

9 NEW TOOLS • 7 WORKSHOP TIPS • 6 ROUTER BITS REVIEWED

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#138, OCTOBER/NOVEMBER 2008

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New!

10" Heavy-Duty Cabinet Table Saws w/Riving Knife

Perfect for cutting panels and wide stock!

- Motor: 3 HP, 220V, single-phase or 5 HP, 220V/440V*, 3-phase
- Precision ground cast iron table
- Table size w/extension: 27" x 75 3/4"
- Max. depth of cut: 3 1/8" @ 90°, 2 1/4" @ 45°
- Arbor: 5/8"
- 52" rip capacity
- Approx. shipping weight: 514 lbs.



Riving Knife can be used with quick release guard!

EXTREME SERIES

See it on Page 23 of the 2008 Catalog.

*440V OPERATION REQUIRES PURCHASE OF ADDITIONAL COMPONENTS. CALL TECH SERVICE FOR MORE INFO.



G0651 3 HP, single-phase

INTRODUCTORY PRICE \$1695⁰⁰

G0652 5 HP, 3-phase

INTRODUCTORY PRICE \$1695⁰⁰

Includes 10" Blade and side & rear extension tables!

\$139⁹⁹ ADVANTAGE IN LOWER 48 STATES

New!

8" Jointer w/Spiral Cutterhead!

Versatile parallelogram table adjustment system!

- Motor: 3 HP, 220V, single-phase, TEFC
- Precision ground cast iron tables
- Total table size: 8" x 76 1/2"
- Infeed table size: 8" x 43 1/2"
- 4 row spiral cutterhead
- Cutterhead speed: 5350 RPM
- Max. rabbeting depth: 1/2"
- Deluxe cast iron fence size: 35"L x 1 1/4"W x 5"H
- Approx. shipping weight: 597 lbs.



MADE IN ISO 9001 FACTORY!

Spiral Cutterhead

BUILT-IN MOBILE BASE

INCLUDES FREE SAFETY PUSH BLOCKS

EXTREME SERIES

Extra Long Infeed Table & Extra Tall Fence

G0490X

INTRODUCTORY PRICE \$1075⁰⁰

\$139⁹⁹ ADVANTAGE IN LOWER 48 STATES

See it on Page 41 of the 2008 Catalog.

12" Baby Drum Sander

- Sanding motor: 1 1/2 HP, 110V, single-phase
- Conveyor motor: 1/4 HP, 110V, single-phase, variable speed 0-15 FPM
- Drum surface speed: 2300 FPM
- Max. stock dimensions: 12" wide x 3 1/2" thick
- Min. stock length: 8"
- Sanding drum size: 4"
- Sanding belt: 3" hook & loop
- Approx. shipping weight: 160 lbs.

SIDE HANDLES FOR PORTABILITY!

2 ADJUSTABLE PRESSURE ROLLERS & INDUSTRIAL-DUTY BELT

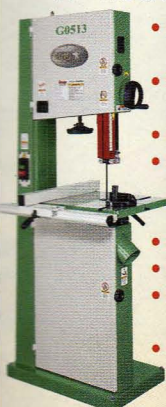


\$69⁹⁹ ADVANTAGE IN LOWER 48 STATES



G0459 ONLY \$650⁰⁰

17" Heavy-Duty Bandsaw



- Motor: 2 HP, 110V/220V, single-phase, TEFC
- Precision ground cast iron table size: 17" sq.
- Table tilt: 10° L, 45° R
- Max. cutting height: 12"
- 2 blade speeds: 1700 & 3500 FPM
- Blade size: 131 1/2" L (3/4" - 1" W)
- Euro-style roller disc blade guides
- Sealed & permanently lubricated bearings
- Approx. shipping weight: 342 lbs.

TOP

Includes Fence, Miter Gauge Quick Change Blade Release/Tensioner & 1/2" Blade

MADE IN ISO 9001 FACTORY!

G0513 \$825⁰⁰ ONLY \$750⁰⁰

\$89⁹⁹ ADVANTAGE IN LOWER 48 STATES

12" x 83 1/2" Parallelogram Jointer

- Motor: 3 HP, 220V, single-phase
- Precision ground cast iron table size: 12 1/4" x 83 1/2"
- Cutterhead knives: (4) 12" x 1/8" 1 1/4"
- Cutterhead dia.: 3 3/4"
- Cutterhead speed: 4950 RPM
- Max. depth of cut: 1/8"
- Max. rabbeting capacity: 3/4"
- Approx. shipping wt: 1059 lbs.

INCLUDES FREE SAFETY PUSH BLOCKS

Handles Fold In For Added Safety



G0609

ONLY \$1595⁰⁰

\$250⁰⁰ ADVANTAGE IN LOWER 48 STATES

15" Planer w/Spiral Cutterhead

- Motor: 3 HP, 220V, single-phase
- Precision ground cast iron tables & extension wings
- Table size: 15" x 20"
- Max. cutting height: 8"
- Feed rate: 16 & 30 FPM
- Cutterhead speed: 5000 RPM
- 2 speed gearbox
- Magnetic safety switch
- Heavy-duty cast iron construction
- Approx. shipping weight: 675 lbs.

New!



Foot Operated Built-in Mobile Base Provides Versatile Positioning

G0453Z

INTRODUCTORY PRICE \$1295⁰⁰

\$139⁹⁹ ADVANTAGE IN LOWER 48 STATES

3 HP Shaper

- Motor: 3 HP, 220V, single-phase, w/reversing switch
- Precision ground cast iron table
- Table with standard wing attached: 30 1/2" x 28 1/4"
- Spindle travel: 3"
- 3 interchangeable spindles: 1/2", 3/4" & 1"
- Spindle openings on table: 1 1/8", 2 1/4", 4" & 5 1/2"
- Spindle speeds: 7000 & 10,000 RPM
- Approx. shipping weight: 357 lbs.

Includes miter gauge & fence w/ hold-down springs



G1026 \$975⁰⁰ ONLY \$895⁰⁰

\$89⁹⁹ ADVANTAGE IN LOWER 48 STATES

2 HP Cyclone Dust Collector

- Motor: 2 HP, 220V, single-phase, TEFC Class "F"
- Amps: 12.5
- Intake hole size: 7"
- Impeller: 13 1/2" steel
- Suction capacity: 1354 CFM @ 2.5" SP
- Max. static pressure: 10.4"
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- Filter: 0.2-2 micron
- Collection drum: steel, 35 gallons
- Approx. shipping weight: 359 lbs.

NEW!

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G0440 ONLY \$745⁰⁰

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70

American Woodworker

#138, October/November 2008

Features



54



51

43 **New! Build Your Skills**

Build Your Own French Doors

Use router bits to make entry doors with divided lights.

51 Entry Door Router Bit Sets

6 sets reviewed: what it's really like to use them.

54 African Mahogany Dictionary Stand

Rout all the curves in one step using a big template.

60 **New! American Masterworks**

Morris Chair and Ottoman

A vacuum press is the quickest way to make broad, curving arms.

70 Hold-Everything Tool Rack

A one-day project for organizing your walls.

74 Vintage Spool Cabinet

Store sewing supplies in a reproduction box from an old-fashioned general store.



43



60

American Woodworker

Departments

12 Q&A

Make herringbone inlay and add a splitter to a zero-clearance throat plate.

14 Workshop Tips

Build a jig for installing drawer slides, mark holes with sticky notes, cut small pieces using a handscrew tablesaw jig, stop a crosscut sled from exposing the saw blade, improve the grip on a marking gauge, make memory sticks for your tablesaw, and carve clamp handles for a better grasp.

20 Tool Nut

A vintage-iron fan chases his Moby Dick.

24 Well-Equipped Shop

Horizontal Router Table from MLCS, Snappy Pocket Hole Adapter Set, General International midi lathe, Craftsman oscillating spindle sander and random orbit sander, DeWalt mobile compressor, MiterSet miter gauge jig, Carter Micro-Adjust bandsaw guides, and CMT Universal Hinge Boring System.

31 **NEW!** Great American Woodworker

Al Hudson's long career, from steam plants to a stunning Salem secretary.

38 School News

A Michigan teacher's organization energizes school shop programs.

82 Turning Wood

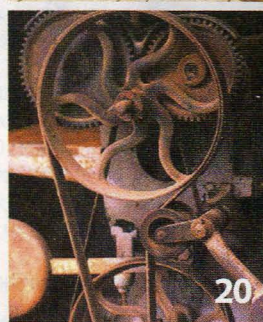
Techniques for making long-grain and short-grain knobs.

86 My Shop

This tiny shop's centerpiece is a precision sawing table.

90 Oops!

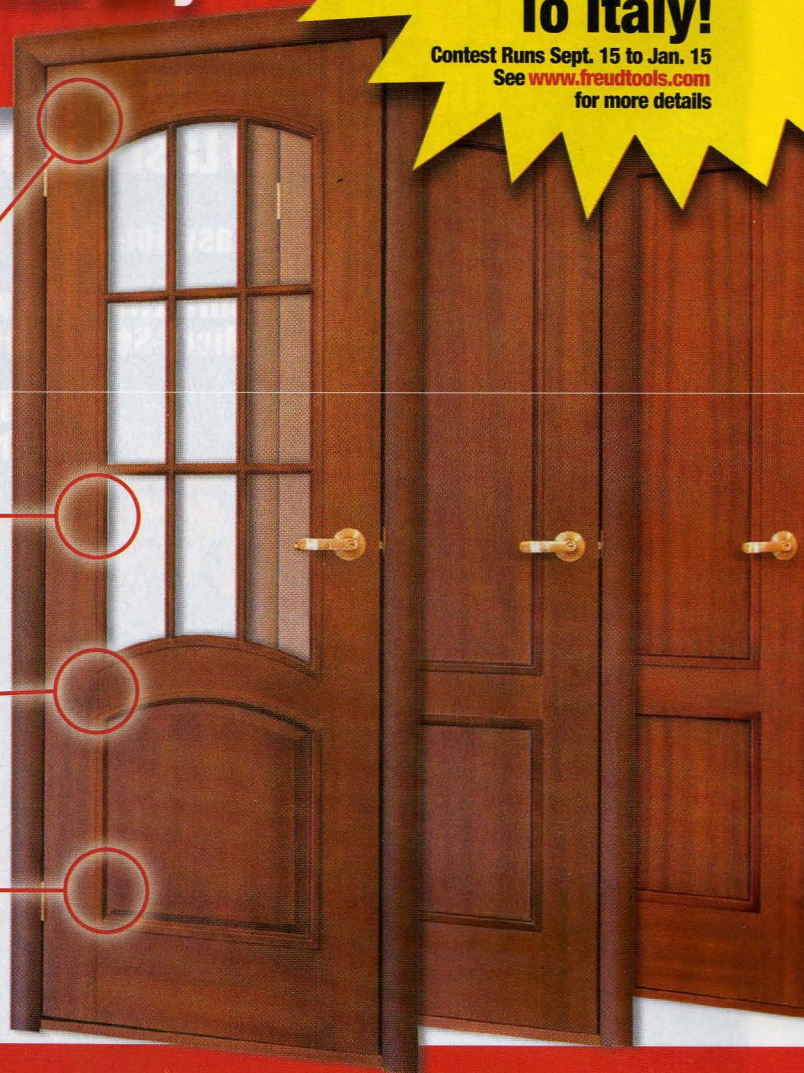
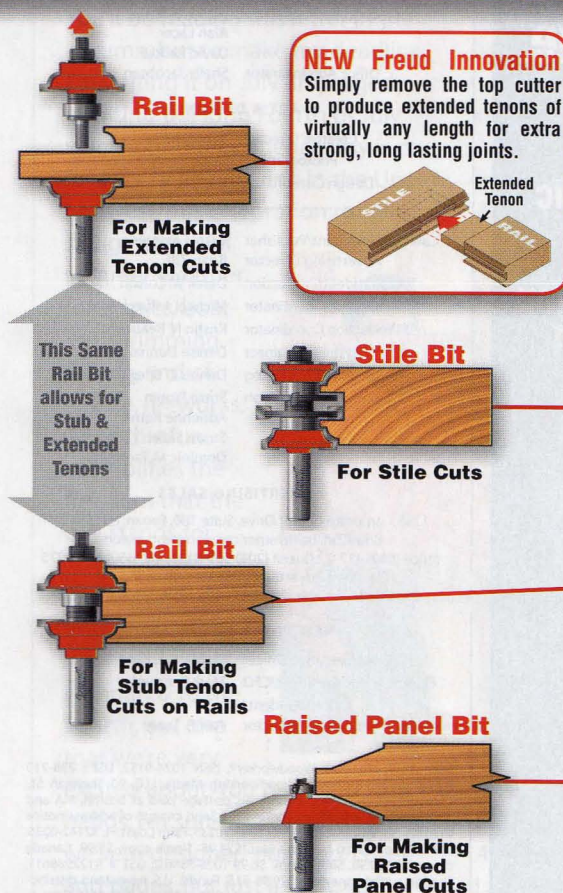
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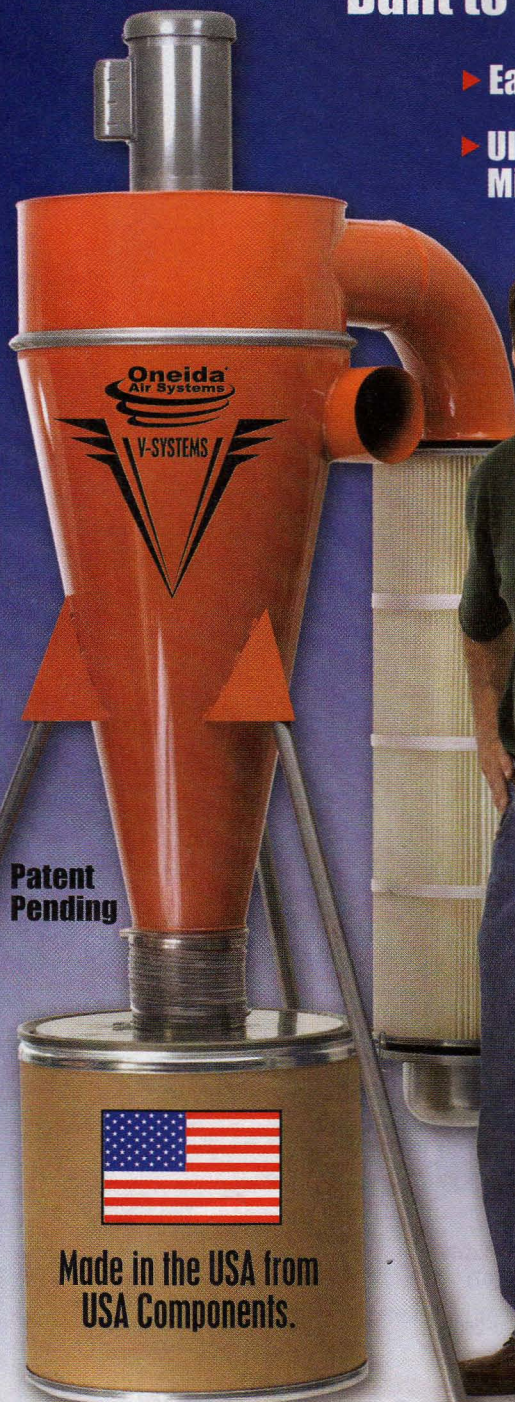
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From the Editor's Desk

Welcome to the NEW American Woodworker

You'll be reading this letter in the autumn, but to make my deadline I'm writing it on July 3rd, eagerly awaiting the long Fourth of July weekend. Independence Day is my favorite holiday. Living in the Upper Midwest, this celebration usually brings beautiful summer weather for picnics, boating, swimming, fishing, and of course, fireworks. All of this fun exemplifies the freedom that the day stands for.

American Woodworker is also celebrating. It's a minor cause compared to the Fourth, but one that we're very excited about. You have it in your hands. I'm sure you've noticed that we've redesigned our logo, cover, and pages. But just as July 4th is more than fireworks, our redesign is more than just a new look. We've also added some new departments and feature stories.

First, there's *A Great American Woodworker*, page 31. In this issue, you'll meet Al Hudson. Al made his living as an engineer, but as a young boy, Al learned woodworking from his grandfather. As Al honed his skills, his part-time hobby became a full-time passion. Looking at Al's masterpiece, I think you'll agree that he deserves the title, *A Great American Woodworker*. In coming issues we'll feature more outstanding artisans. Please email your suggestions to aweditor@americanwoodworker.com. We're looking for inspiring Americans whose lives have been shaped by

wood and whose craftsmanship is at the highest level.

The next new story you'll find in this and coming issues is *American Masterworks*, page 60. This how-to-build-it series brings you classic American furniture design by active

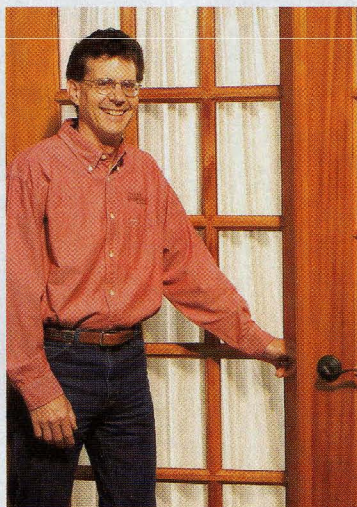
woodworkers just like you. *American Masterworks* includes thorough how-to steps, many helpful photos, detailed drawings, and a complete cutting list. *American Masterworks* projects aren't for beginners, but they include plenty of information. Any woodworker with adequate tools

and motivation will be able to build them successfully. This issue's *American Masterworks* features Laurie McKichan's streamlined Morris chair and ottoman.

The third—but not final—addition to *American Woodworker* is an expanded *Build Your Skills* section, page 43. This department has been so popular that we're giving it more pages, special paper and putting it right in the middle so you can't miss it. We're launching this section with a great story by Brad Holden on router-made French doors. So open the doors and come on in. I hope you enjoy your visit to the new *American Woodworker*.

Come back soon,

Randy Zahn



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Ipe Accents

HERE'S A PHOTO of the cabinets I built for my new woodshop in Sun City, Texas, following your plans (AW #112, January 2005, "Modular Shop Cabinets," page 44). Since I am 6'3" and can reach higher than most, I made the cabinets taller. I used ipe to make the edge trim on the drawers, doors, and all the pulls. The back-splash and front fascia have yet to be added, but I had to get this much finished to unload my boxes from the move.

Dan Capps

Anti-Adirondack

I AM 68 YEARS OLD and live in the heart of the Adirondack Mountains. Regardless of what you say about your Adirondack loveseat ("It's just as comfortable as it looks!" in AW #135, May 2008, "Adirondack Love Seat," page 36), I have never found a "comfortable" Adirondack chair, whatever the design. There isn't a human born whose body is shaped to fit in one. And just try to get out of it!

The trees that are cut to make these chairs would be better left standing in the woods.

Patricia LaGoy

Before the Shopsmith

ON A TRIP TO MY home province of Nova Scotia last year, I noticed an old combination machine similar to the one you recently featured (AW #136, July 2008, "The Electric Carpenter," page 20).

It was located in The Dory Shop Museum in Shelburne, about 200 km south of Halifax on the Atlantic coast. I was told that this serious machining center predates WWI, but it had no obvious manufacturer's stamps or nameplates. The centerpiece of the machine is a large bandsaw, and it also functions as a tablesaw, jointer, and shaper. It was originally powered



by a jackshaft, but the owner of the Shelburne Dory Shop retrofitted it with a large electric motor later on.

Richard MacCaul

Expensive Drawers

THE BUS BINS YOU USED for drawers are clever, but they're an expensive substitute for wooden ones (AW #136, July 2008, "Big Capacity Storage Cabinet," page 39). A dozen drawers could be made from two sheets of Baltic birch at a substantial cost savings. Plus, the woodworker would not be restricted to 5" deep drawers.

Rich Flynn

You're right about the depth restriction, Rich, but I'm not sure about the cost. Two sheets of true Baltic birch (rather than a less expensive multi-ply plywood, which has thinner face veneer) goes for about \$100 around here. The bus boxes cost \$94—about the same price—and they're already

assembled! Less expensive plywood would work, but it wouldn't be as durable as Baltic birch.

Tim Johnson

12,000 Member Shop

WOW... THANK YOU for bringing back a flood of memories from when I served in the Air Force at Offutt AFB and used their woodworking shop (AW #135, May 2008, "Air Force Woodshop," page 86). It doesn't look like it has changed a whole lot since I was there 35 years ago. I had the good fortune to find a sawmill about 90 miles south of Offutt that sold rough kiln-dried walnut for \$1/bd. ft. Good stuff, too! I bought a rather large amount of it and planed it down in Offutt's woodworking shop. From your article, I see that they have a lot more educational activities now than they had back then. Glad to see it is still going strong!

Ben Conner

Woodshop Survival

I AM A WOODWORKING teacher in the Mercer County Schools in Kentucky. For 22 years I have taught applied math, physics, geometry and chemistry through the design and manufacture of woodworking projects. Your article about high school shops really hit home (AW #133, January 2008, "Re-Starting Woodshop," page 30). My district is building a new school and did not add a woodshop. I have tried to convince the administration that what I do is as important as the engineering program that will replace woodworking. I've shared your article with school board members, administrators and parents. As you wrote, other states now recognize that discontinuing their woodworking programs was an error. I just can't give up!

William R. Cruce

To Rout Or Not To Rout

IN RESPONSE TO your excellent router issue (AW #134, March 2008), I cannot believe that I am the only woodworker who doesn't seem to need a router for every application!

My high school woodworking training in the late forties was strictly a "no power tools" course. No machines—just the sweat of student power. There I gained my highest marks in school, and a lifelong love. Upon retirement, I started volunteering at a local high school, teaching woodworking to teenagers. It surprises me how many of them have adopted today's world of rush, rush, rush, even in the shop. They try to push wood through the bandsaw and scrollsaws at lightning speed, as if there was no tomorrow!

I've suggested that working with wood should be relaxing. "Take your time. Enjoy what you're doing and

what you're producing. Don't over-work yourself or the machine." They must think I'm a dumb old codger! Although I do have a few power tools in my small basement shop, I guess I will always prefer hands-on work and its slower pace.

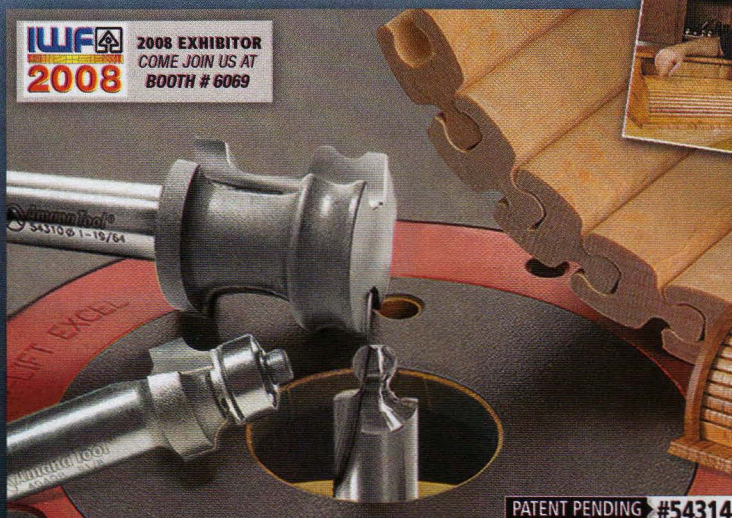
John C. Hudspeth

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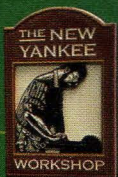
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Herringbone Inlay

Q I'd like to use my own wood to make herringbone inlay. How do I go about it?

A Making your own inlay isn't tough—you just need a well-tuned tablesaw and a good combination or general-purpose blade. A herringbone inlay is one of the simplest built-up patterns to make once you understand how it's put together. It's called herringbone, as you might guess, because the pattern looks like the bones of a fish.

Choosing the right material is important. Look for a board with pronounced, straight figure for the inner pieces and a board of contrasting color for the outer, border pieces. Mill both boards 3/4" thick.

Begin by cutting the board for the inner pieces into 1/4" wide strips (**Photo 1**). Use a stop block to ensure that each piece is exactly the same width. It's best to make a hinged stop block and flip it out of the way before you make the cut. This way, the strips will fall away from the board after they're cut. (They'd get trapped if the stop block isn't hinged.) Add a hold-down and clamp the board to your miter gauge to make sure that the board doesn't shift as you cut it.

Make the border pieces by sawing 1/16" thick strips (**Photo 2**). Use a zero-clearance throat plate with a splitter to eliminate binding and burning (see Splitter For Narrow Pieces,

WHAT IS HERRINGBONE INLAY?

An inlay is a thin piece of wood that's sawn from a thicker blank. A herringbone blank has four parts: on the inside, two pieces whose grain patterns face in opposite, diagonal directions (the herringbone); on the outside, two thin pieces that form a border.

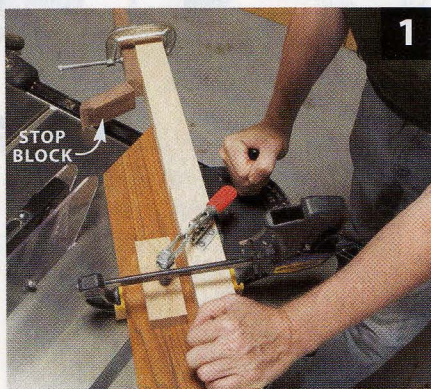
page 13). Guide the board with a large block. Add a tab to the end of the block to help push the board through the cut.

Glue the blanks (**Photo 3**). You can make them as long as you want by butting pieces end-to-end. Clamp the blanks between 2" to 3"-wide boards

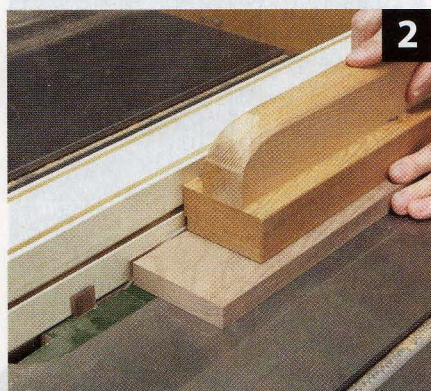
(**Photo 4**). Once the glue is dry, plane or sand the top of each blank so it has a level surface, then glue each blank to the edge of a wider, sacrificial board that's exactly the same length as the blank. Rip the blanks into 1/16" thick strips, using the same setup you used for the border pieces.

continued on next page





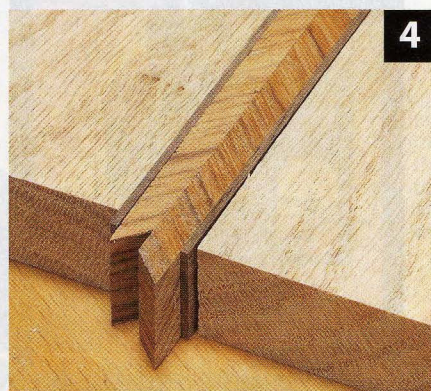
1 MAKE INNER PIECES by crosscutting a board into 1/4" wide strips. Cut the strips at 45° to create a diagonal grain pattern.



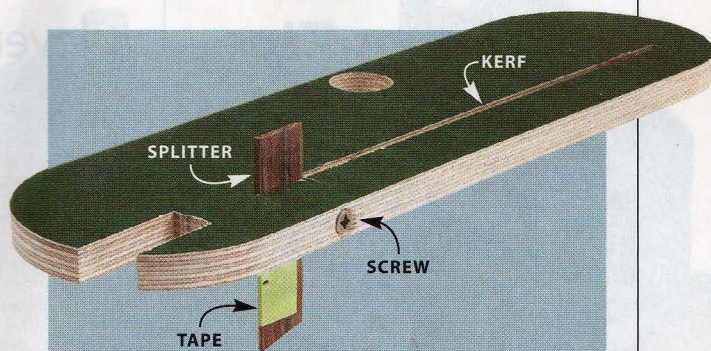
2 MAKE THE BORDER pieces by ripping a board into 1/16" thick strips.



3 GLUE THE BLANK together. Position the inner pieces with their grain patterns running in opposite directions to make the herringbone design.



4 CLAMP THE PIECES between two wider boards, to even out the pressure. After the glue is dry, saw the blank into 1/16" thick pieces to make the inlay.



Splitter for Narrow Pieces

Q How can I avoid burn marks when ripping thin strips?

A Add a splitter to your zero-clearance throat plate. A splitter keeps the wood from binding on the back of the blade.

