of 1/2" plywood to the arm, allowing the jigsaw to simply slide in. Before gluing the housing in place, make a cut for your saw's blade, so that the saw will fit snug in the housing. To avoid binding or burning, the saw's blade must be perpendicular to the radius cen-



terline. Measure the distance from the front edge of the saw's base to the blade's teeth. That's the distance the radius centerline will be from the arm's leading edge. Mount the saw with the blade at a 90° angle to the radius centerline.

To use, position the jig with the blade just touching one edge of the workpiece. Drill a pivot hole in the arm at the desired radius, on the centerline. Slip a nail through the hole and tap it into the workpiece. As you cut, reposition the workpiece as necessary, so you don't saw into your bench.

John Cusimano

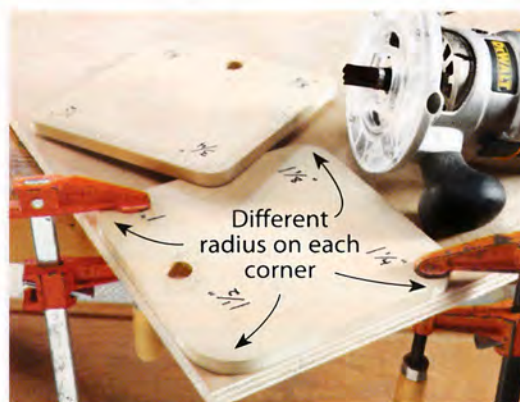
Fast Cornering

MAKING RADIUS CORNERS used to be a multi-step process. First I'd mark the radius with whatever was available—a can, a roll of tape, a circle template—then rough cut, then sand to the line.

To speed up this inefficient process, I made two routing templates. Each template has a different radius on every corner.

Now all I need to do is clamp the template to the workpiece and rout, using a top-bearing pattern bit. I get fast, perfect results every time.

Len Urban



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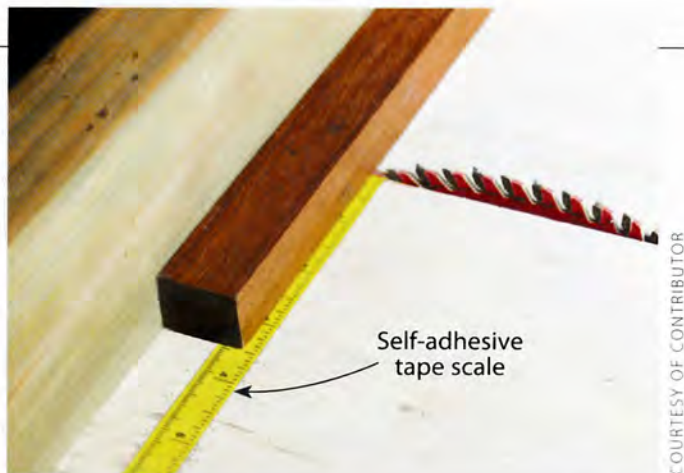


Stock Sizing Board

PLANING STOCK to fit standard dados is much easier than fitting the dado to your stock. Trying to find the right combination of chippers and shims to make an undersized or oversized dado can be frustrating. To make accurate thicknessing of my stock easier, I cut five grooves in a scrap of plywood, using only the blades and 1/8" thick chippers from my dado set.

As I'm running my wood through the planer, I just check it in the grooves. This variation on the classic "go/no-go gauge" is more direct and accurate than measuring the wood's thickness. This way, I know that my stock is going to exactly match my dados.

Tom Caspar



COURTESY OF CONTRIBUTOR

Crosscut Sled Scale

MY CROSSCUT SLED is my "go-to" jig for precise, square cuts. To make cutting more efficient, I recently added Peel-n-Stick Ruler Tape—a self-adhesive tape scale—to my jig.

Peel-n-Stick Ruler Tape is non-metallic and comes in a 1/2" wide x 30' long roll. It's divided into 30 segments each numbering 0"-12".

I added the scale because I had a project requiring crosscutting many pieces of different lengths, so the usual stop-block method wasn't practical. I found that the tape was as accurate up to 12" as my tape measure.

The tape is as thin as a sheet of paper, so I applied it directly to the sled without creating a recess for it, aligning the zero mark with the edge of the saw tooth. Now I can precisely position my workpiece at the exact cut length I need.

Bill Wells

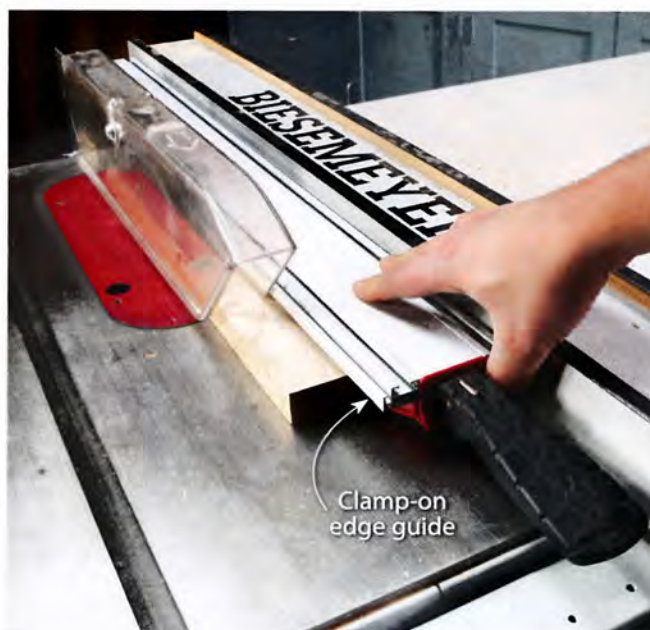
Rough Edge Rip Guide

DON'T HAVE A JOINTER? Here's an easy way to saw a straight edge on a board that has rough or crooked sides: Use a clamp-on edge guide.

Clamp the guide so its right side overhangs the board. When you rip the board, the guide will ride against the saw's fence. The edge you cut will be as straight as the guide.

Here are three provisos, though. First, this technique won't work with all edge guides, because some have clamping pads that extend beyond the aluminum track. Second, the ends of the board must be relatively square, or the clamp won't lock securely. Lastly—and this applies to any board you're ripping—the piece should be relatively flat, so it won't bind or twist or kick back when you cut it.

Ralph E. Sullivan





Drift key

Interchangeable Chucks

DID YOU KNOW that most drill press chucks have the same #2 Morse taper as most lathe chucks? Fortunately, I remembered that fact when I needed to drill a hole in the end of a turning blank that was too long for my drill press. I don't have a lathe chuck, so I removed the chuck from my drill press, installed it in my tail stock, and drilled the part on my lathe.

To remove the chuck from your drill press, check your



owner's manual for directions. My drill press came with a steel wedge, called a drift key, to drive out the chuck. You just slip the drift key through a slot in the quill, give it a tap, and the chuck pops right out.

Make sure your table is raised up to about 1" below the chuck. That way, when it comes out, it won't tumble onto the floor.

Jason Zentner

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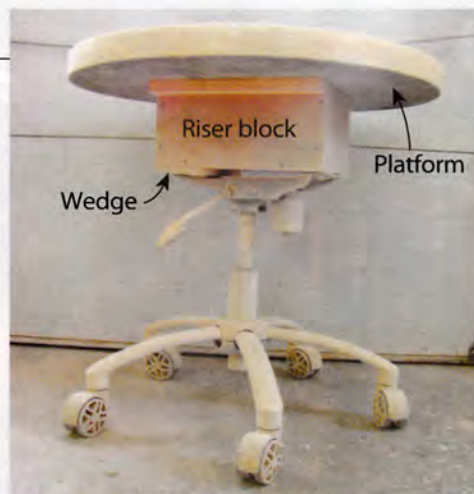
COURTESY OF CONTRIBUTOR

The Third Wheel

ALL MY SHOP CABINETS are on wheels; actually, each cabinet has two wheels on one end and two feet on the other end. When I need to move a cabinet, I turn to my “third wheel.” It’s just a swiveling caster mounted to a 3/4” thick board. The board has rubber shelf lining on top to keep it from sliding while in use.

Using a pry bar, I raise the “feet” end of the cabinet and slide in the third wheel, which holds the feet about 1/2” off the floor. The cabinet’s weight keeps the wheel from tipping. I do have to keep my floor clear of debris to keep all the wheels rolling, but a clean shop is a good thing, right?

Serge Duclos



COURTESY OF CONTRIBUTOR

Swiveling Spray Station

A TYPICAL LAZY SUSAN-STYLE finishing stand takes up bench space, and can’t easily be moved around the shop.

My spray station is made from an old office chair. I threw out the seat and kept the base. It swivels, rolls, and—since it was made to support a person—is sturdy enough to hold anything I care to lift onto it.

I made a platform for the base from a solid-core door, but plywood would work fine. I mounted a riser block to raise the platform to a comfortable work height. The seat mounting plate is at a slight angle, so I installed a wedge under one end of the riser block to make it level.

Originally, I used the chair’s height adjustment feature to customize the height. That worked for a while, until overspray shut down the lift mechanism. On my next version, I’ll cover the lift mechanism with a plastic skirt.

Gerry Tetrault

Flip-up Safety

FLIP-STOPS are common additions to saw fences, but they’re usually vertical, not horizontal. So why use an “in-line” flip-stop like this? It was a question of safety.

I had several parts to cut, all needing a beveled end with a 1/8” wide flat. Easy, right? Just position the board’s end against the stop block and cut. Here’s the problem with that method: the small off-cut could be a potential projectile as it’s trapped between the spinning blade and the stop block. The solutions to this problem are numerous, but this is the fix that came to me in the heat of battle.

I made a new stop block with a hinge. The part that contacts the workpiece flips out of the way once the workpiece is clamped or held in place. After making the cut, the off-cut harmlessly falls away. The same method works for cutting a series of very short pieces with square ends, too.

In order for the flip-up portion to work, it needs to be beveled for clearance. It has a flat that contacts just the very top edge of the workpiece. It’s easy to alter this bevel, as needed, for stock of different thicknesses.

Tom Caspar





Photo 1

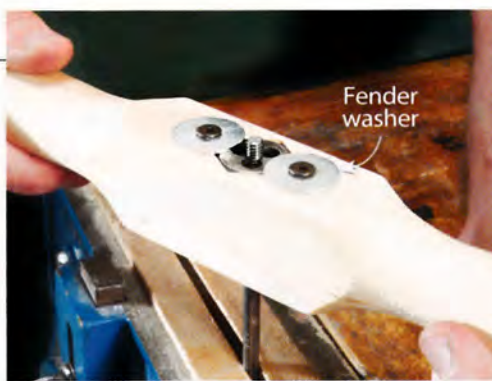


Photo 2

Nice Threads

WHEN THREADING a steel rod, the die needs to stay perpendicular to the rod, otherwise the threads won't be straight and the nut won't seat properly (see photos at right).

I rarely miss an opportunity to make a tool, so I made this die handle from a piece of 1-1/2" x 2" x 12" hard maple. It guarantees straight threading—a standard die handle doesn't. My handle only works for threading one size rod, however. You'd need to make more handles to thread rods of different diameters.

To make the handle, use a 7/8" Forstner bit to drill a recess for the die. Center this hole on the 1-1/2" face of the blank and drill just to the depth of the die's thickness. Next, bore a hole all the way through the blank. This handle is for threading 1/4" rod, so you'd drill a 1/4" hole.

The die must be centered on this hole. Here's how to do it: Insert a 1/4-20 threaded rod or bolt through the hole, and then thread the die onto it. Hold the assembly in the vise and use a marking knife to mark the die's shape around the 7/8" recess (**Photo 1**). Remove the die and the threaded rod, then use a chisel to chop out an octagonal shape. Once the die fits snugly in the recess, use fender washers to hold it in place. Turn the handle on the lathe for a comfortable grip.

To use, clamp a 1/4" steel rod in your vise and slide the die handle over the rod's end, die-side up (**Photo 2**). The 1/4" x 1-5/8" long hole leading to the die ensures the rod will be centered and perpendicular to the die.

Richard Tendick



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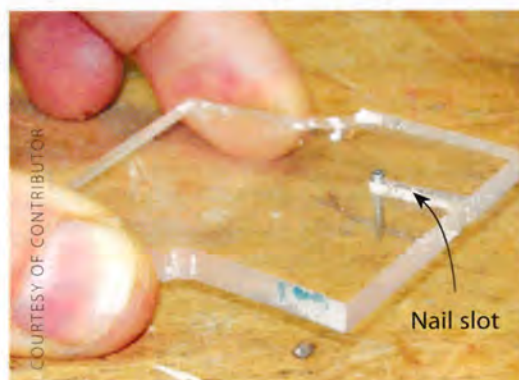
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Nail Steady

DRIVING TINY NAILS with a hammer is tricky, especially if the nail is shorter than the width of your fingers. One small piece of 1/4" thick plastic however, makes it simple. With a handsaw, cut a slot that's wide enough for the nail to just slide in but snug enough to hold the nail securely.

To use, slide a nail into the slot. Position the nail, and tap lightly until the nail stands on its own. Slide the plastic holder off the nail, and drive the nail home. Since the plastic is transparent, it's easy to position the nail right where you want it.

Alejandro Balbis



Pint-Size Precision

THE TERM “PRECISION” tends to be thrown around with abandon, but in this case, it’s warranted. Imagine gene-splicing a micrometer with a plunge base, and then shrinking it; that’s the new Micro Plunge Base from Micro Fence. It’s a miniature version of their standard Precision Plunge Base—made for compact routers. Combined with the Micro Fence Edge Guide (shown here, but only available as an accessory), the Micro Fence system oozes quality.

For intricate inlay work, detailed moldings, guitar and luthier work, small hardware installation and scale model building, even a compact router can seem unwieldy. The Micro Plunge Base is sized for use with smaller units, such as the Dremel and Proxxon high-speed rotary tools. Each requires a different collar/adaptor to fit the base. Adding the base to one of these tools creates a precision machine that’s easy to manage, yet has a substantial feel.

Though operation looks complex, it’s quite simple. One of the handles locks or releases the plunge mechanism. Gross depth adjustment is accomplished with the depth stop rod. The rod’s end contacts a rotating turret that has detents for 1/32", 1/16" and 1/8" depth settings. Locking the depth stop rod in place allows you to fine-tune the depth setting with a micrometer dial that’s accurate to .001".

The Micro Plunge Base includes one acrylic insert for whichever rotary tool you have, one LED light that mounts in the base, a driver for assembly and adjustment, and a sample bottle of spindle oil.

There are a number of optional accessories available. The baseplate is recessed to accommodate an insert that holds a standard router guide bushing; Micro Fence makes a set of precision guide bushings as well. Another accessory—automatic center-



ing bearings—allows you to instantly center a cut on parts up to about 3" wide. The bearings mount in drilled and tapped holes in the baseplate. The small bits used in a high-speed rotary tool don’t create a lot of dust, but you can also purchase a dust shroud that fastens with thumbscrews.

Micro Fence’s Edge-Guide—also equipped with a micrometer-style adjustment—and Circle Jig Attachments both work with the Micro Plunge Base. If you already own the Edge-Guide or Circle Jig, you’ll need a special adapter plate to fit them to the Micro Plunge Base.

SOURCE

Micro Fence, microfence.com, 800-480-6427, Micro Plunge Base, \$300.

Stretchy Tape

CLAMPING AN IRREGULAR SHAPE usually requires a lot of ingenuity, but here’s a novel approach: Elmer’s new Clamp Tape. It stretches up to 300%, like a giant rubber band, and sticks only to itself—not to wood or a finish.

I’ve found that Clamp Tape is best used for holding parts in position once you push them home, like the table legs shown here. It can’t deliver nearly as much pressure as a regular clamp, but it can sure bail you out of a head-scratching situation.

Clamp Tape is 3/4" wide and comes in a 7-1/2' roll. The parts that are stuck together can’t be reused, but you can cut them out and save the rest.

SOURCE

Elmer’s, elmers.com/diy, 800-848-9400, Elmer’s Clamp Tape, \$6.



Set-Up/Sanding Combo

THIS TABLESAW SET-UP/SANDING KIT from Infinity really hits the mark for me. As I've noted in the past, a tool with more than one use always puts a smile on my face. The heart of the kit is a 1/8" thick, 10" diameter steel plate, ground flat to +/- .004". It's primarily used for checking the alignment of your saw's miter slots to your blade. The bonus is its use as a disc sander.

To check your table saw's alignment, mount the plate as you'd mount a blade. Set up a gauge that will slide in your miter slot. The gauge should touch the plate equally at the front and back of the plate. If it doesn't, you'll need to adjust your saw's trunnions or top.

Table saw sanding discs aren't new, so what's different about Infinity's kit? Typically, pressure-sensitive-adhesive-backed (PSA) sanding discs are adhered directly to a steel plate. This kit uses a hook-and-loop fastening system instead. A PSA-backed disc with "hooks" sticks directly on the plate; the sanding discs have "loop" backing, making changing sanding discs a snap.

Since a table saw runs at 3450 rpm, and a typical stand-alone disc sander runs at 1720 rpm, the usual problem with this kind of setup is that the high rpms might cause burning. I tested this kit using 80, 150, and 220 grit sanding discs, and had no burning problems. The hook-and-loop provides a bit of insulation between the sanding



Hook & loop fastening system



Shop-made set-up gauge with feeler screw

JASON ZENTNER

disc and the steel plate, so it runs cooler. As with any disc sander, you still have to use light pressure.

The Infinity kit has a couple other advantages. It's obviously much cheaper than purchasing a stand-alone disc sander, and it doesn't take up any floor space. The downside is that it ties up your table saw.

The package includes a precision-ground steel plate with 5/8" arbor hole, one each 80, 150, and 220 grit sanding discs, and one PSA-backed hook disc.

SOURCE

Infinity Cutting Tools, infinitytools.com, 877-872-2487, Table Saw Setup & Sanding Disk Premium Package, #00-SSD, \$48. Additional sanding disks are \$5 each.

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Easy Bench Upgrade

A GOOD TAIL VISE sometimes ends up being an afterthought. When you built your bench, maybe you could only afford a face vise, or maybe you thought you wouldn't use a tail vise very often. If you're now considering adding a tail vise to your bench, this Inset Vise from Veritas is a nice option at a reasonable price.

While a tail vise application seems the most obvious, you can mount this vise anywhere you need it. One limitation: It's only capable of holding stock horizontally. A traditional tail vise can also hold stock vertically.

The Veritas Inset Vise mounts flush with your benchtop. Mounting requires a stepped mortise: a shallow mortise for the faceplate and a deeper one to house the vise's inner workings. You'll need a top at least 1-1/4" thick for installation.

The Inset Vise uses a removable aluminum dog. The dog has two steel pegs that pop into one of two sets of holes spaced 3-7/8" apart.

The dog has one flat face and one convex face. The flat face has a 2° inward slope to help hold workpieces securely. It also has a keyway which can be used in conjunction with a nut for a 10-24 bolt in order to add cus-



tom shop-made jaws to the dog. A 1-1/2" wide pivoting jaw is available as an accessory. One drawback is that the dog is 1/2" tall, making it unusable for thin stock. In this case you'd have to add a shim under your workpiece.

A stainless steel toggle-style handle turns the 1/2" diameter Acme-threaded steel screw, and the jaw travel is 4".

SOURCE

Lee Valley & Veritas, leevalley.com, 800-871-8158, Veritas Inset Vise, #05G31.01, \$89; Pivoting Jaw, #05G31.03, \$12.40.

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All-Purpose Bench Base

EVERY SHOP NEEDS A BENCH. In fact, two or three are even better, as you'll want an assembly table that's a little lower than your workbench. Then what about all those benchtop power tools—where do they go? The new Universal Bench base from Kreg will cover pretty much any need you've got.

The key is flexibility. The Universal Bench offers five different rail lengths (14", 20", 28", 44" and 64"), and two leg lengths. This gives you 15 possible top sizes, ranging from 14" x 14" to 64" x 64". Both leg lengths are infinitely adjustable within a 6" range, the shorter legs from 15-1/4" to 21-1/4" and the taller ones from 29" to 35". Price ranges from about \$102 for the smallest possible bench to about \$236 for the largest; adjustable feet are included. If you need your bench to be mobile, Kreg offers a set of high-quality 3" locking, swiveling casters (set of 4, \$60).

Assembling the Universal Bench couldn't be much simpler. The 28" x 64" version took me about half an hour to put together. The assembly holes are square, with parts held together by square-shoulder carriage bolts and self-locking nuts. You only need two wrenches: one for the main fasteners and one for the feet.

After assembly, apply whatever top and shelving you wish. You can also add vises, drawers, Kreg accessories, etc., to customize your bench to your liking.



The Universal Bench is capable of supporting up to 600 lbs., so it's no lightweight. The legs are 2" x 2" 12 gauge angle steel, and the rails are 1" x 3" C-channel 14 gauge steel. After assembling my bench, I loaded it up with about 360 pounds of lumber and wheeled it across the shop with ease.

SOURCE

Kreg, kregtool.com, 800-447-8638, Universal Bench.



THE RESAW KING RIPS UP THE COMPETITION

Over the weekend, I set up the bandsaw and did some re-sawing of highly flamed maple. I am very happy with the saw and the Resaw King blade. This equipment will certainly meet my objectives of reducing waste and improving quality of my products. Thanks for the guidance in selecting the saw and blade. I will soon be ordering a second Resaw King blade so that when I need to have one sharpened I will have no down time. I'm now spoiled!

- John P., Milton, West Virginia

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FOR SPRAYING SMALL PROJECTS, this portable, self-contained system sprays almost any finish quickly and easily. Just fill the container with the appropriately thinned finish of your choice, attach the power unit and spray. In the photo, it's spraying a 2lb. cut of dewaxed shellac, but it also works great with oil-based or water-based polyurethane. The main limitation is that you have a round spray pattern only, with no adjustability.

Each power unit sprays up to 16 oz. of liquid and can cover about 100 sq. ft. of surface area. Replacement power units, spray buttons, dip tubes, containers and even a trigger-style gun handle are sold separately.

This system is powered by compressed gas, so the power unit can become quite cold with continuous use. This can reduce the performance of the sprayer and chill the liquid being sprayed; when the power unit begins to feel cold, it's best to take a break until it warms up again.

If you don't exhaust the power unit in a single use, you'll need to clean it. Just spray through whatever solvent you're using to thin your finish until it comes out clear. If you do exhaust the power unit after a single use, no cleanup is necessary!

SOURCE

Preval, preval.com, 877-753-0021, Preval Spray System, \$10.



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My Spare-Room Shop



Small space, ginormous cabinet.

MY SHOP IS LOCATED in a spare bedroom. As a luthier, I don't need a lot of space—just enough to allow working on a double bass. What I do need, though, is storage for lots of small parts, tools, patterns, etc. Before moving to this space, I drew designs and configurations for chests, drawer stacks, hutches and benches in a variety of different forms, but when I saw Dr. Warren Kragt's "Ginormous Shop Cabinet" in *American Woodworker* (#151, Dec-Jan 2011, page 58), it shouted, "I'm the cabinet you've been looking for!"

I modified the dimensions to suit my needs and tweaked the design for both stability and appearance. Having many small parts and tools, I knew I

would make good use of shallow drawers. But I really had to think about what I was going to store in them to determine how shallow or deep they should be and how many I could fit in the cabinet while keeping its proportions close to the original design.

At first I dreamed of storing all of my tools in the cabinet, but ultimately, I decided to install a second cabinet under the bench to keep the chisels, gouges, rulers and other hand tools that I use most frequently close at hand. I also decided to add a desktop hutch to store things that wouldn't fit well in drawers, such as varnishes, resins, touch-up brushes, pigments and the hot plate I use to heat up bridges and

hide glue, as well as reference materials and parts catalogues. Lastly, I installed a wall rack to keep my most commonly used clamps, hammers, Japanese saws and scrapers easily accessible.

I changed the cabinet's structure from frameless to face-frame for increased rigidity. I used walnut for the frame and bird's eye maple for the side panels—I ran across a piece of 3/4" maple ply at my local big-box store that had bird's eye covering its back face. A lucky find! I ebonized the walnut because I think the "ebony/maple" look goes with the violins. The drawer fronts are made from curly maple that I "rescued" from work (a cabinet shop where we don't use figured wood). Each draw-



The original Ginormous Shop Cabinet
(Photo by Dr. Warren Kragt)

er front is banded with ebonized walnut. The drawer boxes are made of hard maple and dovetailed. I added a few secret compartments—and now I'm torn whether or not to tell people about them, lest they not remain so secret!

I've learned that the best way to find what works is through use. In my previous shops my bench was always at desk height, but for this shop I decided to raise it so I could sit at a barstool. However, after many long days at this bar-height bench, I've decided that desk height—and a comfortable chair—has its advantages. So I've decided to recon-

struct the bench to include a lower section. That means I'll have to build another lower, drawer stack—with wider drawers (to remedy a painful oversight in the original). It seems no matter how careful the planning, something always shows up that won't fit in any drawer!



