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February 2014 ■ #209

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- Max. jointer depth of cut: ⅛"
- Max. width of cut: 12"
- Planer feed rate: 22 FPM
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- Cutterhead diameter: 3⅛"
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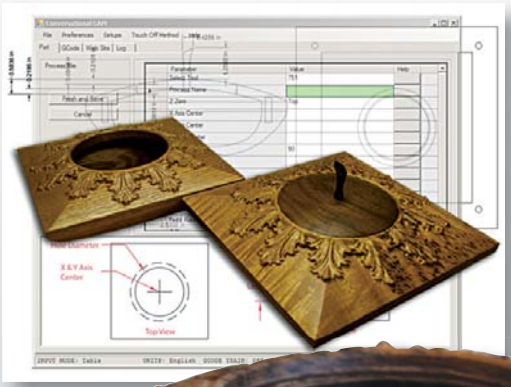

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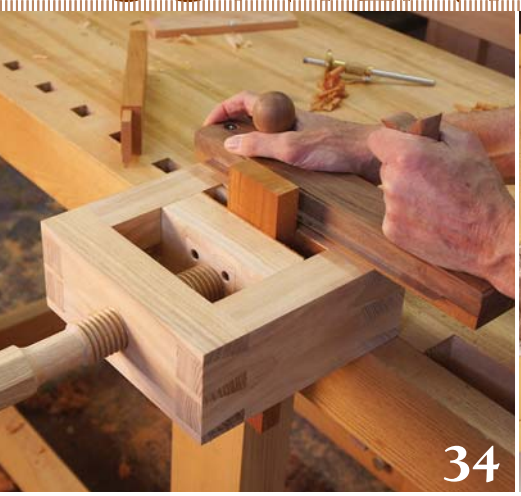

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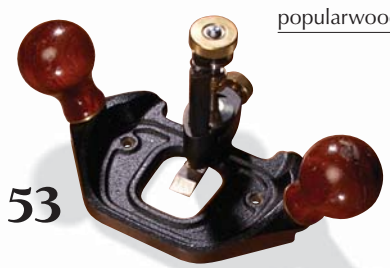

TENON-CUTTING PHOTO BY JEFF MILLER; NAIL CABINET PHOTO BY CHRISTOPHER SCHWARZ;
MERCER MUSEUM PHOTO COURTESY OF THE MERCER MUSEUM; ROUTER PLANE PHOTO BY AL PARRISH

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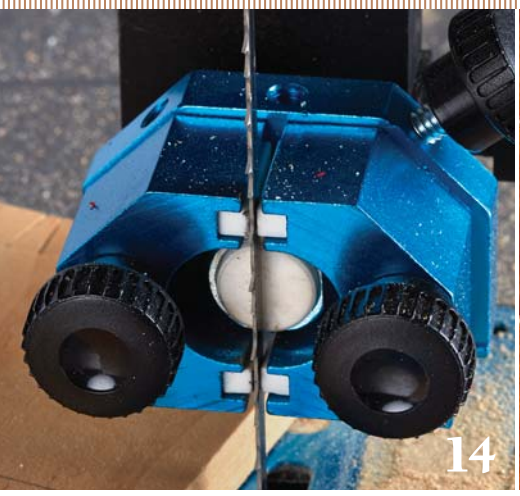

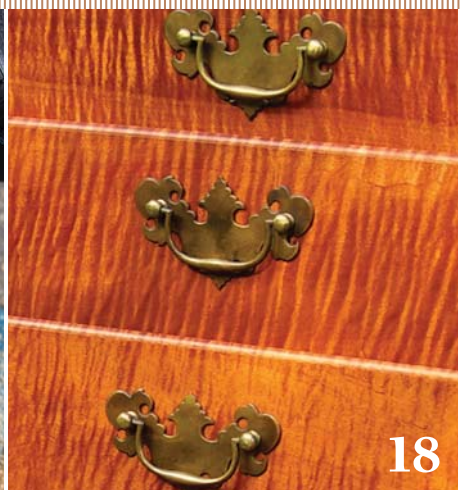

REGULARS

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BAND SAW & TABLE SAW PHOTOS BY AL PARRISH;
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158002

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Online Entertainment

Among the sessions at Woodworking in America 2013 was an Online Woodworking Roundtable, to which we invited representatives of several woodworking message boards, writers of a couple of well-trafficked blogs, instructors at online woodworking schools and members of online woodworking groups.

I had no idea what to expect. While I spend a fair piece of time online every day (and from my daily read of various woodworking message boards, it's clear a lot of other folks do, too), I didn't know how that might translate to non-virtual interaction.

Would the roundtable participants just be chatting amongst themselves in an otherwise empty room? Would five people show up just to heckle? 25? 50? So it was a welcome surprise that more than 100 people graced the room to listen, ask questions, comment on how the various boards and blogs always have an answer when it's needed and, most touching, tell the panelists how much help and inspiration they've been.

It got me thinking about what I value in virtual woodworking – after all, the leisure time I choose to spend online could be time spent in the shop. I check the three most-trafficked woodworking message boards every day at work to make sure any questions and comments about the magazine are addressed – but I also spend at least a few evening hours a week reading through discussions that catch my interest. (They're almost always on the hand tool forums, simply because the minutiae of spokeshaves, handsaws, etc. interests me beyond what I need to know to build something. The finer points of ATB table saw blades and band saw drift do not – I just want my machines to work).

That hand-tool interest also informs the blogs I choose to read – the ones I habitually visit are, however, but a small percentage of what's available in cyberspace.

With such a wealth of instant information available, how do I choose the blogs on which to spend a few hours of leisure (a question that came up during the panel discussion)? Unless I'm in search of an answer to a specific question, for me it boils down to entertainment, veracity and compelling prose.

It's no different than how I choose the authors for whose new books I clamor (Julian Barnes, Bill Bryson, Kathy Reichs, John Irving, Hilary Mantel, Scott Turow…to name just a few). And for me, good writing trumps all. Write it well – or simply in an manner that interests me – and get your facts right, and I needn't care (much) about the topic to keep returning (though admittedly I'm less likely to discover it in the first place). Your reasons for reading may well be different.

Now, at the very large risk of offending those who haven't made my must-check-daily woodworking blog list, here it is:

- blog.lostartpress.com
- pegsandtails.wordpress.com
- pfollansbee.wordpress.com
- cornishworkshop.blogspot.com

My must-check-weekly list is a great deal longer – it can be found on the "blog network" on our web site, under the "blog" drop-down menu. I'm doing my best to keep that list updated and to keep up with my reading – but there is not world enough or time. **PWM**

PHOTO BY THE AUTHOR

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The Science Behind A Spring Joint

I have a question about Thomas MacDonald's toolbox article in the December 2012 issue (#201). He suggests using a spring joint when gluing panels. It appears to me that working this way has the potential for joint failure. Is this technique regularly practiced when joining boards?

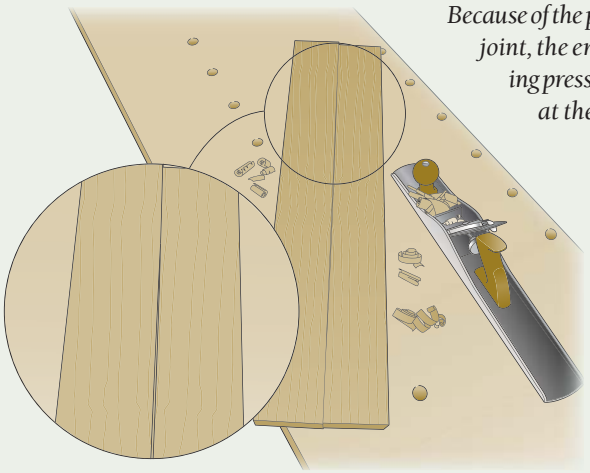
Ed Burns
Mount Holly, North Carolina

Ed,

A spring joint is a common woodworking technique. It's been around for quite some time. The idea – because of the way wood expands and contracts – is to leave a small gap (a few thousandths of an inch at most) at the middle of the edge joint.

Wood loses moisture through the ends of the fibers more so than through the sides. As it loses moisture the fibers contract, so the ends of the board contract more quickly and to a greater degree than the center of the board. In a spring joint, as you clamp the joint closed, you are slightly compressing the fibers at the ends of the board. As the ends of the board lose moisture and begin to shrink, the pressure begins to equalize without opening the glue joint.

An additional advantage to a spring joint is that you can use fewer clamps. Because of the physical make-up of the joint, the ends require less clamping pressure as you close the gap at the middle.



One word of caution: If you spring a joint with too much gap you do run the risk of joint failure – keep the gap to about the thickness of a smooth-plane shaving.

Chuck Bender, senior editor

Life's Better With a Mate

I enjoyed Bill Anderson's panel-raising plane article in the November 2013 issue (#207). Several years ago at a flea market, I purchased an unmarked plane when I recognized it was for creating raised panels. I found little additional information, and because all of my attempts to use it were frustrated by the clumsiness of repositioning the panels as I worked, and when dealing with opposing grain directions, I presumed that the plane was half of a set of two – one right-hand and one left-hand.

That being said, I decided to duplicate my antique plane for the opposite side. After reading the article, I doubt that the original plane ever had a mate. It does now. I find the pair to be more useful.

Steve O'Brien
East Windsor, Connecticut

Stain Substitution

I'm building the "Simple Barrister Bookcases" from the April 2007 issue (#161). I cannot find the Olympic oil-based stain that was used in the article. Where did you find it?

My local home center tells me that Olympic does not make an interior stain anymore. Can I use another brand?

Ralph Wernimont
Andover, Minnesota

Ralph,

At the time, we could get Olympic stains at any home center. Today, it appears this stain isn't available in Canada, but can be found in some stores in the United States. I would suggest a search of the company's web site (olympic.com/stains) if you're set on using the Olympic stain we did.

On the other hand, any oil-based stain will work the same way. Simply find the color you like and make it happen. I would, however, make a sample board before jumping right to the bookcases.

Glen D. Huey, managing editor

Polyurethane Glue, Moisture & Bent Laminations

I have a quick question about the bent lamination shelf (October 2005, issue #150). In the article, Robert W. Lang used a polyurethane glue to make the bent laminations for the shelf supports. Did he wet the strips? If so, did he wet both sides before spreading the glue on the strips using a putty knife?

Also, I'm using hickory. Does wood choice make a difference?

Rocky Ferraro
via e-mail

Rocky,

As I recall, I didn't wet any of the surfaces. It's usually relatively humid here in southwestern Ohio, so I don't think it's always necessary to add moisture when using polyurethane glues.

If I did feel the need, I would use a misting bottle to lightly spray the pieces. Apply glue to one side of each piece and spritz the facing piece.

Water acts as a catalyst for the glue and makes it react faster, and damp is good enough. I would be careful, however,

CONTINUED ON PAGE 10

ILLUSTRATION BY MARY JANE FAVORITE

CONTINUED FROM PAGE 8

about getting things too wet inside the joints because extra water can take some time to completely evaporate.

A small test sample would let you know what will work in your environment and with the wood you choose.

Robert W. Lang, executive editor

City Sideboard Finish

I've had many compliments from family and friends on my interpretation of Mario Rodriguez's sideboard from the April 2013 issue (#203). I need to do some final sanding then add doors and drawer knobs, and I'm hoping to present my version at the next meeting of the Arizona Association of Fine Woodworkers.

I don't have spray equipment, so I'm wondering what you recommend for a finish – this is always the difficult part of a project for me.

I would also appreciate your input as to where to purchase the hinges and knobs used on the sideboard.

Thanks for designing a great project.

George Olson
Phoenix, Arizona

George,

In the past, I've used a tung oil-based product from Waterlox (waterlox.com). Be sure to carefully follow the manufacturer's instructions and allow adequate time for each coat to dry. You will probably need three or four coats.

I'm currently experimenting with a wipe-on varnish by General Finishes (generalfinishes.com). It's a gel-like material that is brushed or wiped on, allowed to sit for about five to 10 minutes, then wiped off. Again, follow the directions on the can and you should be fine. My experiments with this product thus far have produced attractive results.

The hinges are Brusso hinges, which can be purchased from Lee Valley Tools (leevalley.com) or Tools for Working Wood (toolsforworkingwood.com). The knobs were turned on a lathe.

Mario Rodriguez, contributor

[Editor's note: You can buy similar knobs at Woodcraft (woodcraft.com).]

Best Way to Remove Old Glue

When repairing old furniture, including 19th-century pieces, I often need to re-glue mortise-and-tenon joints. Removing the old glue from the tenons is easy, but to get a clean surface inside the mortises is not, especially in those that are not large, such as on frames of small cabinet doors. What's a good fix?

Eric G. Bolen
Wilmington, North Carolina

Eric,

The solution is to clean the glue off both the mortise and tenon without removing any wood fibers. (This allows the fibers of both to remain in contact when re-glued.) It's important because not all glues stick to one another. If you leave a part covered in glue, there' is no guarantee you'll end up with a strong joint once it's re-assembled.

In order to get into small mortises, I use sharpened, thin strips of a card scraper to reach deep into the recesses.

For joints secured with hide glue, you could try using a hair dryer or heat gun to soften the glue prior to using a scraper. (Note that if you're removing hide glue and repairing with hot hide glue, small flakes of remaining glue will remelt; large globs may not.)

If the joint was held together with another type of glue, you may need to pare the walls of the mortise. If you remove small amounts of wood fiber with the glue, a thin piece of veneer can make up for widening the mortise. **PWM**

Chuck Bender, senior editor

ONLINE EXTRAS

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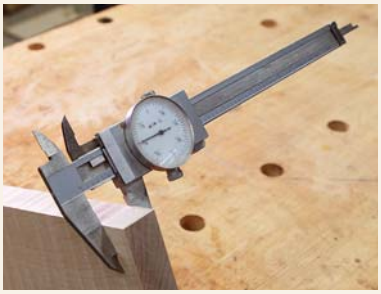

PHOTO BY GLEN D. HUEY

Highly Recommended

A dial caliper is easier to use and to read than is a vernier caliper, and it is more durable than its digital brethren.

I use a fractional caliper, calibrated to 1/64". Many of these tools are overly burdened with markings – I keep it simple. And I'm not a fan of using a wheel to move the jaws. My choice is Woodcraft's WoodRiver design.

When properly used, this tool increases your accuracy in a big way, especially when milling boards to thickness. *— Glen D. Huey, managing editor*

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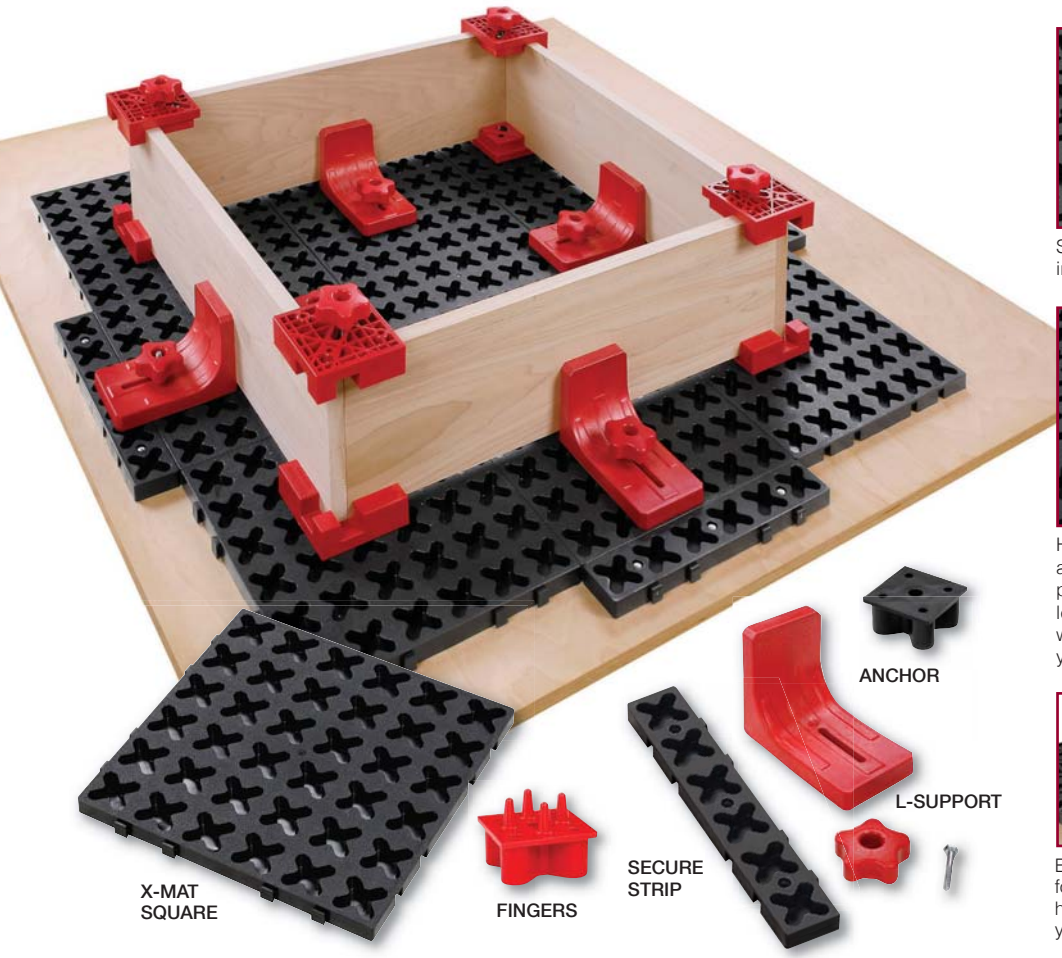
Safety is your responsibility. Manufacturers place safety devices on their equipment for a reason. In many photos you see in *Popular Woodworking Magazine*, these have been removed to provide clarity. In some cases we'll use an awkward body position so you can better see what's being demonstrated. Don't copy us. Think about each procedure you're going to perform beforehand.

NEW from Woodpeckers®

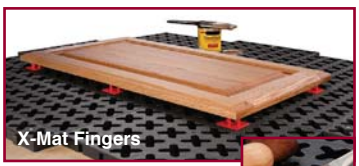
X-Mat Assembly System

Secure Parts in Place • Hold Jigs and Fixtures • Perfect Support for Finishing!



Support upright material; perfect for holding larger parts during assembly.

Hold X-Mat accessories in place; has countless applications when paired with your own shop-made jigs and fixtures.



Elevate large or small parts for finishing; radiused tips have minimal contact with your workpiece.

Introducing the X-Mat Assembly System, designed to help you meet a multitude of shop work-holding challenges from assembling large cabinets to finishing small parts. The X-Mat System is like having a shop helper for those times when you need an extra set of hands.

X-Mat Squares, the Foundation of Our Modular Assembly System. Customize your assembly mat size using modular 12" x 12" X-Mat Squares. Each ¾" thick square is molded from super tough, chemical-resistant resin. The squares fit tightly together with interlocking dovetail-shaped keys. Now you're ready to position X-Mat work-holding accessories into any of the 36 "X" shaped sockets in each 12" x 12" X-Mat. All accessories feature a piston-fit "X" shape bottom that anchors them to the mat and makes them impossible to slip sideways.

X-Mat L-Supports are perfect for holding larger cabinet parts during assembly. These L-shaped brackets are robust in size at 3½" wide, with a 5" long base and 4" tall face and are formed from glass-reinforced polycarbonate making them virtually indestructible. The base is slotted to allow 2" of travel to easily accommodate any cabinet size. When positioned, the L-Supports are easily clamped in place using their comfort-grip knob.

With project parts in position, Woodpeckers Box Clamps are the perfect assembly companion to lock any 90° woodworking joint together.

X-Mat Anchors are not only used to hold X-Mat accessories, but have countless applications when paired with shop-made devices – like clamp supports, planing stops or securing our Box Clamps. Their uses are only limited by your imagination.

X-Mat Fingers elevate parts for finishing with minimal contact to the wood. They cradle small parts and support larger cabinet parts – perfect for applying finish to all sides. And finish materials don't stick to the chemical-resistant material.

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THE WINNER:

Use Shrink Wrap as A Clamp for Veneer

While trying to attach a carved 1/8"-thick mahogany veneer to the edge of a curved shelf, an idea came to me as a last moment glue-up solution.

Initially I thought I could make it easier to bend by wrapping the sawn veneer in a towel then saturating it with boiling water; this didn't have the effect for which I had hoped. As I started to bend the veneer around the shelf, it was apparent that it would not lie flat around the curve.

Grabbing a small offcut of the shelf to use as a caul, I clamped it to the apex of the curved edge, but this still left the balance of the veneer away from the shelf.

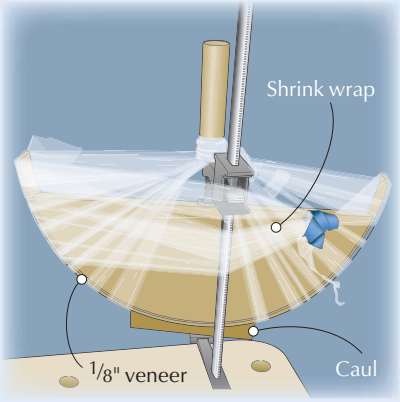
My next thought was to use masking tape. But the veneer was still damp, so I couldn't be sure the tape would hold. And the glue was setting fast.

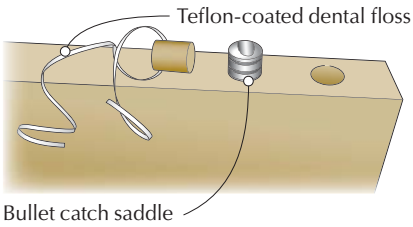
Then it hit me. If I had something that would stretch like rubber and was clear so I could see the glue joint, I could work my way from the apex of the curve to the back edge of the shelf to get a good glue joint. I would then be able to accomplish the glue-up.