For most rip cuts, you should use your blade guard and its built-in splitter to prevent binding, but it's often not practical when ripping pieces less than 1" wide. For these cuts, remove the guard and install a shop-made or commercial zero-clearance throat plate so there's full support under the workpiece.

To add the splitter, first extend the length of the throat plate's kerf by raising the blade all the way, under power. Next, make the splitter from a piece of wood that's two paper thicknesses thinner than the kerf, for adequate clearance. Cut the piece 1/2" wide and 1-1/2" long. Remove the throat plate from the saw and clamp it in a vise. Wrap the splitter with masking tape (so it fits tight in the kerf) and put it in the throat plate, butted up to the back of the kerf and extending about 1/2" above the throat plate. Drill and countersink a hole for a long No. 8 screw through the side of the throat plate and through the splitter. Remove the splitter and slightly enlarge the hole, so the screw won't split the splitter. Put the splitter back in place and drive in the screw. Cut off the tape above the throat plate. Taper the front of the splitter with a file, and you're all set. Be sure to use a push stick to keep your hands out of harm's way.

If you have a question you'd like answered, send it to us at Question & Answer, American Woodworker, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121, or e-mail to qanda@americanwoodworker.com.

Terrific Tip!



Universal Slide Jig

I'VE TRIED ALL KINDS of jigs for installing drawer slides, none to my satisfaction. But my new jig holds the drawer slides right where I want while I install them.

You can make this jig for any size cabinet. For standard base cabinets, cut four strips of 3/4" plywood, 3" wide. Cut two of the strips 30" long for the base and the crossbar; cut the other two 38" long for the legs.

Next rout 3/8" x 3/4" long slots into the legs, so the jig is infinitely adjustable. Then, glue and screw the legs to the base, offsetting them 1/4" from the base's edge so the crossbar sits flat against the cabinet side even

when you have a slide mounted on the cabinet's bottom.

The crossbar spans the two legs and is held in place with 1/4" by 2" bolts and 1/4"-20 jig knobs. Counterbore the bolts so they don't scratch the cabinet sides. The jig extends past the front of the cabinet so you can get at the front slide screws.

To use the jig, mark your drawer heights at the front and back of the cabinet. Stand the jig in the cabinet and position the crossbar to hold the first slide. Then just flip the jig around to the other side to install the first slide's mate.

—Rod Wolfington

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Mark-Free Drilling

SOMETIMES DRILLING a hole in a finished or ready-to-be finished piece of wood is unavoidable. I keep a pad of sticky notes nearby for this purpose.

I put the sticky note roughly over the area where the hole is to go. Then I can mark the location of the hole without making any marks directly on the wood. Paper is easier to write on than either tape or finished wood. A sticky note doesn't harm finishes or leave a residue.

—Mark Hudson



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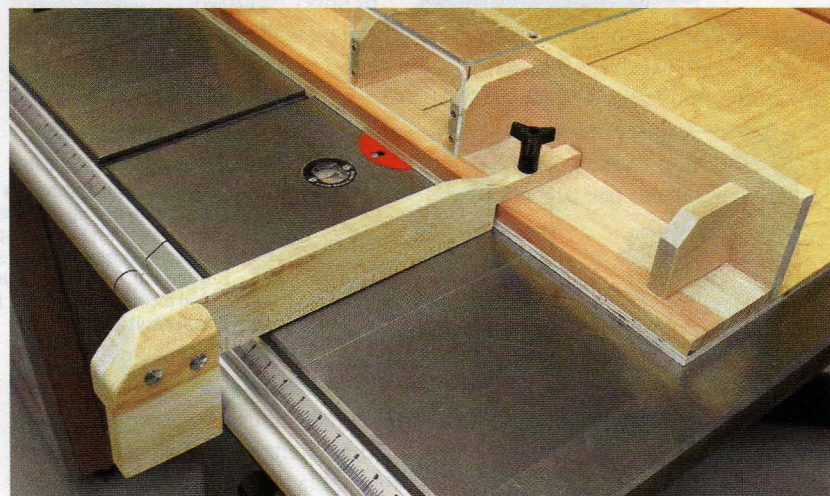
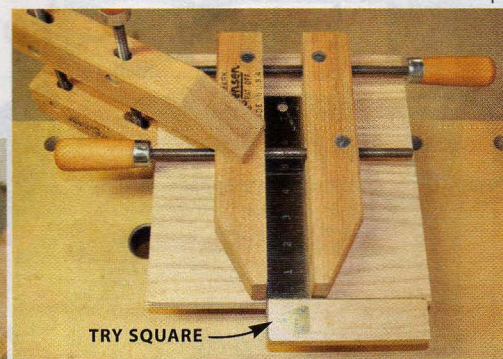
Tablesaw Finger Saver

TRIMMING SMALL PARTS on a tablesaw using a miter gauge can be a little nerve wracking. In order to do this job safely, I use a handscrew-jig instead of a miter gauge.

To make the jig, I cut a piece of plywood. Next, I gripped a try square in the handscrew and clamped it square to one edge of the plywood. Then I fastened the front jaw of the handscrew to the plywood. The opposite edge of the plywood rides against the saw's fence.

I mounted a piece of clear acrylic on top to prevent cutoffs from flying up. I also use a zero-clearance throat plate to keep small cutoffs from getting stuck.

—Jay McClellan



Sled Stop.....

THE MOST TROUBLESOME aspect of a crosscut sled is pushing it too far and exposing the tablesaw's blade at the back of the sled. I added a detachable stop to the last couple of sleds that I've built. It's just a long "L" that can be removed for storage by

unscrewing one T-nut knob.

The short arm of the "L" catches the front fence rail of my saw and limits the sled's travel. It's offset just far enough to one side so it never gets in the way.

—John English

Easy-Grip Marking Gauge

OVER THE YEARS

I have used about every type of marking gauge made. I prefer the newer wheel gauges because they're easy to adjust and tighten, but I find them hard to grip. To solve this problem, drill a hole in a piece of 3/4" thick maple that exactly fits the steel rod of the gauge. Then sand the maple to fit comfortably in your hand. Attach the new grip to the face of the gauge with double-faced tape.

—Gary Wallen



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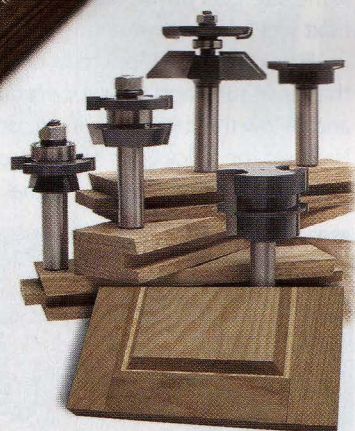
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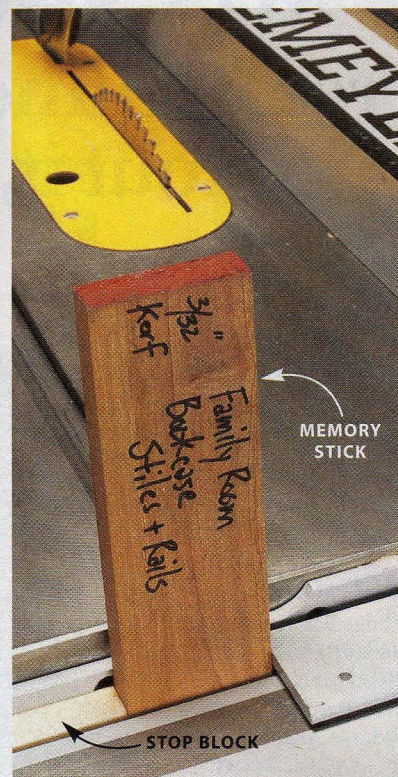
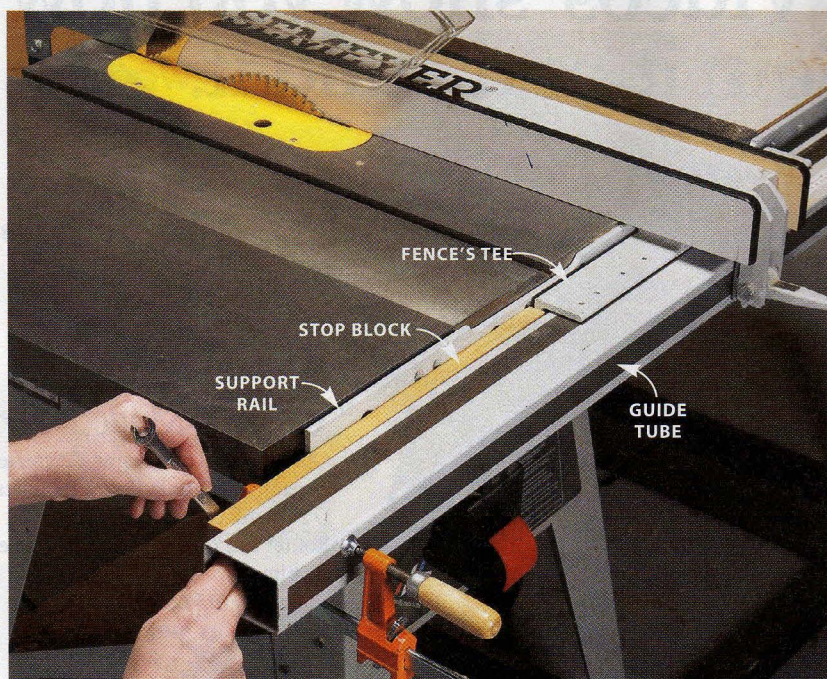
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Memory Stick

HERE'S A SIMPLE WAY to guarantee that duplicate parts turn out the same size every time, whether its next week or next year.

First, cut a stop block to fit between the guide tube and the support rail, and below the miter slots, if necessary. Next, set the fence against the blade and slide the stop block up to the

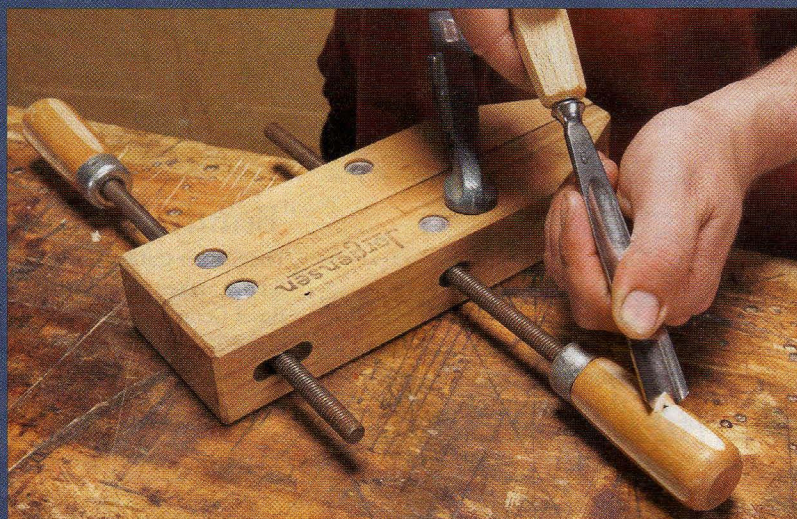
fence's tee. Secure the stop block in place however you wish. It's best to make it easily removeable, though.

To verify your stop block's zero position, cut a memory stick about 2" wide. Loosen the fence and slide it to the right. Position the memory stick so that it's held between the fence's tee and the stop block, then

lock the fence.

Take out the memory stick, and make a test cut. The board you cut should come out the same 2" width as the memory stick. Make and label memory sticks, including the thickness of the blade's kerf, for any parts you want to duplicate.

—Randall Thomas



Groovy Handscrews

After years of use, the handles on my handscrews became slick, smooth, and hard to grip. My solution is easy and costs nothing. I carve grooves lengthwise on the handles using a medium-sized gouge. Problem solved.

—Clovis Davis

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Moby Dick, the Great White Planer

THE NEWSPAPER advertisement was brief: "Planer, 24", \$450. Call."

My friend Charles Poth and I had been looking for just such a machine. We found the owner's home outside rural Jeromesville, Ohio, at the end of a long gravel road. The planer was stored outside under a raggedy canvas tarp. It was huge!

As usual, there was some shooting the breeze before getting down to business. The fellow had bought the planer at auction from a lumber mill near Bellville, Ohio, five years earlier, intent on purchasing enough equipment to open his own lumber mill. As new machinery came in the front door, the older equipment went out the back, into an open field. We counted three planers there, each progressively newer. Miles of rusting line shafting also lay stacked about in forlorn piles.

The man had begun restoring the planer with optimism. He was surprised that it hadn't been frozen up too badly, despite having been exposed to rain and snow for years. He re-turned the rusted and pitted feed rolls on a metal lathe, repoured all the Babbitt bearings, repaired the pressure bar, replaced some bolts, and did a serviceable cleanup. His ambitious business plans didn't work out so well, though, so he put everything up for sale.

Charles is an expert on antique machinery, so he gave the planer a thorough examination. There was no structural damage, and no motor to test, because the planer had originally been powered by a wide leather belt connected to a line shaft. Unfortunately, the machine didn't have a nameplate. Its manufacturer remained a mystery for some time.

While we were studying the machine, two other men stopped by.



After restoration, my 1876 planer still runs on flat belts, but I power it with an electric motor. The bed is supported by a single column, housed in the bell-shaped base.

They took one look at the planer, laughed derisively, immediately got back in their car and left. That probably explains how the sale price of \$450 quickly became "or best offer." Our \$350 in cash clinched the deal.

We loaded the planer into Charles' pick-up truck during a blinding snowstorm. A neighbor down the country lane kindly volunteered his small Bobcat skid loader, but we still had a difficult time maneuvering the one-ton dinosaur. Back home, we struggled through deep drifts, falling snow, and biting wind to get the smaller parts into Charles' shop and under cover. A few days later, we hired a local towing service to get the rest of the beast off the truck and into his shop.

A couple of years later, while going through some very old issues

of *The Manufacturer And Builder* magazine, I discovered that the planer had been designed and patented by well-known inventor E. F. Gordon, and made by the John A. White Co. of Dover, New Hampshire, about 1876. That makes it a mere 132 years old.

Charles and I got the planer working OK, but we had to use his old Allis-Chalmers farm tractor to provide the power. This became rather inconvenient, to say the least. Anytime I wanted to plane a wide board I had to travel the mile or so to Charles's shop and hope he was free to move the tractor into position and belt everything up. I resolved to move the beast yet again.

One obstacle stood in the way: Charles had installed another massive machine between the planer and the door. This was a 1917 43"x 8" P. B. Yates No. 401 three-drum sander,

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— Gary Striegler, President, Striegler & Associates Custom Homebuilders



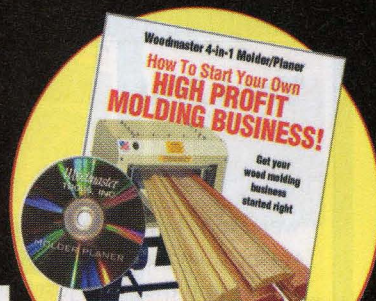
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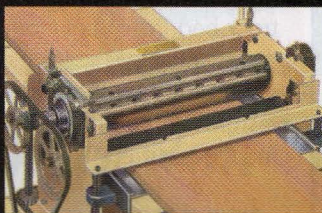
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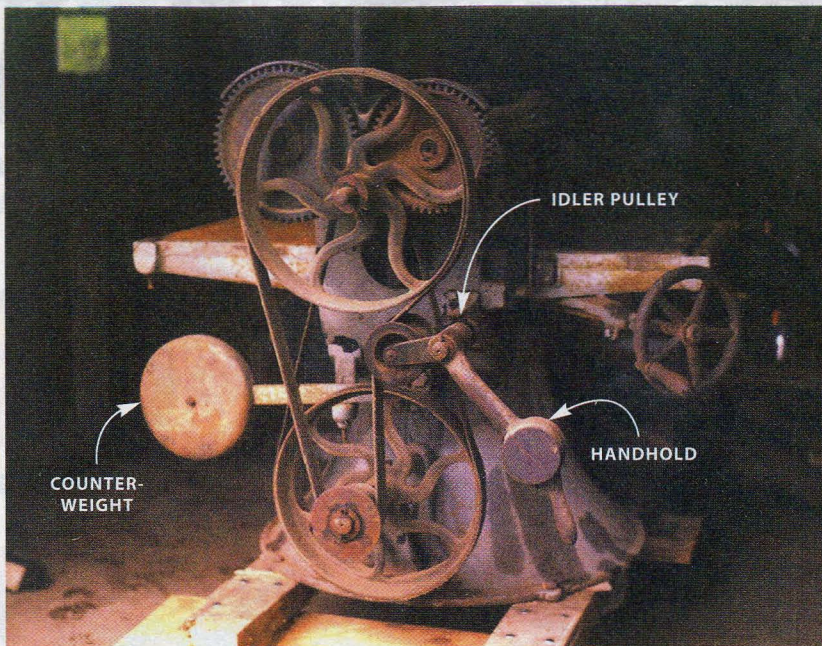
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weighing almost 8,000 pounds. It wasn't going anywhere soon. Charles calmly said that we'd just remove the wall behind the planer and pull it out that way.

Tear out a wall! Turns out that the wood frame building once belonged to the township. For efficiency, they had built it with an entrance on both ends so road equipment could enter at one end and go out the other. Charles had sealed off the other end long ago. In less than an hour four of us took down the wall. We used pry bars to rotate the planer 90° so a rollback truck operator could winch it through the opening.

It only hung up once, but a strong push with a 4x4 freed it again. It was weird seeing the planer traveling down the road chained atop the truck bed, instead of a car. Unloading it was anticlimactic. With the planer now in my own shop, I decided to restore it as completely as skills and funds permitted.



Here's the planer before restoration. The feed roller can be slowed down or stopped by a handhold connected to an idler pulley if the cut is too heavy.

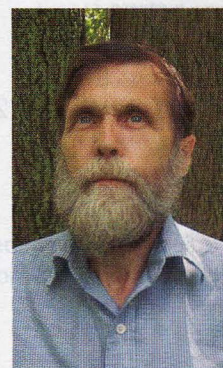
I added a new 5 hp, 220 volt, three-phase motor. After brushing on a new coat of light gray paint one day, matching the original color, I

stepped back to admire my handiwork. "Moby Dick," I said. "That's its real name!" I'd been chasing this leviathan for years, but unlike old Ahab, I landed the white whale. 🐋

—Dana Batory

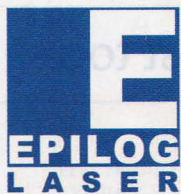


Moving this one-ton beast was quite a job. We needed extra leverage just to slide it off a flat-bed truck and into my shop. I hope I never have to move it again!

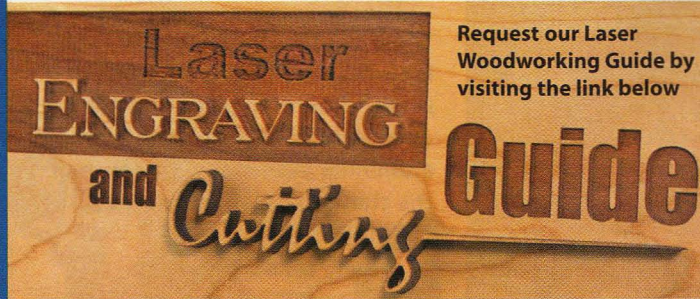
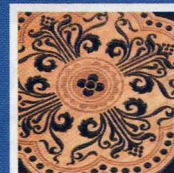
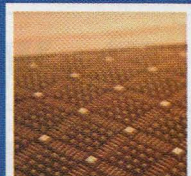


Dana Batory is the author of two volumes of "Vintage Woodworking

Machinery," published by the Astragal Press (www.astragalpress.com). These unique reference books cover the history and products of Fay & Egan, Yates-American, Defiance, Oliver, Parks, Boice-Crane, Baxter D. Whitney & Son, and Crescent machine companies. Dana's shop is in Crestline, Ohio.



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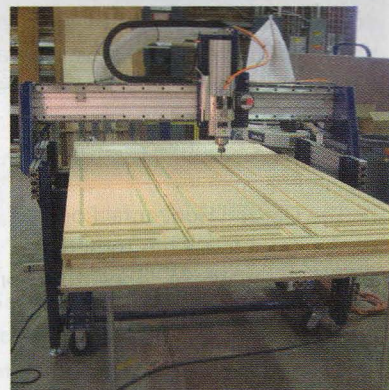
The ShopBot Buddy is the "ultimate workshop tool," allowing you to create a huge variety of projects and components, from simple 2D shapes to intricate relief carvings. American built and engineered, the Buddy is a professional-grade CNC tool with the performance, size and price to fit your needs, space and budget.



Buddy 32

With complete systems for less than \$6,000, the Buddy is the perfect tool for many applications, whether you need a flexible CNC machine to add to your manufacturing operation or you're looking for a way to take a hobby or small business to a new level of quality or profitability.

Buddy is available in two sizes - 24"x32" and 24"x48" - and the optional PowerStick attachment extends the length up to 12 feet, so the system can grow as your needs change. Plus, it's fully mobile, so it's never in the way when you're not using it. The ShopBot Buddy is the perfect CNC solution for when you don't want to compromise speed, accuracy and performance for price or space.



Buddy 48

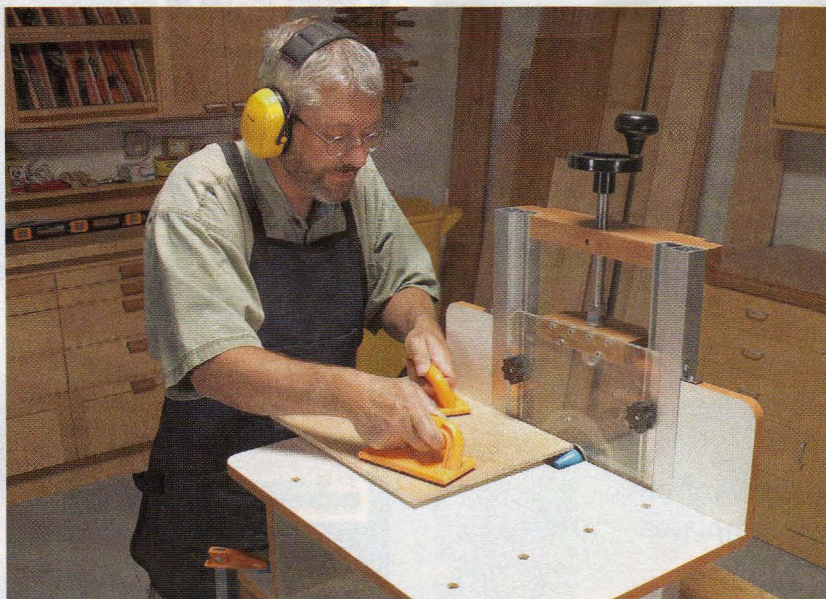
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What will you make today?



The MLCS Horizontal Router Table features a 3/8" thick, clear plastic router-mounting plate that adjusts up and down between two heavy aluminum extrusions. One turn of the crank changes the router's height by 1/16".

A Safer Way To Cut Panels and Moldings with Vertical Bits

VERTICAL BITS for raised panels and moldings eliminate the need for a variable speed router. These bits are much smaller in diameter than horizontal bits, which must be slowed down for safety. But vertical bits can be awkward to use. You must hold a tall panel against a short fence while balancing the panel on its narrow edge. That's tough to do, even with featherboards.

The Flatbed Horizontal Router system from MLCS has turned the tables on the whole concept. Its horizontal table flips the normal positions of the router and fence. Now you can feed the panel into the bit

while enjoying total support.

I spent about two hours assembling the table. The instructions were a bit sketchy and led to a couple do-overs (I could have been a more careful reader), but there were no major setbacks.

Once assembled, the table worked great. One thing that's different from what I'm used to is feeding the stock from right to left, the opposite direction from a standard router table. Height adjustments are quick and easy—one turn of the crank equals exactly 1/16" of bit travel. So, a 1/4 turn gives you accuracy to within 1/64". I wish the crank was larger,

though, so it would be easier to turn. The 20"x 24" table provides plenty of support for raising large panels.

The table works for mortising, too. I found it best to take light cuts when cutting deep mortises because the router mounting plate can flex. If you really need to make heavy cuts, use a couple C-clamps to hold the plate steady where it's not attached under the table. A second set of hold down knobs below the table would be a nice addition to an otherwise fine product.

This benchtop router table is light and easy to stow away. Its open frame provides lots of clamping areas to secure it to your workbench. All surfaces are melamine coated and provide a slick surface for feeding stock. Exposed edges are protected with molded plastic.

MLCS, www.mlcswoodworking.com, (800) 533-9298, Flatbed Horizontal Router Table, #9767, \$190.

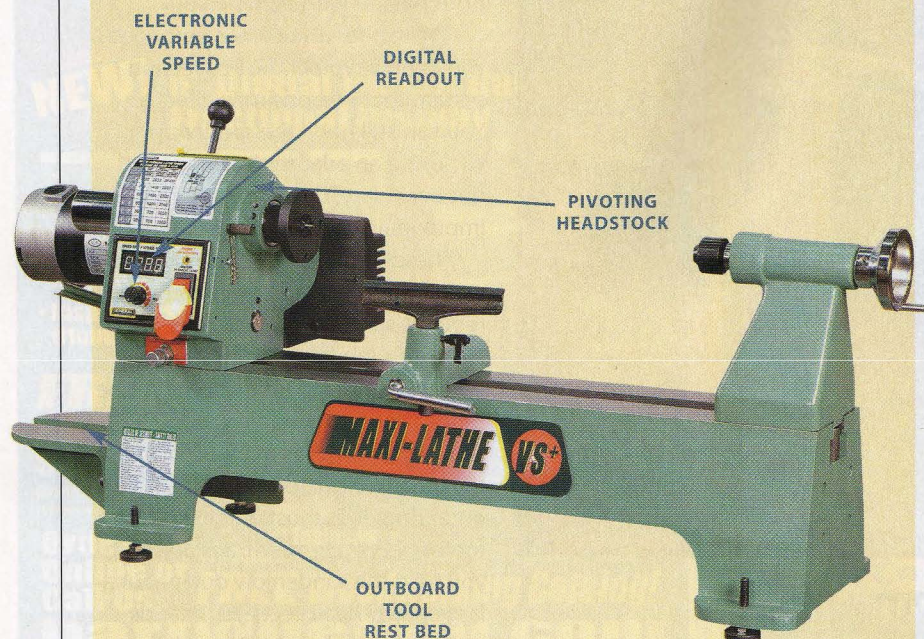
Make Pocket Holes Even Faster

Now you can drill pocket holes *and* drive the screws without fiddling with your drill's chuck. The new Snappy Pocket Hole Adapter Set includes a quick release chuck, a 3/8" bit holder, and a square drive bit. Here's how it can save you time: Put the Snappy quick-change chuck

into your drill. Snap the pocket-hole bit and holder assembly into the chuck and drill your holes. Pop out the bit, snap in the driver, and send the screws home.

Snappy, (800) 334-7472, www.snappy-tools.com, Pocket Hole Adapter Set, \$20.





Maxed Out Midi Lathe

GENERAL INTERNATIONAL'S New Variable Speed Maxi-Lathe VS has all the great features that made its predecessor, the General 25-100, so popular. Both machines are made of heavy cast iron for stability and low vibration. Both also feature quick-release control levers and a #2 Morse taper head and tailstock.

But General has added some significant upgrades to the 25-200VS. They upped the motor from 1/2 hp to 3/4 hp and enlarged the swing over the bed from 10" to 12". They also increased the distance between centers from 15" to 17-5/16". That distance can be stretched to an impressive 49" by purchasing an accessory cast iron extension bed.

The headstock on the new 200VS pivots 360° with positive stops at 180° for outboard turning. Outboard turning yields a 19-1/4" swing—that's some pretty

serious bowl-turning capacity. The headstock features positive spindle indexing in 10° increments.

Another welcome feature for turners is the electronic variable speed with digital readout. The variable speed is coupled with a three-step pulley system to yield three speed ranges: 300-900, 600-1800, and 1200-3600 rpm. A quick release lever makes changing the belt position for each speed range a snap.

Of course, all these additional features have caused the lathe to put on a little weight. At 146 lbs., the 25-200VS is getting a bit on the heavy side for a portable lathe. It comes equipped with a live center, spur center, knockout bar and safety glasses.

Source: General International, (514) 326-1161, www.general.ca, 25-200 M1 - Variable Speed "Maxi-Lathe VS+", \$670.

Sand Curves With Ease

Sanding is one of those necessary evils we all face. That's why we flock to any tool that promises to make the job easier. Craftsman's new Oscillating Spindle Sander makes sanding curves and contours easier and less time consuming.