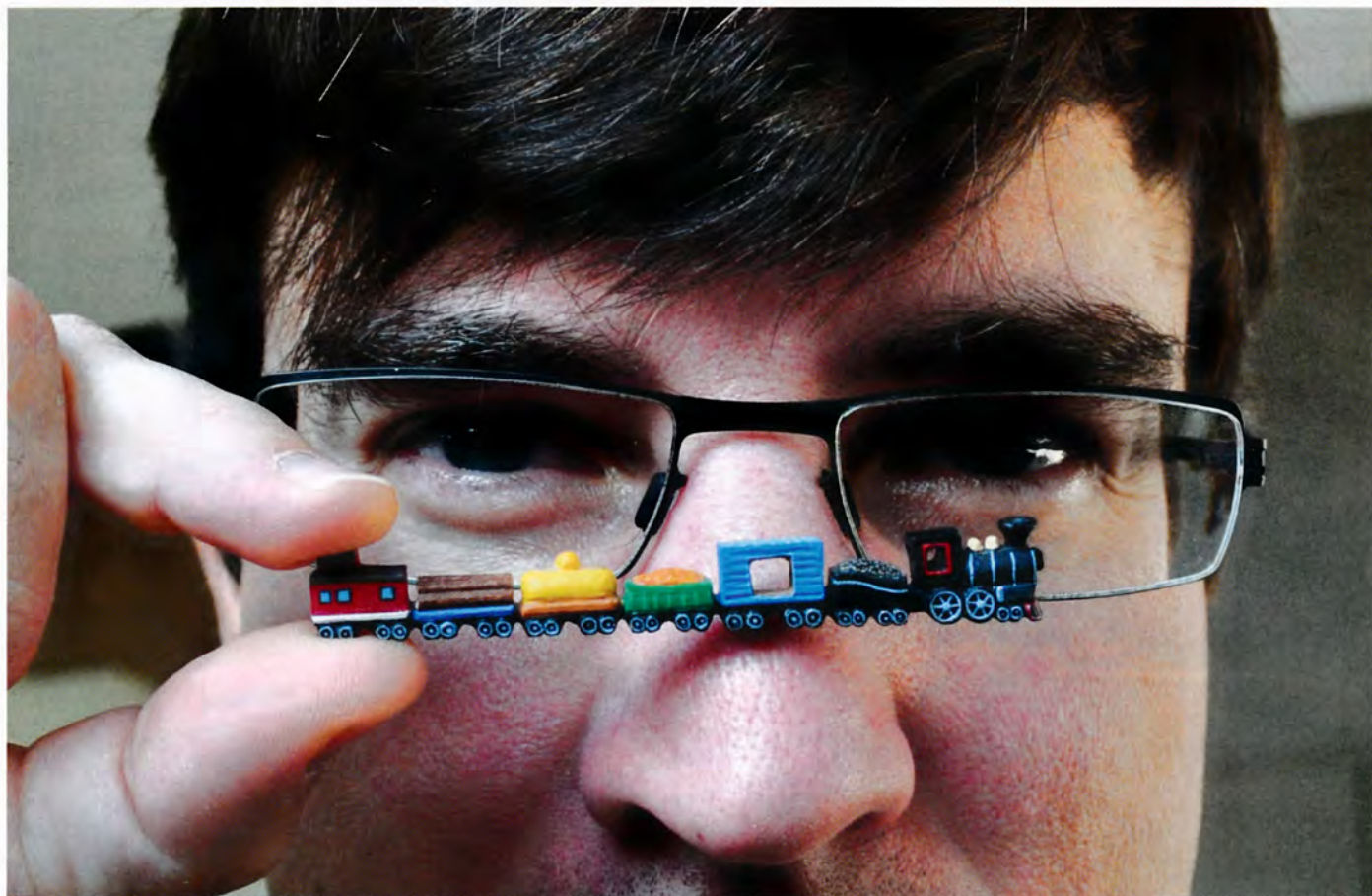
*Mark Hollerud
Austin, Minn.*

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Steve Tomashek

Creating a large footprint in a small world

by Spike Carlsen

STEVE TOMASHEK TURNED PRO at a very young age. He made his first sale—for fifty cents—at a craft fair in Minneapolis when he was ten. “My dad would supplement his income selling sculptures and carved duck decoys at craft fairs,” Steve explains. “He’d let us kids set up a card table and we used to sell things such as agates with plastic animals pasted to them.” Steve has come a long way since then, but one thing hasn’t changed—he still likes to work small.

Intoxicated by art

Steve has always been surrounded by art. In addition

to sculpting and carving, his father built furniture and toys, worked in watercolors, and even had a printing press in the basement. “I think art is how our parents controlled us,” Steve (the youngest of seven) muses. “They’d throw a bunch of paints in front of us and tell us to get to work and not bother them until we were done.”

Steve took up whittling in his early teens. Years later, while attending the University of Indiana to earn his bachelor’s in secondary education, he took an art class that required completing a different project every week for fifteen weeks. By the end of the class Steve had discovered the world of miniature animistic sculpture. “I



Feather Your Nest

was intoxicated by it," he explains. "I went to the library and copied everything about it that I could find." Other factors converged. A cohort at school who carved wooden Santa Clauses was one source of inspiration. Steve was playing a lot of chess, so he carved his own chess set. "I wasn't very good," he explains. "I was the guy with the band-aids on his thumbs."

After graduating, Steve was looking for a teaching job when a serious car accident derailed his plans. "That accident turned out to be a good thing," he recalls, "because I began to explore woodcarving as a profession." Steve used the shotgun approach to find his specialty. "At first it was start and stop, feast or famine, and I wanted to carve everything," he explains. After zeroing in on miniatures, Steve wasn't sure if he should create one-of-a-kind high-end pieces for customers wanting works of art or mass-produced pieces he could sell cheaply. He tested the waters through galleries, craft shows and even eBay before finally settling on carving miniature works of art, primarily exotic creatures of nature's—or his own—imagination.

Steve estimates that he's created close to 10,000



Giraffes

carvings. Pop culture and cartoonists such as Gary Larson of "The Far Side" have inspired his caricaturist leanings. His bright color palette shows influences of Mexican and Balinese art. But his style is all his own. Steve believes the connection between a person and a miniature can be something special, so he goes to great lengths to spark that connection. He says his goal isn't to make things as teensy as possible. "I'm not the guy that paints your name on a grain of rice," he explains. Rather, his goal is to create works that inspire wonder—and tickle the funny bone.

Branching out

With the help of photographer and co-conspirator Glenn Gordon, Steve has created a line of whimsical notecards, magnets and matted prints that gleefully portray the members of his "miniature menagerie." Steve equates a punchy photograph with a good one-liner, so giraffes graze on broccoli stalk trees, mice hide in Swiss cheese holes and lions roam amidst herds of animal crackers. These unforgettable cards and prints allow Steve to offer something at every price point. For



Tomatillos



Dragon

A Great American Woodworker

continued



Emperors



Fox Sketch

example, if someone loves a wondrously carved and painted tiger, but can't plunk down \$150 to buy it, he can still walk away with an \$8 magnet featuring the same fanciful critter.

Steve has recently completed his first book, *Tiny Whittling: More Than 20 Projects to Make* (see Sources, page 27) and has also produced, directed and filmed several hilarious short movies featuring his carvings.

Speaking of branching out, Steve now lives in Halle, Germany, a historic city located south of Berlin. He visited Germany in 2010 to check out Berlin's world-famous Christmas Market and met his girlfriend Randi while "couch surfing" during his stay. "She lent me the couch," he says, "and eventually I got upgraded." As a surgeon, Randi also wields small sharp instruments for a living. "She's actually pretty good at woodcarving," Steve says, "but she can't risk cutting herself." Steve returns to the United States each summer to visit his family and show his work at selected art fairs and craft shows.

Candy box workshop

One benefit of working small is that the tools, lumberyard and workshop can also be Lilliputian. On a recent trip to Puerto Rico, Steve carried all the tools and materials for his "recreational whittling" in a candy box.

Steve's home workshop consists of a desk and a thumb protector. His primary tools are a pair of professional carving knives, sandpaper and needle files. Occasionally he'll use a Dremel tool for getting into impossible places or a tablesaw "with a capacity of nine millimeters," he explains. But for the most part, he can work faster and more accurately using woodcarving knives. Another advantage of working small is there are few big mistakes. "If something isn't turning out, I just toss it in my rejects briefcase and pick up something else," he smiles.

Most of Steve's pieces are carved from straight-grained basswood and boxwood (he uses boxwood for more detailed work). To minimize eyestrain, Steve wears the same OptiVisor magnifiers that jewelers wear.



Erudite Owl



Floss



Pins and Needles

A chronic doodler, Steve sketches his newest creatures on paper before transferring the shape to wood—and even with animals he’s carved before, he starts with a penciled outline on the wood. For his smallest works, Steve will often rough out the shape on a 12" long stick, using the uncarved portion as a handle, and then cut the critter loose at the end for the final shaping and sanding.

Painting also requires focus. Steve has seen too many beautiful carvings obliterated by lousy paint jobs. “When you spend that much time carving something, you want the best,” he says. Steve inserts a toothpick in a hole drilled in the bottom of each piece to serve as a handle and then uses acrylic paint and miniscule brushes to create the details. “A typical craft brush is a size 4, Steve explains. “As brushes get smaller they go to zero—and then they start adding zeroes.” For the finest details, Steve uses ten- to twenty-zero brushes. He uses a compact disc as a palette.

Most of Steve’s critters take hours to create. A tiny mouse can take up to 2-1/2 hours from start to finish. A dragon can take 25 hours. Multiple-piece dioramas can take weeks.

Steve suggests those wishing to test their carving prowess start in the kitchen, with root crops and par-



Squirrel Monkey

ing knives. “If you cut yourself—and you will—and in three days find yourself wanting to go back and carve again, you probably have the right mindset and passion to pursue carving and be successful.” Steve surely has it.

SOURCE

Tiny Whittling: More than 20 Projects to Make (Chicago Review Press, November, 2012) by Steve Tomashek; available from Chicago Review Press, Inc., chicagoreviewpress.com, 800-888-4741, \$16.95.

Find more of Steve’s miniatures, films and instructional videos at ministeve.com.

Spike Carlsen is the author of *Woodworking FAQ*, *A Splintered History of Wood* and *Ridiculously Simple Furniture Projects*. For more information visit spikecarlsen.com or facebook.com/spikecarlsenbooks.



See how Steve carves a mouse at
AmericanWoodworker.com/WebExtras



Winter Wolf



Zebrew

The Powermatic PM1500 Bandsaw



Loaded with power, heft and well-designed features, this 15", 3 hp brute can outperform most 18" saws.

by Michael Springer

NOTHING BEATS a powerful bandsaw for milling boards from a log, roughing out massive blanks for turning or carving, or resawing wide flitches from dry timber. Making tough cuts like these in wood 12" thick or more has traditionally been a job for commercial 18" bandsaws, but a growing class of intermediate-size saws (between 14" and 18") has started to buck this tradition.

Powermatic's new PM1500 15" bandsaw is a member of this class, but only nominally. It's actually larger and heavier than most 18" saws, has greater resaw capacity (14")—and is more expensive. It's almost as if Powermatic set out to make an exceptional 18" saw with everything but 18" wheels.

High-end and heavy-duty

The PM1500 is the second saw in Powermatic's super-premium bandsaw line, which also includes the flagship PM1800 18" saw. Although smaller in size and capacity, the less expensive PM1500 is still designed to have all the features, convenience and performance a user could want. I think of these saws as the luxury sports sedans of the bandsaw world.

Right out of the crate, the PM1500 impresses. Its beefy welded steel construction, large cast-iron table and sizable 3 hp motor makes it tip the scales at almost 400 lbs. To be honest, I was much happier about all that frame-stiffening, vibration-absorbing mass once I managed to wrestle the PM1500 safely off its pallet and into a sturdy mobile base (see Sources, page 31).

Performance to match

Turn the magnetic power switch and this saw continues to impress. The switch itself contains a safety disc. When the disc is removed from its slot, the saw can't be turned on. The disc contains a strong magnet, so it's really easy to remove and stick close by on the saw whenever you have the cabinet doors open or are making adjustments to the saw. This disc is one of the saw's many thoughtful safety features.

The PM1500 operates smoothly and quietly. It can barely be heard over the air rushing through its two dust-collection ports. As for vibration, even when mounted on a flexible mobile base with soft tires, this saw still passes the nickel test—and even the penny test: Balance a penny on edge on the saw's table and it stays on edge from startup through full coast-down. And thanks to its powerful motor and heavy cast-iron wheels, I never felt the PM1500 slow down or falter while cutting, no matter how large the stock or how hard I pushed. The blade's ability to slice and clear wood from the kerf is the only factor that limits the cutting speed.

Powerful drivetrain

The PM1500's 240 volt, 3 hp motor requires its own 20 amp circuit. The motor's 55 amp starting draw cranks the saw's heavy iron wheels up to speed almost instantly and it runs pretty efficiently, with a full load rating of 12 amps. Tool-free motor belt tensioning adjustment is accessible from outside the cabinet.

Because of the wheels' momentum, the saw takes about 35 seconds to wind down—that's a long time to wait before backing out an errant blade or removing a small offcut. Luckily the PM1500 comes with a foot brake that can stop the blade in about five seconds (see bottom photo, page 31). Lightly tapping the brake pedal activates a switch that shuts off the motor, while continuous pressure brings everything to a halt with a friction brake. Besides using the brake to move quickly between cuts, it's also essential for hands-free shut off (when holding both halves of the large stock you've just cut through, for example), to help regain control if the stock slips and for emergency stops.

Unique blade length

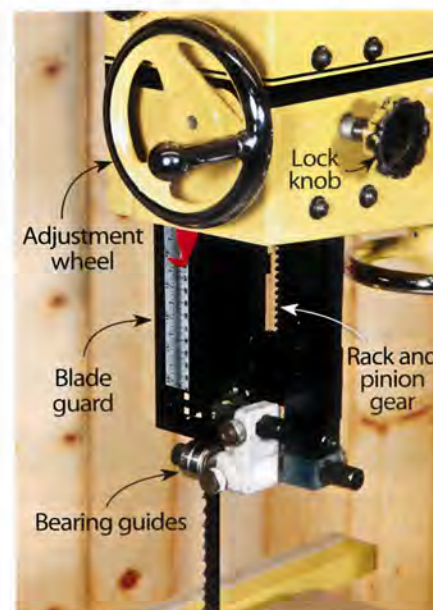
The PM1500 accepts blades from 1/8" to 1" wide. But it requires blades that are 153" long, a unique length, so currently, they have to be custom sized. Finding heavy-duty blades that can negotiate the PM1500's 15" wheels is another issue. I've been operating the saw with Timber Wolf blades, partly because I've had good luck with them in the past and partly because the company assured me that the silicon steel in their 3/8" and 1/2" rough shaping and 1" milling/resawing blades (.032" and .035" respectively; see Sources) can handle the stress of bending around 15" wheels. (Typically, blades thicker than .025" are recommended only for wheel sizes of 16" and up, as they can crack when bent too sharply.) I haven't had any problems, but thinner 1" resaw blades are available from at least one other manufacturer, should I ever need them. When used carefully, 3/4" blades can also resaw accurately. They may be as large as you need to go.

Always within reach, the blade tensioning lever features an electrical interlock that will not allow the saw to be switched on unless the lever is set to the full tension position. Here the lever is set at the partial tension position, which allows relaxing the blade when the saw isn't being used.



Bright yellow tires make the blade easy to see while adjusting its tracking, and indentations make the cast-iron wheels safe to spin. View windows allow monitoring the blade's tracking and tension while the saw is running.

Rack and pinion gearing in the guide post keeps the bearing guides nearly perfectly aligned with the blade all along the post's travel. A four-sided guard surrounds the blade.





Doubled-up bearings on both sides of the blade are easy to adjust, but the upper thrust bearing behind the blade isn't. I drilled an access hole to simplify its lateral adjustment.



The lower guide assembly mounts on top of the cabinet. Once again, the thrust bearing is difficult to adjust, and this time, there's no simple fix.



The large table extends nearly to the cabinet to fully support stock up to 14-1/2" wide and it remains rock-solid while using the miter slot to guide a milling sled to cut heavy, wet logs.

Tension-free tensioning

The three-position blade tensioning lever is always within reach (unlike some that point toward the ceiling) and it features an electrical interlock that will not let the saw operate unless the lever is set to the (horizontal) full-tension position (see photo, page 28 and top photo page 29). The partial-tension setting relaxes the blade when the saw isn't being used.

The wheels feature bright yellow tires that make it easy to see the blade while adjusting its tracking (see middle photo, page 29). They also have indentations that allow users to safely rotate the wheels by hand during blade and bearing guide adjustments—a nice luxury touch if ever there was one.

Premium guide post

Rather than a conventional steel rod that simply slides up and down by hand, the PM1500's sophisticated guide post assembly features rack-and-pinion gears. It raises and lowers via a large hand crank, with very little variation in the bearing-to-blade spacing between its top and bottom positions (see bottom photo, page 29). This well-engineered post has three major advantages over old-school guide posts: It won't crash down to the table when its locking knob is loosened; it can be safely adjusted up and down while the saw is running; and it keeps the bearing guides in close alignment with the blade everywhere along its 14 inches of travel. In addition, a four-sided guard attached to the post completely surrounds the blade.

Robust blade guides

The PM1500 features ball-bearing guide assemblies above and below the table, each with doubled-up bearings on both sides of the blade and a single thrust bearing with a centering groove to support the back of the blade (see photos, at left).

The side bearing guide adjustments work perfectly. Knurled knobs provide a sure grip for fine-tuning the bearings when spinning the saw by hand. And if sap buildup makes a bearing start to spin during milling, you can quickly and safely adjust it on the fly without getting your fingers close to the moving blade by turning the knob with a hex wrench.

The setscrew for laterally adjusting the thrust bearing on the upper assembly is hidden behind the blade guard, making this adjustment a fidgety process that requires removing the right side bearing assembly. To ease the process, I drilled an access hole for the hex wrench through the blade guard.

The knob and locking ring used to set the front-to-back position of the lower thrust bearing are also difficult to reach, because they're tucked under the table between protrusions that are part of the trunnions. Making this adjustment causes grief with every blade change—it's the only tedious aspect of using the PM1500.

I noticed a few nicks from the blade in the fence and throat plate after cutting tight curves and making thin rips. Such nicks caused by blade wander may not have occurred if the lower side bearings were located closer to the bottom of the table.

Big table, tall fence

The PM1500's large (21-1/2" wide by 16" deep) cast iron-

table is rock-solid (see bottom photo, page 30). Anchored by a steel trunnion assembly and positioned at 40"—a comfortable height for both resawing and tabletop work—it extends nearly to the saw's cabinet on the left and features a miter slot to the right of the blade. Using a slot-guided milling sled to cut heavy, wet logs concentrates all the weight over the table's cantilevered edge, but I never encountered any sagging or shifting in the table while cutting through logs that outweigh me.

Still, I wish it had another slot to the left of the blade so the weight of the stock could be borne by the center of the table, which is supported on both sides.

The table tilts down 45° to the right and down 10° to the left for bevel cutting. A rack-and-pinion gear with tremendous mechanical advantage makes it quite easy to crank this massive cast-iron table to the desired angle with one hand. And a locking bolt with a repositionable ratcheting lever handle allows users to quickly lock in the angle with the other hand. There's a positive stop at 45° for the right tilt, but in order to be tilted to the left, the 0° stop that normally keeps the table flat must be undone—there's no way to bypass this stop.

The sturdy T-square-style fence has a 6-1/2" x 19-3/4" aluminum faceplate that can be attached "face out" for ripping or "face down" to fit under the guide bearings and get close to the blade for cutting thin stock into narrow widths (see top photo at right). This fence provides ample support to accurately rip 14" tall boards and shows no deflection when large, heavy stock is pushed hard against it.

To facilitate rip cuts that must be angled to allow for blade drift, the PM1500 comes with a 6-1/2" tall guide pin that can be attached to the fence in place of the aluminum faceplate. This pin is good to have because the fence has no provision to allow adjusting for drift without undoing its square setting—and requiring it to be recalibrated before using it normally again.

Dust collection

Dust collection is effective when the PM1500 is paired with a 600 cfm dust collector, the minimum recommended size. Dual 4" dust ports—one just below the blade and one at the floor of the lower cabinet—capture almost all of the dust when routed through a 5" or larger wye. Adjustable brushes against the blade and lower wheel are designed to flick dry sawdust into the air so it can be sucked up, and the tightly sealing cabinet doors reduce air infiltration to keep the vacuum pressure low inside the lower cabinet, a must for good collection.

I witnessed just how well the PM1500's dust collection works. While cutting thick stock, my main collection hose accidentally disconnected. Within minutes, shavings and sawdust were flying into the upper cabinet and piling up in the tracking, tensioning and guide post adjustment mechanisms. Another sizable pile had started to clog the motor's wide drive belt in the lower cabinet. Trust me, when you use the PM1500 for milling or resawing, dust collection is mandatory.

The bottom line

The PM1500 is not just built right; it's overbuilt from almost every conceivable measure. The result is an impressive package with unstoppable power, ample capacity and features



An extruded aluminum faceplate that can be positioned vertically for resawing or horizontally for narrow cuts in thin stock maximizes the versatility of the T-square-style fence.



The foot brake shuts off the motor electrically and stops the drive wheel mechanically within five seconds.

that deliver on their promise. Just what you'd expect from a bandsaw that's built, billed (and billed \$\$\$) as a super-premium tool. 

SOURCES

- Powermatic, powermatic.com, 800-274-6848, PM1500 Bandsaw, #1791500, \$2900.
- Rockler Woodworking and Hardware, rockler.com, 800-279-4441, Rockler All-Terrain Mobile Base, #22672, \$207.
- Suffolk Machinery, suffolkmachinery.com, 800-234-7297, Timber Wolf Bandsaw Blades (153" length): Rough Cutting/Green Wood, 3/8" x 3 tpi, #380AS, \$29.79, 1/2" x 3 tpi, #1203AS, \$30.51; Milling/Resawing, 3/4" x 2-3 tpi, #3423VPC \$38.02; Green Wood Milling, 1" x 2 tpi, #102PC \$539.81; KD Wood Resawing, 1" x 3 tpi, #103PC, \$39.81.



Michael Springer is a craftsman and journalist who specializes in tool testing. He covers the tool industry from his home base in Boulder County, Colo.

Lumberyard Bowls

Kiln-dried wood requires a different approach than green wood.



ALTHOUGH MOST BOWLS are turned from green material, working with kiln-dried lumber has its advantages. You don't have to deal with checks and cracks or significant distortion. Sanding is far easier and you can apply finish immediately. However, turning dry wood has its own challenges and real differences compared with turning wet wood. And because wet wood often costs nothing, dry wood—especially thick stock—usually costs more. So, if you're up for a challenge, have money to burn and a burning desire to turn a bowl, you're in luck—this story is for you.

Choosing stock

Roughsawn kiln-dried hardwood lumber is available in thicknesses ranging from 4/4 (1") to 16/4 (4"). Sizes 8/4 and thicker make decent bowl material. Thinner stock is excellent for turning plates and platters. Hardwood lum-

beryards typically stock various species in 4/4, 5/4, 6/4 and 8/4 sizes and one or two species in 10/4, 12/4 and perhaps even 16/4 sizes.

Some lumberyards allow buying a portion of a board. For example, cutting 4' from the end of a 12' board—or 2' from a 10' board—leaves a salable 8' length. So before you buy an entire board, ask if the yard will sell one end.

Traditional furniture and cabinet woods such as walnut, ash, mahogany, hard and soft maple, beech, cherry, birch and white oak are excellent choices for this type of turning. Some pines, cypress and cedar may also have merit.

Prepare the wood

Cut the wood into square blanks. The wider the board is, the larger the bowl's diameter can be. Decide which side will be the top (the inside of the bowl). Hollowing into the bark side of the blank (against the curve of the wood's



1 **Maximize** the blank's usable thickness by gluing a waste block on its bottom to hold the faceplate's mounting screws.



2 **Establish** the bowl's maximum diameter by trueing the blank. Cut from the outside to the center on both the left and right, so you don't chip out the edges.



3 **Establish** the bowl's maximum height by leveling about 1" of the top. To make this cut, roll over the gouge and use a delicate scraping action with its bottom edge.

annual rings) usually creates fairly straight grain patterns. Hollowing into the pith side of the blank creates curving patterns that I find more interesting.

Flatten the blank's bottom face. Then locate its center and use a compass to draw the largest possible circle. Mark the center point that the compass leaves, so it's easy to find. Then head to the bandsaw and saw the blank into a disc.

To make the best use of your stock, it's important to choose a mounting method that minimizes wood loss. I usually use a faceplate that screws into a waste block of poplar or other hardwood scrap that's glued to the blank's flattened bottom surface (**Photo 1**).

Cut the waste block into a disc that's about 10% larger than the faceplate's diameter. Use the center point from the circle drawn earlier on the blank to draw a second circle that matches the waste block's diameter. Use this circle to locate the waste block. Glue on the block using yellow or white glue, clamp it securely and allow it to dry overnight. Draw a centered circle on the waste block to locate the faceplate. Then attach the faceplate directly to the block, using No. 10 or No. 12 sheet metal screws or SPAX screws.

Use the right tools

In almost every case, the correct tool is a bowl gouge made from 1/2" or 5/8" diameter high-speed steel rod (see Sources, page 35). *Do not* use a spindle roughing gouge. Supplement the bowl gouge with a round-end bowl scraper for areas that are hard to reach with the bowl gouge or that just require light finishing or blending (see Sources).

True the blank

Screw the blank/faceplate assembly onto the lathe's headstock and bring up the tailstock for extra support. Set the lathe at slow speed—the larger the blank, the slower the speed. (For roughing, I typically set the speed below 600 rpm.) Then use the bowl gouge to true the blank (**Photo 2**).

Next, level the top of the disc, using a scraper or a bowl gouge rolled over to a scraping angle (**Photo 3**). As most of

the top will be hollowed, you only need to level about 1" in from the edge. When you make this scraping action, make sure the top edge of the gouge doesn't contact the wood.

Shape the outside

Determine the bowl's profile. The sweeping "U" shape shown here is relatively easy to create (**Photo 4**). If you're new to bowl turning, it's a great shape to start with.