My eyes fell upon a roll of shrink wrap – just what I needed. I wrapped it around the curve and tied it off at the top of the clamp. I repeated the process until the entire assembly was covered and secure. As a bonus, the translucence of the shrink wrap allowed me to keep tabs as I worked.

Everything worked out, but I think it will be a while before I attempt a glue-up again without first making a dry run.

Tim DeKorte,
Santa Maria, California





Bullet Catch Adjuster

Installing a bullet catch into the frame and door of a cabinet can be tricky. It requires both halves of the catch to be almost perfectly aligned for the catch to work and feel right.

The spring-loaded ball is easily adjusted if it's set to an incorrect depth in the frame rail. I drill a small hole on the backside of the rail to insert a nail to use as a lever if it is set too deep.

The mating saddle piece is more difficult because you don't want a hole on the inside of the door. You need to drill the catch hole to the right depth, which can be a difficult task to complete.

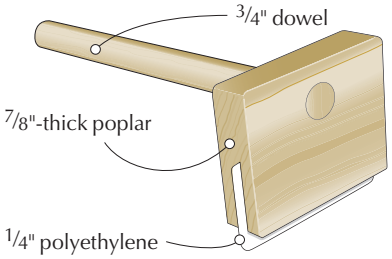
My solution is to drill the hole deeper than needed, and install a short dowel with a small hole though which I thread Teflon-coated dental floss.(The floss makes the fit snug, so glue is optional.) I then slip in the saddle. Pulling on the floss moves the dowel and allows me to make fine adjustments to set the depth just right. After the saddle is properly positioned, trim away the floss ends.

Len Meyer,
Mesa, Arizona

Shop-made Veneer Hammer

As I became interested in hammer veneering, I realized the need for a proper veneer hammer. Instead of spending $40 to $50 for a commercial hammer, I thought I could build one inexpensively using shop scraps.

I had a piece of 1/4" polyethylene plastic on hand that would be perfect for the scraping surface. Using a piece of poplar that was milled to 7/8" thick, I ran a 1/4" x 1 3/8" groove along one edge. (I wanted a snug friction fit on the plastic; as I cut the groove in the poplar, I sneaked up on the width to get a perfect fit.) I cut the poplar to 2 3/4" wide x 3 1/2" long then drilled a 3/4" hole centered from end to end and 1 1/4" from the non-grooved edge.



The plastic was cut to 1 3/4" x 3 1/2", then inserted into the groove.

The handle is a 10"-long piece of 3/4" poplar dowel. At my band saw, I cut a kerf into the end of dowel so the handle could be wedged once it was fit to the hammer head. Using a spindle sander, I eased all of the corners so there was nothing sharp, then added the handle.

I haven't decided if I should apply a finish to my hammer. It looks great and it's a pleasure to use.

Dave Griessmann,
Harrison, Ohio

ILLUSTRATIONS BY MARY JANE FAVORITE

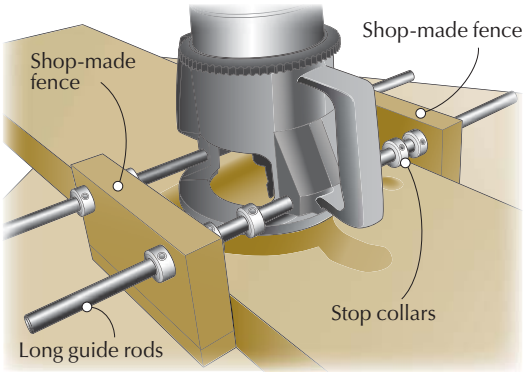
Adjustable Routed Mortises

While building a new workbench with a trestle base and sled-type foot, I discovered the mortises greatly exceeded the capacity of my mortise-and-tenon jig. I needed to come up with a different method for mortising the base.

I've always preferred using a router for mortising. Because I've had mixed results using a template guide, I wanted to try a different method.

After careful consideration I decided to take advantage of the router base holes for the edge guide rods. By passing the rods completely through the base, I could set up two fences to be used (one on each side of the work). It also allows the router to slide laterally on the guide rods.

I purchased a pair of long guide rods at my local hardware store. To the rails I mounted a wooden fence on either side of the router base, held in place with stop collars (also available at the hardware store). This setup allowed me to straddle the work with no side-to-side play, yet it slides smoothly over the length of the work. (A small amount of wax on the fence faces helps.) I still needed a convenient way to limit the travel of the router on the rails to define the limits of the mortise width.



Two additional stop collars (one on each side of the base) limited the lateral movement, and clamping wooden stops on the board limited the mortise length.

With minimal trial cuts, I was able to dial in the exact width of the mortises; a feeler gauge used between the router base and the stop collars allows very fine adjustment.

This setup provides complete control over size and placement of my mortises.

Phil Gaudio,
West Simsbury, Connecticut

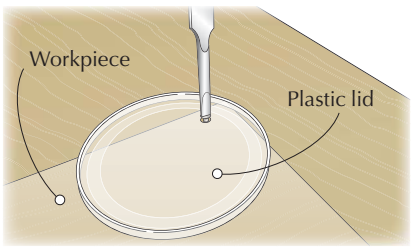
A Fix for Screw-ups

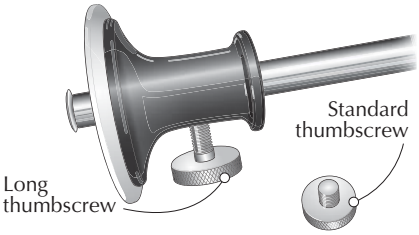
I have to admit that I often slip when driving slot-head screws. Even when I'm being extra careful using a handheld screwdriver, I still manage to dent the surface of my projects.

To prevent dents if my driver slips, I came up with the idea of shielding the surface around the screw head using a plastic lid into which I punched a hole the same diameter as the screw head. Place the shield on the project, start the screw through the shield then tighten.

It worked great. On the next slip, the shield caught the driver and my project was unmarred. No more dents.

Serge Duclos,
Delson, Quebec





Wheel Marking Gauge Stop

One complaint I have about my wheel marking gauge is that it often rolls off the workbench as I'm working. Some folks grind a flat on one side of their gauges, but I don't like that solution because it changes the shape of the tool, and it could affect the resale value.

I came up with a better fix. By simply replacing the short thumbscrew with a longer one that sticks out past the edge of the fence, the gauge stops rolling when the long thumbscrew contacts the bench.

I also feel the leverage of the longer screw makes it easier to secure the fence, so I avoid my tendencies to overtighten the gauge. PWM

Charles Mak,
Calgary, Alberta

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Laguna's '14-Twelve' Band Saw

A tool manufacturer does its homework to build a better band saw.

The Laguna 14-Twelve band saw has the look and feel of a machine thrice its price. There's a lot to like about this machine and the price makes it almost irresistible. Coming in at just under $1,100 ($1,345 with the mobile base and work light) puts it right in line with other manufacturers' mid-range 14" band saws.

The Laguna has plenty of oomph, with a 1¾-horsepower motor; most other band saws in this class are 1½ hp or less. (Grizzly's saw is the exception with a 2-hp motor.) It might not seem like much, but when you're resawing wide material, every bit of power counts. The great thing is you get all that power and can still plug the machine into a standard household outlet.

The body of the saw is a one-piece construction, which gives it rigidity and stability. Some lighter-weight saws with two-piece bodies allow for the addition of a riser block for wider resaw work. The Laguna 14-Twelve has that additional height built in, giving you 13" of resaw capacity.

The saw arrives decked out with Laguna's ceramic blade guides. The system is fairly simple to use and functions extremely well, particularly with wider resaw blades. (The blue anodizing on the guide housing is pretty cool, too.) I found the ceramic much easier on the blade than the old-style metal guides; this setup gives you more control, and the ceramic remains cool in use.

14-Twelve Band Saw

Laguna Tools ▪ lagunatools.com or 800-234-1976

Street price ▪ $1,097

▪ VIDEO *Take a closer look at some of the unique details of this new band saw.*

Price correct at time of publication.

Well guided. *Laguna's new band saw packs the power to get the job done. The ceramic guides are easy to set up and keep wider saw blades in line.*

The guides are easily adjusted with the exception of the lower back ceramic guide. Its locking knob is set to the inside of the blade, making it hard to adjust if you don't tilt the table to 45°. If the lock knob had been placed on the outside of the blade, however, tilting the table to 45° would be impossible. If you don't often tilt your table, move the knob to the outside for easier access. Otherwise, you'll have to live with this minor inconvenience.

I like the quick tension-release and the tracking and tensioning windows; the blade can be tensioned and adjusted with both the upper and lower doors closed, making it much safer to perform those operations. It's great not to have to move back and forth between the front and rear of the saw to tweak the blade.

With the rack-and-pinion system on the 14-Twelve band saw, you'll find the same quality as on Laguna's larger, more expensive saws. The system, which raises and lowers the upper blade guides and guard, is smooth – I'd like to see, though, some type of clutch system added to make changing the position to the extremes a quicker operation.

The hinged blade guard – held closed with a magnet – makes getting the guard out of the way for blade changes quick and easy. It's so simple that you'll wonder why it hasn't been part of all band saws for decades.

I would definitely spring for the mobile base and work light. They make using the 14-Twelve band saw easier and make it more functional.

The light, in particular, is a great addition. I swiveled the orientation 90° from what is illustrated in the manual in order to allow the light to pivot front to back. This better illuminates the workpiece. If 1½" to 2" of extra length were added to the light's arm, any shadows where the work meets the blade would be eliminated.

Overall, this Laguna band saw is a machine I'd be happy to have in my workshop.

— Chuck Bender

CONTINUED ON PAGE 16

PHOTOS BY AL PARRISH

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Czeck Edge Carbide Birdcage Awl

The first thing you notice when you grasp a Czeck Edge Hand Tool birdcage awl is how well it fits in the hand. The cocobolo handle is beautifully turned with a shellac finish that is silky smooth. And the blade is balanced, polished and sharp.

Czeck Edge has sold birdcage awls for quite some time, so why is a review just now gracing these pages? It's because the company has started making an awl with a solid carbide blade.

The great thing about going carbide for an awl is the longevity of the point. Many woodworkers use awls to bore starter holes for small screws (similar to how one would use a gimlet). There's a lot of twisting and turning going on that puts plenty of stress on the point of the awl – particularly if you're boring into hard, figured woods. Carbide is tough and holds an edge longer than regular tool steel, but it may be harder to sharpen when the need arises.

I also like the heft of these Czeck Edge awls. The weight gives the tool a substantial feel, and helps you drive the tool's point into a board; it also helps that same point sever the fibers of the board when using it to strike a line.

With a 10° angle on the pyramid point and a 25° secondary bevel, striking in hardwood leaves a crisp, well-defined line. In softwoods, however, I was less successful, getting just a bit of tear-out; carbide just doesn't get as sharp as regular tool steel.

For me, the Czeck Edge birdcage awl is well worth having in my toolbox because it is both beautiful and functional. I use an awl more for boring starter holes than for scribing lines. And because carbide is tough, I prefer this birdcage awl over the A2 steel version.

— CB

Birdcage Awl

Czeck Edge ▪ czeckedge.com

Street price ▪ $79

▪ BLOG *Read about other new cutting-edge Czeck Edge tools.*

Price correct at time of publication.

Starborn's Smart-Bit Depth Setter

Starborn Industries has set the benchmark for driving screws. The Smart-Bit Depth Setter allows you to sink screws to a consistent depth every time.

Although it was first introduced to the deck-building industry, there are a lot of features about this little tool that make it appealing to furniture makers.

It works with any 1"-long bit including both Torx and Phillips. (The company recommends not using it with square-drive screws because they tend to get stuck and pull the bit out of the driver.) I tested the Depth Setter using both slotted- and Phillips-head screws and it worked flawlessly on both.

On the surface, the Depth Setter appears to be like many other bit-tip holders. This tool, however, has a knurled locking ring that threads against a knurled depth ring. The locking ring seats tightly and stays locked.

The depth-setting ring easily adjusts to allow you to set screws to any depth from flush to 1/4" below the surface. After you use the depth-setting capabilities, you'll realize there is a difference with this bit tip holder.

The Depth Setter actually stops advancing the screw once you've reached the desired depth and it does so without stripping the head of the screw, regardless of which driver you use. It essentially acts like a clutch that disengages the bit from the screw at the proper depth.

There's an O-ring at the tip of the tool that is set into the stop collar. The collar spins freely so you don't have to worry about marring or burnishing the face of your work.

The Depth Setter drives screws consistently, and the company also manufactures tools that drill pilot holes and countersinks using the same depth-stop technology. **PWM**

— CB

Smart-Bit Depth Setter

Starborn ▪ starbornindustries.com or 800-596-7747

Street price ▪ from $21

▪ VIDEO *Watch the Smart Bit Depth Setter in action.*

Price correct at time of publication.

Make the Most of Figured Maple

The right orientation adds shimmer and pop to your work.

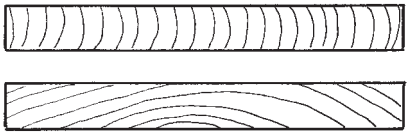
The barn loft was hot and dusty – and especially so after digging through piles of rough lumber for wide cherry boards at the bottom of the stack. We took a break outside for some fresh air and sat on a pile of firewood. I didn't notice it right away, but the surface on the freshly split wood was deeply corrugated like a washboard and, to my horror, the whole woodpile was curly maple – wicked-good curly maple. The farmer seemed as disgusted as I was, but for a different reason. He held up a chunk of it and said, "This junk is a beast to split, burns good, but hardly worth the trouble."

I'll be the first to admit that figured maple, which includes tiger, curly, quilted and fiddleback grain, is ornery. The wavy grain and hardness is a challenge to split, carve or smooth with cutting tools. On top of that, the figure can be elusive: wild in one section of a board then suddenly going dead with no apparent reason.

Yet, if you're willing to face off with it on its own terms, it offers some of the most spectacular beauty of any domestic hardwood. The figure can sometimes fool the eye and appear three-dimensional, swirling and shifting as you walk around it. With the addition of a dye or stain, the striped grain can pop with dramatic patterns. Curly maple is my wood of choice, and over the years I've gathered a few tricks to maximize its potential.

Shimmering drawers. *Figured-maple drawer fronts paint a dramatic visual picture – even outside of their carcase.*

Ripple. *The surfaces of figured maple panels have a glow and can appear three dimensional, as though the surface is a rugged landscape.*



Search for quartersawn. *Finding the best figure involves a bit of Voodoo, but the boldest patterns typically come from the boards with quartersawn grain.*

Prospecting for Wood

I buy figured maple when and if I can find it, often in rough-sawn boards. Even though the surface is dull and ragged from the saw, if the figure is good quality, the washboard striping shows faintly through the roughness.

Figured lumber can vary a great deal. One board can have dramatic grain patterns over the entire width and length, while another can be spotty – even from the same tree.

I keep my eye out for boards that are quartersawn or close to quartersawn. Even within a plain- or flat-sawn log, the slabs near the pith will come out with a more quartered grain orientation. This is where you'll likely find the most dramatic and consistent figure. A plain-sawn board can often have dramatic figure, but the board is more likely to have sections where the curl disappears. In a perfect world, all the boards used in your project should be from the same tree. Yet because figured maple can be so busy, it can often hide differences that might stick out on milder-grained wood.

CONTINUED ON PAGE 20

PHOTOS & ILLUSTRATIONS BY THE AUTHOR

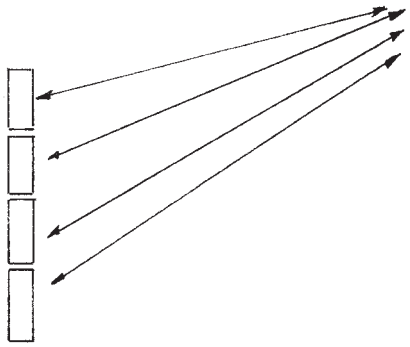
CONTINUED FROM PAGE 18

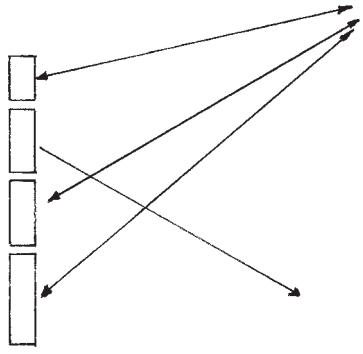
It's all About Luminescence

There are many ways to transform a rough board into a finished piece, with hand tools or machines. The goal is to achieve a smooth, polished surface where the wood glistens. Figured maple can have an almost magical quality because the undulating grain shimmers with life and movement. I can achieve a glass-smooth surface with a well-tuned handplane, but regardless of whether you achieve that final surface with a blade or with many successive grits of sandpaper, the result will be a landscape that reflects light back to your eye with contrasting bands of dark and light.

One thing that's so captivating about figured maple is that the reflections dance as you look at the board from different angles and they can vary in intensity. This should be a clue that can help get the most dramatic pop.

I orient drawer fronts to maximize this effect before sawing any joinery. Wet each smooth drawer face with mineral spirits and hold each front just as you'd normally view it. Flip it end for end and determine which orientation has more luminosity, more pop.





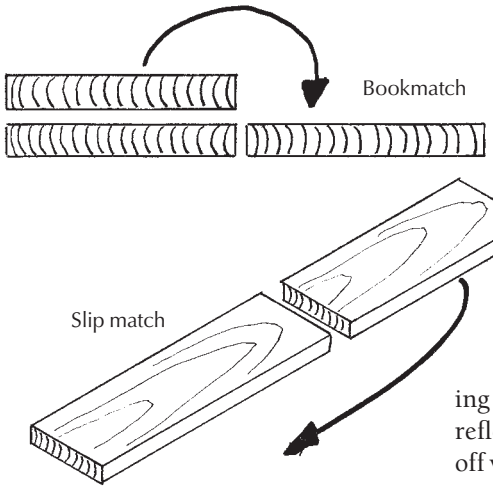
Even glow. *Flip each drawer front in a bank of drawers so they all glow with the same intensity.*

Note that on a tall case piece such as a chest on chest, drawer fronts normally below your eye level will be oriented one way and then flipped end for end to achieve the shimmer for drawers positioned above your eye.

Warning: this varying luminosity can also work against you. Bookmatched panels create a pleasing mirror image, but can have the effect of having one side shimmer and the opposite die. You might have noticed this with bookmatched panels of other fine-grained woods such as walnut, but it's especially prominent with the reflective nature of figured maple.

Really important: If you want to hide a glue line on a wide panel, use a slip match vs. a bookmatch. A slip match ensures that the difference in luminosity doesn't highlight the joint line. If oriented with luminosity in mind, the wild grain will often obscure the joint in a glued-up panel, making it disappear. A slip-matched panel also reduces the chance of tear-out because all the grain runs the same way. Even though figured maple is always tricky to handplane, you'll find it cuts more sweetly from one direction.

This knowledge about capturing that shimmer may also lead you in the opposite direction. Purposely altering grain orientation can delight with reflective patterns that blink on and off with the slightest eye movement.



Hide the glue. *Slip-matched boards will orient the luminosity in the same direction, hiding the glue line.*

Too Much Figure

One final tip to get the most pop from those beautifully figured raised panels in a cabinet door frame: Just as too much carving can actually detract from a composition, give the eyes a rest and choose mild, straight-grained stock to frame your panels. That mild grain also acts as a foil to emphasize the dramatic panel. Less equals more.

Regardless of how you may choose to exploit its secrets, you are joining an army of artisans that have appreciated the dramatic possibilities in curly maple for centuries. If you see some nice figured boards in that barn loft, be sure and buy them…before I do. **PWM**

George is the author of two design DVDs (Lie-Nielsen Toolworks) and co-author (with Jim Tolpin) of "By Hand & Eye" (Lost Art Press).

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About This Column

Design Matters

Design Matters dives into the basics of proportions, forms, contrast and composition to give you the skill to tackle furniture design challenges with confidence.

Small-shop Efficiencies

Simplification and organization are the keys to success.

I've worked in a small workshop for many years now. Many, if not most woodworkers, would classify my 7' x 13' space more as a closet than a workshop. In fact, I have seen some master-suite walk-ins that were indeed larger than my shop.

The challenges of woodworking in a small space are fairly obvious to most people. Many of the luxuries that are afforded by working in a large basement, garage or stand-alone workshop don't exist in a small shop. Nonetheless, one can work efficiently; the secret is to simplify and stay organized.

Bench first. *The workbench is the heart of the small shop. Place the bench in the best position first, then fill in around it.*

Start with the Workbench

The table saw is often considered the heart of the shop and is typically the first machine purchased and moved into place. The problem is, table saws have large footprints and require a lot of open space on at least three sides in order to function. In a small space, this leaves little room for anything else. If you only have a small space to work in, I suggest forgoing the table saw and finding other methods of doing things (a band saw for ripping for example). And for hand-tool-only work, well….

Instead, start with a good, solid workbench. Regardless of your preference in woodworking methods, no shop can function efficiently without a solid, flat workbench. In a small shop, the workbench is where just about every process takes place. It's the layout area, the joinery bench, the assembly table and the finishing room. Without a good workbench, the shop is little more than a storage shed.

I think a workbench should be as long as you can easily fit into your space. Mine is 8' long and there are times that I've wished it was longer. However, small spaces don't always permit a workbench of this size. For small- to moderate-scale furniture work, I think a 5'-long bench is about as short as I'd go. One that size allows you to build things as large as a chest of drawers, and still permits longer appliances to be secured to it for working longer stock, such as mouldings.