The sander features a large 18" dia. cast iron table for better work support and less vibration. The 1/4-hp direct drive induction motor rotates the spindle at 1725 rpm while simultaneously moving it up and down 1" at a rate of 30 strokes per minute. The combined movement creates the oscillating motion that produces a smoother finish with less burning and chatter.

Annoying sawdust is instantly removed by a fan-assisted dust collection system that pulls the sawdust through the inserts and into a 2-1/2" exhaust port for your shop vacuum.



The Craftsman Oscillating Spindle Sander uses a tool-free thumb knob for spindle changes. Other features include: rubber foot pads to reduce vibration, abrasive drums and sleeves in 1/2", 3/4", 1", 1-1/2", 2", and 3" diameters, plus onboard storage for sleeves, drums, inserts and the power cord.

Source: Sears, (800) 377-7414, www.sears.com, Craftsman Oscillating Spindle Sander, Item #00921500000, Mfr. model #21500, \$190.



Low-Vibration Random Orbit Sander

IT'S HARD TO BEAT a random orbit sander for quickly removing material, but some sanders shake so much that they're hard to control. And they often leave your hand tingling from excessive vibration. Craftsman has gone a long way to solve both problems with their new Vibrafree 5-in. random orbit sander. It uses two con-

centric discs, spinning independently, to substantially improve control and reduce vibration. This is the biggest improvement to random orbit sanders in a long time, and it really works. We put two of these machines through a seat-of-the-pants vibration test (stand a cup of coffee on top and observe the ripples), and

both passed with flying colors.

The sander also comes equipped with a new type of dust collection system that's surprisingly effective. You can still hook the sander up to a vac using an adapter, but it's really not necessary. That's another huge improvement over other sanders.

These two important benefits outweigh the sander's shortcomings. It requires special two-part hook-and-loop discs (about \$4 per pack of 3). Varying the speed isn't an option—the sander has only a single speed. Sanding dust tends to accumulate in the middle of the center disc, so the outer ring does most of the work. The motor gets quite warm, a problem if you hold the sander low down—but a large housing protects your hands.

The sander has a 1/8 in. orbit dia., which is a bit more aggressive than many sanders. (Larger orbits are good for fast stock removal; smaller orbits for finish work.) Power is not an issue, though: used correctly, with light pressure, you won't slow down this innovative machine.

Source: Craftsman, www.craftsman.com, (800) 377-7414, 5-in. Professional random orbit sander, #009-25927, \$100.

Small Shop Compressor: It's Compact, Mobile and Durable

DEWALT RECENTLY introduced a new heavy-duty electric portable compressor, the D55171. Its low profile makes it easy to store. The 12-in. puncture-resistant semi-pneumatic tires and retractable handle make it easy to move around, despite weighing 105 pounds. These are all great features for a small shop com-

pressor.

Behind the outward features are some less visible components worth noting: The D55171 has a newly designed sealed lube pump that ensures a long, trouble-free life.



Additionally, the D55171 has increased the max tank pressure to 175 psi. It can deliver 4.6 cfm at 100 psi.

Source: DeWALT, (800) 433-9258 www.dewalt.com, D55171 Portable Electric Compressor, \$660.

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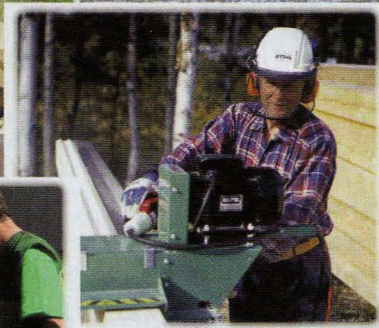
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Miter Gauge Angle Jig

WHEN'S THE LAST TIME you used the scale on your table saw's miter gauge to set a precise angle? The MiterSet is a clever, easy-to-use jig that takes accuracy to a higher level. It locks in your gauge at any angle you wish, tilted left or right, in $1/2^\circ$ increments. It's accurate within $1/20^\circ$, according to MiterSet.

To set your gauge, put one indexing pin in the 0° setting on either side of the MiterSet. Next, for angles in 5° increments, place a second pin in the corresponding hole. The pins are tapered, so there's absolutely no wiggle. Push the miter gauge tight up to the pins, and you're all set. For in-between angles, you add a $1/2^\circ$ step bar. It has notches on both ends that give you $1/2^\circ$ through $2-1/2^\circ$ settings, so all the bases are covered. To set your miter gauge, just push it up against the bar.

This ingenious device couldn't be much easier to use. We wish it had a few extra holes for other common angles, such as $22-1/2^\circ$, so the step bar wouldn't always be necessary. Some miter gauges may wiggle in the MiterSet's slot; to compensate, just push the gauge hard against one side of the slot and you're good to go.



continued



Source: MiterSet, www.miterset.com, 209-835-1626, \$30 (miter gauge not included).

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Setting your bandsaw guides is now easier than ever. With Carter's new Micro-Adjust Bandsaw Guides, all adjustments can be made quickly and easily by hand. No more hunting down misplaced tools.

The Micro-Adjust Guides are currently available as retrofit kits for Jet, Delta and Rikon 14-in. bandsaws, with guides for other major brands coming soon.

These premium guides utilize a compact, permanently lubricated ball bearing design. The bearings spin with the blade to greatly reduce friction. The guides adjust forward, backward and side-to-side and accommodate 1/8" to 1" wide blades.

Source: Carter Products Company, (888) 622-7837, www.carterproducts.com, 14 in. Micro-Adjust Guides, \$199.

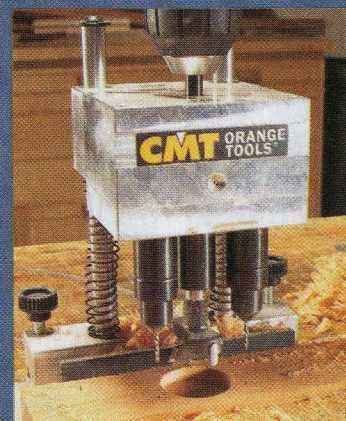
Euro Hinge Boring Head

IT'S HARD TO BEAT Euro-style hinges for their ease of adjustment. Using the CMT333 Universal Hinge Boring System, it's equally easy to precisely position the three holes you need to install the door-side half of the hinge. This jig works for virtually all brands of Euro hinges and is compact enough to take to a job site.

The jig drills all three holes at once. A large carbide-tipped bit drills the center cup hole, while two outer bits drill pilot holes for wood screws or larger diameter holes for plastic dowels. In your shop, you can power the jig using a drill press; on a job site, you can use a hand-held drill.

The hole patterns for Euro hinges differ from brand to brand. This jig isn't adjustable, but CMT offers interchangeable boring heads for Grass, Blum, Mepla, Salice, Hetich and Wurth hinges. From there, setup is easy. There's a stop rod for adjusting the holes' depth, and a fence for adjusting their setback. One stroke of the drill and bing! you're done. On to the next one!

Source: CMT, cmtusa.com, (888) 268-2487, CMT333 Universal Hinge Boring System, \$319.



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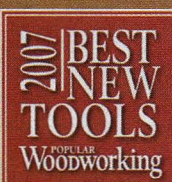
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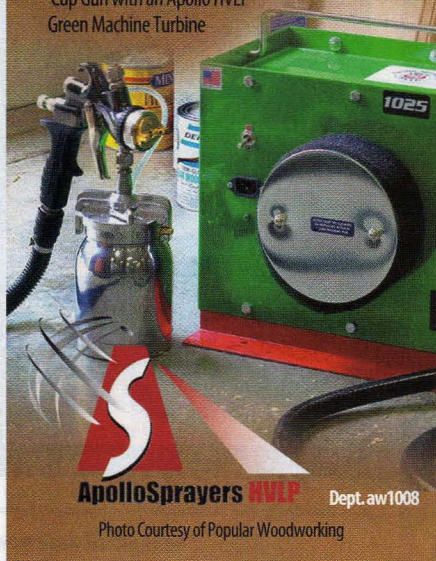
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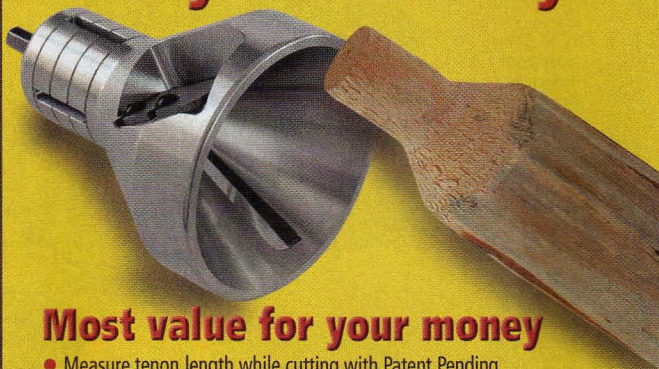
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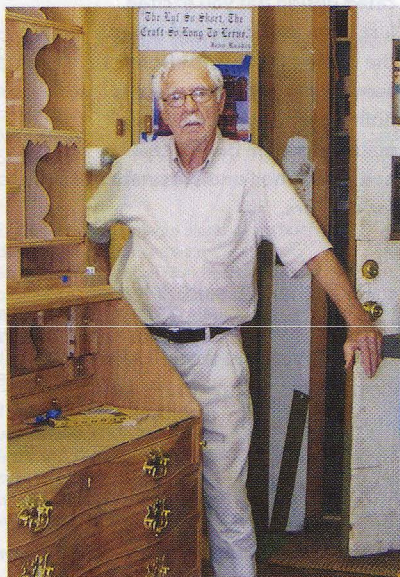
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Al Hudson

An 18th century-style Salem secretary completes one man's long love affair with wood. By Tom Caspar

DEEP IN THE HEART of Tennessee, just north of the Great Smoky Mountains National Park, Al Hudson has been quietly building exquisite reproductions of classic American furniture for over 70 years. At age 88, he's just finished his masterpiece: a double oxbow secretary, based on a number of 18th century beauties from Salem, Massachusetts. Building the secretary took a completely unexpected turn when Al uncovered a secret stockpile of amazing mahogany.

Wood is in Al's blood. He's a third generation woodworker—his grandfather was the master cabinetmaker in a large architectural woodwork mill, and his father rose to become superintendent of the same mill. In the hot summer months of the 1930's, Al worked at the mill during high school and college. "I apprenticed under the watchful eye of my





If beautiful wood and sophisticated design get you excited, just open the doors and lower the writing lid of Al Hudson's secretary. Most of the piece is built from mottled bee's wing mahogany from boards that had languished undiscovered for 40 years.

grandfather," Al said. "I learned to use all manner of hand tools, and dearly loved the work." Al wasn't destined to follow in his family's footsteps, however. "The top pay for a master cabinetmaker in 1937 was 75 cents per hour. There was little future for me at that mill, so I decided to pursue engineering."

Al's career prepared the groundwork for faithfully rendering period furniture. After college and service in the Marine Corps during WWII, Al went to work for the Tennessee Valley Authority (TVA) in Knoxville, Tennessee, where he still lives. He became a Head Mechanical Engineer and supervised the drafting of plans for 11 large coal-fired steam electric power plants. After retiring in 1980, Al returned to his first love, woodworking. In 1996, when he saw a photograph of a stunning secretary, Al was awestruck. He made a vow to build

A top like this really commands attention. Three carved flame finials set off a curved broken pediment.



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The description should include woods used, joinery, type of finish and any story behind the piece. For tips on taking high quality digital photos of your work, check out our web page:

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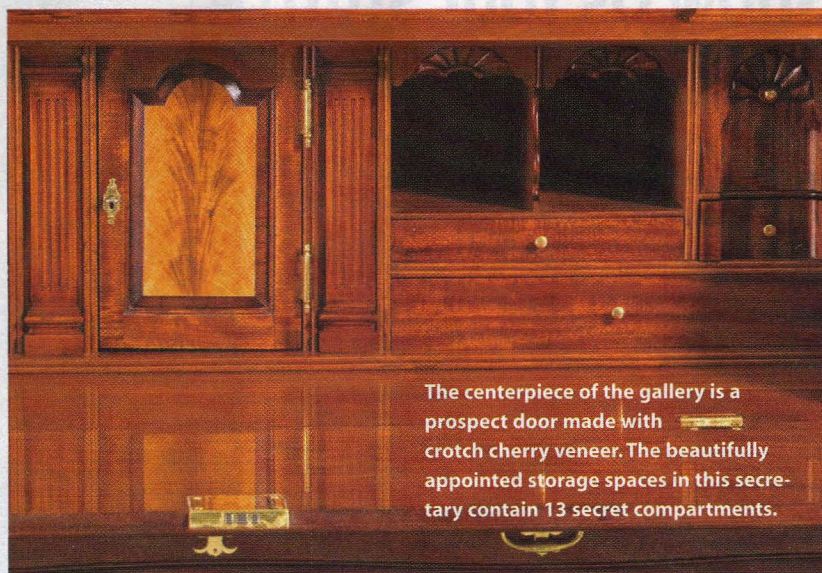
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it—no matter what—as the highest achievement of his career. Twelve years later, at age 88, Al finally had the time to undertake what would be an enormous effort. Drawing on his masterly drafting skills, Al produced the complete plans, sections, and details of the piece before cutting a single piece of wood (see "Al Hudson's Plans," below).

Al began building with enthusiasm, but after cutting most of the parts, he really wasn't satisfied with the mahogany he'd bought. "It just didn't have any character," Al said, so he put the work aside.

Several weeks later, he struck gold. "I found the prettiest wood I had ever seen—it's grain glistened and danced in the light." This treasure trove was four huge quartersawn pieces of beeswing and mottled mahogany. They were former back-



The centerpiece of the gallery is a prospect door made with crotch cherry veneer. The beautifully appointed storage spaces in this secretary contain 13 secret compartments.

ing boards (the pieces left over after veneer is sliced from a log) which had sat unused for over 40 years after a local veneer mill went out of

business. Each board was a full 1-in. thick, 15 in. wide, and 16 ft. long. "When I bought this unbelievable lumber, I started over."

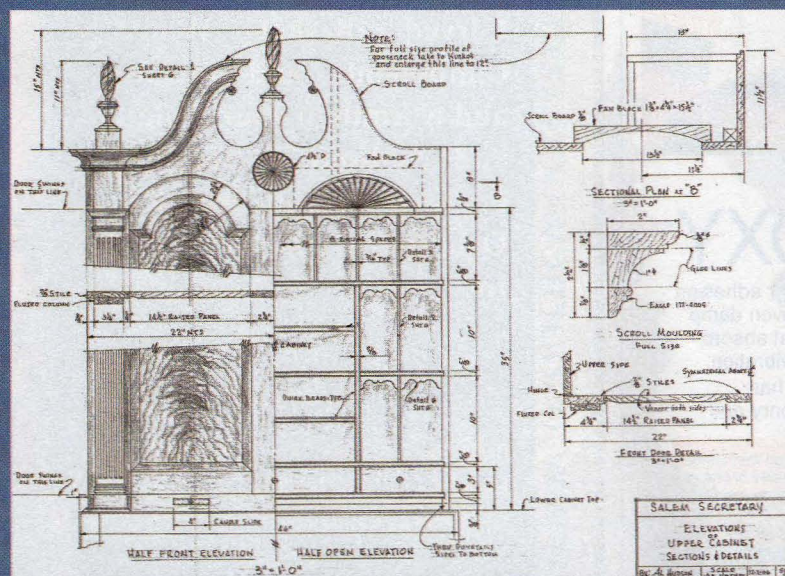
Al also found the perfect crotch mahogany veneer for the tombstone doors by contacting Certainly Wood, a company specializing in high-end veneer (see Source, below). "I sent them the original photo of the secretary, and explained that I was looking for veneer that was equally spectacular. They understood exactly what I needed, and the veneer they sent couldn't have been better!"

Seven hundred hours and nine months later, Al completed the secretary just before Christmas, 2007. But it wasn't quite finished. "I wanted a French polish to show the wood's glory," Al said, "but, never having done this myself, I figured that my secretary was not the project to learn on." Al applied a mixture of aniline dyes to the mahogany and passed it on to a local professional finisher, David Reeves. The amazing results speak for themselves.

Source: Certainly Wood, www.certainlywood.com, (716) 655-0206.

Al Hudson's Plans

The plans that Al Hudson drew for his Salem secretary are works of art in their own right. Rendered entirely by hand by a master draftsman, with beautiful script, they meticulously detail every aspect of this timeless masterpiece. The complete set is now available at www.awbookstore.com in a CD format for \$15 plus S&H. The original blueprints are a generous 17" wide by 24" long; you may have them printed this size by your local copy center, or have them reduced to 11" x 17".





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More Work by Al Hudson

Al Hudson has been building furniture for family and friends from his home in Knoxville, Tennessee, for over 25 years. Here's a sampling:



↑ **PEMBROKE TABLE**
26" H x 19" D x 27" L
Curly cherry; holly, ebony, and hedge apple (osage-orange) inlay

→ **TALL CASE CLOCK, NEWPORT STYLE**
23" W x 11" D x 93" H
Fiddleback and crotch claro walnut

↓ **WILLIAM AND MARY SPICE CABINET**
15" W x 12" D x 18" H
Curly claro walnut; holly and padauk line and berry inlay; ebony and lemonwood inlay borders



PEMBROKE TABLE AND CLOCK: HARLEY FERGUSON; SPICE CABINET (2) JOHN LUCAS



↑ **LADY'S WRITING DESK**
37" H x 28" D x 48" W
Curly cherry, ebony drawer pulls

↓ **HEPPLEWHITE SIDEBORD**
41" H x 24" D x 66" L
Sapele, pommele sapele, and
crotch mahogany veneer; holly,
ebony, lemonwood, padauk and
satinwood inlay



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Woodworking students strut their stuff at the annual MITES Convention and Exhibition.

By Dr. Ron Lutz

WHAT'S KEEPING public school woodshop programs vibrant these days? In Michigan, the answer is MITES, the Michigan Industrial and Technology Education Society. Established in 1928 by manual arts

teachers and now celebrating 80 continuous years of service, MITES is an all-volunteer organization dedicated to supporting students and teachers in industrial arts and technical education programs throughout Michigan and northern Indiana. Currently, more than 600 teachers, administrators, business associates, parents and interested citizens are active members.

The Society's mission is to recognize, encourage and promote student achievement in the "applied arts," as industrial and technical education programs are often called. Applied arts classes, such as woodshop, provide hands-on learning with tools, materials, and processes that result in a finished prototype, project or service. MITES primary goal is to motivate applied arts students to excel—in the classroom, in their personal lives and in their careers.

Applied arts classes attract a wide variety of students and are especially

helpful for those that could potentially get lost between the cracks in conventional "test driven" school programs. Teaching students how to use tools and materials to complete a project is a pragmatic approach to learning that provides them with real-world applications of math, science and writing concepts.

MITES members believe that the process of building a project directly affects academic achievement, because it helps students develop problem-solving skills and understand abstract concepts. Completing a project develops self-esteem and confidence, the basic ingredients to success in any life pursuit.

A Really Big Show

MITES has developed the perfect tool to motivate students and help them to see possibilities beyond the classroom: a huge exhibition. Every spring, over 10,000 applied arts students participate in regional competitions, with the goal of "going to state," and having their project exhibited at the annual MITES convention.

Students compete in woodworking and ten other divisions, including,



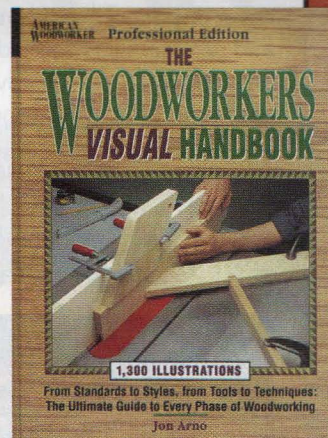
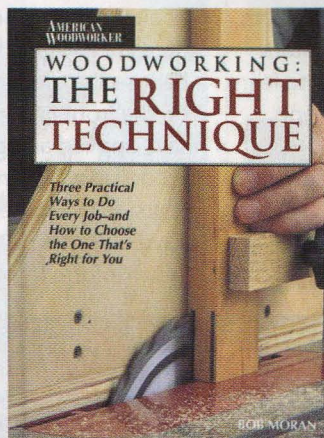
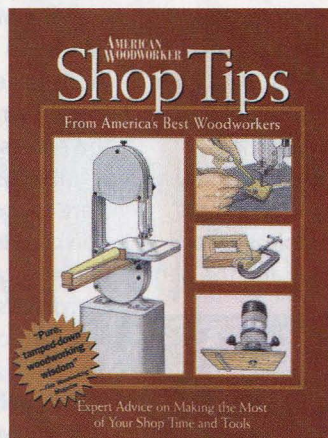
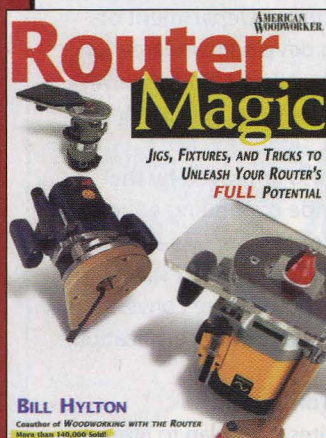
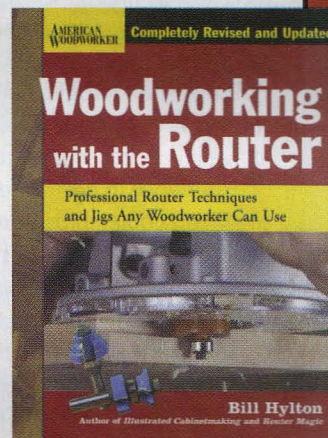
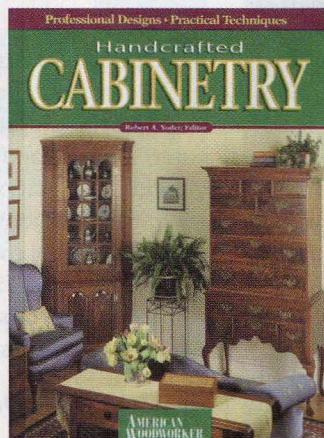
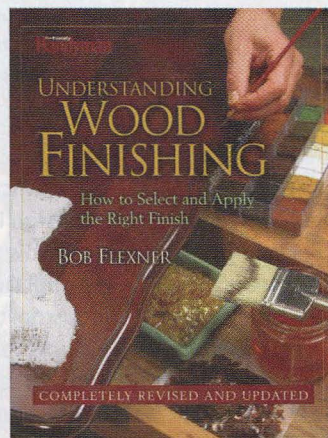
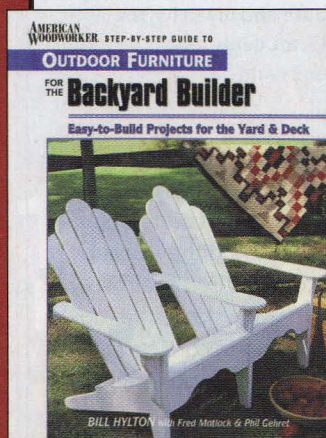
Awards are presented at five levels at the show, based on age and years of experience. Thoughtful design and good craftsmanship appear at every level.

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architectural drawing, mechanical drawing, machine shop, graphic arts, electronics/electrical, plastics, pattern making, wrought metal and applied technology. Up to 7000 individual projects are displayed at the convention. On-site competitions in residential construction and automotive technology also occur.

The woodworking category is always a major part of the show, providing hundreds of impressive pieces—furniture, clocks, decorative turnings, boats, musical instruments—the list goes on and on.

Projects are judged using industry standards. Award winners are chosen at five levels, based on age and years of experience in each category. In addition, scholarships from MITES and from corporate sponsors are awarded to graduating seniors and college students who are studying to become shop teachers.

The exhibition is a great place for students to get recognition, see the work of other students, talk shop, discover inspiration for future projects, and rub shoulders with educators and industry representatives, to learn about the latest trends and tools.

Members are Plugged In

Effective communication is an essential part of the organization. The MITES website, www.mites.cc, journal,

and periodic newsletters include discussions about individual programs and teaching strategies, curriculum development and governmental trends in education, as well as timely information about regional events and the annual convention.

Scores of MITES volunteers meet bi-monthly to organize and present the regional and state conventions.

MITES Plays Politics

MITES members are passionate about the value of educating students of all ages through practical hands-on experience. That puts them on the front lines of the battle to save applied arts programs in schools. And for more than twenty years, MITES leaders and members have played an active role, by working to inform legislators and the gen-

Conceptual projects stimulate imaginative thinking. By presenting woodworking's breadth and diversity, the exhibition helps students look beyond the classroom.

eral public about the growing body of evidence supporting the idea that hands-on learning helps students learn how to think. And they've succeeded! Due to their tireless efforts, industrial technology classes are now included as part of the core curriculum in Michigan's new state graduation requirements.

In addition, MITES is partnering with the Michigan Department of Education to develop standards for industrial education. MITES involvement guarantees teachers a voice in the process.

MITES is also approved by the state to provide continuing education credits for teachers. As a result, teachers can attend MITES-sponsored classes at the state convention and earn credits toward certification.

For More Information:

Visit www.mites.cc or plan to attend MITES 81st annual convention, May 6-9, 2009 in Battle Creek, MI. To see "MITES 2000" a video that describes MITES, interviews teachers and follows students and their projects from the classroom through the convention, go to www.americanwoodworker.com/mitesvideo.

Ron Lutz is a past president of MITES.



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**Traditional
joinery
and stave
construction
make these
doors stable
and durable.**

Build Your Own French Doors

By Brad Holden

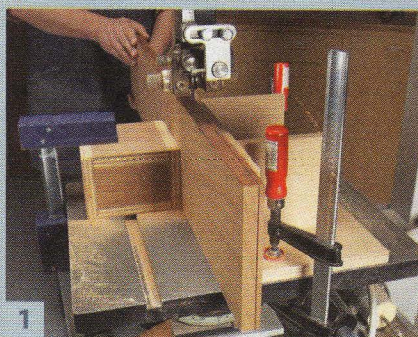
Let that sunlight in, enjoy the view, and make a grand entrance! French doors are simply doors with windows from top to bottom. Building a set of French doors involves milling many parts and some careful up-front planning.

In this story, I'll walk you through the whole process. First of all, since these doors will be exposed to the elements, it's a good idea to make them out of rot-resist-

ant hardwood, such as white oak or mahogany. I chose mahogany because its rich reddish brown hues complement the stone and cedar shakes that surround my entryway. And for the greatest stability—a major requirement for entry doors—I decided to make the stiles and rails using stave construction, a building method commonly used by exterior door manufacturers, rather than solid lumber.



Precision and accuracy are essential, so practice the entire process before milling the actual parts.

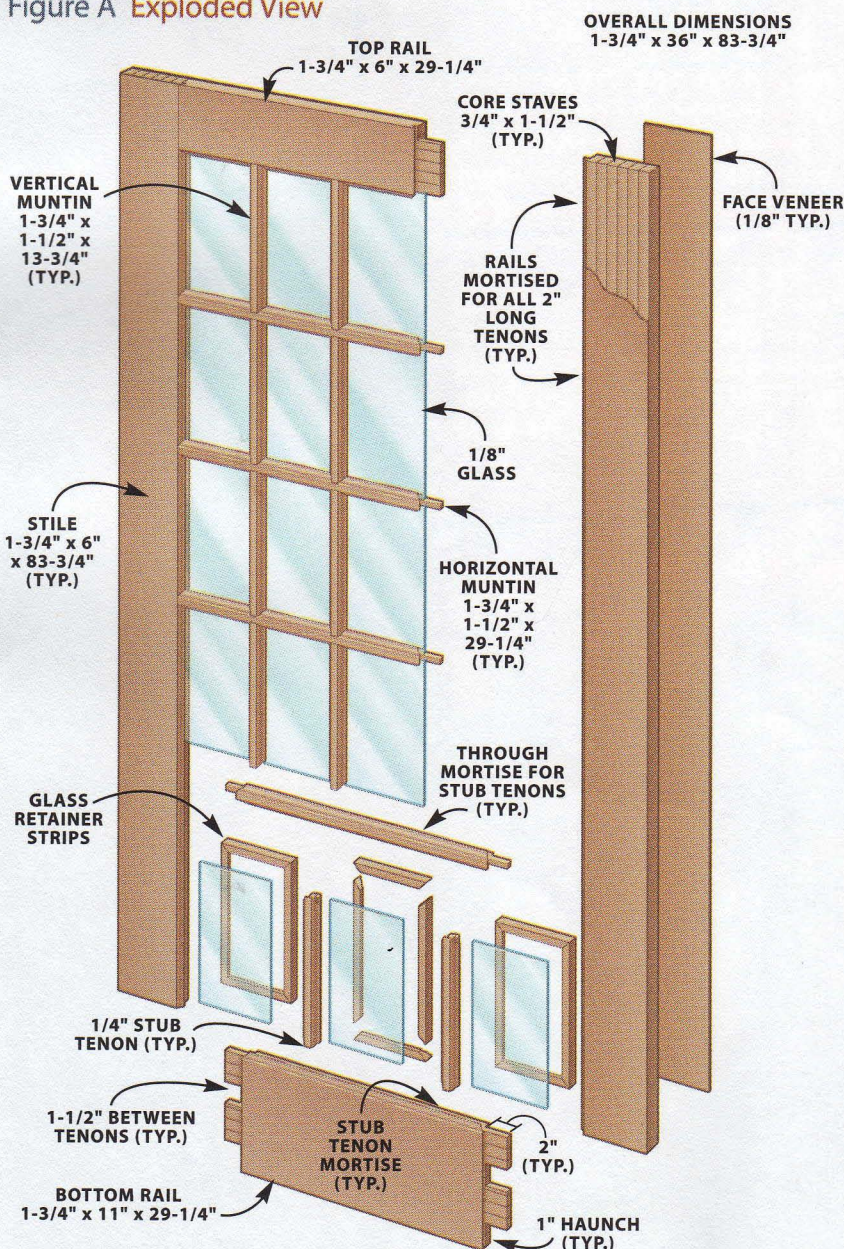


1 Resaw your best boards to make face veneers for the stave core stiles and rails.



2 Glue up the stile and rail cores, using angle iron to keep the boards flush. The cores are made from 3/4" thick boards that are ripped to width and face-glued.