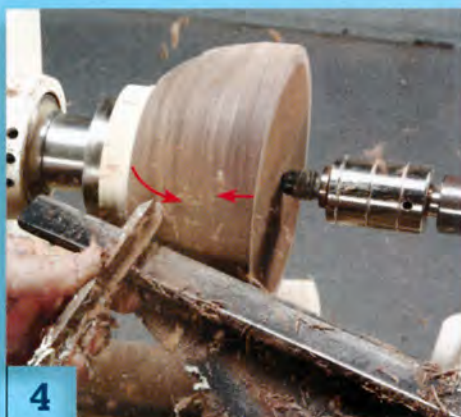
This blank is face-grain mounted, so in order to work "with the grain" while shaping the outside, you have to turn from smaller to larger diameters. Using the bowl gouge, make successive cuts, starting at the bottom edge of the blank and working toward the top to gradually reduce the diameter and create the bowl's "U" shape. As before, do not run off the top. Stop about 1/2" from the edge, switch directions and work back from the rim. This eliminates any chance of chipping out the top edge.

Turn the base to near its final dimensions—unless you decide it will be smaller than the faceplate.

To improve the surface after the shape has been roughly determined, hone the edge of your bowl gouge so it's razor-sharp and then make progressively lighter and lighter cuts. To go one step further, try shear cutting (**Photo 5**). Long, twisted shavings appear when you achieve this cut.

Power-sand

This is the best time to sand the outside of the bowl. Holding sandpaper on the bowl as it spins tends to produce rings that can be tough to remove. One solution is to power-sand using padded discs in a drill (**Photo 6**; see Sources). Any reversing drill will work; a drill with an angled head is a luxury. Set the drill to rotate so the abrasive spins up to meet the bowl (rather than spinning in the same direction as the bowl). You may have to adjust the rotation depending on the area being sanded. Use a hard padded disc for grits below 180 and a soft pad for 180 and above. If your tool work was well done, start with a 120 grit disc and sand through finer grits until there are no visible scratches.



4

Shape the outside of the bowl by making multiple passes. Work from smaller to larger diameter. Stop just short of the top edge and finish by cutting in from the top.



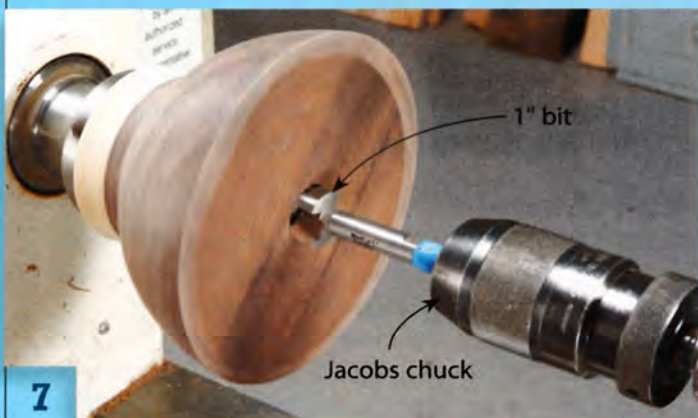
5

Refine the surface by making a shearing cut. Hold the gouge at about a 45° angle to the surface. Rub the bevel, cut lightly and watch for long, twisted shavings.



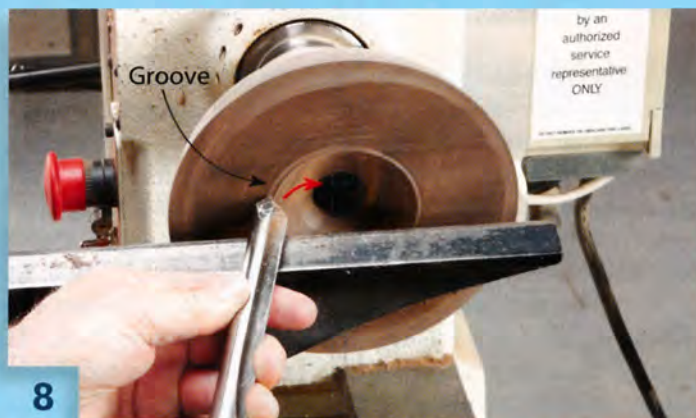
6

Sand the outside using a padded disc and a drill. This method creates a much better result than holding folded sandpaper against the surface.



7

Drill out the center of the bowl to roughly establish its depth and provide clearance for the gouge. This step also eliminates the wood at the center, which is difficult to turn.



8

Begin hollowing the interior by making a series of wider and deeper concave cuts. Establish a groove to support the gouge's bevel and work backward from the hole toward the edge.

Hollow the interior

Mount a Jacobs chuck in the tailstock and drill a hole just large enough to provide an air pocket for the bowl gouge to work into (**Photo 7**). In most cases, 1/2" to 1" dia. bits are sufficient.

To work with the grain while hollowing a face-grain mounted bowl such as this one, you must work from larger to smaller diameters. The process requires making light, concave cuts toward the drilled hole at the center, with each cut progressively wider and deeper (**Photo 8**). Picture the blank as though it consists of a series of small bowls that get progressively larger. Begin by hollowing the smallest bowl and work backward until you reach the intended thickness of the "final" bowl.

Stop to determine the shape of the rim before the wall thickness is less than 1" (**Photo 9**). Rolled, dropped, coved, tapered out or tapered in (as shown)—these are a few of the options that look better than an ordinary flat-topped rim.

As you near the final wall thickness, use double-ended calipers (see Sources) to help make the thickness consistent from the bottom of the bowl to the top. Cracking isn't an issue with kiln-dried material, so you can leave the walls

a bit thicker and heavier than if you were working green wood. However, the heavy weight and feel of a thick wall often distracts from a nice form. Depending on the bowl's diameter, wall thickness between 1/4" and 1/2" is both strong and more elegant in look and feel, in my experience.

Making a uniform and flowing cut with the bowl gouge to blend the bowl's lower interior wall with the bottom is desirable—but difficult. Using a heavy scraper is easier (**Photo 10**).

Sand the rim with folded paper, but try power-sanding the inside, using a 2" to 3" soft padded disc held in a drill (**Photo 11**; see Sources).

Complete the bottom

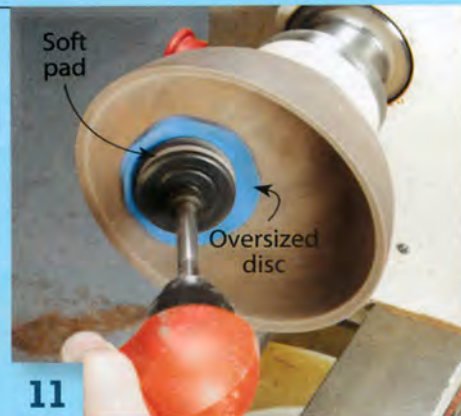
In order to maintain good workmanship when finishing the bottom of the bowl, reverse chucking—turning the bowl around so you can get at the bottom—is absolutely essential. Several commercial and turner-made chucks are available for this purpose, but a very simple version for shallow bowls like the one shown here is a block (usually 1-3/4" thick) that's screwed to the faceplate, trued round and faced flat, and then covered with a soft, grippy material, such as a routing pad (**Photo 12**; see Sources).



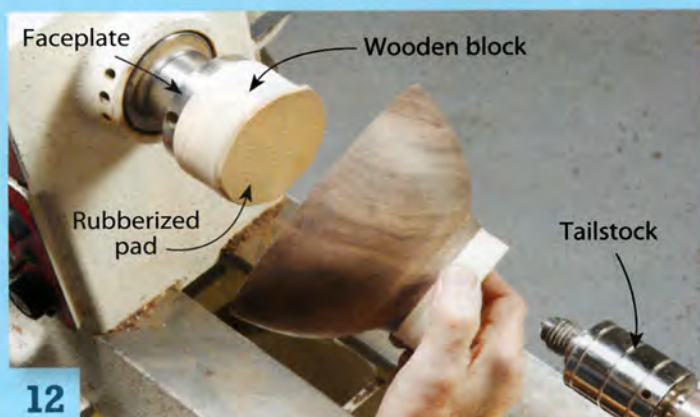
Establish the shape of the rim before completely roughing out the interior, while there's still enough wall thickness to support the cut.



Use a scraper to blend the lower sides and bottom. Position the tool rest close in and hold the scraper with the end of its handle slightly elevated.



Power-sand the inside of the bowl. An oversize sanding disc mounted on a smaller soft pad conforms to the concave contour and leaves a scratch-free surface.



Remount the bowl between the tailstock and a wooden block covered with a rubberized pad. Called "reverse chucking," this step allows you to complete the bowl's base.



Finish turning the bottom of the bowl. After refining its lower outside profile, undercut the base so the bowl sits on a rim.

Place the bowl over the block and bring up the tailstock center to lightly support it. Then center the bowl while turning the lathe by hand. As the bowl rotates, position a pencil near the base to mark the high spot. Slightly reposition the bowl and recheck until the pencil mark is continuous. Then secure the bowl with firm pressure from the tailstock center.

Turn the base and lower portions of the bowl, leaving a tapered tenon (about 1/2" in diameter for this size of bowl) to keep it securely mounted (**Photo 13**). I think a concave base with a rim looks much better than a simple flat base. It also tends to sit better. Finish-sand the lower sides using the padded disc. Use folded paper inside the rim.

Remove the bowl from the chuck with the small tenon attached. (This tenon is all that remains of the waste block.) Orient the bowl to access the tenon's end grain and give it a sharp rap—the tenon should easily snap off. Carve and sand the area at the break to the same quality as the rest of the bowl.

Apply a finish

If a bowl is more decorative than functional, choose a finish for its appearance. Film finishes such as wipe-on

poly, shellac, water-based finishes and lacquer give the wood a pleasant range of sheen (also called luster). Oil-type finishes (oil varnish blend, polymerized oils, mineral oil, walnut oil, tung oil, boiled linseed oil) add color and emphasize the grain. All common wood finishes are food-safe once they've cured (or aren't harmful to begin with, as with mineral and walnut oil). 🐼

SOURCES

- The Sanding Glove, thesandingglove.com, 800-995-9328, Velcro Disc Holder, 5", #SM-5F (firm), \$15.95, #SM-5S (soft), \$15.95; 2", #SM-2S (soft), \$8.95; Norton Dri Ice Ceramic Disc Assortment, 5", #DRI-500AP, \$26.95; 2", #DRI-200AP, \$13.95.
- Craft Supplies USA, woodturnerscatalog.com, 800-551-8876, Bowl Gouges, Bowl Scrapers, Outside Shear Scrapers, Double-End Calipers, Jacobs Chucks.
- Grizzly, grizzly.com, 800-523-4777, 1/8" Router Pad, #W1320, \$10.95.

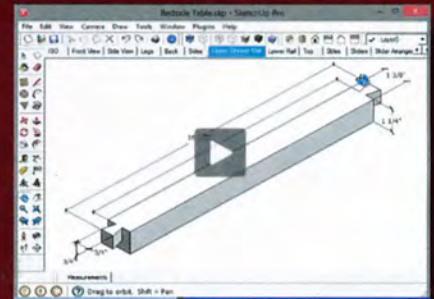
Alan Lacer is a turner, writer, demonstrator and instructor living near River Falls, WI. For more information, visit alanlacer.com.

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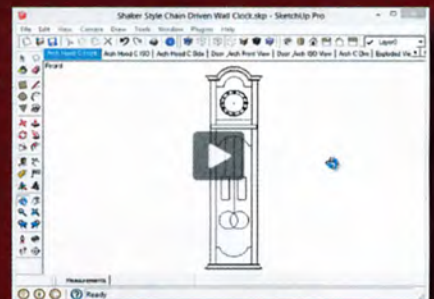
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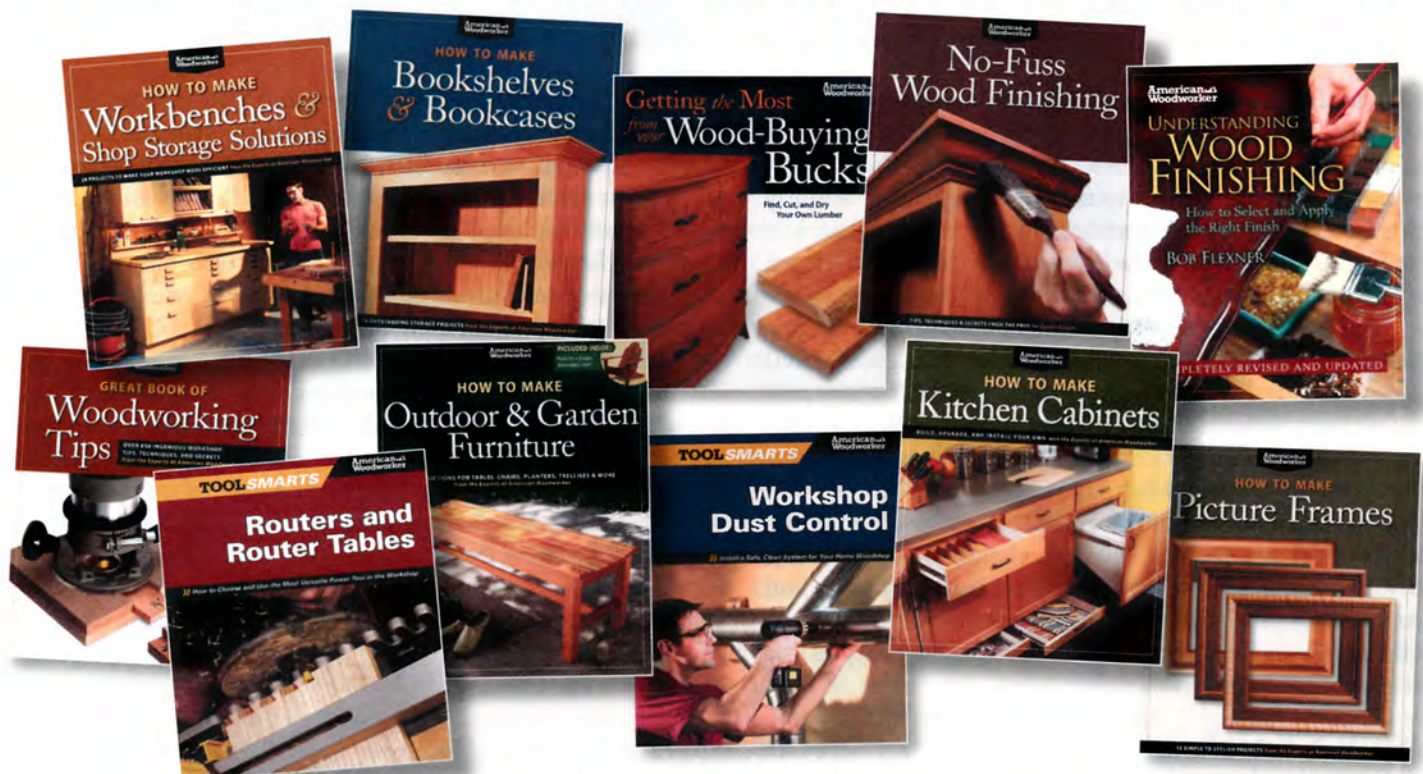


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Monticello Lap Desk

An irresistible project for any history buff.

by Mario Rodriguez

IN 1776, Thomas Jefferson commissioned Benjamin Randolph, a Philadelphia cabinetmaker, to build a compact lap desk to serve as a portable office. Jefferson was often on the road, traveling from Monticello, his hilltop home near Charlottesville, Virginia, to Philadelphia, where the Continental Congress met. Revolution was in the air.

This small mahogany box, now prominently displayed at the Smithsonian Institution, has become one of the most famous wooden artifacts in American history. In addition to his correspondence, Jefferson wrote the Declaration of Independence on it—or so the legend goes.



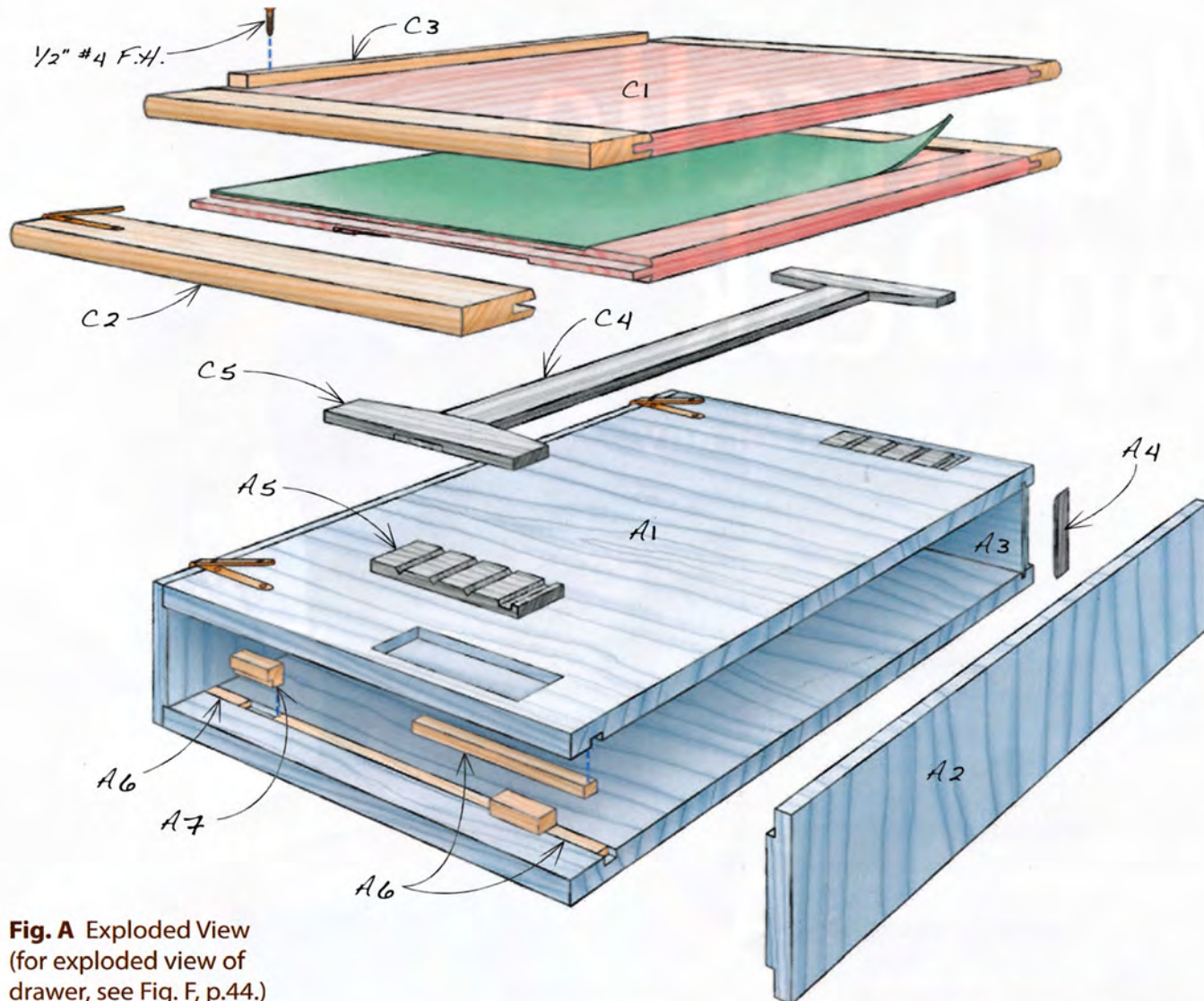


Fig. A Exploded View
(for exploded view of
drawer, see Fig. F, p.44.)

Cutting List

Overall Dimensions: 3-1/2" H x 9-5/8" W x 14-3/4" D



Section	Part	Name	Qty.	Th x W x L
Carcass	A1	Top and bottom	2	3/8" x 14-3/8" x 8-7/8" (a)
	A2	Side	2	3/8" x 14-3/8" x 2-1/2" (a)
	A3	Back panel	1	1/2" x 2" x 8-7/8"
	A4	Stringing		1/16" x 3/8" (b)
	A5	Easel support	2	3/16" x 3" x 1"
	A6	Filler		1/4" x 1/4" (c)
	A7	Drawer stop	2	5/16" x 7/16" x 3/4"
Drawer	B1	Front	1	11/16" x 1-3/4" x 8-5/8"
	B2	Back	1	3/8" x 1-5/16" x 8-5/8"
	B3	Side	2	3/16" x 1-3/4" x 13-5/16"
	B4	Bottom	1	1/8" x 13-1/16" x 8-3/8" (a)
	B5	Stringing		1/16" x 3/16" (b)
	B6	Partition 1	3	1/8" x 1-1/8" (d)
	B7	Partition 2	1	3/16" x 1-1/8" (d)
Easel and Writing Panels	C1	Writing panel	2	3/8" x 9-9/16" x 12-7/8"
	C2	Breadboard	4	3/8" x 1-3/8" x 9-9/16"
	C3	Cleat	1	1/4" x 1/2" x 11-1/4"
	C4	Rail	1	3/16" x 1" x 13-1/2"
	C5	Leg	2	3/16" x 1" x 4"

Notes:

- a) The grain in some of the pieces in this project runs in the short direction. Here, width always refers to the distance going across the grain, while length always refers to the distance going with the grain.
b) A total of 36" is required for the back panel and the drawer combined.
c) A total of 24" is required for the lock mortise and drawer stop grooves combined. Make top filler for lock mortise groove to fit.
d) Calculate length as needed for your own design.



1

Start by building the desk's carcass. Note that the grain runs the short way—from side to side. Cut grooves in the top and bottom pieces of the carcass.



2

Glue filler pieces into one groove. The spaces between the fillers create small mortises, which will receive the drawer stops later on.



3

Pare miters on thin pieces of satinwood that will outline the case's back panel. The best way to avoid tearout is to use a guide block angled at 135°, not 45°.



4

Fit the back panel into grooves in the top, bottom and sides of the carcass. This piece has a reveal all the way around it, so it looks like a drawer front.

Jefferson's desk is an odd piece and unique among its cousins. The box is open at one end to hold a small drawer for writing paper, pens and supplies. Attached to the top of the box is a pair of hinged panels that could be set up at an angle to support a book or, when fully opened, provide a generous writing surface. It's also a piece with significant technical flaws—more about that later—and has been widely reproduced.

Does a portable writing desk have any practical purpose today? Probably not, but for a lifelong woodworker and history buff like myself, this is an irresistible project.

Redesigning the desk

I'm sure the original desk was built to fulfill a hasty and urgent request, so the flaws are understandable. The most significant problem is that the grain of the side panels runs coun-

ter to that of the top and bottom, a condition that would cause the box to come apart or crack with changes in humidity. (Humidity levels change more drastically from summer to winter in our tight, centrally heated houses than in the draftier homes of Jefferson's day.) Another problem is the 5/16" thin writing panels, which are prone to warping.

Some modern builders have addressed the wood-movement problem by veneering the carcass, essentially turning its parts into plywood. While this method preserves the original appearance of the desk, veneering is a long, drawn-out process that I think is unnecessary.

Solid wood will work fine. The grain of the top, sides and bottom just has to run in the same direction, so all of these parts move in unison. There is an unusual twist in my reproduction, though: The grain of the box runs

from side to side, rather than front to back. If the grain ran the long way, the drawer opening would get smaller, the drawer would stick; at worst, the case would crack as it tried to shrink around the drawer. Running the grain the short way avoids these problems.

To further accommodate wood movement, I've treated the back of the desk as a floating panel. It's outlined with stringing to look like a false drawer front and has a small reveal all the way around it, similar to the small gaps around a drawer.

To keep the writing panels rigid and flat, I increased their thickness by 1/16" and added breadboard ends.

The diminutive scale of this desk certainly makes it a challenge to build—it's crammed with small, difficult and precise details. I've played with the desk's design, however, to

Fig. B Top Details

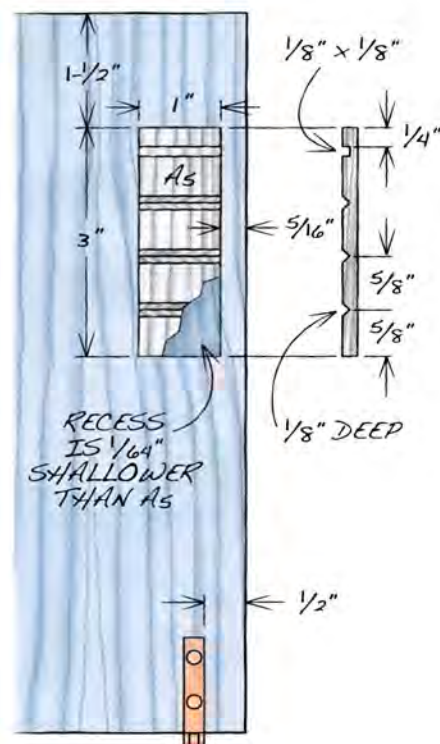


Fig. C End View of Side

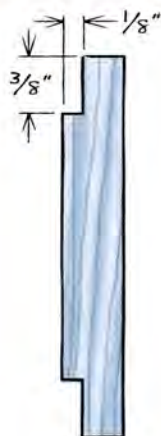


Fig. E Back Panel Details

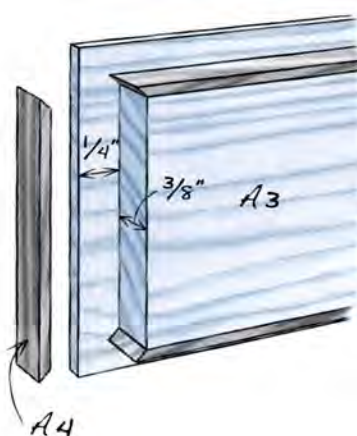
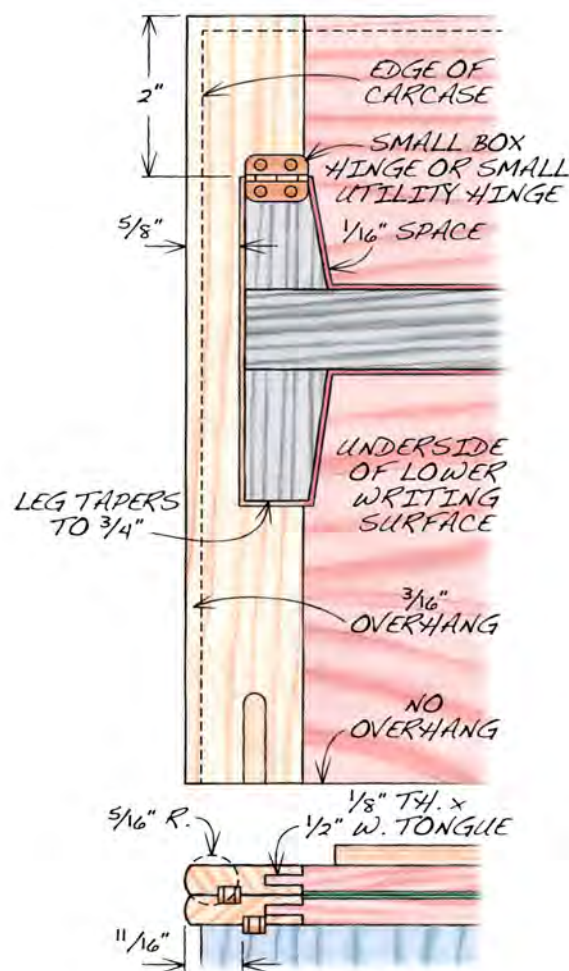


Fig. D Writing Panel Details



make these details more manageable for an intermediate woodworker. As an instructor at the Philadelphia Furniture Workshop, I've been teaching students how to build my version of Jefferson's desk. So far, each one has achieved success. You can, too.