For bench depth, I recommend at least 18". Shallower than this and case sides begin to slip off the benchtop. I also don't recommend the bench be much deeper than 24". A 24"-deep bench is about the maximum that most people can reach across to get at things on the wall behind.

The workbench should go along the longest wall to allow the most space to either end. For right-handers, I think you need at least a foot to the right end of the bench (enough room to start a jointer plane). I also like at least 2' to the left end of the bench for planing off the end of a board, and for shavings to pile up. A trash can also fits well in that space.

A Home for Tools

In a small shop, floor space is typically the most limited resource, so minimizing the footprint of everything you can becomes extremely important. This means storing as much on the walls as possible. You'll probably have close to three to four times as much acreage on the walls as you will on the floor.

I like open wall storage for my most-used tools. Shelves and racks on the walls allow me to easily see what I'm looking for, and easily remove and return tools as I'm working. I arranged my wall storage so that deeper storage shelves are up higher on the wall where they interfere less with the benchtop real estate. Lower items are on shallower racks that protrude from the wall no more than a couple of inches.

I don't like tool cabinets with doors. They look really nice, and they certainly keep more dust off of the tools. However, I dislike how they stick out so far from the wall. This can be acceptable if the cabinet is positioned away

CONTINUED ON PAGE 24

PHOTOS BY THE AUTHOR

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CONTINUED FROM PAGE 22

from the bench so it won't interfere with the work. But to place it away from the workbench means taking wall space away from something else. I prefer my tools close at hand, so I skip the doors and keep the wall storage open, shallow and directly over my workbench.

For less-used tools, I like a traditional tool chest. While it does take up floor space, it can sit underneath the overhang of the workbench if needed, where it is basically out of the way. It can also serve double-duty as a sawbench and a decent place to sit down to take a coffee break.

Storage, Storage, Storage

Even in large shops, there never seems to be enough miscellaneous storage space. I love shallow cabinets and cupboards for storage of odds and ends that I don't want to see. A shallow cabinet hung high on the wall is great for storing small cans of finish, boxes of fasteners and other small items. Don't overlook the space in a corner behind a door either. These otherwise useless nooks are great for tucking away larger items that won't fit in a shallow wall cabinet.

Another great way to add storage to the walls in a small space is to hang some full-length French cleats, Shaker peg rails or both. In addition to being able to hang things from them just about anywhere, they make it easy to re-configure your layout. You can even hang a full-sized cabinet with a French cleat.

Luxury of Lumber Storage

In a small space, there isn't much room for lumber storage. I buy my lumber as needed so I can hand-select boards for a particular part. As a result, I rarely have more than a couple of boards on hand, unless I'm starting a new project. I cut boards that are too long for the shop into shorter lengths in the driveway, then bring the shorter boards into the shop for storage during the build. If you have a few extra feet of space, adding a small lumber rack up high on an unused wall provides some lumber storage. Otherwise, you may just need to store your lumber elsewhere. PWM

Shallow works best. *I keep wall storage shallow to preserve as much depth on the benchtop as possible. Cabinets with doors are too deep and interfere with the work on the bench.*

Tucked away. *A smaller-sized tool chest can fit under the overhang of the workbench in otherwise unused space.*

Don't overlook nooks. *A narrow, shallow cabinet such as this tall cupboard provides a lot of storage space in tight corners such as the space behind this door.*

Easy to rearrange. *French cleats provide an easy way to add re-configurable storage to the shop walls.*

Think up. *In a small space, lumber is best stored up high and out of the way. Don't sacrifice workbench length to add lumber storage.*

Bob has been building furniture for two decades and now works entirely by hand. Read his blog and listen to his podcast at logancabinetshoppe.com.

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BLOG: *Read Bob Rozaieski's blog.*

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About This Column

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Bob Rozaieski of Logan Cabinet Shoppe is taking the Arts & Mysteries reins for Adam Cherubini for the next several issues. "Arts & Mysteries" refers to the contract between an apprentice and master – the 18th-century master was contractually obligated to teach apprentices trade secrets of a given craft (and the apprentice was expected to preserve those "mysteries").

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Connecticut Lowboy

BY GLEN D. HUEY

While simple to build, the details present a worthy challenge.

While teaching a class at the Connecticut Valley School of Woodworking, I was asked to sneak down to the Connecticut Historical Society to take a look around. At the museum, I was shown into a back room full of off-exhibit furniture. Halfway down the first row of shelving, a mixed-wood lowboy caught my eye. "What a great piece," was all I could say. Mass photography began.

The drop pendants and drawer construction on this piece indicate it's early Queen Anne. As I studied the images, I discovered what may be the easiest-to-build lowboy that I've ever seen. But if you dig into the details, you'll find areas that test a seasoned furniture maker, such as applied cock beading and tapered drawer parts. Of course, these details can be omitted and the results would be still be top-shelf.

OPENING PHOTO BY AL PARRISH; STEP PHOTOS BY THE AUTHOR; ILLUSTRATIONS BY ROBERT W. LANG FROM THE AUTHOR'S MODEL

Skip the Knee Blocks

There are numerous video posts and articles that explain how to lay out, cut and shape cabriole legs (see "Online Extras" for additional information). What I haven't read, however, is how to shape legs such as these that don't use knee blocks. So here's the difference.

After you've rough-cut the legs, turned the foot and pad areas and shaped your legs (see the pattern on page 28), you have to shape the knee area to terminate properly. The first step is to use a pattern of the leg to lay in the arched line. The arc begins where the front corner of the post block and the knee intersect, then continues to where the back of the corner post intersects with the curvature of the leg.

With the arc drawn, remove as much waste as you can before turning to your chisels. I find it easy to make two or three cuts with a handsaw, working down to the post block's surface. I then put the saw flat on the post block and saw back to the previously cut lines. Most of the waste material is removed.

What's left to shape the knees is to remove and smooth the ridge created by the saw cuts. Most of this work is across the grain, so a sharp chisel is all that's needed. Pare the material while sculpting the rounded shape.

After the legs are complete, lay out the 1/4"-wide x 1 1/4"-deep mortises for the back, ends and front apron. For the back and ends, the mortises run the length of the post block, except for 1/2" of solid wood at the top and bottom, and for structural support, leave a 1" bridge at the center of the mortises. The front legs require a different layout. From the bottom edge, move up 1/2" as was the case on the back and ends, then mortise up another 2 3/8". The balance of the front leg post is filled with a drawer.

Bulk removal. *A few quick saw cuts and the majority of the waste material is trimmed from the cabriole leg.*

Sculpt to round. *Work away the remaining waste using a sharp chisel until the profile rolls gently back to the post.*

An Apron & Three Panels

The back of the lowboy is simply a panel with tenons on both ends. The ends are also tenoned, and they have cyma-curve cutouts at the bottom edge. The front apron has three cutout areas and is notched at both ends for the outside drawers. It also has tenons at the ends.

Mill the material for the panels and the apron to size. The best method of work is to cut tenons along the ends of all the parts prior to shaping the curves, and before notching for the drawers on the front apron.

I cut tenons at my table saw. My first cut is with the parts lying face down on the tabletop to define the shoulders. My second cut – the cheek – is made with the parts standing on end while clamped to a fence extension as they are passed over the blade. This results in tenons the entire width of the part. Now I need to locate, mark and saw the width of the tenons to fit my mortises.

An easy way to locate the cuts is to show the part to the leg mortises. As you mark, leave about 1/8" of space on each side of the mortises to allow for

Added strength. *The addition of the small uncut section at the center of the leg mortise – known as a bridge – increases the overall strength of the mortise-and-tenon joint.*

Spot-on layout. *The best layout technique is to work directly off your mortises, but leave a little room for seasonal adjustments.*

seasonal movement. Square down from those marks, then cut those lines with your saw. It's easy to remove the end waste by sawing at the tenon's base, but the waste area at the center has to be chopped out.

Patterns Make Work Easier

On a piece of good-quality 1/2" plywood, lay out the three designs from the plans. Cut and fair the curves to a flowing design that is square at the edge and bump free. These patterns are used a few more times throughout the project.

Use the side-panel pattern to lay out the design on the ends. For me, making profile cuts is a router operation. I first cut close to the line (1/8" away) using a band saw, then position my pattern and trim the final shape using a pattern bit as shown below. The same steps are followed for the curves on the front.

To form the outside drawer openings on the apron, lay out then saw free the waste at the ends of the apron. Because I can dial in the correct height for the vertical side of the drawer area at my table saw, I use it to make square and straight cuts. The bottom of the opening – because it is not as easily seen – is easier to cut by hand than it is to rig up something at your table saw.

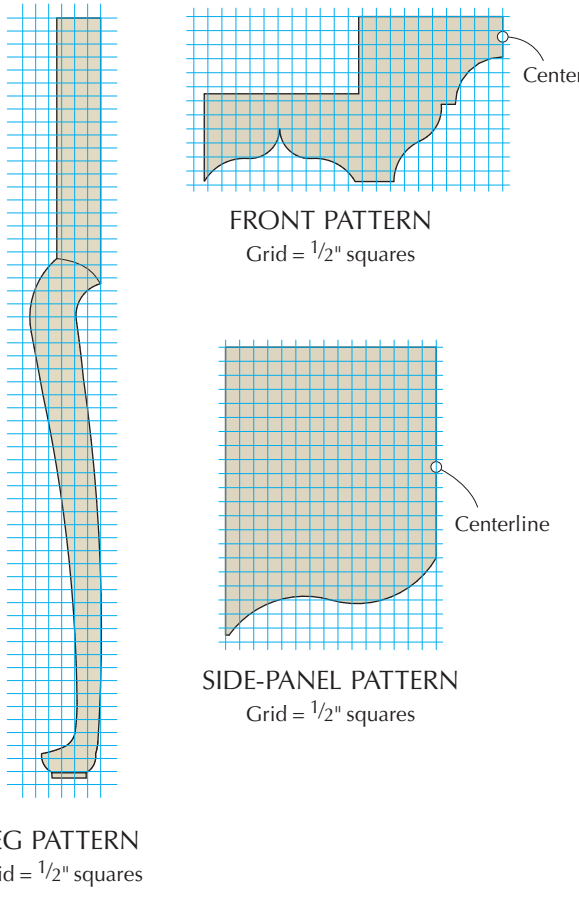
With the cutouts complete on the panels and apron, short dados for the drawer dividers, as well as mortises to catch the drawer runners, are cut into the inside face of the back. For the dados, move in 5 1/2" from the shoulders then lay out the 5/8"-wide x 4 3/8"-long x 1/4"-deep recess. Again, this is a router operation for which I use a simple platform to guide a pattern router bit with a top-mount bearing.

> "So few are the easy victories as the ultimate failures."
>
> —*Marcel Proust (1871-1922), French novelist, critic and essayist*

The mortises are centered in each drawer opening and are positioned to hold the runners – which are set flush with the top edge of the front apron – level from front to back. I chose to work with a 3/16" shoulder around my tenon to provide a clean look, so I have a 3/8"-wide x 1 1/2"-long mortise. If you want, make your mortise any size up to the exact size of the runner. I used a plunge-router setup to hog out the waste, but this work could just as easily be done with a mortise chisel.

A Simplistic Interior

One of the more interesting attributes of this lowboy is the shape of the drawer



Fast & accurate. *Pattern work made with a router setup is quick and easily repeated when needed.*

Choose your tool. *The depth of cut to create the drawer opening can be reached at the table saw, but this operation could just as easily be completed using a handsaw.*

Square-platform jig. *I find this setup to be one of the most repeated operation in my shop. Here I'm using a 5/8" pattern bit.*

Accurate layout. *On the back, each of the mortises are centered in the drawer openings and are set flush with the front apron. If these aren't correct, drawer problems are sure to arise.*

dividers. The pieces are 4 3/8" at one end (to fit into the dados cut in the back) and 7 1/8" at the front end. The bottom edge of the piece is cut at an angle. Did the maker of the lowboy get the two dividers out of a single wide board? Could it have been that he was saving time making the rear dado shorter in length? Regardless of the intent, the interior is quick to build.

Mill the dividers to size and thickness, then pare the bottom edge flat at the rear so it makes solid contact with the dado. At the front end, measure down from the top edge the same 4 3/8". Cut a notch equal to the thickness of the apron from that line down. The notch sits on the front apron and is flush with its face while the cutout portion is snug to the back. Dry-assemble the base to check the divider fit and make any needed adjustments. This is a good time to double-check the lengths of your runners. Measure from the inside of your mortises in the case back to a 1/2" beyond the back face of the apron.

Pull the front apron from the assembly to lay out and cut the dovetail sockets for the drawer runners. Each of the three sockets (one centrally located for each drawer opening to match the mortises cut in the case back) are a single dovetail socket that is set 1/2" in from the back face, 3/4" deep and is as wide as the runner. Lay out then saw the edges to define the socket.

Because the work is across the grain, it's easy to chop the waste using hand tools – it's also easy to remove more than is necessary, so I use a trim router to do the job with the apron face down on my bench. Using a freehand cut, the process is simple and quick, and you're left with a dead-flat bottom. Fine-tune the sockets with a chisel.

Mill your runners to size, then cut the tenons on the back end. On the runners, scribe baselines for the dovetails then show them to the sockets. Transfer the tail shape to the runners. Because it's a single large dovetail, cut away the half-pin waste then check the fit. You want a snug fit that's not too tight.

Cut and fit the drawer guides. Hold the bottom edge of the guides even or slightly below the bottom of the drawer opening. Also, cut and fit the two divider supports. These are notched to wrap around the dividers and fit flush with the top and bottom of the apron – make sure the supports hold the dividers flush with the drawer opening, too. The guides and supports are attached with glue and brads.

Three Steps to Assembly

Before any final assembly of the case, there are a few operations left to complete. I elected to attach the top using pocket screws, even though the original was pegged through its top. Placement of the pockets – three along the back, two spaced evenly on the end panels and one in each of the dividers – is important. Make sure you cut the pockets so they are accessible when you're ready to attach the top. (Don't align the pockets with the runners.)

I use a jig to drill the pockets at my drill press. The piece is held at a 22 1/2° angle as a 3/4"-diameter Forstner bit cuts the pocket. Stop the cut about 5/8"

Piggyback. *Drawer dividers ride on the front apron and sit in dados at the back. That's easy work.*

Exacting fit. *Router waste removal produces a dead-flat socket front for the runner dovetail. A tight fit keeps the joint clean.*

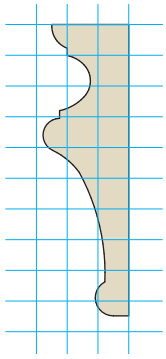
All aboard. *A look at the interior parts of the lowboy shows where the seven parts fit.*

from the bottom edge of your panel and use #8 x 1¼" screws to join the pieces. (Make a test cut in a scrap, complete the through-hole using a 3/16" drill bit and check the needed screw size before beginning the operation; depth of cut adjustments change the screw length required.) When ready, drill the nine pockets.

While you can drill the apron assembly for the drop finials later, this is a good time to do so because it may save you from splitting the apron during glue-up. Find and mark the centers of the bottom edge of the apron and supports. On that mark, drill a ¼" hole that's approximately 1¼" deep. Your holes need to be parallel in both directions for the finials to sit right.

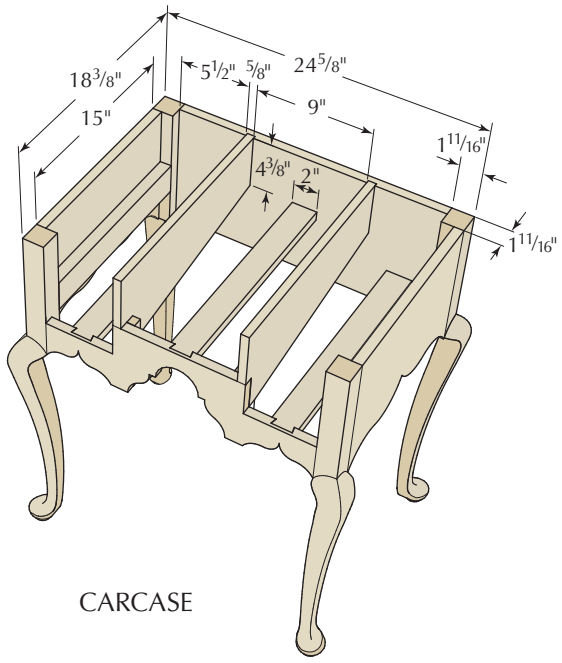
Add glue to the mortise and tenons for the end panels, slip the joints together, align the top edges of the panels and legs then secure a couple of clamps and let the glue dry.

Laid back. *The key to good pocket-screw holes using a press is to tilt the workpiece at 22½° as you drill.*



FINIAL PATTERN

Grid = ¼" squares



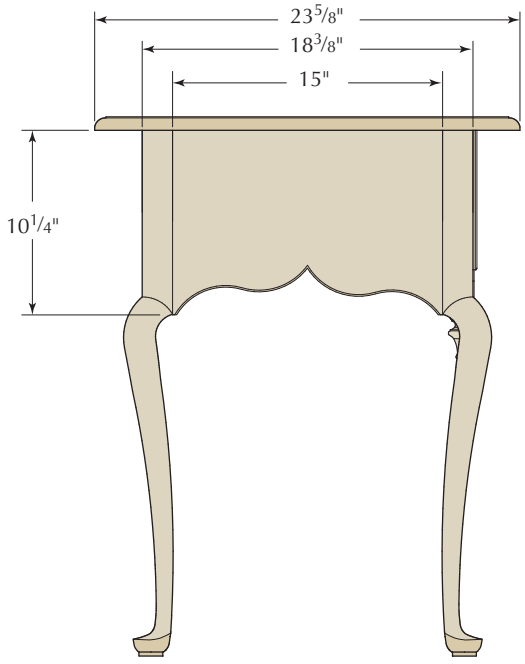
CARCASE

It's possible to exert too much force on the mortise and tenons as you assemble the base, so I use the finial holes and a spacer to support the apron – I don't want to crack or split it as I work. Insert two dowels into the holes, then bridge the gap with a scrap drilled to slip over the dowels as shown on page 31.

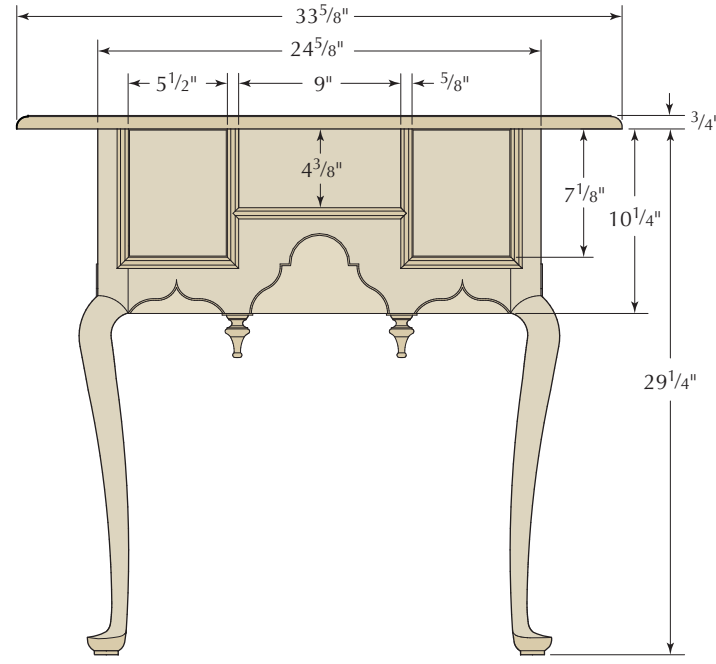
With the glue dry on the end panels, repeat the steps to assemble the apron and back panel. Align the top edges, add a few clamps as needed then set the base aside as the glue dries.

Decorative Details

To wrap up the base assembly, slip the drawer dividers into position. Each di-



SIDE



FRONT

Simple jig. *Holes for the drop finials have to be true; one easy technique is to use a drill press to drill a scrap to use as a guide for your power drill. Hold the scrap flat and tight to the apron as you work.*

Stress relief. *Use the finial holes to hold a temporary support in place as you clamp the lowboy front; this keeps the apron from cracking under stress.*

vider is toenailed at the rear and glued and pinned to the supports; I added a couple of screws through the apron for extra support – the screws are covered by the applied double-arch moulding.

The double-arch moulding surrounds the three drawer openings. There are numerous methods to make this moulding, including a beading plane with a plow plane to groove out the middle, or scratching the profile into the edge of your stock. But for me, this is an operation for the router table. One setup, two passes and it's done.

Install a 1/4" beading bit in your router table, set the profile flush with the tabletop then pass your stock over the bit. Flip the stock end for end and make a second pass. The router bit removes the center as you make the cuts. Rip the moulded strips from the motherboard until you have the necessary lengths.

Miters at the corners of the openings are easy. Where it gets tricky is where the moulding at the bottom edge of the center drawer intersects with the side moulding on the two outside drawer openings. With the ends of the center piece mitered to form a point, I position the piece then mark the two outer edges onto the side mouldings.

On the back face of those pieces, use a combination square to draw in the 45° lines – they intersect at the middle of the moulding. Then saw close to the lines before paring away the balance until you get a tight fit. When the parts are sized, trimmed and ready to install, apply a thin bead of glue, position the mouldings then tack them in place with 23-gauge pins or hammer in a couple of headless brads.

SUPPLIES

Londonderry Brasses
londonderry-brasses.com
or 610-593-6239

3 ■ William & Mary pulls
#wm-88, $38.50

Price correct at time of publication.

Top it Off

There is nothing fancy about the lowboy top. Mill, rip and crosscut the slab to size, then rout a profile along all four edges. I used a 1/2" roundover bit then knocked off the bottom edge using sandpaper.