Figure A Exploded View



The key to this project is a new router bit set designed expressly for French doors (see "Router Bit Set for Making French Doors," page 47). This set features specialized bits that allow making rails and muntins with long tenons, for strong and sturdy mortise and tenon joints. You'll also need a router table equipped with a mid-size router (at least 2-1/4 hp) with variable speed control, a tablesaw, a bandsaw, a jointer and a planer. To make a pair of 1-3/4" by 36" by 84" French doors, plan to buy about 110 bd. ft. of 4/4 lumber.

Stave Core Construction

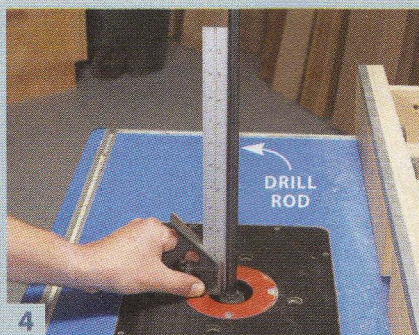
Stave core stiles and rails are made by gluing thick face veneers onto both sides of a glued-up core. The core is made from plainsawn pieces that are ripped to width, turned on edge and face-glued. This technique creates flat stress-relieved boards that won't bow or twist. In addition, these boards are essentially quartersawn, which minimizes seasonal movement.

This technique requires more lumber than using solid wood. To make both doors, you'll need about 50 bd. ft. of 4/4 stock for the core and about 20 bd. ft. for the veneer. I decided to use mahogany for the entire core. You could save money by making the cores from less expensive wood, such as poplar, as long as you use your primary wood for the outside pieces on both edges.

Start by picking out your best-looking boards to make the face veneers.



3 Complete the stave core construction by gluing the face veneers onto the core. Shop-made I-beam clamping cauls guarantee perfectly flat results.



4 Check your router table to make sure the bits will stand perfectly square. This step is essential for the routed joints to fit together correctly.



5 Install the stick cutter to make a set-up board. Raise the bit until the bottom slot cutter is $9/16$ " above the table's surface. This positions the bit for making joints in the $1\text{-}3/4$ " thick stock used to make entry doors.

These boards should have tight, straight grain and be at least an inch wider and several inches longer than the finished stiles and rails. I cut my veneer just over $3/16$ " thick (**Photo 1**). Using $4/4$ lumber, you'll get three pieces of veneer from each board. It'll take two 6" pieces of veneer to cover each face of the bottom rails.

A drum sander is the perfect tool to surface the veneer. You'll get very consistent thickness and no tear-out. A planer with a sled to support the thin veneer will also work.

Next, rip the core staves to $1\text{-}7/8$ " widths, turn them on edge and glue them together face-to-face to create $1\text{-}7/8$ " thick blanks. Glue up these blanks at least $1/2$ " oversize in width. I glued together seven pieces for each stile and top rail, and thirteen pieces for each bottom rail. This leaves plenty of material for flattening and squaring the glued-up blanks.

Use short pieces of angle iron to help keep the staves flush during glue up (**Photo 2**). Let the cores dry overnight, then scrape the excess glue from one face and flatten it on the jointer. Surface the other side with the planer and finish at $1\text{-}1/2$ " thick. Now that both faces are flat, joint one edge and then rip to at least $1/4$ " wider than the finished core.

Next, apply the veneer. I took the time to make I-beams from $3/4$ " MDF to assure that my glued-up stiles and rails would be perfectly flat (**Photo 3**). The beams are $4\text{-}1/2$ " tall and about

$1/2$ " wider than the core; they're glued and screwed together—it's important to assemble them on a flat surface. These I-beams distribute the clamping pressure evenly over the entire surface of the workpiece. After the glue dries, trim off the excess veneer and rip the stiles and rails to their finished widths.

Set Up for Routing

Routing the stiles, rails and muntins requires precision and accuracy, so it's essential to practice the entire process before you machine the actual parts. Use test pieces of poplar or other stable, inexpensive wood to make a corner

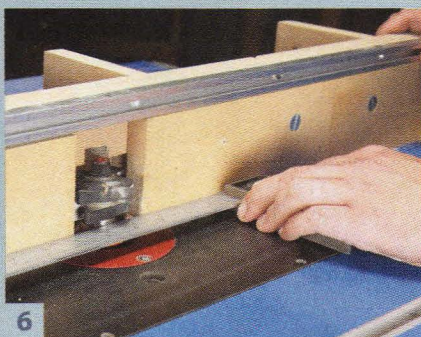
joint and a couple muntins so you get the hang of how everything works.

Start by checking your router table: When the bits are installed, they've got to stand perfectly square to the table for the joints to fit correctly. Install $1/2$ " drill stock in the router's collet and check for square front-to-back and side-to-side (**Photo 4**). Slip shims between the router's base and the table's mounting plate to make any necessary adjustments.

Next, make a set-up board from stock that's exactly $1\text{-}3/4$ " thick—the same thickness as your finished stiles and rails (this piece will be used to posi-

Router bit set for making French doors

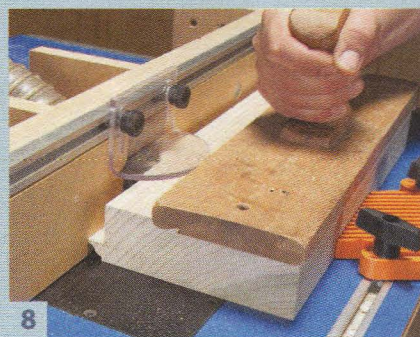
Freud's French door router bit set includes the three bits I used to make my doors: A stick cutter for cutting the long-grain edges of the stiles, rails and muntins, a coping cutter for creating tenons with profiled shoulders on the ends of the rails and muntins, and a large mortising bit for rabbeting the back shoulders of the tenons on the rails and muntins. The set also includes a straight bit for plunge-routing mortises and a muntin joint bit for making grids for doors with simulated divided lights. This set can be used to make both $1\text{-}3/4$ " thick entry doors and $1\text{-}3/8$ " thick interior doors (see Sources, page 50).



Set the depth of cut by positioning the fence flush with the bit's bearing.



Route the profile in two passes. Clamp spacers to the fence to limit the cut on the first pass. Routing this profile in a single pass removes too much material.



Remove the spacers and make another pass to complete the profile and finish making the set up board.

tion the coping cutter in the next step). Install the stick cutter and set its bottom slot cutter 9/16" above the table (**Photo 5**). Then set the fence flush with the bit's bearing (**Photo 6**). This bit takes off a lot of wood, so clamp 1/4" thick spacers to the fence, so that your first pass makes a partial cut (**Photo 7**). Remove the spacers and make another pass to complete the cut (**Photo 8**).

Rout Tenons on the Rails and Horizontal Muntins

The rails and horizontal muntins are the same length, so plan to rout their ends at the same time. It's easiest to rout the muntins as a wide blank and rip them to width later. Decide which face of each board is the front and which is the back and mark them. Then lay out the tenons (**Photo 9**). The shoulder on the front side is 1/2" deeper than the back. Install the coping cutter, using the set up board to set its height (**Photo 10**). Set the fence for a partial cut and rout all the pieces. Then reset the fence and rout to the layout lines (**Photo 11**). You'll have to make several passes. Use a backer board clamped behind the workpiece to avoid blowout on the back edge.

Before you remove the coping cutter, make a coped sled to support the muntins during the next routing steps: Rout the edge of a 5" wide by 30" long board that's exactly the same thickness as the rails and muntins and fasten a stop block on the back end.

Install the mortising bit to square

the back side tenon shoulders on each board (**Photo 12**). Use the same process to rout the ends of the vertical muntins. The vertical muntins all have short tenons (1/4"), because most of them mount in the horizontal muntins.

Rout the Long-Grain Profiles

Install the stick cutter and rout profiles on the inside edges of the rails and stiles, and also on the muntins (**Photo 13**). Follow the same two-step process you used to create the set-up block. For the muntins, rout one edge of the wide blank and then rip off a 1-1/2" wide muntin (**Photo 14**). Repeat this process to cut the rest of the muntins.

To safely rout the remaining profile on each muntin, insert the shaped edge in the coped sled you made earlier. As you did when routing the other profiles, take off half of the waste on the first pass. On the final pass, clamp both of the 1/4" spacers to the outfeed fence, to provide support for the muntin. Make sure you clamp the spacers high enough to allow the profiled edge of the muntin to pass beneath (**Photo 15**).

Finish the Tenons

Bandsaw the rail tenons to final width. On the outside edges, cut a 1" haunch on each tenon. On the bottom rails, divide the wide tenon into two narrower tenons, leaving 1-1/2" between them (**Photo 16**).

Cut The Mortise

Lay out the mortises on the stiles and rails (**Photo 17**). The rail mortises are

only 3/8" deep. My tenons ended up being slightly less than 5/8" thick. No problem. I used a 1/2" Forstner bit in the drill press to get rid of most of the waste, and then finished cutting the mortises with a 1/2" hollow mortise chisel (**Photo 18**). Lay out and cut the mortises in the horizontal muntins in the same way. Install each muntin in the coped sled for support and clamp it in your workbench's face vise to chop the muntin mortises (**Photo 19**).

Make Retaining Strips for the Glass

Remove all the slot cutters from the stick cutter and replace them with the supplied spacers. Figure out how thick the retaining strips will need to be by measuring the depth of the glass recess, and subtracting the thickness of the glazing tape and the glass. Mill a wide board to the resulting thickness, minus 1/8". Rout both edges (**Photo 20**) and then rip the retaining strips free.

Final Assembly

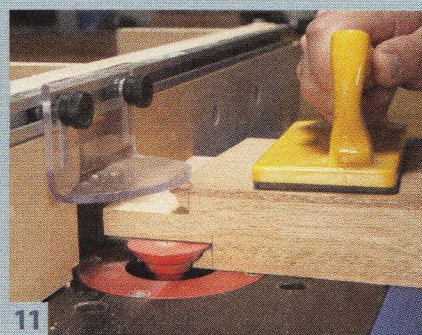
Start by gluing together all the muntins and the top and bottom rails. I used Titebond II Extend, a water-resistant glue with a long open time. Apply the glue with a brush to both surfaces of each joint. Then assemble all the pieces. Clamp one or both stiles in place, without glue, to hold the assembly square until the glue dries (**Photo 21**). Complete the door by gluing on the stiles (**Photo 22**). I found it



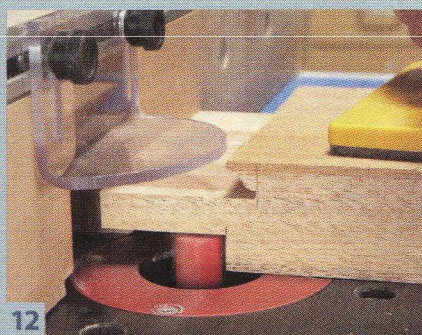
Lay out the offset tenon shoulders on the rails and the horizontal muntin blank. The front-face shoulders are farther from the ends.



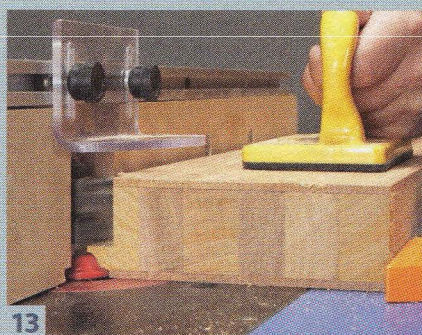
Install the coping cutter to rout tenons with coped shoulders on the ends of the rails. Use the set-up board you made earlier to set the cutter's height and position the fence.



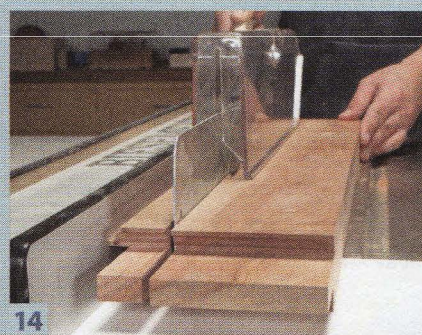
Rout to the layout lines by making multiple shallow passes. Set the fence for one shoulder and rout all the boards. Then set the fence for the other shoulder and go again.



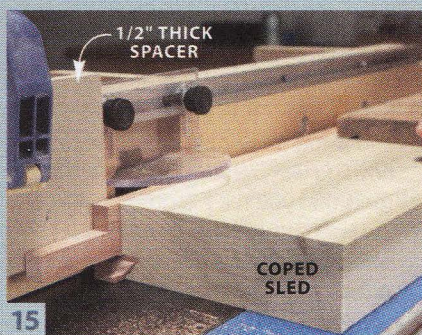
Square the back shoulders of the rails and muntin stock with the mortising bit.



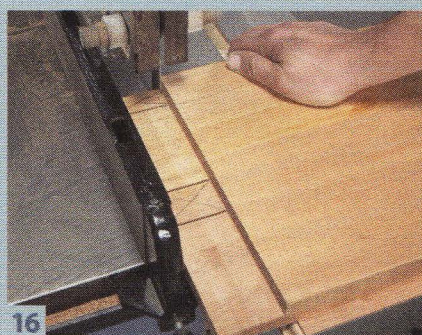
Rout profiles on the inside edges of the rails and stiles and on one side of the muntin blank with the stick cutter. Follow the same procedure you used to create the set-up board.



Rip muntins from the wide blank one at a time. Rout the blank's edge and rip again.



Rout the remaining profile on each muntin using a coped sled. Mount a spacer to support the muntin when you make the final pass.



Haunch the tenon on the outside edges of all the rails. Divide the wide tenons on each bottom rail into two narrower tenons.



Lay out the mortises on the stiles. Drill out the waste using a Forstner bit.



Square the mortises and widen them to full size with a 1/2" hollow mortising chisel.



Use the coped sled to support the horizontal muntins when you drill and square the mortises.



Use the reconfigured stick cutter to rout the glass retaining strips. Rout both edges of a wide board and then rip the strips free.



21

Glue the muntins and rails together, using one stile without glue to keep the assembly square.



22

Glue on the stiles one at a time. These doors require water-resistant glue, as they'll be exposed to the weather.



23

Complete each door by installing glazing tape and glass. Make the glass retaining strips easier to install by pre-drilling the nail holes.

easiest to glue and clamp them one at a time.

Before you buy glass, check local building codes—exterior doors may require tempered glass. Instead of caulking each piece of glass, apply glazing tape in the rabbetted recesses (see Sources). Install the glass and secure it by nailing in the retaining strips (**Photo 23**). 

SOURCES

- ◆ Freud Tools, Inc., www.freudtools.com, (800) 334-4107, 5-Pc. Divided Light French Door Router Bit Set (Ogee Profile), #98-318, \$319. Other profiles are available.
- ◆ TechnologyLK, www.technologylk.com, (888) 663-9830, 1/8 in. x 1/2 in. Black Double Sided Glazing Tape, #ST18X12, 25 ft. roll, \$26.
- ◆ Owens Corning Cultured Stone®, www.culturedstone.com, (800) 255-1727, "Country LedgeStone" Cultured Stone (Caramel color) #CSV 20007, \$9 per sq. ft.; Watertable/Sill Stone Trim (Buckskin color), #SWT 1371, \$11 per 18" section.

Brad Holden is a Minneapolis-based woodworker with a deep interest in making, restoring and using traditional tools. "There's nothing like creating fine work with tools that you have brought to life, or brought out of retirement." Brad works part time as a woodworker and carpenter in the Twin Cities area, specializing in one-of-a-kind custom pieces and small remodeling jobs.



Entry Door Router Bit Sets

Manufacturers use different strategies to produce strong joints. By Tim Johnson



THERE'S NEVER BEEN a better time to build your own entry door, because numerous router bit sets are available to help with the job. You can use any set, as long as you have a router table and a mid-sized router (2-1/4 hp or larger) with variable speed control.

The first thing you notice about the sets is how different they look. That's because manufacturers take different approaches to creating the strong joints that an entry door requires to support its massive size and weight—joints with long tenons and deep mortises.

Fortunately, despite their varied appearances, the sets divide easily into two categories: Short-tenon sets create tongue-and-groove joints with short tenons; these sets are basically large versions of cabinet door bit sets. Long-tenon sets include specialty bits—called stub cope cutters—that allow you to create rails with long tenons.

All the sets leave you with some work to complete the joints: Short-tenon set joints must be reinforced with dowels or loose tenons. Long-tenon sets leave the stiles to be mortised and the tenons to be haunched.

How you plan to reinforce the joints is a good way to choose between sets. If you use a doweling jig, choose a

short-tenon set. If you have a mortiser or a mortising attachment for your drill press, consider the long-tenon sets. The square-end mortises you chop in the stiles will match the tenons.

If you plunge-rout mortises, all the sets are in play. With long-tenon sets, you'll have to square the ends of the mortises you rout. With short-tenon sets, you'll have to rout mortises in both the stiles and rails and then make loose tenons to fit.

Ultimately, choosing a set depends on your budget, the tools you already own and how much additional work and time you're willing to devote to making each joint.

Tips for Using

I've used all of these sets, so I've had a chance to try all of the approaches the manufacturers suggest, and I've discovered some useful tips and short cuts:

- ♦ It's essential for the installed bits to stand perfectly square to your router table, so check your setup before you rout and take the time to make any necessary adjustments.
- ♦ Rough-cutting the long tenons before you rout simplifies routing,
- ♦ because it reduces the amount of material the stub cope cutters have to remove. Saw the tenons slightly oversize in width and undersize in length. Then use the stub cutter to trim the tenon to final thickness and to create the coped profiles.
- ♦ Make multiple passes to create the long tenons. To rout 2-1/2" long tenons, for example, start with the fence positioned to make a 0" cut (flush with the outside edges of the stub cutter's cutting flutes). Install five 1/2" thick spacers behind the fence, at both ends. Clamp stop blocks behind the spacers to hold them snugly against the fence. Loosen the fence and remove one spacer from each end. Press the fence snugly against the remaining spacers and lock it in place. Make one pass on each face. Then repeat the process four more times.
- ♦ If your tenons end up a bit too narrow for your mortises, adjust the fit by shimming the tenon cheeks with veneer. You can make super-thin veneer on your bandsaw or tablesaw. Choose a wide piece of scrap and set the fence to create the veneer as the offcut on the far side of the blade.

Short-Tenon Sets



Matched Rail & Stile Cutters for Entry Doors

\$150, available in three profiles, #8838 shown.

MLCS www.mlcswoodworking.com
(800) 533-9298

What you get:

- ◆ Stacked long-grain and end-grain bits.
- ◆ A bearing on the end-grain bit for convenient depth-of-cut set-up.
- ◆ Single pass profile-cutting capability with both bits.
- ◆ 1/2" thick tenons.
- ◆ Ability to make 1-3/4" and 1-3/8" doors.

What you have to do:

- ◆ Set the depth of cut by trial and error for all long-grain cuts.
- ◆ Strengthen the joints by routing mortises and installing loose tenons or by drilling holes and installing dowels.

2-Piece Matched Stile and Rail Entry Door Set

\$200, available in two profiles, #185-1705 shown.

Eagle America www.eagleamerica.com
(800) 872-2511

What you get:

- ◆ Stacked long-grain and end-grain bits.
- ◆ Bearings on the end-grain bit for convenient depth-of-cut set-up.
- ◆ Single pass profile-cutting capability with both bits.
- ◆ 1/2" thick tenons.
- ◆ Ability to make 1-3/4" and 1-3/8" doors.

What you have to do:

- ◆ Set the depth of cut by trial and error for all long-grain cuts.
- ◆ Strengthen the joints by routing mortises and installing loose tenons or by drilling holes and installing dowels.

2-Piece Entry & Passage Door Set

\$170, available in two profiles, #91-525 shown; Extended Tenon Cutter, \$35, #91-525TC shown.

Infinity Tools www.infinitytools.com
(877) 872-2487

What you get:

- ◆ Stacked long-grain and end-grain bits.
- ◆ Single pass profile-cutting capability with both bits.
- ◆ Bearings on the end-grain bit for convenient depth-of-cut set-up.
- ◆ 1/2" thick tenons.
- ◆ Ability to make 1-3/4" and 1-3/8" doors.
- ◆ The option to rout coped rail tenons of any length, by adding the stub cutter.

What you have to do:

- ◆ Set the depth of cut by trial and error for all long-grain cuts.
- ◆ Strengthen the joints by routing mortises and installing loose tenons, or by drilling holes and installing dowels.

A SLICK WAY TO CREATE LONG-TENON JOINTS

1. Rough-saw the rail tenons, using a bandsaw or tablesaw.
2. Establish the tenons' final thickness with a stub cope cutter.
Make test cuts on both sides of a test piece to dial in the bit's height. This step automatically centers the tenon.
3. Rout the tenons, using multiple passes with the stub cutter.
4. Install the stacked bit, using one of the tenons you've routed to set its height.
5. Set the fence and rout the inside edges of the stiles and rails.
6. Chop mortises in the stiles.
7. Haunch the tenons.

Long-Tenon Sets



2-Piece Entry and Interior Door Router Bit Set

\$200, available in three profiles, #99-267 shown.

Freud www.freudtools.com
(800) 334-4107

What you get:

- ◆ Stacked long-grain and end-grain bits. The end-grain bit disassembles to create a stub cope cutter.
- ◆ Single pass profile-cutting capability with both bits.
- ◆ Bearings on both bits for convenient depth-of-cut set-up.
- ◆ The ability to rout coped rail tenons of any length.
- ◆ 5/8" thick tenons.
- ◆ Angled cutters for shearing cuts.
- ◆ Ability to make 1-3/4" and 1-3/8" doors.

What you have to do:

- ◆ Chop or rout mortises in the stiles.
- ◆ Haunch the rail tenons.

3-Piece Entry and Interior Door Router Bit Set

\$299, roundover profile only, #800.527.11.

CMT www.cmtusa.com
(888) 268-2487

What you get:

- ◆ A long-grain bit, an adjustable tenon cutter and a stub cope cutter. The tenon cutter can be used independently to make tongue-and-groove joints.
- ◆ Single pass profile-cutting capability with the long-grain bit.
- ◆ Bearings on the long-grain bit for convenient depth-of-cut set-up.
- ◆ The ability to rout coped rail tenons of any length.
- ◆ 5/8" thick tenons.
- ◆ Angled cutters for shearing cuts.
- ◆ Ability to make 1-3/4" and 1-3/8" doors.

What you have to do:

- ◆ Chop or rout mortises in the stiles.
- ◆ Haunch the rail tenons.

Stub Spindle and Cope Cutter Entry Door System

\$140, ogee profile only, #47511.

Amana www.amanatool.com
(800) 445-0077

What you get:

- ◆ One profile bit and one stub cope cutter.
- ◆ Single pass profile-cutting capability with the profile bit.
- ◆ A bearing on the profile bit for convenient depth-of-cut set-up.
- ◆ The ability to rout coped rail tenons of any length.
- ◆ 1/2" thick tenons.
- ◆ Angled cutters for shearing cuts.

What you have to do:

- ◆ Rout or saw long-grain grooves in the stiles and rails.
- ◆ Chop mortises in the stiles.
- ◆ Make two separate passes (one on each face) to create every profile.
- ◆ Haunch the rail tenons.

CONCLUSIONS

Short-tenon entry door sets are easy to set up and use. They function similarly to standard cabinet door sets and produce perfectly fitting joints that must be reinforced with dowels or loose tenon joints.

My dream long-tenon entry door set would include two bits: A stub cope cutter to rout long tenons on the rails and a stacked bit (with a bearing for setting the depth of cut) to rout the inside edges of the stiles and rails. 

African Mahogany Dictionary Stand

Got curves? Use full size templates. by Bruce Kieffer

I DESIGNED AND BUILT this stand for a good friend who wanted a bold look. I chose African mahogany for its warm tone, which gets darker and richer over time. I wanted the stand's curves to give it a stately elegance, but I also wanted the construction to remain relatively straightforward. After gluing each side together from rectangular pieces, I made a full-size template to rout all the curves.

Prototypes

When I set out to design a new piece, my first stop is the drawing board. Once the drawing is complete, I almost always put together a full-size prototype (**Photo 1**). It doesn't have to be anything fancy. This one was a bunch of scrap plywood and particleboard, rough-cut to shape and assembled with staples, nails and screws.

A prototype always reveals areas where the drawn version needs refinement. Better to catch problems early than have regrets after the piece is built! Many woodworkers make scale model prototypes, but I didn't think that approach would work with this stand. A scale model would not have allowed me to judge the height or feel of the piece. The dictionary stand prototype showed me that, as drawn, the top was too small, the height was too short, and the feet weren't spread wide enough.

Digital Templates

Every piece of this stand is shaped. To help you get the shapes right, I've drawn a grid that you can use to make templates (Fig. D, page 59). But you may find it easier to download a PDF file with full size templates from www.americanwoodworker.com/Dstemplates. Download the file to a CD and take it to a

photocopy store that has a large format printer. Ask them to print it out with a page setup of 36" wide x 48" tall. Double-check the measurements shown on the printout to make sure they are correct. If not, ask to have it adjusted and reprinted.

For the shelf, top and supports (C, D and E) use paper templates to trace the shapes onto your mahogany pieces. The sides (A and B) require a template made from 3/4" MDF for shaping. Make your template for the sides as accurate and smooth as possible. The more time you spend refining and perfecting the templates, the less time you'll spend sanding the routed edges.

Build the Sides

1. Cut the leg and feet blanks (A and B) to size. Cut the bottoms of the legs to 93°, and cut the trapezoid shape of the feet (Fig. B, Page 60). Cut the biscuit grooves that join the legs and feet. Glue and clamp the legs to the feet (**Photo 2**).

2. Make a routing template for the sides from MDF. Cut out the shape on a bandsaw or jigsaw. Fair and smooth the long curves with a hard-bottomed sanding block. Use curved sanding blocks or a spindle sander for the tighter curves.

3. Trace the template onto both mahogany side blanks. Rough cut the shapes, leaving a 1/8" margin to be routed off later.

4. Align and clamp the template to the side. Tearout can be a real problem on the side assemblies, so avoid disaster by routing in stages. For the first stage, mount a 5/8" template bushing and a long 1/2" dia.



Prototyping is an essential step to refine a new design. What looks good in a drawing doesn't always work in three dimensions. After making this mock-up, I changed the drawings and started building the real thing.



African mahogany has a warm, golden tone that gets darker and richer as it ages.

straight bit in your router. Use this setup to remove most of the wood, but leave enough for a final cleanup pass. Set the router for a 1/4" deep cut on the first pass, then increase the depth about 3/16" for each subsequent pass (**Photo 3**). Leave the sharp angles at the tip of the feet and the top of the legs for hand shaping (**Photo 4**).

5. Remove the straight bit and bushing, and insert a 1-1/2" long top-bearing flush-trim bit. Make the final trim

cut. If your top-bearing bit is not long enough, rout as deep as you can. Then, remove the template, flip the side over and finish shaping the edge with a bottom-bearing flush-trim bit.