Build the carcass

Milling the thin wood for the desk requires great care to avoid warping. Follow this three-stage process: First, rough-cut the pieces oversize. Second, resaw the pieces at least 1/8" extra-thick. Third, joint the face sides and plane to final thickness. At each stage, allow the material to "rest" a couple of days before proceeding. As a final precaution, prepare about 25% extra material.

Start by building the carcass. It only has five parts: the top and bottom (A1), two sides (A2) and a back panel (A3). Note carefully how the grain runs on

these pieces (Fig. A, p. 38) and make sure they're flat before proceeding.

Using a dado head on the table-saw, cut rabbets along the ends of the side panels to accept the top and bottom (Fig. C). Cut a continuous groove to receive the drawer lock bolt into the underside of the cabinet top along its front edge (Fig. H, page 42). You'll need to purchase the drawer lock before cutting this groove (see Sources, page 43). The groove should be just a little bit wider than the bolt and positioned directly above where the bolt will go.

Cut a 1/4" groove for the drawer stops along the front edge of the bottom piece (Photo 1). Make filler pieces (A6) and drawer stops (A7) to fit the groove. Cut the drawer stops to length, then glue in the filler pieces, leaving room between them for the drawer stops (Photo 2). Plane the filler pieces flush. Use a similar pro-

cedure for filling in the groove for the drawer lock. Note that you'll have to figure out the exact position of the lock, side to side, before proceeding. Make the bolt's "mortise" at least 1/8" extra-long for insurance.

Cut a 1/8" groove along the rear edges of both sides and the top and bottom to receive the back panel (Fig. H). Rabbet the back panel to fit these grooves. In addition to the tongue, the width of the rabbet must include room for 1/16" thick satinwood stringing (A4) and a 1/16" reveal (Fig. E).

Miter the stringing to fit the back panel (Photo 3). Glue the stringing in place, then plane the stringing flush with the outside face of the back panel. Make sure the panel fits inside the assembled case (Photo 4). It should be able to move about 1/16" up and down, to allow for expansion.

Make a temporary "drawer front" that perfectly fits the drawer opening



5 **Glue** the carcass. To keep the assembly square, place a tight-fitting piece of wood in the opening where the drawer will go.



6 **Make** the easel. Join its legs and rail with a half-lap joint.



7 **Saw** v-grooves across a block. The grooves support the easel when the desk's writing surfaces are tilted up. Rip the block in half.



8 **Fit** and glue the v-groove blocks into two recesses in the top of the carcass. Sawing the grooves in these loose pieces is less risky than chopping directly into the carcass.



9 **Make** the writing panels, which have breadboard ends. Saw tongues on the ends of the panels, then plane the tongues to fit the breadboards' grooves.

(**Photo 5**). Use this piece to ensure that the carcass is square as you glue it together. After the glue is dry, plane and scrape the joints flush.

Make the easel

The easel consists of two legs (C5) and a rail (C4) forming an *H*. The pieces are connected with half-lap joints (**Photo 6**). The original desk's easel was made with 1/8" stock, but I increased its thickness to 3/16" to make it stronger and easier to build. Cut each half of the joint a little shy, then plane the corresponding piece to fit. Taper both ends of each leg, then glue up the easel.

The easel will be hinged to the underside of the lower writing panel (C1). When opened, its feet are set into narrow, angled mortises in the top of the carcass, thus supporting both writing panels at an angle.

Rather than tediously chop each

mortise—and run the risk of ruining the top by making a mistake—it's best to adopt a different strategy, using inlaid "easel support" pieces (A5). Make both pieces from one blank. Saw the blank (**Photo 7** and Fig. B), then rout shallow rectangles in the carcass top to receive the supports. Cut the blank into two pieces and fit them into the recesses (**Photo 8**). Glue the supports in place and plane and scrape them flush. Note that the orientation of the support's grain is the same as the carcass's top.

Build the writing panels

Make sure the stock for the writing panels and breadboard ends (C2) is perfectly flat before proceeding. Saw a 1/8" wide groove down the edge of the breadboards (Fig. D, page 38), then mill corresponding tongues on the ends of the panels. Leave the tongues a bit fat, then plane them down for a

perfect fit (**Photo 9**). Glue the breadboards onto the panels. Leave 2-1/2" at the ends unglued in order to allow the panels to move with changes in humidity. Plane the breadboards level with the panels.

Rout or plane a thumbnail profile on three sides of each panel (Fig. D). The side that will receive the hinges should be left square. A thumbnail shape softens the overhanging edges of the writing panels and lessens unsightly wear.

The easel must be recessed into the underside of the lower writing panel so both panels can sit flat on the carcass. Trace an outline of the easel on the lower panel allowing a 1/16" margin all around (Fig. D). Using a trim router with a 1/4" straight bit, excavate the panel within 1/16" of the outline (**Photo 10**). Straighten the edges of the recess with a chisel. Attach the easel with two hinges. (Although the



10

Rout a recess into the underside of the lower writing panel to receive the easel.



11

Recess both panels to receive pieces of felt. The recess is very shallow—it enables the felt to be flush with the breadboards.



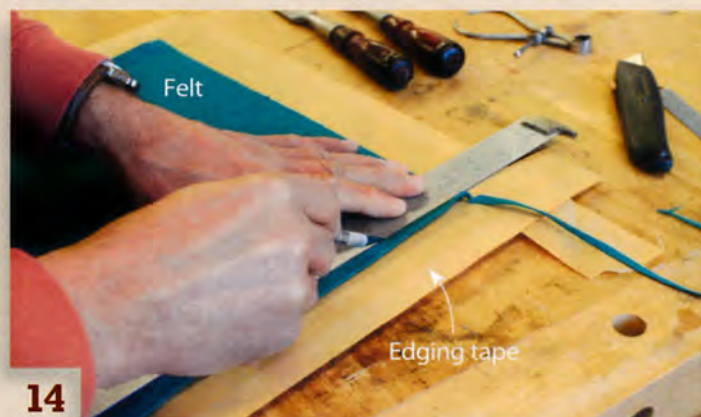
12

Rout mortises for the hinges that connect the writing panels. Install the hinges in both panels, joining the panels together.



13

Plane the surfaces of the writing panels so they're even with each other. When the panels are opened, you'll want them to form a continuous, smooth surface.



14

Glue oversize pieces of felt into both recesses, then trim the felt to fit before the glue dries. Edging tape protects the wood.

drawing shows butt hinges here, I've since switched to strap hinges. You can see them in Photo 21. Both types of hinges are listed in the Sources).

Add the baize

Using the trim router again, excavate the panels for the baize (felt) writing surface (**Photo 11**). Of course, you'll need to buy the baize first (see Sources). Measure its thickness in order to figure out how deep the recess should be. Note that the baize doesn't run the full width and length of the writing panels—when the panels are open, the baize is bordered by the breadboards and sections of the writing panels that are not recessed. Draw a border on both writing panels, making sure you've identified the correct sides!

Beginning on the side where the hinges will eventually go, take small, light cuts, traveling lengthwise. Stop

shy of the breadboards and the writing-panel borders. Clean up the edges of the recesses with a chisel and small shoulder plane.

To join the panels on the original desk, Randolph used small butt hinges and staggered their placement because the panels were so thin. By doing so, one set of hinges unfortunately intruded onto the writing surface. Instead of using small butt hinges to connect the panels, I substituted slender strap hinges. These are placed entirely on the breadboard ends and offset from each other for maximum strength. Use a router with a fence to create the hinge mortises, then install the hinges that join the two panels (**Photo 12**). Use a block plane and scraper to level the panels where they meet (**Photo 13**).

To apply the baize, mask the borders with painter's tape and spray a coat of 3M Super 77 adhesive onto

the recessed areas. While waiting for the glue to set, cut a slightly oversized piece of baize, spray a light coat of adhesive onto its back and set it aside. After a few minutes, replace the painter's tape (sullied by adhesive overspray) with a fresh layer.

Carefully drape the baize over the panels, gently press the fabric into place and smooth out any wrinkles. Lightly push the material into each corner. Carefully trim the baize in place with an X-Acto knife (**Photo 14**). With the baize only lightly glued down, press it tightly against the recesses' borders to close up any small gaps. When everything looks good, press down on the baize with some force, using only your hand, to ensure a strong bond.

Dovetail the drawer

So far, all the desk's parts have been very small in scale, but building the car-



15

Make the drawer. Start by laying out the dovetails using a metal template.



16

Cut out the waste pieces between the tails using a jeweler's saw. These openings are very small!



17

Trace the tails onto the drawer front using a carving knife.



18

Aim for a nice, tight fit. These dovetails invite close scrutiny, so take your time and do a nice job!

case, easel and writing panels is just a warmup for making the drawer. You'll be working with extremely thin material and precisely executing tiny joints.

When beginning any new project, I usually make two full-size practice joints using the same wood—and the same dimensions—that the project calls for. This provides an opportunity to carefully select my tools, become familiar with the joinery, figure out the sequence of operations and get the feel of the material. The time I spent practicing this drawer's miniature dovetails definitely paid off.

The drawer is joined with half-blind dovetails at the front and through dovetails at the back, which is typical of a well-made period drawer (Fig. F). The half-blind dovetails are the ones that will be subject to the closest scrutiny. Take your time and do a nice job.

Mill the drawer front (B1), back

(B2) and sides (B3) oversize, then plane them to final thickness. To better accommodate the drawer lock, I thickened the drawer front to 11/16" (almost double the thickness of the same piece in the original desk). This also allowed me to elongate the pins and tails, producing a nicer-looking, more elegant joint. Trim the four parts to final width and length, making a special effort to cut the drawer front to fit tightly in the opening.

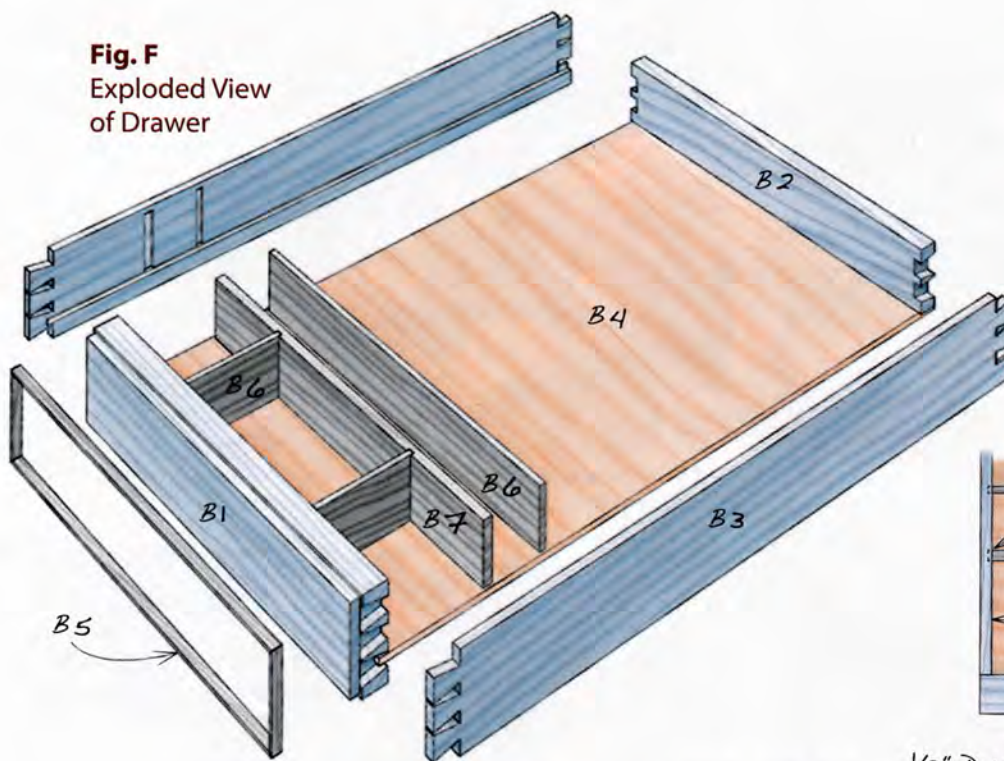
While there are many ways to cut dovetails by hand, let me lead you through a method I've followed for years. I always do my tails first. Lay them out on a piece of aluminum flashing using a utility knife (Fig. H). Cut out the waste with stationery scissors. Trace the template onto the tail boards using a thin carving knife (Photo 15). Scribe the baselines quite deeply with a sharp marking gauge or a utility knife.

Saw fine, clean kerfs directly through the angled lines. Remove the waste near the baseline with a jeweler's saw (Photo 16), then perform very minor cleanup with a small chisel and a marking knife.

Mark the pins on the ends of the drawer front directly from the tail boards (Photo 17). This time, cut outside each line. Remove the waste between the pins and carefully pare to the line (Photo 18). This technique, scrupulously executed, always produces impeccable dovetails.

As for the through dovetails at the back of the drawer, you may wonder why I've departed from tradition and made the back piece substantially thicker than the sides. There's a very practical reason: This extra width is necessary for screwing the drawer bottom in place. Cut the through dovetails using the same method used for the half-blinds.

Fig. F
Exploded View
of Drawer



See how adding drawer slips can strengthen thin sides
AmericanWoodworker.com/WebExtras

Fig. G Drawer Partitions

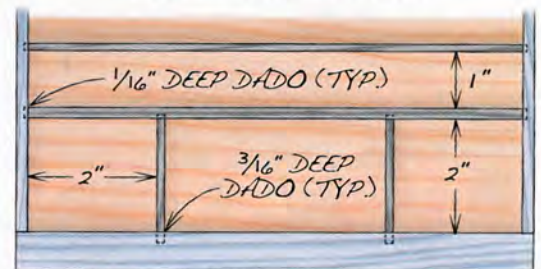
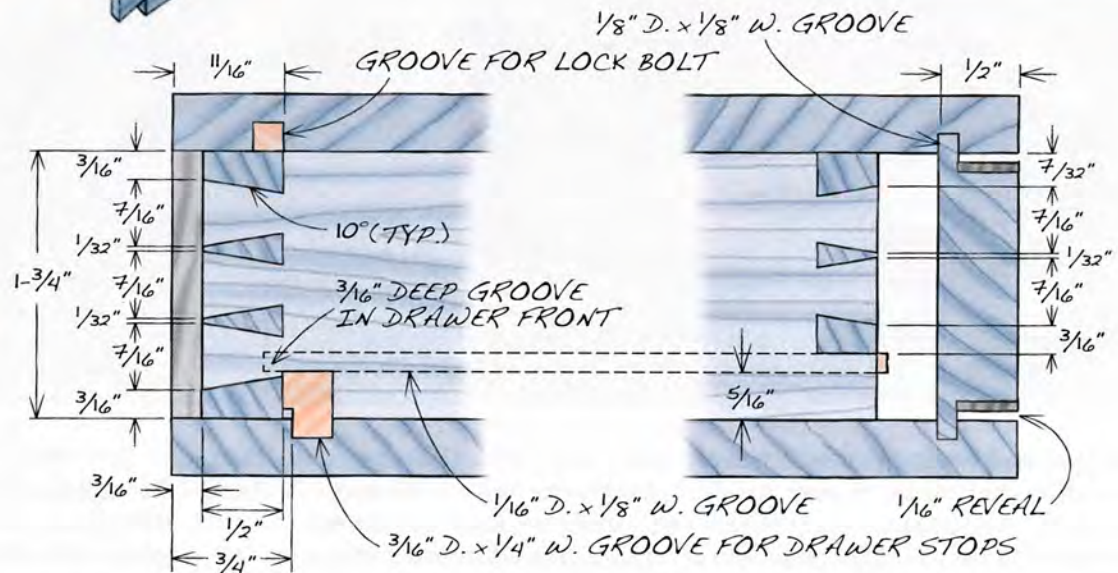


Fig. H
Carcase and
Drawer Details



Saw the grooves in the drawer's front and sides to receive the drawer bottom (B4). Note that this groove should be completely hidden by the front dovetails; it should also be high enough to clear the drawer stops when the drawer is inserted into the cabinet.

Install drawer hardware

I've selected a drawer lock, key escutcheon and handle that are similar to period hardware (see Sources). Install the drawer lock first. Clamp the drawer front onto the bench and mark out the position of the lock. After cutting the mortise, gently press the pin into the mortise, leaving a clear mark. (The pin receives the hollow end of the key.) Drill a 3/16" hole through

the mark. Place the lock in the mortise and screw the lock in place.

Turn over the drawer front to make sure that the lock pin is centered in its hole. If all is good, center the escutcheon over this hole and mark its outline onto the drawer face. (Tapering the sides of the escutcheon with a file will make it easier to install.) Using a 1/8" straight chisel, pare away the waste until the escutcheon fits tightly but sits proud. In addition, use the chisel to carve out the rest of the keyhole. Coat the excavation with epoxy and press the escutcheon into place with a clamp. After the glue hardens, file the escutcheon flush with the drawer front.

Once the escutcheon is glued in, test-fit the key. It should slide in easily

and engage the lock. If the fit is a little tight, open the keyhole a bit with a file.

Complete the drawer

The drawer partitions (B6 and B7) can be laid out any way you wish. The drawing here shows their arrangement and spacing in the original desk (Fig. G), but consider what modern materials or supplies you'll store in the drawer before committing to a particular design. You can cut the various grooves to hold the partitions by hand or by using a router.

Make the drawer bottom with the grain running side to side. Make sure its edges run nicely in the grooves in the drawer sides, then cut a small slot in its back end to receive a small pan head screw. (The slot allows the bottom to



19

Install the drawer stops. Using a small bullnose rabbet plane, shave the front edges of the stops so the drawer front is flush with the carcass.



20

Glue satinwood stringing around the front of the drawer, after it has been glued and fitted.



21

Finish the desk with shellac, followed by a coat of paste wax.

expand and contract without cracking.) Glue up the drawer. Slide in the bottom to hold the drawer square and glue the bottom in the groove in the drawer's front. Install the screw.

Test the drawer in the carcass. It should be a snug fit, with just the smallest reveal all around. If it's too tight, judiciously plane the sides or top and bottom edges. Glue the two drawer stops into their mortises, then trim the stops with a small shoulder plane, if necessary, until the drawer stops flush with the case (**Photo 19**). Test the lock to make sure the bolt engages its mortise.

The stringing (A4) comes last. Cut a 1/16" deep by 3/16" wide rabbet all around the drawer front on the table-saw, burying part of the blade in a sub-fence. Miter the stringing to fit, then glue it into the rabbet using masking tape to hold it in place (**Photo 20**). Trim the stringing flush with a block plane.

Assemble and finish

Attach the hinges that hold the writing panel assembly to the cabinet. The writing panels should lie flat on the case when closed, then easily swing open at the four angles provided by the easel. If the panels bind when opened, bevel the hinge edge of the upper panel. Lastly, install a cleat (C3) to support a book when the writing panels are closed and propped at an angle.

Dismantle the desk. After a thorough sanding, apply a 1 lb. sealer coat of shellac. Rub it out when dry. Apply a second coat of 2 lb. shellac and rub this out as well. Finally, apply a coat of paste wax (**Photo 21**). This finish yields a very soft, low-luster sheen; a high-gloss finish isn't appropriate here, I believe. After a few months of exposure to sunlight and plenty of gentle but careful handling, your mahogany will develop a wonderful bronze color and an attractive patina.

SOURCES:

- Bank Shot Billiards, bankshotbilliards.com, 21 oz. Pool Table Green Felt, \$8.99/ft., available only through their store on Amazon.com.
- White Chapel Hardware, whitechapel-ltd.com, 307-739-9478, Box Strap Hinges, #247HV12, \$11.58 ea.
- Lee Valley, leevalley.com 800-267-8767, Small Box Hinges, #00D30.09, \$1.50/pr.; Small Utility Hinges, #00D12.30, \$0.70 ea.; 1-1/2" Economy Tilt/Drawer Lock, #00P20.15, \$13.60; 1/2" Extruded Escutcheon, #00A03.01, \$3.90; 64mm Classic Handle, #01A66.01, \$5.30; screws as needed.



Mario Rodriguez

teaches woodworking at the Philadelphia Furniture Workshop, philadelphiafurnitureworkshop.org.

Medieval Folding Stool

An ancient design
to challenge today's
woodworker.



by Tom Caspar

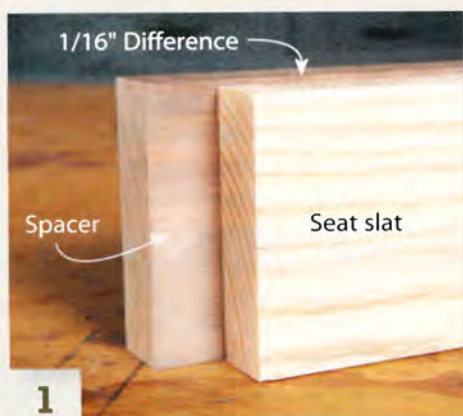
HAVE YOU EVER HEARD of a “faldstool”? You’ve probably seen one in a movie set in medieval or Renaissance times—it’s the portable chair that a nobleman or a bishop sits on, the one with curved legs and arms that looks like it would fold together. The oldest faldstools really did fold up, which makes building one an intriguing woodworking challenge.

This modern version was designed by Rick Hardin, an artisan who sells his wares at Scandinavian-themed craft shows. (You can see his work at Vikingcrafts.com.) It’s based on a simple 16th century German faldstool with straight arms and legs, but Rick’s version is wider and taller—for modern-day Vikings—and amazingly sturdy.

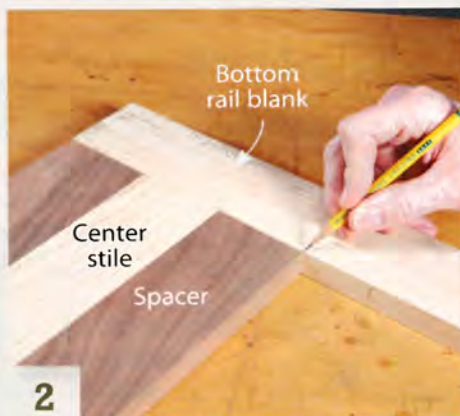
I built the one pictured here from ash, a wood that’s central to Norse mythology. Jock Holmen, a local carver who first introduced me to Rick’s work, embellished the arms with a Nordic dragon motif. Rick’s arms are simpler; you’ll see them in the drawings and how-to photos.

Lifting the seat causes the stool to fold up like an old-fashioned zig-zag clothes rack. See how the puzzle is put together on page 50.





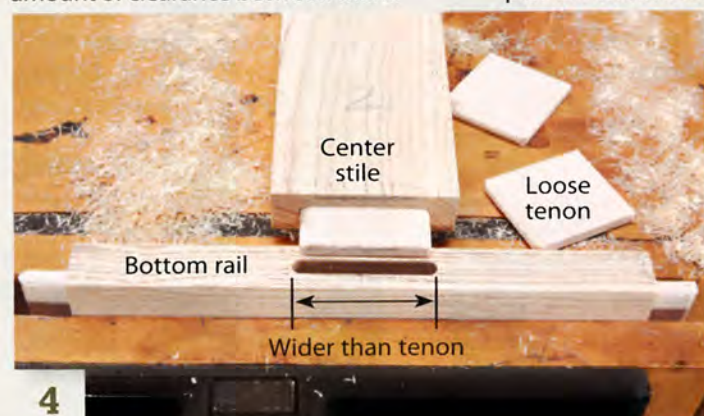
1 **Make** a set of spacers 1/16" wider than the parts of the stool that fold together. The spacers will help you create the right amount of clearance between them.



2 **Use** the spacers to determine the exact length of the stool's bottom rail. The rail's length equals the width of two spacers plus the width of the center stile.



3 **Rout** mortises for loose tenons in the edges of the legs and in the ends of the bottom rails and center stiles. Make the tenons and glue them into these pieces.