The finials use basic turning techniques. It's best to turn the two from a single piece of stock (see the pattern on page 30); that makes it easier to create matching shapes. If you turn the tenon as an integral part of the finial (I prefer to insert a dowel after I have the shapes turned), make sure to get the diameter correct. The finials fit to the apron with a friction fit – no glue needed.

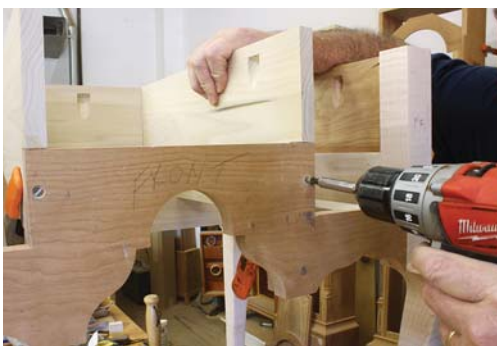
Before installing the finials, you need to make and shape the plates through which the finial tenons fit. The plates are milled to size and thickness then the edges are rounded over. I use a 1/4" roundover bit in my router table, or you could use hand tools to do the job.

Work on the case is now essentially complete, but to take the piece up a notch and to produce a lowboy closer to the original, cock beading can be added. If you plan to take a stab at this technique, see "Cock Beading Done Three Ways" on page 32.

Drawers of Tapered Sides

Making the drawers begins with careful wood selection for the drawer fronts. In most cases, and especially when drawer banks are divided into two or three separate fronts, I cut the pieces from a single piece of stock; it's always best to keep the grain flowing across the fronts.

Drawer construction is another telling sign of early Queen Anne period work. Drawer sides and backs are the



Hidden stability. *A couple of well-placed screws – that will be covered by double-arch mouldings – hold the dividers tight to the apron.*

Slick trick. *Use a scrap cut at a 45° angle to help guide the chisel as you pare the pointed cutout for the intersection of the double-arch moulding.*

COCK BEADING DONE THREE WAYS

When the cock beading was applied to the original lowboy, I suspect that the pieces were steamed then bent into position. If you had seen the number of tacks used to secure the original beading, I'm sure you would think the steamer wasn't working adequately at the time. There are many tacks in use.

While we have the steam-bending method today, we also have a couple other options with which to work. One such method is to soak the 3/32" thick pieces, then apply heat – not hair-dryer heat, but paint-stripping-gun heat – until the wood succumbs and bends to the desired shape. I use this approach to bend and install the cock beading on the end panels. It works fine, but patience is a must during the heating process; I sometimes start bending before the pieces are ready, so I break many as I work. A word of caution with this method: If you expect to need four pieces of beading, make eight.

Work using a heat gun begins with hide glue on the panel edges (as does the steam-bending method). As you "melt" the board and it begins to bend, drill small holes through the cock beading to secure things with 9/16"-long tacks. Don't worry about spacing; place the tacks where they're needed.

While I was set up for this process, I used a rounded form – a negative of the central arch in the apron – to bend the circular piece of cock beading to fit that opening. I held the piece to the form until I was ready to install it, which was after most of the other cock beading was complete.

Another process is available due to routers in the workshop – it uses the patterns made at the beginning of this project to cut the profile, not bend it. Begin with a pattern on top of a piece of stock that is appropriately sized for thickness; orient the board's grain to align with the pattern length. Add a couple of clamps to keep things secure, then mark the pattern design onto your material.

To set up your router, install in a 1/4" spiral-upcut bit, add a 7/16" outside-diameter guide bushing and you're ready to work. The combination of the two router accessories produces a perfectly matched pattern cut that is 3/32" away from the pattern itself. Run the cut while keeping the bushing against the pattern; you can make a couple of passes, but the last should be held tight to the pattern.

Remove the clamps then take the extra stock to a band saw and trim as close to the pencil line as you can without hitting the line. After the thin, shaped piece is cut free, move to a spindle sander to fair the surface to your layout line. While your cock beading may not fit like a glove, it will be so close that the beading snuggles tight when glued and tacked. (Because the tacks are not holding a bend in place, you can arrange the tacks in a more uniform and clean pattern.)

I used this method to make the two front cyma curves that flank the center opening, and the two half-cymas that fit around the arched opening. This method may be unconventional, but it works. Sure, there are places where the grain of the router-cut cock beading is not as strong. But after the pieces are glued and tacked in place (drill pilot holes, by the way), I see little chance of any problems. In fact, I have a 35-year-old lowboy with similarly made cock beading that is still 100 percent intact.

— GDH

Old school. *One technique used to form-bend the cock beading is to apply high heat to a soaked piece of moulding. The act of steaming the piece allows it to bend into shape.*

Works great. *I found heat bending was excellent for the larger radius bends, and for the round center section. Do use a form.*

Synergistic. *The correct combination of router bit and bushing produces a perfectly thicknessed piece for cock beading.*

Test your skills. *Cut close to the line, but don't touch it; excess material can be sanded away, but nicks mean you have to make another piece.*

Look ma, no bends. *It's possible to produce shaped cock beading that perfectly fits the cutout. The secret is pattern work.*

same width, and a bottom is applied to complete the drawer box. As a result, the sides and back are a 1/4" less in width than the drawer fronts, which are rabbeted to accept the drawer bottoms.

Cut and fit the drawer fronts to the openings. Make sure they can easily slide into the openings – I look for about 1/16" gap per edge. When the fronts are properly sized, cut the rabbet along the bottom edge then determine the sizes of other drawer parts from the fronts.

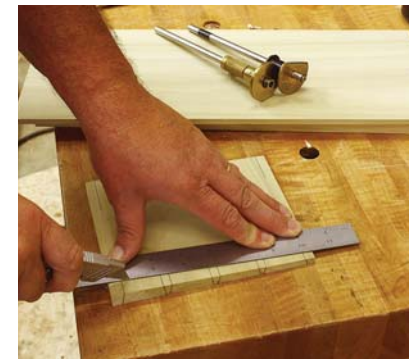
The drawers in the antique lowboy featured tapered sides and backs. Building with tapered parts ups your game as a woodworker, but the drawers would work just as well if they were built without tapers.

Mill the drawer sides and backs to thickness, width and length then if you want to match the original, slice the tapers at a band saw. Because there are two different widths of drawer parts, there are two setups at your band saw.

Tip the band saw table so the blade leaves a bit more than 1/4" at the top and exits the workpiece about 3/8" up from the bottom – after you plane the surface you'll still have a full 1/2" of thickness at the bottom edge, yet the piece tapers evenly along its width.

Mark off your pins and tails before or after scribing a line. Make sure you're layout work is from the outside, or non-tapered face. Complete the dovetail joints, then mill and attach the 1/4"-thick drawer bottoms using glue at the front rabbet and 18-gauge brads to secure the entire bottom.

Tapered parts. *The band saw is the best way to taper drawer parts. Make sure you leave material to plane the surfaces smooth and still hit the appropriate thicknesses.*



Forget a marking gauge. *An easy technique to lay out the top and bottom thicknesses is to strike a line with a sharp knife registered against a straightedge.*

Finish & Hardware

Because there are two different primary woods used on this project (tiger maple and cherry), some finishes are not an option – a clear finish would exacerbate the differences (of course, you may choose to highlight those differences if you like). To better blend the two woods, I applied one coat of aniline dye (Moser's Early American Cherry), then a few coats of shellac. To dull the final coat of shellac, I applied a layer of dull-rubbed effect lacquer.

The three pulls are of an early design, too. The bails of the pulls are attached to the fronts using cotter pins, which are bent and set on the inside face of the drawer fronts. Of course, other hardware options could be used.

With the finish complete and the hardware installed, I attached the top through the nine screw pockets. With the lowboy on the bench with its bottom up, the seven pieces that make up the inside were easy to see.

With a bit of decoration on the outside, you have a great lowboy to display in the house. That's way better than standing on a rack in museum's back room. **PWM**

Glen is quite sure his interior is more complex than that of this lowboy. He can be reached at glen.huey@fwmedia.com if you have comments.

Connecticut Lowboy

NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL	COMMENTS
❑ 4	Legs	2 7/8	2 7/8	29 1/4	Tiger maple	
❑ 1	Back	3/4	10 1/4	23 1/4	Cherry	1" TBE*
❑ 2	Ends	3/4	10 1/4	17	Cherry	1" TBE
❑ 1	Front apron	3/4	5 7/8	23 1/4	Cherry	1" TBE
❑ 1	Top	3/4	23 5/8	33 5/8	Cherry	
❑ 2	Dividers	3/4	7 1/8	17 7/8	Poplar	
❑ 2	Divider supports	3/4	1 1/4	5 7/8	Poplar	
❑ 3	Drawer runners	3/4	2	17 5/8	Poplar	3/8" TOE**
❑ 2	Drawer guides	15/16	2 1/2	15	Poplar	
❑ 2	Finials	1 7/16	1 7/16	3 5/8	Cherry	
❑ 2	Finial plates	1/4	1 9/16	1 9/16	Cherry	
❑ 1	Double-arch moulding	1/4	5/8	60	Cherry	Includes extra
❑ 2	Large drawer fronts	3/4	7 1/8	5 1/2	Cherry	
❑ 1	Small drawer front	3/4	4 3/8	9	Cherry	
❑ 1	Cock beading	3/32	13/16	84	Cherry	Includes extra

*TBE=Tenon both ends; **TOE=Tenon one end

ONLINE EXTRAS

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■ **popularwoodworking.com/feb14**

VIDEO: *Watch the author lay out and cut a cabriole leg using a table saw and band saw.*

BLOG: *Read how tapered drawers are also found in the work of a Shaker craftsman.*

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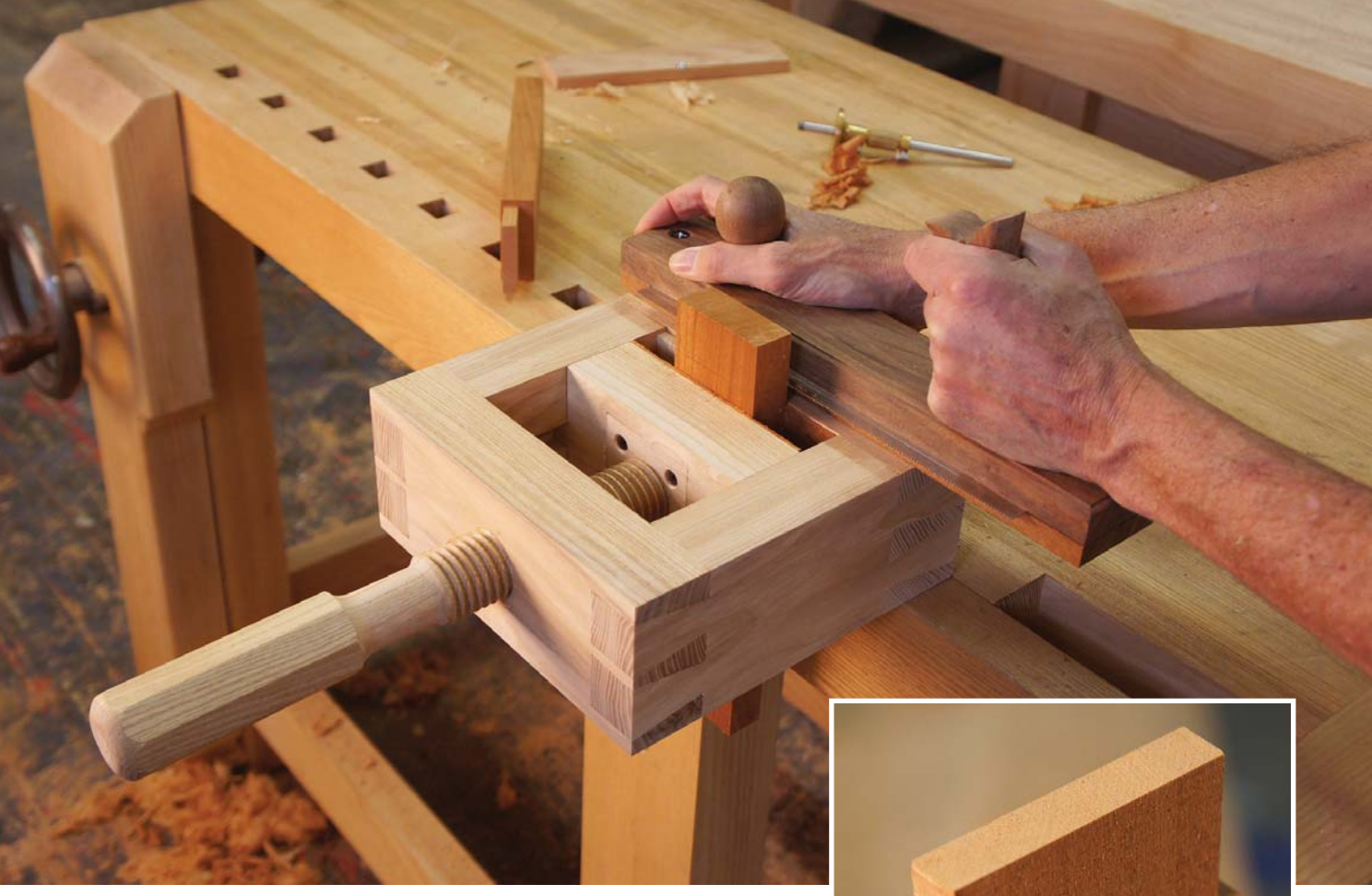
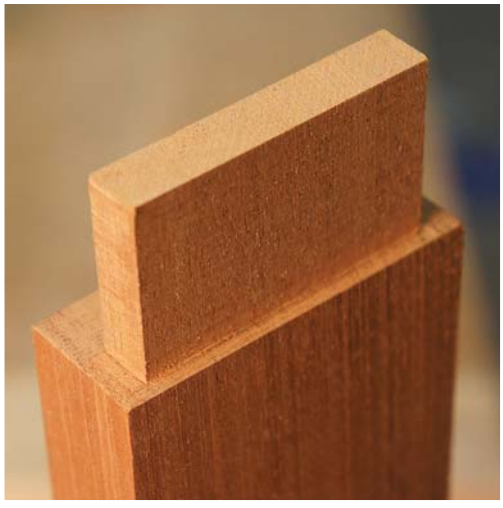




Simple solution. *An easy-to-make tenoning frame and saw (top) make short work of perfect shoulders on any workpiece (inset).*

Perfect Shoulders

BY JEFF MILLER

An 18th-century chairmaker's saw makes 21st-century work easier.

The graveyard of obscure and forgotten tools is large, densely packed and many layers deep. Many of these tools richly deserve their pauper's burial. But once in a while you come across a tool that does things that are quite remarkable, and you wonder why it ever disappeared in the first place.

I didn't go rooting around for an old tool to dig up and bring back to life. I was simply trying to find a better way to cut tenon shoulders for some of my more complicated chairs. Cutting accurate, well-aligned shoulders, even on a straight tenon, is fairly difficult; cutting them on these chairs, where I had curved parts and angled shoulders, is especially so.

I devised a solution, then discovered that earlier chairmakers – of course – had long ago faced the same problem and had come up with a rather elegant solution. But elegant or not, it went the way of so many hand-tool techniques.

The technique relies on a couple of tools that appear to have been in use mainly in France. The armchair maker's saw (*Scie Spéciale pour le Fauteuil*) was used with a vise-like tenoning frame (or jack), and another layout tool, called a *bilboquet*, which I chose not to resurrect (in its stead, you will need to make a simple spacer block for

PHOTOS BY THE AUTHOR; ILLUSTRATIONS BY ROBERT W. LANG FROM THE AUTHOR'S MODELS

setting up the work). With these easily made tools, it's possible to cut straight (or angled), perfectly-aligned shoulders on even curved workpieces.

It's worth noting that my adaptations are not attempts at a perfect reproduction. They were my attempt to make useful tools for my specific needs. But I have been surprised by how generally useful these tools are.

The Armchair Maker's Saw

Take a saw blade, mount it horizontally in a block of wood and add handles on top – that's the essence of the armchair maker's saw. But refinements make the tool, so I experimented a bit with saws and configurations to get it to work just right. A fine-tooth crosscut saw works the best, but you also want a blade thick enough to resist deflection when you're cutting (ruling out some of the Japanese saw blades I tried at first). I wound up using a small crosscut saw blade from Lie-Nielsen Toolworks.

I drilled a couple of holes in the saw, then cleaned up the holes. A machinist, or Lie-Nielsen Toolworks, can punch these holes as well.

I decided to sandwich the saw between an upper block that has handles mounted to it, and a lower block, made out of a much harder wood for wear resistance.

For the upper block and handles, I used walnut; for the lower block, I chose ipe. Aligning the saw blade between the upper and lower blocks, I marked out the location of the holes in the saw blade, allowing for the saw to stick out from the side of the blocks about 5/8". I then added marks for two more holes just beyond the ends of the blade. I clamped the two blocks together and drilled through them both at each marked location with a 3/16" drill bit, then used a 1/4"-20 machinist's tap to cut threads in the lower block.

The easiest way to do this is to chuck the tap in an electric drill then slowly and gently run the tap down into the hole. The pilot hole should keep you straight (you may want to practice this a couple of times). Then reverse the drill and let the tap unthread itself out of the hole. Now enlarge the holes in the upper block to 1/4" and countersink for 1/4"-20 flathead machine screws.

I turned the knob, cut out the tote on the band saw, rasped it to a comfortable shape then scraped and sanded it smooth. I decided to fit the handles into shallow mortises traced on the top of the upper block, then screw and glue them in place from the underside. Finally, I ran a (purely decorative) small ovolo around the edges.

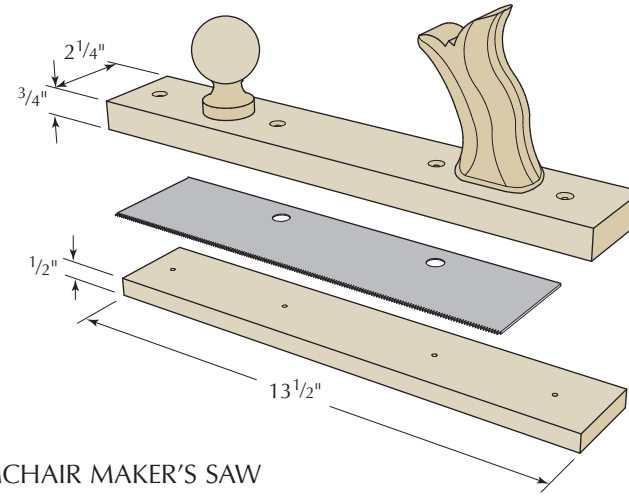
The Tenoning Frame

The tenoning frame holds the workpiece and allows you to saw around all four shoulders. The top surface needs to be as flat as possible, so the armchair maker's saw registers in the same plane on all sides of the workpiece. Beyond that, it's mostly a question of how involved you want to get. (In other words, feel free to simplify.)

Make the back piece of the dovetailed frame out of 2 1/4"- thick stock and the balance from 1 3/4"-thick stock. Rabbet the ends of the two side pieces 1/2" deep x the length of the tails (1 3/4" for the front, 2 1/4" for the back). These rabbets make the dovetails easier to mark out, mean a little less waste to remove when cutting the joints and allow you to cut the 1/2"-deep groove for the vise jaw without cutting into the tails.

I cut the dovetails on the table saw (pins) and the band saw (tails), but for dovetails of this size, an adaptation of the Jameel Abraham's "Condor Tails" approach from the August 2011 *Popular*

> "The contemporary craftsman... celebrates material and skill and considers them sources of meaning within the work."
>
> —*Peter Korn, from "Why We Make Things and Why it Matters"*



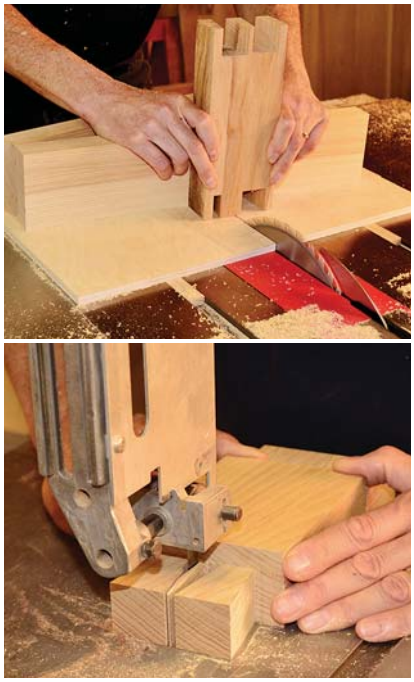
ARMCHAIR MAKER'S SAW

Parts. *The saw consists of a blade, two blocks of wood, two handles and machine screws.*

Ready to cut. *The finished saw looks rather like a handplane.*

Woodworking Magazine (issue #191) would also work well.

Fitting the dovetails and test-assembling the frame proved to be quite a challenge until I figured out that I could disassemble the frame by expanding a wooden handscrew to pull things apart. (It's perfectly acceptable to cut large finger joints then peg the corners, but not nearly as much "fun.")



Machine-assist. *For dovetails of this size, I cut my pins on the table saw and tails on the band saw, then clean up to the baseline with chisels.*

Cut the frame's vise jaw to size and carefully fit it in place. You're looking for a close fit; you want the jaw to move easily (with a little wax applied), but with very little up-and-down slop.

Note: If you happen to have a wagon vise on your workbench, you may be able to use that as your tenoning frame. Just check to be sure that your workpiece is held perfectly square to the workbench top (and that the benchtop is flat) when clamped in the vise.

Wooden Vise Screw & Garter

I opted to make the vise handle integral with the threaded portion, so I started with a 14" long x 1 5/8"-square blank.