Build the Shelves and Supports

6. Glue up boards to make the shelf and top (C and D). Lay out and cut the shapes, then sand the edges smooth.

7. Cut the two support pieces (E).

Cut bevels on their top edges (Fig. C). Drill counterbore holes in the beveled edges for desktop fasteners using a Forstner bit (Fig. A). Then cut and smooth the supports' arches (Fig. D).

8. Drill the dowel holes in the ends of the supports and ends of the shelf (Fig. C). Screw the desktop fasteners to the supports. Screw the supports to the shelf (**Photo 5**).

9. Make the book rest (F) and drill the dowel holes (Fig. A). Position it on

Figure A Exploded View

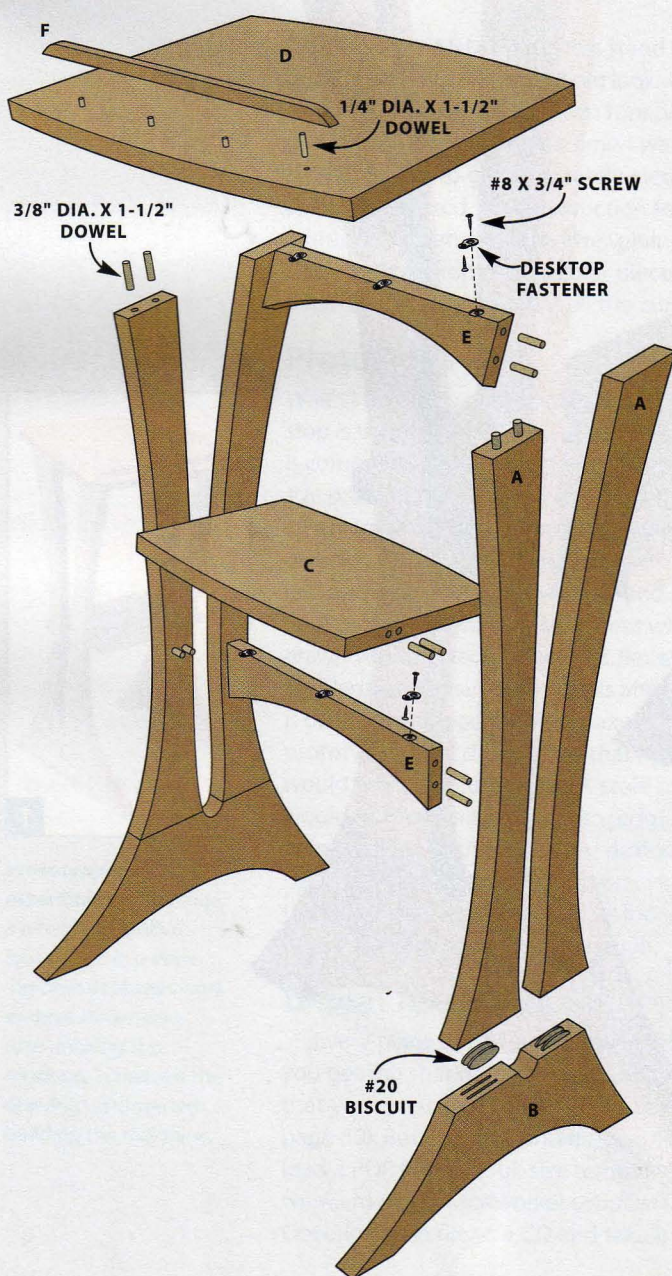
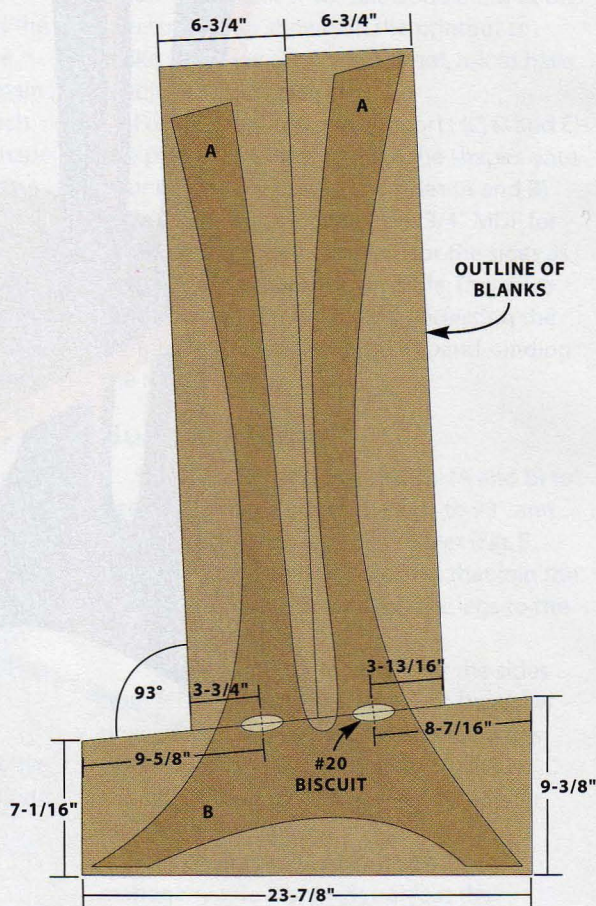


Figure B Side Assembly Layout



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the top using a 1-1/8" wide x 26" long spacer aligned to the front corners. Use 1/4" dowel centers (see Source, below) to mark the holes in the top. Drill the holes.

10. Mark and drill screw holes for the desktop fasteners on the top (**Photo 6**). Drill the holes at the same angle that the support meets the top. Screw the support to the top.

Assemble the Stand

11. There are a lot of dowel holes to mark and drill before assembly can begin. Start by drilling the dowel holes in the tops of the front legs (Fig. C).

12. Make a shelf support stand (**Photo 7**) to position the shelf. Build the stand 15" wide by 10" deep by 18-3/4" tall. Use the stand to align and mark the dowel holes on the insides of

the front legs (**Photo 8**). Drill the dowel holes, and then dry fit and clamp the shelf, dowels and sides together.

13. Make a top spacer 1-1/16" wide x 24" long. Clamp the spacer flush with the rear corners on the underside of the top. Make a spacer 17" long and clamp it between the front legs, near the top, to maintain the proper leg separation. Insert dowel centers in the leg top and top support dowel holes. Gently rest the top on the legs. Make sure the edge of the top spacer is hooked on the back corners of the legs. Tap the top over the front legs and the rear legs at the support to mark the dowel locations. Remove the top, unscrew the support from the top, and drill the dowel holes you just marked.

14. Finish sand all the parts and

ease all the exposed edges.

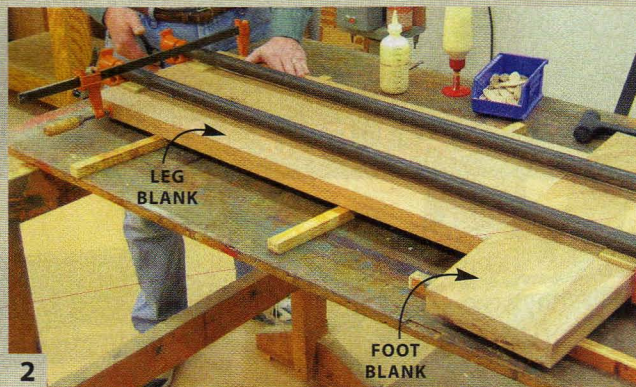
15. Screw the shelf support to the shelf. Glue, dowel and clamp the shelf support and shelf to the legs, and the top support to the rear legs.

16. Glue, dowel and clamp the top to the front legs. Reach underneath the top and screw the top support to the top. Glue the book rest to the top (**Photo 9**). That's it!

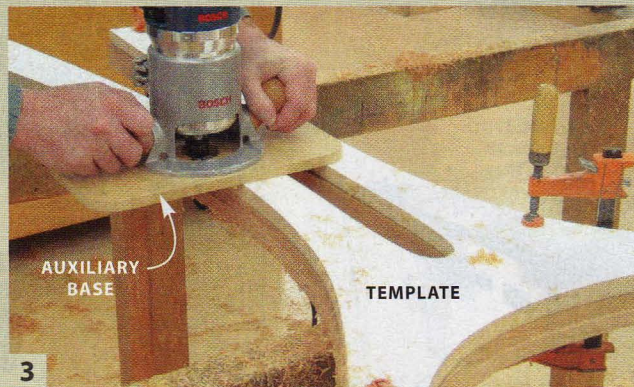
Finishing

17. Apply your favorite finish. I used three coats of clear wipe-on polyurethane. 

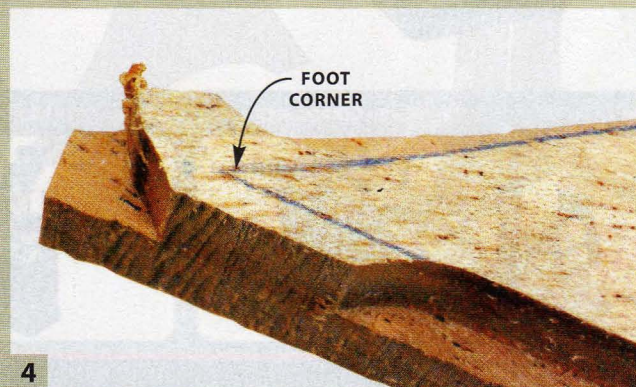
Source: Rockler Woodworking and Hardware, www.rockler.com, (800) 279-4441, Desktop Fasteners-package of 8, #21650, \$2.59; 1/4" Dowel Centers - package of 8, #42341, \$5.49; 3/8" Dowel Centers - package of 8, #42366, \$5.49.



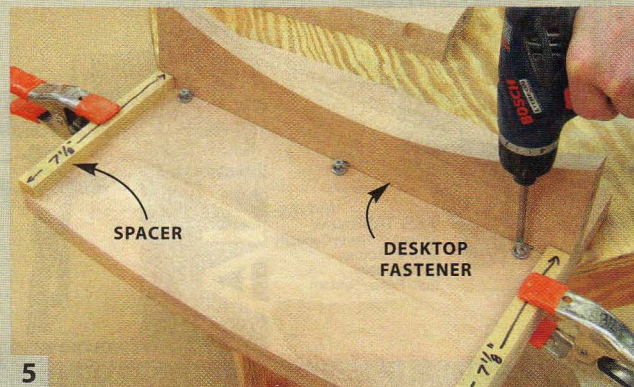
Assemble a side by joining two leg blanks to a foot blank. The bottoms of the legs are biscuitted and glued to the top of the foot. There's no need to glue the joint between the leg blanks.



Template-route the sides. Use an oversized auxiliary base to help stabilize the router. Start the routing process with a template bushing and a straight bit to remove most of the waste. Finish up with a flush trim bit.



Sand, don't rout, the outside corners of the feet and leg tops. Routing is likely to break these fragile areas.



Screw the shelf support to the shelf. Use spacers to position the support relative to the front corners and flush to the sides of the shelf.

Figure C Side Details

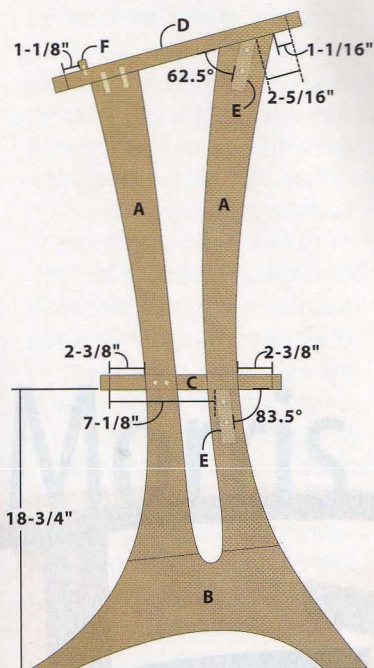
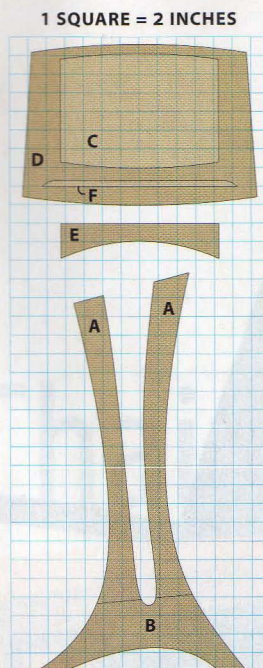


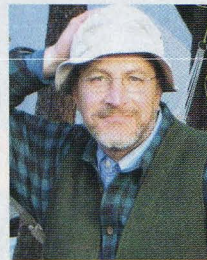
Figure D Shapes



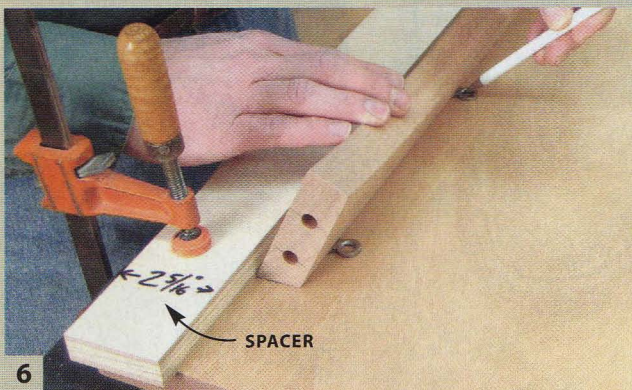
CUTTING LIST

Overall Dimension: 25-1/4"W x 23"D x 44"H

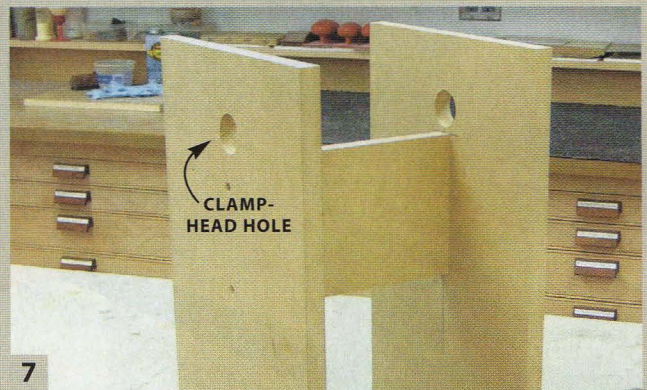
PART NAME	QTY	MATERIAL	THXWxL
A Leg	4	African Mahogany	1-1/4" x 6-3/4" x 35-1/4"
B Foot	2	African Mahogany	1-1/4" x 9-3/8" x 23-7/8"
C Shelf	1	African Mahogany	1" x 12-1/4" x 17"
D Top	1	African Mahogany	1" x 17-1/4" x 25-1/4"
E Support	2	African Mahogany	1" x 3-3/4" x 17"
F Book Rest	1	African Mahogany	1/2" x 5/8" x 21"



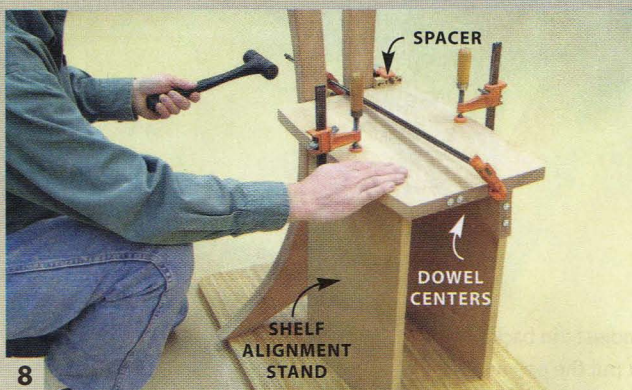
Bruce Kieffer is a freelance wood-working author, technical illustrator, and custom furniture builder. You can see a collection of his work from the past 30-years on his website, www.kcfi.biz.



Mark screw holes for the top's support. Align a spacer to the rear corners of the top. Hold the support tight to the spacer and center it side-to-side.



Most of the project is held together by dowel joints. Make a stand to position the shelf in order to mark the dowel hole locations. Drill holes in the sides of the stand for clamp heads.



Clamp the shelf to the stand. Insert dowel centers in the ends of the shelf and shelf support. Center the side on the shelf, then give it a tap with a rubber mallet to mark the dowel locations.



Glue and clamp the dictionary stand on a flat surface to make sure the feet are in the same plane. Glue the book rest to the top after all the other parts are assembled.



To adjust the back,
just put the peg in
a different hole.

**Curved and laminated arms
grace a timeless design.**

By Laurie McKichan

Morris Chair & Ottoman

A GOOD BOOK, a warm light, and a comfortable reclining chair—what more could you ask for? For a woodworker like me, it would also be the satisfaction of making that chair in my shop.

For inspiration, I turned to a famous chair named after William Morris, a mid-19th century English artist whose back-to-the-basics philosophy influenced a later generation of Arts and Crafts artisans. His firm popularized a large chair with high, broad arms and an adjustable back. Other manufacturers soon adopted the style, particularly Gustav Stickley, who transformed it into an icon of early 20th century American design.



I've modernized the chair by lightening its lines, adding some curves, and using cherry, rather than oak. The curved arms and back presented the biggest challenge—my solution was to laminate these pieces and form their shape in a vacuum bag veneer press (see "Go New Places with a Vacuum Press," page 68). This sounds like a high-tech piece of equipment, but it's readily accessible for small shops or individual artisans, the very people Morris and Stickley held in such high regard. I also used a sophisticated machine, the JDS Multi-Router, to make all the joints (see "The Ultimate in Router Joinery," page 68). Neither the vacuum bag nor the Multi-Router is essential to making the chair, however. Lower-tech methods will work fine.

Bend The Arms

Make the chair's arms (J, see Cutting

Recline or sit up straight: the chair's back has 8 different positions.



List, page 69) by bending and gluing thin laminations. You can use lots of clamps (see AW #121, May 2006, page 34, "Bent Wood Lamination"), but I prefer a vacuum bag, which is much simpler. Either way, you'll need to build a stiff, curved form in the shape of the curve you want. The form is a plywood or MDF box covered with hardboard or bending plywood (Fig. K, page 66).

Begin building the form by making a series of identical curved support pieces (use one as a router template for the others). Glue and pin-nail these to a base, then attach end pieces to ensure the support pieces stay upright (**Photo 1**).

Glue and pin-nail the top onto the form (**Photo 2**). Cut two slots across the form's base using the tablesaw—these slots are essential to allow air to escape when the form is placed inside the vacuum bag.

Mill wood for making the laminations. You'll need six 3/16" thick pieces for each arm, so plan to use two 8/4 (2") boards. Mill the boards 1" extra wide and 5" to 6" extra long. Resaw the boards into 1/4" thick pieces using a bandsaw (**Photo 3**). Plane the boards between cuts so that the face that rides against your saw's fence is always smooth. Run the pieces through a planer or drum



1

Begin building the chair by making the arms, which are composed of six laminations glued over a stiff, curved form. Assemble the form by gluing curved supports to a base.



2

Bend and fasten 1/8" hardboard to the top of the supports to finish the form. You should now have a smooth, evenly curved surface for bending.



3

Resaw wide pieces to make the bending laminations. Saw the laminations for each arm from a single 2" thick board. Stack the laminations in the order that they come from the board.



4

Use a trim roller to apply Unibond 800 glue on the laminations. This glue has a very long open time, but requires wearing a respirator. Keep the pieces in order so their edge grain matches.

sander to smooth their rough faces and reduce their thickness to 3/16".

Spread glue on the laminations (**Photo 4**). I prefer Unibond 800 with medium tint catalyst (see Sources, page 65). This glue is specially formulated for lamination work: it has a long open time, can bridge small gaps, and forms a very rigid glue line. Tape the laminations to the bending form to prevent them from shifting. Slide the form inside the vacuum bag, seal the bag, and turn on the vacuum pump (**Photo 5**). Once all the air has been removed from the bag, and the laminations fully bent, you can walk away (**Photo 6**). Once the glue is dry, open the bag, remove the form, and scrape off the excess glue from the laminations.

Even up one side of the arm using the jointer, then rip it to width using the bandsaw (**Photo 7**). Use a magnetic featherboard to help make a straight cut (see Sources). This method is easier and safer than ripping the arm on a tablesaw.

Cut the arms to length (**Photo 8** and Fig. H). You can use the bending form as a jig to hold the arm, but this will ruin the form because you'll be cutting off its ends. (If you're thinking of making more chairs, build a new jig for this operation.) Most glued-up bent laminations spring back a bit after they're released from the clamps or vacuum bag, so your arm will probably need shimming to prevent it from rocking on the form. Cut both ends of the arm at 14°, using a miter saw.

Make Rails and Legs

The legs and rails for the chair and ottoman are very similar, so if you're going to build the ottoman, make its pieces along with the chair.

TIP: When you select wood for the rails, note that the top edges of all the rails show in the finished pieces. With most woods, this isn't a cause for concern, but it is for cherry. Many cherry boards con-

tain a lot of light-colored sapwood on their edges; if you don't want this sapwood to show, rip it from the board and glue a 1/4" thick all-heartwood cap piece in its place. The joint between the cap piece and rail will be hidden by grooves you'll make later. Glue on the cap pieces before milling the rails to final thickness.

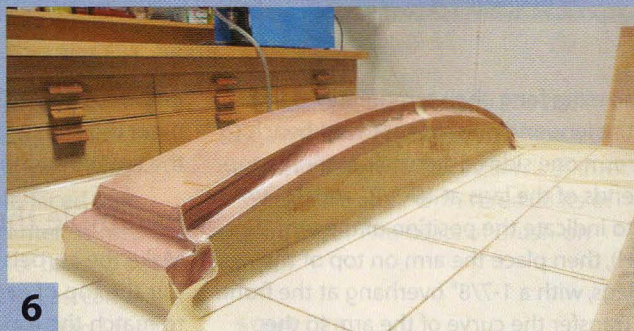
Cut all the rails (C, D, E, F) to length and width. Draw curves on the rails (Fig. G) using a drawing bow (**Photo 9**, see Sources) or a bent piece of hardboard or plywood. Cut the curves using a bandsaw and smooth the surfaces using a drum sander, oscillating spindle sander, or a round-bottom spokeshave.

Cut shallow, flat-bottomed grooves in all the rails (Fig. B) using a router or a tablesaw equipped with a ripping blade with flat-top-ground teeth.

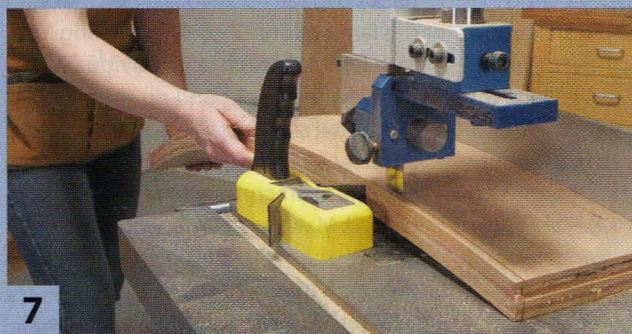
Mill the legs (A, B). Note that the top ends of the chair's legs are angled to accommodate the curved arms. To calculate these angles, make the legs 1" or



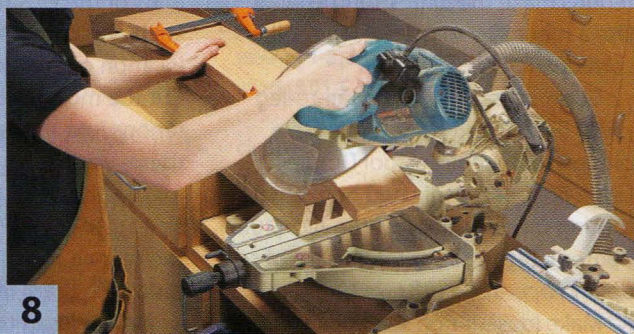
5 Place the laminations on the bending form, cover them with paper to absorb any glue squeeze-out, and slide the assembly inside a vacuum-veneer bag.



6 Remove all the air from the bag using a vacuum pump. Atmospheric pressure compresses the bag and laminations over the bending form, creating the curved arm.



7 Joint one side of each arm, then rip the opposite side using a bandsaw. Use a featherboard to hold the work tight to the fence. This one has a magnetic base.



8 Cut the arms to length. Tilt the blade 14° and use the bending form to support the arm. Cut both ends at a 14° angle.



9

Lay out curves on the rails using a bent stick. I prefer a commercially-made device called a "drawing bow." It has a strap for bending the bow so your hands are free for drawing the curve.



10

Rout mortises for all the joints, which are assembled with loose tenons. The JDS Multi-Router, with its sliding table and horizontally-mounted router, is perfect for mortising both rails and legs.



11

Glue the loose tenons into the rails first, then assemble the chair. Use one wide piece or two narrower ones. The tenons are mitered because the mortises meet inside the legs.



12

Fitting the arms to the back legs takes special care. Mark the tenons using an angled guide piece, then cut them so the arm slides straight down onto the leg.

so extra long, then temporarily clamp the legs and rails on your workbench to form one side of the chair. Mark the top ends of the legs at 19-3/8" and 21-3/4" to indicate the position of the arm (Fig. H), then place the arm on top of the legs, with a 1-7/8" overhang at the front. Transfer the curve of the arm to the legs, then draw a straight line on the legs, tangent to the curve. (The tops of the legs don't have to be curved—three tenons make the joint strong enough.) Use a miter saw to cut the legs at the correct angles.

Cut mortises for all the rail-to-leg joints (Figs. B and H). You can use a plunge router, the Festool Domino, Leigh FMT, or a dedicated horizontal-routing machine such as the JDS Multi-Router, which I prefer for its ease of set-up and operation (Photo 10).

Make loose-tenon stock. It shouldn't be too tight, but should slip easily into the mortise by hand. Round over the edges of the stock using a roundover bit

in a router table. Cut the stock to length; miter the ends of the rail tenons. Glue the tenons into the rails (Photo 11).

Assemble the Base

Make the corbels (G, H, and Fig. N). Cut the top of each corbel at an angle to match the top of the legs. Cut biscuit slots in the corbels and legs for alignment.

Cut mortises for the arms in the top ends of the legs (Fig. C). Dry-clamp each side of the chair and transfer the location of the mortises to each arm. Cut the mortises in the arms. Place the tenons into the legs, but don't glue them—you'll have to taper the tenons for the arm to fit. Mark the tenons with an angled stick (Photo 12). Remove the tenons, cut them on the bandsaw, then glue them into the legs.

Drill holes in the back legs for the pegs (R) that attach the chair's back (Fig. G). Assemble and glue the chair's base. Glue the sides first, then the

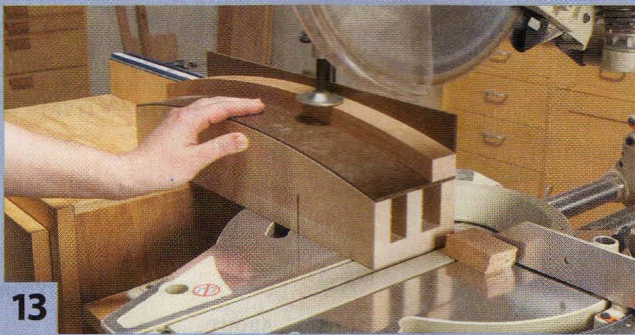
whole base. Glue on the corbels last.

Finish making the arms (Fig. E). Drill holes in the arms for the pegs (S) that the chair's back leans against (Fig. H). Bandsaw the profile on the back ends (don't forget that the two arms are mirror images!). Round the front ends with a file or sandpaper.

Make the Back and Seat

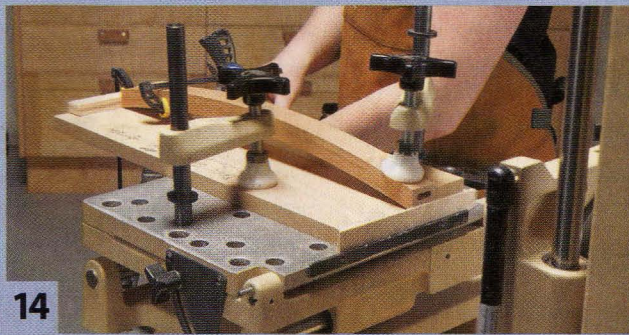
Resaw and plane laminations for the back's top rail (L) and slats (M). Make the laminations 3" to 4" extra long. You may laminate each slat individually or make wider blanks and rip them into individual slats later. These laminations are only 1/8" thick; make extra pieces in case some fracture when they are planed. Make a second bending form (Fig. M), then glue and bend them in the same manner as the arms.

Rip the rail and slats using a bandsaw, as you did with the arms. Use the bending form for cutting the ends of the rail and slats to length (Photo 13).