4 **Rout** an extra-wide mortise in the top side of the bottom rail. During glue-up, this mortise's extra width will allow you to shift the center stile side-to-side into the correct position, if necessary.



5 **Assemble** each half of the stool, without glue, using the spacers. Trim the legs and center stile to final length as a unit, using a crosscut sled.

Spacers are the key

All of the stool's pieces are 3/4" thick, so you could use pre-milled lumber, if you wish. If you're using rough lumber, cut all of the parts oversize in length and width, then joint and plane them to 3/4" thick (see Cutting List, page 46).

Joint one edge of the legs (A) and rip them to final width. Joint the ripped side, too, then trim the legs 1/4" extra-long. Joint one edge of the center stiles (B), bottom rails (C) and seat slats (D), then rip them about 1/32" extra-wide. Joint the ripped sides, taking a 1/32" deep cut to bring the parts to final width. Trim all of these pieces 1/4" extra-long.

Make four spacers (F) from 3/4" stock. They should be exactly 1/16" wider than the seat slats (**Photo 1**). Place two spacers alongside a center stile to mark off the exact length of the bottom rails (**Photo 2**). Trim the rails to length.

I used 1/4" loose tenons to join the lower half of the stool, but 3/8" dowels or #10 biscuits would work as well. I also used a commercial jig for guiding the router (**Photo 3**; see Source, p. 50), but of course there are many shop-made devices that could do the trick. Rout 1-3/4" wide mortises in the ends of the bottom rails. (Note that the mortises aren't

centered top to bottom; see Fig. B, p. 48). Next, rout mortises of the same size in the ends of the center stiles and in the legs. Lastly, rout mortises in the top sides of the bottom rails (**Photo 4**). (Note that these mortises are 1-7/8" wide.)

Make 1-3/4" wide loose tenon stock (G) and cut it to length. Glue tenons into the ends of the center stiles and bottom rails. Draw profiles on the bottom rails (Fig. D), then bandsaw and sand them to final shape.

Cut the leg profile

In the next step, you'll cut the legs and center stiles to final length. The top ends of these pieces have to line up in order to receive the top rail (E). The best way to ensure this is to assemble each side of the stool, without glue, and cut all three pieces at the same time (**Photo 5**). At least, that's what I thought when I first built the stool. After I glued the pieces together, later on, I found that some had shifted. The tops of the legs and center stile were no longer in alignment. No problem—I just trimmed them as a unit again.

Trim the seat slats to final length. Round the corners of one end of each slat (Fig. G), then saw 45° angles on the other ends (**Photo 6** and Fig. H). Precision is important here—the flat portion left on the angled end of the slats must be exactly 1/8" wide so the measurements for drilling



Carve the dragon! See how it's done at AmericanWoodworker.com/WebExtras

Fig. A
Exploded View

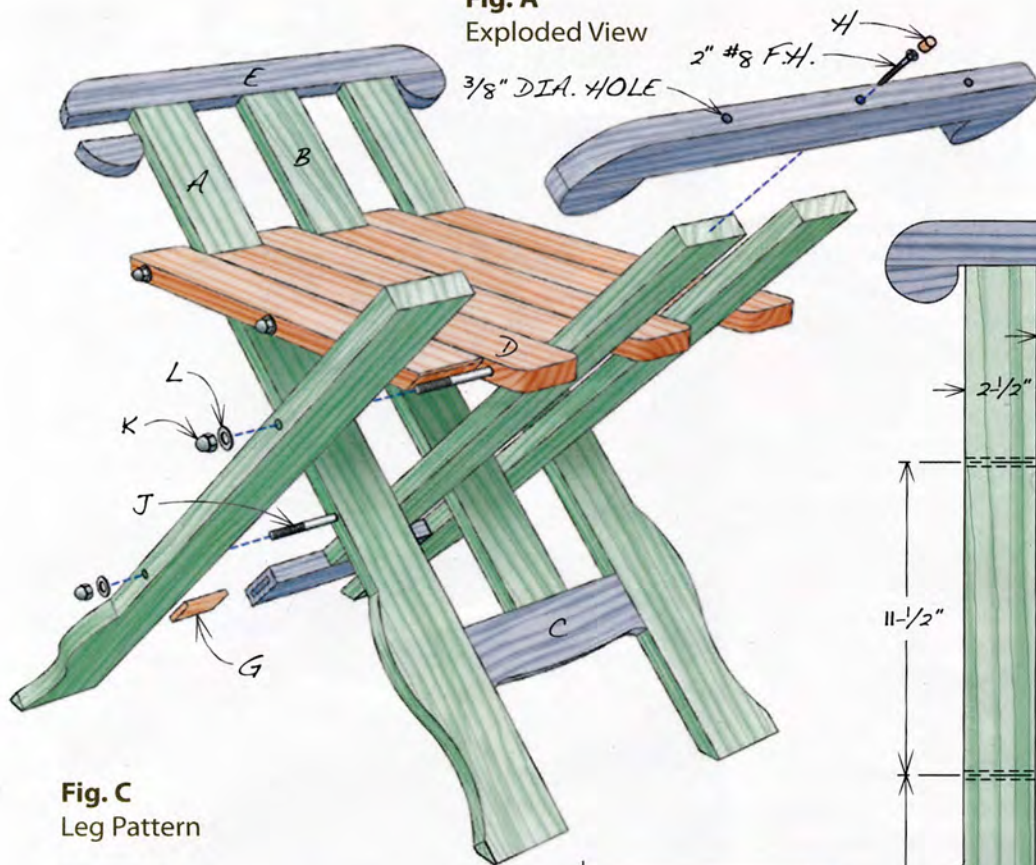


Fig. B Leg Assembly

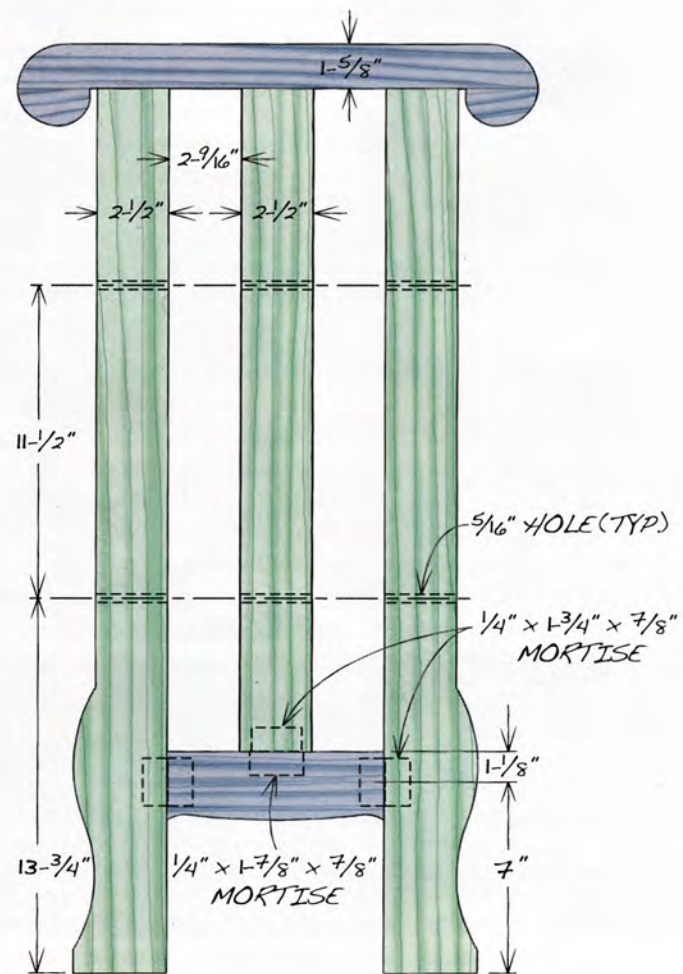


Fig. C
Leg Pattern

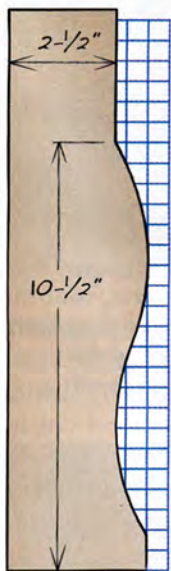


Fig. D
Bottom Rail Pattern

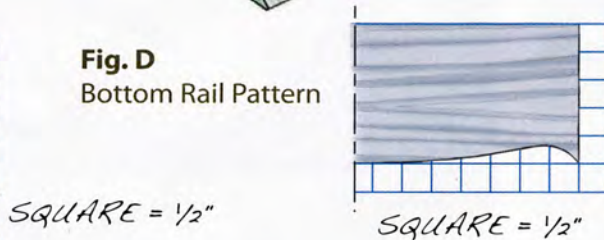


Fig. E Top Rail Pattern

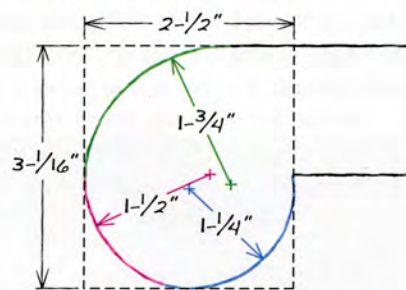
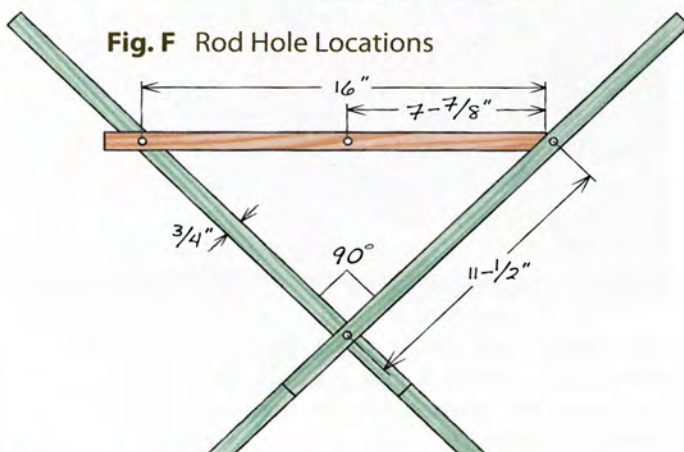


Fig. F Rod Hole Locations



To download full-size patterns for the leg and rails,
go to AmericanWoodworker.com/WebExtras

Cutting List

Overall Dimensions:
24" H x 29-1/2" W x 18-1/8" D

Part	Name	Qty.	Th x W x L
A	Leg	4	3/4" x 3-1/4" x 32-1/2" (a)
B	Center stile	2	3/4" x 2-1/2" x 24-3/8" (a)
C	Bottom rail	2	3/4" x 2-1/2" x 7-9/16"
D	Seat slat	6	3/4" x 2-1/2" x 17-1/2"
E	Top rail	2	3/4" x 3-1/2" x 18-1/8" (b)
F	Spacer	4	3/4" x 2-9/16" x 24"
G	Loose tenon	6	1/4" x 1-3/4" x 1-1/2"
H	Plug	6	3/8" dia. x 3/8"
Hardware			
J	Rod	4	1/4" dia. x 16-3/8" (c)
K	Brass cap nut	8	1/4-20
L	Brass washer	8	1/4-20

Notes:

- a) Cut 1/4" extra-long; trim to final length when assembled
- b) Width and length depend on your design for the ends of the rail.
- c) Determine actual length after stool is built.



6 **Miter** the ends of the legs and seat slats. Use a hinged stop block to position the pieces. This block prevents offcuts from getting trapped, which could cause kickback.



7 **Rip** the top portion of the legs to final width using a bandsaw, fence and featherboard.



8 **Drill** holes for the rods that will pass through the stool's folding parts.



9 **Glue** the leg assemblies together. The spacers ensure that the legs and center stile are parallel and the same distance apart.



10 **Glue** "ears" on the ends of the top rails. Cut or carve them any way you wish to personalize your stool.



11 **Thread** the ends of four pieces of 1/4" cold-rolled rod. Use a shop-made tap to make sure that the threads are straight.

holes through the slats work out correctly. Saw 45° angles on the bottom ends of the legs at the same time. I used a flip-up stop block when cutting these miters (see Workshop Tips, "Flip-Up Safety," p. 14).

With joints cut and ends trimmed, it's time to finish the legs. Draw profiles on the lower ends of the legs (Fig. C), then use a bandsaw to rip the upper half of the legs to width, stopping the cut where the profile's curve begins (Photo 7). After repeating the process for all the legs, saw their profiles. Smooth the sawn surfaces; I used a No. 80 scraper on the ripped portion, but a block plane would also do the job. However you smooth it, make sure this section stays straight.

Drill the rod holes

In the next steps, you'll drill holes for the rods that enable the stool to fold together. While these holes are larger in diameter than the rods, allowing for some play, they must be precisely laid out and drilled to prevent the stool's parts from binding. Precision is also necessary to ensure that the seat slats lie in the same plane when the stool is opened, forming a flat seat. Please note that the measurements for the locations of the rod holes in the seat slats only work if your material is exactly 3/4" thick. If it's thinner, the holes must be slightly closer together; if it's thicker, farther apart.

The best way to drill the rod holes is to set up a long table and fence on your drill press (Photo 8). The table should support the full length of the workpiece. Clamping the workpiece to the fence ensures that it will be perpendicular when drilled. The fence also allows you to use a stop block to ensure all holes are in alignment.

First, mark the location of the rod holes through the legs (Fig. B). Mark centerlines on the legs' outside edges, then continue these lines across both faces of the legs. To lay out the corresponding holes in the center stiles, reassemble each half of the chair. Lay a straightedge along the centerlines and continue the lines across the face of each center stile. This method assures that all the holes will be in alignment.

Before you drill, be sure that the bit is precisely centered on your stock. (A brad-point bit is easier to set up than a standard twist bit.) Drill the holes through all the legs and seat slats (Fig. F), then use a cordless drill and a countersink bit to form large chamfers on both sides of each hole. These chamfers will make the chair much easier to assemble.

Glue the leg assemblies together (Photo 9). Clamp a pair of battens across the top of the legs and center stile to ensure that they stay in the same plane. In addition, place a clamp across the assembly, above the bottom rail, to pull the legs tight against the spacers.



12

Assembling the stool is a four-step process. First, insert a rod through both leg assemblies.



13

Fasten the top rails to both assemblies with screws. Clamp the parts together to make sure they stay flush.



14

Next, install seat slats on both sides of the stool. The slats also pivot on a rod.



15

Complete the assembly by passing a rod through the center of all of the slats. Thread cap nuts on both ends of the rods to hold them in place.

Fig. G Seat Slat Profile

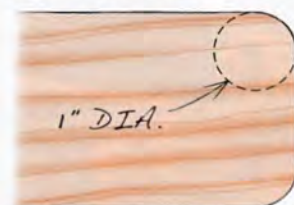


Fig. H Mitered Ends

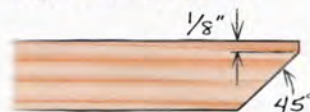


Fig. J Rod Length



The last wooden parts to tackle are the stool's top rails (E). They should look like they're made from one piece, but their lower edges—the part that butts against the legs and center stile—must be absolutely straight. The best way to accomplish this is to make these pieces extra-wide and rip them in half. Joint the lower side of the upper section, then drill holes in it for the screws that will fasten the rails in place. Crosscut the lower section into three pieces, then glue the end pieces back onto the upper section (Photo 10). Lay out and saw the rail's profile with a circle template (Fig. E).

Make the rods and assemble

There's one more set of parts to make: the four metal rods (J) that pass through the stool. The round rod available at hardware stores comes in two types, hot-rolled and cold-rolled. Buy the cold-rolled. Hot-rolled rod is covered with a tough scale that can damage a tap, and generally isn't truly round.

To measure an exact length for the rod (all four pieces are the same length), place one seat slat 1/16" away from a leg assembly. Measure the distance from outside edge to outside edge, then add enough additional length for the rod to bottom out in a pair of cap nuts (K) and pass through a pair of washers (L). In addition, allow two healthy gaps between the washers and the stool (Fig. J).

Cut the rod to length, then thread about 3/4" down both ends of each piece (Photo 11). I made an improved holder for my 1/4-20 tap to ensure that the threads would be straight (see Workshop Tips, "Nice Threads," p. 15).

Assemble the stool to make sure the rod holes all line up. First, run one rod through the lower holes in both leg assemblies (Photo 12). Second, fasten both top rails in place (Photo 13). You can make the plugs (H) that cover the screws at this time, but don't glue them in the holes yet. Third, install both sets of seat slats using two more rods (Photo 14). Run the last rod between all of the slats (Photo 15). When you turn the stool upright, everything should fall right in place.

With so many interlocking pieces, it's best to finish the stool by taking it apart. Temporarily reattach the top rails, break all sharp edges with 100-grit sandpaper and apply three coats of finish. (I used a water-based poly.) When you reassemble the stool, glue on the top rails and add the screw plugs.

Rick, the stool's designer, also added a leather string to one of the top rails in order to tie the stool together when it's folded up. Good idea! 

SOURCE

RG Jig Co., mortisepal.com, 619-459-7951, Mortise Pal Jig Kit, \$209.

Pinwheel Picture Frame



An Arts & Crafts homage that's easy to build.

by Laurie McKichan

BOTH OF THE PRINTS I planned to frame included a windmill as a minor detail. Thinking “What if?” I grabbed four pieces of scrap wood, made a pinwheel and thought, “Not bad!” Adding faux wedges—just to see what they would look like—turned out to be the perfect finishing touch for one of my most popular designs.

Make the pinwheel

Quartersawn white oak is appropriate, as this frame channels the Arts and Crafts era. Mill the stock to 3/4" thickness and

joint one edge. Then rip the frame's long and short side pieces (A and B, Fig. A, page 52 and Cutting List, page 53) to final 2" width. Attach a fence to your miter gauge and square one end of each frame side piece. Then use a clamped-on stop to cut them to final length (**Photo 1**).

The first time I made this frame I used mortises and loose tenons. Biscuit joinery is both easier and faster! Mark one end of each frame side to locate the #0 biscuit slots (**Photo 2**; Fig. B). These slots have to be offset, because they're wider than the frame sides. No worries: The faux wedges will hide the exposed



1
Cut the frame's long and short side pieces to length, using a miter gauge equipped with a fence and a stop block.



2
Cut an offset biscuit slot in one end of each side piece, using a support block to securely position the biscuit joiner.



3
Cut a slot in one edge of each side piece, located to align with the slot in the end of the side piece that forms the butt joint.



4
Glue up the frame after shortening the biscuits to fit the joints. Assemble the opposite corners. Then slide together the halves.

slots. The frame side pieces are narrow, so you have to clamp them next to a support block to create a surface that's wide enough to register the biscuit joiner when you rout the slot.

Clamp the frame together and extend the marks on the end of each part to the edges of the adjacent parts. Use these marks to cut the slots in the edges (**Photo 3**).

Shorten the biscuits so they won't protrude beyond the assembled joint. Apply glue in each slot, install biscuits in the ends of each piece and then assemble the frame in stages. (**Photo 4**). Since this frame has no miters, it's easy to clamp!

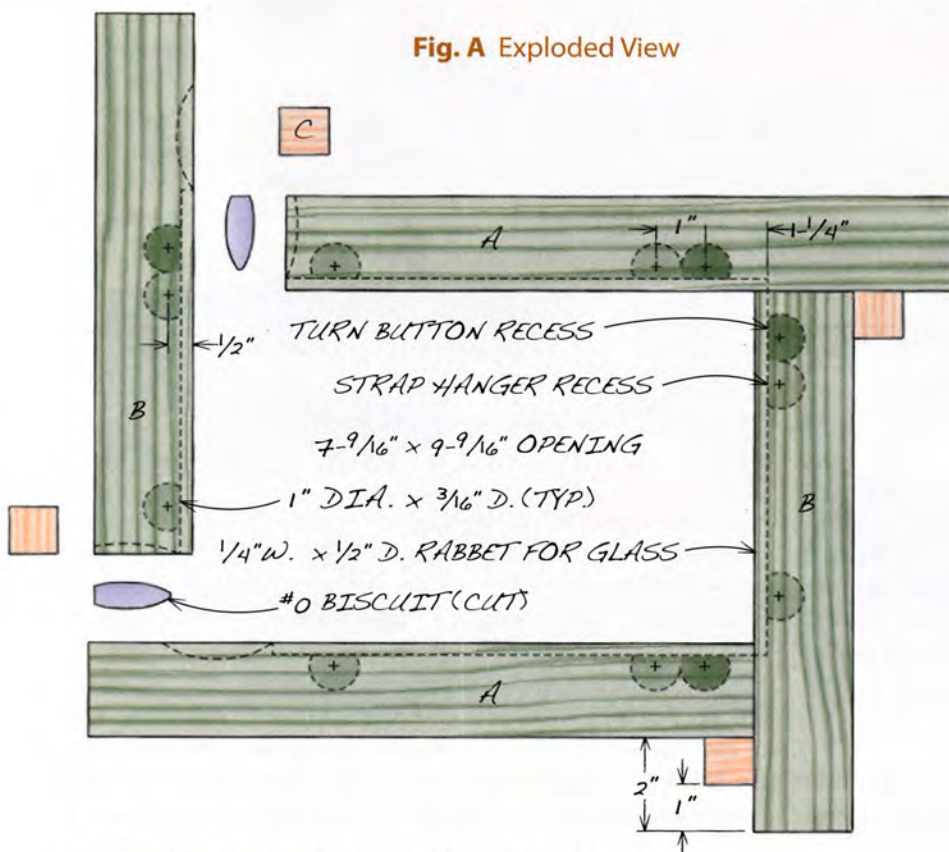
Rout and drill the back

Sand the frame on both sides to make sure all the joints are flush. Then mark the front, so you don't mistakenly rout the rabbet for the glass on the wrong side.

Rout the rabbet by making successive passes and incrementally raising the bit (**Photo 5**). Start with the bit set 1/8" above the table and position the frame before you start the router. Carefully move the frame forward into the bit and then rout the rabbet by moving the frame clockwise, against the bit's rotation. Turn off the router between passes and wait for the bit to stop rotating before raising it. Use a chisel to square the rounded corners left by the router.

To make the frame hang flush against the wall, recess the mounting hardware. Install a 1" dia. Forstner bit in the drill press and drill holes in the back, centered 1/2" from the inside edge (**Photo 6**). To determine the holes' depth, subtract the combined thickness of the glass, image, mat and backing from the 1/2" depth of the rabbet. For example, drilling 3/16" deep holes allows mounting a piece of 3/32" glass, a 1/16" mat, a 1/32" image and 1/8" foam backing. The turn buttons (see Sources, page 53) go on all four sides in the holes nearest the corners. The strap hangers (see Sources) mount in the adjacent holes, one hanger per side.

Fig. A Exploded View





Rout a rabbet for the glass by making several passes and raising the bit with each pass. Square the corners by hand.



Drill pockets to house the turn buttons and strap hangers.



Cut the faux wedges using a pull saw and a shop-made miter box.

Drill an extra pair of strap hanger holes and the frame can be mounted horizontally or vertically.

Add the faux wedges

Cut the 1" square faux wedges (C) from a blank milled 1/2" thick x 1" wide x 12" long (the minimum length for safely working with a piece of wood). For small parts like these, I like to use a "mini" miter box (Photo 7).

Finish-sand both the frame and the faux wedges to 180 grit before gluing them on. It's easier to sand the corners and ease the edges when the parts are separate. Mark the inside corner of each faux wedge and keep it square.

Orient the grain on each faux wedge to match the grain on the butted frame part next to it. Test-fit each wedge and sand its inside corner to correct any misalignment. When you glue on each faux wedge, insert a 1/8" hardboard spacer underneath to center the wedge on the frame's edge. This creates an attractive setback at the front and a shadow line at the back. Glue both inside edges and clamp each faux wedge in place (Photo 8).

Layer the finish

To create an authentic Arts and Crafts look, apply a layered finish using both water-based dye and oil-based stain. This finish is very easy to apply and the results are well worth the effort (see "Arts & Crafts Oak Finish," page 54).

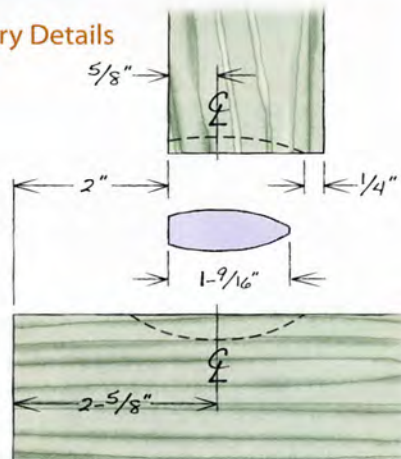
SOURCES

Framing4Yourself, framing4yourself.com, 800-246-4726, 3/4" Turn Buttons with Screws, \$2.25 per 25-pack; One Hole Strap Hangers and Screws, \$4.25 per 20-pack; Light Duty Hanging Wire, 20', \$2.99.



Glue on faux wedges to cover the exposed biscuit slots. Use a hardboard spacer to center each wedge on the edge of the frame.

Fig. B Joinery Details



See how to make a miter box for a pull saw at AmericanWoodworker.com/WebExtras

Cutting List

Overall Dimensions: 3/4" Th x 15-9/16" W x 17-9/16" L

Part	Name	Qty.	Material	Th x W x L
A	Long side	2	Quartersawn white oak	3/4" x 2" x 13-9/16"
B	Short side	2	Quartersawn white oak	3/4" x 2" x 11-9/16"
C	Faux wedge	4	Quartersawn white oak	1/2" x 1" x 1"



Laurie McKichan designs furniture to be "simple, honest and direct." You can see more of her work at lauriemckichan.com.