Mark out the centers on the ends of the blank, then lay out an octagon and saw or plane the four corners down to your layout lines. Mount the octagon on your lathe, and turn down the first 7 3/4" to an accurate 1 1/2" diameter for the threads. The next 2", between the threaded portion and the octagonal handle, should be 1 1/4" in diameter. You should also turn the very end of the octagonal handle to round, leaving a 1/2" boss to be removed later. The octagonal handle winds up being about 4 1/4" long.

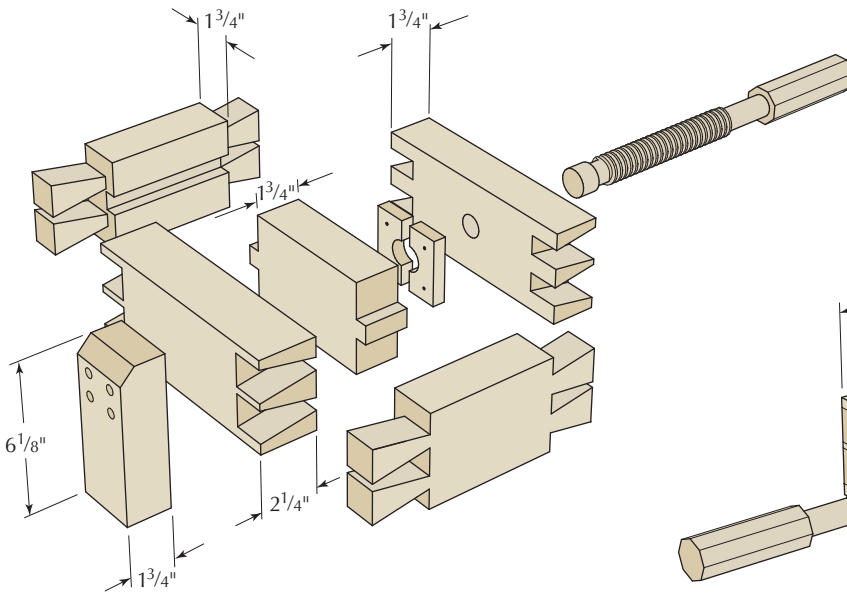
I used a Beall 1 1/2" threader to cut the threads. This required a few practice runs on some extra blanks that I turned, but the results were excellent. Once you've cut the threads, return the handle to the lathe to turn down a 1/2" wide groove for the garter, 5/8" from the end. Use a piece of 1/2" Baltic birch plywood to size this groove for a fairly precise sliding fit. The finished diameter of this groove should be 1".

Make the garter by cutting two pieces of 1/2" Baltic birch plywood to 2 5/8" x 1 5/16". Clamp the two together side-by-side, mark out the midpoint on the seam, then drill a 1" hole through the clamped garter blanks.

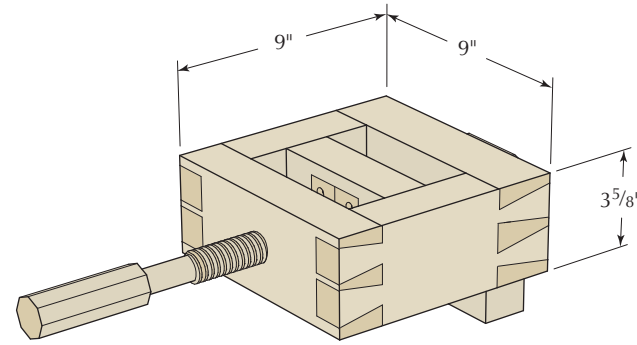
You'll need to cut a stepped recess in the tenoning frame jaw for the end of the vise screw and the garter. Drill a 1 5/8"-diameter hole, 1 5/16" deep that is centered on the front face of the jaw. Around that, mark out a recess 2 5/8" square, then rout 1/2" deep and chisel the corners square so that the garter just fits. You should now be able to capture the end of the vise screw between the two halves of the garter, then slip this assembly into the jaw. Adjust the fit if necessary to allow the handle and screw to rotate without much effort or backlash, then drill four pilot holes for the #6 x 1" screws that attach the garter (and captured threaded handle) to the vise jaw.

Drill a 1 3/8"-diameter through-hole centered in the 1 3/4"-thick end of the frame, then cut the threads with a tap.

Before you assemble the frame, you should glue a piece of suede leather to the face of the jaw and to the business face of the frame. This greatly improves the grip of the setup.



TENONING FRAME – EXPLODED VIEW



TENONING FRAME

Handle it. *After turning and threading the vise screw handle, fit the garter.*

Fit to be screwed. *Cut the recess for the garter in the vise jaw, then drill for and countersink for screws that will allow the entire assembly to move smoothly together.*

Glue up the frame with the sliding jaw in place. When the glue is dry, you can plane the outside surfaces flush and work on any cosmetic issues. Then, thread the screw through the frame end, slide the garter halves together in the notch and screw the garter in place. You may want to wax the surfaces that rub.

Tighten the vise jaw all the way closed, then plane the top surfaces of the frame and the jaw flat and even all the way around (or you can sand the whole frame upside down on a piece of sandpaper stuck to a flat surface). Take your time with this; it's important that the saw has an even, flat plane off which to reference.

On the French version, a stub was usually added to the frame to make it easier to secure in a vise. This was usually just a board that stuck straight out the back. My workbench has a wagon vise, and it seemed simpler and sturdier to have the stub project down from the back of the frame; the frame sits on the benchtop, and the stub is secured in the vise. You should adapt the stub to suit your specific bench.

I also decided to add a removable stop that helps align boards for cutting square tenons. This is just a 1/4"-thick strip of wood roughly 1 1/2" wide that I screwed at the back corner of the frame against one of the sides. Check to ensure that the strip sits perfectly square with the surface and adjust it if necessary. This strip shifts your workpiece squarely into the center of the frame so the vise block pressure bears fully against the surface.

A Setup Guide

The saw and the frame were usually used with a *bilboquet*, a tool for laying out the tenon cheeks and locating the shoulders once the work was clamped in the frame. I did not make one of these; I prefer to lay out my tenons earlier and cut to the lines. But it is important to at least make up a spacer block that you can put on the tenoning frame to give you the exact location of the shoulders. You align your shoulder marks with this spacer block. It should be sized to exactly the distance from the top of the tenoning frame to the bottom of the kerf made by the saw.

To make it a little easier to align perfectly with a gauged shoulder line, you can also screw a scribing disk like those used in cutting gauges so that the edge of the disk is perfectly flush with the top of the spacer block. You'll get just enough tactile feedback when you hit the mark perfectly.

Perfect alignment. *A disc (perhaps the round blade from a cutting gauge) screwed to a spacer block can help you to align your workpiece in the vise for dead-on sawing accuracy.*

How to Use the Tools

Clamp the tenoning frame to your workbench and place your workpiece in the frame. Use your setup guide to align the shoulder marks at the proper height above the frame surface and clamp securely in the frame. Now saw around the four shoulders. Make sure to keep the base of the saw flat, and saw gently and evenly. It takes a little practice to get the feel of the saw. And don't rely on the projection of the saw blade out the side of the saw as a depth stop; just cut by eye to the proper depth.

Peerless Results

The armchair maker's saw and tenoning frame are fascinating tools to have around; they always provoke stares and comments when I take them out in public. And it's not just the novelty of tools, or that they function so differently than what we're used to seeing. It's also that these tools provide what is a remarkably sensible solution to a fairly challenging task.

I find that the armchair maker's saw and tenoning frame are one of the easiest ways to cut tenon shoulders I've come across. And for cutting angled shoulders, or shoulders on oddly shaped pieces, this method is without peer. **PWM**

Jeff is a Chicago-based furniture maker and author of many articles and several books on woodworking.

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For links to all online extras, go to:
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BLOG: *Get a free chapter from the author's "Foundations of Better Woodworking."*

BLOG: *Read Jeff Miller's blog posts about a simpler version of a tenoning frame (hint: no dovetails) and using the frame to hold angled and curved pieces.*

ARTICLE: *Read Christopher Schwarz's profile of Jeff Miller and his work.*

IN OUR STORE: *"Foundations of Better Woodworking," by Jeff Miller.*

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Roy Underhill's Nail Cabinet

On the set. *Roy Underhill's nail cabinet is a converted crate. The cabinet has seen a lot of use and has held up pretty well.*

BY CHRISTOPHER SCHWARZ

It's a crate. It's a cabinet. It's useful shop furniture.

One of the enduring features of Roy Underhill's "The Woodwright's Shop" PBS television show is the familiar and rambling backdrop of former projects, parts, tools and wood that frames most episodes. My favorite item in his shop is his nail cabinet – a pine wall-hung cabinet tucked in the far back corner.

On the inside of the door of the cabinet, Roy has hung a print of a lovely lady holding a bock beer alongside an admiring goat. And while that's some nice lens candy for the television cameras, I'm more attracted to the 21 drawers on the right side of the cabinet. These drawers are more useful to the married woodworker.

Nail cabinets show up frequently in traditional workshops of many trades, and they are illustrated and discussed in books about traditional shops. These cabinets stored the screws, nails and bolts that a workshop might need. And

because these fasteners were valuable, many of the cabinets would have a lock.

The last time I visited Roy, I asked permission to measure and reproduce his nail cabinet, which he purchased during a yard sale in Washington, D.C. As I measured the piece, I was bemused by its unusual construction – it was a finger-jointed carcase covered in nailed-on battens.

Then Roy showed me the reason for the odd construction: The cabinet was built from an old crate for Ohio Blue Tip Matches made by the Ohio Match Co. of Wadsworth, Ohio (1895-1987). For me, this made the project even more fun: I had to first build a crate and then turn it into a wall cabinet.

As a result, some of the construction techniques might seem a bit odd. If you don't like them, feel free to change them. My goal was to make a respectable reproduction of this charming cabinet because I've always liked the one on Roy's show.

Construction Overview

The original is made entirely of pine – probably Eastern white pine – though any dry softwood will do. The carcase of the original crate is joined at the corners with finger joints (though I opted for dovetails on my version). The back of the carcase is nailed-on 3/8"-thick boards that are shiplapped.

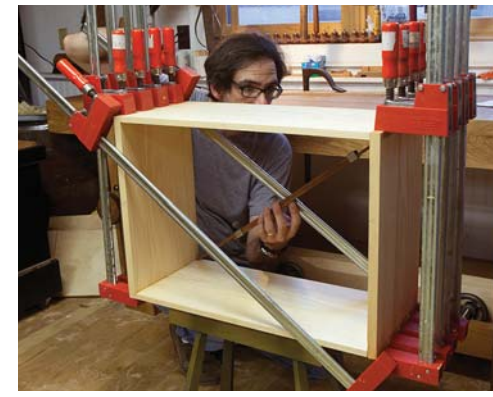
The assembled carcase is covered with narrow 1x battens to make the "crate" easy to grab and lift. These battens conceal the joinery on the corners of the carcase.

Once you have your "crate" built, you can turn it into a cabinet. The interior is divided into 21 spaces using thin pieces of pine that are joined with an egg-crate joint. The drawers are simply glued and nailed together; the only thing difficult about the drawers is that you have to build 21 of them.

Finally, the entire cabinet is fronted by a door with mitered corners. The panel of the original door was simply nailed to the inside of the mitered door frame. The panel had cracked over time, so I chose to make my panel float in grooves plowed into the rails and stiles.

The whole thing is finished with shellac and hung on the wall with a French cleat.

Gang-cut tails. *Whenever possible, I gang-cut my tail boards, which saves time and (in my opinion) makes it easier to keep the saw 90° to the face of the board. A shallow rabbet on each tail board makes it easy to keep things square during transfer.*



As square as possible. *Take extra pains to get the carcase square at glue-up. It will save you frustration later when you fit the door and the 21 drawers.*

The Walls of the Crate

As mentioned above, the walls of the original crate were joined at the corners by narrow finger joints (you can see the joints from the inside where they have separated a bit). I don't have the jigs or desire to make narrow finger joints here, and cutting this machine joint by hand is just silly.

So I joined the case sides, top and bottom using through-dovetails. The joinery is all covered by battens in the end, so the end result looks the same as the original. For strength, I put the tails on the case sides; the pins are on the top and bottom bits.

Glue up the carcase, paying close attention to keeping the corners square at both the front and rear of the case. I use hide glue for joints like this because it's reversible.

If you can't get the case perfectly square at glue-up, you have one more chance to pull it square with the backboards. The backboards are 3/8"-thick boards of pine that are shiplapped on their long edges and nailed to the back of the case.

I used 3*d* cut fine finish standard nails to affix the back, though 4*d* will do.

If your case is out of square, pull the case square with a clamp diagonally across two corners, then nail the backboards in place. This usually helps if the case isn't too racked.

The Interior Dividers

The interior drawer dividers of the original nail cabinet were obviously built up using miscellaneous scraps that were nailed and glued on to get the

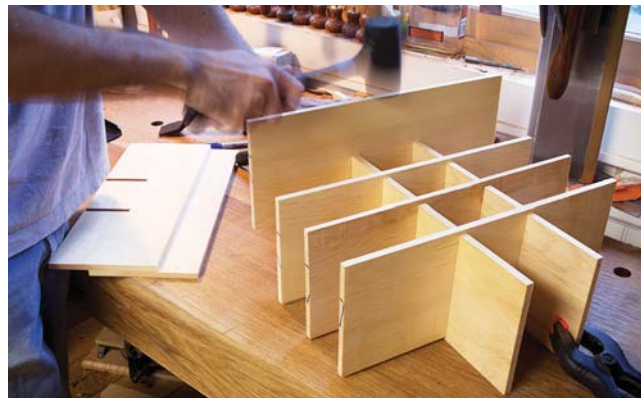
Hide the gap. *The shiplapped joints on the long edges of the backboards hide any gap that would open up when the boards shrink in the dry season.*

Nails, no glue. *Nails will bend, allowing the back to expand and contract without splitting the backboards. Be sure to use nails with a pronounced head to hold the backboards in place.*

PHOTOS BY THE AUTHOR; ILLUSTRATIONS BY ROBERT W. LANG FROM THE AUTHOR'S MODEL

More gang-cutting. *Lay out the slots on one board, clamp all the dividers together and make the cut in one go. Here on the table saw, I'm using the saw's miter gauge and a high fence to push the dividers through the blade.*

Friction & pins. *You should have to knock the joints together with a mallet. Then pin all the intersections with 1"-long headless brads. You'll have to nail them in diagonally to secure them.*

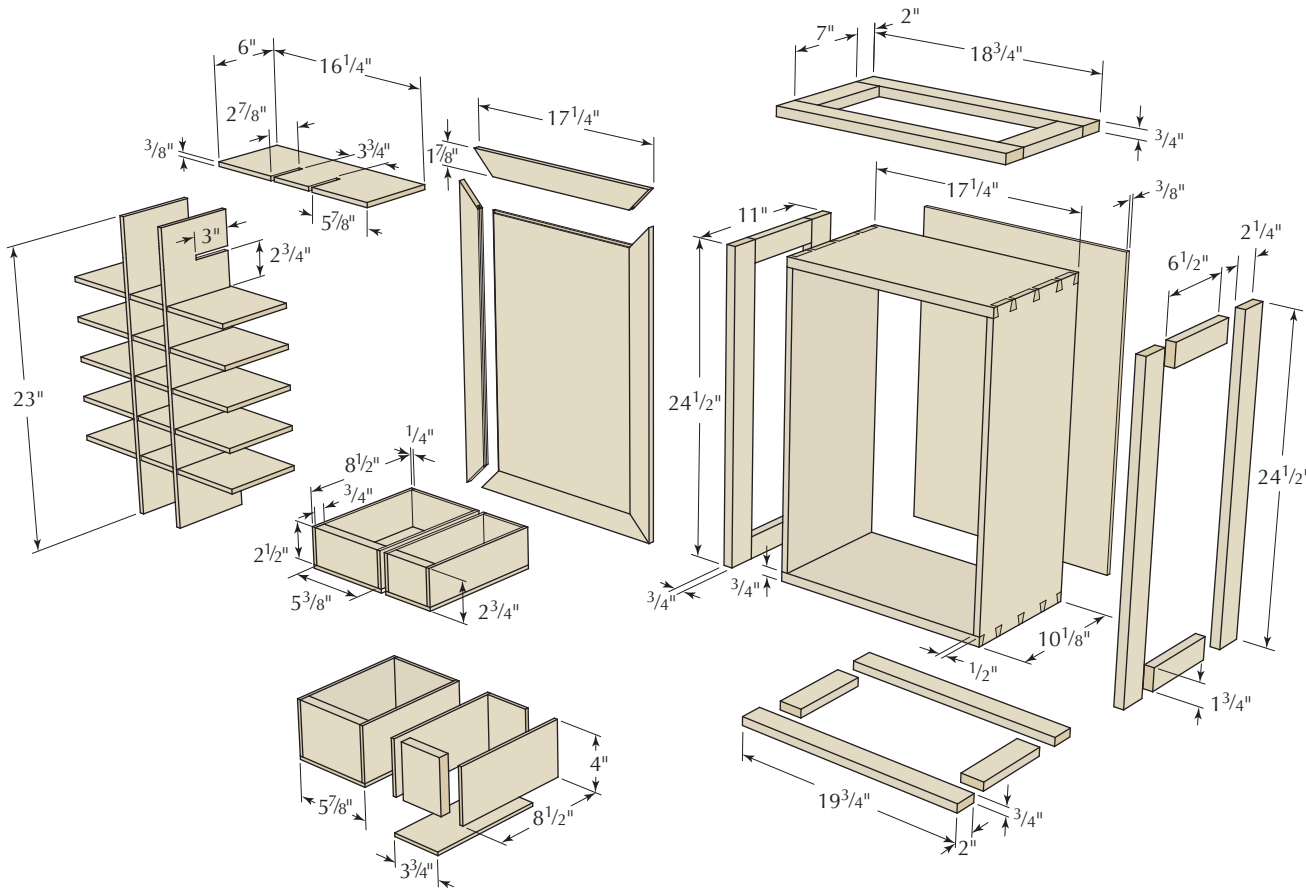


> "Apart from panel and veneer pins the furniture maker has little use for nails except for softwood work etc."
>
> *— Ernest Joyce, "Encyclopedia of Furniture Making"*

job done. Some parts were rough-sawn; some were different species.

Instead of replicating every odd scrap in the cabinet, I simplified the construction while still maintaining its look and function. On the original, the horizontal and vertical dividers are joined with egg-crate joints, and so I used that same joint for my dividers.

The dividers are all 3/8" thick and 6" wide. Every divider has 3/8"-wide slots cut into it. The slots on the horizontal dividers are 2 7/8" long. The slots on the vertical dividers are 3" long. When the dividers are knocked together, they will be offset by 1/8" at the front, just like the original.



EXPLODED VIEW

Nailing jig. *This scrap-wood jig helps you locate exactly where the horizontal dividers are located. It is made using two thin pieces of scrap that are nailed to a scrap of 1/2"-thick pine. Slip the jig onto the carcase and press one of the thin slips against the dividers inside the case. Trace its location on the exterior. Repeat.*

Affix the dividers. *With the lines drawn on the carcase sides, drive in the cut headless brads and set them 1/16" below the surface.*

Lay out the locations of all the slots using the drawings as a guide. I used dividers to step off the drawer sizes, and I used an actual piece of the drawer divider to lay out the width of the slots. Note that the three bottom drawers are taller than the others.

I cut the slots on a table saw, though they are easy to cut by hand or on a band saw. After cutting the slots, knock the dividers together and pin the joints by toenailing them with headless brads.

With the dividers together, knock the assembly into the carcase. The front edge of the horizontal dividers should be located 1½" from the front edge of the carcase. That spacing allows room for the bin pulls and knobs on the drawers.

The next step is to nail the horizontal dividers to the carcase. This is done easily with a simple jig that makes it (almost) impossible to miss with your nails. (See the photo above for details on the jig.)

Use 4*d* headless brads to secure the horizontal dividers to the carcase. There's no need to nail the vertical dividers to the carcase; gravity and friction are sufficient.

Making it a Crate

The fun part of this project is taking this nice carcase and turning it into a packing crate. You do this by nailing on 1x battens so they look a bit like rails and stiles. There is no other joinery between the battens – just glue and nails.

Cut the battens to the sizes shown in the cutlist. The easy way to install these is to first attach them to the carcase sides, trim the pieces flush to the top and bottom of the case then finish up the work on the top and bottom.

The important thing to remember is that the battens should extend out 1/2" (or a tad more) from the front lip

Piece by piece. *The battens form the rails and stiles that frame the exterior walls of the crate. As on the original, they are simply nailed and glued to the carcase – there's no joinery between the rails and stiles. So this is fast work.*

Nail Cabinet

NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL
❑ 2	Sides	1/2	10 1/8	24 1/2	Pine
❑ 2	Top/bottom	3/4	10 1/8	17 1/4	Pine
❑ 1	Back	3/8	17 1/4	24 1/2	Pine
❑ 2	Door rails	1/2	1 7/8	17 1/4	Pine
❑ 2	Door stiles	1/2	1 7/8	24 1/2	Pine
❑ 1	Door panel	3/8	13 3/4	21 1/8	Pine
TOP FRAME					
❑ 2	Stiles	3/4	2	18 3/4	Pine
❑ 2	Rails	3/4	2	7	Pine
SIDE FRAMES					
❑ 4	Stiles	3/4	2 1/4	24 1/2	Pine
❑ 4	Rails	3/4	1 3/4	6 1/2	Pine
BOTTOM FRAME					
❑ 1	Front stile	3/4	2	19 3/4	Pine
❑ 1	Rear stile	3/4	2	18 3/4	Pine
❑ 2	Rails	3/4	2	7	Pine
INTERIOR					
❑ 2	Vertical dividers	3/8	6	23	Pine
❑ 6	Horizontal dividers	3/8	6	16 1/4	Pine
❑ 12	Wide drawer fronts	3/4	2 1/2	5 3/8	Pine
❑ 6	Narrow drawer fronts	3/4	2 1/2	3 1/4	Pine
❑ 2	Wide lower drawer fronts	3/4	4	5 3/8	Pine
❑ 1	Narrow lower drawer front	3/4	4	3 1/4	Pine

of the carcase. This 1/2" lip creates the opening for the door. Before you attach the battens, make sure their position works with the hinges you have purchased for the door. If the hinge leaf is wider than 1/2" you have to shift the battens forward a little on the case so the hinge can open and close.