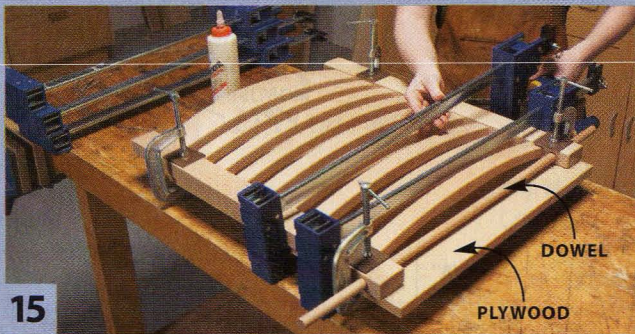
13

The back slats are laminated and curved, just like the arms. Make a new bending form for the slats, and use it for support when you cut the slats to length.



14

Cut mortises in the back's slats using the Multi-Router. Support the slats on a board to hold them square to the bit.



15

Glue the back. Clamp the assembly to a piece of plywood to keep it flat. Use a dowel to align the holes that the back pivots on.



16

Install a slatted frame to support the seat cushion. The screws go in a narrow opening between the slats. Drive the screws using a flexible shaft.

Mill the back's stiles (K) to final size. Drill holes for the side pegs (Fig. G). Machine mortises in the stiles, rails, and slats (**Photo 14**). Clamp the stiles to a board when you glue the back in order to keep the assembly flat (**Photo 15**).

Make the seat supports (N) and glue them to the chair's rails (Fig. H). Build the seat's frame (P, Q) a little oversize, then saw or joint it to fit inside the chair. Fasten the frame to the chair's side rails (**Photo 16**).

Make Pegs and Cushions

I made sturdy and nice looking pegs from hardwood dowels and 1/4" aluminum rod (Figs. R and S). To make the pegs, turn or purchase 5/8", 1" and 1-1/4" cherry dowels. To make the back pegs (R), drill a 1/4" hole into the end of a piece of 1" dowel, then epoxy a short length of aluminum rod into the hole. Make the arm pegs (S) in the same way, from 5/8" and 1" dowels, or turn them as one solid piece. Cut spacers (U) for

the side pegs from 1-1/4" dowel stock (be sure to support the dowel in a V-block for safety). Mount the dowel slice to a board using double-faced tape, then drill a hole in its center using a brad-point bit (a Forstner bit may split the spacer). Alternatively, you can make spacers from flat stock and sand them round. Install the back and see if it pivots without binding.

Make the cushions or hire an uphol-

sterer to make them for you. The back cushion is 4" thick, the seat cushion is 5" thick, and the ottoman cushion is 3" thick.

Finish the chair with three coats of wiping oil, or two coats of brush-on varnish.

SOURCES

- ♦ **Vacuum Pressing Systems**, www.vacupress.com, (207) 725-0935, Unibond 800 with medium tint catalyst, #UB-12 (M), \$21 for 1/2 gal.
- ♦ **Lee Valley**, www.leevalley.com, (800) 871-8158, Symmetric Drawing Bow, #05N55.01, \$24.
- ♦ **Cincinnati Dowel and Wood Products Co.**, cincinnati-dowel.com, (888) 369-3571, 5/8" x 36" cherry dowel, \$5; 1" x 36" cherry dowel, \$9; 1-1/4" x 36" cherry dowel, \$15.
- ♦ **Eazypower**, www.eazypower.com, (773) 278-5000, Flex A Bit flexible shaft, \$6 (available at Home Depot).
- ♦ **Mesa Vista Design**, www.mesavistadesign.com, (800) 475-0293, Grip-Tite 2000 Magnetic Featherboard, \$40.



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

Fig. A
Exploded View
of Chair

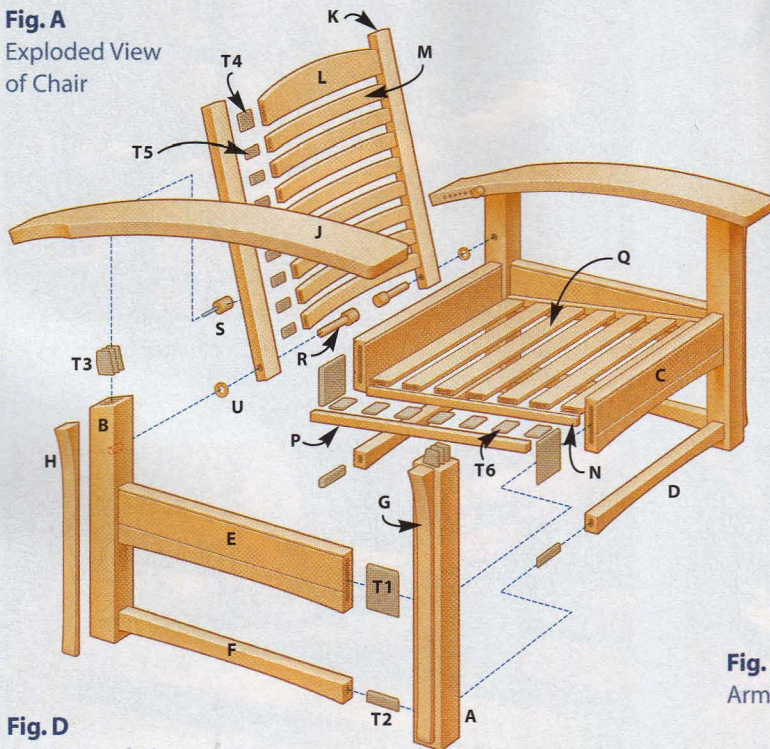


Fig. D
Top View of Chair

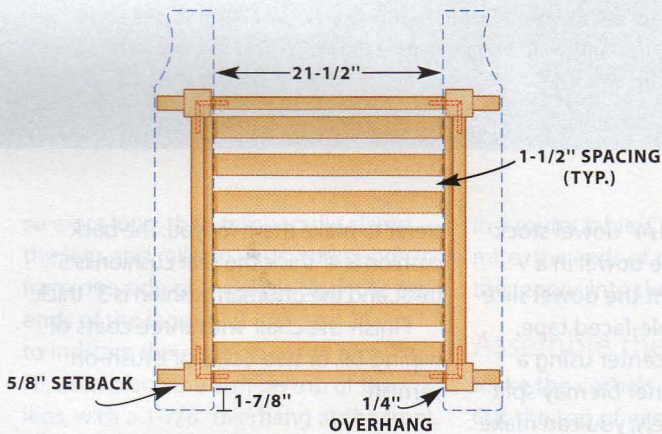


Fig. G
Front View
of Chair

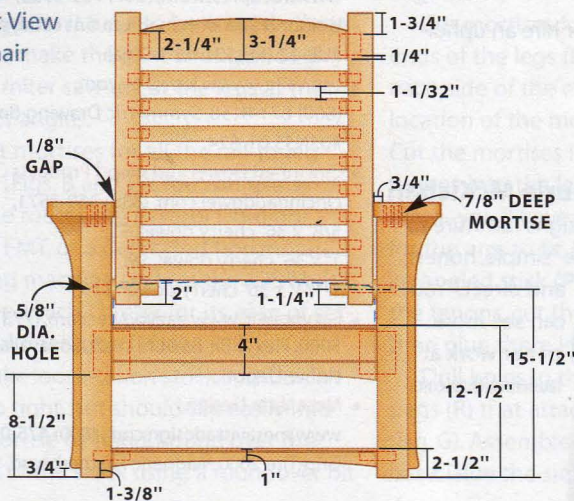


Fig. B
Chair Rail Details

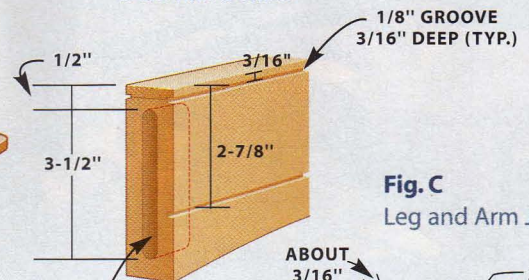


Fig. C
Leg and Arm Joint

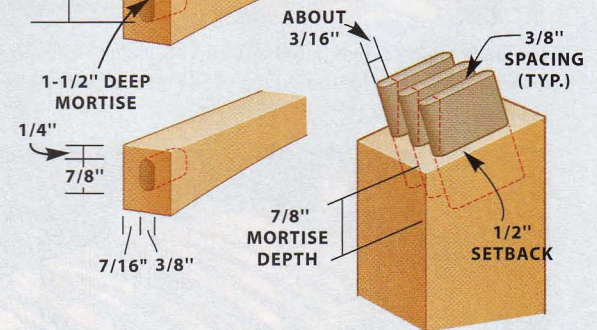


Fig. E
Arm

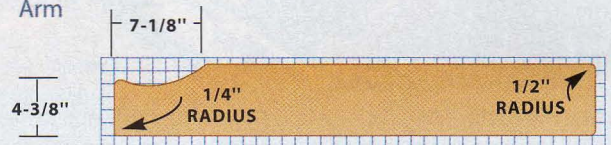


Fig. F
Top View Of Back

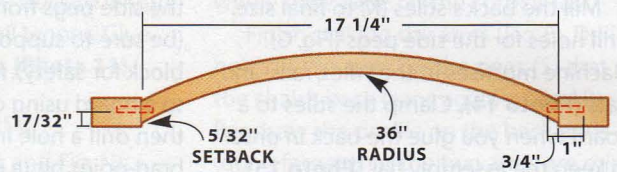


Fig. H
Side View of Chair

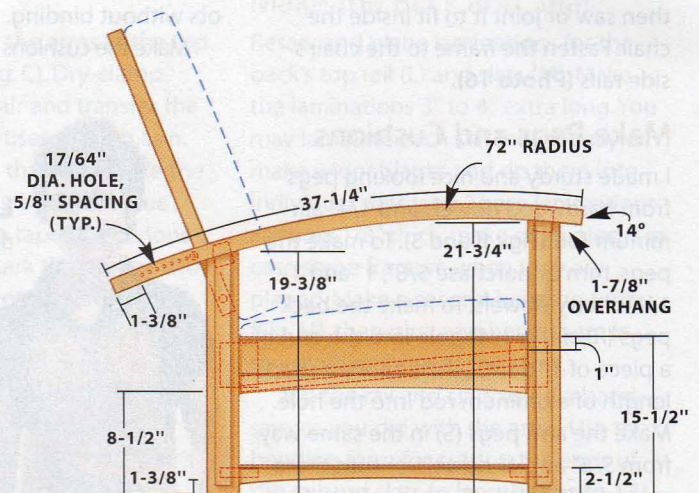


Fig. J
Chair Rail
and Leg Joint

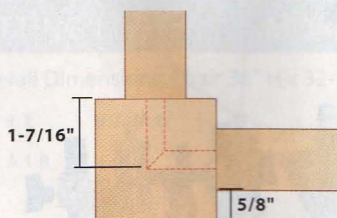


Fig. K
Arm Bending Form

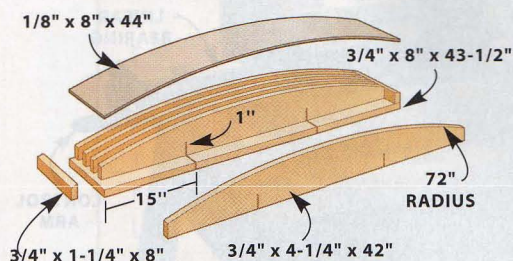


Fig. M
Back Rail and Slat Bending Form

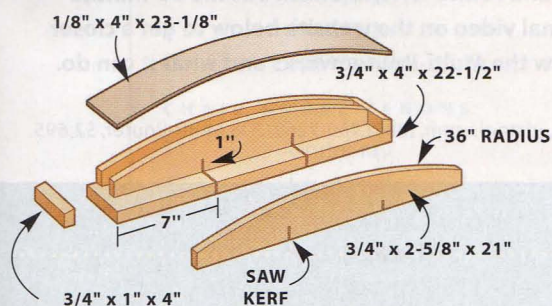


Fig. R
Back Peg

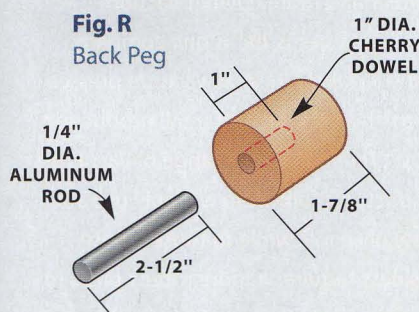


Fig. S
Arm Peg

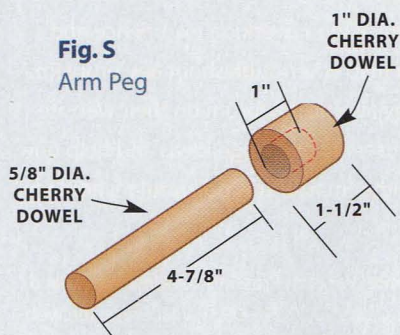


Fig. N
Corbel

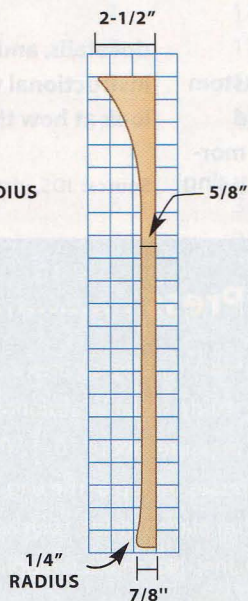


Fig. T
Spacer

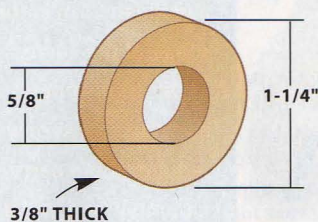


Fig. L
Exploded View
of Ottoman

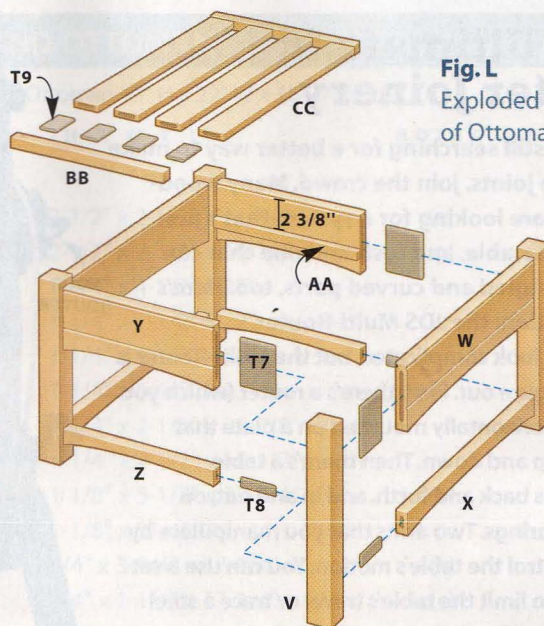


Fig. P
Front View Of Ottoman

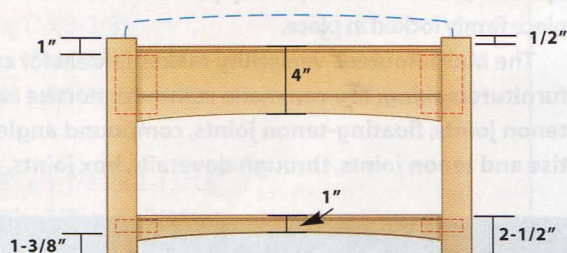


Fig. Q
Top View Of Ottoman

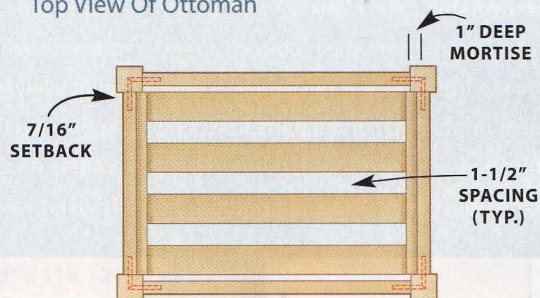
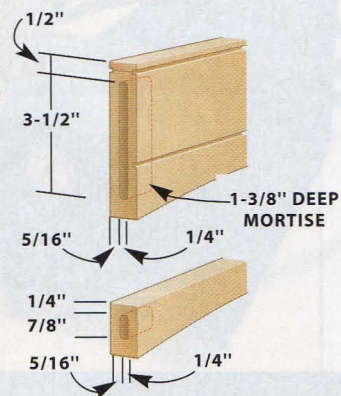


Fig. U
Ottoman
Rail Details

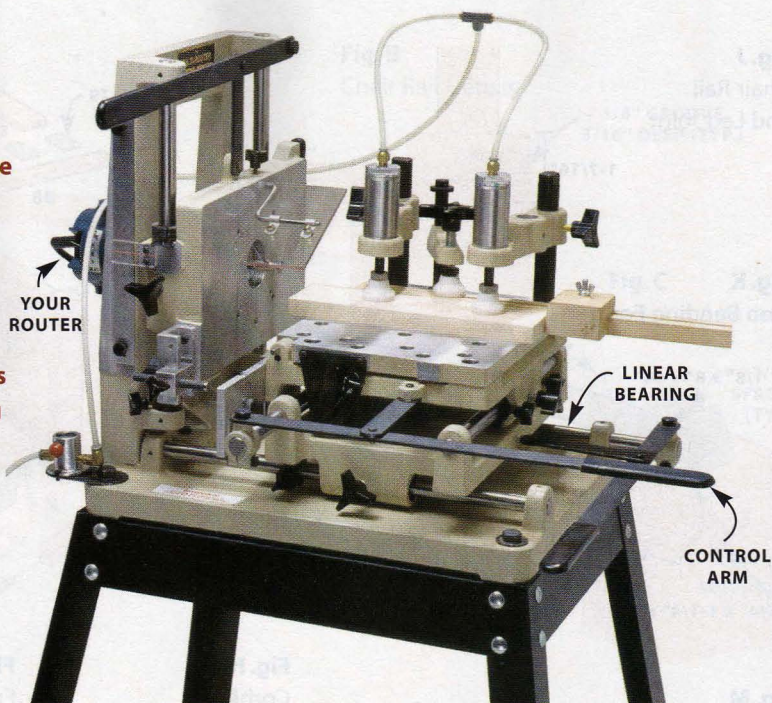


The Ultimate in Router Joinery

If you're still searching for a better way to make furniture joints, join the crowd. Many woodworkers are looking for a system that's precise, repeatable, and fast—and one that can handle angled and curved parts, too. Here's one solution: the JDS Multi-Router.

It may look complicated, but the Multi-Router is easy to figure out. First, there's a router (which you supply) horizontally mounted on a plate that adjusts up and down. Then there's a table that slides back and forth, and in and out, on linear bearings. Two arms that you manipulate by hand control the table's motion. You can use a set of stops to limit the table's travel or trace a steel template with a stylus to make perfectly sized mortises and tenons. Standard hold-downs or optional pneumatic clamps keep your workpiece firmly locked in place.

The Multi-Router's versatility makes it ideal for custom furnituremaking. You can make standard mortise and tenon joints, floating-tenon joints, compound angle mortise and tenon joints, through dovetails, box joints, sliding



dovetails, and round tenons. Check out the 30-minute instructional video on the website below to get a closer look at how the Multi-Router works and what it can do.

Source: JDS, jd stools.com, (800) 480-7269, JDS Multi-Router, \$2,695.

Go New Places With A Vacuum Press

If you'd like to venture into new areas of woodworking, take a look at what a vacuum press can do. It's the high-tech alternative to using dozens of clamps to press veneer or glue-up curved parts from thin laminations.

The principle of a vacuum press is

really quite simple: a pump creates a vacuum inside a sturdy, sealable, airtight bag. Atmospheric pressure (about 10-12 PSI, effectively) presses on top of the bag to squish anything placed inside, such as veneer on a panel-like shrink-wrapping.

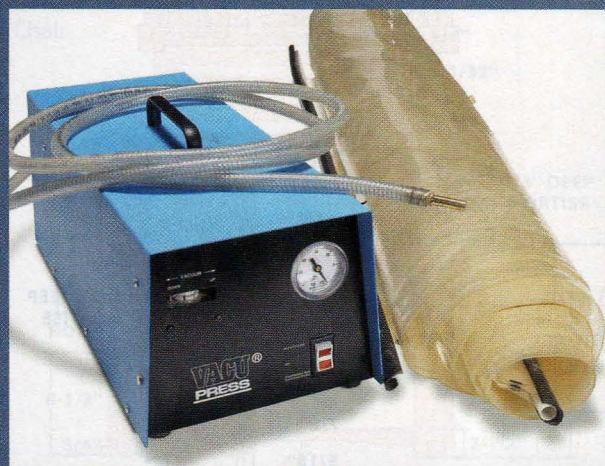
It's a lot easier than using lots of cauls

and clamps, but the real beauty of the system is that the bag forms equally well around flat or curved surfaces. All you need is a wooden form in the shape of the curve.

At its most basic, a vacuum press only requires three parts: a pump, a bag, and a hose to connect them.

It's possible to cobble together your own press, but a commercial press is generally sturdier and more reliable. Vacuum Pressing Systems, Inc. is one company that specializes in small vacuum presses for the home shop and small production shops. They offer a full range of VacuPress products for folks who will only use a press once in a while to those whose business requires a more robust press to run every day. The VacuPress staff has years of woodworking experience and can help you troubleshoot any problem. They also host a forum on their website for users to exchange ideas and help one another master this powerful technology.

Source: Vacuum Pressing Systems, www.vacu-press.com, (207) 725-0935, VacuPress, see website for prices of various systems.



CUTTING LIST

MORRIS CHAIR AND OTTOMAN

Overall Dimensions: Chair 38" H x 32-1/2" W x 36-1/2" D; Ottoman 13" H x 22" W x 16" D

PART	NAME	QTY	TH X W X L	NOTES
CHAIR				
A	Front leg	2	2-1/2" x 2-1/2" x 21-3/4"	(a)
B	Back leg	2	2-1/2" x 2-1/2" x 19-3/8"	(a)
C	Upper rail, front/back	2	1-1/4" x 4-1/2" x 22"	
D	Lower rail, front/back	2	1-1/4" x 1-1/2" x 22"	
E	Upper rail, side	2	1-1/4" x 4-1/2" x 23"	
F	Lower rail, side	2	1-1/4" x 1-1/2" x 23"	
G	Front corbel	2	1-1/4" x 2-1/2" x 20-7/8"	
H	Back corbel	2	1-1/4" x 2-1/2" x 18-1/2"	
J	Arm	2	1-1/8" x 5-1/2" x 37-1/4"	(b)
K	Back stile	2	1-1/8" x 2" x 24"	
L	Back top rail	1	3/4" x 3-1/4" x 17-1/4"	(c)
M	Back slat rail	8	3/4" x 1-1/4" x 17-1/4"	(c)
N	Seat support	2	1/2" x 1" x 23"	
P	Seat stile	2	5/8" x 1" x 23"	
Q	Seat rail	7	1/2" x 2" x 21-3/4"	
R	Back peg	2	1" x 1" x 3-3/8"	(d)
S	Arm peg	2	1" x 1" x 5-3/8"	(e)
U	Spacer, side	2	3/8" x 1-1/4" x 1-1/4"	(f)
CHAIR LOOSE TENONS				
T1	Upper rail	8	3/8" x 3-1/2" x 2-15/16"	
T2	Lower rail	8	3/8" x 7/8" x 2-15/16"	
T3	Arm	12	1/4" x 1-1/2" x 1-3/4"	
T4	Back top rail	2	1/4" x 2" x 1-3/4"	
T5	Back slat rail	16	1/4" x 3/4" x 1-3/4"	
T6	Seat rail	14	1/4" x 1-1/2" x 2-1/4"	
OTTOMAN				
V	Leg	4	1-3/4" x 1-3/4" x 13"	
W	Upper rail, front/back	2	7/8" x 4-1/2" x 18-1/2"	
X	Lower rail, front/back	2	7/8" x 1-1/2" x 18-1/2"	
Y	Upper rail, side	2	7/8" x 4-1/2" x 12-1/2"	
Z	Lower rail, side	2	7/8" x 1-1/2" x 12-1/2"	
AA	Seat support	2	1/2" x 1" x 12-1/2"	
BB	Seat stile	2	5/8" x 1" x 12-1/2"	
CC	Seat rail	4	1/2" x 2" x 17-7/8"	
OTTOMAN LOOSE TENONS				
T7	Upper rail	8	1/4" x 3-1/2" x 2-3/8"	
T8	Lower rail	8	1/4" x 7/8" x 2-3/8"	
T9	Seat rail	8	1/4" x 1-1/2" x 2-1/4"	

NOTES

a. Cut the parts 1" extra long, then cut their top ends at an angle, to fit the arm's curve.

b. The arm is a bent lamination composed of 6 layers of 3/16" cherry. Make the laminations 5-6" extra-long and 1" extra wide. Measure the

final length along the arm's curve.

c. These parts are bent laminations composed of 6 layers of 1/8" cherry. Make the laminations 3-4" extra-long and 1" extra-wide. Measure the final length straight across.

d. Make the peg from 1" cherry dowel

and 1/4" aluminum rod.

e. Make the peg from 1" and 5/8" cherry dowels.

f. Make the spacer from 1-1/4" cherry dowel. 

Hold-Everything Tool Rack

Get organized fast with easy
slat construction and versatile hangers.

By David Pickard

WHETHER YOU HAVE an exquisite collection of antique tools or the latest in high-tech gear, this versatile wall rack stores them all within easy reach. It's easy to build and adapts to fit virtually any wall space. The 48" by 48" rack shown here is made from poplar, but any hardwood or combination of hardwoods will work. Each tool hanger has a bottom groove that allows it to slip snugly onto any of the slats. This nifty feature makes the hangers easy to move, so you can rearrange your rack to accommodate newly acquired tools.

The biggest—and most fun—challenge this rack presents is figuring out how to modify the hangers to display your unique collection of tools.

Build the Rack

1. Cut and plane stiles and rails for the rack's frame to 1" thick and 1-1/4" wide. Their lengths depend on the size of the rack you plan to build. Internal stiles can be spaced up to 24" on center. Dry-assemble the frame and drill pilot holes through the rails and into the end-grain of the stiles. Then screw the frame together (**Photo 1**).

2. Plane and cut the horizontal slats to 1/2" thick and 2-7/16" wide. Leave one slat about 1/2" oversize in width—

plan to attach this slat last. Cut the slats to length to fit your frame.

3. Make a jig to assure that the slats are consistently spaced, so the 3/4" thick hangers will easily slip between them: Simply glue 13/16" thick spacer blocks flush with the edge of a straight 2" wide board.

4. With the frame squared and clamped to your bench, align the first slat with the bottom and sides. Pre-drill pilot holes and then fasten this slat with #6 by 1-1/4" screws. Use your L-shaped spacer jig to position rest of the slats (**Photo 2**). Regularly check the frame with a square (**Photo 3**).

5. Mark the width of the last slat and cut it to fit (**Photo 4**).

6. Apply an oil finish and set the rack aside to dry. Finish seals the wood so the rack is less likely to get dirty or stained.

7. Mount your rack on the wall. The method you use depends on your situation. My shop has wood framing, so I could drill holes through the rack's frame and screw it directly to the studs. If you have concrete block or brick, you'll need to use wall anchors.

Create custom tool hangers

The hangers are nothing more than pieces of 3/4" thick hardwood with a bottom groove cut to fit snugly over the 1/2" thick slats. Use spacers with your dado set, if necessary, to achieve the desired friction fit. Cut the grooves about 7/16" deep. Most of the hangers you'll make will be less than 2-3/4" wide, so you can harvest a pair of long slotted blanks from a 6" wide board (**Photo 5**). I made all the hangers for this rack from an 8' length of 1x6 poplar.