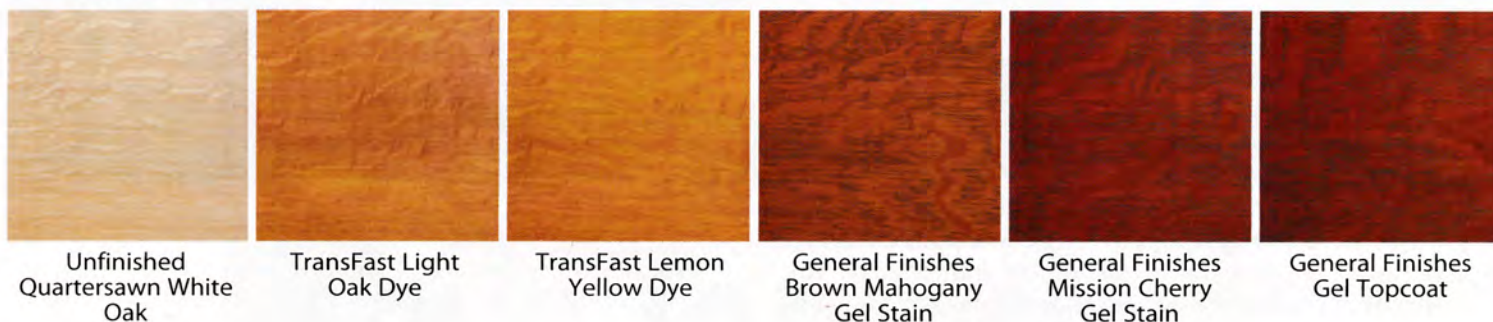


Arts & Crafts Oak Finish

Layering colors
is the secret to an
authentic look.

by Laurie McKichan

Fig. A The Color Layers



WHEN A CUSTOMER asked me to replicate the finish on her antique Stickley sideboard for the new pieces she had commissioned, I grabbed my yellow dye and a few gel stains, because I knew that a layered finish was the only way to achieve the richness and depth of that old Arts and Crafts era finish.

I find layering colors more rewarding than trying to mix a single stain to match a color. A “matched” stain never looks right, because it turns everything the same color. Look closely at an old finish and you’ll see that it actually contains many different colors. By applying each color separately in layers (Fig. A), you can do a better job of imitating that old finish.

Sanding also affects the color. For example, a surface sanded to 120 grit will absorb more color than the same surface sanded to 220 grit. I sanded the frame shown here to 180 grit.

The process

The first three finishing steps go quickly, so it’s nice to have the water-based dye stains ready to go (see Sources, page 55). Mix these stains according to the manufacturer’s instructions. And use distilled water: Oak contains tannins that can react to minerals in tap water and leave black flecks on the wood.

- Step 1** Wet the entire frame. Then let it dry.
- Step 2** Lightly sand the wood, just enough to remove the “fuzz.”
- Step 3** Wipe on light oak dye and wipe off the excess. It’s OK to leave a few streaks. The beauty of layering is that the color inconsistencies in each layer actually enhance the final appearance. Let the wood dry. This usually takes about 15 minutes.
- Step 4** Apply lemon yellow dye using the same method.
- Step 5** Wipe on brown mahogany gel stain. Use a circular motion to rub it in and a small paint brush to work the stain into the corners. Make sure the stain covers all of the yellow dye—especially in the wood’s large pores. Wipe off the excess stain. If you wipe off the small brush, you can use it to clean the corners. Let this coat of stain dry thoroughly.
- Step 6** Apply the Mission cherry gel stain using the same method.
- Step 7** Wipe on one or more top coats. 🛠️

Dampen the wood to raise the grain. You'll be surprised how rough the surface becomes.



Sand lightly to smooth the roughened surface. Skip these first two steps and the water-based dye used in the next step will cause problems.



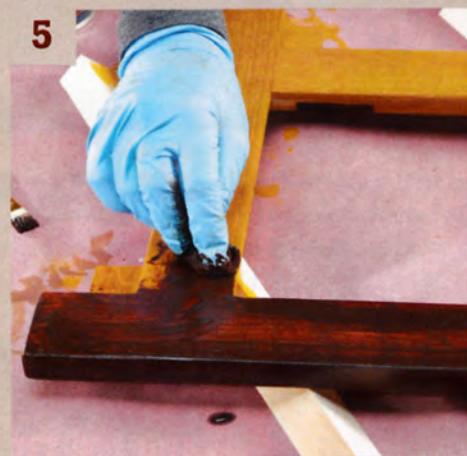
Apply a generous coat of light oak water-based dye. Then wipe off the excess and let the wood dry.



Repeat the previous step using lemon yellow water-based dye. Notice that the light oak dye looks quite different when it's dry.



Wipe on and off a coat of brown mahogany gel stain. Allow this stain to dry thoroughly.



Repeat the previous step using Mission cherry gel stain.



SOURCES

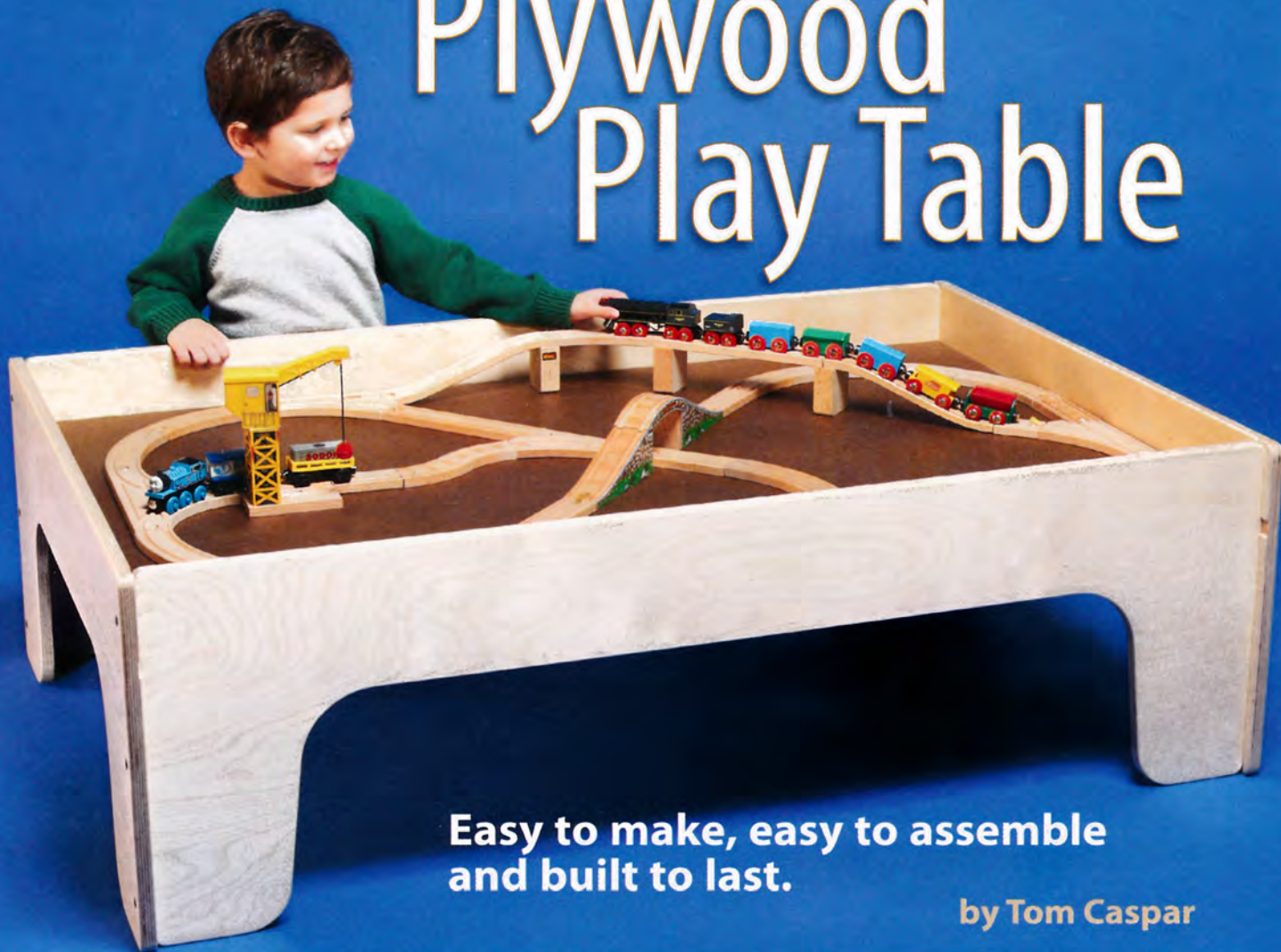
- Homestead Finishing Products, homesteadfinishingproducts.com, 216-631-5309, Where-to-buy information: TransFast Dye Powders, Light Oak, Lemon Yellow, 1 oz. bottle, about \$12.50.
- Rockler Woodworking and Hardware, rockler.com, 800-279-4441, General Finishes Brown Mahogany Gel Stain, qt., #38360, \$19.99; General Finishes Mission Cherry Gel Stain, qt., #24219, \$22.99; General Finishes Gel Topcoat, Satin, qt., #32313, \$21.59.

Laurie McKichan designs furniture to be "simple, honest and direct." You can see more of her work at lauriemckichan.com.

Complete the finish by applying one or more coats of gel varnish.



Plywood Play Table



**Easy to make, easy to assemble
and built to last.**

by Tom Caspar

BACK IN THE PALEOZOIC ERA, when I was a kid, one of my favorite pastimes was playing with a Brio wooden train set. I spread the tracks all over the living room floor, much to the consternation of a very tolerant mom.

Now that I'm the grandfather of a 3-year-old who also loves wooden trains—especially Thomas the Tank Engine—I've built a play table based on a Brio design. It reigns in the play area and allows my grandson to stand, and me to kneel, while indulging our train fantasies. Of course, the table can also be used for Legos or blocks or anything kids like to build up and knock down—its high sides prevent loose pieces from scattering over the house.

I've designed the table to be easy to put together and take apart. All of the pieces form a neat bundle for storing in a closet or shipping to kids who may live far away.

The best material for making the table is 3/4" Baltic birch plywood. Having thick outer plies and no voids, it's extremely durable. Baltic birch comes in 5x5 sheets; other similar multi-ply products that would do just

as well come in 4x8 sheets. To build the table, you'll need one 5x5 sheet or half of a 4x8 sheet.

Before you cut into the plywood, make a template for one of the table's legs (Fig. B). Use 1/4" MDF, hardboard or plywood—MDF is best because it's very easy to shape and sand smooth. Make the template at least 30" long, so it will overlap the center of the table's longest sides. Cut the template's

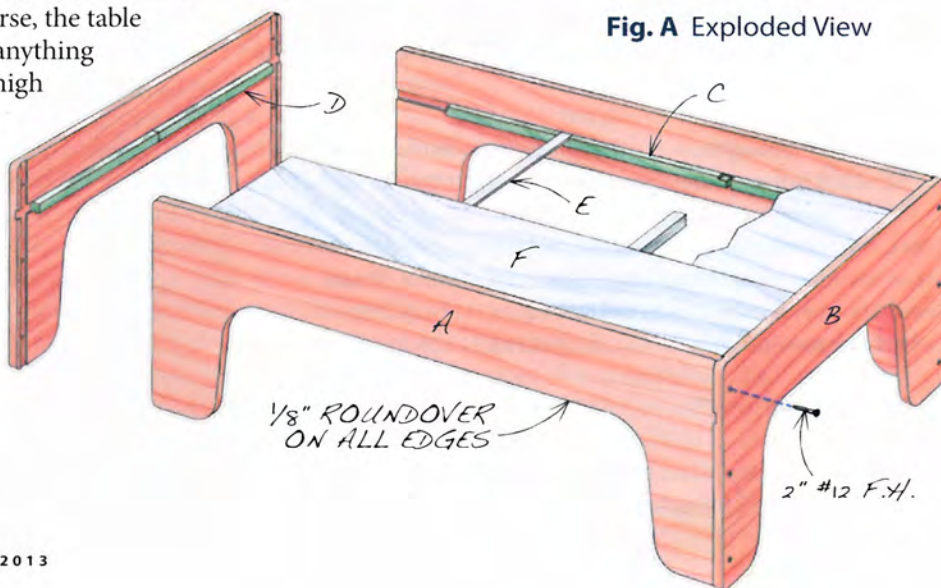
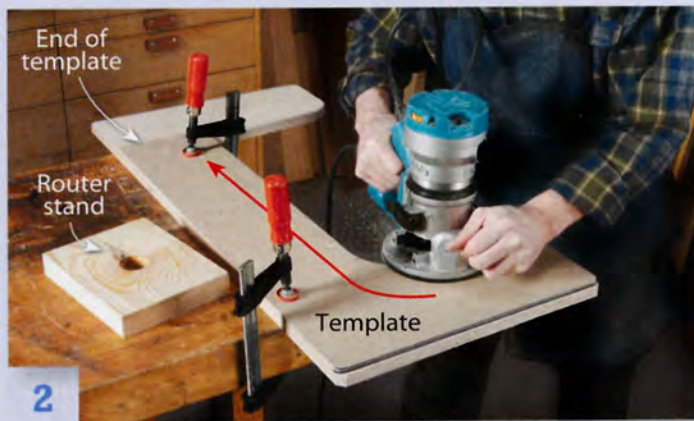


Fig. A Exploded View



1 **Make** a template from 1/4" plywood or MDF. Draw the leg's inner curve by tracing around a coffee can. Tape sandpaper around the can and rotate it to make the template smooth.



2 **Shape** pieces of Baltic birch plywood, using the template and a router equipped with a top-bearing pattern bit, to make all four parts of the table. Use the same template for each leg.

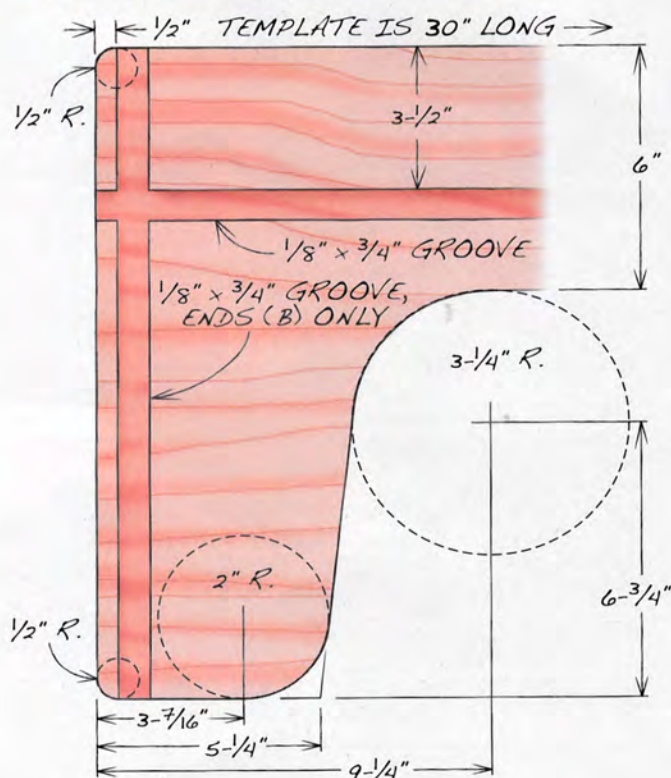


3 **Saw** dados down the length of the table's sides and ends. These dados will receive the ledger strips that support the table's platform.



4 **Glue** the ledger strips in the dados. Use spacers to make sure there are 1/8" gaps between the three ledgers on the table's long sides.

Fig. B Leg Pattern and Groove Layout



straight sections on the tablesaw to ensure that they're square. Cut the curved portions using a jigsaw or bandsaw, then sand them to remove any lumps or divots (**Photo 1**).

Use the template to lay out the table's sides (A) and ends (B) on your plywood (Fig. E). Cut the plywood into two 24" x 48" pieces so they're easy to manage, then cut out the ends and sides. Stay about 1/16" to 1/8" away from any line that you can't saw accurately or easily on the tablesaw, so the pieces are oversize. I used a jigsaw at first, but the plywood tore out quite a lot. I got better results with a bandsaw and a 1/4" blade.

Clamp the template to each piece and use it as a guide for your router, using a top-bearing pattern bit (**Photo 2**). When you're done with all the pieces, use a 1/8" roundover bit with a bearing to soften every exposed edge.

Next, set up a dado set to make a groove that fits the plywood's thickness. Your plywood will probably be a little less than 3/4" thick, so you'll have to use shims to make a groove that's the correct width. Cut 1/8" deep grooves down the length of all four side and end pieces (**Photo 3**). Cut vertical grooves down both legs of the end pieces—but not the side pieces. All of these grooves help align the parts when you



Learn more about routing with a template at
AmericanWoodworker.com/WebExtras



5 Drill holes for the screws that will hold the table together. Using this jig ensures that the holes will be plumb and in the right spot.



6 Fasten the table together. Place the second end piece on top of the sides to hold the table square. The end pieces have dados that lock the side pieces in position.



7 Install steel angle iron in the gaps between the ledger pieces. The rigidity of the angle iron prevents the platform from sagging.

assemble the table.

Cut ledger strips (C and D) to fit into the grooves. Using the dado set, cut notches on both ends of two side ledgers (Fig. D). Glue the ledgers into the grooves (**Photo 4**). On the side pieces, start with the middle ledgers and make sure they're centered. Use a 1/8" spacer to position the outer ledgers.

Drill holes through the end pieces for the screws that will fasten the table together (**Photo 5**). I built a reversible jig for this job (Fig. C), but it's not strictly necessary. Clamp the table together, making sure it's square, and drill pilot holes into the side pieces (**Photo 6**). Install the screws.

Measure the distance between the side rails, then cut pieces of steel angle iron (E) to fit. Drop the angle iron in the notches between the ledgers (**Photo 7**). The angle iron makes the table sturdy enough for a kid to stand on, should playtime get really out of hand!

Cut the platform (F) to fit. I made the platform from two pieces of 1/2" MDF and connected the pieces with five biscuits—glued in only one piece—so the two halves would stay aligned. These pieces are no wider than the table's ends and sides, so they store compactly. You could also use 1/4" hardboard for the platform, but it should be one big piece because it's too thin to align with biscuits. Take the table apart and finish it with three coats of poly. 

Cutting List

Overall Dimensions: 16" H x 49-1/4" W x 33" D

Part	Name	Qty.	Material	Th x W x L
A	Side	2	Baltic birch plywood	3/4" x 16" x 48"
B	End	2	Baltic birch plywood	3/4" x 16" x 33"
C	Side ledger	6	Baltic birch plywood	3/4" x 3/4" x 15-5/8"
D	End ledger	4	Baltic birch plywood	3/4" x 3/4" x 14-1/2"
E	Brace	2	Steel angle iron	1" x 1" x 30-5/8"
F	Platform	2	MDF	1/2" x 15-5/16" x 47-3/4"

Fig. C Drilling Jig

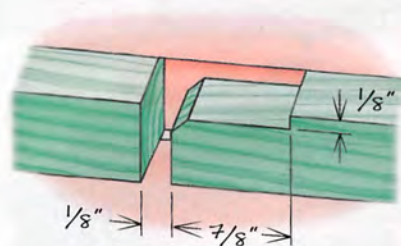
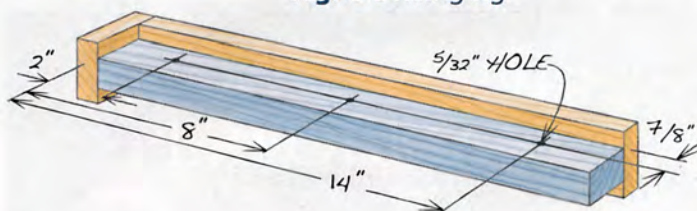
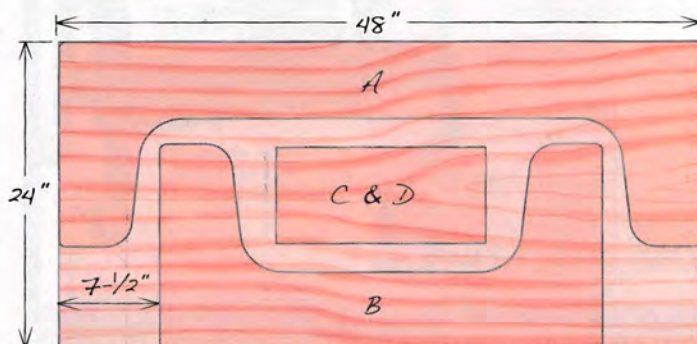
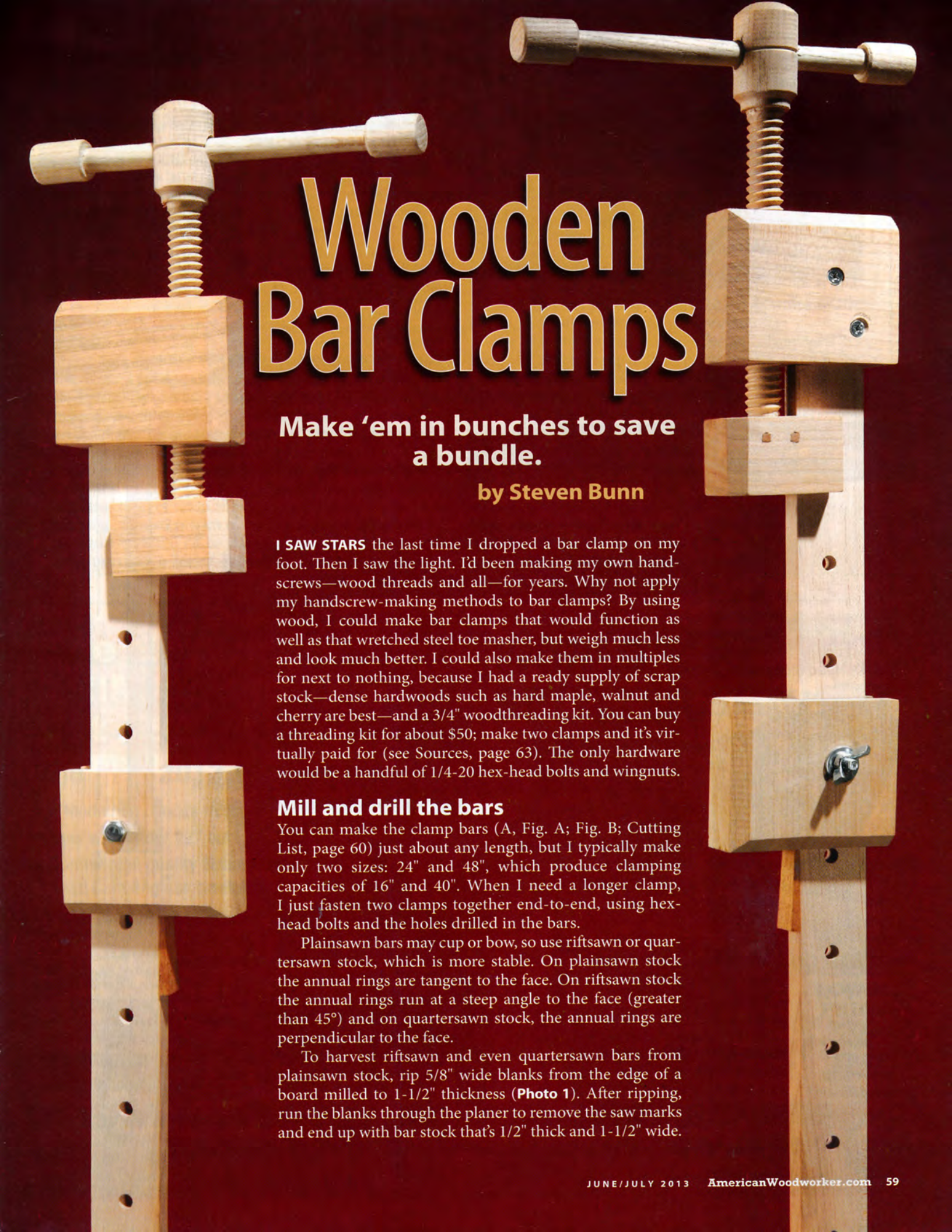


Fig. D
Ledger Detail

Fig. E Plywood Cutting Diagram





Wooden Bar Clamps

Make 'em in bunches to save a bundle.

by Steven Bunn

I SAW STARS the last time I dropped a bar clamp on my foot. Then I saw the light. I'd been making my own handscrews—wood threads and all—for years. Why not apply my handscrew-making methods to bar clamps? By using wood, I could make bar clamps that would function as well as that wretched steel toe masher, but weigh much less and look much better. I could also make them in multiples for next to nothing, because I had a ready supply of scrap stock—dense hardwoods such as hard maple, walnut and cherry are best—and a 3/4" woodthreading kit. You can buy a threading kit for about \$50; make two clamps and it's virtually paid for (see Sources, page 63). The only hardware would be a handful of 1/4-20 hex-head bolts and wingnuts.

Mill and drill the bars

You can make the clamp bars (A, Fig. A; Fig. B; Cutting List, page 60) just about any length, but I typically make only two sizes: 24" and 48", which produce clamping capacities of 16" and 40". When I need a longer clamp, I just fasten two clamps together end-to-end, using hex-head bolts and the holes drilled in the bars.

Plainsawn bars may cup or bow, so use riftsawn or quartersawn stock, which is more stable. On plainsawn stock the annual rings are tangent to the face. On riftsawn stock the annual rings run at a steep angle to the face (greater than 45°) and on quartersawn stock, the annual rings are perpendicular to the face.