All the battens are attached with brads and glue.

Mitered Door

With all the battens attached, you can determine the final sizes of your rails and stiles for the frame-and-panel door. The corners of this light-duty door are joined by miters that are glued and nailed, just like the original.

When I cut miters, I saw them first then trim them to a perfect length and a perfect 45° with a miter shooting board and a handplane.

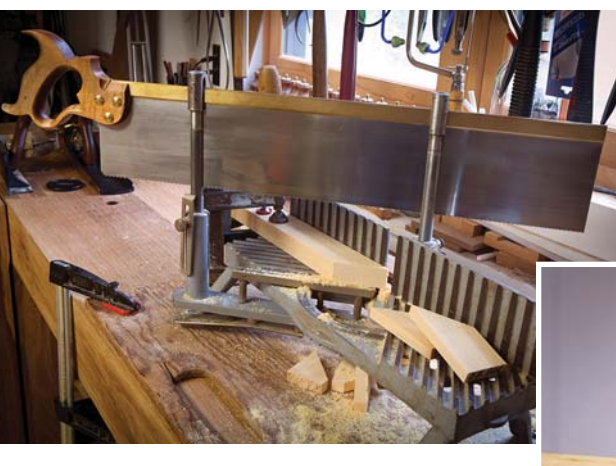
Even if you love your chop saw, I encourage you to give this a try sometime. I've found no easier way to cut perfect miters. By shooting the miters with a handplane you can control the length of your rails and stiles in .001" increments. And you can hit dead-on 45° with ease.

Once the miters are cut, plow a 3/16"-wide x 3/16"-deep groove on the inside edge of the rails and stiles. The 3/8"-thick panel fits into the groove thanks to a rabbet cut on all four edges of the panel. Be sure to size the panel so it has a little room for expansion and contraction in its width.

I don't own any fancy clamps for gluing mitered corners – most band clamps are fairly frustrating to use – so I glue up miters, corner by corner.

First I spread a little glue on the two mating surfaces of the miter and let them dry for a minute. Then I add more glue to the joint. I press the two pieces together and drive a single nail through the stile and into the rail.

I repeat this process for each corner (don't forget to slide the panel into the frame before adding the last piece). Then I clamp up the joints using four ordinary bar clamps. The nails prevent the miters from sliding as you apply pressure at the corners.



Inaccurate. *The 45° setting on my iron miter box is off by about half a degree. But I don't mind. That's because I shoot my miters, which allows me to sneak up on the perfect length and angle.*

Nail the miters. *A single nail through the stile and into the rail prevents things from sliding around as you clamp up this mitered joint. This was, by the way, how the original door was assembled.*

21 Drawers

Because this is a cabinet for nails, it's appropriate that the drawers are nailed together. All the drawers are constructed in a simple manner: The front and back are captured by the sides. The bottom is then nailed on.

The drawers look a little odd – the end grain of the sides and bottom is visible on the drawer front. But they are acceptable for a piece of shop furniture – and the drawers in the original have survived many years of use.

Begin by fitting all the drawer parts for each opening. I try to do as much fitting as I can before assembly. This usually means the drawer will require little or no tweaking after assembly. First I fit each bottom to its opening. Then I fit the sides, front and bottom. Then I begin assembling the drawer.

To do so, place the front and sides in position on the bottom. Feel if the drawer front needs to be reduced in length so the sides are flush to the bottom. If you need to trim the drawer front, trim the back by the same amount.

Glue and nail the sides to the front. Then glue and nail the back to the sides. Finally, glue and nail the bottom to the drawer. Fit each drawer to its opening, numbering the drawer and its opening as you go.

Hardware & Finish

As on the original, I used bin pulls for the larger drawers and knobs for the smaller drawers in the center. To ensure I got the bin pulls located correctly, I made a quick drilling jig that I clamped to each drawer front. The jig ensured I didn't make a layout error.

The knobs are located dead center in the fronts of the smaller drawers.

Were I to make changes to this cabinet, it would be with the hardware. While I like the bin pulls, it would be more helpful to have pulls like an old library card catalog; the card could tell you what type of fastener is inside the drawer.

To solve this problem, Roy simply

SUPPLIES

Lee Valley Tools
leevalley.com or 800-871-8158

1 ▪ knob, 17mm x 15mm
#01A0517, $2.10

1 pair ▪ fixed-pin butt hinges
#00D0302, $20.40/pair

7 ▪ flat knobs, 1 1/4" x 1"
#02W3022, $3.30 each

14 ▪ shell pulls, 3 1/8"
#02W3026, $4.15 each

Prices correct at time of publication.

Begin with the bottom. *Get each bottom board to slide in and out of its opening before sizing the other drawer parts. If the bottom binds, the assembled drawer will bind.*

Glue the bottom. *Because the parts are all softwood, which doesn't move much once it's dry, you can get away with both gluing and nailing this cross-grain joint.*

Too long? *Dry-assemble the drawer to feel if the drawer front is too long.*

Shoot it. *If the drawer front is too long, shoot it to perfect length with a plane on a shooting board. Count your strokes. Then reduce the length of the drawer back by the same number of strokes, provided your original lengths were the same.*

wrote what is in each drawer on the bin pull. I think he did it with pencil – it's almost impossible to see on camera.

Another thought: Add 2" of depth to the cabinet and you can hang hammers, screwdrivers and other accoutrements of fastening and unfastening on the inside of the door.

Install the hinges and knob on the door. I used a magnetic catch to hold the door shut. Because I'm the only person who works in my shop, there's no need for a lock.

I finished the nail cabinet with two coats of garnet shellac, sanding between the coats. The cabinet hangs on my shop wall with a French cleat made from 1/2"-thick material.

And now comes the fun part: Emptying my tackle boxes of nails and screws and putting them into their new drawers, which are located conveniently above my workbench. Oh, and I guess I'll have to look for a picture of a lady and a goat. **PWM**

Christopher is the editor of Lost Art Press and the author of the forthcoming book "Campaign Furniture."

Insurance. *When I have to do something 14 times, you can bet I'm going to make a jig to ensure my mind doesn't wander and cause me to make a fatal error at this stage of the project. This simple jig locates the holes for the bin pulls in the correct place. For the taller drawers on the bottom, I set the jig 3/8" lower on the drawer front.*

ONLINE EXTRAS

For links to all online extras, go to:

- **popularwoodworking.com/feb14**

BLOG: *Read about the fasteners the author recommends for a traditional shop.*

PLAN: *Download a SketchUp model for the Roy Underhill's nail cabinet.*

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4 Ways to Make a Mortise

BY ROBERT W. LANG

A hole is just a hole, no matter how you dig it.

The mortise-and-tenon joint is fundamental in woodworking. Along with the dovetail, this joint has been used for thousands of years. If you judge by the number of devices and methods developed to avoid making mortises, you might think it difficult and demanding. In truth, a mortise is just a square hole.

As with most holes, it doesn't really matter how you dig it. The fundamental elements are the same whether you chop by hand or mill with a machine; confusion arises because it isn't always obvious what is important to make a sound joint in a reasonable amount of time.

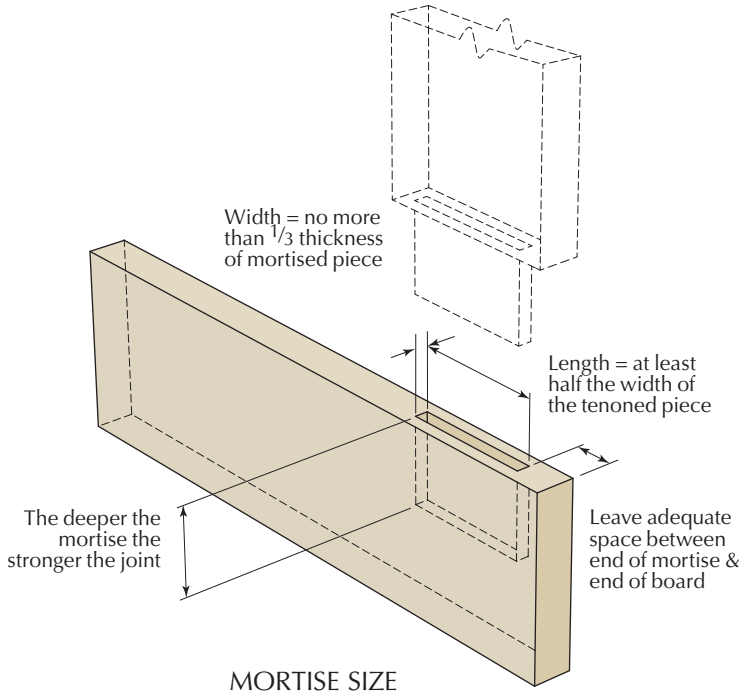
A mortise isn't any good without a matching tenon. If the joint fails it is usually because too little wood is left around the mortise, so it makes sense to let the location and size of the mortise determine the size of the tenon.

The first thing to consider is where to locate the mortise – too close to the end of a board leaves weak grain that can easily break while making the mortise, or when the finished joint is stressed.

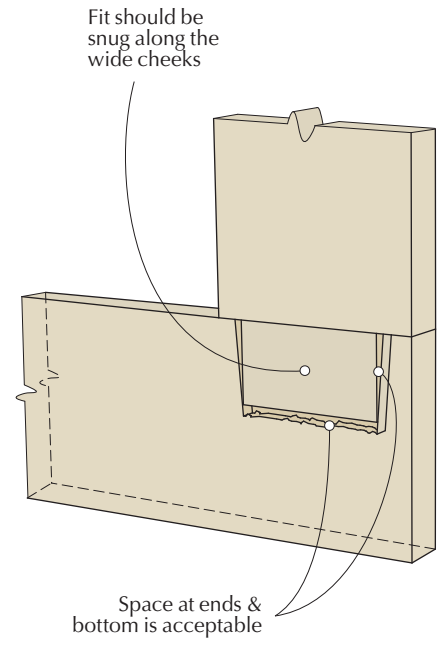
The width and depth of the mortise are equally important. When planning a joint, take no more than one-third the thickness of the mortised piece, and make the mortise as deep as you can. The strength of the joint is mainly a function of how far into the mortised piece the tenon goes.

Through-mortise-and-tenon joints are the strongest, but if you can't (or choose not to) go clear through, two-

LEAD PHOTO BY AL PARRISH; STEP PHOTOS & ILLUSTRATIONS BY THE AUTHOR



MORTISE SIZE



MORTISE-&-TENON CROSS SECTION

thirds the width of the mortised piece is a reasonable target.

That leaves the length of the mortise, or the width of the tenon to be determined. The tenon will be strongest the closer it is to the size of the piece on which it is made. Make the tenon as wide and thick as possible, and at least half as wide as the overall width of the workpiece.

What's Important, What's Not

There are five surfaces in a typical mortise. Two of them need to fit just right for the joint to work. The other three don't much matter.

If you try to make a mortise with a perfect bottom and ends you're wasting time, and asking for trouble. Worry instead about the wide cheeks and make sure they are straight and square, but don't bother to make them perfectly smooth. Extra space beyond the end of the tenon doesn't compromise joint strength and it leaves room for excess glue and bits of debris.

Unless you are making a through-mortise, extra space at the ends will let you adjust the position of the piece and easily take it apart after a test fit.

A good joint can be pushed together by hand pressure and stay together when you lift it by the tenoned piece.

Layout Rules

Whatever method you use to make your mortises, getting them the right size and in the right spot is critical. With machine methods, it is easy to set where the mortise lies in the thickness, and generally the width of the mortise matches the width of your tool, be it a drill bit, router bit or a chisel. Depth is also an easy target, especially if your aim is a bit deeper than the tenon length.

Unless you are setting up for a large production run, it will likely take less time to mark all your mortises and work to your lines. If you accept that the ends don't need to be perfect, you don't need to spend precious time setting stops. Getting close by eye will be faster.

If at all possible, gang parts together and mark them as a group. Prepare a story stick and you need only to measure once. Knife lines and marking-gauge lines might take a little longer to make, but the payoff is in cutting the finished edges before you start to excavate and in providing a path for your tools to follow.

The Mighty Chisel

In recent years it has become fashionable to write about and demonstrate chopping mortises entirely by hand.

Twofer. *Ganging parts for layout ensures that joint locations will be identical, and it saves time. A knife marks a more definite line than a pencil.*

Wheel simple. *A marking gauge defines the finished edges of the mortises and is faster and more accurate than repeated measuring.*

It's a good skill to have, and mortise chisels are great for squaring up the ends of machine-made mortises. But in the end you're digging a hole and no matter how skilled you might be and how nice your shovel is, you're still digging a hole by hand.

There are two steps to making a mortise – removing the waste and tidying up the edges. The mass of a mortise chisel helps considerably, and if the wood is soft and agreeable, you can hand-chop a mortise in a short amount of time. If the wood is hard, or the mortises many, you'll find yourself in the position of your ancestors – wishing for a more expedient way.

After marking out the joint location, there are two general methods for using the chisel to chop out the mortise. The first is to make a cut in the middle area of the space and reverse the direction of the bevel with each cut to create a V-shaped recess. Placing the chisel to start the cut requires some finesse, so this method takes a while.

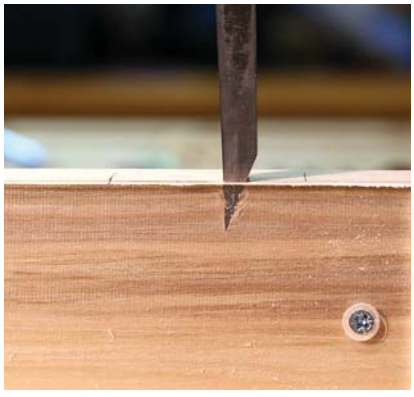
> "Handiwork is no better than machinery if the thing produced be needless and without meaning, and the principle to be established appears to me to be, not the supremacy of the hand over the machine, but the supremacy of the thing that is needed over that which is made more or less as a pastime."
>
> *—Gustav Stickley (1858-1942), Icon of the Arts & Crafts movement*

The other method is to start near an end and make a series of cuts in one direction, then lever out the chips and repeat until you reach the desired depth. When the bulk of the waste is removed, drive the chisel straight down at the ends. If you can keep the chisel from leaning side-to-side, that's all there is to it.

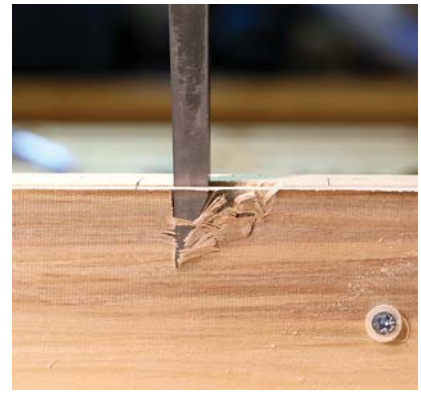
The mass of the chisel helps keep it plumb, if you have a loose grip when you place it. If the business end of the chisel is square, that is another aid to keeping it vertical. And if you position yourself behind the chisel, you will be able to see if it is leaning left or right.

You can tell when the chisel has been driven to an optimal depth by the sound and by the amount of resistance you feel. Pry against the bevel to gain leverage and the back and end scrapes the sides as you remove the waste.

If you don't own a mortise chisel, you can still make a mortise by hand, but you need a lot more patience. The process is essentially the same: Make a series of vertical cuts then lever out the waste. A standard chisel doesn't have the mass to go as deep with each cut.



Size does matter. *The mass of a mortise chisel enables it to drive deeper and remove more wood than a standard chisel.*



Dig deeper. *After the first cut, chips and debris fall into the previous cut, allowing the chisel to go deeper with the same motive force.*

Leverage. *The intersection of the bevel and the back is an effective fulcrum for levering out the waste. The sharp, square end scrapes the edges clean on the way out.*

At the end. *After removing the bulk of the waste, chop straight down at the ends. It's OK if the end cuts are not perfect.*

No Shame in Using a Drill

If you look back in old books about woodworking technique, the use of a drill begins to be recommended right about the time that efficient drill bits became readily available. Again, the method you choose depends on the wood you are working with, the number of mortises you need to make and your desire to get the job done.

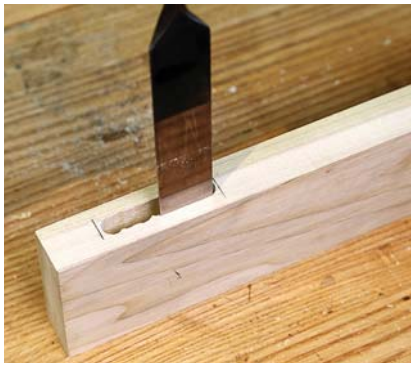
If your mission is to avoid the spouse and kids, get out your brace and bit and drill a hole to the depth of the mortise at one or both ends. That reduces the need for chopping. If you want to be productive, the more wood you can remove by drilling the better – if you have an efficient and reliable way to power the drill.

A drill press, equipped with a fence and a Forstner bit, is ideal. You can use a bit the exact size of the intended mortise, overlap the holes and be confident that the holes are vertical. This reduces the chisel work to easy paring on the side walls and perhaps a couple of cuts on the ends.

If you don't have a drill press, use a hand-held drill with a brad-point bit. Because you won't have the control you

Use a fence. *At the drill press the fence provides for consistent placement of the Forstner bit. Drill a series of holes with a space in between.*

Overlap. *The Forstner bit is guided by its edges and won't wander off course when removing the waste between the first set of holes.*



In the groove. *Incisions from a marking gauge provide a place to locate the end of a wide chisel. When the chisel is in place, little effort is needed to shave off the high spots left by the drill bit.*

Cleanup time. *It takes several cuts to square off the end with a conventional chisel. Position an appropriately sized mortise chisel in a knife line and you can do it with one cut.*

would have with a stationary machine, use a bit that is 1/16"-1/8" smaller than the width of the mortise. As with the chisel, the important thing is to keep the bit plumb side-to-side, and you can easily see that from the end of the mortise.

After drilling you need to pare the side walls with as wide a chisel as you can. If you marked the edges with a gauge or a knife, you will have a defined channel to locate the chisel. Paring is easier than you might think, especially if you excavated the holes with a drill press; all you need to do is shave off the high spots.

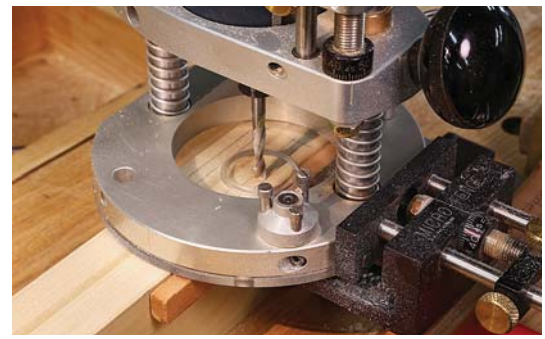
Router & Fence

In theory, the electric router is the ideal tool for making mortises. In reality, it is only if you can wade through the dozens of jigs and complex methods that are available and arrive at an expedient and reliable technique. Most of what you read, however, makes the operation far more complicated than it needs to be.

With a plunge router equipped with a fence and an spiral-upcut bit, you have what you need and can get to work. Remember that the ends of a mortise do not need to be pretty and they do not need to be precisely located. What does need to be precise is the width (the diameter of the bit) and the location (that is controlled by the fence). It is generally easier to bring the router to the work so you can see what you are doing than it is to plunge the work onto the bit at the router table.

If you can keep from tipping the router or biting off more than the router can chew, all you have to worry about is keeping the fence tight to the work. I usually plunge the bit to the final depth at each end, setting the location by eye. Then I waste the material in between with successive passes that increase in depth.

There are limits to what the router can comfortably do. Mortises 1/4" wide and 1" or so in depth can be made with a small router. Beyond that it becomes time for the big-boy router that can be harder to control.



On your mark. *Set the tool to the layout line and avoid the need to measure more than one time. Clamp parts together to provide a stable platform for the router.*

Hole strategy. *Make a full-depth plunge at each end of the mortise, locating the cutter to the layout lines. Then make a series of progressively deeper passes in between.*

Down low. *Clearance between the auger bit and hollow chisel is essential for the tooling to operate efficiently. Don't worry about leaving a ragged bottom.*

First in. *The drill bit does most of the work and leads the way for the chisel to cut the straight surfaces.*

One way out. *Chips are pulled up by the bit and exit through the slot in the chisel. Insert the chisel so the slot is facing forward; if it's sideways, the hole will fill up with chips.*

The spiral bit pulls the material out of the mortise as you go. A straight bit can grind up the wood, but the chips and chunks have nowhere to go.

Routers are also effective for through-mortises in the sides of cases. It's easy to put together a jig to guide the bearing on a flush-trim bit and get precise walls that are square to the surface. Drill a hole to get the bit started (and to remove some of the waste) then square the corners after routing.

Dedicated Mortiser

It's easy to think that a single machine will solve all your problems, at least for a specific task. A hollow-chisel mortiser is an efficient method for making mortises, but the cost of this one-trick pony, in both dollars and in space, can outweigh its usefulness unless you make a lot of mortises on a regular basis.