CUTTING LIST WALL-MOUNT TOOL RACK

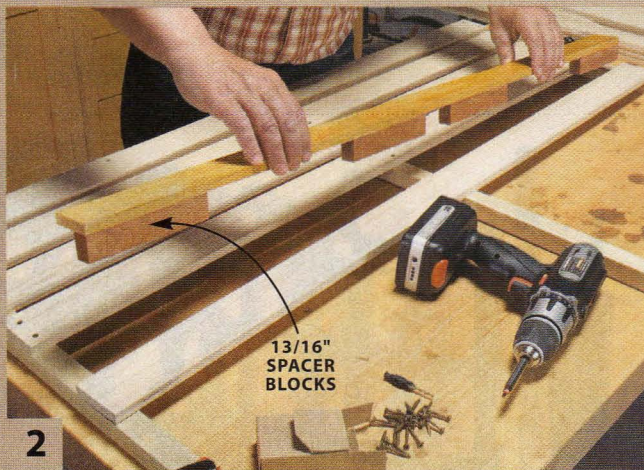
Overall Dimension: 1-1/2" x 48" x 48"

NAME	QTY	TH x W x L
Rail	2	1" x 1-1/4" x 48"
Stile	3	1" x 1-1/4" x 45-1/2"
Slats	15	1/2" x 2-7/16" x 48"

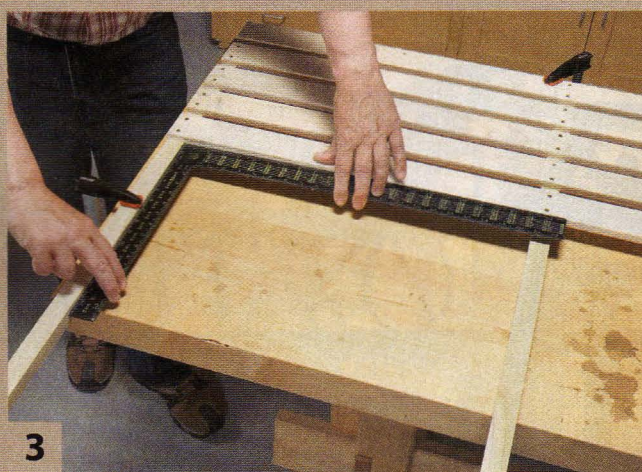




1 The rack consists of slats fastened to a frame. Assemble the frame with one screw at each joint. Clamps hold the frame square during assembly.



2 Use an L-shaped jig to assure uniform spacing when you screw the slats to the frame.



3 Check periodically to make sure the assembly remains square. Each added slat stiffens the frame.



4 Leave the last slat oversize. Mark the edge and trim the slat to width. This method is easier than trying to exactly size all the parts.



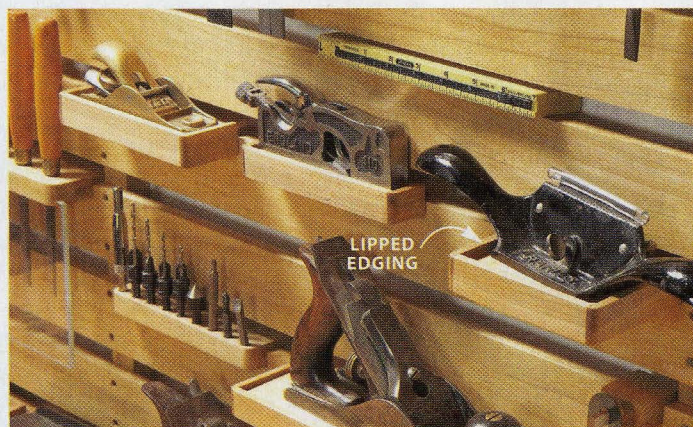
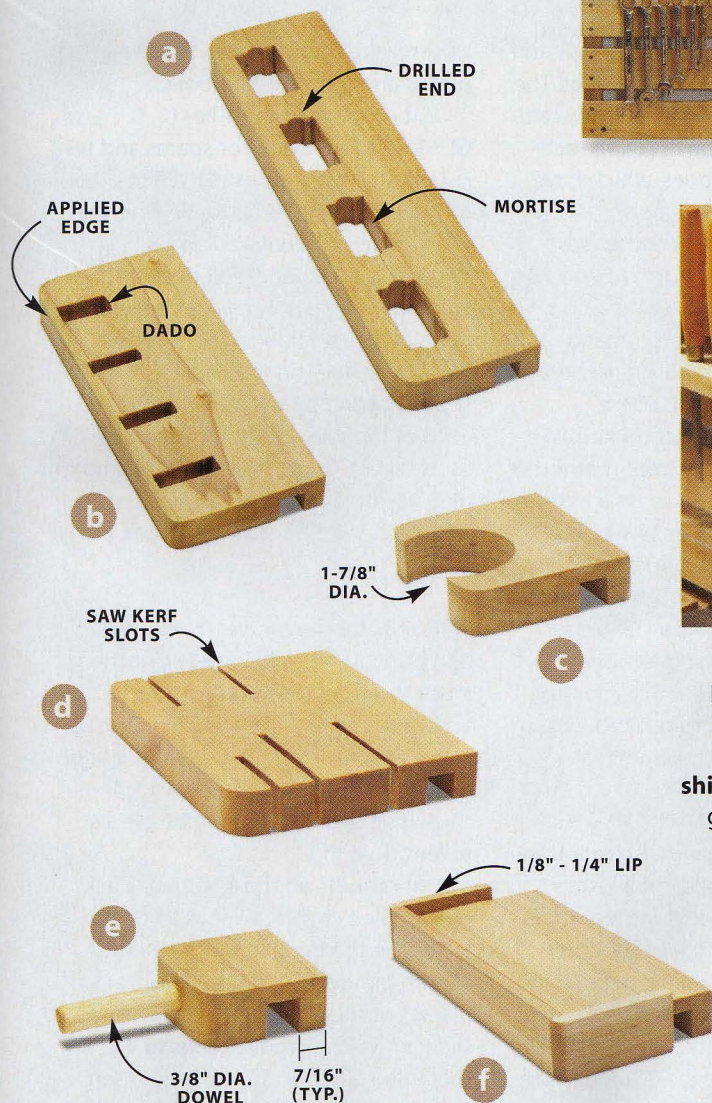
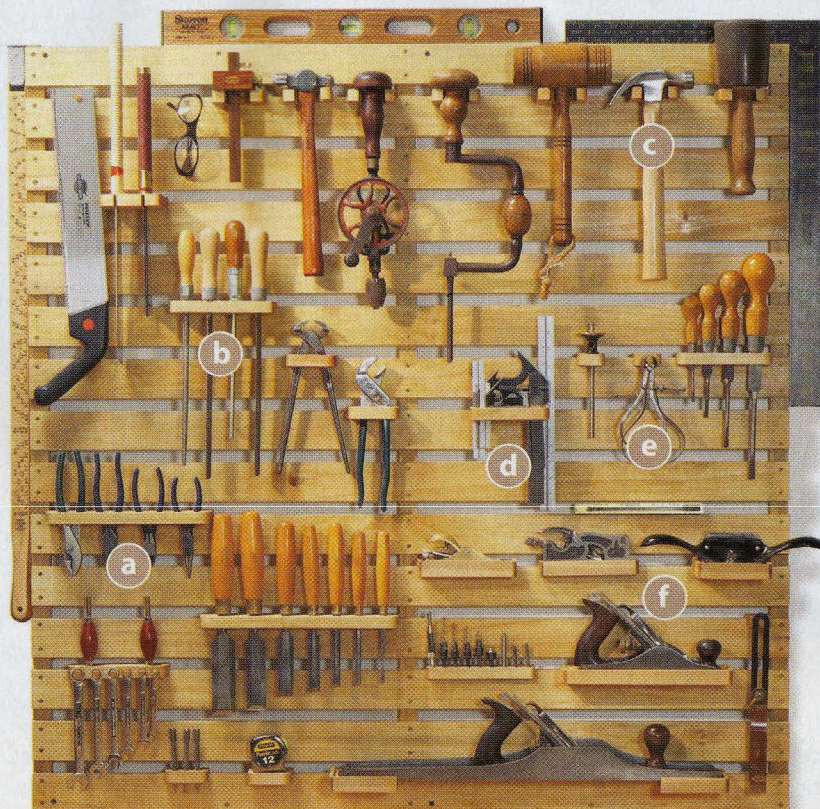
5 Cut grooves in a long, wide board to make tool hanger blanks. Make the grooves a hair wider than the slats.

"My passion for wood-working began as a teenager, so I was thrilled to receive my great-great-grandfather's wooden hand planes and other tools when I was newly married. I enjoy designing and building furniture, because of the challenging joinery and different styles. Building my own router table, miter saw table, and workbenches has also been satisfying."

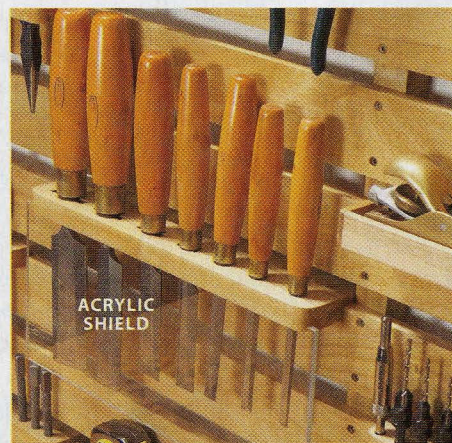
—David L. Pickard
www.woodshopics.com



TO CREATE CUSTOM-FIT HANGERS, lay all your tools onto a large table, then group them according to the types of notches you think they'll require. Sawing slots, installing dowels, drilling holes, chopping mortises or adding lipped edging will accommodate most tools. Rounding the corners makes the hangers more user-friendly. Calculate the spacing for multiple tools such as chisels or wrenches before you start drilling or sawing. You'll find yourself using Forstner bits, files and all kinds of saws to create suitable notches. Don't be afraid to experiment: I even ripped blanks in half, cut notches and then glued the halves back together. Once you've created a couple hangers, you'll get all sorts of ideas. 



Lipped edging keeps planes in place. **Acrylic shields** glued into grooves protect hands from sharp edges.





Vintage

IN THE LATE 19TH and early 20th centuries, the country general store carried a little bit of everything, including sewing supplies. Most stores featured a countertop cabinet whose drawers held dozens of colorful spools of thread.

Most general stores are long gone, of course, but spool cabinets are still useful for anybody who sews or quilts. Old ones in good shape are rare, but reproduction labels and knobs are readily available for building new cabinets that look just like those treasured antiques.

Design Your Cabinet

This cabinet's size works well in my home's sewing room, but old spool cabinets came in many sizes and styles. Most were made of solid oak or walnut, but a few fancy ones had figured veneer or inlay on the front. Frame-and-panel sides were the most common, but some cabinets had solid sides. The number of drawers varied: two, three, four, five and six-drawer cabinets were typical, but a few had 10 or more drawers.

Most old cabinets I've studied were joined with rabbets and dados. Their drawers were usually rabbeted and nailed or had very small box joints. Drawers rode on wooden guides dadoed into the sides or on full-width dividers. Some cabinets had solid

bases, but others omitted the base and just had molding around the sides. The variations are almost endless. This cabinet uses the same construction techniques as many antiques, which have survived for over 100 years.

Purchase your labels and knobs before building (see Sources, page 78). The size of the labels may vary a bit, and you'll need the labels in hand before cutting the openings in the drawer fronts (**Photo 1**). Some stamped-brass reproduction knobs have an authentic bent-wire method of attachment (like the clasp on a manila envelope), but they tend to wobble. I prefer cast-brass reproduction knobs with a standard threaded post.

The oak bead trim is available at larger home centers and lumber suppliers, but if you can't find it you can make your own on a router table using a multi-beading bit (see Sources).

Start the Case

Glue the top and base (A, B) from three pieces of 8" wide stock, cut 1" extra long. Cut all three pieces from a single board so they'll blend well together when stained. After gluing, cut the parts to final width and length.

Rout the top and base edge profiles in two steps (Fig. C, page 78). First, rout the ogee, taking multiple passes to

minimize tearout. Second, flip the pieces and rout the roundover.

Cut all the rails and stiles (C, D, F and G). Make a few extras for spares and test cuts. Rout or saw grooves in each piece to receive a panel (**Photo 2**). Note that the groove isn't centered (Fig. B). This offset gives the panel a deeper setback and makes assembly easier, because the parts go together in only one way.

Cut a rabbet on the back of two side stiles (**Photo 3**). Cut tenons on the ends of the rails using a dado set or router table. Cut the panels (E, H) and glue up the frame and panel assemblies to create the sides and back.

Build the Drawers

Mill stock for the drawer front, sides, and back (M, N) to thickness. Cut the stock to width, then cut grooves to accept the drawer bottom (Fig. D). Use a special 15/64" bit for a snug fit if your plywood, like most, is less than 1/4" thick (see Sources). Cut all the pieces to length.

Cut rabbets on the front and back pieces. Glue each drawer in stages. First, glue the front to the sides, and clamp—but don't glue—the back in place. Cut the bottom (Q) to size and slide it into the grooves (**Photo 4**), then glue and clamp the back. When the glue is dry, drill holes for dowels to

With reproduction labels and brass knobs, this three-drawer
spool cabinet is right at home in any century.

By A.J. Hamler

Spool Cabinet



Figure A Exploded View

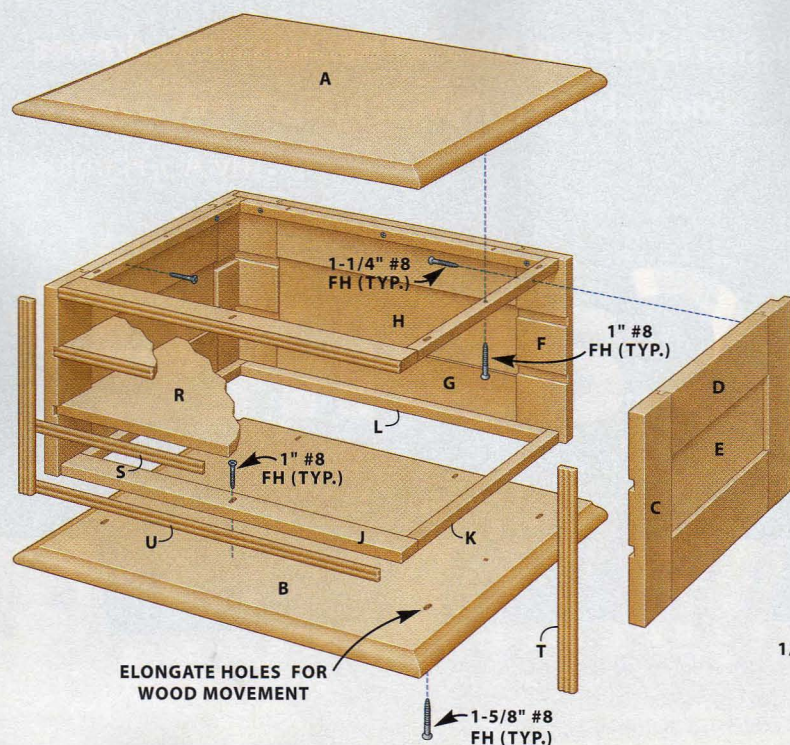
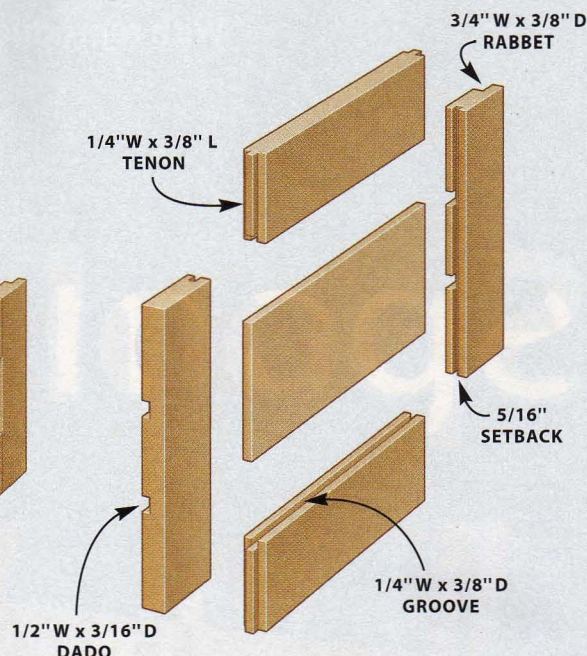


Figure B Side and Back Details



reinforce the joints. Glue the dowels and cut them flush (**Photo 5**).

Plane the stock for the drawer faces (P). Make some extra pieces for test cuts. As with the top, make these pieces from the same board.

Center and trace a drawer label onto the front of each face, then cut out the opening using a jigsaw. Using a bearing-guided cove bit with a 1/8" radius, rout a molding on the inside of each face (**Photo 6**). Do this carefully—you'll be cutting against the grain at times. Glue the faces to the drawer boxes (**Photo 7**).

Complete the Case

With the drawers done, turn back to the case. Make or purchase the bead trim (S, T, and U; Fig. E). Rout the edges of a 3/4" thick board (**Photo 8**), then rip the edges 1/4" thick. Rip some of these pieces 1/2" wide to make the trim for the drawer dividers (R). You can rout the beads directly on the front rails (J), if you wish.

Cut the two drawer dividers slightly oversize, then glue the trim to one edge. Mill the front rails (J) extra-long. Glue trim

to the pieces and cut them to length.

Cut dados in the cabinet's sides and back for the drawer dividers (**Photo 9**). Lay out the dados by measuring the front rail, drawers and drawer dividers, or use the actual pieces as spacers. Add about 1/32" above each drawer for play. Begin by laying out the bottom dado (its distance from the bottom edge is the sum of one front rail, one drawer, and 1/32"). Cut this dado on both of the sides and the back, then temporarily clamp the case together (**Photo 10**). Place the front rail, drawer, and divider in place, then mark the next dado's location, and so on. When you get to the last drawer and put the top rail in place, you may find that the cabinet is too tall. That's because its height was calculated as if the dividers are a full 1/2" thick, and usually this plywood is undersized. If there is a margin above the upper front rail, mark it, and cut down the sides and back.

With the case still dry-clamped, measure the length of the drawer dividers. Cut them so they slide in smoothly and snugly—you'll glue them in after the case is assembled. Insert the dividers back-

ward and mark the rear edge for the correct depth (**Photo 11**). Remove the dividers and cut them to size.

Measure and cut the cleats (K, L). Drill and countersink pilot holes in the upper cleats and upper front rail for fastening the cabinet's top. Elongate the holes in the cleats to allow the top to shrink and swell. Glue and clamp the cleats in place (**Photo 12**). Reinforce the top cleats with screws after the glue dries.

Glue the case together (not including the drawer dividers). Note that the front rails are only connected to the sides by butt joints—adding the cabinet's top and bottom will sufficiently strengthen them.

Drill pilot holes in the top and fasten it to the case. Place the cabinet on its base and trace around it. Mark locations for screws to fasten the base to the sides and back. Drill and countersink these holes (elongate all holes, except the ones in the center). Fasten the base.

Stain and Finish

I like to stain and finish the inside of the cabinet, although it's not strictly necessary. Now's the time to do it,



1
Order labels and knobs before building the cabinet. They're available in different shapes and sizes. Some types might require re-sizing the drawers a bit.



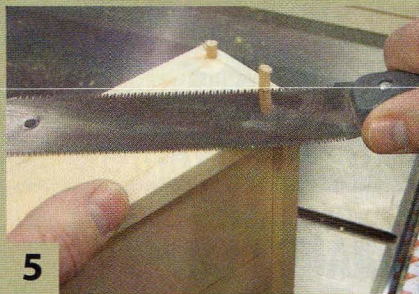
2
Make the sides and back, which are frame-and-panel assemblies. Begin by cutting grooves in the stiles and rails to receive the panels.



3
Cut a rabbet into the side's rear stiles to receive the back. Use a pushstick that butts against the waste piece when making this cut, so the waste doesn't kick back.
CAUTION: You must remove your blade guard for this operation.



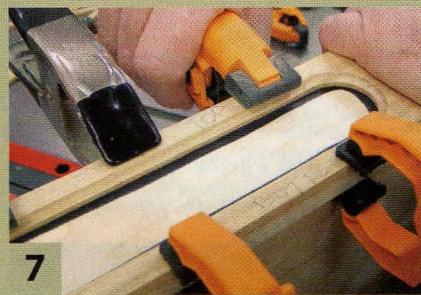
4
Make the drawers before gluing the cabinet together. With the drawers completed, you'll be able to lay out the dividers between the drawers with greater precision.



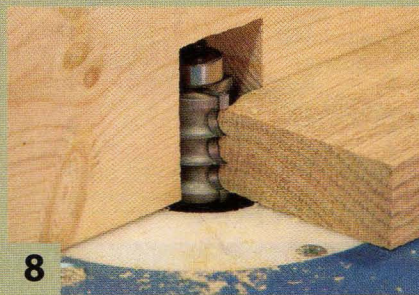
5
Reinforce the drawer's rabbet joints with a pair of dowels. Cut the dowels using a flush-cutting saw and sand smooth.



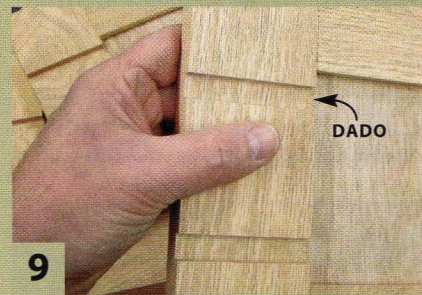
6
Each drawer front is a two-piece sandwich. The outer face, above, has an oval window to outline the label. Shape a molding around the window with a small cove bit.



7
Glue the face to the drawer. Before gluing, draw an oval on the drawer front using a black marker. If the face's opening is slightly larger than the label, the black oval allows the label to blend in.



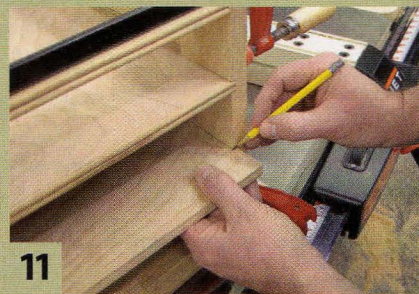
8
Make bead trim for the shelf dividers, front rails, and sides. Rout the profile on a wider piece of wood, then rip the piece to create a 1/4" thick molding.



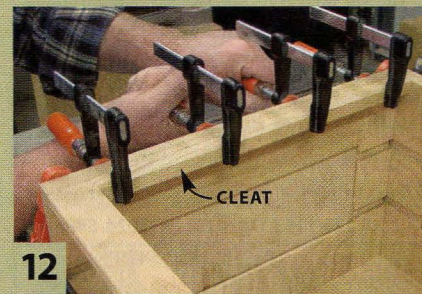
9
Cut dados across the sides and back to receive the drawer dividers. Lay out the dados by measuring the height of your drawers. Start with the lowest dado, then work your way up.



10
Assemble the cabinet without glue, and place the drawers on some temporary dividers. Check the height of the cabinet sides and back. If they're too tall, trim a little bit off to get the right spacing for the top drawer.

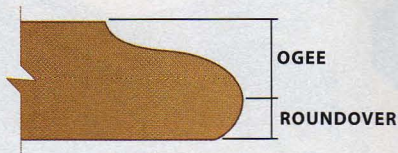


11
Mark the drawer dividers' depth by cutting them an extra 1/2" wide and sliding them backward into the cabinet. Mark each divider's rear edge where it meets the cabinet's sides.



12
Glue the cabinet together, adding cleats along the top edges. Fasten the top with screws that run through the cleats. Stain and finish the cabinet, including the back, so it looks good all the way around.

Figure C Top and Base Molding



before the dividers are in place. Avoid getting stain or finish in the dados, however. I stain and finish the first 4" or so of the dividers, too.

Glue the dividers in place. Cut the front trim pieces to length and glue them on to the cabinet's sides—they'll cover the side's dados.

Stain the entire cabinet and the drawer fronts. I like a medium dark - walnut stain on oak. Original oak cabinets ranged from a very light golden color to extremely dark. Apply several coats of polyurethane or other clear finish to the cabinet and drawer fronts.

When everything is dry and the finished buffed out, drill pilot holes for the drawer knobs. Locate the holes halfway between the label opening and the drawer sides, and centered top to bottom. Attach the knobs and back plates to the drawers. Peel the drawer labels from their protective backing and affix them to the drawers. 

SOURCES

- ◆ Van Dyke's Restorers, www.vandykes.com, (800) 558-1234, Original-style spool cabinet knobs, #02219773, \$6.39 ea; J&P Coats Spool Cabinet Labels (black with gold lettering), #00279745, \$20 set of six.
- ◆ Golden's Antique Supply, www.antiquesupply.com, (866) 497-7281, Spool Cabinet Decals, J&P Coats or Clark's (gold with black lettering), various catalog numbers, \$2.10 ea. or \$8 set of four.
- ◆ Horton Brasses, www.horton-brasses.com, (800) 754-9127, Cast Brass Spool Cabinet Knob, \$5.50 ea.
- ◆ Woodcraft Supply, www.woodcraft.com, (800) 225-1153, Ogee Bit, #823074, \$48; Multi-beading Bit, #813856, \$47; Plywood Panel Bit, 15/64" dia. (1/4"), #144143, \$11; Plywood Panel Bit, 31/64" dia. (1/2"), #144144, \$13.50.
- ◆ Lee Valley, www.leevalley.com, (800) 871-8158, 1/8" Radius Cove Bit, #16J29.52, \$19.

Figure D Drawer Exploded View

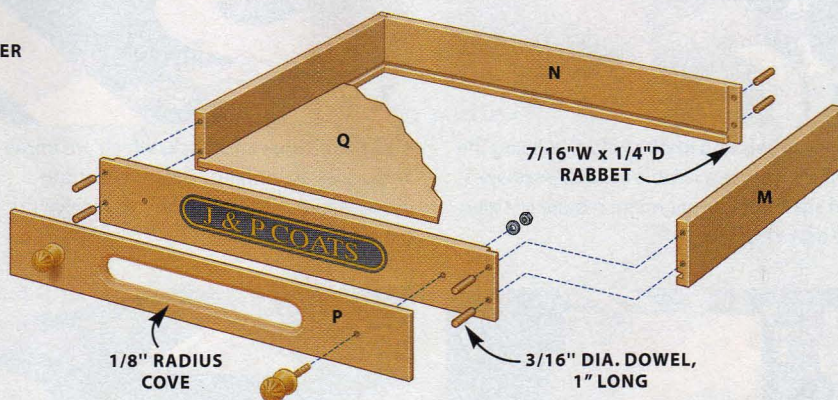
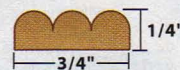


Figure E Bead Trim



CUTTING LIST

SPOOL CABINET

Overall Dimensions: 11"H x 22-3/4" W x 18-1/4"D

PART	NAME	QTY	WOOD	TH X W X L
A	Top	1	Oak	3/4" x 18" x 22-1/4"
B	Base	1	Oak	3/4" x 18-1/4" x 22-3/4"
C	Side stile	4	Oak	3/4" x 2-3/4" x 9-1/2"
D	Side rail	4	Oak	3/4" x 2-3/4" x 11-1/2" (a)
E	Side panel	2	Oak	1/4" x 5" x 11-1/2"
F	Rear stile	2	Oak	3/4" x 2-3/4" x 9-1/2"
G	Rear rail	2	Oak	3/4" x 2-3/4" x 15-3/4" (a)
H	Rear panel	1	Oak ply	1/4" x 5" x 15-3/4" (a)
J	Front rail	2	Oak	1/2" x 1-1/2" x 19-1/16"
K	Side cleat	4	Oak	1/2" x 3/4" x 13-7/8"
L	Rear cleat	1	Oak	1/2" x 3/4" x 17-9/16"
M	Drawer side	6	Poplar	7/16" x 2-1/2" x 14-13/16"
N	Drawer front/back	6	Poplar	7/16" x 2-1/2" x 19"
P	Drawer face	3	Oak	1/4" x 2-1/2" x 19"
Q	Drawer bottom	3	Birch ply	1/4" x 14-13/16" x 18-11/16"
R	Divider	2	Oak	1/2" x 15-5/8" x 19-7/16" (b)
S	Divider bead trim	2	Oak	1/4" x 1/2" x 19-7/16" (b)
T	Front cabinet trim	2	Oak	1/4" x 3/4" x 9-1/2" (b)
U	Front rail bead trim	2	Oak	1/4" x 1/2" x 19-1/16"

(a) Length includes tenon.

(b) Cut oversize, then trim to fit.

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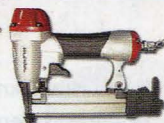
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Turned Knobs

by Alan Lacer

WHY WOULD YOU EVER make your own knobs when you can buy them for less than a buck? I can think of several reasons—limited choices of wood, for example. Many knobs are only available in oak or birch. But perhaps the best reason is aesthetics. Most production knobs look pretty plain, due to the constraints imposed by mass production. It's a shame to saddle your furniture or cabinetry with run-of-the-mill knobs when it's easy to enhance your work with knobs that are hand-turned and finely detailed. Plus, there's the undeniable satisfaction you get from making your own knobs.