To harvest riftsawn and even quartersawn bars from plainsawn stock, rip 5/8" wide blanks from the edge of a board milled to 1-1/2" thickness (**Photo 1**). After ripping, run the blanks through the planer to remove the saw marks and end up with bar stock that's 1/2" thick and 1-1/2" wide.

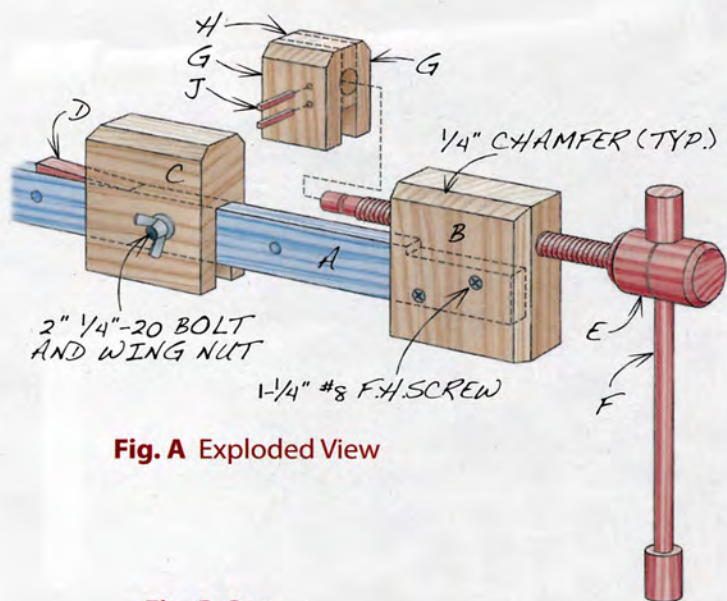


Fig. A Exploded View

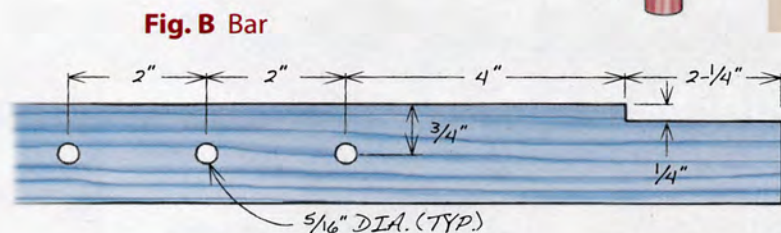


Fig. B Bar

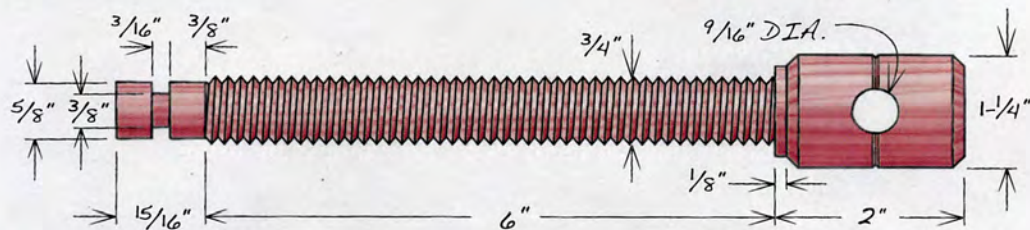
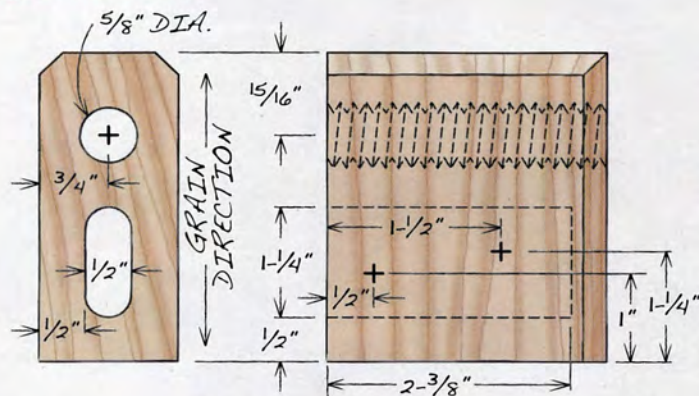


Fig. C Screw and Handle

Fig. D Head Block



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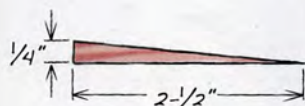
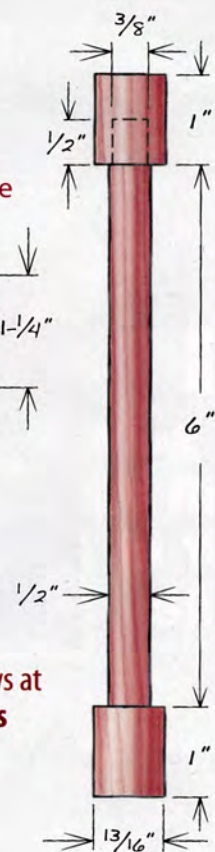


Fig. E Rear Jaw

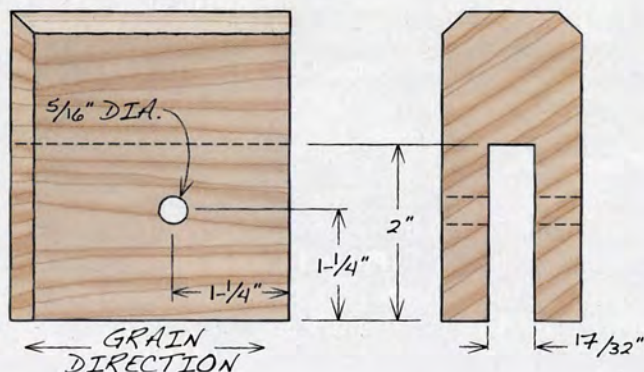


Fig. F Sliding Jaw

Cutting List

Overall Dimensions: 1-1/2" Th x 3-1/2" W x 18" to 56" L

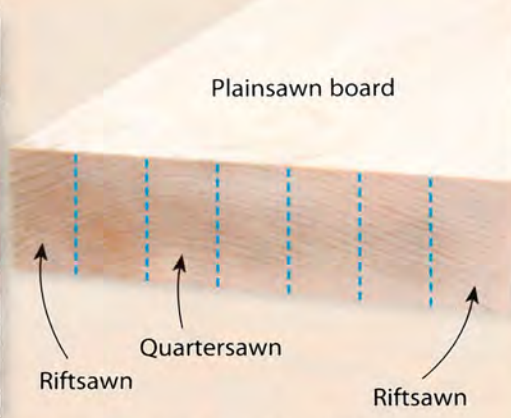
Part	Name	Qty.	Material	Th x W x L
A	Bar	1	Hard maple (a)	1/2" x 1-1/2" x 24" or 48" (c)
B	Head block	1	Cherry (b)	1-1/2" x 3" x 3-1/2" (d)
C	Rear jaw	1	Cherry (a)	1-1/2" x 3" x 3-1/2" (e)
D	Wedge	1	Cherry	1/4" x 1/2" x 2-1/2" (f)
E	Screw	1	Hard maple	1-1/4" dia. x 8-15/16"
F	Handle	1	Hard maple	13/16" dia. x 8"
G	Sliding jaw end	2	Cherry (a)	15/32" x 1-1/2" x 2-1/4" (d, g)
H	Sliding jaw center	1	Cherry (a)	9/16" x 1-1/2" x 1-1/2" (d, g)
J	Pin	2	Cherry	3/16" x 3/16" x 1-1/4"

Notes:

- a) Riftsawn or quartersawn stock.
- b) Quartersawn stock.
- c) The bar can be any length.
- d) Orient the grain to run vertically.
- e) Orient the grain to run horizontally.
- f) Tapers from 1/4" to a point.
- g) The completed sliding jaw measures 1-1/2" x 1-1/2" x 2-1/4".



1 Create stable bar stock for your clamps by ripping narrow blanks from a thick plainsawn board. As the annual rings on the end grain of the plainsawn board show, this method creates riftsawn and quartersawn stock, which is less likely to cup or bow than plainsawn stock.



2 Drill holes through each bar blank. Tape several blanks together and you'll only have to mark the holes on the top one.



3 Notch each bar to create a simple tenon that will be used to mount the bar in the clamp's threaded block.



4 Cut the head blocks from a quartersawn blank that's chamfered on top. Chamfer the end of the blank before cutting each block.



5 Drill stopped holes in each head block to create a mortise. Drill out the center after using stops to establish both ends.

Use a drill press with a fence and a brad point bit to drill centered 5/16" dia. holes down the length of each bar (**Photo 2**). Start 6-1/4" from one end and space the holes 2" apart. Complete the bar by bandsawing a notch on its front end to create a single-shouldered tenon (**Photo 3**). Use a miter gauge to cut the tenon's 1/4" shoulder in the bar's top edge. Then turn the bar and make a rip cut to complete the notch.

Make the head block

Orient the grain vertically on the head block (B; Fig. D). To make this block, start by milling a long quartersawn blank flat and square to 1-1/2" x 3". It's important to use quartersawn stock for this block because a woodthreading tap cuts cleanest when it cuts straight through the wood's growth rings. Tapping through at other angles may result in chipped or splintery threads. In most cases, these threads will still work, but when you're torqu-

ing on the screw to tighten the clamp, you don't want the threads to fail.

Install a fence on the router table to chamfer the top of the blank. Then use a miter gauge or a sled to chamfer one end.

Cut the blank into 3-1/2" long blocks (**Photo 4**). Marking the blocks' length on the crosscut sled's fence makes this easy work. After cutting each block, return to the router table and chamfer the end of the blank.

Mark the center of the threaded hole and both ends of the mortise on the non-chamfered end of each block. Then use a square and a pencil to strike layout lines across the end at these three points.

Install a 1/2" dia. brad-point bit in the drill press and set the fence to center the bit on the block's edge. Install stops and set the drilling depth at 2-3/8". Then drill the mortise (**Photo 5**). Pare the mortise shoulders flat with a chisel, but leave the ends rounded.

Use a 5/8" dia. brad-point bit to drill the hole that will be threaded (**Photo 6**). Set the depth stop to barely allow the bit's center spur to exit the opposite end of the block. Align the bit with the center point marked earlier and drill to the depth stop. Then, keeping the same face against the fence, turn the block over, align the bit with the exit hole and drill out the last bit of waste. This two-step approach keeps the bit from blowing out the end of the block.

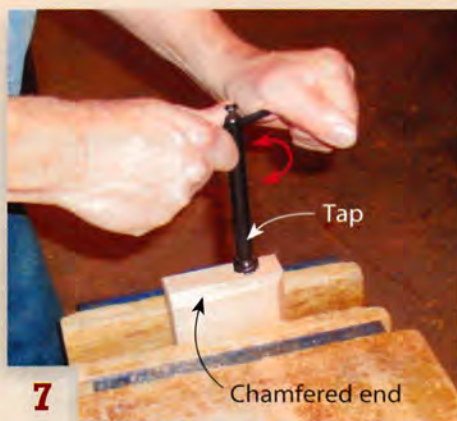
Securely clamp each block chamfered-end up in the face vise. Then use a 3/4" dia. screw tap to thread the hole (**Photo 7**). Start on the back of the block and work all the way through. Then remove the T-handle and let the tap fall into your hand below.

Glue the bar and block

Pare the edges of the bar's tenon to fit the mortise in the threaded block. Then spread glue inside the mortise and drive the head block fully onto the



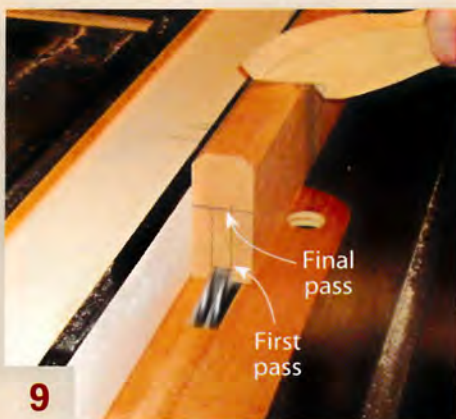
6 **Drill** a hole through each head block. When the bit's point pokes through, turn over the block to finish drilling the hole.



7 **Thread** the hole by repeatedly turning the tap about 180° and then reversing directions to clear the waste.



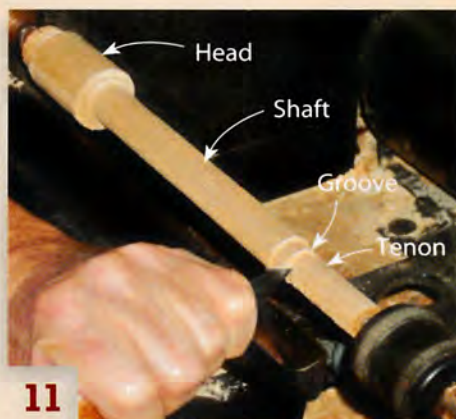
8 **Drive** the completed head block onto the bar after paring the bar's tenon to fit the block's rounded mortise.



9 **Cut** a deep centered groove in the rear jaw blank by making multiple passes and incrementally raising the dado set.



10 **Test** fit the completed rear jaw to make sure the hole you've drilled through it aligns with the holes on the bar.



11 **Turn** a groove in the screw's tenon to house the pins that will hold the screw in the sliding jaw.

tenon, so it registers against its shoulder (**Photo 8**). Check the fit with a square and adjust, as necessary. Then drill two countersunk pilot holes and install screws to reinforce the joint.

Fashion the rear jaw

Start by milling a length of 1-1/2" x 3-1/2" stock flat and square for the rear jaw (C; Fig. E). Use riftsawn or quartersawn stock and orient the grain to run horizontally. Chamfer the top edge of the blank and one end. Then cut a 2" deep centered groove in the bottom (**Photo 9**). To facilitate installing and removing the jaw, make this groove about 1/32" wider than the 1/2" thick bar by installing paper shims (as necessary) between the dado set's cutters. Cut the blank into 3" long sections to create the jaws. As before, chamfer the end of the blank before cutting each jaw.

Lay out the location of the hole used to fasten the jaw to the bar. Install

a fence on the drill press and drill a 5/16" dia. hole. Slide this jaw onto one of the bars and install a 1/4-20 hex bolt to make sure the holes align properly (**Photo 10**). The top edge of the bar should rest against the jaw's groove. Make a wedge (D) to install between the bar and the groove to keep the jaw from rocking back when clamping pressure is applied.

Turn the screw and handle

Turn the screw (E; Fig. C) from a 1-1/2" x 1-1/2" x 11" blank (**Photo 11**). Use a gouge to turn the blank to a cylinder and a parting tool and calipers to establish the locations and diameters of the screw's head, shaft and tenon. Continue by using the gouge and the parting tool to turn these three cylinders and detail the head. Use the parting tool to cut the groove in the tenon. Remove the turned blank from the lathe and cut the screw free using a handsaw. Then head to the drill press

to drill the hole for the handle through the screw's head. Support the head in a V-block to accurately drill this centered hole. Use a 3/4" dia. threadbox to complete the screw (**Photo 12**).

Turn the handle (F) from a 1" x 1" x 10" blank. Note: Make the 1/2" dia. shaft between the two pommels 6-1/2" long. Then turn a 3/8" dia. x 1/2" long tenon against one of the pommels. Finish-sand the handle, remove the blank and use a handsaw to free the handle from the waste. Then cut off the pommel that's adjacent to the tenon. Drill a 3/8" dia. stopped hole in this pommel to create a mortise for the tenon. Slide the handle through the hole in the head of the screw. Then spread glue in the mortise and install the pommel. Clamp the joint and let the glue dry.

Assemble the sliding jaw

Make the sliding jaw (G, H; Fig. F) from riftsawn or quartersawn stock



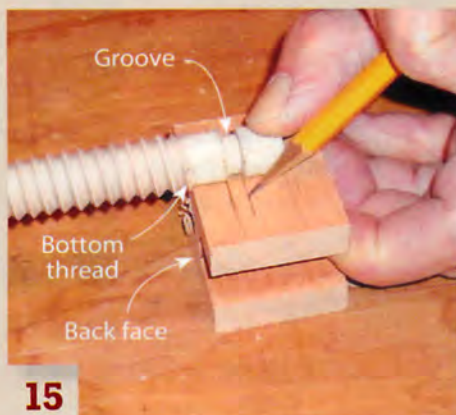
12 Use a threadbox to cut the threads on the screw's shaft. Work back and forth as necessary to clear the waste.



13 Make each sliding jaw by gluing pieces cut from long riftsawn blanks. The shorter, thicker middle piece creates the slot.



14 Use a sled to chamfer the sliding jaw. Make the sled by gluing a squared block onto 1/4" hardboard and attaching a toggle clamp.



15 Transfer the groove's location to the sliding jaw while holding the screw's bottom thread against the jaw's back face.



16 Drill holes in the sliding jaw for the pins that will capture the screw in the hole drilled to house it.



17 Capture the screw by driving square pins into the holes, so they track inside the groove in the screw's tenon.

and orient the grain vertically. This jaw is made differently, because it has to be slotted to fit over the clamp's bar, and it's too small to safely cut the slot using the tablesaw. The best way to make this jaw is to laminate thin pieces (**Photo 13**).

Start by harvesting a pair of 5/8" thick x 1-1/2" wide blanks from a flat-sawn board that's at least 12" long. (Use the method shown earlier to create stock for the clamp's bar.) Mill one of these blanks to 9/16" thickness and the other to 15/32" thickness. Square one end of each blank and then cut 1-1/2" long pieces from the 9/16" blank and 2-1/4" pieces from the 15/32" blank. Make sure the faces remain flush when you glue the parts together.

The slot on this jaw is 1/16" wider than the bar, so it will slide without binding as you turn the screw.

Make a sled to chamfer the top edge of the sliding jaw (**Photo 14**). This part is too short to rout using

only the fence. Complete the cut by making several passes and slightly raising the bit between each pass.

Capture the screw

Drill a 5/8" dia. x 1-1/8" deep hole in the back face of the jaw to house the screw. Then mark and drill the holes for the pins (J). These pins will capture the screw in the jaw by seating in the groove turned in its tenon.

First, precisely mark both shoulders of the screw's groove on the side of the jaw (**Photo 15**). Then use a square to mark the top and bottom edges of the 5/8" dia. hole you've just drilled in the block's back face—these lines will intersect the groove's shoulder lines. Drill 3/16" dia. holes for the pins, centered *between* the groove's shoulder lines and *on* the hole's edge lines (**Photo 16**). Drill these holes deep enough to pass through the 5/8" dia. hole, but not through the entire block.

Assemble the clamp

Thread the screw through the head block that's mounted on the clamp bar. Seat the screw's tenon in the hole in the back face of the sliding jaw. Hold the screw tight against the jaw to align its groove with the pin holes. Then drive in the two 3/16" square pins (**Photo 17**). Work the screw as necessary to wear in the pins until it threads easily in both directions. Then fasten the rear jaw to the clamp bar using a 1/4-20 hex head bolt. 

SOURCES

Woodcraft, woodcraft.com, 800-225-1153, Woodthreading Kit, 3/4" x 6 TPI, #12T14, \$47.79

Steven Bunn owns and operates a cabinet shop in Bowdoinham, Maine. See more of Steve's work at stevenbunn.com.

Make a Book-Matched Veneer Door Panel

**Create an eye-catching pattern
using traditional methods and a
modern gluing system.**

by Greg Larson

IF YOU LIKE the challenge of working with solid wood, you should give veneering a try. After all, veneer is solid wood that's cut very thin. And veneering itself is a sophisticated technique with a rich history that dates all the way back to the Egyptian pharaohs. So it may be surprising to

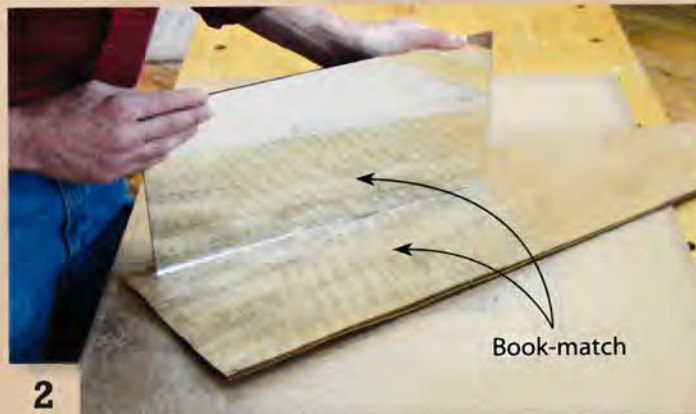
learn that with just a few basic tools, wood glue and a vacuum bag—something the pharaoh's cabinetmakers could only dream of—you can create beautiful book-matched veneer panels that will give your projects a touch of elegance that's fit for royalty.



Discover an easy way to build a cabinet door frame at
AmericanWoodworker.com/WebExtras



1 Number each leaf of veneer to keep them in order. The leaves come stacked as they were cut from the tree, so number both sides and circle the numbers on the back to avoid confusion.



2 Find an attractive pattern by moving a mirror around the veneer. To make a book-match, you open two sequential veneer leaves like a book. A mirror shows the effect on a single leaf.

Veneer 101

Veneer can be sliced like lumber to reveal plainsawn, riftsawn or quartersawn figure. Individual pieces of veneer—called “leaves”—are kept in sequential order as they’re cut from the tree, resulting in a stack, or “flitch.” The leaves are usually as long as the tree was tall. All the leaves from a flitch will have the same color and texture, and very similar grain patterns. This feature makes veneer perfect for decorative techniques such as book-matching that make creative use of the wood’s grain and figure. To create a book-match, you simply open two sequential leaves of veneer like a book to form a mirror image.

Buy online

Most major veneer vendors sell only full-length leaves, which is fine if you’re making book-matched panels for a kitchen full of doors. But if you only want to make one or two panels, check out eBay. You’ll find a host of reputable vendors and a wide selection of sequential veneer leaves in smaller sizes and quantities.

Veneer is commonly rolled up in a box for shipping. Immediately unroll the leaves and number each one to maintain the original sequence (**Photo 1**). Always store veneer flat.

Find the book-match

Book-matching takes advantage of the sequential nature of veneer. Start by choosing two sequential leaves that are a bit longer than the panel you plan to make and more than half of the panel’s width. Keep in mind that your book-match must start out larger than the substrate, so you can cut it to fit. For the 11" x 16" panel shown here, I’m using leaves that are 8" wide.

Move a mirror around the top veneer leaf until you find an attractive book-match (**Photo 2**). In this case, holding the mirror at an angle creates an interesting, v-shaped pattern, but it also reduces the veneer’s width at one end—just make sure enough width remains to meet the minimum size require-

ments. Starting with wider veneer allows holding the mirror at a sharper angle for a more dramatic effect. Once you decide on a pattern, draw light pencil lines along the inside of the mirror to roughly indicate where to make the cuts.

Cut the veneer

The first step is to stack the two leaves as they came from the tree and cut them slightly larger than the panel (**Photo 3**). I use a straightedge and a utility knife for this job.

The next step is critical for a perfect book-match, as you must cut through exactly the same spot on both veneer leaves to achieve a true mirror image across the seam. As before, stack the leaves as they came from the tree. Then match their grain patterns at one end (**Photo 4**). This is important, so take your time. When you’re satisfied with the match, use blue painter’s tape to tightly tape the leaves together at this end, while making sure the alignment stays perfect. Repeat the process to align the grain on the other end. If you’re making two identical panels (as for adjacent doors), stack, align and tape four consecutive veneer leaves.

I prefer to use a hand-held veneer saw to cut through the veneer at the

book-match seam, especially when cutting through a limited number of leaves. A veneer saw, which has very small teeth that are beveled on only one side of the blade, cuts cleanly and creates a very nice seam—provided it’s sharp. Fortunately, pre-sharpened veneer saws are available (see Sources, page 68).

It’s imperative to cut the veneer dead straight (**Photo 5**). Since both leaves are cut at the same time, any deviation will be magnified when they’re joined. To assure the best results, install a piece of 1/4" MDF on your bench as a work surface and use a 1-1/2" thick piece of straight-grained lumber that’s been milled flat and square as a straightedge. Arrange the veneer on one corner and clamp the straight-

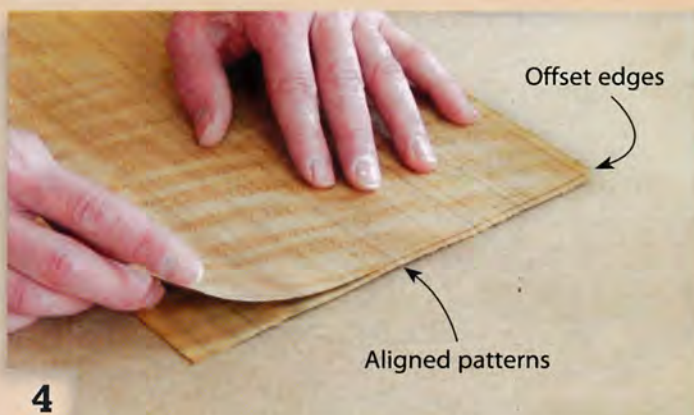
Fig. A

The Veneer Stack

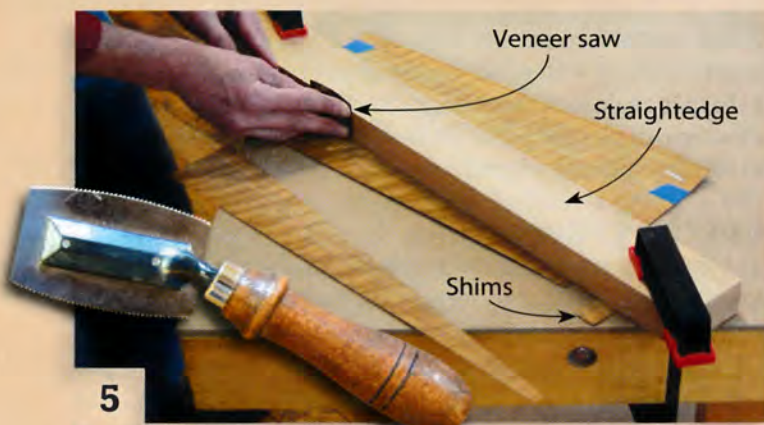




3 **MDF work surface**
Cut the two veneer sheets you've chosen to rough length. Stack the sheets as they came from the tree on an MDF work surface. Then cut in toward the center to avoid ripping out the edges.