A benchtop machine, as discussed in "Woodworking Essentials" in the November 2013 issue (#207), will do the job, but not much faster than using a drill press and a Forstner bit. A machine with a moveable table costs considerably more. The benefit is a quantum leap in productivity if you're willing to pay the price.

The performance of hollow-chisel mortisers suffers as the size of the bit and chisel increase. You can fit a 1/2" or 5/8" chisel in a benchtop machine, but a 1/2" square contains four times the material as a 1/4" square and a 5/8" square has more than six times the area.

An inexpensive machine might breeze through 5/16" or 3/8" mortises but give up when you increase the size. You can make mortises larger than the chisel set by making multiple passes.

At the other end of the spectrum, 1/4" hollow chisels and bits can be fragile. There isn't much metal – you can't lean on a gardener's trowel the way you can on a spade. The good part of this is that in most cases you don't need to buy a complete set of bits.

The chisel/bit combination removes the waste and cuts the mortise sides cleanly in one step. Most chisels benefit from a bit of sharpening. Make the outside smoother and touch up the inside with a diamond cone. Honing to fine grits makes the outside look nice, but doesn't add much benefit.

As the bit chews up the wood inside the mortise, the chips must move up through the chisel to escape. Leave enough of a gap to provide room and give the bit a head start on the chisel. If the machine makes a chattering noise or starts to burn, the bit is set too close; it's choking off the escape route for the waste.

The best practice for making mortises with a hollow-chisel machine is to make a series of square holes with a space in between. After defining both ends of the mortise, come back through and remove the material that remains. Both the chisel and the bit follow the path of least resistance and bend into an open space next to the cut.

Adjust the Tenon

Mortises are straightforward to make, and if you don't get caught up in the minutiae of making them perfect at the ends or bottom, they don't take long to create. Adjusting the size of a completed mortise is another story – you're trying to make fine adjustments inside a narrow hole.

Tenons, on the other hand, are much easier to tweak – mainly because you can see what you are doing and have access to the work. If your skills in mortising make the size unpredictable, wait and cut your tenons to fit. Err on the size of a slightly big tenon then adjust it until you get a decent fit. **PWM**

Bob is executive editor of Popular Woodworking Magazine *and the author of "Shop Drawings for Craftsman Furniture," among other books.*

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THE *Mercer Museum*

BY CHUCK BENDER

A visionary's concrete castle contains a generous slice of pre-industrial life.

Walking through the entrance of the Mercer Museum isn't quite what one would expect from one of the United States' most complete collections of 18th- and 19th-century tools. "Contemporary Spartan" seems a more fitting description, due to all the glass, polished stone and open space. Once you move through the entry and into the castle that is the museum, that all changes.

Henry Chapman Mercer was born in 1856. It was an extraordinary time and Mercer was an extraordinary man. The Victorian era was in full swing when Mercer was born, and as he grew up he saw the massive changes the Industrial Revolution brought to every aspect of life.

Just as a visitor moving from the entry into the museum is struck by the stark contrast, Mercer's life and philosophy reflect a similar change. As a youth he traveled frequently with his mother and his aunt throughout southern Italy and the Middle East, but it wasn't until after he graduated from Harvard and the University of Pennsylvania that he developed a true appreciation for those cultures.

Mercer chose to travel, recreating the trips he took as a child, rather than use his law degree. During those travels people continually captured his attention. He studied them, their ancient cultures, history and implements. More important, he began to collect examples of the early cultures' art and material objects. Mercer was fascinated by people and the implements that made their lives more productive and rich.

Upon returning home to Doylestown, Pa., Mercer's interest in early culture continued as he began seeking evidence of prehistoric cultures in the Delaware Valley.

The Mercer Museum. *The old adage says "A man's home is his castle." For Henry Mercer, his castle is both a home and museum.*

Woodworking shop. *Mercer did his best to preserve as much of pre-industrial life as possible. In the woodworking shop this means there's an abundance of tools on display.*

LEAD PHOTO COURTESY OF THE MERCER MUSEUM; OTHER PHOTOS BY THE AUTHOR

Saws & more. *The woodworking shop at the Mercer Museum is chock-full of examples of saws, planes, chisels and more.*

Moulding time *This is just one of the tool chests in the woodshop at the museum; this one is filled with hollows and rounds, as well as complex moulding planes.*

Files & rasps. *As the production of files and rasps became mechanized, the tools for making them by hand slowly faded from existence.*

Open hearth. *Tinsmiths, blacksmiths and ironmongers all slowly gave way to factories that changed everything – including how the evening meal was cooked.*

Archeology was the fashionable new science, and Mercer managed to get seriously involved. Because of his social status and wealth, he was able to join several archeological expeditions. He became so engrossed with the new field of study that he wrote several scholarly books on the subject, including "Ancient Carpenter's Tools." Mercer made his avocation a career when he agreed to manage the Free Museum of Science and Art (now the University of Pennsylvania Museum) in 1891.

Two years later, Mercer became the curator of the Department of American and Prehistoric Archeology at the Academy of Natural Sciences in Philadelphia. After a few years of clashing with a co-worker and a shift in his interests, Mercer left the Academy to focus on the Bucks County Historical Society – an organization he had helped found some years before. It was at this time that Mercer's focus changed from an interest in prehistoric to historic culture in the Delaware Valley.

A Time to Gather

Mercer traced his interest in the artifacts of the recent past to a very specific time in his life:

"It was then probably one day in February or March of the Spring of 1897 that I went to the premises of one of our fellow-citizens, who had been in the habit of going to country sales and at the last moment buying what they called 'penny lots'…," he wrote in "On Collecting Pennsylvania Artifact in 1897."

Mercer goes on to discuss what he discovered in these "valueless masses" of obsolete utensils or objects: "Old iron or kindling wood, things which fortunately have been preserved among us for two noteworthy reasons, first because of the existence in our country of several of these unthanked and non-mercenary hoarders, and second because of the abundance of wood and consequently of outbuildings, such as are lacking in Europe, adapted to the preservation of perishable heirlooms."

His initial goal was simply to find a pair of iron tongs, "but when I came to hunt out the tongs from the midst of a disordered pile of old wagons, gum-tree salt-boxes, flax-brakes, straw beehives, tin dinner-horns, rope-machines and spinning wheels, things that I had heard of but never collectively saw before, the idea occurred to me that the history of Pennsylvania was here profusely illustrated and from a new point of view." While perhaps difficult to parse, his words help to illustrate his specific collecting mania, which became the basis of his museum.

From that point forward, Mercer focused on collecting examples of the tools and implements that helped the local culture survive. He believed that

industrialization signified the end of many ways of life, so it was foremost in his mind to attempt to preserve those objects that both shaped and defined the culture.

A Time to Create

Mercer's wish to preserve the past was not limited to its implements. He wanted to also preserve methodologies and products after recognizing how industrialization had driven many trades into near extinction.

Mercer's interest in reviving the craft of redware pottery, for example, drove him to explore old methods and recipes for glazes. His first attempts at pottery were dismal failures. So he turned to making redware tiles, and developed his own methods for producing tiles that were "cheap enough to sell and artistic enough to rival the old ones," he wrote.

In 1899, Mercer started the Moravian Pottery and Tile Works and a year later his tiles were highly sought after in the Philadelphia area.

Abstract to Concrete

As Mercer's tool collection gathered mass, he decided there was a need to present his vast array of objects in a way that seemed both relevant and logical. He had exhibited his collection at the Bucks County Courthouse, but wanted something more permanent. After his uncle lost a valuable collection of armor to a fire, Mercer decided to create a museum that could not succumb to the same fate.

Beginning in 1908 with the first of three concrete structures, Mercer embarked on an eight-year journey to create suitable structures to house himself, his work and his collection. Work began first on Fonthill, his home.

Mercer, his staff of eight workers and one horse built the house from the interior outward, one room at a time. They formed, reinforced and poured each room bringing it to full completion before beginning the next room. In the end, the crew created a 44-room castle. Next came the pottery works.

In 1913, they began work on the castle that would become the Mercer Museum. Three years later the museum was complete. A collection of rooms and alcoves designed to show its contents in context, the museum is as unique in its content as it is in its presentation.

Fill it & They Will Come

With the completion of the Mercer Museum, Mercer's collection of more than 30,000 objects could be displayed. It took approximately 6,500 tons of concrete spread out over six stories to create displays for more than 60 trades.

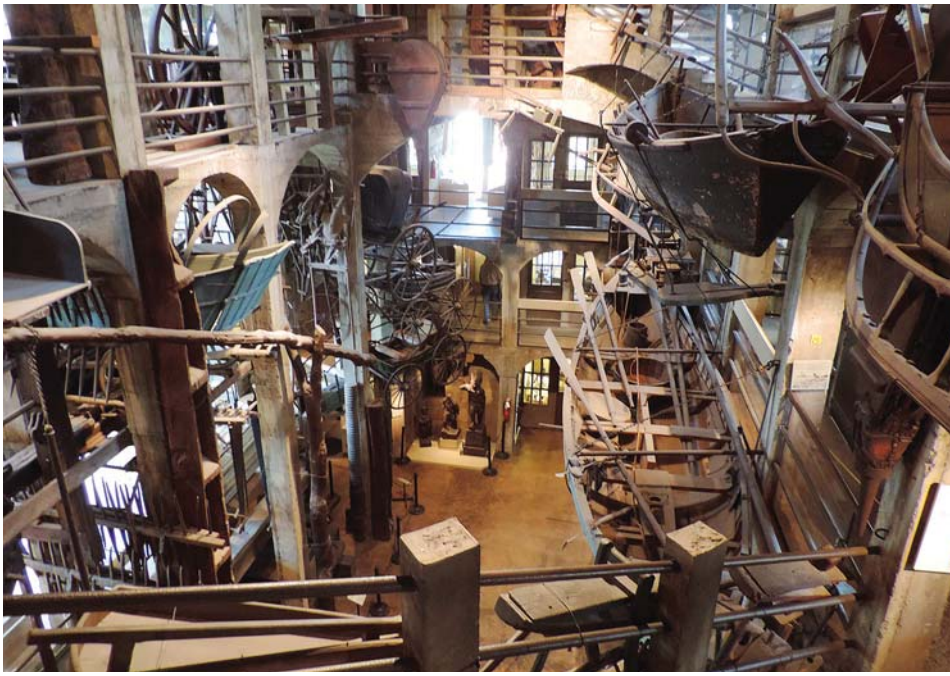
> "The Mercer museum is the only museum worth visiting in the United States."
>
> —*Henry Ford (1863-1947), American industrialist*

When you look at photographs of the interior of Victorian homes the word "abundance" comes to mind; people of this era tended to decorate every inch of every surface. Why have one painting on a wall when you can have five or 10? When you walk from the entry hall into the actual museum, you are instantly struck by the sheer amount of stuff.

So many tools and artifacts line every wall and walkway that it's hard to believe there's any order to the chaos. It is only after you begin to explore that you realize there is a subtle logic. The trip truly takes you inside the mind and life of the museum's maker.

When Mercer first decided to create a museum the idea was to preserve as much of the pre-industrial culture as possible. Mercer did more than his share. The museum is a wondrous place chock-full of tools and items from every imaginable trade, but it's not just the

Heaters. *Firebacks were manufactured throughout the 18th century to help reflect and hold the heat from the household fire. The Mercer has one of the largest collections in existence.*



Messy mezzanine. *The Mercer Museum is a six-story castle with an enormous mezzanine at the center. To house and display the collection, Mercer hung as many objects as possible from the structure, including carriages and boats.*

tools. There are examples of the actual products in the collection as well.

When Mercer decided to show something, it was as complete an attempt as possible. Take clock making for example: Not only did he show the tools used to make the clocks, but you'll find examples of the clocks on display as well. This is true of many of the trades represented. Turners, carriage makers, musical-instrument makers and turpentine producers are all represented (amongst dozens of others).

Many of the displays are small rooms – sealed with glass – that represent the entirety of a single trade. There's a room, for example, that contains the benches and tools of the file- and rasp-making trade alongside examples of the finished products. It gives you a sense of how a craftsman might have worked, not just a display of his tools. There is context. That makes all the difference.

Drawknives. *In typical Victorian style, the walls of the woodshop are decorated with tools of all sorts covering nearly every open space.*

General store. *As life became modernized, the local general store gave way to large department stores that no longer sold handmade items from local craftsmen, but sold mass-produced items from distant factories.*

Blanket chest. *While the focus of the Mercer Museum is primarily on the implements of pre-industrial life, there are a few examples of early furniture including a few paint-decorated chests.*

Don't get me wrong – there are plenty of displays with tools and artifacts. Not everything can shown in context; there's just too much.

The woodworking tools display is one of the larger ones. There's a complete shop setup on the fifth floor; shaving horses, lathes and benches arrayed with tools and clamps abound. The tools, however, are not strictly limited to the woodworking shop.

There are shaving horses hanging from the sides of the staircases, and a complete up and down sawmill suspended between two floors in the atrium. Displaying a sawmill in this manner allows the visitor to see it from many points of view, most of which would not be possible in the normal way of setting up a mill.

Moravian pottery & tile works. *Mercer's attempt to revitalize redware production led to the creation of a pottery that specialized in decorative tiles. This fragment is one of Mercer's highly sought after tiles showing the woodworker at work.*

The six-story atrium is a hodgepodge of items from well pumps to carriages to farm implements to cradles hanging from the ceiling. There is an entire general store in the museum, as well as an open-hearth kitchen that's overflowing with items related to food preparation.

Walking from the stark contemporary entry hall into the museum was, for me, a bit of a culture shock. Once inside, however, I began to understand the connection Henry Mercer had with the people who created such wondrous things by hand, and how he saw industrialization destroying something unique in human history.

For the person who is fascinated by tools and all things mechanical, the Mercer Museum is treasure-trove – and to fully take it in, it must be visited more than once. **PWM**

Chuck is the senior editor at this magazine. He can be reached at chuck.bender@fwmedia.com.

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Mighty Router Planes

BY MEGAN FITZPATRICK

This powerful precision tool belongs in every woodworker's arsenal.

If you're a woodworker who prefers to plug things in, you know there are still at least a few hand tools you need. And when it comes to planes, you likely have a block plane in your toolbox. I, however, think a router plane is of at least equal importance. It can do things that no other tool – hand or power – can. Don't believe me? Take a look at the contents of a patternmaker's tool kit. These precise woodworking professionals had router planes in numbers second only to chisels.

While the router plane shares the first part of its name with a power tool, the two work quite differently. A router plane roots – like a pig hunting for truffles – by getting under the wood to be removed and lifting it out. An electric router works like a small spindle moulder (shaper), spinning a bit that shears the wood away.

And while the two at times perform the same function – for example, cutting a dado – the router plane does it with more precision. But before we get into what the router plane is good for, let's take a quick look at the history and forms of this powerful hand tool.

History

The earliest router planes (and at the time they were simply called "routers") were actually more of a scraping tool, with a straight, toothed blade set at an angle, secured by a wedge through a hole in the wooden stock.

> root (v.) "dig with the snout," 1530s, from Middle English *wroten* "dig with the snout," from Old English *wrotan* "to root up."
>
> —*Online Etymology Dictionary*

Large, small & shop-made. *The large router plane at the top is a "vintage" Veritas (newer models have a more robust depth-stop mechanism); the small open-throat router plane is from Lie-Nielsen. The wooden D router plane was made by my grandfather.*

The next iteration – which is easily made in your shop – is the "hag's tooth" or "old woman's tooth"; it retained the shape of its forebears but with an L-shaped blade secured at 90° to the handle by a wedge.

Today, you can buy (or make) what is – post-political correctness – known as a D router plane (due to the shape of the stock), but the blade is typically secured through a metal collar with a wing nut rather than with a wedge through a hole in the wood. While these wooden-stock planes work, it's difficult to make fine adjustments to the blade (that requires perfect hammer taps), the stock can get in the way of seeing what you're doing (and precludes working in tight quarters) and there is typically no depth stop.

Enter the metal planes. The most common is the Stanley No. 71 (and a bit later, the No. 71 1/2), which first appeared in the late 19th century (you'll also find them by other makers). These planes adjust with a wheel and all but the earliest version included a plate to close the throat in front of the blade (more on that to come), which attaches to a depth-gauge rod. Note, however, that the depth gauge doesn't work well, so it's really more of a "depth suggester."

LEAD PHOTO BY AL PARRISH; STEP PHOTOS BY CHRISTOPHER SCHWARZ

Stanley No. 71. *An early metal router plane was the open-mouthed Stanley No. 71. All but the first versions included a post to which a plate could be attached to close the mouth; the post can be used as a depth stop… of sorts.*

Modern Router Planes

Modern metal router planes (the large ones) have vastly improved depth stops; they actually stop the blade from cutting when it reaches the specified depth, which means you can return over and again to the same setting.

Modern small router planes adjust more like their traditional brethren – that is, with the tap of a hammer, and there is no depth stop (though Lie-Nielsen has a stop collar in the works).

So do you need both sizes? I think so. Small router planes can get in places large ones can't, and can be more easily balanced on narrow workpieces (think hinge gains on doors); large ones remove stock more quickly and have the necessary mass to do it. Using a small plane to clean out the bottom of a large dado is akin to emptying a gallon jug with a teaspoon.

Both Veritas (Lee Valley's manufacturing arm) and Lie-Nielsen offer router planes in both sizes, as well as specialty blades. Let's take a look at some of the differences between them.

The standard blade for both makers' small planes is 1/4". The Veritas large router plane comes stock with a two-piece 1/2" blade (some argue this makes it easier to sharpen) for which you can buy inexpensive replacement cutters. Other sizes are also available, along with pointed blades for working in acute corners (think butterfly patches). There are no additional blades available for the small Veritas router plane.

The Lie-Nielsen one-piece stock blade for its large plane is 3/8", and there are no other blades currently available (though I'm told some soon will be). A pointed blade, however, is available in both 1/4" and 3/8" for the Lie-Nielsen small router plane, and there's an optional blade adapter that allows you to use the blades for the small plane in the large body.

In any case, the stock blade is what you'll likely use 99.9 percent of the time.

The Veritas router planes are available only as closed-throat models; Lie-Nielsen offers a choice of open or closed on both sizes. Why might that matter?

Open throats give you more visibility (for grounding the backgrounds of carvings, for example), but don't work well on edges. You can, however, bridge the open throat with a shop-made base attached by screws through the fence-attachment holes.

And about that fence (that I've never found cause to use) – it comes standard on the Lie-Nielsen but is an (inexpensive) accessory on the Veritas.

I've used both makers' large router planes extensively, and they both work well – and they both cost about the same ($140 for the Lie-Nielsen, $149 for the Lee Valley).

So perhaps it comes down to the shape of the handles; the Lie-Nielsen handles are at 90° to the tool (like on the Stanley No. 71); the Veritas handles are approximately 30° off vertical. Your best approach may be to see how each feels in your hand – but I honestly haven't a preference.

There's another option, though, if you're in the market for a large router plane: Buy a Stanley No. 71, which is readily available on the used market – particularly if you're not concerned about the condition of the blade or blades and the (not terribly useful) fence – for around $25-$30. The blades on used router planes are often skewed because of faulty sharpening; getting them back to square isn't worth the hassle. If that's the problem, buy a new blade from Lee Valley; they fit.

When it comes to the small router plane, though, I do have a preference for the Lie-Nielsen. Not only do I like that the body is shaped to make finger placement a no-brainer, I prefer the square post of the blade; it doesn't turn in use like the round-post blade on the Veritas can (which can be "fixed" by grinding a small flat). At $80, though, the Lie-Nielsen small router plane costs $25 more than the Veritas tool.

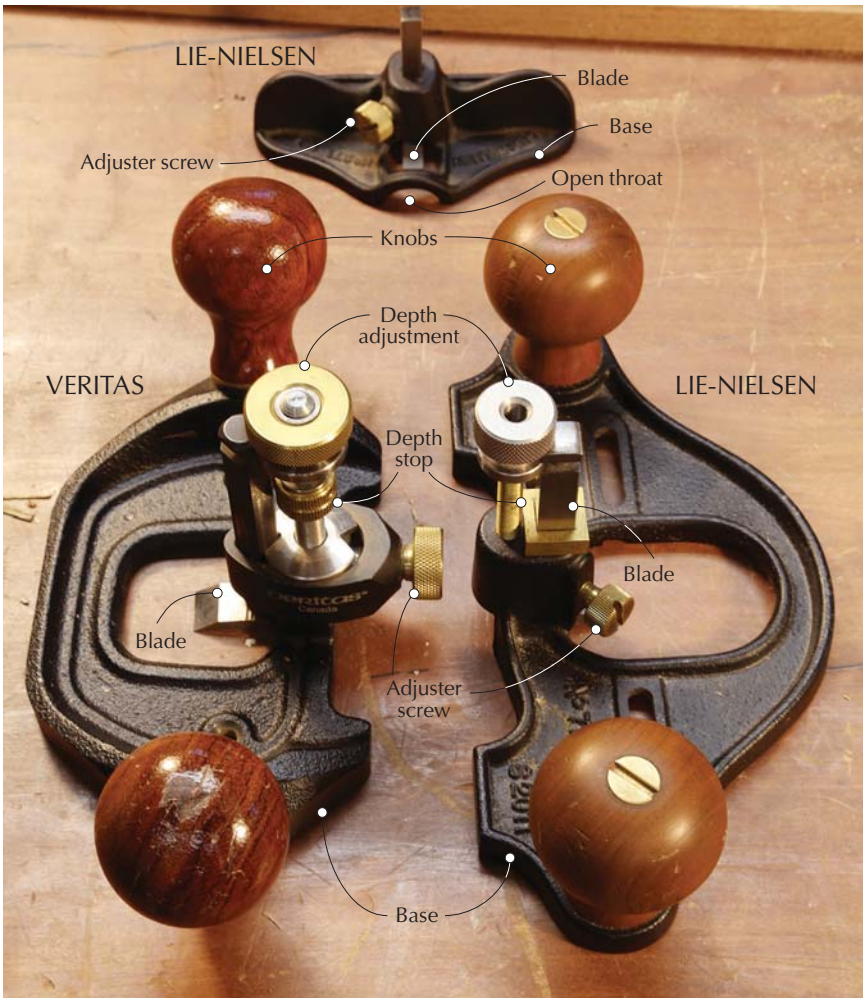
Stay sharp. *Instead of sharpening the blade's bevel (the traditional approach), I was taught to keep my router planes in good working order by sharpening the cutting edge of the back (using the "ruler trick"), then removing the burr on the bevel. No, it doesn't result in a violation of the clearance angle, and it works.*

What's it Good For?