Knob-making is a great exercise in understanding grain orientation and how to work with it. The face of a knob can show either end grain or face grain (**see photos, page 83, top**). End-grain knobs (also called

"long-grain" knobs) are turned with the grain oriented parallel to the lathe's bed, as in spindle turning. Face-grain knobs (also called "short-grain" knobs) are turned with the grain oriented perpendicular to the lathe's bed, as in most bowl turning.

The tools you'll need for turning both types of knobs include a detail/spindle gouge, a parting tool and a skew chisel.

End-Grain Knobs

End-grain knobs are strong because the grain runs lengthwise through the knob. This makes them the best choice if you want to turn slender shanks with delicate shaping and fine detailing. End-grain knobs usually have tenons on the ends rather than being fastened with screws, because screws that are threaded into end grain don't hold well.

Although end-grain knobs are oriented the same way as spindle work, you shouldn't mount the blanks between centers. Instead, provide clear access to the face of the blank by mounting the stock in a scroll chuck (**see photo, page 83, middle**). You can easily chuck a blank that's long enough to turn several knobs—just allow sufficient length for mounting and for waste between the knobs.

Once the blank is mounted, turning an end-grain knob is fundamental spindle work. Start by establishing the knob's diameter (**Photo 1**). Then shape the knob's face by cutting from large to small diameters (**Photo 2**). Use a skew to add details (**Photo 3**). Shape the shank to create a finger recess (**Photo 4**). Again, work from large to small diameters. Finally, turn the tenon to fit the hole drilled in your door or drawer (**Photo 5**).

Face-Grain Knobs

Face-grain knob shanks must be larger in diameter than end-grain knob shanks, to compensate for their grain orientation—these knobs are likely to break at the shank, due to the short grain, if the shank is too slender. I seldom go below 1/2" dia. behind the face.

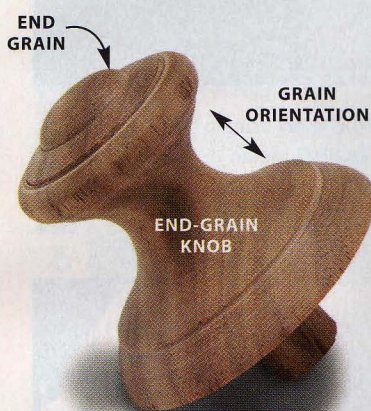
On the other hand, the faces of face-grain knobs show face grain, so they match the fronts of drawers and doors better than the faces of end-grain knobs. Face-grain knobs are also a better choice when the wood is going to be stained, because their faces take stain more evenly.

A screw chuck is the best device for mounting a face-grain knob blank (**see photo, page 83, bottom**). This chuck has the added benefit of creating a centered screw hole for mounting the knob (face-grain knobs attach securely with screws). I attach

a shop-made drawbar to prevent the chuck from popping out during operation.

It's best to turn face-grain knobs one at a time. Using stock milled flat and slightly thicker than the pulls' desired height, cut out a series of blanks, including one or two extras, just in case.

Face-grain knob-turning resem-



bles bowl turning, because the grain runs at a right angle to the lathe's bed, just like a bowl blank. You will quickly discover that cutting coves and fine detail on the side of a face-grain knob is more challenging than it is on an end-grain knob. That's because the side alternates between end grain and long grain as it rotates. On the other hand, detailing the face of a face-grain knob is much easier than it is on an end-grain knob.

To turn a face-grain knob blank into a cylinder without chipping the ends, start your cuts from off the blank at both ends and meet in the center (**Photo 6**). Because of the blank's weak short-grain structure, turn the knob's face first. (If you turn the shank first, it may break while you're turning the face.) To create fine convex and concave details, treat the face as if it were a small bowl (**Photo 7**).

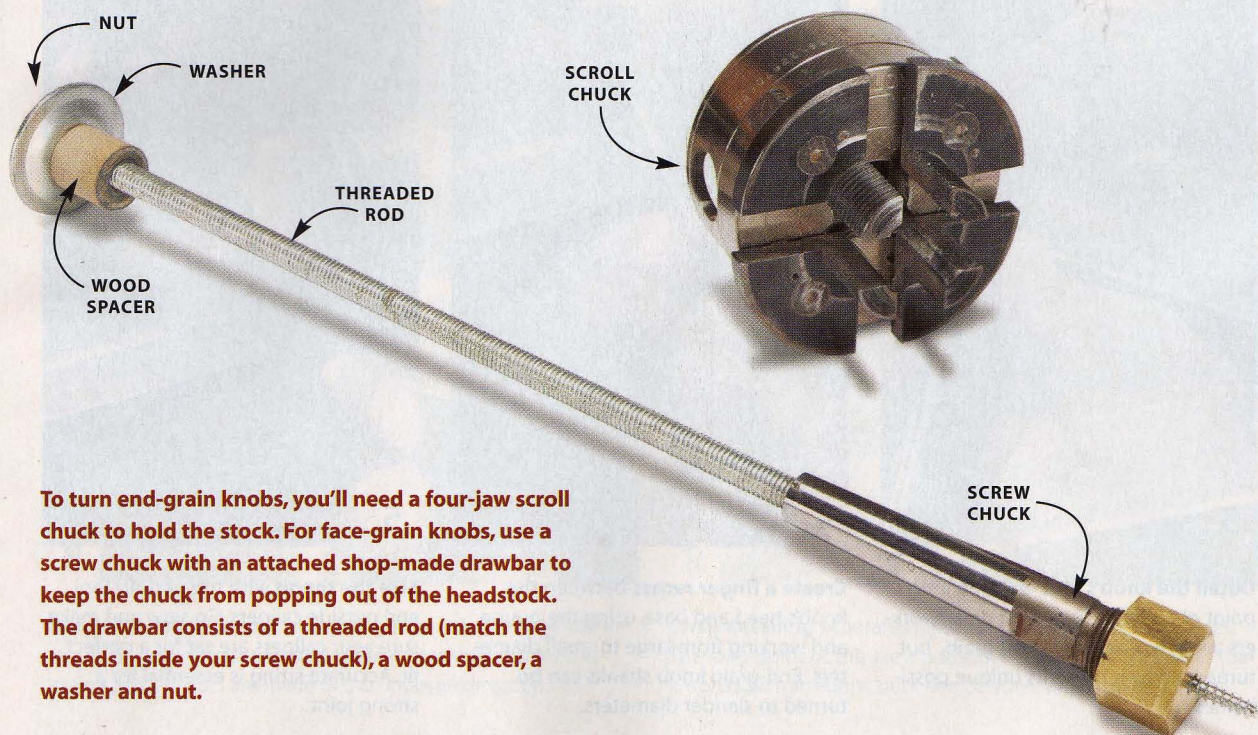
Once the face is complete, you



can address the side of the knob. Here's where things get a little tricky: Because of the side's short-grain structure, you have to work from small to large diameters—the opposite of normal spindle work (**Photo 8**). Add fine details with a skew chisel (**Photo 9**).

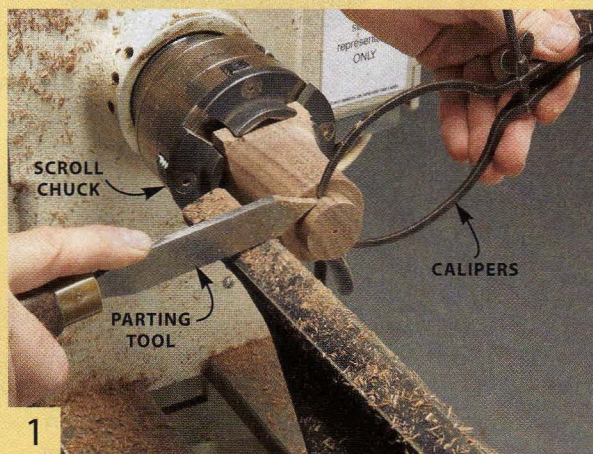
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To turn end-grain knobs, you'll need a four-jaw scroll chuck to hold the stock. For face-grain knobs, use a screw chuck with an attached shop-made drawbar to keep the chuck from popping out of the headstock. The drawbar consists of a threaded rod (match the threads inside your screw chuck), a wood spacer, a washer and nut.

Turn an End-Grain Knob



1

Start an end-grain knob with a blank mounted in a scroll chuck. Establish the knob's diameter with a parting tool and outside calipers. Make sure the caliper points are rounded and smooth, so they won't catch.



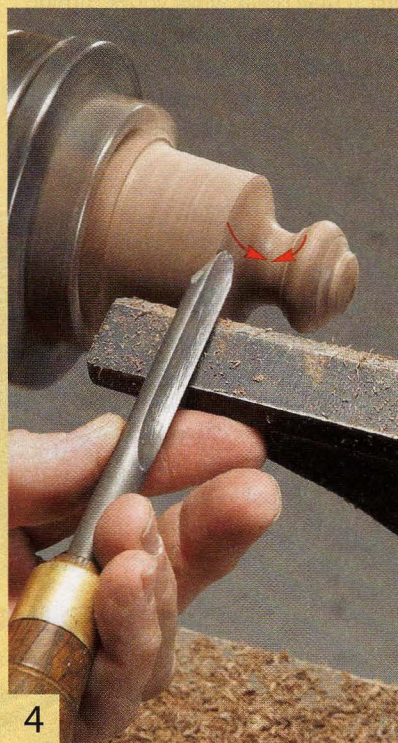
2

Shape the outside face of the knob, using a detail/spindle gouge. Work from large to small diameter.



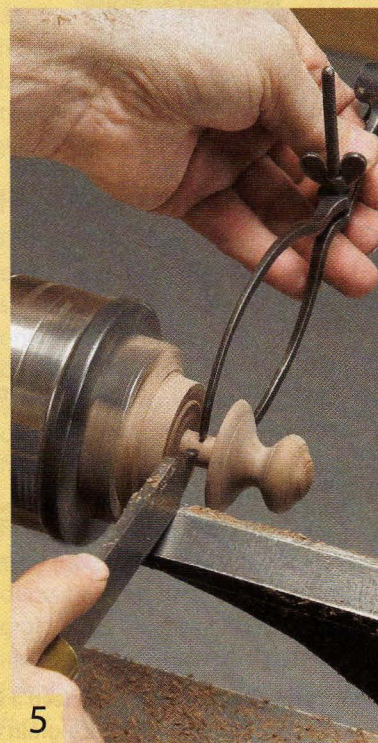
3

Detail the knob's face with the long point of a skew chisel. Most woodworkers avoid working with end grain, but turners know it presents unique possibilities.



4

Create a finger recess between the knob's head and base, using the gouge and working from large to small diameters. End-grain knob shanks can be turned to slender diameters.



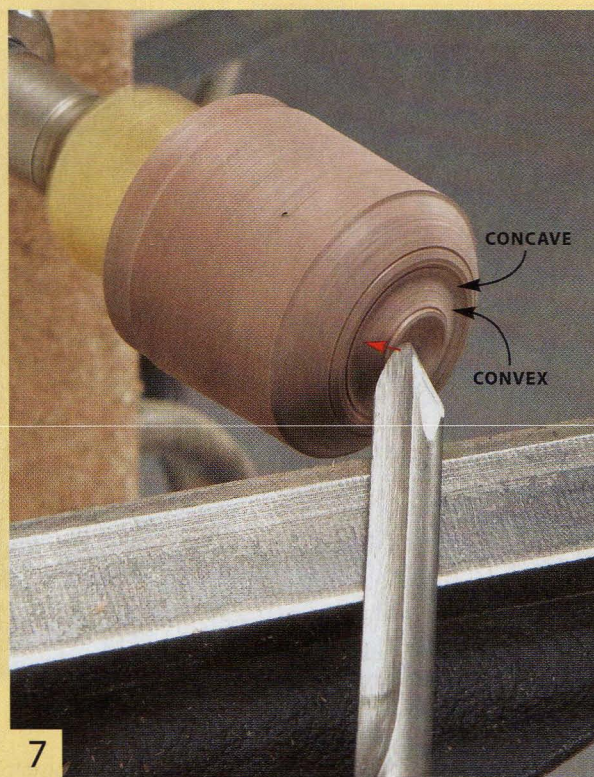
5

Size the tenon with the parting tool and outside calipers. Go slow and make sure your calipers are set for a perfect fit. Accurate sizing is essential for a strong joint.

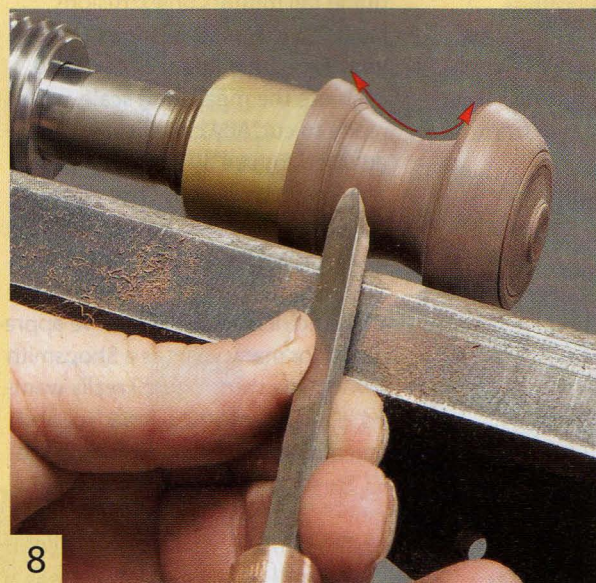
Turn a Face-Grain Knob



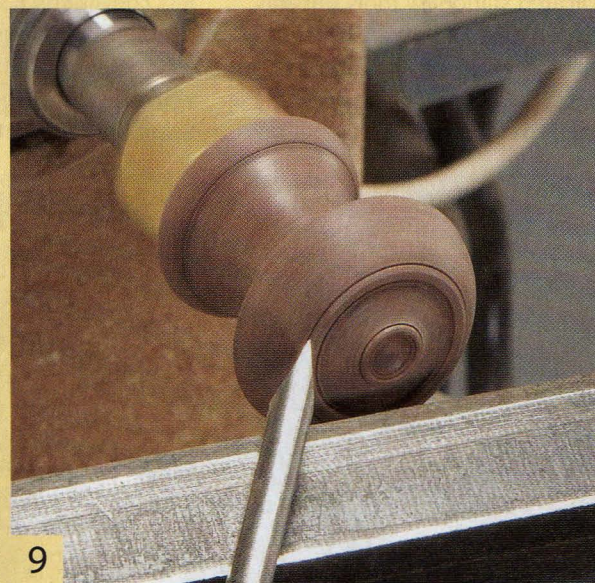
Mount face-grain knob blanks on a screw chuck. Turning these knobs takes a light touch, as heavy cuts can strip the screw hole. Start by creating a cylinder. Work from the ends towards the middle to avoid chipping the outside corners.



Detail the knob's face with the detail/spindle gouge. This work is similar to turning a small face-grain bowl: Work convex areas from small to large diameters and concave areas from large to small diameters.



Create the knob's shank by working from small to large diameters. Face-grain knobs require a different technique than end-grain knobs, as cuts are made in the opposite direction.



Crisp detailing separates handwork from production pieces. The long point of the skew adds fine details and crisp lines that emphasize transitions between concave and convex shapes.



Pint-Size Shop

I HAVE READ with envy about spacious shops with room for many dedicated stationary tools. But alas, my shop is confined to a 200 sq. ft. corner of my basement. After tinkering with layout plans, I finally concluded that the “dream” cabinet saw

I wanted to buy wouldn't fit in my pint-size shop. I didn't want to buy a smaller saw, so I began to consider less conventional solutions.

While exploring online forums, I stumbled upon a group of woodworkers who were passionate about using the EZ Smart system from

Eurekazone (www.eurekazone.com), a guide system designed for precision cutting and routing. The system's guide rail mounts on extrusions fastened to the table edges. Once you align the guide rail at 90° and calibrate the measuring scale, you're ready to cut. Any circular saw can be adapted for use by installing the guide rail's dedicated base plate. Another specialized base plate kit allows adapting virtually any router.

This system intrigued me because it offered flexibility, a virtue I've appreciated for many years as a Shopsmith owner. One shop fixture I really wanted was a large, flat work surface and assembly table. Could I combine the EZ Smart system with an assembly table in lieu of a cabinet saw?

You can see the answer. My 50" by 72" torsion box-style assembly table is dead flat. In addition to the EZ Smart system, it has a replaceable melamine work surface, flush-mounted aluminum channels for clamping, onboard electrical outlets



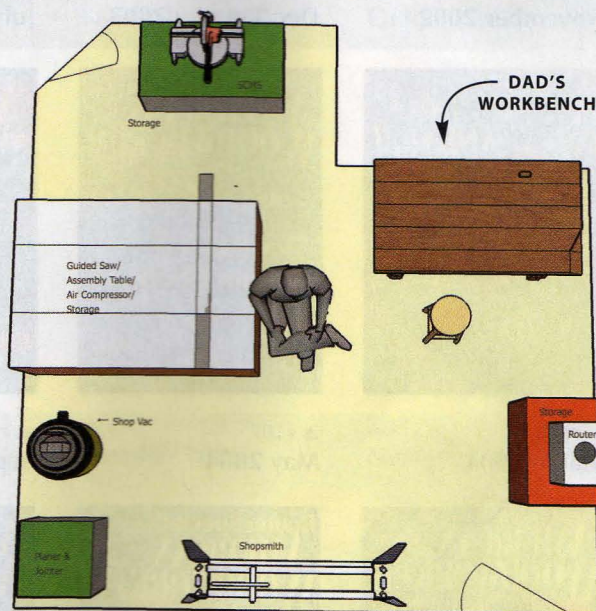


and tool storage in the base.

So in my small space, I have an assembly table/guided saw and router system, a jointer, a planer, a router table, a sliding compound miter saw, a shop vacuum, an air compressor, my trusty 6-in-1 Shopsmith (bandsaw, jointer, drill press, lathe, tablesaw and disc sander) and something I really treasure, my dad's sturdy work-

bench, circa 1935. Of course, I still dream of having a big shop with stationary tools—and my EZ Smart guide system. In the meantime, I love my unconventional little shop. Working efficiently takes a little planning, but capitalizing on the flexibility of my multi-function tools is part of the fun.

—Ed Brady
Colorado Springs, CO



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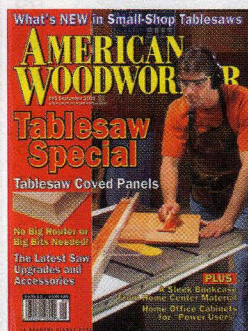
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Groff & Groff Lumber	79
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Hearne Hardwoods	81
Japan Woodworker	79
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Jefferson Tool Nail Extraction	79, 81
Laguna Tools	57, 92
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Rockler Companies, Inc.	33, 35
ShopBot Tools, Inc.	23
Steve Wall Lumber	80
Suffolk Machinery	79
The Berea Hardwoods Co. Inc.	81
The Craftsman Gallery	80
The Gorilla Glue Company	19
TimberKing	80
Toolmarts, Inc.	81
West System, Inc.	33
Woodcraft Plans	81
Wooden-Gear-Clocks	79
Woodmaster Tools	21
WoodMizer Products, Inc.	79
Woodworkers Source	81

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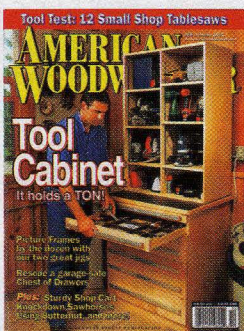
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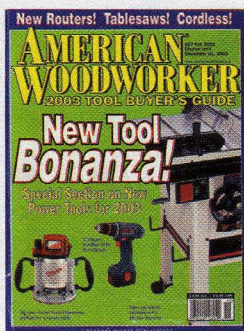
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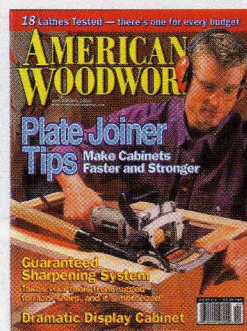
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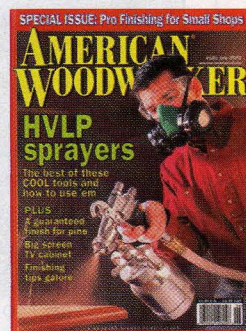
▲ #096
October 2002



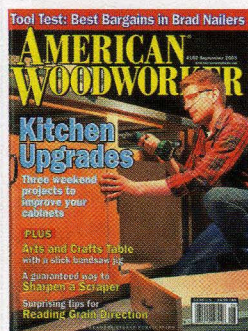
▲ #097
November 2002



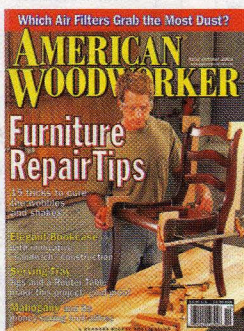
▲ #098
Dec/January 2003



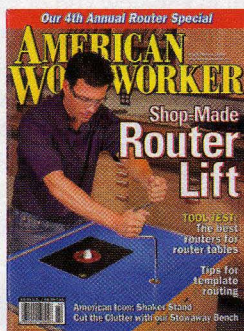
▲ #101
July 2003



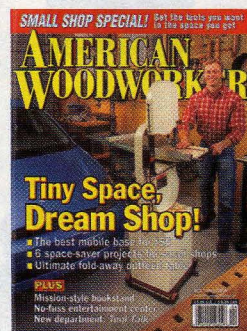
▲ #102
September 2003



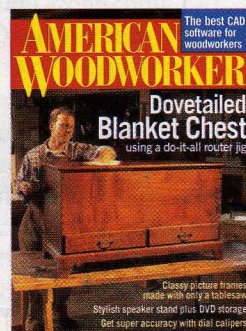
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October 2003



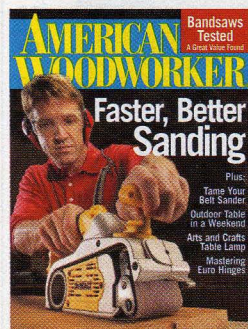
▲ #106
March 2004



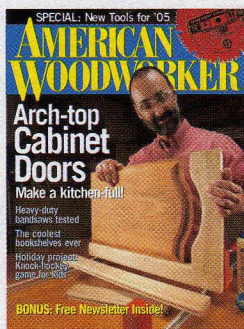
▲ #107
May 2004



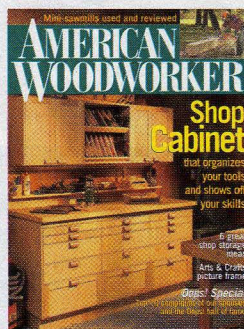
▲ #109
September 2004



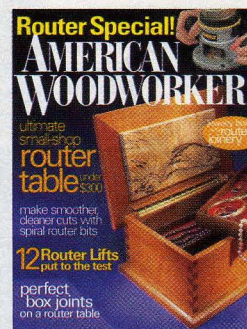
▲ #110
October 2004



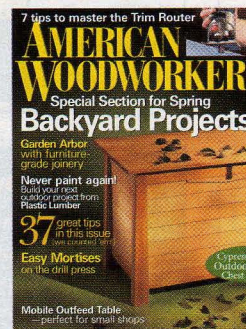
▲ #111
November 2004



▲ #112
Dec/January 2005



▲ #113
March 2005



▲ #114
May 2005

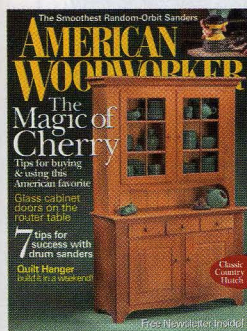
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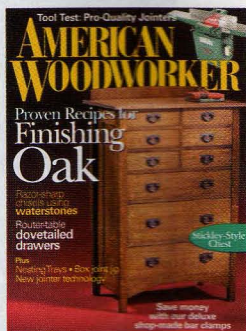
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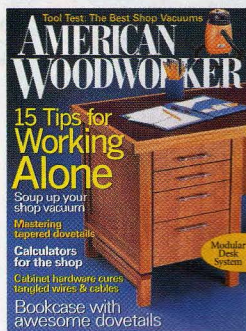
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July 2005



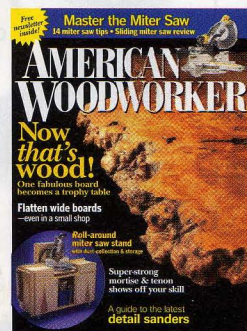
▲ #116
September 2005



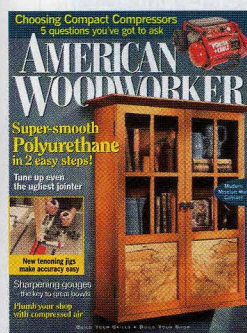
▲ #117
October 2005



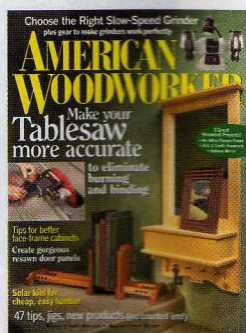
▲ #119
Dec/January 2006



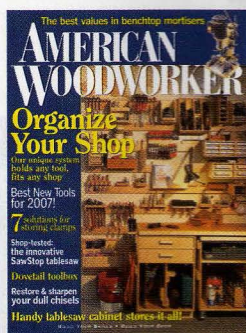
▲ #122
July 2006



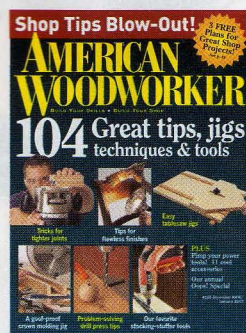
▲ #123
September 2006



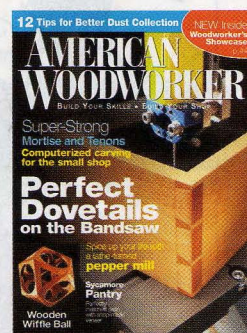
▲ #124
October 2006



▲ #125
November 2006



▲ #126
Dec/January 2007



▲ #132
November 2007



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Flying Sawdust

LAST SUMMER, due to the heat, I covered my portable saw with a canvas tarp and retreated to the cooler air inside my basement shop. The saw sat under the canvas for two months, until I needed to cut some boards that were too long and unwieldy to maneuver in my basement shop.

I uncovered the saw and set up infeed and outfeed tables to handle the boards. I pushed the start button and my trusty saw sprang into action. Clouds of sawdust billowed out, which seemed odd, because I hadn't started cutting. Then I noticed the dust was

black and yellow...and buzzing.

A swarm of enraged wasps boiled from under the saw. Dropping the board I was about to cut, I beat a hasty retreat. I didn't stop running until I reached the fuse box at the far end of my shop, where I turned off the saw's power.

My wife happened to look out the kitchen window just as I was high-tailing it toward my shop. Upon hearing my story, she laughed until she cried. "I've never seen you run so fast," she sobbed.

—Dale Thompson

Botched Box

THE JEWELRY BOX I was making featured an asymmetrical design created with anegre veneer and wenge inlay. To allow the pattern to flow continuously around the box, I planned to glue everything together and then cut off the lid.

I carefully cut the miter joints, fit the top and bottom and glued up the box. So far, so good. Next, I inlaid the wenge and applied the veneer. Excellent!

To separate the lid, I set my tablesaw's blade a bit lower than the stock's thickness and carefully made one pass on each side. Then I finished the cuts with a razor knife. Perfect! I cut hinge mortises in the lid and the box, drilled holes and installed the hinges without busting off any of the tiny brass screw heads. Another triumph!

I closed the lid and gazed lovingly at my creation...until I noticed that the pattern no longer flowed around the box. Argh! I'd mistakenly cut the hinge mortises on the front of the lid.

—Art Greenberg



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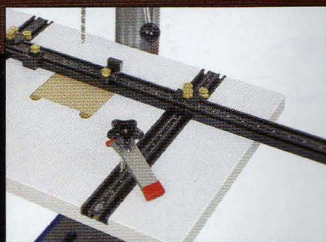
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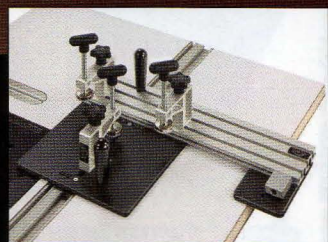
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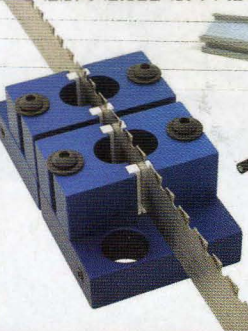


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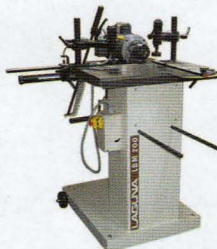
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