4
Carefully align the grain patterns of the two veneer leaves at one end, offsetting the edges if necessary. Then tape the leaves together and repeat the process on the other end.



5
Cut through both leaves at the book-match seam using a veneer saw, a board jointed flat and square as a straightedge, and scrap veneer shims to keep the board from bowing.



6
Smooth the cut edges by pressing the leaves between the MDF work surface and the straightedge and making full-length strokes with a shop-made sanding block and 150 grit sandpaper.

edge on the pencil line drawn earlier with the mirror. Locate the clamps so they don't interfere with the saw's handle or blade. Place two small scraps of veneer (the same thickness as the leaves) under the straightedge to keep it from bowing in the middle. (There's a risk of tearout if the straightedge isn't tight against the veneer along its entire length.)

Cut through the veneer. Using four fingers of your right hand to hold the saw blade tight against the straightedge and with your left hand lightly on the handle, pull the saw back toward you from one end of the veneer to the other. Pressing too hard can cause a ragged cut, and too much pressure on the handle can cause the saw to wander. It should only take two to three strokes to cut through each leaf.

Refine the cut edges after removing the clamps and straightedge (**Photo 6**). Position the taped stack so it barely overhangs the MDF work surface and press the straightedge firmly on top. Then sand the edge by making long, even strokes with a sanding block that has a straight, square edge and is at least as long as the veneer.

Join the book-match

Tape the book-match joint just before you glue the veneer to the substrate. Flip over one of the two leaves you've prepared to create the book-match. Push the two pieces tightly together, taking care to align the mirrored grain patterns for the best

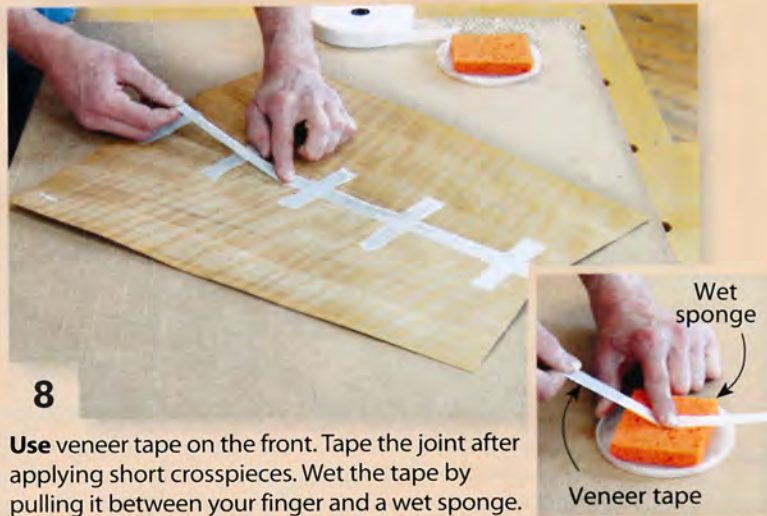
match. Then flip over both pieces and repeat the process to determine which book-matched face looks the best. Examine the seams on both faces; if you see any visible defects, re-stack, re-tape and re-cut the pieces. If the seams look good, use small pieces of blue tape every 3" or so to temporarily clamp the seam on the back face of the book-match (**Photo 7**). Adhere the tape firmly to one piece and then use it to pull the seam tightly together. Then turn over the veneer and examine the seam on the front to make sure it's perfect.

Tape the front seam using veneer tape (see Sources). It's a paper tape with a water-activated adhesive that's easy to apply and remove without damaging the veneer. Solid and perforated versions are available; I usually use solid tape.

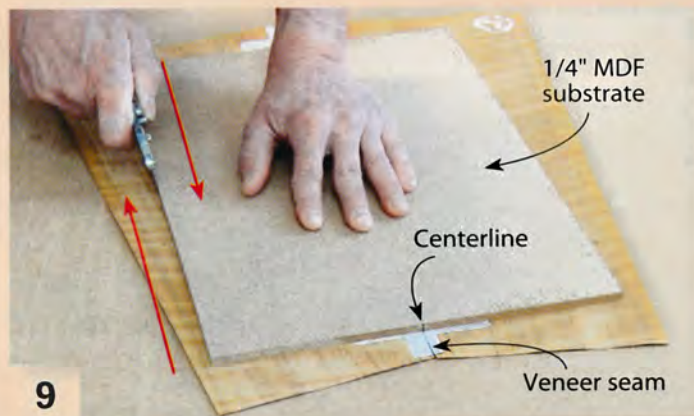
Cut short pieces of veneer tape (2" to 3" long) and moisten them by pulling the tape between your finger and a wet sponge (Note: The adhesive won't adhere properly if it's too dry or too wet, so experiment on scrap veneer before proceeding.) Apply the tape across the seam every few inches, starting at one end and smoothing as you go to avoid bubbles. Then apply a piece of tape down the entire seam (**Photo 8**). Rub the tape with your fingers or a piece of wood with rounded corners to make sure it's fully adhered everywhere. If some spots don't properly adhere, immediately remove the tape in those spots and apply freshly wetted tape; don't worry if the tape overlaps. Veneer tape typically dries in just a few minutes, and it shrinks as it



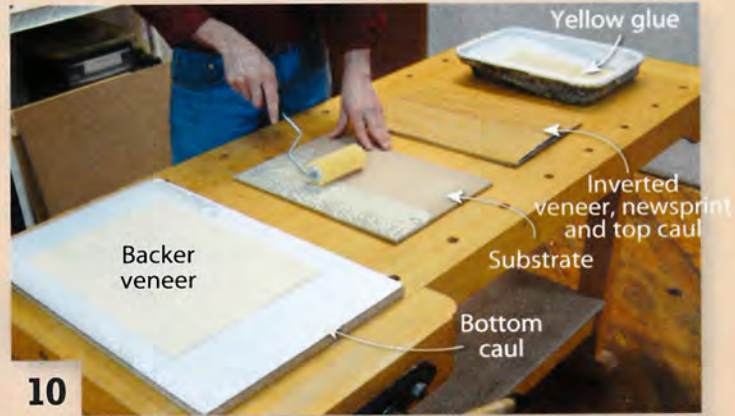
7 **Tape** the seam tightly together on the back face of the veneer, after flipping over one of the leaves to create the book-match. (Note the circled and uncircled numbers on the two leaves.)



8 **Use** veneer tape on the front. Tape the joint after applying short crosspieces. Wet the tape by pulling it between your finger and a wet sponge.



9 **Cut** the veneer to match the substrate. Align center marks drawn on both ends of the substrate with the book-match seam. Then cut from the ends to the center on each side.



10 **Roll** a thin, even layer of glue onto the substrate. Station everything necessary for gluing the veneer to the panel so you can work quickly and efficiently.

dries, which pulls the seam together even tighter. After the veneer tape has dried, remove the blue tape on the back.

Prepare the substrate

To form the panel, the veneer will be glued onto a smooth, flat and stable substrate such as 1/4" MDF. You'll have to veneer both sides of the substrate to keep the panel from bowing. If the back of the panel won't be seen, you can use a single leaf of less costly "backer" veneer on that side.

Cut the substrate at least 1/2" larger than the panel's final width and length so you can cut off squeezed-out glue and re-square the panel if the veneer slips during gluing. Mark the center on both ends of the substrate. Then lay it on top of the veneer and line up the marks with the book-matched seam (**Photo 9**). Hold the substrate tightly on the veneer and use a utility knife or veneer saw to remove the excess veneer. Cut the backer veneer the same way.

Prepare for gluing

A variety of glues can be used for veneering, but yellow wood glue is the best choice for simple veneered panels like this one. I like to use Titebond Extend. It's one of the more rigid PVA glues and it has a few more minutes of open time than regular yellow glue.

A vacuum bag is the easiest and most flexible method

for pressing veneer onto a substrate. The traditional method of using cauls and clamps works just as well—as long as you make sure the clamping pressure is evenly distributed. But with a vacuum bag, you don't have to worry—it provides even pressure on the entire panel equal to atmospheric pressure, nearly 2,000 lbs per sq. ft. A small pump, 4' x 4' bag, and associated tubing costs about \$400 (see Sources).

Inside the vacuum bag, the veneer and substrate are stacked between cauls to evenly distribute the pressure and prevent any dried glue or other contaminants from damaging the veneer. The bottom caul can be larger than the panel. I use 3/4" melamine for this caul because glue won't stick to it. The top caul must be the same size as the panel. (If it's too small, some of the veneer won't adhere; if it's too large, the vacuum pressure can break it.) Since each top caul has to be custom-sized, I use 1/4" MDF and add a piece of newsprint between the veneer and MDF to keep any glue that bleeds through from sticking. Use only black and white newsprint—colored ink can stain the veneer. Break the top edges and corners of both cauls so they don't damage the vacuum bag.

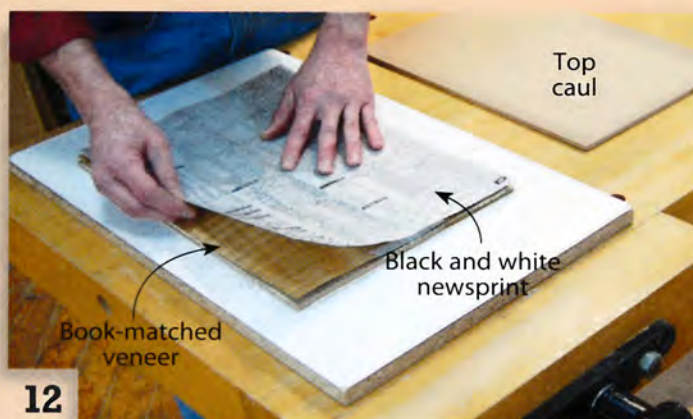
Press the panel

Make sure all the blue tape has been removed as you stack the veneer, substrates and cauls in order (Fig. A, page 65).



11

Carefully position the substrate on the backer veneer, glue-side down. Then roll glue on its exposed face and carefully position the book-matched veneer on top, tape-side up.



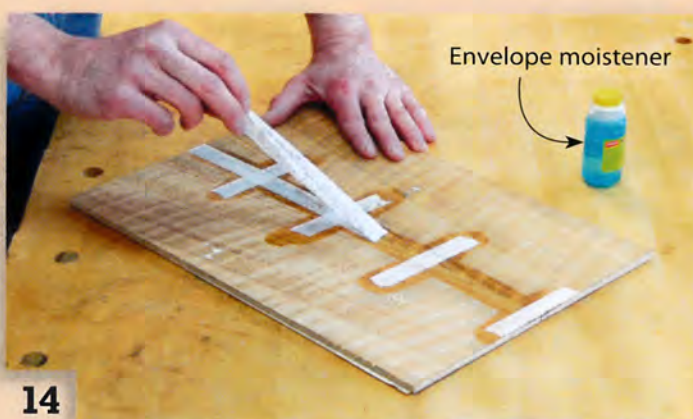
12

Quickly place newsprint between the book-matched veneer and the top caul to absorb any glue that bleeds through, so the veneer and caul won't unintentionally get glued together.



13

Clamp the veneered panel with vacuum pressure after inserting the stack in the bag and making sure none of the parts have shifted. A shop-made grooved platen allows the air to evacuate.



14

Peel off the veneer tape after wetting it and waiting a couple of minutes. A bottle with a sponge applicator wets the tape more evenly and with less mess than a sponge.

Flip the stack so that the backer veneer is on top. Then set the backer veneer (tape-side down if it's book-matched) on the melamine bottom caul.

Apply a thin, even layer of glue to the substrate (**Photo 10**). Never apply glue to the veneer—it will curl up before you can get it into the bag. Carefully place the substrate on the backer veneer (**Photo 11**). Then apply glue to the exposed side of the substrate and carefully position the book-matched face veneer. Immediately put the newsprint and top caul on top of the face veneer (**Photo 12**). Then use blue tape on all four sides of the stack to help hold everything in place. Open the vacuum bag and place the entire stack inside on a grooved platen, taking care not to shift the veneer. (It's easy to tell if any of the pieces have moved, because the top caul is the same size as the panel.) Seal the bag tightly according to manufacturer's instructions and start the vacuum pump. Hold onto the stack while the air evacuates to keep anything from shifting and to smooth out any air bubbles or creases in the bag (**Photo 13**).

Complete the panel

PVA glue can't completely cure in a vacuum, so remove the panel from the bag after about one hour and allow it to dry at least 24 hours with air circulating around all sides.

Remove the veneer tape with a sponge or an envelope

moistener (**Photo 14**; see Sources). Use a wet nylon abrasive pad to scrub off any remaining residue. Then wet the entire panel on both sides and look for bubbles where the glue didn't properly adhere (wetting makes the bubbles stand out). After the panel has fully dried, a hot iron will flatten these bubbles—if there's glue under them. If the iron doesn't work, you'll need to inject glue with a syringe and then clamp the bubble flat. Finish the panel by scraping, sanding and cutting it to final size, making sure to keep its book-matched seam at the center. 

SOURCES

- Joe Woodworker.com, joewoodworker.com, Wood Veneer, price varies; Two Cherries Veneer Saw, Presharpened, \$21.90; Veneer Tape (40 gram thickness without holes), 3/4" x 650' roll, \$2.85; Veneer Tape, (40 gram thickness with holes), 3/4" x 650' roll, \$5.25.
- Vacuum Pressing Systems, Inc., vacupress.com, 800-382-4109, Compact 100 Vacuum Press, #C1002, \$390.
- Staples, staples.com, 800-333-3330, Envelope Moistener, #160788, \$1.29.

Greg Larson is the owner/director of the New England School of Architectural Woodworking (NESAW) and The WorkBench in Easthampton, Mass. For more information, visit nesaw.com or workbenchschool.com.

Designing the Three-Cedars Tansu

A study in composition and proportion.

by John Lavine



EVERY TIME we consider building something, we are immediately faced with two basic questions: What is its purpose? What should it look like? Answering the questions of form and function are the essence of designing, and they go hand-in-hand. The dimensional requirements for different projects—a queen-size bed, a dining table for six—will dictate some of our choices. Sometimes these requirements are minimal; a coffee table, for example, offers plenty of options. Other times they can be quite exacting—an entertainment center that holds specific components and must fit into a particular space, for example.

Beyond these constraints, the variables of visual language to consider seem endless and overwhelming: size, shape, color, pattern, texture, proportion, ornamentation ... the list goes on and on. How do we sort through all these possibilities? Where do we begin?

The design process is organic; it doesn't happen in a linear fashion, systematically proceeding through a checklist of

building blocks. What follows is the story of the process that I followed when I designed and built a dresser some years ago.

The starting point

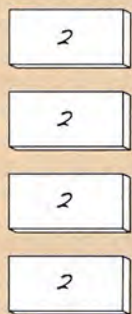
My wife needed a chest of drawers for her clothes, a free-standing furniture piece set against a wall of our bedroom. My initial idea was influenced by two factors. First, I had been studying and admiring Japanese woodworking for a number of years. Second, I had a large stash of 4/4 Alaska yellow cedar left over from another project. I decided to build a tansu, a Japanese chest of drawers, though I imagined mine would depart in some ways from a traditional tansu style.

When developing any design, there are some basic principles worth keeping in mind. First, of course, is clarifying your vision of the piece. I was building not just a chest of drawers, but specifically a dresser for an assortment of clothes. In addition, the tansu aesthetic had certain attributes that I desired for

Fig. A

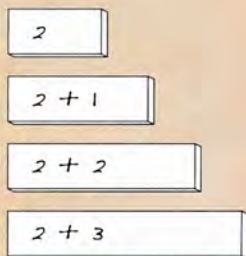
Four Proportioning Systems

If you're proportioning a single dimension, such as length or height, you can use a series of whole numbers based on simple math. Here are four examples.



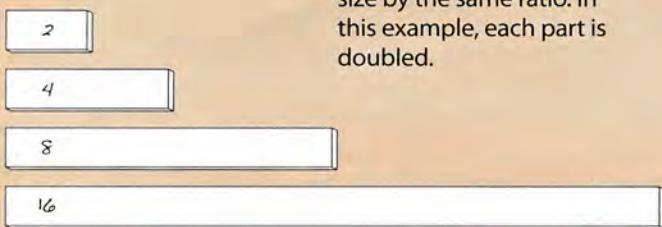
Equal Proportions

All parts are the same size.



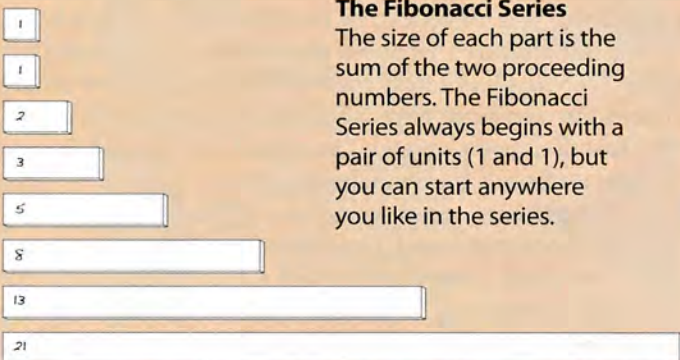
The Arithmetic Progression

Each part increases in size by the same amount. In this example, it's one unit.



The Geometric Progression

Each part increases in size by the same ratio. In this example, each part is doubled.



The Fibonacci Series

The size of each part is the sum of the two preceding numbers. The Fibonacci Series always begins with a pair of units (1 and 1), but you can start anywhere you like in the series.

my piece: a feeling of calm and balance, and the look of natural wood, unadorned.

My next decision was to use frame-and-panel construction for the carcass, and this led to my choice of a secondary wood for the framework: Western red cedar. It was very compatible with the yellow cedar, and the two cedars were in turn very appropriate for the tansu aesthetic. Also, the yellow cedar was uniform in color and without any distinctive grain, and I wanted to use a contrasting wood to add some variation and to help define the overall lines of the piece.

I knew that the tansu would be roughly 4' wide, something between 3-4' tall, and about 20" deep. It would contain a vertical stack of drawers, but I wanted it to read more horizontally than vertically; strong horizontal lines—another part of the aesthetic I admired—would help ground the piece visually. Tansu don't soar upwards, like a Boston highboy, but stand firmly and serenely on the ground. Accordingly, I made the top and bottom rails heaviest in dimension; the vertical corner posts would be slightly reduced; and I added lightweight intermediate rails (actually, the front edges of dust panels) between each drawer for further horizontal emphasis.

Composing

At this point I started sketching. Tansu are all about the front elevation view, which simplified the overall design process and allowed me to focus on the arrangement of drawers and their dimensions. The process of arranging the elements of a piece of furniture, like arranging a piece of music, is referred to as composing, and many of the same principles come into play: movement, dynamics (contrast), balance, visual tension (or no tension), and visual points of focus.

The simplest arrangement imaginable for a dresser would be a stack of identical full-width drawers. It would also be static and boring. Not only that, it would be thoroughly impractical, since a drawer for jeans ought to differ in size from a drawer for socks. Varying the height of the drawers according to their intended contents would create some needed visual movement, however subtle, and for good balance (and to support the concept of groundedness), I would put the larger drawers lower and the smaller drawers higher up. Also, there was no need for a sock or underwear drawer to be full width, and adding some half-width drawers to the mix would add more visual interest.

As I continued to sketch I introduced another element, inspired by the many traditional tansu I had seen—a pair of sliding doors set in recessed tracks. This added a strong focal point and created more opportunities for playing with the overall balance of different components. Equally important, it created a different kind of storage space. And finally, I used a third wood for the door panels—Port Orford cedar—that harmonized with the other cedars but had a subtly different look.

Proportioning

Proportions are the relative sizes of parts to each other and to the whole. To help determine the final dimensions of my tansu, I considered various systems of proportioning. Some systems are expressed as progressions of numbers in a series, while others are based on the ratio of one number to the next (Fig. A). Depending on your project, these systems can be very useful in arriving at a satisfying visual balance of parts (Fig. B).

For sizing my drawer heights, the best choice was an arithmetic progression (Fig. C). If I had used a different number series, the drawer sizes would either grow or shrink too quickly to be useful. Determining that my bottom drawer would be 8-1/2" high, the ones above became 7-1/2", then 6-1/2", and then 5-1/2". At this point, I didn't want to reduce the drawer heights any more. Instead, I shifted to dividing the remaining space by a simple geometric approach, halving and quartering drawer widths, and balanced this space with the pair of sliding doors.

Final details

Details can take on a life of their own, so it's important to make sure that they all support your original concept for the piece. There were three parts of the tansu that I still wanted to consider: hardware, corner joinery and the doors.

For hardware, I chose some traditional forged steel Japanese pulls that were available in three different sizes. I used the largest on the bottom two drawers, the middle size on the middle drawer, and the smallest on the top three drawers.

Traditional tansu builders often used applied corner brackets and other ornamental hardware. I was not interested in that look, but I thought that my post-rail joinery could add some ornamentation. The side rails attach to the posts with through mortise-and-tenons; the posts attach to the top and bottom rails by means of stub tenons that are draw-bored and pinned. I used ebony for the pins and wedges; the black contrasted nicely with the cedar and echoed the drawer pulls.

I used ebony detailing for the doors as well, applying an interweave of thin strips to the surface of the panels—this time, inspired by the patterns in shoji screens. I located the intersection of pieces in the lower corners to align with the drawer hardware, and also because that placement was more dynamic than, for example, having the pieces cross in the center of the panel.

There were a few more details inside that space behind the sliding doors, but as far as its "public face" went, the designing of my three-cedar tansu was complete. 🛠️

Fig. C Proportioning the Three-Cedars Tansu

My design uses a combination of arithmetic and geometric progressions for its drawer layout. The heights increase arithmetically from top to bottom, and the widths increase geometrically for the top three rows.

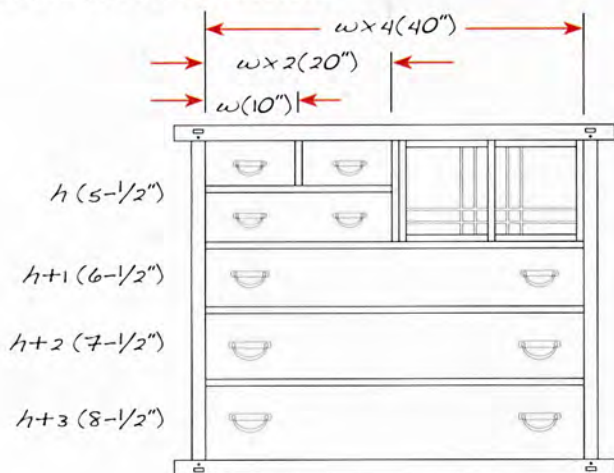


Fig. B

Applied Proportion

Think of the rectangles below as representing the same chest of drawers. Each chest is the same height and contains six drawers. Using the four different number series shown at left, here's how you might determine the height of each drawer.

Equal Proportions

All of the drawers are the same height.

1	a
2	a
3	a
4	a
5	a
6	a

The Arithmetic Progression

The height of each drawer increases by the same unit, which can be any number. In this example, the unit is about 1/5 the height of the top drawer.

1	b
2	$b+1$
3	$b+2$
4	$b+3$
5	$b+4$
6	$b+5$

The Geometric Progression

Here, two wide rails divide the total height of the chest according to a geometric progression. The drawers are two different heights.

1	a	
2		
3	$2a$	
4		b
5	$4a$	b
6		b

The Fibonacci Series

This method of dividing spaces may lead to impractical results. Here, the top drawer is too narrow and the bottom drawer is too wide. However, the Fibonacci series might work for a combination of drawers and open shelves.

1	c
2	$2c$
3	$3c$
4	$5c$
5	$8c$
6	$13c$

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Self Portrait

ONE VERY FINE spring morning, I began to carve a gnome. This little guy would be my masterpiece. Hours, then days, passed as I worked on my gnome. From his ridiculously long beard and massive head to his tiny legs, feet and hands, he was, I felt, a perfectly executed gnome. "A gnome for the ages," I thought as I painted his bright

red coat, orange pants, black shoes and pinkish face.

When the paint had dried, I proudly showed my masterpiece to the rest of my family. Apparently, some of them thought my glorious gnome looked like an older, shorter version of me.

John Montgomery

Yellow Lake

I BUY GLUE by the gallon to save a few bucks, but I'd grown tired of cleaning up spills caused by trying to pour glue from the large, unwieldy jug. So I ordered a smaller squeeze-type bottle to use as a glue dispenser. Unfortunately, the new bottle arrived with a hole in its bottom, so I requested a replacement. This would have been the perfect time to chuck the defective bottle in the garbage, but I left it on my workbench, instead.

The replacement bottle arrived a couple days later. After making sure it was sound, I put it on the bench while I retrieved the glue jug from the other end of the

shop. While returning with the jug, I made a detour to check another project I'd started. Eventually, I got back to the bench, filled the bottle to the top, screwed on the cap and called it a day.

When I entered the shop the next morning, I immediately noticed that something was wrong: Like sentinel pines guarding a calm yellow lake, two empty glue bottles sat on opposite ends of my bench, separated by a perfectly smooth layer of dried glue. Doh! I'd filled the wrong bottle!

Luke Steeves



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