So now you know a bit about the router planes available and some of the differences between the two most common metal versions you can buy new. But

Router plane blades. *The two-piece V-shaped and straight blades are from Veritas (as is the narrow one-piece blade); these also fit Stanley router planes. The single-piece pointed blade is for the Lie-Nielsen small router plane.*

ANATOMY OF A ROUTER PLANE



why do you even need a router plane?

While my uses below barely scratch the surface, here are some common operations for which I turn to this tool.

On occasion, I'll cut dados at the table saw using a dado stack. If you've done this, you know the bottom is never quite flat. A router plane makes quick work of flattening it – even if the workpiece itself is a warped. And if you cut dados by hand, chisels remove most of the waste, but a large router plane is the right tool for taking it to the ideal depth.

For hinge gains and other hardware applications, for me, there's no tool more more precise and less fraught. (Sure, you can use a powered router, but I feel better using a tool far less likely to spin quickly out of control – especially when the project is almost done.) Score the extents of a hinge gain with a knife or cutting gauge, chop out the bulk of the waste, then cut it to perfect depth with a router plane.

Do you need to tune up your tenons? With a router plane, you can quickly and easily remove material in thousandths of an inch increments – and remove it equally from both cheeks.

If you do any relief carving, a router plane is great for grounding the background to a precise depth.

And more.

If you told me I could keep only one joinery plane, there is no question that I'd choose this tool (but I'd fight you to keep both sizes). **PWM**

Megan is the editor of this magazine. She can be reached at 513-531-2690 x11348 or via e-mail at megan.fitzpatrick@fwmedia.com.

Smooth bottom. *A router plane makes quick work of leveling a bumpy bottom left by a dado stack.*

Precision work. *Set the plane's blade depth directly off your hardware, then use it not only to remove material at the perfect depth, but as a marking gauge to score the bottom of the hinge gain.*

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Taming the Table Saw

There's no need to fear the most versatile machine in the modern shop.

There are good reasons that the table saw is at the center of many shops. This machine revolutionized the way we make things. And in recent years, it has become the center of controversy on two fronts: safety and accuracy. There is a lot of money to be made scaring woodworkers about table saws, both in manufacturing and in the media.

There has long been a disconnect between the way table saws are used in real life, and the equipment that comes with saws to keep us safe. Also, there is a lot of confusion about techniques for safe operation. Understanding and managing risks is vastly different than operating out of fear.

The first thing to understand about the table saw is that it is indeed capable of inflicting a life-changing injury in the blink of an eye. (There are many other things in our daily lives with equal or greater potential for disaster.) The key is understanding what happens when you flip the switch and push a piece of wood into the spinning blade. It isn't magic; it's physics. Even though wood as a material varies from piece to piece, what happens is predictable. If you understand and control the physics, you can work accurately and safely.

The most frequently reported accidents at the table saw (and the most preventable) are the result of the operator not paying attention and coming into contact with the blade. If you can't focus on what you're doing while you're doing it, you probably shouldn't use a table saw. If you fit that description, you probably shouldn't drive, either.

Think ahead. *Small pieces (and large ones) can be cut on the table saw safely and accurately.*

What to Worry About

The rising teeth on the back of the blade are perfectly placed to throw wood back at the operator. If the operator loses control, any wood between the spinning blade and a fixed object (most often the saw fence) or any piece that comes into contact with the back of the blade can go flying at a high rate of speed. This (kickback) is the second-most often reported type of injury.

The piece of wood being cut, or a recently cut scrap, takes off and a hand goes with it, often making contact with the blade. A riving knife guards the back teeth and virtually eliminates the risk of kickback. If your saw has a

Trapped. *Wood caught between the fence and the rising teeth of the blade is likely to be thrown back toward the saw operator.*

CONTINUED ON PAGE 60

LEAD PHOTO BY AL PARRISH; STEP PHOTOS BY THE AUTHOR

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CONTINUED FROM PAGE 58

riving knife it should always be in place.

Guarding the front half of the blade is simple for some operations but nearly impossible for others. Most saws in the United States have guards that get in the way when they are most needed. Giving up control of the work in order to use a guard doesn't increase safety.

Real-world Solutions

Guarding systems have gotten better in recent years, but there is still room for improvement. If you can use the guard you should – but what about the numerous operations where the guard gets in the way? The key is to use a method that keeps your hands at a safe distance and maintains control of the work through the entire operation.

For safe and accurate rip cuts, pressure needs to be directed both to the end of the board (to move it into the cut) and toward the fence. If the edge that has just been cut drifts back toward the blade, kickback is likely.

While you want to keep the pushing hand as far from the blade as practical, if that hand is near the center of the board, or slightly to the blade side, you have leverage to keep the far end tight against the fence through the entire cut.

If you push a wide piece with your hand or push stick close to the fence, you not only lose the leverage, you increase the chance of the board drifting toward the blade after it is cut. When the work is narrow, use a push stick – but don't give up control.

Most push sticks are effective for keeping your hand at a distance but don't give enough control over the piece being cut. The type of push stick shown at right has extra material ahead of the hook; it provides leverage to hold the work down as well as motive force against the back end.

With any push stick, things get riskier when the work gets the same size or smaller than the stick itself. It's OK to run the push stick through the blade if you do it in one smooth motion as you cut wood. Don't sacrifice the work or your safety by removing the push stick or shifting it sideways in the midst of a cut.

For even more control over narrow pieces, make a push block that rides along the saw fence. The piece on the blade side of the fence can be replaced as the hook erodes from contact with the blade. The distance from the tabletop to the bottom of the notch should be close to, but slightly less than the thickness of the material you are cutting.

Down and forward. *This type of push stick holds the work down to the table as well as pushing it into the blade.*

No help. *Pushing stock from near the fence tends to move the opposite corner into the blade, inviting kickback.*

Into the fence. *Pushing from near the center of the board increases leverage and keeps the leading edge of the material tight to the fence.*

One Hand Washes the Other

Accuracy and safety go hand in hand because the techniques required for precise work improve both control over the piece being cut, and awareness of where the blade and the hands are at all times during operation.

The great advantage of the table saw is accuracy and repeatability. If you don't want to fiddle with the size of each part of each joint when you make something, this is a game changer. But for accurate cuts to be made again and again there are a couple of conditions to meet, and you want to maintain control over the workpiece before, during and after every cut.

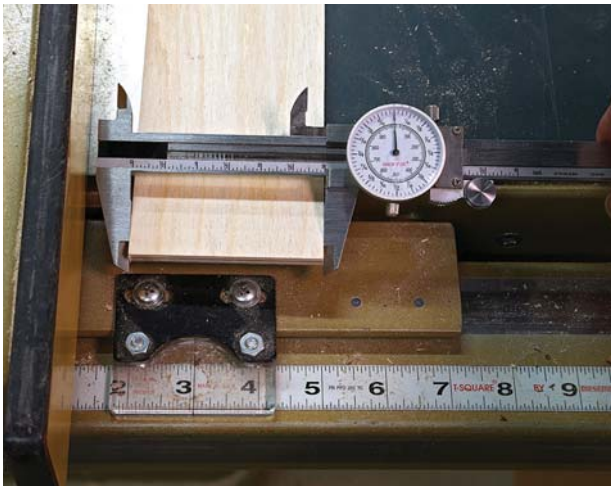
The first thing to do is to make sure that things that are supposed to be square are square, and that things that are supposed to be parallel are parallel. If the fence is leaning in toward the blade it sets up a situation that makes it easier to trap a piece between the fence and the back of the blade.

Good stock preparation is critical. If all the long edges and faces of your material are straight and square before you turn on the table saw, you won't have to worry about twisted pieces drifting

Ride the fence. *A pusher that straddles the fence (along with a zero-clearance insert) makes it possible to rip thin pieces safely.*

On the mark. *A sacrificial board attached to the miter gauge makes it easy to align marks to the path of the blade.*

away from the fence or wobbling while you concentrate on making a cut. The quality of your work will improve and the odds of an accident will go down with straight, flat and square stock.



Worth the effort. *Calibrating the scale on the saw fence and an overall tune-up ensure that accurate cuts are made on a regular basis.*

Zero In

A zero-clearance insert is also a good idea, both for safety and accuracy. The saw cut in the insert is useful for locating exactly where the cut will be, and for closing off the open space on either side of the blade to keep thin offcuts from catching in that space.

For crosscuts, attach a straight piece of wood to the stock of the miter gauge and run that through the blade. This gives a visual indication of what the path of the blade is, and as long as the cut is fresh it's a more accurate point to align cuts than the blade itself. If the piece is wide enough and long enough, you can clamp stop-blocks to locate repeated cuts, or clamp the work to keep your hands at a reasonable distance.

Despite what some hand-tool gurus may tell you, using a table saw requires considerable skill. Part of that is in careful operation, but most of the skill is in setting up to cut exactly where you intend to cut. To accomplish this you enter into the realm of the machinist.

Don't rely on measuring the distance from the blade to the fence with a tape measure and don't trust a cheap square to set the miter gauge to the blade. Make some test cuts and measure the results. With a pair of dial calipers you can adjust the scale on the fence to within a few thousandths of an inch, and an accurate square is also essential. It takes time to dial in the machine, but the reward is the ability to routinely produce precise cuts.

Don't blame the machine if you don't have the patience, ability or the necessary tools to measure tiny increments or determine if a cut is square.

There is also a learned skill in thinking the process through. Know your own limits and comfort level. If you get a "funny feeling," don't go any further until you are sure of what you are doing. It doesn't hurt to stop and count your fingers before and after you use your saw. **PWM**

Bob is executive editor of Popular Woodworking Magazine *and the author of "Shop Drawings for Craftsman Furniture" (Fox Chapel).*

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Acetone in the Woodshop

This solvent's versatility makes it ideal in many situations.

If you've been shopping at paint stores or in the paint department of home centers for the last decade or so, you may have noticed the increased prominence of acetone among the solvents. There is a reason for this.

Acetone is among the very few solvents that have been exempted as a volatile organic compound (VOC) – an environmental (smog) pollutant. And it is the least expensive one, by far. Acetone is exempt because it has so little reactivity.

Being exempt means there are no regulatory restrictions on how much of this solvent we, or the manufacturers we buy from, use. No other commonly available solvent, except water, is so free of restrictions.

Moreover, though acetone has a noticeable odor (which makes it seem toxic), it is actually a fairly benign solvent in vapor form, limited at low exposure to causing only mild irritation of the central nervous system.

Acetone is especially useful because it is miscible with all common solvents and water, and thus most common paints, finishes and coloring products. So acetone can be added in significant percentages to most coating materials.

Also important, acetone is the fastest evaporating and one of the strongest of all commonly available solvents, and it is very dry (meaning non-oily). So it makes an excellent cleaner and degreaser and this is how it is used in most other industries.

The fast evaporation corresponds, however, to high flammability. A flame or spark can set off an explosion or flash fire if vapors build up enough. You should always work with a good exhaust system if you are using the solvent in significant quantities.

The strength means that acetone can damage or remove most paints and finishes, so you should avoid using this solvent as a cleaner on all but the most solvent-resistant finishes. These include conversion varnish, two-part polyurethane, UV-cured finish and epoxy resin. On oil-based polyurethane, test first and be sparing in your use.

Compliant lacquers. *Manufacturers make lacquer compliant with strict VOC laws, which usually limit non-exempt solvents to no more than 27.5 percent, by adding acetone, which is exempt. These lacquers dry fast and are usually labeled "275 VOC." You can slow the drying by adding ethylene glycol monobutyl ether (butyl cellosolve) to the lacquer. Or you can add acetone to non-compliant lacquer to speed drying in cold temperatures.*

Formulating

Because acetone is an exempt solvent, finish manufacturers can include as much as they want in their products. This is significant because it makes possible the continued availability of many products, especially lacquers and non-grain raising (NGR) dye stains that would otherwise be taken off the market in areas with strict environmental laws.

For example, lacquers require a great deal of solvent (often 75 percent or more) to be sprayable, and NGR dye stains, which used to contain methanol, are entirely solvent. Many areas, including California, limit VOC content in lacquer to as low as 27.5 percent, (275 grams/liter). So there would be no way, or at least no inexpensive way, for lacquers and dye stains to comply if it weren't for acetone.

While this is good for us because it keeps products we use on the market, it changes the application characteristics significantly. Any finishing product that contains a large amount of acetone dries very rapidly.

Fast drying can cause dry spray and blushing (the finish turns milky white) in finishes and toners. It can also cause an NGR dye stain to dry so fast that it doesn't wet the wood enough to bring out the expected color.

You can overcome the often too-fast drying by adding some very slow evaporating butyl cellosolve (also labeled Super Retarder, EB, 2-butoxyethanol or ethylene glycol monobutyl ether), which is widely available from distributors and paint stores that sell to the trade. Be aware, however, that adding anything to the product could take it out of compliance in some areas.

Drying

The fast evaporation rate of acetone can be very helpful in cold temperatures when everything dries slower.

PHOTOS BY THE AUTHOR

Thinning with acetone. *You can thin most finishes with acetone, but test water-based finishes first because some, like the one pictured here, coagulate. Most that I've tested don't have this problem.*

Because acetone is compatible or mixable with most finishes and stains, you can add the solvent to speed drying. Acetone is especially effective with shellac and every type of lacquer. Some water-based finishes, however, coagulate when acetone is added. You should test first in a small jar.

Adding acetone to varnish, oil stains or glazes has less effect on the drying because these products cure primarily by the absorption of oxygen, not by solvent evaporation. The tacky stage may be reached more quickly, but the product still has to go through the longer oxidation process.

Keep in mind that thinning any product results in less build, so you may need to apply more coats.

Removing oily resin. *Acetone is great for removing the oily resin from exotic woods before gluing or finishing. But be careful if several woods are mixed. The solvent can pick up some of the color from the darker woods and transfer it to the lighter woods.*

Cleaning

Acetone is commonly used as a cleaner and degreaser in labs and in industry. It is also used as the active ingredient in fingernail polish removers and as the solvent for removing epoxy and cyanoacrylate adhesives such as Super Glue from hands or other surfaces before the adhesive hardens.

More specific to finishing, acetone is the best cleaner for removing the resinous oils in exotic woods such as teak, rosewood and cocobolo – much more effective than naphtha or denatured alcohol. These oils can weaken the bond of water-based adhesives and finishes, and significantly slow the drying of oil and varnish finishes.

To improve the bonding or drying speed, wipe the surface of the wood with acetone just before applying the glue or finish.

Because acetone is miscible with water, it's also useful for removing residue water from spray equipment when switching from a water-based to a solvent-based product.

And because acetone is miscible with mineral spirits, it's useful for speeding the cleaning of varnish, oil-stain and oil-glaze brushes after the mineral-spirits rinse, but before washing in soap and water. It's the residue from mineral spirits that makes washing so time-consuming, because of the number of washings necessary to remove it.

Of course, acetone is excellent for cleaning spray guns used for spraying any finishing product.

Acetone's solvent strength makes it the most effective solvent for removing masking tape and stickers that have been stuck to a surface for so long they no longer peel off. But the solvent may also damage or remove a finish, so it's usually best to try weaker denatured alcohol or naphtha first.

The solvent strength makes acetone excellent for removing paints and finishes, so it is a common ingredient in paint and varnish removers. Evaporation is retarded by the inclusion of paraffin wax, which rises to the surface of thickly applied remover and forms a barrier. **PWM**

Cleaning brushes. *Many woodworkers use cheap throwaway brushes for varnish and polyurethane because brushes are so hard to clean. Washing with soap and water is much easier if you rinse the brush in acetone after a first rinse in mineral spirits. Suds like these, which indicate the brush is clean, usually appear in the first washing.*

Stuck stickers & tape. *Stickers and tape can become so stuck to a surface that you can't peel them off. Wiping with an acetone-wetted cloth usually makes removal easy, but first try a milder solvent such as naphtha on most finishes because acetone will damage them.*

Bob is author of "Flexner on Finishing," "Wood Finishing 101" and "Understanding Wood Finishing."

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The Downside if Up is Sideways

A nervous woodworker is aghast as his best projects arrive from storage.

The message "Up"(with a directional arrow, no less) seems unambiguous. When displayed prominently on all four of what should be the vertical surfaces of a crate, the intent of the person who went to the trouble to emblazon that simple message, multiple times, is quite clear: The surface at the business end of all of those little arrows should be, always and forever, the top of the crate. So it is written, so it shall be done. Or so one would think.

We recently relocated for the second time in three years. Because the first move was to Europe, many of our belongings had to go into long-term storage. The rest were packed in a trailer that was then loaded on a cargo ship.

As a woodworker, consider the implications of the previous sentence. Some of the pieces into which I'd poured my heart and soul, and blood, sweat and tears, would be stuck in a storage facility out of my sight and control for years; the rest would cross the ocean in a metal box lacking even the most rudimentary climate control. Oh, what hell is this? Take a kidney, but please don't do that to my furniture.

Sometimes in life, we do what we have to do. In 2009, a couple of moving-company estimators showed up at our door. The visit of an estimator is not a particularly significant event for most of us, yet I will never forget the first to arrive. We'll call her Satan. At the appropriate time during our conversation – while standing before my reproduction of the Greene & Greene entry hall table from the Gamble house – I indicated that I wanted a couple of our pieces crated. Satan's reply was the stuff of which nightmares are made: "Your wife's employer won't pay for that. If the table gets dinged, we'll fix it."

I kept my cool. To this day, that fact surprises me. I excused myself and asked my wife to join me in the next room. I then said, none too quietly, "There's no way we are using that company." The choice, however, lay entirely with my wife's employer because it was paying for the move.

To its credit, the company was willing to pay for crates for the Gamble House table and a Greene & Greene-inspired chest I'd designed and built. And we didn't have to use Satan's company. All of the furniture we took with us made it safely across the ocean. We hoped that the pieces in storage, including the crated pieces, were as lucky.

Fast-forward to June 2013 and our return to the United States. On a sweltering day, the movers arrived with the stored goods. It was like Christmas in June. As items came off of the truck, I rediscovered things I'd forgotten we had. Fortunately, I was kept busy checking off boxes on the inventory sheet; otherwise I would have driven the movers crazy constantly asking if they'd found the crates containing the two best pieces of furniture I'd ever made.

Eventually, of course, they did find the crates, near the front of the truck. Because this is a family publication, I won't repeat what I said when I spotted them, both standing on end, arrows pointing sideways rather than up. To their credit, the movers quickly righted the pieces and apologized – though it wasn't their fault; the truck had been loaded by a different crew 1,000 miles away. You can imagine my nervousness as I waited for the specialist to arrive to open the crates, expletives still occasionally issuing from my lips. What became of the breadboard ends? The hanging drawers? The shop-made wooden hinges?

It is said that "All's well that ends well." I don't buy that. Carelessness, neglect, crass disregard – we shouldn't tolerate them simply because the result wasn't as bad as it might have been. My furniture is fine, no thanks to some ham-handed, dim-witted movers in Ohio. But I appreciate the table and the chest even more now – old friends rediscovered and none the worse for wear. **PWM**

David is the author of "Greene & Greene Furniture: Poems of Wood & Light." His latest venture, photography of the Swiss Alps, can be viewed at his web site: thealps.wood-and-light.com/en.

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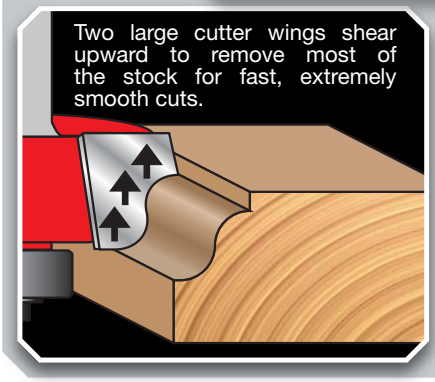

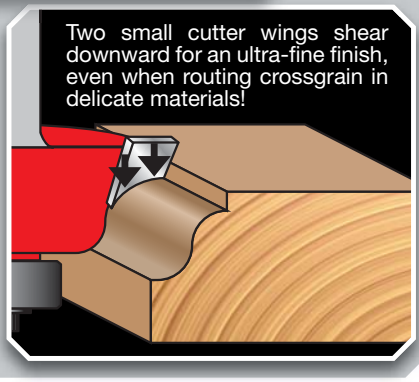

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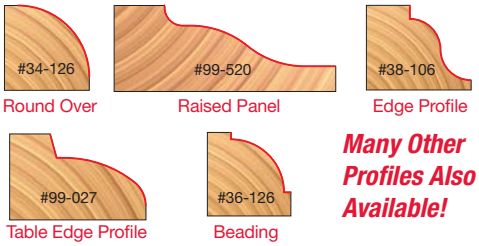

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